ROVDOG Interface Board, Version 3
Design notes from Mike & Glenn

This board mounts on top of the BL1700 board using SamTec mezzanine headers at H6 - H11

Design:
4 layers, internal power plane, internal ground plane:
Top-Red (Signal) | Inner Common-Green (split) | Inner Power-Brown (split) | Bottom-Blue (Signal)
Both the power & ground planes are split to allow for digital, analog & power (motor) sections
The split sections are tied together with a jumper on the top layer near the power connector

Board Size:
Same except a 1" extension on one long side for the ROV RS232 optical isolation circuit

Stack height w/ BL1700 on bottom:

0.420"	J1 RA header or Ribbon cable IDC to vertical header;	**0.230" for JPARO or JCOMP**
0.100"	IDC header base	
0.063"	ROVDOG interface pc board	
0.745"	SamTec #: ESQ-105-69-G-D	
0.100"	IDC header base	
0.063"	BL1700 pc board	
0.125"	nylon spacer	
_____	aluminum base plate	
1.615"	Overall Stack Height;	**1.425" overall for JPARO or JCOMP**

Per Glenn: 1.765" available within a 7.75" diameter circle

As measured from 1 actual base plate with the aluminum splash shield:
1.735" height available with a 7.375" diameter circle
This drops to 1.315" available for an addition 0.5" outside above circle

Existing pc board is 4.215" x 6.250" : 7.54" diameter

***** Tight, move J1 towards board center line**

Connectors:
Same as before, mostly
Per Glenn, USB has never been used, so that could just be a 4 pin header to save room.
Also, the 2 1x3 JTx connectors could just be a single 2x3
which will save some board edge real estate in both cases

Components:
+5 VDC voltage regulators, 3 required
LT1121 5V, 150 mA SOT-223 SM footprint, input voltage range 5.5 - 20VDC, +/-30 V max
3 used; 1 main board, 2 optical isolation

-5 VDC voltage regulators used for both optical isolation & analog circuits
3 used; 1 main board, 2 optical isolation

MAX860 replaces the older LT1044

Motor controller
Dropping diodes

Diode bridge
hex switch

Design notes from Glenn:
Interface board, rev 3

Issues

- 2005 interface board has been modified with trace cuts and jumper wires to isolate ground planes and add overvoltage protection and other features.
- No unmodified boards or unstuffed boards are left.

Goal

Design and fabricate a board to incorporate new changes and repair old problems.

Design limits

- Space: Form factor limited to existing rovdog electronics package volume, maximum 8" dia. x 1" high (**VERIFY DIMENSIONS**).
- IC packages: SMT ok.
- Baseline design: 2005 board with 2007 changes
- BL1700 and existing code still in use

Changes:

- Ground isolation, with jumper points to connect grounds
- Op-amp buffers for all off-board analog inputs
- Dedicated connector for heading compass
- Incorporate RS232 opto-isolation on board
- Incorporate battery backup switching as well ?
    - mrk: no
- Mezzanine sockets to plug directly into BL1700; reduces number of jumpers
    - yes for H6 - H11
    - still short ribbon cables for H12 - H15

Additional documentation:

BL1700 physical layout schematic
Rovdog interface board rev 2.10 (DWG 1024)
BL1700 board
interface board

More notes from Glenn:

5 V supply demand:
16 x 10K pullup resistors = 8 mA max (all pulled to ground worst case)
MPX4115 barometer = 10 mA
Compass = 35 mA (wow)
74LS14 inverter = 0.5 mA (drives ttl inputs, 4 x 0.1 mA max)
LM35 temp sensors, 3 ea,
driving 5 V into 5K = 3 mA (max)
LT1044 quiescent = 0.020

Total: 57 mA

mrk: more +5 V draw from the motor driver 36 mA max (unlikely?)

Need +5 V, 93 mA worst case

LM35

LM35 output is 10m V/Deg C and are input into a ± 0.5 V A/D channel. Since I already set it for negative input, might as well always bias the LM35 channels to read negative temperatures. AD are 12 bit so one bit = 0.24mV or 0.024 C. LM35 probably not that precise.

Dissipation on motor driver.

IC supply voltage: 10.33 V (12V dropped through 2 diodes).

Motor current: 0.2A max

Motor voltage drop: 9.61 V

IC dissipation: 0.2A x 0.7V = 0.14 W

Sound about right?

Driver IC runs pass transistors in full saturation.

Also, driver IC duty cycle is very low. (< 1 %).

So heat sinking isn't a huge problem, some heavy copper should do.