

LASERV2plus

74" 35-38CC



Build Guide

~~E~~XTRME FLIGHT

Please read the following paragraphs before beginning assembly of your aircraft!

THIS IS NOT A TOY! Serious injury, destruction of property, or even death may result from the misuse of this product. Extreme Flight RC is providing you, the consumer with a very high quality model aircraft component kit, from which you, the consumer, will assemble a flying model. It is beyond our control to monitor the finished aircraft you produce. Extreme Flight RC will in no way accept or assume responsibility or liability for damages resulting from the use of this user assembled product. This aircraft should be flown in accordance to the AMA safety code. It is highly recommended that you join the Academy of Model Aeronautics in order to be properly insured, and to operate your model at AMA sanctioned flying fields only. If you are not willing to accept ALL liability for the use of this product, please return it to the place of purchase immediately.

Extreme Flight RC guarantees this kit to be free of defects in materials and workmanship for a period of 30 DAYS from the date of purchase. All warranty claims must be accompanied by the original dated receipt. This warranty is extended to the original purchaser of the aircraft kit only.

Extreme Flight RC in no way warranties its aircraft against flutter. We have put these aircraft through the most grueling flight tests imaginable and have not experienced any control surface flutter. Proper servo selection and linkage set-up is absolutely essential. Inadequate servos or improper linkage set up may result in flutter and possibly the complete destruction of your aircraft. If you are not experienced in this type of linkage set-up or have questions regarding servo choices, please contact us at info@extremeflightrc.com or 770-887-1794. It is your responsibility to ensure the airworthiness of your model.

We recommend that you read this build guide entirely before beginning your assembly, to familiarize yourself with the tools needed and materials used.

The Laser v2 74" aircraft has been upgraded to include our CNC wing and canopy latches.

The Laser v2 74" is shipped with pre-hinged and gap-sealed wings and stabs, and pre-installed rudder hinges on the rudder side.

The Laser is intended for 35-38cc single cylinder gas engines, or 12s 3300-4000mah lipo batteries. When the v2 laser was introduced, it was matched with the XPWR35cc brushless motor. In the interim, we have introduced the XPWR32cc brushless motor, which is also a good choice.

The Laser has extremely large control surfaces. For this reason, it requires extremely powerful servos to prevent flutter. For our build, we chose Savox 1270 servos.

The 35-38cc class of aerobatic aircraft is the most weight-sensitive category that Extreme Flight produces. This is primarily because the equipment and accessories used, such as ignition units, servos, arms, etc. are the same size and weight as those used on 70cc and larger aircraft. Because of this, it is most important that you be careful when choosing components and adding weight to your aircraft. Dual batteries, ignition batteries, large fuel tanks, smoke systems...all of these can contribute to making a 35-38cc class aircraft heavy and sluggish.

Your aircraft has been on a journey around the world since it left our factory. Although the covering material was perfectly smooth when it was boxed up, changes in weather and humidity may have wrinkled the covering material. For certain, wrinkles will appear in the covering once you have unpacked your aircraft and it adjusts to the atmospheric conditions in your region. Learning to remove wrinkles from covering is a necessary skill to maintain your wood aircraft.

Your Extreme-Flight produced aircraft is covered in Ultracote covering material (US market name), also called Oracover in global markets. If you need replacement covering to repair damage, Ultracote/Oracover is widely available from retail hobby suppliers. Also, each roll of Ultracote/Oracover includes excellent instructions which are also available online. Please refer to them for details about working with and/or repairing your covering.

The basic tools are a covering iron and a hobby heat gun. Start by using the iron at 220F (104C) to seal all of the edges on the covering scheme. This is CRITICAL on the leading edges of wings and stabilizers. Then use the iron at 300F (149C) or a heat gun to shrink out any wrinkles in the covering. Remove the plastic canopy from the aircraft when using a heat gun to protect it from heat damage. GO SLOWLY AND CAREFULLY to avoid over-shrinking or burning the covering. This is a skill which takes a bit of practice. There are many tutorial videos online demonstrating shrinking wrinkles from Ultracote.

Periodically repeat the sealing and shrinking process to keep your aircraft in good condition.



If you need additional covering material to repair your Laser, the color codes are:

White/Blue/Red color scheme:

Oracover colors	Ultracote colors
Silver #91	Silver-#HANU881
Dark Blue #52	Midnight Blue- # HANU885
White #10	White-# HANU870
Ferrari Red #23	True Red #HANU 866
Sky Blue #53	Sky Blue #HANU 875

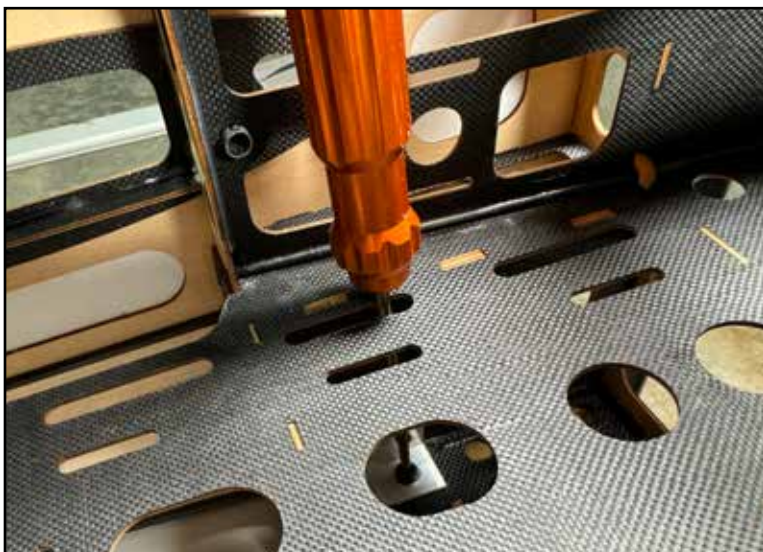
Red/White Scheme

Oracover colors	Ultracote colors
Dark Blue #52	Midnight Blue- # HANU885
White #10	White-# HANU870
Ferrari Red #23	True Red #HANU 866
Gold #92	Gold #HANU879

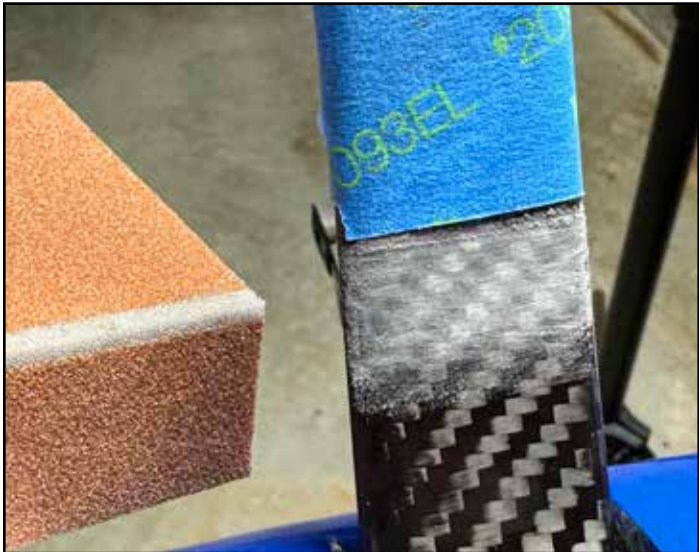
1.

