

Geode™ SP1SC10 Reference Platform: Linux Rev 1.0.5 Software Getting Started Guide

National Semiconductor
Getting Started, **Confidential**
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1.0 Introduction

This document provides guidelines for setting up the National Semiconductor® Geode™ SP1SC10 set-top box reference platform, hardware revisions C and D1.

The hardware revision number and serial number are printed on a label located on the top, front of the unit.

There is a slight difference in the location of rear panel connections between revisions C and D1, as shown in Figure 3-1 "SP1SC10 Rear Panel Connections for Hardware Revision C" and Figure 3-2 "SP1SC10 Rear Panel Connections for Hardware Revision D1" on pages 2 and 3.

Note: This is revision 2.0 of this document. The changes from revision 1.1 (dated July 2001) are: Added wording and Figure 3-2 "SP1SC10 Rear Panel Connections for Hardware Revision D1" to indicate this document applies to hardware revisions C and D1.

2.0 Video Options / Software Upgrade Information

2.1 VIDEO OPTIONS

The SP1SC10 platform has two video options: NTSC and PAL. These options were selected to accommodate the video standards for most locations. There are two NSIDs for platforms with the Linux software:

- SP1SC10-NL for the NTSC version
- SP1SC10-PL for the PAL version

The NSID is printed on the outside of the shipping box and on a label located on the top, front of the unit. Verify that the unit shipped has the correct video option as ordered.

2.2 SOFTWARE UPGRADE INFORMATION

The SP1SC10 platform is shipped with Linux software loaded onto the hard disk drive and provides two demonstration programs: Vtest and WebMedia (described in subsequent sections of this document).

All Linux software including boot-up code is located on the hard disk drive. The designation Linux 1.0.5 refers to the basic set of drivers used to create the complete set of files on the hard disk drive, which is known as an "image". While the basic set of drivers may remain the same, the Linux image may change with slight modifications to the setup data, boot-up sequence, video formats, prompt names, or other items.

The name of the image loaded onto the platform hard drive is printed on the label located at the top-front of the unit. The image is designated cyg_105x, where x is a revision letter. Once an image is approved, it is compressed and archived to a CD-ROM using the Symantec's Ghost software. The CD-ROM is then used to load the image onto each SP1SC10 platform, the unit is tested and verified, a label is placed on the top-front of the unit listing the image revision, NSID, serial number and hardware revision, and finally the unit is placed into the shipping box along with available collaterals. (See the included Welcome Letter for a list of kit contents.)

National is continuously making improvements to the Linux software and correcting problems listed in the Software Errata document. It is recommended the user periodically check with their National FAE or local sales office, or check the IA Developer Support web site for software upgrades. There are several methods to upgrade the Linux software or restore lost or corrupted files:

- 1) Use the compressed image to perform a complete image upgrade or restore the image to its original state. Note that everything on the hard drive is erased.
- 2) Re-install all or parts of the image using the RedHat Linux 6.2 software and/or the PSP binary driver files. Retaining old files and image modifications are up to the user. Knowledge of the Linux OS and commands is required.

The compressed image, binary driver files, and procedures document are contained on a CD-ROM which may be included in your SP1SC10 kit depending on availability at the time of shipment. The CD-ROM can also be obtained by contacting your National FAE or local sales office.

3.0 SP1SC10 Demo Setup

3.1 IR KEYBOARD AND REMOTE

The Linux Rev 1.0.5 software version kit requires a PS2 keyboard and mouse, as the drivers for the infrared keyboard and remote have not yet been released. A PS2 keyboard and mouse are not included with this kit, nor will they be in future releases of the SP1SC10 kit.

3.2 ABOUT THE PROCESSOR

The Geode SC1200 Set-Top box on a Chip used in the SP1SC10, is an engineering sample version, and is designated as such by the letters 'ES'. The SC1200-ES version has special features, such as VGA out, which will not be included in the SC1200 production version. The SC1200 may be replaced by the Geode SC1210 Multimedia System on a Chip, however, this will not affect SP1SC10 platform performance. Refer to the SC1200 and SC1210 datasheets for details.

