

COGNITION

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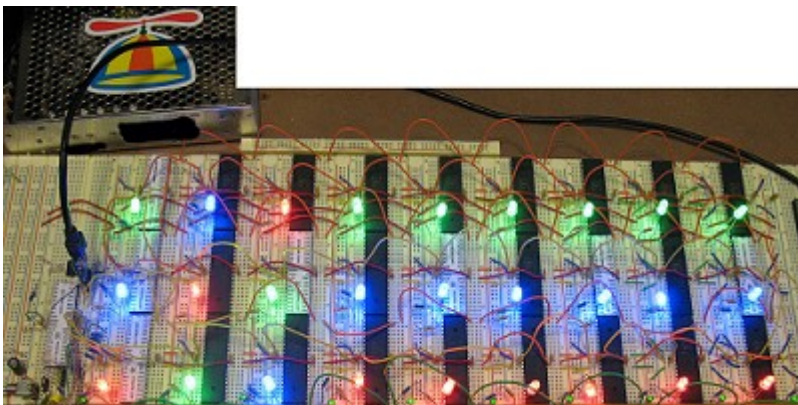
Newsletter of **PROP COG** Propeller Super Computing Open-source Group

All about multi-propeller projects and machines...

| propcog@gmail.com | [PropCOG Users Group](#) | [Parallax Forums](#) |

Issue #1 by Humanoido

Editorial Welcome to the first edition of *Cognition*, the newsletter of *PropCOG, Propeller Super Computing Open-source Group*. PropCOG has initiatives to design and build large working open-source super computing machines using multiple Parallax Propeller chips. *Cognition newsletter* will assemble news, sources and collections of information about multiple Propeller projects and related ideas to save search time and inspire new ideas. Project and information contributors, and comments, are welcome.



EEPROM. That method had a maximum of 12 propellers per EEPROM and was considered sequentially slow. The new parallel method eliminates the EEPROMs keeping the cogs in sync and increases overall load speed. Schematic and code included at the link.

Clock Loop's 28-Prop Machine

[The Big Boy Locomotion Machine](#) is currently roped into 28 props on breadboards. This machine is masterminded by Clock Loop to load up props in parallel, eliminate use of EEPROMs on slave chips, run slaves with no crystals, and keep timing to propagate programming. The circuit goes beyond a four year design established by Godzich, Christian, Ken and Pems in the 2008 thread *Multiple Propellers & one*



Newest 55-Prop Machine

This is a 432 core super computing [Perturbation Machine](#) made by Clock Loop, with 1,620 I/O designed to study the nature of randomness in a digital processor network using the same clock source. 54 prop chips were all connected to a master prop which holds the eeprom and accepts a prop plug



input for memory/program download. The master prop controls the reset and clock lines for all 54 props, and also sends all combinations of a word out - broadcast to all 54 props that are connected bus network style. When a slave prop sees its number broadcast on the bus line, it replies with the same number. Then the slave prop runs code depending on the number broadcast. Repeats are possible in any system that has reduced choices and increased speeds. If repeats are a worry, then a long sized variable should be used in the random ID generation. Enumeration of the Randomly generated ID's. Every step up in variable size reduces the speed that the whole system can communicate at due to more data being sent over the same speed pipe. The communication speeds of the bus network can be increased with lower value resistors, but the power draw will increase, if the props are connected to the bus with lower values, one needs to adjust all other bus resistors in relation. How to build it? You take 55 props, some programming, a bag of five hundred 470 ohm resistors, a two amp 3.3-V regulator, a huge breadboard, wire, and 57 LEDs.



Obrien Bakes Big

If you didn't review the [Multiple Props Projects list](#) for some time, you may want

to do so. Obrien has posted a [photo](#) at the [kilcore web](#)

[site](#) showing (in the works) a project with lots of props on perhaps the largest currently known and most insane breadboard in the world - apparently he's baked up actual meters of breadth mixed with chips. Not fully cooked yet, the photo is cut off at a count of four rows of 17 for a total of 68 props - so we don't know if there's more. Sixty-eight chips sounds like a good start. We await to hear details of this "soon to be released" extremely large prop machine.



