Using the VEX Cortex with ROBOTC

This document is a guide for downloading and running programs on the VEX Cortex using ROBOTC for Cortex 2.3 BETA. It is broken into four sections: Prerequisites, Downloading Using USB Only, Downloading Using VEXnet or USB, and Troubleshooting.

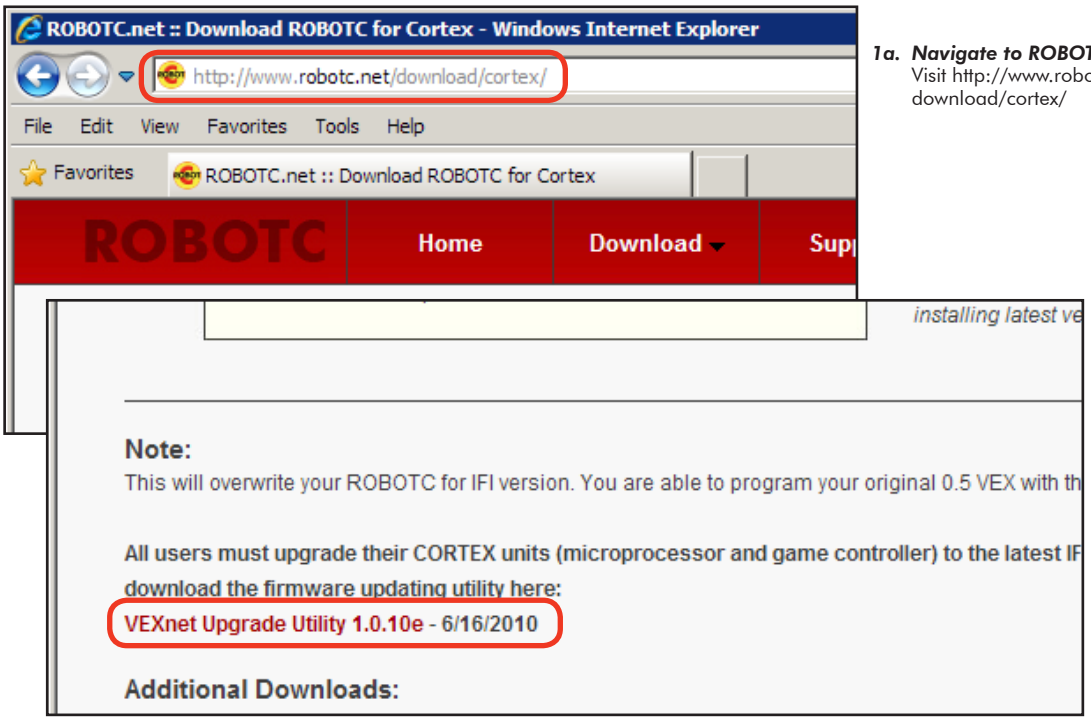
You will need:

- 1 VEX Cortex Microcontroller with one 7.2V Robot Battery
- 2 Motor Modules connected to MOTOR ports 2 and 3 on the VEX Cortex
- 1 VEXnet Remote Control with 6 AAA Batteries
- 2 VEXnet USB Adapter Keys
- A computer with ROBOTC for Cortex 2.3 BETA or higher installed
- 1 VEX Programming Kit
- 1 USB A-to-A Cable

Prerequisites

Both the Cortex and your computer require some configuration before you are able to program your robot using ROBOTC. Follow the steps below to ensure your system is ready.

1. Download the latest **VEXnet Firmware Upgrade Utility** from ROBOTC.net. Use the utility and included instructions to update the firmware on your Cortex and VEXnet Remote Control.

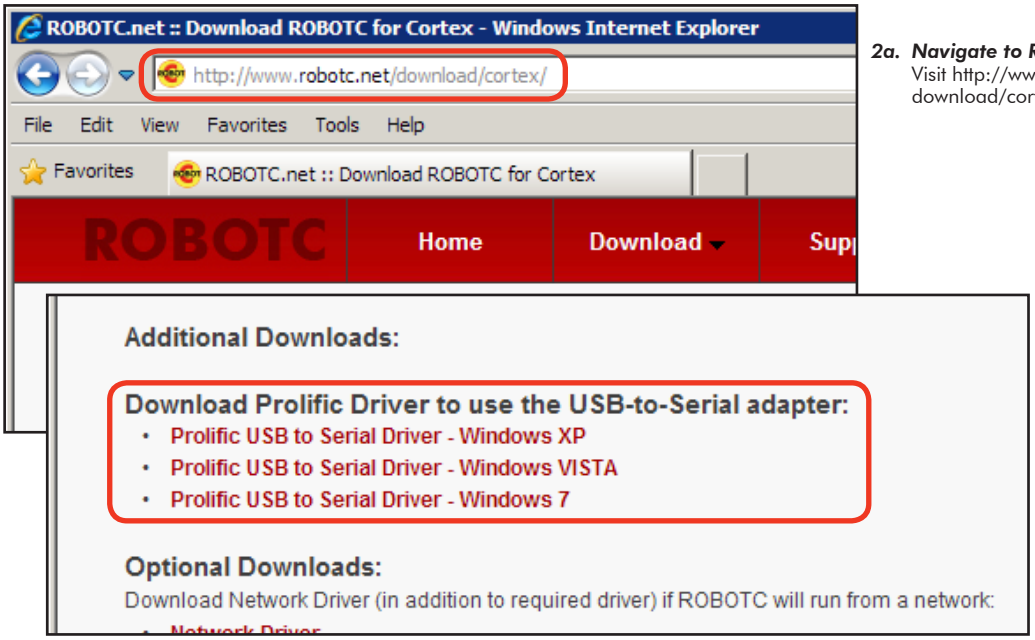


1a. Navigate to ROBOTC.net
Visit http://www.robotc.net/download/cortex/

1b. Download and Run the Utility
Download the "VEXnet Firmware Upgrade Utility" file. Use the utility to update the firmware on your Cortex and VEXnet Remote Control.

