

P8X32A-Q44 SchmartBoard (#27150)

Want to learn how to surface solder but don't know where to start? Parallax Inc has partnered with SchmartBoard to bring an easy electronic circuit prototyping system in the form of a kit. This kit is a perfect starting point; the SchmartBoard technology makes surface mount soldering easy. Once completed, the board will host Parallax's most powerful microcontroller on this convenient development platform, allowing access to all 32 I/O pins of the multi-core Propeller chip.

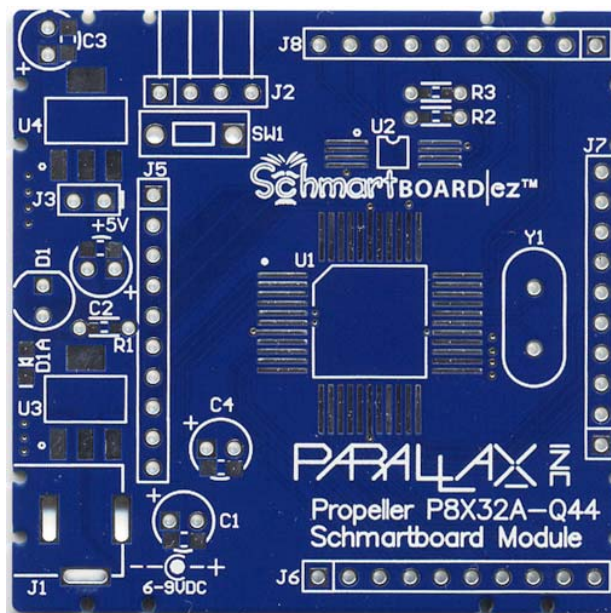
This board is designed to accommodate either surface mount or through-hole components in some circuits. Wherever there is an option, both types of components have been included. The surface mount soldering options, while more challenging, provides easier access to the J5 header.

Features

- Propeller microcontroller
- Headers for easy access to the I/O pins for prototyping
- AC barrel jack for power supply convenience
- Schmartboard technology for easy surface mount soldering
- 3.3 & 5.0 VDC on-board regulators
- Surface mount and through-hole component configuration options

Key Specifications

- Power requirements: 6 to 9 VDC
- Communication: Serial for programming via Prop Plug (not included)
- Operating temperature: -32 to +158 °F (-0 to +70 °C)
- Dimensions: 2 x 2 x 0.56 in (50.60 x 50.60 x 14.45 mm)



Precautions

- Please read entire document before beginning assembly.
- Take all the necessary precautions for handling a hot soldering iron, solder, and soldering equipment, including a well ventilated work area and proper safety gear including eye protection.
- Do not power unit until all parts are attached.
- Check soldering joints throughout the project, this will help ensure no cold solder joints have been overlooked; and help when it comes to troubleshooting.

Warning

Any attempt to assemble or complete this kit voids any warranty that is covered by Parallax Inc. and/or SchmartBoard. Inspect your board carefully for manufacturing flaws before proceeding. If you have questions regarding assembly please review the steps and if further questions arise you can call our Technical Support staff at 888-997-8267 and they will be happy to help with your questions.

Bill of Materials

Please refer to the schematic appended to the end of this PDF for the Location Used references.

