

# Oakland County Competitive Robotics Association - 2013

Marc Center, GM Hybrid Engineer,  
OCCRA VEX Mentor 2007-present

VEX WORKSHOP 1 – Tuesday Sept 17, 2013

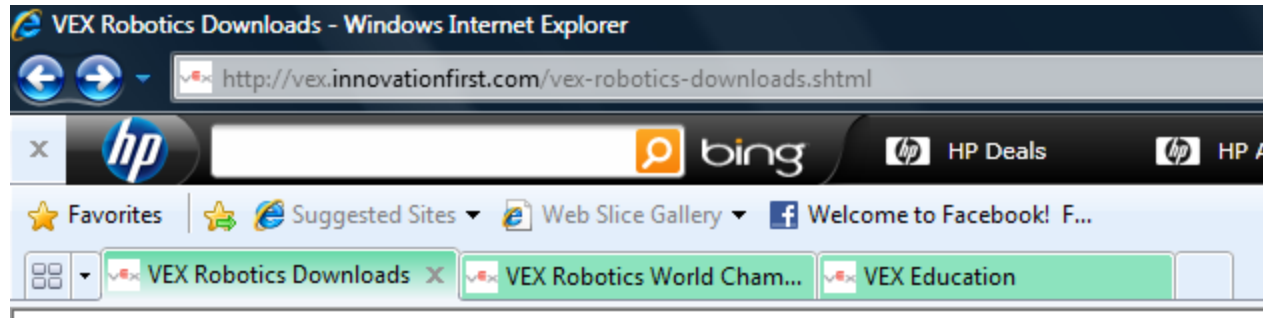
## VEX Game Rule Corrections?

1. 2008 VEX Inventors Manual is online
2. EasyC V4 for Cortex Software Upgrade Version requires (firmware) Mastercode update
3. Must remove EasyC license at end of season
4. Controller Configuration page
5. OCCRA VEXnet field system
6. VEXnet Cortex and Joystick marriage
7. 2012 OCCRA VEX Inspection Form
8. General Programming Tips
9. Lesson from Vex Users

# 2013 OCCRA VEX Game Rules

- OCCRA has eliminated the VEX game portion of that was typically paired to the large robot game.
- A “closed” VEX Tournament will be held in Nov 9, 2013 at Holly for OCCRA VEX teams playing the official VEX game “Toss Up” this year.
- A VEX field will be available for exhibition match play at each regular OCCRA Tournament (5)??.
- Mike Martus, former Chief Delphi FRC 47 coach, is a RECF representative for VEX

Website: [www.innovationfirst.com](http://www.innovationfirst.com)



Website: [www.vexrobotics.com/vex](http://www.vexrobotics.com/vex)



## VEX 2008 Inventor's Guide is Online

### Step 1: Go through the Inventor's Guide Exercises

VEX Robotics Downloads - <b>VEX Documentation</b> - 2008 VEX Inventor's Guide	
<a href="#"><u>VEX 2008 Inventor's Guide Complete</u></a> (27M pdf, 07-22-2008) Combined	<p>Below is the 2008 update to the VEX Inventor's Guide. The Inventor's Guide is provided as a reference guide for all builders using of the VEX Robotics Design System.</p> <p>The individual sections of this guide are available for download below:</p> <p><a href="#"><u>VEX 2008 Inventor's Guide - 1 Introduction</u></a> (0.7M pdf, 06-27-08) <a href="#"><u>VEX 2008 Inventor's Guide - 2 Structure</u></a> (3.2M pdf, 06-27-08) <a href="#"><u>VEX 2008 Inventor's Guide - 3 Motion</u></a> (6.6M pdf, 06-27-08) <a href="#"><u>VEX 2008 Inventor's Guide - 4 Power</u></a> (2.1M pdf, 06-27-08) <a href="#"><u>VEX 2008 Inventor's Guide - 5 Sensors</u></a> (1.9M pdf, 06-27-08) <a href="#"><u>VEX 2008 Inventor's Guide - 6 Control</u></a> (4.1M pdf, 06-27-08) <a href="#"><u>VEX 2008 Inventor's Guide - 7 Logic</u></a> (1.9M pdf, 06-27-08) <a href="#"><u>VEX 2008 Inventor's Guide - 8 Programming (divider)</u></a> (0.1M pdf, 06-27-08) <a href="#"><u>VEX 2008 Inventor's Guide Reference - Appendix A, Safety</u></a> (0.1M pdf, 06-27-08) <a href="#"><u>VEX 2008 Inventor's Guide Reference - Appendix B, Glossary</u></a> (0.5M pdf, 06-27-08) <a href="#"><u>VEX 2008 Inventor's Guide Reference - Appendix C, Challenges</u></a> (0.4M pdf, 06-27-08) <a href="#"><u>VEX 2008 Inventor's Guide Reference - Appendix D, Control Configurations</u></a> (2.6M pdf, 06-27-08) <a href="#"><u>VEX 2008 Inventor's Guide Reference - Appendix E, Transmitter Menus</u></a> (3.1M pdf, 06-27-08)</p>
<p>Note: The easyC programming software includes a programming section to insert in the Inventor's Guide. Other support materials are available for each of the VEX programming languages from their manufacturer. Refer to <a href="#"><u>VEX Robotics Programming</u></a> for more information.</p>	

VEX 2005 Inventor's Guide Notebook provided to OCCRA teams in 2006 (3 ring notebook)



# Inventor's Guide

## Table of Contents:

Structure Subsystem 2.1

Motion Subsystem 3.1

Power Subsystem 4.1

Sensor Subsystem 5.1

Control Subsystem 6.1

Logic Subsystem 7.1

Programming Subsystem 8.1

Reference

## Welcome!

This Inventor's Guide is provided as a tool to help you get accustomed to all the features and functionality of the VEX Robotics Design System. Included in this guide are various chapters which detail the individual subsystems involved in a basic robot. Each chapter includes a description of the components used, the concepts involved in designing and building the subsystem, and how the subsystem interacts with other subsystems.

Along with the Inventor's Guide, there are many resources available to enrich and enhance your experience with the VEX Robotics Design System. Our main portal, [www.VEXrobotics.com](http://www.VEXrobotics.com) has many resources including software, tools for educators, picture galleries of VEX robots and CAD models of our entire product line. [www.VEXrobotics.com](http://www.VEXrobotics.com) is also the official source to purchase products for the VEX Robotics Design System.

If you have any questions about the VEX Robotics Design System, or want to show off your new creations, you can visit [www.VEXforum.com](http://www.VEXforum.com), the official hub of the VEX community. Here you can network with other VEX users, and have your technical questions answered directly by the engineers who design the VEX products.

To learn more about the VEX Robotics Competition and other VEX Robotics events in your area, visit [www.robotevents.com](http://www.robotevents.com). RobotEvents.com exists to connect students, mentors, and schools in every community to a variety of successful and engaging technology-based programs. You'll find information on VEX competitions, as well as conferences and workshops in your local community and beyond.

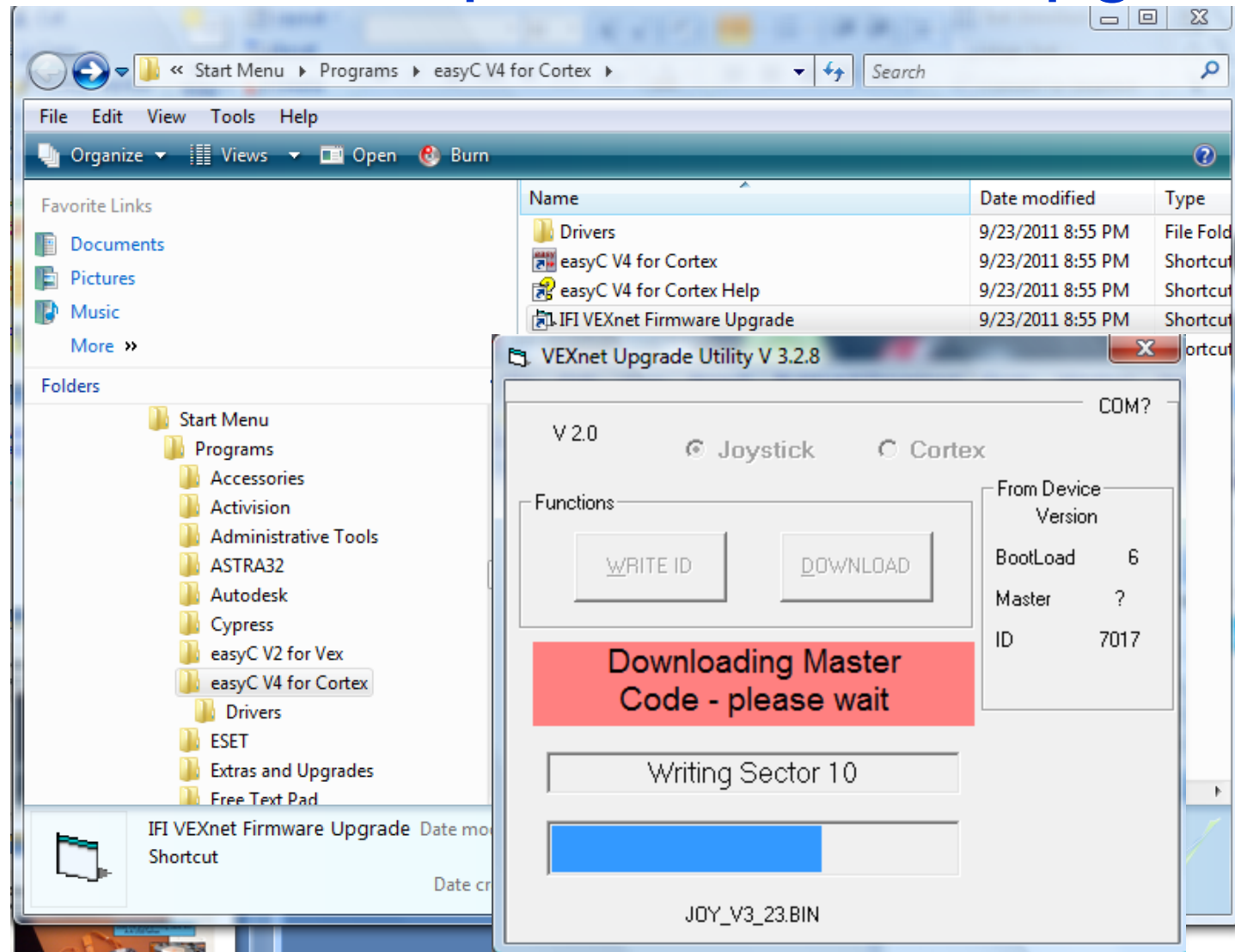
# Important 2013 VEX Programming Information

**Upgrade EasyC Cortex V4 software this year V 4.1.0.5 – Win7/WinXP/Vista**

**You will need to use the VEXnet upgrade utility V3.2.8 or V3.2.9 to update the firmware (mastercode) inside the Cortex and the Joystick**

**2010 OCCRA Easy\_C Site V4 License  
XXX1-YYY3-ZZZ5 (1 per team)**

# VEXnet Upgrade Utility V.3.2.8 released as part of Cortex Upgrade





# VEXnet Upgrade Utility V.3.2.8 released as part of Cortex Upgrade

- Cortex\_V3\_23.Bin
- JOY\_V3\_23.Bin

# Downloading a Program

## Option 1: Direct USB Download



Uses only the A-A USB cable.