Locate the carbon landing gear and note that when installed correctly, the gear sweeps slightly forward. If necessary, use a drill to open the pilot holes in the composite/wood plate on the bottom of the aircraft, the interior aluminum landing gear mounts are already drilled.

Install the landing gear with the included bolts, washers and nylon-locking nuts. The bolts can go either bottom-up or top-down, we find it easiest to install the nuts against the carbon landing gear as shown.

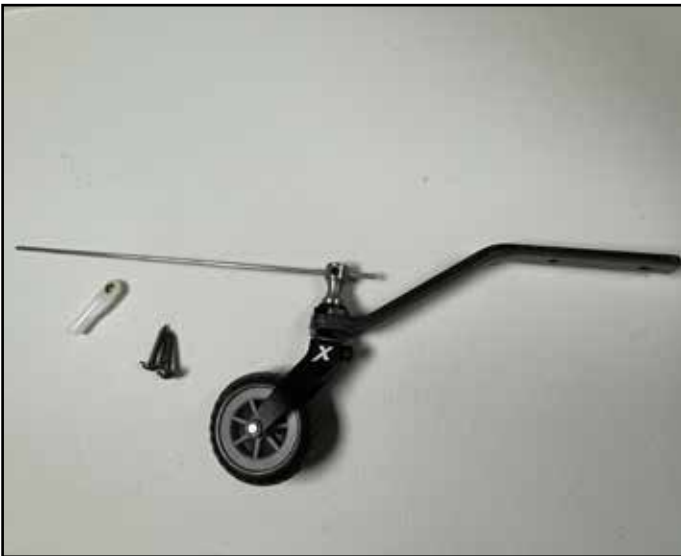
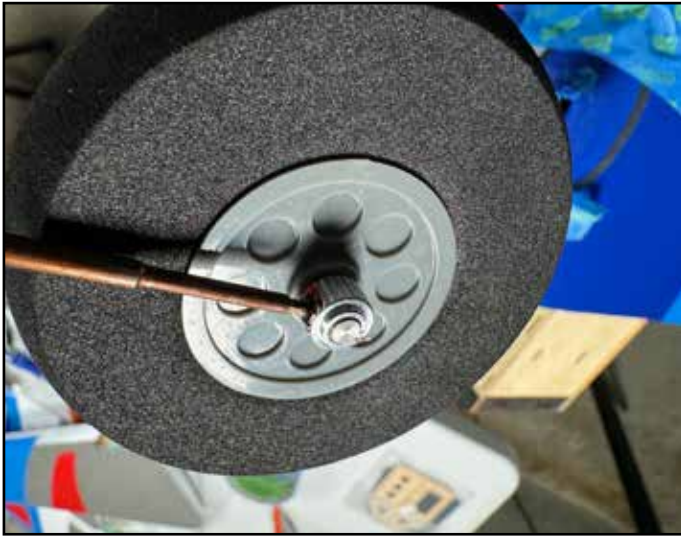


Locate the fiberglass fairings and test-install them onto the landing gear to find the best fit. Place a piece of masking tape on the gear at the end of the fairing as shown. Remove the fairings and use 120-220 grit sandpaper to scuff the gear as shown. Place Goop or Gorilla Clear Bond glue on the gear leg, install the fairing and tape in place to dry. Locate the wheel axles, wheels and hardware. Install the axles onto the landing gear as shown.



2.

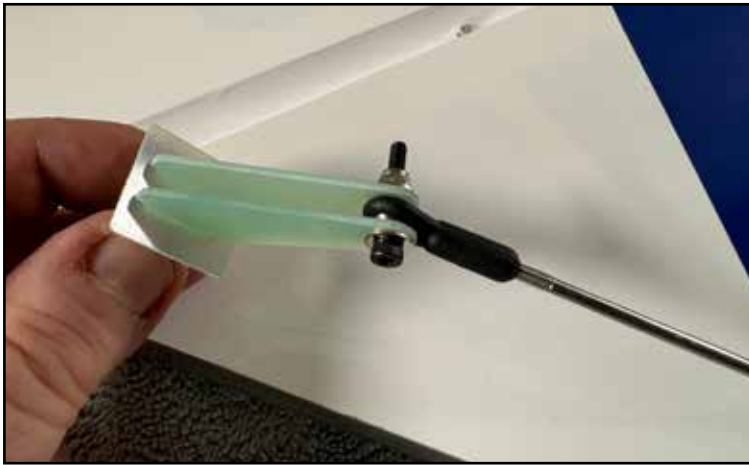
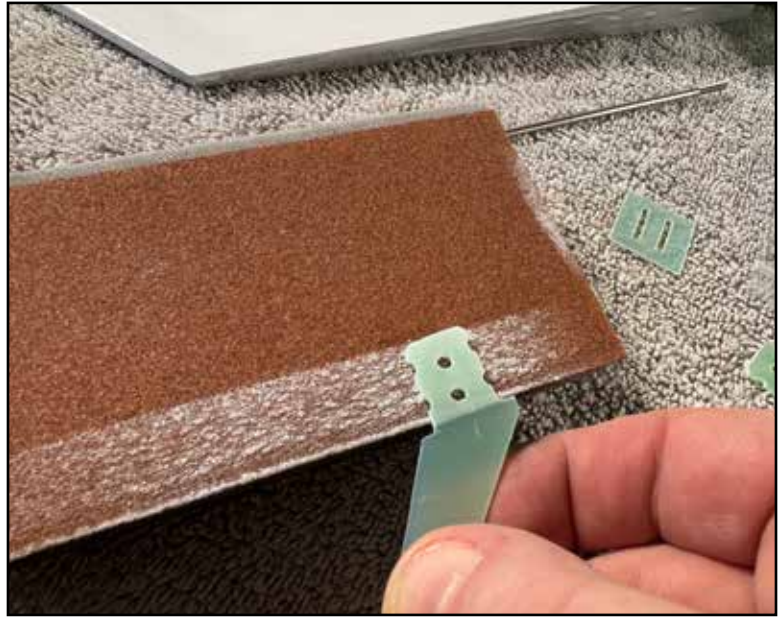
Install the wheels and the wheel collars, tightening the wheel collar set screws into the flat spots machined into the axles. Use loctite thread locker on these set screws. Install the wheelpant over the wheel as shown and use loctite on the bolt which holds the pant. Locate the tailwheel and parts. Install the tailwheel with wood screws into the fuselage as shown. Drill a hole 3" (75mm) back from the hinge line on the bottom of the rudder and install the tiller keeper (plastic ball link) as shown with epoxy glue.



