

Thank You for purchasing the NPE Pocket Programmer



Please check the [NPE Website](#) Product Support section for program updates and information on this and other NPE products.

When you buy an NPE product registering your purchase will give you full access to the support pages for NPE products.

About this Help File

This help file covers the NPE101-A, NPE201-A, and the NPE202-A Pocket Programmers. The NPE101-A is used with the NPE Desktop Programmer to load target images into the Pocket Programmers. The NPE201-A and NPE202-A are the USB version of the Pocket Programmer and does not require a Desktop Programmer to load target images; it connects directly to the USB port on your PC.

The NPE101-A and NPE201-A supports Atmel AVR devices with up to 128kb flash. The NPE202-A supports Atmel AVR devices with up to 256kb flash.

Extra information on a topic is highlighted with the **FYI** (For Your Information) heading. Read this information to get a more in depth understanding of the current topic.

The **Good Practices** headline shows the correct way to accomplish a task. Following these steps assures best operation of the Pocket Programmer.

Version Description

- 4.4 Added NPE202 to the list of supported programmers.
Added help topic relating to target serial number programming.
- 4.3 Deleted references to Add Chip. Support has been removed for adding chips from the application. Added default project file location to the the sections related to projects.
- 4.2 Modified Advanced Menu Help.
The section incorrectly stated that the advanced menu is only available for NPE201. Some items are available to the NPE101 pocket programmer as well.
Added New Advanced Menu Item.
The advanced menu now has an item to allow the user to add a new chip support DLL.
- 4.1 Updated section Using the Pocket Programmer | Programming a Target.
This section was rewritten because it had information from the NPE101 rev 1 device that is no longer correct.
Modified Firmware Section of Help File.
Created a separate file that contains the section information on updating the Pocket Programmer Firmware. This is only a structural change and did not affect content.

The NPE Pocket Programmer comes in two models; the NPE101-A, which requires the NPE Desktop Programmer to load target image files and settings. And the NPE201/202-A, which is the USB version of the Pocket Programmer and connects directly to the USB port on your PC.

Both Pocket Programmers use the **Image Loader** application to load the target image and settings into the Pocket Programmer. The Image Loader application is smart enough to detect the Pocket Programmer being used and connect to it automatically.

FYI - Do not connect both types of Pocket Programmers to a single PC at the same time. This will cause erratic behavior!

Image Loader Application

Click on the different regions of the Image Loader User Interface shown below to get a quick overview of the different functional areas of the application.

Pocket Programmer Status

Connected: ● Type: NPE201 FW Version: 21
 Serial Number: PP-00000000
 Last Operation: Target program/verify successful.



Target Files and Description

Select FLASH file to load.

Select EEPROM file to load.

Enter a brief description and/or version info about the firmware. You can enter up to 127 characters.

Target Processor

ATmega128/A

Set the Lock and Fuse bits to be written into the target.

<input type="checkbox"/> LB1	<input type="checkbox"/> CKSEL0	<input type="checkbox"/> BOOTRST	<input checked="" type="checkbox"/> M103C
<input type="checkbox"/> LB2	<input checked="" type="checkbox"/> CKSEL1	<input checked="" type="checkbox"/> BOOTSZ0	
<input type="checkbox"/> BLB01	<input checked="" type="checkbox"/> CKSEL2	<input checked="" type="checkbox"/> BOOTSZ1	
<input type="checkbox"/> BLB02	<input checked="" type="checkbox"/> CKSEL3	<input type="checkbox"/> EESAVE	
<input type="checkbox"/> BLB11	<input checked="" type="checkbox"/> SUT0	<input type="checkbox"/> CKOPT	
<input type="checkbox"/> BLB12	<input type="checkbox"/> SUT1	<input checked="" type="checkbox"/> JTAGEN	
	<input type="checkbox"/> BODEN	<input type="checkbox"/> OCDEN	
	<input type="checkbox"/> BODLEVEL	<input type="checkbox"/> WDTON	

Target Serial Number

Enabled

Format: ASCII Binary

Serial Number:

Preserve Existing

Location: Flash EEPROM

Address (HEX):

The menu items give access to a number of commonly used functions and some special operations that can not be accessed directly from the Image Loader User Interface.

Many of the functions have speed access keys associated with them. If you know the speed key you don't need to use the mouse to select the function from the menu. The table below lists the function and associated speed key.

