User's Manual

Model LL1200
PC-based Custom Computation Building Tool

IM 5G1A11-01E

YOKOGAWA
Yokogawa Electric Corporation

IM 5G1A11-01E
4th Edition

Introduction

This instruction manual describes the functions of Model LL1200 PC-based Custom Computation Building Tool (hereinafter, simply referred to as the LL1200 tool in the main text), which is used with Model US1000 Digital Indicating Controller (hereinafter, simply referred to as the US1000 controller in the main text), and how to operate the tool.

The LL1200 tool consists of the following component tools.

- Custom computation building tool
- Parameters setting tool

This manual focuses exclusively on the custom computation building tool. For details on the handling of the parameters setting tool, see the Model LL1100 PC-based Parameters Setting Tool instruction manual (IM 5G1A01-01E).

■ Intended Readers

This manual is intended for people familiar with the functions of the US1000 digital indicating controller and capable of working with Windows 95/98/2000/XP or Windows NT 4.0, such as instrumentation and control engineers and personnel in charge of maintaining instrumentation and control equipment.

■ Related Documents

The following instruction manuals all relate to the LL1200 tool. Read them as necessary. The codes enclosed in parentheses are the document numbers.

- *US1000 Digital Indicating Controller-Operation* (IM 5D1A01-01E)
  Supplied with the US1000 controller, this manual explains the basic operations of the controller.
- *US1000 Digital Indicating Controller-Functions* (IM 5D1A01-02E)
  Supplied with the US1000 controller, this manual explains the functions of the controller in detail.
- *US1000 Digital Indicating Controller-Communication Functions* (IM 5D1A01-10E)
  An instruction manual for the communication function of the US1000 controller. Supplied with models having the optional communication function.
- *LL1100 PC-based Parameters Setting Tool* (IM 5G1A01-01E)
  An instruction manual for setting the parameters of the US1000 controller from a personal computer. Supplied with the LL1100 PC-Based Parameters Setting Tool or the LL1200 PC-based Custom Computation Building Tool.
- *LL1200 PC-based Custom Computation Building Tool-User's Reference* (IM 5G1A11-02E)
  An instruction manual that describes the functions needed to create US1000 custom computations. Refer to this manual if you are not familiar with the types of functions available or how these functions work. Supplied with the LL1200 PC-based Custom Computation Building Tool.

■ Trademarks

Windows 95/98/2000/XP and Windows NT 4.0 are registered trademarks of Microsoft Corporation, USA.

FD No. IM 5G1A11-01E
4th Edition: Jun. 2004 (YK)

Visual Inspection and Cross-check of Accessories

Visually inspect the purchased product upon delivery to make sure it is not damaged in any way. Store the box and inner packing material of the package in a safe location - they may be needed should the product fail and need to be sent back to the manufacturer for repair.

■ Cross-check of Model and Suffix Codes

Refer to the following table to make sure the model and suffix codes of the LL1200 tool are as specified in your order.

Model Code	Suffix Code	Description
LL1200		Custom computation building tool*
	-E10	Model for use with IBM PC/AT-compatible personal computers

* The LL1200 tool includes the same parameter setting function as the LL1100 PC-based Parameters Setting Tool.

■ Confirmation of the Model and Suffix Codes

Make sure the delivered package contains all of the following items. If any item is missing or found to be damaged, immediately contact the sales office or dealership from which you purchased the product.

- 3.5-in. floppy disks (5 disks)
- Dedicated adapter, supplied with two AAA-size batteries (one unit)
- Dedicated cable (one cable)
- Model LL1100 PC-based Parameters Setting Tool instruction manual (one copy)
- Model LL1200 PC-based Custom Computation Building Tool instruction manual (one copy)-This manual
- Model LL1200 PC-based Custom Computation Building Tool -User's Reference manual (one copy)

Documentation Conventions

■ Notational Conventions in This Manual

This manual uses the following notational conventions.

[ ]:
indicates the name of a dialog box or message, or a view name (name indicated in the upper-left corner of a dialog box.)
Example: • The [Input Block] dialog box appears.

< >:
indicates the name of a command in a dialog box or the name of a tool menu (or a command in the menu).
Examples: • Click the <OK> button.
• Click the <Cancel> button.
• Click the <Input Block> button.
• From the tool menus, choose <File>, then <Open>.

“ ”:
indicates the text typed.
Example: • Type “ABCD” in the <xxx> text box.

NOTE

Draws attention to information that is essential for understanding the operation and/or features of the product.

TIP

Gives additional information to complement the present topic and/or describe terms used in this document.

See Also

Gives reference locations for further information on the topic.

■ Description of Displays

(1) Some of the representations of product displays shown in this manual may be exaggerated, simplified, or partially omitted for reasons of convenience when explaining them.
(2) Figures and illustrations representing the controller’s displays may differ from the real displays in regard to the position and/or indicated characters (upper-case or lower-case, for example), to the extent that they do not impair a correct understanding of the functions and the proper operation and monitoring of the system.

Notices

■ Regarding This Instruction Manual

(1) This manual should be passed on to the end user. Keep at least one extra copy of the manual in a safe place.
(2) Read this manual carefully to gain a thorough understanding of how to operate this product before you start using it.
(3) This manual is intended to describe the functions of this product. Yokogawa Electric Corporation (hereinafter simply referred to as Yokogawa) does not guarantee that these functions are suited to the particular purpose of the user.
(4) Under absolutely no circumstance may the contents of this manual, in part or in whole, be transcribed or copied without permission.
(5) The contents of this manual are subject to change without prior notice.
(6) Every effort has been made to ensure accuracy in the preparation of this manual. Should any errors or omissions come to your attention however, please contact your nearest Yokogawa representative or our sales office.

■ Regarding Protection, Safety, and Prohibition Against Unauthorized Modification

(1) In order to protect the product and the system controlled by it against damage and ensure its safe use, make sure that all of the instructions and precautions relating to safety contained in this document are strictly adhered to. Yokogawa does not guarantee safety if products are not handled according to these instructions.
(2) The following safety symbols are used on the product and/or in this manual.

●Symbols Used on the Product and in This Manual

CAUTION

This symbol on the product indicates that the operator must refer to an explanation in the instruction manual to avoid the risk of injury or death of personnel or damage to the instrument. The manual describes how the operator should exercise special care to avoid electrical shock or other dangers that may result in injury or loss of life.

Protective Grounding Terminal

This symbol indicates that the terminal must be connected to ground prior to operating the equipment.

Functional Grounding Terminal

This symbol indicates that the terminal must be connected to ground prior to operating the equipment.

●Symbol Used in This Manual Only

WARNING

Indicates that operating the hardware or software in this manner may damage it or lead to system failure.

■ **Force Majeure**

(1) Yokogawa does not make any warranties regarding the product except those mentioned in the WARRANTY provided separately.
(2) Yokogawa assumes no liability to any party for any loss or damage, direct or indirect, caused by the use or any unpredictable defect of the product.
(3) Be sure to use the spare parts approved by Yokogawa when replacing parts or consumables.
(4) Modification of the product is strictly prohibited.
(5) This software may be used with one specified computer only. You must purchase another copy of the software for use on each additional computer.
(6) Copying this software for purposes other than backup is strictly prohibited.
(7) Store the floppy disk(s) (original medium or media) containing this software in a secure place.
(8) Reverse engineering such as the disassembly or decompilation of software is strictly prohibited.
(9) No portion of the software supplied by Yokogawa may be transferred, exchanged, leased or sublet for use by any third party without the prior permission of Yokogawa.

Contents

1. Overview

This chapter first explains what custom computation is and then introduces the tool used to configure these computations and the model and suffix codes of the US1000 controller models to which the tool applies.
This chapter also discusses the system requirements that must be met to be able to use the LL1200 tool and shows external views of the dedicated adapter and cable.

1.1 Function Overview of the LL1200 Tool

The LL1200 tool is designed to run on a personal computer connected to the US1000 controller. You can set a variety of functions for the US1000 controller from the personal computer. Inversely, you can read the settings from the US1000 controller.
In addition to these operations, you can set the various parameters of the US1000. This particular function is the same as the one offered by Model LL1100 PC-based Parameters Setting Tool, another tool used with the US1000 controller. This manual does not therefore discuss this function in particular. When you use this function in your practical applications, refer to the *Model LL1100 PC-based Parameters Setting Tool* instruction manual (supplied together with this manual).

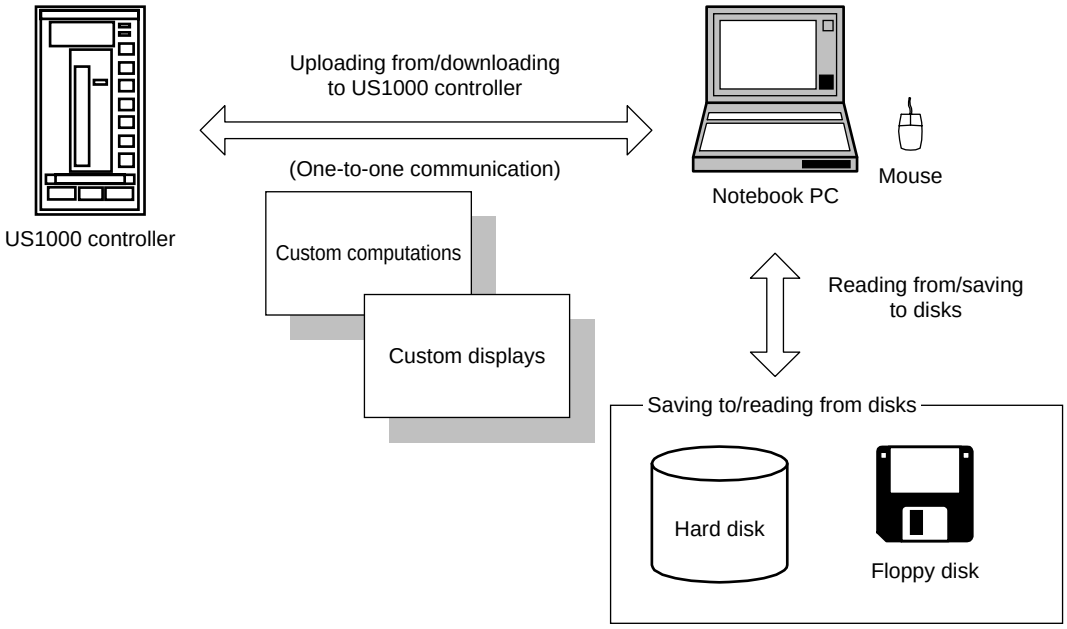

Figure 1.1.1 Conceptual View of LL1200 Tool

The LL1200 tool is designed to run under Windows 95/98/2000/XP or Windows NT 4.0. For details on how to use the personal computer and Windows software, see their respective instruction manuals.

The US1000 controller comes with built-in control functions and various controller modes (US modes) that provide different I/O computing functions. These modes are designed to support their respective control applications. From these choices, you can choose one that best meets your application needs.
In some control applications, however, you may want to execute special computations based upon specific input data or have a contact output of a specific data item in a specific control sequence. To be able to meet these needs, the US1000 controller provides a separate controller mode with which you can freely program your own computations. Computing functions available in these modes are referred to as custom computations.

Custom computations allow you to perform a variety of calculations based on input and output signals. These calculations include not only the four arithmetic operations and logical operations but also ten-segment linear approximations, temperature and humidity computations, temperature-based correction coefficient computations, pressure-based correction coefficient computations, and so on.
For example, you can use the four arithmetic operations to apply the desired type of correction to input signals, or use a logical operation to program a sequencing process that works between input and output contacts.

Custom computations are configured using the given methods of block connection, as shown in Figures 1.1.2 and 1.1.3.

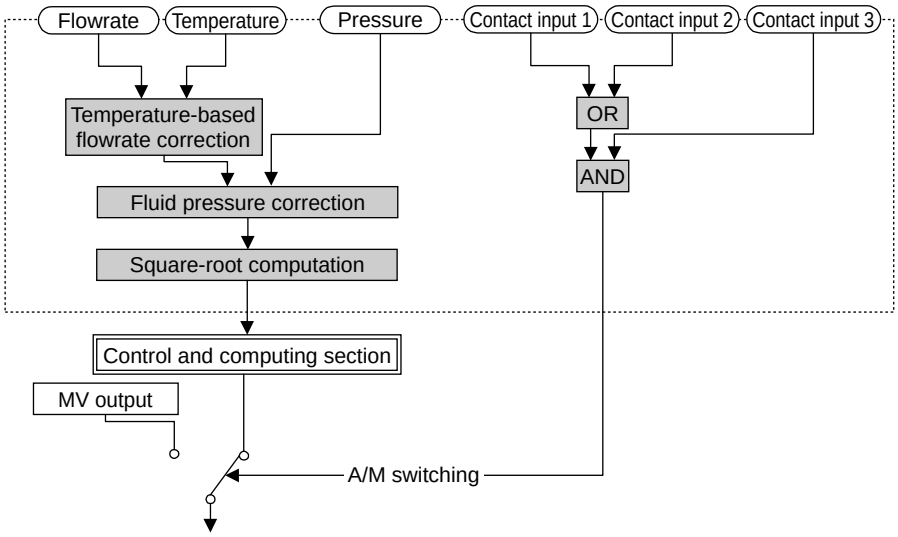

Figure 1.1.2 Custom Computations Applied to Input Signals

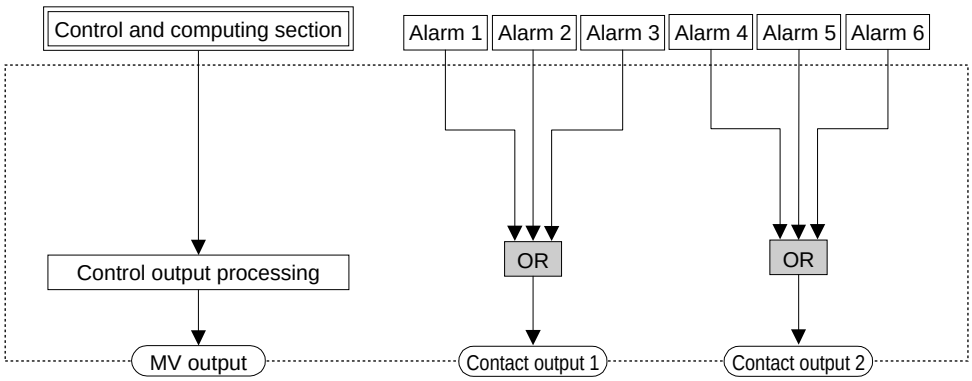

Figure 1.1.3 Custom Computations Applied to Output Signals

When custom computations are in use, you can also freely configure the operation displays of the US1000 controller to suit your desired view. This function is designed so that you can choose from the preset menus the types of data items, the sequence in which the data items are shown, and the conditions required to show them on the PV and SV digital displays of the US1000 controller. The displays thus configured are referred to as custom displays.

Normally, the term “custom computing function” is used to include both the custom computation and custom display functions.

1.2 Operating Environment of the LL1200 Tool and Wiring Specifications

■ System Requirements

- Personal computer: An IBM PC/AT compatible computer with either Microsoft Windows 95/98/2000/XP or Windows NT 4.0 operating software.
- Operating system:

	Version		
	Up to R1.02	R1.03	R1.04 or later
Windows95	√	√	N/A
WindowsNT4.0 (Service Pack3)	√	√	√
Windows98	N/A	√	√
Windows2000 Professional (Service Pack4 or more)	N/A	√	√
WindowsXP Professional (Service Pack1)	N/A	N/A	√
WindowsXP Home Edition (Service Pack1)	N/A	N/A	√

- CPU: 300 MHz Pentium processor or superior is recommended.
- Main memory: 16 MB or more is recommended for Windows 95.
  64 MB or more is recommended for Windows NT 4.0.
  128 MB or more is recommended for Windows 98/2000 or Windows XP.
- Hard disk
  Memory space required to store the tool's programs: 9 MB or more
  Memory space required to store the parameter data: 2 MB or more
- CRT display
  800 x 600 pixels or superior
  Should be capable of handling at least 256 colors.
  Smaller fonts should be used.
- RS-232C communication ports: One channel.
  Version R1.04 or later : select from COM1 to COM16.
  Up to version R1.03 : select from COM1 to COM4.
  With 9-pin D-Sub connector for PC-compatible model.
- 3.5-inch floppy drive: Necessary.
- Printer: As necessary; A4-size printer, compatible with Windows 95/98/2000/XP and Windows NT 4.0

■ Dedicated Adapter

- Communication method
  US1000: Optical, contactless, bidirectional serial communication
  Personal computer: RS-232C half-duplex communication using the dedicated cable
- Power supply: Two AAA-size batteries or external power source
  Use of an external power source is recommended for tuning over a prolonged time period.
- Battery life: Approximately 50 hours (when the adapter is continuously operated on alkaline batteries)
- Specifications of external power source
- Should comply with EIAJ RC-6705.
  Input ratings: 5 V DC/50 mA
  (Purchase a commercially available plug and AC adapter for the external power source.)
- Ambient temperature range: 0 to 50˚C
- Ambient humidity range: 20 to 90%RH (non-condensing)
- Transport and storage conditions: -25 to 70˚C, 5 to 95%RH (non-condensing)
- Dust- and water-proof construction: Not applied.
- Standards: Complies with the CE Mark system (EMC standard only)

WARNING

The dedicated adapter is not waterproof. Do not use the adapter in locations that are likely to be exposed to splashes of water or other liquids.

unit : mm(inch)

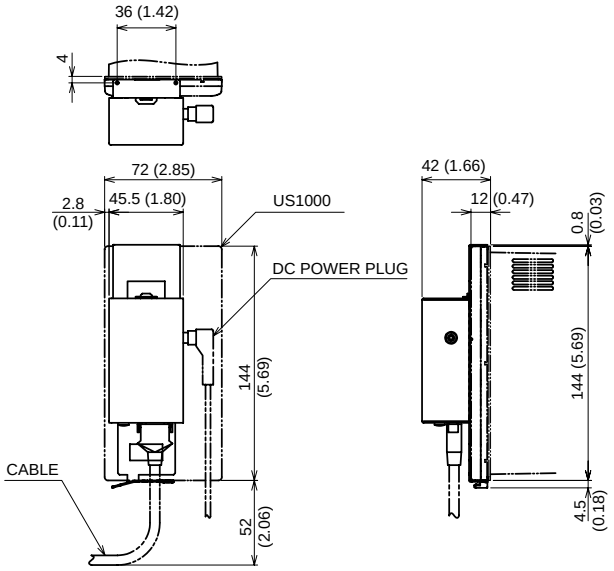

Figure 1.2.1 External View of the Dedicated Adapter

unit : mm(inch)

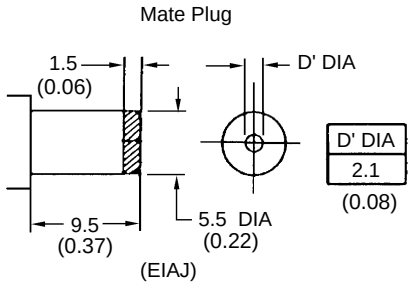

Figure 1.2.2 External View of the External Power Inlet on the Dedicated Adapter

■ Dedicated Cable

Cable with 9-pin D-Sub connector for IBM PC/AT-compatible models: 3-m long

unit : mm(inch)

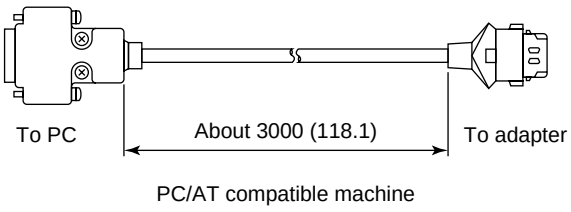

Figure 1.2.3 External View of the Dedicated Cable

1.3 Model and Suffix Codes of Applicable US1000 Controller Models

The US1000 controller models allowing for custom computations are as follows.

Model and Suffix Code Combination	Description
US1000-11	Enhanced model of digital indicating controller without communication function
US1000-11/A10	Enhanced model of digital indicating controller with communication function
US1000-21	Position-proportional model of digital indicating controller without communication function
US1000-21/A10	Position-proportional model of digital indicating controller with communication function

When using custom computations for any of these controller models, set the controller mode (US mode) to “21.”

See Also

“What are the Controller Modes (US Modes)?” in Chapter 2, “Controller Modes (US Modes)” of the *US1000 Digital Indicating Controller-Functions* instruction manual (IM 5D1A01-02E).

2. Setup

This chapter explains how to set up the hardware and software necessary to work with the LL1200 tool.

2.1 Installing the LL1200 Tool

NOTE

Before installing the tool, quit all running applications.

When using Windows 2000 or XP :
Log on using the user name of Administrators group.
The program does not start normally if the user name not belonging to the Administrators group is used for logging on.

(1) Insert Disk 1 of the LL1200 tool into the floppy drive.
(2) From the Start menu of Windows, choose <Run . . .>. Type the name of the floppy drive as \Setup.exe and click the <OK> button.
(3) To continue, follow the instructions given in each dialog box.

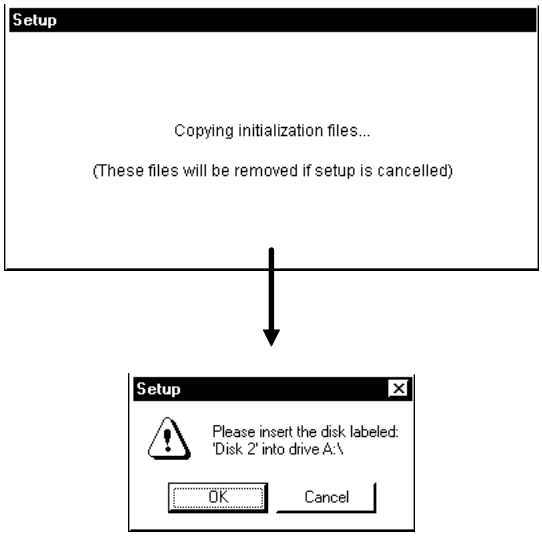

Figure 2.1.1 Window for Installation Operations

When installation is complete, the <LL1200> option is registered with the <Programs> command in the <Start> menu.

■ LL1200 File Package and Files of Information on Configured Custom Computations

The LL1200 package files comprise a set of the files that are needed to run the LL1200 tool, the installation program, sample files, help files, and so on.

NOTE

The file names should contain no more than 16 half-byte alphanumeric characters, and their extensions should be as shown in the following tables.

●LL1200 Package Files

When the installation of the LL1200 tool is complete, the folders in the following table are set up.

Folder Name	File
US	Package files (those other than the sample files)
US\SAMPLE	Sample files (********.1sc)
US\USER	User files (********.1sc, ********.1ec, ********.1sp, ********.1ep and ********.csv)

●Sample Files

The sample files contain information on custom computations in the I/O blocks of controller modes (US modes) 1 to 15.

Sample File	File Name
Controller mode (US mode) 1: Sample file for single-loop control	USM01.1SC
Controller mode (US mode) 2: Sample file for cascade primary-loop control	USM02.1SC
Controller mode (US mode) 3: Sample file for cascade secondary-loop control	USM03.1SC
Controller mode (US mode) 4: Sample file for cascade control	USM04.1SC
Controller mode (US mode) 5: Sample file for loop control for backup	USM05.1SC
Controller mode (US mode) 6: Sample file for loop control with PV switching	USM06.1SC
Controller mode (US mode) 7: Sample file for loop control with PV auto-selector	USM07.1SC
Controller mode (US mode) 8: Sample file for loop control with PV-hold function	USM08.1SC
Controller mode (US mode) 11: Sample file for dual-loop control	USM11.1SC
Controller mode (US mode) 12: Sample file for temperature and humidity control	USM12.1SC
Controller mode (US mode) 13: Sample file for cascade control with two universal inputs	USM13.1SC
Controller mode (US mode) 14: Sample file for loop control with PV switching and two universal inputs	USM14.1SC
Controller mode (US mode) 15: Sample file for loop control with PV auto-selector and two universal inputs	USM15.1SC

●User Files

The user files contain information on user-created custom computations.

Type of User File	File Name
Data file for custom computations and displays	********.1sc
Results of comparison between custom-computation data (text file)	********.1ec
Parameter data file	********.1sp
Results of comparison between parameter data (text file)	********.1ep
Data for printouts (CSV-format file)	********.csv

●Help Files

Type of Help File	File Name
Parameters setting tool help	PARA.hlp
Custom computation building tool help	CUST.hlp
Description of D-registers and I-relays	DREG.hlp
Description of module information	MODUL.hlp

2.2 Uninstalling the LL1200 Tool

(1) Double-click the <Add/Remove Programs> icon in the Control Panel menu of Windows.
(2) Choose <LL1200>, and then click the <Add/Remove . . .> button.
(3) To continue, follow the instructions given in each dialog box.

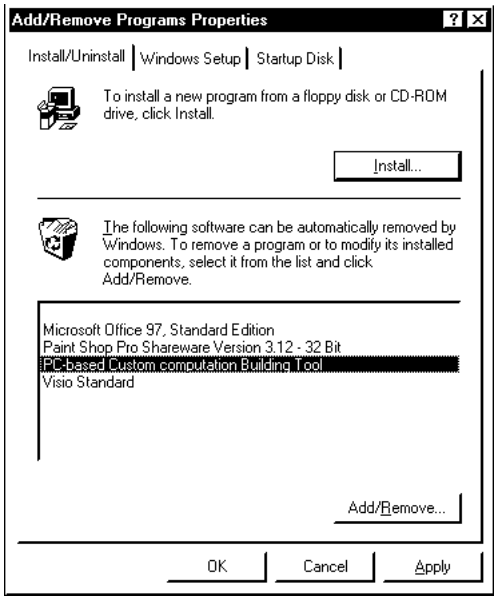

Figure 2.2.1 Dialog Box for Uninstallation Operations

2.3 Connecting the US1000 Controller to the Personal Computer

The US1000 controller can be connected to a personal computer in two ways; using either the optical communication interface on the controller's front panel or the RS-485 communication terminal on the rear panel (if the US1000 controller has the "/A10" option).
This section discusses the way the US1000 controller is connected to the personal computer using the optical communication interface.
Connect the controller to the computer either before or after you configure the custom computations. See Section 3.2, "Flow of Working with the LL1200 Tool," for more information.

See Also

Chapter 1, "Setup," in the *US1000 Digital Indicating Controller-Communication Functions* instruction manual (IM 5D1A01-10E), for details on how to wire the US1000 controller using the RS-485 communication terminal.

NOTE

The dedicated adapter has an internal switch (located where the adapter comes into contact with the US1000 controller). Exercise care to avoid breaking the switch when attaching the adapter onto the US1000 controller. Installing the adapter in place automatically turns on the switch, causing the batteries to discharge even if no communication is done. If you have no immediate plan to communicate, keep the adapter removed from the US1000 controller.

WARNING

When using an external power source, take care to ensure that the polarities of the AC adapter are correct. Do not apply power from the AC adapter in excess of the power ratings of the dedicated adapter. Either of these cases may result in damage to the controller.

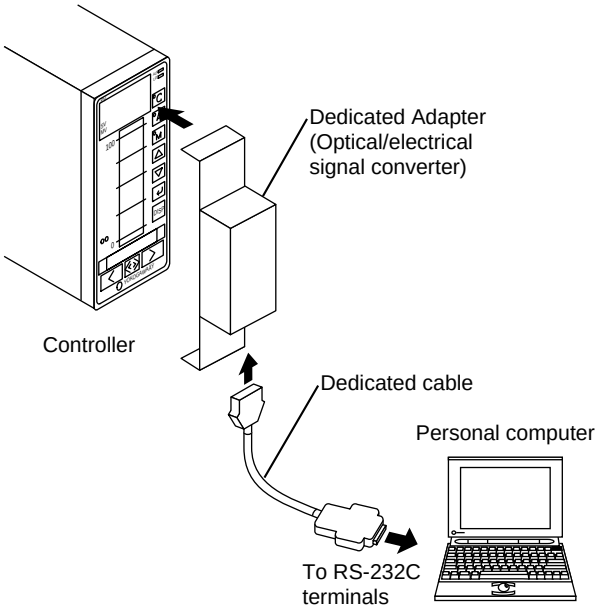

Figure 2.3.1 Connection of the US1000 Controller to the Personal Computer using the Optical Communication Interface

Follow the steps below to connect the dedicated adapter to the US1000 controller.

(1) Wire the dedicated adapter to the RS-232C communication port on the personal computer using the dedicated cable.

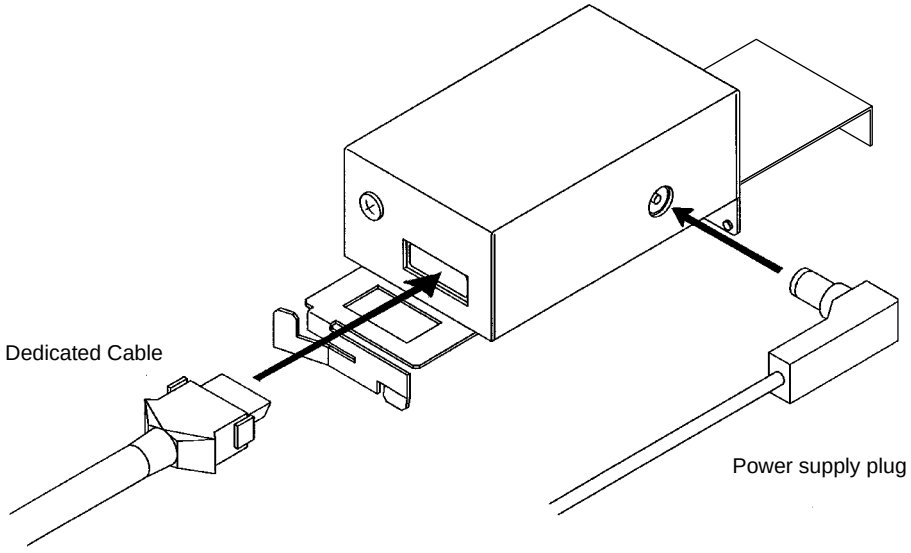

Figure 2.3.2 Connection of the Dedicated Cable to the Dedicated Adapter

(2) Hang the dedicated adapter on the top notches of the US1000 controller, as shown in Figure 2.3.3.
(3) Push the adapter on to the controller's front panel so it is securely fixed.

NOTE

Communication is not possible if the dedicated adapter on the US1000 controller is not horizontally aligned in the correct position. Install the adapter in an upright position on the US1000 controller.

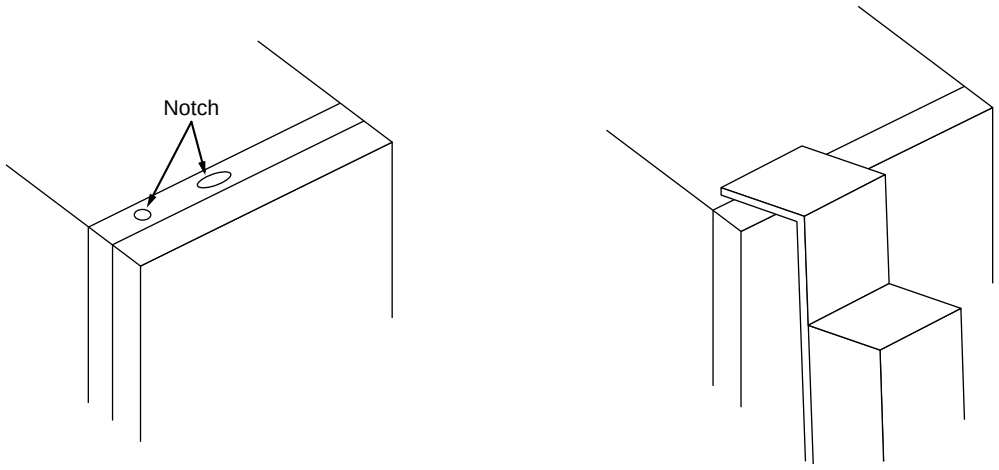

Figure 2.3.3 Installation of the Dedicated Adapter

3. Using the LL1200 Tool

This chapter explains how to use the LL1200 tool. Be sure to read this chapter before you proceed any further.

3.1 Starting and Exiting the Tool

3.1.1 Starting the Tool

(1) From the Start menu of Windows, choose <Programs>, then <LL1200>.
(2) The LL1200 tool starts up and the following dialog box appears.

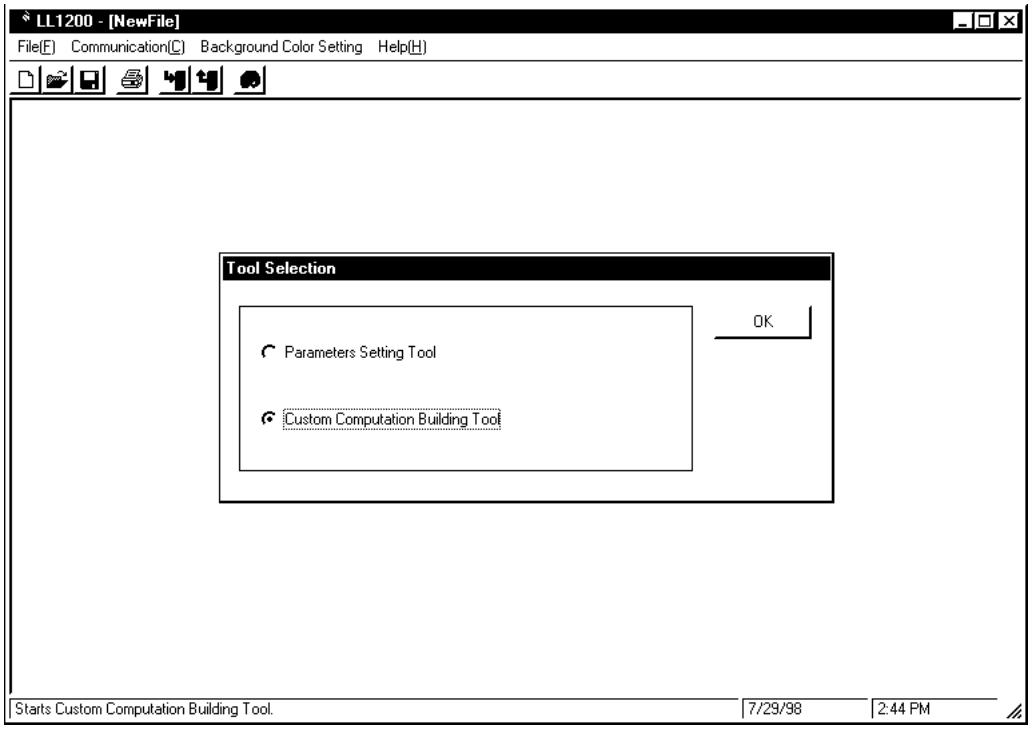

Figure 3.1.1 Dialog Box that Appears When the LL1200 Tool Starts Up

3.1.2 Exiting the Tool

(1) From the LL1200 tool menus, choose <File>, then <Exit>.
(2) The following message box appears.
To save the data of your current work, click the <Yes> button and save the file.
If the data need not be saved, click the <No> button.

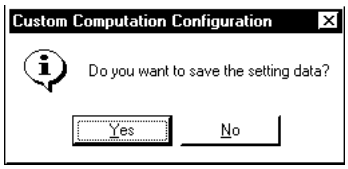

Figure 3.1.2 [Exit LL1200 Tool] Message Box

3.2 Flow of Working with the LL1200 Tool

Figure 3.2.1 shows the flow of work for configuring custom computations and displays.

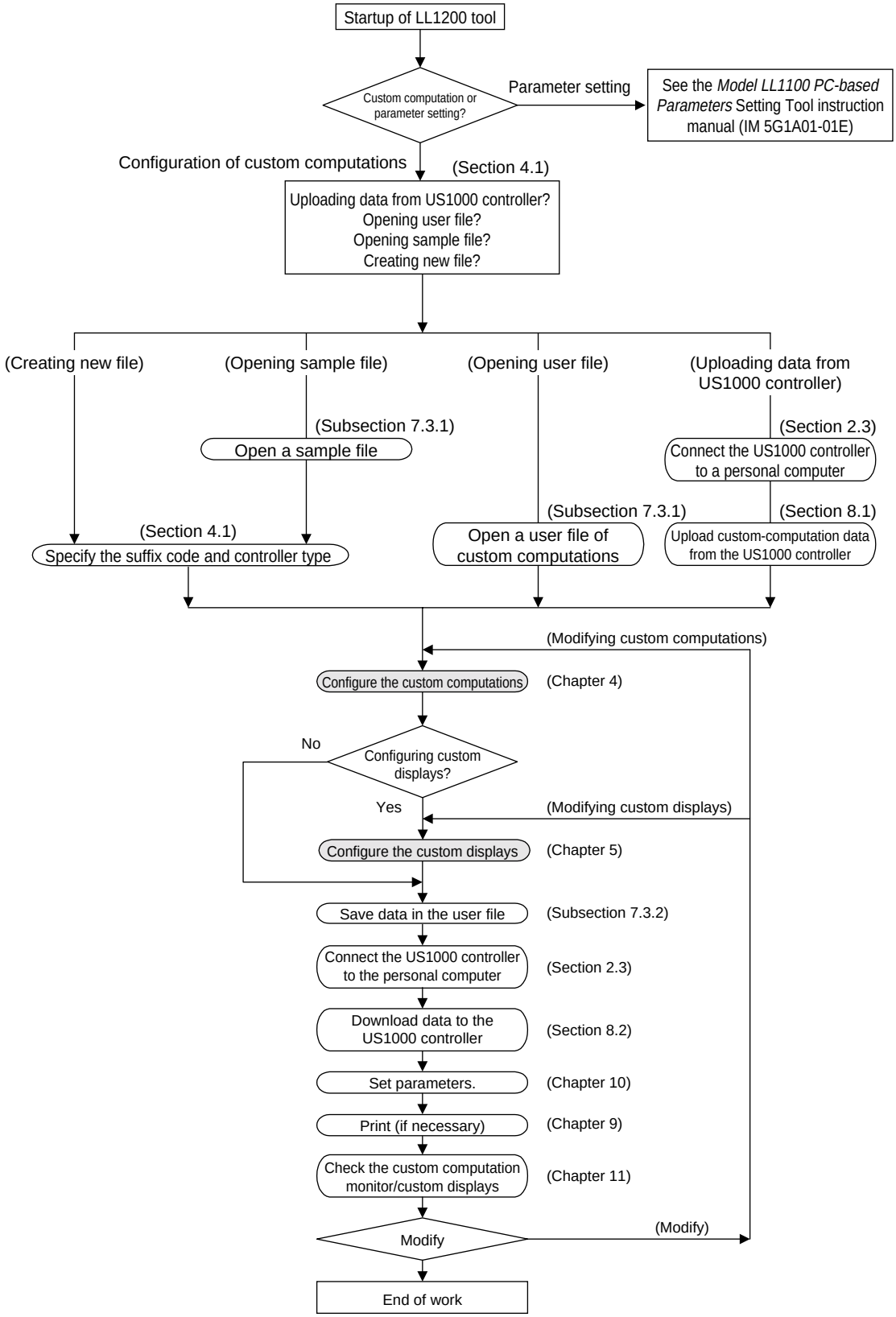

Figure 3.2.1 Flow of Work for Configuring US1000 Functions Using the LL1200 Tool

3.3 Dialog Boxes and Tool Menus

Figures 3.3.1 and 3.3.2 show how the dialog boxes and tool menus are organized within the LL1200 tool.

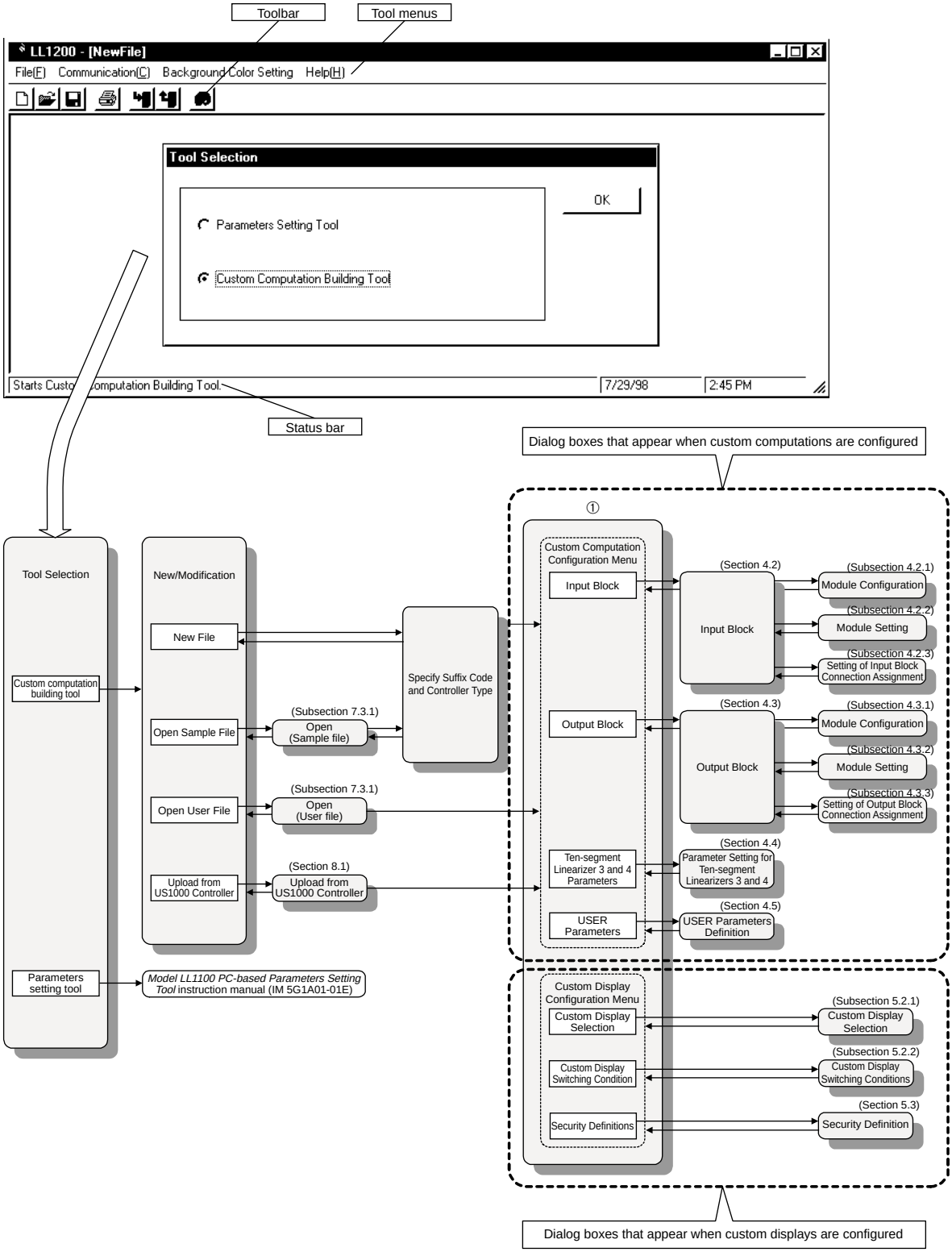

Figure 3.3.1 Paths for Moving among Dialog Boxes

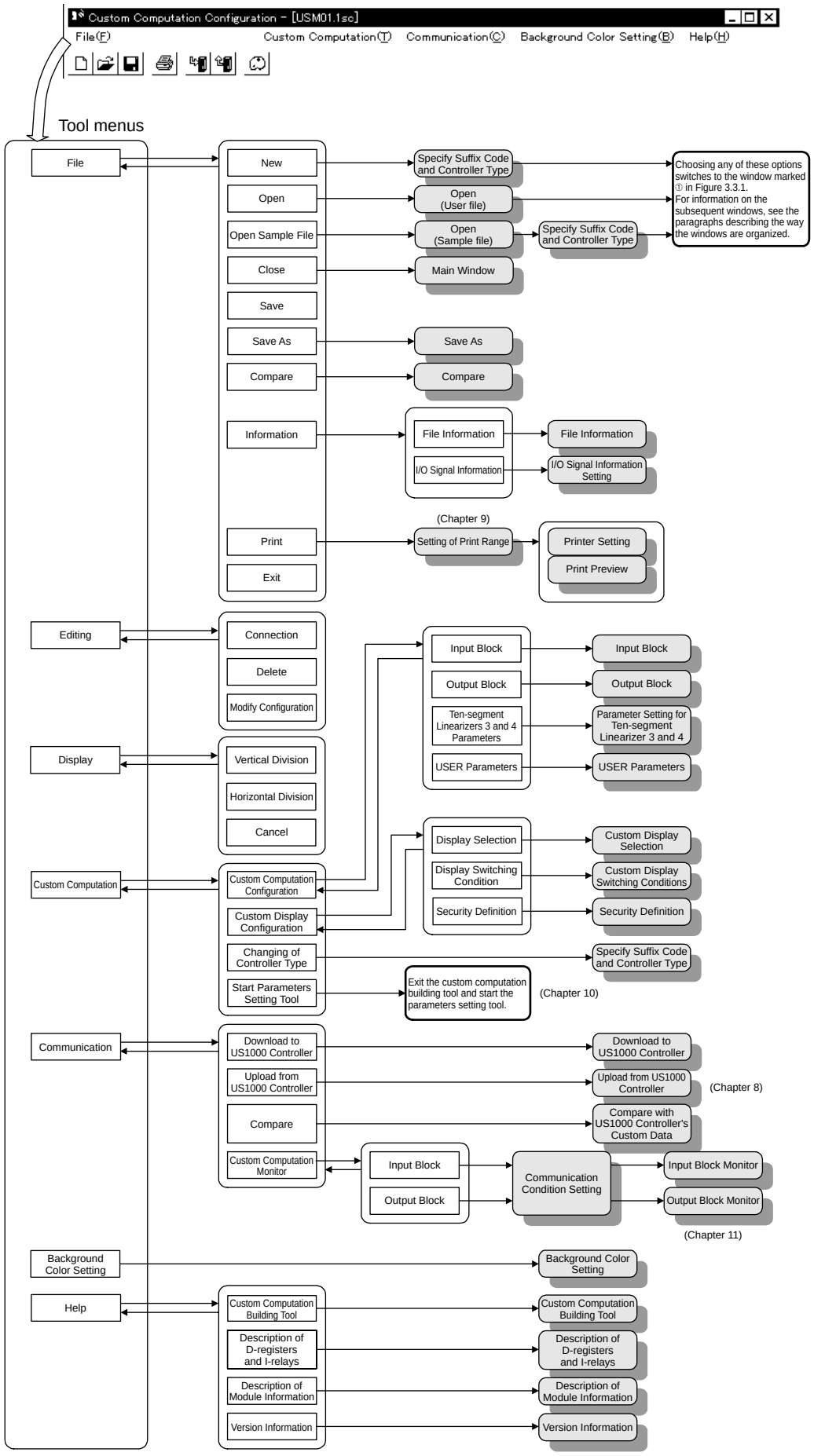

Figure 3.3.2 Paths for Moving among the Options in the Tool Menus

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4. Basic Operations for Configuring Custom Computations and Relevant Explanations

This chapter explains the procedure for configuring custom computations.

For details on the preparatory work for using the LL1200 tool, see Chapter 2, "Setup." Likewise, for an overview of the procedure for configuring custom computations and displays, see Chapter 3, "Using the LL1200 Tool."

Also refer to Chapter 4, "List of Computation Modules and Their Functions," in the *Model LL1200 PC-based Custom Computation Building Tool-User's Reference* instruction manual (IM 5G1A11-02E), for detailed specifications of the computation modules.

In order to configure custom computations, you must follow the steps shown below.

- Step 1: Choosing the Way Computations Are Configured ---------- (Section 4.1)
- Step 2: Configuring Custom Computations in an Input Block ---------- (Section 4.2)
- Step 3: Configuring Custom Computations in an Output Block ---------- (Section 4.3)
- Step 4: Setting Ten-segment Linearizers 3 and 4 Parameters (as necessary) (Section 4.4)
- Step 5: Setting USER Parameters (as necessary) ---------- (Section 4.5)

When you are finished with these steps, download the configured custom computations to the US1000 controller (see Section 8.2). Then, verify their performance by means of custom computation monitoring (see Chapter 11).

4.1 Step 1: Choosing the Way Computations Are Configured

When you start the LL1200 tool, a dialog box appears as shown in Figure 4.1.1.

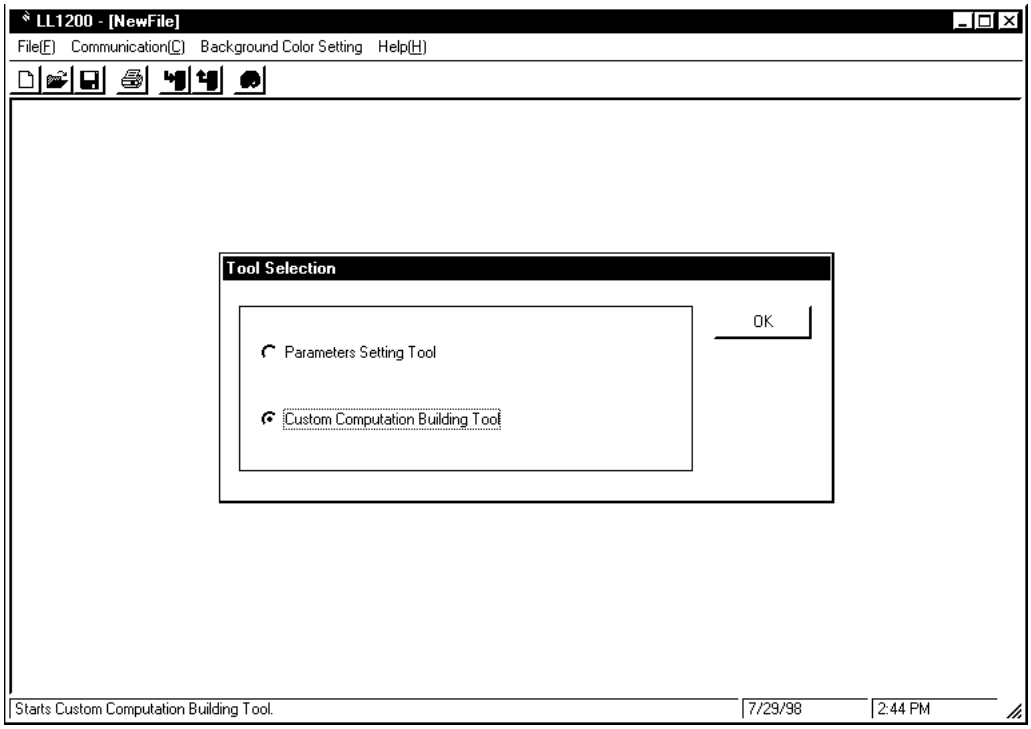

Figure 4.1.1 [Tool Selection] Dialog Box

Click the <Custom Computation Building Tool> option button, and then the <OK> button. The [New/Modification] dialog box (Figure 4.1.2) appears.

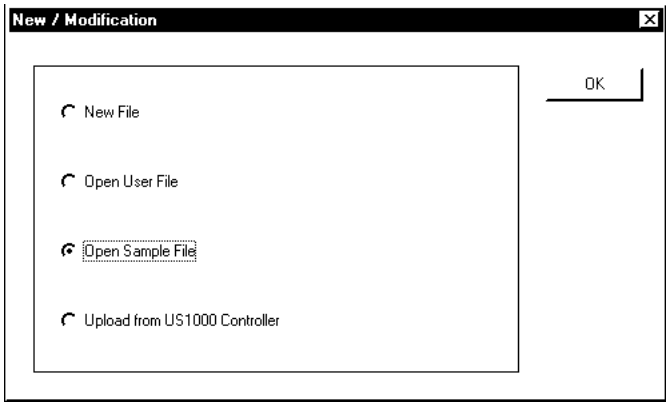

Figure 4.1.2 [New/Modification] Dialog Box

There are four ways of configuring custom computations, as described below. Choose one of these four ways.

TIP

If you are configuring custom computations for the first time, it is advisable that you use a sample file.

For your information, Section 4.2, “Step 2: Configuring Custom Computations in an Input Block,” uses the sample file (USM01.1SC) for single-loop control to explain all the operating procedures that follow that particular section.

① If you are configuring a custom computation from scratch, choose <New File>.
Click the <New File> option button, then the <OK> button. The [Specify Suffix Code and Controller Type] dialog box (Figure 4.1.3) appears.

≠ If you are configuring a custom computation using a user file, choose <Open User File>.
Click the <Open User File> option button, and then the <OK> button. The [Open User File] dialog box (Figure 4.1.4) appears.

③ If you are configuring a custom computation using a sample file, choose <Open Sample File>.
Click the <Open Sample File> option button, and then the <OK> button. The [Open Sample File] dialog box (Figure 4.1.5) appears.

④ If you are configuring a custom computation by uploading data from the US1000 controller, choose <Upload from US1000 Controller>.
Click the <Upload from US1000 Controller> option button, and then the <OK> button. The [Upload from US1000 Controller] dialog box (Figure 4.1.6) appears.

NOTE

When uploading custom computation information from US1000 controller, set the controller mode (US mode) to “21.”

■ [Specify Suffix Code and Controller Type] Dialog Box

If you choose <New File> in the [New/Modification] dialog box (Figure 4.1.2), the [Specify Suffix Code and Controller Type] dialog box (Figure 4.1.3) appears. This dialog box also appears if you choose <Open Sample File>.
In the [Specify Suffix Code and Controller Type] dialog box, click the <OK> button. The [Custom Computation Configuration Menu] dialog box (Figure 4.1.7) appears.

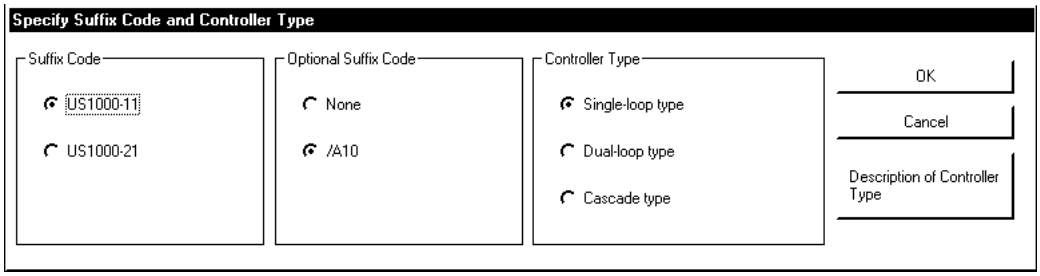

Figure 4.1.3 [Specify Suffix Code and Controller Type] Dialog Box

● Explanation of the [Specify Suffix Code and Controller Type] Option

The suffix code must be specified because the code needs to be verified when you download information on the custom computations you configured using the LL1200 tool, to the US1000 controller. Likewise, the controller type must be specified because you must decide upon the desired operating conditions for the US1000 controller.

Controller Type	Criteria for Choice
Single-loop type	The following are used: • One PID computation • Switching among loop-1 CAS, AUTO and MAN modes • Switching between RUN/STOP modes • Switching between the loop-1 Open/Close modes
Dual-loop type	The following are used: • Two PID computations • Switching among loop-1 CAS, AUTO and MAN modes • Switching among loop-2 CAS, AUTO and MAN modes • Switching between RUN/STOP modes • Switching between the loop-1 Open/Close modes • Switching between the loop-2 Open/Close modes
Cascade type	The following are used: • Two PID computations • Switching between RUN/STOP modes • Switching among the loop-1 CAS, AUTO and MAN modes • Switching between the loop-2 Open/Close modes

NOTE

Data cannot be downloaded to US1000 controllers whose suffix codes do not match the one specified. Check the suffix and optional suffix codes of the US1000 controller to which you download data.

■ Open User File

In the [Open User File] dialog box, choose the file you wish to use and click the <Open> button. The [Custom Computation Configuration Menu] dialog box (Figure 4.1.7) appears.

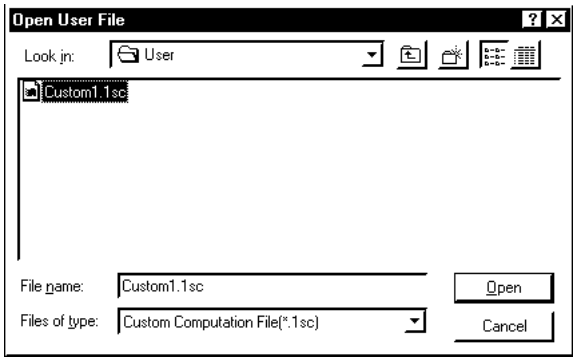

Figure 4.1.4 [Open User File] Dialog Box

■ Open Sample File

In the [Open Sample File] dialog box, choose the file you wish to use and click the <Open> button. The [Specify Suffix Code and Controller Type] dialog box (Figure 4.1.3) appears. In the dialog box, click the <OK> button. The [Custom Computation Configuration Menu] dialog box (Figure 4.1.7) appears.

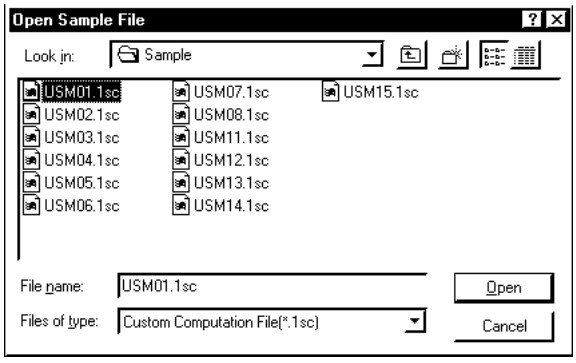

Figure 4.1.5 [Open Sample File] Dialog Box

■ Upload from US1000 Controller

If you choose <Upload from the US1000 Controller> in the [New/Modification] dialog box, the [Upload from US1000 Controller] dialog box (Figure 4.1.6) appears.

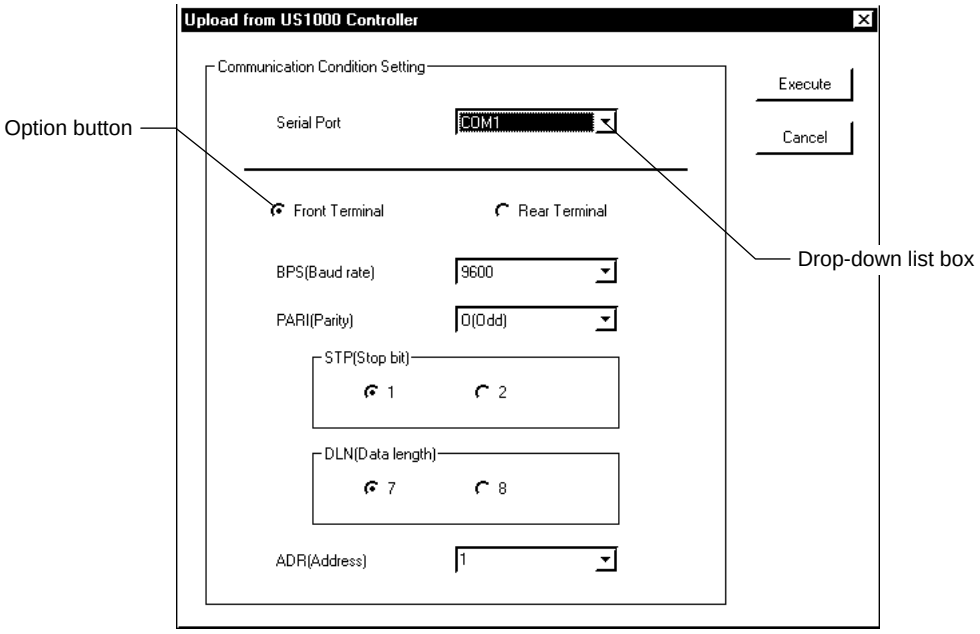

Figure 4.1.6 [Upload from US1000 Controller] Dialog Box

You can communicate with the US1000 controller in either of the following two ways.

●Communication Using the Front-panel Optical Interface

① In the [Upload from US1000 Controller] dialog box, click the <Front Terminal> option button.
≠ From the <Serial Port> drop-down list box, select a communication port of the personal computer.
③ Click the <Execute> button. Data are uploaded from the US1000 controller.
④ When uploading is complete, the [Custom Computation Configuration Menu] dialog box (Figure 4.1.7) appears.
∞ For the subsequent operations, see Section 4.2 and the sections/subsections that follow.

●Communication Using the RS-485 Interface

① In the [Upload from US1000 Controller] dialog box, click the <Rear Terminal> option button.
≠ From the <Serial Port> drop-down list box, select a communication port of the personal computer. Then, from the <Baud Rate>, <Parity> and <Address> drop-down list boxes, choose the options of the three communication conditions, the baud rate, parity and address. Also choose the options of the two communication conditions, the stop bit and data length, by clicking the appropriate option buttons in the <Stop Bit> and <Data Length> sections.
Match the communication conditions of the US1000 controller with those of the personal computer.
③ Click the <Execute> button. The LL1200 tool begins uploading data from the US1000 controller.
④ When uploading is complete, the [Custom Computation Configuration Menu] dialog box (Figure 4.1.7) appears.
∞ For the subsequent operations, see Section 4.2 and the sections/subsections that follow.

NOTE

If you have chosen RS-485 communication, set the communication protocol of the US1000 controller to [PC-link Communication]. Communication is not possible if you set the protocol to [PC-link Communication with Sum Check], [Modbus (RTU)] or [Modbus (ASCII)].

■ Custom Computation Configuration Menu

The dialog box shown below is the first to appear when you configure custom computations. For further operations after this Custom Computation Configuration Menu dialog box, see Section 4.2 and the sections/subsections that follow.

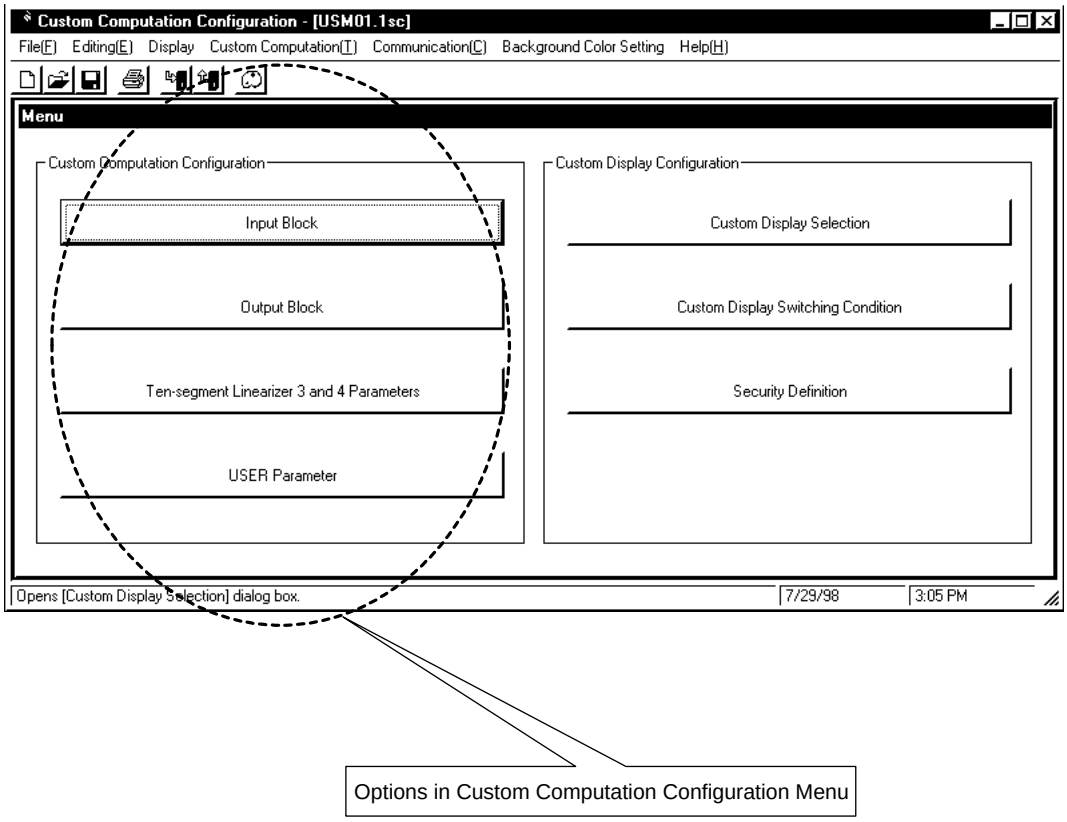

Figure 4.1.7 [Custom Computation Configuration Menu] Dialog Box

4.2 Step 2: Configuring Custom Computations in an Input Block

The flow of work in step 2 is as follows.

This section explains the work flow using the single-loop control sample file (USM01.1SC). Read the sample file onto your personal computer before you start this step.

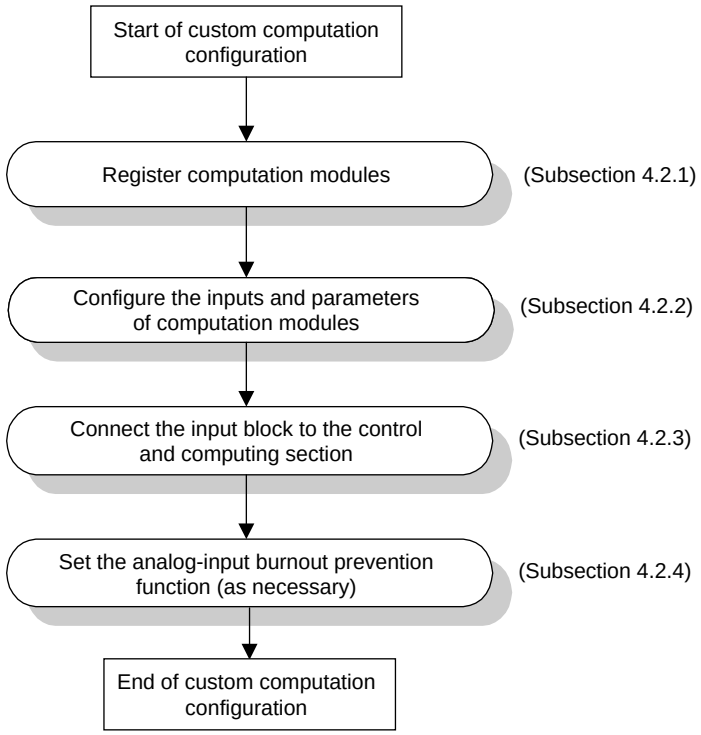

Figure 4.2.1 Flow of Work for Configuring Custom Computations in an Input Block

Figure 4.2.2 shows the [Custom Computation Configuration Menu] dialog box used to configure custom computations.

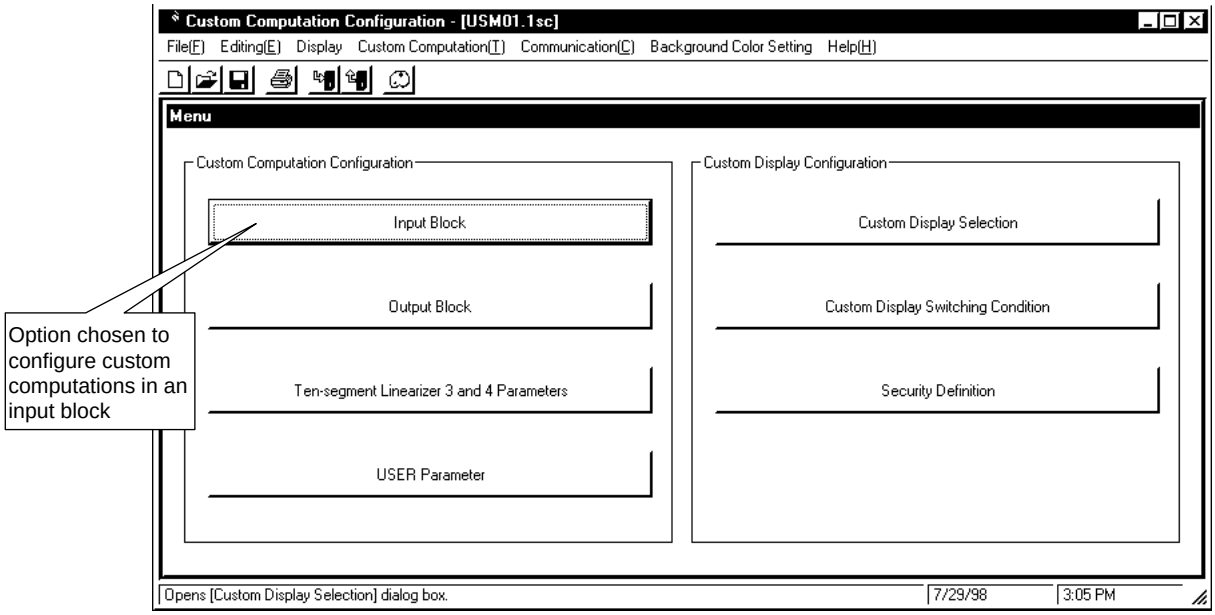

Figure 4.2.2 [Custom Computation Configuration Menu] Dialog Box

4.2.1 Step 2-1: Registering Computation Modules

- Explanation

This step involves registering the computation modules you want to perform operations in an input block, **in the order they are executed**. You can register a maximum of 30 computation modules.

Figure 4.2.3 shows an input block for single-loop control where a module for a logical "NOT" operation is added. The following paragraphs explain how to add a NOT module to the diagram of an input block for single-loop control.

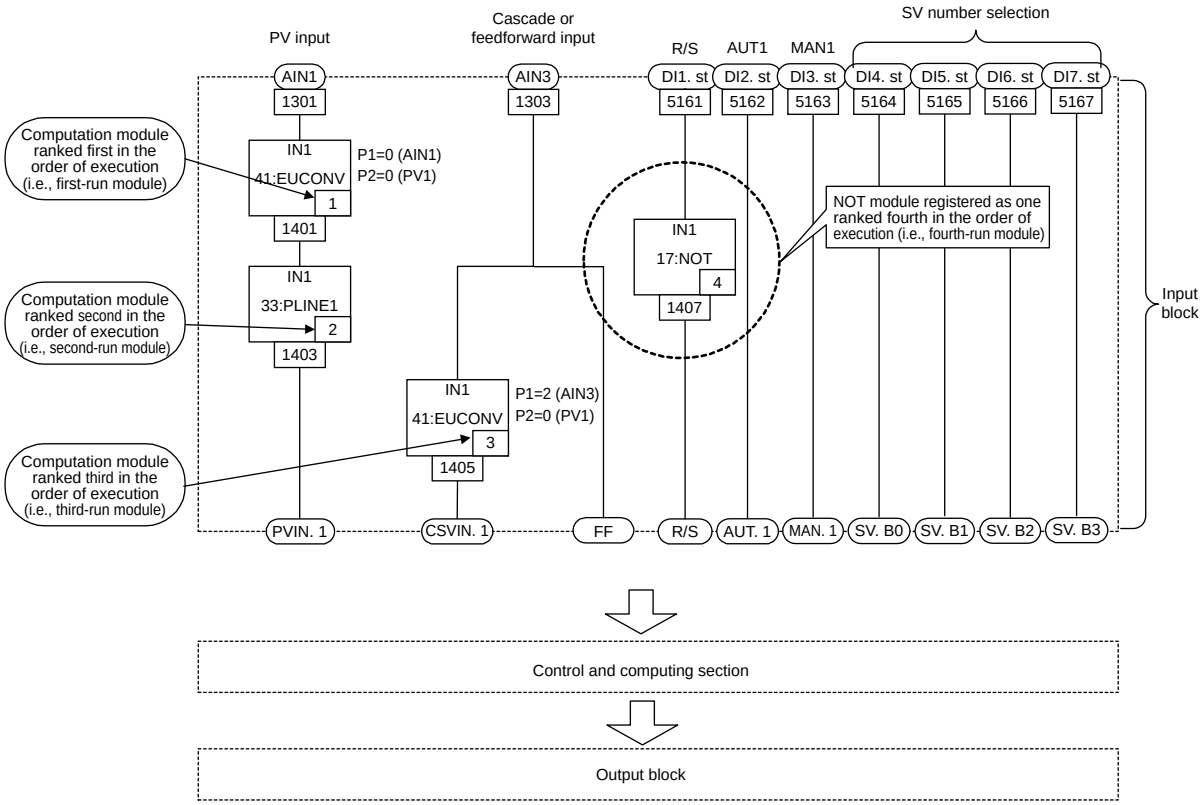

Figure 4.2.3 Addition of a NOT Module to the Diagram of an Input Block for Single-loop Control

TIP

Computation modules can be positioned anywhere within the input block. You should however locate them as close as possible to the input signals (AIN1 to AIN3 and DI1.st to DI7.st) for the input block connected to the modules. This strategy makes wiring between module I/Os visible and simple.

① In the [Custom Computation Configuration Menu] dialog box (Figure 4.2.2), click the <Input Block> button. The [Input Block] dialog box appears. Figure 4.2.4 illustrates the [Input Block] dialog box for single-loop control.

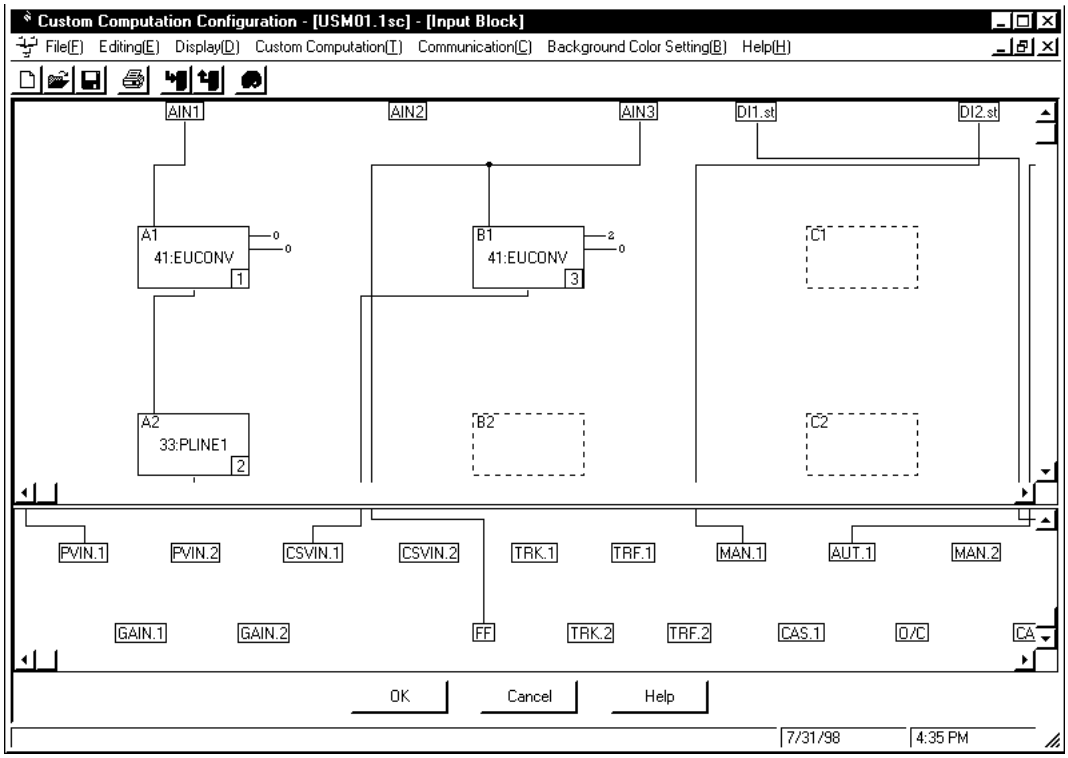

Figure 4.2.4 [Input Block] Dialog Box for Single-loop Control

≠ In the [Input Block] dialog box, double-click a blank box. The [Module Configuration] dialog box (Figure 4.2.5) appears. For ease of selection, modules are classified into four types; arithmetic operation, logical operation, special operation and special function.

