

1.0 Features

- Mounts directly to UAV Dev Board (Red or Green)
- Provides direct connection of a 7-channel radio receiver without using wires *
- Expands UAV input/output channels from 4/3 to 5/7.
- Fully compatible with GentleNav, AileronAssist, MatrixNav, and MatrixPilot UAV opensource firmware.
- Provides optional PWM to Digital Switch Output (TTL) decoding for radio channels 6 and/or 7.
- TTL to CMOS signal buffering for UAV radio and UART ports.
- On-board ISP connector for custom programming of Oil Pan 12F683 PIC.
- Prototyping area on the Oil Pan for easy experimentation and expansion.

* Compatible with most 7-channel Futaba receivers. Other types of receivers may require up to seven 3-wire jumpers to connect the Oil Pan.

2.0 Description

The Oil Pan daughter board provides a physical foundation for mounting the UAV board and radio receiver together. It translates the signals from the receiver to the servos via the UAV board with no changes in functionality the UAV board design. The only wiring cables required are from the assembled module to the remote vehicle (RC) servos.

The follow pictures depict the mechanical layout of the system.

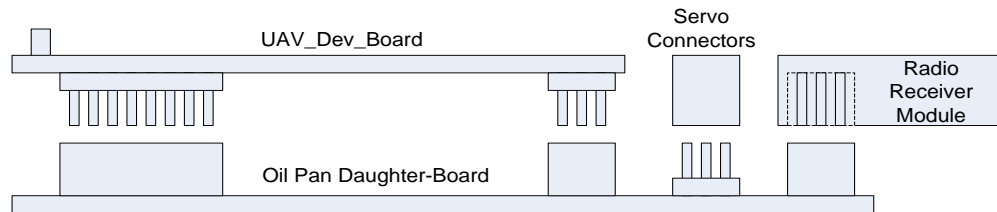


Figure 1: System mounting diagram –side view

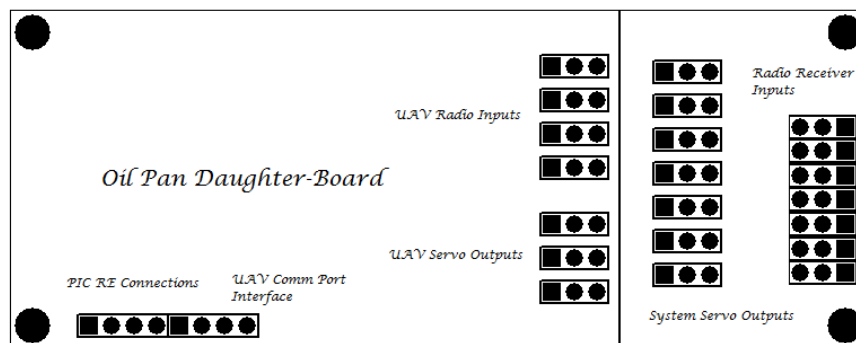


Figure 2: Oil Pan PCB connection diagram

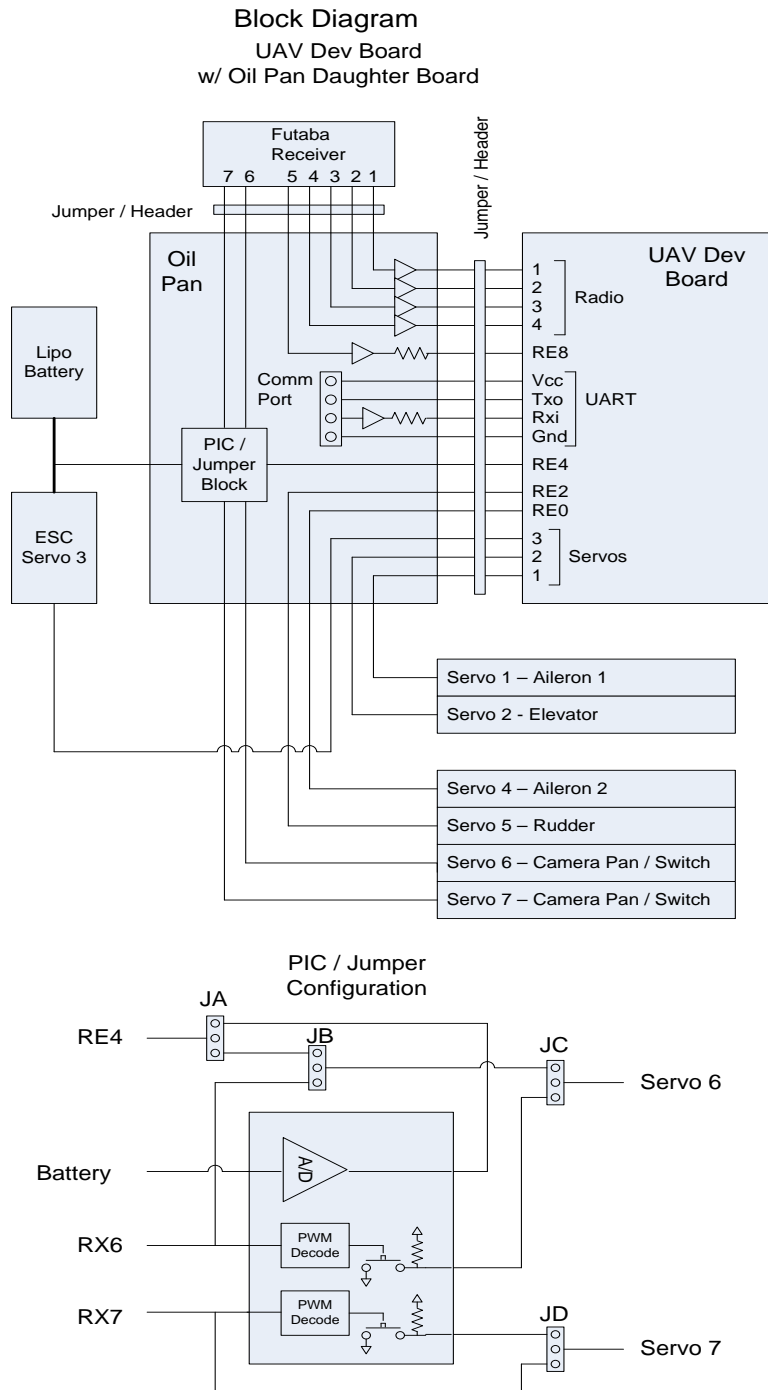
The female header connectors on the Oil Pan PCB are aligned with the UAV board jumpers and radio receiver male connectors for direct easy mounting.

Power for the UAV board / Oil Pan assembly / Receiver assembly is derived from an Electronic Speed Control (ESC) unit which is normally connected to the #3 servo output for throttle control. An additional AUX PWR connector is provided on the Oil Pan PCB if an ESC unit is not used.