Menu Function	Speed Key
File Select Target FLASH	<ctrl>T
File Select Target EEPROM	<ctrl>E
File Load Target Image	None
File Exit	<ctrl>X
Project Load Project	<ctrl>O
Project Save Project	<ctrl>S
Advanced Save Image to Hex File	None
Advanced Set SPI Clock	None
Advanced Update Firmware	None
Help Help Manual	F1
Help About	<ctrl>A

FYI - <ctrl>T means hold down the Control Key on the keyboard while simultaneously pressing the 'T' key. NOTE: the case of the letter does not matter.

The File Menu contains four functions that are explained below.

Select Target FLASH - This selection opens a file dialog box and allows you to select the FLASH file to be loaded into the Pocket Programmer. This selection has the same effect as using the FLASH Files... button on the user interface.

Select Target EEPROM - This selection opens a file dialog box and allows you to select the EEPROM file to be loaded into the Pocket Programmer. This selection has the same effect as using the EEPROM Files... button on the user interface.

Load Target Image - This selection is grayed out if a minimum of Target information has not been entered. Once the minimum required selections have been made this selection, along with the Load Image button on the user interface, become active. When selected the Target information that has been entered is transferred to the Pocket Programmer. After successfully completing this step, you are ready to disconnect the Pocket Programmer and program some target boards!

Exit - Closes the application.

Projects are a powerful way to save and load a particular set of Target selections, for more information see [Creating Projects](#). This menu has two selections, described below.

Load Project - Loads a previously saved project.

Save Project - Saves the current selections in a project file. The project file can be loaded at a later date and will duplicate the project selections and settings as they were saved.

The Advanced Menu allows you to set the SPI clock programming speed, save the stored image to a hex file, or update the Pocket Programmer firmware. Some options are only available when the NPE201-A/NPE202-A USB Pocket Programmer is attached.

Save Image to HEX File - This option allows you to save the contents of the flash and/or EEPROM image stored in the Pocket Programmer to Intel hex format files on your PC.

Set SPI Clock - (NPE201/NPE202 Only) This option allows you to set the SPI clock frequency that the target MCU is programmed at. **WARNING!** Setting the incorrect SPI clock rate will cause target programming to fail. The SPI clock rate should be 1/4 the target MCU clock rate or less. The default clock rate is 115.2 kHz, which will program any target MCU that has the clock option set to the internal RC oscillator. Higher speeds are possible with other clock options since the Pocket Programmer sets the fuse bits first before programming the flash and/or EEPROM.

Update Firmware - (NPE201/NPE202 Only) This option allows you to update the Pocket Programmer firmware. NPE provides updates to the Pocket Programmer firmware as .ENC files.

The Help menu has two selections, described below.

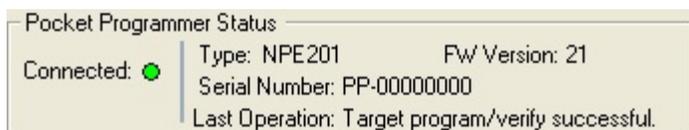
Help Manual - Open this file.

About - Opens the about dialog box, which displays the software versions running on your PC.

The Image Loader application allows you to create an image of a Target system and load that image into the Pocket Programmer. The Pocket Programmer then transfers that information to the Target system when it is programming.

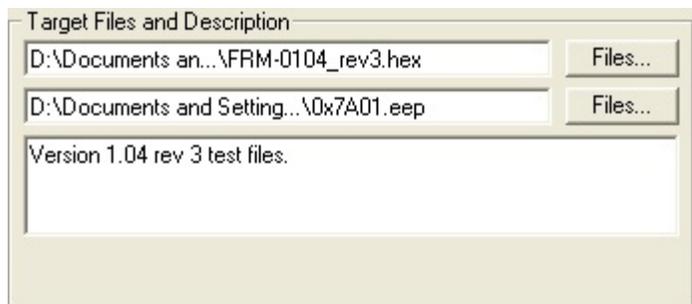
To create a Target image:

1. Connect the Pocket Programmer to the Desktop Programmer or USB port of your computer. The Image loader application will change the Connected LED in the Pocket Programmer Status pane to **GREEN** and display the Type, Serial Number, Version and Last Operation information when the Pocket Programmer is found. The status pane should look something like this -



