

Parallax Forums > Public Forums > Propeller Chip
> **Assembly, step by step**

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Propeller Chip

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Graham Stabler
Registered Member



Date Joined Jul 2006
Total Posts : 1987

Posted 4/25/2007 3:25 PM (GMT -8)



Putting some money where my mouth is here is step one of a series of simple assembly programs to illustrate some basic assembly ideas and to ease you into assembly. My feeling is that the assembly for beginners requires a little more background in assembly than many have.

Step 1: Flash an LED

You will learn:

1. How to start an assembly cog
2. A simple way to load a variable into that cog on start up with no funny business (very handy)
3. How to set a pin as an output
4. One way to make a pin high
5. How to use waitcnt in assembly

DO read the comments

DO confer with the manual

DO ask questions if you really don't get anything

I'd appreciate glaring errors and suggestions for alternative methods to be emailed/messaged to me to avoid confusion in the thread and to keep in short and sweet.

Cheers,

Graham

File Attachment :

ledflash.spin 3KB (application/octet-stream)

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ledflash_demo.spin 0KB (application/octet-stream)
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Graham Stabler
Registered Member



Date Joined Jul 2006
Total Posts : 1987

Posted 4/25/2007 3:25 PM (GMT -8)



Step 2: Setting pins

You will learn:

1. How to create masks for single and multiple pins from variables.
2. How to set up the dira register using these masks
3. How to set outputs high with OR and a mask
4. How to set outputs low with ANDN and a mask
5. How to toggle outputs with XOR and a mask
6. How to use muxc and muxnc to set and clear bits and a mask

The demo flashes 4 leds, two alternatively and a pair together, I used the vga leds on the demoboard.

Graham

Post Edited (Graham Stabler) : 4/26/2007 12:31:33 AM GMT

File Attachment :

masksgalore.spin 5KB (application/octet-stream)
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masksgalore_demo.spin 0KB (application/octet-stream)
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Graham Stabler
Registered Member



Posted 4/25/2007 3:25 PM (GMT -8)



Step 3: Hub to cog data transfer

You will learn:

1. How to pass an address for hub variables to assembly code on start up.
2. How to load these variables from hub to cog within assembly using rdlong.
3. That the addresses are byte wise in assembly
4. How to write functions that can be used in spin to modify the global hub variables.



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Total Posts : 1987

5. How these might be used in a simple spin function

Again we are still just flashing leds but this time we can alter the duty (brightness) and frequency. As a excersise you may consider writing spin functions for the object to control these two parameters more easily.

Graham

Post Edited (Graham Stabler) : 4/26/2007 8:23:26 PM GMT

File Attachment :

datatransfer.spin 5KB (application/octet-stream)

This file has been downloaded 602 time(s).

File Attachment :

datatransfer_demo.spin 1KB (application/octet-stream)

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Graham Stabler
Registered Member



Date Joined Jul 2006
Total Posts : 1987

Posted 4/25/2007 3:25 PM (GMT -8)



Step 4: Cog to hub data transfer

You will learn:

1. Review how to pass an address for hub variables to assembly code on start up.
2. How to load data into hub ram with wrlong

Yet more flashing LEDs in a knight-rider style this time.

But really just remember that the variable that is loaded into hub ram could have been generated by an ADC routine or could have come from an accelerometer or other sensor or any process going on in that cog. It is also a good way to debug programs as you can echo variables in assembly to the terminal or TV in the spin program.

Graham

Post Edited (Graham Stabler) : 5/16/2007 9:22:19 AM GMT

File Attachment :

cog2hub.spin 3KB (application/octet-stream)

This file has been downloaded 516 time(s).

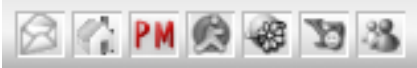
File Attachment :

cogtohub_demo.spin 1KB (application/octet-stream)

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JohnBF
Registered Member



Date Joined Dec 2006
Total Posts : 101

Posted 4/25/2007 5:14 PM (GMT -8)



This is great. Thanks! I wanted to take a small step and make a pin toggle a finite number of times. But with this code the pin doesn't stop. What am I doing wrong?

/John

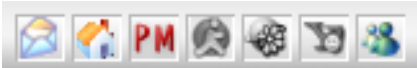
File Attachment :

ToggleFinite.spin 1KB (application/octet-stream)

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potatohead
Do NOT taunt Happy Fun Ball!



