

# How to program a PIC

Hello all

This document will attempt to help you program a PIC if you have never done it before. A PIC if you were wondering is basically a computer on a single chip it has a processor, memory, input, output...etc... So yes the PIC is the heart of the board that you are using. This guide will show you how to program a PIC for the DMX to Grinch converter that RJ has created. If you following these instructions you do so at your own risk. I as well as any member or admin of DoItYourSelfChristmas take no liability in this at all.

The first thing that you will need is a PIC programmer. Now there are many types of PIC programmers and it would be difficult to cover them all but the basic concepts should be the same. The model used here is a generic PICKIT2 that you can get off EBay. This model also came with an Expander equipped with ZIF (Zero Insertion Force) sockets that will be used to plug the PIC into for programming.

To start lets review the Generic PICKIT2 programmer. Below you will see a picture of the complete set as ordered from EBay. This kit came with the PICKIT2, USB connection cable, Expander, and ribbon cables used to connect the PICKIT2 to the expander.



After you have your programmer you will need the software that loads onto your PC that will be used to control the programmer and load the firmware onto the PIC. For the software visit the following link and download it.

[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)

The software requires Microsoft .NET Framework be loaded onto your PC.

The software downloads are at the very bottom of the page. If you do not already have .NET loaded on your PC you can download a version of the installer that will include this as well.

You will also want to grab the software that converts .asm files to .hex. Normally the firmware for the PIC's are created with an .asm extension. These files need to be converted over to .hex before they can be programmed onto a PIC. The software is called MPLAB the following link has it for download at the bottom of the page.

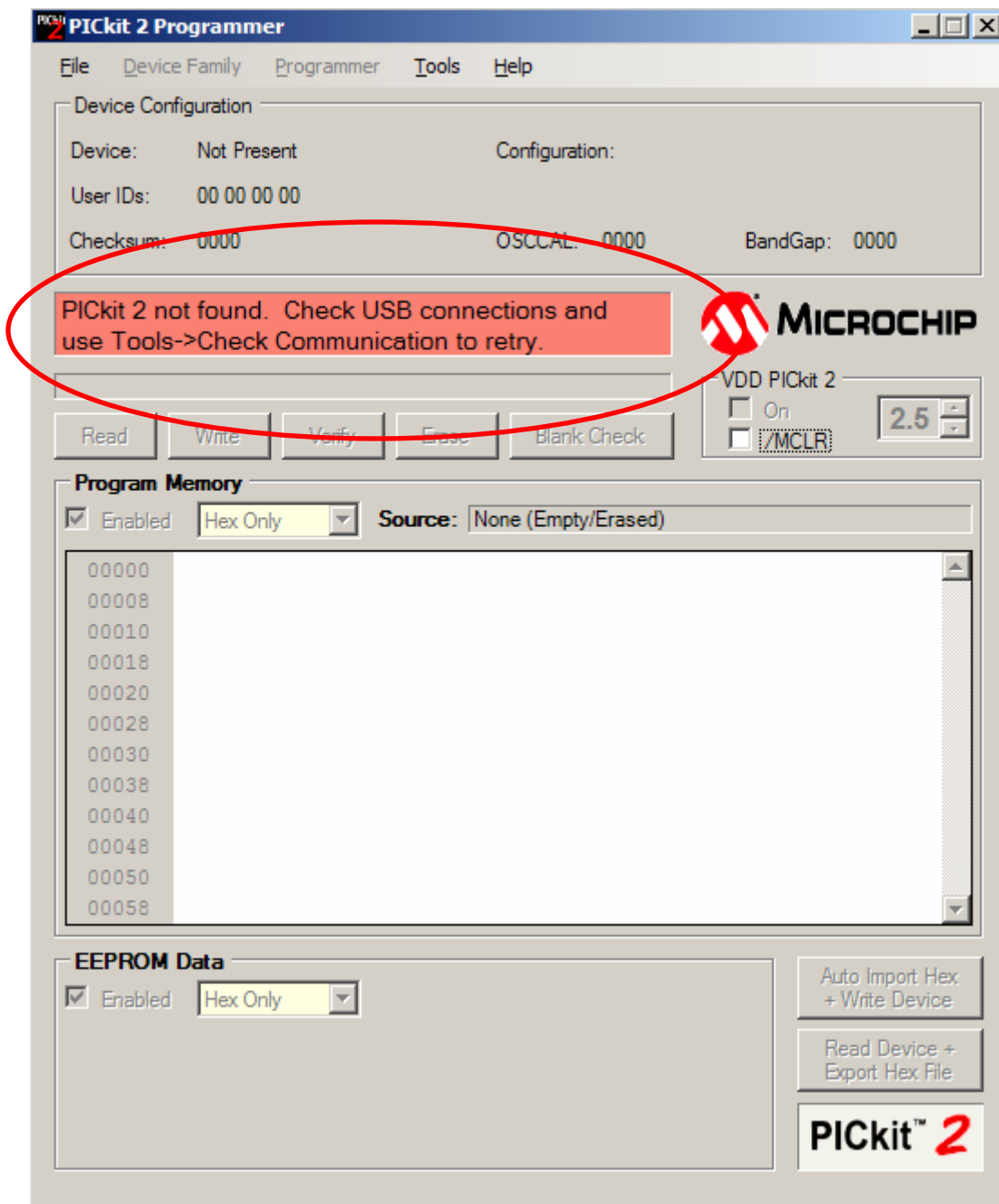
<http://www.electronics-lab.com/downloads/mcu/001/index.html>

