F^{2}MC™-8L/8FX FAMILY

SOFTUNE™ WORKBENCH

OPERATION MANUAL

FUJITSU

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FUJITSU LIMITED

PREFACE

■ What is the SOFTUNE WORKBENCH?

SOFTUNE WORKBENCH is support software for developing programs for the FR-V, FR, F^2MC-16, and F^2MC-8L/8FX families of microprocessors / microcontrollers.

It is a combination of a development manager, simulator debugger, emulator debugger, monitor debugger, and an integrated development environment for efficient development.

■ Purpose of this manual and target readers

This manual explains how to operate the SOFTUNE Workbench and design the product.

This manual is intended for engineers designing several kinds of products using SOFTUNE Workbench.

■ Trademarks

SOFTUNE is a trademark of FUJITSU LIMIITED.

FR-V is a product of FUJITSU LIMIITED.

FR is the abbreviation of FUJITSU RISC Controller and a product of FUJITSU LIMIITED.

F^2MC is the abbreviation of FUJITSU Flexible Microcontroller and a trademark of FUJITSU LIMIITED.

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■ Organization of Manual

This manual consists of four chapters.

Chapter 1   Outline of SOFTUNE WORKBENCH

This chapter gives an outline of SOFTUNE WORKBENCH.

Chapter 2   Operation

This chapter describes the basic operation method and development procedure of SOFTUNE WORKBENCH.

Chapter 3   Windows

This chapter explains SOFTUNE WORKBENCH windows in detail.

Chapter 4   Menus

This chapter explains in detail the SOFTUNE WORKBENCH menu configuration and the dialog boxes to be started from each menu.

Appendix

The Appendixes describes the register name, downloading monitor program, setting LAN interface, setting USB interface, creating ROM on monitor debugger target, building REAROS debugger target, building REAROS debug modules into program, display on ICE.

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READING THIS MANUAL

■ Configuration of Page

In each section of this manual, the summary about the section is described certainly, so you can grasp an outline of this manual if only you read these summaries.

And the title of upper section is described in lower section, so you can grasp the position where you are reading now.

■ Product name abbreviation

In this manual, product names are abbreviated as follows:

Microsoft Windows 95 operating system is abbreviated Windows 95.

Microsoft Windows 98 operating system is abbreviated Windows 98.

Microsoft Windows NT Server network operating system Version 4.0 and Microsoft Windows NT Workstation operating system Version 4.0 are abbreviated Windows NT.

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CONTENTS

CHAPTER 1
OUTLINE OF SOFTUNE WORKBENCH

SOFUTUNE WORKBENCH integrates language tools and debuggers into one to provide the integrated development environment that totally supports processing from programming and debugging to creation of data to be written to ROM. Language tools include a C compiler, assembler, and linkage tool, etc. Debuggers are a simulator debugger, emulator debugger, etc.

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1.1   Outline

This section gives an outline of the development tools integrated by SOFTUNE WORKBENCH.

■ Language tools

In the past, language tools (e.g., C compiler, assembler, and linkage kit) were started and used from command lines.

However, SOFTUNE WORKBENCH can use these tools as they area. An option setting dialog box for each tool opens, thereby enabling the easy use of the tools.

■ Debuggers

SOFTUNE WORKBENCH has integrated the simulator debugger, emulator debugger into one. The optimum debugger can be selected and used as required.

■ Others

Installing an REALOS configurator (option) enables cooperative operation without complicated setting.

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1.2   What is SOFTUNE WORKBENCH?

This section explains the basic configuration of SOFTUNE WORKBENCH.

■ SOFTUNE WORKBENCH configuration

Figure 1.2-1 shows the basic configuration of SOFTUNE WORKBENCH.

Figure 1.2-1 Basic Configuration of SOFTUNE WORKBENCH
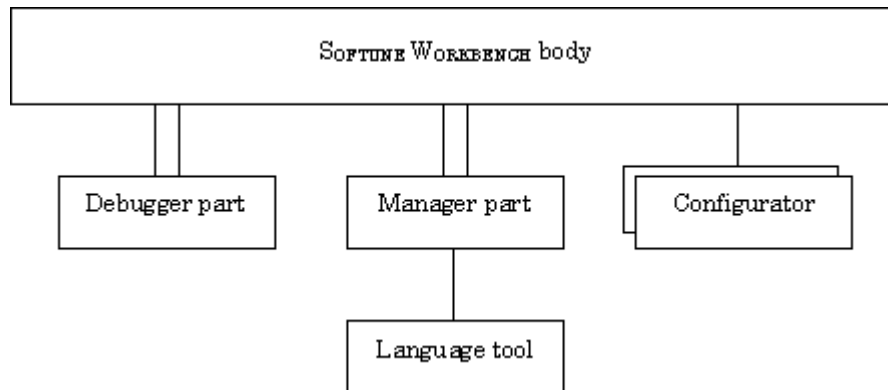
As shown in Figure 1.2-1 SOFTUNE WORKBENCH consists of three parts: body, debugger, and manager.

The debugger part contains the simulator debugger, emulator debugger. These debuggers can be switched and used as required.

The manager part enables users to code and make programs without full knowledge of language tool (e.g., C compiler and assembler) start and option specification.

The configurator is not built into SOFTUNE WORKBENCH because it is an option. Installing this option, however, enables cooperative operation on SOFTUNE WORKBENCH.

SOFTUNE WORKBENCH manages all processing from programming to debugging in units of projects. Projects contain all program files, options of tools (e.g., C compiler), and debugger environment setup, etc.

1.3　Procedure for Developing Programs with SOFTUNE WORKBENCH

The procedure for developing programs with SOFTUNE WORKBENCH consists of the followings:
1. **Setting SOFTUNE WORKBENCH operating conditions**
2. **Designing a project**
3. **Creating a program source and executing make/build**
4. **Executing debugging**

■ Setting SOFTUNE WORKBENCH operating conditions

When developing a program with SOFTUNE WORKBENCH, first open the development environment setup dialog box from the [Setup] - [Development] Menu and set environment variables and projects. For details about how to set environment variables and projects, see Section 4.7.1 Development.

The environment variables set from this dialog box are referenced by language tools such as the C compiler.

■ Designing a project

Set information for the program to be developed in a project.

When developing a new project, open the new creation dialog box from the [File] - [New] Menu and select [Workspace/Project File] from the dialog box. The new project creation dialog box opens.

When the project has already existed, the existing project file can be opened from the [File] - [Open Workspace] Menu. When using the SOFTUNE V01 or V02 project file, see Section 2.13 Reading SOFTUNE Project Files of Old Versions.

■ Creating a program source and executing make/build

Open the new creation dialog box from the [File] - [New] Menu and select [Text File]. When the editor is started, write the source program and save it to the file with the [File] - [Save As] Menu.

When a necessary source file is created, register it in the project with the [Project] - [Add Member] Menu.

When registering the source file in the project is completed, execute "make" with the [Project] - [Make] Menu or execute "build" with the [Project] - [Build] Menu.

If a syntax error occurs during compilation or assembling, double-click the error display location in the Output Window with the left button of the mouse. The program jumps to the line where the error occurred. Correct the source file, and then reexecute the [Project] - [Make] Menu.

■ Executing debugging

When a load module file is created, debugging can be executed.

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CHAPTER 2
OPERATION

This chapter explains the basic operation of SOFTUNE WORKBENCH for each of the following items:

2.1   Parameters to be Entered from Dialog Boxes

When key entry is requested from a dialog box, the following four elements can be written as parameters:
- Data formula
- Address formula
- Identifier
- File name specification

■ Data formula

A data formula consists of a term and an operator. Data formulas comply with C language formulas. Almost C language formulas are recognized. Some points (e.g, line number and register specification) are extended. Operations involving floating-point numbers and character strings are not supported. The overflows that occur during the operation are ignored. Zero division results in an error.

■ Address formula

An address formula is an extension of the data formula; it represents a memory location. Like the data formula, the address formula consists of a term and an operator. The terms and operators usable in address formulas are the same as those in data formulas

■ Identifier

Alphabetic characters, numbers, and "_" can be used as identifiers. Each identifier must begin with a character other than numbers. Uppercase characters are distinguished from lowercase characters or vice versa.

■ File name specification

File name specification complies with Windows rules.

2.1.1   Data and Address Formulas (Numerical constant)

The SOFTUNE WORKBENCH provides numeric constants as the terms of data and address formulas. An integer or floating-point number can be written as a numerical constant.

■ Integer

When writing an integer, specify a specifier (B', Q', D', H', 0x) representing the base number of the numerical value. If no specifier is specified, the base number specified by the default is used. The default base numbers are determined for each of the locations from which values must be entered. For details, see each dialog box.

The numerical value representation range is from 0 to H'FFFFFFFF.

However, this range is further restricted, depending on the values to be entered.

The minus values are represented such as -D'1.

(Example)

Binary constant	B'1010
Octal constant	Q'1267
Decimal constant	D'1800
Hexadecimal constant	H'12AF or 0x12AF

Note:

No blank is allowed between a specifier and a numerical value.

■ Floating-point number

The following two floating-point numbers are supported.

- Single-precision floating-point number (S)....float

- Double-precision floating-point number (D)....double, long double

The internal format and size comply with the floating-point type handled by the C compiler.

$$[F'][\ ]\{.d|d[.[d]]\}[\{S|D\}[[+| -]d]]$$

"d" specifies an unsigned decimal number.

Nearest value rounding applies to input values. If the represented value is not a normalized number, a warning message is displayed and the following value is input:

- When an underflow occurs .... The values that can be represented as unnormalized numbers are changed to unnormalized numbers. The values less than unnormalized numbers are changed to ± 0.

- When an overflow occurs   .... Values are changed to infinity.

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A floating-point number can also be specified in a hexadecimal number as follows:

H' hexadecimal - number [.{S|D}]

Note:

If S and D are omitted, D is assumed.

2.1.2 Data and Address Formulas (Symbols, Line Numbers, Character Constants)

The SOFTUNE WORKBENCH provides symbols, line numbers, and character constants as the terms of data and address formulas.

■ Symbol

The symbols used in the source program can be referenced as addresses; they have the type information generated by the C compiler and other accessory information. The accessory information generated by the assembler is label information. Each symbol consists of a module name, a function name, and a symbol name. Specify these names as follows:

```
[[module-name][\function-name]\] symbol-name
```

When the source program is written in the assembly language, module-name is the name written in the operand of the [PROGRAM] statement. When it is written in the C language, module-name is the name of the source file to be compiled. Function-name is a function name written in the C language; it is valid only when the source program is written in the C language.

To distinguish a global symbol from others, write it as \symbol-name.

Table 2.1-1 shows symbol description.

No Japanese character strings can not be used for symbols.

Table 2.1-1 Symbol Cannot Description

Description	Contents
Symbol	Local symbol in function → static symbol in module → global symbol Global symbol
\Symbol	Local symbol in the specified function in the current module
\function\symbol	Static symbol in the specified module or global symbol defined in the specified module
Module\symbol	Local symbol in the specified function in the specified module
Module\function\symbol	Symbol in class (Valid for static) Symbol in class function

■ Line number

The line numbers to be generated by the C compiler or assembler can be used to reference addresses. For the C language, a line number indicates the starting address when one line is compiled.

```
[source file-name]$line-number
```

When referencing an address with a line number, prefix $ to the line number. A line number can be specified only in a decimal number. Specify the line number in the following format. If the extension of the

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source file name is .c, line number specification can be omitted. If the source file name is not alphanumeric characters, enclose the line number in double quotes.

■ Character constant

A character constant is the character value enclosed in a single quote; it cannot include a single quote and \. Instead of these characters (single quote and back slash), escape characters can be used as character constants. Characters that can constitute character strings can be used as escape characters.

2.1.3 Data and Address Formulas (Register name, Flag name)

The SOFTUNE WORKBENCH provides register and flag names as the terms of data and address formulas.

■ Register name, flag name

Register and flag names can be specified in data formulas; they represent the register values at that point of time.

Specify the register name and flag name, following %.

Usable register names differ for each MCU; see Appendix A Register Names.

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2.1.4   Operators Usable in Data and Address Formulas

Table 2.1-2 lists the operators that can be used in data and address formulas and their priorities.

■ **Operators Usable in Data and Address Formulas**

Table 2.1-2 List of Operators Usable in Data and Address Formulas

Priority	Symbol	Explanation	Type of operator
1	( ) [ ] . - >	Priority change Subscript representation Structure Structure pointer	Linear expression
2	- & ! ~ * sizeof (type)	Minus sign Address Logical NOT Bit NOT Memory indirect reference Size (byte) Type cast	Binary operator
3	* / %	Multiplication Division Remainder	Binary operator
4	+ -	Addition Subtraction	
5	<< >>	Left shift Right shift	
6	< <= > >=	Less than Less than or equal to Greater than Greater than or equal to	Binary operator (Relational operator)
7	== !=	Equal to Not equal to	
8	&	Bit AND	Binary operator
9	^	Bit EOR	
10	|	Bit OR	
11	&&	Logical AND	
12	||	Logical OR	

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Remarks:

When the comparison result is true, the relational operator becomes H'1. When false, it becomes H'0. The SOFTUNE WORKBENCH does not support the conditional operator (?:), comma operator (,), increment operator (++) and decrement operator (--) of C language.

2.1.5   Address Formula Specification

Address formula specification is divided into the addressing and Address range specification.

■ Addressing

The addressing format is as follows:

16-bit-addressing

16-bit-addressing: ....Expression for addressing

■ Address range specification

Address range specification, representing a memory range, consists of two addressings; it has any of the following two formats:

Addressing..addressing (from starting address to ending address)
Addressing..+ offset (from starting address to starting address + offset)

offset: Value relative to addressing (starting address)

■ Bit addressing

The notation below is used to represent a bit address. Symbols for bit address attributes can be also used. Bit addressing is valid when /BIT is specified in the command qualifier.

[addressing] : bit-offset

bit-offset: ....Value used to specify a bit position

When addressing is omitted, address 0 is assumed.

2.1.6   File Name Specification

File name specification complies with Windows for host environment.

■ File name specification

| [drive-name:] [directory-path-name] file-name [.extension] |

When drive-name is omitted, the current drive is selected.

2.2 Starting and Terminating SOFTUNE WORKBENCH

This section explains how to start and terminate SOFTUNE WORKBENCH.

■ Starting and terminating SOFTUNE WORKBENCH

With SOFTUNE V3, to start SOFTUNE WORKBENCH, double-click the [F^{2}MC-8L Family Softune Workbench] icon in the [Softune V3] group.

When this program is started for the first time with SOFTUNE Manager V01 or V02 installed, the dialog box is displayed which asks whether or not to take over information for [Setting editor], [Setting tools], and [Setting error jump] set in the previous version. To take over the information, click the [Yes] button. Not to take over it, click the [No] button.

■ Terminating SOFTUNE WORKBENCH

To terminate SOFTUNE WORKBENCH, select [Exit] from the [File] Menu or click the x button above and on the right of the window.

SOFTUNE WORKBENCH cannot be terminated when compile/assemble, make, build, or tool is being executed. Be sure to terminate SOFTUNE WORKBENCH after compile/assemble, make, build, or tool has been terminated or suspended.

2.3   Creating Workspace

Workspace is necessary to store projects in SOFTUNE WORKBENCH to register project, follow the steps below.

■ Creation of Workspace

SOFTUNE WORKBENCH uses the following methods to create workspace.

- Creating workspace in creating new project

  When a new project is created, workspace to store the project is also created.

  In this case, the name and position of workspace are the same as those of the project.

- Creating workspace in opening project

  When [File]-[Open Workspace] is selected to open a project, workspace to store the project is also created.

  In this case, the name and position of workspace are the same as those of the project.

  If any workspace file already exists, however, it is opened instead of the project file.

- Creating blank workspace

  Blank space that has no project is created. Projects must be stored separately.

  In this case, projects can be stored different in name and position from workspace.

■ Creating Workspace in Creating New Project

1. Select [File]-[New].
   When the [New] dialog is opened, select "Workspace/Project File" in [Type of File] and click the [OK] button.

2. Select the [Project] tab.
   When the [New] dialog is opened, select the [Project] tab.

3. Select [Create New Workspace].
   Click the [Create New Workspace] check button to create workspace. Create workspace in the same way that a new project is created.

■ Creating Workspace in Opening Project

1. Select [File]-[Open Workspace].

2. Select "Project File" in [Type of File].
   When the [Open Workspace] dialog is opened, select "Project File" in [Type of File].

3. Select the project file to be opened.
   Select the project file to be opened.

4. Click the [Open] button.

■ Creating Blank Workspace

1. Select [File]-[New].
   When the [New] dialog is opened, select "Workspace/Project File" in [Type of File] and click the [OK] button.

2. Select the [Workspace] tab.
   When the [New] dialog is opened, select the [Workspace] tab.

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3. Select the type of workspace.
   Select [Blank Workspace] as the type of workspace.

4. Enter the workspace name.
   Enter the workspace name. This name is used as a workspace file name. At default it is also used as a workspace directory (the workspace directory can be changed).

5. Click the [OK] button.

2.4   Storing of Project

A project is necessary to develop and debug software in SOFTUNE WORKBENCH. To store a project in workspace, follow the steps below.

■ Storing of Project

SOFTUNE WORKBENCH uses the following methods to store a project in workspace. To store a new project is as active project in workspace.

- Storing new project in currently opened workspace

  A new project is stored in currently opened workspace.

- Storing existing projects in currently opened workspace

  Existing projects are stored in currently opened workspace.

■ Storing New Project in Currently Opened Workspace

1. Open workspace to store a project.
   Please open workspace to be stored a project.

2. Select [Project]-[Add Project]-[New].

3. Select [Add to Current Workspace].
   Click the [Add to Current Workspace] check button.

4. Select [Project Type].
   Select the type of file last created in the project [Project Type]. Table 2.4-1 indicates the selectable project types and their explanation.

5. Select the chip type and target MCU.
   Selectable values are indicated in the top-down list. Select the chip and target MCU from the list.

6. Enter the project name.
   Enter the project name. This name can be use as a project file name. At default it is also used as a target file name and project directory (the target file name and project directory can be changed).

7. Set project dependence.
   When defining a project as a subproject in another project, place a checkmark in the [Project Dependence] checkbox and select the project name from the list in the [Project Dependence] checkbox.

8. Click the [OK] button.

"Debug", "Debug\ABS", "Debug\OBJ", "Debug\LST", or "Debug\OPT" directory is created as a subdirectory in the project directory.

Debug: A directory to store information for each project configuration. The default configuration name as a new project is created is "Debug".

   ABS: Directory in which the target file is stored

   OBJ: Directory in which the object file is stored

   LST: Directory in which the list file is stored

   OPT: Directory in which the option file is stored

When REALOS is selected as the project type, the Setup Wizard of the configurator opens. For details,

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refer to the manual accompanying SOFTUNE REALOS.

Table 2.4-1 List of Project Types

Project type	Explanation
Absolute format (ABS)	An ordinary program file is created.
Relative format (REL)	A relative format file is created.
Library file	A library file is created.
REALOS (ABS)	A program that uses a real-time operating system is created.

■ Storing Existing Projects in Workspace

1. Open workspace to store a project.
   Open workspace to store a project.

2. Select [Project]-[Add Project]-[Project].

3. Select the project to be stored.
   Select the project to be stored in the [Add Project] dialog.

4. Set project dependence.
   When defining a project as a subproject in another project, place a checkmark in the [Dependence] checkbox and select the project name from the list in the [Dependence] checkbox.

5. Click the [Open] button.

■ Setting Active Project

The active project is a project that undergoes [Make], [Build], [Compile/Assemble], [Start Debug] and [Include Dependence] in the menu. [Make], [Build], [Compile/Assemble], and [Include Dependence] affects the subprojects in the active project.

To set an active project, select [Project]-[Set Active Project]. When the submenu is displayed, select the name of a project to be made active from the submenu.

■ Deleting Project Stored in Workspace

Select the project to be deleted in the Project window. Select [Delete Project] in the shortcut menu.

The specified project is deleted from workspace, but the project file itself is not deleted.

If the deleted project is used as the subproject in the project within workspace, the project dependence is also deleted.

Note:

If SOFTUNE REALOS is not installed, REALOS is not displayed as the project type.

2.5 Creating and Registering Source File in Project

This section explains the procedure for creating a new source file with SOFTUNE WORKBENCH and registering the file in the project.

■ Creating the new source file

1. Select the [File]-[New] Menu.
   When the [New] dialog box opens, select [Text File] from [Types of Files], then click the [OK] button.

2. Select the [File]-[Save As] Menu.
   When the [Save As] dialog box opens, select [Text File] from [Types of Files], then click the [OK] button.
   When the file dialog box for specifying the directory to which the created file is to be saved and the file name opens, select the directory, specify the file name, then click the [Save] button.

■ Registering the created file in the project

Select the [Project]-[Add Member] menu. The File dialog is opened to select the file to be added to the member. Select the created source file, followed by the folder to be inserted into the Project window, and click the [Open] button. The file is stored in the project and its name is displayed in the source file category in the Project window.

■ Storing Created File with Directory in Project

Select the [Project]-[Add Member]-[Directory] menu. The Add Member Directory dialog is opened to select the folder to be added to the member. Select the directory having the created source file, followed by the folder to be inserted into the Project window, and click the [OK] button. The file and directory are stored in the project and the file and directory below the specified directory are displayed in the specified folder in the Project window.

The type of file to be stored can be restricted by setting [Type of File] in the dialog.

■ To delete files stored in the project

Select a file(s) to be deleted in the Project window. Select "Delete" from the shortcut menu. The selected file is deleted from the project member, but the file itself is not deleted. Users cannot delete files in the [Dependencies] category and [Debug] category files.

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2.6   Definition of Subproject

This section explains how to define a subproject.

■ Definition of Subproject

The subproject is a project on which other projects depend.

SOFTUNE WORKBENCH uses the following methods to define a subproject.

- Defining project as subproject in storing it

When created, a new project is defined as a subproject in another project. For the setting method, see Section 2.4 Storing of Project.

- Defining subproject between existing projects

A subproject is defined between projects in workspace.

Another project is defined as a subproject in the subproject in the parent project. Such a recurrent definition that the parent project itself serves as a subproject is impossible.

■ Defining Subproject between Existing Projects

1. Select [Project]-[Project Dependence].

2. Select the parent project in which a subproject is defined.
   When the [Project Dependence] dialog is opened, select the name of the parent project in which a subproject is defined from the [Project Name] box.

3. Select the project that is defined as a subproject.
   Check the project that is defined as a subproject from those in the [Dependent Project] list.

4. Click the [OK] button.

■ Deleting Subproject from Project

1. Select [Project]-[Project Dependence].

2. Select the parent project from which a subproject is deleted.
   When the [Project Dependence] dialog is opened, select the name of the parent project from which a subproject is deleted form the [Project Name] box.

3. Select the subproject to be deleted.
   Deselect the subproject that is deleted from the [Dependent Project] list.

4. Click the [OK] button.

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2.7   Creation of Project Configuration

This section explains how to create a project configuration.

■ Creation of Project Configuration

The project configuration is a series of settings for specifying the characteristics of the target file. By creating a new project configuration, two or more tool settings can be stored in the project.

When a new project is created, the project configuration is created under a default name of "Debug".

In SOFTUNE WORKBENCH, the project configuration is created as follow.

- Creating project configuration on settings of existing project configuration

A new project configuration is created on the settings of the selected existing project configuration. In the new project configuration, the same files as those in the original project configuration are always used.

■ Creating Project Configuration on Settings of Existing Project Configuration

1. Select [Project]-[Project Configuration]-[Add and Delete].

2. Select the project to which a project configuration is added.
   When the [Add and Delete Project] dialog is opened, select the project to which a project configuration is added.

3. Click the [Add] button.
   Click the [Add] button. The [Add Project Configuration] dialog is opened.

4. Enter the project configuration name.
   Enter the unique name of a new project configuration. The characters that can be used to form a name are "a to z", "A to Z", "0 to 9" and "_".

5. Select the project configuration to which settings are copied.
   Select the initial settings of a project configuration to be added. The selected settings of the project configuration (such as tool options, file configurations, and configurations of subprojects to be build) are copied as they are.

6. Click the [OK] button.
   Click the [OK] button in the [Add Project Configuration] dialog and the [OK] button in the [Add and Delete Project Configuration] dialog.

■ Setting Active Project Configuration

The active project configuration is at default a project configuration that undergoes [Make], [Build], [Compile/Assemble], [Start Debug], and [Include Dependence].

1. Select [Project]-[Project Configuration]-[Add and Delete].

2. Select the project configuration that is made active.
   When the [Add and Delete Project] dialog is opened, select the name of the project configuration that is made active.

3. Click the [Active] button.
   Click the [Active] button. The specified configuration and its project become active.

4. Click the [OK] button.

■ Deleting Specific Active Project Configuration from Project

1. Select [Project]-[Project Configuration]-[Add and Delete].

2. Select the project configuration that is deleted from the project.
   When the [Add and Delete Project] dialog is opened, select the project configuration name to be deleted.

3. Click the [Delete] button.
   Click the [Delete] button. The specified project configuration is deleted. When all project configurations in a project are deleted, the project itself is also deleted.

4. Click the [OK] button.

2.8   Setting Tools

When make or build is executed by SOFTUNE WORKBENCH, appropriate options must be set in such tools as a compiler, assembler and linker. Set these options as follows:

■ Select the [Project]-[Setup Project] Menu

The [Set Project] dialog is opened. The option selected in the [Set Project] dialog box is applicable to two or more projects. The applicable project configuration can be limited. For example, the settings of project configurations A and B can be changed. The same setting can be also specified for all project configurations.

Specify the project configuration in the [Setting Target] box, the project set in tree view, and select the tool tab.

When the compiler, assembler and linker/librarian are selected, the category can be selected in the top tab of the setting dialog box for each tool. After the top-down list is opened, select a category. When a category was selected, the contents in the display are changed and the options included in each category can be set.

In most cases, compiler and assembler options need not be set except when output of list file and make or build is executed under specific conditions. Set only linker options. For how to set linker options, see Section 2.9 Setting Linker Options.

■ Click the [OK] button to complete tool setting

When setting all necessary tool options is completed, click the [OK] button. All the set options are registered in the project; they become valid when make or build is executed.

Clicking the [Cancel] button cancels all the set options.

Note:

When the [Update] button is clicked during tool option setting, the previously set options cannot be restored.

2.9   Setting Linker Options

When creating a program with SOFTUNE WORKBENCH, be sure to set a memory map with a linker option.

■ Automatic Setting of Linker Options

In SOFTUNE WORKBENCH, the following linker options are automatically set on the basis of information on the MCU selected when a new project is created;

- Specify the internal ROM/RAM address of the MCU in the memory area option.

  Internal ROM is output under an area name of "_INROMxx" and internal RAM under an area name of "_INRAMxx" (where x is numbered consecutively starting with 01).

- Set the automatic disposition mode to mode 2 (optimum automatic disposition by linker).

  When creating a program in a mode other than the single-chip mode or when customizing the disposition of sections, set the [Disposition/Connection] option as the linker option.

■ Setting of Linker Options

In SOFTUNE WORKBENCH, specifying memory mapping is basic to the disposition of each section in the memory area. Therefore, set a memory area and set each section in the memory area.

■ Set a memory area

Enter a ROM/RAM area name, start address and end address, select an area attribute (ROM or RAM), then click the [Setup] button. This setting is displayed in the ROM/RAM area list. In the ROM/RAM area, assign a unique ROM/RAM name so that it does not match other area names.

A easy program consists of a ROM area and a RAM area, but in a complicated program, several area may be specified.

The number of areas that can be set is not limited; set all the areas necessary to configure the memory map of the program to be developed.

■ Set the sections to be allocated to each of the set areas

Selecting the area from the ROM/RAM area list and clicking the [Setup Section] button opens the [Setup Section] dialog box, enabling the sections to be allocated to the selected area. When selecting an area, click the start address of the area.

When the [Setup Section] dialog box opens, specify section names in the order the sections are allocated to the area. Specify section names one by one. When section name specification is completed, click the [Setup] button to register the section names in the section name list.

When execute make/built the sections are allocated to the area in the order the section names were registered in the section name list.

When setting the sections to be allocated to one area is completed, click the [OK] button to return the linker option setting dialog box. Also set other areas in the same way.

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Reference:

Allocating sections to several areas can be continuously set by changing ROM/RAM area name display in the uppermost part of the [Setup Section] dialog box. The linker option setting dialog box need not be returned each time sections are allocated to an area.

2.10   Make/Build

SOFTUNE WORKBENCH can create a program in two methods: make and build.

■ Make

Compiles or assembles only the modified source file and then links all objects to the library to generate an object program. SOFTUNE WORKBENCH recognizes the dependency of the include files registered in the [Dependencies] category of the Project Window to compile or assemble the source file.

Use the [Project]-[Make] Menu to execute make.

■ Build

Not only modified source file, but compiles or assembles all the source files registered in the project and then links all objects to the library to generate a target file.

Use the [Project]-[Build] Menu to execute build.

■ Stop

Stop is the function that forcibly suspends processing during make, build, compilation, or assembling.

Execute stop with the [Project]-[Stop] Menu during make, build, compilation, or assembling.

2.10.1 Making or Building of Project

SOFTUNE WORKBENCH enables making or building for each project configuration.

■ Making or Building of Project

[Make] or [Build] in the menu applies to the active configuration of an active project. If a subproject is defined, priority is given to making or building of the subproject.

For details about how to change the active project and active configuration, see Section 2.4 Storing Project and Section 2.7 Creation of Project Configuration.

■ Making or Building Specified Project

Select the project to be made or built in the Project window. Select [Make] or [Build] in the shortcut menu. The active configuration of the specified project is made or built. If a subproject is defined, priority is given to making or building of the subproject.

■ Changing Subproject Configuration at Making or Building

1. Select [Project]-[Project Configuration]-[Configuration at Build].

2. Select the parent project and configuration.
   When the [Set Configuration at Build] dialog is opened, select the project to be set from the [Project] box. The configuration of a subproject to be made or built is displayed.

3. Select the configuration of a subproject.
   Select the configuration to be made or built from [Configuration of Subproject at Make/Build].

4. Click the [OK] button.

2.11   Debugging

The absolute file created as a result of normal termination of make/build can be debugged immediately after SOFTUNE WORKBENCH has migrated to the debug session.

■ Migrating SOFTUNE WORKBENCH to debug session

To enable SOFTUNE WORKBENCH to debug the absolute file, migrate it to the debug session.

To migrate SOFTUNE WORKBENCH to the debug session, select [Start Debug] from the [Debug] Menu

-First debugging after project creation

Setup Wizard for debuggers is started. Set the type of the debugger and others (4.7.2.4 Setup Wizard).

-Second or subsequent debugging after project creation

Start SOFTUNE WORKBENCH in the debugger mode that has been already set. To change the type of the debugger, select the [Debug]-[End] Menu to terminate debugging once, and then change [Project Setup] Menu.

■ Loading the target program

When SOFTUNE WORKBENCH enters the debug session, select [Load target program] from the [Debug] Menu to load the target program. The created program is loaded to the debugger and all debugging preparations are completed now.

■ Operating the debugger

For how to operate the debugger, see Chapter 3 Windows and Chapter 4 Menus in this manual.

For debugger commands and debugger output error messages, refer to the SOFTUNE WORKBENCH Command Reference Manual

For the debugger functions (MCU common function, MCU chip dependency function), refer to the SOFTUNE WORKBENCH Users Manual

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2.12 Executing Debugging Only

SOFTUNE WORKBENCH can be used as the conventional debuggers.

■ Creating a project

In SOFTUNE WORKBENCH, projects are a basis of all work. This is not an exception also at debugging. For this reason, executing debugging only requires the creation of a project for debugging.

First, create the project for debugging and the workspace which stores the project in the following procedure:

1. Select [New] from the [File] Menu.

2. Select [Project/Workspace File] from the file open dialog box.

    -Select the absolute format (ABS) from the new creation dialog box for the project.

    -Specify a project name.

    -Specify a project directory.

    -Select a target MCU name and chip type.

■ Setting of Workspace

Perform setting common to projects to be stored in workspace.

1. Select [Set Workspace] from the [Project] menu.

2. When the [Set Workspace] dialog is opened, perform the following setting:

    • Debug when workspace opened: Start debugging.

    • Save setup information: Save.

■ Settings related to the debugger

1. Select [Project Setup] from the [Project] Menu.

2. When the setup dialog box opens, open the [Debug] tag and select [Setup] category:

3. Set a setup name.
    A project name is set both in [Setup Name List] and [Valid Setup Name] as the default setup name. Usually, setup names are identified by the type of the debugger to be used. However, if only one debugger is used, the default name may be set as it is.

    When the default name is used as is, select the default name already set in [Setup Name List], then click the [Change Setup] button. When another name is used, specify [Setup Name], then click the [Add Setup] button.

■ Setup Wizard

Clicking the [Add Setup] or [Change Setup] button starts the Setup Wizard for debuggers. Once Setup Wizard has been started, set items according to instructions from Setup Wizard. For how to set items with Setup Wizard, see Section 4.7.2.4 Setup Wizard.

When all settings with Setup Wizard are completed, click the [Complete] button.

When the [Project Setup] dialog box is redisplayed, click the [OK] button.

When all the above steps are completed, save the project, then close it once.

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■ Starting debugging

When steps from [Creating a project] to [Setup Wizard] are already completed, open the project. SOFTUNE WORKBENCH automatically migrates to the debug session, enabling the immediate start of debugging.

Select [Open] from the [File] menu and specify the load module file to load the target program.

2.13   Reading SOFTUNE Project Files of Old Versions

The SOFTUNE project files of old versions can be read.

■ Procedure

- The project files created in SOFTUNE WORKBENCH V3 version need the following setting.

1. Select [Open Workspace] from the [File] menu.

2. Select 'Project file' from File Type and specify the project file made by the early version of SOFTUNE WORKBENCH. If the specified file is one made by the early version of SOFTUNE WORKBENCH, a dialog asking whether to convert the file to a workspace project format is opened.

[Yes] button: The project file is converted and opened in the workspace project format.

[No] button: The project file is not converted and is opened in the old project format. In this case, some functions cannot be used. For details of functions that can be used in the old project format, refer to Section 1.2 Management Function for Project of SOFTUNE WORKBENCH Users Manual.

[Cancel] button: Opening of the project file is cancelled.

- The project files created in SOFTUNE Manager V01/V02 version needs the following setting.

1. Select [Open Workspace] from the [File] Menu.

2. Select 'Project file' from File Type and specify the project file made by SOFTUNE Manager. If the specified file is one made by SOFTUNE Manager, a dialog asking whether to convert the file to a workspace project format is opened.
Click the [Cancel] button to cancel opening of the project file.

3. Click the [OK] button to start conversion.
When you click the [Cancel] button, it cancels the opening of the project file.

4. When the New Project Creation Window opens, set the chip type and target
MCU, then click the [OK] button.

5. When conversion is completed, the dialog box showing the end of conversion opens. Click the [OK] button to close the dialog box.

■ Backup file

In SOFTUNE WORKBENCH, when a project file is converted to a workspace project format, a backup file is made automatically. The extension of backup file varies with the type of project file. The method for opening the backup project file is also different depending on the extension.

● SOFTUNE WORKBENCH V3

Old project file (.prj) → .p03
Old option data file (.dat) → .d03

● SOFTUNE MANAGER V01/V02

Old project file (.prj) → .V01

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● SOFTUNE WORKBENCH V3 (.p03)

- Change the extension of the backup project file (.p03) and option data file (.d03) to '.prj' and '.dat,' respectively.

● Softune Manager V01/V02 (.v01)

- Change the extension of the backup project file (.v01) to '.prj.'

Note:

- Tool options are not passed to projects. Reset these options after read has terminated.

- Be sure to reset "User Include File Directory" set by "Set Environment Variable" of an old version as the "Include Path" option of the C compiler or assembler. Also be sure to reset "Library File Search Path" set by "Environment Variable Setup" of the old version as the "Library Search Path" option of the linker.

- If the workspace file having the same name as that of the specified project file is in the same directory, the workspace file is opened instead of the project file, and no project file is converted.

2.14   Moving Project File

This section explains how to move a project file to another directory or a personal computer.

■ Procedure

1. Set the path to the member stored in the project file to the relative path from the project file.
   In SOFTUNE WORKBENCH, files in the same drive as that of the project file are usually stored in the relative path. To check whether the files are stored in the relative path, check File Property in the Project window. For the file property, see Section 4.3.8 Property.

2. Set the path to the target file directory, object file directory and list file directory to the relative path from the project file.
   In SOFTUNE WORKBENCH, when a new project is created, the output directory is set to the relative path from the project file. To make a change and check, open the [Set Project] dialog. For details, see Section 4.5.5 Setup Project.

3. Set the directories such as the include path and library path specified in the tool option to the relative path or macro description.
   For the macro description, see Section 1.11 Macro Descriptions Usable in Manager. For the tool option, see Section 4.5.5 Setup Project of SOFTUNE Workbench Function Manual.

4. After the completion of the setting in steps 1 to 3, save the project.

5. Move the project file without changing the directory structure in steps 1 to 3.

CHAPTER 3
Windows

**This chapter explains SOFTUNE WORKBENCH windows.**

3.1 Window Configuration

Each SOFTUNE WORKBENCH window consists of a menu bar, tool bar, window screen, and status bar. Menus are explained in Chapter 4.

■ **Main Window**

Figure 3.1-1 shows the SOFTUNE WORKBENCH Main Window. As shown in this figure, child windows (e.g., project window and output window) and the tool bar can be shown with the Main Window and displayed.

Figure 3.1-1 The SOFTUNE WORKBENCH Main Menu
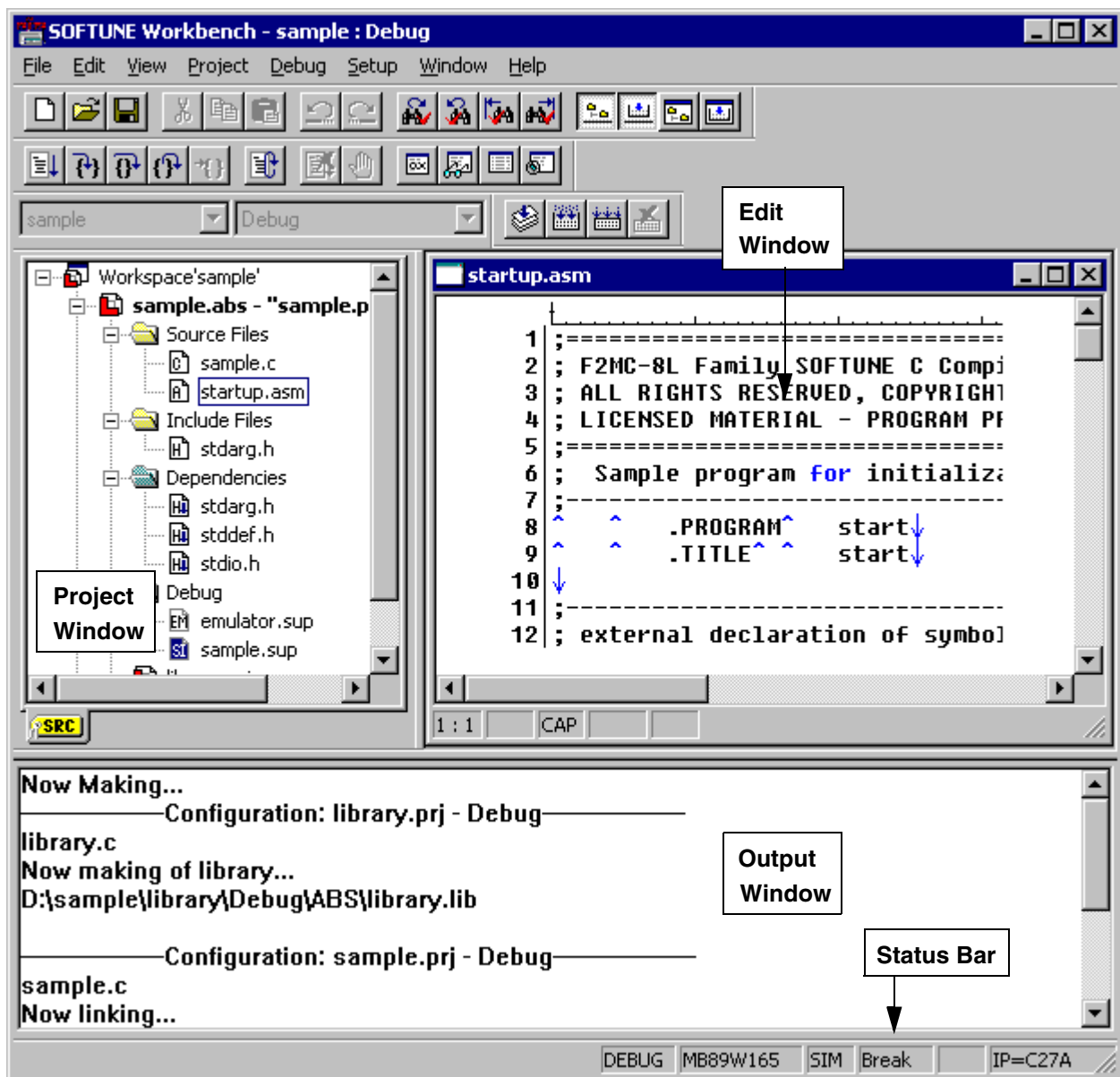
3.2　Tool Bar

Command buttons to be used often are assigned to the tool bar for each group. The groups that can be selected and the command buttons in the groups are shown below.

■ Common bar

▢	New
📂	Open
💾	Save
✂	Cut
📋	Copy
📋	Paste
↩	Undo
↪	Redo
	Jump to Next error
	Jump to Previous error
	Jump to Top error
	Jump to Bottom error
	Project window Docking
	Output window Docking
	Open Project window
	Open Output window

■ Project bar

The active project and its active configuration name are set and displayed.

Sample ▼	Debug ▼
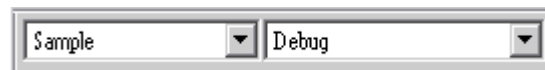
■ Build bar

	Compile/Assembly
	Make
	Build
	Stop Make/Build

■ Debug bar

	Go
	Step In

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	Step Over
	Step Out
	Run Until Cursor
	Reset of MCU
	Abort
	Breakpoint Set/Reset
	Register window
	Watch window
	Memory window
	Disassembly

■ Flash (MB2146-09)

	Download Flash Memory
	Upload Flash Memory
	Erase Flash Memory

■ Flag bar

Display and setting of MCU condition flag status

□ H □ I   □ N □ Z □ V □ C

3.3   Status Bar

The current status of SOFTUNE Workbench is displayed. The status bar is displayed in the last part of the main window.

■ Status bar

The status bar has the areas in which information is displayed. The information and the areas in which it is displayed are simply shown in Figure 3.3-1 .

Figure 3.3-1 Status Bar

The current status of SOFTUNE WORKBENCH is displayed.

Break at F305 by breakpoint   DEBUG MB89051   EML Break   IP=F305

[DEBUG] is displayed when SOFTUNE WORKBENCH enters the debug session.

An MCU number (e.g., "MB89051") is displayed when SOFTUNE WORKBENCH is in the debug mode.

The type of the debugger is displayed when SOFTUNE WORKBENCH is in the debug mode.

The debugger status (e.g., execute, break) is displayed when SOFTUNE WORKBENCH is in the debug mode.

The current IP (instruction address) when is displayed when SOFTUNE WORKBENCH is in the debug mode.

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3.4　Project Window

The name of the current project and the file names registered in the project are displayed in the tree view format.

■ Project window

Figure 3.4-1 shows an example of the project window.

■ Function

-Display the workspace name

-Display all projects stored in workspace

-Display the subproject

The subproject in the project is displayed below the parent project.

-Display of the project target file name

-Display of all the source file names registered in the project

 When a source file name is double-clicked, the editor opens to enable the editing of the source file.

-Display of the include files that are in dependency

 When an include file name is double-clicked, the editor opens to enable the editing of the include file.

-Displaying Debugger setup name

 When the Debugger setup name is double-clicked, debugging is started based on the setup information.

-Drug and drop

 The member can be moved in the Project window and stored from the explorer.

Figure 3.4-1 Example of Project Window

Workspace'sample'	Workspace name
sample.abs - "sample.prj" [Debug]	Target file name of project. It is followed by the project name and active configuration name. The active project is given in bold type.
Source Files	
sample.c	
startup.asm	Folder that can be deleted. When opened, the files and folders stored are displayed. "Source Files" and "Include Files" are created at default.
Include Files	
stdarg.h	
Dependencies	"Dependencies" category, the names of the files in which dependencies are detected are displayed. The category cannot be deleted.
stddef.h	
stdio.h	
Debug	"Debug" category. When opened, the setup name stored is displayed. The category cannot be deleted.
emulator.sup	
sample.sup	
library.prj	Subproject name
library.lib - "library.prj" [Debug]	
SRC	The files stored in project for making or building are listed.

■ Project window bitmap image list

Icon	Description
	Workspace file name
	Target file name
	Subproject name
	Folder
	Category
	C++ source file
	C++ source file (not subject to making or building)
	C++ source file in which individual options specified
	C++ source file in which individual options specified (not subject to making or building)
	C source file
	C source file (not subject to making or building)
	C source file in which individual options specified
	C source file in which individual options specified (not subject to making or building)
	Assembler source file
	Assembler source file (not subject to making or building)

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[A icon]	Assembler source file in which individual options specified
[X A icon]	Assembler source file in which individual options specified (not subject to making or building)
[H icon]	Include file
[X H icon]	Include file (with dependence)
[lib icon]	Library file
[X lib icon]	Library file (not subject to making or building)
[O icon]	Object file
[X O icon]	Object file (not subject to making or building)
[Re icon]	Relative file
[X Re icon]	Relative file (not subject to making or building)
[SI icon]	Simulator Debugger setup name
[SI icon]	Valid setup name (for Simulator Debugger)
[EM icon]	Emulator Debugger setup name
[EM icon]	Valid setup name (for Emulator Debugger)

■ Shortcut menus (Click the right button of the mouse on a workspace name)

There are two menus below:

- Add Project A project is added to workspace.
- Property   The property of a workspace file is displayed.

- Add Project

  When selected, the following two submenus are displayed.

  - New

    A new project is added to workspace (See Section 4.5.2 Add Project.).

  - Existing Project

    An existing project is added to workspace (See Section 4.5.2 Add Project.).

- Property

  Information on the workspace file is displayed (See Section 4.3.8 Property.)

■ Shortcut menus (Click the right button of the mouse on a target name)

There are 12 menus below:

- Set Active Project   The currently selected project is set in the active project.
- Create New Folder   A new folder is created in project.
- Add Member to Project   A member is added to the project.
- Set Project   A project is set.
- Set Linkage Order   This checks and changes the Linkage Order of the member files registered in a project.
- Make   Starts make.
- Build   Starts build.
- Executing linker or librarian   The linker or librarian is started.

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   • Delete Project   The project is deleted from workspace.

   • Property   Displays output file information.

   • Open List File   Opens the list file.

   • Open HEX File   Opens the HEX file. (HEX file information is displayed only when the project type is "absolute format".)

- Set Active Project

  The currently selected project is set in the active project in workspace.

- Create New Folder

  When selected, the [Create New Folder] dialog (Figure 3.4-2) is opened. Enter the folder name and click the [OK] button.

    - When the folder name is entered, the folder is inserted into the hierarchy immediately below the project.

    - The folders are listed in the order in which they are created.

Figure 3.4-2 Create New Folder Dialog
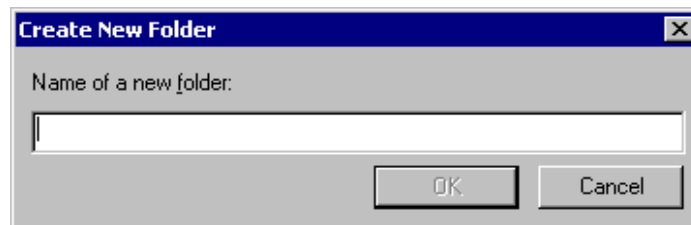
- Add Member to Project

When selected, the following two submenus are displayed.

  • File

   A member is added in files to the currently selected project (See Section 4.5.3 Add Member.).

   At default, a member is inserted into the hierarchy immediately below the project.

  • Directory

   A member is added in directories to the currently selected project (See Section 4.5.3 Add Member.).

   At default, a member is inserted into the hierarchy immediately below the project.

- Set Project

  A project is set (See Section 4.5.5 Setup Project.).

- Set Link Order

  When selected, the [Set Linkage Order] dialog (Figure 3.4-3) is opened. The files displayed in the [Linkage Order] box are linked from top to down. To change the link order, select the configuration to be set from the [Target of Setting] box, followed by the file name, and use the [Up] or [Down] button to move the file to a desired position.

  The [Export] dialog (Figure 3.4-4) allows the current order to affect other configurations.

  The files not subject to link are displayed in gray.

Figure 3.4-3 Set Linkage Order Dialog
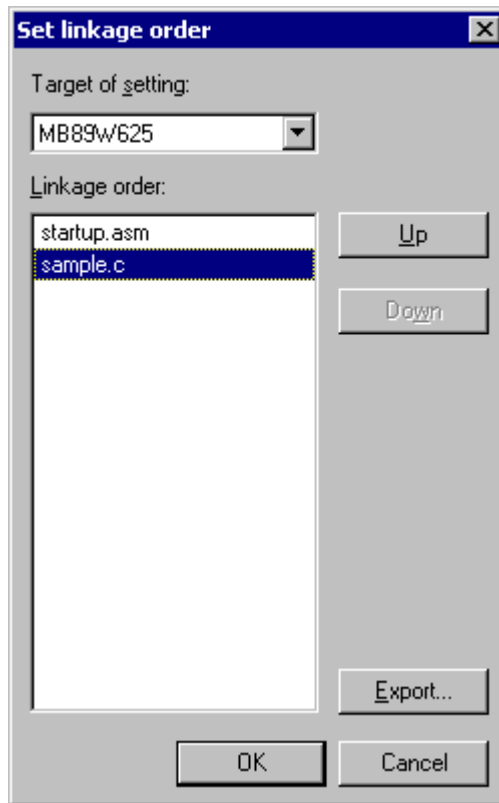
Figure 3.4-4 Export Dialog
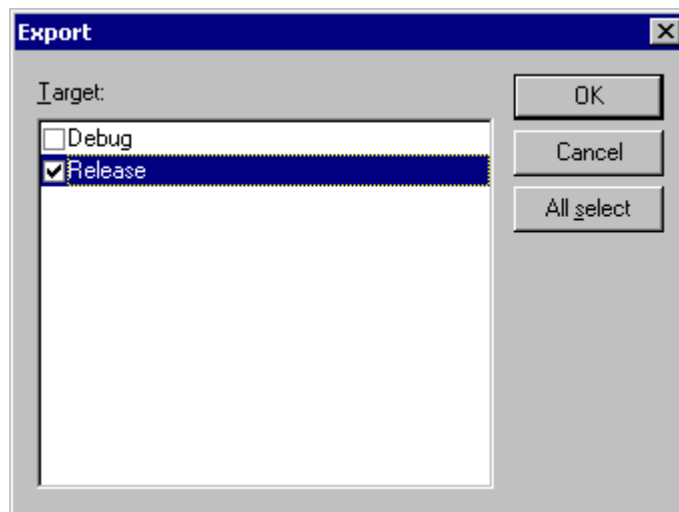
- Make/Build

Making or building is performed in the active configuration of the currently selected project to create a target file.

- Start Linker/Librarian

The linker or librarian is started in the active configuration of the currently selected project to create a target file.

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- Delete Project

  The specified project is deleted from workspace. The project file itself is not deleted.

- Property

  Click the right button of the mouse to display the shortcut menu, then select [Property].

- File information is displayed. See Section 4.3.8 Property.

- Open List File

1. Click the right button of the mouse to display the shortcut menu, then select [Open List File].
   - The submenu is displayed.

2. Select the list file you want to open.
   - If the list file you want to open is not created, no submenu item can be selected.

- Open HEX File

1. Click the right button of the mouse to display the shortcut menu, then select [Open HEX File].
   - The submenu is displayed.

2. Select the HEX file you want to open.
   - If the HEX file you want to open is not created, no submenu item can be selected.

■ Shortcut menu (Click the right button of the mouse on a subproject name)

There is one menu below:

- • Delete Subproject

  A subproject is deleted.

- Delete Subproject

  The subproject in the specified project is deleted. To define a subproject again, see Section 4.5.7 Project Dependencies.

■ Shortcut menus (Click the right button of the mouse on a folder)

There are seven menus below:

- • Create New Folder

  A new folder is created.

- • Add Member to Project

  A member is added to the project.

- • Set

  Setting is performed.

- • Make

  Making is started.

- • Build

  Building is started.

- • Delete

  A folder and a member in the folder are deleted.

- • Property

  Information on folders is displayed.

- Create New Folder

  - When selected, the [Create New Folder] dialog (Figure 3.4-2) is opened. Enter the folder name and click the [OK] button.

  - When the folder name is entered, a folder is inserted into the selected folder.

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- The folders are listed in the order in which they are created.

- Add Member to Folder

  When selected, the following two submenus are displayed:

  - File

    A member is added in files to the currently selected project (See Section 4.5.3 Add Member).

    At default, a member is inserted into the selected folder.

  - Directory

    A member is added in directories to the currently selected project (See Section 4.5.3 Add Member).

    At default, a member is inserted into the selected folder.

- Set

  When selected, the following two submenus are displayed:

  - Individual Setting

    A project is set (See Section 4.5.5 Setup Project).

  - Return to Common Setting

    All individual options in the specified folder are returned to common options.

- Make/Build

  Making or building is performed in the active configuration of the currently selected project to create a target file.

- Delete

  The selected folder and all files in the folder are deleted from the project. The files themselves are not deleted.

  If the files (RCR files) that cannot be deleted are included, the folder is not deleted.

- Property

  Information on folders is displayed (see Section 4.3.8 Property).

■ Shortcut menus (Click the right button of the mouse on a [Dependencies] category)

There are three menus below:

- • Make   Making is started.
- • Build   Building is started.
- • Property   Information on folders is displayed.

- Make/Build

  Making or building is performed in the active configuration of the currently selected project to create a target file.

- Property

  Information on folders is displayed (see Section 4.3.8 Property).

■ Shortcut menus (Click the right button of the mouse on a [Debug] category)

There are two menus below:

- • Add Setup   A debug setup is added.
- • Property   Information on folders is displayed.

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- Add Setup

When selected, the following two submenus are displayed:

- New

When selected, the [Create New Setup] dialog (Figure 3.4-5) is opened. Enter the setup name and click the [OK] button.

When the setup name is entered, the setup wizard is started. For details about the setup wizard, See Section 4.7.2.4 Setup Wizard.

- Reference

When selected, the [Create New Setup] dialog (Figure 3.4-5) is opened. Enter the setup name and click the [OK] button.

When the setup name is entered, the [Select File] dialog is opened. Select the file and click [Open] button. Information is read from the specified file.

Figure 3.4-5 Create New Setup
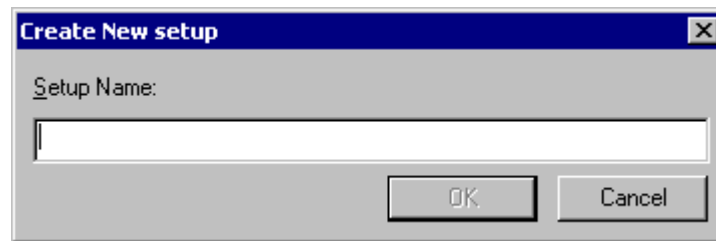
- Property

Information on folders is displayed. See Section 4.3.8 Property.

■ Shortcut menu (Click the right button of the mouse on a source file name.)

There are six menus below:

- Open   Opens the selected source file.
- Compile (Assemble)   Compiles (Assembles) the selected source file.
- Set   Setting of project
- Delete   Releases the source file from the project.
- Property   Displays source file properties.
- Open List File   Opens the list file

- Open

Click the right button of the mouse to display the shortcut menu, then select [Open].

- When SOFTUNE WORKBENCH is in the debug session, the specified source file is displayed in the Source Window.

- When SOFTUNE WORKBENCH is not in the debug session, the specified source file is displayed in the Edit Window.

- Compile (Assemble)

Click the right button of the mouse to display the shortcut menu, then select [Compile] [Assemble].

- The specified source file is automatically judged whether it is the C or assembler source and then compiled or assembled.

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- Set

  Click the right button of the mouse to display the shortcut menu, then select [set].

  - Individual Setting

    A project is set (See Section 4.5.5 Setup Project).

  - Return to Common Setting

    All individual options in the specified folder are returned to common options.

- Delete

  Click the right button of the mouse to display the shortcut menu, then select [Delete].

   - The specified file is released from the project member. The file itself is not deleted.

- Property

  Click the right button of the mouse to display the shortcut menu, then select [Property].

  - File information is displayed. See Section 4.3.8 Property.

- Open List File

  Click the right button of the mouse to display the shortcut menu, then select [Open List File].

  Select the list file you want to open.

  - If the list file you want to open is not created, no submenu item can be selected.

■ Shortcut menu (Click the right button of the mouse on an include file name and other user's registration file.)

There are three menus below:

- • Open   Opens the selected include file.

- • Delete   A file is deleted from the project.

- • Property Displays include file information (properties).

- Open

  Click the right button of the mouse to display the shortcut menu, then select [Open].

  - When SOFTUNE WORKBENCH is in the debug session, the specified include file is displayed in the Source Window.

  - When SOFTUNE WORKBENCH is not in the debug session, the specified include file is displayed in the Edit Window.

- Delete

  Click the right button of the mouse to display the shortcut menu, then select [Delete].

   - The specified file is released from the project member. The file itself is not deleted.

- Property

  Click the right button of the mouse to display the shortcut menu, then select [Property].

   - File information is displayed. See Section 4.3.8 Property.

■ **Shortcut menus (Click the right button on library file, object file and relative file)**

There are three menus below:

- • Set   Setting is performed.
- • Delete   A file is deleted from the project.
- • Property The property of a file is opened.

- Set

  When selected, the following two submenus are displayed:

  - Individual Setting

    A project is set (See Section 4.5.5 Setup Project).

  - Return to Common Setting

    All individual options in the specified folder are returned to common options.

- Delete

  - The specified file is released from the project member. The file itself is not deleted.

- Property

  File information is displayed. See Section 4.3.8 Property.

■ **Shortcut menus (Click the right button on [Dependencies] category)**

There are two menus below:

- • Open the selected file is opened.
- • Property The property of a file is opened.

- Open

  When selected, the following two submenus are displayed.

  When SOFTUNE WORKBENCH is in the debug session, the specified source file is displayed in the Source Window.

  When SOFTUNE WORKBENCH is not in the debug session, the specified source file is displayed in the Edit Window.

- Property

  File information is displayed. See Section 4.3.8 Property.

■ **Shortcut menu (Click the right button on setup name.)**

There are four menus below:

- • Start/End Debug   Debugging is started or ended.
- • Change   Debugger setup information is changed.
- • Delete   Debugger setup information is deleted.
- • Property   Debugger setup information is displayed.

- Start /End Debug

  - During debugging session, the confirmation dialog "Is the current session ended to start debugging?" is displayed. Select Yes.

  - The current debugging is ended, and then debugging is started based on the specified setup information.

  - During non-debugging session, debugging is started without displaying the confirmation dialog.

  - Debugging can be started only in the active project.

  - In debug session, only the valid setup changes from [Start Debug] to [End Debug]. When [End Debug]

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is selected, debugging is ended.

- Change

The setup wizard for changing the setup setting is started (see Section 4.7.2.4 Setup Wizard).

- Delete

Debugger setup information is deleted from the project.

Valid setup information cannot be deleted. To delete, change the valid setup temporarily.

- Property

Click the right button of the mouse to display the short cut menu, then select [Property].

Setup information is displayed (see Section 4.3.8 Property).

■ Shortcut menu (Click the right button of the mouse on a place other than project window characters.)

There are two menus below:

- Docking View   Sets or resets the docking view.
- Hide   Closes the project window.

- Docking View

Click the right button of the mouse to display the shortcut menu, then select [Docking View].

- The project window is docked with the frame in the check status.

- Hide

Click the right button of the mouse to display the shortcut menu, then select [Hide].

- The project window enters the nondisplay status.

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3.5   Output Window

The output window displays compiler version information and error messages, etc., when make or build is executed.

■ Output window

Figure 3.5-1 is an example of the output window.

As shown in this example, when the left button of the mouse is double-clicked on the line to which an error message was output, control automatically jumps to the source line where the error occurred.

Figure 3.5-1 Example of Output Window

Tool start message (e.g., version and copyright)

```
Output Window                                                    ✕
─────────────Configuration: sample.prj - MB89W625───────────   ▲
E:\Softune\sample\896\Project\startup.asm
E:\Softune\sample\896\Project\sample.c


──────────────
Dependencies update success
                                                                ▼
──────────────
```

Tool error message (example of C compiler)
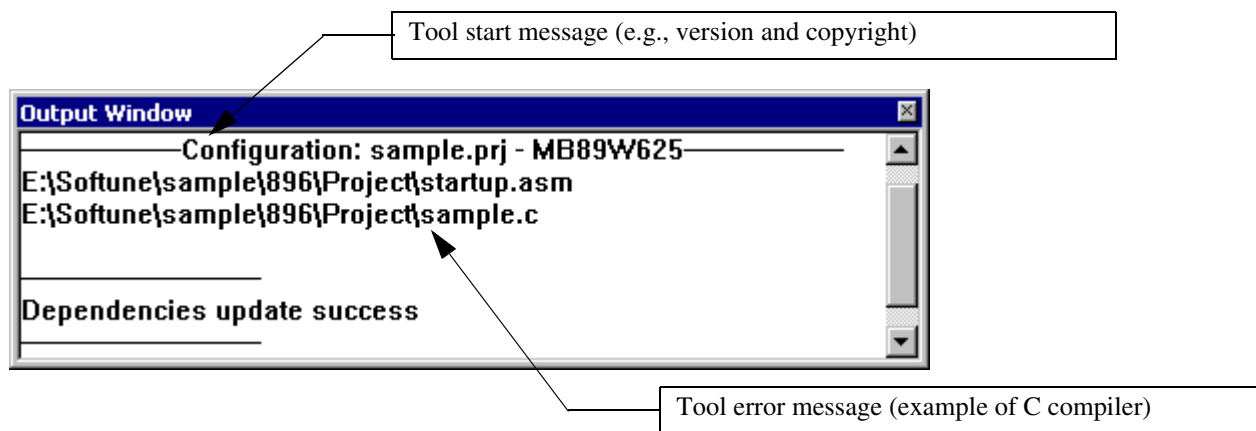
■ Shortcut menu

There are seven menus below:

- Copy	Copies the selected character string to the clipboard.
- Clear	Clears all the items displayed in the output window.
- Docking View	Sets or resets the docking view.
- Nondisplay	Places the output window in the nondisplay status.
- Set Font	Selects a display font in the output window.
- Keyword Coloring	Whether or not to highlight the error number of the error message is set.
- Logging	The result of output to the Output window is stored in a file.

■ Operation

- Copy

1. Select the character string you want to copy.

2. Click the right button of the mouse in the output window to display the shortcut menu.

3. Select [Copy] from the shortcut menu.

See Section 4.3.2 Cut, Copy, Paste, Delete.

- Clear

1. Click the right button of the mouse in the output window to display the shortcut menu.

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2. Select [Clear] from the shortcut menu.

- Docking View

1. Click the right button of the mouse in the output window to display the shortcut menu.

2. Select [Docking View] from the shortcut menu.

  - The output window is docked with the frame in the check status.

