X-SEL

PC Software for X-SEL
Operation Manual
6th Edition

I A I America, Inc.

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[7] The content of this manual is subject to change without notice.

[8] This software runs on Windows 95, Windows 98, Windows NT, Windows 2000 or Windows Me (this software does not contain Windows). This manual is written on the assumption that the user already has a basic understanding of Windows operations.

INTELLIGENT ACTUATOR

Table of Contents

1. Before You Begin

1-1. Items Supplied with This Software

Please check to make sure that the following items are included in your software package.
[1]   Operation manual (1)
[2]   3.5-inch floppy disks containing the software (2)
[3]   Software license agreement (explanation sheet) (1)
[4]   Standard RS232C cable *1 (1)
      (*1: A separate adapter may be required on some NEC computers.)

1-2. What You Will Need (System Requirements)

The following PC and peripherals will be necessary to run this software program.
[1]   PC and compatible keyboard
      A PC *1 running Windows and a compatible keyboard.
      (*1: Personal computer. Abbreviated as "PC" throughout this manual.)
[2]   Memory
      Enough memory to run Windows.
[3]   Monitor
      A monitor compatible with the PC.
[4]   Graphics board
      A VGA graphics board or better.
[5]   Mouse or other pointing device and mouse driver
      A mouse or other pointing device with which you can operate this software comfortably, and an
      applicable driver.
[6]   Windows
      Windows 95, Windows 98, Windows NT, Windows 2000 or Windows Me.
[7]   Floppy disk drive unit
      A floppy disk drive unit that accepts a 3.5-inch disk with 1.44 MB capacity.
[8]   Hard disk
      The hard disk should have 3 MB or more of free disk space. (The software is run from the hard disk.)
[9]   Serial port
      An RS232C serial port. (A 25 or 9-pin port is supported.)
[10] Printer
      A printer compatible with the PC.

1-3. Installing the Software

This software is run from the hard disk. This section explains how to install the software.

[1] Turn on the power to the PC and start Windows.
[2] Click **Start**, point to **Settings (S)**, point to **Control Panel (C)**, and then click **Control Panel (C)** to open the Control Panel.
[3] In the Control Panel, double-click **Add or Remove Programs**.
[4] Click **Setup (I)** under **Setup and Remove**.
[5] Insert the first floppy disk containing this software program into the floppy disk drive.

⚠ **Caution** | If a CD-ROM is set in the CD-ROM drive, remove the CD-ROM before inserting the program disk into the floppy disk drive.

[6] Click **Next (N)**. When the setup program window appears, SETUP.EXE in the program disk is already selected.
[7] Click **Finish** to run the setup program (install program). Follow the onscreen instructions to install the software.
[8] When the installation is completed, the item "Iai" has been added to the **Programs (P)** list in the **Start** menu. To start this software, point to **Iai**, point to **X_sel**, and then click **X-SEL PC Software**.

1-4. Starting the Software

[1] Turn off the power to the controller and PC, and connect the controller to the PC using the standard RS232C cable that comes with the software.
Set the mode switch on the controller to the MANU side.

- When this software is started, the "safety velocity" mode is enabled. In this mode, the maximum velocity is limited to 250 mm/sec or below in programs started from the PC software. To operate programs according to their programmed velocity commands, the safety velocity mode must be disabled. Refer to 3-3, "Explanation of the Toolbar," for how to enable/disable the safety velocity mode.

[2] Turn on the power to the controller and PC, and start Windows.
[3] Start this software.
 When the application is started, the Connection Confirmation window (Fig. 1.1) will open first. In the list boxes of **Port Number** and **Baud Rate (bps),** select the communication port (*1) to which the X-SEL controller is connected and an applicable baud rate (*2), and then click **OK**.
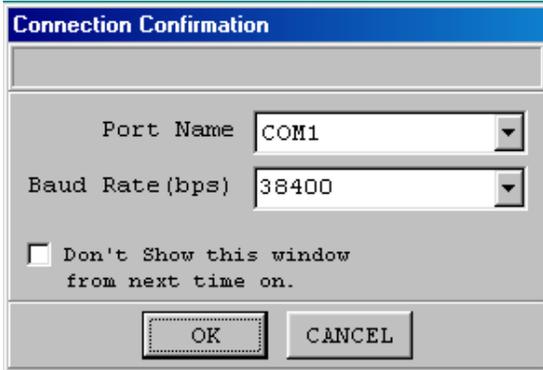
Fig. 1.1 Connection Confirmation Window

(*1) Only the communication ports that are available when the application is started can be selected.
(*2) "57600" and "115200" bps are supported only by the P/Q controllers.
[4] Once the controller connection is confirmed, the application will start in the online mode. If the controller cannot be recognized or **CANCEL** is clicked in this window, the application will start in the offline mode. (Even after the application has started in the offline mode, you can use the "Reconnect" function explained later to switch the application to the online mode.)

If **Don't Show this window from next time on** is checked, the software will automatically select port number and baud rate that were in use the last time the application was closed and check the controller connection based on these settings.

⚠ Important

With J/K type X-SEL controllers, executing the command "OPEN 1" (channel 1 is shared with the PC software) in a SEL program in the MANU (manual) mode will forcibly switch the right of control over serial port channel 1 to the SEL program and disconnect the communication link between the controller and PC software. The program will continue to run. (* Error No. A5D "SCIF open error in non-AUTO mode" will occur.)
To stop the actuator operation, always use the emergency-stop button. (In particular, exercise due caution when stopping a jogging actuator.)

* This error code is applicable in main controller application version 0.16 or earlier.

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In the case of a P/Q controller or a J/K controller running main controller application version 0.16 or later, opening the TP port (teaching connector) may result in the following conditions depending on whether or not the servo is in use.

<MANU mode/Servo not in use>

	Before the OPEN command	After the OPEN command
TP port connection	Connected to the PC software.	Forcibly switched to SEL program connection (message error). The program continues to run.

Error No. A50 "SCIF open error in non-AUTO mode" will occur following the OPEN command.

<MANU mode/Servo in use>

	Before the OPEN command	After the OPEN command
TP port connection	Connected to the PC software.	Connected to the PC software (cold start error). The program ends.

Error No. E89 "SCIF open error in non-AUTO mode" will occur following the OPEN command. (Servo in use)

The channel number assigned to the TP port will vary depending on the controller type.
J/K type: Channel 1 ("OPEN 1")
P/Q type: Channel 0 ("OPEN 0")

The "Important" information provided in the above box applies to a condition where the controller is in the MANU mode and I/O parameter No. 90 is not set to "2" (IAI protocol).

2. How to Save Data

The X-SEL controller adopts a flash memory. Accordingly, some data is stored in the memory areas backed up by a battery, while other data is stored in the flash memory areas.
Also note that transferring data from the PC software or teaching pendant to the controller will only write the data in the controller's memory, as illustrated below, and the data will be cleared once the controller power is turned off or the controller is reset.
To save important data, always write it in the flash memory.

2-1. Factory Setting – When a Backup Battery Is Used
(Other parameter No. 20 = "2" (Backup battery installed))

Data edited on the PC or teaching pendant	Data retained while the power is on, and cleared after reset	Data retained after the power is turned off
Programs, parameters (content 1), symbols	Transfer → Memory	Write to flash memory → Flash memory / Load after reset ←
Slave card parameters (content 2)	Transfer → Memory	Transfer → EEPROM / Load after reset ←
* Encoder parameters	Transfer → Memory	Transfer → * Encoder's EEPROM / Load after reset ←
Positions	Transfer → Memory backed up by battery	Write to flash memory → Flash memory
SEL global data (content 3), error lists	Transfer → Memory backed up by battery	

* Encoder parameters are stored in the EEPROM of the actuator's encoder, not in the controller's EEPROM. Therefore, encoder parameters will be loaded to the controller every time the controller power is turned on or a software reset is executed.

Programs, parameters and symbols are loaded from the flash memory after the controller is restarted. Unless written to the flash memory, therefore, edited programs, parameters and symbols will return to the original data once the controller is restarted.

The controller always operates according to the data (excluding parameters) stored in its memory (indicated by dotted lines).

Content 1: All parameters other than those specified under Content 2
Content 2: Driver card and I/O slot card (power-supply card) parameters
Content 3: Flags, variables, strings and error lists

2-2. When a Backup Battery Is Not Used

(Other parameter No. 20 = "0" (Backup battery not installed))

Data edited on the PC or teaching pendant	Data retained while the power is on, and cleared after reset	Data retained after the power is turned off
Programs, parameters (content 1), symbols positions → Transfer →	Memory — Write to flash memory → ← Load after reset	Flash memory
Slave card parameters (content 2) → Transfer →	Memory — Transfer → ← Load after reset	EEPROM
* Encoder parameters → Transfer →	Memory — Transfer → ← Load after reset	* Encoder's EEPROM
SEL global data (content 3), error lists → Transfer →	Memory	

Programs, parameters and symbols are loaded from the flash memory after a restart. Unless written to the flash memory, therefore, edited programs, parameters and symbols will return to the original data once the controller is restarted.

The controller always operates according to the data (excluding parameters) stored in its memory (indicated by dotted lines).

Note: SEL global data cannot be retained when a backup battery is not installed.

2-3. Notes

Note on transferring data and writing it to the flash memory
  Never turn off the main power while data is still being transferred or written to the flash memory.
  The data may be lost and the controller operation may be disabled.

Note on saving parameters to a file
  Encoder parameters are saved in the EEPROM of the actuator's encoder (unlike other parameters, they
  are not stored in the controller's EEPROM). Therefore, encoder parameters are loaded from the
  encoder's EEPROM to the controller after the controller power is turned on or a software reset is
  executed.
  For this reason, saving controller parameters to a file after the controller power has been turned on (or
  software reset has been executed) without the actuator (encoder) connected to the controller will create
  a file containing invalid encoder parameters.

Note on transferring a parameter file to the controller
  When a parameter file is transferred to the controller, the encoder parameters in the file will be
  transferred to the encoder's EEPROM (excluding manufacture information and function information).
  Therefore, transferring to the controller a parameter file that has been read from the controller after the
  controller was started without the actuator connected will write invalid encoder parameters to the
  encoder's EEPROM. (This applies when the file is transferred to the controller to which the actuator is
  currently selected.)
  When saving parameters to a file, therefore, do so in a condition where the controller is connected to the
  actuator.

3. Main Menu Window

3-1. Explanation of the Menus

When the software has been started, the main window will open showing 12 menus, a speed bar with 15 icons, and a tree view on the left side of the window (this window is called the "initial window" or "main menu window").
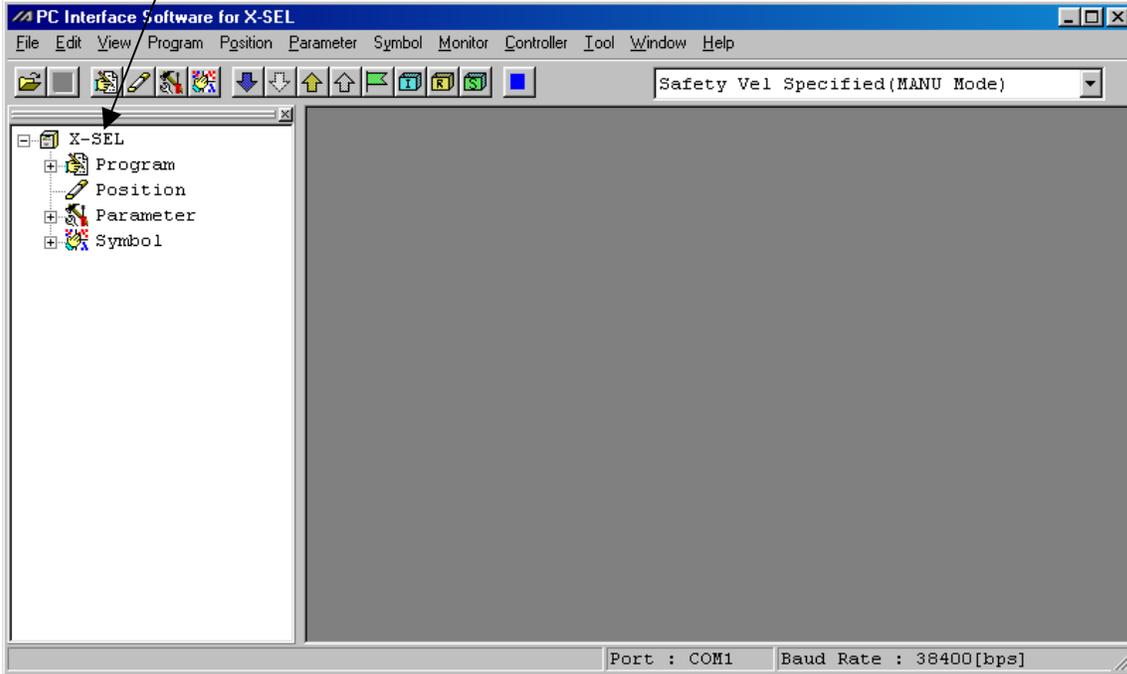
Fig. 3.1   Initial Window in Online Mode
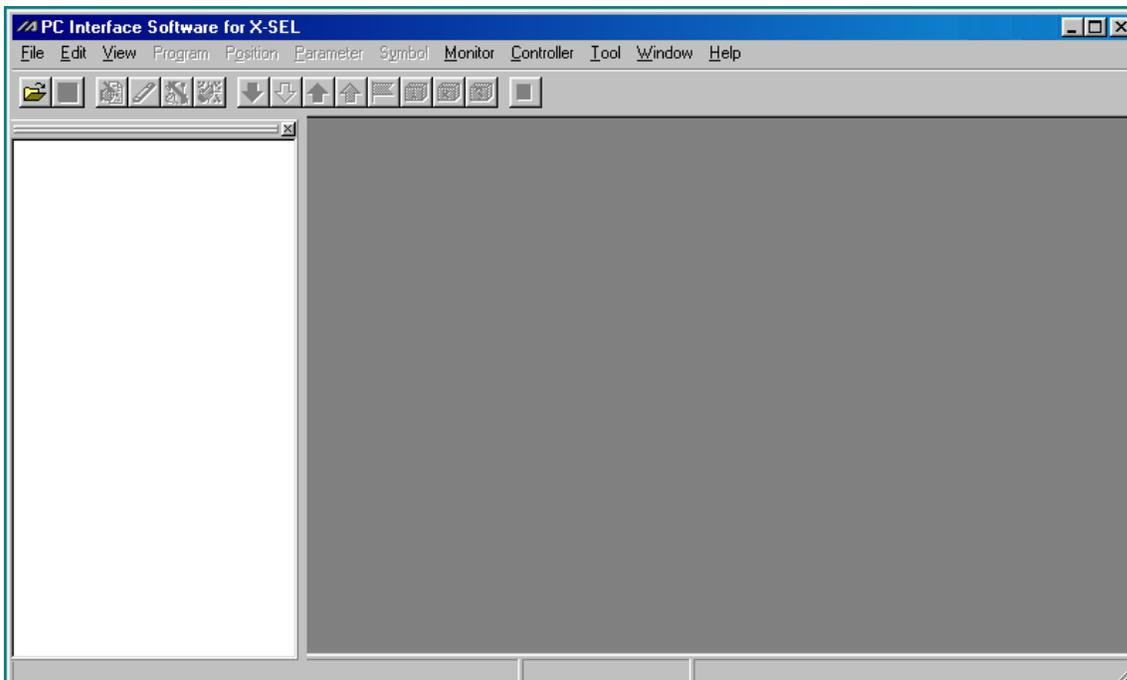
Fig. 3.2   Initial Window in Offline Mode

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3-2. Explanation of the Commands

(1) File (F)

    [1]   New (N)   Create new SEL data.

            • Program (S)   Open the edit window for creating a new program.

            • Position (O)   Open the edit window for creating new position data.

            • Symbol (Y)   Open the edit window for creating new symbol data.