After you have installed the PicKit2 software you are ready to attach the PicKit2 programmer.

First open the PicKit2 software. Once it has been installed you will find a program group called Microchip.



After you open the software you should see something like the below



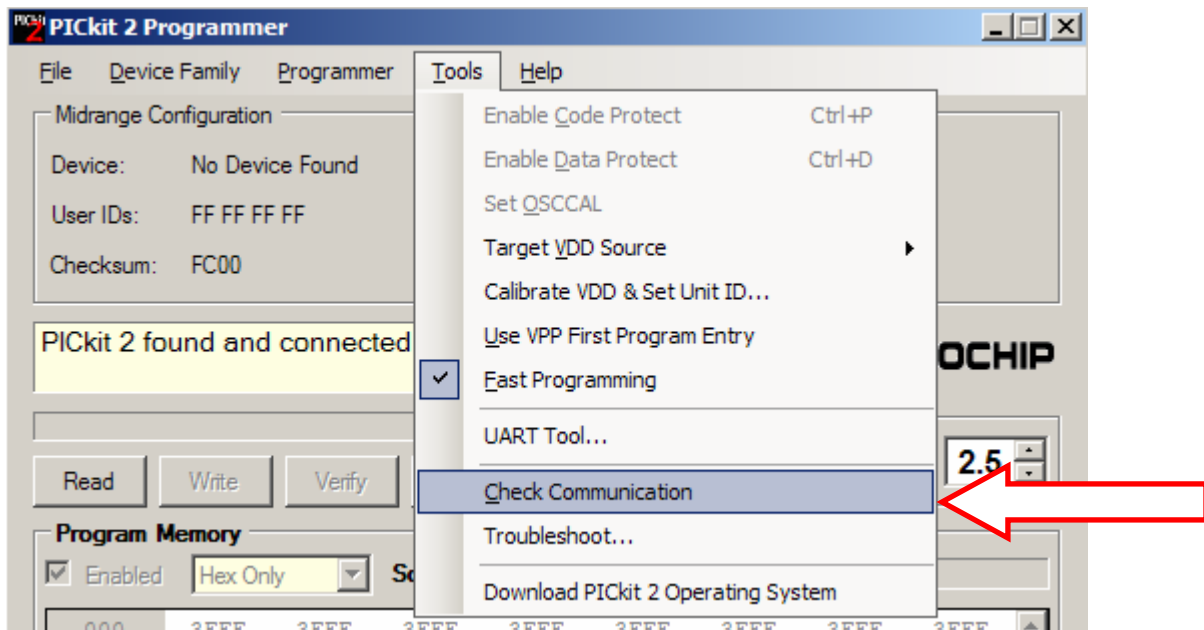
You will see that the software does not see a PICKIT2 because we have not attached it yet.

The first time you attach the programmer the software will prompt that you need to install an OS onto the programmer. I do not know if this is the case with the actual PicKit2 or with any other programmers but the one you see here off EBay will prompt for this to be done. This OS loading process should be automatic but you can also manually load an OS should it not automatically do it by doing the following.