Battery is not  
needed



**BEST™**

# Downloading a Program

## Option 2: Tethered Download





# Re-Syncing (Pairing) VEXnet



Power Cortex First, then Joystick

If VEXnet does not connect, you may need to re-sync the joystick/controller pair by simply connecting a USB cable and powering on both units.

For the Cortex to operate properly the following conditions MUST be true:

1. Both the cortex and controller MUST be using the same version of Firmware
2. The Cortex and Controller MUST be "Married" via the USB AA tether
3. The Cortex MUST have a charged battery 7.2 or higher.
4. The controller MUST have good batteries.  
The first light MUST be green.
5. Starting sequence MUST be followed: Cortex, blinky lights on Cortex, key must be in or Comp Cable plugged in, Power Adapter or turn on joystick, watch for green lights

## CORTEX Microcontroller and Joystick Quick Start Guide

4. Diagnostics Information: refer to the following chart for Joystick and CORTEX light patterns and meanings.

Robot	VEXnet	Game	
	Blip (yellow)		Startup - looking for USB device
	Fast (yellow)		Linking - Searching for VEXnet mate
	Fast (green)		Linked
	Slow (yellow)		Linked - Data quality reduced
	Solid (green)		Tethered
	Slow (red)		Fault: Lost Link - Searching for VEXnet mate

Robot [1]	VEXnet	Game	
(red)			Main Battery = Dead (<5.5v) or CORTEX Off [2]
(yellow)			Main Battery = Low (<6.5v) [2]
(green)			Main Battery = Good
Solid			All Good: Both Joysticks connected
Solid + 1 Blink			All Good: Tx1 Joystick connected
Fast (red) [3]			Fault: Low Backup Battery (0v-8v)

Note 1: Robot LED only works on Joystick when Linked

Note 2: Lowest CORTEX battery color latched at Joystick and CORTEX

Note 3: No Backup Battery only Indicated if competition cable is connected.

Robot	VEXnet	Game [4]	
		Off	No Competition connection
		Solid (green)	Driver
		Fast (green)	Autonomous
		Fast (yellow)	Disabled

Note 4 : Game LED only used when the competition cable is connected.

Game LED only works on the Robot when Linked.

Joystick [5]	
(red)	Joystick Battery = Dead (<5.5v)
(yellow)	Joystick Battery = Low (<6.5v)
(green)	Joystick Battery = Good
Fast	Two Joysticks in use
Solid	One Joystick in use

Note 5 : Joystick LED only on Joystick.

Robot, VEXnet, and Game LED's  
show the same data [2]



You must remove the EasyC V4  
license code from your laptop  
at the end of OCCRA in  
December 2013

Function Blocks

- Program Flow
- Inputs
- Outputs
- Joystick
- LCD
- Battery
- Mathematics
- User Functions

Projects

Recent Projects

- OCCRA11 Sonar2
- Victor Test 03
- OCCRA11 Sonar1
- Victor Test 02
- Victor Test 01
- OCCRA\_2010\_Stop\_Switch11

New / Open

- New Standalone Project
- New Competition Project
- Open Project...

