Electric Setup for LT-40 Arf

by Gordon Collyer

Laying out the internals of an electric power system can sometimes be a bit of a challenge with conversions from fuel planes, and even with electric planes if specific components are not called out in the plans and instructions. An example may help the new RC'er to succeed in the first installation experience. Below are some pictures of the power system I put in an LT-40 ARF. Figure 1 is the motor box. A small ESC might fit between the firewall and the motor mounting plate, but here the space is taken up with wires. There is a plastic cowl that fits tightly over the motor box, so the motor wires must go through this space. I tied the motor leads down at the corner of the motor box with a tie wrap and in the fuselage with the red tape visible in the upper center of Figure 1. With a lite 6.5 oz. motor, the LT-40 balanced with a 4 cell 4350 mah battery all the way forward. The red tape both keeps the wires out of the way of the battery but also keeps the ESC leads from being moved around a lot. If you're not familiar with the 3M double sided red tape, it available in most home improvement centers. It is double sided and very sticky. I've seen it used for attaching home security sensors to walls in places where it is difficult to use screws. After being in place for a while it becomes a good semi-permanent adhesive. I use it both double sided to attach things like ESCs and receivers, and single sided to hold wires in place.

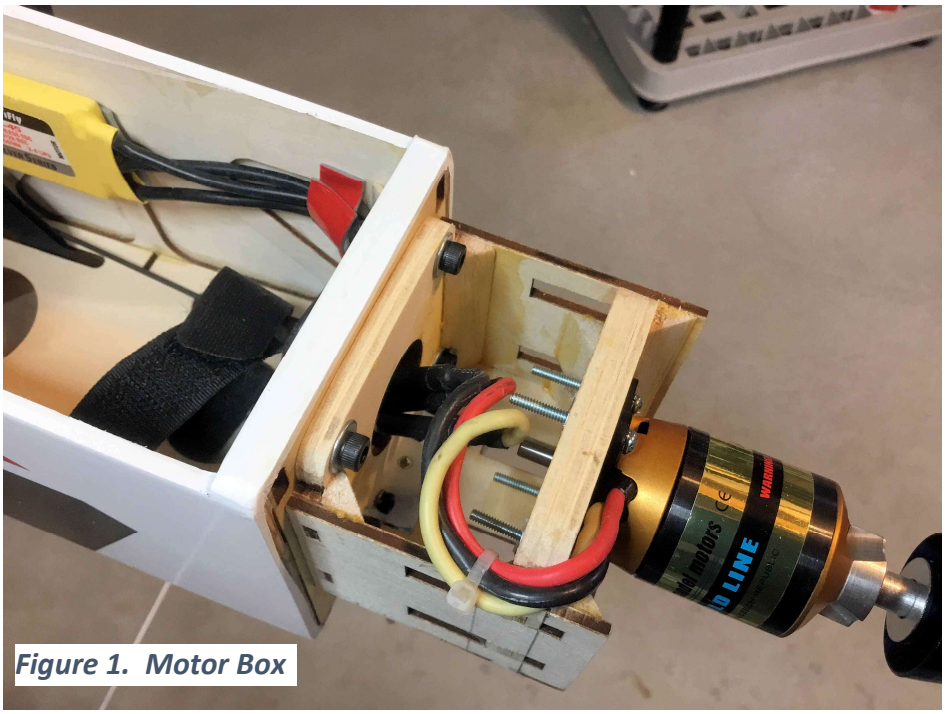

Figure 1. Motor Box

The LT-40 ARF comes with a large magnetic front hatch and a pre-installed battery/fuel tank floor. Figure 2 shows the battery compartment and the ESC mounted with the double sided red tape to the side of the fuselage. In Figure 2 you can see the Velcro battery hold-down straps and the slots for the straps in the compartment floor. The nose wheel pushrod runs down the left side of the battery compartment and takes up some room, so I mounted the ESC on the left side above the pushrod. If a battery should ever need more side clearance I can push it all the way to the right. If the hold down straps aren't used here, some sort of a balsa or plywood

battery box would need to be constructed to restrain the battery. In this event, the hatch might need to be configured to lock in place to help restrain the battery.