Date Joined Sep 2006
Total Posts : 1556

Posted 4/25/2007 8:00 PM (GMT -8)



I don't see you decrementing cycles, for one, thus it stays at 10.

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Graham Stabler
Registered Member



Posted 4/25/2007 11:34 PM (GMT -8)



Potatohead, the djnz command decrements cycles and jumps if not zero.

John, your code looks fine except that you add 9 to time for no good reason, it isn't enough cycles for the first waitcnt so I suspect it messes things up.

try:



Date Joined Jul 2006
Total Posts : 1987

```
Toggle          mov     dira, Pin
                 mov     Time, cnt
                 add     Time, Delay
:loop           waitcnt Time, Delay
                 xor     outa, Pin
                 djnz    Cycles, #:loop
```

So to reiterate the waitcnt command,

waitcnt target, delta

It waits until cnt = target and then adds delta to target. So the process is:

1. load target variable with cnt
2. add delta to target variable
3. waitcnt target, delta

The delta field of waitcnt just means you can avoid step 2 after the first delay.

Another point is that you may want to close the cog after your pulses:

```
          CogId      CogNum      ' Get COG ID
          CogStop    CogNum      ' Stop this COG

CogNum    long        0
```

Graham

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crgwbr
Registered Geek



Date Joined May 2006
Total Posts : 617

Posted 4/26/2007 3:44 AM (GMT -8)



This should definitely be a sticky.

I would love to change the world, but they won't give me the source code

People say that if you play Microsoft CD's backwards, you hear satanic things, but that's nothing, because if you play them forwards, they install Windows.

I spent a minute looking at my own code by accident. I was thinking "What the heck is this guy doing?"

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potatohead
Do NOT taunt Happy Fun Ball!



Date Joined Sep 2006
Total Posts : 1556

Posted 4/26/2007 6:35 AM (GMT -8)



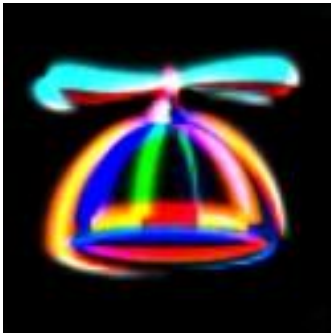
It does!

That's other CPU's still getting in the way! I'm now very interested in the waitcnt behavior...

If it misses the mark, shouldn't it hang?

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CJ
Registered nutcase



Date Joined May 2005
Total Posts : 466

Posted 4/26/2007 6:44 AM (GMT -8)



it will wait until CNT comes back around (~53 secs @ 80Mhz)

Parallax Forums - If you're ready to learn, we're ready to help.

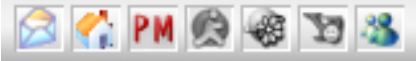
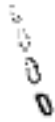
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potatohead
Do NOT taunt Happy Fun Ball!

Posted 4/26/2007 7:27 AM (GMT -8)



Thanks.



Date Joined Sep 2006
Total Posts : 1556

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Graham Stabler
Registered Member



Date Joined Jul 2006
Total Posts : 1987

Posted 4/26/2007 12:22 PM (GMT -8)



Step 3 now posted. Next, how to get data out of the cog!

Graham

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JohnBF
Registered Member



Date Joined Dec 2006
Total Posts : 101

Posted 4/26/2007 3:44 PM (GMT -8)



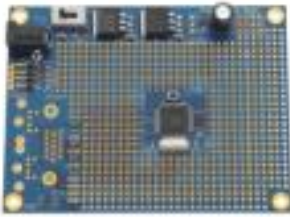
Graham,

Thanks very much for the explanation. Adding the 9 comes from the example code on page 340 of the Propeller Manual. That's the one line I didn't understand.

/John

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MacGeek117
Registered Member



Date Joined Dec 2004
Total Posts : 678

Posted 5/3/2007 6:22 PM (GMT -8)



>>Next, how to get data out of the cog!
Simple. WRLONG Value, # Address
RoboGeek

"I reject your reality and subsitute my own!"

Adam Savage, Mythbusters

www.parallax.com

www.goldmine-elec.com

www.expresspcb.com

www.startrek.com

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Mike Green
Registered Member



Date Joined Oct 2004
Total Posts : 14543

Posted 5/3/2007 7:07 PM (GMT -8)



Remember that you're using the immediate form of the WRLONG instruction which only allows operands from 0-511. If you address is above that, it won't work, you'll have to have the address in some other location and reference that like "WRLONG Value,LongWithAddress".