    [2]   Open (O)   Load data currently saved in a file.

    [3]   Close (C)   Close the currently active window.

    [4]   Save (S)   Save the data in the active edit window by overwriting the corresponding file.

    [5]   Save As (A)   Save the data in the active edit window to a different file under a desired name.

    [6]   Print Setup (P)   Set the print font and printer.

    [7]   Most Recently Opened Files (D)

                             Selecting this menu item will display a list of files most recently loaded to the software, where you can select and load desired files.

    [8]   Exit (X)   Close the application.

(2) Edit (E)

    This menu lets you perform operations used in editing data.

    [1]   Cut (T)   Cut the data corresponding to the cursor line in the edit window and save the data to the clipboard.

    [2]   Copy (C)   Copy to the clipboard the data corresponding to the cursor line in the edit window.

    [3]   Paste (P)   Paste the data on the clipboard to the cursor line in the edit window.

    [4]   Find (F)   Find a specified character string.

    [5]   Find Next (S)   Find the character string specified in [4] again, starting from the cursor line position.

(3) View (V)

    This menu lets you set options relating to screen views.

    [1]   Tree View (T)   Show/hide the tree view that appears on the left side of the main window.

    [2]   Font (F)   Set the font of text shown in the windows.

(4) Program (S)

    This menu lets you perform operations relating to programs. (Available only in the online mode.)

    [1]   Edit (E)   Load a selected program from the controller for editing.

    [2]   Copy/Move (C)   Copy/move (cut & paste) a program.

    [3]   Clear (L)   Clear a program.

    [4]   Save to File (S)   Save a selected program or all programs to a file under a desired name.

    [5]   End All Operations (T) End all programs and operations that are currently running/being performed.

(5) Position (O)

This menu lets you operate position data. (Available only in the online mode.)

[1] Edit (E)   Load position data from the controller for editing.
[2] Copy/Move (C)   Copy/move (cut & paste) position data.
[3] Clear (L)   Clear position data.

(6) Parameter (P)

This menu lets you operate parameters. (Available only in the online mode.)

[1] Edit (E)   Load parameters from the controller for editing.

(7) Symbol (Y)

This menu lets you operate symbol data. (Available only in the online mode.)

[1] Edit (E)   Load symbol data from the controller for editing.
[2] Clear All (C)   Clear all symbol data.

(8) Monitor (M)

This menu lets you monitor various statuses, global variables, port statuses, and so on. (Available only in the online mode.)

[1]   Task Status (T)   Open the task status monitor window.
[2]   System Status (S)   Open the system status monitor window.
[3]   Axis Status (A)   Open the axis status monitor window.
[4]   Input Port (I)   Open the input port monitor window.
[5]   Virtual Input Port (N)   Open the virtual input port monitor window.
[6]   Output port (O)   Open the output port monitor window.
[7]   Virtual Output Port (U) Open the virtual output port monitor window.
[8]   Global Flag (F)   Open the global flag monitor window.
[9]   Global Integer (L)   Open the global integer monitor window.
[10] Global Real (R)   Open the global real variable monitor window.
[11] Global String (G)   Open the global string monitor window.
[12] Detailed Error Information (E)
                               Open the detailed error information monitor window.

(9) Controller (C)

This menu lets you perform operations relating to the controller, such as executing a software reset or resetting controller errors.

[1] Reconnect (C)   Reestablish communication with the controller. If the software is currently in the offline mode but is able to establish communication with the controller, selecting this menu item will switch the software to the online mode.
[2] Change Baud Rate (B) Change the baud rate used for communication between the controller and PC.
[3] Write to Flash ROM (W)

                              Clear the data areas in the flash ROM and then write the data saved in the controller's RAM to the flash ROM.
[4] Initialize Memory (I)
     • Global Variable (V) Clear all global variables to zero.

[5]   Absolute Reset (A)   Reset absolute data.
[6]   Software Reset (R)   Execute a software reset of the controller.
[7]   Reset Error (E)   Reset errors present in the controller.
[8]   Drive-source Recovery Request (P)
                                  Issue a drive-source recovery request to the controller.
[9]   Operation-pause Reset Request (L)
                                  Issue an operation-pause reset request to the controller.
[10] About ROM Version (V)
                                  Show the various ROM version information regarding the controller.

(10) Tool (T)
     This menu lets you specify settings relating to this application.
     [1]   Environment Setup (S) Set items that define how the application is run.

(11) Window (W)
     This menu lets you change how the windows are displayed.
     [1]   Cascade (C)   Cascade all open windows diagonally from top to bottom.
     [2]   Tile Vertically (V)   Arrange all open windows vertically without overlapping.
     [3]   Tile Horizontally (H) Arrange all open windows horizontally without overlapping.
     [4]   Minimize All (M)   Minimize all open windows (reduce them to icons).
     [5]   Arrange Icons (A)   Arrange minimized windows (window icons).

(12) Help (H)
     [1]   About This Software (A)
                                  Show the version information of this software.

3-3. Explanation of the Toolbar

This section explains the toolbar (Fig. 3.1) shown at the top of the main window (below the menu bar).

Fig. 3.3　Toolbar

	Open File	Same as clicking **File (F)** and then selecting **Open (O)**.
	Save	Same as clicking **File (F)** and then selecting **Save (S)**.
	Edit Program	Same as clicking **Program (S)** and then selecting **Edit (E)**.
	Edit Position	Same as clicking **Position (O)** and then selecting **Edit (E)**.
	Edit Parameter	Same as clicking **Parameter (P)** and then selecting **Edit (E)**.
	Edit Symbol	Same as clicking **Symbol (Y)** and then selecting **Edit (E)**.
	Monitor Input Port	Same as clicking **Monitor (M)** and then selecting **Input Port (I)**.
	Monitor Virtual Input Port	Same as clicking **Monitor (M)** and then selecting **Virtual Input Port (N)**.
	Monitor Output Port	Same as clicking **Monitor (M)** and then selecting **Output Port (O)**.
	Monitor Virtual Output Port	Same as clicking **Monitor (M)** and then selecting **Virtual Output Prot (U)**.
	Monitor Global Flag	Same as clicking **Monitor (M)** and then selecting **Global Flag (F)**.
	Monitor Global Integer Variable	Same as clicking **Monitor (M)** and then selecting **Global Integer (L)**.
	Monitor Global Real Variable	Same as clicking **Monitor (M)** and then selecting **Global Real (R)**.
	Monitor Global String Variable	Same as clicking **Monitor (M)** and then selecting **Global String (G)**.
	End All Operations	Same as clicking **Program (S)** and then selecting **End All Programs (T)**.
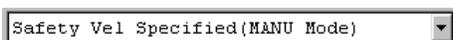
This list box is used to enable/disable the safety velocity limit in the manual mode.
Safety Vel Specified (MANU Mode) --- Enable the safety velocity limit. (The maximum velocity will be limited to 250 mm/sec or below regardless of the velocity settings in the programs and parameters.)
Safety Vel Not Specified (MANU Mode) --- Disable the safety velocity limit.

3-4. Tree View

You can display various data edit windows in the online mode by double-clicking the corresponding items displayed in the tree view (Fig. 3.4) that appears on the left side of the main window.
You can show or hide the tree view by clicking **View (V)** from the menu bar and then selecting **Tree View (T)**.

Remaining steps that can be stored in the controller

Currently registered programs
    Number of registered steps in ( )
    Program name in [ ] (if a symbol is registered)

Unregistered programs

Position data edit item
    Double-click to open the position edit window.

Parameter edit items
    Double-click a desired parameter category to open the corresponding edit window.

Symbol edit items
    Double-click a desired symbol category to open the corresponding edit window.

Fig. 3.4   Tree View

4. Program Edit Window

4-1. Explanation of the Items Displayed in the Program Edit Window

(1) Click **Program (S)** from the menu bar, and then select **Edit (E)**.

(2) When the program number selection window opens, select the program you want to edit, and then click **Load**.

Program name assigned in the symbol edit window

No	Steps	Program Name
1	15	Drawing
2	5	sample
3	9	test
4	56	may26
5	40	prg5
6	31	prg6
7	0	
8	0	
9	0	
10	0	

Remaining Steps 5522

Read

Cancel
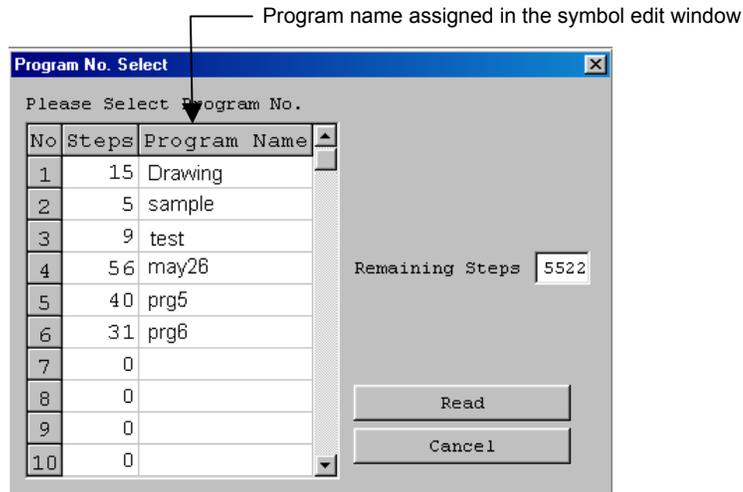
Fig. 4.1   Program Number Selection

(3) The program edit window will open. This window has the following controls and fields.

No.	Step number.
B	Use this field to set a breakpoint. (Supported only in the online edit mode.)
	Click the "B" field in the line you want to set a breakpoint for. Once a breakpoint is set, "B" will be shown in the field.
E	Enter a desired extended condition.
N	Specify reversing "N" of the input condition.
Cnd *	Enter a desired input condition.
Cmnd	Enter a desired SEL command.
	Double-clicking this field or pressing the **F1** key will open the SEL Command Explanation window (Fig. 4.4).
	This window provides an explanation of each SEL command. You can select a desired command in this window and input it to the step data.
Operand 1 *	Enter desired operand 1.
Operand 2 *	Enter desired operand 2.
Pst *	Enter a desired output (operand 3).
Comment	Enter a command, if necessary (using up to 18 single-byte characters).
	You can also double-click this field to modify a part of the comment currently entered.
	* Press **F11** to find a specific symbol in the input condition/operand fields.

Fig. 4.2　Program Edit

Right-clicking a desired input item in each line will display a pop-up menu (Fig. 4.3). The items in the pop-up menu are explained below.

Cut (T)	Same as clicking **Edit (E)** from the menu bar and then selecting **Cut (T)**.
Copy (C)	Same as clicking **Edit (E)** from the menu bar and then selecting **Copy (C)**.
Paste (P)	Copy the entire cursor line. Same as clicking **Edit (E)** from the menu bar and then selecting **Paste (P)**. The step data saved on the clipboard will be inserted into the cursor line.
Insert 1 Line (I)	Insert one line at the cursor line.
Delete Selected Lines (D)	Delete the lines in the selected range.
Set Comment (S)	Set the entire cursor line as a comment (invalid step). If a valid step has been set as a comment by mistake, you can select **Release Comment** explained below to return the line to a valid step. Executing **Release Comment** on a line containing character strings will clear all character strings in the line.
Release Comment (R)	Return the selected comment line to a step.

Fig. 4.3　Pop-up Menu

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Double-clicking the **Cmnd** field or pressing the F1 key will open the SEL Command Explanation window. Use this window as a reference when editing data.
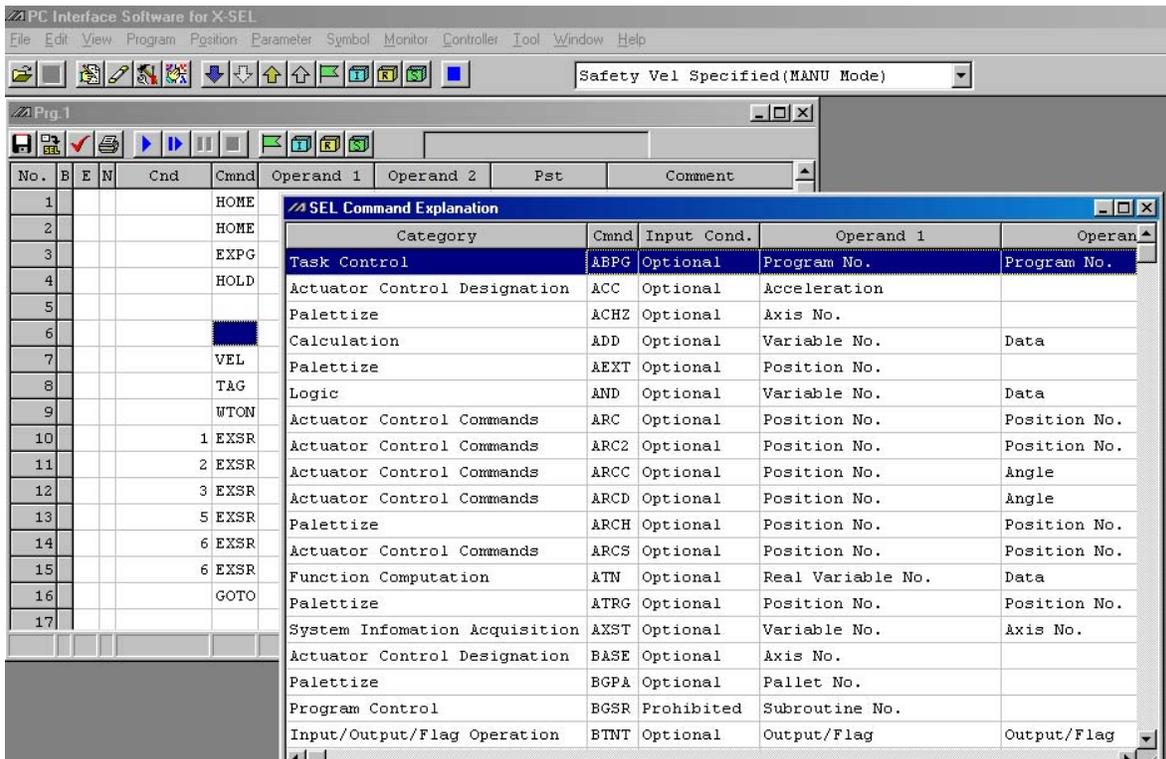
Fig. 4.4   SEL Command Explanation

Right-clicking on the SEL Command Explanation window will open a pop-up menu containing the following items.

Input (I)   Input the command in the cursor line to the step data (into the cursor line in the program edit window).

Font (F)   You can set a desired font for displaying the SEL command explanations.

