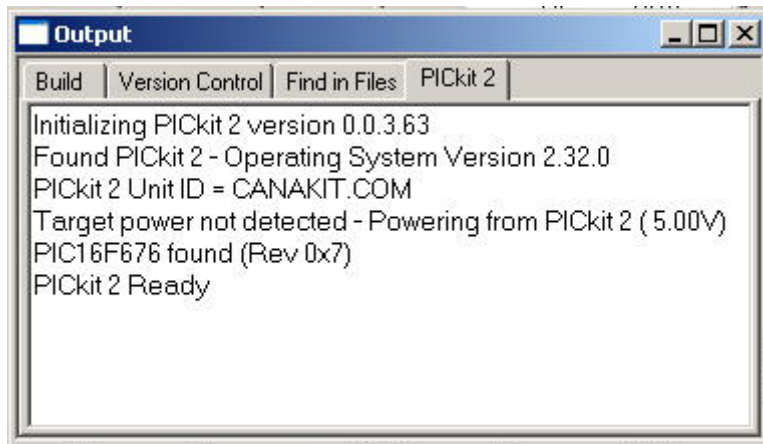
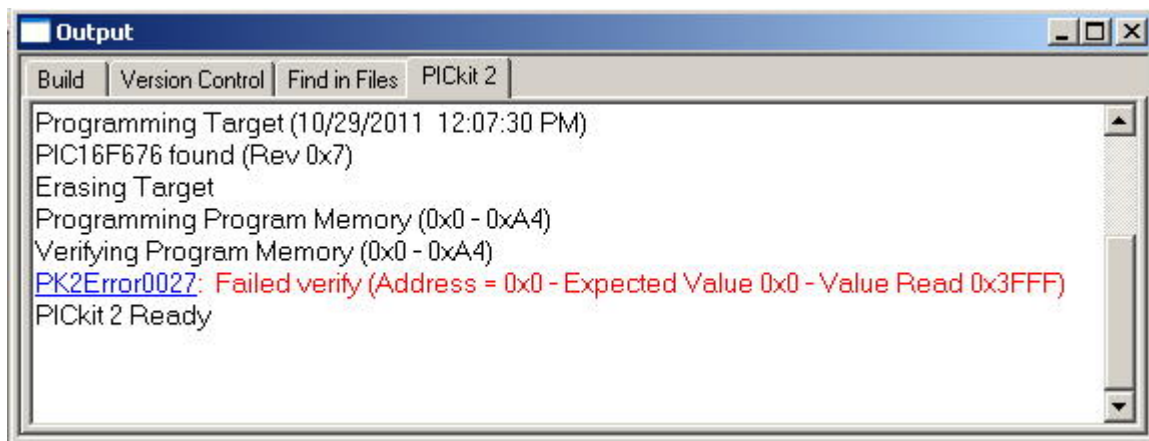


Canakit Programmer Error 27 Workaround  
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**Introduction.** Many readers of the *PIC Programming for Beginners* book that are using the Canakit programmer supplied in the kit of parts purchased from the ARRL are having difficulty with an ERROR 27 when they attempt to program the PICs. Diligently following the directions in the book, they will connect the programmer and the programmer will be recognized.



When the program is compiled, built, and sent to the programmer, the return is an ERROR 27 message and the programming stops.



The reason why this is happening is unknown. There appears to be a conflict between the Canakit PICKit2 clone programmer and MPLab IDE. When you hit the programming icon in MPLab, a number of steps are taken by the software to accomplish the actual programming. Early in the programming sequence, the contents of a critical register called the OSCCAL value is retrieved from the PIC and is supposed to be stored temporarily while the rest of the program is sent to the PIC. After the main program is delivered to the PIC, the OSCCAL value is re-installed back onto the PIC. For some yet