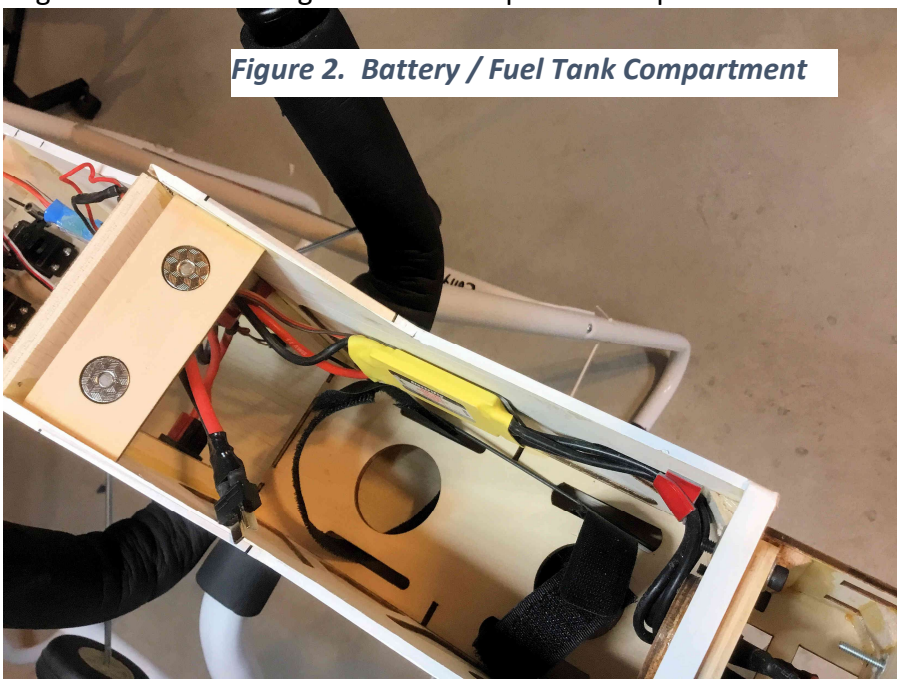

Figure 2. Battery / Fuel Tank Compartment

Figure 3 is the battery strapped into the battery tray. The leads are placed to the rear to allow the battery to be as far forward as possible. I will typically use both an arming plug and a secondary power supply for the electronics rather than the ESC battery eliminator output. To keep things uncluttered I will place these behind the first former. In the LT-40 there is lots of room between the battery tray and the servo tray so this works out well. If this were not the case then the arming plug and power supply would have to be positioned above, or beside the battery, but in a way that would allow it to still be slipped in unrestrained. In cases where things get tight, the ESC could be attached to the underside of the hatch if the leads are long enough to allow access for the battery when the hatch is off.