3

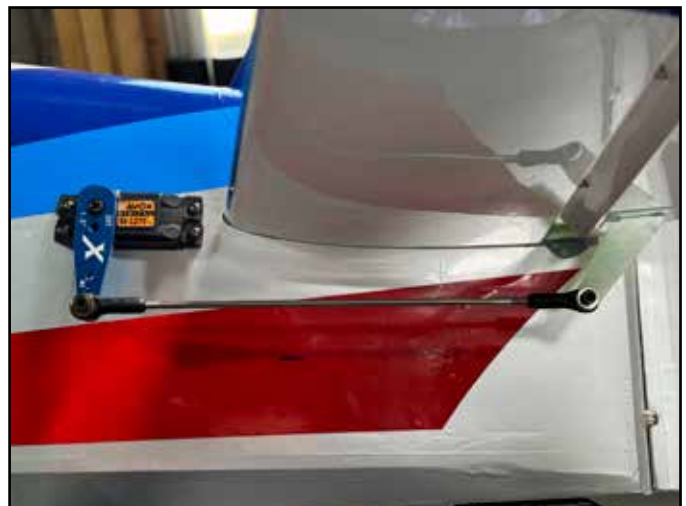
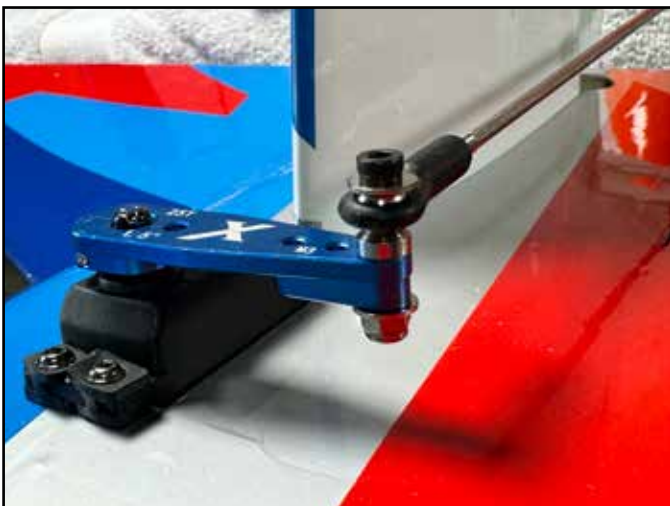
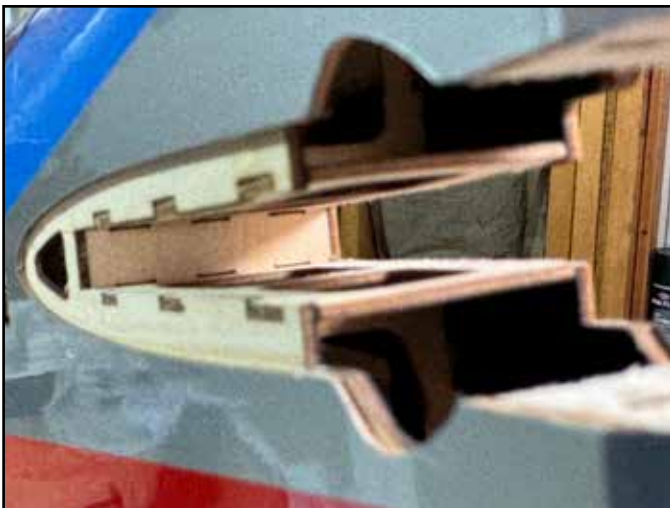
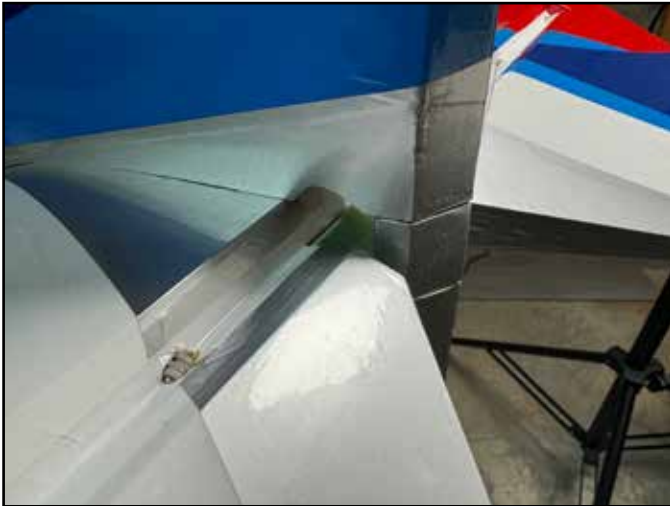
All of the control horns on your aircraft install in the same way. The horns insert into slots in the control surface, where epoxy glue forms a strong shear joint. They also have trim plates which go on top and help to hold correct geometry during installation. We will detail this process during the installation of the horn for the elevator first.

Begin by scuffing the area of the control horn which will be inserted into the control surface with sandpaper (any grit 120-220 is fine) as shown. This cleans the horn and provides a rough surface for the epoxy glue to grab on to. Then, assemble the horns with the trim plates and correct pushrod assembly as shown, using washers and locking nuts. Remove the covering in-between the slots as shown and test fit the horns into the slots. Apply plenty of epoxy (at least 15 minutes cure time) into the slots and to the horn. When you install the horn, some epoxy should squeeze out, clean up any excess with denatured alcohol and a rag.



4

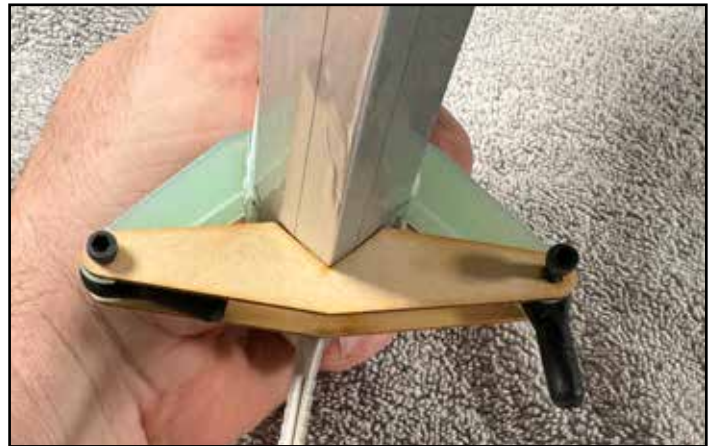
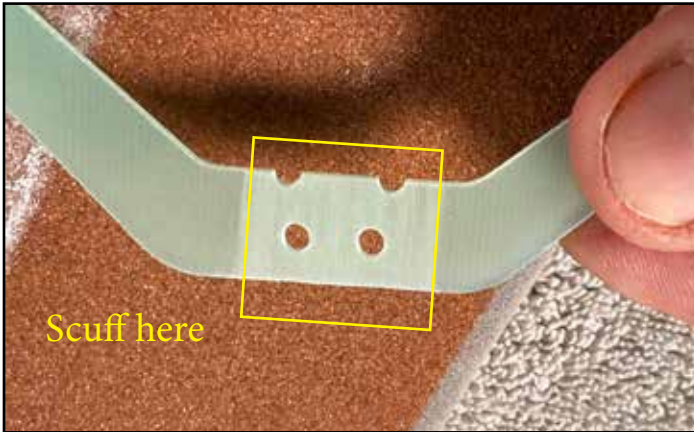
Test fit the horizontal stabilizer into the slot in the fuselage. Make sure it fits all the way forward and test fit the trim block behind the stab. Move the elevator up and down and make sure there is plenty of clearance and no binding or contact. Remove the stab and coat the mating surfaces with epoxy of at least 15 minutes cure time. Install the stab. Install the trim block with glue. Add your 24" servo wire extension to your elevator servo, including a plug lock or tape, and install the servo as shown. We chose to pre-drill these servo screw holes with a 1/16" drill bit.



