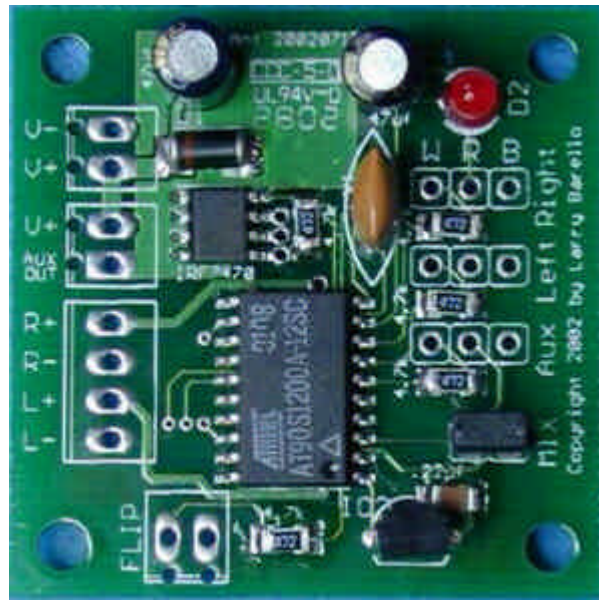


Antweight R/C Robot Controller v1.0



Ant weight combat robots are an inexpensive and *safe* way to participate in the "battle robot" craze. There are no limits besides a one-pound maximum weight limit.

The Ant R/C Robot Controller offers unparalleled functionality and reliability for your creation with dual motor drive, selectable single stick control, an 11-amp relay output for weapon actuation and a FLIP input that reverses and swaps the motor drive output for robots that are invertible.

Specifications:

- ❑ 1-1/2" square, 11.5 gm, 1-1/4" hole pattern for 4-40 bolts.
- ❑ 7-16 cell NiCad or NiMh supply.
- ❑ Three channels input compatible with any R/C radio: Left, Right and Aux.
- ❑ Left/Right drive rated for 2.5 amps each, 5-amp peak. Thermally protected.
- ❑ **11 Amp** relay auxiliary output for weapon control.
- ❑ Selectable channel mixing for single stick or tank style control.
- ❑ +5v power supplied to radio.
- ❑ Ultra efficient driver delivers full battery voltage to motors without a heat sink.
- ❑ **Advanced switching for precise control at low speeds.**
- ❑ +/- 64 steps of output control.
- ❑ FLIP input for automatic drive correction of invertible robots.
- ❑ Status LED indicating signal presence for each channel.

Version Description

The ANT 1.0 Controller can have one of four software versions loaded. The versions reflect alternate usage of the FLIP and AUX inputs as reflected in the table below:

Version	Flip Input	Aux Output
ANT 1.0	Switch closure	On/Off (Relay)
ANT 1.0 A	R/C signal	On/Off (Relay)
ANT 1.0 B	Switch Closure	Variable (PWM)
ANT 1.0 C	R/C signal	Variable (PWM)

Please refer to the sections on Connections, FLIP and AUX for more details on each option

Power Supply

The ANT 1.0 controller will function with a supply voltage as low as 5.0-volts before the reset circuit shuts down the board. The motor driver circuit, however, requires a minimum of 10v to operate. Experience shows that the motor driver will operate as low as 8.3v, but this might not be true under extreme temperature conditions. It is recommended that the ANT be powered by at least an 8-cell battery pack (9.6v nominal), but 7-cell packs have been known to work well. The nominal voltage for a 7-cell pack is 8.4v, but end of charge voltage is only 7v so the controller will not be able to fully discharge a 7-cell battery. An 8 cell pack end of charge voltage is ~8v, so the controller will be able to fully use the battery.