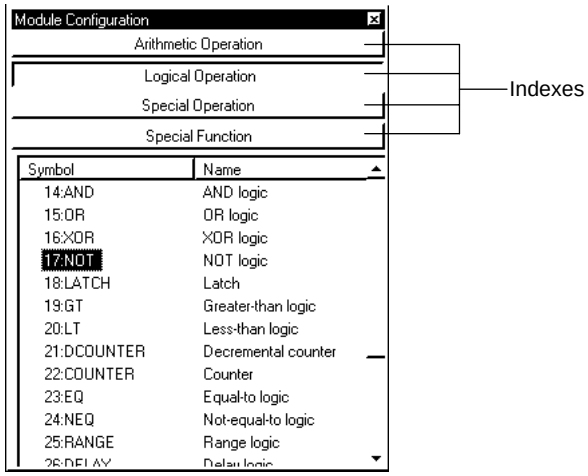

Figure 4.2.5 [Module Configuration] Dialog Box

③ Click the index that contains the computation module you register.

④ Double-clicking the module registers it.
Figure 4.2.6 shows an example where the <17: NOT> option in the <Logical Operation> index is registered.

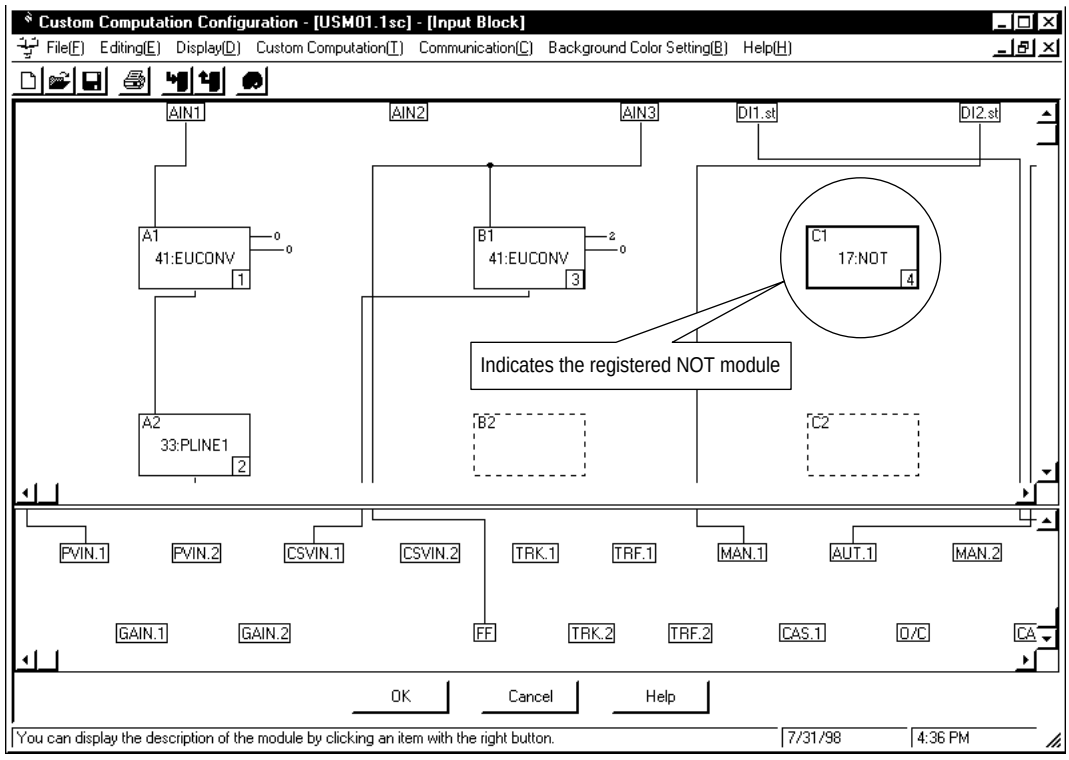

Figure 4.2.6 Example where a NOT Module Is Registered as the Fourth-Run Module

TIP

To view an explanation on the selected module, click the right mouse button in the [Module Configuration] dialog box. And then click the [Module Description]. The [Custom Computation Module Help for US1000] view appears. Figure 4.2.7 shows an explanation on a NOT module.

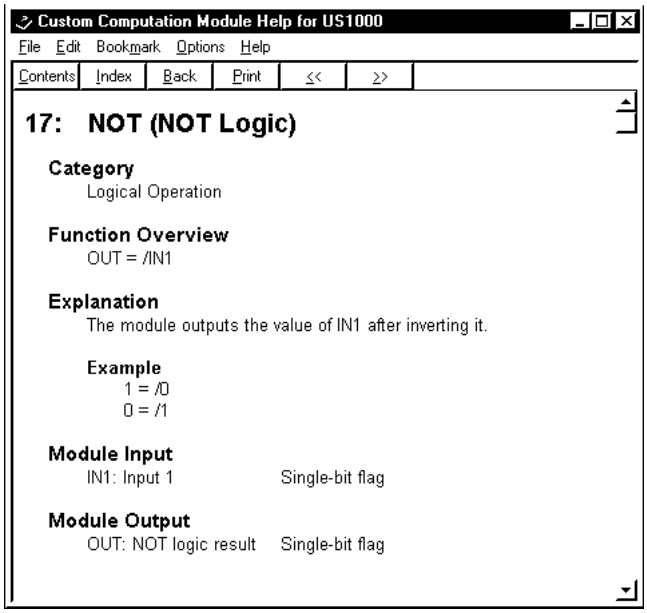

Figure 4.2.7 [Custom Computation Module Help for US1000] View

Repeat steps ≠ to ④ to register other necessary computation modules also.

When you have finished registering modules, proceed to subsection 4.2.2, “Step 2-2: Configuring the Inputs and Parameters of Computation Modules.”

4.2.2 Step 2-2: Configuring the Inputs and Parameters of Computation Modules

- Explanation

Each computation module has inputs (8 maximum), parameters (4 maximum) and an output. This step involves configuring inputs and parameters only. The results of computation provided by the output are automatically stored, according to the module's order of execution, in the data storage area of the US1000 controller.

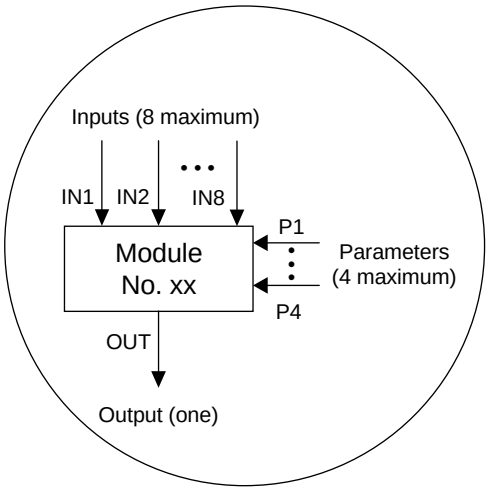

Figure 4.2.8 Conceptual View of Module Configuration

As was the case in the previous subsection, Figure 4.2.9 shows an input block for single-loop control where a logical NOT operation module is added.
In this block diagram, analog input 1 (AIN1) is connected to the input of an EUCONV module ranked first in the order of execution. Since the EUCONV module requires parameters, a constant data value of 0 is set for both parameters P1 and P2.
For more information on the handling of P1 and P2 parameters, see Chapter 4, "List of Computation Modules and Their Functions," in the *Model LL1200 PC-based Custom Computation Building Tool-User's Reference* instruction manual (IM 5G1A11-02E).
The output of the EUCONV module, which is ranked first in the order of execution, is connected to the input of the PLINE1 module which is ranked second in the order of execution. The PLINE1 module has no parameters. Analog input AIN3 is connected to the input of the EUCONV module ranked third in the order of execution. The constant data values of 2 and 0 are set in parameters P1 and P2 of the EUCONV module. In addition, contact input 1 is connected to the input of the NOT module which was registered in the previous subsection and is ranked fourth in the order of execution.

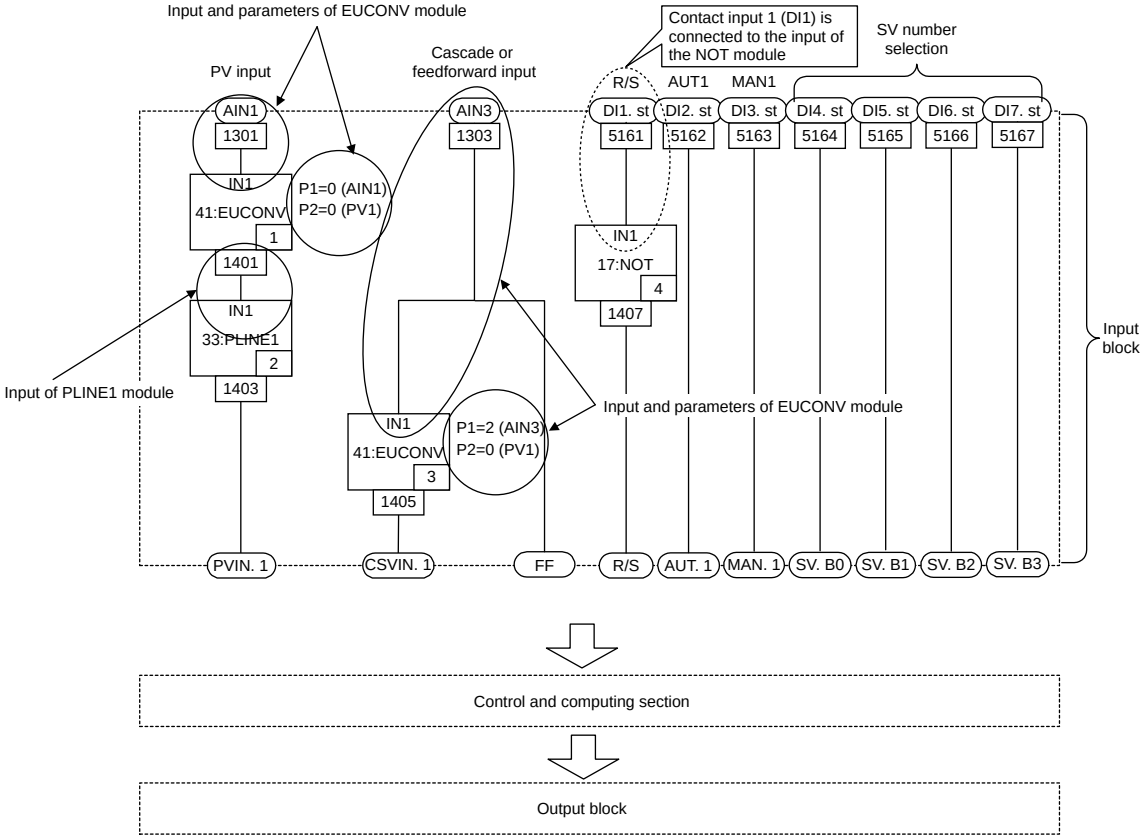

Figure 4.2.9 Contact Input 1 Connected to the Input of the NOT Module

- Operation: Configuring the Modules

This operation involves configuring the inputs and parameters of the computation modules.

① In the [Input Block] dialog box, click the module whose inputs and parameters you want to configure. In the example shown in Figure 4.2.6, click the NOT module.

≠ From the tool menus, choose <Editing>, then <Connection>.
The [Module Setting] dialog box (Figure 4.2.10) appears.

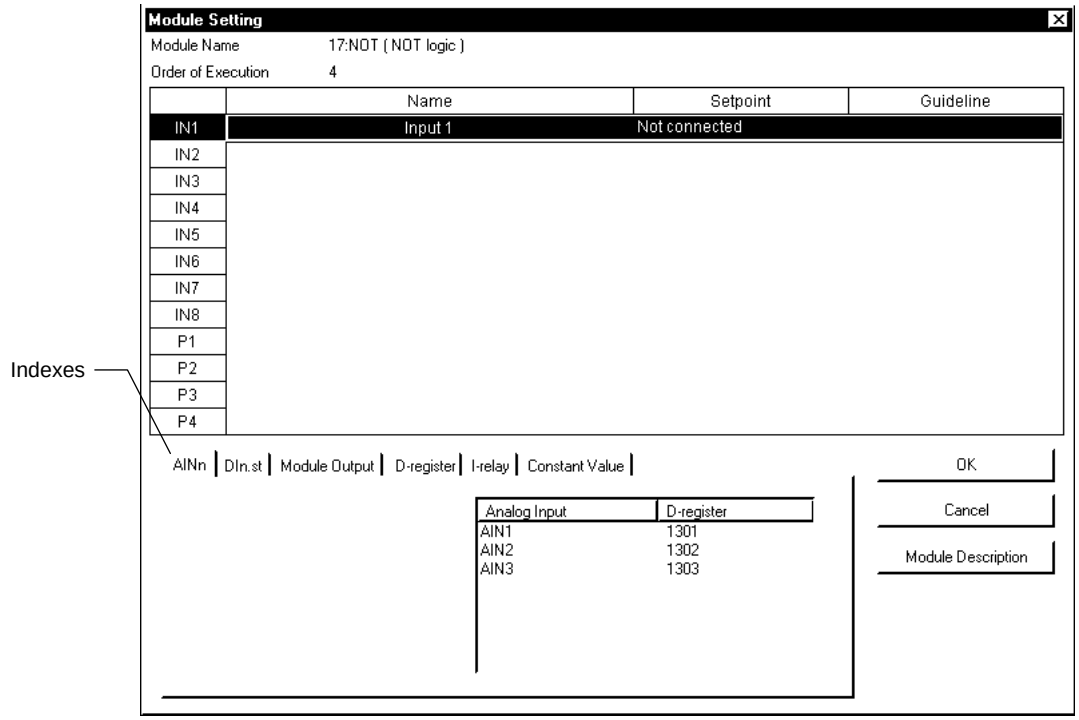

Figure 4.2.10 [Module Setting] Dialog Box

③ Click the input from among <IN1> to <IN8> or the parameter from among <P1> to <P4>, that need to be configured.

④ Click the appropriate index.
Indexes are classified into <AINn>,<DIn.st>, <Module Output>, <D-register>, <I-relay> and <Constant Value>.

●Description of Indexes

Index	Description	Remarks
AINn	AIN1: Analog Input 1 AIN2: Analog Input 2 AIN3: Analog Input 3	Analog input data fed to input block
DIn.st	DI1.st: Contact Input 1 DI2.st: Contact Input 2 DI3.st: Contact Input 3 DI4.st: Contact Input 4 DI5.st: Contact Input 5 DI6.st: Contact Input 6 DI7.st: Contact Input 7	Contact input data fed to input block
Module Output	IMO1L to IMO30L (outputs of input-block computation modules) OMO1L to OMO30L (outputs of output-block computation modules)	See Appendix 4, "Areas for Storing Data Output from Computation Modules."
D-Register	Process data, mode data, operation parameters, setup parameters	See Sections 5.3 to 5.9 in the *Model LL1200 PC-based Custom Computation Building Tool—User's Reference* instruction manual (IM 5G1A11-02E).
I-Relay	ON/OFF status, ON status, OFF status, SVNO, PIDNO, timer flags, power-on flags, alarm flags, etc.	See Sections 5.10 to 5.13 in the *Model LL1200 PC-based Custom Computation Building Tool—User's Reference* instruction manual (IM 5G1A11-02E).
Constant Value	Configurable range: -19999 to 30000	

∞ Double-clicking the appropriate input source configures the selected index.
To configure the <Constant Value> index, type a value in the text box, and then press the <Enter> key. The figure below shows an example of how to configure contact input 1 <DI1.st>.

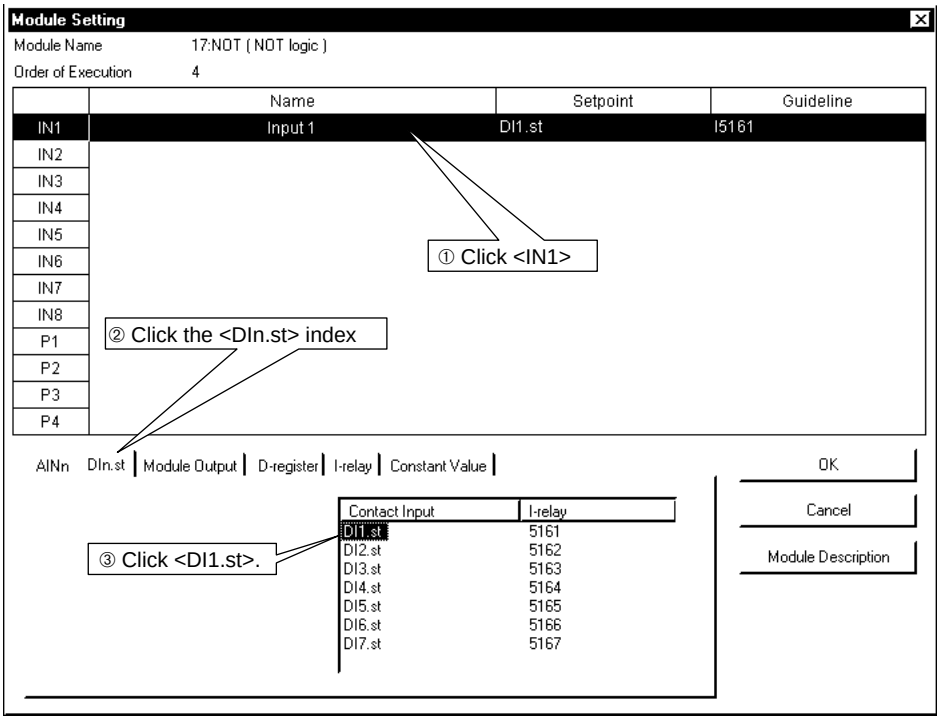

Figure 4.2.11 Configuring Contact Input 1 <DI1.st>

± Repeat steps ③ to ∞ to configure the other necessary inputs among <IN1> to <IN8> or parameters among <P1> to <P4>.

≤ Clicking the <OK> button closes the [Module Setting] dialog box. When the dialog box closes, the computation modules are automatically wired according to the inputs and parameters you configured.

≥ Repeat steps ① to ≤ to configure other computation modules also.

When you have finished configuring the inputs and parameters of computation modules, proceed to subsection 4.2.3, “Step 2-3: Connecting Computation Modules to the Control and Computing Section.”

4.2.3 Step 2-3: Connecting Computation Modules to the Control and Computing Section

- Explanation

This step involves making the settings needed to pass the results of computation to the control and computing section after completing the module configuration and settings discussed so far.

As was the case in the previous subsection, Figure 4.2.12 shows an input block for single-loop control where a logical NOT operation module is added.

In this block diagram, the output of the ten-segment linearizer 1 (PLINE1) module ranked second in the order of execution is connected to the loop-1 PV input (PVIN.1). The output of the EU range conversion (EUCONV) module ranked third in the order of execution is connected to the loop-1 cascade input (CSVIN.1). AIN3 is connected to the feedforward input (FF). In addition, the output of the NOT module ranked fourth in the order of execution is connected to the RUN/STOP mode (R/S) output signal.

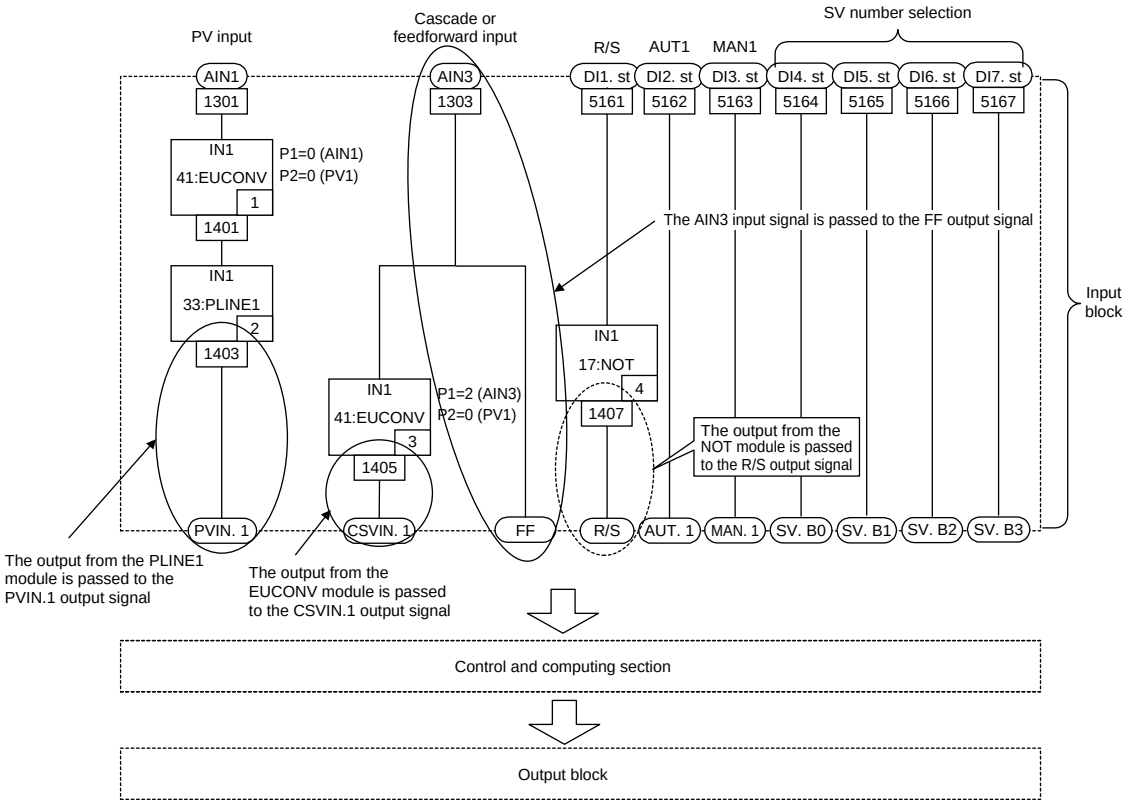

Figure 4.2.12 Connection of the NOT Module’s Output to the Control and Computing Section

- Operation: Connecting to the Control and Computing Section

This operation involves making the settings needed to pass the results of computation in the input block to the control and computing section.

① In the [Input Block] dialog box (Figure 4.2.13), click the appropriate output signal. Click <R/S> in the example shown in Figure 4.2.13.

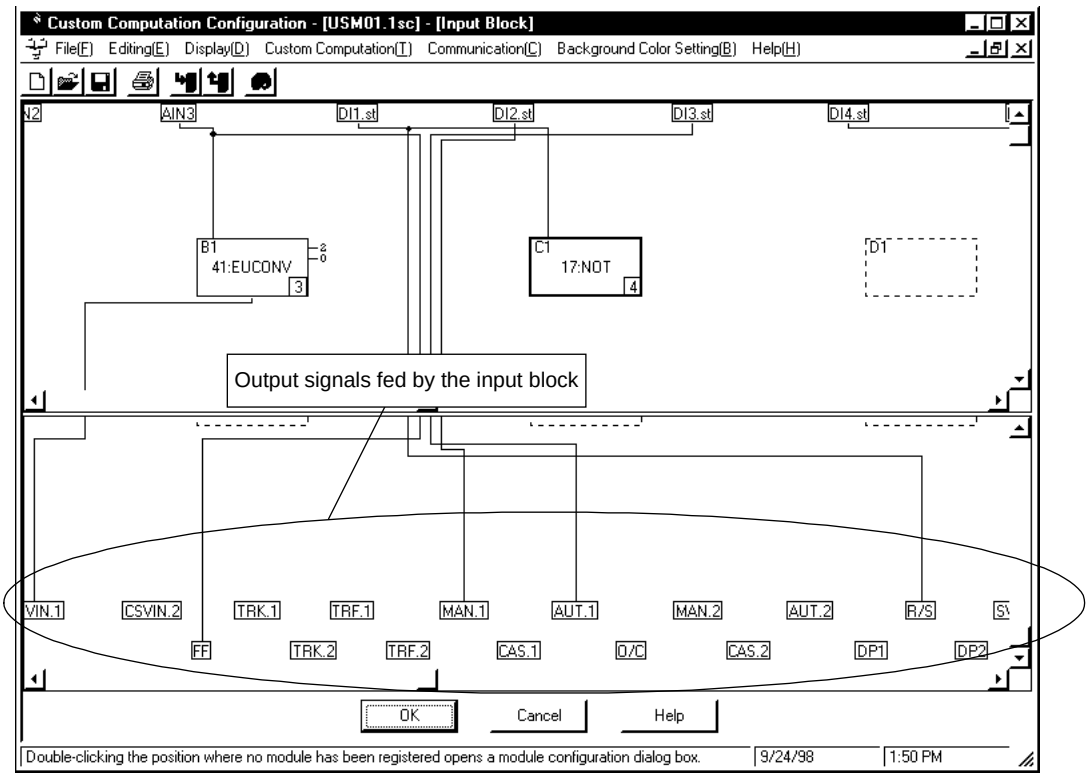

Figure 4.2.13 Output Signals Fed by the Input Block

●Description of Output Signals Fed by the Input Block

Output Signal Fed by Input Block	Description
PVIN.1	Loop-1 PV input
PVIN.2	Loop-2 PV input
CSVIN.1	Loop-1 cascade input
CSVIN.2	Loop-2 cascade input
GAIN.1	Loop-1 gain setting value
GAIN.2	Loop-2 gain setting value
TRK.1	Loop-1 tracking input
TRK.2	Loop-2 tracking input
FF	Feedforward input
CAS.1	Loop-1 CAS mode
AUT.1	Loop-1 AUTO mode
MAN.1	Loop-1 MAN mode
CAS.2	Loop-2 CAS mode
AUT.2	Loop-2 AUTO mode
MAN.2	Loop-2 MAN mode
O/C	OPEN/CLOSE mode
R/S	RUN/STOP mode
TRF.1	Loop-1 tracking flag
TRF.2	Loop-2 tracking flag

≠ From the tool menus, choose <Editing>, then <Connection>.
The [Setting of Input Block Connection Assignment] dialog box (Figure 4.2.14) appears.

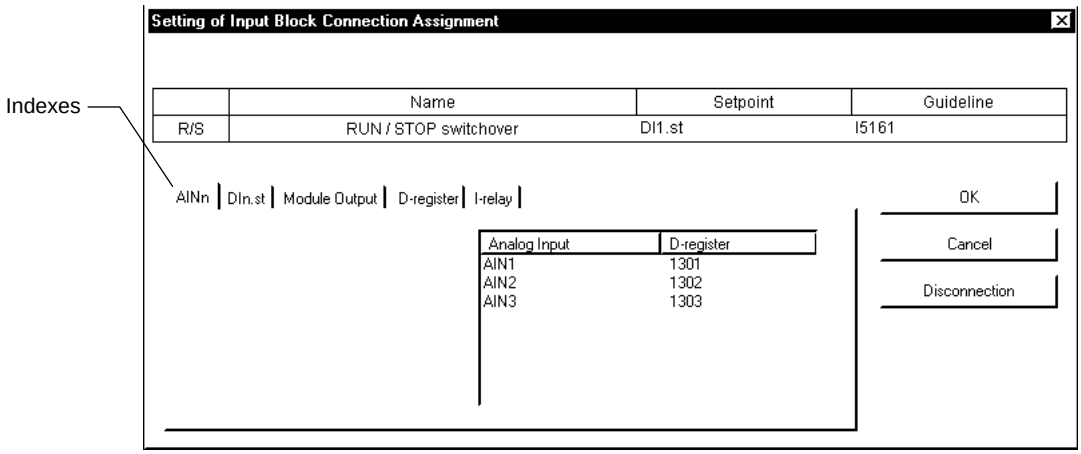

Figure 4.2.14 [Setting of Input Block Connection Assignment] Dialog Box

③ Click the appropriate index.
Indexes are classified into <AINn>,<DIn.st>, <Module Output>, <D-register>, <I-relay> and <Constant Value>.

●Description of Indexes

Index	Description	Remarks
AINn	AIN1: Analog Input 1 AIN2: Analog Input 2 AIN3: Analog Input 3	Analog input data fed to input block
DIn.st	DI1.st: Contact Input 1 DI2.st: Contact Input 2 DI3.st: Contact Input 3 DI4.st: Contact Input 4 DI5.st: Contact Input 5 DI6.st: Contact Input 6 DI7.st: Contact Input 7	Contact input data fed to input block
Module Output	IMO1L to IMO30L (outputs of input-block computation modules) OMO1L to OMO30L (outputs of output-block computation modules)	See Appendix 4, "Areas for Storing Data Output from Computation Modules."
D-Register	Process data, mode data, operation parameters, setup parameters	See Sections 5.3 to 5.9 in the *Model LL1200 PC-based Custom Computation Building Tool—User's Reference* instruction manual (IM 5G1A11-02E).
I-Relay	ON/OFF status, ON status, OFF status, SVNO, PIDNO, timer flags, power-on flags, alarm flags, etc.	See Sections 5.10 to 5.13 in the *Model LL1200 PC-based Custom Computation Building Tool—User's Reference* instruction manual (IM 5G1A11-02E).
Constant Value	Configurable range: -19999 to 30000	

④ Double-clicking the appropriate input source configures the selected index.
To configure the <Constant Value> index, type a value in the text box, and then press the <Enter> key. The figure below shows an example of how to configure <IMO4L>, the module that is the fourth input-block computation module to be carried out.

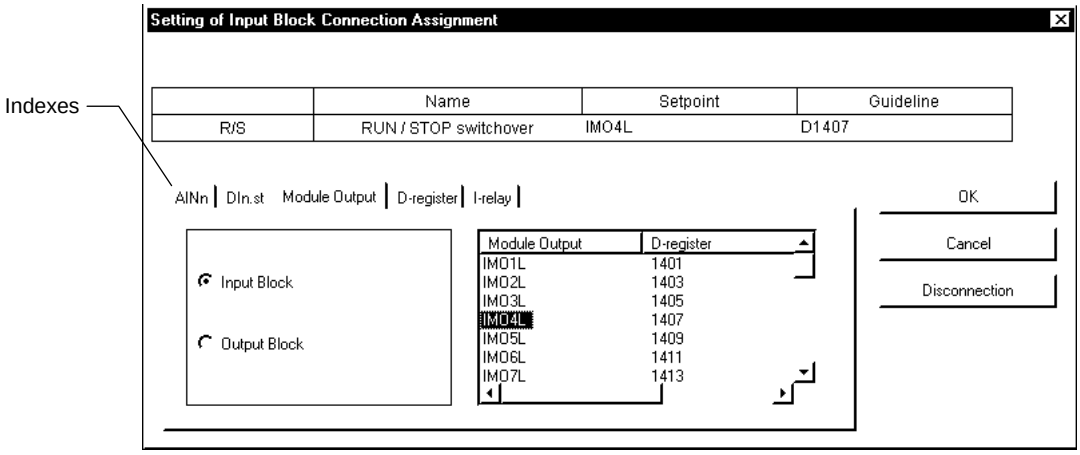

Figure 4.2.15 Configuring <IMO4L>, the Fourth Input-block Computation Module to Be Carried Out

∞ Clicking the <OK> button after the configuration is completed closes the [Setting of Input Block Connection Assignment] dialog box. When the dialog box closes, the computation modules are automatically wired according to the settings you defined.

± Repeat steps ① to ∞ to define the connection of other necessary output signals also.

Figure 4.2.16 shows the input block with the configuration and setting of computation modules, as well as their connection to the control and computing block, completed.

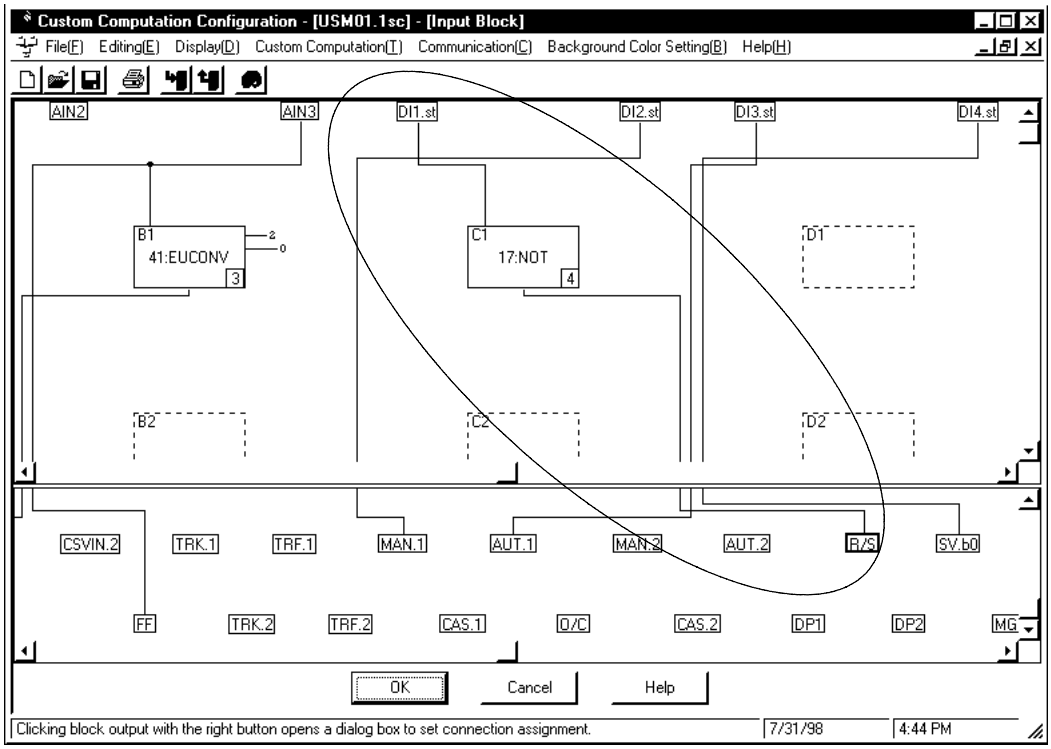

Figure 4.2.16 Registration of a NOT Module in the Diagram of an Input Block for Single-loop Control (Finished View)

4.2.4 Step 2-4: Setting the Analog-input Burnout Function

- Explanation

The US1000 controller has a function designed to switch the output of a loop in use to the preset value in the event of an A/D conversion failure or analog-input burnout. This function is configured in the following step.
To use the function, determine which output signal among PV1, PV2, CSV1 and CSV2 should be coupled with signals coming in through the AIN1, AIN2 and AIN3 inputs.
In the example shown in the [Connection of Analog Input Burnout Information] dialog box (Figure 4.2.17), AIN1 is coupled with PVIN.1 and AIN3 with CSV.1. This configuration switches the loop-1 MV output value to the preset one if a burnout occurs at either the AIN1 or AIN3 input.

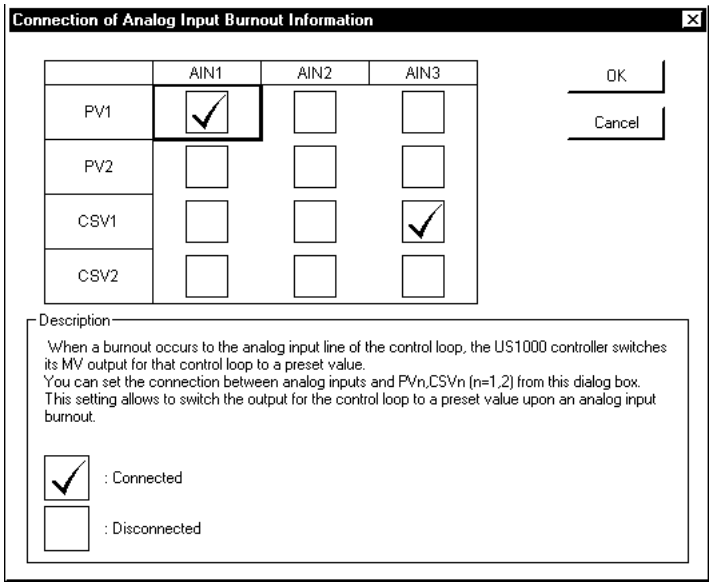

Figure 4.2.17 [Connection of Analog Input Burnout Information] Dialog Box

- Operation

① The [Connection of Analog Input Burnout Information] dialog box appears when you finish configuring custom computations in the [Input Block] dialog box and click the <OK> button. If you do not need to set any analog-input burnout information, simply click the <OK> button.
≠ In the [Connection of Analog Input Burnout Information] dialog box, click the appropriate blank box. A check mark (✔) appears in the box. The setting is complete if the box shows a check mark.
③ When the setting is complete, click the <OK> button. The display returns to the [Custom Computation Configuration Menu] dialog box (Figure 4.2.2).

If you also want to configure custom computations in the output block after you finish configuring the input-block custom computations, proceed to the next section.

4.3 Step 3: Configuring Custom Computations in an Output Block

The flow of work in step 3 is as follows.

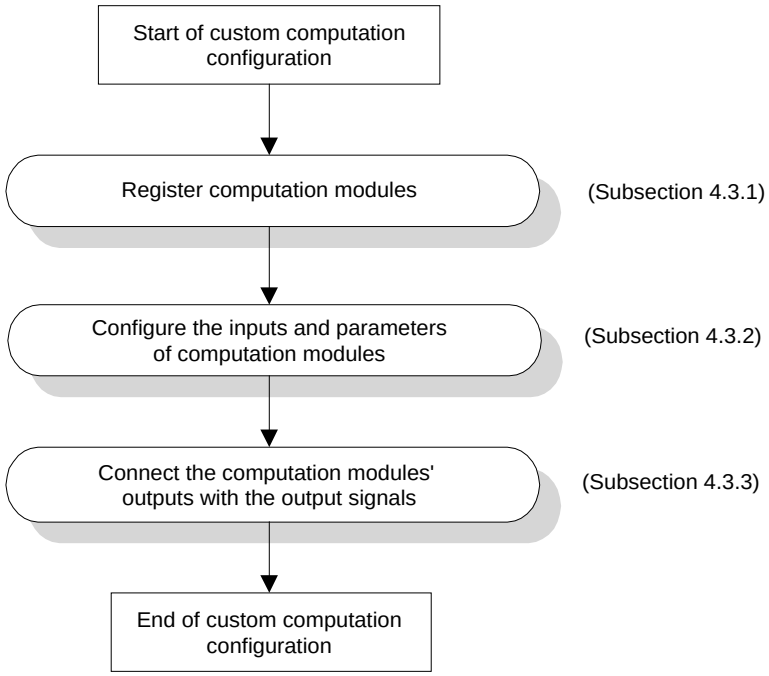

Figure 4.3.1 Flow of Work for Configuring Custom Computations in an Output Block

Figure 4.3.2 shows the [Custom Computation Configuration Menu] dialog box used to configure custom computations.

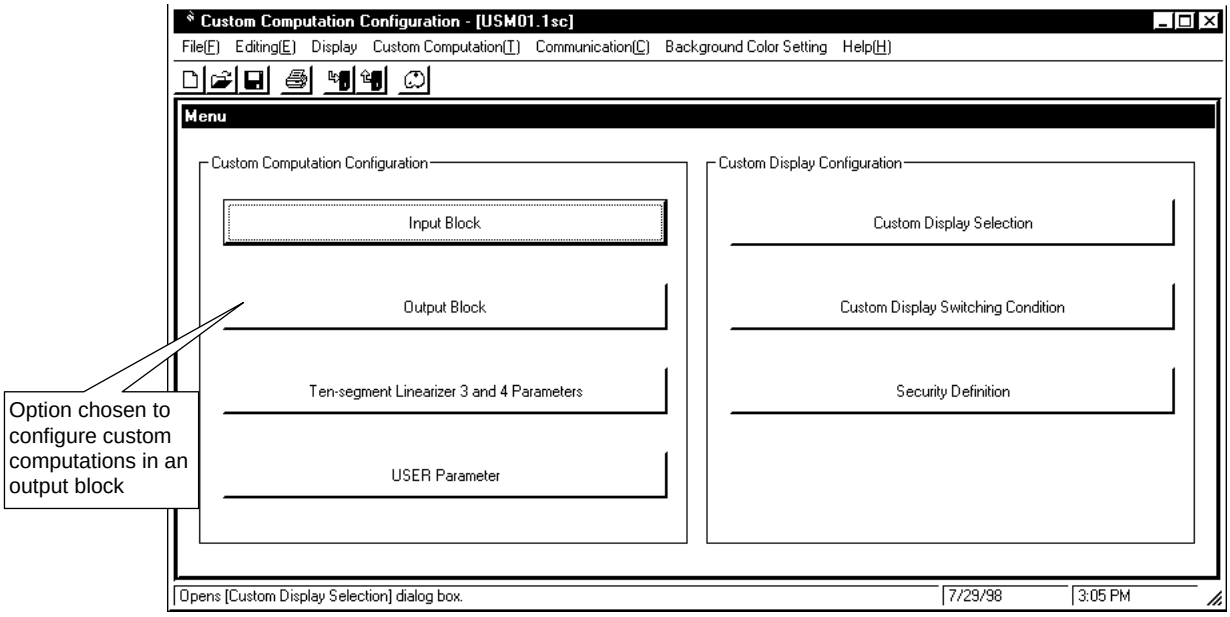

Figure 4.3.2 [Custom Computation Configuration Menu] Dialog Box

4.3.1 Step 3-1: Registering Computation Modules

- Explanation

This step involves registering the computation modules you want to perform operations in an output block, in the order they are executed. You can register a maximum of 30 computation modules.

NOTE

It is recommended that the output blocks included in the US mode of the US1000 be used as they are. The output selection modules listed below can be used to select the output type using the output selection parameter (MVS1 or MVS2). If you make any change to the way an output selection module is connected, the output in question may fail to function correctly.
Available output selection modules: OUTSEL1, OUTSEL11, OUTSEL12, OUTSEL13, OUTSEL2 and OUTSEL21

NOTE

When applying time-proportional PID computation, do not allow the computation to be carried out between the output selection module and an output signal (OUT1A, OUT2A, OUT1R or OUT2R).

Figure 4.3.3 shows an output block for single-loop control where a logical OR operation module is added. The following paragraphs explain how to add an OR module to the diagram of an output block for single-loop control.

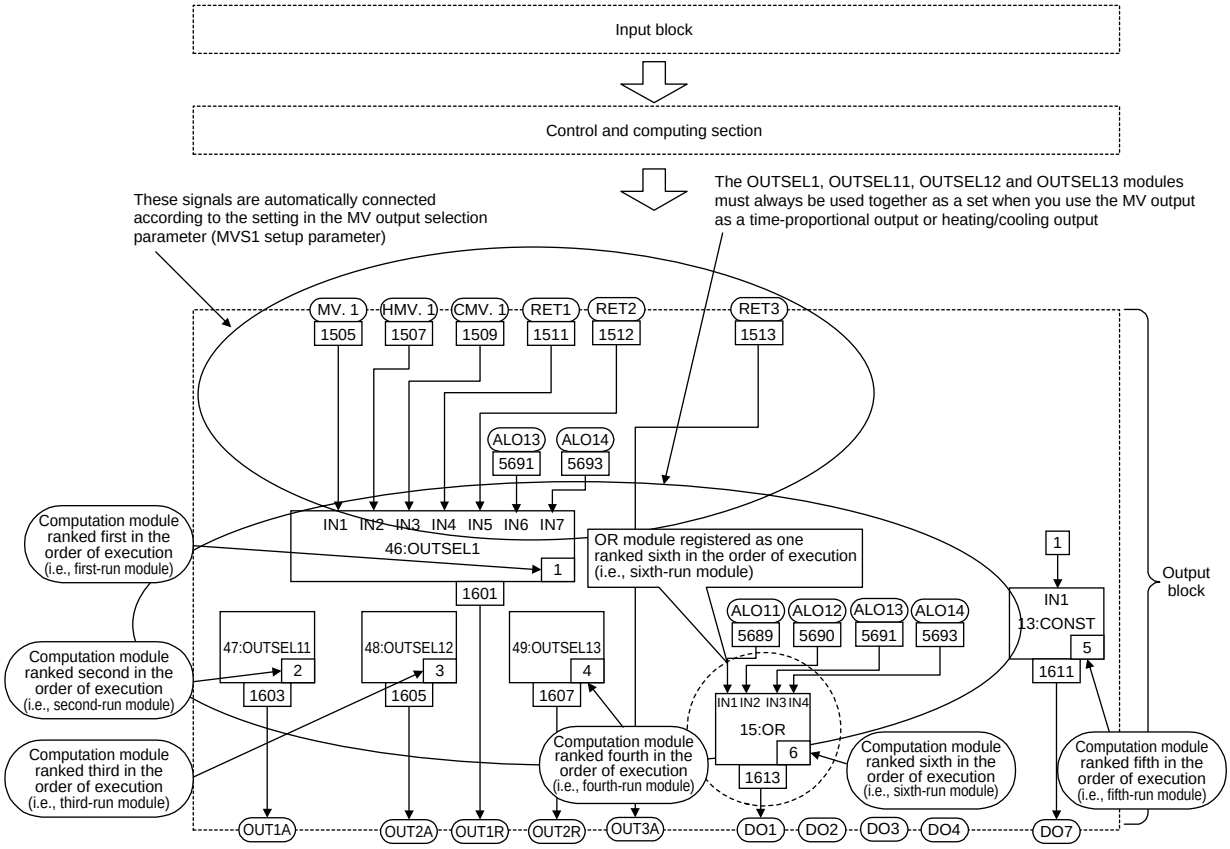

Figure 4.3.3 Addition of an OR Module to the Diagram of an Output Block for Single-loop Control

- Operation: Registering the Modules

TIP

Computation modules can be positioned anywhere within the output block. You should however locate them as close as possible to the output signals (PV.1, PV.2, CSV.1, CSV.2, MV.1, MV.2, HMV.1, HMV.2, CMV.1, CMV.2, RET1, RET2 and RET3) for the output block connected to the modules. This strategy makes wiring between module I/Os visible and simple.

① In the [Custom Computation Configuration Menu] dialog box (Figure 4.3.2), click the <Output Block> button. The [Output Block] dialog box appears. Figure 4.3.4 illustrates the [Output Block] dialog box for single-loop control.

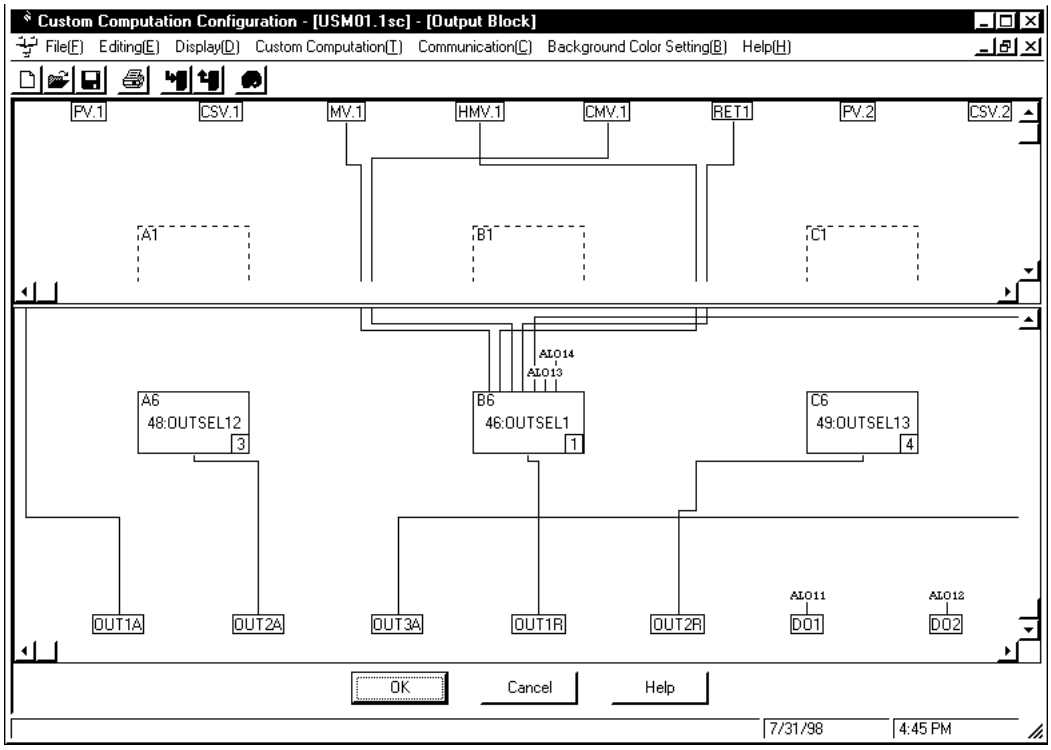

Figure 4.3.4 [Output Block] Dialog Box for Single-loop Control

≠ In the [Output Block] dialog box, double-click a blank box. The [Module Configuration] dialog box (Figure 4.3.5) appears. For ease of selection, modules are classified into four types; arithmetic operation, logical operation, special operation and special function.

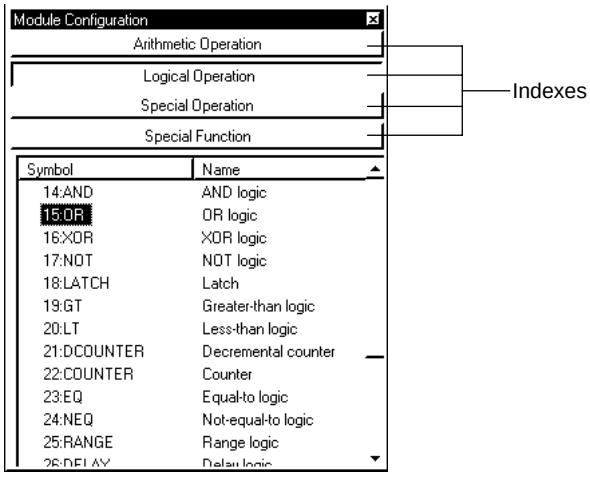

Figure 4.3.5 [Module Configuration] Dialog Box

③ Click the index that contains the computation module you register.

④ Double-clicking the module registers it.
Figure 4.3.6 shows an example where the <15: OR> option in the <Logical Operation> index is registered.

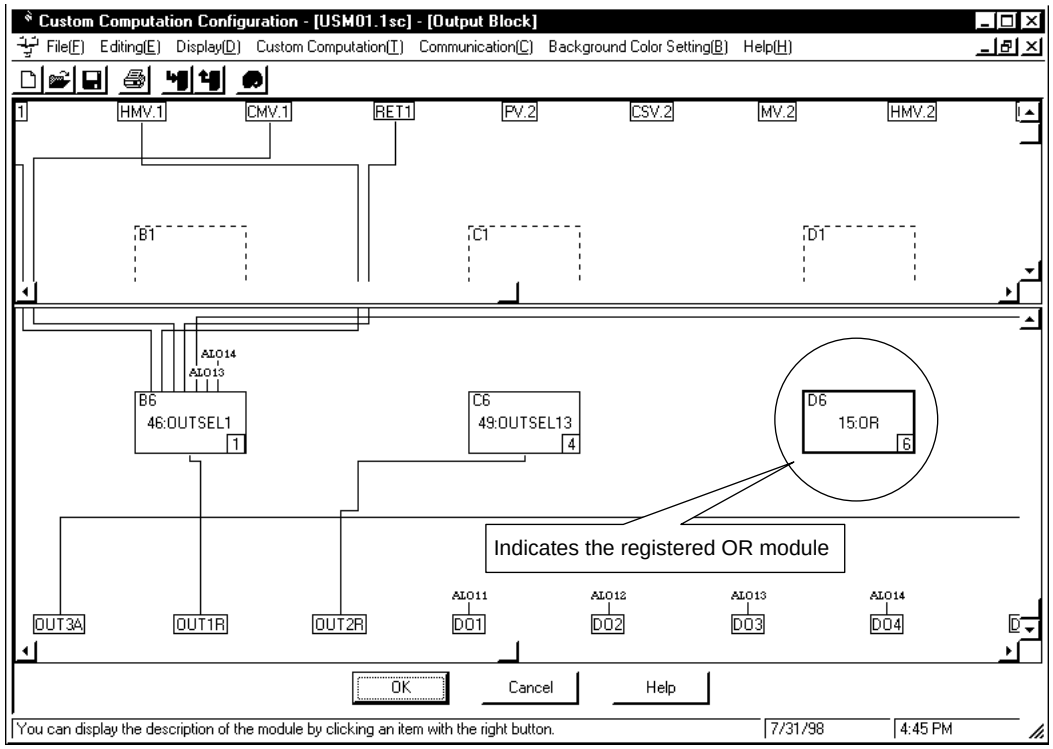

Figure 4.3.6 Example where an OR Module Is Registered as the Sixth-run Module

TIP

To view an explanation on the selected module, click the right mouse button in the [Module Configuration] dialog box. And then click the [Module Description]. The [Custom Computation Module Help for US1000] view appears. Figure 4.3.7 shows an explanation on an OR module.

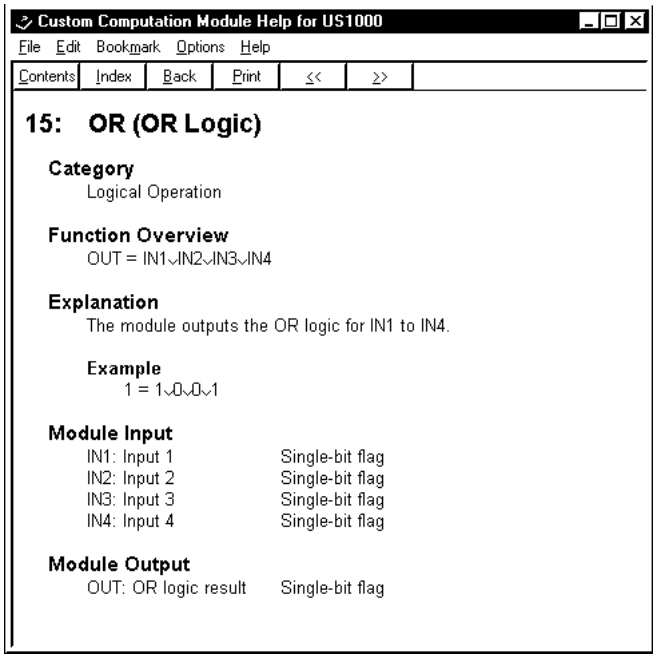

Figure 4.3.7 [Custom Computation Module Help for US1000] View

Repeat steps ≠ to ④ to register the other necessary computation modules also.

When you have finished registering modules, proceed to subsection 4.3.2, “Step 3-2: Configuring the Inputs and Parameters of Computation Modules.”

4.3.2 Step 3-2: Configuring the Inputs and Parameters of Computation Modules

- Explanation

Each computation module has inputs (8 maximum), parameters (4 maximum) and an output. This step involves configuring inputs and parameters only. The results of computation provided by the output are automatically stored, according to the module's order of execution, in the data storage area of the US1000 controller.

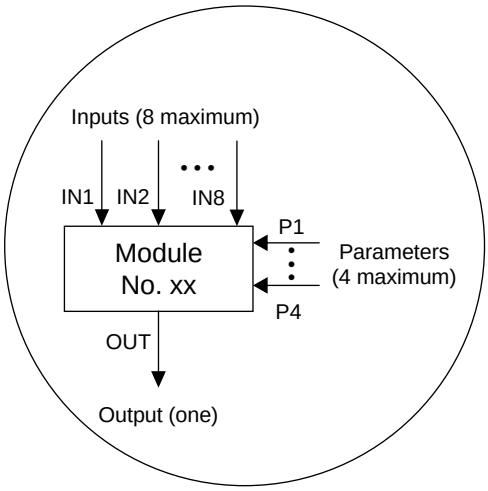

Figure 4.3.8 Conceptual View of Module Configuration

As was the case in the previous subsection, Figure 4.3.9 shows an output block for single-loop control where a logical OR operation module is added.
In this block diagram, the MV.1, HMV.1, CMV.1 RET1, RET2 and RET3 control and computing signals are connected to the inputs of an OUTSEL1 module ranked first in the order of execution. This module has no parameters. The OUTSEL11, OUTSEL12 and OUTSEL13 modules, which are ranked second, third and fourth in the order of execution, respectively, have neither inputs nor parameters. The constant value "1" is coupled with the input of the CONST module ranked fifth in the order of execution. In addition, the output statuses of alarms 1 to 4 are coupled with the inputs of the OR module which was registered in the previous subsection and is ranked sixth in the order of execution.

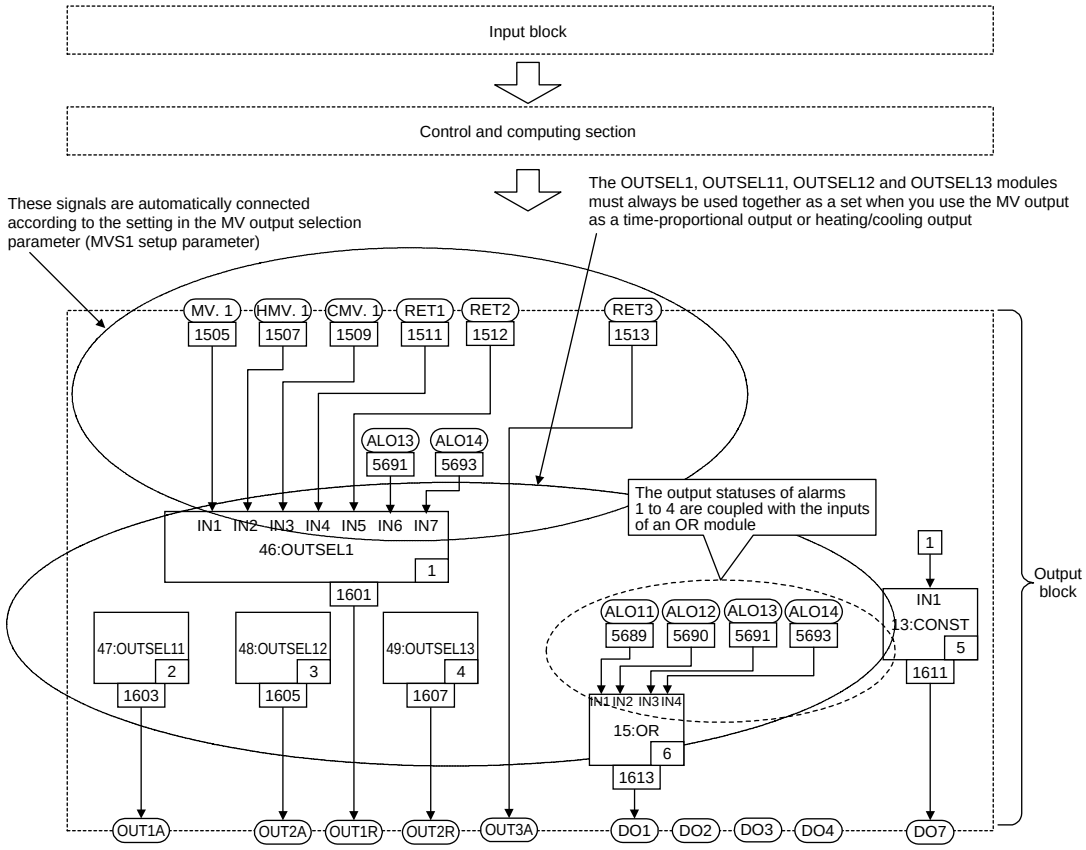

Figure 4.3.9 Coupling of the Output Statuses of Alarms 1 to 4 with the Inputs of an OR Module

- Operation: Configuring the Modules

This operation involves configuring the inputs and parameters of the computation modules.

① In the [Output Block] dialog box, click the module whose inputs and parameters you want to configure. In the example shown in Figure 4.3.6, click the OR module.

≠ From the tool menus, choose <Editing>, then <Connection>.
The [Module Setting] dialog box (Figure 4.3.10) appears.

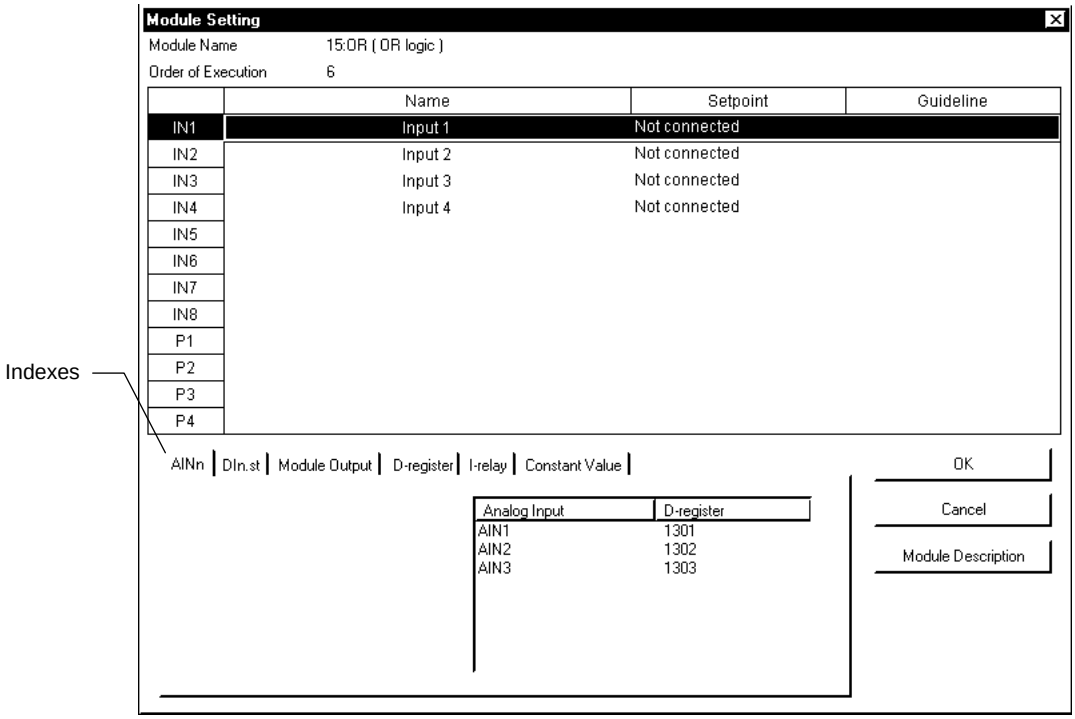

Figure 4.3.10 [Module Setting] Dialog Box

③ Click the input from among <IN1> to <IN8> or the parameter from among <P1> to <P4>, that needs to be configured.

④ Click the appropriate index.
Indexes are classified into <AINn>,<DIn.st>, <Module Output>, <D-register>, <I-relay> and <Constant Value>.

●Description of Indexes

Index	Description	Remarks
AINn	AIN1: Analog Input 1 AIN2: Analog Input 2 AIN3: Analog Input 3	Analog input data fed to input block
DIn.st	DI1.st: Contact Input 1 DI2.st: Contact Input 2 DI3.st: Contact Input 3 DI4.st: Contact Input 4 DI5.st: Contact Input 5 DI6.st: Contact Input 6 DI7.st: Contact Input 7	Contact input data fed to input block
Module Output	IMO1L to IMO30L (outputs of input-block computation modules) OMO1L to OMO30L (outputs of output-block computation modules)	See Appendix 4, "Areas for Storing Data Output from Computation Modules."
D-Register	Process data, mode data, operation parameters, setup parameters	See Sections 5.3 to 5.9 in the *Model LL1200 PC-based Custom Computation Building Tool—User's Reference* instruction manual (IM 5G1A11-02E).
I-Relay	ON/OFF status, ON status, OFF status, SVNO, PIDNO, timer flags, power-on flags, alarm flags, etc.	See Sections 5.10 to 5.13 in the *Model LL1200 PC-based Custom Computation Building Tool—User's Reference* instruction manual (IM 5G1A11-02E).
Constant Value	Configurable range: -19999 to 30000	

∞ Double-clicking the appropriate input source configures the selected index.
To configure the <Constant Value> index, type a value in the text box, and then press the <Enter> key. The figure below shows an example of how to configure <ALO11> to <ALO14>, alarm outputs 1 to 4.

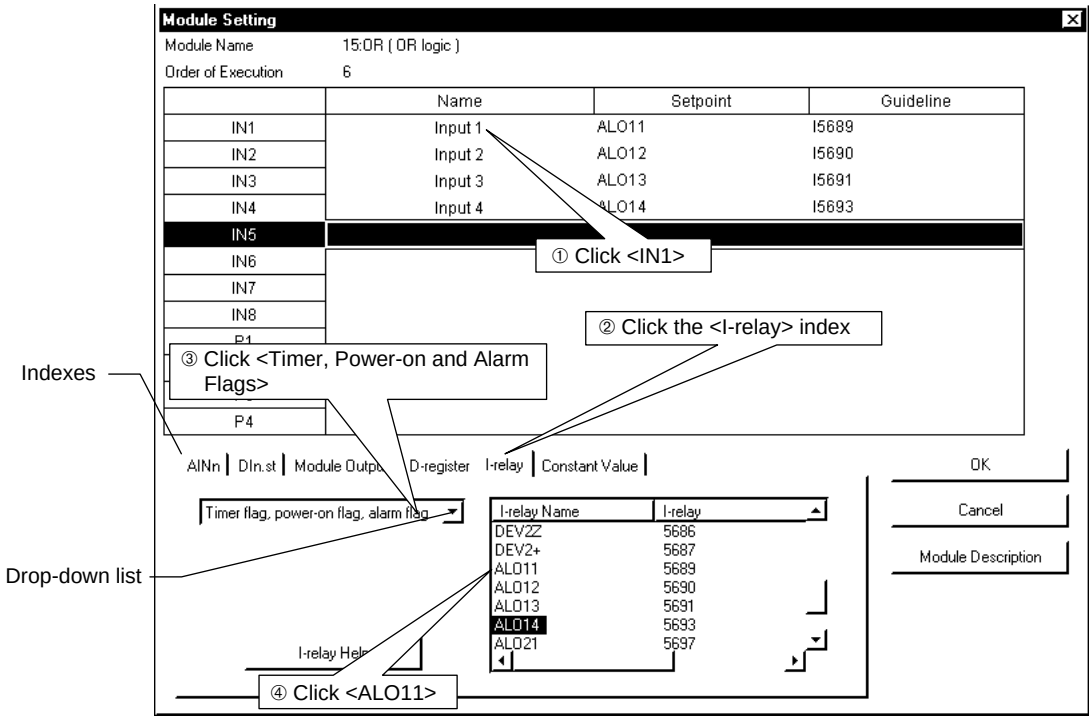

Figure 4.3.11 Configuring <ALO11> to <ALO14>, Alarm Outputs 1 to 4

± Repeat steps ③ to ∞ to configure the other necessary inputs among <IN1>to <IN8> or parameters among <P1> to <P4>.

≤ Clicking the <OK> button closes the [Module Setting] dialog box. When the dialog box closes, the computation modules are automatically wired according to the inputs and parameters you configured.

≥ Repeat steps ① to ≤ to configure other computation modules also.

When you have finished configuring the inputs and parameters of computation modules, proceed to subsection 4.3.3, “Step 3-3: Connecting Computation Modules to Output Signals.”

4.3.3 Step 3-3: Connecting Computation Modules to Output Signals

- Explanation

This step involves making the settings needed to pass the results of computation to the output signals after completing the module configuration and setting discussed so far.

As was the case in the previous subsection, Figure 4.3.12 shows an output block for single-loop control where a logical OR operation module is added.
In this block diagram, the outputs of the OUTSEL1, OUTSEL11, OUTSEL12 and OUTSEL13 modules, which are ranked first, second, third and fourth in the order of execution, are connected to OUT1R, OUT1A, OUT2A and OUT2R signals, respectively. The output of the CONST module ranked fifth in the order of execution is connected to the DO7 signal. In addition, the output of the OR module ranked sixth in the order of execution is connected to the DO1 signal.

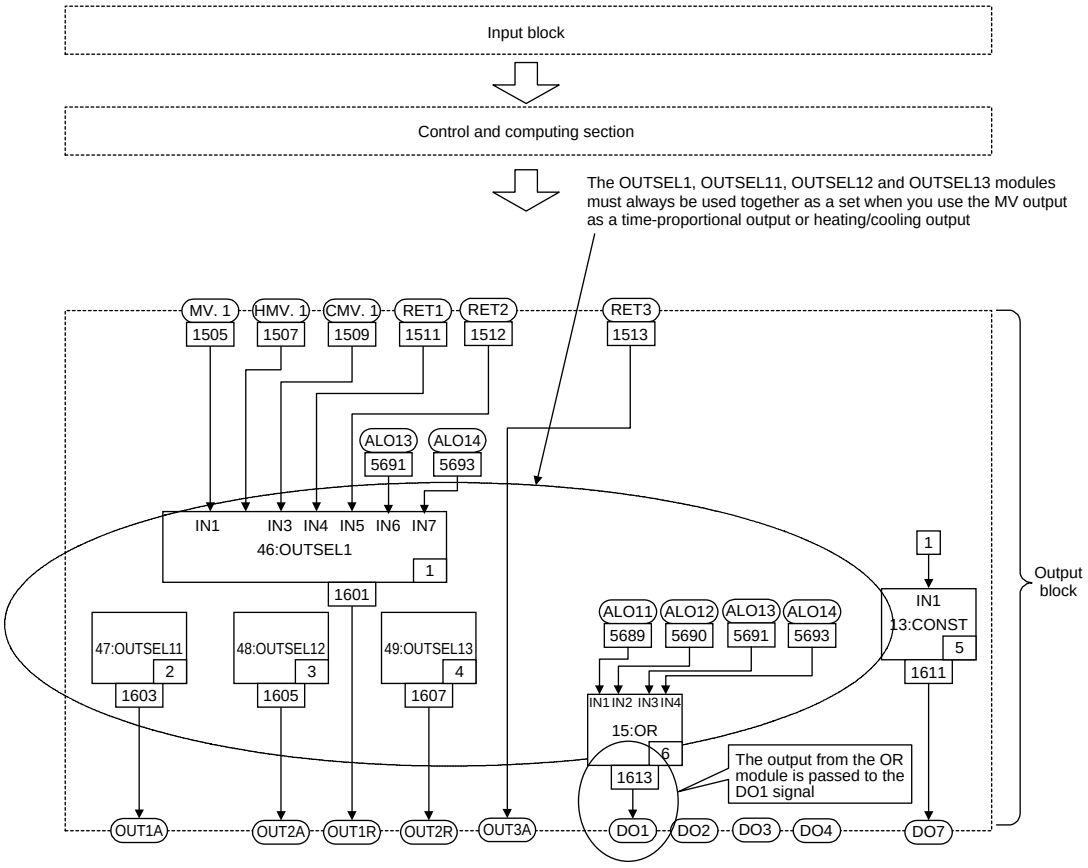

Figure 4.3.12 Connection of the OR Module’s Output to an Output Signal

- Operation: Connecting to Output Signals

This operation involves making the settings needed to pass the results of computation in the output block to output signals.

① In the [Output Block] dialog box (Figure 4.3.13), click the appropriate output signal.

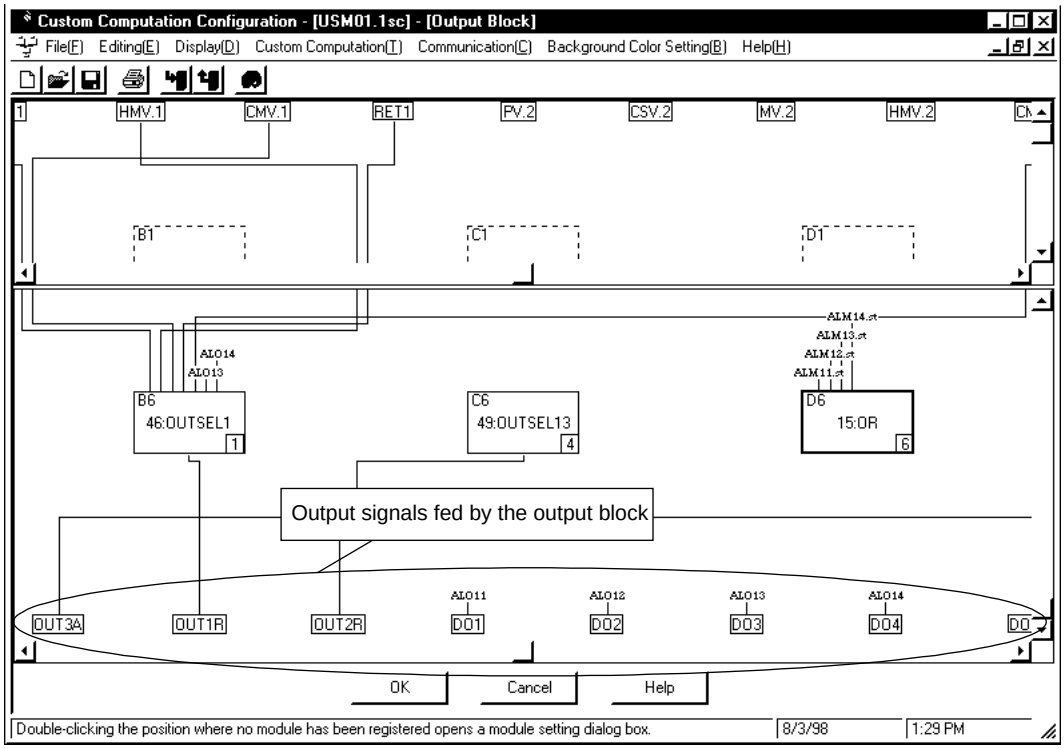

Figure 4.3.13 Output Signals Fed by the Output Block

●Description of Output Signals Fed by the Output Block

Output Signal Fed by Output Block	Description
OUT1A	Analog output 1 (current/voltage pulse)
OUT2A	Analog output 2 (current/voltage pulse)
OUT3A	Analog output 3 (voltage)
OUT1R	MV1 relay output
OUT2R	MV2 relay output
DO1	Contact output 1 (relay)
DO2	Contact output 2 (relay)
DO3	Contact output 3 (relay)
DO4	Contact output 4 (open collector)
DO5	Contact output 5 (open collector)
DO6	Contact output 6 (open collector)
DO7	Contact output 7 (open collector)

≠ From the tool menus, choose <Editing>, then <Connection>.
The [Setting of Output Block Connection Assignment] dialog box (Figure 4.3.14) appears.