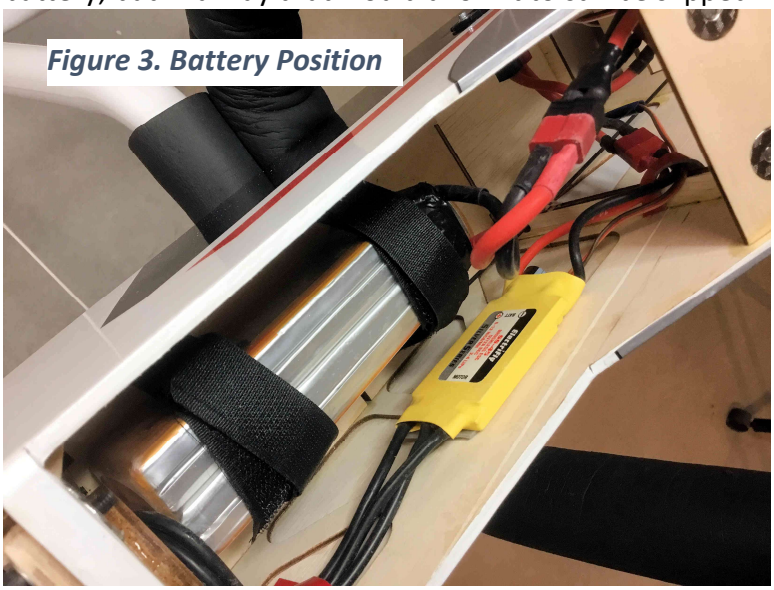

Figure 3. Battery Position

Figure 4 is another view of the ESC mounting, including the red tape I've wrapped around the former to tie up the leads from the ESC. This will keep them from potentially interfering with larger batteries and again keeps them from being moved around a lot during battery changes.

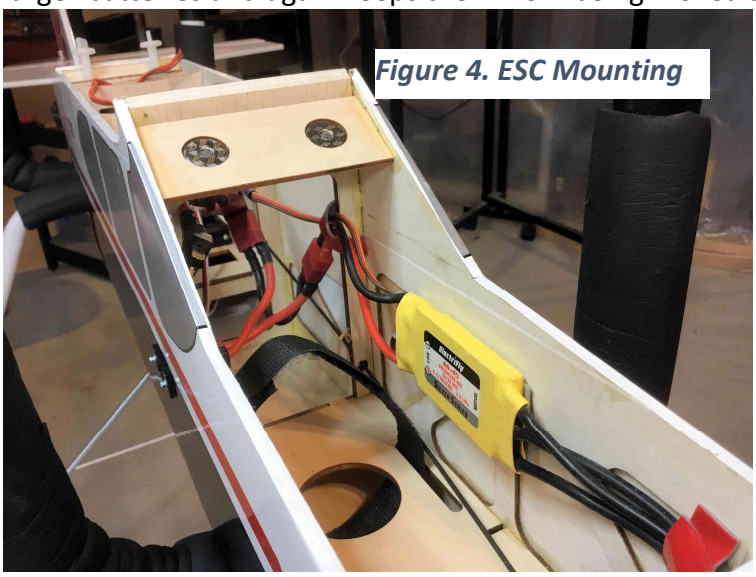

Figure 4. ESC Mounting

Figures 5 and 6 show the arming plug socket installed in the side of the fuselage aft of the first former. A parallel plug routes the battery connection to both the arming plug and the secondary power supply which is the blue component at the end of the smaller wires.

