EPSON

SCE88J4X01

Windows CE 2.11
Development Kit
For
SH-CARD (CARD-E09A)

Operation Manual

EPSON Electronics America
150 River Oaks Parkway, San Jose, CA 95134

May 5, 1999

Tel: (408) 922-0200

EPSON

NOTICE:

No part of this material may be reproduced or duplicated in any form or by any means without the written permission of Seiko Epson. Seiko Epson reserves the right to make changes to this material without notice. Seiko Epson does not assume any liability of any kind arising out of any inaccuracies contained in this material or due to its application or use in any product or circuit and, further, there is no representation that this material is applicable to products requiring high level reliability, such as, medical products. Moreover, no license to any intellectual property rights is granted by implication or otherwise, and there is no representation or warranty that anything made in accordance with this material will be free from any patent or copyright infringement of a third party. This material or portions thereof may contain technology or the subject relating to strategic products under the control of the Foreign Exchange and Foreign Trade Control Law of Japan and may require an export license from the Ministry of International Trade and Industry or other approval from anther government agency.

©**SEIKO EPSON CORPORATION** 1999 All rights reserved.

CompactFlash ™ is a trademark of Sandisk Corporation. CompactFlash™ is licensed to CFA (CompactFlash Association). PS/2 and VGA are trademarks and/or registered trademarks of International Business Machines Corporation. ETHERNET is a registered trademark of Xerox limited.

All other product names mentioned herein are trademarks and/or registered trademarks of their respective companies.

EPSON Electronics America
150 River Oaks Parkway, San Jose, CA 95134

May 5, 1999
Tel: (408) 922-0200

INDEX

1. Introduction 1
2 Handling Precautions 3
2.1 Back Up of an ATA Card 3
2.2 If an ATA Content is Lost 4
3 Installation of Development Kit 5
3.1 Installation of Platform Builder 5
3.2 Installation of Windows CE DevKit CD 5
4 Generation of Windows CE and Execution 6
4.1 Generation of Windows CE Binary Image 6
4.2 Transfer and Boot of Windows CE Binary Image 7
5 LOADER 11
5.1 Features 11
5.2 About Windows CE Boot-up 12
5.3 Configuration of LOADER 13
5.4 Start Up Date (startup.dat) 14
5.5 Functional Description 16
6 Quick Debugger "DEBUGS" 23
6.1 How to Use "DEBUGS" 23
6.2 How to Make an ATA Card to Boot Quick Debugger 28
7 Power Management 29
7.1 CPU Standby Mode 29
7.2 Suspend / Resume Mode 29

1. Introduction

SCE88J4X01, Windows CE 2.11 Development Kit for SH-CARD, is designed to provide an integrated development environment for Windows CE 2.11 development for a CARD-E09A (Part Number: SCE8700C01, called "SH-CARD" thereafter) based hardware.

The following product is also required in conjunction with SCE88J4X01;

- **SCE8700C01** (SH-CARD, CARD-E09A)
- **SCE88J0X01** or SCE88J1X01 (SH-CARD evaluation kit).
- A personal computer equipped with 2 PCMCIA Type II slots and a CD-ROM with Windows NT 4.0 installed.

The personal computer described above is necessary to use Windows CE Platform Builder, made by Microsoft and packaged in SCE88J4X01.

SCE88J4X01 consists of the following items;

- License Agreement of Windows CE 2.11 Development Kit for SH-CARD
- Operational Manual of Windows CE 2.11 Development for SH-CARD (this manual)
- Windows CE Platform Builder (Microsoft)
- A CD of Windows CE 2.11 development tools for SH-CARD (called "DevKit CD" thereafter)
- A serial cable
- A PPSH cable
- 5 licenses of Windows CE

License Agreement of Windows CE Development Kit for SH-CARD

Read this first. It is packed with a CD of Windows CE 2.11 for SH-CARD (called "CE 2.11" thereafter).

A CD of Windows CE 2.11 for SH-CARD (called "DevKit CD" thereafter)

It offers an integrated development environment for Windows CE development for SH-

CARD. It includes OAL (OEM Adaptation Layer) customized for SH-CARD, device drivers, loader, and other development software tools.

Windows CE Platform Builder

A development tool kit made by Microsoft for development.

PPSH Cable

It is used to transfer a Windows CE binary image target SH-CARD system.

Serial Cable

It is used to debug Windows CE.

License Sticker

It shall be used in accordance with the software

2 Handling Precautions

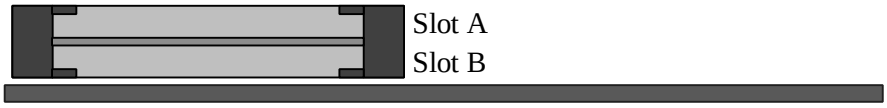
The following procedure shall be done before using the development kit. It is also described in the manual of the SH-CARD evaluation kit (SCE88J0X01 Software Manual). If a back up ATA card has been made, the following procedure may be skipped.

The back up ATA card is necessary to write a boot loader into a SBR (sub boot record; sector 2 of the ATA card) of a blank ATA card, which will be used to boot Windows CE or "DEBUGS" (quick debugger). Please take an extra caution not to damage the boot record.

2.1 Back Up of an ATA Card

A master ATA card is enclosed in this kit, which pre-loads "DEBUGS" at the factory. A back up ATA card shall be made before using the development kit. The following shows the procedure to make a back up ATA card.