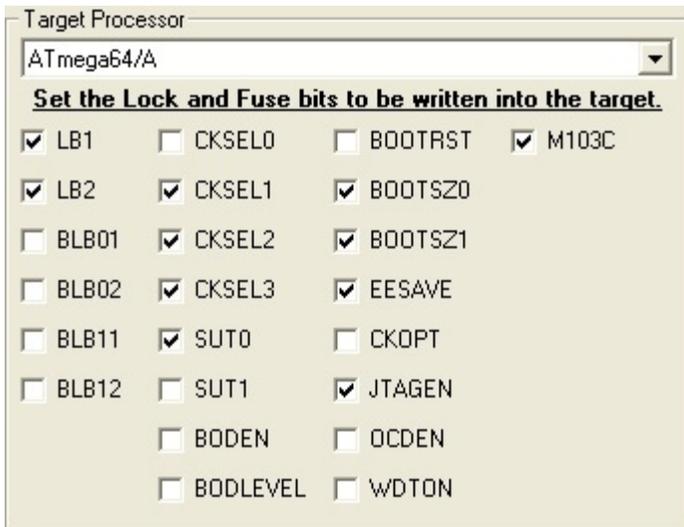
when the Pocket Programmer is ready to accept the Target Image.

2. Select a FLASH and/or EEPROM file to be loaded into the Target processor.
3. Enter a description of the Target data being loaded in the Target Description box that follows the EEPROM file box. The Target Files and Description pane should look something like this -



The information in the Target Description will not be written to the Target but it is written into the Pocket Programmer. So if you attach the Pocket Programmer to the Image Loader application you can see what is programmed into it. The Target Description area can hold up to 128 characters of text.

4. Select the Target Processor! This is the processor type on the Target board that will be programmed with this image. The selected Target Processor must match the processor on the Target board or the Pocket Programmer will refuse to program it. Once you have selected a Target Processor the Lock and Fuse bits that are defined for that processor are displayed, as shown below.

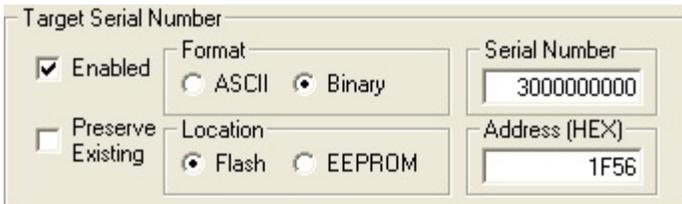


Here the Atmel ATmega64/ATmega64A processor was selected. The Lock and Fuse bits will initially be set to the defaults as specified in the data sheet for the selected processor.

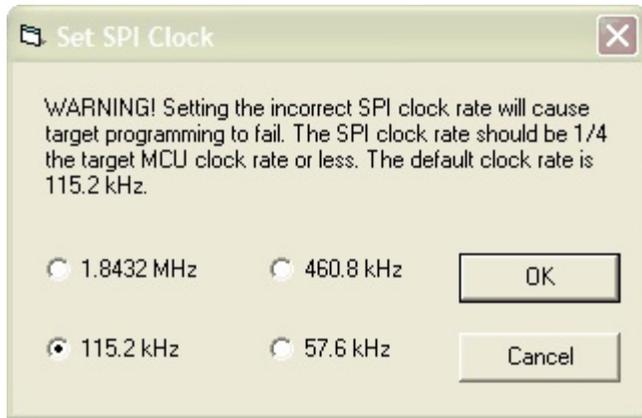
- Set the Lock and Fuse bits to the desired values. You may need to consult the data sheet for the selected processor to determine the settings for the Lock and Fuse bits. When you check a Lock or Fuse bit it writes it to the selected state. The settings here show:

Checked	Description
LB1, LB2	Further programming of FLASH and EEPROM is disabled.
CKSEL[3:1]	Internal 1 MHz nominal frequency clock selected (default).
SUT0	6 clk + 65 ms - Slowly rising power.
BOOTSZ[1:0]	4096 words reserved for boot sector.
EESAVE	Don't erase EEPROM data.
JTAGEN	The JTAG interface will be enabled.
M103C	ATmega103 compatibility mode selected.

- Optional:** Set the target serial number. Click the Enabled check box to enable target serialization and set the various serial number options. See [Target Serial Number](#) for details.



