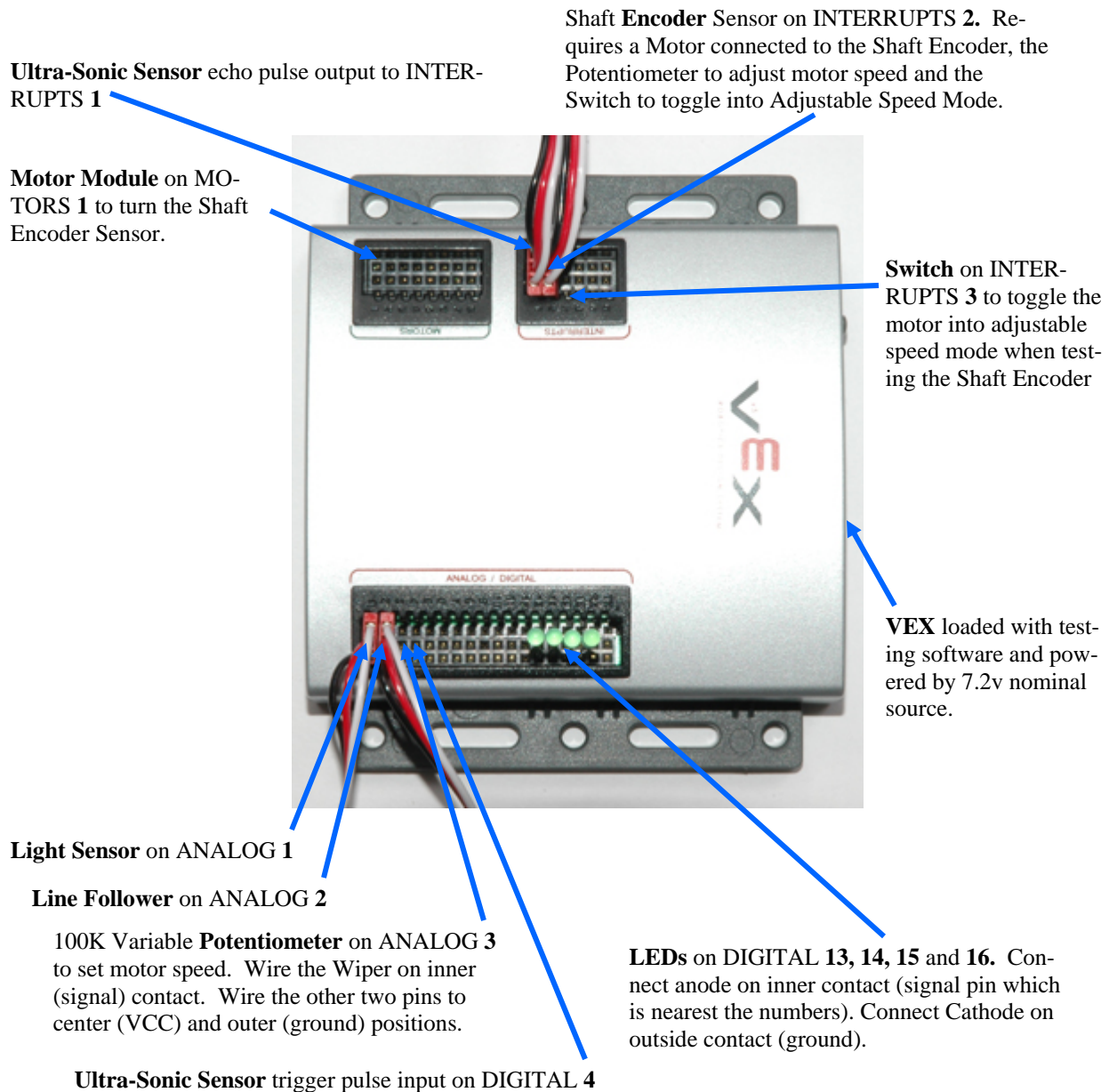


Test Procedure for the Light Sensor, Line Follower Sensor, Ultra-Sonic Sensor and Optical Shaft Encoder

This test procedure provides a quick go/no-go test for the above VEX sensors. Stations can be set up to test a single type of sensor. The other sensors do not have to be attached unless described below.