3.3 HARDWARE REQUIREMENTS

The following hardware is necessary to get started:

- TV with a composite or S-video input, L-R audio inputs
- PS2 keyboard
- PS2 mouse

Note: A VGA monitor can also be hooked up, but is not required. A variety of other input and output devices can be connected to the SP1SC10, as noted in the rear panel connection diagrams (Figures 3-1 and 3-2).

3.4 HARDWARE CONNECTIONS

Complete the following hardware connections. Refer to Figure 3-1 for revision C hardware, and Figure 3-2 for revision D1 hardware.

- 1) Remove the SP1SC10 from the box and set it in front of the TV. Do not plug in the power cable.
- 2) Identify the connections for the RCA audio/video, S-video, and power cables.
- 3) Connect the RCA audio/video cable to the SP1SC10 as follows:
 - Yellow to Video
 - White to Audio L
 - Red to Audio R
- 4) Plug the other end of the RCA cables into the TV. If the TV has an S-video jack, it is recommended the S-video cable be used instead of the RCA video cable, for improved video quality.
- 5) Plug the PS2 Y-connector into the SP1SC10 (Note that the PS2 connector is rotated 45 degrees). Connect a PS2 keyboard to the **purple** connector and a PS2 mouse to the **green** connector.
- 6) Connect an antenna or analog cable to the RF connector. This provides an analog TV video source for TV channel access.
- 7) Connect an external video source with audio to the S-video, composite video, and audio input jacks. While these connections are not required, they are needed to demonstrate the Video and S-video software functions.
- 8) Connect an ethernet cable to the ethernet jack. This connection enables web browsing in the WebMedia application, provided the network is configured in Linux.

Note: Linux network configuration is discussed in the Cygnus-Linux Network Configuration section of the Cygnus Setup Procedure guide. Currently this document exists in preliminary format only, and can be obtained from your local FAE.
- 9) **OPTIONAL:** Connect a VGA monitor. The VGA output is intended for testing and debugging, and therefore the picture and graphics on the VGA monitor may not match those on the TV. During some applications, the VGA screen may be blank.
- 10) Once the cables have been connected, plug in the power cable. The unit will boot up and load the Linux software. Refer to Section 4.4 "Vtest application instructions" on page 5 or Section 4.5 "WebMedia Operating Instructions" on page 6 for further information.