Projects

Tools

Help

Tutorials



Competition Project Setting

☒ Field Control Competition Project

☐ Timed Competition Project

Team Number: 3548

Autonomous Time: 0

Operator Control Time: 0

OK

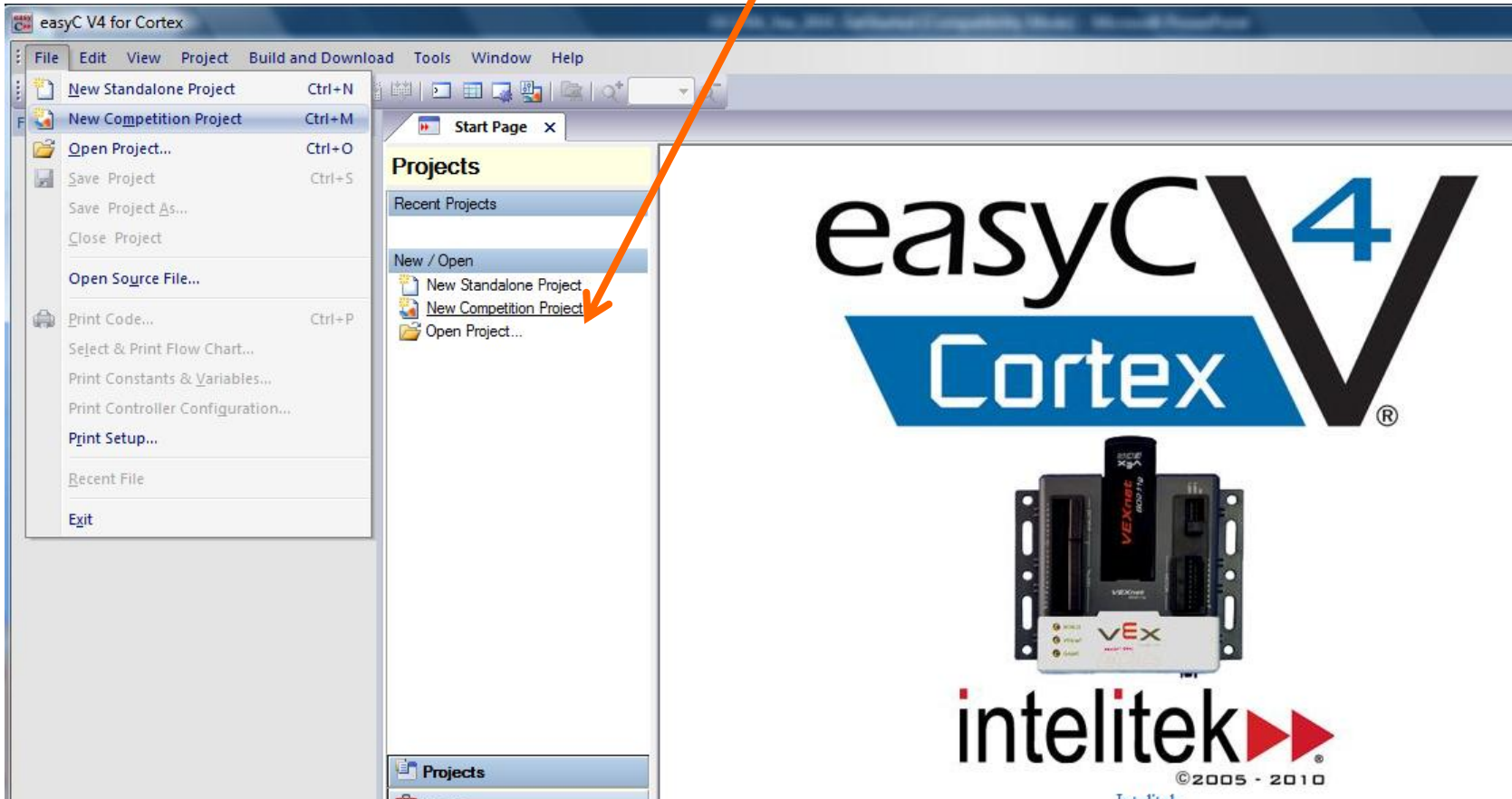
Cancel

Help

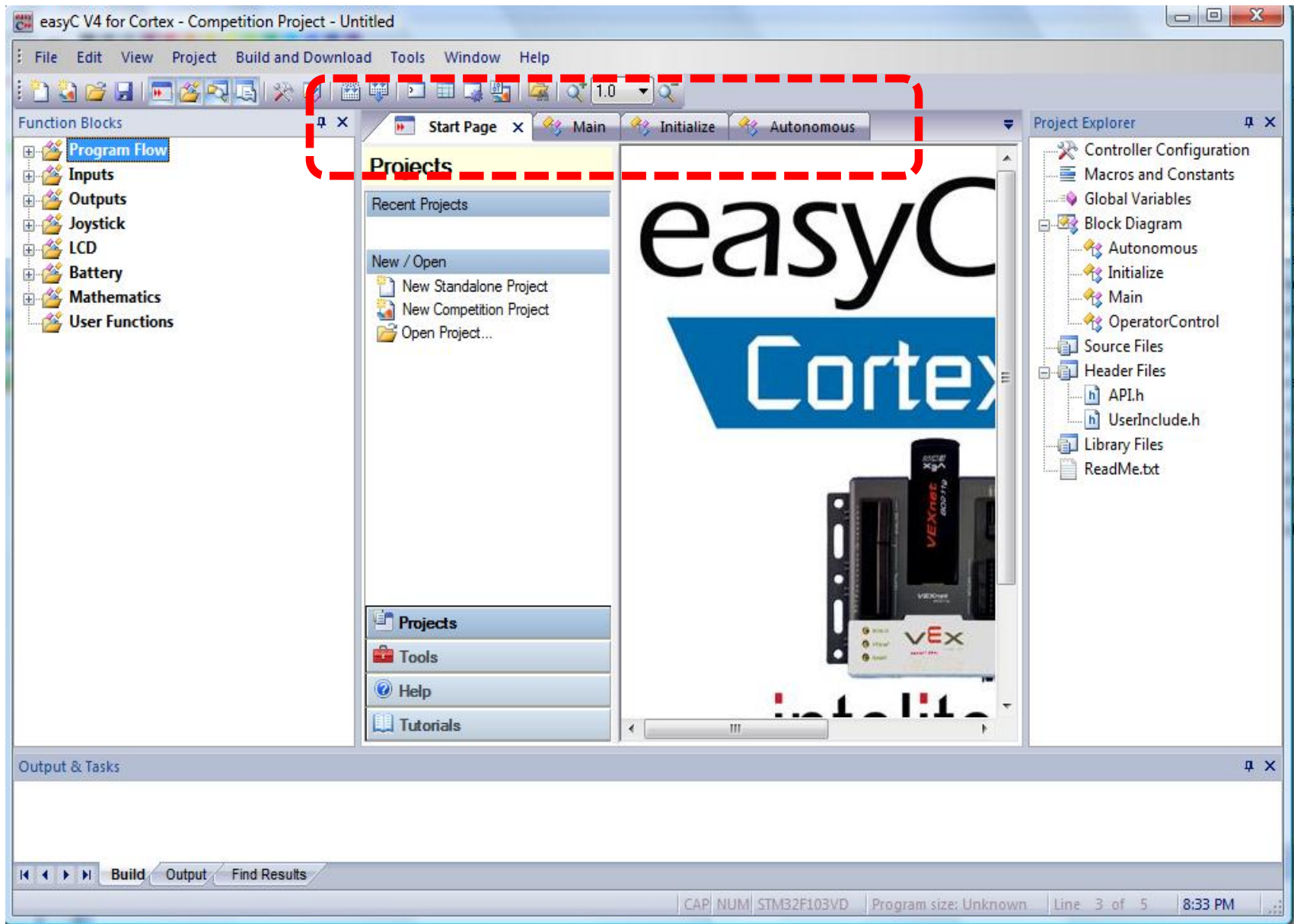
New- Sept 2011



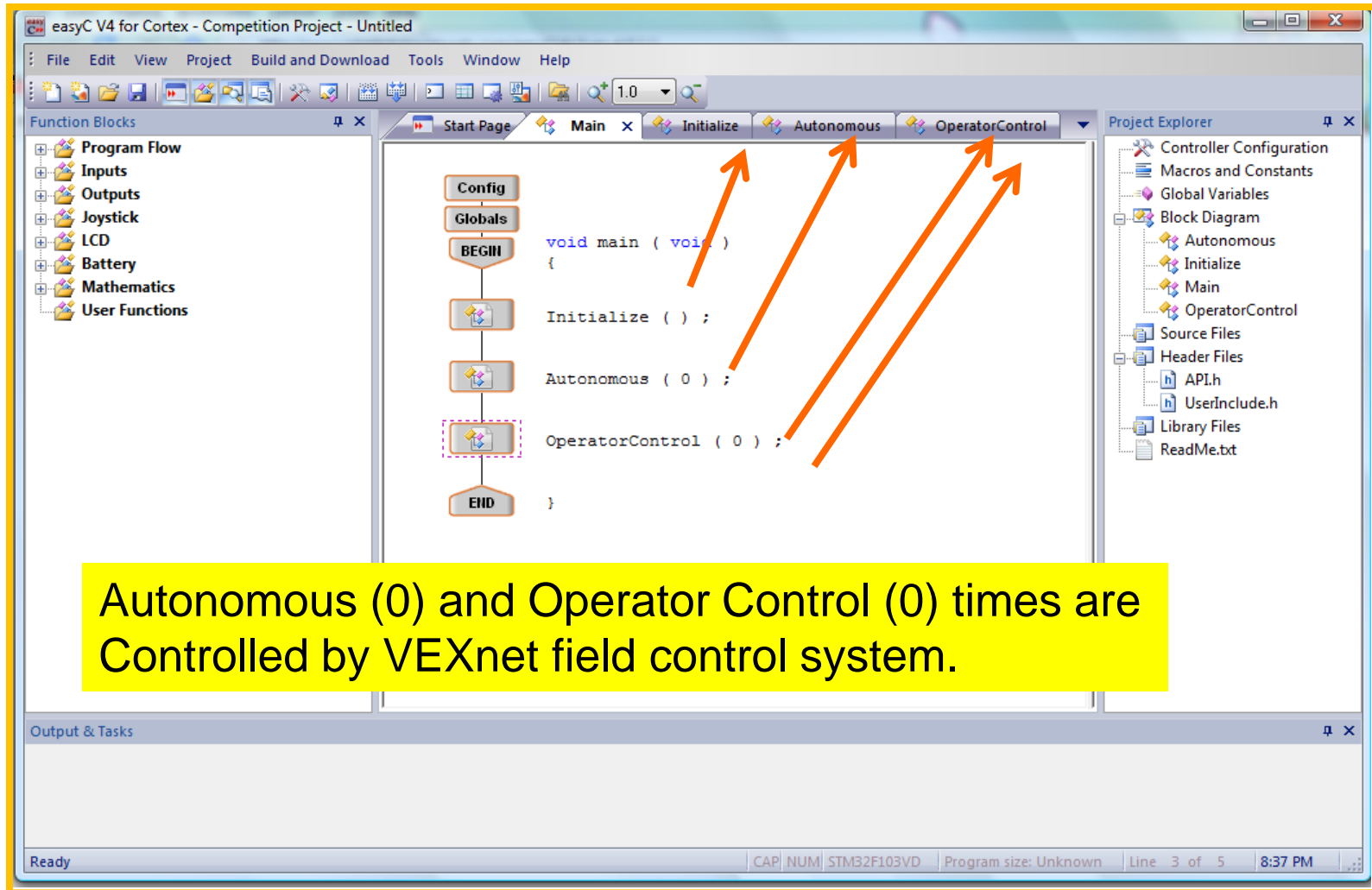
You must create your OCCRA program using the New Competition Project feature in easyC V4



If you miss this step, VEXnet will not work with your system and You will have to retype your entire program back in starting with This step – BIG GOTCHA! – 2010 slide

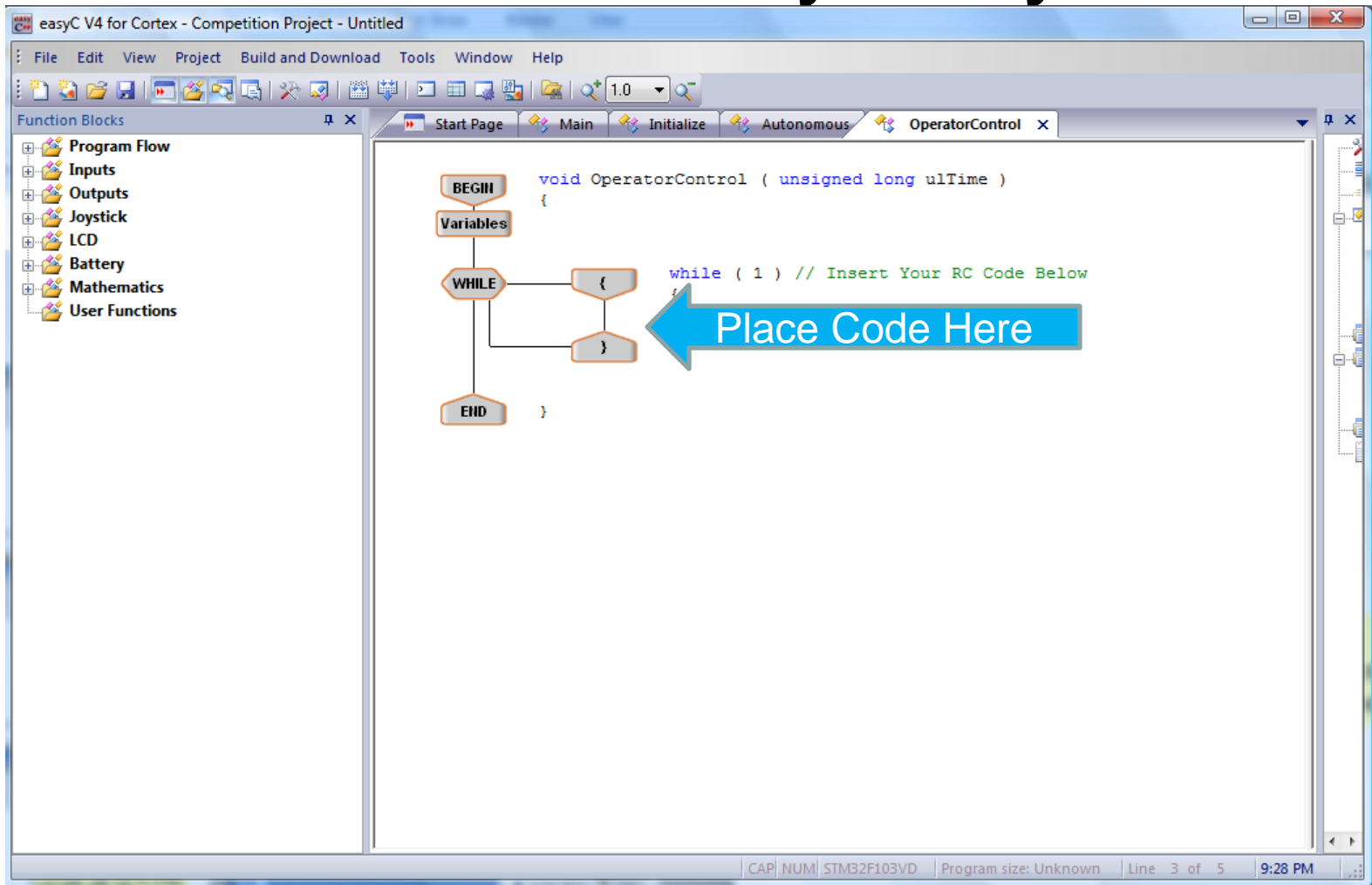


Initialize, Autonomous and Operator Control each have Their own high level Tab for easy switching between.

