

# C O M B A T Z O N E

## Featured This Month:

### Features

- 26 BUILD REPORT:**  
*Reversing the Trend*  
by Pete Smith
  - 27 MANUFACTURING:**  
*DIY CNC for CAD/CAM*  
by J. Miles
  - 30 PARTS IS PARTS:**  
*Kitbots Rolls Out B-16 Gearmotor Mounts*  
by Kevin Berry
  - 31 RioBotz Combob Tutorial Summarized: LaunchBots**  
Summarized by Kevin Berry
  - 34 Combat Zone's Greatest Hits**  
by Kevin Berry
- ### Events
- 35 Feb/Mar Results and May/Jun Upcoming Events**
  - 35 EVENT REPORT:**  
*Motorama 2010*  
by Chris Olin

## BUILD REPORT:

### Reversing the Trend

● by Pete Smith

I recently completed our first drum bot – Weta, God of Ugly Things (**Figure 1**). And while it is a pretty conventional design, it does have one feature rarely seen in bots of this type: The drum is reversible, so it can spin in either direction.

Drum bots work best when the drum is spinning so that the teeth will come up and catch an opponent and throw them up into the air. If the bot gets flipped over, the teeth then try to push the opponent down instead. This has proven to be pretty ineffective (**Figure 2**).

Weta was designed to be completely invertible and it can operate equally well either way it ends up since it is able to quickly and smoothly reverse the direction of rotation of the

brushless motor that powers the drum. Reversible Electronic Speed Controllers (ESC) have been used for some time in RC cars, but have been cost-prohibitive. The

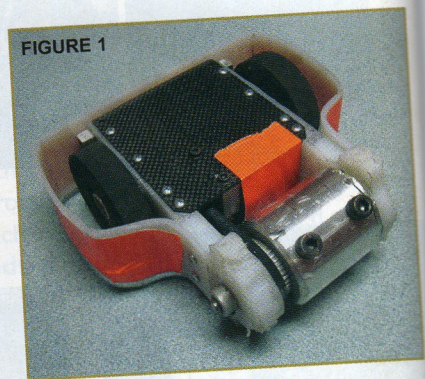
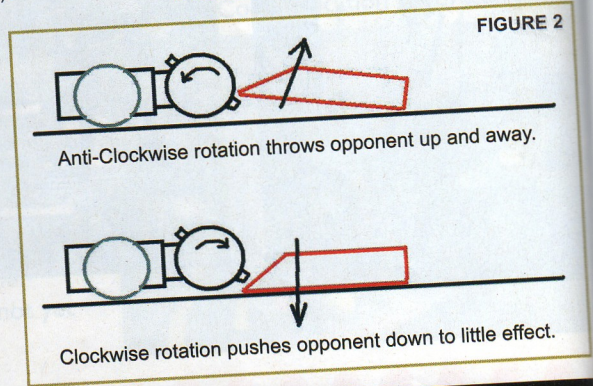


FIGURE 1





recent availability of much cheaper units have made them attractive for use in the smaller 1-12 lb weight classes.

The ESC I used in our beetleweight was the Turnigy TR35A-V2 from [www.hobbyking.com](http://www.hobbyking.com) and it cost less than \$40. As delivered (**Figure 3**), it has a small fitted fan, long cables, and a separate on/off switch; it weighs a total of 2.5 oz. The fan is too fragile for use in a combat robot; the switch is another failure point; and the wires are too bulky and heavy. I removed the fan (it's held on by only two small screws) and clipped off its power cables close to the ESC's circuit board. The wires for the switch were cut about an inch from the board, stripped, soldered together, then protected by some heatshrink.

The other wires were shortened and new connectors added to match the type I use in my other beetleweights (so we can use the same batteries). There was also a large capacitor that was held in place by the fan, and that was secured using a dab of Shoe Goo®. The result (**Figure 4**) is much neater and almost one ounce lighter.

The ESC is best programmed using the optional programming card (**Figure 5**). The various options are explained in the manual that comes with the ESC. I initially tried out the brake function but found it stopped the drum very abruptly

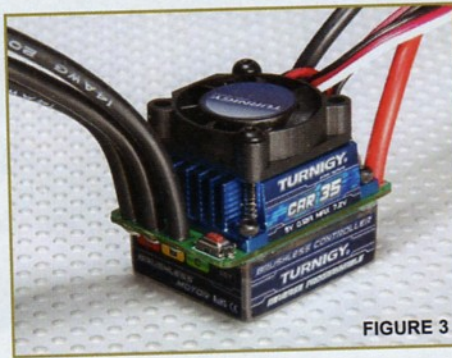


FIGURE 3

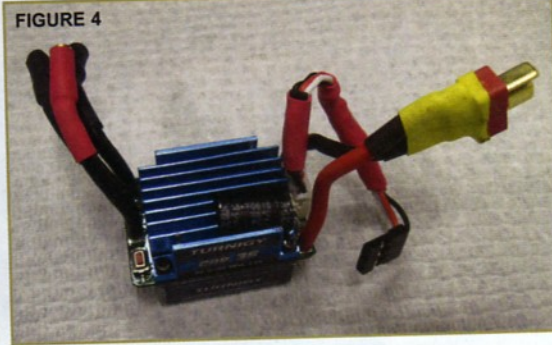


FIGURE 4

and applied too much stress to the pulley on the weapon motor. I reduced the braking settings to zero and found that the drum still stops and reverses quickly enough for it not to be a problem. I used the rudder function on my TX to operate the forward, stop, and reverse of the motor. After a few problems with calibration (the lights did not come on as per the instructions), I had it running well. The rudder stick is spring loaded so it always returns to the center "off" position if released — a useful safety feature. The ESC also failsafes correctly if it loses the signal from the TX.

Weta had its first competition at Motorama in February and the reversibility of the drum really proved very useful and allowed us to win at least two fights we would have otherwise lost. Removing the fan did not create overheating problems since the "cruising" amps to drive the drum were well below the rating of the ESC.

We went on to take 2nd place in the 3 lb class. Weta's

fights can be seen on YouTube by searching for "Weta" and "Motorama."

Hobby King also has 60A and 18A versions which could work in hobby and antweights. The 35A we used and the 60A version both run on 3S LiPo (with the 18A one only for 2S). Some reports say that the 60A will run on 4S, but that has not been confirmed. **SV**

FIGURE 5



# MANUFACTURING: DIY CNC for CAD/CAM

● by J. Miles

When I get ready to start building a new fighting robot,

the first thing that I do (besides daydream at work about what I

want it to look like!) is sit myself down in front of a computer and