Sort (S)   You can sort the command list alphabetically or by command category.
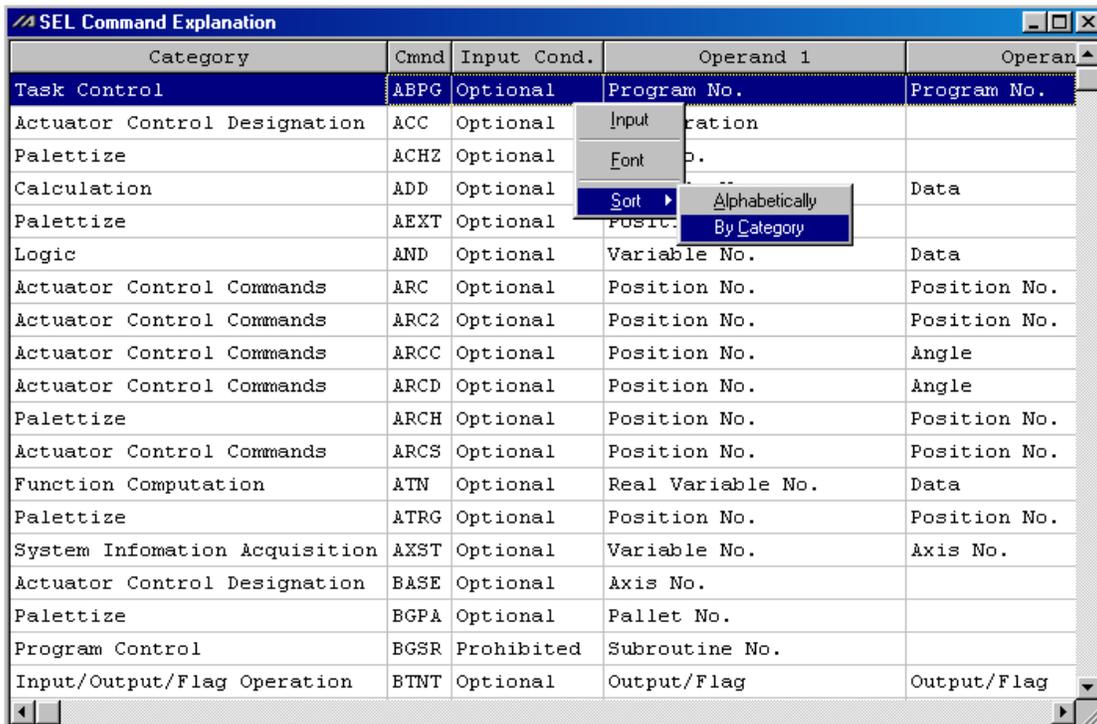
Fig. 4.5   Pop-up Menu

(4) This window has the various buttons shown below.
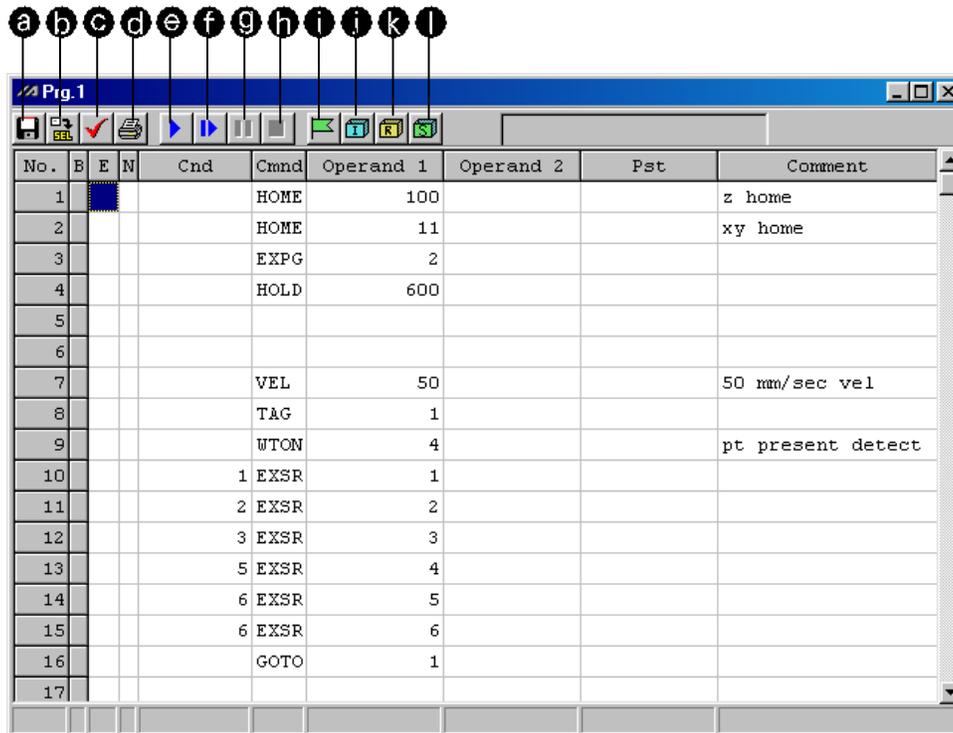
Fig. 4.6 Buttons

(a) <u>Save to File</u>
Clicking this button will open a dialog box where you can save the current program to a file under a desired name.
(b) <u>Transfer to Controller</u>
Clicking this button will prompt the software to check the program data for syntax errors and transfer the program data to the controller if no errors have been found.
(c) <u>Check Program</u>
Clicking this button will display information regarding syntax errors found in the program you have created, as well as operands used in the program.
(d) <u>Print</u>
Clicking this button will print the program.
(e) <u>Run</u>
Clicking this button will run the program. If the program has not yet been saved after editing, you must <u>transfer the program to the controller</u> beforehand.
Caution: Since the controller's processing speed is faster than the PC's communication speed, the cursor position in the program edit window may not always correspond to the actual movement of the actuator.

(f) <u>Run 1 Step</u>
The program will run one step every time this button is clicked.
(g) <u>Pause</u>
Clicking this button will pause the program currently running.
(h) <u>End</u>
Clicking this button will end the program currently running.
(i) <u>Show Local Flag</u>
Clicking this button will show the local flag window for the program currently running.
(j) <u>Show Local Integer Variable</u>
Clicking this button will show the local integer variable window for the program currently running.
(k) <u>Show Local Real Variable</u>
Clicking this button will show the local real variable window for the program currently running.
(l) <u>Show Local String Variable</u>
Clicking this button will show the local string variable window for the program currently running.

(5) Checking the program

The software will check the program you have created, for SEL syntax errors.

[1] Click the Check Program button in the program edit window.

[2] If any error is found, the error list will be displayed.

Check Program button
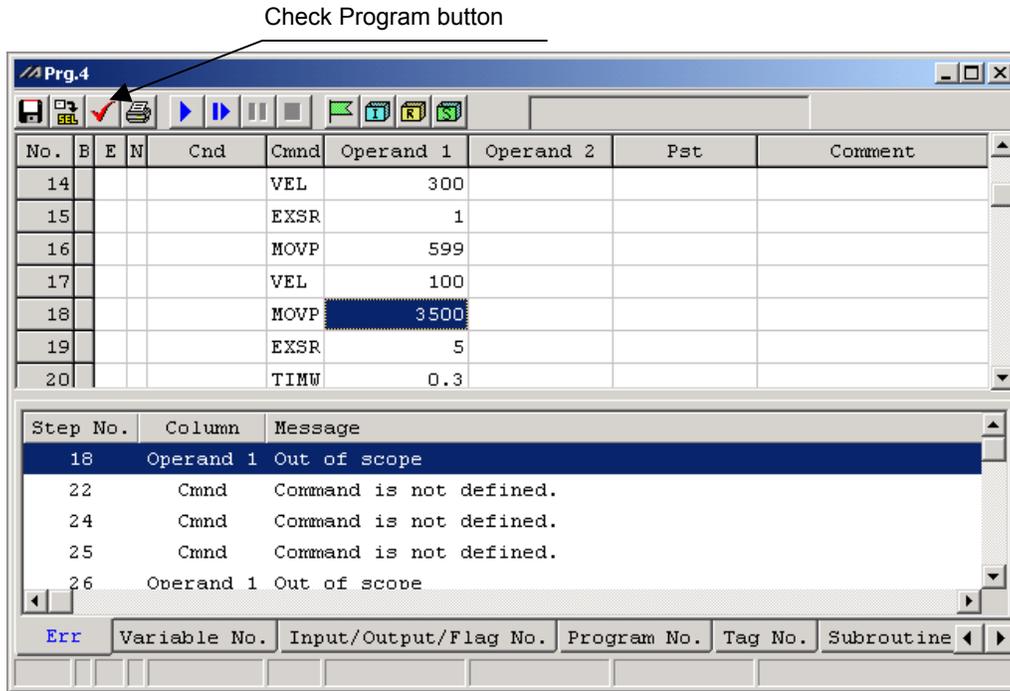
Fig. 4.7   Error List

The error list has the **Step No.**, **Column** and **Message** fields. Double-clicking an error line will move the cursor to the location of the corresponding error.

[3] Information regarding the operands (**Cnd**, **Operand 1, Operand 2** and **Pst**) in the program you are editing is displayed.
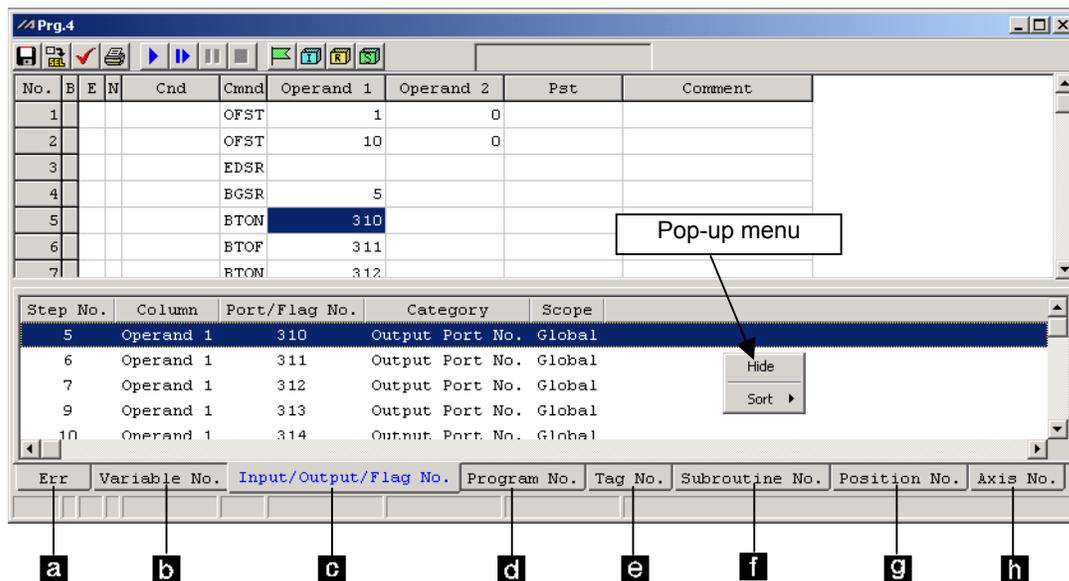
Fig. 4.8   Operand Information

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[a]　Err
　　"Message" (Content of error)

[b]　Variable No.
　　"Variable No."
　　"Category" (Integer or Real)
　　"Scope" (Global or Local)
　　*　　If the applicable variable number is specified indirectly, the Category and Scope fields will show "Unknown."

[c]　Input/Output/Flag No.
　　"Port/Flag No."
　　"Category" (Input Port No, Output Port No. or Flag No.)
　　"Scope" (Global or Local)
　　* If the applicable port/flag number is specified indirectly, the Category and Scope fields will show
　　　"Unknown."

[d]　Program No.
　　"Program No."

[e]　Tag No.
　　"Tag No." (Tag number in use)
　　"Declaration/Jump"

[f]　Subroutine No.
　　"Subroutine No."
　　"Declaration/Call"

[g]　Position No.
　　"Position No."

[h]　Axis No.
　　"Axis No."

　　* If a symbol is used in any of the numbers in [b] though [h], the definition of the symbol will be
　　　displayed in the margin.

The above information is displayed in an itemized list at the bottom of the program edit window. You can double-click a desired item to move the cursor to the corresponding position.
You can also right-click the list to display a pop-up menu and hide the list or sort the records.

4-2. Saving a Program and Closing the Edit Window

(1) Saving to a file the program data you are editing
Click the Save to File button in the program edit window. This is the same as clicking **File (F)** and
then selecting **Save As (A)**.

(2) Transferring to the controller the program data you are editing
You can save the program data you are editing to the controller's memory.
Click the Transfer to Controller button in the program edit window.
This button is selectable only in the online edit mode.

⚠ **Caution**	If the program contains any error, the error will be displayed and the program will not be transferred to the controller.

(3) Writing to the flash ROM
Once the program has been transferred to the controller, the following confirmation dialog box with
the message, "Write Flash ROM?" will be displayed.
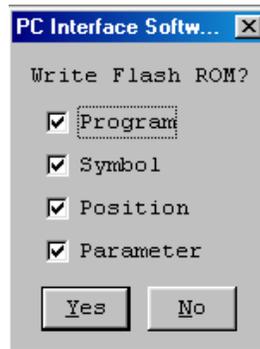
Fig. 4.8   Confirmation

Click **Yes (Y)** → The memory data will be written to the flash ROM.
Click **No (N)**   → The memory data will not be written to the flash ROM.
If **No (N)** is selected, the controller will clear all data in its memory after a reset (i.e.,
after the controller power is reconnected or a software reset is executed), and then
load the data from the flash ROM. (The controller will operate in accordance with
the transferred data until a reset is executed.)

(4) Closing the program edit window
Attempting to close the program edit window will display the following confirmation dialog box with the
message, "Save edited data in the Controller?"
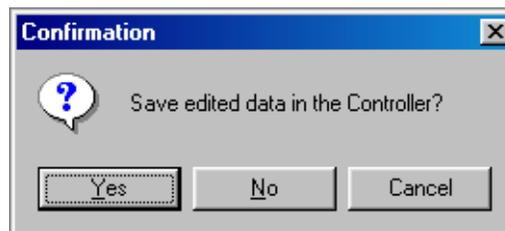
Fig. 4.9   Confirmation

Yes (Y)   The edited data will be transferred to the controller → (3), "Writing to the flash ROM"
No (N)   The software will close the program edit window without saving the edited data.
Cancel   The software will cancel the operation and return to the program edit window.

4-3. Saving All Programs to a File

(1) Saving all programs to a file
You can save program Nos. 1 to 64 in the controller to a single file (.xpa).

[1] Click **Program** from the menu bar, and then select **Save to File**.
[2] In the program number selection window, click **Save All**. Specify a desired file name and folder, and then click **Save**.
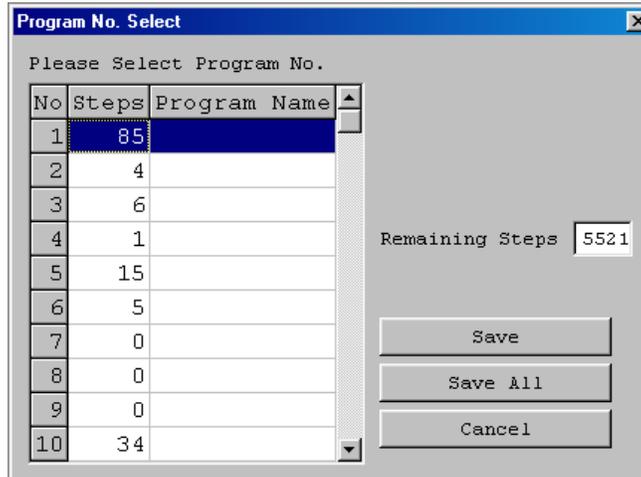
Fig. 4.10   Program Save

(2) Opening the all programs file

[1] Click **File** from the menu bar, and then select **Open**.
[2] In the file open window, select the file you want to open and then click **Open**.
[3] In the program number selection window, select **Load All Program** if you want to transfer all programs to the controller. If you want to select programs in the all programs file and transfer them individually, select desired program numbers and then click **Load a Program** to transfer the corresponding programs to the controller.
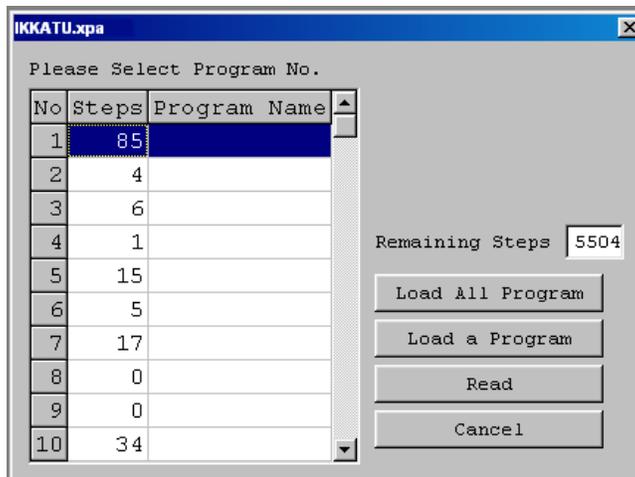
Fig. 4.11   Program Transfer

(3) Important note on transferring an all programs file to the controller

[1] Transferring an all programs file to the controller with **Load All Program** will clear the existing programs of Nos. 1 to 64 in the controller. If necessary, back up all current programs in the controller beforehand.