1) Prepare a DOS formatted (FAT12 or FAT16) ATA card with 4MB or larger capacity.
2) Prepare a PC equipped with 2 PCMCIA slots. Copy all files in the master ATA card into the DOS formatted ATA card (called "back up ATA card", thereafter). This process can be done by using Windows Explorer or COPY command at Command Prompt.
3) Prepare the SH-CARD evaluation board (SCE88J0X01, called expansion board sometimes in the other manual) and a VGA CRT monitor. Set the master ATA card into PCMCIA slot A. Set the back up ATA card into PCMCIA slot B. Refer to the diagram below.



4) Apply the power of the SH-CARD evaluation board after connecting the monitor and a keyboard.
5) After the quick debugger prompt appears on the CRT screen, type the following

command from the keyboard;

- SBR SBR.BIN B <Enter>

6) It takes a while to make a back up files. Turn the power off after it completes.

2.2 If an ATA Content is Lost

The back up ATA card is necessary to make a ATA card with SBR to boot Windows CE or DEBUGS (quick debugger). If SBR is damaged or lost, Windows CE or DEBUGS will not boot. In such case, please contact with your sales representative to get the SBR recovered.

3 Installation of Development Kit

The following shows the procedure of installation of Windows CE development kit.

3.1 Installation of Platform Builder

Install Windows CE Platform Builder into a host PC. Run **SETUP.EXE** of Platform Builder Disc 1 to start installation.

Note: It is highly recommended to choose “custom installation” to reduce a disk space. It is possible to eliminate unnecessary files.

3.2 Installation of Windows CE DevKit CD

After completion of Platform Builder installation, run **INSTALL.EXE** of the DevKit CD. It will generate an integrated development environment of the Windows CE development suite. The following icon will be made on your desktop.

INSTALL.EXE

Note:

1) If “BUILD” is executed to generate Windows CE binary image before completion of Platform Builder installation by INSTALL.EXE, it is possible that the integrated development environment is not installed correctly.
2) While INSTALL.EXE is being run, the monitor displays the status of the installation. Check if any error message is displayed or not. If an error occurred, read INSTALL.LOG (a text file) to see what happened.

4 Generation of Windows CE and Execution

This chapter describes how to generate a Windows CE binary image and how to execute it on a target SH-CARD based system.

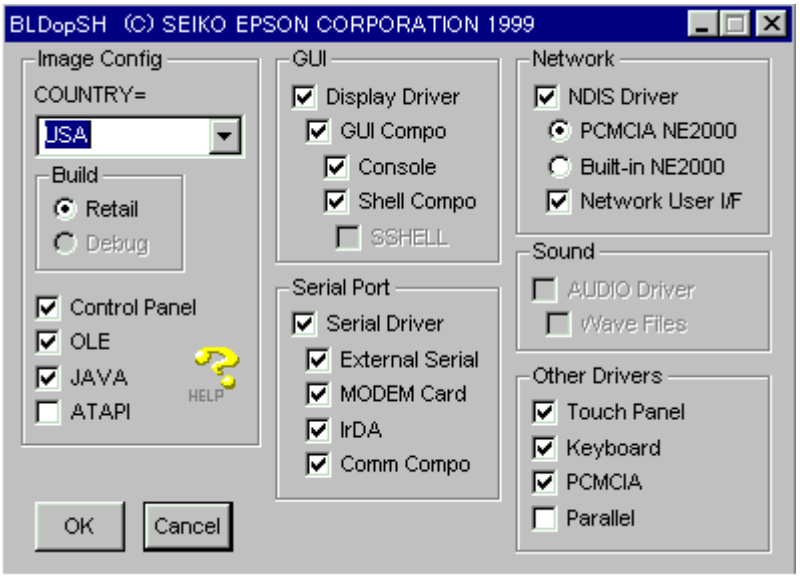
4.1 Generation of Windows CE Binary Image

1) Run **CARDMAX.EXE** at W I N C EP2U1B1L\ I C \ MfAoXlAdLeLr .

CardMax.EXE

2) Run BLD at CARDMAX command prompt.

3) BLDopSH is executed then the following display appears on the screen. Necessary functions are chosen at this menu screen. Default setting will choose standard functions for CEPC. Continue with default settings.



4) Then **BLDDEMO** is automatically executed to generate a binary image of Windows CE (NK.BIN) at WINCE211\RELEASE folder. **NK.BIN** is the binary image to boot Windows CE.

4.2 Transfer and Boot of Windows CE Binary Image

The following chapters describe the procedure of the transfer from the host PC to the target system and the boot of NK.BIN on the target system.

4.2.1 NK.BIN Transfer by a PPSH Cable

The conditions below should be met to enable the file transfer by the PPSH cable.

- The host PC has installed Windows NT 4.0.
- The host PC supports EPP (enhanced parallel port) function.

Below describes the procedure of the PPSH file transfer.

1) Connect the host PC and the target system by the PPSH cable. Use the parallel port.
2) Run **CARDMAX** on the WINCE211\ICE\MAXALL folder to display a command prompt.
3) Type as below on the host PC;

   cesh –p CEPC

4) Set an ATA card with loader installed into PCMCIA slot A. Turn on the power of the evaluation board. File transfer starts automatically and it takes about one minute to complete.
5) Windows CE will boot after completion of the file transfer.

