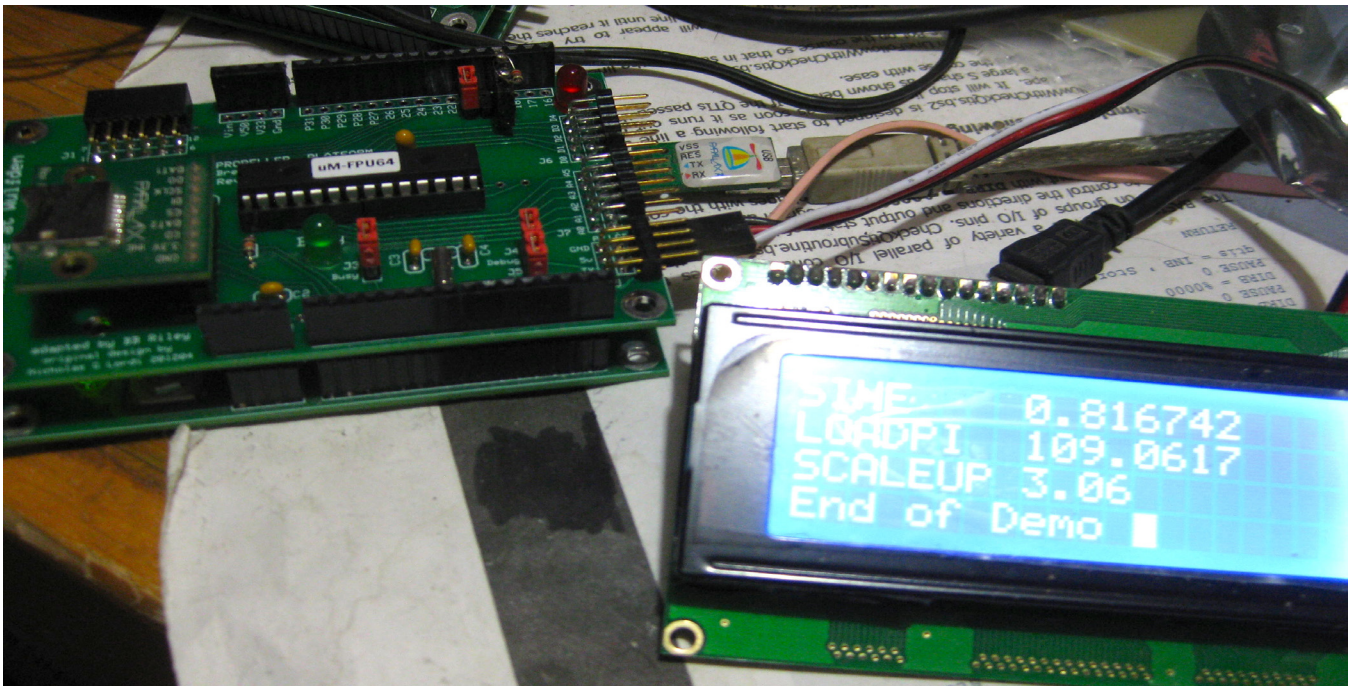
Wulfden Prop Platform
microMega FPU-64
Breakout Board Kit

