

:: Zoom SDK ::

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LOGIC

User's Manual www.logicpd.com

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1 Getting Started

Congratulations on your purchase of the Zoom™ Starter Development Kit. The Zoom Starter Development Kit (SDK) is a complete development system with everything you need to evaluate the functionality of Logic's Card Engine and immediately begin application development. Logic's embedded solutions fast forward product development and helps your company stay focused on your high-value core technologies.

1.1 Have you read the Zoom™ Starter Development Kit QuickStart Guide?



If the answer is yes, you are ready to proceed to Section 2: Install Software Tools.

If not, please familiarize yourself with the *Zoom SDK QuickStart Guide* before you read this document. The latest version of the *Zoom SDK QuickStart Guide* is located at <http://www.logicpd.com/auth/>.

1.2 QuickStart Guide Review

Thank you for reading the *Zoom SDK Quick Start Guide* before proceeding through this document. Now you are familiar with the following:

- SDK system contents
- Development PC requirements
- Peripheral connectors
- JTAG settings
- Terminal emulator and LogicLoader “Test Drive” scenarios
- Product notice and registration details
- Ordering information
- Support information

2 Install Software Tools

Important Note: It is assumed that you have read and completed all steps described in the Zoom SDK Quick Start Guide, located at <http://www.logicpd.com/auth/>, before you begin.

2.1 Objective

The objective of this chapter is to provide step-by-step instructions for installing:

- Tera Term Section 2.3
- Cygwin Section 2.4
- GNU Toolchain Section 2.5

2.2 Prerequisites

- Zoom Starter Development Kit CD
- Microsoft Windows® 2000 or later host PC
- Pentium® processor or equivalent
- 64 MB RAM
- 1 GB free hard disk space
- 115200 baud-capable RS-232 port (COM port)
- Connection to the Internet

2.3 Installing Tera Term

Tera Term is a software terminal emulator for Windows that can send and receive both binary and ASCII characters over system COM ports.

1. To begin installation, insert Logic's Zoom SDK CD into your CD-ROM drive. A web browser window will open, displaying the contents of the CD. If this window does not launch automatically, double-click the 'index.html' file in the CD contents folder. (Alternatively, access the 'tools' directory included on Logic's Zoom SDK CD, open the 'Tera Term' folder, unzip the compressed file, and double-click the setup.exe file. Then proceed to step 4, below.)

Your web browser will display a screen similar to that below.

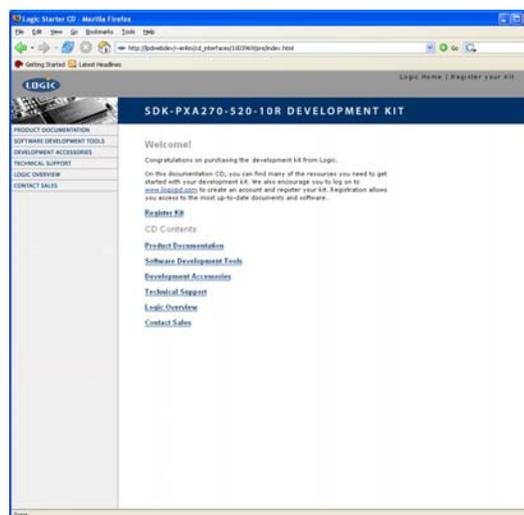


Figure 2.1: Start page

2. On the Start Page, select 'Software Development Tools.'

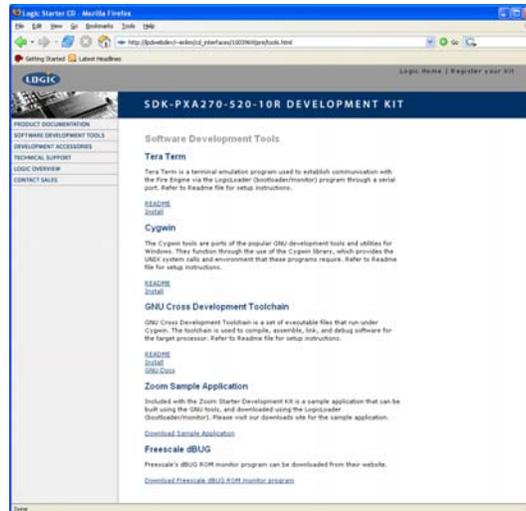


Figure 2.2: Software Development Tools page

3. The first option on the 'Software Development Tools' page is Tera Term. Click 'Install.'
4. Tera Term Pro Setup will begin. Follow these steps through the installation windows:
 - 4.1. Select a language, and then click 'Continue.'
 - 4.2. If Tera Term is already running, close it, and then click 'Continue.'

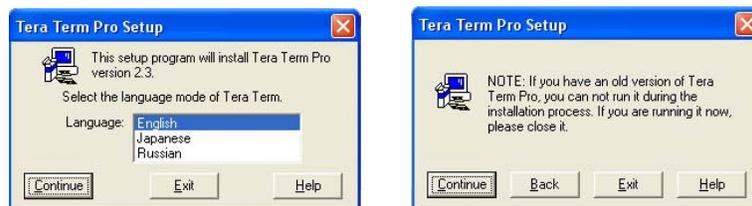


Figure 2.3: Tera Term Setup windows 1-2

- 4.3. Select a root directory for Tera Term. You can accept the default installation directory or enter an alternate path name in the 'Path' text field, then click 'Continue.'
- 4.4. Tera Term will install. Click the 'OK' button. Setup is now complete.

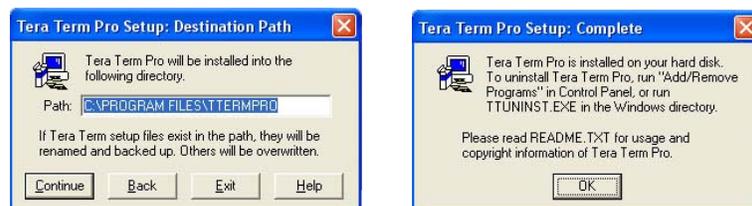


Figure 2.4: Tera Term Setup windows 3-4

2.4 Installing Cygwin

Cygwin is a UNIX® environment for Windows. It is a collection of tools that provides a UNIX Application Program Interface (API) emulator to allow compilation of sample source code.

