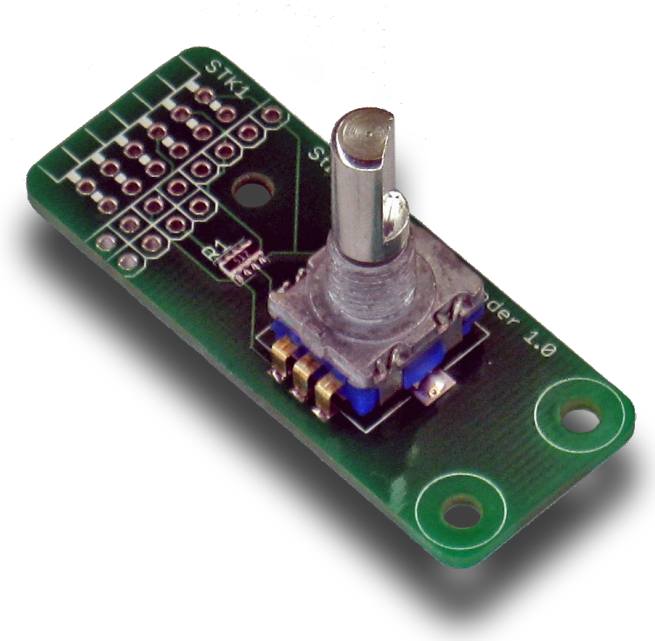
XESS Corporation

StickIt! Rotary Encoder Manual

How to install and use your new StickIt! Rotary Encoder Module



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StickIt! Rotary Encoder Manual
MAN010 (V1.0) November 12, 2013

The following table shows the revision history for this document.

Date	Version	Revision
11/12/2013	1.0	Initial release for StickIt! Rotary Encoder module V1.0.

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C.1 Preliminaries

Here's some helpful information before getting started.

Getting Help!

Here are some places to get help if you encounter problems:

- If you can't get the StickIt! Rotary Encoder module to work, send an e-mail message describing your problem to help@xess.com or submit a problem report at http://www.xess.com/help.php.
- Our web site also has
  - answers to frequently-asked-questions,
  - example designs, application notes and tutorials,
  - a forum where you can post questions.

Take Notice!

It's pretty hard to get in trouble with this module.

Packing List

Here is what you should have received in your package:

- a StickIt! Rotary Encoder module.
- PMOD™ male header.
- Wing male headers (8-pin & 4-pin).

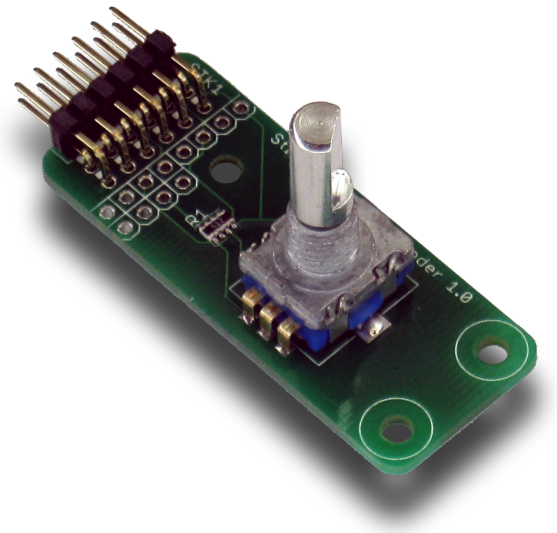
C.2 Setup

The StickIt! Rotary Encoder module provides an eight-position DIP switch that connects to an eight-bit PMOD or a Wing socket on your StickIt! board.

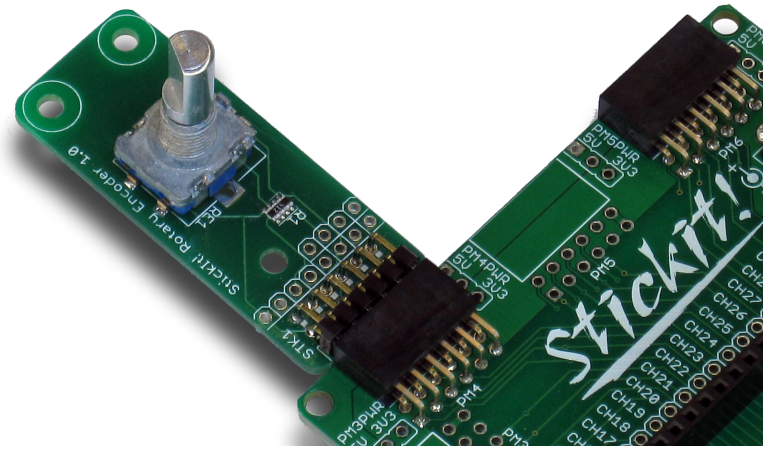
Inserting Your StickIt! Rotary Encoder Module Into Your StickIt! Board