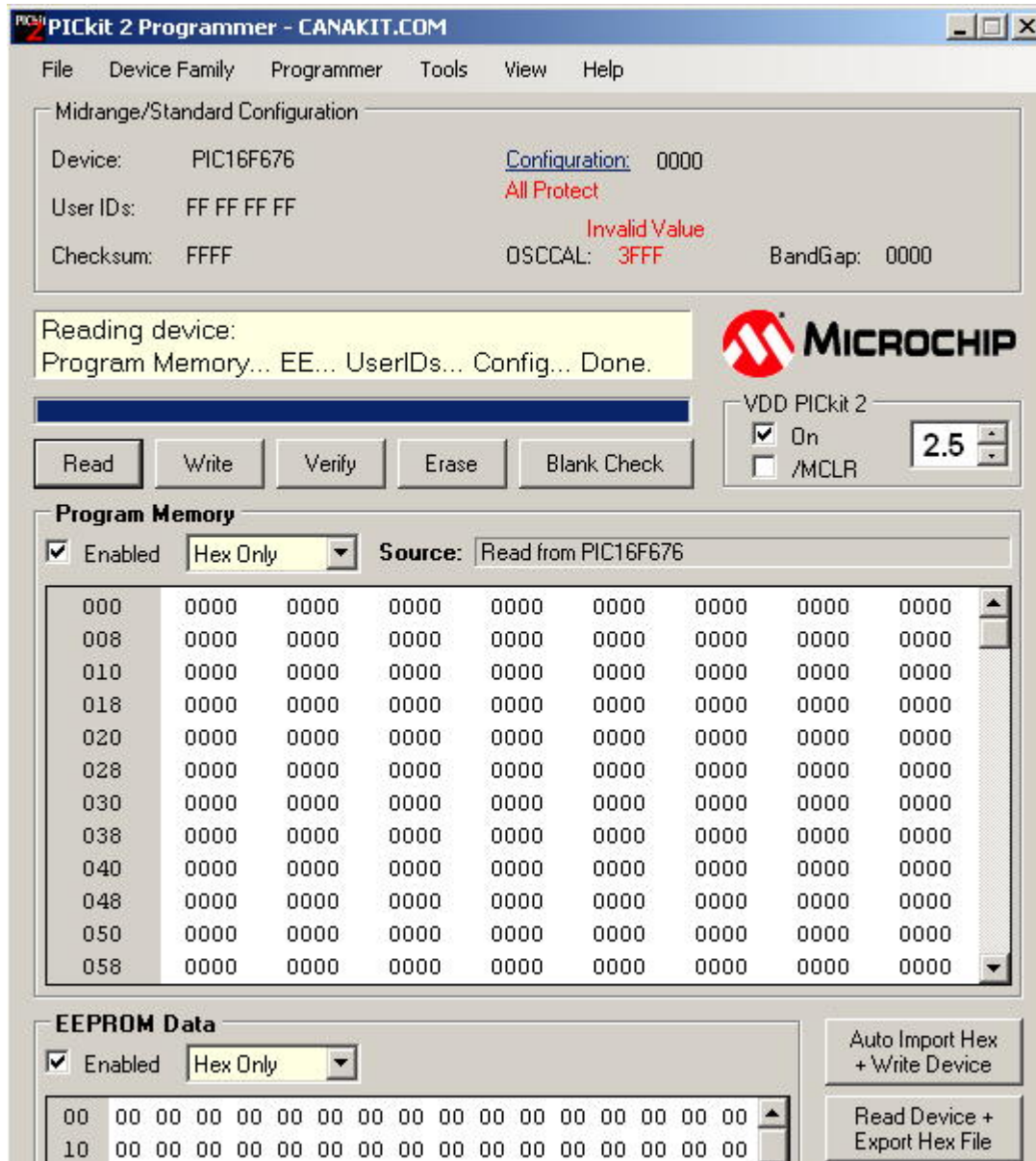
undetermined reason, this is not happening with the CanaKit programmer. The OSCCAL value is lost and the programming is stopped with the ERROR 27 message returned. The OSCCAL value is actually gone and needs to be recovered before the PIC device can be used again as mentioned in the book.

The CanaKit works fine with another programming software package called PICKit 2 (not to be confused with the programmer called PICKit 2). The following steps outline a workaround to allow you to continue your studies of PIC programming while using the CanaKit programmer with PICKit 2 software.