If one of the following conditions is met, NK.BIN in the compact flash will boot.

- No PPSH cable connected,
- **cesh** does not run,
- No NK.BIN at Wince211\release folder, or
- File transfer failed.

Note: If the PPSH cable is connected and **cesh** is not invoked, the execution speed of Windows CE may be slow.

4.2.2 NK.BIN Transfer by an ATA Card

NK.BIN file can be transferred by file copy into the ATA card directly. It is recommended because it is done much quicker than PPSH file transfer. In this case, the host PC with Windows NT 4.0 must have a PCMCIA slot.

4.2.3 How to Boot Windows CE2.11

The following describes how to boot Windows CE from the ATA Card (including a CompactFlash card) on the target system. Always confirm that a back up ATA card has been made before going next step.

1) Prepare a PC equipped with a PCMCIA slot and a CD-ROM drive. Copy the following files from “tools” folder of the DevKit CD enclosed in the development package to the ATA Card or the CompactFlash Card;

   NKLOADS.BIN, STARTUP.DAT, DEBUGS.BIN, BLDFZD.EXE

   Note:

   (1) If the ATA Card used here has been made by the back up procedure, described at the section 2.1, it is not necessary to copy the above files.

   (2) It is not necessary to copy these files again, unless they are damaged or lost.

2) Copy NK.BIN made on the host PC into the ATA Card (or the CompactFlash Card).
3) Set the ATA Card (or the CompactFlash Card) into the PCMCIA slot of the SH-CARD evaluation board (SCE88J0X01), then turn the power on.
4) Windows CE will boot from the ATA Card (or the CompactFlash Card).

Note: Windows CE 2.11 does not include. Use Task Bar (Ctrl + Esc) to run a program.

Note: There are two ways to boot Windows CE;

1) Set the CompactFlash Card with an ATA adapter into the PCMCIA slot-A (CN11). Then turn on the power of the target system.
2) Set the CompactFlash Card into the CompactFlash socket of the SH-CARD. Then turn on the power of the target system. It is not highly recommended because it is not so convenient to remove the CompactFlash Card from the SH-CARD.

4.2.4 Priority at Boot-up by Quick Debugger ”DEBUGS”

Windows CE or Quick Debugger “DEBUGS” tries to boot up from an ATA Card or a CompactFlash Card according to priority. The following describes the boot up priority.

- Windows CE or Quick Debugger will boot up w
  priority.
  (1) ATA Card on Slot-A of the SH-CARD evaluation
  (2) CompactFlash Card on the SH-CARD (SCE8700C0
  Conditions: SBR (sub boot record) must be res

- The order of the files read by the boot loader is as shown below;
  (1) SBR (sub boot record)
  (2) STARTUP.DTA; “DEBUGS” will follow the orders described in STARTUP.DAT. If no STARTUP.DTA is present in the boot device (which is either an ATA Card or a CompactFlash Card), “DEBUGS” will not start.
  (3) NKLOADS.BIN
  (4) NK.BIN

  Note: If SBR is not found or failed to read from the first boot device, IPL tries to read from the second boot device. If no STARTUP.DAT is present in the boot device, and if NK.BIN is present, Windows CE will start to run.

Note: If all tries described above have been failed, a quick debugger resides in IPL ROM will start running.

4.2.5 If “FrzDri” is Used

SCE88J4X01, Windows CE 2.11 development kit for SH-CARD, prepares a useful function, which stores Windows CE data as a file and restore at resume. It is called “**FrzDri**”. It is necessary to build a file as a storage of Windows CE data when a new NK.BIN is built. This process is always necessary whenever the size of NK.BIN is changed or any parameters or any files names have been modified. Below shows the procedure to enable “FrzDri” function;

1) Use the host PC (which has installed DevKit already) and set the ATA Card into a PCMCIA slot. The ATA Card has been made previously.
2) Open a command prompt for the ATA Card.
3) Type “Bldfrz” to build a data storage file “**NK.FZD**” in the ATA Card.

   Bldfzd <Enter>

5 LOADER

"LOADER" of SH-CARD has several complementary features in addition to booting Windows CE. The following chapter describes these features.

5.1 Features

- **Load Windows CE**
  Load NK.BIN to start Windows CE.
- **Display Logo**
  Display a bit map image during Windows CE booting.
- **FrzDri**
  Save Windows CE data (registry and file) in RAM and restore when resume.
- **Display to LCD**
  Adjust parameters of display controller to display LCD panel without modifying the video drivers of Windows CE.
- **Change display resolution**
  Change display resolution without modifying the video drivers of Windows CE.
- **Start quick debugger "DEBUGS"**
  Start quick debugger "DEBUGS" instead of booting Windows CE.
- **Transfer NK.BIN to a target system**
  Transfer NK.BIN from the host PC to the target SH-CARD system through PPSH cable.

5.2 About Windows CE Boot-up

Windows CE is an operating system designed for hardware which always keeps DRAM contents. The boot up process of Windows CE differs from the other Windows operating system (such as Windows 95, Windows 98 or Windows NT). It could be a good feature for a hand held PC, but it also limits the capability of the embedded system. EPSON provides several additional features to eliminate such limitations of Windows CE. Below describes how EPSON Windows CE boot up.