Using the VEX Cortex with ROBOTC *(cont.)*

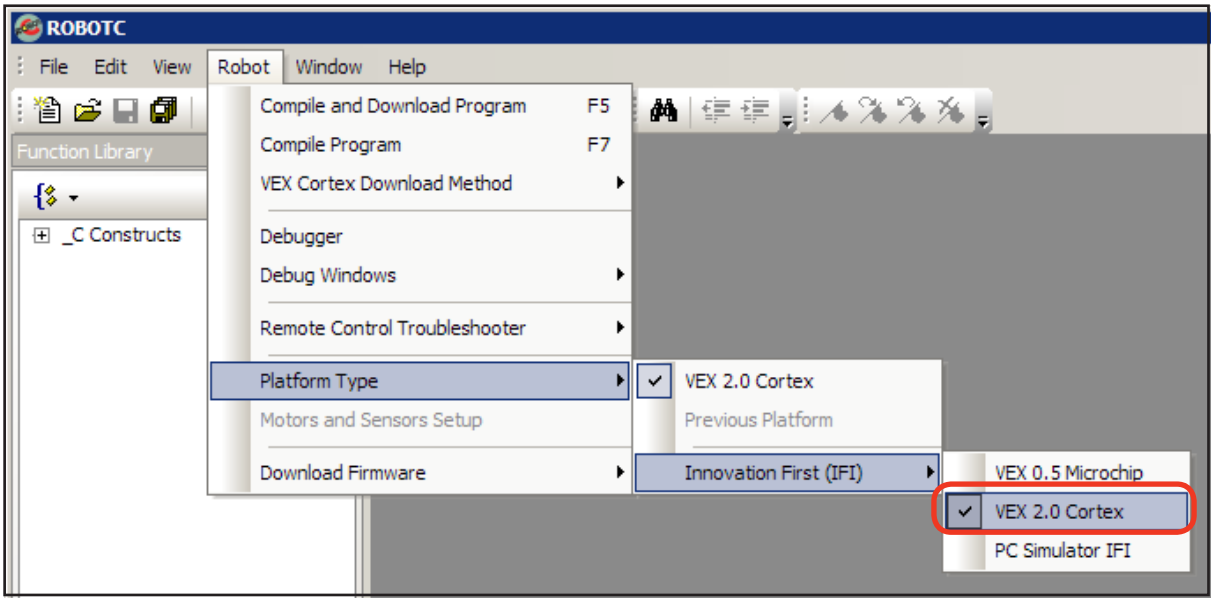
2. Download and install the appropriate device driver for the USB-to-Serial adapter (VEX Programming Kit) for your system.



2a. Navigate to ROBOTC.net
Visit http://www.robotc.net/download/cortex/

2b. Download and Install the driver
Download and install the correct driver for the operating system on your computer.

3. Set the *Platform Type* in ROBOTC to *VEX 2.0 Cortex*.

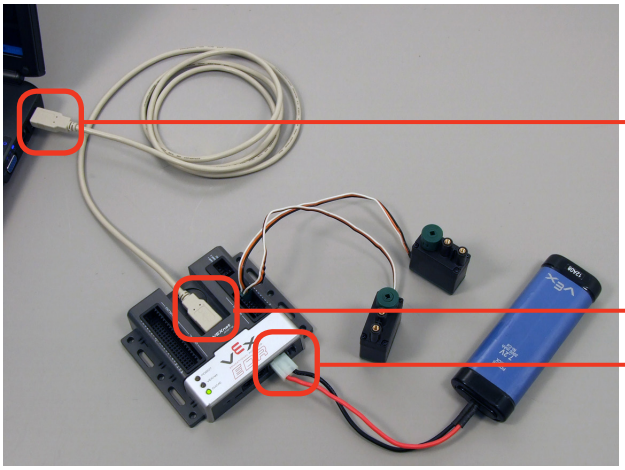


Using the VEX Cortex with ROBOTC *(cont.)*

Option 1. Downloading Using USB Only

When programming the VEX Cortex, a USB A-to-A cable can be used to directly connect your computer to the Cortex. This method instructs the robot to immediately run the program stored in memory when it is powered on, and skips the intial VEXnet link setup. Downloading using USB only is effective for writing and testing autonomous-only programs that do no require a VEXnet link.

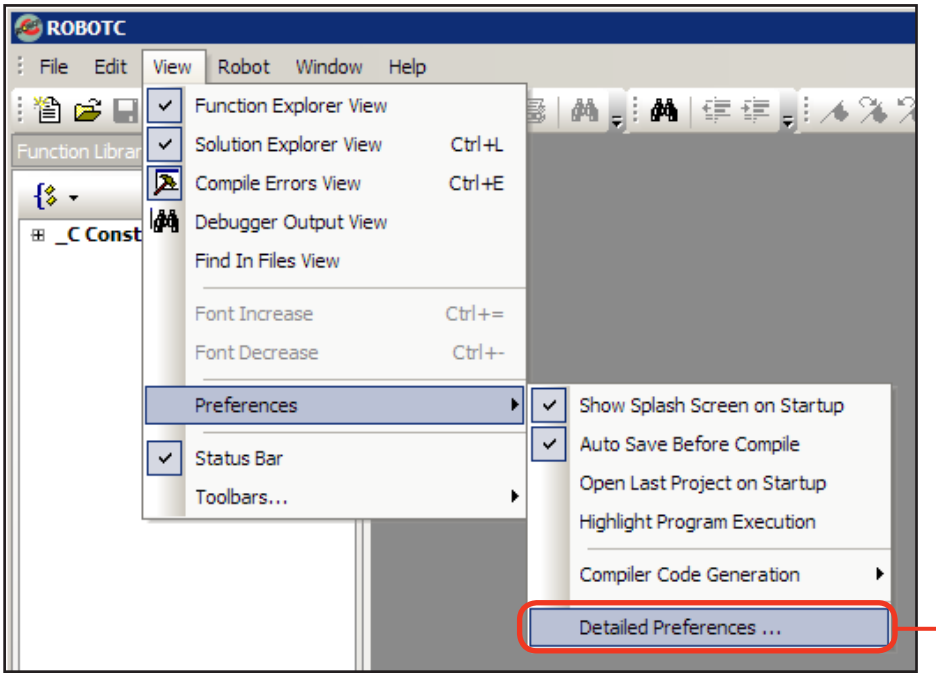
1. Leaving the POWER switch in the OFF position, connect your Cortex to the computer using the USB A-to-A cable. Once the cable is attached, move the POWER switch to the ON position.



1a. Connect the Cortex to your PC
Use the USB A-to-A cable to connect your Cortex to your PC.

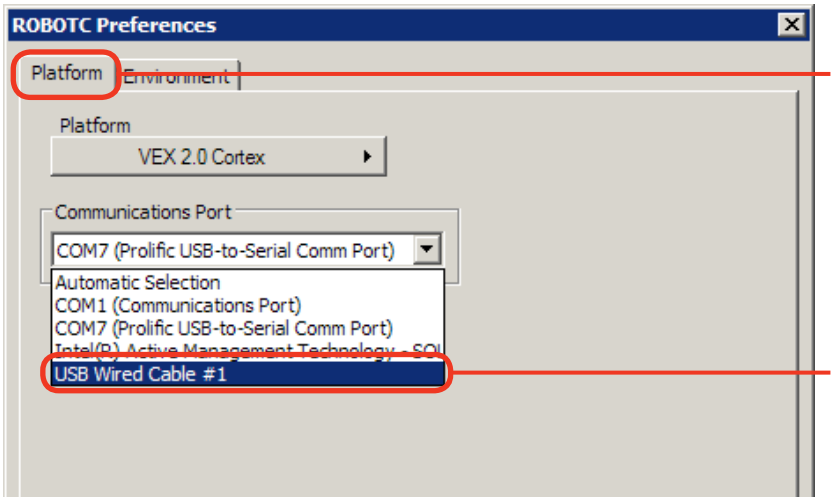
1b. Turn the Cortex ON
Make sure a 7.2V Robot battery is connected and move the POWER switch on the Cortex to ON.

