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Consumer Products Division

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SNASM-CD Installation Manual

May, 1993

ver. 1.0

SEGA CD™

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INTRODUCTION

SNASM-CD is a very flexible, high performance 68000 assembly language development system made up of the following components:

SNASM68k

Converts programs written in 68000 assembly language into absolute code which can be sent directly to the target machine, CPE (Cross Product Executable) files; or object modules suitable for linking.

SNBUG68k

Allows 68000 programs running on the target machine to be debugged from the development machine.

SNLINK

Combines object modules created by the SNASM68k program, and evalutes any expressions which could not be resoved earlier.

SNLIB

A utility program that builds and maintains object module libraries (a collection of object modules which reside in one file) for SNLINK.

SnSERVER

A TSR utility which allows a remote computer to read and write files into a PC's hard disk.

Additional Copies

To obtain additional copies of this document, contact:

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CONTENTS

SNASM FEATURES:

Hardware Link

The development PC is connected to the target machine using a SCSI (Small Computer Systems Interface) bus to speed program development. SNASM68k, SNLINK, and SNBUG68k use this interface to send code to the target machine.

Convenience

A program can be assembled and debugged without exiting the Brief editor, greatly speeding up the edit/assembly/debug process.

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Hardware Installation

Hardware Requirements

SNASM68k requires the following minimum configuration:

- IBM-PC or compatible
- For development, a second IBM-PC is needed (one for emulation, the other for development).
- One free 8 and 16 bit slot; or two free 16-bit slots
- 256k of memory
- MS-DOS 2.0 or above
- If two PC's are being used, one must have a 1.2 gig drive
- A hard disk with approximately 500k of free space

Hardware Recommendations

- 8mhz IBM PC/AT or faster
- A fast hard disk
- 640k of memory and a 1Mb RAM disk
- DOS 3.0 or above
- VGA graphics

Configuring the SNASM SCSI Card

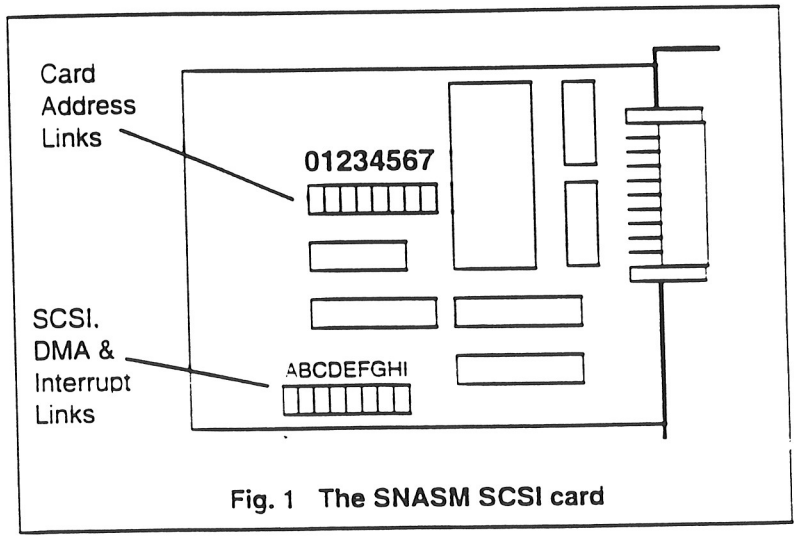

Fig. 1 The SNASM SCSI card

The SNASM SCSI card can reside at one of several addresses in the PC's port map. The links labelled 0-7 (see *Figure 1*) are used to set the desired address as follows:

Link	Address
0	300-307
1	308-30F
2	310-317
3	318-31F
4	380-387
5	388-38F
6	390-397
7	398-39F

Note: The card is preset with link 6 connected at 390 hex.

The SCSI bus supports up to eight devices, each requiring a different SCSI number. The links labelled A-I (see *Figure 1*) are used to set the SCSI number, in addition to the DMA and Interrupt channels the card will use.