Part #	Description	Quantity	Location Used
150-01031	Resistor, 10 k Ω [brown, black, orange]	2	R2, R3
150-04710	Resistor, 470 Ω [yellow, violet, brown]	1	R1
150-11031	Resistor, 10 k Ω SMT*	2	R2, R3
150-14712	Resistor, 470 Ω SMT*	1	R1
200-11503	Capacitor, 10 μ F *	3	C1, C2, C3
201-01050	Capacitor, 1 μ F electrolytic	1	C4
201-01062	Capacitor, 10 μ F electrolytic	3	C1, C2, C3
213-01051	Capacitor, 1 μ F SMT*	1	C4
251-05000	5 MHz Crystal	1	Y1
300-27150	PCB SchmartBoard	1	N/A
350-00006	LED-Red - T1	1	D1
350-10001	LED-Red 0603 SMT*	1	D1
400-00025	Push Button	1	SW1
451-00201	2-Pin Header [single row]	1	J3
451-01002	10-pin SIP Socket	4	J5, J6, J7, J8
451-04001	40-pin SIP Header [optional header]	1	J5, J6, J7, J8
451-04002	4-pin Header [right angle]	1	J2
452-00007	Power Jack [2.1mm]	1	J1
601-10335	3.3 Voltage Regulator [17-33] SMT	1	U4
601-10340	5.0 Voltage Regulator [117-5] SMT	1	U3
700-00037	PCB Rubber Feet	1	Underside of PCB
602-10001	512K EEPROM	1	U2
P8X32A-Q44	Propeller Chip [P8X32A-Q44]	1	U1

* These SMT are surface-mount options for the corresponding through-hole parts supplied.

Tools Required (Not Included)

- Basic soldering iron with 2.4 mm soldering tip
- Lead-Free Solder (with or without resin core)
- Standard flux
- 70% or higher isopropyl alcohol & cleaning utensils (soft bristled brush works nice)
- Probe soldering tool (or other non conductive tool)
- Helping Hands tool w/ magnifier (not needed, but helpful)
- Soldering Wick
- Wire Cutters

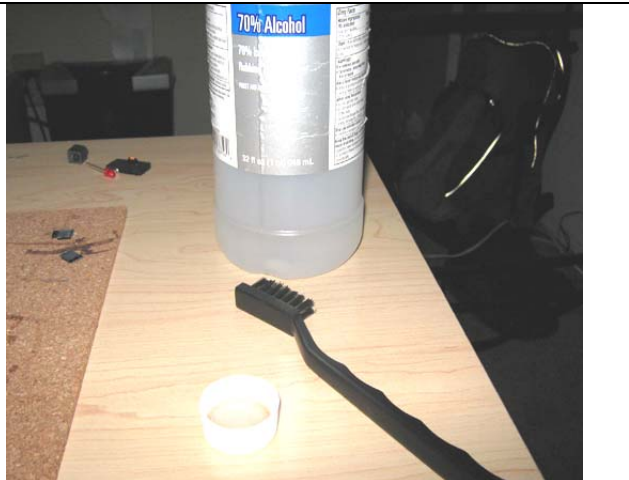
Assembly Instructions

This kit can be assembled in two ways; using mostly surface mount or through-hole parts. This set of instructions covers the through-hole component options where available; for those interested in a challenge you can use the surface mount parts in place of the through-hole parts to complete the project.

Step 1: Unpack contents of package and compare with the Bill of Materials above to ensure all parts are accounted for. If any parts are missing, contact Parallax directly (contact information is at the top of the first page).



Step 2: Wash the PCB with alcohol to clean the surface of any grease or oils, and allow it to dry before soldering.

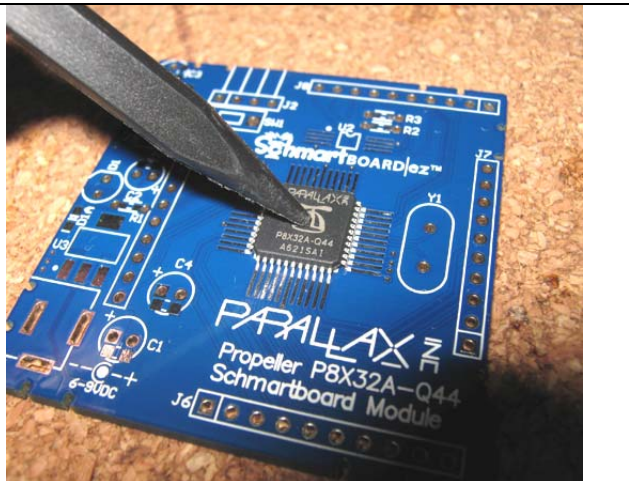


Step 3: Solder is in place on the board for U1 and U2.