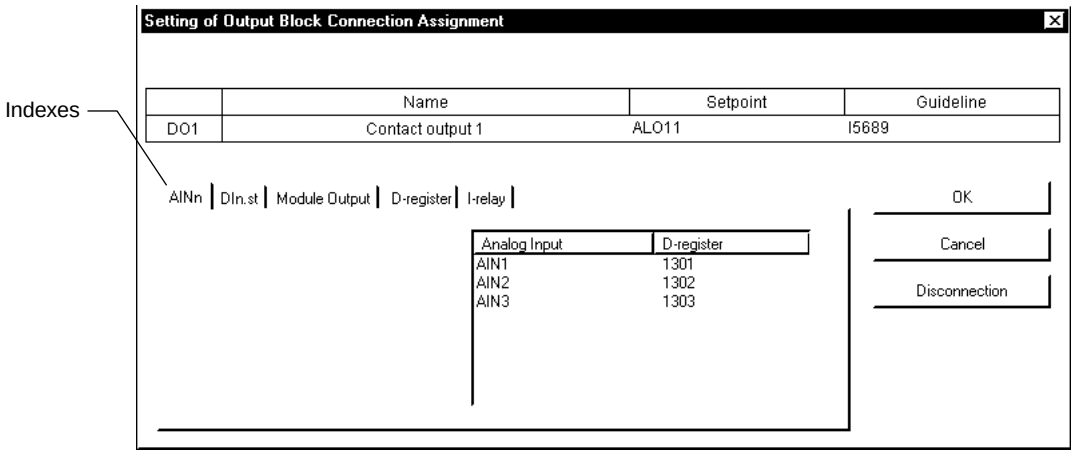

Figure 4.3.14 [Setting of Output Block Connection Assignment] Dialog Box

③ Click the appropriate index.
Indexes are classified into <AINn>, <DIn.st>, <Module Output>, <D-register>, <I-relay> and <Constant Value>.

●Description of Indexes

Index	Description	Remarks
AINn	AIN1: Analog Input 1 AIN2: Analog Input 2 AIN3: Analog Input 3	Analog input data fed to input block
DIn.st	DI1.st: Contact Input 1 DI2.st: Contact Input 2 DI3.st: Contact Input 3 DI4.st: Contact Input 4 DI5.st: Contact Input 5 DI6.st: Contact Input 6 DI7.st: Contact Input 7	Contact input data fed to input block
Module Output	IMO1L to IMO30L (outputs of input-block computation modules) OMO1L to OMO30L (outputs of output-block computation modules)	See Appendix 4, “Areas for Storing Data Output from Computation Modules.”
D-Register	Process data, mode data, operation parameters, setup parameters	See Sections 5.3 to 5.9 in the *Model LL1200 PC-based Custom Computation Building Tool—User’s Reference* instruction manual (IM 5G1A11-02E).
I-Relay	ON/OFF status, ON status, OFF status, SVNO, PIDNO, timer flags, power-on flags, alarm flags, etc.	See Sections 5.10 to 5.13 in the *Model LL1200 PC-based Custom Computation Building Tool—User’s Reference* instruction manual (IM 5G1A11-02E).
Constant Value	Configurable range: -19999 to 30000	

④ Double-clicking the appropriate input source configures the selected index.
To configure the <Constant Value> index, type a value in the text box, and then press the <Enter> key. The figure below shows an example of how to configure <OMO6L>, the sixth output-block computation module to be carried out.

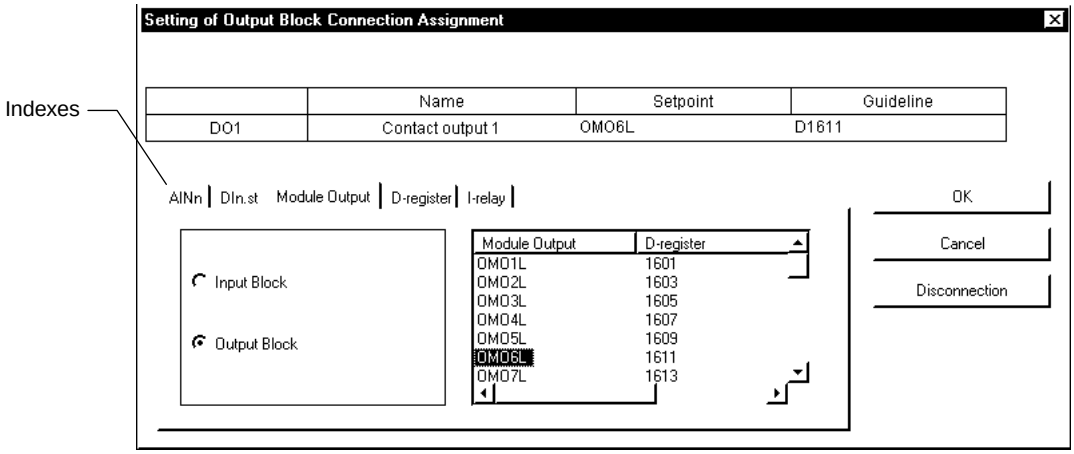

Figure 4.3.15 Configuring <OMO6L>, the Sixth Output-block Computation Module to Be Carried Out

∞ Clicking the <OK> button after the configuration is completed closes the [Setting of Output Block Connection Assignment] dialog box. When the dialog box closes, the computation modules are automatically wired according to the settings you defined.

± Repeat steps ① to ∞ to define the connection of other necessary output signals also.

Figure 4.3.16 shows the output block with the configuration and setting of computation modules, as well as their connection to the output signals, completed.

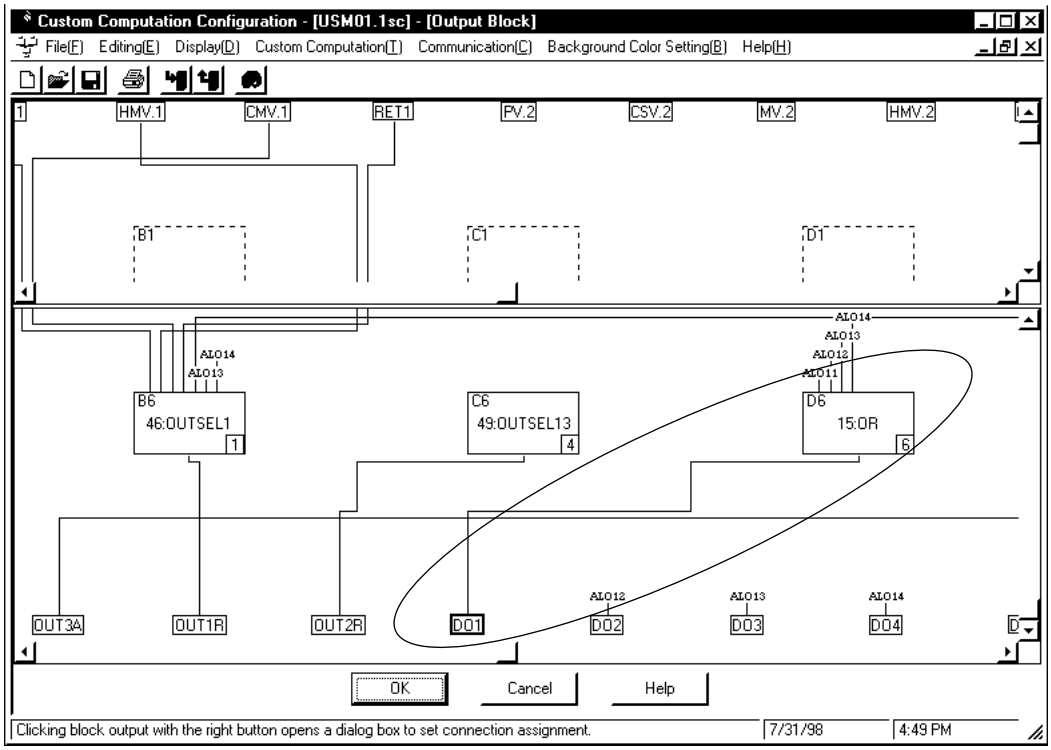

Figure 4.3.16 Registration of an OR Module with the Diagram of an Output Block for Single-loop Control (Finished View)

Now, you have finished configuring custom computations in a output block.

4.4 Step 4: Configuring the Parameters of Ten-segment Linearizers 3 and 4 (as necessary)

The settings of the parameters of ten-segment linearizers 3 and 4 can be used only if the ten-segment linearizers 3 and 4 (PLINE3 and PLINE4) modules are registered in an input or output block. Since these functions are designed for exclusive use with custom computations, the available unit of computation is “ABS0 (-19999 to 30000, with the maximum span of 30000)” only.

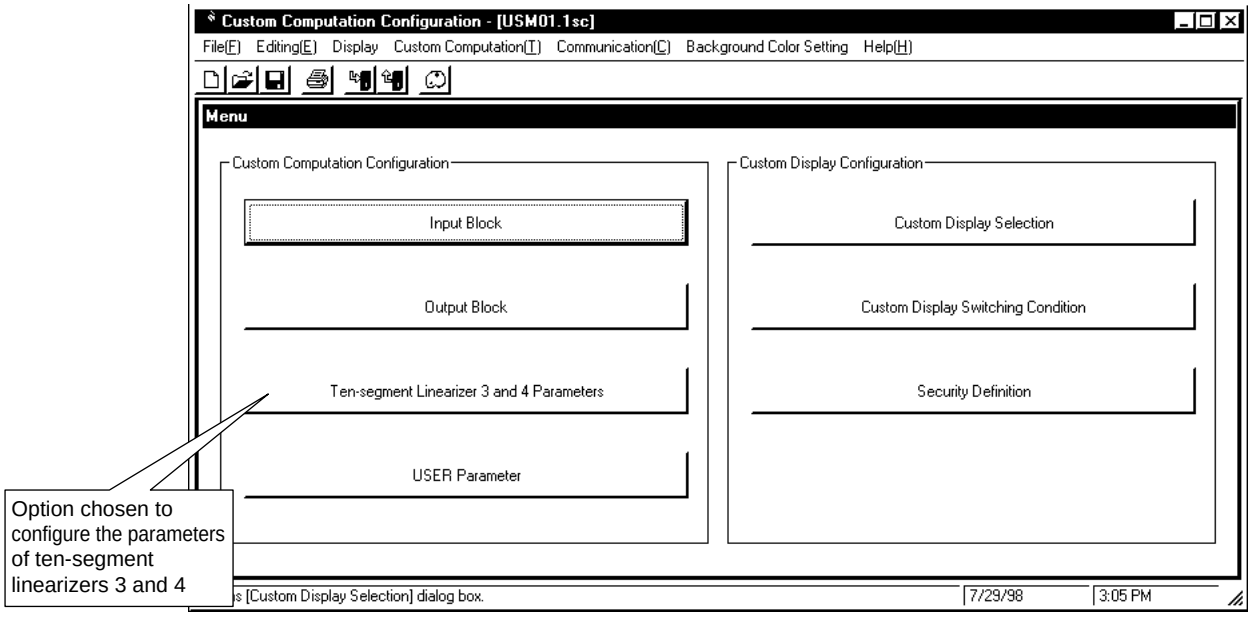

Figure 4.4.1 [Custom Computation Configuration Menu] Dialog Box

- Operation

① [illegible]

Parameter Setting for Ten-segment Linearizer 3 and 4

	n=3	n=4
n.X1(Ten-segment linearizer input 1)	0	0
n.Y1(Ten-segment linearizer output 1)	0	0
n.X2(Ten-segment linearizer input 2)	0	0
n.Y2(Ten-segment linearizer output 2)	0	0
n.X3(Ten-segment linearizer input 3)	0	0
n.Y3(Ten-segment linearizer output 3)	0	0
n.X4(Ten-segment linearizer input 4)	0	0
n.Y4(Ten-segment linearizer output 4)	0	0
n.X5(Ten-segment linearizer input 5)	0	0
n.Y5(Ten-segment linearizer output 5)	0	0
n.X6(Ten-segment linearizer input 6)	0	0
n.Y6(Ten-segment linearizer output 6)	0	0
n.X7(Ten-segment linearizer input 7)	0	0
n.Y7(Ten-segment linearizer output 7)	0	0
n.X8(Ten-segment linearizer input 8)	0	0
n.Y8(Ten-segment linearizer output 8)	0	0
n.X9(Ten-segment linearizer input 9)	0	0
n.Y9(Ten-segment linearizer output 9)	0	0
n.X10(Ten-segment linearizer input 10)	0	0
n.Y10(Ten-segment linearizer output 10)	0	0
n.X11(Ten-segment linearizer input 11)	0	0
n.Y11(Ten-segment linearizer output 11)	0	0

OK

Cancel

[illegible]

[illegible]

≠ [illegible]

③ [illegible]

[illegible]

4.5 Step 5: Configuring USER Parameters (as necessary)

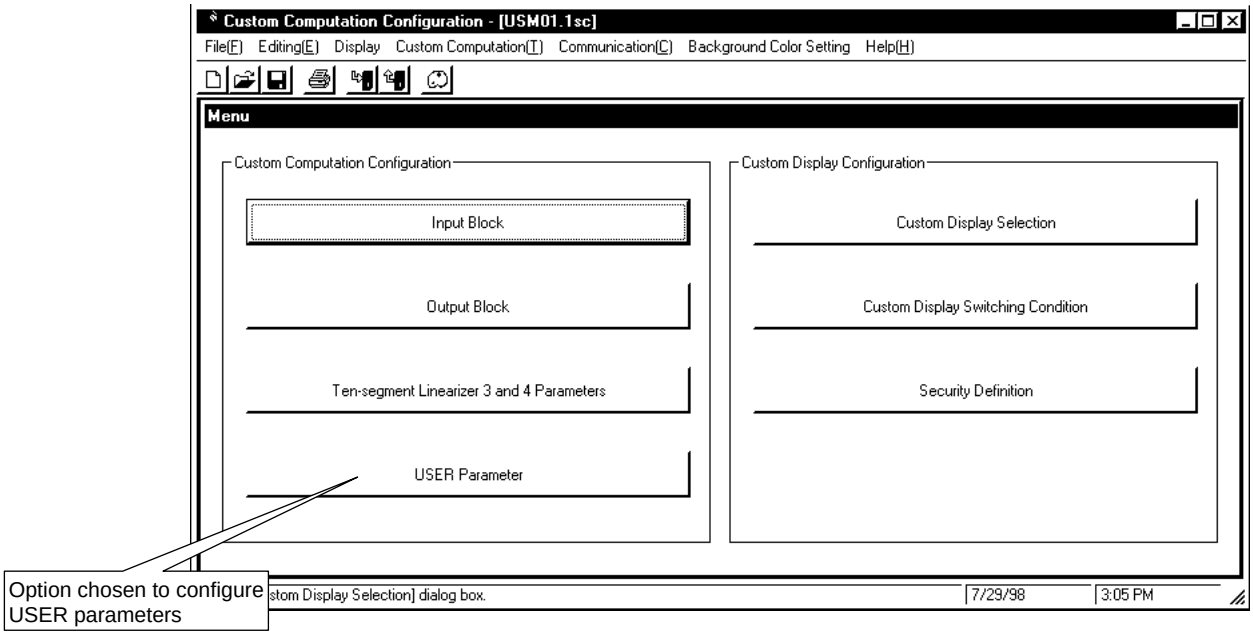

Figure [Custom Computation Configuration Menu] Dialog Box

- Operation

① In the [Custom Computation Configuration Menu] dialog box, select the USER Parameter button. The [USER Parameters Definition] dialog box appears.

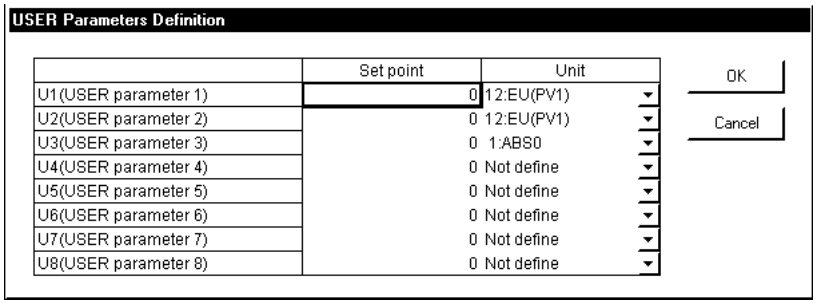

Figure [USER Parameters Definition] Dialog Box

≠ For the items below, choose the USER parameter you

Unit	Description
%	% data type
ABS0	Absolute-vale data without decimal point
ABS1	Absolute-vale data with one decimal place
ABS2	Absolute-vale data with two decimal places
ABS3	Absolute-vale data with three decimal places
ABS4	Absolute-vale data with four decimal places
EU(AIN1)	Engineering unit of AIN1 range
EUS(AIN1)	Engineering-unit span of AIN1 range
EU(AIN2)	Engineering unit of AIN2 range
EUS(AIN2)	Engineering-unit span of AIN2 range
EU(AIN3)	Engineering unit of AIN3 range
EUS(AIN3)	Engineering-unit span of AIN3 range
EU(PV1)	Engineering unit of PV1 range
EUS(PV1)	Engineering-unit span of PV1 range
EU(PV2)	Engineering unit of PV2 range
EUS(PV2)	Engineering-unit span of PV2 range

③ Type the description for the USER parameter in the <Description> text box.

NOTE

If you specify an EU (engineering unit) or EUS (engineering-unit span), the default is 0.0 (a value equivalent to 0%). This is because you need to set the range first for custom computation ...

④ Repeat steps ≠ and ③ to configure the necessary USER parameters.

∞ Click the <OK> button.

The [USER Parameter Definition] dialog box closes.

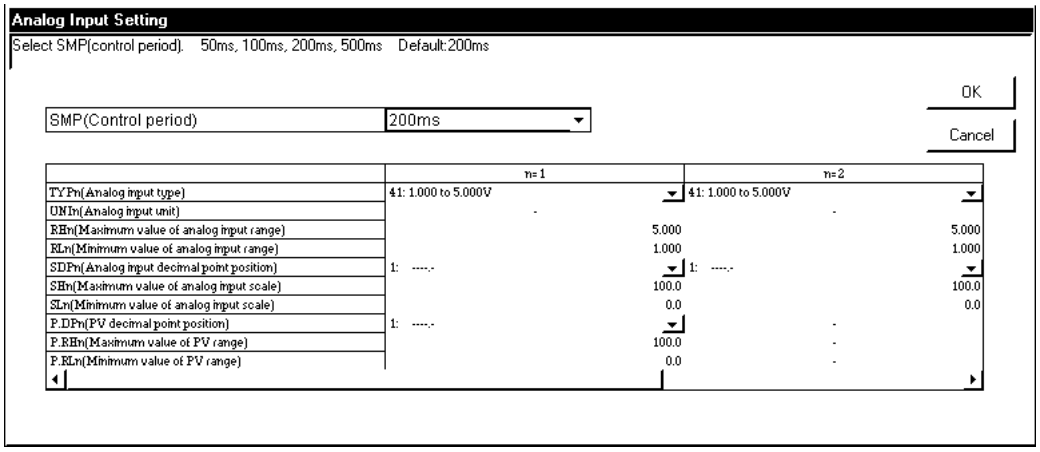

Fig.3 [Analog Input Setting] Dialog Box (Parameter Setting Tool)

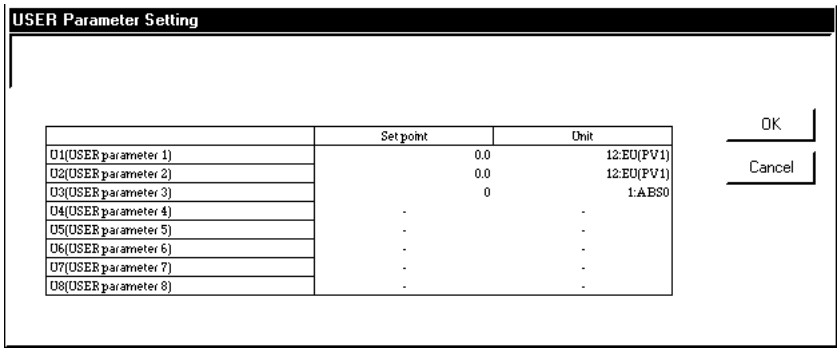

Fig.4 [USER Parameter Setting] Dialog Box (Parameter Setting Tool)

■ Example of Using USER Parameters

Figure 4.5 shows a sample block for a case where the controller mode (US mode) is loop control with PV switching.

Switching between PV input 1 and PV input 2 is achieved using the SELECT2 module. The SELECT2 module requires parameters, and thus, USER parameters U1, U2 and U3 are coupled with the input parameters.

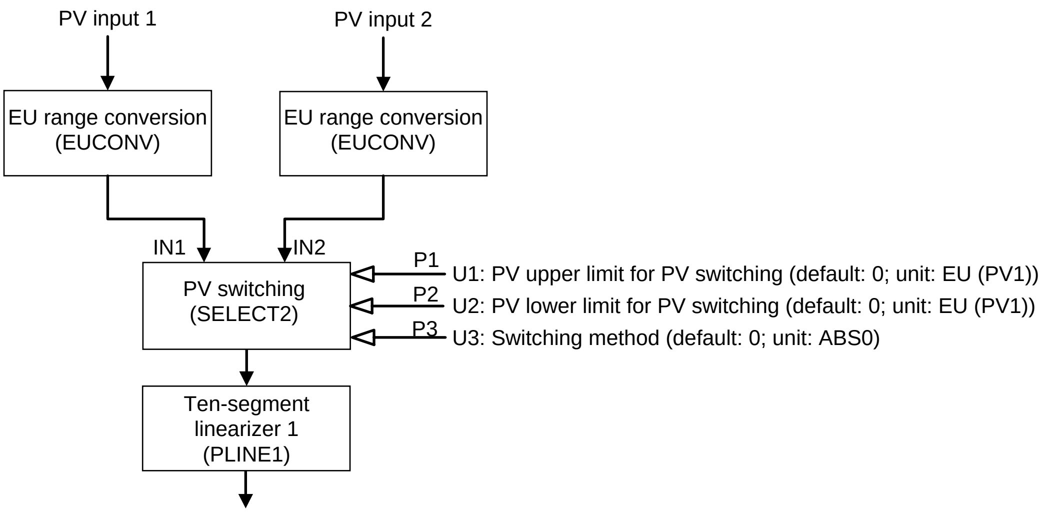

Figure 4.5 Example of Using User Parameters

TIP

USER parameters are used for the controller mode (US mode) 6, 7, 14 or 15 standard with the US1000.

See Also

Controller modes (US modes) in Chapter 2, "Controller Modes (US Modes)" in the *US1000 Digital Indicating Controller-Functions* instruction manual (IM 5D1A01-02E)

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5. Basic Operations for Configuring Custom Displays and Relevant Explanations

This chapter explains the procedure for configuring custom displays.

For details on how to prepare the LL1200 tool for use, see Chapter 2, “Setup.” For an overview of the procedure for configuring custom computations and displays, see Chapter 3, “Using the LL1200 Tool.”

Also refer to Chapter 6, “Specifications of Custom Display Functions,” in the *Model LL1200 PC-based Custom Computation Building Tool—User’s Reference* instruction manual (IM 5G1A11-02E), for details on the available displays and the data items they show.

In order to configure custom displays, you must follow the steps shown below.

- Step 1: Choosing the Method of Custom Display Configuration (if no custom computations are configured yet) ---------- (Section 5.1)
- Step 2: Choosing the Custom Display(s) ---------- (Section 5.2.1)
- Step 3: Setting Conditions Necessary to Switch to Custom Displays ---------- (Section 5.2.2)
- Step 4: Defining the Security Function (as necessary) ---------- (Section 5.3)

When you finish configuring custom computations and displays, download the created data to the US1000 controller (see Section 8.2). Then, verify their performance using the custom computation monitor (see Chapter 11).

5.1 Step 1: Choosing the Method of Custom Display Configuration

If you have configured custom computations already, refer to Section 5.2 and subsequent subsections/paragraphs.

If you are configuring custom displays and no custom computations have been configured yet, follow the instructions below to retrieve the [Custom Display Configuration Menu] dialog box.

When you start the LL1200 tool, a dialog box appears as shown in Figure 5.1.1.

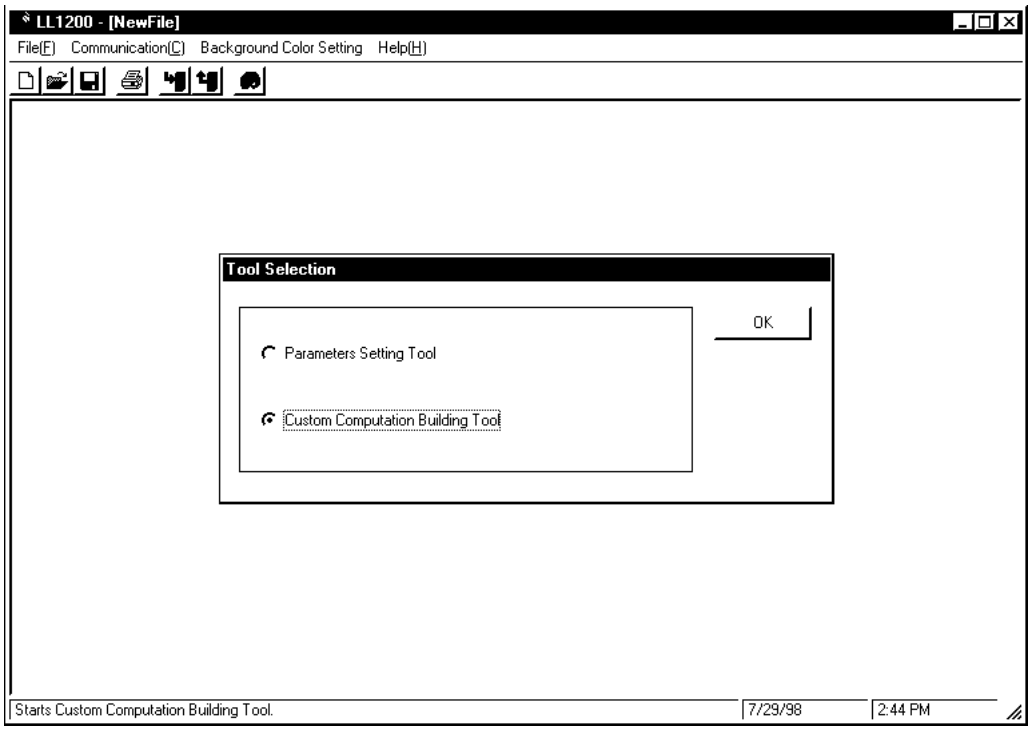

Figure 5.1.1 [Tool Selection] Dialog Box

Click the <Custom Computation Building Tool> option button, and then the <OK> button. The [New/Modification] dialog box (Figure 5.1.2) appears.

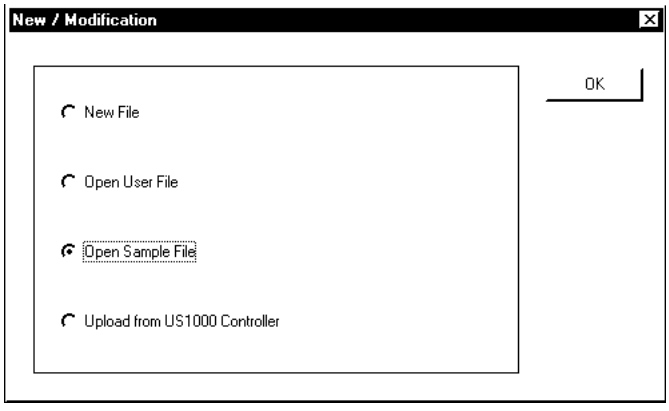

Figure 5.1.2 [New/Modification] Dialog Box

There are four ways of configuring custom displays, as described below. Choose one of these four ways.

TIP

If you are configuring custom displays for the first time, it is advisable that you use a sample file.

Section 5.2, “Step 2: Configuring Custom Displays,” uses a sample file to explain all the operating procedures in that section.

① If you are configuring a custom display from scratch, choose <New File>.
Click the <New File> option button, then the <OK> button. The [Specify Suffix Code and Controller Type] dialog box (Figure 5.1.3) appears.

≠ If you are configuring a custom display using a user file, choose <Open User File>.
Click the <Open User File> option button, then the <OK> button. The [Open User File] dialog box (Figure 5.1.4) appears.

③ If you are configuring a custom display using a sample file, choose <Open Sample File>.
Click the <Open Sample File> option button, then the <OK> button. The [Open Sample File] dialog box (Figure 5.1.5) appears.

④ If you are configuring a custom display by uploading data from the US1000 controller, choose <Upload from US1000 Controller>.
Click the <Upload from US1000 Controller> option button, then the <OK> button. The [Upload from US1000 Controller] dialog box (Figure 5.1.6) appears.

NOTE

When uploading custom computation information from US1000 controller, set the controller mode (US mode) to “21.”

■ [Specify Suffix Code and Controller Type] Dialog Box

If you choose <New File> in the [New/Modification] dialog box (Figure 5.1.2), the [Specify Suffix Code and Controller Type] dialog box (Figure 5.1.3) appears. This dialog box also appears if you choose <Open Sample File>.

In the [Specify Suffix Code and Controller Type] dialog box, click the <OK> button. The [Custom Display Configuration Menu] dialog box (Figure 5.1.7) appears.

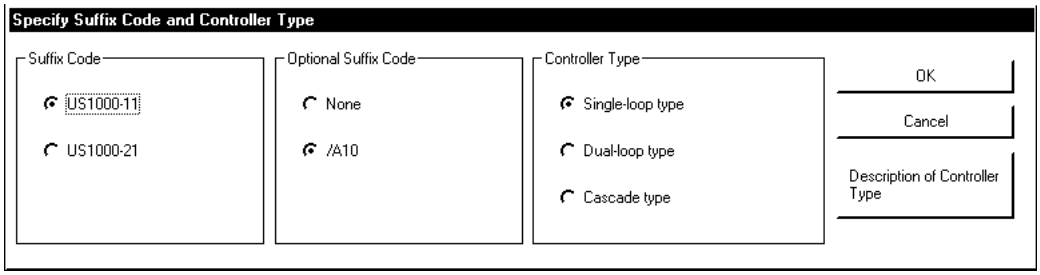

Figure 5.1.3 [Specify Suffix Code and Controller Type] Dialog Box

●Explanation of the [Specify Suffix Code and Controller Type] Dialog Box

The suffix code must be specified because the code needs to be verified when you download information on the custom computations you configured using the LL1200 tool, to the US1000 controller.

Likewise, the controller type must be specified because you must decide upon the desired operating conditions for the US1000 controller.

Controller Type	Selection Criteria
Single-loop type	The following are used: • One PID computation • Switching between loop-1 CAS, AUTO and MAN modes • Switching between RUN/STOP modes • Switching between loop-1 Open/Close modes
Dual-loop type	The following are used: • Two PID computations • Switching between loop-1 CAS, AUTO and MAN modes • Switching between loop-2 CAS, AUTO and MAN modes • Switching between RUN/STOP modes • Switching between loop-1 Open/Close modes • Switching between loop-2 Open/Close modes
Cascade type	The following are used: • Two PID computations • Switching between RUN/STOP modes • Switching between loop-1 CAS, AUTO and MAN modes • Switching between loop-2 Open/Close modes

NOTE

Data cannot be downloaded to US1000 controllers whose suffix codes do not match the one you specified.

Check the suffix and optional suffix codes of the US1000 controller to which you want to download data.

■ **Open User File**

In the [Open User File] dialog box, choose the file you want to use and click the <Open> button. The [Custom Display Configuration Menu] dialog box (Figure 5.1.7) appears.

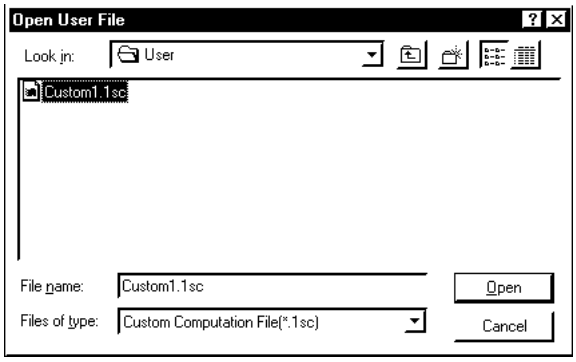

Figure 5.1.4 [Open User File] Dialog Box

■ **Open Sample File**

In the [Open Sample File] dialog box, choose the file you want to use and click the <Open> button. The [Specify Suffix Code and Controller Type] dialog box (Figure 5.1.3) appears. In the dialog box, click the <OK> button. The [Custom Display Configuration Menu] dialog box (Figure 5.1.7) appears.

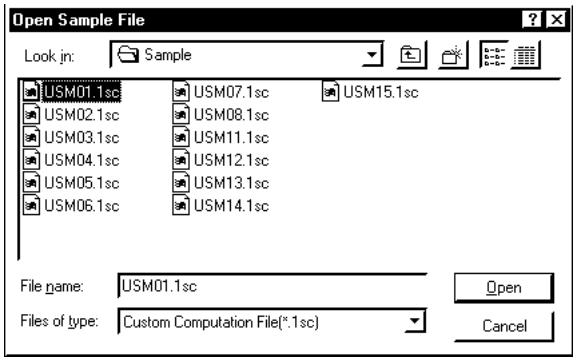

Figure 5.1.5 [Open Sample File] Dialog Box

■ Upload from US1000 Controller

If you choose <Upload from US1000 Controller> in the [New/Modification] dialog box, the [Upload from US1000 Controller] dialog box (Figure 5.1.6) appears.

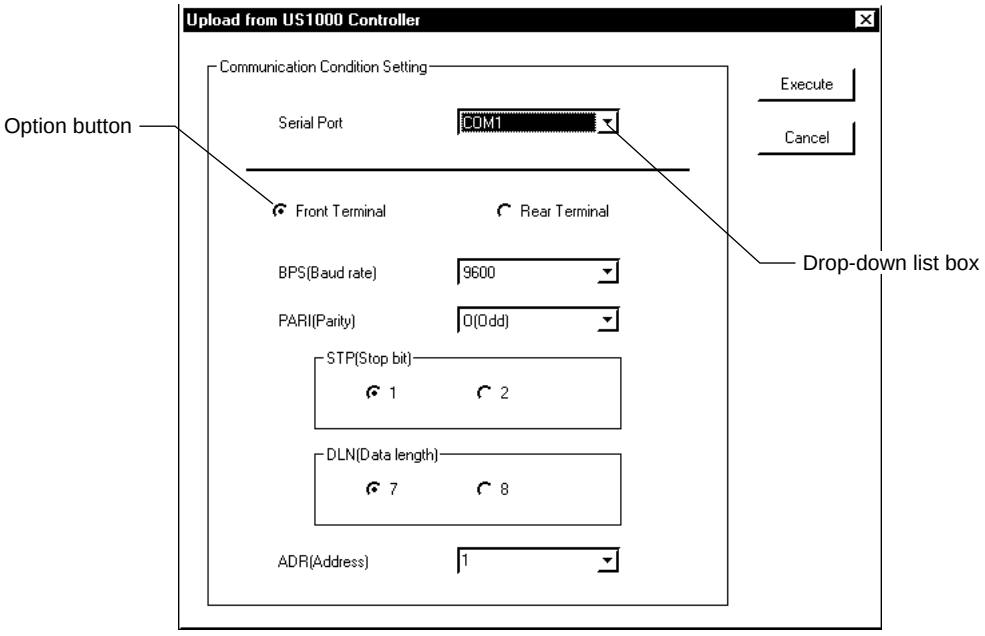

Figure 5.1.6 [Upload from US1000 Controller] Dialog Box

You can communicate with the US1000 controller in either of the following two ways.

●Communication Using the Front-panel Optical Interface

① In the [Upload from US1000 Controller] dialog box, click the <Front Terminal> option button.
≠ From the <Serial Port> drop-down list box, select a communication port of the personal computer.
③ Click the <Execute> button. Data are uploaded from the US1000 controller.
④ When uploading is complete, the [Custom Display Configuration Menu] dialog box (Figure 5.1.7) appears.
∞ For the subsequent operations, see Section 5.2 and the sections/subsections that follow.

●Communication Using the RS-485 Interface

① In the [Upload from US1000 Controller] dialog box, click the <Rear Terminal> option button.
≠ From the <Serial Port> drop-down list box, select a communication port of the personal computer. Then, from the <Baud Rate>, <Parity> and <Address> drop-down list boxes, choose the options of the three communication conditions, the baud rate, parity and address. Also choose the options of the two communication conditions, the stop bit and data length, by clicking the appropriate option buttons in the <Stop bit> and <Data Length> sections.
Match the communication conditions of the US1000 controller with those of the personal computer.
③ Click the <Execute> button. The LL1200 tool begins uploading data from the US1000 controller.
④ When uploading is complete, the [Custom Display Configuration Menu] dialog box (Figure 5.1.7) appears.
∞ For the subsequent operations, see Section 5.2 and the sections/subsections that follow.

NOTE

If you have chosen RS-485 communication, set the communication protocol of the US1000 controller to [PC-link Communication]. Communication is not possible if you set the protocol to [PC-link Communication with Sum Check], [Modbus (RTU)] or [Modbus (ASCII)].

■ Custom Display Configuration Menu

The dialog box shown below is the first to appear when you configure custom Display. For further operations after this Custom Display Configuration Menu dialog box, see Section 5.2 and subsections that follow.

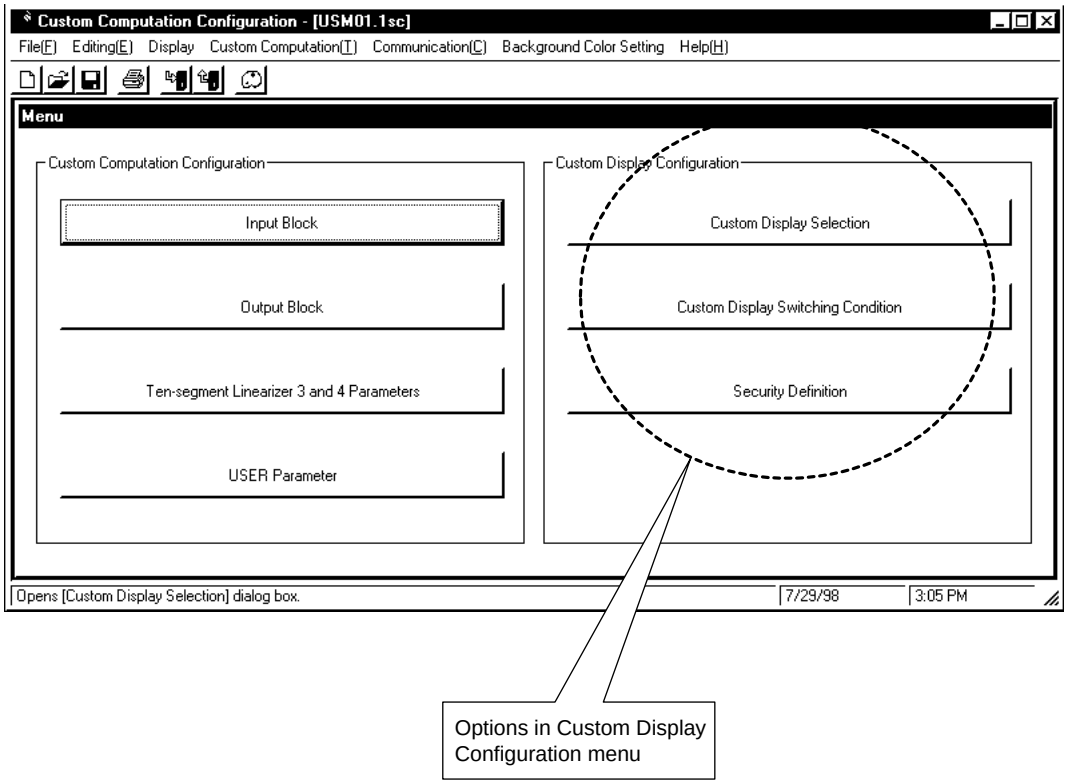

Figure 5.1.7 [Custom Display Configuration Menu] Dialog Box

5.2 Step 2: Configuring Custom Displays

The flow of work in step 2 is as follows.

This section explains the work flow using the single-loop control sample file (USM01.1SC). Read the sample file onto your personal computer before you start this step.

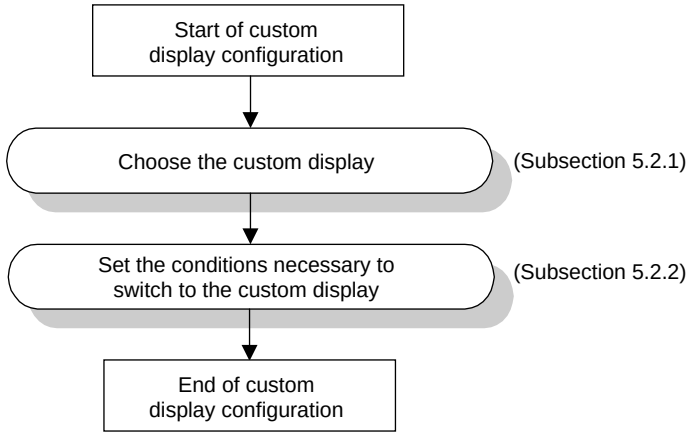

Figure 5.2.1 Flow of Work for Configuring Custom Displays

Figure 5.2.2 shows the [Custom Display Configuration Menu] dialog box used to configure custom displays.

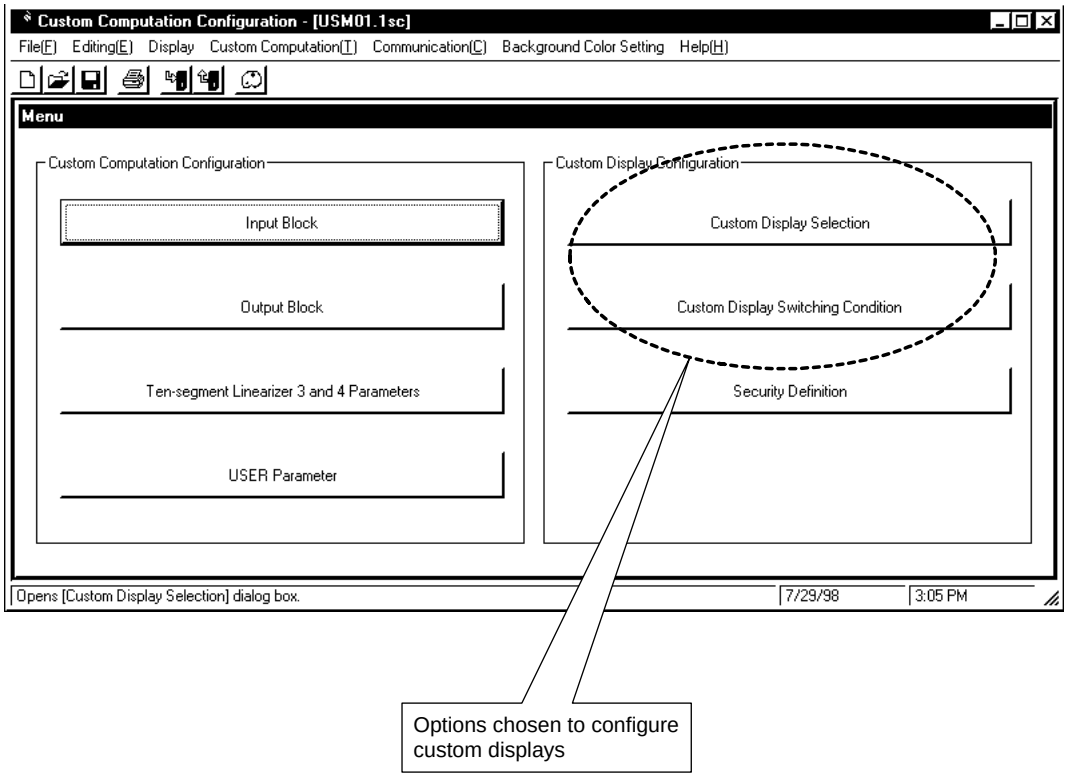

Figure 5.2.2 [Custom Display Configuration Menu] Dialog Box

5.2.1 Step 2-1: Choosing the Custom Display

- Explanation

Two built-in custom displays, the PV1 & SV1 display and PV1 & MV1 display, are available for single-loop control, as shown in Figure 5.2.3.

This step explains the procedure for registering the Loop-1 Alarm display as an additional display for single-loop control.

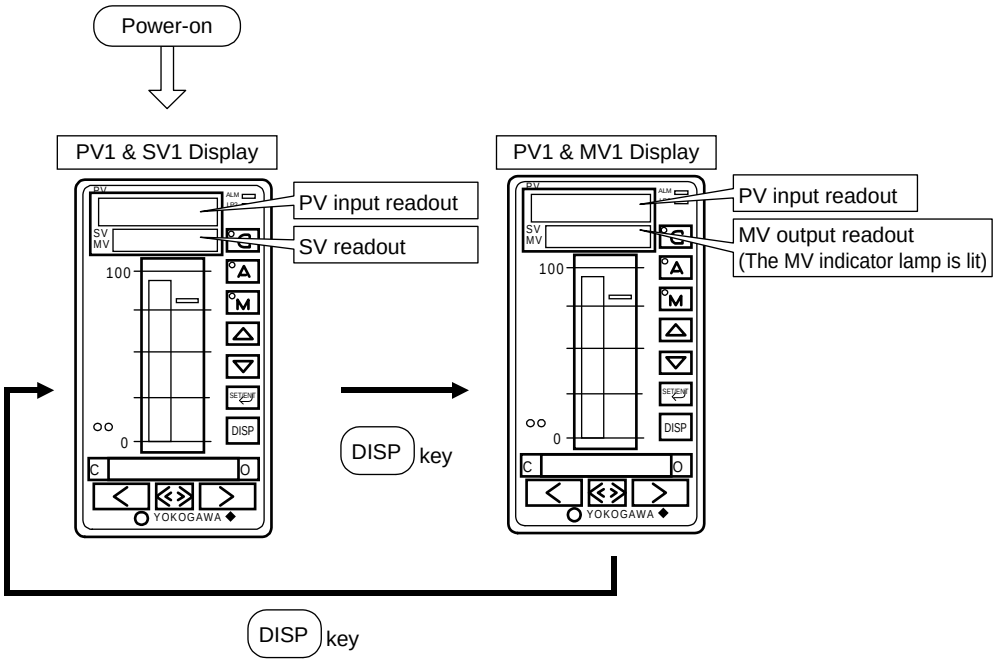

Figure 5.2.3 Displays for Single-loop Control

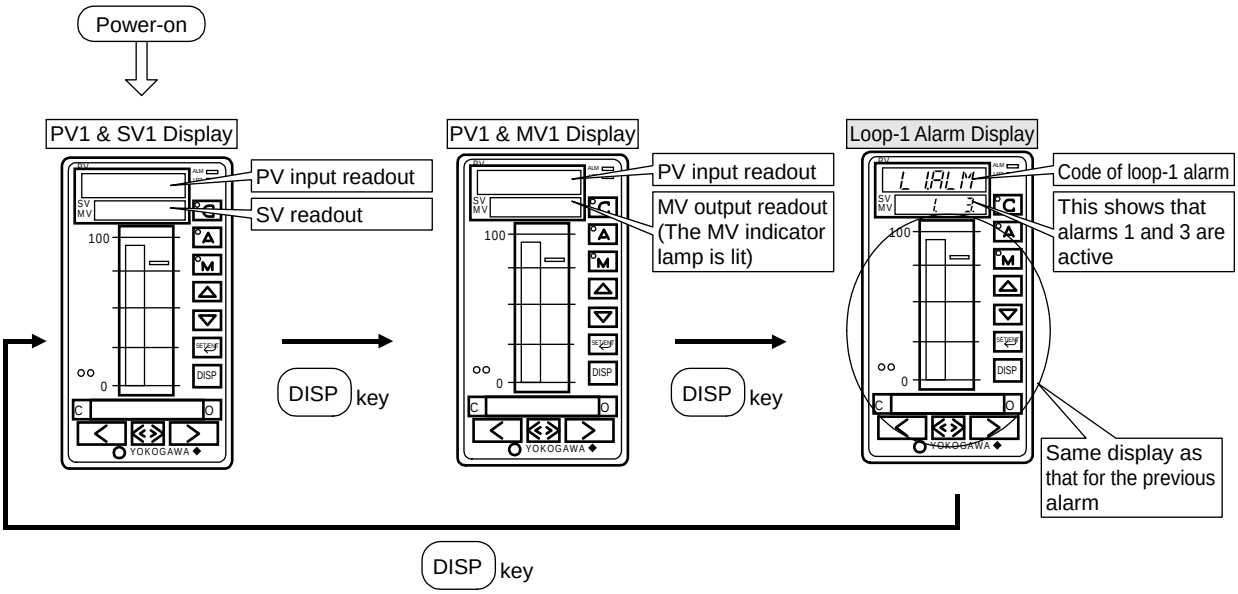

Figure 5.2.4 Addition of Loop-1 Alarm Display to the Displays for Single-loop Control

① In the [Custom Display Configuration Menu] dialog box (Figure 5.2.2), click the <Custom Display Selection> button. The [Custom Display Selection] dialog box appears. Figure 5.2.5 illustrates the choices of custom displays for single-loop control.

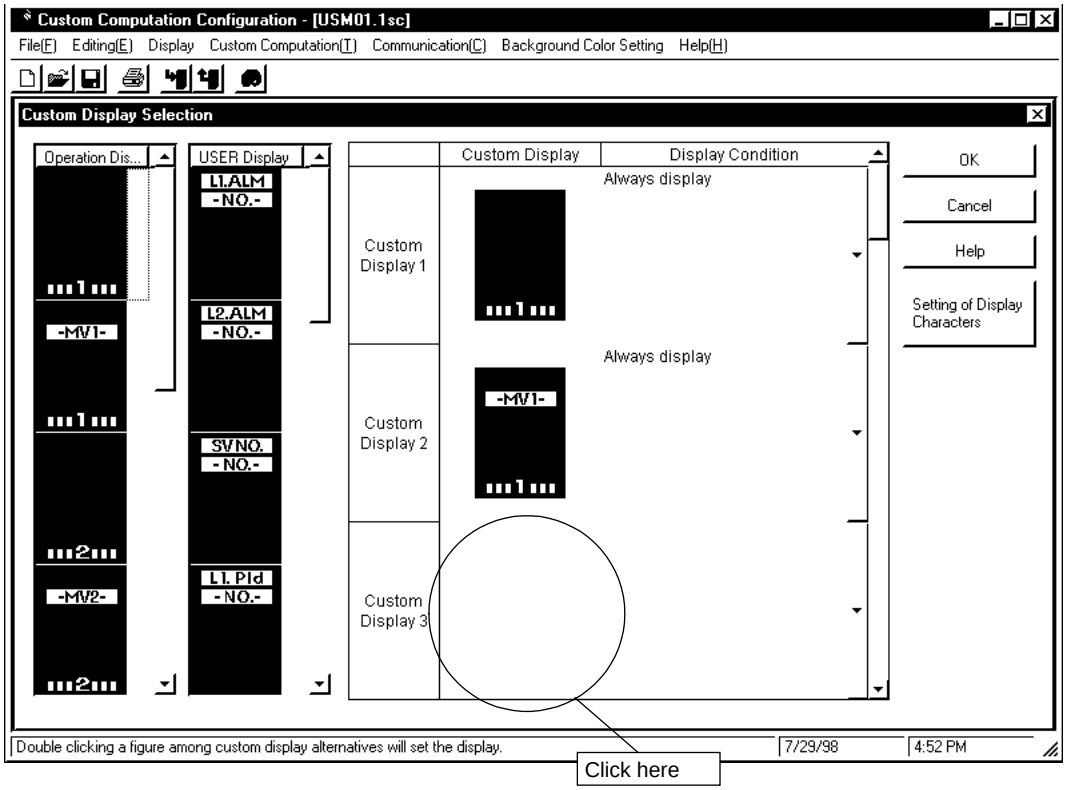

Figure 5.2.5 Choices of Custom Displays for Single-loop Control

≠ In the [Custom Display Selection] dialog box (Figure 5.2.5), click the <Custom Display Selection> cell in the <Custom Display 3> section of the rightmost box.

③ In the same dialog box, double-click <Loop-1 Alarm Display>—L1.ALM—in the <User Display> list box positioned second from the left. <Loop-1 Alarm Display> is registered with the Custom Display 3 section (Figure 5.2.6).

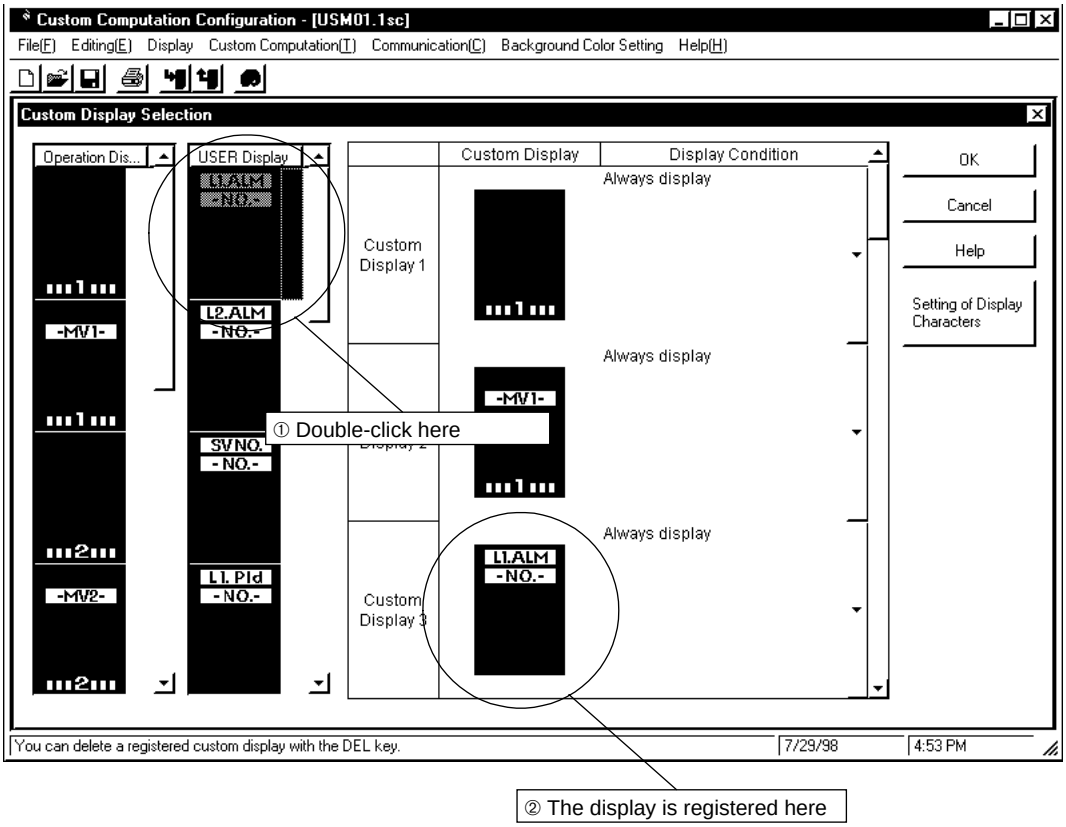

Figure 5.2.6 Registration of <Loop-1 Alarm Display> in the Custom Display 3 Section

④ Next, set the display conditions. Click the Display Conditions drop-down list box (Figure 5.2.7).

The default is “Always display.”
The “Display when Close” and “Display when Open” options are selectable only if the controller mode is cascade-type.

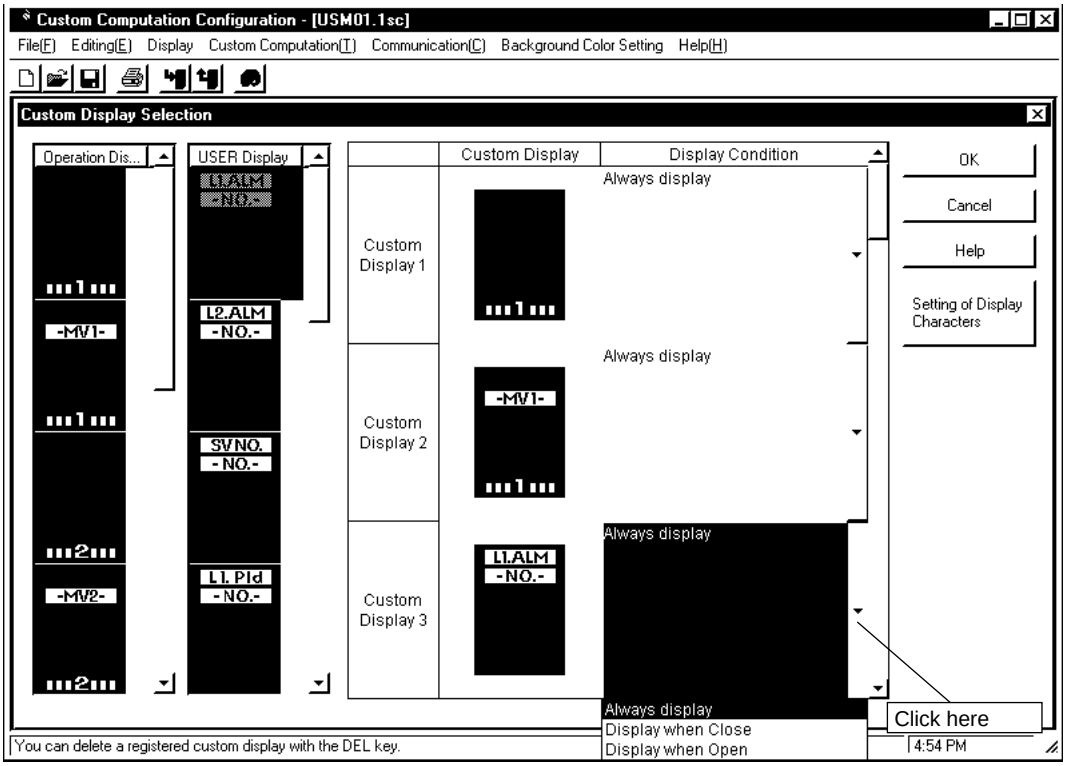

Figure 5.2.7 Display Conditions Set for Loop-1 Alarm Display

Display Condition	Description
Always display	The custom display is always visible.
Display when Close	The custom display is visible only when the CLOSE mode is selected for the OPEN/CLOSE Mode operation parameter.
Display when Open	The custom display is visible only when the OPEN mode is selected for the OPEN/CLOSE Mode operation parameter.

∞ Click the <OK> button. The [Custom Display Selection] dialog box closes.

■ Text Setting

The dialog box shown in Figure 5.2.8 appears if you click the <Setting of Display Characters> button in the [Custom Display Selection] dialog box.

You will need to use the <Setting of Display Characters> button when you register the DISP1 or DISP2 user display as the custom display. The DISP1 and DISP2 displays are available only if you register the DISP1 and DISP2 modules in an input or output block.

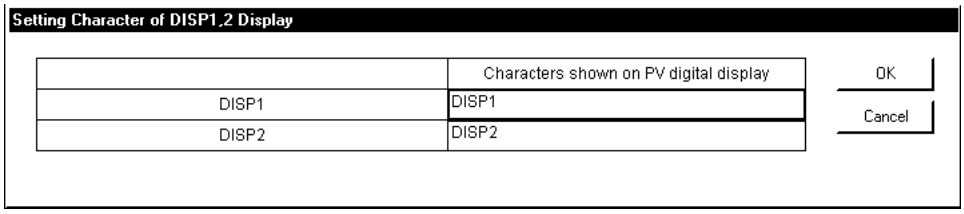

Figure 5.2.8 [Setting Character of DISP1, 2 Displays] Dialog Box

See Also

Chapter 4, “List of Computation Modules and Their Functions,” in the *Model LL1200 PC-based Custom Computation Building Tool-User’s Reference* instruction manual (IM 5G1A11-02E), for an example of the DISP1 or DISP2 display.”

Step 2-1, “Choosing the Custom Display,” is now complete.

When you finish selecting the custom displays, proceed to subsection 5.2.2, “Step 2-2: Setting Conditions Needed to Switch to Custom Displays.”

5.2.2 Step 2-2: Setting Conditions Needed to Switch to Custom Displays

- Explanation

You can preset the desired conditions for the custom displays registered in the previous subsection so that those displays are switched to when the selected conditions become true. To achieve this, you must specify a custom display for each switching condition. You can set two or more conditions at the same time for a single custom display.

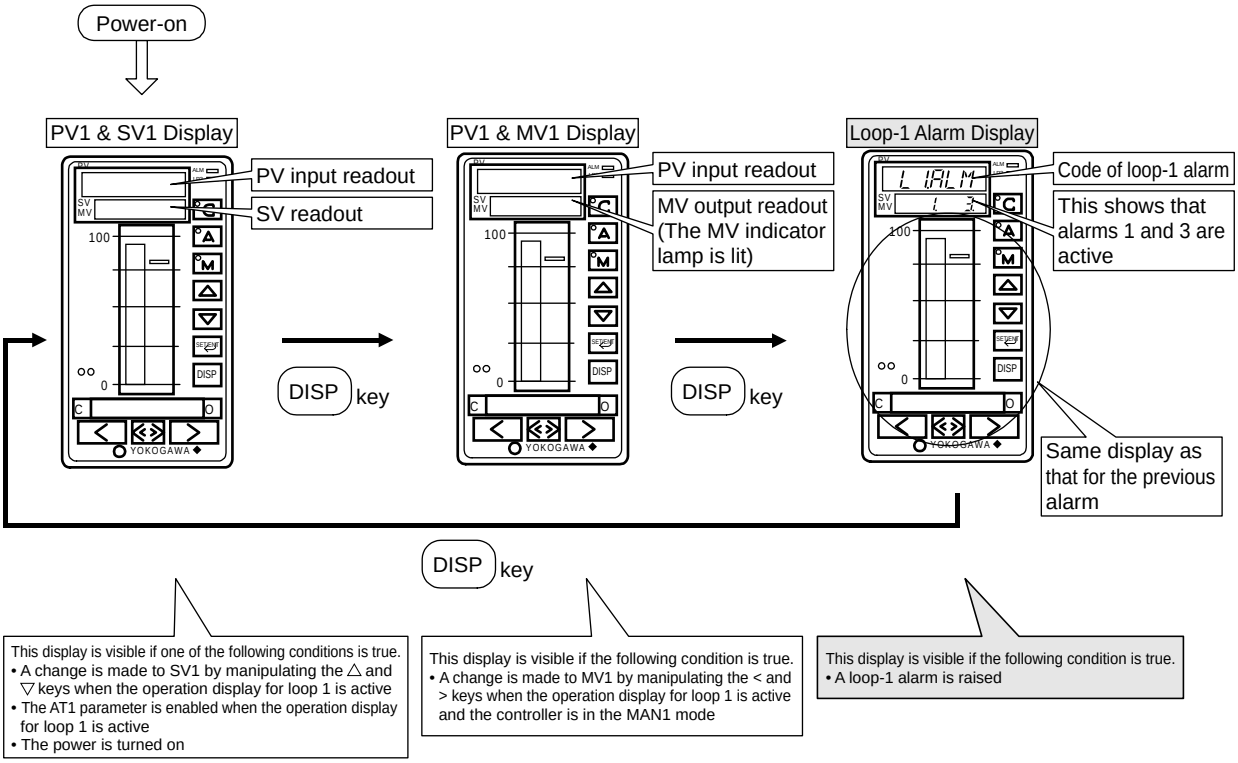

Figure 5.2.9 Switching Conditions when Loop-1 Alarm Display Is Added to the Displays for Single-loop Control

- Operation

① In the [Custom Display Configuration Menu] dialog box (Figure 5.2.2), click the <Custom Display Switching Condition> button. The [Custom Display Switching Condition] dialog box (Figure 5.2.10) appears.

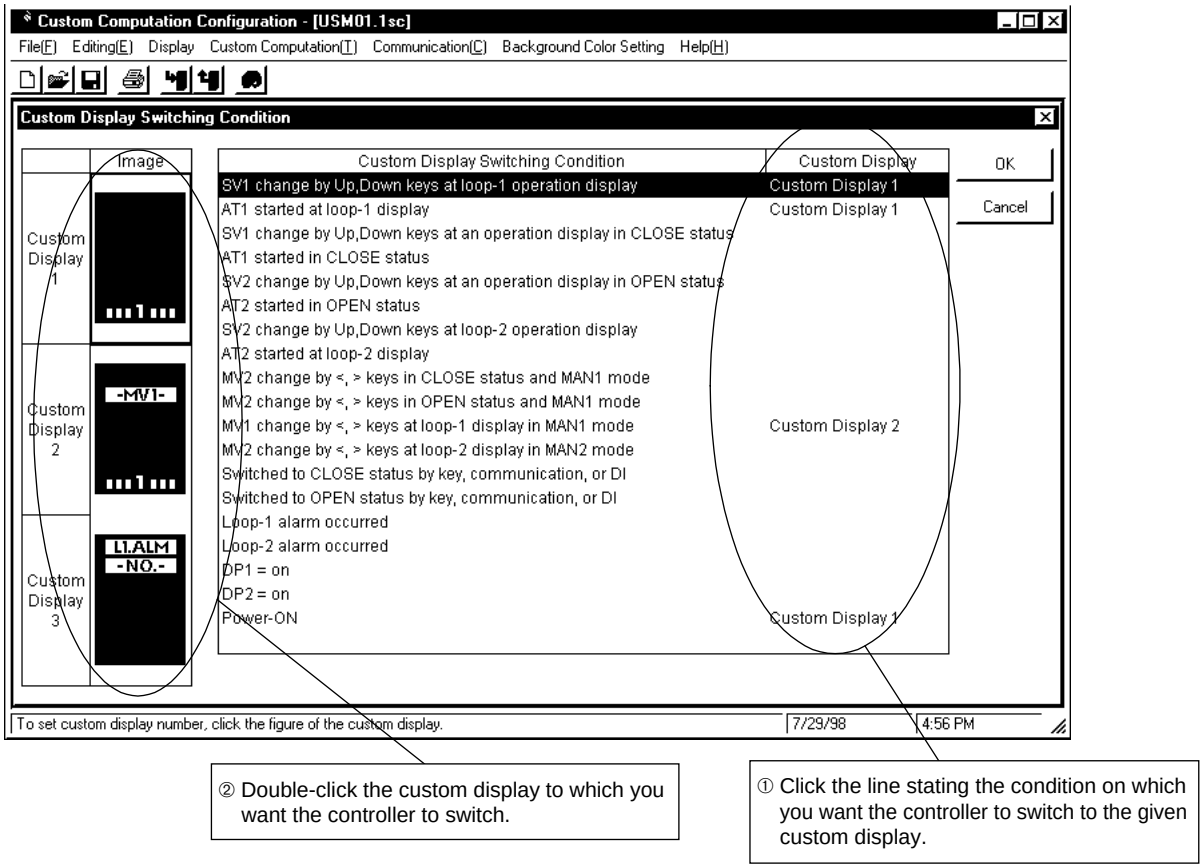

Figure 5.2.10 [Custom Display Configuration Menu] Dialog Box

≠ In the right-hand side area of the [Custom Display Switching Condition] dialog box, click the option, among the options under “Custom Display Switching Condition,” you want to set.

③ Double-click the picture in the Custom Display section of the dialog box.

④ To set other necessary switching conditions, repeat steps ≠ and ③.

Step 2-2, “Setting Conditions Needed to Switch to Custom Displays,” is now complete.

5.3 Step 3: Defining the Security Function (as necessary)

This section explains the procedure for setting the security function.

Security is defined by configuring the keylock setup and menu-lock setup parameters of the US1000 controller.

Keylock Setup Parameter	Description
SVC	Prohibits the use of the SV Setting key when operation displays are active
△ / ▽	Prohibits the use of the Data Setting key
< / >	Prohibits the use of the MV Manipulation key
C	Prohibits the use of the C Mode key (CAS mode)
A	Prohibits the use of the A Mode key (AUTO mode)
M	Prohibits the use of the M Mode key (MAN mode)

Menu-lock Setup Parameter	Description
MODE	Prohibits the showing of the MODE menu (Operation Parameter menu)
O.LP1	Prohibits the showing of the O.LP1 menu (Operation Parameter menu)
O.LP2	Prohibits the showing of the O.LP2 menu (Operation Parameter menu)
PID	Prohibits the showing of the PID menu item (Operation Parameter menu)
USR	Prohibits the showing of the USR menu item (Operation Parameter menu)
PYS1	Prohibits the showing of the PYS1 menu item (Operation Parameter menu)
PYS2	Prohibits the showing of the PYS2 menu item (Operation Parameter menu)
PWD	Prohibits the showing of the password setup parameter

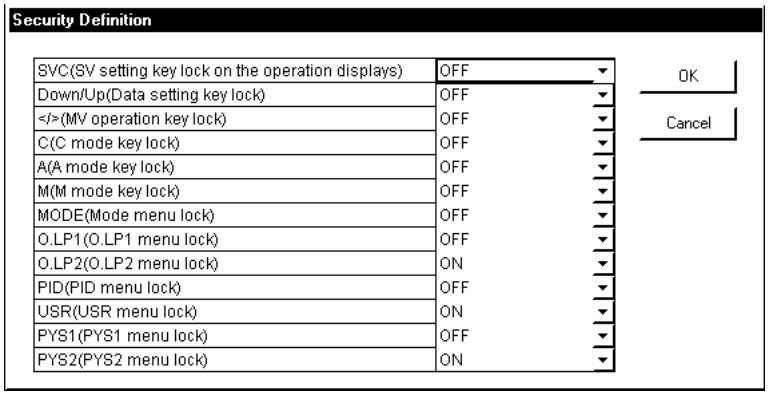

Figure 5.3.1 [Security Definition] Dialog Box

- Operation

① From the drop-down list box, choose the parameter whose security function you want to set up.
ON: Lock; OFF: Unlock

≠ Click the <OK> button.

Step 3, “Defining the Security Function,” is now complete.

6. Editing

This chapter explains the procedure for editing custom computations and displays.

6.1 Editing Custom Computations

6.1.1 Moving Computation Modules

The operations discussed here are used only for the purpose of moving computation modules visually. Use them when the automatic wiring is too complex or when you want to add a computation module or modules.

These operations are possible in full-screen windows, horizontally-split windows or vertically-split windows.

The following example shows a case where these operations are used within an input block; the operations can also be used within an output block.

- Operation

① In the [Input Block] or [Output Block] dialog box, click the computation module you want to move.

≠ Use a drag-and-drop operation to move the module to its destination (Figures 6.1.1 and 6.1.2).

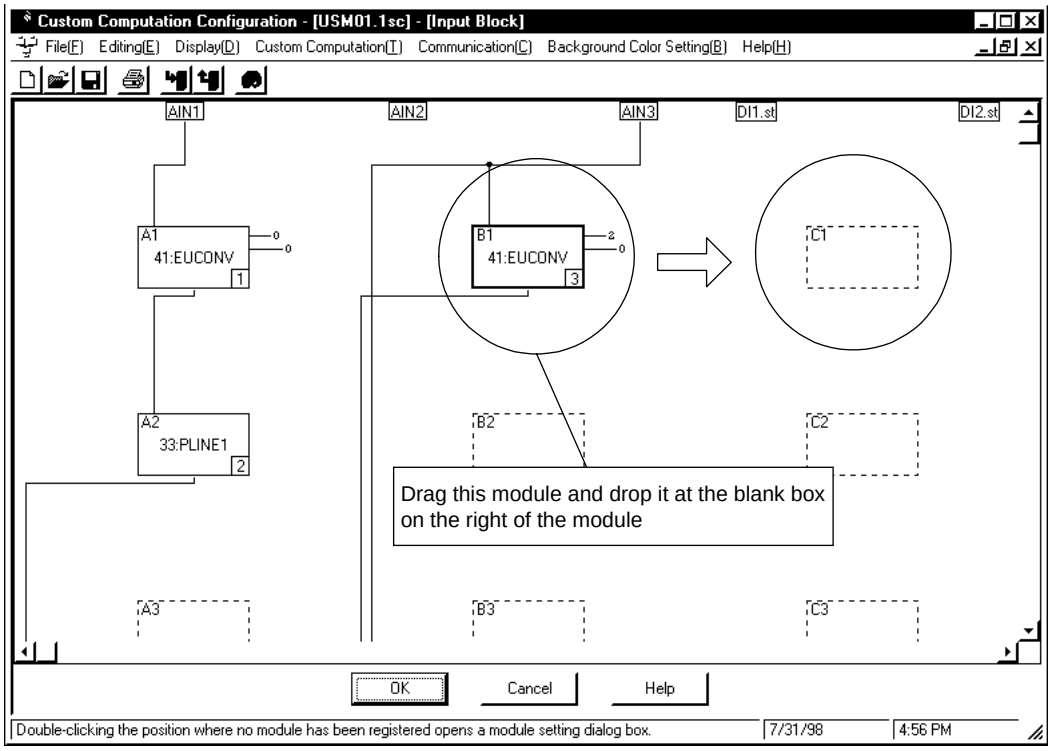

Figure 6.1.1 Computation Module before Move

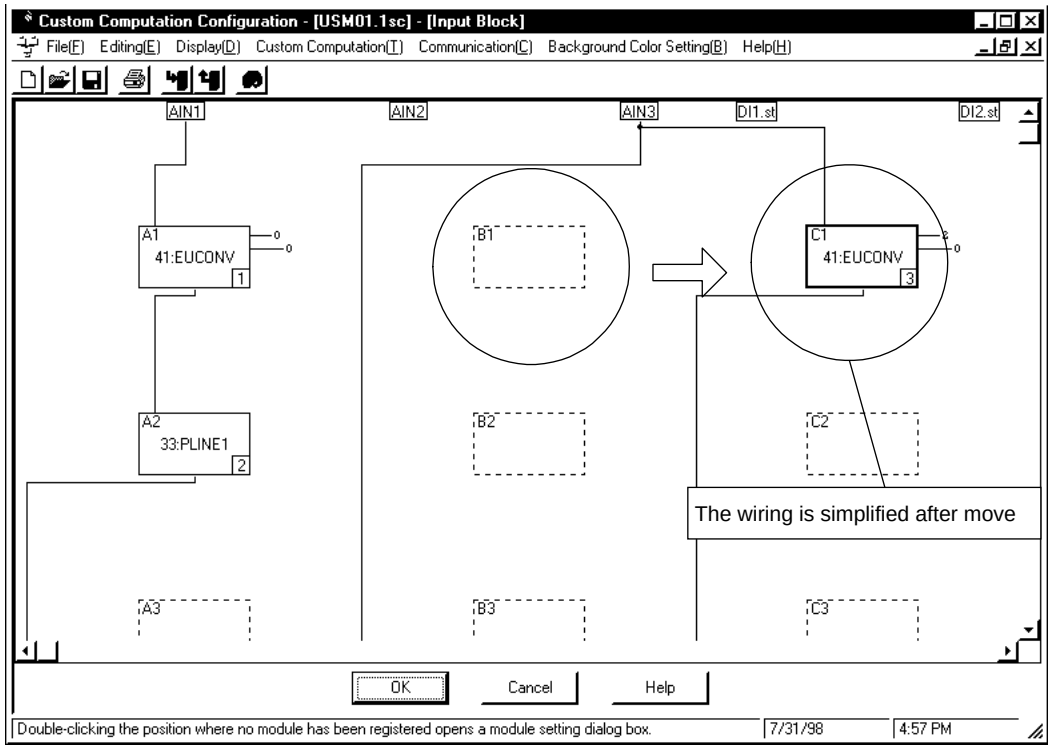

Figure 6.1.2 Computation Module after Move

6.1.2 Deleting Computation Modules

This subsection explains the procedure for deleting registered computation modules.