**Using PICKit 2 Software to Program the PIC.** The work around takes advantage of the fact that the CanaKit appears to work fine with the PICKit 2 software package. This PICKit 2 software is a pretty functional programming package. While it does not facilitate the writing of programs as you are learning to do in the book (MPLab is still required for program development), the PICKit 2 software utilities allow you to recover a lost or corrupted OSCCAL value and also to program the PIC from a HEX file.

**Step 1. Install the PICKit 2 software package.** Go to the Microchip web page at this URL:

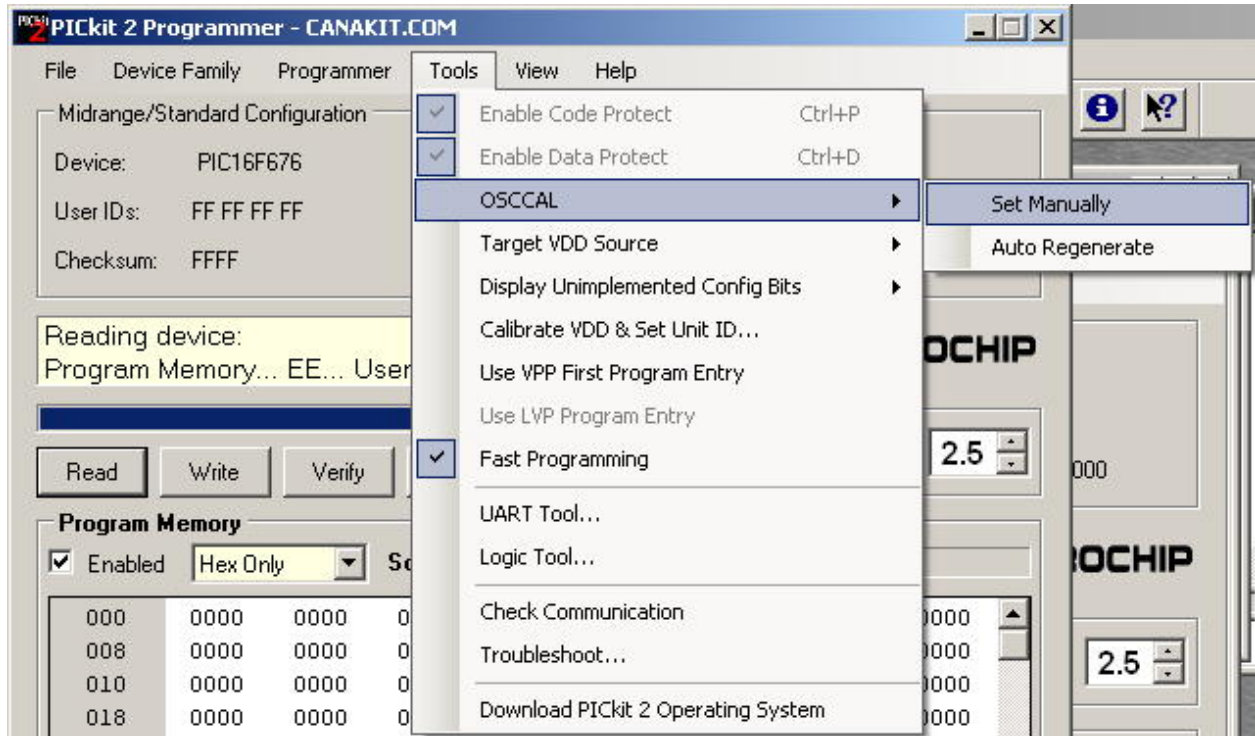
[http://www.microchip.com/stellent/idcplg?IdcService=SS\\_GET\\_PAGE&nodeId=1406&dDocName=en023805](http://www.microchip.com/stellent/idcplg?IdcService=SS_GET_PAGE&nodeId=1406&dDocName=en023805). On the right side of the page you will see this link: [PICKit 2 v2.61](#). Download and install the PICKit 2 software accepting the defaults. When you run the software with your CanaKit programmer attached, you will see the software displayed like this:



Notice that the OSCCAL value is highlighted in red and indicates that there is an invalid value of 3FFF (if your PIC has been previously corrupted, if not, the value here will probably be valid with the value of 34XX...the XX are hex numbers that reflect the PICs OSCCAL value).

