

ID78K Series

Integrated Debugger Ver. 2.30 or Later

Operation (Windows™ Based)

Target Devices

78K/0 Series

78K/0S Series

78K/IV Series

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INTRODUCTION

Readers This manual is intended for user engineers who design and develop application systems of the 78K/0 Series, 78K/0S Series, and 78K/IV Series.

Purpose This manual is intended to give users an understanding of the functions of the ID78K Series shown in the organization below.

Organization This manual consists of the following chapters:

- General
- Installation
- Starting and exiting
- Functions of ID78K Series
- Association with project manager
- Window reference

How to read this manual It is assumed that the readers of this manual have general knowledge of electrical engineering, logic circuits, microcontrollers, C language, and assemblers.

For users who are using this manual for products other than ID78K0-NS
→ In CHAPTERS 2 and 3, the ID78K0-NS is treated as the representative product.
In the other chapters, the ID78K0-NS is also treated as the representative product unless there are differences in function.
As required, take the ID78K0-NS as other products in the ID78K Series.

Product description

ID78K0-NS → ID78K0-NS

ID78K0 (-NS) → ID78K0 and ID78K0-NS

To understand the hardware functions of the 78K/0 Series, 78K/0S Series, and 78K/IV Series.

→ Refer to the **Hardware User's Manual** for each product.

To understand the instruction functions of the 78K/0 Series

→ Refer to the **78K/0 Series User's Manual Instructions**.

To understand the instruction functions of the 78K/0S Series

→ Refer to the **78K/0S Series User's Manual Instructions**.

To understand the instruction functions of the 78K/IV Series

→ Refer to the **78K/IV Series User's Manual Instructions**.

Conventions

Data significance:	Higher digits on the left and lower digits on the right
Note:	Footnote for item marked with Note in the text
Caution:	Information requiring particular attention
Remark:	Supplementary information
Numerical representation:	Binary... xxxx or xxxxB
	Decimal... xxxx
	Hexadecimal... xxxxH
Prefixes indicating power of 2 (address space, memory capacity):	
K (kilo): $2^{10} = 1,024$	
M (mega): $2^{20} = 1,024^2$	

Key descriptions: The key descriptions in this manual are explained in terms of the PC-9821 series keyboard. When using a keyboard whose key descriptions differ from the above, use the keys in accordance with the descriptions in **APPENDIX D KEY FUNCTION LIST**.

Related Documents

The documents related to this manual are listed below.
The related documents indicated in this publication may include preliminary versions.
However, preliminary versions are not marked as such.

Documents related to development tools (user's manuals) (78K/0 Series)

Document Name		Document No.
IE-78K0-NS		U13731E
IE-78K0-NS-A		U14889E
IE-78K0-NS-PA		To be prepared
CC78K0 C Compiler	Operation	To be prepared
	Language	To be prepared
RA78K0 Assembler Package	Operation	To be prepared
	Language	To be prepared
	Structured Assembly Language	U11789E
SM78K0S, SM78K0 System Simulator Ver. 2.10 or Later Windows Based	Operation	U14611E
SM78K Series System Simulator Ver. 2.10 or Later	External Part User Open Interface Specifications	U15006E
ID78K Series Integrated Debugger Ver. 2.30 or Later Windows Based	Operation	This manual
78K/0 Series Real-Time OS	Fundamentals	U11537E
	Installation	U11536E
78K/0 Series OS MX78K0	Fundamental	U12257E

Documents related to development tools (user's manuals) (78K/0S Series)

Document Name		Document No.
IE-78K0S-NS		U13549E
IE-78K0S-NS-A		To be prepared
CC78K0S C Compiler	Operation	U11816E
	Language	U11817E
RA78K0S Assembler Package	Operation	U11622E
	Language	U11599E
	Structured Assembly Language	U11623E
SM78K0S, SM78K0 System Simulator Ver. 2.10 or Later Windows Based	Operation	U14611E
SM78K Series System Simulator Ver. 2.10 or Later	External Part User Open Interface Specifications	U15006E
ID78K Series Integrated Debugger Ver. 2.30 or Later Windows Based	Operation	This manual
78K/0S Series OS MX78K0S	Fundamental	U12938E

Documents related to development tools (user's manuals) (78K/IV Series)

Document Name		Document No.
IE-78K4-NS		U13356E
CC78K4 C Compiler	Operation	U11572E
	Language	U11571E
RA78K4 Assembler Package	Operation	U11334E
	Language	U11162E
	Structured Assembler Preprocessor	U11743E
SM78K4 System Simulator Windows Based	Reference	U10093E
SM78K Series System Simulator Ver. 1.40 or Later	External Part User Open Interface Specifications	U10092E
ID78K Series Integrated Debugger Ver. 2.30 or Later Windows Based	Operation	This manual
78K/IV Series Real-Time OS	Fundamentals	U10603E
	Installation	U10604E
	Debugger	—
78K/IV Series OS MX78K4	Fundamentals	U11779E

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CHAPTER 1 GENERAL

1.1 Overview

The integrated debuggers for the 78K Series (ID78K0S-NS/ID78K0-NS/ID78K0/ID78K4-NS/ID78K4) are software tools designed to efficiently debug user programs developed for NEC's 78K/0, 78K/0S, and 78K/IV Series of 8-/16-bit microcontrollers for embedded control applications.

This ID78K Series features an easy-to-understand GUI (graphical user interface) on a host machine using Windows as the operating system.

Moreover, the commands that are frequently used are displayed as buttons that can be activated using the mouse, providing an environment with excellent operability.

1.2 Features

The features of the ID78K Series are as follows.

(1) GUI function

The ID78K0 Series runs in a Windows environment and their debugging operations can be controlled with a mouse. Buttons and menus are displayed in each window, and other related information can be selected from the displayed information.

(2) Debugging at source level

Referencing/setting variables and structures, displaying programs, and setting breakpoints can be efficiently performed at source text level by manipulating function names and line numbers.

(3) Debugging at instruction level

Referencing/setting symbols and register values, displaying programs, and setting breakpoints can be efficiently performed at instruction level by manipulating labels and addresses.

(4) Use of in-circuit emulator

Breakpoints can be set and user programs can be traced by using the detailed event setting functions of an in-circuit emulator.

(5) Monitor function (automatic display updating function while execution is stopped)

When execution of the user program is stopped, the values displayed in the window are automatically updated.

(6) Saving/restoring debugging environment

The debugging environment can be saved in a file. The saved environment can be restored, and debugging can be resumed from where the debugging environment was saved.

(7) Function expansion by TIP (Tool Interface Protocol)

By linking up with a task debugger (RD)^{Note}, system performance analyzer (AZ)^{Note}, etc., it is possible to vastly improve the debugging efficiency of applications that use a real-time OS (RX).

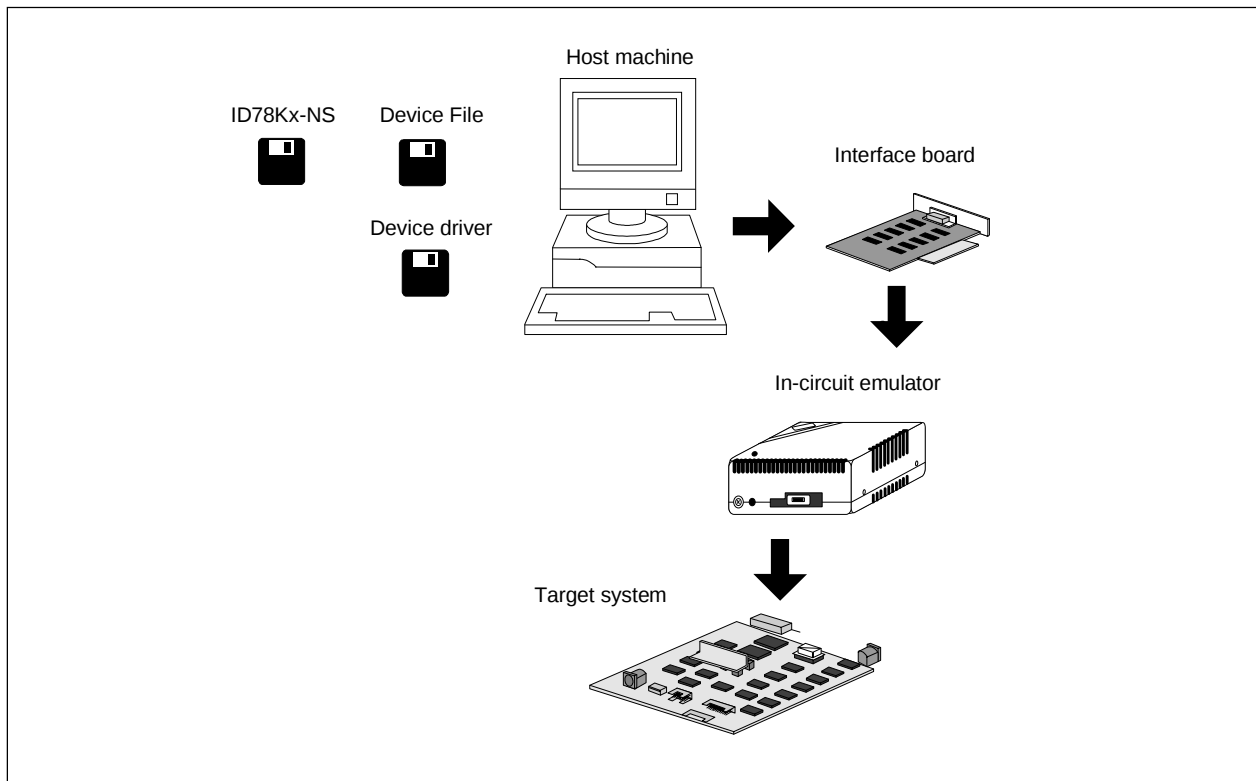
Note Supported only in the ID78K4 (-NS)

1.3 System Configuration

The ID78K Series offers a comfortable debugging environment for user programs and target boards developed for the 78K/0, 78K/0S, and 78K/IV Series by connecting the host machine and the in-circuit emulator via a dedicated parallel interface board.

Figure 1-1 shows an example of the system configuration of the ID78Kx-NS Series.

Figure 1-1. ID78Kx-NS Series System Configuration Example



1.4 Operating Environment

To use the ID78K Series, the following hardware and software environments are necessary.

1.4.1 Hardware environment

(1) Host machine

- PC-9821 series
- PC98-NX series
- IBM PC/AT™ or compatibles

CPU: Pentium™ 100 MHz or more (120 MHz or more is recommended)

Memory: RAM: 32 MB or more (64 MB or more is recommended)

(2) In-circuit emulator

- | | |
|----------------|------------------|
| • For ID78K0 | • For ID78K0-NS |
| • IE-78001-R-A | • IE-78K0-NS |
| | • IE-78K0-NS-A |
| | • For ID78K0S-NS |
| | • IE-78K0S-NS |
| | • IE-78K0S-NS-A |
| • For ID78K4 | • For ID78K4-NS |
| • IE-784000-R | • IE-78K4-NS |

(3) In-circuit emulator optional board

- | | |
|--------------------|---|
| • For ID78K0 | • For ID78K0-NS |
| • IE-780xxx-NS-EMx | <1> Emulation board |
| • IE-78K0-R-EXx | • IE-780xxx-NS-EM1 |
| • IE-780xxx-R-EM | • IE-780xxx-NS-EM4 |
| • IE-78K0-NS-P0x | • IE-78K0-NS-P0x |
| | <2> Performance board (78K/0 Series only) |
| | • IE-78K0-NS-PA |
| | • For ID78K0S-NS |
| | • IE-789xxx-NS-EM1 |
| • For ID78K4 | • For ID78K4-NS |
| • IE-784000-R-EM | • IE-784xxx-NS-EM1 |
| • IE-784xxx-NS-EM1 | |
| • IE-784xxx-R-EM1 | |
| • IE-78K4-R-EXx | |

Caution These optional boards are used in combination with the in-circuit emulator.

(4) Interface board

- IE-70000-98-IF-C (PC-9821 series)
- IE-70000-PC-IF-C (IBM PC/AT or compatibles)
- IE-70000-CD-IF-A
- IE-70000-PCI-IF-A

1.4.2 Software environment

(1) OS

Windows 95, Windows 98, Windows Me, Windows 2000, Windows NT™4.0 (Service Pack 3)

(2) Device file

Device file of target file to be used

(3) Device driver

Device driver for interface board (included with this product)

1.5 Note for Debugging at Source Level

When debugging at the source level, add an option (-g option) that creates debugging information after the source files have been compiled. If this is not done, debugging cannot be performed at the source level.

CHAPTER 2 INSTALLATION

Note that in this chapter, the ID78K0-NS is treated as the representative product. If you are using another product, take the ID78K0-NS as the other product.

Prior to using the ID78K0-NS, it is necessary to install the ID78K0-NS, a device file, and a device driver.
This chapter explains how to install/uninstall the ID78K0-NS.

2.1 Device Driver

Install the device driver according to the "README_E.TXT^{Note}" in the 3.5-inch floppy disk "NEC IE-PC Driver V1.0" or CD-ROM directory "Driver".

Note When using Windows 98, Windows Me, or Windows 2000, follow the same procedure as when using Windows 95.

2.2 Device File

To install the device file, use the "Device file installer" included with this product. Use of this dedicated installer enables installation of the device file in the Win32 environment.

Since the installer "SETUP.EXE" in the device file product disk is for the Win16 environment, it registers the device file information "NECDEV.INI". However, because this product supports the Win32 environment, the device file information must be registered in the registry. It is therefore essential to use the "Device file installer".

An outline of the installation procedure is described below.

- <1> Start up the "Device file installer". When newly installing the device file, click the **Install** button on the display following startup and specify the installation information file "NECSETUP.INI" from the device file product disk.
- <2> If the device file is registered in "NECDEV.INI" and needs to be moved to the Win32 environment, specify "NECDEV.INI" from the DFINST "source selection". Following the specification, select the type displayed in the "Source" list and click the **Move** button. (Note that the FPGA data file (G0XXX.78K) will not be moved automatically and therefore should be copied manually.)
- <3> To uninstall the device file, select the type displayed in the DFINST "registry" list, select "Delete files", and click the **Uninstall** button.

2.3 Installation of ID78K0-NS

2.3.1 Precautions for installation

- <1> Prior to installation, create a backup of the system disks. The computer may need to be restarted after installation, so exit all other applications currently being used.
- <2> Do not install the ID78K0-NS in a directory in which a version of the ID78K0-NS earlier than V2.xx is installed. Since products of an earlier version than V2.xx support Win16, addition of an ID78K0-NS supporting Win32 in the same directory may cause the device to malfunction.
- <3> If reinstalling the ID78K0-NS, be sure to uninstall it first. If the ID78K0-NS has not been uninstalled and is reinstalled in a directory that is different to the one the ID78K0-NS was originally installed in, uninstallation of the originally installed ID78K0-NS may become impossible.
- <4> Do not install the ID78K0-NS in a directory with blank spaces. Related tools, such as the Project Manager, that are to be installed in the same directory as the ID78K0-NS may not operate correctly, depending on their version.
- <5> The file below created following installation is the file used for uninstallation, and therefore should not be deleted (it is assumed that the installation destination is C:\nec tools32).

C:\nec tools32\SETUP*. *

- <6> "comctl32.dll4.72 installation" (40comupd.exe) is registered in the program folder in which the ID78K0-NS is installed. This file is used to update the comctl32.dll file used in the ID78K0-NS. If an application error occurs while in use or problems such as a dialog box not displaying data correctly are experienced, install comctl32.dll using "comctl32.dll4.72 installation". If Windows 98, Windows Me, Windows 2000, or Microsoft Internet Explorer 3.0 or later is installed, installation of comctl32.dll is unnecessary.

2.3.2 Installation procedure

The following describes the method of installing the ID78K0-NS. Here, the installation procedure is explained with "C:\Windows" as the directory in which Windows is installed and "E" as the floppy disk drive.

<1> Turn on power to the host machine (PC-9821 or IBM PC/AT) and start up Windows.

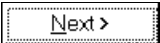
<2> <When CD-ROM used as supply medium>

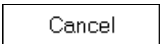
Insert the CD-ROM in the CD-ROM drive. The installer will automatically start.

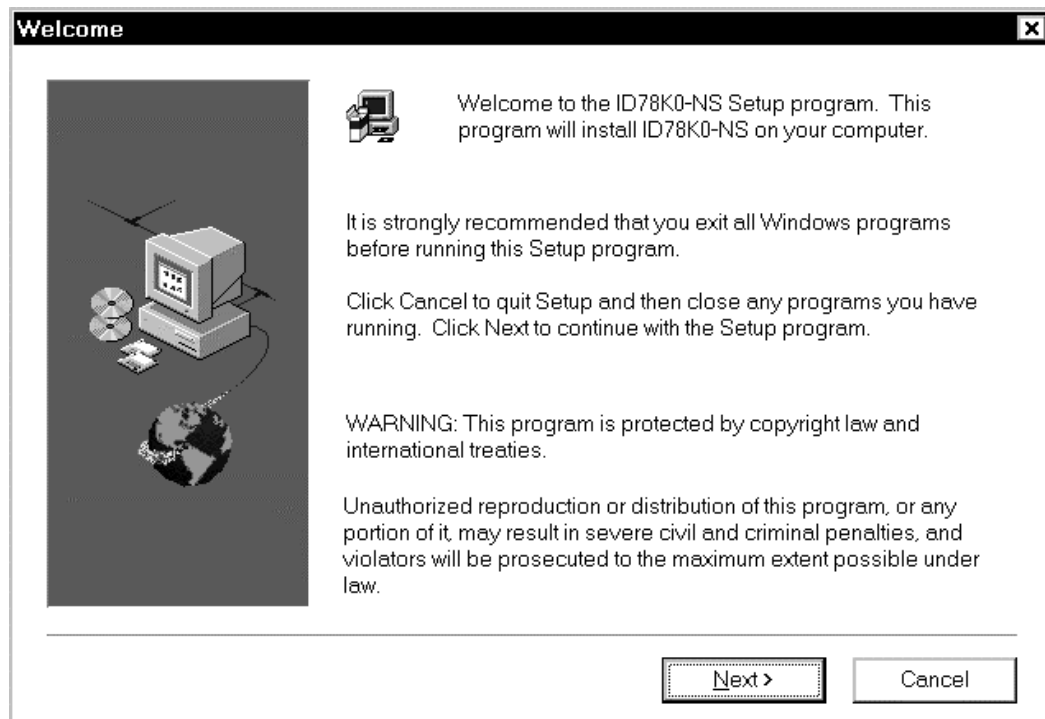
If the installer does not start automatically, start from the directory "DISK1/setup.exe".

<When 3.5-inch floppy disk used as supply medium>

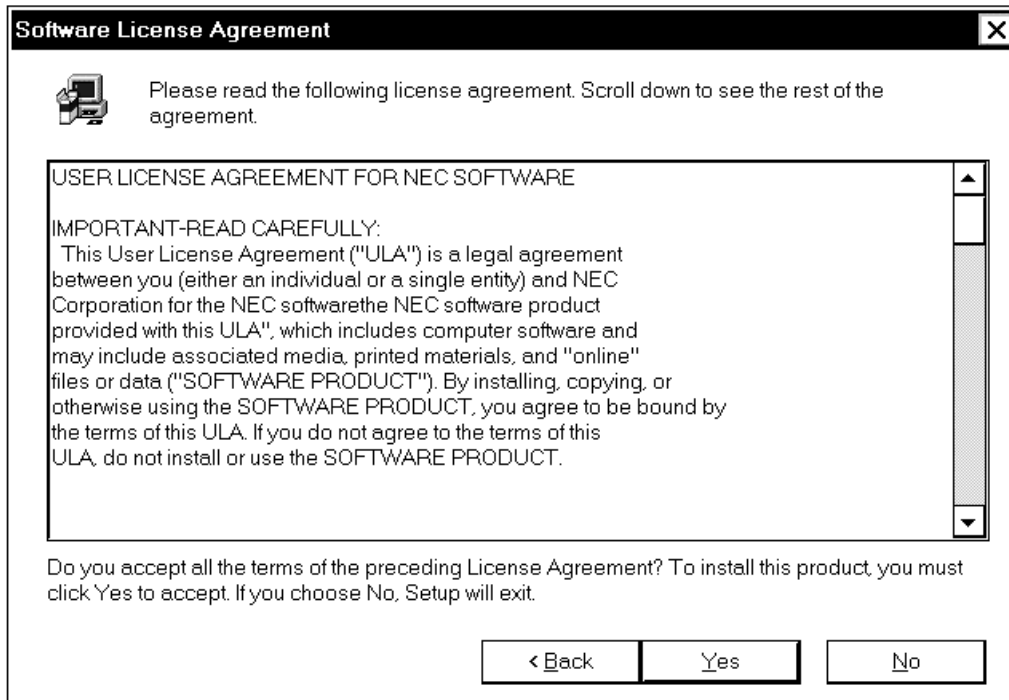
Insert system disk #1 of the ID78K0-NS in the floppy disk drive (A drive) and start the installer "setup.exe".

<3> The setup program is activated following setup initialization. Click .

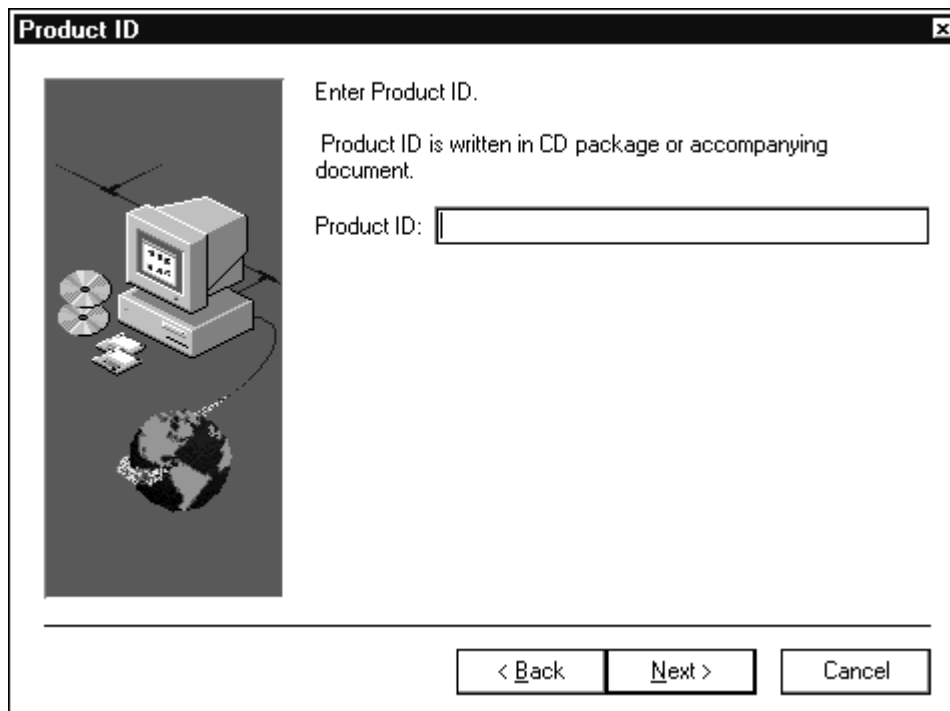
Installation can be terminated by clicking the  button.



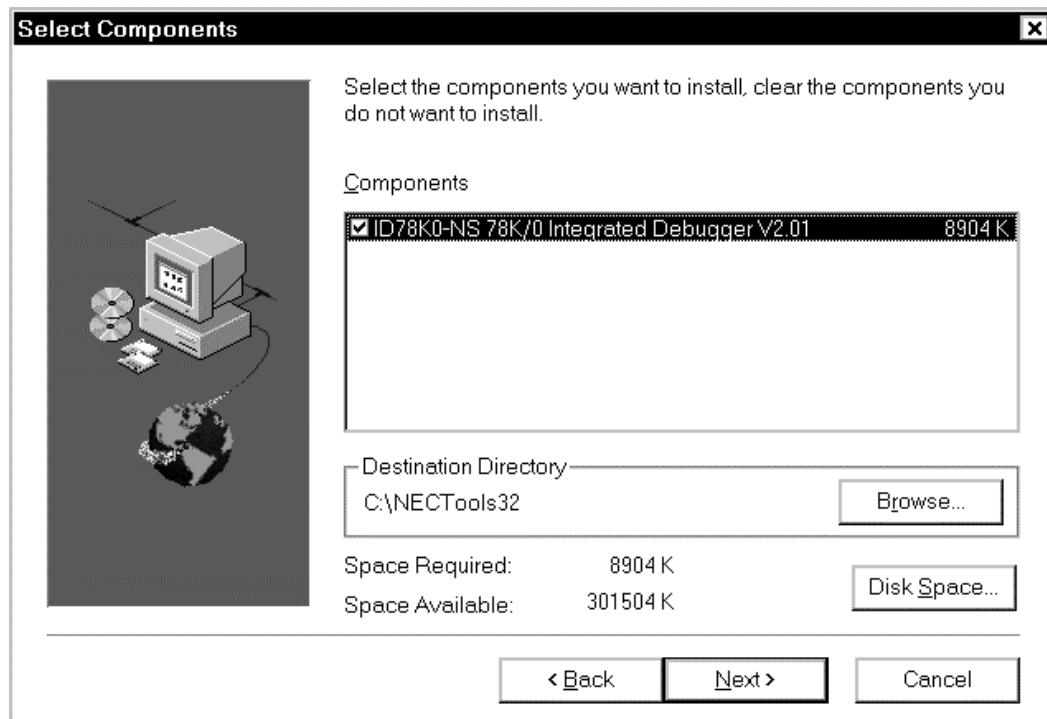
- <4> When installing the ID78K0-NS, click after reading and accepting the terms of the software license agreement. Clicking will abort installation. Click to display the previous screen.



- <5> Input the product ID. The product ID is indicated on the CD case or on the FD.

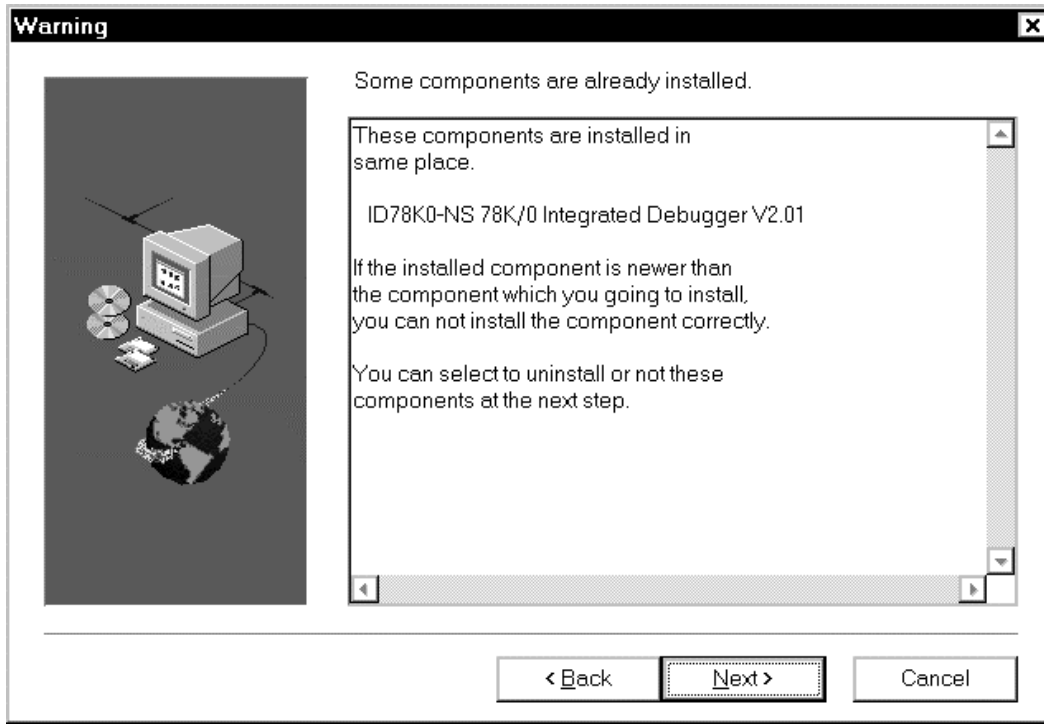


- <6> Select the items to be installed and the destination drive or directory. Clear the check mark from the components that are not to be installed. The default destination drive or directory is C:\nectools32. Bearing in mind relationships with other NEC tools, installation using the default directory is recommended. If there is a problem with the drive or directory, click **Browse...** and make appropriate modifications. After setting each item, click **Next >**. To abort installation, click **Cancel**. Click **< Back** to display the previous screen.



<7> If newly installing an ID78K0-NS or if previously installed ID78K0-NS has already been uninstalled, follow the procedure from <8>.

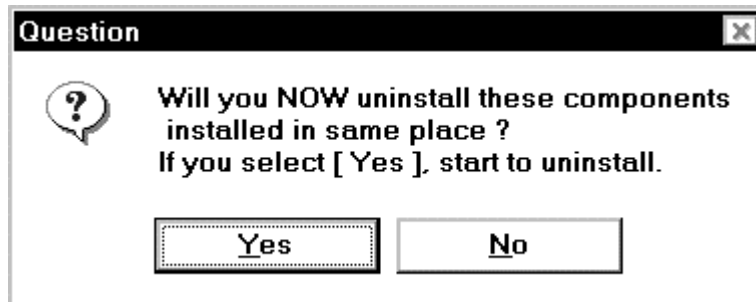
(1) If there is an ID78K0-NS preinstalled in the directory specified by <6>, the following message is displayed.



Click and the following dialog box appears.

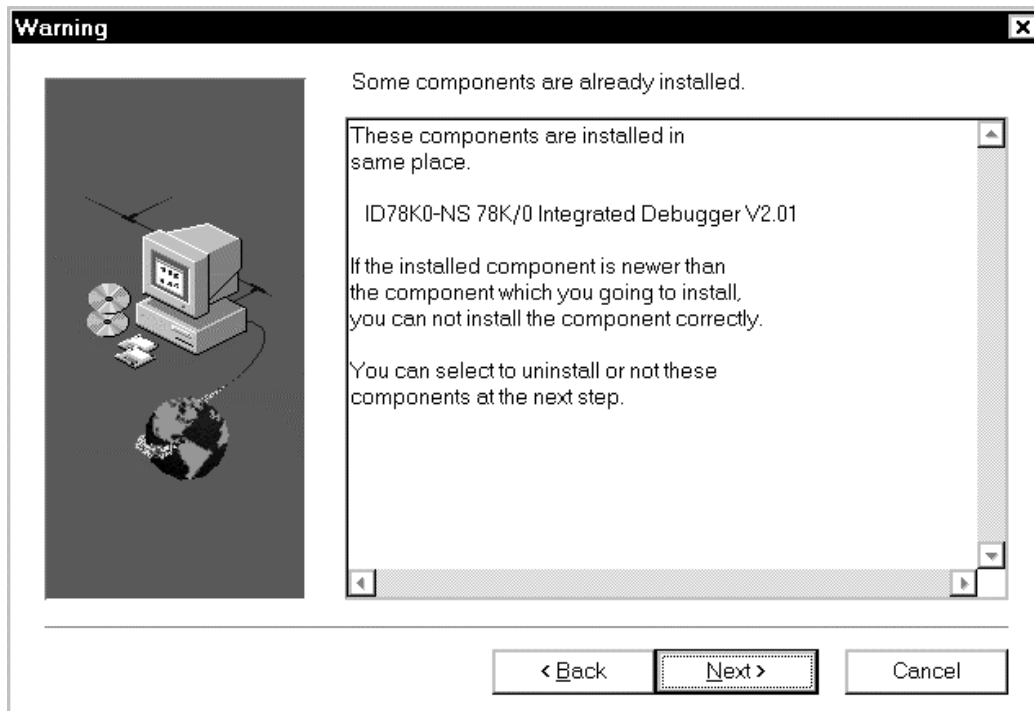
Click to uninstall the ID78K0-NS.

If is selected, uninstallation will not be executed and the procedure shifts to <8>.

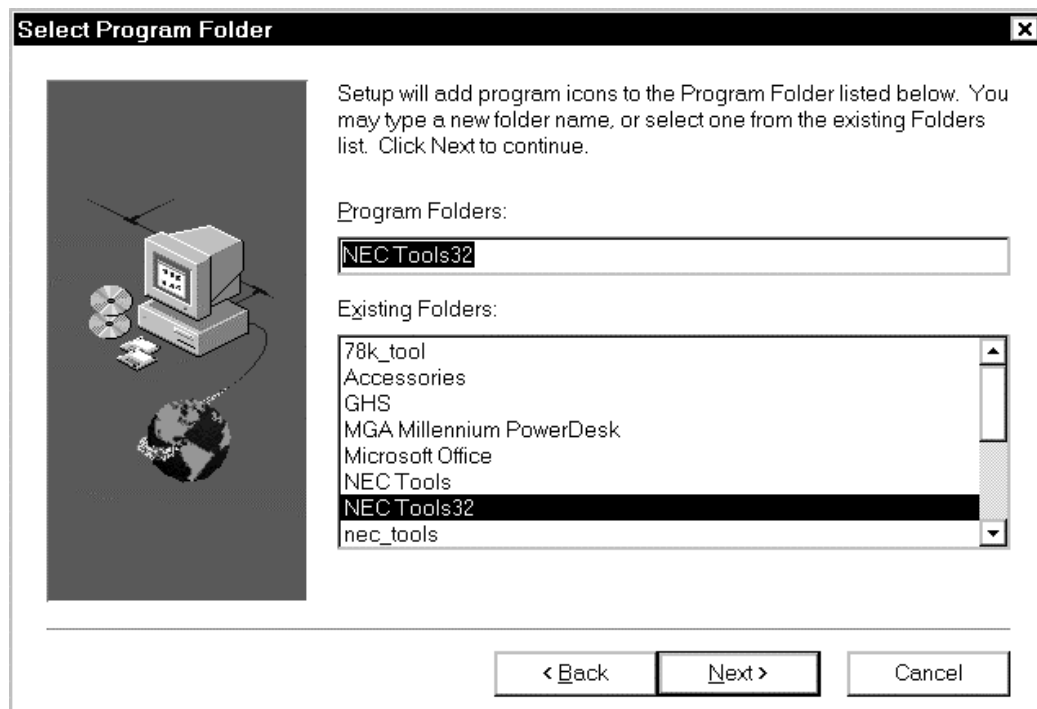


- (2) If the ID78K0-NS is installed in a directory other than a directory specified by <6>, the following message is displayed.

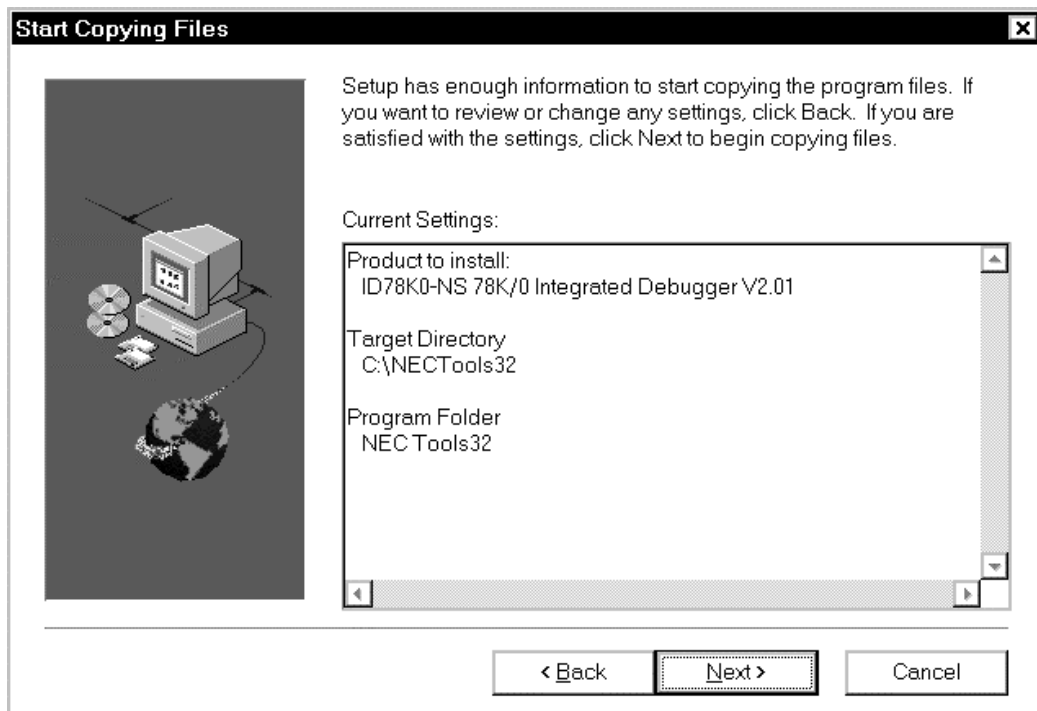
Note that the execution shifts to <8> by clicking **Next >**, in which case the uninstaller will not be activated.



- <8> Specify the name of the folder in which the ID78K0-NS icon is to be registered. The default folder name is "NEC Tools32". After specifying the folder name, click **Next >**. To abort installation, click **Cancel**. Click **< Back** to display the previous screen.



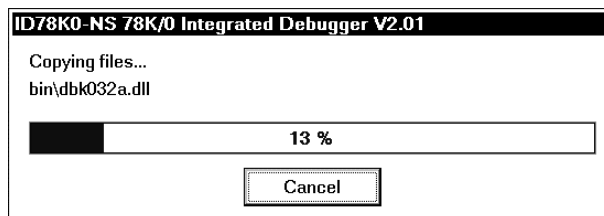
- <9> Final confirmation of installation start is made. Check the settings made in <4> to <8>. If there are no changes to these settings, click . If changes are necessary, click . If there are any problems, click and abort installation.



<10> Start copying files.

<When CD-ROM used as supply medium>

The Change-of-system-disk message will not be displayed. The contents of directory DISK1 to DISK5 are automatically copied.



The installation status is displayed.

<When 3.5-inch floppy disk used as supply medium>

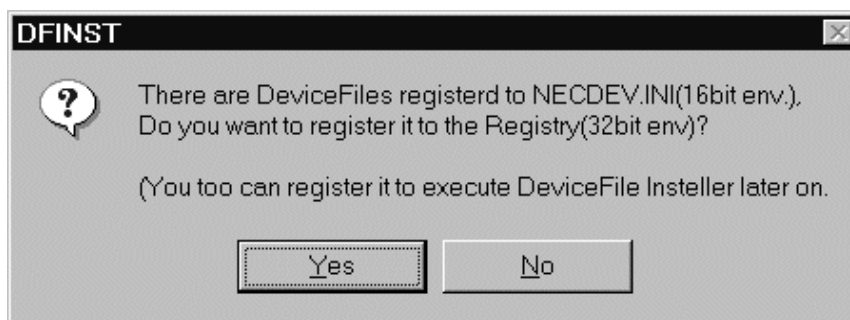
The change-of-system-disk message (Setup Needs the Next Disk) dialog box will open, so after changing the disk, click . This operation is repeated until the insertion of system disk #5.



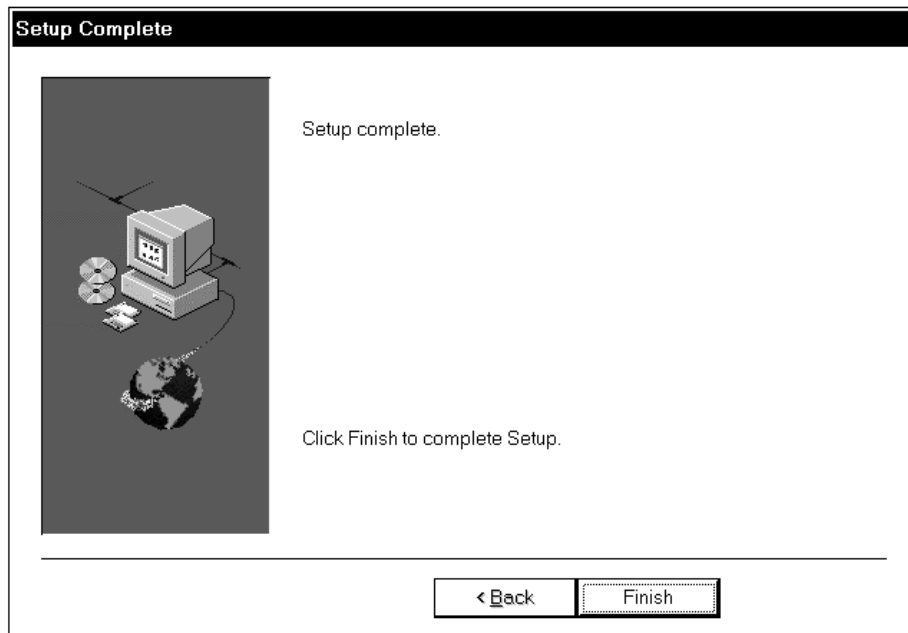
The Change-of-system-disk message will appear during copying.

<11> If an NEC development tool environment for Win16 (default directory: \nectools) does not exist in the host machine used, move to procedure <12>.

If a development tool for Win16 exists in the host machine, the following dialog box appears. Click to move the device file used in the development tool environment for Win16 to the development tool environment for Win32 (this product). If is selected, execute the device file installer "DFINST.EXE" following the installation of the ID78K0-NS to shift the device file. The ID78K0-NS will not operate normally unless the device file is moved.



<12> After the files have been copied, the Setup Complete dialog box will open, so click **Finish**.
Installation of the ID78K0-NS is now complete.



<13> The ID78K0-NS icon will be registered in the folder specified in procedure <8>.



2.4 Uninstalling ID78K0-NS

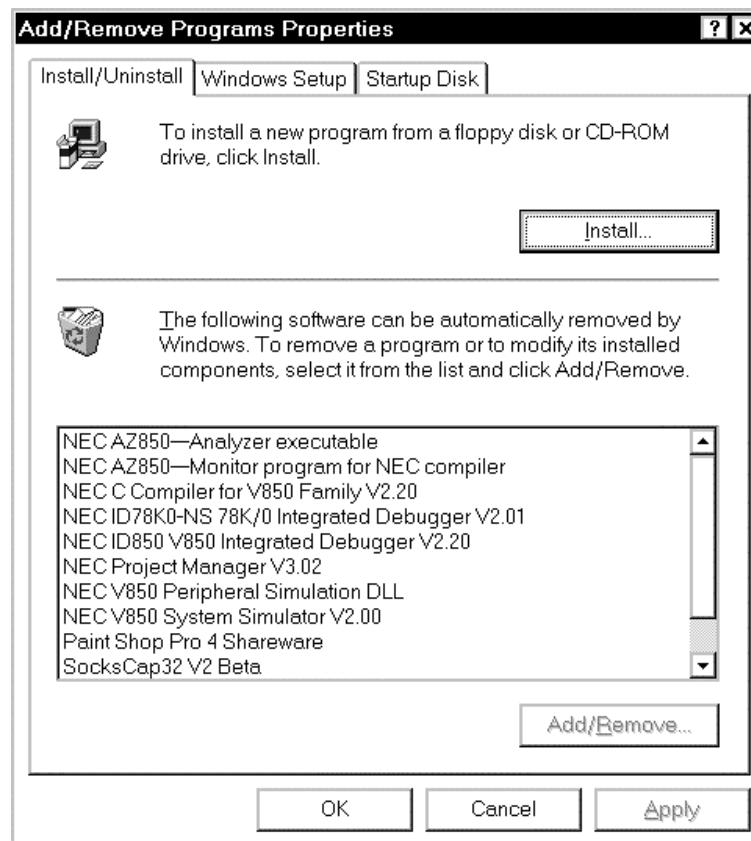
This section explains how to uninstall the ID78K0-NS, using "C:\WINDOWS" as the directory in which Windows is installed.

<1> Turn on power to the host machine (PC-9821 or IBM PC/AT) and start up Windows.

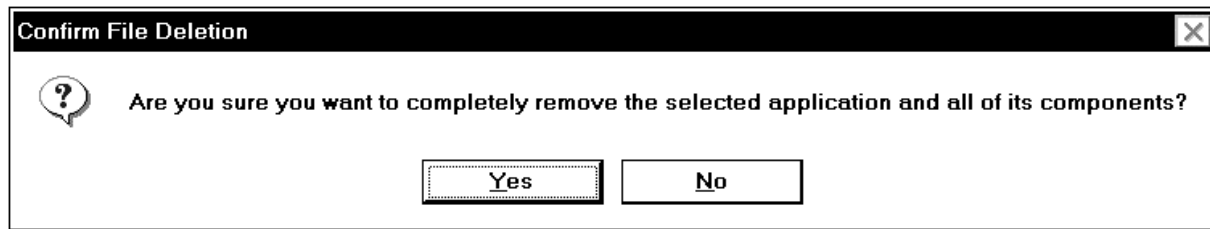
<2> Activate "Add/Remove Programs" from the control panel.



<3> Select "NEC ID78K0-NS 78K/0 Integrated Debugger V2.xx" from the list displayed in "Install/Uninstall" and click .

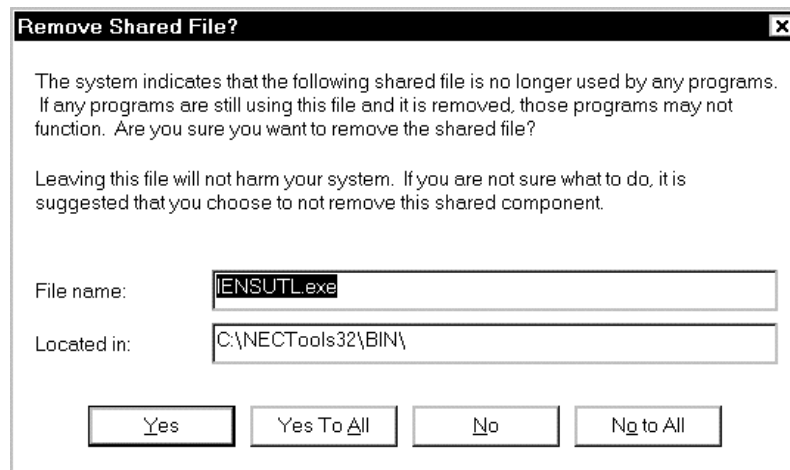


<4> The Confirm File Deletion dialog box will be displayed next, so click .

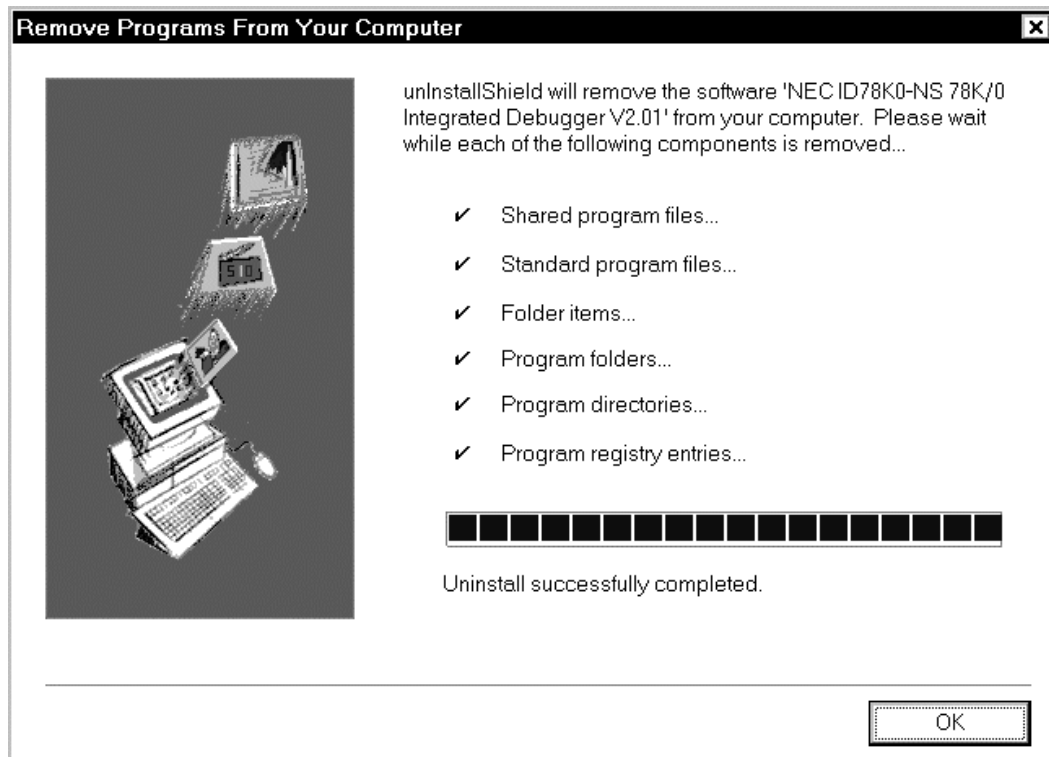


File deletion starts.

<5> The dialog box below will appear during deletion, so click (if is selected and the files are not deleted here, the latest "TIPAD78K0A.DLL" will be overwritten when the ID78K Series is reinstalled).



<6> The program will be deleted. When the message "Uninstall completed" appears, click .



Uninstallation of ID78K0-NS is now complete.

CHAPTER 3 STARTING AND EXITING

Note that in this chapter, the ID78K0-NS is treated as the representative product. If you are using another product, take the ID78K0-NS as the other product.

This chapter explains how to start and exit the ID78K0-NS.

3.1 Starting

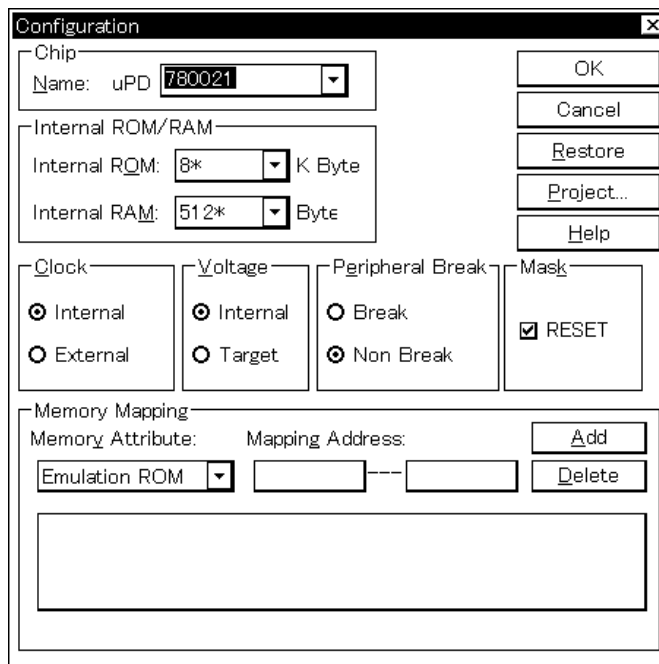
The start method is as follows:

- <1> Turn on power to the in-circuit emulator and target system.
- <2> Start Windows on the PC.
- <3> Double-click the shortcut icon of the ID78K0-NS on the desktop to start up the ID78K0-NS (See **Figure 3-1**).
The Configuration dialog box will be displayed (See **Figure 3-2**).

Figure 3-1. ID78K0-NS Icon

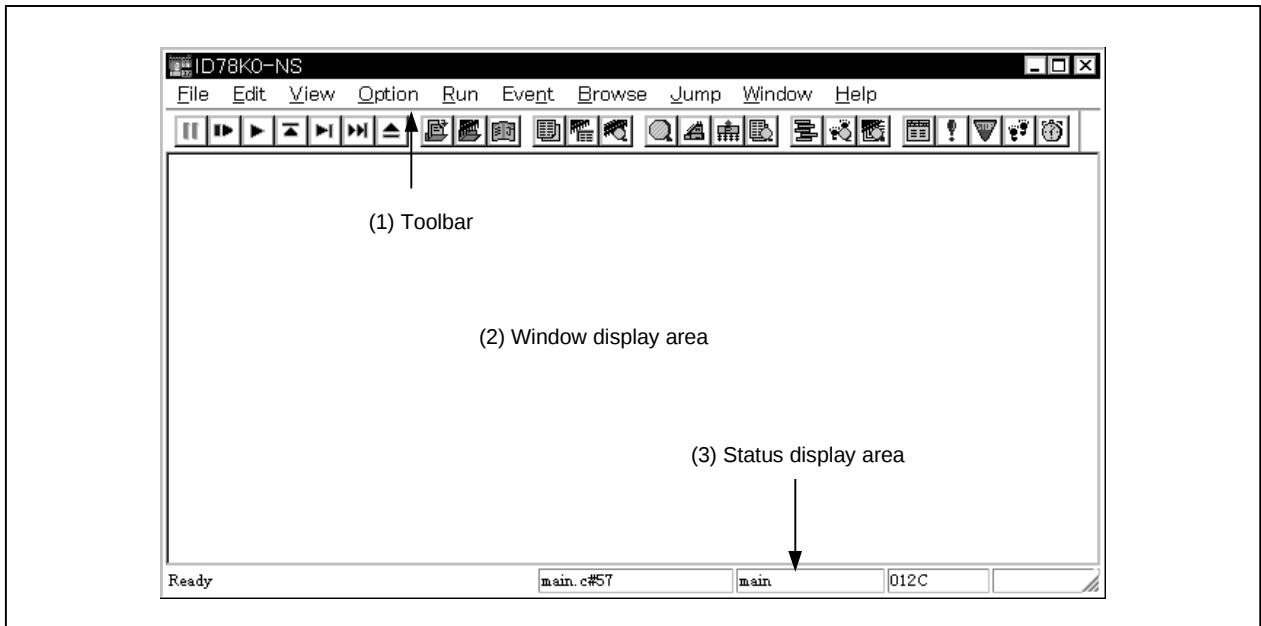


Figure 3-2. Configuration Dialog Box on Starting



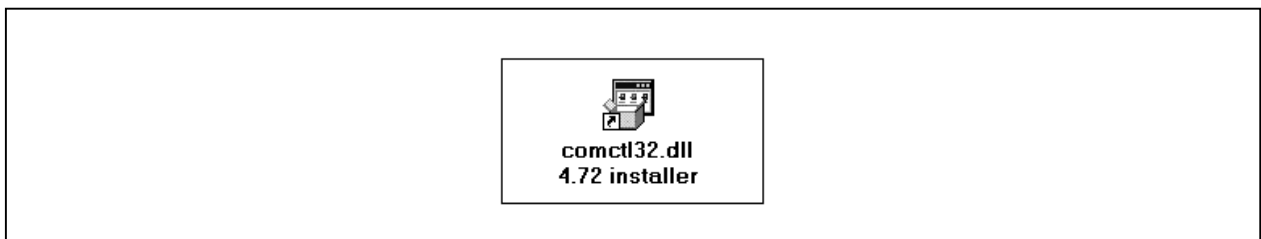
- <4> Operating environment parameters for the ID78K0-NS are set in this dialog box (refer to **CHAPTER 6 WINDOW REFERENCE**). After setting the parameters, click the button in the dialog box.
- <5> The main window will then be opened (See **Figure 3-3**) and the ID78K0-NS can be operated. Debugging operations are all carried out from this window.

Figure 3-3. Main Window



Caution Problems such as dialog boxes not displaying data correctly are sometimes experienced when the ID78K0-NS is started up, or if an application error occurs while in use. One cause of such problems may be that an old version of comctl32.dll, which comes with Windows 95, is being used. If this is the case, it will be necessary to update comctl32.dll using the comctl32.dll 4.72 Installer (40comupd.exe) included with this product. Note that if Windows 98 or Microsoft Internet Explorer 3.X or 4.X has been installed, this update is unnecessary.

Figure 3-4. comctl32.dll 4.72 Installer

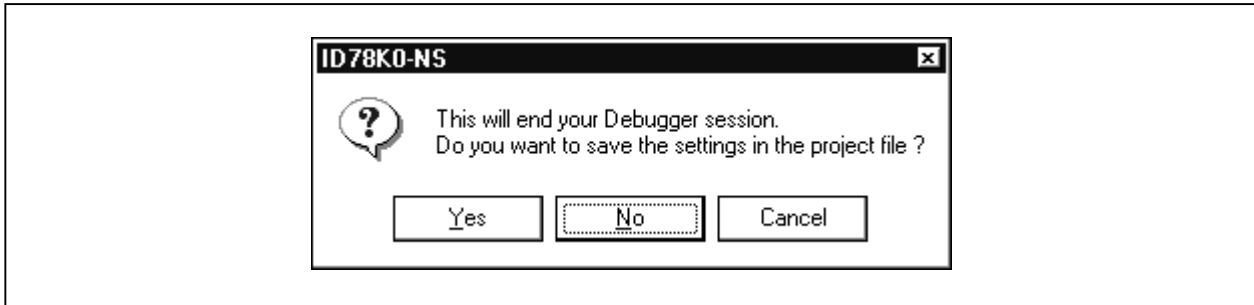


3.2 Exiting

The exit method is as follows:

- <1> In the main window, select [File] → [Exit].
 - The following Exit Debugger dialog box will be displayed.

Figure 3-5. Exit Debugger Dialog Box



- <2> Click the **No** button.
 - If the **Yes** button is clicked, the Save As dialog box is displayed^{Note}, the current debugging environment is saved to the project file, and all the windows are closed.

Note The Save As dialog box is displayed only when a project file name is not determined (otherwise, it is not displayed).

CHAPTER 4 FUNCTIONS OF ID78K SERIES

This chapter explains the basic functions and processing conventions of the ID78K Series.

4.1 Mapping Function

4.1.1 Mapping function of ID78K0-NS (-NS) and ID78K4 (-NS)

The following seven types of mapping functions are available.

These mapping functions are set in the Configuration dialog box (Refer to **CHAPTER 6 WINDOW REFERENCE**).

(1) Internal ROM

The memory area specified as internal ROM is equivalent to the internal ROM of the target device.

If the target device writes data to the memory area, a write protect break occurs.

(2) Internal RAM

The memory area specified as internal RAM is equivalent to the internal RAM of the target device.

In this case, the target device accesses the memory in the in-circuit emulator.

(3) User area mapping (Target)

The memory area specified for user area mapping^{Note} is an area that accesses the memory on the target system.

In this case, the target device accesses the memory on the target system.

Note These memory areas can be set in address areas other than the internal ROM and internal RAM areas.

(4) Emulation ROM

The memory area specified as emulation ROM^{Note} is equivalent to the ROM connected to the target device.

Note These memory areas can be set in address areas other than the internal ROM and internal RAM areas.

(5) Emulation RAM

The memory area specified as emulation RAM^{Note} is equivalent to the RAM connected to the target device.

In this case, the target device accesses the memory in the in-circuit emulator.

Note These memory areas can be set in address areas other than the internal ROM and internal RAM areas.

(6) I/O protect area (I/O Protect)

The I/O protect area can be set in the area specified as Target. This area is displayed in the same manner as an unmapped area on the Memory window (the symbol ?? is displayed). If this area is mapped with this attribute, it can no longer be read or written easily, protecting it from erroneous access from the Memory window.

To read or write a value of the area mapped with this attribute, register in the SFR window or Watch window (Refer to **CHAPTER 6 WINDOW REFERENCE**).

(7) Stack area^{Note}

The area used as a stack area can be set as the stack area. Setting the stack area enables deletion of a "stack overflow error" when data has overflowed from the stack area during program execution.

Note The ID78K4-NS does not support stack mapping.

4.1.2 Mapping functions of ID78K0S-NS

For the ID78K0S-NS, the following type of mapping function is available.

This mapping function is set in the Configuration dialog box (Refer to **CHAPTER 6 WINDOW REFERENCE**).

(1) Stack area

The area used as a stack can be set as the stack area. Setting the stack area enables detection of a "stack overflow error" when data has overflowed from the stack area during program execution.

4.2 Emulation Execution Functions

The emulation execution functions start the execution of the user program and the operation of the tracer and timer by the emulation CPU.

These functions are classified as follows by the execution mode of the user program.

4.2.1 Real-time execution function

Real-time execution can be performed by the following commands.

- Go command ( button)
- Ignore break points and Go command ( button)
- Start command (no button)
- Go & Go command (no button)
- Come command (no button)
- Restart command ( button)
- Return Out command ( button)

(1) Go command (button)

This command executes the user program starting from the address indicated by the current PC register. Execution of the user program is stopped when a specified break event condition is satisfied.

Each analyzer gets ready to operate when the user program is executed, and is executed or stopped depending on whether each event condition (trace event condition, timer event condition, etc.) is satisfied or not.

(2) Ignore break points and Go command (button)

This command executes the user program, ignoring the set break conditions (both hardware and software conditions).

(3) Start command

This command executes the user program starting from a specified address. Execution of the user program is stopped when a specified break event condition is satisfied.

(4) Go & Go command

This command executes the user program starting from the address indicated by the current PC register. Execution of the user program is stopped once if a specified break event condition is satisfied. The contents of each window are updated, and the user program is then executed again starting from the address where it stopped. These operations are repeated until the user issues a Stop command.

(5) Come command

This command executes the user program starting from the address indicated by the current PC register to the address selected in the line/address display area on the Source window or Assemble window (Refer to **CHAPTER 6 WINDOW REFERENCE**), and then a break occurs.

While the user program is being executed by this command, the break event currently set does not occur.

(6) Restart command (button)

This command resets the emulation CPU and then executes the user program starting from address 0.

This operation is the same as when the Go command is executed following reset of the emulation CPU prior to user program execution.

(7) Return Out command (button)

This command executes until execution returns to the calling function.

This command may not operate properly with assembler functions, etc.

4.2.2 Non real-time execution function

Non real-time execution can be performed by using the following commands.

- Step In command ( button)
- Return Out command ( button)
- Next Over command ( button)
- Slowmotion command (no button)

(1) Step In command (button)

The operation performed by this command differs as follows depending on the debugging mode.

(a) “Source level” mode

One line of the source text is executed starting from the current PC register value, and the contents of each window are updated.

(b) “Instruction level” mode

One instruction is executed starting from the current PC register value, and the contents of each window are updated.

(2) Return Out command (button)

This command executes the program in real-time from the current PC register value to the calling source, and updates the contents of each window.

(3) Next Over command (button)

The operation of this command differs depending on the debugging mode.

(a) Source level

Next step execution is performed for one line of the source text from the current PC register value and the contents of each window are updated.

(b) Instruction level

Next step execution is performed for one instruction from the current PC register value and the contents of each window are updated.

(4) Slowmotion command

This command executes one line in the “source level” mode, or one instruction in the “instruction level” mode, starting from the address indicated by the current PC register. The contents of each window are updated each time this command is executed. These operations are repeated until the user issues a Stop command.

4.3 Event Function

An event is a “specific status of the target system” during the execution of the user program, for example “address 0x1000 fetched” and “data written to address 0x1000” showing the specific status of the target system during debugging.

The ID78K Series use these events as action triggers for break, trace, timer measurement, snapshot, DMM event^{Note}, and stub functions. An event function sets, deletes, or references the “specific status of the target system” that triggers an action (debug action) as an “event condition”.

Note The DMM event function is provided only in the ID78K0-NS and ID78K0S-NS.

4.3.1 Using event function

To use an action that is triggered by an event in accordance with the user's debugging aims, the event conditions shown in Table 4-1 must be set.

Table 4-1. Relationship Between Event Conditions and Setting Dialog Box

Event Condition	Setting Dialog Box	Function
Break event condition	Break dialog box	Condition to execute user program or stop operation of tracer and timer
Trace event condition	Trace dialog box	Start/end condition when execution process of user program is saved in trace memory
Timer event condition ^{Note 1}	Timer dialog box	Start/end condition when execution time of user program is measured
Snap event condition ^{Note 1}	Snap Shot dialog box	Trigger condition for executing snapshot
DMM event condition ^{Note 2}	DMM dialog box	Condition to write arbitrary data to specified address when a specified event is established during execution of user program
Stub event condition ^{Note 3}	Stub dialog box	Condition in which execution jumps to specified address if specified event is established.

- Notes**
1. Not supported in the ID78K4-NS
 2. Supported only in the ID78K0-NS and ID78K0S-NS
 3. Supported only in the ID78K4

These event conditions are set by using an “event condition” or “event link condition” alone or in combination.

To use the event function of the ID78K Series, therefore, the necessary “event condition” and “event link condition” are first created, and then the event conditions shown in Table 4-1 are set by using these conditions.

4.3.2 Event conditions

How to create each event condition is explained next.

(1) Creating event conditions

An “event condition” is set in the Event dialog box (Refer to **CHAPTER 6 WINDOW REFERENCE**). An address condition, status condition, data condition, external sense data condition, and access size condition are set in this dialog box. A name is given to the combination of these conditions for registration. The maximum number of event conditions that can be registered in the Event dialog box is 256. The maximum number of event conditions that can be simultaneously used for each event condition is 28 (16 execution events and 12 access events) for the IE-78K0-NS + IE-78K0S-NS-PA, IE-78K0-NS-A, and IE-78K0S-NS-A, 12 (8 execution events and 4 access events) for the IE-78K0-NS and IE-78K0S-NS, 10 (3 execution events and 7 access events) for the IE-784000-R, and 8 (4 execution events and 4 access events) for the IE-78K4-NS.

Table 4-2 lists the contents of each condition that can be set in the Event dialog box.

Table 4-2. Each Condition That Can Be Set in Event Dialog Box

Condition	Contents
Address condition	Uses a specified address or address range as an event. In the ID78K0 (-NS) and ID78K0S-NS, a mask value cannot be set for the specified address. A mask value can only be set for the specified address in the ID78K4 (-NS). To set an address range, an error occurs unless the start address is an even address and the end address is an odd address. Note that bits can also be set (address.bit).
Status condition	Uses a status for an address condition as an event. The status is selected from the following. [ID78K (-NS), ID78K0S-NS] Execution^{Note 1}: Execution of instruction Before Execution^{Note 2}: Execution of instruction (Break before execution) Read: Reading memory Write: Writing memory R/W: Reading/writing memory External Trigger1^{Note 2}: External trigger (1 bit) External Trigger2^{Note 2}: External trigger (ID78K0-NS: 8 bits) (ID-78K0S-NS: 16 bits) [ID78K4 (-NS)] Execution^{Note 1}: Execution of instruction Opcode Fetch: Op code fetch Before Execution: Execution of instruction (break before execution) R/W^{Note 3}: Reading/writing memory Read^{Note 3}: Reading memory Write^{Note 3}: Writing memory R/W by Macro: Data read/write by macro service Read by Macro: Data read by macro service Write by Macro: Data write by macro service R/W by Program: Data read/write by program Read by Program: Data read by program Write by Program: Data write by program Vector Read: Vector read by interrupt Access: All accesses External Trigger: External trigger (1 bit)
Data condition	Uses the data detected by a status condition as an event. A mask value can be set for the data.
External sense data condition	Uses the data of the external probe signal as an event. A mask value can be set for an external sense data condition.

Notes 1. If Execution is selected as the status condition, the address mask, data, data mask, and access size conditions are invalid.

2. Not supported in the ID78K0

3. Not supported in the ID78K4

(2) Event condition type

Event conditions are classified into the three event types shown in the table below. These event types are automatically determined by selecting the desired status condition when creating an event condition.

Table 4-3 lists the event condition types.

Table 4-3. Event Condition Types

[ID78K (-NS), ID78K0S-NS]

Event Type	Status	Function
Execution event	Execution Before Execution External Trigger1 External Trigger2	Event condition is satisfied when user program begins execution of instruction at specified address and when data is input to external sense clip at that time. Up to 18 event conditions of this type can be used for each event condition.
Access event	Program Read Program Write Program R/W	When the user program accesses specified memory, up to 12 event conditions of this type can be used for each event condition.

[ID78K4 (-NS)]

Event Type	Status	Function
Execution event	Execution	An event condition is satisfied when the user program attempts to execute an instruction at the specified address and when data is input to an external sense clip at that time. Up to 18 event conditions of this type can be used for each event condition.
Access event	Opcode Fetch Before Execution R/W ^{Note} Read ^{Note} Write ^{Note} R/W by Macro Read by Macro Write by Macro R/W by Program Read by Program Write by Program Vector Read Access External Trigger ^{Note}	When the user program accesses specified memory, up to 12 event conditions of this type can be used for each event condition.

Note Not supported in the ID78K4

(3) Creating event link condition

An “event link condition” is a condition under which a sequential rule is applied to the respective events to treat the events as a single event. An event link condition is created in the Event Link dialog box (Refer to **CHAPTER 6 WINDOW REFERENCE**). By arranging the event conditions first registered in the Event dialog box in random order in the Event Link dialog box, these event conditions can be registered under one name as single event link condition. The registered event link condition can be used to set various event conditions in the same manner as event conditions.

The maximum number of event link conditions that can be set in the Event Link dialog box is 256. However, up to three event conditions can be simultaneously used in the ID78K0-NS and ID78K0S-NS, and up to two event conditions can be used in the ID78K4. Only one event condition can be used in the ID78K0 and ID78K4-NS.

(4) Displaying setting status of event condition

All the registered event conditions and event link conditions are managed or displayed in the Event Manager (Refer to **CHAPTER 6 WINDOW REFERENCE**). The setting status of all the event conditions created by using the event conditions or event link condition are also managed or displayed in the Event Manager.

In the Event Manager (Refer to **CHAPTER 6 WINDOW REFERENCE**), a mark indicating the type of each event condition, and an icon indicating an event name specified for registration are displayed.

(5) Setting each event condition

The event conditions shown in Table 4-1 are created in each setting dialog box. Each event condition is created by dragging the event condition registered in the Event Manager, or the icon of an event link condition, to the condition item in each setting dialog box.

A created event condition is “set” by clicking the function button or in the setting dialog box, or by clicking the mark of the event icon in the Event Manager and display it in red. By setting a created event condition, a debug action occurs as an event condition.

For all the event conditions it is possible to “register” up to 256 conditions, but the number of conditions that can be “set” differs depending on each event condition.

4.4 Break Functions

The break functions stop the execution of the user program and the operation of the tracer and timer by the emulation CPU.

The following six types of break functions are available.

- Event detection break
- Break by Come function
- Software break
- Break on satisfaction of condition during step execution
- Forced break
- Fail-safe break

When the Come, Step In, Return Out, or Next Over command of the emulation execution functions is executed, event detection break and detection of software break are not performed.

Each break function is explained below.

(1) Event detection break

An event detection break is a function to stop the execution of the user program by detecting a set break event condition. This function is used to stop a user program executed by the Go, Go & Go, and Restart commands.

When the Go & Go command has been executed, the contents of each window are updated and the user program is then executed again after an event detection break has been implemented. Set break events as follows:

- Set a break event in the Source window or Assemble window as an execution event.
- Set a break event in the Break dialog box (refer to **CHAPTER 6 WINDOW REFERENCE**).

(2) Break by Come function

The break by Come function is a function to stop a user program executed by the Come command by detecting an address specified in the Source window or Assemble window. After user program execution has been stopped, the breakpoint by Come function is eliminated.

While the user program is being executed using this function, the currently set break event does not occur.

(3) Software break

A software break is a function to stop a user program executed by the Go, Go & Go, or Restart command, by detecting a specified address.

While event detection breaks use one hardware resource for one event condition, a software break can set a breakpoint to two or more addresses.

(4) Break on satisfaction of condition during step execution

This is a function to stop the execution of the user program when the end condition of each command (Step In, Next Over, Return Out, or Slowmotion) is satisfied.

Because one instruction at a time is executed, stopped, and condition checked, the processing time of this function is slower than that of real-time execution.

(5) Forced break

A forced break is a function to forcibly stop the execution of the user program. This function is valid for all the program execution commands. A forced break is implemented by the following command.

- Stop command
Forcibly stops the execution of the user program.

(6) Fail-safe break

A fail-safe break is a function to forcibly stop the user program when there has been an execution prohibiting the user program from accessing the memory and registers.

The following three types of fail-safe break functions are available.

(a) Non-map break

This break occurs if an attempt is made to access non-mapping area.

(b) Write-protect break

This break occurs if an attempt is made to write to memory that must not be written to, such as ROM.

(c) SFR illegal access break

This break occurs if an attempt is made to access an SFR illegally.

If a fail-safe break occurs, the chances are the user program has a problem or the set environment of the ID78K Series is wrong.

Caution A non-map break may occur if the user program is written in the vicinity of the boundary between the mapping area and non-mapping area. This non-map break occurs in the following case.

$$[\text{Maximum address value of mapping area} - 5] \leq [\text{Program address}] \leq [\text{Maximum address value of mapping area}]$$

4.5 Trace Function

The trace function is to save the history of the data indicating the execution process of the user program in the trace memory. The trace data saved in the trace memory can be displayed on the Trace View window (refer to **CHAPTER 6 WINDOW REFERENCE**).

The functions related to the trace operation and trace are explained below.

4.5.1 Operation of trace

The trace memory of the ID78K0 (-NS) and ID78K0S-NS is a ring buffer with a capacity of 8,192 frames, and that of the ID78K4 (-NS) is a ring buffer with a capacity of 32,768 frames. If trace is executed exceeding these frame limits, therefore, the newest frame data overwrites the oldest frame.

The operation of the tracer differs as follows depending on the execution mode of the user program.

(1) Operation during real-time execution

The operation of the tracer differs depending on the specified trace mode.

Trace Mode	Operation of Tracer
All trace	Starts trace when real-time execution of program is specified, and ends trace when break occurs
Conditional trace	Starts/ends trace when condition set on Trace dialog box is satisfied (if break occurs before that, however, trace is immediately stopped)

(2) Operation during Step In execution

The tracer operates each time one step is executed, and the trace data of one step is consecutively added to the trace memory.

(3) Operation during Next Over execution

The operation of the tracer is the same as in Step In execution.

4.5.2 Trace condition setting function

The setting function of a trace condition is as follows.

(1) Setting of trace mode

The following two trace modes can be set.

Trace Mode	Trace Contents
All trace	Unconditionally traces all execution processes of user program (default)
Conditional trace	Traces only specified zone

These trace modes are set by selecting [Run] from the main window (refer to **CHAPTER 6 WINDOW REFERENCE**) followed by [Uncond. Trace ON]/[Cond. Trace ON].

To stop the tracer function, select [Run] from the main window, followed by [Tra~~c~~er Stop] (this is valid only when [Ignore Break Point] under [Run] in the main window has been checked).

(2) Setting trace event condition

A trace event condition is a condition under which trace execution is started/ended if the conditional trace is selected as the trace mode.

The trace event condition can be set on the Trace dialog box (refer to **CHAPTER 6 WINDOW REFERENCE**). Up to 256 trace event conditions can be registered, of which only one (ten in the ID78K4) can be set.

The following two modes can be selected for the conditional trace.

(a) Section trace

In this mode, trace is started when a specified trace start condition is satisfied, and ends when a specified trace end condition is satisfied. As a start/end condition, an event condition or event link condition is used.

(b) Qualify trace

In this mode, trace is executed only when a specified address is executed or accessed. An event condition is used as the event trigger.

4.5.3 Trace result display function

The result of a trace can be checked in the Trace View window (refer to **CHAPTER 6 WINDOW REFERENCE**). The Trace View window displays each frame of the trace contents of the following items shown in Table 4-4.

Table 4-4. Trace Data Display Contents

Displayed Item	Contents
Frame	Frame number of trace memory indicating time sequence
Time ^{Note}	Execution time of each frame
Address	Fetch address
Data	Fetch data
Status	Fetch status
Address	Access address
Data	Access data
Status	Access status
Ext Probe ^{Note}	Input data of external sense clip
DisAsm	Disassemble result

Note Not supported in the ID78K4-NS

Displayed Item and Contents can be selected by opening the Trace Data Select dialog box under [View] → [Select...] in the main window.

4.6 Coverage Measurement Function (Other than ID78K4-NS)

The coverage measurement function is for registering a status for each address when the user program is executed. The ID78K0-NS and ID78K0S-NS have a coverage memory of 64 KB and can measure any 64 KB space. In the ID78K4, a 1 MB space of 0 to FFFFFH can be measured.

Coverage measurement can be performed by selecting [Option] → [Coverage ON] in the main window, and the measurements are recorded in the coverage memory when a program is executed.

The result of coverage can be checked in the Coverage window. The coverage efficiency can be displayed in the Coverage-Efficiency View dialog box.

4.7 Snapshot Function (Other than ID78K4-NS)

The snapshot function is used to preserve the contents of register memory in the course of user program execution and the contents of the SFRs in the trace memory as snap data.

A trigger that executes this snapshot is specified by a snap event condition. The snap event condition is set in the Snap Shot dialog box. When the snap event condition set in this dialog box is satisfied, the following data can be collected as snap data.

- Register values (program registers and system registers)
- SFR values
- Memory contents

One snap event condition can be specified to collect snap data up to 16 times.

4.8 Load/Save Functions

The load/save functions are for loading load modules and symbol information, and loading/saving data and debugging environments.

The ID78K Series individually loads/saves each file. The following two types of files are loaded/saved.

- **Display files:** Files recording the screen information when they are saved. By loading these files, the reference file is opened in the Source window.
- **Information files:** Files recording various set data and debugging environments as the internal information of the ID78K Series.

4.8.1 Display files

Table 4-5 lists the display files handled by the ID78K Series.

Table 4-5. Display Files Handled by ID78K Series

File Name (Extension)	Outline	Operation Window
Variable display file (.WCH)	Shows variable information in Watch window	View File Load dialog box, View File Save dialog box
Assemble display file (.DIS)	Shows assemble information in Assemble window	
Memory display file (.MEM)	Shows memory information in Memory window	
Register display file (.REG)	Shows register information in Register window	
Stack trace display file (.STK)	Shows stack trace information in Stack window	
SFR display file (.SFR)	Shows SFR information in SFR window	
Local variable display file (.LOC)	Shows local variable information in Local Variable window	
Trace display file (.TVW)	Shows trace information in Trace View window	
Coverage display file ^{Note} (.COV)	Shows coverage information in Coverage window	
Source display file (.SVW)	Shows text information in Source window	

Note Not supported in the ID78K4-NS

4.8.2 Information files

Table 4-6 lists the information files handled by the ID78K Series.

Table 4-6. Information Files Handled by ID78K Series

File Name (Extension)	Outline	Operation Window
Object file (.HEX)	Stores object code of user program	Download dialog box Upload dialog box
Load module file (.LNK, .LMF, .D2B ^{Note 1})	Stores object code of user program, symbol, and source information	Download dialog box
Project file (.PRJ)	Stores debugging environment	Project File Load dialog box Project File Save dialog box
Binary file (.BIN)	Stores data of binary format	Download dialog box Upload dialog box
Event set file (.EVN)	Stores event set information of Event Manager	View File Load dialog box View File Save dialog box
Coverage result file ^{Note 2} (.CVB)	Stores coverage result	Download dialog box Upload dialog box

Notes 1. “.D35” in ID78K4 (-NS)

2. Not supported in the ID78K4-NS

The project file sets window/dialog box display information, size, and display area when it is loaded to restore the previous debugging environment (the status when the project file was saved).

4.9 Register Manipulation Functions

The register manipulation functions are for displaying or changing the contents of the 78K/0 Series and 78K/0S Series microprocessors' program registers (PC and rp0 to rp3), system registers (SP and PSW) (program registers (rp0 to 7) and system registers (PC, SP, and PSW) for the 78K/IV Series), and SFRs. These functions can be used in the Register window or SFR window (refer to **CHAPTER 6 WINDOW REFERENCE**).

4.10 Memory Manipulation Functions

The memory manipulation functions are for displaying or changing the contents of the memory by using mnemonic, hexadecimal, and ASCII codes. These functions can be used in the Memory window or Assemble window (refer to **CHAPTER 6 WINDOW REFERENCE**).

4.11 Time Measurement Function

The time measurement function is for measuring the total execution time from the start of execution of the user program to the end, and the execution time in a certain zone of the user program by using timer event.

Only Run-Break can be executed in the ID78K0.

In the ID78K4-NS, the time of the zone set for zone trace can be measured.

This function can be used in the Timer dialog box (refer to **CHAPTER 6 WINDOW REFERENCE**).

Caution The number of usable timers is 1.

4.12 Real-Time RAM Sampling Function

The real-time RAM sampling function reads the memory contents in real time and updates the displayed contents when a variable allocated to any 1 KB in internal RAM area, whose contents can be read even during execution of the user program, is displayed (Variable window) or the memory contents are displayed (Memory window).

In the ID78K4-NS, RRM can be executed only in the internal high-speed RAM (IRAM).

In the ID78K4, RRM can be executed in the internal high-speed RAM (IRAM) and internal peripheral RAM (PRAM). However, the values of ROM/RAM in the entire memory space can be read, stopping the program temporarily, depending on the setting of the Extended Option setting dialog box (pseudo-RRM function)^{Note}.

The sampling time for real-time RAM sampling can be set in units of 1 ms in the Extended Option dialog box (refer to **CHAPTER 6 WINDOW REFERENCE**).

Note The pseudo-RRM function is supported in Ver.2.30 or later.

CHAPTER 5 ASSOCIATION WITH PROJECT MANAGER

This chapter explains the procedure and notes on using the functions associated with the Project Manager (PM hereafter). The ID78K Series can automatically perform a sequence of tasks such as creating a program, compiling, debugging, and correcting the program, in association with the PM.

To debug a load module file created in the PM at the source level, confirm that the item [Option] → [Debug] is checked for building.

Caution When a load module file is created by using an MS-DOS™ prompt, the functions of the ID78K Series associated with the PM cannot be used.

5.1 Debugger Registration in PM Project

Either of the debuggers for ID78K Series/SM78K Series can be specified for each project in the PM.

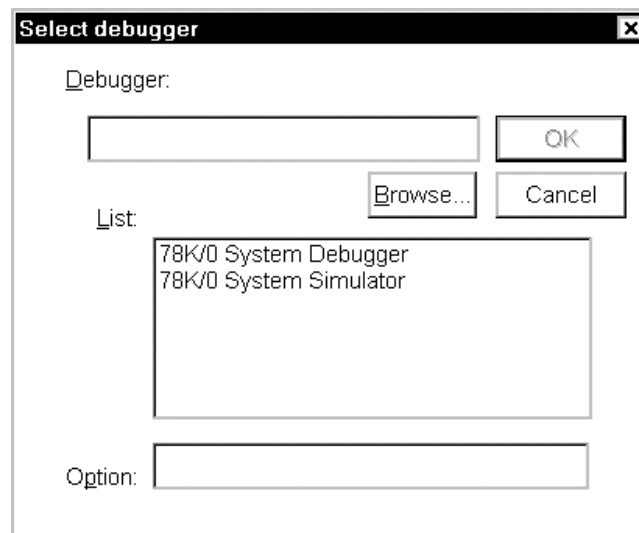
The selection procedure is explained below (the ID78K0-NS is treated as the representative product in the following explanation).

5.1.1 Debugger selection

The procedure for selecting the debugger is as follows.

- <1> Select [Project] → [New] in the PM to create a new project for the PM. Alternatively, read an existing PM project by selecting [Project] → [Open...].
→ For details of the setting items, refer to the PM online help or user's manual.
- <2> Select [Option] → [Select Debugger...] from the PM menu bar.
→ This opens the Select Debugger Type dialog box. Figure 5-1 shows the Select Debugger Type dialog box.

Figure 5-1. Select Debugger Type Dialog Box (PM)



- <3> Either click “78K/0 System Debugger” by mouse from the debugger list, or specify the execution file name IDK032A.EXE (with path) for the debugger file name.
- <4> Click OK.
 - ID78K0-NS will now be registered as the project debugger of the open PM.
 - The ID78K0-NS icon will also be displayed on the PM toolbar.

5.2 Starting Up ID78K Series from PM

One of the following three methods can be used to start up the ID78K Series from the PM.

- (1) Click the ID78K Series startup button on the PM toolbar.
- (2) Select [Build] → [Debug] from the PM menu bar.
- (3) Select [Build] → [Build and Debug] from the PM menu bar. Alternatively, click the batch-processing button on the PM toolbar (however, the ID78K Series will start up only if Build has finished normally).

5.2.1 Reproducing debug environment

By following the procedure shown below, it is possible to reproduce the debug environment of the previous time the ID78K Series was started up from the PM.

- <1> Create a new project file^{Note} with the PM (eg: aaa.prj)

Note Use the project file to save and reference the environment data for the debugger (ID78K Series) and the PM. The project file extension when dealing with the debugger and PM is prj. Refer to the online help or user's manual of each product regarding the data that is saved and reproduced using a project file.

- <2> Start up the ID78K Series from the PM. Because the project file is new, set items other than the device classification in the Configuration dialog box, in the same way as when starting up the ID78K Series individually.
- <3> Debug the target device with the ID78K Series.
- <4> When the ID78K Series has finished debugging, click the button in the Exit Debugger dialog box and exit the ID78K Series.
 - The debug environment at the completion of ID78K Series debugging is saved to the aaa.prj file (the debug environment can also be saved to the aaa.prj file at times other than the completion of ID78K Series debugging).
- <5> When the ID78K Series is next started up after the aaa.prj file is read by the PM, the debug environment saved in <4> above is automatically reproduced.
 - The project file currently being used by the PM (aaa.prj) is automatically read when the ID78K Series is started up.

5.3 Correction and Auto Load of Source File

If a bug is found as a result of debugging using the ID78K Series, source file editing, compiling, and re-downloading can be automatically executed using the following procedure while the ID78K Series remains activated (the ID78K0-NS is treated as the representative product in the following explanation).

Caution If [Option] → [Project Manager Options...] is selected in the PM, and if an editor other than the standard editor is selected, this processing cannot be performed.

- <1> Read the source file to be corrected with the ID78K0-NS in the Source window. With the Source window displayed at the foremost position, select [File] → [Open...] on the main window to specify the corresponding file (if the corresponding file has already been displayed in the Source window, activate the window).
→ The corresponding file is displayed in the Source window.
- <2> Select [Edit] → [Edit Source] in the ID78K0-NS main window.
→ The corresponding source file is automatically read to the standard editor and opened.
- <3> Correct the source file in the editor.
- <4> Select [File] → [Save] in the editor and save the file.
- <5> Select [File] → [Exit idea-L] in the editor to terminate the editor.
→ As a result, the PM automatically executes compiling, assembling, and linking in accordance with the settings of the project. When these operations have been completed normally, the created load module file is automatically downloaded to the ID78K0-NS.

- Cautions**
1. When the load module file is automatically downloaded, CPU reset is not executed.
 2. The debug window, which was opened when the editor was called, and all event settings are restored. However, if the previously used lines and symbols have been deleted because of source file correction, an error message is displayed, and an event using the deleted symbol cannot be used.

CHAPTER 6 WINDOW REFERENCE

This chapter explains in detail the functions of the windows and dialog boxes of the ID78K Series. For the configuration and details of the types of the windows and dialog boxes, refer to **APPENDIX B TERMINOLOGY**.

6.1 Window List

Table 6-1 lists the windows of the ID78K Series debugger.

Table 6-1. Windows of ID78K Series Debugger (1/2)

Window Name	Outline	Page
Main window	This window is displayed first when the debugger is started. It controls execution of the user program. In addition, various windows are opened from this window.	p.60
Configuration dialog box	Sets/displays the debugger environment	p.86
Bank Set dialog box	Sets the memory banks	p.92
Mask Option dialog box	Sets the mask options	p.95
Extended Option dialog box	Sets/displays each extended option	p.97
Debugger Option dialog box	Sets/displays each option	p.103
Font dialog box	Sets the type and size of the display font in the Source window	p.111
Project File Load dialog box	Reads debugging environment	p.114
Project File Save dialog box	Saves the debugging environment	p.117
View File Load dialog box	Reads the display files of each window and the source text and event setting files	p.121
View File Save dialog box	Saves the display files of the current window and the event setting files	p.124
Download dialog box	Downloads the object files, binary files, and coverage results	p.130
Upload dialog box	Saves the memory or coverage contents to a file	p.134
Browse dialog box	Selects the files to be set in the Debugger Option and Source Search dialog boxes	p.137
Source Move dialog box	Specifies the files to be displayed in the Source window and the display start position	p.139
Address Move dialog box	Specifies the display start address for the Memory, Assemble, and Coverage windows	p.142
Trace Move dialog box	Specifies the display start position for the Trace View window	p.145
Symbol To Address dialog box	Displays the addresses and symbol values of variables and functions	p.148
Source window	Displays source files and text files	p.151
Source Search dialog box	Searches a character string in a source file	p.164
Assemble window	Displays the disassemble text and executes on-line assemble	p.167
Assemble Search dialog box	Searches the contents of the Assemble window	p.178
Memory window	Displays/changes the memory contents	p.181
Memory Search dialog box	Searches the contents of the Memory window	p.186
Memory Fill dialog box	Initializes the memory contents by specified data	p.189
Memory Copy dialog box	Copies the memory contents	p.191
Memory Compare dialog box	Compares the memory contents	p.193
Memory Compare Result dialog box	Displays the result of comparison of memory contents	p.195

Table 6-1. Windows of ID78K Series Debugger (2/2)

Window Name	Outline	Page
Pseudo DMM dialog box	Sets the address and data for DMM.	p.197
Watch window	Displays/changes variables	p.199
Quick Watch dialog box	Displays/changes variable values temporarily	p.204
Add Watch dialog box	Registers variables to be displayed in the Watch window	p.208
Change Watch dialog box	Changes data on the line selected in the Watch window.	p.211
Register window	Displays/changes register (program register, system register) contents	p.214
SFR window	Displays/changes contents of SFR	p.218
SFR Select dialog box	Selects SFRs and I/O ports to be displayed in the SFR window	p.222
Add I/O Port dialog box	Registers I/O ports to be displayed in the SFR window	p.225
Local Variable window	Displays/changes local variable in current function	p.228
Stack window	Displays/changes the stack contents of the current user program	p.231
Trace View window	Displays the trace results	p.236
Trace Search dialog box	Searches the trace data	p.246
Trace Data Select dialog box	Selects items to be displayed in the Trace View window	p.254
Coverage window	Displays the coverage results	p.258
Coverage Search dialog box	Searches the coverage results	p.263
Coverage Clear dialog box	Clears the coverage results	p.266
Coverage-Condition Setting dialog box	Sets the coverage efficiency of the measurement range	p.268
Coverage-Efficiency View dialog box	Displays the coverage results in terms of efficiency	p.271
Event Manager	Displays, switches enable/disable, or deletes each event	p.274
Software Break Manager	Displays, switches enable/disable, or deletes a software break	p.284
Event dialog box	Registers/displays an event condition	p.287
Event Link dialog box	Registers/displays an event link condition	p.303
Break dialog box	Registers/sets/displays a break event condition	p.313
Trace dialog box	Registers/sets/displays a trace event condition	p.320
Snap Shot dialog box	Registers/sets/displays a snap event condition	p.331
Stub dialog box	Registers/sets/displays a stub event condition	p.346
Timer dialog box	Displays the result of execution time measurement and registers/sets/displays timer event conditions	p.354
Timer Result dialog box	Displays the results of the executed measurement	p.365
DMM dialog box	Sets dynamic memory modification	p.368
Pass Count dialog box	Sets the pass count	p.374
Delay Count dialog box	Sets the delay count	p.376
Reset Debugger dialog box	Initializes the ID78K Series, and target CPU and symbol information	p.378
About dialog box	Displays the version of the ID78K Series	p.380
Exit Debugger dialog box	Terminates the ID78K Series	p.381
Error/Warning dialog box	Displays an error/warning message	p.383
Console window	Command input window.	p.384

6.2 Explanation of Windows

This section explains each window using the format shown below.

Window Name

The window name is indicated in this frame.

General

Briefly explains the window.

Opening method

Explains how to open the window.

Window

Shows the screen image of the window configuration.

Function

Explains each function of the window.

Function buttons

Explains the operations of the function buttons in the window.

Menu bar

Enumerates the menus pulled down from the menu bar, and explains the function of each menu.

Caution

Explains points of caution to be noted.

Main Window

General

This window is automatically opened after the ID78K Series is started and initialization is complete. It remains displayed until the ID78K Series is terminated. Various windows are opened and manipulated from this window. Execution of the user program is also controlled in this window. Execution of the user program can be controlled in three modes: source mode, instruction mode, and automatic mode.