Modified Serial Communication for 8.42 Meg Baud Propeller to Propeller Communication Software [download here](#)



Parallax PropScope Clock Loops says his 55-Props machine now includes a [Parallax PropScope](#) to do signal and waveform measurements and testing (see 2nd photo on p1). The PropScope is a two-channel oscilloscope that is capable of reading 25 million samples per second with ten bits of resolution over one, two, ten, or twenty volt peak-to-peak waveforms. Power is provided through the USB port requiring only a single cable to connect the PropScope to any laptop or desktop PC. More information at the link.

Beau's High Speed Serial

It depends on your idea of supercomputer – hardware combined with [Beau's High Speed Serial](#)

[communications](#) software can vastly increase the

speed of communicating Propeller chips. Beau said,

"14.5 Meg Baud Upgrade using 4 I/O Pins.... This is still work in progress. Using only 1 COG for the Transmitter, and 1 COG for the Receiver, 14.5 Mega Baud Communication Packets can be achieved. With slight modification to the "Transmitter" (using 1 COG) and "Receiver" (using 2 COGs ; 180 deg out of phase) 29 Mega Baud communication packets should be achieved through the current implementation of 4 - I/O pins. The current demo sends pseudo random Packets with a length of 32768 bits in approximately 2.25mS



(<-14.5Mega Baud) at a repetition rate of 174 Hz effectively providing a constant throughput of 5.7 Mega Baud. Keep in mind that the 174 Hz is deterministic of the overhead required for the display and Packet confirmation. Also, the demo provides a "real time" visual representation of the Transmitter's I/O state displayed on the Receiver screen. Enjoy!!"

Multiple Prop Projects

Multiple Props Projects List
Add your multiple Propeller Project here.

- Two Props Projects**
- Dr_Acula 2 props - DracBlade SBCwvw
forums.parallax.com/forums/default.asp
- Bill Henning Morpheus - 2 propsforums
m=445460
- mikronauts.com/products/morpheus/
- Jazzed Propalyzer - 2 props piggyback
forums.parallax.com/forums/default.asp
- Obrien 2 props on a solderless breadbo
/index.html
- Ale 2 props, communicate via 4 bit paral
- kuroneko 2 props, RAMBlade 104MHz c

The List of Multiple Propeller Projects currently has accumulated 57 Parallax Propeller machine projects and 15 machine *constructioners*. Some projects under construction are also listed. There are also a reported five multiple prop designs and various works in progress. If you're interested in multiple prop projects or want to have your project on the list, check it out [here](#) and make a post describing your work and interests.



PROPCOG.zip

PropCOG.zip information package now includes newsletters, letterhead, notification of email, user's group location, logo, and any other current news items for distribution.

PropFORTH: The Jupiter Ace was an early computer with programming in FORTH language. The new version of [PropFORTH](#), programmed by Sal and supported by Braino, is *for kids and experimenters* and is moving towards the number one spot for a fun programming language with multiple Propeller processors. It includes interesting historical Jupiter Ace features as described in the link.



Opening Multi-COGS Open up two cog channels dedicated to serial transmission at full duplex and the prop can simultaneously send and receive data to maximize speed. You'll need to decide, fewer cogs and more speed or more cogs and less speed.

The 80-Cog Project Propalot [Propalot Stuff Newsletter](#) is now merged with *Cognition Newsletter*, to continue to pave the way for multiple Propeller-based machines. The breadboard with ten props was successfully used for load testing, crystal and eeprom circuit experiments, software experimenting, component evaluations, and it illustrated new circuits with more Propeller chips paving the way for

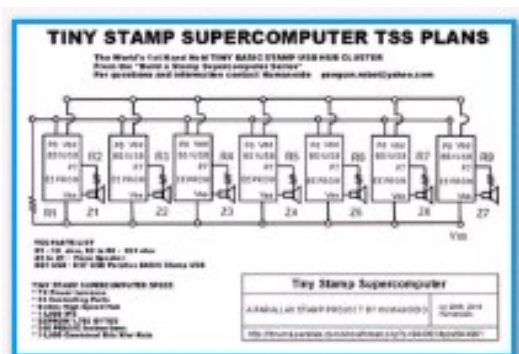


The beginning project - connect ten props. Decide on the connection interface, communications format and finish the wiring design.

Induction or Infrared Design?