**Step 2. Recovering the OSCCAL value.** This step can take two directions. One if you were diligent in recording the OSCCAL value as suggested in the book before you do any programming of the device. The other direction is if you forgot to do that, or couldn't for some reason, and allows you to recover the unknown value to make the PIC usable again.

**Direction one.** Click on Tools/OSCCAL/Manual Set.

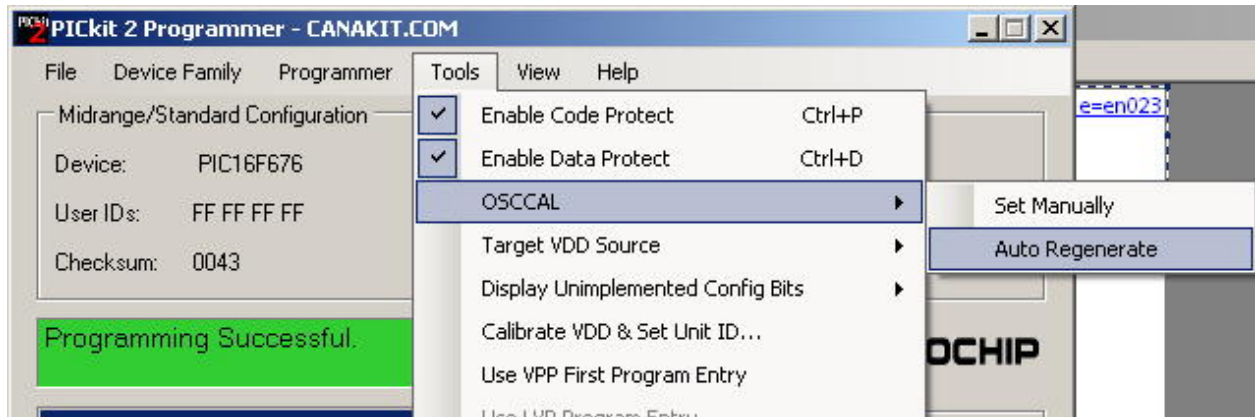


This popup window will be displayed allowing you to manually enter the OSCCAL value, in this case 3454.



All the OSCCAL values will begin with 34, followed by two alpha-numeric characters that are the actual HEX values of the OSCCAL value. Don't worry about the WARNING, that ship has already sailed. Click on Set. Once the software has reinstalled the OSCCAL value, you will be returned to the main software window and the correct OSCCAL value will be displayed and you're ready to move on.