A small PIC device (12F683) is used on the Oil Pan board for optionally providing PWM to switch decoding. The PIC device can be reprogrammed via an on-board connector to change it's operation. The PIC device may be removed if the functionality beyond that provided by the basic UAV board are not needed.

3.0 Logic Flow

The following block diagram depicts the basic interconnections between the UAV board, Oil Pan board, radio receiver, and the aircraft control signals in the assembly's full configuration. The features and functions added by the Oil Pan board are selected by four on-board jumper blocks.



3.0 Oil Pan Configuration Jumpers

The following table describes the possible functions available with the Oil Pan board along with the appropriate configuration jumper settings.

3.1 Jumper Block JA

No connections should be made.

3.2 Jumper Block JB

Jumper from JB Pin-2 to JB Pin-3 only.

3.3 Jumper Block JC

JC-Pin 1 to JC-Pin 2 => Radio receiver channel 6 directly connected to Servo 6 output.

JC Pin-2 to JC Pin-3 => Digital switch decode of channel 6 connected to Servo 6 output.

3.4 Jumper Block JD

JD-Pin 1 to JD-Pin 2 => Radio receiver channel 7 directly connected to Servo 7 output.

JD Pin-2 to JD Pin-3 => Digital switch decode of channel 7 connected to Servo 7 output.

4.0 Assembly Instructions

***** IMPORTANT - PLEASE READ AND FOLLOW *****

Several modifications to both the UAV Board and the Oil Pan board must be performed for the system to perform properly and reliably.

- 4.1 In order to mount the Oil Pan board to the UAV board, numerous male-pin connectors need to be removed and re-mounted on the UAV board.

On the UAV Board, remove the following 3-pin male connectors from the top of the board and remount them to the bottom of the board. NOTE: Care must be used in this operation. If any of the connectors are damaged, use new connectors in their place.