2. Specify how your Cortex is connected to the computer in the ROBOTC Preferences.



2a. Detailed Preferences...
Go to *View* > *Preferences* and select *Detailed Preferences...*

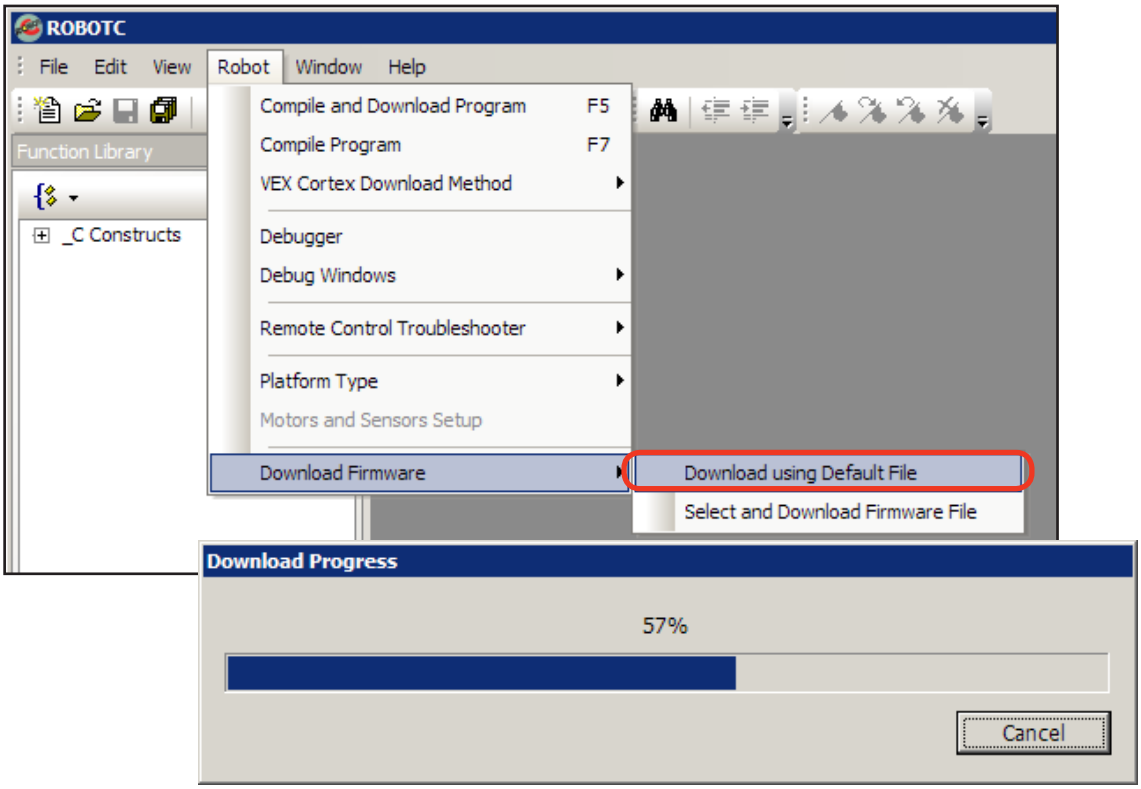
Using the VEX Cortex with ROBOTC *(cont.)*



2b. ***Platform Tab***
Make sure that the ***Platform*** tab is selected on the ***ROBOTC Preferences*** window.

2c. ***Communication Port***
To program directly over the USB A-to-A cable, select the option that specifys the ***USB Wired Cable***. Press ***OK*** to finalize your setting.

3. The ROBOTC Firmware enables you to download ROBOTC programs to your robot and utilize the various debug windows. Go to ***Robot*** > ***Download Firmware*** and select ***Download using Default File*** to download the ROBOTC Firmware to your robot.

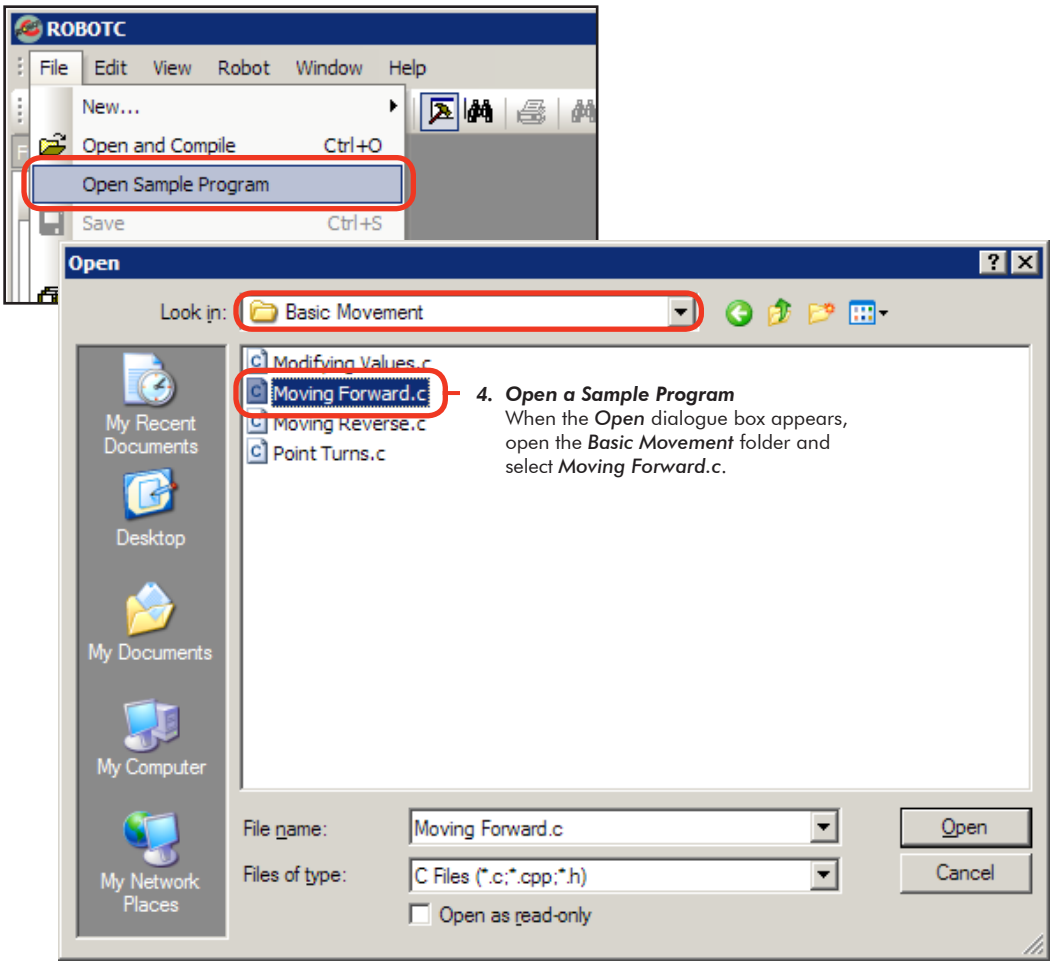


3. ***Download Progress***
A ***Download Progress*** window will appear and begin the download process. When the window closes, the firmware download is complete.