The communications design (each prop can talk to any other prop) is currently under consideration for infrared transmitter receiver pairs on each chip. However, there is potential for a accomplishing the same with a magnetic induction circuit or another wireless circuit. A table containing the merits of induction and alternatives is at <http://forums.parallax.com/forums/>

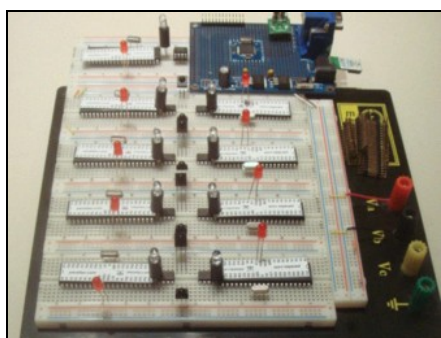
larger machines, including the UltraSpark 40. The majority of the machines now under construction harbor far more propeller chips, i.e. 20, 40 and above.



TSS in Robot Magazine The TSS Tiny Stamp Supercomputer is a seven core project that simulates a Propeller chip in a

limited fashion – it can function in Parallel. Based on [Parallax USB Stamps](#), the TSS includes a transmitter-receiver pair combination, LCD, actively powered Belkin Hub, many speakers, and a 64K RAM added memory board. For more information, see *LERN*, **Robot Magazine**, p. 16, Jan./Feb. 2011.

Breadboards or Greenboards a long debated issue, in the case of maximum over-clocking, are there limitations on what you can do with breadboards and higher clock frequencies? Take into consideration the wideband connecting conductive plate structure of the breadboards. Examine these differences and choose a suitable board. Green boards can have ideal configurations just waiting for component placement, and may not have the problems of breadboards with overclocking.



Breadboard Configurations You can put together a large group of breadboards by purchasing the standard group of four, and adding one more, to hold a total of ten Propeller chips as seen in the photo. The extra breadboard is overhanging at the top – this can even hold a Parallax Proto Board containing the TV, mouse, VGA, and keyboard connectors. Putting together these board configurations can result in a much larger breadboard space.

New Super Groups There's no shortage on multi propeller computing groups. The [Propeller Super Computing group](#) is now available thanks to the new *Parallax Forum* capabilities for starting groups. Also at startup phase is the PropCOG group. For more information about the new PropCOG, refer to this newsletter's editorial and the Parallax Forums.

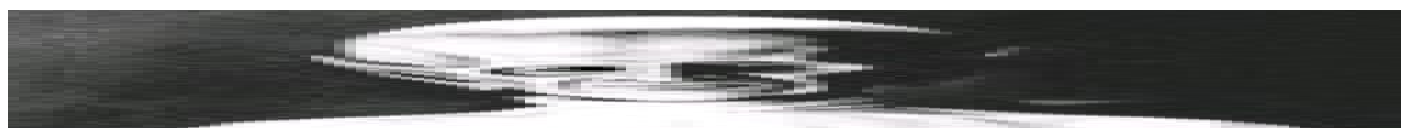
Social Group

Propeller Super Computing

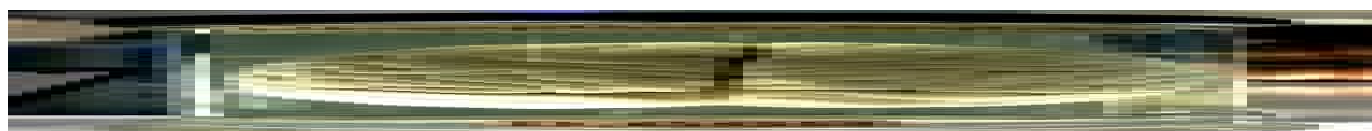
Group Maintained by [Humanoido](#)

Ways to make a more powerful Propeller computing machine by combining multiple chips, software, various enhancements and algorithms.





Braino's Bantering Brain I have two physical architectures in mind, method using full-duplex synchronous serial channels. Each half duplex channel uses one cog on each prop, one end continuously transmits and other end continuously receives. the more changes you add, the fewer are available for application work. A full duplex channel requires a cog to send and a cog to receive on each prop. Each cog to cog connection consumes one dedicated i/o port each. A) Daisy chain: Prop <=> prop <=> ... <=> prop (original prop). B) binary Tree: Each parent node has two child nodes. BOTH methods require FOUR cogs on each prop JUST FOR COMMUNICATIONS. C) Modified Tree: SO, "leaf" node that only have a single pair of cogs used for communication can have six cogs available... continued [here](#)

