

CMOS 4-BIT SINGLE CHIP MICROCOMPUTER **E0C60/62 Family**

DEVELOPMENT TOOL MANUAL



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PREFACE

This manual describes how to use the Windows version development tools for the E0C60 Family and E0C62 Family of CMOS 4-bit, single-chip microcomputers.

This manual is applicable to all types of microcomputers in the family for which the development tools are available including explanations for tools not yet prepared.

For details about option lists inherent in each type of microcomputer and other information, refer to the Technical Manual.

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1 OUTLINE OF THE PACKAGE

1.1 Overview

The E0C60xx/62xx Development Tool for Windows is a development tool package for each type of microcomputer in the E0C60 Family and E0C62 Family of CMOS 4-bit, single-chip microcomputers. This package includes the tools to create mask option and mask data files, as well as files that contain descriptions of setup information for each type of microcomputer. The tools 1 to 4 below are Windows GUI applications that run under Windows 95, Windows 98, Windows NT 4.0 versions.

1. Function option generator <winfog.exe>

This tool creates a function option ROM HEX file to install to the EVA60xx/62xx after selecting the mask options of the E0C60xx/62xx and the function option document file that is necessary to generate IC mask patterns. You can create function option data by selecting the appropriate item using the check boxes.

2. Segment option generator <winsog.exe>

This tool creates a segment option ROM HEX file to install to the EVA60xx/62xx after selecting the segment options of the E0C60xx/62xx and the segment option document file that is necessary to generate IC mask patterns. You can create segment assignment data by merely clicking on the display memory map and segment decode table shown on the window.

Note: The winsog is only included in the package for microcomputers in which segment options are set.

3. Mask data checker <winmdc.exe>

This tool checks the data in development-completed program ROM files and option document files to create the mask data file that will be presented to Seiko Epson.

4. EPROM data generator <winedg.exe>

This tool merges two program-ROM (high-order/low-order) files into one file for writing to an external EPROM.

Note: The winedg is only included in the package for microcomputers that support an external EPROM.

5. Device information definition file <e0c60xx.ini/e0c62xx.ini>

This file is used to set information, such as the configuration of options, on each type of microcomputer for the tools of 1 to 3 described above. This file must be available before each tool can be executed.

6. Parameter file <ics60xxp.par/ics62xxp.par>

This file is used to establish correspondence between the E0C62 Family common development tools and each type of microcomputer. This file is needed when executing the debugger, linker or other tools included in the E0C62 Family assembler package. Place this file in the directory where the E0C62 Family assembler package is installed.

7. Function option and LCD segment option setup HEX sample files <c60xxf.hex/c62xxf.hex, c60xxs.hex/c62xxs.hex>

These are HEX sample files necessary to set function options and LCD segment options for each type of microcomputer in ICE62R (ICE6200) or EVA60xx/62xx. Although you use HEX files created by winfog and winsog during actual software development process, you can use this data to verify the operation of ICE62R (ICE6200) or EVA60xx/62xx. The HEX sample file for LCD segment option setup is not included for microcomputers that have had no LCD segment options set.

Notes:

- Although E0C60xx/62xx Development Tool for Windows is provided individually for each type of microcomputer in the E0C60/62 Family, there is no difference between each tool between the different types of microcomputers. Therefore, the explanations in this manual are for all types of microcomputers and uses "E0C60xx/62xx" as the representative name. The sample screens and sample files assume an E0C60xx model. The contents of the sample screens vary according to the type of microcomputer.

- For software development, in addition to this package, you also need to have the E0C62 Family assembler package, which is compatible with all microcomputers in the E0C62 Family.

1 OUTLINE OF THE PACKAGE

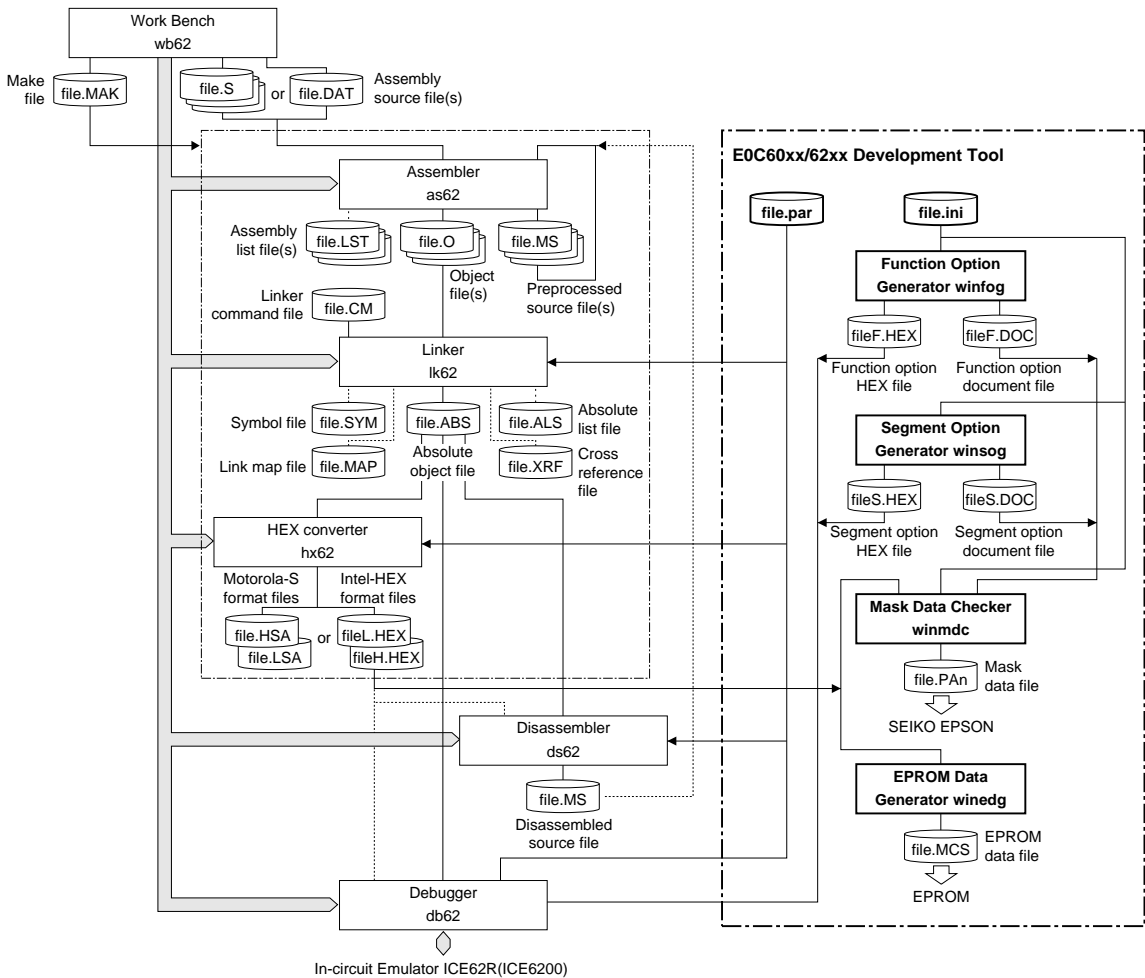


Fig. 1.1.1 Software Development Flow

1.2 Package Components

The following lists the components of the package.

1. Tool disk (3.5-inch floppy disk for Windows)..... 2 pcs.
2. E0C60/62 Family Development Tool Manual 1 pc. in Japanese and English
3. Warranty card 1 pc. in Japanese and English each
4. Registration card 1 pc. in Japanese and English each

2 *INSTALLATION*

This chapter describes the operating environment required for the tools included in the package and how to install them.

2.1 *Operating Environment*

For each tool to be used, the following operating environment is required:

Personal computer

IBM PC/AT or fully compatibles that can run the system software listed below. A personal computer using Pentium 90 MHz or greater as the CPU and incorporating 32 MB or more of RAM is recommended.

Display

A 800 × 600 dots display unit or higher is required.

System software

Each tool is designed to run under Microsoft® Windows®95, Windows®98, Windows NT® 4.0 versions (in English or Japanese).

Other

The E0C62 Family assembler package is also required for software development.

2.2 Installation Method

To install the development tools, use the installer (Setup.exe) on the floppy disk included with the package.

To install the tools



Setup.exe

- (1) Start Windows95/98 or Windows NT 4.0. If the OS is already active, close active programs.
- (2) Insert Disk1 into the drive.
- (3) Double-click Setup.exe.



Welcome

- (4) Click on the [Next>] button to proceed.



Choose Destination Location

A dialog box for specifying the directory in which to install the tools appears.

- (5) If you do not wish to change the default settings, simply click the [Next>] button to execute installation.

To install in another directory

Click [Browse...] to bring up the [Choose Folder] dialog box. From this dialog box, enter the path or select the directory in which to install the tools. Click the [OK] button to finish directory selection and then click the [Next>] button.

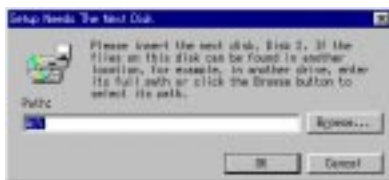


Select Program Folder

- (6) Enter the desired program folder name and click the [Next>] button. To use the default folder name, simply click the [Next>] button.

The installer will start installing the tools.





Setup Needs The Next Disk

When the installer finishes copying Disk1, it displays a message prompting you to change disks.

(7) After removing Disk1, insert Disk2 into the drive and click [OK].



Setup Complete

(8) Click [Finish] to terminate the installer.

Program menu

The folder of tools is registered to the program menu by the installer.

To end installation

All dialog boxes that appear during installation have a [Cancel] button. To prematurely terminate installation, click [Cancel] in the dialog box when it is displayed.

To uninstall

To uninstall the installed tools, use "Add/Remove Programs" on the Control Panel.

3 FUNCTION OPTION GENERATOR <winfog>

3.1 Outline of winfog

The E0C60xx/62xx chip allows several hardware specifications such as I/O port functions to be selected as mask options. This helps you to configure the hardware of your product by changing the E0C60xx/62xx chip's mask patterns according to its specifications.

The Function Option Generator <winfog> is the software tool for creating the files necessary to generate mask patterns. Its graphical user interface (GUI) ensures easy selection mask options. From the files created by winfog, Seiko Epson produces the mask patterns for the E0C60xx/62xx chip.

In addition, simultaneously with this file, winfog can create a HEX file (Intel HEX format data) for a mask option ROM that is required when debugging the program with EVA60xx/62xx. By writing this data to a ROM and installing it to EVA60xx/62xx, the EVA60xx/62xx is configured with the option settings and works as the actual IC.

3.2 Input/output Files

Figure 3.2.1 shows the input/output files of winfog.

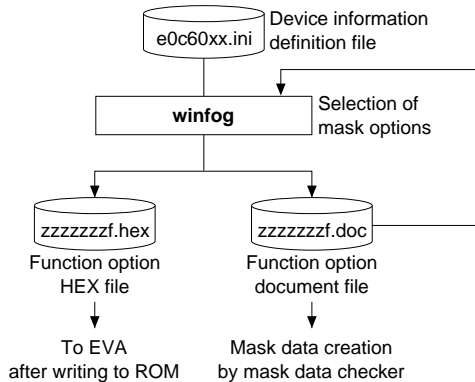


Fig. 3.2.1 Input/Output Files of winfog

Device information definition file (e0c60xx.ini/e0c62xx.ini)

This file contains option lists for various types of microcomputers and other information. Always be sure to use the files presented by Seiko Epson. This file is effective for only the type of microcomputer indicated by the file name. Do not modify the contents of the file or use the file in other types of microcomputers.