Totally Open Propeller-Compatible
Hardware Development

Valid for Rev. 20121203
594-CN15A220J

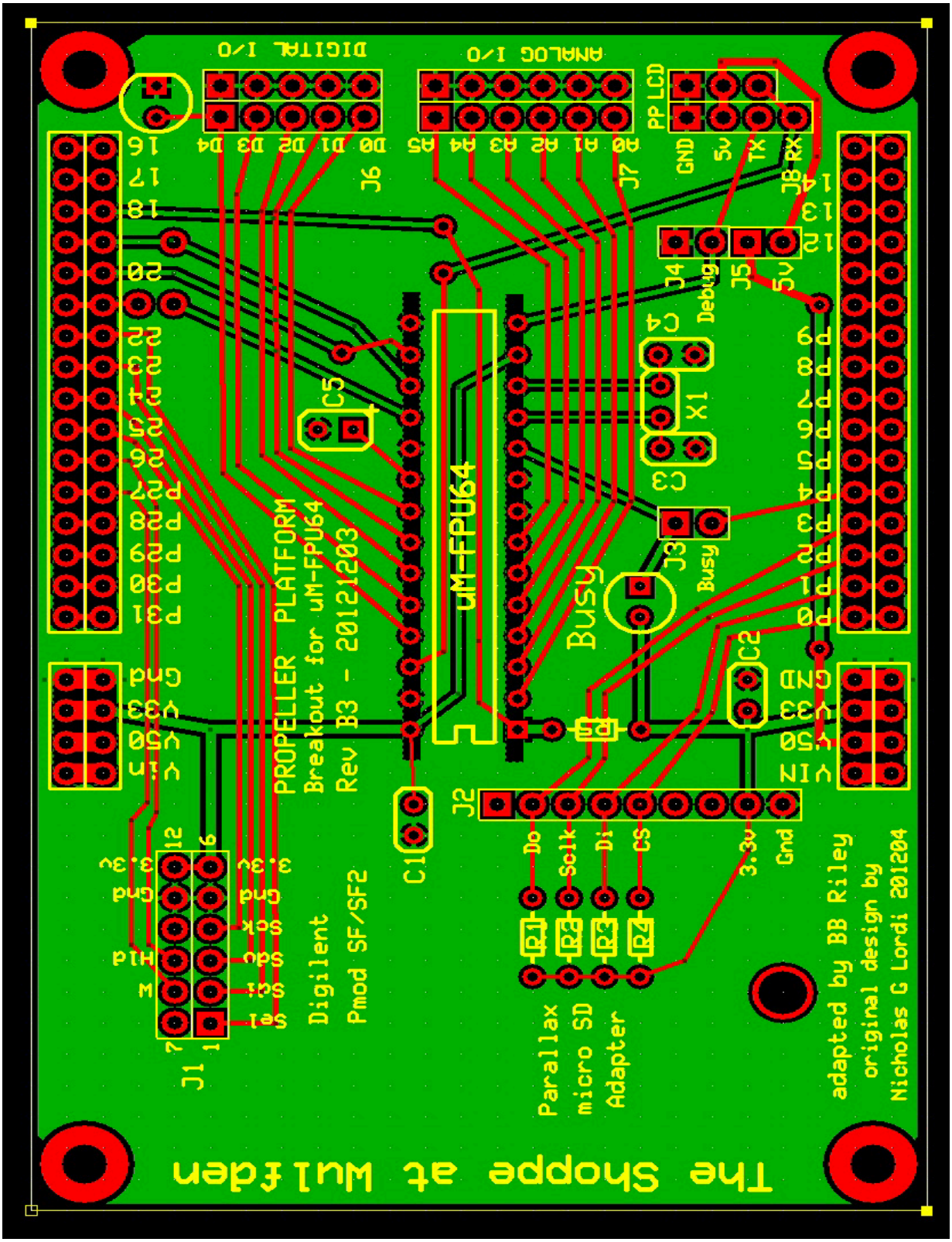
Wulfden at Hawk's Mountain
The Shoppe
P.O. Box 188
Underhill Center, VT 05490