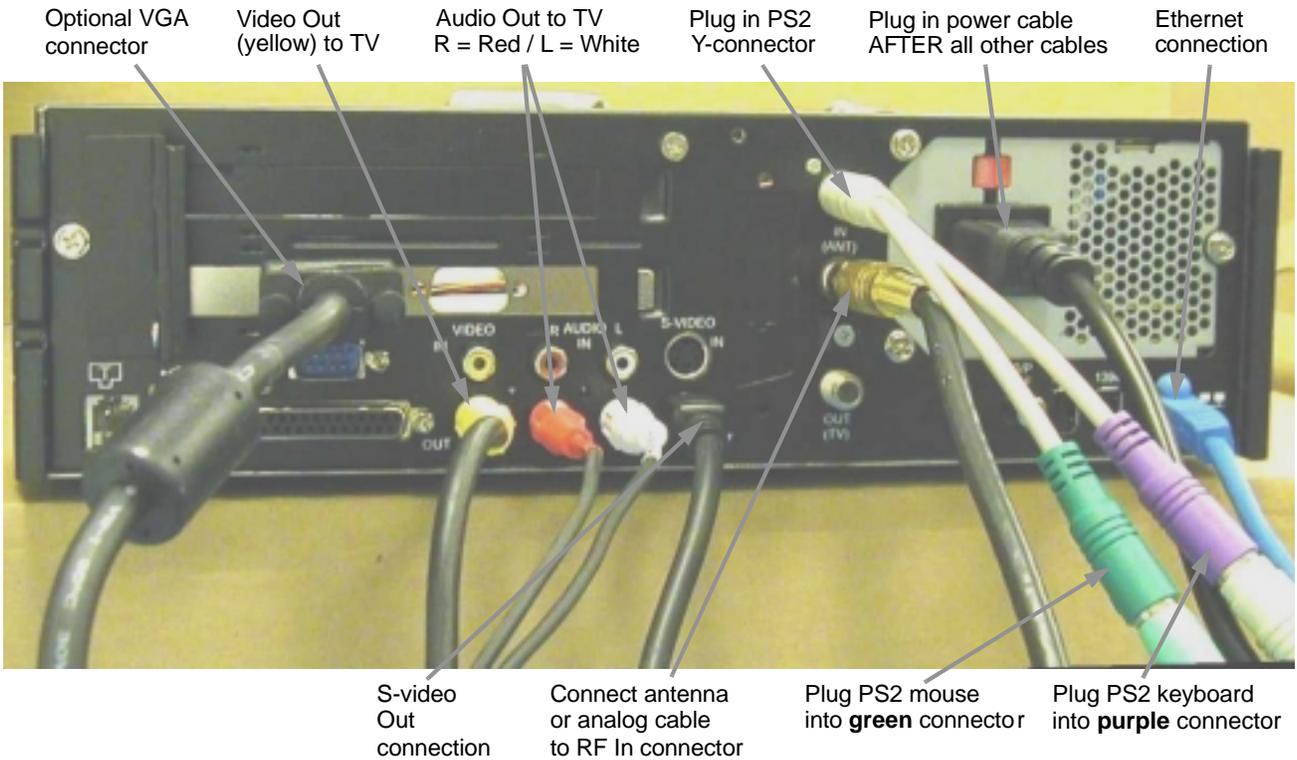


Figure 3-1. SP1SC10 Rear Panel Connections for Hardware Revision C

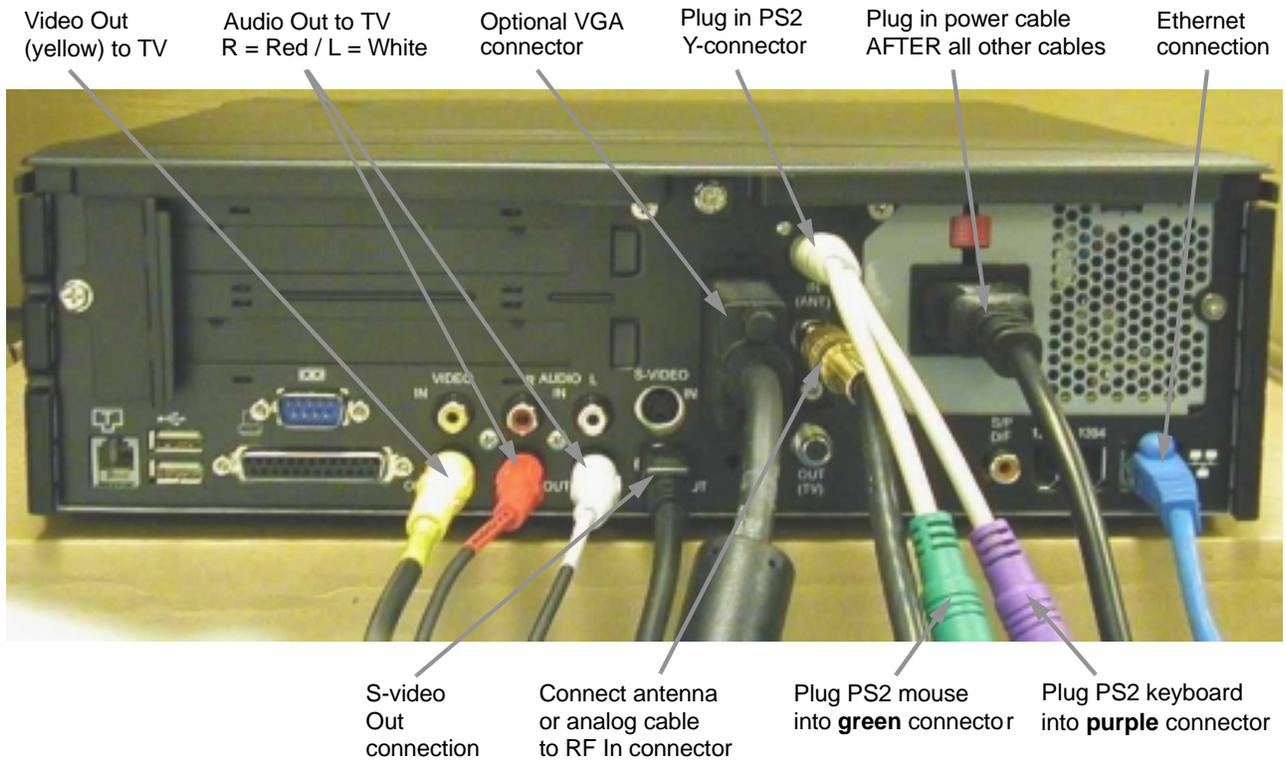


Figure 3-2. SP1SC10 Rear Panel Connections for Hardware Revision D1

4.0 Linux Rev 1.0.5 Software

4.1 OVERVIEW

The Linux software is intended to demonstrate several functions of the SC1200-ES. The software is preliminary, therefore not all of the hardware functions are demonstrated. National is continuously improving the video drivers and enhancing the software feature set. It is recommended you upgrade to the latest Linux software version as soon as it becomes available.

4.2 VERSION REFERENCE INFORMATION

This information is for reference only. Descriptions of individual drivers are not discussed in this document.

- Package version: 1.0.5
- OS Platform: RedHat 6.2, Linux kernel 2.4.0
- XpressROM version 1.03
- Test applications: Vtest 1.0.2, WebMedia 1.03
- Graphics driver: geodefb 1.1.1
- Microwindows: version 0.89pre7 with bitmap button patch
- Video4Linux2: geode_v, version 1.0.5
- Sound driver: cx5530 version 1.0.4 (OSS)
- MPEG decoder: NetStream2000-0.2.42.2
- Net Browser: Viewml 1.05

4.2.1 Rev 1.0.5 Software Driven Operations

The following hardware functions are demonstrated by the vtest and WebMedia programs in the Linux Rev 1.0.5 software (digital video format is CCIR656):

- SC1200-ES:
 - PCI bus control
 - ISA bus control for BIOS device and M-Systems' DOC (DiskOnChip).
 - Primary IDE bus control of HDD, secondary IDE control of DVD player