Link	Address
A	IRQ5
B	IRQ7
C	DRQ1
D	DACK1
E	DRQ3
F	DACK3
G	Bit 2
H	Bit 1
I	Bit 0

Notes:

* The card is preset with links C and D connected so the card uses DMA channel 1. To use DMA channel 3, move jumpers to links E and F; or remove them if hardware DMA is not desired.

* Links G and H are connected giving the card a SCSI device number 6. This should not be changed unless it clashes with another device on the SCSI bus. Do not set the SCSI ID to 5 or 7.

* Links A and B should be left unconnected if interrupts are not currently used.

Installing the SCSI and Emulator Cards

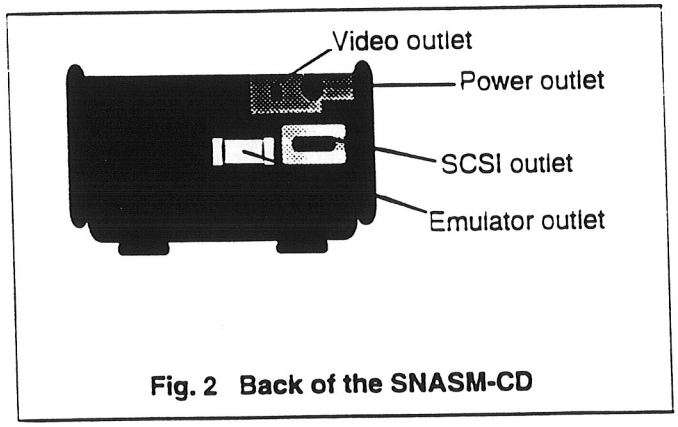

Fig. 2 Back of the SNASM-CD

1. Make sure the SNASM-CD and both PC's (the CD emulator is usually in a second PC which is connected to the first) are powered down.

2. Insert the SNASM SCSI BOARD into an empty 8 or 16-bit slot inside the debugging computer.

3. Insert the EMULATOR BOARD into an empty 16-bit slot inside the emulator computer.

4. Connect the SNASM SCSI board to the SNASM-CD by attaching the SCSI cable to the board and into the SCSI OUTLET in the back of the SNASM-CD (see *Figure 2*).

5. Connect the EMULATOR BOARD to the SNASM-CD by attaching the rainbow cable to the board and into the EMULATOR OUTLET in the back of the SNASM-CD (see *Figure 2*).

6. Plug the 9V@3A POWER SUPPLY into the POWER OUTLET in back of the SNASM-CD.

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Hardware Setup

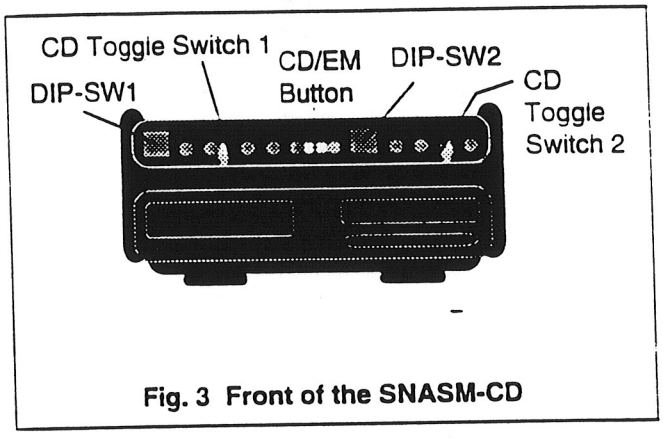

Fig. 3 Front of the SNASM-CD

The SNASM-CD can function as a standard MegaDrive CD player, or an assembly language development system/debugger, depending on the configuration of the DIP Switch, CD Toggle Switches, and the CD/EM Button.