Function option document file (zzzzzzzf.doc)

This is a text format file in which the contents of selected mask options are stored. You can read this file into winfog and correct the already selected option settings. This file is packed along with completed other program/data files into a single file by the mask data checker <winmdc>, which we would like to have presented to Seiko Epson as the mask data file. From this file, Seiko Epson will create the mask patterns for the IC.

Function option HEX file (zzzzzzzf.hex)

This is the Intel HEX format file necessary to set the selected mask options in EVA60xx/62xx. When you debug programs with EVA60xx/62xx, create a ROM with this file and install the ROM to the function option ROM socket on the EVA60xx/62xx, or download this file into EVA60xx/62xx through ICE62R (ICE6200) using a debugger <db62> command.

- *1 The "xx" in the file name denotes the model name of a microcomputer. For the "zzzzzzz" part, any given file name can be specified.
- *2 For details on how to download mask options, refer to the "E0C62 Family Assembler Package Manual".

3.3 Using winfog

3.3.1 Starting Up

Startup from Explorer



Double-click on the winfog.exe icon or select winfog from the start menu. If the device information definition file (e0c60xx.ini/e0c62xx.ini) was loaded into your computer during previous execution, winfog automatically reads the same file as it starts. Alternatively, drag the Device information definition file icon into the winfog.exe icon to start winfog, which will then read the Device information definition file.

Startup by command input

You can also start winfog from the MS-DOS prompt by entering the command shown below.

>winfog [e0c60xx.ini/e0c62xx.ini]

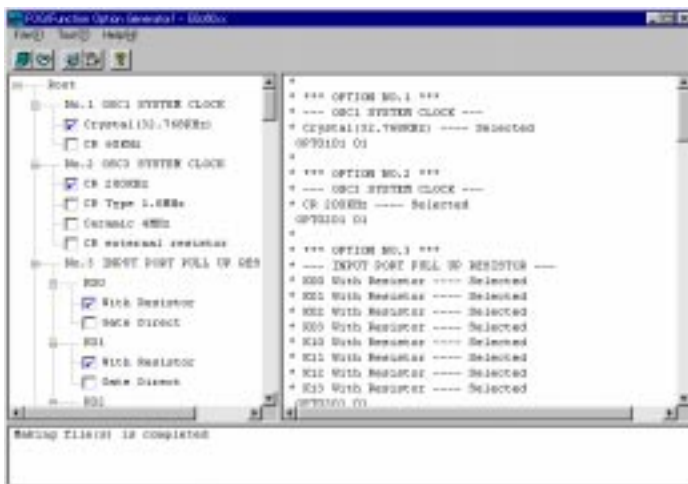
denotes entering the return key.

You can specify the device information definition file (e0c60xx.ini/e0c62xx.ini) as a command option. (You can also specify a path.) When you specify the device information definition file here, winfog reads it as it starts. This specification can be omitted.

When winfog starts, it displays the [FOG] window. The following diagrams show a [FOG] window when the device information definition file has been loaded and when it has not.

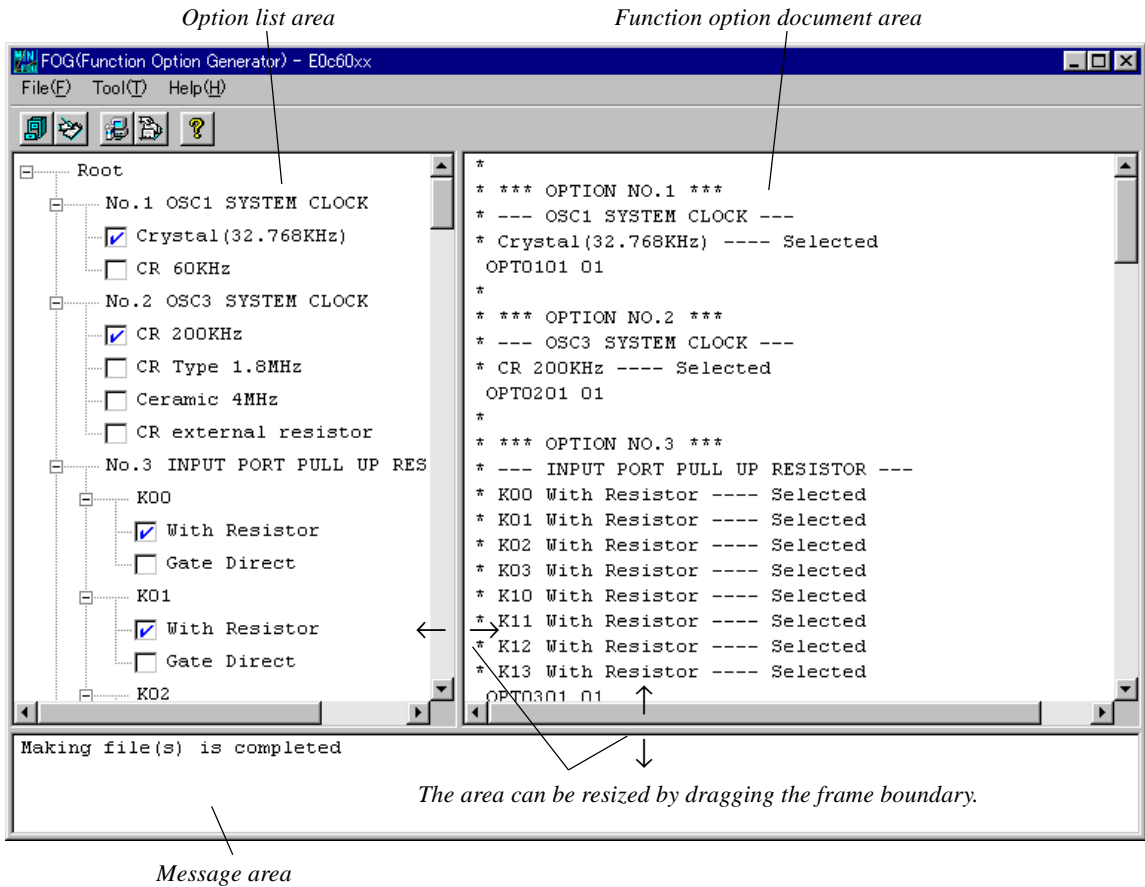


[FOG] Window (initial screen)



[FOG] Window (after reading the device information definition file)

3.3.2 Window



- * The microcomputer model name on the title bar is the file name (not including the path and extension) of the device information definition file that has been read.
- * The option list and the function option document vary with each type of microcomputer.

Fig. 3.3.2.1 Window Configuration

The [FOG] window is divided into three areas as shown above.

Option list area

Lists mask options set in the device information definition file (e0c60xx.ini/e0c62xx.ini). Use the check boxes in this area to select each option. A selected option has its check box marked by ✓.

Function option document area

Displays the contents of selected options in the function option document format. The contents displayed in this area are output to the function option document file. When you change any selected item in the option list area, the display in this area is immediately updated.

Message area

When you create a file by selecting [Generate] from the [Tool] menu or clicking the [Generate] button, this area displays a message showing the result of the selected operation.

3.3.3 Menus and Toolbar Buttons

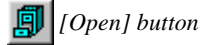
This section explains each menu item and toolbar button.

[File] menu



Open

Opens a function option document file. Use this menu command when correcting an existing file. The [Open] button has the same function.

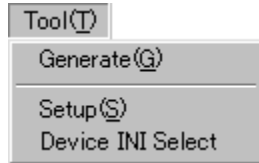


[Open] button

End

Terminates winfog.

[Tool] menu



Generate

Creates a file according to the selected contents of the option list. The [Generate] button has the same function.



[Generate] button

Setup

Sets the date of creation, output file name and a comment included in the function option document file. The [Setup] button has the same function.



[Setup] button

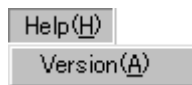
Device INI Select

Loads the device information definition file <e0c60xx.ini/e0c62xx.ini>. The [Device INI Select] button has the same function. This file must be loaded first before performing any operation with winfog.



[Device INI Select] button

[Help] menu



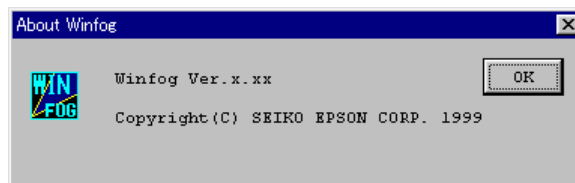
Version

Displays the version of winfog. The [Help] button has the same function.



[Help] button

The dialog box shown below appears. Click [OK] to close this dialog box.



3.3.4 Operation Procedure

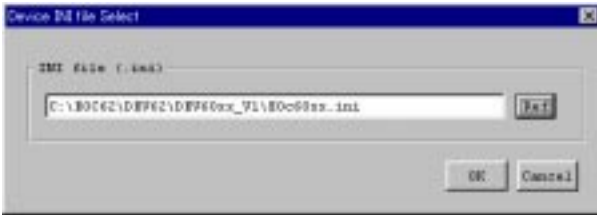
The following shows the basic operation procedure.

(1) Loading the device information definition file

First, select a device information definition file <e0c60xx.ini/e0c62xx.ini> and load it. Select [Device INI Select] from the [Tool] menu or click the [Device INI Select] button.

 [Device INI Select] button

The dialog box shown below appears. Enter a file name including the path in the text box or select a file by clicking the [Ref] button.



Click [OK], and the file is loaded. If the specified file exists and there is no problem with its contents, the option list and the function option document, which have both been set by default, are displayed in each area.

To stop loading the file, click [Cancel].

Once a device information definition file is selected, the same file is automatically loaded the next time you start winfog.

Note: When you load a device information definition file after setting up options, all settings are reset to the default state.

(2) Setup

Select [Setup] from the [Tool] menu or click the [Setup] button to bring up the [Setup] dialog box. From this dialog box, select items and enter data.

 [Setup] button



Date

Displays the current date. Change it as necessary.

Function Option Document file

Specify the function option document file name you want to create. The file name displayed by default can be modified. You can use the [Ref] button to look at other folders.

Function Option HEX

Do you make hex file?

Select whether to create a function option HEX file. You need to create one when you use EVA60xx/62xx to debug programs.

Function Option HEX file

When you create a function option HEX file, specify its file name here. The file name displayed by default can be modified. You can use the [Ref] button to look at other folders.

EPROM Type

Select a ROM type to be used when installing the ROM in which the generated HEX data is written to the EVA60xx/62xx. The data start address is decided according to the selected ROM type as shown below.

27C64 = 0000H 27C128 = 0000H 27C256 = 4000H 27C512 = C000H

When downloading the file via the ICE62R (ICE6200) using the debugger, select 27C64 (default).

User's Name

Enter your company name. The limit is 40 characters, and any characters exceeding this limit will not be recognized. You can use English letters, numbers, symbols, and spaces. The content entered here is recorded in the USER'S NAME field of the function option document file.

Comment

Enter a comment. Up to 50 characters can be entered in one line. You can enter up to 10 lines. You can use English letters, numbers, symbols, and spaces. Use the [Enter] key to create a new line. All comments should include the following information:

- Place of business, your department or section
- Address, telephone number, and facsimile number
- Other: Technical information, etc.

The content entered here is recorded in the COMMENT field of the function option document file.