The operations in this procedure are possible in full-screen windows, horizontally-split windows or vertically-split windows.

The following example shows a case where these operations are used within an input block; the operations can also be used within an output block.

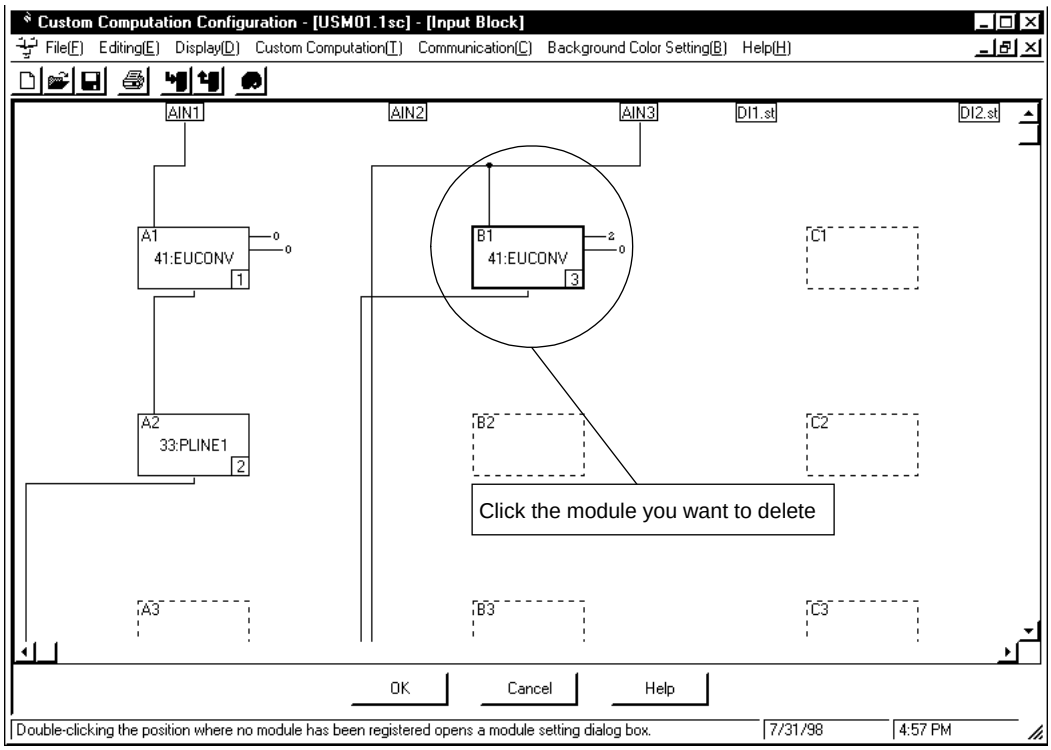

Figure 6.1.3 Deletion of Computation Modules

NOTE

If you delete a computation module, the lines wired to the module are also deleted.

- Operation

① In the [Input Block] or [Output Block] dialog box, click the computation module you want to delete.

≠ From the tool menus, choose <Editing>, then <Delete>.

6.1.3 Adding Computation Modules

You can add computation modules using the same procedure as used for configuring new custom computations.

The operations in this procedure are possible in full-screen windows, horizontally-split windows or vertically-split windows.

See Also

"Adding computation modules within an input block" in subsection 4.2.1, "Step 2-1: Registering Computation Modules," and subsection 4.2.2, "Step 2-2: Configuring the Inputs and Parameters of Computation Modules."

"Adding computation modules within an output block" in subsection 4.3.1, "Step 3-1: Registering Computation Modules," and subsection 4.3.2, "Step 3-2: Configuring the Inputs and Parameters of Computation Modules."

6.1.4 Changing the Order in Which Computation Modules Run

This subsection explains the procedure for changing the order in which registered computation modules are run.

The operations in this procedure are possible in full-screen windows, horizontally-split windows or vertically-split windows.

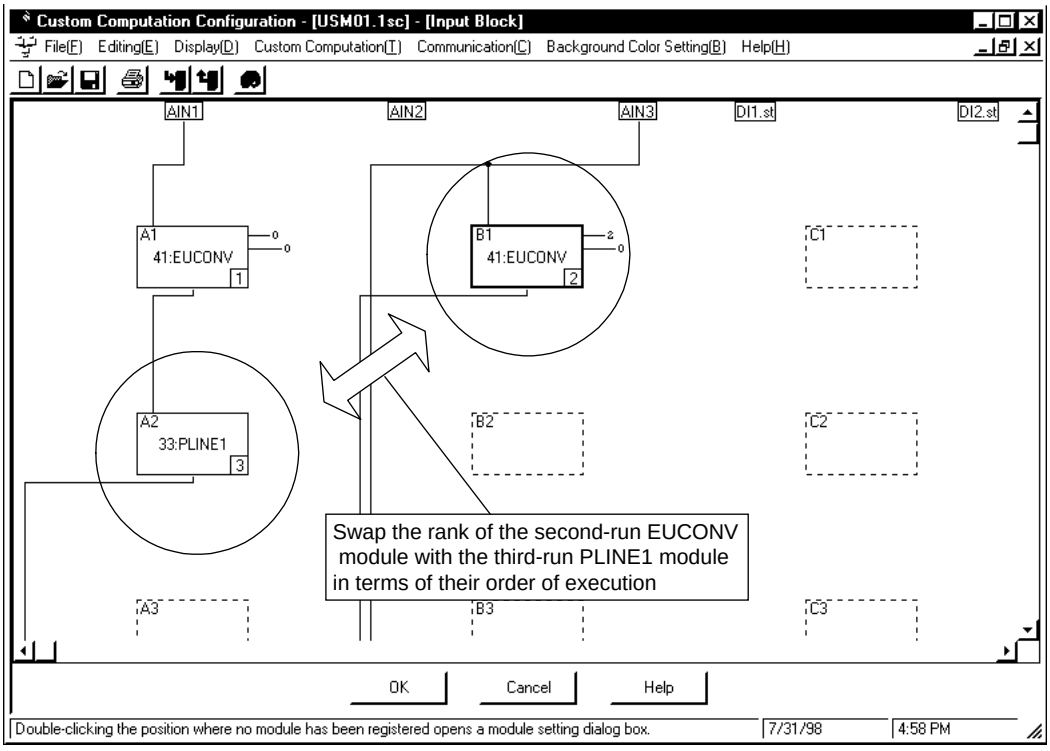

Figure 6.1.4 Change in Computation Modules' Order of Execution

- Operation

① With the [Input Block] or [Output Block] dialog box shown, click the computation module, and choose <Editing> from the tool menus, and then <Modify Configuration>, from the Editing menu. The [Modify Configuration] dialog box (Figure 6.1.5) appears. This dialog box lists the preregistered computation modules in their order of execution.

Click the third-run EUCONV, and then the <Up> button. The EUCONV module and the second-run PLINE1 module swap positions with each other

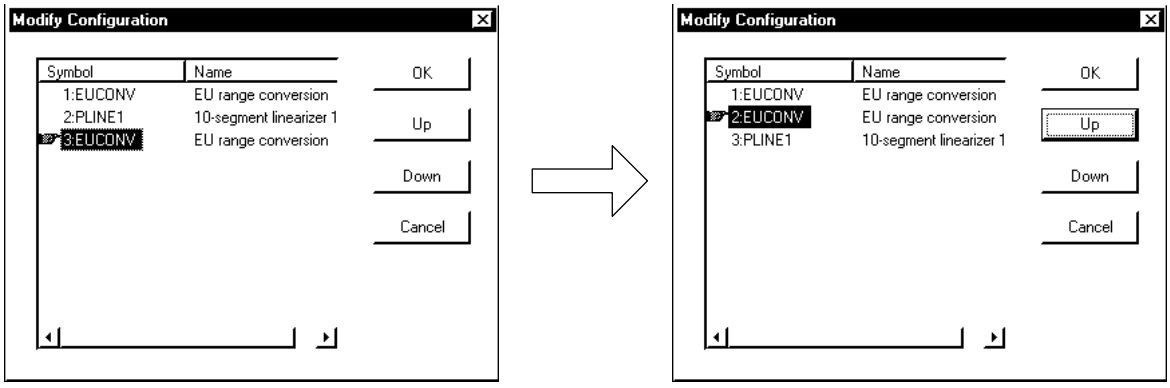

Figure 6.1.5 [Modify Configuration] Dialog Box

≠ Click the computation module whose order of execution you want to change.
③ Click the <Up> or <Down> button. The module moves up or down one line.
④ When the module is repositioned to the desired rank, click the <OK> button.
∞ In the [Input Block] or [Output Block] dialog box, make sure the order of execution has been changed.

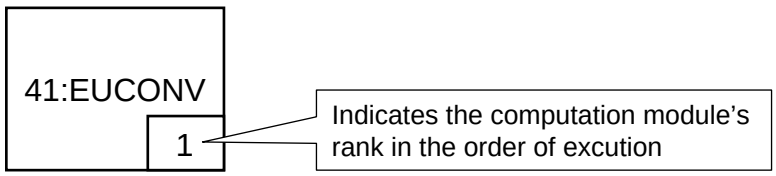

Figure 6.1.6 Computation Module's Rank in the Order of Execution

6.1.5 Changing the Way Computation Modules Are Connected

This subsection explains the procedure for changing the inputs and parameters of computation modules and for changing and deleting the way the modules are connected to the control and computing section and the output signals.

■ Reconfiguration of Module's Inputs and Parameters

- Operation

① In the [Input Block] or [Output Block] dialog box, click the computation module whose inputs or parameters you want to reconfigure.

≠ From the tool menus, choose <Editing>, then <Connection>.
The [Module Setting] dialog box (Figure 6.1.7) appears.

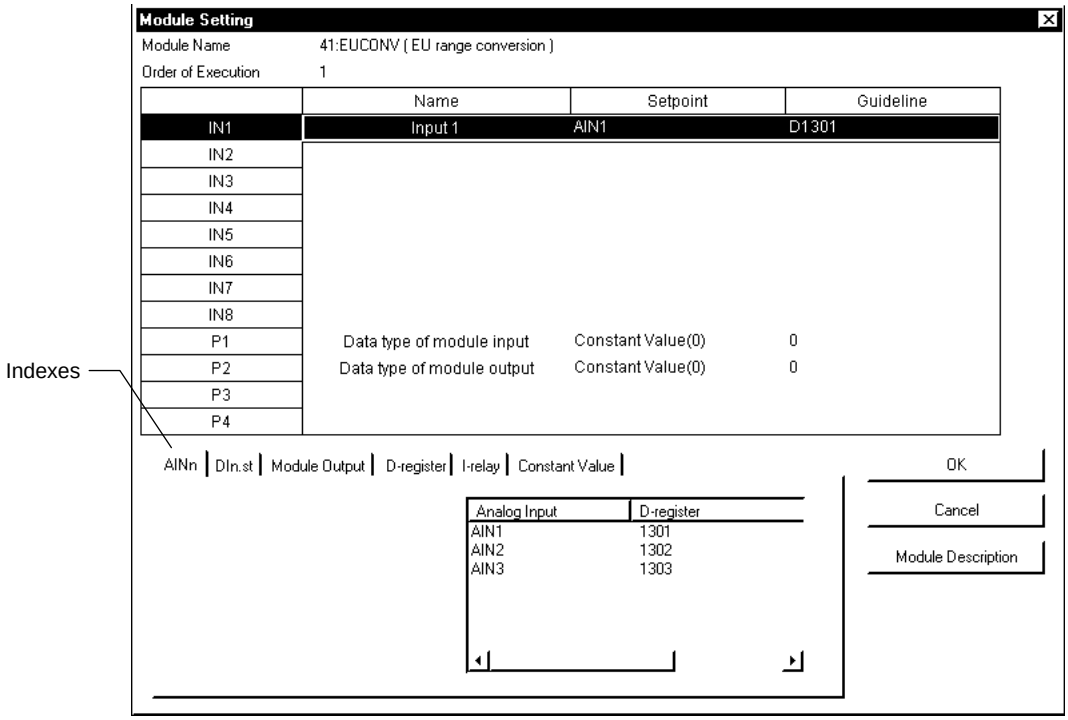

Figure 6.1.7 [Module Setting] Dialog Box

③ Click the input or parameter you want to reconfigure from among <IN1> to <IN8> and <P1> to <P4>, respectively.

④ Click the appropriate index.
Indexes are classified into <AINn>,<DIn.st>, <Module Output>, <D-register>, <I-relay> and <Constant Value>.

●Description of Indexes

Index	Description	Remarks
AINn	AIN1: Analog Input 1 AIN2: Analog Input 2 AIN3: Analog Input 3	Analog input data fed to input block
DIn.st	DI1.st: Contact Input 1 DI2.st: Contact Input 2 DI3.st: Contact Input 3 DI4.st: Contact Input 4 DI5.st: Contact Input 5 DI6.st: Contact Input 6 DI7.st: Contact Input 7	Contact input data fed to input block
Module Output	IMO1L to IMO30L (outputs of input-block computation modules) OMO1L to OMO30L (outputs of output-block computation modules)	See Appendix 4, “Areas for Storing Data Output from Computation Modules.”
D-Register	Process data, mode data, operation parameters, setup parameters	See Sections 5.3 to 5.9 in the *Model LL1200 PC-based Custom Computation Building Tool—User’s Reference* instruction manual (IM 5G1A11-02E).
I-Relay	ON/OFF status, ON status, OFF status, SVNO, PIDNO, timer flags, power-on flags, alarm flags, etc.	See Sections 5.10 to 5.13 in the *Model LL1200 PC-based Custom Computation Building Tool—User’s Reference* instruction manual (IM 5G1A11-02E).
Constant Value	Configurable range: -19999 to 30000	

∞ Double-clicking the appropriate input source reconfigures the selected index.
To reconfigure the <Constant Value> index, type a value in the text box, and then press the <Enter> key.

± Repeat steps ③ to ∞ to reconfigure other necessary inputs among <IN1> to <IN8> or parameters among <P1> to <P4>.

≤ Clicking the <OK> button closes the [Module Setting] dialog box. When the dialog box closes, the computation modules are rewired according to the inputs and parameters you reconfigured.

■ Changing and Deleting the Way Computation Modules Are Connected to the Control and Computing Section

- Operation

This paragraph explains the procedure for changing and deleting the way signals fed by the input block are connected to the control and computing section.

① In the [Input Block] dialog box (Figure 6.1.8), click the appropriate output signal.

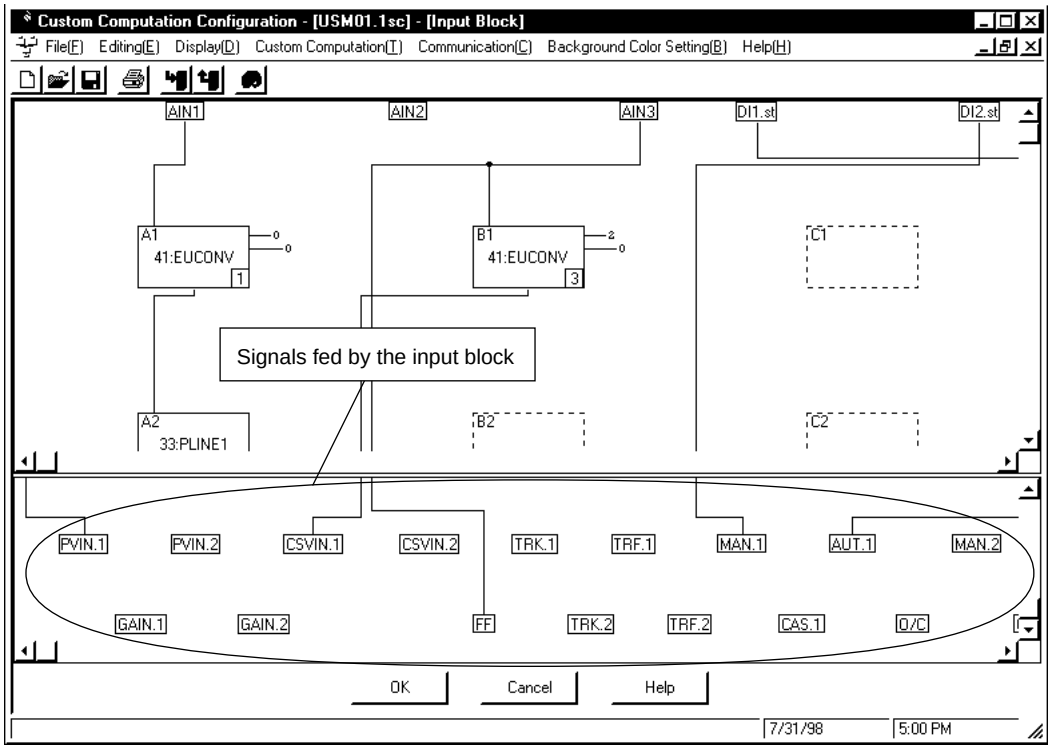

Figure 6.1.8 Output Signals Fed by the Input Block

●Description of Output Signals Fed by the Input Block

Output Signal Fed by Input Block	Description
PVIN.1	Loop-1 PV input
PVIN.2	Loop-2 PV input
CSVIN.1	Loop-1 cascade input
CSVIN.2	Loop-2 cascade input
GAIN.1	Loop-1 gain setting value
GAIN.2	Loop-2 gain setting value
TRK.1	Loop-1 tracking input
TRK.2	Loop-2 tracking input
FF	Feedforward input
CAS.1	Loop-1 CAS mode
AUT.1	Loop-1 AUTO mode
MAN.1	Loop-1 MAN mode
CAS.2	Loop-2 CAS mode
AUT.2	Loop-2 AUTO mode
MAN.2	Loop-2 MAN mode
O/C	OPEN/CLOSE mode
R/S	RUN/STOP mode
TRF.1	Loop-1 tracking flag
TRF.2	Loop-2 tracking flag

≠ From the tool menus, choose <Editing>, then <Connection>.
The [Setting of Input Block Connection Assignment] dialog box (Figure 6.1.9) appears.

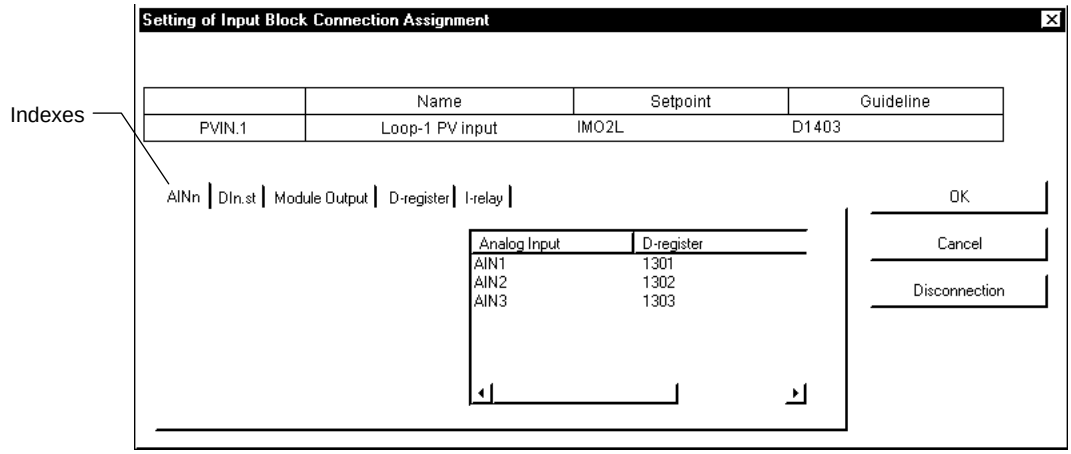

Figure 6.1.9 [Setting of Input Block Connection Assignment] Dialog Box

③ Click the appropriate index.
Indexes are classified into <AINn>,<DIn.st>, <Module Output>, <D-Register>, <I-Relay> and <Constant Value>.

●Description of Indexes

Index	Description	Remarks
AINn	AIN1: Analog Input 1 AIN2: Analog Input 2 AIN3: Analog Input 3	Analog input data fed to input block
DIn.st	DI1.st: Contact Input 1 DI2.st: Contact Input 2 DI3.st: Contact Input 3 DI4.st: Contact Input 4 DI5.st: Contact Input 5 DI6.st: Contact Input 6 DI7.st: Contact Input 7	Contact input data fed to input block
Module Output	IMO1L to IMO30L (outputs of input-block computation modules) OMO1L to OMO30L (outputs of output-block computation modules)	See Appendix 4, “Areas for Storing Data Output from Computation Modules.”
D-Register	Process data, mode data, operation parameters, setup parameters	See Sections 5.3 to 5.9 in the *Model LL1200 PC-based Custom Computation Building Tool—User’s Reference* instruction manual (IM 5G1A11-02E).
I-Relay	ON/OFF status, ON status, OFF status, SVNO, PIDNO, timer flags, power-on flags, alarm flags, etc.	See Sections 5.10 to 5.13 in the *Model LL1200 PC-based Custom Computation Building Tool—User’s Reference* instruction manual (IM 5G1A11-02E).
Constant Value	Configurable range: -19999 to 30000	

④ Double-clicking the appropriate input source reconfigures the selected index.
To reconfigure the <Constant Value> index, type a value in the text box, and then press the <Enter> key.

∞ Clicking the <OK> button after the reconfiguration is completed closes the [Setting of Input Block Connection Assignment] dialog box. When the dialog box closes, the computation modules are rewired according to the reconfiguration.

■ Changing and Deleting the Way Signals Fed by the Output Block Are Connected to the Output Signals

- Operation

This paragraph explains the procedure for changing and deleting the way signals fed by the output block are connected to the output signals.

① In the [Output Block] dialog box (Figure 6.1.10), click the appropriate output signal.

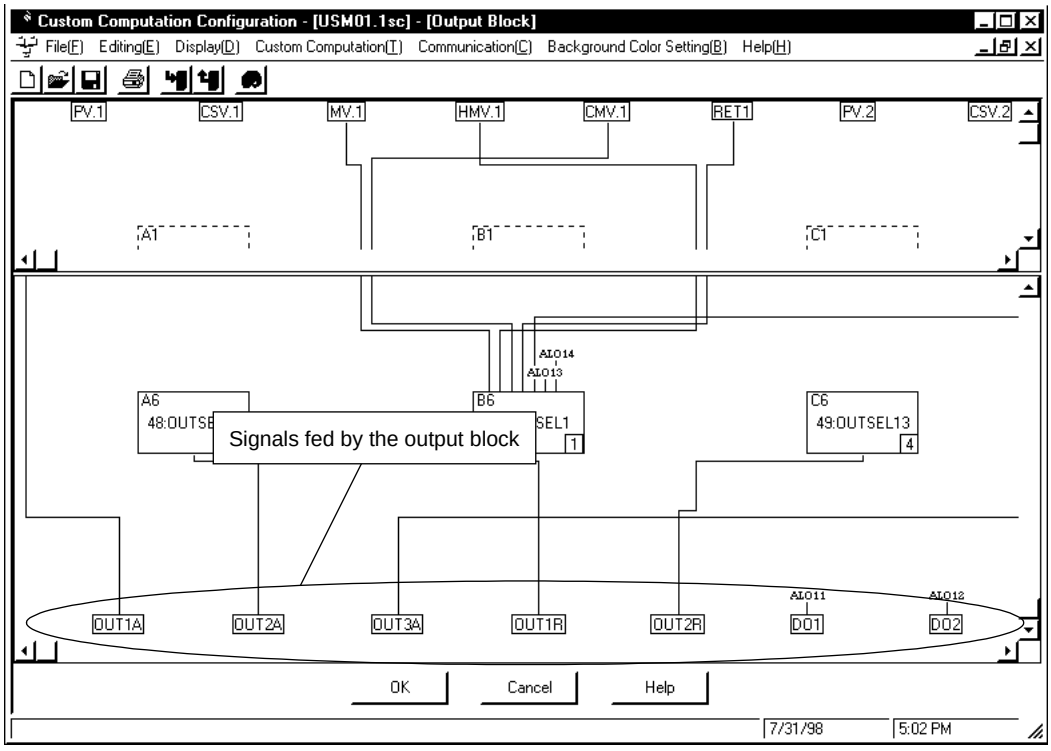

Figure 6.1.10 Output Signals Fed by the Output Block

●Description of Output Signals Fed by the Output Block

Output Signal Fed by Output Block	Description
OUT1A	Analog output 1 (current/voltage pulse)
OUT2A	Analog output 2 (current/voltage pulse)
OUT3A	Analog output 3 (voltage)
OUT1R	MV1 relay output
OUT2R	MV2 relay output
DO1	Contact output 1 (relay)
DO2	Contact output 2 (relay)
DO3	Contact output 3 (relay)
DO4	Contact output 4 (open collector)
DO5	Contact output 5 (open collector)
DO6	Contact output 6 (open collector)
DO7	Contact output 7 (open collector)

≠ From the tool menus, choose <Editing>, then <Connection>.
The [Setting of Output Block Connection Assignment] dialog box (Figure 6.1.11) appears.

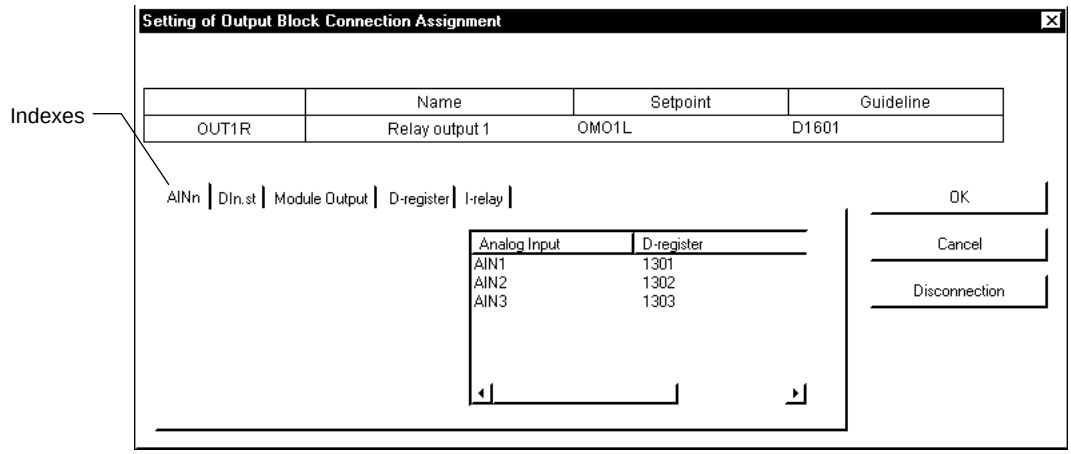

Figure 6.1.11 [Setting of Output Block Connection Assignment] Dialog Box

③ Click the appropriate index.
Indexes are classified into <AINn>, <DIn.st>, <Module Output>, <D-register>, <I-relay> and <Constant Value>.

●Description of Indexes

Index	Description	Remarks
AINn	AIN1: Analog Input 1 AIN2: Analog Input 2 AIN3: Analog Input 3	Analog input data fed to input block
DIn.st	DI1.st: Contact Input 1 DI2.st: Contact Input 2 DI3.st: Contact Input 3 DI4.st: Contact Input 4 DI5.st: Contact Input 5 DI6.st: Contact Input 6 DI7.st: Contact Input 7	Contact input data fed to input block
Module Output	IMO1L to IMO30L (outputs of input-block computation modules) OMO1L to OMO30L (outputs of output-block computation modules)	See Appendix 4, “Areas for Storing Data Output from Computation Modules.”
D-Register	Process data, mode data, operation parameters, setup parameters	See Sections 5.3 to 5.9 in the *Model LL1200 PC-based Custom Computation Building Tool—User’s Reference* instruction manual (IM 5G1A11-02E).
I-Relay	ON/OFF status, ON status, OFF status, SVNO, PIDNO, timer flags, power-on flags, alarm flags, etc.	See Sections 5.10 to 5.13 in the *Model LL1200 PC-based Custom Computation Building Tool—User’s Reference* instruction manual (IM 5G1A11-02E).
Constant Value	Configurable range: -19999 to 30000	

④ Double-clicking the appropriate input source reconfigures the selected index.
To reconfigure the <Constant Value> index, type a value in the text box, and then press the <Enter> key.

∞ Clicking the <OK> button after the configuration is completed closes the [Setting of Output Block Connection Assignment] dialog box. When the dialog box closes, the computation modules are automatically rewired according to the reconfiguration.

6.2 Editing Custom Displays

6.2.1 Deleting Custom Displays

- Operation

① In the [Custom Display Selection] dialog box (Figure 6.2.1), click the custom display you want to delete.

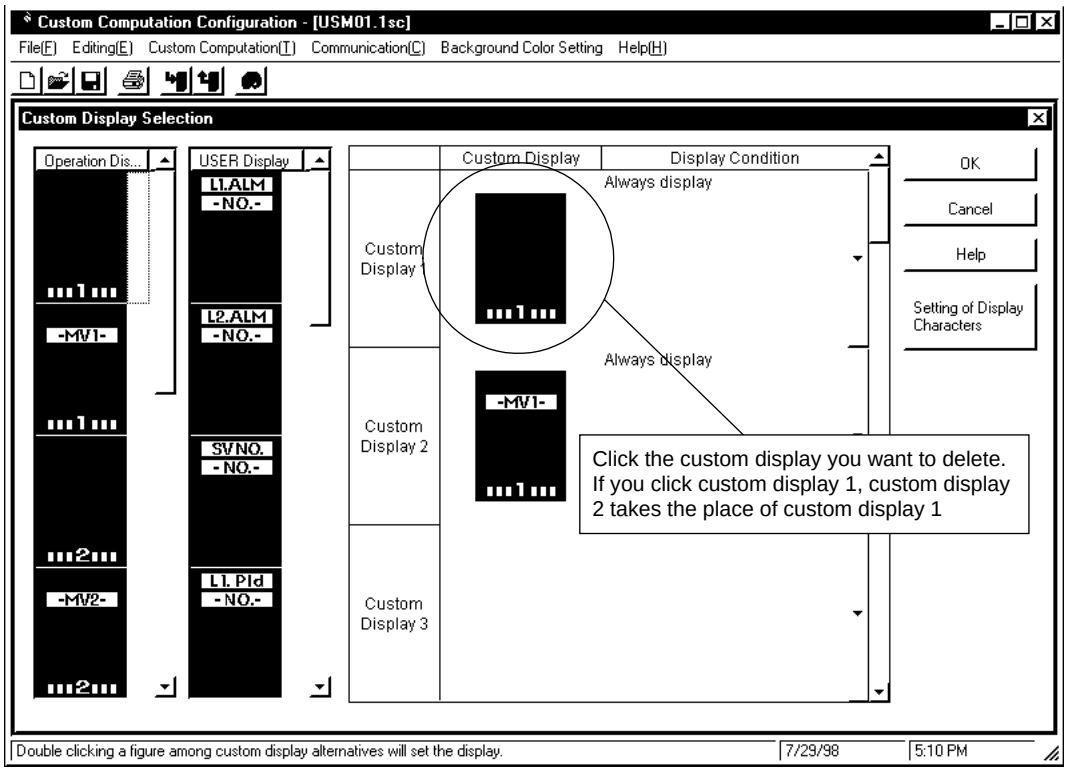

Figure 6.2.1 [Custom Display Selection] Dialog Box

≠ From the tool menus, choose <Editing>, then <Delete>.

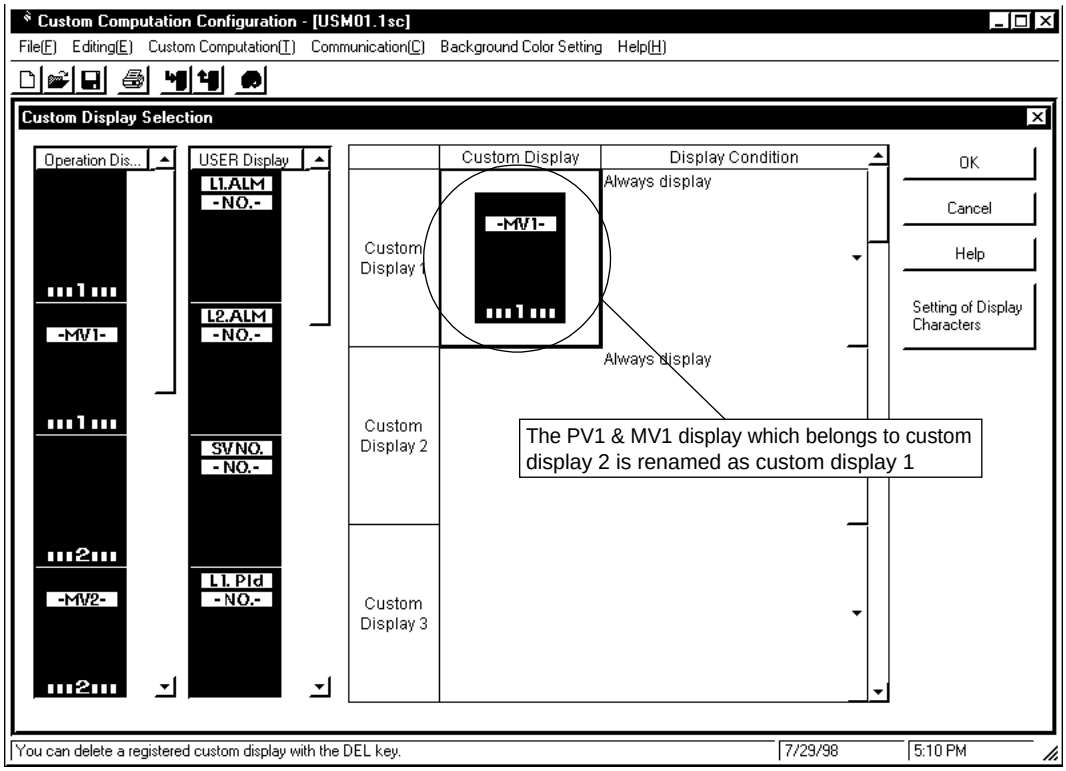

Figure 6.2.2 [Custom Display Selection] Dialog Box after Deletion of a Custom Display

6.2.2 Adding Custom Displays

New custom displays are added to the end of the list of preregistered custom displays in the dialog box. You cannot add a new display between any two options of the preregistered displays. For details on the procedure for adding custom displays, see Chapter 5, “Basic Operations for Configuring Custom Displays and Relevant Explanations.”

TIP

You cannot change the order in which custom displays are shown in the dialog box.

After adding custom displays, refer to Chapter 5, “Basic Operations for Configuring Custom Displays and Relevant Explanations,” to reregister the displays.

7. Working with Custom Computation and Custom Display Data Files

This chapter explains the procedure for saving custom-computation data, which is newly created or uploaded from the US1000 controller on disk, and the procedure for reading files saved on the disk into the LL1200 tool. You can set user information, such as the creator, the date of creation and comments, in files to be saved on disk.

7.1 Setting the File Information

Before saving data in a created custom-computation data file, you can set the title, the creator, the date of creation and comments in the file.

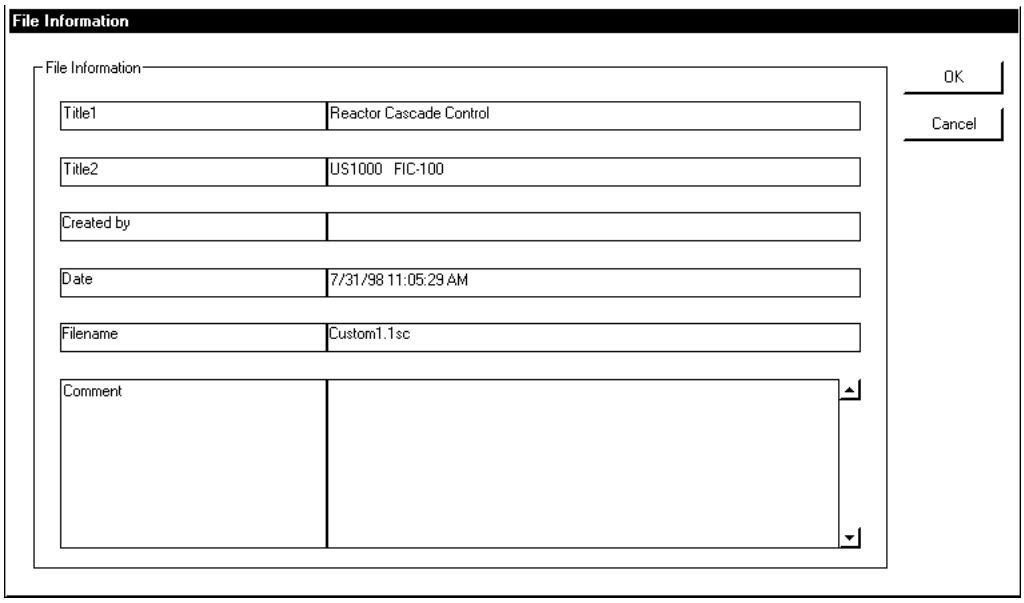

Figure 7.1.1 [File Information] Dialog Box

- Operation

① From the tool menus, choose <File>, then <Information>, then <File Information>. The [File Information] dialog box (Figure 7.1.1) appears.
≠ Type the necessary item of file information in each text box.
③ Click the <OK> button. The [File Information] dialog box closes.
④ Finally, save the data on disk.

See Also
Subsection 7.3.2, “Saving Data on Disk”

7.2 Setting Comments for I/O Signals

Before saving data in a file, you can set comments (temperature input, flowrate input, status signal, MV output, etc.) for the I/O signals of custom computations.

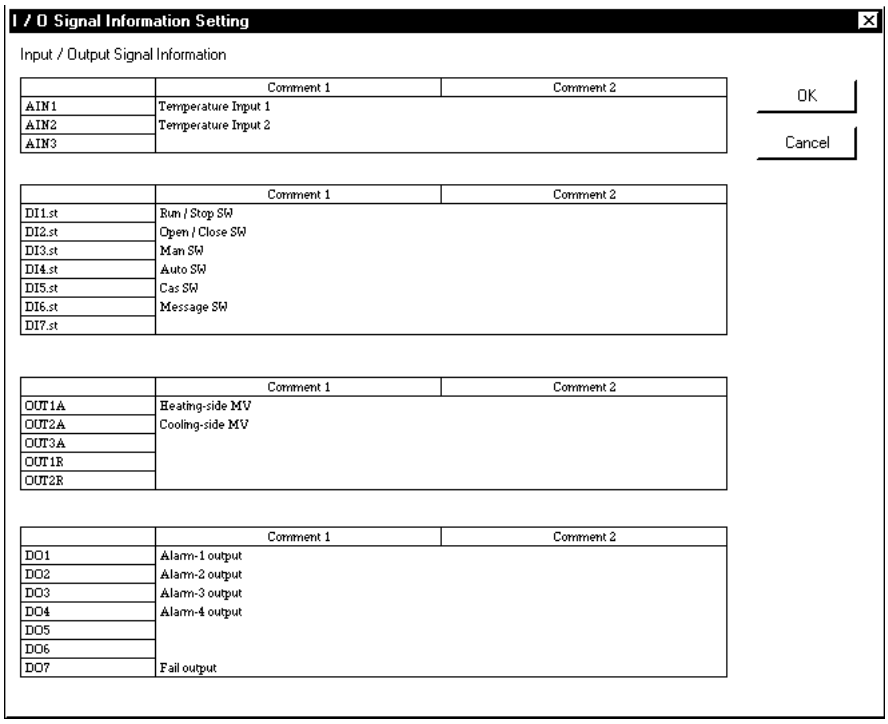

Figure 7.2.1 [I/O Signal Information Setting] Dialog Box

- Operation

① From the tool menus, choose <File>, then <Information>, then <I/O Signal Information>. The [I/O Signal Information Setting] dialog box (Figure 7.2.1) appears.
≠ Type the necessary comments in a text box for each signal.
③ Click the <OK> button. The [I/O Signal Information Setting] dialog box closes.
④ Finally, save the data on disk.

See Also

Subsection 7.3.2, “Saving Data on Disk”

7.3 Reading/Saving Data from/on Disk and Comparing Data Values

7.3.1 Reading Data from Disk

NOTE

If you read new data from a disk, it entirely replaces the current data of the LL1200 tool. If you need the current data, save it on disk before you read the new data.

■ **Open User File**

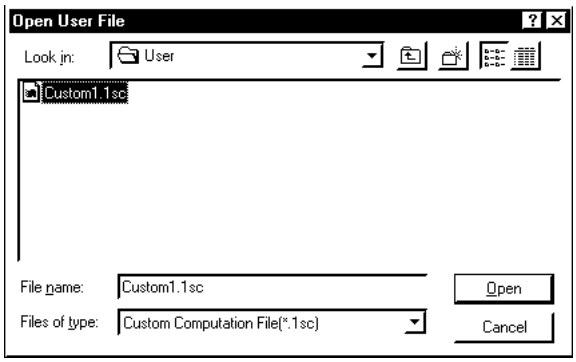

Figure 7.3.1 [Open User File] Dialog Box

- Operation

① From the tool menus, choose <File>, then <Open...>. The [Open User File] dialog box (Figure 7.3.1) appears.
≠ From the list box, choose the file in question.
③ Click the <Open> button.
④ When file reading is complete, the [Custom Computation Configuration Menu/Custom Display Configuration Menu] dialog box appears.

■ **Open Sample File**

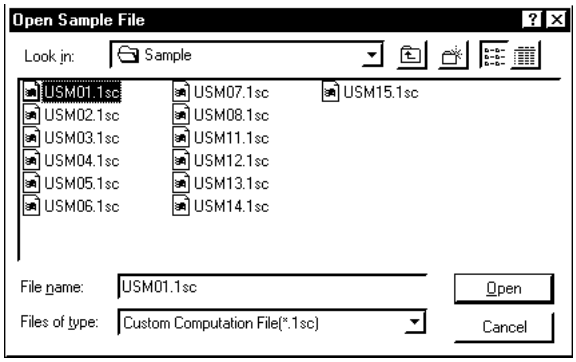

Figure 7.3.2 [Open Sample File] Dialog Box

- Operation

① From the tool menus, choose <File>, then <Open Sample File...>. The [Open Sample File] dialog box (Figure 7.3.2) appears.
≠ From the list box, choose the file in question.
③ Click the <Open> button.
④ When file reading is complete, the [Custom Computation Configuration Menu/Custom Display Configuration Menu] dialog box appears.

See Also

"Sample files" in Section 2.1, " ■ LL1200 File Package and Files of Information on Configured Custom Computations."

7.3.2 Saving Data on Disk

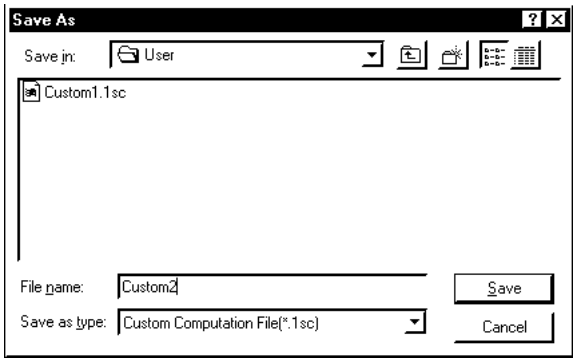

Figure 7.3.3 [Save As...] Dialog Box

- Operation

① From the tool menus, choose <File>, then <Save As...>. The [Save As...] dialog box (Figure 7.3.3) appears.

≠ Type a name in the File Name text box, and then click the <Save> button. The file is saved as a user file (********.1sc).

7.3.3 Compare between Data Values

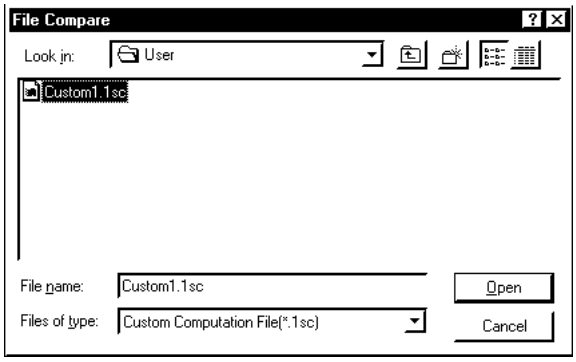

Figure 7.3.4 [File Compare] Dialog Box

- Operation

① From the tool menus, choose <File>, then <Compare...>. The [File Compare] dialog box (Figure 7.3.4) appears.

≠ From the list box, choose the file whose data values you will compare with those of the new file.

③ Click the <Open> button. A message appears, asking whether a comparison should be made.

④ If you click <Yes>, the LL1200 tool begins comparing data values.

∞ As a result of data comparison, the message “Match” or “No match” appears.
When the data do not match, you can view a list of the unmatched data items. You can also save the unmatched data items as a file. Files of comparison results have the 1ec extension, as in “********.1ec.”

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8. Uploading/Downloading Data from/to US1000 Controller and Comparing between Data Values

This chapter explains the procedures for uploading data from the US1000 controller, downloading data to the controller, and comparing data values with those of the controller.

8.1 Uploading Data from US1000 Controller

This section explains the procedure for uploading the custom-computation data from the US1000 controller to the LL1200 tool.

See Also

Section 2.3, “Connecting the US1000 Controller to the Personal Computer,” for details on how to connect the personal computer to the US1000 controller.

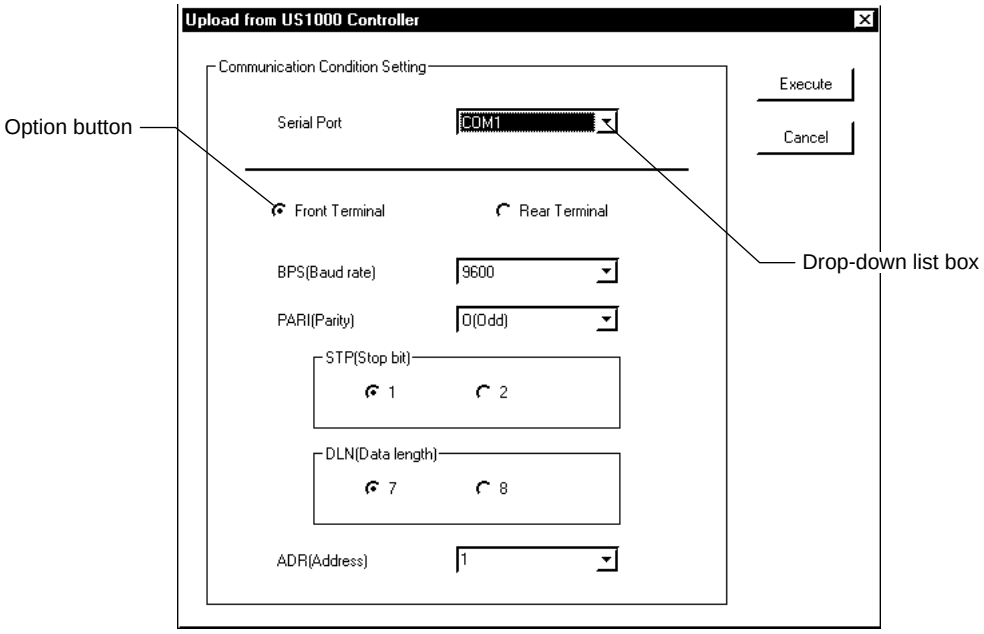

Figure 8.1.1 [Upload from US1000 Controller] Dialog Box

NOTE

If you have chosen RS-485 communication, set the communication protocol of the US1000 controller to [PC-link Communication]. Communication is not possible if you set the protocol to [PC-link Communication with Sum Check], [Modbus (RTU)] or [Modbus (ASCII)].

NOTE

When uploading custom computation information from US1000 controller, set the controller mode (US mode) to “21.”

- Operation (Communication via Front Terminal)

① From the tool menus, choose <Communication>, then <Upload from US1000 Controller...>. The [Upload from US1000 Controller] dialog box (Figure 8.1.1) appears.
≠ In the [Upload from US1000 Controller] dialog box, click the <Front Terminal> option button.
③ From the <Serial Port> drop-down list box, select a communication port of the personal computer.
④ Click the <Execute> button.
∞ A message appears, informing that the reading of information on custom computations is complete.
± When reading is complete, the [Custom Computation Configuration Menu/Custom Display Configuration Menu] dialog box appears.

- Operation (Communication via Rear Terminal)

① From the tool menus, choose <Communication>, then <Upload from US1000 Controller...>. The [Upload from US1000 Controller] dialog box appears.
≠ In the [Upload from US1000 Controller] dialog box, click the <Rear Terminal> option button.
③ From the <Serial Port> drop-down list box, select a communication port of the personal computer. Then, from the <Baud rate>, <Parity> and <Address> drop-down list boxes, choose the options of the three communication conditions, the baud rate, parity and address. Also choose the options of the two communication conditions, the stop bit and data length, by clicking the appropriate option buttons in the <Stop bit> and <Data length> sections.
Match the communication conditions of the US1000 controller with those of the personal computer.
④ Click the <Execute> button.
∞ A message appears, informing that the reading of custom-computation data is complete.
± When reading is complete, the [Custom Computation Configuration Menu/Custom Display Configuration Menu] dialog box appears.

8.2 Downloading Data to US1000 Controller

This section explains the procedure for downloading custom-computation data created using the LL1200 tool to the US1000 controller.
Note that, before downloading custom-computation data, you must rename that data file to a user filename. Files with the filename of a sample file cannot be downloaded.

See Also

Section 2.3, “Connecting the US1000 Controller to the Personal Computer” for details on how to connect the personal computer to the US1000 controller.

WARNING

It is hazardous to download any custom computation to the US1000 controller while the controller is in operation because unexpected adverse effects may be inflicted upon the process. Be SURE to change the operating mode to STOP before you download custom computations.

For details on how to change the operating mode, see Section 6.13, “Stopping Controller Operation, in the *US1000 Digital Indicating Controller* instruction manual (IM 5D1A01-01E).

NOTE

Data cannot be downloaded to the connected US1000 controller if its suffix code does not match the one you set in the [Specify Suffix Code and Controller Type] dialog box.

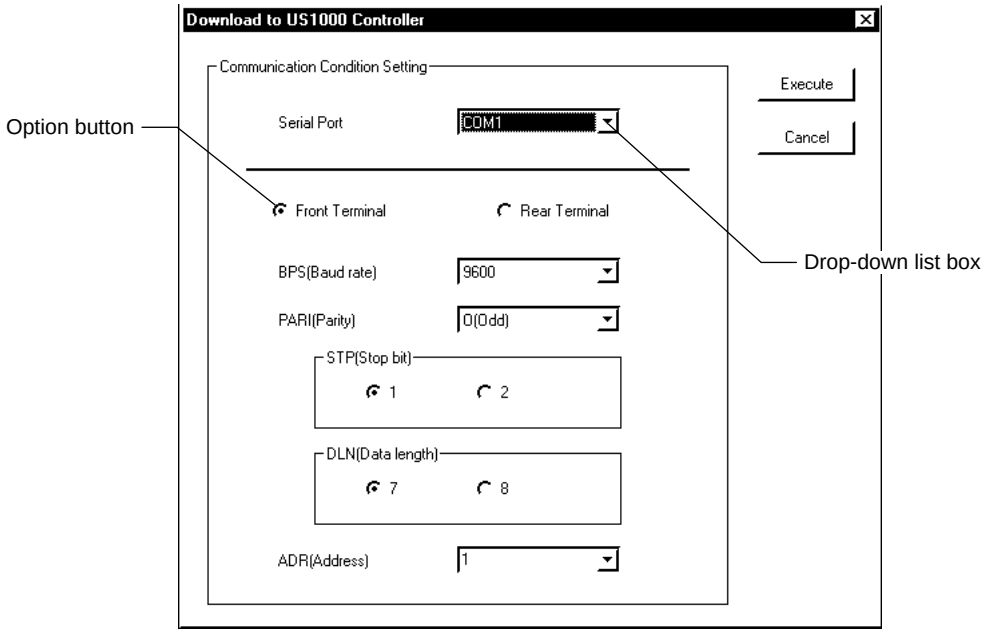

Figure 8.2.1 [Download to US1000 Controller] Dialog Box

NOTE

If you have chosen RS-485 communication, set the communication protocol of the US1000 controller to [PC-link Communication]. Communication is not possible if you set the protocol to [PC-link Communication with Sum Check], [Modbus (RTU)] or [Modbus (ASCII)].

- Operation (Communication via Front Terminal)

① From the tool menus, choose <Communication>, then <Download to US1000 Controller...>. The [Download to US1000 Controller] dialog box (Figure 8.2.1) appears.
≠ In the [Download to US1000 Controller] dialog box, click the <Front Terminal> option button.
③ From the <Serial Port> drop-down list box, select a communication port of the personal computer.
④ Click the <Execute> button.
∞ A message appears, informing that the reading of custom-computation data is complete.

- Operation (Communication via Rear Terminal)

① From the tool menus, choose <Communication>, then <Download to US1000 Controller...>. The [Download to US1000 Controller] dialog box appears.
≠ In the [Download to US1000 Controller] dialog box, click the <Rear Terminal> option button.
③ From the <Serial Port> drop-down list box, select a communication port of the personal computer. Then, from the <Baud rate>, <Parity> and <Address> drop-down list boxes, choose the options of the three communication conditions, the baud rate, parity and address. Also choose the options of the two communication conditions, the stop bit and data length, by clicking the appropriate option buttons in the <Stop bit> and <Data length> sections.
Match the communication conditions of the US1000 controller with those of the personal computer.
④ Click the <Execute> button.
∞ A message appears, informing that the writing of custom-computation data is complete.

8.3 Comparing Data Values with Those of the US1000 Controller

This section explains the procedure for comparing the custom-computation data downloaded to the US1000 controller with those of the LL1200 tool.

See Also

Section 2.3, “Connecting the US1000 Controller to the Personal Computer” for details on how to connect the personal computer to the US1000 controller.

NOTE

Data comparison is not possible if its suffix code does not match the one you set in the [Specify Suffix Code and Controller Type] dialog box.

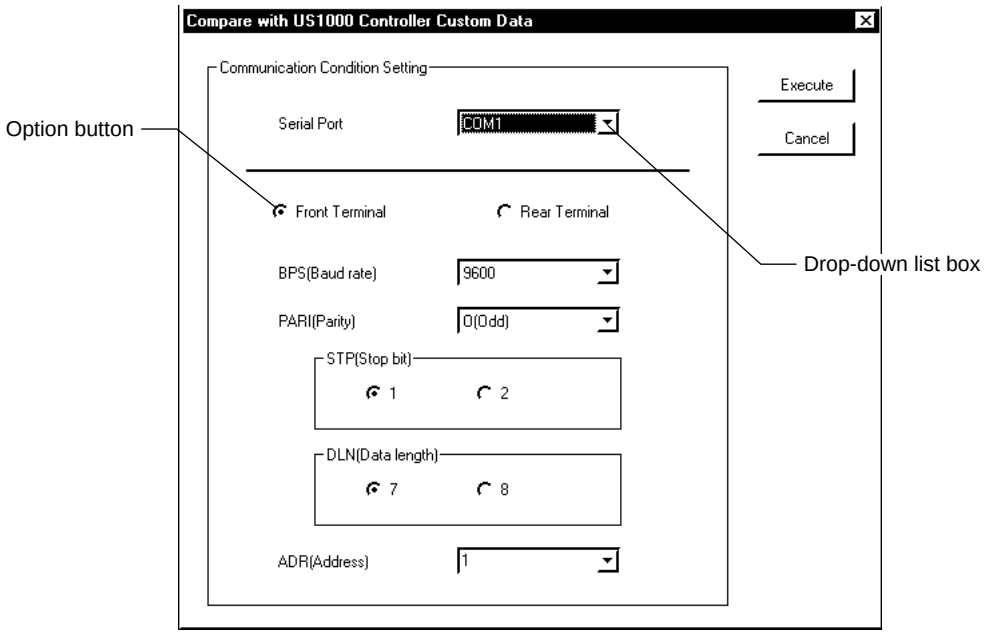

Figure 8.3.1 [Compare with US1000 Controller Custom Data] Dialog Box

NOTE

If you have chosen RS-485 communication, set the communication protocol of the US1000 controller to [PC-link Communication]. Communication is not possible if you set the protocol to [PC-link Communication with Sum Check], [Modbus (RTU)] or [Modbus (ASCII)].

NOTE

When comparing custom computation information with those of the US1000 controller, set the cotroller mode (US mode) to “21.”

- Operation (Communication via Front Terminal)

① From the tool menus, choose <Communication>, then <Compare...>. The [Compare with US1000 Controller Custom Data] dialog box (Figure 8.3.1) appears.

≠ In the [Compare with US1000 Controller Custom Data] dialog box, click the <Front Terminal> option button.

③ From the <Serial Port> drop-down list box, select a communication port of the personal computer.

④ Click the <Execute> button.

∞ As a result of data comparison, the message "Match" or "No match" appears.
When the data do not match, you can view a list of the unmatched data items. You can also save the unmatched data items as a file. Files of comparison results have the 1ec extension, as in "********.1ec."

- Operation (Communication via Rear Terminal)

① From the tool menus, choose <Communication>, then <Compare with US1000 Controller Custom Data>. The [Compare with US1000 Controller Custom Data] dialog box (Figure 8.3.1) appears.

≠ In the [Compare with US1000 Controller Custom Data] dialog box, click the <Rear Terminal> option button.

③ From the <Serial Port> drop-down list box, select a communication port of the personal computer. Then, from the <Baud rate>, <Parity> and <Address> drop-down list boxes, choose the options of the three communication conditions, the baud rate, parity and address. Also choose the options of the two communication conditions, the stop bit and data length, by clicking the appropriate option buttons in the <Stop bit> and <Data length> sections.
Match the communication conditions of the US1000 controller with those of the personal computer.

④ Click the <Execute> button.

∞ As a result of data comparison, the message "Match" or "No match" appears.
When the data do not match, you can view a list of the unmatched data items. You can also save the unmatched data items as a file. Files of comparison results have the 1ec extension, as in "********.1ec."

9. Printing Custom Computations

This chapter explains the procedure for printing the current custom-computation data of the LL1200 tool. You can save the printout data as a text file.

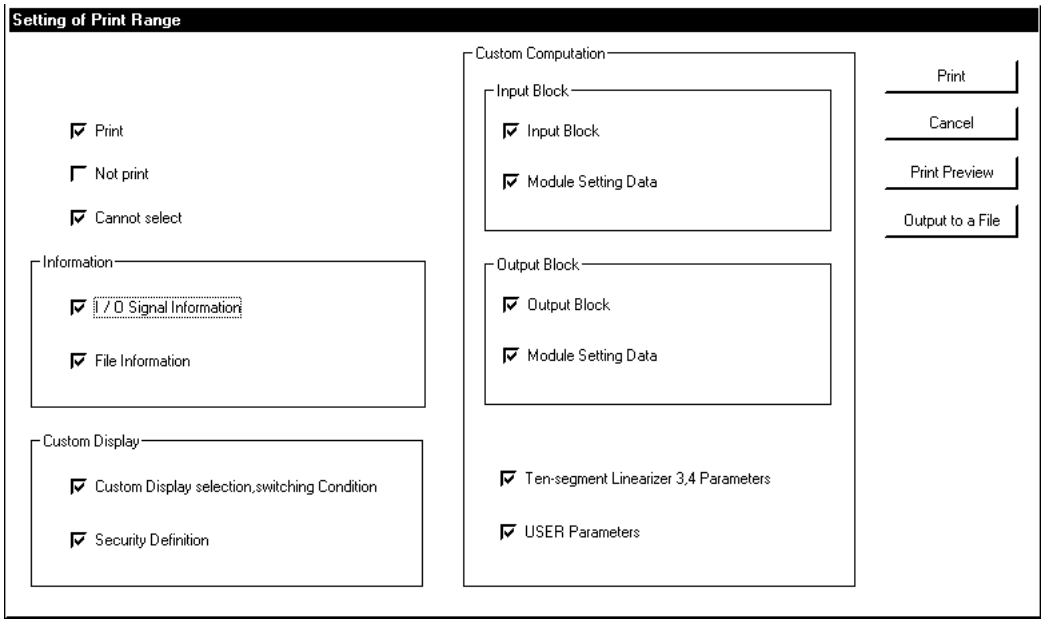

Figure 9.0.1 [Setting of Print Range] Dialog Box

- Operation

① Make sure the printer is connected to the personal computer.
≠ From the tool menus, choose <File>, then <Print...>. The [Setting of Print Range] dialog box (Figure 9.0.1) appears.
③ Click the check boxes to choose the data items to be printed.
④ Click the <OK> button. The [Printer Settings] dialog box appears.
∞ In the [Printer Settings] dialog box, click the <OK> button to begin printing.

If you click the <Print Preview> button in the dialog box shown in Figure 9.0.1, the dialog box shown in Figure 9.0.2 appears.

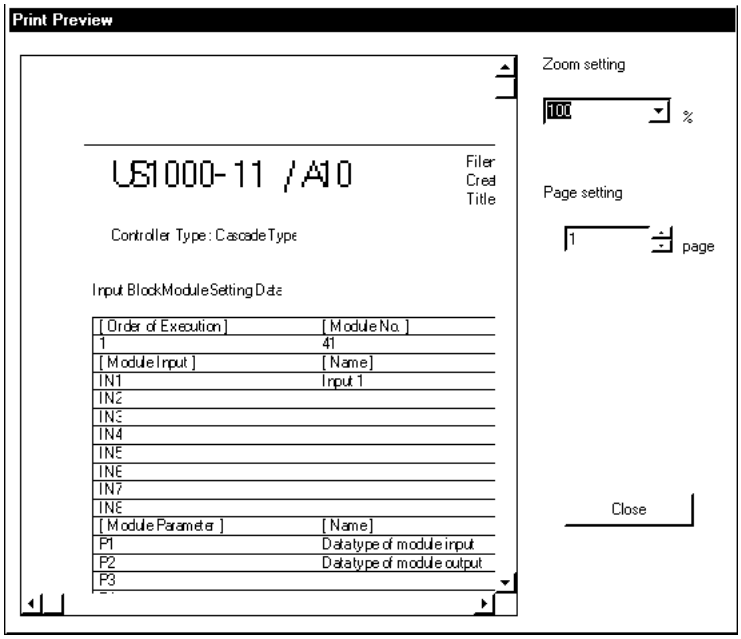

Figure 9.0.2 Example of Print Preview Window

If you click the <Output to a File> button in the dialog box shown in Figure 9.0.1, the dialog box shown in Figure 9.0.3 appears. The file extension used to save data as a file is ********.csv.

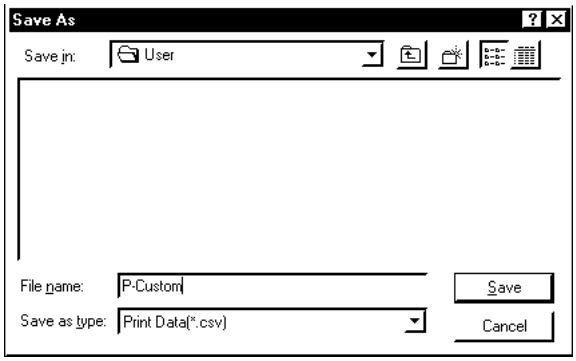

Figure 9.0.3 [Save As] Dialog Box

10. Configuring Parameters

This chapter explains the procedure for starting the parameters setting tool after custom computations are configured. For details on how to work with the parameters setting tool, see the Model LL1100 PC-based Parameters Setting Tool instruction manual (IM 5G1A01-01E).

NOTE

If you start the parameters setting tool, the current custom-computation data in the tool will be deleted. Before starting up the tool, either download the data to the US1000 controller or save the data in a file.

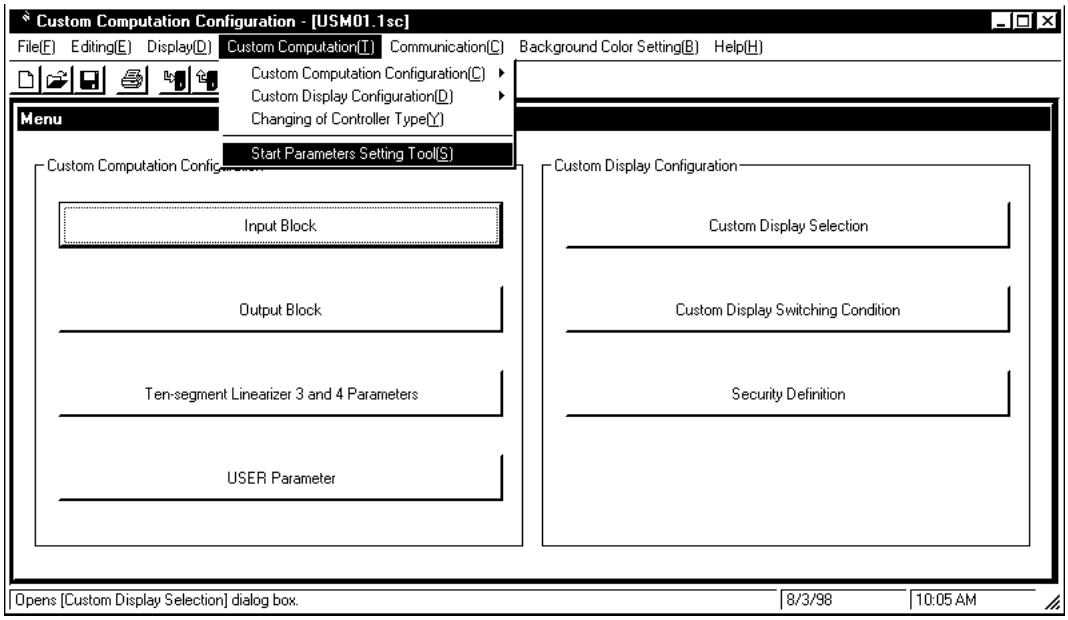

Figure 10.1.1 Startup of the Parameters Setting Tool

① From the tool menus, choose <Custom Computation>, then <Start Parameters Setting Tool>. The [Parameters Setting Tool] dialog box (Figure 10.1.2) appears.

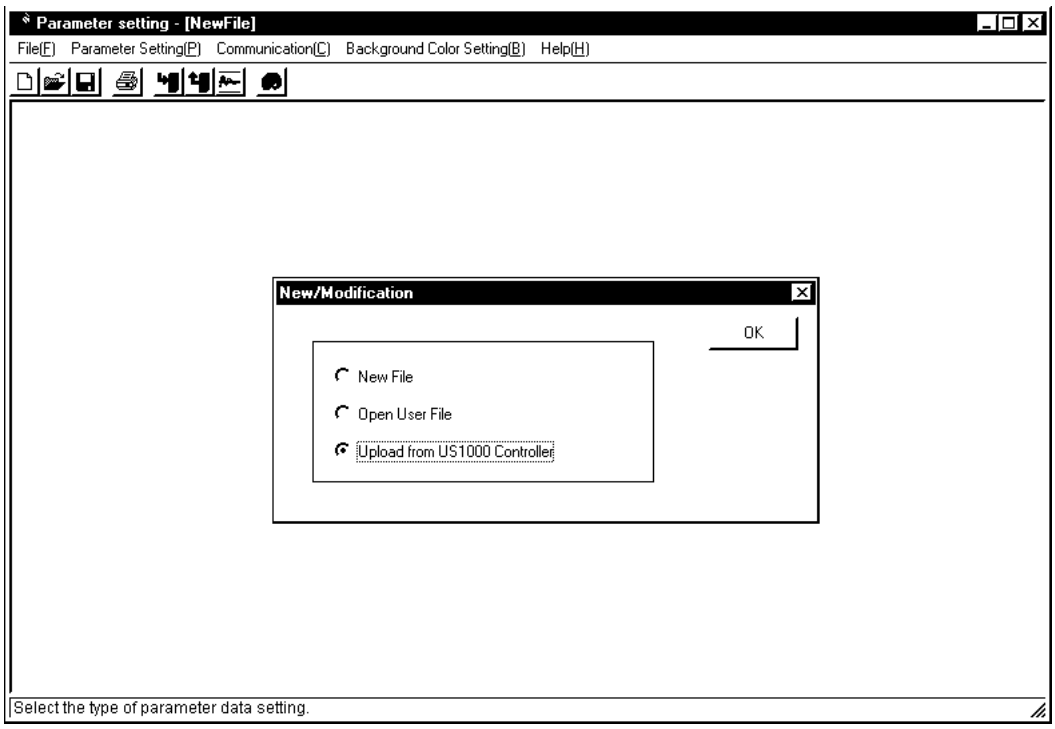

Figure 10.1.2 [Parameters Setting Tool] Dialog Box

NOTE

After starting the parameters setting tool, upload the parameter settings from the US1000 and then modify them as necessary.

11. Custom Computation Monitor

This chapter explains the procedure for monitoring custom computations downloaded to the US1000 controller.

Note that you cannot monitor custom displays, however. After downloading the custom-display data to the US1000 controller, use the <DISP> key to verify the custom displays.

NOTE

You cannot monitor custom computations if the suffix code you set in the [Specify Suffix Code and Controller Type] dialog box does not match that of the connected US1000 controller.

NOTE

If you have chosen RS-485 communication, set the communication protocol of the US1000 controller to [PC-link Communication]. Communication is not possible if you set the protocol to [PC-link Communication with Sum Check], [Modbus (RTU)] or [Modbus (ASCII)].

NOTE

In order to monitor the custom computation of US1000 controller, the mode (US mode) of the controller must be set to “21.”

11.1 Preparations for Monitoring of Custom Computations

1. Procure equipment that supplies analog input signals to the US1000 controller, and wire them properly.
2. Procure equipment that supplies contact input signals to the US1000 controller, and wire them properly. Contact input signals can also be supplied by directly short-circuiting the contact-input terminals or by alternative means.
3. Make a printout of custom-computation data.

See Also

Chapter 9, “Printing Custom Computations”

4. Connect the personal computer to the US1000 controller.

See Also

Chapter 3, “Wiring,” in the *US1000 Digital Indicating Controller* instruction manual (IM 5D1A01-01E) for details on how to connect the US1000 controller to external equipment; and Section 2.3, “Connecting the US1000 Controller to the Personal Computer” for details on how to connect the personal computer to the US1000 controller.

11.2 Monitoring Custom Computations Configured in an Input Block

You can monitor the data values (analog and contact input signals) coming into an input block, as well as the data values (computation and flag data) emitted from the input block. You can also monitor data values fed to computation modules, as well as their parameter values.

See Also

Section 3.2, “Data Fed to Input Blocks,” and Section 3.3, “Data Fed from Input Blocks,” in the *Model LL1200 PC-based Custom Computation Building Tool—User’s Reference* instruction manual (IM 5G1A11-02E) for details on computation data in an input block.

11.2.1 Monitoring Data Values Fed to/from an Input Block

In the [Input Block Monitor] view (Figure 11.2.2), you can monitor the signals listed in the following table.

	Signal Name	Description
Analog input data fed to input block	AIN1	Analog Input 1
	AIN2	Analog Input 2
	AIN3	Analog Input 3
Contact input data fed to input block	DI1.st	Contact Input 1
	DI2.st	Contact Input 2
	DI3.st	Contact Input 3
	DI4.st	Contact Input 4
	DI5.st	Contact Input 5
	DI6.st	Contact Input 6
	DI7.st	Contact Input 7
Computation data fed from input block	PVIN.1	Loop-1 PV input
	PVIN.2	Loop-2 PV input
	CSVIN.1	Loop-1 cascade input
	CSVIN.2	Loop-2 cascade input
	TRK.1	Loop-1 tracking input
	TRK.2	Loop-2 tracking input
	FF	Feedforward input
	GAIN.1	Loop-1 gain setting value
	GAIN.2	Loop-2 gain setting value
Computation flags fed from input block	CAS.1	Loop-1 CAS mode
	AUT.1	Loop-1 AUTO mode
	MAN.1	Loop-1 MAN mode
	CAS.2	Loop-2 CAS mode
	AUT.2	Loop-2 AUTO mode
	MAN.2	Loop-2 MAN mode
	O/C	OPEN/CLOSE mode
	R/S	RUN/STOP mode
	TRF.1	Loop-1 tracking flag
	TRF.2	Loop-2 tracking flag
	SV.B0	Bit-0 of SV number setting
	SV.B1	Bit-1 of SV number setting
	SV.B2	Bit-2 of SV number setting
	SV.B3	Bit-3 of SV number setting
	DP1	Operation display for interruption 1
	DP2	Operation display for interruption 2
	MG1	Interruptive message display 1
	MG2	Interruptive message display 2
	MG3	Interruptive message display 3
	MG4	Interruptive message display 4

① From the tool menus, choose <Communication>, then <Custom Computation Monitor>, then <Input Block>. The [Communication Condition Setting] dialog box (Figure 11.2.1) appears.

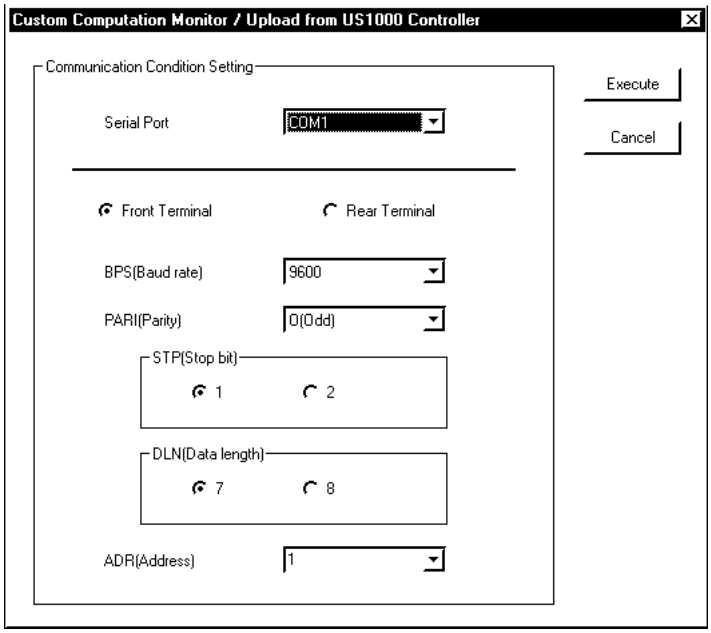

Figure 11.2.1 [Communication Condition Setting] Dialog Box

≠ Match the communication conditions of the US1000 controller with those of the personal computer, and then click the <OK> button.

③ The [Input Block Monitor] view (Figure 11.2.2) appears.