DIP Switch Functions

Two banks of DIP Switches appear on the front of machine (see *Figure 3*). DIP-SW1 (the left bank) controls the main CPU, and its functions are:

Switch	Default	Function
1,2,3	7. All on	SCSI ID
4,5	off, off	4 (ntsc/pal); 5 (Japan/US)
6	On	IO Block enable
7	On	Enable startup from debugging ROM
8	On	Enable mapping of RAM into 00000-1FFFF

IP-SW2 (the right bank) controls the sub CPU, and its functions are:

Switch	Default	Function
1,2,3	6. 1,3 On; 2 Off	SCSI ID
4,5		Unused
6	On	IO Block enabled (off to disable extra hardware)
7	On	Enable startup from debugging ROM
8		Unused**

** The main CPU normally boots from a ROM in the MegaCD. If DIP 8 is enabled, then this ROM is mapped to 40000 and RAM is mapped at 0. This allows different BIOS ROMs to be sent to the unit without changing ROM (see **Megarun.exe** on page 9).

> **Note:** For normal programming, all DIP switches can be left in their default positions, except 4 and 5 on the main side).

CD Toggle Switches

CD Toggle Switch 1 on the front of the machine (refer to *Figure 3*) controls the main CPU, while the CD Toggle Switch 2 operates the sub CPU. When both switches are to the left (OFF or ROM), the relevant CPU will boot as a normal MegaDrive with MegaCD and debugging won't be possible. If both switches are to the right (ON), the processor will boot from the internal debugging ROM and the unit can be controlled via the SCSI interface.

Note: The CD Toggle Switches work in conjunction with the CD/EM Button described in the next section.

The two LED's left of each switch indicate, when lit, which system is currently active (main CPU or sub CPU).

The CD/EM Button

The CD/EM Button works jointly with the CD Toggle switches. When the switches are set for OFF, the CD/EM Button must be in the out (CD) position. Likewise, when the switches are on, the button must be pushed in (EM).

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Software Installation

Software installation consists of these two procedures done in the following order:

1. Installing the SNASM68k software
2. Installing the SnServer utility

Installing the SNASM68k Program

> **Note:** The SNASM program is designed (but not required) to work within the Brief text editor. If you wish to work in this manner, make sure Brief is installed BEFORE installing the SNASM program.

The INSTALL program on the SNASM68k floppy disk will automatically install the entire SNASM system. Insert the SNASM68k floppy disk into a drive, change to that drive by typing **A:** or **B:**, then type **INSTALL.**

While in the install program, pressing **Y**, **N** or **ESC** is requested in most cases. INSTALL will perform the following steps:

1. INSTALL first checks to see if the default directory **c:\SNASM** exists. If it doesn't, that directory (or a user specified one) will be created.

2. INSTALL will then ask for the boot drive where the autoexec.bat file is located. Install will not continue until autoexec.bat is found.

3. The location of the SNASM68k floppy disk (either **A:** or **B:**) is requested.

4. If SNASM68k has been installed in the past, the user will have the option to backup old files.

5. Should INSTALL detect that the directory holding the executable files in not on the search path of the users system, it will ask if it should add it.

6. INSTALL will next look for the BPATH and HHELP environmental variables to determine where (or if) to copy the Brief macros and menu files to.

7. Before editing the autoexec.bat file, INSTALL will prompt the user if a backup (as autoexec.old) should be created.

8. SCSILINK is a program which handles the communications between the PC and the target machine, and must be installed before any programs can be run. INSTALL will ask the user if SCSILINK should be installed using the default configurations. If so, INSTALL will add a line to the autoexec.bat file instructing SCSILINK to automatically install itself upon booting. If not, then user specified configurations can be entered, or SCSILINK can be loaded manually.

Note: Refer to the next section for more information on SCSILINK.

9. Once INSTALL finishes, the computer must be reset to load the new SNASM evnvironment.

SCSILINK

Usage:

SCSILINK address [,D?][,I?]

Default:

SCSILINK 390,D1

* The "address" is whatever was set using links 0-7 on the SNASM SCSI card (default is link 6 at 390 hex).

* The number after "D" should be the DMA channel currently being used. If no channel is specified, DMA will not be used.

* The "I" parameter is used to give the card a different SCSI device number without manually changing the links inside the computer. This is not often required, however.

Note: SCSILINK must be loaded before any of SNASM68k's other programs can be run.

Installing the SnServer Utility

Note:	The SNASM68k program must be installed BEFORE installing the SnServer utility.