5.

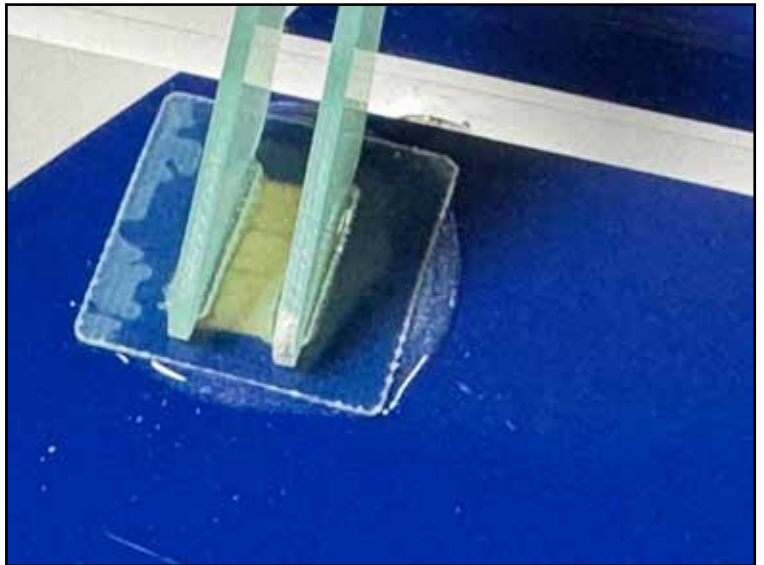
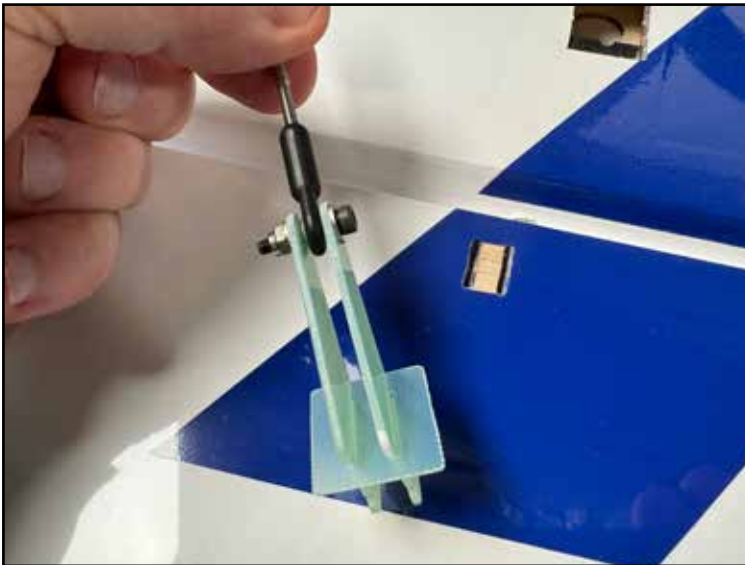
Install the double-sided rudder horn as shown. A wooden jig is included to help center the horn side-to-side in the rudder. The main purpose of the jig is to center the horn side-to-side within the rudder. You may enlarge the holes in the jig if necessary because the fit is too tight, all that is required is to center the horn side-to-side. Scuff the horn as shown in the gluing area, test fit the horn, then install the horn with epoxy. Install the horn trim plates and allow to cure.

Once the horns are cured, place epoxy (at least 15 minutes cure time) into the hinge-pin holes in the vertical stab and install the rudder. Make sure the rudder swings freely as the glue is curing, and make sure the gap in the hinge line is no larger than 1-2mm.



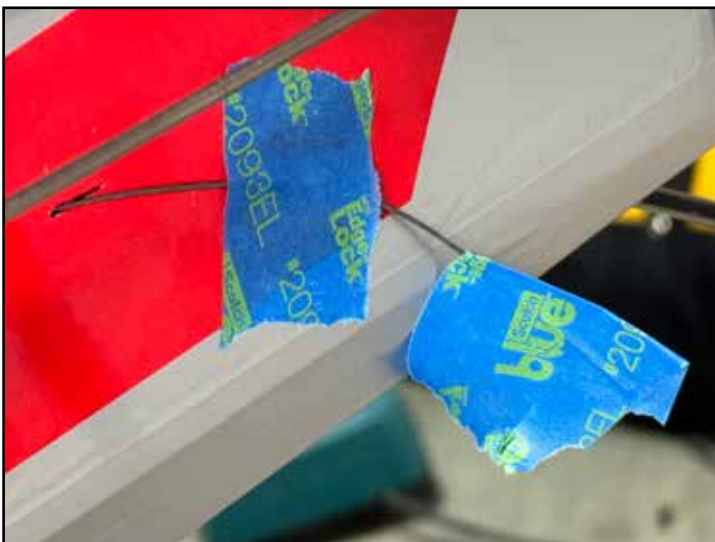
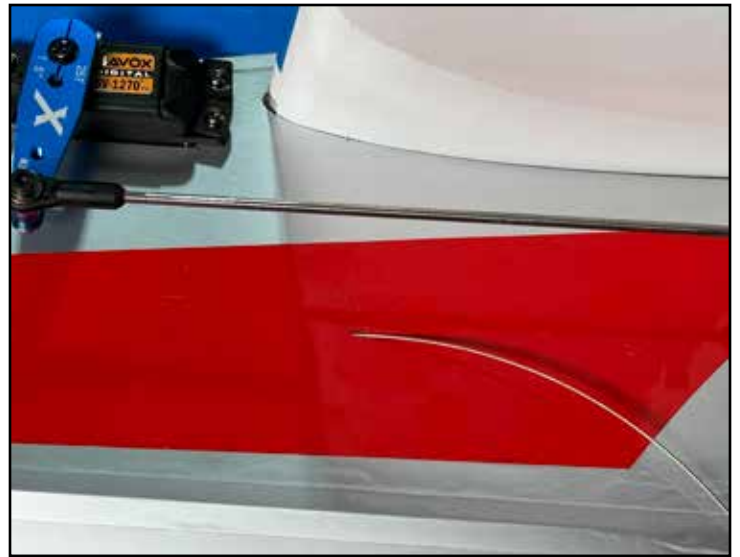
6.

