MF953-02

EPSON

CMOS 4-BIT SINGLE CHIP MICROCOMPUTER **E0C63358**

DEVELOPMENT TOOL MANUAL

ENERGY SAVING EPSON

SEIKO EPSON CORPORATION

CONTENTS

CHAPTER 1 OUTLINE OF PACKAGE

1.1 Preface

The "E0C63358 Development Tool" package is a software development tool package for the CMOS 4-bit single chip microcomputer E0C63 Family, and consists of software tools necessary for debugging by the ICE63 and mask option setting for the E0C63358. The "E0C63 Family Assembler" package common to all the family models is also necessary for the software development in addition to this package.

1) HEX data converter **hex63358**
2) Function option generator **fog63358**
3) Segment option generator **sog63358**
4) Mask data checker **mdc63358**
5) Parameter file for ICE63 ..... **par63358.par**
6) HEX sample file for function option setting **c3358xxx.fsa**
7) HEX sample file for segment option setting **c3358xxx.ssa**

1.2 Provided Floppy Disks

This package includes the following floppy disks which are necessary for debugging by the ICE63 and mask option setting of the IC for the E0C63358 development.

1) 3.5" floppy disk for NEC PC9801 1
2) 3.5" floppy disk for IBM-PC/AT 1
3) E0C63358 Development Tool Manual (English) 1
4) E0C63358 Development Tool Manual (Japanese) 1

The type of the personal computer that can be used with the development system and the restrictions are as follows:

1) Model:	IBM-PC/AT or compatible model
	NEC PC9801 Series or compatible model
2) OS:	MS-DOS or PC-DOS, ver. 3.3 or higher
3) RAM capacity:	640K bytes
4) Disk drive:	3.5 inches (1.2M: PC9801 and the compatible)
	3.5 inches (1.44M: IBM-PC/AT and the compatible)
5) Necessary software:	General purpose editor

* This software operates in the real mode and does not use EMS and protected memory.

Keep the original disk in a safe place as a backup after copying the contents to hard disk or other floppy disk.

1.3 Outline of Software Tool

The software tools included in this package take position indicated in the following Figure 1.3.1 (parts with a halftone) on the whole software development.

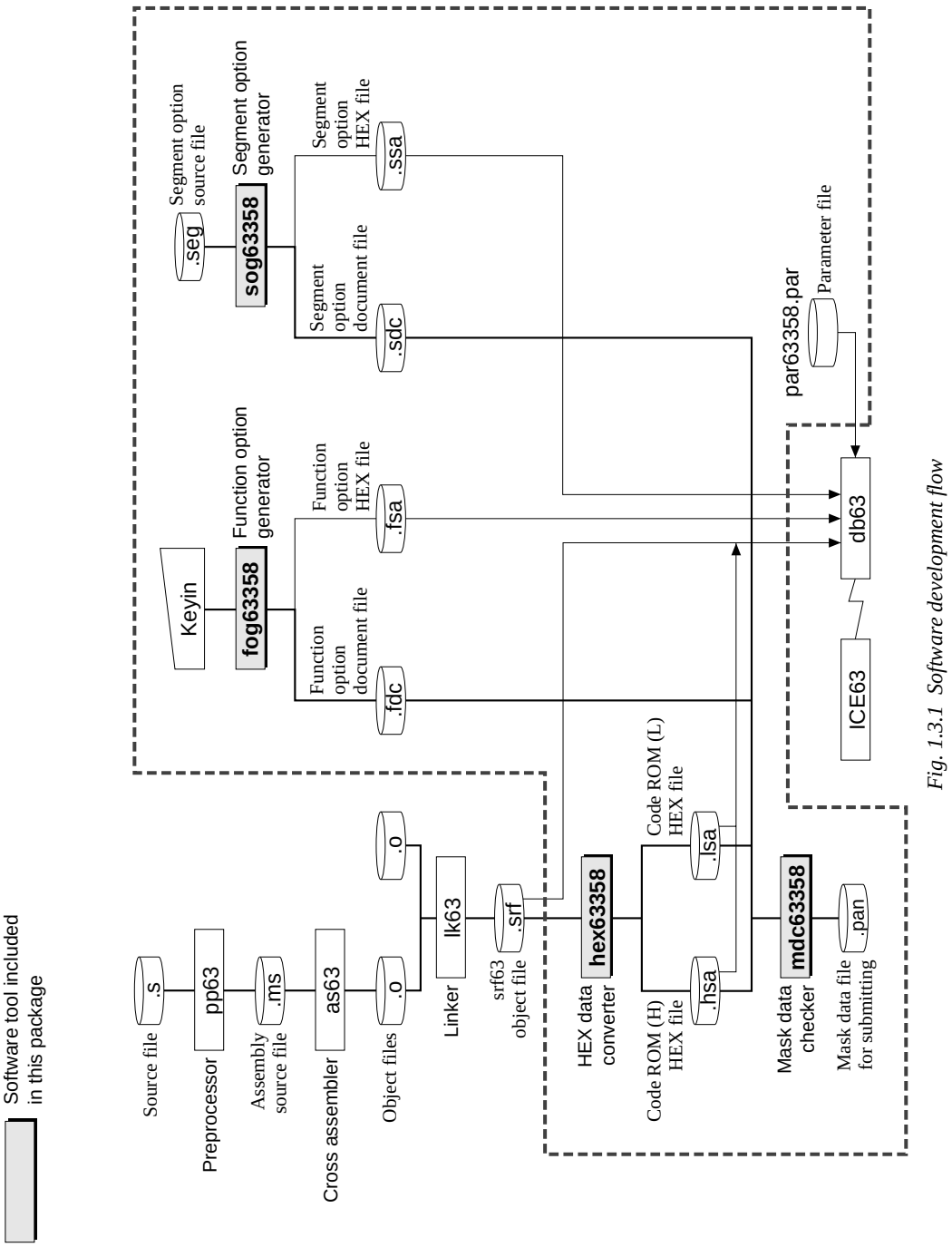


Fig. 1.3.1 Software development flow

The following shows the outline of the basic function of each software.

1.3.1 HEX data converter <hex63358>

The HEX data converter hex63358 converts the file output by the linker (lk63) for the E0C63 Family into a HEX file (Motorola S2 format). At the same time, it fills unused ROM space with FFH data. The completed program should be finally verified by loading the HEX file output from this tool to the ICE63.

1.3.2 Function option generator <fog63358>

In the E0C63358, some hardware specifications such as an I/O port function can be selected as mask option. The function option generator fog63358 is a tool that can interactively select the E0C63358 mask option settings and generates the mask option setting file for the ICE63 and the function option document file for generating the IC mask pattern.

1.3.3 Segment option generator <sog63358>

The E0C63358 also provides hardware options for setting the output specifications of the LCD segment terminals and for allocating the display memory to the segments.
The segment option generator sog63358 converts the segment option source file, and generates the mask option setting file for the ICE63 and the segment option document file for generating the IC mask pattern. This file must be loaded to the ICE63 at the beginning of debugging using the "lo" command.

1.3.4 Mask data checker <mdc63358>

The mask data checker mdc63358 is a software tool that checks the ROM data and option data developed and generates a file for submitting to Seiko Epson.

1.3.5 Parameter file for ICE63 <par63358.par>

This is a parameter file for setting the ICE63 so that the ICE63 will be compatible with each model. Place this file in the directory where the tools for the "E0C63 Family Assembler" package are installed.

1.3.6 HEX file for function option setting <c3358xxx.fsa>

This file is used to define the function option and other settings of each model into the ICE63. This file is included in the package as a sample.
Create an actual use file using the function option generator fog63358.

1.3.7 HEX file for segment option setting <c3358xxx.ssa>

This file is used to define the segment option and other settings of each model into the ICE63. This file is included in the package as a sample.
Create an actual use file using the segment option generator sog63358.

1.4 Installation Procedure

This package does not include an installer program. Please copy the all files to the working directory.

CHAPTER 2 HEX DATA CONVERTER (hex63358)

2.1 Outline of hex63358

The HEX data converter utility hex63358 converts the file (~.srf) output by the linker (lk63) for the E0C63 Family into a HEX file (Motorola S2 format). At the same time, it fills unused ROM space with FFH data. The completed program should be finally verified by loading the HEX files output from this tool to the ICE63. Then create data for submitting to Seiko Epson from the HEX files using the mask data checker (mdc63358).

2.2 Execution Flow and Input/Output Files

Figure 2.2.1 shows the hex63358 execution flow.

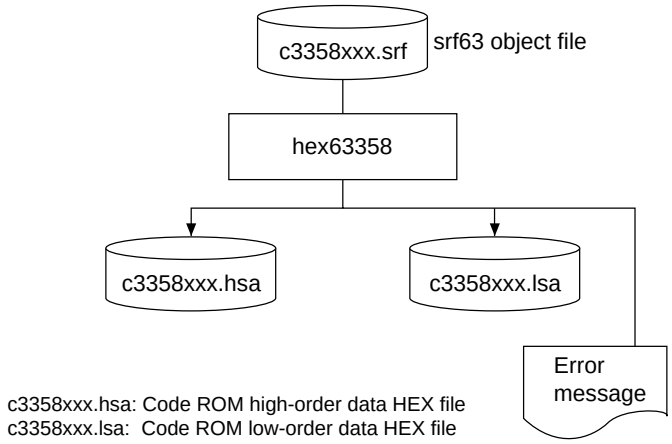


Fig. 2.2.1 hex63358 execution flow

Note: Since the customer code is entered in the xxx part of the file name, it should be as designated by Seiko Epson.