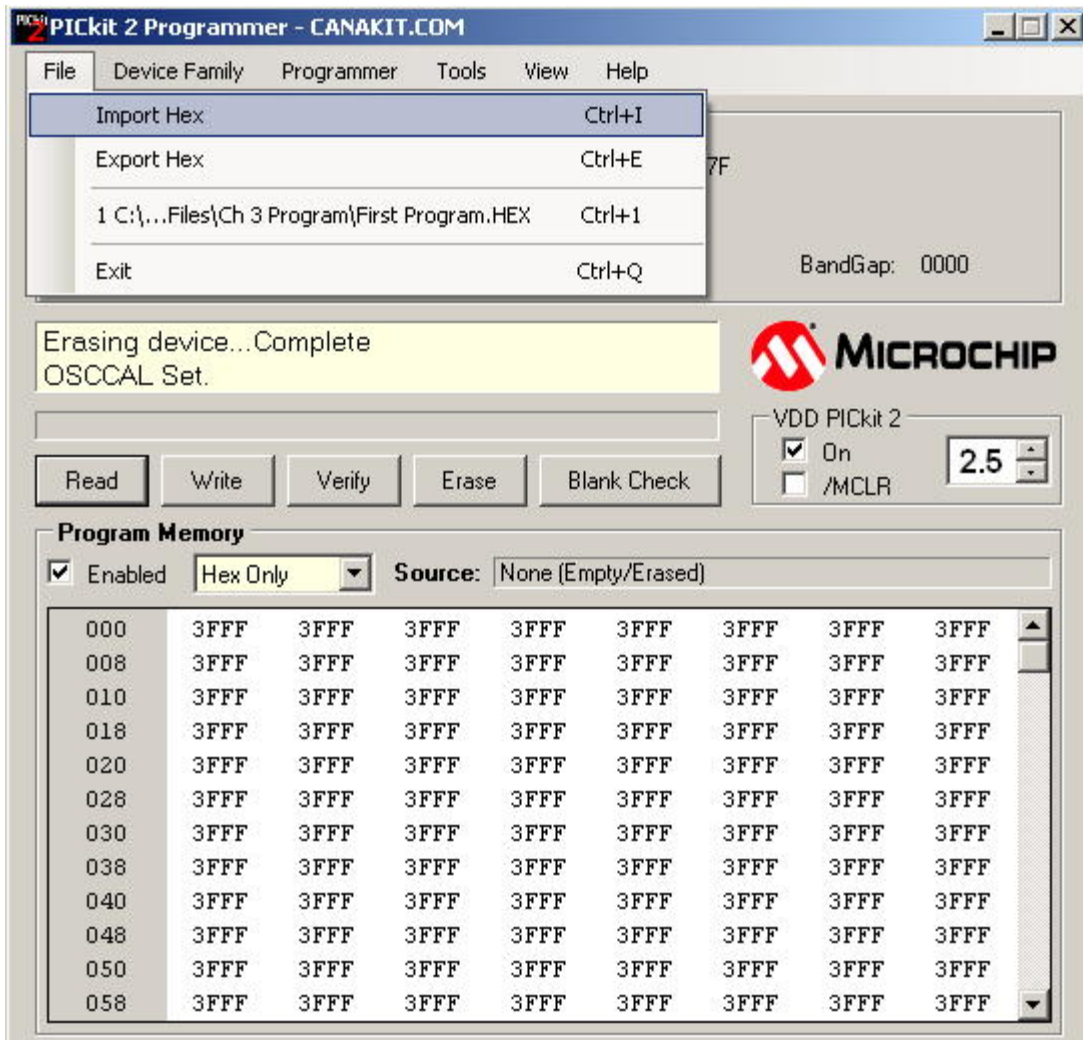
**Direction two.** If you have no idea what the OSCCAL value is for a particular device, you can allow the software to experimentally determine the value and install it. This system apparently is not perfect, because frequently you will find that the software generated OSCCAL value and the factory determined OSCCAL value (that you read off of a fresh device) are not always the same. There must be some range of acceptable values because I have used the software generated OSCCAL values for many applications with no problem. To have the software determine and load the OSCCAL value, click on Tools/OSCCAL/Auto Regenerate.



Then follow the prompts to allow the software to regenerate and install the OSCCAL value. Click on OK.