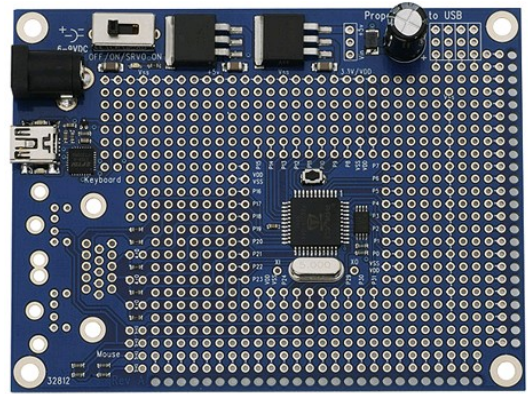


Propeller P8X32A Questions and Answers

- Welcome
- What's New
- About the Propeller P8X32A
- Propeller Applications
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- Cogs
- Memory
- Locks
- Spin Language
- Propeller Assembly Language
- Objects
- Methods
- Variables
- Counters
- Video Generation
- Code Execution Time
- Stack Space
- Why the Propeller Works

Tower Design Change OK'd

Breaking a near decade long tradition of interfacing multiple chips using a single wire Daisy Chain Bus designed at Half Duplex (due to incorporating single duplex BASIC Stamps), Humanoido has redesigned to go full duplex with Propeller chips and is experimenting to take advantage of Beau's high speed serial communications. The new machine tests are conducted with a stack of [Parallax Proto Boards](#) and additionally introduce

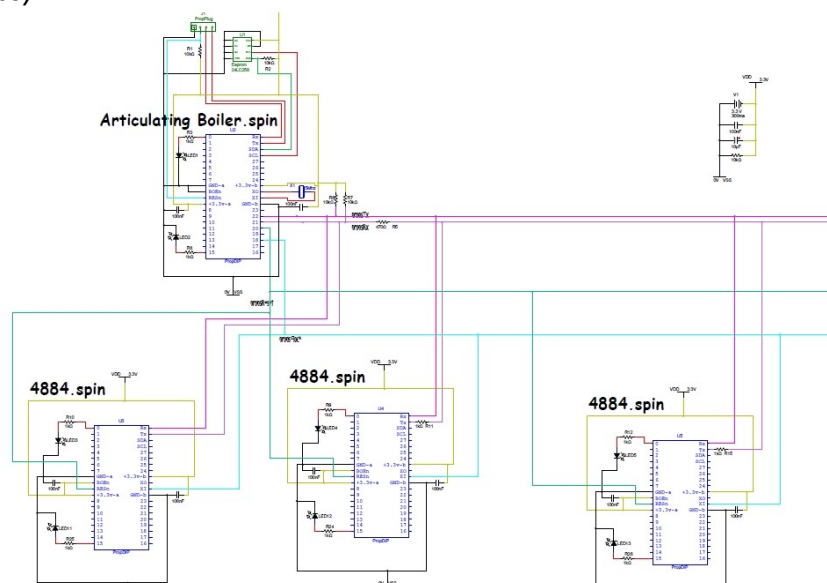


experiments with new green boards manufactured in China. (The *Proto Board* has a 64K EEPROM that allows both program and data storage, and voltage regulation.) Note for obvious reasons, single duplex operation will continue in devices that merge the Stamp with the Propeller.



Two or More Propeller Chips with One EEPROM There are now two methods to driving multiple prop chips with only one EEPROM. Clock Loop has perfected a parallel method for faster response - for the open source project see [here](#). Another method is sequential instead of parallel, designed by Godzich, Christian, Ken and Pems in 2008 reviewed [here](#).

Clock Loop quotes, *You can have the first prop boot from the eeprom, which then programs the second prop. You can also have the first prop do all the logic work for the second prop. Follow my link and if you look at schematic, CUT off all 4884 props except the first one, that is then the master prop controlling slave prop circuit that uses a single eeprom. [This thread](#) moves far into parallelism and so do attached circuits, program , but it also uses the concept of booting multiple props from a single eeprom & xtal. (BELOW, Clock Loops Schematic for one EEPROM and multiple Propeller chips)*



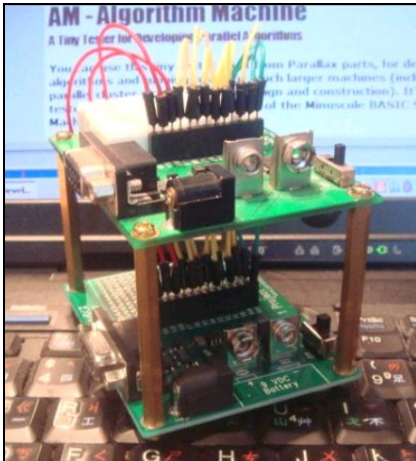
From the Parallax Forum. The Big Boy project is capable of loading two or more propeller chips with one eeprom. Schematic by Clock Loop. For the newest schematic update, consult the Parallax Propeller Forum.