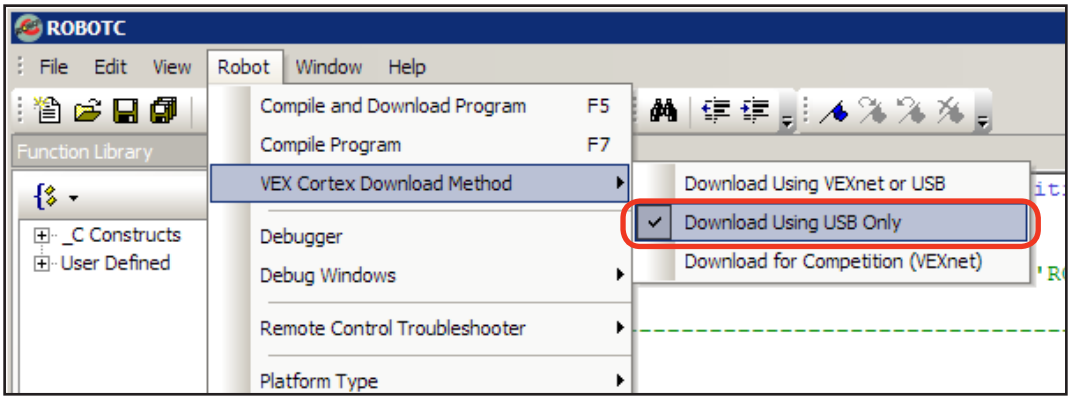
Note: You only need to download the ROBOTC Firmware once. Switching programs or download methods does not require a re-download.

Using the VEX Cortex with ROBOTC *(cont.)*

4. Go to *File* and select *Open Sample Program* to open a ROBOTC sample program.

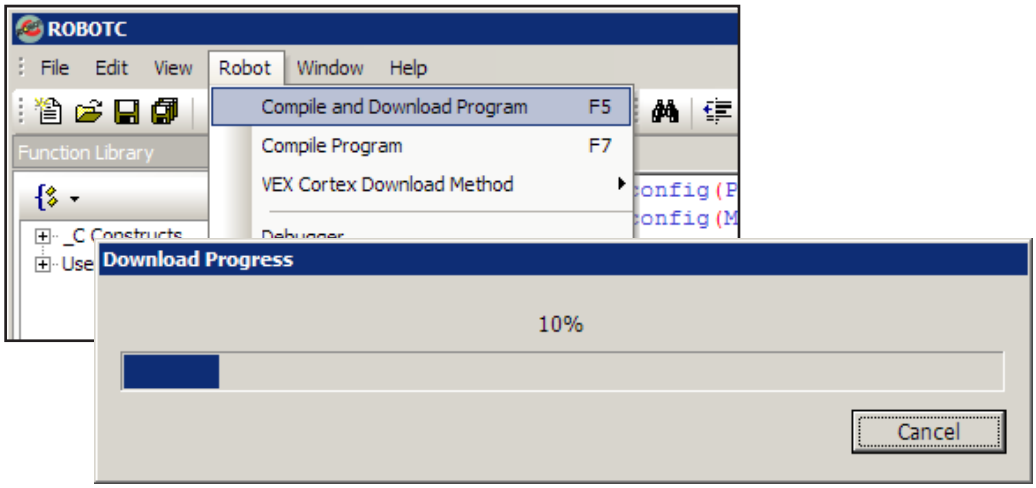


5. Specify the *Download Using USB Only* as the *VEX Cortex Download Method*. ROBOTC will remember your choice, so you do not need to select it every time you download a program.



Using the VEX Cortex with ROBOTC *(cont.)*

6. Go to ***Robot*** and select ***Compile and Download Program*** to download the sample program to the robot.



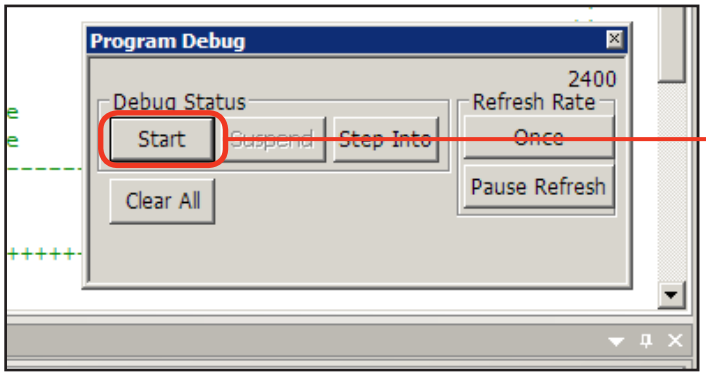
6. Download Progress
A ***Download Progress*** window will appear and begin the download process. When the window closes, the program download is complete.

Important Information - Power Cycle the VEX Cortex

In addition to ROBOTC, the VEX Cortex also remembers your Download Method setting. If this is the first time that you have chosen "***Download Using USB Only***", or if you just switched from "***Download Using VEXnet USB***" or "***Download for Competition (VEXnet)***", you will need to completely power cycle your Cortex (unplug the USB cable, power the Cortex OFF and then ON) before the updated setting takes effect and the program runs immediately.

The process of power cycling your Cortex is required any time you switch the Download Method setting.

7. Run the program on your robot by pressing the Start button on the Program Debug window, or by power cycling the Cortex.



7a. Program Debug window
The ***Program Debug*** window appears every time you download a ROBOTC program to your robot. Press the ***Start*** button to run the program.

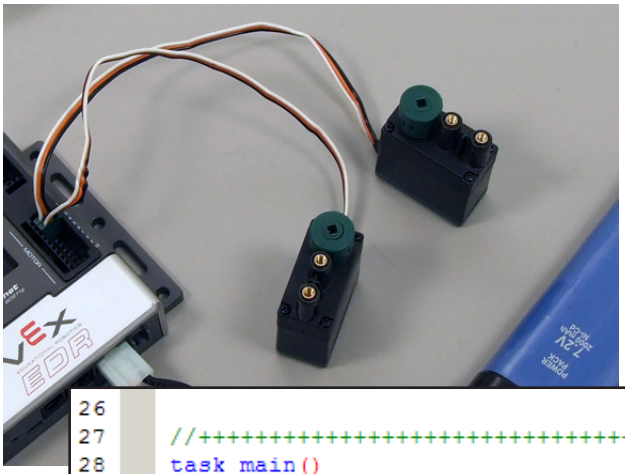
Note: Remember that you may need to power cycle your Cortex for the program to immediately run, if you are using ***Download Using USB Only*** the first time, or have just switched from another method.