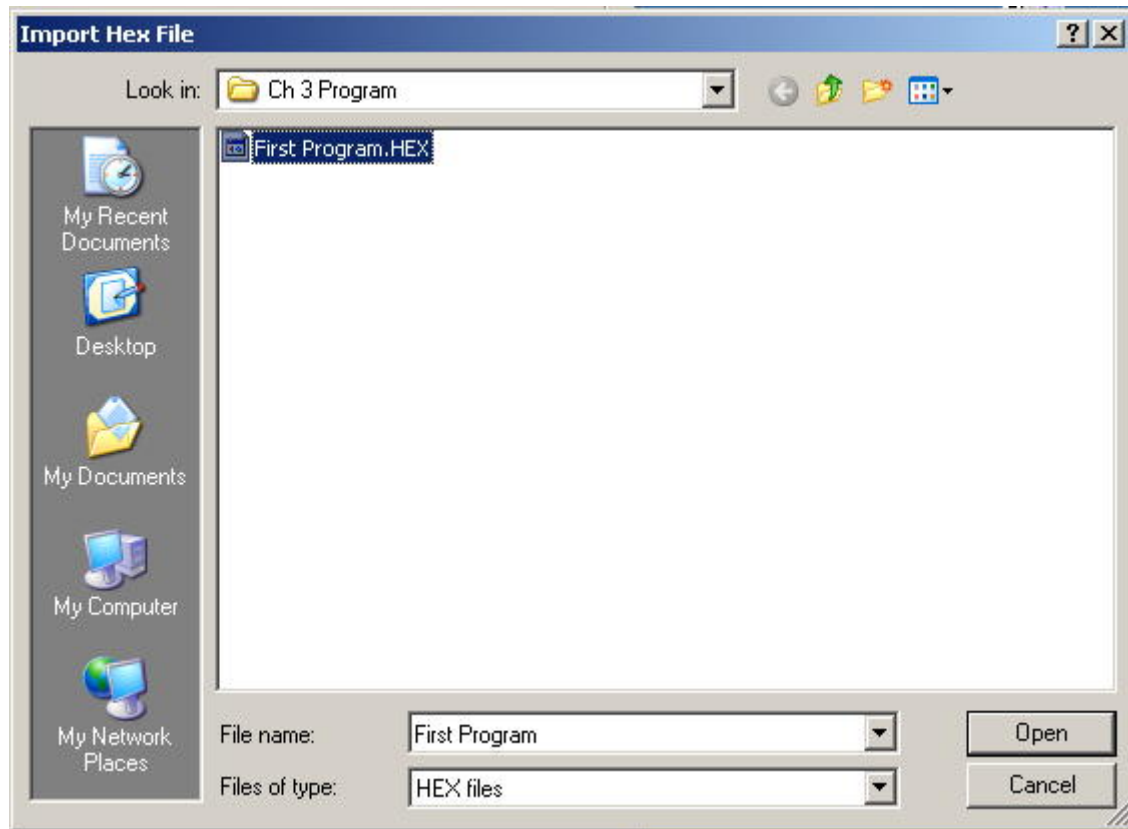


**Step 3. Using PICkit 2 software to download a HEX file into the PIC.** When you use MPLab IDE to author and build a program for the PIC, the software actually creates a number of files without your direct intervention. The programs that you write in the MPLab editor window are not the actual files that are downloaded into the PIC, but the “human” language interpretation of the program. The MPLab compiler actually converts your writing into machine language that the PIC understands, and the program in machine language is actually what is installed onto the PIC. That machine language version of your program is in the HEX file (HEX is short for hexadecimal...base 16 numbering system) and has the extension .HEX. If you look in the directory where your program files are stored, you will find the associated HEX file for the program you are working on. It is this HEX file that you will install using PICkit 2 software. After you have created your programs as outlined in the book in MPLab, instead of using MPLab to install the program on the PIC, launch the PICkit 2 software.