- **NK.BIN**

  NK.BIN is made when Windows CE is built. Once NK.BIN is transferred in the main memory space, and JUMP to the entry point, Windows CE starts running. Hand Held PC (HPC) stores NK.BIN in memory mapped ROM and it executes in place.

- **RAM Section**

  The standard Windows CE is made to run on a system with no storage device other than DRAM. It stores parameters and files, such as registry, in DRAM. This are is called "RAM Section".

- **Cold Boot**

  Two different cold boots are available depending on the description in STARTUP.DAT.
  1) Default setting; DRAM is initialized, or
  2) Use "FrzDri" file to restore parameters or registry into DRAM.

  Cold Boot is invoked when a hardware reset switch is pressed, or after power up. If no "FrzDri" file present or STARTUP.DAT does not specify a "FrzDri" file, the DRAM contents are initialized and no previous state is restored.

- **Turn On / Shut Off of Windows CE**

  The POWER button of a regular HPC is not a power off switch. It is a suspend / resume switch. Therefore, it resumes the previous state after toggling the switch. If the power is removed, no DRAM data will be restored in the HPC. It is a limitation of the regular

Windows CE. EPSON added a feature "**FrzDri**" to store and restore DRAM information before and after the power on and off. Please note that "FrzDri" is not suspend / resume so it does not restore the state of the application program which may be running before turning off the power.

5.3 Configuration of LOADER

"**LOADER**" of SH-CARD consists of three files; IPL (**ipl.bin**; resident on the SH-CARD flash ROM), SBR (**sbr.bin**; resident on the CompactFlash Card), and NKLOADS (**nkloads.bin**) and a data file (**startup.dat**). The following chapters describe these files and functions.

- **IPL (initial program loader)**

  ipl.bin runs first right after the power is applied to SH-CARD. It initializes the hardware simply enough to boot SBR from the CompactFlash Card, then jumps to SBR routine.

- **SBR (sub boot record)**

  sbr.bin is a sub loader stored in where it is not formatted in the boot device. In other words, it is stored at and from the sub boot record (the sector #2) of the CompactFlash Card. SBR analyzes the files system of the ATA Card (or the CompactFlash Card) to load NKLOADS. Then jumps to NKLOADS.

- **NKLOADS (nkloads.bin)**

  nkloads.bin provides additional features besides loading NK.BIN (Windows CE binary image) from the CompactFlash (or ATA Card). NKLOADS also initializes the functional blocks inside the SH-CARD companion chip, such as PCMCIA controller, bus controller, video controller, serial ports and other hardware. NKLOADS shall be present as a DOS file at the root directory of the DOS formatted CompactFlash Card (or ATA Card). The supported file format is **FAT12** and **FAT16**. The other format, such as TFFS, is not recognized.

- **STARUP Data (startup.dat)**

  startup.dat holds initialization parameters used when NKLOADS boots up. The following

information can be saved in STARTUP.DAT;

- parameters to initialize video controller
- a file name of logo display and location at the screen
- a file name of “FrzDri”
- enable or disable “DEBUGS”

Note: STARTUP.DAT has a defined data format and it shall be present at the root directory of the boot device.

5.4 Start Up Date (startup.dat)

“Start Up Data” consists of parameters specifying initializing method or program behavior. It is very easy to enable the following features by modifying the parameters of “Start Up Data”.

- Adjust video controller parameters to connect several different types of LCD.
- Adjust video controller parameters to change video resolution.
- Specify user defined logo screen during Windows CE boot up.
- Invoke quick debugger “DEBUGS”
- Specify “FrzDri” file name
-

STARTUP.DAT (a file of “Start Up Data”) is a text file saved on the CompactFlash Card (or ATA Card). It is very easy to modify the contents by a host PC or even by a target system.

Note:

1) The file name of the “Start Up Data” file is **startup.dat**. No other file name shall be recognized as a “Start Up Data” file. It is not case sensitive.
2) Parameters shall be specified by “8-digit hexadecimal” with no sign. Alphabet (A, B, D, D, E, and F) is not case sensitive.
3) Comment may be added with “**;**” (no quotation) and the characters from “;” to the end of the line are ignored by LOADER. If “;” is found at the beginning of the line, the whole line is

ignored.

5.5 Functional Description

The following paragraphs describe the detail functions and behavior of the features.

5.5.1 Loading of Windows CE

NK.BIN is made when Windows CE Platform Builder builds Windows CE. It is a Windows CE binary image. Once NK.BIN is loaded in a main memory space, an entry point is invoked, Windows CE starts running. “LOADER” controls the process. Please note the following points.

Notes for Windows CE loading;

- “LOADER” tries to boot Windows CE by priority below;
  1) NK.BIN of the ATA Card in the PCMCIA Slot-A of the evaluation board (SCE88J0X01).
  2) NK.BIN of the CompactFlash attached with SH-CARD.
  Note: If no NK.BIN is found anywhere, the system does not display anything and halt.

- In case that NK.BIN is loaded from the CompactFlash of SH-CARD, ATA Cards in PCMCIA slots will be recognized as shown below;

  Case 1: Both PCMCIA slots have an ATA Card before booting Windows CE

[Device]	[Device Folder Name]
CompactFlash of SH-CARD:	“Storage Card”
ATA Card in PCMCIA Slot-A	“Storage Card2”
ATA Card in PCMCIA Slot-B	“Storage Card3”

  Case 2: Both PCMCIA slots have no ATA Card before booting Windows CE, then an ATA Card is inserted into Slot-A first, and Slot-B the last.