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[2] If the all programs file includes any program that contains symbols and the symbols are not defined in the controller's memory, an error will occur when the applicable program is transferred to the controller. If an error occurs, none of the programs will be transferred to the controller. Therefore, if the applicable symbol data is saved to a file, transfer the symbol definition file first. If there is no symbol definition file, define the applicable symbols in the symbol edit window and then transfer the definitions to the controller, before transferring the all programs file again.

[3] If the all programs file contains any error, the error window will be displayed and none of the programs will be transferred to the controller. In this case, double-click the error shown in the error window to open the program file that contains the applicable error. Correct the error, and then save the file by overwriting. If multiple errors exist, correct all errors. When all errors have been corrected, transfer the programs to the controller again.
The procedure in [3] provides an important recovery method for program files containing errors.

4-4. Running the Program

You can run the program in the program edit window.
To run the program you are editing, transfer it to the controller first.
Note)   Once transferred to the controller, the program can be run without being written to the flash ROM first. If the program is not written to the flash ROM, however, it will be lost once the controller power is reconnected or a software reset is executed.

Run: Clicking this button will run the program.
Run 1 Step: The program will run one step every time this button is clicked.
Pause: Clicking this button will pause the program currently running. Clicking it again will resume the program.
End: Clicking this button will end the program currently running.
Breakpoint: You can pause the program in a desired step. "B" will appear/disappear every time the field is clicked.

Fig. 4.12   Program Run

Cursor colors
Green: The program is paused (by step operation, by a breakpoint, by the pause button, by the SSPG command, etc.).
Red: The program is waiting (in response to the TIMW, WTxx, WZxx, WRIT or READ command, waiting for a servo command to be completed, etc.).
Blue: Any condition other than those represented by a green or red cursor.

Background colors
Gray: The program is running.
White: The program is not running.

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5. Copying/Moving/Clearing a Program

5-1. Program Copy/Move Window

The steps to copy or move a program to other program number are explained below.

(1) Click **Program (S)** from the menu bar, and then select **Copy/Move (C)**.

(2) The program copy/move window will open.

Program number to copy/move from

Program number to copy/move to
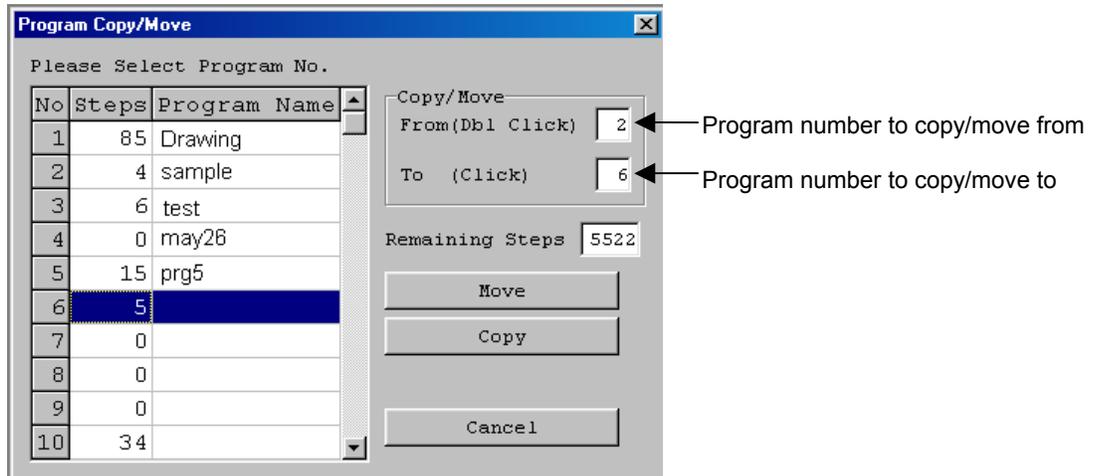
Fig. 5.1   Program Copy/Move

Double-click the source program you want to copy or move.
Click the destination program you want to copy or move the source program to.

To copy the program, click **Copy**. To move the program, click **Move**. Both operations are done in the memory.
Clicking **Cancel** will cancel the selected operation.

(3) Writing to the flash ROM
When the copy or move is completed, the following confirmation dialog box with the message, "Write Flash ROM?" will be displayed.
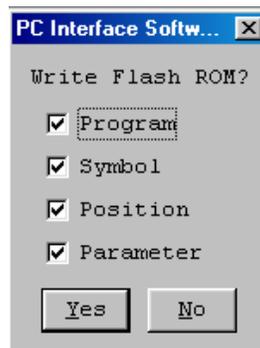
Fig. 4.9   Confirmation

Click **Yes (Y)** → The memory data will be written to the flash ROM.
Click **No (N)** → The memory data will not be written to the flash ROM.
Once the controller is reset (the controller power is reconnected or a software reset is executed), the original program arrangement before the copy or move will be restored.

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5-2. Program Clear Window

The steps to clear a program are explained below.
(1)   Click **Program (S)** from the menu bar, and then select **Clear (L)**.
(2)   The program clear window will open.
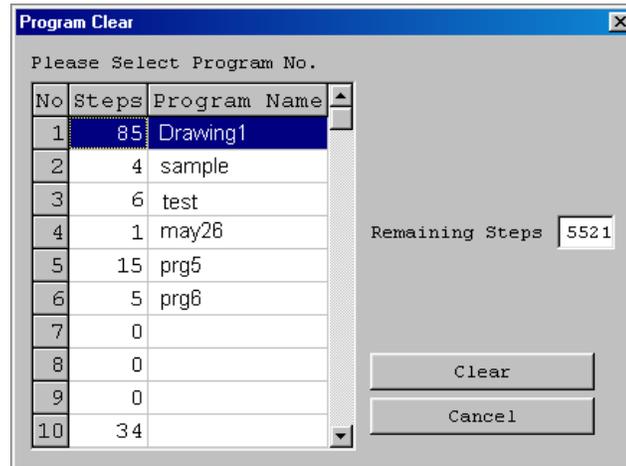
Fig. 5.3   Program Clear

Click the program you want to clear.
Next, click Clear.
(This operation is done in the memory.)
Clicking Cancel will cancel the operation.

(3)   Writing to the flash ROM
When the clear is completed, the following confirmation dialog box with the message, "Write Flash ROM?" will be displayed.
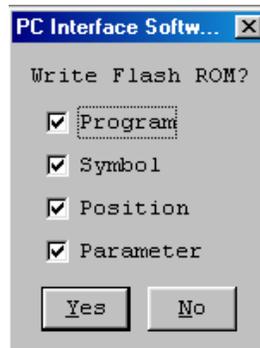
Fig. 5.4   Confirmation

Click Yes (Y)   →   The memory data will be written to the flash ROM.
Click No (N)   →   The memory data will not be written to the flash ROM.
                Once the controller is reset (the controller power is reconnected or a software reset
                is executed), the cleared program will be restored.

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6.   Position Data Edit Window

6-1. Explanation of the Items Displayed in the Position Data Edit Window

(1)   Click **Position (O)** from the menu bar, and then select **Edit (E)**.
(2)   The position data window (Edit Position Data) will open. This window has the following controls and
      fields.
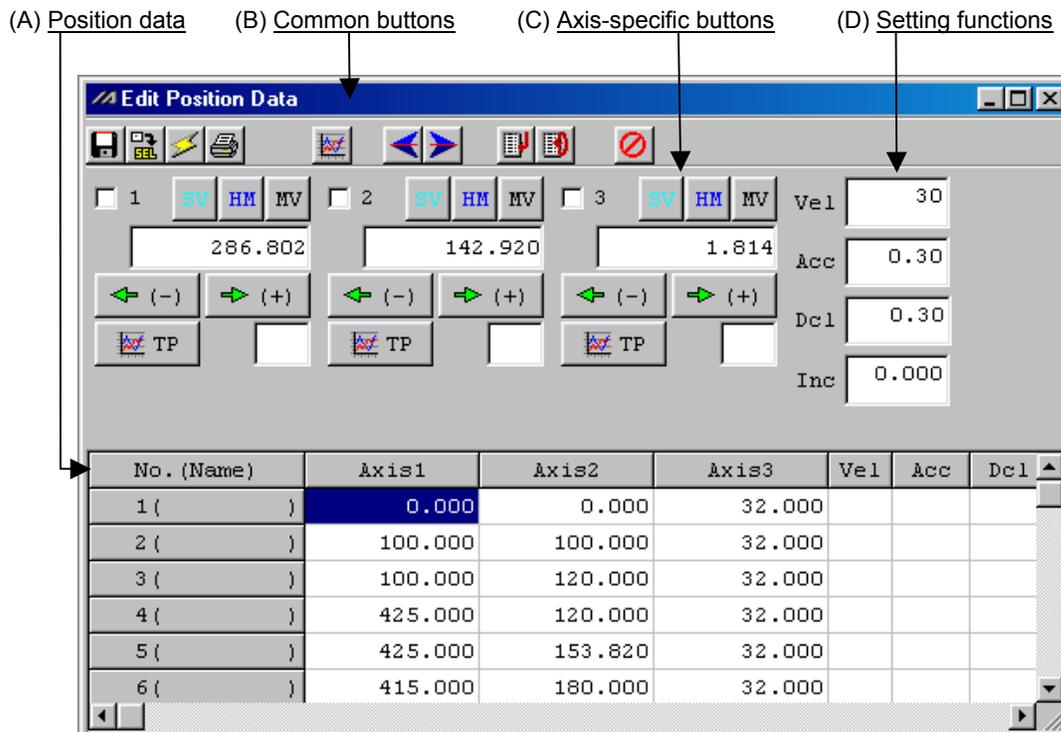
(A) Position data   (B) Common buttons   (C) Axis-specific buttons   (D) Setting functions

(A) Position data

Fig. 6.2   Position data

No. (Name)
        The position number and corresponding symbol are displayed.
        You can press the **F11** key to open the symbol edit window where you can edit the symbol
        assigned to the applicable position number. Pressing the **F11** key on the symbol edit window will
        return the input focus to the applicable position data in the edit window.
        * You can press the **F11** key to return the input focus from the symbol edit window to the position
          data edit window only when the position data edit window is currently open.
        * To show or hide symbols, do so in the Environment Setup window accessible from **Tool**.
          (For the specific method, refer to 4, "Environment Setup.")

Axis 1 to 4
:   Specify a desired position for each axis.
    The setting range is from –99999.999 to 99999.999.

Vel
:   Specify a desired velocity.
    The setting range is from 1 to the value set in All-axis common parameter No. 21, "Operating velocity MAX for input value check."
    * If All-axis common parameter No. 20, "Operating velocity check timing" is set to "0" (Check upon entry), the data in the **Vel** field will be checked against this maximum velocity when it is entered. If the above parameter is set to "1" (Check during operation = factory setting), the data in the **Vel** field will not be checked when it is entered.

Acc
:   Specify a desired acceleration.
    The setting range is from 0.01 to the value set in All-axis common parameter No. 22, "Acceleration MAX."

Dcl
:   Specify a desired deceleration.
    The setting range is from 0.01 to the value set in All-axis common parameter No. 23, "Deceleration MAX."

(B) Common buttons

Fig. 6.3   Common buttons

Save to File
Clicking this button will open a dialog box where you can save the position data to a file under a desired name.

Transfer to Controller
Clicking this button will transfer the position data to the controller.

Refresh Position Data
After a program that rewrites position data has been run, click this button to refresh the position data display.

Print
Clicking this button will print the position data.

Capture Current Position
Clicking this button will capture the current position into the position number corresponding to the cursor position for all axes indicated by [✓]. (The captured position is not yet transferred to the controller.)

Jog –
All axes indicated by [✓] and whose servo is ON will jog backward while this button is clicked.
If a value (0.001 to 1) is entered in the **Inc.** field in the setting function group, the axis will perform inching. In this case, one click will move the axis by one inching distance.

Jog +
All axes indicated by [✓] and whose servo is ON will jog forward while this button is clicked.
If a value (0.001 to 1) is entered in the **Inc.** field in the setting function group, the axis will perform inching. In this case, one click will move the axis by one inching distance.

Move
Clicking this button will move all axes indicated by [✓] and whose servo is ON to the position of the position number corresponding to the cursor position.
* If any of the applicable position data has been changed, transfer the latest position data to the controller first.

Move Continuously
Clicking this button will move all axes indicated by [✓] and whose servo is ON to the position of the position number corresponding to the cursor position. Thereafter, each axis will continue to move to the position set by the data in next position number.
* If any of the applicable position data has been changed, transfer the latest position data to the controller first.

Stop All Axes
Clicking this button will stop all axes currently moving.

(C) Axis-specific buttons

Axis number

Select the axis you
want to move using the
common buttons.

Current position of the selected axis

Error code
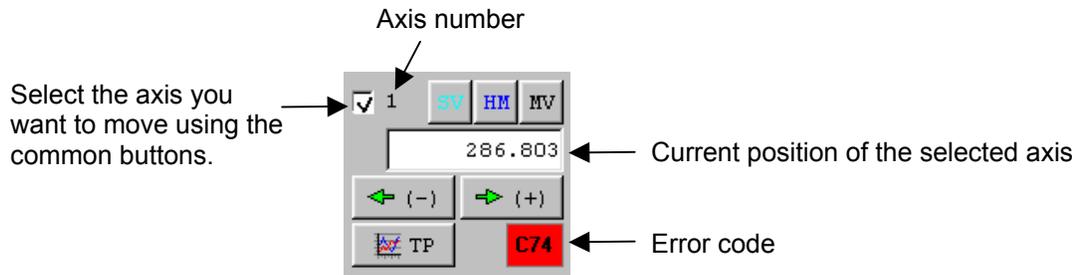
Fig. 6.4   Axis-specific buttons

SV
Clicking this button will turn the servo of the selected axis OFF if it is currently ON,
or turn the axis servo ON if it is currently OFF.
(The button is shown in light blue when the servo is ON.)

HM
Clicking this button will perform homing if the servo of the selected axis is ON.

MV
Clicking this button will move the selected axis to the position specified by the data
in the position number corresponding to the cursor position, if the axis servo is ON.
(The button remains yellow while the axis is moving.)

(+)
The selected axis will jog backward while this button is clicked, if the axis servo is
ON.
If a value (0.001 to 1) is entered in the **Inc.** field in the setting function group, the
axis will perform inching. In this case, one click will move the axis by one inching
distance.

(−)
The selected axis will jog forward while this button is clicked, if the axis servo is ON.
If a value (0.001 to 1) is entered in the **Inc.** field in the setting function group, the
axis will perform inching. In this case, one click will move the axis by one inching
distance.

TP
Clicking this button will capture the current position of the selected axis into the
position number corresponding to the cursor position. (The captured position is not
yet transferred to the controller.)

(D) Setting functions

Set the velocity (Vel), acceleration (Acc), deceleration (Dcl) and inching distance (Inc.) to be used when the actuator is operated using the various buttons.
If a value is entered in any of the **Vel**, **Acc** and **Dcl** fields in the position data area, the value in the applicable position data field will be given priority for movement to the corresponding position number.

Fig. 6.5   Setting functions

Fig. 6.6   Jog Buttons

These jog buttons can also be used to jog those axes that have not yet completed homing. However, coordinate values have no meaning for these axes, so pay due attention to avoid contact with the stroke end.
If a value (0.001 to 1) is entered in the **Inc.** field in the setting function group, the jog buttons will function as inching buttons.
Continue to click an inching button will change the operation to jogging. Specifically, the axis will start jogging approx. 1.6 seconds after the inching button is clicked. If the button is held continuously, the jogging velocity will change approx. every second thereafter in the order of $1 \rightarrow 10 \rightarrow 30 \rightarrow 50 \rightarrow 100$ [mm/sec].