Place the P8X32A-Q44 on its pad (U1) so the Pin 1 indicator on the chip and on the board are matched, and the legs of the chip are aligned with solder grooves.

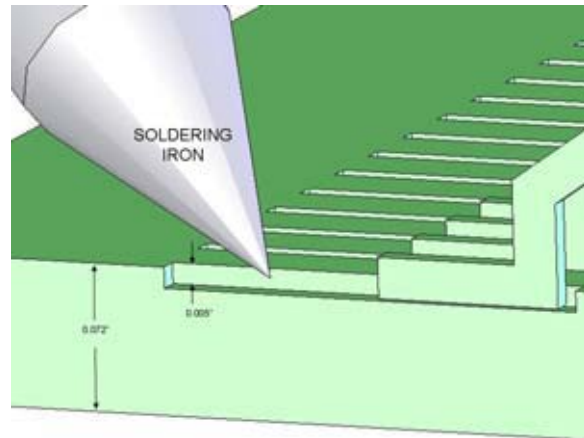
Then, add some flux.

(To position the chip you can use tape or a non-conductive tool like the one shown; which worked very well.)

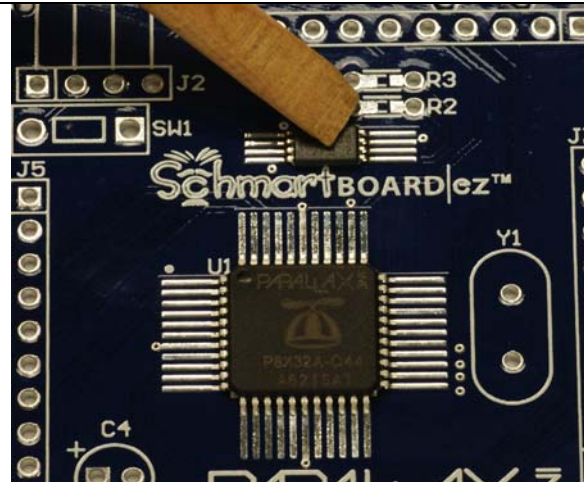


Step 4: Carefully solder each chip leg to the SchmartBoard, by pushing the solder from the outside of the groove to the chip leg; hold iron by pad about 2-3 seconds.

You do not need to add any solder to this step. Put the soldering iron tip in the first electronic pad groove at the outside point of the groove and push it forward until it touches the chip leg. Do not put pressure in a downward position; the solder will melt and be pushed towards the leg. Do this in each groove that has a leg.



Step 5: Repeat Steps 3 to 5 to solder the EEPROM chip (U2) as you did the P8X32A chip.



Step 6: Open the P8X32A SchmartBoard Schematic.pdf; this will be a reference while assembling.

Each of the parts that you will install from here out will need the appropriate portions of solder and flux; depending on the type of solder you use will determine the heat needed for the soldering iron; please see solder package for details. The SchmartBoard uses lead-free solder and is suggested as the type to use.



Step 7: Following the schematic, you can identify each part placement on the board; for example, C4 is a 1 μ F capacitor and R3 is a 10 k Ω resistor. You may notice that there are 2 components for many of the connections; this is because there are two styles of components for this kit.

Do not connect both the surface mount and through-hole components for a given location, as that will alter the operation of the whole unit.

A good rule when soldering is start from the inside and work out, so I am starting with the 5 MHz crystal and work clock-wise, leaving the header pieces for last.

