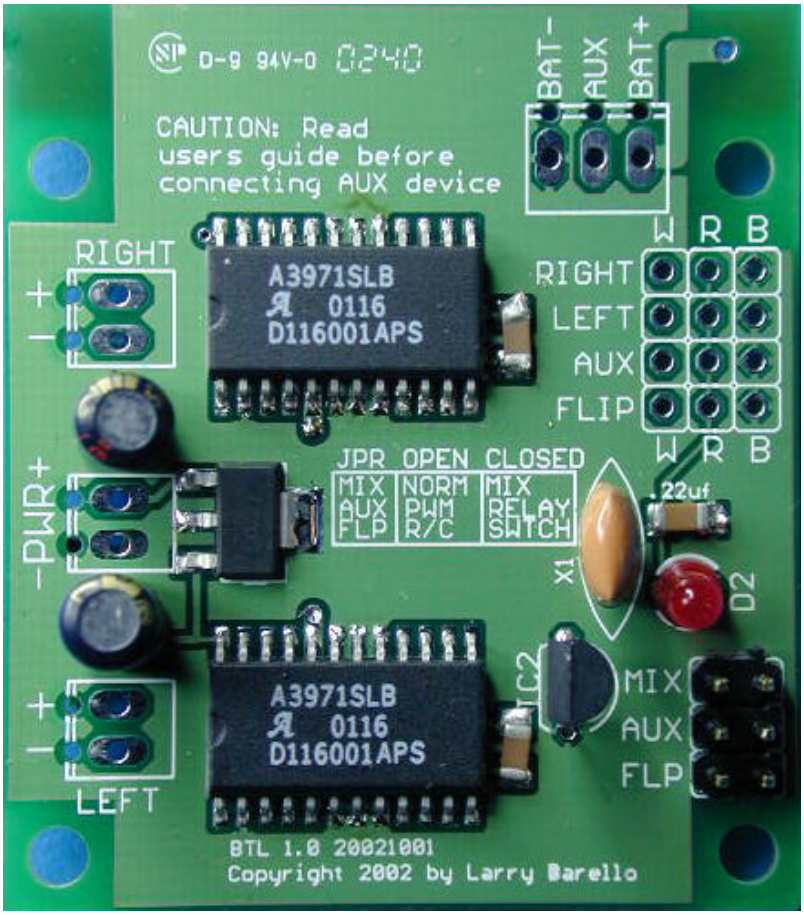
Antweight R/C Robot Controller v2.0



The Ant 2.0 R/C Robot Controller offers unparalleled functionality and reliability for your creation with dual motor drive, selectable single stick control, an 20 auxiliary output for weapon actuation and a FLIP input that reverses and swaps the motor drive output for robots that are invertible.

Specifications:

- 2 x 1-3/4 x 5/8”, 13 gm, 1-1/2" hole pattern for 4-40 bolts.
- 7-20 cell NiCad or NiMh supply. +5v power supplied to radio
- Four channels input compatible with any R/C radio: Left, Right, Aux and Flip.
- Left and Right output rated for 5 amps continuous, 10-amp peak each. Thermally protected.
- **20 amp** auxiliary output for weapon control.
- Selectable channel mixing for single stick or tank style control.
- 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.
- Status LED indicating signal presence for each channel.