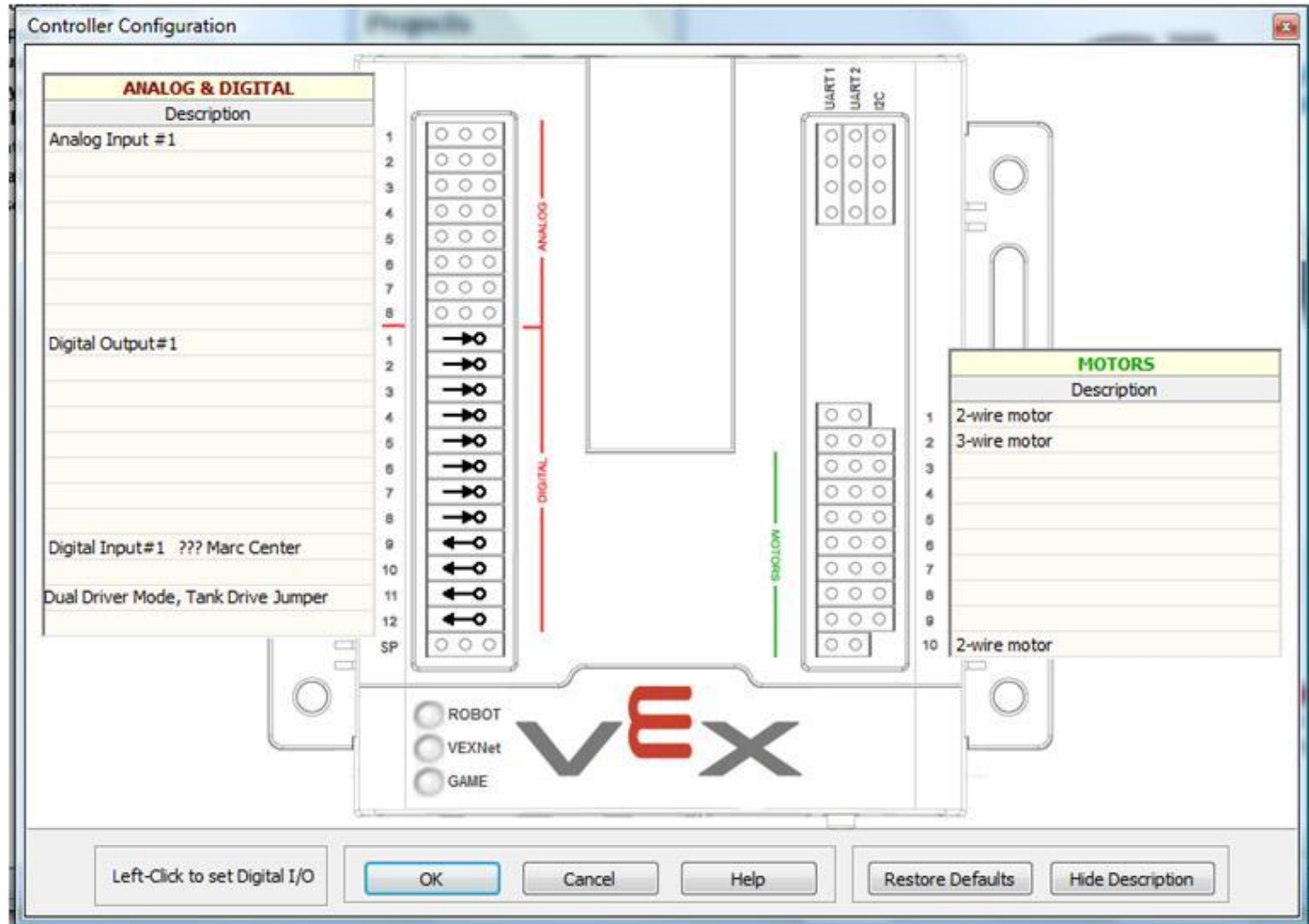


Autonomous (0) and Operator Control (0) times are Controlled by VEXnet field control system.

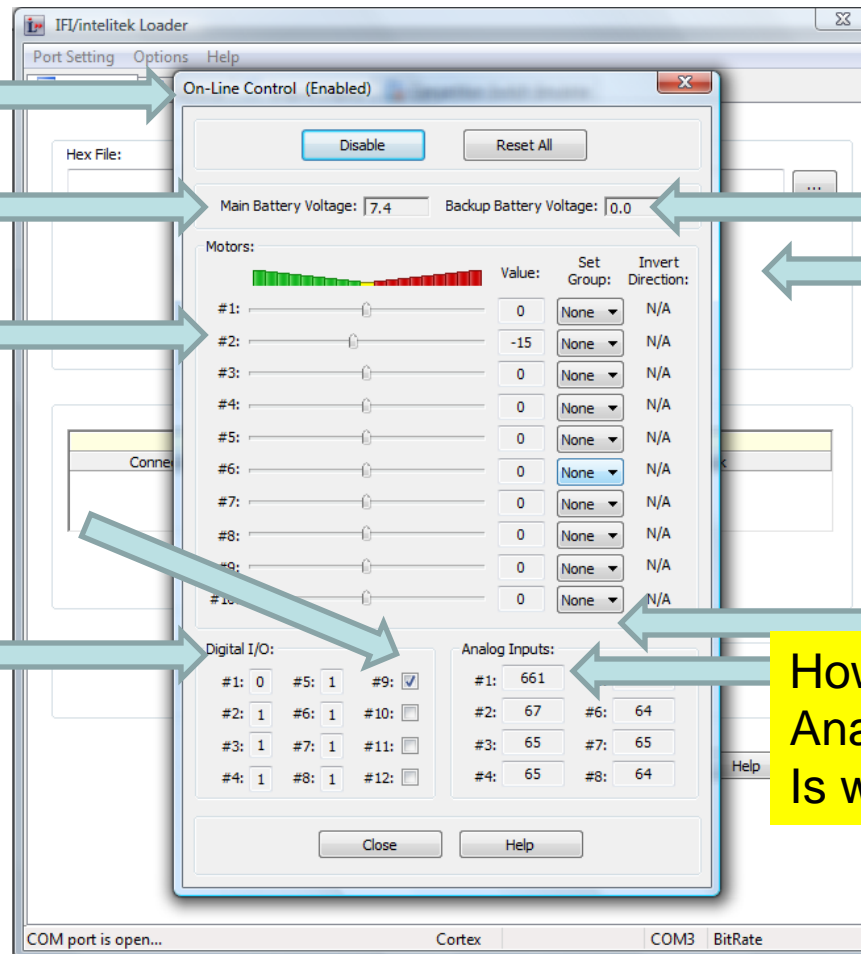
# EasyC V4 adds while (1) automatically for you



# Controller Configuration – where digital inputs/outputs can be selected



# EasyC On-Line Control

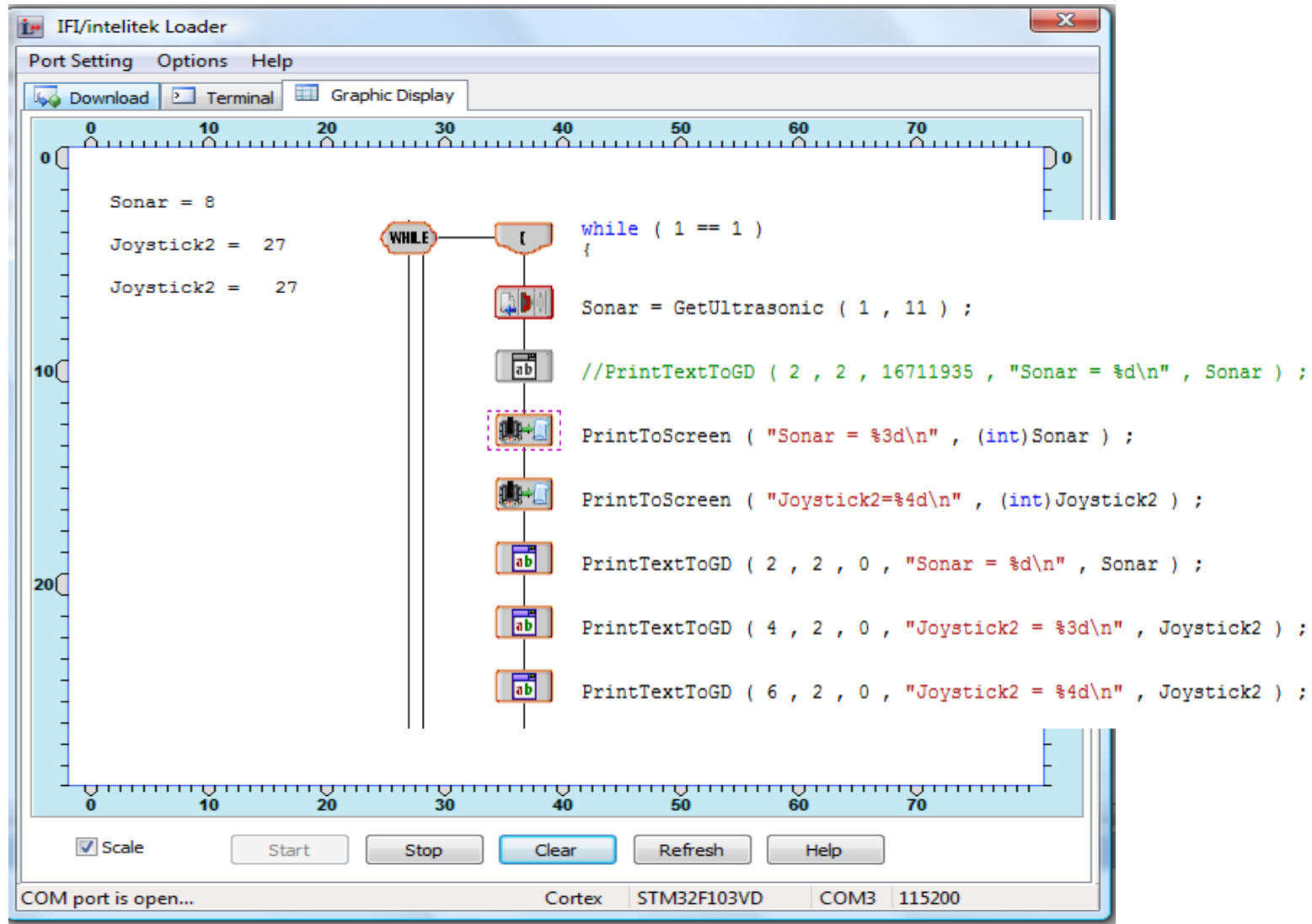


How can we see if Motor's are wired up and determine Direction if positive or Negative?