SnServer is a TSR (terminate and Stay resident) utility which allows a remote computer connected to the SNASM SCSI bus to read and write files onto a PC's hard disk. It is designed to speed up the development of software by allowing data files and program overlays to be kept on the PC's hard disk, thereby eliminating the need of copying them to disk on the remote machine.

REQUIREMENTS

- SNASM68k 1.02 or greater with SCSI interfaces
- SNBUG68k 1.02 or greater
- DOS 3.0 or greater

RECOMMENDED

- Brief 1.50 or later

The INSTALL utility on the SnServer floppy disk will copy the required files into your SNASM directory and customise any Brief SNASM macros to allow the use of SnServer from within Brief. Insert the SnServer floppy disk into a drive, change to that drive by typing **A:** or **B:**, then type **INSTALL.**

While in the install program, pressing **Y**, **N** or **ESC** is requested in most cases. INSTALL will perform the following steps:

1. INSTALL first checks to see if a **\SNASM** directory exists on the hard drive. If so, the user will be asked if new SnServer files should be copied into the SNASM directory.

2. INSTALL will next indicate whether or not Brief has been found. If not, INSTALL will recommend it be installed before continuing.

3. The location of the SnServer floppy disk (either **A:** or **B:**) is requested.

4. If SnServer has been installed in the past, the user will have the option to backup old files.

5. INSTALL will indicate if installation is successful or not.

Updating the CPU Code

The Interrupt Vector information listed in the **APPENDIX** must be added to the main CPU and sub CPU code so the debugger can gain control of the CPU when the startup code is loaded and executed.

Operating the SNASM-CD

The two vital executable programs that make SNASM-CD work are "Sega.exe" and "Megarun.exe".

Sega.Exe

This program is an ICOM disk emulator utility that emulates a Sega CD-ROM. Sega.exe must be copied into the \SNASM directory.

Usage:

SEGA Name -

* "Name" is the emulation file to be debugged.

Megarun.Exe

The SNASM-CD development system has a utility called MEGARUN that allows different BIOS to be downloaded to the unit. This permits different BIOS versions to be used without having to actually change the boot ROM chip.

The following are steps to download a U.S. BIOS to a Japanese MegaDrive development system (which is the way they come from Cross Products):

1. Turn off dip switches 4 and 5 on the main side of the unit to convert the MegaDrive to a Genesis.

2. The BIOS bin file must be split and rebuilt opposite of what is required to burn the bin file onto an EPROM. We split the binary into two images: ROM0 and ROM1. To burn an EPROM, these files are combined as ROM0 ROM1 to make BIOS.BIN For Megarun, the files must be combined ROM1 ROM0 to make MBIOS.BIN. This MBIOS file is then ready for downloading.

3. To download to the development system, flip both CD Toggle switches to the RIGHT.

4. Type **MEGARUN -f**(filename)

   For example: **MEGARUN -fMBIOS.bin**

5. If you have problems, make sure that the SCSI id (bank jumpers on the bottom of the SCSI board) is NOT set to 5 or 7.

Start-Up Procedure

The following steps will run the SNASM-CD development system/debugger:

Note: Before beginning, make sure the CPU code is updated. See *Updating the CPU Code* on page 8.

1. Configure the SNASM SCSI card and DIP Switches to desired specifications.

2. Flip both CD Toggle Switches to the RIGHT.

3. Press the CD/EM Button IN.

4. Turn on the SNASM-CD unit.

5. Power up your PC.

6. From the \SNASM directory, type **SEGA**, followed by the name of the file to be emulated.

7. At the DOS prompt, type **MEGARUN -c**. The message "Mega CD patching complete" will appear when the file is successfully loaded.

Note: Enter **MEGARUN -f** if you need to download a different BIOS.