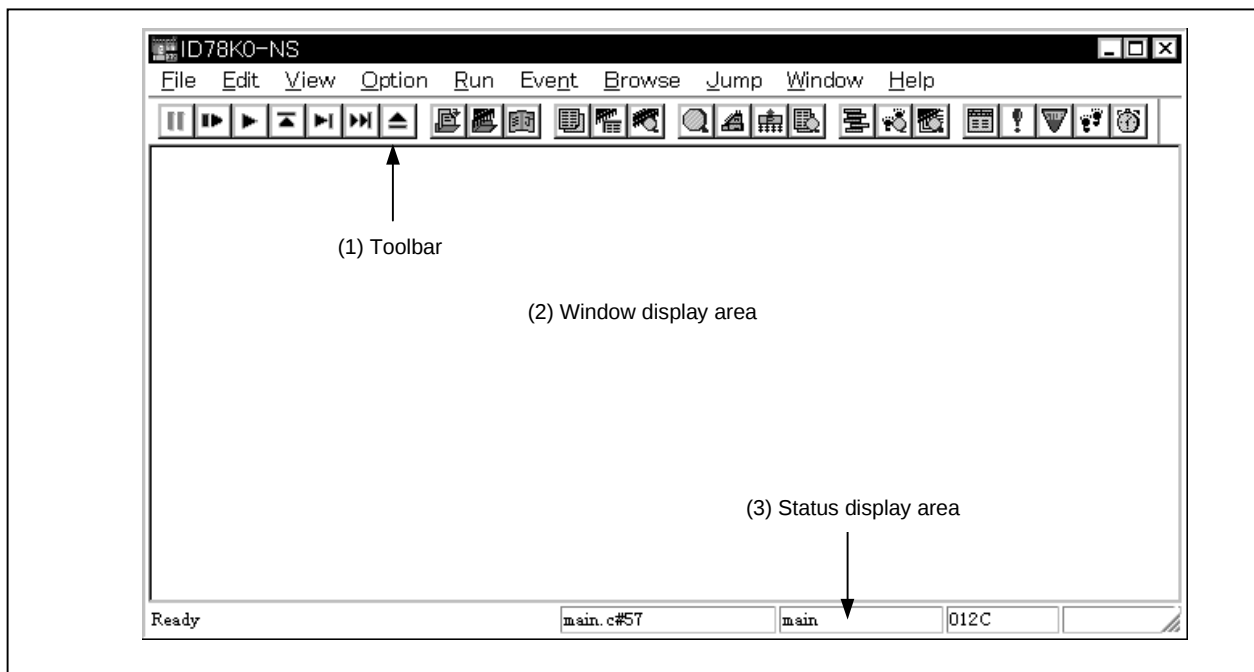
- Source mode
Debugging is performed at the source level.
- Instruction mode
Debugging is performed at the instruction level.

- Automatic mode
Switches automatically between the source mode and instruction mode.
This window is in the source mode (other than mixed display mode) or the instruction mode when the Source window is active and in the instruction mode when the Assemble window is active. When neither window is active, this window is in the source mode.

When starting the ID78K Series, the automatic mode is assumed.

Window

Figure 6-1. Main Window



Function

The main window consists of the following areas.

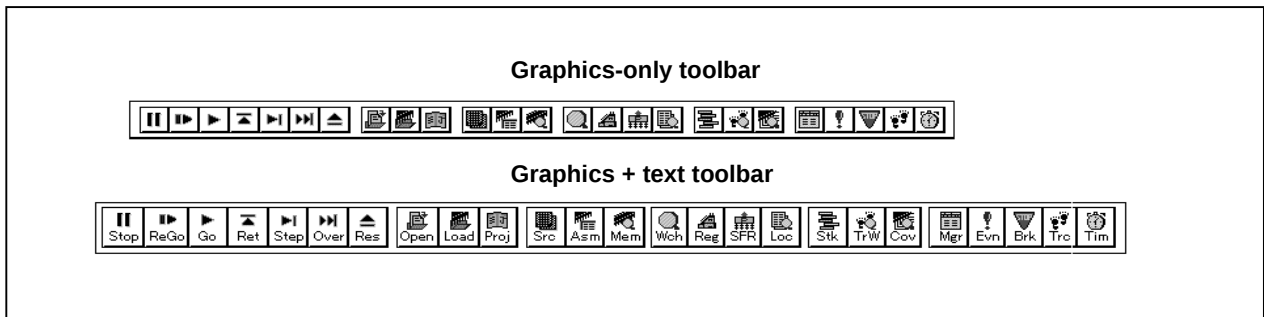
- Menu bar
- Toolbar
- Window display area
- Status display area

The function of each area is explained below.

(1) Toolbar

The toolbar consists of buttons that can execute frequently used commands with a single click. Each button is graphically displayed and easy to understand. This button group can be switched between “Graphics-only buttons” and “Graphics + Text buttons” by the Debugger Option dialog box. The function of each button can also be executed using the menu bar in this window. This toolbar is not shown when it is specified not to be displayed by selecting [Option] → [Tool Bar] from the menu bar of this window.

Figure 6-2. Toolbar



An explanation of each button is given below.



This button stops execution of the user program.
The same function as [Run] → [Stop] on the menu bar.



This button runs the user program after the emulation CPU is reset.
The same function as [Run] → [Restart] on the menu bar.



This button runs the user program without resetting the emulation CPU.
The same function as [Run] → [Go] on the menu bar.



This button executes the user program, ignoring the set break conditions (both hardware and software conditions).
The same function as [Run] → [Ignore break points and Go] on the menu bar.



This button executes the program in real-time until execution returns to the calling function.
The same function as [Run] → [Return Out] on the menu bar.



This button is used for step execution.

By clicking this button successively, the program is executed by as many steps as the number of times this button is clicked. Step execution is performed in line units in the source mode, and in instruction units in the instruction mode.

The same function as [Run] → [Step In] on the menu bar.



This button executes the next step (i.e. executes the program, regarding the function/call statement as one step.).

By clicking this button successively, next step execution is performed as many times as the number of times this button is clicked. Next step execution is performed in line units in the source mode, and in instruction units in the instruction mode.

The same function as [Run] → [Next Over] on the menu bar.



This button resets the emulation CPU.

The same function as [Run] → [CPU Reset] on the menu bar.



This button opens the View File Load dialog box.

The same function as [File] → [Open...] on the menu bar.



This button opens the Download dialog box.

The same function as [File] → [Download...] on the menu bar.



This button opens the Project File Load dialog box.

The same function as [File] → [Project] → [Open...] on the menu bar.



This button opens the Source window and displays the contents of the source text.

The same function as [Browse] → [Source Text] on the menu bar.



This button opens the Assemble window, where the user program is disassembled and displayed.

The same function as [Browse] → [Assemble] on the menu bar.



This button opens the Memory window and displays the memory contents.

The same function as [Browse] → [Memory] on the menu bar.



This button opens the Watch window and displays the watch contents.

The same function as [Browse] → [Watch] on the menu bar.



This button opens the Register window and displays the contents of the registers.

The same function as [Browse] → [Register] on the menu bar.



This button opens the SFR window and displays the contents of the SFRs.

The same function as [Browse] → [SFR] on the menu bar.



This button opens the Local Variable window and displays the local variable contents.

The same function as [Browse] → [Local Variable] on the menu bar.



This button opens the Stack window and displays the contents of the stack.
The same function as [Browse] → [Stack Trace] on the menu bar.



This button opens the Trace View window and displays the result of a trace.
The same function as [Browse] → [Trace] on the menu bar.



This button opens the Coverage window and displays the coverage measurement results^{Note}.
The same function as [Browse] → [Coverage] on the menu bar.



This button opens the Event Manager.
The same function as [Event] → [Event Manager] on the menu bar.



This button opens the Event dialog box and registers or sets events.
The same function as [Event] → [Event...] on the menu bar.



This button opens the Break dialog box and registers, sets, or displays break events.
The same function as [Event] → [Break...] on the menu bar.



This button opens the Trace dialog box and registers, sets, or displays trace events.
The same function as [Event] → [Trace...] on the menu bar.



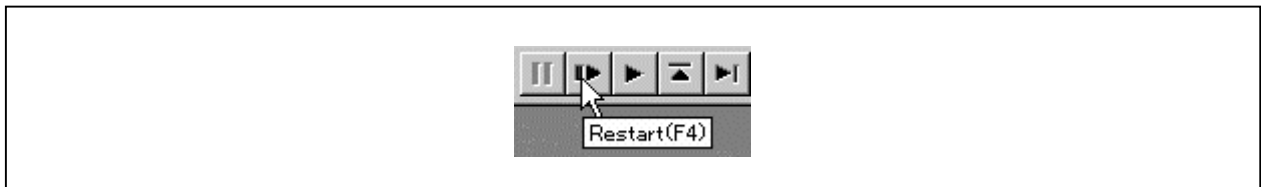
This button opens the Timer dialog box, registers, sets, or displays timer events, and displays the result of timer measurement.
The same function as [Event] → [Timer...] on the menu bar.

Note This is valid when the performance board is attached, when the IE-78K0-NS-A or IE-78K0S-NS-A is used, or when the IE-784000-R is used.

(a) Tool hint function

If the mouse cursor is pointed at any of the buttons on the toolbar, a tool hint pops up after a few seconds.

Figure 6-3. Example of Tool Hint



(b) Moving the toolbar

By dragging toolbar with the mouse, it can be moved to any desired position within or outside the main window.

(2) Window display area

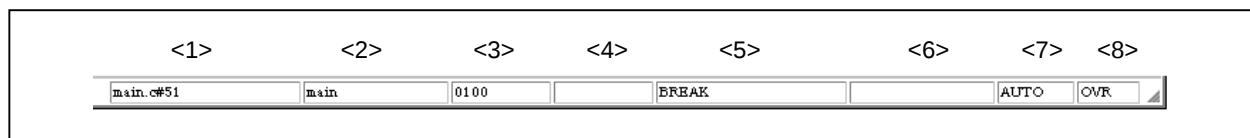
This area displays various debug windows.

The displayed window can be changed in size or registered as an icon in this area. The list of the windows displayed in this area is as follows.

- Source window
- Assemble window
- Watch window
- Memory window
- Register window
- SFR window
- Local variable window
- Stack window
- Trace View window
- Coverage window
- Event Manager

(3) Status display area

Figure 6-4. Status Bar



This area displays the status of the debugger and in-circuit emulator.

<1> Program name \$ Source name # Line No.

Program name: Displays the program file name indicated by the PC value.

Source name: Displays the source file name indicated by the PC value.

Line No.: Displays the line number indicated by the PC value.

<2> Function name: Displays the function name indicated by the PC value.

<3> PC value: Displays the current PC value.

<4> CPU status: Displays the status of the CPU (target device) (not displayed in the ID78K0-NS).

<5> IE status: Displays the status of the in-circuit emulator (RUN, BREAK mode).
Displays the character "I" as a delimiter if there are multiple states.
If "RUN" is displayed (while the user program is being executed), the color of the status bar changes to red, indicating that program execution is in progress.

<6> Break cause: Displays the cause of the break.

<7> STEP mode: Displays the step execution mode.

<8> Key input mode: Displays the key input mode.

The types of IE and CPU statuses are shown below.

Table 6-2. IE Status Display Contents

Status Indication	Meaning
RUN ^{Note}	Currently running a user program.
STEP	Currently executing a step.
TRC	Currently operating a trace.
TIM	Currently operating a timer.
COV	Currently operating coverage.
BREAK	Break

Note If "RUN" is displayed, the color of the status bar changes to red, indicating that program execution is in progress.

Table 6-3. CPU Status Display Contents

Status Indication	Meaning
STANDBY	In standby mode
H-STOP	In hardware stop mode
HOLD	Bus hold ^{Note}
WAIT	Bus wait ^{Note}
POW OFF	Power is not supplied to the target system

Note Supported only in the ID78K4

The causes of a break are as follows.

Table 6-4. Display Contents of Break Cause

Displayed Cause	Meaning
Manual Break	Forcible break
Temporary Break	Temporary break
Event Break	Break by event
Software Break	Break by software break event
Non Map Break	Access in non-map area
Write Protect	Write access to write-protected area
SFR Illegal	Illegal access to SFR
Stack Overflow ^{Note 1}	Break by stack overflow
Relocation Break ^{Note 2}	Execution of LOCATION instruction different from default

Notes 1. Cannot be detected in the ID78K4-NS

2. Supported only in the ID78K4 (-NS)

The types of STEP modes are shown below.

Table 6-5. STEP Modes

STEP Mode	Meaning
SRC	STEP execution is in the source mode. This is displayed when [Option] → [Source Mode] in the menu bar is selected.
INST	STEP execution is in the instruction mode. This is displayed when [Option] → [Instruction Mode] in the menu bar is selected.
AUTO	STEP execution is in the automatic mode. This is displayed when [Option] → [Auto Mode] on the menu bar is selected.

The types of key input modes are shown below.

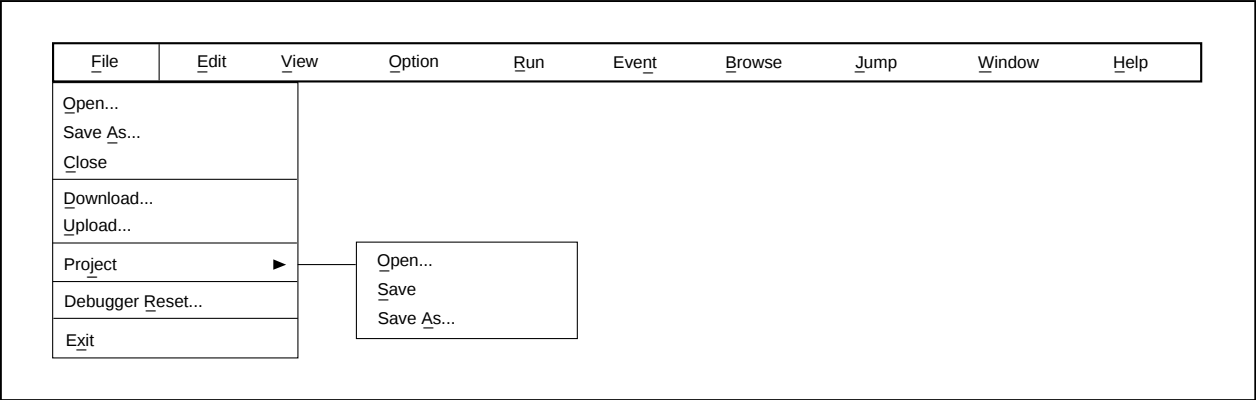
Table 6-6. Key Input Modes

Key Input Mode	Meaning
INS	Displayed when key input is in the insert mode.
OVR	Displayed when key input is in the overwrite mode.

Menu bar

(1) File

Figure 6-5. File Menu Bar



[Open...]

This loads the display file or a source file or text file.
Opens the View File Load dialog box.
Operation differs depending on the file type selected in the dialog box.

When it is a source file in which symbol information is read:
Files are displayed in the Source window.

When it is an event setting file (.EVN):
The Event Manager is opened and the event is set.

When it is a source file in which symbol information is not read, or a display file:
Files are displayed in the Source window as text format files.

[Save As...]

Saves the displayed contents of the current window in a file under another name.
Opens the View File Save dialog box.

[Close]

Closes the current window.

[Download...]

Downloads the program.
Opens the Download dialog box.

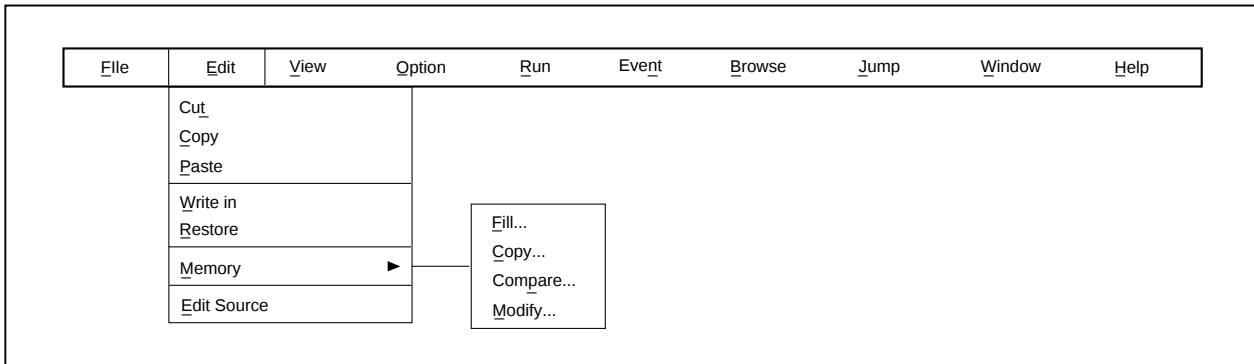
[Upload...]

Uploads the program.
Opens the Upload dialog box.

[Project >]	Operates a project file.
[Open...]	Opens a project file. Opens the Project File Load dialog box.
[Save]	Overwrites the current status to the project file. The file to be overwritten is the project file that is currently being read in the debugger.
[Save As...]	Saves the current status in a project file. Opens the Project File Save dialog box.
[Debugger Reset...]	Resets the target CPU, symbols, and debugger. Opens the Reset Debugger dialog box.
[Exit]	Terminates the debugger. Opens the Exit Debugger dialog box.
[Open File]	Displays a list of the downloaded files. If a file name is selected, that file is downloaded again.

(2) Edit

Figure 6-6. Edit Menu Bar



[Cut]	Cuts the selected character string and places it in the clipboard buffer.
[Copy]	Copies the selected character string to the clipboard buffer.
[Paste]	Pastes the contents of the clipboard buffer at the text cursor position.
[Write in]	Writes corrections to the target.
[Restore]	Cancels the correction.
[Memory >]	Manipulates the memory contents.
[Fill...]	Initializes the memory contents. Opens the Memory Fill dialog box.

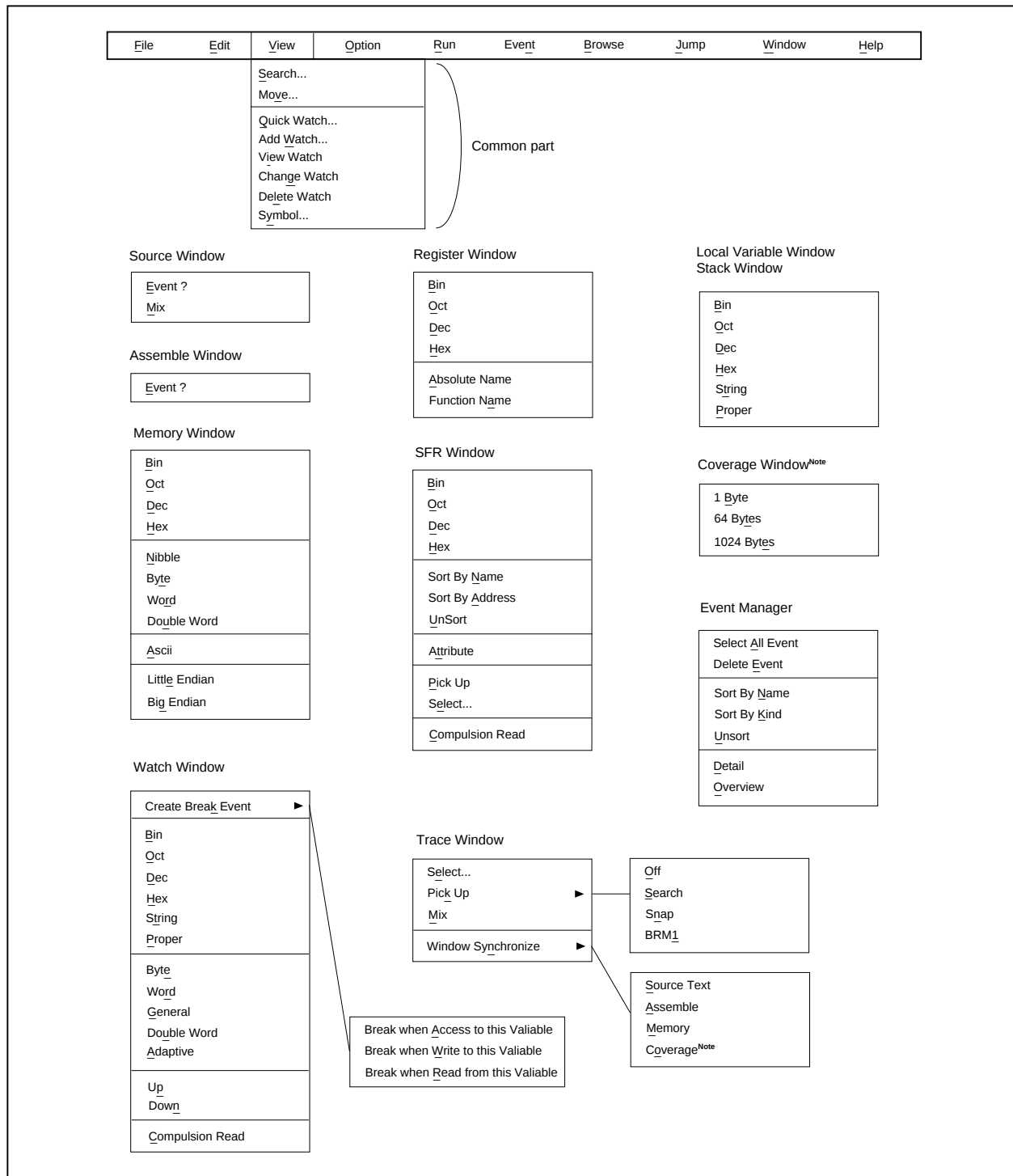
[Copy...]	Copies values from memory to memory. Opens the Memory Copy dialog box.
[Compare...]	Compares values between memories. Opens the Memory Compare dialog box.
[Modify...]	Modifies the memory while the user program is being executed. The pseudo-DMM dialog box is opened.
[Edit Source]	When the Project Manager is operating, opens the source file displayed in an active Source window by using the editor specified by the Project Manager.

(3) View

The display menu consists of a common part, in which the menu items are common to all windows and a dependent part, in which the menu items differ according to the active window.

An explanation of each dependent part is given in (b) to (k).

Figure 6-7. View Menu Bar



Note The Coverage window is valid when the IE-78K0-NS-PA is installed in the IE-78K0-NS, when the IE-78K0-NS-A or IE-78K0S-NS-A is used, or when the IE-784000-R is used.

(a) Common part

[Search...]	Performs a search. Opens the search dialog box according to the current window. Performs the same operation as the [Search] button.
[Move...]	Moves the display position. Opens the Source Move dialog box, Address Move dialog box or Trace Move dialog box corresponding to the current window.
[Quick Watch...]	Displays the contents of the specified data temporarily. Opens the Quick Watch dialog box.
[Add Watch...]	Adds the specified data to the Watch window. Opens the Add Watch dialog box.
[View Watch]	Adds the selected data to the Watch window. In the case of a symbol, it adds it in accordance with the settings in the Debugger Option dialog box.
[Change Watch]	Changes the character string of the variable name at the selected watch point. Opens the Add Watch dialog box. This menu is valid only when a variable is specified in the Watch window.
[Delete Watch]	Deletes the selected watch point from the Watch window. This menu is active only when variables are specified in the Watch window.
[Symbol...]	Displays the address of the specified variable or function and the value of the specified symbol. Opens the Symbol To Address dialog box.

(b) Source window dependent part

[Event?]	Displays the cursor position line or the address's event information. If an event is set, it opens the Event dialog box.
[Mix]	Switches between mixed display and no mixed display for the assemble display. No check mark (" "): No mixed display (default). Check mark ("√"): Mixed display.

(c) Assemble window dependent part

[Event?]	Displays event information for the cursor position address. If an event is set, it opens the Event dialog box.
-----------------	--

(d) Memory window dependent part

[Bin]	Displays the current window in binary.
[Oct]	Displays the current window in octal.
[Dec]	Displays the current window in decimal.
[Hex]	Displays the current window in hexadecimal (default).
[Nibble]	Displays data in 4-bit units.
[Byte]	Displays data in 8-bit units (default).
[Word]	Displays data in 16-bit units.
[Double Word]	Displays data in 32-bit units.
[Ascii]	Turns ON/OFF display of ASCII characters. No check mark (" "): Not displayed. Check mark ("✓"): Displayed (default).
[Little Endian]	Displays words and double words in little endian.
[Big Endian]	Displays words and double words in big endian.

(e) Watch window dependent part

[Bin]	The selected item is displayed in binary.
[Oct]	The selected item is displayed in octal.
[Dec]	The selected item is displayed in decimal.
[Hex]	The selected item is displayed in hexadecimal.
[String]	The selected item is displayed as a character string.
[Proper]	The selected item is displayed as the standard value for each variable. In the case of symbols, they are displayed in accordance with the settings in the Debugger Option dialog box (default).
[Byte]	The selected item is displayed in 8-bit units.
[Word]	The selected item is displayed in 16-bit units.
[General]^{Note}	The selected item is displayed in 20-bit units.
[Double Word]	The selected item is displayed in 32-bit units.

Note Supported only in the ID78K4 (-NS)

[Adaptive]	The selected item is displayed as standard values for each variable. In the case of C language symbols, only this item is valid. In the case of assembler symbols, they are displayed in accordance with the settings in the Debugger Option dialog box.
[Up]	The selected data is moved 1 line up.
[Down]	The selected data is moved 1 line down.
[Compulsion Read]	The data in the SFRs, where reading is prohibited because the values will change if they are read, the I/O ports added in the Add I/O Port dialog box, and the I/O protected areas is subjected to compulsory reading.
[Create Break Event >]	Creates an access event for the variable being watched.
[Break when Access to this Variable]	Creates a Read/Write event for a specified variable.
[Break when Write to this Variable]	Creates a Write event for a specified variable.
[Break when Read from this Variable]	Creates a Read event for a specified variable.

(f) Register window dependent part

[Bin]	Displayed in binary.
[Oct]	Displayed in octal.
[Dec]	Displayed in decimal.
[Hex]	Displayed in hexadecimal (default).
[Absolute Name]	Displays register names as absolute names.
[Function Name]	Displays register names as function names (default).

(g) SFR window dependent part

[Bin]	Displayed in binary.
[Oct]	Displayed in octal.
[Dec]	Displayed in decimal.
[Hex]	Displayed in hexadecimal (default).
[Sort By Name]	Displayed in alphabetical order.
[Sort By Address]	Displayed in address order (default).
[UnSort]	Not sorted.
[Attribute]	Selects whether to display or not to display the Attribute field. No check mark (" "): Not displayed. Check mark ("√"): Displayed (default).
[Pick Up]	Only the SFR selected in the SFR Select dialog box is displayed. No check mark (" "): All are displayed (default). Check mark ("√"): The selected register only is displayed.
[Select...]	Opens the SFR Select dialog box.
[Compulsion Read]	The data in the SFRs, where reading is prohibited because the values will change if they are read, the I/O ports added in the Add I/O Port dialog box, and the I/O protected areas is subjected to compulsory reading.

(h) Local Variable window dependent part, Stack window dependent part

[Bin]	Displayed in binary.
[Oct]	Displayed in octal.
[Dec]	Displayed in decimal.
[Hex]	Displayed in hexadecimal.
[String]	Displayed as a character string.
[Proper]	Displayed as the standard value for each variable (default).

(i) Trace View window dependent part

[Select...]	Selects the content of the display. Opens the Trace Data Select dialog box.
[Pick Up >]	Performs pick up display settings.
[Off]	Pick up display is not performed (default).
[Search]	Picks up the frames which match the search conditions and displays them.
[Snap]^{Note 1}	Picks up snap frames and displays them.
[BRM1]	Picks up the first M1 fetch frame after a program branch and displays it (BRM1 cannot be set in this version).
[Mix]	Switches between mixed display or no mixed display of sources. No check mark (" "): No mixed display (default). Check mark ("√"): Mixed display.
[Window Synchronize >]	This links together the Trace View window and Source window, Assemble window, Memory window and Coverage window.
[Source Text]	Selects whether the Source window will be linked or not linked. No check mark (" "): Not linked (default). Check mark ("√"): Linked.
[Assemble]	Selects whether the Assemble window will be linked or not linked. No check mark (" "): Not linked (default). Check mark ("√"): Linked.
[Memory]	Selects whether the Memory window will be linked or not linked. No check mark (" "): Not linked (default). Check mark ("√"): Linked.
[Coverage]^{Note 2}	Selects whether the Coverage window will be linked or not linked. No check mark (" "): Not linked (default). Check mark ("√"): Linked.

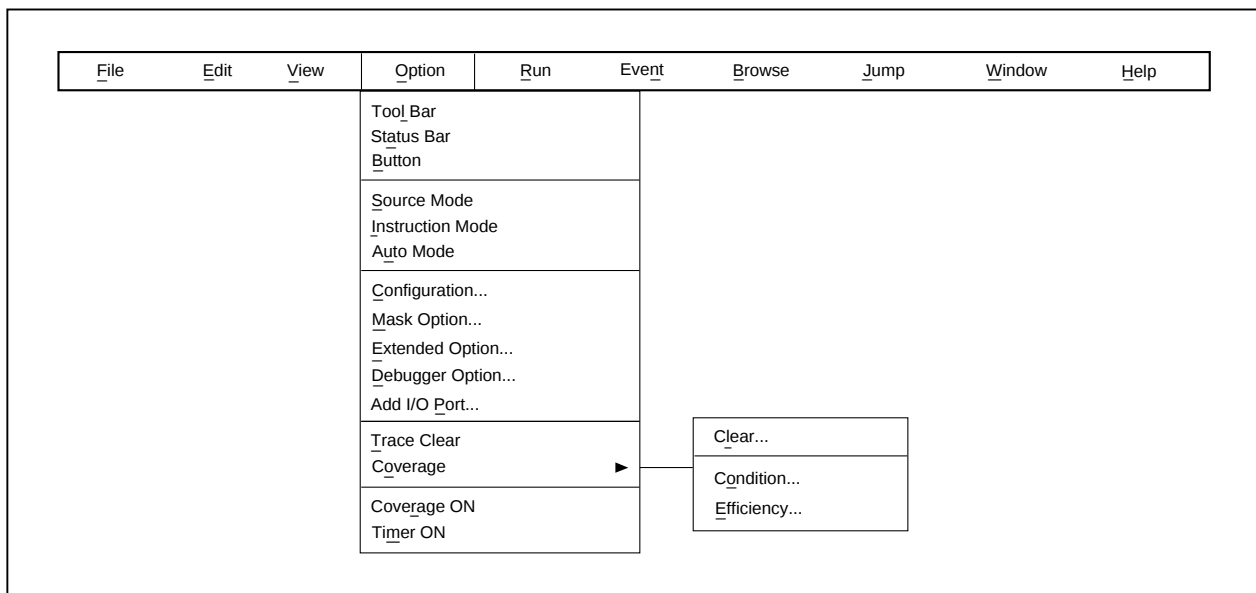
(j) Coverage window dependent part^{Note 2}

[1 Byte]	Displays in 1-byte units (default).
[64 Bytes]	Displays in 64-byte units.
[1024 bytes]^{Note 3}	Displays in 1,024-byte units.

- Notes**
1. Not supported in the ID78K4-NS
 2. This is displayed when the IE-78K0-NS-PA is installed in the IE-78K0-NS, when the IE-78K0-NS-A or IE-78K0S-NS-A is used, or when the IE-784000-R is used.
 3. Supported only in the ID78K4

(k) Event Manager dependent part

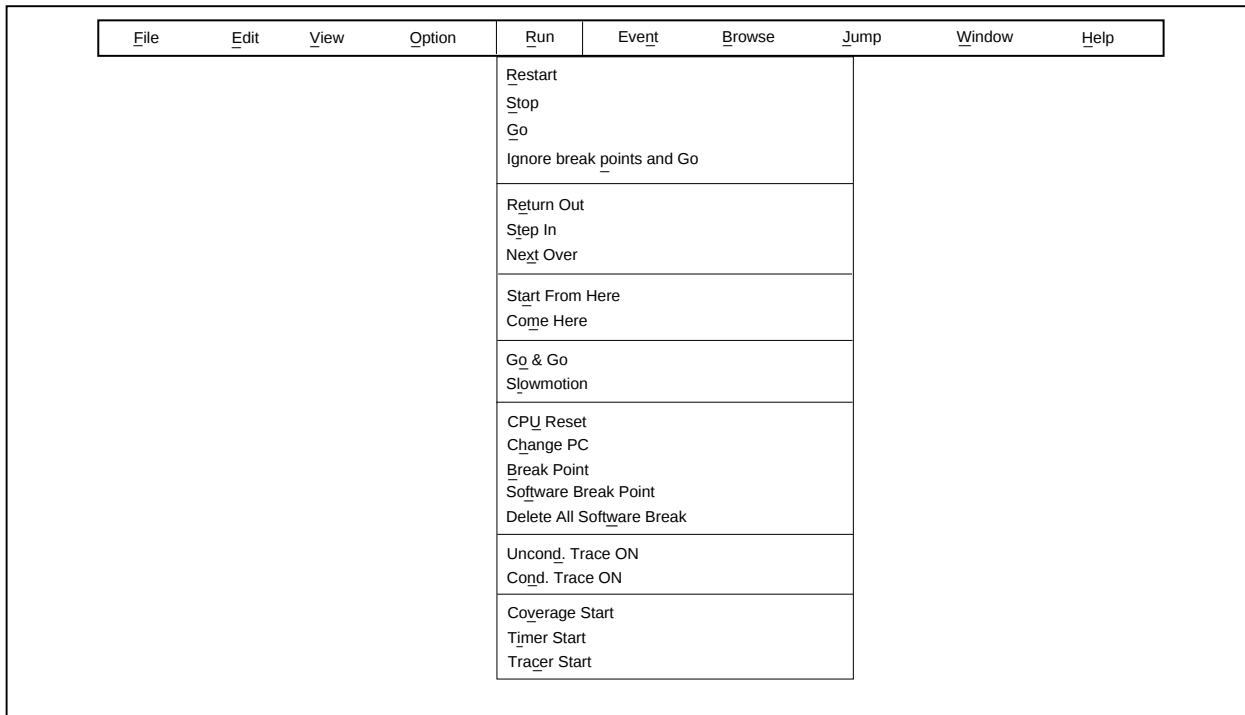
[Select <u>A</u>ll Event]	Selects all the events entered in the Event Manager.
[Delete <u>E</u>vent]	Deletes the selected event.
[Sort By <u>N</u>ame]	Displays the icons sorted by event name.
[Sort By <u>K</u>ind]	Displays the icons sorted by event type.
[<u>U</u>nSort]	Icons are not sorted (default).
[<u>D</u>etail]	Displays details.
[<u>O</u>verview]	Displays a list.

(4) Option**Figure 6-8. Option Menu Bar**

[Tool Bar]	Selects whether the toolbar is displayed or not. No check mark (" "): Not displayed. Check mark ("√"): Displayed (default).
[Status Bar]	Selects whether the status bar is displayed or not. No check mark (" "): Not displayed. Check mark ("√"): Displayed (default).
[Button]	Selects whether the function buttons on each window are displayed or not. No check mark (" "): Not displayed. Check mark ("√"): Displayed (default).

[Source Mode]	Performs step execution at the source level (line units).
[Instruction Mode]	Performs step execution at the instruction level (instruction units).
[Auto Mode]	Switches automatically between source level step execution and instruction level step execution, and executes step execution (default). When the Source window is active, source level step execution (except in the mixed display mode) or instruction level step execution (in the mixed display mode) is performed, and when the Assemble window is active, instruction level step execution is performed. When neither window is active, source level step execution is performed.
[Configuration...]	Sets the environment. Opens the Configuration dialog box.
[Mask Option...] ^{Note 1}	Specifies the mask option for the device and sets the mode of each pin. Opens the Mask Option dialog box.
[Extended Option...]	Sets the extended functions. Opens the Extended Option dialog box.
[Debugger Option...]	Sets the debugger. Opens the Debugger Option dialog box.
[Add I/O Port...]	Adds a user-defined I/O port. Opens the Add I/O Port dialog box.
[Trace Clear]	Clears the trace data. Displays the Trace View window if it is active.
[Coverage >] ^{Note 2}	Opens the coverage-measurement related dialog boxes.
[Clear...] ^{Note 2}	Initializes the coverage measurement results. Opens the Coverage-Clear dialog box.
[Condition...] ^{Note 2}	Sets the coverage efficiency measurement conditions. Opens the Coverage-Condition Setting dialog box.
[Efficiency...] ^{Note 2}	Displays the coverage efficiency results. Opens the Coverage-Efficiency View dialog box.
[Coverage ON] ^{Note 2}	Selects whether coverage measurement is turned on or off. During emulation, this setting cannot be changed. No check mark (" "): Coverage measurement is not performed. Check mark ("√"): Coverage measurement is performed (default).
[Timer ON] ^{Note 3}	Selects whether the timer measurement is turned on or off. During emulation, this setting cannot be changed. No Check Mark (" "): Timer measurement is not performed. Check Mark ("√"): Timer measurement is performed (default). Note that Run-Break event timer measurement cannot be stopped.

- Notes**
1. Supported only in the ID78K0 (-NS)
 2. This is displayed when the IE-78K0-NS-PA is installed in the IE-78K0-NS, when the IE-78K0-NS-A or IE-78K0S-NS-A is used, or when the IE-784000-R is used.
 3. Not supported in the ID78K4-NS

(5) RunFigure 6-9. Run Menu Bar

- [Restart]** Executes the program after resetting the emulation CPU. Performs the same operation as the  button.
- [Stop]** Forcibly stops execution of the program. Performs the same operation as the  button.
- [Go]** Executes the program without resetting the CPU. Performs the same operation as the  button.
- [Ignore break points and Go]** This button executes the program, ignoring the set break points. Performs the same operation as the  button.
- [Return Out]** Executes the program in real time until execution returns to the calling function. Performs the same operation as the  button.
- [Step In]** Performs step execution. Performs the same operation as the  button. In the source mode, the program is executed in line units, and in the instruction mode, it is executed in instruction units.
- [Next Over]** Performs next step execution. Performs the same operation as the  button. Executes the program, regarding a function or subroutine statement as 1 step. In the source mode, the program is executed in line units, and in the instruction mode, it is executed in instruction units.
- [Start From Here]** Executes the program from the cursor position of the Source window or Assemble window.

[Come Here]	Executes the program until the cursor position of the Source window or Assemble window.
[Go & Go]	Continues execution of the program. If a break occurs because a break condition is satisfied, it updates the window and then executes the user program again. Performs the same operation as clicking the  button each time a break occurs.
[Slowmotion]	Continues step execution of the program. After updating the window for each step execution, it performs step execution again. Performs the same operation as clicking the  button each time step execution is performed.
[CPU Reset]	Resets the emulation CPU. Performs the same operation as the  button.
[Change PC]	Sets the address at the cursor position of the Source window or Assemble window to the PC.
[Break Point]	Sets/cancels a breakpoint at the cursor position of the Source window or Assemble window.
[Software Break Point]	Sets/cancels a software breakpoint at the cursor position of the Source window or Assemble window.
[Delete All Software Break]	Cancels all software breakpoints that are set.
[Uncond. Trace ON]	Validates the unconditional trace function. Always traces while the user program is being executed (default). When the tracer is started, the trace mode cannot be changed.
[Cond. Trace ON]	Validates the trace function. Traces while the user program is being executed according to a trace condition. When the tracer is started, the trace mode cannot be changed.
[Coverage Start or Coverage Stop]^{Note}	When coverage measurement is stopped, this starts it. When coverage measurement is being performed, this stops it. The display definitions are as follows. “Coverage Start”: Measurement is stopped. If selected, measurement will be started. “Coverage Stop”: Measurement is in progress. If selected, measurement will be stopped. If there is currently no emulation, and if coverage measurement is off (no “√” mark next to the [Option] → [Coverage ON] item), this item is invalid (it is dimmed). Coverage measurement starts operating immediately after coverage has been turned on and emulation is started.

Note This is displayed when the IE-78K0-NS-PA is installed in the IE-78K0-NS, when the IE-78K0-NS-A or IE-78K0S-NS-A is used, or when the IE-784000-R is used.

**[Timer Start or
Timer Stop]**

When timer measurement is stopped, this starts it.

When timer measurement is being performed, this stops it.

The display definitions are as follows.

"Timer Start": Measurement is stopped. If selected, measurement will be started.

"Timer Stop": Measurement is in progress. If selected, measurement will be stopped.

If there is currently no emulation, and if timer events are not used (no "√" mark next to the [Ignore Break Point] → [Run] item), this item is invalid (it is dimmed).

Timer measurement starts operating immediately after the timer has been turned on and emulation is started.

**[Tracer Start or
Tracer Stop]**

When tracer measurement is stopped, this starts it.

When tracer measurement is being performed, this stops it.

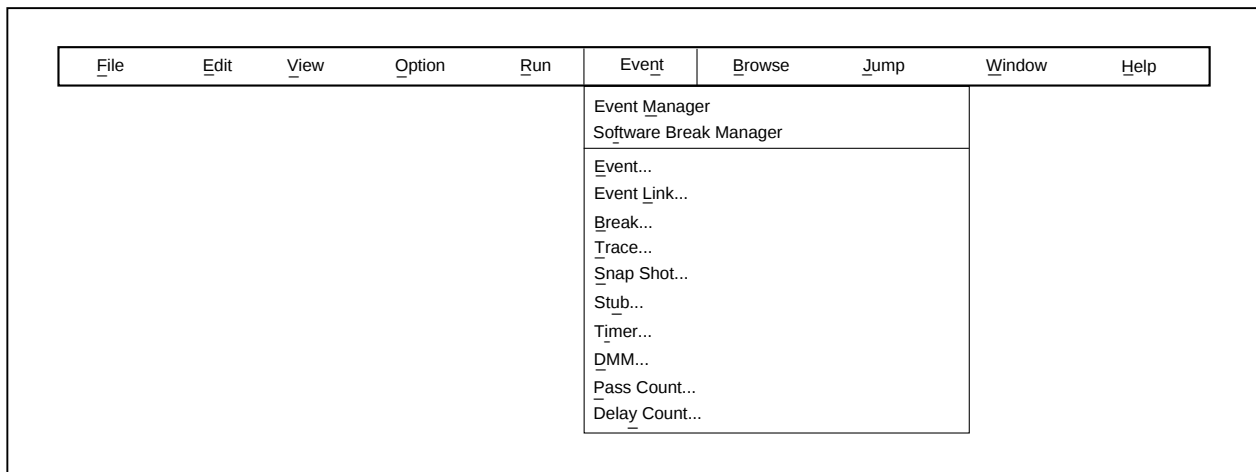
The display definitions are as follows.

"Tracer Start": Measurement is stopped. If selected, measurement will be started.

"Tracer Stop": Measurement is in progress. If selected, measurement will be stopped.

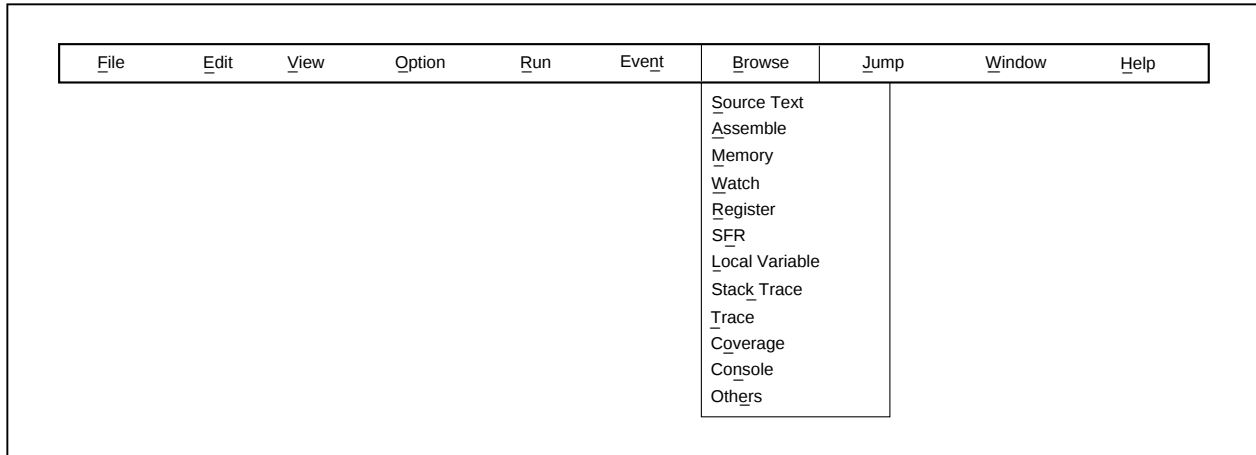
This button is invalid (displayed in gray) while emulation is not in progress and when a command other than [Ignore break points and Go] or the  button is selected.

Tracer measurement starts operating immediately after the tracer has been turned on and emulation is started.

(6) Event**Figure 6-10. Event Menu Bar**

[Event Manager]	Manages each type of event condition. Opens the Event Manager. Operates the same as the  button.
[Software Break Manager] ^{Note 1}	Switches enable/disable and cancels software break. Opens the Software Break Manager.
[Event...]	Enters event conditions. Opens the Event dialog box. Operates the same as the  button.
[Event Link...]	Enters event link conditions. Opens the Event Link dialog box.
[Break...]	Enters and sets break conditions. Opens the Break dialog box. Operates the same as the  button.
[Trace...]	Enters and sets trace event conditions. Opens the Trace dialog box. Operates the same as the  button.
[Snap Shot...] ^{Note 2}	Enters and sets snap event conditions. Opens the Snap Shot dialog box.
[Stub] ^{Note 3}	Enters and sets stub event conditions. Opens the Stub dialog box.
[Timer...]	Enters and sets timer event conditions and displays the measurement results. Opens the Timer dialog box. The ID78K4-NS displays the Section timer measurement result. Operates the same as the  button.
[DMM...] ^{Note 4}	Opens the DMM dialog box.
[Pass Count...] ^{Note 5}	Sets the pass count and displays the pass count value. Opens the Pass Count dialog box.
[Delay Count...]	Sets the delay count and displays the delay count value. Opens the Delay Count dialog box.

- Notes**
1. This is displayed when the IE-78K0-NS-PA is installed in the IE-78K0-NS, when the IE-78K0-NS-A or IE-78K0S-NS-A is used, or when the IE-78K4-NS or IE-784000-R is used.
 2. Not supported in the ID78K4-NS
 3. Supported only in the ID78K4
 4. These functions are valid only when the IE-78K0-NS-PA is installed in the IE-78K0-NS or the IE-78K0-NS-A/IE-78K0S-NS-A is used.
 5. Supported only in the ID78K0 (-NS)

(7) **B**rowse**Figure 6-11. Browse Menu Bar****[Source Text]**

Displays the source text. Opens the Source window. Performs the same operation as the  button.

If a window exists that is already in the active state, it opens the window in the static state.

[Assemble]

Disassembles and displays the user program. Opens the Assemble window. Performs the same operation as the  button.

If a window exists that is already in the active state, it opens the window in the static state.

[Memory]

Displays the memory contents. Opens the Memory window. Performs the same operation as the  button.

If a window exists that is already in the active state, it opens the window in the static state.

[Watch]

Displays the watch contents (variable and other data). Opens the Watch window. Performs the same operation as the  button.

[Register]

Displays the register contents. Opens the Register window. Performs the same operation as the  button.

[SFR]

Displays the contents of the SFRs. Opens the SFR window. Performs the same operation as the  button.

[Local Variable]

Displays the local variable. Opens the Local Variable window. Performs the same operation as the  button.

[Stack Trace]

Displays the stack contents. Opens the Stack window. Performs the same operation as the  button.

[Trace]

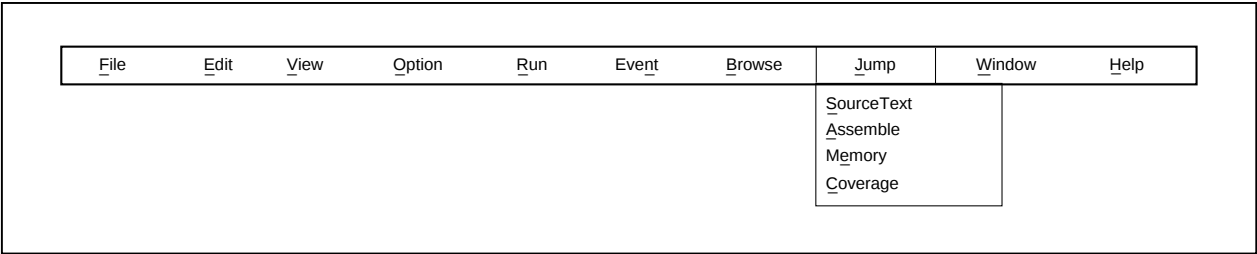
Displays the result of a trace. Opens the Trace View window. Performs the same operation as the  button.

[Coverage] ^{Note}	Displays the result of coverage measurement. Opens the Coverage window. Performs the same operation as the  button. If a window exists that is already in the active state, it opens the window in the static state.
[Console]	Opens the Console window.
[Others]	Opens another window.
[Expansion window]	Adds the name of a user-defined window. When this is selected, the window is opened.

Note This is displayed when the IE-78K0-NS-PA is installed in the IE-78K0-NS, when the IE-78K0-NS-A or IE-78K0S-NS-A is used, or when the IE-784000-R is used.

(8) Jump

Figure 6-12. Jump Menu Bar



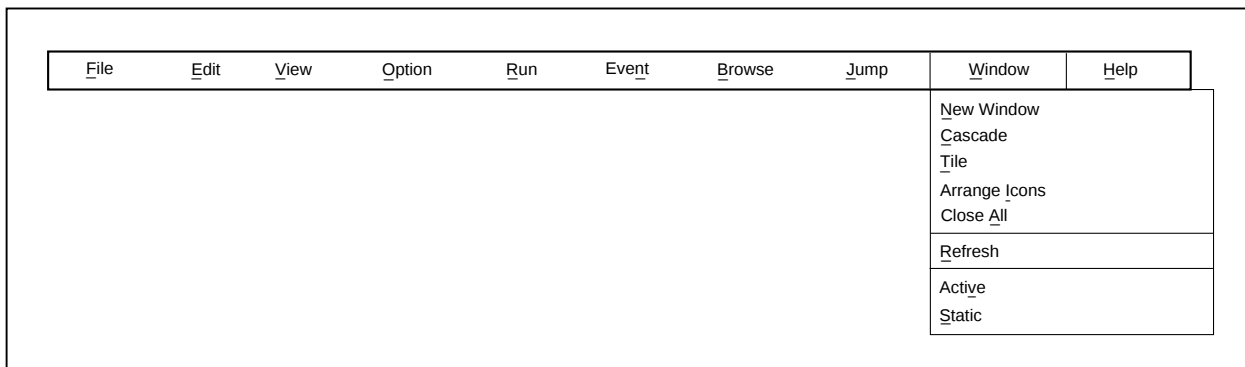
[SourceText]	Sets the data selected in the current window as the jump address, and displays the source text and source line starting from that address. No jump can be performed if the jump address contains no line information. Opens the Source window. If the Source window is being displayed in the active state, that window is displayed on the front plane (operation object).
[Assemble]	Sets the data selected in the current window as the jump address, and displays the disassembled text starting from that address. Opens the Assemble window. If the Assemble window is being displayed in the active state, that window is displayed on the front plane (operation object).
[Memory]	Sets the data selected in the current window as the jump address, and displays the memory contents starting from that address. Opens the Memory window. If the Memory window is being displayed in the active state, that window is displayed on the front plane (operation object).

[Coverage]^{Note}

Sets the data selected in the current window as the jump address, and displays the coverage measurement results from that window. Opens the Coverage window.

If the Coverage window is being displayed in the active state, that window is displayed on the front plane (operation object).

Note This is displayed when the IE-78K0-NS-PA is installed in the IE-78K0-NS, when the IE-78K0-NS-A or IE-78K0S-NS-A is used, or when the IE-784000-R is used.

(9) Window**Figure 6-13. Window Menu Bar****[New Window]**

Opens a new window displaying the same contents as the current window. This is valid only in cases where the current window is the Source window, Assemble window, Memory window or Coverage window.

[Cascade]

Cascades the windows in the main window.

[Tile]

Tiles the windows in the main window.

[Arrange Icons]

Rearranges the icons in the main window.

[Close All]

Closes all the windows except the main window.

[Refresh]

Updates the contents of the window with the latest data.

[Active]

Switches the window to the active state.

If it is currently in the active state, a check mark is entered on the left of this item.

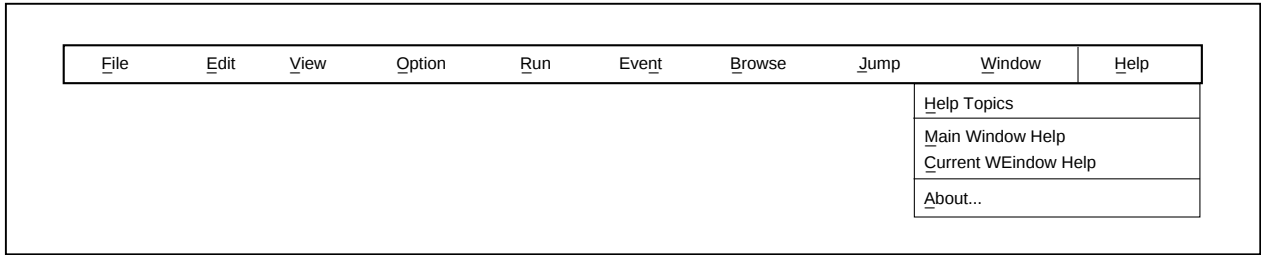
[Static]

Switches the window to the static state.

If it is currently in the static state, a check mark is entered on the left of this item.

[Open window]

Lists the opened windows. The window with a check mark added at the side of the number is the current window. The window selected by selecting a window name is displayed as the current window.

(10) Help**Figure 6-14. Help Menu Bar**

[Help Topics] Displays the table of contents of the Help window.

[Main Window Help] Displays the help for the main window.

[Current Window Help] Displays the help for the current window.

[About...] Displays the version of the debugger.

Configuration Dialog Box

General

Displays and sets the operating environment of the in-circuit emulator.

This dialog box is displayed automatically after the debugger is started. To use the debugger, the operating environment of the in-circuit emulator must be set first in this dialog box.

When a project file is read, however, it doesn't need to be set. The result of reading the project file is reflected in the Configuration dialog box.

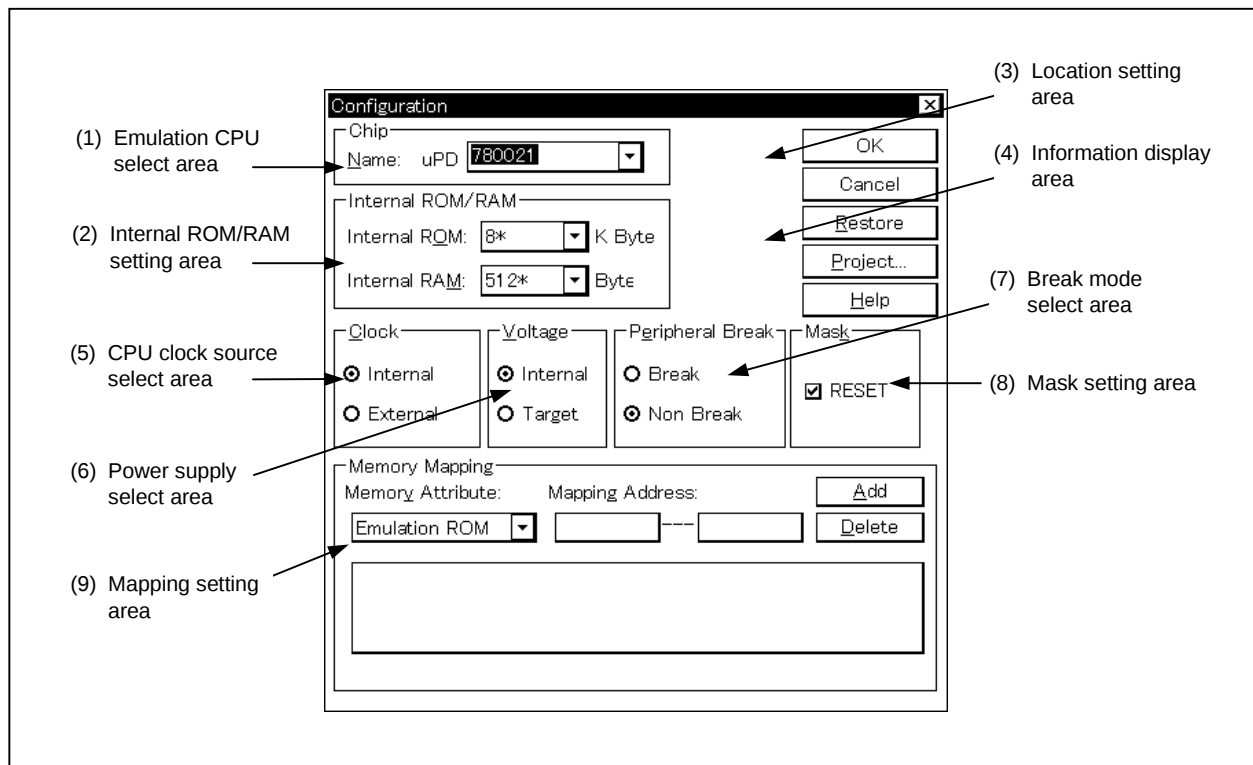
Opening method

This dialog box can be opened by one of the following methods.

- When the debugger is started
Automatically opened
- In the main window
Select [Option] → [Configuration...].
Press the **[GRPH]** + **[O]**, and **[C]** keys in that order.

Window

Figure 6-15. Configuration Dialog Box



Function

The Configuration dialog box consists of the following areas.

- Emulation CPU select area
- Internal ROM/RAM setting area
- Location setting area (ID78K4 (-NS) only)
- Information display area (ID78K4-NS only)
- CPU clock source select area
- Power supply select area
- Break mode select area (ID78K0 (-NS) only)
- Mask setting area
- Mapping setting area

The function of each area is explained below.

(1) Emulation CPU select area

This area selects an emulation CPU. Note that this area can be selected only when the ID78K0-NS is started. A chip name can be specified by inputting a name using the keyboard or selecting one from the Name drop-down list.

Only the chip name registered by the DFINST utility is displayed.

The chip name previously selected is selected as the default chip name.

Caution A product that was selected when starting the debugger cannot be changed after the debugger has been started (this area is dimmed). Even if a project file in which a different device is selected is read after the debugger has been started, the device specified in the project file is not selected.

(2) Internal ROM/RAM setting area

This area displays the size of the internal ROM and RAM of the emulation CPU.

The default size is automatically displayed followed by an asterisk (*) when the emulation CPU is selected.

To change the size of the internal ROM and RAM, select a size from the internal ROM and RAM drop-down list.

If the selected size cannot be realized due to in-circuit emulator limitations, the debugger automatically adjusts the size.

For that reason, when the Configuration dialog box is displayed again, the size being displayed may be greater than the size specified the previous time.

Sizes that can be set are as follows.

Size Part Number	Internal ROM Size		Internal RAM Size	
	Alignment (KB)	Set Range (KB)	Alignment (Bytes)	Set Range (Bytes)
78K/0 Series (ID78K0 (-NS))	4	0 to 64	64	64 to 1,024
78K/0S Series (ID78K0S-NS)	2	0 to 8, 12 to 64		
78K/IV Series (ID78K4 (-NS))	8	0 to 1,024		

(3) Location setting area (ID78K4 (-NS) only)

Location:

This area sets a location.

Two types, 00H and 0fH, can be set. Select a location in accordance with the environment used.

If a Location instruction that differs from this setting is executed, a Relocation Break occurs.

If a load module file is loaded, the location is automatically re-set in accordance with the location information in the load module file.

(4) Information display area (ID78K4-NS only)

Information

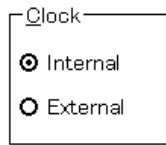
(MEM) 192K

(TRC) ON

This area displays the execution status of the emulation memory and trace memory.

It is not displayed when the program is started. It is displayed after the debugger is started or when the Configuration dialog box is opened by selecting a menu.

- (MEM): Number of bytes of emulation memory
- (TRC): If this is ON, trace memory is mounted; if it is OFF, the trace memory is not mounted.

(5) CPU clock source select area

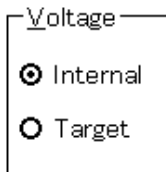
Clock

☒ Internal

☐ External

This area selects the clock source to be input to the emulation CPU.
Select one of the following.

- Internal: The clock in the in-circuit emulator will be used as the CPU clock (default).
- External: The clock of the target device will be used as the CPU clock.

(6) Power supply select area

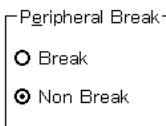
Voltage

☒ Internal

☐ Target

This area selects the power supply to be input to the emulation CPU.
Select one of the following.

- Internal: The power supply in the in-circuit emulator is used as the operating voltage (default). The operation voltage is fixed to 5 V.
- Target: The power supply of the target is used as the operating voltage. The operating voltage can be changed within the range of the device's specifications.

(7) Break mode select area (ID78K0 (-NS) only)

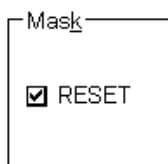
Peripheral Break

☐ Break

☒ Non Break

This area selects the peripheral emulation operation of the in-circuit emulator during a break.
Select one of the following.

- Break: Stops the peripheral emulation function during a break.
- Non Break: Does not stop the peripheral emulation function during a break (default).

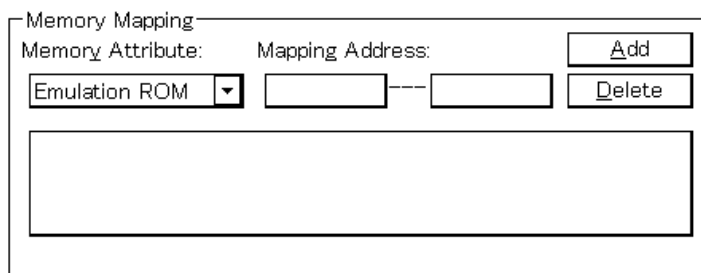
(8) Mask setting area

 A window titled "Mask" containing a single checked checkbox labeled "RESET".

This area specifies a mask for the signal sent from the target.

The signal of the masked pin cannot be input to the in-circuit emulator.

Mask pins only when the operation of the target is unstable at the debugging stage.

In models other than the ID78K4, only the RESET pin can mask signals. In the ID78K4, NMI, WAIT, HLDRQ, and STOP can also be selected.

(9) Mapping setting area

 A window titled "Memory Mapping" with two input fields: "Memory Attribute:" and "Mapping Address:". The "Memory Attribute:" field has a dropdown menu currently showing "Emulation ROM". To the right of the "Mapping Address:" field are two buttons: "Add" and "Delete". Below these fields is a large empty rectangular box.

This area specifies the mapping attribute and address, and sets mapping.

(a) Mapping attribute specification

The following types of mapping attributes can be selected. Select a suitable attribute.

Note, however, that Emulation ROM, Emulation RAM, Target, and I/O Protect cannot be selected for devices without external space and ID78K0S-NS.

Memory Attribute

- Emulation ROM^{Note 1}: Selects an in-circuit emulator alternate ROM.
- Emulation RAM^{Note 1}: Selects an in-circuit emulator alternate RAM.
- Target^{Note 1}: Selects a target memory.
- I/O Protect^{Note 1}: Selects an I/O protect area.
- Stack^{Note 2}: Select a memory in the stack area.

Notes 1. Cannot be selected for the ID78K0S-NS.

2. Cannot be selected for the ID78K4-NS.

The I/O Protect area can only be set inside the area set in the Target and the external SFR area. The area set as I/O Protect cannot be read unless it has been registered as an I/O port in the SFR window, or registered in the Watch window. If it is necessary to read this area, execute a forcible read in these windows.

(b) Mapping address specification

Mapping Address: Specify the address to be mapped.
Input the mapping-start address and the mapping-end address from the keyboard.

(c) Setting of memory mapping

- To add memory mapping

After specifying the Memory Attribute and Mapping Address, click the  button.

Memory mapping corresponding to the Memory Attribute and to the Memory Mapping address range is added.

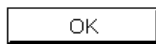
In ID78K0-NS, the mapping units for mapping attributes of other than Stack and I/O Protect are adjusted when the  button is clicked. If the mapping units do not match, the minimum range subject to mapping that can be set, which includes the specified address, is used.

Stack area is set only in the internal RAM area (cannot be set in the internal expansion RAM area).

- To delete memory mapping

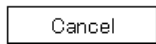
Select the mapping to be deleted from the displayed area, then click the  button. The currently selected mapping will be deleted.

Remark The mapping unit in the Stack and I/O Protect areas is bytes.

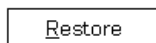
Function buttons

Validates the current environments. Sets environments and closes the Configuration dialog box.

If an error occurs when the  button is clicked, the debugger stops because it is impossible to continue.



Cancels change and closes this dialog box.

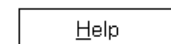


This returns the environmental settings to the state they were in before the Configuration dialog box was opened.



Opens the Project File Load dialog box.

If a project file is open or if an error occurs during reading, the debugger stops because it is impossible to continue.



Opens the help window that explains the Configuration dialog box.

Bank Set Dialog Box (ID78K0 (-NS) only)

General

Sets the memory bank.

Note, however, that the memory bank does not need to be set when reading the project file. The contents of the project file read are reflected in the Bank Set dialog box.

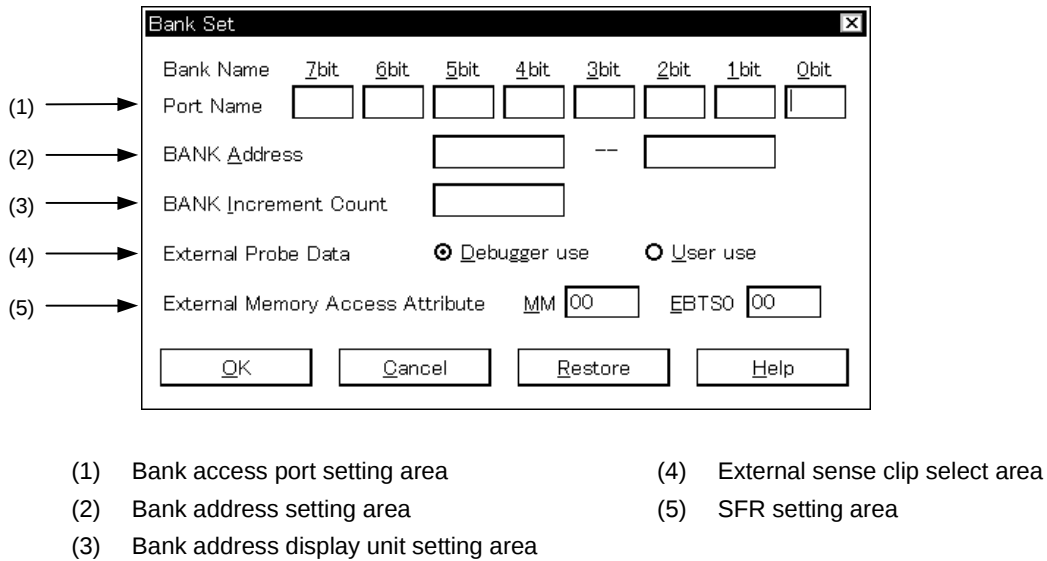
Opening method

This dialog box can be opened by the following method.

- In the Extended Option dialog box
Turn on "Memory Bank" in the Memory Bank area, then click the **BANK Set** button.

Window

Figure 6-16. Bank Set Dialog Box



Function

The Bank Set dialog box consists of the following areas.

- Bank access port setting area
- Bank address setting area
- Bank address display unit setting area
- External sense clip select area
- SFR select area

The function of each area is explained below.

(1) Bank access port setting area

Bank Name								
Port Name								

This area sets the port used to access the memory bank.

(2) Bank address setting area

BANK Address		--	
--------------	----------------------	----	----------------------

This area sets the range within which the memory bank is switched.

(3) Bank address display unit setting area

BANK Increment Count	
----------------------	----------------------

This area sets display unit for the memory bank address.

(4) External sense clip select area

External Probe Data	☒ <u>D</u> ebugger use	☐ <u>U</u> ser use
---------------------	---	--

This area selects whether use the external sense clip for the memory bank or not.

Setting	Description
Debugger use	The external sense clip is used by the debugger for event setting and address creation during trace display for the memory bank area.
User use	The user can freely set in this area. Note, however, that event setting and trace display may be illegal for the memory bank.

When checking “Debugger use” to use the external sense clip, ports correspond to external sense clips as follows.

Bank Port Bit	External Sense Clip No.
Bit 7	No. 8
Bit 6	No. 7
Bit 5	No. 6
Bit 4	No. 5
Bit 3	No. 4
Bit 2	No. 3
Bit 1	No. 2
Bit 0	No. 1

(5) SFR setting area

External Memory Access Attribute MM EBTSO

This area sets the access ports, memory expansion mode, and external bus type selection registers for memory bank access.

The SFRs that need to be specified are shown below.

Setting	Description	Remarks
Pxx	Specify the port used to access the memory bank.	Specify in the access port setting area.
PMxx	Specify when the port for memory bank access is set as an output port.	This is set automatically by the debugger.
MM	Set the external expansion area and number of waits.	—
EBTSO	Set the external bus type.	—

Function buttons

OK	Sets the specified memory bank and closes the Bank Set dialog box.
Cancel	Closes the Bank Set dialog box.
Restore	Restores the input data.
Help	Opens the help window.

Mask Option Dialog Box (ID78K0 (-NS), ID78K0S-NS)

General

Sets the mask option.

Note, however, that the mask option does not need to be set when reading the project file. The contents of the project file read are reflected in the Mask Option dialog box.

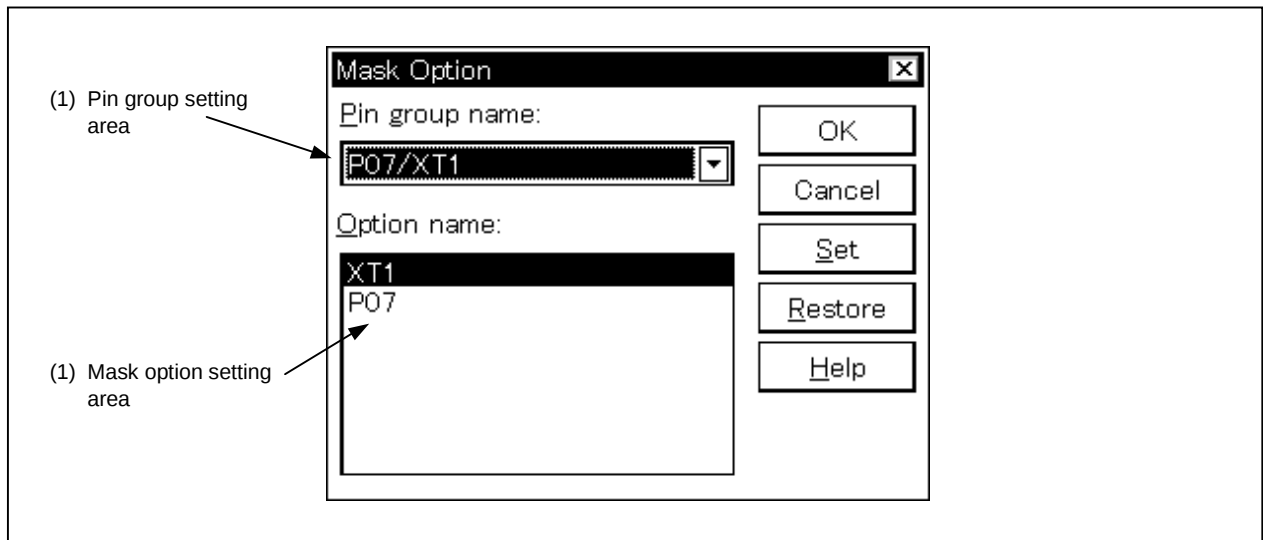
Opening method

This dialog box can be opened by either of the following methods.

- In the main window
Select [Option] → [Mask option] from the menu bar.
Press the **[GRPH]** + **[O]**, and **[M]** keys in that order.

Window

Figure 6-17. Mask Option Dialog Box



Function

The Mask Option dialog box consists of the following areas.

- Pin group setting area
- Mask option setting area

The function of each area is explained below.

(1) Pin group setting area

Pin group name:



This area sets the pin group.

(2) Mask option setting area

Option name:



This area sets the mask option of the device and specifies the pin mode. When this dialog box is opened, the setting option/specified pin mode is displayed at the top.

Function buttons

OK

Sets the specified mask option/pin mode and closes the Mask Option dialog box.

Cancel

Closes the Mask Option dialog box.

Set

Set the specified mask option/pin mode.

Restore

Restores the input data.

Help

Opens the help window.

Extended Option Dialog Box

General

Displays and sets the various extended options of the debugger.

Opening method

This dialog box can be opened by either of the following methods.

- In the main window
Select [Option] → [Extended Option...] from the menu bar.
Press the [GRPH] + [O], and [E] keys in that order.

Window

Figure 6-18. Extended Option Dialog Box (1/2)

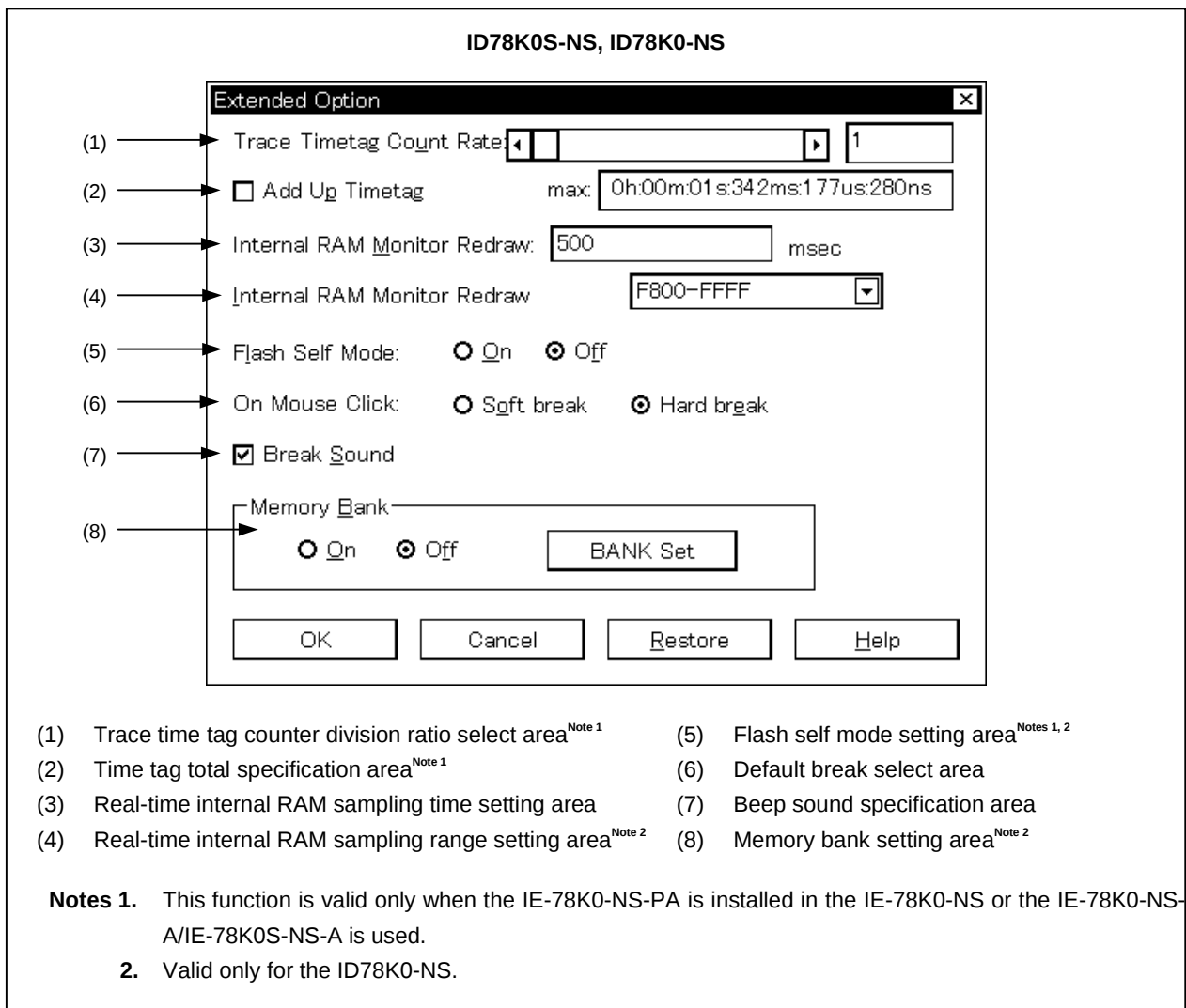
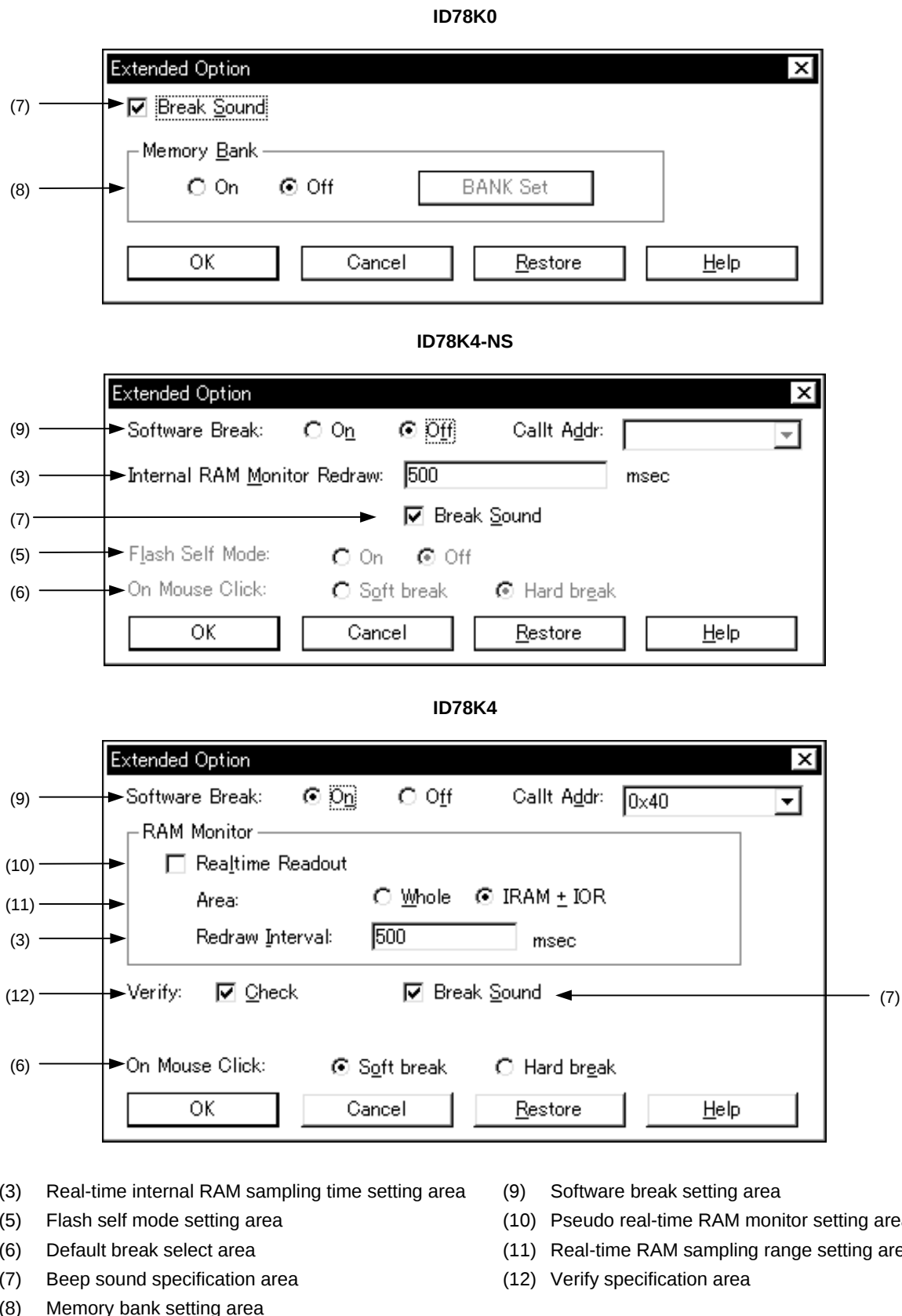


Figure 6-18. Extended Option Dialog Box (2/2)



Function

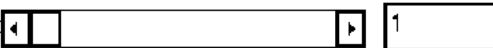
The Extended Option dialog box consists of the following areas.

- Trace time tag counter division ratio select area^{Note 1}
- Time tag total specification area^{Note 1}
- Real-time internal RAM sampling time setting area^{Notes 2, 3}
- Real-time internal RAM sampling range setting area (ID78K0 (-NS) only)
- Flash self mode setting area^{Note 3} (ID78K0 (-NS) only)
- Default break select area^{Note 4}
- Beep sound specification area
- Memory bank setting area (ID78K0 (-NS) only)
- Real-time RAM sampling range setting area
- Software break setting area (ID78K4 (-NS) only)
- Pseudo real-time RAM monitor setting area (ID78K4 only)
- Verify specification area (ID78K4 only)

- Notes**
1. Valid only when the IE-78K0-NS-PA is installed in the IE-78K0-NS or the IE-78K0-NS-A/IE-78K0S-NS-A is used.
 2. Not supported in the ID78K4-NS
 3. Valid only for devices supporting flash self mode.
 4. Valid only for product with new packages (IE-78K0-NS with a control code D or later or the IE-78K0-NS-A/IE-78K0S-NS-A), IE-784000-R, or the IE-78K4-NS.

The function of each area is explained below.

(1) Trace time tag counter division ratio select area^{Note}

Trace Timetag Count Rate 

This area sets the division ratio of the counter to be used as time tag display in Trace View window. Select the division ratio from the drop-down list. The following division ratios can be selected.

Numeric value on drop down list: 1 (default value) to 65,536

When a division ratio has been set, the number of clocks necessary for counting the counter displayed by time tag is changed.

Note This is valid when the IE-78K0-NS-PA is installed in the IE-78K0-NS or when the IE-78K0-NS-A or IE-78K0S-NS-A is used.

(2) Time tag total specification area^{Note}

☐ Add Up Timetag max: 0h:00m:01s:342ms:177us:280ns

If this check box is checked, the trace data time tags will be totaled.
The default is an unchecked box, and therefore no totaling of time tags.

Note This is valid when the IE-78K0-NS-PA is installed in the IE-78K0-NS or when the IE-78K0-NS-A or IE-78K0S-NS-A is used.

(3) Real-time internal RAM sampling time setting area^{Note}

Internal RAM Monitor Redraw: 500 msec

This area specifies the sampling time (ms) of the real-time internal RAM sampling.
During emulation, the range specified in the real-time internal RAM sampling range setting area can be sampled in real time.

Variables, data, etc. allocated to this range can be viewed in real time in the Watch window and the Memory window.

Sampling time can be specified from 0 to 65,500 in 100 ms units.

Real-time display is not performed if the sampling time is set at 0 or is left blank.

Note This is valid when the IE-78K0-NS-PA is installed in the IE-78K0-NS or when the IE-78K0-NS-A or IE-78K0S-NS-A is used.

(4) Real-time internal RAM sampling range setting area (ID78K0-NS only)

Internal RAM Monitor Redraw: F800-FFFF ▼

This area specifies the range of the real-time internal RAM sampling.

Variables, data, etc. allocated to this range can be viewed in real time in the Watch window and the Memory window.

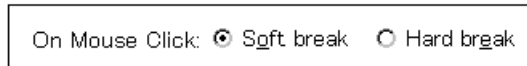
The addresses can be specified in arbitrary 2 KB units.

(5) Flash self mode setting area (ID78K0-NS only)

Flash Self Mode: ☐ On ☒ Off

This area sets the flash self mode.

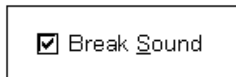
The default setting for this area is "Off" (i.e. not flash self mode).

(6) Default break select area


On Mouse Click: ☒ Soft break ☐ Hard break

Whether to make the breakpoint setting a software break or a hardware break can be selected by clicking the mouse in the Source window or Assemble window.

- **Soft Break:** Sets a software break.
The breakpoint mark is displayed in blue.
- **Hard Break:** Sets a hardware break.
The breakpoint mark is displayed in red.

(7) Beep sound specification area


☒ Break Sound

This area specifies whether there will be a beep sound when there is a break.

If the check box is checked, a beep sound is emitted when there is a break (the default is with the beep sound activated).

(8) Memory bank setting area (ID78K0-NS only)


Memory Bank
☐ On ☒ Off BANK Set

This area sets the memory bank.

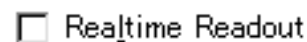
The default setting for this area is "Off" (i.e. memory bank function is not used).

If the BANK Set button is clicked, the Bank Set dialog box is displayed.

(9) Software break setting area (ID78K4-NS only)


Software Break: ☐ On ☒ Off Callt Addr: ▼

This area is used to select whether a software break is used or not. A software break is not used as the default assumption.

(10) Pseudo real-time RAM monitor setting area


☐ Realtime Readout

Do not check Realtime Readout for pseudo real-time monitoring of RAM.

In this case a start address and an end address can be input.

Check Realtime Readout (default) for real-time monitoring of RAM.

In this case, only a start address can be input.

(11) Real-time RAM sampling range setting area

Area: ☐ Whole ☒ IRAM + IOR

This area specifies the address range in which real-time RAM sampling is executed. Variables, data, etc. allocated to this range can be viewed in real-time in the Variable window and the Memory window.

- Whole: All memory spaces are sampled. Because the range in which memories are called is wide, user program execution is stopped for a long time if many windows are opened.
Note also that the mnemonics can be displayed in the Trace window even while the tracer is stopped.
- IRAM + IOR: Only the internal RAM area and IOR area are sampled

(12) Verify specification area (ID78K4 only)

Verify: ☒ Check

This area specifies whether a verify check is executed when data is written to the memory.

If the check box is checked, a verify check is executed when downloading, memory filling, or memory copying is executed. In addition, a verify check is also executed when variables or data are changed in the Variable window or the Memory window and written to the memory (a verify check is executed as the default assumption).

Function buttons

OK

Makes the currently set environment active.
Sets the environment and closes the Extended Option dialog box.

Cancel

Cancels the change contents and closes the Extended Option dialog box.

Restore

Returns to the environmental setting state that existed before the Extended Option dialog box was opened.

Help

Opens the help window that explains the Extended Option dialog box.

Debugger Option Dialog Box

General

Displays and sets each type of extended option in the debugger.

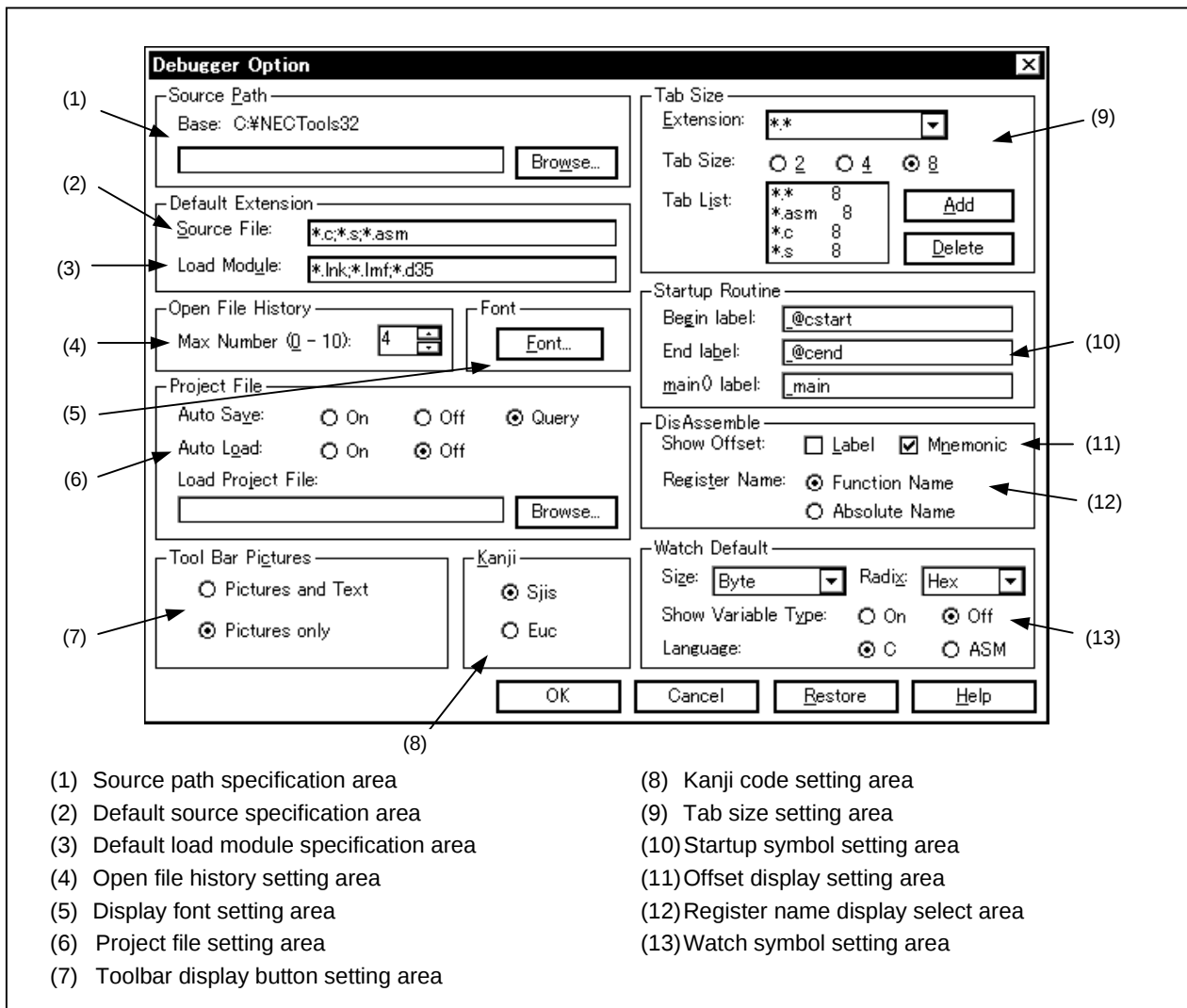
Opening method

This dialog box can be opened by either of the following methods.

- In the main window
Select [Option] → [Debugger Option...] from the menu bar.
Press the **[GRPH]** + **[O]**, and **[D]** keys in that order.

Window

Figure 6-19. Debugger Option Dialog Box



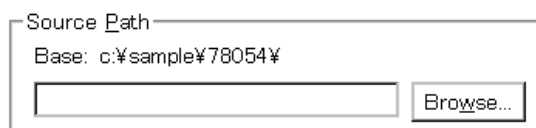
Function

The Debugger Option dialog box consists of the following areas.

- Source path specification area
- Default source specification area
- Default load module specification area
- Open file history setting area
- Tab size setting area
- Project file setting area
- Toolbar display button setting area
- Kanji code setting area
- Display font setting area
- Startup symbol setting area
- Offset display setting area
- Register name display select area
- Watch symbol setting area

The function of each area is explained below.

(1) Source path specification area



This area specifies the directory in which the source file or text files will be searched for.

The path is specified by inputting it from the keyboard or by using the **Browse...** button.

When the **Browse...** button is clicked, the Browse dialog box is displayed and the source path can be added.

A relative path can also be specified. The directory that is the reference for the relative path is displayed to the right of "Base:". The reference directory is decided using the following procedure.

- The directory from which the project files were loaded.
- The directory from which the latest load module or hex file was loaded.
- Windows current directory.

Delimiters in path information are specified by " " (blank), ";" (semi-colon), or "," (comma). Japanese characters can be specified in the source path (Japanese version only).

Example If the source is located in the following directory,

```
b:\src
c:\asm
```

The source path specification becomes as follows.

```
b:\src;c:\asm
```

(2) Default source specification area

Default Extension

Source File: *.*;*.s;*.asm

When [E] → [O]pen... is selected and the Browse dialog box is opened, the file extension of the displayed source file is set in this area.

File extension delimiters are specified by " " (blank), ";" (semi-colon), or "," (comma).

(3) Default load module specification area

Default Extension

Load Module: *.lnk;*.lmf;*.d26

This area sets the file extension of the load module displayed when the Download dialog box is opened.

File extension delimiters are specified by " " (blank), ";" (semi-colon), or "," (comma).

(4) Open file history setting area

Open File History

Max Number (0 - 10): 4

This area sets the number of items in the history displayed at the bottom of the [E] menu.

The number of items that can be set range from 0 to 10.

When 0 is set, the history is not displayed on the menu.

The default is 4.

(5) Display font setting area

Font

Font...

This area specifies the display font in the Source window. If the button is clicked, the Font dialog box opens and the display font can be selected.

(6) Project file setting area

Project File

Auto Save: ☐ On ☐ Off ☒ Query

Auto Load: ☐ On ☒ Off

Load Project File:

This area sets the project file auto save and auto load.

(a) Project file auto save

Selection can be made from among the following items.

Auto Save:

- On: Performs project file auto save when closing.
- Off: Does not perform project file auto save when closing.
- Query: Displays the Exit Debugger dialog box when closing (default).

(b) Project file auto load

Selection can be made from among the following items.

Auto Load:

- On: Performs project file auto load when starting.
- Off: Does not perform project file auto load when starting (default).

(c) Auto load project file settings

Specifies the project file to be loaded during auto load. This can be specified when "Auto Load" has been turned "On." When it is turned "Off," the specification column becomes inactive (dimmed).

Load Project File: Input the project file name from the keyboard or set it by clicking the button.

If the button is clicked, the Browse dialog box is displayed.

(7) Toolbar display button setting area

Tool Bar Pictures

☐ Pictures and Text

☒ Pictures only

This area sets the toolbar display buttons.

The display buttons can be selected from among the following items.

- Pictures only: Displays buttons which show only graphics (default).
- Pictures and Text: Displays buttons which show both graphics and text.

(8) Kanji code setting area

Kanji

☒ Sjis

☐ Euc

This area specifies the kanji code of the files displayed in the Source window or Trace View window. Kanji code can be selected from the following.

Sjis: SJIS is used for the kanji code (default).

Euc: EUC is used for the kanji code.

