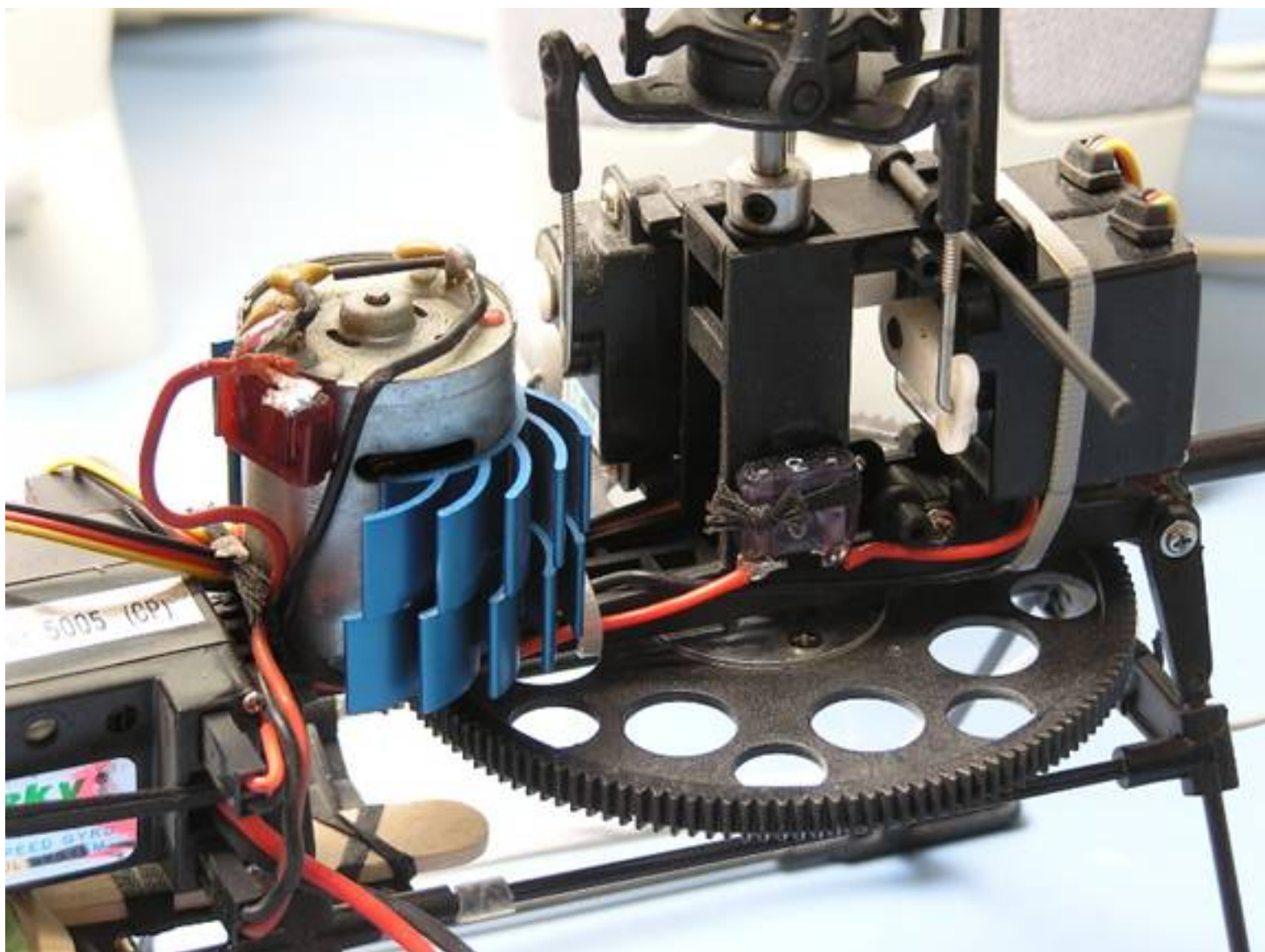


## Upgrading your Mini Electric Helicopter for protections for your motor electronics, main rotor drive gear and drive motors.