- Display

1. Click the right button of the mouse in the output window to display the shortcut menu.

2. Select [Nondisplay] from the shortcut menu.

  - The output window enters the nondisplay status.

- Set Font

1. Click the right button of the mouse in the output window to display the shortcut menu.

2. Select [Set Font] from the shortcut menu.

   The font selection dialog box (Figure 3.5-2) opens.

3. Select [Font] and [Size], then click the [OK] button.

Figure 3.5-2 Font Setting Dialog Box
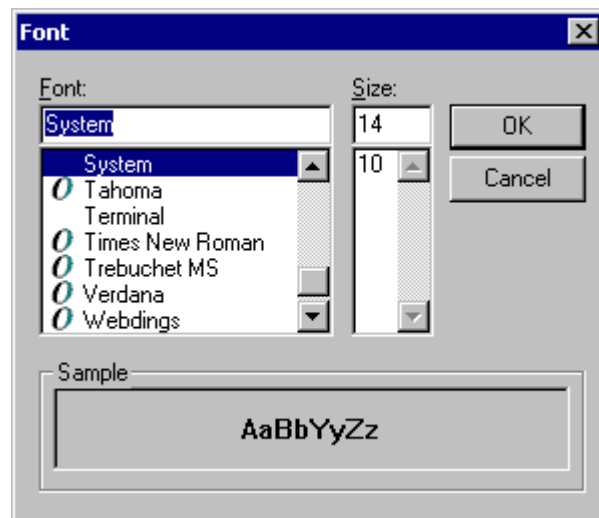
- Highlight Keyword

1. Display the shortcut menu by clicking the right button on the Output window.

2. Select [Keyword Coloring].

  - In the check state, the keyword (error number) of the error message is displayed in red.

- Logging

1. Display the shortcut menu by clicking the right button on the Output window.

2. Select [Logging]-[Start] and then specify the file name of the record target file.
    The result of output to the Output window is recorded in the specified file.

3. To suspend logging, select [Logging]-[Record] and uncheck the checkbox. Logging is restarted again
    when the checkbox is checked.

4. To stop logging, select [Logging]-[Termination].

3.6   Edit Window (Standard Editor)

The edit window is used to display and edit a source file and document file, etc.

■ Edit window

An example of the edit window docked with the Main Window is given in Figure 3.6-1 .

As shown in this example, the edit window docked with the Main Window can be displayed only when the standard editor built into SOFTUNE WORKBENCH is in use.

SOFTUNE WORKBENCH can register and use any external editor. In this case, however, the edit window is not treated as a SOFTUNE WORKBENCH screen.

Figure 3.6-1 Example of Edit Window

Ruler

Line number display

Text editing area

Line selection field

When a read-only file is opened, [Protect] is displayed.

When the Caps key is locked, [CAP] is displayed.

When SOFTUNE WORKBENCH is in the character overwrite editing mode, [Overwrite] is displayed.

The cursor position is displayed in "line:column".
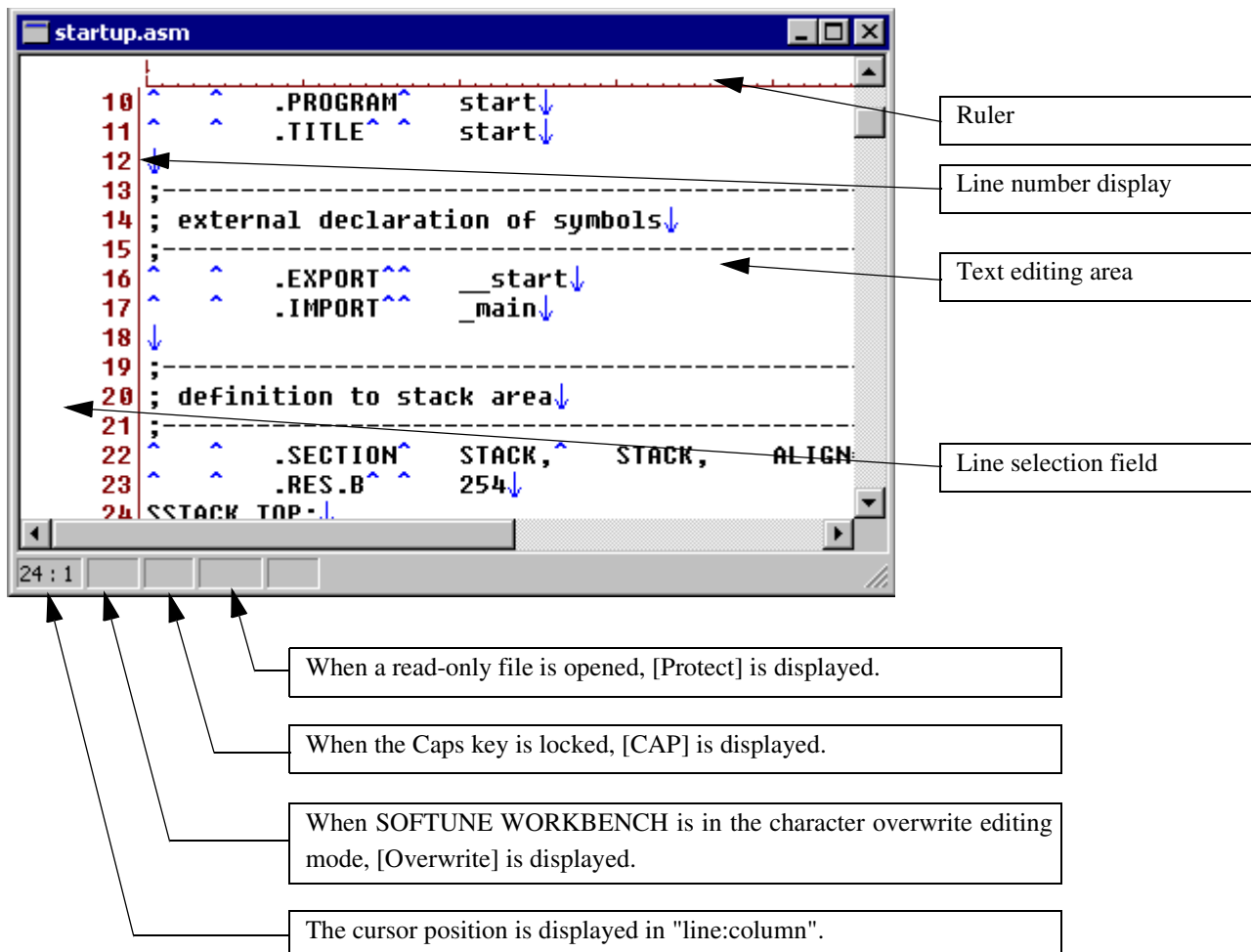
■ Shortcut menu

- Source Window   Opens the Source Window.

- Undo   Undoes the last editing.

- Redo   Redoes the canceled editing.

- Cut   Moves the selected character string to the clipboard.

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- Copy	Copies the selected character string to the clipboard.
- Paste	Pastes the character string in the clipboard to the cursor position.
- Delete	Deletes the selected character string.
- All select	Selects all characters in the buffer.
- Print	Prints the file.
- Add to Project	Adds the file being edited to the active project.
- Find	Opens the character string find dialog box.
- Replace	Opens the character string replacement dialog box.
- Find in Files	See section 4.3.5 Find in Files.
- Jump	Opens the jump line number specification dialog box.
- Tag List	See Section 3.6.1 Tag Jump.
- Set Standard Editor	See Section 3.6.2 Setting Standard Editor.
- Status Bar	Switches status bar display for each window.
- Property	Display file information (properties).

- Source Window

1. Click the right button of the mouse to display the shortcut menu, then select [Source Window] from the menu.

   - When SOFTUNE WORKBENCH is in the debug session, the Source Window is displayed. See Section 3.7 Source Window.

   When SOFTUNE WORKBENCH is not in the debug session, this menu cannot be selected

- Undo

1. Click the right button of the mouse to display the shortcut menu, then select [Undo] from the menu.

   - SOFTUNE WORKBENCH cancels the last editing and undoes the status before the editing. See Section 4.3.1 Undo, Redo.

- Redo

1. Click the right button of the mouse to display the shortcut menu, then select [Redo] from the menu.

   - SOFTUNE WORKBENCH cancels the last editing.

- Cut

1. Select the character string you want to cut.

2. Click the right button of the mouse to display the shortcut menu, then select [Move] from the menu.

   - SOFTUNE WORKBENCH deletes the selected character string from the edit window and moves it to the clipboard. See Section 4.3.2 Cut, Copy, Paste, Delete.

- Copy

1. Select the character string you want to copy.

2. Click the right button of the mouse to display the shortcut menu, then select [Copy] from the menu.

   - SOFTUNE WORKBENCH copies the selected character string to the clipboard. See Section 4.3.2 Cut, Copy, Paste, Delete.

- Paste

1. Move the cursor to the position into which the character string is to be inserted.

2. Click the right button of the mouse to display the shortcut menu, then select [Paste] from the menu.

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- SOFTUNE WORKBENCH inserts the character string in the clipboard into the cursor position. See Section 4.3.2 Cut, Copy, Paste, Delete.

- Delete

1. Select the character string you want to delete.

2. Click the right button of the mouse to display the shortcut menu, then select [Delete] from the menu.

   - SOFTUNE WORKBENCH deletes the selected character string. See Section 4.3.2 Cut, Copy, Paste, Delete.

- All select

1. Click the right button of the mouse to display the shortcut menu, then select [All select] from the menu.

   - SOFTUNE WORKBENCH selects all the texts in the edit window and displays them in reverse video. See Section 4.3.3 All Select.

- Print

1. Click the right button of the mouse to display the shortcut menu, then select [Print] from the menu.

   - The print dialog box opens. See Section 4.2.9 Print.

- Add to Project

1. Click the right button of the mouse to display the shortcut menu, then select [Add to Project] from the menu.

   - SOFTUNE WORKBENCH adds the file being edited to the project.

- Find/Replace

1. Click the right button of the mouse to display the shortcut menu, then select [Find] or [Replace] from the menu.

   - SOFTUNE WORKBENCH sets the clipboard character string in [Find What] and opens the find or replace dialog box. See Section 4.3.4 Find/Replace.

- Find in files

1. Click the right button of the mouse to display the shortcut menu, then select [Find in files] from the menu.

   - SOFTUNE WORKBENCH sets the clipboard character string in [Find What] and opens the [Find in Files] dialog box. See Section 4.3.5 Find in Files.

- Jump

1. Click the right button of the mouse to display the shortcut menu, then select [Jump] from the menu.
   -The dialog box for specifying the jump destination line opens. See Section 4.3.6 Jump.

2. Set the jump destination line number.

3. Click the [OK] button.

- Status Bar

   Status Bar switches status bar display and non-display for each Edit Window.

1. Click the right button of the mouse to display the shortcut menu, then select [Status Bar] from the menu.

   - When the status bar has been already displayed, SOFTUNE WORKBENCH switches status bar display to nondisplay and deletes the check mark from the menu.

   - When the status bar is not displayed, SOFTUNE WORKBENCH displays the status bar and adds a check mark to the left end of the menu.

- Property

1. Click the right button of the mouse to display the shortcut menu, then select [Property] from the list.

   - SOFTUNE WORKBENCH displays file information. See Section 4.3.8 Property.

3.6.1   Tag Jump

This section explains the tag jump function of the standard editor.

■ Tag jump

The standard editor has a function to immediately return control from one place to the tag assigned to the line where the current cursor exists in the edit window. This function is called tag jump.

Several tags can be set.

■ Tag setting procedure

1. Click the right button of the mouse in the edit window to display the shortcut menu.

2. Select [Tag List] from the shortcut menu.
   The tag list dialog box shown in Figure 3.6-2 opens. SOFTUNE WORKBENCH operation (e.g., source file editing) can be continued with the tag list dialog box being open. This is because the tag list dialog box is a modeless dialog box.

3. Move the cursor to the line to which a tag in the Main window is to be assigned.

4. Click the [Add] button from the tag list dialog box.

Figure 3.6-2 Tag List Dialog Box
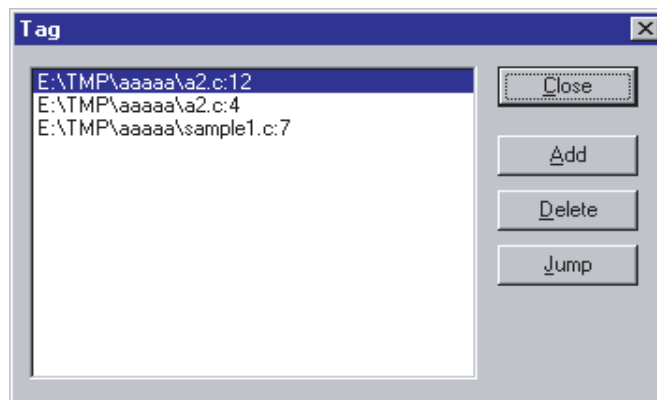
■ Tag deletion procedure

1. Click the right button of the mouse in the edit window to display the shortcut menu.

2. Select [Tag List] from the shortcut menu.
   The tag list dialog box shown in Figure 3.6-2 opens.

3. Select the tag you want to delete.

4. Click the [Delete] button.

■ Tag jump procedure

1. Click the right button of the mouse in the edit window to display the shortcut menu.

2. Select [Tag List] from the shortcut menu.
   The tag list dialog box shown in Figure 3.6-2 opens.

3. Select the tag to which the cursor is to jump.

4. Click the [Jump] button.

3.6.2   Setting Standard Editor

This section explains how to customize the standard editor.

■ Setting the standard editor

Some standard editor functions can be customized.

- Items that can be customized
    - Display fnction
        - Line feed mark display
        - Tag code mark display
        - EOF code mark display
        - Line number display
        - Ruler display
        - Automatic indent function
        - Colored display of C keyword
        - Colored display of ASM keyword
        - Colored display of user keyword
        - Colored display of comment statement
    - Font
    - Tab count
    - Display color
        - Tag
        - Error line
        - C keyword
        - Assembly keyword
        - User keyword
        - Comment statement
        - Line Feed
        - Tab
    - Keyword to be highlighted

■ Customization procedure (display function selection)

1. Click the right button of the mouse in the edit window to display the shortcut menu, then select [Customize...] from the menu.
   The standard editor dialog box shown in Figure 3.6-3 opens.

2. Select the function item you want to set or reset, then click to the left of the item.

3. When not setting other items, click the [OK] button.
   When selecting a color, set all the related items, then click the [OK] button.

■ Customization procedure (display color selection)

1. Click the right button of the mouse in the edit window to display the shortcut menu, then select

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[Customize...] from the menu.

The standard editor dialog box shown in Figure 3.6-3 opens.

2. Click the color button of [Tag], [Error], [C], or [Assembly]. From [View2] tab, you can set a [Comment], [Ret], [Tab], and [User Keyword].

The color dialog box opens.

3. Select a color from the dialog box, then click the [OK] button.

The color of the button changes to the selected color.

4. When not setting other items, click the [OK] button.

When selecting a font, set all the related items, then click the [OK] button.

■ Customization procedure (font selection)

1. Click the right button of the mouse in the edit window to display the shortcut menu, then select [Customize...] from the menu.

The standard editor dialog box shown in Figure 3.6-3 opens.

2. Click the [Font] button.

The font selection dialog box opens.

3. Select a font and size, then click the [OK] button.

4. When not setting other items, click the [OK] button.

When specifying a tab count, set all the related items, then click the [OK] button.

■ Customization procedure (tab count)

1. Click the right button of the mouse in the edit window to display the shortcut menu, then select [Customize...] from the menu.

The standard editor dialog box shown in Figure 3.6-3 opens.

2. Modify the value displayed in the [Tab Count] field.

3. When not setting other items, click the [OK] button.

When selecting a display function, set all the related items, then click the [OK] button.

■ Customization procedure (keyword addition)

1. Click the right button of the mouse in the edit window to display the shortcut menu, then select [Customize...] from the menu.

The standard editor dialog box shown in Figure 3.6-3 opens.

2. Click [View2] tab to choose the keyword type to be changed from the combo box.

Click [Datail...] button.

The keyword dialog box shown in Figure 3.6-5 opens.

3. Enter the keyword to be highlighted in [New Item] field. Click [Add] button.

4. Click the [OK] button.

The keyword files is changed.

5. When not setting other items, click the [OK] button.

When selecting a display function, set all the related items, then click the [OK] button.

■ Customization procedure (deletion of keyword)

1. Click the right button of the mouse in the edit window to display the shortcut menu, then select [Customize...] from the menu.

   The standard editor dialog box shown in Figure 3.6-3 opens.

2. Click [View2] tab to choose the keyword type to be changed from the combo box.

   Click [Datail...] button.

   The keyword dialog box shown in Figure 3.6-5 opens.

3. Choose the keyword to be deleted from the [Keyword List]. Click [Delete] button.

4. Click the [OK] button.

   The keyword files is changed.

5. When not setting other items, click the [OK] button.

   When selecting a display function, set all the related items, then click the [OK] button.

■ Customization procedure (initialization of keyword)

1. Click the right button of the mouse in the edit window to display the shortcut menu, then select [Customize...] from the menu.

   The standard editor dialog box shown in Figure 3.6-3 opens.

2. Click [View2] tab to choose the keyword type to be changed from the combo box.

   Click [Datail...] button.

   The keyword dialog box shown in Figure 3.6-5 opens.

3. Click [Reset] button.

4. Click the [OK] button.

   The keyword files is changed.

5. When not setting other items, clock the [OK] button.

   When selecting a display function, set all the related items, then click the [OK] button.

Figure 3.6-3 Standard Editor Dialog Box
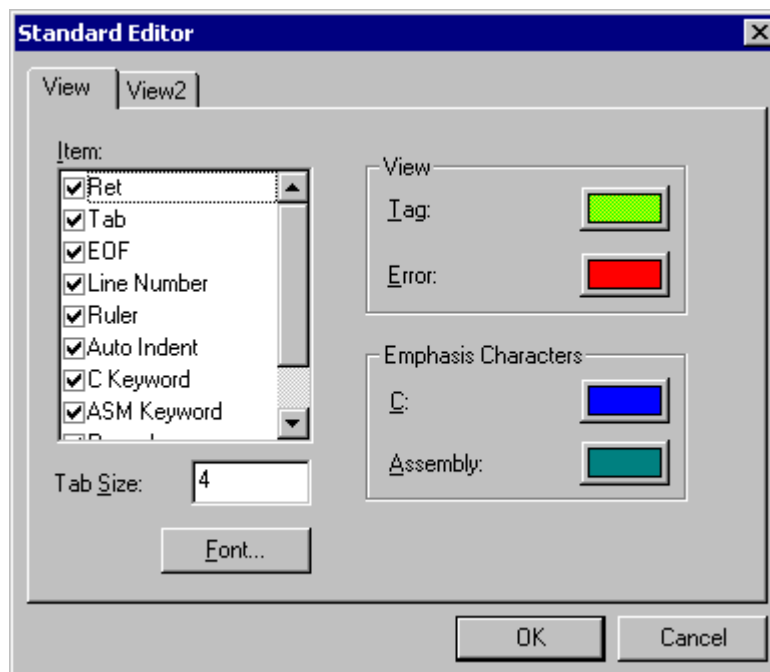
Figure 3.6-4 Standard Editor Dialog Box (View2)
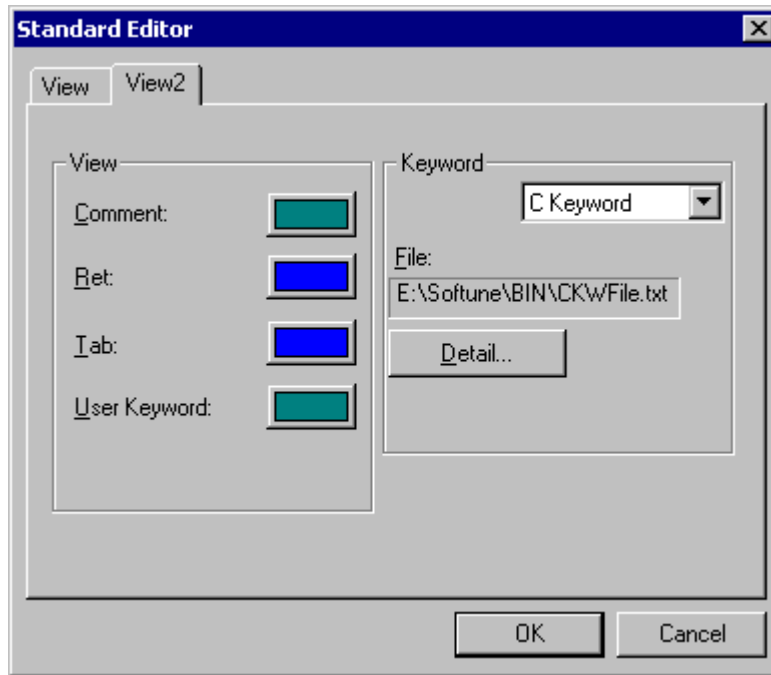
Figure 3.6-5 Keyword Dialog Box
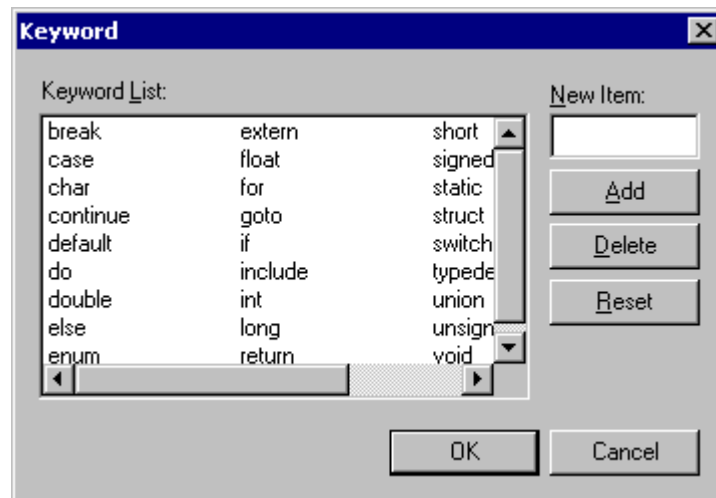
3.7   Source Window

The Source Window displays the source program at debugging.

■ Source Window

Figure 3.7-1 is an example of the Source Window.

■ Function

- Breakpoint setting/releasing

A breakpoint can be set or released by left-clicking '=>○' of '○' at the left edge of the Source Window.

- Instruction execution to specified line (address)

An instruction can be executed at the specified line (address) by left-clicking of '=>○' of '○' at the left edge of the Source Window. Step execution (step/into) is also enabled by clicking the left mouse button at the PC location.

Figure 3.7-1 Example of Source Window
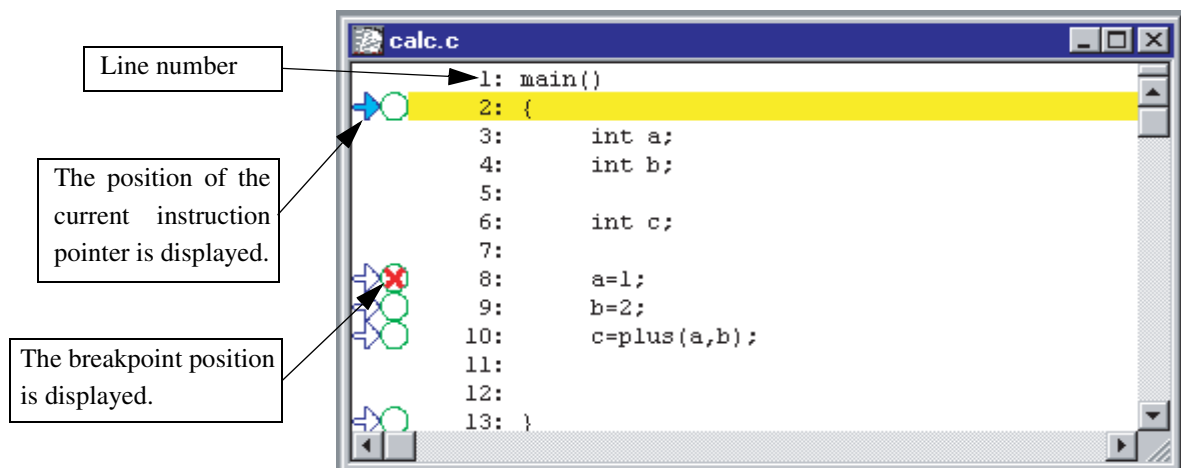
■ Shortcut Menu

- Edit	Opens the edit window.
- Inline Assembly	Opens the Inline Assemble dialog box.
- Find	Opens the Find dialog box Figure 3.7-2 .
- Jump	Displays Jump Dialog Box.
- Go to Current	Displays current PC location.
- Break	See Section 4.6.4 Break Point.
- Watch	Additionally sets watch point
- Stack	See Section 4.6.7 Stack.
- Property	Displays Window properties.
- Mixed Display	Switches whether to display or not disassemble list.
- Close	Closes Source Window.

- Edit

  Opens the edit window to modify the current source file.

  See Section 3.6 Edit Window (Standard Editor).

- Find

  Find the current source file for a character string. Perform this operation in the following procedure:

1. Click the right button of the mouse in the Source Window to display the shortcut menu, then select [Find] from the menu.
   The search dialog box shown in Figure 3.7-2 opens.

2. Set the character string you want to find.

3. Set a find direction.

4. If necessary, display a check mark to the left of [Distinguish Uppercase from Lowercase].

5. Click the [Find Next] button.
   The fond character string is displayed in reverse video.

6. To terminate search, click the [Cancel] button.

Figure 3.7-2 Find Dialog Box in Source Window
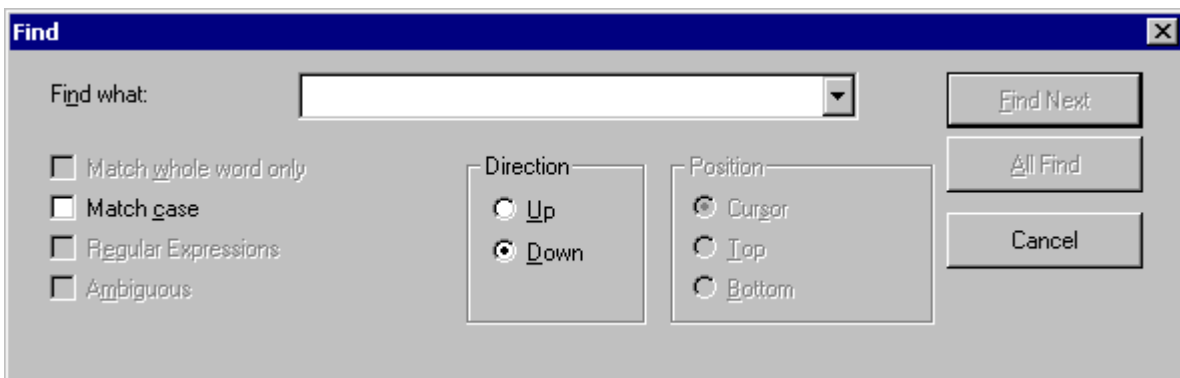
- Jump

  Specifies where in the source window the source program is to be displayed. Perform this operation in the following procedure:

1. Click the right button of the mouse in the Source Window to display the shortcut menu, then select [Jump] from the menu. See Section 4.3.6 Jump.

2. Select a specification format.

3. Specify a cursor display position.

4. Click the [OK] button.

- Watch

  Specifies the variable to watch and opens the watch window. Perform this operation in the following procedure:

1. Click the right button of the mouse in the Source Window to display the shortcut menu, then select [Watch] from the menu. See Section 4.4.7 Watch.

2. Specify a variable name.

3. Select a [mode] as required.

4. Click the [OK] button.

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- Property

1. Click the right button of the mouse to display the shortcut menu, then select [Property] from the menu.

    - File information is displayed see Section 4.3.8 Property.

- Mixed Display

1. Click the right button of the mouse to display the shortcut menu.

2. Check [Mixed Display].
    When a check mark is displayed to the left of [Mixed Display], mixed display has been already set.
    When a check mark is not displayed to the left of [Mixed Display], mixed display has not been set yet.

3. Select [Mixed Display].
    - When it has been already set, mixed display is reset and the check mark is deleted.
    - When it has not been set, mixed display is set and a check mark is displayed.

3.8   Symbol Window

The Symbol Window displays the target file name of the current project and the symbol names (e.g., variable name and function name) being used by the file in the tree view format.

■ Symbol Window

Figure 3.8-1 is an example of the Symbol Window.

Figure 3.8-1 Example of Symbol Window

The load module name is displayed.

The global symbol and the function name is displayed.

The local symbol name defined in the function is displayed.

Module name is displayed.

The local symbol and function name (static) in the module is displayed.
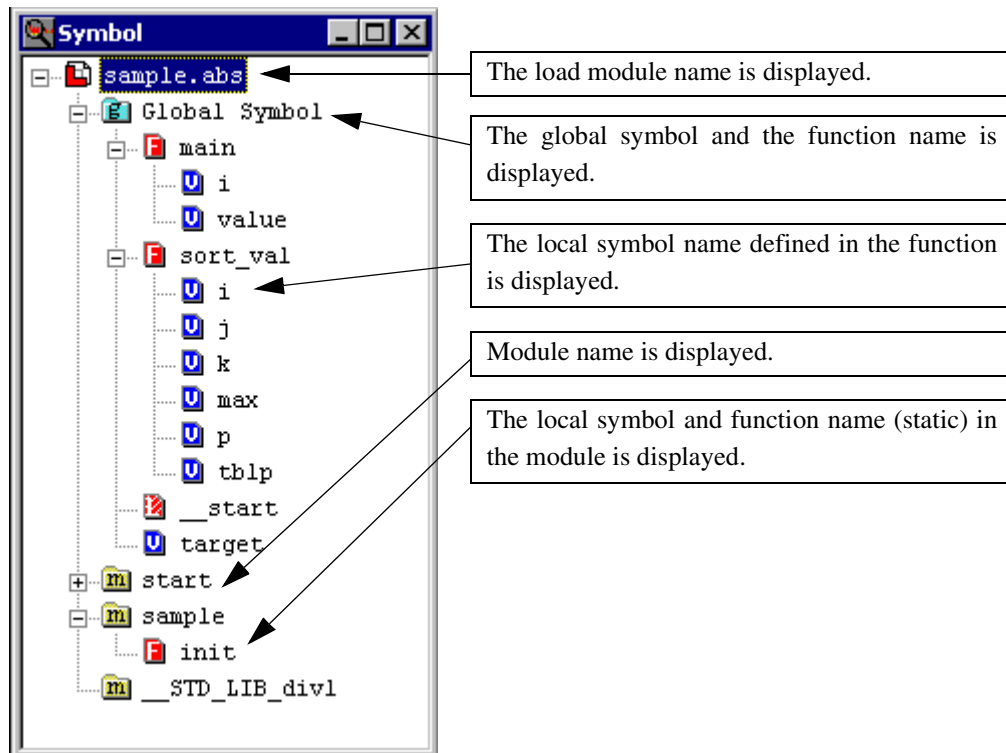
■ Shortcut Menu

Jump	Opens the Source Window of the specified function.
Watch	Sets specified symbol as watch point.
Break	See Section 4.6.4 Break Point.
Property	Displays symbol properties.
Mangle name	Specify whether to display a symbol name as a mangled name.
Refresh	The latest symbol information is displayed.
Close	Closes Symbol Window.

- Jump

1. Click the right button of the mouse on the function name to display the shortcut menu, then select [Jump] from the menu.

   The source window in which the function is defined opens.

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- Watch

1. Click the right button of the mouse on the variable or function name to display the shortcut menu, then select [Watch] from the menu. The variable or function is added to the watch and the Watch Window is displayed.

- Property

1. Click the right button of the mouse to display the shortcut menu, then select [Property] from the menu.

    File information is displayed see Section 4.3.8 Property.

- Mangle name

1. Click the mouse right button to open the shortcut menu and select [Mangled name]. Switch between display and non-display of a symbol name as a mangled name.

- Refresh window

1. Click the mouse right button to open the shortcut menu and select [Refresh window]. The latest symbol information is displayed.

3.9　Disassemble Window

The Disassemble window displays the result obtained by executing disassembling at the specified address. This window is displayed only when SOFTUNE WORKBENCH is in the debug session.

■ Disassemble Window

Example the Disassemble Window displays at Figure 3.9-1 .

■ Function

- Breakpoint setting/releasing

A breakpoint can be set or released by left-clicking '=>○' of '○' of at the left edge of the Disassemble Window.

- Instruction execution at specified line (address)

An instruction can be executed at the specified line (address) by left-clicking of '=>○' of '○' at the left edge of the Disassemble Window. Step execution (step/into) is also enabled by clicking the left mouse button at the PC location.

Figure 3.9-1 Disassemble Window

The position of the current instruction pointer is displayed.

The position at which the breakpoint is set is displayed.

An address is displayed.

A machine code is displayed.

A mnemonic is displayed.

An operand is displayed.

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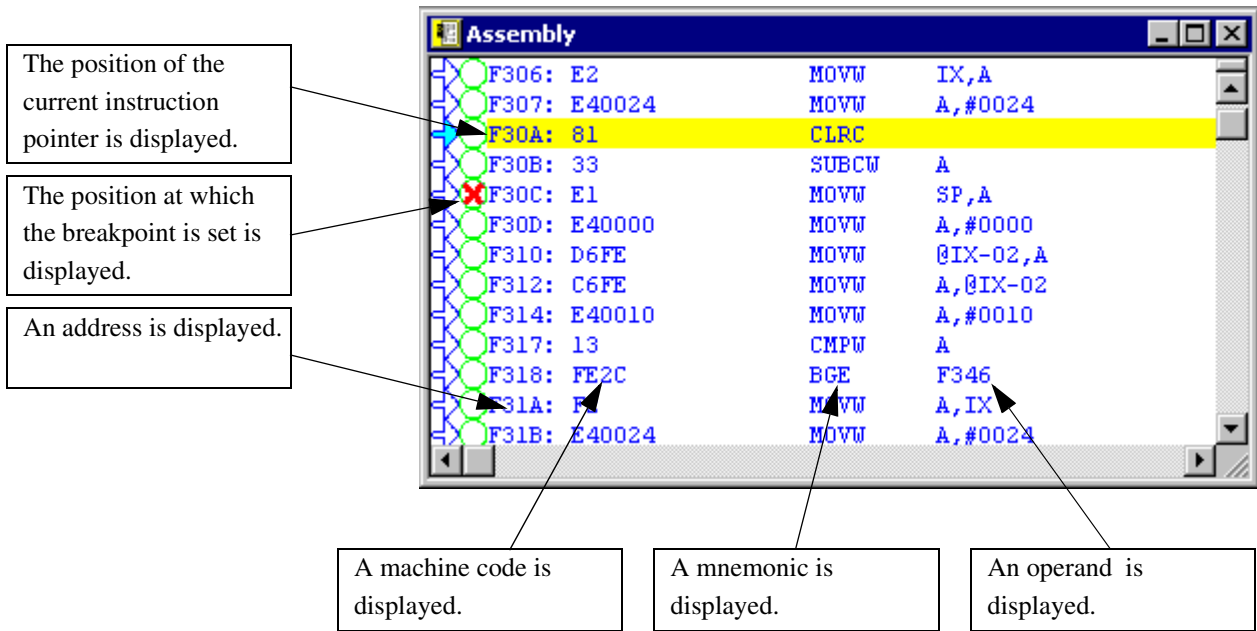
■ Shortcut Menu

Inline Assemble	See Section 4.4.3 Assembly.
Jump	Displays Jump Dialog Box.
Go to Current	Displays current PC location.
Break	See Section 4.6.4 Break Point.
Watch	See Section 4.4.7 Watch.
Stack	See Section 4.6.7 Stack.
Close	Closes Disassemble Window.

- Jump

Specifies where in the Disassemble Window the cursor is to be displayed. Perform this operation in the following procedure:

1. Click the right button of the mouse in the Disassemble Window to display the shortcut menu, then select [Jump] from the menu. See Section 4.3.6 Jump.

2. Select a specification format.

3. Specify a cursor display position.

4. Click the [OK] button.

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3.10   Register Window

The Register Window is used to display and modify MCU register values during debugging. This window is displayed only when SOFTUNE WORKBENCH is in the debug session.

■ Register Window

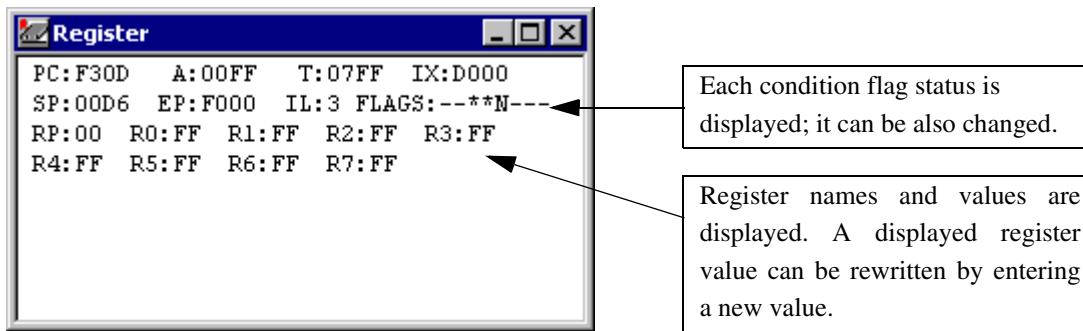Figure 3.10-1 is an example of the Register Window. When debugging, the Register Window displayed the register values. Register values can be rewritten directly. To rewrite values using expressions and symbols, etc., select [Edit] from the shortcut menu for the Register Window.

Arrange registers according to the size of the Register Window.

To select the registers to be displayed, select [Display Setup] from the shortcut menu for the Register Window.

Figure 3.10-1 Example of Resister Window

Each condition flag status is displayed; it can be also changed.

Register names and values are displayed. A displayed register value can be rewritten by entering a new value.

■ Shortcut Menu

- Setup   Setup See Section 3.10.1 Setting Register Display.

- Edit   Displays Register Edit Dialog Box.

- Close   Closes Register Window.

- Edit

Edits register values. Beside this operation, the numerical values displayed in the Register Window can be directly edited. See Section 4.4.4 Register.

1. Click the right button of the mouse in the Register Window to display the shortcut menu, then select [Edit] from the menu.
   The register edit dialog box opens.

2. Select a register name.

3. Enter the value you want to set.
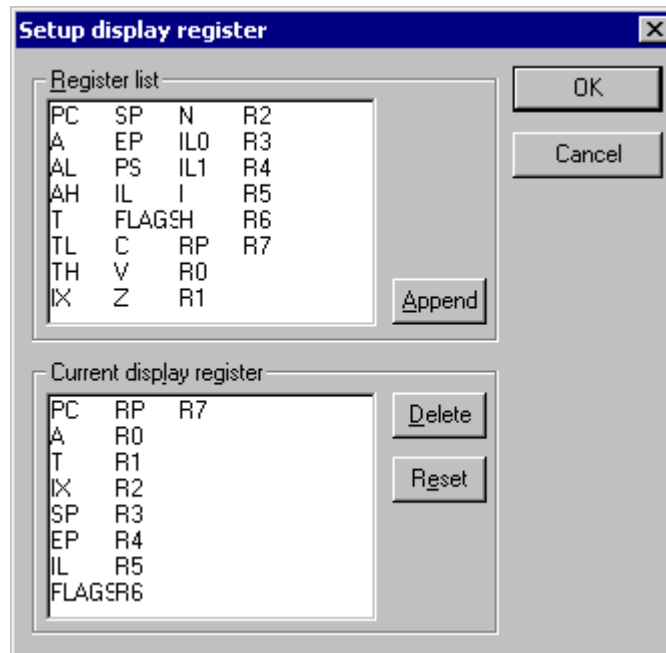
4. Click the [OK] button.

3.10.1   Setting Register Display

This section explains how to set register display.

■ Setting register display

Set the registers to be displayed in the Register Window in the following procedure:

Figure 3.10-2 Display Register Setting Dialog Box

■ Adding registers

Add the register you want to display in the following procedure:

1. Click the right button of the mouse in the Register Window to display the shortcut menu, then select [Display Setup] from the menu.
   The display setting dialog box shown in Figure 3.10-2 opens.

2. Select the register you want to display from [Register List] (upper part of display register setting dialog box), then click the [Add] button.
   The selected register is set in [Current Display Register] (lower part).

3. Set all the registers you want to display by repeating the above operation.

4. Click the [OK] button.

■ Deleting registers

Select the register you want to delete in the following procedure:

1. Click the right button of the mouse in the Register Window to display the shortcut menu, then select [Display Setup] from the menu.
   The display setting dialog box shown in Figure 3.10-2 opens.

2. Select the register you want to delete from [Register List] (lower part of display register setting dialog box), then click the [Delete] button.

The selected register is deleted from [Current Display Register] (lower part).

3. Set all the registers you want to delete by repeating the above operation.

4. Click the [OK] button.

■ Restoring registers to the initial status

Restore the registers in [Current Display Registers] to the initial status (status when SOFTUNE WORKBENCH was installed) in the following procedure:

1. Click the right button of the mouse in the Register Window to display the shortcut menu, then select [Display Setup] from the menu.
The display setting dialog box shown in Figure 3.10-2 opens.

2. Click the [Reset] button.
The registers in [Current Display Registers] (lower part of display register setting dialog box) are restored to the initial status.

3. Click the [OK] button.

3.11   Memory Window

The Memory Window is used to display and modify memory data at the specified address. This window opens only when SOFTUNE WORKBNCH is in the debug session.

■ Memory Window

Figure 3.11-1 is an example of the Memory Window. When debugging, the Memory Window is displayed the memory values. Memory values can be directly rewritten.

To modify by specifying the expression and symbol in the memory values, select [Display Setup] from the shortcut menu for the Memory Window.

Figure 3.11-1 Example of Memory Window
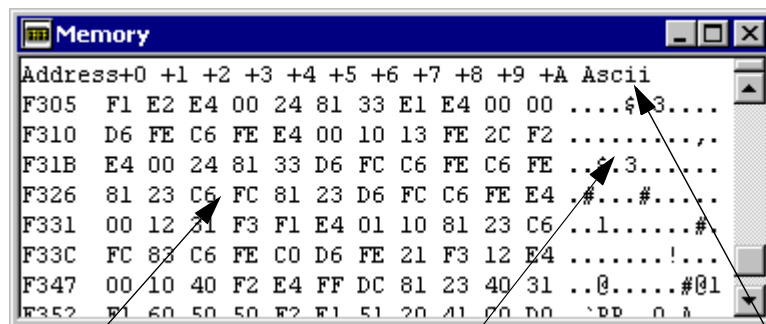
Data display section. Displayed data can be directly modified.

Characters (e.g., control codes) other than ASCII characters are all represented in '.'.

Column title. This line is not scrolled.

■ Shortcut Menu

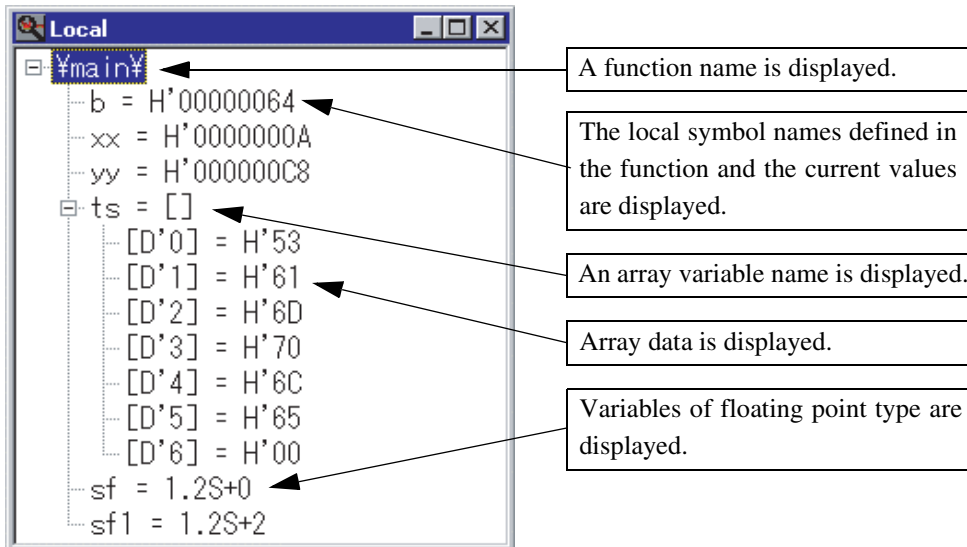|	
- Compare	See Section 4.4.5 Memory.
- Find	See Section 4.4.5 Memory.
- Special	See Section 4.4.5 Memory.
- Inline Assemble	See Section 4.4.3 Assembly.
- Jump	See Section 4.3.6 Jump.
- Edit	See Section 4.4.5 Memory.
- Setup	See Section 4.4.5 Memory.
- Break	See Section 4.6.4 Break Point.
- Event	See Section 4.6.5 Event.
- Watch	See Section 4.4.7 Watch.
- Monitoring	Switches whether to enable or disable monitoring.
- Close	Closes the Memory Window.

3.12   Local Variable Window

The Local Variable Window is used to display and modify local variable values. This window is displayed only when SOFTUNE WORKBENCH is in the debug session. Local variables are displayed in the tree format (function name root).

■ Local Variable Window

Figure 3.12-1 is an example of the Local Variable Window.

Figure 3.12-1 Example of Local Variable Window

A function name is displayed.

The local symbol names defined in the function and the current values are displayed.

An array variable name is displayed.

Array data is displayed.

Variables of floating point type are displayed.

■ Shortcut Menu

- Radix   See Section 4.4.6 Local.

- Element   See Section 4.4.6 Local.

- Edit   See Section 4.4.6 Local.

- Memory Window   Display the Memory Window based on a selected variable as a start address.

- Property   Displays symbol properties.

- Close   Closes Local Window.

- Property

1. Click the right button of the mouse on a displayed variable name to display the shortcut menu, then select [Property] from the menu.
   Information for the variable is displayed. For details, see Section 4.3.8 Property.

2. Click the [Close] button.
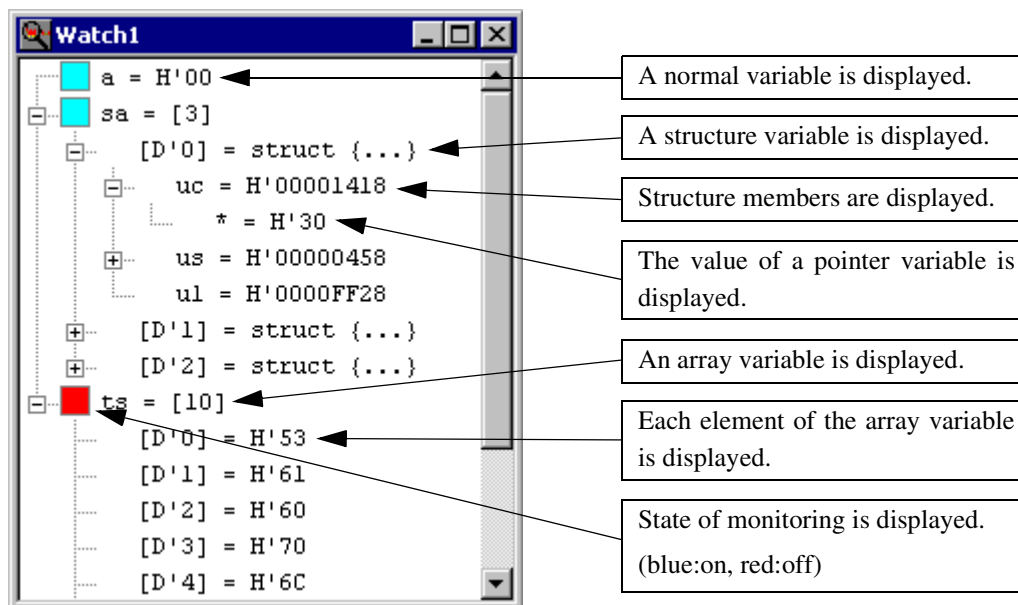
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3.13   Watch Window

The Watch Window is used to display and modify the values of the specified variables. This window is displayed only when SOFTUNE WORKBENCH is in the debug session. Variables are displayed in the tree format.

■ **Watch Window**

The Watch Window can be opened independent 4-windows. When being registered a variable for each window, user select watch window number (1,2,3 or 4).

Figure 3.13-1 is an example of the Watch Window.

Figure 3.13-1 Example of Watch Window

A normal variable is displayed.

A structure variable is displayed.

Structure members are displayed.

The value of a pointer variable is displayed.

An array variable is displayed.

Each element of the array variable is displayed.

State of monitoring is displayed. (blue:on, red:off)

■ **Shortcut Menu**

- Radix	See Section 4.4.7 Watch.
- Setup	See Section 4.4.7 Watch.
- Element	See Section 4.4.7 Watch.
- Edit	See Section 4.4.7 Watch.
- Delete	See Section 4.4.7 Watch.
- All Delete	See Section 4.4.7 Watch.
- Memory window	Display the Memory Window based on a selected variable as a start address.
- Monitoring	Switches whether to enable or disable monitoring.
- Individual setting	The each variable which is registered, user sets "ON" or "OFF" of monitoring. User distinguishes between "ON" and "OFF" by a color of square ICON. A blue means on, and a red means off.
- Property	Displays watch properties.

- Close   Closes Watch Window.

- Property

1. Click the right button of the mouse on a displayed variable name to display the shortcut menu, then
    select [Property] from the menu.
    Information for the variable is displayed. For details. See Section 4.3.8 Property.
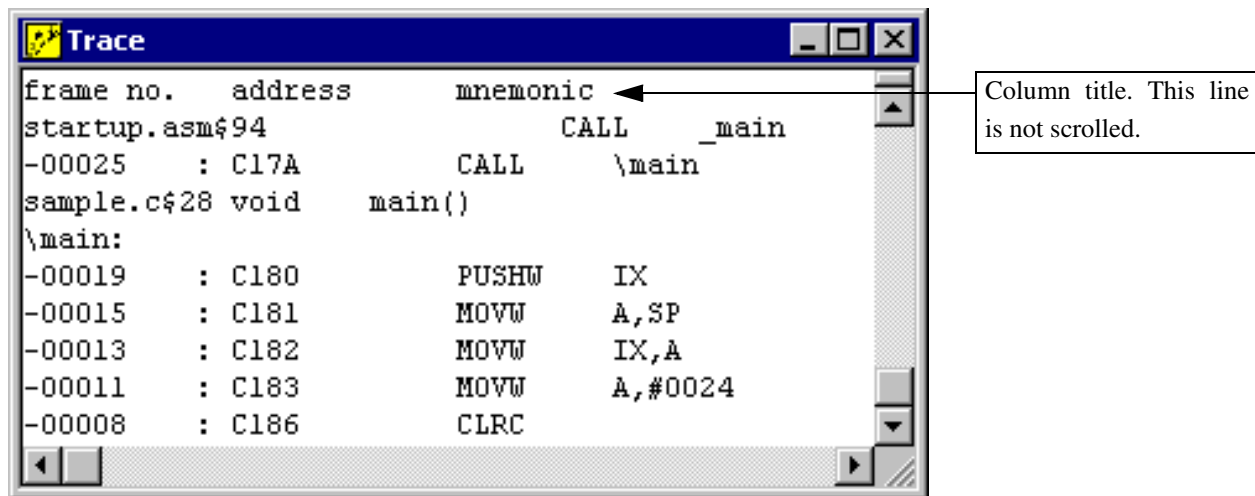
2. Click the [Close] button

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3.14   Trace Window

This section explains the Trace Window. This window is displayed only when SOFTUNE WORKBENCH is in the debug session.

■ Trace Window

The Trace Window displays the trace result. For the trace function, see Section 4.4.8 Trace. Figure 3.14-1 is an example of the Trace Window

Figure 3.14-1 Example of Trace Window

```
Trace                                           _ □ ×
frame no.    address       mnemonic      ◄────   Column title. This line
startup.asm$94                CALL    _main        is not scrolled.
-00025    : C17A       CALL     \main
sample.c$28 void     main()
\main:
-00019    : C180       PUSHW    IX
-00015    : C181       MOVW     A,SP
-00013    : C182       MOVW     IX,A
-00011    : C183       MOVW     A,#0024
-00008    : C186       CLRC
```

■ Shortcut Menu

- Refresh	Refresh Trace Window.
- Jump	See Section 4.3.6 Jump.
- Back Trace	See Section 4.4.8 Trace.
- Instruction	Displays trace result in instruction mode (Valid when the emulator debugger is used).
- Cycle	Displays trace result in cycle mode (Valid when the emulator or simulator debugger is used).
- Source	Displays trace result in source mode (Valid when the emulator or simulator debugger is used).
- Setup	See Section 4.4.8 Trace.
- Find	See Section 4.4.8 Trace.
- Save	Saves Trace data.
- Clear	Clears trace buffer.
- Close	Closes Trace Window.

- Instruction/cycle/source

1. Click the right button of the mouse to display the shortcut menu.

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2. Select [Instruction], [Cycle], or [Source] from the shortcut menu.
   - The trace result is displayed in the selected mode and a check mark is displayed to the left of the selected submenu.

3.15   Command Window

The Command Window displays the execution result of the directly entered debugger command. This window is displayed only when SOFTUNE WORKBENCH is in the debug session.

■ Command Window

Figure 3.15-1 is an example of the Command Window.

Figure 3.15-1 Example of Command Window

| The execution result of the entered command is displayed. |
| The entered command is executed. |
| Enter a debugger command from here. |
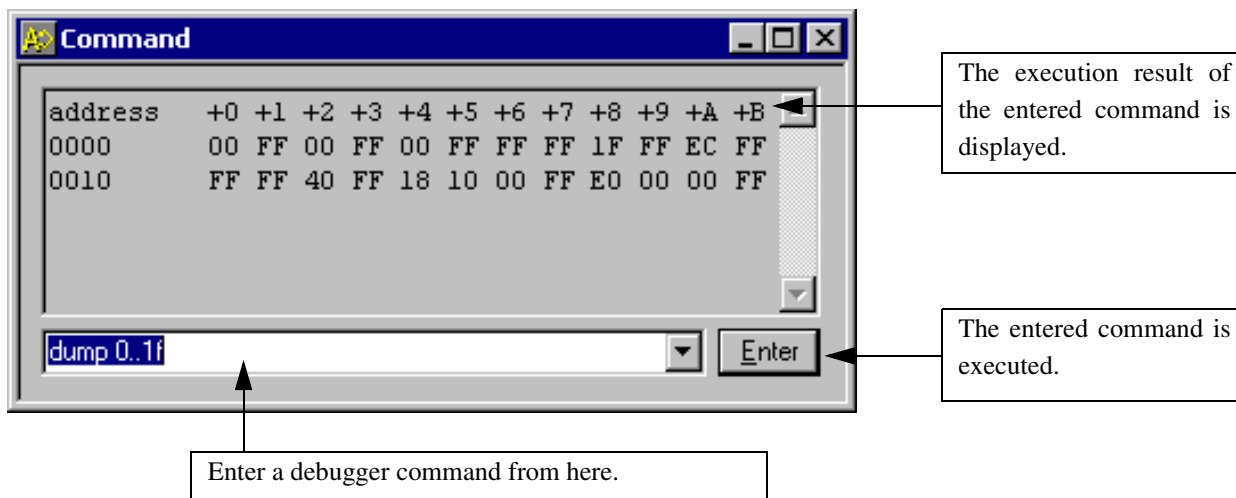
■ Shortcut Menu (Command input field)

- Undo	Cancels the immediately preceding editing.
- Cut	Moves the selected character string to the clipboard.
- Copy	Copies the selected character string to the clipboard.
- Paste	Pastes the character string in the clipboard.
- Delete	Deletes the selected character string.
- All select	Selects all the entered character strings.

- Undo

1. Click the right button of the mouse on the command input field to display the shortcut menu.

2. Select [Undo] from the shortcut menu.

- Cut

1. Select the character string you want to cut.

2. Click the right button of the mouse on the command input field to display the shortcut menu.

3. Select [Cut] from the shortcut menu.

- Copy

1. Select the character string you want to copy.

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2. Click the right button of the mouse on the command input field to display the shortcut menu.

3. Select [Copy] from the shortcut menu.

- Paste

1. Click the right button of the mouse on the command input field to display the shortcut menu.

2. Select [Paste] from the shortcut menu.

- Delete

1. Select the character string you want to delete.

2. Click the right button of the mouse on the command input field to display the shortcut menu.

3. Select [Delete] from the shortcut menu.

- All select

1. Click the right button of the mouse on the command input field to display the shortcut menu.

2. Select [All select] from the shortcut menu.

■ Shortcut Menu (Other than the command input field)

- Load Batch File	Opens the file dialog box for specifying the batch file.
- Load Alias File	Opens the file dialog box for specifying the alias file.
- Macro etc	Displays Command Replacement Dialog Box.
- Logging	Sets log start, log status display and log end.
- Close	Closes Command Window.

- Load Batch File

1. Click the right button of the mouse to display the shortcut menu.

2. Select [Load Batch File] from the shortcut menu.
    The [Open File] file dialog box opens.

3. Select a batch file from the dialog box, then click the [Open] button.

- Load Alias File

1. Click the right button of the mouse to display the shortcut menu.

2. Select [Load Alias File] from the shortcut menu.
    The [Open File] file dialog box opens.

3. Select an alias file from the dialog box, then click the [Open] button.

- Macro etc

1. Click the right button of the mouse to display the shortcut menu.

2. Select [Macro etc] from the shortcut menu.
    The [Replace command] dialog box opens. For details, see Section 3.15.1 Setting Character String
    Replacement.

- Logging

   For logging, see Section 3.15.2 Logging.

- Close

1. Click the right button of the mouse to display the shortcut menu.

2. Select [Close] from the shortcut menu.

3.15.1   Setting Character String Replacement

This section explains how to set character string replacement in the Command Window.

■ Setting Character String Replacement

The aliases, variables, and macro names of the commands used in the Command Window can be defined.

■ Alias

The commands to be used often can be started simply by specifying their names. Set and delete aliases in the following procedures:

- Adding an alias

1. Click the right button of the mouse in the Command Window to display the shortcut menu.

2. Select [Macro etc] from the shortcut menu.
   The character string replacement setting dialog box shown in Figure 3.15-2 opens.

3. Set an alias.
   Specify the alias that does not conflict with command names and the aliases that has been already registered.

4. Write the command to be assigned to the specified alias.
   The command can be written, including its parameters.
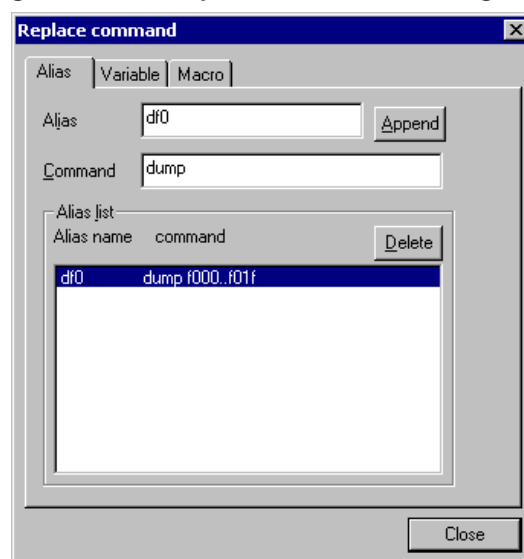
5. Click the [Append] button.

- Deleting an alias

1. Click the right button of the mouse in the Command Window to display the shortcut menu.

2. Select [Macro etc] from the shortcut menu.
   The character string replacement setting dialog box shown in Figure 3.15-2 opens.

3. Select the alias to be deleted from the alias list.

4. Click the [Delete] button.

Figure 3.15-2 Replace Command Dialog Box

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■ Variable

The name assigned to the address range to be referenced often can be used for command input. Add and delete a variable in the following procedures.

- Adding a variable

1. Click the right button of the mouse in the Command Window to display the shortcut menu.

2. Select [Macro etc] from the shortcut menu.
   The character string replacement setting dialog box shown in Figure 3.15-2 opens.

3. Click the [Variable] tag.
   The variable setting dialog box shown in Figure 3.15-3 opens.

4. Set a variable.
   Specify the variable name that does not conflict with the variable names that have been already registered.

5. Write the character string to be assigned to the specified variable name.

6. Click the [Append] button.

- Deleting a variable

1. Click the right button of the mouse in the Command Window to display the shortcut menu.

2. Select [Macro etc] from the shortcut menu.
   The character string replacement setting dialog box shown in Figure 3.15-2 opens.
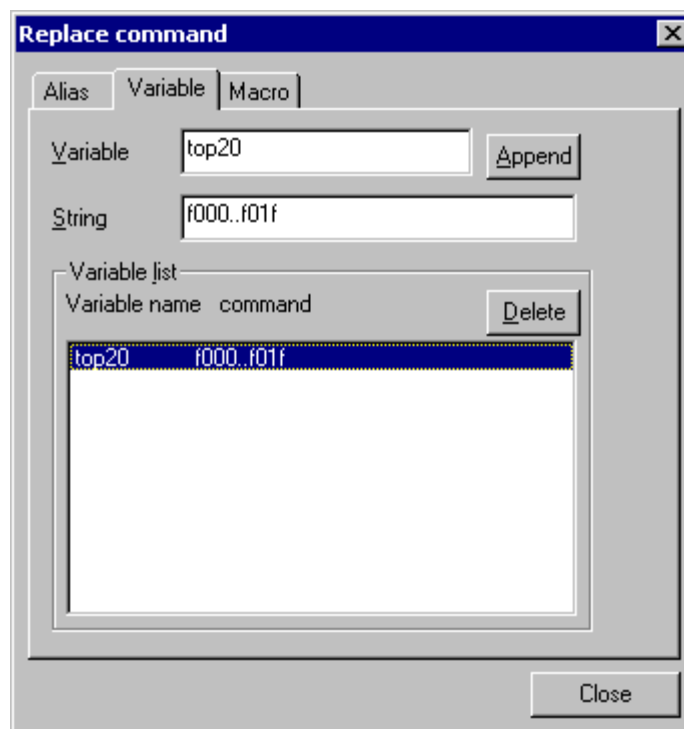
3. Click the [Variable] tag.
   The variable setting dialog box shown in Figure 3.15-3 opens.

4. Select the variable name to be deleted from the debug variable list.

5. Click the [Delete] button.

Figure 3.15-3 Variable Setting Dialog Box

■ Macro

A combination of the special commanads to be used often can be named and used as a macro. Add and delete a macro in the following procedures:

- Adding a macro

1. Click the right button of the mouse in the Command Window to display the shortcut menu.

2. Select [Macro etc] from the shortcut menu.
   The character string replacement setting dialog box shown in Figure 3.15-2 opens.

3. Click the [Macro] tag.
   The macro setting dialog box shown in Figure 3.15-4 opens.

4. Set a macro name.
   Specify a macro name that does not conflict with the macro names that have been already registered.

5. Write the commands to be assigned to the specified macro name.
   Aliases, variables, and other macros can be also written.