The hex63358 inputs an object file (srf63 format) and generates two HEX files (Motorola S2 format).
The object file name is used as the output file name except for the extension. For example, if the object file name is "c33580a0.srf", the hex63358 outputs two files as below:

1) c33580a0.hsa 2) c33580a0.lsa

(1) Input file

- **Object file (~.srf)**
  This is an srf63 format object file output from the linker lk63.

(2) Output files

- **Code ROM high-order data HEX file (~.hsa)**
  The hex63358 outputs this file in Motorola S2 format. This file contains high-order 5 bits of the codes (13 bits each) in the object file.
- **Code ROM low-order data HEX file (~.lsa)**
  The hex63358 outputs this file in Motorola S2 format. This file contains low-order 8 bits of the codes (13 bits each) in the object file.

2.3 Operation Procedure

2.3.1 Starting procedure

(1) Starting command

Enter the command as following format at the DOS command level (state in which a prompt such as A> is displayed).

```
hex63358 <Object file name[.srf]>↵
```

↵ indicates the Return key.
A parameter enclosed by [ ] can be omitted.

The input file should be placed in the current directory. The output files are also generated in the current directory.

(2) Start-up message

When the hex63358 starts up, the following message is displayed.

Example: File name: c33580a0.srf

```
A>hex63358 c33580a0.srf↵
E0C63358 HEX Data Converter Ver.x.xx
Copyright (C) SEIKO EPSON CORP. 199x
Now checking the SROFF file ...
```

2.3.2 End procedure

When a series of operations is completed, the hex63358 displays the following message and returns to the DOS command level.

(1) When terminated normally

The hex63358 displays the following message after generating the output files and returns to the DOS command level.

```
........
Now checking the SROFF file ...
OK.
A>
```

(2) When an error occurs

The hex63358 displays an error message and returns to the DOS command level. The output file is not generated.

```
........
Now checking the SROFF file ...
Error:<Error message>
A>
```

(3) When a warning occurs

The hex63358 displays a warning message, but continues the processing. It returns to the DOS command level after generating the output files.

```
........
Now checking the SROFF file ...
Warnig:<Warning message>
OK.
A>
```

2.4 Error and Warning Messages

The hex63358 error messages and warning message are listed below.

2.4.1 Start-up error

Message	Explanation
Usage: hex63 <file name>	The start-up parameter is incorrect.
Error: "xxxxxxxx.xxx" file is not found.	The specified object file is not found.

2.4.2 Input file format error (1)

Message	Explanation
Error: The start address is out of range.	The start address is out of the ROM capacity range.
Error: The end address is out of range.	The end address is out of the ROM capacity range.
Error: Input file is not E0C63 Sroff file.	The object file specified is not an srf63 file for the E0C63 Family.

2.4.3 Input file format error (2)

When an error message as shown below appears, try to execute the hex63358 again after re-creating the srf63 file. If a similar error still results, please notify Seiko Epson of the situation and the error message displayed.

Message	Explanation
Error: The start address offset error.	The start address is incorrect.
Error: Code conflicted at XXXXH.	A conflict occurred at address XXXXH in the code ROM.
Error: Data conflicted at XXXXH.	A conflict occurred at address XXXXH in the data ROM.
Error: Information chain empty.	The information is empty.
Error: Chain information size is greater than file size.	The chain information size is greater than the file size.
Error: Chain seek address is greater than file size.	The chain seek address is greater than the file size.
Error: File control flag error.	The file control flag in the link format is incorrect.
Error: Entry address error.	The entry address is not 0x00000110.
Error: Section address error.	The section address is out of the 0x00000000 to 0x0000ffff range.
Error: Section ID error.	The section ID is out of the 0x0000 to 0x00ff range.
Warnig: Section information chain is not found.	There is no section information chain.

2.4.4 System error

Message	Explanation
Error: File open error.	The file cannot be opened.
Error: File write erorr.	The file cannot be written.
Error: File read error.	The file cannot be read.
Error: Memory allocate error.	Memory is insufficient.

2.5 hex63358 Execution Example

The following shows an example of when an srf63 format file ("c33580a0.srf") is converted into a Motorola S2 format file ("c33580a0.hsa", "c33580a0.lsa").

```
A>hex63358 c33580a0.srf↵
```

■ Example of input file

<c33580a0.srf>

Hex dump output

```
00000000  00 0A 00 00 01 10 63 00 00 00 00 10 00 00 00 90        c
00000010  00 00 00 3C 00 01 00 00 00 02 00 00 01 10 00 00     <
00000020  00 00 00 00 00 00 00 00 00 68 00 00 00 10 00 00           h
00000030  00 01 00 00 00 88 00 00 00 06 00 00 00 00 00 00
00000040  00 02 00 00 00 02 00 00 80 00 00 00 00 00 00 00
00000050  00 00 00 00 00 78 00 00 00 10 00 00 00 01 00 00       x
00000060  00 8E 00 00 00 02 00 01 00 00 00 00 00 00 00 00
00000070  00 00 00 02 02 4C 31 00 00 00 00 00 00 00 00 00       L1
00000080  00 00 00 02 02 4C 32 00 1E F2 19 72 18 72 0A 0F       L2    r r
00000090  00 00 00 00 00 00 00 B4 00 00 00 0D 00 00 00 01
000000A0  00 00 00 C1 00 00 00 3C 00 00 00 FD 00 00 00 20          <
000000B0  00 00 00 02 00 00 00 08 73 61 6D 70 6C 65 2E 73          sample.s
000000C0  00 FF FF 00 00 00 00 00 00 00 00 00 00 00 00 00
000000D0  06 00 00 00 00 00 00 00 00 00 00 00 07 00 00 00
000000E0  00 00 01 00 00 00 00 00 08 00 00 00 00 00 02 00
000000F0  00 FF FE 00 00 00 00 00 00 00 00 00 00 00 00 00
00000100  00 00 02 00 00 00 00 00 00 02 4C 31 00 00 00 01            L1
00000110  00 02 00 00 00 00 00 01 02 4C 32                          L2
```

■ Example of output file

<c33580a0.hsa>

```
S224000000FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFB
S224000020FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFDB
S224000040FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFBB
S224000060FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF9B
S224000080FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF7B
S2240000A0FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF5B
S2240000C0FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF3B
S2240000E0FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF1B
S224000100FFFFFFFFFFFFFFFFFFFFFFFFFFFFF1E1918FFFFFFFFFFFFFFFFFFFFFFFFFA8
S224000120FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFDA
S224000140FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFBA
:       :       :       :       :       :       :       :       :
S224001FC0FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF1C
S224001FE0FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFC
S804000000FB
```

<c33580a0.lsa>

```
S224000000FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFB
S224000020FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFDB
S224000040FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFBB
S224000060FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF9B
S224000080FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF7B
S2240000A0FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF5B
S2240000C0FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF3B
S2240000E0FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF1B
S224000100FFFFFFFFFFFFFFFFFFFFFFFFFFFFF27272FFFFFFFFFFFFFFFFFFFFFFFF21
S224000120FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFDA
S224000140FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFBA
:       :       :       :       :       :       :       :       :
S224001FC0FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF1C
S224001FE0FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFC
S804000000FB
```

CHAPTER 3 FUNCTION OPTION GENERATOR (fog63358)

3.1 Outline of fog63358

The E0C63358 4-bit single ship microcomputer has 11 mask options to select hardware specifications such as I/O port functions. By modifying the IC mask patterns of the E0C63358 according to the options selected, the system can be customized to meet the specifications of the target system.
The function option generator fog63358 is a software tool for generating the document file used to generate IC mask patterns. The mask options for the E0C63358 can be interactively selected. From the data file created with fog63358, the E0C63358 mask pattern is automatically generated by a CAD machine at Seiko Epson.
In addition, HEX data in the Motorola S2 format necessary for debugging using the ICE63 can be created. By downloading this data file from the host machine when debugging with the ICE63, the same option functions as the actual IC can be realized on the ICE63.

3.2 Execution Flow and Input/Output Files

Figure 3.2.1 shows the fog63358 execution flow.

(1) Option list creation

Select the E0C63358 mask options that meet the target system and record them in the option list (see Section 3.3).

(2) fog63358 execution

Start the fog63358 and select the mask options according to the display on screen. Since options can be selected using the interactive format, a device such as a source file is not necessary.
In addition, when correcting the contents, once it has been set, the necessary points alone can be corrected by inputting the file that was output by the fog63358.
As a result, the fog63358 outputs the following two files.

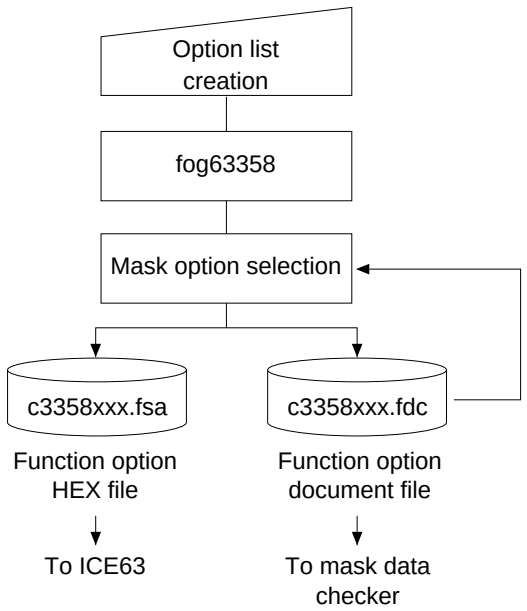


Fig. 3.2.1 fog63358 execution flow

- **Function option document file (c3358xxx.fdc)**
  This file contains the mask option setting data and is used for generating a mask pattern of the IC at Seiko Epson. The option setting data in this file can be modified by loading it to the fog63358. This file should be packed with the completed program files for submitting to Seiko Epson.
- **Function option HEX file (c3358xxx.fsa)**
  This file is a Motorola S2 format data file for setting the E0C63358 mask options to the ICE63. When debugging programs with the ICE63, this file should be loaded into the ICE63 using a command from the db63 debugger for the ICE63.