1. To begin installation, insert Logic's Zoom SDK CD into your CD ROM drive. A web browser window will open, displaying the contents of the CD. If this window does not launch automatically, double-click the 'index.html' file in the CD contents folder.

Your web browser will display a screen similar to that below.

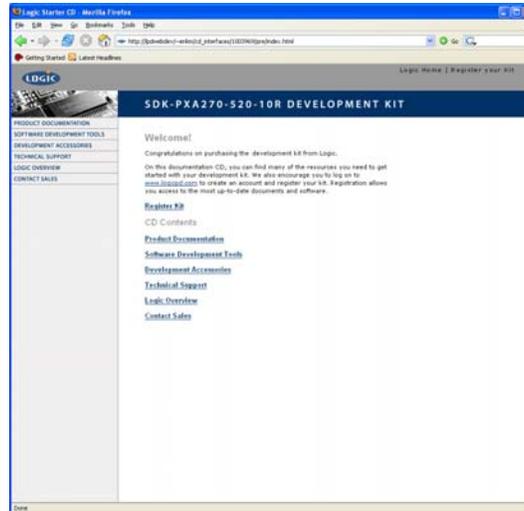


Figure 2.5: Start page

2. On the Start Page, select 'Software Development Tools.'

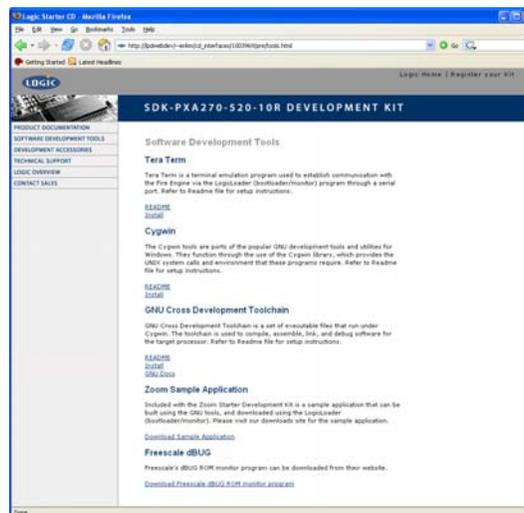


Figure 2.6: Software Development Tools page

3. The second option on the 'Software Development Tools' page is Cygwin. Click on the link to Logic's downloads site, enter your username and password, and then download the Cygwin.zip file. (If you have not registered your product—or do not have your registration information—please register at <http://www.logicpd.com/auth/>. You will receive an e-mail with your new username and password.)
4. Double-click on the 'setup.exe' file after unpacking the .zip file. A window containing 'Important Steps for Cygwin Installation' will be displayed. To continue, press any key.
5. Cygwin Setup will begin. Follow these steps through the installation windows:
 - 5.1. At 'Cygwin Net Release Setup Program,' click 'Next.'

- 5.2. For 'Choose Installation Type', select 'Install from Local Directory,' and click 'Next.'

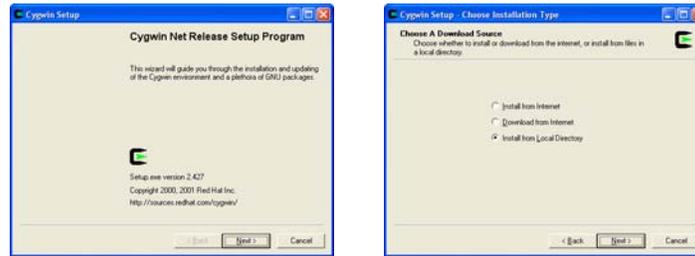


Figure 2.7: Cygwin Setup windows 1-2

- 5.3. Under 'Select Root Install Directory', select the appropriate directory for Cygwin. You can accept the default installation directory, after making sure it is an available local drive, or enter an alternate path name in the 'Root Directory' text field. Next, allow 'Install For' to default to 'All Users' unless you must restrict access. Also, allow 'Default Text File Type' to default to 'UNIX.' Then click 'Next.'
- 5.4. At the 'Select Local Package Directory' window, the 'Local Package Directory' path should point to the location of the unpacked contents of the .zip file. If it is correct, click 'Next.'

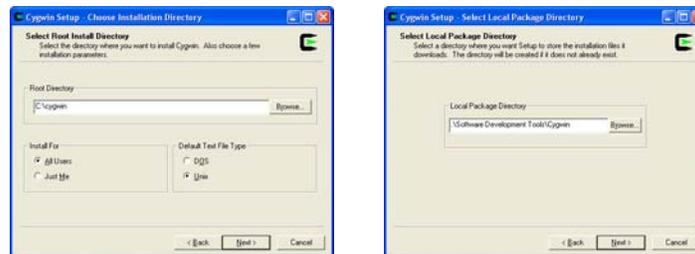


Figure 2.8: Cygwin Setup windows 3-4

- 5.5. For 'Select Packages,' verify that 'Default' is selected for each category. Click 'Next.'
- 5.6. Setup.exe will begin copying files. This may take several minutes. After the files have completed copying, the 'Create Icons' window will appear. Select your icon preference and click 'Finish.'
- 5.7. Cygwin will install. When the 'Installation Complete' window appears, click 'OK.' Setup is now complete.