Using the VEX Cortex with ROBOTC *(cont.)*

7b. Power Cycle the Cortex
You can also run the program by turning the Cortex OFF, and then ON.

Note: The USB cable provides some power to the Cortex, so it must be unplugged to fully turn the Cortex OFF. Closing the ROBOTC Program Debug window before unplugging the USB cable is recommended.

8. Observe the sample program running on the robot. The motors plugged into MOTOR ports 2 and 3 should spin for 3 seconds, according to the ROBOTC program.



```
26
27  //++++++++++++++++++++++++++++++++++++++++++++++| MAIN |++++++++++++++
28  task main()
29  {
30    wait1Msec(2000);            //Robot waits for 2000 milliseconds be
31
32    //Move forward at full power for 3 seconds
33    motor[rightMotor] = 127;    //Motor on port2 is run at full (127)
34    motor[leftMotor]  = 127;    //Motor on port3 is run at full (127)
35    wait1Msec(3000);      //Robot runs previous code for 3000 millisec
36  }                       //Program ends, and the robot stops
37  //++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
38
```

End of Section: Option 1. Downloading Using USB Only
In this section, you learned how to program your robot directly over the USB A-to-A cable. If you experienced issues with the process, make sure you've follwed every step, and then reference the troubleshooting section below.

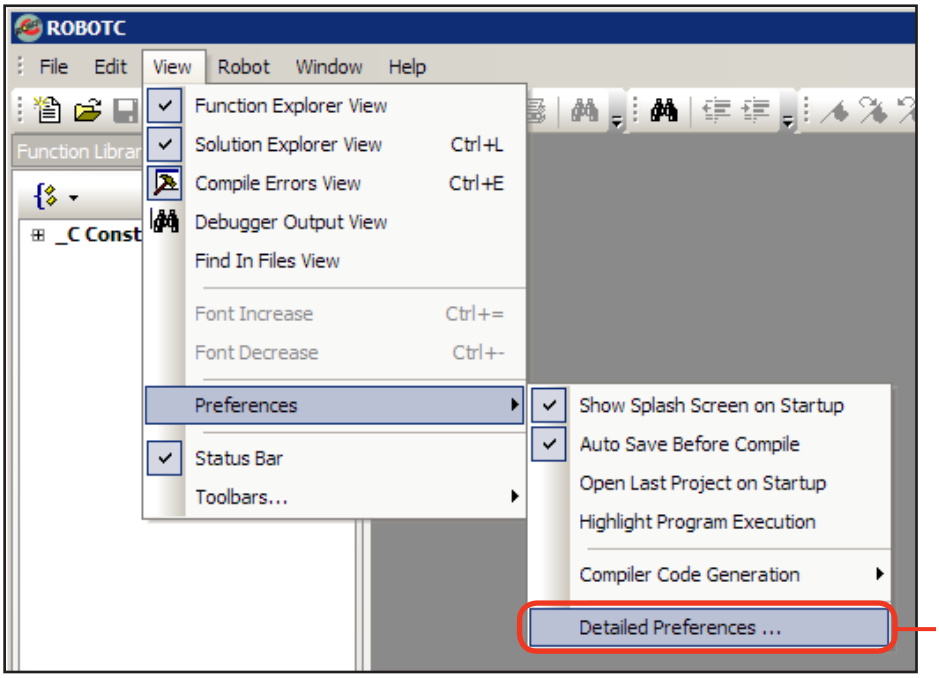
Using the VEX Cortex with ROBOTC *(cont.)*

Option 2. Downloading Using VEXnet or USB

When using the VEXnet link to communicate between your computer and the Cortex, downloading firmware, downloading programs, and using the ROBOTC real-time debugger all work wirelessly. This guide assumes you have already configured the VEXnet link between your Cortex and VEXnet Remote Control. Programs downloaded using this method will not run until a VEXnet link has been established or until 10 seconds have elapsed since the Cortex was powered on.

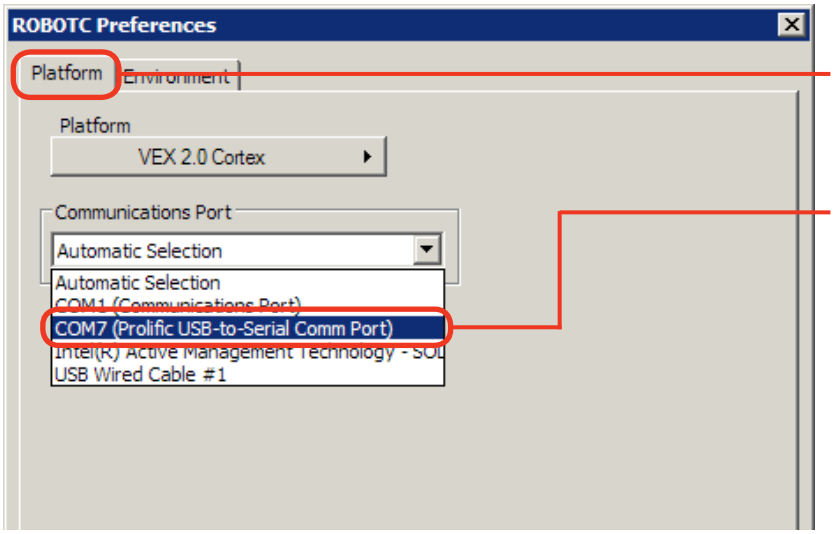
1. Use the VEX Programming Kit to connect a USB port on your computer to the PROGRAM port on your VEXnet Remote Control. Turn both the Cortex and VEXnet Remote Control ON and allow them to sync.

2. Specify how your Cortex is connected to the computer in the ROBOTC Preferences.



2a. Detailed Preferences... Go to *View* > *Preferences* and select *Detailed Preferences...*