Install the ailerons horns as you did the elevator horn, and install your ailerons servos with 6" extensions and plug locks or tape. Note that the linkage is "crooked" when the servo is at the neutral position and becomes "straight" when the servo is at full deflection. This is by design, to minimize side loading on the control horns at full load/deflection.

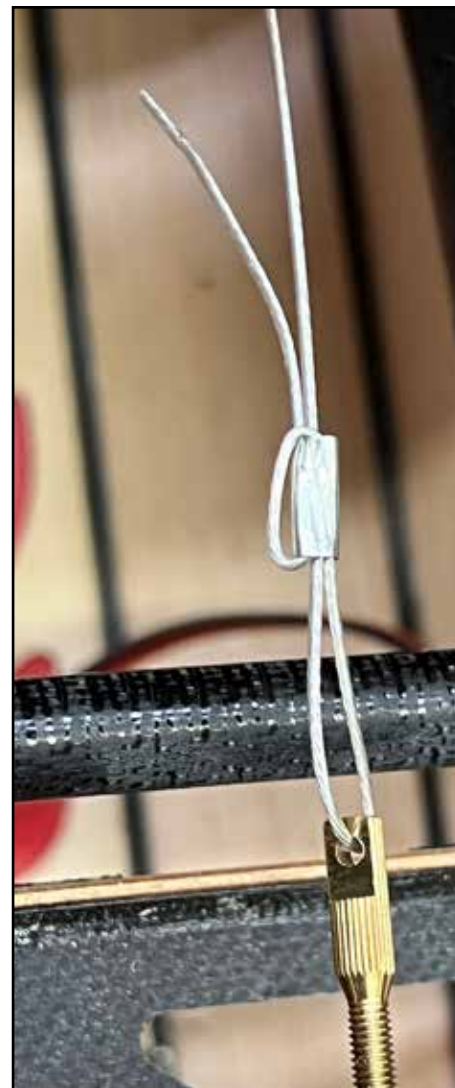
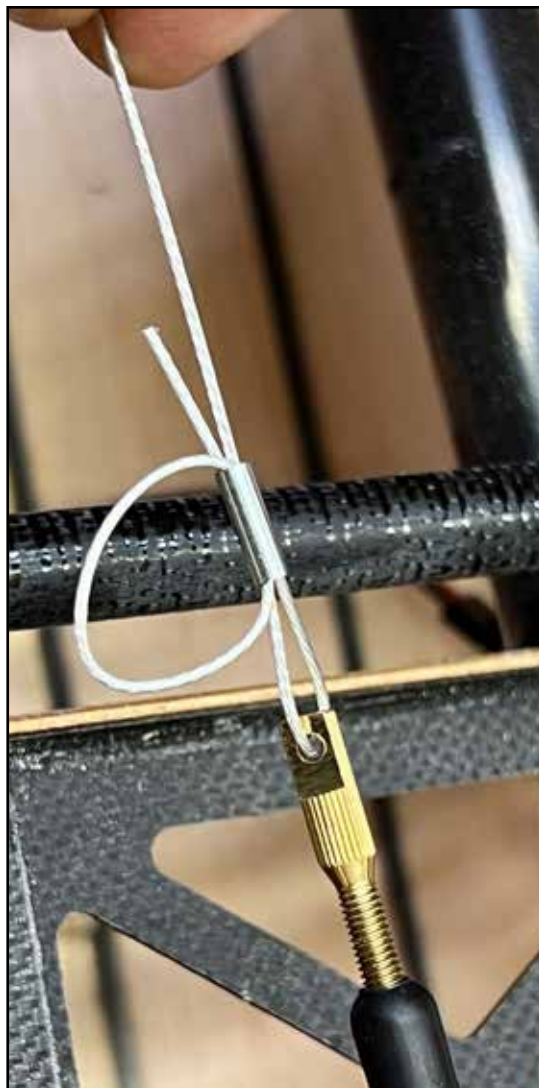
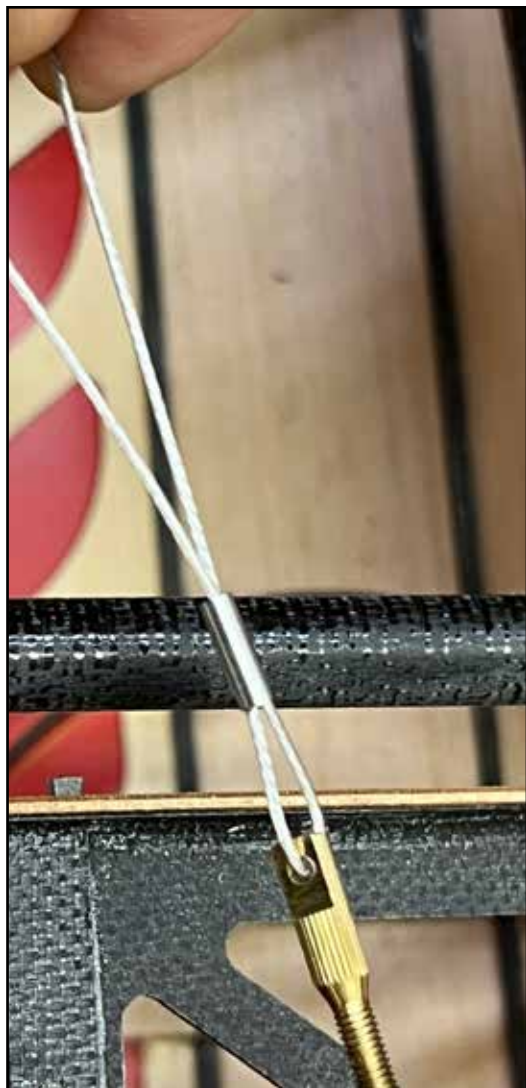
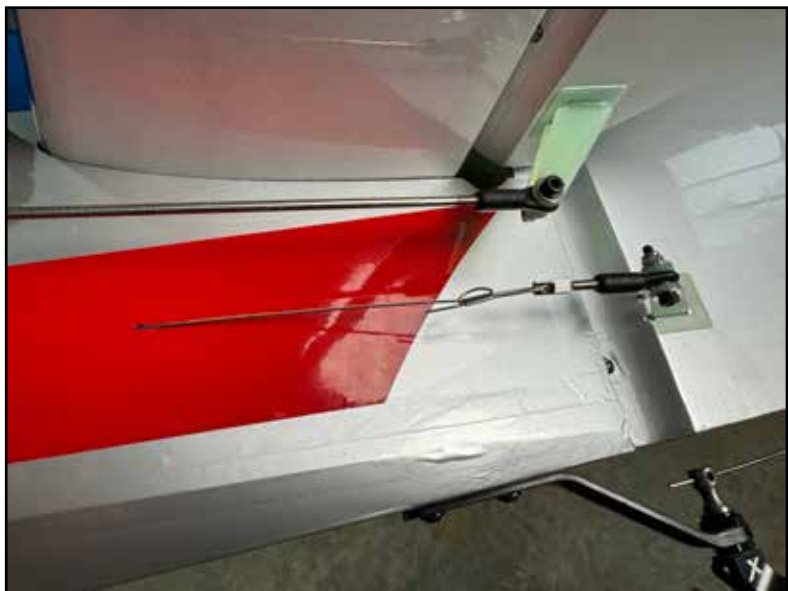