The kanji code is valid only for Japanese Windows.

(9) Tab size setting area

Tab Size

Extension: *.*

Tab Size: ☐ 2 ☐ 4 ☒ 8

Tab List:	
.	8
*.asm	8
*.c	8
*.s	8

Add

Delete

This area sets the tab size for each file extension when displaying files with that file extension.

(a) File extension setting

Set the file extension.

Extension: Setting of the file extension can be done by inputting it from the keyboard or by selecting from the drop-down list.

(b) Tab size selection

The following tab sizes can be selected.

Tab Size:

2: Displays the tab code with 2 spaces.

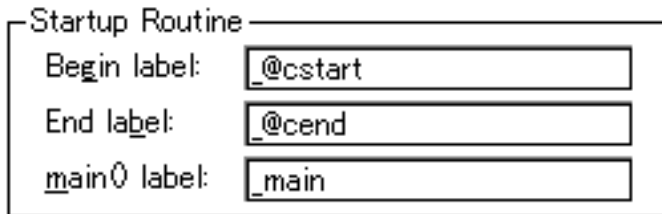
4: Displays the tab code with 4 spaces.

8: Displays the tab code with 8 spaces.

(c) Setting tab size for each file extension

Tab List: Displays a list of the file extensions and tab sizes.

- If a tab size setting is added, and if a tab size is changed, set it by “Extension” and “Tab Size”, then click the  button.
- To delete a tab size setting,
Select the file extension setting in the “Tab List,” then click the  button.
The currently selected file extension setting is deleted.

(10) Startup symbol setting area


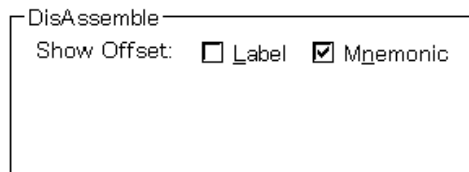
The image shows a dialog box titled "Startup Routine". It contains three text input fields. The first field is labeled "Begin label:" and contains the text "@cstart". The second field is labeled "End label:" and contains the text "@cend". The third field is labeled "main() label:" and contains the text "_main".

This area specifies the beginning symbol (Begin label), the end symbol (End label), and display start symbol (main() label) of the startup routine.

If it is left blank, the Debugger Option dialog box cannot be closed.

The default is as follows.

Begin Label: @cstart
End Label: @cend
main() label: _main

(11) Offset display setting area


The image shows a dialog box titled "DisAssemble". It contains a section labeled "Show Offset:" with two checkboxes. The first checkbox is labeled "Label" and is unchecked. The second checkbox is labeled "Mnemonic" and is checked.

This area sets whether there will be an offset display (symbol + offset) during disassemble display.

If there is no offset display, a symbol is displayed only when there is a symbol that matches the numerical value, and when there is not a matching symbol, the numerical value is displayed as is in hex notation.

The areas where the offset display can be specified are of the following two types.

Label: Sets whether or not there will be an offset display in the label column.
 The default is no offset display.

Mnemonic: Sets whether or not there will be offset display in the mnemonic column.
 The default is offset display.

(12) Register name display selection area

DisAssemble

Register Name: ☒ Function Name
☐ Absolute Name

This area selects the display method of the register name in the mnemonic during disassemble display. The display method can be selected from the following two methods.

Function Name: Displays the register name as a function name or alias (default).
 Absolute Name: Displays the register name as an absolute name.

(13) Watch symbol setting area

Watch Default

Size: Radix:
 Show Variable Type: ☐ On ☒ Off
 Language: ☒ C ☐ ASM

This area specifies the watch symbol.

(a) Default size

Set the display size of data specified as "Adaptive" in the Watch window, etc. The size displayed can be selected from among the following items.

Size:

Byte: Displays data in 8 bits (default).
 Word: Displays data in 16 bits.
 Double Word: Displays data in 32 bits.

(b) Default radix

Set the display radix of data specified as "Proper" in the Watch window, etc. The display radix can be selected from among the following items.

Radix:

Bin: Displayed in binary.
 Oct: Displayed in octal.
 Dec: Displayed in decimal.
 Hex: Displayed in hexadecimal (default).
 String: Displayed as a character string.

(c) Variable type display on/off

Set the variable type display on/off.

Show Variable Type:

On: Displays variable types.

Off: Does not display variable types (default).

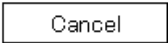
(d) Variable display format

C: Displays in C language format.

ASM: Displays in assembly format.

Function buttonsOK

After activating each type of option in the set debugger, the dialog box is closed.

Cancel

Each of the options set in the debugger on this occasion are made inactive and the dialog box is closed.

Restore

Returns to the environment setting state existing before the Debugger Option dialog box was opened.

Help

Opens the help window for the Debugger Option dialog box.

Font Dialog Box

General

Selects the display font for the Source window and sets the font size.

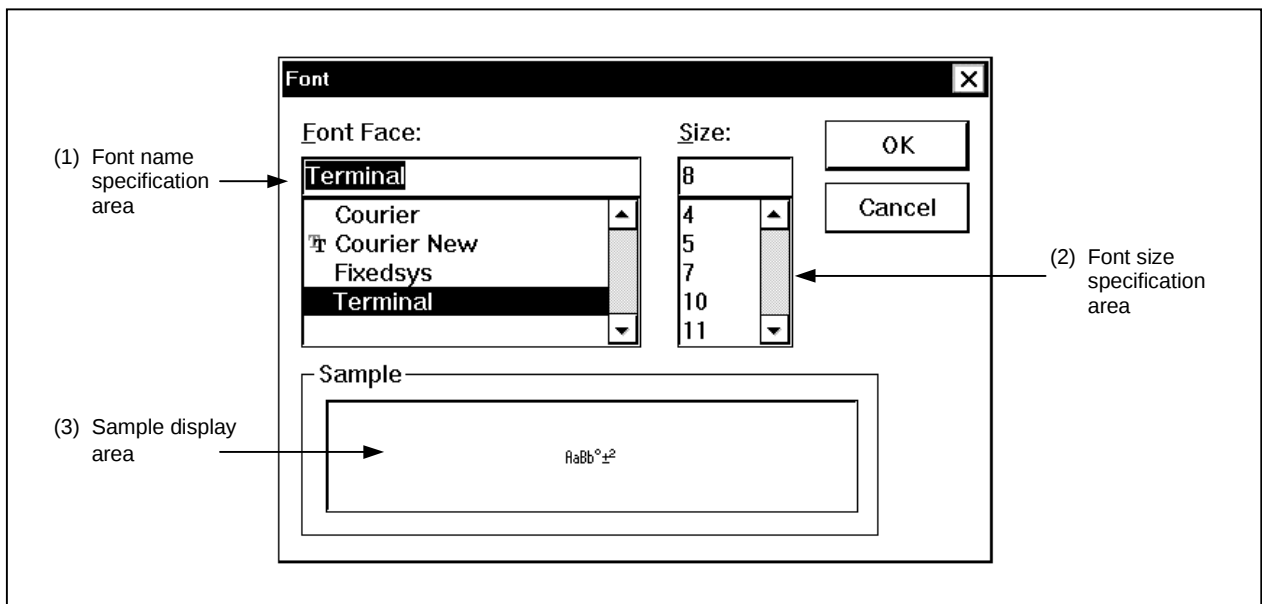
Opening method

This dialog box can be opened by the following method.

- Click the **Font...** button in the Debugger Option dialog box.

Window

Figure 6-20. Font Dialog Box

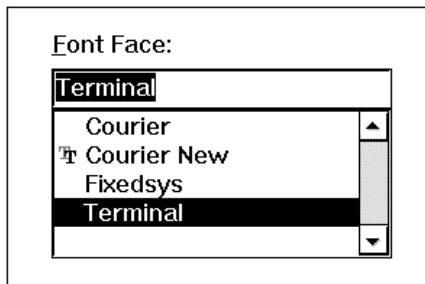


Function

The Font dialog box consists of the following areas.

- Font name specification area
- Font size specification area
- Sample display area

The function of each area is explained below.

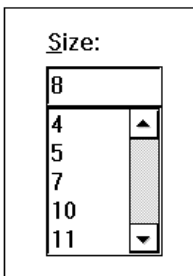
(1) Font name specification area

This area selects the specified font from among the currently usable fonts.

Fixed-width fonts (fonts with a constant stroke width and fixed-pitch fonts) only are listed.

When the font name is selected from the list, the font name is displayed in the edit box and the font sizes with which that font can be used are displayed in the font size specification area.

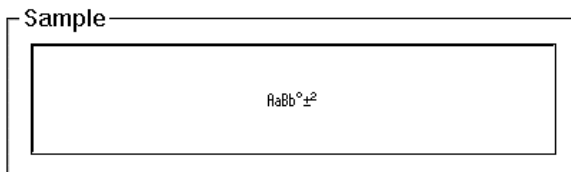
It is also possible to type the font name directly in the edit box using the keyboard.

(2) Font size specification area

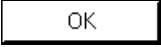
The usable sizes of the font specified in the font name specification area are listed in point units in this area.

When selecting the font size from the list, the size is displayed in the edit box.

It is also possible to type the font size directly in the edit box using the keyboard.

(3) Sample display area

This area displays sample character string showing the specified font and font size.

Function buttonsA rectangular button with a black border and the text "OK" centered inside.

Changes the font in the Source window to the specified font face and font size and closes the dialog box.

A rectangular button with a black border and the text "Cancel" centered inside.

Closes the dialog box without changing the font.

Project File Load Dialog Box

General

Restores previous debugging environments.

The size of the window and the position of the environments in the window are also restored following the project file load.

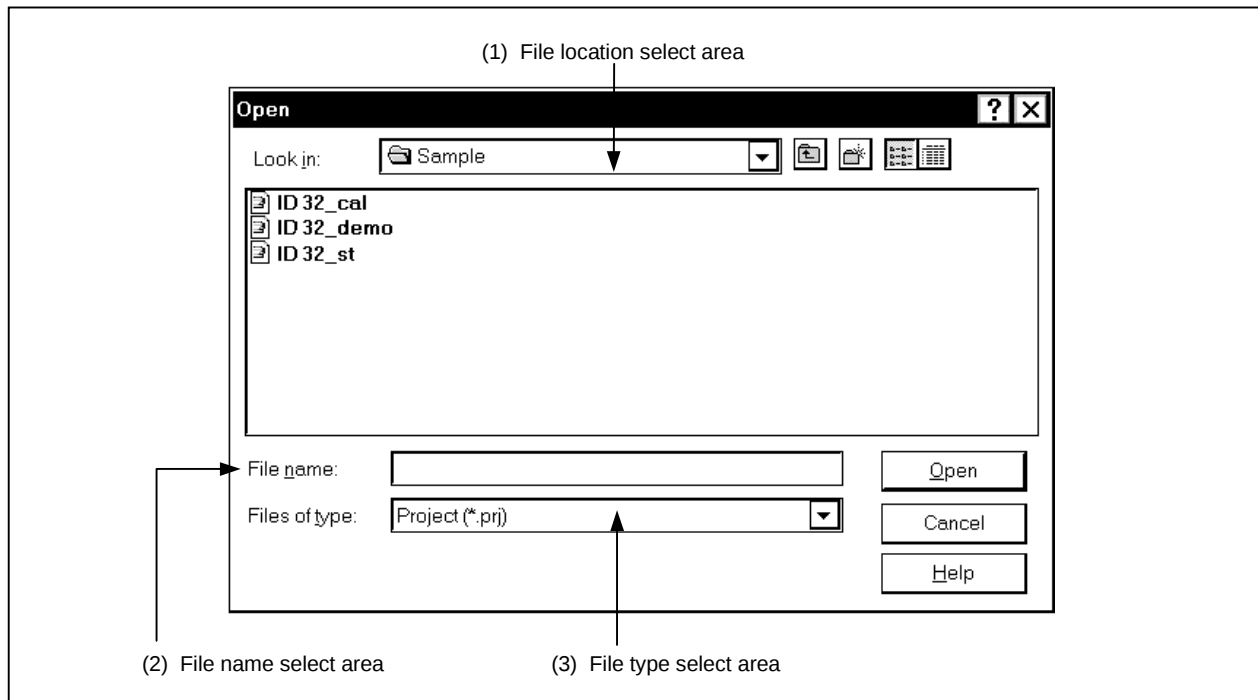
Opening method

This dialog box can be opened by one of the following methods.

- In the main window
Select [File] → [Project...] → [Open Project...] from the menu bar.
Press the **[GRPH] + [F], [J], and [O]** keys in that order.
- Click the  button on the toolbar.

Window

Figure 6-21. Project File Load Dialog Box



Function

Loads project files.

This dialog box consists of the following areas.

- File location select area
- File name select area
- File type select area

The function of each area is explained below.

(1) File location select area

This area selects the drive or directory.

(2) File name select area

This area specifies the file name.

The file name can be input from the keyboard or it can be selected from the list in the top column of the area.

(3) File type select area

This area displays the types of files displayed in the list. Project (*.prj) files are displayed.

Loaded contents

The items from each window shown in the following table are loaded in the project file. However, if the files are loaded after the debugger is started, when a project file with a different target device is loaded, the debugger itself is reset and the project file is loaded (when the target device differs from the target device specified when the debugger was started, the target device becomes the target device specified in the project file).

(1/2)

Window	Set Data
Configuration dialog box	All items (target device, clock source selection, pin mask setting, mapping information)
Main window	Display position, toolbar/status bar/button display information, execution mode information, trace On/Off information, coverage On/Off information
Download dialog box	File information to be downloaded
Extended Option dialog box	Setting information
Debugger Option dialog box	Setting information
Source window	Display information of window, font information
Assemble window	Display information of window, display start address
Memory window	Display information of window, display start address
Stack window	Display information of window
SFR window	Display information of window
Local Variable window	Display information of window
Trace View window	Display information of window
Event dialog box	Display information of window, event information

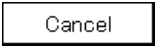
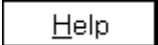
(2/2)

Window	Set Data
Event Link dialog box	Display information of window, link event information
Break dialog box	Display information of window, break event information
Trace dialog box	Display information of window, trace event information
Snap Shot dialog box ^{Note 1}	Display information of window, snap event information
Timer dialog box ^{Note 1}	Display information of window, timer event information
Event Manager	Display information of window, event information
Register window	Display information of window
Watch window	Display information of window, watch entry information
Coverage window ^{Note 1}	Display information of window
DMM dialog box ^{Note 2}	Setting information
Console window	Display information of window
Stub window ^{Note 3}	Display information of window, stub event information

- Notes**
1. Not supported in the ID78K4-NS
 2. Not supported in the ID78K4 (-NS)
 3. Supported only in the ID78K4

Caution The substance of the ID78K0-NS or ID78K0S-NS project is stored in the XXXX.pri file. When specifying the XXXX.prj file, be sure to place the XXXX.pri in the same directory. The program file of the old version (Ver.1.xx or earlier) cannot be read. Re-create the project file.

Function buttons

	Loads the selected file as the project file. Closes the dialog box.
	Closes this dialog box without loading the project file.
	Opens the help window.

Project File Save Dialog Box

General

A project file is a file that stores debugging environments.

When saving debugging environments in a project file, the size of the window and the position of the environments in the window are also saved.

Opening method

This dialog box can be opened by either of the following methods.

- In the main window
Select [File] → [Project] → [Save As...] from the menu bar.
Press the **GRPH** + **F**, **J**, and **A** keys in that order.

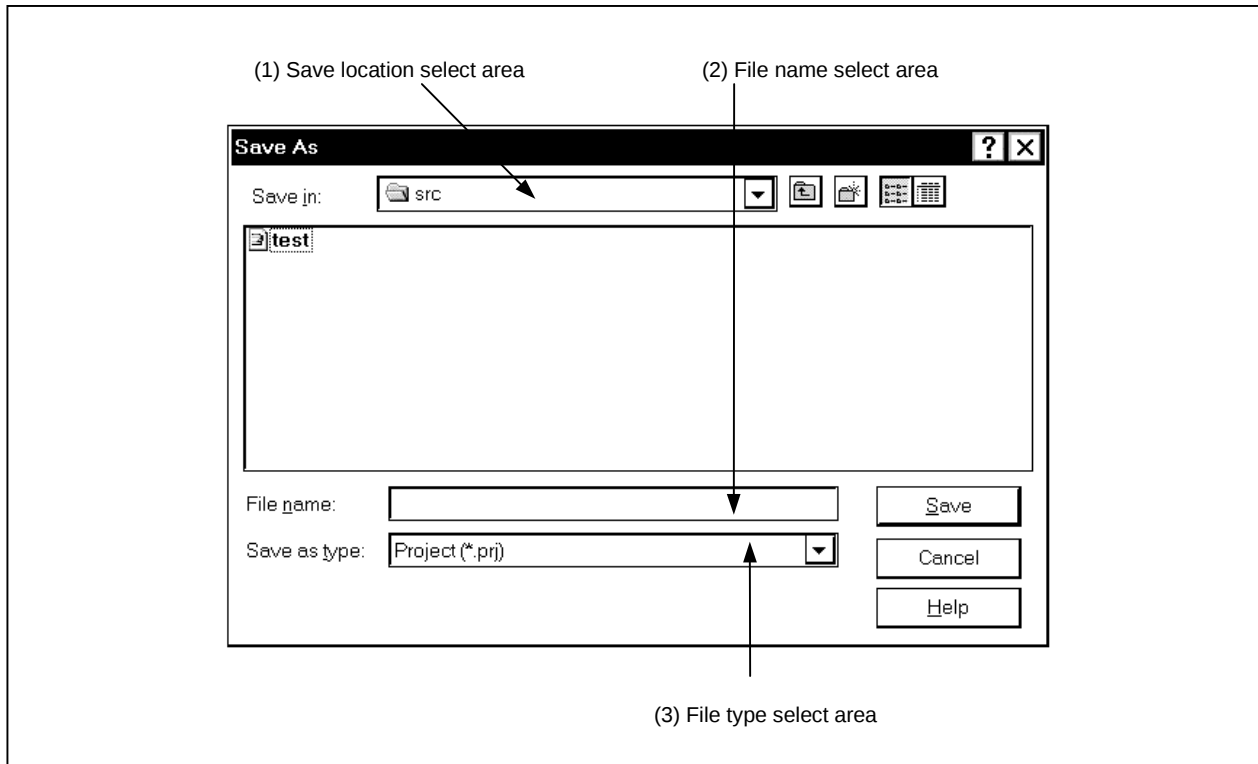
If a project file was loaded or saved previously, and to save a file of the same name, do as follows:

- In the main window
Select [File] → [Project] → [Save] from the menu bar.
Press the **GRPH** + **F**, **J**, and **S** keys in that order.

In this way, a file of the same name as the previously loaded or saved project file can be saved without the Project File Save dialog box being opened.

Window

Figure 6-22. Project File Save Dialog Box



Function

Saves a new project file or a project file whose name has been changed.

This dialog box consists of the following areas.

- Save location select area
- File name select area
- File type select area

The function of each area is explained below.

(1) Save location select area

This area selects the drive or directory.

(2) File name select area

This area specifies the file name.

The file name can be input from the keyboard or it can be selected from the list in the top column of the area.

(3) File type select area

This area displays the types of files displayed in the list.

Project (*.prj) files are displayed.

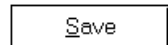
Saved contents

The items from each window shown in the following table are saved in the project file.

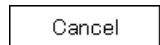
Window	Set Data
Configuration dialog box	All items (target device, clock source selection, pin mask setting, mapping information)
Main window	Display position, toolbar/status bar/button display information, execution mode information, trace On/Off information, coverage On/Off information
Download dialog box	File information to be downloaded
Extended Option dialog box	Setting information
Debugger Option dialog box	Setting information
Source window	Display information of window, font information
Assemble window	Display information of window, display start address
Memory window	Display information of window, display start address
Stack window	Display information of window
SFR window	Display information of window
Local Variable window	Display information of window
Trace View window	Display information of window
Event dialog box	Display information of window, event information
Event Link dialog box	Display information of window, link event information
Break dialog box	Display information of window, break event information
Trace dialog box	Display information of window, trace event information
Snap Shot dialog box ^{Note 1}	Display information of window, snap event information
Timer dialog box ^{Note 1}	Display information of window, timer event information
Event Manager	Display information of window, event information
Register window	Display information of window
Watch window	Display information of window, watch entry information
Coverage window ^{Note 1}	Display information of window
DMM dialog box ^{Note 2}	Setting information
Console window	Display information of window
Stub window ^{Note 3}	Display information of window, stub event information

- Notes**
1. Not supported in the ID78K4-NS
 2. Not supported in the ID78K4 (-NS)
 3. Supported only in the ID78K4

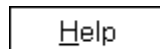
Caution Although XXXX.prj is specified as the project, the substance of the ID78K0-NS or ID78K0S-NS project is stored in the automatically created XXXX.prj file. Use the same XXXX.prj as the Project Manager. Note that project files created using V.1.xx or earlier cannot be used.

Function buttons

Saves the project information in the selected file.
After saving, closes the dialog box.



Closes this dialog box without saving the project file.



Opens the help window.

View File Load Dialog Box

General

Reads display files, and also reads source files, other text files and event setting files, and opens a window.

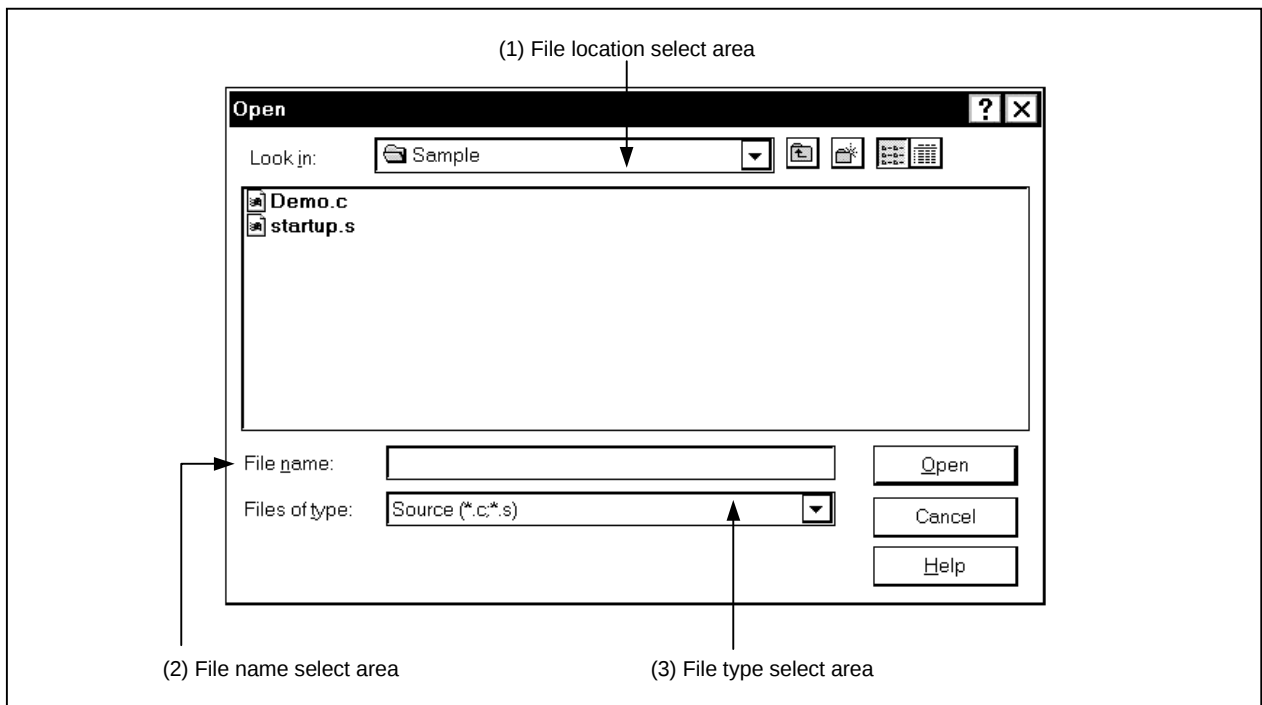
Opening method

This dialog box can be opened by one of the following methods.

- In the main window
Select [File] → [Open] from the menu bar.
Press the **GRPH** + **F**, and **O** keys in that order.
Press shortcut keys **CTRL** + **O**.
- Click the  button on the toolbar.

Window

Figure 6-23. View File Load Dialog Box



Function

Reads display files, and also reads source files, other text files and event setting files, and opens a window. Depending on the file loaded, the window opened and the status differ.

- Loading of a source file (files in which symbol information has been written)
If a Source window exists in the active state, it is opened in the static state. If there is no Source window in the active state, a Source window in the active state is opened.
- Display file or some other text file
It is opened as a text format file in a Source window in the static state.
- Loading of an event setting file
The Event Manager is opened and the event setting contents are returned to the previous environment.

This dialog box consists of the following areas.

- File location select area
- File name select area
- File type select area

The function of each area is explained below.

(1) File location select area

This area selects the drive or directory.

(2) File name select area

This area specifies the file name. The file name can be input from the keyboard or it can be selected from the list in the top column of the area.

(3) File type select area

This area displays the types of files displayed in the list.

Note that the type of the file that used in the prior operation is displayed by default, so specify a suitable file extension in this area.

The file kinds are as shown below.

File Type (File Extension)	Meaning
Source (*.c; *.s; *.asm) ^{Note 1}	Source file
Text (*.txt)	Text file
Source Text (*.svw)	Source window display file
Assemble (*.dis)	Assemble window display file
Memory (*.mem)	Memory window display file
Watch (*.wch)	Watch window display file
Register (*.rgw)	Register window display file
SFR (*.sfr)	SFR window display file
Local Variable (*.loc)	Local Variable window display file
Stack Trace (*.sth)	Stack window display file
Trace (*.tw)	Trace View window display file
Coverage (*.cov) ^{Note 2}	Coverage window display file
Event (*.evn)	Event setting file
All (*.*)	All files

Notes 1. The source file extension (c, s, asm) can be changed in the Debugger Option dialog box.

2. Not supported in the ID78K4-NS

Remark If the conventional Variable window display file is used, it can be used as a Watch window display file by changing the file extension from var to wch.

Function buttons

Open

Loads the selected file.

Cancel

Closes this dialog box without loading the display file.

Help

Opens the help window.

View File Save Dialog Box

General

Saves the contents of the current window when the dialog box was opened to a display file or event setting file.

Opening method

This dialog box can be opened by the following method.

- In the main window, make the window to be saved the current window and perform either of the following operations.
 - Select [File] → [Save As...] from the menu bar.
 - Press the [GRPH] + [F], and [A] keys in that order.

Window

Figure 6-24. View File Save Dialog Box (1/3)

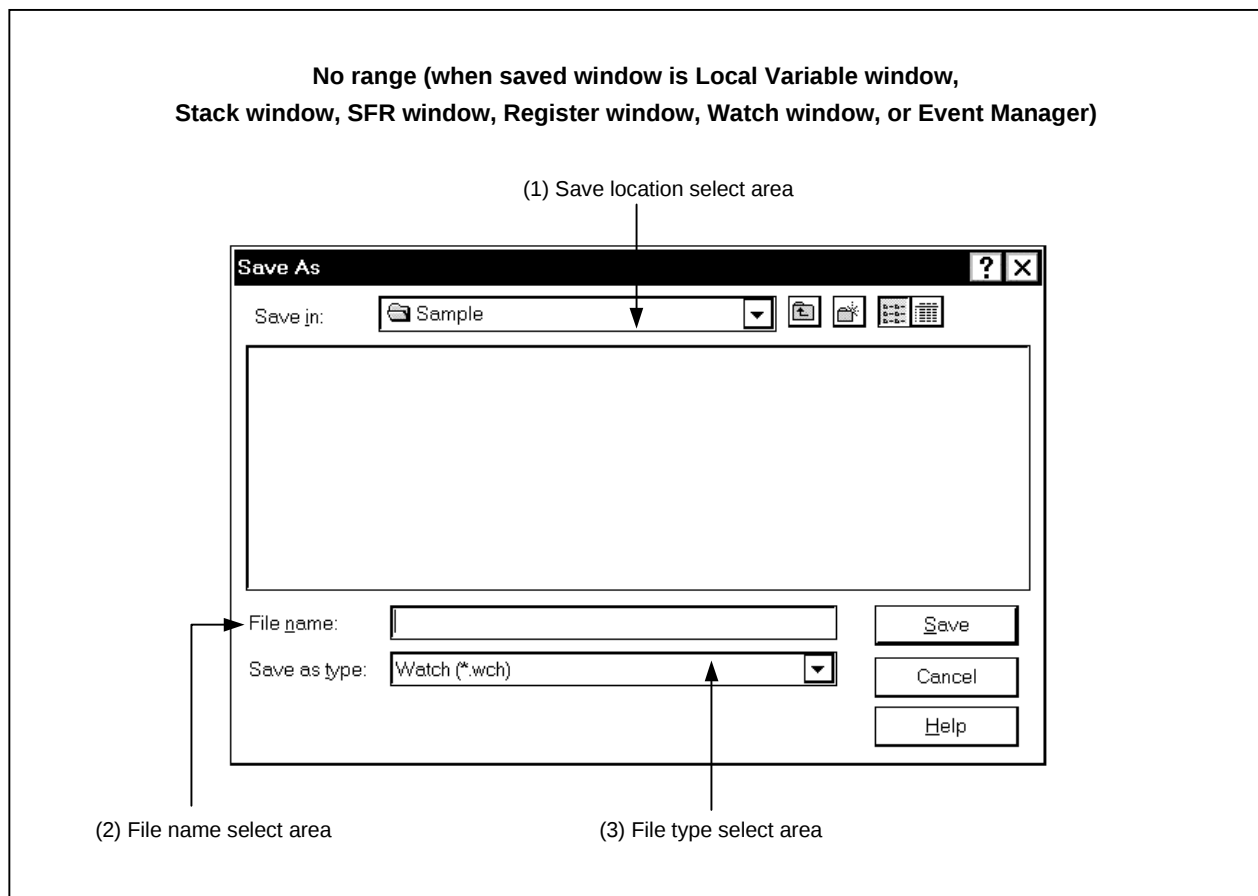
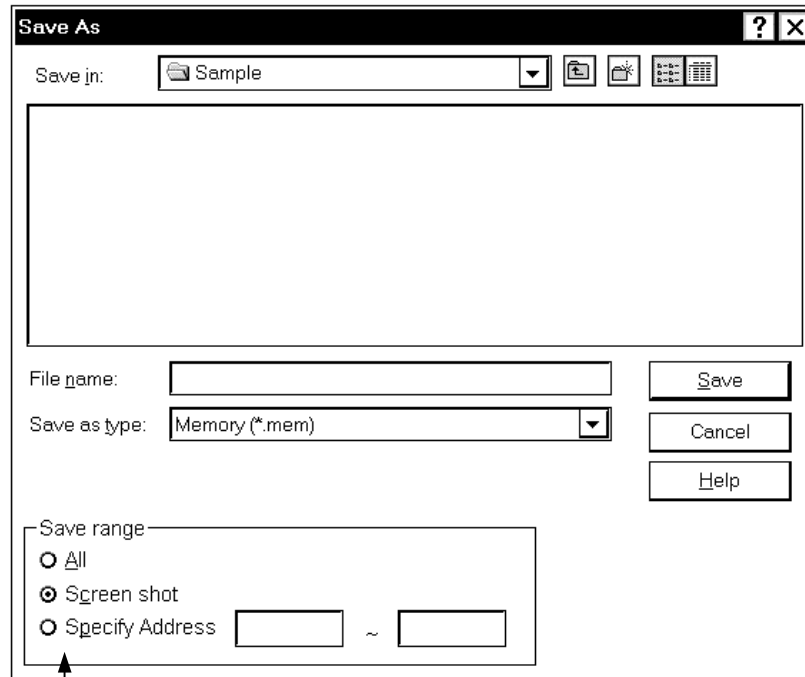


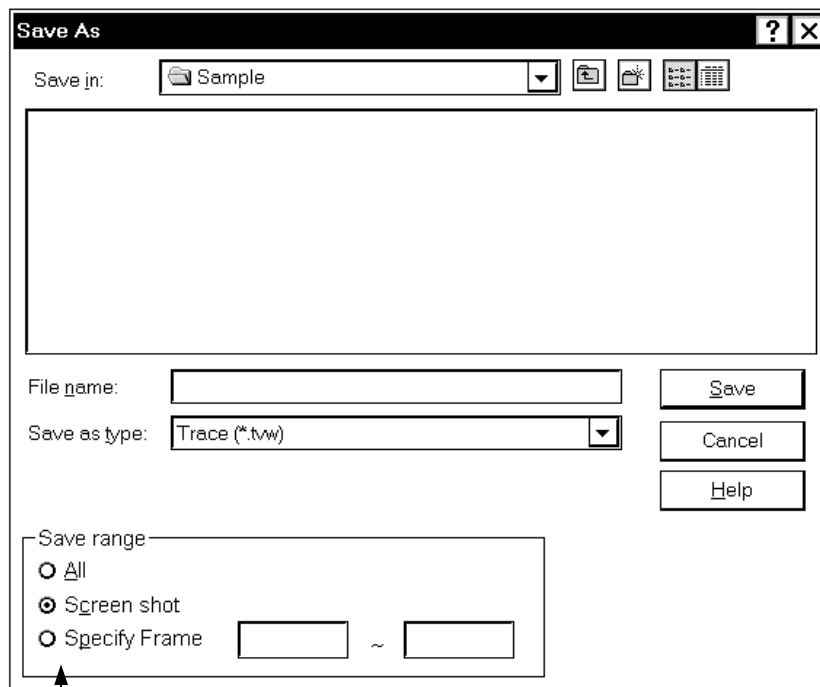
Figure 6-24. View File Save Dialog Box (2/3)

Address range (when saved window is Assemble window, Memory window, or Coverage window)



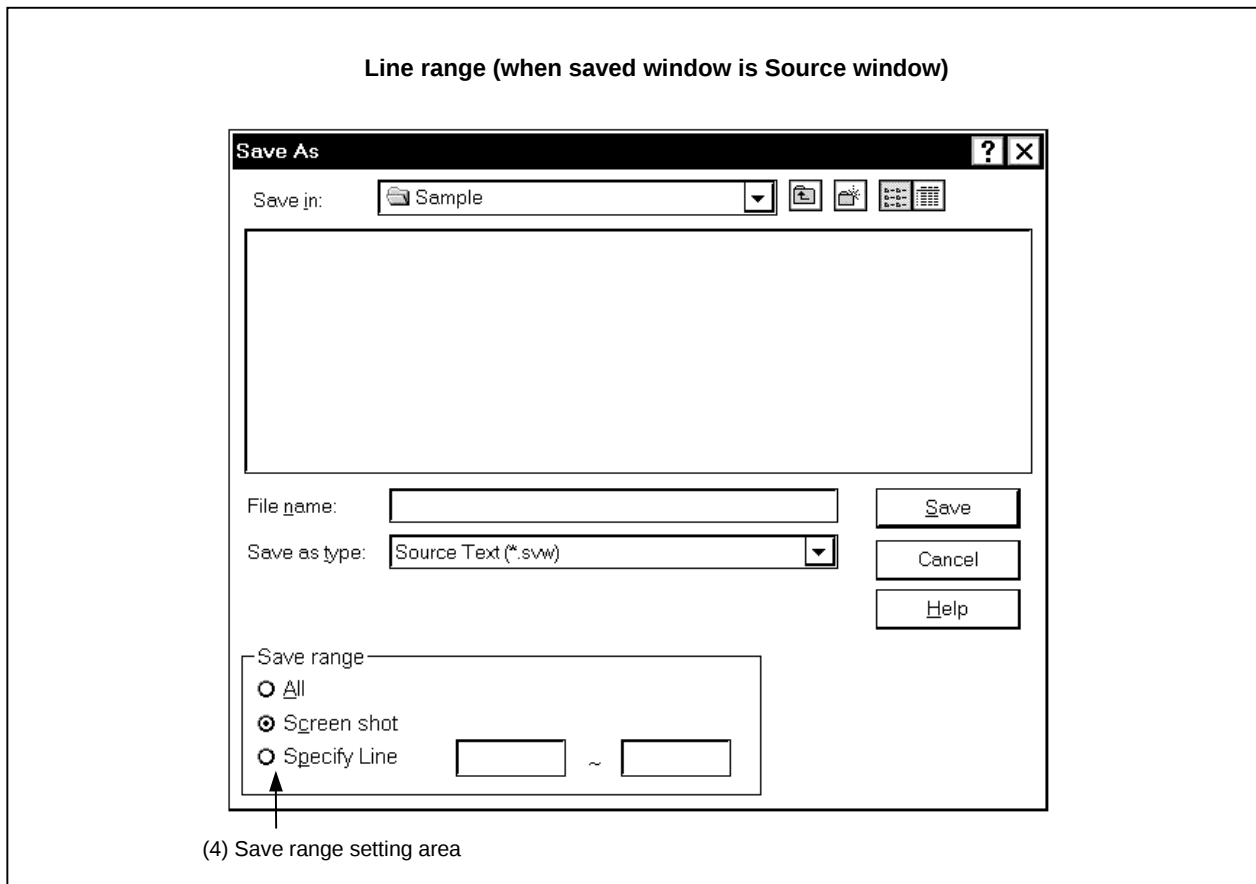
(4) Save range setting area

Frame range (when saved window is Trace View window)



(4) Save range setting area

Figure 6-24. View File Save Dialog Box (3/3)



Function

Saves the contents of the current window in a display file.

This dialog box consists of the following areas.

- Save location select area
- File name select area
- File type select area
- Save range setting area

The function of each area is explained below.

(1) Save location select area

This area selects the drive or directory.

(2) File name select area

This area specifies the file name.

The file name can be input from the keyboard or it can be selected from the list in the top column of the area.

(3) File type select area

This area displays the types of files displayed in the list.

The file types are as shown below.

File Type (File Extension)	Current Window Name
Source Text (*.svm)	Source window
Assemble (*.dis)	Assemble window
Memory (*.mem)	Memory window
Watch (*.wch)	Watch window
Register (*.rgw)	Register window
SFR (*.sfr)	SFR window
Local Variable (*.loc)	Local Variable window
Stack Trace (*.stk)	Stack window
Trace (*.twv)	Trace View window
Coverage (*.cov) ^{Note}	Coverage window
Event (*.evn)	Event Manager

Note Not supported in the ID78K4-NS

(4) Save range setting area

This area is displayed only when the current window to be saved is the Assemble window, Memory window, Coverage window, Source window, or Trace View window.

Save range

☐ All
☒ Screen shot
☐ Specify Address ~

All: Specifies that all the area from the first line to the last line be saved.

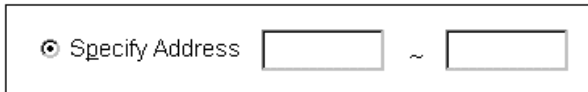
Screen shot: This specifies that the entire visible area from the top line to the bottom line of the screen be saved. However, in cases where there is a mixed display with the Source window, the area saved is the from the source line included in the visible area of the screen.

Specify Line (in the case of the Source window),

Specify Frame (in the case of the Trace View window),

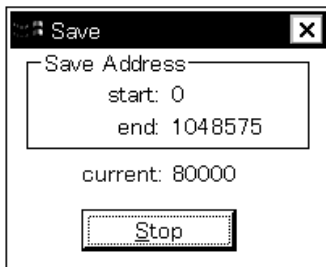
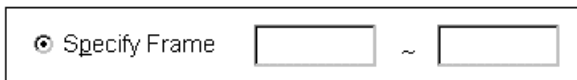
Specify Address (in the case of other windows):

Specify the starting line and end line of the area to be saved. When the starting line and end line are omitted, it is regarded as if the first line/last line were specified. Details are as shown below.

(a) If current window is Assemble window, Memory window, or Coverage windowA dialog box titled "Specify Address" with a radio button selected. It contains two text input fields separated by a tilde (~) symbol.

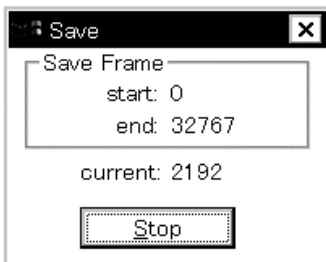
Specify an address range to be saved. Addresses can also be specified by symbols or expressions. (The specification method is the same as in the case of the Address Move dialog box.) The default radix when numbers are input is hexadecimal.

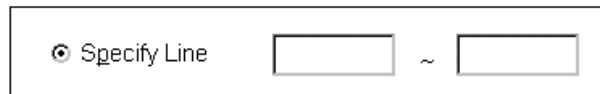
If an area with 256 bytes or more is specified, a dialog box indicating the saving status is displayed. To stop saving midway, click the **Stop** button in this dialog box.

A "Save" dialog box with a title bar and a close button. It contains a "Save Address" section with "start: 0" and "end: 1048575". Below this is "current: 80000" and a "Stop" button.**(b) If current window is Trace View window**A dialog box titled "Specify Frame" with a radio button selected. It contains two text input fields separated by a tilde (~) symbol.

Specify the range of trace frames to be saved. (The specification method is the same as in the case of the Trace Move dialog box.) The default radix when numbers are input is decimal.

If a range of more than 100 frames is specified, a dialog box indicating the saving status is displayed. To stop saving midway, click the **Stop** button in this dialog box.

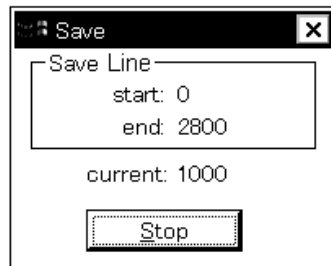
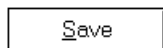
A "Save" dialog box with a title bar and a close button. It contains a "Save Frame" section with "start: 0" and "end: 32767". Below this is "current: 2192" and a "Stop" button.

(c) If current window is Source window

 A dialog box titled "Specify Line" with a radio button selected. It contains two text input fields separated by a tilde (~) symbol.

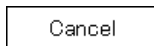
Specify the range by line numbers. The default radix when numbers are input is decimal.

When the Source window is in the mixed display mode, the mixed display portion in the specified lines is also saved.

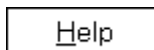
If a range of more than 100 lines is specified, a dialog box indicating the saving status is displayed. To stop saving midway, click the **Stop** button in this dialog box.


 A dialog box titled "Save" with a close button (X). It contains a "Save Line" section with "start: 0" and "end: 2800". Below this, it says "current: 1000". At the bottom is a "Stop" button.
Function buttons

 A button labeled "Save".

Saves the contents of the current window to the selected file.
After that, closes the View File Save dialog box.


 A button labeled "Cancel".

Closes the View File Save dialog box without saving.


 A button labeled "Help".

Opens the help window.

Caution

The Stack Trace window cannot save an area other than one currently displayed in the window.

Download Dialog Box

General

Selects the name and format of a file to be downloaded, and downloads the contents of the target memory or the results of coverage to the in-circuit emulator or target.

The files and file formats that can be downloaded are as follows.

- NEC load module format (XCOFF (.lnk, .lmf))
- Intel HEX format file (normal or extended)
- Motorola HEX format file S type (S0, S2, S3, S7, and S8)
- Extended Tektronix HEX format file
- Binary data format file
- Results of coverage

If a file other than an object file in the load module format is loaded, debugging cannot be executed at the source level.

Network files must be used after being allocated to network drives.

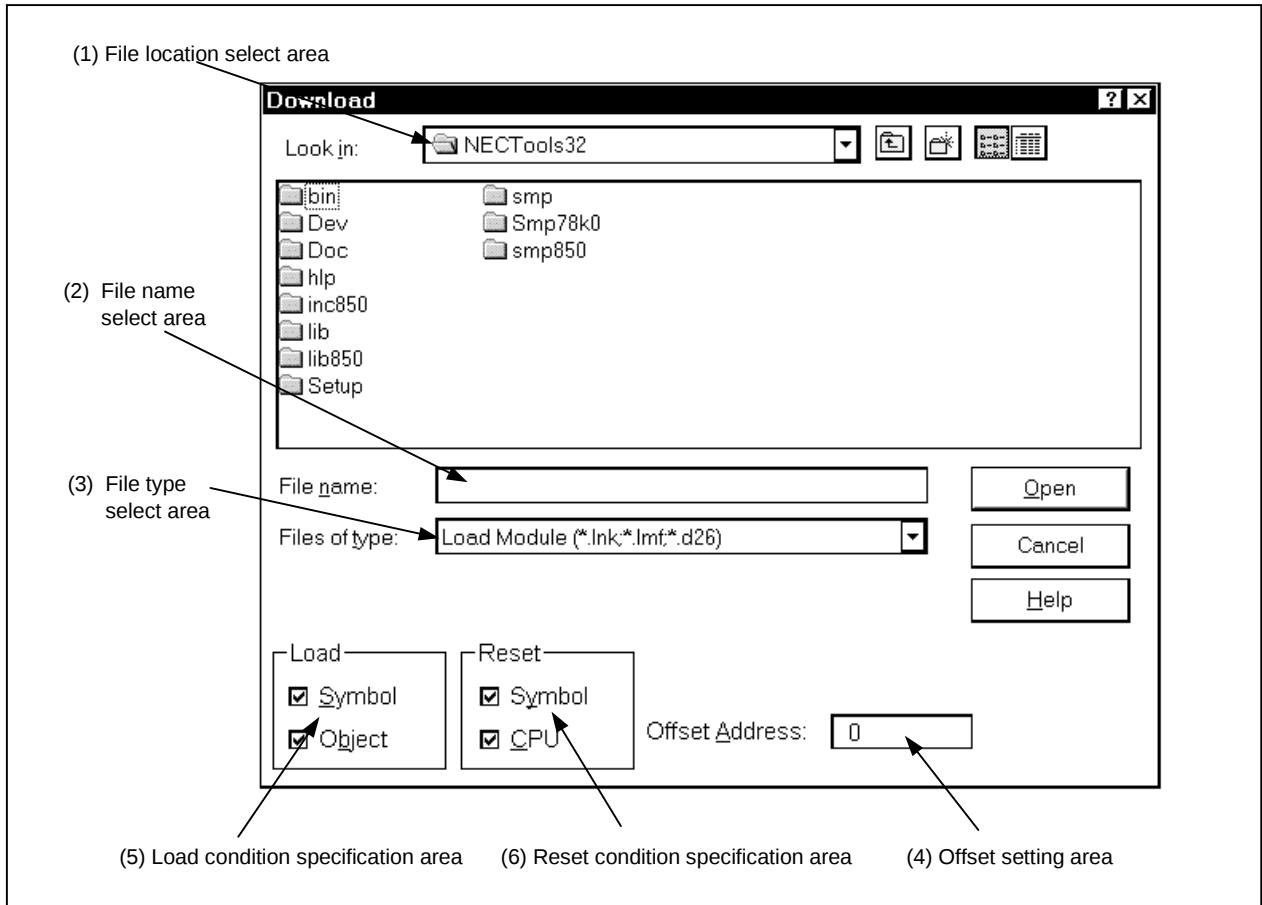
Opening method

This dialog box can be opened by one of the following methods.

- In the main window
Select [File] → [Download...] from the menu bar.
Press the [GRPH] + [F], and [D] keys in that order.
- Click the  button on the toolbar.

Window

Figure 6-25. Download Dialog Box



Function

The Download dialog box consists of the following areas.

- File location select area
- File name select area
- File type select area
- Offset setting area
- Load condition specification area
- Reset condition specification area

The function of each area is explained below.

(1) File location select area

This area selects the drive or directory.

(2) File name select area

This area specifies the file name. The file name can be input from the keyboard or it can be selected from the list in the top column of the area. Multiple files can be specified in this area.

When specifying multiple file names, place " (quotation marks) on both sides of each file name. It is also possible to specify multiple file names from the top column of the area while pressing the **SHIFT** key or the **CTRL** key.

(3) File type select area

This area displays the types of files displayed in the list.

The file types are as shown below.

File Type (File Extension)	Format
Load Module (*.lnk, *.lmf)	Load module format
Hex Format (*.hex)	Hex format (the format is auto-judged)
Binary Data (*.bin)	Binary data format
Coverage (*.cvb)	Coverage results
UBROF (*.d26)	Load module format output by IAR's compiler

Remark The Hex format is judged automatically.

Note that these are the default file extensions; file extensions other than these can also be used.

(4) Offset setting area

Offset Address:

This area specifies the offset address when loading the hex format, the binary data format, and the coverage results. Address specification can also be made by an expression (except symbols). The specification method is the same as in the case of the Address Move dialog box. The default radix when inputting numerical values is hexadecimal. Offset values are disregarded for load module format files.

(5) Load condition specification area

Load—

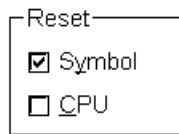
☒ Symbol

☒ Object

This area sets the load conditions.

Symbol: Specifies whether the symbol information is read (checked, default) or not. Note that this condition is disregarded for files other than those in the load module format.

Object: Specifies whether the object information is read (checked, default) or not.

(6) Reset condition specification areaA rectangular box with a title bar labeled "Reset". Inside the box, there are two checked checkboxes: "Symbol" and "CPU".

Reset

☒ Symbol

☒ CPU

This area sets the reset conditions.

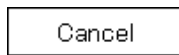
Even if a load module is downloaded again, the event set before downloading is not deleted. The event is re-evaluated and is set as a valid event if the event address is valid; otherwise, it is set as an invalid event. Delete the unnecessary event by using the Event Manager.

Symbol: Reset the symbol information (always checked).

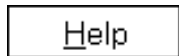
CPU: Specifies whether to reset the emulation CPU or not (checked, default).

Function buttons

Loads the selected file and closes dialog box.



Closes this dialog box without loading the file.



Opens the help window that explains the Download dialog box.



Returns the input data to its original form.

Upload Dialog Box

General

Selects the name and format of the file to be saved, and saves the contents of the target memory or results of coverage in this file.

The following files and file formats can be saved.

- Intel HEX format file (extended only)
- Motorola HEX format file S type (S0, S2, and S8 only)
- Extended Tektronix HEX format file
- Binary data format file
- Results of coverage^{Note}

Note Not supported in the ID78K4-NS

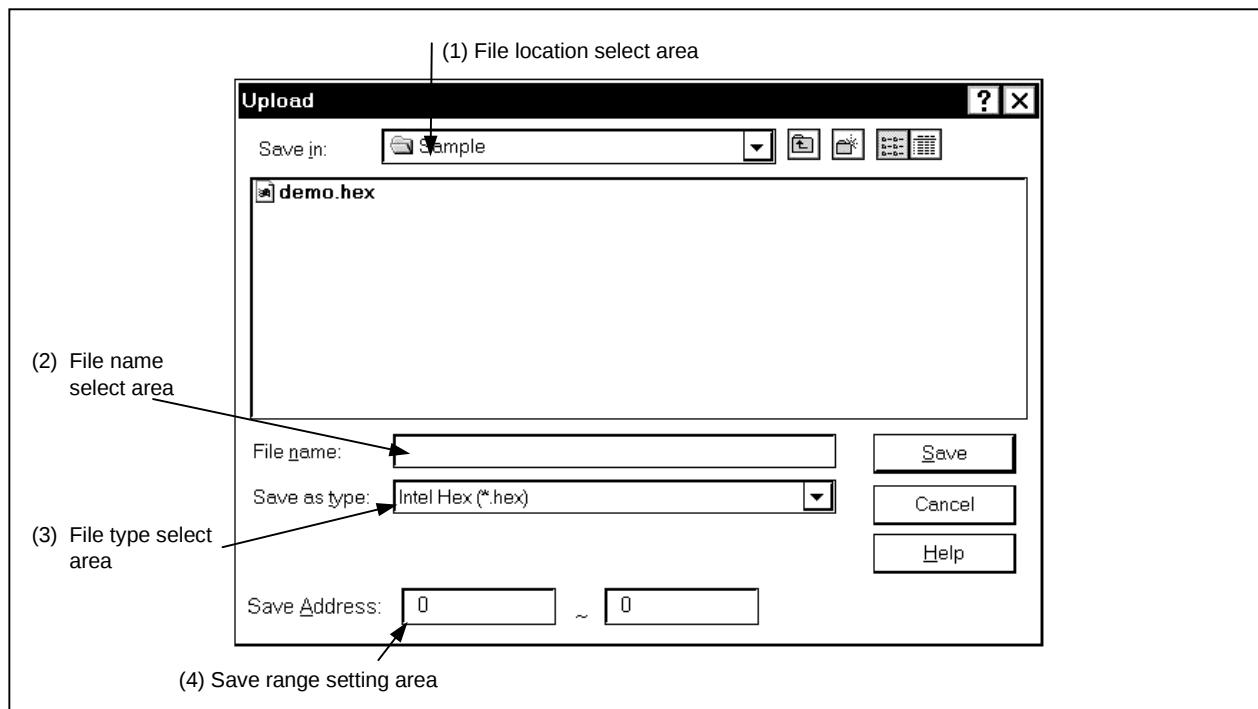
Opening method

The dialog box can be opened by the following methods.

- In the main window
Select [File] → [Upload...] from the menu bar.
Press the [GRPH] + [F], and [U] keys in that order.

Window

Figure 6-26. Upload Dialog Box



Function

The Upload dialog box consists of the following areas.

- File location select area
- File name select area
- File type select area
- Save range setting area

The function of each area is explained below.

(1) File location select area

This area selects the drive or directory.

(2) File name select area

This area specifies the file name. The file name can be input from the keyboard or it can be selected from the list in the top column of the area.

(3) File type select area

The file types are as shown below.

File Type (File Extension)	Format
Intel Hex (*.hex)	Intel extended hex format
Motorola Hex (*.hex)	Motorola hex format
Tektro Hex (*.hex)	Extended Tektronics hex format
Binary Data (*.bin)	Binary data format
Coverage (*.cvb) ^{Note}	Coverage results
All (*.*)	All files

Note Not supported in the ID78K4-NS

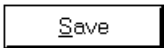
These are the default file extensions; file extensions other than these can also be used.

The data format is decided by the file extension in which it is saved. However, if "All (*.*)" is selected, the file is saved in the default Intel extended hex format.

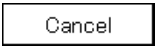
(4) Save range setting area

Save Address:	0	~	0
---------------	--------------------------------	---	--------------------------------

This area specifies the address range which is to be saved. It is possible to specify the address by symbols or by an expression. The specification method is the same as in the case of the Address Move dialog box. The default radix when numbers are input is hexadecimal.

Function buttonsA rectangular button with a black border and the word "Save" in a standard font.

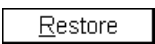
Saves the specified address range in the selected file and closes the dialog box.

A rectangular button with a black border and the word "Cancel" in a standard font.

Closes this dialog box without saving the file.

A rectangular button with a black border and the word "Help" in a standard font.

Opens the help window that explains the Upload dialog box.

A rectangular button with a black border and the word "Restore" in a standard font.

Returns the input data to its original form.

Browse Dialog Box

General

Selects the file set in the Debugger Option dialog box or Source Search dialog box.

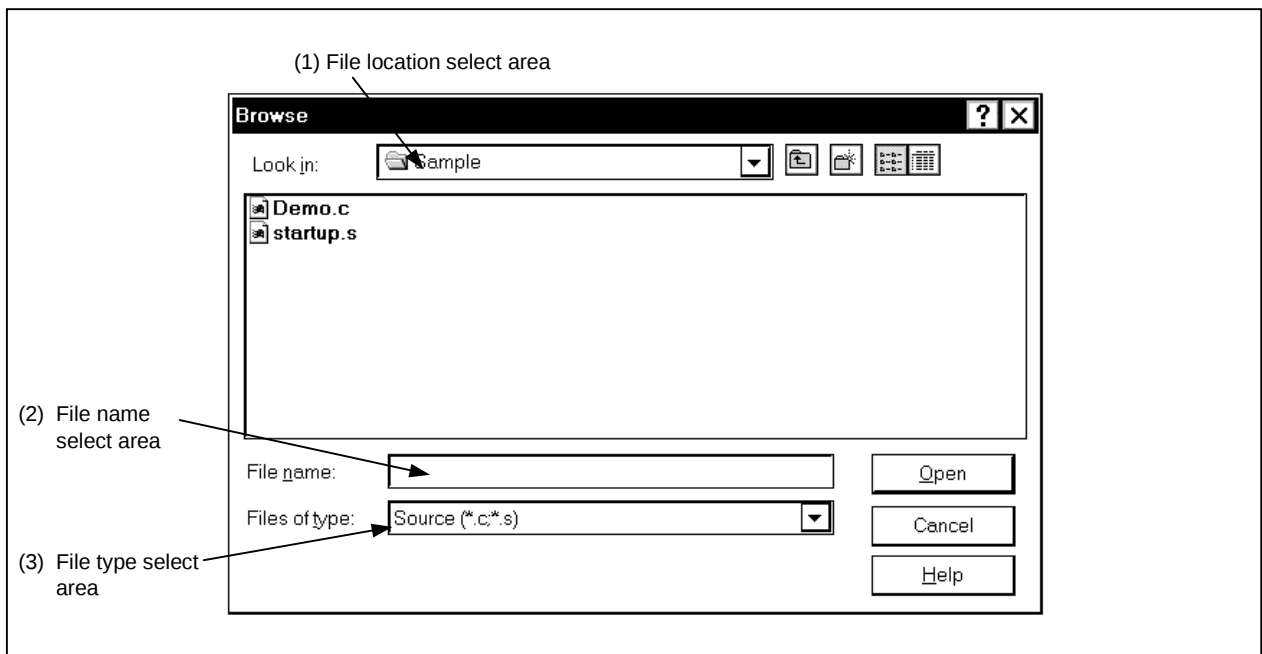
Opening method

This dialog box can be opened by one of the following methods.

- Click the **Browse...** button in the Debugger Option dialog box.
- Click the **Browse...** button in the Source Search dialog box.
- Click the **Browse...** button in the Source Move dialog box.

Window

Figure 6-27. Browse Dialog Box



Function

The Browse dialog box consists of the following areas.

- File location select area
- File name select area
- File type select area

The function of each area is explained below.

(1) File location select area

This area selects the drive or directory.

(2) File name select area

This area specifies the file name. The file name can be input from the keyboard or it can be selected from the list in the top column of the area.

(3) File type select area

This area displays the types of files in the list.

The file types are as shown below.

File Type (File Extension)	Format
Source (*.c;, *.s; *.asm)	Source file (The file extension is specified in the Debugger Option dialog box)
Text (*.txt)	Text file
All (*.*)	All files

Remark The source (c, s, asm) file extension can be changed in the Debugger Option dialog box.

Function buttons

Open

Sets the selected file and closes the dialog box.

Cancel

Closes this dialog box without setting the file.

Help

Opens the Help window that explains the Browse dialog box.

Source Move Dialog Box

General

Specifies the file displayed in the Source window and specifies the display start position.

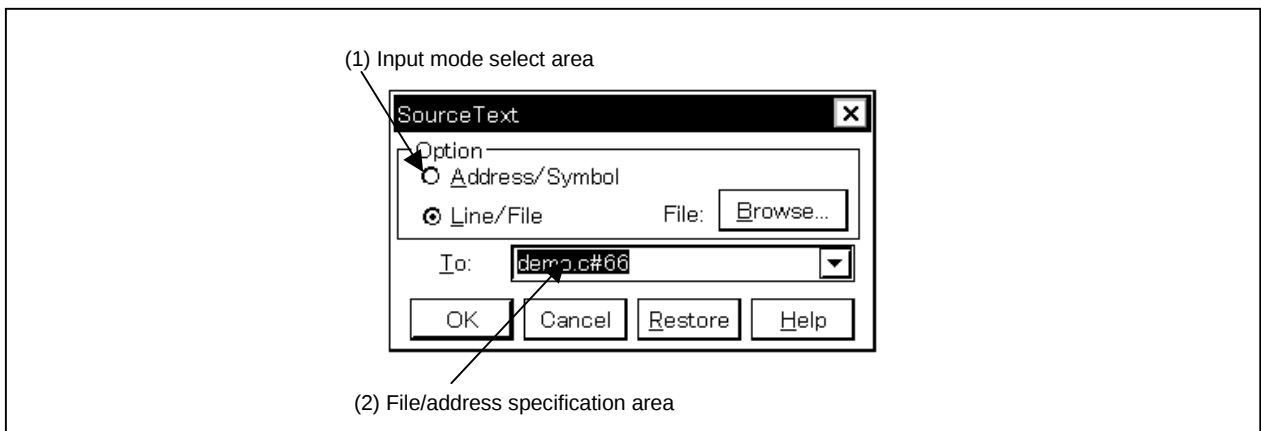
Opening method

This dialog box can be opened by the following methods.

- When the Source window is active
Select [View] → [Move...] from the menu bar.
Press the **GRPH** + **V**, and **V** keys in that order.
Press shortcut keys **CTRL** + **J**.

Window

Figure 6-28. Source Move Dialog Box



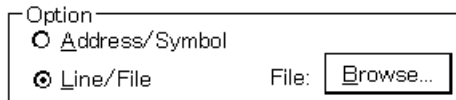
Function

This dialog box is displayed when [View] → [Move...] is selected while the Source window is open and can be used to change the file's display start position (a new window does not open).

The Source Move dialog box consists of the following areas.

- Input mode select area
- File/address specification area

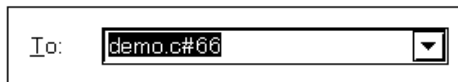
The function of each area is explained below.

(1) Input mode select area


A dialog box titled "Option" with two radio buttons. The first radio button is labeled "Address/Symbol" and is currently selected. The second radio button is labeled "Line/File". To the right of the "Line/File" option is a text field labeled "File:" containing the text "Browse...".

This area selects the input mode in cases where the movement destination is specified.

- ☐ Address/Symbol: Specifies the movement destination by an address (or a symbol).
- ☐ Line/File: Specifies the movement destination by a line No. (or file name).

(2) File/address specification area


A dialog box with a label "To:" followed by a text field containing the text "demo.c#66". To the right of the text field is a small square button with a downward-pointing arrow.

This area specifies the display file name or display address. With the default, the string selected in the accessed window, or when there is no selected string, the first character string in the input history, is displayed, but as necessary, it can be changed by inputting from the keyboard.

The following two specification methods are used.

- Display address specification
- Display file name specification

By clicking the  button and displaying the input history, the contents input previously can be reused. Up to 16 items of input history can be retained.

(a) Display address specification

Specify the address where the display starts. It is possible to specify the address by symbols or by an expression.

The specification method is the same as in the Address Move dialog box. When "Address/Symbol" is selected, the default radix when inputting numerical values becomes hexadecimal.

The source text is displayed so that the source line corresponding to the specified address value can be seen.

(b) Display file name specification

Specify the name of the file to be displayed in the Source window.

For the file name, it is possible to specify the file name only and to specify the absolute path or the relative path.

If the file name only, or the relative path, is specified, search is made for the file in each of the following directories in the order shown. The first file to be found as a result of the search is displayed.

- The directory which is the source path specified in the Debugger Option dialog box.

The line number can also be specified other than the file name. The file's line number is specified as follows.

- <<Path Name>File Name #> Line No.

The file name and line number are specified delimited by a "#". The line number is specified by a decimal number. The file name can be omitted. When "Line/File" is selected, the default radix when inputting numerical values is decimal.

The specified line number is made the header line, and the specified file is displayed. If the file name is omitted, the file is displayed from the specified line of the currently displayed file.

When the line number is omitted, the file is displayed from the header line.

Function buttons

Browse...

Opens the Browse dialog box.

OK

Displays the source text from the specified position.

Cancel

Closes this dialog box.

Restore

Returns the input data to its original form.

Help

Opens the help window.

Address Move Dialog Box

General

Specifies a display start address in the Memory window, Assemble window, or Coverage window.

Opening method

This dialog box can be opened by one of the following methods.

(1) When Assemble window is displayed

- In the main window
Select [View] → [Move...] from the menu bar.
Press the [GRPH] + [V], and [V] keys in that order.
Press shortcut keys [CTRL] + [J].

(2) When Memory window is displayed

- In the main window
Select [View] → [Move...] from the menu bar.
Press the [GRPH] + [V], and [V] keys in that order.
Press shortcut keys [CTRL] + [J].

(3) When Coverage window is displayed^{Note}

- In the main window
Select [View] → [Move...] from the menu bar.
Press the [GRPH] + [V], and [V] keys in that order.
Press shortcut keys [CTRL] + [J].

Note Not supported in the ID78K4-NS

(4) When SFR window is displayed

- In the main window
Select [View] → [Move...] from the menu bar.
Press the [GRPH] + [V], and [V] keys in that order.
Press the shortcut keys [CTRL] + [J].

Window

Figure 6-29. Address Move Dialog Box

Address Move dialog box of Assemble window



Address Move dialog box of Memory window

Address Move dialog box of Coverage window^{Note}

Address Move dialog box of SFR window



Note Not supported in the ID78K4-NS

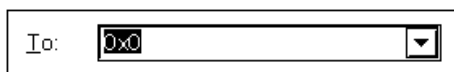
Function

The Address Move dialog box consists of the following area.

- Address specification area

The function of this area is explained below.

(1) Address specification area


 A screenshot of the address specification area. It features a label 'To:' followed by a text input field containing '0x0'. To the right of the input field is a small square button with a downward-pointing arrow, indicating a dropdown menu.

This area specifies an address. The default address is the string selected in the called window, or the value of the current PC. This value can be changed by keyboard input as necessary. An address can also be specified by a symbol or an expression.

The specification method is the same as in the case of the Symbol To Address dialog box, but the default radix when inputting numerical values is hexadecimal.

By clicking the  button and displaying the input history, the contents input previously can be reused. Up to 16 items of input history can be retained.

Function buttons

OK

Displays the Memory window, Assemble window, or Coverage window from the specified address.

Cancel

Closes this dialog box.

Restore

Returns the input data to its original form.

Help

Opens the help window.

Trace Move Dialog Box

Outline

Specifies the display start position in the Trace View window.

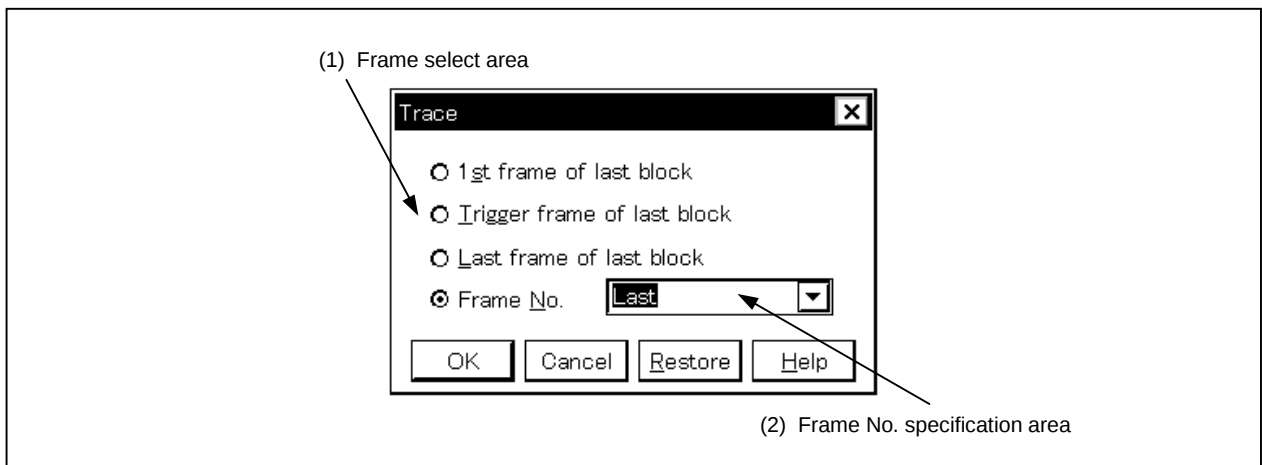
Opening Method

This dialog box can be opened by the following methods.

- When the Trace View window is active,
Select [View] → [Move...] from the menu bar.
Press the [GRPH] + [V], and [V] keys in that order.
Press shortcut keys [CTRL] + [J].

Window

Figure 6-30. Trace Move Dialog Box



Function

This dialog box is displayed by selecting [View] → [Move...] when the Trace View window is open, and can be used to change the trace results display starting position.

The Trace Move dialog box consists of the following areas.

- Frame select area
- Frame No. specification area

The function of each area is explained below.

(1) Frame select area

☐ 1st frame of last block
☐ Trigger frame of last block
☐ Last frame of last block
☒ Frame No.

This area selects the frame that is the move destination.

Selected Item	Description
1st frame of last block	Move to the first frame of the latest block frame in the trace data.
Trigger frame of last block	Move to the latest trigger frame of the latest block frame in the trace data.
Last frame of last block	Move to the last frame in the trace data.
Frame No.	Move to the frame with the specified No. When 0 is specified, move to the first frame in the trace data. When this item is checked, shift the focus to the area specified by the frame No.

(2) Frame No. specification area

If “Frame No.” is selected in the frame selection area, this area specifies the frame No. In the default, the string selected in the accessed window, or “Last” is displayed, but as necessary, it can be changed by inputting from the keyboard.

The default radix when inputting numerical values is decimal.

When a “+” mark is input in front of a numerical value, the area moves forward the specified number of frames (toward the end of the display) from the frame at the cursor position. Conversely, when a “-” mark is input in front of the numerical value, the area moves backward the specified number of frames (toward the beginning of the display).

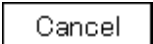
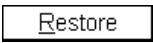
The frame No. specification can also be specified in the following format. It is also possible to specify it in abbreviated form. The input characters are not case sensitive.

The contents are shown below.

Specification	Abbreviated Form	Description
First	S	Move to the first frame of the current trace block.
Trigger	T	Move to the trigger frame of the current trace block.
Last	L	Move to the last frame of the current trace block.
Top	O	Move to the first frame of the trace data.
Bottom	B	Move to the last frame of the trace data.

By clicking the  button and displaying the input history, the contents input previously can be reused. Up to 16 items of input history can be retained.

Function buttons

	Performs trace display from the specified position.
	Closes the Trace Move dialog box.
	Returns the input data to its original form.
	Opens the help window.

Symbol To Address Dialog Box

General

Displays the address of a specified variable or function, and the value of a symbol.

Opening method

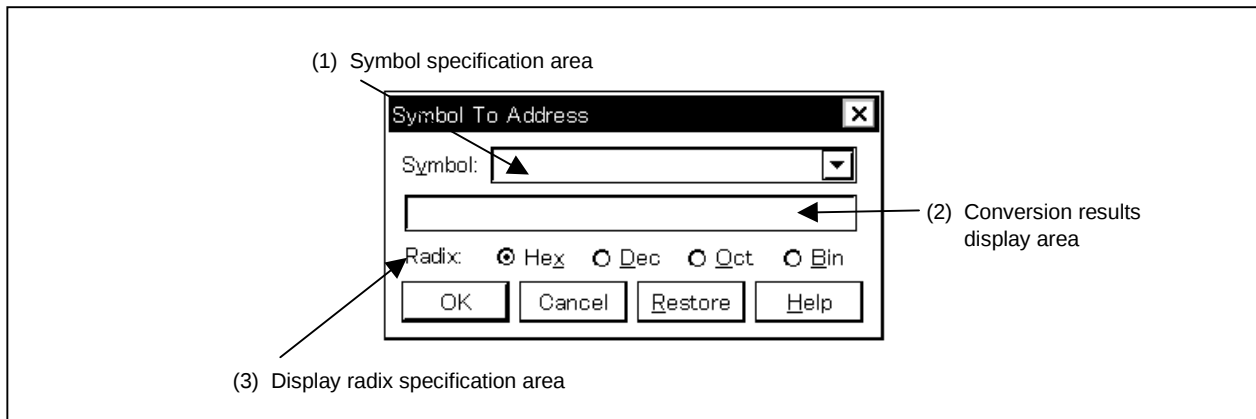
This dialog box can be opened by the following methods.

Select [V]iew → [S]ymbol... from the menu bar.

Press the [GRPH] + [V], and [Y] keys in that order.

Window

Figure 6-31. Symbol To Address Dialog Box



Function

The Symbol To Address dialog box consists of the following areas.

- Symbol specification area
- Conversion results display area
- Display radix specification area

The function of each area is explained below.

(1) Symbol specification area

Symbol:

This area specifies the variable, function name, symbol name, or line number to be converted. Other than this, an I/O port name, SFR name, register name, PSW flag name, or an expression can be specified.

The I/O port name and SFR name are displayed by address values, the register name is displayed by the register contents and the PSW flag name is displayed by the flag value. Also, bit symbols are converted to "Address.bit". Furthermore, an expression which includes a bit symbol cannot be written.

Specification methods are shown below.

Conversion Object	Specification Method
Variable	var file#var (If a static function with a file name attached is specified.) func#var (If a static function with a function name attached is specified.) file#func#var (If a static function with a file name and function name attached is specified.)
Function	func file#func (If a static function with a file name attached is specified.)
Label	label file#label (If a local label with a file name attached is specified.)
EQU symbol	equsym file#equsym (If a local EQU symbol with a file name attached is specified.)
Bit symbol	bitsym file#bitsym (If a local bit symbol with a file name attached is specified.)
Line number of source file	file#no
I/O Port	portname
SFR	sfrname
Register	regname
PSW Flag	pswname

Remark var: Variable name, func: Function, file: File name, label: Label name, equsym: EQU symbol name, bitsym: Bit symbol name, portname: I/O port name, sfrname: SFR name, regname: Register name, pswname: PSW flag name, no: Source file line number.

A "#" (sharp) is used as the delimiter between the file name and the variable, function name, and line No.

If the specified symbol could not be found inside the scope, all symbols are searched for (static variable, static function, local label, local EQU symbol, and local bit symbol).

As the default, the symbol name has priority. Furthermore, when desiring to change the priority order temporarily, adding a "\$" (Dollar) sign in front of the symbol causes the register name to have priority.

If reading multiple load modules, when specifying the load module names, use the delimiter "\$" between the load module name and the file name, variables, function name, and symbol name.

In the default, the string selected in the accessed window is displayed, but as necessary, it is possible to change it by inputting from the keyboard. The radix of the default when inputting numerical values is decimal. When changing the contents of the symbol specification area, clicking the button displays the conversion results in the conversion results display area.

By clicking the button and displaying the input history, the contents input previously can be reused. Up to 16 items of input history can be retained.

(2) Conversion results display area

0xffe00c

The variables specified in the symbol specification area, the function address, symbol values, line number addresses and expression values, etc. are displayed in this area.

(3) Display radix specification area

Radix: ☒ Hex ☐ Dec ☐ Oct ☐ Bin

This area specifies the display radix of the conversion results display area.

- ☐ **Hex** Displayed in hexadecimal (default).
- ☐ **Dec** Displayed in decimal.
- ☐ **Oct** Displayed in octal.
- ☐ **Bin** Displayed in binary.

Function buttons

OK

When the contents of the symbol specification area have been changed, the symbols are converted. When the contents of the symbol specification area are unchanged after conversion, the dialog box closes.

Cancel

Closes the Symbol To Address dialog box.

Restore

Returns the input data to the original values. If the  button has already been clicked, the data returns to the state it was in just after the  button was clicked.

Help

Opens the help window.

Source Window

General

This window displays the source file or text file.

Also, display of disassembly of a program mixed with a source file, and execution of online assembly on a mixed display is possible.

There are two modes in the Source window, normal display mode and mixed display mode.

Opening method

This window can be opened by the following methods.

- In the main window
Select [Browse] → [SourceText] from the menu bar.
Press the **GRPH** + **B**, and **S** keys in that order.
- Click the  button on the toolbar.
- In the View File Load dialog box, select source file or text file, then click the **Open** button.

Window

Figure 6-32. Source Window (1/2)

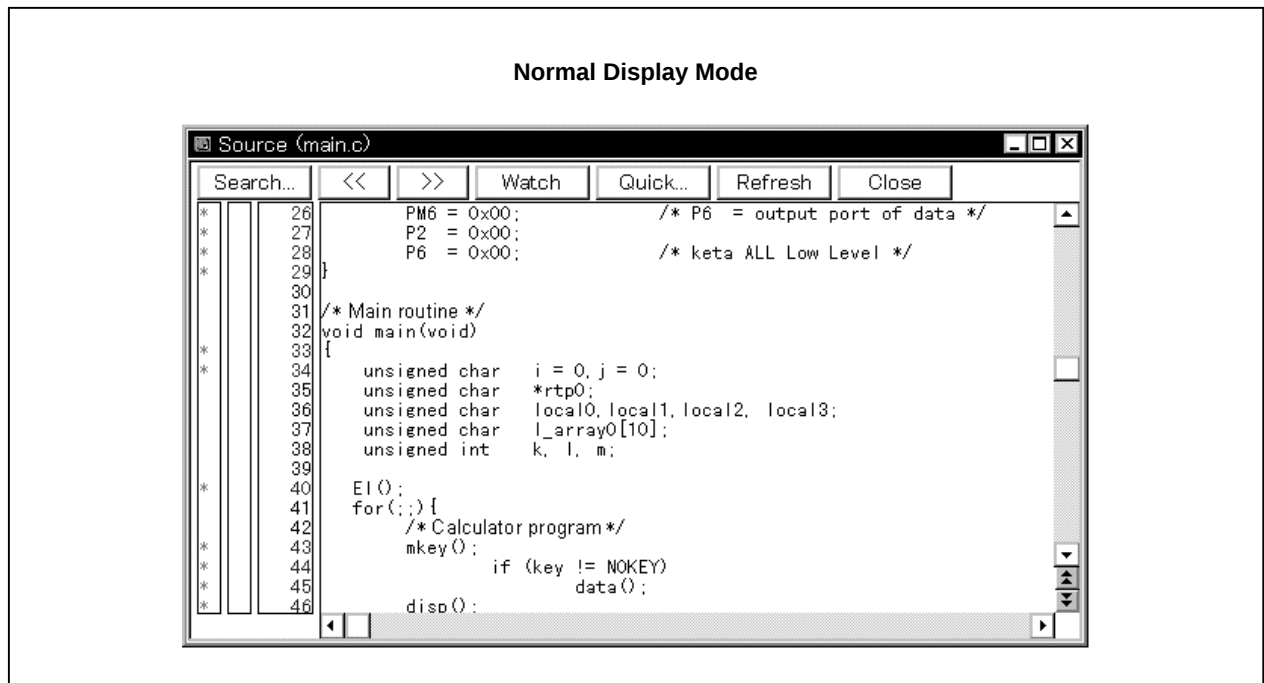
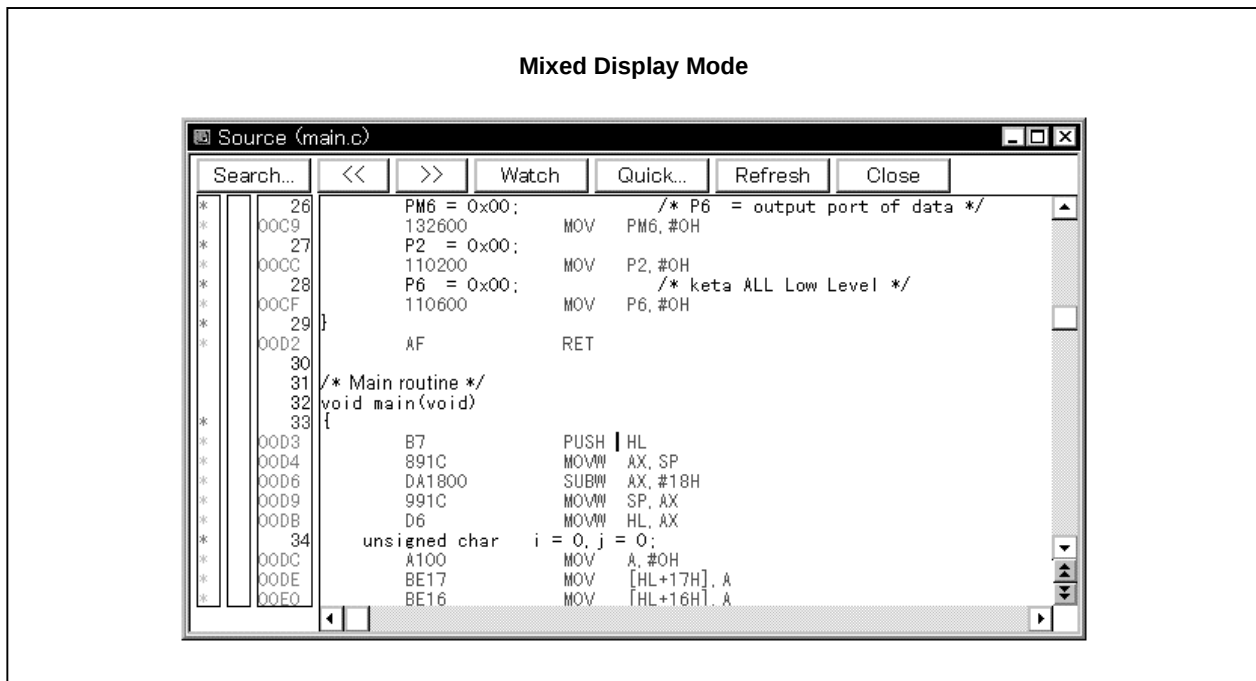


Figure 6-32. Source Window (2/2)



There are two modes in the Source window, normal display mode and mixed display mode. An explanation of each of these modes is given below.

Refer to **(4) Source text display area** for further details.

(a) Normal display mode

In the normal display mode, general text files as well as source files can be displayed.

(b) Mixed display mode

In the mixed display mode, disassembly of programs combined with source files is displayed.

Online assembly cannot be performed in the Source window. Perform online assembly in the Assemble window.

The display contents in the mixed display mode can be saved as a display file.

Also, in a Source window that displays the source file from which the symbol information is read, there are two states, the active state and the static state.

Source windows in the active state can only be opened one at a time, whereas multiple windows can be opened at the same time in the static state. Switching between states is done via the **[Window]** menu.

When switching the state of a window from static to active, the window which was active is switched to static. After being switched to static, the window is displayed with a new number such as Source[2].

Source files in which symbol information has not been read are read as text format files and their contents are not changed.

These two states are described below.

(a) Active state

A Source window in the active state is synchronized with the current PC value and the Source window's display is updated continuously so that it is always displaying the current PC line.

Also, if a Source window in the active state is synchronized not only with the jump function's jump destination but also with the Trace View window, the display in the Source window is updated in synch with the Trace View window.

The first Source window opened is in the active state.

(b) Static State

A Source window in the static state is not synchronized with the current PC value and does not change the display position, but its contents are updated.

Also, a Source window in the static state does not become a jump destination and is not synchronized with the Trace View window.

If an active Source window is already open, a new Source window is opened in the static state.

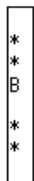
Function

This window displays source files or text files. It also displays disassembled display of programs mixed with source files and can also perform online assembly in a mixed display. The tab size and display font can be specified in the Debugger Option dialog box.

The Source window consists of the following areas.

- Point mark area
- Current PC mark area
- Line number/address display area
- Source text display area

The function of each area is explained below.

(1) Point mark area

This area sets or deletes breakpoints, and displays the set status of each event condition and whether the program code exists or not.

(a) Breakpoint setting/deletion function

By clicking this area with the mouse, a breakpoint can be set or deleted.

The necessary mouse operations are as follows depending on the line where mouse is clicked.

Line	Setting of "On Mouse Click" in Extended Option Dialog Box	Operation
Where blank or marks other than the "B" mark are displayed (E, L, T mark etc.)	Soft Break	Sets software breakpoint
	Hard Break	Sets hardware breakpoint
Where "B" mark (blue) is displayed (software breakpoint)	Soft Break	Deletes software breakpoint
	Hard Break	Sets hardware breakpoint
Where "B" mark (red, black) is displayed (hardware breakpoint)	Soft Break	Sets software breakpoint
	Hard Break	Deletes hardware breakpoint

Setting and deletion of breakpoints can be performed for lines which have an "*" displayed in the point mark area.

As for lines without an "*" displayed, setting or deletion can be done on either the line above or below the line where an "*" is displayed.

If a breakpoint is set, the "B" mark is displayed in the point mark area. However, if a mark other than the "B" mark is displayed, the "A" mark is displayed.

The "A" mark shows that multiple events are set.

When a hardware breakpoint and a software breakpoint overlap, the "A" mark is displayed.

If a breakpoint is deleted, the "B" mark in the point mark area is deleted and the area is left blank or a mark other than the "B" mark is displayed.

The "B" mark is displayed in the following colors in accordance with the type of breakpoint and its state.

Display Color	Explanation
Blue	Shows that a software breakpoint is set.
Red	Shows that the set hardware breakpoint is valid.
Black	Shows that the set hardware breakpoint is invalid. The hardware breakpoint can be made valid in the Event Manager or the Break dialog box.

If a breakpoint is set in the point mark area, it becomes valid as soon as it is set.

(b) Event condition display function

The set status of each event is displayed. If an execution event or access fetch event is set to the corresponding source line, a mark corresponding to the type of event is displayed.

Mark	Meaning
E	Shows that an event condition is set
L	Shows that the final stage of an event link is set
B	Shows that a break event is set
T	Shows that a trace event is set
Ti	Shows that a timer event is set
S	Shows that a snapshot event is set
A	Shows that two or more events are set
M ^{Note}	Shows that a DMM event is set

Note Supported only in the ID78K0S-NS

If a range address is specified as an event's address condition, the lower address of the range becomes the object. Also, the address condition's mask specification is not reflected.

(c) Program code display function

Lines where an "*" is displayed in the point mark area show that program code corresponding to the line number exists.

Symbol	Explanation
With "*"	Shows that program code corresponding to the source file line No. exists. This is displayed only in cases where the load module is downloaded and symbol information has been read.
Without "*"	Shows that program code corresponding to the source file line No. does not exist. Also, if a file other than a source file, such as a text file, is displayed, no lines have "*" displayed.

(2) Current PC mark display area



This area displays the mark ">" indicating the value of the current PC (PC register value). By clicking this mark with the mouse, the PC register value is displayed in the pop-up window.

The program is executed up to the specified line by double-clicking on the current PC mark area.

(3) Line number/address display area

26
27
28
29
30
31
32
33
34
35
36

26
00C9
27
00CC
28
00CF
29
00D2
30
31
32

Normal display mode

Mixed display mode

This area displays the line number of the source file or text file.

On lines where program code corresponding to the source file line number exists, the line number is displayed in red characters and on lines where no program code exists, the line number characters are displayed in black.

Also, the disassemble display's address is displayed in the mixed display mode. Address characters are dimmed.

The position of the line number/address display area can be selected as desired by clicking the mouse. A selected line number or address is highlighted.

The following functions are included in line number or address selection.

(a) Drag-and-drop function

The selected highlighted line number or address can be dragged to another window or area.

If the line number or address position selected in the line number/address display area is dragged using the left button of the mouse, the mouse cursor's shape changes from an arrow to a .

If the cursor is moved into a window or area where it is possible to drop it, the shape of the mouse cursor changes from  to .

The operation is executed for the address determined from the dropped address or line number in the window where it was dropped.

The operation after drag-and-drop differs depending on the window or area where the items were dropped.

Window or Area Which Is the Drop Object	Operation After Drop
- Event Manager Event manager area in each of the setting dialog boxes below - Event dialog box - Event Link dialog box - Break dialog box - Trace dialog box - Snap Shot dialog box^{Note 1} - Timer dialog box^{Note 1}	With the dropped line number or address as the address condition, the execution event conditions are generated automatically. The event condition names are generated automatically, as Evt00001, Evt00002, ... The external sense data conditions are not specified. Address conditions are set in the form of symbol name + offset value for the symbol which is the closest.
- Link condition setting area in the Event Link dialog box - Break condition setting area in the Break dialog box - Section trace start condition area, section trace end condition area, and qualify trace condition area in the Trace dialog box - Snapshot condition setting area in the Snap Shot dialog box^{Note 1} - Stub condition setting area in the Stub dialog box^{Note 2} - Timer condition setting area in the Timer dialog box^{Note 1}	With the dropped line number or address as the address condition, the execution event conditions are generated automatically. Furthermore, automatically generated event conditions are set in the condition setting area where they were dropped. The event condition names are generated automatically, as Evt00001, Evt00002, ... The external sense data conditions are not specified. Address conditions are set in the form of symbol name + offset value for the symbol which is the closest.
- Address condition setting area and data condition setting area in the Event dialog box - Memory snap data setting area in the Snap Shot dialog box^{Note 1} - Jump destination address setting area in the Stub dialog box^{Note 2}	The line numbers or the address texts are set in the area where they were dropped. Address conditions are set in the form of symbol name + offset value for the symbol which is the closest.

Notes 1. Not supported in the ID78K4-NS

2. Supported only in the ID78K4

(b) Window link function

Uses a line number or address to show the linked relationship between the Trace View window and the Source window. The line number or address which is the link object with the Trace View window is highlighted. For details, refer to the window link function under Trace View window.

(4) Source text display area

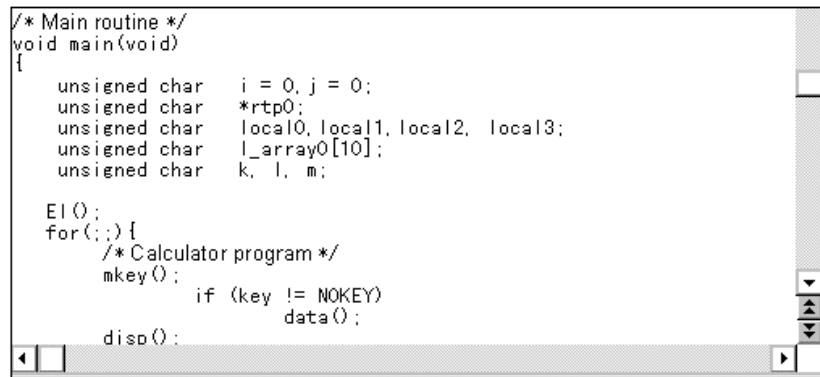
This area performs display and disassembly display of source files and text files and online assembly.

The display contents of the source text display area can be scrolled using the vertical and horizontal scroll bars.

By selecting [View] → [Mix] on the menu bar, the normal display mode and the mixed display mode can be switched.

Example 1. Normal display mode

The normal display mode is the mode in which the contents of source files or text files are viewed.



```

/* Main routine */
void main(void)
{
    unsigned char    i = 0, j = 0;
    unsigned char    *rtp0;
    unsigned char    local0, local1, local2, local3;
    unsigned char    l_array0[10];
    unsigned char    k, l, m;

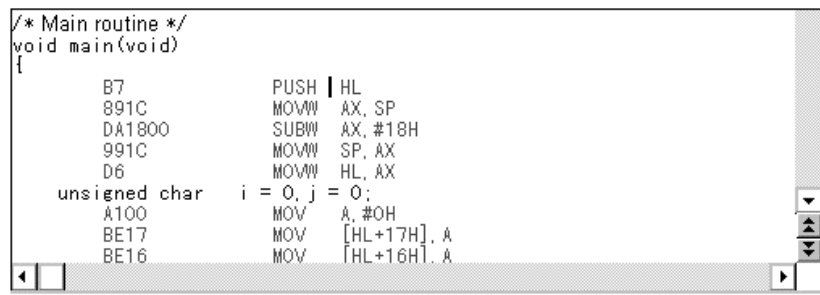
    EI();
    for(;;){
        /* Calculator program */
        mkey();
        if (key != NOKEY)
            data();

        disp();
    }
}

```

2. Mixed display mode

The mixed display mode is the mode where disassembly display in combination with source file display is performed.



```

/* Main routine */
void main(void)
{
    B7          PUSH    HL
    891C        MOVW    AX, SP
    DA1800      SUBW    AX, #18H
    991C        MOVW    SP, AX
    D6          MOVW    HL, AX
    unsigned char    i = 0, j = 0;
    A100        MOV     A, #0H
    BE17        MOV     [HL+17H], A
    BE16        MOV     [HL+16H], A
}

```

- If a line of the displayed source file corresponds to program code, the disassemble line is displayed following that source line. In the disassemble line, the address label, code data, and disassembled mnemonic are displayed.
- The mnemonic's display starting position is adjusted according to the tab size setting value.
- The mixed display mode is valid only in cases where a load module is downloaded and symbol information is read into it, and a source file corresponding to the downloaded load module is displayed.

- Even if [View] → [Mix] on the menu bar is checked and mixed display mode is selected, in cases where a source file other than one corresponding to a load module is displayed, the display mode is the normal display mode.
- The disassemble display in the mnemonic column displayed in the mixed display mode can be changed. In the case of a change, move the cursor to the mnemonic column of the disassemble display line and change it. The overwrite mode and the insert mode can be switched during editing using the **INS** key.

If the cursor is moved to a different line after making changes in the mnemonic column, the change contents are checked. If the change contents are incorrect, the code data in the line where the change was made becomes an “*”.

Even if moved to a different line, the change contents are not written to memory. A different line can be changed with the change contents not written to memory.

The changed contents of the mnemonic column are written to memory using the **Enter** key. The change contents are also checked if the **Enter** key is pressed. If the change contents are incorrect, the code data in the incorrect line become an “*”. If there is even one incorrect line, the change contents are not written to memory. In such a case, correct the change contents. To discard the change contents, press the **ESC** key. If there are no errors in the change contents, press the **Enter** key. After the change contents are written to memory, the cursor moves to the next line's mnemonic column. The next line can then be changed.