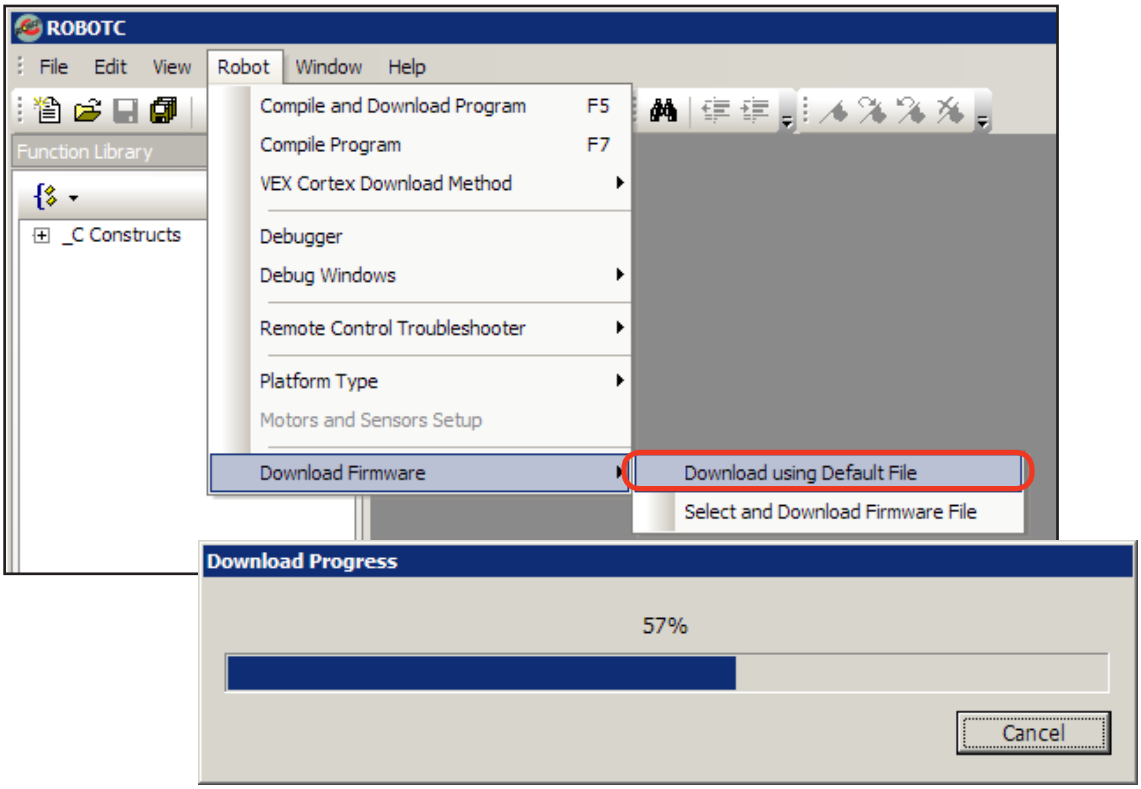
Using the VEX Cortex with ROBOTC *(cont.)*



2b. ***Platform Tab***
Make sure that the ***Platform*** tab is selected on the ***ROBOTC Preferences*** window.

2c. ***Communication Port***
ROBOTC uses the connection between your computer and the VEXnet Remote Control to take advantage of the VEXnet communication link. The VEXnet Remote Control acts as an intermediary between ROBOTC and your robot. Select the port that specifys the ***Prolific USB-to-Serial Comm Port*** and press ***OK*** to finalize your setting.

3. The ROBOTC Firmware enables you to download ROBOTC programs to your robot and utilize the various debug windows. Go to ***Robot*** > ***Download Firmware*** and select ***Download using Default File*** to download the ROBOTC Firmware to your robot.

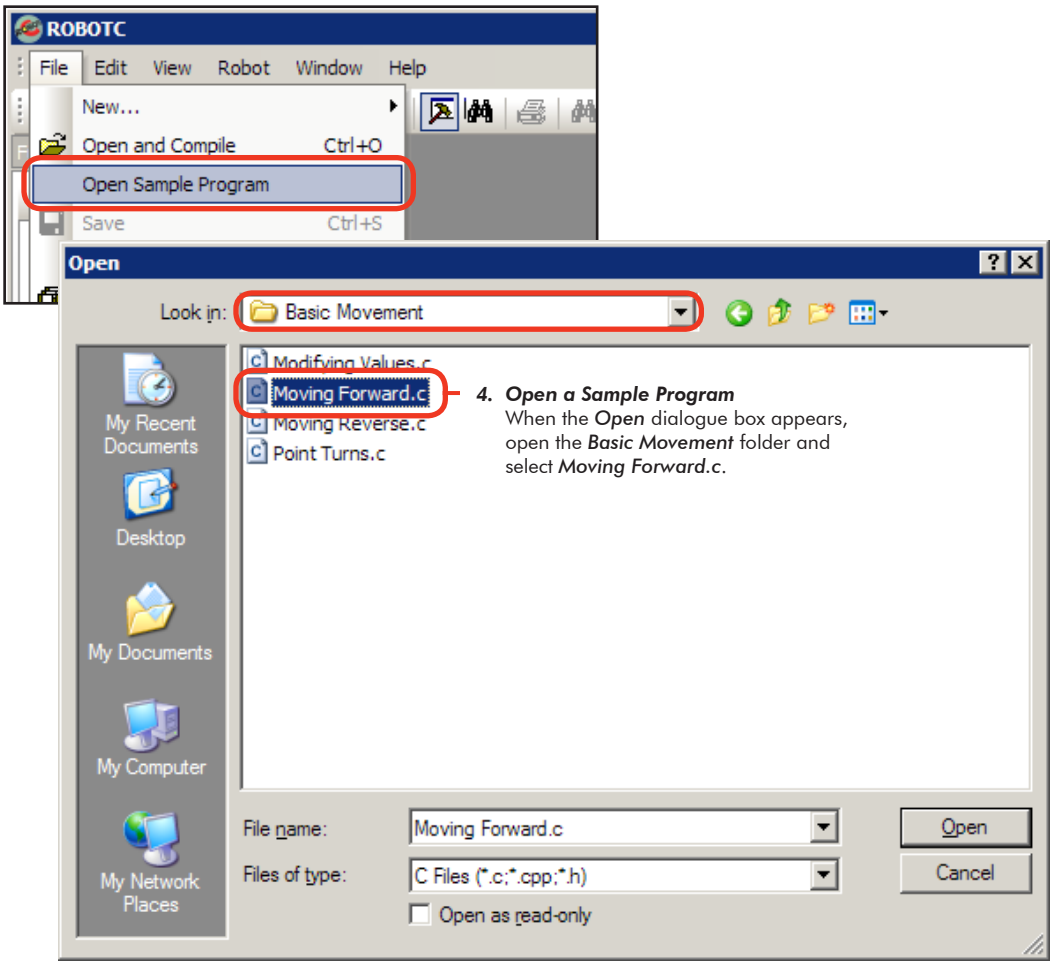


3. ***Download Progress***
A ***Download Progress*** window will appear and begin the download process. When the window closes, the firmware download is complete.

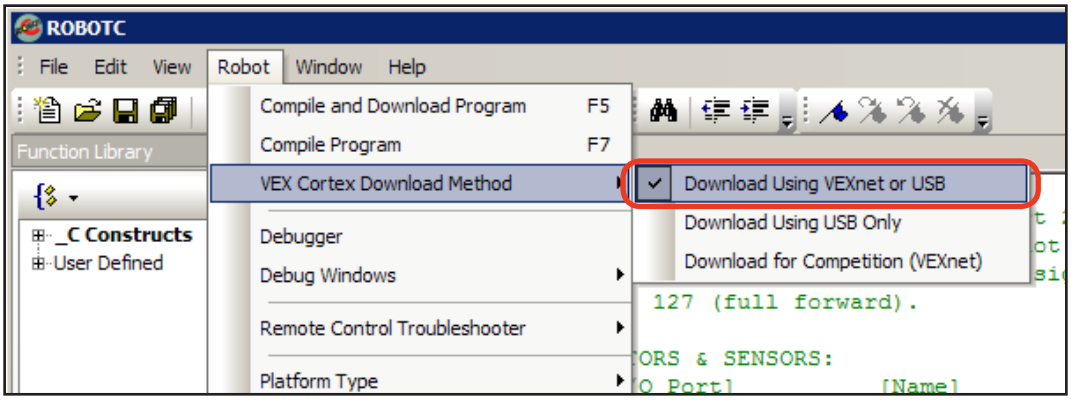
Note: You only need to download the ROBOTC Firmware once. Switching programs or download methods does not require a re-download.