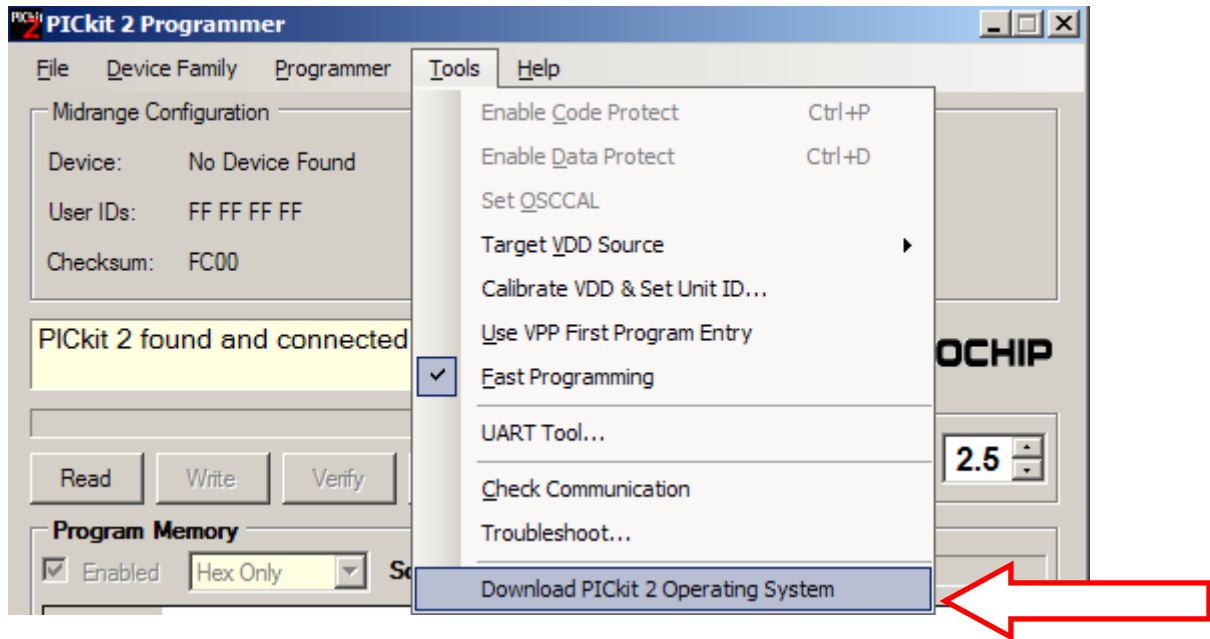
Plug the programmer up to the PC using in this case the USB cable.



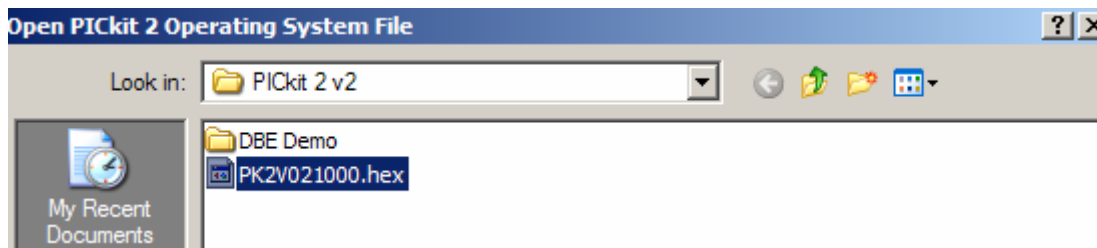
On this model you will see a green power light on the unit when it has been attached. After you attach the software may not see the programmer but have no fear you can either close and then reopen the software or click on “Tools” on the top toolbar and select “Check Communications” from the sub menu. See below pic.



After you click “Check Communications” you will see the software begin the scan and on this programmer you will see activity on the “Target” and “Busy” lights. After the programmer has been found it should prompt that you need to load the OS if it does not find one on the programmer. But as stated earlier this can be done manually by clicking on “Tools” on the top menu bar and select “Download PicKit 2 Operating System” on the sub menu selection. See the below pic.