(E-Sky Honeybee, 3D, CP2, E-flight Blade, Century Hummingbird CP or 3D or any other brand that uses the 4 or 5 in 1 controller)

This is one of the modifications that we came up with and perfected while serving in Iraq as part of the unit- F Company 238<sup>th</sup> Aviation Maintenance. Our mission was Army Helicopter maintenance and support. After 10-14 hour days of heavy maintenance on Army Blackhawk and Chinook helicopters we would end the night with an hour or two of flying our little helicopters in the hangar or under the large towering maintenance lights on the tarmac. At last count there was 14 of us in our group that had various versions of this little helicopter.

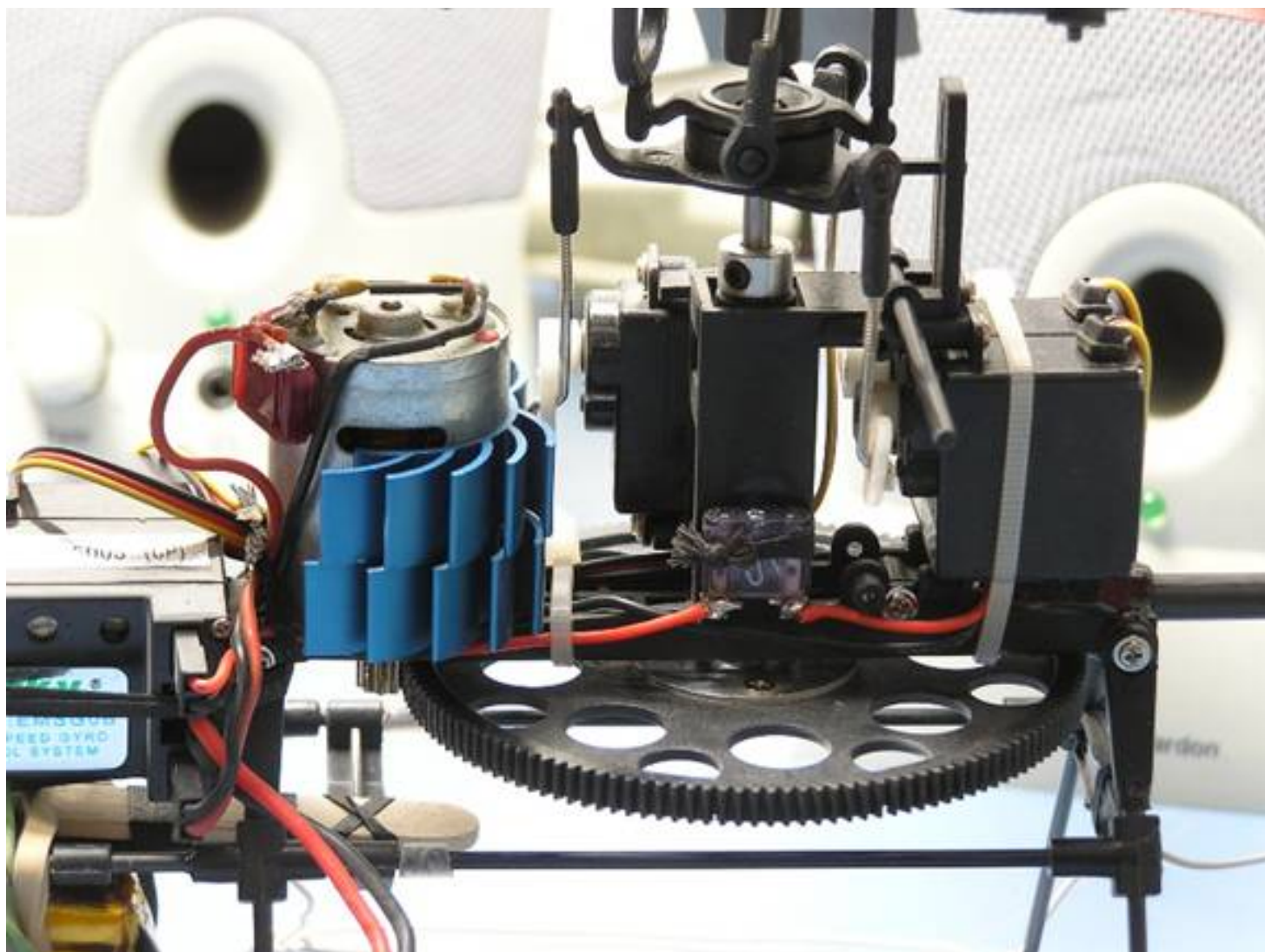
In this modification you will be adding several fast acting fuses to protect your expensive electronics, your main rotor system and drive gear as well as your motors and wiring.