Inserting Into a PMOD Socket

To use the StickIt! Rotary Encoder module with a PMOD socket, first solder the included male PMOD header to the module as shown. (**To insure a stable connection, only use a header with 0.025" square pins.**)

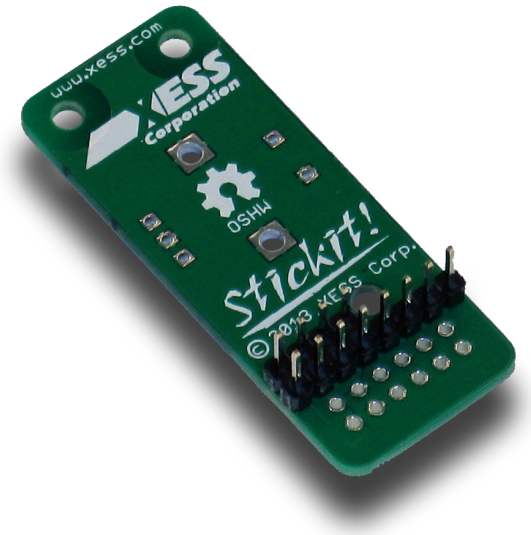


Then insert the module into one of the PMOD sockets on the StickIt! Board.

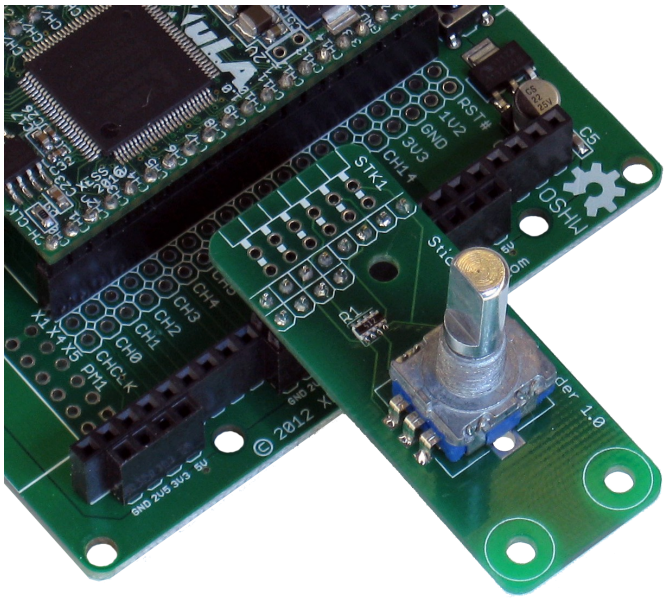


Inserting Into a Wing Socket

To use the StickIt! Rotary Encoder module with a Wing socket, first solder the included male Wing headers to the module as shown. (**To insure a stable connection, only use a header with 0.025" square pins.**)

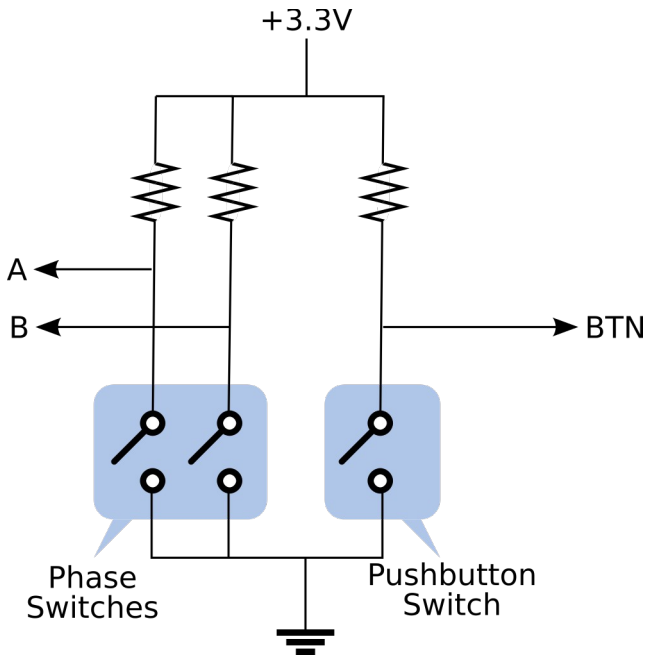


Then insert the module into one of the eight-bit Wing sockets on the StickIt! board.



