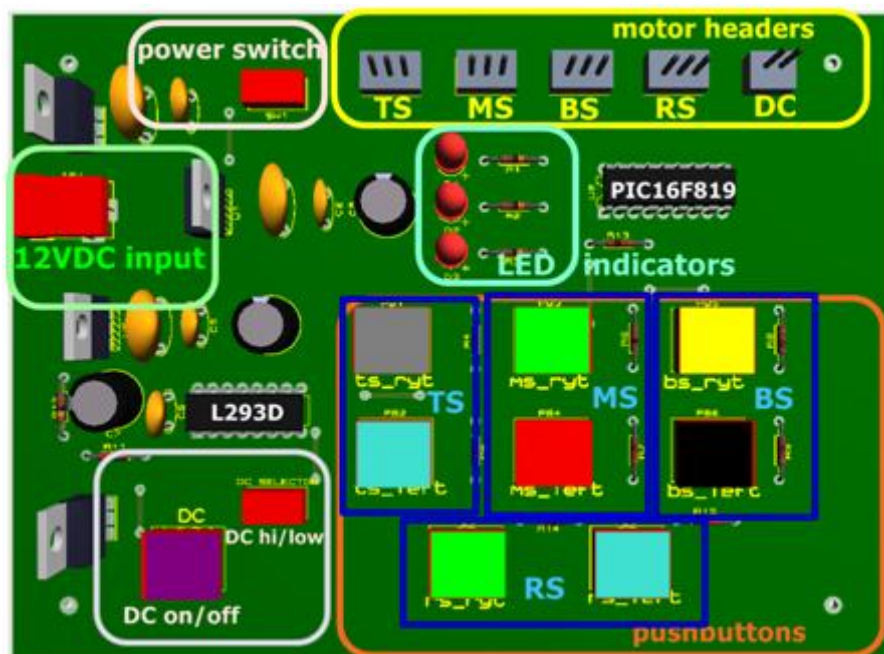
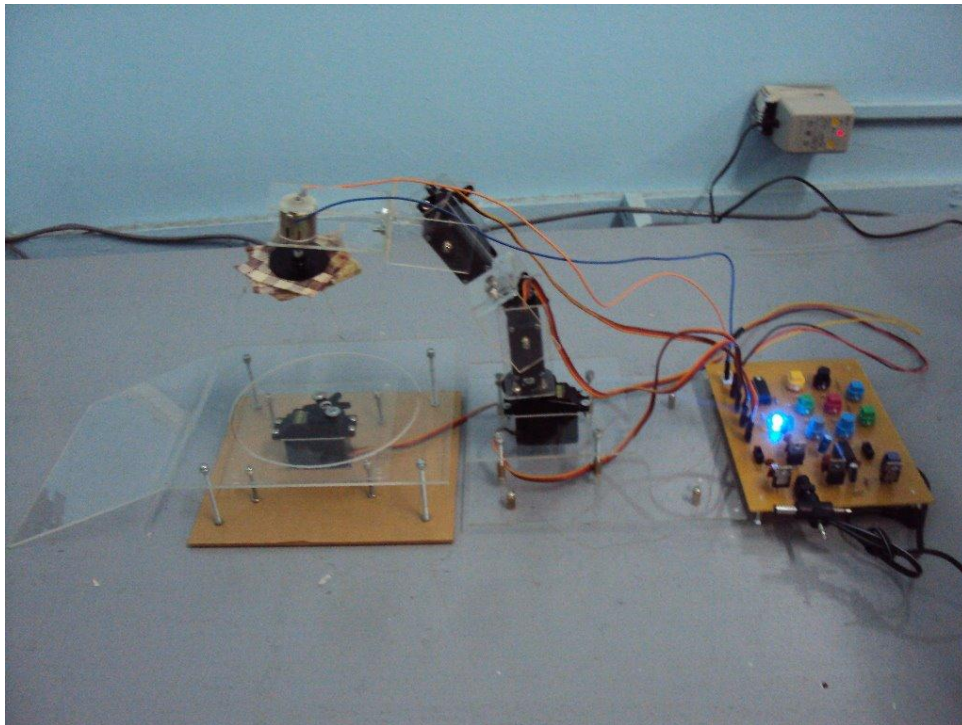