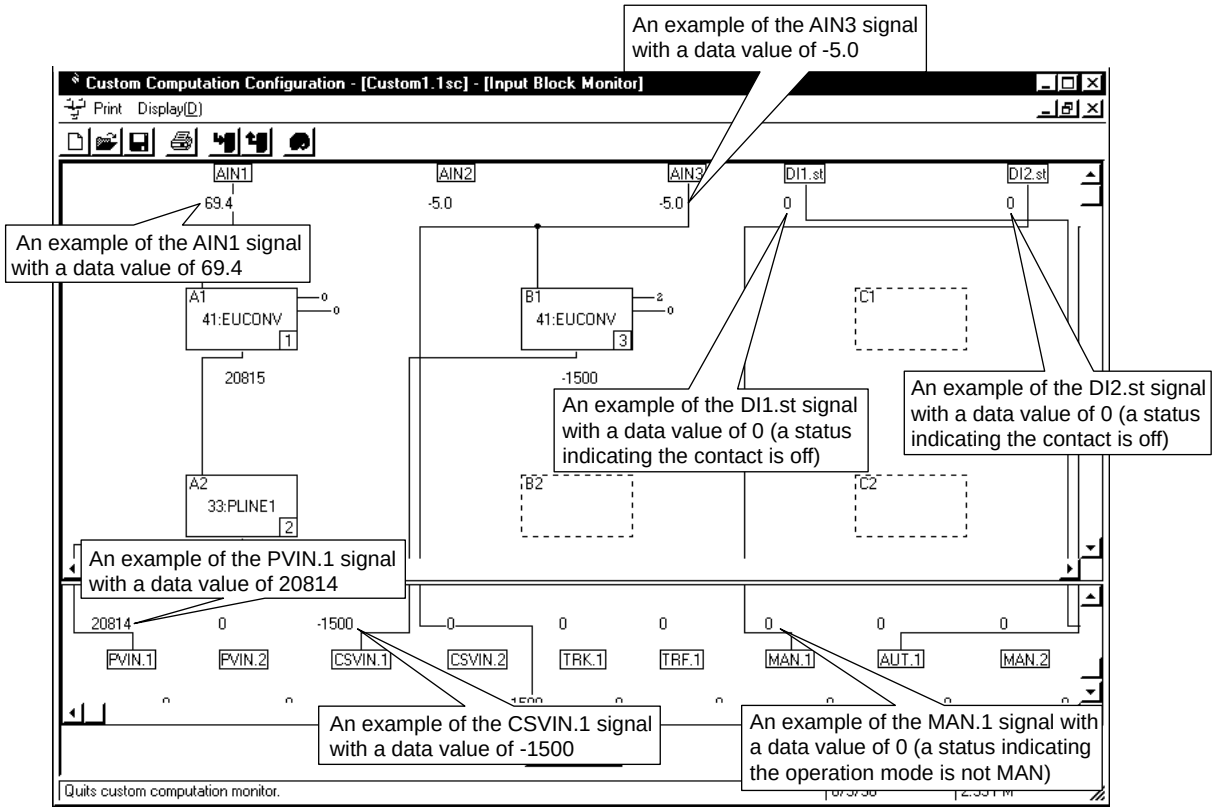

Figure 11.2.2 Example of [Input Block Monitor] View

11.2.2 Monitoring the Inputs and Parameters of Computation Modules

In the [Module Monitor] view (Figure 11.2.3), you can monitor the signals listed in the following table, module by module.

	Signal Name	Description
Inputs of computation modules	IN1	These signals take one of the following data ranges depending on the type of computation module. The numbers of inputs and parameters also depend on the type of computation module. • Signed 4-byte data • Signed 2-byte data • Flag data of 0 or 1
	IN2	
	IN3	
	IN4	
	IN5	
	IN6	
	IN7	
	IN8	
Parameters of computation modules P1	P1	
	P2	
	P3	
	P4	

- Operation

① Double-click the computation module in the [Input Block Monitor] view (Figure 11.2.2). The [Module Monitor] view (Figure 11.2.3) appears.

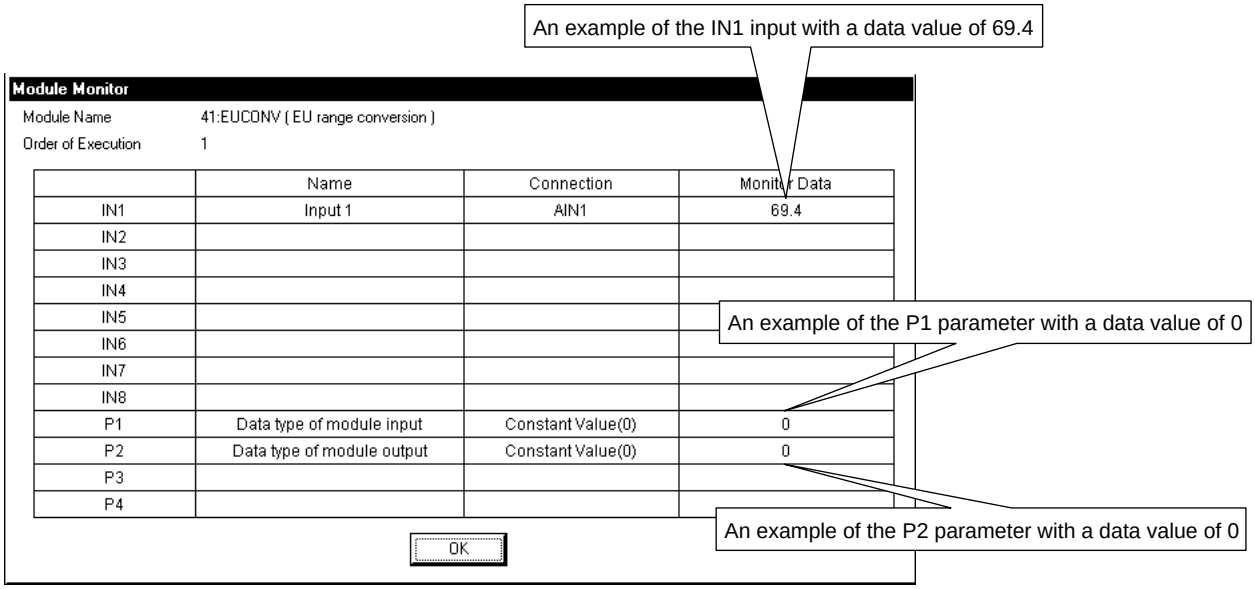

Figure 11.2.3 Example of [Module Monitor] View

11.3 Monitoring Custom Computations Configured in an Output Block

You can monitor the data values (control and computing data) coming into an output block, as well as the data values (analog and relay output data) emitted from the output block. You can also monitor the data values fed to computation modules, as well as their parameter values.

See Also

Section 3.4, "Data Fed to Output Blocks," and Section 3.5, "Data Fed from Output Blocks," in the *Model LL1200 PC-based Custom Computation Building Tool—User's Reference* instruction manual (IM 5G1A11-02E) for details on computation data in an output block.

11.3.1 Monitoring Data Values Fed to/from an Output Block

In the [Output Block Monitor] view (Figure 11.3.2), you can monitor the signals listed in the following table.

	Signal Name	Description
Control and computing data fed to output block	PV.1	Loop-1 PV value
	PV.2	Loop-2 PV value
	CSV.1	Loop-1 cascade setting value
	CSV.2	Loop-2 cascade setting value
	MV.1	Loop-1 MV output value
	MV.2	Loop-2 MV output value
	HMV.1	Loop-1 MV heating-side MV output value
	HMV.2	Loop-2 MV heating-side MV output value
	CMV.1	Loop-1 MV cooling-side MV output value
	CMV.2	Loop-2 MV cooling-side MV output value
	RET1	Retransmission output 1
	RET2	Retransmission output 2
	RET3	Retransmission output 3
Analog data fed from output block	OUT1A	Analog output 1 (current/voltage pulse)
	OUT2A	Analog output 2 (current/voltage pulse)
	OUT3A	Analog output 3 (voltage)
Contact output data from output block	OUT1R	MV1 relay output
	OUT2R	MV2 relay output
	DO1	Contact output 1 (relay)
	DO2	Contact output 2 (relay)
	DO3	Contact output 3 (relay)
	DO4	Contact output 4 (open collector)
	DO5	Contact output 5 (open collector)
	DO6	Contact output 6 (open collector)
	DO7	Contact output 7 (open collector)

- Operation

① From the tool menus, choose <Communication>, then <Custom Computation Monitor>, then <Output Block>. The [Communication Condition Setting] dialog box (Figure 11.3.1) appears.

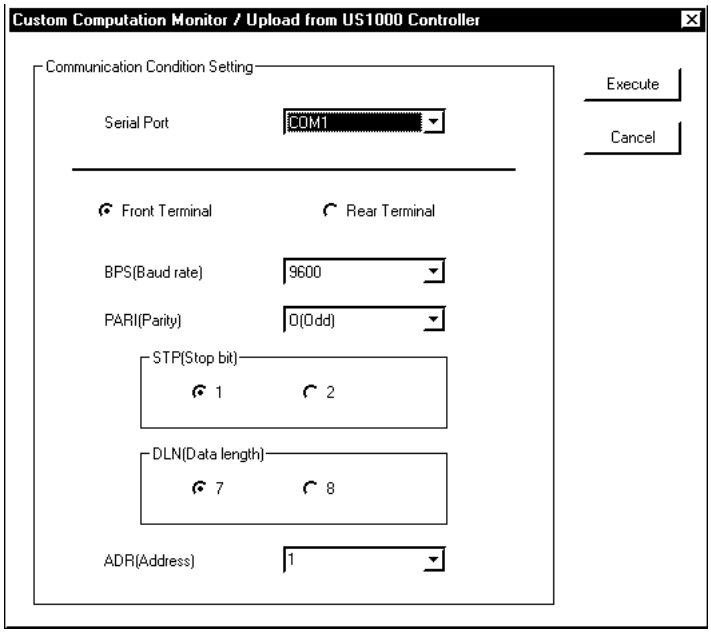

Figure 11.3.1 [Communication Condition Setting] Dialog Box

≠ Match the communication conditions of the US1000 controller with those of the personal computer, and then click the <OK> button.

③ The [Output Block Monitor] view (Figure 11.3.2) appears.

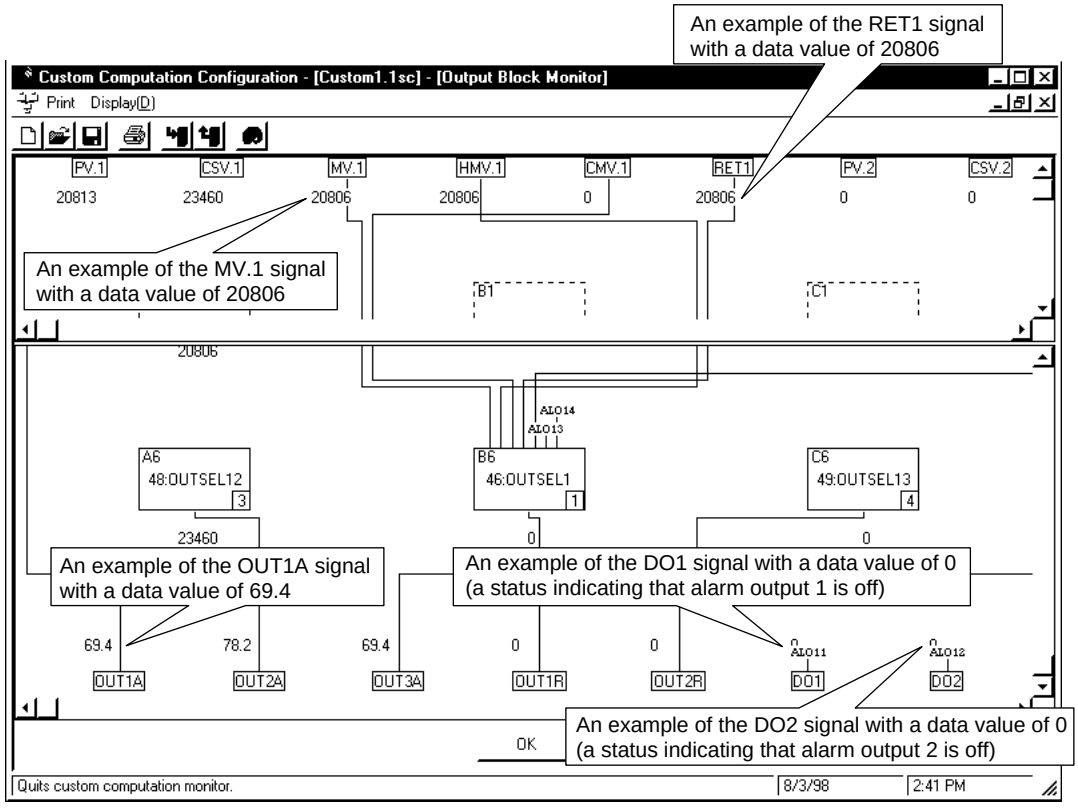

Figure 11.3.2 Example of [Output Block Monitor] View

11.3.2 Monitoring the Inputs and Parameters of Computation Modules

In the [Module Monitor] view, you can monitor the signals listed in the following table, module by module.

	Signal Name	Description
Inputs of computation modules	IN1	These signals take one of the following data ranges depending on the type of computation module. The numbers of inputs and parameters also depend on the type of computation module. • Signed 4-byte data • Signed 2-byte data • Flag data of 0 or 1
	IN2	
	IN3	
	IN4	
	IN5	
	IN6	
	IN7	
	IN8	
Parameters of computation modules	P1	
	P2	
	P3	
	P4	

- Operation

① Double-click the computation module in the [Output Block Monitor] view (Figure 11.3.2). The [Module Monitor] (Figure 11.3.3) view appears.

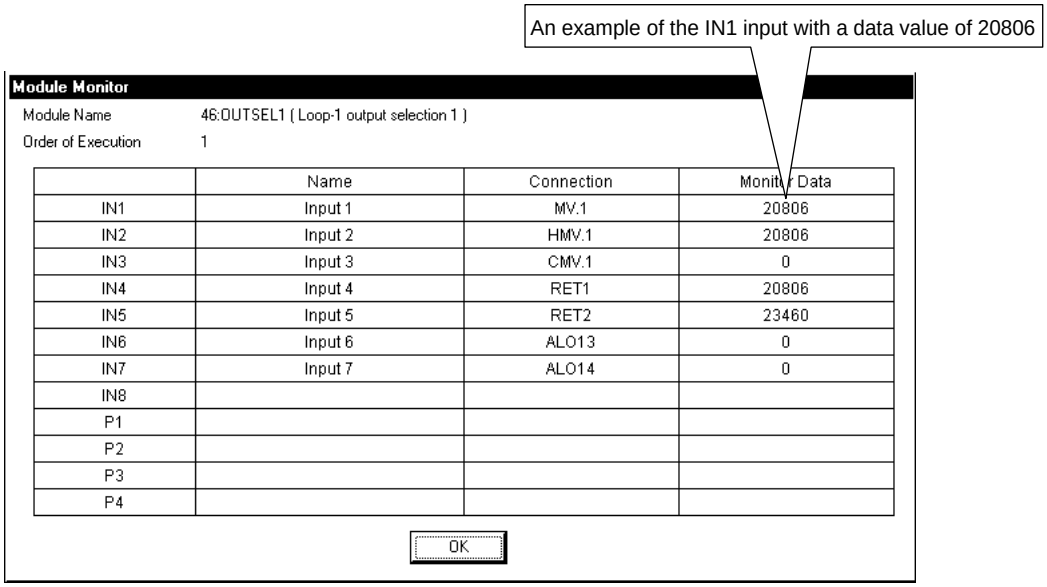

Figure 11.3.3 Example of [Module Monitor] View

12. Examples of Custom Computation and Custom Display Configurations

This chapter gives examples of the configurations of custom computations and custom displays. When configuring custom computations and displays according to these examples, it is recommended that you read the sample files first and then either modify their settings or make the configurations from scratch. In this chapter, the sample file (file name: USM01.1SC) for single-loop control is used for the explanation.

■ Preparations for configuring sample file

When you start the LL1200 tool, the [Tool Selection] dialog box (Figure 12.0.1) appears.

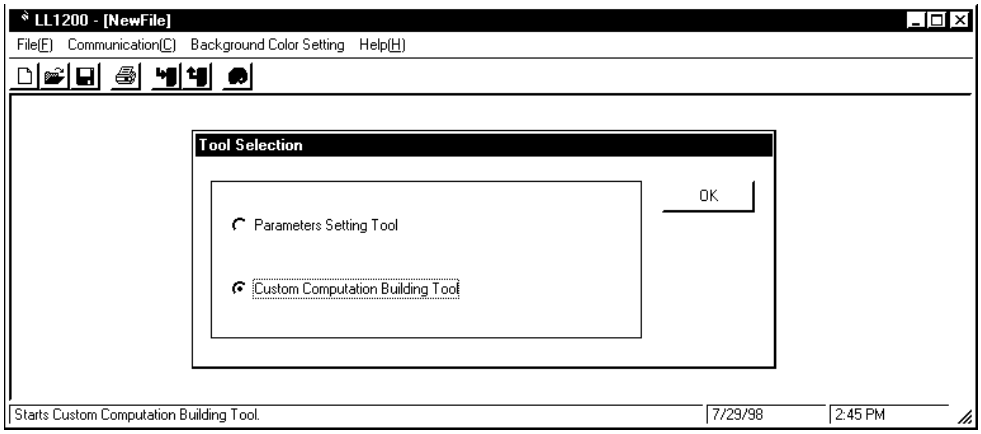

Figure 12.0.1 [Tool Selection] Dialog Box

To read a sample file for single-loop control, follow the steps shown below.

① In the [Tool Selection] dialog box, click the <Custom Computation Building Tool> option button. Then, click the <OK> button.

≠ In the [New/Modification] dialog box, click the <Open Sample File> option button. Then, click the <OK> button.

③ In the [Open Sample File] dialog box, choose the sample for single-loop control (file name: USM01.1SC) as the file to be read.

④ In the [Specify Suffix Code and Controller Type] dialog box, choose <Single-loop type> as the controller type. Specify the same suffix and optional suffix codes as those of the US1000 controller you will connect to the system.

∞ In the [Specify Suffix Code and Controller Type] dialog box, click the <OK> button. The [Custom Computation Configuration Menu/Custom Display Configuration Menu] dialog box (Figure 12.0.2) appears.

± Now, you are ready to configure the same custom computations and displays as the examples discussed later in this chapter.

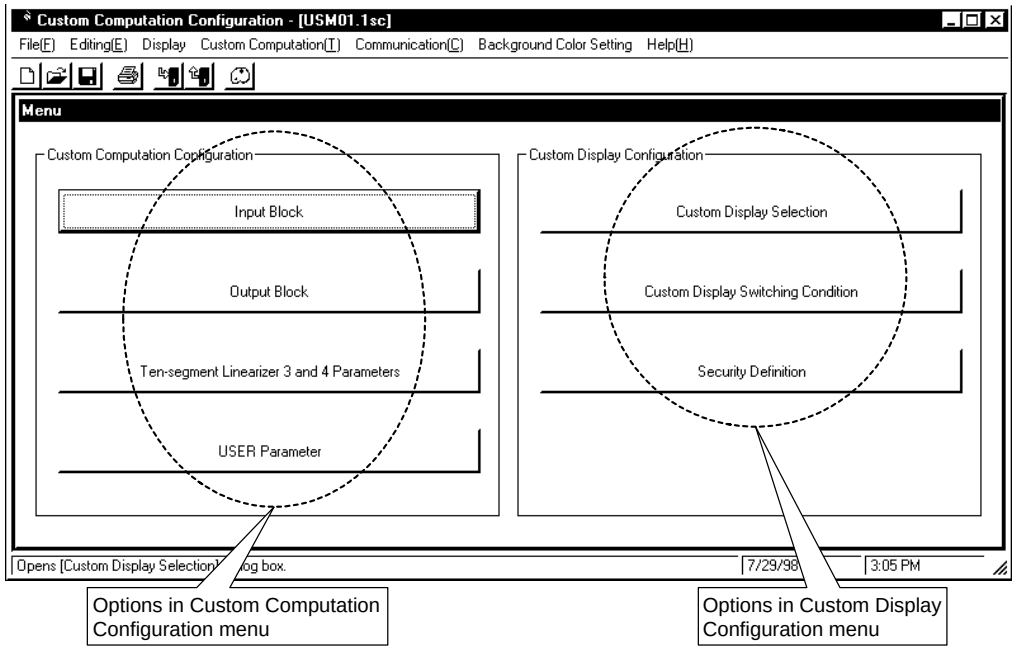

Figure 12.0.2 [Custom Computation Configuration Menu/Custom Display Configuration Menu] Dialog Box

12.1 Example 1: Applying Corrective Computation to the PV Input

In this example, you introduce a 1 to 5-V correction signal through the AIN3 analog input. The purpose of this correction signal is to correct the PV signal by multiplying the PV signal fed to the AIN1 analog input.

■ Preparations for Applying Corrective Computation to the PV Input

Multiply the AIN1 analog input by the AIN3 analog input, which is regarded as a multiplier of 0.5 to 1.5, as shown in the following formula.

PV1 input = AIN1 analog input × AIN3 analog input

Configure the range and scale of the AIN3 analog input as shown below. Note that the parameters listed below are setup parameters.

RH3 (maximum value of analog input-3 range):	5.000 (V)
RL3 (minimum value of analog input-3 range):	1.000 (V)
SH3 (maximum value of analog input-3 scale):	1500
SL3 (minimum value of analog input-3 scale):	500
SDP3 (analog input-3 decimal point position):	3

The readouts of the AIN3 analog input are used as the correction factors and are as shown below.

For a 5-V signal, the AIN3 analog input reads 1.500.

For a 3-V signal, the AIN3 analog input reads 1.000.

For a 1-V signal, the AIN3 analog input reads 0.500.

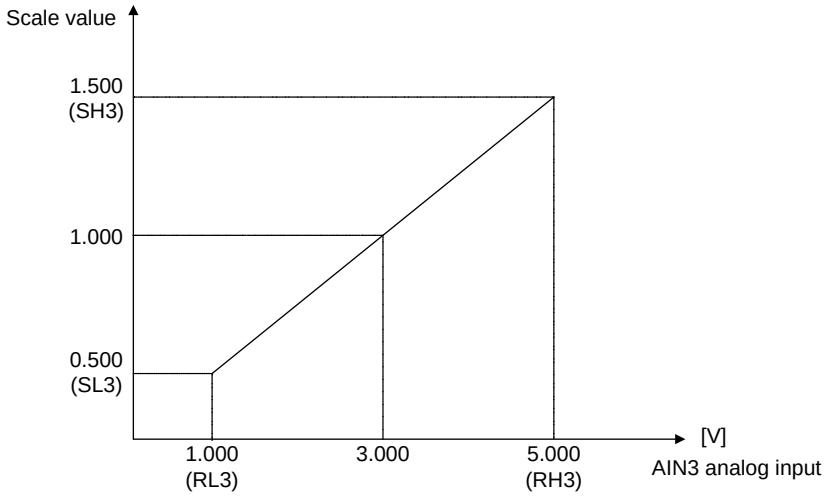

Figure 12.1.1 AIN3 Analog Input vs. Scale Value

The AIN1 analog input reads 0.5 times, or half, the actual value if a 1-V signal is applied to the AIN3 analog input. Likewise, it reads 1.5 times the actual value if a 5-V signal is applied to the AIN3 analog input.

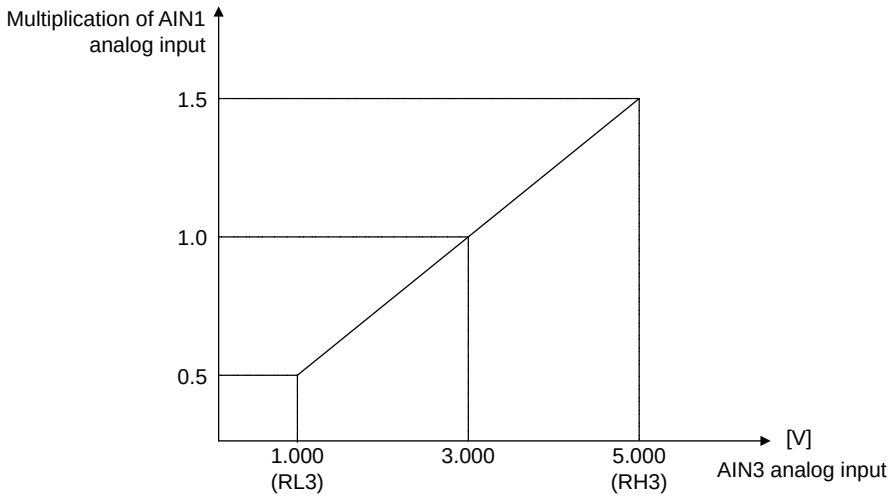

Figure 12.1.2 Multiplication of AIN1 Analog Input vs. AIN3 Analog Input

For the maximum and minimum value of analog input scale, however, each internal data value for custom computation is represented as an integer ranging from 0 to 30000. Hence, the correction factors (multiplications of the AIN1 analog input) of 0.500, 1.000 and 1.500 discussed above are represented as 0, 15000 and 30000, respectively. The PV signal coming in through the AIN1 analog input is multiplied by the specific internal data value determined. If the AIN1 analog input is multiplied simply in this way, the resulting value of the input is 15000 times the actual value for a 3-V signal applied to the AIN3 analog input. In order for the multiplication to become 1.000 in actual application, the following conversion formula must be executed before the AIN1 analog input is multiplied.

$$\text{AIN1 internal data value} \times \frac{\text{AIN2 internal data value}}{30000} + 0.5 \quad \text{---------- ①}$$

Since all data values are handled internally as integers, the fraction of 0.5 cannot be used in this formula. Its use would also prevent you from obtaining the correct result because a fraction is truncated if you first divide the AIN3 value by 30000. To solve these problems, formula ① must be transformed into formula ≠ shown below.

$$\text{AIN1 internal data value} \times \frac{\text{AIN2 internal data value} + 15000}{30000} \quad \text{---------- ②}$$

Now, you are ready to introduce the correction signal.

■ Diagram Showing How Customized Computation Modules for Correcting the PV Input Are Connected

Figure 12.1.3 is a block diagram showing how customized computation modules are connected to implement the process discussed in the previous section.

The procedure for configuring this block diagram is explained in the paragraph, " ■ Procedure for Configuring Custom Computations," that follows.

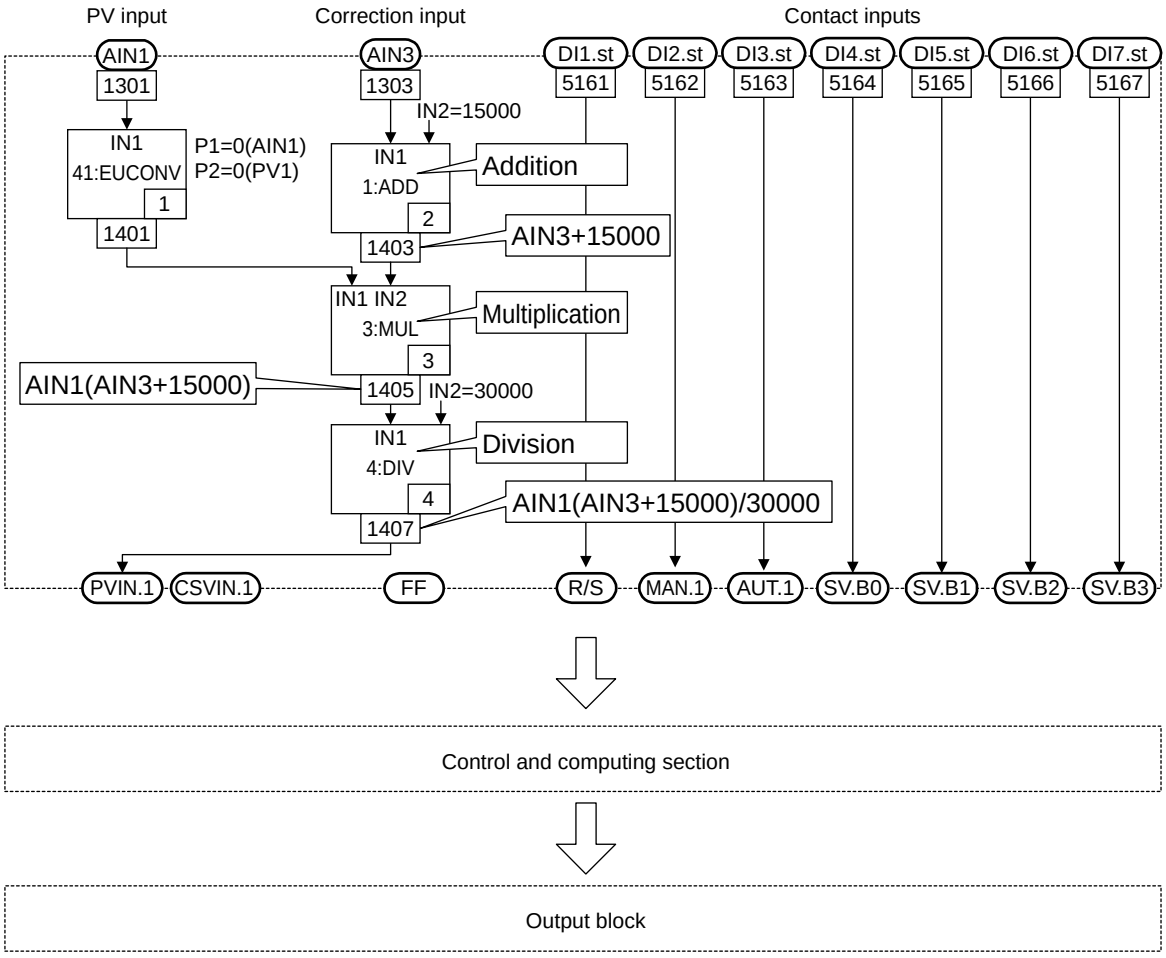

Figure 12.1.3 Diagram Showing How Customized Computation Modules for Correcting the PV Input Are Connected (Input Block)

■ **Procedure for Configuring Custom Computations**

Before you begin configuring custom computations, read the sample file for single-loop control (file name: USM01.1SC). To read the file, see subsection 7.3.1, “Reading Data from Disk.” Next, delete all of the computation modules that exist in the input block, leaving the contact inputs wired as they are. For details on how to delete the computation modules, see Section 6.1.2, “Deleting Computation Modules.”

If you carry out the configuration discussed in this section, you will no longer be able to use the functions of cascade and feedforward inputs available in single-loop control.

To configure the custom computations, follow the instructions in “Operation I,” “Operation II” and “Operation III,” in this order.

- Operation I: Module Configuration

① In the [Custom Computation Configuration Menu] dialog box (Figure 12.0.2), click <Input Block>. The [Input Block] dialog box (Figure 12.1.4) appears.

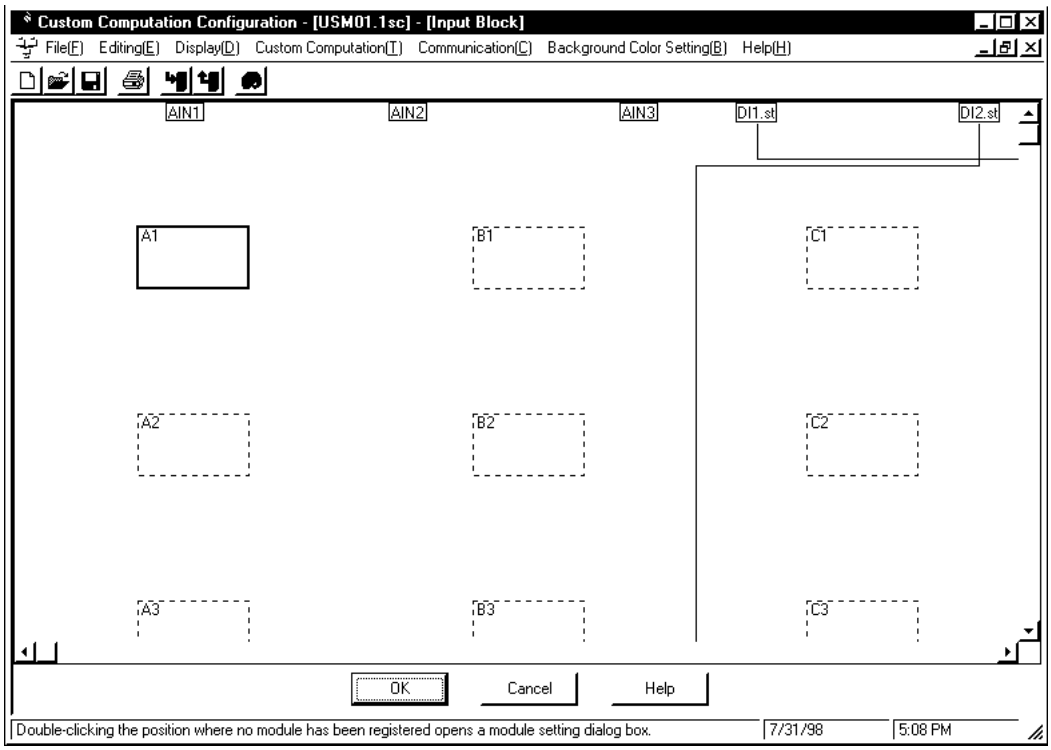

Figure 12.1.4 [Input Block] Dialog Box

≠ In the [Input Block] dialog box, double-click a blank box. The [Module Configuration] dialog box (Figure 12.1.5) appears.

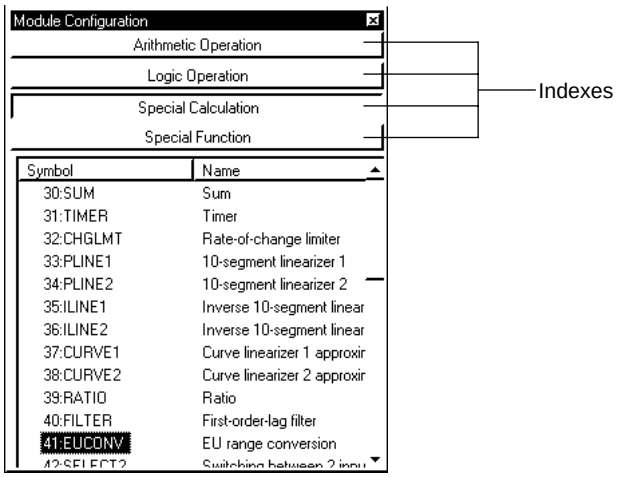

Figure 12.1.5 [Module Configuration] Dialog Box

③ Click the <Special Calculation> index.

④ Double-click <41: EUCONV>. The EUCONV module is registered with the [Input Block] dialog box, as shown in Figure 12.1.6.

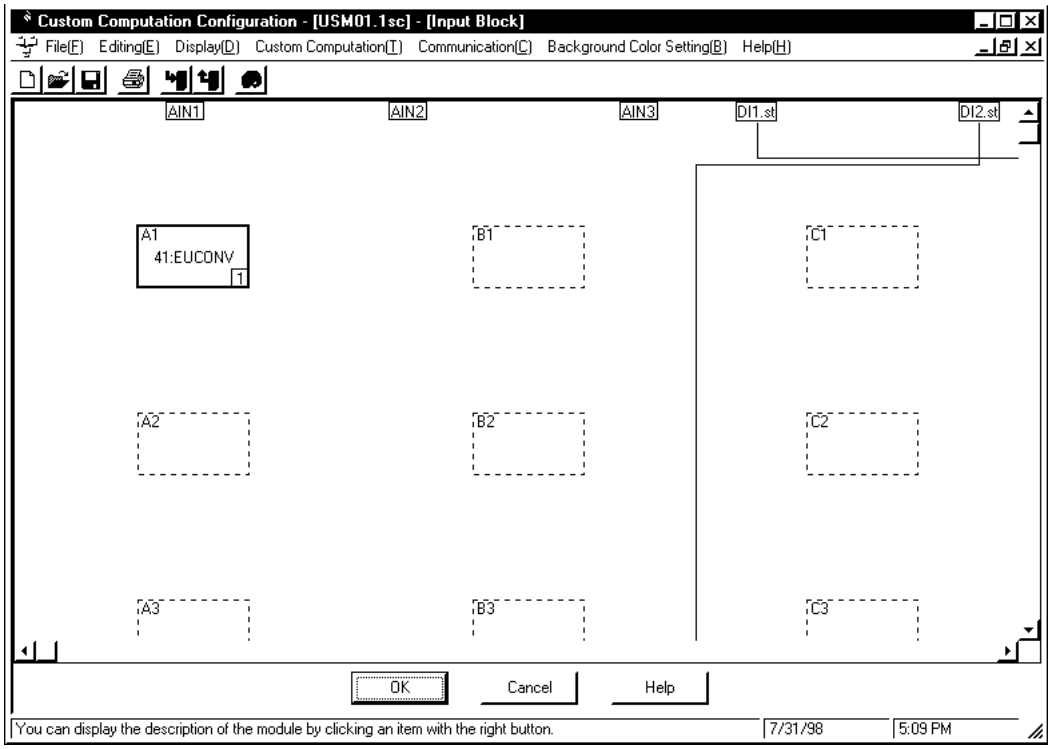

Figure 12.1.6 Example of the [Input Block] Dialog Box where the EUCONV Module Is Registered As the First-run Module

∞ Repeat steps ≠ to ④ to register the Addition (ADD), Multiplication (MUL) and Division (DIV) modules. Register these modules in the order of ADD, MUL and then DIV modules.

Figure 12.1.7 is an example of the [Input Block] dialog box where the EUCONV, ADD, MUL and DIV modules are registered.

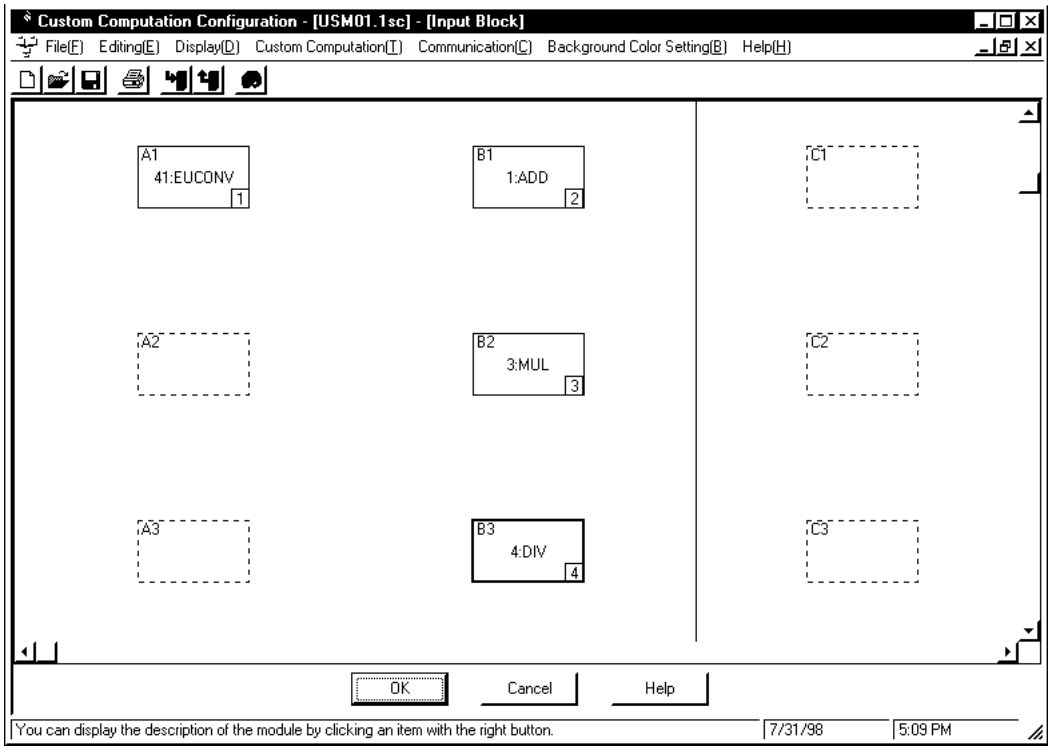

Figure 12.1.7 Example of the [Input Block] Dialog Box where the EUCONV, ADD, MUL and DIV Modules Are Registered

When you finish registering the computation modules, proceed to “Operation II: Module Setting.”

- Operation II: Module Setting

This operation involves configuring the inputs and parameters of computation modules.

① Click the registered first-run EUCONV module.
≠ From the tool menus, choose <Editing>, then <Connection>. The [Module Setting] dialog box (Figure 12.1.8) appears.

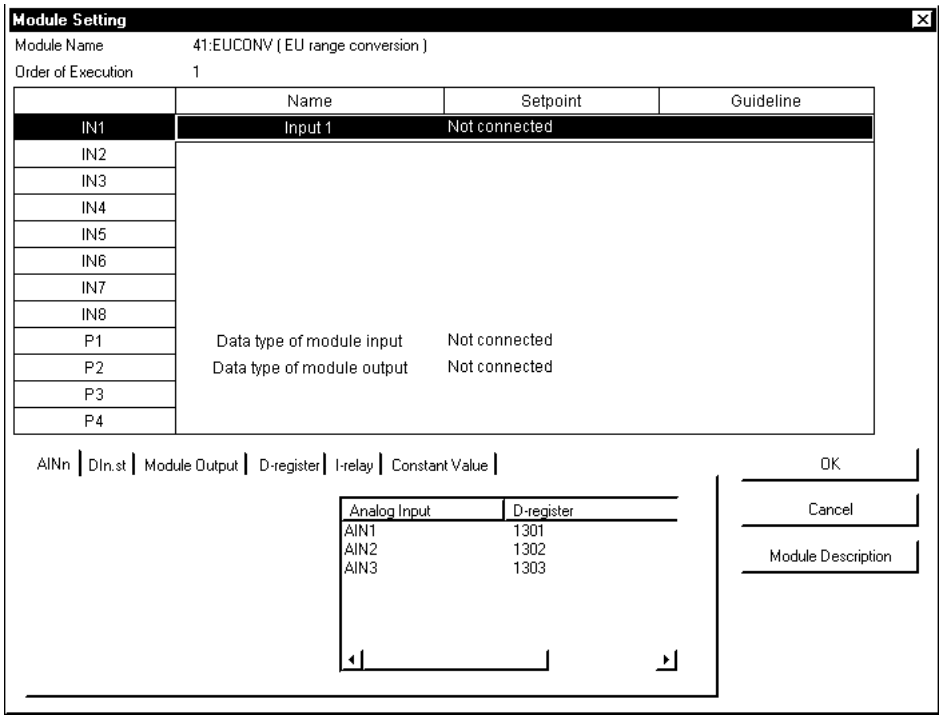

Figure 12.1.8 [Module Setting] Dialog Box

③ Click the <IN1> module input.
④ Click the <AINn> index.
∞ Double-click <AIN1> in the list box. The <AIN1 (Setpoint column)> and <D1301 (Guideline column)> options appear in the <IN1> row.

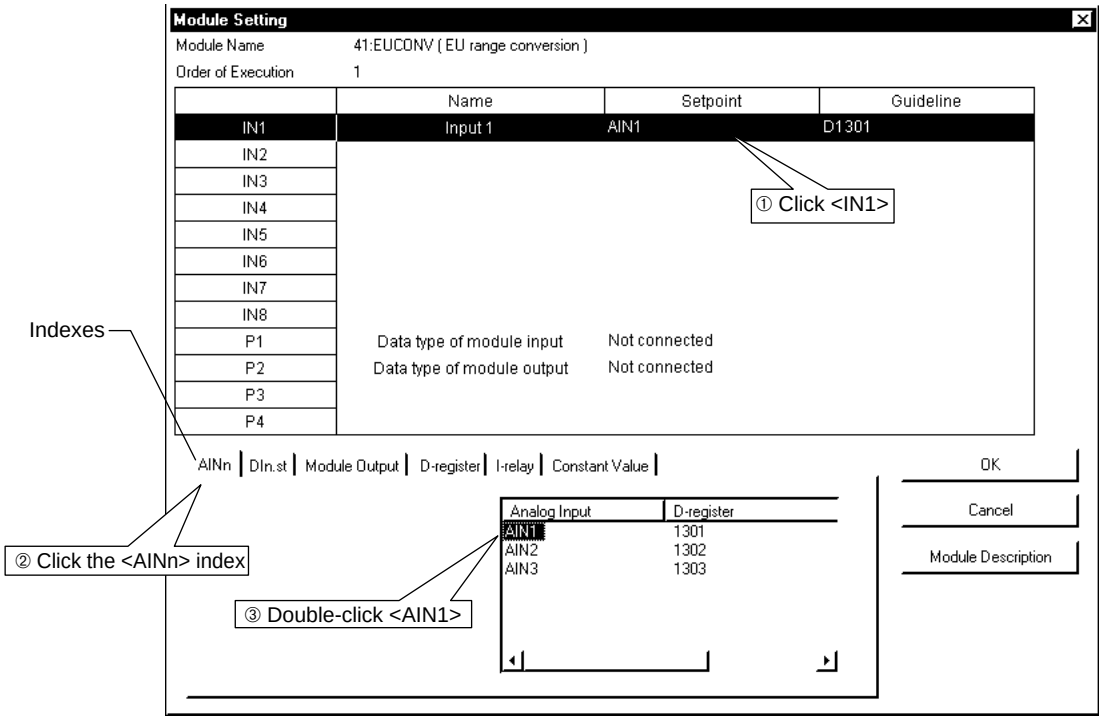

Figure 12.1.9 Configuration of the <IN1> Input

± Click the <P1> module parameter.
≤ Click the <Constant Value> index.
≥ Type “0” in the text box and press the <Enter> key.

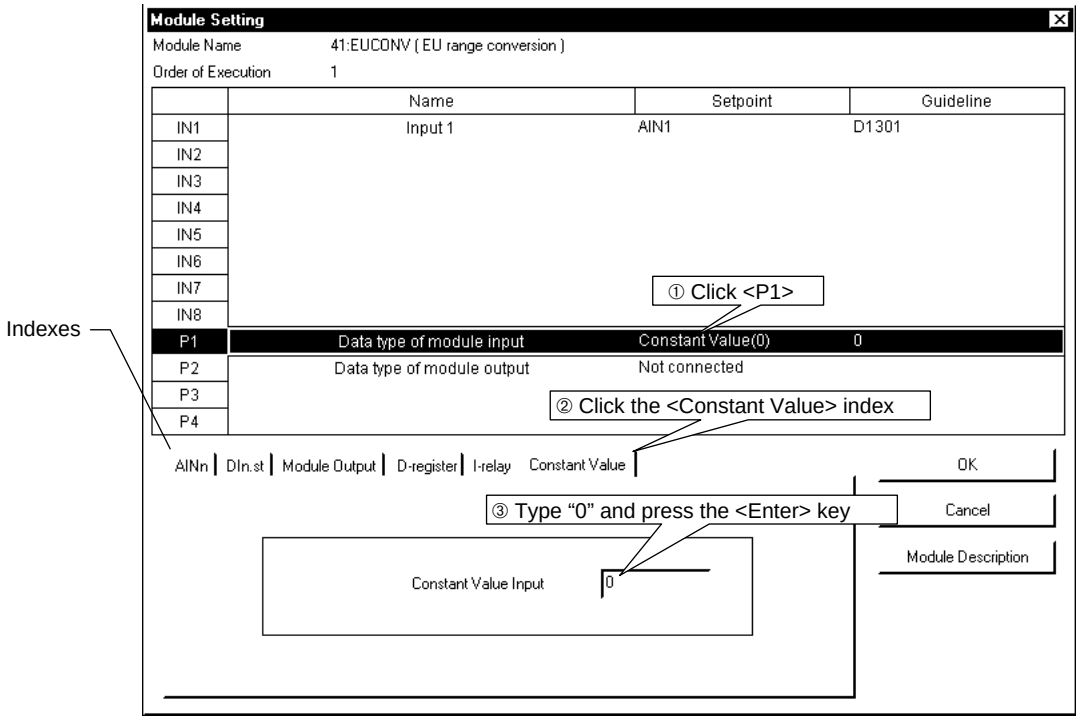

Figure 12.1.10 Configuration of the <P1> Parameter

⑨ Click the <P2> module parameter.
μ Click the <Constant Value> index.
⑪ Type “0” in the text box and press the <Enter> key.

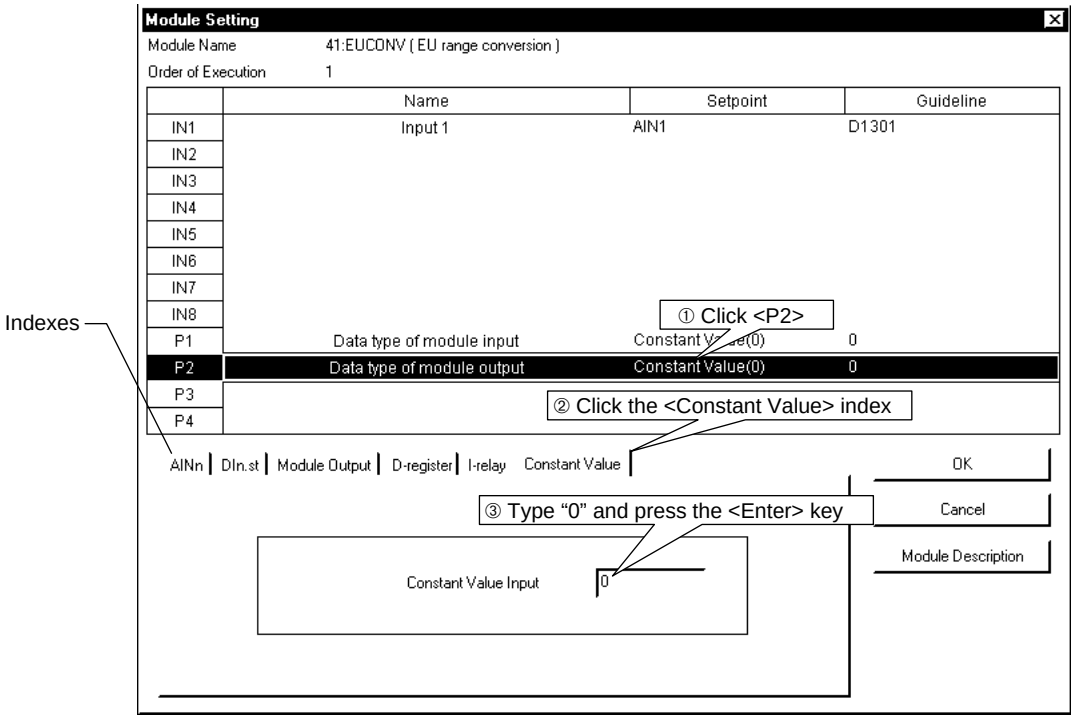

Figure 12.1.11 Configuration of the <P2> Parameter

⑫ Click the <OK> button.

Repeat steps ① to ⑫ to configure the inputs and parameters of the Addition (ADD), Multiplication (MUL) and Division (DIV) modules also.

The setpoints of the inputs for which connection is made are as follows.

ADD module:

Inputs	IN1	Index: [AINn] Selection: [AIN3 (1303)]
	IN2	Index: [Constant Value] Setpoint: [15000]

MUL module:

Inputs	IN1	Index: [Module Output] Group box: [Input Block] Selection: [IMO1L (1401)]
	IN2	Index: [Module Output] Group box: [Input Block] Selection: [IMO2L (1403)]

DIV module:

Inputs	IN1	Index: [Module Output] Group box: [Input Block] Selection: [IMO3L (1405)]
	IN2	IN2 Index: [Constant Value] Setpoint: [30000]

When you finish configuring the computation modules' inputs and parameters, proceed to "Operation III: Connection to the Control and Computing Section."

- Operation III: Connection to the Control and Computing Section

This operation involves defining the settings needed to pass the results of computation in the input block to the control and computing section.

① In the [Input Block] dialog box (Figure 12.1.12), click the <PVIN.1> output signal.

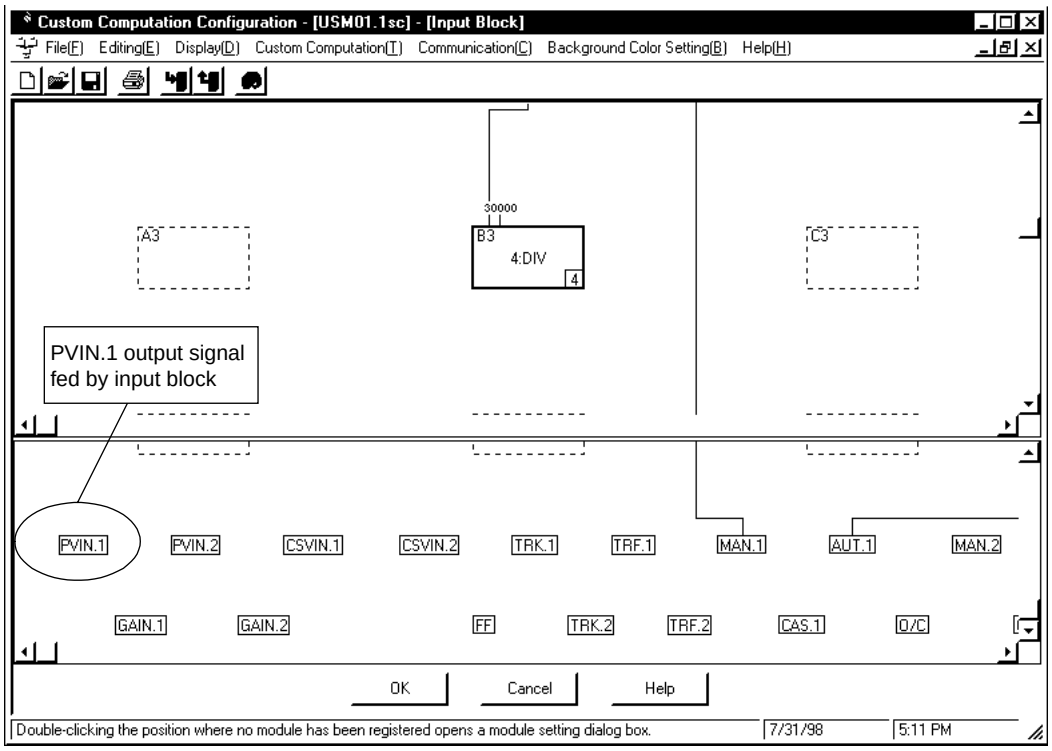

Figure 12.1.12 Output Signal Fed by Input Block

≠ From the tool menus, choose <Editing>, then <Connection>. The [Setting of Input Block Connection Assignment] dialog box (Figure 12.1.13) appears.

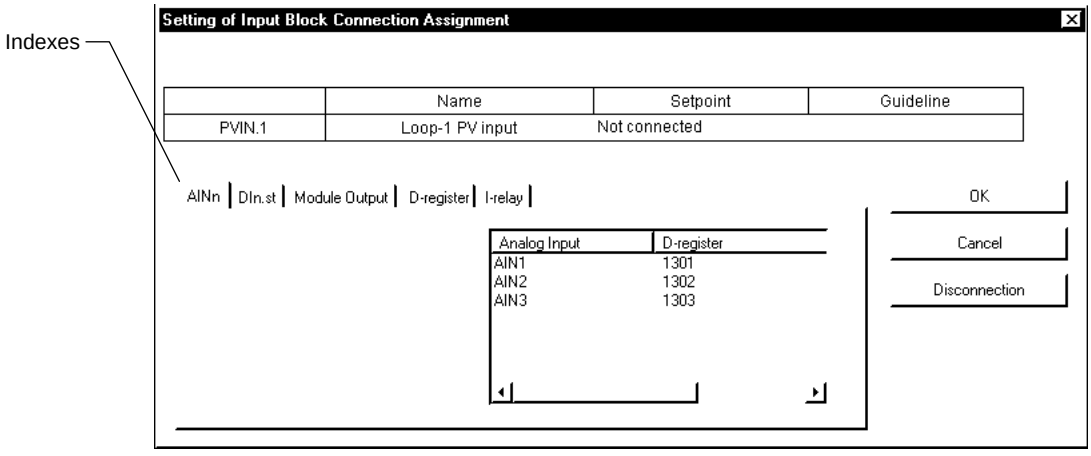

Figure 12.1.13 [Setting of Input Block Connection Assignment] Dialog Box

③ Click the <Module Output> index.
④ Click the <Input Block> option button in the group box.
∞ Double-click <IMO4L> in the list box. The <IMO4L (Setpoint column)> and <D1407 (Guideline column)> options appear in the <PVIN.1> row.

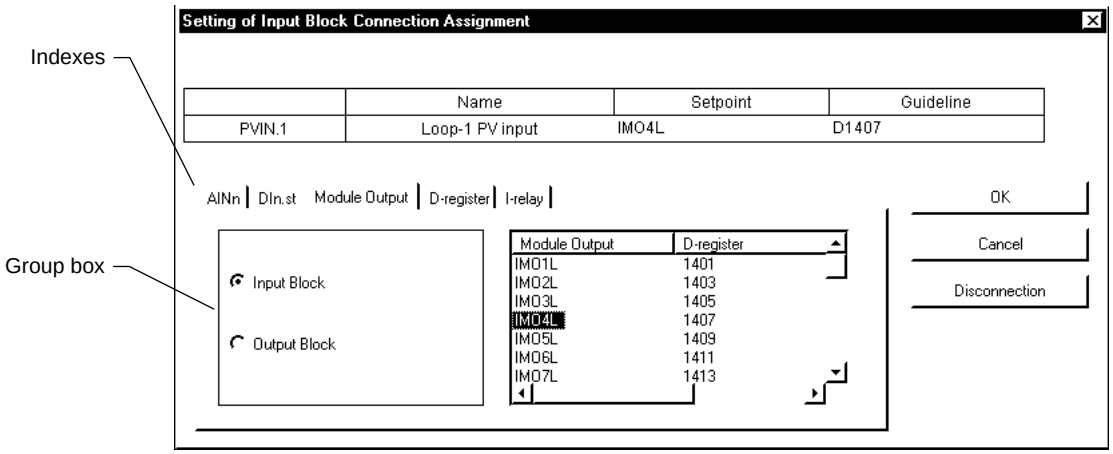

Figure 12.1.14 Configuration of the <IMO4L> Output

± Click the <OK> button.

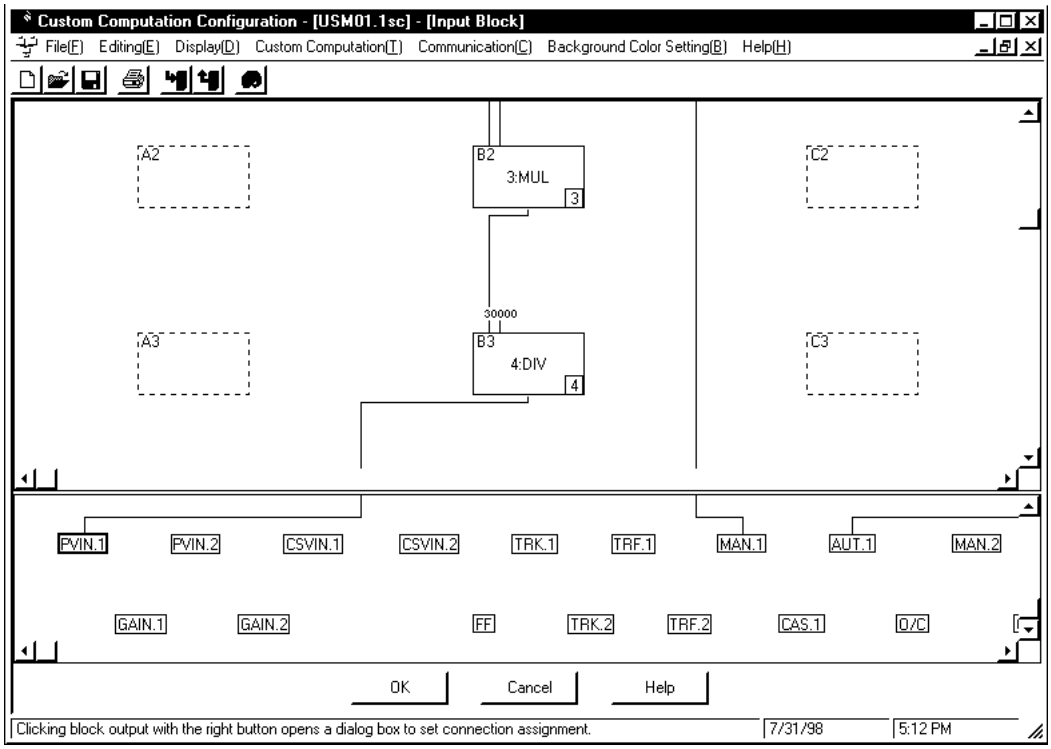

Figure 12.1.15 Example of the [Input Block] Dialog Box (finished view) Where Corrective Computation Is Applied to the PV Input

You have now finished this example of configuring custom computations for correcting the PV input.

The final step when configuring actual custom computations (after this example), is to download the computations to the US1000 controller (see Section 8.2), as necessary, in order to verify their performance by means of custom computation monitoring (see Chapter 11).

12.2 Example 2: Showing the PV Input Value before Corrective Computation

In this example, you use the custom computations you configured in Section 12.1 to show the PV input value before corrective computation on the US1000 controller's SV digital display.

This involves first configuring custom computations for this purpose, and then configuring the custom displays.

When you finish the operations in this section, you can view the PV1 & SV1 display, PV1 & MV1 display and DISP1 display on the operation display panel, in succession with each press of the <DISP> key, as shown in Figure 12.2.1. The SV digital display on the DISP1 display shows the value of the PV input before corrective computation.

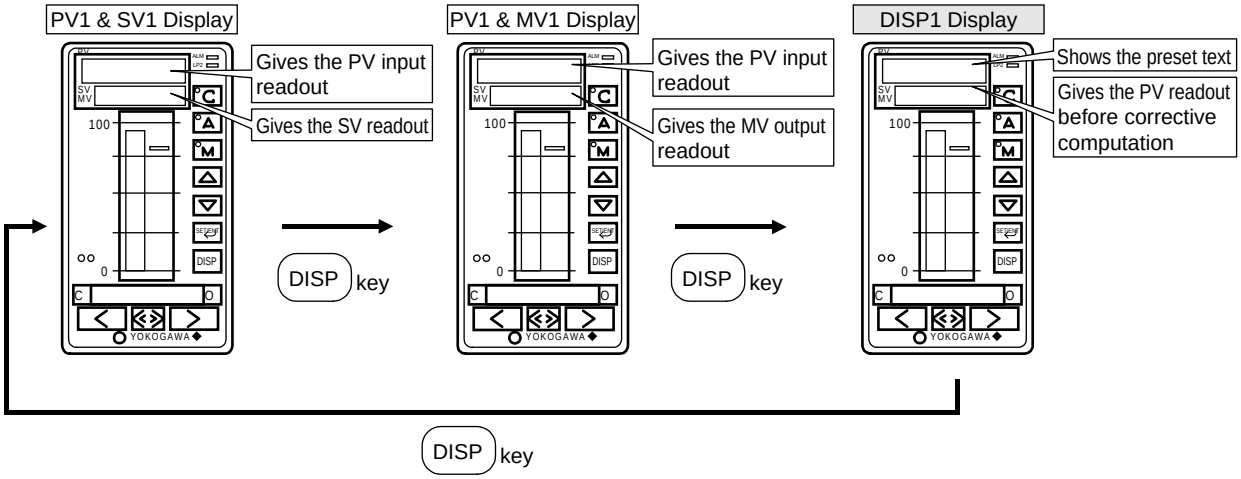

Figure 12.2.1 Addition of DISP1 Display to Operation Displays for Single-loop Control

■ Procedure for Configuring Custom Computations

To configure the custom computations, follow the instructions in “Operation I” and “Operation II” here, in this order.

- Operation I: Module Configuration

① In the [Input Block] dialog box (Figure 12.1.15), double-click a blank box. The [Module Configuration] dialog box (Figure 12.2.2) appears.

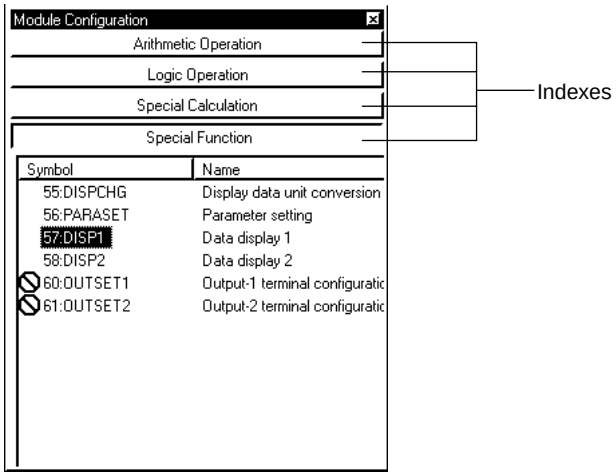

Figure 12.2.2 [Module Configuration] Dialog Box

≠ Click the <Special Function> index.

③ Double-click <57: DISP1>. The DISP1 module is registered with the [Input Block] dialog box, as shown in Figure 12.2.3.

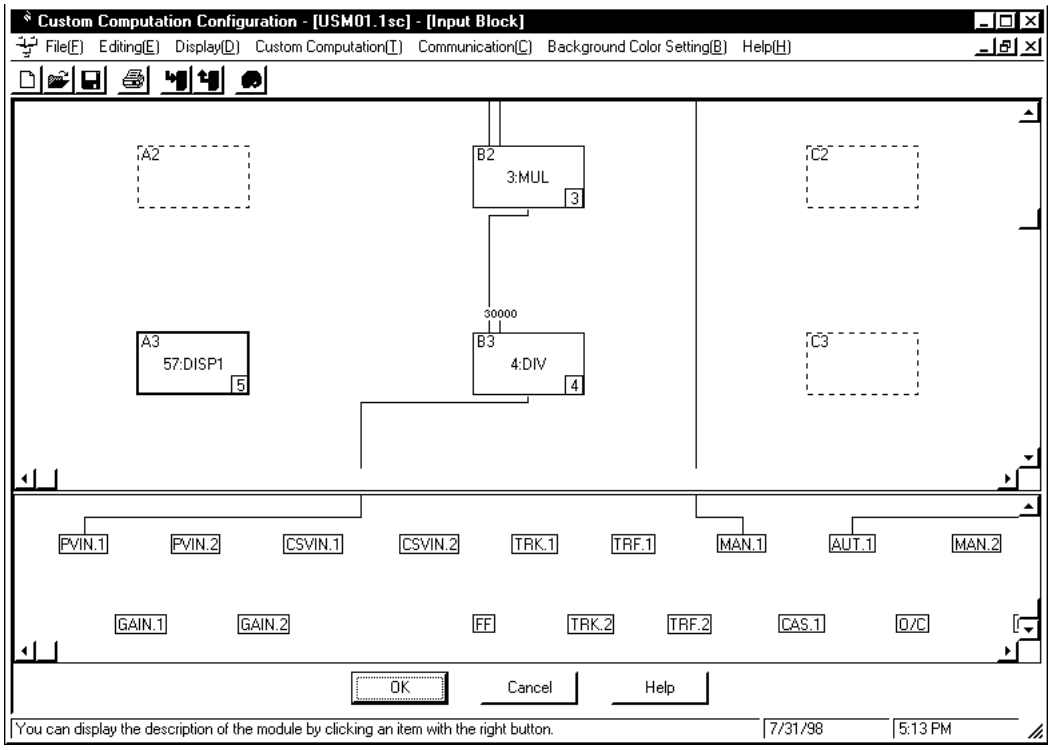

Figure 12.2.3 Example of the [Input Block] Dialog Box where the DISP1 Module Is Registered as the Fifth-run Module

When you finish registering the computation modules, proceed to “Operation II: Module Setting.”

- Operation II: Module Setting

This operation involves configuring the inputs and parameters of computation modules.

① Click the registered fifth-run DISP1 module.

≠ From the tool menus, choose <Editing>, then <Connection>. The [Module Setting] dialog box (Figure 12.2.4) appears.

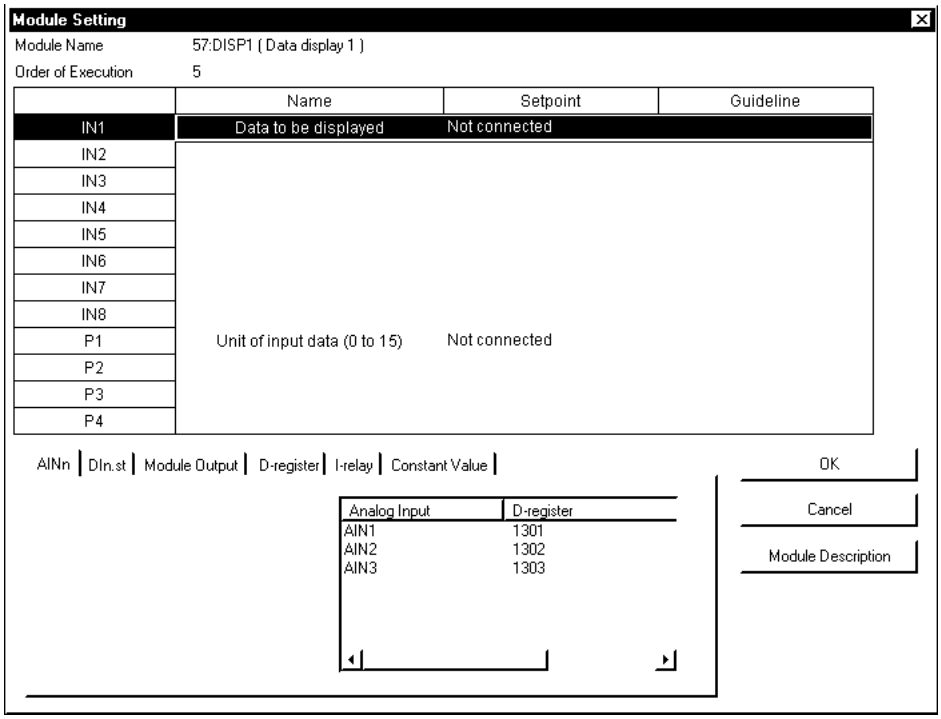

Figure 12.2.4 [Module Setting] Dialog Box

③ Click the <IN1> module input.
④ Click the <Module Output> index.
∞ Click the <Input Block> option button in the group box.
± Double-click <IMO1L> in the list box. The <IMO1L (Setpoint column)> and <D1401 (Guideline column)> options appear in the <IN1> row.

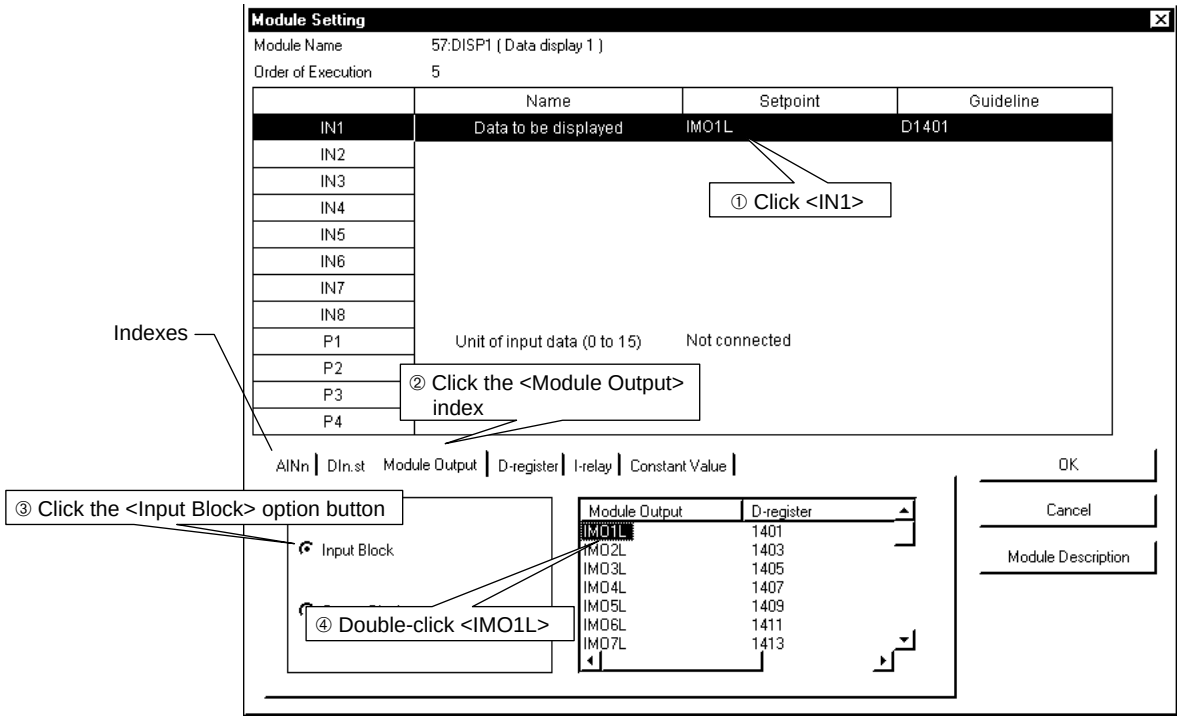

Figure 12.2.5 Configuration of the <IN1> Input

12

≤ Click the <P1> module parameter.
≥ Click the <Constant Value> index.
⑨ Type “6” in the text box and press the <Enter> key.

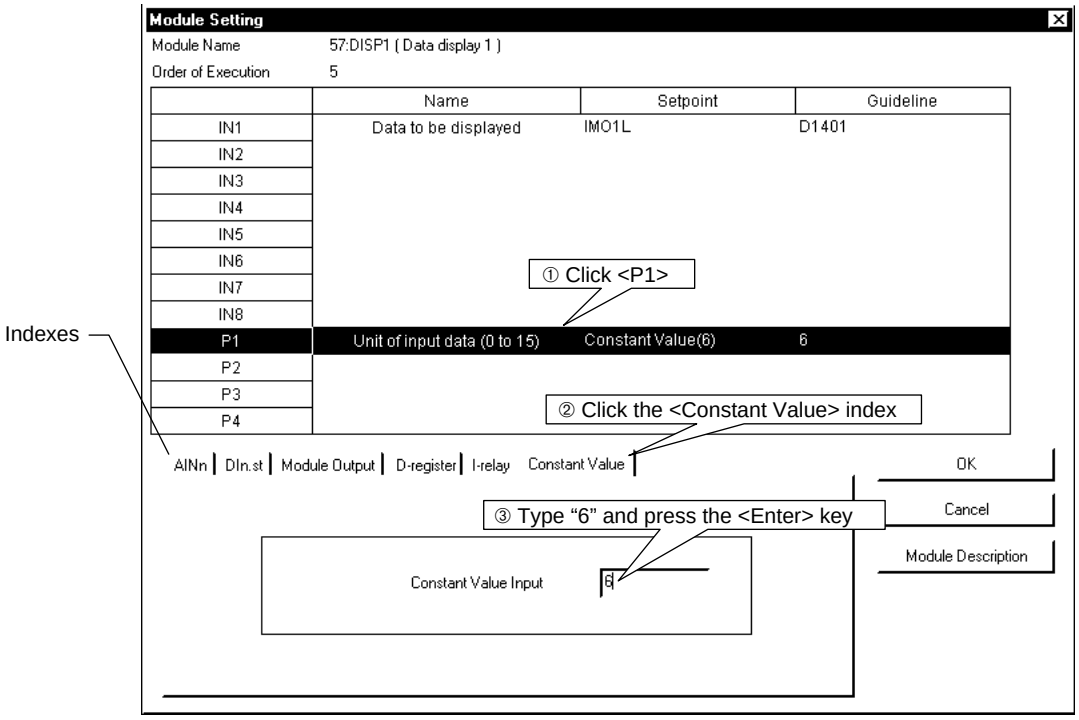

Figure 12.2.6 Configuration of the <P1> Parameter

µ Click the <OK> button.