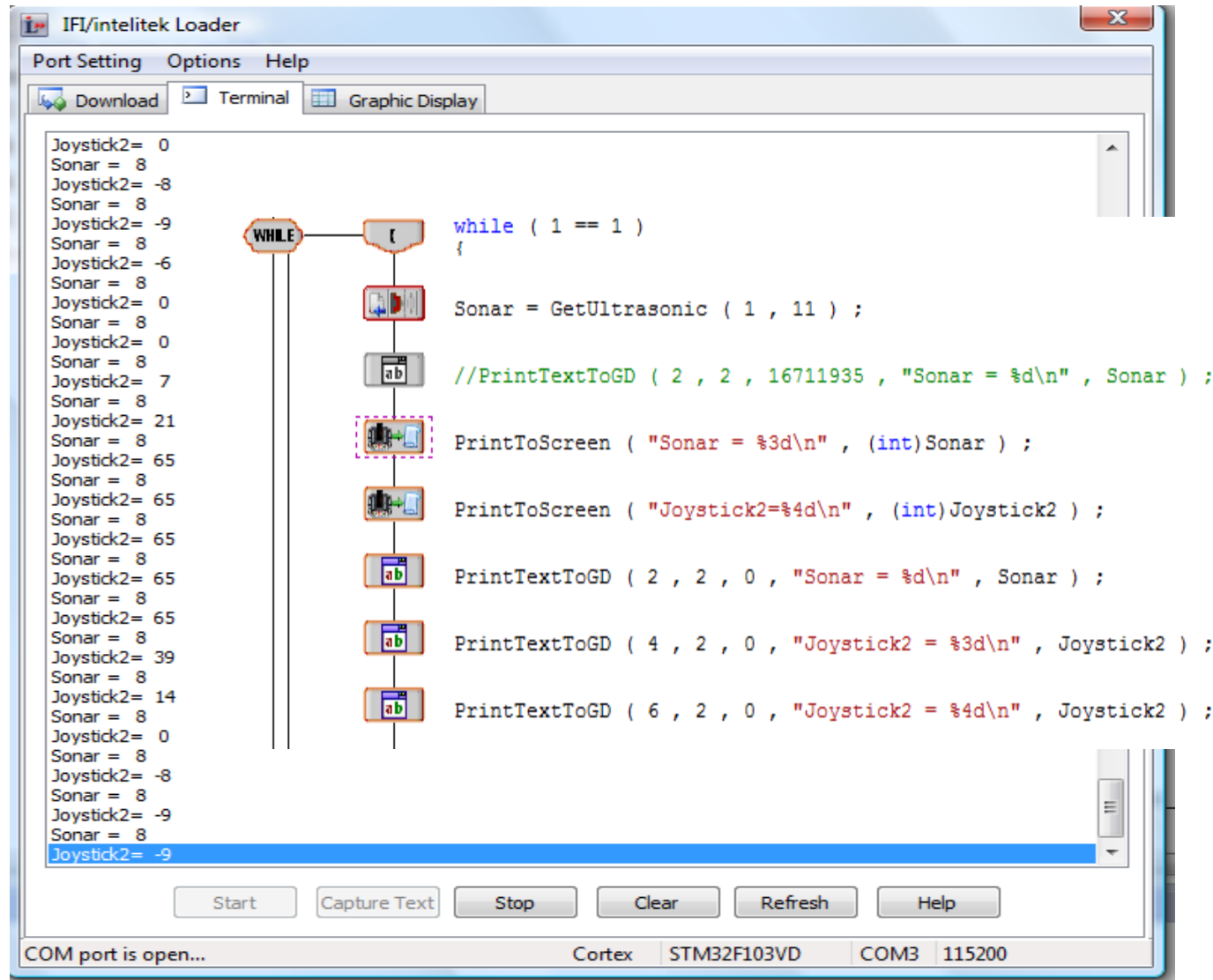
How can we see if Encoder is working?

How can we see if Analog potentiometer Is working/

# Graphic Display vs Terminal Window

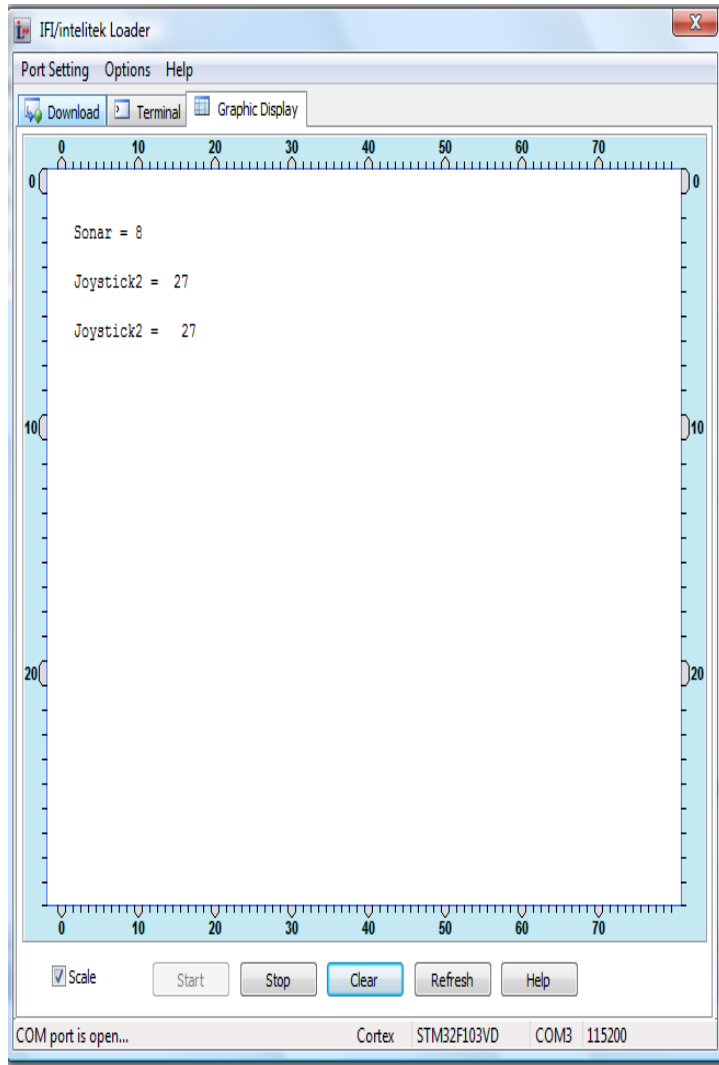


# Graphic Display vs Terminal Window





# Graphic Display vs Terminal Window



IFI/inteltek Loader

Port Setting Options Help

Download Terminal Graphic Display

```
Joystick2= 0
Sonar = 8
Joystick2= -8
Sonar = 8
Joystick2= -9
Sonar = 8
Joystick2= -6
Sonar = 8
Joystick2= 0
Sonar = 8
Joystick2= 0
Sonar = 8
Joystick2= 7
Sonar = 8
Joystick2= 21
Sonar = 8
Joystick2= 65
Sonar = 8
Joystick2= 65
Sonar = 8
Joystick2= 65
Sonar = 8
Joystick2= 65
Sonar = 8
Joystick2= 39
Sonar = 8
Joystick2= 14
Sonar = 8
Joystick2= 0
Sonar = 8
Joystick2= -8
Sonar = 8
Joystick2= -9
Sonar = 8
Joystick2= -9
```

Start Capture Text Stop Clear Refresh Help

COM port is open... Cortex STM32F103VD COM3 115200

## 4 VEXnet System Components (OCCRA KOP)

[Home](#) / [Products](#) / [Robot Accessories](#) / [Logic](#) / **VEXnet System Bundle**

### VEXnet System Bundle

P/N: 276-1604

### VEXnet System Bundle

The VEXnet System Bundle contains everything you need to get started controlling a VEX robot using the VEX Cortex Microcontroller.

- ▷ (1) VEX Cortex Microcontroller
- ▷ (1) VEXnet Joystick
- ▷ (2) VEXnet USB Adapter Keys
- ▷ (1) VEXnet Backup Battery Holder
- ▷ (1) USB A-A Cable

**\$399.99**

 **In Stock**

Qty:  [Add to Cart](#) OR [Add to Wishlist](#)



VEXnet System Bundle

HOVER TO VIEW, CLICK TO ZOOM



## VEX Cortex Microcontroller

P/N: 276-2194

### If you could make yourself smarter, wouldn't you?

The VEX Cortex Microcontroller coordinates the flow of information and power on the robot. All other electronic system components must interface to the Microcontroller.

