



Saturn Boot ROM
ver. 0.8
Floppy Disk Information

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SEGA

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Contents

¥	BOOTIP	--- Sample for initial program (IP) creation.
	BOOT080	--- Source for BOOT ROM Version 0.80 (V0.80)
	FUJITA	• Services design tool from SCSI.
	MASANORI	• Loads and runs CD-ROM file IP from SCSI or SIMM.
	SUZU	• Initializes hardware; loads and runs IP from cartridge or MAP.

Development Environment

These files were created with the Sun workstation version of the SH development software. MAKEFILE must be rewritten before creating on a PC.

When reinstalling on the Sun workstation, change the file names to lower case except for the following file where uppercase is partially used, and then restore:

`boot080/fujita/MB89352A.h`

On the Sun workstation, create the object files in the following order.

Enter the MAKE command under the BOOT080 directory to create the BOOT ROM (V0.80 for BIG BOX Release 1) object. To create files that will be written into the ROM chip, a Sun workstation and a LAN-connected E7000 emulator are needed.

The IP sample can be created with the Sun workstation version of the SH development software. Enter the MAKE command to create all necessary object files under the BOOTIP directory.

Change and use the following files to match the application:

`sys_id.src` and `smp_sys.src`

Reference

BOOT ROM V0.80 checks the following items in `sys_id.src`:

`offset H'00` Presence or absence of "SEGA" characters

`offset H'E0` IP size (minimum H'1000, maximum H'8000)

`offset H'E4` Start address (Must be in range of H'6010000 + IP size.)

Using E7000 in BOOT ROM Creation

First connect the FTP to the Sun, and then switch to the BOOT080 directory. Note the following E7000 commands:

FTP> ASC

FTP> LTR LD.COM;R:LD.COM

FTP> BIN

FTP> CC LD.COM

As a result, the necessary load modules are automatically downloaded to the E7000. After the modules are downloaded, the BOOTROM.MOT file is created in the BOOT080 directory. This file becomes the source file for the data that is written into the 2 Mbit ROM chip.

Loading the BOOT ROM (V0.80) Initial Program (IP)

Currently, the BOOT ROM IP is loaded into memory at the following fixed address. (The address may be changed in the future.)

H'6010000 (Beginning of work RAM + 64 KB offset)

Cartridge IP Load

If ID (object of sys_id.src) is at one of the following memory addresses, the load program begins to load IP before displaying the logo screen display.

H'2000000 (ROM board connected to the A-bus connector) Priority
H'1000000 (E7000 MAP memory)

Before loading the IP, the load program checks the following:

offset H'00 "SEGA" characters are present

If the "SEGA" characters are absent, the load program will not load the IP. After loading the IP, the load program checks the following ranges in the work RAM:

offset H'E0 IP size (minimum H'1000, maximum H'8000)
offset H'E4 Start address (Must be in range of H'6010000 + IP size.)

If the ranges are appropriate, the program jumps to:

H'6010100 sys_sec.obj ... Dummy security code

(After passing through that address, the program jumps to the start address of sys_id H'E4.) Both sys_id and sys_sec are therefore necessary to load and run the IP.

IP Loading from a CD-ROM (Emulation)

If the IP.BIN file is in the SIMM memory, the load program begins to load the file to the work RAM immediately after the logo screen display is started.

H'4000000 (The file is in SIMM memory. However, the header is the IP.BIN file header instead of "SEGA.")

After IP loading from the SIMM memory fails, the load program begins to load the IP from the SCSI if the DIP switch settings for SCSI usage on the Saturn main unit are correct and if the IP.BIN file is in the hard disk of the CD emulator host machine.

After loading the IP, the load program checks the following items in the work RAM:

offset H'00 Presence or absence of "SEGA" characters
offset H'E0 IP size (minimum H'1000, maximum H'8000)
offset H'E4 Start address (Must be in range of H'6010000 + IP size.)

If the ranges are appropriate, the program jumps to:

H'6010100 sys_sec.obj ... Dummy security code

The subsequent steps are the same as for IP loading from a cartridge.

Remarks

Although the IP.BIN source file does not differ from the cartridge IP, some tools are necessary to convert the program. For information on CD-ROM emulation, refer to the other materials.

IP Loading Fails

The logo screen display becomes still, and depending on the DIP switch settings of the Saturn main unit, the system enters operation mode as a SCSI design tool, or it breaks from the E7000 and loads and runs the application.