When you have finished entering the above necessary items, click [OK]. The setup contents are saved, and the dialog box is closed. The setup contents take effect immediately. If you click [Cancel], current settings will not be changed and the dialog box is closed.

Notes: • *File name specification is subject to the following limitations:*

1. *The number of characters that can be used to specify a file name including the path is 2,048.*
2. *The file name itself (not including the extension) can be up to eight characters, and the extension up to three characters.*
3. *The file name cannot begin with a hyphen (-), nor can the following symbols be used as part of directory names (folder names), file names, and extensions:*

*/ : , ; * ? " < > |*

- *The symbols shown below cannot be used in the User's Name and Comment:*

\$ \ | `

(3) Selecting options

Select necessary options by clicking the corresponding check boxes in the option list. When you change any selection item in the option list area, the display in the function option document area is updated. Note that when you have loaded the device information definition file, the option list is placed in its default selection state.

For details about option specifications, refer to the Technical Manual available for each type of microcomputer.

(4) Creating files

After selecting options, select [Generate] from the [Tool] menu or click the [Generate] button to create the files.

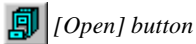


[Generate] button

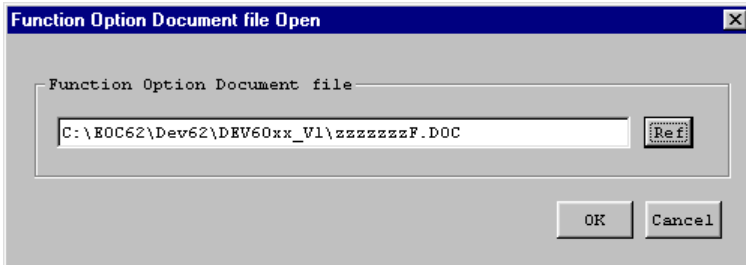
The function option document file you specified from the [Setup] dialog box and the function option HEX file (if specified) are created. When winfog has finished creating the files normally, it displays the message "Making file(s) is completed" in the message area. If an error occurs, an error message is displayed.

(5) Correcting an existing document file

You can read an existing function option document file into winfog and correct it as necessary. To read a file, select [Open] from the [File] menu or click the [Open] button.



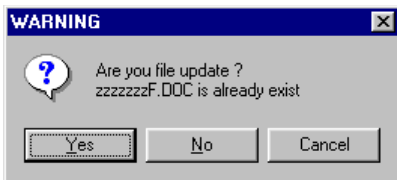
The dialog box shown below appears, so enter a file name including the path in the text box or select a file by clicking the [Ref] button.



Click [OK], and the file is loaded. If the specified file exists and there is no problem with its contents, the option list and the function option document areas are updated according to the contents of the file. To stop loading the file, click [Cancel].

Perform steps (3) and (4) to update the file.

If you select [Generate] without changing the file name, the message shown below is displayed asking you whether or not to overwrite the file. Click [Yes] to overwrite or [No] or [Cancel] to stop overwriting. Use the [Setup] dialog box to change the file name.



Note: The function option document file can be read only when the device information definition file has been loaded.

(6) Quitting

To terminate winfog, select [End] from the [File] menu.

3.4 Error Messages

The error messages of winfog are listed below. The "Dialog" in the Display column means that messages are displayed in the dialog box, and "Message" means that messages are displayed in the [FOG] window message area.

Table 3.4.1 List of winfog Error Messages

Message	Description	Display
Illegal character	Input characters are erroneous, or prohibited characters have been entered.	Dialog
File name error	Input file name is erroneous.	Dialog
Can't open File : xxxx	File cannot be opened.	Dialog
Function Option INI file is not found	Specified device information definition file (.ini) does not exist.	Dialog
Function Option document file is not found	Specified function option document file does not exist.	Dialog
document file is not configuration	Specified file is not a function option document file; or contents are erroneous.	Dialog
A lot of parameter	Too many command line parameters are specified.	Dialog
Making file(s) is completed [xxxx is no data exist]	Finished creating the file, but the created file does not contain any data.	Message
Can't open File: xxxx	File cannot be opened when executing Generate.	Message
Making file(s) is not completed		
Can't write File: xxxx	File cannot be written when executing Generate.	Message
Making file(s) is not completed		

Table 3.4.2 winfog Warning Messages

Message	Description	Display
Are you file update? xxxx is already exist	Overwrite confirmation message (Specified file already exists.)	Dialog

3.5 Example Output Files

Note: Option and other configurations vary with each type of microcomputer.

Example of a function option document file

```
* E0C60xx FUNCTION OPTION DOCUMENT Vx.xxx      ← Version
*
* FILE NAME      zzzzzzzF.DOC                  ← File name (specified by [Setup])
* USER'S NAME   SEIKO EPSON CORPORATION       ← User name (specified by [Setup])
* INPUT DATE    yyyy/mm/dd                    ← Date of creation (specified by [Setup])
* COMMENT      SAMPLE DATA                    ← Comment (specified by [Setup])
*
* *** OPTION NO.1 ***                          ← Option number
* --- OSC1 SYSTEM CLOCK ---                    ← Option name
* Crystal(32.768KHz) ---- Selected             ← Selected specification
OPT0101 01                                     ← Mask data
*
* *** OPTION NO.2 ***
* --- OSC3 SYSTEM CLOCK ---
* CR 200KHz ---- Selected
OPT0201 01
*
* *** OPTION NO.3 ***
* --- INPUT PORT PULL UP RESISTOR ---
* K00 With Resistor ---- Selected
* K01 With Resistor ---- Selected
* K02 With Resistor ---- Selected
* K03 With Resistor ---- Selected
* K10 With Resistor ---- Selected
* K11 With Resistor ---- Selected
* K12 With Resistor ---- Selected
* K13 With Resistor ---- Selected
OPT0301 01
OPT0302 01
OPT0303 01
OPT0304 01
OPT0305 01
OPT0306 01
OPT0307 01
OPT0308 01
*
* *** OPTION NO.4 ***
* --- OUTPUT PORT OUTPUT SPECIFICATION ---
* R00 Complementary ---- Selected
* R01 Complementary ---- Selected
* R02 Complementary ---- Selected
* R03 Complementary ---- Selected
OPT0401 01
OPT0402 01
OPT0403 01
OPT0404 01
*
      :
*
* *** OPTION NO.8 ***
* --- SOUND GENERATOR POLARITY ---
* NEGATIVE ---- Selected
OPT0801 01
*EOF                                           ← End mark
```

Example of a function option HEX file (Intel HEX format)

```
:10000000FFFFFFFFFFFFF0F1FFF1F1F1F1F1F17F
:10001000F1F1F1F1F1F1F1F1F1F1F1F1F1F1D0
:10002000F1F1F1F1F1F1F1F1F1F1F1F1F1F1C0
:10003000FFF1F1F1FFF0F0F1F1F1F1F1F1F097
:10004000FFFFF1F1F0FFFFFFF0F1F1F1F1FFF40
:10005000F1F1F1F1F1F1F1F1F1F1F1F1F1F38E
:00000001FF
```

For details about the Intel HEX format, refer to the Appendix.

4 SEGMENT OPTION GENERATOR <winsog>

4.1 Outline of winsog

Some types of microcomputers in the E0C60/62 Family allow the LCD output pin output specifications and LCD output pin assignments to be set with hardware options, so that mask patterns for the IC are generated according to option settings. The Segment Option Generator <winsog> is the software tool for creating the files required to generate mask patterns. Its graphical user interface (GUI) ensures simple mask option setting.

In addition, simultaneously with this file, winsog can create a HEX file (Intel HEX format data) for a mask option ROM that is required when debugging the program with EVA60xx/62xx. By writing this data to a ROM and installing it to EVA60xx/62xx, the EVA60xx/62xx is configured with the option settings and works as the actual IC.

Note: The Segment Option Generator <winsog> is provided for only certain types of microcomputers that have set segment options.

4.2 Input/output Files

Figure 4.2.1 shows the input/output files of winsog.

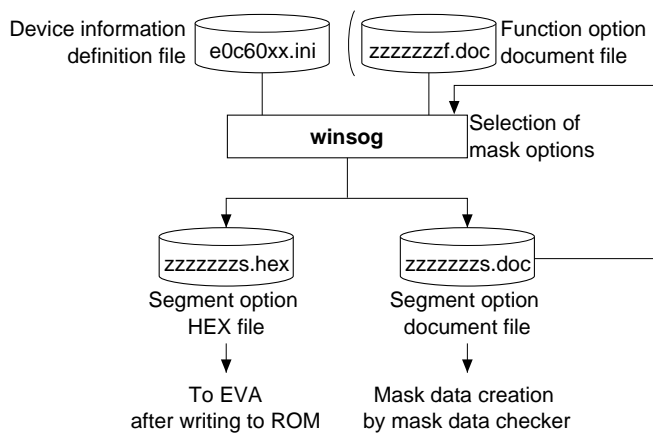


Fig. 4.2.1 Input/Output Files of winsog

Device information definition file (e0c60xx.ini/e0c62xx.ini)

This file contains option lists for various types of microcomputers and other information. Always be sure to use the files presented by Seiko Epson. This file is effective for only the type of microcomputer indicated by the file name. Do not modify the contents of the file or use the file in other types of microcomputers.

Function option document file (zzzzzzf.doc)

This is the text format file generated by winfog and contains the selected mask options. This file is required only when the segment option setup condition depends on the mask option selected with winfog.

Segment option document file (zzzzzzzs.doc)

This is a text format file in which setup contents of segment options are stored. You can read this file into winsog and correct the option settings. This file is packed along with completed other program/data files into a single file by the mask data checker <winmdc>, which will be presented to Seiko Epson as the mask data file. From this file, Seiko Epson will create the mask patterns for the IC.

Segment option HEX file (zzzzzzs.hex)

This is the Intel HEX format file necessary to set the selected mask options in EVA60xx/62xx. When you debug programs with EVA60xx/62xx, create a ROM with this file and install the ROM to the segment option ROM socket on the EVA60xx/62xx, or download this file into EVA60xx/62xx through ICE62R (ICE6200) using a debugger <db62> command.

- *1 The "xx" in the file name denotes the model name of a microcomputer. For the "zzzzzz" part, any given file name can be specified.
- *2 For details on how to download mask options, refer to the "E0C62 Family Assembler Package Manual".

4.3 Using winsog

4.3.1 Starting Up

Startup from Explorer




Double-click on the winsog.exe icon or select winsog from the start menu. If the device information definition file (e0c60xx.ini/e0c62xx.ini) was loaded into your computer during previous execution, winsog automatically reads the same file as it starts. Alternatively, drag the device information definition file icon into the winsog.exe icon to start winsog, which will then read the device information definition file. If a function option document file is required for setting the segment option, a dialog box will appear to allow file selection. In this case enter the file name including the path in the text box or choose the file from the dialog box that appears by clicking on the [Ref] button.