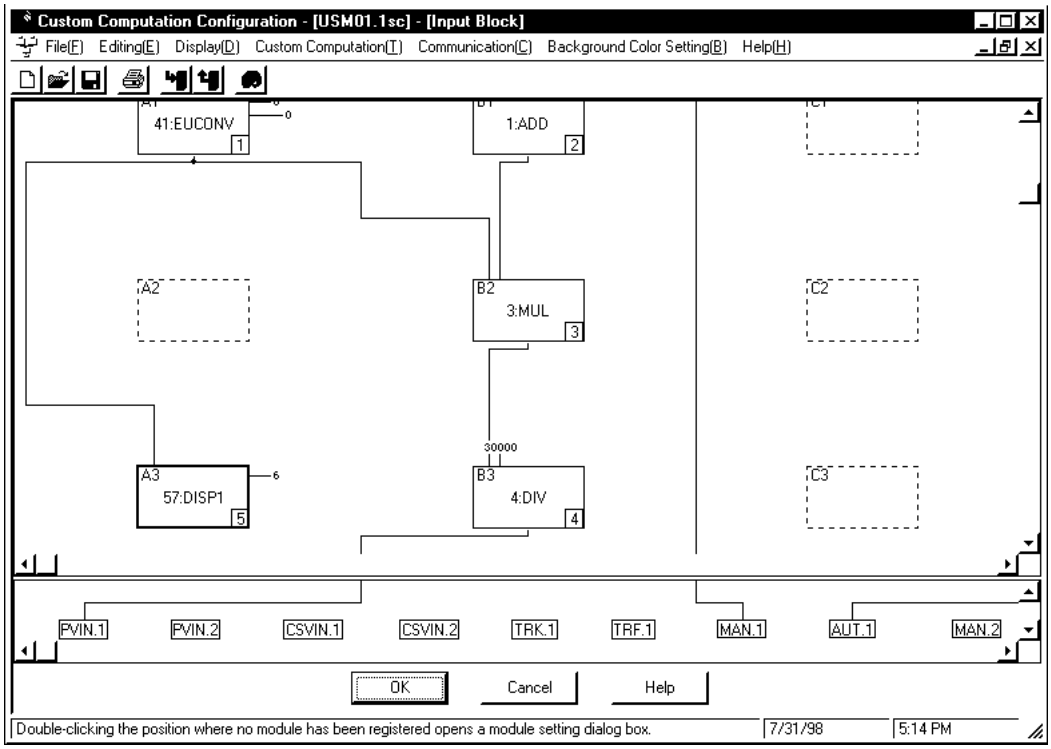

Figure 12.2.7 Example of [Input Block] Dialog Box (finished view) for Showing the PV Input Value before Corrective Computation

You have now finished the configuration of custom computations, and must now configure the custom displays.

■ **Procedure for Configuring Custom Displays**

To configure the custom displays, follow the instructions in “Operation I” and “Operation II” here, in this order.

- Operation I: Custom Display Selection

① In the [Custom Display Configuration Menu] dialog box (Figure 12.0.2), click <Custom Display Selection>. The [Custom Display Selection] dialog box (Figure 12.2.8) for single-loop control appears.

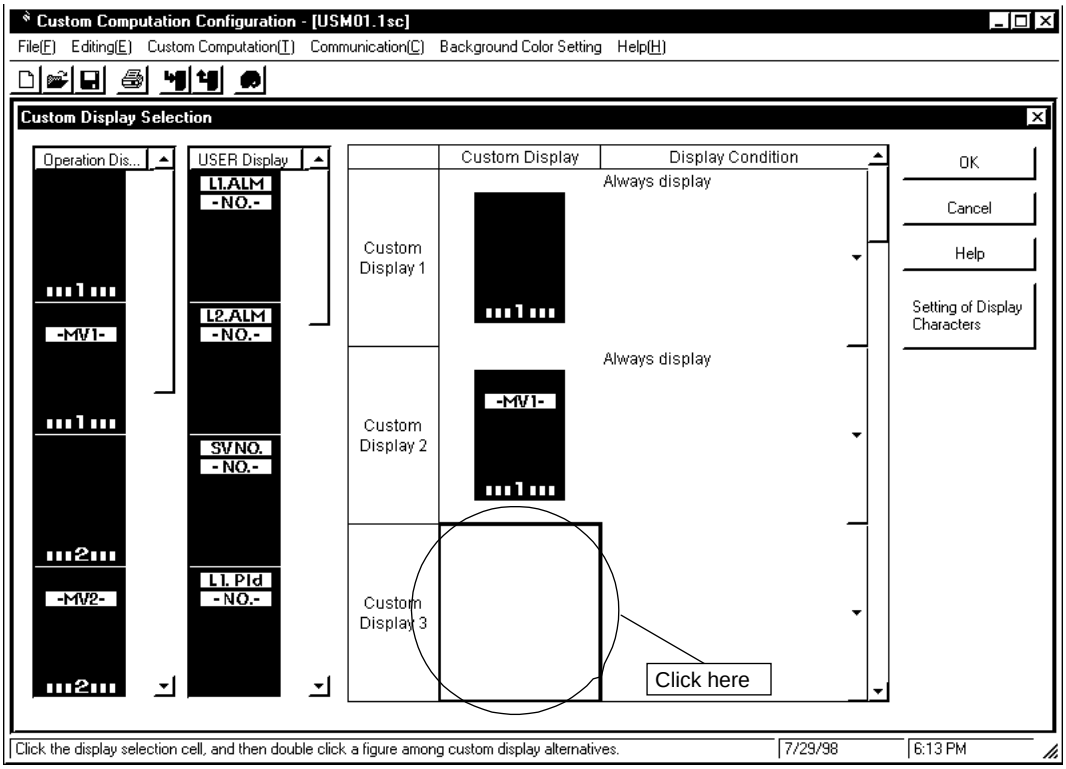

Figure 12.2.8 [Custom Display Selection] Dialog Box

≠ In the [Custom Display Selection] dialog box, click the <Custom Display> cell in the <Custom Display 3> section of the rightmost box.

③ In the same dialog box, double-click <DISP1 Display> in the <USER Display> box, second from the leftmost box. <DISP1 Display> is registered with the Custom Display 3 section, as shown in Figure 12.2.9.

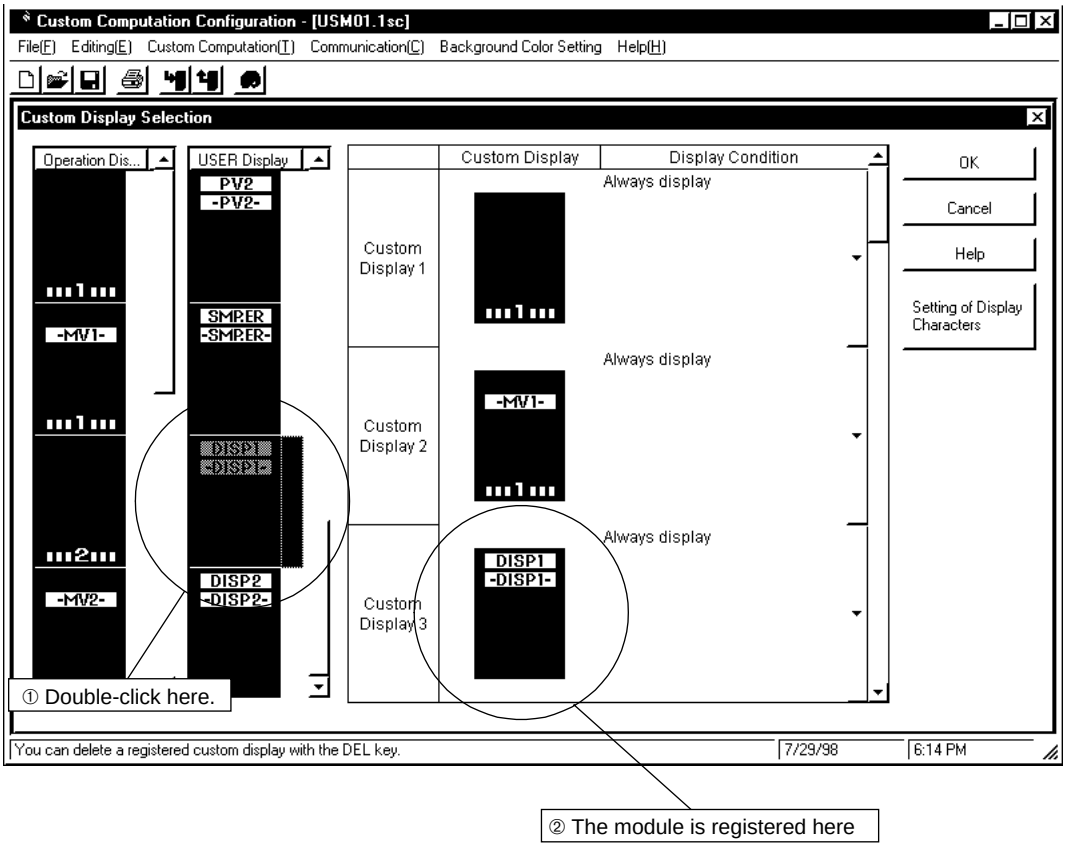

Figure 12.2.9 Registration of DISP1 Display

④ Click the <OK> button.

- Operation II: Text Setting

This operation involves setting the text you want to show on the PV digital display of the DISP1 display. If you skip the steps noted below, the PV digital display shows <DISP1> .

① Click the <Setting of Display Characters> button in the dialog box shown in Figure 12.2.9. The [Setting Character of DISP1, 2 Displays] dialog box (Figure 12.2.10) appears.

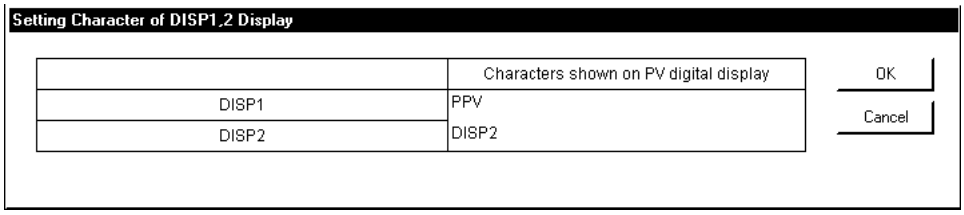

Figure 12.2.10 [Setting Character of DISP1, 2 Displays] Dialog Box

≠ In the text box, type the text you want to show on the PV digital display. You can type a maximum of five half-byte alphanumeric characters. Figure 12.2.11 is an example where “PPV” is set as the text.

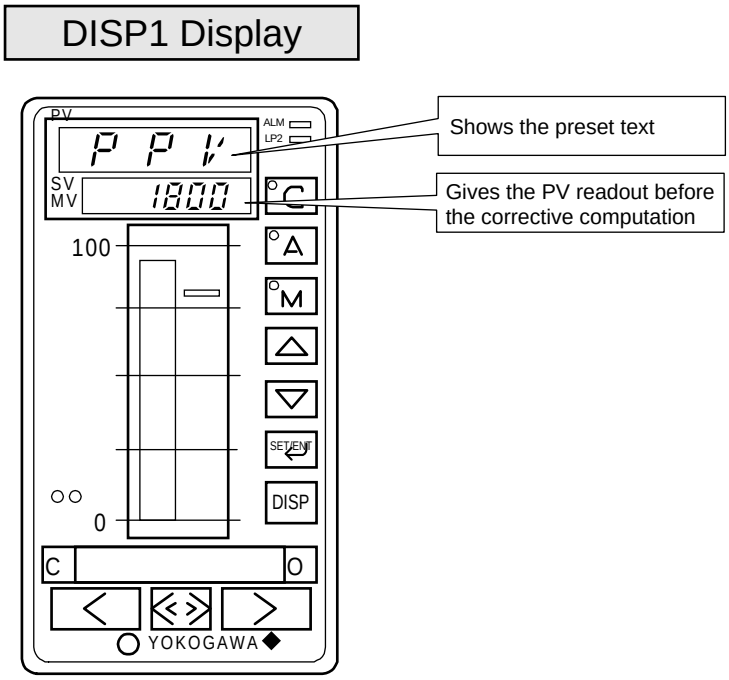

Figure 12.2.11 Example of the DISP1 Display Configured to Show “PPV” on Its PV Digital Display

③ Click the <OK> button.

The PV digital display of the DISP1 display is now configured to show “PPV” as the text.

The final step when configuring actual custom computations (after this example), is to download the computations to the US1000 controller (see Section 8.2), as necessary, in order to verify their performance by means of custom computation monitoring (see Chapter 11).

12.3 Example 3: Implementing Simple Logic Operations

This section introduces an example where two signals are switched between by turning on and off the contact input.

The example shown here is explained using the block diagram of the custom computations configured in Section 12.1.

■ Connection of Customized Computation Modules for Specifying the Presence/Absence of Corrective Computation

In this section, a process which specifies the presence or absence of custom computation depending on the on/off state of contact input 7 (DI7) is added to the block diagram configured in Section 12.1.

The procedure for configuring this block diagram is explained in the paragraph, " ■ Procedure for Configuring Custom Computations," that follows.

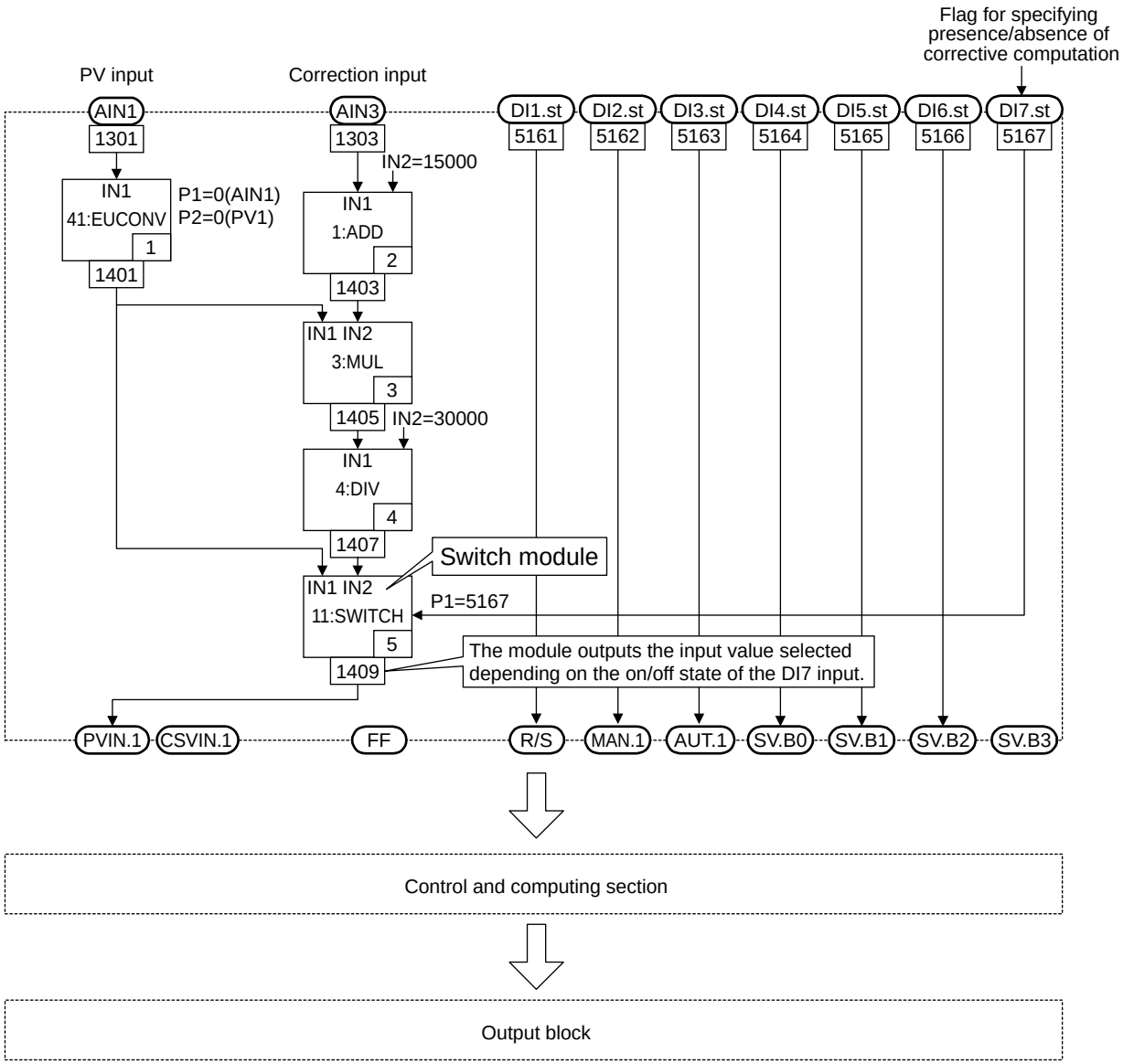

Figure 12.3.1 Connection of Customized Computation Modules for Specifying the Presence/ Absence of Corrective Computation (Diagram of Input Block)

■ **Procedure for Configuring Custom Computations**

Cancel the connection of contact input 7. To cancel, see subsection 6.1.5, “Changing the Way Computation Modules Are Connected.”

If you carry out the configurations discussed in this section, you will no longer be able to use the functions of cascade and feedforward inputs available in single-loop control. You will also not be able to use the function of SV number selection based on contact inputs.

To configure the custom computations, follow the instructions in “Operation I,” “Operation II” and “Operation III” here, in this order.

- Operation I: Module Configuration

① Configure custom computations as per Section 12.1, “Example 1: Applying Corrective Computation to the PV Input.”

≠ In the [Input Block] dialog box (Figure 12.1.15), double-click a blank box. The [Module Configuration] dialog box (Figure 12.3.2) appears.

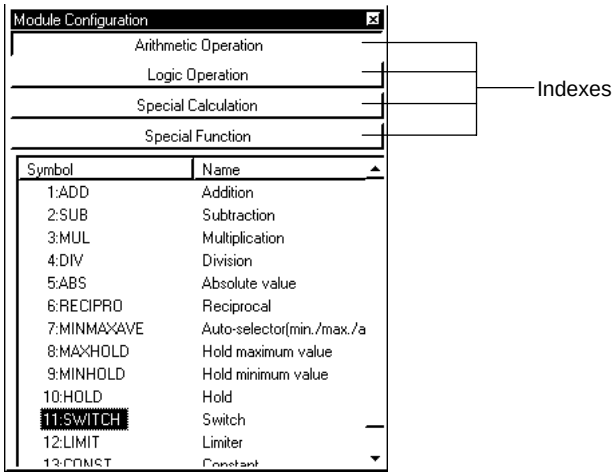

Figure 12.3.2 [Module Configuration] Dialog Box

③ Click the <Arithmetic Operation> index.

④ Double-click <11: SWITCH>. The SWITCH module is registered with the [Input Block] dialog box, as shown in Figure 12.3.3.

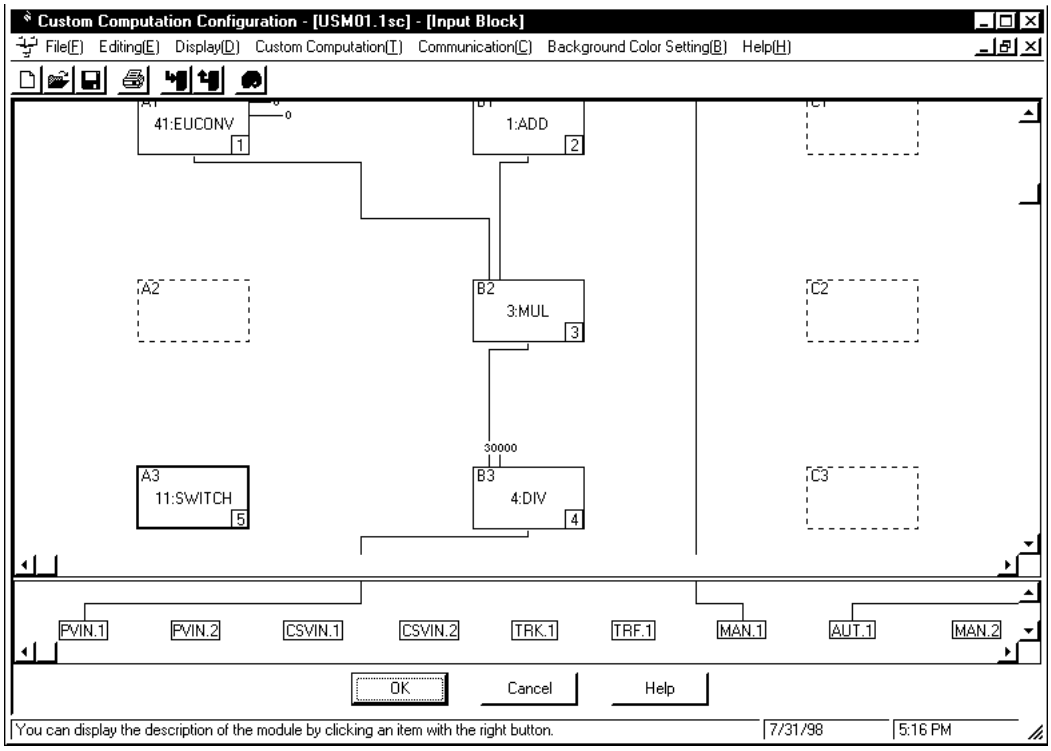

Figure 12.3.3 Example of the [Input Block] Dialog Box where the SWITCH Module Is Registered As the Fifth-run Module

When you finish registering the computation modules, proceed to “Operation II: Module Setting.”

- Operation II: Module Setting

This operation involves configuring the inputs and parameters of computation modules.

① Click the registered fifth-run SWITCH module.

≠ From the tool menus, choose <Editing>, then <Connection>. The [Module Setting] dialog box (Figure 12.3.4) appears.

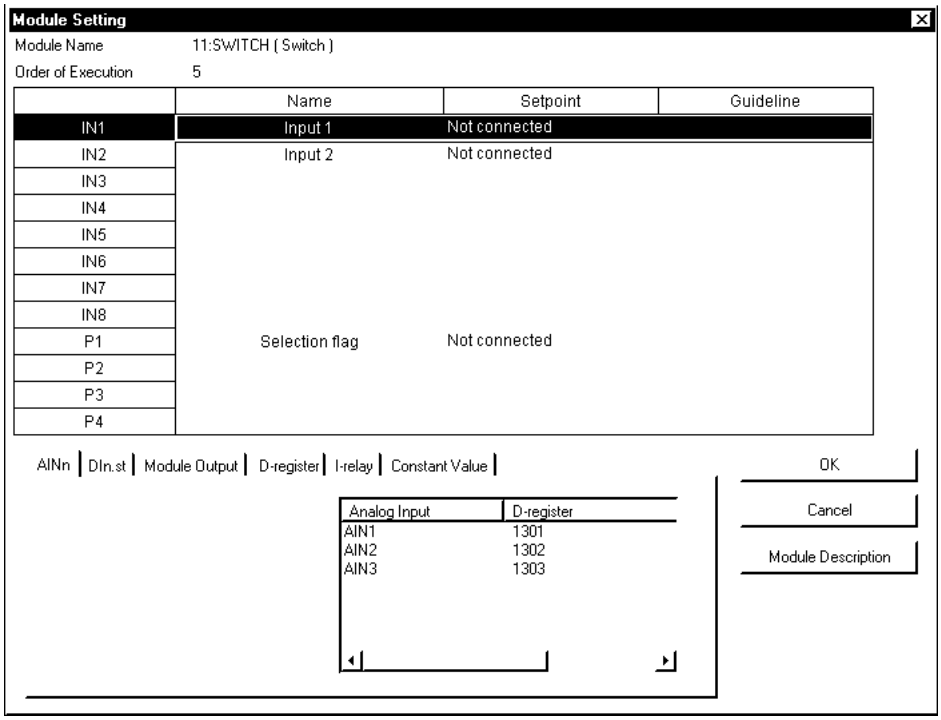

Figure 12.3.4 [Module Setting] Dialog Box

③ Click the <IN1> module input.
④ Click the <Module Output> index.
∞ Click the [Input Block] option button in the group box.
± Double-click <IMO1L> in the list box. The <IMO1L (Setpoint column)> and <D1401 (Guideline column)> options appear in the <IN1> row.

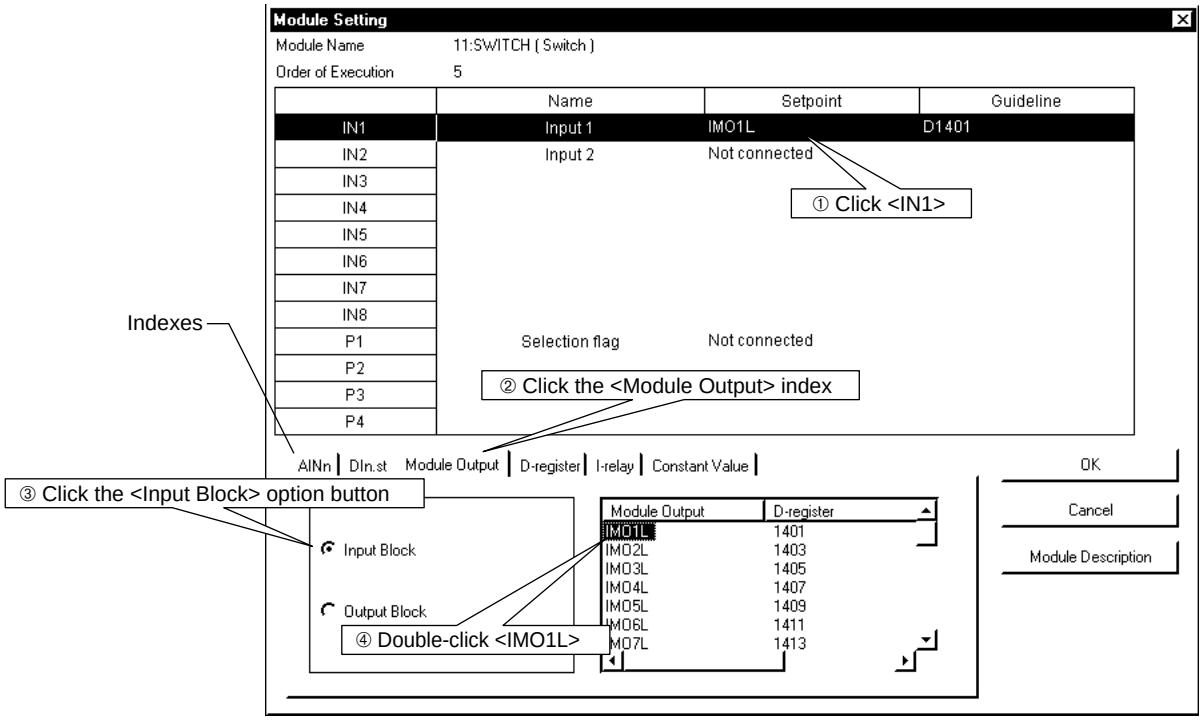

Figure 12.3.5 Configuration of the <IN1> Input

≤ Click the <IN2> module input.
≥ Click the <Module Output> index.
⑨ Click the <Input Block> option button in the group box.
µ Double-click <IMO4L> in the list box. The <IMO4L (Setpoint column)> and <D1407 (Guideline column)> options appear in the <IN2> row.

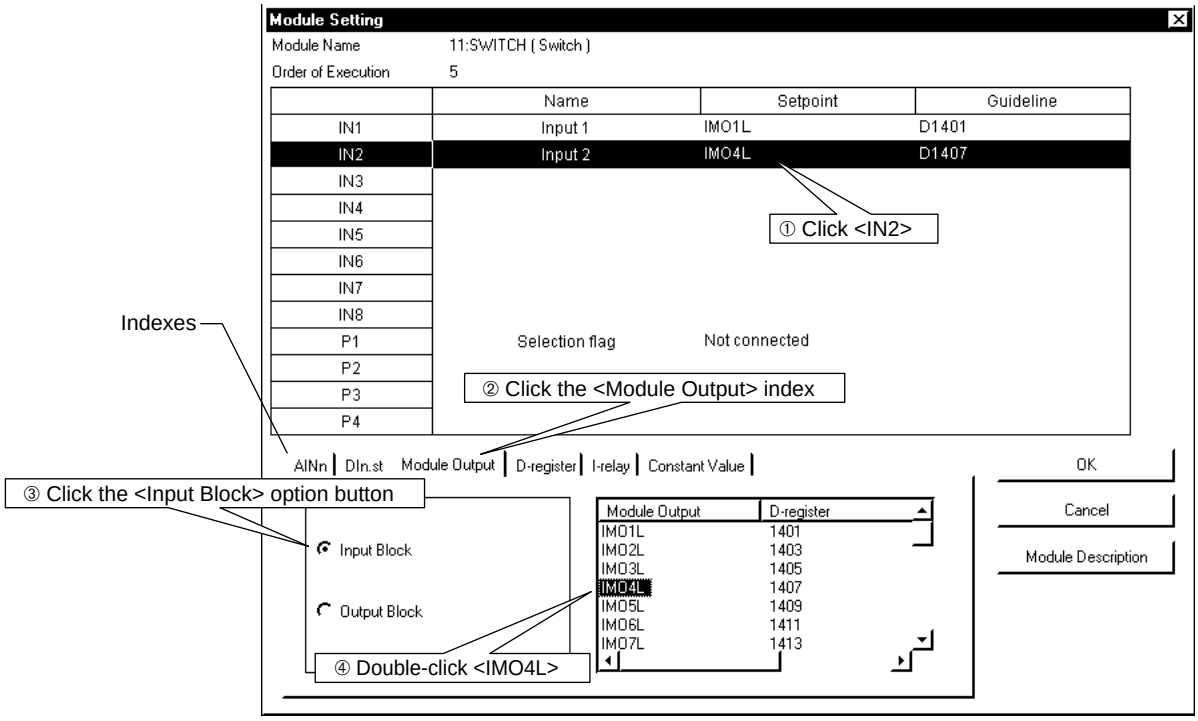

Figure 12.3.6 Configuration of the <IN2> Input

⑪ Click the <P1> module parameter.
⑫ Click the <DIn.st> index.
⑬ Double-click <DI7.st> in the drop-down list box. The <DI7.st (Setpoint column)> and <I5167 (Guideline column)> options appear in the <P1> row.

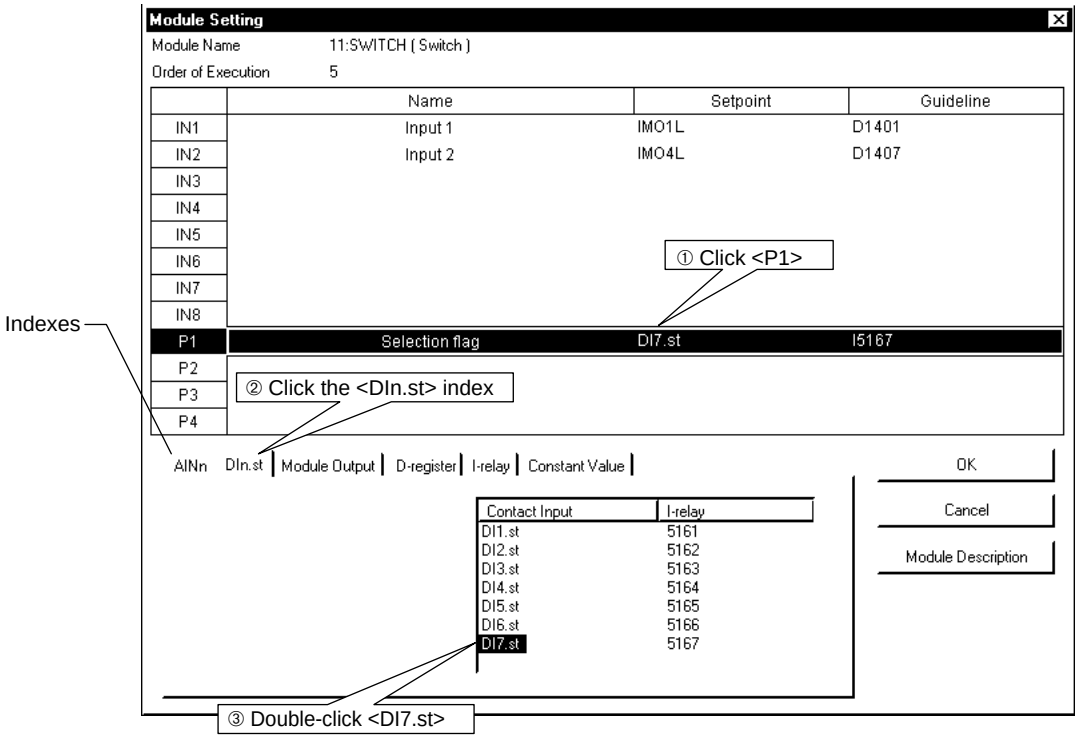

Figure 12.3.7 Configuration of the <P1> Parameter

⑭ Click the [OK] button.

When you finish configuring the inputs and parameters of computation modules, proceed to "Operation III: Connection to the Control and Computing Section."

- Operation III: Connection to the Control and Computing Section

This operation involves defining the settings needed to pass the results of computation in the input block to the control and computing section.

① In the [Input Block] dialog box (Figure 12.3.8), click the <PVIN.1> output signal.

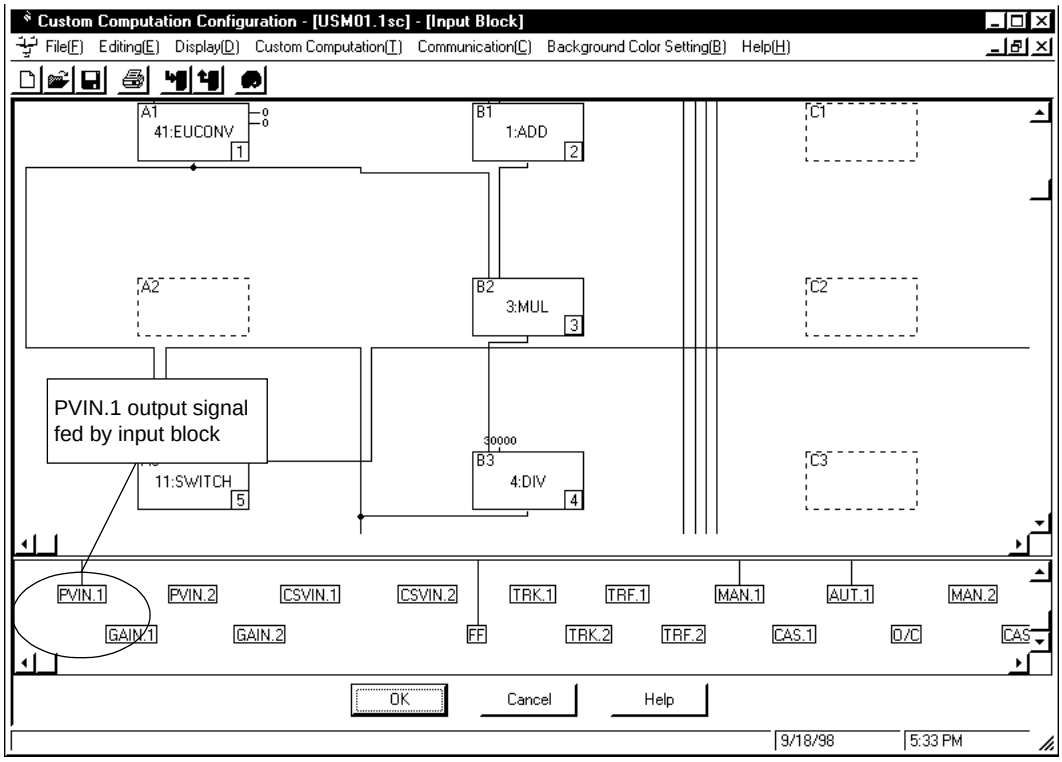

Figure 12.3.8 Output Signal Fed by Input Block

≠ From the tool menus, choose <Editing>, then <Connection>. The [Setting of Input Block Connection Assignment] dialog box (Figure 12.3.9) appears.

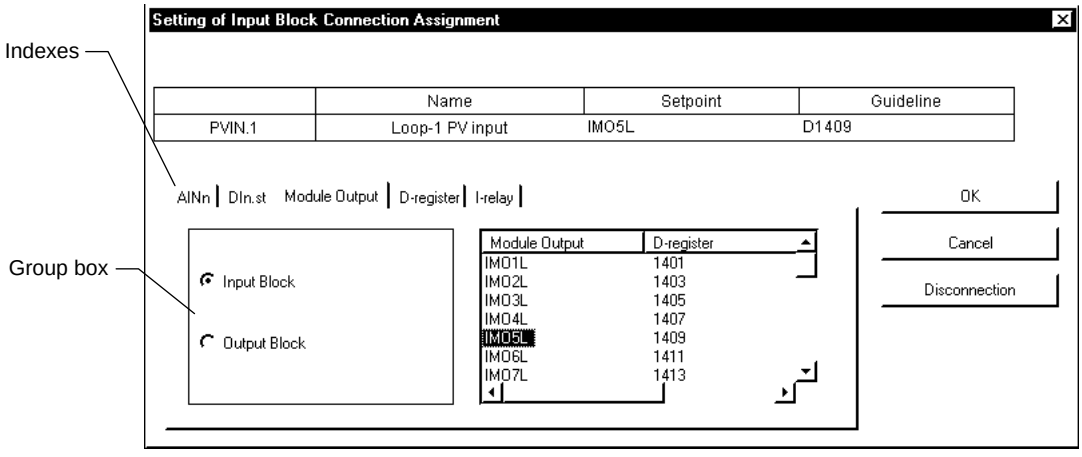

Figure 12.3.9 [Setting of Input Block Connection Assignment] Dialog Box

③ Click the <Module Output> index.
④ Click the <Input Block> option button in the group box.
∞ Double-click <IMO5L> in the list box. The <IMO5L (Setpoint column)> and <D1409 (Guideline column)> options appear in the <PVIN.1> row.
± Click the <OK> button.

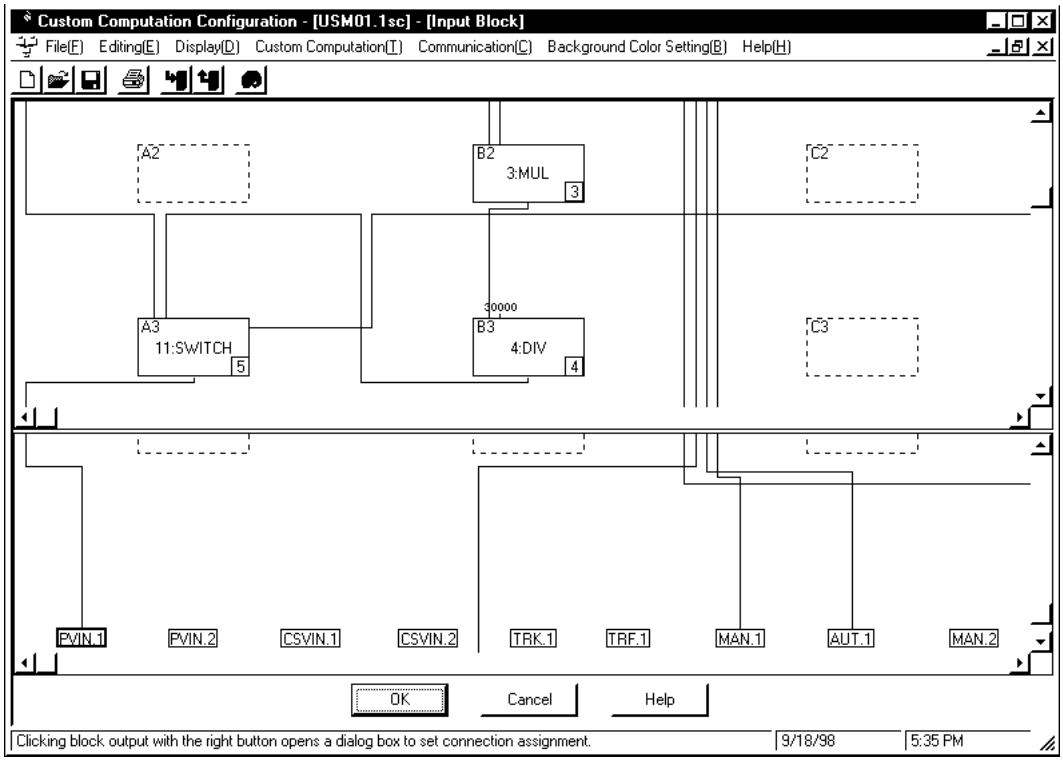

Figure 12.3.10 Example of [Input Block] Dialog Box (finished view) Where a Process for Specifying the Presence/Absence of Corrective Computation Is Added

You have now finished this example of configuring custom computations for correcting the PV input and adding a process for specifying the presence/absence of corrective computation.

The final step when configuring actual custom computations (after this example), is to download the computations to the US1000 controller (see Section 8.2), as necessary, in order to verify their performance by means of custom computation monitoring (see Chapter 11).

12.4 Example 4: Applying Temperature-based Flowrate Corrections to the PV Input

This section introduces an example where the flowrate is corrected according to temperature levels. You can correct the flowrate by the ratio of the current temperature to the reference temperature.

■ **Connection of Customized Computation Modules for Making Temperature-based Flowrate Corrections**

This paragraph introduces an example of flowrate correction where the minimum and maximum temperature range are set to 0.0°C and 100.0°C, respectively, and the span of the temperature range is set to 273.0°C.

In this example, the reference temperature is assumed to be 40.0°C.

The procedure for configuring this block diagram is explained in the paragraph, " ■ Procedure for Configuring Custom Computations," that follows.

The equation applied is

$$\text{PV input value (PV1)} = \text{analog input 3 (AIN3)} \times \frac{\text{analog input 1 (AIN1) + span of temperature range}}{\text{reference temperature + span of temperature range}}$$

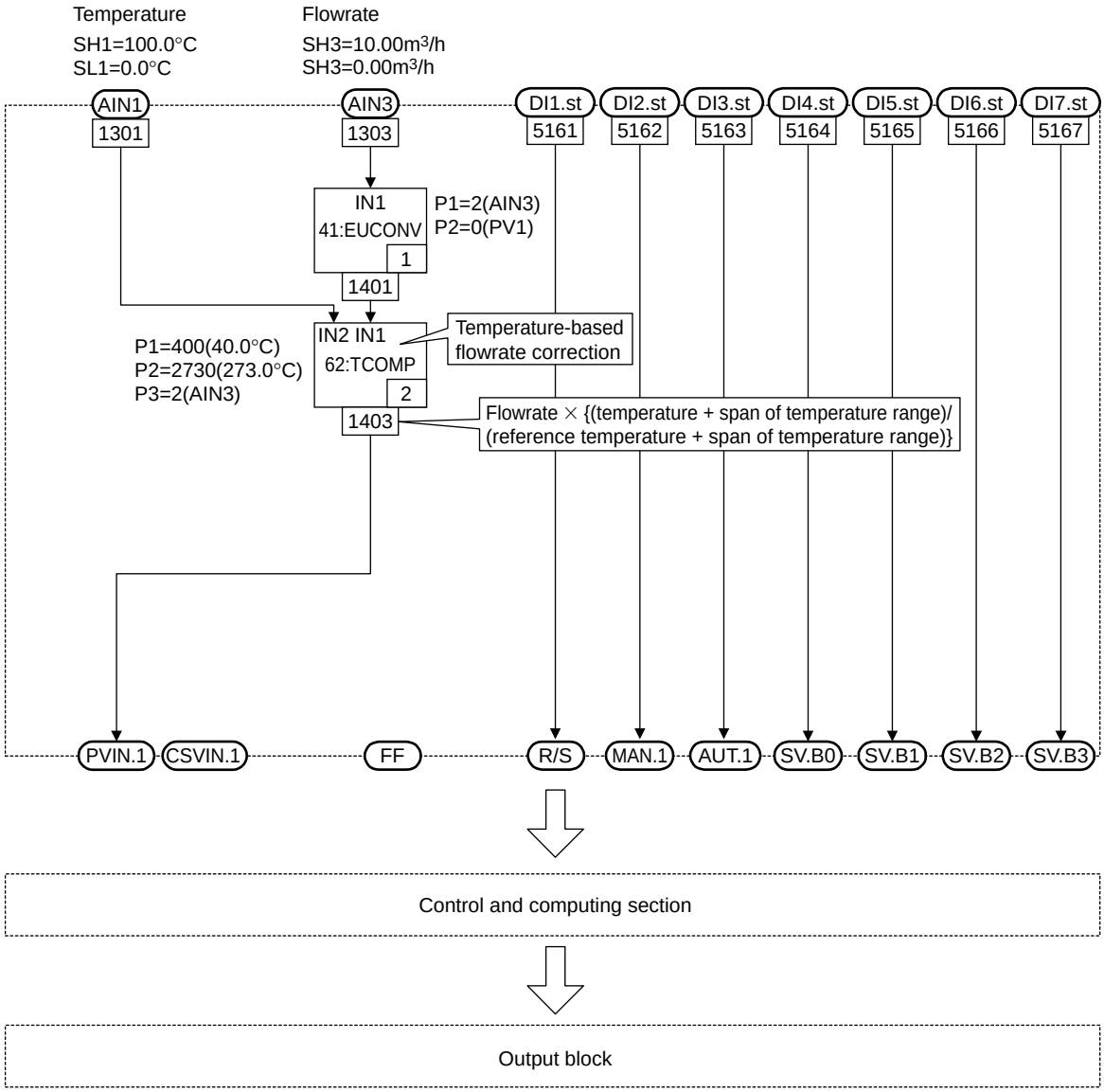

Figure 12.4.1 Connection of Customized Computation Modules for Making Temperature-based Flowrate Corrections (Diagram of Input Block)

■ **Procedure for Configuring Custom Computations**

Before you begin configuring custom computations, read the sample file for single-loop control (file name: USM01.1SC). To read the file, see subsection 7.3.1, “Reading Data from Disk.”

Next, delete all of the computation modules that exist in the input block, leaving the contact inputs wired as they are. For details on how to delete the computation modules, see subsection 6.1.2, “Deleting Computation Modules.”

If you carry out the configurations discussed in this section, you will no longer be able to use the functions of cascade and feedforward inputs available in single-loop control.

To configure the custom computations, follow the instructions in “Operation I,” “Operation II” and “Operation III,” in this order.

- Operation I: Module Configuration

① In the [Custom Computation Configuration Menu] dialog box (Figure 12.0.2), click <Input Block>. The [Input Block] dialog box (Figure 12.4.2) appears.

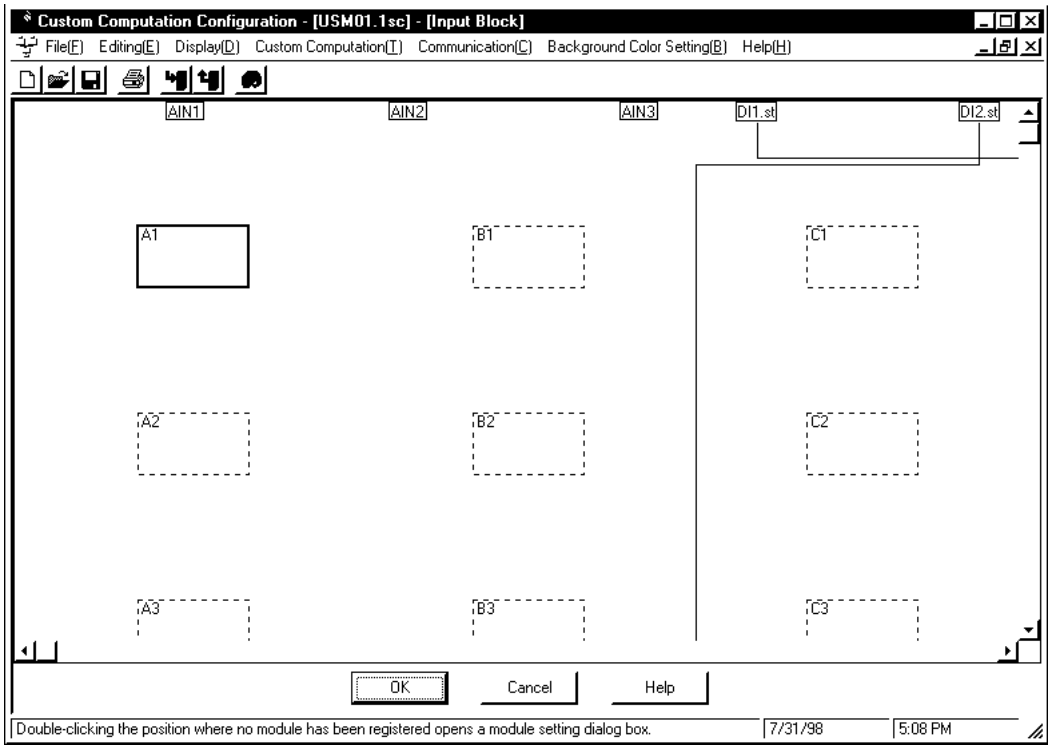

Figure 12.4.2 [Input Block] Dialog Box

≠ In the [Input Block] dialog box, double-click a blank box. The [Module Configuration] dialog box (Figure 12.4.3) appears.

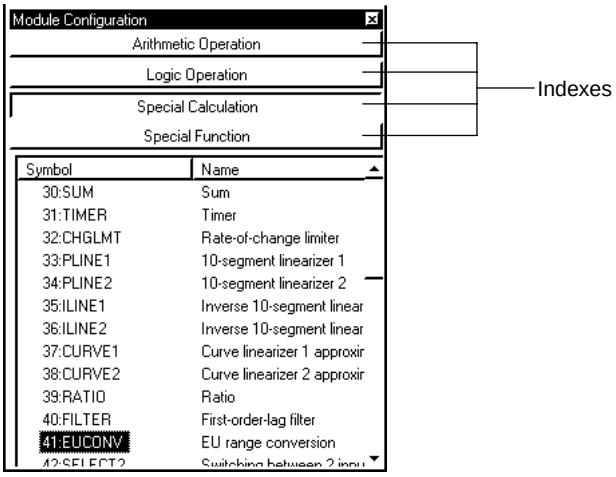

Figure 12.4.3 [Module Configuration] Dialog Box

③ Click the <Special Calculation> index.

④ Double-click <41: EUCONV>. The EUCONV module is registered with the [Input Block] dialog box, as shown in Figure 12.4.4.

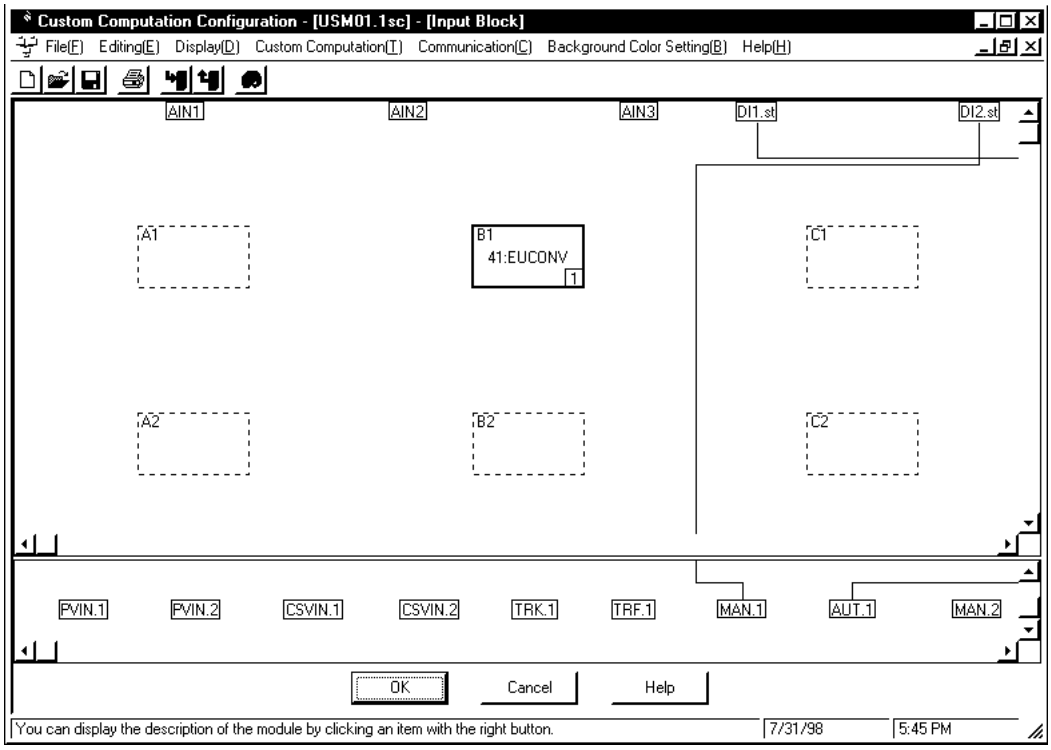

Figure 12.4.4 Example of the [Input Block] Dialog Box where the EUCONV Module Is Registered As the First-run Module

∞ To register the Fluid Temperature Compensation (TCOMP) module also, repeat steps ≠ to ④.

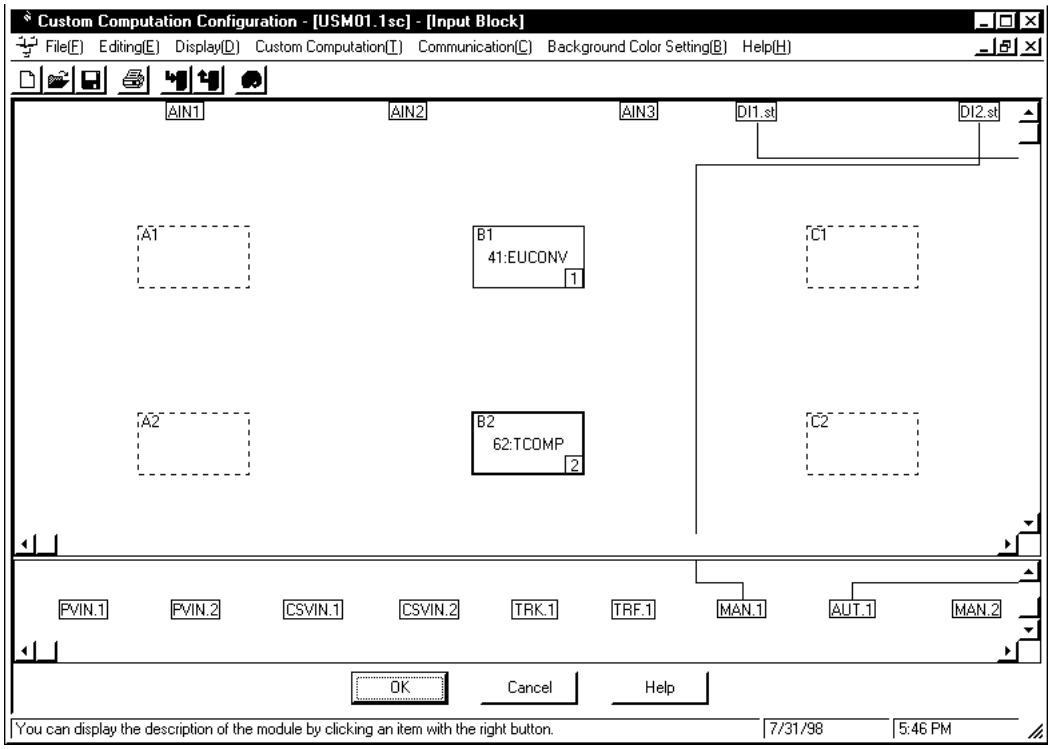

Figure 12.4.5 Example of the [Input Block] Dialog Box where the EUCONV and TCOMP Modules Are Registered

When you finish registering the computation modules, proceed to “Operation II: Module Setting.”

- Operation II: Module Setting

This operation involves configuring the inputs and parameters of computation modules.

① Click the registered first-run EUCONV module.

≠ From the tool menus, choose <Editing>, then <Connection>. The [Module Setting] dialog box (Figure 12.4.6) appears.

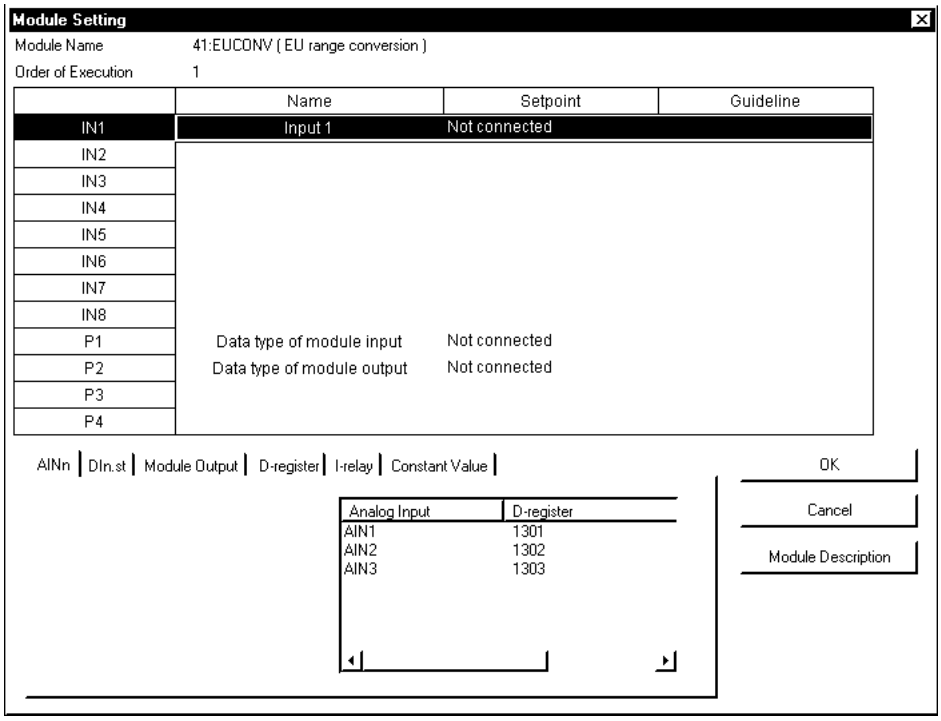

Figure 12.4.6 [Module Setting] Dialog Box

③ Click the <IN1> module input.
④ Click the <AINn> index.
∞ Double-click <AIN3> in the list box. The <AIN3 (Setpoint column)> and <D1303 (Guideline column)> options appear in the <IN1> row.

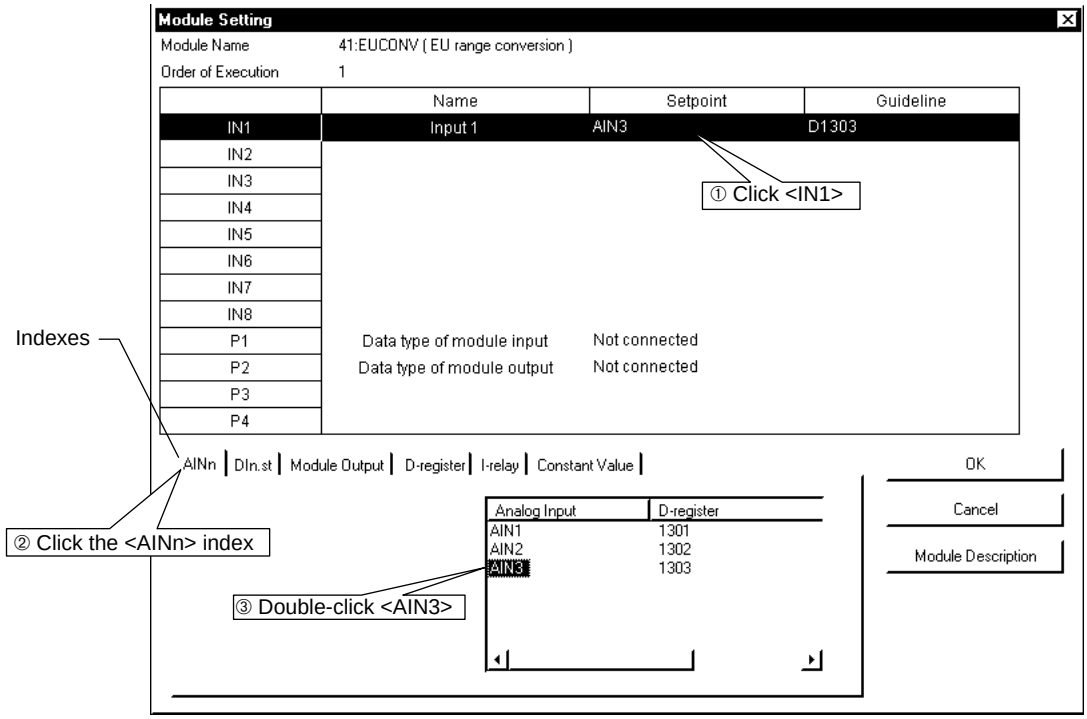

Figure 12.4.7 Configuration of the <IN1> Input

± Click the <P1> module parameter.
≤ Click the <Constant Value> index.
≥ Type “2” in the text box and press the <Enter> key.

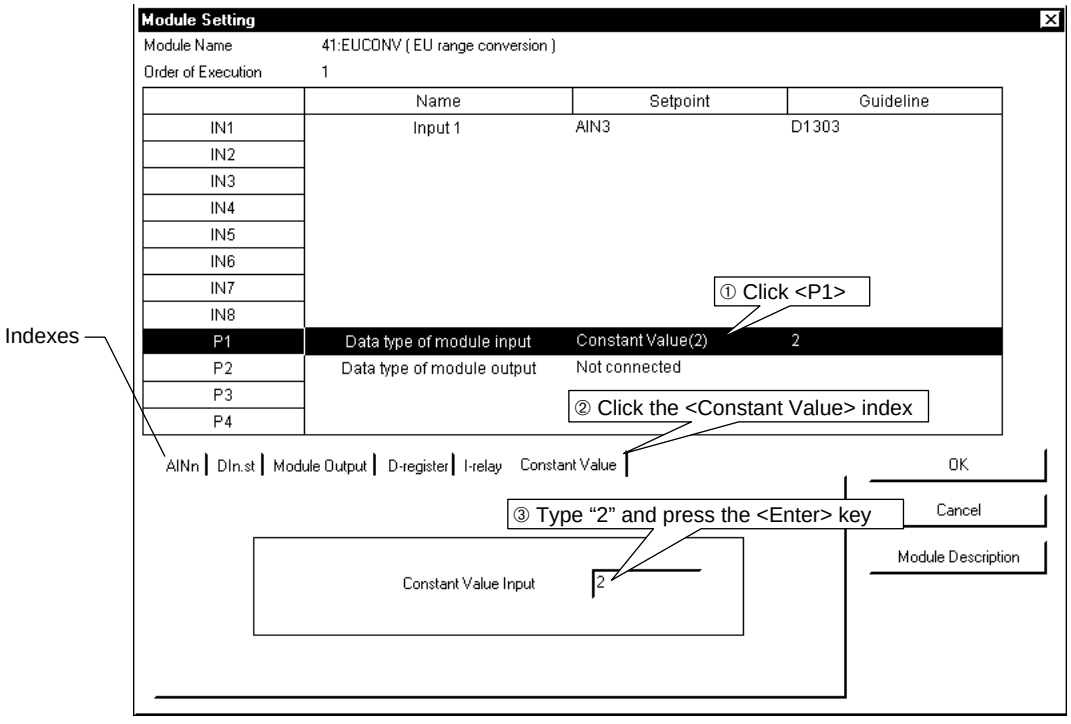

Figure 12.4.8 Configuration of the <P1> Parameter

⑨ Click the <P2> module parameter.
μ Click the <Constant Value> index.
⑪ Type “0” in the text box and press the <Enter> key.

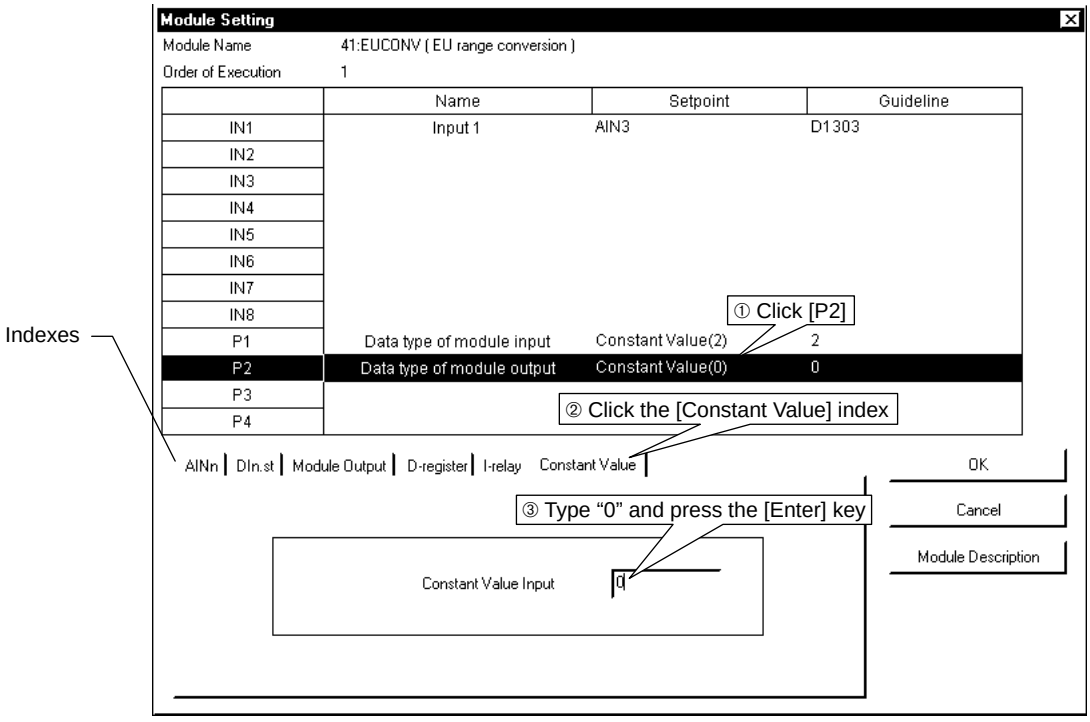

Figure 12.4.9 Configuration of the <P2> Parameter

⑫ Click the [OK] button.

Repeat steps ① to ⑫ to configure the other inputs and parameters of the TCOMP module

The setpoints of the inputs and parameters for which connection is made, are as follows.

Inputs	IN1	Index: [Module Output] Group box: [Input Block] Selection: [IMO1L (1401)]
	IN2	Index: [AINn] Selection: [AIN1]
Parameters	P1	Index: [Constant Value] Setpoint: [400]
	P2	Index: [Constant Value] Setpoint: [2730]
	P3	Index: [2]

When you finish configuring the computation modules’ inputs and parameters, proceed to “Operation III: Connection to the Control and Computing Section.”

- Operation III: Connection to the Control and Computing Section

This operation involves defining the settings needed to pass the results of computation in the input block to the control and computing section.

① In the [Input Block] dialog box (Figure 12.4.10), click the <PVIN.1> output signal.

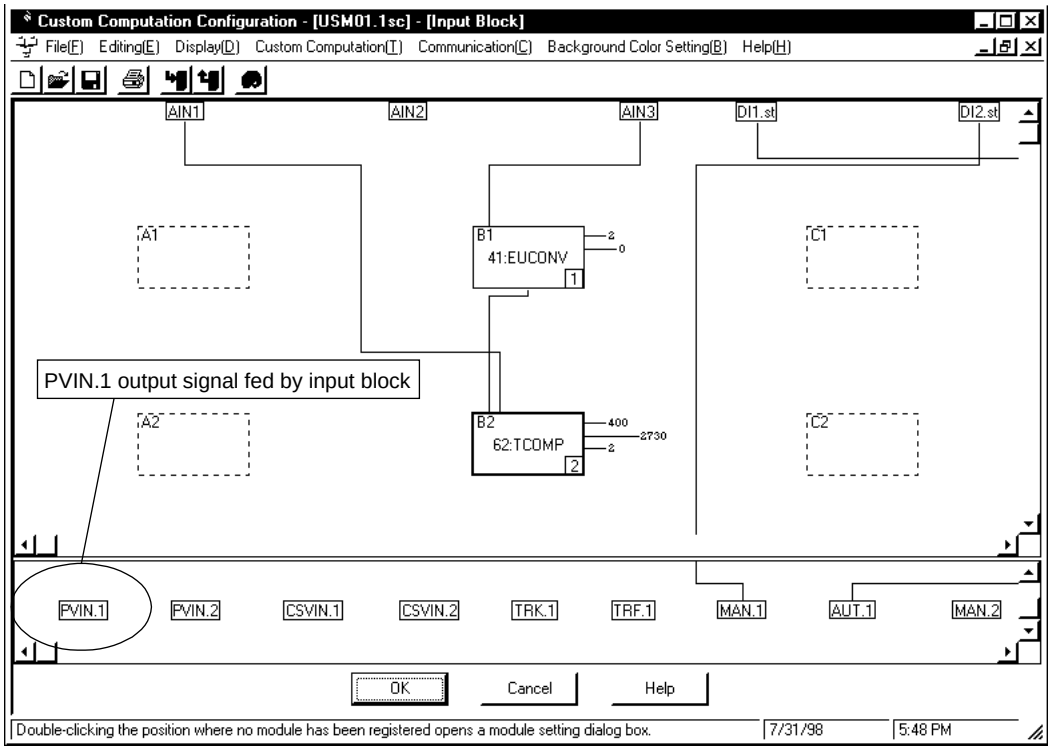

Figure 12.4.10 Output Signal Fed by Input Block

≠ From the tool menus, choose <Editing>, then <Connection>. The [Setting of Input Block Connection Assignment] dialog box (Figure 12.4.11) appears.

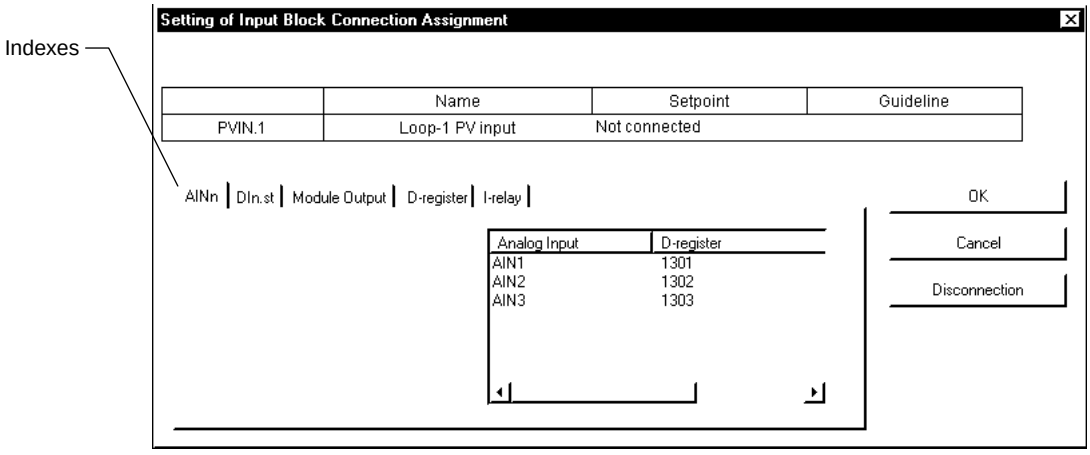

Figure 12.4.11 [Setting of Input Block Connection Assignment] Dialog Box

③ Click the <Module Output> index.
④ Click the <Input Block> option button in the group box.
∞ Double-click <IMO2L> in the list box. The <IMO2L (Setpoint column)> and <D1403 (Guideline column)> options appear in the <PVIN.1> row.

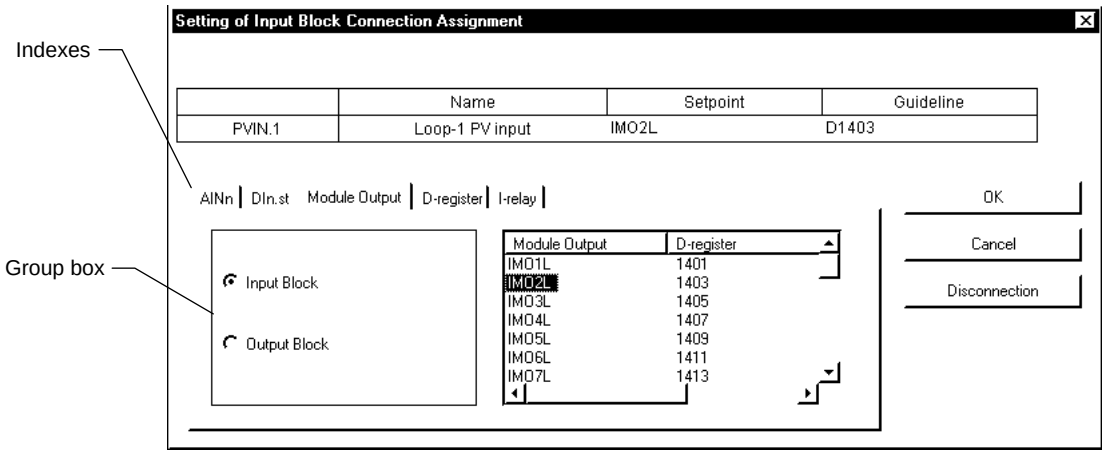

Figure 12.4.12 Configuration of the <IMO2L> Output

± Click the <OK> button.

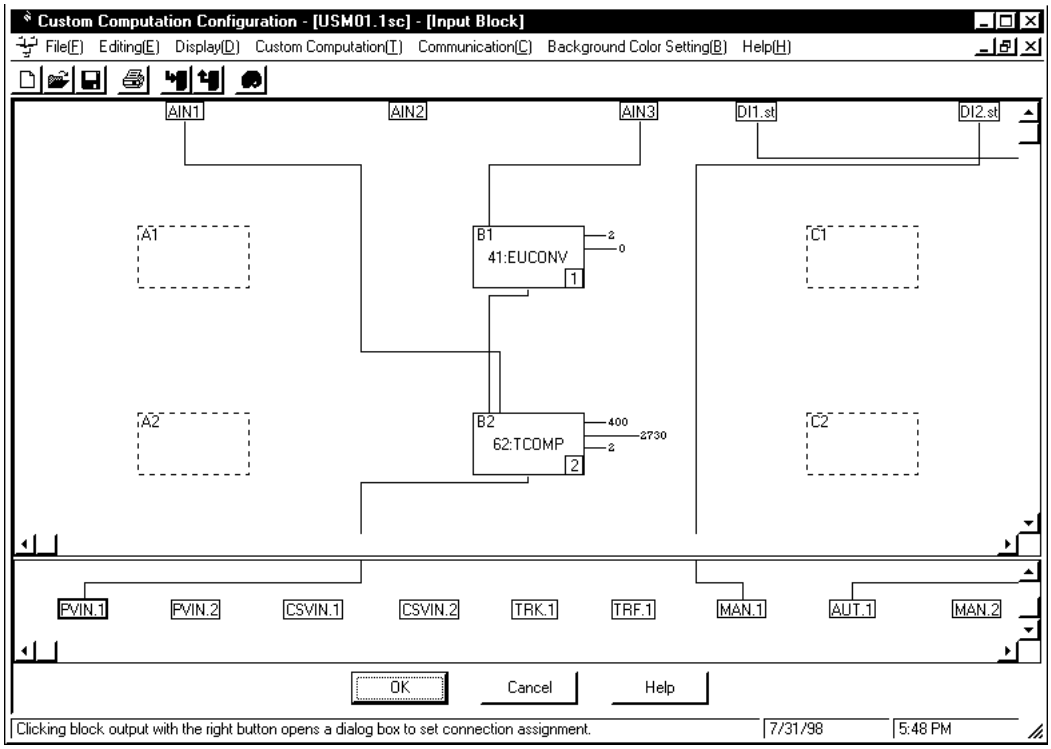

Figure 12.4.13 [Input Block] Dialog Box (finished view) as an Example of Making Temperature-based Flowrate Corrections

You have now finished this example of configuring custom computations for making temperature-based flowrate corrections.