R3 pad for 10 k Ω
through-hole resistor

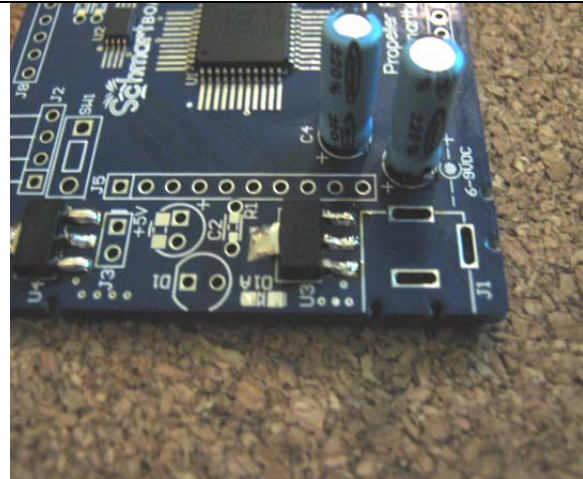


R3 pad for 10 k Ω
surface mount resistor

Step 8: The next components to put on will be the capacitors and regulators.

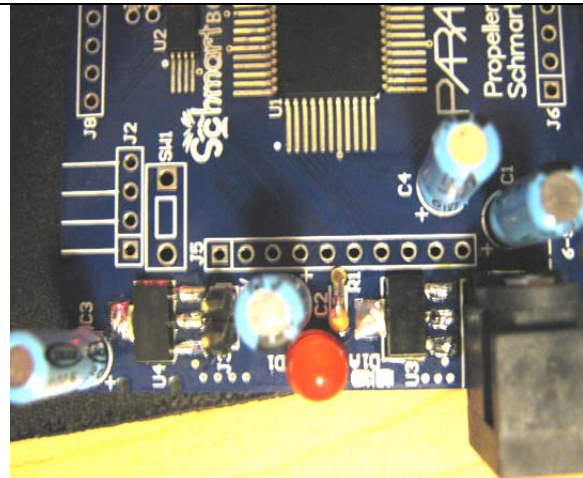
- C1 - 10 μ F capacitor
- C4 - 1 μ F capacitor
- U3 - 5 V regulator
- U4 - 3.3 V regulator

The regulator with "117-5" etched on it is the 5 volt regulator and should be soldered on U3.



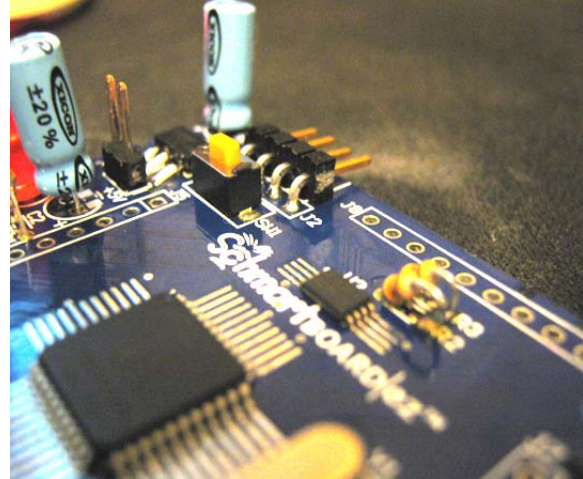
Step 9: Continue soldering on the following components.

- C3 - 10 μ F capacitor
- C2 - 10 μ F capacitor
- R1 - 470 Ω resistor
- D1 - Red LED
- J3 - 2-pin jumper
- J1 - power jack



Step 10: Add these components:

- R3 - 10 k Ω resistor
- R2 - 10 k Ω resistor
- SW1 - reset switch
- J2 - 4-pin programming port header