Important Parallax OBEX Downloads [Focus on Serial Communications]

[Serial Objects for SPIN Programming](#)

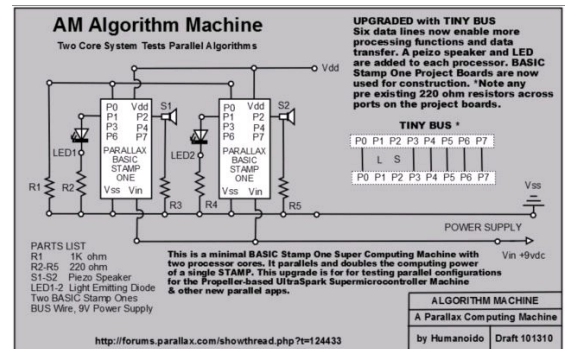


Parallax introduces New Forum features The big new feature is personal blogging, however, other redesigns make the new Forum increasingly useful. Take a look at <http://forums.parallax.com/>.



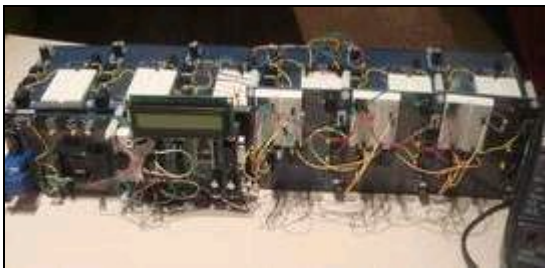
Parallel Algorithm

Machine Humanoido's cute little AM machine fits in your hand and allows creating and testing parallel algorithm ideas which can then port over to Propeller platforms. It includes two BASIC Stamp boards with a parallel interface and programs in PBASIC. It can operate



on two 9-volt batteries for complete portability, holds programming in EEPROMs, and offers a dual processor parallel environment. Features

include: five BUS modes, serial & parallel options, includes WIDE BUS, handles up to 200 step code, programs in PBASIC, has a very small footprint, builds with Parallax BASIC Stamp 1 Project Boards #27110, speakers & LEDs for output, twin 9-volt battery operated. Follow the open source project [link](#).



Development of Humanoido's Parallax-Propeller-Based Multi-Processor Computational Machine in Desktop Form Factor

This 161 processor machine was made by Humanoido and can be seen at the Parallax forum thread in various stages of operation. The machine is designed with robotic brains in

mind. Code named [the Brain Blob](#), it continues to grow with true parallel processors for multi-processor programming. It uses *Blobber software* being developed in Spin language. Parallax Propeller Proto Boards are modified to reduce power consumption and to convert the power LED into a data light. The live brain when completed will have a powerful Propeller enhancement complete with operating system and tools. Connections are hybrid experimental, including options of various BUS' for single wire single duplex, two wire Rx and Tx full duplex and optionally a parallel network for transfer in 8-bit Bytes. The project is posted online and is open source during development at the Parallax Robotics Forum in a highly detailed step by step procedural process – interested enthusiasts may follow along, be inspired, and build their own versions or participate. The thread has evolved from filling the brain with ideas to hardware construction and programming. Follow the link for more photos, testing software downloads and details of how to modify the Parallax Propeller Proto Board.

Cognition Newsletter is designed to collect together and distribute information sources about assembling larger multiple propeller-based machines. These machines may encompass just a couple prop chips for testing or include massive machines with dozens of processors. The newsletter contains photos, news and embedded links for access to more complete stories, schematics, sources and software for download. Cognition is an open source newsletter and anyone may comment or contribute. Cognition newsletter will assemble news sources and collections of information about multiple Propeller projects and related ideas. It will save you lots of search time by bringing things together. PropCOG is the Propeller Super Computing OpenSource Group. PropCOG has initiatives to design and build large working opensource desktop super computing machines using Parallax Propeller chips, leading to open source working desktop super computing machines.

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COGNITION 1

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