Using the VEX Cortex with ROBOTC *(cont.)*

4. Go to *File* and select *Open Sample Program* to open a ROBOTC Sample Program.

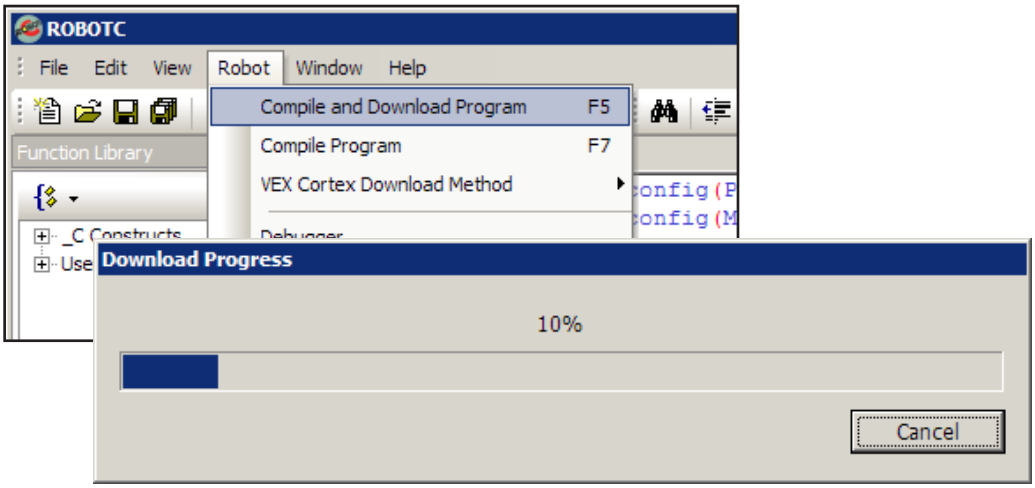


5. Specify the *Download Using VEXnet or USB* as the *VEX Cortex Download Method*. ROBOTC will remember your choice, so you do not need to select it every time you download a program.



Using the VEX Cortex with ROBOTC *(cont.)*

6. Go to ***Robot*** and select ***Compile and Download Program*** to download the sample program to the robot.



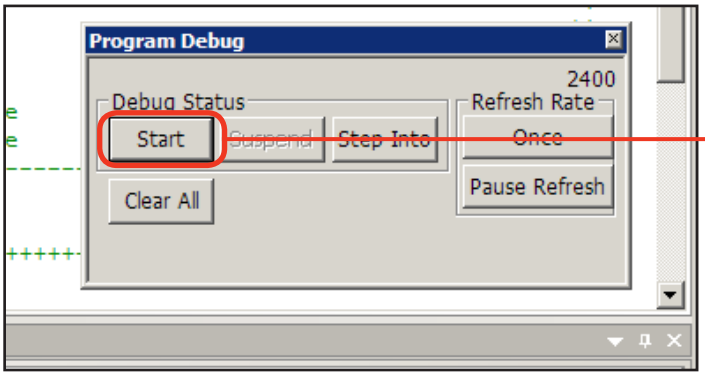
6. Download Progress
A ***Download Progress*** window will appear and begin the download process. When the window closes, the program download is complete.

Important Information - Power Cycle the VEX Cortex

In addition to ROBOTC, the VEX Cortex also remembers your Download Method setting. If this is the first time that you have chosen *"Download Using VEXnet or USB"*, or if you just switched from *"Download Using USB only"* or *"Download for Competition (VEXnet)"*, you will need to completely power cycle your Cortex (power the Cortex OFF and then ON) before the updated setting takes effect and the program looks for the VEXnet link before running.

The process of power cycling your Cortex is required any time you switch the Download Method setting.

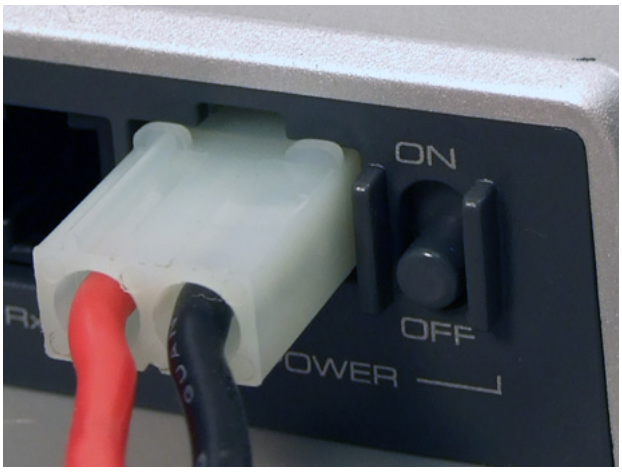
7. Run the program on your robot by pressing the Start button on the Program Debug window, or by power cycling the Cortex.



7a. Program Debug window
The ***Program Debug*** window appears every time you download a ROBOTC program to your robot. Press the ***Start*** button to run the program.

Note: Remember that you may need to power cycle your Cortex for the program to establish a VEXnet link before running, if you are using ***Download Using VEXnet or USB*** the first time, or have just switched from another method.

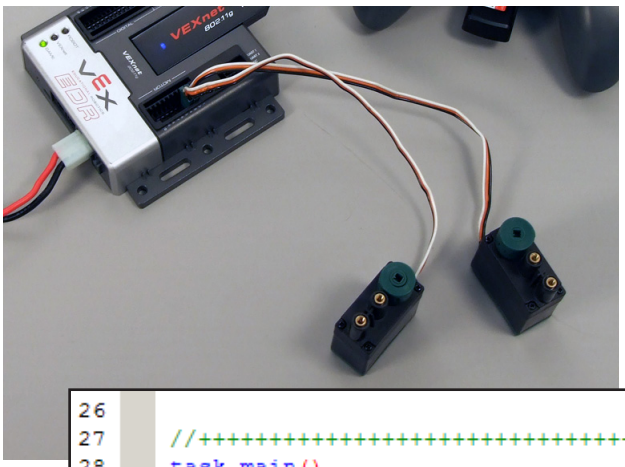
Using the VEX Cortex with ROBOTC *(cont.)*



7b. Power Cycle the Cortex
You can also run the program by turning the Cortex OFF, and then ON.

Note: The Cortex will not run the program until a VEXnet link has been established or at least 10 seconds have elapsed. Closing the ROBOTC Program Debug window before turning off the Cortex is recommended.

8. Observe the sample program running on the robot. The motors plugged into MOTOR ports 2 and 3 should spin for 3 seconds, according to the ROBOTC program.