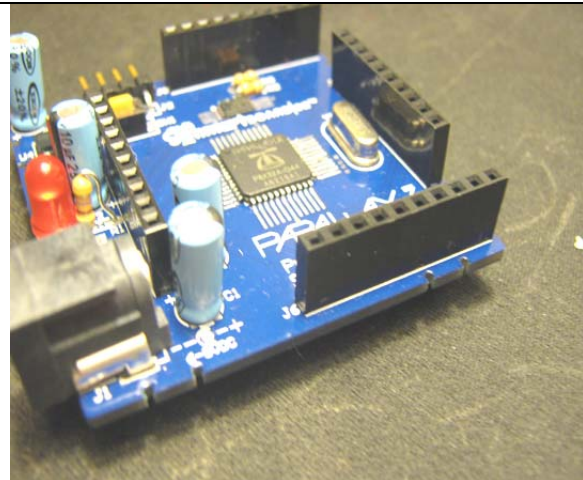


Step 11: For the next step, choose and add either female or male headers:

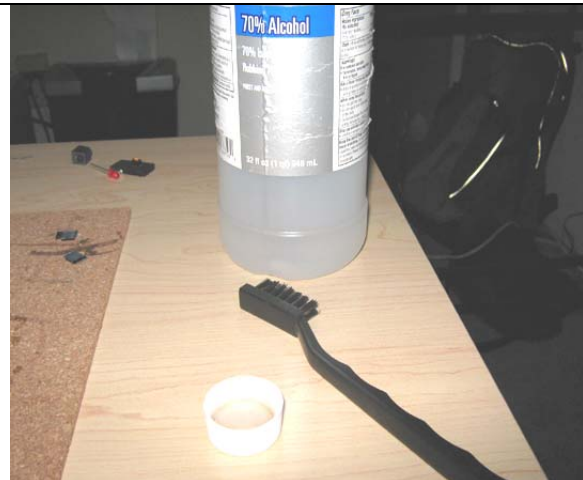
J8, J7, J6, J5 - 10-pin female headers

J8, J7, J6, J5 - 10-pin male headers

If using the male headers, cut the 40-pin SIP header into 4 equal parts with the wire cutters and solder them in the same fashion as shown in the picture; place the shorter side of header into the PCB for soldering.



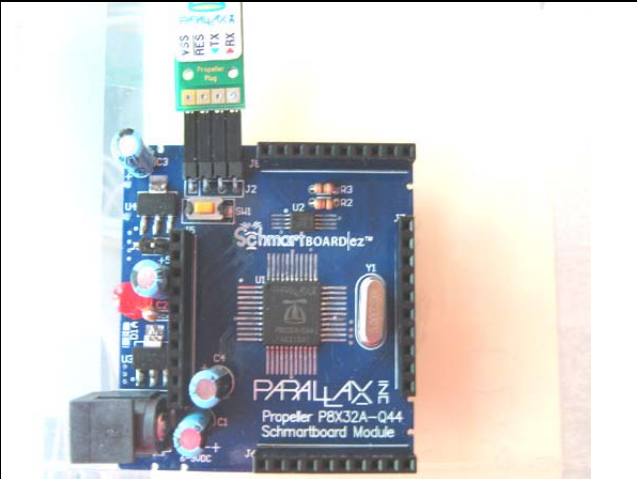
Step 12: Carefully clean off any extra flux that may be on the board and allow to fully dry before connecting to power or programming tool.



Step 13: Before proceeding, Make sure you have installed the Propeller Tool software with the FTDI USB VCP drivers appropriate for your operating system:

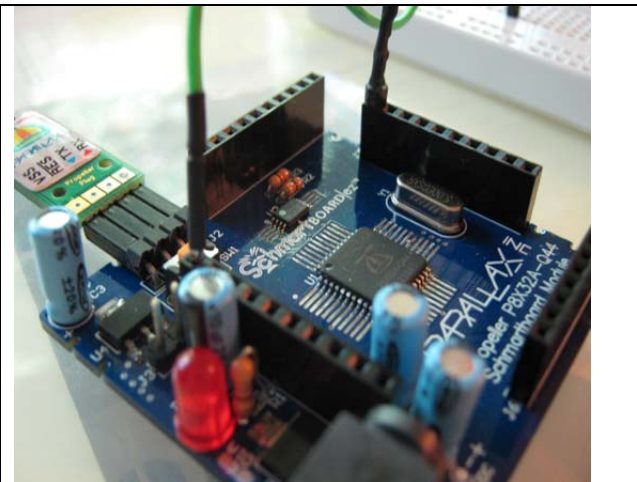
www.parallax.com/usbdriers

Using a Prop Plug, connect programming port to the PC. Then, connect a 6-9 VDC power supply to the jack.