Startup by command input

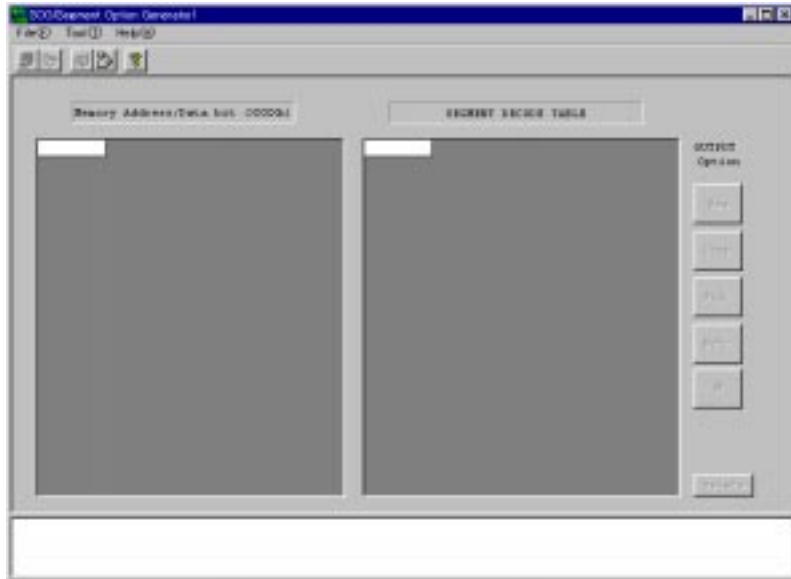
You can also start winsog from the MS-DOS prompt by entering the command shown below.

>winsog [e0c60xx.ini/e0c62xx.ini] 

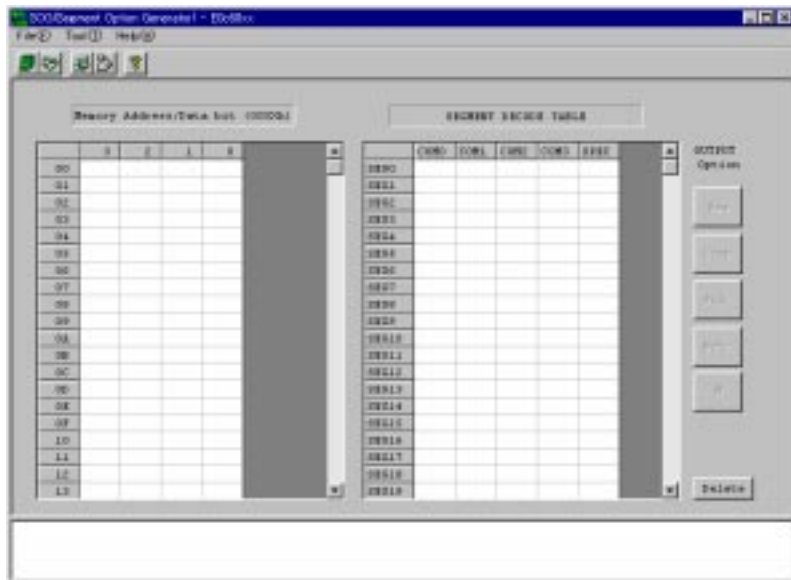
 denotes entering the return key.

You can specify the device information definition file (e0c60xx.ini/e0c62xx.ini) as a command option. (You can also specify a path.) When you specify the device information definition file here, winsog reads it as it starts. If a function option document file is required for setting the segment option, the file (zzzzzzf.doc) must be prepared in the directory in which e0c60xx.ini/e0c62xx.ini and winsog.exe exist before entering the command. When the command is entered, a dialog box will appear to allow file selection. Enter the file name including the path in the text box or choose the file from the dialog box that appears by clicking on the [Ref] button. This specification can be omitted.

When winsog starts, it displays the [SOG] window. The following diagrams show a [SOG] window when the device information definition file has been loaded and when it has not.

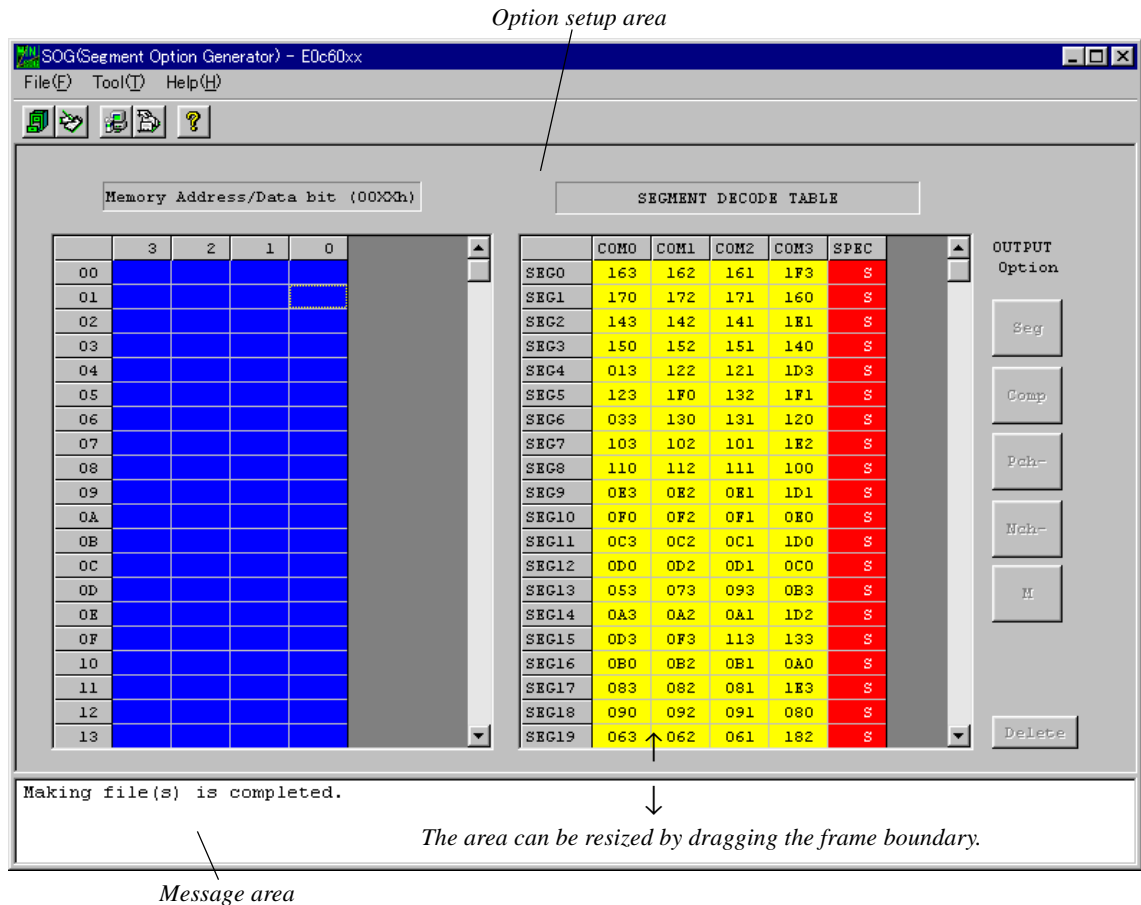


[SOG] Window (initial screen)



[SOG] Window (after reading the device information definition file)

4.3.2 Window



- * The microcomputer model name on the title bar is the file name (not including the path and extension) of the device information definition file that has been read.
- * The display memory addresses and segment configuration vary with each type of microcomputer.

Fig. 4.3.2.1 Window Configuration

The [SOG] window is divided into two areas as shown above.

Option setup area

Comprised of a display memory map, a segment decode table, and buttons to select pin specifications. By clicking on cells in the display memory map and segment decode table, you can assign display memory addresses and bits.

Message area

When you create a file by selecting [Generate] from the [Tool] menu or clicking the [Generate] button, this area displays a message showing the result of the selected operation.

4.3.3 Menus and Toolbar Buttons

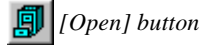
This section explains each menu item and toolbar button.

[File] menu



Open

Opens a segment option document file. Use this menu command when correcting an existing file. The [Open] button has the same function.

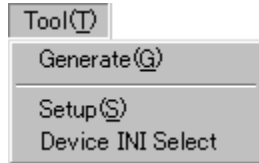


[Open] button

End

Terminates winsog.

[Tool] menu



Generate

Creates a file according to the contents of segment options set. The [Generate] button has the same function.



[Generate] button

Setup

Sets the date of creation or output file name or a comment included in the segment option document file. The [Setup] button has the same function.



[Setup] button

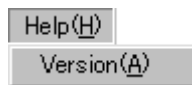
Device INI Select

Loads the device information definition file <e0c60xx.ini/e0c62xx.ini>. The [Device INI Select] button has the same function. This file must be loaded first before performing any operation with winsog.



[Device INI Select] button

[Help] menu



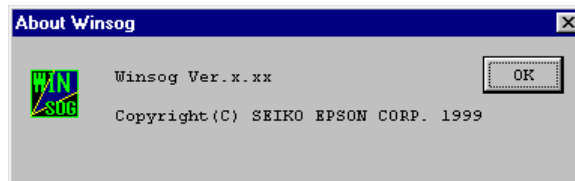
Version

Displays the version of winsog. The [Help] button has the same function.



[Help] button

The dialog box shown below appears. Click [OK] to close this dialog box.



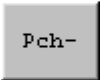
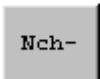



4.3.4 Option Selection Buttons

The following buttons are available in the option setup area.

OUTPUT Option buttons

These buttons select SEG pin output modes. These buttons are enabled when you click a SPEC cell in [SEGMENT DECODE TABLE].

-  Selects LCD segment output.
-  Selects DC-complementary output.
-  Selects DC-Pch open-drain output.
-  Selects DC-Nch open-drain output.
-  Selects segment/common shared output.

[Delete] button

-  Clears one selected segment assignment.

4.3.5 Operation Procedure

The following shows the basic operation procedure.

(1) Loading the device information definition file

First, select a device information definition file <e0c60xx.ini/e0c62xx.ini> and load it. Select [Device INI Select] from the [Tool] menu or click the [Device INI Select] button.



[Device INI Select] button

The dialog box shown below appears. Enter a file name including the path in the text box or select a file by clicking the [Ref] button.

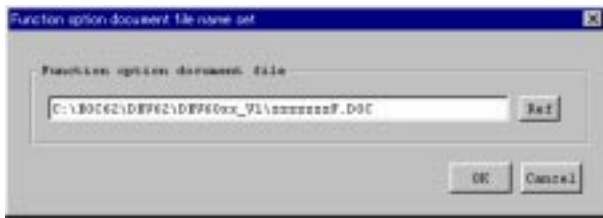


Click [OK], and the file is loaded. If the specified file exists and there is no problem with its contents, the set-up items in winsog are initialized with the loaded device information.

To stop loading the file, click [Cancel].

Once a device information definition file is selected, the same file is automatically loaded the next time you start winfog.

If a function option document file is required for setting the segment option, the dialog box shown below will appear to allow file selection. In this case enter the file name including the path in the text box or choose the file from the dialog box that appears by clicking on the [Ref] button.



Note: When you load a device information definition file after setting up options, all settings are reset to the default state.

(2) Setup

Select [Setup] from the [Tool] menu or click the [Setup] button to bring up the [Setup] dialog box. From this dialog box, select items and enter data.



[Setup] button



Date

Displays the current date. Change it as necessary.

Segment Option Document file

Specify the segment option document file name you want to create. The file name displayed by default can be modified. You can use the [Ref] button to look at other folders.

Segment Option HEX

Do you make hex file?

Select whether to create a segment option HEX file. You need to create one when you use EVA60xx/62xx to debug programs.

Segment Options HEX file

When you create a segment option HEX file, specify its file name here. The file name displayed by default can be modified. You can use the [Ref] button to look at other folders.

4 SEGMENT OPTION GENERATOR <winsog>

EPROM Type

Select a ROM type to be used when installing the ROM in which the generated HEX data is written to the EVA60xx/62xx. The data start address is decided according to the selected ROM type as shown below.