6. Click the [Append] button.

- Deleting a macro

1. Click the right button of the mouse in the Command Window to display the shortcut menu.

2. Select [Macro etc] from the shortcut menu.
   The character string replacement setting dialog box shown in Figure 3.15-2 opens.
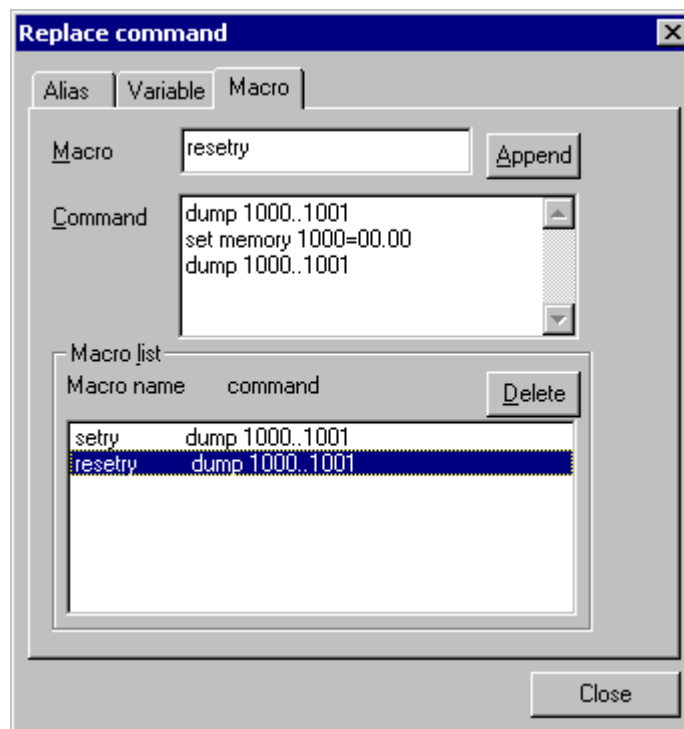
3. Click the [Macro] tag.
   The macro setting dialog box shown in Figure 3.15-4 opens.

4. Select the macro name to be deleted from the macro list.

5. Click the [Delete] button.

Figure 3.15-4 Macro Setting Dialog Box

3.15.2   Logging

This section explains SOFTUNE WORKBENCH logging.

■ Logging

To record a command execution log in the Command Window in a file is called logging. To control logging, click the right button of the mouse in the Command Window to display the shortcut menu, then select [Logging].

Selecting [Logging] from the shortcut menu displays the following submenus:

- Start

- State

- Exit

- Start

1. Click the right button of the mouse to display the shortcut menu.

2. Select [Start] from the shortcut menu.
     The file dialog box for selecting a logging file opens.

3. Specify a logging file name, then click the [Save] button.

- State

1. Click the right button of the mouse to display the shortcut menu.

2. Select [State] from the shortcut menu.
     The logging state display dialog box shown in Figure 3.15-5 opens.

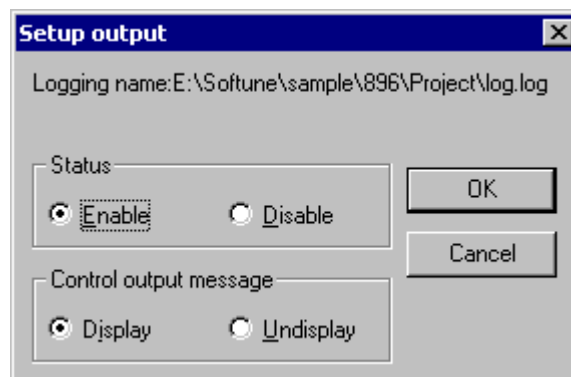3. If necessary, change the state and output message control.

4. Click the [OK] button.

- Exit

1. Click the right button of the mouse to display the shortcut menu.

2. Select [Exit] from the shortcut menu.

### Figure 3.15-5 Logging State Display Dialog Box

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3.16   Object Window

The Object Window displays the object information used by REALOS. This window is displayed only when SOFTUNE WORKBENCH is in the debug session.

■ Object Window

The Object Window displays the object information used by REALOS.

Figure 3.16-1 is an example of the Object Window.

Figure 3.16-1 Example of Object Window

An object is selected.

Information for the selected object is displayed.
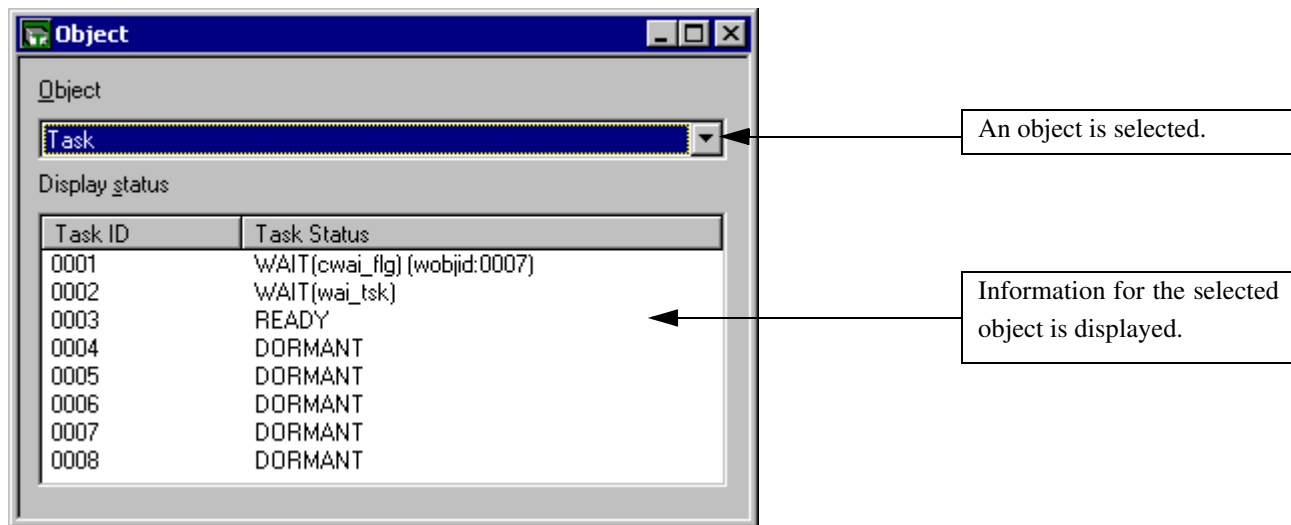
■ Object/State Display

Object	Status display
Task	Task ID, task state
Semaphore	Semaphore ID, count of semaphores
Flag (1-bit flag)	Flag ID, SET or CLEAR
Mail box	Mail box ID, count of message queues, count of tasks
Cyclic handler	Handler ID, active state (residual time till activation)
Ready queue	Priority, count of tasks
Timer queue	Task ID or cyclic handler ID

■ Shortcut Menu

- Task	Executes task system calls
- Semaphore	Executes semaphore system calls
- Event Flag	Executes event flag system calls
- Mail Box	Executes mail box system calls
- Ready Queue	Executes ready queue system calls
- Cyclic Handler	Executes the system calls related to the cyclic handler.
- Monitoring	Switches whether to enable or disable monitoring
- Property	Displays object properties
- Close	Closes Object Window

For details on the above items, see Section 4.4.11 Object.

3.17　Coverage Window

The Coverage Window displays the coverage measurement result. This window is displayed only when SOFTUNE WORKBENCH is in the debug session.

■ Coverage Window

Figure 3.17-1 is an example of the Coverage Window. The Coverage Window displays the coverage measurement result at debugging. This window is displayed only in MB2141 (emulator).

For details on the coverage function, see Section 4.4.12 Coverage.
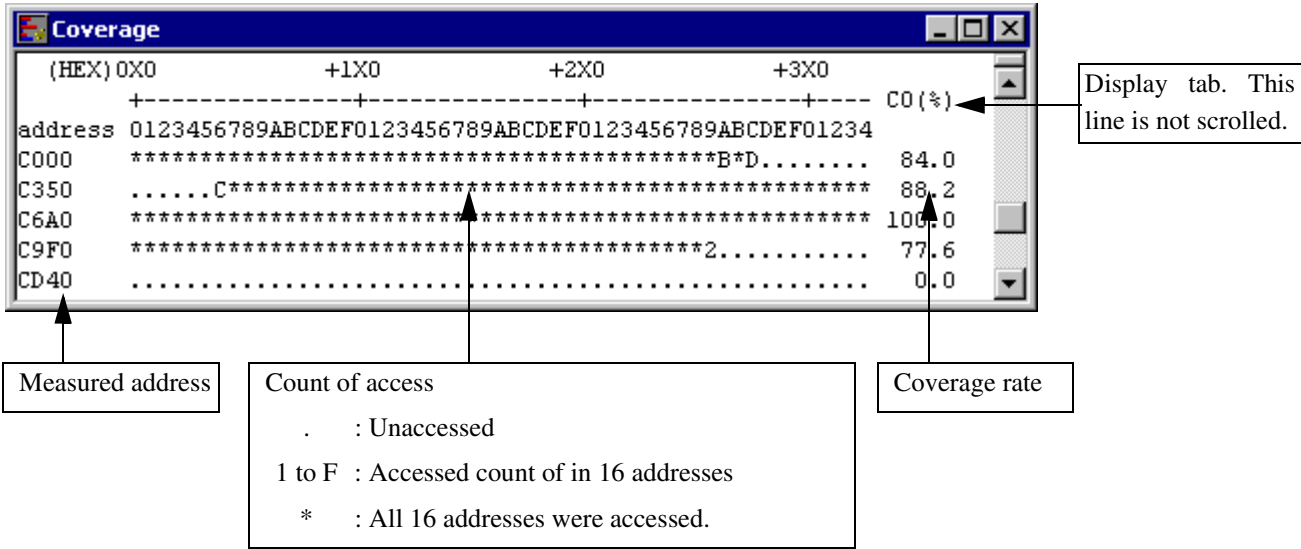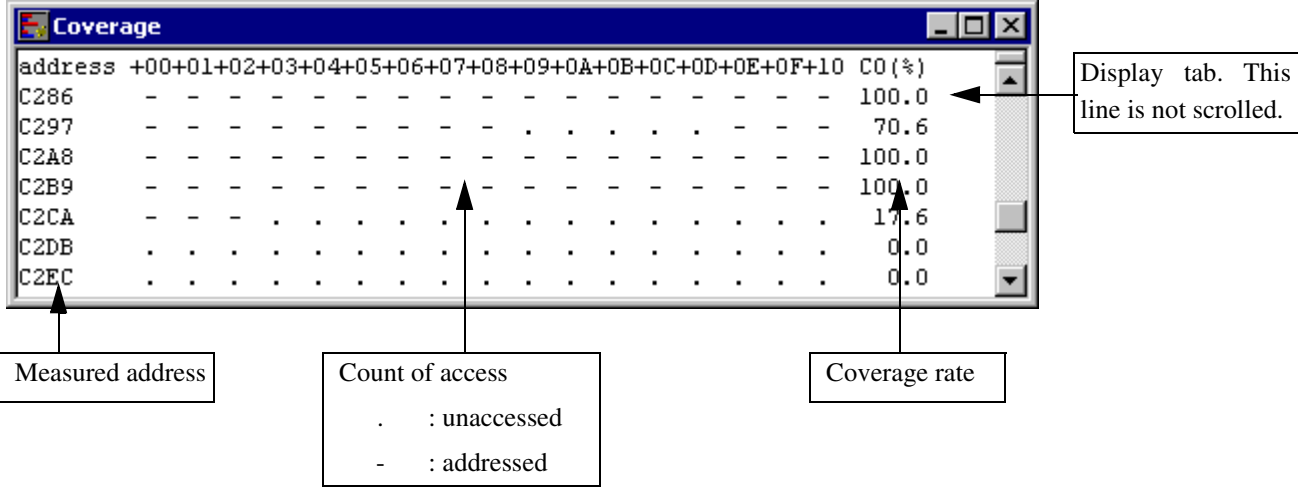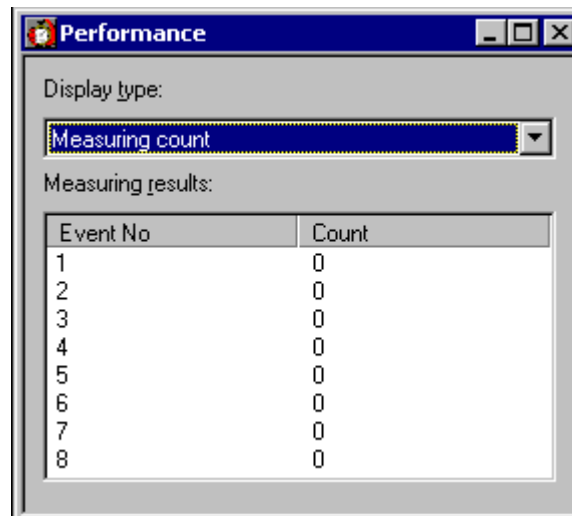
Figure 3.17-1 Coverage Window (16-Address Unit)

```
 Coverage                                                        _ □ ×
   (HEX)0X0          +1X0            +2X0            +3X0
        +---------------+---------------+---------------+----  C0(%)
address 0123456789ABCDEF0123456789ABCDEF0123456789ABCDEF01234
C000    *****************************************B*D........   84.0
C350    ......C*****************************************      88.2
C6A0    ************************************************     100.0
C9F0    ********************************************2.........  77.6
CD40    ...................................................    0.0
```

Display tab. This line is not scrolled.

Measured address

Count of access

　.　 : Unaccessed

1 to F : Accessed count of in 16 addresses

　*　 : All 16 addresses were accessed.

Coverage rate

Figure 3.17-2 Coverage Window (1-Address Unit)

```
 Coverage                                                        _ □ ×
address +00+01+02+03+04+05+06+07+08+09+0A+0B+0C+0D+0E+0F+10 C0(%)
C286    -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -   100.0
C297    -  -  -  -  -  -  -  -  .  .  .  .  .  -  -  -     70.6
C2A8    -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -   100.0
C2B9    -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -   100.0
C2CA    -  -  -  .  .  .  .  .  .  .  .  .  .  .  .  .  .   17.6
C2DB    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .    0.0
C2EC    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .    0.0
```

Display tab. This line is not scrolled.

Measured address

Count of access

　.　 : unaccessed

　-　 : addressed

Coverage rate

■ Shortcut menu

- Refresh	Refresh Coverage Window display.
- Jump	Opens the jump dialog box.
- 16 Address Unit	Displays the coverage measurement result in the unit of 16 addresses.
- 1 Address Unit	Displays the coverage measurement result for each address.
- Set	See Section 4.4.12 Coverage.
- Total Coverage Rate	See Section 4.4.12 Coverage.
- Clear	Clears the coverage measurement buffer.
- Close	Closes the Coverage Window.

3.18   Performance Window

The Performance Window displays the performance measurement result. This window is displayed only when SOFTUNE WORKBENCH is in the debug session.

■ Performance Window

For the performance function, see Section 4.4.13 Performance.

Examples of the performance window are given in Figure 3.18-1 and Figure 3.18-2 . The performance window is used to display the result of performance measurement at debugging. This window is only displayed for the emulator (MB2141).

Figure 3.18-1 Performance Window (Measurement Count)

Figure 3.18-2 Performance Window (Measurement time)
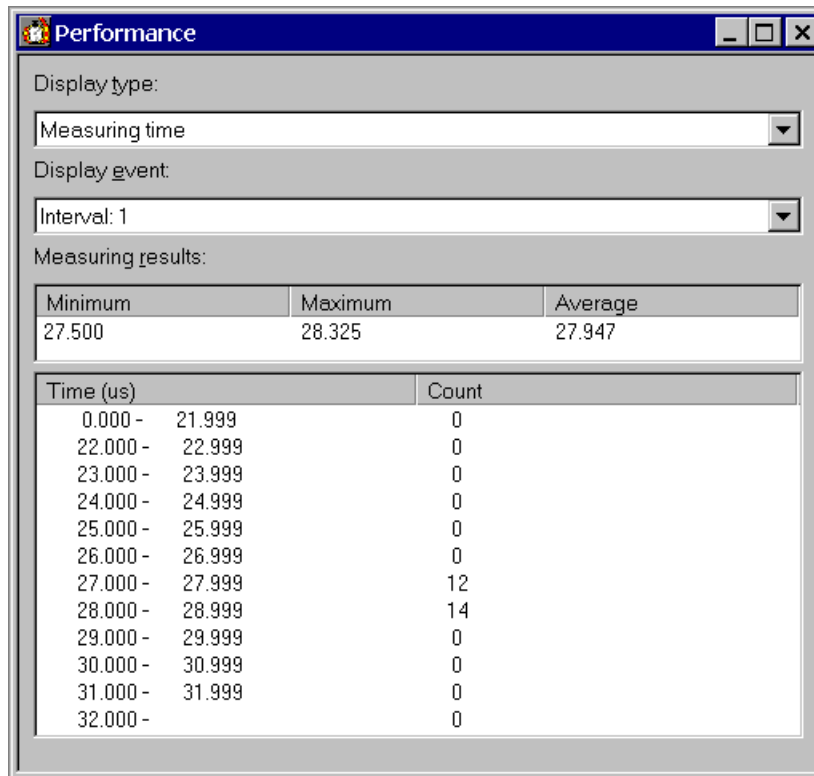
- Display Type	Select measurement time or measurement count as the display type.
- Display Event	A display event is displayed only when measurement time is selected.
	Select a measurement interval.
- Measurement Result	The measurement result is totalized and displayed.
	The minimum measurement result, maximum measurement result, and average measurement result are displayed only when measurement time is selected as the display type.

■ Shortcut menu

- Refresh	Refresh Performance Window display.
- Set	See Section 4.4.13 Performance.
- Display Range	See Section 4.4.13 Performance.
- Event	See Section 4.6.5 Event.
- Clear	Clears the Performance buffer.
- Close	Closes the Performance Window.

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3.19   Sequence Window

The Sequence Window displays the sequence setting state. This window is displayed only when SOFTUNE WORKBENCH is in the debug session.

■ Sequence Window

For details on the sequence function, see Section 4.6.6 Sequence.

An example of the sequence window is shown in Figure 3.19-1 . The sequence window is used to display the sequence setting state at debugging. This window is only displayed for the emulator (MB2141).

Figure 3.19-1 Sequence Window
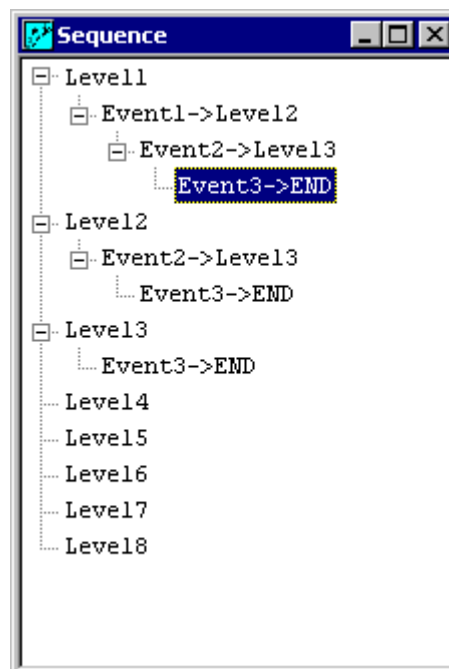
■ Shortcut menu

- Area	See Section 4.6.6 Sequence.
- Delete	Deletes sequence setting.
- Delay Count	See Section 4.6.6 Sequence.
- Set Latch	See Section 4.6.6 Sequence.
- Display Latch	See Section 4.6.6 Sequence.
- Event	See Section 4.6.5 Event.
- Close	Closes the Sequence Window.

CHAPTER 4
MENUS

This chapter explains the SOFTUNE WORKBENCH menu configuration and the dialog boxes to be started from each menu.

4.1 Menu Configuration (Tree)

This section explains the SOFTUNE WORKBENCH menu configuration.

■ **Menu configuration**

The following menus are displayed in the SOFTUNE WORKBENCH Main Window.

[File] [Edit] [View] [Project] [Debug] [Setup] [Window] [Help]

The following functions are assigned to each menu item.

- File

New

Open

Close

Open Workspace

Close Workspace

Save

Save As

Save All

Print

Recent Text File

Recent Project File

Exit

- Edit

Undo

Redo

Cut

Copy

Paste

Delete

All Select

Find

Replace

Find in files

Jump

Previous Error

Next Error

Top of Error

Bottom of Error

Property

- View

　Project

　Output

　Symbol

　Assembly

　Register

　Memory

　Local

　Watch

　Trace

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- Project Menu

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　Reset of MCU

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　Breakpoint Set/Reset

　Event

Sequence

Stack

Time Measurement

Call

Clear Call

Vector

Load Target File

Start Debug/Terminate Debug

- Setup Menu

Development

Debug Environment

Memory Map

Flash area control

Tool

Keyboard

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Error

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- Window Menu

Cascade

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Horizon

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Arrange Icons

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Close All Windows

- Help Menu

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4.2   File Menu

File Menu SOFTUNE WORKBENCH has the following functions:
- **Workspace and file accessing**
- **Printing**
- **End of SOFTUE WORKBENCH**

■ Functions related to project and file accessing

The project and file accessing

- <u>New</u>

- <u>Open</u>

- <u>Close</u>

- <u>Open Workspace</u>

- <u>Close Workspace</u>

- <u>Save</u>

- <u>Save As</u>

- <u>Save All</u>

- <u>Recent Text File</u>

- <u>Recent Workspace File</u>

■ Other functions

Other functions are as follows.

- <u>Print</u>

- <u>Exit</u>

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4.2.1　　New

"New" creates a workspace/project and file newly. Selecting "New" from the File Menu opens the new creation dialog box asking the operator whether to create a workspace/ project or text file (Figure 4.2-1).

■ **New creation dialog box**

Figure 4.2-1 New Creation Dialog Box
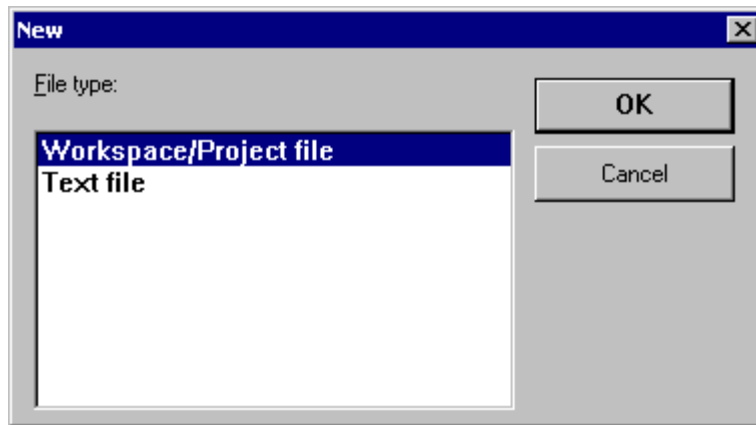
■ **Creation of New Workspace**

To create a new workspace, select [Workspace/Project File]. When the [New] dialog for project is opened, select the [Workspace] tab (Figure 4.2-2). Set the basic items regarding workspace to be created.

For details about the setting procedure, see Section 2.3 Creating Workspace.

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Figure 4.2-2 Project New Dialog (Workspace)
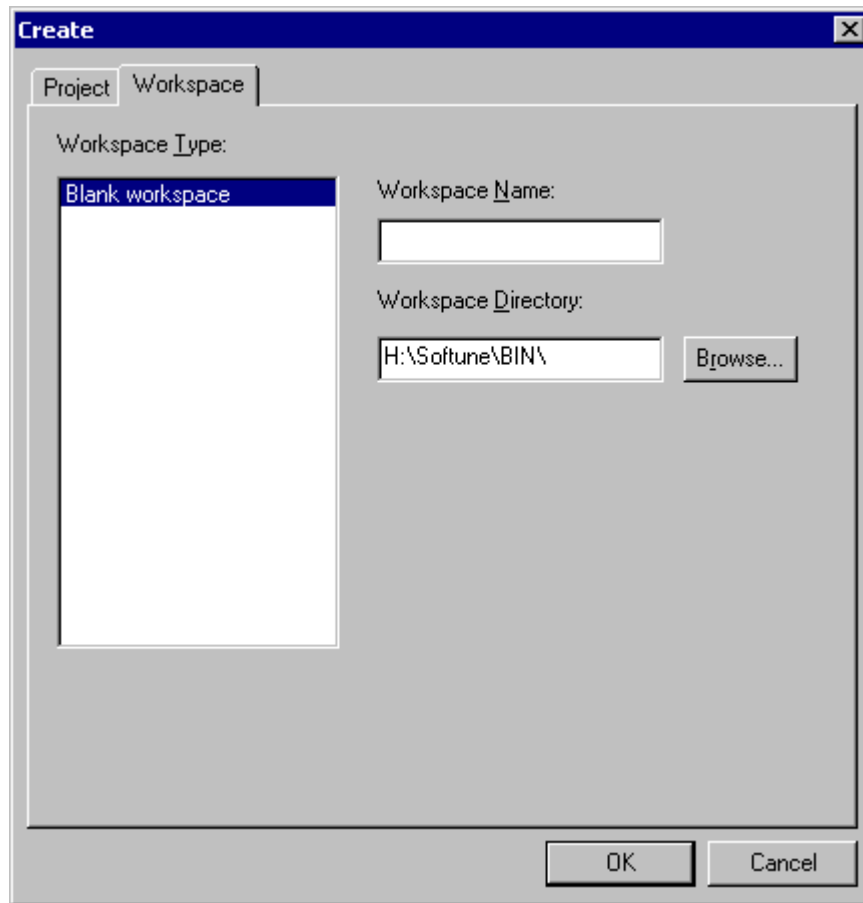
■ Creation of New Project

To create a new project, select [Workspace/Project File]. When the [New] dialog for project is opened, select the [Project] tab (Figure 4.2-3). Set the basic items regarding project to be created.

When creating a new workspace in creating a new project, see Section 2.3 Creating Workspace and when adding to a existing workspace, see Section 2.4 Storing of Project.

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Figure 4.2-3 Project New Dialog (Project)
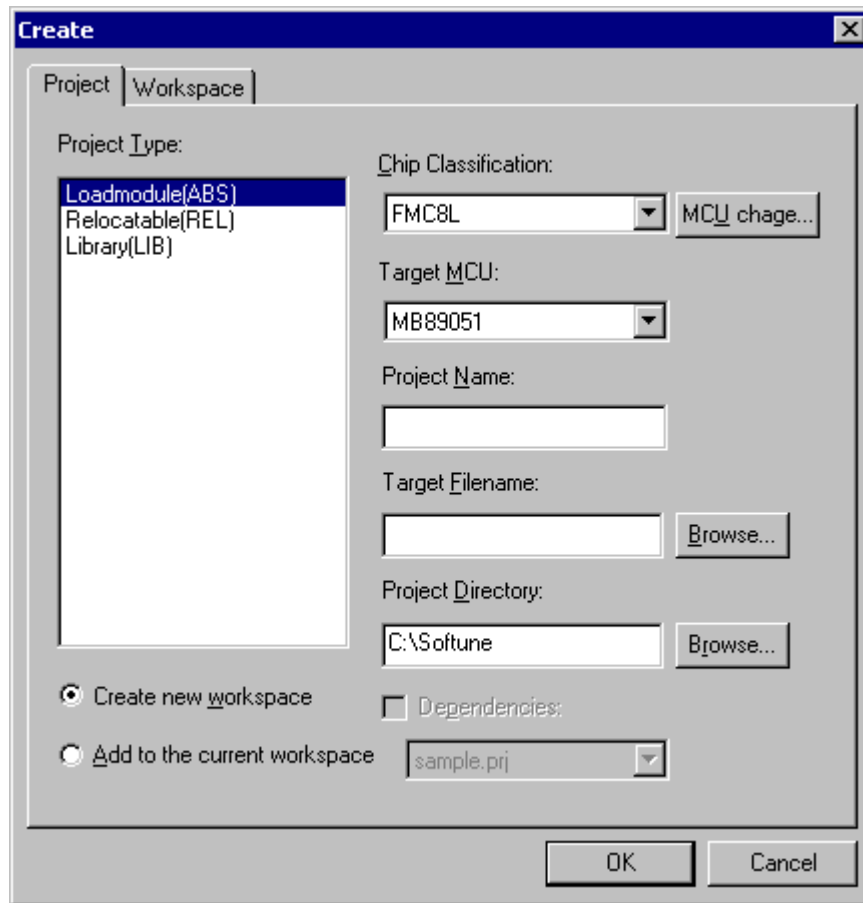
■ Creating source file and document files, etc.

To create a source file and document file, etc., select [Text File] from the new creation dialog box. The editor is started in the status in which a new file is created.

4.2.2   Open

"Open" opens existing files. Selecting "Open" from the File Menu opens the open dialog box asking the file you want to open (Figure 4.2-4).

■ Open dialog box

Selecting [Open] from the File Menu opens the open dialog box.

The open dialog box displays a workspace file, project file, load module file, source file, binary file, alias file, coverage file, batch file, and text file.

If SOFTUNE WORKBENCH is not in the debug session, the binary file, alias file, coverage file, and batch file are not displayed.

Figure 4.2-4 Open Dialog Box
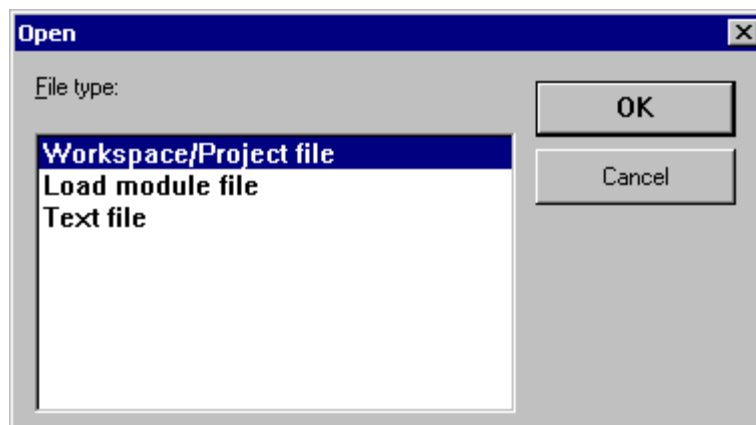
■ Opening the load module file

- When the project file has been already opened and SOFTUNE WORKBENCH is in the debug session.
  The file dialog box for selecting the name of the load module to be debugged opens.
  To load debug information only, set a check box for [Only Debug Information].
  To set a memory map automatically during simulation, set a check box for [Auto mapping]. If this check box is not set, set the memory map before opening the load module file.

- When the project file has been already opened but SOFTUNE WORKBENCH has not been in the debug session.
  The dialog box asking the operator to make SOFTUNE WORKBENCH enter the debug session opens. When the [OK] button is clicked, SOFTUNE WORKBENCH automatically enters the debug session. Clicking the [Cancel] button cancels file open operation.

- When the workspace file is not open.
  The dialog box for checking whether to create a new workspace/project or whether to open the existing projects opens.

    - To create a new workspace/project, click the [Yes] button.

    - To read the existing projects, click the [No] button.
  Clicking the [Cancel] button cancels file open operation.

■ **Opening the binary file**

Specify the start address for binary data read in [Start Address].

■ **Opening the batch file**

Setting [Run in Icon State] starts batch processing in the icon state.

4.2.3   Close

"Close" closes open files and windows.

■ Close

[Close] closes the files open in the Edit Window or debug windows (e.g., Register Window).

-Edit Window

When an unsaved modified file is in the Edit Window, the dialog box for asking the operator whether to save the file opens.

  -[Yes] button   ... Saves the file using the existing file name.

  -[No] button   ... Does not save the file and closes the Edit Window.

  -[Cancel] button   ... Processing is continued with the file being edited and opened.

-Debug windows (e.g., Register Window)

SOFTUNE WORKBENCH closes debug windows immediately.

4.2.4   Open Workspace

"Open Workspace" opens the existing workspace file.

■ Opening the existing workspace file

The file dialog box for selecting the file you want to open opens.

- When the existing workspace file has been already opened and SOFTUNE WORKBENCH is in the debug session.

  The dialog box for asking the operator whether to terminate debugging opens.

    -[OK] button...   Terminates the debugger and continues workspace open processing.

    -[Cancel] button...   Cancels workspace open processing.

- When the existing workspace file has been already opened but SOFTUNE WORKBENCH is not in the debug session.

  The file dialog box for selecting a workspace file opens. When a workspace file name is specified, SOFTUNE WORKBENCH closes the currently open workspace file and then opens the specified file. If the open registered file is not saved although it is being edited, the dialog box for asking the operator whether to save the file opens.

    -[Yes] button...   Saves the file using the existing file name and continues processing.

    -[No] button...   Continues processing without saving the file.

    -[Cancel] button...   Cancels workspace open processing.

- When the existing workspace file is not open.

  The file dialog box for selecting a project file opens. When a workspace file name is specified, SOFTUNE WORKBENCH opens the specified file. When a workspace file is opened, the used window when the file was saved is redisplayed.

    -[Cancel] button...   Processing is continued with the file being edited opened.

The project file can be opened instead of the workspace file. For details, see Section 2.3   Creating Workspace.

4.2.5   Close Workspace

"Close Workspace" closes the currently open workspace file.

■ When the currently open workspace file is not edited at all

SOFTUNE WORKBENCH tries to close the file immediately.

When the workspace file is closed, the dialog box for asking the operator whether to save the current workspace information opens.

-[Yes] button   ... Saves the current workspace information and closes the workspace file.

-[No] button   ... Closes the workspace file without saving the current workspace information.

-[Cancel] button   ... Cancels workspace file close processing.

In the following cases, however, the above dialog box does not open:

-The workspace file is not modified.

-When the workspace file is closed, inquiry for save is not set.

■ When the currently open workspace file is being edited

The dialog box for asking the operator whether to save the current workspace information opens. When the [Yes] or [No] button is clicked to continue processing, the dialog box for asking the operator whether to save the file being edited subsequently opens.

-[Yes] button   ... Saves the file being edited and then closes the workspace file.

-[No] button   ... Closes the file being edited without saving the file being edited.

-[Cancel] button   ... Workspace is closed with the file being edited opened.

4.2.6   Save

"Save" saves the currently open file using the existing file name.

■ Save dialog box

The save dialog box is used to save the file using the existing file name.

The text file, project file, binary file, alias file, setup file, or coverage file can be selected from this dialog box as the type of file.

If SOFTUNE WORKBENCH is not in the debug session, the binary file, alias file, setup file, and coverage file are not displayed.

Figure 4.2-5 Save Dialog Box
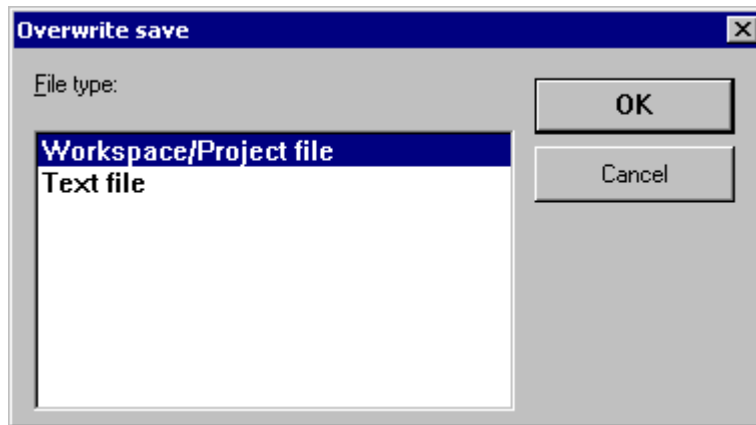
4.2.7   Save As

"Save As" stores the previously saved file under a new file name.

■ Save As

[Save As] stores the previously saved file under a new file name.

The text file, output window, project file, binary file, alias file, setup file, or coverage file can be selected as the type of file.

If SOFTUNE WORKBENCH is not in the debug session, the binary file, alias file, setup file, and coverage file are not displayed.

Figure 4.2-6 Save as Dialog Box
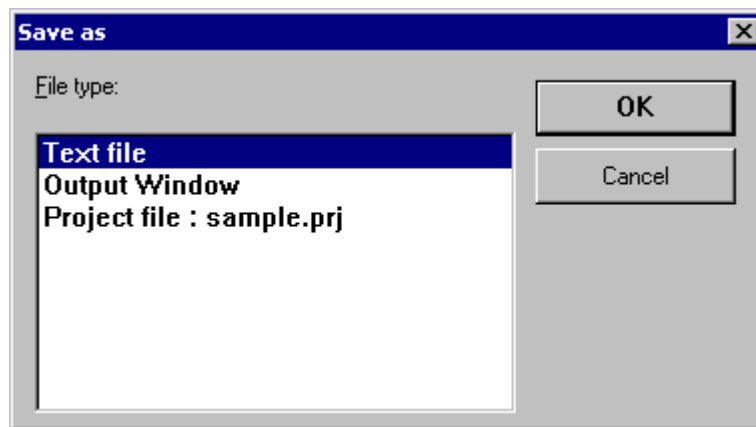
■ Saving the project file

Save the active project file.

Select the format for saving the project file from the [File Type] combo box.

For the project formats, refer to Section 1.2 Management Function for Project of SOFTUNE WORKBENCH Function Manual.

If a Workspace project format (*.prj) is selected, it saves all project information in workspace project format (compatible to workspace).

When the project file opened in old project format is overwritten in workspace project format, conversion is performed and restrictions on old project files are cleared. Subsequent saving is performed in workspace project format.

If an Old project format (*.prj) is selected, it saves information on active project configurations in old project format (incompatible to workspace).

The project file opened in workspace project format cannot be overwritten in old project format. In this case, save the file as a different name.

■ Saving the binary file

Specify a save start address in [Start Address]. When the binary file has been already loaded, the start address at that time is set.

Specify a save end address in [End Address]. When the binary file has been already loaded, the end

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address at that time is set.

Note:

If the project file in a different directory from the original one is saved, the members described in a relative path may not be referred. In this case, move the members with the original directory configuration kept being unchanged.

4.2.8   Save All

"Save All" saves all the files currently being edited.

■ Files to be saved

The files to be saved include text files such as the source file open in the edit window. Data in the workspace, project file and output window is not saved.

Even the text file open in the edit window is not saved if it is not edited.

When SOFTUNE WORKBENCH is in the debug session, the binary, alias, setup, or coverage file that was edited even once is to be saved.

■ Processing a newly created text

If there is a newly created text that has not been saved yet, the file dialog box for asking the operator to enter the name of the file to be saved opens. Specify a file name from this dialog box.

4.2.9　　Print

"Print" prints file data.

■ Data to be printed

[Print] prints data in the file currently open in the edit window; it cannot print other window (file) data.

Print output window data in any of the following two procedures:

-Copy output window data to the edit window in the following procedure, then select [Print] from the [File] menu:

　　1.Select all output window data.

　　2.Click the right button of the mouse to display the menu, then select [Copy].

　　3.Open the edit window, then select [Paste] from the [Edit] menu.

-Save output window data once, then print it.

　　For how to save output window data, see Section 4.2.7 Save As.

　　Open the saved file with the edit window, then select [Print] from the [File] menu.

4.2.10   Recent Text File/Recent Workspace File

Of the source files opened in the Source Window, "Recent Text File" stores up to five most recently opened source files. Of the used project files, "Recent Workspace File" stores up to five most recently opened project files.

■ Recent Text File

Of the source files opened in the Source Window, [Recent Text File] stores up to five most recently opened source files. It enables to open the desired text file immediately by selecting it.

The files in the Edit Window are not stored here.

■ Recent Workspace File

Of the used workspace files, [Recent Workspace File] stores up to five most recently opened workspace files. It enables you to open the desired workspace file immediately by selecting it.

Note:

If a text or project file has been already deleted or moved to another directory, it cannot be opened even if it is listed here.

4.2.11   Exit

"Exit" terminates SOFTUNE WORKBENCH.

■ When a file is being edited

The dialog box for asking the operator whether to save the file being edited opens.

[Yes]   ... Saves the file being edited and terminates SOFTUNE WORKBENCH.

[No]   ... Terminates SOFTUNE WORKBENCH without saving the file being edited.

[Cancel]   ... Does not terminate SOFTUNE WORKBENCH.

■ When the workspace is open

The dialog box for asking the operator whether to save the current workspace information opens.

[Yes]   ... Saves the current workspace information in the file.

[No]   ... Does not save the current workspace information in the file.

[Cancel]   ... Does not terminate SOFTUNE WORKBENCH.

If no file is being edited, SOFTUNE WORKBENCH terminates immediately. If there is a file being edited, processing explained in "When a file is being edited" is performed.

■ When SOFTUNE WORKBENCH is in the debug session

As in processing explained in "When the workspace is open", the dialog box for asking the operator whether to save the current workspace information opens. Clicking [Yes] or [No] from this dialog box continues processing and automatically terminates the debug session.

If no file is being edited, SOFTUNE WORKBENCH terminates immediately. If there is a file being edited, processing explained in "When a file is being edited" is performed.

4.3   Edit Menu

The Edit Menu provides such functions as file editing, character string search, and error jump.

■ File editing function

The file editing function includes the following:

- <u>Undo</u>
- <u>Redo</u>
- <u>Cut</u>
- <u>Copy</u>
- <u>Paste</u>
- <u>Delete</u>
- <u>All Select</u>

■ Character string search function

The character string search function includes the following:

- <u>Find</u>
- <u>Replace</u>
- <u>Find in files</u>

■ Error jump function

The error jump function includes the following:

- <u>Jump</u>
- <u>Previous Error</u>
- <u>Next Error</u>
- <u>Top of Error</u>
- <u>Bottom of Error</u>
- <u>Property</u>

4.3.1   Undo, Redo

"Undo" cancels the immediately preceding editing and undoes the status before the editing.

■ Target

The function is available only for edits for the edit window. It can also continuously cancel or undo a "series of actions" for successive addition or deletion of characters and lines.

Note:

This function is valid only for the edit window. Note that the value changed in the Memory or Register Window when SOFTUNE WORKBENCH is in the debug session cannot be undone.
[Undo], [Redo] function may not always work for a large amount of edits.

4.3.2   Cut, Copy, Paste, Delete

"Cut" cuts the selected character string and "Copy" copies it to the clipboard. "Delete" deletes the selected character string. "Paste" inserts the copied character string into the cursor position or replaces it with the selected character string.

■ Cut

"CUT" cuts the character string selected from the edit window and moves it to the clipboard. This command can be executed only in the edit window.

The character string cut here can be pasted later.

■ Copy

"COPY" copies the character string selected from the edit window or the Symbol Window, Assembly Window, Register Window, Memory Window, Local Symbol Window, Watch Window, Trace Window, Command Window or Coverage Window (valid in debug session) to the clipboard.

The character string copied here can be pasted later.

■ Paste

"PASTE" inserts the cut character string or the character string copied to the clipboard into the current cursor position. If the selected character string is in the edit window, this command also replaces it with the character string in the clipboard.

■ Delete

"DELETE" deletes the character string selected from the edit window. This command can be executed only in the edit window.

The deleted character string cannot be pasted later.

Table 4.3-1 Relationship between Edit Functions and Windows

Window	Cut	Copy	Paste	Delete
Edit Window	❍	❍	❍	❍
Project Window	❍	✕	✕	✕
Output Window	✕	❍	✕	✕
Symbol Window	✕	❍	✕	✕
Assembly Window	✕	❍	✕	✕
Register Window	✕	❍	✕	✕
Memory Window	✕	△ *1	✕	✕
Local Symbol Window	✕	△ *2	✕	✕
Watch Window	✕	△ *2	✕	✕
Trace Window	✕	△ *1	✕	✕
Command Window	✕	❍	✕	✕
Coverage Window	✕	△ *1	✕	✕
Performance Window	✕	✕	✕	✕
Sequence Window	✕	✕	✕	✕
Object Window	✕	✕	✕	✕

*1:   Lines other than the column title can be copied.

*2:   Only the symbol name can be copied.

4.3.3   All Select

"All Select" selects all the character strings displayed in a window.

■ Target

This function operates only in the edit and output windows.

4.3.4 Find/Replace

"Find" searches the text file displayed in the edit window for any character string.
"Replace" replaces the found character string with the specified character string.

■ Target

"FIND" and "REPLACE" can be executed only for the text files displayed in the edit window; they cannot be executed in the output window and others.

■ Find

When the find dialog box shown in Figure 4.3-1 opens, specify the character string you want to find from this dialog box. Character string search conditions (Table 4.3-2) can also be specified from this dialog box.

The found character string is displayed in reverse video.

The find dialog box is not automatically closed irrespective of whether the character string is found. For this reason, when search terminates, click the [Cancel] button to close the find dialog box.

When SOFTUNE WORKBENCH is in the debug session, the Source Window can also be searched.

Figure 4.3-1 Find Dialog Box

■ Replace

When the replace dialog box shown in Figure 4.3-2 opens, specify a search character string and a replacing character string. In this case, character string search conditions (Table 4.3-2) can be also specified from this dialog box.

The found character string is displayed in reverse video. Clicking the [Replace] button replaces the specified search character string with the specified replacing character string. Clicking the [All Replace] button replaces all the character strings found before search terminates.

The replace dialog box is not automatically closed irrespective of whether the found character string was replaced. For this reason, when search terminates, click the [Cancel] button to close the replace dialog box.

Figure 4.3-2 Replace Dialog Box
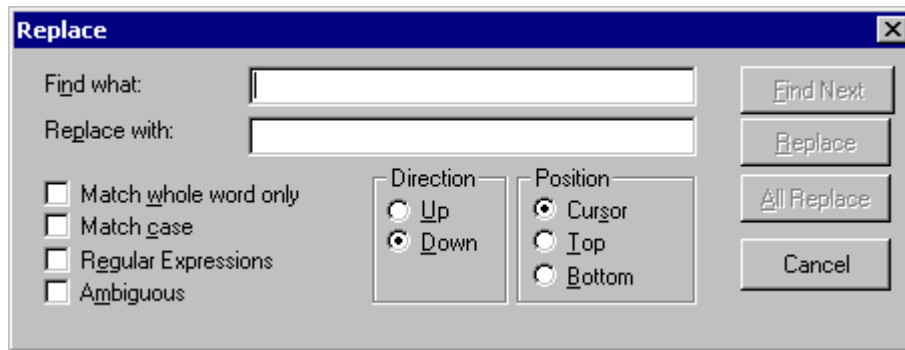
Table 4.3-2 Character String Search Conditions

Condition	Explanation
Match whole word only	Does not search partial character strings of words. Effective in searching for independent words that may become parts of other words such as "able".
Match case	Distinguishes uppercase characters from lowercase characters or vice versa.
Regular Expression	Specifies a search character string in regular expression. Enables use of a wildcard, etc.
Direction	Specifies a search direction (Up or Down). "Up" searches the file upward. "Down" searches the file downward.
Position	Specifies a search start position (cursor, top, bottom).

4.3.5   Find in Files

This section explains how to search the specified file for the specified character string.

■ File search

SOFTUNE WORKBENCH searches the specified file for the specified character string and displays the search result in the output window.

SOFTUNE WORKBENCH can search several files at a time.

A line can be immediately edited by double-clicking the mouse on the line in the output window.

■ Search procedure

1. Select the [Edit] - [Find in Files] menu.
   Dialog box Figure 4.3-3 opens.

2. Specify a character string.
   The dialog box showing the character strings in the clipboard opens.

3. Specify the file to be searched.
   A wild card can also be used to specify the file to be searched.

4. Specify the directory to be searched.
   Click the button to the right of the specified field to open the directory search dialog box.

5. Specify [Match whole word only] and [Match case] as required.

6. Click the [Find] button.
   The search result appears in the output window in real time.

7. To abort a search, click [Abort] button.
   The file search is aborted.

8. When search terminates, click the [Cancel] button.

Figure 4.3-3 Find in Files Dialog Box
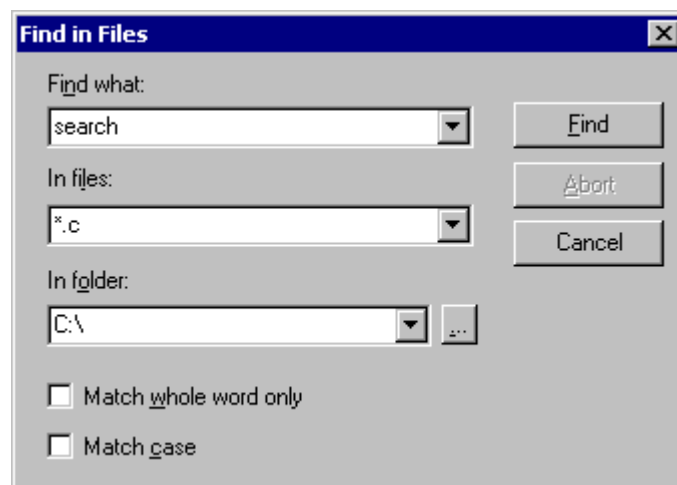
4.3.6   Jump

"Jump" moves the cursor to any line in the text file being edited. When SOFTUNE WORKBENCH is in the debug session, this function (command) specifies the display start position of a source line, disassemble, memory, or trace coverage.

■ Edit window

When the jump dialog box shown in Figure 4.3-4 opens, specify a jump destination line number. When the edit window is active, the cursor in the edit window jumps to the specified line irrespective of whether SOFTUNE WORKBENCH is in the debug session.

Figure 4.3-4 Jump Dialog Box (Edit)
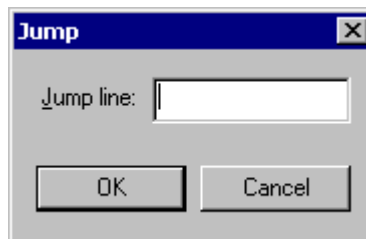
■ Debug session

If a window other than the edit window becomes active when SOFTUNE WORKBENCH is in the debug session, the dialog box shown in Figure 4.3-5 opens. Select [TYPE], then specify [POSITION] in the selected format.

The following can be selected as [TYPE].

　　　-Line number

　　　-Address

　　　-Frame

Figure 4.3-5 Jump Dialog Box (Debug)

4.3.7   Previous error, Next error, Top of Error, Bottom of Error

"Previous error", " Next error", "Top of Error" and "Bottom of Error" moves the cursor in the edit window to the source line where a make, build, compilation, or assembler error occurred.

■ Previous error

The cursor jumps to the error line immediately before the cursor position in the output window. If there is no error-line before the cursor position, the cursor loops back and jumps to the bottom error line.

■ Next error

The cursor jumps to the error line immediately after the cursor position in the output window. If there is no error line after the cursor position, the cursor loops back and jumps to the top error line.

■ Top of error

The cursor jumps to the top error line displayed in the output window.

■ Bottom of error

The cursor jumps to the bottom error line displayed in the output window.

4.3.8　Property

"Property" displays information for the specified file.

■ Property

There are six windows below.

- <u>Project Window</u>
- <u>Edit Window</u>
- <u>Source Window</u>
- <u>Symbol Window</u>
- <u>Local Window</u>
- <u>Watch Window</u>

4.3.8.1　Property-Project Window

This section explains the property in the Project Window.

■ **Property: General**

Figure 4.3-6 Property-Project Window Dialog Box (General 1)
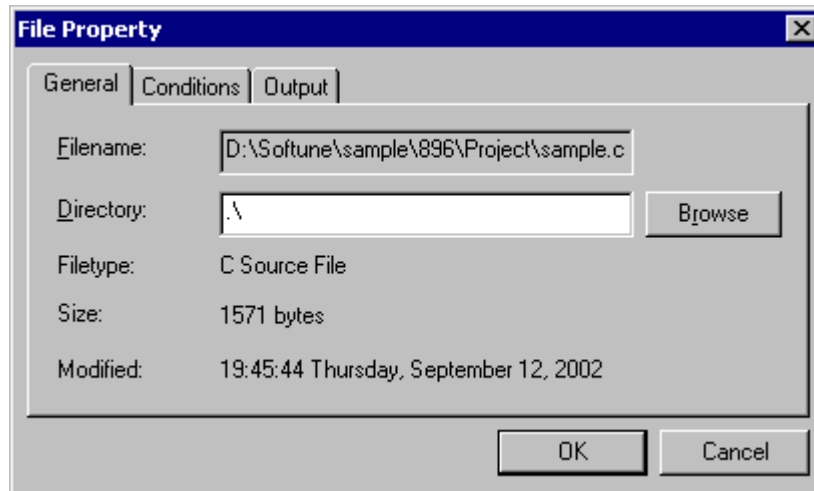
-File name

　The full-path to the selected file is displayed.

-Directory

　The directory of the selected file is displayed. If editing is enabled, the file to be referred can be changed.

　If given in a relative path, the directory is described in a relative path in the project file.

-File type

　The type of file managed in the project is displayed.

-Size

　Displays the file size.

-Updating date

　Displays the date and time of the last file update.

Figure 4.3-7 Property-Project Window (General 2)
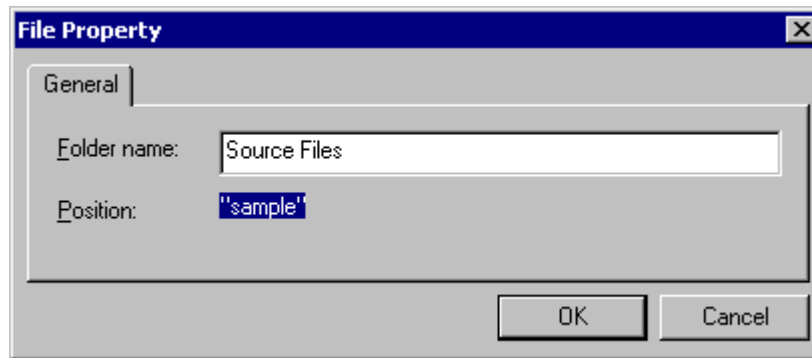
-Folder name

The name of the selected folder is displayed. If editing is enabled, folder name can be changed.

-Place

The place of the selected folder is displayed.

Figure 4.3-8 Property-Project Window (General 3)
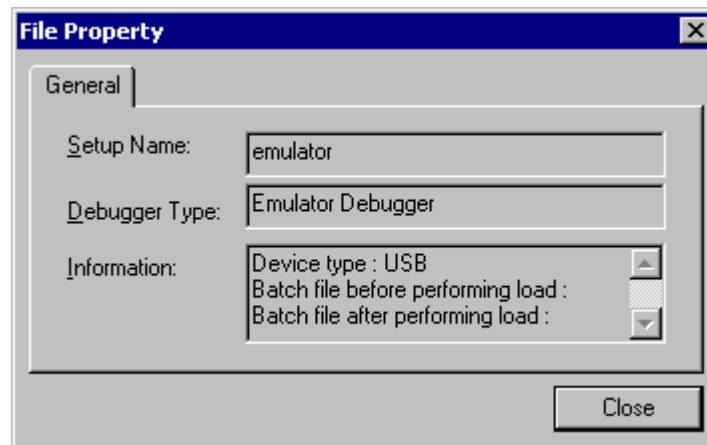
-Setup name

The selected setup name is displayed.

-Debugger type

The Debugger type set in Debugger setup is displayed.

-Information

The device type, host, port, baud rate, batch file before performing load, batch file after performing load, etc., are displayed. The displayed information depends on the device type, etc.

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■ **Property: Conditions**

Figure 4.3-9 Property-Project Window (Dependence)
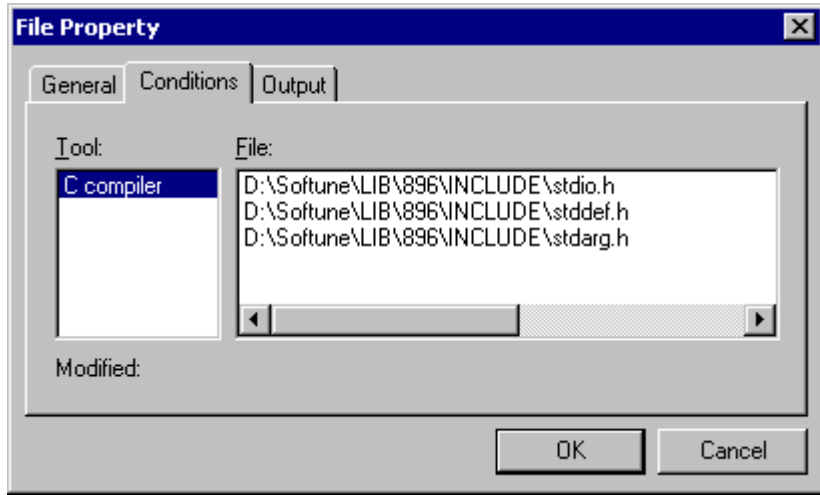
-Tool

Displays the language tool to be executed.

-File

Displays a dependency file list. Selecting a file name from the list displayed the update date and time of the file.

-Updating date

Displays the date and time of the last file update.

■ **Property: Input**

Figure 4.3-10 Property-Project Window (Input)
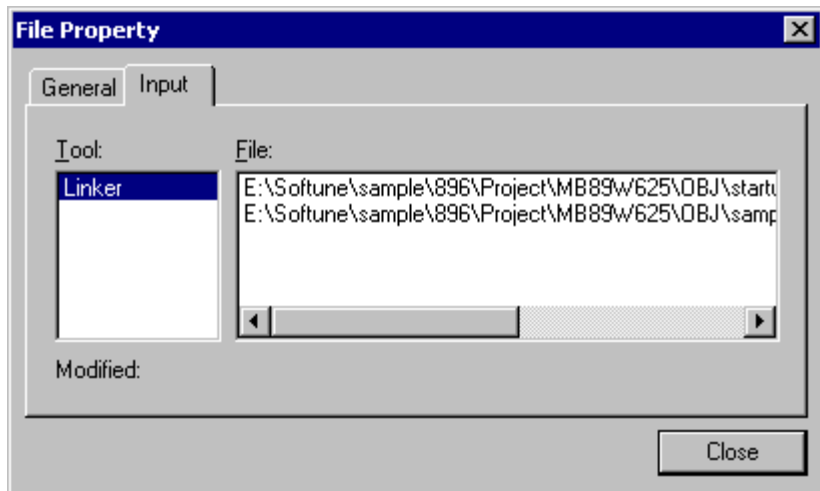
-Tool

Displays the language tool to be executed.

-File

The file used in creating a target file is displayed in order.

-Updating date

Displays the date and time of the last file update.

■ Property: Output

Figure 4.3-11 Property-Project Window (Output)
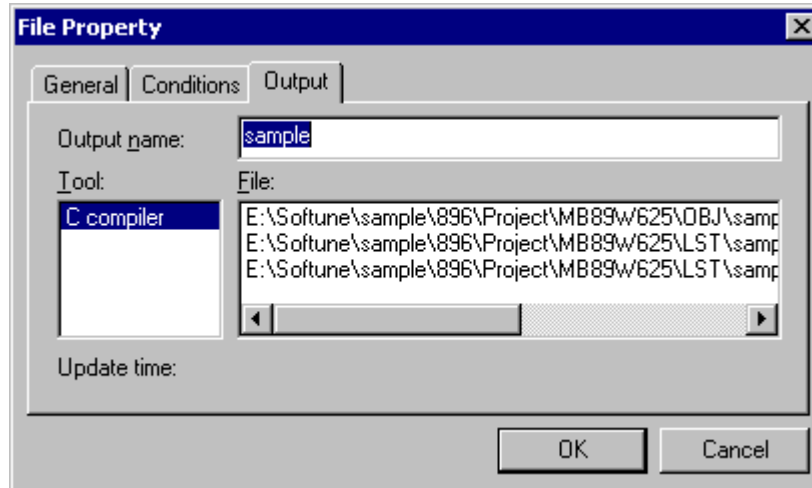
-Output name

Base name of output file

-Tool

Displays the language tool to be executed.

-File

Output file list created by the language tool.

-Updating data

Displays the date and time of the last file update.

4.3.8.2 Property-Edit Window

This section explains the property in the Edit window.

■ Property: General

Figure 4.3-12 Property-Edit Window (General)
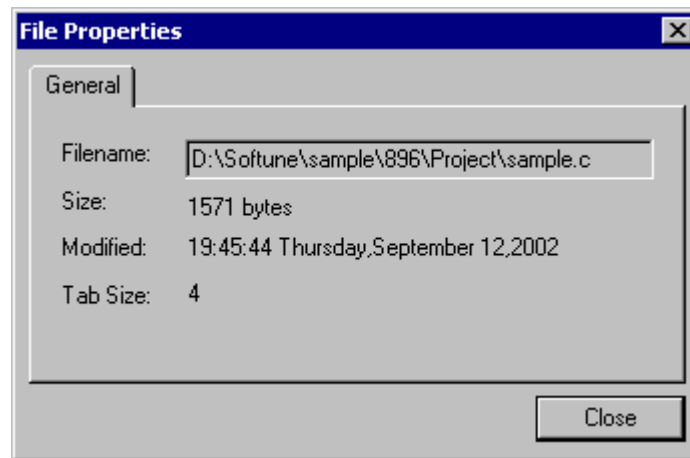
-File name

 The full-path to the selected file is displayed.

-Size

 Displays the file size.

-Updating date

 Displays the date and time of the last file update.

-Tab size

 The size of tab code is displayed

4.3.8.3   Property-Source Window

This section explains the property in the Source window.

■ **Property: General**

Figure 4.3-13 Property-Source Window (General)
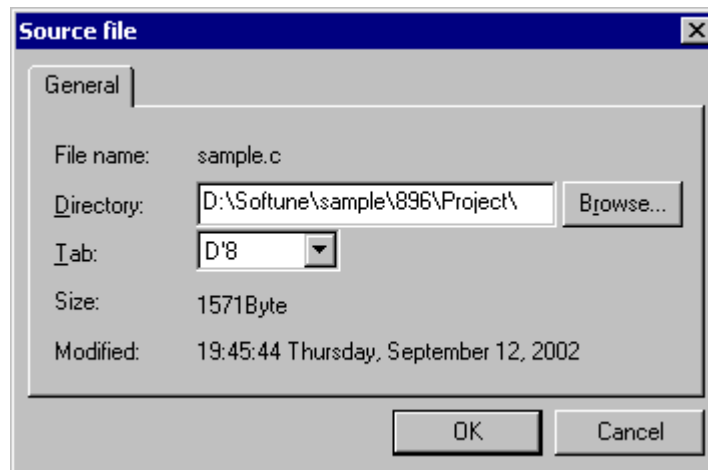
-File name

   The full-path to the selected file is displayed.

-Directory

   Displays the directory in which the source file exists (valid only when Source Window information is
   displayed). When changed, the directory is searched and the found source file is redisplayed.

-Tab

   Displays the tab size. It is possible to change.

-Size

   Displays the file size.

-Updating date

   Displays the date and time of the last file update.

4.3.8.4   Property-Symbol Window

This section explains the property in the Symbol window.

■ **Property: General**

Figure 4.3-14 Property-Symbol Window (General)
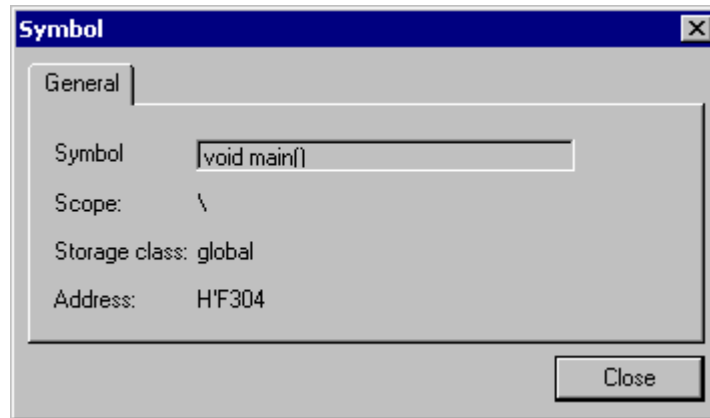
-Symbol name

   The name of the selected symbol is displayed.

-Scope

   The scope position of the selected symbol is displayed.

-Storage class

   The storage class of the selected symbol is displayed.

-Address

   The address of the selected symbol is displayed.

4.3.8.5   Property-Local Window

This section explains the property in the Local window.