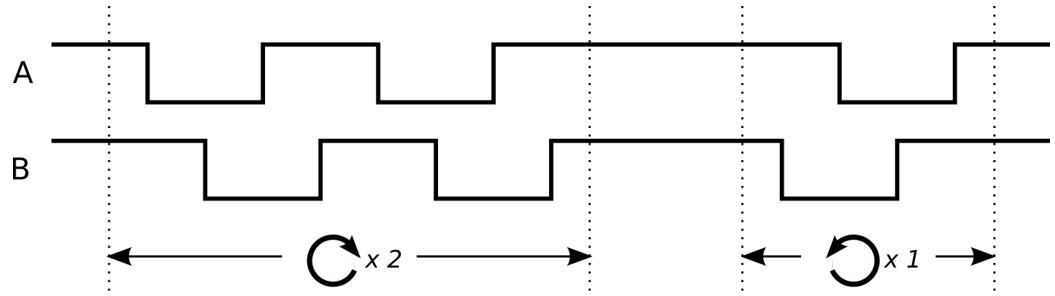
C.3 Operation

This chapter describes the operation of the StickIt! Rotary Encoder module using a simplified schematic. You can find a complete schematic at the end of this manual.



The StickIt! Rotary Encoder module has a single rotary encoder. The rotary encoder has two phase outputs (A and B) that indicate the direction of rotation of the control knob (clockwise or counter-clockwise). There is also an output (BTN) that indicates whether the control knob has been depressed or not.

The relationship between the A and B phase outputs for clockwise and counter-clockwise rotation of the control knob are shown below. For each rotation of the knob by a single click-stop (or *detent*), a single pulse is emitted by both the A and B outputs. The phase relationship between the A and B pulses determines whether the rotation was in the clockwise or counter-clockwise direction.



C.4 Using the Module

To use the StickIt! Rotary Encoder module, you will need to do the following:

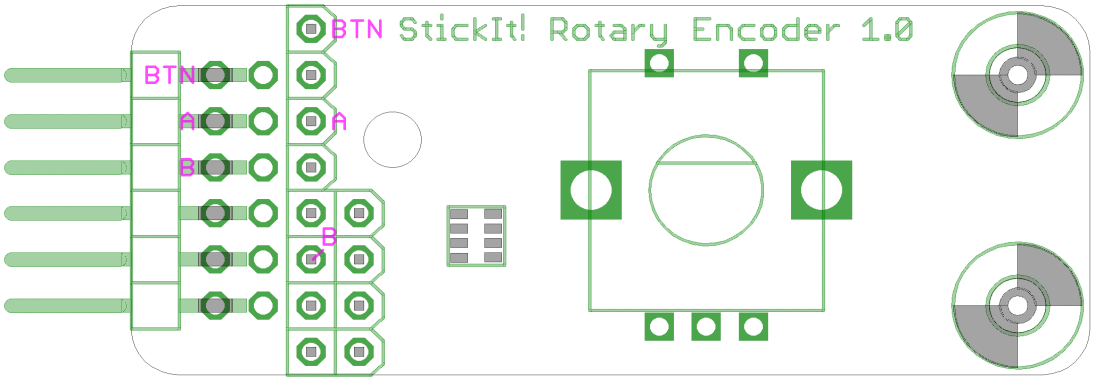
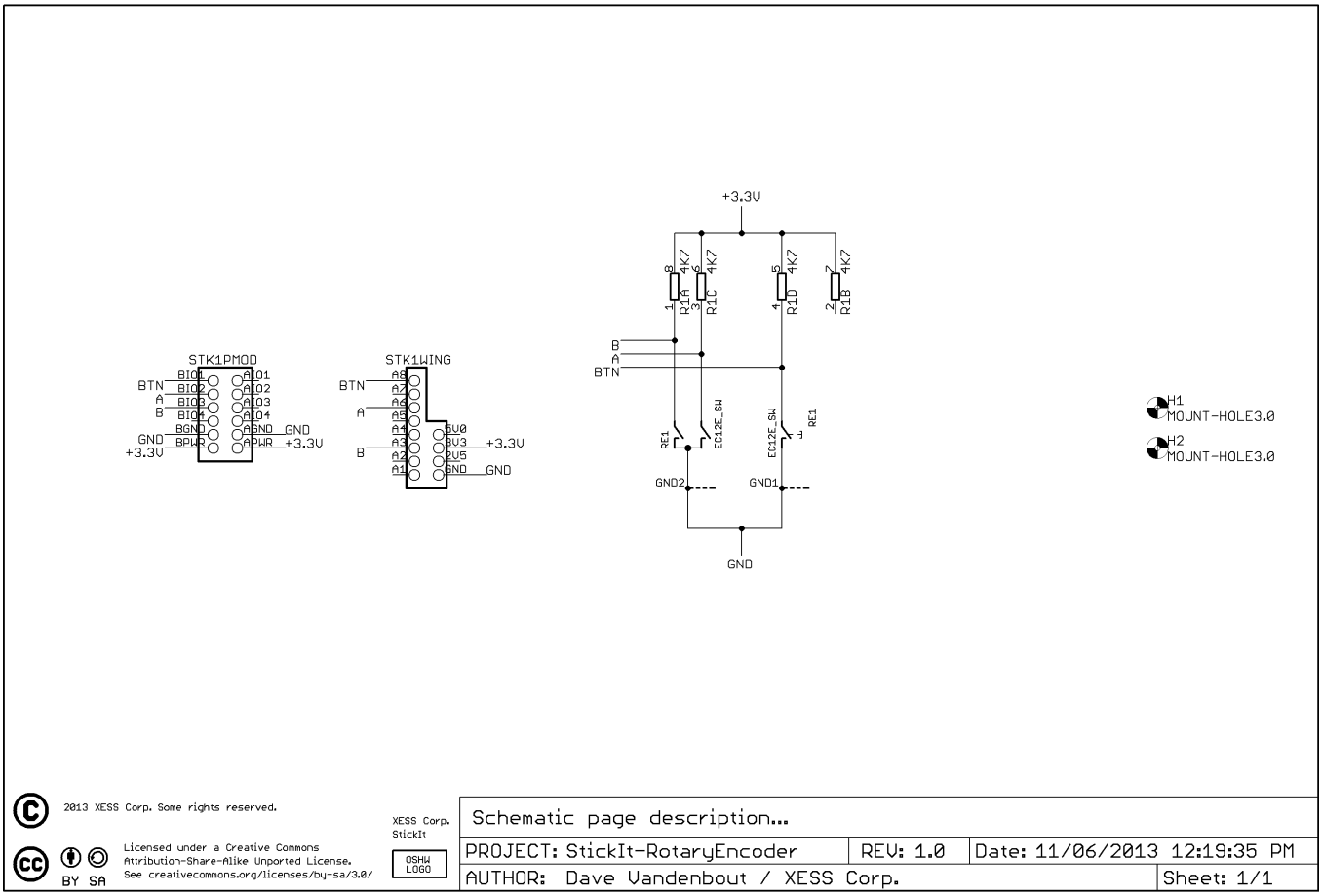
- Create a Xilinx ISE FPGA project and allocate three input ports to accept the A and B phase and the pushbutton outputs from the module.
- Attach the module to either a PMOD or Wing socket on the StickIt! board.
- Determine the channel signals on the PMOD or Wing socket that connect to each I/O pin of the module.
- Find which FPGA pin of the XuLA board connects to each channel signal. (You can find this information in the StickIt! Board manual.)
- Make a UCF file associating each FPGA pin with an I/O pin of the module.
- Include the UCF file in your ISE project.

That's a lot of work just to read the rotary encoder, so we've done most of it for you. Just go to http://github.com/xesscorp/StickIt. There, you will find a subdirectory with a Xilinx ISE project that includes:

- an FPGA design that senses the rotation of the encoder and displays an accumulator value on an LED Digits StickIt! module,
- a Python program that queries the module and displays the accumulator value,
- a UCF file containing the FPGA pin assignments to use when installing the StickIt! Rotary Encoder module into any of the PMOD or Wing sockets.

A.1 I/O Locations

The connections of the PMOD and Wing header I/O signals to the A and B phase switches and the BTN pushbutton outputs of the StickIt! Rotary Encoder module are shown below.



A.2 Schematic