

The **BabyBully** is a small, low cost yet powerful servo amplifier for DC permanent magnet brushed motors developed from our proven RET series speed control. We've added additional circuitry to make a basic servo amplifier suitable for fabricating your own position servos. You supply the motor and feedback potentiometer and the **BabyBully** supplies the control functions including the digital PWM power H-bridge to directly drive your motor. The H-bridge is constructed from rugged *discrete* MOSFETs thermally mounted to a metal thermal plate or heatsink with insulating thermal washers making the case electrically neutral. It is commanded by the popular 1-2 ms Servo Command Pulse from standard Radio/Control receivers such as Futaba, JR, HiTec, and Spektrum. The command is optically isolated to eliminate ground loops and plugs into your R/C receiver like any other servo. For the **RBSB421P** plate mounted version they are a compact 1.8 X 1.97 X .82" and weight about 2.5 ounces. The **RBSB421H** heat sink version is slightly larger and heavier.

To keep costs low adjustments are limited, lead/lag compensation is fixed, and the feedback potentiometer must be 5000 ohms with a fixed travel range. Failsafe in the absence of a command pulse results in the servo motor de-powered. Servo applications requiring extensive programmable tuning adjustments, additional failsafe features and high linearity should use our RBSC series.

INSTALLATION: Don't locate the unit close to the R/C receiver, antenna, or hot components. Usually no special attention is required for cooling; simply mount the unit so that the aluminum plate or heatsink is exposed to the air. Larger applications with continuous loads at the controller's maximum ratings may require moderate cooling air and/or the "P" plate version may require mounting by the aluminum plate to additional heat dissipating metal surfaces. The case is electrically isolated so you can safely mount the plate to your

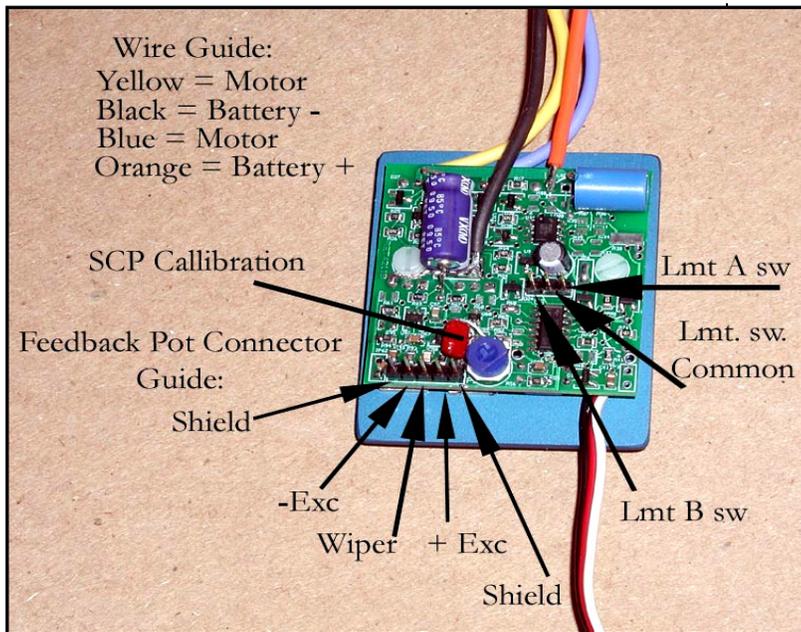
- **LOWEST COST**
- **CLOSED LOOP POSITION SERVO**
- **POTENTIOMETER FEEBACK**
- **7 – 26 VDC OPERATION**
- **UP TO 15A SERVO MOTOR AVG**
- **5 SECOND 30A SURGE**

metal shelf, vehicle frame or heatsink of your choice. Do not drill holes in the **BabyBully** plate or heatsink.

POWER WIRING: The **BabyBully** is powered by 12V DC through the Black and Orange #18 AWG wires: Black goes to the negative battery terminal and Orange goes to the positive battery terminal. Observe the polarity religiously to avoid destruction. Anticipate stalled motor conditions by installing a fuse and switch in series with the orange wire, *even when just experimenting*. With a centered mechanical load the quiescent current drain is about 25mA. However your fuse will have to be sized according to the starting current requirements of your motor. The **BabyBully** can control motors up to 15A average running current and 5 second 30A starting surges for starting or high transient servo loads. The unit will operate over 7 to 26 VDC but 12 VDC servo operation is recommended.