∗1 Since the customer code is entered in the xxx part of the file name, it should be as designated by Seiko Epson.

∗2 Pack the document file and the program files using the mask data checker and submit it to Seiko Epson.

∗3 Refer to the "E0C63 Family Assembler Package Manual" for the method of downloading the mask options into the ICE63.

3.3 Option List

The following options can be set for the E0C63358.
Multiple selections are available in each option item as indicated in the Option List. Using "E0C63358 Technical Manual" as reference, select the specifications that meet the target system and check the appropriate box. Be sure to record the specifications for unused functions too, according to the instructions provided.
The option selection is done interactively on the screen during the fog63358 execution, using this option list as reference.

1 OSC1 SYSTEM CLOCK

☐ 1. Crystal (32.768KHz)
☐ 2. CR (50KHz)

2 OSC3 SYSTEM CLOCK

☐ 1. Use <Ceramic (2MHz)>
☐ 2. Use <CR (2MHz)>

3 MULTIPLE KEY ENTRY RESET COMBINATION

☐ 1. Not Use
☐ 2. Use <K00, K01, K02, K03>
☐ 3. Use <K00, K01, K02>
☐ 4. Use <K00, K01>

4 MULTIPLE KEY ENTRY RESET TIME AUTHORIZE

☐ 1. Not Use
☐ 2. Use

5 INPUT PORT PULL UP RESISTOR

- K00 ..... ☐ 1. With Resistor ☐ 2. Gate Direct
- K01 ..... ☐ 1. With Resistor ☐ 2. Gate Direct
- K02 ..... ☐ 1. With Resistor ☐ 2. Gate Direct
- K03 ..... ☐ 1. With Resistor ☐ 2. Gate Direct
- K10 ..... ☐ 1. With Resistor ☐ 2. Gate Direct
- K11 ..... ☐ 1. With Resistor ☐ 2. Gate Direct
- K12 ..... ☐ 1. With Resistor ☐ 2. Gate Direct
- K13 ..... ☐ 1. With Resistor ☐ 2. Gate Direct
- K20 ..... ☐ 1. With Resistor ☐ 2. Gate Direct

6 OUTPUT PORT OUTPUT SPECIFICATION

- R1∗ ..... ☐ 1. Complementary ☐ 2. Nch Open Drain
- R2∗ ..... ☐ 1. Complementary ☐ 2. Nch Open Drain

7 I/O PORT OUTPUT SPECIFICATION

- P1∗ ..... ☐ 1. Complementary ☐ 2. Nch Open Drain
- P20 ..... ☐ 1. Complementary ☐ 2. Nch Open Drain
- P21 ..... ☐ 1. Complementary ☐ 2. Nch Open Drain
- P22 ..... ☐ 1. Complementary ☐ 2. Nch Open Drain

- P23 ..... ☐ 1. Complementary ☐ 2. Nch Open Drain
- P30 ..... ☐ 1. Complementary ☐ 2. Nch Open Drain
- P31 ..... ☐ 1. Complementary ☐ 2. Nch Open Drain
- P32 ..... ☐ 1. Complementary ☐ 2. Nch Open Drain
- P33 ..... ☐ 1. Complementary ☐ 2. Nch Open Drain
- P40 ..... ☐ 1. Complementary ☐ 2. Nch Open Drain
- P41 ..... ☐ 1. Complementary ☐ 2. Nch Open Drain
- P42 ..... ☐ 1. Complementary ☐ 2. Nch Open Drain
- P43 ..... ☐ 1. Complementary ☐ 2. Nch Open Drain

8 I/O PORT PULL UP RESISTOR

- P1* ..... ☐ 1. With Resistor ☐ 2. Gate Direct
- P20 ..... ☐ 1. With Resistor ☐ 2. Gate Direct
- P21 ..... ☐ 1. With Resistor ☐ 2. Gate Direct
- P22 ..... ☐ 1. With Resistor ☐ 2. Gate Direct
- P23 ..... ☐ 1. With Resistor ☐ 2. Gate Direct
- P30 ..... ☐ 1. With Resistor ☐ 2. Gate Direct
- P31 ..... ☐ 1. With Resistor ☐ 2. Gate Direct
- P32 ..... ☐ 1. With Resistor ☐ 2. Gate Direct
- P33 ..... ☐ 1. With Resistor ☐ 2. Gate Direct
- P40 ..... ☐ 1. With Resistor ☐ 2. Gate Direct
- P41 ..... ☐ 1. With Resistor ☐ 2. Gate Direct
- P42 ..... ☐ 1. With Resistor ☐ 2. Gate Direct
- P43 ..... ☐ 1. With Resistor ☐ 2. Gate Direct

9 LCD DRIVING POWER

☐ 1. Internal Power Voltage 3V (3.0V)
☐ 2. External Power Voltage 3V $V_{DD}=V_{C1}$ (4.5V)
☐ 3. External Power Voltage 3V $V_{DD}=V_{C2}$ (4.5V)
☐ 4. External Power Voltage 3V $V_{DD}=V_{C3}$ (3.0V)
☐ 5. External Power Voltage 2V $V_{DD}=V_{C1}=V_{C2}$ (3.0V)
☐ 6. External Power Voltage 2V $V_{DD}=V_{C3}$, $V_{C1}=V_{C2}$ (3.0V)

10 SERIAL INTERFACE POLARITY

☐ 1. Positive
☐ 2. Negative

11 SOUND GENERATOR POLARITY FOR OUTPUT

☐ 1. Positive
☐ 2. Negative

3.4 Operation Procedure

3.4.1 Starting procedure

(1) Starting command

```
fog63358↵
```

↵ indicates the Return key.

To start fog63358, enter "fog63358" at the DOS command level (a state in which a prompt such as A> is displayed). The "fog63358.exe" program should be previously copied into the working directory.

(2) Start-up message

```
A>fog63358
E0C63358 Function Option Generator Version x.xx
Copyright (C) SEIKO EPSON CORP. 199x

This software makes the following files.

c3358xxx.fsa ... function option HEX file.
c3358xxx.fdc ... function option document file.
```

When the fog63358 starts up, the start-up message is displayed.

The following explains the actual operation method of the fog63358 according to the screen displayed.
To suspend execution, press the "CTRL" and "C" keys together; the sequence returns to the DOS command level. It is possible by pressing "STOP" key depending on the PC used.

(3) Date input

```
Current data is '96/12/11
Please input new data :  96/12/11↵
```

Following the start-up message, the date currently set in the host computer is displayed, prompting entry of a new date. When modifying the date, enter the 2-digit year, month, and day of the month by delimiting them with a slash ("/"). When not modifying the date, press the Return key to continue.

(4) Operation selection menu

```
*** Operation select menu ***

      1. Input new file
      2. Edit file
      3. Return to dos

Please select No. ?
```

When the date is set, the operation selection menu is displayed on the screen. Enter a number from 1 to 3 to select a subsequent operation.

The items indicate the following.

1. Input new file: Used to set new function option file.

2. Edit file: Used to read the already-generated function option document file and set or modify the option contents. In this case, the current directory must contain the function option document file (c3358xxx.fdc) generated by "1. Input new file".

3. Return to DOS: Used to terminate the fog63358 and return to the DOS command level.

3.4.2 Setting new function options (Input new file)

This section explains how to set new function option file.

∗ In the examples, ↲ indicates the Return key.

```
*** Operation select menu ***

        1. Input new file
        2. Edit file
        3. Return to dos

Please select No. ? 1↲                                                    ...(1)

Please input file name ? c3358xxx↲                                        ...(2)
Please input user's name ? SEIKO EPSON CORP.↲                             ...(3)
Please input any commen
(one line is 50 chr) ? ED MARKETING DEPARTMENT↲                           ...(4)
                       ? 421-8 HINO HINO-SHI TOKYO 191-8501 JAPAN↲
                       ? TEL 042-587-5816↲
                       ? FAX 042-587-5624↲
                       ? ↲
```

(1) Please select No. ?

Select "1. Input new file" on the operation selection menu.

(2) Please input file name ?

Enter the function option document (and HEX) file name to be generated. Do not enter the extension of the file name.

Furthermore, in case a function option document file with the same name as the file name specified in the current directory exists, the user is asked whether overwritten is desired. Enter "Y" or "N" accordingly.

```
Please input file name ? c3358xxx↲
File exists. Overwrite (y/n) ?
```

(3) Please input user's name ?

Enter your company name.

Up to 40 characters may be entered. If 41 or more characters are entered, they are ignored.

"[" and "]" are converted into "(" and ")" to record in the document file.

(4) Please input any comment

Enter any comment. Up to 50 characters may be entered in one line. If 51 or more characters are entered in one line, they are ignored. Up to 10 comment lines may be entered. To end entry of comments, press the Return key at the beginning of the line. Small letters entered are converted into capital letters to record in the document file.

Furthermore, include the following in comment lines:

- Department, division, and section names
- Company address, phone number, and FAX number
- Other information, including technical information

Moreover, the below symbols for the inputting of (3) and (4) cannot be used. When those symbols are input, it displays an "Illegal character" error message, then again returns to the input status for that line.

"$", "\"("¥"), "|", "`(back-quote)" ... input disabled

Next, start mask option setting for the E0C63358. For new settings, select options Option No. 1 to No. 11 sequentially and interactively.

See "3.4.4 Option selection" for the selection procedure of each function option.

3.4.3 Modifying function option settings (Edit file)

This section explains how to modify the settings in the function option file.