Note

Operating any selectable jog button for an operating axis will jog the axis, and the axis will stop once the button is released. (If the next operation command is input, the axis will perform the specified operation.)

6-2. Saving Position Data and Closing the Edit Window

(1) Saving to a file the program data you are editing
Click the Save to File button in the position edit window. This is the same as clicking **File (F)** and then selecting **Save As (A)**.

(2) Transferring to the controller the program data you are editing
Click the Transfer to Controller button in the position edit window. The program data you are editing will be saved to the controller's memory.
This button is selectable only in the online edit mode.

(3) Writing to the flash ROM
Once the program has been transferred to the controller, the following confirmation dialog box with the message, "Write Flash ROM?" will be displayed.
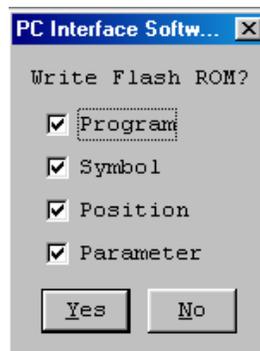
Fig. 6.7 Confirmation

Click **Yes (Y)** → The memory data will be written to the flash ROM.
Click **No (N)** → The memory data will not be written to the flash ROM.

(4) Closing the point edit window
Attempting to close the position edit window will open the following confirmation dialog box with the message, "Save edited data in the Controller?"
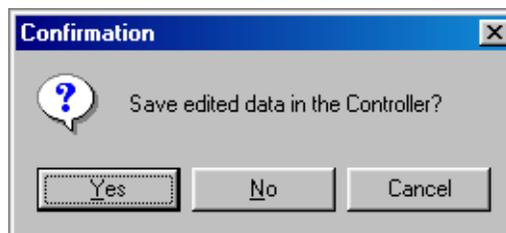
Fig. 6.8 Confirmation

Yes (Y) The edited data will be transferred to the controller → (3), "Writing to the flash ROM"
No (N) The software will close the program edit window without saving the edited data.
Cancel The software will cancel the operation and return to the position edit window.

7. Copying/Moving/Clearing Position Data

7-1. Copying/Moving Position Data

(1) Click **Position (O)** from the menu bar, and then select **Copy/Move (C)**.

(2) The position data copy/move window (Copy/Move Position Data) will open.

Copying position data: In **Source to Copy/Move**, specify the **Top No.** and **Last No.** of the position range you want to copy or move. In **Destination to Copy/Move**, specify the **Top No.** of the position range to copy the source position data to. Then, click **Copy**. The positions specified in **Source to Copy/Move** will be copied to the positions specified in **Destination to Copy/Move**.

Moving position data: Click **Move**. The positions specified in **Source to Copy/Move** will move to the positions specified in **Destination to Copy/Move**.
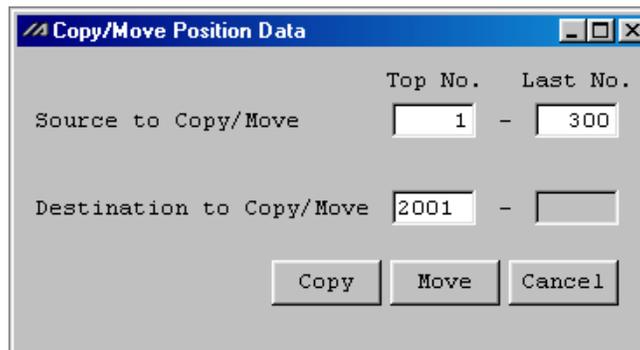
Fig. 7.1   Position Data Copy/Move

* Clicking **Cancel** will cancel the selected operation.

(3) Writing to the flash ROM
When the copy or move is completed, the following confirmation dialog box with the message, "Write Flash ROM?" will be displayed.

Fig. 7.2   Confirmation

Click **Yes (Y)** → The memory data will be written to the flash ROM.
Click **No (N)**   → The memory data will not be written to the flash ROM.

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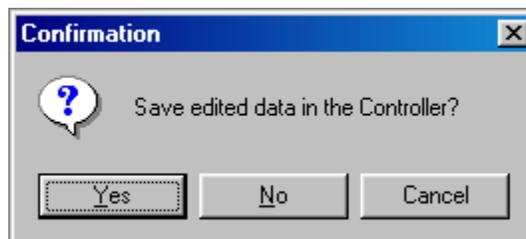
7-2. Clearing Position Data

(1)   Click **Position (O)** from the menu bar, and then select **Clear (L)**.

(2)   The position data clear window (Clear Position Data) will open.
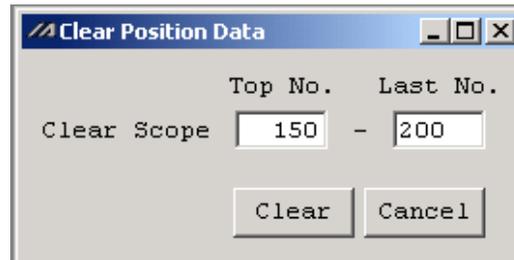
Fig. 7.3   Position Data Clear

In **Clear Scope**, specify the **Top No.** and **Last No.** of the position range you want to clear. Then, click **Clear**. Clicking **Cancel** will cancel the operation.

(3)   Writing to the flash ROM
When the clear is completed, the following confirmation dialog box with the message, "Write Flash ROM?" will be displayed.
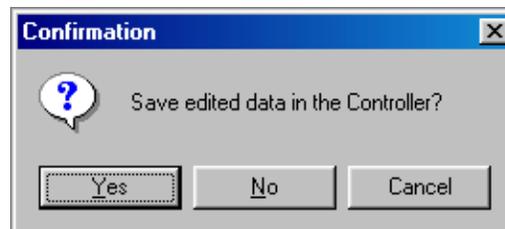
Fig. 7.2   Confirmation

Click **Yes (Y)**   →   The memory data will be written to the flash ROM.
Click **No (N)**   →   The memory data will not be written to the flash ROM.

8.　Parameter Edit Window

8-1.　Explanation of the Parameter Edit Window

(1)　Click **Parameter (P)** from the menu bar, and then select **Edit (E)**.

(2)　The parameter edit window (Edit Parameter) will open.
　　You can select a desired parameter and change the value.
　　Values that are grayed out are read-only and cannot be changed.

　　　　🖫　Save to File
　　　　　　Clicking this button will open a dialog box where you can save the parameter data to a file under a
　　　　　　desired name.
　　　　🖳　Transfer to Controller
　　　　　　Clicking this button will transfer the parameter data to the controller.

　　　　🖨　Print
　　　　　　Clicking this button will print the parameter data.
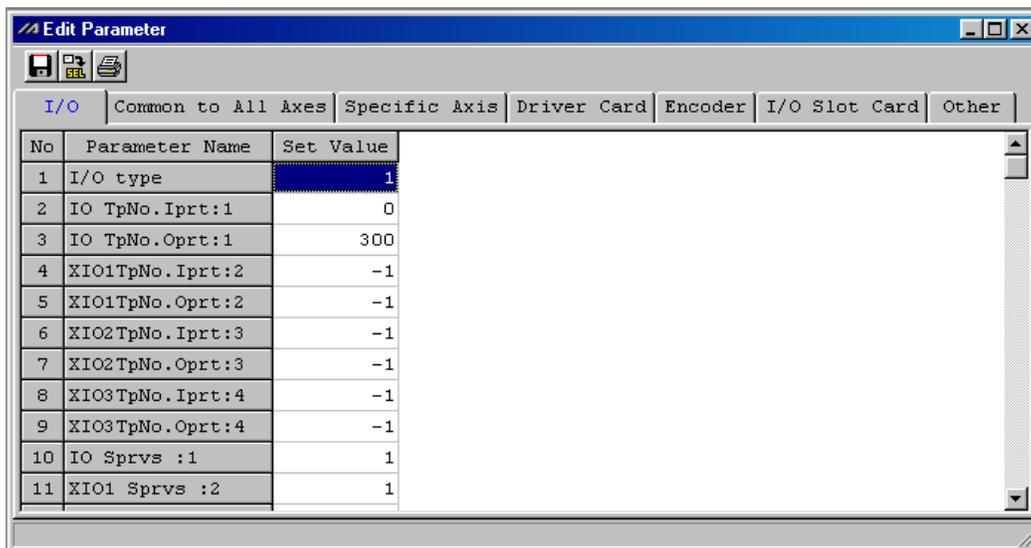
Fig. 7.2　Parameter Edit

* The above window shows I/O parameters. You can display other parameters by clicking each category
　tab.

8-2.　Saving Parameter Data and Closing the Edit Window

(1)　Saving to a file the parameter data you are editing
　　Click the Save to File button in the parameter edit window. This is the same as clicking **File (F)** and
　　then selecting **Save As (A)**.

(2)　Transferring to the controller the parameter data you are editing
　　You can save the parameter data you are editing to the controller's memory. Click the Transfer to
　　Controller button in the parameter edit window.

(3) Writing to the flash ROM
Once the program has been transferred to the controller, the following confirmation dialog box with the message, "Write Flash ROM?" will be displayed.
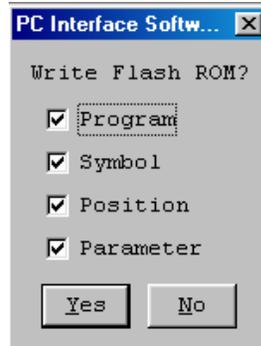
Fig. 8.2   Confirmation

Click Yes (Y) → The memory data will be written to the flash ROM.

Click No (N) → The memory data will not be written to the flash ROM.
If **No (N)** is selected, the controller will clear all data in its memory after a reset (i.e., after the controller power is reconnected or a software reset is executed), and then load the data from the flash ROM.

(4) Restarting the controller (software reset)
After the data has been written to the flash ROM, the following confirmation dialog box with the message, "Restart the controller" will be displayed.

Yes (Y)   The new parameters will become effective.

No (N)   The new parameters will not become effective.
The parameters will become effective after the controller is restarted (software reset) or the controller power is reconnected.
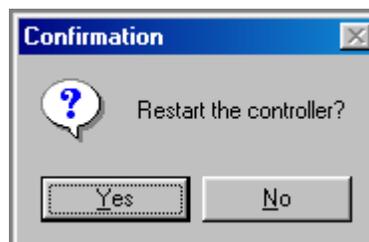
Fig. 8.3   Confirmation

(5) Closing the parameter edit window
     Attempting to close the parameter edit window will display the following confirmation dialog box with
     the message, "Save edited data in the Controller?"
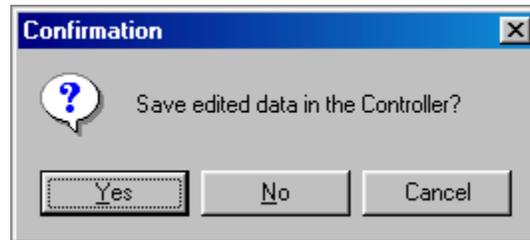
Fig. 8.4   Confirmation

Yes (Y)   The edited data will be transferred to the controller → (3), "Writing to the flash ROM"
No (N)   The software will close the program edit window without saving the edited data.
Cancel   The software will cancel the operation and return to the parameter edit window.

• The user of the PC software is recommended to back up the parameters when the controller is delivered
  and also when the system into which the controller has been assembled is started.
  * There are many customizable parameters. It is recommended that you back up the parameters
    frequently just like you do the programs.

8-3. Transferring a Parameter File

Pay attention to parameter categories when transferring parameter data files to the controller.
The controller is shipped with its axis-related parameters set, for each axis, to values appropriate for the type of the actuator connected.
There are three categories of axis-related parameters: axis-specific parameters, driver card parameters and encoder parameters.
Exercise due caution when using an existing file containing customized parameters.

8-3-1.   Selecting Categories of Parameters to Be Transferred

(1)   Select **Open** from the **File** menu or click the corresponding button in the toolbar. In the file selection dialog box, select the parameter file (extension: .xpm) you want to transfer to the controller. Load the file into the PC software and open the parameter edit window.

(2)   Click the Transfer to Controller button in the parameter edit window.

(3)   The Select Parameter Category window (Fig. 8.5) will open. This window has the following controls and fields. (The specific items will vary depending on the controller.)
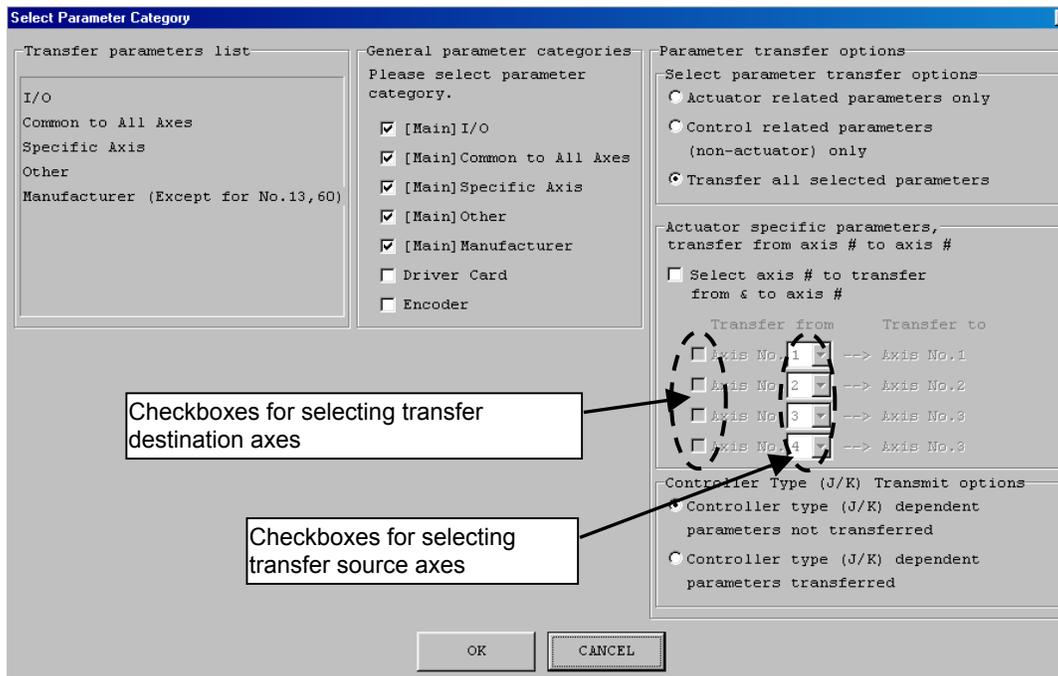
Fig. 8.5   Select Parameter Category Window
(This window is supported by PC software version 3.0.1.0 or later.)

[1]   Transfer parameters list
        The parameters to be transferred to the controller are displayed in accordance with the selections made in [2] through [5] explained below.
        Before clicking **OK**, be sure to check the categories of parameters to be transferred.

[2] General parameter categories
     Click the checkbox corresponding to each category of parameters you want to transfer (the clicked
     checkbox will be selected).
     Only the parameters of the selected category or categories will be transferred to the controller.

[3] Parameter transfer options – Select parameter transfer options
     Of the parameters selected in the **General parameter categories** group, select whether to
     transfer actuator-related parameters only, transfer non-actuator parameters (control-related
     parameters) only, or transfer all selected parameters.
     In the following cases, no parameters will be transferred and the warning message, "Parameters
     will not be transferred" will be displayed.
     • **Actuator related parameters only** is selected under Select parameter transfer options in the
       Parameter transfer options group when no actuator-related parameter category (**Specific Axis**,
       Driver Card or **Encoder**) is selected in the **General parameter categories** group.
     • **Control related parameters (non-actuator) only** is selected under Select parameter transfer
       options in the Parameter transfer options group when no actuator-related parameter category
       is selected in the **General parameter categories** group.