In the picture above you can see the location of the two fuses. Use a 7.5 Amp fuse on the main motor. Trim the fuse terminals and bend them into position. Then solder the fuse directly to the terminal on the side of the motor and solder your wire to the other terminal of the fuse (as shown).

- Make sure that the fuse terminals do not touch the edge of the main motor when you solder it in place. Otherwise you might damage your 4-in-1

controller.

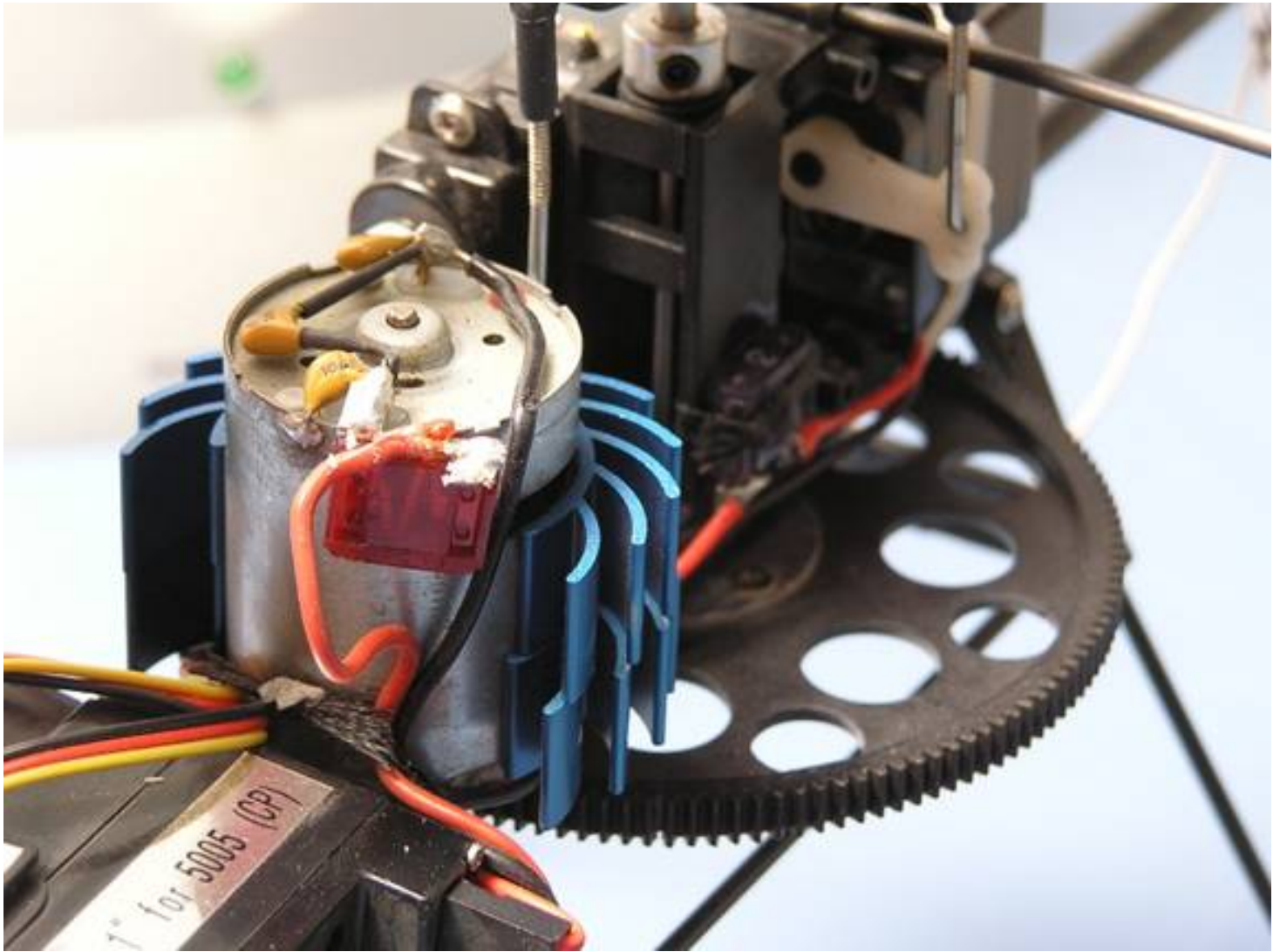


Here

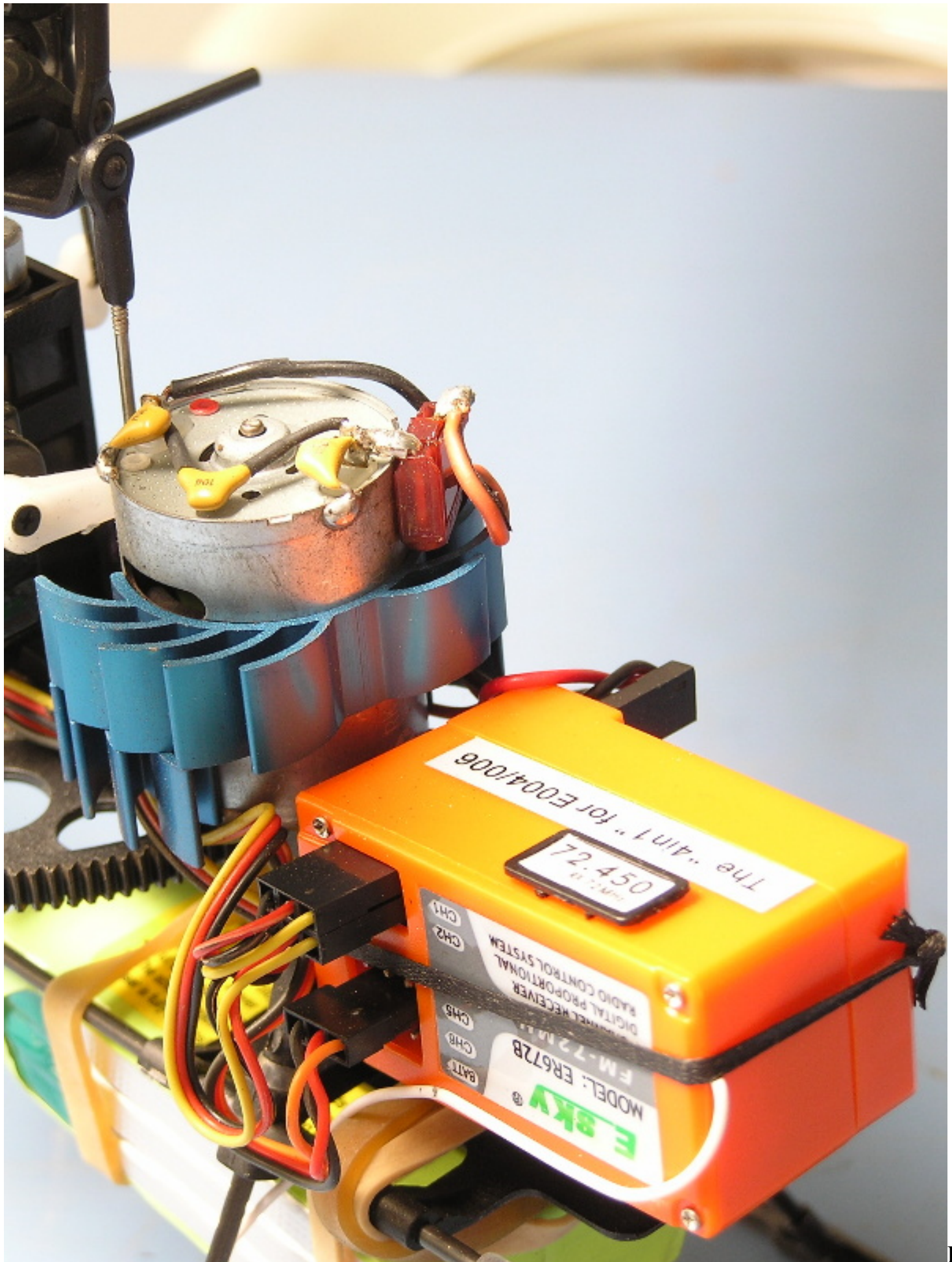
is another photo giving another view.