The current PC line and the breakpoint setting line are displayed with different display colors and in bold characters.

Meaning of Line	Display Color	Explanation
Current PC line	Yellow	This is the source line or the disassemble display line corresponding to the current PC value. It is the line where a “>” is displayed in the current PC mark area. When there is a mixed display, the display color of the disassemble display line only is changed. The source line is displayed with the normal display color.
Breakpoint setting line	Red	This is a source line or a disassemble display line where a valid breakpoint is set. It is the line where a red or blue “B” is displayed in the point mark area. When there is a mixed display, the display color of the disassemble display line only is changed. The source line is displayed with the normal display color.

The source text display area has a number of functions, including program execution with the line where the cursor is positioned as the object and setting of the breakpoint.

- Start function
- Come function
- Breakpoint setting function
- Program counter setting function
- Jump function

With these functions, if there is a cursor located on the source text line, the top address of the program code corresponding to the source line becomes the object and if the cursor is located on the disassemble display line, that address becomes the object. Also, if no program code exists on the source line, the top address of either the line above or the line below that line, where program code exists, becomes the object.

Furthermore, these functions cannot be executed in the following cases. The corresponding menu becomes unavailable (dimmed).

- In the case where a file other than a source file is being displayed.
- In the case where a user program is being executed.

Each function is explained below.

(a) Start function

Executes the user program from the line where the cursor is placed.

This function is executed by performing the following operations in sequential order.

- <1> Move the cursor to the line where execution is to start.
- <2> Perform one of the following operations in the main window.
 Select [Run] → [Start From Here] from the menu bar.
 Press the [GRPH] + [R], and [A] keys in that order.
 Press the shortcut keys [SHIFT] + [f.6].

(b) Come function

Executes the user program up to the line where a cursor is placed.

While the user program is being executed by this function, however, the currently set break event is not generated.

This function is executed by performing the following operations in sequential order.

- <1> Move the cursor to the line at which a break is to occur.
- <2> Perform one of the following operations in the main window.
 Select [Run] → [Come Here] from the menu bar.
 Press the [GRPH] + [R], and [M] keys in that order.
 Press the shortcut key [f.6].

(c) Breakpoint setting function

Sets a breakpoint to the line where a cursor is placed. An execution event is used as the breakpoint to be set.

This function is executed by performing the following operations in sequential order.

- <1> Move the cursor to the line on which a breakpoint is to be set.
- <2> Perform one of the following operations in the main window.
 Select [Run] → [Break Point] or [Software Break Point] from the menu bar.
 Press the [GRPH] + [R], and [B] keys or [GRPH] + [R], and [F] keys in that order.
 Press shortcut key [f.9] or [f.11].

(d) Program counter setting function

Sets the address of the line where a cursor is placed to the program counter (PC).

This function is executed by performing the following operations in sequential order.

- <1> Move the cursor to the line where the program counter (PC) is to be set.
- <2> Perform one of the following operations in the main window.
 Select [Run] → [Change PC] from the menu bar.
 Press the [GRPH] + [R], and [H] keys in that order.
 Press shortcut keys [CTRL] + [f.9].

(e) Jump function

Jumps to the Assemble window, Memory window, or Coverage window^{Note} by using the address of the line where a cursor is placed as a jump pointer. The jump destination window displays the jump pointer at the beginning.

This function is executed by performing the following operations in sequential order.

Note Not supported in the ID78K4-NS

- <1> Move the cursor to the line that is the jump origin.
- <2> Perform one of the following operations in the main window.

- If the jump destination is the Assemble window
 Select [Jump] → [Assemble] from the menu bar.
 Press the [GRPH] + [J], and [A] keys in that order.
 Press shortcut keys [CTRL] + [D].
- If the jump destination is the Memory window
 Select [Jump] → [Memory...] from the menu bar.
 Press the [GRPH] + [J], and [E] keys in that order.
 Press shortcut keys [CTRL] + [M].
- If the jump destination is the Coverage window^{Note}
 Select [Jump] → [Coverage] from the menu bar.
 Press the [GRPH] + [J], and [C] keys in that order.
 Press shortcut keys [CTRL] + [I].

Note Not supported in the ID78K4-NS

The text displayed in the source text display area can be selected by the following methods.

- From the desired position in the displayed text, drag the text to the desired position within the range of one line. Select the text from the drag start position to the end position.
- Double-click on the character string. The words in the double-clicked position are selected.

In the source text display area, there are a number of functions which can be performed with the selected text as the object, such as watch and quick watch.

(f) Watch function

Adds the selected variables, etc. to the Watch window and displays their contents. This function can be run by performing the following operations in order.

- <1> Select the text.
- <2> Perform one of the following operations in the main window.
 - Select [View] → [View Watch] from the menu bar.
 - Press the **GRPH** + **V**, and **I** keys in that order.
 - Click the  button in the Source window.

If the assembler symbol was selected, add it to the Watch window in accordance with the settings in the Debugger Option dialog box.

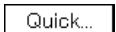
Apart from the above method, this function can also be run by performing the following operation.

- <1> Select the text.
- <2> Perform one of the following operations in the main window.
 - Select [View] → [Add Watch...] from the menu bar.
 - Press the **GRPH** + **V**, and **W** keys in that order.

By performing the above operation, the Add Watch dialog box is opened and the selected text is added to the Watch window. Furthermore, if the Watch window has not yet been opened, it will be opened.

(g) Quick watch function

This displays the contents of the selected variables, etc. temporarily in the Quick Watch dialog box. This function is run by performing the following operations in order.

- <1> Select the text.
- <2> Perform one of the following operations in the main window.
 - Select [View] → [Quick Watch...] from the menu bar.
 - Press the **GRPH** + **V**, and **Q** keys in that order.
 - Press the shortcut keys **CTRL** + **W**.
 - Click the  button in the Source window.

The Quick Watch dialog box will open and the contents will be displayed.

(h) Drag-and-drop function

Through a drag-and-drop operation, the selected text can be dragged to another window or area and dropped. The operation order is shown below.

- <1> Drag the selected text using the left button of the mouse. The mouse cursor's shape will change from an arrow to a .
- <2> If the mouse cursor is moved into a window or area where it is possible to drop it, the shape of the cursor changes from  to .

Operation after drag-and-drop differs depending on the window or area where the items were dropped.

Window or Area Which Is the Drop Object	Operation After Drop												
- Event Manager Event manager area in each of the setting dialog boxes below - Event dialog box - Event Link dialog box - Break dialog box - Trace dialog box - Snap Shot dialog box^{Note 1} - Stub dialog box^{Note 2} - Timer dialog box^{Note 1}	If it is possible to convert the dropped text to an address value as a symbol, with the converted address value as the address condition, the Access status (all-access status) or the Execute status event conditions are generated automatically. The event condition names are generated automatically, as Evt00001, Evt00002, ... The data conditions and external sense data conditions are not specified. The dropped text is set in the address conditions. The relationship between the generated event conditions and the symbols is as follows. <table> <tr> <th>Symbol</th><th>Status</th></tr> <tr> <td>Variable</td><td>R/W</td></tr> <tr> <td>Function</td><td>Execution</td></tr> <tr> <td>Symbols in the data section</td><td>R/W</td></tr> <tr> <td>Symbols in the code section</td><td>Execution</td></tr> <tr> <td>Other</td><td>R/W</td></tr> </table>	Symbol	Status	Variable	R/W	Function	Execution	Symbols in the data section	R/W	Symbols in the code section	Execution	Other	R/W
Symbol	Status												
Variable	R/W												
Function	Execution												
Symbols in the data section	R/W												
Symbols in the code section	Execution												
Other	R/W												
- Link condition setting area in the Event Link dialog box - Break condition setting area in the Break dialog box - Section trace start condition area, section trace end condition area, and qualify trace condition area in the Trace dialog box - Snapshot condition setting area in the Snap Shot dialog box^{Note 1} - Stub condition setting area in the Stub dialog box^{Note 2} - Timer condition setting area in the Timer dialog box^{Note 1}	If it is possible to convert the dropped text to an address value as a symbol, with the converted address value as the address condition, the Access status (all-access status) or the Execute status event conditions are generated automatically. Furthermore, the automatically generated event conditions are set in each dropped conditions setting area. The event condition names are generated automatically, as Evt00001, Evt00002, ... The data conditions and external sense data conditions are not specified. The dropped text is set in the address conditions. The relationship between the generated event conditions and the symbols is as follows. <table> <tr> <th>Symbol</th><th>Status</th></tr> <tr> <td>Variable</td><td>R/W</td></tr> <tr> <td>Function</td><td>Execution</td></tr> <tr> <td>Symbols in the data section</td><td>R/W</td></tr> <tr> <td>Symbols in the code section</td><td>Execution</td></tr> <tr> <td>Other</td><td>R/W</td></tr> </table>	Symbol	Status	Variable	R/W	Function	Execution	Symbols in the data section	R/W	Symbols in the code section	Execution	Other	R/W
Symbol	Status												
Variable	R/W												
Function	Execution												
Symbols in the data section	R/W												
Symbols in the code section	Execution												
Other	R/W												
- Address condition setting area and data condition setting area in the Event dialog box - Memory snap data setting area in the Snap Shot dialog box^{Note 1} - Jump destination address setting area in the Stub dialog box^{Note 2}	Text is set in the dropped area.												
Watch window	If the dropped text can be recognized as a symbol, the symbol contents are displayed.												

Notes 1. Not supported in the ID78K4-NS

2. Supported only in the ID78K4

Function buttons**Search...**

Opens the Source Search dialog box and searches for source text character strings.

If text is selected in the source text display area, the selected text is set as the search object and the Source Search dialog box is opened. If text has not been selected, the Source Search dialog box is opened with the search object in the blank state.

The search method is specified in the Source Search dialog box. The search results are displayed as selected in the Source window.

Performs the same operation as [V]iew → [S]earch on the menu bar.

<<

Searches for the text that matches the search conditions set in the Source Search dialog box in the backward direction from the cursor position (toward the top of the display). It changes to a **Stop** button during a search.

>>

Searches for the text that matches the search conditions set in the Source Search dialog box in the forward direction from the cursor position (toward the bottom of the display). It changes to a **Stop** button during a search.

Stop

Interrupts a search.

During a search, the << button or the >> button changes to a **Stop** button.

Watch

Adds variables and other items selected in the source text display area to the Watch window.

If the Watch window is currently not open, this button opens it.

If text is not selected in the source text display area, the Watch window is only opened.

This button operates the same as [V]iew → [V]iew Watch].

Quick...

Displays the selected variables and other contents of the source text display area temporarily in the Quick Watch dialog box.

Opens the Quick Watch dialog box.

If text is not selected in the source text display area, the Quick Watch dialog box is only opened.

This button operates the same as [V]iew → [Q]uick Watch].

Refresh

Updates the contents of the window with the latest data.

Close

Closes this window.

Caution

If program code is described in an include file and if multiple files are included, the 1 to 1 relationship between line numbers and addresses disappears. In such include files, the function which uses the relationship between the line number and the address does not function normally.

Source Search Dialog Box

General

Searches file contents.

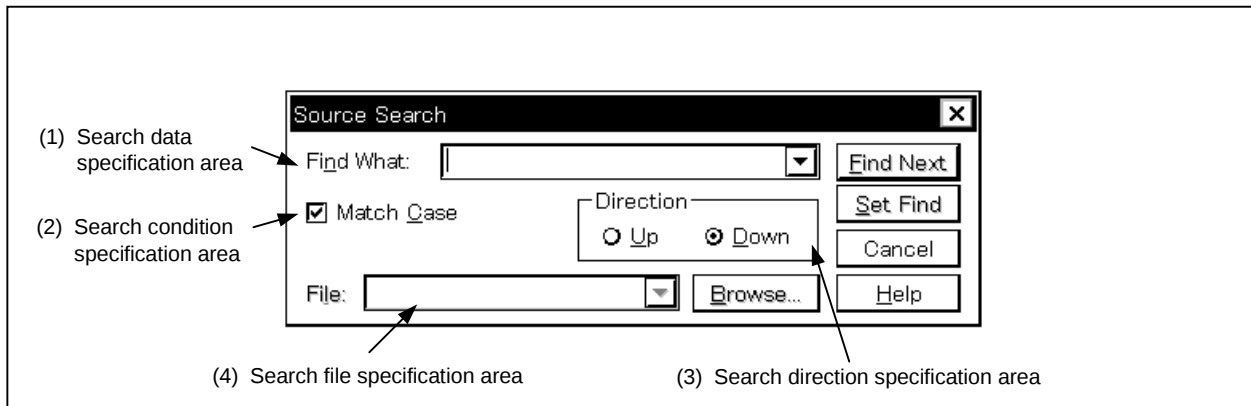
Opening method

This dialog box can be opened by the following methods.

- When the Source window is active
Select [View] → [Search...] from the menu bar.
Press the [GRPH] + [V], and [S] keys in that order.
Press the shortcut keys [CTRL] + [G].
Click the [Search...] button.

Window

Figure 6-33. Source Search Dialog Box

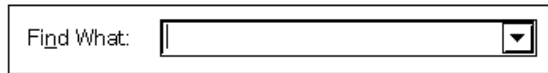


Function

The Source Search dialog box consists of the following areas.

- Search data specification area
- Search condition specification area
- Search direction specification area
- Search file specification area

The function of each area is explained below.

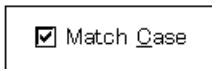
(1) Search data specification area


This area specifies the data to be searched.

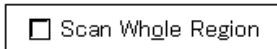
Although the character string selected in the window that has called this dialog box is displayed as the default assumption, the character string can be changed by keyboard input as necessary.

By clicking the  button and displaying the input history, the contents input previously can be reused. Up to 16 items of input history can be retained.

The maximum length of the character string to be search that can be input is up to 150 one-byte characters.

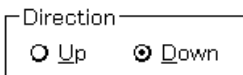
(2) Search condition specification area


This area specifies via a check box whether the data specified for searching is case sensitive or not. As the default, the data is case sensitive.



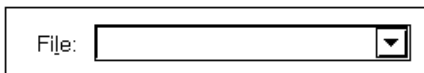
Not case sensitive

Case sensitive (default)

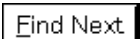
(3) Search direction specification area


This area specifies the search direction. Two directions, upward and downward, can be selected.

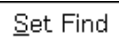
- Up: Upward search. Searches the data from the current cursor position toward the beginning (upward on display).
- Down: Downward search. Searches the data from the current cursor position toward the end (downward on display).

(4) Search file specification area


This area specifies the search file. If the specification is omitted, a search is made within the accessed window.

Function buttonsA rectangular button with a black border and the text "Find Next" inside.

Searches the specified data under given conditions.
If a matching character string is found as a result of the search, it is highlighted.
To continue searching data, click this button again.

A rectangular button with a black border and the text "Set Find" inside.

Sets the specified conditions as search conditions and closes the dialog box.

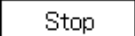
A rectangular button with a black border and the text "Stop" inside.

Stops searching the data.

The  button changes to the  button while data is being searched.

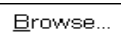
A rectangular button with a black border and the text "Cancel" inside.

Closes the Source Search dialog box.

This button changes to the  button while data is being searched.

A rectangular button with a black border and the text "Help" inside.

Opens the help window that explains the Source Search dialog box.

A rectangular button with a black border and the text "Browse..." inside.

Opens the Browse dialog box.

Assemble Window

General

This window displays a disassemble text and can also execute online assemble.

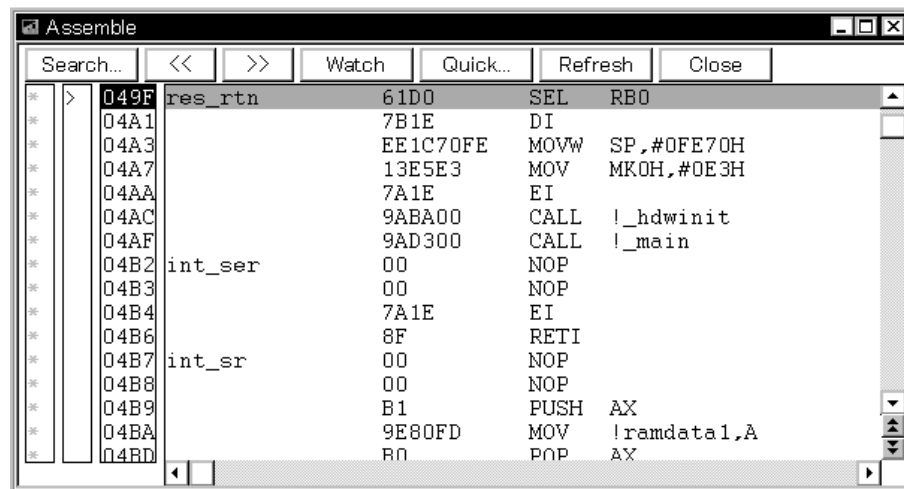
Opening method

This window can be opened by the following methods.

- In the main window
Select [Browse] → [Assemble...] from the menu bar.
Press the [GRPH] + [B], and [A] keys in that order.
- Click the  button on the toolbar.

Window

Figure 6-34. Assemble Window



Function

Performs disassemble display and online assembly.

Online assembly is performed by moving the cursor to the mnemonic.

The online assembly results are also reflected in the Memory window.

The Assemble window has two states, the active state and the static state.

Only one Assemble window in the active state can be opened at a time, but multiple Assemble windows which are in the static state can be opened at the same time.

These two states are described below.

(1) Active state

The first Assemble window that is opened is in the active state.

The Assemble window's display is updated when it is in the active state so that the current PC line is displayed at all times in sync with the current PC value.

Also, when in the active state, the Assemble window becomes the jump destination for the jump function and, if it is synchronized with the Trace View window, the Assemble window's display is updated in sync with the Trace View window.

(2) Static state

An Assemble window in the static state is not synchronized with the current PC value and it displays a constant address.

Also, an Assemble window in the static state cannot be made a jump destination, nor can it be synchronized with the Trace View window.

If an Assemble window has already been opened in the active state, then all subsequent windows are opened in the static state.

The Assemble window consists of the following areas.

- Point mark display area
- Current PC mark display area
- Address display area
- Disassemble display area

The function of each area is explained below.

(1) Point mark display area

This area sets or deletes breakpoints, and displays the setting status of each event.

(a) Breakpoint setting/deletion function

By clicking this area with the mouse, breakpoints can be set or deleted. The operation when clicking the mouse is as follows depending on the line where the mouse is clicked and the setting of On Mouse Click in the Extended Option dialog box.

Line	Setting of "On Mouse Click" in Extended Option Dialog Box	Operation
Where blank or marks other than the "B" mark are displayed (E, L, T mark etc.)	Soft Break	Sets software breakpoint
	Hard Break	Sets hardware breakpoint
Where "B" mark (blue) is displayed (software breakpoint)	Soft Break	Deletes software breakpoint
	Hard Break	Sets hardware breakpoint
Where "B" mark (red, black) is displayed (hardware breakpoint)	Soft Break	Sets software breakpoint
	Hard Break	Deletes hardware breakpoint

If a breakpoint is set, the “B” mark is displayed in the point mark area. However, if a mark other than the “B” mark is displayed, the “A” mark is displayed.

The “A” mark shows that multiple events are set.

When a hardware breakpoint and a software breakpoint overlap, the “A” mark is displayed.

If a breakpoint is deleted, the “B” mark in the point mark area is deleted and the area is left blank or a mark other than the “B” mark is displayed.

The “B” mark is displayed in the following colors in accordance with the type of breakpoint and its state.

Display Color	Explanation
Blue	Shows that a software breakpoint is set.
Red	Shows that the set hardware breakpoint is valid.
Black	Shows that the set hardware breakpoint is invalid. The hardware breakpoint can be made valid in the Event Manager or the Break dialog box.

If a breakpoint is set in the point mark area, it becomes valid at the time it is set.

(b) Event condition display function

The set status of each event is displayed. If the execution event, or the fetch condition of an access event is set, a mark indicating the type of each event condition is displayed in the corresponding assemble line.

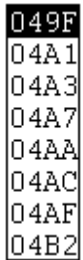
Mark	Meaning
E	Shows that an event condition is set
L	Shows that the final stage of an event link is set
B	Shows that a break event is set
T	Shows that a trace event is set
T ^{Note 1}	Shows that a timer event is set
S ^{Note 1}	Shows that a snapshot event is set
U ^{Note 2}	Shows that a stub event is set
A	Shows that two or more events are set
M ^{Note 3}	Shows that a DMM event is set

- Notes**
1. Not supported in the ID78K4-NS
 2. Supported only in the ID78K4
 3. Supported only in the ID78K0S-NS

If a range address is specified as an event's address condition, the lower address of the range becomes the object. Also, the address condition's mask specification is not reflected.

(2) Current PC mark display area

This area displays mark ">" indicating the value of the current PC (PC register value). The program is executed up to the specified line by double-clicking the current PC mark area.

(3) Address display area

This area displays the disassemble start address. When this field is clicked, an address is highlighted and selected.

In addition, this area has the following functions.

(a) Drag-and-drop function

A selected address which is highlighted can be dragged to another window or area.

If the mouse cursor is positioned on the position of the selected address in the address display area and the left button is pressed and held down, then when the mouse is dragged, the arrow cursor form changes to a .

If the mouse cursor is moved into a window or area where it is possible to drop it, the shape of the cursor changes from  to .

The operation is performed with respect to the dropped address in the window where it was dropped.

Operations after an address is dropped depend on the respective window or area where it was dropped.

Window or Area Which Is the Drop Object	Operation After Drop
- Event manager Event manager area in each of the setting dialog boxes below - Event dialog box - Event Link dialog box - Break dialog box - Trace dialog box - Snap Shot dialog box^{Note 1} - Stub dialog box^{Note 2} - Timer dialog box^{Note 1}	With the dropped address as the address condition, the execution event conditions are generated automatically. The event condition names are generated automatically, as Evt00001, Evt00002, ... The external sense data conditions are not specified. Address conditions are set in the form of symbol name + offset value for the symbol which is the closest.
- Link condition setting area in the Event Link dialog box - Break condition setting area in the Break dialog box - Section trace start condition area, section trace end condition area, and qualify trace condition area in the Trace dialog box - Snapshot condition setting area in the Snap Shot dialog box^{Note 1} - Stub condition setting area in the Stub dialog box^{Note 2} - Timer condition setting area in the Timer dialog box^{Note 1}	The execution event conditions are generated automatically with the dropped address as the address condition. Furthermore, automatically generated event conditions are set in the conditions setting area where they were dropped. The event condition names are generated automatically, as Evt00001, Evt00002, ... The external sense data conditions are not specified. Address conditions are set in the form of symbol name + offset value for the symbol which is the closest.
- Address condition setting area and data condition setting area in the Event dialog box - Memory snap data setting area in the Snap Shot dialog box^{Note 1} - Jump destination address setting area in the Stub dialog box^{Note 2}	The address text is set in the area where it was dropped. Address conditions are set in the form of symbol name + offset value for the symbol which is the closest.

Notes 1. Not supported in the ID78K4-NS

2. Supported only in the ID78K4

(b) Window link function

Uses an address to show the linked relationship between the Trace View window and the disassemble display.

The address which is the link object with the Trace View window is highlighted. For details, refer to the window link function of the Trace View window.

(4) Disassemble display area

res_rtn	61D0	SEL	R0
	7B1E	DI	
	EE1C70FE	MOVW	SP,#0FE70H
	13E5E3	MOV	MK0H,#0E3H
	7A1E	EI	
	9ABA00	CALL	!_hdwinit
	9AD300	CALL	!_main
int_ser	00	NOP	
	00	NOP	
	7A1E	EI	
	8F	RETI	
int_sr	00	NOP	
	00	NOP	
	B1	PUSH	AX
	9E80FD	MOV	!ramdata1,A
	R0	POP	AX

The address label, code data, and disassembled mnemonic are displayed in the disassemble display area.

The disassemble display in the mnemonic column can be changed.

To change it, move the cursor to the mnemonic column. During editing, the **INS** key can be used to switch between the overwrite mode and the insert mode.

After making the desired changes in the mnemonic column, if the cursor is moved to a different line, the contents of the change are checked. If the change contents are incorrect, the code data in the changed line becomes an "*".

Even if it is moved to a different line, the change contents are not written to memory. Another line can be changed without the changes being written to memory.

The changed contents in the mnemonic column are written to memory by pressing the **Enter** key. The change contents are also checked when the **Enter** key is pressed. If the change contents are incorrect, the code data in the incorrect line become an "*". If even one line is incorrect, the change contents are not written to memory. In such a case, correct the change contents. To discard the change contents, press the **ESC** key. If the change contents are not incorrect, if the **Enter** key is pressed, after the change contents are written to memory, the cursor moves to the next line's mnemonic column. In this way changes can continue to be made in the next line.

If, as a result of the change, the number of bytes in the instructions after the change is fewer than the number of bytes in the instruction before the change, the remaining bytes are replaced by the "NOP" instruction.

Also, if, as a result of the change, the number of bytes in the instructions after the change is greater than the number of bytes in the instruction before the change, the next instruction is overwritten. In this case also, the remaining bytes are replaced by the "NOP" instruction. Even in cases where the change runs into the source line, it is overwritten in the same way.

- Cautions 1.** If the disassemble display area is scrolled upward (toward the direction in which the address is decremented), an illegal mnemonic may be displayed (because the middle address of a multiple-byte instruction is displayed).
- 2.** In the disassemble display area, SFRs or label symbols with different names but having the same address cannot be distinguished and displayed.

As for the current PC line and the breakpoint setting line, the display color is changed and they are displayed in bold.

Meaning of Line	Display Color	Explanation
Current PC line	Yellow	This line corresponds to the current PC value. This is the line where a ">" is displayed in the current PC mark area.
Breakpoint setting line	Red	This is the line where the valid breakpoint is set. This is the line where a red or blue "B" is displayed in the point mark area.

The disassemble display area includes a number of functions such as program execution with the line where the cursor is located as the object, or setting of the breakpoint, etc.

- Start function
- Come function
- Breakpoint setting function
- Program counter setting function
- Jump function

Furthermore, in the following case, these functions cannot be executed. The corresponding menu is dimmed and becomes impossible to select.

- If a user program is being executed.

Each function is explained below.

(a) Start function

Executes the user program from the line where the cursor is located.

This function is executed by performing the following operations in sequential order.

- <1> Move the cursor to the line where execution is to start.
- <2> Perform one of the following operations in the main window.
Select [Run] → [Start From Here] from the menu bar.
Press the [GRPH] + [R], and [A] keys in that order.
Press the shortcut keys [SHIFT] + [f.6].

(b) Come function

Executes the user program up to the line where a cursor is placed.

While the user program is being executed in this mode, however, the break event currently set is not generated.

This function is executed by performing the following operations in sequential order.

- <1> Move the cursor to the line where execution is to start.
- <2> Perform one of the following operations in the main window.
Select [Run] → [Come Here] from the menu bar.
Press the [GRPH] + [R], and [M] keys in that order.
Press the shortcut key [f.6].

(c) Breakpoint setting function

Sets a breakpoint to the line where a cursor is placed.

An execution event is used as the breakpoint to be set.

This function is executed by performing the following operations in sequential order.

- <1> Move the cursor to the line to which a breakpoint is to be set.
- <2> Perform one of the following operations in the main window.
 Select [Run] → [Break Point] from the menu bar.
 Press the [GRPH] + [R], and [B] keys in that order.
 Press shortcut key [f.9].

(d) Program counter setting function

Sets the address of the line where the cursor is placed to the PC (program counter).

- <1> Move the cursor to the line where the program counter is to be set (PC).
- <2> Perform one of the following operations in the main window.
 Select [Run] → [Change PC] from the menu bar.
 Press the [GRPH] + [R], and [H] keys in that order.
 Press the shortcut keys [CTRL] + [f.9].

(e) Jump function

Jumps to the Source window, Memory window, or Coverage window^{Note} by using the address of the line where the cursor is placed as a jump pointer.

The jump destination window displays the jump pointer at the beginning.

This function is executed by performing the following operations in sequential order.

Note Not supported in the ID78K4-NS

- <1> Move the cursor to the line which is the jump origin.
- <2> Perform one of the following operations in the main window.
 - If the jump destination is the Source window
 Select [Jump] → [SourceText] from the menu bar.
 Press the [GRPH] + [J], and [S] keys in that order.
 Press shortcut keys [CTRL] + [U].
 - If the jump destination is the Memory window
 Select [Jump] → [Memory] from the menu bar.
 Press the [GRPH] + [J], and [E] keys in that order.
 Press shortcut keys [CTRL] + [M].
 - If the jump destination is the Coverage window^{Note}
 Select [Jump] → [Coverage] from the menu bar.
 Press the [GRPH] + [J], and [C] keys in that order.
 Press the shortcut keys [CTRL] + [I].

Note Not supported in the ID78K4-NS

The text displayed in the disassemble display area can be selected by the following method.

- From the position where the desired text starts in the display, drag the mouse to the position within the range of 1 line. The text from the starting position to the end position is the text that is selected.
- Double-click the character string. The words in the double-clicked position are selected.

In the disassemble display area, a number of functions, such as watch and quick watch with the selected text as the object, can be performed.

(f) Watch function

This adds the selected data to the Watch window and displays its contents.

Furthermore, if an assembler symbol is selected, it is added to the Watch window in accordance with the settings in the Debugger Option dialog box.

This function is executed by carrying out the following operations in order.

- <1> Select the text.
- <2> Perform one of the following operations in the main window.
 - Select [View] → [View Watch] from the menu bar.
 - Press the [GRPH] + [V], and [I] keys in that order.
 - Select [View] → [Add Watch...] from the menu bar.
 - Press the [GRPH] + [V], and [W] keys in that order.
 - Click the  button in the Assemble window.

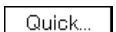
If any of these operations is carried out, the Add Watch dialog box opens and adding is performed.

If the Watch window is not currently open, the Watch window is opened.

(g) Quick watch function

This temporarily displays the contents of the selected data in the Quick Watch dialog box.

This function is executed by carrying out the following procedure in order.

- <1> Select the text.
- <2> Perform one of the following operations in the main window.
 - Select [View] → [Quick Watch...] from the menu bar.
 - Press the [GRPH] + [V], and [Q] keys in that order.
 - Press the shortcut keys [CTRL] + [W].
 - Click the  button in the Assemble window.

The Quick Watch dialog box opens and its contents are displayed.

(h) Drag-and-drop function

Through a drag-and-drop operation, the selected text can be dragged to another window or area. The operation order is shown below.

<1> Drag the selected text using the left button of the mouse. The mouse cursor's shape will change from an arrow to a .

<2> If the mouse cursor is moved into a window or area where it is possible to drop it, the shape of the cursor changes from  to .

Operation after drag-and-drop differs depending on the window or area where the items were dropped.

Window or Area Which Is the Drop Object	Operation After Drop												
- Event Manager - Event manager area in each of the setting dialog boxes below - Event dialog box - Event Link dialog box - Break dialog box - Trace dialog box - Snap Shot dialog box^{Note 1} - Stub dialog box^{Note 2} - Timer dialog box^{Note 1}	If it is possible to convert the dropped text to an address value as a symbol, with the converted address value as the address condition, the Access status (all-access status) or the Execute status event conditions are generated automatically. The event condition names are generated automatically, as Evt00001, Evt00002, ... The data conditions and external sense data conditions are not specified. The dropped text is set in the address conditions. The relationship between the generated event conditions and the symbols is as follows. <table> <tr> <th>Symbol</th><th>Status</th></tr> <tr> <td>Variable</td><td>R/W</td></tr> <tr> <td>Function</td><td>Execution</td></tr> <tr> <td>Symbols in the data section</td><td>R/W</td></tr> <tr> <td>Symbols in the code section</td><td>Execution</td></tr> <tr> <td>Other</td><td>R/W</td></tr> </table>	Symbol	Status	Variable	R/W	Function	Execution	Symbols in the data section	R/W	Symbols in the code section	Execution	Other	R/W
Symbol	Status												
Variable	R/W												
Function	Execution												
Symbols in the data section	R/W												
Symbols in the code section	Execution												
Other	R/W												
- Link condition setting area in the Event Link dialog box - Break condition setting area in the Break dialog box - Section trace start condition area, section trace end condition area, and qualify trace condition area in the Trace dialog box - Snapshot condition setting area in the Snap Shot dialog box^{Note 1} - Stub condition setting area in the Stub dialog box^{Note 2} - Timer condition setting area in the Timer dialog box	If it is possible to convert the dropped text to an address value as a symbol, with the converted address value as the address condition, the Access status (all-access status) or the Execute status event conditions are generated automatically. Furthermore, the automatically generated event conditions are set in each dropped conditions setting area. The event condition names are generated automatically, as Evt00001, Evt00002, ... The data conditions and external sense data conditions are not specified. The dropped text is set in the address conditions. The relationship between the generated event conditions and the symbols is as follows. <table> <tr> <th>Symbol</th><th>Status</th></tr> <tr> <td>Variable</td><td>R/W</td></tr> <tr> <td>Function</td><td>Execution</td></tr> <tr> <td>Symbols in the data section</td><td>R/W</td></tr> <tr> <td>Symbols in the code section</td><td>Execution</td></tr> <tr> <td>Other</td><td>R/W</td></tr> </table>	Symbol	Status	Variable	R/W	Function	Execution	Symbols in the data section	R/W	Symbols in the code section	Execution	Other	R/W
Symbol	Status												
Variable	R/W												
Function	Execution												
Symbols in the data section	R/W												
Symbols in the code section	Execution												
Other	R/W												
- Address condition setting area and data condition setting area in the Event dialog box - Memory snap data setting area in the Snap Shot dialog box^{Note 1} - Jump destination address setting area in the Stub dialog box^{Note 2}	Text is set in the dropped area.												
Watch window	If the dropped text can be recognized as a symbol, the symbol contents are displayed.												

Notes 1. Not supported in the ID78K4-NS

2. Supported only in the ID78K4

Function buttons

Search...

Opens the Assemble Search dialog box and searches the character string of a mnemonic. If text has been selected in the disassemble display area, sets the selected text as the search object and opens the Assemble Search dialog box.

If text has not been selected, the Assemble Search dialog box will open with the search object in the blank state.

Specify the search method in the Assemble Search dialog box. The search results are selectively displayed in the Assemble window.

Operation is the same as when [View] → [Search...] is selected on the menu bar.

<<

Searches for the contents that match the search conditions set in the Assemble Search dialog box in the backward direction from the cursor position (toward the top of the display).

During the search, it changes to a **Stop** button.

>>

Searches for the contents that match the search conditions set in the Assemble Search dialog box in the forward direction from the cursor position (toward the bottom of the display).

During the search, it changes to a **Stop** button.

Stop

Interrupts the search.

During a search, the **<<** button or the **>>** button changes to the **Stop** button.

Watch

Adds the symbol, etc. selected in the disassemble display area to the Watch window.

If the Watch window has not been opened, it opens the Watch window.

If text has not been selected in the disassemble display area, the Watch window is only opened.

The operation is the same as when [View] → [View Watch] is selected on the menu bar.

Quick...

Temporarily displays the contents of symbols, etc. selected in the disassemble display area in the Quick Watch dialog box.

It opens the Quick Watch dialog box.

If text has not been selected in the disassemble display area, the Quick Watch dialog box is only opened.

The operation is the same as when [View] → [Quick Watch] is selected on the menu bar.

Refresh

Updates the window contents with the latest data.

Close

Closes the Assemble window.

Assemble Search Dialog Box

General

Searches the contents of the Assemble window.

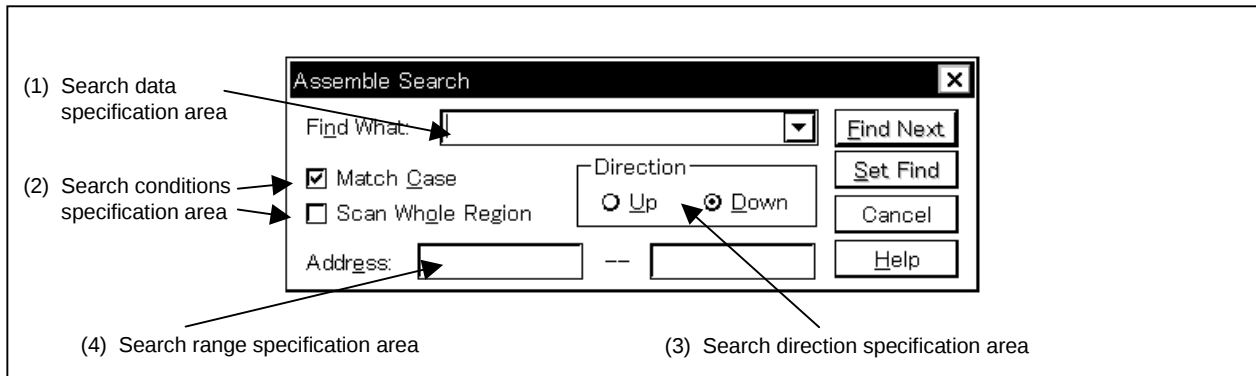
Opening Method

This dialog box can be opened by one of the following methods when the Assemble window is the current window.

- In the main window
Select [View] → [Search...] from the menu bar.
Press the [GRPH] + [V], and [S] keys in that order.
Press the shortcut keys [CTRL] + [G].
- In the Assemble window
Click the [Search...] button.

Window

Figure 6-35. Assemble Search Dialog Box



Function

Initiates a search for the disassemble contents. Continuous null characters which include input character strings and disassemble character strings are compared as a single null character.

The Assemble Search dialog box consists of the following areas.

- Search data specification area
- Search conditions specification area
- Search direction specification area
- Search range specification area

The function of each area is explained below.

(1) Search data specification area

This area specifies the data that is to be searched for.

In the default setting, the string selected in the accessed window is displayed, but as necessary, it can be changed by inputting from the keyboard.

By clicking the  button and displaying the input history, the contents input previously can be reused. Up to 16 items of input history can be retained.

The maximum length of the character string to be search that can be input is up to 150 one-byte characters.

(2) Search conditions specification area

(a)  Match Case

When searching, this check box specifies whether the data specified for searching is case sensitive or not.

In the default setting, the data is case sensitive.

- | | |
|--|--------------------------|
| ☐ Match <u>C</u> ase | Not case sensitive. |
| ☒ Match <u>C</u> ase | Case sensitive (default) |

(b)  Scan Whole Region

When searching, this check box specifies whether to search the whole range or not. In the default setting, only the remaining portion of the range is searched.

- | | |
|---|--|
| ☐ Scan Whole <u>R</u> egion | Only the remaining portion of the range is searched (default). |
| ☒ Scan Whole <u>R</u> egion | The whole range is searched. |

(3) Search direction specification area

This specifies the search direction.

There are two types of search, upward, and downward.

Up: Upward search. Searches the data from the current cursor position toward the beginning (upward on display).

Down: Downward search. Searches the data from the current cursor position toward the end (downward on display).

(4) Search range specification area

Address:		--	
----------	----------------------	----	----------------------

This area specifies the addresses being searched. A symbol or an expression can also be specified for an address.

The specification method is the same as in the case of the Address Move dialog box. The default radix when inputting numerical values is hexadecimal.

Function buttons

- | | |
|--|--|
| <input type="button" value="Find Next"/> | Searches for the specified search data in accordance with the conditions. As the search results, the matching character string is highlighted. For a continuous search, press this button again. |
| <input type="button" value="Set Find"/> | Sets the specified conditions as the search conditions and closes the dialog box. |
| <input type="button" value="Stop"/> | Interrupts the search for data.
During the data search, the <input type="button" value="Cancel"/> button changes to the <input type="button" value="Stop"/> button. |
| <input type="button" value="Cancel"/> | Closes the Assemble Search dialog box.
During a data search, it changes to the <input type="button" value="Stop"/> button. |
| <input type="button" value="Help"/> | Opens the help window that explains the Assemble Search dialog box. |

Memory Window

General

This window displays and changes the memory contents.

Opening method

This window can be opened by the following methods.

- In the main window
Select [Browse] → [Memory] from the menu bar.
Select [Jump] → [Memory] from the menu bar.
Press the [GRPH] + [B], and [M] keys in that order.
Press the [GRPH] + [J], and [E] keys in that order.
Click the  button on the toolbar.

Window

Figure 6-36. Memory Window

Without ASCII display

Memory																
Search... << >> Refresh Close																
Addr	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+A	+B	+C	+D	+E	+F
FB00	00	00	02	00	04	00	08	00	FF	FF	FF	FF	00	04	00	00
FB10	FF	FF	FF	FF	00	40	03	00	FF	FF	FF	FF	00	40	02	00
FB20	FF	FF	FF	FF	00	00	04	00	FF	FF	FF	FF	00	00	00	00
FB30	FF	FD	BF	FF	00	00	00	00	FF	FF	FF	EF	00	00	00	00
FB40	FF	FF	FF	FF	10	00	00	00	FF	FF	FF	77	00	01	00	42
FB50	FF	FE	DF	FF	00	00	00	00	FF	FF	FF	FF	00	00	00	01
FB60	FF	FF	FF	FF	08	00	00	10	FF	FF	FF	FF	00	00	10	00
FB70	FF	F7	FF	FF	00	00	00	20	FF	FF	FE	FF	00	00	00	00
FB80	FE	FF	FF	BF	00	00	80	00	FF	FF	FF	FF	00	00	00	00
FB90	FF	FD	FF	FF	00	00	00	24	FF	FF	FE	FF	04	00	00	00
FBA0	FF	FF	FF	FF	00	00	00	00	FF	FF	FF	DF	08	00	02	00
FBB0	FF	FF	FF	FF	40	00	00	00	FF	FF	FF	FF	00	04	00	00
FBC0	BF	FF	FF	FF	81	00	00	01	FD	FF	FF	BB	20	80	00	00
FBD0	FF	FF	FF	FF	00	00	00	00	FF	FF	FF	BF	08	00	00	10
FBE0	FF	FF	FF	FF	00	00	00	00	FF	FF	FF	FF	04	00	00	00
FBF0	F7	FF	DF	FF	00	00	00	00	FF	7F	FF	FF	00	00	00	00
FC00	FF	FF	FF	5F	00	00	00	00	FF	FF	FF	EF	10	00	00	00
FC10	FF	FF	FF	FF	00	00	00	00	7E	DE	FE	FE	00	10	00	00

With ASCII display

Memory																		
Search...		<<		>>		Refresh		Close										
Addr	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+A	+B	+C	+D	+E	+F	0123456789ABCDEF	
FB00	00	00	02	00	04	00	08	00	FF	FF	FF	FF	00	04	00	00		
FB10	FF	FF	FF	FF	00	40	03	00	FF	FF	FF	FF	00	40	02	00	@.....@..	
FB20	FF	FF	FF	FF	00	00	04	00	FF	FF	FF	FF	00	00	00	00		
FB30	FF	FD	BF	FF	00	00	00	00	FF	FF	FF	EF	00	00	00	00	..¿.....	
FB40	FF	FF	FF	FF	10	00	00	00	FF	FF	FF	77	00	01	00	42	w...B	
FB50	FF	FE	DF	FF	00	00	00	00	FF	FF	FF	FF	00	00	00	01	..ß.....	
FB60	FF	FF	FF	FF	08	00	00	10	FF	FF	FF	FF	00	00	10	00		
FB70	FF	F7	FF	FF	00	00	00	20	FF	FF	FE	FF	00	00	00	00		
FB80	FE	FF	FF	BF	00	00	80	00	FF	FF	FF	FF	00	00	00	00	..¿.....	
FB90	FF	FD	FF	FF	00	00	00	24	FF	FF	FE	FF	04	00	00	00	\$.....	
FBA0	FF	FF	FF	FF	00	00	00	00	FF	FF	FF	DF	08	00	02	00	ß.....	
FBB0	FF	FF	FF	FF	40	00	00	00	FF	FF	FF	FF	00	04	00	00	@.....	
FBC0	BF	FF	FF	FF	81	00	00	01	FD	FF	FF	BB	20	80	00	00	¿.....»...	
FBD0	FF	FF	FF	FF	00	00	00	00	FF	FF	FF	BF	08	00	00	10	¿.....	
FBE0	FF	FF	FF	FF	00	00	00	00	FF	FF	FF	FF	04	00	00	00		
FBF0	F7	FF	DF	FF	00	00	00	00	FF	7F	FF	FF	00	00	00	00	..ß.....	
FC00	FF	FF	FF	5F	00	00	00	00	FF	FF	FF	EF	10	00	00	00	..._.....	
FC10	FF	FF	FF	FF	00	00	00	00	7E	DE	FE	FE	00	10	00	00	R	

Function

Displays and changes the memory contents.

A vertical scroll bar is always displayed so that the memory contents can be scrolled.

The  button or the  button can also be used to move the display one page up or one page down.

Also, even during emulation, the memory contents can be displayed in real time. The real-time display range is the address range set in the Extended Option dialog box.

The Memory window has two states, the active state and the static state.

Only one Memory window in the active state can be opened at a time, but multiple Memory windows which are in the static state can be opened at the same time.

Each Memory window state is explained below.

(1) Active state

A Memory window in the active state is the jump destination for the jump function and, if it is synchronized with the Trace View window, the Memory window's display is updated in synchronization with the Trace View window. The first Memory window opened is in the active state.

(2) Static State

A Memory window in the static state is not the jump destination and is not synchronized with the Trace View window. Except for those points, it operates in the same way as in the active state.

If an active Memory window is already open, then all subsequent Memory windows are opened in the static state.

The Memory window consists of the following areas.

- Address display area
- Memory display area
- ASCII display area

The function of each area is explained below.

(1) Address display area

Addr
FB00
FB10
FB20
FB30
FB40
FB50
FB60
FB70
FB80
FB90
FBA0

This area displays memory addresses.

Addresses are displayed in 4 digits (16 bits) in the ID78K0-NS and ID78K0S-NS, and 5 digits (20 bits) in the ID78K4 (-NS).

The address width changes when memory bank is used.

(2) Memory display area

+0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+A	+B	+C	+D	+E	+F
00	00	02	00	04	00	08	00	FF	FF	FF	FF	00	04	00	00
FF	FF	FF	FF	00	40	03	00	FF	FF	FF	FF	00	40	02	00
FF	FF	FF	FF	00	00	04	00	FF	FF	FF	FF	00	00	00	00
FF	FD	BF	FF	00	00	00	00	FF	FF	FF	EF	00	00	00	00
FF	FF	FF	FF	10	00	00	00	FF	FF	FF	77	00	01	00	42
FF	FE	DF	FF	00	00	00	00	FF	FF	FF	FF	00	00	00	01
FF	FF	FF	FF	08	00	00	10	FF	FF	FF	FF	00	00	10	00
FF	F7	FF	FF	00	00	00	20	FF	FF	FE	FF	00	00	00	00
FE	FF	FF	BF	00	00	80	00	FF	FF	FF	FF	00	00	00	00
FF	FD	FF	FF	00	00	00	24	FF	FF	FE	FF	04	00	00	00
FF	FF	FF	FF	00	00	00	00	FF	FF	FF	DF	08	00	02	00
FF	FF	FF	FF	40	00	00	00	FF	FF	FF	FF	00	04	00	00
BF	FF	FF	FF	81	00	00	01	FD	FF	FF	BB	20	80	00	00
FF	FF	FF	FF	00	00	00	00	FF	FF	FF	BF	08	00	00	10
FF	FF	FF	FF	00	00	00	00	FF	FF	FF	FF	04	00	00	00
F7	FF	DF	FF	00	00	00	00	FF	7F	FF	FF	00	00	00	00
FF	FF	FF	5F	00	00	00	00	FF	FF	FF	EF	10	00	00	00
FF	FF	FF	FF	00	00	00	00	7F	DF	FF	FF	00	10	00	00

This area displays and changes the memory contents. The contents to be changed are displayed in red characters, then by pressing the **[Enter]** key, they are actually written to the target. The contents prior to the change (when in the red character state) can be erased using the **[ESC]** key.

Up to 256 bytes of data can be changed at one time.

This area also has the following two functions in addition to displaying the memory contents making changes.

(a) Jump function

Jumps to the Source window, Assemble window, or Coverage window^{Note} by using the address at the cursor position as a jump pointer. The jump destination window displays the jump pointer at the beginning.

This function is executed by performing the following operations in sequential order.

Note Not supported in the ID78K4-NS

<1> Move the cursor to the line which is the jump origin.

<2> Perform one of the following operations in the main window.

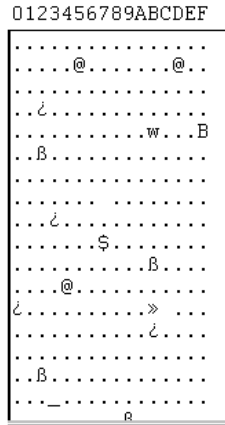
- If the jump destination is the Source window
Select **[Jump]** → **[SourceText]** from the menu bar.
Press the **[GRPH]** + **[J]**, and **[S]** keys in that order.
Press shortcut keys **[CTRL]** + **[U]**.
- If the jump destination is the Assemble window
Select **[Jump]** → **[Assemble]** from the menu bar.
Press the **[GRPH]** + **[J]**, and **[A]** keys in that order.
Press shortcut keys **[CTRL]** + **[D]**.
- If the jump destination is the Coverage window^{Note}
Select **[Jump]** → **[Coverage]** from the menu bar.
Press the **[GRPH]** + **[J]**, and **[C]** keys in that order.
Press shortcut keys **[CTRL]** + **[I]**.

Note Not supported in the ID78K4-NS

(b) Window link function

Shows the relationship between the Trace View window and the Memory window via memory contents.

For further information, refer to the description of the window link function for the Trace View window.

(3) ASCII display area

This area displays the memory contents in ASCII. The memory contents can be converted into ASCII characters for display. The conversion method is the same as the memory display area.

The display can be turned on and off by selecting [View] → [Ascii] on the menu bar (the display is on by the default setting).

This area is also a jump pointer for the jump function, in the same way as in **(2) Memory display area**.

Function buttons

Opens the Memory Search dialog box and searches for a character string in the displayed memory contents or memory contents. At this time, the selected data (memory value) is displayed in the Memory Search dialog box as the search subject. If the dialog box is opened without data specified, specify data by key input. The result of the search is highlighted in the Memory window.

Searches for the memory contents that match the search conditions set in the Memory Search dialog box in the backward direction from the cursor position (toward the top of the display). It changes to a button during a search.

Searches for the memory contents that match the search conditions set in the Memory Search dialog box in the forward direction from the cursor position (toward the bottom of the display). It changes to a button during a search.

Interrupts a search.

During a search, the button or the button changes to a button.

Updates the window's contents with the latest data.

Closes this window.

Memory Search Dialog Box

General

Searches the memory contents.

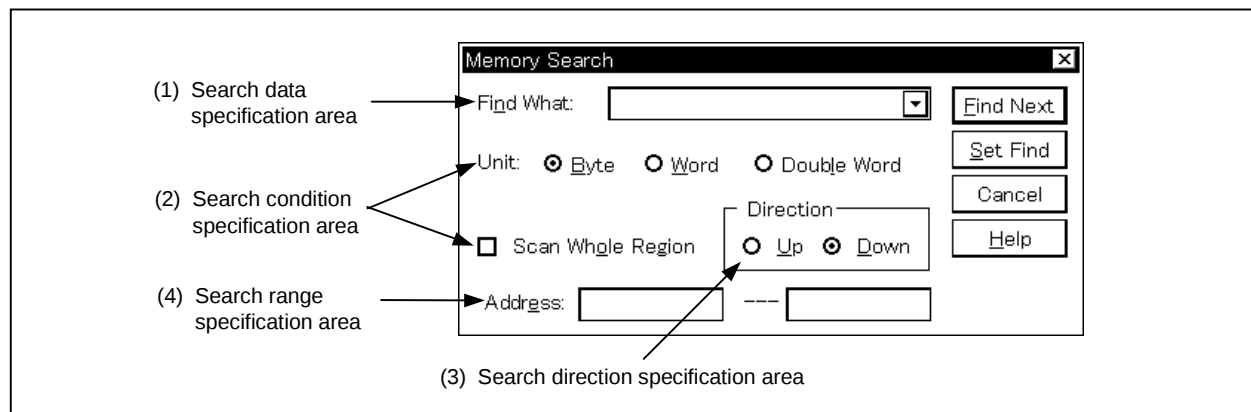
Opening method

This dialog box can be opened by one of the following methods.

- Set the Memory window as the current window and in the main window;
Select [View] → [Search...] from the menu bar.
Press the **[GRPH]** + **[V]**, and **[S]** keys in that order.
Press the shortcut keys **[CTRL]** + **[G]**.
- In the Memory window
Click the **Search...** button.

Window

Figure 6-37. Memory Search Dialog Box



Function

This searches the contents of memory for the Memory window where the cursor is placed.

If the cursor is in the memory display area, the specified data is regarded as a binary data string and the memory display area is searched.

If the cursor is in the ASCII display area, the specified data is regarded as an ASCII character string and the ASCII display area is searched.

Unmapped areas, SFR areas, and I/O protected areas are not searched.

The search result is highlighted in the Memory window. The highlighted data can be placed on the clipboard, but note that only the last line is placed when the data extends to several lines.

The Memory Search dialog box consists of the following areas.

- Search data specification area
- Search condition specification area
- Search direction specification area
- Search range specification area

The function of each area is explained below.

(1) Search data specification area

Find What:		▼
------------	----------------------	----------------------------------

This area specifies the data to be searched.

Although the character string selected in the window that has called this dialog box is displayed as the default assumption, the character string can be changed by keyboard input as necessary (input cannot be made using a symbol or expression.)

When searching the memory display area, a maximum of 16 items of data can be specified at one time. Specify each item of data using a space as a delimiter.

When searching the ASCII display area, a maximum of 256 characters of data can be specified. Spaces in the data are treated as null characters.

By clicking the button and displaying the input history, the contents input previously can be reused. Up to 16 items of input history can be retained.

The maximum length of the character string to be search that can be input is up to 150 one-byte characters.

(2) Search condition specification area

(a) Unit: ☒ Byte ☐ Word ☐ Double Word

This area specifies the bit size each specified search data is to be regarded as via a check box. As the default, the data is searched as 8-bit data.

Byte: Search as 8-bit data (default)

Word: Search as 16-bit data

Double Word: Search as 32-bit data

(b)

☐ Scan Whole Region

This is a check box which specifies whether to search the whole specified region or not when conducting search. With the default, only the portion remaining in the range is searched.

- ☐ Scan Whole Region Searches the remaining portion of the range (default).
☒ Scan Whole Region Searches the whole range.

(3) Search direction specification area

Direction

☐ Up
 ☒ Down

This area specifies the direction of search.
Two directions, upward and downward, can be selected.

- Up: Upward search. Searches the data from the current cursor position toward the beginning (upward on display).
- Down: Downward search. Searches the data from the current cursor position toward the end (downward on display).

(4) Search range specification area

Address: ---

This area specifies the addresses being searched. A symbol or expression can also be specified for an address.

The specification method is the same as in the case of the Address Move dialog box. The default radix when inputting numerical values is hexadecimal.

Function buttons

Find Next

Searches for the specified search data in accordance with the conditions. As the search results, the matching character string is highlighted. For a continuous search, press this button again.

Set Find

Sets the specified conditions as the search conditions and closes the dialog box.

Stop

Interrupts the search for data.
During the data search, the button changes to the button.

Cancel

Closes the Memory Search dialog box.
During a data search, it changes to the button.

Help

Opens the help window that explains the Memory Search dialog box.

Memory Fill Dialog Box

General

Initializes the memory contents with a specified code.

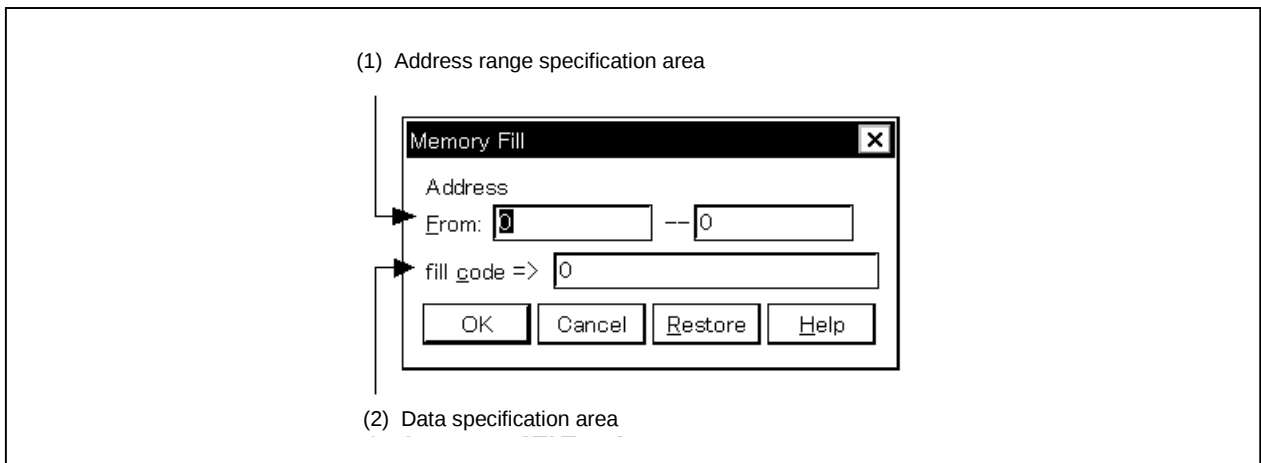
Opening method

This dialog box can be opened by the following methods.

- In the main window
Select [Edit] → [Memory] → [Fill...] from the menu bar.
Press the [GRPH] + [E], [M], and [F] keys in that order.

Window

Figure 6-38. Memory Fill Dialog Box

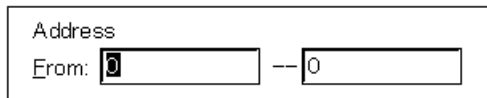


Function

The Memory Fill dialog box consists of the following areas.

- Address range specification area
- Data specification area

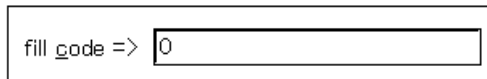
The function of each area is explained below.

(1) Address range specification area

 A rectangular box containing the text "Address" at the top. Below it, the text "From:" is followed by a small square icon, then a text input field containing "0", followed by a hyphen "--", and another text input field containing "0".

This area specifies the address range of the memory contents to be initialized.

A symbol or expression can also be specified for an address. The default radix when inputting numerical values is hexadecimal.

Specify the initialization top and end addresses, in that order.

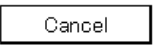
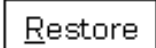
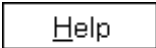
(2) Data specification area

 A rectangular box containing the text "fill code =>" followed by a text input field containing "0".

This area specifies the data to be initialized.

Binary data strings (byte data strings) with up to 16 items of data can be specified. Specify each item of data using a space as a delimiter.

The default radix is hexadecimal and the radix can be specified for each item of data.

Function buttons

	Initializes the memory contents.
	Closes this dialog box.
	This button changes to the  button during memory initialization.
	Stops initializing the memory.
	The  button changes to the  button during memory initialization.
	Returns the input data to its original form.
	Opens the help window.

Memory Copy Dialog Box

General

Copies the memory contents.

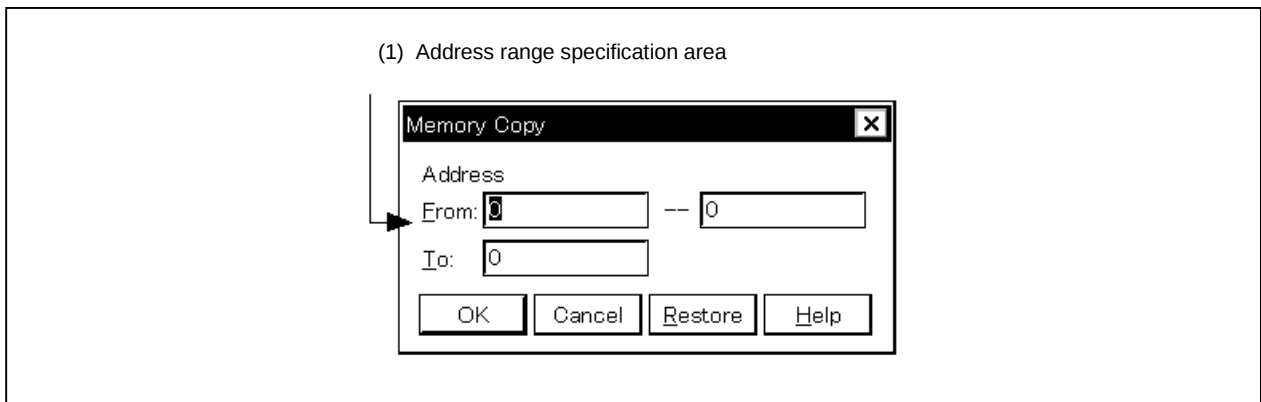
Opening method

This dialog box can be opened by the following methods.

- In the main window
Select [Edit] → [Memory] → [Copy...] from the menu bar.
Press the **GRPH** + **E**, **M**, and **C** keys in that order.

Window

Figure 6-39. Memory Copy Dialog Box



Function

The Memory Copy dialog box consists of the following area.

- Address range specification area

The function of this area is explained below.

(1) Address range specification area

Address

From: --

To:

This area specifies the copy source and copy destination addresses.

A symbol or expression can also be specified for an address. The default radix when inputting numerical values is hexadecimal.

From: Specifies the address range of the copy source. Specify the copy source top address and copy source end address, in that order.

To: Specifies the top address of the copy destination.

Function buttons

OK

Copies the memory contents.

Cancel

Closes this dialog box.

This button changes to the **Stop** button while copying the memory.

Stop

Stops copying the memory data.

The **Cancel** button changes to the **Stop** button while copying the memory.

Restore

Returns the input data to its original value.

Help

Opens the help window.

Memory Compare Dialog Box

General

Compares the memory contents.

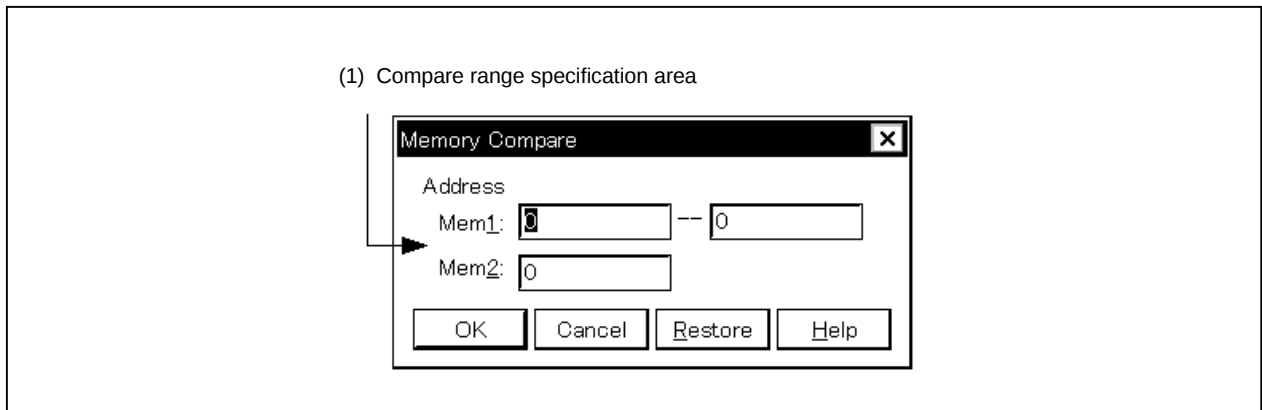
Opening method

This dialog box can be opened by the following methods.

- In the main window
Select [Edit] → [Memory] → [Compare...] from the menu bar.
Press the [GRPH] + [E], [M], and [P] keys in that order.

Window

Figure 6-40. Memory Compare Dialog Box



Function

The Memory Compare dialog box consists of the following area.

- Compare range specification area

The function of this area is explained below.

(1) Compare range specification area

Address

Mem1: --

Mem2:

This area specifies the compare source and compare destination addresses.

A symbol or expression can also be specified for an address. The default radix when inputting numerical values is hexadecimal.

Specify the address range of the compare source and the compare destination so that a guard area is not included. If a guard area is included, an error will occur and the error message f201 (F) will be displayed.

Mem1: Specify the address range of the compare source. Specify the compare source top address and compare source end address, in that order.

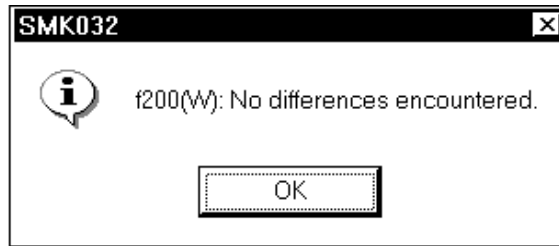
Mem2: Specify the top address of the compare destination.

Function buttons

OK

Compares the memory contents.

If no difference is found as a result of comparison, a confirmation dialog box is displayed. If a difference is found, a Memory Compare Result dialog box is opened. The confirmation dialog box that is displayed if no difference is found as a result of comparison is shown below.



By clicking the button in this confirmation dialog box, the Memory Compare dialog box is closed.

Cancel

Closes this dialog box.

This button changes to the button during comparison.

Stop

Stops comparing the memory contents.

The button changes to the button while comparing the memory contents.

Restore

Returns the input data to its original value.

Help

Opens the help window.

Memory Compare Result Dialog Box

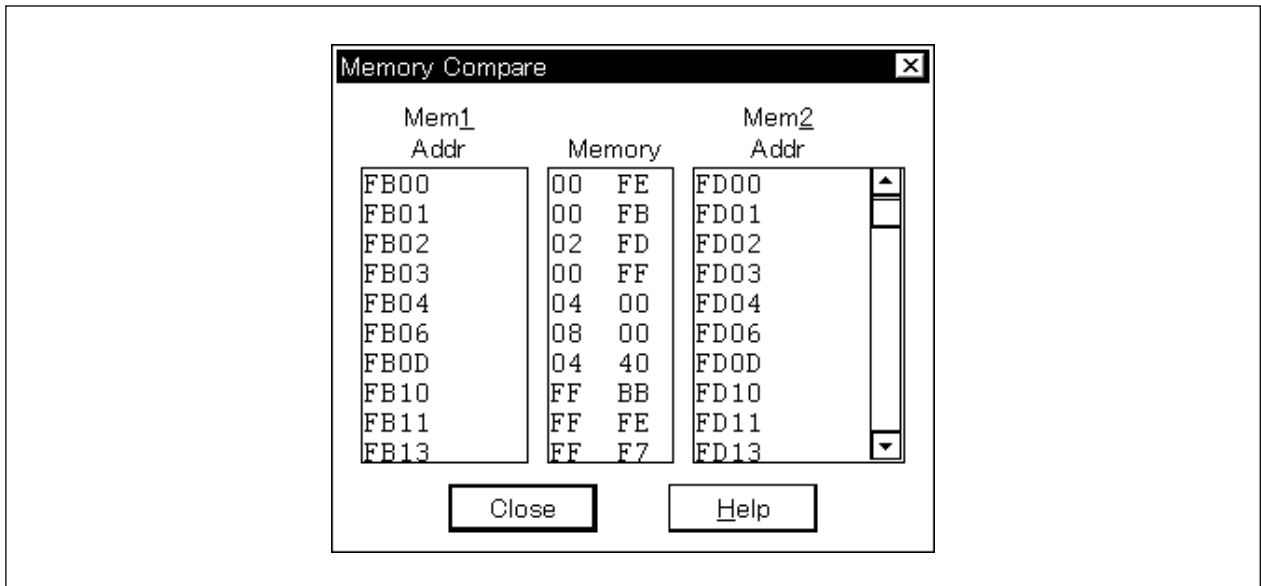
General

Displays the result of comparing memory contents.

This dialog box is opened if a discrepancy is found as a result of comparing the memory contents in the Memory Compare Dialog box. If no discrepancy is found, a confirmation dialog box is opened instead of this dialog box.

Window

Figure 6-41. Memory Compare Result Dialog Box



Function

The Memory Compare Result dialog box consists of the following area.

- Compare result display area

The function of this area is explained below.

(1) Compare result display area

Mem1 Addr	Memory	Mem2 Addr
FB00	00 FE	FD00
FB01	00 FB	FD01
FB02	02 FD	FD02
FB03	00 FF	FD03
FB04	04 00	FD04
FB06	08 00	FD06
FB0D	04 40	FD0D
FB10	FF BB	FD10
FB11	FF FE	FD11
FB13	FF F7	FD13

This area displays the result of comparing memory contents. Only those parts where there were comparison errors are displayed.

Mem1 Addr: Displays the compare source address at which an error has been found.

Memory: Displays the data that has caused the error. The compare source data is displayed on the left, and the compare destination data is displayed on the right.

Mem2 Addr: Displays the compare destination address at which an error has been found.

The address width changes when a memory bank is used.

Function buttons**Close**

Closes this dialog box.

Help

Opens the help window.

Pseudo DMM dialog box

General

Sets the address and data for which DMM is to be executed.

The memory contents are rewritten in real-time while the user program is being executed (However, the user program under execution is temporarily stopped and then re-executed because this function is realized by software emulation).

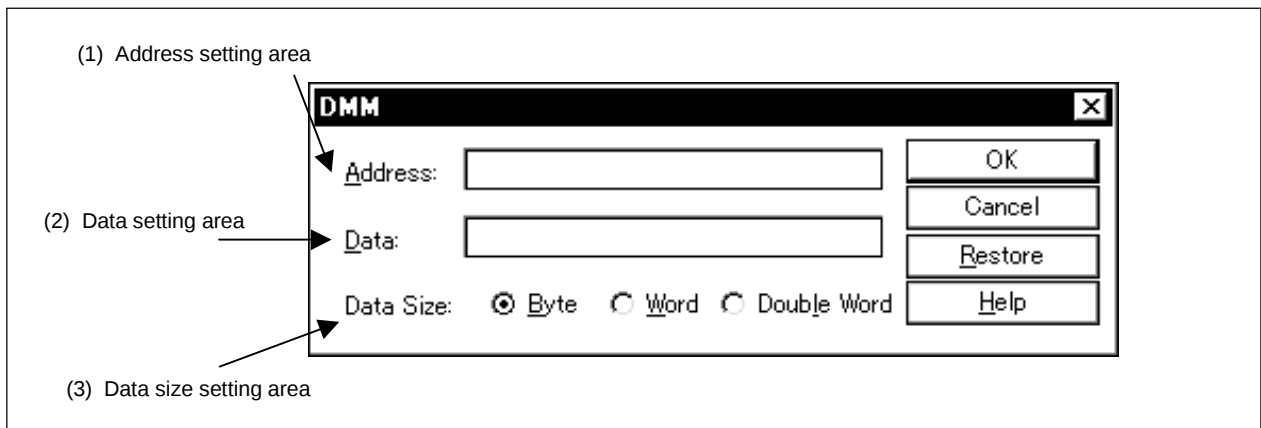
Opening method

This dialog box can be opened by one of the following methods.

- In the main window
Select [Edit] → [Memory...] → [Modify] from the menu bar.
Press the **GRPH** + **E**, **M**, and **M** keys in that order.

Window

Figure 6-42. Pseudo DMM Dialog Box



Function

The pseudo DMM dialog box consists of the following areas.

- Address setting area
- Data setting area
- Data size setting area

The function of each area is explained below.

(1) Address setting area

Address:

This area specifies the address to which data is to be written.

An address can be specified by a symbol or an expression, in the same manner as in the Address Move dialog box. The default radix when inputting a numerical value is hexadecimal.

(2) Data setting area

Data:

This area specifies the data to be written to the memory address specified in the address setting area above.

Only one binary data string can be specified at a time. Specify the size of the data in the data size setting area below. The default radix is hexadecimal.

(3) Data size setting area

Data Size: ☒ Byte ☐ Word ☐ Double Word

This area specifies the size of the data to be written.

Select the size of the data from the following:

Byte: Writes the data specified in the data setting area as 8-bit data.

Word: Writes the data specified in the data setting area as 16-bit data.

Double Word: Writes the data specified in the data setting area as 32-bit data.

Function buttons

OK

Writes the data.

Cancel

Closes the DMM dialog box.

<u>R</u> estore

Returns the input data to its original form.

<u>H</u> elp

Opens the help window.

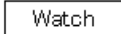
Watch Window

General

This window displays and changes the specified data.

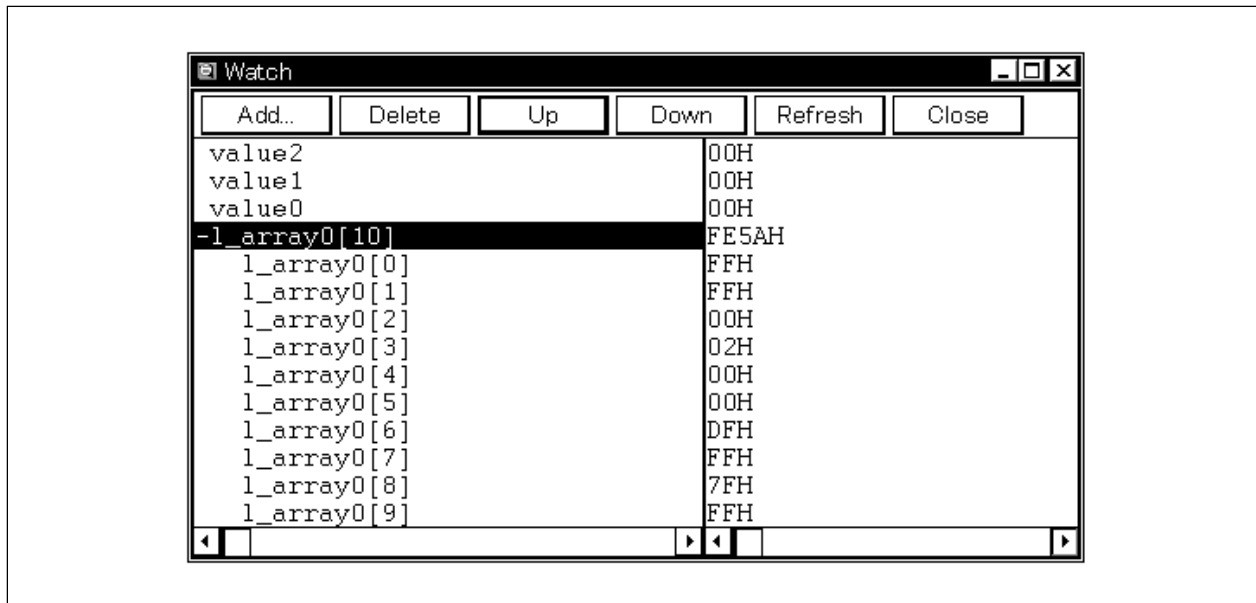
Opening method

This window can be opened by one of the following methods.

- In the main window
Select [Browse] → [Watch] from the menu bar.
Press the [GRPH] + [B], and [W] keys in that order.
Click the  button on the toolbar.
- In the Source window
After selecting data, select [View] → [View Watch] from the menu bar.
Press the [GRPH] + [V], and [I] keys in that order.
Click the  button.
- In the Assemble window
After selecting data, select [View] → [View Watch] from the menu bar.
Press the [GRPH] + [V], and [I] keys in that order.
Click the  button.

Window

Figure 6-43. Watch Window



Function

Displays and changes data.

The data display is added to by selecting a variable name or symbol name in the Source window or the Assemble window and clicking the **Watch** button, or by dragging the selected part directly to the Watch window with the mouse.

Adding can also be done by specifying a variable name or symbol name in the Quick Watch dialog box or the Add Watch dialog box and clicking **Add...**.

To delete a data display, click a variable name or symbol name, then after highlighting it, click the **Delete** button. Alternatively, make a selection using the arrow keys, then after highlighting the selection delete it by pressing the **DEL** key.

Data value update results and rewrites are reflected in the Memory window.

Also, wide-area data allocated to any 2 KB of internal RAM area (such as global variables or public symbols) can be displayed in real time even during emulation, just as in the Memory window.

The boundary line between the symbol name display area and data value display/setting area can be moved to the left or right using the mouse.

To move the boundary, drag the mouse cursor at the point when it changes from "↔" to "↔".

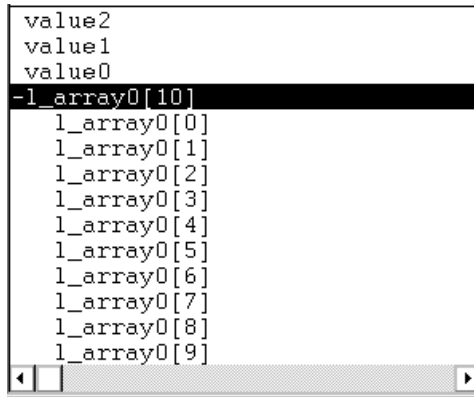
Note This data is allocated to the internal high-speed RAM (IRAM) area in the ID78K4-NS, and to the internal RAM (IRAM and PRAM) areas in the ID78K4.

The Watch window consists of the following areas.

- Symbol name display area
- Data value display/setting area

The function of each area is explained below.

(1) Symbol name display area



This area displays the variable names and symbol names.

A “+” is displayed in front of arrays, pointer type variables, and structures/unions. These variables are expanded and displayed as shown below by double-clicking them.

- For an array, all the elements of the variable are displayed in accordance with the type of array variable.
- For pointer type variables, the data indicated by the pointer is displayed.
- For structures/unions, all the members of the structure/union are displayed in accordance with the type of member variable.

However, if a structure/union is defined within a structure/union, the members up to the tag name or variable name in the internal structure/union are displayed.

For variables which have been expanded and displayed, the “+” display is changed to a “–” display. If they are double-clicked in this state, the expansion display is deleted.

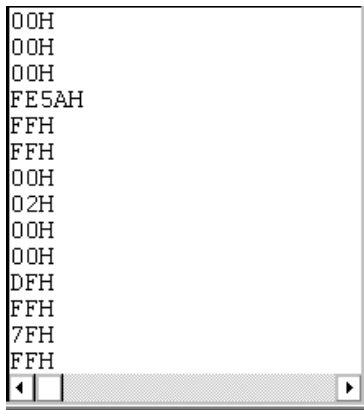
Note that variables with a “+” that are displayed inside a structure/union are expanded and displayed in the same way by double-clicking them.

To expand and display, or to delete an expansion display, select the variable with the arrow keys, then press the **Enter** key.

Data which has become invalid due to changes in the scope or optimization compilation is dimmed.

Whether to display or not display variable types can be set in the Debugger Option dialog box.

Caution Arrays of up to four dimensions are supported. An array of five dimensions or more cannot be displayed.

(2) Data value display/setting area

This area is where data values are displayed and changed.

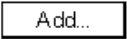
- When the variable is a structure/union, the address is displayed.
- When the variable is an enumeration type, the member name is displayed.
- When the variable is an integer, it is displayed as follows.
 - XXXH: Displayed in hexadecimal.
 - XXXT: Displayed in decimal.
 - XXXQ: Displayed in octal.
 - XXXY: Displayed in binary.
- When the variable is a floating point, it is displayed as follows.
 - [+|-] inf
 - [+|-] nan
 - [+|-] integer portion e [+|-] exponent
 - [+|-] integer portion. Decimal portion [e [+|-] exponent]

Values are updated when execution is stopped. To save values, select [File] → [Save As...] in the main window, then save to the displayed file. Also, if the acquisition of data values has failed, this area will be blank.

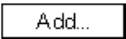
Data which has become invalid due to the changing of the scope or optimization compilation is displayed together with a "?".

The contents of changes are written to the target by pressing the **Enter** key. The contents prior to the change can be erased using the **ESC** key.

If the display size of variables, or assembler bit symbols or registers, etc. in the C language is fixed, the display size cannot be selected.

Function buttonsA rectangular button with a black border and the text "Add.." inside.

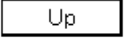
Opens the Add Watch dialog box.

In the Add Watch dialog box, if the data is specified and the  button is clicked, the specified data is added to the Watch window.

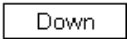
A rectangular button with a black border and the text "Delete" inside.

Deletes the specified data from the watch window.

The  key also performs this operation.

A rectangular button with a black border and the text "Up" inside.

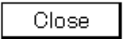
Moves the selected data one line up.

A rectangular button with a black border and the text "Down" inside.

Moves the selected data one line down.

A rectangular button with a black border and the text "Refresh" inside.

Updates the contents of the window with the latest data.

A rectangular button with a black border and the text "Close" inside.

Closes the Watch window.

Quick Watch Dialog Box

General

Temporarily displays and changes specified data.

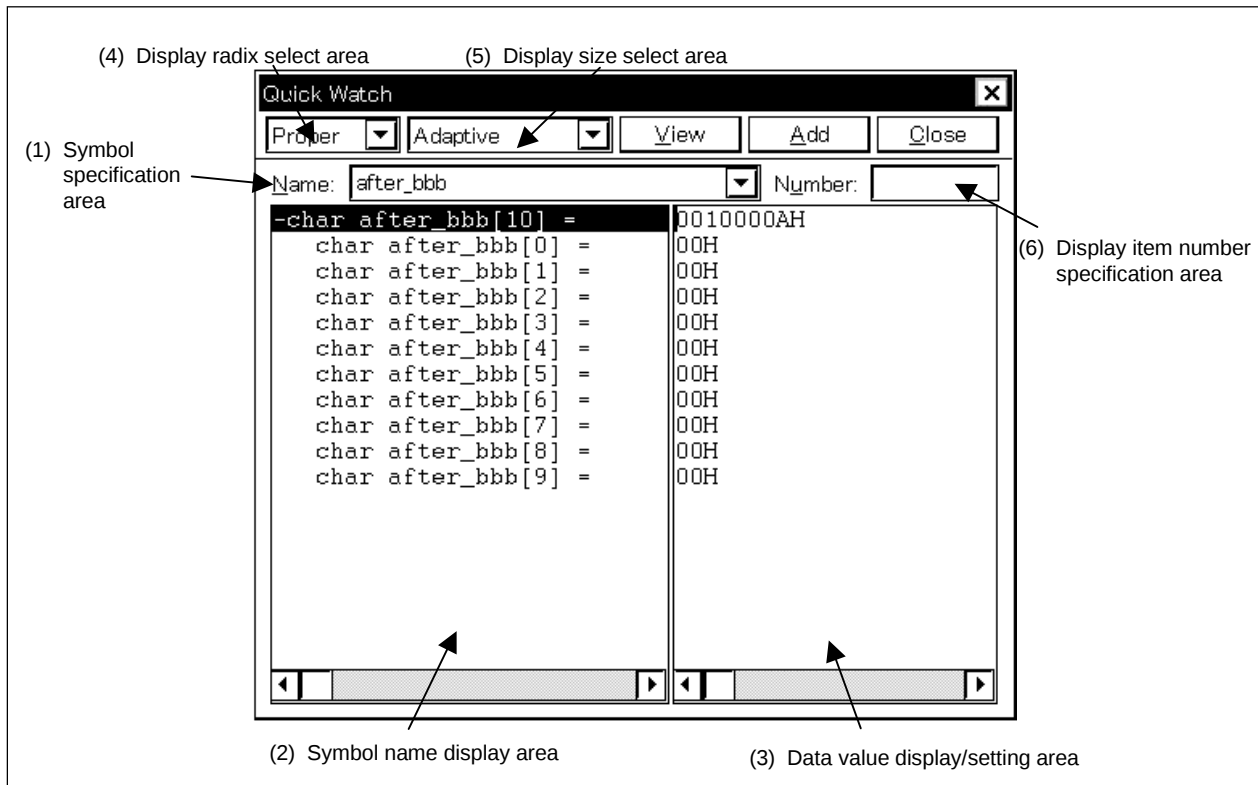
Opening method

This dialog box can be opened by one of the following methods.

- In the main window
Select [View] → [Quick Watch...] from the menu bar.
Press the **GRPH** + **V**, and **Q** keys in that order.
- In the Source window
Click the **Quick...** button in the Source window.
Press the shortcut keys **CTRL** + **W**.
- In the Assemble window
Click the **Quick...** button in the Assemble window.
Press the shortcut keys **CTRL** + **W**.

Window

Figure 6-44. Quick Watch Dialog Box



Function

Temporarily displays and changes specified data.

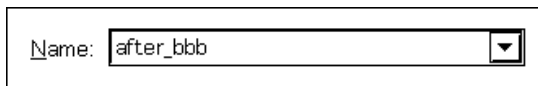
The boundary between the symbol name display area and the data value display/setting area can be moved to the left or right using the mouse. To move the boundary, drag the mouse cursor at the point when it changes from “” to “”.

The Quick Watch dialog box consists of the following areas.

- Symbol specification area
- Symbol name display area
- Data value display/setting area
- Display radix select area
- Display size select area
- Display item number specification area

The function of each area is explained below.

(1) Symbol specification area



Name: ▼

This area specifies the data to be displayed.

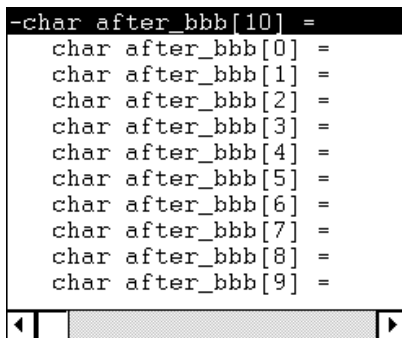
In the default setting, the string selected in the accessed window is displayed, but as necessary, it is also possible to change it by inputting from the keyboard. However, if the selected string does not exist, this area becomes blank.

By clicking the ▼ button and displaying the input history, the contents input previously can be reused. Up to 16 items of input history can be retained.

When the contents of the symbol specification area have been changed, clicking the button causes the data specified in the symbol specification area to be displayed in the symbol name display area and data value display/setting area.

(2) Symbol name display area

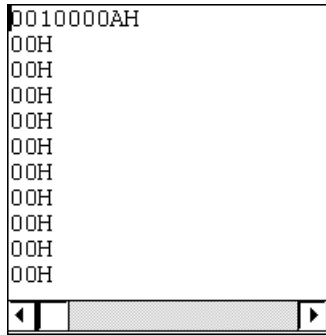
```
-char after_bbb[10] =
char after_bbb[0] =
char after_bbb[1] =
char after_bbb[2] =
char after_bbb[3] =
char after_bbb[4] =
char after_bbb[5] =
char after_bbb[6] =
char after_bbb[7] =
char after_bbb[8] =
char after_bbb[9] =
```



This area displays the variable names or symbol names. The display contents are the same as in the Watch window.

However, data which has becomes invalid due to changes in the scope or optimization compilation is not displayed.

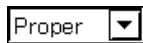
(3) Data value display/setting area



This area displays the data values.

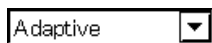
The display contents and the way to change the contents are the same as in the Watch window.

(4) Display radix select area



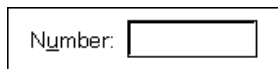
This area selects the radix to be displayed.

(5) Display size select area



This area selects the size to be displayed.

(6) Display item number specification area



This area specifies the number of data items to be displayed.

Specify blank or a number from 1 to 256. The default is blank.

If blank, the data is displayed as a simple variable. If a number 1 or greater is specified, it is displayed as an array variable. In this case, a "+" is displayed in front of the data. By double-clicking this data, all the elements of the data are expanded and displayed in accordance with the data type. "+" of the expanded and displayed data changes to "-". Double-clicking in this state cancels the expanded display.

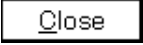
If the display number of variables, or assembler bit symbols or registers, etc. in the C language is fixed, the display number cannot be specified.

Function buttonsThe button is rectangular with a black border. It contains the text "View" in a standard font, with the letter "V" underlined.

Displays the data specified in the symbol specification area in the symbol name display area and the data value display/setting area.

The button is rectangular with a black border. It contains the text "Add" in a standard font, with the letter "A" underlined.

Adds the data specified in the symbol specification area to the Watch window.

The button is rectangular with a black border. It contains the text "Close" in a standard font, with the letter "C" underlined.

Closes this dialog box.

Change contents that have not actually been written to the target are erased.

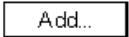
Add Watch Dialog Box

General

Registers data to be displayed in the Watch window.

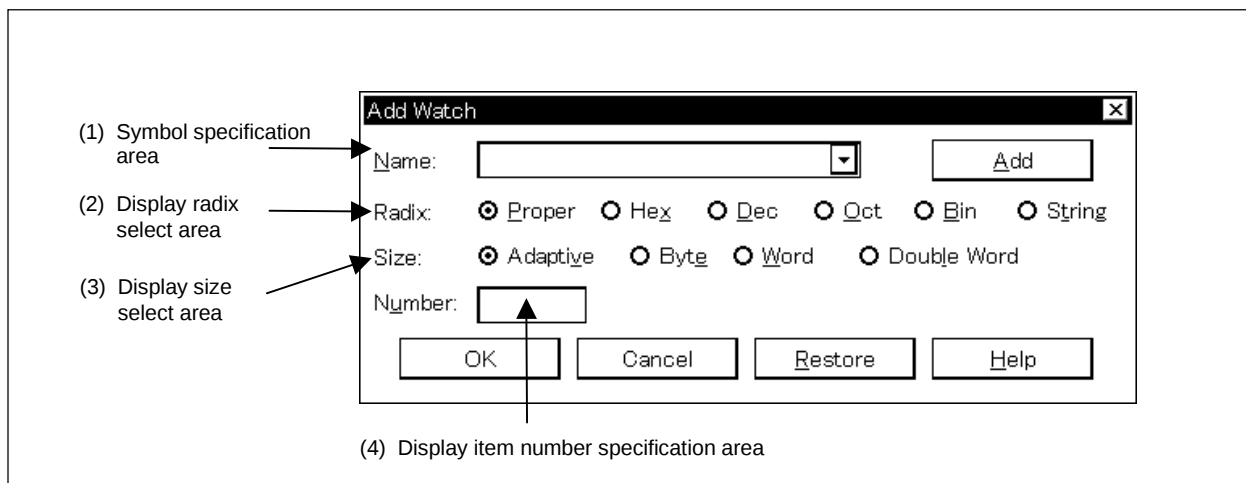
Opening method

This dialog box can be opened by either of the following methods.

- In the main window
Select [V]iew → [Add Watch...] from the menu bar.
Press the [GRPH] + [V], and [W] keys in that order.
- In the Watch window
Click the  button in the Watch window.

Window

Figure 6-45. Add Watch Dialog Box

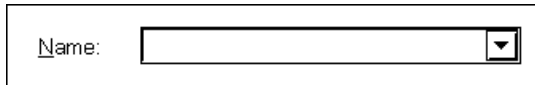


Functions

The Add Watch dialog box consists of the following areas.

- Symbol specification area
- Display radix select area
- Display size select area
- Display item number specification area

The function of each area is explained below.

(1) Symbol specification area

 A rectangular box containing the text "Name:" followed by a text input field and a small downward-pointing arrow button.

This area specifies the data to be viewed in the Watch window.

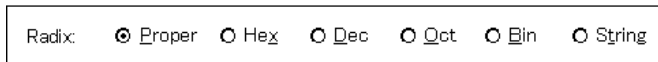
In the default setting, the string selected in the accessed window is displayed, but as necessary, it is also possible to change it by inputting from the keyboard. However, if the selected string does not exist, this area becomes blank.

By clicking the  button and displaying the input history, the contents input previously can be reused. Up to 16 items of input history can be retained.

The expressions that can be used for inputting data are as shown below.

- C language variable name (Variable expression: Variable name)

Variable expression [decimal constant values]:	Array elements
Variable expression. Member name:	Structure/union actual member
Variable expression → Member name:	Member of structure/union that indicates a pointer
*Variable expression:	Value of pointer variable
- Register name
- SFR name, SFR bit name
- Label, EQU and immediate address
- Register name.bit
- Label name.bit, EQU symbol name.bit, immediate address.bit
- Bit symbol

(2) Display radix select area

 A horizontal row of radio buttons with labels: "Radix:", "Proper", "Hex", "Dec", "Oct", "Bin", and "String". The "Proper" radio button is selected.

This area selects the display radix.

The display radix can be selected from among the following.

- | | |
|---------|--|
| Proper: | In the case of a variable, the value specified for each variable is displayed.
In the case of a symbol, it is displayed in the radix set in the Debugger Option dialog box. |
| Hex: | Displayed in hexadecimal (XXXH). |
| Dec: | Displayed in decimal (XXXT). |
| Oct: | Displayed in octal (XXXQ). |
| Bin: | Displayed in binary (XXXY). |
| String: | Displayed as a character string. |

(3) Display size select area

Size:	☒ Adaptive	☐ Byte	☐ Word	☐ Double Word
-------	---	----------------------------	----------------------------	-----------------------------------

This area selects the display size.

The display size can be selected from among the following.

- | | |
|--------------|---|
| Adaptive: | In the case of a variable, the value specified for each variable is displayed.
In the case of a symbol, the size set in the Debugger Option dialog box is displayed. |
| Byte: | Displayed in 8 bits. |
| Word: | Displayed in 16 bits. |
| Double word: | Displayed in 32 bits. |

If the display size of variables, or assembler bit symbols or registers, etc. in the C language is fixed, the specified size is displayed in the Watch window regardless of the specified display size.

(4) Display item number specification area

Number:	
---------	----------------------

This area specifies the number of data items to be displayed.

Specify blank or a number from 1 to 256. The default is blank.