[4] Parameter transfer options – Actuator specific parameters, transfer from axis # to axis #
     You can associate axis-related parameters in the source file with a given axis number in the
     destination controller and transfer them to the specified axis number.
     Select **Select axis # to transfer from & to axis #.**
     Select the checkboxes corresponding to the axes (under **Transfer to**) you want to transfer the
     parameters to. They are arranged in the order of axis 1, axis 2, and the like, on the controller side,
     from the top. Do not select the checkboxes corresponding to the axes you don't want to transfer
     the parameters to.
     In each **Transfer from** box, specify the axis number whose axis-related parameters in the file you
     want to transfer.
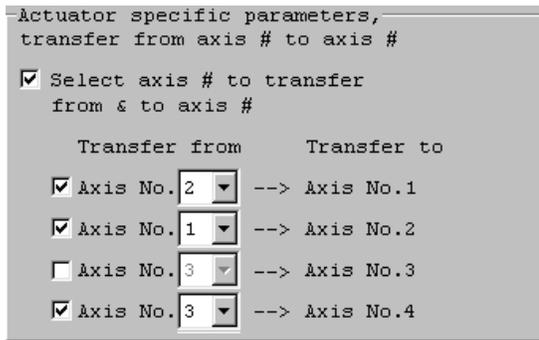
In the specification example shown to the left,
data for axis 2 in the file is sent to axis 1 in the
controller, data for axis 1 in the file is sent to axis
2 in the controller, and data for axis 3 in the file is
sent to axis 4 in the controller, respectively. (No
data will be sent to axis 3 in the controller.)

Fig. 8.6   Example of Transfer Source/Destination Specifications

Note)   Do not select **Select axis # to transfer from & to axis #** if you want to transfer the axis-related
        parameters for all axes without changing their axis numbers (i.e., to transfer all axis parameters
        to the axes of the same numbers), or if no axis-related parameters are transferred. This
        checkbox is normally left unselected.
        Take note that the electrical circuit of each controller is different depending on the actuator
        connected to each axis. An attempt to change the axis configuration only by changing
        parameters may cause problems or errors.

[5] Parameter transfer options – Controller Type (J/K) Transmit options
Select whether to enable transfer of parameters dependent on controller type (J/K).
If parameters dependent on controller type (J/K) are not included in the selections made in [2], [3] and [4], selecting **Controller type (J/K) dependent parameters transferred** will not transfer the applicable parameters.
Normally, select **Controller type (J/K) dependent parameters not transferred.**
Select **Controller type (J/K) dependent parameters transferred** only in the following conditions:
• The flash ROM was corrupted, and the parameters must be rewritten.
• Parameters for a wrong controller type were written by mistake, and the parameters must be rewritten.

8-3-2.   Default Specifications

In the **Parameter transfer options** group, you can set the default setting only for **Select parameter transfer options** in the window accessible by selecting **Environment Setup** from the **Tool** menu (Fig. 8.7).
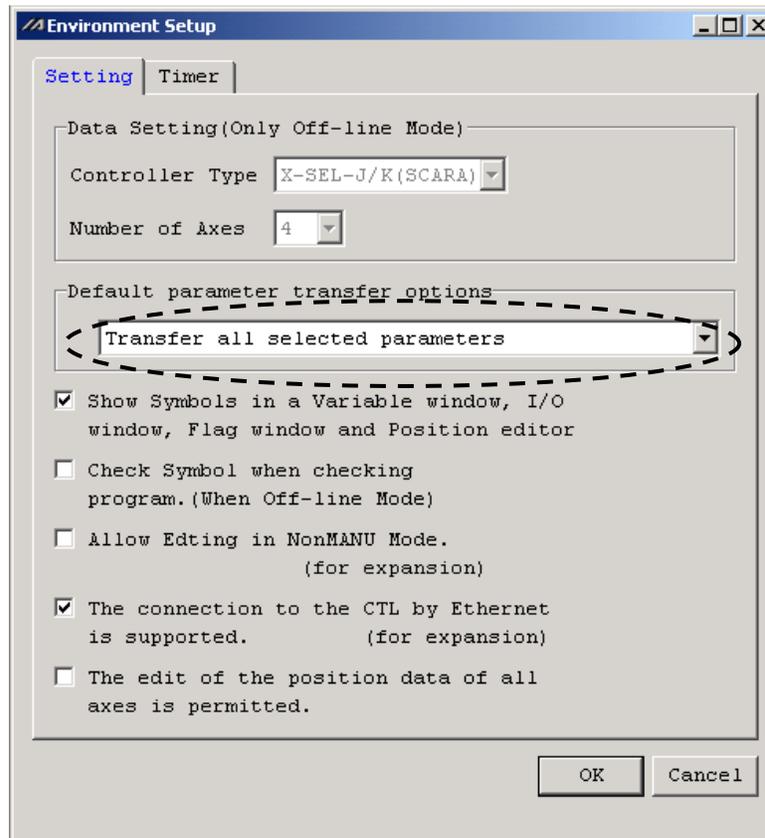
Fig. 8.7   Environment Setup

9.　Symbol Edit Window

9-1.　About Symbols

In the X-SEL controller, variable numbers, flag numbers and other values can be treated as symbols.

(1) Values supporting symbol conversion
The following values can be treated as symbols:
Variable number, flag number, tag number, subroutine number, program number, position number, input port number, output port number, axis number, constant

(2) Symbol description rules
[1] First character: A single-byte alphabet or single-byte underscore.
[2] Second and subsequent characters: Any characters corresponding to ASCII codes 0x21 to 0x7e that can be entered from the keyboard.
[3] Maximum number of characters: 9 single-byte characters (or 8 single-byte characters in the case of a character string literal).
[4] Definition of the same symbol for two or more values within a given function is prohibited. (The same symbol can be defined for two or more local values that are each used in a different program.)
[5] Definition of the same symbol for two or more flag numbers, input ports and/or output ports is prohibited. (The same symbol can be defined for two or more local flags/ports that are each used in a different program.)
[6] Definition of the same symbol for two or more integer variable numbers and/or real variable numbers is prohibited. (The same symbol can be defined for two or more local variables that are each used in a different program.)
[7] Definition of the same symbol for two or more integer constants and/or real constants is prohibited.

(3) Number of symbol definitions: Up to 1,000.

(4) Number of symbol uses allowed in commands: Up to 5,000 times including character string literals.
* Defining the input condition, operands 1 and 2 and output in a step all using symbols is equivalent to four symbol uses in one step.

9-2. Explanation of the Symbol Edit Window

(1) Click **Symbol (Y)** from the menu bar, and then select **Edit (E)**.
(2) The symbol edit window (Edit Symbol) will open.

Save to File
Clicking this button will open a dialog box where you can save the symbol data to a file under a desired name.

Transfer to Controller
Clicking this button will transfer the symbol data to the controller.

Print
Clicking this button will print the symbol data.

Select the scope as **Global** or **Local**.   If **Local** is selected, specify a desired program number.
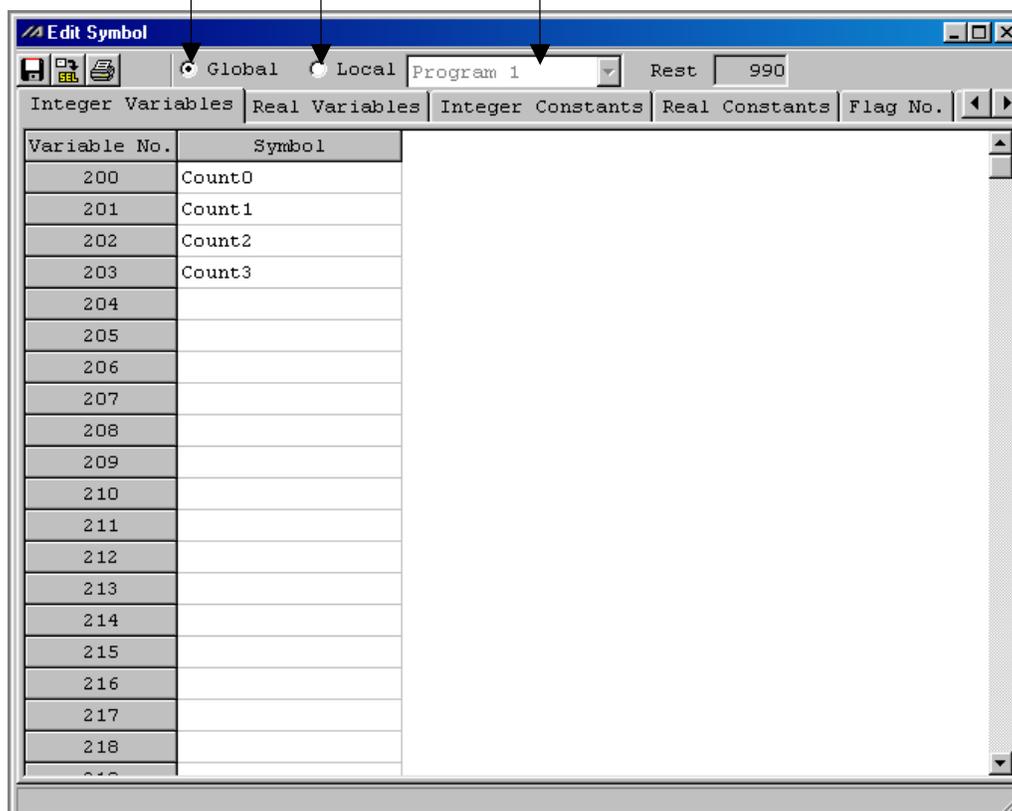
Fig. 9.1   Symbol Edit

* The above symbol edit window is for integer variables. You can display other symbols by clicking each category tab.

9-3. Saving Symbol Data and Closing the Edit Window

(1) Saving to a file the symbol data you are editing
Click the Save to File button in the symbol edit window. This is the same as clicking **File (F)** and then
selecting **Save As (A)**.

(2) Transferring to the controller the symbol data you are editing
You can save the symbol data you are editing to the controller's memory.
Click the Transfer to Controller button in the symbol edit window.
This button is selectable only in the online edit mode.

(3) Writing to the flash ROM
Once the program has been transferred to the controller, the following confirmation dialog box with the message, "Write Flash ROM?" will be displayed.
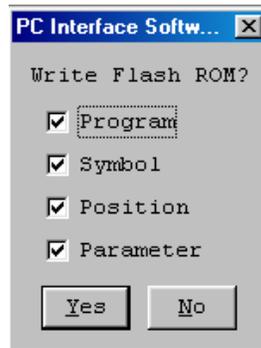
Fig. 9.2 Confirmation

Click **Yes (Y)** → The memory data will be written to the flash ROM.
Click **No (N)** → The memory data will not be written to the flash ROM.
If **No (N)** is selected, the controller will clear all data in its memory after a reset (i.e., after the controller power is reconnected or a software reset is executed), and then load the data from the flash ROM. (The controller will operate in accordance with the transferred data until a reset is executed.)

(4) Closing the symbol edit window
Attempting to close the symbol edit window will display the following confirmation dialog box with the message, "Save edited data in the Controller?"
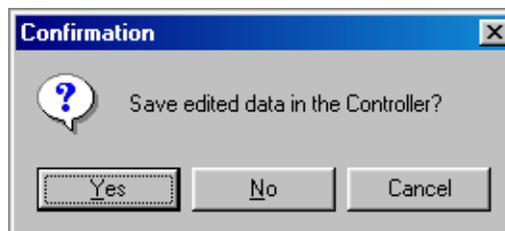
Fig. 9.3 Confirmation

Yes (Y)   The edited data will be transferred to the controller → (3), "Writing to the flash ROM"
No (N)   The software will close the program edit window without saving the edited data.
Cancel   The software will cancel the operation and return to the symbol edit window.

10. Monitor

You can check the current statuses of various items from the **Monitor** menu.

(1) Task status monitor window
    This window shows the statuses of running programs.

Fig. 10.1   Task Status

No.:   Program No.
Name: Symbol
Sts: Task status
          Task status managed by the internal OS.
          (Main application version 0.14 or later)
          (PC software version 0.0.7.2. or later)
L: Task level
Exec: Current step number
T: Paused (by step operation, by a breakpoint, by the pause button, by the SSPG command, etc.)
W: Waiting (in response to the TIMW, WTxx, WZxx, WRIT or READ command, waiting for a servo
          command to be completed, etc.)
          (PC software version 1.1.0.5 or later)
H: HOLD input (main application version 0.26 or later) (PC software version 1.1.0.5 or later)
C: CANC input (main application version 0.26 or later) (PC software version 1.1.0.5 or later)
Err: Error number
Prg. and subsequent fields: Detailed error information

(2) System status monitor window

Fig. 10.2   System Status

(3) Axis status monitor window
      This window shows the status of each axis.
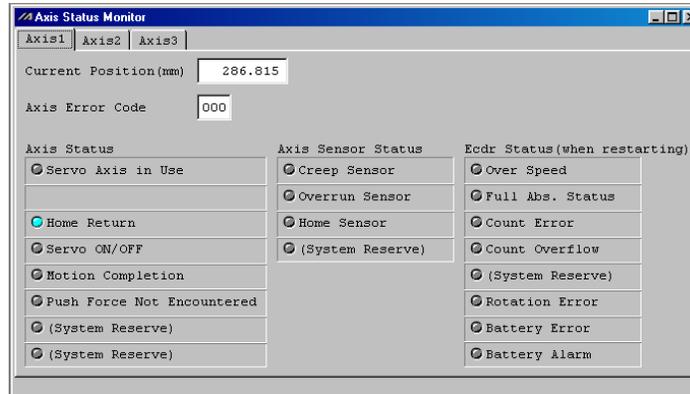
Fig. 10.3   Axis Status

(4) Input port, virtual input port, output port and virtual output port windows
      These windows show the ON/OFF status of each input/output.   1: ON, 0: OFF
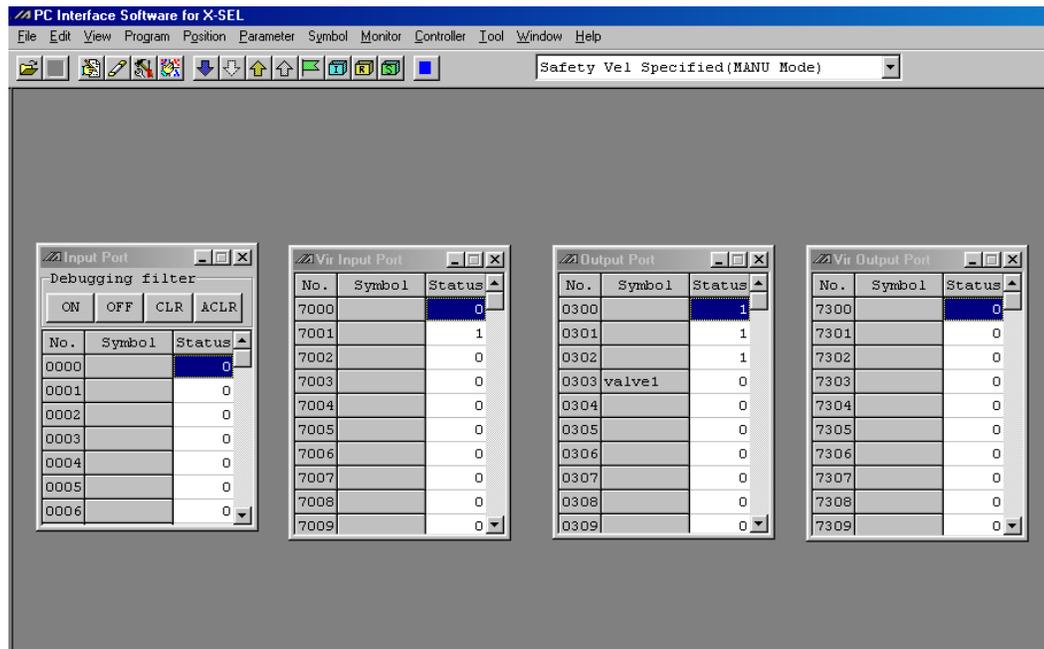
Fig. 10.4   Input/Output Ports

You can double-click a desired output port, virtual output port or global flag to change its 1/0 (ON/OFF) status.