∗ In the examples, ↲ indicates the Return key.

```
*** Operation select menu ***

        1. Input new file
        2. Edit file
        3. Return to dos

Please select No. ? 2↲                          ...(1)

*** Source file(s) ***

C33580A0      C33580B0      C33580C0            ...(2)

Please input file name ? c33580A0↲               ...(3)
Please input user's name ? ↲                    ...(4)
Please input any comment
(one line is 50 chr) ? ↲                        ...(5)
Please input edit no.(End=e) ? 2↲               ...(6)
```

(1) Please select No. ?

Select "2. Edit file" on the operation selection menu.

(2) *** Source file(s) ***

Will display the function option document files on the current drive.
If no modifiable source exists, the following message is displayed and the program is terminated.

```
Function option document file is not found.
```

(3) Please input file name ?

Enter a file name. Do not enter the extension of the file name. If the specified function option document file (c3358xxx.fdc) is not in the current directory, an error message like the one below is output, prompting entry of other file name.

```
Please input file name ? c33580a0↲
Function option document file is not found.
```

(4) Please input user's name ?

When modifying the company name, enter a new name. The previously entered name may be used by pressing the Return key.

(5) Please input any comment

When modifying a comment, enter all the comment lines anew, beginning with the first line; comment data cannot be partially modified. Previously entered comment data can be used by pressing the Return key. The input conditions are the same as for new settings.

(6) Please input edit No. (End = e) ?

Enter the number (1–11) of the option to be modified, then start setting the option contents (See "3.4.4 Option selection").
When selection of one option is complete, the system prompts entry of another function option number. Repeat selection until all options to be modified are selected.
If the Return key is pressed without entering a number, the option of the subsequent number can be selected.
Enter "E↲" to end option selection. Then, move to generate for the function option HEX file.

Example:
- When modifying the settings of the option of No. 2
  `Please input edit No.(End=e) ? 2↲`
- When ending setting
  `Please input edit No.(End=e) ? E↲`

3.4.4 Option selection

Selection procedure for function options are described below.
Option selection is done interactively. For new settings (Input new file), set all options Option No. 1 to No. 11 sequentially; to modify settings (Edit file), the specified option number may be set directly.

(1) Example of option selection

```
*** Option NO.1 ***
--- OSC1 SYSTEM CLOCK ---

         1. CRYSTAL (32.768KHz)
         2. CR (50KHz)

PLEASE SELECT NO.(1) ? 1↵
         1. CRYSTAL (32.768KHz)     selected
```

The selections for each option correspond one to one to the option list. While referring to the contents recorded in the option list, enter the selection number.
In the message that prompts entry, the value in parentheses ( ) indicates the default value in case of new settings, or the previously set value in case of setting modification. This value is set when only the Return key is pressed.
Furthermore, in the selection examples, "↵" indicates the Return key input.

When all of option settings are completed in new settings, move to the generate for the function option HEX file.
When modify settings are completed, move to generate for the function option HEX file by entering "E↵".

(2) Modifying procedure when wrong number is selected in new setting (Input new file)

```
*** Option NO.2 ***
--- OSC3 SYSTEM CLOCK ---

         1. USE <CERAMIC(2MHz)>
         2. USE <CR(2MHz)>

PLEASE SELECT NO.(1) ? B↵

*** Option NO.1 ***
--- OSC1 SYSTEM CLOCK ---

         1. CRYSTAL (32.768KHz)
         2. CR (50KHz)

PLEASE SELECT NO.(1) ?
```

To modify previously set option in the new setting process (Input new file), enter "B↵" to return 1 step back to the previous function option setting operation.

3.4.5 HEX file generation

When function option settings are completed, the following message is output to ask the user whether to generate the function option HEX file.

```
End of option setting.
Do you make HEX file (y/n) ? y↵
```

Enter "Y" to generate the HEX file (c3358xxx.fsa). If "N" is entered, no HEX file is generated and only document file (c3358xxx.fdc) is generated.
Since the function option HEX file (c3358xxx.fsa) is needed when debugging the target program with the ICE63, normally set "Y".

Furthermore, when debugging with the ICE63, download the generated HEX file into the ICE63.

When the above operation is completed, the fog63358 generates the function option HEX file and function option document file. And then the following message is output and the sequence returns to the operation selection menu. However, when "N" is input in the above selection for the function option HEX file, the end message shown below is not displayed.

```
Making file(s) is completed.
```

3.4.6 End procedure

```
*** Operation select menu ***

       1. Input new file
       2. Edit file
       3. Return to dos
```

When a series of operations are completed, the sequence returns to the operation selection menu. Execution of the fog63358 can be terminated by selecting "3. Return to DOS" on this menu.

The fog63358 can be forcibly terminated by pressing the "CTRL" and "C" keys together during this software execution. (It is possible by pressing "STOP" key depending on the PC used.) However, in this case, the correct function option HEX file and function option document file are not generated.

3.5 Error Message

Table 3.5.1 lists the fog63358 error messages.

Table 3.5.1 fog63358 error message list

Message	Explanation
Illegal character!!	There is an input character error. An input disable character has been input.
Function option document file is not found.	There is no document file at the time of the setting modification (Edit file). There is no document file with the input file name at the time of the setting modification (Edit file).
File name error.	9 characters or more have been input for the file name input.
Bad function option document file.-filename-	A function option document file other than for the E0C63358 is specified during modification (Edit file).
Error: File write error.	The function option document file or function option HEX file cannot be created. This error may occur if there is no disk space.
Can't open file : finename	The file cannot be opened. This error may occur when too many files exist in the current directory.

3.6 Sample Files

■ Example of function option document file

```
* E0C63358 FUNCTION OPTION DOCUMENT V 1.00
*
* FILE NAME    C33580A0.FDC
* USER'S NAME  SEIKO EPSON CORP.
* INPUT DATE   '96/11/27
* COMMENT      ED MARKETING DEPARTMENT
*              421-8 HINO HINO-SHI TOKYO 191-8501 JAPAN
*              TEL 042-587-5816
*              FAX 042-587-5624
*
* *** OPTION NO.1 ***
* --- OSC1 SYSTEM CLOCK ---
*     CRYSTAL (32.768KHZ)  ---------------------------------------   SELECTED
 OPT101 01
*
* *** OPTION NO.2 ***
* --- OSC3 SYSTEM CLOCK ---
*     USE <CERAMIC(2MHZ)>  ---------------------------------------   SELECTED
 OPT201 01
*
* *** OPTION NO.3 ***
* --- MULTIPLE KEY ENTRY RESET COMBINATION ---
*     NOT USE  ---------------------------------------------------   SELECTED
 OPT0301 01
*
* *** OPTION NO.4 ***
* --- MULTIPLE KEY ENTRY RESET TIME AUTHORIZE ---
*     NOT USE  ---------------------------------------------------   SELECTED
 OPT0401 01
*
* *** OPTION NO.5 ***
* --- 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
*     K20                  WITH RESISTOR  ------------------------   SELECTED
 OPT0501 01
 OPT0502 01
 OPT0503 01
 OPT0504 01
 OPT0505 01
 OPT0506 01
 OPT0507 01
 OPT0508 01
 OPT0509 01
*
* *** OPTION NO.6 ***
* --- OUTPUT PORT OUTPUT SPECIFICATION ---
*     R1*                  COMPLEMENTARY  ------------------------   SELECTED
*     R2*                  COMPLEMENTARY  ------------------------   SELECTED
 OPT0601 01
 OPT0602 01
*
* *** OPTION NO.7 ***
* --- I/O PORT OUTPUT SPECIFICATION ---
*     P1*                  COMPLEMENTARY  ------------------------   SELECTED
*     P20                  COMPLEMENTARY  ------------------------   SELECTED
*     P21                  COMPLEMENTARY  ------------------------   SELECTED
*     P22                  COMPLEMENTARY  ------------------------   SELECTED
*     P23                  COMPLEMENTARY  ------------------------   SELECTED
*     P30                  COMPLEMENTARY  ------------------------   SELECTED
```

```
*     P31                 COMPLEMENTARY  ------------------------   SELECTED
*     P32                 COMPLEMENTARY  ------------------------   SELECTED
*     P33                 COMPLEMENTARY  ------------------------   SELECTED
*     P40                 COMPLEMENTARY  ------------------------   SELECTED
*     P41                 COMPLEMENTARY  ------------------------   SELECTED
*     P42                 COMPLEMENTARY  ------------------------   SELECTED
*     P43                 COMPLEMENTARY  ------------------------   SELECTED
 OPT0701 01
 OPT0702 01
 OPT0703 01
 OPT0704 01
 OPT0705 01
 OPT0706 01
 OPT0707 01
 OPT0708 01
 OPT0709 01
 OPT0710 01
 OPT0711 01
 OPT0712 01
 OPT0713 01
*
* *** OPTION NO.8 ***
* --- I/O PORT PULL UP RESISTOR ---
*     P1*                 WITH RESISTOR  ------------------------   SELECTED
*     P20                 WITH RESISTOR  ------------------------   SELECTED
*     P21                 WITH RESISTOR  ------------------------   SELECTED
*     P22                 WITH RESISTOR  ------------------------   SELECTED
*     P23                 WITH RESISTOR  ------------------------   SELECTED
*     P30                 WITH RESISTOR  ------------------------   SELECTED
*     P31                 WITH RESISTOR  ------------------------   SELECTED
*     P32                 WITH RESISTOR  ------------------------   SELECTED
*     P33                 WITH RESISTOR  ------------------------   SELECTED
*     P40                 WITH RESISTOR  ------------------------   SELECTED
*     P41                 WITH RESISTOR  ------------------------   SELECTED
*     P42                 WITH RESISTOR  ------------------------   SELECTED
*     P43                 WITH RESISTOR  ------------------------   SELECTED
 OPT0801 01
 OPT0802 01
 OPT0803 01
 OPT0804 01
 OPT0805 01
 OPT0806 01
 OPT0807 01
 OPT0808 01
 OPT0809 01
 OPT0810 01
 OPT0811 01
 OPT0812 01
 OPT0813 01
*
* *** OPTION NO.9 ***
* --- LCD DRIVING POWER ---
*     INTERNAL POWER V3V (3.0V)  --------------------------------   SELECTED
 OPT0901 01
*
* *** OPTION NO.10 ***
* --- SERIAL INTERFACE POLARITY ---
*     POSITIVE  ------------------------------------------------   SELECTED
 OPT1001 01
*
* *** OPTION NO.11 ***
* --- SOUND GENERATOR POLARITY FOR OUTPUT ---
*     POSITIVE  ------------------------------------------------   SELECTED
 OPT1101 01
*EOF
```