7. **Optional:** Set the target SPI clock programming frequency. Make sure the fuse bits are correctly set for the desired target processor clock speed. The SPI clock rate should be 1/4 the target MCU clock rate or less. The default clock rate is 115.2 kHz, which will program any target MCU that has the clock option set to the internal RC oscillator. Go to the Advanced Menu and select Set SPI clock. The following dialog appears.



8. At this point we are ready to load the settings and files into the Pocket Programmer. To do that click  You will see the progress bar indicating the progress of the load process and the Status area will display a success message. At this point you can remove the Pocket Programmer from the Desktop Programmer or the USB. **FYI - If you want to save these settings into a project file do not remove the Pocket Programmer** until you have selected the Project | Save Project menu item.

Target Serial Number

The Pocket Programmer starting with firmware version 21 now has the option to program a serial number into the target. The serial number to be programmed is incremented by one after each successful programming operation. The serial number is a numeric value with a range of 0 to 4294967295. The serial number will roll back to 0 once it has reached the top of it's range. One important thing to note is when the **Preserve Existing** option is checked - the Pocket Programmer will not use the serial number it maintains internally. It will just read the target serial number and program it back to the target. The serial number read is NOT validated! Blank target devices have the flash and EEPROM bits set to 1. Therefore, the Pocket Programmer will just program the erased value back to the target.

The options for the serial number are -

Enabled - Target serialization is enabled when this box is checked. This box needs to be checked to set the other options.

Enabled

Preserve Existing - You can preserve the existing serial number programmed into the target. The serial number box will be disabled. **IMPORTANT NOTE:** The programmer will read the target serial number prior to erasing and programming the target device. It does NOT attempt to validate the serial number!

Preserve Existing

Format - ASCII: The serial number is written to the target as ten bytes of ASCII text with the lowest byte address containing the most significant decimal digit and padded with leading zeros. Binary: The serial number is written to the target as a 32-bit binary number with the lowest byte address containing the least significant byte.

Format
 ASCII Binary

Location - This option sets the location of the serial number in flash or EEPROM.

Location
 Flash EEPROM

Serial Number - The starting or current serial number to program. This number will be incremented by one after each successful programming operation. Enter a decimal value in the range of 0 to 4294967295. This box is disabled if Preserve Existing is checked.

Serial Number
3000000000

Address - Enter the address of the serial number in hexadecimal. This will be the address of an existing serial number or the address to program a new serial number.

Address (HEX)
1F56

Projects are a great way for an engineer to create a specific Target Image and allow less technical users to load a Pocket Programmer with the correct settings. Project files can be emailed or sent to other sites where Pocket Programmers are used and will work correctly because each project file contains all of the files and settings that make up the Target Image to be programmed.

Creating a Project is simple. First, configure the Target files and settings (see [Loading a Target Image and Settings](#) for details). Then select Project | Save Project (or <ctrl>S) from the menu. And finally choose a location and name for the project and click the Save button. The default location is My Documents\Pocket Programmer Projects. That's all there is to it!

FYI:

A project file is a type of zip file that contains the target FLASH and/or EEPROM image file and a control file that describes the other settings of the user interface. Since this bundle of files contains all the information about a Target Image programming operation, you can copy these files to other PCs that have the Image Loader application on them.

Connect a Pocket Programmer to the PC running the Image Loader application. Notice the Connected LED goes **GREEN**.

To load a previously saved project, go to the menu Project | Load Project or use <ctrl>O to open a Project load dialog box. Navigate to the directory that contains the project to load and select the project file (.ppj extension), then click the Open button. The default location is My Documents\Pocket Programmer Projects.

The project file will be opened and read into the Image Loader Application. Then click the Load Image button to load the Target Image into the Pocket Programmer.

The Load Last Project button is useful for loading a number of Pocket Programmers during the same session. The Load Last Project button becomes active when a project has been loaded from the project menu and a new Pocket Programmer has been connected. Clicking this button starts loading the files and settings into the Pocket Programmer as specified in the project.



The NPE Pocket Programmer is extremely easy to use. This section will step you through using the NPE Pocket Programmer to program a target board. These steps assume you have a target image is loaded into the Pocket Programmer.