- The tail rotor fuse is held in place by a drop of super glue and in the photos I also used a piece of wax string to tie it in place to make sure it doesn't move. We later found that this wasn't really necessary as the glue holds great.





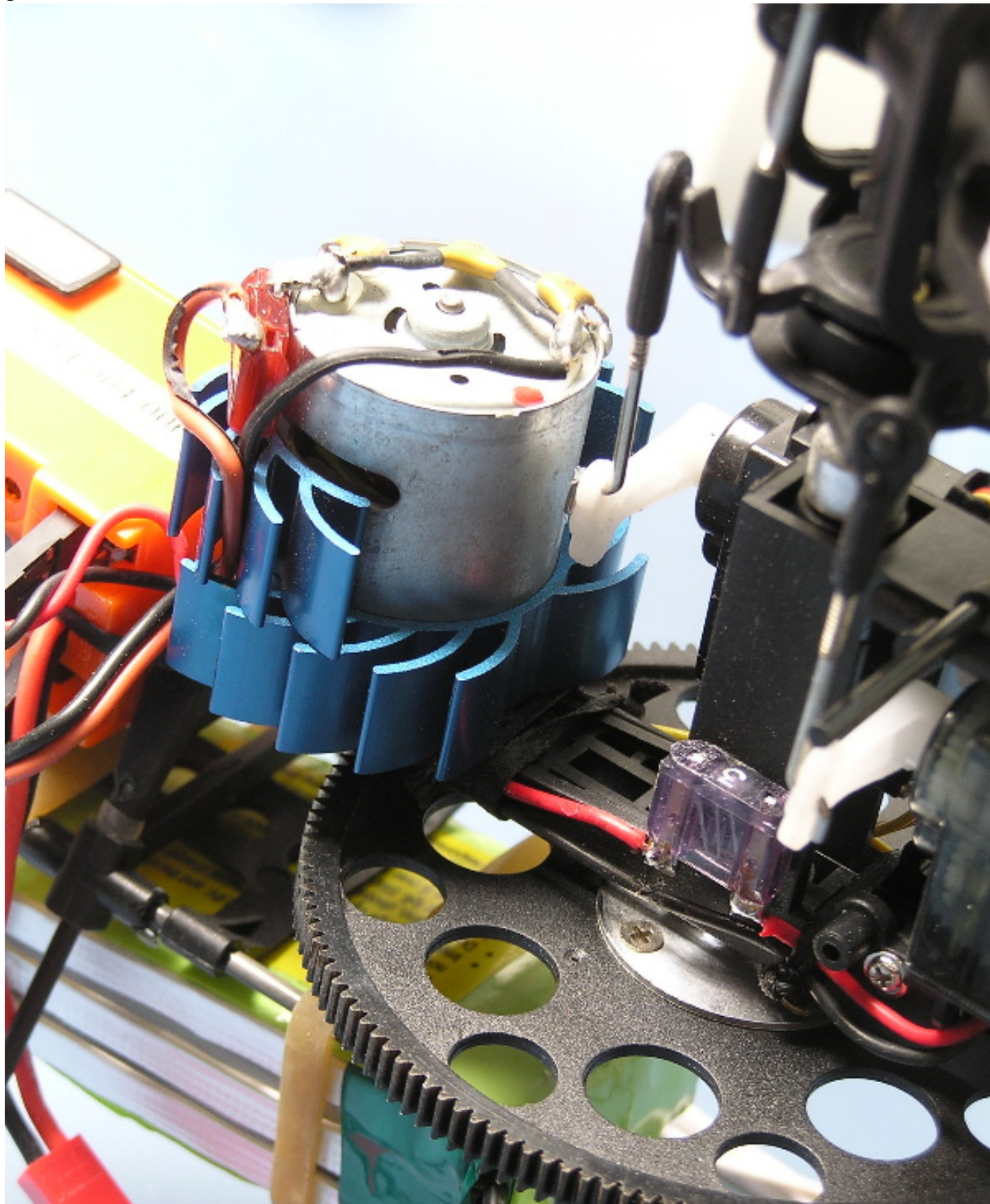
Here is a view from the front. Again- make sure neither of the fuse contacts touches the metal case of the motor. If it touches the motor can then you will probably damage your speed controller (4 In 1 Controller).