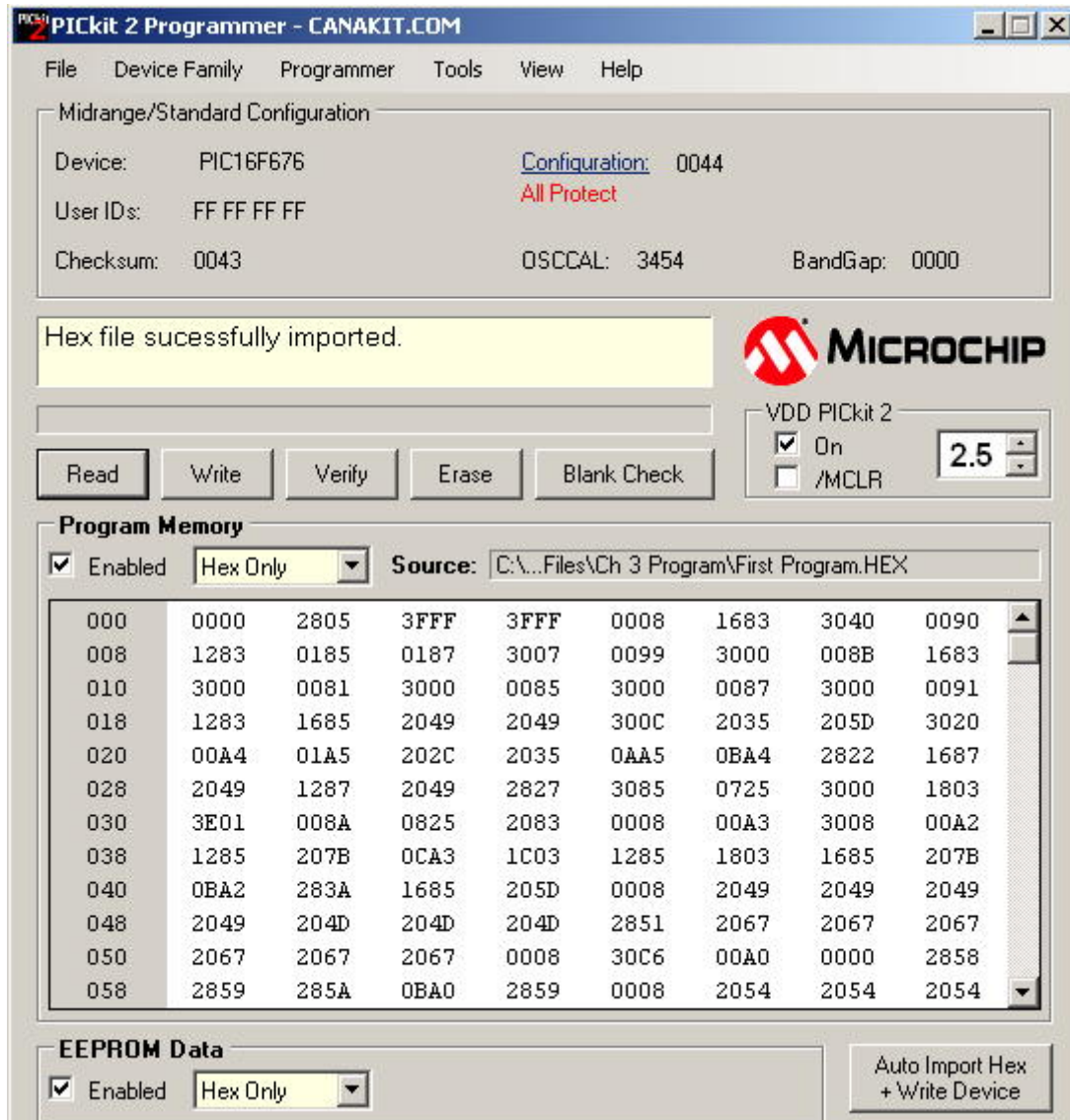


Click on File/Import Hex and navigate to where your programs are being filed on your hard disk.