If blank, the data is displayed as a simple variable. If a number 1 or greater is specified, it is displayed as an array variable. In this case, a "+" is displayed in front of the data. By double-clicking this data, all the elements of the data are expanded and displayed in accordance with the data type. "+" of the expanded and displayed data changes to "-". Double-clicking in this state cancels the expanded display.

If the display number of variables, or assembler bit symbols or registers, etc. in the C language is fixed, the display number cannot be specified.

Function buttons

Add	Adds the specified data to the Watch window. Does not close the Add Watch dialog box.
OK	Adds the specified data to the Watch window and closes the Add Watch dialog box.
Cancel	Closes the Add Watch dialog box.
Restore	Returns the input data to its original form.
Help	Opens the help window.

Change Watch dialog box

General

Changes the data on the line selected in the Watch window. The line of an opened hierarchy, such as the elements of an array and the members of a structure or a union cannot be changed. If watch data is changed, the contents of the selected line are replaced by new data.

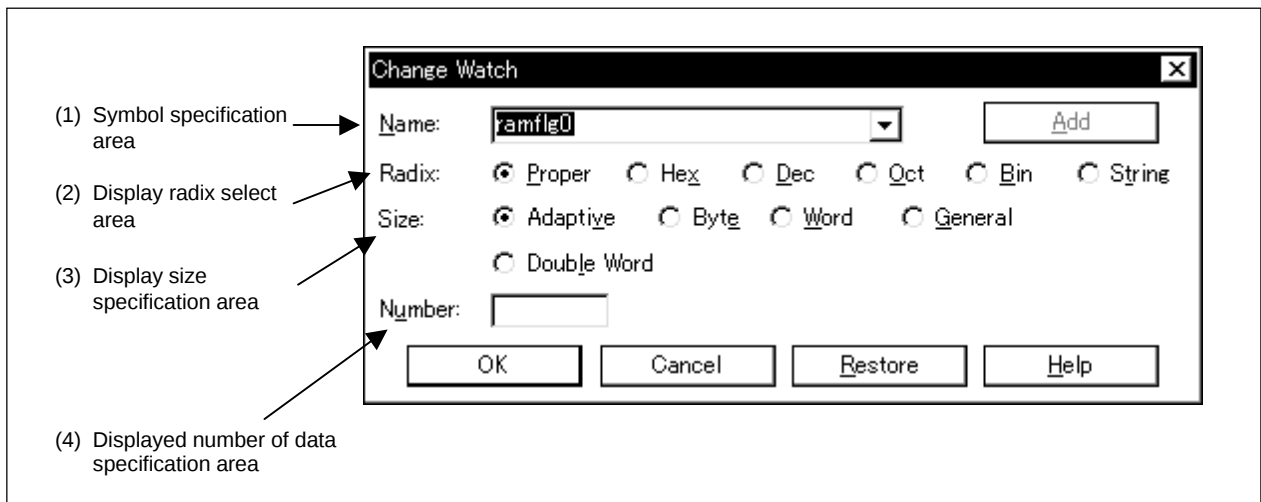
Opening method

This dialog box can be opened by one of the following methods.

- In the main window,
Select [V]iew → [Change Watch...] from the menu bar.
Press the **[GRPH]** + **[V]** and **[G]** keys in that order.
- In the Watch window,
Click the **Add...** button.

Window

Figure 6-46. Change Watch Dialog Box



Function

Changes the data on the line selected in the Watch window. The line of an opened hierarchy, such as the elements of an array and the members of a structure or a union cannot be changed. If watch data is changed, the contents of the selected line are replaced by new data.

The Change Watch dialog box consists of the following areas.

- Symbol specification area
- Display radix select area
- Display size specification area
- Displayed number of data specification area

The function of each area is explained below.

(1) Symbol specification area

Name:

This area changes the symbol name.

For details, refer to the symbol specification area of the Add Watch dialog box.

(2) Display radix select area

Radix: ☒ Proper ☐ Hex ☐ Dec ☐ Oct ☐ Bin ☐ String

This area changes the radix to be displayed.

For details, refer to the display radix select area of the Add Watch dialog box.

(3) Display size specification area

Size: ☒ Adaptive ☐ Byte ☐ Word ☐ General
☐ Double Word

This area changes the size to be displayed.

For details, refer to the display size specification area of the Add Watch dialog box.

(4) Displayed number of data specification area

Number:

This area changes the number of data to be displayed.

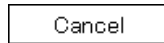
For details, refer to the display size specification area of the Add Watch dialog box.

Function buttons

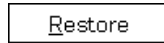
Always dimmed.



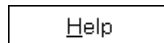
Replaces the registered contents of the line currently selected by the specified data, and then closes the Change Watch dialog box.



Closes the Change Watch dialog box.



Returns the input data to its original form.



Opens the Help window.

Register Window

General

This window displays and changes the contents of the registers (general-purpose registers and control registers).

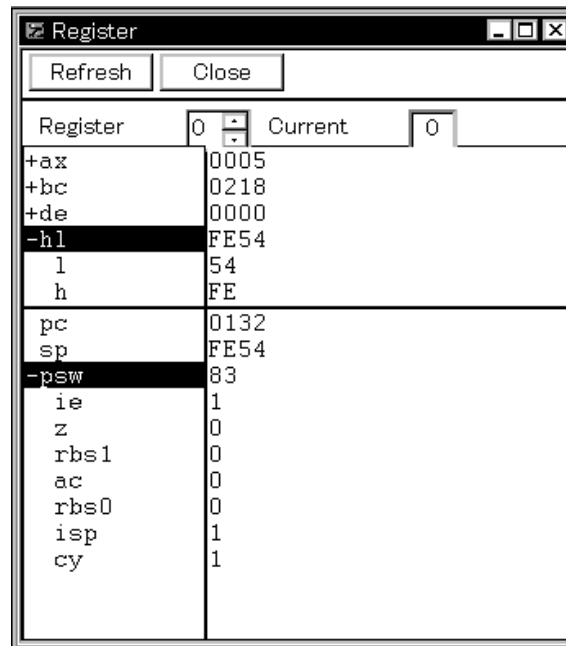
Opening method

This window can be opened by the following methods.

- In the main window
Select [Browse] → [Register] from the menu bar.
Press the [GRPH] + [B], and [R] keys in that order.
Click the  button on the toolbar.

Window

Figure 6-47. Register Window



Function

Displays and changes the contents of registers (general-purpose registers and control registers).

The register to be displayed can be selected in the Register Select dialog box.

The Register window can be opened only in the active state.

The Register window consists of the following areas.

- Register bank setting area (ID78K0-NS only)
- General-purpose register display area
- Control register display area

The boundary line between the general-purpose register display area and control register display area can be moved up or down using the mouse. To move the boundary, drag the mouse cursor at the point when it changes from “” to “”.

The function of each area is explained below.

(1) Register bank setting area (ID78K0-NS only)

Register	0	Current	0
----------	---	---------	---

This area displays and sets the bank number of the general-purpose registers.

Item	Description
Register Bank:	Displays and sets the register bank displayed in the general-purpose register display area. Changing the bank number is performed using the  button.
Current Bank:	Displays the register bank number currently set to the target (current bank).

(2) General-purpose register display area

+ax	0005
+bc	0218
+de	0000
-hl	FE54
l	54
h	FE

This area displays or changes the contents of the registers with the bank number displayed by Register Bank: in the register bank setting area. The contents can be written to the target memory by pressing the  key. The contents prior to the change can be erased using the  key.

This area also functions as a jump pointer for the jump function in addition to displaying/changing general-purpose registers. Operation of the jump function is the same as in the case of the control registers.

General-purpose registers are displayed as absolute names or function names, which can be switched using an item in the View menu displayed or the menu bar.

(3) Control register display area

pc	0132
sp	FE54
-psw	83
ie	1
z	0
rbs1	0
ac	0
rbs0	0
isp	1
cy	1

This area displays or changes the contents of the control registers. The contents can be written to the target memory by pressing the **[Enter]** key. The contents prior to the change can be erased using the **[ESC]** key.

The flag names and flag values of the register to which “+” is prefixed are displayed by double-clicking the register name. “+” then changes to “-”. Switching can also be done by selecting a register name using the arrow keys then pressing the **[Enter]** key.

In addition, this area also functions as a jump pointer for the jump function.

The jump function is a function to jump to the Source window, Assemble window, Memory window, or Coverage window^{Note} by using a selected control register value as a jump pointer. The jump destination window displays the jump pointer at the beginning.

This function is executed by performing the following operations in sequential order.

Note Not supported in the ID78K4-NS

<1> Select the control register.

<2> Perform one of the following operations in the main window.

- If the jump destination window is the Source window.
Select **[Jump]** → **[Source]** from the menu bar.
Press **[GRPH]** + **[J]**, and **[S]** keys in that order.
Press the shortcut keys **[CTRL]** + **[U]**.
- If the jump destination window is the Assemble window.
Select **[Jump]** → **[Assemble]** from the menu bar.
Press **[GRPH]** + **[J]**, and **[A]** keys in that order.
Press the shortcut keys **[CTRL]** + **[D]**.
- If the jump destination window is the Memory window.
Select **[Jump]** → **[Memory]** from the menu bar.
Press **[GRPH]** + **[J]**, and **[E]** keys in that order.
Press the shortcut keys **[CTRL]** + **[M]**.
- If the jump destination window is the Coverage window^{Note}.
Select **[Jump]** → **[Coverage]** from the menu bar.
Press **[GRPH]** + **[J]**, and **[C]** keys in that order.
Press the shortcut keys **CTRL** + **[I]**.

Note Not supported in the ID78K4-NS

When the memory bank is used, the address width of the PC changes.

Function buttonsA rectangular button with a thin black border and the word "Refresh" centered inside.

Updates the contents of the window with the latest data.

A rectangular button with a thin black border and the word "Close" centered inside.

Closes the Register window.

SFR Window

General

This window displays and changes SFRs. The I/O ports set in the Add I/O Port dialog box can also be displayed and changed.

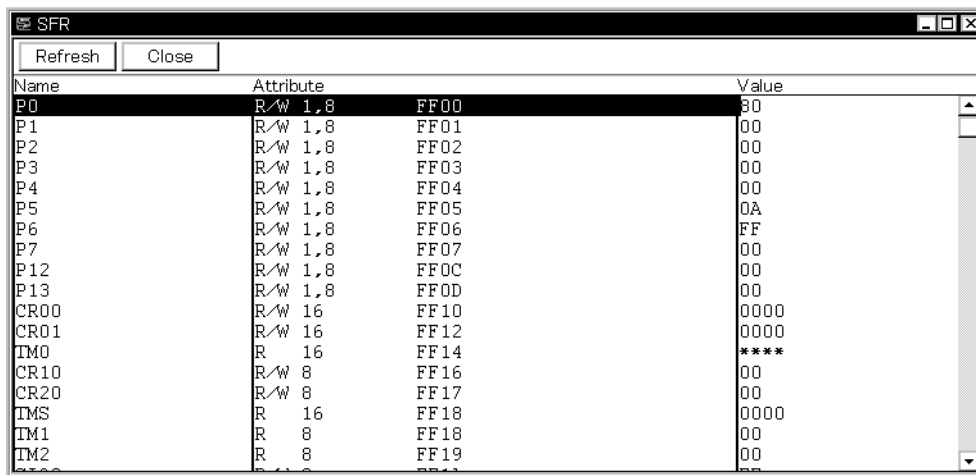
Opening method

This window can be opened by the following methods.

- In the main window
Select [Browse] → [SFR] from the menu bar.
Press the [GRPH] + [B], and [F] keys in that order.
Click the  button in the tool bar.

Window

Figure 6-48. SFR Window



Name	Attribute	Value
P0	R/W 1,8 FF00	80
P1	R/W 1,8 FF01	00
P2	R/W 1,8 FF02	00
P3	R/W 1,8 FF03	00
P4	R/W 1,8 FF04	00
P5	R/W 1,8 FF05	0A
P6	R/W 1,8 FF06	FF
P7	R/W 1,8 FF07	00
P12	R/W 1,8 FF0C	00
P13	R/W 1,8 FF0D	00
CR00	R/W 16 FF10	0000
CR01	R/W 16 FF12	0000
TM0	R 16 FF14	****
CR10	R/W 8 FF16	00
CR20	R/W 8 FF17	00
TMS	R 16 FF18	0000
TM1	R 8 FF18	00
TM2	R 8 FF19	00

Function

Displays and changes the contents of the SFRs. Note, however, that values cannot be changed for read-only SFRs.

Also, SFRs that cause the device to operate when read are read-protected and cannot therefore be read. When reading such SFRs, select the SFR to be read and execute [View] → [Compulsion read] from the menu bar.

The I/O ports set in the Add I/O Port dialog box can also be displayed and changed.

The operation for read-only or read-protected I/O ports is the same as that for SFRs.

The SFR window consists of the following areas.

- SFR name display area
- Attribute display area
- Contents of SFR display area

The function of each area is explained below.

(1) SFR name display area

Name
P0
P1
P2
P3
P4
P5
P6
P7
P12
P13
CR00
CR01
TM0
CR10
CR20
TMS
TM1
TM2

This area displays the SFR and I/O port names.

When the I/O port address is an undefined value, the I/O port name is dimmed.

(2) Attribute display area

Attribute
R/W 1,8
FF00
R/W 1,8
FF01
R/W 1,8
FF02
R/W 1,8
FF03
R/W 1,8
FF04
R/W 1,8
FF05
R/W 1,8
FF06
R/W 1,8
FF07
R/W 1,8
FF0C
R/W 1,8
FF0D
R/W 16
FF10
R/W 16
FF12
R 16
FF14
R/W 8
FF16
R/W 8
FF17
R 16
FF18
R 8
FF18
R 8
FF19

This area displays the read/write attribute, access type, and absolute address of the SFR name or I/O port.

Whether to display or not display the attribute display area can be selected using [View] → [Attribute] from the menu bar.

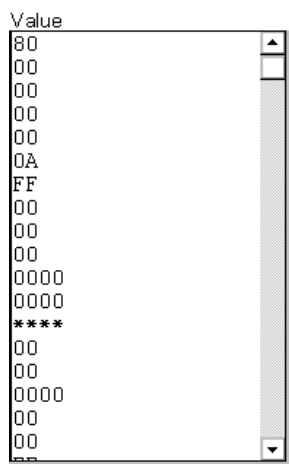
The types of read/write attributes are as follows.

Attribute	Meaning
R	Read-enabled SFR or I/O port
W	Write-enabled SFR or I/O port
R/W	Read-/Write-enabled SFR or I/O port

The access types are as follows.

Access Type	Meaning
1	Bit-access-enabled SFR
8	Byte-access-enabled SFR or I/O port
16	Word-access-enabled SFR or I/O port

(3) Contents of SFR display area



This area displays and changes the contents of the SFRs or I/O ports. This area is displayed as follows depending on the attribute of the SFR or I/O port.

- Read-enabled SFR or I/O port: Displayed in black
- Write-enabled SFR or I/O port: Displayed with "—"
- Read-/Write-enabled SFR or I/O port: Displayed in black
- SFR or I/O port with values that change when read: Displayed with "***"

The changed contents are written to the target by pressing the **Enter** key. The contents before change can be erased with the **Esc** key. The value of an SFR or I/O port which is protected from reading can be read by executing **[View] → [Compulsion read]** from the menu bar.

Function buttonsA rectangular button with a black border and the word "Refresh" in black text.

Updates the contents of the window with the latest data.

A rectangular button with a black border and the word "Close" in black text.

Closes the SFR window.

SFR Select Dialog Box

General

Selects SFRs or I/O ports that are not displayed in the SFR window.

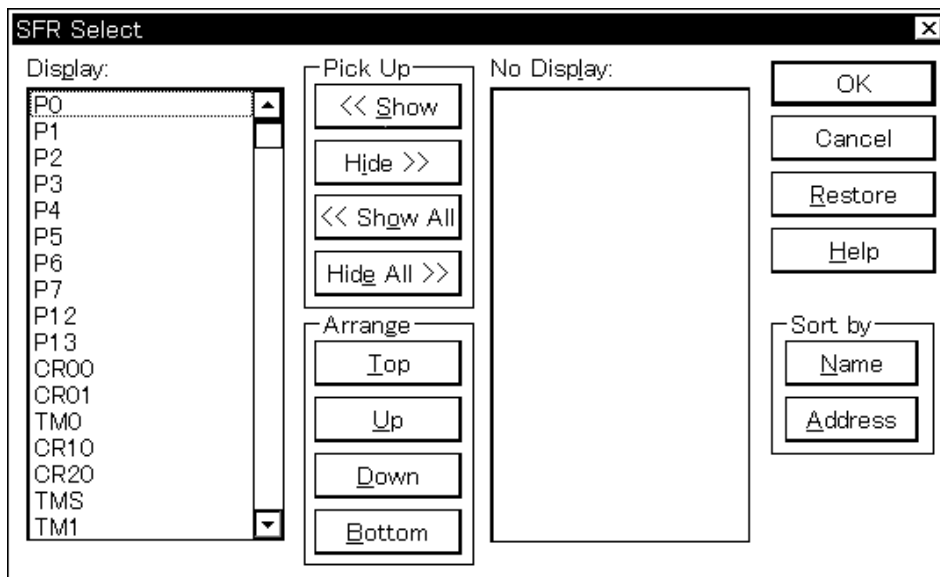
Opening method

This dialog box can be opened by the following methods when the current window is the SFR window.

- In the main window
Select [View] → [Select...] from the menu bar.
Press the [GRPH] + [V], and [E] keys in that order.

Window

Figure 6-49. SFR Select Dialog Box

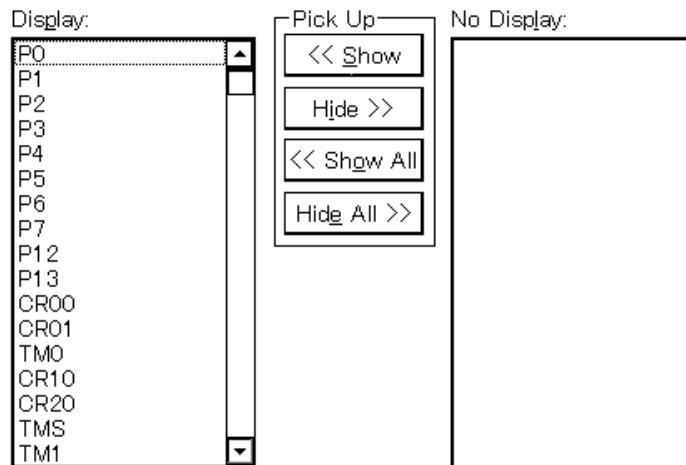


Function

The SFR Select dialog box consists of the following areas.

- Display SFR select area
- Display order specification button
- No display list display order change button

The function of each area is explained below.

(1) Display SFR select area

Select the SFRs or I/O ports that are to be displayed in the SFR window, and the SFRs or I/O ports that are not to be displayed.

The SFRs or I/O ports displayed in the SFR window are shown on the [Display:] list, and the SFRs or I/O ports not displayed are shown on the [No Display:] list. The SFRs or I/O ports displayed or not displayed in the SFR window can be changed by selecting an SFR or I/O port name from these lists and by clicking the **<< Show** or **Hide >>** button. If all the SFRs or I/O ports are to be displayed, click the **<< Show All** button. If all the SFRs or I/O ports are to be hidden, click the **Hide All >>** button. The function of each button is explained below.

<< Show

Moves the SFR or I/O port selected in the [No Display:] area to the [Display:] list area.

Hide >>

Moves the SFR or I/O port selected in the [Display:] list area to the [No Display:] area.

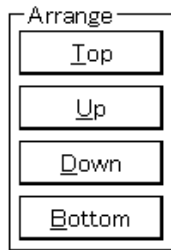
<< Show All

Moves all the SFRs or I/O ports to the cursor position in [Display:].

Hide All >>

Moves all the SFRs or I/O ports to [No Display:].

Two or more SFRs or I/O ports can be selected by clicking the mouse while holding down the control key or the shift key when selecting an SFR or I/O port from the [Display:] list or [No Display:] list.

(2) Display order specification button

This button sets the display order in the [Display:] list. The SFR or I/O port selected in the [Display:] list is moved to the top of the list with the **Top** button, and to the bottom with the **Bottom** button. It is also moved up one line with the **Up** button and down one line with the **Down** button.

The function of each button is as follows.

Top	Moves the SFR or I/O port selected in the [Display:] list to the top of the list.
Up	Moves the SFR or I/O port selected in the [Display:] list up one line in the list.
Down	Moves the SFR or I/O port selected in the [Display:] list to down one line in the list.
Bottom	Moves the SFR or I/O port selected in the [Display:] list to the bottom of the list.

(3) Display order of non-display list change button

This button selects the display order in the [No Display:] list. SFRs or I/O ports are displayed in alphabetical order using the **Name** button and in address order using the **Address** button.

The function of each button is as follows.

Name	Displays the list in [No Display:] in alphabetical order.
Address	Displays the list in [No Display:] in address order.

Function buttons

OK	Reflects the result of selection and specification of display order in the SFR window and closes the SFR Select dialog box.
Cancel	Cancels the change and closes this dialog box.
Restore	Cancels the change and restores the original setting.
Help	Opens the help window.

Add I/O Port Dialog Box

General

Registers an I/O port to be added to the SFR window.

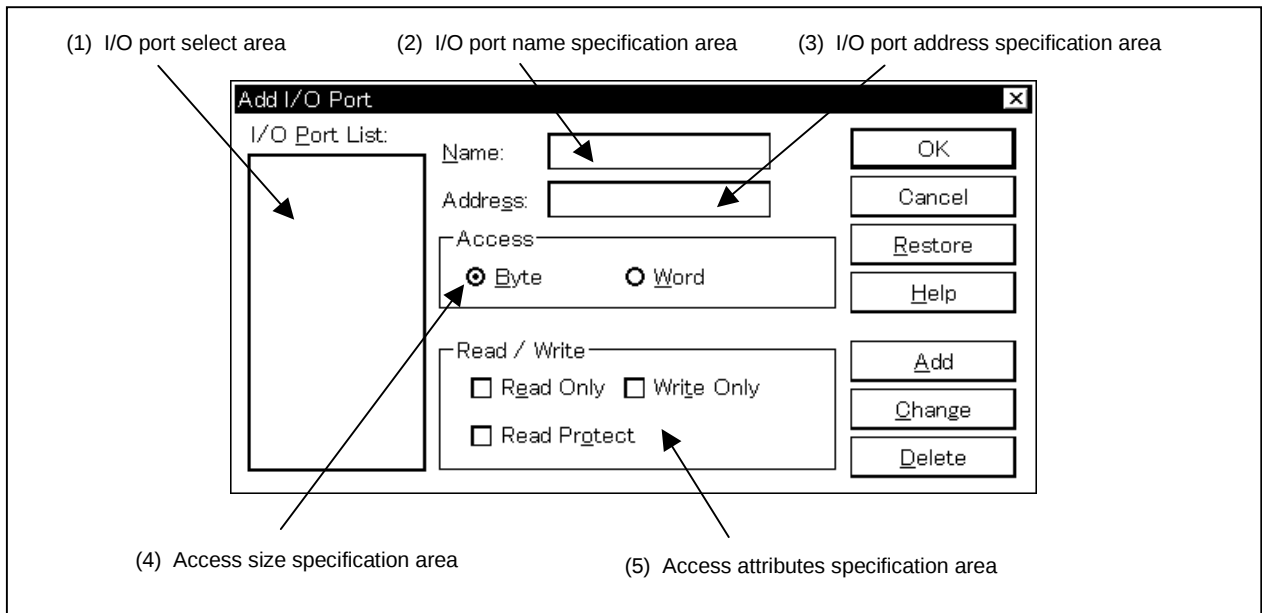
Opening method

This dialog box can be opened by either of the following methods.

- In the main window
Select [Option] → [Add I/O Port...] from the menu bar.
Press [GRPH] + [O], and [P] keys in that order.

Window

Figure 6-50. Add I/O Port Dialog Box

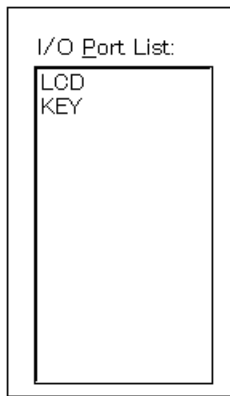


Function

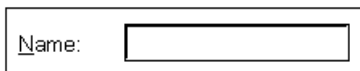
The Add I/O Port dialog box consists of the following areas.

- I/O port select area
- I/O port name specification area
- I/O port address specification area
- Access size specification area
- Access attribute specification area

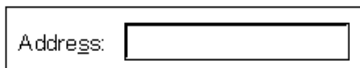
The function of each area is explained below.

(1) I/O port select area

 A rectangular dialog box titled "I/O Port List:". Inside, there is a list box containing the text "LCD" and "KEY".

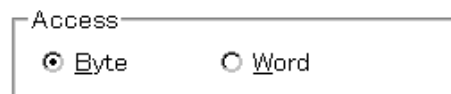
This area displays a list of the currently entered I/O ports. If a new I/O port is entered, it is added to this list. An I/O port that has already been entered can also be selected and changed or deleted.

(2) I/O port name specification area

 A rectangular area containing the label "Name:" followed by a single-line text input field.

This area specifies the name of the I/O port to be added.
An I/O port name with up to 15 characters can be specified.

(3) I/O port address specification area

 A rectangular area containing the label "Address:" followed by a single-line text input field.

This area specifies the I/O port address to be added.
Addresses can be specified using symbols or expressions. The specification method is the same as in the case of the Address Move dialog box.
The default radix when inputting numerical values is hexadecimal.

(4) Access size specification area

 A rectangular area containing the label "Access:" followed by two radio button options: "Byte" (which is selected) and "Word".

This area specifies the access size of the added I/O port.

Byte: 8 bits (default)
Word: 16 bits

Word access can be specified only for SFRs or external SFRs.

(5) Access attribute specification area

Read / Write

☐ Read Only ☐ Write Only

☐ Read Protect

This area specifies the access attributes of the added I/O port.

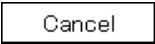
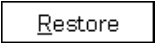
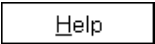
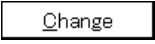
Read Only: Sets exclusive read only.

Write Only: Sets exclusive write only.

Read Protect: Sets read protect.

In the default (all unchecked state), read and write are both enabled.

Function buttons

	Reflects the add results in the SFR window and closes the Add I/O Port dialog box.
	Cancels the change and closes this dialog box.
	Cancels the change and restores the original state.
	Opens the help window.
	Adds the I/O port with the specified address.
	Changes the settings for the selected I/O port.
	Deletes the selected I/O port.

Local Variable Window

General

This window displays or changes the local variable in the current function.

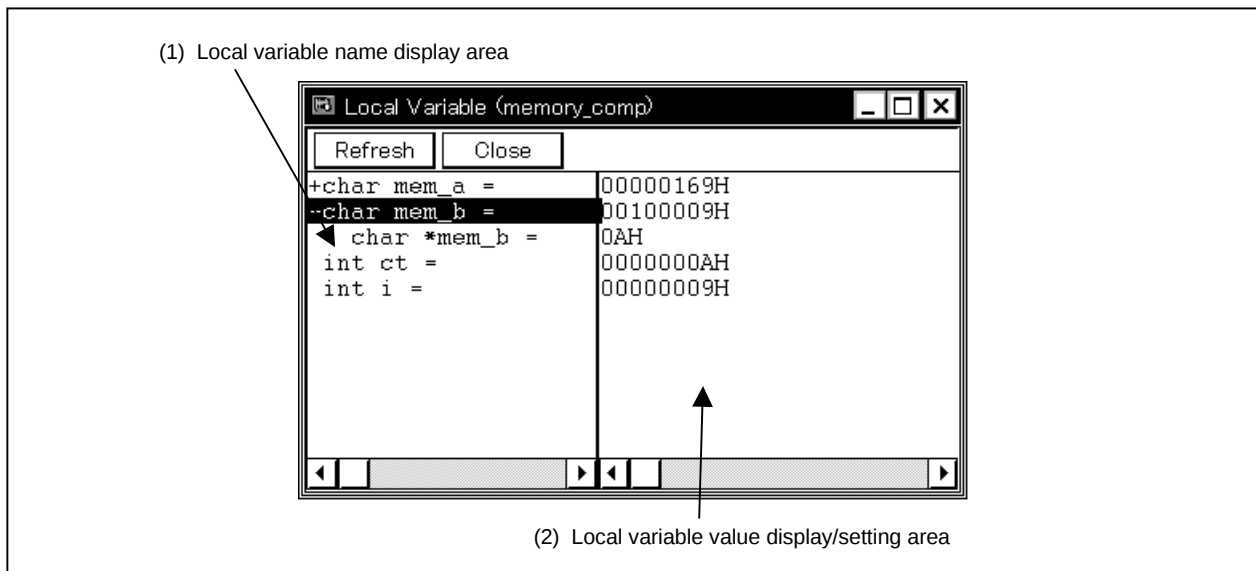
Opening method

This window can be opened by the following methods.

- In the main window
Select [Browse] → [Local Variable] from the menu bar.
Press the [GRPH] + [B], and [L] keys in that order.
Click the  button on the toolbar.

Window

Figure 6-51. Local Variable Window



Function

Displays or changes the local variable.

This window automatically displays the local variable in the current function. Variables cannot be added or deleted.

The boundary line between the local variable name display area and local variable value display/setting area can be moved to the left or right by the mouse. The boundary can be moved by dragging when the mouse cursor changes from "↖" to "↔".

The Local Variable window consists of the following areas.

- Local variable name display area
- Local variable value display/setting area

The function of each area is explained below.

(1) Local variable name display area

```
+char mem_a =
-char mem_b =
  char *mem_b =
  int ct =
  int i =
```



This area displays local variable names.

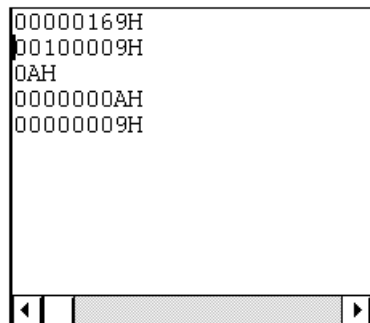
The type and variable name are shown. These are displayed in the same way as in the Watch window. Also, it is possible to have an expansion display like in the Watch window. However, variable names that have become invalid due to optimization compilation, etc., are not displayed.

The auto variable, internal static variable and the register variable can be displayed.

Caution A local variable cannot be displayed if the value of the program counter (PC) is in the prologue or epilogue of a function.

(2) Local variable value display/setting area

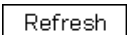
```
00000169H
00100009H
0AH
0000000AH
00000009H
```



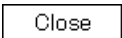
This area displays/changes local variable values.

The variable value is displayed in the same way as in the Watch window.

Change contents are written to the target by pressing the **Enter** key. The contents prior to the change can be erased using the **ESC** key.

Function buttonsA rectangular button with a thin black border containing the word "Refresh" in a sans-serif font.

Updates the contents of the window with the latest data.

A rectangular button with a thin black border containing the word "Close" in a sans-serif font.

Closes this window.

Stack Window

General

This window displays and changes the current stack contents of the user program.

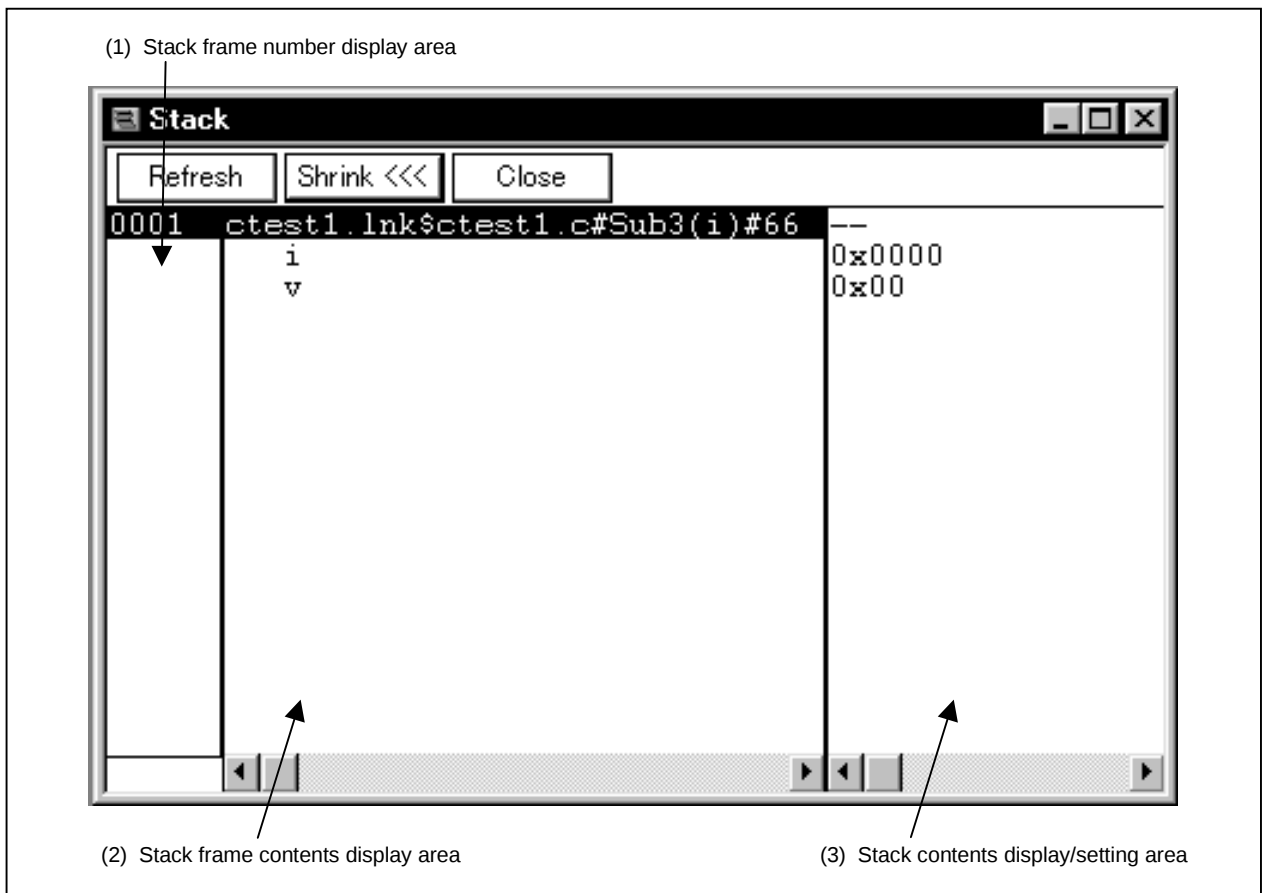
Opening method

This window can be opened by the following methods.

- In the main window
Select [Browse] → [Stack Trace] from the menu bar.
Press the **GRPH** + **B**, and **K** keys in that order.
Click the  button on the toolbar.

Window

Figure 6-52. Stack Window



Function

Displays and changes the stack contents.

If the full traced contents cannot be displayed, a vertical scroll bar is displayed so that the contents can be scrolled.

The boundary between the stack frame contents display area and the stack contents display/setting area can be moved to the left or right by the mouse. To move the boundary, drag the mouse cursor at the point when it changes from "↖" to "↔".

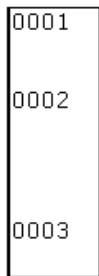
This window has an active state only.

This window consists of the following areas.

- Stack frame number display area
- Stack frame contents display area
- Stack contents display/setting area

The function of each area is explained below.

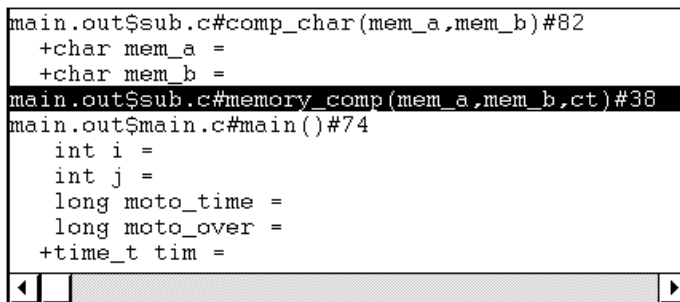
(1) Stack frame number display area



This area displays the stack frame numbers.

The stack frame number is a natural number starting from 1, and the shallower the stack nest is, the larger this number becomes. A stack number that is 1 larger than a certain function is the calling function of that function.

(2) Stack frame contents display area



This area displays the stack frame contents.

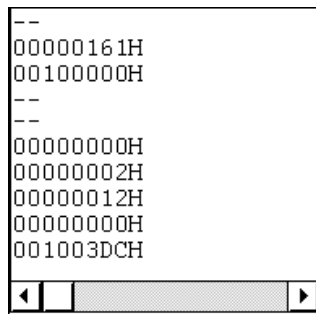
The function or local variable names are displayed.

If the stack contents are functions, they are displayed by [Program name \$ File name # Function name (Index list) # Line no.]. The delimiter between the program name and the file name is a "\$" and the delimiter between the file name and the function name is a "#". The "#" is also used as the delimiter between the function name and the line no. The local variable list is not expanded and not displayed by clicking the **Shrink** button, and is expanded and displayed by clicking the **Expand** button. If there are local variables in a function, the local variables are displayed on the following and subsequent lines.

If the contents of the stack are local variables, the type and variable name is displayed. They are displayed in the same way as in the Watch window. Whether to display or not display the variable type can be set in the Debugger Option dialog box. Note that internal static variables and register variables other than current functions are not displayed.

Caution If "automatically assign to auto variable register, saddr area (-qv1 or -qv2)" or "access SP argument/auto variable (-qf)" is specified by an option of the CC78K4, the stack frame cannot be correctly displayed.

(3) Stack contents display/setting area



This area displays and changes the contents of the stack. "-" or local variable values are displayed. If the stack contents are functions, a "-" is displayed and the contents cannot be changed.

If the stack contents are local variables, the variable values are displayed. Variable values are displayed in the same way as in the Watch window. It is possible to change variable values.

Changed contents are written to the target by pressing the **Enter** key. The contents prior to the change can be erased using the **ESC** key.

Other than displaying the stack contents, this area has the following functions.

(a) Jump function

Jumps to the Source window, Assemble window, Memory window, or Coverage window^{Note} by using the function indicated by the stack frame number at the cursor as a jump pointer. The jump destination window displays the jump pointer at the beginning.

This function is executed by performing the following operations in the sequential order.

Note Not supported in the ID78K4-NS

- <1> Position the cursor in the stack contents display/setting area.
- <2> Perform one of the following operations on the main window.

- If the jump destination is the Source window
Select [Jump] → [SourceText] from the menu bar.
Press the [GRPH] + [J], and [S] keys in that order.
Press shortcut keys [CTRL] + [U].
- If the jump destination is the Assemble window
Select [Jump] → [Assemble] from the menu bar.
Press the [GRPH] + [J], and [A] keys in that order.
Press shortcut keys [CTRL] + [D].
- If the jump destination is the Memory window
Select [Jump] → [Memory] from the menu bar.
Press the [GRPH] + [J], and [E] keys in that order.
Press the shortcut keys [CTRL] + [M].
- If the jump destination is the Coverage window^{Note}
Select [Jump] → [Coverage] from the menu bar.
Press the [GRPH] + [J], and [C] keys in that order.
Press the shortcut keys [CTRL] + [I].

Note Not supported in the ID78K4-NS

Details of the jump destination are as follows.

Type of Function	Description of Operation
Function with the shallowest nest (in the case of the current function)	• If the jump destination is the Source window, it jumps to the current PC line. • If the jump destination is other than the Source window, it jumps to the current PC address.
Functions with nests below (in the case of a function other than the current function)	• If the jump destination is the Source window, it jumps to the line where the function nested below is called. • If the jump destination is other than the Source window, it jumps to the next address of the instruction that is calling the function nested below.

Function buttons

Refresh

Updates the contents of the window with the latest data.

Close

Closes this window.

Shrink <<<

Cancels expanded display of the local variable list of the selected function. This button changes to **Expand** when it is selected.

Expand >>>

Expands and displays the local variable list of the selected function. This button changes to **Shrink** when it is selected.

Cautions

- (1) If the stack trace display function has a function that does not push the frame pointer (HL) to a stack frame (such as the noauto or norec function) or the -qf option is added as an optimization option when compiling, it may not be displayed correctly.
- (2) [ERROR] may be displayed during function prologue processing or epilogue processing.

Trace View Window

General

This window displays the trace results.

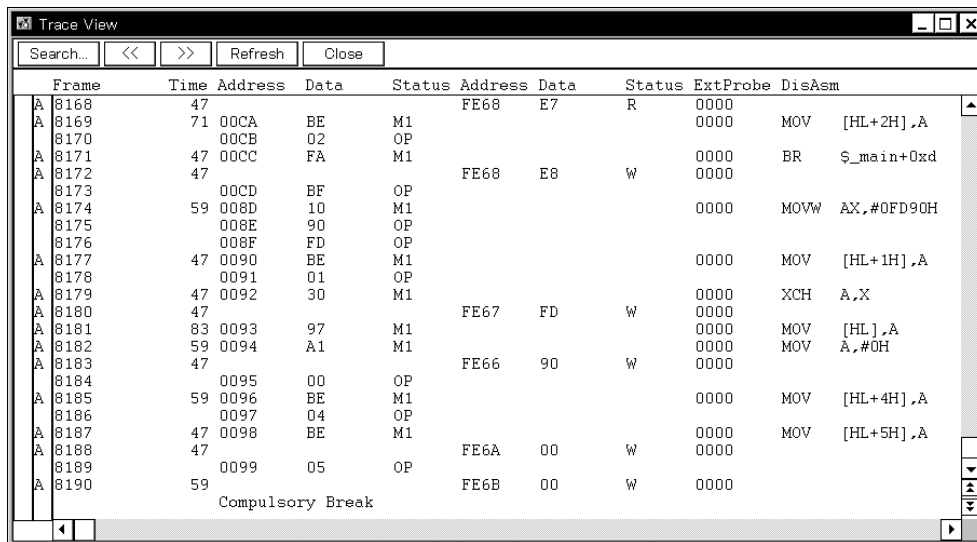
Opening method

This window can be opened by the following methods.

- In the main window
Select [Browse] → [Trace] from the menu bar.
Press the [GRPH] + [B], and [T] keys in that order.
Click the  button on the toolbar.

Window

Figure 6-53. Trace View Window



Frame	Time	Address	Data	Status	Address	Data	Status	ExtProbe	DisAsm
A 8168	47				FE68	E7	R	0000	
A 8169	71	00CA	BE	M1				0000	MOV [HL+2H],A
A 8170		00CB	02	OP					
A 8171	47	00CC	FA	M1				0000	BR \$ _main+0xd
A 8172	47				FE68	E8	W	0000	
A 8173		00CD	BF	OP					
A 8174	59	008D	10	M1				0000	MOVW AX,#0FD90H
A 8175		008E	90	OP					
A 8176		008F	FD	OP					
A 8177	47	0090	BE	M1				0000	MOV [HL+1H],A
A 8178		0091	01	OP					
A 8179	47	0092	30	M1				0000	XCH A,X
A 8180	47				FE67	FD	W	0000	
A 8181	83	0093	97	M1				0000	MOV [HL],A
A 8182	59	0094	A1	M1				0000	MOV A,#0H
A 8183	47				FE66	90	W	0000	
A 8184		0095	00	OP					
A 8185	59	0096	BE	M1				0000	MOV [HL+4H],A
A 8186		0097	04	OP					
A 8187	47	0098	BE	M1				0000	MOV [HL+5H],A
A 8188	47				FE6A	00	W	0000	
A 8189		0099	05	OP					
A 8190	59				FE6B	00	W	0000	
Compulsory Break									

Function

Displays the trace results.

The contents can be scrolled by the vertical scroll bar. It is also possible to move up one page or down one page using the  button or  button.

There are two modes in the Trace View window, the normal display mode and the mixed display mode.

- Normal display mode: Displays the trace results only.
- Mixed display mode: Displays the source file together with the trace results.

The Trace View window can be opened only in the active state and the window's display is updated during a break or step execution.

The tracer has a ring structure. For that reason, if data exceeding a valid frame is written, the oldest data is overwritten. Also, in the display, the frames are displayed in frame order with the oldest data as frame 0.

Block information is written to the tracer between the end of one execution of the user program and the beginning of the next one. A horizontal line is displayed indicating the block information display in each display area. Block information is written in the following cases, depending on the previous and subsequent execution mode.

Previous Execution Mode	Execution Mode This Time
Real-time execution	When executing real-time execution When executing step execution
Step execution	When executing real-time execution When executing step execution after changing execution address

To clear the trace contents, select [Option] → [Trace Clear] .

Note that, operation with respect to a tracer during program execution is performed by selecting [Run] → [Tracer Start/Close] (this is possible only when executing with a break ignored).

The Trace View window consists of the following areas.

- Point mark display area
- Trace mode display area
- Trace result display area

The function of each area is explained below.

(1) Point mark display area



This area displays the setting states of various events. If an execution event or fetch event (access operation) is set to the corresponding trace address, the mark corresponding to the type of the event is displayed.

Note that the marks displayed are not marks from tracing but are event marks set when the trace results are displayed.

Mark	Meaning
E	Shows that an event condition is set.
L	Shows that the final level of an event link is set.
B	Shows that a break event is set.
T	Shows that a trace event is set.
T ^{Note 1}	Shows that a timer event is set.
S ^{Note 1}	Shows that a snapshot event is set.
A	Shows that two or more events are set.
M ^{Note 2}	Shows that a DMM event is set

- Notes 1.** Not supported in the ID78K4-NS
2. Supported only in the ID78K0S-NS

(2) Trace mode display area



This area displays the type of trace mode.
The display contents are as follows.

- A: All traces or section-traced frames
- Q: Qualify-traced frames
- S: Step execution frames
- T: Delay trigger frames

“T” is displayed for all the frames in which a delay trigger is generated.

“Q” is displayed when the qualify trace condition is met while the section trace condition has been met.

(3) Trace result display area

Frame	Time	Address	Data	Status	Address	Data	Status	ExtProbe	DisAsm
8168	47				FE68	E7	R	0000	
8169	71	00CA	BE	M1				0000	MOV [HL+2H],A
8170		00CB	02	OP					
8171	47	00CC	FA	M1				0000	BR \$ _main+0xd
8172	47				FE68	E8	W	0000	

This area displays the trace results. If this area is selected, the jump function and the window linking function can be used.

The following contents are displayed in the trace results display area. Note that display or non-display of each area can be selected in the Trace Data Select dialog box.

- Trace frame number display
- Time tag display^{Note 1}
- Fetch access display
- Data access display
- External sense data display^{Note 1}
- Branch source address display^{Note 2}
- Mnemonic display

Notes 1. This is valid when the IE-78K0-NS-PA is installed in the IE-78K0-NS, when the IE-78K0-NS-A or IE-78K0S-NS-A is used, or when the IE-784000-R is used.

2. Supported only in the ID78K4

(a) Trace frame number display (Frame)

This is where the trace frame number is displayed.

(b) Time tag display (Time)

Displays the clocks required for the target chip from the start of execution of the previous trace contents to the start of execution of the current trace contents.

This is valid when the IE-78K0-NS-PA is installed in the IE-78K0-NS, when the IE-78K0-NS-A or IE-78K0S-NS-A is used, or when the IE-784000-R is used.

The count division rate can be changed in the Extended Option dialog box.

The Trace Data Select dialog box can select the display or non-display of the time tag.

The time tag display can be switched between clock count display and time display.

Number of Clocks	Time Tag Value			
	Division Ratio 1	Division Ratio 2	Division Ratio 4	Division Ratio 8
1	1	1	1	1
2	2	2	2	2
3	3	2	2	2
4	4	3	2	2
5	5	3	2	2
6	6	4	3	2
7	7	4	3	2
8	8	5	3	2
9	9	5	3	2

(c) Fetch access display (Address Data Status)

This is where the fetch results of the program and the snap contents are displayed. This field is displayed as follows depending on the status displayed in the status display field (Status).

Item	Display Contents	
Status	M1	Program fetch display (the first byte fetch of the instruction)
	OP	Program fetch display (2nd and subsequent op code fetch)
	IF	Program fetch display (invalid fetch or status unknown)
	SNAP ^{Note 1}	Snap display
	BRM1 ^{Note 2}	The first byte fetch of the first instruction after a branch.
	Other than above	No display (blank)

Notes 1. This is valid when the IE-78K0-NS-PA is installed in the IE-78K0-NS, when the IE-78K0-NS-A or IE-78K0S-NS-A is used, or when the IE-784000-R is used.

2. Supported only in the ID78K4 (-NS)

In the case of the program fetch display, the display is as follows.

Item	Display Contents
Address	Fetch address display
Data	Fetch data display

Note that display/non-display of fetch operation access can be selected in the Trace Data Select dialog box.

In the case of the snap display, the display is as follows.

Item	Snap Type	Display Contents
Address	Register	Register name
	SFR	SFR name
	Memory	Memory address
Data	Register	Register name
	SFR	SFR name
	Memory	Memory contents

(d) Data access display (Address Data Status)

This is where the data access results are displayed.

[ID78K0 (-NS), ID78K0S (-NS)]

Items	Display Contents	
Status	VECT	Vector read
	RW	Data read/write
	R	Data read
	W	Data write
Address	Address display	
Data	Data display	

[ID78K4 (-NS)]

Items	Display Contents	
Status	VECT	Vector read
	RW	Data read/wirte ^{Note}
	R	Data read ^{Note}
	W	Data wirte ^{Note}
	RWP	Data read/write by user program
	RP	Data read by user program
	WP	Data write by user program
	RWM	Data read/write by macro service
	RM	Data read by macro service
	WM	Data write by macro service
Address	Address display	
Data	Data display	

Note Supported only in the ID78K4

(e) External sense data display (Ext Probe)

This is where the input level of the external sense clip at trace time is displayed.

The correspondence of each bit is as follows.

[ID78K0-NS, ID78K0S-NS]

This is valid when the IE-78K0-NS-PA is installed in the IE-78K0-NS, when the IE-78K0-NS-A or IE-78K0S-NS-A is used, or when the IE-784000-R is used.

External Sense Data Display	External Sense Clip Number
bit 15	NO.16
bit 14	NO.15
bit 13	NO.14
bit 12	NO.13
bit 11	NO.12
bit 10	NO.11
bit 9	NO.10
bit 8	NO.9
bit 7	NO.8
bit 6	NO.7
bit 5	NO.6
bit 4	NO.5
bit 3	NO.4
bit 2	NO.3
bit 1	NO.2
bit 0	NO.1

[ID78K0, ID78K4]

External Sense Data Display	External Sense Clip Number
bit 7	NO.8
bit 6	NO.7
bit 5	NO.6
bit 4	NO.5
bit 3	NO.4
bit 2	NO.3
bit 1	NO.2
bit 0	NO.1

Note that display/non-display of external sense data can be selected in the Trace Data Select dialog box.

(f) Branch source address display (Jmpaddress)^{Note}

This is where the last address at the branch destination is displayed.

This is displayed only when the status is BRM1.

Whether the branch source address is displayed or not can be selected in the Trace Data Select dialog box.

Note Supported only in the ID78K4

(g) Mnemonic display (DisAsm)

This is where the disassemble result is displayed.

This is displayed only when the status of the fetch operation access display is M1.

In the trace results display area, the normal display mode and mixed display mode can be switched by selecting [View] → [Mix] from the menu bar.

- Normal display mode

Normal display mode is the mode in which only the trace results are shown.

- Mixed display mode

Mixed display mode is the mode in which the source file is displayed in combination with the trace results.

If the program code corresponds to the displayed program fetch address line, the source file line is displayed before that trace results line.

When the load module is downloaded and symbol information is being read, the mixed display mode becomes valid only in cases where fetch address, fetch data, fetch status, or disassemble results are being displayed.

Even in cases where [View] → [Mix] is selected on the menu bar and mixed display mode is selected, if none of the above items is being displayed, the display is normal.

The source file line's display color is changed and is highlighted in green.

The jump function and window link function are detailed below.

- Jump function
- Window link function

(i) Jump function

The jump function is executed by carrying out the following operations in order.

<1> Move the cursor to the jump source line.

<2> In the main window, do one of the following operations.

- If the jump destination window is the Source window
Select [Jump] → [Source] from the menu bar.
Press the [GRPH] + [J], and [S] keys in that order.
Press the shortcut keys [CTRL] + [U].
- If the jump destination window is the Assemble window
Select [Jump] → [Assemble] from the menu bar.
Press the [GRPH] + [J], and [A] keys in that order.
Press the shortcut keys [CTRL] + [D].

- If the jump destination window is the Memory window
 Select [Jump] → [Memory] from the menu bar.
 Press the **GRPH** + **J**, and **E** keys in that order.
 Press the shortcut keys **CTRL** + **M**.
- If the jump destination window is the Coverage window
 (This is valid when the IE-78K0-NS-PA is installed in the IE-78K0-NS, when the IE-78K0-NS-A or IE-78K0S-NS-A is used, or when the IE-784000-R is used.)
 Select [Jump] → [Coverage] from the menu bar.
 Press the **GRPH** + **J**, and **C** keys in that order.
 Press the shortcut keys **CTRL** + **I**.

The address used as the jump source changes according to the cursor position.

Cursor Position	Jump Pointer
Access address display area	Access address ^{Note}
Access data display area	Access address ^{Note}
Access status display area	Access address ^{Note}
Other than above	Fetch address

Note If the jump destination is the Source window or the Assemble window, the fetch address is made the jump pointer.

(ii) Window link function

The window link function can be used by carrying out the following operations in order.

- <1> Make the Trace View window the current window and select the window to be synchronized with from among the items in [View] → [Window Synchronize] on the menu bar

Items in [Window Synchronize]	Linked Window
<u>S</u> ource	Source window
<u>A</u> ssemble	Assemble window
<u>M</u> emory	Memory window
<u>C</u> overage ^{Note}	Coverage window

Note This is displayed when the IE-78K0-NS-PA is installed in the IE-78K0-NS, when the IE-78K0-NS-A or IE-78K0S-NS-A is used, or when the IE-784000-R is used.

- <2> Move the cursor to the synchronization origin line in the trace results display area in the Trace View window. If the window to be synchronized with is not open in the active state, it will open in the active state.
- <3> The trace results address selected in <2> is used as the pointer, and the linked contents are displayed in the corresponding window selected in <1>, or the cursor is positioned there.

In the case of window linking, the address which is the link origin also changes as follows in accordance with the cursor position.

Cursor Position	Jump Pointer
Access address display area	Access address ^{Note}
Access data display area	Access address ^{Note}
Access status display area	Access address ^{Note}
Other than above	Fetch address

Note If the linking destination is the Source window or the Assemble window, the fetch address is always made the jump pointer. Unlike the jump function, if the cursor's position is moved in the Trace View window, the cursor or the highlighted display in each linked window is also moved.

Unlike for the jump function, for the window link function, if the cursor is moved on the Trace window, the cursor and display in reverse video on each of the linked windows are also moved.

Function buttons

Search...

Opens the Trace Search dialog box and searches trace results or performs pick up. Search results are highlighted in the Trace View window. In the pick up display mode^{Note}, frames which matched the search conditions are picked up and displayed. This button cannot be selected when a snap frame is picked up and displayed.

<<

Searches for the trace results that match the search conditions set in the Trace Search dialog box in the backward direction from the cursor position frame (toward the top of the display). This button cannot be selected in the pick up display.

>>

Searches for the trace results that match the search conditions set in the Trace Search dialog box in the forward direction from the cursor position frame (toward the bottom of the display). This button cannot be selected in the pick up display.

Refresh

Updates the contents of the window with the latest data.

Close

Close this window.

Note The pick up display mode is when [View] → [Pick Up] → [Search] is selected or when "Pick Up Search Frame" is selected in the Trace Data Select dialog box.

Trace Search Dialog Box

General

Searches trace data.

If search frame pick up is specified from the [View] menu, or the Trace Data Select dialog box (pick up display mode), pick up of trace data is executed.

Opening method

This dialog box can be opened by one of the following methods when the current window is the Trace View window.

- In the main window
Select [View] → [Search...] from the menu bar.
Press the [GRPH] + [V], and [S] keys in that order.
- In the Trace View window
Click the [Search...] button.
Press the shortcut keys [CTRL] + [G].

Window

Figure 6-54. Trace Search Dialog Box (1/2)

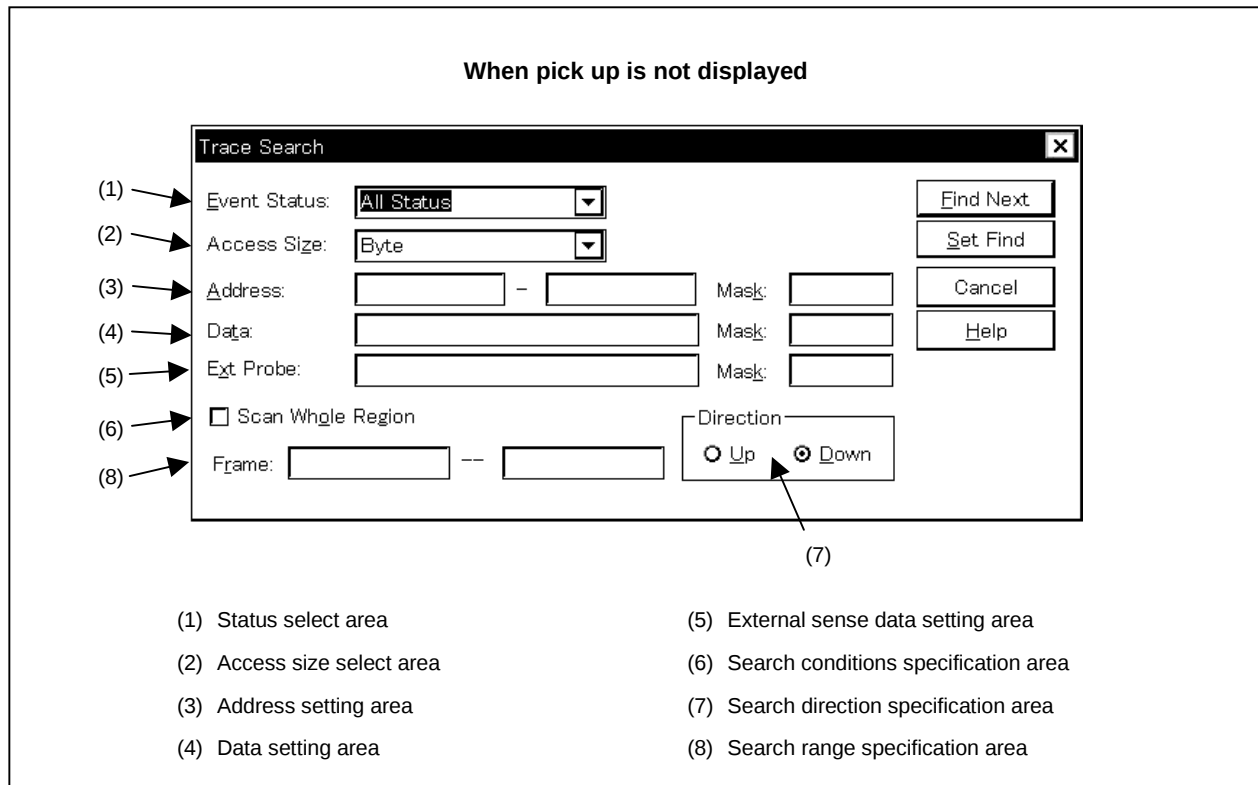
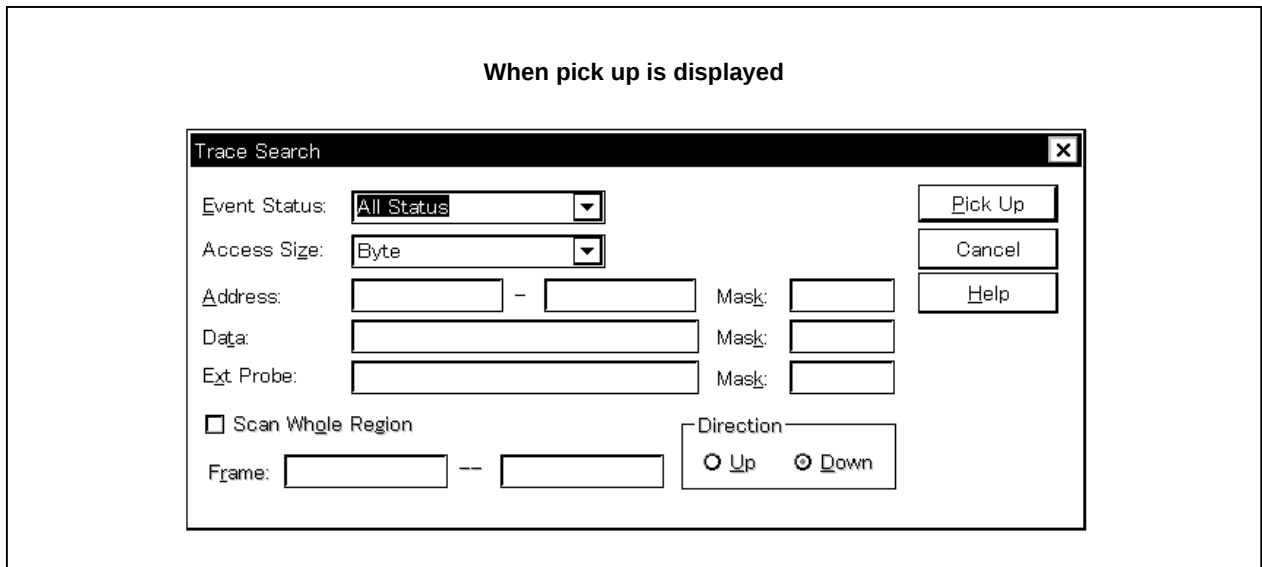


Figure 6-54. Trace Search Dialog Box (2/2)



Functions

Trace data is searched and picked up.

- If [V]iew → [P]ick Up → [O]ff is selected from the menu bar, or [Pick Up O]ff is selected in the Trace Data Select dialog box, a trace data search is executed.
- If [V]iew → [P]ick Up → [S]earch is selected from the menu bar, or [Pick Up S]earch Frame is selected in the Trace Data Select dialog box (pick up display mode), trace data pick up is executed.

Note that if pick up of a snap frame is specified from the menu bar or the Trace Data Select dialog box, the Trace Search dialog box cannot be called.

The Trace Search dialog box consists of the following areas.

- Status select area
- Access size select area
- Address setting area
- Data setting area
- External sense data setting area
- Search conditions specification area
- Search direction specification area
- Search range specification area

The function of each area is explained below.

(1) Status select area

 A screenshot of a software interface showing a label 'Event Status:' followed by a dropdown menu. The dropdown menu is open, displaying 'All Status' as the selected option.

This area sets and selects the status conditions.

The status conditions that can be specified are shown below. It is possible to specify the status condition in abbreviated form. There is no distinction between uppercase and lowercase characters in the input status condition.

[ID78K0 (-NS), ID78K0S (-NS)]

Status	Abbreviated Form	Meaning
M1 Fetch	M1	M1 fetch
R/W	RW	Data read/write (including R, W)
Read	R	Data read
Write	W	Data write
Vector Read	VECT	Vector read by an interrupt
All status	ALL	All of the above specifications (M1, RW, R, W, VECT)

[ID78K4 (-NS)]

Status	Abbreviated Form	Meaning
All status	ALL	All frames below (BRM1, M1, R, W, VECT)
BRM1 Fetch	BRM1	First M1 fetch after program branch
M1 Fetch	M1	M1 fetch (including BRM1)
R/W	RW	Data read/write (including R and W) ^{Note}
Read	R	Data read ^{Note}
Write	W	Data write ^{Note}
R/W by Macro	RWM	Data read/write by macro service (including RM and WN)
Read by Macro	RM	Data read by macro service
Write by Macro	WM	Data write by macro service
R/W by Program	RWP	Data read/write by program (including RP and WP)
Read by Program	RP	Data read by program
Write by Program	WP	Data write by program
Vector Read	VECT	Vector code by interrupt

Note Supported only in the ID78K4

If the status condition setting is omitted, all the frames become search objects.

(2) Access size select area

Access Size:	Byte	▼
--------------	------	---

This area sets and selects the access size conditions.

By specifying the access size conditions, the access width for the data condition during a trace data search is determined.

The access size conditions that can be specified are shown below. It is possible to specify the access size conditions in abbreviated form. There is no distinction between uppercase and lowercase characters in the input access size condition.

Size	Abbreviated Form	Meaning
Byte	B	Search is made with an 8-bit width as the data condition. Search is made only during 8-bit access.
Word ^{Note}	W	Search is made with a 16-bit width as the data condition. Search is made only during 16-bit access.
No Condition	NC	An access-size search is not executed.
Bit	1	Detection is carried out with a 1-bit width as the data condition. Detection is carried out only during 8-bit access.

Note Supported only in the ID78K4 (-NS)

When an op code fetch access event is specified as a status condition, the selection of Bit is not displayed. Even if Bit or 1 is selected, an error will occur.

If Bit is specified as the access size condition, the search is made with a 1-bit width as the data condition. However, due to emulator operation, access to the bit itself cannot be traced directly and the debugger searches for a pseudo bit access by setting the address conditions and data conditions internally as follows.

Input Example				Trace Search Setting	
Address	fe20.1	➔		Address	fe20
Data	1			Data	00000010B
				Mask	11111101B

For that reason, for access to other bits in the same address, or even for access to all 8 bits in the same address, if the values match the specified values (address, bit), trace data is searched for in accordance with the specified status.

- If No Condition is specified, the data setting area is displayed in gray and input is not possible.
- If the access size condition setting is omitted, it is judged automatically from the address conditions and data conditions and set.
- If a bit is set for the address condition, the condition becomes Bit.
- If 8 bits is set for the data condition, the condition becomes Byte.
- If the data condition specification is omitted, the condition becomes No Condition.

(3) Address setting area

Address: - Mask:

This area sets the address condition.

The setting range is as follows.

[ID78K0 (-NS)]

(When a bank is not used)

Setting range: $0 \leq \text{Address value} \leq 0xFFFF$

$0 \leq \text{Mask value} \leq 0xFFFF$

(When a bank is used)

Setting range: $0 \leq \text{Address value} \leq (n^{\text{Note}} \ll 16) | 0xFFFF$

$0 \leq \text{Mask value} \leq (n^{\text{Note}} \ll 16) | 0xFFFF$

Note n is the maximum bank number used.

[ID78K0S-NS]

Setting range: $0 \leq \text{Address value} \leq 0xFFFF$

$0 \leq \text{Mask value} \leq 0xFFFF$

[ID78K4 (-NS)]

(Execution or fetch event)

Setting range: $0 \leq \text{Address value} \leq 0xFFFFF$

$0 \leq \text{Mask value} \leq 0xFFFFF$

(Data access event)

Setting range: $0 \leq \text{Address value} \leq 0xFFFFF$

$0 \leq \text{Mask value} \leq 0xFFFFF$

Note n is the maximum bank number used.

There are two types of address conditions: Address, where the address value is set, and Mask, where the mask value for the address value is input. The setting method is shown below.

(a) Address

Input the lower address and higher address, in that order.

The following three types of settings are possible for the address condition.

<1> Point setting

For a point setting, set a value in the lower address only, or set the same value in both the lower address and the higher address. A mask setting can be made.

<2> Range setting

For a range setting, set values in the lower address and the higher address. Mask settings cannot be made. Note that if the same value is input for the lower address and the higher address, it is not handled as a range setting. In this case, it becomes a point setting or a bit setting.

<3> Bit setting

For a bit setting, set a value in the lower address only, or set the same value in the lower address and the higher address. Specify the value in the address.bit format. Mask settings cannot be made. The value of the bit that shows the bit position must be $0 \leq \text{bit} \leq 7$.

For the address value, it is possible to specify a symbol or an expression. The specification method is the same as in the Address Move dialog box.

The default radix when numerical values are input is hexadecimal.

If the address condition setting is omitted, detection of the address condition is not performed.

(b) Mask

Set the mask value for the address value.

When mask setting is made, for a bit with a mask value of 1, it doesn't matter if the address value is 0 or 1.

Example 1. Address: to

Mask:

In this kind of setting, the conditions match up to addresses 0x4000 to 0x40FF.

2. Address: to

Mask:

In this kind of setting, addresses 0x4000, 0x4001, 0x4100 and 0x4101 match the conditions.

If the mask value setting is omitted, masking is not executed.

The default radix when numerical values are input is hexadecimal.

(4) Data setting area

Data:		Mask:	
-------	----------------------	-------	----------------------

This area sets the data condition. The setting range is as follows.

Access Size Condition	Setting Range
Byte	$0 \leq \text{Data value} \leq 0xFF$ $0 \leq \text{Mask value} \leq 0xFF$
Word ^{Note}	$0 \leq \text{Data value} \leq 0xFFFF$ $0 \leq \text{Mask value} \leq 0xFFFF$
Bit	Data value = 0, 1 Mask value = Cannot be specified.

Note Supported only in the ID78K4 (-NS)

There are two types of data conditions: Data, where the data value is set, and Mask, where the mask value for the data value is set. The setting method is shown below.

(a) Data

Specify the data value.

It is also possible to set a symbol or expression for the data value. The specification method is the same as in the case of the Symbol To Address dialog box, but the default radix when numerical values are input is hexadecimal.

If the data condition setting is omitted, data conditions are not detected.

(b) Mask

Set the mask value for the data value.

When mask setting is made, for a bit with a mask value of 1, it doesn't matter if the data value is 0 or 1.

Example 1. Data:

Mask:

In this kind of setting, the conditions match when the data value is 0x4000 to 0x40FF.

2. Data:

Mask:

In this kind of setting, when the data are 0x4000, 0x4001, 0x4100, and 0x4101, they match the conditions.

If the mask value setting is omitted, masking is not executed.

The default radix when numerical values are input is hexadecimal.

(5) External sense data setting area

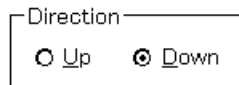
Ext. Probe:		Mask:	
-------------	----------------------	-------	----------------------

The external sense data cannot be set in this version.

(6) Search conditions specification area
☐ Scan Whole Region

This check box specifies whether to search the whole specified region or not when conducting a search. With the default, only the portion remaining in the range is searched.

- | | |
|---|--|
| ☐ Scan Whole Region | Searches the remaining portion of the range (default). |
| ☒ Scan Whole Region | Searches the whole range. |

(7) Search direction specification area


Direction

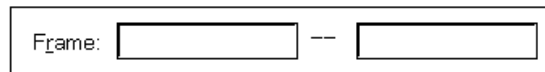
☐ Up ☒ Down

Specify the search direction.

There are two search directions, an upward search and a downward search.

Up: Upward search. This searches in the forward direction from the current cursor position (toward the top of the display).

Down: Downward search. This searches in the backward direction from the current cursor position (toward the bottom of the display) (default).

(8) Search range specification area


Frame: --

This area specifies the frame number that is being searched for. The specification method is the same as in the case of the Trace Move dialog box, but the default radix during input of numerical values is decimal.

Function buttons

Find Next

Searches from the trace results in accordance with the specified conditions.
From the search results, the frames that match are highlighted in the Trace View window.
For a continuous search, click this button again.

Set Find

Sets the specified conditions as the search conditions and closes the Trace dialog box.
Search is executed by the and buttons in the Trace View window.

Pick Up

(During Pick Up Display)

Pick up the specified search data from the trace results in accordance with the conditions.
Only the frames that match the trace window conditions are displayed. To change the conditions and conduct pick up again, click this button again.

Cancel

This closes the Trace Search dialog box.

Help

This opens the help window that explains the Trace Search dialog box.

Trace Data Select Dialog Box

General

Selects the items to be displayed in the Trace View window.

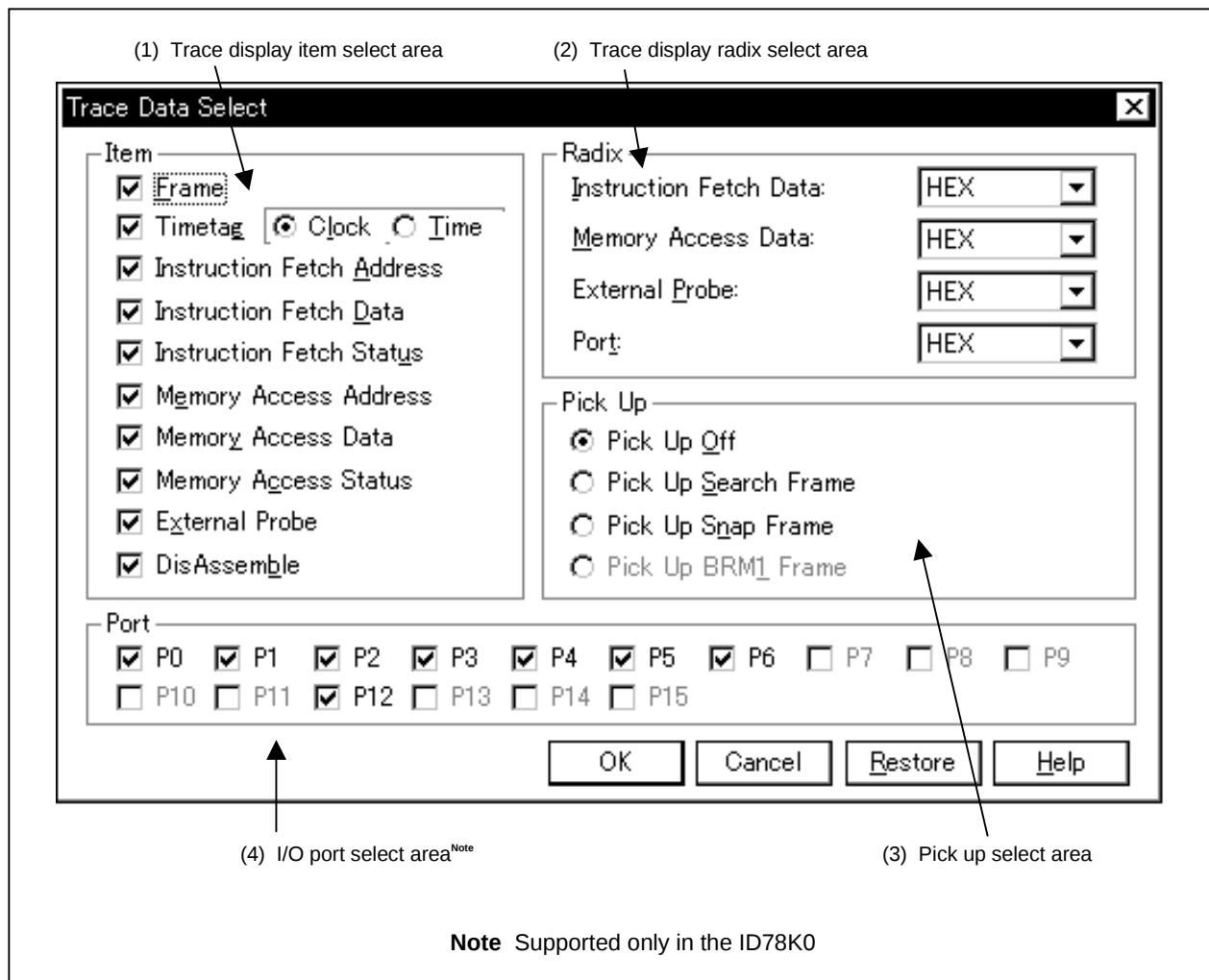
Opening method

This dialog box can be opened by the following methods when the current window is the Trace View window.

- In the main window
Select [View] → [Select] from the menu bar.
Press the **[GRPH] + [V]**, and **[E]** keys in that order.

Window

Figure 6-55. Trace Data Select Dialog Box



Function

The Trace Data Select dialog box consists of the following areas.

- Trace display item select area
- Trace display radix select area
- Pick up select area
- I/O port select area (ID78K0 only)

The function of each area is explained below.

(1) Trace display item select area

Item

☒ Frame

☒ Timetag

☒ Clock☐ Time

☒ Instruction Fetch Address

☒ Instruction Fetch Data

☒ Instruction Fetch Status

☒ Memory Access Address

☒ Memory Access Data

☒ Memory Access Status

☒ External Probe

☒ DisAssemble

This area selects the items to be displayed in the Trace View window.
The following items can be selected to be displayed or not displayed.
If there is a check mark, that area is displayed.

Frame:	Frame no. display field
Timetag ^{Note} :	Time tag display field
	· Clock: Clock display (default)
	· Time: Time display
Instruction Fetch Address:	Fetch address display field
Instruction Fetch Data:	Fetch data display field
Instruction Fetch Status:	Fetch status display field
Memory Access Address:	Access address display field
Memory Access Data:	Access data display field
Memory Access Status:	Access status display field
External Probe ^{Note} :	External sense data display field
DisAssemble:	Disassemble display field

Note This is displayed when the IE-78K0-NS-PA is installed in the IE-78K0-NS, when the IE-78K0-NS-A or IE-78K0S-NS-A is used, or when the IE-784000-R is used.

(2) Trace display radix select area

Radix	
Instruction Fetch Data:	HEX ▼
Memory Access Data:	HEX ▼
External Probe:	HEX ▼

This area selects the radix to be displayed. The display radix can be selected for the following items.

Instruction Fetch Data:	Fetch data display field
Memory Access Data:	Access data display field
External Probe ^{Note 1} :	External sense data display field
Port ^{Note 2} :	I/O port data display field

Notes 1. This is valid when the IE-78K0-NS-PA is installed in the IE-78K0-NS, when the IE-78K0-NS-A or IE-78K0S-NS-A is used, or when the IE-784000-R is used.

2. Supported only in the ID78K0

The display radix can be selected from the following.

Hex:	Displayed in hexadecimal
Dec:	Displayed in decimal
Oct:	Displayed in octal
Bin:	Displayed in binary

(3) Pick up select area

Pick Up	
☒	Pick Up <u>O</u> ff
☐	Pick Up <u>S</u> earch Frame
☐	Pick Up <u>S</u> nap Frame
☐	Pick Up BRM1 <u>F</u> rame

This area selects the pick up conditions.

Pick Up Off:	Pick up is not displayed.
Pick Up Search Frame:	Picks up and displays frames which match the search conditions.
Pick Up Snap Frame ^{Note 1} :	Picks up and displays snap frames.
Pick Up BRM1 Frame ^{Note 2} :	Picks up and displays the first M1 fetch frame (BRM1) after a program branch.

Notes 1. This is valid when the IE-78K0-NS-PA is installed in the IE-78K0-NS, when the IE-78K0-NS-A or IE-78K0S-NS-A is used, or when the IE-784000-R is used.

2. Cannot be selected in this version.

(4) I/O port select area (ID78K0 only)

Port

☒ P0	☒ P1	☒ P2	☒ P3	☒ P4	☒ P5	☒ P6	☐ P7	☐ P8	☐ P9
☐ P10	☐ P11	☒ P12	☐ P13	☐ P14	☐ P15				

Whether each I/O port data is displayed or not can be selected.

Function buttons

OK	Reflects the result of selection in the Trace View window.
Cancel	Closes this dialog box.
Restore	Cancels the change and restores the original setting.
Help	Opens the help window.

Coverage Window

(This is valid when the IE-78K0-NS-PA is installed in the IE-78K0-NS, when the IE-78K0-NS-A or IE-78K0S-NS-A is used, or when the IE-784000-R is used.)

General

This window displays the coverage result.

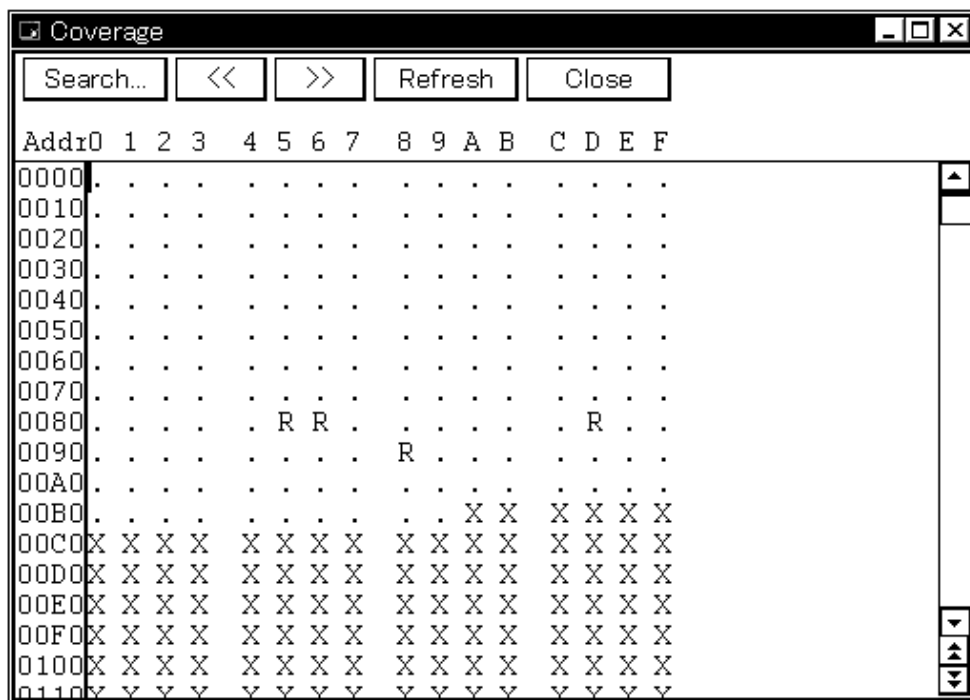
Opening method

This window can be opened by the following methods.

- In the main window
 Select [Browse] → [Coverage] from the menu bar.
 Press the **GRPH** + **B**, and **O** keys in that order.
 Click the  button on the toolbar.

Window

Figure 6-56. Coverage Window



Function

Displays the coverage result.

The vertical scroll bar is displayed at all times and the contents can be scrolled. It is also possible to move up one page or down one page using the  button or  button.

The Coverage window has two states, the active state and the static state.

There can be only one Coverage window in the active state, but multiple windows can be opened in the static state at the same time.

Active state: The Coverage window in the active state has a display position and contents which are synchronized with the current PC value and which are updated automatically. Also, in addition to becoming a jump destination for the jump function, if it is synchronized with the Trace View window, the Coverage window's display is updated in synchronization with the Trace View window.

The first Coverage window to be opened is in the active state.

Static state: When in the static state, the Coverage window's contents are updated in synchronization with the current PC value, but the display position does not move. Also, it does not become a jump destination and is not synchronized with the Trace View window.

If a Coverage window in the active state has already been opened, a new window is opened in the static state.

Coverage measurement is enabled by selecting the check box in [Option] → [Coverage ON]. Note that operations with respect to coverage measurement while a program is being executed are executed by [Run] → [Coverage Start/Stop].

The Coverage window consists of the following areas:

- Address display area
- Coverage display area

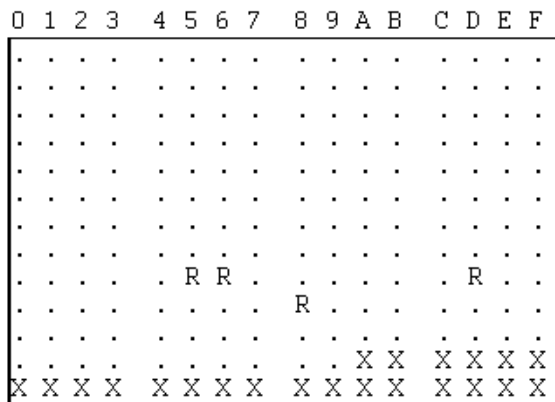
The function of each area is explained below.

(1) Address display area

Addr
0000
0010
0020
0030
0040
0050
0060
0070
0080
0090
00A0

This area displays coverage addresses.

The ID78K4 displays 5-digit (20-bit) addresses.



This area displays the coverage result.

The symbols displayed in this area have the following meanings.

When in 1-byte display mode

Symbol	Meaning
.	Nothing has been executed.
X	Execution only
R	Read only
W	Write only
A	Read and write
\$	Execute and read
#	Execute and write
%	All execution, reading, and writing have been performed.

When in 64-/1,024-byte display mode

Symbol	Meaning
.	No execution, read, and write operations concerning the addresses within the 64-/1,024-byte area were performed.
X	All addresses in the 64-/1,024-byte area were executed.
R	All addresses in the 64-/1,024-byte area were read.
W	All addresses in the 64-/1,024-byte area were written.
A	Reading and writing were executed at all addresses in the 64-/1,024-byte area.
\$	Execution and reading were performed at all addresses in the 64-/1,024-byte area.
#	Execution and writing were performed at all addresses in the 64-/1,024-byte area.
%	All execution, read, and write operations concerning all addresses within the 64-/1,024-byte area were performed.

This area has two functions besides displaying the coverage results.

(a) Jump function

Jumps to the Source window, Assemble window, or Memory window using the address at the cursor as a jump pointer. The jump destination window is displayed with the jump pointer at the beginning. This function is executed by performing the following operations in sequential order.

- <1> Position the cursor.
- <2> Perform one of the following operations in the main window.
 - If the jump destination is the Source window
 - Select [Jump] → [SourceText] from the menu bar.
 - Press the **GRPH** + **J**, and **S** keys in that order.
 - Press shortcut keys **CTRL** + **U**.
 - If the jump destination is the Assemble window
 - Select [Jump] → [Assemble] from the menu bar.
 - Press the **GRPH** + **J**, and **A** keys in that order.
 - Press shortcut keys **CTRL** + **D**.
 - If the jump destination is the Memory window
 - Select [Jump] → [Memory] from the menu bar.
 - Press the **GRPH** + **J**, and **E** keys in that order.
 - Press shortcut keys **CTRL** + **M**.

(b) Window link function

Uses the coverage results to show the linked relationship between the Trace View window and the Coverage window. The coverage results that are the target of linking with the Trace View window are positioned by the cursor. For details, refer to the **Window link function of the Trace View window**.

Function buttons**Search...**

Opens the Coverage Search dialog box and searches for coverage results. Search results are highlighted in the Coverage window. This button can be selected when in 1-byte display mode only.

<<

Searches the Coverage results which match the search conditions, and which have been set in the Coverage Search dialog box, from the cursor position toward the beginning (toward the top of the display). This button can be selected when in 1-byte display mode only. It changes to the **Stop** button during a search.

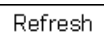
>>

Searches the Coverage results which match the search conditions, and which have been set in the Coverage Search dialog box, from the cursor position toward the end (toward the bottom of the display). This button can be selected when in 1-byte display mode only. It changes to the **Stop** button during a search.

A rectangular button with the word "Stop" inside.

Interrupt a search.

During a search, the  and  buttons change to the  button.

A rectangular button with the word "Refresh" inside.

Updates the window's contents with the latest data.

A rectangular button with the word "Close" inside.

Closes this window.

Coverage Search Dialog Box

(This is valid when the IE-78K0-NS-PA is installed in the IE-78K0-NS, when the IE-78K0-NS-A or IE-78K0S-NS-A is used, or when the IE-784000-R is used.)

General

Searches the coverage result.

This can be called only when in 1-byte mode display.

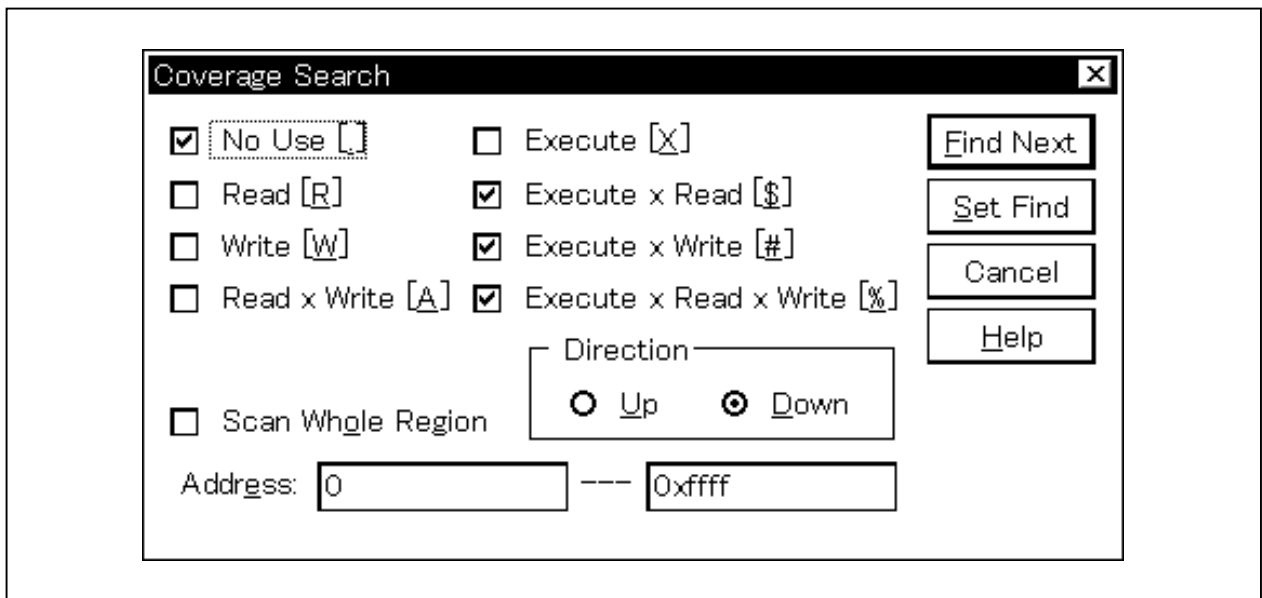
Opening method

This dialog box can be opened by the following methods when the current window is the Coverage window.

- In the main window
Select [View] → [Search...] from the menu bar.
Press the **GRPH** + **V**, and **S** keys in that order.
- In the Coverage window
Click the **Search...** button.
Press the shortcut keys **CTRL** + **G**.

Window

Figure 6-57. Coverage Search Dialog Box



Functions

Searches for coverage results.

Unmapped areas are not searched.

Also, searches cannot be performed when there are unmapped areas between areas to be searched.

The Coverage Search dialog box consists of the following areas.

- Search data specification area
- Search condition specification area
- Search direction specification area
- Search range specification area

The function of each area is explained below.

(1) Search data specification area

☒ No Use [.]	☐ Execute [X]
☐ Read [R]	☒ Execute x Read [\$]
☐ Write [W]	☒ Execute x Write [#]
☐ Read x Write [A]	☒ Execute x Read x Write [%]

The search conditions can be specified from these 8 check boxes. The meanings of the respective symbols are as shown below.

Symbol	Meaning
No Use [.]	Nothing has been executed.
Read [R]	Read only
Write [W]	Write only
Read x Write [A]	Read and write
Execute [X]	Execute only
Execute x Read [\$]	Execute and read
Execute x Write [#]	Execute and write
Execute x Read x Write [%]	All execution, reading, and writing has been performed.

If multiple search conditions have been selected, whichever one of the conditions matches is searched (an OR search).

(2) Search condition specification area
☐ Scan Whole Region

This is a check box which specifies whether to search the whole specified region or not when conducting a search. With the default, only the portion remaining in the range is searched.

- ☐ Scan Whole Region Searches the remaining portion of the range (default).
☒ Scan Whole Region Searches the whole range.

(3) Search direction specification area

Direction

☐ Up ☒ Down

This area specifies the search direction.

There are two search directions, an upward search and a downward search.

Up: Upward search. Searches the data from the current cursor position toward the beginning (upward on display).

Down: Downward search. Searches the data from the current cursor position toward the end (downward on display).

(4) Search range specification area

Address: ---

This area specifies the address that is being searched for. Addresses can be specified using a symbol or expression. The specification method is the same as in case of the Address Move dialog box. The default radix during input of numerical values is hexadecimal.

Function buttons

- | | |
|--|--|
| <input type="button" value="Find Next"/> | Searches from the coverage results in accordance with the specified conditions.
For the search results, the frames that match are highlighted.
For continuous search, click this button again. |
| <input type="button" value="Set Find"/> | Sets the specified conditions as the searched conditions and closes this dialog box. |
| <input type="button" value="Stop"/> | Interrupts a search.
During a search, the <input type="button" value="Cancel"/> button changes to the <input type="button" value="Stop"/> button. |
| <input type="button" value="Cancel"/> | Closes the Coverage Search dialog box.
It changes to the <input type="button" value="Stop"/> button during a search. |
| <input type="button" value="Help"/> | Opens the help window that explains this dialog box. |

Coverage-Clear Dialog Box

(This is valid when the IE-78K0-NS-PA is installed in the IE-78K0-NS, when the IE-78K0-NS-A or IE-78K0S-NS-A is used, or when the IE-784000-R is used.)

General

Clears the coverage results.

Opening method

This dialog box can be opened by the following methods.

- In the main window
Select [Option] → [Coverage] → [Clear...] from the menu bar.
Press the [GRPH] + [O], [O], and [L] keys in that order.

Window

Figure 6-58. Coverage-Clear Dialog Box

**Function**

Clears the coverage measurement results in the specified address range.

It initializes the Coverage window and the contents in the Coverage-Efficiency View dialog box.

The Coverage-Clear dialog box consists of the following area.

- Address specification area

The function of this area is explained below.

(1) Address specification area

Address Range: --

This area specifies the addresses in the coverage results to be cleared. Addresses can also be specified using symbols or an expression. The specification method is the same as in the case of the Address Move dialog box. The default radix during input of numerical values is hexadecimal.