<http://www.wulfden.org>



1 microMega FPU-64 ... a breakout board for the Propeller Platform

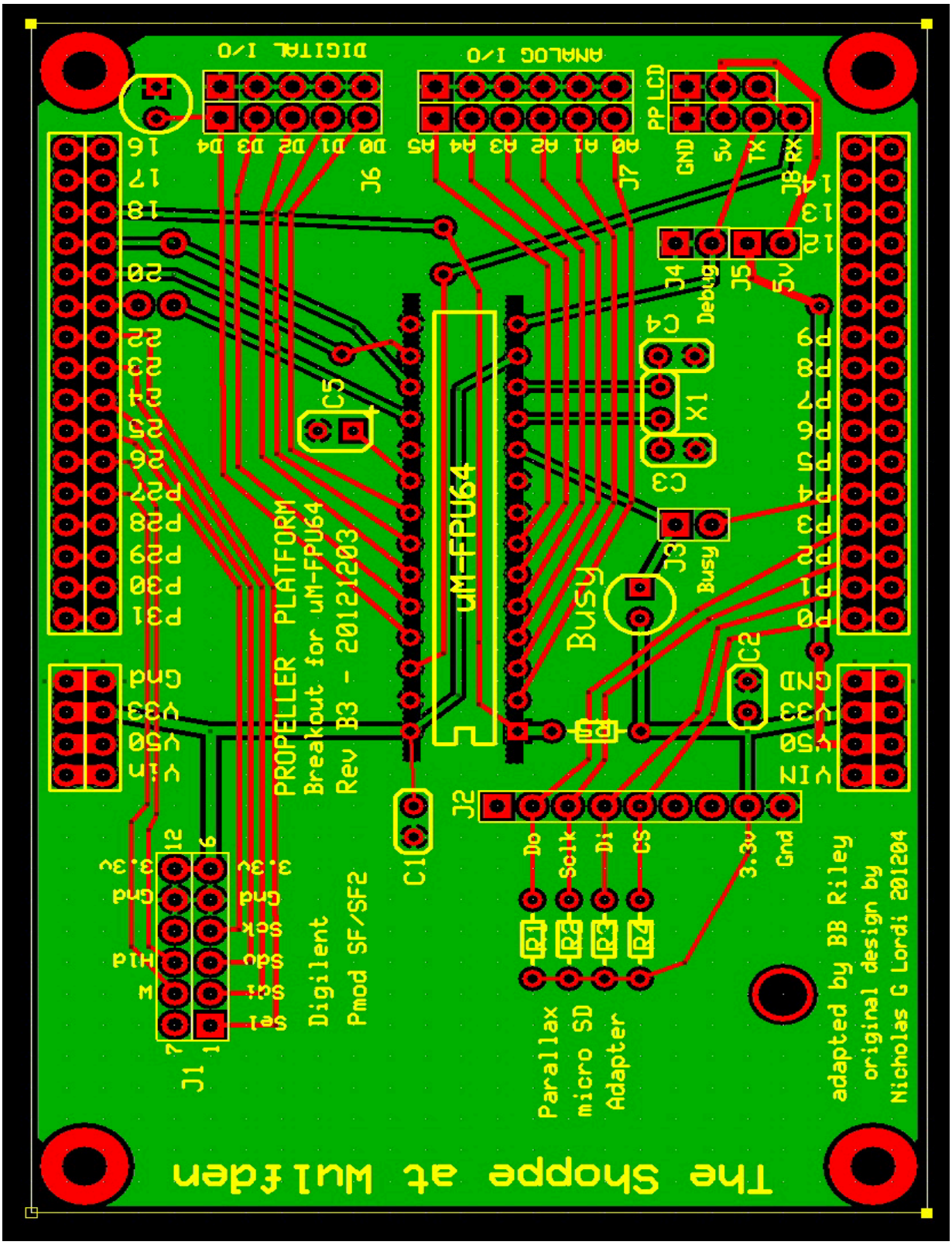
1. CAUTION - P18 of the Prop is connected to pin1 /MCLR of the FPU64 and they are pulled up to Vdd through a 10K resistor. So immediately on startup /MCLR sees a high and stays out of reset. That is until your Propeller software, properly declares P18 an OUTPUT without specifically setting it high. To the contrary it gets set low and the FPU is stuck in a continuous state of Reset. Two things need to be done. First statement after declaring P18 an OUTPUT must be to set P18 high. And ... any statent or routine that implements a hardware reset of the FPU must end with a statemnt returning P18 to high.
2. The demos in the Parallax OBEX appear to have followed the above guideline.
3. R1-R4 are for pullups on the SD socket SPI only if needed.
4. The final version of the PP_FPU-64 will move to the Propeller Platform Short footprint (2.8" x 2.5"), and eliminating J1 and J2. Added will be J9 a make/break jumper in the line between the FPU /MCLR and the Prop's P18.
5. Depending on interest this design will also be ported to the Parallax QuickStart foot print.


The Shoppe at Wulfden
PROPELLER PLATFORM
Breakout for uM-FPU64
Rev B3 - 20121203
Digilent
Pmod SF/SF2
uM-FPU64
DIGITAL I/O
ANALOG I/O
PP LCD
Busy
Parallax
micro SD
Adapter
adapted by BB Riley
original design by
Nicholas G Lordi 201204

2 Wulfden PP_FPU-64 Layout Details

	Part ID	Qty	Description	Source	Part-num
2.	R1-R5	5	1/8 watt carbon film resistor - 10K ohm	Mouser	299-10K -RC
3.	R6	1	1/8 watt carbon film resistor - 1 Kohm	Mouser	299-1K-RC
4.	C1-C2	1	Monolithic Capacitor 0.1 uF / 50 vdc	Mouser	80-C315C104M5U
5.	C3-C4	1	Monolithic Capacitor 22 pf / 50 vdc	Mouser	594-CN15A220J
6.	C5	1	4.7 uFTantalum Capacitor	DigiKey	399-3553-ND
7.	X1	1	Watch Crystal 22 pf, 32.768 KHz	DigiKey	X1123-ND
8.	LED	1	5mm green LED w/resistor	Mouser	SSL-LX5093GD-12V
9.	LED	1	5mm red LED w/resistor	Mouser	SSL-LX5093ID-5V
10.		2	3M dual wipe DIP socket - 14 pins	Mouser	517-4814-3004-CP
11.	U1	1	uM-FPU64	Solarbotics	
12.		1	PP_FPU64 PCB	Express PCB	n/a