Here



is another view from the other side of how to mount your 7.5 amp fuse. (Normal power draw when the helicopter is in flight is 3.5 - 5.5 Amps so the fuse will never blow unless you hit something) If you do hit something you want the motor to stop immediately as you are going to do less damage to the rotor system if it is not under power when it bumps around hitting things on the way to the ground.





is another shot showing both the main motor fuse as well as the tail rotor fuse. Remember in anything you do to modify your helicopter that lighter is better. These fuses weigh .5 grams and we have found they are the best choice.

### How and why it works:

The only time you will ever blow a fuse is in a crash. The physics of what happens is that when the main rotor or tail rotor hits something hard -the motor suddenly experiences an immediate and very abrupt load which stalls the motor and causes the current to instantly spike extremely high. It is this much higher than normal current load that burns out your 4 in 1 (the motor speed control) in a matter of just a few seconds. A properly selected fuse is very fast acting (.1 second response) and immediately blows which shuts off the current to the motor and saves both the motor, speed control as well as your drive gears. No more stripped gears or burned out 4 in 1 controls which save down time and lots of bucks. We have had several instances where one of us hit the top wall and ceiling of the hangar and only had to replace a piece of the landing gear and the blown motor fuse and were flying again.

Another modification we recommend is using the PE foam blades (see [heli-fever.com](http://heli-fever.com)) . They are cheap \$3.75 a set (cover them with some packing tape for extra life), are very forgiving and will break up before you destroy parts on your rotor head. A big savings while you master your flying!





The photo above is an example of the fuses. The fuses you need are the small mini-Blade automotive fuses available at any automotive parts store. Use the mini-blade fuses as they are smaller and lighter than the normal blade fuses (weigh less than .5 grams). Use 7.5 amp for the main motor and 2 (preferred) or 3 Amp for the tail motor.

If you should have any questions or comments that might make this instruction sheet better just let me know! [ScottHelmann@msn.com](mailto:ScottHelmann@msn.com)

Happy Flying!

-Scott