7

The rudder control installation on the 74" Laser is via pull-pull cables. If this is the first time you have installed a pull-pull setup, it can seem complicated at first. Go slowly and carefully. Locate the rudder hardware bag. The bag contains two cables and the parts to make 4 cable ends. Begin by taping the rudder as shown to hold it straight during this install. Thread the cables into the fuselage through the exit slots as shown. Thread them forward into the fuselage, they cross once to form an "X" shape inside the fuselage. Tape the cables to the rear of the fuselage as shown so you don't accidentally pull them completely into the fuselage. Assemble the cable ends onto the ball joints as shown by screwing the ball joint on, and install the assembly onto the pull-pull servo arm as shown.



To terminate the cables at each end, you will use a metal crimp tube. Follow the photos below to thread the cable through the tube and cable end, pull tight, and crimp the tube with pliers. Add a drop of thin CA glue to the crimp tube to finish. Start at the servo end of the cables, then move to the rear at the rudder. When you crimp the cables at the rudder end, pull the cables taught and remove as much sag as possible, you won't be able to remove 100% of the sag, so afterwards you will tread the cable ends farther into the ball links to take up slack. Don't make the cable too tight, all we need is a sag-free installation that prevents the rudder from moving against slack cables.

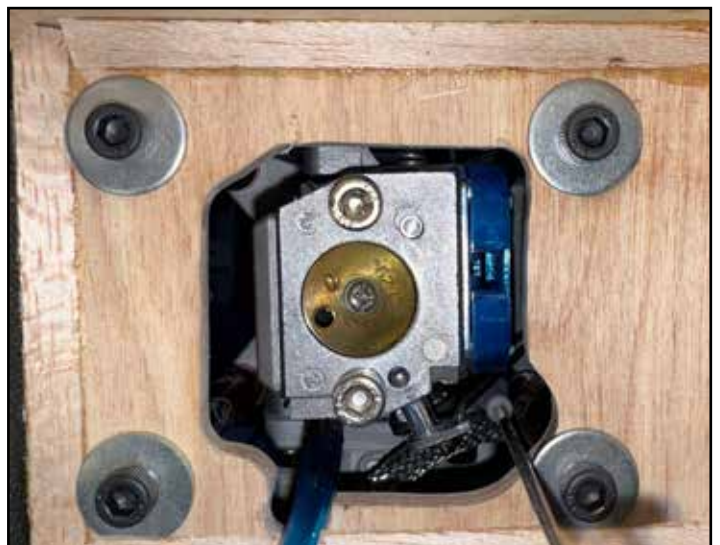
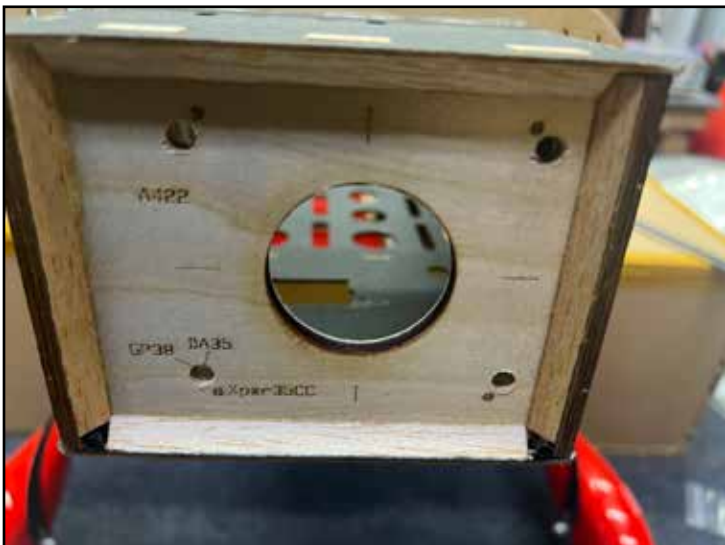
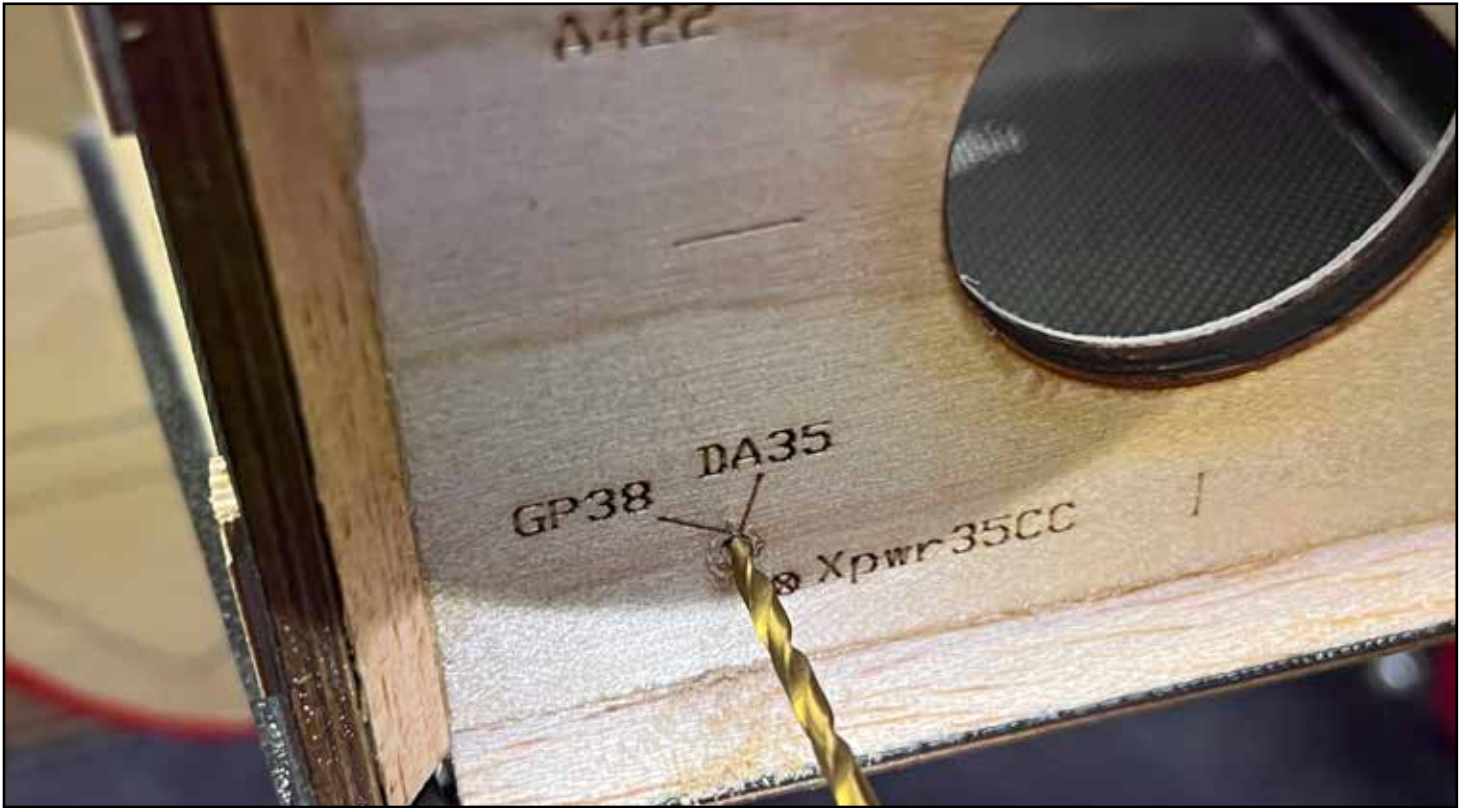