	Pin/Socket Headers and Jumpers
1. J1	Digilent Promod SF-2 - HS Serial Flash
2. J2	Parallax MicroSD Card Adapter p/n 32312
3. J3	(jumper) Connects FPU Busy (pin 10) to Prop P4
4. J4	(Jumper)Grounds FPU SERIN - FPU NOT in Debug
5. J5	(Jumper)Supplies 5V to pin 2 of J8a and J8b
6. J6	Digital I/O - D0-D4 , bottom row is all grounds
7. J7	Analog I/O - A0-A5 , bottom row is all grounds
8. J8a	(4pins) - Serial I/O configured to Prop Plug
9. J8b	(3pins) - Serial OUT configured to Servo/LCD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DIGITAL I/O
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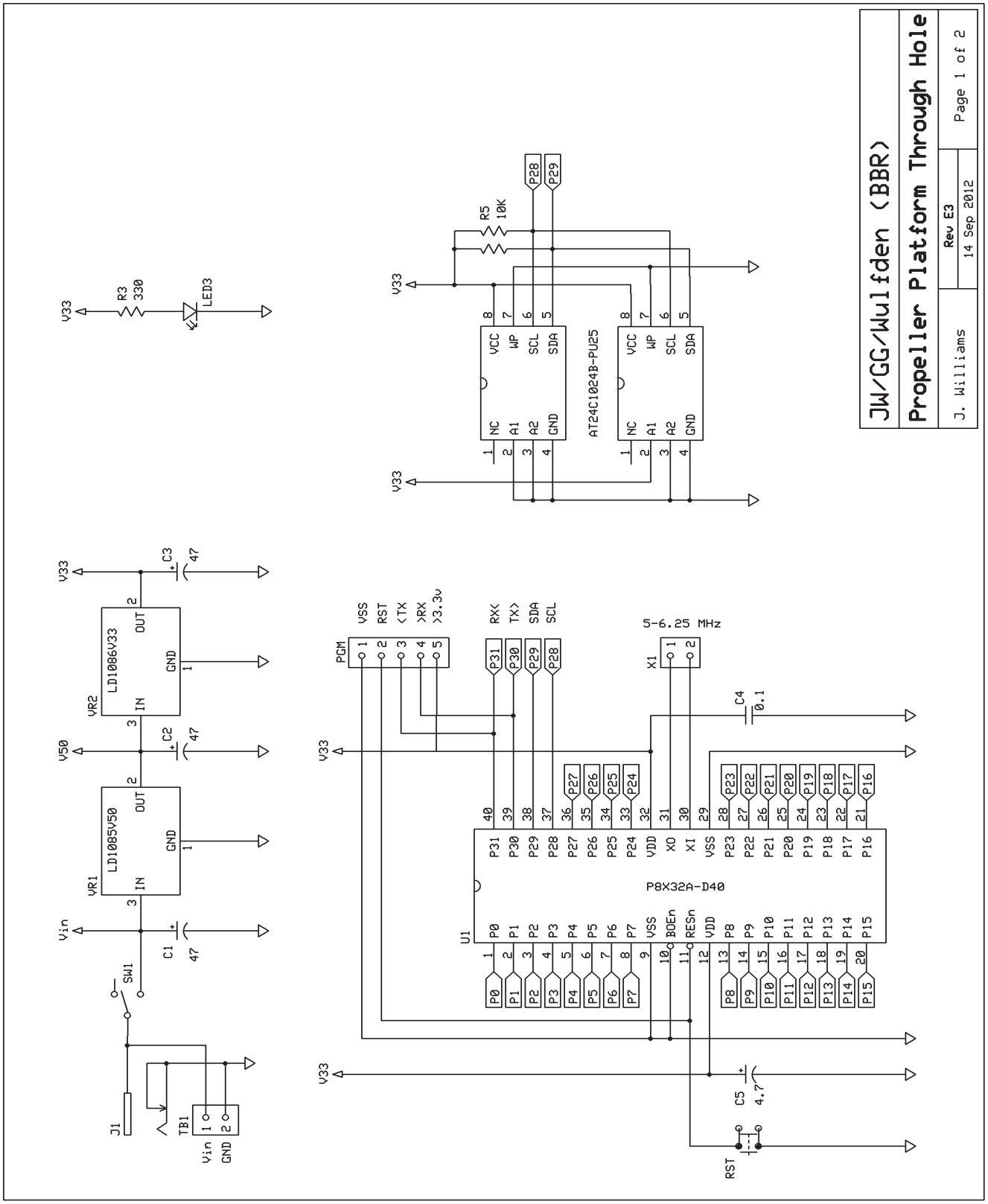
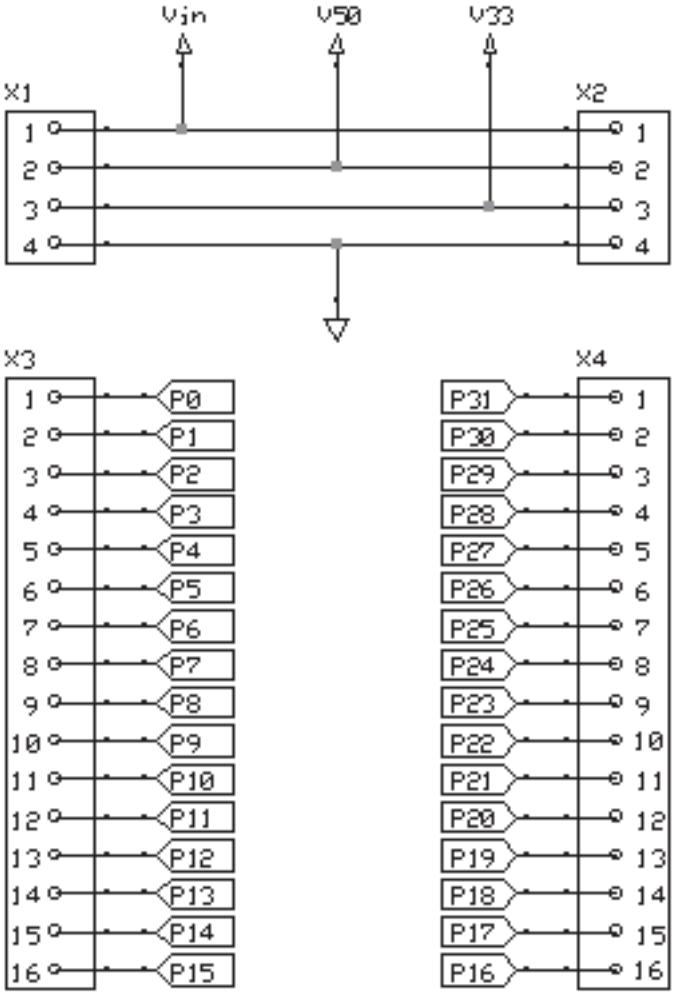
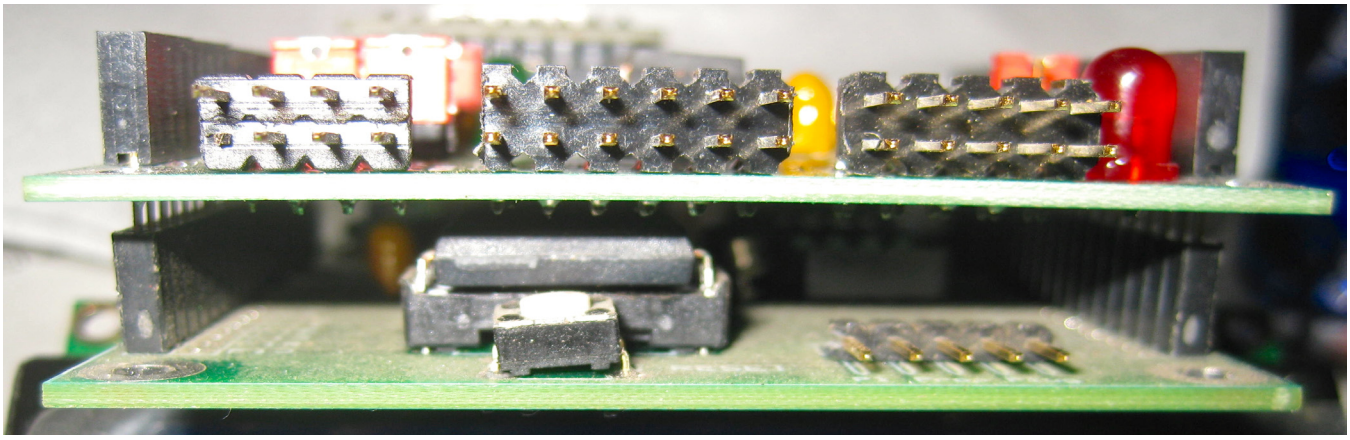
PP LCD
Debug
5v
GND
TX
RX
Busy
Do
Sclk
Di
CS
3.3v
Gnd