27C64 = 0000H 27C128 = 0000H 27C256 = 4000H 27C512 = C000H

When downloading the file via the ICE62R (ICE6200) using the debugger, select 27C64 (default).

User's Name

Enter your company name. The limit is 40 characters, and any characters exceeding this limit will not be recognized. You can use English letters, numbers, symbols, and spaces. The content entered here is recorded in the USER'S NAME field of the segment option document file.

Comment

Enter a comment. Up to 50 characters can be entered in one line. You can enter up to 10 lines. You can use English letters, numbers, symbols, and spaces. Use the [Enter] key to create a new line. All comments should include the following information:

- Place of business, your department or section
- Address, telephone number, and facsimile number
- Other: Technical information, etc.

The content entered here is recorded in the COMMENT field of the segment option document file.

When you have finished entering the above necessary items, click [OK]. The setup contents are saved, and the dialog box is closed. The setup contents take effect immediately. If you click [Cancel], current settings will not be changed and the dialog box is closed.

Notes: • *File name specification is subject to the following limitations:*

1. *The number of characters that can be used to specify a file name including the path is 2,048.*
2. *The file name itself (not including the extension) can be up to eight characters, and the extension up to three characters.*
3. *The file name cannot begin with a hyphen (-), nor can the following symbols be used as part of directory names (folder names), file names, and extensions:*
/ : ; * ? " < > |

- *The symbols shown below cannot be used in the User's Name and Comment:*
\$ \ | `

(3) Setting segment outputs

The LCD drive circuit of a E0C60/62 Family chip that has had segment options set normally allows selecting the segment output and DC output for every two pins (in certain types of microcomputers, individually for each pin). Segment output should be specified when using the pins for driving an LCD panel.

Segment output ports have a built-in segment decoder allowing any address and data bit in the display memory area to be assigned to any segment. When the segment memory bit is set to 1, the assigned segment lights up; when the bit is set to 0, the segment dims. Segments and display memory bits correspond individually, so that you cannot assign one display memory bit to multiple segments. Therefore, all segments must be assigned different addresses and data bits.

For details about the display memory map and segment assignment, refer to the Technical Manual for each type of microcomputer.

In the explanation below, the chip is assumed to have four common pins, COM0 to COM3.

Follow the procedure below to assign segments:

1. From the [Memory Address/Data bit] table, select the memory address/data bit you want to assign by clicking the appropriate cell. The cell changes color to blue.

If you select an incorrect cell, select a correct cell.

The horizontal rows of the table correspond to display memory addresses. The hexadecimal number shown to the right of the "Memory Address/Data bit" title is the base address of display memory, with only the lower byte of address being displayed in each row of the table. The vertical columns of the table correspond to data bits.

2. From [SEGMENT DECODE TABLE], select the SEG pin/COM pin to which you want to assign the memory address/data bit selected in 1 by clicking the appropriate cell. A 3-digit numeric value is displayed in the cell, showing the selected address (2 high-order digits) and data bit (1 low-order digit), and the cell changes color to yellow.

Selection example: 

If you select an incorrect cell, click the [Delete] button to clear its assignment and reselect from 1. Before selecting a cell in [SEGMENT DECODE TABLE], always select a cell in [Memory Address/Data bit].

3. Click the SPEC cell for the segment selected in 2 and then the [Seg] button. The cell shows the letter S and changes color to red. This means that the segment has been set for a LCD segment output pin.

If your chip requires selecting segment output and DC output every two pins, the other pin that comprises a pair is set in the same way.

Selection example: 

4. Repeat steps 1 to 2 for all segments used for LCD output. Specification selection in 3 may be performed later.

If any COM cell in one SEG pin is unused, leave it blank.

Selection example: 

(4) Setting DC outputs

When using SEG pins for general-purpose DC output, assign segments according to steps 1 and 2 described in Item (3), "Setting segment outputs". However, output control works in such a way that the display memory assigned to COM0 is enabled while the display memory assigned to COM1 through COM3 are disabled. Therefore, set a memory address/data bit for only COM0 cell and leave memory address/data bits for COM1 through COM3 cells blank.

For DC output, you may select an output mode between complementary output and Nch (or Pch) open-drain output. Select your desired output in SPEC cell using the buttons listed below:

[Comp] button: Complementary output (C)

[Nch-] button: N-channel open-drain output (N)

[Pch-] button: P-channel open-drain output (P)

If your chip requires selecting an output mode every two pins, the other pin that comprises a pair is set in the same way.

Selection example: 

(5) Setting SEG/COM shared pins

Whether the SEG/COM shared pins output segment signals or common signals is determined by selecting the function option.

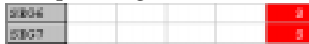
When using the shared pins as SEG pins, allocate display memory addresses/bits as shown above and leave unused COM cells blank. When using the shared pins as COM pins, select segment/common shared output ([M] button) as the output specification and do not allocate memory.

Note: This setting is required only for microcomputers that have SEG/COM shared pins.

(6) Setting unused SEG pins

For SEG pins that are used for neither LCD output nor DC output, leave COM0 through COM3 cells in [SEGMENT DECODE TABLE] blank. However, SPEC cells cannot be left blank, so select segment output (S) for the corresponding SPEC cells.

Selection example:



(7) Creating files

After selecting options, select [Generate] from the [Tool] menu or click the [Generate] button to create the files.



[Generate] button

The segment option document file you specified from the [Setup] dialog box and the segment option HEX file (if specified) are created. When winsog has finished creating the files normally, it displays the message "Making file(s) is completed" in the message area. If an error occurs, an error message is displayed.

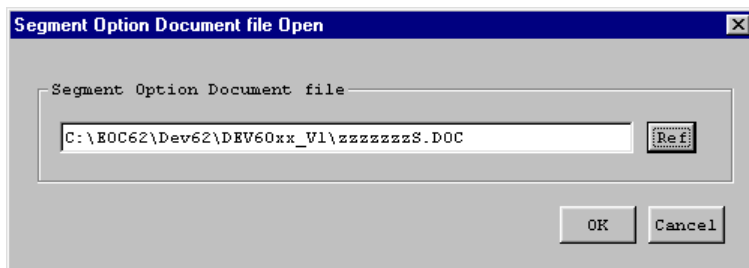
(8) Correcting an existing document file

You can read an existing segment option document file into winsog and correct it as necessary. To read a file, select [Open] from the [File] menu or click the [Open] button.



[Open] button

The dialog box shown below appears, so enter a file name including the path in the text box or select a file by clicking the [Ref] button.



Click [OK], and the file is loaded. If the specified file exists and there is no problem with its contents, [Memory Address/Data bit] and [SEGMENT DECODE TABLE] are updated according to the contents of the file. To stop loading the file, click [Cancel].

If you want to change an assigned address, clear its cell assignment using the [Delete] button first and then reassign a new address. If you want to change a selected output mode too, select the corresponding SPEC cell and clear its selected output mode with the [Delete] button before reselecting a new output mode.

If you select [Generate] without changing the file name, the dialog box asking you whether to overwrite the file is displayed. Click [Yes] to overwrite or [No] or [Cancel] to stop overwriting. Use the [Setup] dialog box to change the file name.

Notes:

- The segment option document file can be read only when the device information definition file has been loaded.

- If a function option document file was loaded at the start of winsog, the segment option document file in which the settings do not match the function option cannot be read.

(9) Quitting

To terminate winsog, select [End] from the [File] menu.

4.4 Error Messages

The error messages of winsog are listed below. The "Dialog" in the Display column means that messages are displayed in the dialog box, and "Message" means that messages are displayed in the [SOG] window message area.

Table 4.4.1 List of winsog Error Messages

Message	Description	Display
file name format error!	Input characters are erroneous, or prohibited characters have been entered.	Dialog
Can't open file : xxxx	File cannot be opened.	Dialog
INI file is not found!	Specified file is not the correct device information definition file (.ini) or does not exist.	Dialog
Document file not match INI file!	Specified segment option document file does not exist or the recorded contents do not match the device information definition file (.ini).	Dialog
Document file is not found!	Specified function option document file does not exist.	Dialog
Error: can't find mask data in f.doc file	Contents of the function option document file are illegal.	Dialog
Can't open File: xxxx Making file(s) is not completed	File cannot be opened when executing Generate.	Message
Can't write File: xxxx Making file(s) is not completed	File cannot be written when executing Generate.	Message
ERROR: SPEC is not set Making file(s) is not completed	One or more SPEC cells are left blank when executing Generate.	Message

Table 4.4.2 winsog Warning Messages

Message	Description	Display
Are you file update? xxxx is already exist	Overwrite confirmation message (Specified file already exists.)	Dialog

4.5 Example Output Files

Note: The display memory addresses, the number of SEG/COM pins, and output specification vary with each type of microcomputer.

Example of a segment option document file

```
* E0C60xx SEGMENT OPTION DOCUMENT Vx.xx      ← Version
*
* FILE NAME      zzzzzzzS.DOC                ← File name (specified by [Setup])
* USER'S NAME   SEIKO EPSON CORPORATION      ← User name (specified by [Setup])
* INPUT DATE    yyyy/mm/dd                   ← Date of creation (specified by [Setup])
* COMMENT       SAMPLE DATA                 ← Comment (specified by [Setup])
*
*
* OPTION NO.xx      ← Option number (varies with type of microcomputer)
*
* < LCD SEGMENT DECODE TABLE >
*
* SEG COM0 COM1 COM2 COM3 SPEC
*
  0  163  162  161  1F3  S                    ← Segment decode table
  1  170  172  171  160  S
  2  143  142  141  1E1  S
  3  150  152  151  140  S
      :
  xx 3B0  3B1  3B2  3B3  S
* EOF                                          ← End mark
```

Example of a segment option HEX file (Intel HEX format)

```
:1002B0006B036B026B016B00FFFFFFFFFFFFFFFFF94
:1002C0006C036C026C016C00FFFFFFFFFFFFFFFFF80
:
:1010F000FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF00
:00000001FF
```

For details about the Intel HEX format, refer to Appendix.

5 MASK DATA CHECKER <winmdc>

5.1 Outline of winmdc

The Mask Data Checker <winmdc> is the software tool for checking the format of each generated file and creating the file necessary to generate mask patterns. winmdc checks the HEX files of the program ROM generated by HEX converter <hx62>, the function option document file generated by function option generator <winfog>, and the segment option document file generated by segment option generator <winsog>.

winmdc also has a function for restoring the created mask data file into the original file format.

5.2 Input/Output Files

Figure 5.2.1 shows the input/output files of winmdc.