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34    motor[leftMotor]  = 127;    //Motor on port3 is run at full (127)
35    wait1Msec(3000);      //Robot runs previous code for 3000 millisec
36  }                       //Program ends, and the robot stops
37  //++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
38
```

End of Section: Option2 . Downloading Using VEXnet or USB
In this section, you learned how to program your robot wirelessly using VEXnet. If you experienced issues with the process, make sure you've follwed every step, and then reference the troubleshooting section below.

Using the VEX Cortex with ROBOTC *(cont.)*

Troubleshooting

Problem: Communication using the USB A-to-A cable between ROBOTC and the Cortex is very slow, or not working.

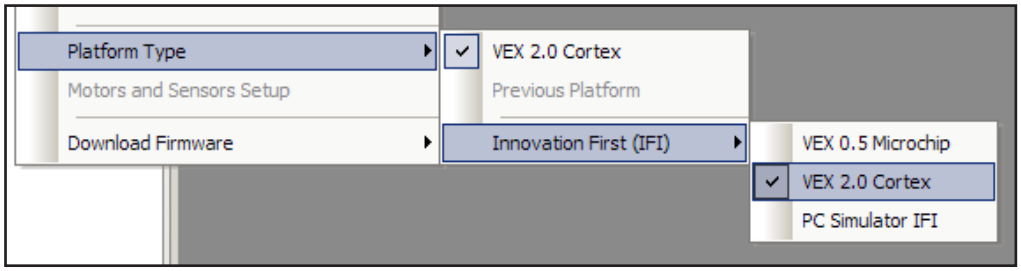
Resolution: Verify each of the following options, and re-test your communication link before moving on:

Is the USB A-to-A cable connecting the computer to your Cortex? The USB cable will provide some power to the Cortex, powering some of its status lights. If not, try rebooting your system.

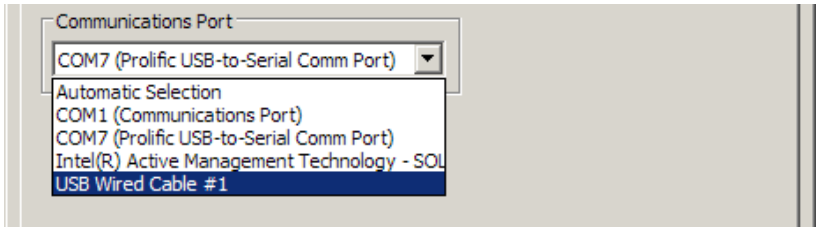
Is your robot also connected to and powered on by a charged battery?

Did you have the robot powered on before you connected it to the computer using the USB A-to-A cable? The robot must first be connected to the computer using the USB A-to-A cable, and then powered on with the battery.

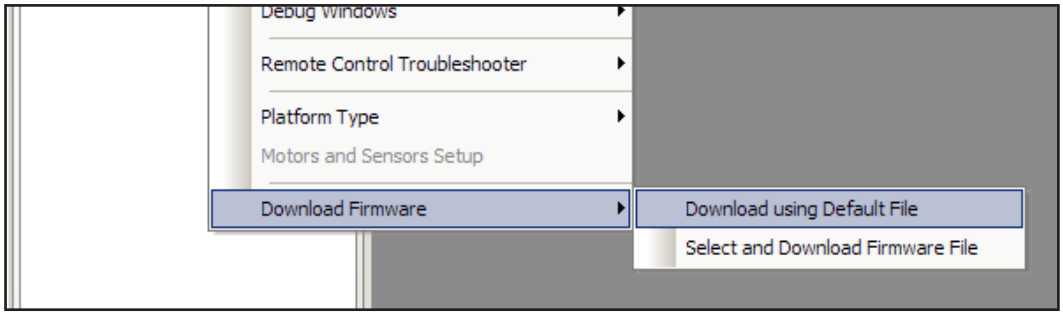
Is VEX 2.0 Cortex selected as the Platform Type in ROBOTC?



Have you selected the correct Communication Port in the ROBOTC Preferences?



Have you downloaded the ROBOTC Firmware to the Cortex?

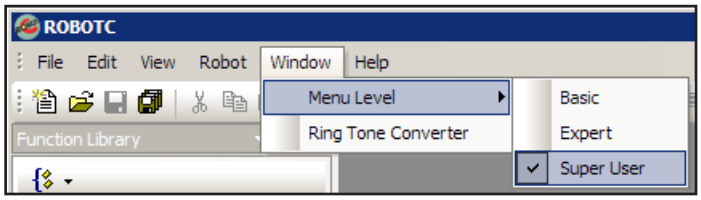


Using the VEX Cortex with ROBOTC *(cont.)*

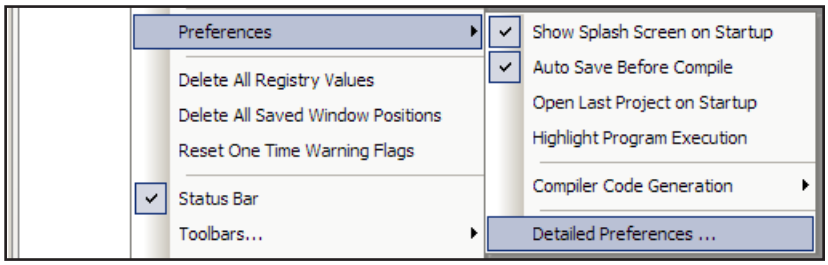
Troubleshooting

If you've verified all of the previous options with no success, you can enable "Message Tracing" to put ROBOTC into a persistent communication mode.

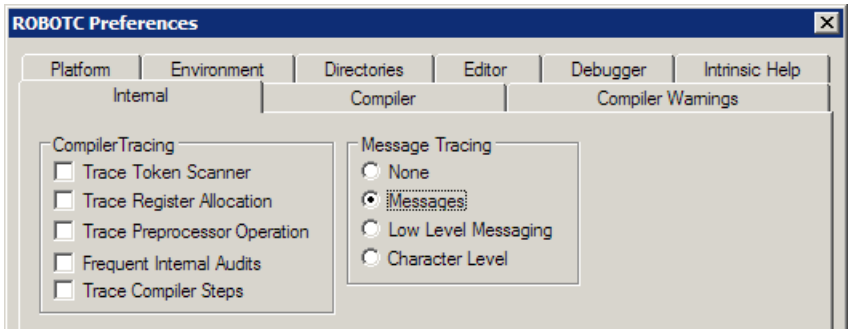
Begin by going to *Window* > *Menu Level* and selecting *Super User* to switch your viewing preferences to the Super User level.



Then go to *View* > *Preferences* and select *Detailed Preferences...*



On the *Internal* tab, select *Messages* under *Message Tracing* to put ROBOTC into its persistent communication mode. Press *OK* to verify your setting.



Now when you download a program, ROBOTC will also open the *Message Log* with the Cortex in a new tab. You can switch back and forth between your program and the Message Log by clicking on the desired tab.