■ Example of function option HEX file (Motorola S2 format)

```
S224000000462499840000000000000000000000000000000000004A0C00000000000000FE
S804000000FB
```

CHAPTER 4 SEGMENT OPTION GENERATOR (sog63358)

4.1 Outline of sog63358

The E0C63358 provides hardware options for setting the output specifications of the LCD segment terminals and for allocating the display memory to the segments. By modifying the IC mask patterns of the E0C63358 according to the options selected, the system can be customized to meet the specifications of the target system.
The segment option generator (hereinafter called sog63358) is a software tool that inputs a source file in which the segment option settings are described, and generates data files for generating mask patterns. In addition, HEX data in the Motorola S2 format necessary for debugging using the ICE63 can be created. By downloading this data file from the host machine when debugging with the ICE63, the same option functions as the actual IC can be realized on the ICE63.

4.2 Execution Flow and Input/Output Files

Figure 4.2.1 shows the sog63358 execution flow.

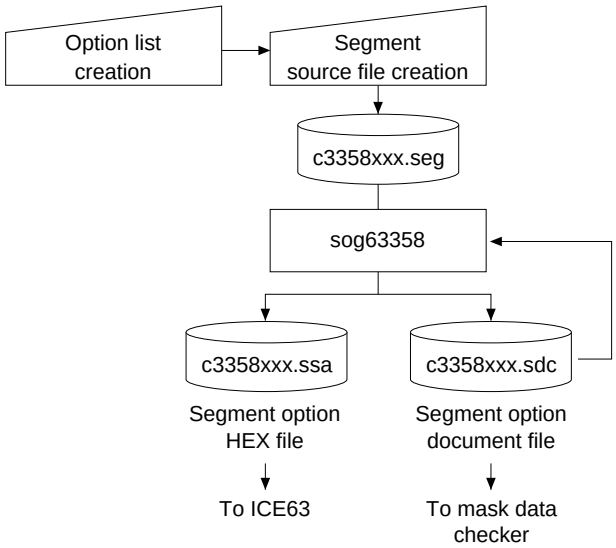


Fig. 4.2.1 sog63358 execution flow

(1) Segment option source file creation

Decide the output specifications of the LCD segment terminals and the display memory allocation, then record them in the option list (see Section 4.3).
Next create the segment source file (c3358xxx.seg) using an editor while referencing the option list.

(2) sog63358 execution

The sog63358 reads a source file containing segment port specification, and output following files.

- **Segment option document file (c3358xxx.sdc)**
  This is a data file used to generate the mask patterns of the segment decoder and segment output port.
- **Segment option HEX file (c3358xxx.ssa)**
  This file is a Motorola S2 format data file for setting the E0C63358 segment options to the ICE63. When debugging programs with the ICE63, this file should be loaded into the ICE63 using a command from the db63 debugger for the ICE63.

∗1 Since the customer code is entered in the xxx part of the file name, it should be as designated by Seiko Epson.

∗2 Pack the document file and the program files using the mask data checker and submit it to Seiko Epson.

∗3 Refer to the "E0C63 Family Assembler Package Manual" for the method of downloading the mask options into the ICE63.

4.3 Option List

The option list has columns for writing display memory addresses to be allocated to the segments and check boxes for selecting the output specifications. Using the next section as a reference, select the specifications that meet the target system and check the appropriate box.
Furthermore, write the display memory addresses as well as the selected output specifications.
Create a segment option source file by using the option list as reference.

TERMINAL NAME	ADDRESS (F0xx)												OUTPUT SPECIFICATION
	COM0			COM1			COM2			COM3			
	H	L	D	H	L	D	H	L	D	H	L	D	
SEG0													SEG output
SEG1													DC output ☐ C ☐ N
SEG2													SEG output
SEG3													DC output ☐ C ☐ N
SEG4													SEG output
SEG5													DC output ☐ C ☐ N
SEG6													SEG output
SEG7													DC output ☐ C ☐ N
SEG8													SEG output
SEG9													DC output ☐ C ☐ N
SEG10													SEG output
SEG11													DC output ☐ C ☐ N
SEG12													SEG output
SEG13													DC output ☐ C ☐ N
SEG14													SEG output
SEG15													DC output ☐ C ☐ N
SEG16													SEG output
SEG17													DC output ☐ C ☐ N
SEG18													SEG output
SEG19													DC output ☐ C ☐ N
SEG20													SEG output
SEG21													DC output ☐ C ☐ N
SEG22													SEG output
SEG23													DC output ☐ C ☐ N
SEG24													SEG output
SEG25													DC output ☐ C ☐ N
SEG26													SEG output
SEG27													DC output ☐ C ☐ N
SEG28													SEG output
SEG29													DC output ☐ C ☐ N
SEG30													SEG output
SEG31													DC output ☐ C ☐ N

Legend: <ADDRESS>
H: RAM data high order address (0 or 1)
L: RAM data low order address (0–F)
D: Data bit (0–3)

<OUTPUT SPECIFICATION>
S: Segment output
C: Complementary output
N: Nch open drain output

Note: 1. Even if there are unused areas, set "---" (hyphens) such that there are no blank columns.
2. When DC output is selected, the display memory of the COM0 column becomes effective.

4.4 Segment Ports Output Specifications

For the output specification of the segment output ports SEG0–SEG31, segment output and DC output can be selected in units of two terminals. When used for liquid crystal panel drives, select segment output; when used as regular output port, select DC output. When DC output is selected, either complementary output or Nch open drain may further be selected.
However, for segment output ports that will not be used, select segment output.

(1) When segment output is selected

The segment output port has a segment decoder built-in, and the data bit of the optional address in the display memory area (F000H–F01FH) can be allocated to the optional segment. With this, up to 128 segments (96 segments when 1/3 duty is selected or 64 segments when 1/2 duty is selected) of liquid crystal panel could be driven.
The display memory may be allocated only one segment and multiple setting is not possible.
Separate the segment allocation data (low-order byte of the display memory address and the data bit number) into 3 parts and write them in the corresponding columns.

H column: Upper nibble of low-order byte (0 and 1)
L column: Lower nibble of low-order byte (0 to F)
D column: Data bit (0 to 3)

For segment ports that will not be used, write "---" (hyphen) in the H, L, and D columns of COM0–COM3.
The allocated segment displays when the bit for this display memory is set to "1", and goes out when bit is set to "0".

(2) When DC output is selected

The DC output can be selected in units of two terminals and up to 32 terminals may be allocated for DC output. Also, either complementary output or Nch open drain output is likewise selected in units of two terminals. When the bit for the selected display memory is set to "1", the segment output port goes high (V_{DD}), and goes low (V_{SS}) when set to "0". Segment allocation is the same as when segment output is selected but for the while the display memory allocated to COM1–COM3 becomes ineffective. Write three hyphens ("---") in the COM1–COM3 columns in the option list.

4.5 Creating Segment Option Source File

The sog63358 needs, as an input file, a segment option source file containing the specifications for the segment output ports. Using an editor, create this source file by referencing the contents of the option list. Use the following file name. For "xxx", enter the string distributed by Seiko Epson.

```
c3358xxx.seg
```

Write the output specifications (SEG output, DC complementary output, or DC Nch open drain output) and the display memory-SEG ports correspondence data (data that associates display memory addresses to SEG ports) in the file. Comments may also be written in the file.

The description procedure is explained by using a sample segment option source file.

```
; C3358xxx.SEG                                    ┐
; LCD SEGMENT DECODE TABLE                        ├ Comment
;                                                 ┘
 0      001 000 032 120 S        ;1st DIGIT
 1      012 011 010 023 S
 2      013 020 021 022 S
 3      100 002 030 031 S
 4      1E0 --- --- --- C        ;DC OUTPUT
 5      1F0 --- --- --- C
 :       :   :   :   :  :
└──────────────────────┘└┘       └──────────┘
Display memory-SEG ports  Output  Comment
correspondence data       specification data
```

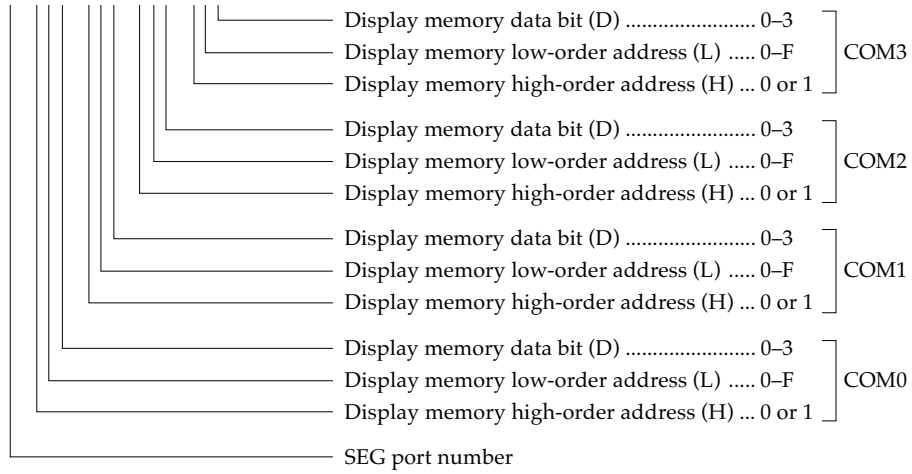
(1) Comment

A statement beginning with a semicolon (";") is considered a comment. Such items as date, summary, and version may be written in such a line.