[Device]	[Device Folder Name]
CompactFlash of SH-CARD:	“Storage Card”
ATA Card in PCMCIA Slot-A	“Storage Card2”
ATA Card in PCMCIA Slot-B	“Storage Card3”

  Case 3: Both PCMCIA slots have no ATA Card before booting Windows CE, then an

ATA Card is inserted into Slot-B first, and Slot-A the last.

[Device]	[Device Folder Name]
CompactFlash of SH-CARD:	“Storage Card”
ATA Card in PCMCIA Slot-A	“Storage Card3”
ATA Card in PCMCIA Slot-B	“Storage Card2”

- In case that no CompactFlash Card is present in the CompactFlash socket of SH-CARD, there is no mechanism to recognize the existence of the CompactFlash by software, Windows CE (running off an ATA Card in this case) displays the following message;

  Unidentified PCCard Adapter
  Enter the name of the driver for this PCCard
  Drive Name: Unknown card in Socket 1

  Windows CE will continue to boot by entering <Enter> key. After boot up, each PCMCIA slot will be recognized as shown below (assumed, both slots have an ATA card individually before booting up);

[Device]	[Device Folder Name]
ATA Card in PCMCIA Slot-A	“Storage Card2”
ATA Card in PCMCIA Slot-B	“Storage Card3”

5.5.2 Modification of Video Initialization Parameters

The color of display and display resolution can be changed by the parameters below;

How to modify the video initialization parameters;

1) Search [1355] in the **startup.dat** file.
2) Change parameters of SED1355 registers to meet your needs.

For example of 640x480 dots, 8-bpp (bit per pixel), the parameter table should be

```
[1355]
; Index,        data
B4000001        30      ;/* CLKI/512 (65KHz refresh at 33MHz), 2CAS, EDO  */
B4000002        2E      ;/* 8bit Passive, Color */
B4000003        00      ;/* LCD */
B4000004        4F      ;/* H size = (79+1)*8 = 640 pixel */
B4000005        1D      ;/* H non-display = (30+1)*8 = 248 pixel */
B4000006        01      ;/* HRTC start = (1+1)*8-2 = 14 pixel */
B4000007        01      ;/* HRTC pulse = (7+1)*8 = 64 pixel */
B4000008        DF      ;/* V size = 479+1 = 480 */
B4000009        01      ;/* V size */
B400000a        09      ;/* V non-display = 19+1 = 20 lines */
B400000b        00      ;/* VRTC start = 0+1 = 1 line */
B400000c        00      ;/*`VRTC pulse = 2+1 = 3 lines */
B400000d        0F      ;/* CRT & LCD power should off while init the chip */ /* 8bpp */
B400000e        FF      ;/* Split line (Word) */
B400000f        03      ;
B4000010        00      ;/* Screen 1 start [7:0](Word) = 0h */
B4000011        00      ;/* [15:8] */
B4000012        00      ;/* [19:16] */
B4000013        00      ;/* Screen 2 start (Word) = 28000*2 = 50000h */
B4000014        00      ;/* [15:8] */
B4000015        00      ;/* [19:16] */
B4000016        40      ;/* Memory Address Offset */
B4000017        01      ;/* 640 = 280h then 140h (word) */
B4000018        00      ;
B4000019        00      ;/* Clock Configuration Resister */
B400001a        02
B400001b        01
B400001e        00
B400001f        00
B4000020        00
B4000021        00
```

```
B4000022    24
B4000023    00
FFFFFFFF    FFFFFFFF    ;END Mark
```

Please refer to SED1355F0A Technical Manual (MF1150-01) for detail settings and values.

5.5.3 Display of Logo

A Logo of a bit map image can be displayed during Windows CE booting. Only xx.bmp file can be used as a logo file. Below shows the procedure.

1) Prepare a bit map image file (xx.bmp) as a log file. 8bpp (256 colors) can be used. The resolution of the bit map image should be equal or less than the display resolution specified by **startup.dat**.
2) Copy the file into the root directory of the CompactFlash Card.
3) Specify the name of the bit map file and the display location in **startup.dat**. The location can be chosen from “center of display” or “dot”.

How to specify the name of the logo file;

1) Search [LOGOFILE] in the **startup.dat** file.
2) For example, logofile.bmp is a name of the logo file. Describe as below;

```
[LOGOFILE]
logofile.bmp
```

Note: The file name is not case sensitive.

Note: If no logo file is specified in **startup.dat**, no logo is displayed during Windows CE booting.

How to specify the location of logo in the screen

1) Search [LOGOXY] in the **startup.dat** file.
2) If the logo should be displayed in the center of the screen, specify as below;

```
[LOGOXY]
FFFF  FFFF
```

Note: The characters used here are not case sensitive.

Where the first parameter specifies the location of the left most edge of the logo image

horizontally, the second parameter specifies the location of the top edge of the logo vertically. Only when both are “FFFF”, it is located in the center of the screen.

5.5.4 FrzDri Function

Windows CE has been made for a product that always keeps memory alive. Because registry information and files are stored in RAM Section, the information will be lost when the power is removed from the system. EPSON Windows CE 2.11 development kit provides a feature to save and restore the information of the RAM Section as a file. It is called “**FrzDri**”.