ROBOTIC ARM USER MANUAL

A. OPERATION

1. Prepare the robotic arm kit.



2. Connect a 12VDC input to the DC jack at the right side of the circuit.
3. Connect the motor header cables to the header pins in the circuit. Follow the guides in connecting TS (Top Servo), MS (Mid Servo), BS (Bottom Servo), RS (Ramp Servo), and DC (DC Motor).
4. Switch the device on by sliding the ON/OFF switch to ON. The motor should move in its starting position as shown in the image.
5. Use the pushbuttons to control the robotic arm. The buttons are labeled and color coded as follows:
 - TS_RYT (gray) – rotates top servo right
 - TS_LEFT (blue1) – rotates top servo left
 - MS_RYT (green1) - rotates mid servo right
 - MS_LEFT (red) – rotates mid servo left
 - BS_RYT (yellow) – rotates bottom servo right
 - BS_LEFT (black) – rotates bottom servo left
 - RS_RYT (green2) - rotates ramp servo right
 - RS_LEFT (blue2) – rotates ramp servo left
 - DC (purple) – activates the DC motor wiper
6. Control the speed of the DC motor end effector using the DC hi/low slide switch.
7. To turn off device, slide ON/OFF switch to off.

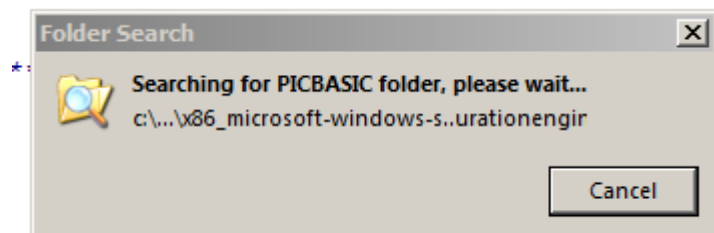
B. PROGRAMMING

The robot can be reprogrammed to modify the motor angle ranges, button functions, etc. Just get the PIC16F819 from the circuit using a IC Puller and connect in a PIC programmer. The compiler discussed here PIC BASIC PRO, but you are free to use any high-level programming language available for PIC MCUs (or PIC assembly language) to program the robotic arm.

1. Copy the entire PBP folder to a folder in your computer. The PBP folder can be accessed in the SOFTWARE option in the CD Menu. It is recommended that you copy it in the root folder of your primary hard disk (C:/PBP)
2. Copy the entire MPASM folder to a folder in your computer. The MPASM folder can be accessed in the SOFTWARE option in the CD Menu. It is recommended that you copy it in the root folder of your primary hard disk (C:/MPASM)

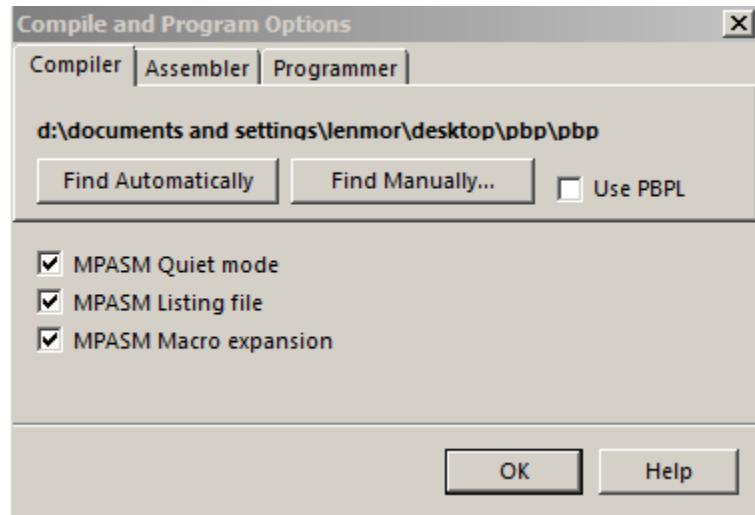
Note: If you have installed MPLAB in your PC, you can skip this step, so that that you can use your own MPASM inside your MPLAB installation folder.

3. Install MicroCode Studio (mcsinstall.exe).
4. Run MicroCode Studio. It will probably display a dialog like this, searching for the PBP folder.

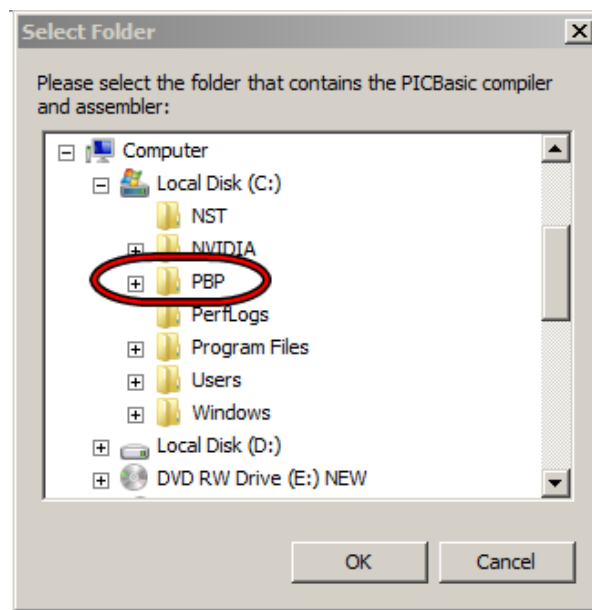


5. You can let the dialog search for the PBP folder, but if it would take too long, click Cancel, so that you can search the folder yourself.