Connections

Connections are straightforward. All connections are labeled on the board (refer to the picture above). The connections are, CCW from the upper left:

- ❑ V+, V-: Main Supply.
- ❑ Aux-Out: Aux-out is a switch to ground. V+ is brought out to the Aux Out connector so the device being actuated can be connected directly to the board. The device attached to Aux-Out may be connected to a different supply that is equal or less than the main supply voltage.
- ❑ R+, R-: Right motor connection
- ❑ L+, L-: Left motor connection
- ❑ FLIP: When shorted corrects left and right drive for inverted operation. If the R/C input option is selected, then stick forward ½ activates the flip function.
- ❑ MIX: open = tank style drive, shorted = single stick operation where the left channel is throttle and the right channel is steering.
- ❑ AUX: R/C input that controls the AUX Out relay. Relay is activated at ½ stick forward. If the Variable output option is selected, output is continuously variable from 0% at center stick to 100% at stick full forward.
- ❑ LEFT: R/C input that controls the left drive, or throttle in mixed mode
- ❑ RIGHT: R/C input that controls the right drive, or steering in mixed mode

Battery Eliminator Circuit (BEC)

Power is supplied for the R/C radio at the connectors. The radio power is not intended to drive servos and will not drive a standard servo under load. If you prefer to use a separate battery to drive your radio and servos do not connect the middle lead of the connectors. This lead is typically red and is labeled on the board with an "R". Note: you must cut or detach *all* of the red leads as each is connected to +5v on the board.

Status LED

The status LED blinks once for each active channel during a 1-2 second cycle time. If only one channel is active, then one blink, if two channels active, then two blinks, etc. If the LED is on continuously, there is power, but no signal. If the LED is not illuminated, then there is no power or the CPU is damaged.

FLIP input

When using the R/C input option for FLIP, connect the signal wire (usually white or yellow) of the R/C cable to the *left* FLIP input and the black wire to the *right* FLIP input. You must have at least one other full cable connected to the ANT 1.0 board to supply +5v and ground to the receiver. Note: It is optional to connect the black wire, as the signal return is present on the other, standard, R/C cables connected to the board.

With the relay output AUX channel and the Switch Input FLIP the FLIP input may be connected directly to the AUX-OUT output so that the AUX channel actuates the FLIP function. Connect the *left* FLIP input to the AUX-OUT with a short piece of wire. When you do this, leave the V+ and the *right* side of the FLIP connector unconnected.

AUX output

The auxiliary output is capable of handling between 10-12 amps. The output driver has no lower voltage limitations and can safely switch any voltage that is *less* than or equal to the main supply voltage of the board. This applies to both variable and on/off output versions.

For example, if 2x7.2v rechargeable batteries (i.e. 9v replacement batteries) were used for the main supply and drive motors, one could use two or three sub-C cells for a weapon supply. Connect the weapon between the + side of the weapon battery and the AUX out and connect the - side of the weapon battery to ground or V- on the board.

Limitations

The Ant 1.0 controller uses an Allegro dual H-Bridge driver chip. This part is very rugged and includes thermal overload protection. However, it does not have over current protection. Using an inappropriate motor, or shorting the output to ground or V+ will destroy the chip. The chip is rated for 2.5 amps continuous per channel and a maximum rating of 5.0 amps per channel. In practice it can handle more current but reliability will be affected (shorter lifetime, greater chance of destroying the chip).

Motor selection

Do not use cheap toy motor gearboxes with the Ant 1.0 controller. You will destroy the controller. Most cheap toy motors are designed for 3v or so. Since the Ant 1.0 controller requires a supply greater than 8 volts, it will seriously over drive the motors and overheat. The Ant 1.0 controller is thermally protected against gross overloads, it is not protected against dead shorts or high current surges that occur with low voltage motors.

It is better to use 6-12v motors and reasonable battery packs (e.g. 8 cell pack or 2 x 9v rechargeable batteries) to power the controller. Higher voltage motors draw proportionally less current and deliver the same power. Higher voltage motors combined with the smaller 9v rechargeable batteries makes for a high powered package that doesn't weigh much and should still operate for many minutes between recharges.

Disclaimer

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Schematic