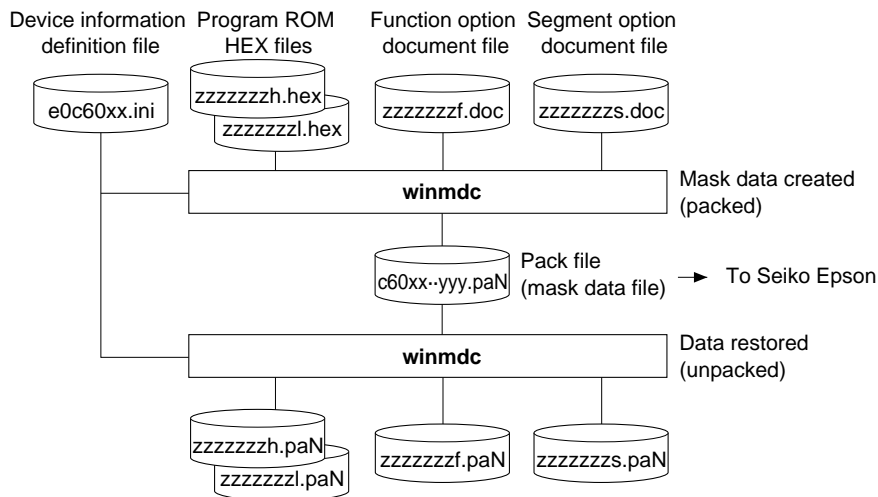


Fig. 5.2.1 Input/Output Files of winmdc

Device information definition file (e0c60xx.ini/e0c62xx.ini)

This file contains option lists for various types of microcomputers and other information. Always be sure to use the files presented by Seiko Epson. This file is effective for only the type of microcomputer indicated by the file name. Do not modify the contents of the file or use the file in other types of microcomputers.

Program ROM HEX files (zzzzzzzh.hex, zzzzzzzl.hex)

Both these files are Intel HEX format files, with the 4 high-order bits of object code (12 bits) stored in "h.hex" and the 8 low-order bits of object code stored in "l.hex". These files are created from the object files output by linker <lk62> by converting them into HEX format using HEX converter <hx62>. For details about hx62, refer to the "E0C62 Family Assembler Package Manual".

Function option document file (zzzzzzzf.doc)

This is a text format file in which the contents of selected function options are stored. This file is created by function option generator <winfog>.

Segment option document file (zzzzzzzs.doc)

This is a text format file in which the contents of segment options set are stored. It is created by segment option generator <winsog>. This file is available for only microcomputers with set segment options.

Pack file (c60xx-yyy.paN/c62xx-yyy.paN, N = 0 and over)

This is a text format file which contains the above data files combined into one. We would like to have this file presented to Seiko Epson as the mask data file. Seiko Epson will create the mask patterns for the IC from this mask data file.

- * The "xx.." in the file name denotes the model name of a microcomputer. The "yyy" part of the file name represents the custom code of each customer. Enter the code from Seiko Epson here. For the "zzzzzz" part, any given file name can be specified.

5.3 Using winmdc

5.3.1 Starting Up

Startup from Explorer



Winmdc.exe

Double-click on the winmdc.exe icon or select winmdc from the start menu. If the device information definition file (e0c60xx.ini/e0c62xx.ini) was loaded into your computer during a previous execution, winmdc automatically reads the same file as it starts. Alternatively, drag the device information definition file icon into the winmdc.exe icon to start winmdc, which will then read the device information definition file.

Startup by command input

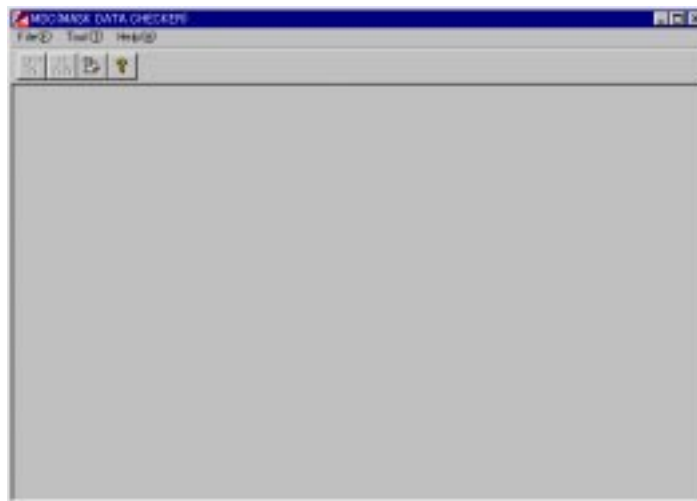
You can also start winmdc from the MS-DOS prompt by entering the command shown below.

```
>winmdc [e0c60xx.ini/e0c62xx.ini] ↵
```

↵ denotes entering the return key.

You can specify the device information definition file (e0c60xx.ini/e0c62xx.ini) as a command option. (You can also specify a path.) When you specify the Device information definition file here, winmdc reads it as it starts. This specification can be omitted.

When winmdc starts, it displays the [MDC] window.



[MDC] Window (initial screen)

- * The microcomputer model name on the title bar is the file name (not including the path and extension) of the device information definition file that has been read.
- * The [Pack] and [Unpack] buttons on the tool bar are enabled when the device information definition file is read.

5.3.2 Menus and Toolbar Buttons

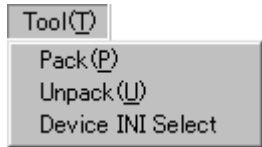
This section explains each menu item and toolbar button.

[File] menu

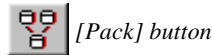


End
Terminates winmdc.

[Tool] menu



Pack
Packs the ROM data file and option document file to create a mask data file for presentation to Seiko Epson. The [Pack] button has the same function.



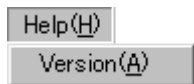
Unpack
Restores files in the original format from a packed file. The [Unpack] button has the same function.



Device INI Select
Loads the device information definition file <e0c60xx.ini/e0c62xx.ini>. The [Device INI Select] button has the same function. This file must be loaded first before performing any operation with winmdc.

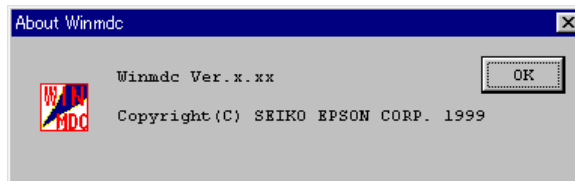


[Help] menu



Version
Displays the version of winmdc. The [Help] button has the same function. [Help] button

The dialog box shown below appears. Click [OK] to close this dialog box.



5.3.3 Operation Procedure

The following shows the basic operation procedure.

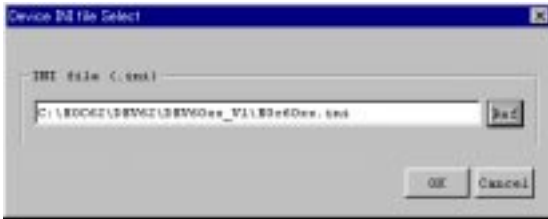
(1) Loading the Device information definition file

First, select a device information definition file <e0c60xx.ini/e0c62xx.ini> and load it. Select [Device INI Select] from the [Tool] menu or click the [Device INI Select] button.



[Device INI Select] button

The dialog box shown below appears. Enter a file name including the path in the text box or select a file by clicking the [Ref] button.



Click [OK], and the file is loaded. If the specified file exists and there is no problem with its contents, the set-up items in winmdc are initialized with the loaded device information. To stop loading the file, click [Cancel].

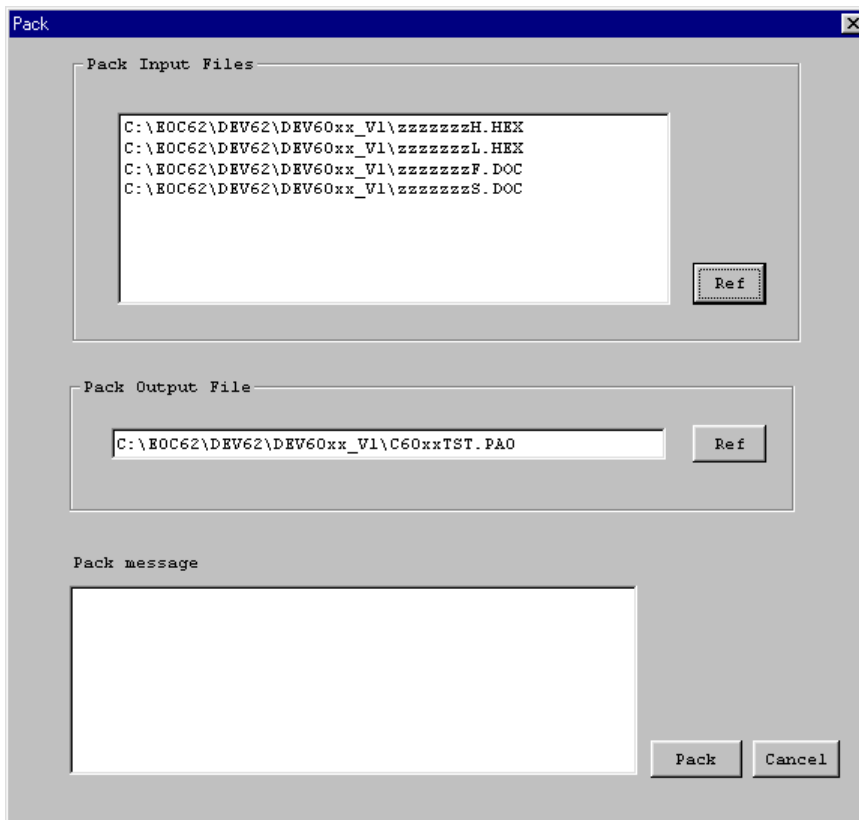
Once a device information definition file is selected, the same file is automatically loaded the next time you start winmdc.

(2) Packing

1. Select [Pack] from the [Tool] menu or click the [Pack] button on the tool bar to bring up the [Pack] dialog box.



[Pack] button



5 MASK DATA CHECKER <winmdc>

2. Select the files to be entered.

[Pack Input Files] lists the files of the type specified in the device information definition file by their default file names. If the data files to be entered are represented by different names in this list, replace the file names following the procedure below.

- a. Select a file name to be changed by clicking on it from the list box.
- b. Click the [Ref] button and select the data file to be entered.

Do this for all files listed.

When replacing files, take care not to mistake one file type (extension) for another. If the type of input file is erroneous, an error will result during file packing.

3. Setting output file names

In the [Pack Output File] text box, specify a pack file name in which you want the mask data to be output. The file name displayed by default can be modified. You can use the [Ref] button to look at other folders.

Make sure the extension of the output file name is ".pa0". If after presenting data to Seiko Epson, you present new data due to program bugs or any other reason, increase the number in the last digit of the extension in increments of one. For example, the extension of the second file presented should be "c60xx·yyy.pa1".

Note: File name specification is subject to the following limitations:

1. The number of characters that can be used to specify a file name including the path is 2,048.
2. The file name itself (not including the extension) can be up to 15 characters, and the extension up to three characters.
3. The file name cannot begin with a hyphen (-), nor can the following symbols be used as part of directory names (folder names), file names, and extensions:
/ : ; * ? " < > |

4. Click the [Pack] button to execute packing.

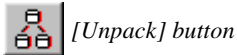
When winmdc has completed packing, it displays a message "Packing completed!" in the [Pack message] text box. If an error has occurred, an error message is displayed.