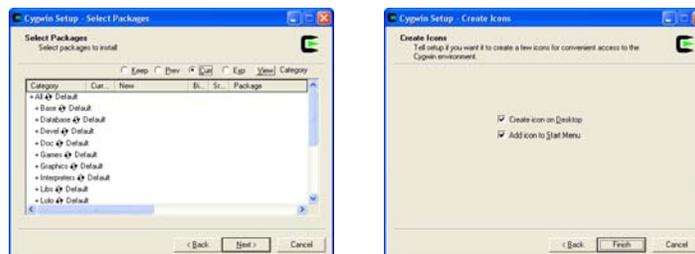


Figure 2.9: Cygwin Setup windows 5-6



Figure 2.10: Cygwin Setup: Installation Complete window

2.5 Installing the GNU Cross Development Toolchain

The GNU Cross Development Toolchain is a collection of tools that allows for software source code compilation and linking to create object code for your target hardware. **Note:** You will need a complete installation of Cygwin on a local drive. For example: C:\cygwin or D:\cygwin.

1. To begin installation, insert Logic's Zoom SDK CD into your CD-ROM drive. A web browser window will open, displaying the contents of the CD. If this window does not launch automatically, double-click the 'index.html' file in the CD contents folder.

Your web browser will display a screen similar to that below.

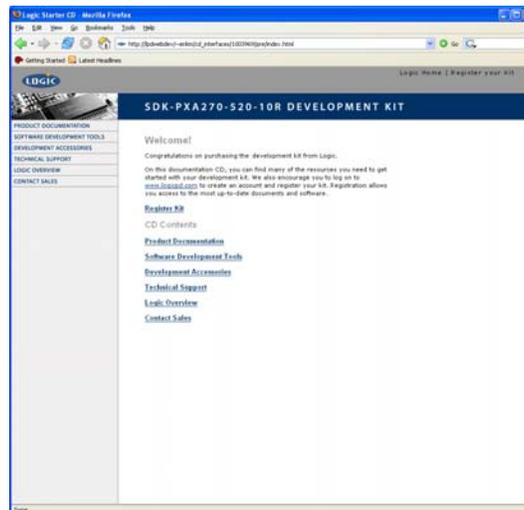


Figure 2.11: Start page

2. On the Start Page, select 'Software Development Tools.'

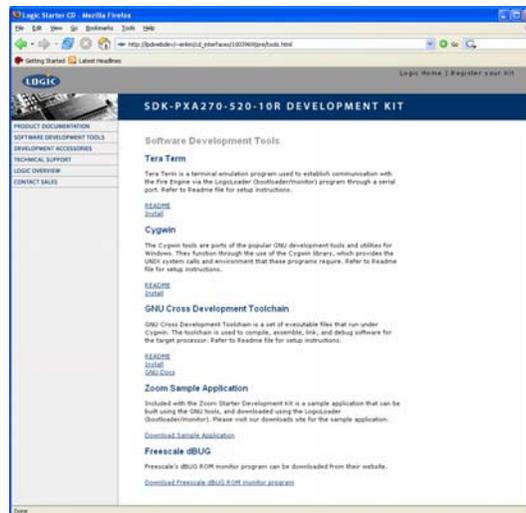


Figure 2.12: Software Development Tools page

3. The third option on the 'Software Development Tools' page is GNU Cross Development Toolchain. Click on the link to Logic's downloads site, enter your username and password, and then download the Cygwin.zip file. (If you have not registered your product—or do not have your registration information—please register at <http://www.logiccpd.com/auth/>. You will receive an e-mail with your new username and password.)
4. Double-click on the downloaded 'gntools_install' icon. GNU Cross Development Toolchain Setup will begin. Follow these steps through the installation windows:
 - 4.1. At the 'GNU Cross Development Toolchain v2.2 Setup' window, click 'Next.'
 - 4.2. For the 'Choose Components' options, select the type of install as 'ALL - All Supported Processors,' then click 'Install.'



Figure 2.13: GNU Cross Development Toolchain Setup windows 1-2

- 4.3. Please wait while an 'Installing' window appears and the necessary files are copied to your Cygwin directory. When installation is complete, click 'Finish.' Upon completion, the installer automatically appends \gntools\bin to the Cygwin PATH variable. Setup is now complete.

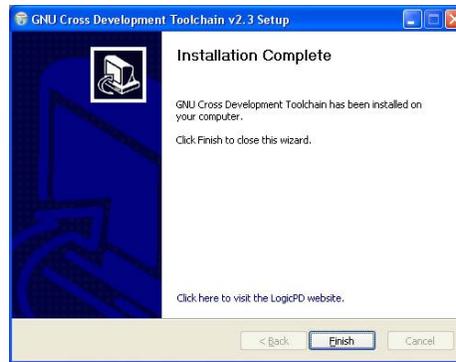


Figure 2.14: GNU Cross Development Toolchain Setup window 3

2.5.1 GNU Tools Documentation

A complete set of manuals for the GNU tools is contained in the Zoom SDK Development CD in the following directory: \tools\Documentation\GNU_Docs.

3 Build a Sample Application

3.1 Objective

The objective of this section is to explain how to build a sample application for the Zoom Starter Development Kit.

Background Information:

- This application is very simple and is only intended to serve as a starting point for software developers. The purpose of the sample application is to verify that the development tools (compiler, linker, etc.) have been correctly installed and are working properly.
- 'make' utility:
The build procedure in this section utilizes the 'make' utility in Cygwin—'make' is a utility common in UNIX environments. Note that the files in the 'sample_app' directory tree are called makefiles. Makefiles contain rules that the 'make' utility follows when building an application. For additional info regarding 'make,' refer to the documentation on the Zoom SDK CD at: tools\Documentation\GNU_Docs\Using_make\make.pdf.
- 'target' argument:
For the sample application the user supplies a 'target' argument on the 'make' command line. For example: 'make sample_RAM' instructs 'make' to build a new target called 'sample_RAM.'

3.2 Prerequisites

- Base directory in which source code can be placed
- Cygwin with GNU Cross Development Tools installed
- Tera Term installed

3.3 Procedure

1. To begin installation, insert Logic's Zoom SDK CD into your CD-ROM drive. A web browser window will open, displaying the contents of the CD. If this window does not launch automatically, double-click the 'index.html' file in the CD contents folder.