 - ACCESS.bus control of Alps TV Tuner, Philips' SAA7114 Video Digitizer, Philips' TDA9851 Audio Decoder
 - Dedicated AC'97 bus control of National's LM4548 codec
 - LPC bus control of National's PC87364 superI/O
 - Digital video input on VIP port
 - VGA monitor test output
 - Composite and S-video TV outputs to video switch
- XpressROM 1.03 BIOS in boot device on ISA bus

- TV tuner:
 - Input from RF connector
 - Composite video output to SAA7114, and composite audio to TDA9851
 - RF modulated video output on channel 4
- SAA7114 video digitizer:
 - Composite video input from TV tuner
 - Composite and S-video inputs direct from chassis connectors
 - Digital video input from Sigma Designs' EM8400 MPEG-2 decoder
 - Digital video output to SC1200-ES VIP port
- EM8400 MPEG-2 decoder:
 - Input via PCI bus
 - Digital video output to SAA7114 in pass-through mode, then to VIP port on SC1200-ES
 - Composite and S-video outputs to video switch
 - Digital audio outputs: S/PDIF using DTS encoding, PCM digital out to audio DAC
- TDA9851 audio decoder:
 - Input from TV tuner
 - Stereo audio output to LM4548 codec
- LM4548 codec:
 - EM8400 input via DAC, TV tuner via SAA7114, or audio input RCA jacks
 - Stereo audio output to RCA jacks
- PC87364 superI/O:
 - Controls 3.5" floppy drive
 - Controls PS2 keyboard and mouse
- Pericom video switch:
 - Selects composite and S-video from SC1200-ES or EM8400 using GPIO line. Fixed at selecting video from SC1200-ES in the Vtest applications.
- 10.2 GB HDD on primary IDE bus
- DVD drive on secondary IDE bus