“**FrzDri**” has several advantages such as

- When a frequent configuration is necessary, “FrzDri” holds the latest configuration before removing the power, then restores it into RAM Section after power up.
- Only one set of NK.BIN in conjunction with several different “FrzDri” files is adequate to several different hardware configuration.
- If a couple of different boot up configuration is necessary, it can be done by using a different “FrzDri” file in **startup.dat**.

In summary, the main features of “FrzDri” are

1) Saves RAM Section as a file before removing power.
2) Restore the saved “FrzDri” file to restore the information into RAM Section.

The following sections describe the detail of usage of “FrzDri” function.

Back up function (Save to Disk “S2D”)

1) Generation of back up file

The information in RAM Section is stored as a file “**NK.FZD**”. “NK.FZD” should be made by “BLDFZD” utility software. “NK.FZD” must be present at the root directory of the boot device.

2) Backing up RAM Section

Upon pushing the manual reset button of the SH-CARD evaluation board (SCE88J0X01),

the data in RAM Section is stored into NK.FZD automatically (IS IT TRUE ?). After completing the data saving, the display turns off. It is safe to remove the power from the target system. Also after completing the data saving successfully, "PWOFF#" signal becomes "Low" state. It is highly recommended to use "PWOFF#" signal to control the system power supply.

Reboot after RAM Data Restore

NKLOAD restores RAM data from a "FrzDri" file, before Windows CE boots up. Start up data in **startup.dat** determines the way of reboot; either initialize DRAM or restore DRAM data. In other words, if NK.FZD is present in the boot device and it is specified in **startup.dat**, RAM data is restored before booting Windows CE.

Please note the following points;

- The file name containing the DRAM data for restore must be specified in **startup.dat**, and it may be different name than NK.FZD.
- If no such file specified in **startup.dat** present in the boot device, or the file is not the correct format, Windows CE boots up with default setting.

How to Specify The File Name of "FrzDri" File

1) Search [FRZDRI] in **startup.dat**.
2) Specify the back up file as shown below;

[FRZDRI]
NK.FZD

Note: If there is no specified file is present in the boot device (at root directory), "FrzDri" function does not work.

How to Specify The File Name of Logo

1) Search [FZDBMP] in **startup.dat**.
2) Specify the image file name as shown below;

[FZDBMP]
sample.bmp

Note: If there is no specified is present in the boot device (at root directory), no bit map image will be displayed during boot up.

5.5.5 LCD Resolution

The standard Windows CE usually requires to re-compile the whole thing with an associate video driver to accommodate with a new display resolution of a LCD panel. EPSON Windows CE does not require to do so. Parameters in **startup.dat** can specify the resolution of a LCD panel and Windows CE uses the display setting thereafter. EPSON supports two resolutions as standard, 640 x 480 and 800 x 600. The video drivers are built-in the DevKit CD of SCE88J4X01. The following LCD panels are supported by EPSON Windows CE and confirmed the function with SH-CARD. Different panel needs different parameters. Please contact with a sales representative to get parameters.

- TFT LCD 640x480 pixels, 256 or 65,536 colors
- TFT LCD 800x600 pixels, 256 or 65,536 colors
- STN LCD 640x480 pixels, 256 or 65,536 colors

5.5.6 How to Invoke Quick Debugger "DEBUGS"

Quick Debugger "DEBUGS" will start if it is specified in **startup.dat**. NK.BIN does not start in this case. LOADER loads the debugger into the memory only when the debugger name is specified in **startup.dat**.

How to Specify "DEBUG"

1) Search [DEBUGGER] in **startup.dat**.

3) Specify the debugger file name as shown below;

```
[DEBUGGER]
DEBUGS.BIN
```

Note: If no debugger file is specified, Windows CE starts booting instead.

6 Quick Debugger “DEBUGS”

About Quick Debugger “DEBUGS”

“DEBUGS” enables the hardware diagnostics or test of the SH-CARD evaluation board (SCE88J0X01). “DEBUGS” is stored in the enclosed ATA Card in the evaluation kit.

6.1 How to Use “DEBUGS”

The following chapters describe how to use “DEBUGS” from the enclosed ATA Card. If another ATA Card with “DEBUGS” is necessary, please refer to the section “How to Generate an ATA Card with “DEBUGS”.

How to boot “DEBUGS”;

1. Setting up the hardware.
   1) Connect CRT, PS/2 keyboard, and power supply with the evaluation board.
   2) Insert the enclosed ATA Card with “DEBUGS” into the PCMCIA Slot-A.
2. Turn-on the power
   1) Turn the power of the evaluation board on.
   2) “DEBUGS” will start from the ATA Card, then a prompt “-“ will appear on the screen.
   3) It is ready to enter “DEBUGS” command from the keyboard.
3. “DEBUGS” Commands
   The following commands are supported by “DEBUGS”;

1	RB, RW, RL command	(Read byte/word/long word)
2	RB, RW, RL command	(Write byte/word/long word)
3	DB, DW, DL command	(Dump byte/word/long word)
4	E command	(Edit)
5	REG command	(Register editor)
6	CLS command	(Clear screen)
7	H command	(Help)
8	SBR command	(Write to SBR)
9	LCD command	(LCD test)

Below describes the syntax of the commands.