The final step when configuring actual custom computations (after this example), is to download the computations to the US1000 controller (see Section 8.2), as necessary, in order to verify their performance by means of custom computation monitoring (see Chapter 11).

12.5 Example 5: Configuring Timers

12.5.1 Configuring a Four-second Timer

■ Connection of Customized Computation Modules for Configuring a Four-second Timer

In this example, you add a timer to the input block for single-loop control. Since the timer does not automatically initialize itself, the timer output latches to the "on" state four seconds after the start of the timer. The timer I/Os are assigned as:

DI6: enable flag; DI7: initialization flag; DO3: timer output.

The procedure for configuring this block diagram is explained in the paragraph, " ■ Procedure for Configuring Custom Computations," that follows.

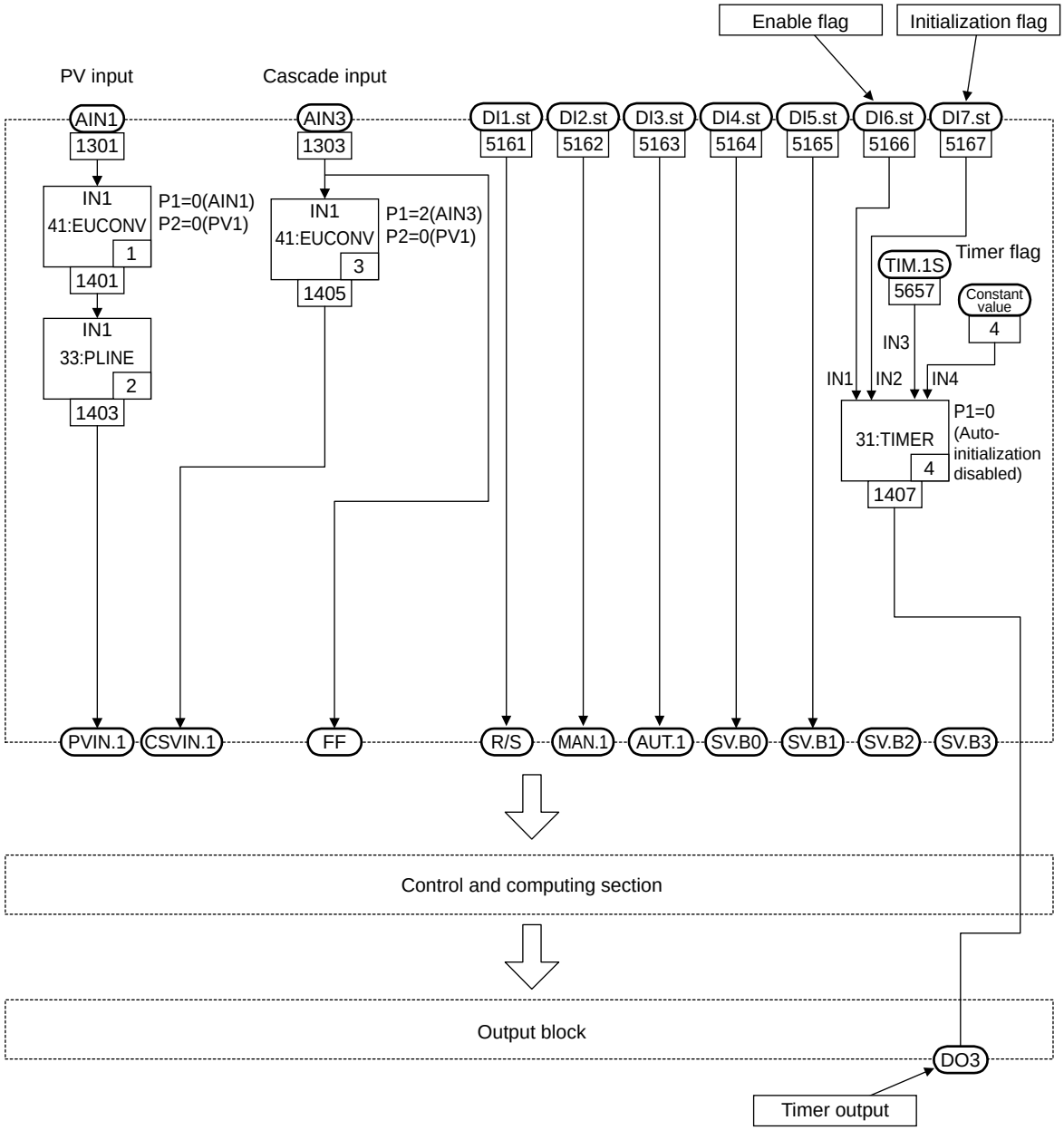

Figure 12.5.1 Connection of Customized Computation Modules for Configuring a Four-second Timer (example for a control period of 200 ms)

Figure 12.5.2 is the timing chart of a four-second timer where the control period is 200 ms and the clock pulse duration is one second. In the example shown, a maximum error of no more than one second will occur since the timer value is decremented at either the rising or falling edge of each clock pulse.

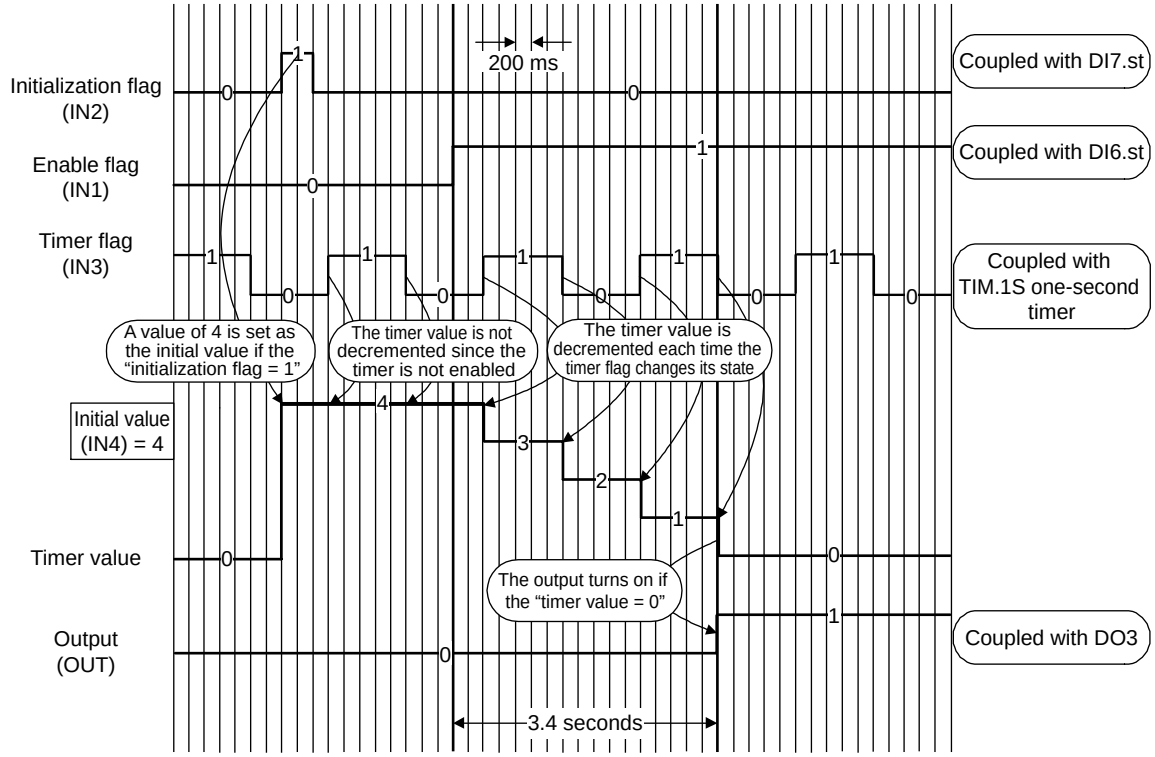

Figure 12.5.2 Timing Chart of a Four-second Timer (example for a control period of 200 ms)

■ **Procedure for Configuring Custom Computations**

Before you begin configuring custom computations, read the sample file for single-loop control (file name: USM01.1SC). To read the file, see subsection 7.3.1, “Reading Data from Disk.”

Next, cancel the wiring to contact inputs 6 and 7. For details on how to cancel the wiring, see subsection 6.1.5, “Changing the Way Computation Modules Are Connected.”

If you carry out the configurations discussed in this section, you will no longer be able to use the function of SV number selection based on contact input.

To configure the custom computations, follow the instructions in “Operation I,” “Operation II” and “Operation III,” in this order.

- Operation I: Module Configuration

① In the [Custom Computation Configuration Menu] dialog box (Figure 12.0.2), click <Input Block>. The [Input Block] dialog box (Figure 12.5.3) appears.

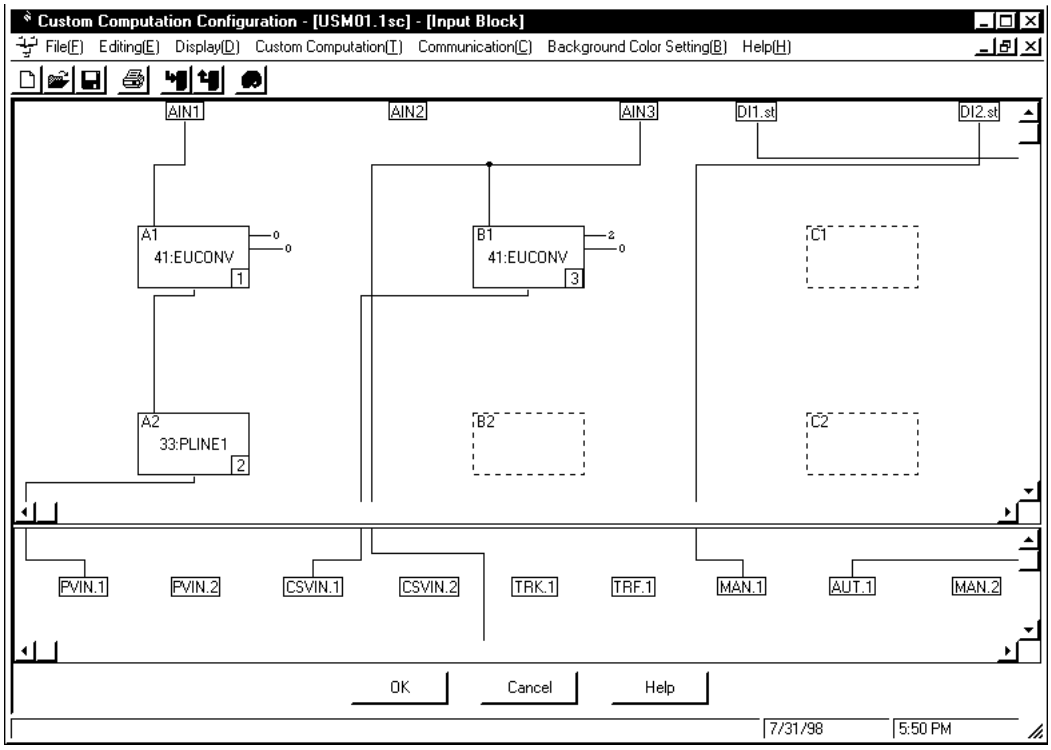

Figure 12.5.3 [Input Block] Dialog Box

≠ In the [Input Block] dialog box, double-click a blank box. The [Module Configuration] dialog box (Figure 12.5.4) appears.

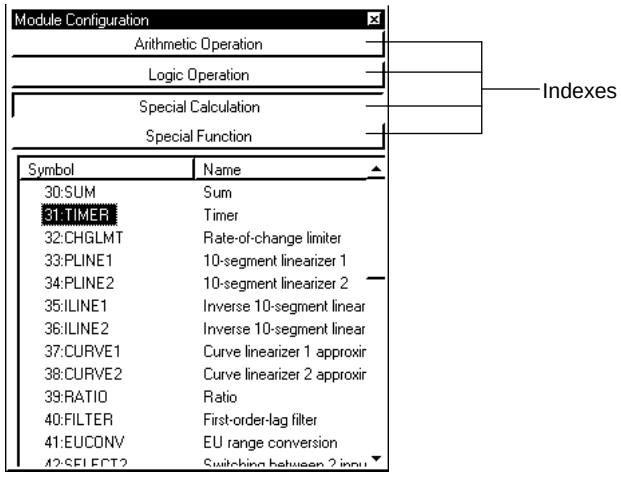

Figure 12.5.4 [Module Configuration] Dialog Box

③ Click the <Special Calculation> index.

④ Double-click <31: TIMER>. The TIMER module is registered with the [Input Block] dialog box, as shown in Figure 12.5.5.

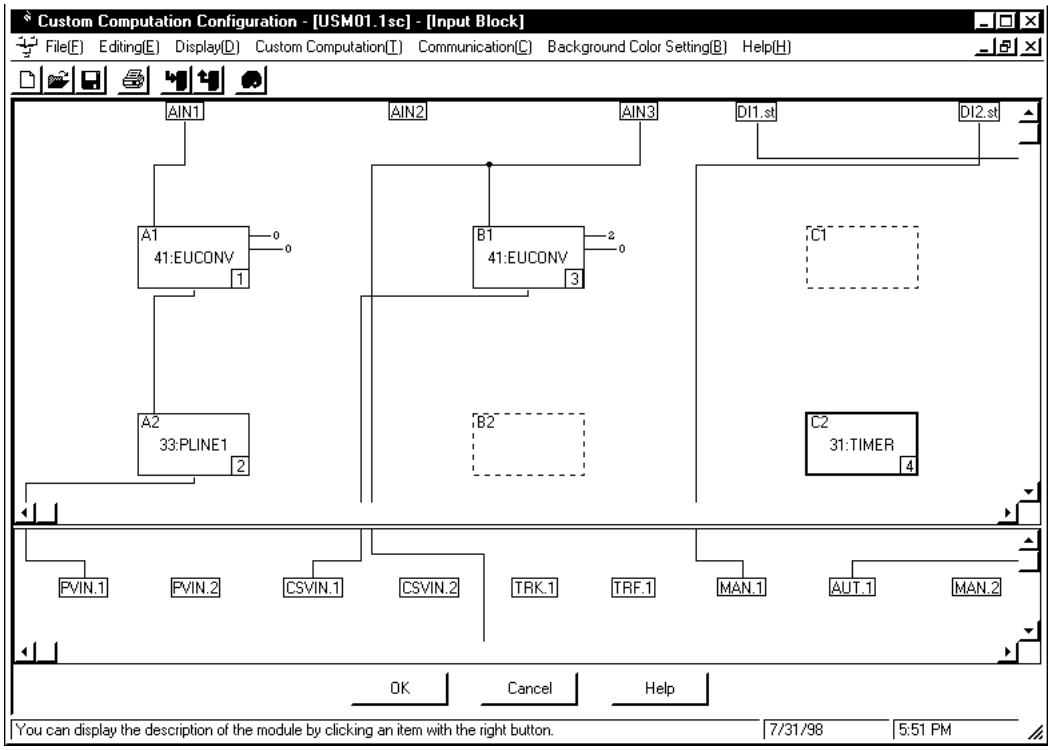

Figure 12.5.5 Example of the [Input Block] Dialog Box where the TIMER Module Is Registered As the Fourth-run Module

When you finish registering the computation modules, proceed to “Operation II: Module Setting.”

- Operation II: Module Setting

This operation involves configuring the inputs and parameters of computation modules.

① Click the registered fourth-run TIMER module.

≠ From the tool menus, choose <Editing>, then <Connection>. The [Module Setting] dialog box (Figure 12.5.6) appears.

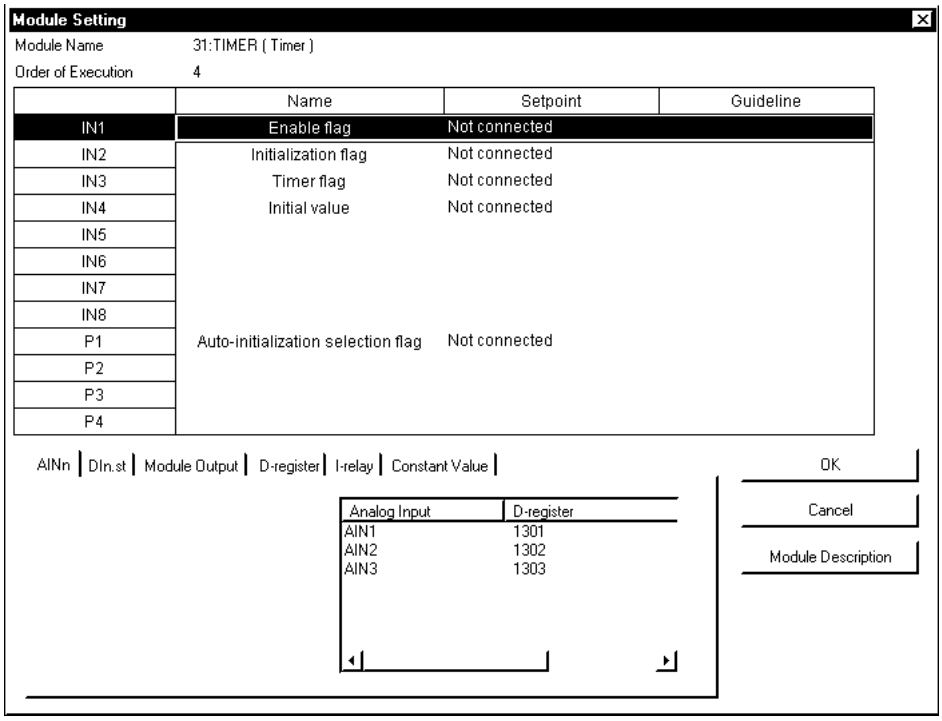

Figure 12.5.6 [Module Setting] Dialog Box

③ Click the <IN1> module input.

④ Click the <DIn.st> index.

∞ Double-click <DI6.st> in the list box. The <DI6.st (Setpoint column)> and <I5166 (Guideline column)> options appear in the <IN1> row.

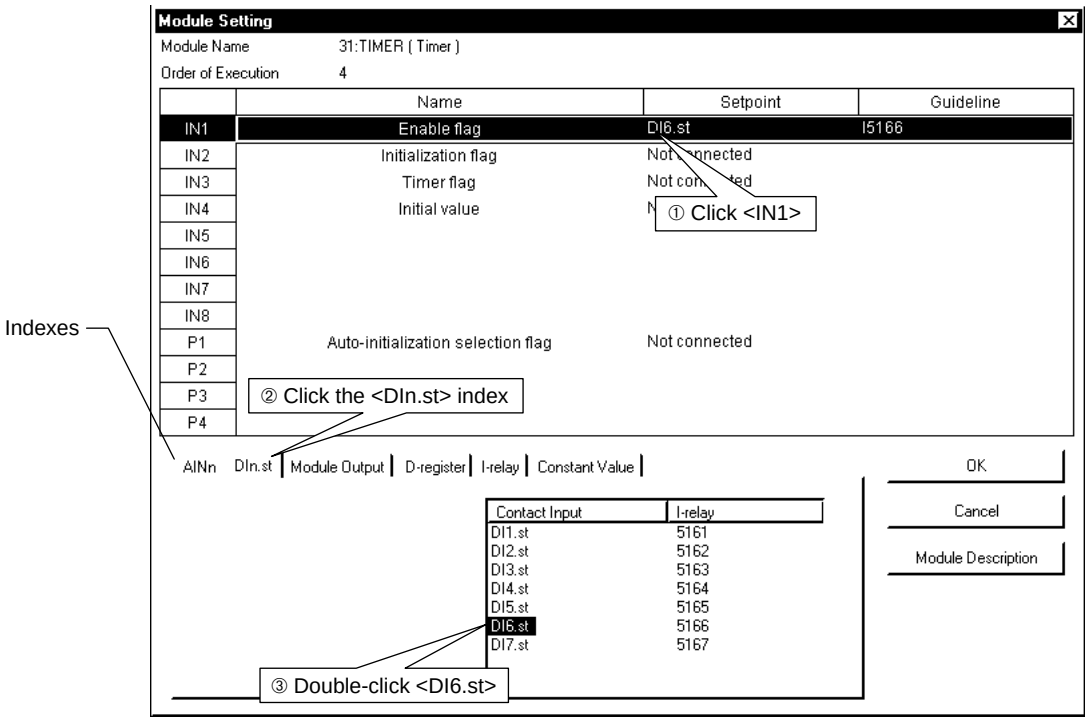

Figure 12.5.7 Configuration of the <IN1> Input

± Click the <IN2> module input.
≤ Click the <DIn.st> index.
≥ Double-click <DI7.st> in the list box. The < DI7.st (Setpoint column)> and <I5167 (Guideline column)> options appear in the <IN2> row.

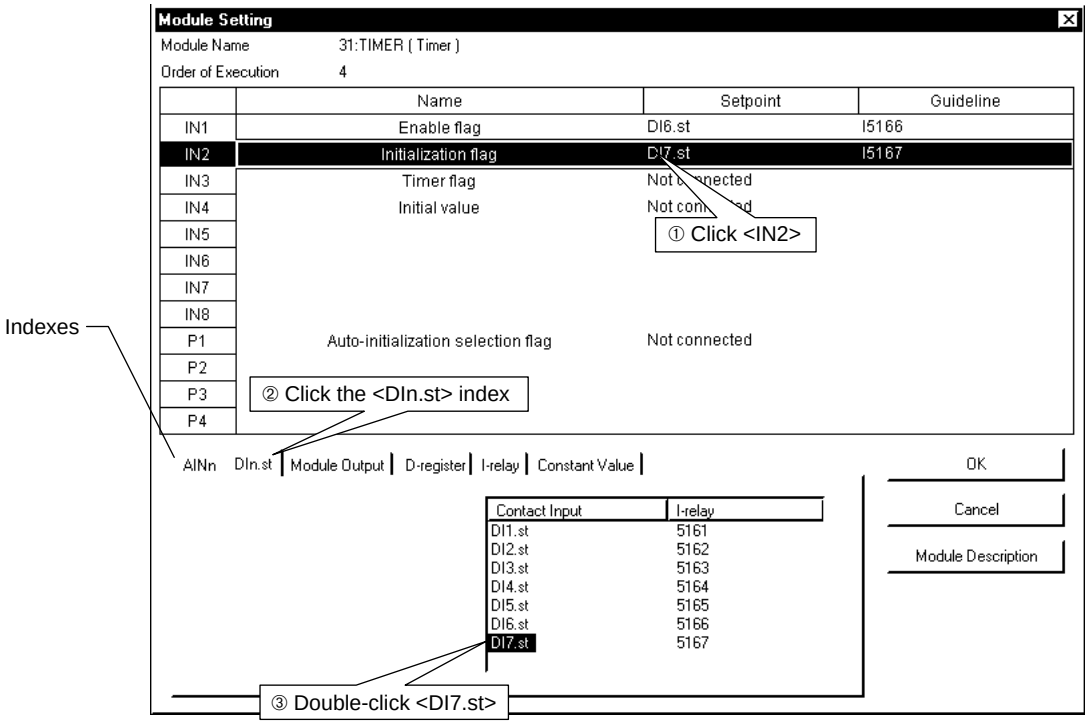

Figure 12.5.8 Configuration of the <IN2> Input

⑨ Click the <IN3> module input.
⑩ Click the <I-relay> index.
⑪ Click <Timer flag, power-on flag, alarm flag> in the drop-down list box.
⑫ Double-click <TIM.1S> in the list box. The <TIM.1S (Setpoint column)> and <I5657 (Guideline column)> options appear in the <IN3> row.

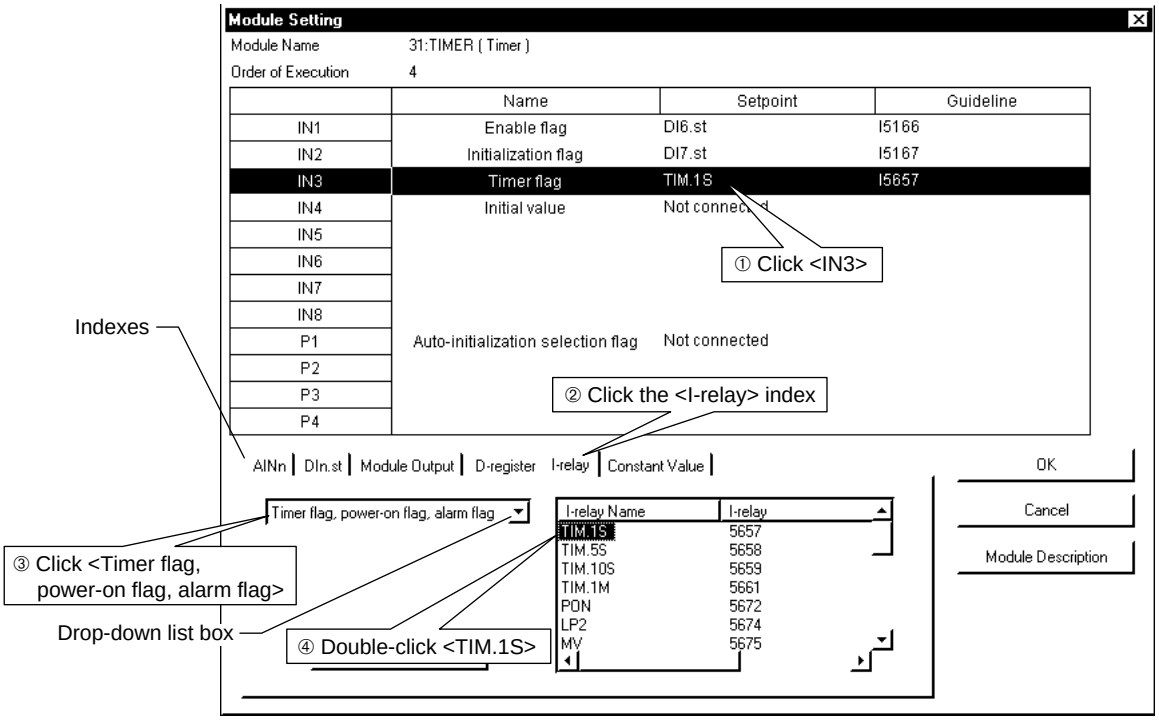

Figure 12.5.9 Configuration of the <IN3> Input

⑬ Click the <IN4> module input.
⑭ Click the <Constant Value> index.
⑮ Type “4” in the text box and press the <Enter> key.

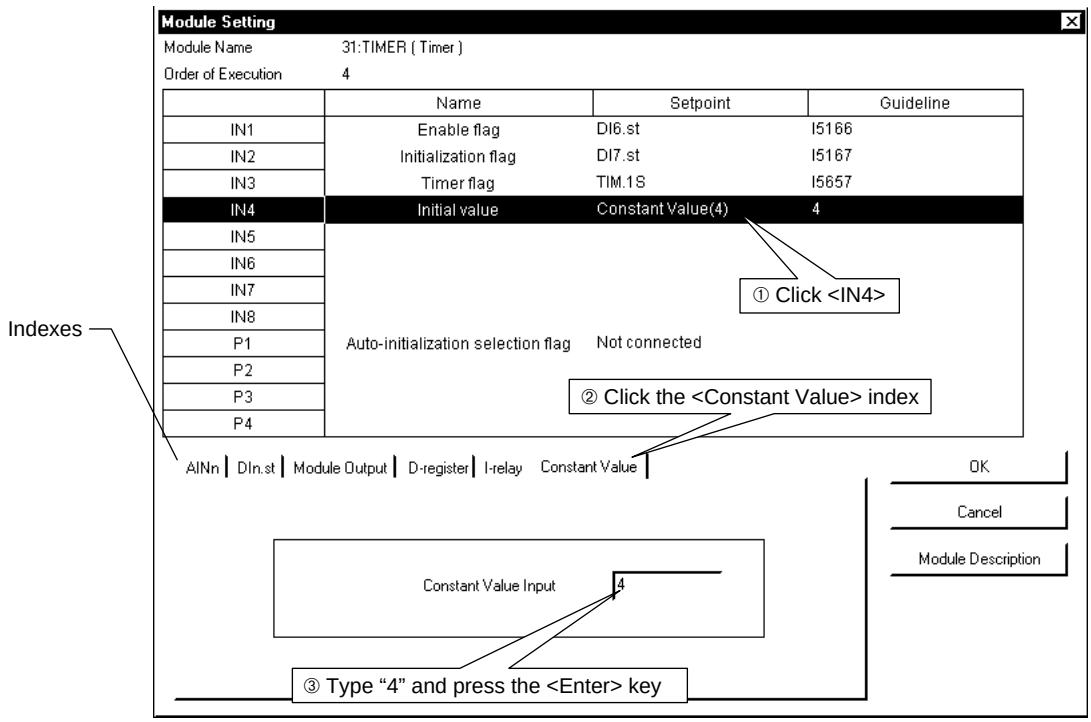

Figure 12.5.10 Configuration of the <IN4> Input

⑯ Click the <P1> module parameter.
⑰ Click the <Constant Value> index.
⑱ Type “0” in the text box and press the <Enter> key.

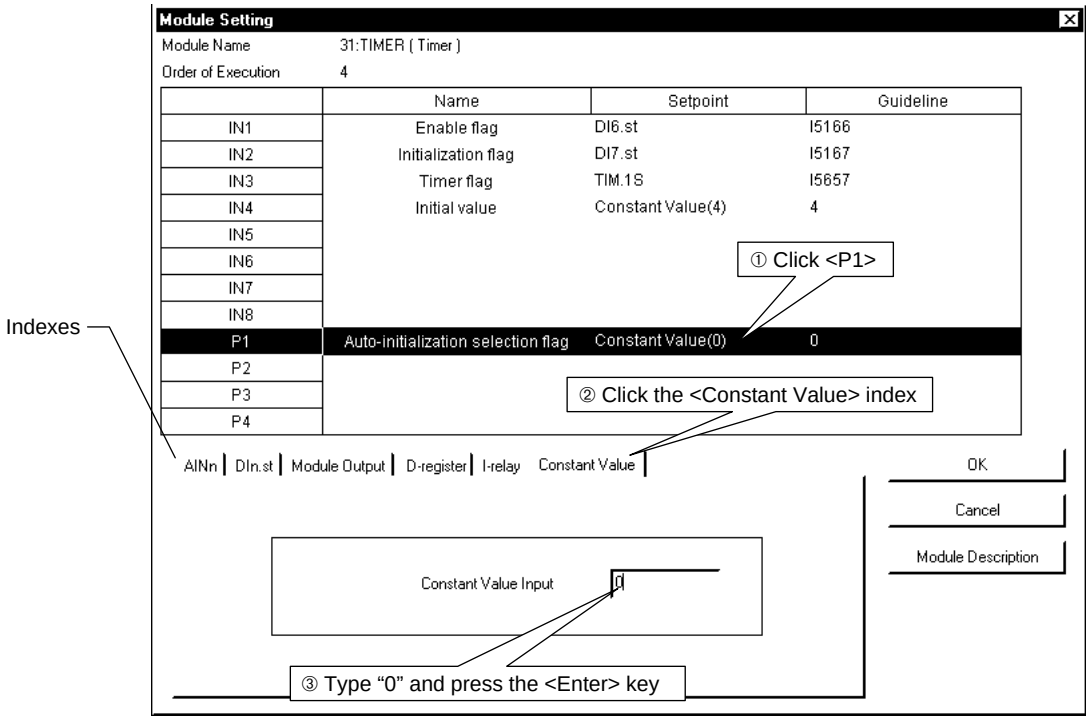

Figure 12.5.11 Configuration of the <P1> Parameter

⑲ Click the <OK> button.
⑳ In the [Input Block] dialog box, click the <OK> button.

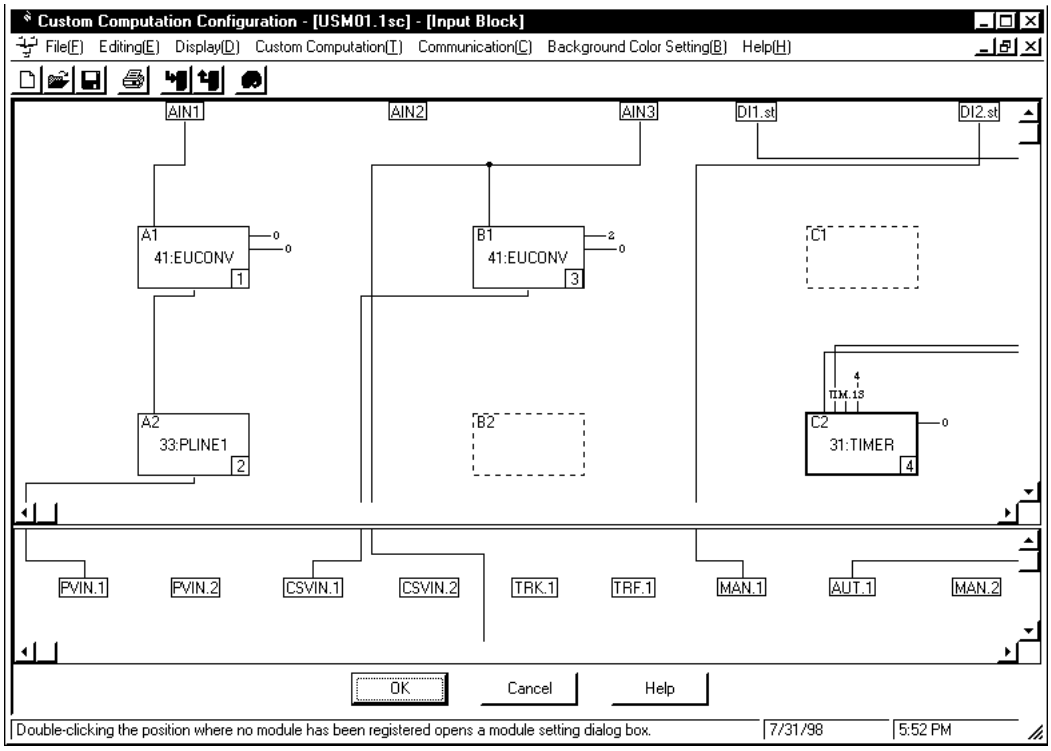

Figure 12.5.12 Example of the [Input Block] Dialog Box (finished view) Where a Four-second Timer Is Implemented

When you finish configuring the computation modules' inputs and parameters, proceed to "Operation III: Connection to the Output Signal."

- Operation III: Connection to the Output Signal

This operation involves configuring the TIMER module's output in the output block. In the output block, you can view the block diagram of single-loop control.

① In the [Output Block] dialog box (Figure 12.5.13), click the <DO3> output signal.

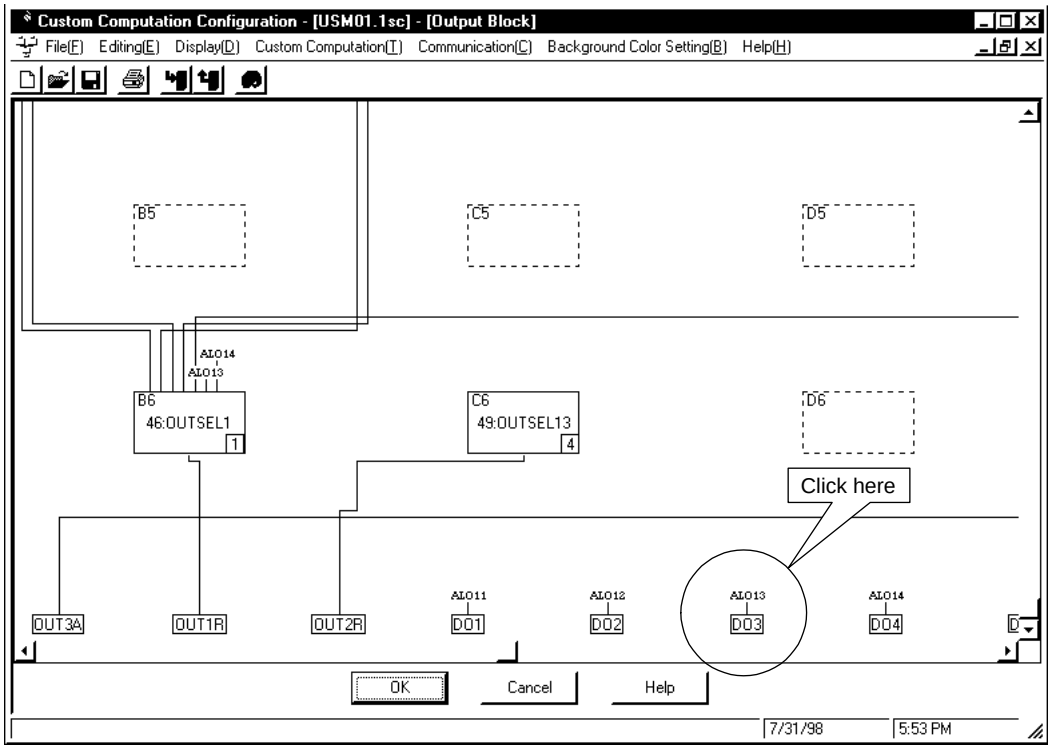

Figure 12.5.13 [Output Block] Dialog Box

≠ From the tool menus, choose <Editing>, then <Connection>. The [Setting of Output Block Connection Assignment] dialog box (Figure 12.5.14) appears.

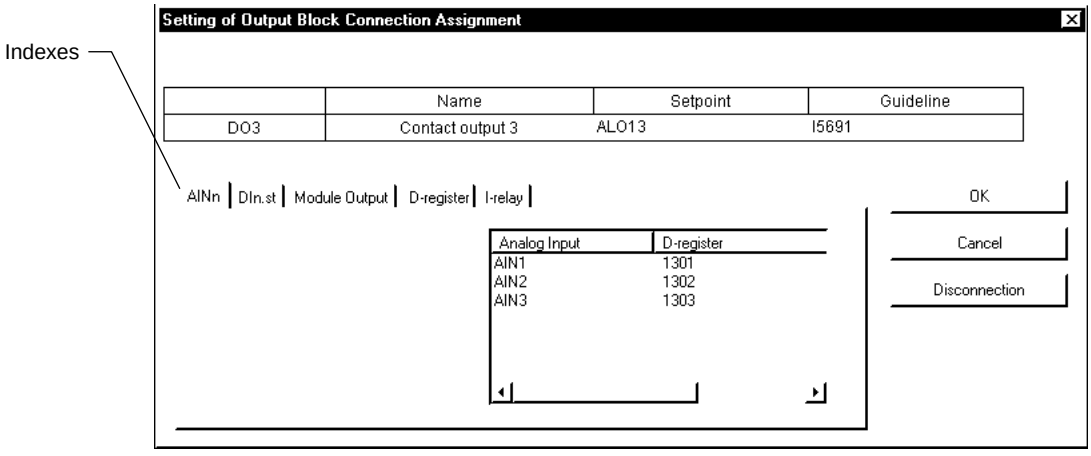

Figure 12.5.14 [Setting of Output Block Connection Assignment] Dialog Box

③ Click the <Module Output> index.
④ Click the <Input Block> option button in the group box.
∞ Double-click <OMO4L> in the list box. The <OMO4L (Setpoint column)> and <D1607 (Guideline column)> options appear in the <DO3> row.

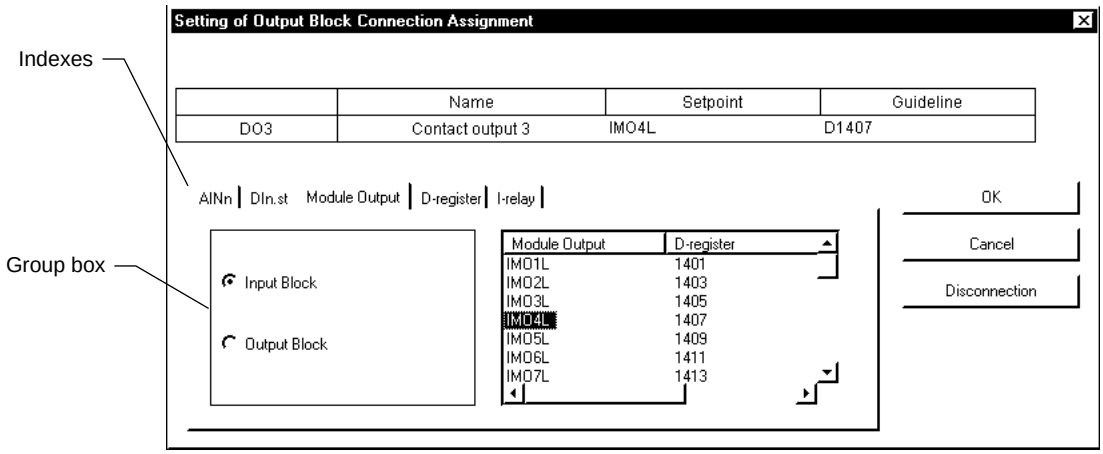

Figure 12.5.15 Configuration of the <OMO4L> Output

± Click the <OK> button.

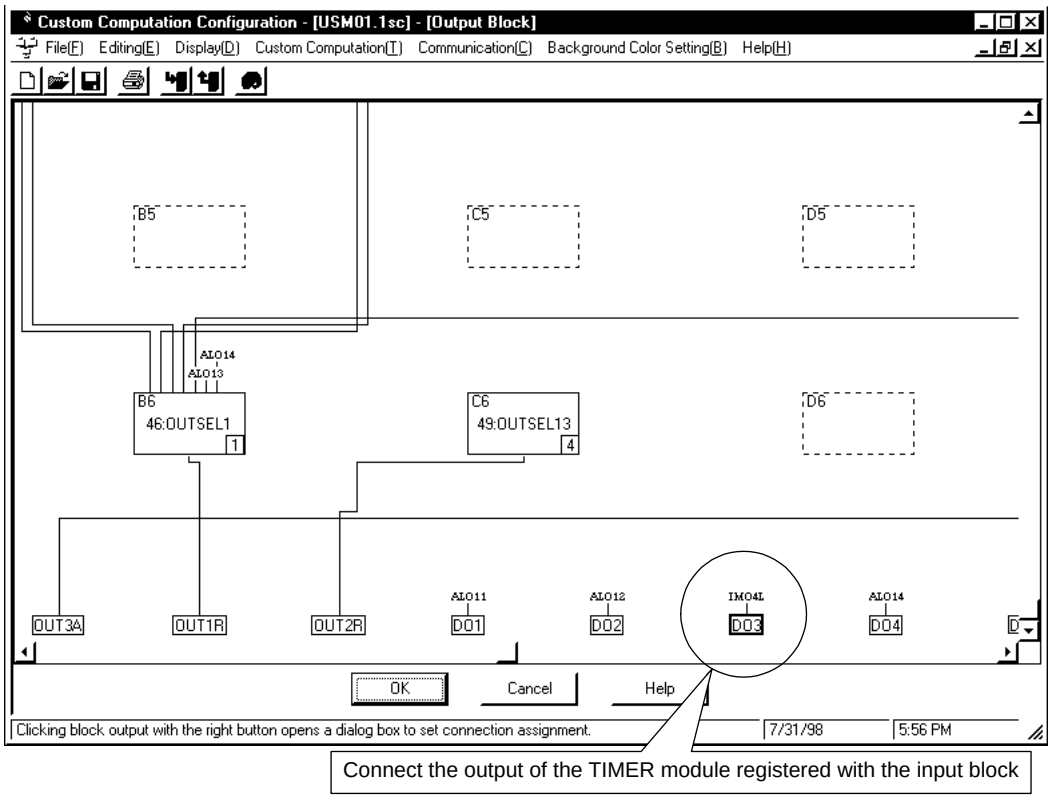

Figure 12.5.16 Example of the [Output Block] Dialog Box (finished view) Where a Four-second Timer Is Implemented

You have now finished this example of configuring custom computations for implementing a four-second timer.

The final step when configuring actual custom computations (after this example), is to download the computations to the US1000 controller (see Section 8.2), as necessary, in order to verify their performance by means of custom computation monitoring (see Chapter 11).

12.5.2 Configuring a Fixed-interval Five-second Timer

In this example, the block diagram of custom computations created in the previous subsection is used to explain how to configure a five-second timer.

■ Connection of Customized Computation Modules for Configuring a Fixed-interval Five-second Timer

To be able to configure any fixed-interval timer, you must define it as one having the automatic initialization capability. A fixed-interval timer repeats its operation every five seconds once the timer output turns on. After each five-second period, the output remains turned on for the duration of the timer flag.

The five-second timer can be implemented by reconfiguring the inputs and parameters of the TIMER module for the custom computations configured in the previous subsection.

The procedure for configuring this block diagram is explained in the paragraph, " ■ Procedure for Configuring Custom Computations," that follows.

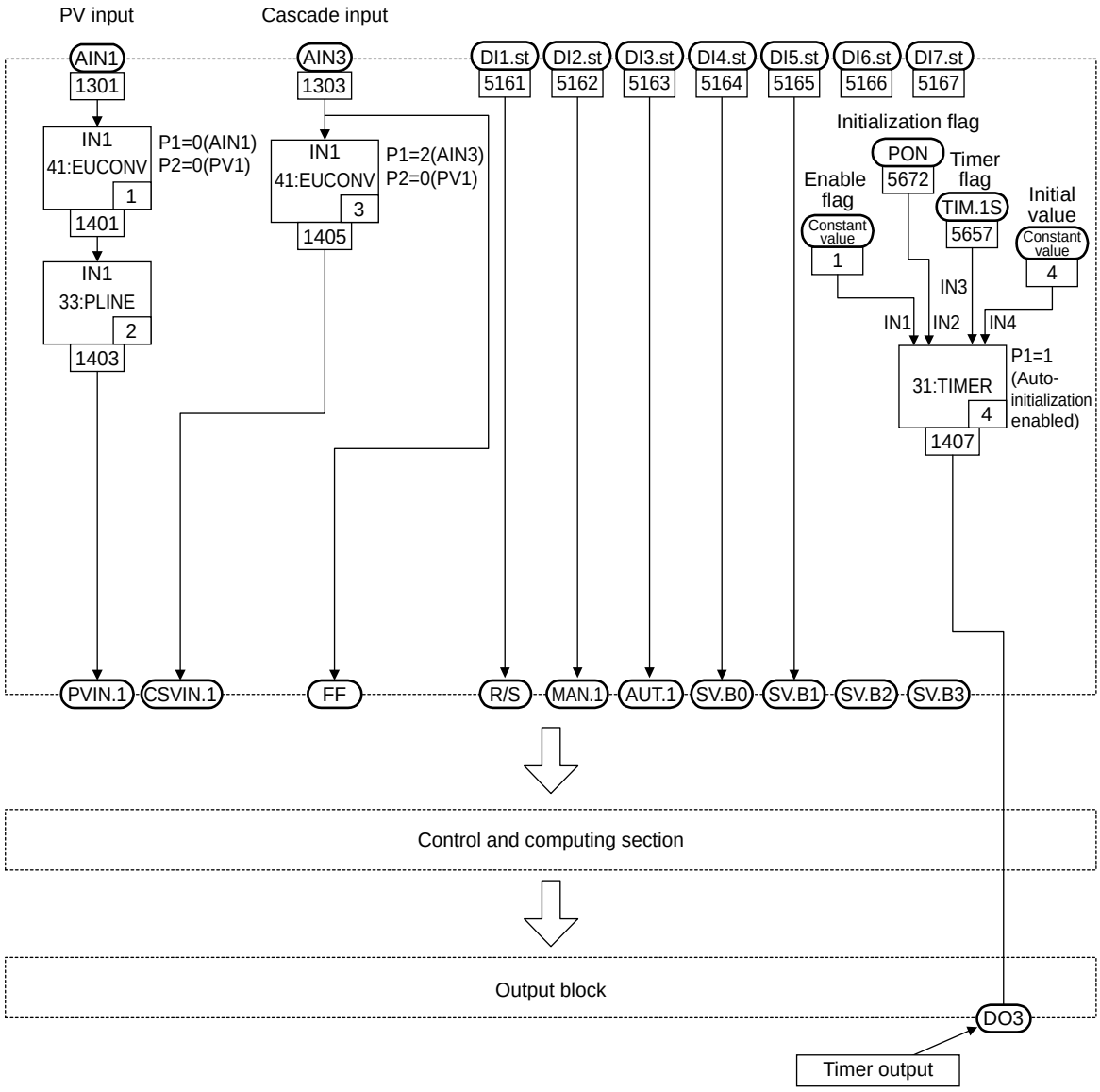

Figure 12.5.17 Connection of Customized Computation Modules for Configuring a Fixed-interval Five-second Timer (example for a control period of 200 ms)

Figure 12.5.18 is the timing chart of a five-second timer where the control period is 200 ms and the clock pulse duration is one second.

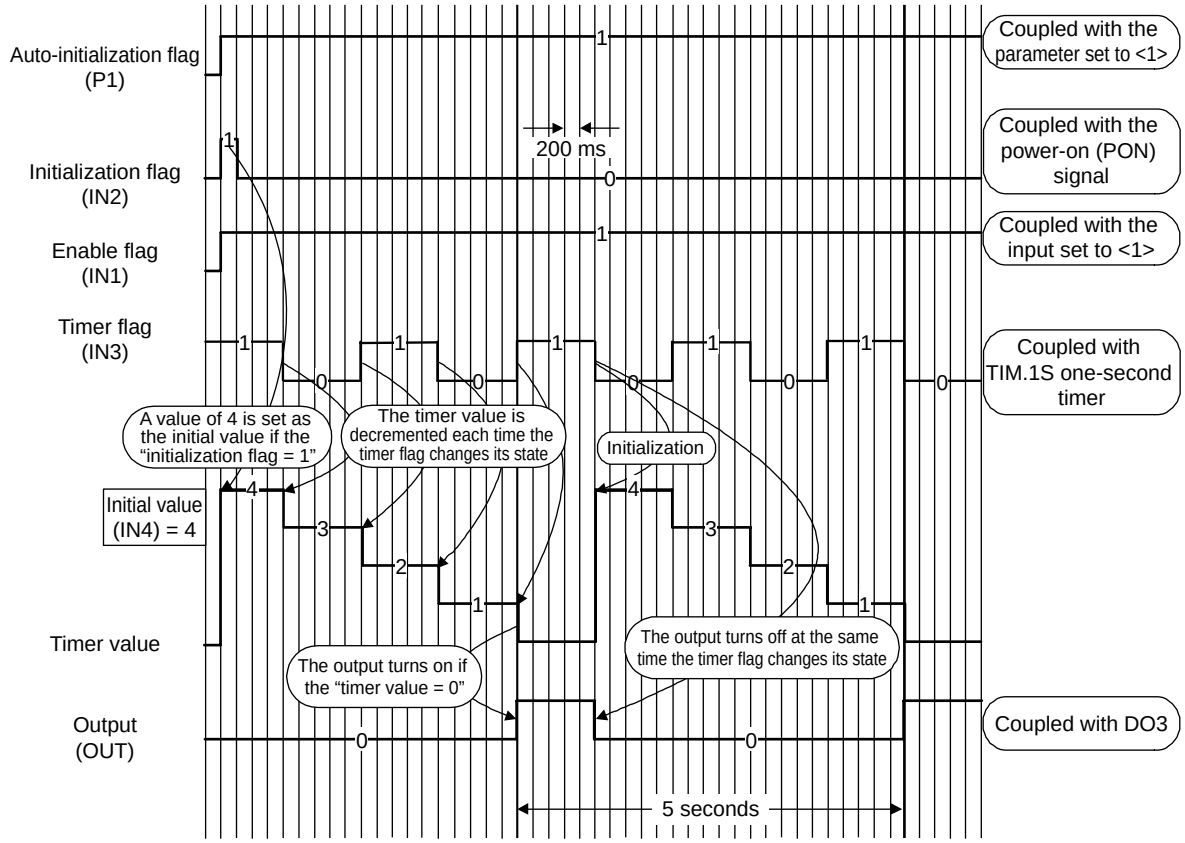

Figure 12.5.18 Timing Chart of a Fixed-interval Five-second Timer (example for a control period of 200 ms)

■ Procedure for Configuring Custom Computations

① In the [Input Block] dialog box (Figure 12.5.12), click the registered TIMER module.

≠ From the tool menus, choose <Editing>, then <Connection>. The [Module Setting] dialog box (Figure 12.5.19) appears.

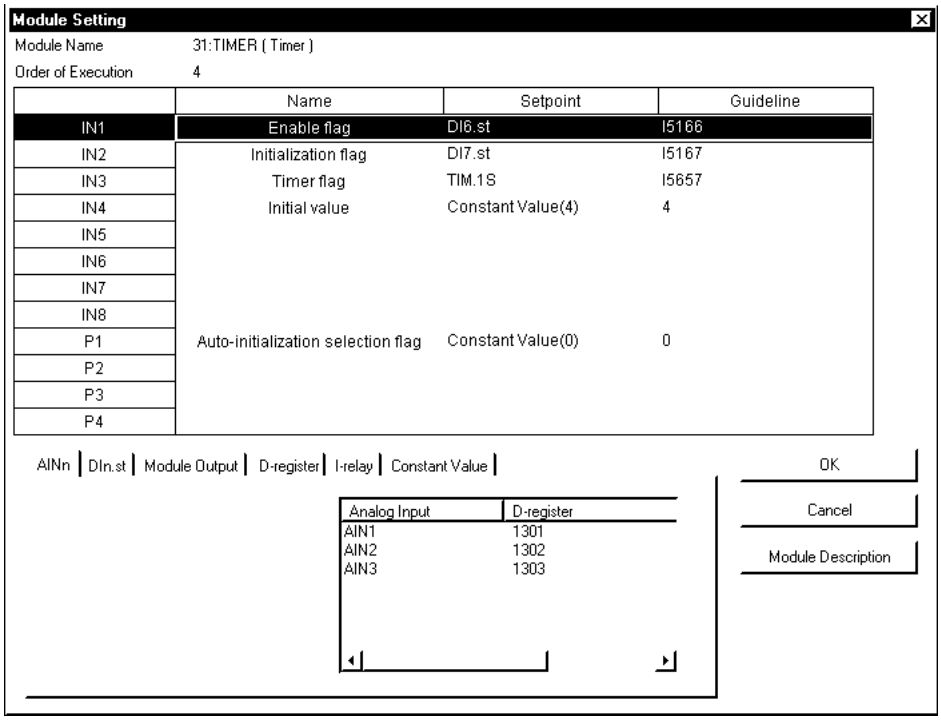

Figure 12.5.19 [Module Setting] Dialog Box

③ Click the <IN1> module input.

④ Click the <Constant Value> index.

∞ Type "1" in the text box and press the <Enter> key.

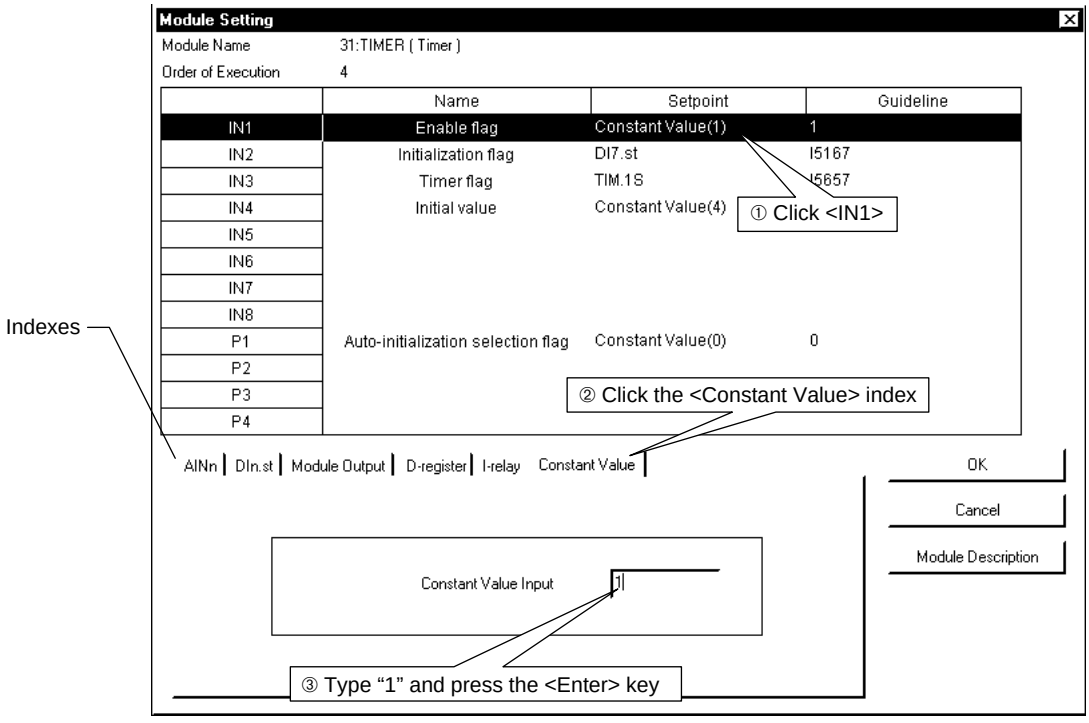

Figure 12.5.20 Configuration of the <IN1> Input

± Click the <IN2> module input.
≤ Click the <I-relay> index.
≥ Click <Timer flag, power-on flag, alarm flag> in the drop-down list box.
⑨ Double-click <PON> in the list box. The <PON (Setpoint column)> and <I5672 (Guideline column)> options appear in the <IN2> row.

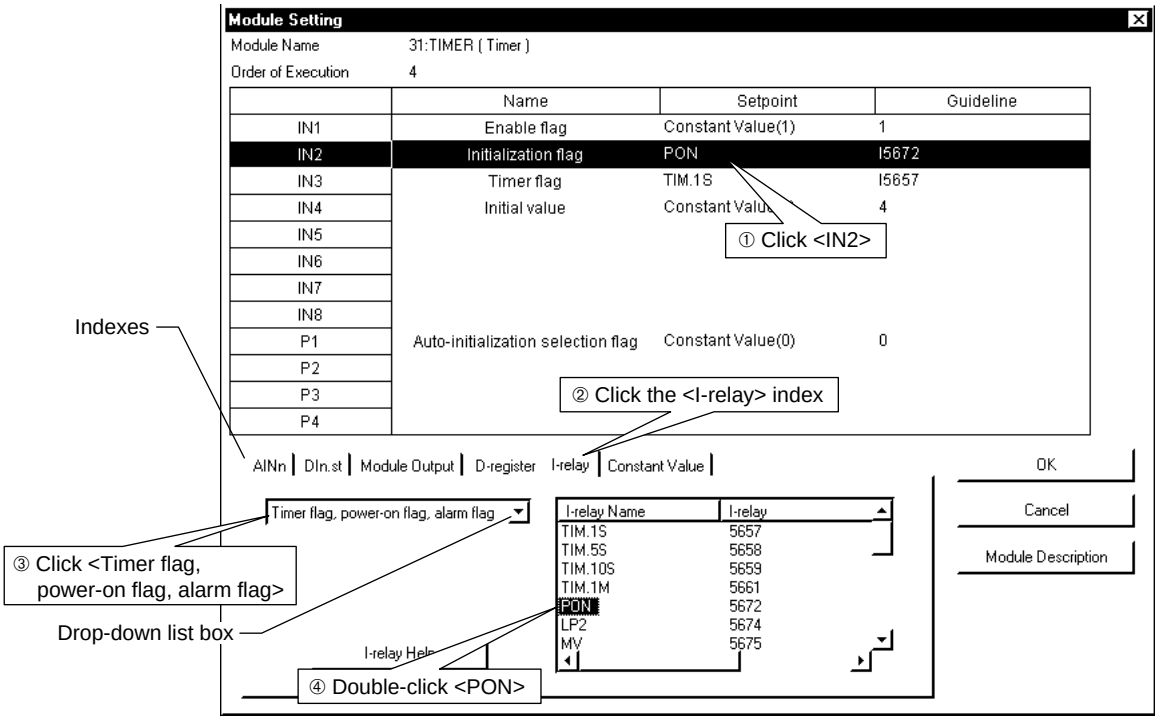

Figure 12.5.21 Configuration of the <IN2> Input

µ Click the <IN3> module input.
⑪ Click the <I-relay> index.
⑫ Click <Timer flag, power-on flag, alarm flag> in the drop-down list box.
⑬ Double-click <TIM.1S> in the list box. The <TIM.1S (Setpoint column)> and <I5657 (Guideline column)> options appear in the <IN3> row.

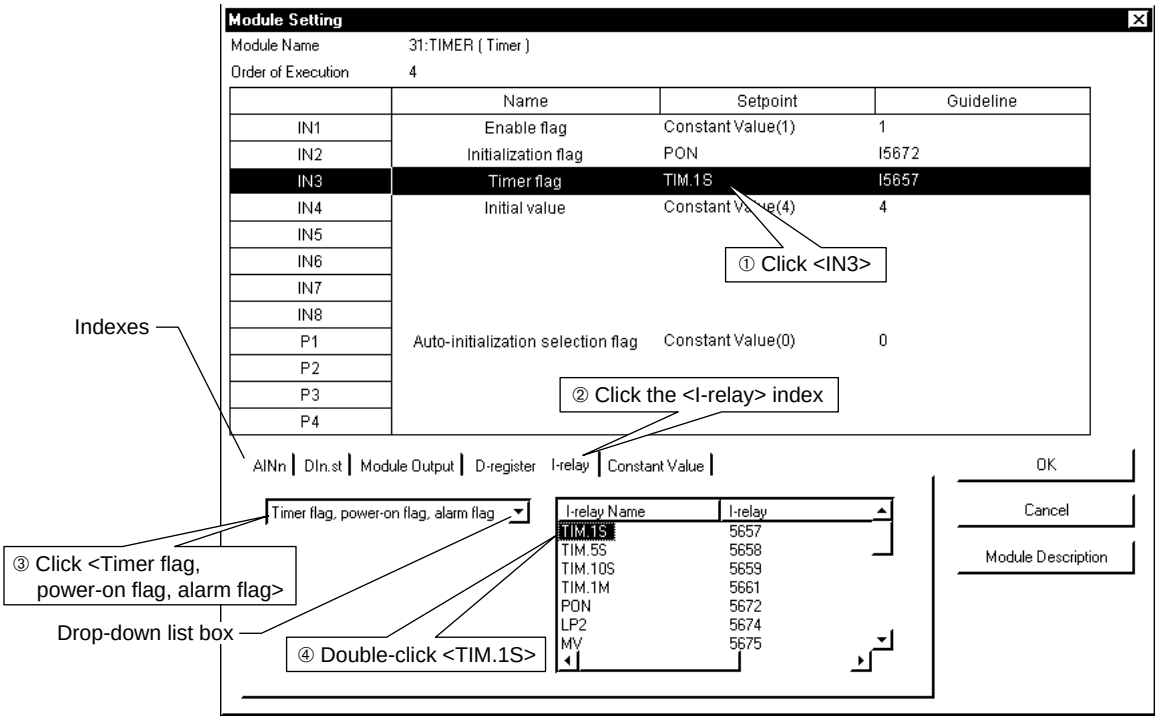

Figure 12.5.22 Configuration of the <IN3> Input

⑭ Click the <IN4> module input.
⑮ Click the <Constant Value> index.
⑯ Type “4” in the text box and press the <Enter> key.

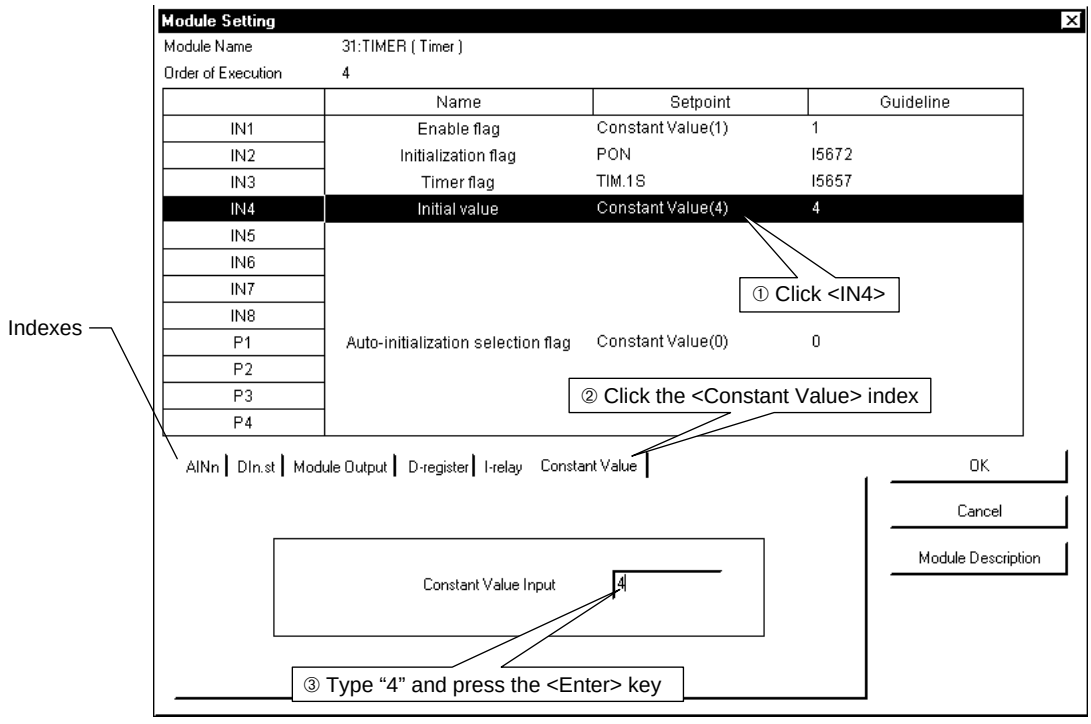

Figure 12.5.23 Configuration of the <IN4> Input

⑰ Click the <P1> module parameter.
⑱ Click the <Constant Value> index.
⑲ Type “1” in the text box and press the <Enter> key.

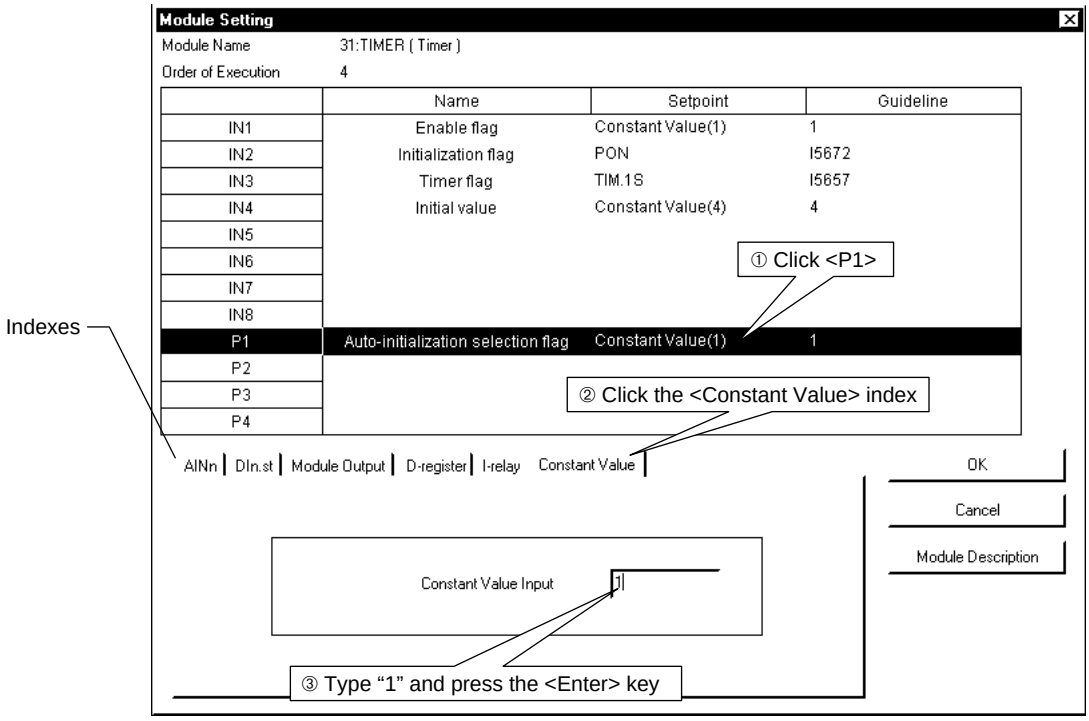

Figure 12.5.24 Configuration of the <P1> Parameter

⑳ Click the <OK> button.
㉑ In the [Input Block] dialog box, click the <OK> button.

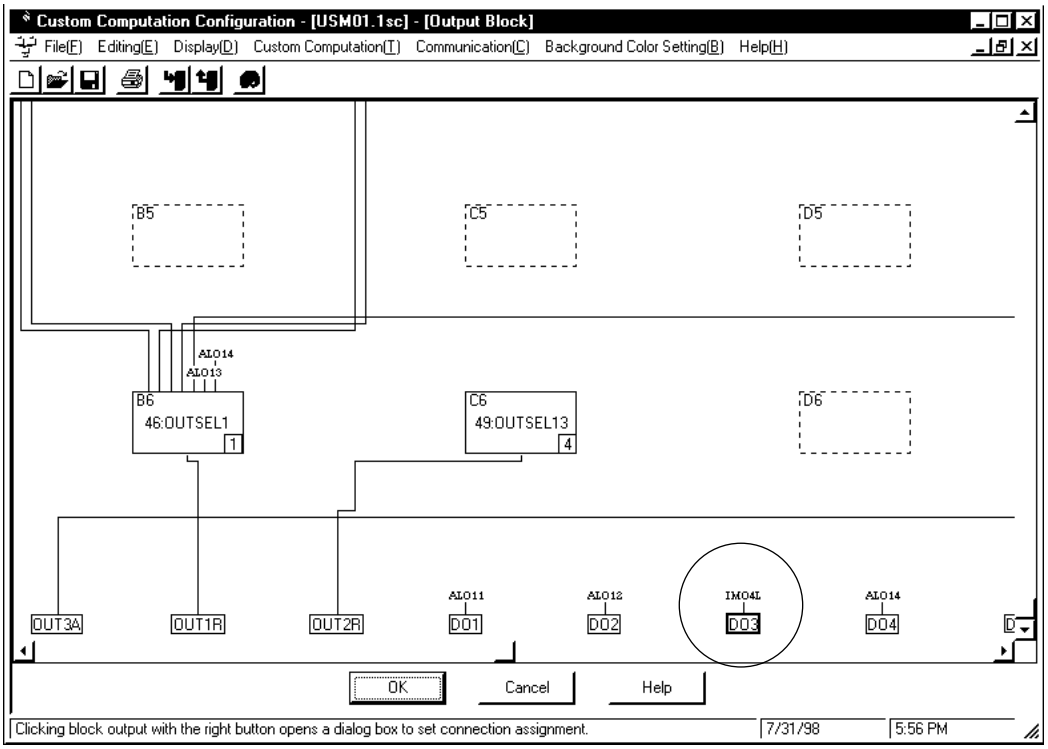

Figure 12.5.25 Example of the [Output Block] Dialog Box (finished view) Where a Fixed-interval Five-second Timer Is Implemented

You have now finished this example of configuring custom computations for implementing a fixed-interval five-second timer.

The final step when configuring actual custom computations (after this example), is to download the computations to the US1000 controller (see Section 8.2), as necessary, in order to verify their performance by means of custom computation monitoring (see Chapter 11).

12.6 Example 6: Setting Parameters

■ **Connection of Customized Computation Modules for Setting Parameters**

In this paragraph, you configure computation modules so that a value of 200.0°C is written into the target-setpoint register (numbered 301) when contact input 7 turns on.

The procedure for configuring this block diagram is explained in the paragraph, " ■ Procedure for Configuring Custom Computations," that follows.

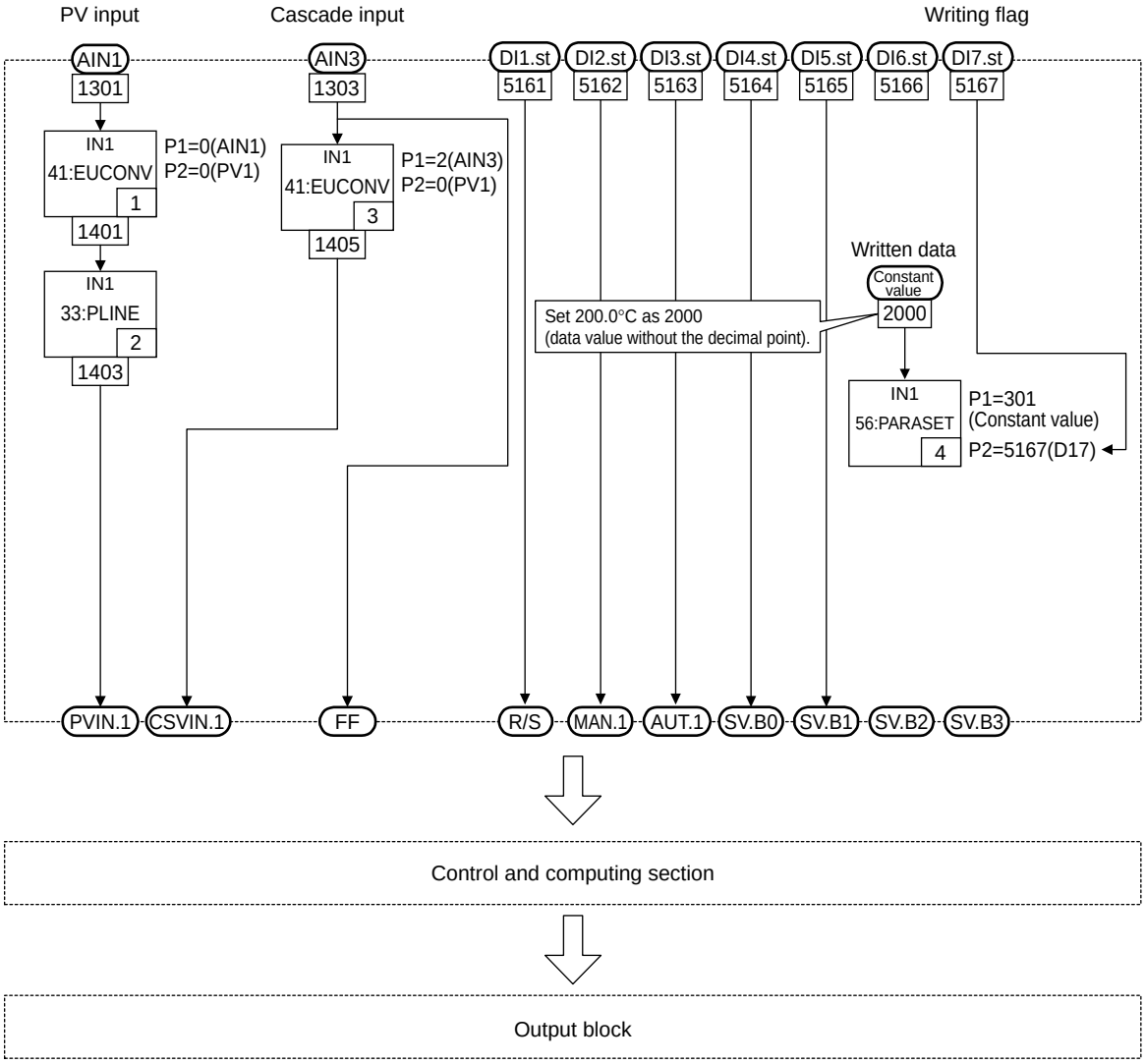

Figure 12.6.1 Connection of Customized Computation Modules for Setting Parameters (diagram of input block)

■ Procedure for Configuring Custom Computations

Before you begin configuring custom computations, read the sample file for single-loop control (file name: USM01.1SC). To read the file, see subsection 7.3.1, “Reading Data from Disk.”