Function buttons

	Clears the coverage results in the address range specified by the address specification area and closes the dialog box.
	Interrupts clearing the coverage results. During the coverage result clear operation, the  button changes to the  button.
	Closes this dialog box. It changes to the  button during the coverage result clear operation.
	Cancels the change and restores the original setting.
	Opens the help window.

Coverage-Condition Setting Dialog Box

(This is valid when the IE-78K0-NS-PA is installed in the IE-78K0-NS, when the IE-78K0-NS-A or IE-78K0S-NS-A is used, or when the IE-784000-R is used.)

General

Specifies the coverage efficiency measurement range.

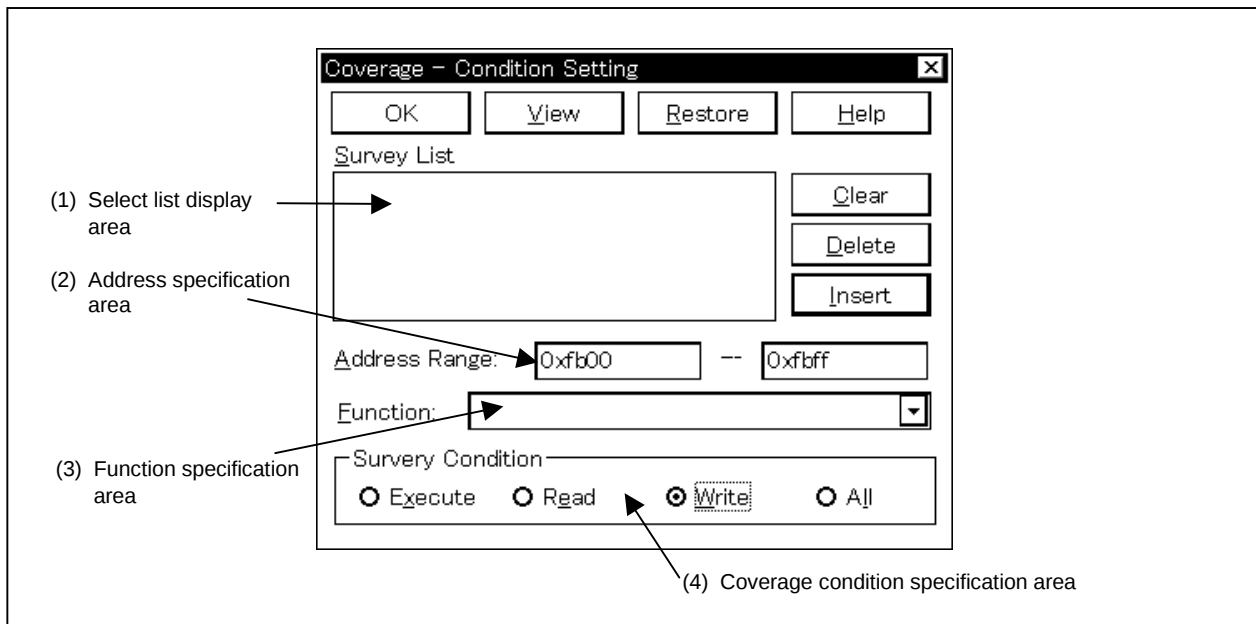
Opening method

This dialog box can be opened by the following methods.

- In the main window
Select [Option] → [Coverage] → [Condition...] from the menu bar.
Press the [GRPH] + [O], [O], and [O] keys in that order.
- Click the **Condition** button in the Coverage-Efficiency View dialog box.

Window

Figure 6-59. Coverage-Condition Setting Dialog Box



Function

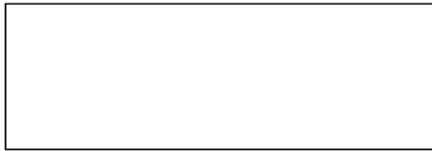
The Coverage-Condition Setting dialog box consists of the following areas.

- Select list display area
- Address specification area
- Function specification area
- Coverage condition specification area

The function of each area is explained below.

(1) Select list display area

Survey List



Displays the currently selected lists.

Selected lists can be added by the following two methods.

(a) When adding from the function list

- <1> Specify the status conditions in the status condition specification area.
- <2> Select the function to be added to the function specification area and click the button.
The specified function can be deleted from the list by using the button.

Note It is meaningless to select an instruction other than Execute.

(b) When specifying and adding an address

- <1> Specify the status conditions in the status condition specification area.
- <2> Input the address range to the address specification area and click the button.
The specified address range can be deleted from the list by using the button.

(2) Address specification area

Address Range: --

This area is used to input the coverage efficiency address range conditions. Addresses can also be specified by a symbol or expression. The specification method is the same as in the case of the Address Move dialog box. The default radix during input of numerical values is hexadecimal.

(3) Function specification area

Function: 

This area is used to input the coverage efficiency address conditions in function units or to select the function name from the drop-down list.

Function names registered to the load module file are displayed.

(4) Status condition specification area

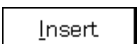
Survey Condition

☒ Execute ☐ Read ☐ Write ☐ All

This area selects the coverage efficiency status conditions. The selectable status conditions are as follows:

Status	Description
Execute	Proportion of program execution performed.
Read	Proportion of memory read performed.
Write	Proportion of memory write performed.
All	Proportion of either program execution, memory read or memory write performed.

Function buttons

	Closes the Coverage-Condition Setting dialog box.
	Displays the coverage efficiency. Opens the Coverage-Efficiency View dialog box.
	Cancels the changes and restores the original setting.
	Opens the help window.
	Clears the contents in the select list display area.
	Deletes the function name or the address range specified in the select list display area from the list.
	Enters the function name specified in the function specification area or the address range specified in the address specification area in the select list display area.

Coverage-Efficiency View Dialog Box

(This is valid when the IE-78K0-NS-PA is installed in the IE-78K0-NS, when the IE-78K0-NS-A or IE-78K0S-NS-A is used, or when the IE-784000-R is used.)

General

Displays the coverage results in the range specified in the Coverage-Condition Setting dialog box as coverage efficiency.

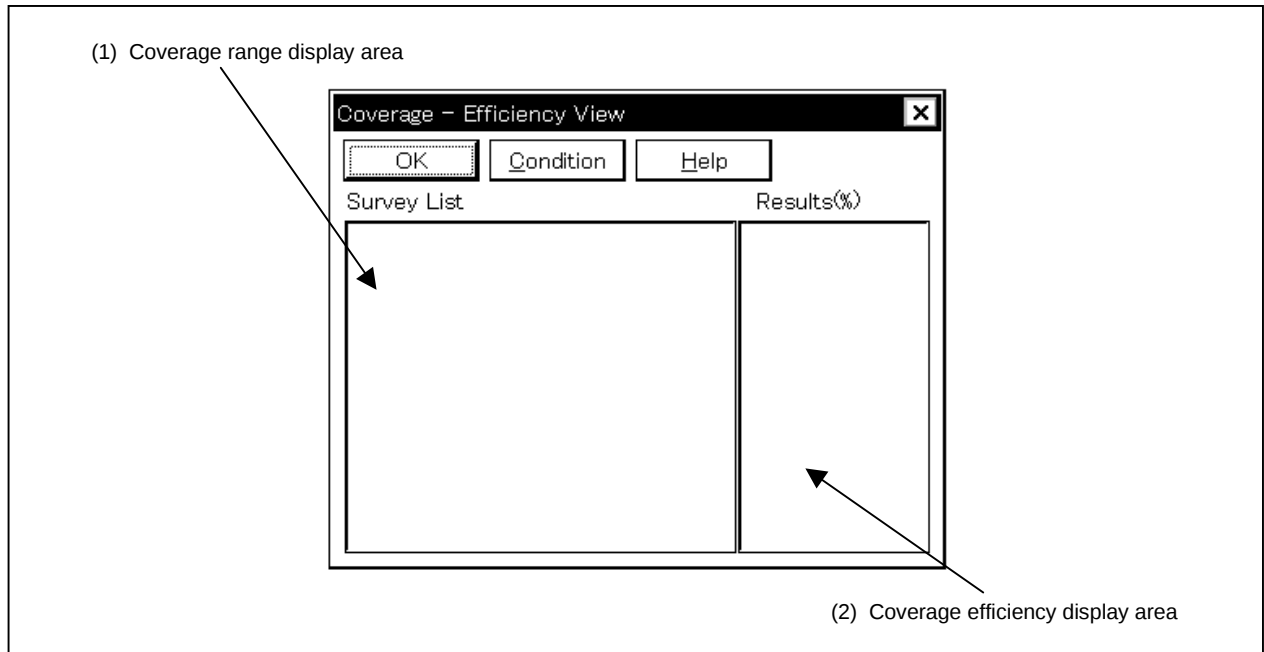
Opening method

This dialog box can be opened by the following methods.

- In the main window
Select [Option] → [Coverage] → [Efficiency...] from the menu bar.
Press the **[GRPH]** + **[O]**, **[O]**, and **[E]** keys in that order.
- Click the **View** button in the Coverage-Condition Setting dialog box.

Window

Figure 6-60. Coverage-Efficiency View Dialog Box



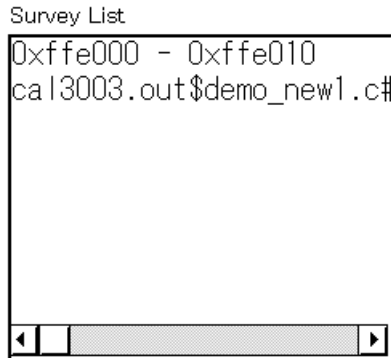
Function

The Coverage-Efficiency View dialog box consists of the following areas.

- Coverage range display area
- Coverage efficiency display area

The function of each area is explained below.

(1) Coverage range display area



This area specifies the coverage efficiency measurement range.

The range specified in the Coverage-Condition Setting dialog box is displayed in this area.

If specified by a function name, it is displayed as "Program name \$ File name # Function name."

(2) Coverage efficiency display area

Results(%)	
ALL	5.9
X	0.0

This area displays the coverage efficiency.

The coverage efficiency shows what percentage of the measurement range the specified status (execute, read, write) occupies.

The status list is shown below.

Status	Description
X	Proportion of program execution performed.
W	Proportion of memory write performed.
R	Proportion of memory read performed.
All	Proportion of either program execution, memory read or memory write performed.

Function buttons**OK**

Closes the Coverage-Efficiency View dialog box.

Condition

Sets the displayed contents of the coverage efficiency.
Opens the Coverage-Condition Setting dialog box.

Help

Opens the help window.

Event Manager

General

This window displays, enables/disables and deletes various events.

Through manipulation in this window, the event conditions registered in the Event dialog box or Event Link dialog box can be allocated to break events, trace events, snapshot events^{Note 1}, DMM events^{Note 2}, timer events^{Note 1}, or stub events^{Note 3}.

- Notes**
1. Not supported in the ID78K4-NS
 2. Not supported in the ID78K4 (-NS)
 3. Supported only in the ID78K4

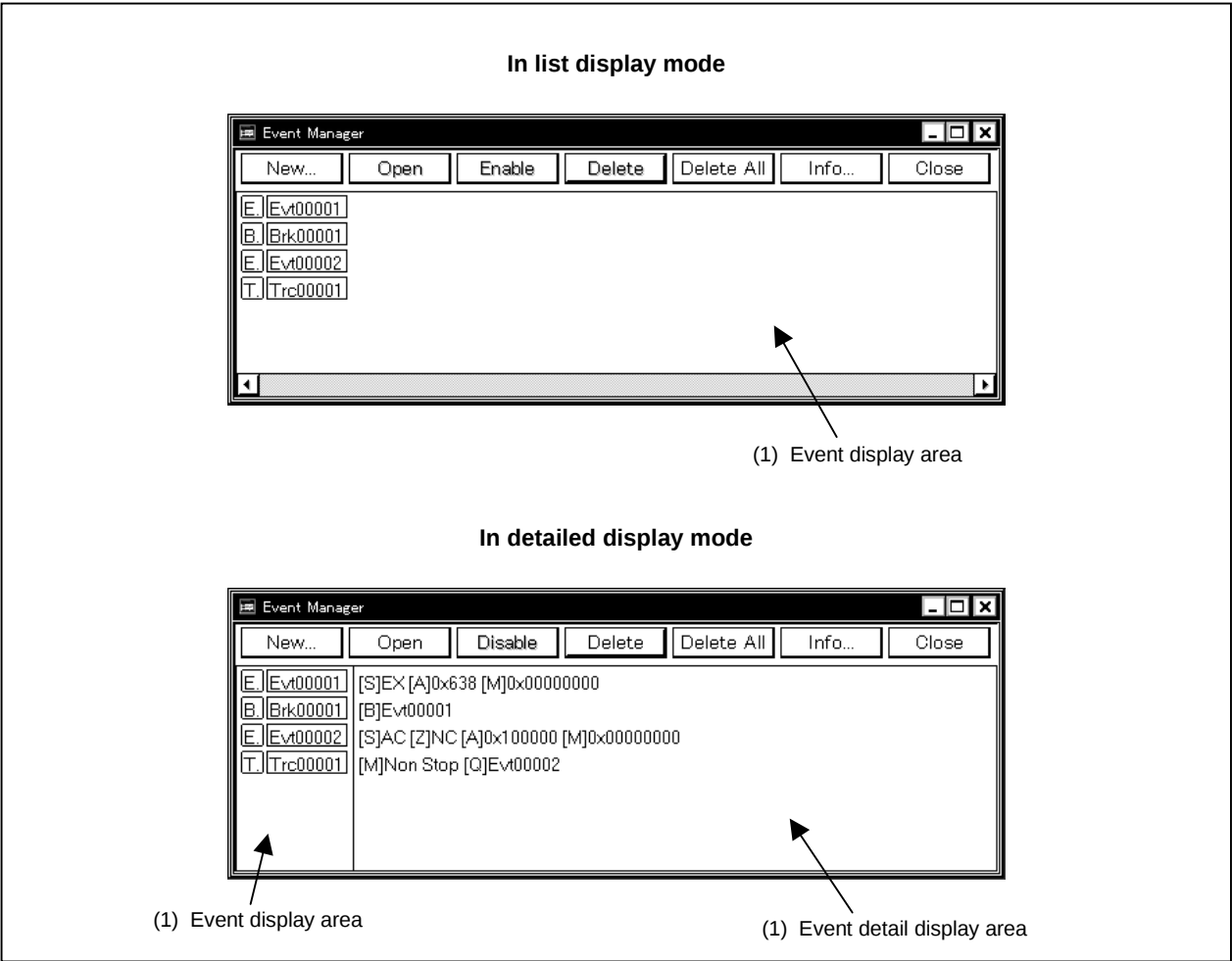
Opening method

This window can be opened by one of the following methods:

- In the main window
 Select [Event] → [Event Manager] from the menu bar.
 Press the [GRPH] + [N], and [M] keys in that order.
 Click the  button from the toolbar.
- In the Source window
 Moves the cursor to the source line in the source text display area where the event is set, or to the disassemble line in case of the mix display mode, and carry out either of the following steps:
 Select [View] → [Event?] from the menu bar.
 Press the [GRPH] + [V], and [E] keys in that order.
- In the Assemble window
 Moves the cursor to the line in the mnemonic display/change area where the event is set, and carry out either of the following steps:
 Select [View] → [Event?] from the menu bar.
 Press the [GRPH] + [V], and [E] keys in that order.
- In the Event dialog box
 Click the  button.
 Press the shortcut keys [GRPH] + [G].
- In the Set Other dialog box
 Click the  button.
 Press the shortcut keys [GRPH] + [M].

Window

Figure 6-61. Event Manager



Function

Displays, enables/disables, and deletes various events and manages event conditions for registering or setting various event conditions (such as event link conditions, break event conditions, trace event conditions, snapshot event conditions^{Note 1}, DMM event conditions^{Note 2}, timer event conditions^{Note 1}, and stub event conditions^{Note 3}).

- Notes**
- 1.** Not supported in the ID78K4-NS
 - 2.** Not supported in the ID78K4 (-NS)
 - 3.** Supported only in the ID78K4

The Event Manager consists of the following areas.

- Event display area
- Event detail display area

The function of each area is explained below.

(1) Event display area

- In list display mode

E.	Evt00001
B.	Brk00001
E.	Evt00002
T.	Trc00001

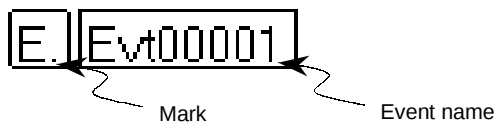
- In detailed display mode

E.	Evt00001	[S]EX [A]0x638 [M]0x00000000
B.	Brk00001	[B]Evt00001
E.	Evt00002	[S]AC [Z]NC [A]0x100000 [M]0x00000000
T.	Trc00001	[M]Non Stop [Q]Evt00002

In the event display area, icons (event icons) for various types of event conditions of the registered event, event link, break, trace, snapshot^{Note 1}, DMM^{Note 2}, timer^{Note 1}, and stub^{Note 3} are displayed.

The icon of the event condition consists of a mark indicating the type of each event condition and an event name.

- Notes 1.** Not supported in the ID78K4-NS
2. Not supported in the ID78K4 (-NS)
3. Supported only in the ID78K4



The contents displayed in the event display area can be changed by the Event Info dialog box which is opened by the [View] menu or the Info... button in the Event Manager.

The marks are listed below.

Mark	Meaning
	Indicates event condition
	Indicates event link condition
	Indicates break event
	Indicates trace event
	Indicates snapshot event ^{Note 1}
	Indicates DMM event ^{Note 2}
	Indicates timer event ^{Note 1}
	Indicates stub event ^{Note 3}

- Notes**
1. Not supported in the ID78K4-NS
 2. Not supported in the ID78K4 (-NS)
 3. Supported only in the ID78K4

The color of the character displayed in a mark indicates the setting status of each event condition.

Character Color in Mark	Corresponding Mark	Meaning
Red	,	Indicates that the event conditions using events and event link conditions are valid.
	, , , , ,	Indicates that each event condition is “enabled”. Each event is generated when condition is satisfied.
Black	,	Indicates that the event conditions using events and event link conditions are invalid.
	, , , , ,	Indicates that an event is invalid. The event does not occur even if the conditions are established.
Yellow	, , , , , , ,	Indicates that the symbol specified in the event cannot be recognized by the program that is currently loading, so it is held pending.

In addition to the above function, this area also has the following four functions.

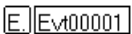
(a) Jump function

Jumps to the Source window, Assemble window, Memory window or Coverage window by using the address condition of the selected icon as a jump pointer if the selected icon is the event condition. The jump destination window displays the jump pointer at the beginning.

If the address condition is a range setting, the lower address becomes the jump pointer. If a mask is set, the point address before the mask is executed becomes the jump pointer.

In the case of a bit setting, the address of the specified bit position becomes the jump pointer.

This function is executed by performing the following operations in sequential order.

<1> Select an icon ().

<2> Perform one of the following operations in the main window.

- If the jump destination is the Source window
Select [Jump] → [SourceText] from the menu bar.
Press the  + , and  keys in that order.
Press shortcut keys  + .
- If the jump destination is the Assemble window
Select [Jump] → [Assemble] from the menu bar.
Press the  + , and  keys in that order.
Press shortcut keys  + .
- If the jump destination is the Memory window
Select [Jump] → [Memory] from the menu bar.
Press the  + , and  keys in that order.
Press shortcut keys  + .
- If the jump destination is the Coverage window^{Note}
Select [Jump] → [Coverage] from the menu bar.
Press the  + , and  keys in that order.
Press shortcut keys  + .

Note Not supported in the ID78K4-NS

(b) Open function

Opens the setting dialog box corresponding to the selected icon's event. The contents of the selected event are displayed in each setting dialog box that is opened.

This function is executed by performing one of the following operations.

<1> Double-click the icon.

<2> Select the icon, then click .

(c) Enabled state switching function

Switches the state of the event corresponding to the selected icon between enabled and disabled.

Except for an event and event link, it is possible to operate break, trace, snapshot^{Note 1}, DMM^{Note 2}, timer^{Note 1}, and stub^{Note 3} events by icons.

This function is executed by performing one of the following operations.

- Notes**
1. Not supported in the ID78K4-NS
 2. Not supported in the ID78K4 (-NS)
 3. Supported only in the ID78K4

<1> Click the left button of the mouse when the mouse cursor is on the icon mark.

<2> Select an icon and click or , or press the + keys.

If an event is in the enabled state, it becomes disabled (black), and if the event is in the disabled state, it becomes enabled (red).

The button is displayed when an icon in the disabled state is selected, and the button is displayed when an icon in the enabled state is selected.

(d) Delete function

Deletes registration/set contents of the event condition of a selected icon.

Multiple icons can be selected using the and keys.

To select all the icons, select → from the menu bar.

However, an event condition and event link condition can be deleted only when that event condition is not used by other event condition (, , , , , or). If the event condition or event link condition has already been used for any other event, delete the event used.

This function is executed by performing one of the following operations.

<1> Select an icon and perform one of the following operations in the main window.

Select → from the menu bar.

Press the + , and keys in that order.

<2> Select an icon and perform one of the following operations in the Event Manager.

Click button.

Press the key.

(2) Event detail display area

```
[S]EX [A]0x638 [M]0x00000000
[B]Evt00001
[S]AC [Z]NC [A]0x100000 [M]0x00000000
[M]Non Stop [Q]Evt00002
```

This area is displayed only when the detailed display mode is selected.

This area displays the detailed information corresponding to the icon of each event. This area displays the contents of the status condition, access size condition, data condition, external sense data condition, and pass count condition, in that order, by using the information of each key as a delimiter, when an event condition is specified. The following tables show the correspondence between the information of each key and the condition.

- **Event condition**

Key Information	Description
[S]	Status condition
[Z]	Access size condition
[A]	Address condition
[D]	Data condition
[E]	External sense data condition ^{Note 1}
[M]	Mask condition
[P]	Pass count condition ^{Note 2}

Notes 1. Not supported in the ID78K4-NS

2. Supported only in the ID78K4 (-NS)

- **Event link condition**

Key Information	Description
[P1] to [P4]	Event link condition of nth stage (n = 1 to 4)
[D]	Disable condition ^{Note}
[P]	Pass count condition ^{Note}

Note Not supported in the ID78K4-NS

- Break condition

Key Information	Description
[B]	Break condition

- Trace condition

Key Information	Description
[M]	Trace mode
[D]	Delay count
[Q]	Qualify trace condition

- Timer condition^{Note}

Key Information	Description
[S]	Timer measurement start condition
[E]	Timer measurement end condition
[U]	Timer measurement unit

Note Not supported in the ID78K4-NS

- Snapshot condition^{Note}

Key Information	Description
[SN]	Snapshot condition
[R]	Register condition
[B]	Register bank condition
[M]	Memory condition
[Z]	Access size condition
[F]	SFR condition

Note Not supported in the ID78K4-NS

- DMM condition^{Note}

Key Information	Description
[DM]	DMM condition
[A]	Address condition
[D]	Data condition
[Z]	Data size condition

Note Not supported in the ID78K4 (-NS)

- Stub condition^{Note}

Key Information	Description
[SU]	Stub condition
[A]	Jump address

Note Supported only in the ID78K4

If the address condition of an event condition, a data condition, or the memory condition of a snapshot condition is a symbol or an expression, the actual address is displayed within “()”.

Function buttons

New...

Opens the New Event dialog box.



In the New Event dialog box, by clicking each button, the setting dialog box for event, event link, break, trace, snapshot^{Note 1}, DMM^{Note 2}, timer^{Note 1}, and stub^{Note 3} events can be opened.

Each setting dialog box that is opened has the new event name set in it.

After each setting dialog box is opened, the New Event dialog box is closed.

If **Cancel** is clicked or the **ESC** key is pressed, the New Event dialog box closes and the screen returns to the Event Manager.

Open

Opens the setting dialog box corresponding to the event condition selected in the event display area. The event condition contents selected in the event display area are displayed in the setting dialog box.

If the event condition has not been selected, or if multiple conditions are selected, this button is dimmed and can no longer be clicked.

The **Enter** key also has the same operation.

- Notes**
1. Not supported in the ID78K4-NS
 2. Not supported in the ID78K4 (-NS)
 3. Supported only in the ID78K4



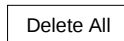
Sets break, trace, snapshot^{Note 1}, DMM^{Note 2}, timer^{Note 1}, and stub^{Note 3} events in the enabled state. The **Enable** button is displayed in place of the **Disable** button if one disabled event or multiple events including only disabled events are selected.



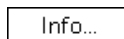
Sets break, trace, snapshot^{Note 1}, DMM^{Note 2}, timer^{Note 1}, and stub^{Note 3} events in the disabled state. The **Disable** button is displayed in place of the **Enable** button if one enabled event is selected or multiple events including enabled events are selected. If an event or an event link only is selected, this button is dimmed and it can no longer be clicked.



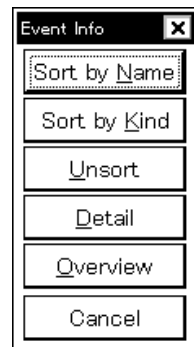
Deletes the event condition selected in the event display area. When deleting an event or event link, if that event is being used by a break, trace, snapshot^{Note 1}, DMM^{Note 2}, timer^{Note 1}, stub^{Note 1}, or event link, it results in an error. The **DEL** key also has the same operation.



Deletes all the events whether they are enabled or disabled.



Opens the Event Info dialog box.



The **Sort by Name** button rearranges events in name order and displays them.

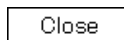
The **Sort by Kind** button rearranges events by type and displays them.

The **Unsort** button displays the events in the order in which they were entered without rearranging them.

The **Detail** button sets the display mode to the detailed display mode.

The **Overview** button sets the display mode to the list display mode.

The **Cancel** button or the **ESC** key closes the dialog box.



Closes the Event Manager.

- Notes**
1. Not supported in the ID78K4-NS
 2. Not supported in the ID78K4 (-NS)
 3. Supported only in the ID78K4

Software Break Manager

(This is valid when the IE-78K0-NS-PA is installed in the IE-78K0-NS, when the IE-78K0-NS-A or IE-78K0S-NS-A is used, or when the IE-78K4-NS or IE-784000-R is used.)

General

This window displays, switches enable/disable, and deletes software breaks.

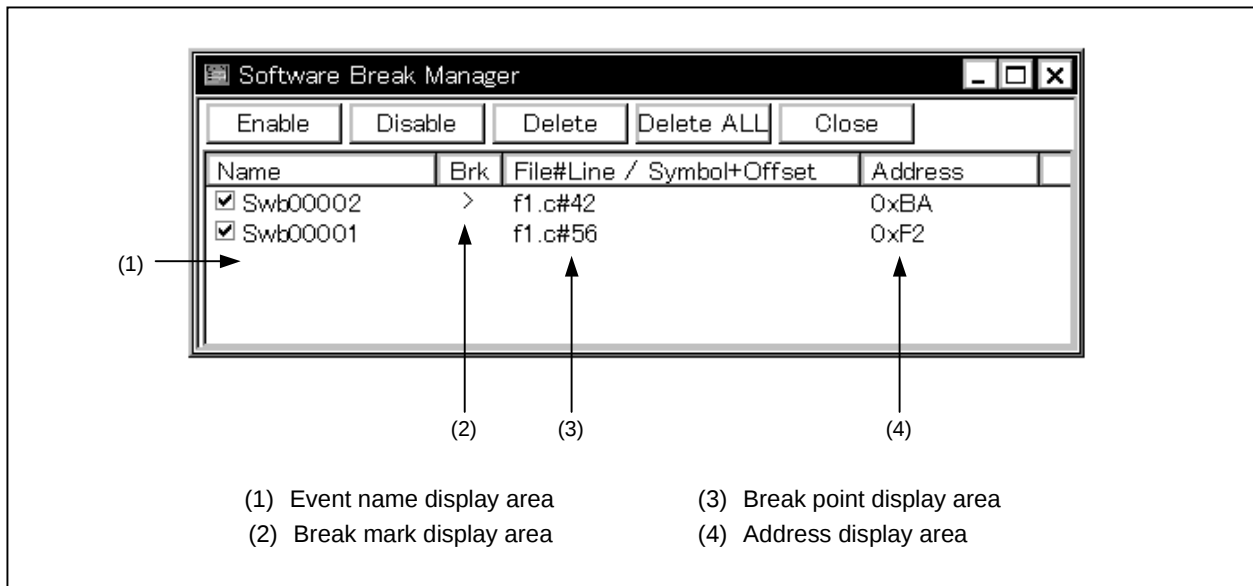
Opening method

This window can be opened by the following methods.

- In the main window
Select [Event] → [Software Break Manager] from the menu bar.
Press the **[GRPH]** + **[N]**, and **[M]** keys in that order.

Window

Figure 6-62. Software Break Manager

**Function**

Displays, switches enable/disable, and deletes software breaks. Up to 100 software break events can be valid simultaneously.

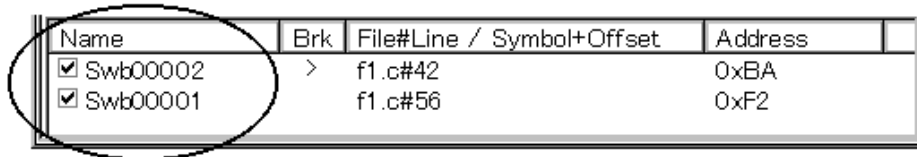
Note that the setting of the software break point is not performed in this window, but in the Source window or Assemble window.

The software break manager consists of the following areas.

- Event name display area
- Break mark display area
- Break point display area
- Address display area

The function of each area is explained below.

(1) Event name display area



Name	Brk	File#Line / Symbol+Offset	Address
☒ Swb00002	>	f1.c#42	0xBA
☒ Swb00001		f1.c#56	0xF2

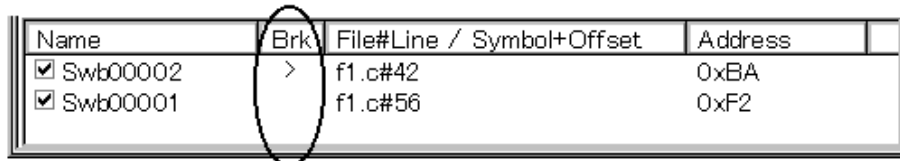
This area consists of check boxes to indicate the registered event name and valid/invalid status of the event. To change the event name, edit directly after clicking the name to be changed. The name will be determined by pressing the return key. [Swb + number] is displayed in this area as the default.

To validate the event, check the check box (as the default, the check box is checked for a newly created event).

Also, double-clicking the event name makes it possible to jump to the window where the event was created (the Source window/Assemble window).

Remark By clicking Name on the label, character strings of the displayed items are compared and arranged in alphabetical order (ascending or descending can be switched by clicking).

(2) Break mark display area



Name	Brk	File#Line / Symbol+Offset	Address
☒ Swb00002	>	f1.c#42	0xBA
☒ Swb00001		f1.c#56	0xF2

This area displays the mark ">" for the software break event set at the current PC area to make it easy to specify the software break event that has caused the break.

(3) Break point display area

Name	Brk	File#Line / Symbol+Offset	Address
☒ Swb00002	>	f1.c#42	0xBA
☒ Swb00001		f1.c#56	0xF2

This area displays the location where the software break event is set in the following format.

File name # line number (when set in the Source window)

Symbol + offset (when set in the Assemble Text window)

Re-evaluating the event when redownloading symbols is performed based on the above.

Remark By clicking File#Line/Symbol+Offset on the label, character strings of the displayed items are compared and arranged in alphabetical order (ascending or descending can be switched by clicking).

(4) Address display area

Name	Brk	File#Line / Symbol+Offset	Address
☒ Swb00002	>	f1.c#42	0xBA
☒ Swb00001		f1.c#56	0xF2

This area displays addresses where software break events are set.

Remark By clicking Address on the label, values of the displayed items are compared and arranged in size order (ascending or descending can be switched by clicking).

Function buttons

Enable

Validates the event selected.

Disable

Invalidates the event selected.

Delete

Deletes the event selected.

Delete All

Deletes all software break events set.

Close

Closes the Software Break Manager window.

Event Dialog Box

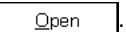
General

Registers and displays event conditions.

The event conditions created (registered) in this dialog box are automatically registered to the Event Manager.

Opening method

This dialog box can be opened by the following methods.

- In the main window
Select [Event] → [Event...] from the menu bar.
Press the **[GRPH]** + **[N]**, and **[E]** keys in that order.
Click the  button on the toolbar.
- Execute one of the following operations in the Break, Trace, Snap Shot^{Note 1}, DMM^{Note 2}, Timer^{Note 1}, Stub^{Note 3}, or Event Link dialog boxes.
Click the **Add Event...** button.
Press the shortcut keys **[GRPH]** + **[E]**.
- Execute one of the following operations in the event setting area or the event manager area of the Break, Trace, Snap Shot^{Note 1}, DMM^{Note 2}, Timer^{Note 1}, Stub^{Note 3}, or Event Link dialog boxes.
Select the event condition and click .
Select the event condition and press the shortcut keys **[GRPH]** + **[O]**.
Double-click the event condition.
- In the Event Manager, execute one of the following operations.
Select an event condition and click .
Double-click the event condition.
- Execute one of the following operations in the New Event dialog box or the Set Other dialog box.
Click the **[Event...]** button.
Press the shortcut keys **[GRPH]** + **[E]**.
- In the Source window
Move the cursor to the source line in the source text display area where the event is set, or to the disassemble line in the mixed display mode, and execute one of the following operations.

Select [View] → [Event?] from the menu bar.

Press the **[GRPH]** + **[V]** and **[E]** keys in that order.

- Notes**
1. Not supported in the ID78K4-NS
 2. Not supported in the ID78K4 (-NS)
 3. Supported only in the ID78K4

- In the Assemble window

Move the cursor to the line of the mnemonic display/change area where the event is set and execute one of the following operations.

Select [View] → [Event?] from the menu bar.

Press the [GRPH] + [V] and [E] keys in that order.

Window

Figure 6-63. Event Dialog Box (1/2)

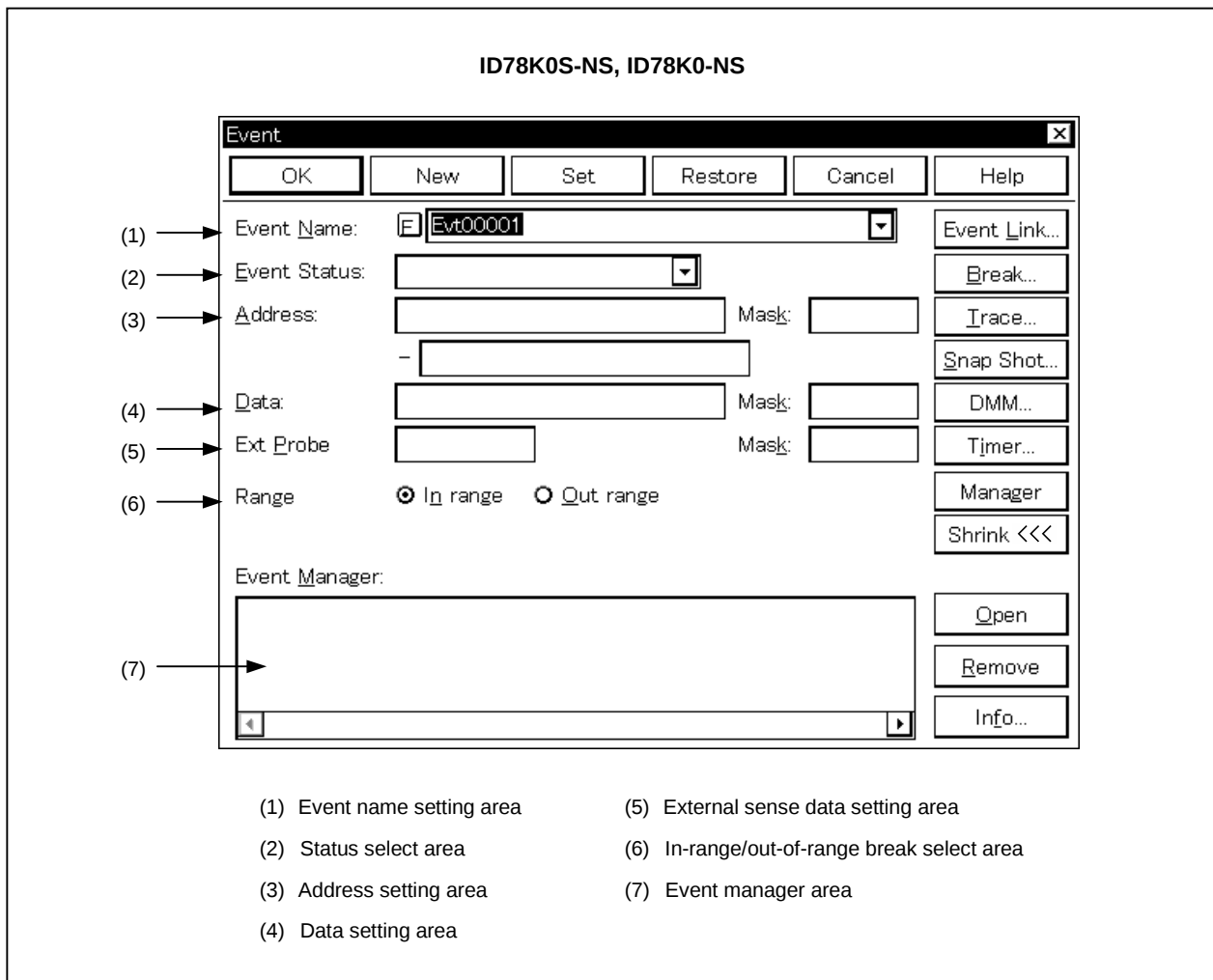
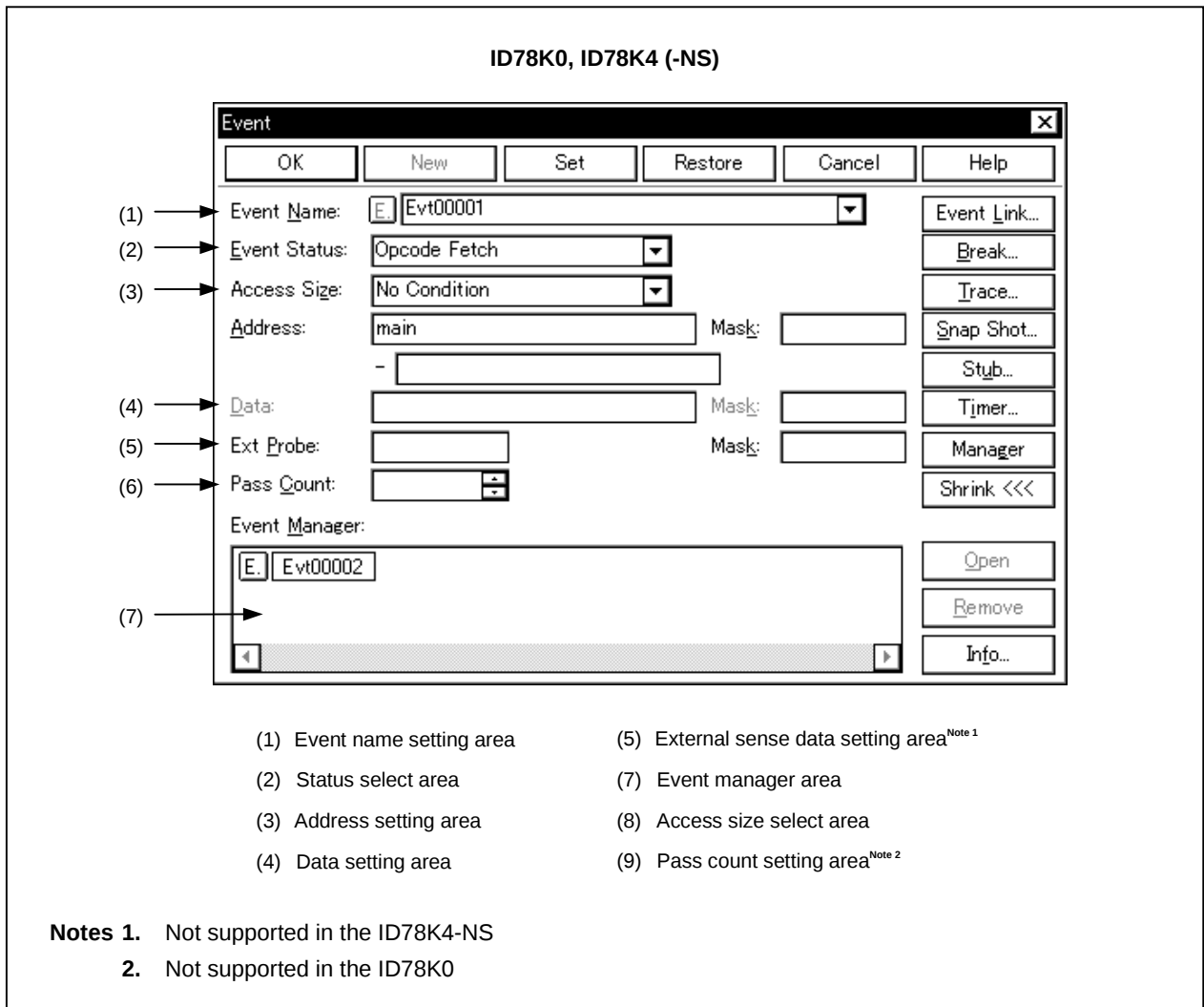


Figure 6-63. Event Dialog Box (2/2)



Function

This dialog box registers and displays event conditions.

Up to 256 conditions can be entered for event conditions. However, the number of event conditions which can be used simultaneously in enabled break, trace, snapshot^{Note 1}, DMM^{Note 2}, timer^{Note 1}, and stub^{Note 3} events is 8 execution events (or one event link) and 4 access events.

When the IE-78K0-NS-PA is installed in the IE-78K0-NS or the IE-78K0-NS-A/IE-78K0S-NS-A is used, the number of event conditions that can be used simultaneously will increase by 8 for each.

In the IE-78K4-NS, four execution events and four access events can be used. In the IE-784000-R, three execution events and seven access events can be used.

The number of event conditions that can be used simultaneously is up to the number of event conditions given above, but a single event condition can be set in multiple break, trace, snapshot^{Note 1}, DMM^{Note 2}, timer^{Note 1}, stub^{Note 3}, and event link events.

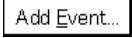
- Notes 1.** Not supported in the ID78K4-NS
- 2.** Not supported in the ID78K4 (-NS)
- 3.** Supported only in the ID78K4

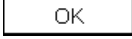
The Event dialog box has two modes, the normal mode and the select mode.

- Normal mode

When the  button from the toolbar or [Event] → [Event...] from the menu bar in the main window is selected and the Event dialog box is opened, event conditions can be entered without restriction as to purpose. This is the normal mode.

- Select mode

When the  button in the Break, Trace, Snap Shot^{Note 1}, DMM^{Note 2}, Timer^{Note 1}, Stub^{Note 3}, and Event Link dialog boxes is clicked and the Event dialog box is opened, the event conditions used by these are selected. This is the select mode.

In the select mode, when  is clicked, the event condition selected in the event name setting area of the Event dialog box is set in the event condition setting area of the setting dialog box that originally called the Event dialog box.

Even in the select mode, event conditions can be entered and displayed just as in the normal mode.

Depending on the mode, the title bar display on the dialog box will differ. Refer to the section entitled [Title Bar] described later on.

The Event dialog box consists of the following areas.

- Event name setting area
- Status select area
- Access size select area^{Note 1}
- Address setting area
- Data setting area
- External sense data setting area^{Note 2}
- In-range/out-of-range break select area^{Note 3}
- Pass count setting area^{Note 4}
- Event manager area

Notes 1. Not supported in the ID78K0S-NS and ID78K0-NS

2. Not supported in the ID78K4-NS

3. Not supported in the ID78K0 and ID78K4 (-NS)

4. Supported only in the ID78K4

The function of each area is explained below.

(1) Event name setting area

Event Name:  

-  Evt00001
-  Evt00002
-  Evt00003
-  Evt00004
-  Evt00005
-  Evt00006

This area sets an event name and selects an event condition.

When entering an event condition, it is necessary to set an event name. An event name may consist of up to eight alphanumeric characters.

When displaying event conditions which have already been created, either type the name of the already created event in the text box or select the event condition from the drop-down list in the event name setting area.

Note that when moving to another event before completing an event setting, the data which was being set is deleted.

In the select mode, the selected event condition can be set in the event condition setting area of the original setting dialog box that called the Event dialog box.

The  mark on the left side of the event name setting area shows the use conditions of the event condition.

The relationship between the color of the character in the  mark and the status is shown below.

Color of Character in  Mark	Condition
Red	That event condition is being used by break, trace, snapshot ^{Note 1} , DMM ^{Note 2} , timer ^{Note 1} , stub ^{Note 3} , or event link and indicates that it is enabled.
Black	Indicates that that event condition has not been enabled.
Gray	Indicates that that event condition is currently being edited and that it has not been entered.
Yellow	Indicates that that event is an event which is in the hold state. An event in the hold state is in a state where the symbol specified by the event condition by program download, etc. cannot be referred to.

- Notes**
1. Not supported in the ID78K4-NS
 2. Not supported in the ID78K4 (-NS)
 3. Supported only in the ID78K4

(2) Status select area

Event Status: 

This area sets and selects a status condition.

By specifying the status condition, the distinction between the execution event and access event is decided at the same time. If execution event is specified, the access size select area, the mask field of the address setting area and the data setting area are dimmed and are in a state where input is impossible.

The status conditions that can be specified are shown below. It is possible to specify a status condition in abbreviated form.

The input status condition is not case sensitive.

[ID78K0 (-NS), ID78K0S (-NS)]

Status	Abbr.	Event Type	Meaning
Execution	EX	Execution event	Program execution
Before Execution	EX-B		Program execution (break before execution) ^{Note 1}
R/W	RW	Access event	Memory read/write
Read	R		Memory read
Write	W		Memory write
External Trigger1	Trigger-1		External Trigger (1 bit)
External Trigger2	Trigger-2		External Trigger (ID78K0-NS: 8 bits, ID78K0S-NS: 16 bits) ^{Note 2}

- Notes**
1. Valid only for products with new packages (IE-78K0-NS with a control code D or later or the IE-78K0-NS-A (IE-78K0S-NS-A)).
 2. Valid only when the IE-78K0-NS-PA is installed in the IE-78K0-NS or the IE-78K0-NS-A/IE-78K0S-NS-A is used.

[ID78K4 (-NS)]

Status	Abbr.	Event Type	Meaning
Execution	EX	Execution event	Program execution ^{Note}
Opcode Fetch	OP		Op code fetch (including prefetch)
R/W	RW	Access event	Memory read/write ^{Note}
Read	R		Memory read ^{Note}
Write	W		Memory write ^{Note}
R/W by Macro	RWM		Data read/write by macro service
Read by Macro	RM		Data read by macro service
Write by Macro	WM		Data write by macro service
R/W by Program	RWP		Data read/write by program
Read by Program	RP		Data read by program
Write by Program	WP		Data write by program
Vector Read	VECT		Vector read by interrupt
Access	AC		All access statuses
External Trigger1	Trigger-1		External trigger (1 bit) ^{Note}

Note Supported only in the ID78K4

In the ID78K0 (-NS) and ID78K0S-NS, two or more of External Trigger1 and External Trigger 2 can be registered, but only one of them can be enabled.

Two or more of Before Execution can be registered but only 16 (15 in flash self-mode) of them can be enabled. In addition, they cannot be used as other event conditions.

In the ID78K4 (-NS), an address range can be set for Execution. At this time, the start address must be an even address and the end address must be an odd address.

If Op code Fetch is specified, an address other than those in the 1M space must not be set.

A value greater than 1 can be set as the Pass Count only when one event is used in the ID78K4-NS or when two events are used in the ID78K4.

These areas are blank when the condition of a newly created event is set.

(3) Address setting area

Address: Mask:
 -

This area sets an address condition.

The setting range is as shown below.

[ID78K0S-NS]

Setting range: $0 \leq \text{Address value} \leq 0xFFFF$
 $0 \leq \text{Mask value} \leq 0xFFFF$

[ID78K0 (-NS)]

(When a bank is not used)

Setting range: $0 \leq \text{Address value} \leq 0xFFFF$
 $0 \leq \text{Mask value} \leq 0xFFFF$

(When a bank is used)

Setting range: $0 \leq \text{Address value} \leq (n^{\text{Note}} \ll 16) | 0xFFFF$
 $0 \leq \text{Mask value} \leq (n^{\text{Note}} \ll 16) | 0xFFFF$

Note n is the maximum bank number used.

[ID78K4 (-NS)]

(Execution event)

Setting range: $0 \leq \text{Address value} \leq 0xFFFFF$
 $0 \leq \text{Mask value} \leq 0xFFFFF$

(Access event)

Setting range: $0 \leq \text{Address value} \leq 0FFFFFFF$
 $0 \leq \text{Mask value} \leq 0FFFFFFF$

Input the lower and higher addresses in that order.

The following three types of settings can be made when specifying an address condition.

<1> Point setting

Only the lower address or the same address value is set to the lower and higher addresses when a point is set. Masks can be set.

<2> Range setting

A range is specified by the lower and higher addresses.

Note that if the same value is input for the lower address and the higher address, it is not handled as a range setting. In this case, it becomes a point setting or a bit setting.

In the ID78K4 (-NS), an error occurs unless the start address is an even address and the end address is an odd address.

<3> Bit setting

For a bit setting, set a value in the lower address only, or set the same value in the lower address and the higher address. Specify the value in the address.bit format. The value of the bit that shows the bit position must be $0 \leq \text{bit} \leq 7$.

For the address, it is possible to specify a symbol or an expression. The specification method is the same as in the Address Move dialog box.

The default radix when numerical values are input is hexadecimal.

This area is blank in the case of newly created event conditions.

(4) Data setting area

Data: Mask:

This area sets a data condition.

The setting range is as follows.

Access Size Condition	Setting Range
Byte	$0 \leq \text{Data value} \leq 0xFF$ $0 \leq \text{Mask value} \leq 0xFF$
Word ^{Note}	$0 \leq \text{Data value} \leq 0xFFFF$ $0 \leq \text{Mask value} \leq 0xFFFF$
Bit	Data value = 0, 1 Mask value = Cannot be specified

Note Supported only in the ID78K4 (-NS)

If the data condition setting has been omitted, data condition detection is not performed.

For a newly created event condition, the address value and the mask value input columns are both blank.

There are two types of data conditions: Data, which sets the data value, and Mask, which inputs the mask value of the data value.

How to set each of these types is explained below.

(a) Data

Set a data value.

A data value can also be specified by a symbol or expression. The specification method is the same as in the case of the Symbol To Address dialog box, but the default radix when numerical values are input is hexadecimal.

(b) Mask

Set a mask value for the data value.

When mask setting is made, for a bit with a mask value of 1, it doesn't matter if the data value is 0 or 1.

Example 1. Data:

Mask:

In this kind of setting, the conditions match when the data value is 0x4000 to 0x40FF.

2. Data:

Mask:

In this kind of setting, when the data is 0x4000, 0x4001, 0x4100, and 0x4101, the conditions are matched.

If the mask value setting is omitted, masking is not executed.

The default radix when numerical values are input is hexadecimal.

(5) External sense data setting area

Ext Probe

Mask:

This area sets the external sense data condition.

Setting range: $0 \leq \text{Data value} \leq 0xFFFF$

$0 \leq \text{Mask value} \leq 0xFFFE$

The external sense data condition enables the input pin level of the external sense clip attached to the emulation probe connected to the in-circuit emulator to be a search condition.

The correspondence between the external sense data and the external sense clip is as follows.

[ID78K0 (-NS), ID78K0S-NS]

External Sense Data Display	External Sense Clip Number
bit 15	NO.16
bit 14	NO.15
bit 13	NO.14
bit 12	NO.13
bit 11	NO.12
bit 10	NO.11
bit 9	NO.10
bit 8	NO.9
bit 7	NO.8
bit 6	NO.7
bit 5	NO.6
bit 4	NO.5
bit 3	NO.4
bit 2	NO.3
bit 1	NO.2
bit 0	NO.1

[ID78K4]

External Sense Data Display	External Sense Clip Number
bit 7	NO.8
bit 6	NO.7
bit 5	NO.6
bit 4	NO.5

The input pin level of the external sense clip is set to 1 for high level and 0 for low level.

There are two types of external sense data conditions: Ext Probe, which sets the external sense data value, and Mask, which sets the mask value of the external sense data value.

The setting method is shown below.

(a) Ext Probe

Specify the external sense data value.

The default radix when numerical values are input is hexadecimal.

(b) Mask

Set a mask value for the external sense data value.

When mask setting is made, for a bit with a mask value of 1, it doesn't matter if the data value is 0 or 1.

Example 1. Data:

Mask:

In this kind of setting, the conditions match when the data value is 0x8 to 0xF.

2. Data:

Mask:

In this kind of setting, when the data is 0x8, 0x9, 0xC, and 0xD, the conditions are matched.

If the mask value setting is omitted, masking is not executed.

The default radix when numerical values are input is hexadecimal.

When the debugger uses the external sense data condition for event detection of the bank address, those bits cannot be accessed^{Note}.

If the number of bits in the bank port is equal to or more than the maximum number of the external sense data condition, the external sense data condition and mask value are dimmed and cannot be input^{Note}.

If less than the maximum, the unused bits of the external sense data condition can be set arbitrarily.

At this time, setting bits that are being used by the debugger will cause an error^{Note}.

If the external sense data condition setting is omitted, the external sense data condition is not detected.

The data value and mask value text boxes are blank in the case of newly created event conditions.

Note These specifications do not apply to the ID78K4.

(6) In-range/out-of-range break select area (ID78K0S-NS, ID78K0-NS)

Range ☒ In range ☐ Out range

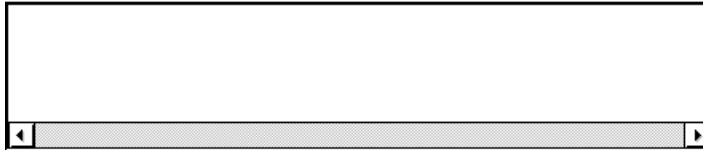
This area selects the break condition (in-range/out-of-range).

In range: Break within the range (default)
Out range: Break out of the range

This area selects whether the break occurs within the specified address range or not. This can be selected only when R/W, Read, Write, or Before Execution is specified for the status.

(7) Event manager area

Event Manager:



This area displays a list of each of the entered events, event links, breaks, trace, snapshots^{Note 1}, timer^{Note 1}, and stub^{Note 2} events.

By selecting an event and clicking , or by double-clicking the event, a setting dialog box opens corresponding to the selected event and the event setting contents can be displayed.

When the focus is on the event manager area, select the event icon and click , or press the key to delete the selected event.

By clicking , it is possible to select the event manager area display mode or sequencing.

Notes 1. Not supported in the ID78K4-NS

2. Supported only in the ID78K4

(8) Access size select area (ID78K0 and ID78K4 (-NS))

Access Size:

This area sets or selects the access size condition.

By specifying an access size condition, the access width of the data condition to be detected by the access event is determined.

The access size conditions that can be specified are shown below. An access size condition can also be specified in an abbreviated form. The uppercase and lowercase characters of the input access size condition are not distinguished.

Access Size	Abbreviation Form	Description
Byte	B	Detection is carried out with an 8-bit width as the data condition. Detection is carried out only during 8-bit access.
Word	W	Detection is carried out with a 16-bit width as the data condition. Detection is carried out only during 16-bit access.
No Condition	NC	An access-size search is not executed
Bit	1	Detection is carried out with a 1-bit width as the data condition. Detection is carried out only during 8-bit access.

(9) Pass count setting area (ID78K4 (-NS) only)

Pass Count 

This area sets a pass count condition.

[ID78K4]

Setting range: $1 \leq \text{Pass count value} \leq 32,767$

[ID78K4-NS]

Setting range: $1 \leq \text{Pass count value} \leq 255$

This area sets the condition that is to be satisfied if an event condition (address condition, status condition, access size condition, data condition, or external sense data condition) has been satisfied a given number of times during user program execution.

If the pass count is set to 1, the condition is satisfied as soon as the event condition has been satisfied.

If the pass count is set to 2 or more, the number of events that can be simultaneously enabled is up to two, with event conditions and event link conditions combined. In the ID78K4, an event condition for which the pass count is set to 2 or more cannot be used as an event link condition.

If the pass count condition setting is omitted, it is assumed to be 1.

The pass count is also assumed to be 1 when there is a newly created event condition.

Function buttons

OK

(Normal mode)

Closes the Event dialog box.

If there is an event condition that is being edited, it is entered automatically and the dialog box is closed.

OK

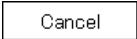
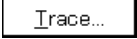
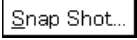
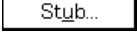
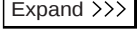
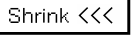
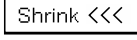
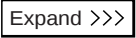
(Select mode)

Sets the displayed event as the event condition of the original dialog box that called the Event dialog box and returns to the original setting dialog box.

If the Event dialog box is already open, the select mode returns to the normal mode only and the Event dialog box does not close. In other cases, it closes.

If there is an event condition being edited, enter/select is performed automatically and the program returns to the original setting dialog box.

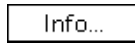
New	Newly creates an event condition. An event name is generated automatically and a newly created event condition is prepared. After it is created, be sure to enter the event condition using the OK or the Set button.
Set	Enters an event condition. When a new event condition has been created or when the contents of an event condition have been changed, be sure to enter the event condition using this button. The entered event condition is reflected in the Event Manager. If event conditions that have already been entered are displayed, they cannot be selected.
Clear	Clears the contents of an event condition. If an event condition is entered but not edited, the Restore button is displayed in place of this button.
Restore	Returns the contents of an event condition to the original contents. If an event condition that has not been entered is displayed, all the area is made blank except the event name, or the settings return to the default settings. If an event condition is being edited, the Clear button is displayed in place of this button.
Close	Closes the Event dialog box. If an event condition has been created/changed/deleted, after that, the Cancel button becomes this button. Even if there is an event condition that is being edited, the dialog box closes without the event condition being entered. The ESC key has the same operation.
(Normal mode)	
Cancel	Closes the Event dialog box. If an event condition is not being created/changed/deleted, the Close button becomes this button. Even if an event condition is being edited, the dialog box closes without the event condition being entered. The ESC key has the same operation.
(Normal mode)	
Cancel	Returns to the original setting dialog box that called the Event dialog box without an event condition being selected. If an event condition is not being created/changed/deleted, the Abort button becomes this button. If the Event dialog box is already open, the select mode returns to the normal mode only, and the Event dialog box does not close. In other cases, the Event dialog box closes. Even if an event condition is being edited, it is not entered. The ESC key has the same operation.
(Select mode)	

 (Select mode)	Returns to the original setting dialog box without selecting the event condition. If an event condition has been edited/changed/deleted, the  button becomes this button. If the Event dialog box is already open, the select mode returns to the normal mode only, and the Event dialog box does not close. In other cases, the Event dialog box closes. Even if an event condition is being edited, it is not entered. The  key has the same operation.
	Opens the help window.
	Opens the Event Link dialog box.
	Opens the Break dialog box.
	Opens the Trace dialog box.
 Note 1	Opens the Snap Shot dialog box.
 Note 2	Opens the DMM dialog box.
 Note 1	Opens the Timer dialog box.
 Note 3	Opens the Stub dialog box,
	Opens the Event Manager.
	Displays the event manager area. Expands the size of the dialog box. When the event manager area is not displayed, this button is displayed in place of the  button.
	Does not display the event manager area. Shrinks the size of the dialog box. When the event manager area is displayed, this button is displayed in place of the  button.
	Opens the setting dialog boxes and displays the event, event link, break, trace, snapshot^{Note 1}, DMM^{Note 2}, timer^{Note 1}, or stub^{Note 3} conditions selected in the event manager area.

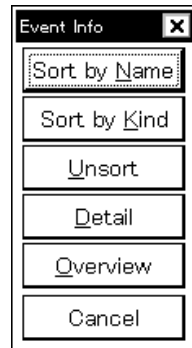
- Notes**
1. Not supported in the ID78K4-NS
 2. Not supported in the ID78K4 (-NS)
 3. Supported only in the ID78K4



Deletes the event, event link, break, trace, snapshot^{Note 2}, DMM^{Note 3}, timer^{Note 2}, or stub^{Note 1} conditions selected in the event manager area.



Opens the Event Info dialog box.



The button rearranges events in name order and displays them.

The button rearranges the events in order by type and displays them.

The button displays the events in the order in which they were entered without rearranging them.

The button changes the event manager area to the detailed display mode.

The button changes the event manager area to the list display mode.

The button or the key closes the dialog box.

Notes 1. Supported only in the ID78K4

2. Not supported in the ID78K4-NS

3. Not supported in the ID78K4 (-NS)

Title bar

In the normal mode, [Event] is displayed as the title in the title bar.

Title bar
Event

In the select mode, the title in the title bar becomes as follows in accordance with the original setting dialog box that called the Event dialog box.

Title Bar	Original Setting Dialog Box
Event – Break	Break dialog box
Event – Trace	Trace dialog box
Event – Snap Shot	Snap Shot dialog box ^{Note 1}
Event – DMM	DMM dialog box ^{Note 2}
Event – Timer	Timer dialog box ^{Note 1}
Event – Stub	Stub dialog box ^{Note 3}
Event – Event Link	Event Link dialog box
Event – Event Link – Break	Event Link dialog box (While in the Break dialog box select mode)
Event – Event Link – Trace	Event Link dialog box (While in the Trace dialog box select mode)
Event – Event Link – Snap Shot ^{Note 1}	Event Link dialog box (While in the Snap Shot dialog box select mode)
Event – Event Link – Timer ^{Note 1}	Event Link dialog box (While in the Timer dialog box select mode)
Event – Event Link – Stub ^{Note 3}	Event Link dialog box (While in the Stub dialog box select mode)

- Notes**
1. Not supported in the ID78K4-NS
 2. Not supported in the ID78K4 (-NS)
 3. Supported only in the ID78K4

Event Link Dialog Box

General

Registers and displays event link conditions.

The event link conditions created (registered) in this dialog box are automatically registered to the Event Manager.

Opening method

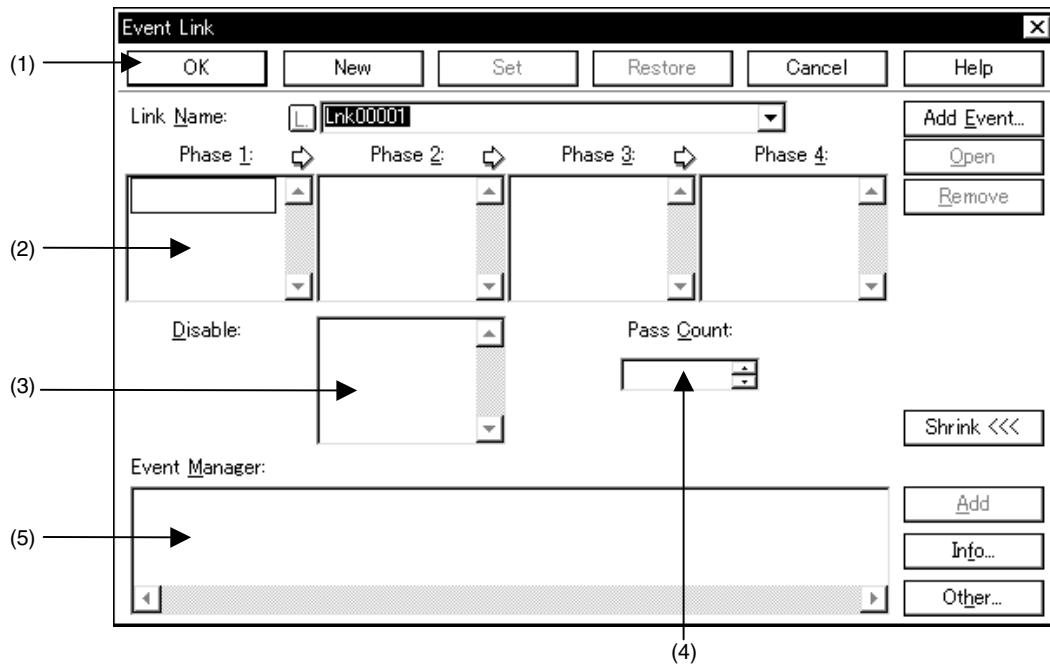
This dialog box can be opened by one of the following methods.

- In the main window
Select [Event] → [EventLink...] from the menu bar.
Press the **[GRPH]** + **[N]**, and **[L]** keys in that order.
- In the Event dialog box
Click the **Event Link...** button.
Press the shortcut keys **[GRPH]** + **[L]**.
- Execute one of the following operations in the Break dialog box.
Click the **Add Link...** button.
Press the shortcut keys **[GRPH]** + **[L]**.
- Execute one of the following operations in the event setting area or the event manager area of the Event, Break, Trace, Snap Shot^{Note 1}, DMM^{Note 2}, Timer^{Note 1}, or Stub^{Note 3} dialog boxes.
Select the event link condition and click **Open**.
Select the event link condition and press the shortcut keys **[GRPH]** + **[O]**.
Double-click the event link condition.
- In the Event Manager, execute one of the following operations.
Select an event link condition and click **Open**.
Double-click the event link condition.
- Execute one of the following operations in the New Event dialog box or the Set Other dialog box.
Click the **Event Link...** button.
Press the shortcut keys **[GRPH]** + **[L]**.

- Notes**
1. Not supported in the ID78K4-NS
 2. Not supported in the ID78K4 (-NS)
 3. Supported only in the ID78K4

Window

Figure 6-64. Event Link Dialog Box



- (1) Event link name setting area
- (2) Link condition setting area
- (3) Disable condition setting area^{Note}
- (4) Pass count setting area^{Note}
- (5) Event manager area

Note Supported only in the ID78K4

Function

Registers and displays event link conditions.

If the event link conditions are satisfied, an event occurs only if the user program is executed in the specified order of the event conditions that have been set.

Up to 256 event link conditions can be registered.

However, the number of event link conditions which can be used simultaneously is 1.

The Event Link dialog box has two modes, the normal mode and the select mode.

- Normal mode

When [Event] → [Event Link...] from the menu bar in the main window is selected and the Event Link dialog box is opened, event link conditions can be entered without restriction as to purpose. This is the normal mode.

- Select mode

When in the Break dialog box is clicked and the Event Link dialog box is opened, the event conditions used by these are selected. This is the select mode.

In the select mode, when is clicked, the event link condition selected in the event link name setting area of the Event Link dialog box is set in the event condition setting area of the setting dialog box that originally called the Event Link dialog box.

Even in the select mode, event conditions can be entered and displayed just as in the normal mode.

Depending on the mode, the title bar display on the dialog box will differ. Refer to the section entitled [Title Bar] described later.

The Event Link dialog box consists of the following areas.

- Event link name setting area
- Link condition setting area
- Disable condition setting area^{Note}
- Pass count setting area^{Note}
- Event manager area

Note Supported only in the ID78K4

The function of each area is explained below.

(1) Event link name setting area

Link Name: ☐ 

Lnk00001

Lnk00002

Lnk00003

Lnk00004

This area sets event link names and selects event link conditions.

When entering an event link condition, it is necessary to set an event link name.

An event link name may consist of up to eight alphanumeric characters.

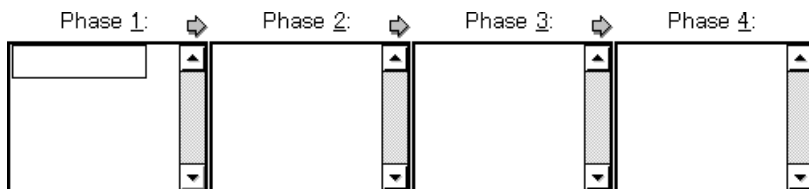
When displaying event link conditions which have already been created, either type the event link name of the already created event link condition in the text box or select the event link condition from the drop-down list in the event link name setting area.

In the select mode, the selected event link condition can be set in the event link condition setting area of the original setting dialog box that called the Event Link dialog box.

The ☐ mark on the left side of the event link name setting area shows the use conditions of the event link condition.

The relationship between the color of the character in the ☐ mark and the status is shown below.

Color of Character in ☐ Mark	Condition
Red	Indicates that that event link condition is being used and that it is enabled.
Black	Indicates that that event link condition has not been enabled.
Gray	Indicates that that event link condition is currently being edited and that it has not been entered.
Yellow	Indicates that that event is an event which is in the hold state. An event in the hold state is in a state where the symbol specified by the event condition by program download, etc. cannot be referred to.

(2) Link condition setting area

This area sets the sequence of event detection as a link condition.

Event conditions are set in four steps, from Phase 1 to Phase 4. Event conditions need not be set up to Phase 4. If Phase 4 is not set, an event occurs when the event condition set to the last Phase is detected.

Event conditions can be set in only Phase 1, and same event conditions can be set in two or more Phases.

The number of event conditions that can be set to each Phase in the link condition setting area is up to 1^{Note 1}.

Also, the only type of event condition that can be set to each Phase in the link condition setting area is on execution event^{Note 2}.

Notes 1. Up to 10 event conditions can be set in the ID78K4.

2. An event condition for which the pass count is set to 1 or an access event condition can be set in the ID78K4.

To set an event condition, use one of the following methods.

- Click **Add Event...** and open the Event dialog box in the "Select mode", then select the event conditions to be set.
- In the event manager area, select one (or more than one) event condition, then click **Add** or set it by a drag-and-drop operation.

Setting of an event condition by a drag-and-drop operation is possible even from outside the Event Link dialog box's event manager area; event conditions can be set from the event manager area of each setting dialog box and from the Event Manager.

When the focus is on each Phase of the link condition setting area, click **Remove** to delete the event condition selected in the Phase which was focused on.

It can also be deleted by pressing the **DEL** key.

Each Phase of the link condition setting area and the event conditions in the disable condition setting area can be copied mutually or moved by drag-and-drop. The contents are shown below.

- If an event condition is dropped only by the mouse, it is moved.
- If it is dropped while pressing the **SHIFT** key, the event condition is moved.
- If it is dropped while pressing the **CTRL** key, the event condition is copied.

Selecting only one event condition in the link condition setting area and clicking **Open** or double-clicking it opens the Event dialog box and displays the contents of the event condition.

(3) Disable condition setting area (ID78K4 only)

This area sets an event condition that invalidates the event condition that has been satisfied.

The number of event conditions that can be set in the disable condition setting area is up to 10, with both execution events and access events combined.

Set an event condition with a pass count set to 1. An event condition with a pass count set to 2 or more cannot be set.

Click the **Add Event...** button and open the Event dialog box in the "select mode," then select the event conditions to be set.

Or, select an event condition in the event manager area and click the **Add** button or set it by a drag-and-drop operation.

Setting of an event condition by drag-and-drop is possible even from outside the Event Link dialog box's event manager area; event conditions can be set from the event manager area of each setting dialog box and from the Event Manager.

When the focus is on the disable condition setting area, click the **Remove** button to delete the selected event condition.

It can also be deleted by pressing the **DEL** key.

Each Phase of the disable condition setting area and the link condition setting area can be copied manually or moved by drag-and-drop as follows:

- If an event condition is dropped only by the mouse, it is moved.
- If it is dropped while pressing the **SHIFT** key, the event condition is moved.
- If it is dropped while pressing the **CTRL** key, the event condition is copied.

Selecting only one event condition in the disable condition setting area and clicking the **Open** button opens the Event dialog box and displays the contents of the event condition.

The disable condition setting area is blank when there is a newly created event condition.

(4) Pass count setting area (ID78K4 only)

Pass Count:

 A rectangular text box containing the number '1'. To the right of the box are two small square buttons with upward and downward arrows, indicating a spin control.

This area sets a pass count condition.

Setting range: $1 \leq \text{Pass count value} \leq 32,767$

This area sets the condition that is to be satisfied if an event link condition has been satisfied a given number of times while the user program is executed.

If the pass count is set to 1, the condition is satisfied as soon as the event link condition has been satisfied.

If the pass count is set to 2 or more, the number of events that can be simultaneously enabled is up to two, with event conditions and event link conditions combined.

If a value is directly input to the text box, 1 is assumed.

The pass count is also assumed to be 1 when there is a newly created event link condition.

(5) Event manager area

Event Manager:

 A large rectangular list box with a horizontal scrollbar at the bottom. The list box is currently empty.

This area displays a list of each of the entered events, event links, breaks, traces, snapshots^{Note 1}, timer^{Note 1}, and Stub^{Note 2} events.

An event condition that is displayed in the event manager area can be set in the link condition setting area or disable condition setting area by clicking .

By dragging it from the event manager area in the Event Link dialog box, it can be set in the event setting area in each setting dialog box for break, trace, snapshot, and timer.

When the focus is on the event manager area, select the event icon and click , or press the key to delete the selected event.

Also, when the focus is on the event manager area, select one event icon, then click , or double-click the event icon to open the setting dialog box corresponding to the selected event and display the event's setting contents.

By clicking , it is possible to select the event manager area display mode or sequencing.

Notes 1. Not supported in the ID78K4-NS

2. Supported only in the ID78K4

Function buttons

OK

(Normal mode)

Closes the Event Link dialog box.

If there is an event link condition that is being edited, it is entered automatically and the dialog box is closed.

OK

(Select mode)

Sets the displayed event as the event link condition in the original dialog box that called the Event Link dialog box.

If the Event Link dialog box is already open, the select mode returns to the normal mode only and the Event Link dialog box does not close. In other cases, it closes.

If there is an event link condition being edited, enter/select is performed automatically and the program returns to the original setting dialog box.

New

Newly creates an event link condition.

An event name is generated automatically and a newly created event link condition is prepared. After it is created, be sure to enter the event link condition using the or the button.

Set

Enters an event link condition.

When a new event link condition has been created or when the contents of an event link condition have been changed, be sure to enter the event link condition using this button. The entered event link condition is reflected in the Event Manager.

If event link conditions that have already been entered are displayed, they cannot be selected.

Clear

Clears the contents of an event link condition.

If an event link condition is entered but not edited, the button is displayed in place of this button.

Restore

Returns the contents of an event link condition to the original contents.

If an event link condition that has not been entered is displayed, all the area is made blank except the event link name, or the settings return to the default settings.

If an event link condition is being edited, the button is displayed in place of this button.

Close

(Normal mode)

Closes the Event Link dialog box.

If an event link condition has been created/changed/deleted, after that, the button becomes this button.

Even if there is an event link condition that is being edited, the dialog box closes without the event link condition being entered.

The key has the same operation.


(Normal mode)

Closes the Event Link dialog box.

If an event link condition is not being created/changed/deleted, this button is displayed.

Even if an event link condition is being edited, the dialog box closes without the event link condition being entered.

The  key has the same operation.


(Select mode)

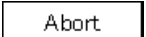
Returns to the original setting dialog box that called the Event Link dialog box without an event link condition being selected.

If an event link condition is not being created/changed/deleted, the  button becomes this button.

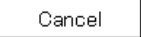
If the Event Link dialog box is already open, the select mode returns to the normal mode only, and the Event Link dialog box does not close. In other cases, the Event Link dialog box closes.

Even if an event link condition is being edited, it is not entered.

The  key has the same operation.


(Select mode)

Returns to the original setting dialog box without selecting the event link condition.

If an event link condition has been created/changed/deleted, the  button becomes this button.

If the Event Link dialog box is already open, the select mode returns to the normal mode only, and the Event Link dialog box does not close. In other cases, the Event Link dialog box closes.

Even if an event link condition is being edited, it is not entered.

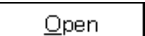
The  key has the same operation.



Opens the help window.



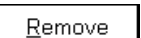
Opens the select mode in the Event dialog box and makes additional settings in the link condition setting area or disable condition setting area. The area where additional settings are made becomes the selected area when  is clicked.



Opens each setting dialog box for the event selected in the link condition setting area, disable condition setting area or event manager area and displays the contents.

If an event is not selected, or if multiple events are selected, selection cannot be made.

The operation is the same as double-clicking the event icon.



Deletes the event selected in the link condition setting area, disable condition setting area or event manager area.

The same operation is performed by pressing the  key.

Expand >>>

Displays the event manager area. Expands the size of the dialog box.
When the event manager area is not displayed, this button is displayed in place of the Shrink <<< button.

Shrink <<<

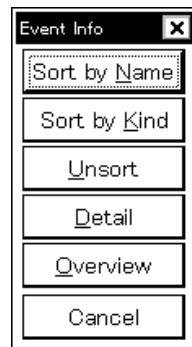
Does not display the event manager area. Shrinks the size of the dialog box.
When the event manager area is displayed, this button is displayed in place of the Expand >>> button.

Add

Adds an event condition or event link condition selected in the event manager area to the link condition setting area or disable condition setting area and sets it.
The area where it is added becomes the selected area when Add is clicked.

Info...

Opens the Event Info dialog box.



The Sort by Name button rearranges events in name order and displays them.

The Sort by Kind button rearranges the events in order by type and displays them.

The Unsort button displays the events in the order in which they were entered without rearranging them.

The Detail button changes the event manager area to the detailed display mode.

The Overview button changes the event manager area to the list display mode.

The Cancel button or the ESC key closes the dialog box.

Other...

This opens the Set Other dialog box.

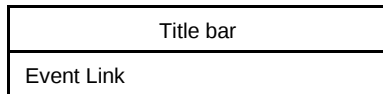


Clicking each button opens the Event Manager and the Event, Break, Trace, Snap Shot^{Note 1}, DMM^{Note 2}, Timer^{Note 1}, or Stub^{Note 3} dialog box, and closes the dialog box. Close the dialog box by clicking or and return to the Event Link dialog box.

- Notes**
1. Not supported in the ID78K4-NS
 2. Not supported in the ID78K4 (-NS)
 3. Supported only in the ID78K4

Title bar

In the normal mode, [Event Link] is displayed as the title in the title bar.



In the select mode, the title in the title bar becomes as follows in accordance with the original setting dialog box that called the Event Link dialog box.

Title Bar	Original Setting Dialog Box
Event Link – Break	Break dialog box
Event Link – Trace	Trace dialog box
Event Link – Snap Shot	Snap Shot dialog box ^{Note 1}
Event Link – DMM	DMM dialog box ^{Note 2}
Event Link – Timer	Timer dialog box ^{Note 1}
Event Link – Stub	Stub dialog box ^{Note 3}

- Notes**
1. Not supported in the ID78K4-NS
 2. Not supported in the ID78K4 (-NS)
 3. Supported only in the ID78K4

Break Dialog Box

General

Registers, sets, and displays break event conditions.

The break event conditions registered in this dialog box are automatically registered to the Event Manager.

Opening method

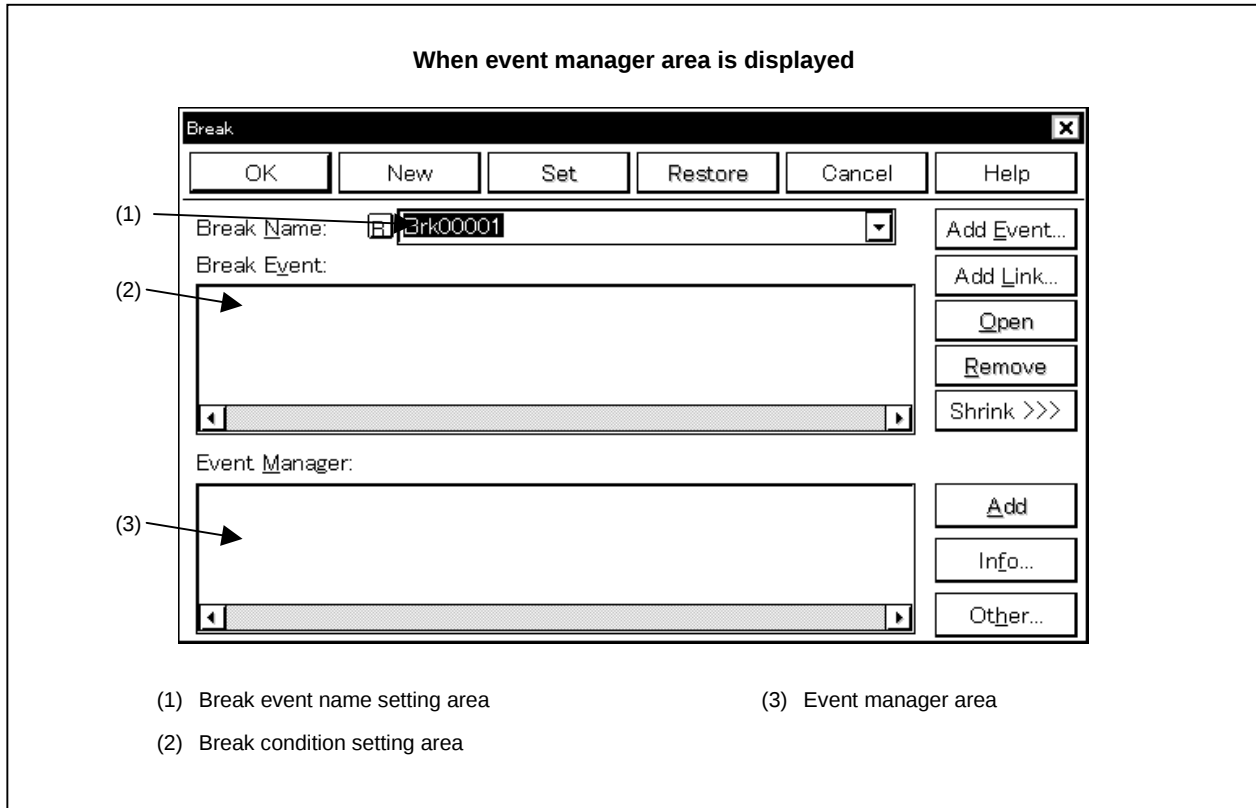
This dialog box can be opened by one of the following methods.

- In the main window
Select [Event] → [Break...] from the menu bar.
Press the **[GRPH]** + **[N]**, and **[B]** keys in that order.
Click the  button on the toolbar.
- In the Event dialog box
Click the **[Break...]** button.
Press the shortcut keys **[GRPH]** + **[B]**.
- Execute one of the following operations in the event manager area in the Event, Event Link, Trace, Snap Shot^{Note 1}, DMM^{Note 2}, Timer^{Note 1}, or Stub^{Note 3} dialog box.
Select the break event condition and click **[Open]**.
Select the break event condition and press the shortcut keys **[GRPH]** + **[O]**.
Double-click the break event condition.
- In the Event Manager, execute one of the following operations.
Select an break event condition and click **[Open]**.
Double-click the break event condition.
- Execute one of the following operations in the New Event dialog box or the Set Other dialog box.
Click the **[Break...]** button.
Press the shortcut keys **[GRPH]** + **[B]**.

- Notes**
1. Not supported in the ID78K4-NS
 2. Not supported in the ID78K4 (-NS)
 3. Supported only in the ID78K4

Window

Figure 6-65. Break Dialog Box



Function

Registers, sets, and displays break event conditions.

Up to 256 break event conditions can be entered. However, when the IE-78K0-NS is used, the number of break event conditions that can be used simultaneously is 12, when the IE-78K0-NS-PA is installed in the IE-78K0-NS or the IE-78K0-NS-A/IE-78K0S-NS-A is used, this number is 28, when the IE-784000-R is used, this number is 10, and when IE-78K4-NS is used, this number is 8.

Break event conditions become valid automatically when they are entered. However, if the number of break event conditions exceeds the number that can be used simultaneously, or if the number of event conditions or event link conditions in use exceeds the number that can be used simultaneously, the break event conditions are entered in the disabled state. Also, in this case, a break event condition cannot be enabled.

Note that if [Run] → [Ignore Break Point] is selected, the break event condition will not operate even if it is enabled.

The Break dialog box consists of the following areas.

- Break event name setting area
- Break condition setting area
- Event manager area

The function of each area is explained below.

(1) Break event name setting area

Break Name:  Brk00009

- Brk00001
- Brk00002
- Brk00003
- Brk00004
- Brk00005
- Brk00006

This area sets break event names and selects break event conditions. When entering an event condition, it is necessary to set a break event name. Break event names of up to 8 alphanumeric characters can be set.

When displaying break event conditions which have already been created, either type the break event name of the already created break event condition in the text box or select the break event condition from the drop-down list in the break event name setting area.

Clicking the  mark in the break event name setting area switches between enabling or disabling the break event condition.

The relationship between the color of the character in the  mark and the status is shown below.

Color of Character in  Mark	Condition
Red	Indicates that the break event condition has been enabled. A break event occurs if the condition is satisfied.
Black	Indicates that the break event condition has not been enabled. No break event occurs if the condition is satisfied.
Gray	Indicates that the break event condition is currently being edited and that it has not been entered.
Yellow	Indicates that the break event is an event which is in the hold state. An event in the hold state is in a state where the symbol specified by the event condition by program download, etc. cannot be referred to.

(2) Break condition setting area

Break Event:

◀
▶

This area sets an event condition for a break.

The number of event conditions that can be set in the break condition setting area is 12 when the IE-78K0-NS is used (8 execution events and 4 access events), 28 when the IE-78K0-NS-PA is installed in the IE-78K0-NS or the IE-78K0-NS-A or IE-78K0S-NS-A is used (16 execution events and 12 access events), 10 when the IE-784000-R is used, and 8 when the IE-78K4-NS is used.

Also, the number of event link conditions that can be used simultaneously is up to 2, as long as the number of event conditions in use does not exceed the number of event conditions that can be used simultaneously.

Carry out setting of the disable conditions by one of the following methods.

- Click and open the Event dialog box in the select mode, then select the event condition which is to be set.
- Click and open the Event Link dialog box in the select mode, then select the event link condition which is to be set.
- Select an event link condition in the event manager area and click , or make the setting by a drag-and-drop operation.

When setting the event condition or event link condition by a drag-and-drop operation, besides the event manager area in the Break dialog box, it is possible to set it from the event manager area and Event Manager in each setting dialog box.

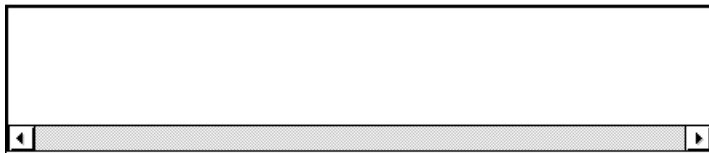
When the focus is on the break condition setting area, clicking deletes the selected event condition or event link condition.

It can also be deleted by key.

If only one event condition or event link condition in the break condition setting area is selected and is clicked or the item is double-clicked, the Event dialog box or Event Link dialog box is opened and the event condition or event link condition contents are displayed.

(3) Event manager area

Event Manager:



This area displays a list of each of the entered events, event link, break, trace, snapshot^{Note 1}, DMM^{Note 2}, timer^{Note 1}, and stub^{Note 3} events.

An event or event link condition that is displayed in the event manager area can be set in the break condition setting area by clicking .

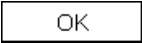
Also, event conditions or event link conditions in the event manager area can be dragged directly to the break condition setting area.

When the focus is on the event manager area, select the event icon and click , or press the key to delete the selected event.

Also, when the focus is on the event manager area, select one event icon, then click , or double-click the event icon to open the setting dialog box corresponding to the selected event and display the event's setting contents.

By clicking , it is possible to select the event manager area display mode or sequencing.

- Notes**
1. Not supported in the ID78K4-NS
 2. Not supported in the ID78K4 (-NS)
 3. Supported only in the ID78K4

Function buttonsOK

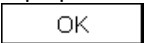
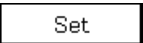
Closes the Break dialog box.

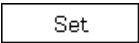
If there is a break event condition that is being edited, it is entered automatically and the dialog box is closed.

A break event conditions are enabled as soon as it is entered.

New

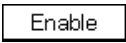
Newly creates a break event condition.

A break event name is generated automatically and a newly created break event condition is prepared. After it is created, be sure to enter the break event condition using the  or the  button.

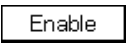
Set

Enters the break event condition.

This button is displayed when a new break event condition is created or when the contents of a break event condition have been changed. In this case, be sure to enter the break event condition.

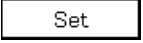
If a break event condition that has already been entered is displayed, this button changes to either the  button or the  button.

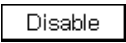
A break event condition is enabled as soon as it is entered.

Enable

Enables a break event condition.

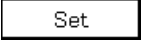
This button is displayed in cases where a break event condition is in the disabled state.

It changes to either the  button or the  button.

Disable

Disables a break event condition.

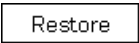
This button is displayed in cases where a break event condition is in the enabled state.

It changes to either the  button or the  button.

Clear

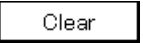
Clears the contents of a break event condition.

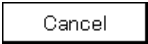
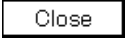
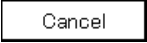
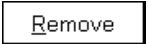
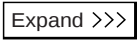
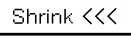
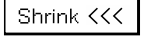
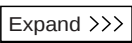
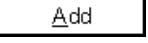
If a break event condition is entered but not edited, this button is displayed. It changes to the  button.

Restore

Restores the break event condition to its original contents.

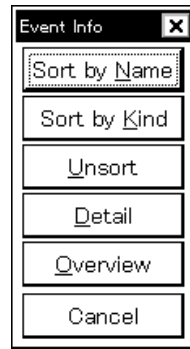
If a break event condition that has not been entered is displayed, the display area is restored to the blank state except for the break event name.

This button is displayed in the case where a break event condition is being edited. It changes to the  button.

	Closes this dialog box. If a break event condition is not being created/changed/deleted, this button is displayed. Even if a break event condition is being edited, this dialog box is closed without entering the condition. The  key has the same operation.
	Closes this dialog box. If a break event condition has being created/changed/deleted, the  button becomes this button. Even if a break event condition is being edited, this dialog box is closed without entering the condition. The  key has the same operation.
	Opens the help window.
	Opens the Event dialog box in the select mode and selects the set event condition.
	Opens the Event Link dialog box in the select mode and selects the set event link condition.
	Displays the contents of an event selected in the break condition setting area or the event manager area by opening each setting dialog box. Its operation is the same as double-clicking the event icon. When the event icon is not selected, or if multiple icons have been selected, this button is disabled.
	Deletes an event selected in the break condition setting area or the event manager area. Pressing the  key performs the same operation.
	Displays the event manager area. Expands the size of the dialog box. When the event manager area is not displayed, this button is displayed in place of the  button.
	Does not display the event manager area. Shrinks the size of the dialog box. When the event manager area is displayed, this button is displayed in place of the  button.
	Adds the event condition or event link condition selected in the event manager area to the break condition setting area. An event other than an event condition or an event link condition cannot be added.

Info...

Opens the Event Info dialog box.



The **Sort by Name** button rearranges events in name order and displays them.

The **Sort by Kind** button rearranges the events in order by type and displays them.

The **Unsort** button displays the events in the order in which they were entered without rearranging them.

The **Detail** button changes the event manager area to the detailed display mode.

The **Overview** button changes the event manager area to the list display mode.

The **Cancel** button or the **ESC** key closes the dialog box.

Other...

Opens the Set Other dialog box.



Clicking each button opens the Event Manager and the Event, Event Link, Trace, Snap Shot^{Note 1}, DMM^{Note 2}, Timer^{Note 1}, or Stub^{Note 3} dialog box, and closes the dialog box.

Close the dialog box by clicking **Cancel** or **Break...** and return to the Break dialog box.

- Notes**
1. Not supported in the ID78K4-NS
 2. Not supported in the ID78K4 (-NS)
 3. Supported only in the ID78K4

Trace Dialog Box

General

Registers, sets, and displays trace event conditions.

The trace event conditions registered in this dialog box are automatically registered to the Event Manager.

Opening method

This dialog box can be opened by one of the following methods.

- In the main window
Select [Event] → [Trace...] from the menu bar.
Press the **GRPH** + **N**, and **T** keys in that order.
Click the  button on the toolbar.
- In the Event dialog box
Click the **Trace...** button.
Press the shortcut keys **GRPH** + **T**.
- Execute one of the following operations in the event manager area in the Event, Event Link, Break, Snap Shot^{Note 1}, DMM^{Note 2}, Timer^{Note 1}, or Stub^{Note 3} dialog box.
Select the trace event condition and click the **Open** button.
Select the trace event condition and press the shortcut keys **GRPH** + **O**.
Double-click the trace event condition.
- Execute one of the following operations in the Event Manager.
Select the trace event condition and click the **Open** button.
Double-click the trace event condition.
- Execute one of the following operations in the New Event dialog box or Set Other dialog box.
Click the **Trace...** button.
Press the shortcut keys **GRPH** + **T**.