1 RB, RW, RL command (Read byte/word/long word)

[Syntax] RB aaaaaaaa
RW aaaaaaaa
RL aaaaaaaa

[Behavior] Displays data at Address aaaaaaaa
RB command; 8bit
RW command; 16bit
RL command; 32bit

2 WB, WW, WL command (Write byte/word/long word)

[Syntax] WB aaaaaaaa dd
WW aaaaaaaa dddd
WL aaaaaaaa dddddddd

[Behavior] Write data into Address aaaaaaaa
WB command; 8bit
WW command; 16bit
WL command; 32bit

? D, DW, DL command (Dump byte/word/long word)

[Syntax] D aaaaaaaa
DW aaaaaaaa
DL aaaaaaaa

[Behavior] Displays 256 bytes from Address aaaaaaaa
D command; 8bit
DW command; 16bit
DL command; 32bit

? E command (Edit Memory)

[Syntax] E aaaaaaaa

[Behavior] Edit the memory data at Address aaaaaaaa
(1) Displays 256 bytes of data from Address aaaaaaaa
(2) It waits for keyboard input.
(2) User can edit the data from the keyboard.
? Operation of keys
· Arrow Keys (? ? ?) ? : move cursor
· Digit Keys (0~ 9, A~ F) : enter digit
· <Enter> Key : store the editing data
· <Esc> Key : exit from the command

? REG command (Edit Register)

[S y n t a x] R E G

[Behavior] Edit the registers of SH-CARD

(1) Displays values of registers of SH-CARD
(2) It waits for keyboard input.
(3) User can edit the data from the keyboard.

The registers subject to change are
(a) Registers of Companion Chip
(b) Registers of SH7709A
(c) Registers of SED1355

? Operation of keys

- Arrow Keys (? ? ?) ? : move cursor
- Digit Keys (0~ 9, A~ F) : enter digit
- <Enter> Key : store the editing data
- <PgDn> <PgUp> Keys : change register values
- <F5> Key : restore the register value
- <Esc> Key : exit from the command

? CLS command (Clear screen)

[Syntax] CLS
[Behavior] ? Clear screen, then
? move the cursor upper left corner

? H command (Help)

[Syntax] H
[Behavior] Display the syntax of a command

? SBR command

[Syntax] SBR SBR.BIN drive
drive A: PCMCIA Slot-A
B: PCMCIA Slot-B
C: CompactFlash
[Behavior] Write **sbr.bin** stored on a boot device (ATA Card) into the sector #2 or the following sectors of the specified “drive”.

- The operation of SBR command is as shown below;
  1) Load a file from the boot device
  2) Write a file into the specified “drive”
  3) Verify the data integrity

? LCD command

[Syntax] LCD

[Behavior] · Display test of LCD/CRT controller SED1355
· Any parameters of SED1355 may be tested by using the command.

Note: A parameter buffer table is prepared to change the register value of SED1355. After setting the parameters in the table for a particular display test, the test can be done.

When the display test is completed, the display mode is set to "CRT only" with 640x480 pixels mode.

[Detail of LCD command]

The following menu is displayed when LCD command is entered.

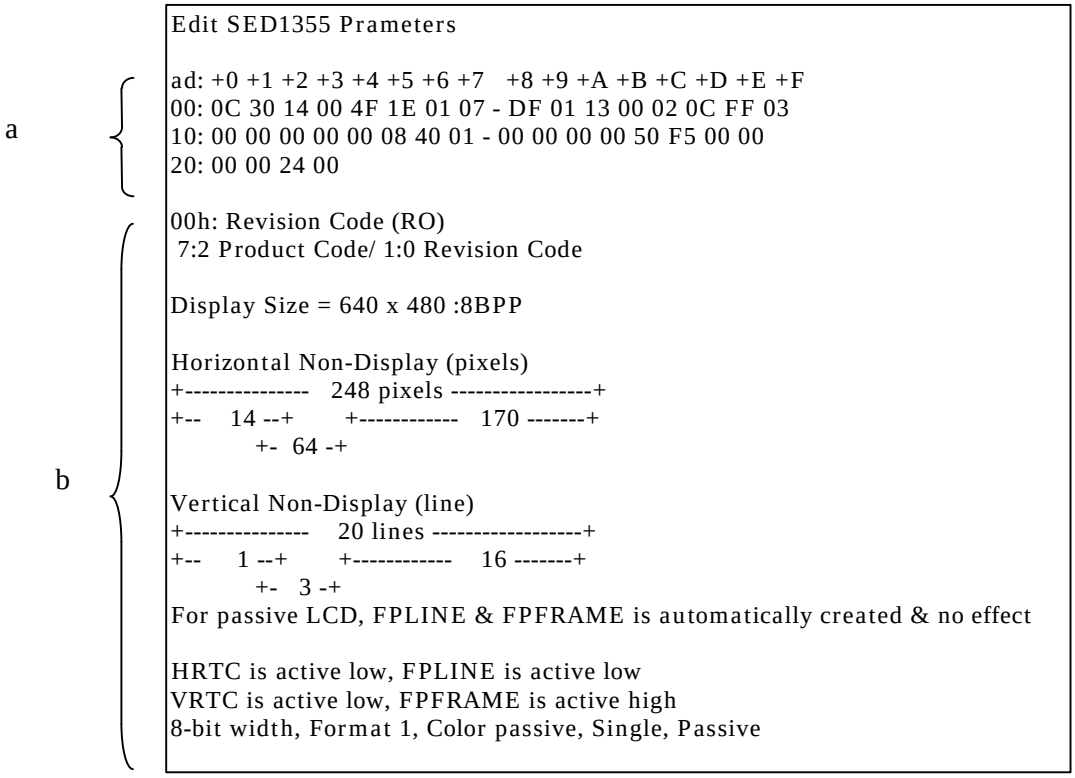
```
LCD Display Test
1. Edit parameters
2. Display
3. Video Test
A. Set default parameter (CRT, 16bpp)
B. Set default parameter (CRT, 15bpp)
C. Set default parameter (CRT, 8bpp)
D. Set default parameter (CRT, 4bpp)
E. Set default parameter (CRT, 2bpp)
F. Set default parameter (CRT, 1bpp)
G. Set default parameter (CRT, 800x600,8bpp)
Q. Quit
H. Show help
```