Power Supply

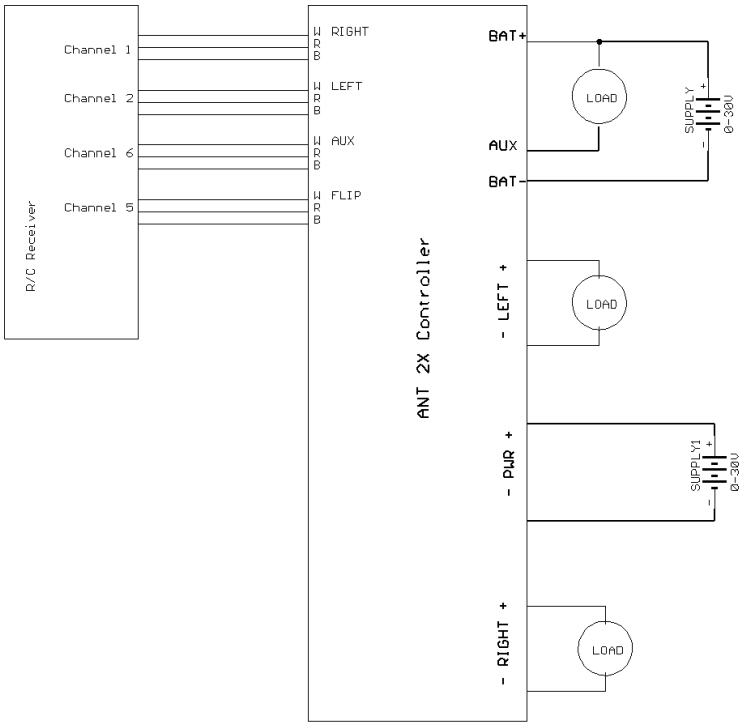
The ANT 1.0 controller will function with a supply voltage as low as 5.0-volts before the board shuts down. The motor driver circuit, however, requires a minimum of 10v to operate. Experience shows that the motor driver will operate as low as 8.3v, but this might not be true under extreme temperature conditions. It is recommended that the ANT be powered by at least an 8-cell NiCad 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 can fully use the battery.

Connections

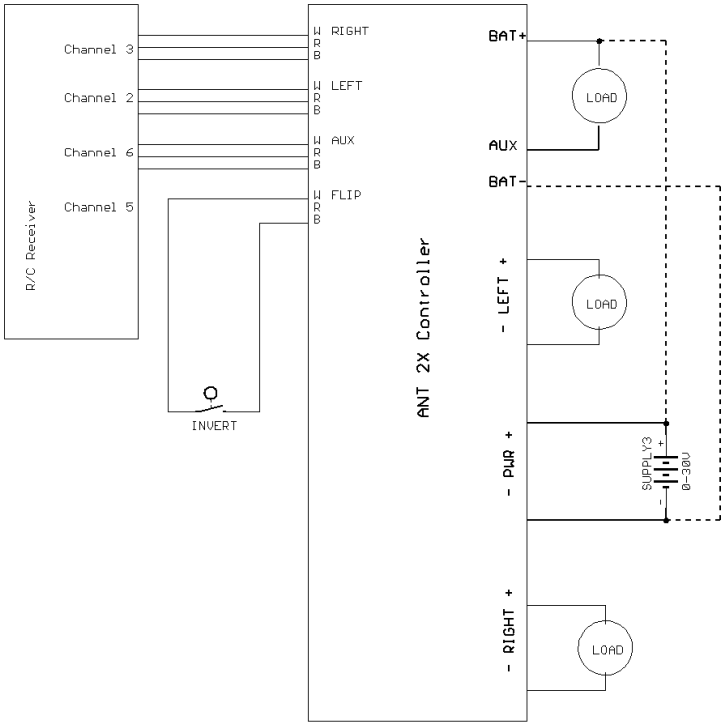
Connections are straightforward. All connections are labeled on the board (refer to the picture above). The connections are, CCW from the upper left:

- RIGHT motor connection
- PWR – Main power connection to board. Must be at least 8.4v
- LEFT motor connection.
- FLP - Jumper
  Open = FLIP is controlled with an R/C signal (stick ½ forward to activate)
  Closed = FLIP is controlled by a switch closure.
- AUX - Jumper
  Open = Auxiliary output is PWM, 0-100% with stick forward from neutral.
  Closed = Auxiliary output is a relay closed (activated) with stick ½ forward.
- MIX – Jumper
  Open = Normal tank style control. Left R/C controls Left Motor, etc.
  Closed = Joystick control: Left R/C = velocity, Right R/C = Steering.
- FLIP R/C signal that activates the Flip function on robots that are invertible. This input is optionally a switch-activated input if the FLP jumper is present.
- AUX R/C signal that controls the Auxiliary output. Auxiliary output is a 20 amp FET driver that can operate in either PWM or RELAY mode depending upon the presence of the AUX jumper.
- LEFT R/C input that controls the LEFT motor, or, Throttle if the MIX jumper is present.
- RIGHT – R/C input that controls the RIGHT motor, or, steering if the MIX jumper is present.
- BAT+ Power Supply for Auxiliary device (See AUX Output, below)
- AUX Auxiliary Device Ground return
- BAT- Power return to Auxiliary power source

Typical wiring diagrams are shown below. Note that channel assignments will vary depending upon the radio gear used.



Connections for Single Stick (mixed), R/C flip and Dual power supply



- Connections for Tank Steering, Switch activated flip and Single supply

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 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 2 second cycle time. 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 board is damaged.

FLIP input

FLIP input is used to reverse and swap the left and right output drive. This allows robots that are invertible, or can operate in reverse, to be controlled with normal stick movements. A jumper labeled FLP sets the activation mode of the board.

1. With the jumper removed an R/C signal activates the FLIP function with stick ½ forward.
2. With the jumper present a switch closure between the W and B leads activates the FLIP function.

Option 1 allows internal tilt sensors to be used for automatic flip correction. Option 2 allows remote activation.

AUX output

The auxiliary output is capable of handling 20 amps continuously and many times that in surge current. The output driver has no lower voltage limitations and can safely switch any voltage up to the limit of the board (30v). To safely allow alternate supplies and accommodate the high currents involved special wiring is needed. Please refer to the wiring diagrams on page 3 when reading the wiring instructions, below.

1. The Auxiliary supply is connected to the terminal labeled **BAT+** and **BAT-**. **BAT-** is electrically connected to the ground (**PWR-**) of the board. However, due to the high currents present, do ***not*** use the board ground return for the auxiliary load. You must use **BAT-** for the ground return of the auxiliary load.
2. Auxiliary output is a switch to ground. Therefore the load must be connected between **BAT+** and **AUX**.
3. If the main power source supplies both the board and the AUX drive, then use separate wires for the supply and ground return from the battery to the main power (**PWR**) and auxiliary power (**BAT**). For light duty use, jumpers from **PWR+** to **BAT+** and **PWR-** to **BAT-** may be used. However, the terminal blocks will not accommodate two wires of the appropriate size for the currents the board can handle.

Limitations

The Ant 2.0 controller uses an Allegro dual H-Bridge driver chip, which is very rugged and includes thermal overload protection. However, it does not have short circuit protection. Using an inappropriate motor, or shorting the output to ground or power will destroy the chip. The chip is rated for 5-amps continuous and 10-amp peak. In practice the parts can handle more current but reliability will be affected.

Motor selection

Do not use cheap toy motor gearboxes with the Ant 2.0 controller. You will destroy the controller. Most cheap toy motors are designed for 3v or so. Since the Ant 2.0 controller requires a supply greater than 8 volts, it will seriously over drive the motors and overheat. The Ant 2.0 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. 8-16 cell pack) to power the controller. Higher voltage motors draw proportionally less current and deliver the same power.

Forced Cooling

The Ant 2.0 board was designed to run without heat sinks or cooling under normal circumstances. However, the board can benefit from additional heat sinking or forced cooling when operated at extreme levels. The Ant 2.0 board was laid out to facilitate gluing heat sink material on the surface of the main driver chips.

If your application causes thermal limiting (the motors start to whine and lose power) you can extend the time before thermal limiting by adding thermal mass or finned sinks to the top of the chips. This will only extend the range by a small amount. If thermal limiting starts quickly and is not helped by additional heat sink material you may need to re-examine you choice of motors, gearing or batteries to find a combination more suited to the Ant 2.0 board.

Disclaimer

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