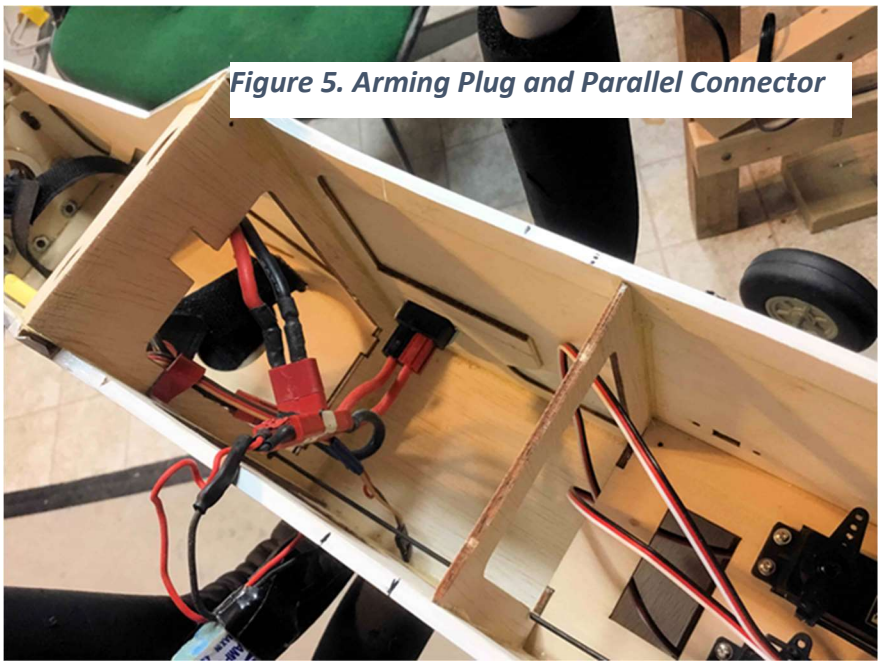

Figure 5. Arming Plug and Parallel Connector

In Figure 6, the leads that go forward through the first former are a short extension so that I can tie the parallel connector down and plug the battery in easily. Looking back to Figure 2, these can be seen at the top of the opening in the first former.

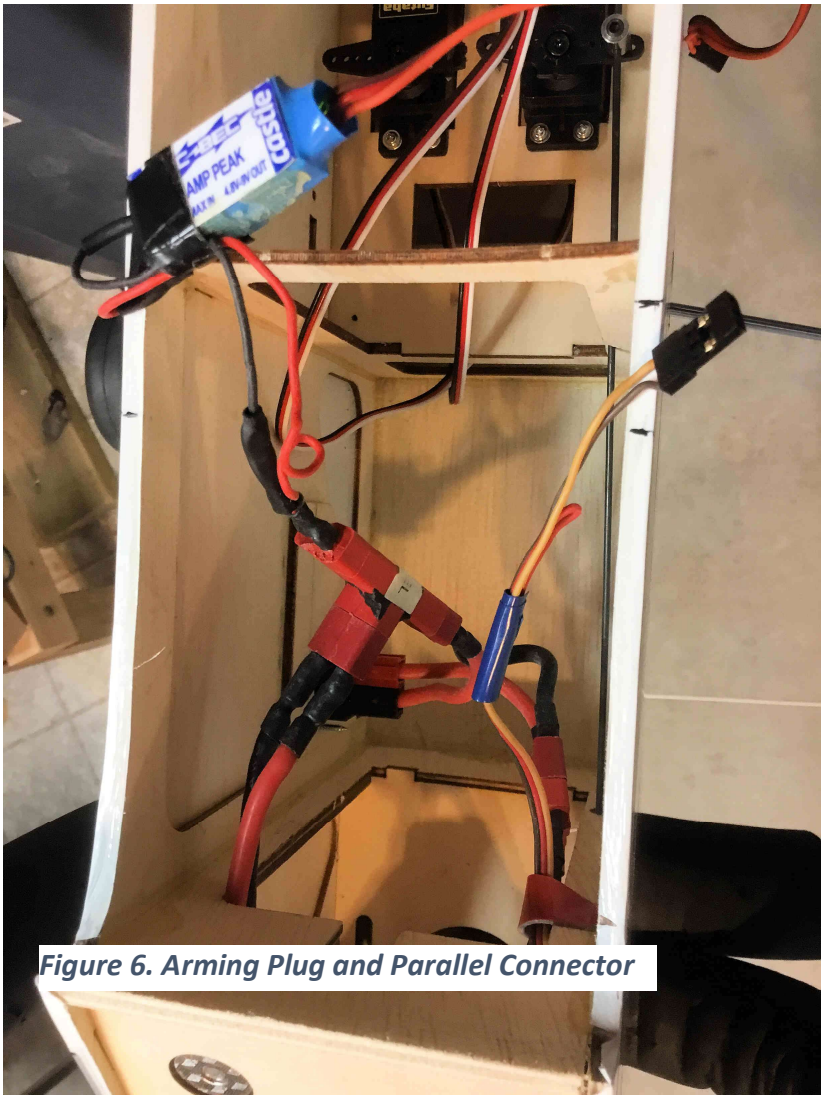

Figure 6. Arming Plug and Parallel Connector

Figure 7 shows the receiver installed on the second former (red tape again) and the secondary power supply floating in the compartment. On the first former, the extension from the parallel connector to the can be seen passing through a plywood guide. The plane can be flown in this configuration. However, I will “red tape” the secondary power supply and the parallel connector to the sides of the fuselage. The receiver is mounted on a scrap plywood piece that I glued across the second former.