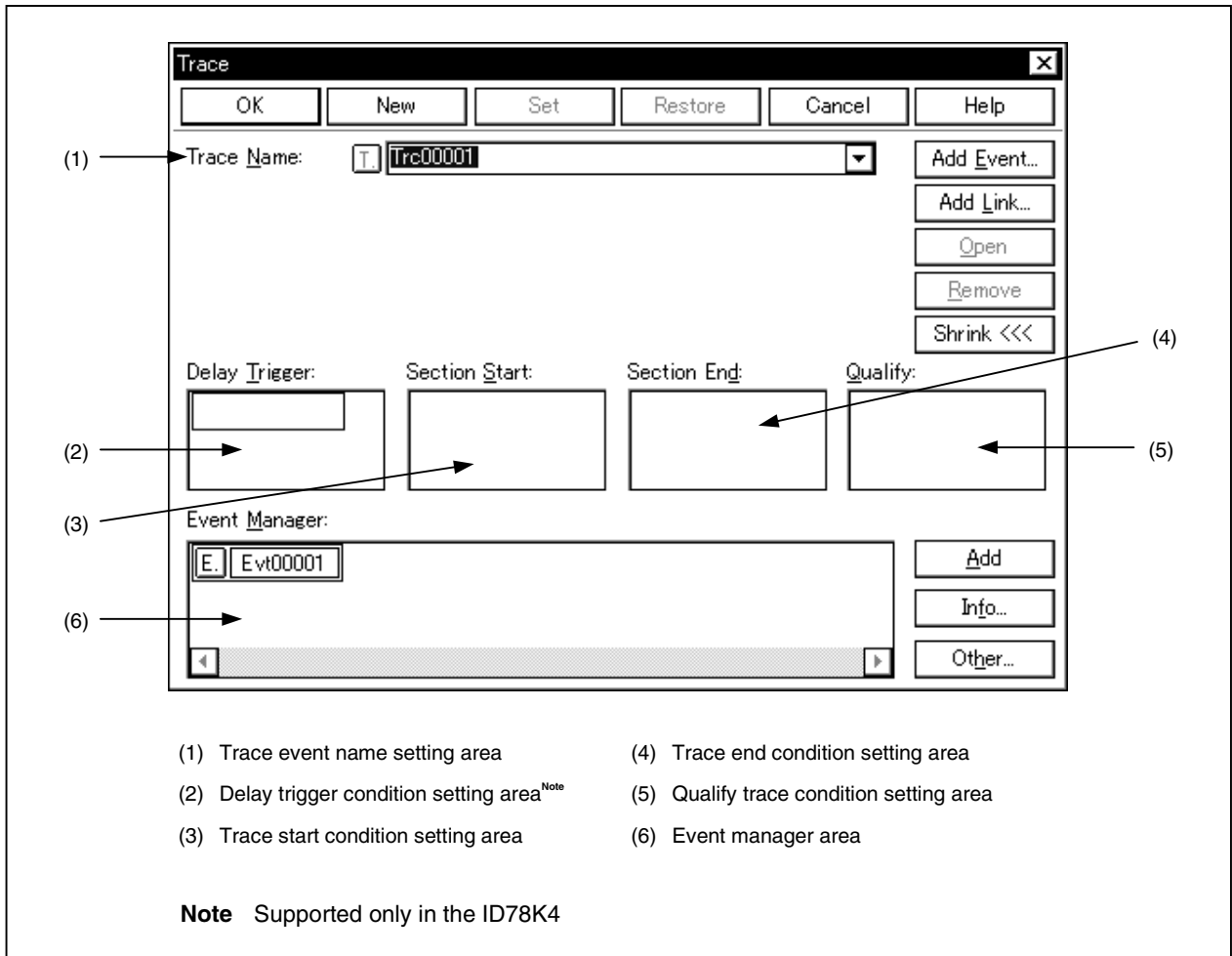
Notes 1. Not supported in the ID78K4-NS

2. Not supported in the ID78K4 (-NS)

3. Supported only in the ID78K4

Window

Figure 6-66. Trace Dialog Box



Function

Sets various types of trace operations, and registers, sets and displays trace event conditions.

The trace operation settings shown in (a) and (b) below can be executed.

(a) Operation when trace data is written to entire trace memory

The trace frame makes a scan of the trace memory and when it arrives at the oldest frame, it continues the trace operation and overwrites the oldest trace frame.

(b) Setting trace event conditions

The following three types of trace event conditions can be set when the IE-78K0-NS-PA is installed in the IE-78K0-NS, when the IE-78K0-NS-A or IE-78K0S-NS-A is used, or when the IE-784000-R is used,

- Section trace start event condition
- Section trace end event condition
- Qualify event condition

The following event condition can be set only when the IE-784000-R is used.

- Delay trigger event condition

Up to 256 trace event conditions can be entered. However, the number of trace event conditions that can be used simultaneously is 1^{Note}.

Trace event conditions become valid automatically when they are entered. However, if an enabled trace event condition already exists, or if the number of event conditions or event link conditions in use exceeds the number that can be used simultaneously, the trace event conditions are entered in the disabled state. Also, in this case, a trace event condition cannot be enabled.

A trace is performed only when the tracer is in the enabled state. Set it by the procedure shown below.

Note Ten trace event conditions can be used in the ID78K4.

- When performing a trace or a qualify trace, select [Run] → [Cond. Trace ON], and in other cases, select [Run] → [Uncond. Trace ON].

During emulation, in order to stop the currently operating tracer, select [Run] → [Tracer Stop] from the menu bar. Also, during emulation, in order to run the currently stopped tracer, select [Run] → [Tracer Start] from the menu bar. These two menus toggle and their display changes according to the current tracer state.

Note, however, that this operation is valid only when [Run] → [Ignore Break Point] is selected and executed.

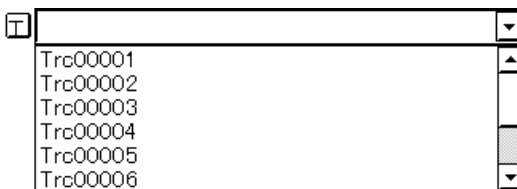
This dialog box consists of the following areas.

- Trace event name setting area
- Delay trigger condition setting area^{Note}
- Trace start condition setting area
- Trace end condition setting area
- Qualify trace condition setting area
- Event manager area

Note Supported only in the ID78K4

The function of each area is explained below.

(1) Trace event name setting area

Trace Name: 

This area sets trace event names and selects trace event conditions.

When entering a trace event condition, it is necessary to set a trace event name.

Trace event names that can be set must be of 8 alphanumeric characters or less.

When displaying trace event conditions which have already been created, either type the trace event name of the already created trace event condition in the text box or select one from the drop-down list in the trace event name setting area.

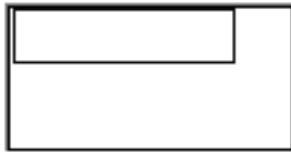
Clicking the  mark in the trace event name setting area switches between enabling or disabling the trace event condition.

The relationship between the color of the character in the  mark and the status is shown below.

Color of Character in  Mark	Condition
Red	Indicates that the trace event condition has been enabled. A trace event occurs if the condition is satisfied.
Black	Indicates that the trace event condition has not been enabled. No trace event occurs if the condition is satisfied.
Gray	Indicates that the trace event condition is currently being edited and that it has not been entered.
Yellow	Indicates that the trace event is an event which is in the hold state. An event in the hold state is in a state where the symbol specified by the event condition by program download, etc. cannot be referred to.

(2) Delay trigger condition setting area (ID78K4 only)

Delay T trigger:



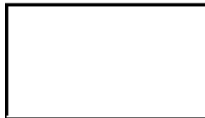
This area sets the delay trigger event condition.

It is blank in the case of newly created event conditions.

The number of event conditions that can be set in the delay trigger condition setting area is up to 10 (3 execution events and 7 access events).

(3) Trace start condition setting area

Section S start:



This area sets an event condition for starting a trace.

In the ID78K0-NS, ID78K0S-NS, the number of event conditions that can be set in the trace start condition setting area is 16 (8 execution events and 8 access events).

In the ID78K4, up to 10 event conditions (3 execution events and 7 access events) can be set. The number of event link conditions that can be set is 2.

In the ID78K4-NS, the number of event conditions that can be set is 1.

Carry out setting of the trace start conditions by one of the following methods.

- Click and open the Event dialog box in the select mode, then select the event condition which is to be set.
- Click and open the Event Link dialog box in the select mode, then select the event link condition which is to be set.
- Select one or more event condition or event link condition in the event manager area and click , or make the setting by drag-and-drop.

When setting the event condition or event link condition by drag-and-drop, besides the event manager area in the Trace dialog box, it is possible to set it from the event manager area and Event Manager in each setting dialog box.

When the focus is on the trace start condition setting area, click the button, or press the key to delete the selected event condition or event link condition.

It is possible to move and copy event conditions and event link conditions in the trace start condition setting area back and forth among the different setting areas in the Trace dialog box by drag-and-drop operations, as shown below.

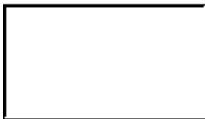
- If an event condition or event link condition is dropped only by the mouse, it is moved.
- If it is dropped while pressing the key, the event condition or event link condition is moved.
- If it is dropped while pressing the key, the event condition or event link condition is copied.

Selecting an event condition or event link condition in the trace start condition setting area and clicking or double-clicking it opens the Event dialog box or Event Link dialog box and displays the contents of the event condition or event link condition.

The trace start condition setting area is left blank when there is a newly created trace event condition.

(4) Trace end condition setting area

Section End



This sets an event condition for ending a trace.

When Trace Stop is selected in the trace full mode, the trace end condition cannot be set.

The number of event conditions that can be set in the trace end condition setting area is 16 (8 execution events and 8 access events).

In the ID78K4, up to 10 event conditions (3 execution events and 7 access events) can be set. The number of event link conditions that can be set is 2.

In the ID78K4-NS, the number of event conditions that can be set is 1.

Carry out setting of the trace end conditions by one of the following methods.

- Click and open the Event dialog box in the select mode, then select the event condition which is to be set.
- Click and open the Event Link dialog box in the select mode, then select the event link condition which is to be set.
- Select one or more event condition or event link condition in the event manager area and click , or make the setting by drag-and-drop.

When setting the event condition or event link condition by drag-and-drop, besides the event manager area in the Trace dialog box, it is possible to set it from the event manager area and Event Manager in each setting dialog box.

When the focus is on the trace ending condition setting area, click the **Remove** button, or press the **DEL** key to delete the selected event condition or event link condition.

It is possible to move and copy event conditions and event link conditions in the trace end condition setting area back and forth among the different setting areas in the Trace dialog box by drag-and-drop operations, as shown below.

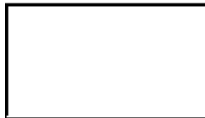
- If an event condition or event link condition is dropped only by the mouse, it is moved.
- If it is dropped while pressing the **SHIFT** key, the event condition or event link condition is moved.
- If it is dropped while pressing the **CTRL** key, the event condition or event link condition is copied.

Selecting an event condition or event link condition in the trace end condition setting area and clicking **Open** or double-clicking it opens the Event dialog box or Event Link dialog box and displays the contents of the event condition or event link condition.

The trace end condition setting area is left blank when there is a newly created trace event condition.

(5) Qualify trace condition setting area

Qualify:



This area sets event conditions for a qualify trace.

A qualify trace is executed only when the trace condition is satisfied.

If two or more event conditions are set, the trace is executed when each event condition is satisfied.

The number of event conditions that can be set in the qualify trace condition setting area is 4 (4 access events)^{Note 1}.

The number of event link conditions that can be set is 1^{Note 2}.

Carry out setting of the qualify trace condition by either of the following methods.

Notes 1. For the IE-784000-R, up to 10 event conditions

2. For the IE-784000-R, the number of event link conditions is up to 2

- Click **Add Event...** and open the Event dialog box in the select mode, then select the event condition which is to be set.
- Select one or more event condition in the event manager area and click **Add**, or make the setting by drag-and-drop.

When setting the event condition by drag-and-drop, besides the event manager area in the Trace dialog box, it is possible to set it from the event manager area and Event Manager in each setting dialog box.

When the focus is on the qualify trace condition setting area, click the **Remove** button, or press the **DEL** key to delete the selected event condition.

It is possible to move and copy event conditions in the qualify trace condition setting area back and forth among the different setting areas in the Trace dialog box by drag-and-drop operations, as shown below.

- If an event condition is dropped only by the mouse, it is moved.
- If it is dropped while pressing the **SHIFT** key, the event condition is moved.
- If it is dropped while pressing the **CTRL** key, the event condition is copied.

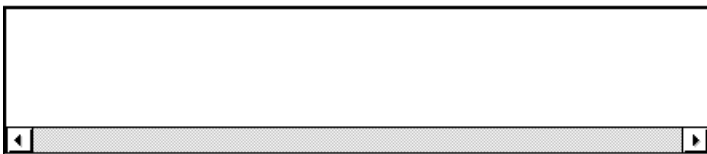
The event condition in the qualify trace condition setting area can be moved or copied alternately with other setting areas in the Trace dialog box by a drag-and-drop operation.

Selecting an event condition in the qualify trace condition setting area and clicking **Open** or double-clicking it opens the Event dialog box and displays the contents of the event condition.

The qualify trace condition setting area is left blank when there is a newly created trace event condition.

(6) Event manager area

Event Manager:



This area displays list of each event, event link, break, trace, snapshot^{Note 1}, DMM^{Note 2}, timer^{Note 1}, and stub^{Note 3} event.

By selecting an event condition or event link condition displayed in the event manager area and clicking **Add**, the event condition or event link condition, etc. can be set in the delay trigger condition setting area, trace start condition setting area, trace end condition setting area, qualify trace condition setting area and other setting areas.

Also the event condition or event link condition in the event manager area can be directly dragged to each event setting area.

When the focus is on the event manager area, select an event icon, and click the **Remove** button, or press the **DEL** key to delete the selected event.

When the focus is on the event manager area, selecting an event icon and clicking **Open** or double-clicking an event icon opens the setting dialog box corresponding to the selected event, and displays the contents of the event.

By clicking **Info...**, it is possible to select the event manager area display mode or sequencing.

- Notes**
1. Not supported in the ID78K4-NS
 2. Not supported in the ID78K4 (-NS)
 3. Supported only in the ID78K4

Function buttons

OK

Closes the Trace dialog box.

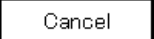
If there is a trace event condition that is being edited, it is entered automatically and the dialog box is closed.

A trace event condition becomes enabled as soon as it is entered.

New	Creates a new trace event condition. A trace event name is generated automatically and a newly created trace event condition is prepared. After it is created, be sure to enter the trace event condition using the OK or the Set button.
Set	Enters a trace event condition. When a new trace event condition has been created or when the contents of a trace event condition have been changed, be sure to enter the trace event condition using this button. If trace event conditions that have already been entered are displayed, it changes to either the Enable button or Disable button. A trace event condition becomes enabled as soon as it is entered.
Enable	Enables a trace event condition. This button is displayed in cases where a trace event condition is in the disabled state. It changes to either the Set button or the Disable button.
Disable	Disables a trace event condition. This button is displayed in cases where a trace event condition is in the enabled state. It changes to either the Set button or the Enable button.
Clear	Clears the contents of a trace event condition. If a trace event condition is entered but not edited, this button is displayed. It changes to the Restore button.
Restore	Returns the contents of a trace event condition to the original contents. If a trace event condition that has not been entered is displayed, all the area is made blank except the trace event name, or the settings return to the default settings. If a trace event condition is being edited, the Clear button is displayed in place of this button.
Cancel	Closes the Trace dialog box. If a trace event condition is not being created/changed/deleted, this button is displayed. Even if a trace event condition is being edited, the dialog box closes without the trace event condition being entered. The ESC key has the same operation.

Close

Closes the Trace dialog box.

If a trace event condition has been created/changed/deleted, after that, the  button becomes this button.

Even if there is a trace event condition that is being edited, the dialog box closes without the trace event condition being entered.

The  key has the same operation.

Help

Opens the Help window.

Add Event...

Opens the Event dialog box in the select mode and adds an event condition to the selected position in the delay trigger condition setting area, trace start condition setting area, trace end condition setting area or qualify trace condition setting area.

The area where the event condition is added becomes the selected area when  is clicked.

Add Link...

Opens the Event Link dialog box in the select mode and adds an event link condition to the selected position in the trace start condition setting area, trace end condition setting area or qualify trace condition setting area.

The area where the event link condition is added becomes the selected area when  is clicked.

Open

Displays the event contents selected in the trace start condition setting area, trace end condition setting area, qualify trace condition setting area or event manager area by opening each setting dialog box.

Its operation is the same as double-clicking the event icon.

When the event icon is not selected, or if multiple icons have been selected, this button is disabled.

Remove

Opens the Event Link dialog box in the select mode and deletes the event selected in the trace start condition setting area, trace end condition setting area, qualify trace condition setting area or event manager area.

The  key has the same operation.

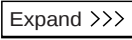
Expand >>>

Displays the event manager area. Expands the size of the dialog box.

When the event manager area is not displayed, this button is displayed in place of the  button.

Shrink <<<

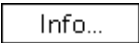
Does not display the event manager area. Shrinks the size of the dialog box.

When the event manager area is displayed, this button is displayed in place of the  button.

Add

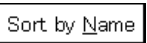
Adds the event condition or event link condition selected in the event manager area to the selected position in the trace start condition setting area, trace end condition setting area or qualify trace condition setting area.

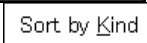
The area where the event condition is added becomes the selected area when  is clicked.

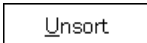
Info...

Opens the Event Info dialog box.



The  button rearranges events in name order and displays them.

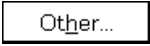
The  button rearranges the events in order by type and displays them.

The  button displays the events in the order in which they were entered without rearranging them.

The  button changes the event manager area to the detailed display mode.

The  button changes the event manager area to the list display mode.

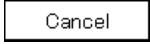
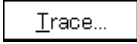
The  button or the  key closes the dialog box.

Other...

Opens the Set Other dialog box.



Clicking each button opens the Event, Event Link, Break, Snap Shot^{Note 1}, DMM^{Note 2}, Timer^{Note 1}, or Stub^{Note 3} dialog box and the Event Manager, and closes the Set Other dialog box.

Close the dialog box by clicking  or  and return to the Trace dialog box.

- Notes**
1. Not supported in the ID78K4-NS
 2. Not supported in the ID78K4 (-NS)
 3. Supported only in the ID78K4

Snap Shot Dialog Box

(Not supported in the ID78K4-NS)

General

Registers, sets, and displays snapshot event conditions.

The snapshot event condition registered in this dialog box is automatically registered to the Event Manager.

This is valid when the IE-78K0-NS-PA is installed in the IE-78K0-NS, when the IE-78K0-NS-A or IE-78K0S-NS-A is used, or when the IE-784000-R is used.

Opening method

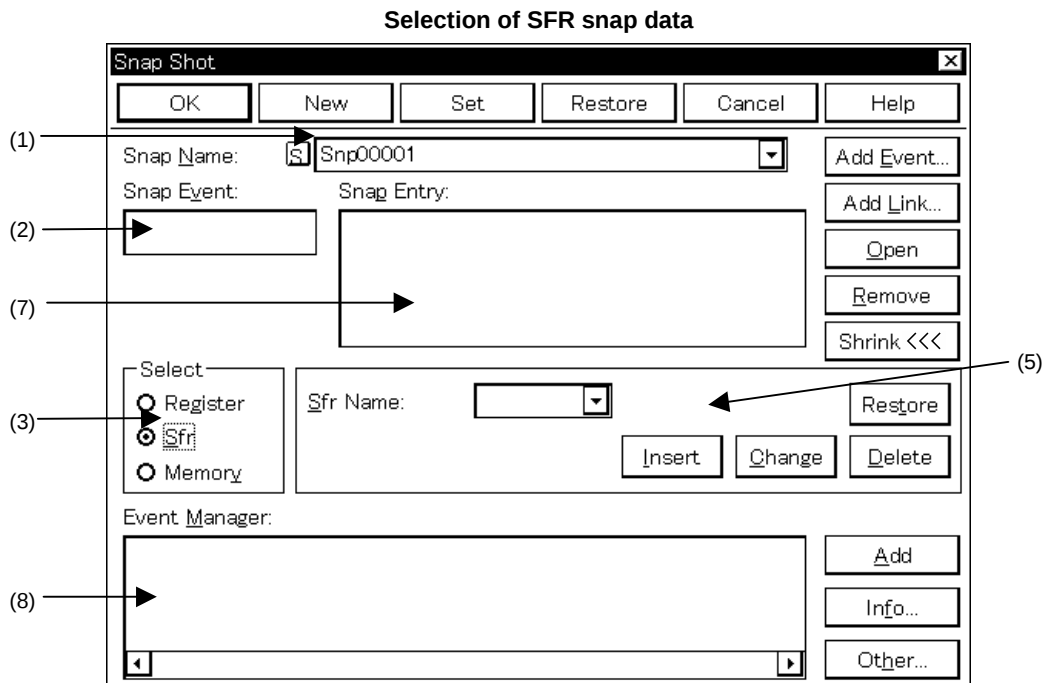
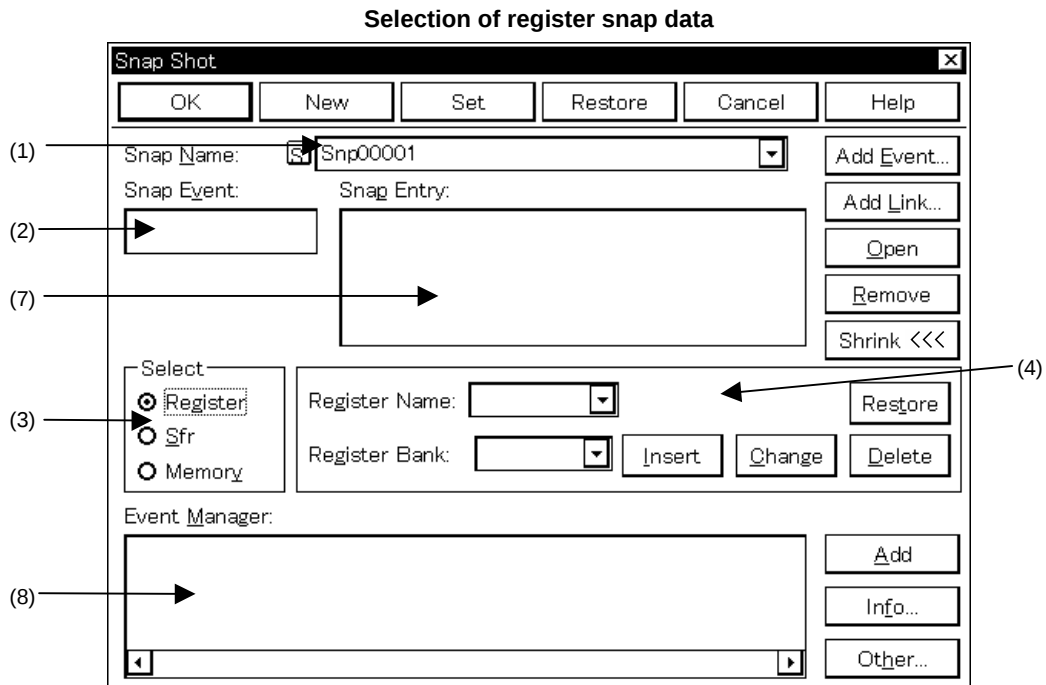
This dialog box can be opened by one of the following methods.

- In the main window
Select [Event] → [Snap Shot...] from the menu bar.
Press the **GRPH** + **N**, and **S** keys in that order.
- In the Event dialog box
Click the **Snap Shot...** button.
Press the shortcut keys **GRPH** + **S**.
- Execute one of the following operations in the event manager area in the Event, Event Link, Break, Trace, DMM^{Note 1}, Timer, or Stub^{Note 2} dialog box.
Select the snapshot event condition and click the **Open** button.
Select the snapshot event condition and press the shortcut keys **GRPH** + **O**.
Double-click the snapshot event condition.
- Execute one of the following operations in the Event Manager.
Select the snapshot event condition and click the **Open** button.
Double-click the snapshot event condition.
- Execute one of the following operations in the New Event dialog box or Set Other dialog box.
Click the **Snap Shot...** button.
Press the shortcut keys **GRPH** + **S**.

- Notes**
1. Not supported in the ID78K4-NS
 2. Supported only in the ID78K4

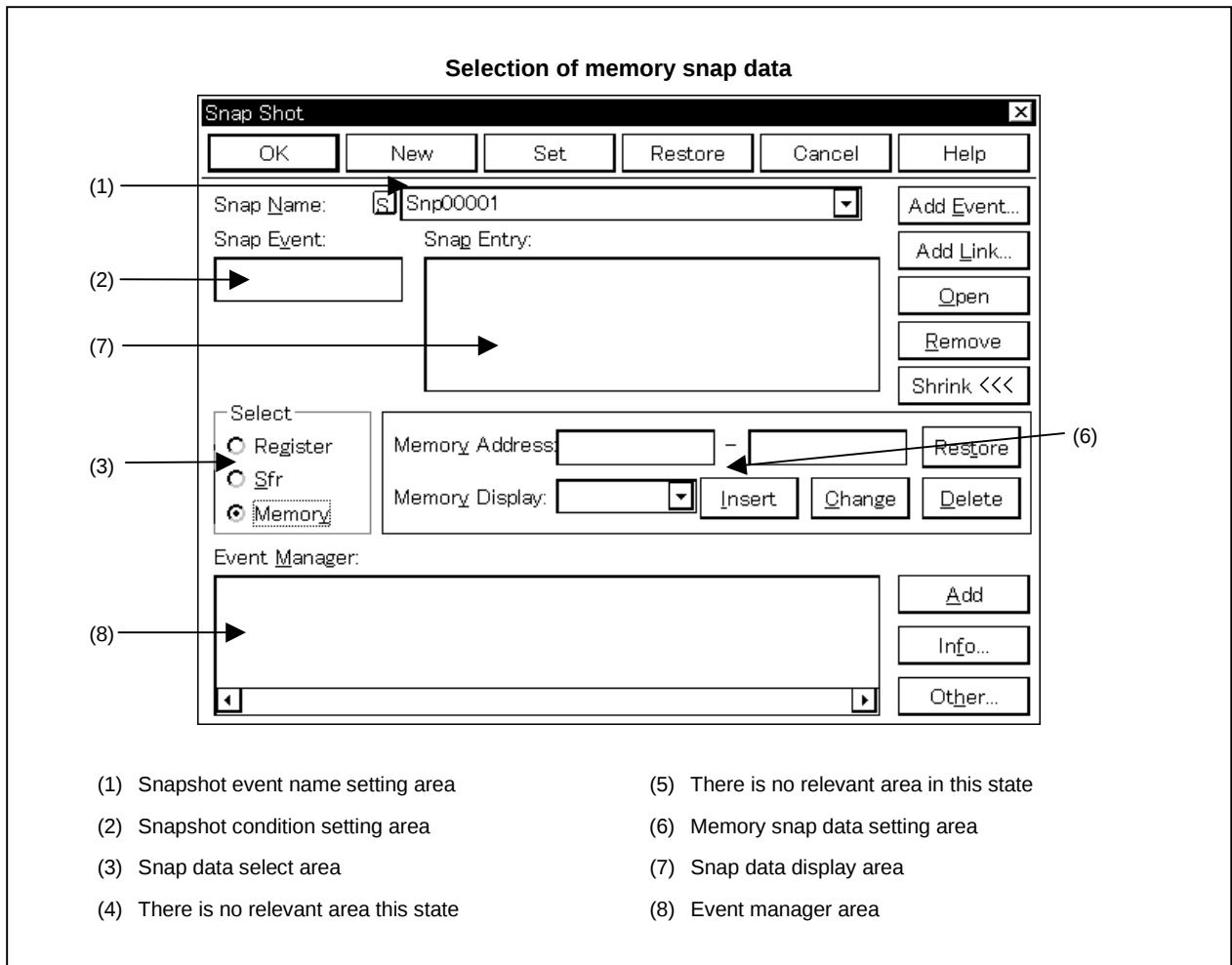
Window

Figure 6-67. Snap Shot Dialog Box (1/2)



- | | |
|--------------------------------------|---|
| (1) Snapshot event name setting area | (5) SFR snap data setting area |
| (2) Snapshot condition setting area | (6) There is no relevant area in this state |
| (3) Snap data select area | (7) Snap data display area |
| (4) Register snap data setting area | (8) Event manager area |

Figure 6-67. Snap Shot Dialog Box (2/2)

**Function**

Registers, sets, and displays snapshot event conditions.

Snapshot is for saving the contents of the registers, memory and SFRs when the program is executed in the trace buffer. The timing at which snapshot is to be performed is specified by a snapshot event condition.

Up to 256 snapshot event conditions can be set. However, the number of snapshot event conditions that can be used simultaneously is 1.

Snapshot event conditions become valid automatically when they are entered. However, if the number of snapshot event conditions exceeds the number that can be used simultaneously, or if the number of event conditions or event link conditions in use exceeds the number that can be used simultaneously, the snapshot event conditions are entered in the disabled state. Also, in this case, a snapshot event condition cannot be enabled.

Up to 16 items of snap data can be set for each of the registers, SFRs, and memory, for a total of up to 48 items.

This dialog box consists of the following areas.

- Snapshot event name setting area
- Snapshot condition setting area
- Snap data select area
- Register snap data setting area
- SFR snap data setting area
- Memory snap data setting area
- Snap data display area
- Event manager area

The function of each area is explained below.

(1) Snapshot event name setting area

Snap Name: ☐ Snp00006

Snp00001
Snp00002
Snp00003
Snp00004
Snp00005
Snp00006

This area sets a snapshot event name and displays a snapshot event condition.

When entering a snapshot event condition, it is necessary to set a snapshot event name. A snapshot event name may consist of up to eight alphanumeric characters.

When displaying snapshot event conditions which have already been created, either type the name of the already created snapshot event condition in the text box or select the snapshot event condition from the drop-down list in the snapshot event name setting area.

Clicking the ☐ mark in the snapshot event name setting area switches between enabling or disabling the snapshot event condition.

The relationship between the color of the character in the ☐ mark and the status is shown below.

Color of Character in ☐ Mark	Condition
Red	Indicates that the snapshot event condition has been enabled. A snapshot event occurs if the condition is satisfied.
Black	Indicates that the snapshot event condition has not been enabled. No snapshot event occurs even if the condition is satisfied.
Gray	Indicates that the snapshot event condition is currently being edited and that it has not been entered.
Yellow	Indicates that the snapshot event is an event which is in the hold state. An event in the hold state is in a state where the symbol specified by the event condition by program download, etc. cannot be referred to.

(2) Snapshot condition setting area

Snap Event:

This area sets a snapshot event condition.

Only one event condition or event link condition can be set in the snapshot condition setting area.

Carry out setting of the snapshot condition by either of the following methods.

- Click and open the Event dialog box in the select mode, then select the event condition which is to be set.
- Click and open the Event Link dialog box in the select mode, then select the event link condition which is to be set.
- Select an event condition or event link condition in the event manager area and click , or make the setting by a drag-and-drop operation.

If an event condition or event link condition is already set in the snapshot condition setting area, it is replaced by the newly set event condition or event link condition.

When setting the event condition or event link condition by drag-and-drop, besides the event manager area in the Snap Shot dialog box, it is possible to set it from the event manager area and Event Manager in each setting dialog box.

When the focus is on the snapshot condition setting area, click the button, or press the key to delete the selected event condition or event link condition.

Selecting an event condition or event link condition in the snapshot condition setting area and clicking or double-clicking it opens the Event dialog box or Event Link dialog box and displays the contents of the event condition or event link condition.

The snapshot condition setting area is left blank when there is a newly created snapshot event condition.

(3) Snap data select area

Select
☒ Register
☐ Sfr
☐ Memory

This area selects the type of snap data.

The following three types of snap data are available.

Item	Contents
Register	A register can be registered.
Sfr	An SFR can be registered.
Memory	Memory can be registered.

The following displays are switched by selection in the snap data select area.

- Register snap data setting area
- SFR snap data setting area
- Memory snap data setting area

Also, if snap data is selected in the snap data display area, the selection items in the snap data select area change in accordance with the type of snap data selected.

(4) Register snap data setting area

Enter, change or delete register snap data in this area.

This area is displayed by selecting Register in the snap data select area.

Snap data which is entered/changed/deleted here is reflected in the snap data display area. If register snap data is selected in the snap data display area, the contents of the selected register snap data are displayed.

Up to 16 items of register snap data can be entered.

The register snap data setting area consists of the following items.

(a) Register name setting area

This specifies the register name.

Specification of a register name is accomplished by selecting the register name from a drop-down list.

A general-purpose register or control register can be specified. Uppercase and lowercase characters are not distinguished (in the Trace View window, all the characters are standardized to uppercase characters and displayed).

Names that can be specified are function names and absolute names. Note, however, that the snap data displayed in the Trace View window is always displayed as an absolute name.

To specify all the registers, select All from the drop-down list or specify directly in the text box.

For a newly created snapshot event condition, this area is blank.

When entering register snap data, it is necessary to specify a register name.

(b) Register bank setting area

Register Bank: 

This area specifies the register bank.

To specify the register bank, enter the value directly in the text box or select from the drop-down list. The setting range is as follows.

[When IE-78K0-NS-PA is installed in the IE-78K0-NS or when IE-78K0-NS-A or IE-78K0S-NS-A is used]

Setting range: $0 \leq \text{Register bank} \leq 3$

[When IE-784000-R is used]

Setting range: $0 \leq \text{Register bank} \leq 7$

To specify the current bank, select "Current" from the drop-down list or enter "Current" or "C" (abbreviation) directly in the text box.

If the register bank specification is omitted, the current bank will be specified.

For a newly created snapshot event condition, this area is blank.

(c) button

Enters register snap data.

Entered snap data is inserted in the snap data display area's select position and displayed.

(d) button

Changes the contents of snap data selected in the snap data display area to the specified register snap data.

(e) button

Deletes the snap data selected in the snap data display area.

If the focus is on the snap data display area, the same kind of operation can be performed using the  key.

(f) button

Restores the contents of the snap data display area to the original contents.

(5) SFR snap data setting area

Enter, change or delete SFR snap data in this area.

This area is displayed by selecting Sfr in the snap data select area.

Snap data which is entered/changed/deleted here is reflected in the snap data display area. If SFR snap data is selected in the snap data display area, the contents of the selected SFR snap data are displayed.

Up to 16 items of SFR snap data can be entered.

The SFR snap data setting area consists of the following items.

(a) SFR name setting area

This area specifies the SFR name. Only SFR names that are possible to read can be specified.

Also, SFR bit names and I/O port names entered in the Add I/O Port dialog box cannot be specified.

The SFR name can be set by typing the SFR name directly in the text box or by selecting the SFR name from the drop-down list.

SFR names are not case sensitive (in the Trace View window, all the characters are standardized to uppercase characters and displayed).

For a newly created snapshot event condition, this area is blank.

When entering SFR snap data, it is necessary to specify an SFR name.

(b) button

Enters SFR snap data.

Entered snap data is inserted in the snap data display area's select position and displayed.

(c) button

Changes the contents of snap data selected in the snap data display area to the specified SFR snap data.

(d) button

Deletes the snap data selected in the snap data display area.

If the focus is on the snap data display area, the same kind of operation can be performed using the  key.

(e) button

Restores the contents of the snap data display area to the original contents.

(6) Memory snap data setting area

Memory Address:		-		Restore	
Memory Display:		▼	Insert	Change	Delete

This area specifies the range of the memory data for the snapshot and access size.

This area is displayed only when Memory is selected in the snap data select area.

Snap data which is entered/changed/deleted here is reflected in the snap data display area. If memory snap data is selected in the snap data display area, the contents of the selected memory snap data are displayed.

Up to 16 items of memory snap data can be entered.

The memory snap data setting area consists of the following items.

(a) Memory address setting area

Memory Address: -

This area specifies the memory address range.

Input the start address and end address, in that order.

The setting range is as shown below.

[When IE-78K0-NS-PA is installed in the IE-78K0-NS or when IE-78K0-NS-A or IE-78K0S-NS-A is used]

Setting range: $0 \leq \text{Address} \leq 0\text{xffff}$

[When IE-784000-R is used]

Setting range: $0 \leq \text{Address} \leq 0\text{xfffff}$

If a value is input for the start address only and the end address is omitted, it is regarded as if the value specified for the end address was the same as that specified for the start address.

If the specified address range cannot be divided by the access size, the address range is rounded up and corrected to a range that can be divided by the access size.

For the address range specification, it is possible to specify by a symbol or an expression. The specification method is the same as in the Address Move dialog box. The default radix when numerical values are input is hexadecimal.

If an expression or symbol is specified in the memory address setting area and then entered and changed, the converted address value is displayed together with the specified expression or symbol in the snap data display area.

Only the converted address value is displayed for snap data displayed in the Trace View window.

For a newly created snapshot event condition, this area is blank.

When entering memory snap data, it is necessary to specify a starting address.

(b) Memory display size setting area

Memory Display: 

This area specifies the memory snap data access size.

The access size can be specified by typing the value directly in the text box or by selecting it from the drop-down list.

The following can be specified.

Access Size	Abbreviated Form	Contents
Byte	B	Memory snapshot is executed in 8-bit units.
Word	W	Memory snapshot is executed in 16-bit units.
Double word	DW	Memory snapshot is executed in 32-bit units.

Remark The specified characters are not case sensitive.

For a newly created snapshot event condition, this area is blank.

When entering memory snap data, it is necessary to specify the access size.

(c) button

Enters memory snap data.

Entered snap data is inserted in the snap data display area's select position and displayed.

(d) button

Changes the contents of snap data selected in the snap data display area to the specified memory snap data.

(e) button

Deletes the snap data selected in the snap data display area.

If the focus is on the snap data display area, the same kind of operation can be performed using the  key.

(f) button

Restores the contents of the snap data display area to the original contents.

(7) Snap data display area

Snap Entry:

--

This area lists the registered snap data.

Snap data, including registers, SFRs, and memory data, can be registered.

The registered snap data is written to the tracer when a snapshot event occurs.

If snap data is selected in the snap data list, the contents of the selected snap data are displayed in the setting areas for the register, the SFR, and memory.

Each type of snap data is displayed as follows.

(a) Register snap data

Register name

Example

RP0[0] RP1[Current] All[2]

(b) SFR snap data

SFR name

Example

PM0 PM1

(c) Memory snap data

Starting address <Symbol, expression> – End address <Symbol, expression>, Access size

Example

0xFE20<byVar >, B 0xFE22<wVar >, W 0xFE30<szVar >–0xFE2F<szVar+0x10 >, B
--

Remark Symbols or expressions specified in the address are enclosed by "< >".

(8) Event manager area

Event Manager:



This area displays a list of each of the entered event and event link conditions, and break, trace, snapshot, DMM^{Note 1}, timer, and stub^{Note 2} events.

An event or event link condition that is displayed in the event manager area can be set in the snapshot condition setting area by clicking the **Add** button.

Also, event conditions or event link conditions in the event manager area can be dragged directly to the snapshot condition setting area.

When the focus is on the event manager area, select an event icon and click the **Remove** button, or press the **DEL** key to delete the selected event.

When the focus is on the event manager area, selecting an event icon and clicking **Open** or double-clicking an event icon opens the setting dialog box corresponding to the selected event and displays the contents of the event.

By clicking **Info...**, it is possible to select the event manager area display mode or sequencing.

Notes 1. Not supported in the ID78K4-NS

2. Supported only in the ID78K4

Function buttons

OK

Closes the Snap Shot dialog box.

If there is a snapshot event condition that is being edited, it is entered automatically and the dialog box is closed.

A snapshot event condition becomes enabled as soon as it is entered.

New

Newly creates a snapshot event condition.

A snapshot event name is generated automatically and a newly created snapshot event condition is prepared. After it is created, be sure to enter the snapshot event condition using the **OK** or the **Set** button.

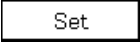
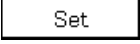
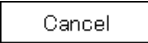
Set

Enters a snapshot event condition.

When a new snapshot event condition has been created or when the contents of a snapshot event condition have been changed, be sure to enter the snapshot event condition using this button.

If snapshot event conditions that have already been entered are displayed, it changes to either the **Enable** button or **Disable** button.

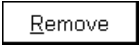
A snapshot event condition becomes enabled as soon as it is entered.

	Enables a snapshot event condition. This button is displayed in cases where a snapshot event condition is in the disabled state. It changes to either the  button or the  button.
	Disables a snapshot event condition. This button is displayed in cases where a snapshot event condition is in the enabled state. It changes to either the  button or the  button.
	Clears the contents of a snapshot event condition. If a snapshot event condition is entered but not edited, this button is displayed. It changes to the  button.
	Returns the contents of a snapshot event condition to the original contents. If a snapshot event condition that has not been entered is displayed, all the area except the snapshot event name is made blank. If a snapshot event condition is being edited, the  button is displayed in place of this button.
	Closes the Snap Shot dialog box. If a snapshot event condition is not being created/changed/deleted, this button is displayed. Even if a snapshot event condition is being edited, the dialog box closes without the snapshot event condition being entered. The  key has the same operation.
	Closes the Snap Shot dialog box. If a snapshot event condition has been created/changed/deleted, after that, the  button becomes this button. Even if there is a snapshot event condition that is being edited, the dialog box closes without the snapshot event condition being entered. The  key has the same operation.
	Opens the help window.
	Opens the Event dialog box in the select mode and selects the event condition to be set.
	Opens the Event Link dialog box in the select mode and selects the event link condition to be set.

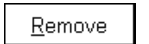


Displays the event contents selected in the snapshot condition setting area or event manager area by opening the corresponding setting dialog box.

The  button is enabled only when the focus is on the snapshot condition setting area or the event manager area, and when a single event is selected. In cases other than that, it is dimmed and cannot be clicked.



Deletes an event selected in the snapshot condition setting area or event manager area.

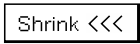
The  button is enabled only when the focus is on the snapshot condition setting area or the event manager area, and when an event is selected. In cases other than that, it is dimmed and cannot be clicked.

The  key has the same operation.



Displays the event manager area. Expands the size of the dialog box.

When the event manager area is not displayed, this button is displayed in place of the  button.



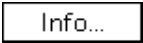
Does not display the event manager area. Shrinks the size of the dialog box.

When the event manager area is displayed, this button is displayed in place of the  button.

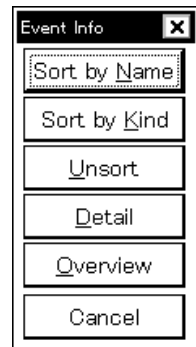


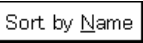
Adds the event condition or event link condition selected in the event manager area to the selected position in the snapshot event condition setting area.

Events other than the event condition or event link condition cannot be added.



Opens the Event Info dialog box.



The  button rearranges events in name order and displays them.

The  button rearranges the events in order by type and displays them.

The  button displays the events in the order in which they were entered without rearranging them.

The button changes the event manager area to the detailed display mode.

The button changes the event manager area to the list display mode.

The button or the key closes the dialog box.

Opens the Set Other dialog box.



Clicking each button opens the Event Manager and the Event, Event Link, Break, Trace, DMM^{Note 1}, Timer, or Stub^{Note 2} dialog box, and closes the Set Other dialog box.

Close the dialog box by clicking the or and return to the Snap Shot dialog box.

Notes 1. Not supported in the ID78K4 (-NS)

2. Supported only in the ID78K4

Stub dialog box

(Supported only in the ID78K4)

General

Registers, sets, and displays stub event conditions.

The stub event condition registered in this dialog box is automatically registered to the Event Manager.

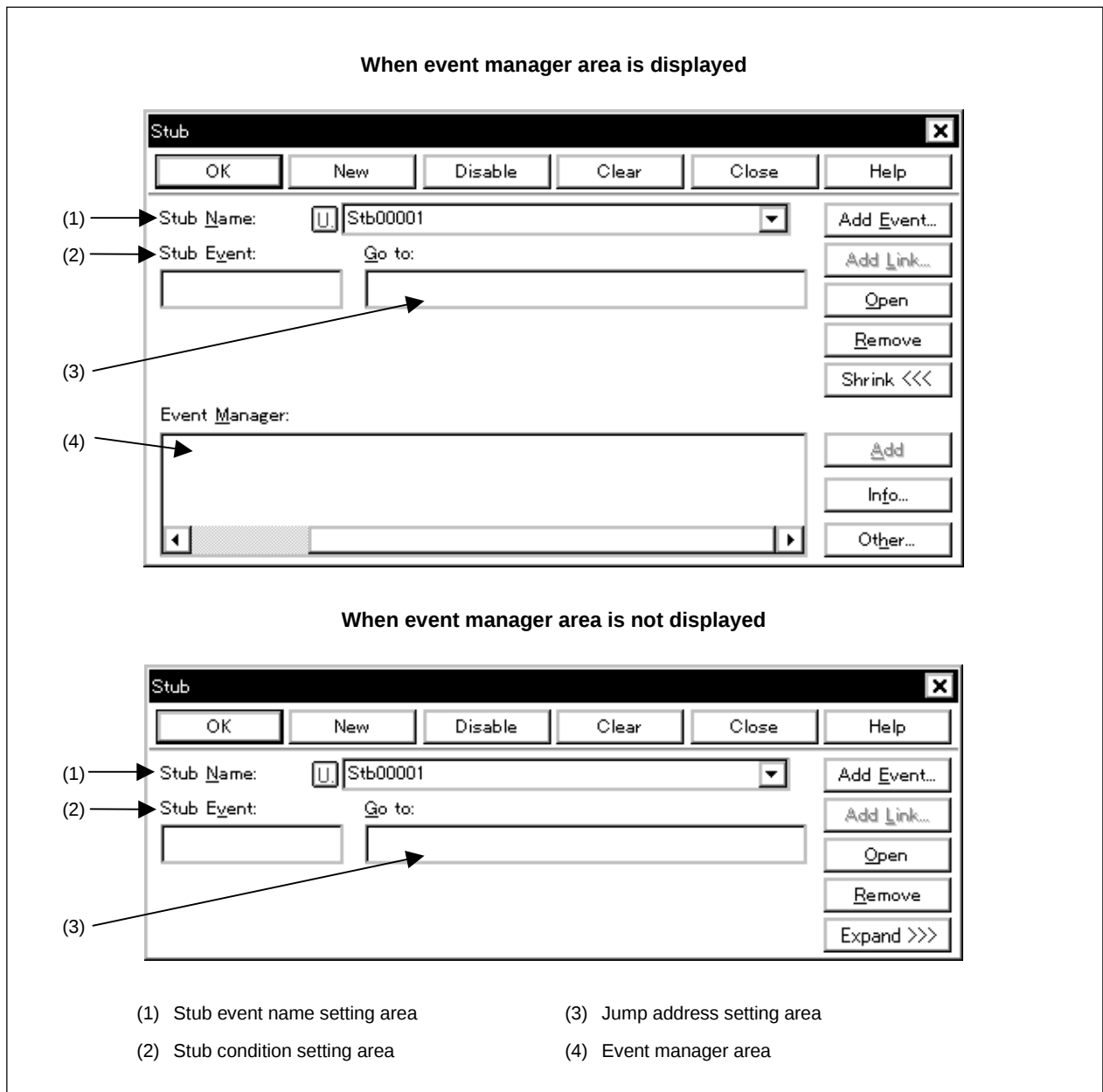
Opening method

This dialog box can be opened by one of the following methods.

- In the main window
Select [Event] → [Stub...] from the menu bar.
Press the **GRPH** + **N**, and **U** keys in that order.
- In the Event dialog box
Click the **Stub...** button.
Press the shortcut keys **GRPH** + **U**.
- Execute one of the following operations in the event manager area in the Event, Event Link, Break, Trace, Snap Shot, or Timer dialog box.
Select a stub event condition and click the **Open** button.
Select a stub event condition and press the shortcut keys **GRPH** + **O**.
Double-click a stub event condition.
- Execute one of the following operations on the Event Manager.
Select a stub event condition and click the **Open** button.
Double-click a stub event condition.
- Execute one of the following operations in the New Event dialog box and Set Other dialog box.
Click the **Stub...** button.
Press the shortcut keys **GRPH** + **U**.

Window

Figure 6-68. Stub Dialog Box



Function

Registers, sets, and displays stub event conditions.

The stub function is to execute a user program that has been downloaded or written by online assemble in advance to a vacant area of the memory when an event condition is satisfied. The timing at which stub function is to be performed is specified by a stub event condition.

Up to 256 stub event conditions can be set. However, only one stub event condition can be used at a time.

Stub event conditions become invalid automatically as soon as they are entered. However, if the number of stub event conditions exceeds the number that can be used simultaneously, or if the number of event conditions or event link conditions in use exceeds the number that can be used simultaneously, the stub event conditions are entered in the disabled state. Also, in this case, a stub event condition cannot be enabled.

This dialog box consists of the following areas.

- Stub event name setting area
- Stub condition setting area
- Jump address setting area
- Event manager area

The function of each area is explained below.

(1) Stub event name setting area

Stub Name: ☐ 

Stb00001 

Stb00002

Stb00003

Stb00004

Stb00005

Stb00006 

This area sets a stub event name and selects a stub event condition.

When entering a stub event condition, it is necessary to set a stub event name.

A stub event name may consist of up to eight alphanumeric characters.

When displaying a stub event condition that has already been created, either type the name of the already created stub event in the text box or select the stub event condition from the drop-down list in the stub event name setting area.

Clicking the ☐ mark in the stub event name setting area switches between enabling or disabling the stub event condition.

The relationship between the color of the character in the ☐ mark and the status is as shown below.

Color of Character in ☐ Mark	Condition
Red	Indicates that the stub event condition has been enabled. A stub event occurs if the condition is satisfied.
Black	Indicates that the stub event condition has been disabled. No stub event occurs even if the condition is satisfied.
Gray	Indicates that the stub event condition is currently being edited and that it has not been entered.
Yellow	Indicates that the stub event is an event which is in the hold state. An event in the hold state is in a state in which the symbol specified by the event condition cannot be referred to due to program download, etc.

(2) Stub condition setting area

Stub Event:

This area sets a stub event condition.

Only one event condition or event link condition can be set in the stub condition setting area.

Carry out setting of the stub condition by either of the following methods.

- Click the **Add Event...** button to open the Event dialog box in the select mode, then select the event link condition to be set.
- Click the **Add Link...** button to open the Event Link dialog box in the select mode, then select the event link condition to be set.
- Select an event condition or event link condition in the event manager area and click the **Add** button, or make the setting by a drag-and-drop operation.

If an event condition or an event link condition is already set in the stub condition setting area, it is replaced by the newly set event condition or event link condition.

When setting the event condition or an event link condition by drag-and-drop, in addition to the event manager area in the Stub dialog box, it is possible to set it from the event manager area and Event Manager in each setting dialog box.

When the focus is on the stub condition setting area, click the **Remove** button to delete the selected event condition or event link condition.

The event condition or event link condition can also be deleted by pressing the **DEL** key.

Selecting an event condition or an event link condition in the stub condition setting area and clicking the **Open** button or double-clicking the selection opens the Event dialog box or Event Link dialog box and the displays contents of the event condition or event link condition.

The stub condition setting area is left blank when there is a newly created stub event condition.

(3) Jump address setting area

Go to:

This area specifies the first address of the function to be executed when a stub event occurs.

To return from a specified function to the original position when a stub event occurs, the "RETB instruction" must be described in the function.

The first address of the function can be also specified by a symbol or an expression, in the same manner as in the Address Move dialog box. The default radix when inputting a numerical value is hexadecimal.

Specify the first address of the function in the following setting range:

Setting range: $0 \leq \text{First address of function} \leq 0xFFFFF$

The jump address setting area is left blank when there is a newly created stub event condition.

(4) Event manager area

Event Manager:



This area displays a list of the entered events, event links, breaks, traces, snap shots, stubs, and timers.

An event or event link condition that is displayed in the event manager area can be set in the stub condition setting area by clicking the **Add** button.

Also, the event conditions or event link conditions in the event manager area can be dragged directly to the stub condition setting area.

When the focus is on the event manager area, select an event icon and click the **Remove** button, or press the **DEL** key to delete the selected event.

When the focus on the event manager area, selecting an event icon and clicking the **Open** button or double-clicking the event icon opens the setting dialog box corresponding to the selected event and displays the set contents of the event.

By clicking the **Info...** button, it is possible to select the event manager area display mode or sequencing.

Function buttons**OK**

Closes the Stub dialog box.

If there is a stub event condition that is being edited, it is entered automatically and the dialog box is closed.

A stub event condition becomes enabled as soon as it is entered.

New...

Newly creates a stub event condition.

A stub event name is generated automatically and a newly created stub event condition is prepared. After it is created, be sure to enter the stub event condition using the **OK** or the **Set** button.

Set

Enters a stub event condition.

When a new stub event condition has been created or when the contents of the stub event condition have been changed, be sure to enter the stub event condition using this button.

If stub event conditions that have already been entered are displayed, it changes to either the **Enable** button or the **Disable** button.

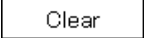
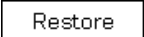
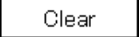
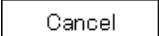
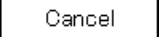
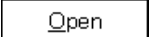
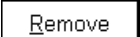
A stub event condition becomes enabled as soon as it is entered.

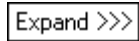
Enable

Enables a stub event condition.

This button is displayed in cases where a stub event condition is in the disabled state.

It changes to either the **Set** button or the **Disable** button.

	Disables a stub event condition. This button is displayed in cases where a stub event condition is in the enabled state. It changes to either the  button or the  button.
	Clears the contents of a stub event condition. If a stub event condition is entered but not edited, this button is displayed. It changes to the  button.
	Returns the contents of a stub event condition to the original contents. If a stub event condition that has not been entered is displayed, all the area except the stub event name is made blank. If a stub event condition is being edited, the  button is displayed in place of this button.
	Closes the Stub event dialog box. If a stub event condition is not being created/changed/deleted, this button is displayed. Even if a stub event condition is being edited, the dialog box closes without the stub event condition being entered. The  key has the same operation.
	Closes the Stub dialog box. If a stub event condition has been created/changed/deleted, after that, the  button becomes this button. Even if a stub event condition is being edited, the dialog box closes without the stub event condition being entered. The  key has the same operation.
	Opens the Help window of the Stub dialog box.
	Opens the Event dialog box in the select mode and selects the event condition to be set.
	Opens the Event Link dialog box in the select mode and selects an event link condition to be set.
	Displays the event contents selected in the stub condition setting area or event manager area by opening the corresponding setting dialog box. Double-clicking the event icon has the same operation. If an event icon is not selected, or if two or more event icons are selected, this button cannot be selected.
	Deletes an event selected in the stub condition setting area or event manager area. The  key has the same operation.



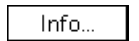
Displays the event manger area.
 Expands the size of the dialog box.
 When the event manager area is not displayed, this button is displayed in place of the button.



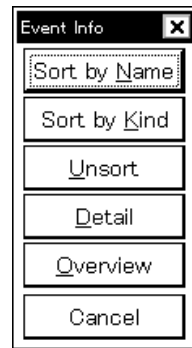
Does not display the event manager area.
 Shrinks the size of the dialog box.
 When the event manager area is displayed, this button is displayed in place of the button.



Adds the event condition or event link condition selected in the event manager area to the selected position in the stub condition setting area.
 Events other than an event condition or an event link condition cannot be added.



Opens the Event Info dialog box.



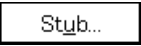
The button rearranges the events in name order and displays them.
 The button rearranges the events in order by type and displays them.
 The button displays the events in the order in which they were entered without rearranging them.
 The button changes the event manager area to the detailed display mode.
 The button changes the event manager area to the list display mode.
 The button or the key closes the dialog box.

Other...

Opens the Set Other dialog box.



Clicking each button opens the Event Manager and the Event, Event Link, Break, Trace, Snap Shot, or Timer dialog box, and closes Set Other dialog box.

Close the dialog box by clicking the  button or the  button and return to the Stub dialog box.

Timer Dialog Box

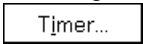
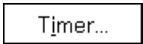
General

Displays the result of measuring execution time, and registers and sets timer event conditions.

The timer event condition registered in this dialog box is automatically registered to the Event Manager.

Opening method

This dialog box can be opened by the following methods.

- In the main window
Select [Event] → [Timer...] from the menu bar.
Press the **GRPH** + **N**, and **I** keys in that order.
Click the  button on the toolbar.
- In the Event dialog box
Click the  button.
Press the shortcut keys **GRPH** + **I**.
- Execute one of the following operations in the event manager area in the Event, Event Link, Break, Trace, Snap Shot^{Note 1}, or DMM^{Note 2} dialog box.
Select the timer event condition and click the  button.
Select the timer event condition and press the shortcut keys **GRPH** + **O**.
Double-click the timer event condition.
- Execute one of the following operations in the Event Manager.
Select the timer event condition and click the  button.
Double-click the timer event condition.
- Execute one of the following operations in the New Event dialog box or Set Other dialog box.
Click the  button.
Press the shortcut keys **GRPH** + **I**.

Notes 1. Not supported in the ID78K4-NS

2. Not supported in the ID78K4 (-NS)

Window

Figure 6-69. Timer Dialog Box (1/2)

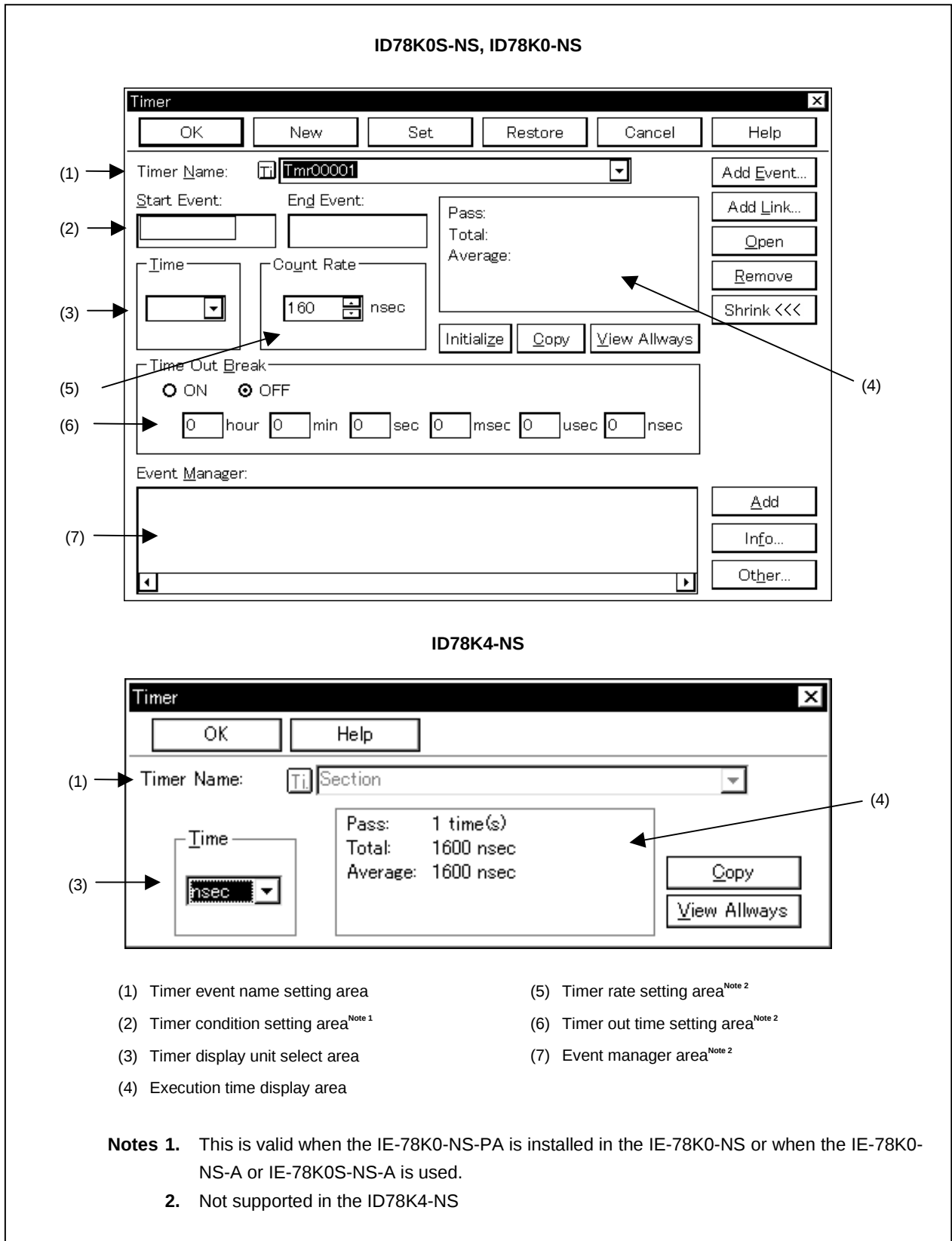
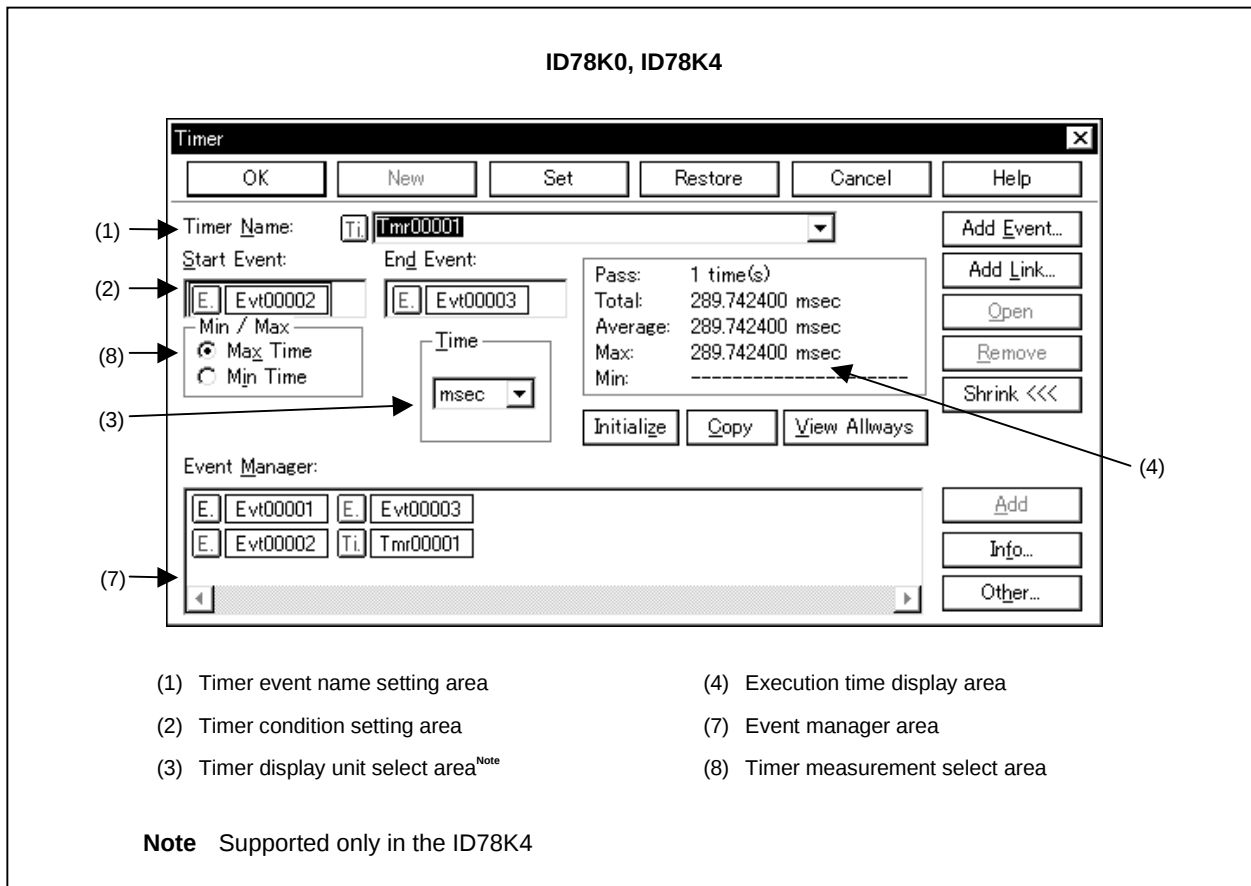


Figure 6-69. Timer Dialog Box (2/2)



Function

Displays the result of measuring execution time, and registers and sets timer event conditions.

The result of measuring execution time is displayed by selecting the set timer event condition.

Up to 256 timer event conditions can be entered. However, the number of timer event conditions that can be used simultaneously is 16 (3 in the ID78K4).

Timer event conditions become valid automatically when they are entered. However, if the number of timer event conditions exceeds the number that can be used simultaneously, or if the number of event conditions or event link conditions in use exceeds the number that can be used simultaneously, the timer event conditions are entered in the disabled state. Also, in this case, a timer event condition cannot be enabled.

The execution time from the start of the program to occurrence of a break can be displayed. It can be displayed by selecting "Run-Break"^{Note} in the timer event name setting area.

A timer event condition is set only when the timer is in the enabled state.

If the timer is disabled without checking [Option] → [Timer ON] on the menu bar in the main window, the timer will not be executed. However, "Run-Break"^{Note} is not affected by the timer's on/off status. "Run-Break"^{Note} is included in the number of timer events that can be enabled simultaneously. If there is a vacancy in the setting numbers, "Run-Break" is always enabled and can be used.

Note For the ID78K4-NS, this is fixed to "Section".

During emulation, in order to stop the currently operating timer, select [Run] → [Timer Stop] from the menu bar. Also, during emulation, in order to run the currently stopped timer, select [Run] → [Timer Start] from the menu bar. These two menus toggle and their display changes according to the current timer state.

However, only the ID78K4-NS displays the result of measuring the execution time of a section trace from the start event to the end event. The timer operates only when a valid section trace event is set.

This dialog box consists of the following areas.

- Timer event name setting area
- Timer condition setting area^{Note 1}
- Timer display unit select area
- Execution time display area
- Timer rate setting area^{Note 2}
- Timer out time setting area^{Note 2}
- Event manager area^{Note 3}
- Timer measurement select area^{Note 4}

Notes 1. This is valid when the IE-78K0-NS-PA is installed in the IE-78K0-NS, when the IE-78K0-NS-A or IE-78K0S-NS-A is used, or when the IE-78000-R or IE-784000-R is used.

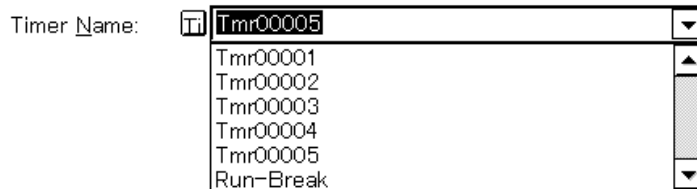
2. Not supported in the ID78K4 (-NS) and ID78K0

3. Not supported in the ID78K4-NS

4. Supported only in the ID78K4

The function of each area is explained below.

(1) Timer event name setting area



This area sets a timer event name and selects a timer event condition^{Note}.

When entering a timer event condition, it is necessary to set a timer event name.

Timer event names of up to 8 alphanumeric characters can be set.

The timer event name “Run-Break”^{Note}, which displays the execution time from the start of execution to occurrence of a break, is registered from the beginning (this timer event name, however, is not displayed in the Event Manager).

When displaying timer event conditions which have already been created, either type the timer event name of the already created timer event condition in the text box or select from the drop-down list in the timer event name setting area.

Clicking the  mark in the timer event name setting area switches between enabling or disabling the timer event condition.

The relationship between the color of the character in the  mark and the status is shown below.

Note A timer event name cannot be set in the ID78K4-NS. The timer event name setting area of the ID78K4-NS is fixed to “Section”.

Color of Character in  Mark	Condition
Red	Indicates that the timer event condition has been enabled. A timer event occurs if the condition is satisfied.
Black	Indicates that the timer event condition has not been enabled. No timer event occurs even if the condition is satisfied.
Gray	Indicates that the timer event condition is currently being edited and that it has not been entered.
Yellow	Indicates that the timer event is an event which is in the hold state. An event in the hold state is in a state where the symbol specified by the event condition by program download, etc. cannot be referred to.

(2) Timer condition setting area (This is valid when the IE-78K0-NS-PA is installed in the IE-78K0-NS, when the IE-78K0-NS-A or IE-78K0S-NS-A is used, or when the IE-78000-R or IE-784000-R is used.)

Start Event: End Event:

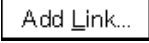
This area sets an event condition for the timer.

Start Event: Sets event condition or event link condition to start time measurement.

End Event: Sets event condition or event link condition to end time measurement.

The number of event conditions and event link conditions that can be entered in the timer condition setting area is one condition for each of the start and end conditions.

Carry out setting of the timer condition by either of the following methods.

- Click  and open the Event dialog box in the select mode, then select the event condition which is to be set.
- Click  and open the Event Link dialog box in the select mode, then select the event link condition to be set.
- Select an event condition in the event manager area and click , or make the setting by drag-and-drop.

If an event condition or an event link condition is already set in the timer condition setting area, it is replaced with the newly set event condition or event link condition.

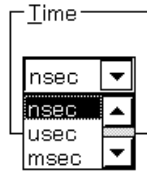
When setting the event condition or event link condition by drag-and-drop, besides the event manager area in the Timer dialog box, it is possible to set it from the event manager area and Event Manager in each setting dialog box.

When the focus is on the timer condition setting area, click the  button, or press the  key to delete the event condition selected in [Start Event:] or [End Event:].

It is possible to move the event condition or event link condition in [Start Event:] and [End Event:] in the timer condition setting area by a drag-and-drop operation.

Selecting an event condition or event link condition selected in [Start Event:] or [End Event:] in the timer condition setting area and clicking  or double-clicking it opens the Event dialog box and displays the contents of the event condition or event link condition.

The timer condition setting area is left blank when there is a newly created timer event condition.

(3) Timer display unit select area

This area selects the timer measurement results display unit.

The unit can be selected from the following five types.

- nsec: Measurement results are displayed in nanosecond units.
- usec: Measurement results are displayed in microsecond units.
- msec: Measurement results are displayed in millisecond units.
- sec: Measurement results are displayed in second units.
- min: Measurement results are displayed in minute units.

nsec is selected for a newly created timer event condition.

(4) Execution time display area

Pass:
 Total:
 Average:

This area displays the execution time and execution count of the program. The execution time can be measured up to 14 minutes (in 0.08 μ s units from 0.16 μ s to 204 μ s of the resolution) in the ID78K0 (-NS), up to 14 minutes and 18 seconds (0.2 μ s of the resolution) in the ID78K4, and up to 14 minutes and 33 seconds (0.2 μ s of the resolution) in the ID78K4-NS. The execution count can be measured up to 65,535 counts.

If measurement is not conducted or if the measurement results are cleared, it is shown as a blank.

If the measurement results overflow, the message "Timer measurement overflowed!" is displayed^{Note 1}.

The following functions can be used by operating each button.

- By clicking Initialize^{Note 2}, the measurement results can be cleared.
- "Run-Break" measurement results cannot be cleared. They are cleared automatically when execution starts.
- By clicking Copy, the measurement results can be copied to the clipboard in text format.
- By clicking View Allways, the Timer Result dialog box, which displays the selected timer event conditions or the "Run-Break" measurement results, is displayed.

Notes 1. Not displayed in the ID78K4 (-NS)

2. Not supported in the ID78K4-NS

(5) Timer rate setting area (Not supported in the ID78K4 (-NS) and ID78K0)

This area sets the timer rate value to measure the execution time. The minimum rate value is 160 nsec (default) which can be increased in 80 nsec units.

(6) Time out time setting area (Not supported in the ID78K4 (-NS) and ID78K0)

When the Timer Out Break is on, time out time can be set, but not when the Timer Out Break is off. When the measurement time of a period (from timer start event generation to timer end event generation) exceeds the time out time, execution ends. Up to 24 hours can be set.

(7) Event manager area (Not supported in the ID78K4-NS)

This displays a list of each of the entered event and event link conditions, and break, trace, snapshot^{Note 1}, DMM^{Note 2}, timer^{Note 1}, and stub^{Note 3} events.

An event condition or event link condition displayed in the event manager area can be set in the timer condition setting area by clicking **Add**.

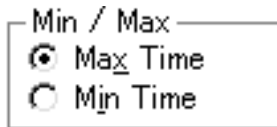
Also, an event condition or event link condition in the event manager area can be dragged directly to the timer condition setting area.

When the focus is on the event manager area, select the event icon and click **Remove** or press the **DEL** key to delete the selected event.

When the focus is on the event manager area, selecting an event icon and clicking **Open** or double-clicking an event icon opens the setting dialog box corresponding to the selected event and displays the contents of the event.

By clicking **Info...**, it is possible to select the event manager area display mode or sequencing.

- Notes 1.** Not supported in the ID78K4-NS
2. Not supported in the ID78K4 (-NS)
3. Supported only in the ID78K4

(8) Timer measurement select area (supported only in the ID78K4)

This area selects the timer measurement mode.

The following two modes can be selected:

Max Time This mode is to measure the maximum execution time.
The longest processing time between the events set as timer event conditions is measured.

Min Time This mode is to measure the minimum execution time.
The shortest processing time between the events set as timer event conditions is measured.

If "Run-Break" is selected in the timer event name setting area, the timer measurement select area is dimmed and cannot be selected.

Max Time is selected for a newly created timer event condition.

Function buttons

Caution The ID78K4-NS does not support any buttons other than **OK**, **Help**, **Copy**, and **View Always**.

OK

Closes the Timer dialog box.

If there is a timer event condition that is being edited, it is entered automatically and the dialog box is closed.

A timer event condition becomes enabled as soon as it is entered.

New

Newly creates a timer event condition.

A timer event name is generated automatically and a newly created timer event condition is prepared. After it is created, be sure to enter the timer event condition using the

OK

 or the

Set

 button.

Set

Enters a timer event condition.

When a new timer event condition has been created or when the contents of a timer event condition have been changed, be sure to enter the timer event condition using this button.

If timer event conditions that have already been entered are displayed, it changes to either the

Enable

 button or

Disable

 button.

A timer event condition becomes enabled as soon as it is entered.

Enable

Enables a timer event condition.

This button is displayed in cases where a timer event condition is in the disabled state.

It changes to either the

Set

 button or the

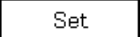
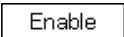
Disable

 button.

Disable

Disables a timer event condition.

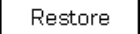
This button is displayed in cases where a timer event condition is in the enabled state.

It changes to either the  button or the  button.

Clear

Clears the contents of a timer event condition.

If a timer event condition is entered but not edited, this button is displayed.

It changes to the  button.

Restore

Returns the contents of a timer event condition to the original contents.

If a timer event condition that has not been entered is displayed, all the area is made blank except the timer event name, or the settings return to the default settings.

If a timer event condition is being edited, this button is displayed.

It changes to the  button.

Cancel

Closes the Timer dialog box.

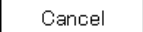
If a timer event condition has not been created/changed/deleted, this button is displayed.

Even if a timer event condition is being edited, the dialog box closes without the timer event condition being entered.

The  key has the same operation.

Close

Closes the Timer dialog box.

If a timer event condition has been created/changed/deleted, after that, the  button becomes this button.

Even if there is a timer event condition that is being edited, the dialog box closes without the timer event condition being entered.

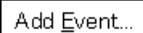
The  key has the same operation.

Help

Opens the Help window.

Add Event...

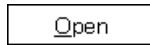
Opens the Event dialog box in the select mode and adds to set the event condition either in [Start Event:] or in [End Event:] in the timer condition setting area.

The area where the event condition is added becomes the selected area when  is clicked.

Add Link...

Opens the Event Link dialog box in the select mode and adds to set the event link condition either in [Start Event:] or in [End Event:] in the timer condition setting area.

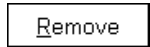
The area where the event condition is added becomes the selected area when  is clicked.



Displays the event contents selected in [Start Event:] or in [End Event:] in the timer condition setting area or event manager area by opening the corresponding setting dialog box.

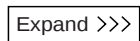
Operation is the same as double-clicking the event icon.

If an event icon is not selected, or if multiple events are selected, selection cannot be made.



Deletes an event selected in [Start Event:] or in [End Event:] in the timer condition setting area or event manager area.

The **DEL** key has the same operation.



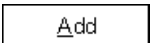
Displays the event manager area. Expands the size of the dialog box.

When the event manager area is not displayed, this button is displayed in place of the **Shrink <<<** button.



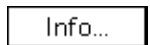
Does not display the event manager area. Shrinks the size of the dialog box.

When the event manager area is displayed, this button is displayed in place of the **Expand >>>** button.



Adds the event condition or event link condition selected in the event manager area to the selected position in [Start Event:] or in [End Event:] in the timer condition setting area.

The area where the event condition is added becomes the selected area when **Add** is clicked.



Opens the Event Info dialog box.



The **Sort by Name** button rearranges events in name order and displays them.

The **Sort by Kind** button rearranges the events in order by type and displays them.

The **Unsort** button displays the events in the order in which they were entered without rearranging them.

The **Detail** button changes the event manager area to the detailed display mode.

The **Overview** button changes the event manager area to the list display mode.

The **Cancel** button or the **ESC** key closes the dialog box.

Other...

Opens the Set Other dialog box.



Clicking each button opens the Event Manager and the Event, Event Link, Break, Trace, Snap Shot^{Note 1}, DMM^{Note 2}, or Stub^{Note 3} dialog box, and closes the Set Other dialog box.

Close the dialog box by clicking **Cancel** or **Timer...** and return to the Timer dialog box.

Initialize

This button clears the measurement results.

When measurement is not being performed, it is dimmed and cannot be clicked.

It is also dimmed and cannot be clicked when a user program is being executed.

Copy

Copies measurement results to the clipboard in text format.

View Allways

Displays the Timer Result dialog box, which displays the selected timer event condition or "Run-Break" measurement results.

- Notes**
1. Not supported in the ID78K4-NS
 2. Not supported in the ID78K4 (-NS)
 3. Supported only in the ID78K4

Timer Result Dialog Box

General

Displays the execution time measurement results.

Opening method

This dialog box can be opened by the following methods.

- Select a timer event condition or “Run-Break” in the Timer dialog box^{Note} and execute one of the following operations.

Click the **View Always** button.

Press the shortcut keys **GRPH** + **V**.

Note Cannot be selected in the ID78K4-NS.

Window

Figure 6-70. Timer Result Dialog Box (1/2)

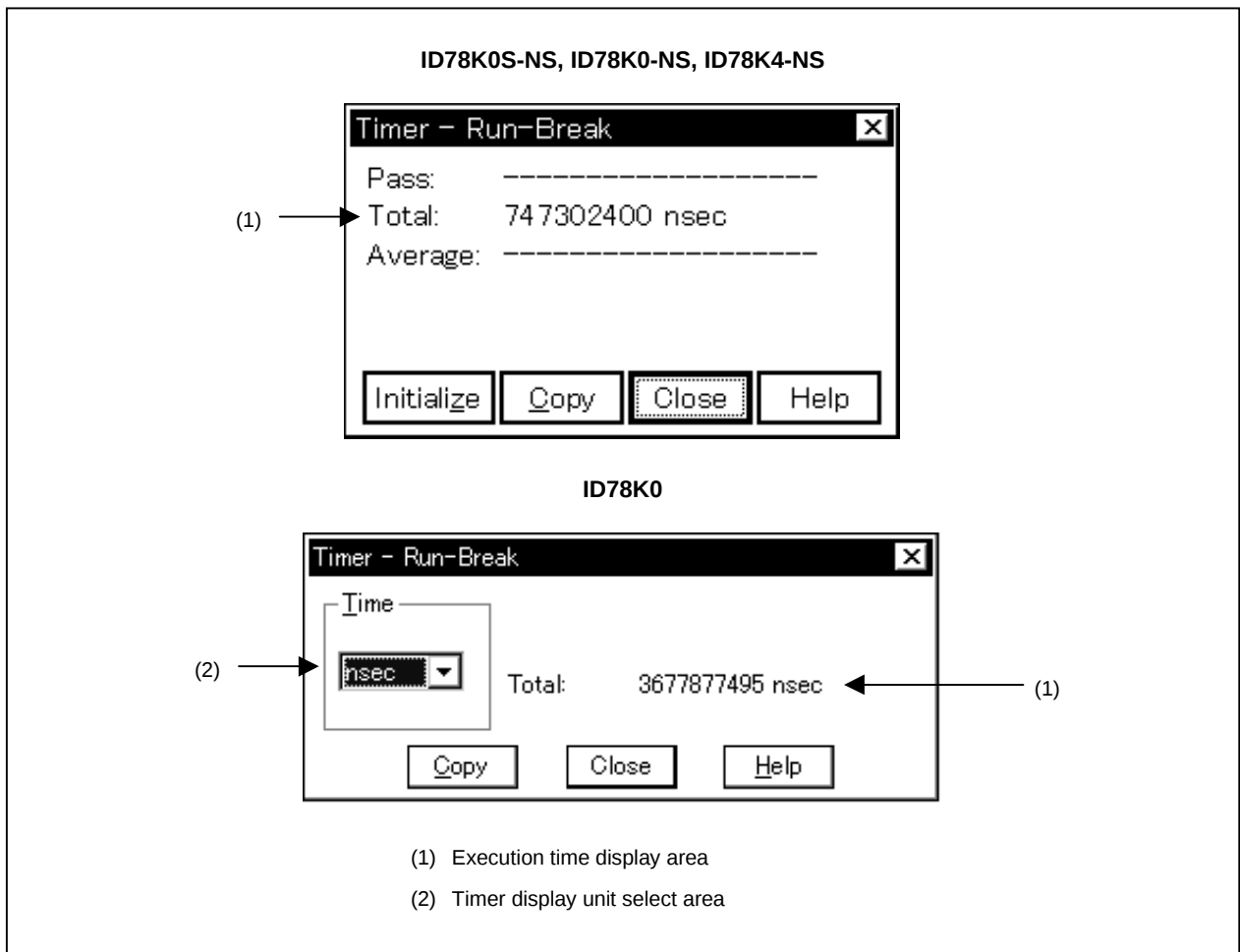
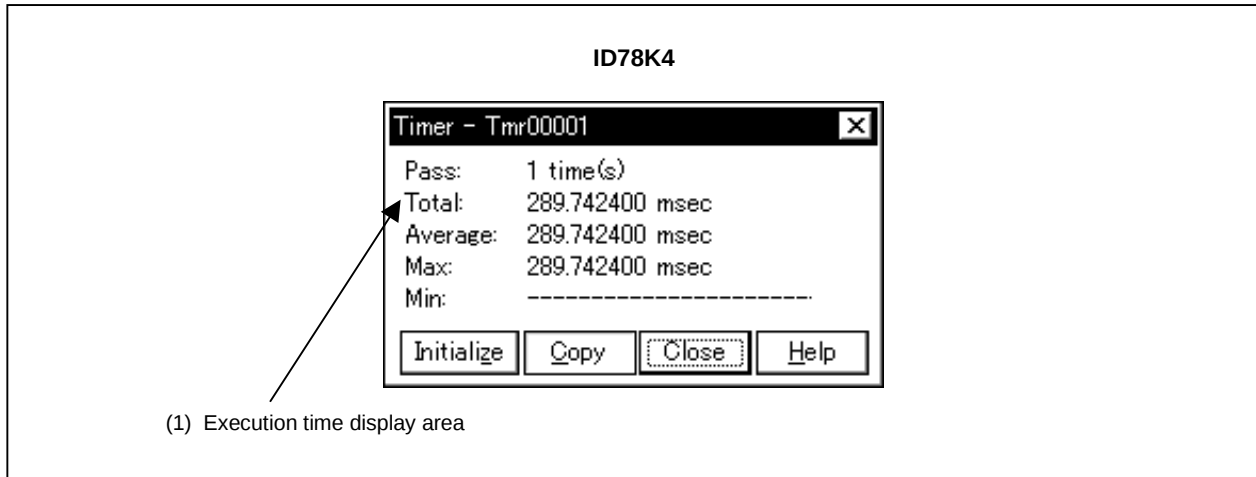


Figure 6-70. Timer Result Dialog Box (2/2)



Function

Displays the execution time measurement results.

This displays the execution time measurement results for the timer event condition or "Run-Break" set in the Timer dialog box.

The Timer Result dialog box corresponds 1 to 1 with a timer event condition or "Run-Break" and multiple dialog boxes can be opened simultaneously. The number that can be opened simultaneously is 256 for timer event conditions and 1 corresponding to "Run-Break", for a total of 257. However, the number of measurements that can be taken simultaneously for both timer event conditions and "Run-Break" is 17 (4 in the ID78K4)^{Note}.

Note Not supported in the ID78K4-NS

The Timer Result dialog box consists of the following area.

- Execution time display area
- Timer display unit select area

The function of this area is explained below.

(1) Execution time display area

Pass: -----
 Total: 747302400 nsec
 Average: -----

This area displays the measurement results of the execution time and execution count of the program.

Execution time and execution count display the cumulative execution time, pass count, and average execution time of the measurement period specified by the start event and end event conditions.

Also, the execution time is displayed in the unit set for the timer event condition.

Measurement Result	Contents	Remark
Pass ^{Note 1}	Displays the pass count.	Not measured during "Run-Break".
Total	Displays the cumulative execution time.	
Average ^{Note 1}	Displays the average execution time.	Not measured during "Run-Break".
Max ^{Note 2}	Displays the maximum execution time.	Not measured during "Run-Break".
Min ^{Note 2}	Displays the minimum execution time.	Not measured during "Run-Break".

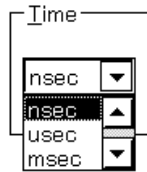
Notes 1. Not supported in the ID78K0

2. Supported only in the ID78K0-NS and ID78K4

If measurement is not conducted or if the measurement results are cleared, it is shown as a blank.

If the measurement results overflow, the message "Timer measurement overflowed!" is displayed.

(2) Timer display unit select area



This area selects the timer measurement results display unit.

The unit can be selected from the following five types.

nsec: Measurement results are displayed in nanosecond units.

usec: Measurement results are displayed in microsecond units.

msec: Measurement results are displayed in millisecond units.

sec: Measurement results are displayed in second units.

min: Measurement results are displayed in minute units.

"nsec" is selected for a newly created timer event condition.

Function buttons

Initialize ^{Note}

Clears the timer measurement results.

When timer measurement is not being performed, it is dimmed and cannot be clicked.

It is also dimmed and cannot be clicked when a user program is being executed.

A "Run-Break" cannot be cleared. It is cleared automatically when program execution starts.

Copy

Copies timer measurement results to the clipboard in text format.

Close

Closes the Timer Result dialog box. It becomes the default button. The **ESC** key has the same operation.

Help

Opens the help window.

Note Not supported in the ID78K4-NS

DMM Dialog Box

(Not supported in the ID78K4 (-NS))

General

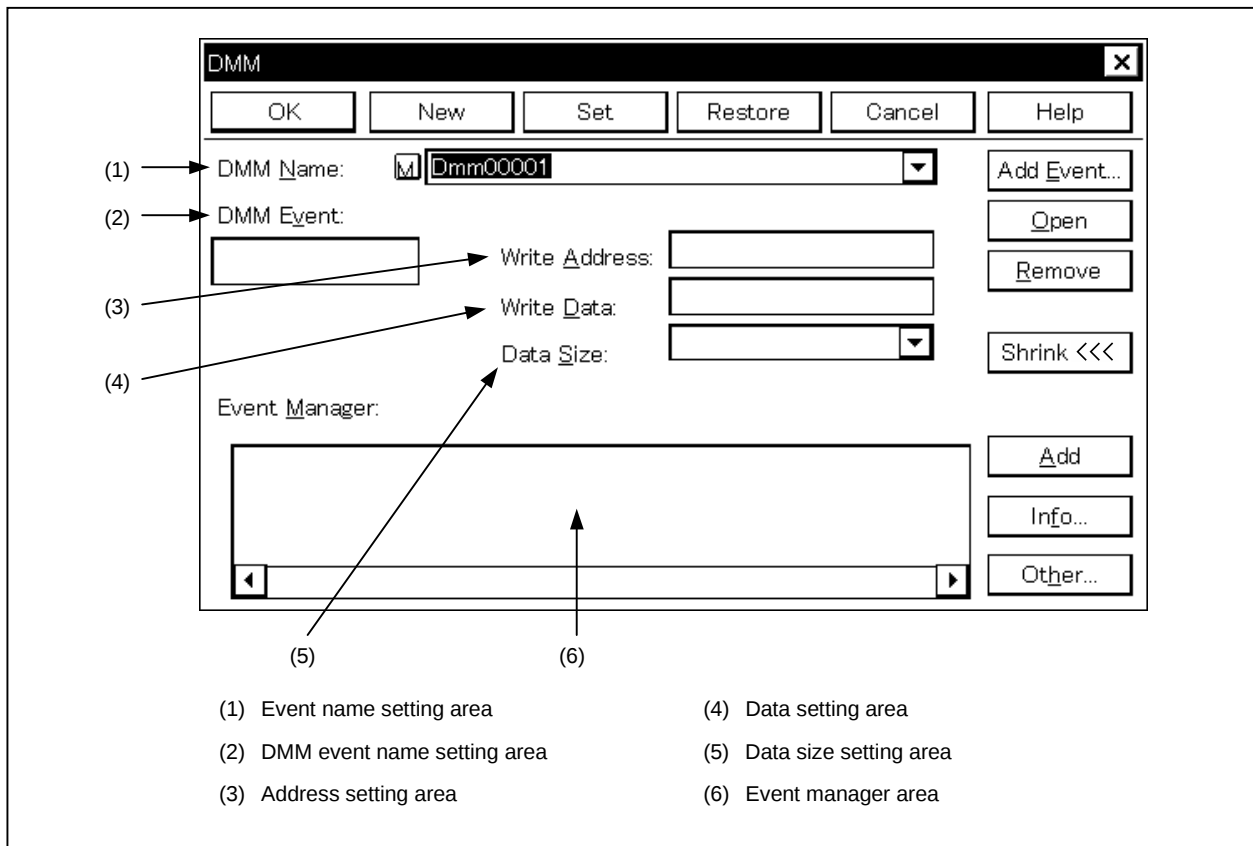
Sets dynamic memory modification (DMM).

This dialog box is only valid when the IE-78K0-NS-PA is installed in the IE-78K0-NS or the IE-78K0-NS-A/IE-78K0S-NS-A is used.

Opening method

This dialog box can be opened by the following methods.

- In the main window
Select [Event] → [DMM] from the menu bar.
Press the [GRPH] + [N] and [D] keys in that order.

Window**Figure 6-71. DMM Dialog Box**

Function

Registers and displays DMM event conditions.

DMM is used to write arbitrary data to a specified address when a specified event occurs during emulation.

This dialog box consists of the following areas.

- Event name setting area
- DMM event name setting area
- Address setting area
- Data setting area
- Data size setting area
- Event manager area

The function of each area is explained below.

(1) Event name setting area

DMM Name:  

This area sets an event name and selects an event condition.

When entering an event condition, it is necessary to set an event name. An event name may consist of up to eight alphanumeric characters.

When displaying event conditions which have already been created, either type the event name of the already created event name in the text box or select the event condition from the drop-down list in the event name setting area.

In the select mode, the selected event condition can be set in the event condition setting area of the original setting dialog box that called the Event dialog box.

The mark  on the left side of the event name setting area shows the use conditions of the event condition.

If the character in the mark  is red, it indicates that that DMM event condition is valid.

If the character in the mark  is black, it indicates that that DMM event condition is invalid.

If the character in the mark  is yellow, it indicates that that DMM event condition is in the hold state. An event in the hold state is in a state where the symbol specified by the event condition by program download, etc. cannot be referred to.

(2) DMM event name setting area

DMM Event:

This area sets event conditions for DMM.

Up to 16 DMM event conditions can be set (8 execution events and 8 access events).

(3) Address setting area

Write Address:

This area sets the address to which data is written after the event has occurred.

(4) Data setting area

Write Data:

This area sets the data to be written after the event has occurred.

(5) Data size setting area

Data Size: ▼

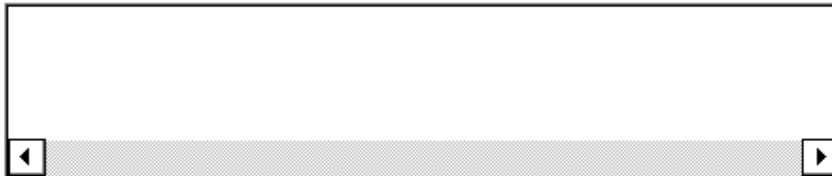
This area sets the size of the data to be written after the event has occurred.

The size can be selected from “Byte” or “Word”.

Example In the case of writing 0xff to 0xFBoo: 0xff is written to 0xFBoo when Byte is specified, and 0xff is written to 0xFBoo and 0x00 to 0xFBo1 when Word is specified.

(6) Event manager area

Event Manager:


 The Event Manager window is a rectangular box with a light gray background. It contains a list of events, represented by small icons. At the bottom of the window, there is a horizontal scrollbar with a left arrow and a right arrow.

This area displays a list of the entered event and event link conditions, and break, trace, snapshot, DMM and timer events.

An event condition or event link condition displayed in the event manager area can be set in the delay trigger condition setting area, trace start condition setting area, trace end setting condition area, qualify trace condition area, etc. by clicking **Add**.

Also, an event condition or event link condition in the event manager area can be dragged directly to the each event condition setting area.

When the focus is on the event manager area, select the event icon and click **Remove** or press the **DEL** key to delete the selected event.

When the focus is on the event manager area, selecting an event icon and clicking **Open** or double-clicking an event icon opens the setting dialog box corresponding to the selected event and displays the contents of the event.