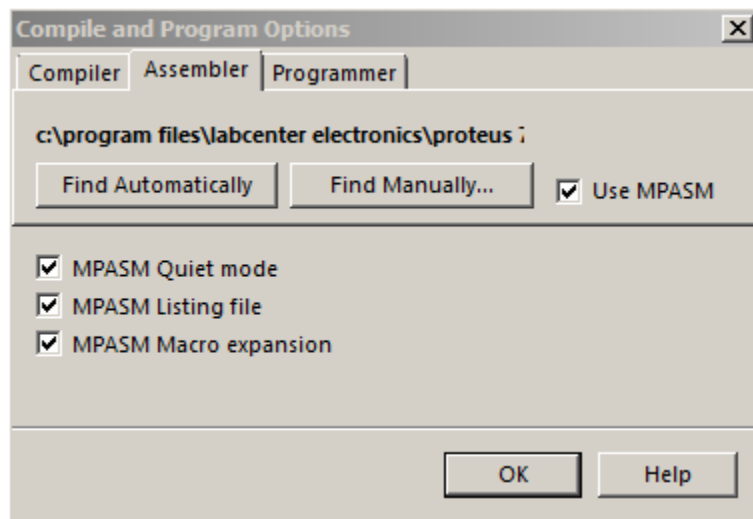
6. Click in the Menu Bar, View > Compile and Program Options
7. At the Compiler tab, click Find Manually



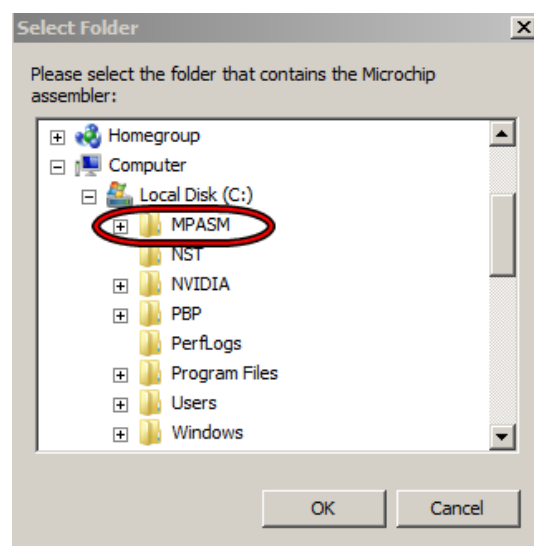
8. Browse for the PBP folder. If you have put it in your root folder, you can find it easily. Click OK.



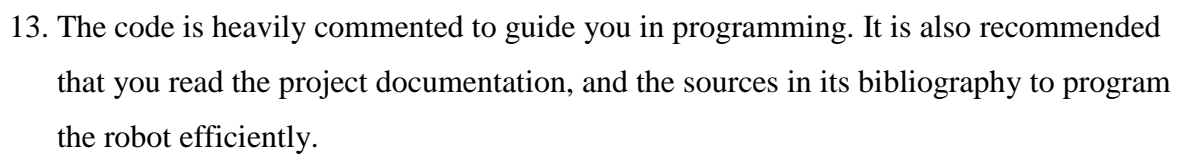
9. Similar steps for the Assembler tab. Check the 'Use MPASM' checkbox and click Find Manually.