■ **Property: General**

Figure 4.3-15 Property-Local Window (General)
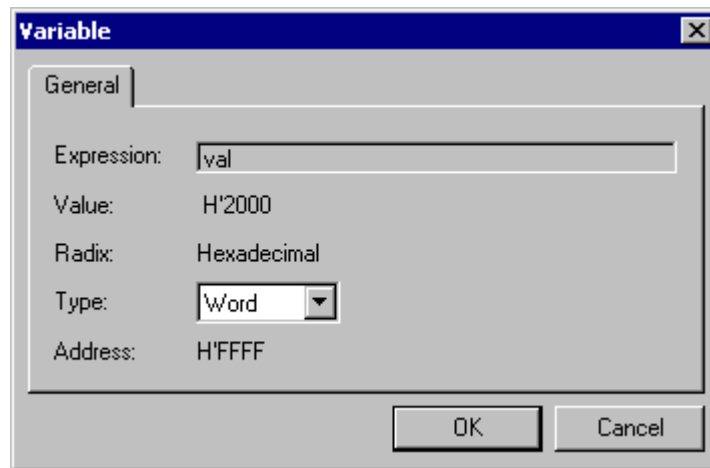
-Expression

  The selected item is displayed.

-Value

  The value of the selected expression is displayed.

-Base

  The base in which the value is given is displayed.

-Type

  The type of the selected expression is displayed.

-Address

  The symbol-address of the selected expression is displayed.

4.3.8.6　　　Property-Watch Window

This section explains the property in the Watch window.

■ **Property: General**

Figure 4.3-16 Property-Watch Window (General)
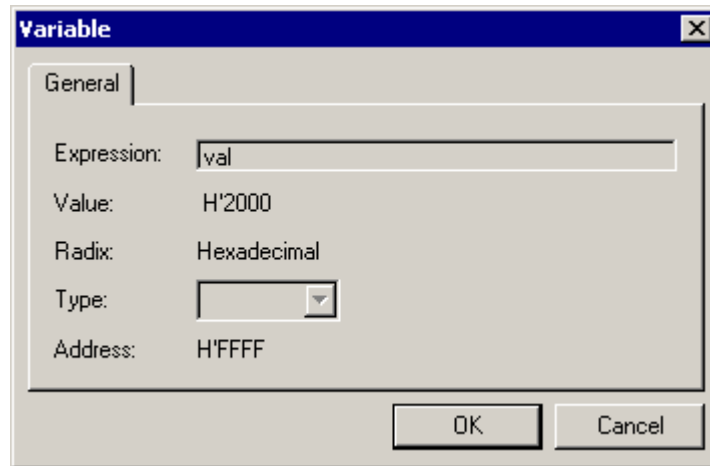
-Expression

　　The selected item is displayed.

-Value

　　The value of the selected expression is displayed.

-Base

　　The base in which the value is given is displayed.

-Type

　　The type of the selected expression is displayed.

-Address

　　The symbol-address of the selected expression is displayed.

4.4   View Menu

The View Menu displays each window. It also sets the tool bar and status bar to view or nonview.

■ Window view/non-view

The View Menu can set the following windows to view or non-view.

-Project Window

-Output Window

■ Window display (debug session)

The View Menu displays the following Debugger windows (valid only when SOFTUNE WORKBENCH is in the debug session):

-Symbol

-Assembly

-Register

-Memory

-Local

-Watch

-Trace

-Coverage

-Performance

-Command

-Object

■ Tool bar/status bar

The View Menu can set the tool bar and status bar to view or non-view. The set of tool buttons displayed in the tool bar can be also selected using the View Menu.

-Tool Bar

-Status Bar

■ Font-related items

The fonts for each window can be changed.

-Fonts

4.4.1   Project/Output

"Project" switches the Project Window to view or non-view or vice versa. "Output" switches the Output Window to view or non-view or vice versa.

■ Project Window

When the Project Window is displayed, a check mark is set to the left of [Project] in the View Menu. Even if the Project window is switched to non-view, the project is not closed. When it is switched to display again, the Project Window is displayed at the previously displayed position.

■ Output Window

When the Output Window is viewed, a check mark is set to the left of [Output Window] in the View Menu. Even if the Output Window is switched to non-view, data in the Output Window is not cleared. When it is switched to displayed again, the Output Window is displayed at the previously displayed position.

If make, build, compile, assemble, update of dependencies or stop is executed when the Output Window is set to non-view, the Output Window automatically enters the view status.

Even if the Output Window is set to non-view when make, build, compile, or assemble is being executed, error messages are never lost. These messages are all displayed when the Output Window is redisplayed.

4.4.2 Symbol

"Symbol" views the Symbol Window.

■ Symbol

When the Symbol Window is opened, all the symbols used in the target file are displayed in the tree format.

This function (command) can only be used when SOFTUNE WORKBENCH is in the debug session.

Selecting [Symbol] when the Symbol Window has been already opened activates the Window.

4.4.3   Assembly

"Assembly" displays the <u>Disassemble Window</u>.

■ Assembly

When the Assembly window is opened, the assembly is displayed, starting at the specified address. Line assembly from the shortcut menu is also possible.

This function (command) can be used only when SOFTUNE WORKBENCH is in the debug session.

- When the Assembly Window has been already opened

  The Assembly Window is activated.

- When the Assembly Window is not opened

  The dialog for specifying the display start address (Figure 4.4-1) opens. Specify the address where display is to be started, then click the [OK] button.

Figure 4.4-1 Dialog Box for Specifying Display Start Address
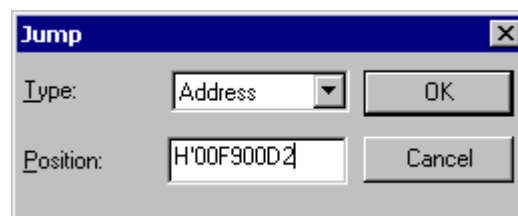
- Type (Line number/Address/Frame)

  Specify the type of display position.

- Position

   Display disassembling from the position specified in the above type.

■ Line assemble

Selecting [Line Assemble] from the shortcut menu opens the line assemble dialog shown in Figure 4.4-2 .

Figure 4.4-2 Inline Assemble Dialog Box
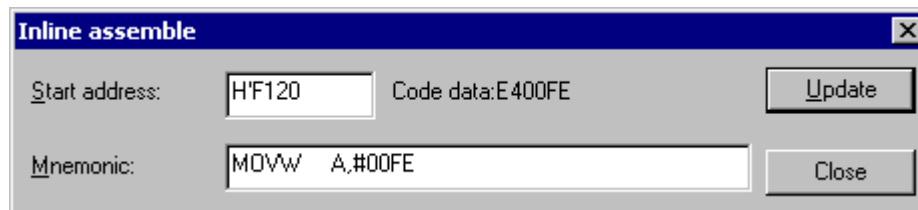
Writing a mnemonic in the [Mnemonic] edit box and clicking the [Update] button assembles and sets the mnemonic, starting from the start address. The start address subsequently advances to the next address.

To change the address where the mnemonic is to be written, change [Start Address].

When mnemonic change is completed, click the [Close] button.

4.4.4   Register

"Register" displays the <u>Register Window</u>.

■ Register

When the Register Window is opened, the selected target MCU register name and each register retention value are displayed.

This function (command) can be used only when SOFTUNE WORKBENCH is in the debug session.

Selecting [Register] when the Register Window has been already opened activates the Window.

■ Changing register values

The values saved by the registers displayed in the Register Window can be changed directly by the following procedures:

- Full change

1. Double-click a register name or display value.
    - The register name or display value is reverse displayed.

2. Specify the values to set in turn using a hexadecimal number, starting from the highest-order digit (leftmost digit).
    -The register value is set automatically when the digit in the lowest-order bit (rightmost digit) is changed.

- Partial digital (bit field) change

1. Click the digit to be changed in the register value display.
    - The cursor appears at the left of the clicked digit.

2. Set the new value as a 1-digit hexadecimal number.
    - The cursor automatically moves to the right digit. If the changed digit is the lowest-order digit, the register value is updated automatically.

3. When changing of the required number of digits is completed, click another register name or register value display.
    - If the Register Window is closed without clicking another register name or register value display, the changed value is not set in the register.
    - This operation is not necessary when the change to the lowest-order bit is completed.

- Selected register name change

1. Click the right mouse button in the Register Window to display the shortcut menu, then select [Edit]. The register edit dialog shown in Figure 4.4-3 opens.

2. Select a register name.

3. Input the value to set.

4. Click the [OK] button.

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Figure 4.4-3 Resister Edit Dialog Box
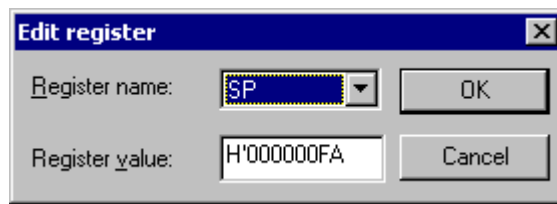
- Register name

  Specify a register name.

- Register value

  Specify the value set in a register

4.4.5   Memory

"Memory" displays the <u>Memory Window.</u>

■ Displaying memory data

When the Memory Window is opened, memory data dump is displayed, starting from the specified address. Memory data can be also modified using the shortcut menu.

This function (command) can be used only when SOFTUNE WORKBENCH is in the debug session.

- When the Memory Window has been already opened

  The Memory Window is activated.

- When the Memory Window is not opened.
  The dialog for specifying the display start address (Figure 4.4-4) opens.

Figure 4.4-4 Dialog for Specifying Display Start Address
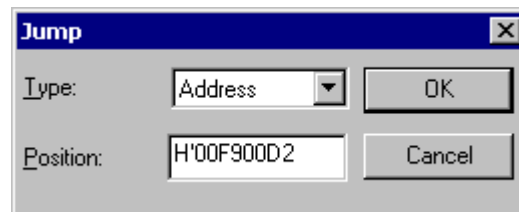
- Type (Line number/Address/Frame)

  Specify the type of display position.

- Position

  Display disassembling from the position specified in the above type.

■ Changing memory data

Memory data can be changed by rewriting the displayed dump value directly. When a character string is entered from the ASCII character string display field, the ASCII code of each character is set automatically in the corresponding address.

The address where the memory dump is to be started can be changed by changing the address field display.

■ Searching memory data

Click the right mouse button in the Memory Window to display the shortcut menu, then select [Search] from the menu.

The search dialog shown in Figure 4.4-5 opens.

Figure 4.4-5 Search Dialog
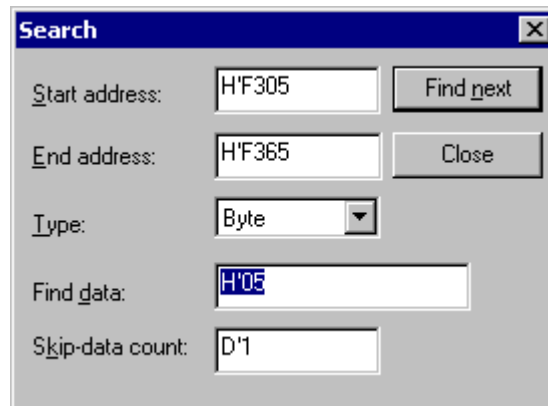
-Start Address

   Specifies start address of search range

-End Address

   Specifies end address of search range

-Type

   Selects data type (Byte/Word/Long/Ascii)

-Find Data

   Specifies matching data type.

   When ASCII is selected as the data type, specify a character string. To search for several data items continuously when the data type is not ASCII, write each item, delimited by a comma (,).

-Skip Data Count

   To search the search range continuously, set 1. When a value greater than or equal to 2 is set as the skip byte count, addresses are skipped for each set count and the search range is searched.

■ Special operation

To fill memory with data or to copy data to memory, start debugging, click the right mouse button in the Memory Window to display the menu, then select [Special Operation] from the menu. The memory operation dialog opens.

Clicking the [OK] button from this dialog starts the function of the open tab.

-Fill

Figure 4.4-6 Memory operation Dialog (Fill)
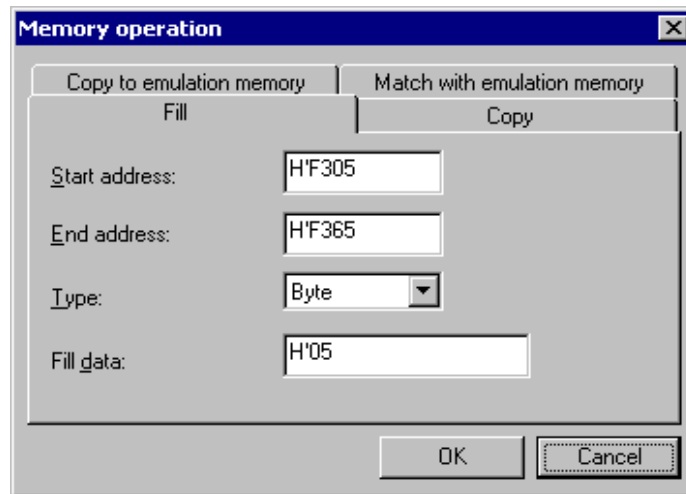
To fill memory with data, open the [Fill] tag, then set the start address, end address, data type, and filling data.

  -Start Address

   Specifies start address of memory area to be filled with data. Data filling is started at this address.

  -End Address

   Specifies end address of memory area to be filled with data. Data filling is continued to this address.

  -Type

   Specifies type of filled data. (Byte/Word/Long/Ascii)

  -Fill Data

   Specifies filling data to fill specified memory area. Several filling data can be specified, delimited by a comma (,).

-Copy

Figure 4.4-7 Memory Operation Dialog (Copy)
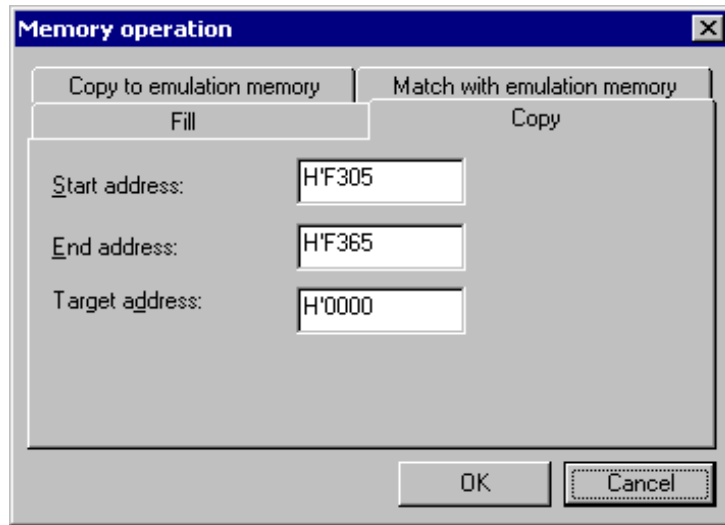
To copy data to memory, open the [Copy] tag, then set the copy source start address, copy source end address, and copy destination start address.

-Start Address

Specifies start address of copy source area. Data copy is started at this address.

-End Address

Specifies end address of copy source area. Data copy is continued to this address.

-Target Address

Specifies start address of copy destination area.

-Copy emulation memory (MB2141)

Figure 4.4-8 Memory Operation Dialog (Copy Emulation Memory)
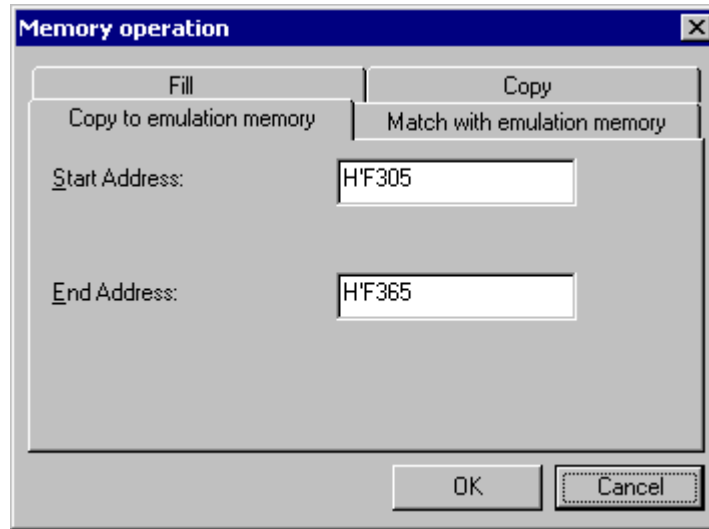
To copy data from user memory to emulation memory, open the [Copy Emulation Memory] tag, then set the transfer start address and transfer end address.

  -Start Address

  Specifies address at which data transfer is to be started. Copy to emulation memory is started at this address.

  -End Address

  Specifies end address of transfer source area. Copy to emulation memory is continued to this address.

-Verify emulation memory (MB2141)

Figure 4.4-9 Memory Operation Dialog (Verify Emulation Memory)
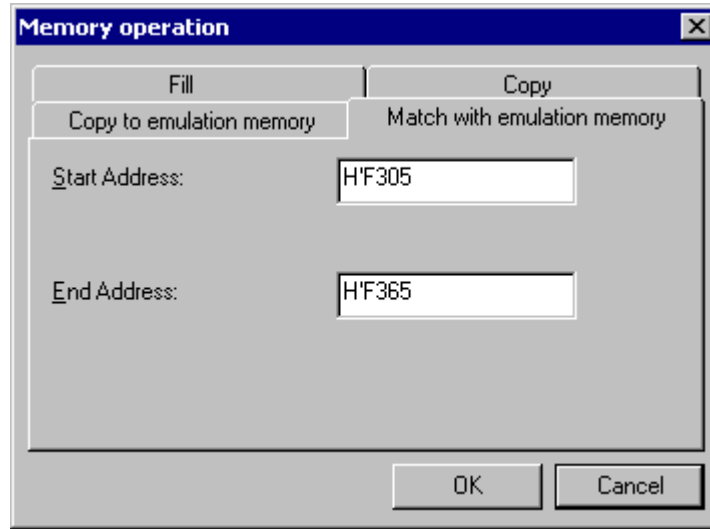
To collate user memory with emulation memory, open the [Verify Emulation Memory] tag, then set the collocation start address and collation end address.

-Start Address

Specify the address at which collation is to be started. Collating user memory with emulation memory is started at this address.

-End Address

Specify the end address of the collation source area. Collating user memory with emulation memory is continued to this address.

■ Comparing memory blocks

To compare memory blocks, click the right mouse button in the Memory Window to display the menu, then select [Compare] from the menu. The comparison dialog shown in Figure 4.4-10 opens.

-Start Address

Specifies start address of comparison source area. Memory block comparison is started from this address.

-End Address

Specifies end address of comparison source area. Memory block comparison is continued up to this address.

-Target Address

Specifies start address of comparison destination area.

Figure 4.4-10 Comparison Dialog
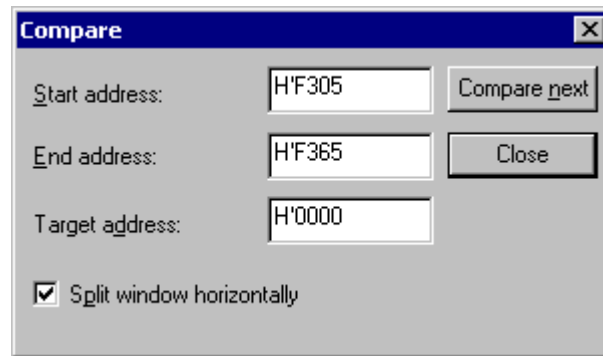
For example, when 4 is specified as the skip byte count, addresses are skipped for each 4 bytes like address 4 and address 8 and the search range is searched.

[Example]

Suppose the data in memory is "0000 01 02 03 01 02 01 02 03 04 01 01 02 03".

When Data Type is Byte, Search Data is 01, and Skip Byte Count is 1, all search data is found. However, when Skip Byte Count is 2, only 01 search data at address 0000 and 000A is found. 01 search data at other addresses is not found.

When Data Type is Byte, Search Data is 01 and 02, and Skip Byte Count is 3, only 01 and 02 search data at address 0000 and address 0003 is found. 01 and 02 search data at address 0005 and address 000A is not found.

■ Edit

To edit memory data, click the right mouse button in the Memory Window to display the menu, then select [Edit] from the menu. The edit dialog shown in Figure 4.4-11 opens.

  -Address

    Specifies address to edit.

  -Data

    Specifies memory data to rewrite.

  -Type

    Specifies size of data to rewrite. (Byte/Word/Long)

Figure 4.4-11 Memory Edit Dialog
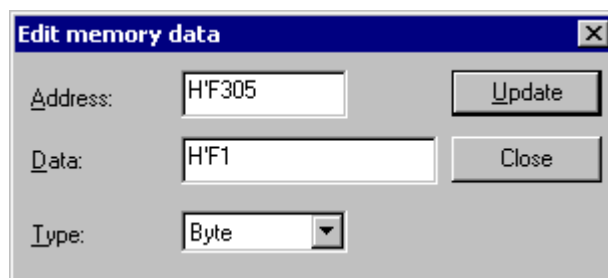
■ Setup

To set the display format of the Memory Window, click the right mouse button in the Memory Window, then select [Display Setup] from the menu. The display setup dialog shown in Figure 4.4-12 opens.

-Display format

Specifies display format of Memory Window.

"Bit", "byte", "word", or "long" can be selected.

-Display Format

Selects whether to display ASCII characters at right of Memory Window.

Figure 4.4-12 Display Setup Dialog Box
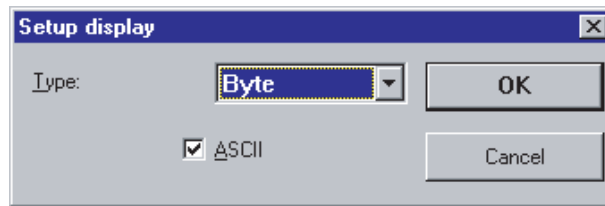
4.4.6   Local

"Local" displays the <u>Local Variable Window</u>.

■ Local Variable Window

The Local Variable Window displays, in tree format, the local variables of the function where the current instruction pointer exists using the function name as the root. The displayed variables cannot be added nor can the displayed variables be canceled.

The variable values modified as a result of program execution are updated automatically. For this reason, the user can observe how variable values change as a result of program execution.

Variable values can be also modified to continue debugging.

■ Setting Radix

The Radix when a variable value is displayed can be set for each variable using the following procedure:
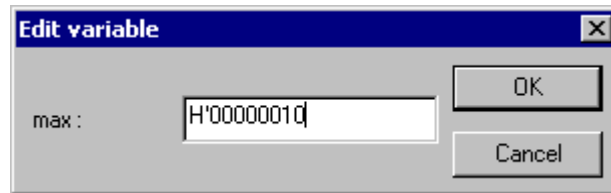
1. Click the right mouse button in the line containing the variable of the base number to be modified.
   The shortcut menu is displayed.

2. Move the mouse cursor to [Base Number].
   The list showing selectable base numbers is displayed in the submenu.

3. Select the base number to modify from the list.

■ Modifying a variable value

The variable value can be modified by the following procedure:

1. Click the right mouse button in the line containing the variable to be modified.
   The shortcut menu is displayed.

2. Select [Edit] from the shortcut menu.
   The variable edit dialog shown in Figure 4.4-13 opens.

3. Set a variable value, then click the [OK] button.

Figure 4.4-13 Variable Edit Dialog

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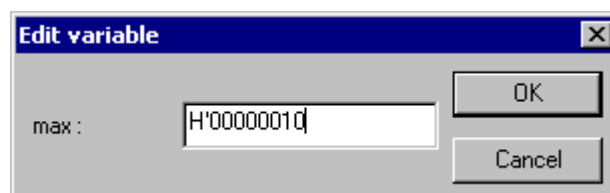
4.4.7　　Watch

"Watch" displays the <u>Watch Window</u>.

■ Watch Window

The Watch Window displays the values of the specified variables in tree format. The variable values modified as a result of program execution are updated automatically. For this reason, the user can observe how variable values change as a result of program execution. The shortcut menu can be used to modify the displayed variable values.

1. Click the right mouse button in the Watch Window.
   The shortcut menu is displayed.

2. Click [Setup].
   The watch setup dialog shown in Figure 4.4-14 opens.

3. Input a variable name from the dialog. Also select a [mode] as required.

4. Select a [watch] window number.

5. Click the [OK] button.

Figure 4.4-14　Watch Setup Dialog
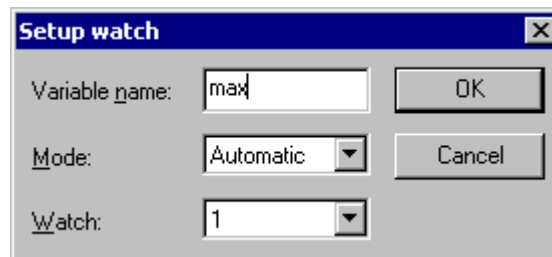
- Variable name

  Specify the name of a variable to be displayed.

- Mode (Automatic/ C language/Assembler)

  Specify the mode, C or assembler language, in which a variable is displayed. For automatic operation, the variable is displayed in the predetermined language mode.

- Watch

  Specify the Watch Window Number name.

■ Setting Radix

The Radix when a variable value is displayed can be set for each variable using the following procedure:

1. Click the right mouse button in the line containing the variable of the base number to modify.
   The shortcut menu is displayed.

2. Move the mouse cursor to [Base Number].
   The list showing selectable base numbers is displayed in the submenu.

3. Select the base number to modify from the list.

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■ Modifying a variable value

The variable value can be modified using the following procedure:

1. Click the right mouse button in the line containing the variable to modify.
   The shortcut menu is displayed.

2. Select [Edit] from the shortcut menu.
   The variable edit dialog shown in Figure 4.4-15 opens.

3. Set a variable value, then click the [OK] button.

Figure 4.4-15 Variable Edit Dialog

Edit variable	✕
max :	H'00000010
	OK
	Cancel

■ Canceling display of unnecessary variable

Display of a set variable that is no longer needed can be canceled from the Watch Window using the following procedure:

1. Click the right mouse button in the line displaying the variable to cancel.
   The shortcut menu is displayed.

2. Select [Delete] from the shortcut menu.

Note:

Display of each array element or each member (e.g., structure) cannot be canceled. When [delete] is executed in each element or member line, display of the array or structure is canceled.

4.4.8   Trace

"Trace" displays the <u>Trace Window</u>.

■ Trace

This function retroactively displays addresses and instructions executed so far. [Enable] can be switched to [Disable] or vice versa during debugging. Display per machine instruction, cycle display, display per source can be selected as trace result display.

■ Refresh

The Trace Window display is not refreshed in real-time according as debugging progresses. Consequently, to display the latest trace, click the right mouse button in the Trace Window to display the shortcut menu, then select [Refresh] from the menu.

■ Buffer size

Trace data is buffered in the trace buffer. The trace buffer becomes full some time during debugging because its size is finite. When the trace buffer becomes full, the program being executed can be stopped.

■ Trace setup

Select [Setup] from the shortcut menu.

-Trace [Simulator/MB2141]

Figure 4.4-16 Trace Setup DIalog
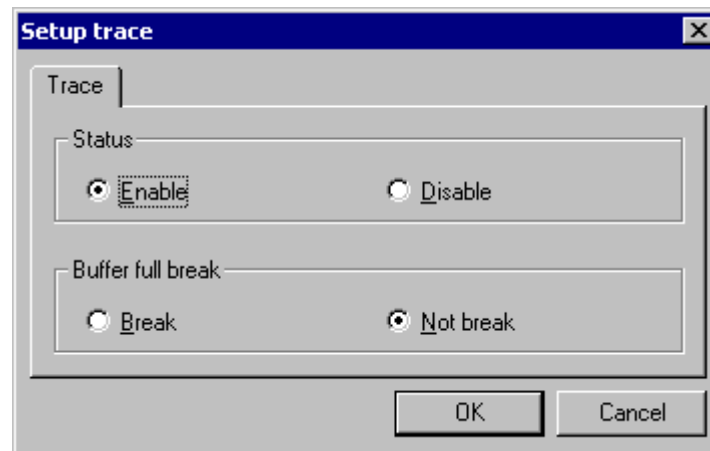
-Status

Specifies control status.

-Buffer Full Break

Specifies whether or not to break trace buffer full.

Note:

In single trace and multitrace, items are individually set.

■ Trace Search

Select [Search] from the shortcut menu.

-Address (Simulator)

Figure 4.4-17 Trace Search Dialog (Address)
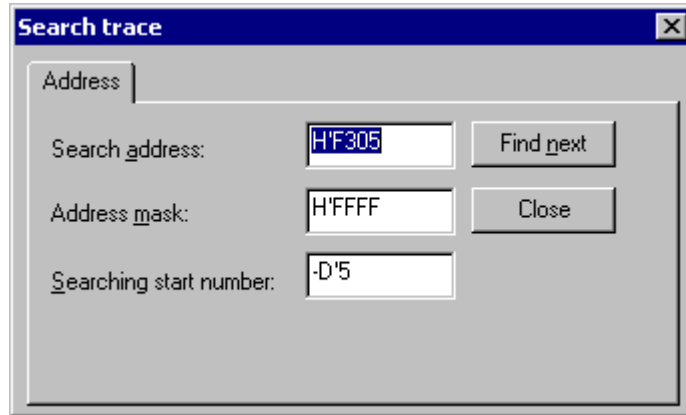
-Start Address

Specifies start address of search range.

-End Address

Specifies end address of search range.

-Search Start Number

Specifies number of frame where search to start.

-Trace (Emulator)

Figure 4.4-18 Trace Search Dialog (EML)
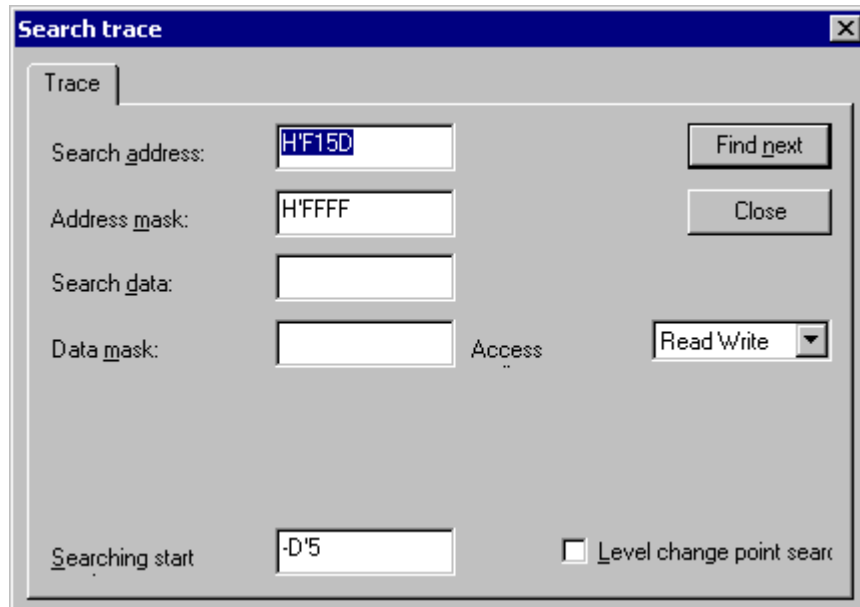
-Search Address

  Specifies address to search.

-Address Mask

  Specifies address mask. Only bit-1 addresses are compared.

-Search Data (MB2141)

  Specifies data to find.

-Data Mask (MB2141)

  Compares only 1-bit data.

-Search Start Number

  Specifies number of frame where search to start.

-Access Attribute (MB2141)

  Specifies access attribute. (Code/Read/Write/Code Read/Read Write/Code Read Write)

-Level Change Point Search (MB2141)

  Specifies sequencer level change point. This item is not displayed when multitrace search is executed.

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■ Example of address mask

The relationship among search address, address mask and the actual address to be found is shown in Table 4.4-1 .

Table 4.4-1 Relationship among Search Address, Address Mask, and the Actual Address to be found

Search address	Address mask	Actual address to be found
H'F8CA	H'FFFF	H'F8CA
	H'FF00	Any address from H'F800 to H'F8FF

■ Back trace

Select [Back Trace] from the shortcut menu.

Figure 4.4-19 Back Trace Dialog
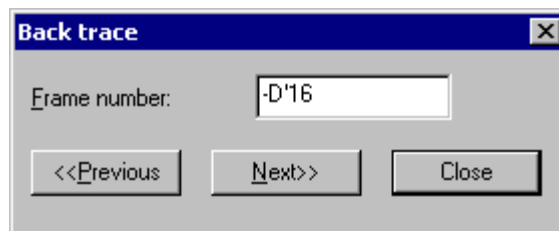
- Frame Number

Specifies frame number corresponding to Trace Window.

4.4.9   Command

"Command" displays the <u>Command Window</u>.

■ Command

A debugger command can be entered and executed directly from the displayed Command Window. The command execution result is also displayed in the Command Window. For the supported debugger commands, refer to "SOFTUNE WORKBENCH Command Reference Manual".

4.4.10   Tool Bar, Status Bar

Tool bar sets display items.   Status Bar switches display to nondisplay or vice versa.

■ Tool bar

Any of the following tool button sets displayed in the tool bar can be selected:

-Common bar

-Build

-Debug

-Flag

-Flash

-Project

For the buttons included in the above sets, see Section 3.2 Tool Bar.

■ Status Bar

"Status Bar" can only switch display to nondisplay or vice versa. For status bar display items, see Section 3.3 Status Bar.

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4.4.11   Object

"Object" displays the <u>Object Window</u>.

■ Object Window

The Object Window displays the detailed object information used by REALOS. This window can be also used to issue system calls.

To display detailed object information, select an ID, then select [Property] from the shortcut menu.

■ Detailed display of task

Figure 4.4-20 Detailed Task Display Dialog
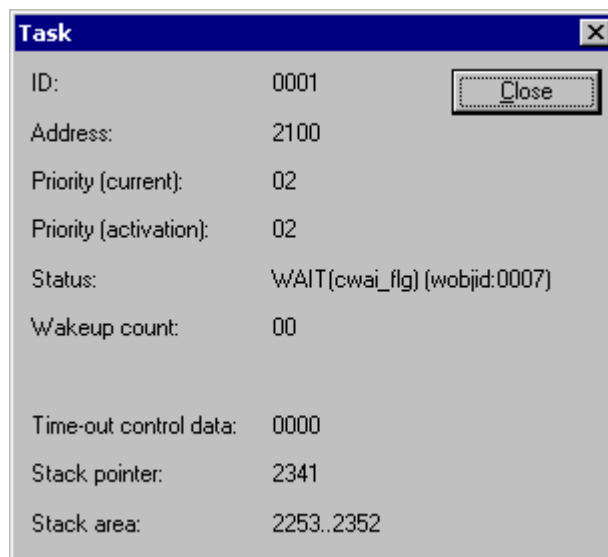
- ID Task	ID number
- Address	Task control block address
- Priority (Current)	Current task priority
- Priority (Start-up)	Task priority at start-up
- Status	Task state
TTS_RDY	Running or ready state
TTS_DMT	Dormant state
TTS_WAI	Wait state
TSS_SUS	Suspend state
Wait factor:	The wait factor is displayed when SOFTUNE WORKBENCH is in the object wait state.
TTW_SLP	slp_tsk/tslp_tsk wait state
TTW_DLY	dly_tsk wait state
TTW_SEM	wai_sem wait state

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TTW_FLG	wai_flg wait state
TTW_MBX	rcv_msg wait state
TTW_MPL	get_blk wait state
- Wakeup Count	Wakeup request count
- Timeout Control Data	Timeout management data
- Stack Pointer	Stack pointer
- Stack Area	Stack area

■ Detailed display of semaphore

Figure 4.4-21 Detailed Semaphore Display Dialog
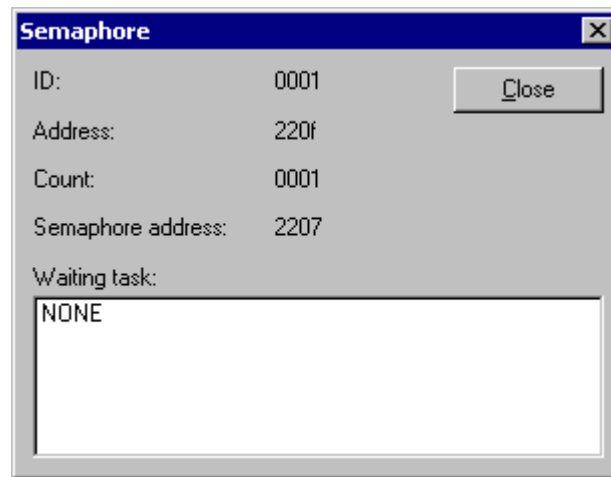
- ID	Semaphore ID number
- Address	Address of semaphore control block
- Semaphore Address	Semaphore queue address
- Count	Current semaphore count
- Waiting Task	ID number of task in queue

■ Detailed display of event flag

Figure 4.4-22 Detailed Event Flag Display Dialog

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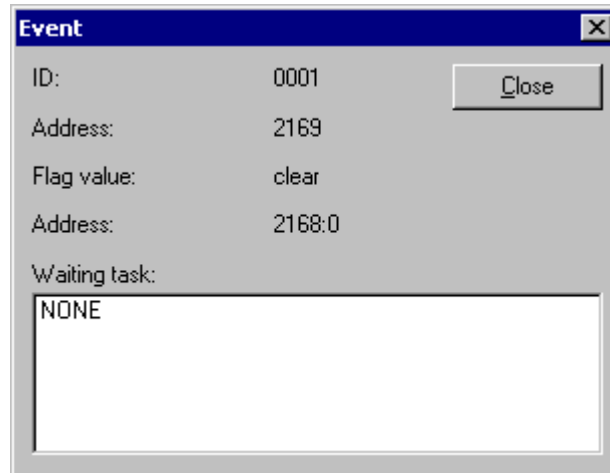
- ID   event flag ID number

- Address   Address of event flag control block

- Flag value   current event flag pattern

- Flag address   address of current event flag table

- Waiting Task   ID number of task in queue

■ Detailed display of mailbox

Figure 4.4-23 Detailed Mailbox Display Dialog
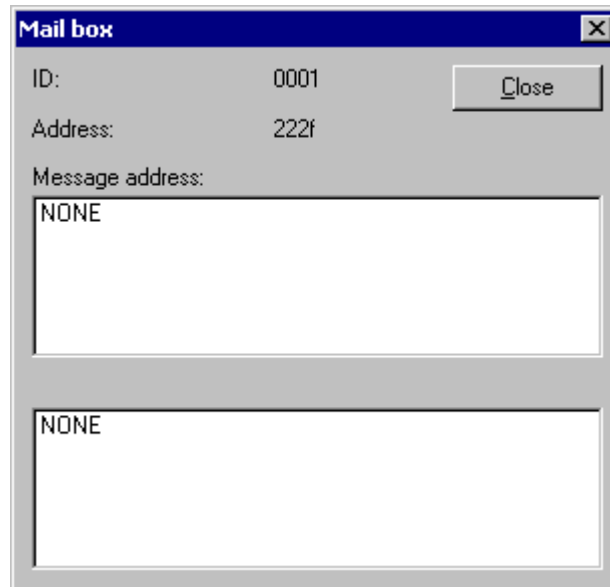
- ID   Mailbox ID number

- Address   Address of mailbox control block

- Message State   Message address

- Waiting Task   ID number of task in queue

Waiting Task or Message State is displayed according to the wait factor.

■ Detailed display of cyclic handler

Figure 4.4-24 Detailed Cyclic Handler Display Dialog
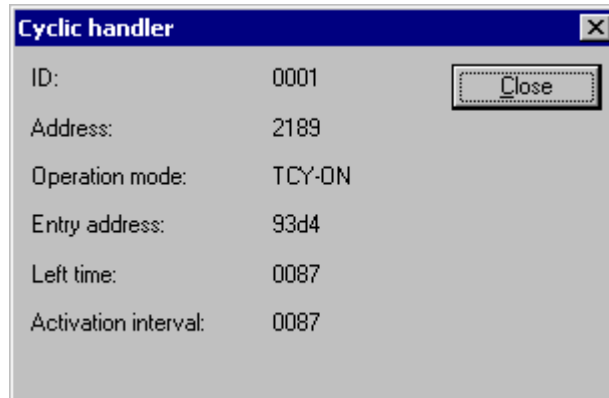
- ID	ID number of cyclic handler
- Address	Address of cyclic handler control block
- Operation Mode	Cyclic handler state (Enable/Disable)
- Handler Address	Cyclic handler address
- Left Time	Residual time till activation
- Activation Interval	Cyclic time interval

■ Detailed display of ready queue

Figure 4.4-25 Detailed Ready Queue Display Dialog
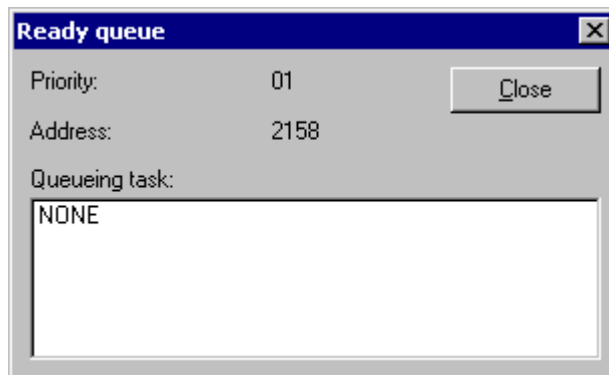
- Priority	Priority
- Address	Address of ready queue header table
- Queueing task	ID number of queued task

■ Detailed display of timer queue

Figure 4.4-26 Detailed Timer Queue Display Dialog
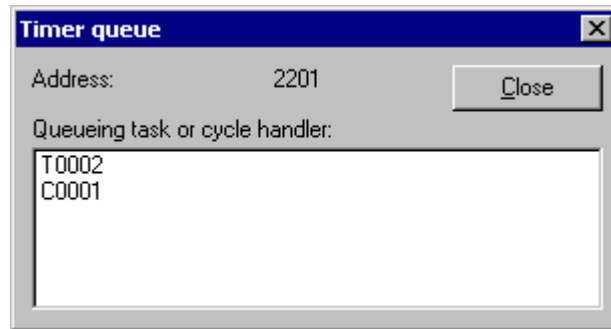
- Address   Timer queue address

- Queueing task cycle handler   Cyclic handler ID placed in the timer queue or timeout waiting task ID

4.4.12   Coverage

"Coverage" displays the <u>Coverage Window</u>.

■ Coverage Window

The window displaying the coverage measurement result is opened for setting the coverage and displaying the total coverage rate.

This window can be used only for the debug session for the MB2141 (emulator).

■ Coverage setup

Select [Setup] from the shortcut menu of the Coverage Window.

Figure 4.4-27 Coverage Setup Dialog
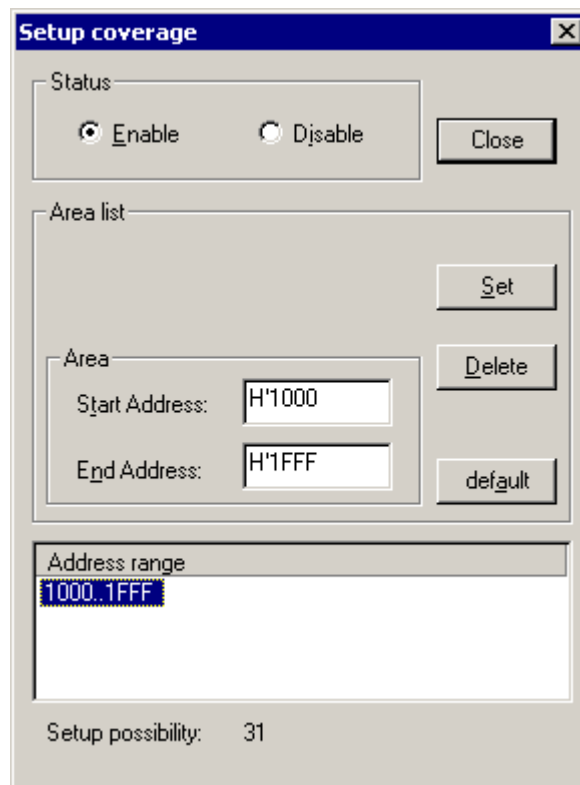
- State   Select [Enable] or [Disable].

- Area list   Set [Attribute] and [Area].

To delete an area, click the [Delete] button.

To set an area automatically after the load module file has been read, click [Default].

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■ Coverage rate

Select [Total Coverage] from the shortcut menu of the Coverage Window.

The total coverage rate and the coverage rate for each address range are displayed.

Figure 4.4-28 Coverage Rate Dialog Box
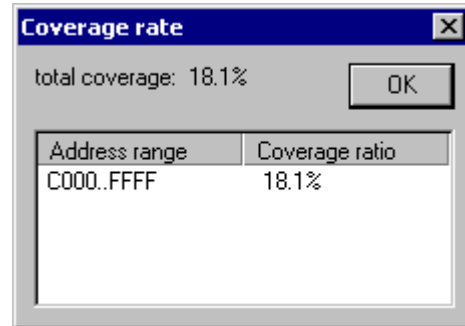
4.4.13   Performance

"Performance" displays the <u>Performance Window</u>.

■ **Performance Window**

Open the Performance Window to display the performance measurement result. The Performance Window is used to control and set performance.

This function can be used only in the MB2141 (emulator).

■ **Performance control**

Select [Setup] from the shortcut menu of the Performance Window. When the buffer is full, set whether to break buffer full.

Figure 4.4-29 Performance Control Dialog
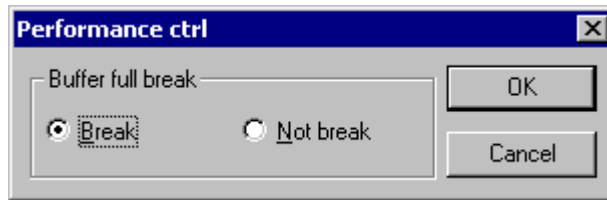
■ **Performance display setup**

Select [Display Scope] from the shortcut menu of the Performance Window.

Figure 4.4-30 Performance Display Setup Dialog
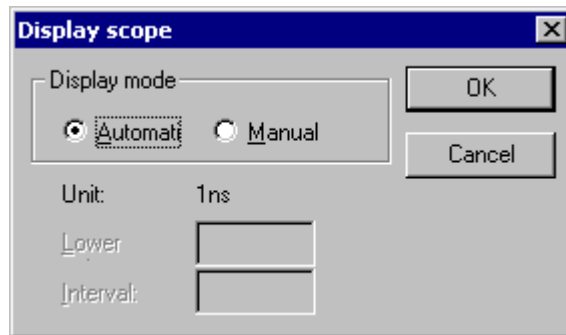
- Display Mode

    Select [Auto] or [Manual]. When [Manual] is selected, set [Lower Scope] and [Interval Scope].

- Lower Scope

    Specify display start time for detailed measurement result display.

- Interval Scope

    Specify display interval time for detailed measurement result display.

- Unit

The values set in [Timer minimum measuring unit] of the [Emulation] tab in the debug environment setup dialog box are displayed. This dialog opens when [Debug environment] is selected from the [Setup] Menu.

4.4.14　Fonts

The Fonts for each window are changed.

■ Setting fonts

The font information (font name and size) currently set for each window can be displayed and the setting can be changed. Also, all font settings can be set to the defaults.

During debugging, the fonts for debug-related windows (such as Source window) can be changed.

■ Changing fonts

Change fonts as follows:

1. Select the [Display]-[Font] menu.
   - The font setting dialog is displayed (Figure 4.4-31).

2. Select the window with the font to be changed and click the [Font...] button.
   - The font setting dialog is displayed (Figure 4.4-31).

3. Specify the font name and size and click the [OK] button. The font type that can be selected depends on the window.

4. When the [OK] button in the font setting dialog (Figure 4.4-31) is clicked, the window fonts are changed.

■ Resetting fonts

Reset fonts as follows:

1. Select the [Display]-[Font] menu.
   - The font setting dialog is displayed (Figure 4.4-31).

2. Click the [All Reset] button.

3. The fonts for the window displayed in [Window] are all reset to the defaults.

4. When the [OK] button is clicked, the window fonts are returned to the defaults.

Figure 4.4-31 Set Font Dialog
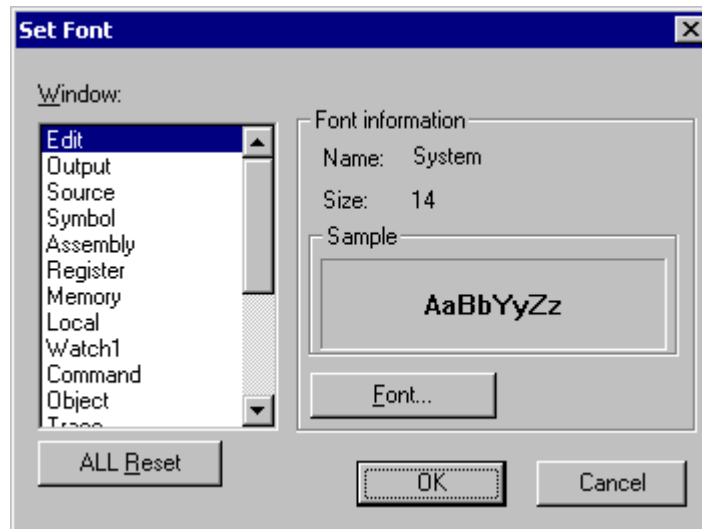
Figure 4.4-32 Font Dialog

4.5   Project

"Project" sets project-related items and executes make/build.

■ **Project-related item setup**
- Active Project
- Add Project
- Add Member
- Setup Workspace
- Setup Project
- Customize Build
- Project Dependencies
- Configuration
- Include Dependencies

■ **Make/build execution**
- Compile
- Make
- Build
- Stop

Note:

No selection can be made during debugger startup. Quit the debugger.

4.5.1   Active Project

The active project is replaced.

■ Active Project

When the names of all projects in workspace are displayed in the submenu, click the name of the project that is made active.

A checkmark is placed at the left side of the active project name in the menu.

4.5.2   Add Project

A project is added to workspace.

■ Add Project

There are the following two menus to add a project:

- New

A new project is created and stored in workspace.

- Project

An existing project is stored in workspace.

Note:

If any project having the same name as that of the project to be stored is in workspace, it cannot be stored in workspace.

4.5.2.1   Add Project - Create

A new project is created and stored in workspace.

■ Add Project - Create

Figure 4.5-1 Create Project Dialog
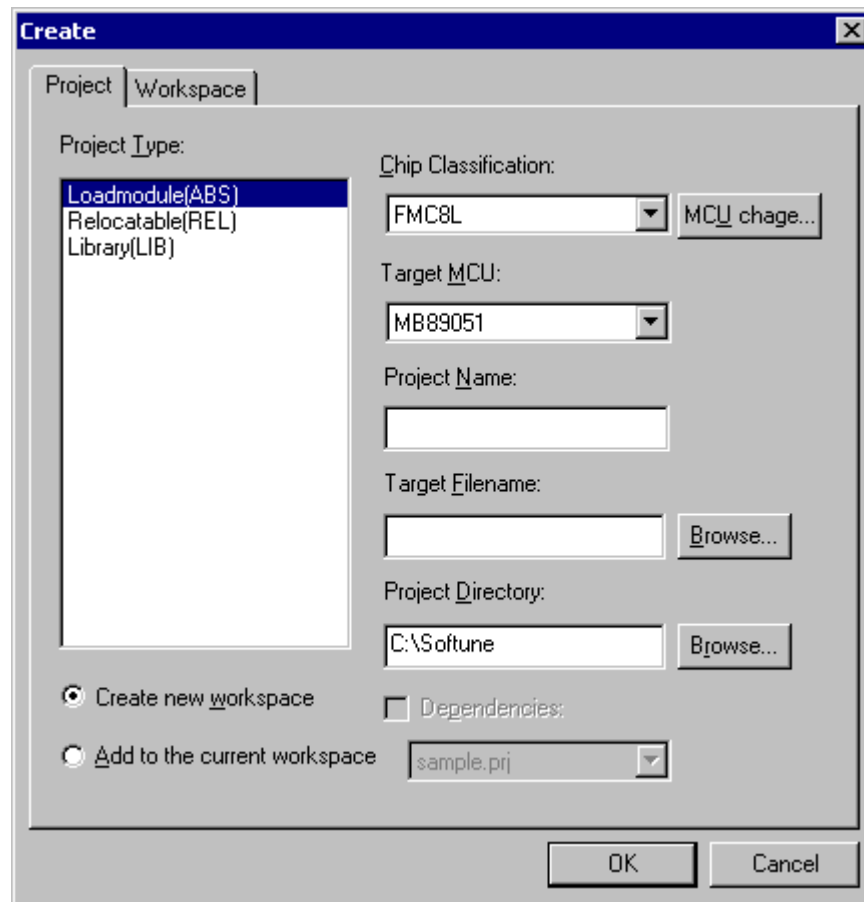
- Project Type

   Select the project type. For details about the project type, see Section 2.4 Storing of Project.

- Create new workspace

   New workspace is created for storage of a project. This item cannot be selected.

- Add to the current workspace

   A project is stored in the currently opened workspace.

- Chip Classification

   Selects the chip classification.

- Target MCU

   Selects the target MCU.

- Project Name

  Specifies the project name.

- Target File name

  Specifies the target file name.

- Project Directory

  Specifies the directory of the project.

- Dependencies

  When the project name is specified in the combo box, the project to be stored is defined as a subproject in the specified project.

- MCU change

  Opens MCU change dialog box.

■ Procedure for Addition

For the procedure for addition of a project, see Section 2.4 Storing of Project.

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4.5.2.2   Add Project - Existing Project

An existing project is stored in workspace.

■ Add Project - Existing Project

Figure 4.5-2 Add Project Dialog
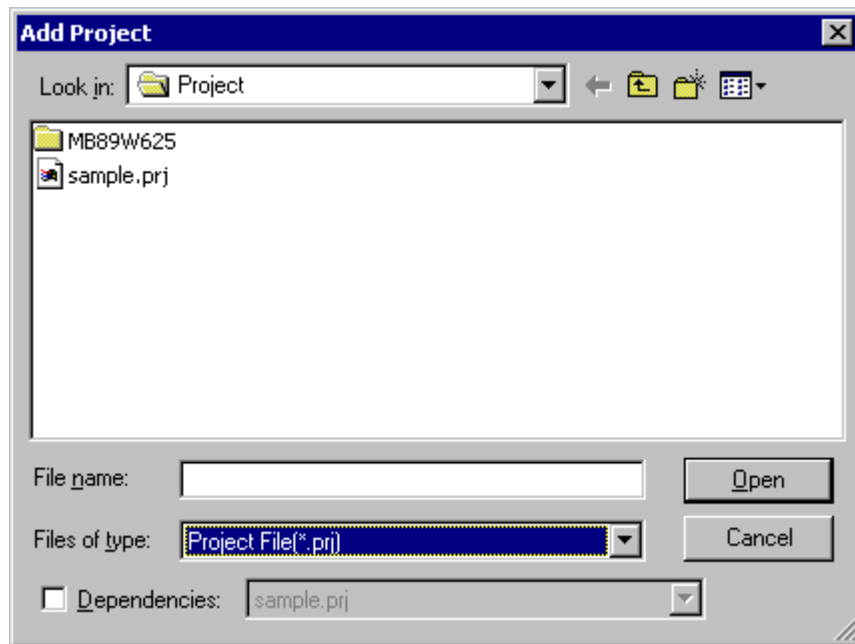
- Dependencies

    When the project name is specified in the combo box, the project to be stored is defined as a subproject in the specified project.

■ Procedure for Addition

For the procedure for addition of a project, see Section 2.4 Storing of Project.

4.5.3   Add Member

"Add Member" adds a file to the project.

■ Add Member

There are the following menus to add a member:

- File

A file is specified and stored in the project.

- Directory

A directory is specified to store its file and folder in the project.

The file dialog box for file selection is displayed. Two or more files can be selected at a time.

The selected files are added to the project and displayed in the Project Window.

4.5.3.1 Add Member - File

A file is specified and stored in the project.

■ Add Member - File

The file dialog box for file selection is displayed. Two or more files can be selected at a time.

Figure 4.5-3 Add Member Dialog-File
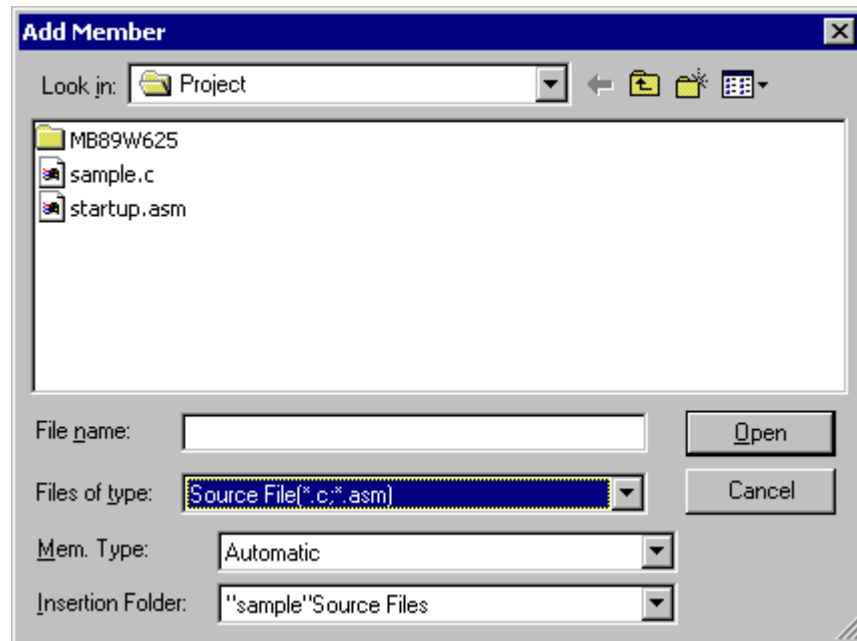
- Mem. Type

    The file to be stored is stored as the type of specified member in the project. If "Auto" is selected, the type of member is determined by the extension.

- Insertion Folder

    The project in which a file is stored and the folder into which the file is inserted are specified. The character string enclosed between "and" is the project name.

■ Procedure for Addition

For the procedure for addition of a member, see Section 2.5 Creating and Registering Source File in Project.

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4.5.3.2   Add Member - Directory

A directory is specified to store its file and folder in the project.

■ Add Member - Directory

Figure 4.5-4 Add Member Dialog-Directory
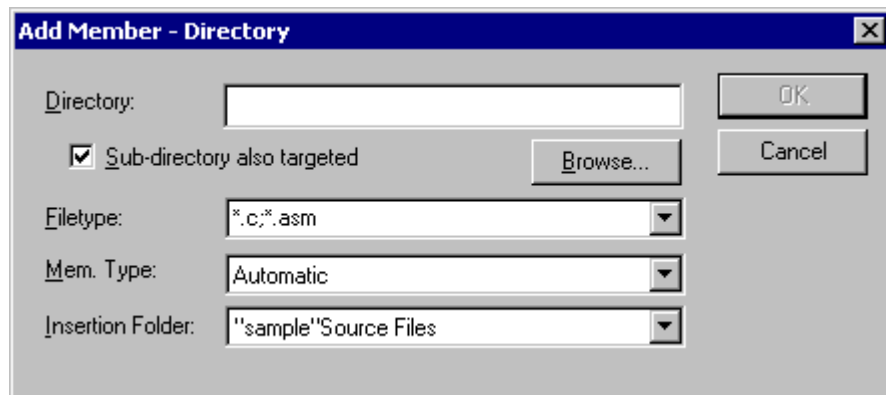
- Directory

    Specifies the directory having the file to be stored.

- Sub-directory also targeted

    When turned on, the file in the subdirectory in the specified directory is stored. A subdirectory is hierarchically created as a folder in the project.

- File type

    Only the file having a specified extension is stored in the project.

- Mem. Type

    The file is stored as the type of the specified member in the project. If "Auto" is selected, the type of member is determined by the extension.

- Insertion Folder

    Specify the project in which a file is stored and the folder into which the file is inserted. The character string enclosed between "and" is the project name.

■ Procedure for Addition

    For the procedure for addition of a member, see Section 2.5 Creating and Registering Source File in Project.

4.5.4　Setup Workspace

The basic setting regarding workspace is performed.

■ **Setup Workspace**

Figure 4.5-5　Setup Workspace Dialog
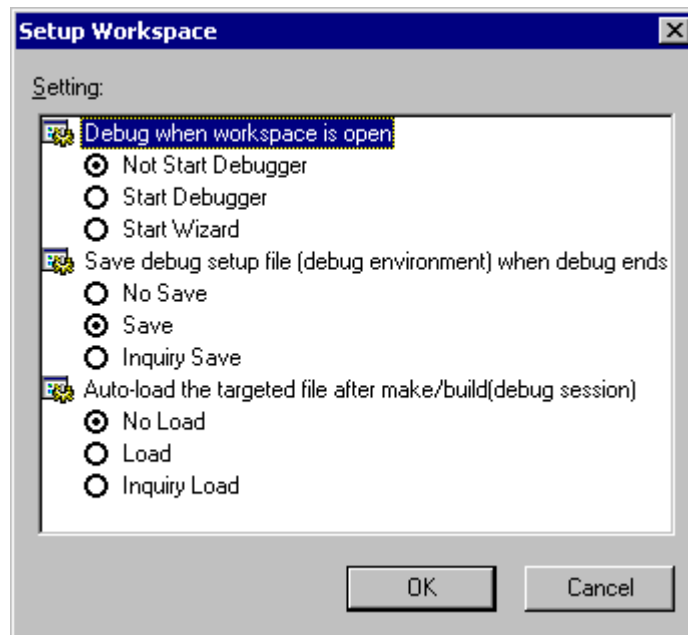
- Debug when workspace is open

　Specifies the debug action just after the workspace opens.

- Save debug setup file (debug environment) when debug ends

　Specifies whether to save setup information upon completion of debug session.

- Auto-load the targeted file after make/build (debug session)

　Specifies whether to reload target file after make/build executed in debug session.

4.5.5   Setup Project

Setting regarding the project is performed.

■ Setup Project

The Set Project dialog has the part where the target item is set and the part where setting is performed.

The set values are enabled when the [Apply] or [OK] button is clicked.

The directory can be described in a relative path from the project.

If two or more target items are set, the values are displayed as follows:

- Edit

  If the values are equal in all target items, they are displayed as they are.

  If the values are not equal in at least one target item, they are blanked.

- Check button

  If the values are equal in all target items, they are displayed as they are.

  If the values are not equal in at least one target item, they are dimmed.

Figure 4.5-6 Setup Project Dialog
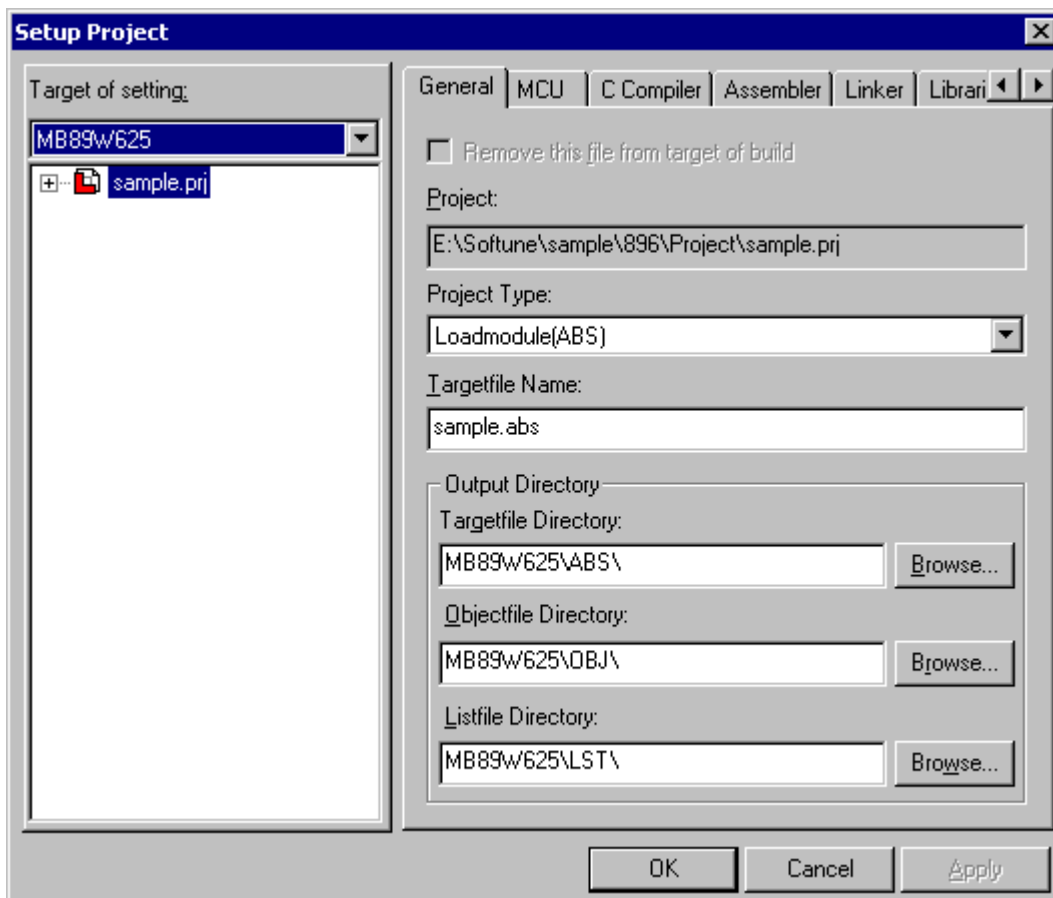
■ **Setup Target**

The items to be set in the combo box and tree view at the left side of the dialog are specified.