- ▷ STMicroelectronics ARM Cortex-M3 user processor
- ▷ Wireless with built-in VEXnet technology
- ▷ (8) Standard 3-wire Motor ports
- ▷ (2) 2-wire Motor ports
- ▷ (1) I2C "smart sensor" port
- ▷ (2) UART Serial Ports
- ▷ (8) Hi-res (12-bit) Analog Inputs
- ▷ (12) Fast digital I/O ports which can be used as interrupts
- ▷ Programmable with easyC v4 for Cortex or ROBOTC for Cortex & PIC

**\$249.99**

 In Stock

Qty:  [Add to Cart](#) OR [Add to Wishlist](#)



VEX Cortex Microcontroller

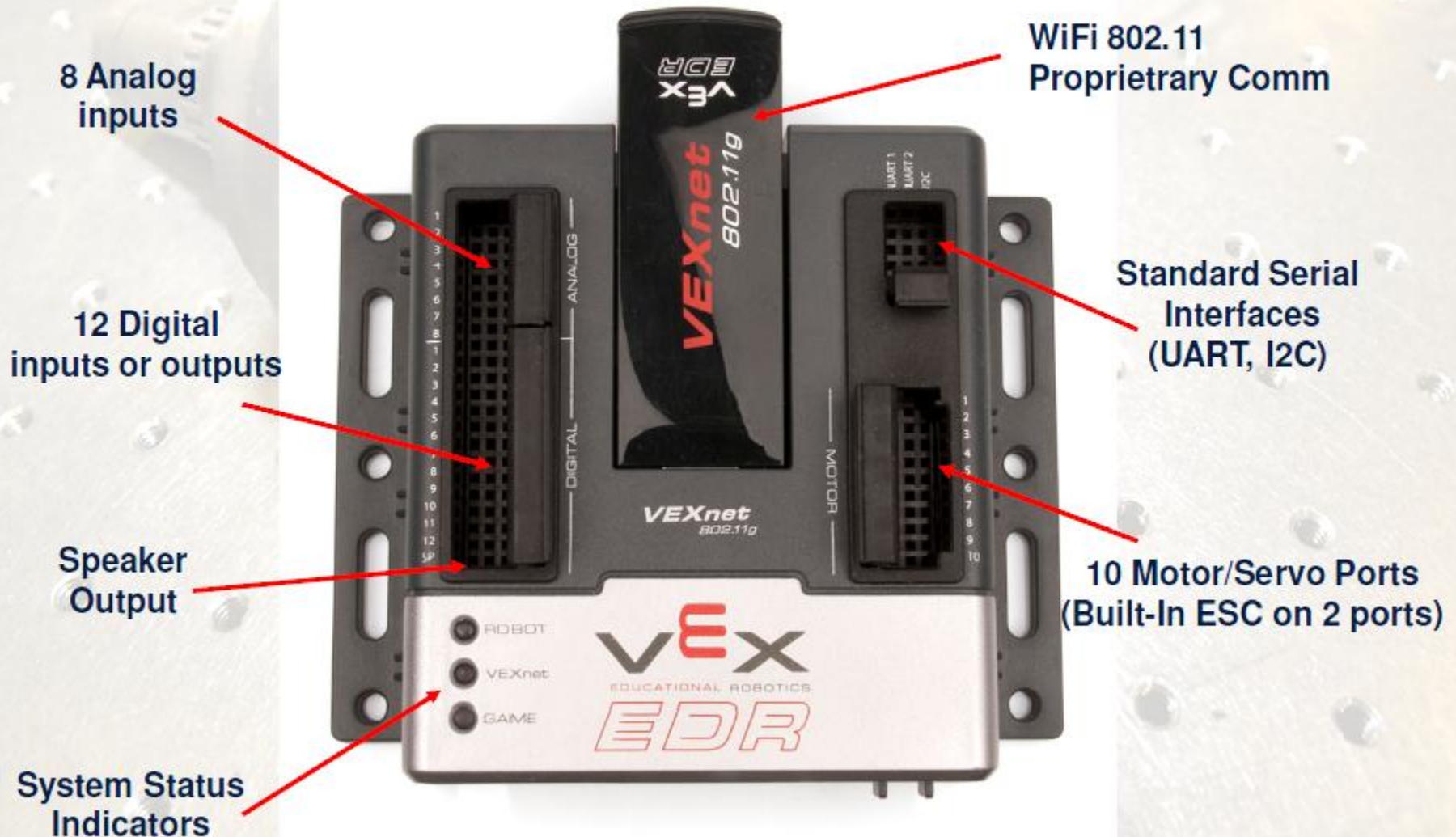
HOVER TO VIEW, CLICK TO ZOOM





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# VEXnet Cortex M3 Controller





# VEXnet Joystick



♦“Playstation” game-style controller



8 buttons on top

2 XY analog joysticks

Power switch

6 AAA  
rechargeable  
batteries

Plug-in USB/ WiFi Key

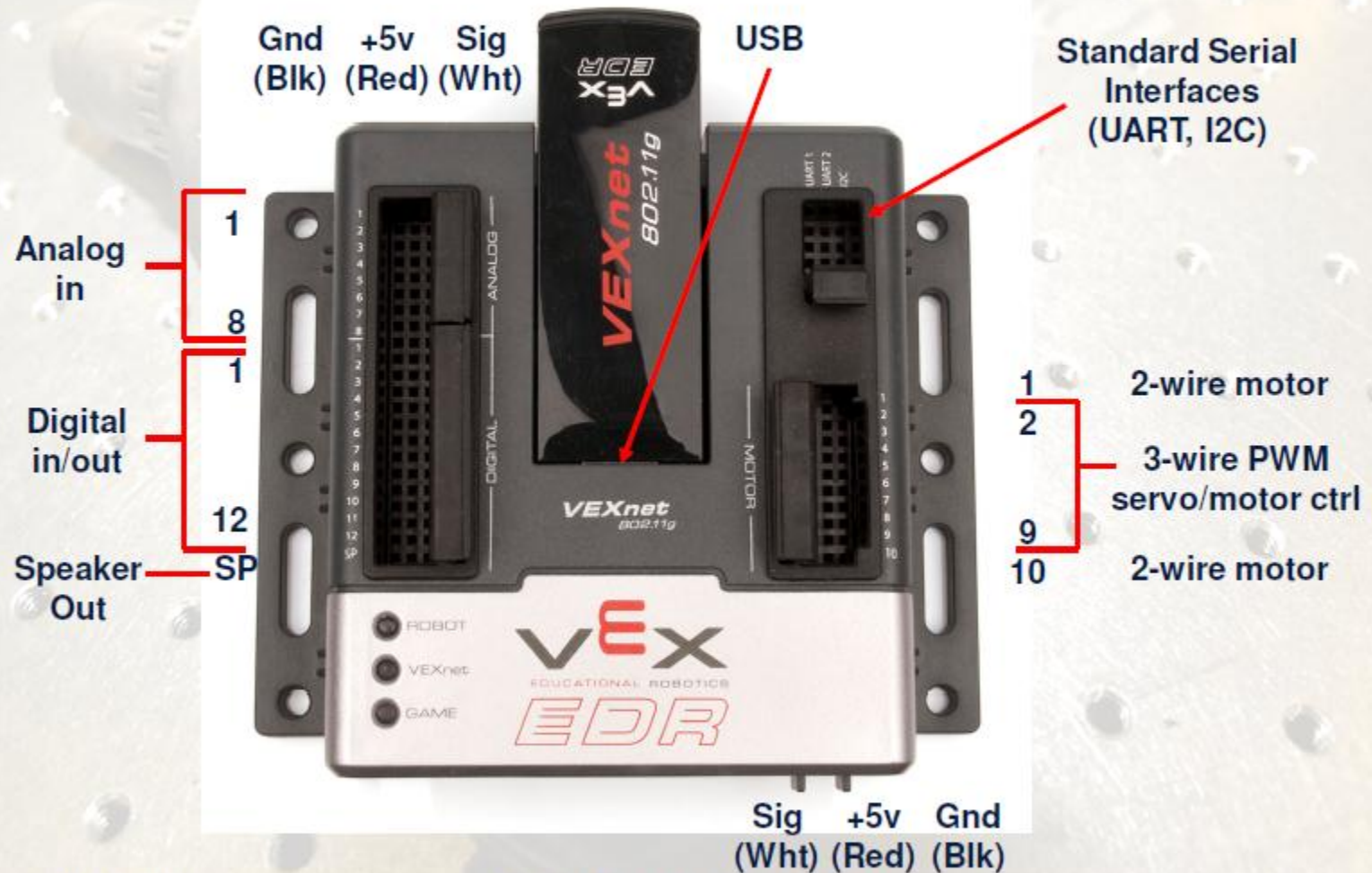
4 Button on front-side

Programming Interface



3 Axis Accelerometer  
(XY Tilt, XYZ Accel, Shake)

# VEX Cortex Connectors





**BEST™**

# VEX Cortex Pinouts

- Ground
- + 5V
- Signal/Control
- + Battery Power
- + Battery Power  
(for + control input)
- + Battery Power  
(for – control input)





# LED Status Lights



joystick battery status

robot battery status

comm. link status

Game status  
(not used by  
BEST)

- Green battery – good charge
- Yellow battery - dying
- Red battery – dead

- Green VEXnet – comm. established
- Yellow VEXnet – searching
- Lights on the controller and the joystick are the same



# VEXnet Joystick – new programming location



# VEXnet Joystick batteries last two hours – turn off frequently

## ***VEXnet Joystick***

The VEXnet Joystick is a controller for the VEX Robotics system. It sends VEXnet signals through a VEXnet USB Adapter Key to one attached to a microcontroller on a VEX robot. The VEXnet Joystick is compatible only with the VEX Cortex Microcontroller.

## ***Operator Controls***

The joystick has two 2-axis analog joysticks, 4 trigger buttons on the back side and two 4-button directional pads on the top. It also has a 3-Axis Accelerometer that provides X-Y tilt outputs, X-Y-Z acceleration and a shake output. This allows you to control an arm or drive system by changing the orientation of the joystick (tilting, turning or shaking).

## ***Power and Tethering***

The VEXnet Joystick is powered by (6) AAA Batteries. For longest battery life, turn ON the unit only when needed. Fresh batteries in the Joystick will provide about two hours of run time. The battery life status can be seen from the LED labeled “Joystick” on the top of the unit – see Troubleshooting (LED Codes) below for more details.

If wireless operation is not required, substitute the VEXnet keys with a USB A-A Tether Cable. For this tether configuration, turn ON the Cortex Microcontroller but leave the Joystick OFF. The USB A-A cable will power the Joystick.