In the input port window, you can set an input port debug filter.
"Input port debug filter" is a function that causes the controller to recognize a given physical input port as ON or OFF regardless of the actual input status of the physical input port.
(This function is supported by X-SEL PC software version 1.1.1.0 or later.)

To set a debug filter, use the following four buttons provided on the **Debug filter** setting panel in the input port window (available in the MANUAL mode).
[1] ON
      Clicking this button will set an ON filter for the input port corresponding to the cursor position.
      The controller will always recognize the specified port as ON.
[3] OFF
      Clicking this button will set an OFF filter for the input port corresponding to the cursor position.
      The controller will always recognize the specified port as OFF.
[3] CLR
      Clicking this button will clear the debug filter currently set for the input port corresponding to the cursor position.
[4] ACLR
      Clicking this button will clear the debug filters currently set for all physical input ports.
* While a debug filter is set, the status of the port ("0" or "1") for which the ON or OFF filter is set will be shown in red (all ports for which a debug filter is not set will be shown in black).

Buttons on the **Debug filter** setting panel (from left):
[1] ON (Set an ON filter)
[2] OFF (Set an OFF filter)
[3] CLR (Clear a filter)
[4] ACLR (Clear all filters)

An OFF filter has been set for this port.

An ON filter has been set for this port.

Port number selection cursor (Port No. 4 is selected in this example.)
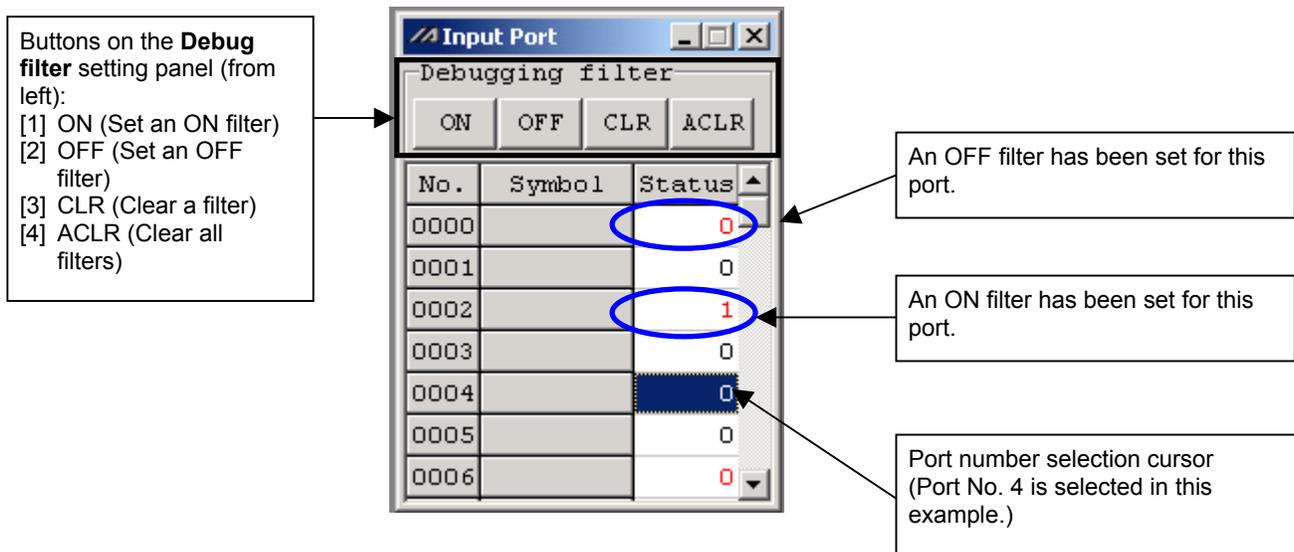
Fig. 10.5   Input Port Window

Clicking **CLR** or **ACLR** will display the warning message shown in Fig. 10.6.
Select **Yes (Y)** (clear the filter(s)) or **No (N)** (cancel the clear) after carefully reading the content of the message.
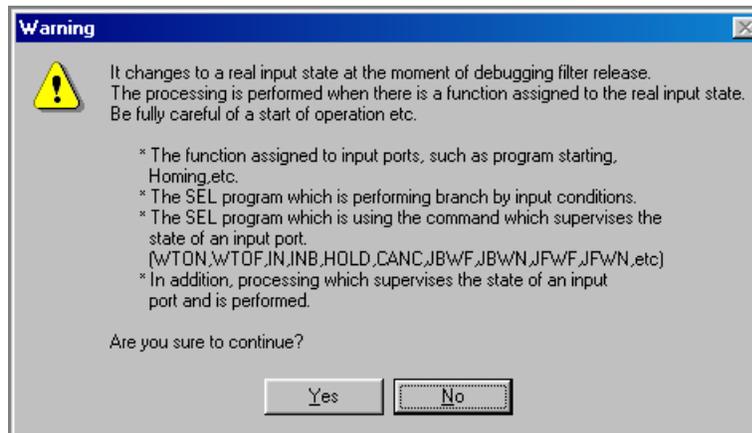
Fig. 10.6   Warning Message

Note

The status (ON/OFF) of each input port as recognized by the controller changes the moment the debug filter is cleared or controller operation mode (MANUAL or AUTO) is changed.

(1)   Upon clearing a filter

Actual input status / Filter type	ON	OFF
ON	-	ON → OFF
OFF	OFF → ON	-

(2)   Upon switching the controller mode from MANUAL to AUTO

Actual input status / Filter type	ON	OFF
ON	-	ON → OFF
OFF	OFF → ON	-

(3)   Upon switching the controller mode from MANUAL to AUTO and then back to MANUAL

Actual input status / Filter type	ON	OFF
ON	-	OFF → ON
OFF	ON → OFF	-

* Changing the controller mode (MANUAL or AUTO) will not clear debug filters. Accordingly, changing the controller mode back to MANUAL from AUTO will make effective again the debug filters that were set in the previous MANUAL mode.

If any function is assigned to an input port, the applicable process will be executed when the port turns ON. When setting/clearing debug filters or changing the controller mode, exercise due caution against sudden start of the following functions and program operations:
- Functions assigned to input ports, such as program start and homing of all valid axes
- SEL programs that use branching based on input condition
- SEL programs that include commands for monitoring input port statuses (WTON, WTOF, IN, INB, HOLD, CANC, JBWF, JBWN, JFWE, JFWN, etc.)
- Other processes executed according to the input port statuses as monitored (recognized) by the controller

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(5) Global flag, global integer variable, global real variable and global string windows
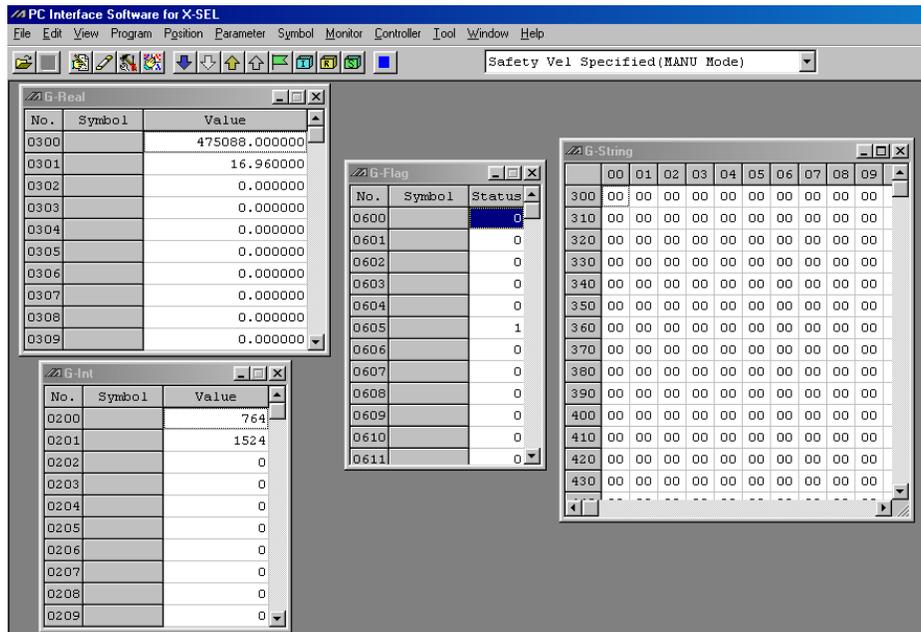
Fig. 10.7   Global

You can change the values in global variables or assign values to global variables.
You can also change the characters in global strings or assign characters to global strings.

(6) Detailed error information
     This window shows the error codes, messages and other information relating to the errors that have occurred.
     The errors are shown in the order of occurrence time, starting from the most recent error shown at the top.

Error code
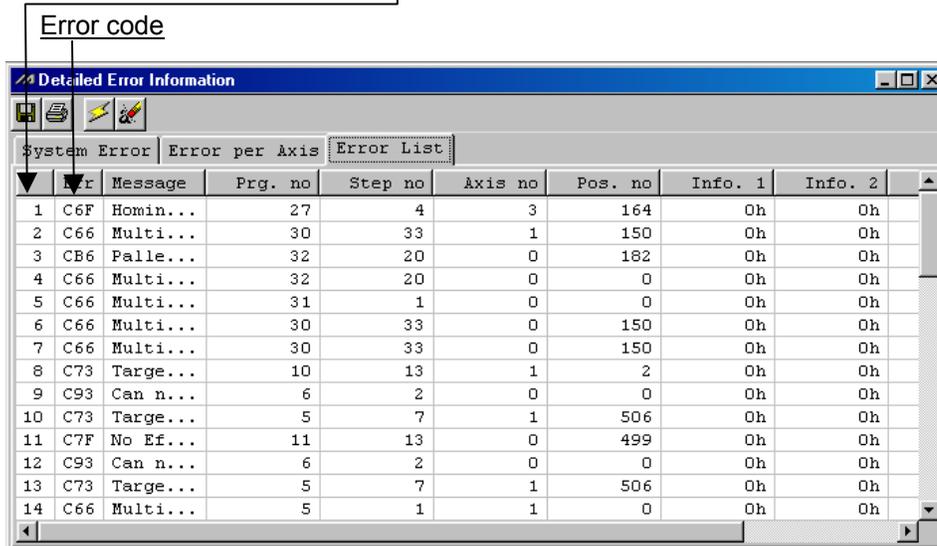
Fig. 10.8   Detailed error information

11. How to Reset an Absolute Encoder

If the voltage of the absolute-encoder backup battery in the X-SEL controller becomes low or after the battery or encoder cable has been disconnected, an encoder battery error will occur. In this case, the absolute encoder must be reset.

(1)   Click **Controller (C)** from the menu bar, and then select **Absolute Reset (A)**.

(2)   When the following warning window appears, click **OK**.
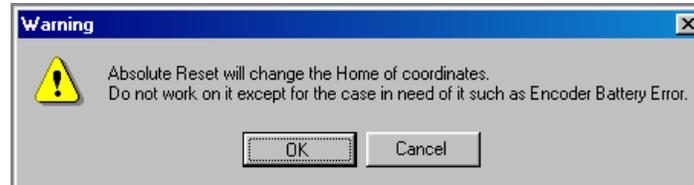
Fig. 11.1   Warning

(3)   The Abs. Encoder Reset window will open. Click here to select the axis you want to execute an absolute encoder reset for.
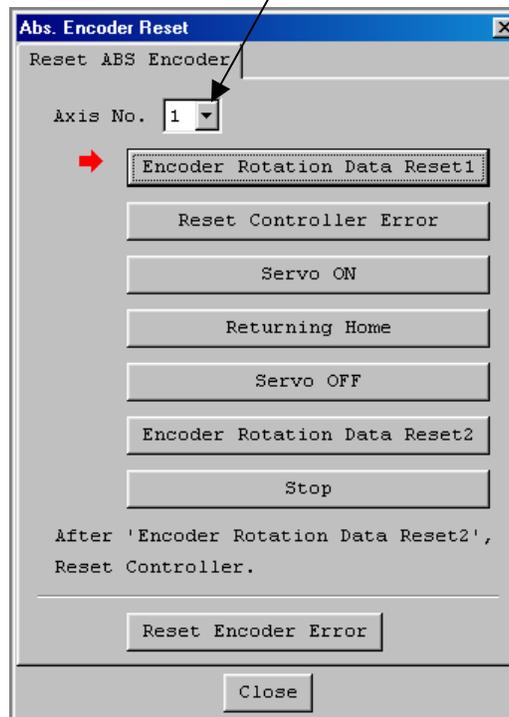
Fig. 11.1   Absolute Reset

(4)   Clicking **Encoder Rotation Data Reset 1** will display the following warning window. Click **Yes (Y)**.

Fig. 11.3   Warning

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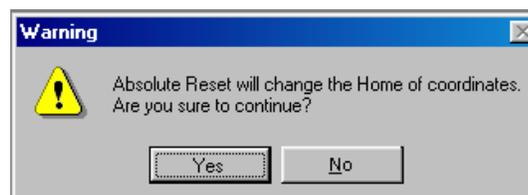
(5)　When the following warning window appears, click **Yes (Y)** again.

Fig. 11.4　Warning

(6)　After the Encoder Rotation Data Reset 1 process is completed, the red arrow will move to the next item below. Click the applicable button. Repeat this operation until all of the following processes are completed (every time a process is completed, the red arrow will move to the next item below):

    1.　Reset Controller Error
    2.　Servo ON
    3.　Returning Home
    4.　Servo OFF
      Note:　If you are using PC software of version 1.1.0.0 or later and a driver with CPU version 0.23 or later, the Encoder Rotation Data Reset 2 process is performed with the servo ON. Accordingly, the servo OFF step is skipped.
    5.　Encoder Rotation Data Reset 2

  (Note)　With an earlier product, clicking **Reset Controller Error** may generate an error (No. D10: IPM error). If this error occurs, close the PC tool, reconnect the controller power, and then repeat from step (2). (If the encoder battery is normal, the error will no longer occur after the power is reconnected and "rdy" or "Ardy" will be shown on the controller's 7-segment display. Take note that the axis has not yet completed homing in this state).

  After the Encoder Rotation Data Reset 2 process is completed, the red arrow will return to the position in (3). If you want to perform an absolute encoder reset for multiple axes, select each subsequent target axis and repeat the steps from (3). To end the reset operation, click **Close** to close the Abs. Encoder Reset dialog box.

    (Note)　If a need arises to perform an absolute encoder reset for multiple axes, be sure to complete steps (3) through (6) for all applicable axes before performing a software reset in step (7).

(7)　Click **Controller (C)** from the menu bar, and then select **Software Reset (R)**.

(8)　When the following confirmation dialog box appears, click **Yes (Y)** to restart the controller.

Fig. 11.5　Confirmation

(9)　If no other error is present, the controller's 7-segment display will show "rdy."

(10)　This completes the absolute encoder reset operation.
To repeat the reset operation, close the X-SEL PC software first, and then repeat the steps from the beginning.

12. Supplemental Information on Controller Menu Items

12-1. Software Reset

Selecting this menu item will restart the controller.
Caution is required because data that is not yet written to the flash ROM will be lost after this operation.
Click **Controller (C)** from the menu bar, and then select **Software Reset (R)**.

12-2. Reset Error

Selecting this menu item will reset message level errors and operation-cancellation level errors. Even after selecting **Reset Error**, those errors whose cause has not been removed will occur again.
Click **Controller (C)** from the menu bar, and then select **Reset Error (E)**.