By clicking **Info...**, it is possible to select the event manager area display mode or sequencing.

Function buttons

OK

Closes the DMM dialog box.

If there is a DMM event condition that is being edited, it is entered automatically and the dialog box is closed.

This is the default button.

New

Newly creates a DMM event condition.

A DMM event name is generated automatically and a newly created DMM event condition is prepared. After it is created, be sure to enter the DMM event condition using the **OK** or the **Set** button.

Set

Enters a DMM event condition.

When a new DMM event condition has been created or when the contents of a DMM event condition have been changed, be sure to enter the DMM event condition using this button.

If DMM event conditions that have already been entered are displayed, it changes to either the **Enable** button or **Disable** button.

A DMM event condition becomes enabled as soon as it is entered.

Enable

Enables a DMM event condition.

This button is displayed in cases where a DMM event condition is in the disabled state.

It changes to either the **Set** button or the **Disable** button.

Disable

Disables a DMM event condition.

This button is displayed in cases where a DMM event condition is in the enabled state.

It changes to either the **Set** button or the **Enable** button.

Clear

Clears the contents of a DMM event condition.

If a DMM event condition is entered but not edited, this button is displayed.

It changes to the **Restore** button.

Restore

Returns the contents of a DMM event condition to the original contents.

If a DMM event condition that has not been entered is displayed, all the area is made blank except the DMM event name.

If a DMM event condition is being edited, this button is displayed.

It changes to the **Clear** button.

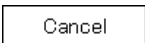
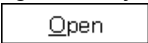
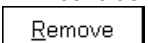
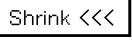
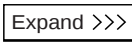
Cancel

Closes the DMM dialog box.

If a DMM event condition has not been created/changed/deleted, this button is displayed.

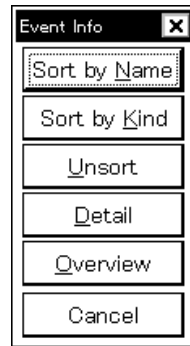
Even if a DMM event condition is being edited, the dialog box closes without the DMM event condition being entered.

The **ESC** key has the same operation.

Close	Closes the DMM dialog box. If a DMM event condition has been created/changed/deleted, after that, the  button becomes this button. Even if there is a DMM event condition that is being edited, the dialog box closes without the DMM event condition being entered. The  key has the same operation.
Help	Opens the help window.
Add Event...	Opens the DMM dialog box in the select mode and adds the event condition specified in the DMM condition setting area. The area to which the event condition is added is the area selected when the  button is clicked.
Add Link...	Opens the DMM dialog box in the select mode and adds the event link condition specified in the DMM condition setting area. The area to which the event link condition is added is the area selected when the  button is clicked.
Open	Displays the event contents selected in the DMM condition setting area or event manager area by opening the corresponding setting dialog box. The  button is only valid when the focus is on the DMM event setting area or event manager area and when one event has been selected. In all other cases, the button is dimmed and items cannot be selected.
Remove	Opens the DMM dialog box in the select mode and deletes an event selected in the DMM condition setting area or event manager area. The  button is only valid when the focus is on the DMM event setting area or event manager area and when an event has been selected. In all other cases, the button is dimmed and items cannot be selected. The  key has the same operation.
Expand >>>	Displays the event manager area. Expands the size of the dialog box. When the event manager area is not displayed, this button is displayed in place of the  button.
Shrink <<<	Does not display the event manager area. Shrinks the size of the dialog box. When the event manager area is displayed, this button is displayed in place of the  button.

Info...

Opens the Event Info dialog box.



The **Sort by Name** button rearranges events in name order and displays them.

The **Sort by Kind** button rearranges the events in order by type and displays them.

The **Unsort** button displays the events in the order in which they were entered without rearranging them.

The **Detail** button changes the event manager area to the detailed display mode.

The **Overview** button changes the event manager area to the list display mode.

The **Cancel** button or the **ESC** key closes the dialog box.

Other...

Opens the Set Other dialog box.



Clicking each button opens the Event manager and the Event, Event Link, Break, Trace, DMM, Timer, or Stub^{Note} dialog box, and closes the Set Other dialog box.

Close the dialog box by clicking the **Cancel** or **DMM...** button and return to the Snap Shot dialog box.

Note Supported only in the ID78K4

Pass Count Dialog Box

(Not supported in the ID78K4 (-NS))

General

Sets the pass count.

Opening method

This dialog box can be opened by the following methods.

- In the main window
Select [Event] → [Pass Count...] from the menu bar
Press the shortcut keys **GRPH** + **N** and **P**.

Window**Figure 6-72. Pass Count Dialog Box****Function**

Sets and displays the pass count.

The pass count setting is used to stop execution of the program and tracer after a specified number of events have occurred.

The Pass Count dialog box consists of the following area.

- Pass count setting area

The function of this area is explained below.

(1) Pass count setting area

Pass Count

This area sets and displays the pass count.

The settable range is from 1 (default) to 255.

Function buttonsOK

Closes the Pass Count dialog box after setting the edited pass count.
This is the default button.

Restore

Returns the pass count to the previous value.

Cancel

Closes the Pass Count dialog box without setting any changes made to the pass count value.

The  key has the same operation.

Help

Opens the help window.

Delay Count Dialog Box

General

Sets the delay count.

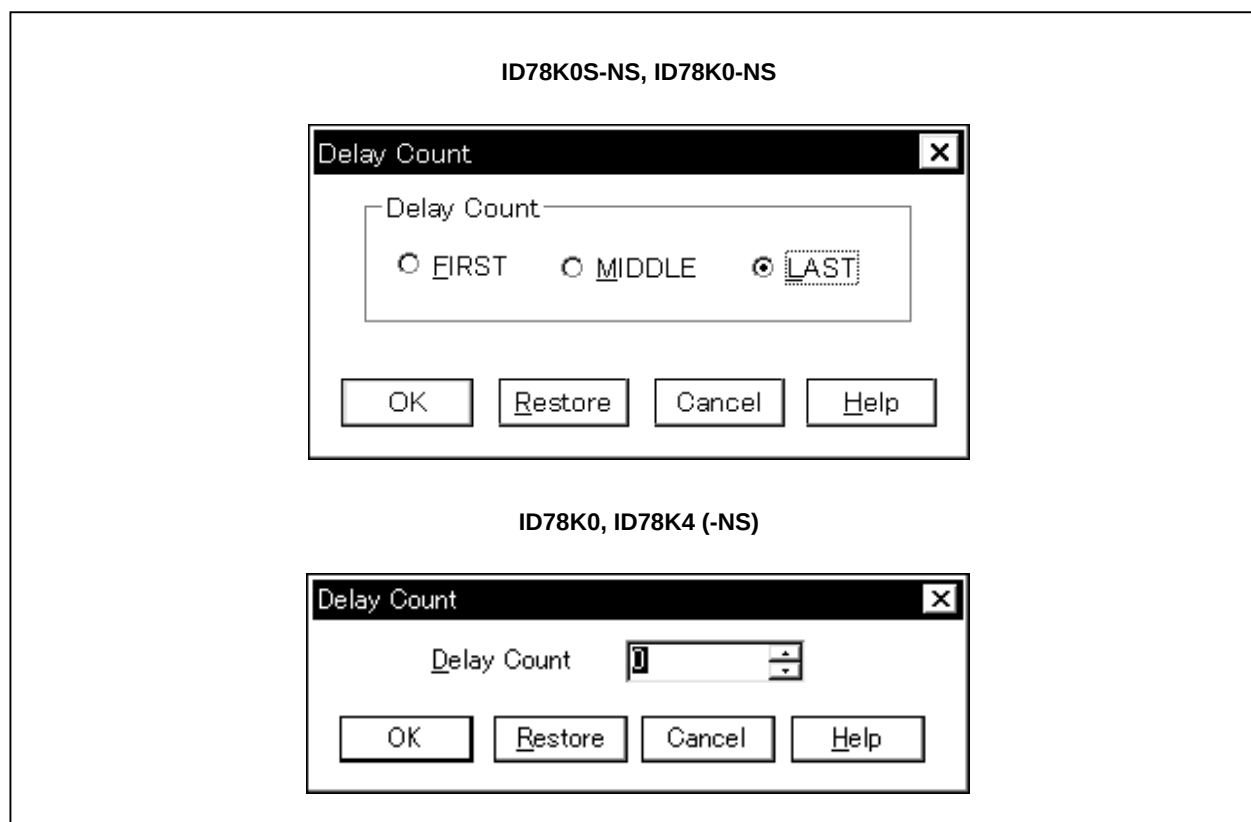
Opening method

This dialog box can be opened by the following methods.

- In the main window
Select [Event] → [Delay Count...] from the menu bar
Press the shortcut keys **GRPH** + **N** and **D**.

Window

Figure 6-73. Delay Count Dialog Box



Function

Sets and displays the delay count.

The delay count setting is used to stop execution of the program and tracer after a stop condition event is satisfied and a trace is performed for a specified count value.

The Delay Count dialog box consists of the following area.

- Delay count setting area

The function of this area is explained below.

(1) Delay count setting area

Delay Count

☐ FIRST ☐ MIDDLE ☒ LAST

This area sets and displays the delay count.

[ID78K0-NS, ID78K0S-NS]

The delay count can be selected from the following three settings.

- ☐ FIRST: The trigger pointer is placed at the start of the trace data, and tracing stops after about 8000 frames have been traced.
- ☐ MIDDLE: The trigger pointer is placed in the middle of the trace data, and tracing stops after about 4,000 frames have been traced.
- ☐ LAST: The trigger pointer is placed at the end of the trace data, and tracing stops immediately.

[ID78K0, ID78K4 (-NS)]

The delay count setting range is from 0 (default value) to 32,767 in the ID78K4 (-NS).

Function buttons

OK

Closes the Delay Count dialog box after setting the edited delay count.
This is the default button.

Restore

Returns the delay count to the previous value.

Cancel

Closes the Delay Count dialog box without setting any changes made to the delay count value.

The **ESC** key has the same operation.

Help

Opens the help window.

Reset Debugger Dialog Box

General

Initializes the debugger, emulation CPU, and symbol information.

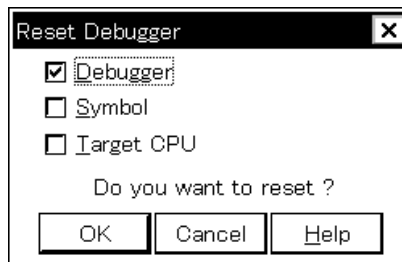
Opening method

This dialog box can be opened by the following methods.

- In the main window
Select [File] → [Debugger Reset...] from the menu bar.
Press the **GRPH** + **F**, and **R** keys in that order.

Window

Figure 6-74. Reset Debugger Dialog Box



Function

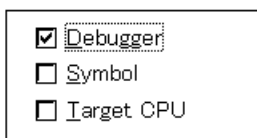
Specifies, by using a check box, whether the debugger, emulation CPU, or symbol information is initialized. As the default, only the debugger is initialized.

The Reset Debugger dialog box consists of the following area.

- Reset subject select area

The function of this area is explained below.

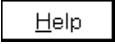
(1) Reset subject select area



This area selects the subject to be reset from the following.

Selected Item	Description
Debugger	Initializes and restarts the debugger (default).
Symbol	Resets symbol information.
Target CPU	Resets emulation CPU.

Function buttons

	Initializes the selected subject.
	Ignores the setting and closes this dialog box.
	Opens the help window.

About Dialog Box

General

Displays the version information of the debugger.

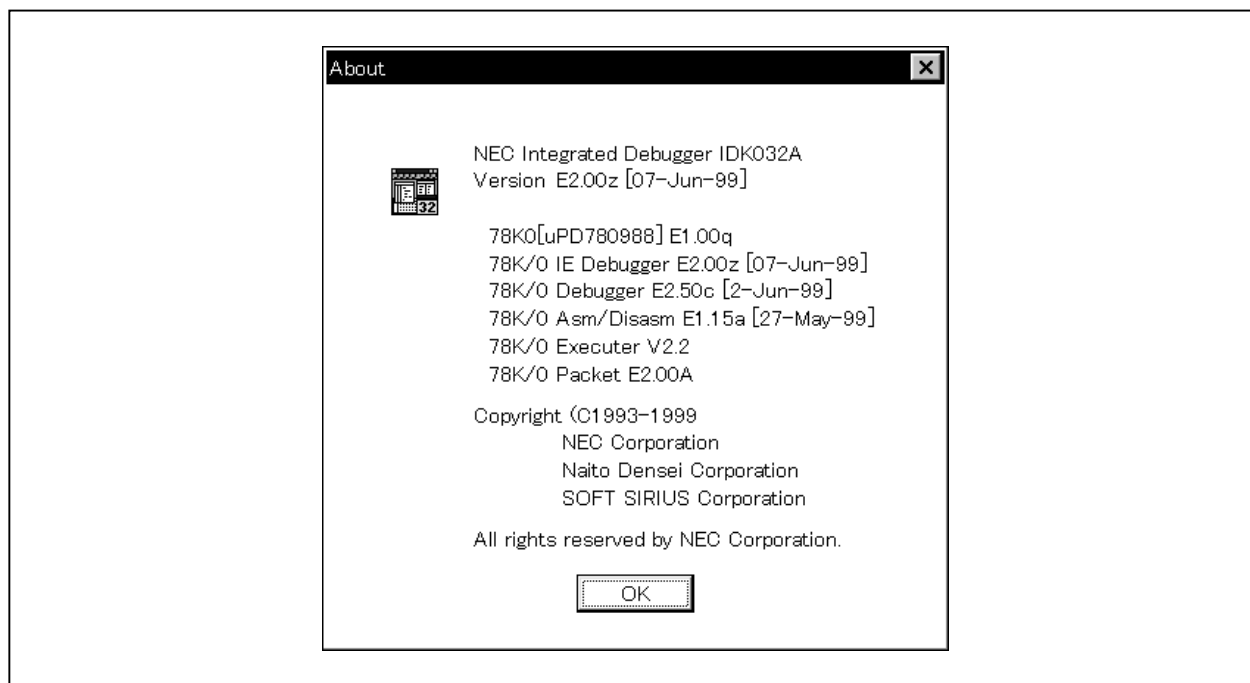
Opening method

This dialog box can be opened by the following methods.

- In the main window
Select [H]elp → [A]bout... from the menu bar.
Press the [GRPH] + [H], and [A] keys in that order.

Window

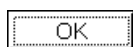
Figure 6-75. About Dialog Box



Function

Displays the version of the debugger and that of the device files, GUI, debugger DLLs, assembler DLLs, executor, and packet DLLs.

Function button



Closes this dialog box.

Exit Debugger Dialog Box

General

Terminates the debugger.

When terminating the debugger, the debugging environments can be saved in a project file.

Opening method

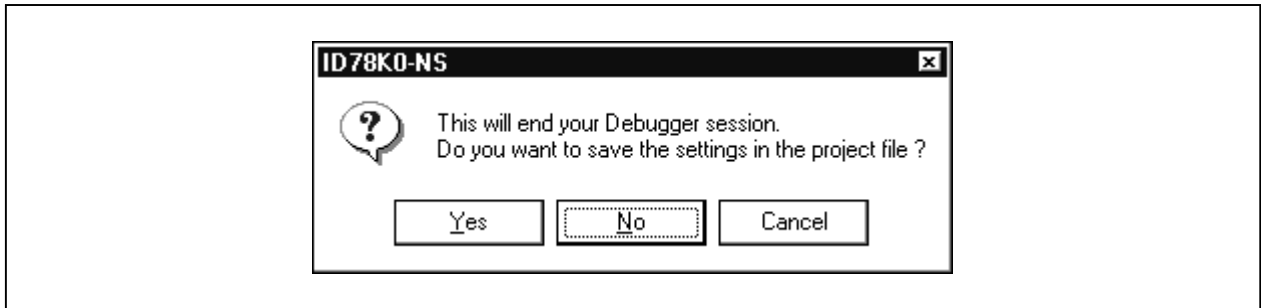
This dialog box can be opened by the following methods.

- In the main window
Select [File] → [Exit] from the menu bar.
Press the **[GRPH] + [F]**, and **[X]** keys in that order.

Also, the Exit Debugger dialog box opens when a compulsory close is executed, such as when Windows is closed or when an application is closed in the task list.

Window

Figure 6-76. Exit Debugger Dialog Box



Function

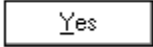
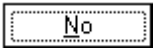
Specifies, by using a check box, whether the current debugging environments are saved in a project file or not when the debugger is terminated. As the default, the debugging environments are not saved in a project file. If the project file has been saved or loaded during a debugging operation, the default is to save the debugging environments.

When the **Yes** button is clicked, the Project File Save dialog box is opened, the current debugging environments are saved in the project file, and all the windows are closed. The debugger is then terminated.

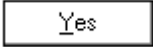
If the project file has been saved or loaded during a debugging operation, however, the Project File Save dialog box is not opened, and the debugging environments are saved in the project file.

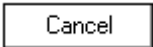
If the **No** button is clicked, all the windows are closed, and the debugger is terminated.

Note that the Exit Debugger dialog box can be set not to open in the Debugger Option dialog box.

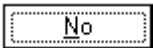
When terminating the debugger during user program execution is attempted, the message “User program is running, Do you want to stop use program?” is displayed. If the  button is selected, a Termination Confirmation dialog box is displayed after the execution of the user program has been stopped. However, if a setting not to display the termination confirmation dialog box has been made in the Debugger Option dialog box, the debugger is directly terminated. If the  button is selected, execution of the user program is not stopped, the Termination Confirmation dialog box is not displayed, and the debugger is not terminated.

Function buttons

Yes

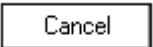
After saving the current debugging environment to a project file, closes all the windows and terminates the debugger. If the project file name has not been set, the Project File Save dialog box appears. If the  button in the Project File Save dialog box is selected, the project file is not saved and the debugger is not terminated.

If the project file is loaded or saved during debugger operation, this button is the default.

No

Closes all the windows and terminates the debugger.

If no project file is loaded or saved during debugger operation, this button is the default.

Cancel

Closes the dialog box without doing anything.

Error/Warning Dialog Box

General

Opens if an error or a warning occurs, to inform the user to check the message.

Window

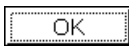
Figure 6-77. Error/Warning Dialog Box



Function

Displays the contents of the error or warning in the message display area.
Refer to **APPENDIX C ERROR MESSAGE LIST** if an error occurs.

Function button



Closes this dialog box.

Console Window

General

This window is used to input debugger control commands.

Since the key bind is emacs-like, accelerator keys are not acknowledged when the Console window is active.

However, the F1 key displays the help file for the console window.

For the command specifications, refer to the help file displayed by clicking the F1 key.

Opening method

This dialog box can be opened using any one of the following methods.

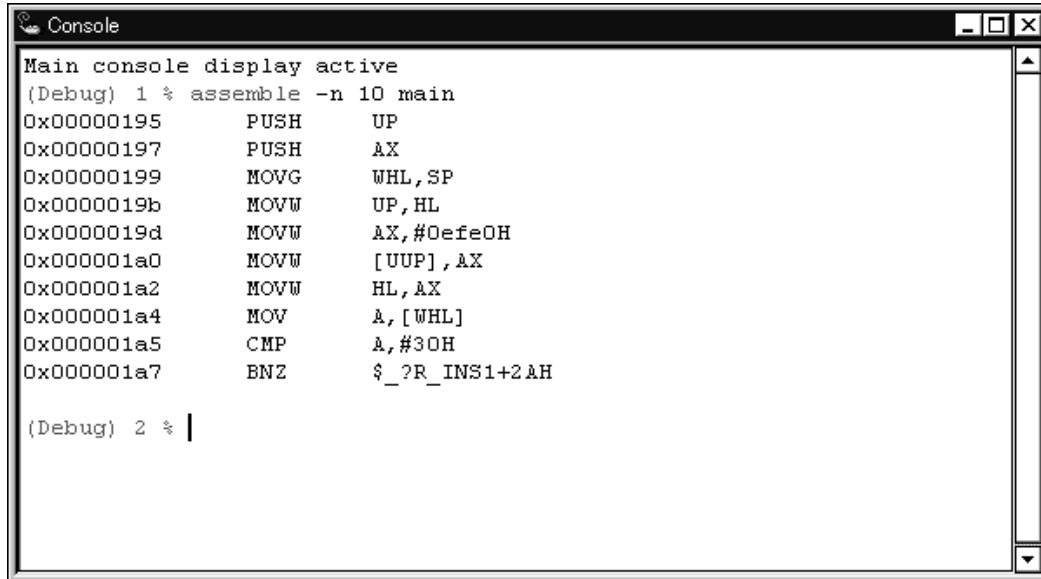
- In Main window

On the menu bar, select [Brow]se] → [Con]sole].

Press the [GRPH] + [B], [N] keys, in this sequence.

Window

Figure 6-78. Console Window



Function

Since the key bind is emacs-like, accelerator keys are not acknowledged when the Console window is active.

However, the [F1] key displays the help file for the console window.

For the command specifications, refer to the help file displayed by clicking the [F1] key.

The command specifications are listed in the following table.

Table 6-7. Command Specifications

Command Name	Outline	Page
address	Evaluate address expression	p.386
assemble	Disassemble/Line assemble	p.387
breakpoint	Set/delete breakpoint	p.388
batch	Batch execution (with echo)	p.390
download	Download	p.391
errmesg	Display error message	p.392
extwin	Create extension window	p.393
finish	Return from function	p.394
go	Continue execution	p.395
help	Display Help	p.396
hook	Set hook	p.397
ie	IE control	p.398
jump	Jump to window	p.399
map	Set/delete memory mapping	p.400
mdi	Set extension window	p.401
memory	Display/set memory	p.402
module	Display file list, function list	p.403
next	Procedure steps	p.404
refresh	Redraw window	p.405
register	Display/set register value and I/O register value	p.406
reset	Reset	p.407
run	Reset & execute CPU	p.408
step	Step execution	p.409
stop	Stop execution	p.410
upload	Upload	p.411
version	Display version	p.412
watch	Display/set variable value	p.413
where	Trace stack	p.414
wish	Start Tclet	p.415
xcoverage	Coverage manipulation	p.416
xtime	Timer manipulation	p.417
xtrace	Tracer manipulation	p.418

address

Evaluate address expression

Syntax

address *expression*

Explanation

Converts the address expression specified with ***expression*** to an address.

Description example

```
(IDCON) 1 % address main
0xaa
(IDCON) 2 % address main+1
0xab
```

assemble

Disassemble/Line assemble

Syntax

assemble *?options? address ?code?*

Explanation

Assembles the character string specified with **code** from the address specified with **address**. If '.' has been specified for **address**, interprets this as the address following the one handled in the immediately preceding assemble operation.

If **code** is omitted, disassembles from the address specified with **address**.

The following **options** are available. They are ignored in the case of assemble.

- code

Displays instruction code. Ignored in case of assemble.
- number *number*

Displays *number* lines. Ignored in case of assemble.

Description
example

```
(IDCON) 1 % assemble -n 5 main
0x000000aa  B7          PUSH   HL
0x000000ab  B1          PUSH   AX
0x000000ac  891C        MOVW    AX,SP
0x000000ae  D6          MOVW    HL,AX
0x000000af  A100        MOV     A,#0H
(IDCON) 2 % assemble main mov a,b
(IDCON) 3 % assemble . mov a,b
```

breakpoint

Set/delete breakpoint

Syntax

breakpoint *?options? ?address1? ?address2?*

breakpoint *-delete brkno*

breakpoint *-enable brkno*

breakpoint *-disable brkno*

breakpoint *-information*

Explanation

Manipulates the breakpoint set with **options** and **address**.

A breakpoint number is returned when a breakpoint is correctly set.

The following **options** are available.

-software	Specifies software break.
-hardware	Specifies hardware break (default).
-execute	Sets address execution break (default).
-beforeexecute	Sets break before address execution
-read	Sets address data read break.
-write	Sets address data write break.
-access	Sets address data access break.
-size <i>size</i>	Sets access size (8, 16, or 32)
-data <i>value</i>	Sets data condition.
-datamask <i>value</i>	Sets data mask.
-extprobe <i>value</i>	Sets external sense data condition.
-extprobemask <i>value</i>	Sets external sense data mask.
-pass <i>value</i>	Sets pass count.
-information	Displays breakpoint list.
-delete	Deletes breakpoint of specified number.
-disable	Disables breakpoint of specified number.
-enable	Enables breakpoint of specified number.

**Description
example**

```
(IDCON) 19 % breakpoint main
1
(IDCON) 20 % breakpoint -i
1 Brk00001 enable rammon.c#17

(IDCON) 21 % breakpoint -software sub1
2
(IDCON) 22 % breakpoint -i
1 Brk00001 enable rammon.c#17
2 Brk00001 enable rammon.c#8

(IDCON) 23 % breakpoint -disable 2
(IDCON) 24 % breakpoint -i
1 Brk00001 enable rammon.c#17
2 Brk00001 disable rammon.c#8

(IDCON) 25 % breakpoint -delete 1
2 Brk00001 disable rammon.c#8
```

batch

Batch execution (with echo)

Syntax

batch *scriptname*

Explanation

Executes at one time all the files selected with ***scriptname*** while displaying them on the screen.
Nesting is supported.

Description example

```
(IDCON) 1 % clear
(IDCON) 2 % batch bat_file.tcl
(IDCON) 3 % tkcon save a:/log.txt
```

download

[Download](#)

Syntax

download *?options? filename ?offset?*

Explanation

Downloads the file specified with **filename** according to the selected **options**.

If **offset** is specified, offsets addresses by the **offset** value.

-binary	Downloads binary format data.
-coverage	Downloads coverage data.
-append	Performs additional download.
-nosymbol	Performs download without reading symbol information.
-reset	Resets CPU following download.
-information	Displays downloaded information.

Description example

```
(IDCON) 1 % download test.lmf
```

errmesg

Display error message

Syntax**errmesg** *errno***Explanation**

Displays the error message corresponding to *errno*.

**Description
example**

```
(IDCON) 1 % errmesg 2  
0002 (F) : This function is not supported.
```

extwin

Create extension window

Syntax

extwin *scriptfile*

Explanation

Creates extension window with *scriptfile*.

Description example

```
(IDCON) 1 % extwin d:/foo.tcl
```

finish

Return from function

Syntax

finish

Explanation

Performs execution until return to the program that called the current function.

Description example

```
(IDCON) 1 % finish
```

go

Continue execution

Syntax**go** *?options?***Explanation**

Continues the program execution. If -waitbreak is specified, waits until the program stops.

The following **option** is available.

-waitbreak

-waitbreak: Waits until program stops.

**Description
example**

```
(IDCON) 1 % go -w
```

help

Display Help

Syntax

help

Explanation

Displays the Dcl Help file.

Description example

```
(IDCON) 1 % help
```

hook

[Set hook](#)

Syntax

hook *scriptfile*

Explanation

Sets the hook procedure with *scriptfile*.

Description example

```
(IDCON) 1 % hook d:/foo.tcl
```

ie

IE control

Syntax*ie reg address ?value?**ie dcu address ?value?***Explanation**

The ie command is IE-dependent.

**Description
example**

```
(IDCON) 1 % ie reg 0x100 1
```

```
(IDCON) 2 % ie dcu 0x100 1
```

jump

Jump to window

Syntax

jump *-source -line filename ?line?*

jump *?options? address*

Explanation

Displays the window specified with the **options**.

-source	Displays Source window from address specified with <i>address</i> .
-assemble	Displays Assemble window from address specified with <i>address</i> .
-memory	Displays Memory window from address specified with <i>address</i> .
-coverage	Displays Coverage window from address specified with <i>address</i> .
-line	Moves to the line specified with <i>line</i> .

Description example

```
(IDCON) 1 % jump -s main
(IDCON) 2 % jump -s -l mainfile.c 10
(IDCON) 3 % jump -m array
```

map

Set/delete memory mapping

Syntax

map *options address1 address2 ?accsize?*

Explanation

Displays the window specified with the *options*.

-source	Displays Source window from address specified with <i>address</i> .
-assemble	Displays Assemble window from address specified with <i>address</i> .
-memory	Displays Memory window from address specified with <i>address</i> .
-coverage	Displays Coverage window from address specified with <i>address</i> .
-line	Moves to the line specified with <i>line</i> .

Description example

```
(IDCON) 1 % map -i
1: 0 0x7fff 8 {IROM}
2: 0x8000 0x87ff 8 {Target RRM}
3: 0x8800 0x9fff 8 {Target}
4: 0xa000 0xf7ff 8 {NonMap}
5: 0xf800 0xfaff - {NonMap}
6: 0xfb00 0xfedf 8 {Saddr}
7: 0xfef0 0xfef 8 {Register}
8: 0xff00 0xffff 8 {SFR}
(IDCON) 2 % map -erom 0x100000 0x10ffff
(IDCON) 3 % map -c
```

mdi

Set extension window

Syntax

mdi *geometry* ?x y? *width height*

mdi *title string*

Explanation

Specifies the size and title of the extension window.

This command can be used only from the extension window.

Description example

```
(IDCON) 1 % mdi geometry 0 0 100 100
(IDCON) 2 % mdi title foo
```

memory

Display/set memory

Syntax

memory *?options? address ?value?*

memory *?options? -fill address1 address2 value*

memory *?options? -copy address1 address2 address3*

Explanation

Sets the **value** according to the **options** in the memory of the address specified with **address**.

When **value** is omitted, displays the value of the memory of the address specified with **address**.

When **-fill** is specified, fills the interval between address 1 and address 2 with value.

When **-copy** is specified, copies the interval between address 1 and address 2 to address 3.

The following **options** are available.

-byte	Displays/sets in 1-byte units (default).
-word	Displays/sets in 1-word units.
-fill	Fill data.
-copy	Copies data.

Description example

```
(IDCON) 1 % memory 100
0x10
(IDCON) 2 % memory 100 2
(IDCON) 3 % memory 100
0x02
(IDCON) 4 % memory -fill 0 1ff 0
```

module

Display file list, function list

Syntax

module *progrname* *?filename?*

Explanation

Displays the file list, function list of the load module file specified with ***progrname***. If no *filename* is specified, displays the file list. If *filename* is specified, displays the function list of the specified file.

Description example

```
(IDCON) 1 % module rammon.lmf
1: rammon.c
(IDCON) 2 % module rammon.lmf rammon.c
1: rammon.c sub1
2: rammon.c main
```

next

Procedure steps

Syntax

next *?options?*

Explanation

Executes the procedure steps. If function call is performed, stops after that function is executed.
The following *options* are available.

-source	Executes in source line units (default).
-instruction	Executes in instruction units.

Description example

```
(IDCON) 1 % next -i
(IDCON) 2 % next -s
```

refresh

Redraw window

Syntax

refresh

Explanation

Redraws the window and updates it with the latest data.

Description example

```
(IDCON) 1 % batch foo.tcl
(IDCON) 2 % refresh
```

register

Display/set register value and I/O register value

Syntax

register *?options? regname ?value?*

Explanation

Sets **value** to the register specified with **regname**. If **value** is omitted, displays value of register specified with **regname**.

The following **options** are available.

- | | |
|------------------------------|-----------------------|
| -force | Performs forced read. |
| -bankno <i>bankno</i> | Specifies bank No. |

Description example

```
(IDCON) 1 % register pc
0x100
(IDCON) 2 % register pc 200
(IDCON) 3 % register pc
0x200
```

reset

Reset

Syntax

reset *?options?*

Explanation

Resets the CPU, debugger, or symbol.

If options are omitted, resets the CPU.

The following **options** are available.

-cpu	Resets the CPU (default).
-debugger	Resets the debugger.
-symbol	Resets the symbol.

Description example

```
(IDCON) 1 % reset
```

run

Reset & execute CPU

Syntax`run ?options?`**Explanation**

Executes the program following reset. If -waitbreak is not specified, does not wait for the program to stop.
The following ***option*** is available.

-waitbreak

Waits until the program stops.

**Description
example**

```
(IDCON) 1 % run
(IDCON) 2 % run -w
```

step

Step execution

Syntax**step** *?options?***Explanation**

Performs step execution. If function call is performed, stops at the start of that function.

The following **options** are available.

-source

Executes in source line units (default).

-instruction

Executes in instruction units.

**Description
example**

```
(IDCON) 1 % step -i
(IDCON) 2 % step -s
```

stop

Stop execution

Syntax**stop****Explanation**

Forcibly stops the program.

**Description
example**

```
(IDCON) 1 % run  
(IDCON) 2 % stop
```

upload

Upload

Syntax

upload *?options? filename address1 address2*

Explanation

Saves the memory data or coverage data in the specified address range to a file.

The following **options** are available.

-binary	Saves in the binary format.
-coverage	Saves coverage data.
-intel	Saves in the Intel HEX format (default).
-motorola	Saves in the Motorola HEX format.
-tektronix	Saves in the Tektronix HEX format.
-force	Overwrites the file.

Description example

```
(IDCON) 1 % upload -b foo.hex 0 0xffff
(IDCON) 2 % upload -c -f foo.cov 0 0xffff
```

version

Display version

Syntax**version****Explanation**

Displays the debugger version.

**Description
example**

```
(IDCON) 1 % version
GUI
E2.00y [31-May-99]
Devicefile                : 78K0 [uPD780034] E1.01a
Debugger                   : 78K/0 Debugger E2.50c [02-
Apr-99]
Executer                   : 78K/0 Executer E1.3c
Packet translator          : 78K/0 Packet E2.00w
Assembler                  : 78K/0 Asm/Disasm E1.15a
[01-Apr-99]
Tcl/Tk                     : 8.1.1
```

watch

Display/set variable value

Syntax

watch *?options? variable ?value?*

Explanation

Displays and sets the value of the variable.

The following **options** are available.

-binary	Displays the value in binary.
-octal	Displays the value in octal.
-decimal	Displays the value in decimal.
-hexdecimal	Displays the value in hexadecimal.
-string	Displays the value as a character string.
-sizeof	Displays the size of the variable instead of its value in hexadecimal.

Description example

```
(IDCON) 1 % watch var
0x10
(IDCON) 2 % watch -d var
16
(IDCON) 3 % watch array\[0\] 0xa
```

where

[Trace stack](#)

Syntax

where

Explanation

Back traces stacks.

Description example

```
(IDCON) 1 % where
1: test2.c#sub2(int i)#13
2: test.c#num(int i)#71
3: test.c#main()#82
```

wish

[Start Tclet](#)

Syntax

wish *scriptname*

Explanation

Starts script (Tclet) using Tk.

Extension windows can be created with Tclet.

Description example

```
(IDCON) 1 % wish test.tcl
```

xcoverage

Coverage manipulation

Syntax

xcoverage *option*

Explanation

Manipulates coverage.

The following **options** are available.

-start	Starts coverage during program execution.
-stop	Stops coverage during program execution.
-clear	Clears the coverage memory.

Description example

```
(IDCON) 1 % xcoverage -start
(IDCON) 2 % xcoverage -stop
(IDCON) 3 % xcoverage -clear
```

xtime

Timer manipulation

Syntax

`xtime option`

Explanation

Manipulates the timer.

The following **options** are available.

-start	Starts the timer during program execution.
-stop	Stops the timer during program execution.
-gobreak	Displays the time between go-breaks as a number of clocks.

Description example

```
(IDCON) 1 % xtime -start
(IDCON) 2 % xtime -stop
```

xtrace

Tracer manipulation

Syntax**xtrace** *-dump ?-append? frameno ?filename?***xtrace** *-start***xtrace** *-stop***xtrace** *-clear***xtrace** *-addup bool***xtrace** *-mode mode***Explanation**

Manipulates the tracer.

The following **options** are available.

-start	Starts the tracer during program execution.
-stop	Stops the tracer during program execution.
-clear	Clears the trace memory.
-dump	Dumps the trace data (default) When a file name is specified, writes the trace data to that file.
-append	Appends the dump result to the file.
-addup bool	Selects whether to add up time tags.
-mode mode	Selects the trace control mode (all, cond, nonstop, fullstop, fullbreak, delaystop, delaybreak, machine, or event).

**Description
example**

```
(IDCON) 1 % xtrace -start
(IDCON) 2 % xtrace -stop
(IDCON) 3 % xtrace -dump 3
_ 01685 2 000000BC M1 br _sub2+0x2
_ 01686 4 0000009A BRM1 st.w r6, 0x8[sp]
_ 01687 3 0000009E BRM1 st.w r0, 0x0[sp]
(IDCON) 4 % xtrace -clear
(IDCON) 5 % xtrace -addup true
```

APPENDIX A DEBUGGING WITH ID78K SERIES

This appendix explains the basic debugging operation using the ID78K Series.

For the details of each window and dialog box mentioned in this section, refer to **CHAPTER 6 WINDOW REFERENCE**.

(1) Setting debug environment

Set the operating environment of debugger.

If a previous debug environment has been saved to a project file, the debug environment can be restored by loading that file. The procedure differs as follows depending on whether a project file is used or not.

(a) When project file is not used

- <1> Set all the items in the Configuration dialog box.
- <2> Set the extended options in the Extended Option dialog box.
- <3> Set the debug options in the Debugger Option dialog box.

(Caution Always specify the startup symbol.)

(b) When project file is used

• When project file is used at startup

- <1> Click **Project...** in the Configuration dialog box.
→ The Project File Load dialog box will open.
- <2> Specify the project file name and click **OK**.
→ The project file will be loaded.

The following procedure can also be used.

- <1> Select **[Run]** from the Start menu in Windows.
- <2> Use the **Browse** button to specify the file to be executed, IDK032A.EXE (for the ID78K0-NS).
- <3> After IDK032A.EXE (for the ID78K0-NS), specify the name of the project file to be used (eg. A:\nectools32\bin\IDK032A.EXE\B:\Test\Test1.prj (Δ = space)).
- <4> Click **OK**.

• When project file is used during debugging

- <1> Select **[File] → [Project] → [Open]** in the main window, or click the  button.
→ The Project File Load dialog box will open.
- <2> Specify the project file name and click **OK**.
→ The project file will be loaded.

(2) Download load module file

- (a) Download the load module file to be debugged.
→ Download dialog box

- (b) Confirming loaded files
→ Load Module List dialog box

(3) Display disassemble result

Display the result of disassembling the downloaded user program.

→ Assemble window

The method of displaying the disassemble display label column and mnemonic column can be changed.

→ Debugger Option dialog box

(4) Display source program

Display the source program. A program whose source can be debugged must have debug information compiled with the -g option specified.

→ Source window

(a) Setting source path information, display font, and source file extension

→ Debugger Option dialog box

(b) Selecting source file

→ Browse dialog box

(c) Source file and disassemble

→ Select [V]iew → [M]ix when the source text file is the current window.

(5) Setting of event**(a) Registering event conditions and event link conditions**

→ Event dialog box

Event Link dialog box

(b) Setting of event conditions

Set event conditions by using the event icons in the Event Manager or in the event manager area of various event setting dialog boxes (however, breakpoints can be set in the Source window/Assemble window).

- Trace event condition
→ Trace dialog box
- Break event condition
→ Break dialog box
- Timer event condition
→ Timer dialog box
- Snap event condition
→ Snap Shot dialog box
- DMM event condition
→ DMM dialog box

(c) Checking setting of event conditions

→ Event Manager, the event manager area in each event setting dialog box

(6) Executing user program

By executing the user program, the value of the PC advances to the set breakpoint, break event or forced break.

- Types of execution
 - Execution control buttons on the toolbar in the main window, or [Run] menu

(7) Checking trace data

→ Trace View window

(8) Editing, checking, and changing contents of memory

→ Memory window
Memory Copy dialog box
Memory Fill dialog box
Memory Compare dialog box
Memory Compare Result dialog box

(9) Registering, checking, and changing variable values

→ Quick Watch dialog box
Add Watch dialog box
Watch window
Local Variable window

(10) Checking contents of stack

→ Stack window

(11) Checking and changing registered contents of register value

→ Register window
SFR window
The PC register value can also be checked in the Source and Assemble windows.

(12) Checking and changing contents of SFR

→ SFR window
SFR Select dialog box

(13) Registering, checking, and changing user-defined I/O port value

→ Add I/O Port dialog box
SFR window

(14) Changing mnemonics and executing on-line assemble

→ Assemble window
Source window

(15) Checking execution time of user program

→ Timer dialog box
Timer Result dialog box
Trace View window

(16) Checking coverage measurement result

- Coverage window
 - Coverage-Clear dialog box
 - Coverage-Condition Setting dialog box
 - Coverage-Efficiency View dialog box

(17) Searching character string in each window

- Source Search dialog box
- Assemble Search dialog box
- Memory Search dialog box
- Trace Search dialog box
- Coverage Search dialog box

(18) Referencing “display file” saved in previous debugging process

- View File Load dialog box

(19) Saving screen contents to “display file” during debugging

- View File Save dialog box

(20) Uploading memory contents and coverage results

- Upload dialog box

(21) Saving debug environment to project file

- Project File Save dialog box

(22) Terminating ID78K Series

- Exit Debugger dialog box

APPENDIX B TERMINOLOGY

Words and window types (refer to **CHAPTER 6 WINDOW REFERENCE**) used in this document are described below.

B.1 Terminology

The following words are described in this document.

- Debugging mode
- Current window
- Delimiter symbol (separator)
- Program
- Current program
- File
- Current file
- Function
- Current function
- Structure
- Stack frame number
- Line
- Register name
- Numeric value
- Address
- Symbol
- Expression and operator
- Character set

Each word and the input conventions are explained below.

(1) Debugging mode

Execution of the user program can be controlled in the following three debugging modes.

- Source mode
Step execution is performed in units of one line of a source text.
- Instruction mode
Step execution is performed in instruction units.
- Automatic mode
This mode automatically switches between source mode and instruction mode.
In this mode, when the Source window is active, step execution is performed in units of 1 line of source text (instruction units for mixed display), and when the Assemble window is active, step execution is performed in instruction units. When neither window is active, this mode becomes instruction mode.

These three debugging modes are selected from the “Option menu” of the main window. When starting the debugger, the automatic mode is selected as the default.

(2) Current window

The current window is the window in which an operation is currently being performed. In this window, information can be input from the keyboard and menus can be selected.

(3) Delimiter symbol (separator)

A file, function, variable, or line can be specified by using the delimiter symbols listed in Table B-1.

Table B-1. Delimiter Symbols

Symbol	Specification
#	Used as a separator between file names and variable/function names and line numbers.
\$	Used as a separator between load module names and file, variable, and function names.

(4) Program

A program is the executable unit that is subject to debugging. The ID78K Series deals with each load module file specified when downloading as one program. The name of a program is specified by using the name of the load module file that is downloaded.

(5) Current program

The current program is the program that contains the instruction for a break currently taking place (i.e., the instruction indicated by the program counter (PC)).

When specifying a file in the current program, specifying the program name may be omitted.

(6) File

The allowable number of characters in a file name is up to 127 characters in a full path.

Depending on the file type, it may be possible to specify a file name with more than 127 characters.

(7) Current file

The current file is the source file that has the instruction for a break currently taking place (i.e., the instruction indicated by the program counter (PC)).

When specifying a line or function in the current file by using a command, the file name can be omitted.

(8) Function

Functions constitute a C source program.

(9) Current function

The current function is the function that has the instruction for a break currently taking place (i.e., the instruction indicated by the program counter (PC)). When accessing a local variable in the current function, specifying the function name can be omitted.

(10) Structure

Structures and unions of the C language are generically referred to as “structures”. When a structure or union variable is used without explicitly specifying a member, the term “structure” is used.

(11) Stack frame number

A stack frame number is a decimal number starting from 1. The stack contents are displayed numbered. The shallower the nesting of the stack, the higher the number. Therefore, a function having a stack number 1 less than the stack number of another function calls that function.

(12) Line

A line is specified to identify a certain line in the source file.

Line numbers are specified by an integer constant that starts from 1.

(13) Register name

A register name is specified by the absolute name of a system register or general-purpose register of the 78K/0, 78K/0S, and 78K/IV Series microcontrollers listed in Table B-2, or by the alias of a register.

Table B-2. Register Set of 78K Series

Register Type	Register Name	
	Absolute Name	Alias
System registers	PC	
	PSW	
	SP	
General-purpose registers	r0	zero
	r1	
	r2	
	r3	sp
	r4	gp
	r5	tp
	r6	
	r7	
	r8 ^{Note}	
	r9 ^{Note}	
	r10 ^{Note}	
	r11 ^{Note}	
	r12 ^{Note}	
	r13 ^{Note}	
	r14 ^{Note}	
	r15 ^{Note}	

Note r8 to r15 are supported only for the 78K/IV Series.

(14) Numeric value

The following four types of numeric values can be used.

- Binary Input format: nY
 n...nY (n = 0, 1)
- Octal Input format: nO
 n...nO (n = 0 to 7)
 nQ
 n...nQ (n = 0 to 7)
- Decimal Input format: n
 n...n
 nT
 n...nT (n = 0 to 9)

- Hexadecimal Input format:
 - n
 - n...n
 - nH
 - n...nH
 - 0xn
 - 0xn...n (n = 0 to F)

- Cautions**
- Suffixes (Y, O, Q, T, H, 0x) and the alphabetical characters in hexadecimal numbers are not case sensitive.**
 - If the first character is one of A to F, a 0 must be affixed in front.**
 - The radix in the input column switches between decimal and hexadecimal in accordance with the default radix.**

(15) Address

- An address is specified by directly specifying a numeric value.
- An address can also be specified by using a symbol or expression.
- When specifying an address by using a numeric value, hexadecimal, decimal, octal, or binary numbers can be used.

(16) Symbol

- A symbol consists of characters A to Z, a to z, @, _ (underline), and 0 to 9.
- A symbol must begin with a character other than numerals 0 through 9.
- This software distinguishes between uppercase (A to Z) and lowercase (a to z) characters.
- A symbol name can consist of up to 256 characters.
- If a symbol exceeding 256 characters is specified, the first 256 characters are valid.
- A symbol is defined by loading a load module file.
- Symbols can be classified into the following types by the valid range.

(a) Global symbols (assembly language, C language)

(b) Static symbols (C language)

Static symbols in files

Static symbols in functions

(c) Local symbols (C language)

Local symbols in files

Local symbols in functions

Local symbols in blocks

- The following symbols exist in each of the languages used.

(a) Assembly language

Label names

(b) C language

Variable names (including pointer function names, enumerate type variable names, array names, structure name, and union names)

Function names, label names

Array elements, structure elements, union elements (if the symbol is an array, structure, or union)

- A symbol can be described instead of an address and numeric value.
- The valid range of symbols is determined based on the source debugging information when the source file is assembled or compiled.
- A global symbol only describes a symbol name.
- A local symbol is expressed as a pair with a file name.

(17) Expression and operator**<Expression>**

- An expression consists of constants, register names, SFR names, and symbols combined by operators.
- If an SFR name, label name, function name, or variable name is described as a symbol, an address is calculated as the value of the symbol.
- Elements constituting an expression, other than operators, are called terms (constants and labels). Terms are called the first term, second term, and so on, in the sequence they are described, starting from the one on the left.

<Operator>

- The following operators of C language can be used.

Arithmetic operators

Symbol	Meaning	Remark
+	Addition	Returns sum of values of first and second terms
–	Subtraction	Returns difference in value between first and second terms
*	Multiplication	Returns product of values of first and second terms
/	Division	Divides value of first term by value of second term, and returns integer of result
MOD, %	Remainder	Divides value of first term by value of second term, and returns remainder of result
– sign	Unary operation (negative)	Returns two's complement of value of term
+ sign	Unary operation (positive)	Returns two's complement of value of term

Logical operators

Symbol	Meaning	Remark
NOT ~	Negation	NOTs each bit of term, and returns result.
AND &	Logical product	ANDs each bit of values of first and second terms, and returns result
OR 	Logical sum	ORs each bit of values of first and second terms, and returns result
XOR ^	Exclusive logical sum	Exclusive-ORs each bit of values of first and second terms, and returns result

Shift operators

Symbol	Meaning	Remark
SHR >>	Right shift	Right shifts the first term the amount of the value (bit number) expressed by the second term and returns the result. The number of higher bits shifted are replaced with 0.
SHL <<	Left shift	Left shifts the first term the amount of the value (bit number) expressed by the second term and returns the result. The number of lower bits shifted are replaced with 0.

Byte resolution operators

Symbol	Meaning	Remark
HIGH	Higher byte	The higher 8 bits of the term's lower 16 bits are returned.
LOW	Lower byte	The lower 8 bits of the term's lower 16 bits are returned.

Word resolution operators

Symbol	Meaning	Remark
HIGHW	Higher word	The higher 16 bits of the term's 32 bits are returned.
LOWW	Lower word	The lower 16 bits of the term's 32 bits are returned.

Others

Symbol	Meaning	Remark
(	Left parenthesis	Executes operation in () before operations outside ()
)	Right parenthesis	

Cautions 1. Parentheses “(” and “)” must always be used in pairs.

2. Operations are performed in compliance with the following rules.

- The operation sequence is in accordance with the priority of the operator.
- When the priority of operators is the same, the operation sequence is from left to right.
- The operation within parentheses is executed before the operations outside the parentheses.
- Each term of an operation is treated as unsigned 32-bit data.
- All the operation results are treated as unsigned 32-bit data.
- If an overflow occurs during operation, the lower 32 bits are treated as valid, and the overflow is not detected.

3. The priority of the operator is as follows.

Priority		Operator
1	↑	(,)
2	Higher	+ sign, – sign, NOT, ~, HIGH, LOW, HIGHW, LOWW
3		*, /, MOD, %, SHR, >>, SHL, <<
4		+, –
5	Lower	AND, &
6		OR, I, XOR, ^

<Term>

- The following numeric values can be described when a constant is described as a term.

(a) Binary

$0Y \leq \text{numeric value} \leq 11111111111111111111111111111111Y$ (32 digits)

(b) Octal

$0O \leq \text{numeric value} \leq 37777777777O$

(c) Decimal

$-2147483648 \leq \text{numeric value} \leq 4294967295$

A negative decimal number is internally converted into two's complement.

(d) Hexadecimal

$0H \leq \text{numeric value} \leq 0FFFFFFFH$

(18) Character set

With the ID78K Series, the following character set can be used.

Character set

Symbol		Description
Alphabet character	Uppercase characters	A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
	Lowercase characters	a b c d e f g h i j k l m n o p q r s t u v w x y z
Numerals		0 1 2 3 4 5 6 7 8 9
Alphabet equivalent characters		@ _
Special characters		. , ; * / % + - ' " < > () ! [] & \ ^ ~ # = \$? ' { }

Other character set

Character	Name	Main Usage
.	Period	Direct member operator, bit position specifier
,	Comma	Delimiter of operands
*	Asterisk	Multiplication operator or indirect reference operator
/	Slash	Division operator
%	Percent	Remainder operator
+	Plus	Positive sign or addition operator
–	Minus	Negative sign or subtraction operator
(	Left parenthesis	Changes operation sequence
)	Right parenthesis	Changes operation sequence
[	Left bracket	Base register specification symbol, array subscript operator
]	Right bracket	Base register specification symbol, array subscript operator
&	Ampersand	Address operator or bit AND operator
^	Control	Bit XOR operator
	Vertical line	Bit OR operator
~	Tilde	Complement operator

B.2 Window Types and Configuration

The ID78K Series debuggers consist of windows and dialog boxes.

Basically, a window can be opened by using an icon, while a dialog box cannot.

B.2.1 Windows

Windows are broadly divided into the following two types.

- Main windows
- MDI child windows

MDI child windows cannot be displayed outside of the main window frame.

B.2.2 Dialog boxes

Dialog boxes can be classified into the following two types.

- Modal dialog boxes
- Modeless dialog boxes

(1) Modal dialog boxes

When this type of dialog box is open, the user cannot access other windows or dialog boxes until the dialog box is exited.

When the dialog box is closed after the operation in the dialog box has been completed or by selecting the Cancel button of the dialog box, other windows and dialog boxes can be accessed.

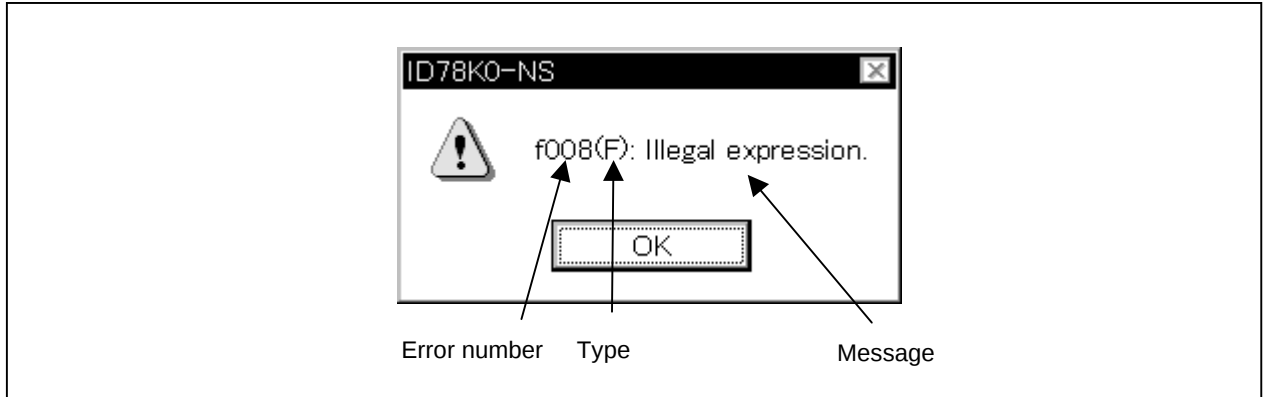
(2) Modeless dialog boxes

Unlike a modal dialog box, the user can access other windows and dialog boxes even if the operation in the dialog box has not been completed.

APPENDIX C ERROR MESSAGE LIST

The error messages displayed in the ID78K Series consist of **Error No.** + **Type** + **Message**.

Figure C-1. Display Format of Error Message



When the **OK** button is clicked, the Error Message window is closed, and the operation is performed in accordance with the message.

The error type is identified by the following three uppercase characters.

Table C-1. Error Message Type

Type	Meaning
A	Fatal error (<u>A</u> bort Error). The processing is aborted and the debugger is terminated. If this error occurs, the debugging work cannot be continued.
F	Syntax error (<u>F</u> atal Error). The processing is aborted, and all open windows and dialog boxes are closed.
W	<u>W</u> arning. The processing is aborted. Open windows and dialog boxes are not closed.

Table C-2 lists the error messages.

Table C-2. Error Message List (1/21)

Error No.	Type	Error Message/Meaning
0002	F	This feature is not supported. This function is not supported.
0100	A	Can not communicate with ICE. Please confirm the installation of the device driver for the PC interface board. Communication with the in-circuit emulator cannot be established. Check that the device driver for the interface board has been correctly installed.
0101	A	Can not find initialization file (expc.ini). An initialization file (EXPC.INI) cannot be found.
0102	A	Host name not found. No host name is found.
0103	A	Data transfer to ICE is timed out. Please confirm the power of ICE, connection of the interface cable, or I/O address of the PC interface board. Data could not be transmitted to the in-circuit emulator. Check the in-circuit emulator's power supply, cable connection, I/O address settings, etc.
0104	A	Data receive from ICE is timed out. Please confirm the power of ICE, connection of the interface cable, or I/O address of the PC interface board. The in-circuit emulator returns no response. Check the in-circuit emulator's power supply, cable connection, I/O address settings, etc.
0105	A	Failed in reading device file (d0xxx.78k). The device file (d0xxx.78k) could not be correctly read.
0106	A	Illegal data received. Received data is abnormal.
01a0	A	No response from the evachip. Please confirm the signal of the CLOCK or RESET, WAIT, HLDRQ and so on. There was no response from the evaluation chip. Check that the $\overline{\text{RESET}}$, $\overline{\text{WAIT}}$, $\overline{\text{HLDRQ}}$ (etc) signals or the clock signal are not abnormal.
01a1	A	Failed in reading ie703000.ie. ie703000.ie could not be correctly read.
01a2	A	Break board is not connected. The BK board is not connected.
01a3	A	Emulation board is not connected. The emulation board is not connected.
01a4	A	Board configuration of ICE is not consistent. The board configuration in the in-circuit emulator is not consistent.
01a5	A	POD/EM1 board is not connected. The POD/EM1 board is not connected.
01a6	A	Executor is running. The executor is running.
01a8	A	Failed in reading initialization file (expc.ini). The initialization file (EXPC.INI) has not been correctly read.
01d0	A	Failed in starting simulator. Simulator startup has failed.
01d1	A	Not enough memory in starting simulator. The memory at simulator startup is insufficient.

Table C-2. Error Message List (2/21)

Error No.	Type	Error Message/Meaning
0200	F	Verification error. A verify error.
02a0	F	Bus hold error. The bus is in the hold status.
02d2	F	Not enough memory for trace-buffer. Memory for trace frame cannot be allocated.
0300	F	User program is running. The user program is being executed.
0301	F	User program is being broken. The user program is undergoing a break.
0302	F	User program is being traced. The user program is being traced.
0303	F	Not traced. Tracer measurement is not performed.
0304	F	Trace memory is not set. The tracer is off.
0306	F	No trace block exists. There is no trace block.
0307	F	No event condition exists. There is no event condition.
0308	F	No timer measurement is done. Timer measurement is not performed.
0309	F	No trigger frame exists. There is no trigger frame.
030a	F	Tracer is being stopped. The tracer is stopped.
030b	F	Specified snap-event has not been registered. The snap event to be referenced/deleted is not registered.
030d	F	Timer is running. The timer is operating.
030e	F	Memory copy area is overlapped. The memory copy range has been overlapped.
030f	F	Trace has been already set. Trace is already in the ON status.
0310	F	Event condition is not set. No event condition is set.
0311	F	Too many valid timer event conditions. The number of valid timer event conditions exceeds the maximum settable number.
0312	F	Specified timer event is not set. This timer event is not set.
0313	F	Illegal map range. The map setting is wrong.

Table C-2. Error Message List (3/21)

Error No.	Type	Error Message/Meaning
03a0	W	Target is not turned on. Power is not supplied to the target device.
03a1	F	Step execution is being done. This command is under step execution.
03a2	F	Timer and Tracer are running. The timer and tracer are operating.
03d0	A	Backtrace is being executed. Back trace is under execution.
03d1	A	Backtrace is being stopped. Back trace is stopped.
03d2	A	Backtrace execution point overrun oldest frame. The back trace execution stop position exceeds the oldest frame.
03d3	A	Illegal AND condition. AND condition is illegal.
03d4	A	No backtrace information exists. The back trace information does not exist.
03d5	A	Last command can not be backstepped. Back step of the last instruction could not be performed.
0400	F	Illegal condition. The specified condition is illegal.
0401	F	Result of timer measurement overflowed. The timer measurement result has overflow.
0402	F	Too many event conditions with path count. Too many event conditions that set path count have been used.
0403	F	Too many address range conditions. The maximum value of the address range specification condition is exceeded.
0404	F	Too many simultaneously-usable-event conditions. The maximum number of event conditions that can be used simultaneously is exceeded.
0405	F	Too many snap-events. The maximum number of snap events that can be set is exceeded.
0407	F	Too many initialization data. The number of initialized data exceeds the initialization area.
0408	F	Too large search data (> 16 byte). The searched data exceed 16 bytes.
0409	F	Too large search data (> search range). The size of the searched data exceeds the size of the search range.
040a	F	Too many Linking-event conditions. The maximum number of integrated events that can be set is exceeded.
04a0	F	Too many software breaks (> 100). The number of software breaks exceeds 100.
04a1	F	Not enough memory for emulation. The memory for emulation is insufficient.

Table C-2. Error Message List (4/21)

Error No.	Type	Error Message/Meaning
04a2	F	Too many partition of bus size. The maximum number of delimiters of bus size has been exceeded.
04a3	F	Too many execution-event conditions. The maximum number of execution event conditions has been exceeded.
04a4	F	Too many bus-event conditions. The maximum number of bus event conditions has been exceeded.
0600	A	Can not allocate buffer. A buffer could not be allocated.
0c00	F	Monitor file read error. The monitor file could not be read.
0c20	F	Guarded area can not be accessed. There was an attempt to access a guarded area.
0c40	F	Different address condition is specified in re-registering event. The address condition when the event was reregistered was different to the previous one.
0c41	F	Coverage test is being executed. A coverage test is under execution.
0c60	F	Event number with different condition exists. An event number with a different condition exists.
0c61	F	Can not register event numbers which can not be used for hardware break. It is impossible to register event numbers that cannot be used for hardware breaks.
0c62	F	Event numbers reserved for hardware breaks can not be used. It is impossible to use event numbers that are used for hardware breaks.
0ca0	F	Can not communicate with ICE. Please confirm the power of ICE, connection of the interface cable, or I/O address of the PC interface board. Communication with the in-circuit emulator could not be established. Check the in-circuit emulator's power supply, cable connection, I/O address settings, etc.
0ca1	F	Monitor file not found. The monitor file could not be found.
1000	A	Failed in initializing ICE. Initializing the in-circuit emulator has failed.
1001	A	No entry exists for specified number. The entry of the specified number does not exist.
1002	A	Can not relocate internal RAM. The internal RAM cannot be relocated.
1003	F	Illegal relocation address. The relocation address is illegal.
1004	F	Illegal condition. The specified condition is illegal.
1005	A	Invalid attribute. The attribute is invalid.
1006	F	Illegal address. The address is illegal.
1007	A	Not enough memory on ICE. In-circuit emulator alternate memory is short.

Table C-2. Error Message List (5/21)

Error No.	Type	Error Message/Meaning
1008	A	Can not allocate memory for tables. Memory for tables cannot be allocated.
1009	A	Already initialized. Already initialized.
100a	A	Not initialized. Not initialized yet.
100b	F	User program is running. The user program is being executed.
100c	F	Different bus size has been already specified. An attempt was made to set in duplicate an area with different bus size.
100d	F	Too large bus size. The bus size exceeds the maximum value able to be defined.
100e	F	Too large bus partition size. The delimiter of bus size has exceeded the maximum value.
100f	W	Target is not turned on. The power supply of the target is off.
1010	A	Illegal map range. An illegal map range specification was made.
1011	F	Failed in setting internal ROM and RAM. Setting the internal ROM and RAM has failed.
1012	F	This feature is not supported. This function is not supported.
1013	F	No terminal name. This pin name does not exist.
10ff	A	Can not communicate with ICE. A communication error has occurred. Communication with the in-circuit emulator cannot be performed.
1dbe	A	Internal error. Internal error of the debugger.
2000	F	Illegal I/O register name. The I/O register name is illegal.
2001	A	Illegal address. The address is illegal.
2002	F	User program is running. The user program is being executed.
2003	F	Illegal I/O register number. An illegal number of I/O registers were specified.
2004	F	Illegal bit number. The bit position is illegal.
2005	W	Redraw I/O register name. An I/O register that must not be redrawn is specified.
2006	F	This I/O register is hidden I/O register. An I/O register with a hidden attribute was specified.

Table C-2. Error Message List (6/21)

Error No.	Type	Error Message/Meaning
2007	F	Can't read/write. A read/write disabled I/O register was specified.
2008	F	Too big number. The specified I/O register does not exist.
2009	A	Error in device file. A device file error.
200a	F	Illegal value specified for I/O register. An illegal value was specified for the I/O register.
200b	A	Can not copy. Copying has failed.
200c	A	Can not allocate memory. Memory allocation has failed.
20ff	A	Can not communicate with ICE. A communication error has occurred. Communication with in-circuit emulator cannot be established.
2222	A	Illegal condition. The specified condition is illegal.
3000	F	Illegal address. The address is illegal.
3001	F	Memory has different value. The memory contents do not match.
3002	F	Illegal source address. The source address is illegal.
3003	F	Illegal destination address. The destination address is illegal.
3004	F	Illegal address (source & destination). Both source address and destination address are illegal.
3005	F	Illegal condition. The specified condition is illegal.
3006	F	User program is running. The user program is being executed.
3007	A	Verification error. Verify error.
3008	F	No condition specified. A condition has not been specified.
3009	F	Parameter size does not align with access size alignment. The size of the parameter is not access size aligned.
300a	F	Specified address does not align with access size alignment. The specified address is not access size aligned.
300b	F	Source address does not align with access size alignment. The specified address (Source) is not access size aligned.
300c	F	Destination address does not align with access size alignment. The specified address (Destination) is not access size aligned.

Table C-2. Error Message List (7/21)

Error No.	Type	Error Message/Meaning
300d	F	Illegal end address. The end address is illegal.
300e	F	Different access size in specified area. The access size differs in the specified range.
300f	F	Different access size both in source and destination areas. The access size differs in the specified range (Source).
3010	F	Different access size in destination area. The access size differs in the specified range (Destination).
3011	F	Different access size, source & destination. The access size differs between the specified Source range and the specified Destination range.
3012	A	Can not allocate memory. Memory allocation has failed.
3013	A	Failed in writing DMM. Writing DMM has failed.
3014	F	Overflowed mapping area. The mapping area is exceeded.
3015	A	Interrupted. Processing is aborted.
3016	F	This feature is not supported. This function is not supported.
30ff	A	Can not communicate with ICE. A communication error has occurred. Communication with the in-circuit emulator cannot be established.
4000	F	Can not delete specified event number. The specified event number cannot be deleted.
4001	F	Illegal table number. The specified table number is illegal.
4002	F	Illegal start address. The start address is illegal.
4003	F	Illegal end address. The end address is illegal.
4004	F	Illegal status. The status is illegal.
4005	F	Illegal data. The data is illegal.
4006	F	Specified event number has been already used. An attempt was made to specify an event number that has already been used.
4007	F	Too many same events are registered. The maximum of the number of registered events of the same type is exceeded.
4008	F	Specified event has not been registered. The specified event is not registered.
4009	F	Illegal data size. The data size is illegal.

Table C-2. Error Message List (8/21)

Error No.	Type	Error Message/Meaning
400a	F	Illegal mode. The mode is illegal.
400b	F	Illegal condition. The specified condition is illegal.
400c	F	Illegal type. The type is illegal.
400d	F	Too many identical events are registered (≥ 32767). An attempt was made to make registration exceeding 32,767 of the same registered events.
400e	F	Specified event condition does not exist. The specified event condition does not exist.
400f	F	Illegal event link condition. An event link condition is illegal.
4010	F	Function not found. The specified function was not found.
4011	F	Not enough memory. Application has run out of memory.
4012	F	Timer is being disabled. The timer is invalid.
4013	W	Access size is different from its mapped bus size. The access size and mapped bus size differ.
4014	F	Can not use software break. Software break cannot be used.
4015	F	Can not use event condition specifying address range. An event condition with a range specified cannot be used for an address condition.
4016	F	Can not change event condition. The event condition cannot be changed.
4017	F	Can not access word at odd address. Word access to an odd address cannot be performed.
4018	A	Not enough memory. Application has run out of memory.
4019	F	Not support. This function is not supported.
401a	F	No Event. There is no event.
401b	F	Can not use tag-event. A tag event cannot be used.
4318	F	Illegal memory bank setting. The setting of the memory bank is illegal.
5000	A	Illegal type. The type is illegal.
5001	A	Can not allocate memory. Memory allocation has failed.

Table C-2. Error Message List (9/21)

Error No.	Type	Error Message/Meaning
5002	A	Can not open device file. Opening the device file has failed.
5003	A	Can not seek device file. Seeking the device file has failed.
5004	A	Can not close device file. Closing the device file has failed.
5005	A	Illegal device file format. The format of the device file is wrong.
5006	A	Failed in initializing ICE. Initializing the in-circuit emulator has failed.
5007	A	Device information does not exist. Device information is missing.
5008	F	Can not open device file. The specified device file cannot be opened.
5009	F	Can not open ie703000.ie. ie703000.ie cannot be opened.
500a	F	Specified device file is illegal version. The version of the device file is illegal.
500b	W	Specified device file does not relocate IRAM. This device file does not relocate IRAM.
500c	A	Failed in reading expc.ini. The initialization file (EXPC.INI) cannot be correctly read.
500d	A	Not enough memory. The memory has run short.
5300	A	Illegal type. The type is illegal.
5301	A	Can not allocate memory. Memory allocation has failed.
5302	A	Can not open database file. The database file could not be opened.
5303	A	Can not seek database file. The database file could not be searched.
5304	A	Can not close database file. The database file could not be closed.
5305	A	Illegal device format. The format of the database file is illegal.
5306	A	Database information has been already initialized. Initialization of the database information is already finished.
5307	A	Database information does not exist. There is no database information.
5308	F	Can not open specified database file. The specified database file could not be opened.

Table C-2. Error Message List (10/21)

Error No.	Type	Error Message/Meaning
5309	F	Specified database file is illegal version. The version of the database file is illegal.
6000	F	Current function does not exist. The current function does not exist.
6001	F	Illegal symbol name. The symbol name is illegal.
6002	F	Illegal condition. The specified condition is illegal.
6003	F	Illegal function name. The function name is illegal.
6004	F	Overflowed output buffer size. The data size exceeds that of the output buffer.
6005	F	Illegal expression. The expression is illegal.
7000	F	Illegal mode. The specified mode is wrong.
7001	F	User program is running. The user program is being executed.
7002	F	User program has been stopped. The user program is being stopped.
7003	F	Trace enabled. Trace is being executed.
7004	F	Trace memory is not set. The trace memory is OFF.
7005	F	Function return address does not exist, can not do step execution. The return address of the function does not exist. Step execution is not performed.
7010	W	No source information exists. The source information is missing.
7011	W	Unknown result of step execution. The result of step execution is unknown.
7012	A	Not enough memory. Application has run out of memory.
70fe	A	Bus hold error. The bus is in the hold status.
70ff	A	Can not communicate with ICE. A communication error has occurred. Communication with the in-circuit emulator cannot be established.
7801	F	Canceled step wait. The wait status following completion of step execution has been canceled.
7802	F	Interrupted step execution. Step execution processing was aborted.
7f00	F	Aborted step execution. Step execution processing was forcibly terminated.

Table C-2. Error Message List (11/21)

Error No.	Type	Error Message/Meaning
7f02	F	Suspended step execution. Step execution was aborted.
7f03	A	Failed in canceling RUN/STEP. Canceling RUN/STEP has failed.
7f04	F	Can not execute non-mapped area. An attempt is made to execute from an area not mapped.
7f05	F	This feature is not supported. This function is not supported.
8000	F	File not found. The specified file is not found.
8001	F	Illegal line number. The line number is illegal.
8002	F	Current information is not set. The current information is not set.
8003	F	Illegal address. The address is illegal.
8004	F	This feature is not supported. This function is not supported.
9000	A	Specified register symbol does not exist. The specified register symbol does not exist.
9001	A	Specified register symbol ID does not exist. The specified register symbol ID does not exist.
9002	F	Illegal value. The specified value is illegal.
9003	A	Illegal condition. The specified condition is illegal.
9004	A	Too large register size. The register size is too big.
9005	F	This feature is not supported. This function is not supported.
a001	F	Illegal expression. The expression is illegal.
a002	F	Start address is bigger than the end address. The start and end address specifications have been reversed.
a003	F	Illegal source path. The specified source path information is illegal.
a004	F	Too long expression. The expression is too long.
a005	A	Not enough memory. Application has run out of memory.
a006	F	Illegal argument. The argument is illegal.

Table C-2. Error Message List (12/21)

Error No.	Type	Error Message/Meaning
a007	A	Illegal program number. The program number is wrong.
a008	F	Source path is not set. The source path is not set.
a009	F	File not found. The file is not found.
a00a	F	Can not open file. Opening the file has failed.
a00b	A	Can not close file. Closing the file has failed.
a00c	A	Failed in reading file. Reading the file has failed.
a00d	F	Not source file of load module. This is not the load module's source file.
a00e	F	Illegal line number. The line number is illegal.
a00f	F	Variable does not exist. The variable does not exist.
a010	A	Can not communicate with ICE. A communication error has occurred. Communication with the in-circuit emulator cannot be established.
a011	F	Can not access register. The register cannot be accessed.
a012	F	Can not access memory. The memory (variable) cannot be accessed.
a013	F	Can not seek file. Seeking a file has failed.
a014	F	This is binary file. This is a binary file.
a015	F	Can not get temporary path. A temporary path could not be allocated.
a016	F	Can not create temporary file. A temporary file could not be created.
a017	F	Can not remove temporary file. A temporary file could not be deleted.
a020	F	This feature is not supported. This function is not supported.
a021	F	Specified symbol is assigned to register. The specified symbol has already been assigned to a register.
b000	F	Illegal command line. The command line is illegal.
b001	F	Program information does not exist in specified load module file. The load module file does not have program information.

Table C-2. Error Message List (13/21)

Error No.	Type	Error Message/Meaning
b002	F	File not found. The file is not found.
b003	F	Function not found. The function is not found.
b004	F	Illegal magic number. The magic number is illegal.
b005	F	Symbol not found. The symbol is not found.
b008	F	Illegal expression. The expression is illegal.
b009	A	Not enough memory. Application has run out of memory.
b00a	F	Illegal symbol in load module file. An illegal symbol exists in the load module file.
b00b	F	Current program does not exist. The current program does not exist.
b00c	F	Current file does not exist. The current file does not exist.
b00d	A	Current function does not exist. A current function does not exist.
b00e	A	Current line does not exist. A current line does not exist.
b00f	A	Tag not found. No tag is found.
b010	A	Failed in loading symbol table. Loading the symbol table has failed.
b011	A	Illegal line number. The line number is illegal.
b012	F	Too large line number. The line number is too large.
b015	A	Failed in reading file. Reading the file has failed.
b016	A	Can not open file. Opening the file has failed.
b017	A	Failed in writing file. Writing the file has failed.
b019	A	Can not seek file. Seeking the file has failed.
b01a	A	Can not close file. Closing the file has failed.
b01b	A	Too long load module file name. The file name of the load module is too long.

Table C-2. Error Message List (14/21)

Error No.	Type	Error Message/Meaning
b01c	A	Too many entries of the task kind. There are too many task classification entries.
b01d	F	Address not found. The address does not exist.
b01e	W	No line information (not compile with -g). There is no line information (it was not compiled using -g).
b01f	F	Can not find structure member. The member of the structure cannot be found.
b020	F	Can not find value. The value could not be found.
b021	F	No symbol information exists in load module file. The load module file does not have symbol information.
b022	F	Illegal line number. The line number is illegal.
b023	A	Current stack frame is not active. The current stack frame is not active.
b024	A	Different section. The section is wrong.
b026	F	Too many array dimensions (> 4). The displayed array exceeds the fourth dimension.
b027	F	Found end of file. The file ends in the middle.
b028	F	This feature is not supported. This function is not supported.
b029	F	Illegal address. The address is illegal.
b02a	A	Can not communicate with ICE. A communication error has occurred. Communication between in-circuit emulator cannot be established.
b02b	F	Can not stack trace with current PC value. Stack trace cannot be executed with the current PC value.
b02c	F	Too many blocks for one function. The maximum number of blocks allowable in 1 function has been exceeded.
b02d	F	Illegal argument. The argument passed to the function is illegal.
b02e	A	Path not found. The specified path is not found.
b02f	A	Information has been deleted because of optimization. Information has been deleted as a result of optimization.
b030	A	Monitor timed out. Timeout for the monitor.
b031	A	Already set in memory. Already set on the memory.

Table C-2. Error Message List (15/21)

Error No.	Type	Error Message/Meaning
b032	A	Out of scope. Out of scope.
b033	A	LP is not stored. LP has not been stored.
b034	A	Inside of prologue or epilogue. Within the prologue or epilogue.
b036	W	Out of variable region. The specified variable cannot be referenced by the current PC.
b037	F	Too Many Line-Numbers Information. There is too much line information.
b038	F	Compiler version mismatch. Because this compiler version is not supported, the debug information could not be loaded.
b039	A	Failed in loading debug information. The debug information could not be loaded.
b03a	A	No more section information. There is no section information.
b040	A	Specified file is not load module. The specified file is not in a load module format.
b041	A	Too many files in load module to download. The number of files in the load module exceeds the maximum number the debugger can handle.
b042	W	Symbol module is not initialized. The SYM module has not been initialized.
b32e	F	Illegal port number. An illegal port number.
b32f	F	Illegal port name. An illegal port name.
b330	F	Illegal port position. The bit position of the specified port is illegal.
b331	F	Illegal increment number. The specified increment count is illegal.
b332	F	Port for memory bank is not set. The port for memory bank is not set.
b333	F	Illegal bank number. An illegal bank number is specified.
b334	F	Area for memory bank is not set. An area for memory bank is not set.
b335	W	Too long symbol name. The symbol name is longer than the maximum allowable length.
c001	F	Can not open file. Opening the file has failed.
c002	A	Can not close file. Closing the file has failed.

Table C-2. Error Message List (16/21)

Error No.	Type	Error Message/Meaning
c003	A	Failed in reading file. Reading the file has failed.
c004	A	Can not seek file. Seeking the file has failed.
c005	F	Illegal file type. A non-existent file type has been specified.
c006	F	Illegal magic number. The magic number is illegal.
c007	F	Specified file is not load module. The specified file is not in a load module format.
c008	F	Specified load module file (ELF) is old version. The version of the load module file (ELF) is old.
c009	F	Not enough memory. Application has run out of memory.
c00a	F	Illegal address. The address is illegal.
c00b	F	Load module is not loaded. The load module is not loaded.
c00c	F	Illegal argument. The argument is illegal.
c00d	F	User program is being emulated. The user program is being emulated.
c00e	F	User program is being traced. The user program is being traced.
c00f	A	Interrupted. Under processing.
c010	A	Can not communicate with ICE. A communication error has occurred. Communication between the in-circuit emulator cannot be established.
c011	F	Illegal load module file format. The format of the load module file is wrong.
c012	F	Check sum error. A check sum error has occurred.
c013	F	Too wide address range to upload (> 1M byte) The address range to be uploaded exceeds 1 MB.
c014	F	Failed in writing file. Writing the file has failed.
c015	F	Illegal program number. The program number is illegal.
c016	F	Load information is full. The load information is full.
c017	W	Symbol information is duplicated, please reset symbols. The symbol information overlaps. Reset the symbol.

Table C-2. Error Message List (17/21)

Error No.	Type	Error Message/Meaning
c018	F	Specified file is not load module. The specified file is not in a load module format.
c019	F	Failed in writing memory. Memory could not be written to.
c100	F	This feature is not supported. This function is not supported.
d000	A	Internal error. An error occurs inside the debugger.
d001	F	Not enough memory. Application has run out of memory.
d002	A	Failed in reading initialization file (expc.ini). The initialization file (EXPC.INI) cannot be read correctly.
d003	A	ICE is not connected. The in-circuit emulator is not connected.
d004	A	Can not find Dynamic Link Library. The dynamic link library could not be found.
e000	F	Illegal argument. The argument is illegal.
e001	F	Illegal start address. The start address is illegal.
e002	F	Illegal end address. The end address is illegal.
e003	F	Too large size. The address size is too large.
e004	F	Can not open file. Opening the file has failed.
e005	F	Failed in reading file. Reading the file has failed.
e006	F	Can not seek file. Seeking the file has failed.
e007	F	Failed in writing file. Writing the file has failed.
e008	F	Not enough memory. Application has run out of memory.
e009	F	Illegal file format. The file format is wrong.
e00a	F	Verification error. Verify error.
e010	F	This feature is not supported. This function is not supported.
f000	F	Not enough memory. Application has run out of memory.

Table C-2. Error Message List (18/21)

Error No.	Type	Error Message/Meaning
f001	F	XXX not found. XXX could not be found.
f002	F	not found XXX. Search from the beginning? XXX could not be found. Do you want to search from the beginning?
f003	W	Already exceed search region The search range has already been exceeded.
f004	F	Missing parameter. The parameter is illegal.
f005	F	Illegal name. The name is illegal.
f006	F	Illegal number. The number is illegal.
f007	F	Start address is bigger than end address. Start address is bigger than end address.
f008	F	Illegal expression The expression is illegal.
f009	F	XXX This file is illegal type. XXX This file is an illegal type.
f100	F	Disk cannot write or full. Either the disk could not be written to or it is full.
f101	F	File not found. This file could not be found.
f102	F	File not Create. This file could not be created.
f103	F	Old file version. This file is an old version.
f104	F	Illegal file type. The file format is illegal.
f105	F	This file is a project file for XXXX Please select a correct file. This project file is a file for XXX. Specify a correct file.
f200	W	No differences encountered. There were no differences found.
f201	F	Memory mapping error. The memory could not be mapped.
f202	F	Verify error. Verify error.
f300	F	Would you like to save the changes made in XXX? Do you want the changes made in XXX to be saved?
f301	F	The symbol being used on the event condition can't be evaluated. The symbol being used in the event condition could not be evaluated.
f302	F	Delete XXX? Do you want XXX to be deleted?

Table C-2. Error Message List (19/21)

Error No.	Type	Error Message/Meaning
f303	F	XXX is edited. Delete YYY? XXX is being edited; do you want YYY to be deleted?
f304	F	XXX is edited. Save YYY? XXX is being edited; do you want YYY to be saved?
f305	F	XXX is already exist. Do you replace it? Do you want to replace the existing XXX?
f306	F	This name is too long. This name is too long.
f307	F	There is the same name in other kinds. The same name is being used in other conditions.
f308	F	An address can't be omitted. An address cannot be omitted.
f309	F	Illegal address mask. The address mask is illegal.
f30a	F	Illegal data mask. The data mask is illegal.
f30b	F	Illegal ext probe mask. The external probe mask is illegal.
f30c	F	Illegal ext probe data. The external probe data is illegal.
f30d	F	Illegal pass count. The pass count is illegal.
f30e	F	Illegal register name. The register name is illegal.
f30f	F	Illegal register bank. The register bank is illegal.
f310	F	Illegal delay count. The delay count is illegal.
f311	F	Only one XXX can be enabled. Do you make this YYY to enable? Only one XXX can be enabled; do you want to enable YYY?
f312	F	XXX is already there. XXX already exists.
f313	F	Event number already exist. This event number already exists.
f314	F	Event name is not set. The event name has not been set.
f315	F	XXX is already there. XXX already exists.
f316	F	Max number of XXX enabled event is over. Please disable other enabled event. The maximum allowable number of valid event conditions has been exceeded. Disable other event conditions.
f317	F	Max number of set event is over. The maximum number of settable event conditions has been exceeded.

Table C-2. Error Message List (20/21)

Error No.	Type	Error Message/Meaning
f318	F	Max number of set event link is over. The maximum number of settable event link conditions has been exceeded.
f319	F	Max number of set break event is over. The maximum number of settable break conditions has been exceeded.
f31a	F	Max number of set trace event is over. The maximum number of settable trace conditions has been exceeded.
f31b	F	Max number of set snap event is over. The maximum number of settable snap conditions has been exceeded.
f31d	F	Max number of set timer event is over. The maximum number of settable timer conditions has been exceeded.
f31e	F	Illegal start address. The start address is illegal.
f31f	F	Illegal end address. The end address is illegal.
f320	F	Illegal bit address. The bit address is illegal.
f321	F	Specified read-protect I/O register. A read-protected I/O register has been specified.
f350	F	There is a phase which event are not in the middle. An event condition setting is missing from the middle of a phase.
f351	F	The same event is contained in Link and Disable. The same event condition is already being used.
f352	F	An event isn't specified. An event condition has not been set.
f353	F	Incompatible event is specified in phase 1. An incompatible event condition has been set in Phase 1.
f354	F	AND event is in Phase 1. Can't specify event with exception of phase 1. An AND condition event has already been set in Phase 1. Event conditions cannot be set anywhere except in Phase 1.
f355	F	REG/MEM event in Disable. The REG/MEM status event has been set to Disable.
f356	F	AND event is in Disable. The AND condition event has been set to Disable.
f400	F	Coverage mapping error. Coverage mapping could not be performed.
f401	F	Clear coverage? Do you want to clear the coverage?
f500	F	Illegal symbol. The symbol is illegal.
f501	F	Illegal value. The value is illegal.
f502	F	Illegal parameter. The parameter is illegal.

Table C-2. Error Message List (21/21)

Error No.	Type	Error Message/Meaning
f600	F	Save project file? Do you want to save the project file?
f601	W	When connecting the target system, please turn on the target system. When connecting the target system, be sure to turn its power supply on.
f700	F	Download failed. Data could not be downloaded.
f800	F	Configuration of Memory Bank is not set. The memory bank setting has not been made.
f801	F	BANK address must be in target memory. The address of the memory bank must be inside the target memory.
f802	F	All events are deleted because the use of external probe was changed. All event conditions have been deleted because the external probe has changed.
f803	F	This event address is invalid on current configuration. The address of this event condition is illegal.
f804	F	Invalid PC value. The PC value is illegal.
f805	F	Cannot set temporary break on this address. A temporary break cannot be set to this address.
f806	F	External data is being used by Debugger. External data is being used by the debugger.
f900	F	Missing parameter. The name is illegal.
f901	F	Memory mapping error. There is a fault with the memory mapping.
f902	F	Illegal access size. The access size is illegal.
f903	F	Illegal access type. The access type is illegal.
f904	F	There is the same name. The same name cannot be registered.
f905	W	XXX is already exist. Do you replace it? Do you want to replace the existing XXX?
f906	W	Would you like to register the change made in XXX? Do you want to register the changes made to XXX?
fa00	F	The XXXX function of current program on PC position not found. The function XXXX of the PC position program could not be found.
fa01	F	The line information on PC position not found. The line information of the PC position could not be found.
fb00	W	User program is running. Do you want to stop user program? The program is being executed. Do you want to stop the program?

APPENDIX D KEY FUNCTION LIST

Efficient debugging can be realized by performing operations using the special function keys.

Note that because the key explanations differ depending on the type of keyboard in IBM PC/AT and compatible machines, the key inscriptions employed here are general or generic key inscriptions.

D.1 Special Function Key Function List

A list of the special function key functions of the PC-9821 series and IBM PC/AT and compatibles is shown in the table below.

Table D-1. Special Function Key Function List (1/2)

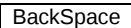
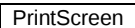
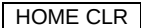
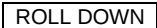
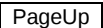
Key Type		Function
PC-9821 Series	IBM PC/AT Compatibles	
		Deletes a character preceding the cursor and moves the cursor to the position of the deleted character. At this time, the string of characters following the cursor moves forward one space.
		- Deletes a character at the cursor position and moves the following characters forward one space. - Deletes the event conditions selected in the Event Manager and each event dialog box. - Deletes the data selected in the Watch window.
		Switches the modes between insert mode and overwrite mode in the Source and Assemble windows. However, this key is disabled in the Memory, Register, and SFR windows, where the input mode is overwrite mode only.
		Places the entire screen display on the clipboard as a bitmap image (Windows function).
		- Closes a pull-down menu. - Closes a modal dialog box. - Restores input data.
		Moves the cursor on the menu bar.
		Moves the cursor to the end of the line.
		Moves the cursor to the start of the line.
		Scrolls the screen up one screen. Simultaneously moves the cursor to the top of the screen.
		Scrolls the screen down one screen. Simultaneously moves the cursor to the top of the screen.
		Inserts a 1-character space.
		Moves the cursor to the next item.
		Moves the cursor up. When the cursor is at the top of the screen, the screen is scrolled down one line at a time.

Table D-1. Special Function Key Function List (2/2)

Key Type		Function
PC-9821 Series	IBM PC/AT Compatibles	
		Moves the cursor down. When the cursor is at the bottom of the screen, the screen is scrolled up one line at a time.
		Moves the cursor to the left. When the cursor is on the far left of the screen, the screen is scrolled to the right one item at a time.
		Moves the cursor to the right. When the cursor is on the far right of the screen, the screen is scrolled to the left one item at a time.
		• Sets the input data. • Presses the default push button.

D.2 Function Key Function List

A list of the function key functions of the PC-9821 series and IBM PC/AT and compatibles is shown in the table below.

Table D-2. Function Key Function List (1/2)

Key Type		Function
PC-9821 Series	IBM PC/AT Compatibles	
		Opens the Help window.
		Forcibly stops program execution. The same function as [Run] → [Stop] on the menu bar.
		Resets the emulation CPU. The same function as [Run] → [CPU Reset] on the menu bar.
		Executes the program after resetting the emulation CPU. The same function as [Run] → [Restart] on the menu bar.
		Executes the program. The same function as [Run] → [Go & Go] on the menu bar.
		Executes the program as far as the cursor position in the Source or Assemble window. The same function as [Run] → [Come Here] on the menu bar.
		Executes the program in real-time until execution returns to the calling origin. The same function as [Run] → [Return Out] on the menu bar.
		Performs step execution. The same function as [Run] → [Step In] on the menu bar.
		Sets/cancels a breakpoint at the cursor position in the Source or Assemble window. The same function as [Run] → [Break Point] on the menu bar.

Table D-2. Function Key Function List (2/2)

Key Type		Function
PC-9821 Series	IBM PC/AT Compatibles	
		Performs next step execution. The same function as [Run] → [Next Over] on the menu bar.
		Sets/cancels a software breakpoint. The same function as [Run] → [Software Break Point] on the menu bar.

D.3 Special Function Key Function List (+ Key)

A list of the special function key functions ( + key) of the PC-9821 series and IBM PC/AT and compatibles is shown in the table below.

Table D-3. Special Function Key Function List ( + Key)

Key Type		Function
PC-9821 Series	IBM PC/AT Compatibles	
		Extends the selected range to the end of the line.
		Extends the selected range to the start of the line.
		Extends the selected range one character to the left.
		Extends the selected range one character to the right.

D.4 Function Key Function List (+ Key)

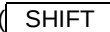
A list of the function key functions ( + key) of the PC-9821 series and IBM PC/AT and compatibles is shown in the table below.

Table D-4. Function Key Function List ( + Key)

Key Type		Function
PC-9821 Series	IBM PC/AT Compatibles	
		Executes the program from the cursor position in the Source or Assemble window. The same function as [Run] → [Start From Here] on the menu bar.

D.5 Special Function Key Function List (**CTRL** + Key)

A list of the special function key functions (**CTRL** + key) of the PC-9821 series and IBM PC/AT and compatibles is shown in the table below.

Table D-5. Special Function Key Function List (**CTRL + Key)**

Key Type		Function
PC-9821 Series	IBM PC/AT Compatibles	
HELP	End	Displays the last line. Simultaneously moves the cursor to the start of the last line.
HOME CLR	Home	Displays the first line. Simultaneously moves the cursor to the start of the first line.
←	←	Moves the cursor one word to the left. When the cursor is on the far left of the screen, the screen is scrolled one item to the right.
→	→	Moves the cursor one word to the right. When the cursor is on the far right of the screen, the screen is scrolled one item to the left.

D.6 Function Key Function List (**CTRL** + Key)

A list of the function key functions (**CTRL** + key) of the PC-9821 series and IBM PC/AT and compatibles is shown in the table below.

Table D-6. Function Key Function List (**CTRL + Key)**

Key Type		Function
PC-9821 Series	IBM PC/AT Compatibles	
f-5	F5	Ignores the set breakpoint and executes the program. The same function as [Run] → [Ignore break points and Go] on the menu bar.
f-9	F9	Sets the address of the cursor position in the Source or Assemble window in the PC. The same function as [Run] → [Change PC] on the menu bar.

D.7 Control Key Function List (**CTRL** + Key)

A list of the control key functions (**CTRL** + key) of the PC-9821 series and IBM PC/AT and compatibles is shown in the table below.

Table D-7. Control Key Function List (**CTRL + Key)**

Key Type	Function
PC-9821 Series IBM PC/AT Compatibles	
D	Shows a disassemble display from the jump destination address of the data value selected in the current window. Opens the Assemble window. The same function as [Jump] → [Assemble] on the menu bar.
C	Copies the selected character string and places it in the clipboard buffer. The same function as [Edit] → [Copy] on the menu bar.
G	Performs a search. Opens the search dialog box appropriate to the current window. The same function as [View] → [Search...] on the menu bar.
I	Displays the memory contents from the jump destination address of the data value selected in the current window. Opens the Coverage window. The same function as [Jump] → [Coverage] on the menu bar.
J	Moves the display position. Opens the Source Move, Address Move, and Trace Move dialog box appropriate to the current window. The same function as [View] → [Move...] on the menu bar.
M	Displays the memory contents from the jump destination address of the data value selected in the current window. Opens the Memory window. The same function as [Jump] → [Memory] on the menu bar.
O	Loads a display, source, or text file. Opens the View File Load dialog box. Operations differ depending on the file extension. For display files: Displayed in corresponding window. For other files: Displayed in Source window. The same function as [File] → [Open...] on the menu bar.
U	Displays the corresponding source text and source line from the jump destination address of the data value selected in the current window. Opens the Source window. The same function as [Jump] → [Source] on the menu bar.
V	Pastes the contents of the clipboard buffer at the cursor position. The same function as [Edit] → [Paste] on the menu bar.
W	Temporarily displays the contents of the specified data. Opens the Quick Watch dialog box. The same function as [View] → [Quick Watch...] on the menu bar.
X	Removes the selected character string and places it on the clipboard buffer. The same function as [Edit] → [Cut] on the menu bar.

D.8 Special Function Key Function List (+ Key)

A list of the special function key functions ( +  key) of the PC-9821 series and IBM PC/AT and compatibles is shown in the table below.

Table D-8. Special Function Key Function List ( +  Key)

Key Type		Function
PC-9821 Series	IBM PC/AT Compatibles	
		Extends the selected range one word to the left.
		Extends the selected range one word to the right.

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