(2) Display memory-SEG ports correspondence data

This data indicates correspondence between display memory addresses and segment ports. The arrangement is the same as that of the option list, so write the data in the following format while referencing the option list.

```
0 001 000 032 120
: ::: ::: ::: :::
```



- Low-order addresses correspond to bits 0 through 3 of the display memory address. High-order addresses correspond to bits 4 through 7.
- Each SEG port number corresponds to an actual device, so it must be unique. Moreorve, data descriptions in accordance with the following format are required for all segment terminals.
- Off areas COM0 to COM3, write three successive "---" (3 hyphens) as data for unused areas. SEG port numbers are needed even if the ports themselves will not be used, so write "---" (3 hyphens) for all areas COM0 to COM3.

  Example: When not using COM2 in SEG8

  ```
  8 081 080 --- 122
  ```

  Example: When not using SEG12

  ```
  12 --- --- --- ---
  ```

- When "DC output" is selected, write the display memory-SEG ports correspondence data for COM0; "---" (hyphens) for COM1 to COM3.

  Example: When setting SEG20 and SEG21 as DC output

  ```
  20 033 --- --- ---
  21 043 --- --- ---
  ```

- Be sure to write one or more blanks or a tab between the SEG port number, COM0, COM1, COM2, and COM3.

(3) Output specification selection data

This data is used to specify whether the SEG port will be used as a segment output port, a DC complementary output port, or a DC Nch open drain output port.
Write data after inserting one or more blanks or a tab after the display memory-SEG ports correspondence data.

S: Segment output
C: DC complementary output
N: DC Nch open drain output

- The SEG port output specifications must be selected in units of two ports, so write the selection data carefully while referencing the option list.

  Example: When setting SEG22 and SEG23 as DC complementary output

```
22 1E0 --- --- --- C
23 1F0 --- --- --- C
```

- Select "SEG output" for the segment ports that will not be used.

  Example: When not using SEG18

```
18 --- --- --- --- S
```

Create the segment option source file according to the formats and restrictions above.

4.6 Operation Procedure

4.6.1 Starting procedure

(1) Starting command

To start sog63358, enter the following at the DOS command level (state in which a prompt such as A> is displayed).
The current drive must contain the segment option source file (c3358xxx.seg).

```
sog63358 [-H]↵
```

↵ indicates the Return key.
A parameter enclosed by [ ] can be omitted.

-H: Specifies the segment option document file (c3358xxx.sdc) for input file of the sog63358.

(2) Start-up message

When the sog63358 starts up, the start-up message is displayed.

```
A>sog63358
E0C63358 Segment Option Generator Version x.xx
Copyright (C) SEIKO EPSON CORP. 199x

Segment option source file name is "c3358xxx.seg".

This software makes following file(s).
    c3358xxx.ssa ... segment option HEX file.
    c3358xxx.sdc ... segment option document file.
```

The following explains the actual operation method of the sog63358 according to the screen displayed.
To suspend execution, press the "CTRL" and "C" keys together; the sequence returns to the DOS command level. It is possible by pressing "STOP" key depending on the PC used.

4.6.2 Input operation

```
*** E0C63358 user's option setting --- Ver. x.xx  ***
Current date is 96/12/11
Please input new date: ↵                                                    ...(1)

*** E0C63358 source file(s) ***

C33580A0                                                                    ...(2)

Please input segment source file name? c33580A0↵                            ...(3)
Please input user's name? SEIKO EPSON CORP.↵                                ...(4)
Please input any comment
 ( One line is 50 chr ) ? ED MARKETING DEPARTMENT↵                          ...(5)
                        ? 421-8 HINO HINO-SHI TOKYO 191-8501 JAPAN↵
                        ? ↵
```

↵ indicates the Return key.

(1) Date input

Following the start-up message, the date currently set in the host computer is displayed, prompting entry of a new date.
When modifying the date, enter the 2-digit year, month, and day of the month by delimiting them with a slash ("/").
When not modifying the date, press the Return key to continue.

(2) *** E0C63358 source file(s) ***

Will display readable files on the current drive.
If no readable source exists, the following message is displayed and the program is terminated.

```
Segment option file is not found.
```

(3) Please input segment source file name ?

Enter a segment option source file name (-H option use: segment option document file name). Do not enter the extension of the file name. If the specified file is not in the current directory, an error message like the one below is output, prompting entry of other file name.

```
Please input segment source file name ? c33580b0↵
Segment option source file is not found.
```

(4) Please input user's name ?

Enter your company name.
Up to 40 characters may be entered. If 41 or more characters are entered, they are ignored.

(5) Please input any comment

Enter any comment. Up to 50 characters may be entered in one line. If 51 or more characters are entered in one line, they are ignored. Up to 10 comment lines may be entered. To end entry of comments, press the Return key at the beginning of the line. Small letters entered are converted into capital letters to record in the document file.
Furthermore, include the following in comment lines:

- Department, division, and section names
- Company address, phone number, and FAX number
- Other information, including technical information

Moreover, the below symbols for the inputting of (4) and (5) cannot be used. When those symbols are input, it displays an "Illegal character" error message, then again returns to the input status for that line.
"$", "\"("¥"), "[", "]", "~", "_", "|", "{", "}", "-" ... input disabled

When the above operations are complete, move to the confirmation procedure for HEX file generation.

4.6.3 HEX file generation

When input operatin is completed, the following message is output to ask the user whether to generate the segment option HEX file.

```
End of option setting.
Do you need HEX file (y/n) ? y↵
```

Enter "Y" to generate the HEX file (c3358xxx.ssa). If "N" is entered, no HEX file is generated and only document file (c3358xxx.sdc) is generated.
Since the segment option HEX file (c3358xxx.ssa) is needed when debugging the target program with the ICE63, normally set "Y".

However, when -H option is used, HEX file is generated without any conditions. Therefore, this message is not displayed.

When the above operation is completed, the sog63358 generates the segment option HEX file and segment option document file (-H option use: HEX file only). And then the following message is output and the sog63358 program will be terminated.

```
Making file is completed.
```

If an error occurs during execution, an error message like the one below appears and the sequence prompts entry of another file name.

```
Do you need HEX file (y/n)? y↵
R 7     6 004 --- --- --- N

 1 error(s).

Strike any key.

Making file is not completed by source file error(s).

*** E0C63358 source file(s) ***

C33580A0
```

4.6.4 End procedure

When a series of operations are completed, the sog63358 program will be terminated.

The sog63358 can be forcibly terminated by pressing the "CTRL" and "C" keys together during this software execution. (It is possible by pressing "STOP" key depending on the PC used.) However, in this case, the correct segment option HEX file and segment option document file are not generated.

4.7 Error Message

Message	Explanation
S (Syntax Error)	The data was written in an invalid format.
N (Segment No. Select Error)	The segment number outside the specificable range was specified.
R (RAM Address Select Error)	The segment memory address or data bit outside the specificable range was specified.
D (Duplicate Error)	The same data (SEG port No., segment memory address, or data bit) was specified more then once.
Out port set error	The output specifications were not set in units of two ports. Data other than "---" was recorded as the COM1–COM3 data of the segment for DC output.

4.8 Sample Files

■ Example of input file

```
C33580A0.SEG

    0 000 001 002 003 S
    1 010 011 012 013 S
    2 020 021 022 023 S
    3 030 031 032 033 S
    4 040 041 042 043 S
    5 050 051 052 053 S
    6 060 061 062 063 S
    7 070 071 072 073 S
    8 080 081 082 083 S
    9 090 091 092 093 S
   10 0A0 0A1 0A2 0A3 S
   11 0B0 0B1 0B2 0B3 S
   12 0C0 0C1 0C2 0C3 S
   13 0D0 0D1 0D2 0D3 S
   14 0E0 0E1 0E2 0E3 S
   15 0F0 0F1 0F2 0F3 S
   16 100 101 102 103 S
   17 110 111 112 113 S
   18 120 121 122 123 S
   19 130 131 132 133 S
   20 140 141 142 143 S
   21 150 151 152 153 S
   22 160 161 162 163 S
   23 170 171 172 173 S
   24 180 181 182 183 S
   25 190 191 192 193 S
   26 1A0 --- --- --- N
   27 1B0 --- --- --- N
   28 1C0 1C1 1C2 1C3 S
   29 1D0 1D1 1D2 1D3 S
   30 1E0 --- --- --- C
   31 1F0 --- --- --- C
```