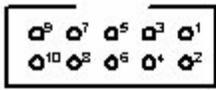
1. Connect the NPE Pocket Programmer to the unit to be programmed.
2. Power up the board to be programmed. The programming LED on the Pocket Programmer should be solid yellow, indicating that the Pocket Programmer is ready to program.
3. Momentarily press the program button to begin programming the target unit.
 - a. The status indicator LED will **blink yellow** while the programming operation is active.
 - b. After programming the verify operation will take place, during verify the status indicator will **blink green**.
 - c. Finally, after the verify operation the status indicator will show a **steady green** if the operation was successful or a **steady red** if an error was detected.

The Pocket Programmer uses LED codes to give feedback to the user. The LED codes used are listed in the table below.

LED Indicator Status	Description
Red On	Program/Verify Failed
Green On	Program/Verify Succeeded
Yellow On	Pocket Programmer Ready
Red Blink	Low Voltage
Green Blink	Busy Verify
Yellow Blink	Busy Program
Red/Green Alternate	No Target Device Attached
Green/Yellow Alternate	No Flash or EEPROM Image Present
Red/Yellow Alternate	Not Defined

The Pocket Programmer is shipped with one of two types of connectors, either the standard 10-pin connector or the new STK500 6-pin connector. The signal outputs for each connector is shown below. Pin 1 is indicated by a diamond on the haeader and the red wire on the cable.

10-pin Connector



1 - M O S I	2 - V C C
3 - S S	4 - G N D
5 - R e s e t	6 - G N D
7 - S C K	8 - G N D
9 - M I S O	10 - G N D

6-pin Connector

1 - M I S O	2 - V C C
3 - S C K	4 -
M O S I	
5 - R e s e t	6 - G N D

FYI: On the 10-pin connector, pin 3 is used to control loading of the Target Image into the NPE101-A version of the Pocket Programmer. This pin is not used on the USB version.

The firmware (i.e. software that runs in the Pocket Programmer) in a Pocket Programmer may become damaged by using the Desktop Programmer to load a target application. Instead of loading the target application the Desktop Programmer overwrites the firmware of the Pocket Programmer. That is why it is important to use the Image Loader application when loading a target application.

If you may have done this, you can still recover use of your Pocket Programmer by reloading the firmware. This section tells you how to do this.

Depending on which Pocket Programmer you are using, there are two different ways to update the firmware. The NPE101-A requires the Desktop Programmer and the Desktop Programmer application. The NPE201-A/NPE202-A only requires the Image Loader application. ***It is important that you use the correct firmware file and procedure for your version of the Pocket Programmer.*** See the "**About Pocket Programmer Firmware.txt**" file for information on which firmware file to use. If you used the standard install the file is located in the directory at:

C:\Program Files\North Pole Engineering\Pocket Programmer\Firmware

Select the appropriate link below for the procedure to update your firmware.

[Updating the NPE101-A Firmware](#)

[Updating the NPE201-A/NPE202-A USB Firmware](#)

There are two versions of the NPE101-A Pocket Programmer. Before loading microcode into the Pocket Programmer you must determine which version you have.

Determining the Pocket Programmer Version

1. Start the Desktop Programmer application.
2. Attach the Pocket Programmer to the Desktop Programmer.
3. Click '**Connect**' on the Desktop Programmer application.
4. After the Desktop Programmer connects, check the 'Device Type' field:
 - a. AT90S4433 is a version 1 Pocket Programmer.
 - b. ATmega8 is a version 2 Pocket Programmer.
5. See the "**About Pocket Programmer Firmware.txt**" file for information on which firmware file to use. If you used the standard install the file is located in the directory at:

C:\Program Files\North Pole Engineering\Pocket Programmer\Firmware

Loading the Pocket Programmer Firmware

After determining the Pocket Programmer version, leave the Desktop Programmer connected and click the FLASH File button. Navigate to the installation directory for the Pocket Programmer and then into the Firmware subdirectory. If you used the standard install the directory is located at:

C:\Program Files\North Pole Engineering\Pocket Programmer\Firmware.

1. Select the appropriate firmware file for your version of the Pocket Programmer.
2. Clear all Fuse Bits if any exist.
3. Clear all Lock Bits if any exist.
4. Select the '**Verify after Programming**' command modifier.
5. Click the '**Program**' button.

After a successful verify your Pocket Programmer firmware load is complete.