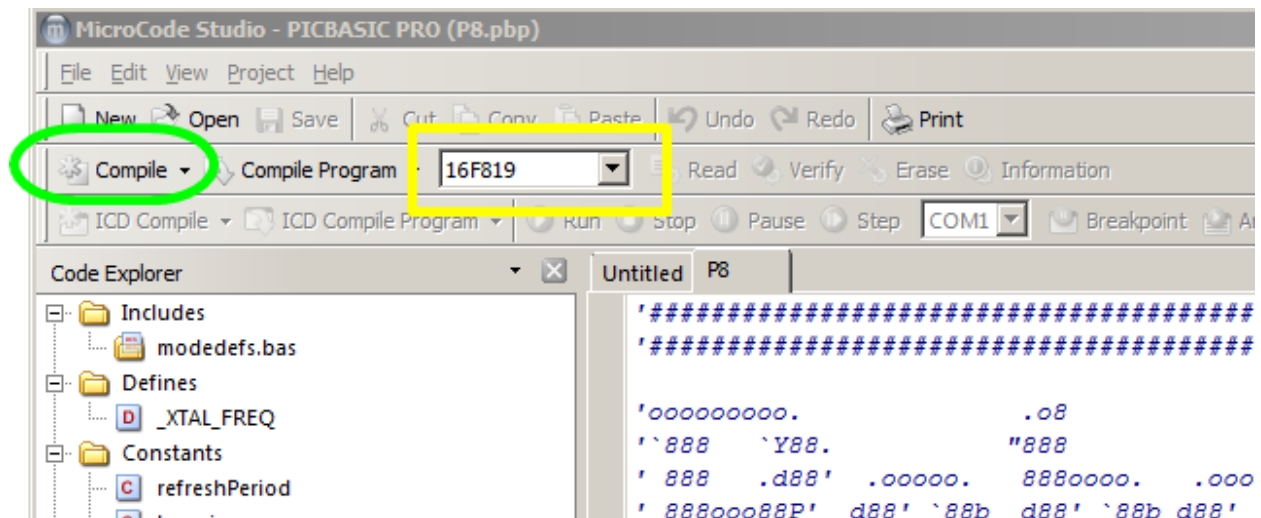
10. This time, browse for the MPASM folder. If you have put it in your root folder, you can find it easily. Click OK.



12. The code will open in read-only mode because it is in the CD. Save the code first in your hard disk before editing.



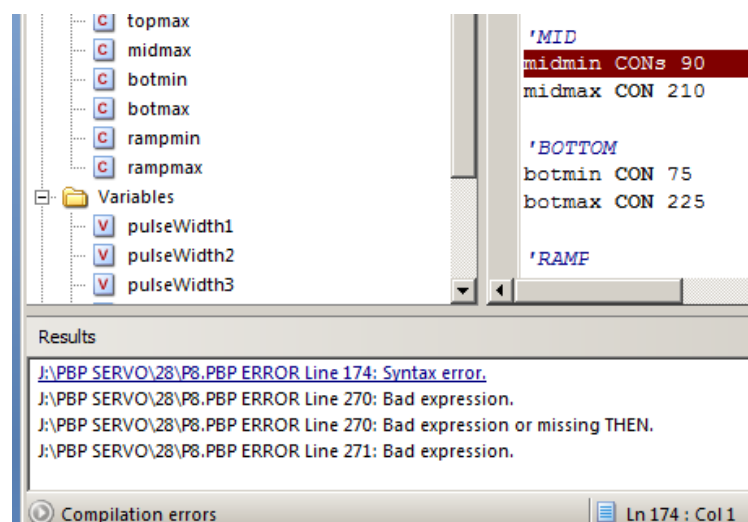
14. After editing, you can now compile the program (option circled green). Make sure you choose the correct PIC name (option circled yellow).



15. You should see the Success prompt at the status bar that signifies compilation success.



16. Otherwise, errors will be shown. The error lines are clickable so that you can pinpoint and highlight the error inside the code easily.



17. After successful compilation, you can find the .hex file inside the folder where you saved your code.

18. Next step is to burn the .hex code to the PIC. There are different PIC Programmers available today, as well as some open source design and Do-It-Yourself (DIY) kits in the internet. Often times, the burning software is included with the burning hardware. It is important that the burning software is compatible with the burning hardware. Some popular hardware-software tandems are the ff:

- **JDM Programmer – ICPROG**

- <http://www.volunteerlabrat.com/default.html?goto=picburner.html>
- <http://www.instructables.com/id/Simple-JDM-PIC-Programmer/>
- <http://www.instructables.com/id/JDM2-based-PIC-Programmer/>
- <http://www.ic-prog.com/index1.htm>

- **GTP USB – WinPic800**

- <http://ali3nworld.blogspot.com/2006/09/gtp-usb-lite-programmer-again.html>
- <http://www.instructables.com/id/GTP-USB-PIC-PROGRAMMER-Open-Source/>

- **MICROCHIP PICKit – MPLAB, PICKit burner**

- http://www.microchip.com/stellent/idcplg?IdcService=SS_GET_PAGE&nodeId=1406&dDocName=en010053
- 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=en538340

19. Observe proper procedures in burning conforming to the settings and options in your chosen burning hardware-software tandem configurations.