MOTOR WIRING: The motor of your servo is connected via the yellow and blue #18 wires. Which motor connection gets which color is unknown by us and is determined experimentally. At the motor terminals, or as close as practical to the motor brushes, install the (black) MOV device across the brushes to suppress Radio Frequency Interference.

FEEDBACK POT: The feedback potentiometer must be 5000 ohms and electro-mechanically centered with the desired center position of the servo. Please use a potentiometer rated for servo service. There is no benefit to purchasing an ultra-linear device. Wirewound pot types can be made to work but are not recommended. Low cost Cermet type elements are fine. Some high-end potentiometers use a plastic resistance element which cannot tolerate the 2000 ohm load placed on the wiper by the **BabyBully** circuitry. Pots without a physical stop are preferred so to avoid damage under some operating faults.



all servo motor and servo motor battery leads separated from receiver leads. Use the full extended length of the supplied receiver antenna and locate it away from all other wires or metal. About 1mA is required from the R/C receiver to power the optical isolator circuit.

FIRST TIME OPERATION: Assume the motor to feedback pot phasing will be wrong and take measures to avoid mechanical damage to your parts. Feedback potentiometers with mechanical stops are vulnerable. Begin with a mechanically un-loaded servo, smaller fuses, and no hard mechanical stops. The motor will not run without an R/C command. If the motor runs continuously the most probable cause is incorrect motor to feedback pot phasing; correct by turning the symmetrical feedback pot connector around.

If the unit becomes too hot to touch the plate or heatsink comfortably then cease operation and investigate the cause. Verify motor current under mechanical load with an inexpensive automobile amp meter.

To work correctly the potentiometer must be closely coupled mechanically to the motor/gear train with minimum backlash so that the pot is driven monotonically. Travel range is fixed within the unit. Over the 1-2 ms Servo Command Pulse range a 310 degree travel pot will traverse about +/- 45 degrees.

Connect the Feedback pot via the 5 pin standard 0.1" pitch header. In order for the servo to converge on a position the motor rotation must be phased with the feedback pot wiper voltage. The connector pin assignment is of symmetrical arrangement to facilitate easy phasing of the feedback signal with the motor rotation by simply turning around your mating connector to the header. The pot is excited by 4 volts. Header wiring is detailed in the picture. The first and last pins on the header are for a shield. Some applications with >8" wiring from the feedback pot to the *BabyBully* may require shielded wire to prevent corruption of the feedback signal. Leave the shield un-terminated at the pot end. Don't bundle the feedback wiring together with other wiring.

The only adjustment is the SCP calibration which is set at the factory for a FB pot wiper voltage of 1.8 volts at the servo center position eg: 1.51 ms SCP.

LIMIT SWITCHES: Limit switch inputs are on a separate 3 pin standard 0.1" pitch header. Actuate the limit function to de-power the servo motor by closing the switch contacts to the limit switch common. Detail in the picture. Servo will coast to a stop so design your limit switch mechanisms with provision for over-travel.

COMMAND INPUT: Plug the servo connector into the R/C receiver. The supplied universal connector may be plugged into a Futaba receiver incorrectly without harm but without successful operation. When plugged in correctly the colors line up with the colors on adjacent servos. Keep

Lead/lag compensation is fixed for 150W servos like pictured. Consult www.vantec.com/RBSB421apnote.htm for more information.

REPAIR: Our one year *limited* warranty covers parts and repair labor for a nominal charge if unit not abused; details on our website. Units **MUST** include a check or VISA/MC with EXPIRATION date for the current repair deposit amount listed at www.vantec.com/pricelist.htm. Please indicate associated equipment and *briefly* explain the problem. It is not necessary to obtain a "Return Materials Authorization" number, but often a telephone call can save you the time, trouble, and expense of a repair. Please insure shipment.

NOTES: These products are not safety devices nor for use in life-critical or life support systems. A slight hum from the motor is normal. Specifications and price are subject to change without notice. Patented or patent pending or expired. Some trade names and trademarks owned by others.