Your web browser will display a screen similar to that below.

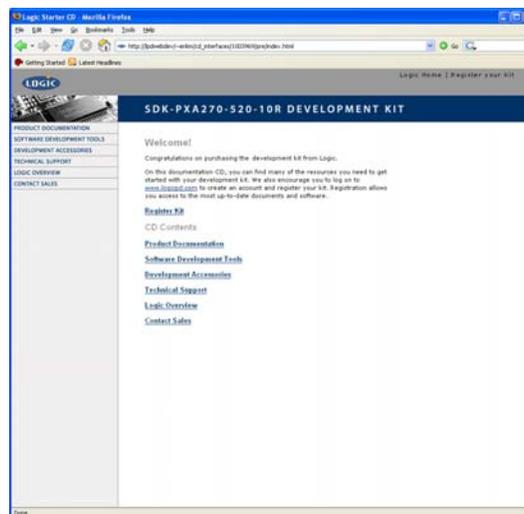


Figure 3.1: Start page

2. On the Start Page, select 'Software Development Tools.'

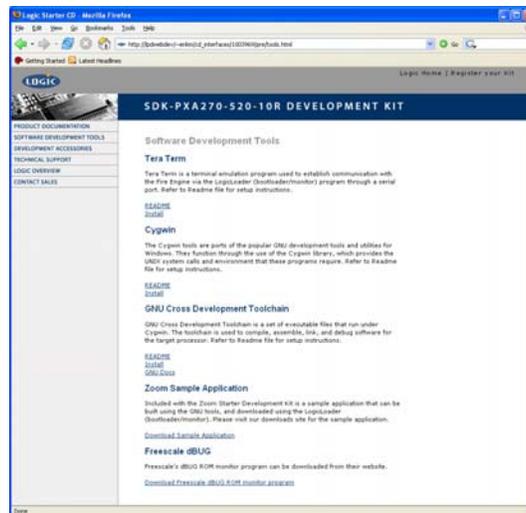


Figure 3.2: Software Development Tools page

3. The fourth option on the 'Software Development Tools' page is Zoom Sample Application. Click on the link to Logic's downloads site, enter your username and password, and then download the Sample Application Package. (If you have not registered your product—or do not have your registration information—please register at <http://www.logicpd.com/auth/>. You will receive an e-mail with your new username and password.)
4. Double-click on the 'apps_install.exe' icon you downloaded and LogicLoader Sample Application Package Setup will begin. Follow these steps through the installation windows:
 - 4.1. At the 'LogicLoader Sample Application Package Setup' window, click 'Next.'
 - 4.2. At the 'Choose Components' window, make sure 'Sample Applications' is checked and then click 'Next.'

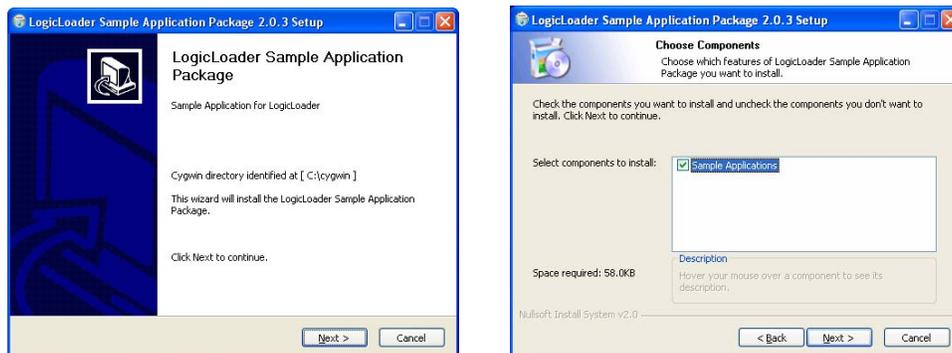


Figure 3.3: LogicLoader Sample Applications Package Setup windows 1-2

- 4.3. Select an install location for the LogicLoader Sample Application Package. You can accept the default installation directory or enter an alternate path name in the 'Destination Folder' field. Click 'Install' to begin installing files.
- 4.4. Please wait while an 'Installing' window appears and the necessary files are copied to your Cygwin directory. When installation is complete, click 'Finish.' Setup is now complete.