Hardware Initialization by the BOOT ROM (1) 03/08/1994 (2) 03/23/1994

CPU Initialization

CPU type	Initialization by BOOT ROM		Initialization during user-defined usage
	V0.80	V0.90 and above	
Master SH2 cache	1 KB, 4-way	Same as for V0.80	Can be changed (2-way + 2KB bank)
Bus control	For BIG BOX	For MID For SMALL	Not necessary. Or, can be used for same initialization
Interrupt control	Defines vector numbers of installed modules. Priority is 0. (No actual use in verification initialization.)	Same as for V0.80 Assigns FRT input capture interrupt to communication with slave SH2.	Vector numbers can be changed if no constraints are imposed by high-level software, such as the library. Priority must be changed before installed modules can be used.
Vector table, VBR	Regulates use of initial work RAM area.	Same as for V0.80	Cannot be changed
SP	Occupies about 8 KB in work RAM.	Same as for V0.80	Can be changed
Other	No processing	Same as for V0.80	Arbitrary or restricted by regulations
Slave SH2 cache	(Currently, no hardware) 1 KB, 4-way	Same as for V0.80	Can be changed (2-way + 2KB bank)
Bus control	For BIG BOX	For MID For SMALL	Not necessary. Or, can be used for same initialization
Interrupt control	No processing. Undefined	Assigns FRT input capture interrupt to communication with master SH2. Slave has only this interrupt, no SCU interrupt.	Priority must be changed before installed modules can be used.
Vector table, VBR	Initializes initial work RAM area. +H'800	Undefined	
SP	Occupies about 2 KB in work RAM.	Undefined	Can be changed
Other	No processing	Undefined	Arbitrary or restricted by regulations
DSP	(No hardware) No processing	No processing?	Arbitrary or restricted by regulations
68000	No processing during erratic run. Cannot be controlled.	Can be used as a demonstration?	Arbitrary or restricted by regulations
MPC	(No hardware)	SMPC operates without initialization. Used for clock setup, backup RAM management.	Arbitrary or restricted by regulations

2. Board Initialization

Init type	Initialization by BOOT ROM		Initialization during user-defined usage
	V0.80	V0.90 and above	
Work RAM	Writes vectors to first 64 KB. No data is written to other areas.	Same as for V0.80 (Size may be reduced)	Arbitrary except for first 64 KB
SCU interrupt control	Allows VBI, VBO, and end code fetch interrupts. Also, allows A-BUS interrupt when SCSI is enabled.	Processing changes depending on graphic tool	Arbitrary or restricted by regulations. Note that A-bus needs CD or SCSI.
DMA	Stopped (Currently, no hardware)	Same as for V0.80	Arbitrary use or may require regulations if constrained by high-level software
A-bus setup	Sets SCSI1 and SIMM memory refresh.	Same as for V0.80	Cannot be changed
VDP1 register	1/60 auto draw Transparent illustration	Processing changes depending on graphic tool	Arbitrary
RAM	Terminate command only	Processing changes depending on graphic tool	Arbitrary
VDP2 register	320 mode VRAM allocation A0-NBG0 Character A1-NBG0 Name B0-NBG1 Character B1-NBG1 Name 16x16 cells 16 million colors 24-bit name	Processing changes depending on graphic tool	Arbitrary
VRAM	Logo (NBG1) Background (NBG0)	Processing changes depending on graphic tool	Arbitrary

3. Work RAM Initialization

Unit type	Initialization by BOOT ROM		Initialization during user-defined usage
	V0.80	V0.90 and above	
Vector table	Already set up in beginning of work RAM.	Same as for V0.80	Cannot be changed due to regulations.
Hook area	+H'280 IP check (Not disclosed)	Overall modification scheduled for security reasons	Not disclosed
	+H'300 Interrupt handler. 4 registration references	Scheduled addition of disclosed routines, such as SCU interrupt mask setup Specifications being studied. Scheduled addition of multiplayer-related routine, resolution change routine	Forced usage to user Not disclosed
Debugging monitor	+H'700 SCU interrupt Counter	Deleted.	Status monitoring of normal C functions registered to interrupts by user. For V0.80 only; therefore not disclosed.
Service routines	Resident interrupt handler (Includes monitor function)	Resident interrupt handler. Hook services.	Can be used through hook area. Cannot be used directly.
SCSI	Used for graphic tool.	Deleted in product version Continued in development version	Can be used as a development tool