■ Example of output file (Segment option document file)

```
C33580A0.SDC

* E0C63358 SEGMENT OPTION DOCUMENT  V x.xx
   *
   * FILE NAME    C33580A0.SDC
   * USER'S NAME  SEIKO EPSON
   * INPUT DATE   96/12/12
   * COMMENT      TEST
   *
   *
   * OPTION NO.12
   *
   * < LCD SEGMENT DECODE TABLE >
   *
   * SEG COM0 COM1 COM2 COM3 SPEC
   *
      0  000  001  002  003  S
      1  010  011  012  013  S
      2  020  021  022  023  S
      3  030  031  032  033  S
      4  040  041  042  043  S
      5  050  051  052  053  S
      6  060  061  062  063  S
      7  070  071  072  073  S
      8  080  081  082  083  S
      9  090  091  092  093  S
     10  0A0  0A1  0A2  0A3  S
     11  0B0  0B1  0B2  0B3  S
     12  0C0  0C1  0C2  0C3  S
     13  0D0  0D1  0D2  0D3  S
```

```
  14  0E0  0E1  0E2  0E3  S
  15  0F0  0F1  0F2  0F3  S
  16  100  101  102  103  S
  17  110  111  112  113  S
  18  120  121  122  123  S
  19  130  131  132  133  S
  20  140  141  142  143  S
  21  150  151  152  153  S
  22  160  161  162  163  S
  23  170  171  172  173  S
  24  180  181  182  183  S
  25  190  191  192  193  S
  26  1A0  1A1  1A2  1A3  N
  27  1B0  1B1  1B2  1B3  N
  28  1C0  1C1  1C2  1C3  S
  29  1D0  1D1  1D2  1D3  S
  30  1E0  1E1  1E2  1E3  C
  31  1F0  1F1  1F2  1F3  C
*EOF
```

■ Example of output file (Segment option HEX file)

C33580A0.SSA

```
S2240000000000000100020003FFFFFFFFFFFFFFFF0100010101020103FFFFFFFFFFFFFFFFDB
S2240000200200020102020203FFFFFFFFFFFFFFFF0300030103020303FFFFFFFFFFFFFFFFAB
S2240000400400040104020403FFFFFFFFFFFFFFFF0500050105020503FFFFFFFFFFFFFFFF7B
S2240000600600060106020603FFFFFFFFFFFFFFFF0700070107020703FFFFFFFFFFFFFFFF4B
S2240000800800080108020803FFFFFFFFFFFFFFFF0900090109020903FFFFFFFFFFFFFFFF1B
S2240000A00A000A010A020A03FFFFFFFFFFFFFFFF0B000B010B020B03FFFFFFFFFFFFFFFFEB
S2240000C00C000C010C020C03FFFFFFFFFFFFFFFF0D000D010D020D03FFFFFFFFFFFFFFFFBB
S2240000E00E000E010E020E03FFFFFFFFFFFFFFFF0F000F010F020F03FFFFFFFFFFFFFFFF8B
S2240001001000100110021003FFFFFFFFFFFFFFFF1100110111021103FFFFFFFFFFFFFFFF5A
S2240001201200120112021203FFFFFFFFFFFFFFFF1300130113021303FFFFFFFFFFFFFFFF2A
S2240001401400140114021403FFFFFFFFFFFFFFFF1500150115021503FFFFFFFFFFFFFFFFFA
S2240001601600160116021603FFFFFFFFFFFFFFFF1700170117021703FFFFFFFFFFFFFFFFCA
S2240001801800180118021803FFFFFFFFFFFFFFFF1900190119021903FFFFFFFFFFFFFFFF9A
S2240001A01A001A011A021A03FFFFFFFFFFFFFFFF1B001B011B021B03FFFFFFFFFFFFFFFF6A
S2240001C01C001C011C021C03FFFFFFFFFFFFFFFF1D001D011D021D03FFFFFFFFFFFFFFFF3A
S2240001E01E001E011E021E03FFFFFFFFFFFFFFFF1F001F011F021F03FFFFFFFFFFFFFFFF0A
S224000200FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF9
S224000220FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFD9
S224000240FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFB9
S224000260FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF99
S224000280FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF79
S2240002A0FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF59
S2240002C0FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF39
S2240002E0FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF19
S224000300FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF8
                :
                :
S224000F00FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFEC
S224000F20FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFCC
S224000F40FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFAC
S224000F60FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF8C
S224000F80FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF6C
S224000FA0FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF4C
S224000FC0FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF2C
S224000FE0FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF0C
S224001000000000000000000000000000000000000000000000000000050500000101BF
S224001020FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFCB
S224001040FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFAB
S224001060FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF8B
S224001080FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF6B
S2240010A0FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF4B
S2240010C0FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF2B
S2240010E0FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF0B
S804000000FB
```

CHAPTER 5 MASK DATA CHECKER (mdc63358)

5.1 Outline of mdc63358

The mask data checker mdc63358 is a software tool that checks the format of the input files, code ROM files (c3358xxx.hsa, c3358xxx.lsa) generated by the hex63358, the function option document file (c3358xxx.fdc) generated by the fog63358 and the segment option document file (c3358xxx.sdc) generated by the sog63358, and generates a data file (c3358xxx.pan) for generating mask patterns. Submit the file generated through this software tool to Seiko Epson.
Moreover, the mdc63358 has a function to restore the generated data file (c33580a0.pan) to the original file format.

5.2 Execution Flow and Input/Output Files

Figure 5.2.1 shows the mdc63358 execution flow.

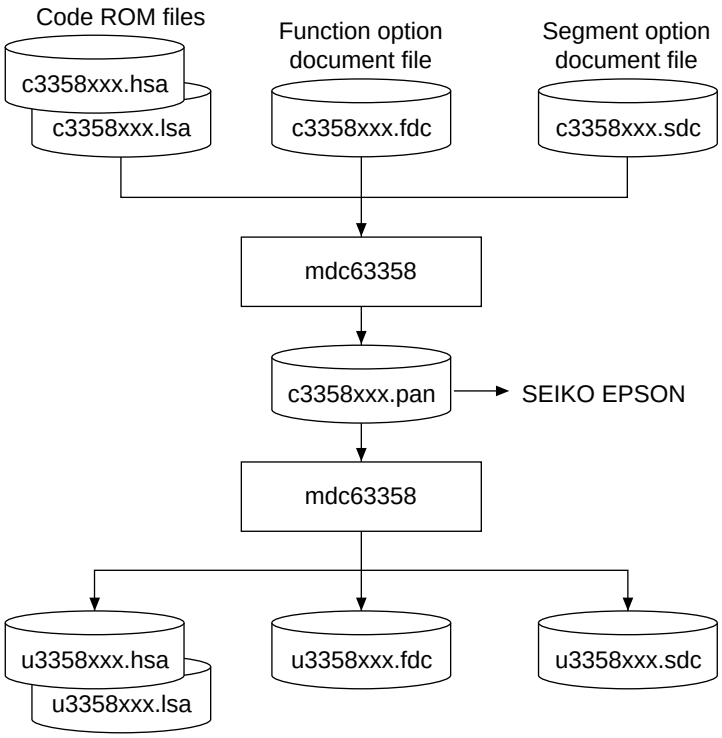


Fig. 5.2.1 mdc63358 execution flow

(1) Preparation of code ROM files (c3358xxx.hsa, c3358xxx.lsa)

Prepare the code ROM HEX files output from the HEX data converter (hex63358).

(2) Preparation of function option data file (c3358xxx.fdc)

Prepare the function option document file output from the function option generator (fog63358).

(3) Preparation of segment option data file (c3358xxx.sdc)

Prepare the segment option document file output from the segment option generator (sog63358).

(4) Packing of data

Using the mask data checker (mdc63358), compile the code ROM files, function option document file and segment option document file in one data file for masking (c3358xxx.pan). This packing file should be sent to Seiko Epson.

(5) Unpacking of data

The data file for masking (c3358xxx.pan) generated by packing process can be restored to the original file using the mask data checker (mdc63358).

Note: Since the customer code is entered in the xxx part of the file name, it should be as designated by Seiko Epson.

5.3 Operation Procedure

5.3.1 Copying each data files

When submitting data to Seiko Epson, copy on the work disk the data generated from the HEX converter (hex63358), the function option generator (fog63358) and the segment option generator (sog63358).
Be sure to assign the following file names. Since the customer code is entered in the xxx part of the file name, it should be as designated by Seiko Epson.

1) Code ROM files: c3358xxx.hsa
c3358xxx.lsa

2) Function option document file: c3358xxx.fdc

3) Segment option document file: c3358xxx.sdc

5.3.2 Starting procedure

(1) Starting command

To start mdc63358, enter the command as following format at the DOS command level (state in which a prompt such as A> is displayed).

```
mdc63358 {-p | -u} <file name>↵
```

↵ indicates the Return key.
{-p | -u} indicates either one can be specified.

(2) Option

The options below have been set for the start-up command of the mdc63358.

-p

Specification of packing. When specifying this option, **an output file name must also be specified**. In this case, the code ROM files (~.hsa, ~.lsa), function option document file (~.fdc) and segment option document file (~.sdc) must have the same name (excluding the extension) as the specified output file name.
Furthermore, generation of the output file and reading of the input files are done only for the current directory.
Example: `mdc63358 -p c33580a0.pa0`↲

-u

Specification of unpacking. When specifying this option, **an input file name must also be specified**. Furthermore, reading of the input file and generation of the output files are done only for the current directory.
Example: `mdc63358 -u c33580a0.pa0`↲

Default (When option has not been specified)

When an option has not been specified, it is designed such that pack/unpack processing can be selected from the operation menu displayed, following start-up. It is set-up such that the packing file name to be output or input can also be specified according to the message displayed.

(3) Start-up message

When the mdc63358 starts up, the following message is displayed.

Example: When option has not been specified.

```
E0C63358 Mask Data Checker Version x.xx
Copyright (C) SEIKO EPSON CORP. 199x

---<< Operation menu >>---

         1. Pack
         2. Unpack

Please select No.? 1↲
```

When an option is not specified at the time the start-up command is input, the operation menu is displayed and the user is prompted to select operation. When creating a mask data for submission to Seiko Epson, select "1"; when the mask data is to be split and restored to the original format, select "2". When an option has been specified at the time of start-up of the mdc63358, it executes directly the selected packing or unpacking process without displaying this operation menu.