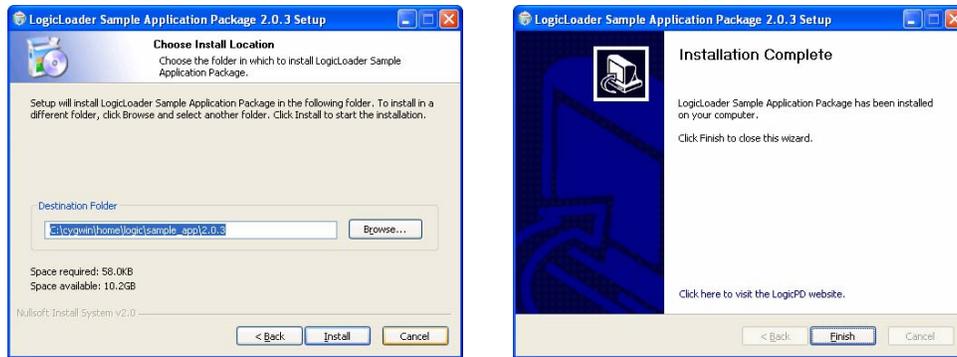


Figure 3.4: LogicLoader Sample Applications Package Setup windows 3-4

5. Next, open Cygwin. (Open Start | Programs to locate Cygwin, or double-click the Cygwin shortcut icon on your desktop, depending on where you saved the icon.) A Cygwin window will appear.
6. In your Cygwin window, type the following command: 'cd /home/logic/sample_app/2.10/led_flasher'. This will change the working directory to your sample_app folder. (Note: 2.10 is the version number of the Zoom Sample Application. Please note which version you have downloaded and edit the folder name in the command line as appropriate.)
7. Next, type 'make clean' in your Cygwin window. This cleans previously built files (if any).
8. Next, type 'make' in order to get the list of build file options. (The image below only approximates what your screen will display; this image may not show all available modules for the most recent sample application downloaded.)

```

/home/logic/sample_app/2.0.3/led_flasher
Your group is currently "mkpasswd". This indicates that
the /etc/passwd (and possibly /etc/group) files should be rebuilt.
See the man pages for mkpasswd and mkgroup then, for example, run
mkpasswd -l [-d] > /etc/passwd
mkgroup -l [-d] > /etc/group
Note that the -d switch is necessary for domain users.

aaron@PLPD200 ~
$ cd /home/logic/sample_app/2.0.3/led_flasher/
aaron@PLPD200 /home/logic/sample_app/2.0.3/led_flasher
$ make
bash build.sh

-----
Sample Application Build Tool
-----

Select module:
1) MCF5474_10      4) MCF5485_10      7) -----      10) -----
2) MCF5484_10     5) LLH7a400_10    8) LLH79524_10   11) LSH7760_10
3) MCF5475_10     6) LLH7a404_11    9) LSH7727_20   12) PXA270_10
module? 6

Select program location:
1) flash
2) ram
location? 2

```

Figure 3.5: Building a sample application

9. Type the appropriate number that matches the Card Engine module that you are building on. Then select whether you want to build the application for flash or RAM.

10. When complete, your sample application will be located under the directory: `home/logic/sample_app/2.10/led_flasher/<program_name>`. (Note: 2.10 is the version number of the Zoom Sample Application. Please note which version you have downloaded and edit the folder name as appropriate.)

4 Download a Sample Application

4.1 Objective

The objective of this section is to download the sample application which you built in “Section 3: Build a Sample Application” to your Zoom Starter Development Kit. This example demonstrates how to download the sample application with LogicLoader.

Background Information:

- The application ‘led_flasher.elf’ is linked to download and execute directly from RAM.
- LogicLoader is a bootloader/firmware-monitor program developed by Logic Product Development. Please refer to the *LogicLoader User's Manual* for more information.

4.2 Prerequisites

- A successfully built sample application from “Section 3: Build a Sample Application,” above
- Cygwin and GNU Cross Development Tools installed
- Tera Term installed and running
- Zoom Starter Development Kit up and running
- Zoom Starter Development Kit connected to development computer via null modem serial cable

4.3 Procedure

1. Open a Tera Term shell. Click ‘Setup’ and select ‘Serial port’ in order to verify that Tera Term is configured correctly.

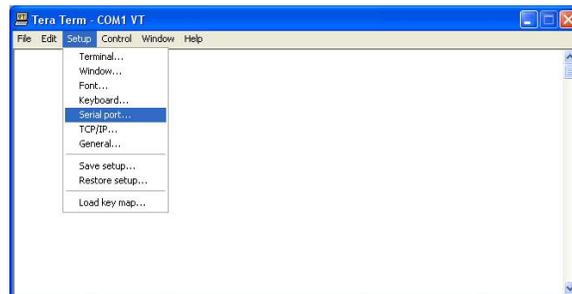


Figure 4.1: Click ‘Setup’ and select ‘Serial port’

2. Verify the following settings: ‘port’ is the active port, ‘baud-rate’ is 115200, ‘data’ is 8-bit, ‘parity’ is none, ‘stop’ is 1-bit, and ‘flow control’ is none.

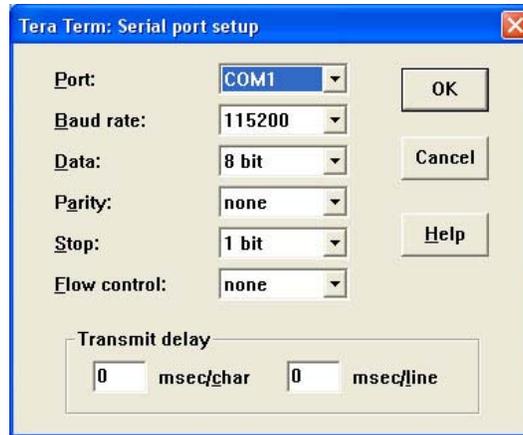


Figure 4.2: 'Serial port' settings

3. Next, press the Reset switch on the Zoom Starter Development Kit application board (with your Card Engine properly inserted) in order to reboot the kit. LogicLoader will appear in Tera Term.
4. Prepare LogicLoader to receive the sample application by typing 'load elf' after the losh> prompt, and then press 'Enter'. See figure below. (Note: the version numbers displayed in these images may differ depending on the Card Engine model used.)