A. Radio 1 through Radio 4 (4 connectors)

B. Servo 1 through Servo 3 (3 connectors)

On the UAV Board, remove the following 8-pin male connector from the top of the board and remount it to the bottom of the board. NOTE: Care must be used in this operation. If the connector is damaged, use a new connector in its place.

A. Aux Connector (RE4, RE2, RE0, RE8, VCC, TXO, RXI, GND)

***** MOST IMPORTANT *****

- 4.2 Trim or remove the VCC connection (male pin) from the UAV Board "Aux Connector" that was mounted to the bottom of the UAV Board. This is required to isolate the UAV power supply from the Oil Pan Board.
- 4.3 Mount the UAV Board to the top of the Oil Pan Board, carefully aligning the connections.
- 4.4 Mount the RC Radio Receiver on the Oil Pan Board. For non-Futaba RC Radio Receivers or Futaba RC Radio Receivers with more than 7 channels, use 3-wire Female-Female jumper wires to connect the receiver to the Oil Pan Board.
- 4.5 If an external UART/COMM device is needed to be connected to the UAV Board, use the COMM Port on the Oil Pan Board. It is tied directly to the UAV board. Power to the COMM port is supplied from the Oil Pan Board.
- 4.6 Complete the board rework listed in the Appendix.

Congratulations! The assembly process is complete. The assembly can now be used with any existing UAV board instructions and available firmware.

5.0 Acknowledgements

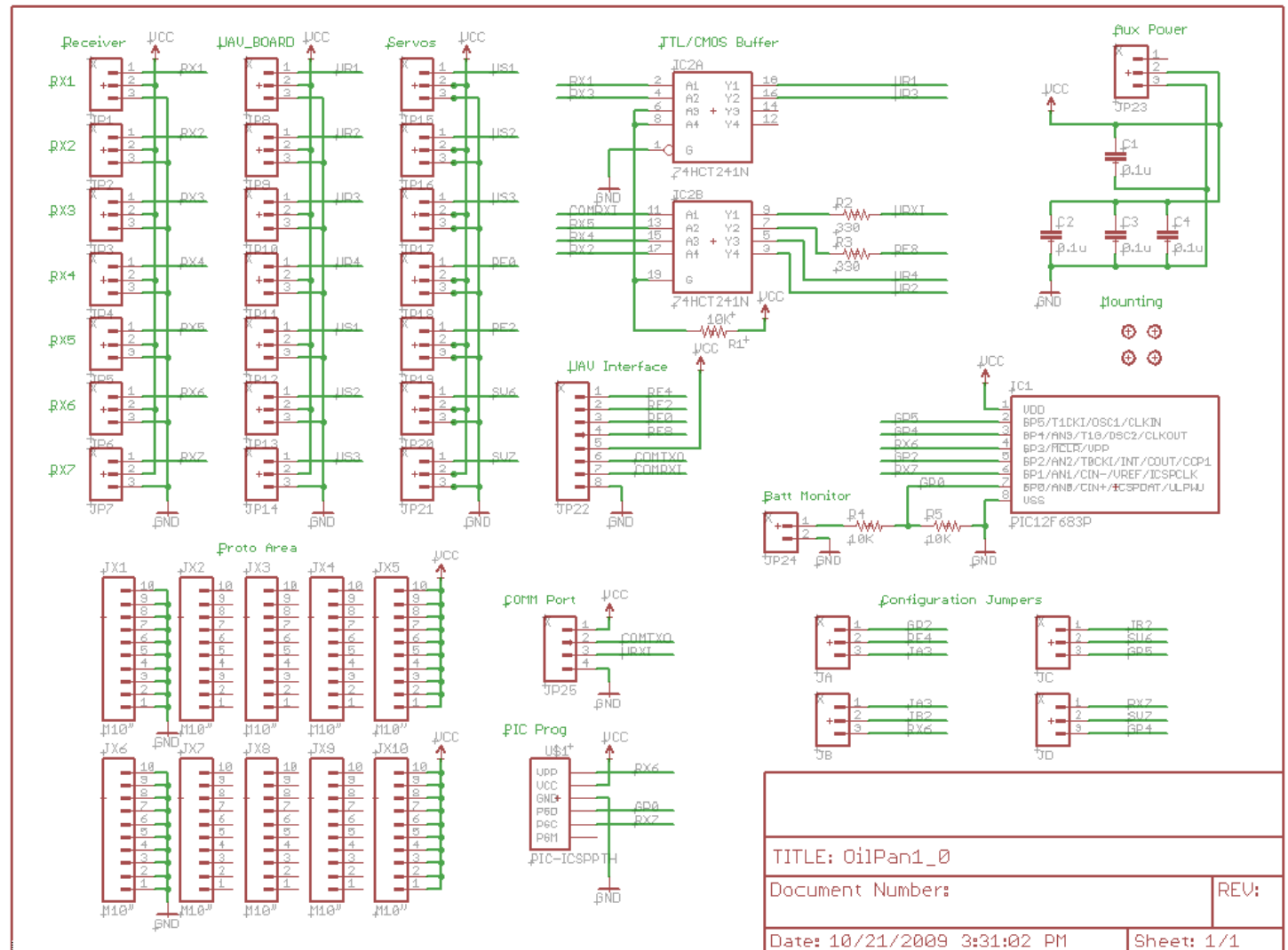
Bill Premerlani's innovative development of the UAV board and his incredible GentleNav DCM firmware has enabled the hobbyist to enjoy the benefits of RC auto-piloting and assisted-flight without spending thousands (or even tens or hundreds of thousands) of dollars to do so. Talented followers of Bill - Ben Levitt, Paul Bizard, Adam Barrow, Adam Bellchambers, Pete Holland, UFOMan, Riccardo Kuebler, Russell Duffy, SIDDHARTH, and many others continue to refine and improve the system to levels not imagined just a short time ago.