JW/GG/Wulfden (BBR)
Propeller Platform Through Hole
J. Williams
Rev E3
14 Sep 2012
Page 1 of 2
V33
R3
330
LED3
R5
10K
P28
P29
AT24C1024B-PU25
VCC
WP
SCL
SDA
NC
A1
A2
GND
Vin
V50
VR1
VR2
LD1085V50
LD1086V33
IN
OUT
C1
C2
C3
47
SW1
J1
TB1
GND
PGM
VSS
RST
<TX
>RX
>3.3v
RX<
TX>
SDA
SCL
X1
5-6.25 MHz
C4
0.1
C5
4.7
RST
U1
P8X32A-D40
P0
P1
P2
P3
P4
P5
P6
P7
P8
P9
P10
P11
P12
P13
P14
P15
P16
P17
P18
P19
P20
P21
P22
P23
P24
P25
P26
P27
P28
P29
P30
P31
VDD
XO
XI
VSS
BOEn
RESn



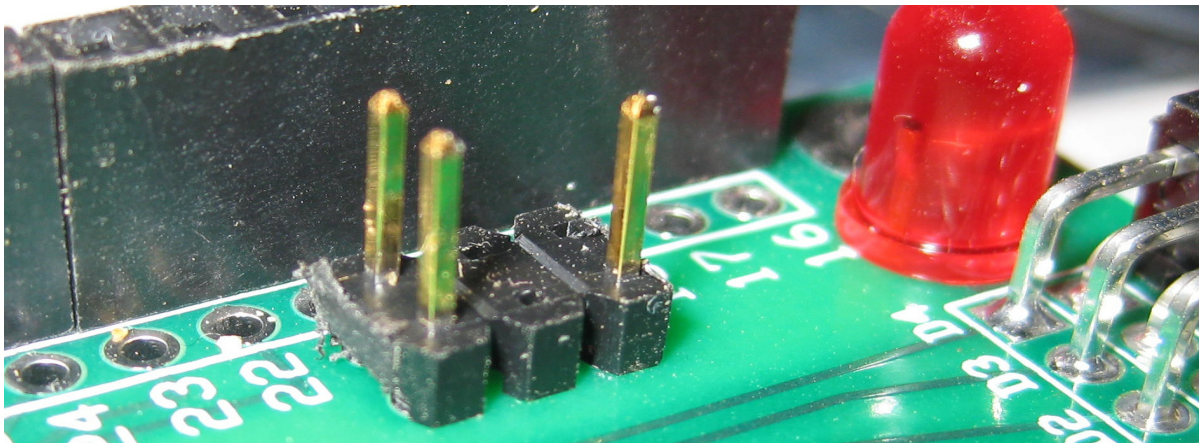
TTL Label	TTL Pin	Description	DB9 Pin	DB9 Label
TX	1	TTL ==> RS232	2	RxD
RX	2	TTL < == RS232	3	TxD
3.3-5V	3	requires power		
G	4	ground (common)	5	GND
RT	5	TTL < == RS232	4	DTR

