

2006 Programming Quick Start

1. Beginners need the following to program the FIRST robot:
 - ❖ FRC (Full-size Robot Controller) RC Default Code
 - ❖ Microchip MPLAB & C compiler or intelitek Easy C
 - ❖ IFI_Loader
 - ❖ A standard serial cable
 - ❖ A Windows PC with a serial port or USB-to-serial converter
2. Where to get everything:
 - Basic default code, updates, documentation, and support information is available on the Innovation FIRST (IFI) website (<http://www.ifirobotics.com/rc.shtml>), in particular at:
 - ❖ 2006 default code comes ready for basic driving and with a variety of sample I/O usages. -- <http://www.ifirobotics.com/docs/frc-code-1-04-2006.zip>
 - ❖ Robot Controller -- <http://www.ifirobotics.com/rc.shtml>
 - ❖ Operator Interface -- <http://www.ifirobotics.com/oi.shtml>
 - ❖ CMUCam2 -- <http://www.ifirobotics.com/camera.shtml>
 - The Camera default code for use with the CMUCam2 camera is available at the developer Kevin Watson's website (<http://kevin.org/frc/>). While there you'll also find code examples for using other beneficial sensors. This default code may have the normal driving mode disabled.
 - MPLAB is the FIRST supplied Windows based development environment (edit, compile, debug) that runs on your desktop computer and comes in the Kit-of-Parts wrapped inside the MPLAB notepad. Manuals for using MPLAB come on the CD and are also found on-line at the Microchip website (http://microchip.com/stellent/idcplg?IdcService=SS_GET_PAGE&nodeId=1406&dDocName=en019469&part=SW007002).
 - IFI_Loader v1.0.12 (<http://www.ifirobotics.com/docs/ifi-loader-v1-0-12.zip>) (also on the KOP CD) is used to download the compiled code into the RC via a serial cable from your desktop or laptop computer.
 - EasyC from Intellitek can be used instead of MPLAB or as a rapid prototyping tool. The Main Contact of each team received an email from FIRST on 1/10/06 with directions on downloading the software.
3. National Instruments Labview came in the kit-of-parts and very useful special applications for the camera and OI dashboard among others have been provided in this Chiefdelphi thread (<http://www.chiefdelphi.com/forums/showthread.php?t=41214>).
4. Check the IFI website periodically for updates to the software that corrects issues and fixes problems. For instance, new Master Controller "patches" if any, will be made available there. Directions will be included with any download.
5. The programming language used is "C" or PIC assembly. Tutorials in C can be found on the web, in your local bookstore or on the FIRST website, e.g.,
 - ❖ C Programming Resource Library has a great overview of the programming process -- http://www.usfirst.org/robotics/C_help.htm

- ❖ Learn C Programming - Developed by Carnegie Mellon and the National Robotics Engineering Consortium specifically for FIRST, this interactive website will get your team prepared for the FIRST Robotics Competition.
http://www.rec.ri.cmu.edu/education/robot_builder/

6. Newer laptops no longer come with the serial port required to download code to the Robot Controller. If you have this problem one solution is to use a USB/Serial converter. Various models are available at Radio Shack, CompUSA, or online, however, some models can be temperamental and they generally take longer to download than a built-in serial port (60sec vs. 10 sec). Good results have been reported using: Bafo Technologies BF-810 (~\$15) and a Radio Shack USB-to-Serial port cable #26-183 (\$42). You can also use the converter that comes with the Radio Shack Vex Programming Kit.

7. Documentation is your friend. Take the time to at least leaf through each manual, so you have an idea of where information can be found. Most of the basic information beginners require can be found in the IFI documents or MPLAB documents available from the websites:

- a. The 2005 [[url=http://www.ifirobotics.com/docs/legacy/control-system-overview-2004-01-07.pdf](http://www.ifirobotics.com/docs/legacy/control-system-overview-2004-01-07.pdf)]IFI Control System Overview[[url](http://www.ifirobotics.com/docs/legacy/control-system-overview-2004-01-07.pdf)] version applies to 2006 as well.
- b. [[url=http://www.ifirobotics.com/docs/rc-ref-guide-01-31-2005.pdf](http://www.ifirobotics.com/docs/rc-ref-guide-01-31-2005.pdf)]2005 IFI Programming Reference Guide[[url](http://www.ifirobotics.com/docs/rc-ref-guide-01-31-2005.pdf)] – basic how to hookup, program and download to the RC, hookup switches and sensors and do normal robot operations.
- c. Useful programming and compiler documents come on the Kit provided MPLAB CBOT CD with the tool installations or are available from either [[url=http://kevin.org/frc/](http://kevin.org/frc/)]Kevin Watson's[[url](http://kevin.org/frc/)] website or the legacy section of the Microchip website.
 - ❖ c18_getting_started_2.4
http://ww1.microchip.com/downloads/en/DeviceDoc/MPLAB_C18_Getting_Started_51295d.pdf
 - ❖ c18_libraries_2.4– details on timers, interrupts, and various other utility functions available to the programmer.
http://ww1.microchip.com/downloads/en/DeviceDoc/C18_Lib_51297d.pdf
 - ❖ c18_users_guide_2.4 - table of max numbers each variable type will store, compiler options, error messages, detailed descriptions of pragmas and some other advanced topics.
http://ww1.microchip.com/downloads/en/DeviceDoc/C18_UG_51288e.pdf
 - ❖ Microchip pic18f8520 data sheet - PIC assembly instruction set and details on EEPROM and other chip specific topics:
<http://ww1.microchip.com/downloads/en/DeviceDoc/39609b.pdf>
Mistakes in the datasheet:
<http://ww1.microchip.com/downloads/en/DeviceDoc/80157d.pdf>
 - ❖ Microchip PICmicro 18C MCU Family Reference Manual – all things great and small (in excruciating detail) about the processor

we use:

<http://ww1.microchip.com/downloads/en/DeviceDoc/39500a.pdf>

- ❖ MPLAB Quick Start Guide - basic how to use MPLAB and set options:

<http://ww1.microchip.com/downloads/en/DeviceDoc/51281d.pdf>

- ❖ MPLAB Users Guide:

<http://ww1.microchip.com/downloads/en/DeviceDoc/51519a.pdf>

8. For the CMUCam2 sensor delivered in the Kit-Of-Parts (KOP):

Use the special Labview Calibration application mentioned here:

<http://www.chiefdelphi.com/forums/showthread.php?t=41214>

to focus and test the camera.

Use <http://kevin.org/frc/> Kevin Watson's camera baseline program and his collection of camera documentation, but remember it only solves the headache of working the camera for you it doesn't drive your robot.

- Visit the ChiefDelphi (<http://www.chiefdelphi.com/forums>) Programming forum for discussions on all programming topics, problems, issues, and ideas.