Step 1: Download the VexSensorTextCode.hex file to the Vex Controller then power the unit off.

Step 2: Place parts described below as needed. Ultra-Sonic Sensor: 279-2155. Line Follower: 276-2152. Light Sensor: 276-2158. Optical Shaft Encoder: 276-2156. Motor: 276-2163. Switch: 276-2174. Potentiometer: 100 k-ohm Precision Electronic Components RV4NAYSJ104A or equivalent. LEDs: Fairchild HLMP-1790 3mm green or equivalent.



Step 3: Turn on the power to the Vex controller. Hook up a shaft from the Motor Module to the Optical Shaft Encoder Module. Push / release the Switch to toggle the VEX Motor Module between fixed speed mode and adjustable speed modes to the adjustable speed mode. Adjust the Potentiometer to obtain max motor speed. Optionally, you may turn a shaft connected to the Optical Shaft Encoder by hand.

Step 4: To test multiples of the same sensor type, after the sensor is tested as shown below, it may be removed and replaced with the next sensor to be tested.

Step 5: Pass / fail criteria. The pass criteria are listed below. Otherwise the sensor has failed.

LED 1 (DIGITAL 13) will turn on when the Light Sensor detects bright light. It will turn off when the sensor is covered (dim/dark detect).

LED 2 (DIGITAL 14) will turn on when the Line Follower sees a white color (high reflected or ambient infrared light detected). It will turn off when the sensor sees a dark color (low or no infrared light detected).

LED 3 (DIGITAL 15) will turn on when the Ultra-Sonic sensor sees an object within approximately 1 foot plus or minus 1 inch from it. It will turn off when the object is moved further in or further out of range. If the object is suddenly removed, the LED may stay on.

LED 4 (DIGITAL 16) will be on bright when the Optical Shaft Encoder is rotating at approximately more than 1 revolution per second. It will be dim or turn off when the Encoder is stopped or not rotating fast enough.

Diagnostics and Troubleshooting:

The output of the VEX may be monitored by connecting a PC to a serial cable, then to the Programmer Module, then to a 6-wire 6 contact modular cable and then to the VEX RJ14 input. Open PC terminal software such as HyperTerminal. Set the PC serial port to 115,200 baud, 8 data bits, no parity, 1 stop bit, no flow control and with ASCII Sep Receiving set to append line feeds to incoming line ends. Power cycle the VEX.

When light falling on the Light Sensor goes from dark to light and light to dark, it will output the state change to the PC. The Line Follower will output a similar response for received infrared energy.

When asserting a jumper on INTERRUPTS 5 (connecting the inner signal pin to the outer ground pin), values from the light sensor, line follower and Potentiometer will be sent to the Terminal Window. The response will be: light val, (a 10 bit hexadecimal value from 0 to 3ffH with closer to 0 being brighter), line val, (10 bit hex where close to 0 is higher received infrared energy), and pot val, (8 bit hex, where 0 is close to 0 volts and ffH is close to 5 volts. You may have to push/release the Switch to toggle between a fixed 7fH value mode and the adjustable values mode).

When asserting a jumper on INTERRUPTS 6 (connecting the inner signal pin to the outer ground pin), data from the Ultra-Sonic Sensor will be sent to the Terminal Window. The response will be: H (higher order 8 bit hex range byte), L (lower order 8 bit hex range byte), D (the difference between the filtered value and the low resolution value as an 8 bit hex value). The H, L and D values are filtered by the VEX test software and do not necessarily change smoothly as objects are moved closer and further from the sensor.

The trigger pulse input from the VEX test software to the Ultra-Sonic Sensor is a 13 millisecond high going pulse every 56 milliseconds. The echo pulse output back to the VEX will be a high going pulse of 1.7 milliseconds to 2.0 milliseconds when sensing an object of approximately 11 to 13 inches away.

The VEX test software needs at least approximately 90 output pulses per second from the Optical Shaft Encoder to illuminate the pass LED.