- Target of setting combo box: All the configuration names of projects in workspace are displayed.

Configuration name: The selected configuration is set.

[All Configuration]: All configurations are set.

[Multiple Configuration]: The Multiple Configuration dialog (Figure 4.5-7) is opened. The two or more configurations specified in the dialog are set.

-Target of setting Tree View: All projects having the configuration names specified in the combo box are displayed. The items that can be set vary depending on the selected items. When two or more items are selected, they can be changed at a time. If the items of different types are selected, only overlapped items can be set.

Project: The [General] items, [MCU] items, common options ([C Compiler], [Assembler], [Linker], [Librarian]), and [Debug] items can be set.

C source file: The [General] items and individual options ([C Compiler]) can be set.

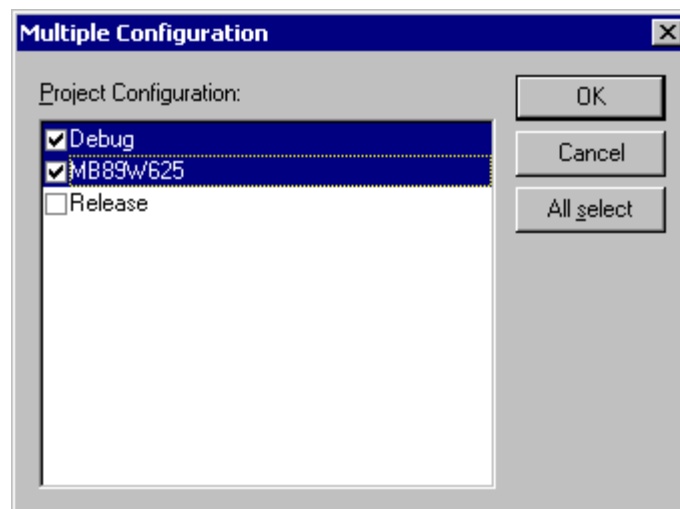Assembler source file: The [General] items and individual options ([Assembler]) can be set.

Library file: The [General] items can be set.

Object file: The [General] items can be set.

Relative file: The [General] items can be set.

Folder: All files in the folder are set.

Figure 4.5-7 Multiple Configuration Dialog

■ Setting Items

The following items can be set or changed in tab form.

- General

   The project type, target name, output directory, and file building are set.

- MCU

   The items regarding the MCU, such as the chip type and target MCU, are set.

- C Compiler

   The C compiler options are set.

- Assembler

   The assembler options are set.

- Linker

   The linker options are set.

- Librarian

   The librarian options are set.

- Converter

   The converter start and converter options are set.

- Debug

   The debug options and debug setup information are set.

4.5.5.1 General

This section explains the items that can generally be set in the [Setup Project] dialog.

■ Setting of General

1. Click the [General] tab in the [Setup Project] dialog.

2. Set the following items as needed.

   [Remove this file from target of Build]

   [Project type]

   [Output Directory]

Figure 4.5-8 Setup Project Dialog-General
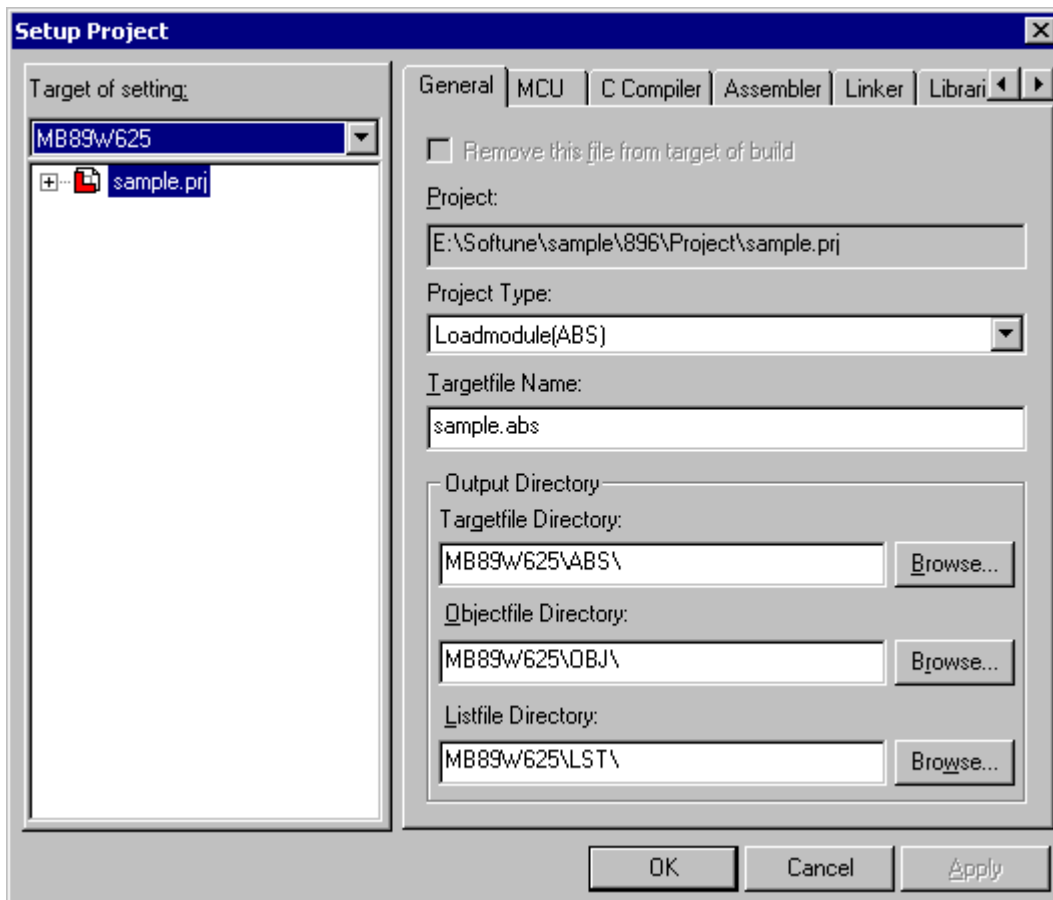
- Remove this file from target of build

    The file selected in the tree view is removed from the Make/Build target. This item can be set when C source file, Assembler source file, Library file, Object file, or Relative file is selected.

- Project

    The full path to the project file is displayed.

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- Project Type

Set the type of project file selected in the tree view (absolute (ABS)/relative (REL)/library (LIB)). If the REALOS (ABS)) type is selected, the project type cannot be changed. This item can be set when the project file is selected singly.

The project type cannot be set for each configuration.

- Target File Name

Set the target file name. This item can be set when only Project (two or more intems may be set) is selected.

- Target File Directory

Set the directory of the target file. This item can be set when only Project (two or more items may be set) is selected.

- Object File Directory

Set the output directory of the object file output in compiling or assembling. This item can be set when only Project (two or more items may be set) is selected.

- List File Directory

Set the output directory of the list file output in compiling or assembling. This item can be set when only Project (two or more items may be set) is selected.

4.5.5.2   MCU

This section explains the items that can be set MCU in the [Set Project] dialog.

■ Setting of MCU

1. Click the [MCU] tab in the [Set Project] dialog.
2. Set the following items as needed: [Chip Classification], [Target MCU], [Set CPU information], [MCU Change].

Figure 4.5-9 Setup Project Dialog-MCU
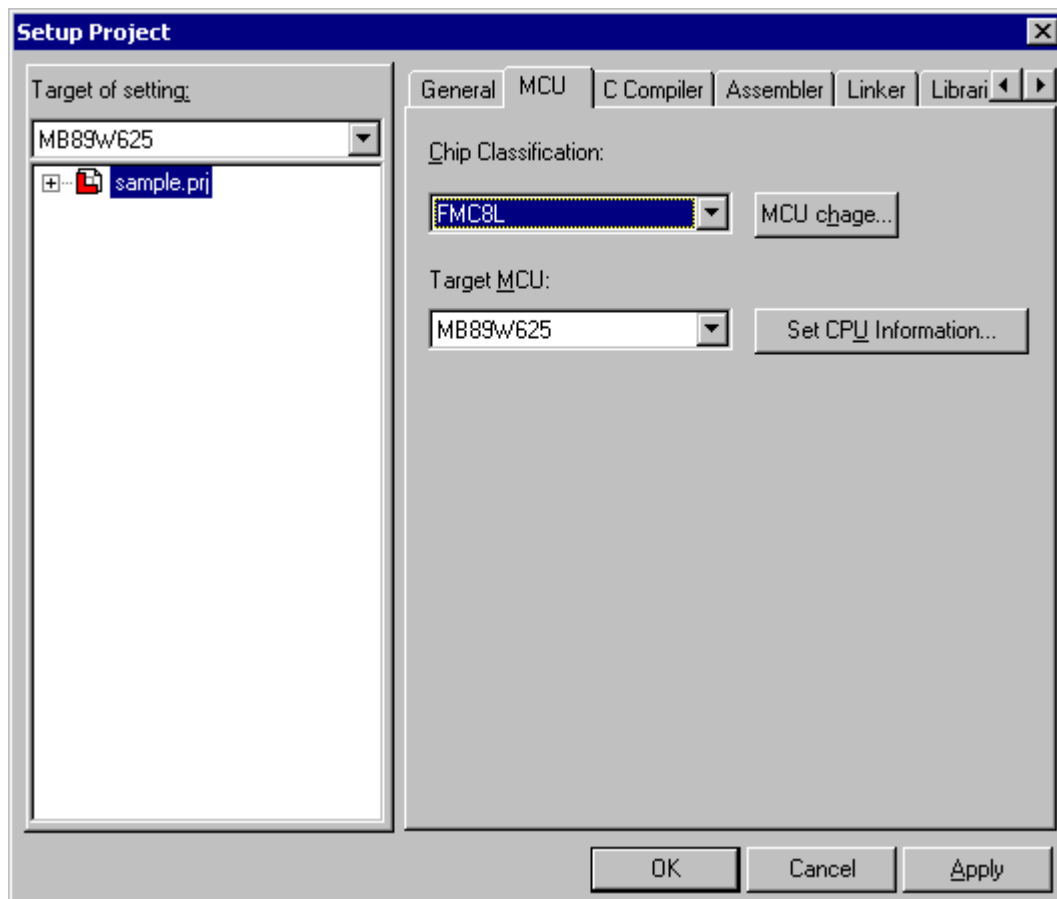
- Chip Classification

   Selects the type of chip.

- Target MCU

   Select the target MCU of the chip type selected in [Chip Classification].

- Set CPU Information

   The Set CPU Information dialog is opened.

- MCU Change

   Open MCU Change dialog box.

■ Setting of CPU Information

- Setup CPU information - IRQ and ICR

Figure 4.5-10 CPU Information setup Dialog (IPQ and ICR)
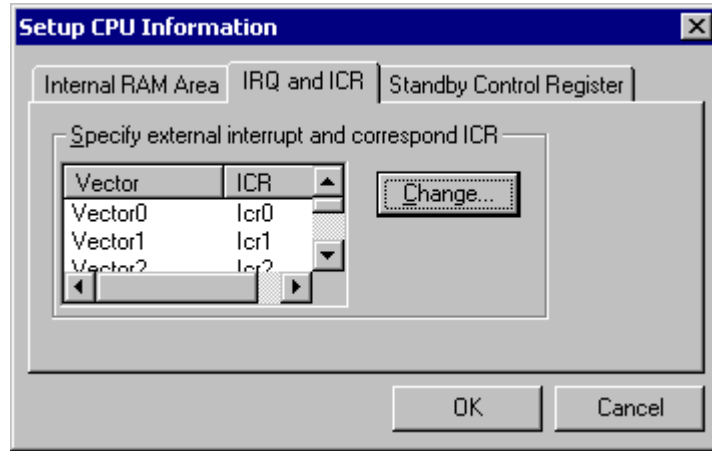
- Relationship between Vector and ICR

    The correspondence between external interrupts (Vector) and the interrupt control register (ICR) varies with the target MCU.

    This correspondence is specified by the simulator debugger.

- Setting Correspondence between External Interrupts and ICRs

    Set the interrupt control registers (ICRs) corresponding to vector numbers. When a vector number is selected and the [Change] button is clicked, the dialog shown in Figure 4.5-11 opens.

Figure 4.5-11 Correspondence between External Interrupts and ICRs

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- Setup CPU Information - Internal RAM Area

Figure 4.5-12 CPU Information Setup Dialog (Internal RAM Area)
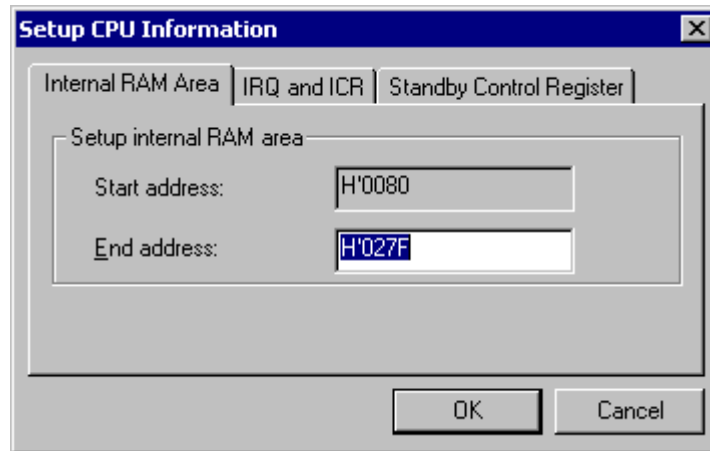
- Start Address

Sets start address of internal RAM area.

- End Address

Sets end address of internal RAM area.

- Setup CPU Information - Standby Control Register

**Figure 4.5-13 CPU Information Setup Dialog (Standby Control Resister)**
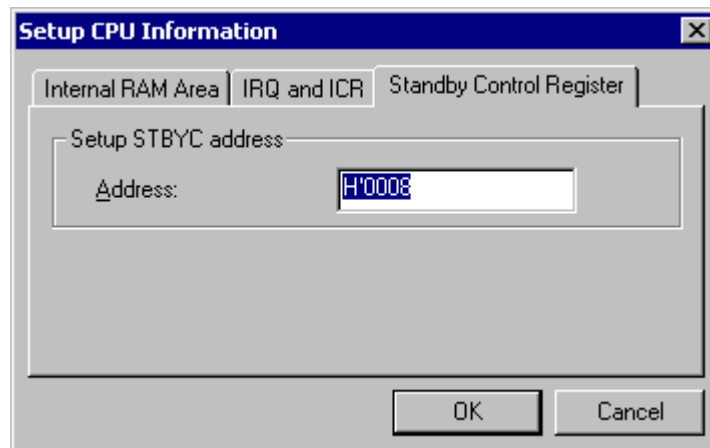
- Address

Sets STBYC address.

■ Setting of MCU change dialog box

1. Click [MCU change] button.
   The MCU change dialog box shown in Figure 4.5-10 opens.

2. From [Current file], choose the CPU information to be used. If a CPU information file to be used is not found, add it with the [Add] button for [CPU information file list].
   The MCU list for the selected CPU information file appears in [Chip] and [Target MCU].

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3. Choose the MCU to be changed from the [Chip] and [Target MCU], and click [OK] button.
    The change you specified takes effect.

Figure 4.5-14 MCU change dialog box
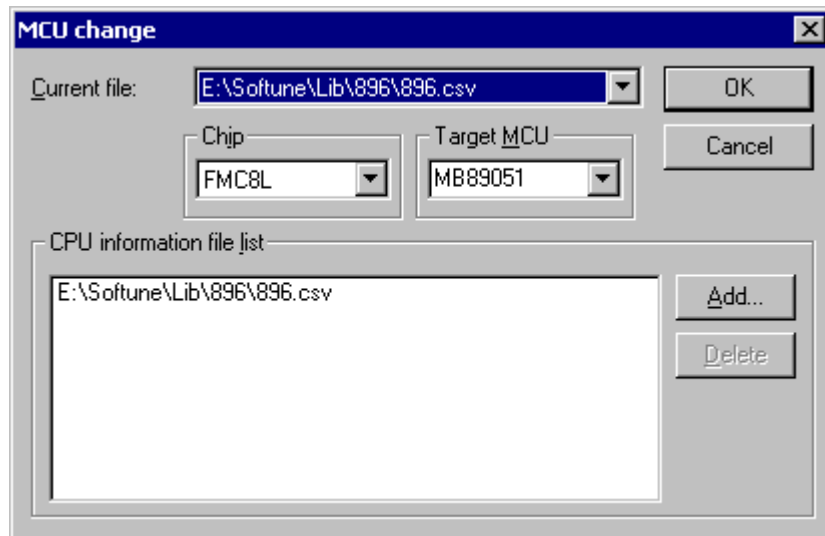
- Current file

    Choose the CPU information file to be used. The MCU list for the selected CPU information file appears in [Chip] and [Target MCU].

- Chip

    Choose a chip type.

- Target MCU

    Choose a target MCU for the chip type that is chosen from the [Chip] area.

- CPU information file list

    Lists the registered CPU information files.

- Add

    Adds a CPU infromation file.

- Delete

    Deletes a CPU information file that is chosen from the [CPU information file list].
    Note that the files that are retrieved by default cannot be deleted.

Note:

    There are no functions with some CPU.

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4.5.5.3 Setting C Compiler Options

This section explains how to set C compiler options.

■ Setting C compiler options

1. Click the [C Compiler] tab from the project setup dialog.

2. Select category.

   [General], [Define Macro], [Include Path], [Optimize] or [Language specifications] can be selected as category.

   Specified options can be checked using [Option] at the bottom of the dialog.

   If the individual option is set, the [Common Option] button can be clicked to return to the common option.

   The macro description can be used to describe options. For the macro description, refer to Section 1.11 in SOFTUNE WORKBENCH Function Manual.

■ Setting [General] Options

Figure 4.5-15 General Option Setup Dialog
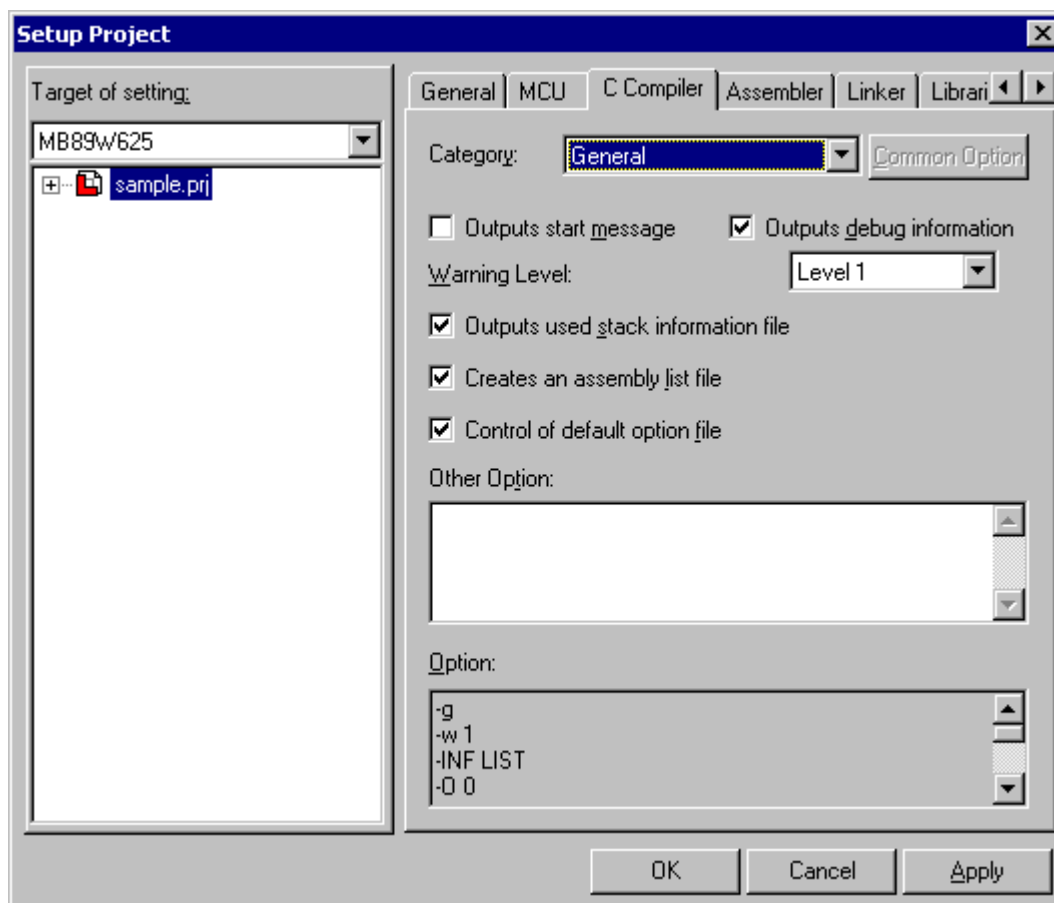
The following options can be set from the normal option setup dialog.

- Outputs start message (-V).

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- Outputs debug information (-g).

- Outputs warning message (or warning level) (-w).

- Outputs stack usage information list (-INF STACK).

- Creates assembly list file (-INF LIST).

- Control of default option file (-Xdof).

Depending on CPU classification, [Output warning level] (levels 0 to 3) may be selected instead of [Output warning message].

At Specification in [Other Option], all C compiler options can be written like start-up options from command lines. Write the options that do not belong to any C compiler option setup categories directly at Specification in [Other Option].

■ Setting a macro name

Figure 4.5-16 Macro Name Setup Dialog
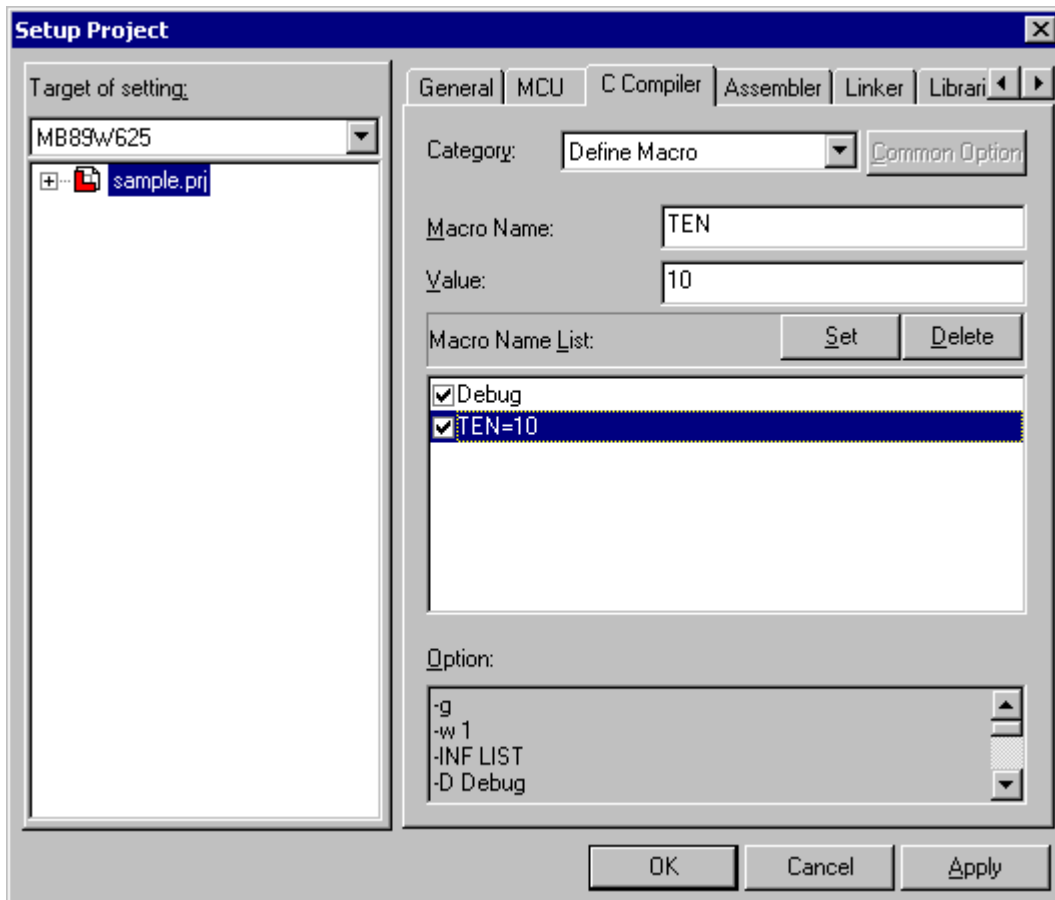
If there are two or more items to be set, the macro name found in some item is grayed.

1. Select the [Define Macro] category.

    The macro name setup dialog shown in Figure 4.5-16 opens.

2. Specify the macro name.

3. Specify the setting value as required.

4. Click the [Set] button.

    The specified macro name is set as a define (-D) option.

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5. To set the specified macro name as an undefine (-U) option, reset the check mark of the macro name from [Macro Name List].

Note:

When "undefine" is set, both the define and undefine options are output for the same macro name. This causes no problem because the undefine option precedes the define option.

■ Resetting a macro name

1. Select the [Define Macro] category.
   The macro name setup dialog box shown in Figure 4.5-16 .

2. Select the macro name to reset from [Macro Name List].

3. Click the [Delete] button.

■ Setting an include path

Figure 4.5-17 Include Path Setup Dialog
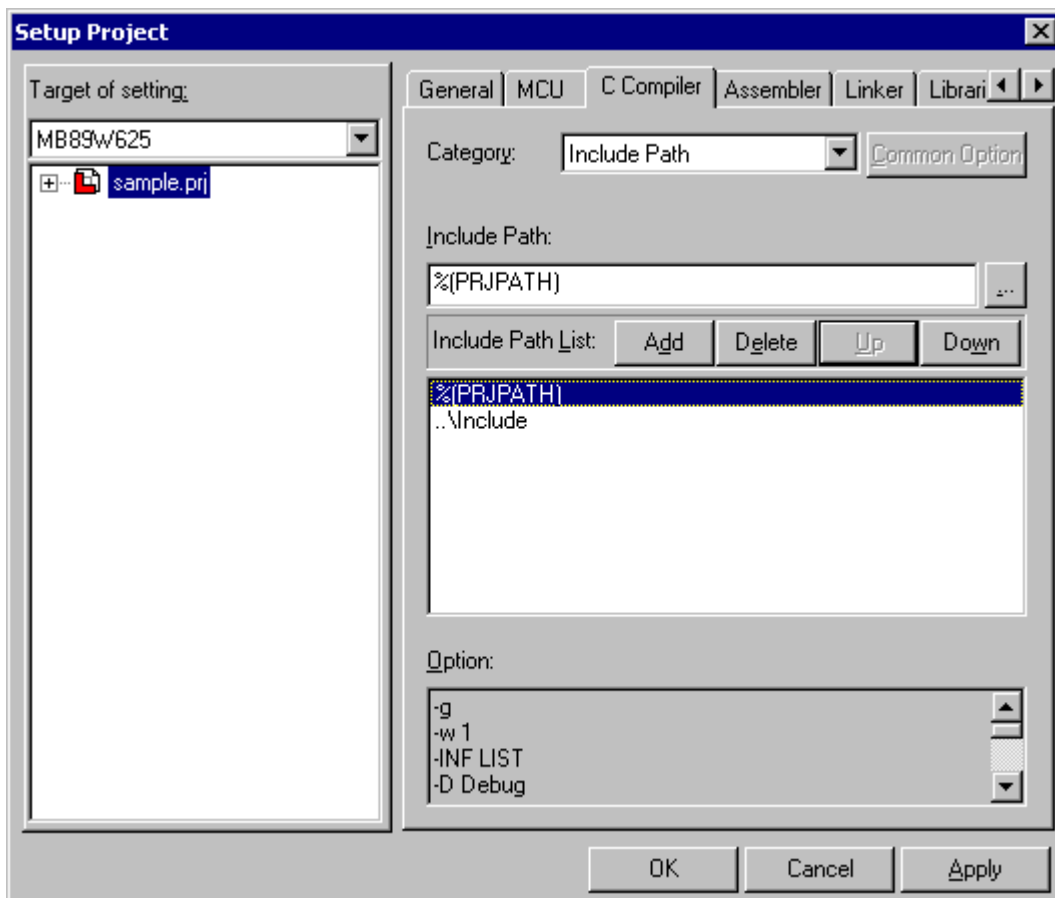
1. Select the [Include Path] category.
   The include path setup dialog shown in Figure 4.5-17 opens.

2. Specify the include path.
   Clicking the [Brows..."] button to the right of the input field enables directory selection.

3. Click the [Add] button.

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The specified include path is added to the end of the [Include Path List].

■ Resetting an include path

1. Select the [Include Path] category.
   The include path setup dialog shown in Figure 4.5-17 opens.

2. Select the include path to reset in the [Include Path List].

3. Click the [Delete] button.

■ Changing the include path retrieval order

Include paths are retrieved in turn from top of the [Include Path List]. The order in which include paths are registered in the list can be changed as follows:

1. Select the [Include Path] category.
   The include path setup dialog shown in Figure 4.5-17 opens.

2. Select the include path whose order is to be changed from [Include Path List].

3. Click the [Up] or [Down] button to move the cursor to a relevant position.

■ Setting [Optimize] options

**Figure 4.5-18 Optimize Option Setup Dialog**
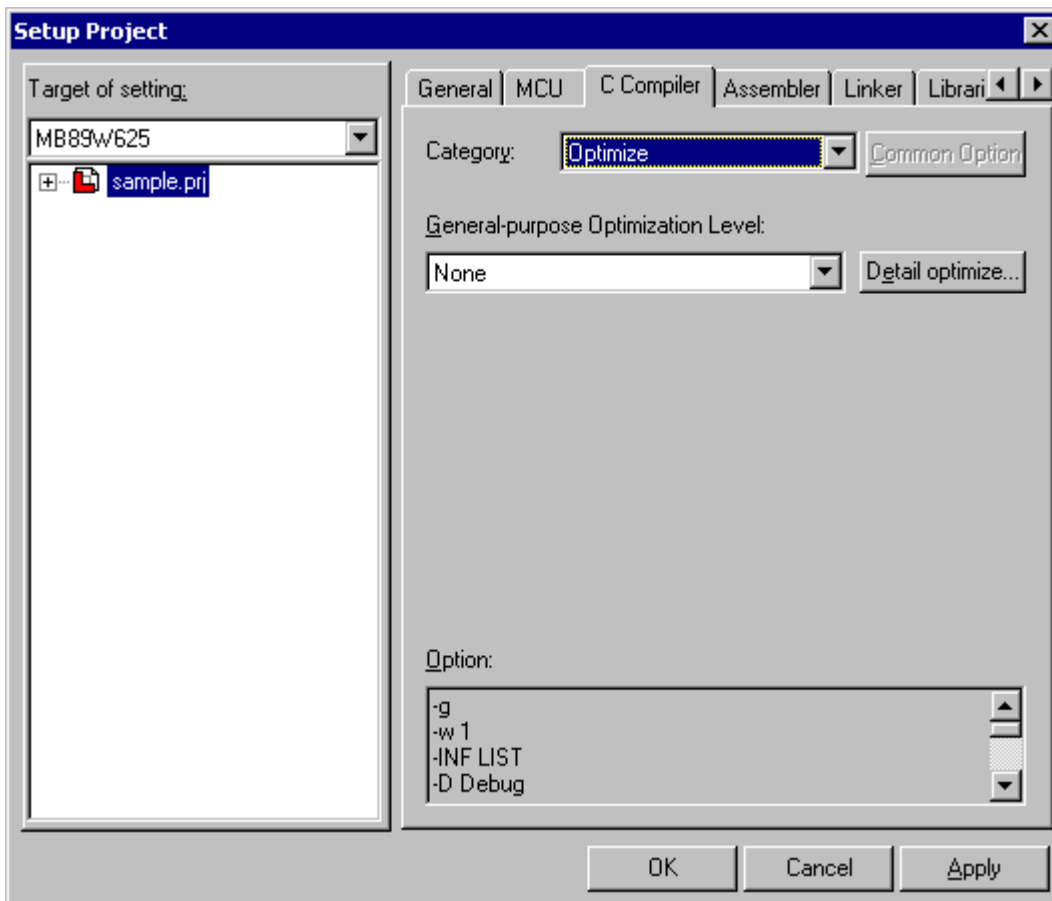
The following options can be set from the optimize option setup dialog. Select the optimize option to set from the drop-down list.

- General-purpose optimization level. (-O)

    (None/Level1-4/speed priority/size priority)

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■ Setting of Options Included in [Detail Definition] in [Optimization]

Figure 4.5-19 Optimize Details Setup Dialog
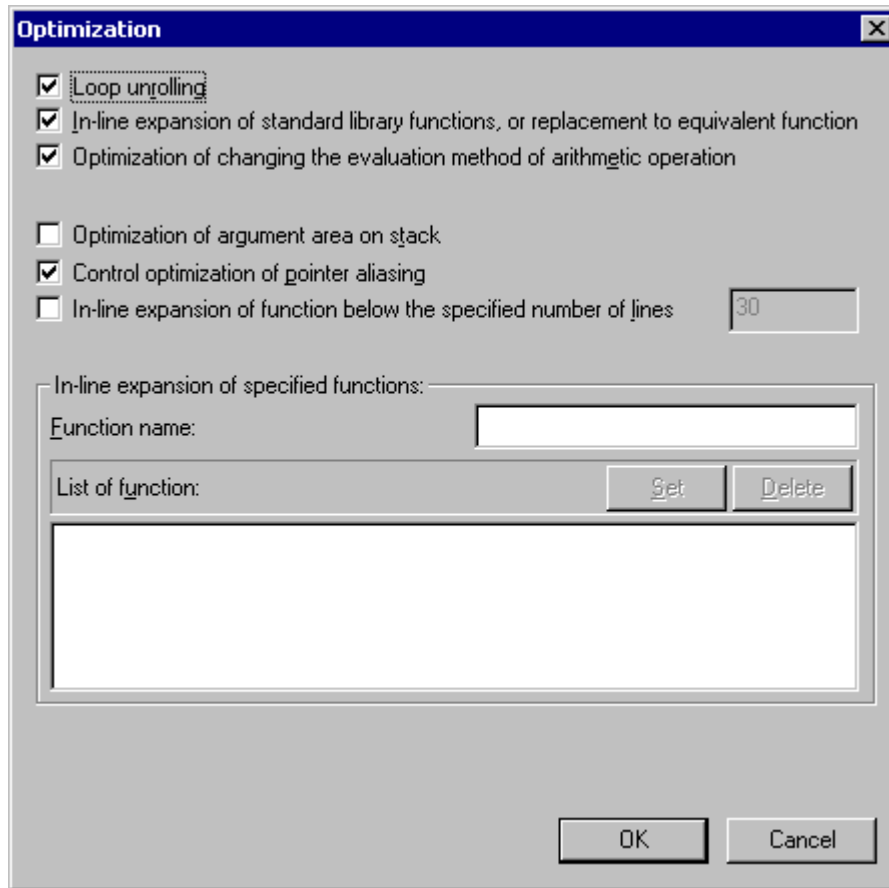
The following options can be specified:

- Loop unrolling (-K UNROLL)

- In-line expansion of standard library functions, or replacement to equivalent function (-K LIB)

- Optimization for changing type of evaluating method of arithmetic operations (-K EOPT)

- Optimization of argument area on stack (-K ADDSP)

- Control optimization of pointer aliasing (-K NOALIAS)

- In-line expansion of function below the specified number of lines (-x auto)

- In-line expansion of specified functions (-x)

■ Setting In-line Expansion of Specified functions

1. Select the [Optimization] category.
   The Set Optimization dialog (See Figure 4.5-19) opened.

2. Set [Optimization level] to any values other than 0 and click [Detail] button.

3. Specify [Function name].

4. Click the [Set] button.

■ Canceling In-line Expansion of Specified functions

1. Select the [Optimization] category.
   The Set Optimization dialog (See Figure 4.5-19) opened.

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2. Sets [Optimization level] to any values other than 0 and click [Detail] button.

3. Select the function name to be deleted from [Function list].

4. Click the [Delete] button.

Note:

If an optimization level is changed, options set in the Detail Definition Dialog are initialized according to the optimization level.

■ Setting of Options Included in [Language Specifications]

Figure 4.5-20 Language Specification Option Setup Dialog
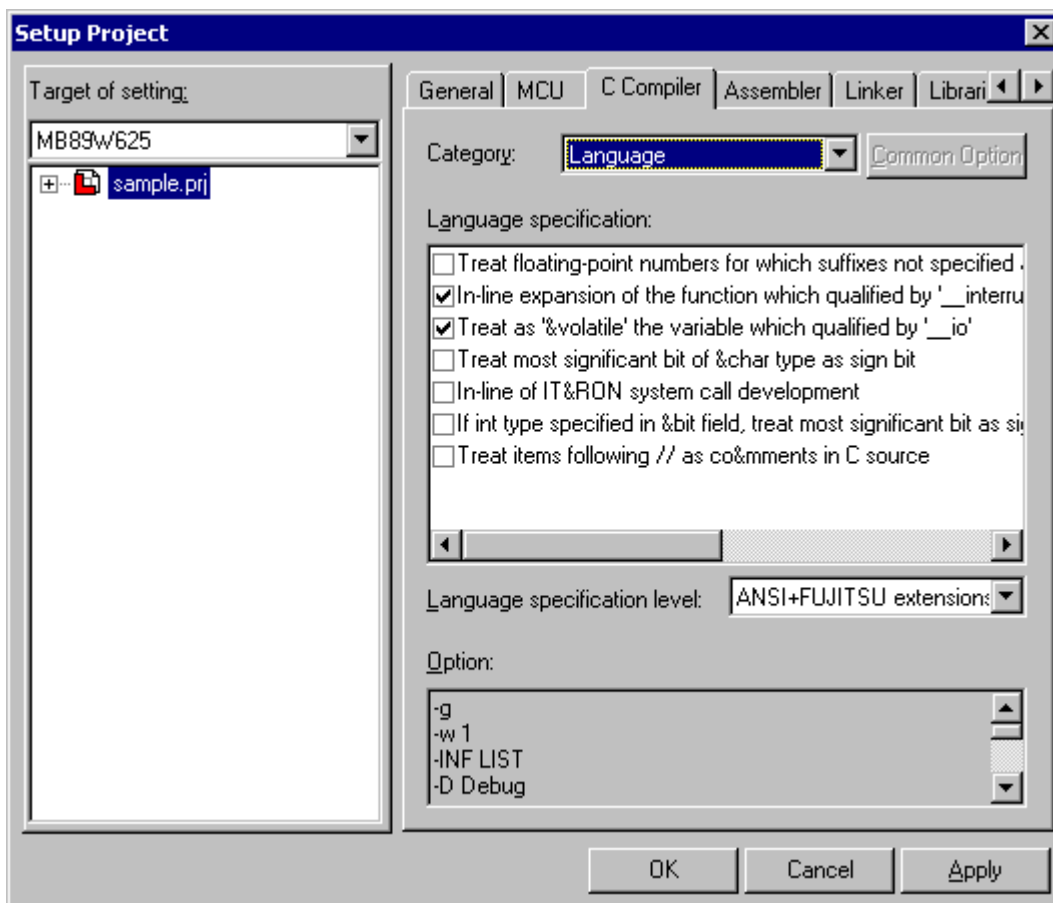
The following options can be specified:

- Treat floating-point numbers for which suffixes are not specified as float type (-K FCONST/DCONST).

- In-line expansion of the function which is qualified by '_interrupt' (-K NOINTLIB).

- Treat the variable which is qualified by '_io' as 'volatile' (-K NOVOLATILE).

- Treat most significant bit of char type as sign bit (-K SCHAR).

- In-line of ITRON system call development (-K REALOS).

- If int type specified in bit field, treat most significant bit as sign bit (-K SBIT).

- Change order in which & static variables are stored in memory to order in which sources are described (-verorder).

- Treat items following " // " as comments in C source (-B).

- Language specification level (-Jalcle)

(EC++/ANSI/ANSI + FUJITSU extensions)

4.5.5.4   Setting Assembler Options

**This section explains how to set assembler options.**

■ Setting assembler options

1. Click the [Assembler] tab from the project setup dialog box.

2. Select category.

   [General], [Define Macro], [Include Path], [Target Depend], or [Output List] can be selected as category.

   Specified options can be checked using [Option] at the bottom of the dialog.

   If the individual option is set, the [Common Option] button can be clicked to return to the common option. The macro description can be used to describe options. For the macro description, refer to Section 1.11 in SOFTUNE WORKBENCH Function Manual.

■ Setting [General] Options

Figure 4.5-21 General Option Setup Dialog Box
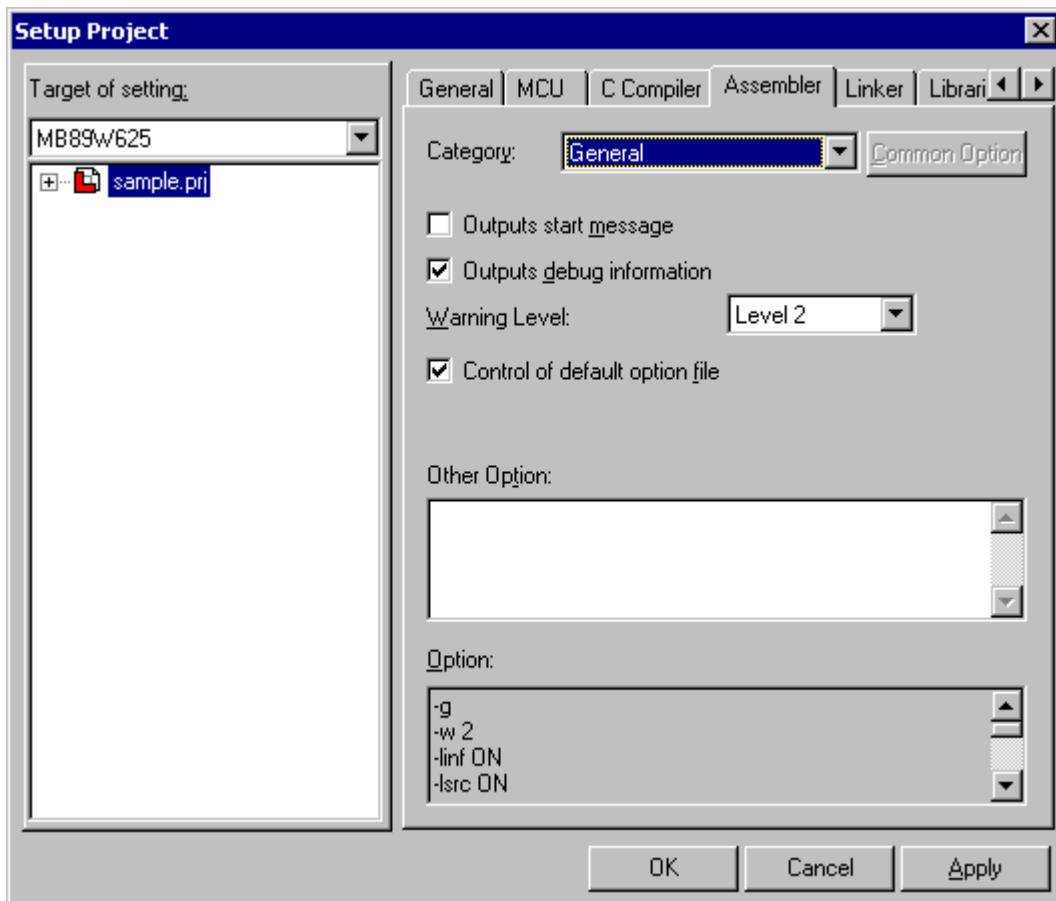
The following options can be set from the general option setup dialog box.

   - Outputs start message (-V)

   - Outputs debug information (-g)

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- Control of default option file (-Xdof)

- Warning Level (-w)   (Level 0 to 3)

Select Warning Level from the drop-down list.

In [Other Option], all assembler options can be written like startup options from command lines. Write the options that do not belong to any assembler option setup categories directly in [Other Option].

■ Setting a macro name

Figure 4.5-22 Macro Name Setup Dialog Box
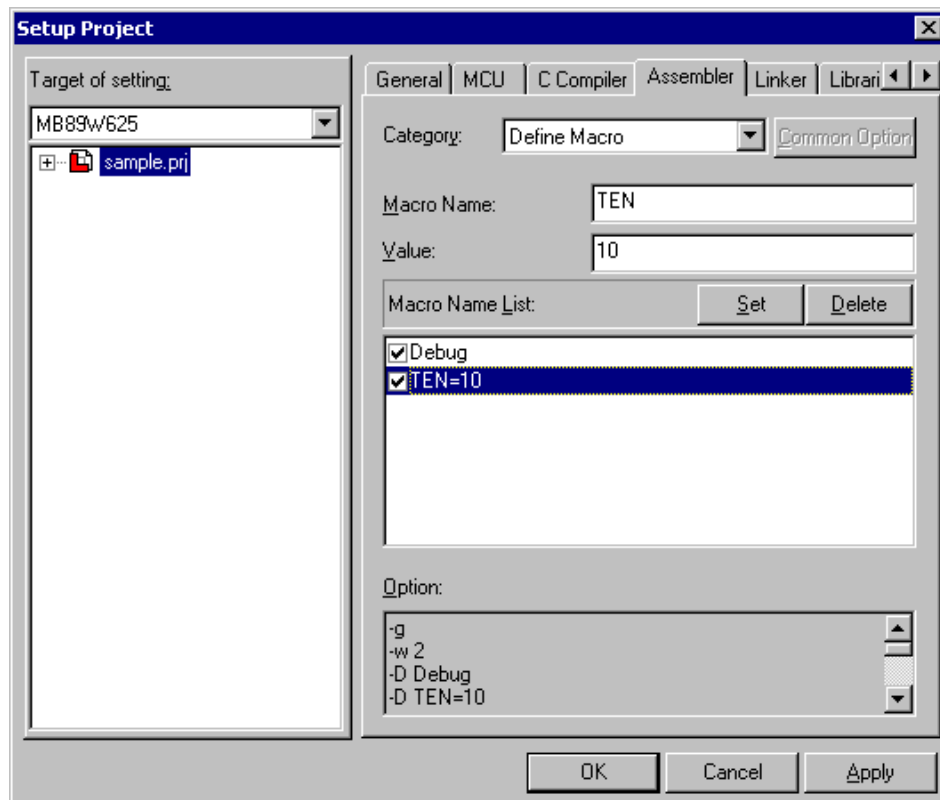
If there are two or more items to be set, the symbol found in some item is grayed.

1. Select the [Define Macro] category.
   The macro name setup dialog box shown in Figure 4.5-16 opens.

2. Specify a macro name.

3. Specify a setting value as required.

4. Click the [Set] button.
   The specified macro name is set as a define (-D) option.

5. To set the specified macro name as an undefine (-U) option, reset the check mark of the macro name in [Macro Name List].


Note:

　　When "undefine" is set, both the define and undefine options are output for the same macro name. This causes no problem because the undefine option precedes the define option.

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■ Resetting a macro name

1. Select the [Define Macro] category.
   The macro name setup dialog box shown in Figure 4.5-22 opens.

2. Select the macro name you want to reset from [Macro Name List]

3. Click the [Delete] button.

■ Setting an include path

Figure 4.5-23 Include Path Setup Dialog Box
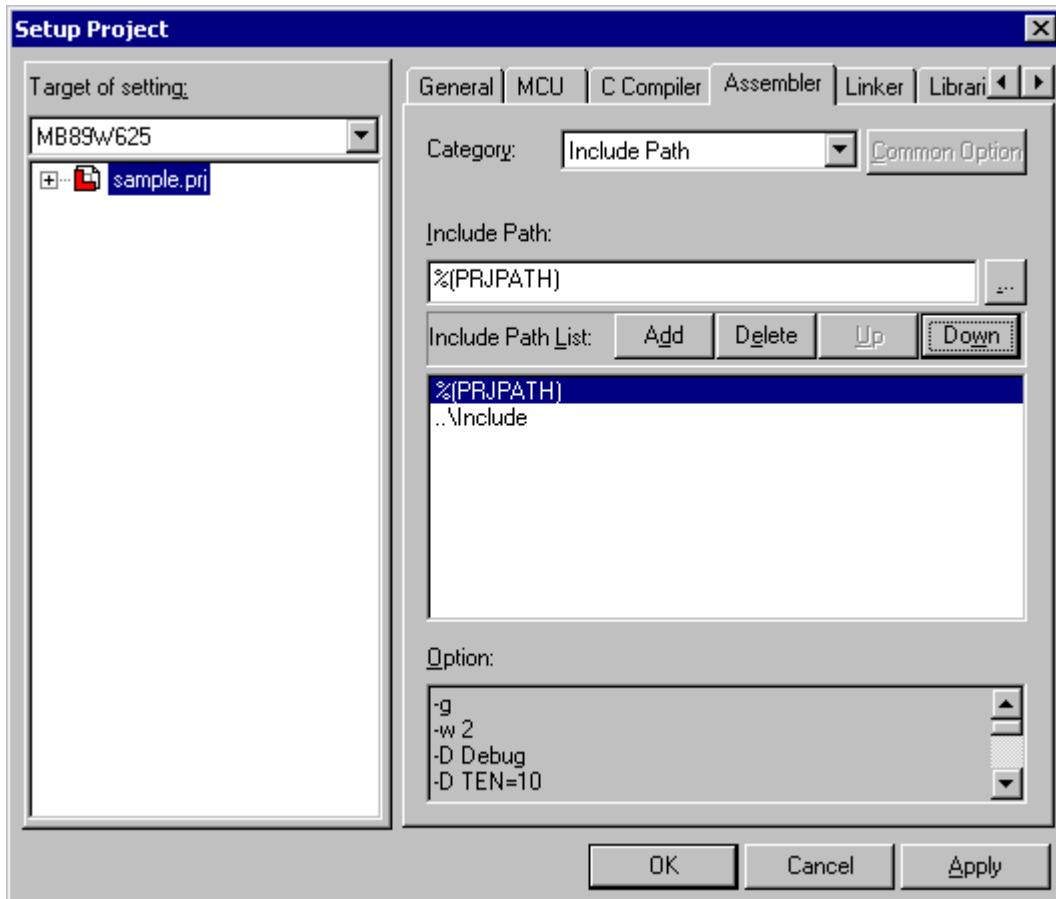
1. Select the [Include Path] category.
   The include path setup dialog box shown in Figure 4.5-23 opens.

2. Specify an include path.
   Clicking the [Browser button to the right of the input field enables directory selection.

3. Click the [Add] button.
   The specified include path is added to the end of [Include Path List].

■ Resetting an include path

1. Select the [Include Path] category.
   The include path setup dialog box shown in Figure 4.5-23 opens.

2. Select the include path you want to reset from [Include Path List]

3. Click the [Delete] button.

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■ Changing the include path retrieval order

Include paths are retrieved in turn from top of [Include Path List]. The order in which include paths are registered in the list can be changed in the following procedure:

1. Select the [Include Path] category.
   The include path setup dialog box shown in Figure 4.5-23 opens.

2. Select the include path whose order is to be changed from [Include Path List].

3. Click the [Up] or [Down] button to move the cursor to a relevant position.

■ Setting list output

**Figure 4.5-24 List Output Setup Dialog Box**
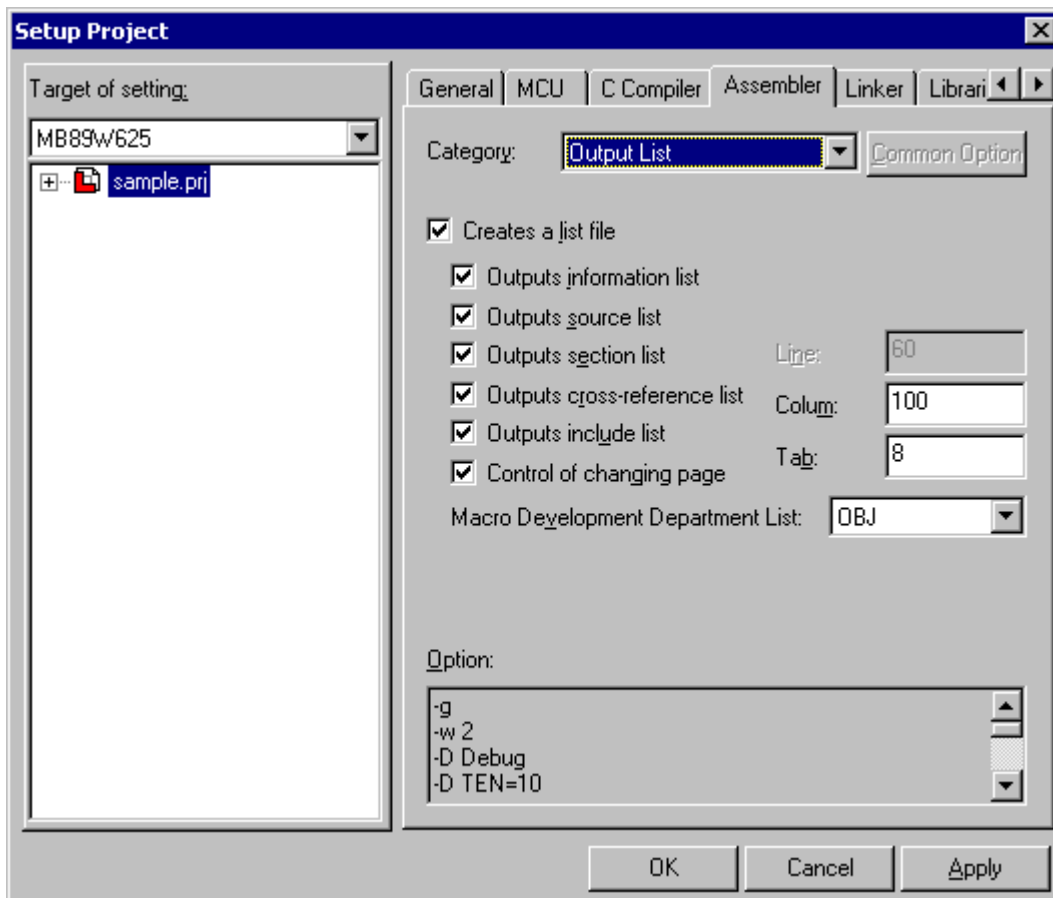
1. Select the [Output List] category.
   The list output setup dialog box shown in Figure 4.5-24 opens.

2. To output a list file, set a check mark to the left of [Creates a list file].
   When the list file is not output, no other item need to be set. Execute Step (3) and after only when outputting the list file.

3. Select the list file(s) you want to output. Items with check marks are selected.
   - Outputs information list
   - Outputs source list
   - Outputs section list
   - Outputs cross-reference list
   - Outputs include list

4. Specify whether to suppress page change. When a check mark is set to the left of [Control of changing page], page change is suppressed.
   When page change is suppressed, the line count cannot be set.

5. Select a macro development department list from the drop-down list. (No output, SRC/OBJ, OBJ)

6. Set line count, column count, and tab count to the right of [Line], [Column], and [Tab] as required.

■ [Target Depend] options

Figure 4.5-25 Target Dependency Setup Dialog
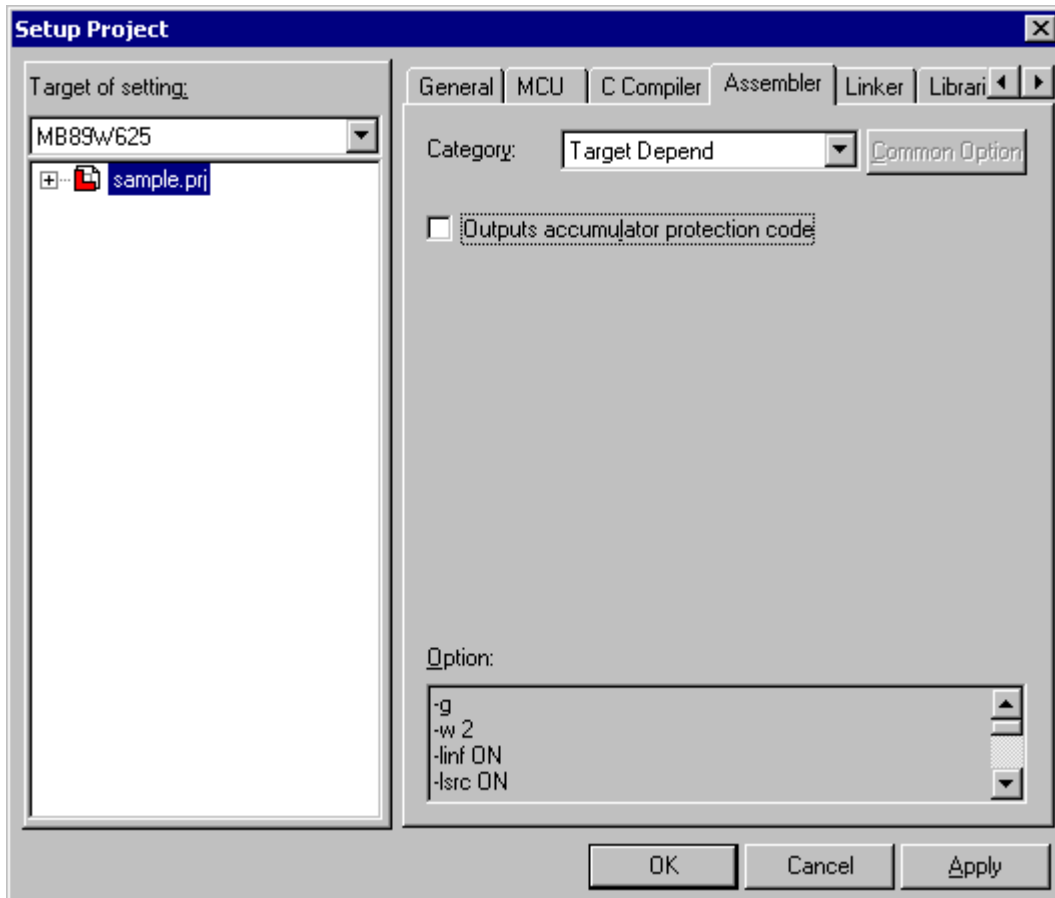
The following options can be specified:

- Outputs accumulator protection code (-sa)

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4.5.5.5   Setting Linker Options

This section explains how to set linker options.

■ Setting linker options

1. Click the [Linker] tab from the project setup dialog box.

2. Select category.

   [General], [Allocation/Link], [Define Symbol], [List Output], [Absolute Assemble List] [Control Library], or [Register Bank] can be selected as category.

   Specified options can be checked using [Option] at the bottom of the dialog.

   The macro description can be used to describe options. For the macro description, refer to Section 1.11 in SOFTUNE WORKBENCH Function Manual.

■ Setting [General] options

Figure 4.5-26 General Option Setup Dialog Box
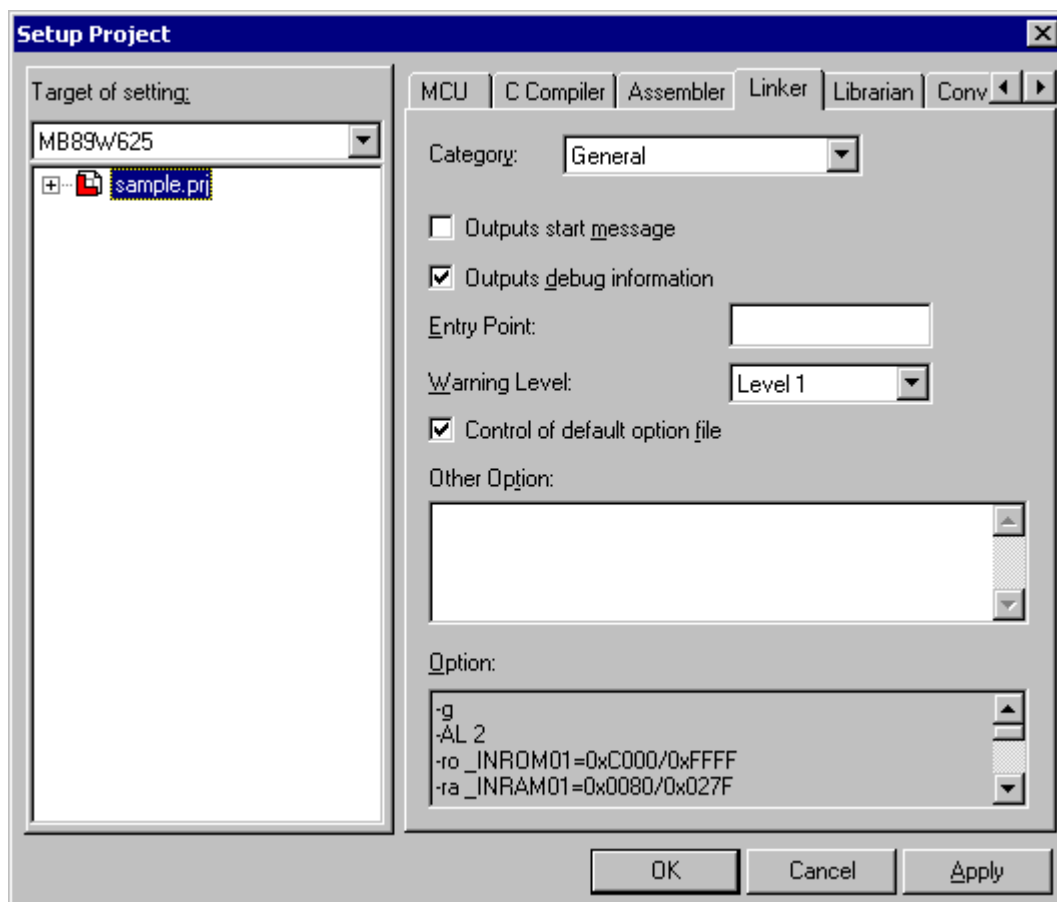
The following options can be set from the general option setup dialog box.

- Outputs start message (-V)

- Outputs debug information (-g)

- Control of Default Option File (-Xdof)

- Entry Point (-e)

- Warning Level (-w)(Level 0 to 2)

- Other Option

Entry Point is the address to be set in the PC when data is loaded by the debugger. Be sure to specify this option with a global symbol.

Select Warning Level from the drop-down list.

In [Other Option], all assembler options can be written like startup options from command lines. Write the options that do not belong to any assembler option setup categories directly in [Other Option].

■ Setting disposition/connection

See Section 4.5.5.6 Section Disposition/Connection Specifying.