After you select the option of “Download PicKit 2 Operating System” you will be prompted to select the OS program to download. See Below pic.



Select the file “PK2V021000.hex” then click on the “Open” button.

After you click the “Open” button you will see the software download the OS into the PicKit2. Status can be seen in the status window.

PICkit 2 not found. Check USB connections and use Tools->Check Communication to retry.

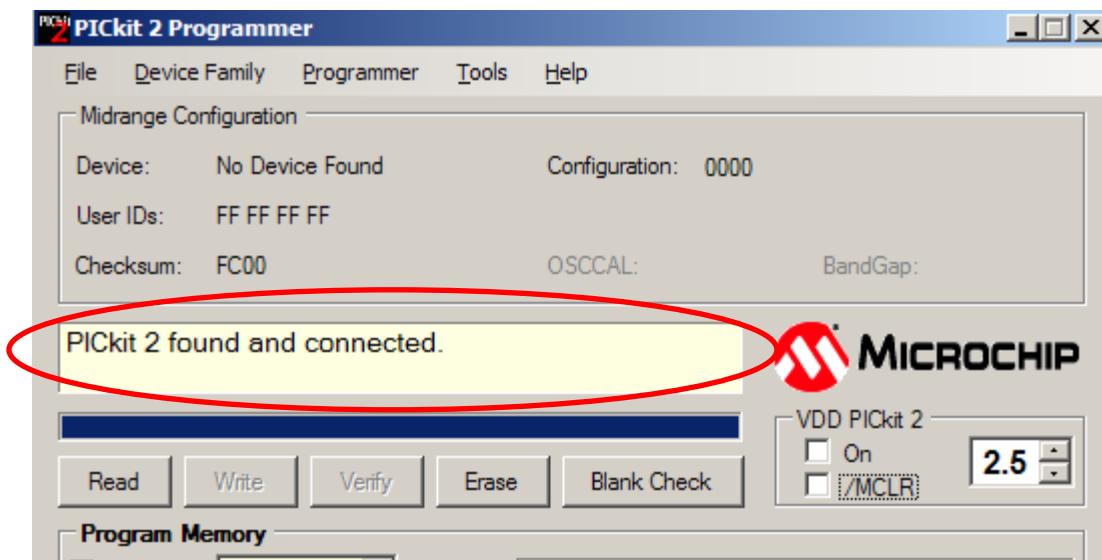
This window will change to say

1. Downloading
2. Verifying
3. Waiting for PicKit 2 to reset
4. PicKit2 found and connected

While the software is programming the programmer you should see activity on the programmer Via the “Target” and “Busy” leds on the programmer.

After the programmer resets and if you see the status window in the software display the following “PicKit2 found and connected.” Then you have successfully programmed the programmer and are ready to continue. This only needs to be done once unless you are loading and updated OS onto the programmer.

The below pic shows the software seeing the programmer attached to the PC Via the USB cable.



So far we have loaded the software, connected the programmer to the PC, and loaded an OS onto the programmer.

Next we need to attach the extender to the programmer. For this version you just use the supplied ribbon cable to attach the extender. See Below Pic.



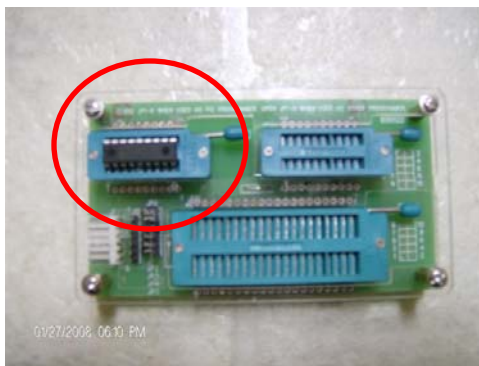
After we have attached the extender we need to get the firmware for the PIC that we are going to program. As I said earlier normally the firmware is in an .asm format and needs to be converted to .hex first. This conversion can be done with the MPLAB software via the link listed earlier in this document.

The firmware we will be using has already been converted to .HEX for us. Thanks RJ for posting the .HEX version. We will be programming a PIC18F1220-E/P this PIC is used for the Grinch to DMX converter and on the Lynx.