4.3 LINUX SOFTWARE LOGIN INSTRUCTIONS

- 1) Make sure the hardware is connected as described in the Section 3.4 "Hardware Connections" on page 2.
- 2) Plug in the power cord if not already plugged in.
- 3) After the boot-up sequence, **cygnus login** will appear. Type **root** and press Enter.
- 4) If the **password** prompt appears, type **123456** and press Enter.
- 5) At the **[root@cygnus /root]#** prompt, enter Linux commands, or start the Vtest or WebMedia applications as described in the following sections.

4.4 VTEST APPLICATION INSTRUCTIONS

- 1) At the `[root@cygnus /root]#` prompt, type `vtest.sh`, and press Enter.
- 2) The program displays the menu shown in Figure 4-1. The TV tuner function runs with a default channel.



Figure 4-1. Channel Display at Vtest Screen

- **TV:** Selects the TV tuner functions.
 - Type in a two-digit channel. The TV tuner tunes in that channel (appearing in the upper right of the screen) from the RF connector, and sends the composite video to the SAA7114.
 - The SAA7114 digitizes the composite video from the TV tuner and sends the digital video to the SC1200-ES VIP port.
 - The SC1200-ES maintains the current graphics overlay and displays the channel on the right side of the display.
- **Video:** Selects the external composite video input to the SAA7114.
 - The SAA7114 digitizes the external composite video input and sends the digital video to the SC1200-ES VIP port.
 - The SC1200-ES displays the video and maintains the current graphics overlay (Figure 4-1).
- **SVideo:** Selects the external S-video input to the SAA7114.
 - The SAA7114 digitizes the external S-video input and sends the digital video to the SC1200-ES VIP port.
 - The SC1200-ES displays the video and maintains the current graphics overlay (Figure 4-1).
- **Digital:** Plays the MPEG-2 demo file from the HDD.
 - The SC1200-ES reads the MPEG-2 data from the HDD through the primary IDE bus.
 - The MPEG-2 data is sent to the EM8400 through the PCI bus.
 - The EM8400 decodes the MPEG-2 data into digital video data, and sends it to the SAA7114.
 - The SAA7114 is set to “pass-through” mode, and passes the digital video data to the SC1200-ES through the VIP port.
 - The SC1200-ES displays the video and maintains the current graphics overlay (Figure 4-1).

- **Web:** Not functional – do not select. If accidentally selected, click on one of the other functions.
- **Pref:** Displays additional controls, shown in Figure 4-2.

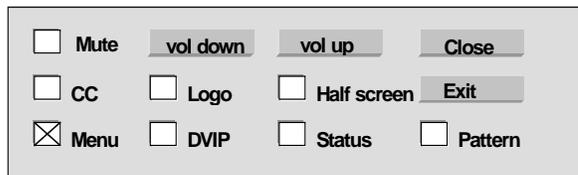


Figure 4-2. Pref Screen

- **Mute:** Cancels the audio output.
- **CC:** Not functional.
- **Menu:** When checked, the menu items are displayed. When unchecked, the menu items disappear.
- **Logo:** Demonstrates the alpha blending function of the SC1200-ES by creating a text box containing the National logo (continuously fades in and out).
- **DVIP:** Not functional.
- **Half Screen:** Halves the screen size. The Logo and Menu options are not functional in half-screen mode.
- **Status:** Not functional.
- **Pattern:** Causes a vertical test pattern to appear in place of the video.
- **Vol up, Vol down:** Increases and decreases the audio volume.
- **Close:** Closes the Pref menu.
- **Exit:** Quits the Vtest application. To restart, type `vtest.sh` at the `[root@cygnus /root]#` prompt.