8.

In this section we will detail the installation of a GP38 gas engine. All single-cylinder gas installations will be fundamentally the same. Begin by drilling the appropriate holes in the firewall. If your engine is not marked, you will need to obtain a drilling template, usually included in the engine package or downloadable form the manufacturer's website. Drill first with a small drill bit (1/16" or 2mm) and then move to the final size.

The firewall has a generic round center hole cut into it, you will need to make any modifications which fit your particular engine's connections and controls as shown. We recommend a Dremel-type rotary tool for this job. Mount the engine, using washers on the back side of the wood firewall as shown, and loctite thread locker.

The distance from the firewall to the spinner location is approximately 6.375" / 162mm. This is the length of most 35-38cc engines with their packaged standoffs. Use large washers against the firewall to spread the load, and if needed trim the washer to clear the balsa braces on the back of the firewall.



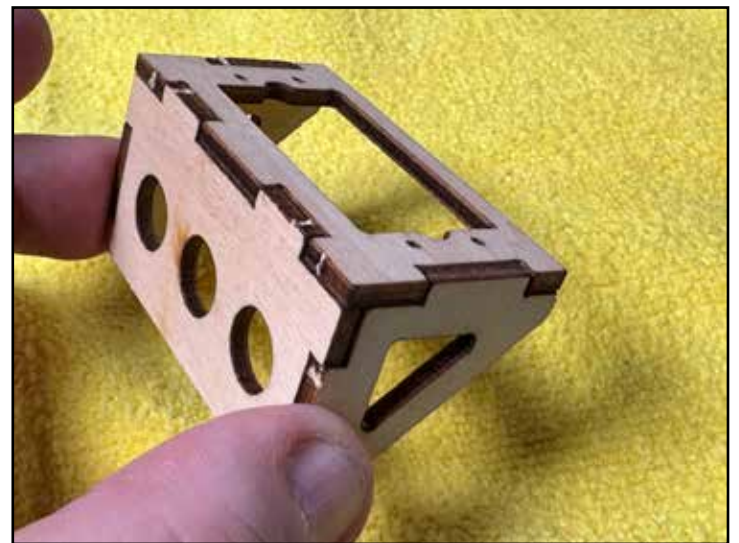
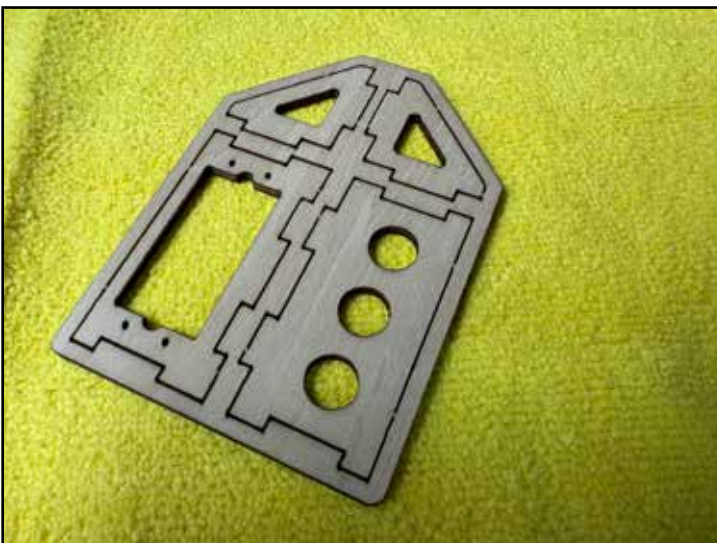
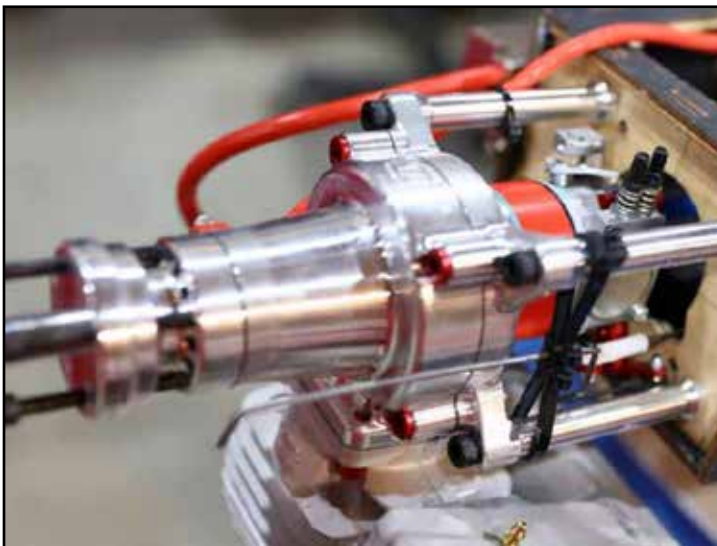
Mount the throttle servo as shown.

Due to availability of parts, throttle linkage pieces may vary over time in our kits, this is the most common type in our 35-38CC aircraft. There are many different carburetor arm styles, so these instructions are approximate and some creativity may be required in creating your throttle linkage.

This type of connector is a common one for our linkage, it attaches to the servo arm by tightening the clinch nut so that the barrel of the connector is still free to rotate, and placing a drop of medium CA glue on the nut to stop it backing off.