■ Setting symbol definition

Figure 4.5-27 Symbol Definition Setup Dialog Box
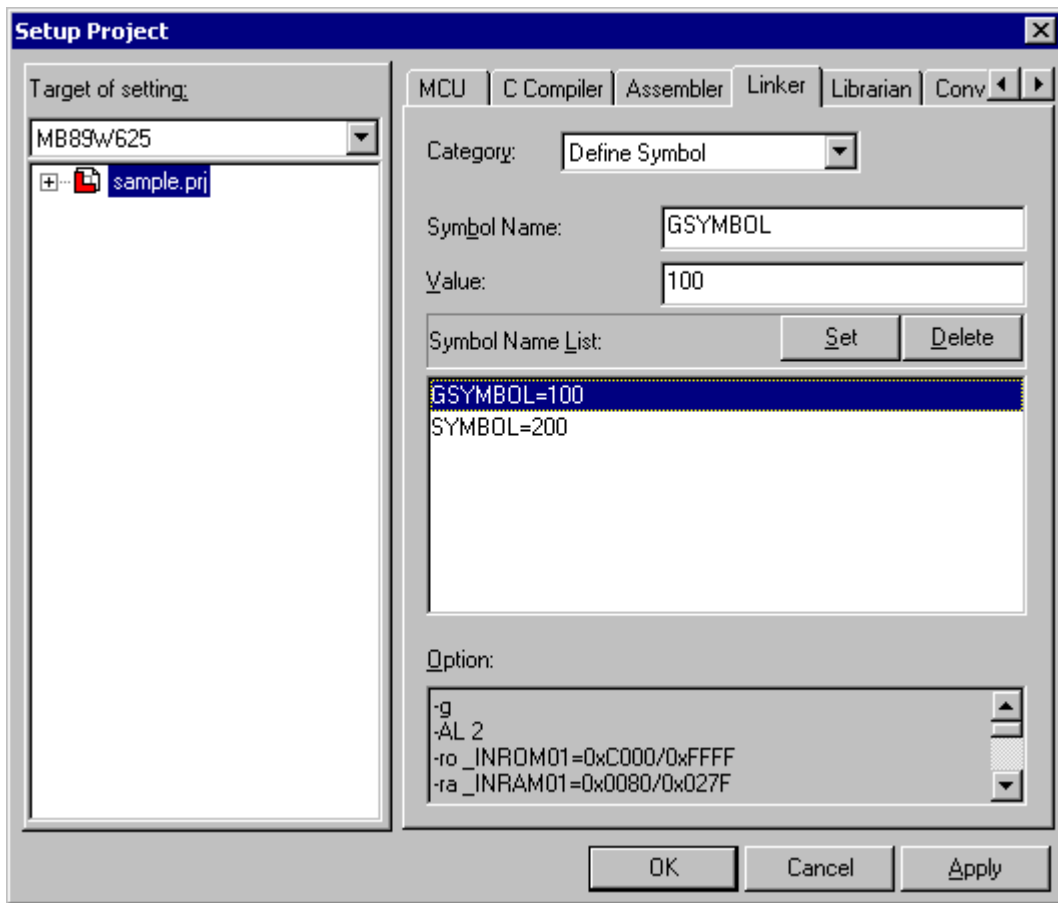
If there are two or more items to be set, the symbol found in some item is grayed.

1. Select the [Define Symbol] category
   The symbol definition setup dialog box shown in Figure 4.5-27 opens.

2. Specify a symbol name.

3. Specify a setting value.

4. Click the [Set] button.

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■ Resetting symbol definition

1. Select the [Define Symbol] category.
   The symbol definition setup dialog box shown in Figure 4.5-27 opens.

2. Select the symbol name you want to reset from [Symbol Name List].

3. Click the [Delete] button.

■ Selecting output file

Figure 4.5-28 Output List Setup Dialog Box
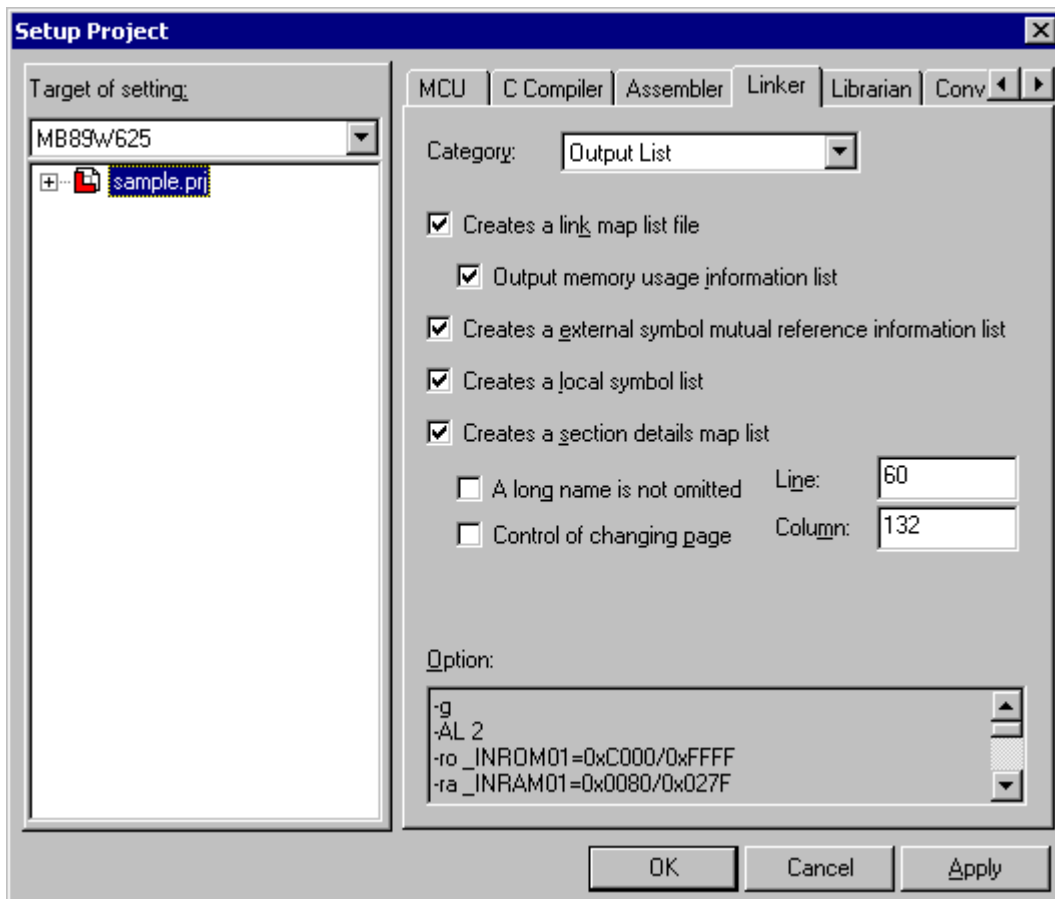
1. Select the [Output List] category.
   The list output setup dialog box shown in Figure 4.5-28 opens.

2. Set check marks to the left of the list(s) to be created.
   - Creates a link map list file
   - Creates a external symbol mutual reference information list
   - Creates a local symbol list
   - Creates a section details map list

   When none of the above lists is output, no other item need to be set from the list output setup dialog box. Execute Step (3) and after only when outputting any of the lists.

3. Check [Output memory usage information list] as needed.

4. Set a check mark to the left of [A long name is not omitted] as required.
   Even names exceeding one list file line are fully output.

5. Specify whether to suppress page change. When a check mark is set to the left of [Control of changing
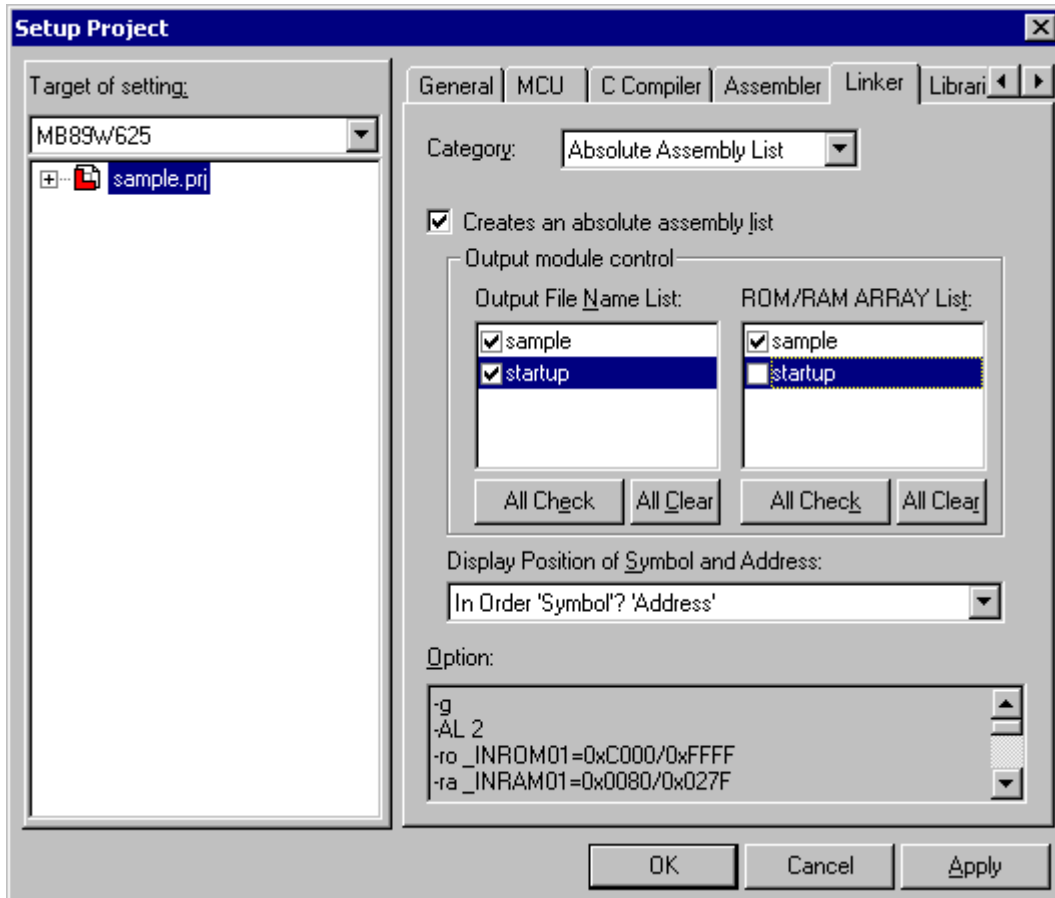
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page], page change is suppressed.

When page change is suppressed, the line count cannot be set.

6. Set line count and column count to the right of [Line] and [Column] as required.

## ■ Setting absolute format assemble list options

Figure 4.5-29 Absolute Format Assemble List Dialog Box

1. Select the [Absolute Assemble List] category.
   The absolute format assemble list setup dialog box shown in Figure 4.5-29 opens.

2. Set a check mark to the left of [Creates an absolute assemble list].
   When the absolute format assemble list is not output, no other item need to be set from the absolute format assemble list setup dialog box. Execute Step (3) and after only when outputting the absolute format assemble list.

3. Select the module to which the absolute format assemble list is to be output from [Output File Name List], then set a check mark to the left of the selected module.

4. Select the module to which the ROM/RAM/ARRAY list is to be output from [ROM/RAM/ARRAY List], then set a check mark to the left of the selected module.

5. Select Display Position of Symbol and Address from the drop-down list.
   (In Order 'Address' to 'Symbol' / In Order 'Symbol' to 'Address')

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■ **Setting of Options for Library Control**

Figure 4.5-30 Library Control Setup Dialog Box
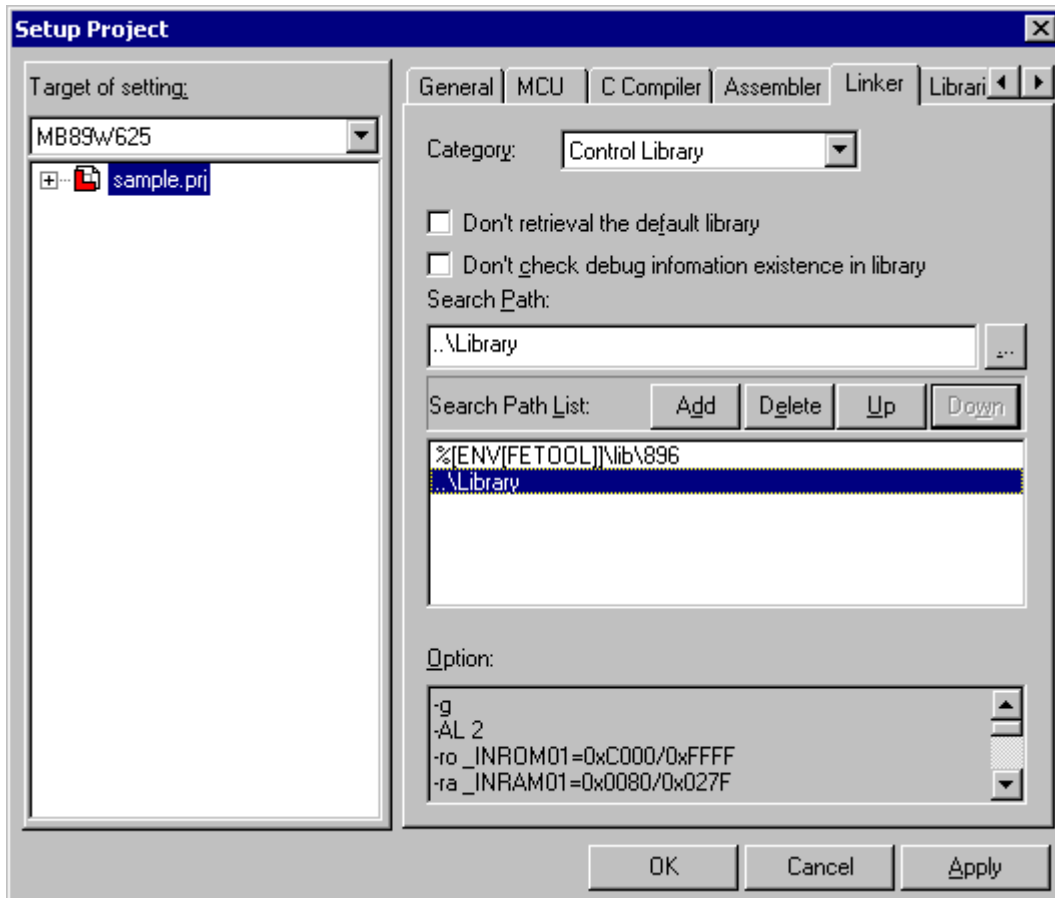
■ **Setting when the default library is not used**

    1. Select the [Control Library] category.

        The library control setup dialog box shown in Figure 4.5-30 opens.

    2. Set a check mark to the left of [Don't retrieve the default library].

■ **Setting method when debug information existence check for library file module is inhibited**

    1. Select the [Control Library] category.

        The library control setup dialog box shown in Figure 4.5-30 opens.

    2. Set a check mark to the left of [Don't check debug information existence in library].

■ **Setting a library retrieval path**

    1. Select the [Control Library] category.

        The library control setup dialog box shown in Figure 4.5-30 opens.

    2. Set [Search Path].

        Clicking the [Browse] button to the right of the input file enables path reference.

    3. Click the [Add] button.

        The set library retrieval path is added to the end of [Search Path List].

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■ Resetting a library retrieval path

1. Select the [Control Library] category.
   The library control setup dialog box shown in Figure 4.5-30 opens.

2. Select the path you want to reset from [Search Path List].

3. Click the [Delete] button.

■ Changing the library retrieval path retrieval order

Library retrieval paths are retrieved in turn from top of [Search Path List]. The order in which library retrieval paths are registered in the list can be changed in the following procedure:

1. Select the [Control Library] category.
   The library control setup dialog box shown in Figure 4.5-30 opens.

2. Select the library retrieval path whose order is to be changed from [Search Path List].

3. Click the [Up] or [Down] button to move the cursor to a relevant position.

■ Setting register bank

Figure 4.5-31 Resister Bank Setup Dialog Box
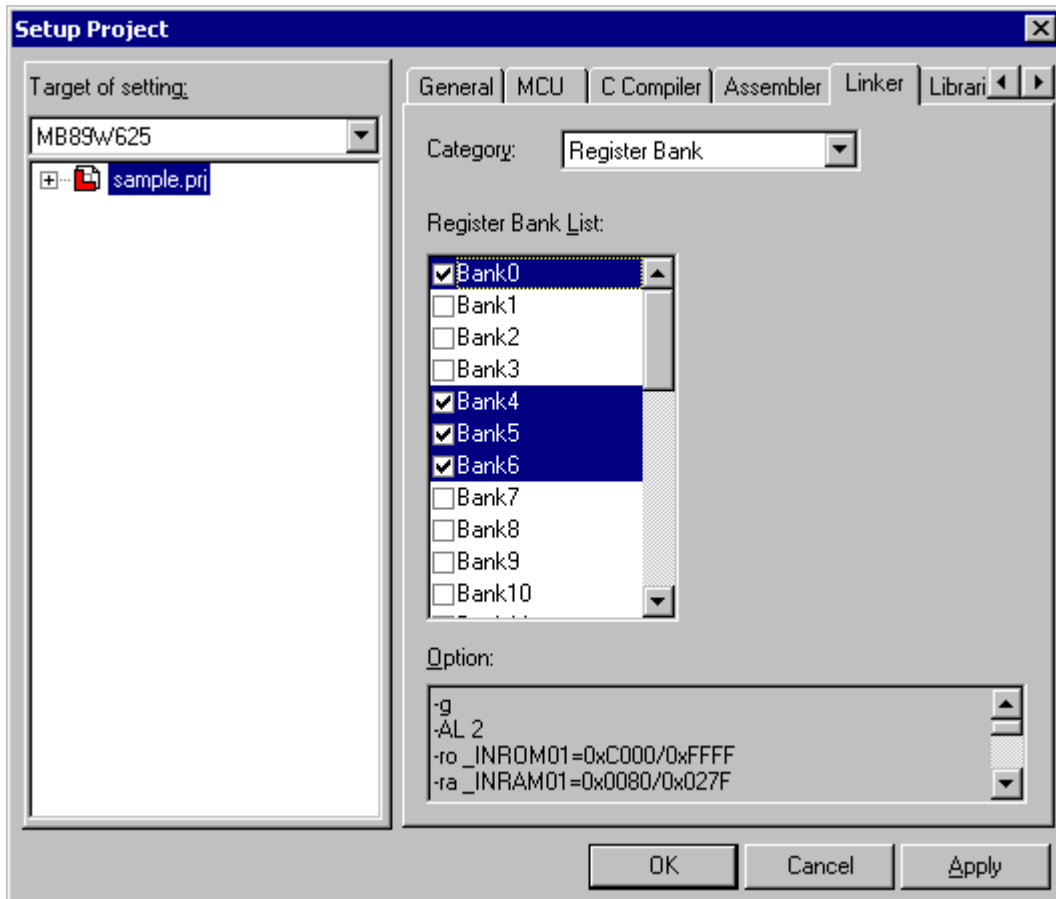
1. Select the [Register Bank] category.
   The register bank setting dialog is displayed (Figure 4.5-31).

2. Set the check mark for the register bank list to be used.

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4.5.5.6   Section Disposition/Connection Specifying

This section explains how to set the section allocation/link option (linker option).

■ **Section disposition/connection specifying**

1. Click the [Linker] tab from the project setup dialog box.

2. Select the [Disposition/Connection] category.
   The disposition/connection setup dialog box shown in Figure 4.5-32 opens.

3. Select [Auto Disposition] from the drop-down list.
   (None/Mode 1/Mode 2)
   The subsequent setting depends on how the section is concretely allocated.

Figure 4.5-32 Disposition/Connection Setup Dialog Box
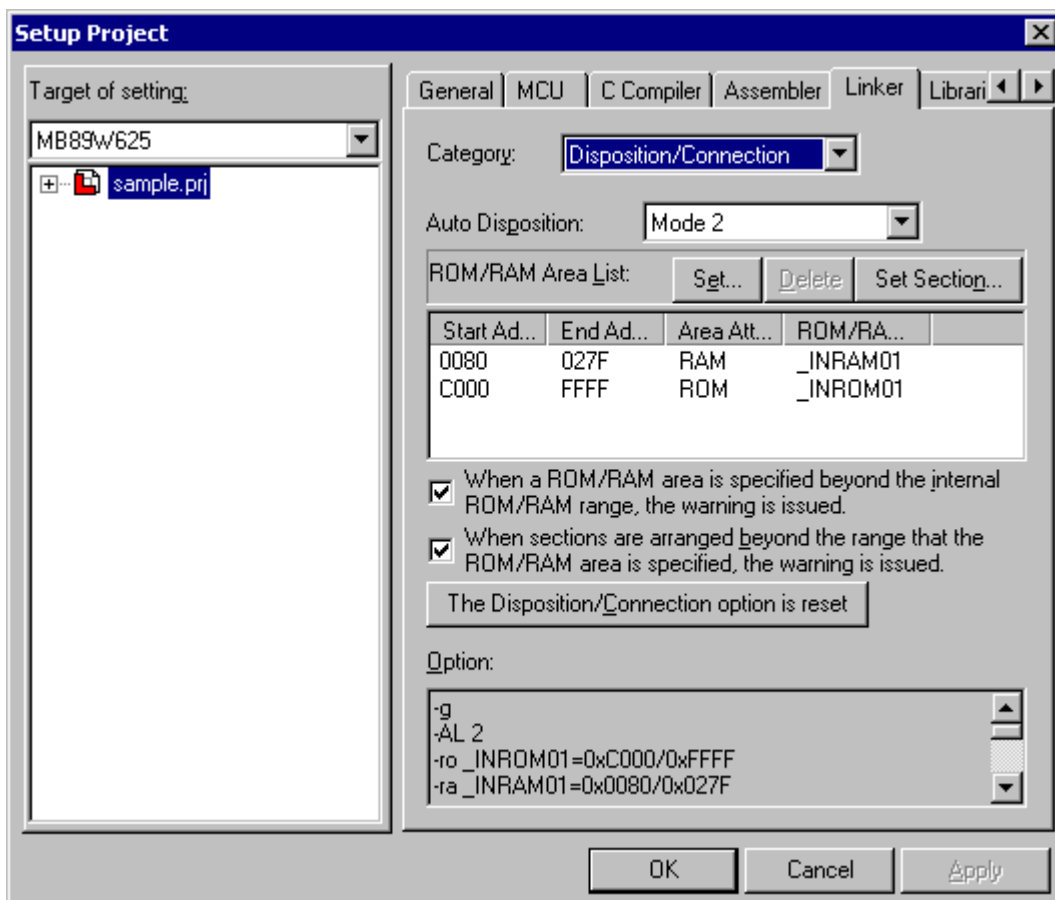
■ **When a section is allocated to the specified ROM/RAM area**

1. Define the ROM/RAM area.
   See Defining the ROM/RAM area.

2. Select the ROM/RAM area you want to set from [ROM/RAM Area List].

3. Click the [Set Section...] button.
   The section setup dialog box shown in Figure 4.5-32 opens.

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4. Specify the name of the section to be allocated to the selected area.
A wild card character can be also used.

5. Select a content type from the drop-down list as required.
(None/Code/Data/Stack/Const/IO)

6. Click the [Set] button.
The set section is added to the end of [Section Name List].

7. When all settings are completed, click the [OK] button.

The order in which sections are allocated to the specified ROM/RAM area is the same as the order in [Section Name List]. For how to change this order, see Changing the section allocation order next by one.

■ When a section is allocated to the specified starting address

1. Click the [Set Section...] button.
The section setup dialog box shown in Figure 4.5-32 opens.

2. Select [Specify in Address] from the drop-down list for [ROM/RAM Area Name].

3. Specify the name of the section to be allocated to the ROM/RAM area.
A wild card can be also used.

4. Specify the starting address to which the section is to be allocated.

5. Select and set a content type from the drop-down list as required.

6. Click the [Set] button.
The specified section is added to the end of [Section Name List].

7. When all settings are completed, click the [OK] button.

To continuously allocate several sections to the specified address, execute step (6), set Section Name and Content Type only, then click the [Set] button. Repeat this operation.
Sections are allocated in the specified order. For how to change this order, see the next changing the section allocation order.

■ Changing the section allocation order

1. Click the [Set Section...] button.
The section setup dialog box shown in Figure 4.5-32 opens.

2. Specify the area you want to change in [ROM/RAM Area Name]. When an address is directly specified, select [Addressing]. The sections to be allocated to the area (or address) are displayed in [Section Name List].

3. Select the section name whose order is to be changed, then click the [Up] or [Down] button to move the cursor to a relevant position.
For addressing, also see Notes in addressing in the next item.

■ Notes in addressing

Examples of relationship between descriptions in [Section Name List] and the linker options to be generated are given below. Pay special attention when changing the section allocation order.

[Example 1] When descriptions in [Section Name List] are as follows:

sec1=H'1000

sec2

sec3=H'F000

sec4

The following sections are generated.

-sc sec1+sec2=H'1000

-sc sec3+sec4=H'F000

[Example 2] When the sec4 allocation order is changed as follows:

sec1=H'1000

sec2

sec4

sec3=H'F000

The following sections are generated:
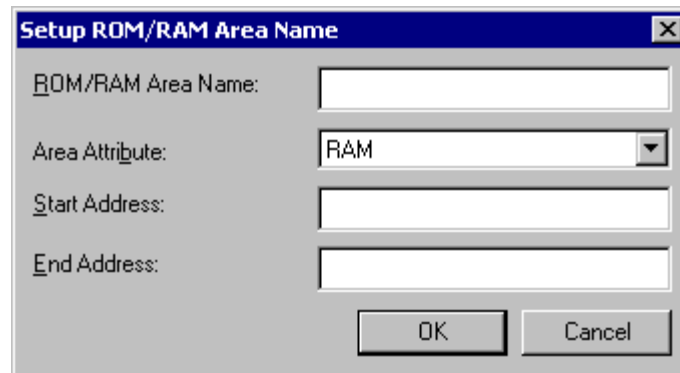
-        sc sec1+sec2+sec4=H'1000

-sc sec3 =H'F000

■ Defining the ROM/RAM area

1. Click the [Add] button.
   The Set ROM/RAM Area Name dialog Figure 4.5-33 .

**Figure 4.5-33 Setup Disposition / Connection Dialog**

2. Specify a ROM/RAM area name.
   Specify the ROM/RAM name that differs from the set names.

3. Select ROM or RAM as [Area Attribute].

4. Specify a start address and end address (starting address and end address of ROM/RAM area).

5. Click the [Set] button.
   The specified ROM/RAM area is registered in [ROM/RAM Area List].
   In [ROM/RAM Area List], ROM/RAM areas are sorted and displayed in the start address order.

■ **Deleting a ROM/RAM area**

    1. Select the ROM/RAM area you want to delete from [ROM/RAM Area List].

    2. Click the [Delete] button.

Figure 4.5-34 Setup Section Dialog
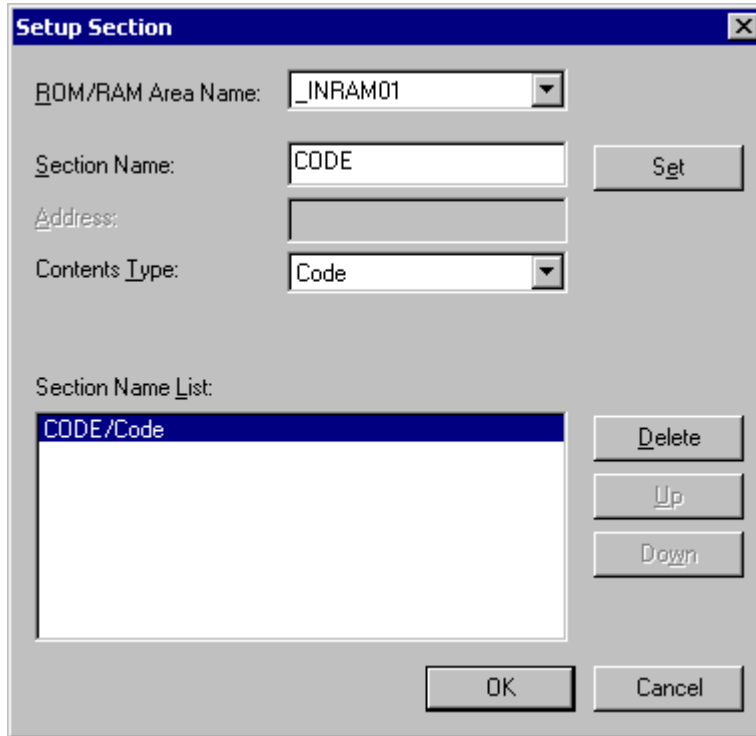
■ **Method of outputting warning when ROM/RAM area is specified outside range of internal ROM/RAM**

    1. Put a check mark in the checkbox. When sections are arranged beyond the range that the ROM/RAM area is specified, the warning is issued.

      - When an area outside the internal-ROM/RAM area is specified in the dialog, a warning dialog is displayed.

      - When an area outside the internal-ROM/RAM area is set, a warning is output at linking.

■ **Method of outputting warning when section is placed outside specified ROM/RAM area range**

    1. Put a check mark in the checkbox. When a ROM/RAM area is specified beyond the internal ROM/RAM range, the warning is issued.

      - When a section is placed outside the specified ROM/RAM area (-ro and -ra options) or outside the internal-ROM/RAM area in the MCU, a warning is output at linking.

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■ **When initializing [Placement/link] option based on MCU information**

    1. Click the [Reset placement/link option] button.

      - The placement/link option is reset.

        When this reset is performed, the placement/link option is set as follows:

      - Automatic placement (-AL 2)

        Mode 2 (optimum automatic placement by linker) is set.

      - ROM/RAM area (-ro, -ra)

        The ROM/RAM area is all cleared and the currently selected MCU internal ROM/RAM address is set.

      - Section information (-sc)

        Section information is all cleared.

     - A warning is output when a ROM/RAM area outside the range of the internal ROM/RAM (-check_rora) is specified.

        Setting is performed so as to output a warning. However, when an MCU without single-chip mode is selected, setting is performed so as not to output a warning.

     - A warning is output when a section is placed outside the specified ROM/RAM area range (-check_locate)

        Setting is performed so as to output a warning.

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4.5.5.7　　Setting Librarian Options

This section explains how to set librarian options.
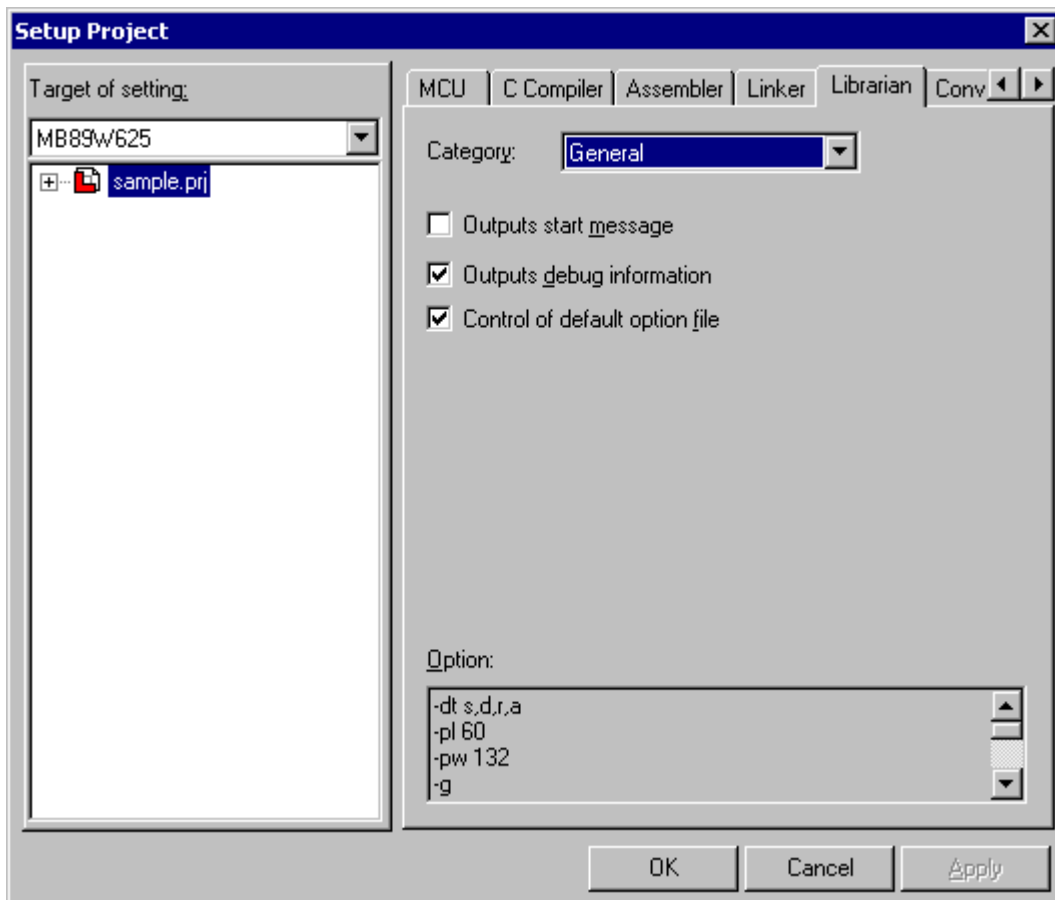

■ Setting librarian options

1. Click [Librarian] from the project setup dialog box.

2. Select category.

   [General] or [Output List] can be selected as category.

   The specified options are displayed in the lower part of the project setup dialog box.

■ Setting Options in [General]

Figure 4.5-35 Librarian Option Setup Dialog Box (General)
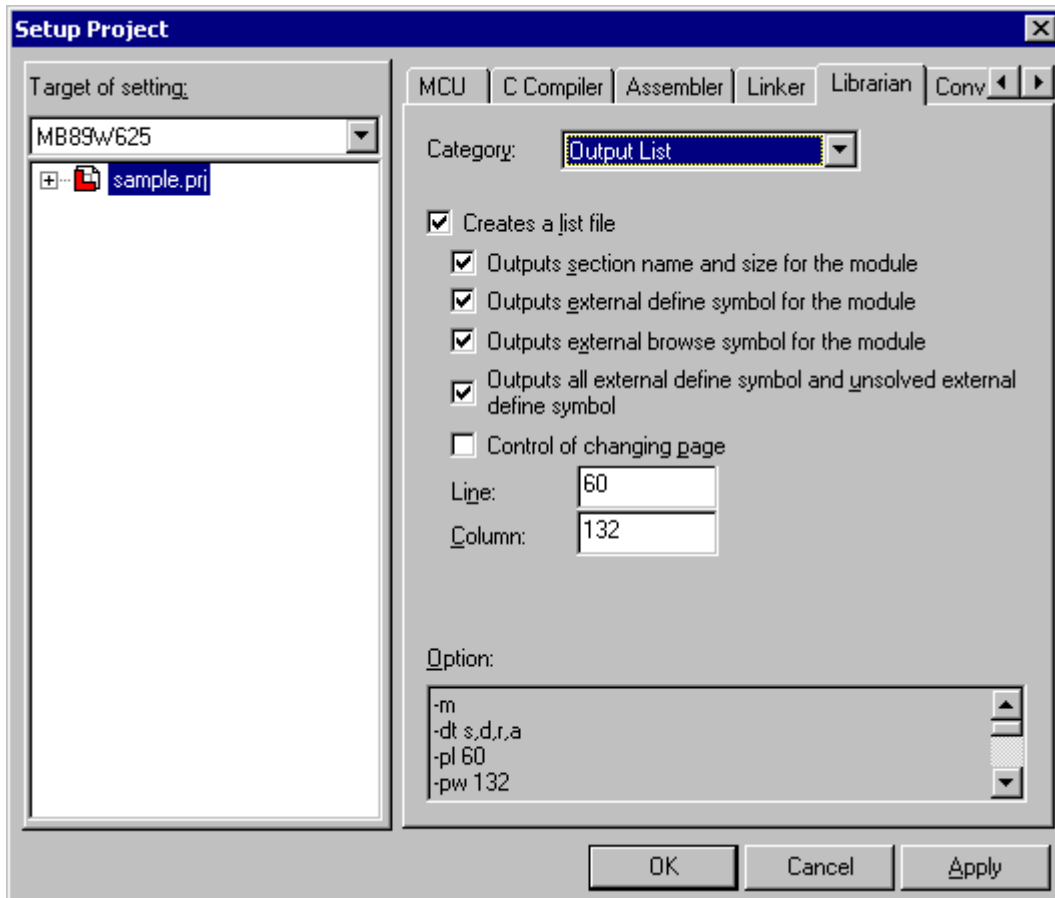

The following options can be set:

- Output start message (-v)

- Output debug information (-g)

- Disable default option (-Xdof)

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■ **Setting the Output-listing**

Figure 4.5-36 Librarian Option Setup Dialog Box (Output List)

1. Select any of the following output types:
   - Outputs section name and size for module
   - Outputs external define symbol for module
   - Outputs external browse symbol for module
   - Outputs all external define symbol and unsolved external define symbol

2. To suppress page change, set a check mark to the left of [Control of changing page].
   When page change is suppressed, the line count cannot be set.

3. Set Line Count and Column Count to the right of [Line] and [Column] as required.

■ **Starting Librarian**

If the project type is a "library file," the librarian is started.

To change the project type, see 4.5.5.1 General.
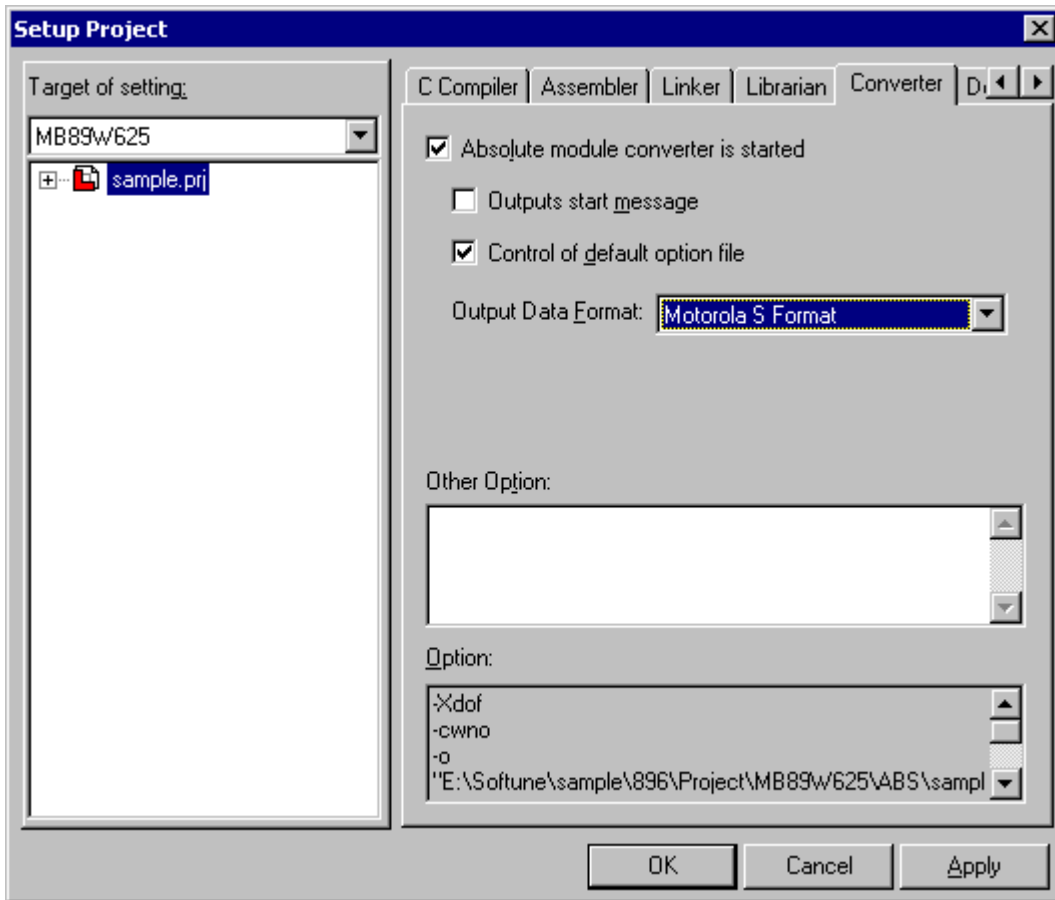
4.5.5.8   Setting Converter Options

This section explains how to set converter options.

■ Setting converter options

1. Click the [Converter] tab from the project setup dialog box.

2. To start the load module converter, mark the [Start load module converter] checkbox.

3. Select a conversion format. (Motorola S format/Intel Hex format/Intel Extend Hex format)

4. Set the following items as required:

     - The start message is output

     - Debug information is output

   The macro description can be used to describe options. For the macro description, refer to Section 1.11in
   SOFTUNE WORKBENCH Function Manual.

Figure 4.5-37 Converter Option Setup Dialog Box

4.5.5.9   Setting Debug Options

This section explains how to set debug options.
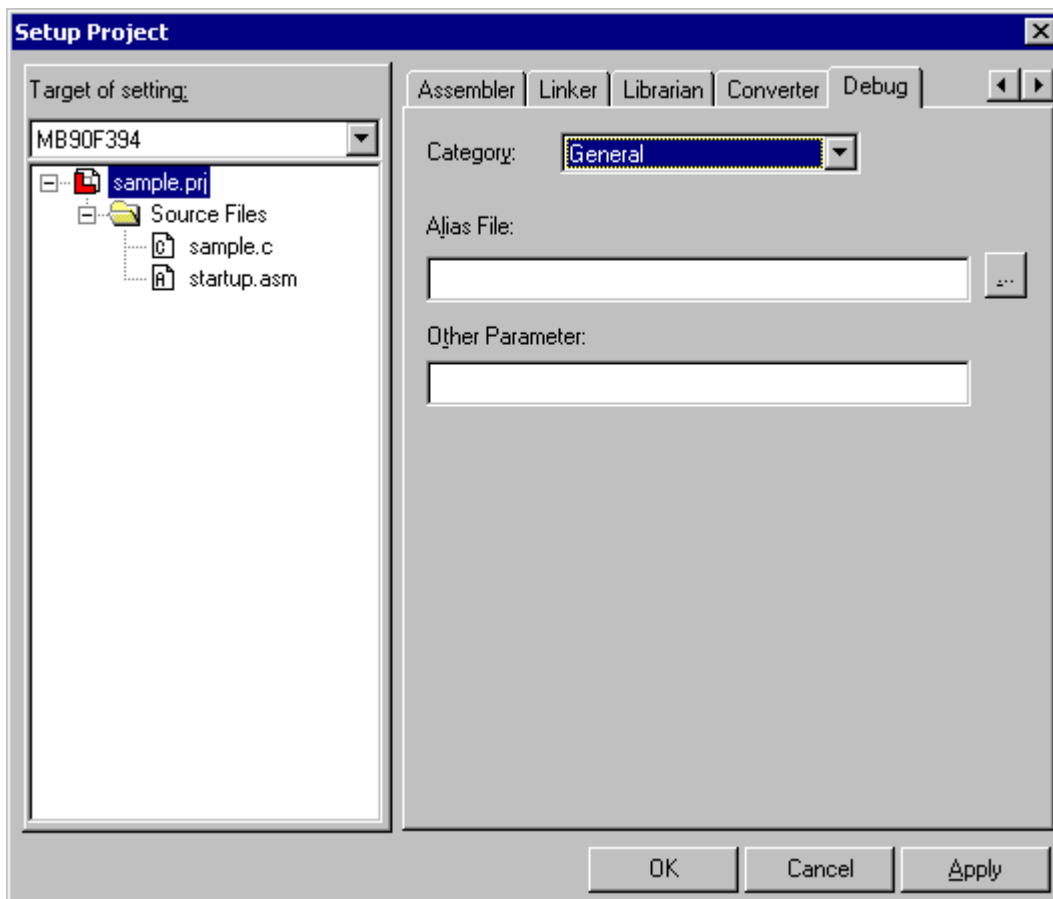
■ **Setting debug options**

    1. Click the [Debug] tab from the project setup dialog box.
        The debug option setup dialog box shown in Figure 4.5-38 opens.

    2. Select category.
        [General] or [Setup] can be selected as category.

■ **Setting Options in [General]**

    1. Set an alias file.
        Clicking the [...] button to the right of the input field enables file reference.

    2. When setting other options, write them in [Other Parameter].

Figure 4.5-38 Debug Option Setup Dialog Box

■ **Setting Options in [Setup]**

    1. Click the [Debug] tab from the project setup dialog box.

    2. Select [Setup] category.

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3. Set [Setup Name].

Set a different name from registered setup names.

4. Click the [Add Setup] or [Add Reference] button.

Clicking the [Add Setup] button starts the Setup Wizard and adds the new setup. See Section 4.7.2.4 Setup Wizard.

Clicking the [Add Reference] button reads information from the set file for setup. When the file selection dialog opens, select a file from the dialog, then click the [Open] button.

Figure 4.5-39 Debug Option Setup Dialog Box
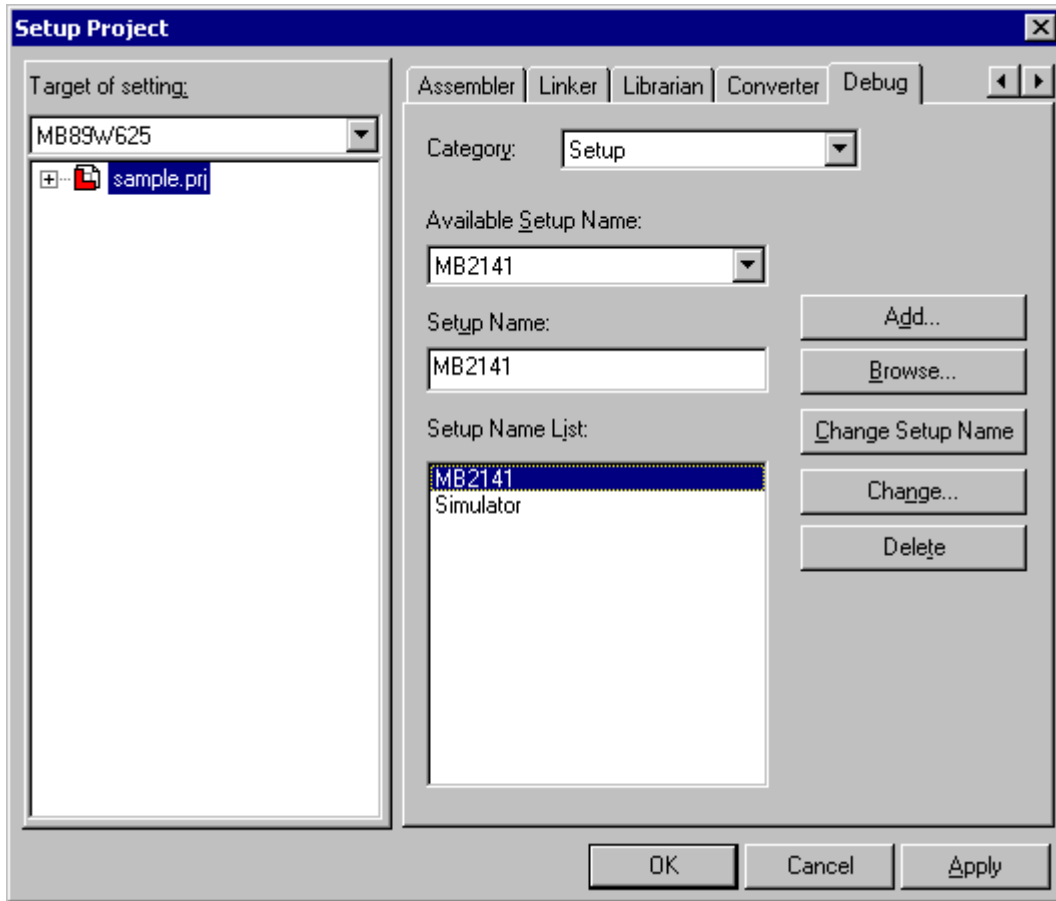
■ **Deleting debugger setup**

1. Click [Debug] tab from the project setup dialog box.

2. Select [Setup] category.

3. Select the setup name to be deleted from [Setup Name List].

4. Click the [Delete] button.

■ Changing debugger setup

1. Click [Debug] tab from the project setup dialog box.

2. Select [Setup] category.

3. Select the setup name to be changed from [Setup Name List].

4. Click the [Change Setup] button.

   Setup Wizard is started. See Section 4.7.2.4 Setup Wizard.

■ Changing setup name

1. Click [Debug] tab from the project setup dialog box.

2. Select [Setup] category.

3. Select the setup name to be changed from [Setup Name List].

4. Click the [Change Setup Name] button.

4.5.6　Setting Customize Build

This section explains how to start a different tool before or after executing the language tool during Make or Build.

■ Customize Build function

In SOFTUNE WORKBENCH, it is possible to make a different tool operate automatically before or after executing the language tool during Compile, Assemble, Make, or Build. Using this function makes it possible to:

make a customer tool operate before the Compiler is executed.

make the object module conversion tool operate after the Linker is executed.

This setting is stored on a project-by-project basis.

Figure 4.5-40 Setup Customize Build Dialog Box
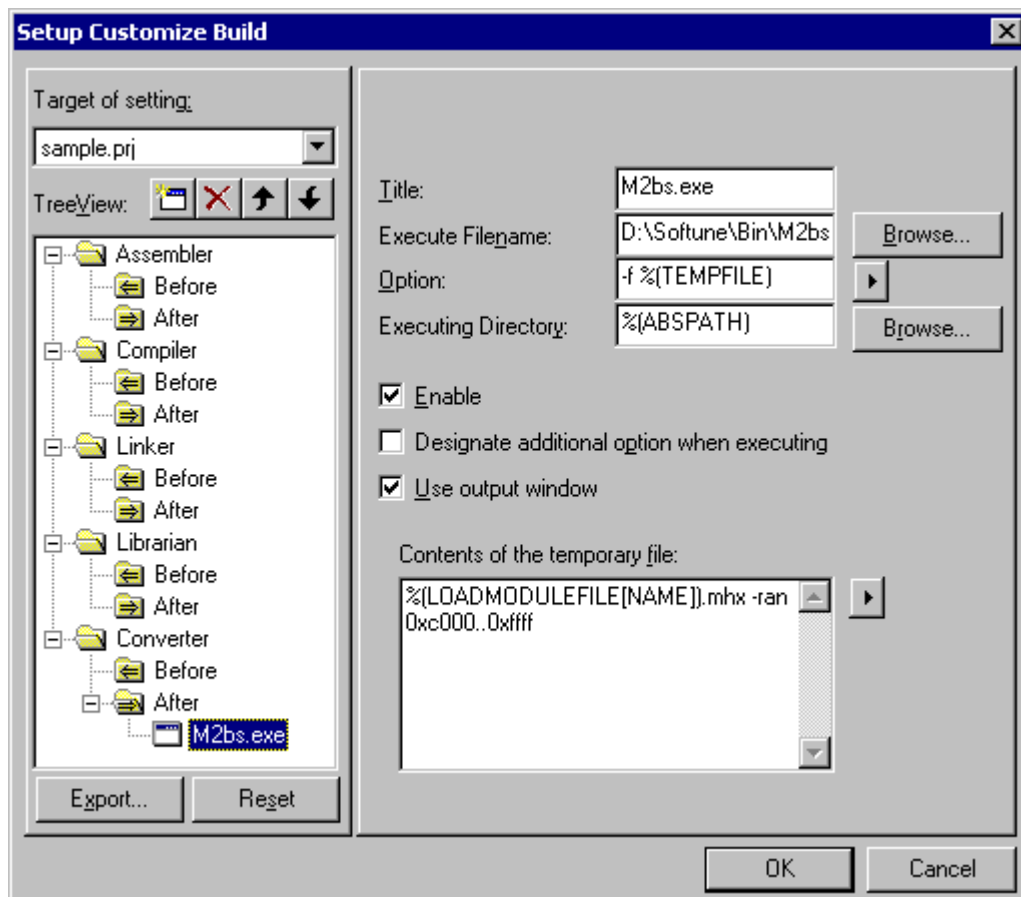
■ Tool button list

🗋	New
✕	Delete
↑	Up
↓	Down

■ Setting Target

There are two types of setting targets in [Target of setting]: Default, and Project name.

See [Target of setting] for which one is currently set.

- Default

    When the Customize Build is set when no project is opened, the default setting can be changed.

    The Customize Build setting is referred when creating a new project and is copied to that project.

    "Default" is displayed in [Target of setting].

Note:

When a project created in an older version is opened, this setting is also referred and copied to that project.
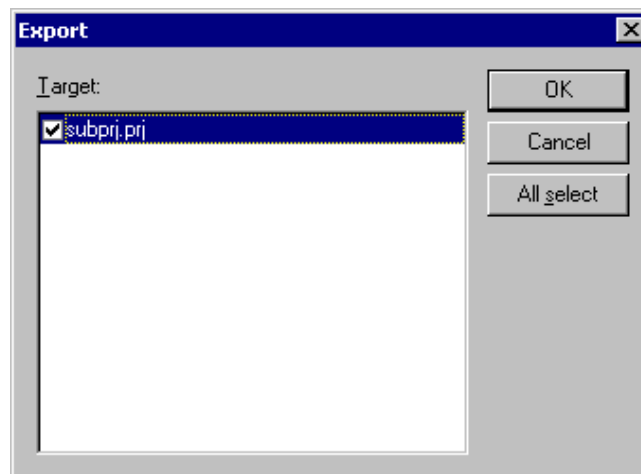

- Project Name

    Customize build is set for the project. The tool operates at Compile, Assemble, Make, or Build for the opened project.

■ Export

The [Export] button is clicked to open the Export dialog shown in Figure 4.5-41 .

By specifying the project in this dialog, tool information can be copied to other projects in workspace.

Figure 4.5-41 Export Dialog Box

■ Reset

To clear the currently set state and return to the default setting, click [Reset]. The [Reset] button can be used when the setting target is Project.

■ **Title**

Input the tool name; duplicated tool names do not cause a problem.

■ **Execution File Name**

Input the file name of the executed tool.

■ **Option**

Specify the option for the executed tool. A macro can be specified in this field.

For the macros, refer Section 1.1.1 in the SOFTUNE WORKBENCH User's Manual.

When the button at the right of this field is clicked, the list of usable macros is displayed. For example, when [Build File]-[Directory] is clicked, %(FILE[PATH]) is inserted for the option at the cursor position.

■ **Executing Directory**

To execute the tool for a particular directory, specify the Executing Directory. If the Executing Directory is not specified, the tool is executed for the project directory.

■ **Enable**

This specifies whether or not to execute the tool at Compile, Assemble, Make, or Build. The tool is not executed when the checkbox is unchecked. To suspend execution of the tool, uncheck the checkbox.

■ **Designate additional option when executing**

This specifies whether or not to display a dialog in which additional options can be specified at executing the tool. When adding options at executing the tool, check the checkbox.

The option set in the specifying other parameter dialog is added as is to the end of the character string specified for [Option].

■ **Use Output window**

To display the tool execution result in the Output window, check the checkbox. There are some precautions to follow when using the Output window. For details, refer to Section 1.1.1 in SOFTUNE WORKBENCH User's Manual.

■ **Contents of the temporary file**

When the %(TEMPFILE) macro is specified for [Option], SOFTUNE WORKBENCH creates a new temporary file at executing the tool and deletes it at ending the tool execution. In this field, specify the data to be written to this temporary file. For example, when the tool option becomes very long, it is possible to specify %(TEMPFILE) for [Option] and specify that option in this field (However, this is only valid when the tool to be executed permits specifying the option in the file.)

Macros can be input in this field. For the macros, refer to Section 1.1.1 in SOFTUNE WORKBENCH User's Manual.

■ **Setting procedure**

1. Select [Project]-[Customize Build].
   - The Customize Build setting dialog is displayed (Figure 4.5-40).

2. Select the tool registered position from the tree view and then press the [NEW] button.
   - When a category is selected and the [NEW] button is pressed, a tool entitled "NEWTOOL" is created at the end of the category. When a tool is selected and the [NEW] button is pressed, a tool entitled "NEWTOOL" is created immediately after the selected tool.
   - Tools in the Before/After category are executed sequentially from the top.

3. Set the title of the tool to be registered.

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4. Set the execution file to be registered.
   - When the [Browse] button at the right of this field is clicked, the file selection dialog is displayed and the tool execution file name can be selected from this dialog.

5. Set the option if necessary.

6. Set the execution-time directory if necessary.
   - When the [Browse] button at the right of this field is clicked, the directory selection dialog is displayed and the execution-time directory can be selected from this dialog.

7. Set [Enable], [Designate additional option when executing], and [Use Output window] if necessary.
   - Select a category or two or more tools from the tree view to batch-change [Enable], [Designate additional option when executing], and [Use Output window].

8. Set the temporary file data as necessary.

9. Click the [OK] button to complete setting.

■ Deletion procedure

1. Select [Project]-[Customize Build].
   - The Customize Build setting dialog is displayed (Figure 4.5-40).

2. Use the tree view to select the title of the tool to delete.
   - When a category is selected, all the tools in the category are deleted.
   - Two or more tools can be also selected.

3. Click the [DELETE] button.

■ Start sequence change procedure

1. Select [Project]-[Set Customize Build].
   - The Customize Build setting dialog is displayed (Figure 4.5-40).

2. Use the tree view to select the tools for which the start sequence is to be changed.
   - Tools in the Before/After category are sequentially executed from the top.

3. Click the [UP] and [DOWN] buttons to arrange in the start sequence.
   - Tools can be moved only within the category which the tools belong.

4.5.7   Project Dependencies

A subproject is defined in the project.

■ Project dependency

Figure 4.5-42 Dependency of Project Dialog Box
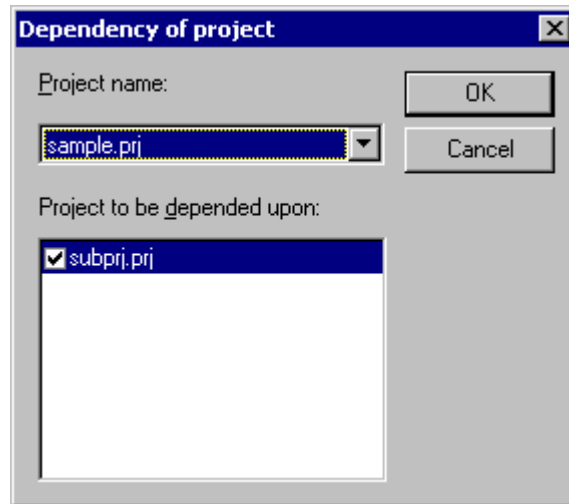
- Project name

> The name of the project, which a subproject is defined in or deleted from, is displayed.

- Project to be depended upon.

> The name of the project on which the selected project can depend in "Project name" is displayed.

> The project name indicated by checkmark is the name of the subproject in the project selected in "Project name".

■ Procedure for defining Project dependence

For the procedure to define project dependence, see Section 2.6 Definition of Subproject.

4.5.8   Project Configuration

The project configuration is set.

■ Project Configuration

There are the following menus to set the project configuration:

- Add and Delete

    The project configuration is added and deleted, and the active configuration is changed.
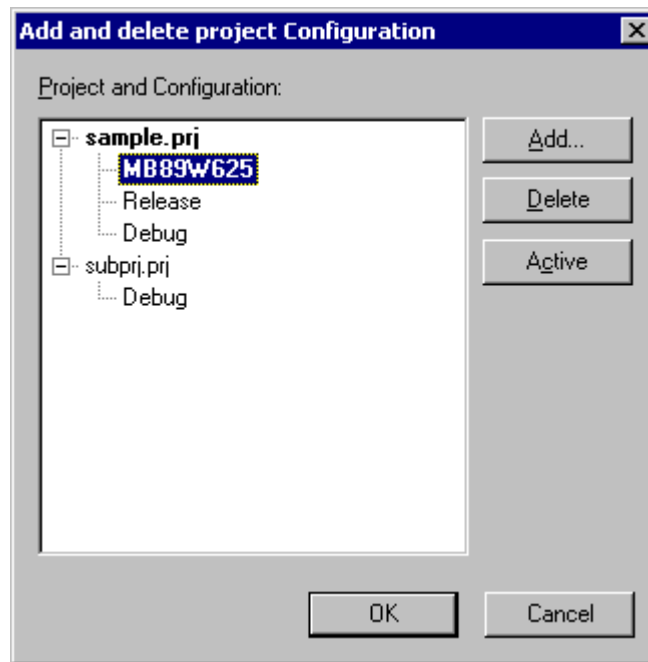
- Configuration at build

    The configuration as a subproject is made or built is set.

4.5.8.1   Project Configuration - Add and Delete

The project configuration is set (Add and Delete).

■ Project Configuration - Add and Delete

Figure 4.5-43 Add and Delete Project Configuration Dialog Box

- Project and Configuration

    All projects in workspace and their configurations are displayed.

- Add

    Click this button to open the [Add Project Configuration] dialog shown in Figure 4.5-43 .
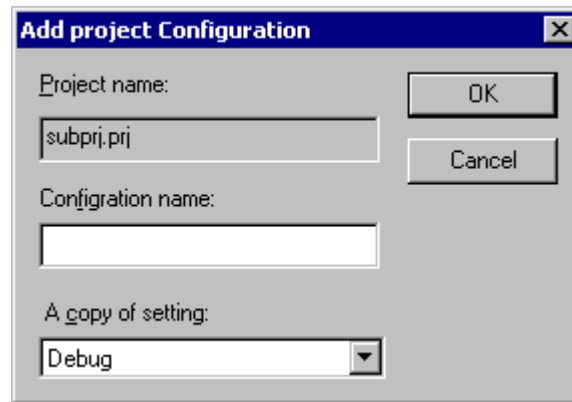
    This dialog enables the addition of the project configuration.

- Delete

    Click to delete the selected project and its configuration.

- Active

    Click this button to make the selected project and its configuration active.

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Figure 4.5-44 Add Project Configuration Dialog Box

- Project name

  The name of the project to which the configuration is added is displayed.

- Configuration name

  Set the name of the project configuration to be added.

- A copy of setting

  Select the configuration to which settings are copied.
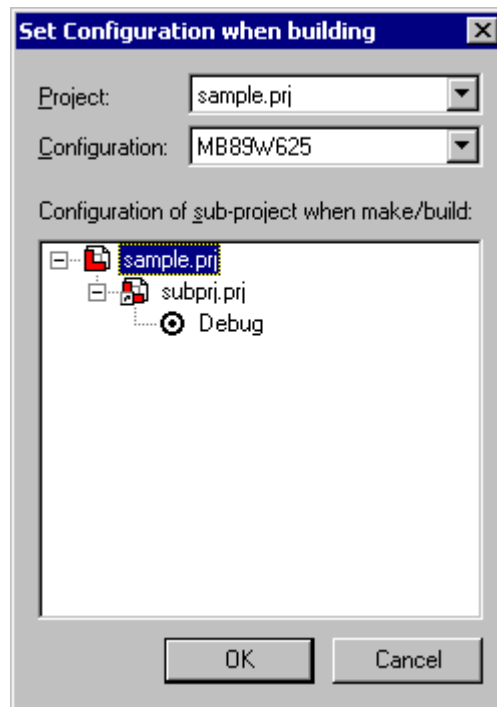
■ Setting Procedure

For the setting procedure, see Section 2.7 Creation of Project Configuration.

4.5.8.2   Project Configuration - Configuration at Build

The configuration as a subproject is made or built is set.

■ Project Configuration - Configuration at Build

Figure 4.5-45 Set Configuration when Building Dialog Box

- Project

   Select the parent project of a subproject.

- Configuration

   Select the configuration of the parent project select in "Project."

- Configuration of sub-project when made/built

   Select the configuration of the subproject, as the configuration of the parent project selected in "Configuration" is made or built.