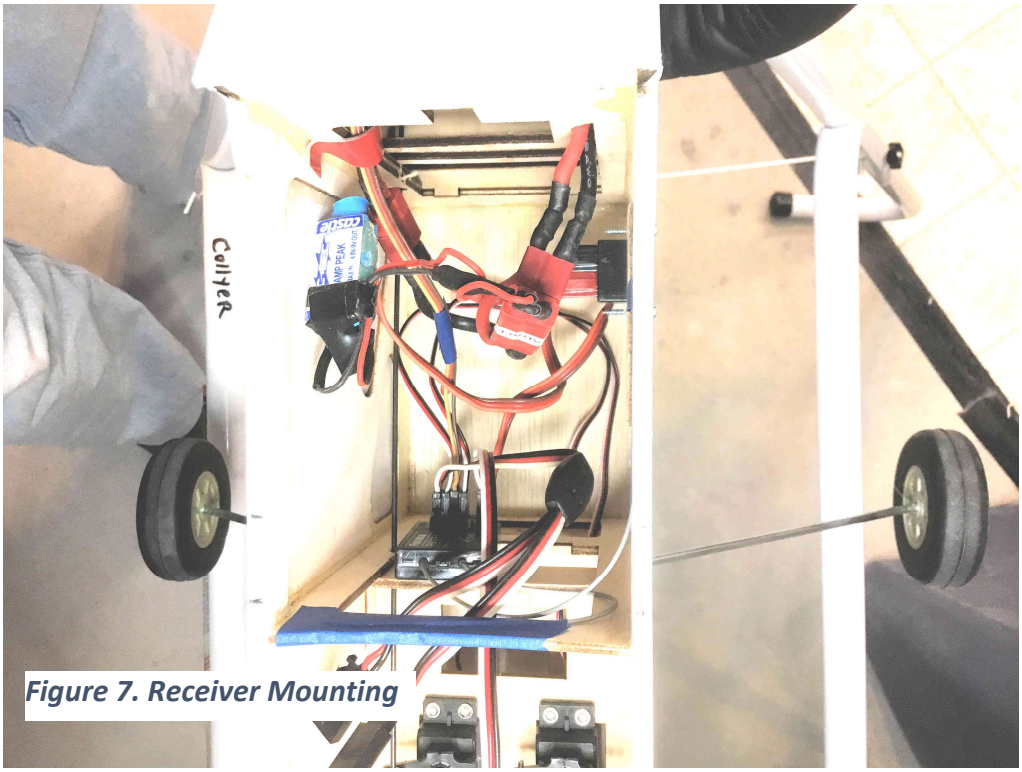

Figure 7. Receiver Mounting

In Figure 8, several pieces of scrap plywood that I glued across the first former to keep the battery from shifting to the rear can be seen. Since the 4350 mah battery I have doesn’t reach all the way to the first former I will put some foam between the battery and these plywood cross pieces to prevent its shifting. Also in Figure 8 a plywood guide for the power extension from the parallel connector can be seen.