The firmware for the DMX to Grinch converter can be found in the thread for the DMX to Grinch Co-Op Forum. See below link

<http://www.doityourselfchristmas.com/forums/showthread.php?t=1623>

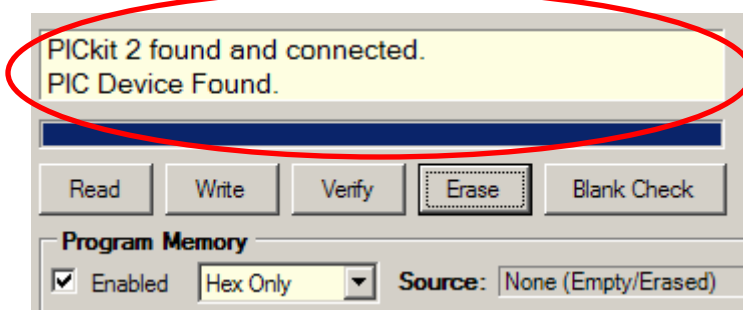
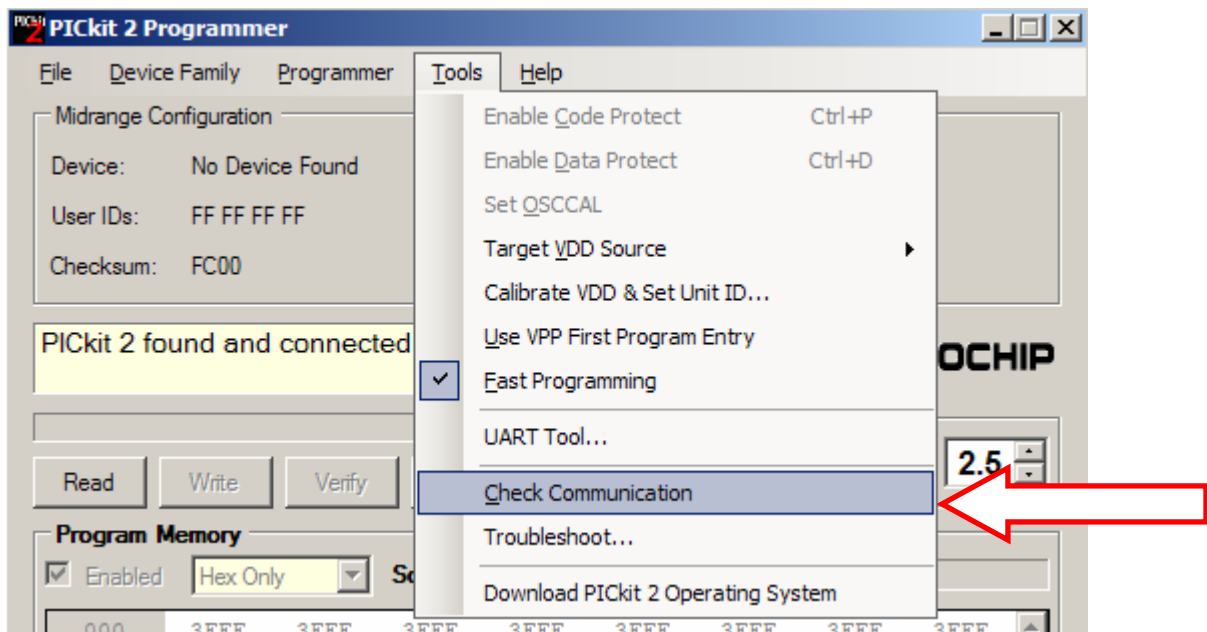
After you have the file downloaded load the PIC into the expander using the ZIF sockets. When you insert the PIC raise the ZIF handle next to the socket to open the socket and insert the PIC. When you insert the PIC make sure you match up pin 1 on the PIC with pin 1 on the ZIF socket. On the PIC you will see a small dot next to PIN 1 and on the expander you will see a 1 on the board next to the ZIF socket. After you have installed the PIC lower the ZIF handle next to the socket to lock the PIC into place. See below picture.



So at this point we have the PIC installed into the ZIF socket and the expander is attached to the programmer. Now we need to load the .HEX file onto the PIC.

Now we need to get the software to see that we have attached the Expander and that the Expander has a PIC installed. To do this we need to have the software “Check Communications” this will get the software to search for the programmer and in the process should also find the PIC.