Step 15: Connect pin 10 of J7 to the anode (+) of an LED, and pin 1 of J5 to the cathode (-) of the LED.

Using the reference above, pin 10 on J7 is connected to I/O pin P23 on the Propeller. This is information we will use to run a sample program.



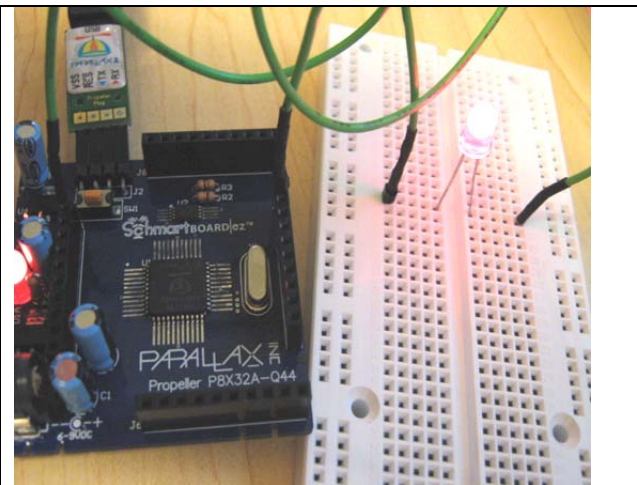
Step 16: Run this test code that blinks the LED on I/O pin P23 to confirm operation. Change the Pin constant and circuit to test the rest of the I/O pins.

```
'' Title: SchmartBoard Kit Test
'' Author: Parallax Inc.

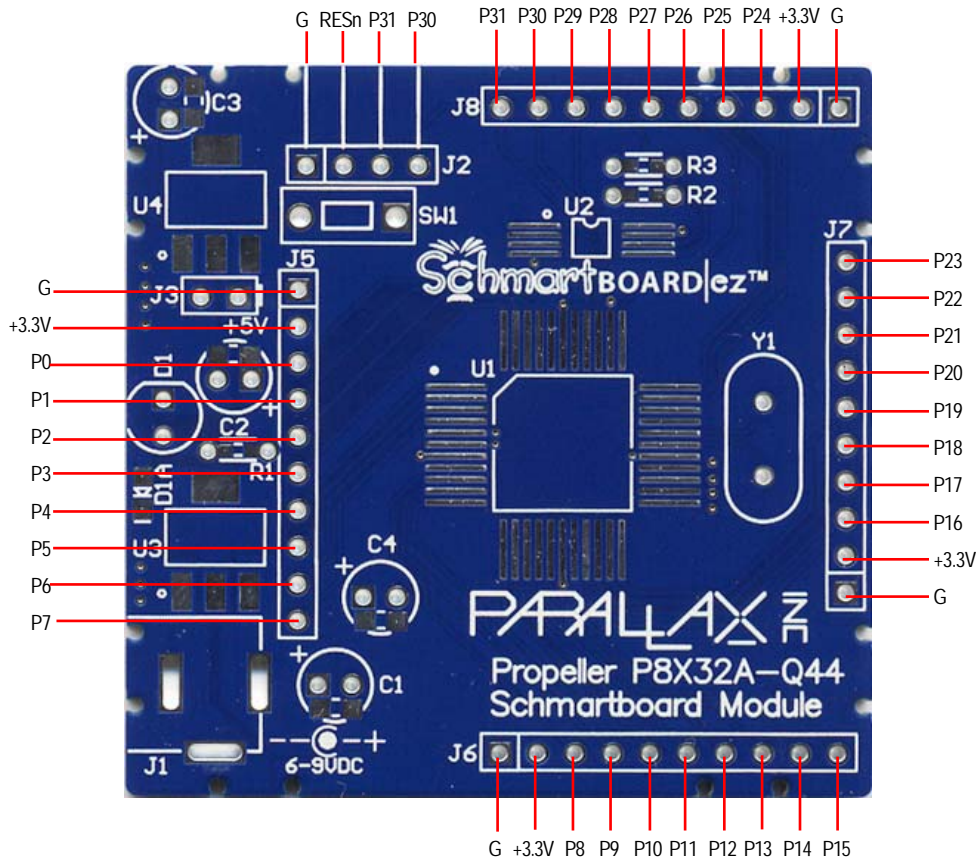
CON
  _clkmode = xtal1 + pll16x 'System clock
  _xinfreq = 5_000_000      'set 80 MHz
  Pin = 23                 'select I/O pin to test

PUB MAIN
  dira[Pin]~~             ' Sets Pin as output
  outa[Pin]~              ' Sets Pin low

  repeat
    !outa[Pin]            ' Toggles Pin
    waitcnt(clkfreq + cnt) ' Wait 1 sec
```