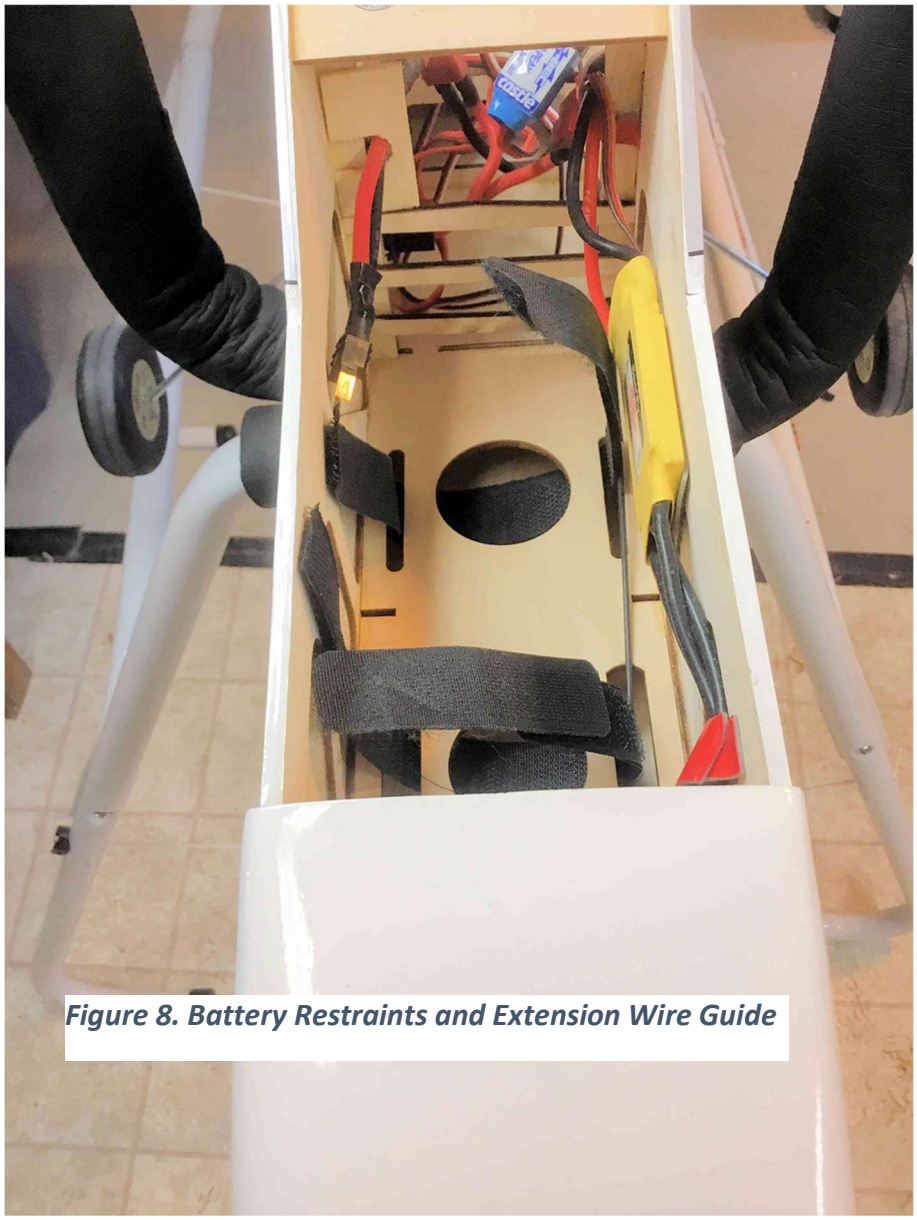

Figure 8. Battery Restraints and Extension Wire Guide

Figure 9 shows the final wiring in the receiver compartment. The parallel plug (seen on edge) is "red taped" to the right side of the fuselage just above the arming plug socket. The secondary power supply is "red taped" to the left side of the fuselage and to keep the rudder and elevator servo wires out of the way they are taped to the floor of the fuselage.