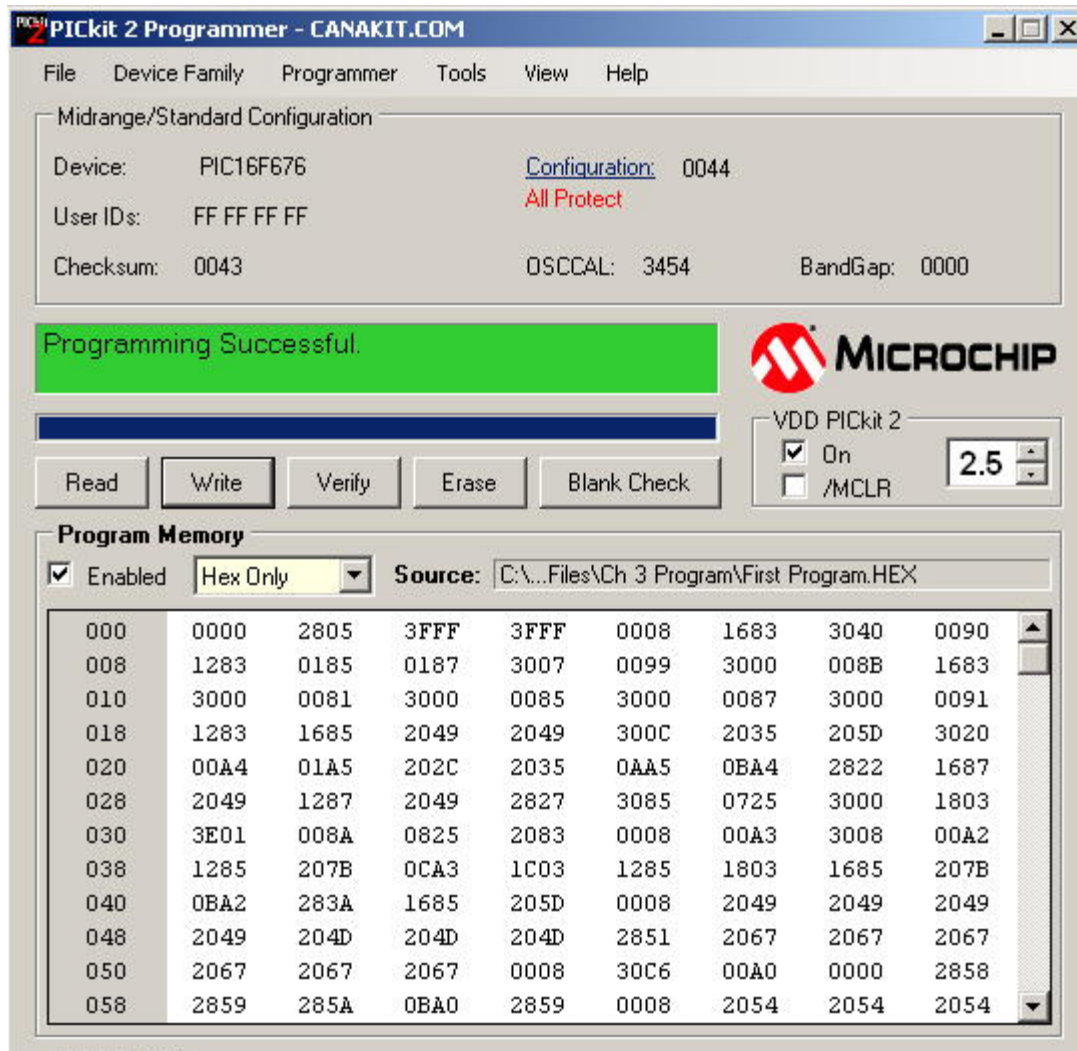


If you use the default folders for the program files in the book, you will find the HEX file for the program as shown here for the first program in chapter 3. Click on Open and the HEX version of your program will be imported into PICKt 2 and is ready for installation into the PIC memory.



You will notice that the HEX values in the Program Memory area of PICkit 2 have changed from all 0000's to HEX numbers that reflect the program values. Finally, click on Write and the PICkit 2 software will do its thing and install the program onto the PIC.





Now that the program is in the PIC, it will start running on the PIC. Here is where you remove the PIC from the CanaKit programmer and install it in your circuit for testing.

### Conclusion.

If you are getting ERROR 27 messages when you are using the CanaKit programmer with MPLab IDE, there is an unidentified conflict that is being worked. There is a workaround that will allow you to continue with your studies of PIC programming while using the CanaKit.

1. Install the PICKit 2 software package from the Microchip web site. The CanaKit programmer appears to work will with the PICKit 2 software package. PICKit 2 software allows you to install program HEX files onto the PIC.
2. Using PICKit 2, recover the OSCCAL value that was lost or corrupted during the attempt to program using the CanaKit with MPLab. The OSCCAL value can be restored using the known factory determined OSCCAL value or it can be auto regenerated using the PICKit 2 utility. (The

loss of the OSCCAL value appears to only be happening when using the CanaKit programmer with MPLab, it does not happen when using the PICkit 2 software.)

3. After you have developed the program using MPLab, build the program, but stop short of using MPLab to install the program onto the PIC.
4. Launch the PICkit 2 software. Click on File/Import and navigate to the folder where your program files are stored. Click on the appropriate file with the .HEX extension to import the hex version of your program into PICkit 2.
5. Click on Write to install the program. The OSCCAL value should not be lost using this procedure so set 2 above will not be needed further.
6. Remove the PIC from the CanaKit programmer and install it into your circuit for testing.