■ Setting Procedure

For the setting procedure, see Section 2.10.1 Making or Building of Project.

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4.5.9   Include Dependencies

"Include Dependencies" updates include file dependency.

■ Updating include file dependency

This command (function) checks all the source files in the project file and registers all the include files being used by the source files in the project. The registered include files are displayed in the [Dependencies] category field of the Project Window.

4.5.10　Compile, Make, Build, and Stop

This section explains the functions of Compile, Make, Build, and Stop.

■ Compile

Compile compiles only the specified source file irrespective of whether other source files and include files are corrected. However, compile does not link the specified source file.

This command also assembles the specified file when the file is an assembler source file.

■ Make

Make checks all the source and include files in the project and compiles or assembles only the corrected file.

If some library and object files are modified, make links them to create a target file.

■ Build

Build compiles or assembles all the source files in the project irrespective of whether they are corrected.

It also links all object and library files to create a target file.

■ Stop

Use Stop when you want to stop compile, make, or build execution for some reason.

■ Checking source file saving

When an unsaved file is being edited by the standard editor, execute compile (assemble), make, or build, then save the file. If a check mark is set to the left of [Inquiry for Save at Compile/Assemble] in [Setup]-[Development...]-[Project], however, the dialog box for asking whether to save the file opens. When the [No] button is clicked, the source file is compiled without being saved.

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4.6   Debug

"Debug" starts and terminates debugging and controls the debugger when SOFTUNE WORKBENCH is in the debug session.

■ Debug start and termination

-Loading Target File

-Start Debug/End Debug

■ Debugger control when SOFTUNE WORKBENCH is in the debug session

-Run

-Abort

-Reset of MCU

-Break Points...

-Breakpoint Set/Reset

-Event...

-Sequence

-Stack...

-Time Measurement...

-Call...

-Clear Call

-Vector

4.6.1   Run

This section explains the debugger program execution function.

■ Run

"Run" provides the following five functions:

-Go

When [Go] is clicked, the debugger continuously executes the program from the current PC position. When a breakpoint is reached or when [Abort] is selected from the [Debug] Menu, the debugger stops program execution.

-Step In

When [Step In] is clicked, the debugger executes the step, moves the PC to the address of the next instruction, and stops. When a function call instruction is executed, the debugger stops at the beginning of the function.

-Step Over

When [Step Over] is clicked, the debugger executes the step, moves the PC to the beginning of the next instruction, and stops. When a function call instruction is executed, the debugger executes all the functions, moves the PC to the next instruction address of the function call instruction, and stops.

-Step Out

When [Step Out] is clicked, the debugger executes the current function to the end, returns control to the function caller, moves the PC to the next instruction address of the function call instruction, and stops.

-Run Until Cursor

When [Run Until Cursor] is clicked, the debugger executes the program to the instruction immediately before the address indicated by the cursor (in the Source or Assembly Window), moves the PC to the address, and stops.

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4.6.2   Abort

This section explains the debugger program execution stop function.

■ Abort

[Abort] is used to forcibly interrupt the program being executed by the debugger. When the program stops, the PC moves to the next instruction address of the last executed instruction. Source line display and disassemble display are also updated according to the PC value set when the program stopped.

4.6.3   Reset of MCU

This section explains the MCU reset function of the debugger.

■ MCU reset function

The MCU reset function resets the MCU.

-Emulator

The MCU reset function issues the reset signal to the emulator.

-Simulator

As with the actual chip, set the initial values of the registers to be initialized by reset and clear other registers to 0.

In reset of MCU, breakpoints, watch points, map setting, and program variables are not modified.

4.6.4   Break Point

This section explains how to set, reset, and modify a breakpoint and how to display a break list.

■ Breakpoint

When the PC passes an address or the program accesses data at an address, the position where program execution by the debugger is to be stopped is called a breakpoint.
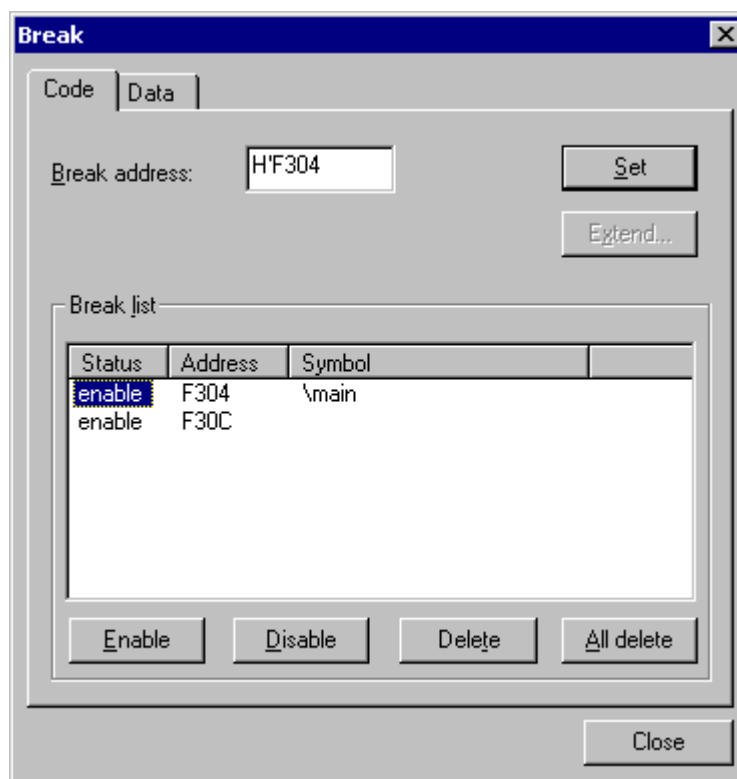
■ Code breakpoint

When the PC passes the set address (when the address is executed), the breakpoint where program execution is to be stopped is called a code breakpoint.
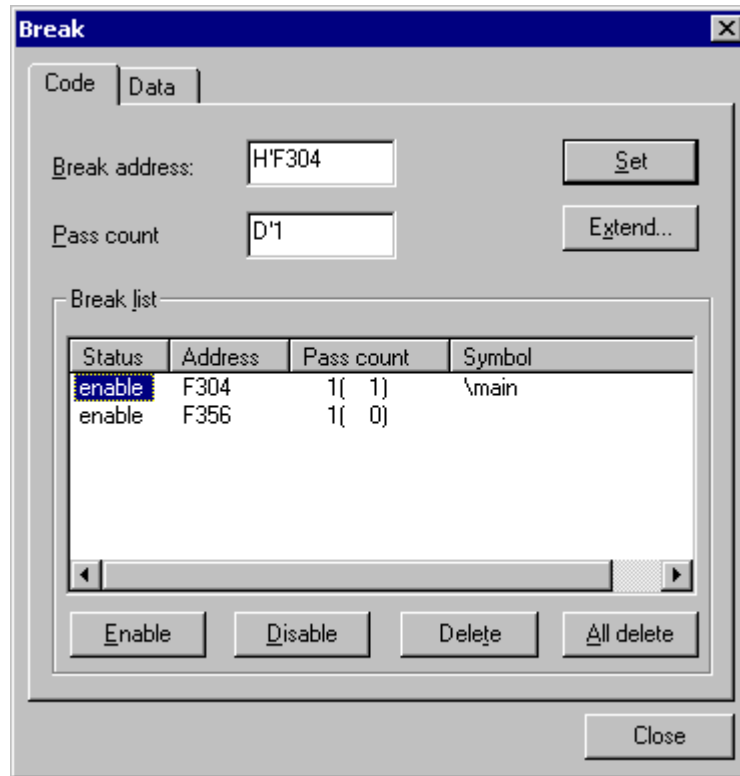
■ Setting of code breakpoint

[Emulator]

Figure 4.6-1 Break Dialog Box (Code)

[Simulator]

Figure 4.6-2 Break Dialog Box (Code)

- Breakpoint address

    In this field, the address that sets a breakpoint is specified.

- Remaining count

    The remaining count of settable breakpoint is displayed.

- Pass count

    In this field, the count of times the PC passes that point (a particular point) before causing a break is set. This field is only enabled for the simulator.

- Breakpoint list

    A list of code breakpoints currently being set is displayed.

    State   : Enable or disable is displayed.

    Type   : The breakpoint type is displayed.

    Address   : The set address is displayed.

    Attribute   : The breakpoint attribute is displayed.

    Pass count : The set pass count is displayed. In ( ), the count of times the PC has passed that point by the present time is displayed.

    Symbol   : The symbol given to that address is displayed.

- [Setting] button

    These buttons are used to set a breakpoint at the specified address. When an address that is already set in the breakpoint list is specified, the set data of the breakpoint at this address is changed.

- [Enable] button

  This button is used to enable the breakpoints in the breakpoint list currently being selected.

- [Disable] button

  This button is used to disable the breakpoints in the breakpoint list currently being selected. The breakpoints are simply disabled; that is, the setting itself of the breakpoints is not cancelled.

- [Delete] button

  This button is used to delete the setting of the breakpoints in the breakpoint list currently being selected.

- [Delete All] button

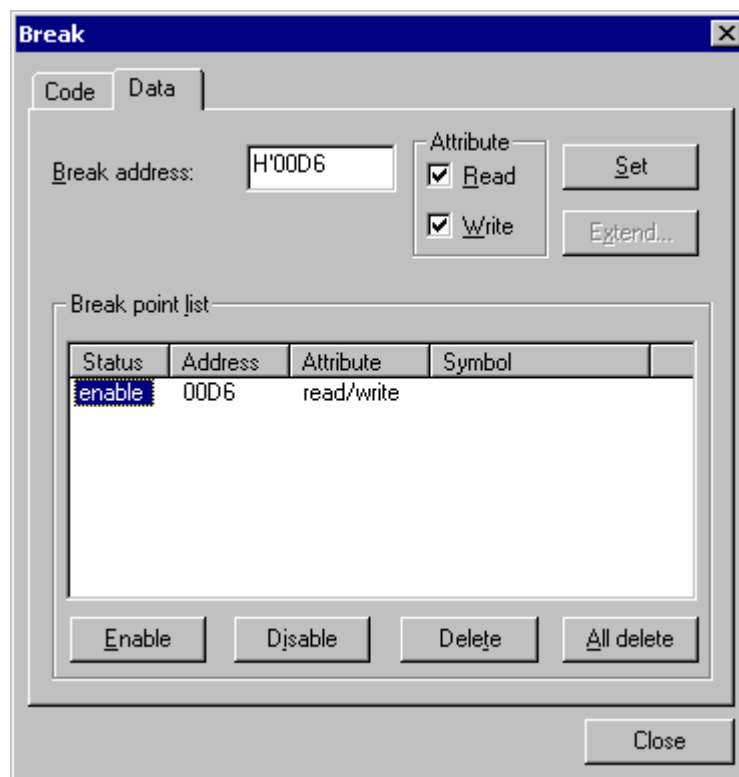 This button is used to delete the setting of all the breakpoints in the breakpoint list.

■ Data breakpoint

Such a breakpoint as stop the program when data at the set address is accessed is called the data breakpoint.
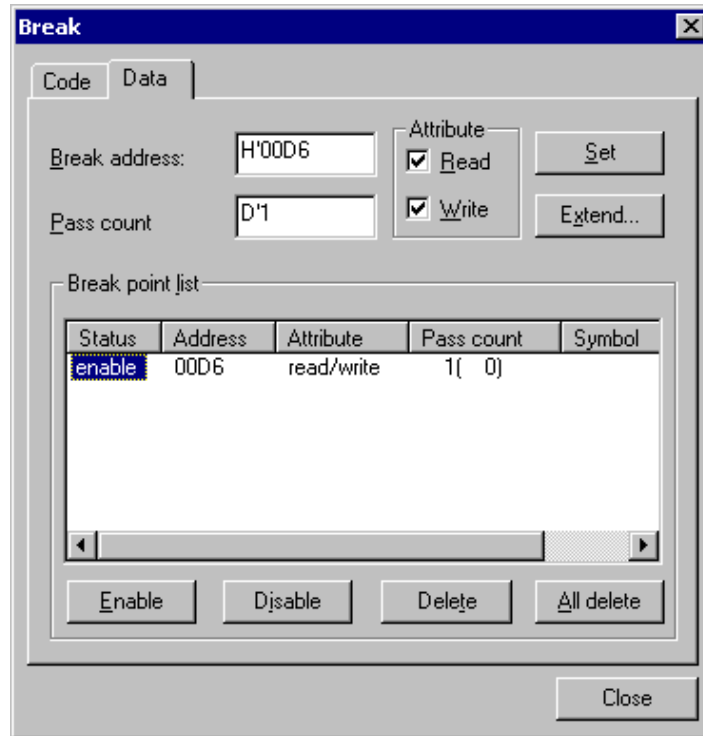
■ Setting of data breakpoint

[Emulator]

Figure 4.6-3 Break Dialog Box (Data)

[Simulator]

Figure 4.6-4 Break Dialog Box (Data)

- Breakpoint address

    In this field, the address that sets a breakpoint is specified.

- Pass count

    In this field, the count of times access with the specified attribute is to be made to that point (a particular point) before causing a break is set. This field is only enabled for the simulator.

- Attribute

    In this field, read access, write access, or both is specified.

- Breakpoint list

    A list of data breakpoints currently being set is displayed.

State	:	Enable or disable is displayed.
Address	:	The set address is displayed.
Attribute	:	The attribute is displayed.
Pass count	:	The set pass count is displayed. In ( ), the count of times the PC has passed that point by the present time is displayed.
Symbol	:	The symbol given to that address is displayed.

- [Setting] button, [Add] button

    These buttons are used to set a breakpoint at the specified address. When an address that has been already set in the breakpoint list is specified, the set data of the breakpoint at this address is changed.

- [Details] button

    This button is used to set the details of a breakpoint at the specified address. For details, see 4.6.4.1 Breakpoint Details Setting.

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- [Enable] button

    This button is used to enable the breakpoints in the breakpoint list currently being selected.

- [Disable] button

    This button is used to disable the breakpoints in the breakpoint list currently being selected. The breakpoints are simply disabled; that is, the setting itself of the breakpoints is not cancelled.

- [Delete] button

    This button is used to delete the setting of the breakpoints in the breakpoint list currently being selected.

- [Delete All] button

    This button is used to delete the setting of all the breakpoints in the breakpoint list.
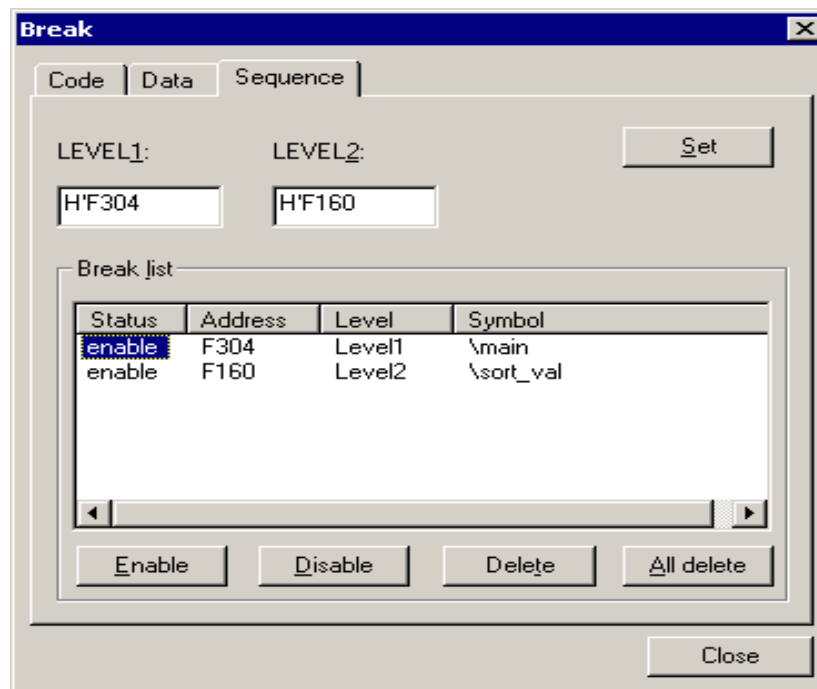
■ Sequence breakpoints

When two set addresses are passed the order of LEVEL1 → LEVEL2, the breakpoints to be stopped the program is called a sequence breakpoints.

■ Setting of sequence breakpoints

[Emulator (MB2146-09)]

Figure 4.6-5 Break Dialog Box (Sequence)

- LEVEL

    In this field, the address that sets a breakpoint is specified.

- Breakpoint list

    A list of sequence breakpoints currently being set is displayed

    State   : Enable or disable is displayed.

    Address   : The set address is displayed.

    LEVEL   : The order of address to be the breakpoint condition is displayed.

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Symbol   : The symbol given to that address is displayed.

- [Setting] button,

These buttons are used to set a breakpoint at the specified address. When an address that has been already set in the breakpoint list is specified, the set data of the breakpoint at this address is changed.

- [Enable] button

This button is used to enable the breakpoints in the breakpoint list currently being selected.

- [Disable] button

This button is used to disable the breakpoints in the breakpoint list currently being selected. The breakpoints are simply disabled; that is, the setting itself of the breakpoints is not cancelled.

- [Delete] button

This button is used to delete the setting of the breakpoints in the breakpoint list currently being selected.

- [Delete All] button

This button is used to delete the setting of all the breakpoints in the breakpoint list.

■ Setting and resetting a breakpoint

In the Source or Assembly Window, a breakpoint can be easily set at the address indicated by the cursor. The breakpoint set at the address indicated by the cursor can be also reset easily. Set and reset this breakpoint as follows:

-Select [Breakpoint Set/Reset] from the [Debug] Menu.

The breakpoint is alternately set and reset each time [Breakpoint Set/Reset] is selected.

-Click the left button of the mouse in the breakpoint display field of each window.
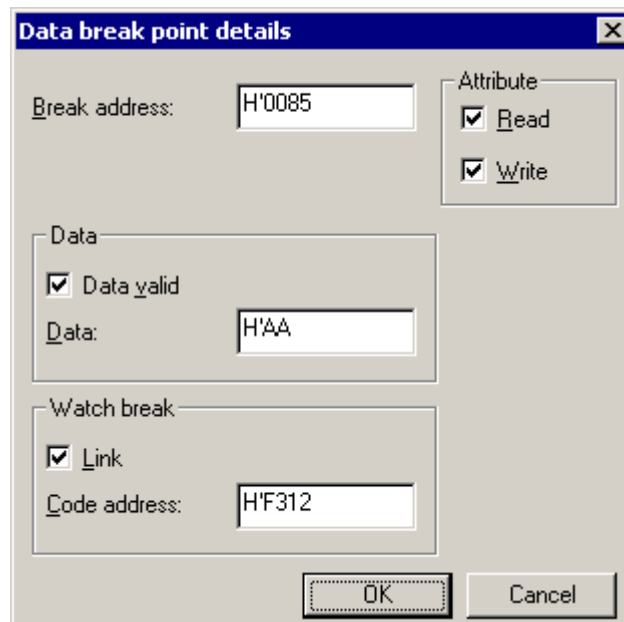
The breakpoint is alternately set and reset each time the left button is clicked.

4.6.4.1 Breakpoint Details Setting

Setting of breakpoint details is explained here.

■ **Details of data breakpoint: (For MB2146-09)**

Figure 4.6-6 Data Breakpoint Details Dialog

- Breakpoint address

    In this field, the address that sets a breakpoint is specified.

- Attribute

    The attribute at the time of data access is specified.

- Data valid

    This checks when the data watch is specified in the breakpoint condition.

- Data

    In this field, data at the time of data access is specified.

- Link

    This checks when the link is used as the data monitoring condition.

- Code address

    In this field, the breakpoint address of the data monitoring breakpoint is specified.
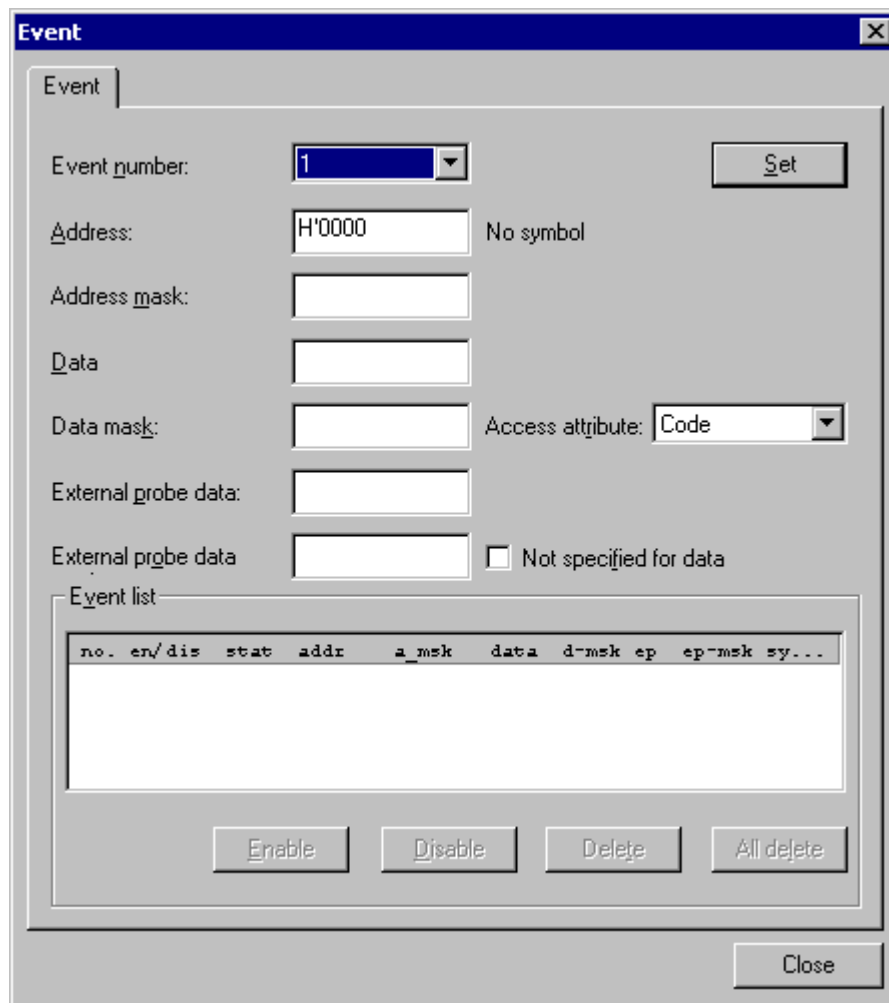
4.6.5   Event

This section explains how to set SOFTUNE WORKBENCH events.

■ Setting events

Events can be set from the event dialog box shown in Figure 4.6-7 . This function can be used only in the emulator (MB2141).

[MB2141 (event mode: Normal)]

Figure 4.6-7 Event Dialog Box (Event)

- Event Number

     Specifies an event number (1 to 8).

- Address

     Specifies the address at which the event occurrence condition is to be set.

- Address Mask

     Specifies address mask. Only the addresses whose bits are 1 are to be compared.

- Data

    Specifies the data to be set as the event occurrence condition.

- Data Mask

    Specifies data mask. Only the data items whose bits are 1 are to be compared.

- Access Attribute

    Specifies a data access attribute. (Code/Read/Write/Read Code/Read Write/Modify)

- External Probe Data

    Specifies the external probe data value to be set as the event occurrence condition.

- External Probe Data Mask

    Specifies external probe data mask. Only the data items whose bits are 1 are to be compared.

- Data NOT Specification

    Specifies the condition when the data values do not match.

- Event List

    Displays the current event setting state.

4.6.6   Sequence

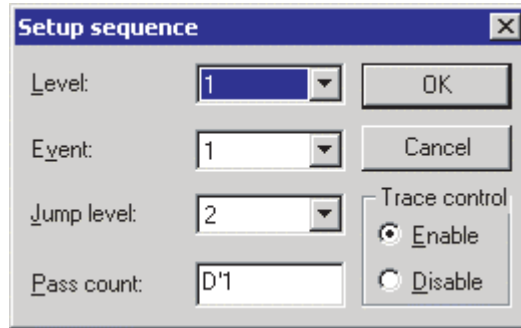**"Sequence" displays the Sequence Window.**

■ Sequence Window

The window that displays the sequence setting state opens. A sequence, latch, and delay count can be set from this window.

This function can be used in the emulator (MB2141).

■ Setting the sequence

Select [Setup] from the shortcut menu of the Sequence Window.
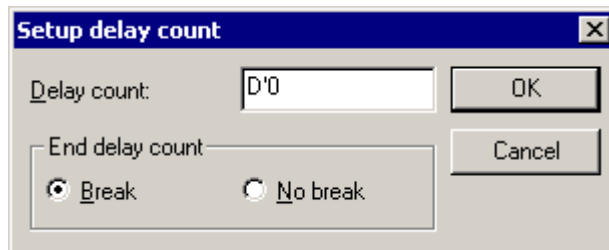
Figure 4.6-8 Sequence Setting Dialog

-Level	Select a level.(1-8)
-Event	Select an event.(1-8/Timer)
-Jump	Select a jump destination level. (1-8/END)
-Pass Count	Set a pass count.
-Trace Control	Select "Enable" or "Disable".

■ Setting the delay count

Select [Delay Count] from the shortcut menu of the Sequence Window.
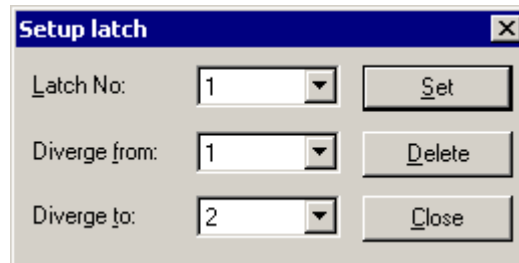
Figure 4.6-9 Delay Count Setup Dialog Box

| -Delay Count | Set the delay count. |
| -Delay Count Break | Select "Break" or "Not Break". |

■ Setting latch

Select [Setup Latch] from the shortcut menu of the Sequence Window.

Figure 4.6-10 Latch Setup Dialog Box

-Latch Number	Select a latch number. (1-2)
-Diverge from	Select a branching source level. (1-8)
-Diverge to	Select a branching destination level. (1-8/END)
-Delete	Deletes the set items.

■ Displaying the latch measurement result

Select [Latch Display] from the shortcut menu of the Sequence Window. The latch measurement result is displayed.

Figure 4.6-11 Latch Display Dialog Box

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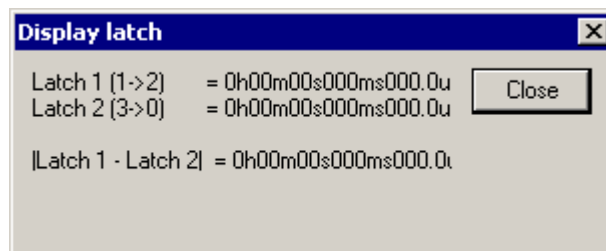
4.6.7   Stack

This section explains a SOFTUNE WORKBENCH call stack.

■ Call stack

Usually, a program is a set of several subroutines. For this reason, as debugging advances, function calls of several stages occur. For example, one routine calls another and the called routine calls further another.

The call stack retains the relationship among function calls. Clicking a function name from the function name list immediately displays information for the function in the Source Window.

Figure 4.6-12 Call Stack Dialog Box
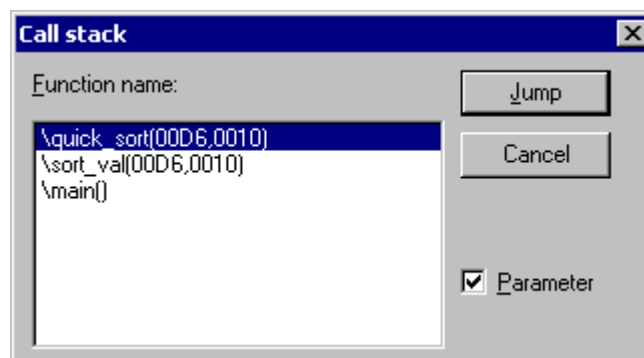
The function written in the lowermost line of the function name list is the main function. This main function calls the function above it.   The called function calls further a function above it. In this way, the function written in the uppermost line is the function in which the current PC exists.

When return is executed, functions are deleted in turn from the function name list, starting from the uppermost line.

-Argument Display

When a check mark is set to the left of Argument Display, an argument value is displayed after each function name, as shown in Figure 4.6-12 .
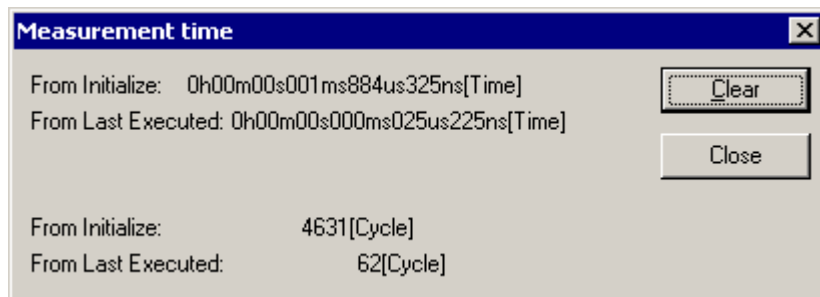
When no check mark is set to the left of Argument Display, only parentheses "( )" are displayed after each function name.

4.6.8   Time Measurement

This section explains SOFTUNE WORKBENCH time measurement.

■ Time measurement

Figure 4.6-13 Time Measurement Dialog Box

-Items to be displayed

	Time	Cycle count	Step count
SIM	×	○	○
EML(MB2141)	○	×	×
EML(MB2146-09)	×	×	×

-From Initialize

Indicates the cumulative total value of execution after the [Clear] button has been clicked.

-From Last Executed

Indicates the immediately preceding execution time.

Note:

The measurement results have errors. For details, refer to 'Execution Time Measurement' in each chapter in SOFTUNE WORKBENCH Function Manual.
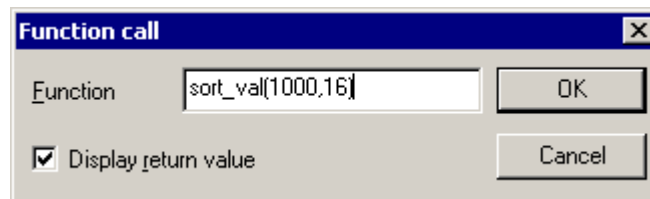
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4.6.9   Call

This section explains the SOFTUNE WORKBENCH function call function.

■ Function call

The specified function can be started during debugging without reference to the flow of the program. This function is known as function call.

Figure 4.6-14 Function Call Dialog Box

When the function call dialog box shown in Figure 4.6-14 opens, specify the function you want to call with a correct argument.

If a breakpoint is set in the called function, the program stops at this breakpoint. When processing of the called function is terminated and control is returned, the function call result dialog box shown in Figure 4.6-14 .

Then, the PC returns to the value before the function was called.

Figure 4.6-15 Function Call Result Dialog Box
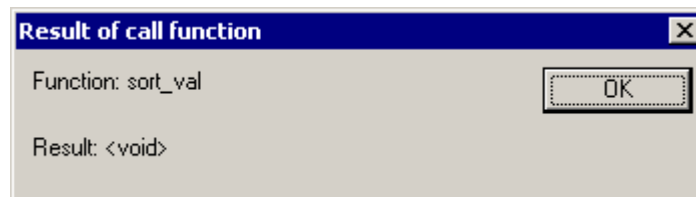
[Example]

When function definition is int sub (int param);, specify the function call as follows:

sub (10): When a constant value is directly specified

sub (ii): When variable ii is specified

4.6.10   Clear Call

This section explains the SOFTUNE WORKBENCH call clear function.

■ Clear Call

"Clear Call" is used to restore the original state without executing the function call (see Section 4.6.9 Call) to the end. This function is used after program execution has been stopped by "Breakpoints...", etc.

When "Clear Call" is executed, control returns from the immediately called function. In this case, the function call result is not displayed because the called function is not executed to the end.

4.6.11   Vector

This section explains how to display and modify SOFTUNE WORKBENCH vectors.
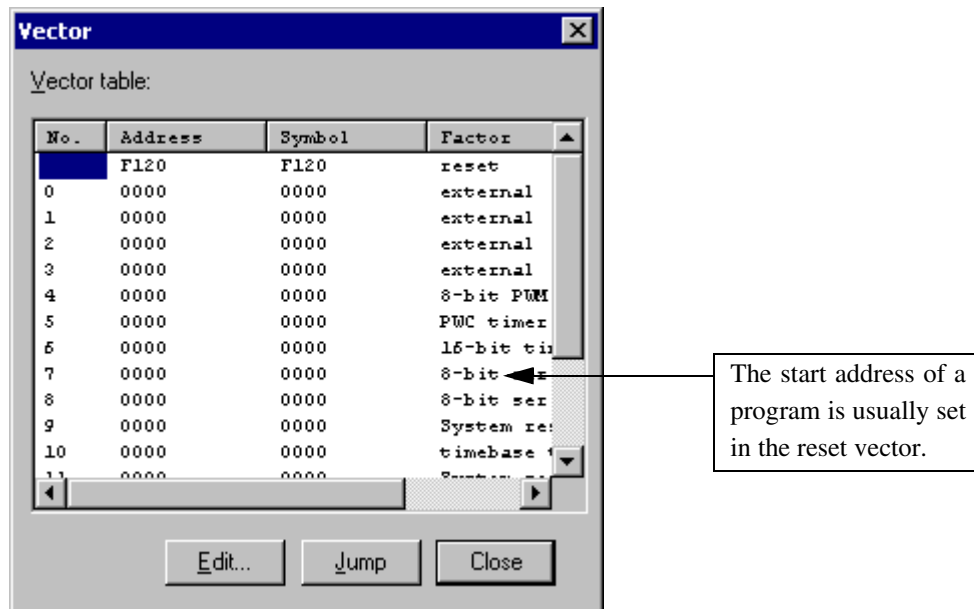

■ Vector

When the MCU is reset or when an interrupt processing request is issued for a variety of factors, the MCU sets the data, set in the address determined in advance according to the type of the interrupt, in the PC as the address of the interrupt processing routine. The address at which this interrupt processing routine is set is called a vector. Vectors are determined in advance according to the kind of the MCU.

■ Display and setting vectors

-Display

Figure 4.6-16 Vector Display Dialog Box

The start address of a program is usually set in the reset vector.

Setting an address

Change the address, set in a vector as the following procedure:

1) Select a vector table number, then click the [Edit] button.

   - The vector edit dialog box opens.

2) Set an address, then click the [OK] button.

■ Jump

Display the source of the stored program at the address set in the vector table in the following procedure:

1. Select a vector number.

2. Click the [Jump] button.

If the starting address of the program set in the vector table is incorrect, the source cannot be displayed (disassemble display).

Note:

The jump function merely displays the jump destination program; it does not update the program counter to move control to the address set in the vector table.

4.6.12   Load Target File

This section explains how to load the target file to be debugged by SOFTUNE WORKBENCH.
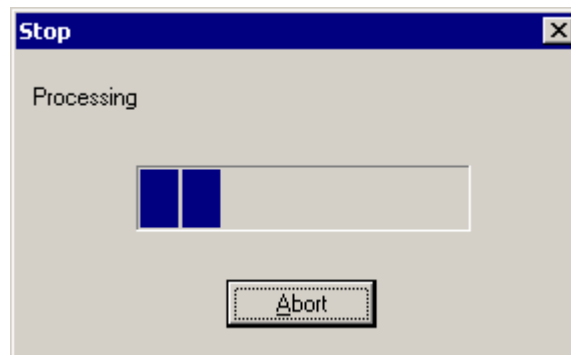
■ **Target file**

An ABS format target file is to be debugged. This file is registered as a project target file.

Debugging can be started after the ABS format target file has been created. Use SOFTUNE WORKBENCH to create a source program and execute compile/assemble and link. Creation of the ABS format target file is enabled when the program is free from compile/assemble and link errors.

■ **Loading the target file**

Before loading the target file, select [Start debug] from the [Debug] Menu to place SOFTUNE WORKBENCH in the debug session. When SOFTUNE WORKBENCH enters the debug session, select [Load target file] from the [Debug] Menu to load the target file. The target file load state displays dialog box shown in Figure 4.6-17 opens when the target file is being loaded.

Figure 4.6-17 Target File Load State Display Dialog Box

When loading the target file terminates, an entry point is set in the PC, the source line of the module including the entry point is displayed, and the program stops.

Execute [Step] and [Go], etc., subsequently to continue debugging.

4.6.13 Start Debug/Terminate Debug

This section explains how to start and terminate debugging.

■ Starting debugging

"Start debug" places SOFTUNE WORKBENCH in the debug session to enable the subsequent use of debugger commands. When SOFTUNE WORKBENCH enters the debug session, at first load the target file (see Section 4.6.12 Load Target File).

■ Terminating debugging

"Terminate debug" terminates the SOFTUNE WORKBENCH debug session.

4.7   Setup

"Setup" sets SOFTUNE WORKBENCH execution environment, debugger mode environment, and other tools.

■ **Setting the SOFTUNE WORKBENCH execution environment**

       - <u>Development</u>

■ **Setting the debugger mode environment**

       - <u>Debug Environment</u>

       - <u>Memory Map...</u>

       - <u>Flash area control</u>

■ **Setting other tools**

       - <u>Tool</u>

       - <u>Keyboard</u>

       - <u>Editor</u>

       - <u>Error</u>

       - <u>Start Tool</u>

4.7.1   Development

"Development..." sets SOFTUNE WORKBENCH operation and the environment variables required by language tools (e.g., compiler).

■ Environment variable

Figure 4.7-1 shows the environment variable setup dialog box. The environment variables listed in Table 4.7-1 are set in this section.

Table 4.7-1 Environment Variable Names

Environment variable name	Explanation
FETOOL	Standard directory in which language tools were installed
INC896	Directory in which include file exists
LIB896	Directory in which library file exists
OPT896	Directory in which the language tool default option file exists
FELANG	Character code system switching in the messages output by language tools (SJIS: Japanese language (shift JIS), ASCII: English)
PATH	Directory in which language tools exist
TMP	Directory in which work files exist

Figure 4.7-1 Development Environment Setup (Environment Variable) Dialog Box
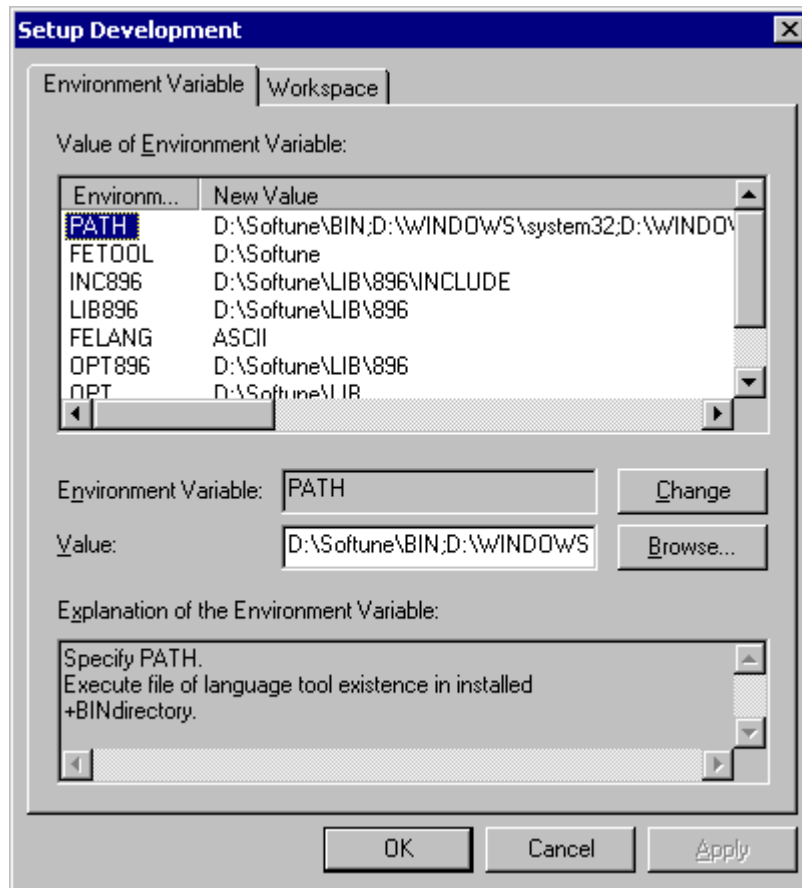
Set the development environment in the following procedure:

1. Select the name of the environment variable whose setting is to be changed from the [Value of Environment Variable] list. The current setting value is displayed in the [Value] field.
   Simple explanation of the environment variable is displayed in [Explanation of the Environment Variable].

2. Change the description of the [Value] field.

3. Click the [Change] button.

■ Workspace

"Workspace" sets the following SOFTUNE WORKBENCH operations:

-Open the last workspace at starting

  Setting a check mark to the left of this item enables the opening of the previously opened workspace file when SOFTUNE WORKBENCH is started.

-Output tool option at compile/assemble

  Setting a check mark to the left of this item enables the display of the options, specified when the C compiler or assembler is started, in the Output Window.

-Inquiry for save at close workspace

  When a check mark is set to the left of this item, SOFTUNE WORKBENCH asks you whether to save the currently open file to the workspace file when the workspace is closed.

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-Inquiry for save at compile/assemble

When a check mark is set to the left of this item, SOFTUNE WORKBENCH asks you whether to save the file currently being edited before compile/assemble.

Figure 4.7-2 Development Environment Setup (Workspace) Dialog Box
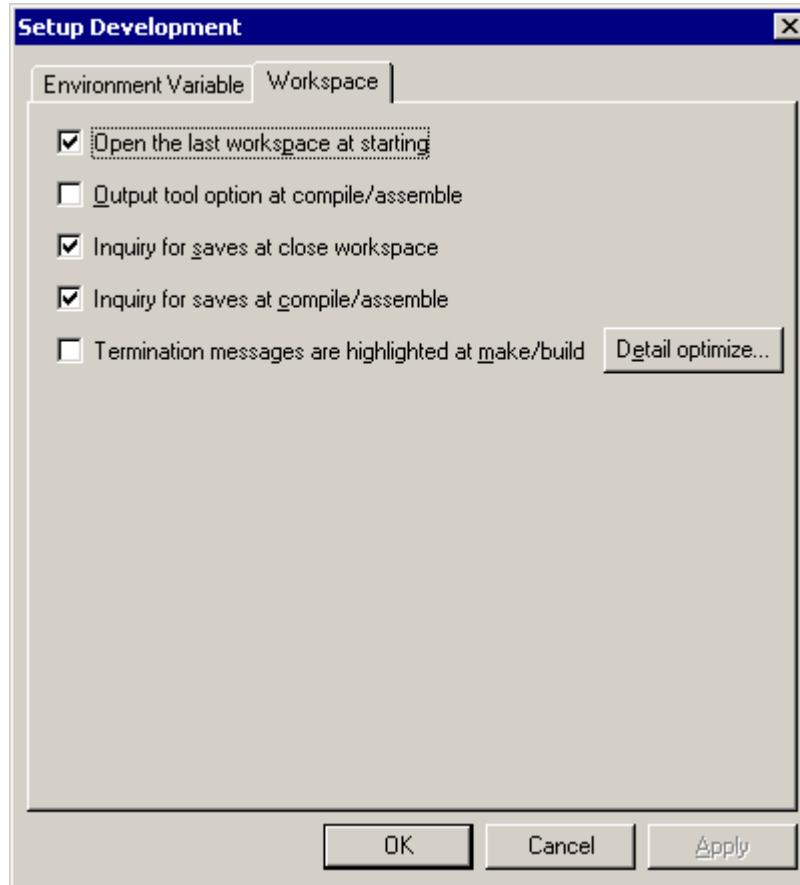

-Termination messages are highlighted at make/build

When this item is checked, the display color of termination messages (abort, no error, warning, error, fatal error, or fail during start) during Compile, Assemble, Make, or Build, can be changed.

To change the display color, click the [Detailed optimize] button at the right of this field; the termination message display color dialog is displayed (Figure 4.7-3). Change the display color.

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Figure 4.7-3 Display Color of Messages Dialog Box
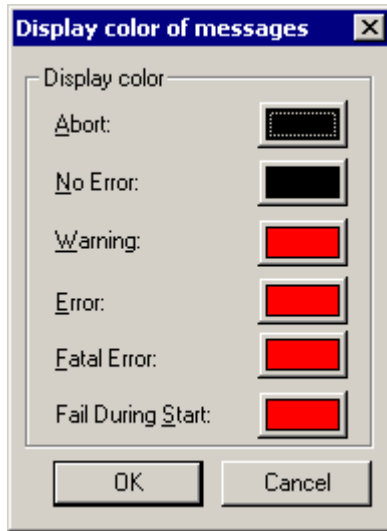
4.7.2 Debug Environment

"Debug Environment" sets the debug environment; it is valid only when SOFTUNE WORKBENCH is in the debug session.

■ Items to be set

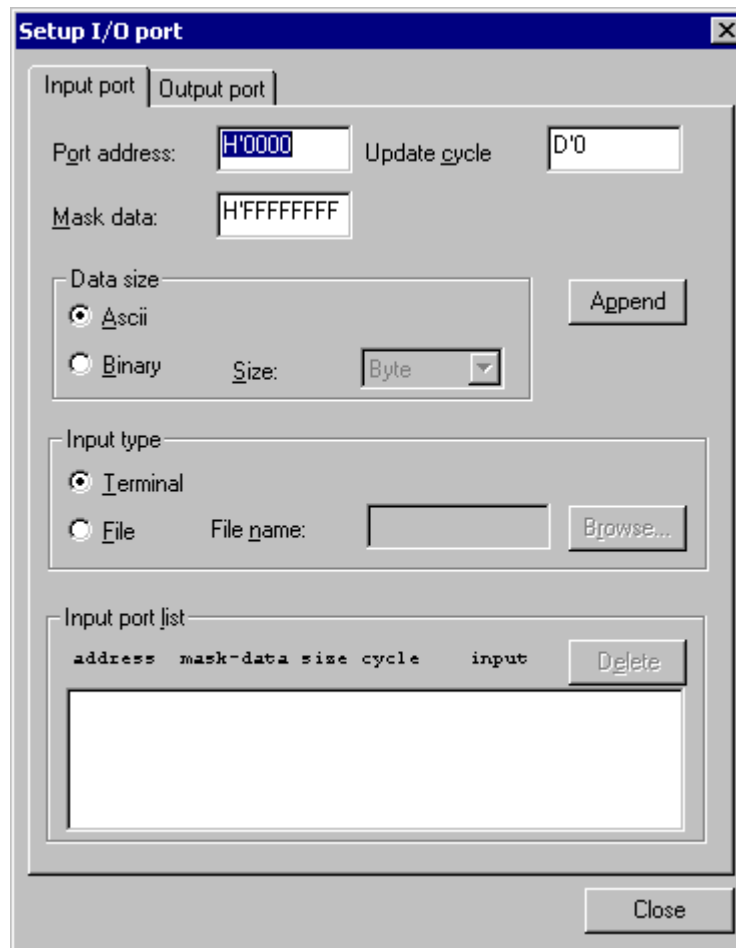Select and set the following items from the submenu:

- <u>I/O Port</u>

- <u>Interrupt</u>

- <u>Debug Environment</u>

- <u>Setup Wizard</u>

4.7.2.1 I/O Port

This section explains the I/O port setup procedure.

■ Setting an input port

Figure 4.7-4 Input Port Setup Dialog Box

-Port Address

 Specifies a port address.

-Mask Data

 Specifies address mask. Only the addresses whose bits are 1 are to be compared.

-Data Size

 Specifies a data input type. When Binary is selected, specify its size. (Byte/Word/Long)

-Input Type

 Specifies a port data input source.

-Input Port List

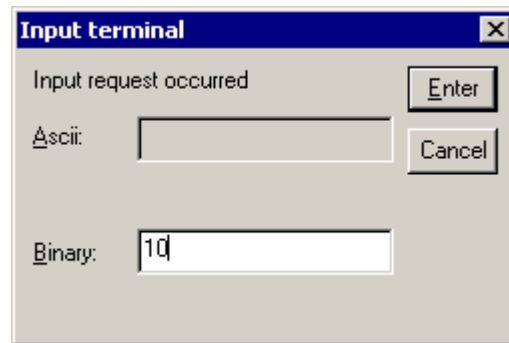 Displays the currently specified ports.

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-Input terminal

When an input request is issued during program execution with [Input Type] set to [Terminal], the input terminal dialog box opens.

Specifying [ASCII] as [Data Type] in input port setting enables ASCII input.

Specifying [Binary] as [Data Type] enables binary input.

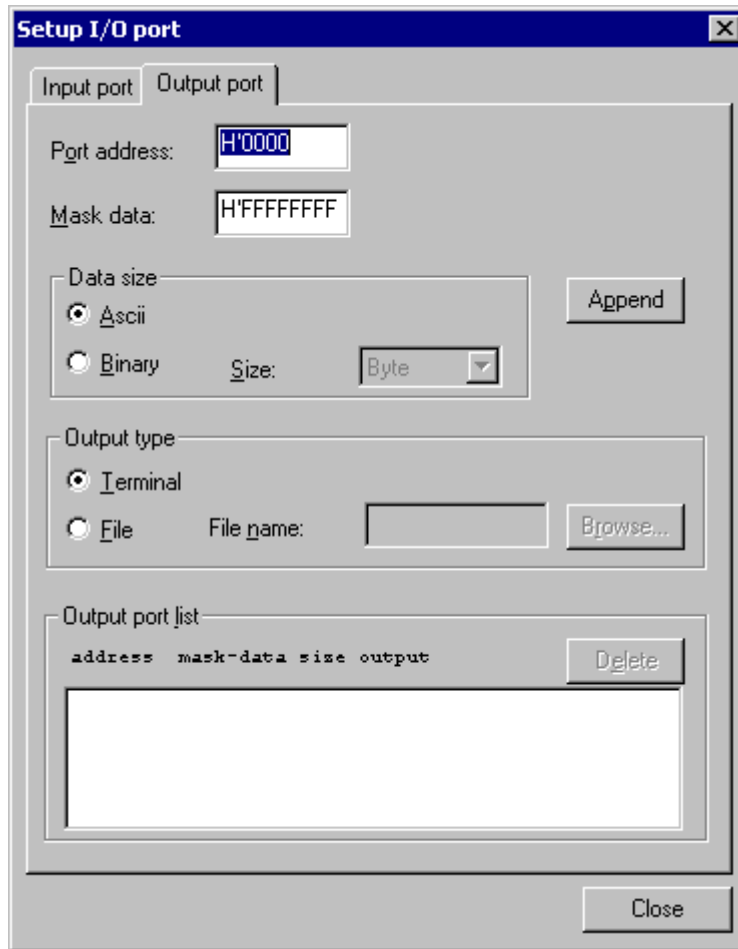**Figure 4.7-5 Input Terminal Dialog Box**

■ Resetting an input port

1. Select the input ports to be reset from [Input Port List].

2. Click the [Delete] button.

3. When resetting all the selected ports is completed, click the [Close] button.

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■ Setting an output port

Figure 4.7-6 Output Port Setup Dialog Box

-Port Address

  Specifies a port address.

-Mask Data

  Specifies address mask. Only the addresses whose bits are 1 are to be compared.

-Data Size

  Specifies a data output type. When Binary is selected, specify its size. (Byte/Word/Long)

-Output Type
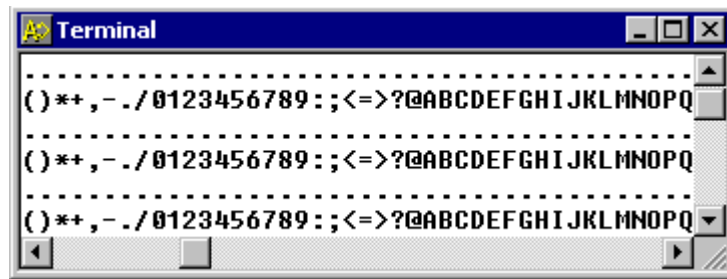
  Specifies a port data output destination.

-Output Port List

  Displays the currently specified ports.

-Output terminal

  When an output request is issued during program execution with [Output Type] set to [Terminal], the Terminal Window is displayed. The output type also depends on [Data Type].

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Figure 4.7-7 Output Terminal Window (Binary)

■ Resetting an output port

1. Select the output ports you want to reset from [Output Port List].

2. Click the [Delete] button.

3. When resetting all the selected ports is completed, click the [Close] button.

4.7.2.2   Interrupt

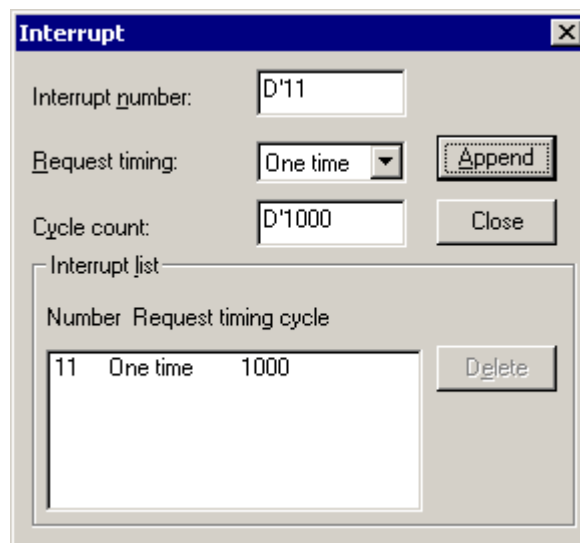**This section explains the interrupt setup procedure.**

■ Setting an interrupt

1. When the interrupt setup dialog box shown in Figure 4.7-8 opens, set an interrupt number.

2. Select an issuance timing.
   [One Time] or [Interval] can be selected.

3. Set the interrupt cycle count.

4. Click the [Add] button.
   The set interrupt number, issuance timing, and interrupt cycle count are displayed in [Interrupt List].

5. When setting all the items is completed, click the [Close] button.

■ Resetting an interrupt

1. When the interrupt setup dialog box shown in Figure 4.7-8 opens, set an interrupt number.

2. Select the interrupt to be reset from [Interrupt List].

3. Click the [Delete] button.

4. When resetting all the selected interrupts is completed, click the [Close] button.

Figure 4.7-8 Interrupt Setup Dialog Box
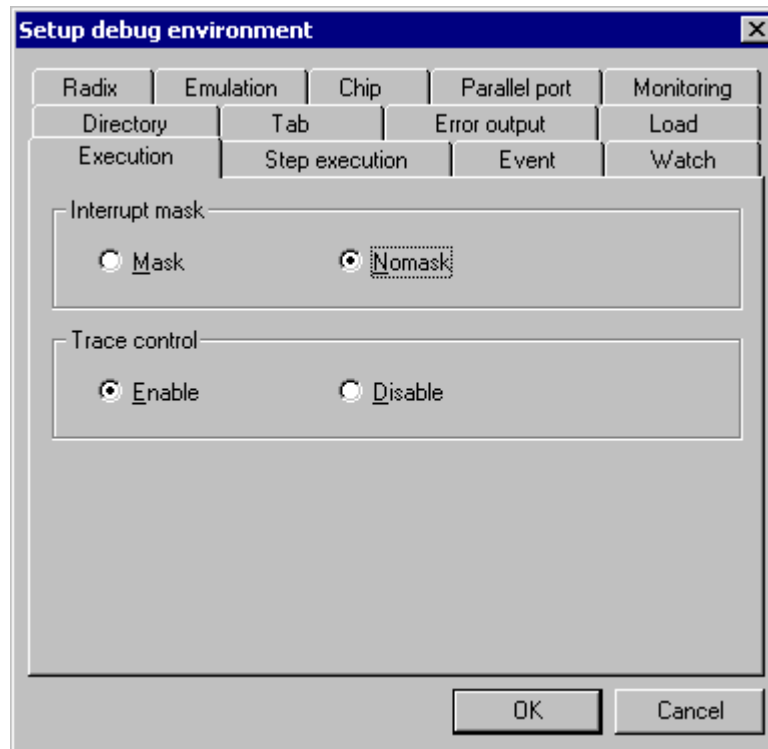

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4.7.2.3　Debug Environment

This section explains the debug environment setup procedure.

■ Debug environment setup procedure

-Execution

Figure 4.7-9 Debug Environment Setup Procedure (Execution)

-Interrupt Mask

　Specifies whether to enable/disable interrupt mask during step execution.

-Trace Control

　Specifies whether to enable/disable trace control.

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-Step Execution

Figure 4.7-10 Debug Environment Setup Dialog Box (Step Execution)
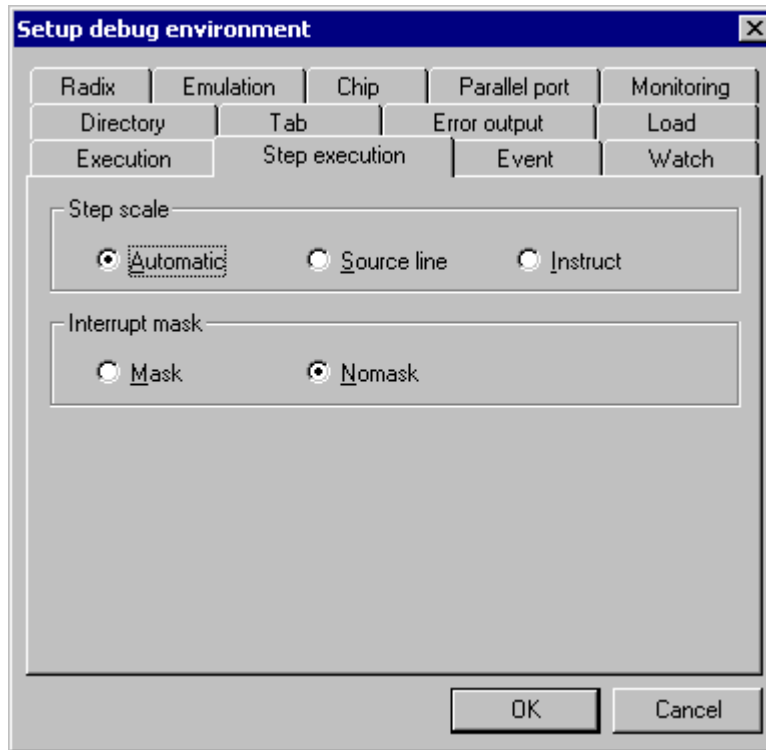
- Step Scale

    - Auto

        Automatically sets the step unit according to the window display state.

    - Source Line

        Executes the step in units of source lines.

    - Instruct

        Executes the step in units of machine languages.

- Interrupt Mask

    Specifies whether to enable/disable interrupts.

-Event [MB2141]

Figure 4.7-11 Debug Environment Setup Dialog Box (Event)
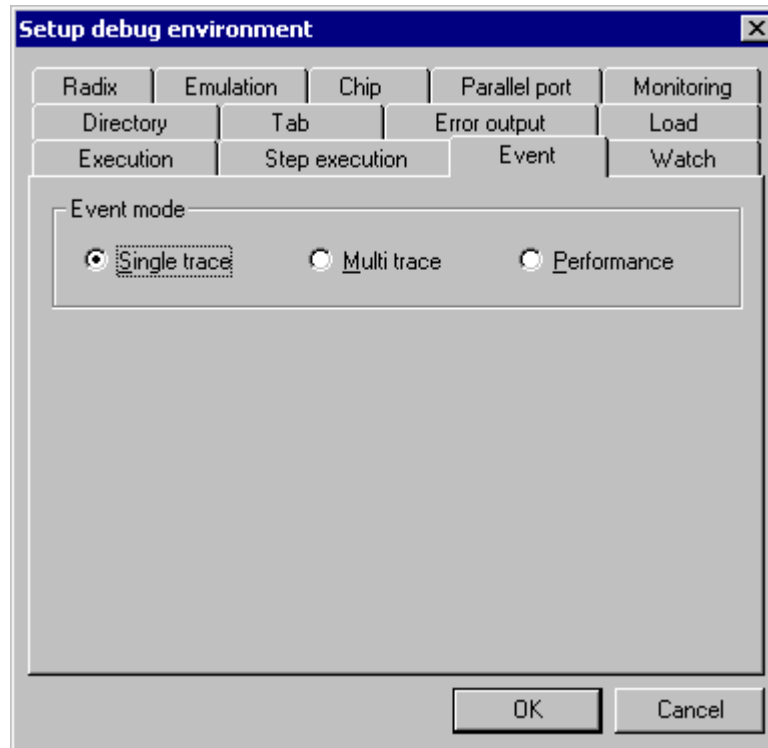
-Event Mode

Specifies an event mode.

    -Single Trace

     Specifies the normal mode.

    -Multi-Trace

     Specifies the multi-trace mode.

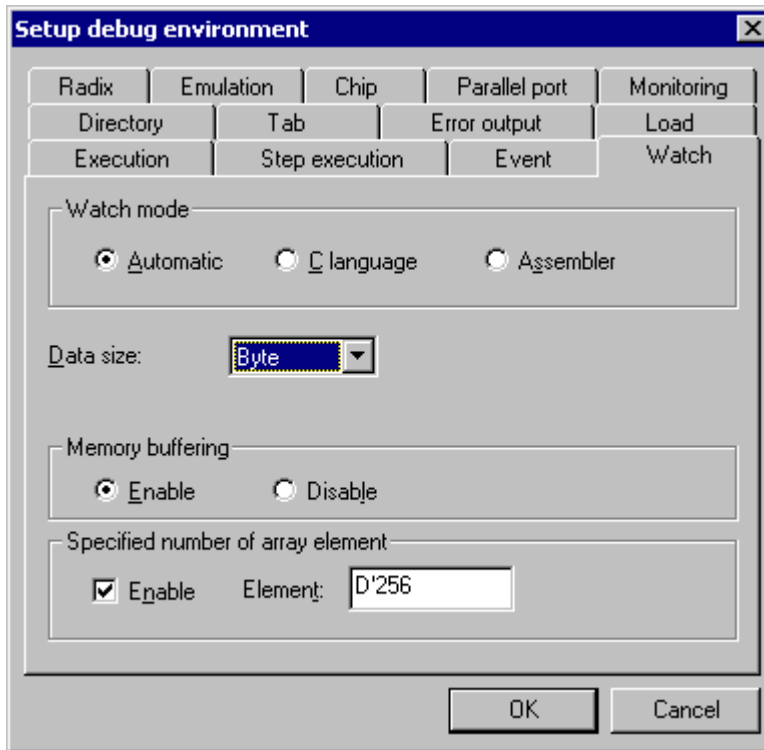   -Performance

     Specifies the performance mode.

-Watch

Figure 4.7-12 Debug Environment Setup Dialog Box (Watch)

-Watch Mode

  -Automatic

   Sets the watch mode automatically according to the analysis result.

  -C Language

   Sets the C language mode (interpretation as C language expressions).

  -Assembler

   Sets the assembler mode (interpretation as assembler expressions).

-Data Size

Sets the display size in the assembler mode.

  -Byte/word/long/single precision/double precision

-Memory Buffering

  -Enable

   In case of variables as arrays or structures, the memory of whole variables is read.

   They are accessed by size of the top variable.

  -Disable

   In case of variables as arrays or structures, the memory of each element and member unit is read.

-Specified number of array element

  -Enable

   Debugger displays a warning dialog in case of big array element larger than the number of limited
   array-element when you registering or expanding an array with a watch variable.