## 4 VEXNET Cortex System (OCCRA KOP)

# Big Robot programming

### NO Jumpers Installed - Single Driver Mode, Tank Drive

Motor 1	LEFT DRIVE	Primary Driver	Channel 3 (left stick, Y-axis)	Joystick Up = Motor CW
Motor 2	LEFT DRIVE	Primary Driver	Channel 3 (left stick, Y-axis)	Joystick Up = Motor CW
Motor 3	LEFT DRIVE	Primary Driver	Channel 3 (left stick, Y-axis)	Joystick Up = Motor CW
Motor 4	RIGHT DRIVE	Primary Driver	Channel 2 (right stick, Y-axis)	Joystick Up = Motor CCW
Motor 5	RIGHT DRIVE	Primary Driver	Channel 2 (right stick, Y-axis)	Joystick Up = Motor CCW
Motor 6	MECH 1	Primary Driver	Channel 5 (left shoulder buttons)	U Button = Motor CW
Motor 7	MECH 2	Primary Driver	Channel 6 (right shoulder buttons)	U Button = Motor CW
Motor 8	MECH 3	Primary Driver	Channel 7 (left d-pad buttons, U/D)	U Button = Motor CW
Motor 9	MECH 4	Primary Driver	Channel 8 right d-pad buttons, U/D)	U Button = Motor CW
Motor 10	RIGHT DRIVE	Primary Driver	Channel 2 (right stick, Y-axis)	Joystick Up = Motor CCW

### Jumper installed in Digital 11 - Dual Driver Mode, Tank Drive

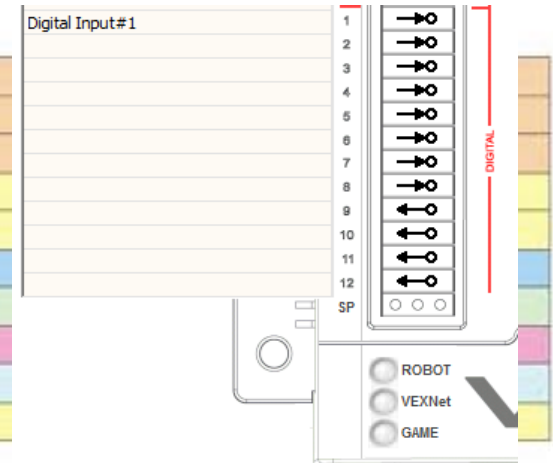
Motor 1	LEFT DRIVE	Primary Driver	Channel 3 (left stick, Y-axis)	Joystick Up = Motor CW
Motor 2	LEFT DRIVE	Primary Driver	Channel 3 (left stick, Y-axis)	Joystick Up = Motor CW
Motor 3	LEFT DRIVE	Primary Driver	Channel 3 (left stick, Y-axis)	Joystick Up = Motor CW
Motor 4	RIGHT DRIVE	Primary Driver	Channel 2 (right stick, Y-axis)	Joystick Up = Motor CCW
Motor 5	RIGHT DRIVE	Primary Driver	Channel 2 (right stick, Y-axis)	Joystick Up = Motor CCW
Motor 6	MECH 1	Secondary Driver	Channel 5 (left shoulder buttons)	U Button = Motor CW
Motor 7	MECH 2	Secondary Driver	Channel 6 (right shoulder buttons)	U Button = Motor CW
Motor 8	MECH 3	Secondary Driver	Channel 3 (left stick, Y-axis)	Joystick Up = Motor CW
Motor 9	MECH 4	Secondary Driver	Channel 2 (right stick, Y-axis)	Joystick Up = Motor CW
Motor 10	RIGHT DRIVE	Primary Driver	Channel 2 (right stick, Y-axis)	Joystick Up = Motor CCW



# Big Robot programming

## Jumper installed in Digital 12 - Single Driver Mode, Arcade Drive

Motor 1	LEFT DRIVE	Primary Driver	Arcade Drive (see separate chart)
Motor 2	LEFT DRIVE	Primary Driver	Arcade Drive (see separate chart)
Motor 3	LEFT DRIVE	Primary Driver	Arcade Drive (see separate chart)
Motor 4	RIGHT DRIVE	Primary Driver	Arcade Drive (see separate chart)
Motor 5	RIGHT DRIVE	Primary Driver	Arcade Drive (see separate chart)
Motor 6	MECH 1	Primary Driver	Channel 5 (left shoulder buttons)
Motor 7	MECH 2	Primary Driver	Channel 6 (right shoulder buttons)
Motor 8	MECH 3	Primary Driver	Channel 3 (left stick, Y-axis)
Motor 9	MECH 4	Primary Driver	Channel 4 left stick, X-axis)
Motor 10	RIGHT DRIVE	Primary Driver	Arcade Drive (see separate chart)



## Jumper installed in Digital 11 & Digital 12 - Dual Driver Mode, Arcade Drive

Motor 1	LEFT DRIVE	Primary Driver	Arcade Drive (see separate chart)	
Motor 2	LEFT DRIVE	Primary Driver	Arcade Drive (see separate chart)	
Motor 3	LEFT DRIVE	Primary Driver	Arcade Drive (see separate chart)	
Motor 4	RIGHT DRIVE	Primary Driver	Arcade Drive (see separate chart)	
Motor 5	RIGHT DRIVE	Primary Driver	Arcade Drive (see separate chart)	
Motor 6	MECH 1	Secondary Driver	Channel 5 (left shoulder buttons)	U Button = Motor CW
Motor 7	MECH 2	Secondary Driver	Channel 6 (right shoulder buttons)	U Button = Motor CW
Motor 8	MECH 3	Secondary Driver	Channel 3 (left stick, Y-axis)	Joystick Up = Motor CW
Motor 9	MECH 4	Secondary Driver	Channel 2 (right stick, Y-axis)	Joystick Up = Motor CW
Motor 10	RIGHT DRIVE	Primary Driver	Arcade Drive (see separate chart)	

## 4 VEXNET Transmitters (OCCRA KOP)

### User Features

- ▶ New LED scheme: Robot, VEXnet, and Game LEDs on the robot and transmitter.
- ▶ Robot LED is for battery status and joystick status
- ▶ VEXnet LED is for Link status and data quality
- ▶ Game LED shows Disabled, Driver, and Autonomous modes
- ▶ The VEXnet Transmitter Upgrade Module is paired to the VEXnet Microcontroller Upgrade Module at the factory
- ▶ Users can pair their robot to a different transmitter simply by tethering them together
- ▶ Wireless driving, programming, and debugging
- ▶ Simply connect the upgraded transmitter to a PC using the current orange Programming Cable.
- ▶ Two VEX Transmitters can connect to one robot (only one VEXnet Upgrade Bundle required)
- ▶ The second transmitter is connected to the primary transmitter using a RJ-10 tether cable. Both transmitters send data to the same VEXnet Upgrade Module which provides the wireless link to the VEX microcontroller.
- ▶ easyC and ROBOTC software patch required for VEXnet operation for competition

### Competition Features

- ▶ New [VEXnet field controller](#) for competitions
- ▶ Special Game LED on the robot and transmitter lets you know your mode: Disabled, Driver, or Autonomous
- ▶ No more templates for autonomous timing
- ▶ The field now signals both Start/Stop and Driver/Autonomous
- ▶ Low battery re-boots will not cause autonomous to restart
- ▶ Robots are automatically switched to a private channel for competitions
- ▶ Robots are automatically switched to one of the pit channels when not competing

### Compatibility

- ▶ VEXnet works with easyC and ROBOTC.
- ▶ Watch for software updates to optimize VEXnet functionality.
- ▶ [Click here](#) for a list of VEX & VEXnet electronics product compatibilities.

### Future Features

- ▶ Autonomous (no transmitter) while connected to a PC
- ▶ Plug the VEXnet USB Adapter into your PC
- ▶ Plugging the VEXnet USB Adapter into your PC will allow for programming, debugging, and driving from the PC
- ▶ More with future VEX microcontrollers

## 4 Vexnet Field Controller

### VEXnet Field Controller Kit (802.11g)



A full set of controllers and cables for use with the VEXnet 802.11g system and/or the VEX 75MHz Crystal Radios. Field control allows for accurate starting of competition matches. The VEXnet Field Controller Kit consists of the following: 1 Field Controller, 2 Alliance Splitters, 1 USB A-B Cable, 2 50' Ethernet Cables, 4 5' Ethernet Cables, 10 Coiled Headset Cords, and 1 Software CD to installed on your PC.

275-1401

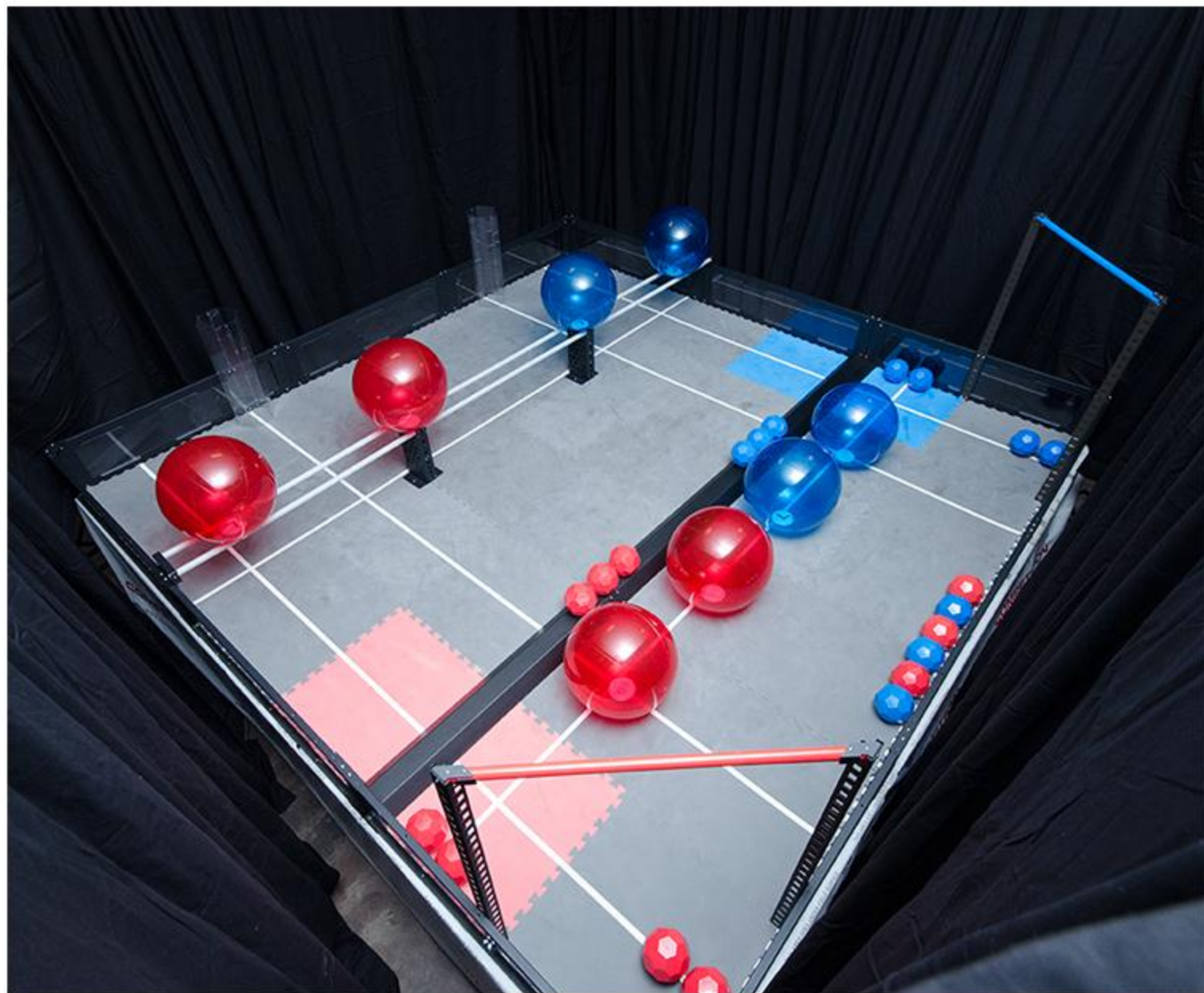
VEXnet Field Controller  
(802.11g)