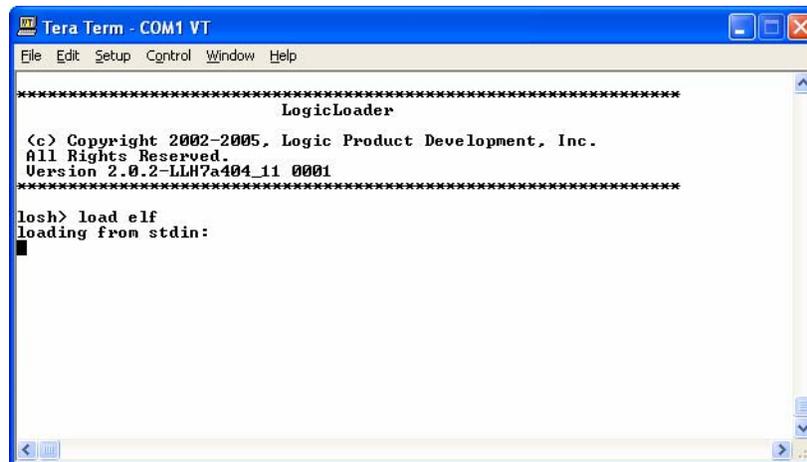


Figure 4.3: Prepare LogicLoader to receive the sample application

5. Click 'File' and select 'Send file' to send the sample application to the development kit.

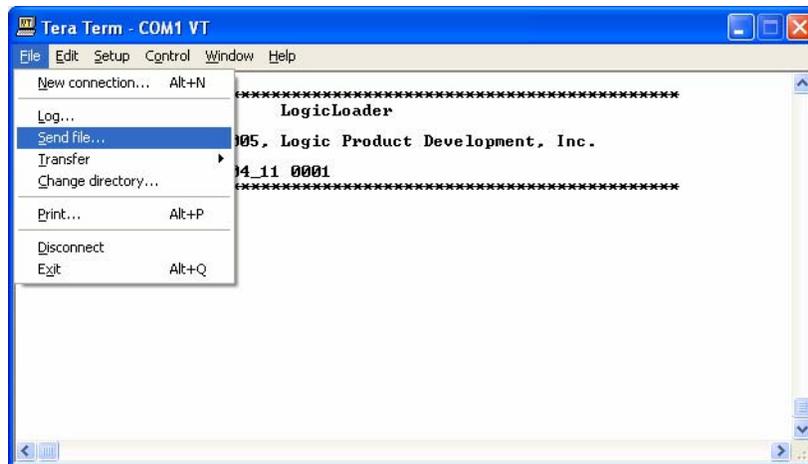


Figure 4.4: Click 'File' and select 'Send file'

6. A 'Tera Term: Send file' window will open. Verify that the 'Binary' option is selected.
7. Locate the sample application file you built in Section 3, above. The default location is: `\cygwin\home\logic\sample_app\2.10\led_flasher`. (Note: 2.10 is the version number of the Zoom Sample Application. Please note which version you have downloaded.) See figure below.

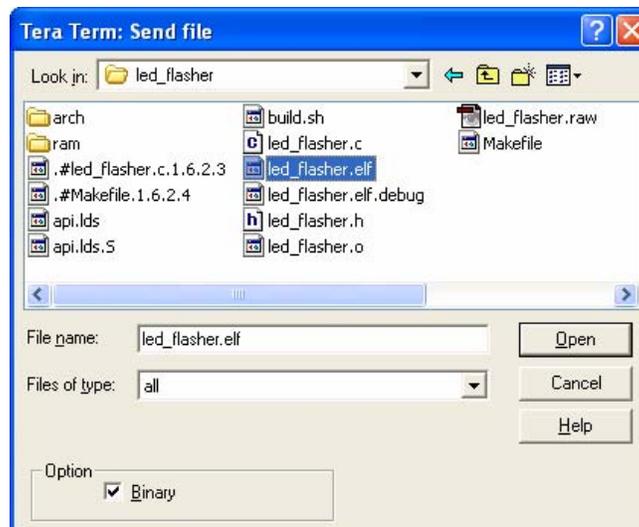
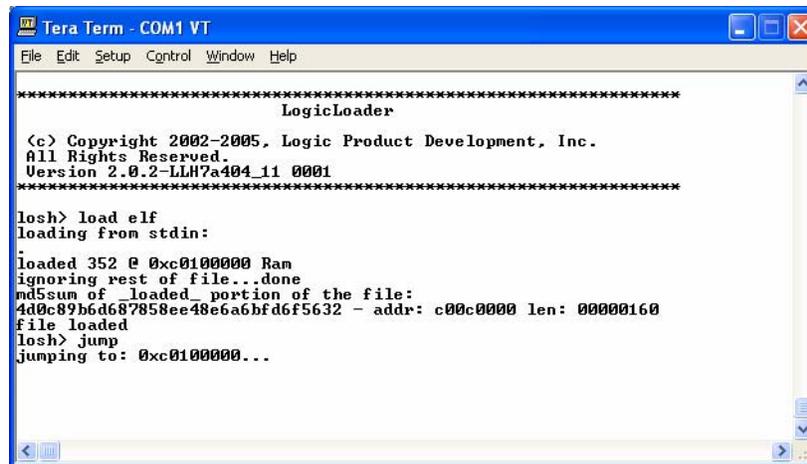


Figure 4.5: Locate the sample application

8. Select your sample application file and click 'Open.' The image will download to the Zoom Starter Development Kit.
9. Now the sample application is ready to run. At the 'losh>' prompt, type 'jump' to run the application. See figure below.



```
Tera Term - COM1 VT
File Edit Setup Control Window Help
*****
                LogicLoader
*****
<c> Copyright 2002-2005, Logic Product Development, Inc.
All Rights Reserved.
Version 2.0.2-LLH7a404_11 0001
*****
losh> load elf
loading from stdin:
loaded 352 @ 0xc0100000 Ram
ignoring rest of file...done
md5sum of loaded portion of the file:
4d0c89b6d687858ee48e6a6bfd6f5632 - addr: c00c0000 len: 00000160
file loaded
losh> jump
jumping to: 0xc0100000...
```

Figure 4.6: 'LED Flasher' sample program screen

The sample application will run on the Zoom Starter Development Kit. This application blinks the GPIO1 LED on the Zoom SDK baseboard until you reset the kit.

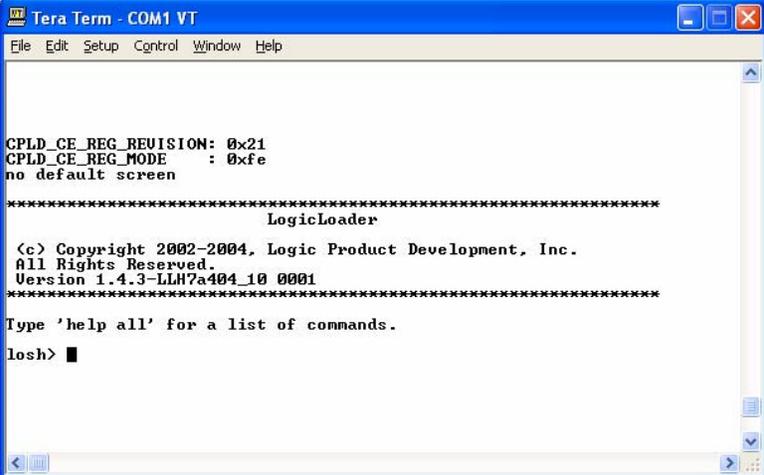
5 Download LogicLoader

5.1 Objective

The objective of this section is to download a new version of the LogicLoader (bootloader/firmware-monitor) to the Zoom Starter Development Kit.