Pin Definitions and Ratings



Location	Name	Function
J5, J6, J7, J8	P0 – P31 *	Propeller I/O pins able to source / sink 40 mA each at 3.3 VDC
J5, J6, J7, J8	+3.3 VDC	Regulated +3.3 VDC able to source up to 400 mA **
J3	+5.0 VDC	Regulated +5.0 VDC able to source up to 400 mA **
J3, J5, J6, J7, J8	G	Ground
J1	Power Jack	6 to 9 VDC center-positive (2.1 mm) power supply
J2	G, Resn, P31, P30	Programming / Debugging header for Prop Plug

* Pins 28 – 31 have a special purpose upon power-up/reset but are general I/O afterwards.

** Total output of board is 400 mA based on traces and heat dissipation of module.

Additional Resources

[Breadboard - 6 7/8" L X 2 9/16" W X 3/8" D #700-00078](#)

[Pluggable Wires Male-Female 12.5" - \(1 pack of 10\) #800-00029](#)

[Pluggable Wires Female-Female 12.5" - \(1 pack of 5\) #27926](#)

Parallax Object Exchange: <http://obex.parallax.com>

Parallax Forums: <http://forums.parallax.com>

Troubleshooting

There are a handful of things to keep an eye out for while putting this kit together.

1. Before you try to troubleshoot any issues, first clean off all excess flux and any other materials that might cause a short or other malfunction before powering the module.