5. Click the [Cancel] button to close the dialog box.

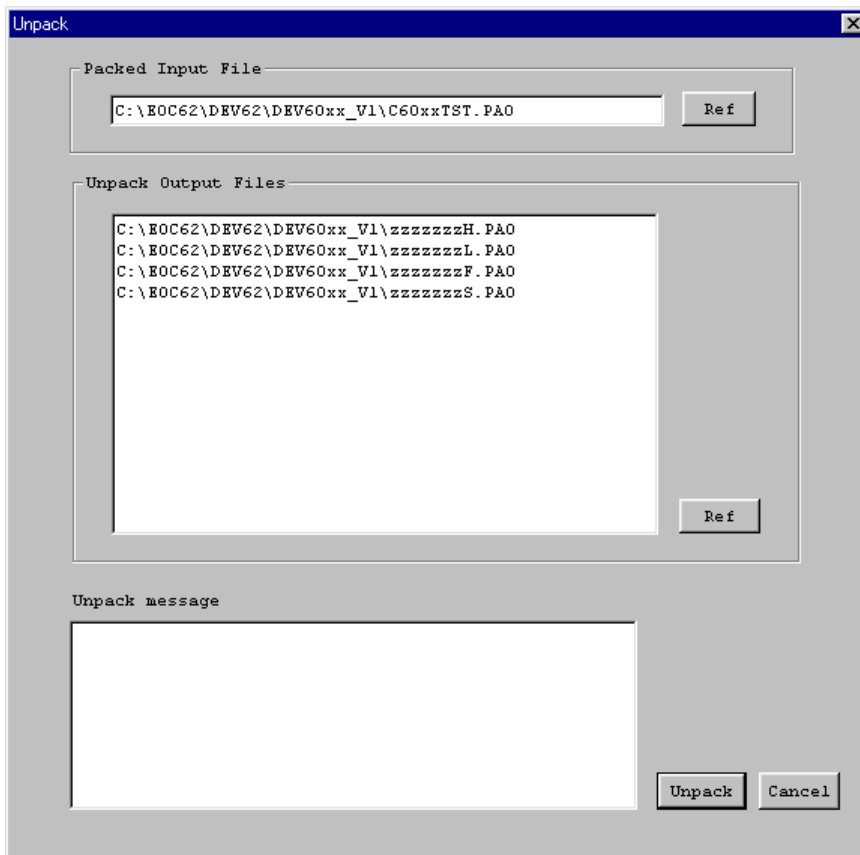
Alternatively, you can click the [Cancel] button to quit winmdc before it executes packing.

(3) Unpacking

1. Select [Unpack] from the [Tool] menu or click the [Unpack] button on the tool bar to bring up the [Unpack] dialog box.



[Unpack] button



2. Select the file you want to unpack.
In the [Packed Input File] text box, specify the pack file name you want to enter. Use the names displayed by default to specify this file name after changing one, or select another file using the [Ref] button.
3. Select the directory in which to output.
[Unpack Output Files] lists the files of the type specified in the device information definition file by their default file names. The file name displayed by default can be modified. You can use the [Ref] button to look at other folders. The extension cannot be changed.
4. Click the [Unpack] button to execute unpacking.
When winmdc has completed unpacking, it displays a message "Unpacking completed!" in the [Unpack message] text box. If an error has occurred, an error message is displayed.
5. Click the [Cancel] button to close the dialog box.
Alternatively, you can click the [Cancel] button to quit winmdc before it executes unpacking.

(4) Quitting

- To terminate winmdc, select [End] from the [File] menu.

5.4 Error Messages

The error messages of winmdc are listed below. The "Dialog" in the Display column means that messages are displayed in the dialog box, and "Message" means that messages are displayed in the message area of the [Pack] or [Unpack] dialog box.

Table 5.4.1 List of I/O Error Messages

Message	Description	Display
Illegal character	Input characters are erroneous, or prohibited characters have been entered.	Dialog
File name error	Input file extension is erroneous.	Dialog
Can't open file : xxxx	File cannot be opened.	Dialog
File write error: xxxx	File cannot be written.	Dialog
INI file does not include MDC information	Specified file is not the correct device information definition file (.ini).	Dialog

Table 5.4.2 List of ROM Data Error Messages

Message	Description	Display
Hex data error: Not S record.	Data does not begin with "S."	Message
Hex data error: Data is not sequential.	Data is not listed in ascending order.	Message
Hex data error: Illegal data.	Invalid character is included.	Message
Hex data error: Too many data in one line.	Too many data entries exist in one line.	Message
Hex data error: Check sum error.	Checksum does not match.	Message
Hex data error: ROM capacity over.	Data is large. (Greater than ROM size)	Message
Hex data error: Not enough the ROM data.	Data is small. (Smaller than ROM size)	Message
Hex data error: Illegal start mark.	Start mark is incorrect. (When unpacking)	Message
Hex data error: Illegal end mark.	End mark is incorrect. (When unpacking)	Message
Hex data error: Illegal comment.	Model name shown at the beginning of data is incorrect. (When unpacking)	Message

Table 5.4.3 List of Function Option Data Error Messages

Message	Description	Display
Option data error : Illegal option number.	Option No. is incorrect.	Message
Option data error : Illegal select number.	Selected option number is incorrect.	Message
Option data error : Data is not enough.	Option data is insufficient.	Message
Option data error : Illegal start mark.	Start mark is incorrect. (When unpacking)	Message
Option data error : Illegal end mark.	End mark is incorrect. (When unpacking)	Message

Table 5.4.4 List of Segment Option Data Error Messages

Message	Description	Display
LCD segment data error : Illegal segment No.	Segment No. is incorrect.	Message
LCD segment data error : Illegal segment area.	Display memory address is out of range.	Message
LCD segment data error : Illegal segment output specification.	Specified output mode is incorrect.	Message
LCD segment data error : Illegal data in this line.	Data written here is not hex number or output mode.	Message
LCD segment data error : Data is not enough.	Segment data is insufficient.	Message
LCD segment data error : Illegal start mark.	Start mark is incorrect. (When unpacking)	Message
LCD segment data error : Illegal end mark.	End mark is incorrect. (When unpacking)	Message

5.5 Example Output File

Note: The configuration and contents of data vary with each type of microcomputer.

Example of a pack file (mask data file)

```

*
* E0C60xx MASK DATA VER x.xx          ← Version
*
\ROM1                                  ← Program ROM HEX data start mark
E0C60xyyy PROGRAM ROM                 ← Model name
:100000000.....
:
:00000001FF                            "zzzzzzzh.hex", "zzzzzzzl.hex"
:100000000.....
:
:00000001FF
\END
\OPTION1                               ← Program ROM HEX data end mark
* E0C60xx FUNCTION OPTION DOCUMENT V x.xx ← Function option start mark
*
* FILE NAME      zzzzzzzF.DOC
* USER'S NAME    SEIKO EPSON CORPORATION
* INPUT DATE     yyyy/mm/dd
* COMMENT        SAMPLE DATA
*
* *** OPTION NO.1 ***
* --- OSC1 SYSTEM CLOCK ---
* Crystal(32.768KHz) ---- Selected
OPT0101 01
:
:
OPTnn01 01
*EOF
\END
\SEGMENT1                               ← Function option end mark
* E0C60xx SEGMENT OPTION DOCUMENT Vx.xx ← Segment option start mark
*
* FILE NAME      zzzzzzzS.DOC
* USER'S NAME    SEIKO EPSON CORPORATION
* INPUT DATE     yyyy/mm/dd
* COMMENT        SAMPLE DATA
*
*
* OPTION NO.xx
*
* < LCD SEGMENT DECODE TABLE >
*
* SEG COM0 COM1 COM2 COM3 SPEC
*
* 0 163 162 161 1F3 S
* 1 170 172 171 160 S
*
* :
*
* xx 3B0 3B1 3B2 3B3 S
*EOF
\END                                     ← Segment option end mark

```

6 EPROM DATA GENERATOR <winedg>

6.1 Outline of winedg

The EPROM Data Generator <winedg> merges two program-ROM HEX files generated by the HEX converter <hx62> (4 high-order bit file: h.hex, 8 low-order bit file: l.hex) into one 12-bit instruction code file for writing to an EPROM.

Note: The EPROM Data Generator <winedg> is available only for microcomputers that support an external EPROM.

6.2 Input/Output Files

Figure 6.2.1 shows the input/output files of winedg.

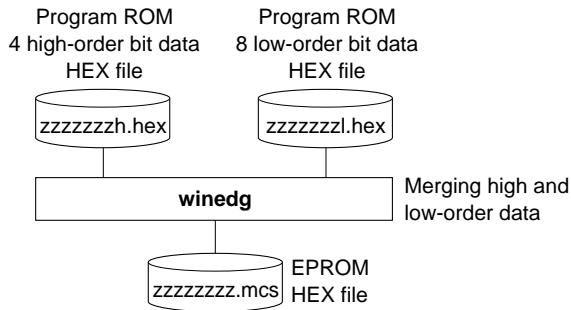


Fig. 6.2.1 Input/Output Files of winedg

Program ROM HEX files (zzzzzzzh.hex, zzzzzzzl.hex)

Both these files are Intel HEX format files, with the 4 high-order bits of object code (12 bits) stored in "h.hex" and the 8 low-order bits of object code stored in "l.hex". These files are created from the object files output by linker <lk62> by converting them into HEX format using HEX converter <hx62>. For details about hx62, refer to the "E0C62 Family Assembler Package Manual".

EPROM HEX file (zzzzzzzz.mcs)

Two HEX data "l.hex" and "h.hex" are merged into one 12-bit object data and output to this file. The unused area is filled with FFH. Furthermore, 12 low-order bits of the sum total of the merged data is written to the address following the ROM area end address.

Write the contents of this file to an EPROM to make the external ROM for executing the program.

6.3 Using winedg

6.3.1 Starting Up

Startup from Explorer



Double-click on the winedg.exe icon or select winedg from the start menu.

Winedg.exe

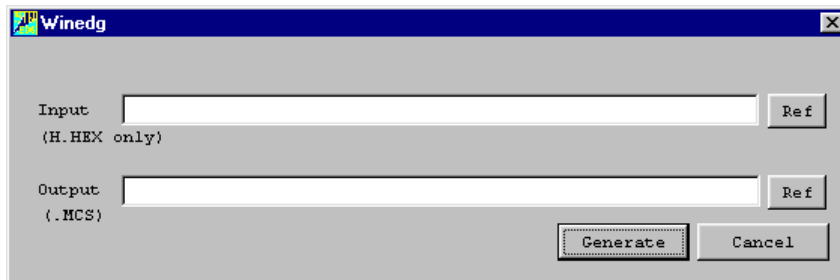
Startup by command input

It is also possible to start winedg from the MS-DOS prompt by entering the command shown below.

>winedg ↵

↵ denotes entering the return key.

When winedg starts, it displays the [Winedg] dialog box.



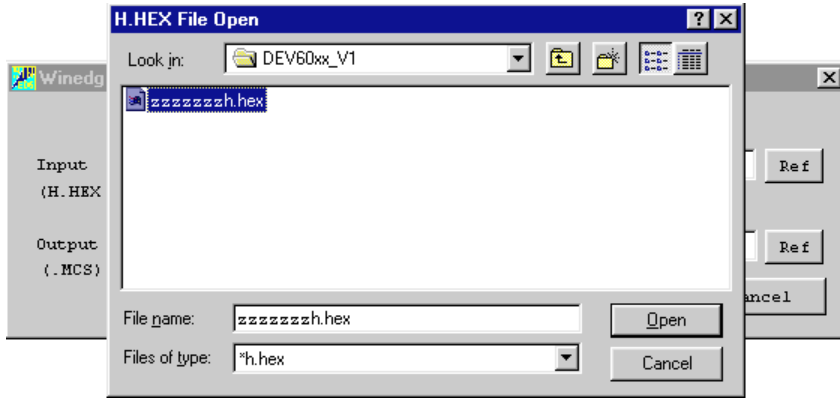
[Winedg] Dialog Box

6.3.2 Operation Procedure

The following shows the operation procedure.

(1) Selecting input files

First, select the high-order 4-bit program data HEX file (h.hex) to be merged. Enter the file name including the path in the [Input] text box or choose the file from the dialog box that appears by clicking on the [Ref] button.