Visit and join the team at: <<http://code.google.com/p/gentlenav/>> or <<http://diydrones.com>>

6.0 Disclaimer

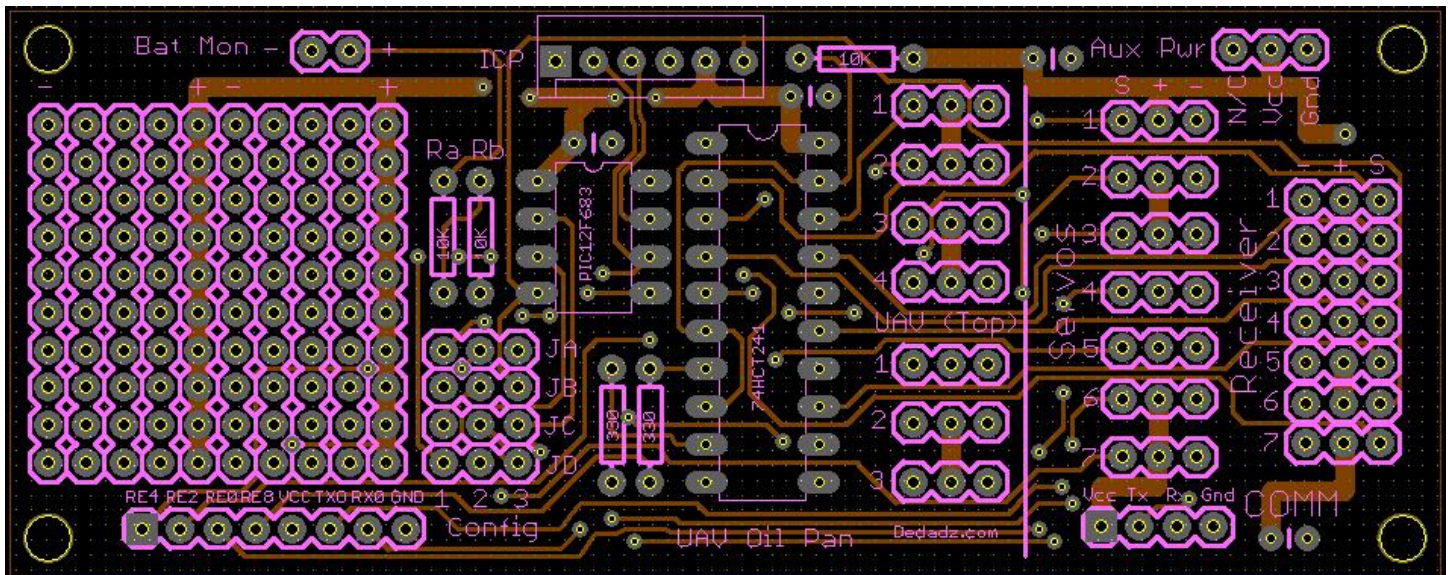
This product, including the Oil Pan board and/or included firmware is not guaranteed or include a warranty. It is intended for experimental use only. The author and designer of this product will not be responsible for any damage, injury, or legal action caused by the use or misuse of this product. Use, modification, or production of this product is covered under the GNU General Public License V3 agreement.

