

Multi-Prop configurations with PropForth v5.0

The goal is to explore and identify basic functionality to allow multiple Propellers and PropForth to build configurations that exceed 8 COGs and 32 pins per programming environment in as transparent an infrastructure as possible.

Prop to Prop communication methods:

- 1) Standard serial I/O – each prop has one or more COGs running the PropForth standard Serial I/O routines
- 2) MCS serial I/O – each Prop has one (or more?) COGs running the PropForth Multi-Channel Serial I/O routines
- 3) Communicating Sequential Processes (CSP) – the Prop cluster is configured with the CSP implementation and talking through the master to a host PC. At this level, the transport mechanism can probably be serial, MCS or even TCP/IP.

Master Prop – the Propeller (Prop#0 in some configurations) which communicates to a host PC and provides loading, configuration, control and work distribution to the Slave or Peer propellers. Even in a Peer to Peer configuration, there will probably be a Master (or Lead) Propeller.

Slave Prop – a minimal Propeller configuration which relies on a Master prop for power, clocking, initial loading and configuration and work assignments. The slave may have peripherals or devices it controls but it does not have EEPROM and does not have any means of loading code except through the Master Prop. Slave props will be used mostly to add COGs and pins to a multi-Propeller cluster.

Peer Prop – a standard configuration Propeller platform that has its own clocking, EEPROM and possibly host communications and power. A peer can participate in a multi-Propeller cluster as either a slave or a peer providing a service to the master or lead Propeller and the cluster.

Configurations to be explored:

- 1) Master Prop (Quickstart board) with multiple slave Propellers connected to it. There are three possible arrangements for this configuration: horizontal, vertical and mixed. The details of each will be described below. Due to their dependence on the Master, the slaves will be co-located with the Master. This configuration will support experiments with all communication methods.
- 2) Peer-to-Peer configurations will be explored with a Gadget Gangster PUSB hosting a Tetra-Prop card from jazzed. Each Propeller is independently loadable from a host PC and has its own EEPROM for program and configuration retention. This peer-to-peer configuration will be based on co-located, physically connected propellers, basically, a card stack of some sort. This configuration will support experiments with all communication methods.
- 3) Distributed Propeller configurations. This configuration has yet to be built. It will allow experiments with remotely distributed Peer Propellers connected in various manner; wired serial, wireless serial, MCS, and TCP/IP

Master Propeller – Basic Horizontal Configuration (1 Master, 1 to 4 slaves)

- 1) Master QuickStart with slave Propeller on QuickStart Proto Board
 - a. QuickStart provides clock to all Propellers in cluster
 - b. QuickStart provides EEPROM to all Propellers in cluster
 - c. QuickStart controls reset, loading and serial I/O to all Propellers in cluster
 - d. 6 pin interface for each slave propeller: RESET, XI, TX, RX, EEPROM SCL, EEPROM SDA
 - e. 57600bps serial I/O between Propeller – 1 COG on each slave dedicated to I/O, 1 COG per Slave required on Master Propeller
 - f. One Master can support up to 4 Slaves in this configuration (6 pins per slave)
 - g. Master pins 28-31 are used for standard EEPROM and serial I/O access
 - h. Master pins 24-17 are reserved for SD card connection for cluster
 - i. Master COG usage:
 - i. COG7 – serial I/O to host PC
 - ii. COG6 – Master Forth Interpreter
 - iii. COG5 – serial I/O to Slave 1
 - iv. COG4 – serial I/O to Slave 2
 - v. COG3 – serial I/O to Slave 3
 - vi. COG2 – serial I/O to Slave 4
 - vii. COG1 – available
 - viii. COG0 – available
 - j. Each slave has 28 free pins and 7 free COGs
- 2) Slave Propeller on Quickstart Proto Board
 - a. P8X32A DIP in 40 pin socket
 - b. Slave PIN 31 connected to Master PIN 1 through 220 Ohm resistor
 - c. Slave PIN 30 connected to Master PIN 0 through 220 Ohm resistor
 - d. Slave PIN 29 connected to Master PIN 3 through 220 Ohm resistor (PIN 29 also needs a 10k Ohm pull up resistor)
 - e. Slave PIN 28 connected to Master PIN 2 through 220 Ohm resistor
 - f. Slave RESET to Master PIN 4 – no resistor (my first prototype has RESET and XI flipped)
 - g. Slave XI to Master PIN 5 – no resistor

4-29-12 - With the configuration above, I was able to load PropForthEEPROMKernel onto the QuickStart, and follow the PropForth tutorial 7.2 – NoROM, with the appropriate PIN changes to set up a 2 Propeller Master/Slave configuration.