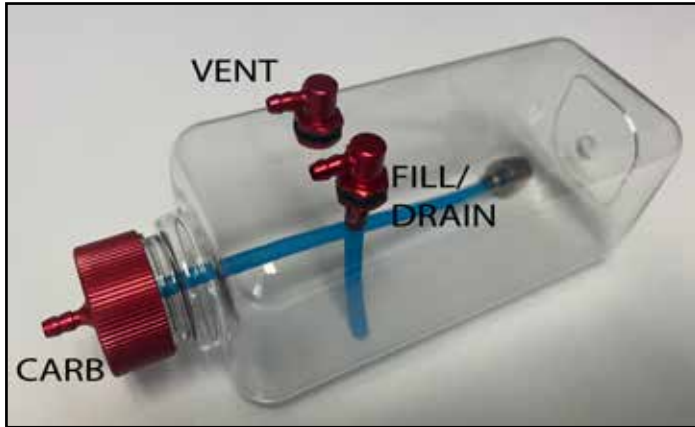
There are many options for choke actuation. You can run the linkage to the rear, you can install a choke servo; here we show a very simple forward manual choke rod installation, this works well on the Laser because it is easily accessed through the large cowl vent. A forward choke rod may need a middle support, one convenient method is to make an "x" from zip ties around the engine standoffs, see photo. If you need to relocate your throttle servo for a non-standard installation, or install a choke servo, a servo mount is included as shown.



9

For plumbing your aircraft, we recommend Extreme Flight Flowmaster fuel tanks, fuel line, and fuel dot connectors. There are three primary connections on your gasoline fuel system: Fuel clunk to carburetor, fill/drain line to fuel dot, and vent. Extreme Flight fuel tubing is designed to grab onto barbed connections, and so zip ties or wire ties to secure fuel connections are optional. Note that the vent line has a loop in it to prevent siphoning fuel during flight, and the vent exits the airplane on the bottom of the cowl.

We attach the fuel tank to the tray in the fuselage with self-adhesive velcro and two to three strong velcro straps. Typically, the fuel tank is located at the rear of the front tray, as close to the center of gravity as possible. Exit your vent line out of the bottom of the aircraft. Install your fuel dot at the top of the fuselage side near your tank.



10.

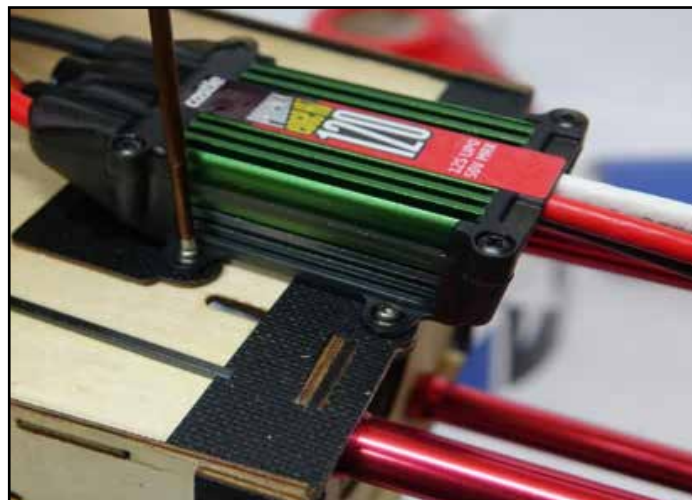
You will need to cut openings in the cowl for the cylinder head/spark plug and any muffler outlet pipes. We prefer to make a template out of paper or card stock or light wood and mark the positions of the cylinder and pipe. We use the bottom cowl screw as a reference point and transfer the cutout locations onto the cowl. We use a dremel type cutting tool with a sanding drum attachment to cut the cowl. This creates fiberglass dust so be sure to wear eye and skin protection.



11.

The 74" Laser is a good match to our XPWR 32cc and 35cc brushless motors. The bolt pattern for the 35cc is laser etched on the firewall, if installing another brushless motor, use the motor X-mount as a guide to mark the firewall. The target length for the entire motor and standoff package is approximately 6.375" / 162mm, to find the necessary length of standoffs, measure the length of your motor and subtract from 162mm. This XPWR 35cc is 82mm long, so we need 80mm long standoffs. Use loctite on all mounting bolts.

The underside of the motor box is a convenient place to mount the ESC with good cooling air access. If using a Castle Creations ESC with the XPWR motor, it is critical to use firmware 4.22 in the ESC. Use the Castle Link adaptor to connect your ESC to your computer and change the firmware version if necessary.



12.

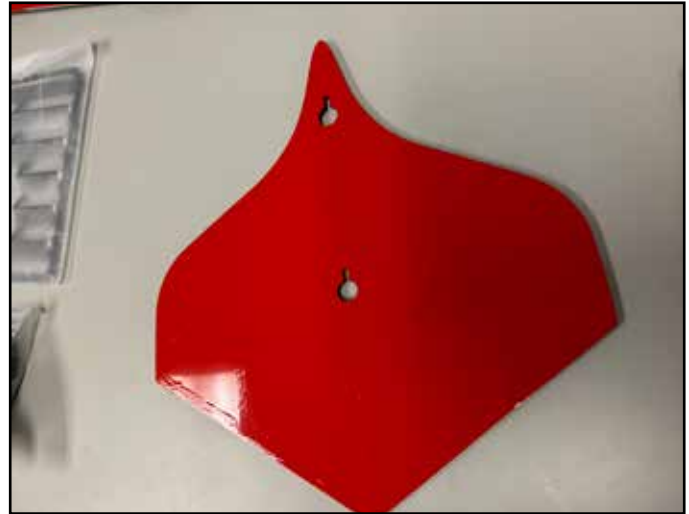
The 74" Laser includes a pre-fabricated vent plate which is installed on the bottom of the fuselage to provide a cooling air outlet for either electric or gas power installations. Remove the covering over the mating panel on the bottom of the fuselage and install with glue. We used Gorilla Clear Bond for this step.

If you need additional cooling, remove the covering over another panel on the bottom of the fuselage.



13.

The Laser includes SFG panels for the wingtips. The SFG's (Side-Force Generators) increase stability and make post-stall 3D flight easier, at the expense of rolling performance. If you are working to increase your 3D flying skill, you should definitely try them. To use the SFG's, install the clear plastic spacer onto the wingtip with the thumb-screws (install the black rubber o-rings onto the threads of the thumbscrews). To prevent damage to the SFG's over time, the kit includes composite washers, these can be glued onto the SFG's with Clear Bond.



14.

Our preferred Center of Gravity for a maiden flight is the center of the wing tube. After your maiden you can move the CG back according to your liking.

Control setup:

Elevator: Low Rate 8-10 deg. 15-20% expo
3D Rate 45-50 deg. 60-65% expo
XA/Tumbling rate 60+ deg. 65-70% expo

Aileron: Low Rate 15-20 deg. 40-45% expo
High Rate 38-40 deg. 70-75% expo

Rudder: Low Rate 20 deg 40-45% expo
High Rate 45-50 deg. 80-90% expo

These exponential values are high, to soften response for early flights. If you have a typical expo value you like to run on other aircraft, apply it.