A test can be made by choosing one set of parameters from the menu. For example, if "1" is typed, "Edit parameters" will run.

The next page shows the detail of the operation.

(1) Edit parameters

· It edits parameter buffers. The following image appears on the screen.



· The area indicated by “a” above shows the parameter buffer editing.
· Registers (indexed from 00h to 23h) of SED1355 can be edited.
· Use digit keys (1 ~ 9, A,B,C,D,E,F) and arrow keys to edit.
· Exit from the editing mode by pressing <Esc> Key.
· The power on default value is set to “640x480 pixels, 8bpp, CRT only”.

· The area indicated by “b” shows the meaning of the parameters.
· The information shown above will be updated when the parameters are modified.
· Please refer to “SED1355 Technical Reference Manual” for the detail of the register values.

(2) Display

· It tests the display modes.
· Parameters set by “Edit parameters” command will be stored in the registers of SED1355. After a several LCD display sequences, a test pattern data will be displayed.
· Exit by <Esc> Key.

(3) Video Test
- This function does the similar test as described at (2).Display.
- Exit by <Esc> Key.
- It displays a different test pattern for screen 1 and screen 2 of SED1355.

(4) A. Set default parameter (CRT, 16bpp) /
B. Set default parameter (CRT, 15bpp) /
C. Set default parameter (CRT, 8bpp) /
D. Set default parameter (CRT, 4bpp) /
E. Set default parameter (CRT, 2bpp) /
F. Set default parameter (CRT, 1bpp) /
G.Set default parameter (CRT, 800x600,8bpp)

- These choices store the standard parameters into registers of SED1355.
- If one of them are chosen before doing (1) Edit parameters, it decreases user's work for editing data.
- All settings above are for "CRT only".

(5) Q. Quit
- Quit from a command

(6) H. Show help
- It displays help screen to explain key operation for parameter buffer editing screen and test pattern displaying screen.

6.2 How to Make an ATA Card to Boot Quick Debugger

The procedure to make an ATA Card to boot quick debugger "DEBUGS" is already explained in the section "2.1 Back up of an ATA Card".

7 Power Management

EPSON Windows CE 2.11 for SH-CARD has two power management modes, CPU standby mode and suspend / resume mode.

7.1 CPU Standby Mode

CPU Standby mode is invoked when Windows CE detects an idle state (in which Windows CE kernel does not have any thread to run). During CPU Standby mode, CPU is put in sleep mode, while the CPU internal peripheral devices keep running and a clock is driven through CKIO terminal. CPU resumes operation one of the following events occurs;

- NMI
- IRQ0 (Suspend / Resume button, RTC Alarm, or Timer interrupt)
- IRQ1 (LAN interrupt)
- IRQ2
- IRQ3
- IRQ4
- Reset

7.2 Suspend / Resume Mode

Suspend / Resume mode is invoked when “SRBTN#” signals becomes “Low” state. When a suspend / resume button is pressed, “SRBTN#” becomes “Low” with the SH-CARD evaluation board. Windows CE recognizes the suspend / resume event and calls device drivers for power off operation. It then calls power off routine of HAL to enter Suspend mode. During the Suspend mode, CPU is put into Standby mode, CPU internal peripheral devices are all stopped and the clock through CKIO terminal is also stopped.

Below indicates the status of each device of SH-CARD during Suspend mode.

CPU (SH7709A)

Standby mode (CPU and its internal peripheral devices are all stopped. No clock is driven

through CKIO terminal)

SDRAM

Self refresh mode.

Video

- SED1355 Hardware suspend mode
- DAC IREF turned off
- VRAM Self refresh mode
- LCD Turned off

Companion Chip

- Companion Chip Standby mode
- Timer Ch0 clock stop
- Timer Ch1 clock stop
- Timer Ch2 clock stop
- Serial 3 clock stop
- Serial 4 clock stop
- Keyboard Interface clock stop
- Mouse Interface clock stop
- PCMCIA, CompactFlash clock stop

Note: When LCD is turned off and on by suspend / resume operation, a programmed period of wait (which is specified in **startup.dat**) is inserted until the LCD panel settles. The period of wait is determined by the fourth parameter of “video mode characteristics data” indicated by [1355PROPERTY] key in **startup.dat**.

EOF