4 Simple Serial Access to FPU-64



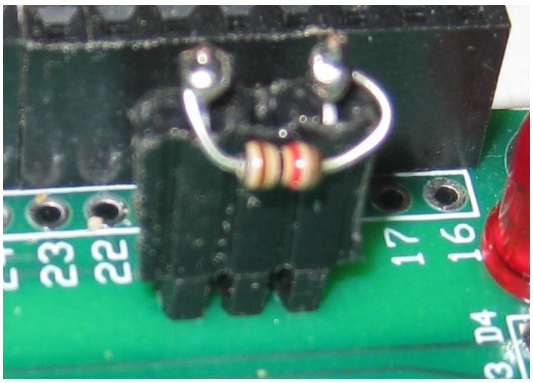
1. There are three sets of double rows of pins that offer access to the FPU64; From left to right the communications group 2 rows of 4 pins, the analog i/o group, 2 rows of 6 pins and last the digital i/o group, 2 rows of 5 pins.
2. The communications group is a little odd. The overall functionality of SERIO is connected to this group of pins in two different ways. First lets look at the bottom row of 4 pins ... oops ... there's only 3 pins. Counting in reverse from right to left, there is 1,2,3, , and pin 4 has been removed. 1, 2 ,and 3 are GND, +5v, SEROUT ... the familiar Paralllax, servo, sensor, serial LCD configuration. In order for the 5 volts to be present on pin 2 either top or bottom row the shunt (jumper) must be placed on the 2 pins of J5 labeled "5V." The most common use for this is with a serial LCD.
3. The lower group explained,the top 4 pins are easy. It is designed to accommodate a Parallax Prop Plug ... So, first we protect the Reset signal from the PropPlug, also on pin 2, by removing the 5V jumper on J5 and the jumper on J4 that ties SERIN to GND (informing the FPU that you are NOT in Debug mode) . Then plug in the PP normal side up to the top row of 4 pins. The most common use of this port is to connect to MicroMega's Windows-based FPU64 IDE.
4. Moving, now, to the Analog i/o group, 2 rows of six pins in the middle. The top row of 6 pins is, from left to right, Analog0 (A0) to Analog5 (A5). The bottom row of 6 pins are all GNDs, each nominally in service of the analog pin above it. This way you can access a single analog pin with just a single two or 3 conductor cable.
5. ... and, finally, on the right, the Digital i/o group. 2 rows of 5 pins. Set up just like its neighbor the Analog i/o, the top row of 5 pins is, from left to right, Digital0 (D0) to Digital4 (D4) and the bottom row of five pins are the matching GNDs. The red LED to the right, its anode connected to D4 will blink if the 1 Hz "heartbeat" is activatted in the FPU's Real Time Clock.

5 SPI 2-Wire and 3-Wire Access to FPU-64

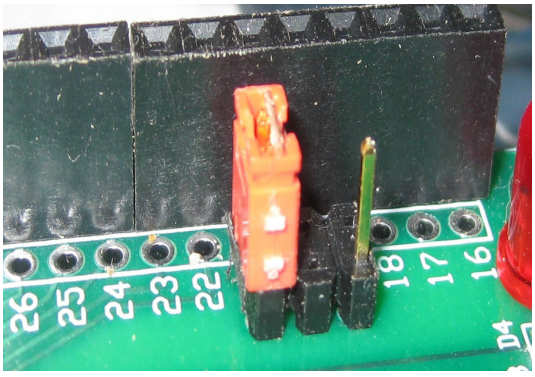


1. Holding the board so that the bulk of the silkscreen tex is readablle and with P0 to P15 closest to you. Look the faar right area by P21, P20, and P19. From teh parts kit get the 6 pin (2 rows of 3 pins) header. With a pair of needle-nosed pliers pull 3 pins as seen in the picture above. Place into three matching holes and solder.