Background Information:

- Logic Product Development Card Engines come with the LogicLoader environment loaded into the flash memory resident on the platform. LogicLoader is capable of booting many different kinds of programs and operating systems. For further documentation, please refer to the *LogicLoader User's Manual*.
- The most current version of LogicLoader for your Card Engine hardware can be downloaded from Logic's product downloads page at <http://www.logicpd.com/auth/>.
- LogicLoader prints version information at the top of the menu as displayed in the figure below. If the LogicLoader menu is not currently visible, the LogicLoader 'info' command may be used, with no parameters, to display the current version information.



```
Tera Term - COM1 VT
File Edit Setup Control Window Help

CPLD_CE_REG_REVISION: 0x21
CPLD_CE_REG_MODE    : 0xfe
no default screen

*****
                        LogicLoader
*****
(<) Copyright 2002-2004, Logic Product Development, Inc.
All Rights Reserved.
Version 1.4.3-LLH7a404_10 0001
*****
Type 'help all' for a list of commands.
losh> █
```

Figure 5.1: Type LogicLoader's 'info' command at the 'losh>' prompt

Please use the steps below to update LogicLoader if you do not have the latest version posted on Logic's downloads site.

5.2 Prerequisites

- A recent version of Internet Explorer or Firefox
- Tera Term installed and running
- Zoom Starter Development Kit up and running
- Zoom Starter Development Kit connected to development computer via null modem serial cable

5.3 Procedure

1. Access Logic's download site at <http://www.logicpd.com/auth/> and enter your username and password. (If you have not registered your product—or do not have your registration information—please register at <http://www.logicpd.com/auth/>. You will receive an e-mail with your new username and password. Use this information to complete this step.)
2. Locate the most recent version of LogicLoader (under the "LogicLoader Bootloader/Monitor" heading) and download it to your hard drive.

- Next, open a Tera Term shell. Click 'Setup' and select 'Serial port' in order to verify that Tera Term is configured correctly. Verify the following serial port settings: 'port' is the current active port, 'baud-rate' is 115200, 'data' is 8-bit, 'parity' is none, 'stop' is 1-bit, and 'flow control' is none. See figure below.

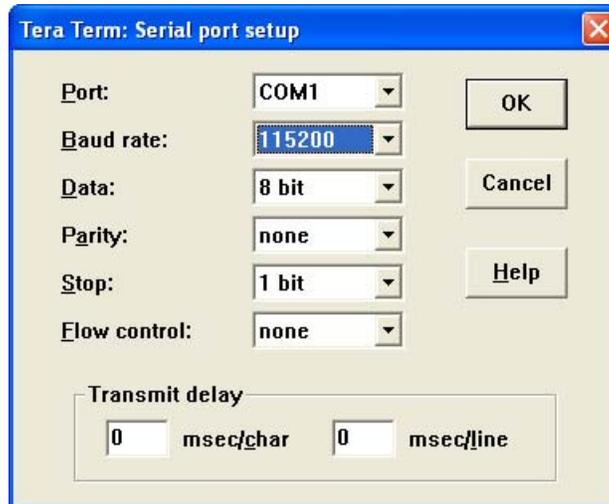


Figure 5.2: Serial port settings

- Type the 'update' command.

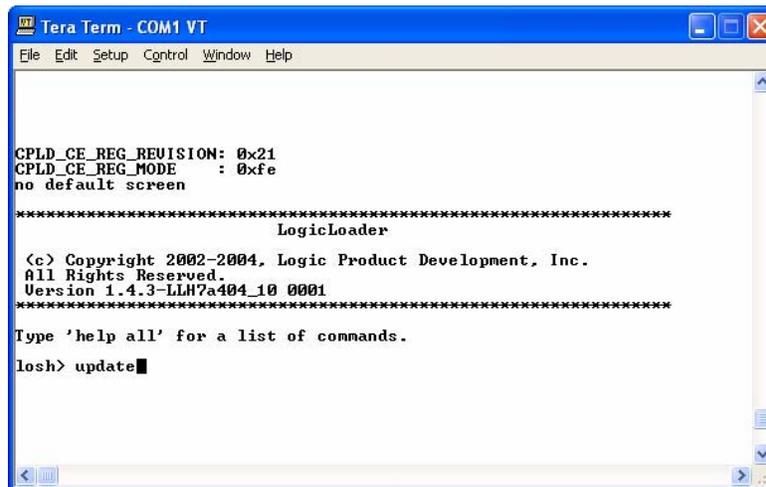


Figure 5.3: Type the 'update' command

- Send the new version over the serial port. Click 'File' and select 'Send file' to send the new LogicLoader to your development kit. Locate and select the LogicLoader file you downloaded to your hard drive from Logic's website in Step 2. Also, verify that the 'Binary' option is selected. Then click 'Open' to download the new LogicLoader.