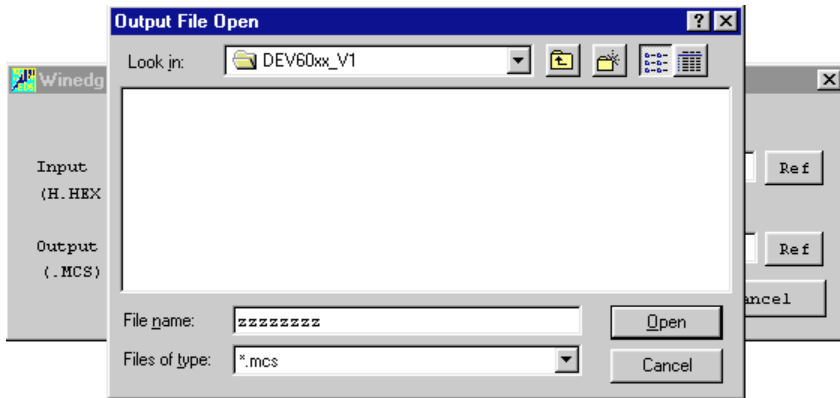
Selection Using the [Ref] Button

In this dialog, the high-order 4-bit HEX file (h.hex) must be selected. The low-order 8-bit HEX file (l.hex) with the same name as the selected HEX file will be automatically loaded during the merge operation. Note that both the high-order 4-bit and low-order 8-bit HEX files must be located in the same folder.

(2) Specifying the output file name

Next, specify an output file name.

Enter the file name including the path in the [Output] text box or choose the folder / file from the dialog box that appears by clicking on the [Ref] button. The text box in the dialog box that appears by clicking on [Ref] shows the input file name by default. When entering a file name, do not type the file extension (.mcs).



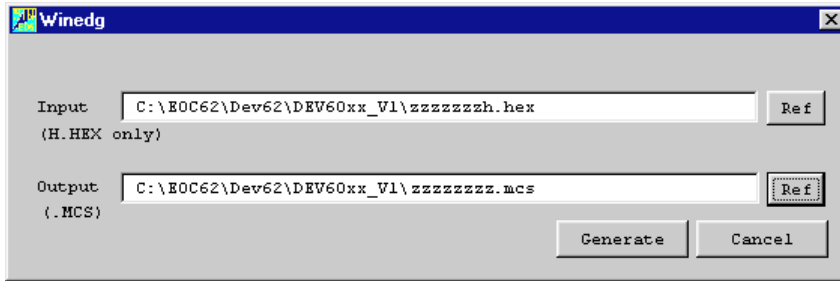
Specifying a File Name Using the [Ref] Button

Note: File name specification is subject to the following limitations:

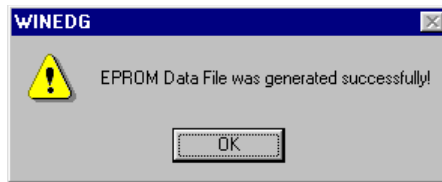
1. The number of characters that can be used to specify a file name including the path is 2,048.
2. The file name itself (not including the extension) can be up to 8 characters, and the extension up to three characters.
3. The file name cannot begin with a hyphen (-), nor can the following symbols be used as part of directory names (folder names), file names, and extensions:
/ : ; * ? " < > |

(3) Generating the file

Verify the input and output file names and then click on the [Generate] button.



The dialog box shown below appears when the file is generated properly.



Click on the [OK] button.

(4) Canceling execution and quitting

Click on the [Cancel] button to cancel generation of the file or to terminate winedg. The dialog box closes and winedg terminates.

6.4 Error Messages

The error messages of winedg are listed below.

Table 6.4.1 List of Error Messages

Message	Description	Display
Can not Open File: XXXX	File cannot be opened.	Dialog
Can not Create File: XXXX	Input file is invalid or prohibited characters have been entered.	Dialog
Please input the H.HEX file name!	File name is not H.HEX.	Dialog
Error: Not Intel Hex Format!	Input file is not Intel HEX format.	Dialog
Error: Each HEX data size not agree!	H.HEX and L.HEX file sizes are not the same.	Dialog
Error: Invalid data length!	Illegal record with a length not 10 is included.	Dialog

Table 6.4.2 List of Warning Messages

Message	Description	Display
Warning: Exceeded ROM Address area!	Data exceeds the ROM capacity.	Dialog

6.5 Example Input/Output Files

Input files

h.hex

```
:1000000050B0E050E050E050E0E0EA020F0E0E46
:10001000A070A070E0F0E0E0B0E0A070F050B0E2E
:10002000050E050E050E0F070E0A070F0E0F0721
:100030000A070A060E000E0F0B0F070E0A070F0E17
:100040000E0E0E0E0E0E0E0B0E0E0E040E0E040EE7
:100050000E040E0E0E0405000E0E0E0B0A0E020EFE
:1000600000E0E040A060E000F0B0E0F0E0E0B0EE6
:100070000B0C0F050E0E0B0D060F0B0C0F0E0B0CC1
:100080000B0E050B0D0C070F0B0C0E0C070C0F0EB7
:100090000E0B0E0A070FFFFFFFFFFFFFFFFFFFF23
:1000A000FFFFFFFFFFFFFFFFFFFFFFFFFFFF60
:1000B000FFFFFFFFFFFFFFFFFFFFFFFFFFFF50
:1000C000FFFFFFFFFFFFFFFFFFFFFFFFFFFF40
:1000D000FFFFFFFFFFFFFFFFFFFFFFFFFFFF30
:1000E000FFFFFFFFFFFFFFFFFFFFFFFFFFFF20
:1000F000FFFFFFFFFFFFFFFFFFFFFFFFFFFF10
:10010000000000000000000000000000000000EF
:100110000B0E050B0D000E0F0E0F0E0E0E0B0E1D
:100120000E05050B0E0E0E0E0E0F0F0F0F0F02
:
:100FA000FFFFFFFFFFFFFFFFFFFFFFFFFFFF51
:100FB000FFFFFFFFFFFFFFFFFFFFFFFFFFFF41
:100FC000FFFFFFFFFFFFFFFFFFFFFFFFFFFF31
:100FD000FFFFFFFFFFFFFFFFFFFFFFFFFFFF21
:100FE000FFFFFFFFFFFFFFFFFFFFFFFFFFFF11
:100FF000FFFFFFFFFFFFFFFFFFFFFFFFFF01FFFF
:00000001FF
```

l.hex

```
:100000006980100E110E130E1281E8440ADF81E898
:100010004F0F5F0FE8DF108100E84819DF6980109B
:100020002D112D132D1281023FE04427DF81023F65
:100030005F344F36E02EE0DF00083FE04839DFA0B4
:1000400090A494A89802804A10B04412B44412B804
:10005000441200114412695612811040F098610058
:10006000620144125868B85CDFEF28DF0280032188
:10007000E8E44869028003E17357E8A8DF18EE876
:10008000EBC86CEB2F1F82DFEE2101F8BE4DF1248
:100090008140E84792DFFFFFFFFFFFFFFFFFFFF09
:1000A000FFFFFFFFFFFFFFFFFFFFFFFFFFFF60
:1000B000FFFFFFFFFFFFFFFFFFFFFFFFFFFF50
:1000C000FFFFFFFFFFFFFFFFFFFFFFFFFFFF40
:1000D000FFFFFFFFFFFFFFFFFFFFFFFFFFFF30
:1000E000FFFFFFFFFFFFFFFFFFFFFFFFFFFF20
:1000F000FFFFFFFFFFFFFFFFFFFFFFFFFFFF10
:1001000016CC2C10A11010105010101010101040
:10011000EB2569EB2F1200F008E050028090EB2FE6
:100120000008FEB200280F4C21042E8C1C0C4C5B9
:
:100FA000FFFFFFFFFFFFFFFFFFFFFFFFFFFF51
:100FB000FFFFFFFFFFFFFFFFFFFFFFFFFFFF41
:100FC000FFFFFFFFFFFFFFFFFFFFFFFFFFFF31
:100FD000FFFFFFFFFFFFFFFFFFFFFFFFFFFF21
:100FE000FFFFFFFFFFFFFFFFFFFFFFFFFFFF11
:100FF000FFFFFFFFFFFFFFFFFFFFFFFFFAAFF56
:00000001FF
```

Output file

.mcs

```
:10000000569B80E1050EE1150EE1350EE12E81EE5
:100010008A4420AFDFE81EE8A4F70FA5F70FEE8FA4
:10002000DFE10E81B00EE8A48719FDF569B80E1066
:1000300052DE1152DE1352DE12E81F0273FEE0A4FC
:100040004727FDFE81F0273FA5F734A4F636EE00E2
:100050002EEE0FDFB00F0873FEE0A48739FDFEA07F
:10006000E90EA4E94EA8E98E02E80B4AE10EB0E4DD
:100070004412EB4E44412EB8E44412E00E11E44425
:1000800012569056E12E81E10B4A0AF0E98261E00CD
:10009000062E01E44412A58668EB805CFDFBEBE2CE
:1000A0008FDFE02E80B03E21BE8CE4F48569E02E27
:1000B00080B03DE1673F57BE8CA8FDFE18BEECE85E
:1000C000BEBEC856CBEBD2FC1F782FDFBFECE2E1FF
:1000D0000C1F78BCE4FDFE12E81B40EE8A47792F26
:1000E000DFFFFFFFFFFFFFFFFFFFFFFFFFFFF40
:1000F000FFFFFFFFFFFFFFFFFFFFFFFFFFFF10
:10010000FFFFFFFFFFFFFFFFFFFFFFFFFFFF
:10011000FFFFFFFFFFFFFFFFFFFFFFFFFFFFEF
:10012000FFFFFFFFFFFFFFFFFFFFFFFFFFFFDF
:
:101800004B5FFFFFFFFFFFFFFFFFFFFFFFFFFFF3C
:
:101FA000FFFFFFFFFFFFFFFFFFFFFFFFFFFF41
:101FB000FFFFFFFFFFFFFFFFFFFFFFFFFFFF31
:101FC000FFFFFFFFFFFFFFFFFFFFFFFFFFFF21
:101FD000FFFFFFFFFFFFFFFFFFFFFFFFFFFF11
:101FE000FFFFFFFFFFFFFFFFFFFFFFFFFFFF01
:101FF000FFFFFFFFFFFFFFFFFFFFFFFFFFFF1
:00000001FF
```

←Low-order 12 bits of the sum total
(Address 1800H is example of E0C60R08)

APPENDIX INTEL HEX FORMAT

Function option HEX files, segment option HEX files, and the program ROM HEX files packed by winmdc are created in Intel HEX format.

An example of data in Intel HEX format is shown below.

```

data volume type
  | address | data | sum
  |-----|-----|
:10000000FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF00
:10001000FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF0
:
:1001000008E000F04200420606FFFFFFFFFFFF8E
:
:100FF000FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF01
:
:00000001FF

```

data volume (1 byte): Indicates the data length of each record. The maximum length of a data record is 0x10, while the end record is fixed at 0x00.

address (2 bytes): Indicates the address where the head data in a record is placed.

type (1 byte): Indicates the type of hexadecimal format, currently only "00".

data (16 bytes max.): The object codes are placed here. This is not included in the end record.

sum (1 byte): This is a checksum (2's complement) from "Data volume" to the last data.

The end records are always "00000001FF".

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