REC Unit 2: Introduction to Vex Programming

Catalog No.	77-8105-0020
Category	Mobile Robotics
Duration	15 Hours
Software Supplied	easyCv5

2.1 A (Core): Basic Motor Control

Introduction to Process Control

Control by Human

Computer Program Defined

Writing a Program

Four Steps

2.1 B (Activity) Programming Components

Introduction to the Controller

The Programming Module

The USB cable

Steps of a Process

Operations

Drag and Drop

Programming in easyC

Parameters

Reading Block Programs

Command Blocks

Motor Modules

Controlling Motor ON time

Wait Dialogue Box

Worksheet: Describe a Process

2.2 (Activity): Draw a Line

- Safety Rules Review
- Polarity
- Overheating
- Connecting the Vex Programming Module
- Connect to Joystick
- Connections Layout
- Configure easyC
- Blocks
- Output
- Flowchart
- Error Message Alert Box
- Hardware Reset
- Print your Records
- Motor Direction

2.3 (Core): Pseudocode and Turns

- Pseudo-Code
- Right Turns
- Left Turns
- Compensating for System Variations
- Worksheet

2.4 (Activity): Make a Square

(Activity): Make a Square - Fundamental

Introduction

Create Pseudo-Code

Convert to easyC

Download and Test

Analyze Behavior, Refine Code

Questions

Challenge Activities

Make a Square - Conclusion

(Activity): Make a Square - Advanced

Introduction

Create Pseudo-Code

Convert to easyC

Download and Test

Analyze Behavior, Refine Code

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Make a Square - Conclusion

2.5 (Core): Variables, Constants and Comments

Numbers, Constants, and Variables

Conventions for Naming of Variables

Integers and Floats

Bits and More Bits

Section 2.5 Quiz

Sizes of Typical Variables

Signed and Unsigned

Choosing Variable Type

The easyC Variables Window

Constants

Creating Constants

Commenting

Worksheet: Numbers, Constants, and Variables

Section 2.5 Review

2.6 (Activity): Apply Constants, Variables, and Comments

Review Code from Activity 2.4

Replace all Fixed Values with Constants

Create and Use a Variable for the Main "Wait(...)" Statement

Modify the Program to Make Your Robot Move Twice

Challenge Activity

2.7 (Core): Tools in easyC

Tools

Motor Ports

Sensor Ports

The On-Line Window

Port Labeling

Analog and Digital Ports

2.8 (Activity): Using easyC Tools

Open easyC

Label Ports

Save Controller Configuration

On-Line Window

Enable On-Line Window

Observe

PWM near 0

Modified PWM Graph

Collect and Analyze Data

Restore to Default Code

2.9 (Core): Dead Reckoning and User Functions

- Dead Reckoning
- Functions
- Example of a User-Defined Function
- Passing Parameters to a Function
- Receiving a Return Value from a Function
- Worksheet: User-Defined Functions

2.10 (Activity): Follow a Complex Path

- Procedure
- Determine DCONSTANT
- Create DCONSTANT and Distance
- Modify Wait()
- Run your Program
- Create a User Function
- Creating a Call
- Test your Code
- Angles
- Follow a Complex Path
- Suggestions, Hints and Tricks

2.11 (Core): Conditional Statements

- Autonomous Behavior
- Branching
- Tests
- Example Flowchart
- C-Programmer's Shortcut
- The "=="Comparison Operator
- Double Equals
- Example - Error
- Confusion over Equals Sign
- Purpose
- The Else Statement

2.12 (Activity): Modifying the GoForward Function

- Create Go Function
- Structure the Go Function
- Import Functions
- Copy to IF
- Copy to Else
- Navigate in Reverse
- Restore the Default Code

2.13 (Core): Loops

- While-Loop Syntax
- While-Loop Example
- The "For" Statement
- "For" Loops
- "For" Loops for Efficiency
- For-Loop Syntax
- Initial Condition
- Comparison Operators
- Increment Expressions
- Loops inside Loops

2.14 (Activity): Make Multiple Squares

- Example
- Instructions
- For Loops
- For Loop Iteration
- Draw a Square Wave
- Draw a Sine Wave

2.15 (Core): Simplified Symbols, Logical Operators, and Integer Math

- Shorthand for Efficiency
- Incrementing
- Simple Incrementing
- Decrementing
- Incrementing and Decrementing
- Simplified Incrementing
- Other Operators
- Constants
- Expressions
- Divisions
- Quotient and Remainder
- Mod Illustrated
- Trunction
- Reaching the Limit
- Wrapping - Signed Integers
- Worksheet

2.16 (Activity): Drawing Shapes

- Programming Efficiency
- Overview of Robot Driving
- Define Motors
- Time control
- Turn Center and Turn Swing
- Reflections
- Draw a Square
- Program a Complex Path
- Draw More Shapes

2.17 (Project): Fine Motor Control

Acceleration

High Center of Gravity

Ramping

Physical Modifications

Outrigger Assembly

Software Modifications

Write Pseudo-Code

Brainstorm, Analyze, Test