-Element

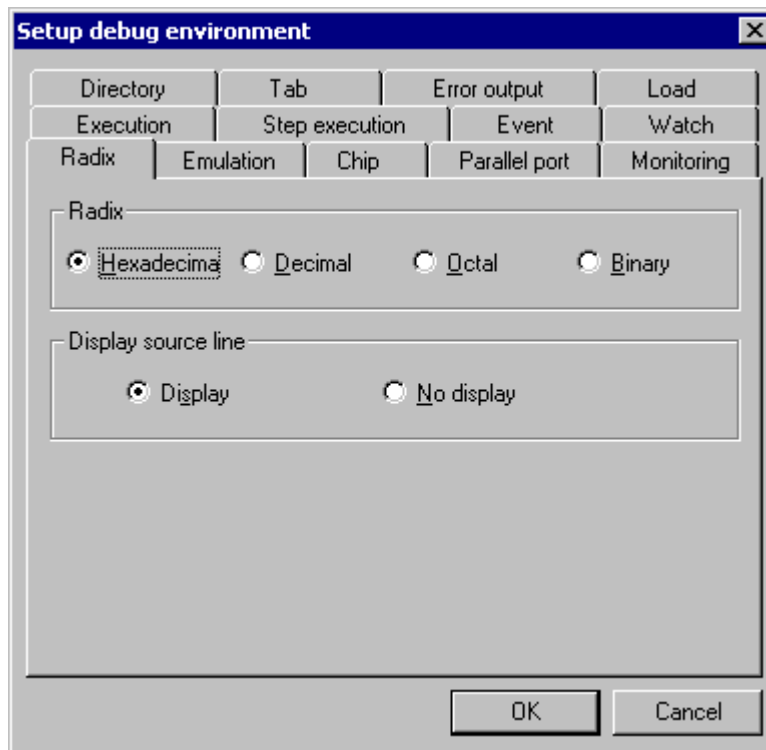Specifies number (a default is D'256) of array element.

The default of this control is "Enable".

If "Disable" is selected, the watch window and the local window may be displayed slowly.

-Radix

Figure 4.7-13 Debug Environment Setup Dialog Box (Radix)

-Radix

Sets the base number for numerical value display and analysis.

-Display Source Line

Switches source line display and nondisplay.

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-Emulation [MB2141]

Figure 4.7-14 Debugging Environment Setting (Emulation)
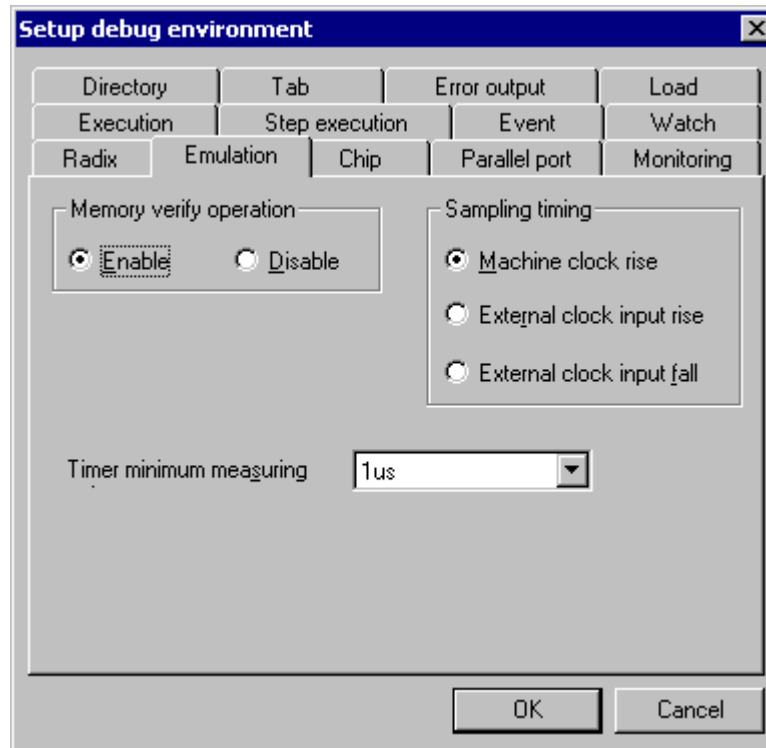
-Memory Verify Operation

 Specifies whether to verify memory when data is written to memory.

-Sampling Timing

- Machine Clock Rising

 Sets the rising of the machine clock as sampling timing.

- External Clock Input Rising

 Sets the rising of the external clock as sampling timing.

- External Clock Input Falling

 Sets the falling of the external clock as sampling timing.

-Minimum Measurement Unit of Timer

 Specifies the minimum unit for execution time measurement. (1us/100ms)

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- Chip [MB2141/MB2146-09]

Figure 4.7-15 Debug Environment Setup Dialog Box (Chip)
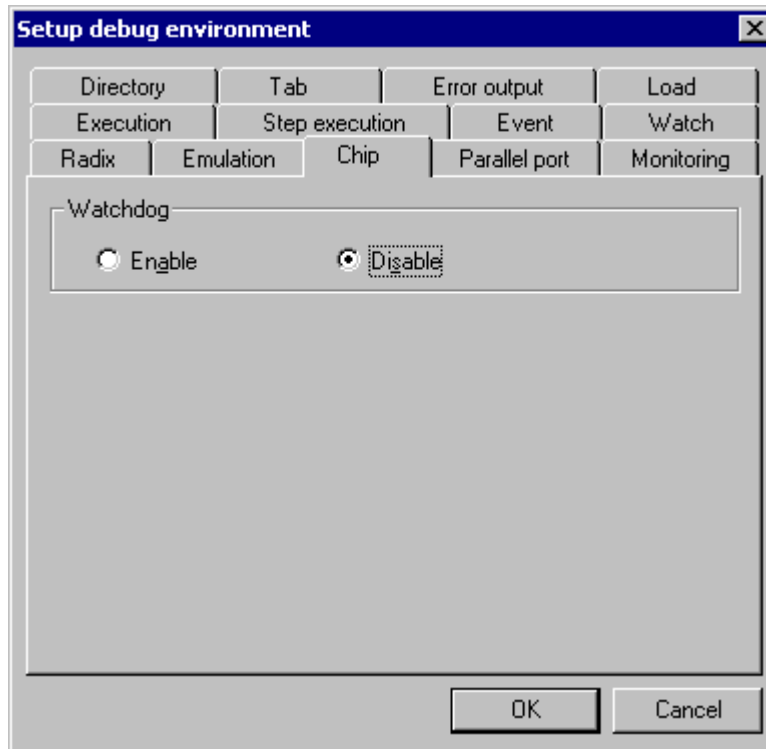
-Watchdog

  Specifies whether the watchdog timer is valid or invalid.

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-Parallel Port [MB2141]

Figure 4.7-16 Debug Environment Setup Dialog Box (Parallel Port)
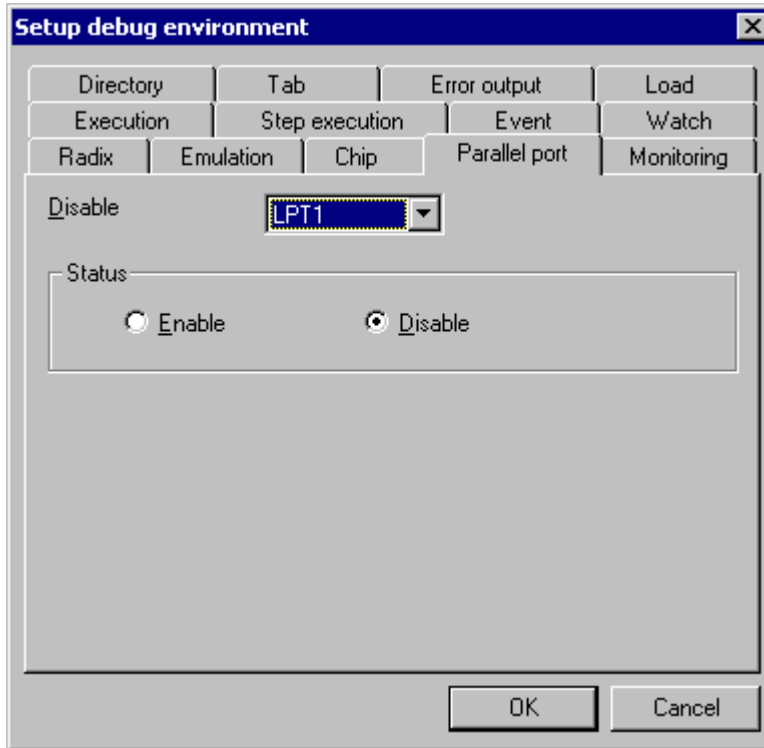
-Port Name

 Specifies non-connection or a parallel port name.(None/LPT1/LPT2)

-State

 Specifies whether the parallel port is valid or invalid.

-Monitoring[MB2141/Simulator]

Figure 4.7-17 Debug Environment Setup Dialog Box (Monitoring)
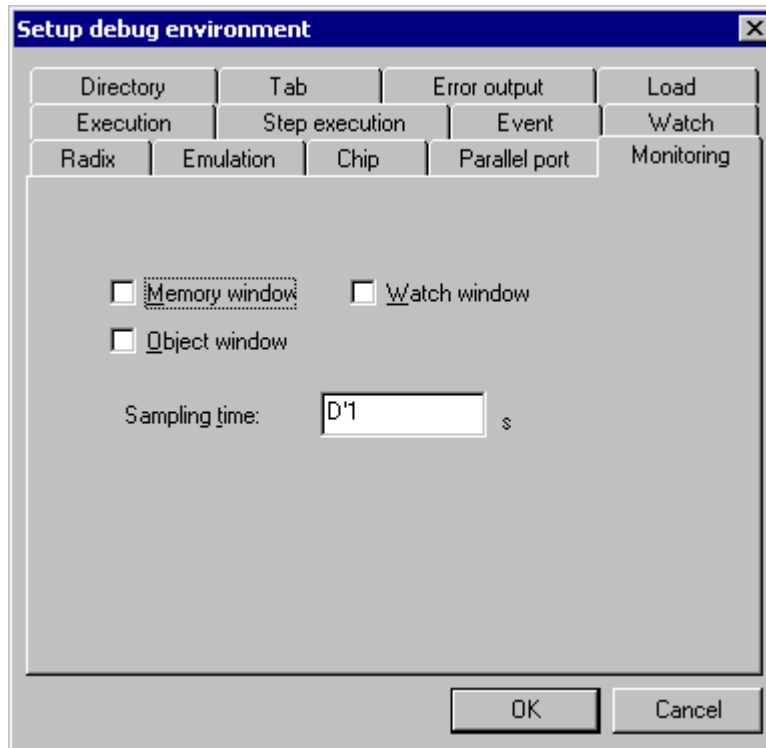
-Monitoring Control

  Sets monitoring control.

   -Memory Window

    Specifies whether to monitor the Memory Window.

   -Watch Window

    Specifies whether to monitor the Watch Window.

   -Object Window

    Specifies whether to monitor the Object Window.

   -Sampling Time

    Specifies sampling time.

    MB2141   : minimum 1000ms

-Directory

Figure 4.7-18 Debug Environment Setup Dialog Box (Directory)
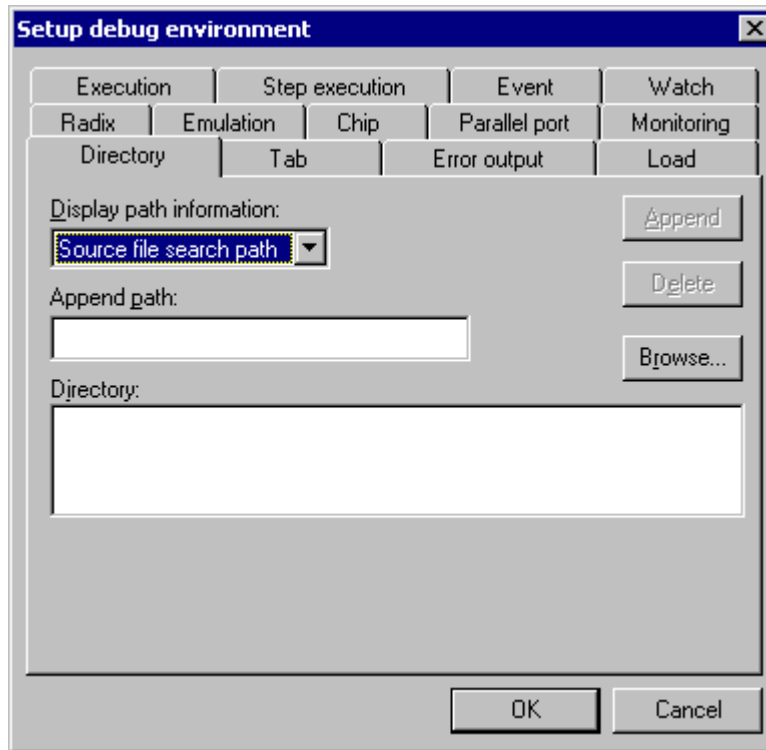
-Display Path Information

 Specifies the path information to be displayed.

-Append Path

 Sets the path to be added.

-Directory

 Displays the currently set directory.

-Directory setup procedure

 1.Select the [Display Path Information] to be displayed.

 2.Set the [Append Path].

   Clicking the [Browse] button to the right of the [Append Path] setup field enables path selection.

 3.Click the [Append] button.

 4.When there is no other item to be set, click the [OK] button.

 -Directory reset procedure

 1.Select the directory you want to delete from [Directory].

 2.Click the [Delete] button.

 3.When there is no other item to be set, click the [OK] button.

-Tab

Figure 4.7-19 Debug Environment Setup Dialog Box (Tab)
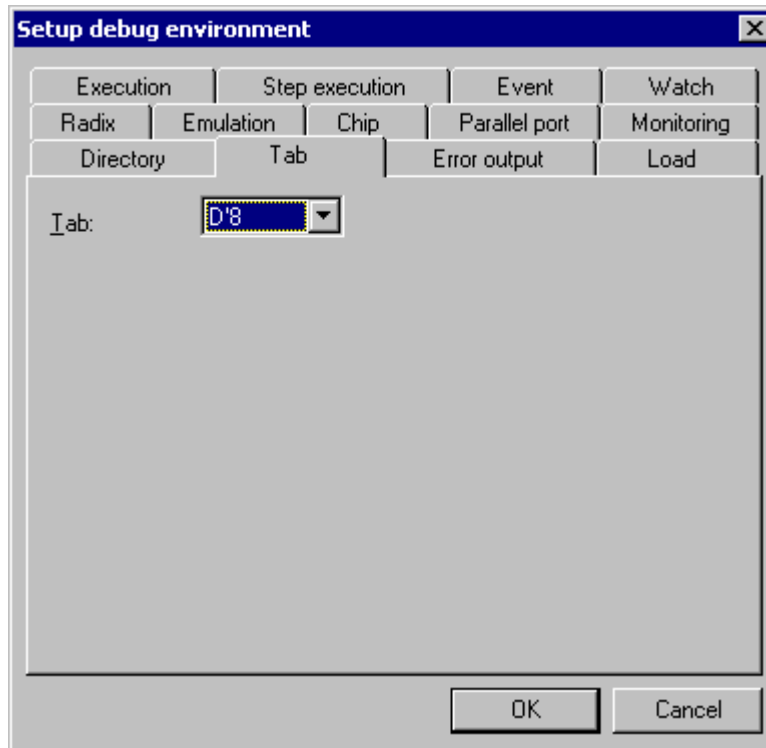
-Tab

 Specifies the Tab.(D'4/D'8)

-Error output

Figure 4.7-20 Debug Environment Setup Dialog Box (Error Output)
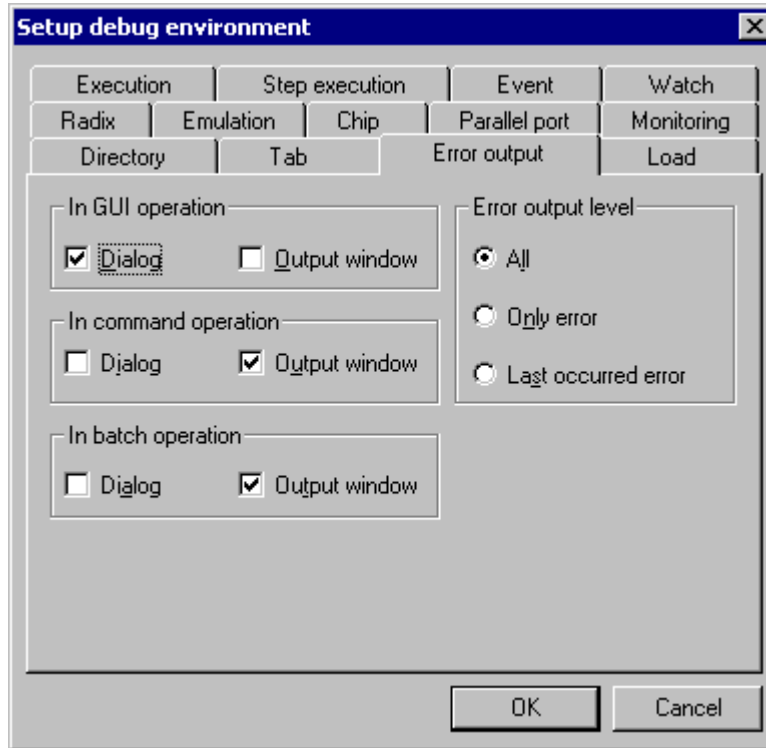
-In GUI Operation

  Specifies an error output type at GUI operation.

-In Command Operation

 Specifies an error output type at command operation.

-In Batch Operation

 Specifies an error output type at batch operation.

-Error Output Level

 Sets the output type when several errors occur.

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-Load

Figure 4.7-21 Debugging Environment Setting (Load)
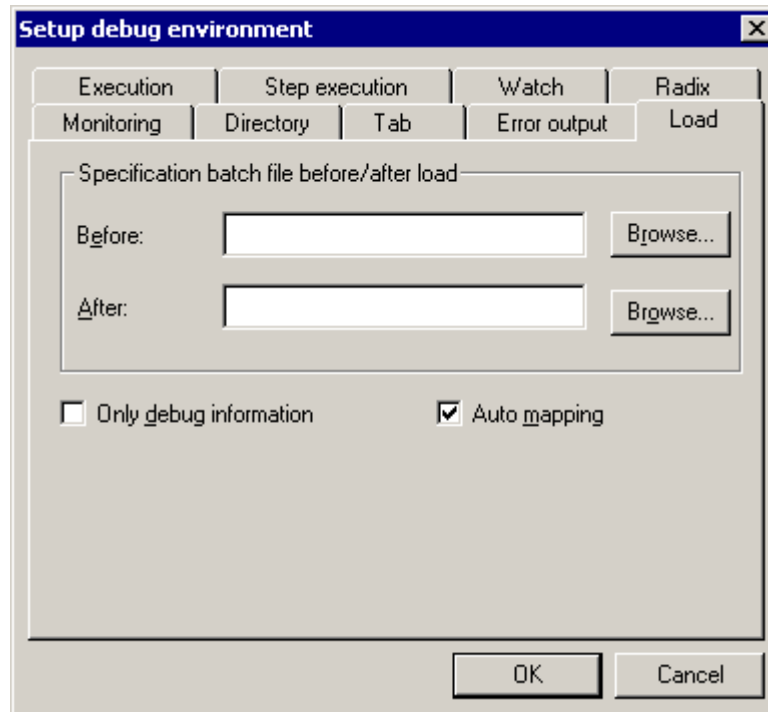
This sets the environment when loading a target file registered in the project.

-Pre-Post Load Batch File Specification

Pre- Load

This specifies the batch file to execute prior to the loading of the target file. This can be changed using the Debugger's setup wizard.

Post- Load

This specifies the batch file to execute after the loading of the target file. This can be changed using the debugger's setup wizard.

-Debug Information Only

This specifies whether or not to load only the debug information or not. When checked, only the debug information is loaded.

-Auto-Map Setting

This specifies whether or not to enable the Auto-Map Setting. When checked, Auto-Map Setting is enabled. This is valid the simulator only.

- Response speed [MB2146-09]

Figure 4.7-22 Debugging Environment Setting (Response Speed)
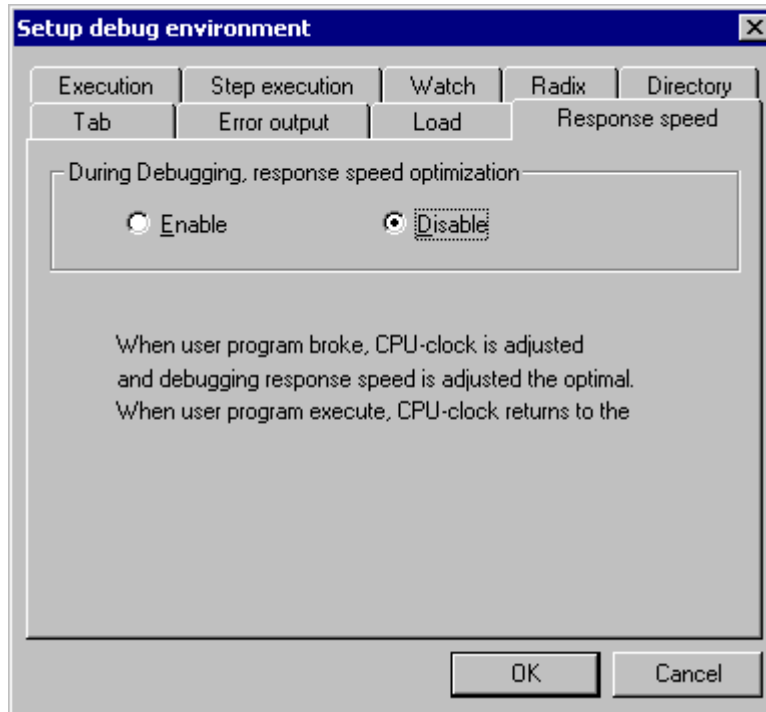
- Response speed optimization at debugging

When the user program is broken, the CPU clock is automatically adjusted, and it specifies whether to set the response speed of the debugger to the optimal value. Further, when the user program is executed, be sure to return the CPU clock to the original value.

4.7.2.4　Setup Wizard

This section explains how to operate the debugger's Setup Wizard.

■ Setup Wizard operation procedure

1. Select [Setup Name] from [Debugger Startup Selection], then click the [OK] button.
   The check dialog box opens.

2. Click the [OK] button.
   Debugger's Setup Wizard is started.

3. Click the [Next] button.

4. Select a debugger type, then click the [Next] button.
   Setting of the subsequent items depends on the debugger's type.
   To reset an item, click the [Return] button.
   The immediately preceding setup screen is redisplayed.

■ Procedure when the emulator (MB2141) is selected

1. Select the ICE type.

2. Click the [Next] button.

3. Select [RS232C] or [LAN] as the device type.
   When [RS232C] is selected, set a port and baud rate.
   When [LAN] is selected, set a host name.

4. Click the [Next] button.

5. Set whether or not to automatically load the monitor program at debugging start.

6. Click the [Next] button.

7. Set whether or not to load the target file automatically during debugging.

8. Specify the batch files used before and after load as required.
   Clicking the [Refer] button to the right of each input field enables batch file selection.

9. Click the [Next] button.

10. Select the item to be set in the setup file.
    When [Specify] is selected, click the [Setup] button to open the item selection dialog box, select the item to be set from the dialog box, then click the [OK] button.

11. Click the [Next] button.

12. Click the [Complete] button.
    Emulator (MB2141) setup has been just completed.

■ **Procedure when the emulator (MB2146-09) is selected**

1. Select the ICE type.

2. Click the [Next] button.

3. Select ([USB]) as the device type.

4. Click the [Next] button.

5. Specify the frequency (Main) and the Response speed mode.

6. Click the [Next] button.

7. Set whether or not to load the target file automatically during debugging.

8. Specify the batch files used before and after load as required.
    Clicking the [Refer] button to the right of each input field enables batch file selection.

9. Click the [Next] button.

10. Select the item to be set in the setup file.
    When [Specify] is selected, click the [Setup] button to open the item selection dialog box, select the item to be set from the dialog box, then click the [OK] button.

11. Click the [Next] button.

12. Click the [Complete] button.
    Emulator (MB2146-09) setup has been just completed.

■ **Procedure when the simulator is selected**

1. Set whether to load the target file automatically during debugging.

2. Specify the batch files used before and after load as required.
    Clicking the [Refer] button to the right of each input field enables batch file selection.

3. Click the [Next] button.

4. Select the item to be set in the setup file.
    When [Specify] is selected, click the [Setup] button to open the item selection dialog box, and select the item to be set from the dialog box, then click the [OK] button.

5. Click the [Next] button.

6. Click the [Complete] button.
    Simulator setup has been just completed.

4.7.3   Memory Map

"Memory Map..." sets the debugger's memory map.

■ Memory map setup [Simulator]

-Map List

Figure 4.7-23 Memory Map Setup Dialog Box
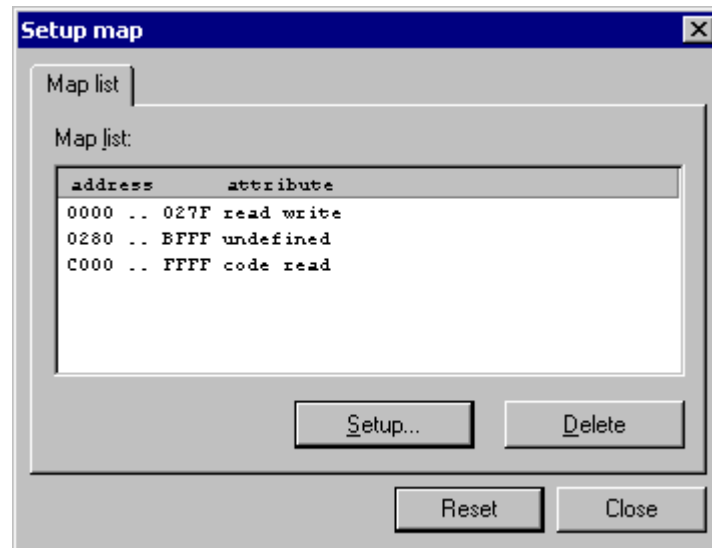
-Map Area

  Displays the currently set map area.

-Clicking the [Setup] button opens the setup dialog box (Figure 4.7-23) corresponding to the debug
  session.

-Map Setup

Figure 4.7-24 Map Setup Dialog Box [Simulator]
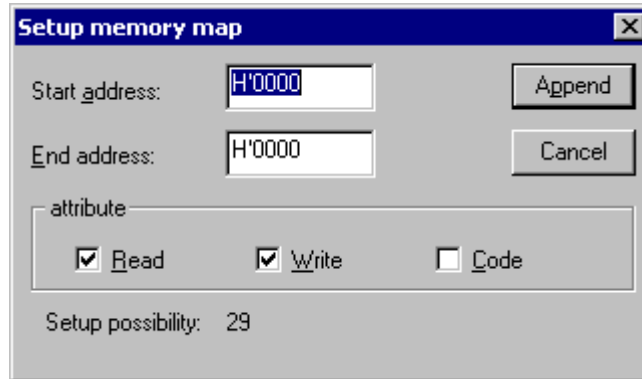
-Start Address

  Specifies the start address to be set.

-End Address

   Specifies the end address to be set.

-Attribute

  Specifies a memory space attribute (Read, Write, or Code).

■ Memory map setup [MB2141]

-Map List

Figure 4.7-25 Memory Map Setup Dialog Box
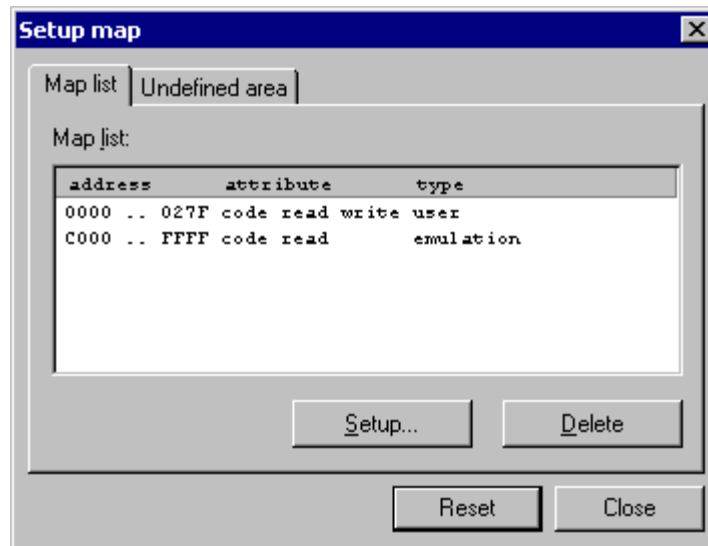
-Map Area

Displays the currently set map area.

-Clicking the [Setup] button opens the setup dialog box (Figure 4.7-25) corresponding to the debug session.

-Map Setup

Figure 4.7-26 Map Setup Dialog Box [MB2141]
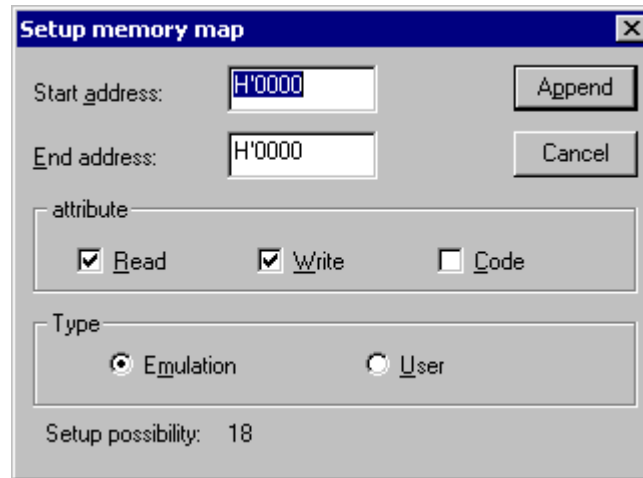
-Start Address

  Specifies the start address to be set.

-End Address

  Specifies the end address to be set.

-Attribute

  Specifies a memory space attribute (Read, Write, or Code).

-Type

  Specifies a setup area type.

-Undefined Area [MB2141(emulator)]

Figure 4.7-27 Undefined Area Setup Dialog Box
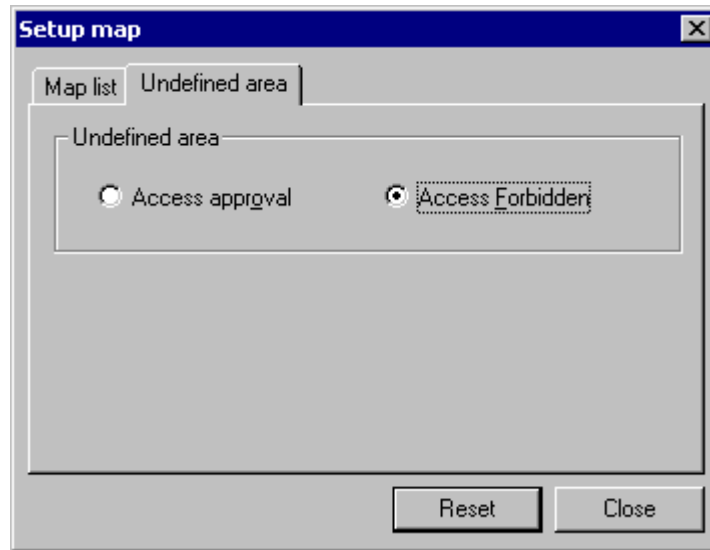
- Undefined Area

  - Access Approval

    Permits access to the undefined area.

  - Access Forbidden

    Inhibits access to the undefined area.

4.7.4   FLASH Area Control

The MB2146-09 emulator supports programming to the Flash memory area.

■ FLASH Area Control

The MB2146-09 emulator supports functions of programming to the Flash memory area and of code breaks (software breaks). The emulator saves the contents of the Flash memory area in the debugger's buffer; and references the buffer's contents when reading from/programming to the Flash memory. Writing to Flash memory is usually performed automatically prior to executive operation or reset processing.

■ Download FLASH memory

([Environment]-[FLASH area control]-[Download FLASH memory] menu)

Updates Flash memory. Flash memory is usually updated automatically prior to executive operation or reset processing. Use this menu when updating Flash memory before automatic updating. This menu is enabled when data in the Flash memory area is changed, requiring the writing to of Flash memory.

■ Upload FLASH memory

([Environment]-[FLASH area control]-[Upload FLASH memory] menu)

Synchronizes Flash memory and the buffers within the Debugger. Be sure to perform this synchronization when Flash memory is rewritten (updated) by the user program, or the program would not operate properly.

■ Erase FLASH memory

([Environment]-[FLASH area control]-[Erase FLASH memory] menu)

Erase all data in Flash memory. Note that this operation will erase all code break (software break) settings.

4.7.5　Tool

"Tool..." sets the tools to be directly started by SOFTUNE WORKBENCH.

■ Tools

"Tool..." is not a tool that takes charge of basic SOFTUNE WORKBENCH functions such as a C compiler and assembler. It is a function that builds auxiliary tools (e.g., simple filters) into the system so that they can be started directly from SOFTUNE WORKBENCH. Building "dir" into the system, for example, enables the output of the result obtained as a result of executing the dir command at the DOS prompt to the SOFTUNE WORKBENCH Output Window.

Figure 4.7-28　Tool Setup Dialog Box
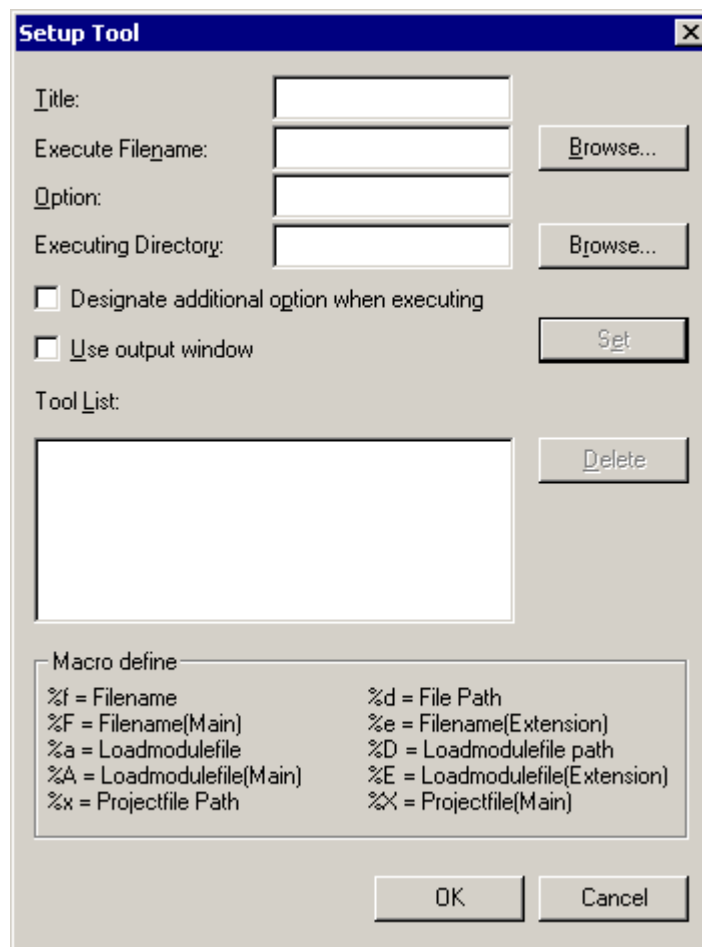
■ Tool setup procedure

1. Select [Tool...] from the [Setup] Menu.
   The tool setup dialog box shown in Figure 4.7-28 opens.

2. Set a title that differs from the registered names.

3. Specify the execution file name of the tool to be registered.
   Clicking the [Browse] button to the right of this field opens the file selection dialog box. The execution

file name of the tool can be selected from this dialog box.

4. Set an option.

Macro description can be used in this field. For macro description, refer to Section 1.11 Macro Descriptions Usable in Manager in SOFTUNE WORKBENCH User's Manual.

5. Write an executing directory.

This description may be omitted if control need not be moved to any specific executing directory.

Clicking the [Browse] button to the right of this field opens the file selection dialog box. A run-time directory can be selected from this dialog box.

6. Set a check mark to the left of [Designate Additional Option when Executing] and [Use Output Window] as required.

When a check mark is set to the left of [Designate Additional Option when Executing], SOFTUNE WORKBENCH asks you to enter additional options when a tool is started. When a check mark is set to the left of [Use Output Window], SOFTUNE WORKBENCH displays tool output (output to the standard output device or standard error output device) in the Output Window.

7. Click the [Setup] button.

■ Tool deletion procedure

1. Select [Tool...] from the [Setup] Menu.

   The tool setup dialog box shown in Figure 4.7-28 opens.

2. Select the tool title you want to delete from the tool list.

3. Click the [Delete] button.

■ Tool change procedure

1. Select [Tool...] from the [Setup] Menu.

   The tool setup dialog box shown in Figure 4.7-28 opens.

2. Select the tool title you want to change from the tool list.

   The values set in [Title], [Execute Filename], [Option], [Executing Directory], [Designate Additional Option when Executing], and [Use Output Window] are displayed.

3. Change [Execute Filename], [Option], [Executing Directory], [Designate Additional Option when Executing], and [Use Output Window].

   When [Title] is changed, the set tool is registered as another tool.

4. Click the [Setup] button.

   The dialog box asking you whether to change the tool opens.

5. Click the [Yes] button.

■ Example of tool setup

-When notepad is used

Title	:	note pad
Execute Filename	:	note pad.exe
Option	:	%f
Executing Directory	:	%x
Designate Additional Option when Executing:		A check mark is not set.
Use Output Window	:	A check mark is not set.

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-When the dir command is registered

Title	:	Dir
Execute Filename	:	command.com
Option	:	/c dir
Executing Directory	:	
Designate Additional Option when Executing:		A check mark is not set.
Use Output Window	:	A check mark is set.

4.7.6   Keyboard

"Keyboard..." enables definition of shortcut keys.

■ Keyboard setup procedure

1. Select a type.
   Functions are displayed in [Function List].

2. Select the function to be set from [Function List].
   The explanation of the selected function is displayed in the explanation field (lower part) of the keyboard setup dialog box. When an assigned function is selected, the currently assigned keys are displayed in [Assign key].

3. Set a focus in [New Assign], then specify the key to be assigned to the selected function from the keyboard (press the key).

4. Click the [Set] button.

■ Procedure for deleting an assigned key

1. Select the function corresponding to the key to be deleted (see (1) and (2) in the keyboard setup procedure above).
   The currently assigned keys are displayed in [Assign key].

2. Select the key to be deleted from the key list displayed in [Assign key].

3. Click the [Delete] button.
   The dialog box for checking to be deleted the key opens.

4. Click the [OK] button.

■ Procedure for changing an assigned key

1. Delete an assigned key (see the procedure for deleting an assigned key above).

2. Set a focus in [New Assign], then specify the key to be assigned to the function from the keyboard (press the key).

3. Click the [Set] button.

■ Displaying the current setup state list

Click the [Definition List] button to display the key definition list.

■ Restoring all the set keys to the initial state

Click the [Reset] button.

Note:

-Several keys can be assigned to one function. In this case, the assigned keys have the same function.

-Once the [Set] or [Reset] button is clicked, the set or reset key cannot be canceled. If the [Set] or [Reset] button is clicked by mistake, set the key again.

-As for the keys that can be set, see Table 4.7-2 .

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Figure 4.7-29 Key Setup Dialog Box
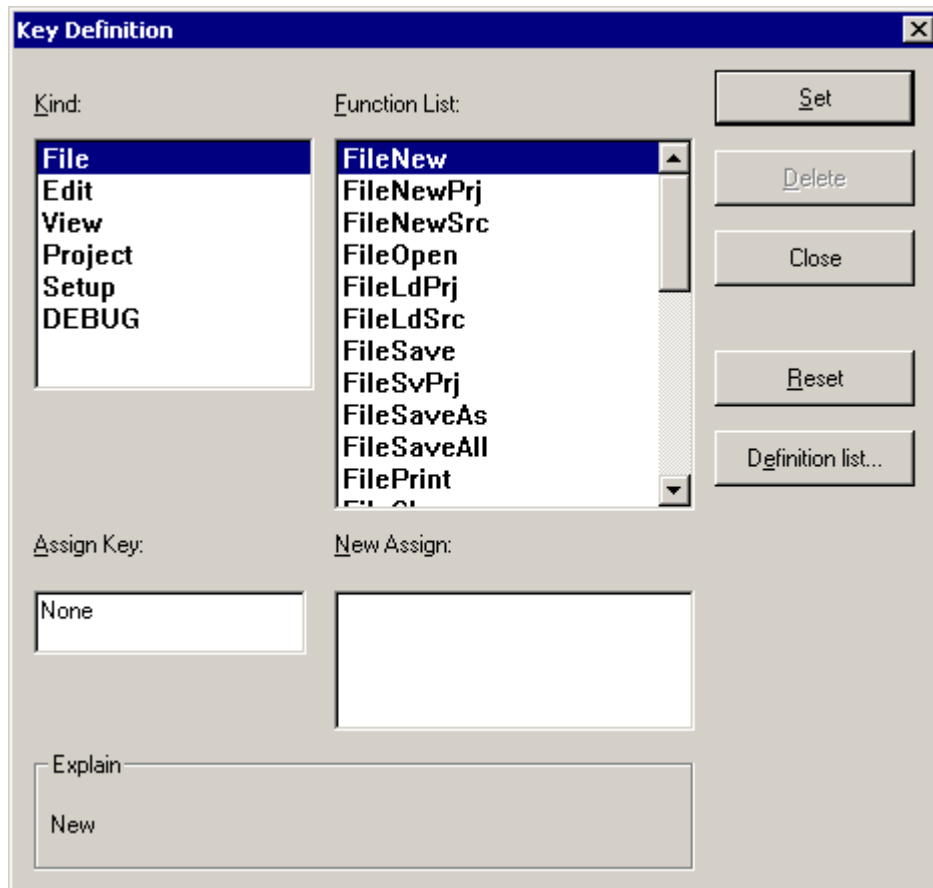
Table 4.7-2 Keys That can be Set

Key	Explanation
CTRL + A to Z	Press any of the A to Z keys while holding down the CTRL key.
SHIFT + CTRL + A	Press any of the A to Z keys while holding down the SIFT and CTRL keys.
SHIFT + F1	Press the F1 key while holding down the SHIFT key.

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4.7.7   Editor

"Editor..." enables any editor to be registered and used as the standard editor.

■ Registering an editor

Register the editor to be used instead of the standard editor built into SOFTUNE WORKBENCH in advance. Set the registered editor as the SOFTUNE WORKBENCH editor before editing the file actually. Of the registered editors, the editor set in [Userble Editor] is used to edit the file.

Figure 4.7-30 Editor Setup Dialog Box
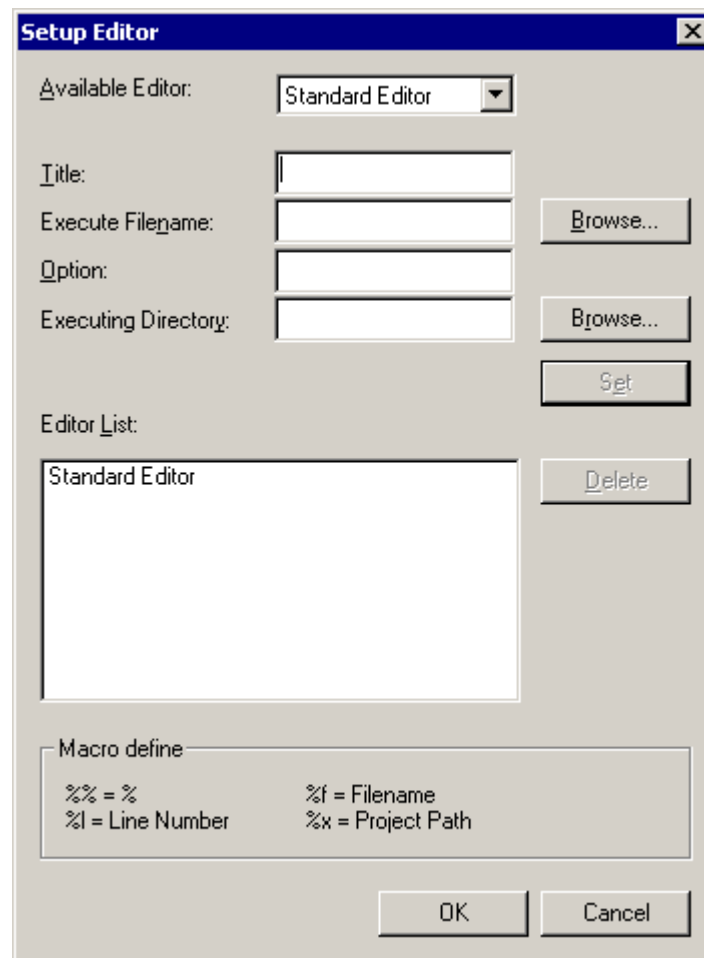
■ Editor registration procedure

1. Select [Editor...] from the [Setup] Menu.
   The editor setup dialog box shown in Figure 4.7-30 opens.

2. Set a unique title that differs from the registered names.

3. Specify the execution file name of the editor to be registered.
   Clicking the [Browse] button to the right of this field opens the file selection dialog box. The execution file name of the editor can be selected from this dialog box.

4. Set an option.

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Macro description can be used in this field. For macro description, refer to Section 1.9 Registering External Editors_ in SOFTUNE WORKBENCH User's Manual.

5. Write a run-time directory.

This description may be omitted if control need not to be moved to any specific run-time directory.

Clicking the [Browse] button to the right of this field opens the file selection dialog box. A run-time directory can be selected from this dialog box.

6. Click the [Set] button.

■ Editor deletion procedure

1. Select [Editor...] from the [Setup] Menu.
The editor setup dialog box shown in Figure 4.7-30 opens.

2. Select the title of the editor to be deleted from the editor list.

3. Click the [Delete] button.

■ Editor change procedure

1. Select [Editor...] from the [Setup] Menu.
The editor setup dialog box shown in Figure 4.7-30 opens.

2. Select the title of the editor to be changed from the editor list.
The values set in [Title], [Execute Filename], [Option], and [Executing Directory] are displayed.

3. Change [Execute Filename], [Option], and [Executing Directory]. When [Title] is changed, the set editor is registered as another editor.

4. Click the [Set] button.
The dialog box asking you whether to change the editor opens.

5. Click the [Yes] button.

■ Setting the editor to be used

1. Register the external editor to be used according to the editor registration procedure.

2. Click the [▼] button to the right of the [Available Editor] field. The drop-down list showing registered editor titles is displayed.

3. Select the editor title to be used from the drop-down list.

■ Example

Example of Fujitsu Power EDITOR setup

Title	:	Power EDITOR
Execution File Name	:	c:\Powered\powered. exe
Option	:	"%f"-g%l
Run-Time Directory	:	%x

Entering the above and clicking the [Set] button, registers Fujitsu Power EDITOR in the editor list.

After registering Fujitsu Power EDITOR, select [Power EDITOR] from [Available Editor] and click the [OK] button.

4.7.8   Error

"Error..." registers error message patterns of various tools to enable error jump.

■ Error jump setup procedure

1. Select [Error...] from the [Setup] Menu.
   The error jump setup dialog box shown in Figure 4.7-31 opens.

2. Enter a syntax.
   For details on syntaxes, refer to Section 1.7 Error Jump Function in SOFTUNE WORKBENCH User's Manual.

3. Enter a comment as required.
   A comment can be added to each syntax.

4. Click the [Set] button.

Figure 4.7-31 Error Jump Setup Dialog Box
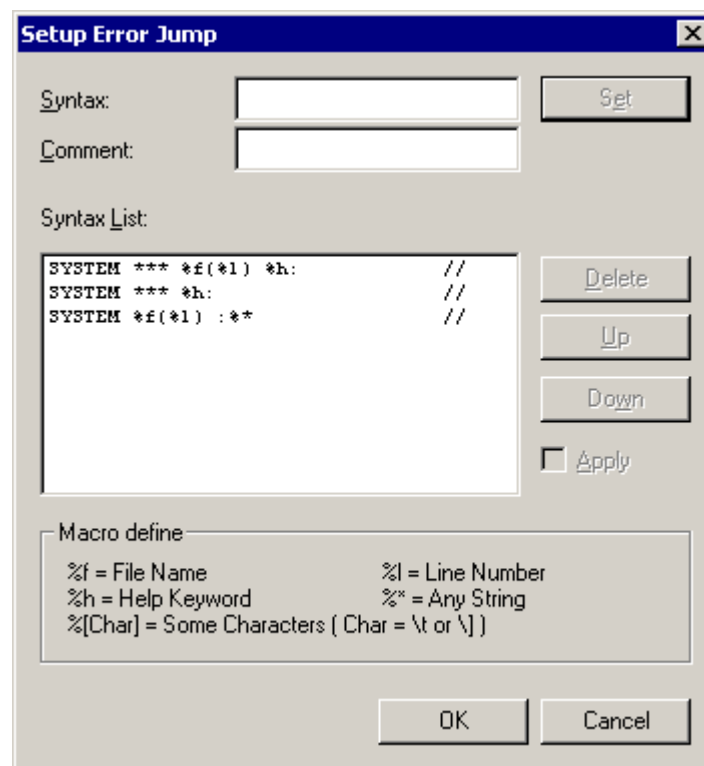
■ Syntax deletion procedure

1. Select [Error...] from the [Set] Menu.
   The error jump setup dialog box shown in Figure 4.7-31 opens.

2. Select the syntax to be deleted from the syntax list.

3. Click the [Delete] button.

■ Syntax modification procedure

Modify a set syntax in the following procedure:

1. Select [Error...] from the [Set] Menu.

   The error jump setup dialog box shown in Figure 4.7-31 opens.

2. Select the syntax to modified from the syntax list.

   The syntax and comment are displayed in the associated fields.

3. Modify the syntax and comment, then click the [Set] button.

   The modified syntax and comment are newly set.

4. Delete an unnecessary syntax (syntax used before modification).

■ Analysis order change and application ON/OFF

-Analysis order change

Error messages are analyzed from the patterns registered in the upper part of the syntax list. To assure correct analysis, the analysis order may have to be changed. The analysis order can be changed in the following procedure:

1.Select [Error...] from the [Set] Menu.

   The error jump setup dialog box shown in Figure 4.7-31 opens.

2.Select the syntax whose order is to be changed from the syntax list.

3.Click the [UP] or [Down] button to move the cursor to the position where error jump is to be set.

-Application ON/OFF

When the check mark to the left of [Apply] is not set, error messages are not analyzed according to the registered syntax.

When a check mark is set to the left of [Apply], ON is displayed in the syntax list. When a check mark is not set, OFF is displayed in the syntax list.

■ Example of error jump setup

When the error format is [error-message: line-number file-name]

Syntax	:	%* : %1 %f
Comment	:	sample

Note:

The syntax for which SYSTEM is displayed in the syntax list cannot be deleted.

4.7.9   Tool Startup

This section explains how to start a registered external tool.

■ Starting an external tool

The tools set by Section 4.7.5 Tool... are registered in the submenu. A tool can be started by selecting it from this submenu.

Setting a check mark to the left of [Designate Additional Option when Executing] in tool setup opens the additional option setup dialog box shown in Figure 4.7-32 before the tool is started. Set an additional option from this dialog box, then click the [OK] button.

The option specified from this dialog box is added after the option specified in tool setup and the tool is started.

Figure 4.7-32 Additional Option Setup Dialog Box
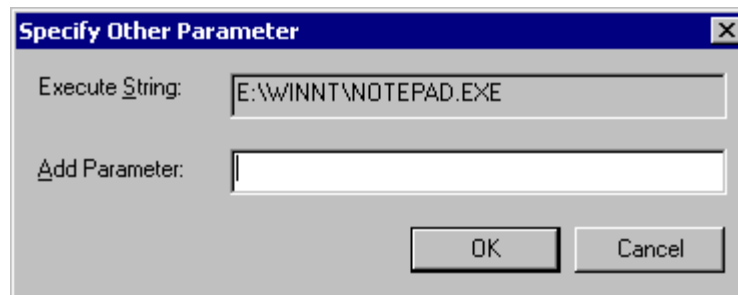
4.8   Window

"Window" controls window display.

■ Control related to window display

  - Cascade

  - Vertical

  - Horizon

  - Split

  - Arrange Icons

  -Refresh Window

  -Refresh All Windows

  -Close All Windows

■ Window name display

Up to 9 currently open window names are displayed, including icon windows. If ten windows or more are open, the tenth and subwindows are displayed in [Other Windows].

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4.8.1   Cascade, Vertical, Horizon

"Cascade", "Vertical", and "Horizon" specify the display formats of subwindows (e.g., Source Window, Register Window, and Assembly Window).

■ Cascade

"Cascade" displays currently open subwindows in the main window.

■ Vertical

"Vertical" arranges currently open subwindows vertically and fully displays them in the main window.

■ Horizon

"Horizon" arranges currently open subwindows horizontally and fully displays then in the main window.

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4.8.2   Split

"Split" specifies where a window is vertically split.

■ Split

"Split" specifies where a window is vertically split. The following windows can be vertically split.

-Source Window

-Assembly Window

-Trace Window

-Memory Window

-Coverage Window

4.8.3   Arrange Icons

"Arrange icons" arranges the locations of the minimized window icons.

■ Icon arrangement

"Arrange icons" arranges all the minimized windows in the SOFTUNE WORKBENCH main window (Figure 4.8-1). However, unminimized windows are not affected.

Figure 4.8-1 Main Window State after Icon Arrangement
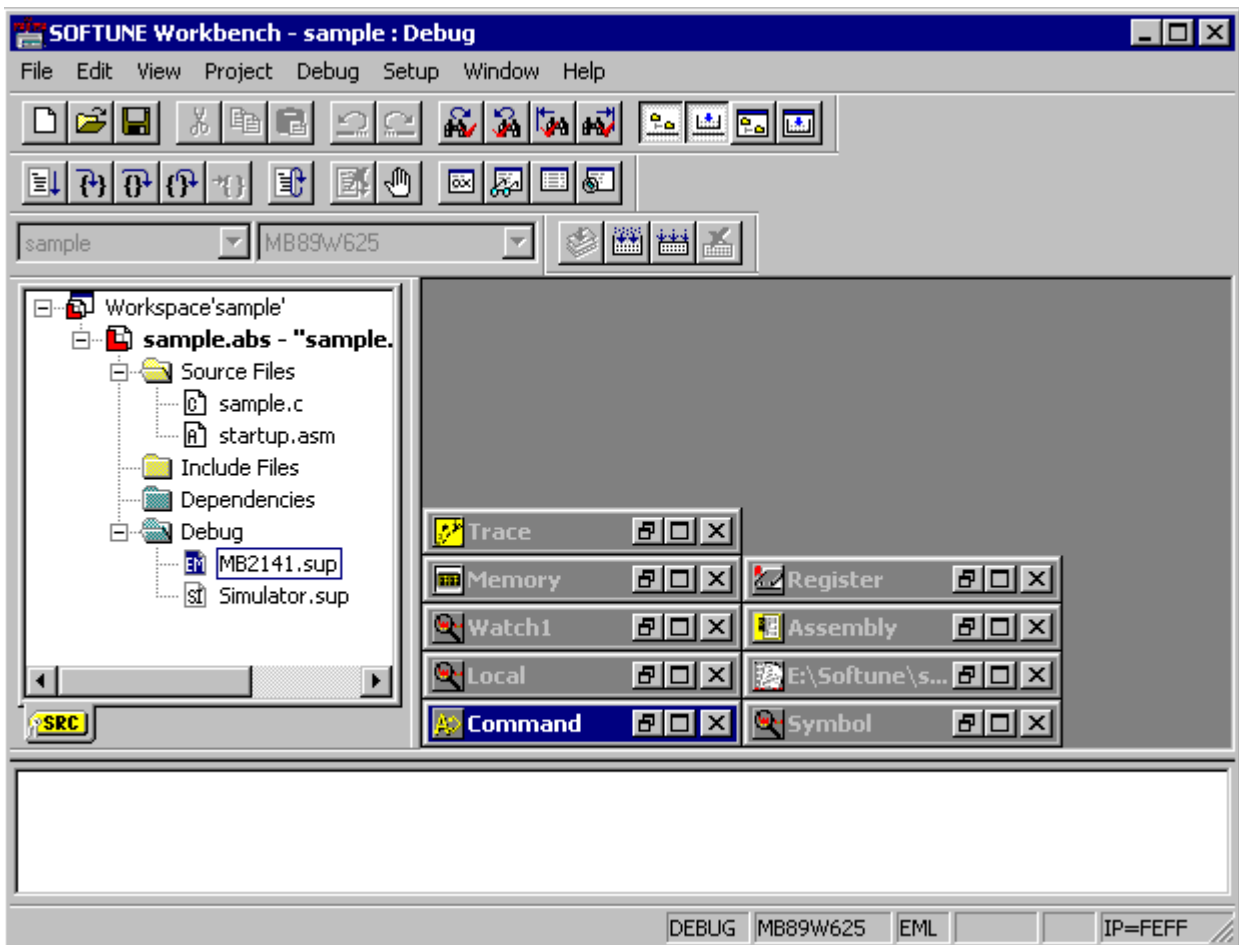
4.8.4   Refresh Window

This command updates information on an active window.

■ Refresh window

Information on the current active window is updated.

4.8.5   Refresh All Windows

This command updates information on all the open windows.

■ Refresh all windows

Information on all the open windows except the Project and Output windows is updated.

4.8.6   Close All Windows

"Close all windows" closes all open windows.

■ Close all windows

"Close all windows" closes all currently open windows other than the Project and Output Windows. If the File Edit Window being edited has not saved yet, the dialog box asking you whether to save the window opens.

The file opened by the external editor cannot be closed by this function.

Even if all windows are closed, the SOFTUNE WORKBENCH state remains unchanged. For this reason, register values, etc., are not affected even during debugging.

4.9   Help

"Help" displays online help.

■ **Online help**

-Help Topics

-Support Information

■ **About Fs896s**

-Version Information

4.9.1 Help Topics

"Help Topics" retrieves help items according to keywords.

■ **Contents**

"Contents" hierarchically displays online help contents. It is used to search the contents for the item to be searched.

■ **Keyword**

SOFTUNE WORKBENCH searches the help file for the directly specified item.

4.9.2　Support Information

"Support Information" opens the attached support information file in the Edit Window.

■ Support information

Support information provides the information not written in the attached manual. Please read through support information once before using SOFTUNE WORKBENCH.

4.9.3   About Fs896s...

"About Fs896s..." displays SOFTUNE WORKBENCH version information.

■ **Version information display when SOFTUNE WORKBENCH is not in the debug session**

"About Fsxxxx..." opens the version information dialog box showing the SOFTUNE WORKBENCH logo mark and version information.

■ **Version information display when SOFTUNE WORKBENCH is in the debug session**

"About Fsxxxx..." opens the version information dialog box showing the SOFTUNE WORKBENCH logo mark, version information, type of the currently selected debugger, and type of the target MCU being debugged.

Reference:

Be sure to let us know the displayed version information when asking our company about SOFTUNE WORKBENCH.

APPENDIX

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APPENDIX A   List of Register Names

Register names are displayed.

■ Registers

The registers that can be operated by SOFTUNE Workbench differ for each MCU type as follows:

Accumulator	:	A
Temporary accumulator	:	T
Stack pointers	:	SP
Program counter	:	PC
General-purpose registers	:	R0 to R7
Interrupt level	:	IL0, IL7
Others	:	RP, DP, CCR, PS, IX, EP
Flags	:	H, I, N, Z, V, C

APPENDIX B   Downloading Monitor Program

To use the emulator debugger, the monitor program corresponding to the chip to be used must be written to the ICE.
This processing is called "monitor program download".

■ Downloading Monitor Program

- When the ICE is the MB2141 series

The Downloading Monitor Program procedure is described below:

1. Connect the ICE to a personal computer (PC) with an RS-232C or LAN interface.
   (When connecting the ICE to the PC, see APPENDIX C Setting LAN Interface.)

2. Press the reset switch, then turn on the ICE.
   Check that the READY LED of the ICE body turn on.

3. Execute the [Monitor Loader] Menu from [SOFTUNE V3] of [F^{2}MC-8L Family SOFTUNE WORKBENCH Tools] of the Windows Start Menu.
   The monitor loader program is started.

4. Select the monitor program to be loaded.
   Select the monitor program corresponding to the chip to be used.

5. Specify a communication type.
   To use the RS-232C interface, specify a communication port and a baud rate.
   To use the LAN interface, specify the host name of the ICE.

6. Click [Start Load].
   The selected monitor program is downloaded to the ICE.

7. Select [Exit] from the [File] menu to exit the monitor program.

Table B-1 Monitor Program

Chip type	Corresponding chip	Monitor program
F^{2}MC-8L	MB896XX	EML96A.HEX(*1) EML96N.HEX(*2) EML96NW.HEX(*3)

*1: For MB2144-505 emulation pod
*2: For MB2144-508 emulation pod
*3: For MB2144-508 emulation pod (new emulator interface)

APPENDIX C   Setting LAN Interface

To enable LAN communication, the LAN interface must be set at the PC and ICE sides. Consult the LAN administrator when setting the IP address and a port address, etc.

■ Setting LAN interface at PC side

1. Install the TCP/IP protocol in network setting dialog on WindowsXP, WindowsMe, Windows2000, Windows98 or WindowsNT4.0.
   Install the TCP/IP protocol.
   Click [Control Panel]-[Network] to set in WindowsMe, Windows98, or WindowsNT4.0.
   Click [Control Panel]-[Network and Dial-up Connections]-[Local Area Connection]-[Property] to set in WindowsXP and Windows2000.

2. Add the IP address, assigned to the ICE, to the HOSTS file.
   Add the following items:
   IP address   Host name
   For WindowsMe and Windows98, the IP address and host name are in the Windows directory.
   For WindowsXP, Windows2000 and WindowsNT4.0, the IP address and host name are in SYSTEM32 \DRIVERS\ ETC. Users with administration authority must set the address and name.

3. Register the ICE port address and service name in the SERVICES file. At the default, 5001 is the support address, and fjicesv is the service name. Register the following items:
   fjicesv   5001/tcp
   For WindowsMe and Windows98, the port address and service name are in the Windows directory.
   For WindowsXP, Windows2000 and WindowsNT4.0, the port address and service name exist in SYSTEM32 \DRIVERS\ ETC. Users, who possess an administrator authority, must set these address and name.

■ Setting LAN interface at ICE side

In case of MB2141 ICE, this procedure is following:

1. Connect the ICE to the PC with the RS-232C interface.

2. Turn on the ICE.

3. Execute the [LAN Address] Menu from [SOFTUNE V3]- [F^{2}MC-8L Family SOFTUNE WORKBENCH Tool] of the Start Menu.
   The LAN address setup program is started.

4. Select ICE name (MB2141).

5. Click [Set Communication] to set the RS-232C interface.

6. Click [Read] to read the current ICE setting status.

7. Set IP Address and Port Address. The IP address and port address set values at the PC side are displayed.

8. Usually, [Universal] is used as MAC Address. However, when using [Local] as MAC Address, consult the LAN address administrator.

9. Select [Exit] from the [Setup] menu to exit the LAN address setup program.

10. Press the ICE reset button (button on rear) to reset the ICE.

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APPENDIX D   Setting USB Interface

Communication via USB requires installation of the USB driver in the personal computer.

■ Installation of USB driver

WindowsXP, WindowsMe, Windows2000 and Windows98 connect the emulator to a personal computer via USB.

To install the USB driver, proceed as follows:

1. Connect the emulator to a personal computer with the USB cable.

2. When the power supply of the emulator is turned on, the OS requests installation of the USB driver. Specify the directory (Drivers) on this product CD-ROM.

Note:

The following ICE have USB interface.
MB2146-09

APPENDIX

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Free Manuals Download Website

http://myh66.com

http://usermanuals.us

http://www.somanuals.com

http://www.4manuals.cc

http://www.manual-lib.com

http://www.404manual.com

http://www.luxmanual.com

http://aubethermostatmanual.com

Golf course search by state

http://golfingnear.com

Email search by domain

http://emailbydomain.com

Auto manuals search

http://auto.somanuals.com

TV manuals search

http://tv.somanuals.com