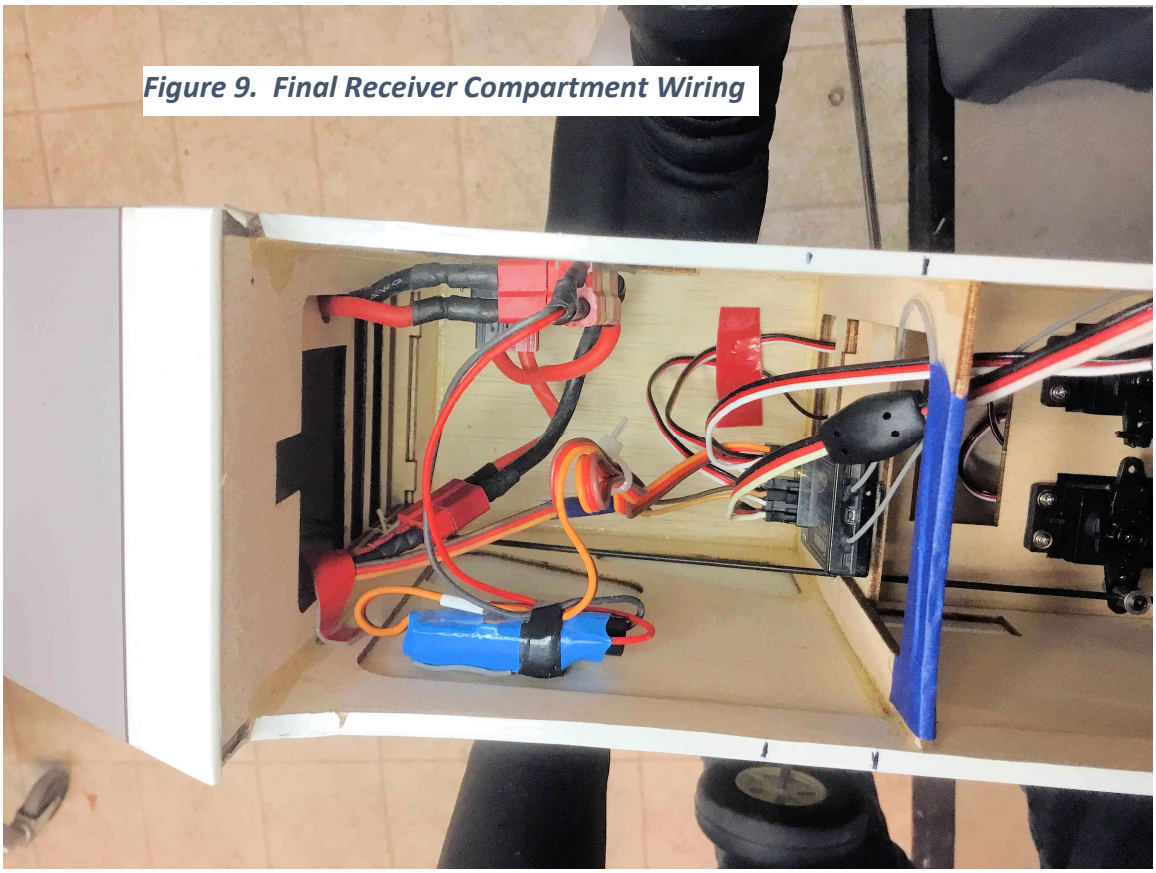

Figure 9. Final Receiver Compartment Wiring

When warmer weather came I found the 45 AMP ESC would go into thermal cutoff after 6 minutes or so of flying. The adjustable plywood motor mount that comes with the ARF LT-40 is handy, but has only a limited potential for airflow to the volume behind the firewall since the only opening is the circular hole that the ESC wires must pass through. (See Figure 1 again). A higher capacity ESC might help, but also take up more space. In looking at the ESC I saw that there were heat sink plates built-in to both sides, so my installation was in effect insulating half of the unit. To help with the cooling, I reinstalled the ESC on a standoff that would allow air to circulate around both sides. I also cut a cooling vent in the battery hatch with some internal ducting that would aid in blowing air directly on the ESC. I read recently in the AMA magazine that running the ESC at low power is inherently inefficient which results higher heat generation. Since I started flying the LT-40 with at 12x8" propeller and very low throttle settings I tried a 12x6" propeller. The lower pitch resulted in higher RPM and throttle settings but little change in the nominal flight characteristics. So far, in 85-90 degree flying the ESC has been running much cooler and has allowed 10+ minute flights without any cutoffs. These final changes are shown in figures 10-12.

Figure 10. ESC Reinstalled on Balsa Standoff

Figure 11. Cooling Vent Cut in Battery Cover

Figure 11. Battery Cover Ducting