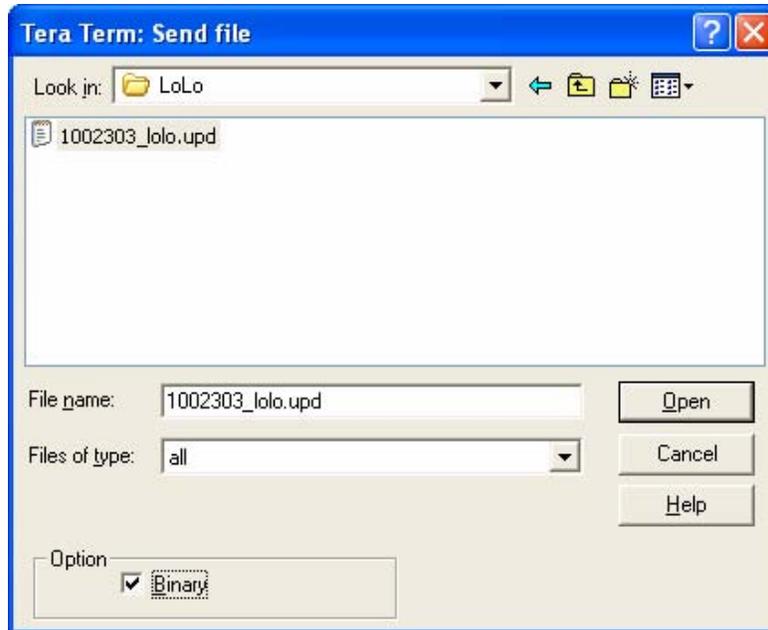


Figure 5.4: Send new version over the serial port

6. Verify that the download was successful by waiting for an “update done” message to appear.

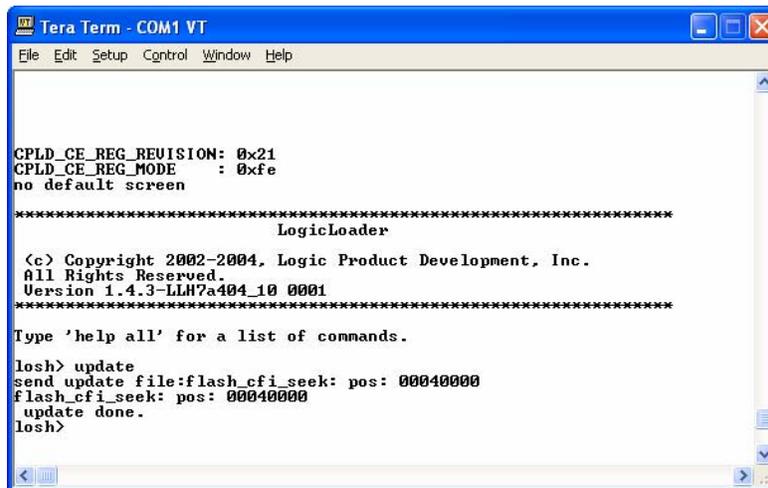


Figure 5.5: Verify that the download was successful

7. Reset the Card Engine and verify the new LogicLoader version number.

6 Restore LogicLoader: Preliminary Steps

6.1 Objective

The intention of this section is to describe the preliminary steps necessary to restore LogicLoader if your Zoom Starter Development Kit **will not boot up** at the Tera Term window.

Background Information:

- This section is only applicable if your Zoom Starter Development Kit will not boot up at the Tera Term window.
- In order to restore LogicLoader to your system, you must have the most recent version of LogicLoader downloaded to your hard drive. You also must have a JTAG emulator which functions with your particular Card Engine and Zoom Starter Development Kit.

6.2 Prerequisites

- A recent version of Internet Explorer or Firefox
- Tera Term installed and running
- Zoom Starter Development Kit
- Zoom Starter Development Kit connected to development computer via null modem serial cable
- JTAG debugger

6.3 Procedure

1. Access Logic's download site at <http://www.logicpd.com/auth/> and enter your username and password. (If you have not registered your product—or do not have your registration information—please register at <http://www.logicpd.com/auth/>. You will receive an e-mail with your new username and password. Use this information to complete this step.)
2. Locate the most recent version of LogicLoader on Logic's website and download it to your hard drive, as described in Section 5, above.
3. Use a JTAG emulator that functions with your Card Engine to restore LogicLoader to your Zoom Starter Development Kit. Contact Logic's Support Services if you need further information.

7 Download a New BSP: Preliminary Steps

Logic offers product-ready Board Support Packages (BSPs) in binary format for Zoom Starter Development Kits, available for various operating systems (Windows CE, Linux, etc.) and dependent on Card Engine Development Kit purchased.

Logic provides sample downloadable evaluation Windows CE images (NK.bins) to evaluate the Windows CE operating system on Logic's line of Development Kits. These sample images are provided as part of the Microsoft® Windows CE Hardware Kitting Program. Logic packages a 120-day evaluation version of Windows CD Platform Builder in the Development Kit and posts downloadable sample images on the Logic website. These images are licensed for evaluation purposes only, and are not intended for commercial use. Please reference Logic's Application Note 296 entitled *When to Use an NK.bin* for information about the capabilities of the binary OS images; available for download at: <http://www.logicpd.com/downloads/724/>.

If your development effort requires the use of a BSP, Logic provides a binary BSP as a downloadable item from the website. In order to obtain Logic's Windows CE BSP, please read and sign the Windows CE BSP License Agreement located at: <http://www.logicpd.com/downloads/406/>.

7.1 Objective

The intention of this section is to present the preliminary steps necessary to download a new BSP (Board Support Package) to your Zoom Starter Development Kit.

Background Information:

- Each BSP release includes directions for installation.

7.2 Prerequisites

- A recent version of Internet Explorer or Firefox
- Tera Term installed and running
- Zoom Starter Development Kit up and running
- Zoom Starter Development Kit connected to development computer via null modem serial cable

7.3 Procedure

To download a new BSP from the 'support' section of Logic Product Development's website follow the instructions below.

1. Access Logic's download site at <http://www.logicpd.com/auth/> and enter your username and password. (If you have not registered your product—or do not have your registration information—please register at <http://www.logicpd.com/auth/>. You will receive an e-mail with your new username and password. Use this information to complete this step.)
2. Locate the new BSP and its accompanying directions, and then begin installation.

8 Using a Cross-over Cable with Logic's SDK Kit

Please refer to Logic's Application Note 161 *Using a Cross-over Cable with Logic's SDK Kit* for information. This document is available for download at: <http://www.logicpd.com/downloads/92/>.



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