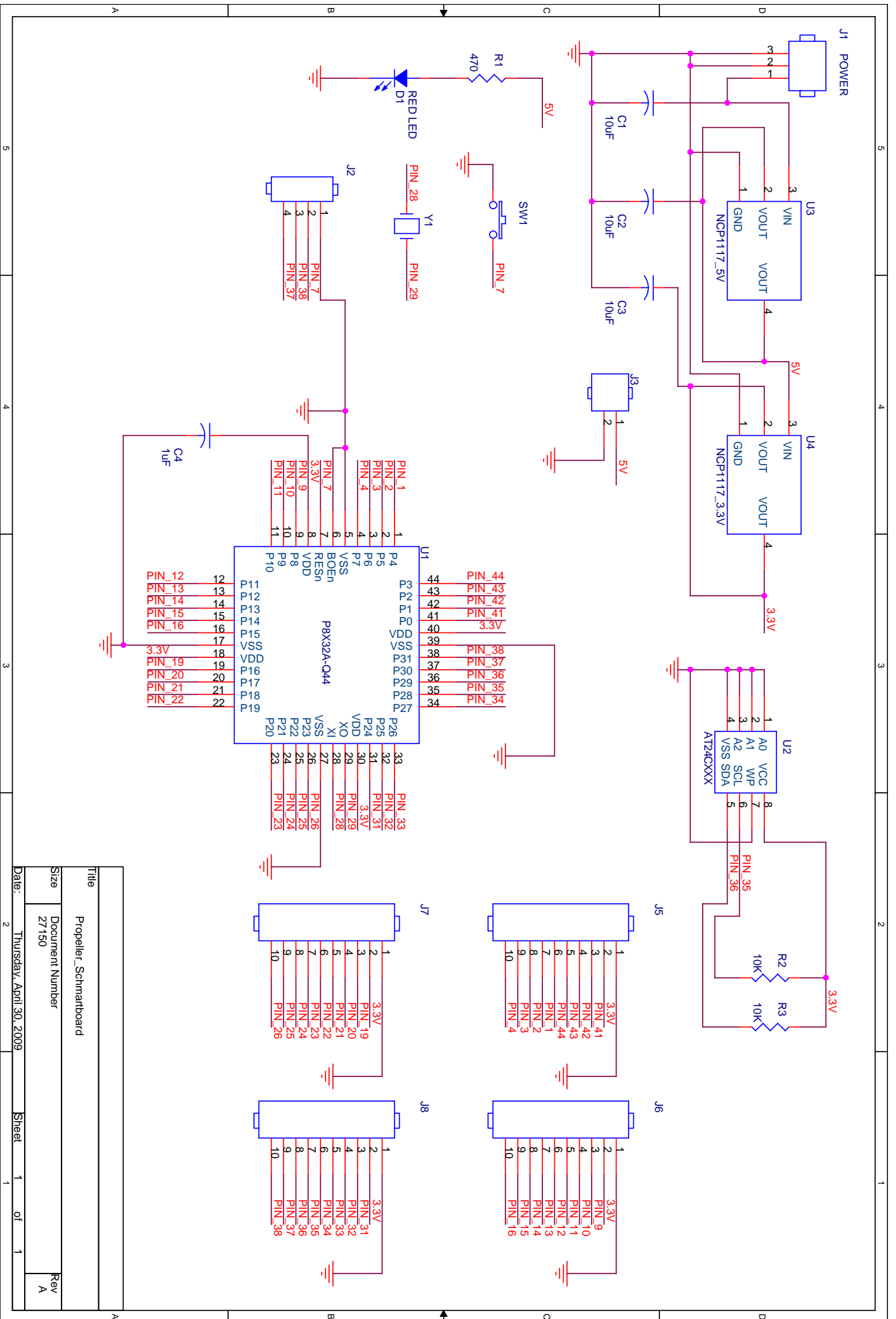
Error: "No Propeller Chip Found on COM Ports"

1. Verify that the USB drivers have been successfully installed for the Prop Plug to be used. The latest driver can be found at www.parallax.com/usbdriers.
2. Check the connections at J2 to ensure that there is connection with the programming pins.
3. Check continuity between pins I/O pins 30, 31 (on J8) with the RX and TX on the programming port and ground to the boards ground.

Error: "Could not verify EEPROM"

1. Verify if there is an issue with the EEPROM only, trying to download a program to RAM only (F10 in the Propeller Tool).
2. Check the SMT EEPROM pads to make sure all the legs are touching the pad, and that there are no solder bridges from leg to leg.
3. Verify that EEPROM pins (5 and 6) have continuity with I/O pins 29 and 28 (on J8).
4. Verify voltage of the power going to the EEPROM; Vdd (pin 8) should be ~3.3 VDC.

For further assistance, contact Parallax Tech Support (support@parallax.com, or call 1-888-997-8267 toll-free in the Continental US, Monday through Friday from 7 a.m. to 5 p.m. Pacific Time.



Title		Propeller_Schmatboard	
Size		Document Number	
Date:		Thursday, April 30, 2009	
Sheet		1 of 1	
Rev		A	