12-3. Drive-source Recovery Request and Operation-pause Reset Request

(1) Drive-source recovery request
    [1] How to issue a drive-source recovery request
       A drive-source recovery request can be issued using one of the following methods:
- Set I/O parameter No. 44 to "1" (Input selection function 014 = Drive-source cutoff reset input), and then input the ON edge to input port No. 14.
- Select **Drive-source Recovery Request (P)** from the **Controller (C)** menu on the PC software screen.
- Select **Ctl** (controller operation) and **RPwr** (drive-source recovery request) on the mode selection screen of the teaching pendant.

    [2] Case where a drive-source recovery request is required
       A drive-source recovery request is required only in the following case:
- A drive-source cutoff factor occurred when I/O parameter No. 44 was set to "1" → Recovery after the cutoff factor is removed.

(2) Operation-pause reset request
    [1] How to issue an operation-pause reset request
       An operation-pause reset request can be issued using one of the following methods:
- Set I/O parameter No. 35 to "1" (Input selection function 005 = Operation-pause reset signal), and then input the ON edge to input port No. 5.
- Select **Operation-pause Reset Request (L)** from the **Controller (C)** menu on the PC software screen.
- Select **Ctl** (controller operation) and **RAct** (operation-pause reset request) on the mode selection screen of the teaching pendant.

    [2] Cases where an operation-pause reset request is required
       An operation-pause reset request is required in any of the following cases:
- The automatic operation was stopped using the deadman switch when other parameter No. 9 was set to "2" (Deadman-switch recovery type = Continued operation) (only during automatic operation) → Recovery (reset of operation pause) after the stop is reset.
- An emergency stop was actuated during automatic operation when other parameter No. 10 was set to "2" (Emergency-stop recovery type = Continued operation) (only during automatic operation) → Recovery (reset of operation pause) after the emergency stop is reset.
- The safety gate was opened during automatic operation when other parameter No. 11 was set to "2" (Safety-gate open recovery type = Continued operation) (only during automatic operation) → Recovery (reset of operation pause) after the safety gate is closed.
- An OFF-level input signal was received by input port No. 6 during automatic operation when I/O parameter No. 36 was set to "1" (Input selection function 006 = Operation-pause signal) → Recovery (reset of operation pause) after an ON-level input signal is received by input port No. 6.

* If the case in [2] of (1) and any of the cases in [2] of (2) are present at the same time, a drive-source recovery request must be issued first, followed by an operation-pause reset request.

13. Tool

The Environment Setup window accessible from the Tool menu consists of the **Setting** and **Timer** tabs.

(1) Tool
In the online mode, you can select the target controller and number of axes before creating a new program or position data. This PC software can be used to edit program files and position data files for SEL-E/G, DS and SEL-H controllers in addition to those for X-SEL controllers.
You can also specify whether or not to check symbols during the program error check.

Select the target controller whose data you want to edit.
Select the applicable number of axes.

If this checkbox is not selected, symbol errors will not be checked.
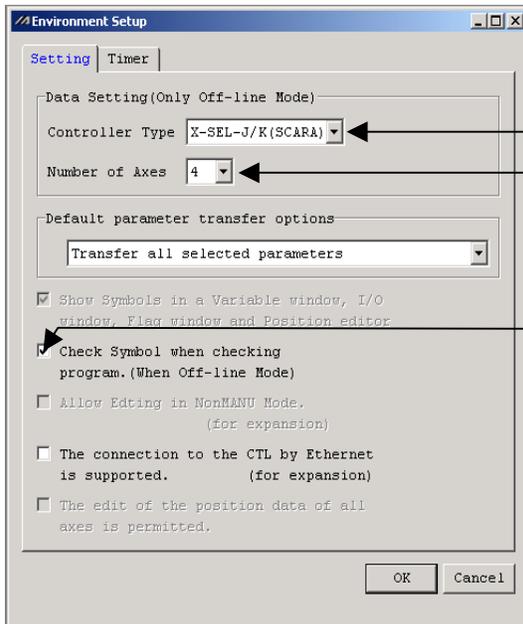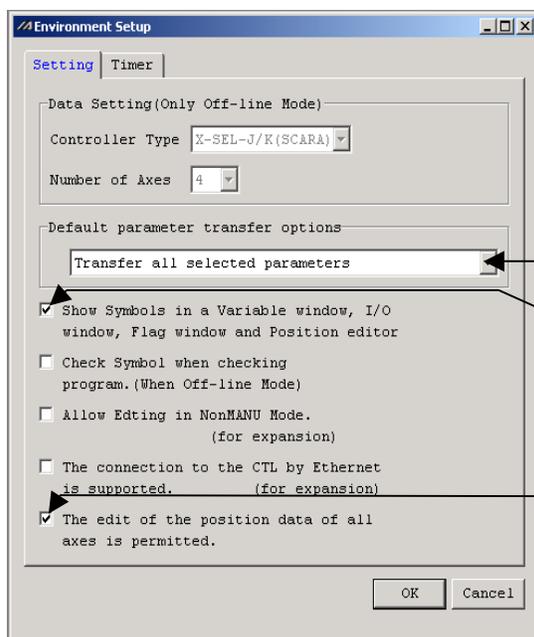
Fig. 13.1   Setting (Offline)

Specify the default parameter transfer option.

If this checkbox is selected, symbols will be shown in the variable window, I/O window, flag monitor window and position data edit window.

Position data editing is permitted for four axes in the case of X-SEL J/K controllers, and for six axes in the case of P/Q controllers.

Fig. 13.2   Setting (Online)

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(2) Timer
You can set the times required for the controller to make reference to the various data. Normally the settings need not be changed.
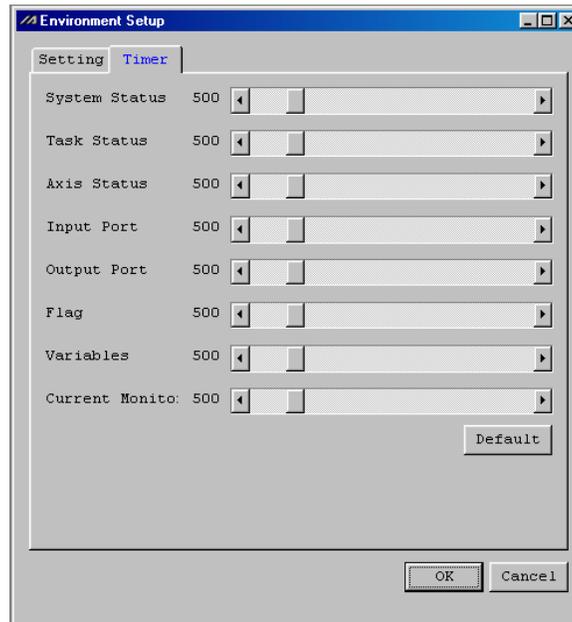
Fig. 13.3　Timer

◎ Error Level Control

Error level	System error source	Error No. (HEX)	Display (7-segment display, etc.)	Error list	Error LED output	Program operation Other Parameter No.4 = 0	Program operation Other Parameter No.4 = 1	Error reset	Remarks
Secret level	Main application	800 ~ 88F		○					Special error used for maintenance purpose
	Main core	890 ~ 8AF							
	PC	8B0 ~ 8DF							
	TP	8E0 ~ 8FF							
Message level	Main application	900 ~ 93F	○	△ (Errors relating to battery or fieldbus are registered in the error list.)				Allowed	Status display, input error, etc.
	Main core	940 ~ 97F							
	PC	980 ~ 9AF							
	PC (update tool)	9B0 ~ 9BF							
	TP	9C0 ~ 9FF							
	Flash ACK timeout	A00 ~ A6F							
	Main core	A70 ~ A9F							
	PC	AA0 ~ ACF							
	TP	AD0 ~ AFF							
Operation reset level	Main application	B00 ~ B9F	○	○		The program generating error is reset. (Except for axis errors, cause of reset only generates the moment the error occurs.)	All programs are reset, other than the "I/O processing program activated upon operation interruption." (Except for axis errors, cause of reset only generates the moment the error occurs.)	Allowed	Errors that affect operation. As for minor errors below this level, a reset attempt will be made by the auto-reset function upon reception of an external active command (SIO/PIO).
	Main core	BA0 ~ BBF							
	PC	BC0 ~ BDF							
	TP	BE0 ~ BFF							
	Main application	C00 ~ CCF							
	Main core	CD0 ~ CDF							
	PC	CE0 ~ CEF							
	TP	CF0 ~ CFF							
Cold start level	Main application	D00 ~ D8F	○	○		The program generating error is reset. * However, all programs will be reset, other than the "I/O processing program activated upon operation interruption," if the error requires cutoff of the drive source (initialization error, power-supply error, etc.).	All programs are reset, other than the "I/O processing program activated upon operation interruption."	Not allowed	Power must be reconnected. (CPU-OS runs normally.)
	Main core	D90 ~ DAF							
	PC	DB0 ~ DCF							
	PC (update tool)	DD0 ~ DDF							
	TP	DE0 ~ DFF							
	Main application	E00 ~ E8F							
	Main core	E90 ~ EBF							
	PC	EC0 ~ EDF							
	TP	EE0 ~ EFF							
System down level	Main application	FF0 ~ FBF	○	○	○	All reset		Not allowed	Power must be reconnected. (CPU-OS cannot be run.)
	Main core	FC0 ~ FCF							
	PC	FD0 ~ FDF							
	TP	FE0 ~ FFF							

PC: PC Software, TP: Teaching Pendant

(Errors specific to the PC Software are listed below. See the X-SEL Controller Operation Manual for controller errors.)

Error No.	Error name	Special note
980	Can not Copy, Move, Clear Program being edited on-line.	Program copy/move/clear was performed while the online program edit window was open. Close the online program edit window first.
981	Can not transmit the program file being edited on-line.	Program file transfer was performed to/from the program being edited online. Close the online edit window for the target program first.
982	Can not Copy, Move, Clear Position data being edited on-line.	Position data copy/move/clear was performed while the online position data edit window was open. Close the online position data edit window first.
983	Can not transmit the Position data being edited on-line.	Position data file transfer was performed while the online position data edit window was open. Close the online position data edit window first.
984	Can not transmit the Parameter file being edited on-line.	Parameter file transfer was performed while the online parameter edit window was open. Close the online parameter edit window first.
985	Can not Clear Symbol data being edited on-line.	Symbol data clear was performed while the online symbol data edit window was open. Close the online symbol data edit window first.
986	Can not transmit Symbol data file being edited on-line.	Symbol data file transfer was performed while the online symbol data edit window was open. Close the online symbol data edit window first.
987	Can not initialize memory being edited on-line.	Memory initialization was performed while the program/symbol/position data online edit window was open. Close the applicable online edit window first.
988	Can not Jog when Servo OFF.	Jogging was performed for an axis whose servo was OFF. Turn ON the servo first.
989	Acceleration Specification Error.	The specified acceleration during jog, move or continuous move exceeds the allowable range or is invalid. Check the specified acceleration.
98A	Deceleration Specification Error.	The specified deceleration during jog, move or continuous move exceeds the allowable range or is invalid. Check the specified deceleration.
98B	Can not edit while running program. (PC)	Write, copy, move, clear or other edit operation was performed for the program currently running. End the program you wish to edit, and then try again.
AA0	Input data error	A value outside the allowable range or invalid character has been input.
AA1	Password Error.	The entered password is invalid. Enter the correct password.
AA2	Failed in writing file.	
AA3	Data edit prohibited in operating mode	Data edit was performed in operating mode. Check the type of manual operation (Other Parameter No. 21 and the type of manual PC Software operation currently selected).
AA4	Data write prohibited during flash ROM write	Data write was performed while the flash ROM was written. Data edit cannot be performed while the flash ROM is written.
AA5	File data error	The data read from a file is abnormal.

Error No.	Error name	Special note
AA6	Jog/move/continuous move speed too low	
AA7	Jog/move/continuous move speed too high	
AA8	Data transmission not possible offline	Data transmission cannot be performed while the communication with the controller is cut off. Try again after starting the application in online mode.
AA9	Teaching prohibited before completion of homing	Teaching operation (current position capture) was performed for an axis whose homing was not yet complete. Complete homing first.
AAA	Memory initialization prohibited in operating mode	Memory initialization was performed in operating mode. Check the type of manual operation (Other Parameter No. 21 and the type of manual PC Software operation currently selected).
AAB	Flash ROM write prohibited in operating mode	The flash ROM was written in operating mode. Check the type of manual operation (Other Parameter No. 21 and the type of manual PC Software operation currently selected).
AAC	Error list clear prohibited in operating mode	The error list was cleared in operating mode. Check the type of manual operation (Other Parameter No. 21 and the type of manual PC Software operation currently selected).
AAD	Slave unit type not entered	
AAE	Slave unit type error	
AAF	Slave device No. not entered	
AB0	Slave device No. error	
AB1	Slave command ID not entered	
AB2	Slave command ID error	
AB3	Prohibited slave command issued	
AB4	Prohibited slave command issued before completion of homing	A slave command was issued whose use is prohibited before completion of homing.
AB5	Prohibited slave command issued during servo ON	A slave command was issued whose use is prohibited when the servo is ON.
AB6	Move/continuous move prohibited before completion of homing	Move/continuous move was performed for an axis whose homing was not yet complete. Complete homing first.
AB7	Re-homing not complete	The absolute encoder rotation data was reset when re-homing was not yet complete. Regardless of whether or not a prior homing had been completed, fresh homing operation must always be performed when resetting the absolute encoder rotation data.
AB8	File read error	The file format is wrong or abnormal data is contained.
AB9	Too many breakpoints	The number of breakpoints exceeds the settable range. Cancel unnecessary breakpoints and then try again.
ABA	File open error	The file cannot be opened. Check if the file is being used by other application.
ABB	File type error	The file type is invalid. Check the file type (extension).

Error No.	Error name	Special note
ABC	Data not entered	Data is not entered in a mandatory field or fields. Enter data.
ABD	Symbol first character error	The first character of the symbol is invalid.
ABE	Symbol character string error	The symbol character string contains an invalid character or characters.
ABF	Symbol multiple definition error	The same symbol is defined more than once.
AC0	Program name multiple definition error	The same program name is defined more than once.
AC1	Encoder type error	Check the encoder ABS/INC type (Axis Parameter No. 38), etc. of the target axis.
AC2	Monitoring axis not selected	
AC3	Date entry error	(For future extension)
AC4	Time entry error	(For future extension)
AC5	Inching distance excessive	
AC6	Window closing prohibited during data transmission	The edit window whose data is being transmitted cannot be closed. Close the window after the transmission is complete.
AC7	Too many symbol definitions	The number of symbol definitions exceeds the allowable range. Create empty area by deleting unnecessary symbols, and then try again.
AC8	Entered value too large	
AC9	Entered value too small	
ACA	Parameter initialization prohibited during online edit	Parameter initialization was performed while the online parameter edit window was open. Close the online parameter edit window first.
ACB	SEL program/symbol/position data initialization prohibited during online edit	SEL program/symbol/position data initialization was performed while the program/symbol/position data online edit window was open. Close the applicable online edit window first.
ACC	Symbol not defined	An undefined symbol or symbols is/are used in the program step data.
ACD	File not found	The specified file cannot be found. Check the file name.
ACE	File not supported	The specified file format is not supported by the application. Check the file type.
ACF	No available axis	There is no available axis that can be edited/operated. Check the available axis pattern (All-Axis Common Parameter No. 1).
EC0	Received message string error (PC)	The received message contains error. If the error persists after reconnection, contact IAI.
EC1	Controller not connected	Communication may not yet be established or the connected controller may not be supported. Check the physical connection with the controller and then perform "reconnection."
EC2	Receive time out. (PC)	Communication error. Check the cable connection, short, noise, etc.
EC3	Receive Length Error. (PC)	Communication error. Check the cable connection, short, noise, etc.
EC5	Com Port Open Error.	The COM port cannot be opened. Check if the COM port is available.
EC6	Sum Check Error. (PC)	Communication error. Check the cable connection, short, noise, etc.
EC7	Receive Buffer Overflow. (PC)	The receive buffer (PC) overflowed. Perform "reconnection."

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