Select “Tools” option in the software and then select “Check Communications” after a small bit of activity you should see something new in the status window. See below pics.

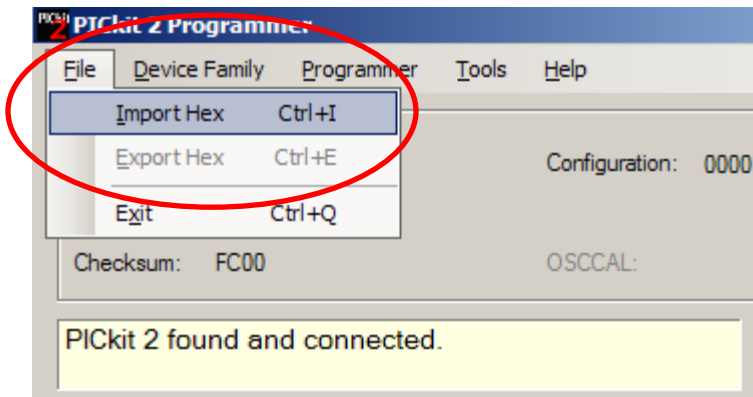


If you see “PIC Device Found” you have successfully attached your PIC to the programmer and are ready to continue.



Now we need to load the .HEX file into the PIC.

Select “File” from the top toolbar inside the software and select “Import .HEX”

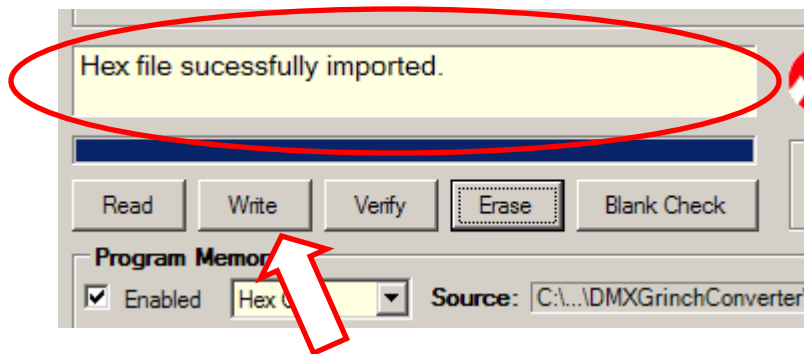


You will then be prompted to browse for the file that you want to import. Browse to your file.



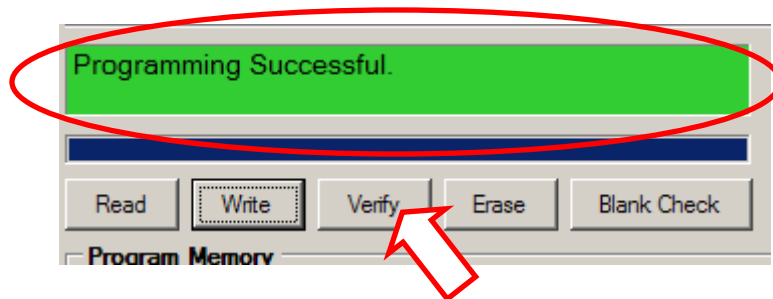
And then click on the “Open” button.

If the .HEX imports OK you should see the below on the status screen. See below pic.



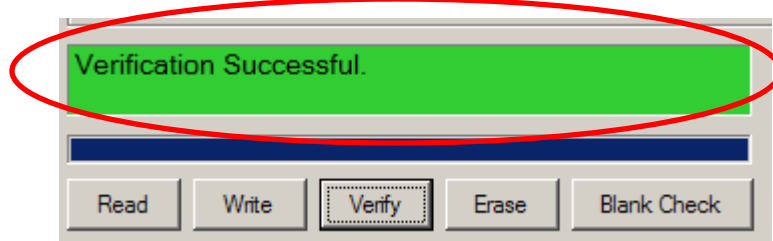
After you have successfully imported the .HEX file click on the write button.

You will see activity on the status screen of the software if the program is successful you will see the below in the status window.



If you would like to be extra sure that the program was complete you can always click the "Verify" button for extra measure.

If the verification is successful you will see the below in the status window. See pic.



Congratulations you have programmed your first PIC.