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Propeller Education Kit - 40-Pin DIP (#32305)

PE Platform Circuit Enhancements

The following material has been added to the Propeller Education Kit Labs: Fundamentals text v1.2, Setup and Testing chapter, just before the Troubleshooting section. It includes optional additions to the 40-pin DIP version of the PE Platform circuit. While the basic circuit is adequate for the experiments in the book, the optional additions make it more robust and are recommended for more demanding applications. CAUTION: THIS DOES NOT APPLY TO THE PROPSTICK USB VERSION.

Propeller Supply Voltage Regulation – It’s Important!

A stable voltage supply is important because many different application circuits and subsystems depend on it. Any voltage supply fluctuations will translate directly into fluctuations in 3.3 V high signals sent by Propeller I/O pins. They also translate into fluctuations in Propeller I/O pin threshold voltage, which in the Propeller is approximately $\frac{1}{2}$ of the 3.3 V supply voltage. When voltage is applied to a Propeller I/O pin set to input, the Propeller interprets it as binary-1 if that voltage is above the threshold or binary-0 if it’s below. Propeller I/O pin high and low signal levels and input threshold voltage are also used in a variety of analog to digital (voltage measurement) and digital to analog (voltage synthesis) applications. So any supply voltage fluctuations that affect output-high and input threshold voltage levels also reduce the accuracy of both voltage measurement and synthesis.

Products and prototyping printed circuit boards designed with Propeller chips typically have several features that improve supply voltage stability. The voltage regulator output is usually very close to the Propeller chip’s supply inputs—the 3.3V and GND pins. Depending on the diagram, you might also see them labeled Vdd and Vss. The metal traces on the board that connect the voltage regulator to the Propeller’s supply inputs are also typically wider than other traces that transmit signals. Since even metal conductors have a small amount of resistance, these measures minimize the resistance between the voltage regulator’s output and the Propeller chip’s supply inputs. This in turn improves supply voltage stability by minimizing voltage fluctuations that can occur if Propeller current consumption fluctuates, which can in turn occur when processors boot and I/O pins that drive loads switch on and off. Capacitors can also be connected across the Propeller chip’s supply inputs to provide additional protection from voltage fluctuations and further improve supply voltage stability.

Improve PE Kit Supply Voltage Stability

In comparison to products and prototyping boards, the distance between the voltage regulator output and the Propeller supply inputs is quite large and can reduce voltage stability at the Propeller chip’s supply inputs. That’s bad. The remedy is simple, and only requires two capacitors and two wires. That’s good. The wires connect the supply inputs on opposite sides of the chip to each other to ensure that the supply voltage levels are identical at both input terminals. The capacitors are placed across the 3.3 V and GND supply input terminals on both sides of the propeller chip to filter out any voltage fluctuations caused by the long supply lines.

Parts List:

- (1) Built and tested PE Kit Platform - 40-Pin DIP version
- (2) Jumper Wires
- (2) Capacitors – 0.1 μ F

Procedure:

Figure 3-6 shows the jumper wire and capacitor connections. The Propeller chip's 3.3 V supply pins are connected to each other with one jumper wire, and the GND pins are connected with a second jumper wire. 0.1 μ F capacitors are then connected across the 3.3 V and GND pins on both sides.

- ✓ Disconnect power and programming port
- ✓ Trim the two jumper wires to reduce any excess wire length when connected as shown in Figure 3-6 .
- ✓ Use a red jumper wire to connect (J, 22) to (D, 19).
- ✓ Use a black jumper wire to connect (J, 20) to (D, 22).
- ✓ Plug the leads of one 0.1 μ F capacitors into (K, 22) and (J, 19).
- ✓ Plug the leads of the other 0.1 μ F capacitor into (B, 19) and (B, 22).
- ✓ Double-check your wiring.
- ✓ Reconnect power and programming port.

Figure 3-6: Supply Input Strap and Filter Capacitor Connections for 40-Pin DIP PE Kit Platform