8. Type **snbug68k** to display the program on screen for debugging.

Appendix A

```
; Code run by sub CPU

; Initialize Snasm vectors - wait for main CPU to turn off write protect first
                move.w 0,d0                     ; get contents of location 0
@wait           add.w   #1,0                    ; try to add 1 (check write protect)
                cmp.w   0,d0
                beq.s   @wait                   ; loop whilst wrprot
                move.w d0,0                     ; restore loc 0

SSCSITrap       equ     $208008
SSCSIExcept     equ     $20800C
                move.l  #$02<<24+SSCSIExcept,8+(4*0)
                move.l  #$03<<24+SSCSIExcept,8+(4*1)
                move.l  #$04<<24+SSCSIExcept,8+(4*2)
                move.l  #$05<<24+SSCSIExcept,8+(4*3)
                move.l  #$06<<24+SSCSIExcept,8+(4*4)
                move.l  #$07<<24+SSCSIExcept,8+(4*5)
                move.l  #$08<<24+SSCSIExcept,8+(4*6)
                move.l  #$09<<24+SSCSIExcept,8+(4*7)
                move.l  #SSCSITrap,$80

@l              trap    #0
                bra.s   @0


; Code for main CPU
;allow the sub CPU to modify its ROM
                move.w $a12002,d7       ; get sub write protect
                move.w d7,d6
                and.w   #$00FF,d7       ; allow write to all
                move.w d7,$a12002
; and then modify our own
                move.b d0,$108000       ; allow write to Snasm RAM (128K emulated ROM)

MSCSITrap       equ     $108008
MSCSIExcept     equ     $10800C
                move.l  #$02<<24+MSCSIExcept,8+(4*0)
                move.l  #$03<<24+MSCSIExcept,8+(4*1)
                move.l  #$04<<24+MSCSIExcept,8+(4*2)
                move.l  #$05<<24+MSCSIExcept,8+(4*3)
                move.l  #$06<<24+MSCSIExcept,8+(4*4)
                move.l  #$07<<24+MSCSIExcept,8+(4*5)
                move.l  #$08<<24+MSCSIExcept,8+(4*6)
                move.l  #$09<<24+MSCSIExcept,8+(4*7)
                move.l  #MSCSITrap,$80

                move.b d0,$10F001       ; write protect Snasm RAM

; delay here long enough to ensure sub CPU has done its changes

                move.w d6,$a12002

@loop           trap    #0
                bra.s   @loop
```

The above code needs to be loaded and executed by the startup code in the disk image.

Appendix B

Notes of Interest for CD-developers

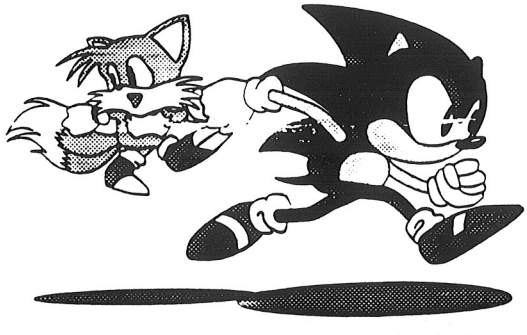
1. The SNASM SCSI card is known to conflict with Soundblaster sound cards.

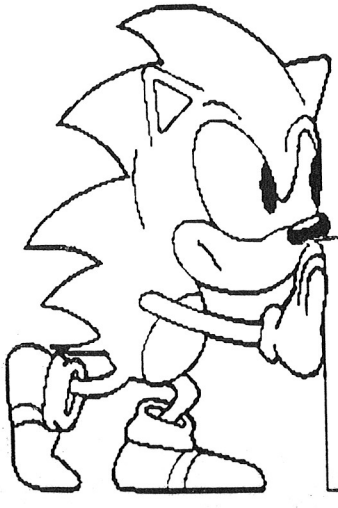
2.. Redbook files produced by a Macintosh cannot be used raw. They must be converted into Inxel format. This tool is available on the SEGA BBS.

3. When using **BD.exe**, a pause must be inserted before the first redbook track or else a crunching sound will be heard during the game.

4. If the emu screen just continues to say reset and never loads the file, remove and reseat the rainbow cable at both ends.

5. If the emu screen displays multiple seeks and reads, but the game is not doing anything, the rainbow cable needs to be reseated.





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