Note: In the OS environment setup file "CONFIG.SYS", the number of files that can be opened at the same time must be set at least 10.
Example: FILES = 20

5.3.3 Packing of data

When generating data for submission to Seiko Epson, select packing option at the time of start-up of the mdc63358 (see "5.3.2 Starting procedure").

(1) Input file name

When the operation menu item 1, "Pack", is selected after starting up the mdc63358 in default (without option specification), the mdc63358 prompts to enter **a file name to be generated**.
Moreover, when the -p option has been specified at the mdc63358 start-up, it executes directly the packing process without displaying the operation menu and confirmation message of the file name to be generated.

```
Input files are: C3358xxx.HSA
                 C3358xxx.LSA
                 C3358xxx.FDC
                 C3358xxx.SDC
Output file is : C3358xxx.PAn

Please input pack file name(C3358xxx.PAn) ? c33580a0.pa0↵
```

Since the customer code is entered in the xxx part of the file name, it should be as designated by Seiko Epson.
Moreover, after submitting the masking data to Seiko Epson and there is need to re-submit the mask data for reasons such as faulty programs, etc., increase the numeric value of "n" by one when the input is made. For example, when re-submitting data after "c3358xxx.pa0" has been submitted, the pack file name should be entered as "c3358xxx.pa1".

(2) Packing process

Access to the input files when packing data is done only for code ROM files (~.hsa, ~.lsa), function option document file (.fdc) and segment option document file (.sdc) that have the same name (excluding the extension) as the specified output file name on the current directory.

If there is no problem in inputting of the file name and the contents of the input files, the input data are packed to generate the mask data and displays the generated file name.

With this, the data file for masking is generated. Submit this file to Seiko Epson.

```
Input files are: C33580A0.HSA
                 C33580A0.LSA
                 C33580A0.FDC
                 C33580A0.SDC
Output file is : C33580A0.PA0
```

5.3.4 Unpacking data

When restoring the packed data to original file format, select unpacking option at the time of start-up of the mdc63358 (see "5.3.2 Starting procedure").

(1) Input file name

When the operation menu item 2, "Unpack", is selected after starting up the mdc63358 in default (without option specification), the mdc63358 prompts to enter **a file name to be unpacked**.

When the -u option has been specified at mdc63358 start-up, it executes directly the unpacking processing without displaying the operation menu and confirmation message of the unpacking file name to be input.

```
Input  file is  : C3358xxx.PAn
Output files are: U3358xxx.HSA
                  U3358xxx.LSA
                  U3358xxx.FDC
                  U3358xxx.SDC

Please input pack file name(C3358xxx.PAn) ? c33580a0.pa0↵
```

Since the customer code is entered in the xxx part of the file name, it should be as designated by Seiko Epson.

(2) Unpacking process

The mdc63358 finds the specified file from the current directory and loads it for unpacking.

```
Input  file is  : C33580A0.PA0
Output files are: U33580A0.HSA
                  U33580A0.LSA
                  U33580A0.FDC
                  U33580A0.SDC
```

If there is no problem in the entering of the file name and the input file, the mdc63358 unpacks the file to restore it to the original format files.

The first character of the unpacked file names are replaced with "U".

5.3.5 End procedure

When a series of operations is completed, the mdc63358 displays the following message and returns to the DOS command level.

(1) When terminated normally

```
Pack/Unpack Completed
A>
```

The output file is generated in the same directory as the input file.

(2) When an error occurs

```
Pack file name (C33580K0) error.
A>
```

When an error has occurred, the file is not generated.

5.4 Error Messages

In the packing operation, each ROM data file and option file are checked; in the unpacking operation, the packed file is checked. If there is any abnormal each format, the message below is displayed.
The mdc63358 error message lists are indicated below.

5.4.1 Start-up error

Message	Explanation
Usage: mdcxxxx [-p,-u] [filename]	The start-up parameter is incorrect.
"xxxxxxxx.xxx" file is not found.	The specified file is not found.
Pack file name (xxxxxxxx.xxx) error.	A wrong pack file name is specified for packing.
Packed file name (xxxxxxxx.xxx) error.	A wrong pack file name is specified for unpacking.

5.4.2 ROM data error

When an error message as shown below appears, try to execute the mdc63358 again after checking and re-creating each file. If a similar error still results, please notify Seiko Epson of the situation and the error message displayed.

Message	Explanation
Hex data error : Not S record.	The data does not begin with "S".
Hex data error : Data is not sequential.	The data is not described in the ascending order.
Hex data error : Illegal data.	There is an illegal character.
Hex data error : Too many data in one line.	There are too many data in 1 line.
Hex data error : Check sum error.	The checksum is not correct.
Hex data error : ROM capacity over.	The data capacity is too large.
Hex data error : Not enough the ROM data.	The data capacity is too small.
Hex data error : Illegal start mark.	The start mark is incorrect. (during unpacking)
Hex data error : Illegal end mark.	The end mark is incorrect. (during unpacking)
Hex data error : Illegal comment.	The model name at the beginning of the data is incorrect. (during unpacking)

5.4.3 Function option data error

When an error message as shown below appears, try to execute the mdc63358 again after checking and re-creating the file. If a similar error still results, please notify Seiko Epson of the situation and the error message displayed.

Message	Explanation
Option data error : Illegal option number.	The option number is incorrect.
Option data error : Illegal select number.	The option select number is incorrect.
Option data error : Data is not enough.	There is not enough option data.
Option data error : Illegal start mark.	The start mark is incorrect. (during unpacking)
Option data error : Illegal end mark.	The end mark of the option data is incorrect. (during unpacking)
Option data error : Illegal comment.	The model name at the beginning of the option data is incorrect. (during unpacking)

5.4.4 Segment option data error

When an error message as shown below appears, try to execute the mdc63358 again after checking and re-creating the file. If a similar error still results, please notify Seiko Epson of the situation and the error message displayed.

Message	Explanation
LCD segment data error : Illegal segment No.	The segment number is incorrect.
LCD segment data error : Illegal segment area.	The display memory address is out of the range.
LCD segment data error : Illegal segment output specification.	The output specification is incorrect.
LCD segment data error : Illegal data in this line.	There is an illegal description other than hexadecimal numbers and an output specification symbol in the line.
LCD segment data error : Data is not enough.	There is not enough segment data.
LCD segment data error : Illegal start mark.	The start mark is incorrect. (during unpacking)
LCD segment data error : Illegal end mark.	The end mark is incorrect. (during unpacking)
LCD segment data error : Illegal comment.	The model name at the beginning of the data is incorrect. (during unpacking)

5.4.5 File access error

Message	Explanation
Directory Full.	The directory is full.
Disk Write Error.	Writing on the file is failed. This error may occur if there is no disk space.

5.5 Packed File

5.5.1 Configuration of packed file

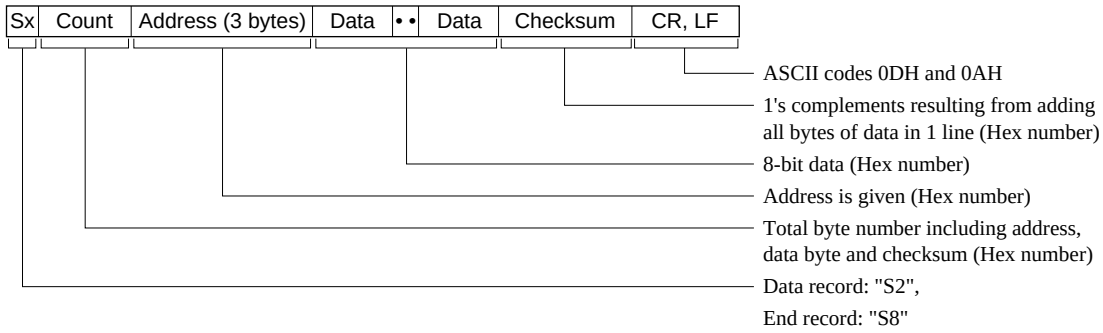
The packed file is configured according to the following format:

```
                  *
Model name        * E0C63358 MASK DATA VER x.xx
                  *
Code ROM start mark   \PROM
Master slice model name   E0C63358xxx PROGRAM ROM
                  S224000000.....................................................
                        :       :       :       :       :       :       :
Code ROM          S804000000FB
                  S224000000.....................................................
                        :       :       :       :       :       :       :
                  S804000000FB
End mark          \END
Function option start mark   \FOPTION
                  * E0C63358 FUNCTION OPTION DOCUMENT V x.xx
                  *
                  * FILE NAME    C3358xxx.FDC
                  * USER'S NAME  SEIKO EPSON
                  * INPUT DATE   '96/12/11
                  * COMMENT      FOR SAMPLE
                  *
Function option   * *** OPTION NO.1 ***
                  * --- OSC1 SYSTEM CLOCK ---
                  *     CRYSTAL (32.768KHZ)  -------------------------   SELECTED
                   OPT0101 01
                        :       :       :       :       :       :       :
                   OPT1101 01
                  *EOF
End mark          \END
Segment option start mark   \SEGMENT
                  * E0C63358 SEGMENT OPTION DOCUMENT V x.xx
                  *
                  * FILE NAME    C3358000.SDC
                  * USER'S NAME  SEIKO EPSON
                  * INPUT DATE   '96/12/11
                  *
                  *
                  * OPTION NO.12
Segment option    *
                  * < LCD SEGMENT DACODE TABLE >
                  *
                  * SEG COM COM1 COM2 COM3 SPEC
                     0  163  162  161  1D0  S
                     1  170  172  171  160  S
                        :       :       :
                    31  1D3  1E3  1F2  1F3  S
                  *EOF
End mark          \END
```

* \ sometimes appears as ¥, depending on the personal computer being used.

5.5.2 ROM data format

Each ROM data is configured as follows, using Motorola S2 format:



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