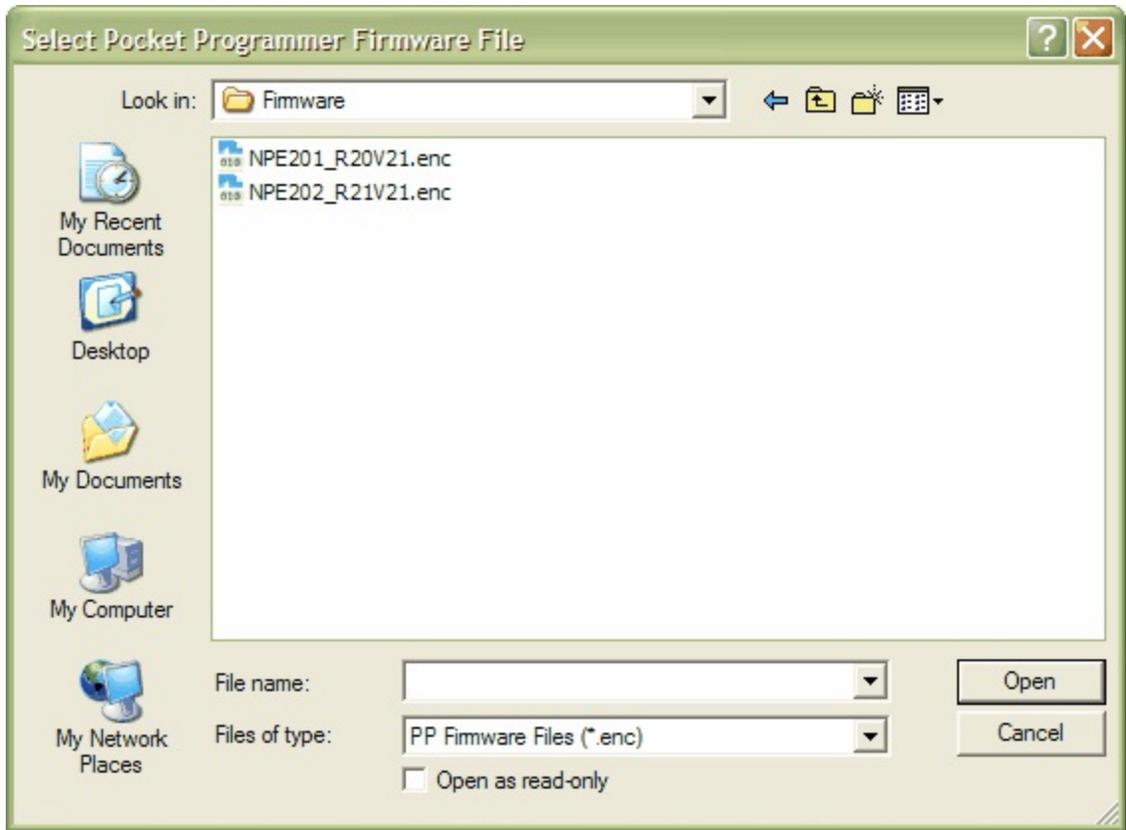
Verify that the Reload was Successful

You can verify that the microcode load restored operation of your Pocket Programmer by closing the Desktop Programmer Application and opening the Image Loader Application. If the code was successfully loaded the Image Loader should automatically discover the attached Pocket Programmer.

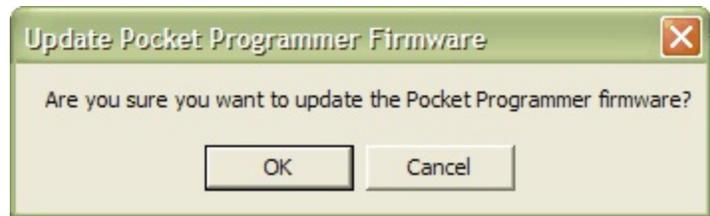
Updating the NPE201-A/NPE202-A USB Firmware

You can only update the NPE201-A/NPE202-A firmware with the **Image Loader** application. NPE distributes the NPE201-A/NPE202-A firmware as a .ENC file. See the "**About Pocket Programmer Firmware.txt**" file for information on which file to use. If you used the standard install the file is located in the directory at:
C:\Program Files\North Pole Engineering\Pocket Programmer\Firmware.

To update the firmware, click on the Advanced menu and select Update Firmware. A dialog box will appear prompting you to select a Pocket Programmer firmware file to download.



You will then be asked if you want to update the Pocket Programmer firmware. Click OK to update or cancel to end the update.



After you click OK, there will be short wait while the firmware is being updated. You will see the following message When the update is complete.