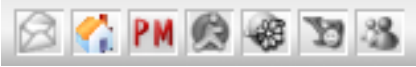
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Graham Stabler
Registered Member

Posted 5/4/2007 12:27 AM (GMT -8)



part 4 comming soon. iust have to get the weekend over with.



Date Joined Jul 2006
Total Posts : 1987

part 1 coming soon, just have to get the weekend over with.

Graham

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Brian_B
Registered Member



Date Joined Dec 2006
Total Posts : 638

Posted 5/15/2007 2:04 AM (GMT -8)



Graham,
Any new sample code yet ? This has been very helpful :-)

Thank's Brian

www.truckwiz.com

"Imagination is more important than knowledge..." *Albert Einstein*

<http://www.diycalculator.com/subroutines.shtml> My favorite website (Bet you can't guess why)

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Graham Stabler
Registered Member



Posted 5/15/2007 3:29 AM (GMT -8)



Sorry Brian, busy at work last week but I'll get the next installment done tonight.

Graham



Date Joined Jul 2006
Total Posts : 1987

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ALIBE
Registered Member



Date Joined Mar 2006
Total Posts : 299

Posted 5/15/2007 3:51 AM (GMT -8)



this thread is fantastic. It should be sticky.

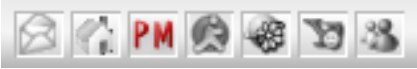
Graham, thanks for this kick-off - very helpful for prop asm beginners like me.

"any small object, accidentally dropped, goes and hides behind a larger object."

ALIBE - Artificial LIfe BEing. In search of building autonomous land robot

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Kaio
Registered Member



Date Joined Jan 2007
Total Posts : 194

Posted 5/15/2007 5:43 AM (GMT -8)



Graham,

I would recommend to add this thread to your thread index at the first position of section "Programming the propeller". So asm beginners could start with it, before they be frustrated looking in other links.

@ALIBE

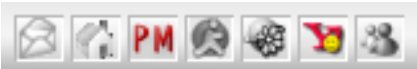
Then you could find this here which is already sticky.

<http://forums.parallax.com/forums/default.aspx?f=25&m=148376>

Thomas

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M. K. Borri
Registered Member



Date Joined Jul 2006
Total Posts : 152

Posted 5/15/2007 5:47 AM (GMT -8)



seconded on the stickiness. i stink at asm and this is helping a lot!

forums.parallax.com/forums/default.aspx?f=25&m=190494

Total Posts : 152

meow, i have my own topic now? (sorta)

[Back to Top](#)**Graham Stabler**
Registered MemberDate Joined Jul 2006
Total Posts : 1987

Posted 5/15/2007 7:19 AM (GMT -8)



I think there are already too many sticky threads (that was why I started the index originally) so I'll just add it to the index as per Thomas' suggestion.

Graham

[Back to Top](#)**Graham Stabler**
Registered MemberDate Joined Jul 2006
Total Posts : 1987

Posted 5/15/2007 3:26 PM (GMT -8)



I've uploaded part 4 and I have added thread to thread index

Post Edited (Graham Stabler) : 5/15/2007 11:38:13 PM GMT

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JohnBF
Registered Member



Date Joined Dec 2006
Total Posts : 101

Posted 5/15/2007 4:49 PM (GMT -8)



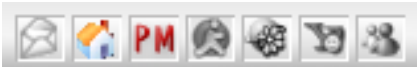
Another great chapter. Thanks! Why stop now - any chance for a part 5?

A question: is it really necessary to declare time as a local variable in the demo program's start method? It's only used in the cog2hub's ASM routine, which declares it itself.

/John

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simonl
Registered Member



Date Joined Apr 2006
Total Posts : 737

Posted 5/16/2007 12:54 AM (GMT -8)



Hey Graham, you're helping me loads with this! Until you started posting these steps I didn't really know where to start - thank you 😊

Cheers,
Simon

BTW: I type as I'm thinking, so please don't take any offense at my writing style 😊

www.norfolkhelicopterclub.co.uk

You'll always have as many take-offs as landings, the trick is to be sure you can take-off **again** ;-)

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