**\$199.99** ea In Stock



1

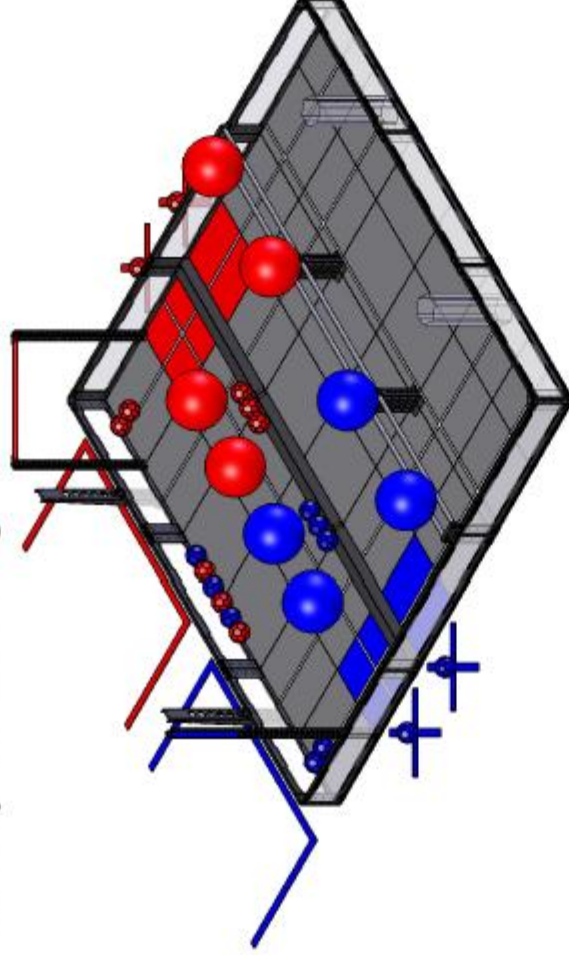
Buy Now







## Game Description & Scoring



### The Game:

VEX Toss Up is played on a 12'x12' square field configured as seen above. Two alliances – one "red" and one "blue" – composed of two teams each, compete in matches consisting of a fifteen minute autonomous period followed by one minute and forty-five seconds of driver-controlled play.

The object of the game is to attain a higher score than the opposing *Alliance* by *Scoring* your colored *BuckyBalls* and *Large Balls* into the *Middle Zone* and *Goal Zone*, by *Stashing* your colored *BuckyBalls* and *Large Balls* into the *Goals*, and by *Hanging* or *Hanging With A Ball*, at various heights, off your colored *Bar* at the end of the match.

### The Details:

There are a total of twenty (20) *BuckyBalls* and eight (8) *Large Balls* available as *Scoring Objects* in the game. Most *Scoring Objects* begin in designated locations on the field, while some are available to be loaded prior to the *Match*.

Each *Robot* (smaller than 18"x18"x18" to start) begins a match on one of their *Alliance Starting Tiles*. There are two (2) *scoring Zones* and (2) *Goals* that *Alliances* can *Score Objects* into. *Alliances* also earn points for having *Robots* of their own color *Hanging* from their *Hanging Bar* at the end of the *Match*. A bonus is awarded to the *Alliance* that has the most total points at the end of the *Autonomous Period*.

### Scoring:

Each <i>BuckyBall</i> Scored in the <i>Middle Zone</i>	1 point
Each <i>Large Ball</i> Scored in the <i>Middle Zone</i>	1 point
Each <i>BuckyBall</i> Scored in the <i>Goal Zone</i>	2 points
Each <i>Large Ball</i> Scored in the <i>Goal Zone</i>	5 points
Each <i>BuckyBall</i> Stashed in a <i>Goal</i>	5 points
Each <i>Large Ball</i> Stashed in a <i>Goal</i>	10 points
Each <i>Robot</i> that is <i>Low Hanging</i>	5 points
Each <i>Robot</i> that is <i>High Hanging</i>	10 points
Each <i>Robot</i> that is <i>Hanging With A Ball</i>	10 points + Hanging pts
<i>Alliance</i> with the most points at the end of autonomous	10 points



## VEX Toss Up Game Details

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VEX Toss Up is played on a 12'x12' square field configured as seen above. Two alliances – one “red” and one “blue” – composed of two teams each, compete in matches consisting of a fifteen second autonomous period followed by one minute and forty-five seconds of driver-controlled play.

The object of the game is to attain a higher score than the opposing Alliance by Scoring your colored BuckyBalls and Large Balls into the Middle Zone and Goal Zone, by Stashing your colored BuckyBalls and Large Balls into the Goals, and by Hanging or Hanging With A Ball, at various heights, off your colored Bar at the end of the match.

There are a total of twenty (20) BuckyBalls and eight (8) Large Balls available as Scoring Objects in the game. Most Scoring Objects begin in designated locations on the field, while some are available to be loaded prior to the Match.

Each Robot (smaller than 18"x18"x18" to start) begins a match on one of their Alliance Starting Tiles. There are two (2) scoring Zones and (2) Goals that Alliances can Score Objects into. Alliances also earn points for having Robots of their own color Hanging from their Hanging Bar at the end of the Match. A bonus is awarded to the Alliance that has the most total points at the end of the Autonomous Period.













## VEX Add It Up Registration & Event Info

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Visit the [RobotEvents](#) [page](#) for the VEX Robotics Competition to find an event near you, register a team, volunteer, and more.

## VEX Toss Up Documents & Downloads

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- [VEX Toss Up Game Manual](#)  (Last Updated: 5/31/2013)
- [VEX Toss Up Game Manual \(Spanish\)](#)  (Manual del Juego Español) (Last Updated: 7/17/2013)
- [VEX Toss Up - Appendix A Field Drawings, Specifications & BOM](#)  (Last Updated: 7/23/2013)
- [VEX Toss Up - Appendix B Robot Skills Challenge](#)  (Last Updated: 5/2/2013)
- [VEX Toss Up - Appendix C Programming Skills Challenge](#)  (Last Updated: 5/10/2013)
- [VEX Toss Up - Appendix D Awards](#) 
- [VEX Toss Up - Appendix E VEX U Program Rules](#)  (Last Updated: 5/2/2013)
- [VEX Toss Up - One Page Game Description](#) 
- [VEX Toss Up Game Video High Resolution \(QuickTime, 336 MB\)](#) 
- [VEX Toss Up Game Video Low Resolution \(QuickTime, 40 MB\)](#) 
- [VEX Toss Up Logos](#) 

This page was last modified on 16 August 2013, at 16:55.

This page has been accessed 48,959 times.

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# 2012 VEX Inspection Form is Online at VEX website

VEX Robotics Competition - *Sack Attack*

## Robot Inspection Checklist (VEXnet or Crystal)

Team Number: \_\_\_\_\_



### Size Inspection

<input type="checkbox"/>	Robot fits within starting size restrictions (18" x 18" x 18") does not touch walls or ceiling of the sizing box! <i>Robot should be measured WITH Robot Flag &amp; Team ID # Plates installed.</i>	R4
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### Overall Inspection

<input type="checkbox"/>	Team is only competing with <b>ONE</b> robot - they have no spare or replacement robots.	R1
<input type="checkbox"/>	Robot displays VEX Team Identification Number on at least (2) opposing sides.	R18
<input type="checkbox"/>	Robot does <b>NOT</b> contain any components which will be intentionally detached on the playing-field.	G10
<input type="checkbox"/>	Robot does <b>NOT</b> contain any components that could damage the playing-field or other robots.	R3
<input type="checkbox"/>	Robot does <b>NOT</b> contain any sharp edges or corners.	R3
<input type="checkbox"/>	Robot poses <b>NO</b> obvious unnecessary risk of entanglement.	R3

## 7 General Programming Tips

- 1) Save your program often, in a new file so that you have a string of files, especially at the end of class, session or after having completed a “milestone”. It is a good practice to save every 15 minutes during “heavy activity” times.
- 2) Use a file index system (Team3548\_VEX\_YY1)
- 3) Program one part at a time and debug one part at a time
- 4) Try to think like the VEX controller when programming and debugging (process of making your program operate the way you think it should – design intent) your program
- 6) Work with a partner if possible – “two heads better than one”
- 7) After two hours maximum of programming – take a break
- 8) Don't bother with high-school “overnighters”

## 8 Lessons shared from existing VEX users

- 1) Motor module and Servo module look similar (both green) - use #6 lock washers on both
- 2) Shaft collars are required on the outputs of shafts but are not shown in the 2005 instructions
- 3) Spacers are missing or use lock collars w/set screw
- 3) INFO – Bolt thread are #8-32 and wrench size is 11-32
- 4) TIP- Need to purchase more allen wrenches (5 ?)
- 5) TIP- Charge up rechargeable battery pack, first thing, mark new VEX NiMH Battery with 2012 label
- 6) TIP- Try to obtain a laptop that will be regularly used with the VEX robot to speed up development process
- 7) TIP – Chief Delphi Website has OCCRA forum where students can post VEX questions