7.0 Schematic

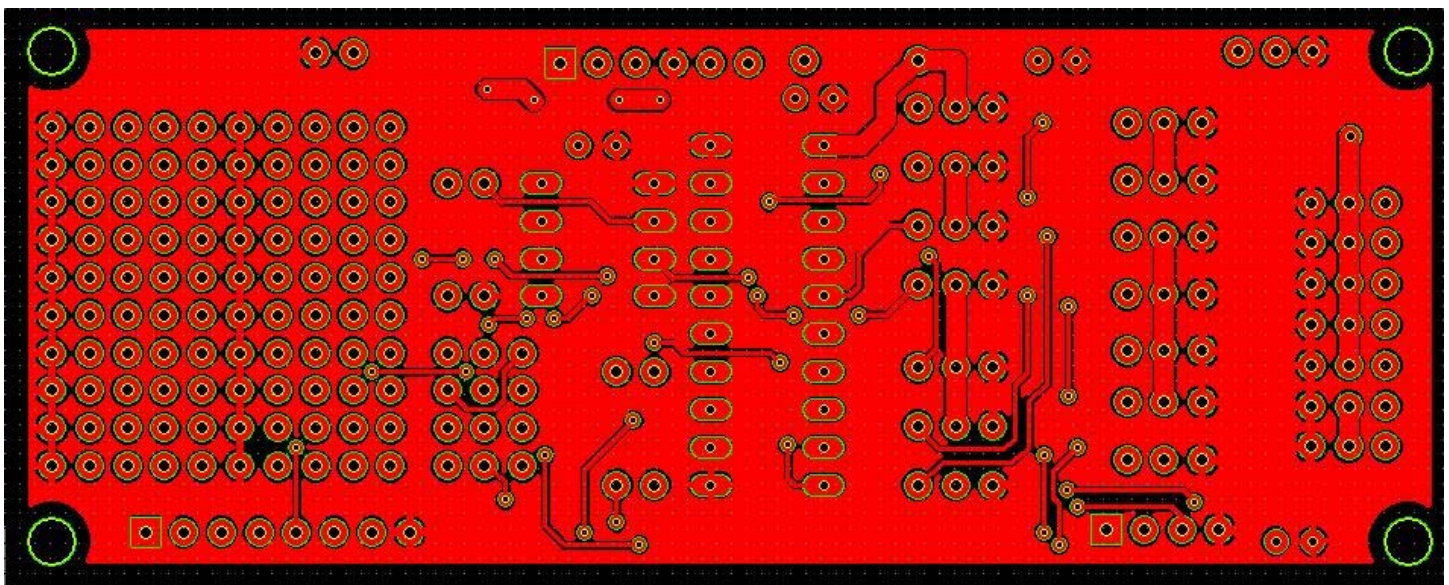


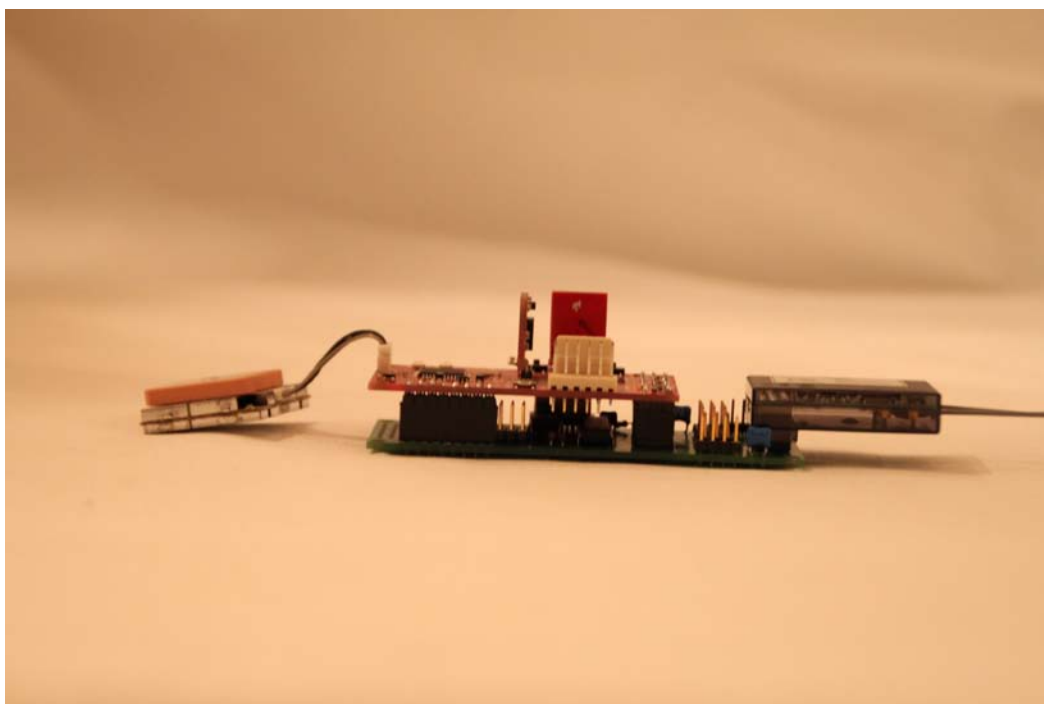
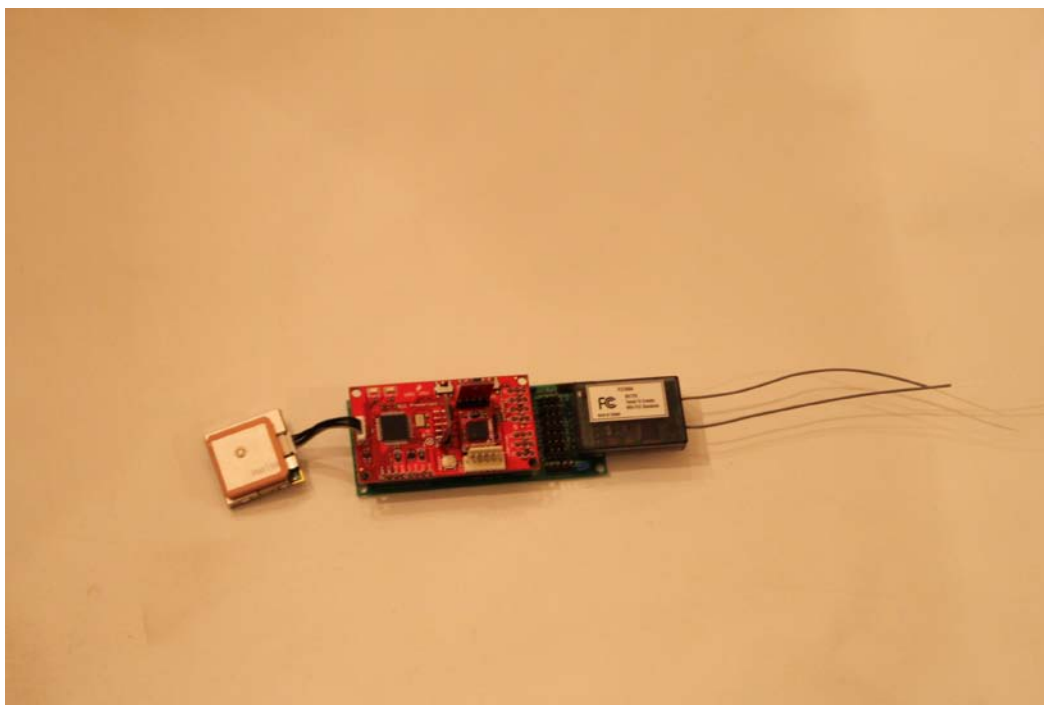
8.0 PCB Layout

8.1 Component Side (Top)



8.3 Solder Side (Bottom)





APPENDIX

1. (01/06/10) Rework for proper operation of the COMM RX Input on the Oil Pan Board.

- a. Remove R2 on the Oil Pan board.
- b. Add jumper wire from R2 pin 2 to CONFIG connector Pin 7 (RX0)