4.4.1 Shortcut Keys

Below is a list of shortcut keys and their corresponding function:

t	Select tuner
v	Select video
s	Select S-video source
d	Select digital source
p	Open/close the control panel
m	Mute/unmute audio
n	Activate/deactivate DVIP (only available with DVIP versions of Vtest)
<	Volume increase
>	Volume decrease
c	Closed caption
l	Logo
h	Half screen
<space>	Menu
?	Status
i	Decrease sharpness
o	Increase sharpness
b	Graphic test pattern
q	Exit

4.4.2 Quit the Vtest Application

Press CTRL-Break, 'q' key or click Exit on the Pref screen (see Figure 4-2) to quit the vtest application and return to the **[root@cygnus /root]#** prompt. At the prompt, you can rerun Vtest, run WebMedia, or shutdown.

4.5 WEBMEDIA OPERATING INSTRUCTIONS

- 1) At the **[root@cygnus /root]#** prompt, type **st** and press Enter.
- 2) The Home Menu will appear, as shown in Figure 4-3. The S-video source is the default upon startup.

The Home Menu features a scaled version of the video overlaid on a Graphical User Interface (GUI) with user controls, and is comprised of the following:

- Menu buttons: Source, Web, Exit.
- A scaled video image of the selected video display source.
- A source control area below the scaled video image.
- An area containing information on a variety of topics.



Figure 4-3. Home Menu Display

4.5.1 Home Menu Buttons

■ Source:

To select a video source, highlight the Source button and click the mouse repeatedly until the desired video source is displayed in the control area.

The selected video source is displayed in the scaled video window, and any associated controls are displayed in the control area.

The available video sources are:

- S-video: Selects the external S-video source.
- Tuner: Selects the RF tuner, with channel-changing controls.
- DVD: Plays DVD movies from the DVD/CD-ROM drive. The available controls are Play, Pause, Stop, Fast Forward, and Rewind.
- Video: Selects the external composite video from the RCA jack.
- Stream: Plays the MPEG-2 file located in the /Cygnus/sigma/ directory. The MPEG-2 file has a .mpg extension. The Play, Pause, and Stop operations are available on the stream source.

■ Web:

Selects the Viewml 1.05 browser. The browser demonstrates internet browsing but has limited functions in this version. The browser utilizes National's DP83815 MacPHYTER™ 10/100 Mb/s ethernet controller.

Note: Instructions for setting up the ethernet controller and internet browser are discussed in the Cygnus Setup Procedure guide. Currently this document exists in preliminary format only, and can be obtained from your National FAE.

■ Exit:

Exits the Home Menu and scales the video image to full-screen mode.

In the full-screen mode, clicking the mouse anywhere on the screen will bring up the Home Menu.

4.5.2 DVD Player

Selecting the DVD player video source from the Home Menu displays the DVD label in the source control area, along with Play, Stop, Pause, Rewind, and Fast Forward controls.

Play: The program begins playing the DVD from the beginning.

Stop: The program stops playing the DVD and the video blanks (goes black). Selecting Stop automatically resets the program logic. A subsequent Play operation starts the program from the beginning.

Pause: The program is suspended until Play or Pause is pressed.

Rewind: The program runs in reverse at a rate of approximately 3x the normal speed, and audio output is disabled.

Fast Forward: The program advances at a rate of approximately 3x the normal speed, and audio output is disabled.

Eject: After the DVD is stopped, depress the eject button on the front panel of the SP1SC10.

4.5.3 MPEG Play

When the stream video source is selected from the source menu, the stream label is displayed in the source control area, along with Play, Pause, and Stop controls.

4.5.4 Quitting the WebMedia application

Press CTRL-Break, then CTRL-C to return to the `[root@cygnus /root]#` prompt. At the prompt, you can rerun WebMedia, run Vtest, or shutdown.

4.6 SHUTDOWN AND POWER OFF

To shutdown the SP1SC10, type `shutdown -h now` at the `[root@cygnus /root]#` prompt and press Enter. After shutdown is complete, unplug the power cable.

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