Next, cancel the wiring to contact input 7. For details on how to cancel the wiring, see subsection 6.1.5, “Changing the Way Computation Modules Are Connected.”

If you carry out the configurations discussed in this section, you will no longer be able to use the function of SV number selection based on contact input.

To configure the custom computations, follow the instructions in “Operation I” and “Operation II,” in this order.

- Operation I: Module Configuration

① In the [Custom Computation Configuration Menu] dialog box (Figure 12.0.2), click <Input Block>. The [Input Block] dialog box (Figure 12.6.2) appears.

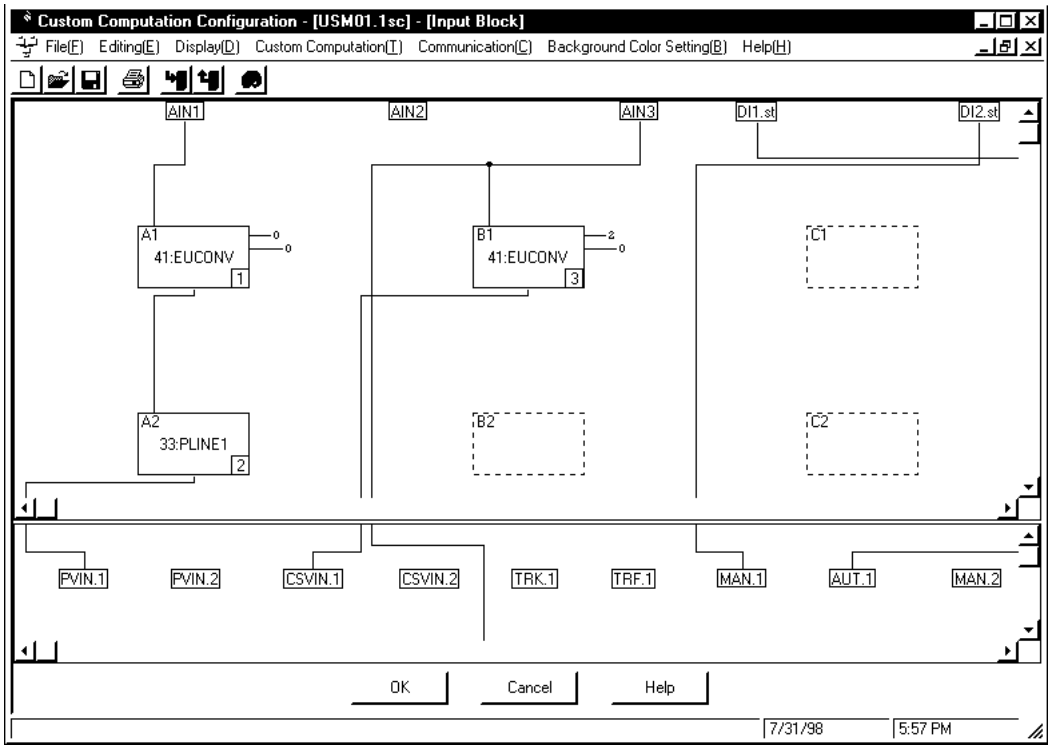

Figure 12.6.2 [Input Block] Dialog Box

≠ In the [Input Block] dialog box, double-click a blank box. The [Module Configuration] dialog box (Figure 12.6.3) appears.

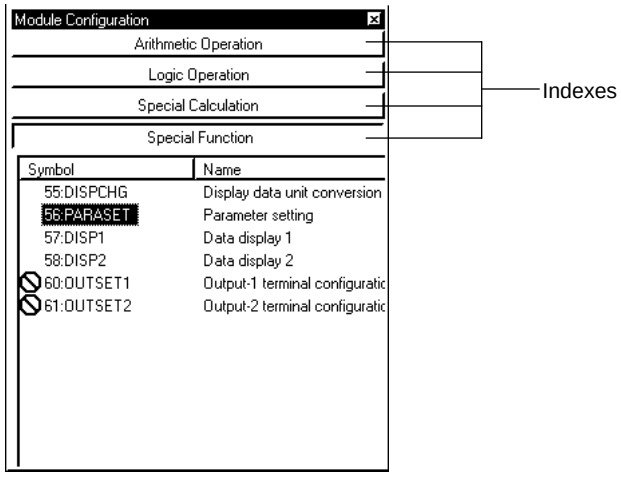

Figure 12.6.3 [Module Configuration] Dialog Box

③ Click the <Special Function> index.

④ Double-click <56: PARASET>. The PARASET module is registered with the [Input Block] dialog box, as shown in Figure 12.6.4.

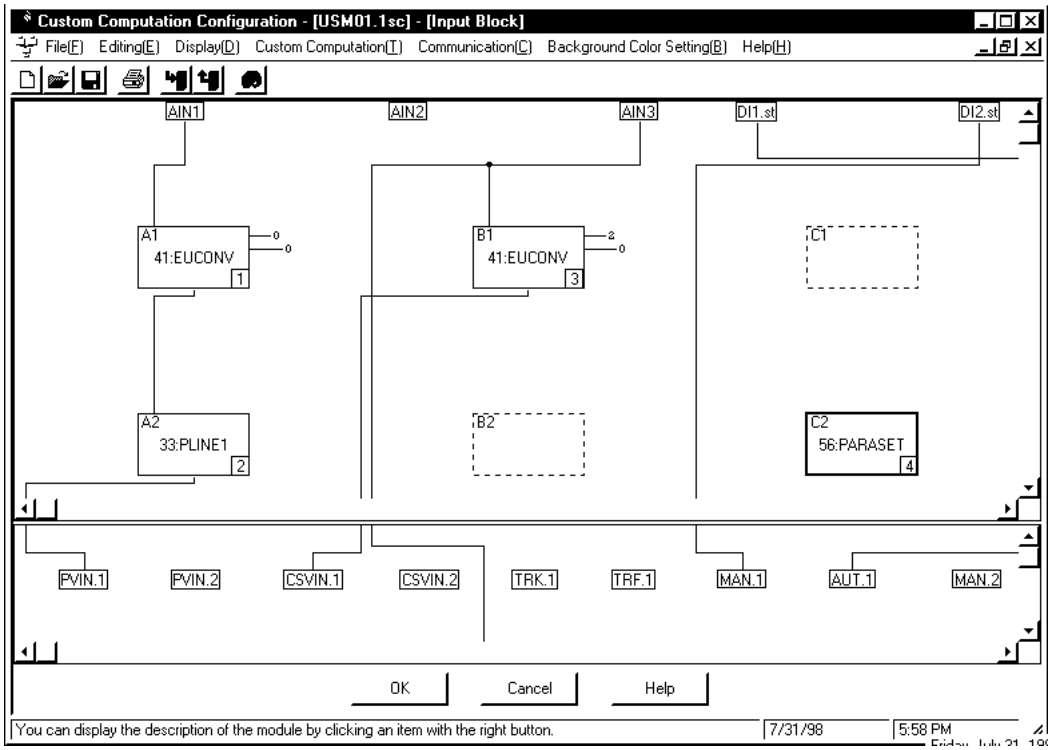

Figure 12.6.4 Example of the [Input Block] Dialog Box where the PARASET Module Is Registered As the Fourth-run Module

When you finish registering the computation modules, proceed to “Operation II: Module Setting.”

- Operation II: Module Setting

This operation involves configuring the inputs and parameters of computation modules.

① Click the registered fourth-run PARASET module.
≠ From the tool menus, choose <Editing>, then <Connection>. The [Module Setting] dialog box (Figure 12.6.5) appears.

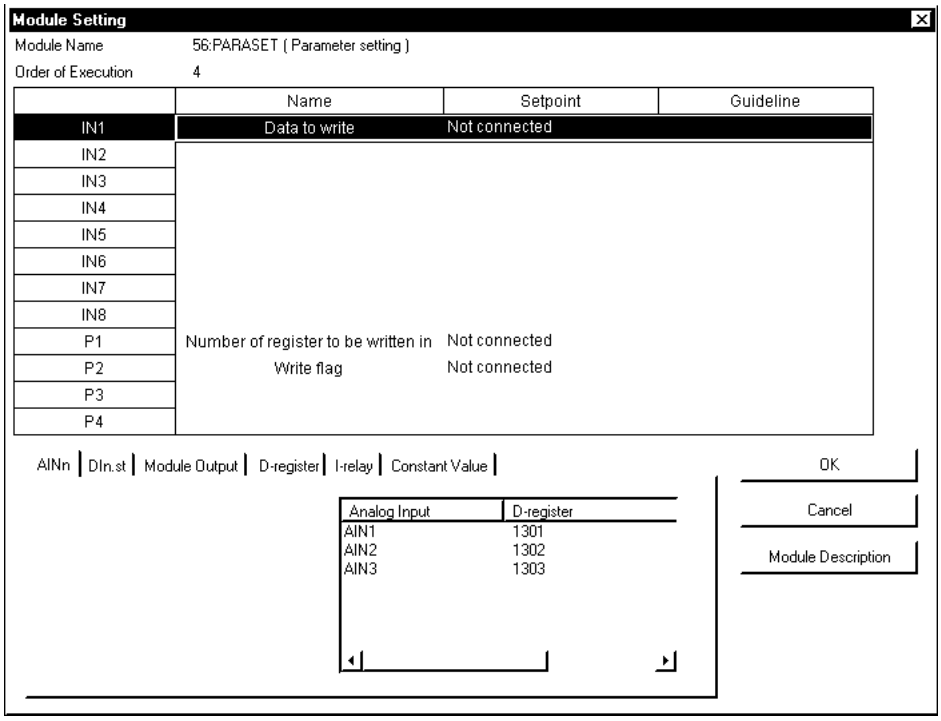

Figure 12.6.5 [Module Setting] Dialog Box

③ Click the <IN1> module input.
④ Click the <Constant Value> index.
∞ Type “2000” in the text box and press the <Enter> key.

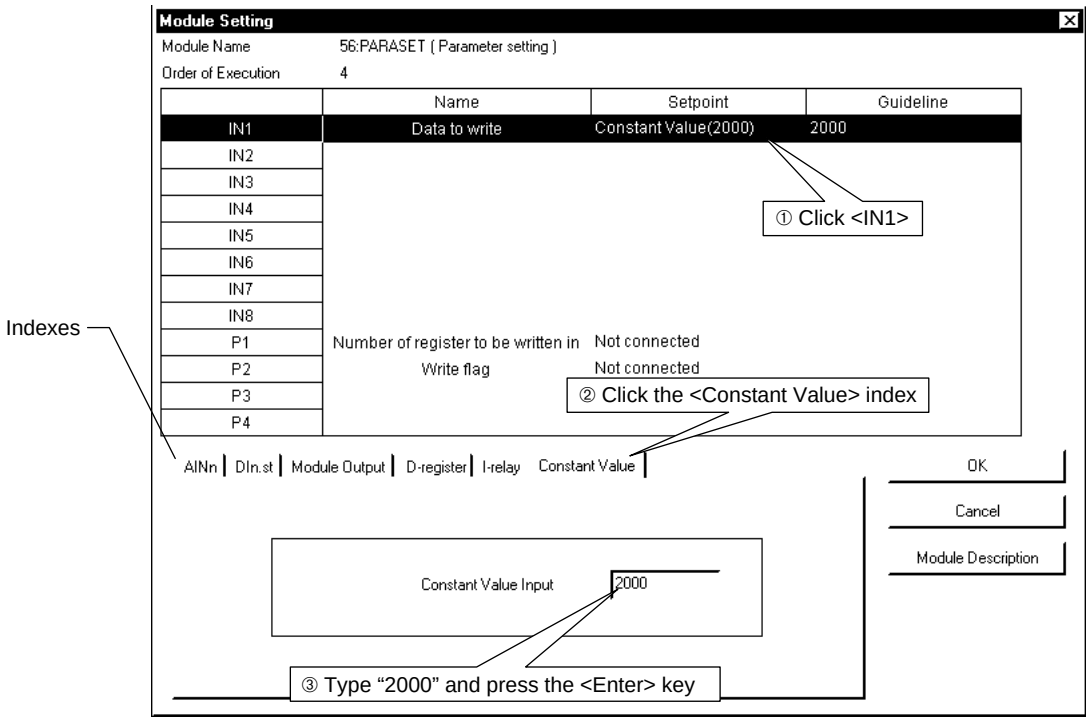

Figure 12.6.6 Configuration of the <IN1> Input

± Click the <P1> module parameter.
≤ Click the <Constant Value> index.
≥ Type “301” in the text box and press the <Enter> key.

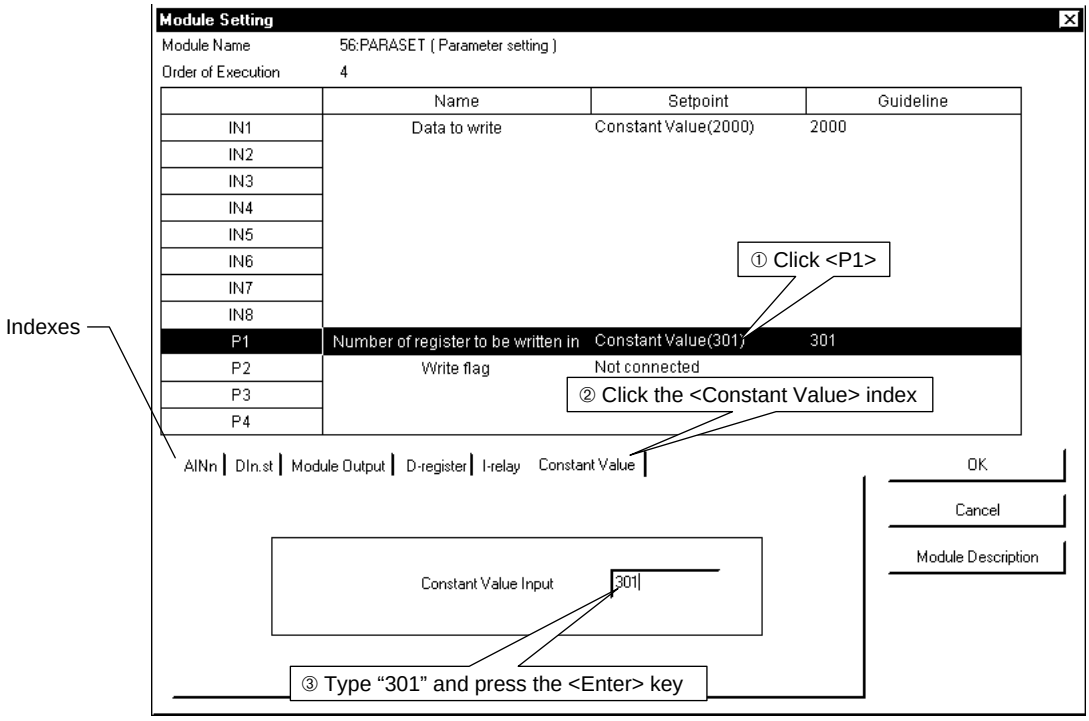

Figure 12.6.7 Configuration of the <P1> Parameter

⑨ Click the <P2> module parameter.
μ Click the <DIn.st> index.
⑪ Double-click <DI7.st> in the drop-down list box. The <DI7.st (Setpoint column)> and <I5167 (Guideline column)> options appear in the <P2> row.

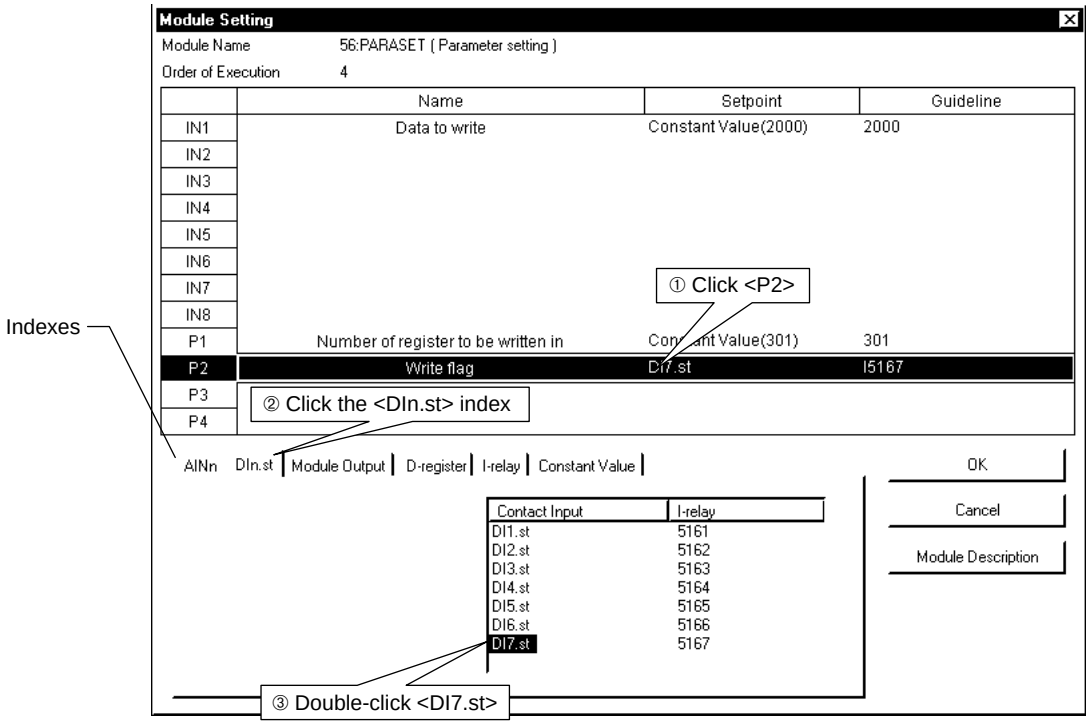

Figure 12.6.8 Configuration of the <P2> Parameter

⑫ Click the <OK> button.
⑬ In the [Input Block] dialog box, click the <OK> button.

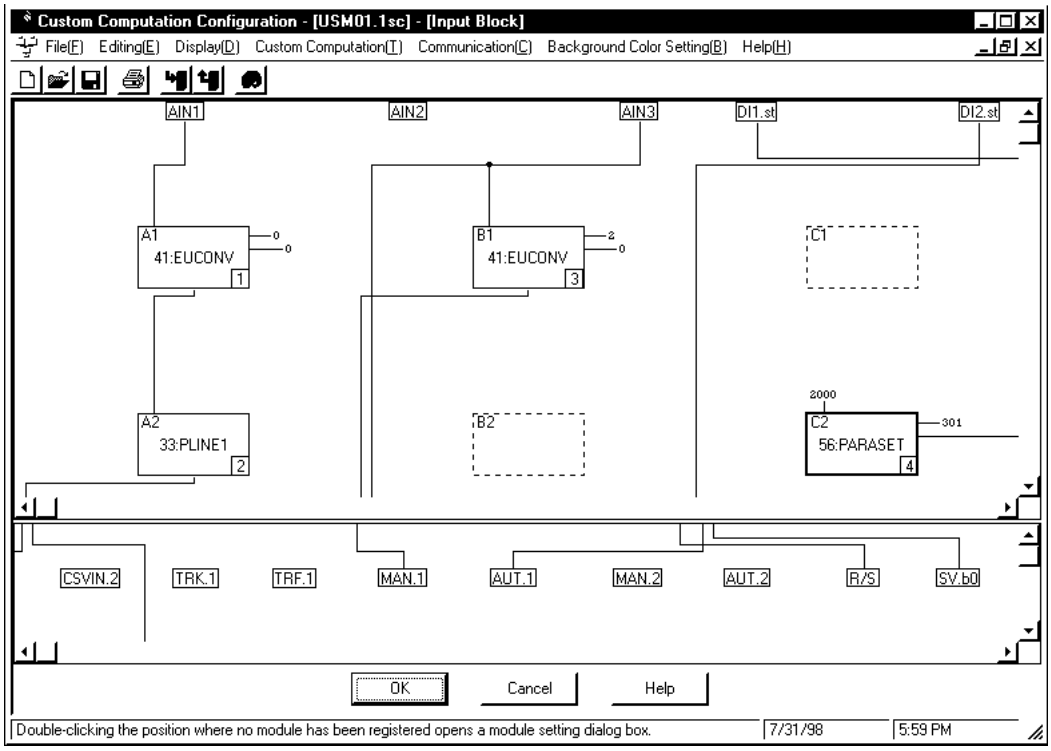

Figure 12.6.9 Example of the [Input Block] Dialog Box (finished view) Edited for Parameter Setting

You have now finished this example of configuring custom computations for setting parameters.

The final step when configuring actual custom computations (after this example), is to download the computations to the US1000 controller (see Section 8.2), as necessary, in order to verify their performance by means of custom computation monitoring (see Chapter 11).

12.7 Example 7: OR Function of Alarm Outputs

■ Connection of Customized Computation Modules for OR Operation of the Alarm Outputs

In this paragraph, you configure computation modules so that the logical OR of alarm-1 to alarm-4 outputs is sent to a contact output.

Figure 12.7.1 is the output block diagram of single-loop control, while Figure 12.7.2 shows the modified layout of the output block diagram.

The procedure for configuring this block diagram is explained in the paragraph, " ■ Procedure for Configuring Custom Computations," that follows.

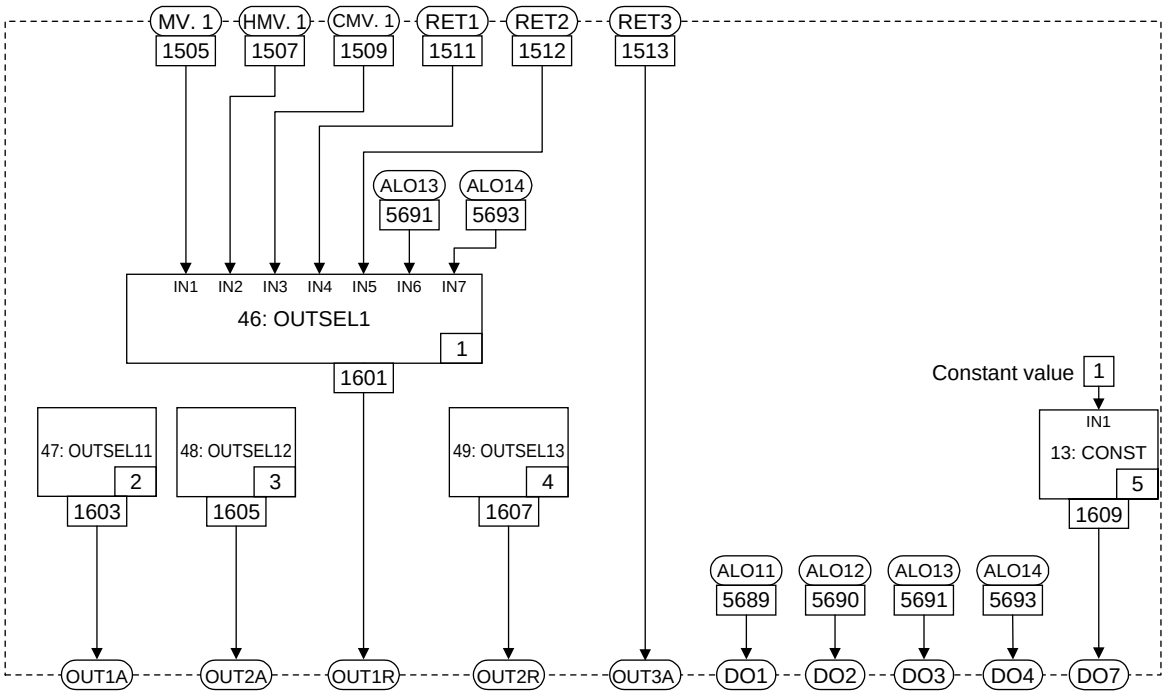

Figure 12.7.1 Output Block Diagram Configured to Carry Out Single-loop Control

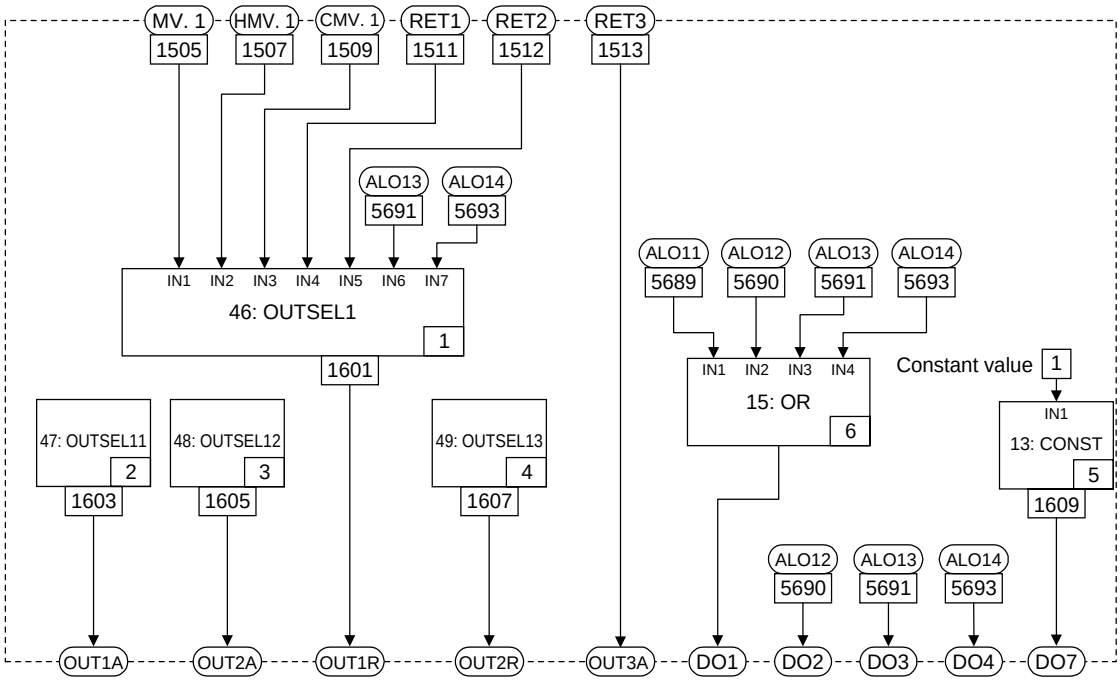

Figure 12.7.2 Connection of Customized Computation Modules for OR Operation of the Alarm Outputs (Output Block)

■ Procedure for Configuring Custom Computations

Before you begin configuring custom computations, read the sample file for single-loop control (file name: USM01.1SC). To read the file, see subsection 7.3.1, “Reading Data from Disk.”

To configure the custom computations, follow the instructions in “Operation I,” “Operation II” and “Operation III,” in this order.

- Operation I: Module Configuration

① In the [Custom Computation Configuration Menu] dialog box (Figure 12.0.2), click <Output Block>. The [Output Block] dialog box (Figure 12.7.3) appears.

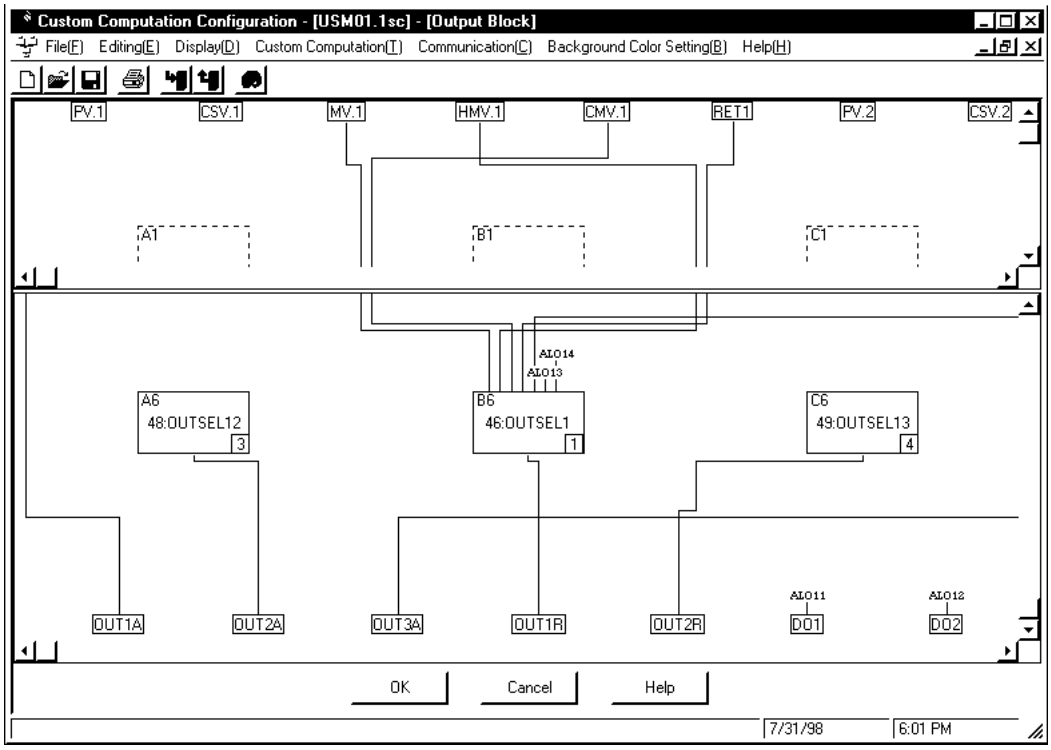

Figure 12.7.3 [Output Block] Dialog Box

≠ In the [Output Block] dialog box, double-click a blank box. The [Module Configuration] dialog box (Figure 12.7.4) appears.

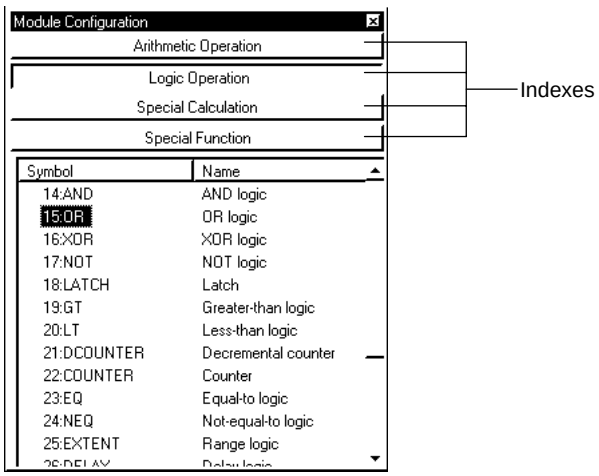

Figure 12.7.4 [Module Configuration] Dialog Box

③ Click the <Logic Calculation> index.
④ Double-click <15: OR>. The OR module is registered with the [Output Block] dialog box, as shown in Figure 12.7.5.

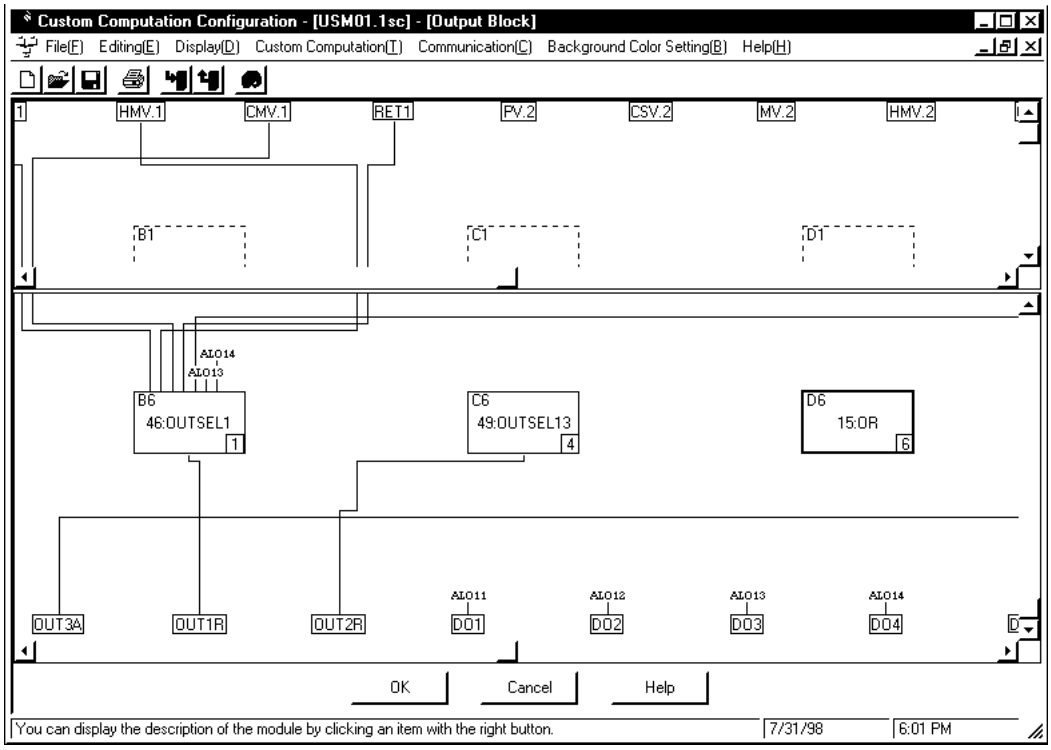

Figure 12.7.5 Example of the [Output Block] Dialog Box where the OR Module Is Registered As the Sixth-run Module

When you finish registering the computation modules, proceed to “Operation II: Module Setting.”

- Operation II: Module Setting

This operation involves configuring the inputs and parameters of computation modules.

① Click the registered sixth-run OR module.
≠ From the tool menus, choose <Editing>, then <Connection>.
The [Module Setting] dialog box (Figure 12.7.6) appears.

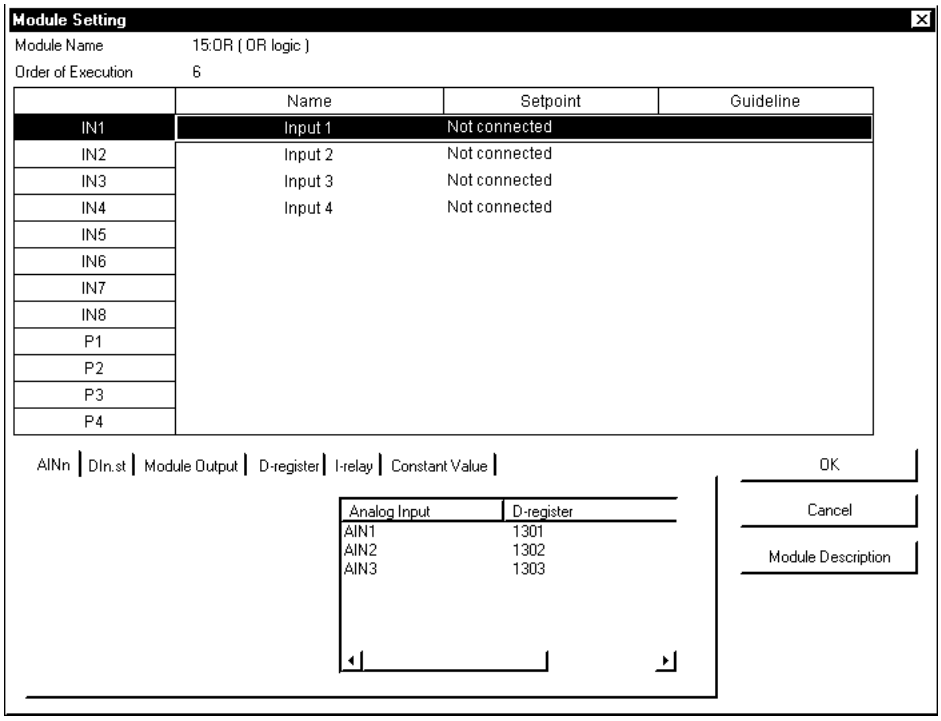

Figure 12.7.6 [Module Setting] Dialog Box

③ Click the <IN1> module input.
④ Click the <I-relay> index.
∞ Click <Timer flag, power-on flag, alarm flag> in the drop-down list box.
± Double-click <ALO11> in the list box.
The <ALO11 (Setpoint column)> and <I5689 (Guideline column)> options appear in the <IN1> row.

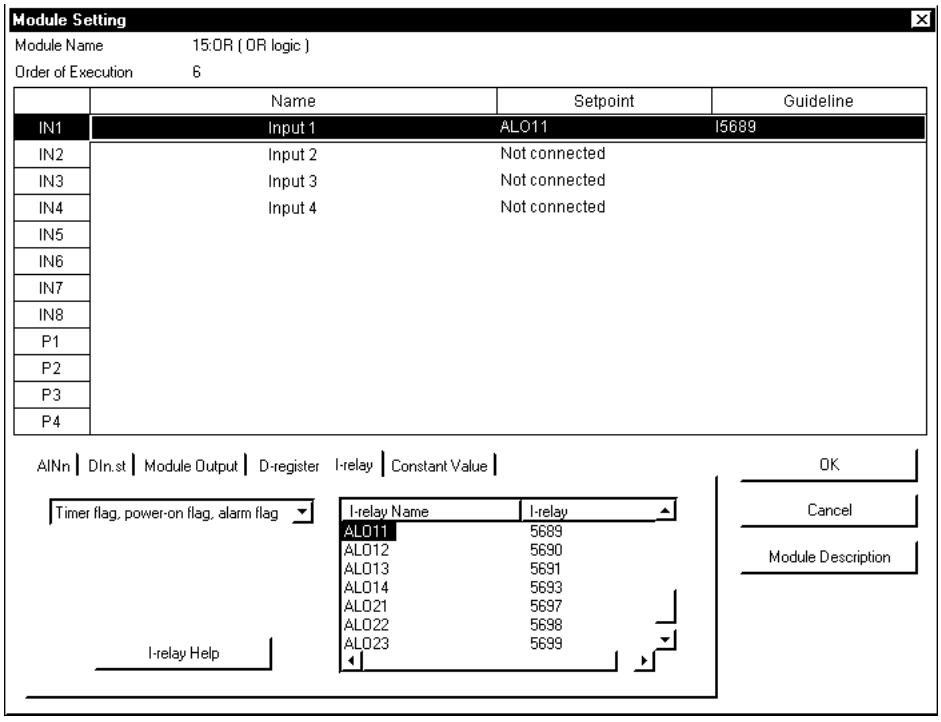

Figure 12.7.7 Configuration of the <IN1> Input

≤ Repeat steps ③ to ± to configure the <IN2> to <IN4> inputs also.

The setpoints of the inputs and parameters for which connection is made, are as follows.

Inputs	IN2	Index: [I-relay] Drop-down list box: [Timer flag, power-on flag, alarm flag] Selection: [ALO12 (5690)]
	IN3	Index: [I-relay] Drop-down list box: [Timer flag, power-on flag, alarm flag] Selection: [ALO13 (5691)]
	IN4	Index: [I-relay] Drop-down list box: [Timer flag, power-on flag, alarm flag] Selection: [ALO14 (5693)]

≥ Click the <OK> button.

When you finish configuring the computation modules' inputs and parameters, proceed to "Operation III: Connection to the Output Signal."

- Operation III: Connection to the Output Signal

This operation involves configuring the OR module's output in the output block.

① In the [Output Block] dialog box (Figure 12.7.8), click the <DO1> output signal.

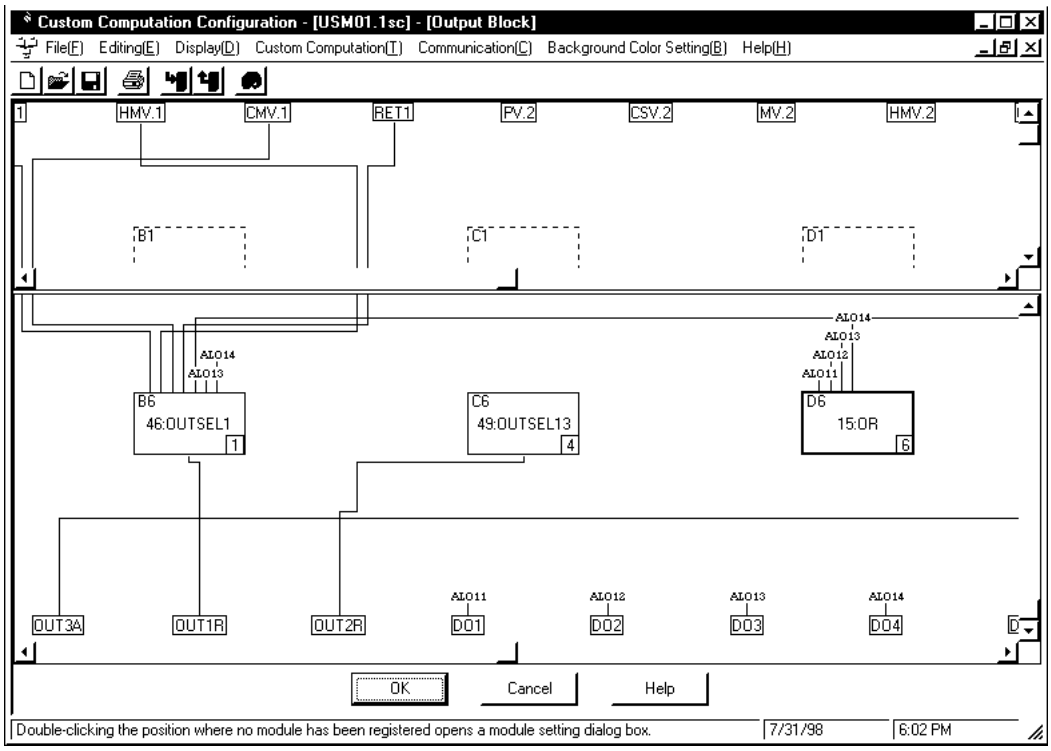

Figure 12.7.8 [Output Block] Dialog Box

≠ From the tool menus, choose <Editing>, then <Connection>. The [Setting of Output Block Connection Assignment] dialog box (Figure 12.7.9) appears.

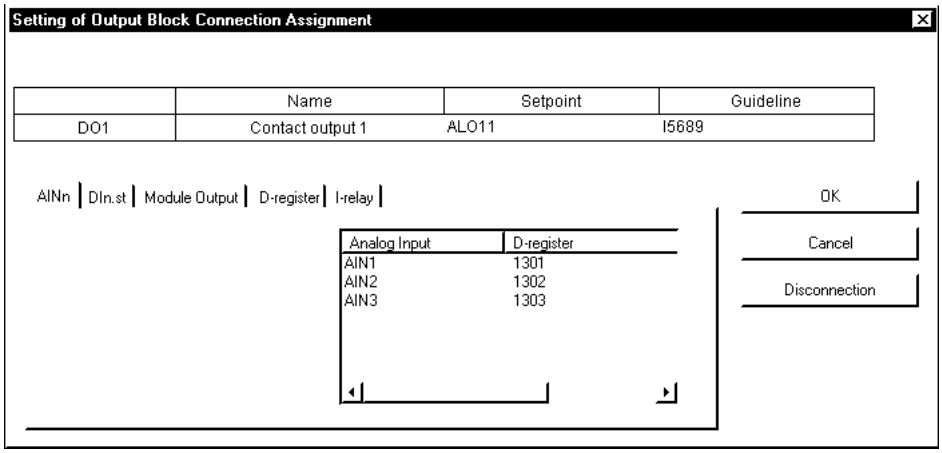

Figure 12.7.9 [Setting of Output Block Connection Assignment] Dialog Box

③ Click the <Module Output> index.
④ Double-click <OMO6L> in the list box.
The <OMO6L (Setpoint column)> and <D1611 (Guideline column)> options appear in the <DO1> row.
∞ Click the <OK> button.

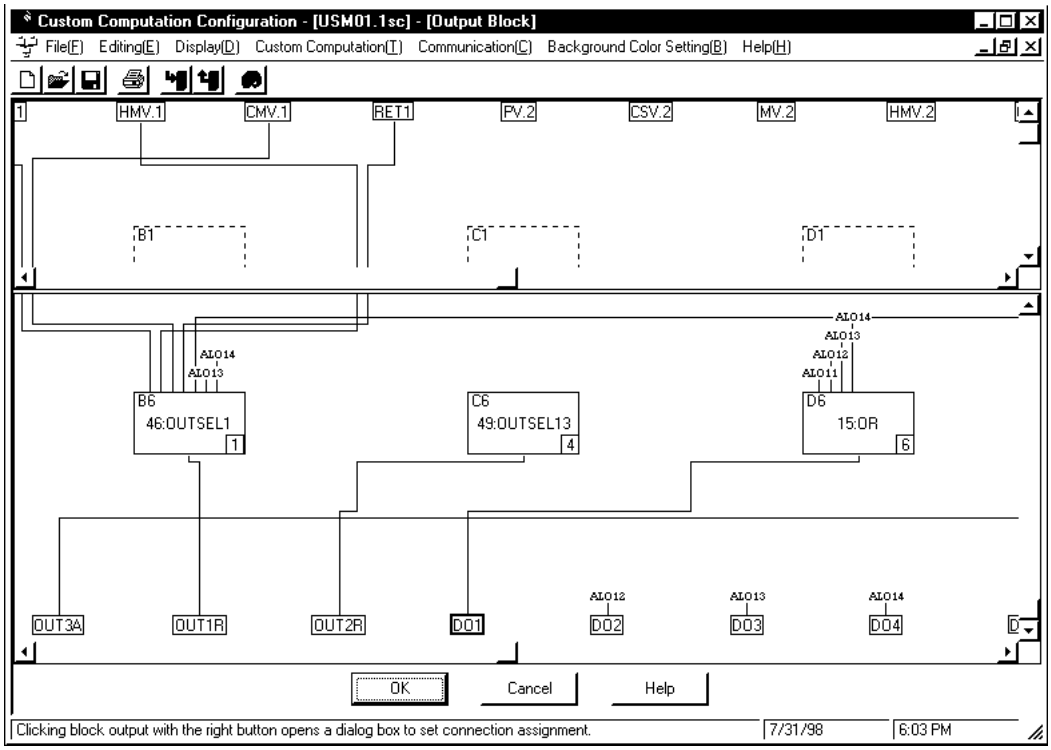

Figure 12.7.10 Example of the [Output Block] Dialog Box (finished view) Edited to Output the Logical OR of the Alarm Outputs

You have now finished this example of configuring custom computations to OR the alarm outputs.

The final step when configuring actual custom computations (after this example), is to download the computations to the US1000 controller (see Section 8.2), as necessary, in order to verify their performance by means of custom computation monitoring (see Chapter 11).

13. Maintenance and Troubleshooting

This chapter explains how to replace the batteries in the dedicated adapter and methods for solving problems that may occur when the LL1200 tool is in use.

13.1 Replacing the Batteries

When replacing the batteries in the dedicated adapter, follow the procedure noted below.

NOTE

The dedicated adapter is equipped with an internal switch (where the adapter comes into contact with the US1000 controller). Be careful not to break the switch when installing the adapter on the US1000 controller.

Installing the adapter in place automatically turns on the switch, causing the batteries to discharge even if there is no communication.

If you have no immediate plan to communicate, do not attach the adapter to the US1000 controller.

(1) Remove the screw from the bottom side of the adapter.
(2) Slide the cover approximately 5 mm downward, and then remove it.
(3) Replace the existing two units of AAA-size batteries with new ones.
(4) Place the cover back on the adapter while making sure the cover's hook properly engages with the opening on the adapter's top.
(5) Slide the cover upward until you feel a click.
(6) Fasten the screw in the bottom side of the adapter.

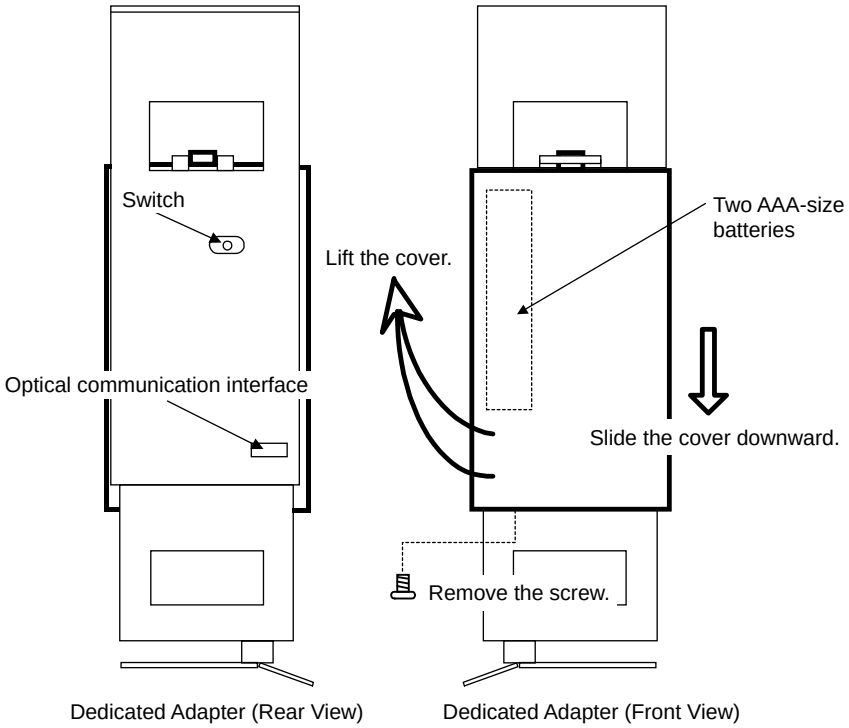

Figure 13.1.1 Removal of the Cover from the Dedicated Adapter

WARNING

Replace both of the existing batteries at the same time with new batteries of the same type.

Do not loosen screws that fasten the printed circuit board; otherwise your attempt to communicate will fail.

The batteries used are not rechargeable. If you attempt to recharge the batteries, the internal fluid may leak, possibly resulting in damage to the adapter.

Be careful about the polarities of the batteries; use of the batteries with wrong polarities may also lead to fluid leakage and thereby damage the adapter.

13.2 Troubleshooting Problems with the Display and Communication Functions

13.2.1 Problems with the Display Functions

■ Improper Views of Windows

For the operating environment requirements, Yokogawa Blank PageBlank Pagerecommends that you use a display unit that has a resolution of 800 × 600 pixels or superior, is capable of handling at least 256 colors, and is configured to operate with smaller fonts. Make sure your system satisfies these requirements.

If you have any difficulties in viewing windows due to an improper background color, you can edit the LL1200 tool's <Background Color Setting> menu to adjust the color.

13.2.2 Problems with the Communication Functions

Check your system according to each of the following instructions.

■ Cases When Communication Is Carried Out via the Front Terminal (Optical Interface)

- Make sure the dedicated adapter is installed correctly.
- Check if the dedicated cable is disconnected.
- Check if the batteries in the dedicated adapter have run out.
- Make sure you are using the correct serial ports of the personal computer.

■ Cases When Communication Is Carried Out via the Rear Terminal (RS-485 Interface)

- Make sure the rear terminal is wired correctly.
- Make sure the communication address and baud rate of the US1000 controller are consistent with those of the personal computer.
- Make sure the communication protocol is set to [PC-link Communication]. Communication is not possible if the protocol is set to [PC-link Communication with Sum Check].
- Make sure you are using the correct serial ports of the personal computer.

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Appendix 1. WORKSHEET

WORKSHEET [INPUT BLOCK]	Specifications No. (Doc No.)			P. /
	Order No.	Sec.	Loop	Item
	Instrument No. (Serial No.)			
Customer	Model and Suffix Codes			
System (Plant) Name	TAG No.			

AIN1 AIN2 AIN3 DI1.st DI2.st DI3.st DI4.st DI5.st DI6.st DI7.st

PVIN.1 PVIN.2 GAIN.2 FF TRK.1 MAN.1 DP2 MAN.2 CAS.1 MG4 CAS.2 SV.b0 MG1 SV.b1 MG2

GAIN.1 CSVIN.1 CSVIN.2 TRK.2 TRF.1 TRF.2 DP1 AUT.1 MG3 AUT.2 R/S SV.b2 SV.b3

Rev	n	Remarks	Date	Rev.By	Customer DR.	Customer CH.	Rep. DR.	Rep. CH.	Engineer DR.	Engineer CH.	
△											
△											
△											

WORKSHEET [OUTPUT BLOCK]	Specifications No. (Doc No.)			P. /
	Order No.	Sec.	Loop	Item
	Instrument No. (Serial No.)			
Customer	Model and Suffix Codes			
System (Plant) Name	TAG No.			

PV.1 CSV.1 MV.1 HMV.1 CMV.1 PV.2 CSV.2 HMV.2 CMV.2 RET1 RET2 RET3

OUT1A OUT2A OUT3A OUT1R OUT2R DO1 DO2 DO3 DO4 DO5 DO6 DO7

					Customer		Rep.		Engineer		
△					DR.	CH.	DR.	CH.	DR.	CH.	
△											
△											
Rev	n	Remarks	Date	Rev.By							

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Appendix 2. DATASHEET

DATASHEET

Specifications No. (Doc No.)				P. /
Order No.		Sec.	Loop	Item
Instrument No. (Serial No.)				
Customer		Model and Suffix Codes		
System (Plant) Name		TAG No.		

Data Specifications		Remarks	Standard Value	Scale Values for Range 0	Scale Values for Range 100	Controller Mode / Controller Type			
Analog Inputs	AIN1					Control Period	ms		
	AIN2					Setup Data Items	Input 1	Input 2	Input 3
	AIN3					Input Type			
Analog Outputs	OUT1A					Unit Specification			
	OUT2A					Range Maximum			
	OUT3A					Range Minimum			
Variable Constants (USER Parameters)	U1					Scale Maximum			
	U2					Scale Minimum			
	U3					"Burnout" Action			
	U4					RJC Selection			
	U5					Retransmission Outputs	RET1	RET2	RET3
	U6					Type of Retransmission Output			
	U7								
	U8								

Digital Inputs			Ten-segment Linearizer 1				Ten-segment Linearizer 2			
	DI1		x1		y1		x1		y1	
	DI2		x2		y2		x2		y2	
	DI3		x3		y3		x3		y3	
	DI4		x4		y4		x4		y4	
	DI5		x5		y5		x5		y5	
	DI6		x6		y6		x6		y6	
	DI7		x7		y7		x7		y7	
Digital Outputs (Relays)	DO1		x8		y8		x8		y8	
	DO2		x9		y9		x9		y9	
	DO3		x10		y10		x10		y10	
Digital Outputs (Transistors)	DO4		x11		y11		x11		y11	
	DO5									
	DO6		Ten-segment Linearizer 3				Ten-segment Linearizer 4			
	DO7		x1		y1		x1		y1	
			x2		y2		x2		y2	
			x3		y3		x3		y3	
			x4		y4		x4		y4	
			x5		y5		x5		y5	
			x6		y6		x6		y6	
Alarm Outputs		Type / Remarks / Setpoint / Hysteresis	x7		y7		x7		y7	
	AL1		x8		y8		x8		y8	
	AL2		x9		y9		x9		y9	
	AL3		x10		y10		x10		y10	
	AL4		x11		y11		x11		y11	

Rev	n	Remarks	Date	Rev.By	Customer DR.	Customer CH.	Rep. DR.	Rep. CH.	Engineer DR.	Engineer CH.	
△											
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△											

Appendix 3. Restrictions Imposed Depending on the Suffix Code and/or Controller Type

Depending on the suffix code and/or controller type of the US1000 controller, restrictions apply to the types of computation modules and custom displays that can be used. Care must therefore be taken when configuring custom computations and displays.

■ Restrictions Imposed by the Suffix Code on the Choice of a Specific Controller Type

Depending on the suffix code of the US1000 controller, you may not be allowed to choose a specific controller type, as shown in the following table.

		Suffix Code	
		-11	-21
Controller type	Single-loop	Yes	Yes
	Cascade	Yes	Yes
	Dual-loop	Yes	No

■ Restrictions on the Choice of Computation Modules

You are not allowed to choose some types of computation modules when you are working with the input block. More specifically, you cannot use the computation modules listed below in the input block.

		Input Block	Output Block
Names of computation modules	Loop-1 Output-Selection 1 (OUTSEL1)	No	Yes
	Loop-1 Output-Selection 11 (OUTSEL11)	No	Yes
	Loop-1 Output-Selection 12 (OUTSEL12)	No	Yes
	Loop-1 Output-Selection 13 (OUTSEL13)	No	Yes
	Loop-2 Output-Selection 2 (OUTSEL2)	No	Yes
	Loop-2 Output-Selection 21 (OUTSEL21)	No	Yes
	Loop-2 Output-1 Terminal Configuration (OUTSET1)	No	Yes
	Loop-2 Output-2 Terminal Configuration (OUTSET2)	No	Yes

■ Restrictions Imposed by the Controller Type on the Use of Signals within the Input Block

An error will result if you use any of the signals which you are not allowed to use for the selected controller type. If such signals (those marked “No” in the table below) are being used in your system, change your choice of signals.

		Single-loop Type	Dual-loop Type	Cascade Type
Signals fed to input block	AIN1	Yes	Yes	Yes
	AIN2	Yes	Yes	Yes
	AIN3	Yes	Yes	Yes
	DI1.st	Yes	Yes	Yes
	DI2.st	Yes	Yes	Yes
	DI3.st	Yes	Yes	Yes
	DI4.st	Yes	Yes	Yes
	DI5.st	Yes	Yes	Yes
	DI6.st	Yes	Yes	Yes
	DI7.st	Yes	Yes	Yes
Signals fed from input block	PVIN.1	Yes	Yes	Yes
	PVIN.2	No	Yes	Yes
	CSVIN.1	Yes	Yes	Yes
	CSVIN.2	No	Yes	Yes
	GAIN.1	Yes	Yes	Yes
	GAIN.2	No	Yes	Yes
	TRK.1	Yes	Yes	Yes
	TRK.2	No	Yes	Yes
	FF	Yes	Yes	Yes
	C1	Yes	Yes	Yes
	A1	Yes	Yes	Yes
	M1	Yes	Yes	Yes
	C2	No	Yes	Yes
	A2	No	Yes	Yes
	M2	No	No	Yes
	O/C	Yes	Yes	Yes
	R/S	Yes	Yes	Yes
	TRF.1	Yes	Yes	Yes
	TRF.2	No	Yes	Yes
	SV.B0	Yes	Yes	Yes
	SV.B1	Yes	Yes	Yes
	SV.B2	Yes	Yes	Yes
	SV.B3	Yes	Yes	Yes
	DP1	Yes	Yes	Yes
	DP2	Yes	Yes	Yes
	MG1	Yes	Yes	Yes
	MG2	Yes	Yes	Yes
	MG3	Yes	Yes	Yes
	MG4	Yes	Yes	Yes

■ Restrictions Imposed by the Suffix Code and/or Controller Type on the Use of Signals within the Output Block

An error will result if you use any of the signals which you are not allowed to use for the selected suffix code and/or controller type. If such signals (those marked "No" in the table below) are being used in your system, change your choice of signals.

		Suffix Code		Single-loop Type	Dual-loop Type	Cascade Type
		-11	-21			
Signals fed to output block	PV.1	Yes	Yes	Yes	Yes	Yes
	PV.2	Yes	Yes	No	Yes	Yes
	CSV.1	Yes	Yes	Yes	Yes	Yes
	CSV.2	Yes	Yes	No	Yes	Yes
	MV.1	Yes	Yes	Yes	Yes	Yes
	MV.2	Yes	Yes	No	Yes	Yes
	HMV.1	Yes	Yes	Yes	Yes	Yes
	HMV.2	Yes	Yes	No	Yes	Yes
	CMV.1	Yes	Yes	Yes	Yes	Yes
	CMV.2	Yes	Yes	No	Yes	Yes
	RET1	Yes	Yes	Yes	Yes	Yes
	RET2	Yes	Yes	Yes	Yes	Yes
	RET3	Yes	Yes	Yes	Yes	Yes
Signals fed from output block	OUT1A	Yes	Yes	Yes	Yes	Yes
	OUT2A	No	Yes	Yes	Yes	Yes
	OUT3A	Yes	Yes	Yes	Yes	Yes
	OUT1R	No	Yes	Yes	Yes	Yes
	OUT2R	No	Yes	Yes	Yes	Yes
	DO1	Yes	Yes	Yes	Yes	Yes
	DO2	Yes	Yes	Yes	Yes	Yes
	DO3	Yes	Yes	Yes	Yes	Yes
	DO4	Yes	Yes	Yes	Yes	Yes
	DO5	Yes	Yes	Yes	Yes	Yes
	DO6	Yes	Yes	Yes	Yes	Yes
	DO7	Yes	Yes	Yes	Yes	Yes

■ Restrictions on the Choice of Custom Displays

An error will result if you choose any of the user displays which you are not allowed to use for the selected controller type. If such user displays (those marked "No" in the table below) are being used in your system, change your choice of user displays.

		Single-loop Type	Dual-loop Type	Cascade Type
User displays	Loop-2 Alarm Display	Yes	Yes	Yes
	Loop-2 PID Number Display	No	Yes	Yes
	PV2 Display	No	Yes	Yes

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Appendix 4. Areas for Storing Data Output from Computation Modules

Custom computations are configured using the given methods of block connection. In order to connect computation modules, you must familiarize yourself with the code names of the D registers where data output from the computation modules are stored.

See Also

Chapter 5, "US1000 Data Storage Areas (D Registers and I Relays)," in the *Model LL1200 PC-based Custom Computation Building Tool—User's Reference instruction manual* (IM 5G1A11-02E) for details on the D registers (or D-register numbers given to the areas for storing computation modules' output data).

■ Data Output from Input-block Computation Modules

Two registers are reserved for the output of each computation module configured within the input block.

For example, assume that an EU Range Conversion (EUCONV) module is configured as the first-run module and a Ten-segment Linearizer 1 (PLINE1) module as the second-run module. The EUCONV module's output data are stored in the two D registers code-named IMO1L and IMO1H. Similarly, the PLINE1 module's output data are stored in the two D registers code-named IMO2L and IMO2H.

When connecting a computation module using the LL1200 tool (see Figures App.4.2 and App.4.3), you must specify the code name of the D register (i.e., D-register number) for the lower-order word—a code name ending with "L."

As shown in Figure App.4.1, the output of the EUCONV module is connected to the IN1 input of the PLINE1 module.

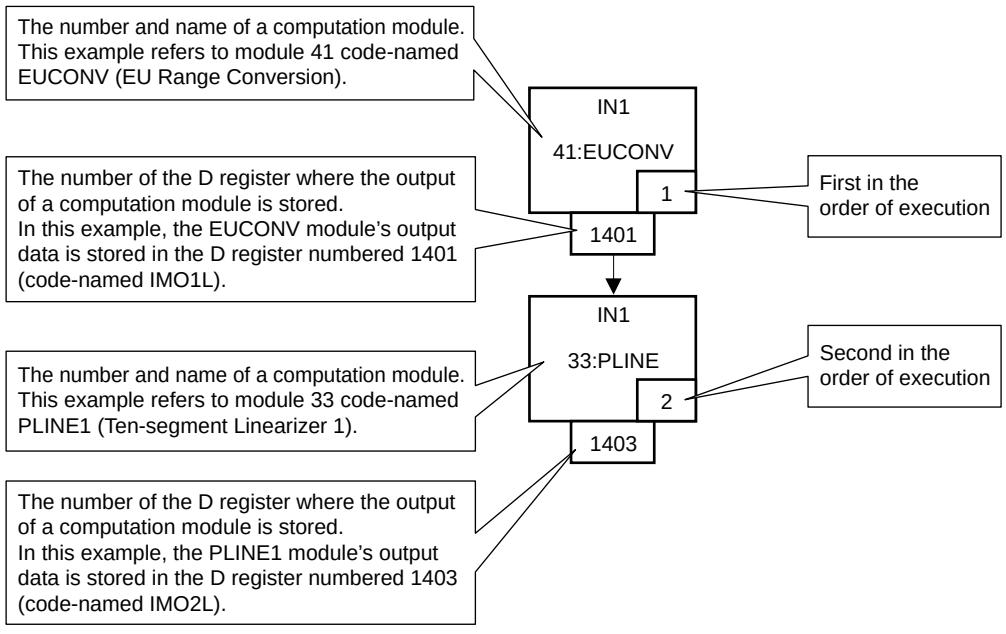

Figure App.4.1 Illustrated Explanation of Computation Modules' Outputs

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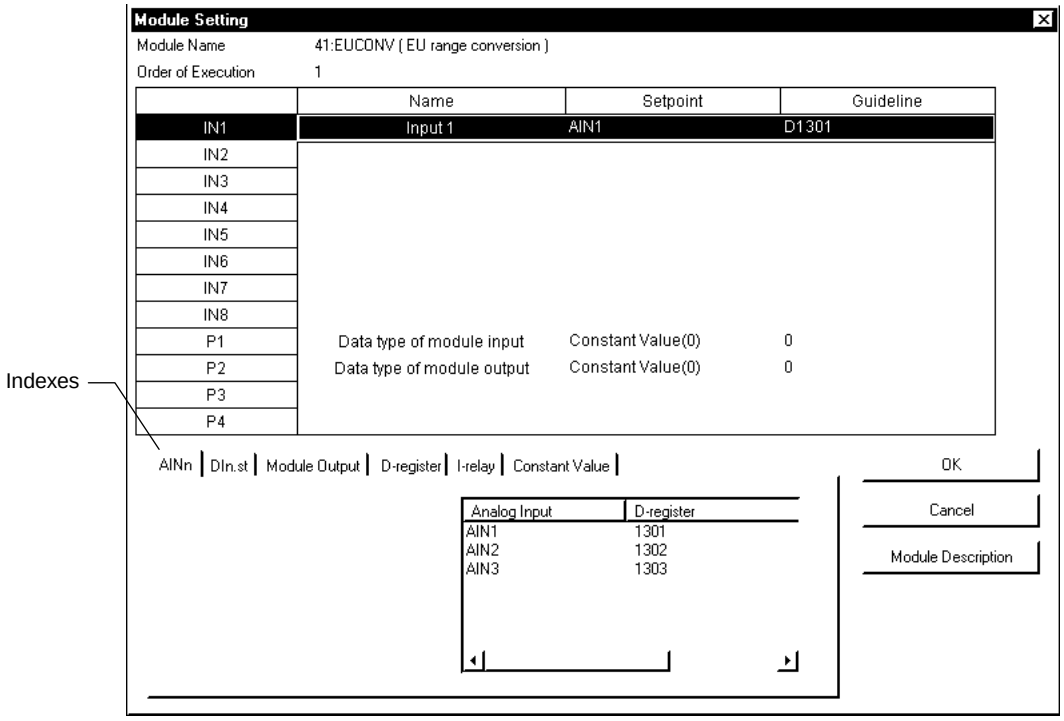

Figure App.4.2 [Module Setting] Dialog Box

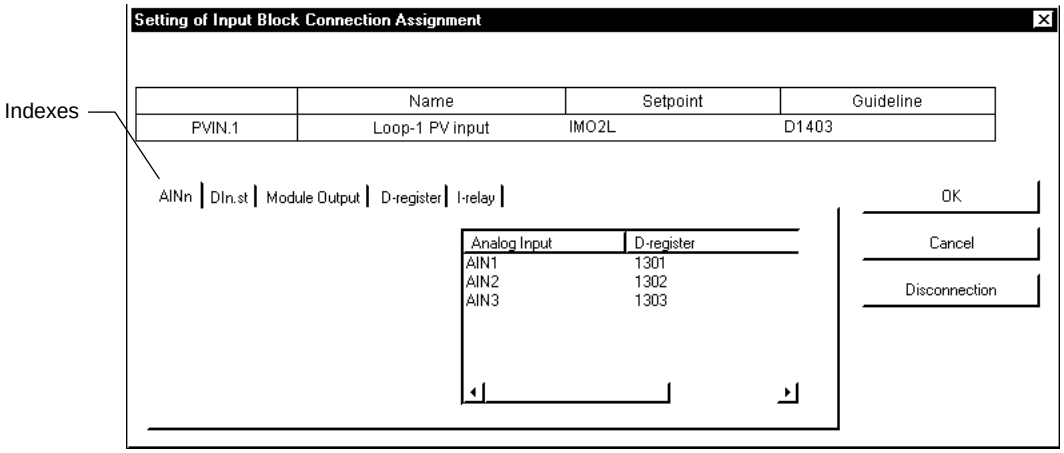

Figure App.4.3 [Setting of Input Block Connection Assignment] Dialog Box

Computation Modules Listed In the Order of Execution	Code Name of D Register	D-register Number
Output of first-run computation module	IMO1L (lower-order word)	1401
	IMO1H (higher-order word)	1402
Output of second-run computation module	IMO2L (lower-order word)	1403
	IMO2H (higher-order word)	1404
Output of third-run computation module	IMO3L (lower-order word)	1405
	IMO3H (higher-order word)	1406
. . .	. . .	. . .
Output of 29th-run computation module	IMO29L (lower-order word)	1457
	IMO29H (higher-order word)	1458
Output of 30th-run computation module	IMO30L (lower-order word)	1459
	IMO30H (higher-order word)	1460

■ Data Output from Output-block Computation Modules

Two registers are reserved for the output of each computation module configured within the output block.

When connecting a computation module using the LL1200 tool (see Figures App.4.4 and App.4.5), you must specify the code name of the D register (i.e., D-register number) for the lower-order word—a code name ending with “L.”

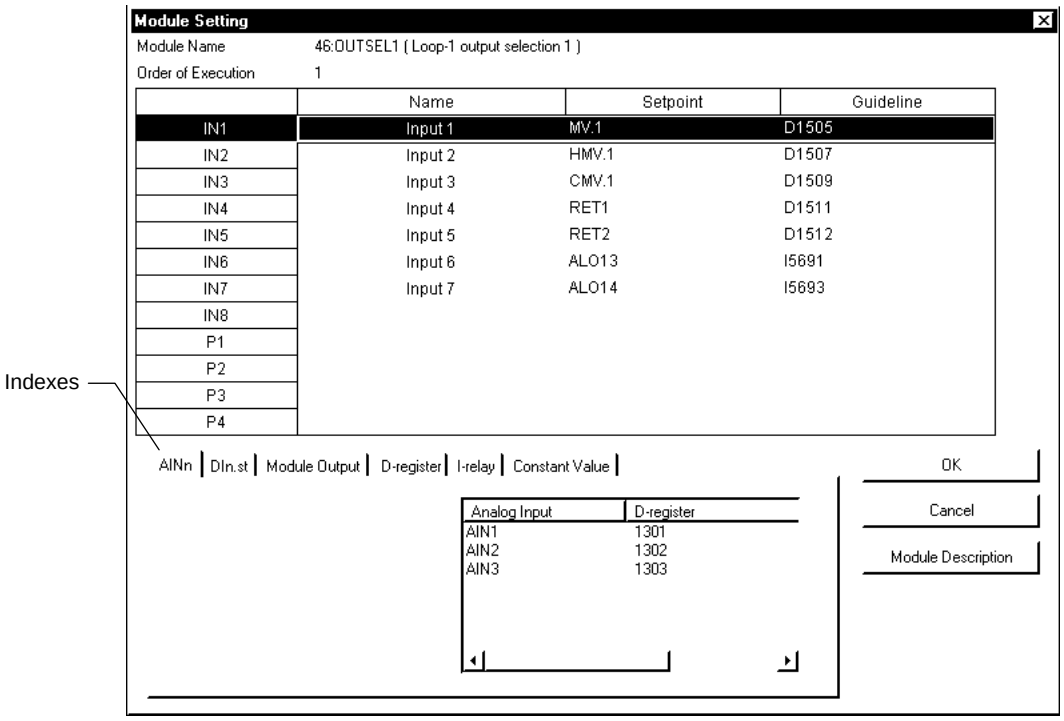

Figure App.4.4 [Module Setting] Dialog Box

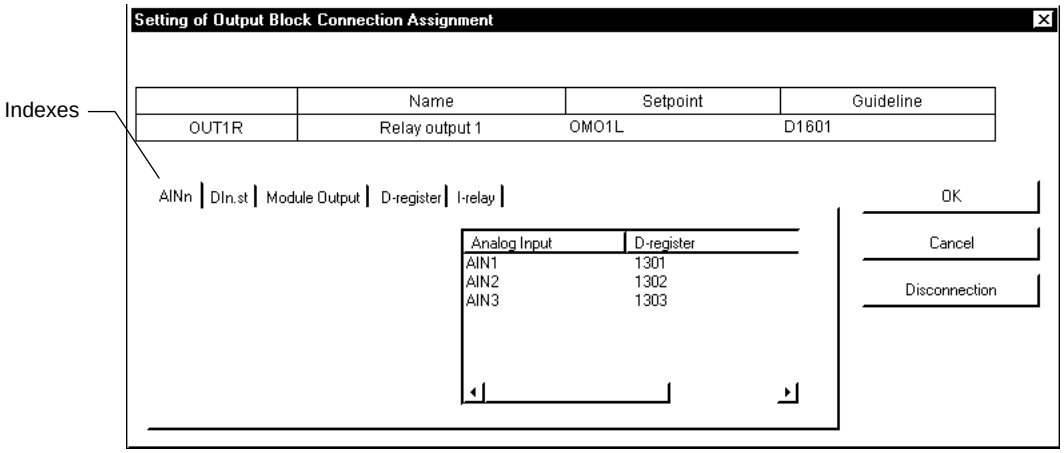

Figure App.4.5 [Setting of Output Block Connection Assignment] Dialog Box

Computation Modules Listed In the Order of Execution	Code Name of D Register	D-register Number
Output of first-run computation module	OMO1L (lower-order word)	1601
	OMO1H (higher-order word)	1602
Output of second-run computation module	OMO2L (lower-order word)	1603
	OMO2H (higher-order word)	1604
Output of third-run computation module	OMO3L (lower-order word)	1605
	OMO3H (higher-order word)	1606
. . .	. . .	. . .
Output of 29th-run computation module	OMO29L (lower-order word)	1657
	OMO29H (higher-order word)	1658
Output of 30th-run computation module	OMO30L (lower-order word)	1659
	OMO30H (higher-order word)	1660

Revision Record

Manual Title: Model LL1200 PC-based Custom Computation Building Tool Instruction Manual
Manual number: IM 5G1A11-01E

Edition	Data	Revised Item
1st	Aug., 1998	Newly published.
2nd	Sep., 1998	Error Corrections
3rd	Jan., 2004	Supports Windows 2000 and XP.
4th	Jun., 2004	Change of the company name.

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