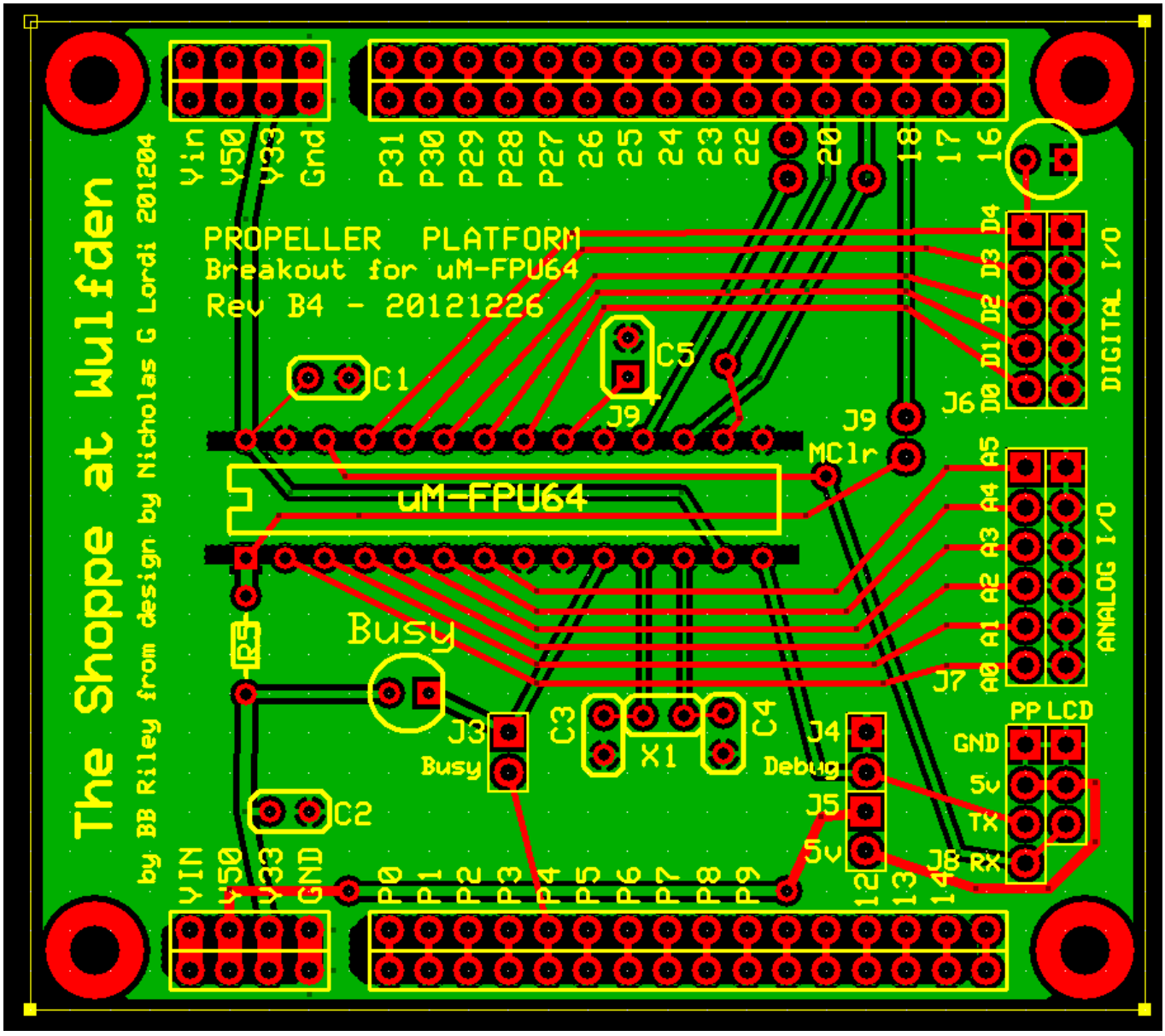
2. To do 2-Wire SPI we have to joint SERIN and SEROUT with a 1 K (brown-black-red) resistor and at connect SERIN to P19. Take a 3 pin socket header, remove the center pin, then attach and solder the 1K resistor. Last, place the socket header onto the two wide-spaced pins adjacent to P21 and P19. See picture to the right. The SPI setup data is SCLK is P20, MISO and MOSI are both P19. CS is hardwired as selected.

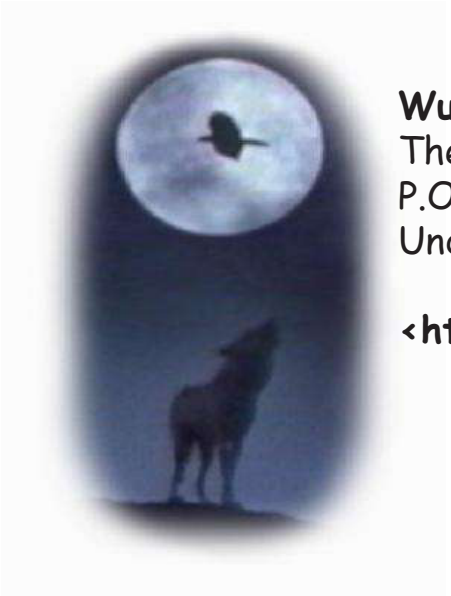


3. To do 3-Wire SPI entails nothing more than placing a shunt (jumper) on the two close spaced pins by P21. See picture to the right. The SPI setup data is SCLK is P20, MISO is P19, and MOSI is P21. CS is hardwired as selected.



6 Propsed Final PP Version





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