

**EXTREME FLIGHT**  
**EXTRA NG**

**78"** **35-38CC**



# Build Guide

**EXTREME 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](mailto: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 NG is intended for 35-38cc single cylinder gas engines, or XPWR40CC with 12s 4000-5000mah lipo batteries.

The NG 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.

The 78" NG is shipped with pre-hinged ailerons and elevators with gap seals in place.

The 78" NG has an option for mounting the rudder servo, either in the tail using a pushrod, or under the canopy using pull-pull cables. For most typical gas or electric installations we recommend the pull-pull installation to make it easy to achieve proper CG.

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 Extra NG, the color codes are:

#### Blue/White Scheme

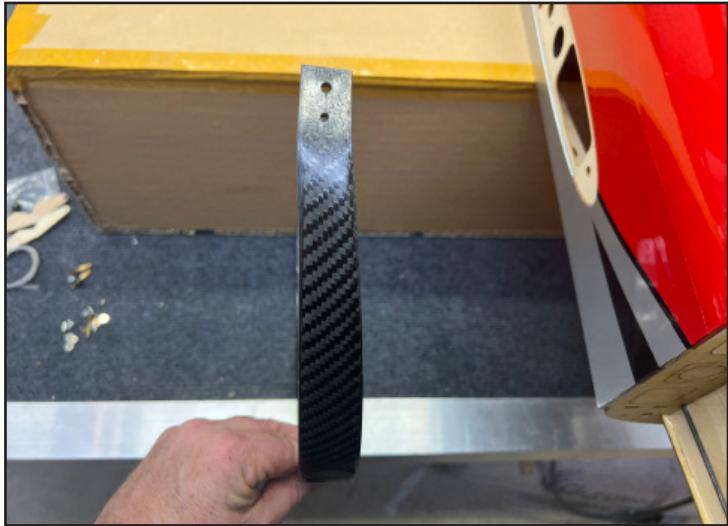
Oracover colors	Ultracote colors
Black #71	Black #HANU874
Pearl Blue #57	Pearl Blue #HANU845
Dark Blue #52	Midnight Blue #HANU885
Cub Yellow #30	Cub Yellow #HANU884
Silver #91	Silver #HANU881
White #10	White #HANU870

#### Red/Silver Scheme

Oracover colors	Ultracote colors
Pearl Charcoal #77	Pearl Charcoal #HANU846
Silver #91	Silver #HANU881
White #10	White #HANU870
Black #71	Black #HANU874
Ferrari Red #23	True Red #HANU 866

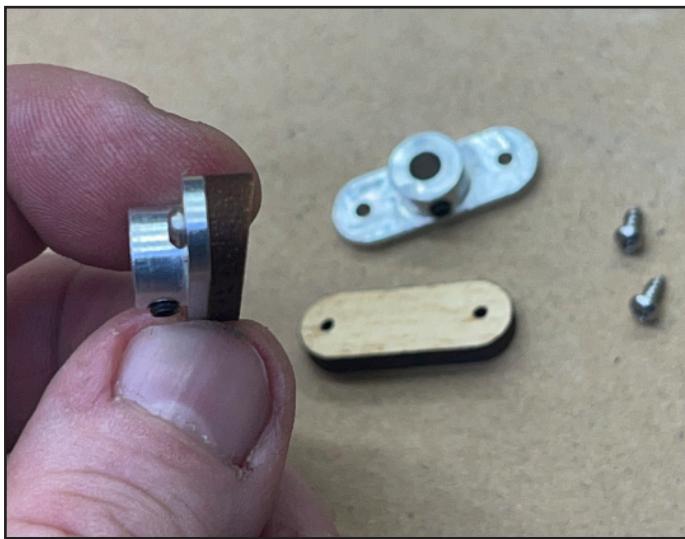
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Locate the carbon landing gear and note that when installed correctly, the gear sweeps slightly forward. Install the landing gear with the included bolts, using loctite thread locker. Locate the fiberglass fairings and test-install them onto the landing 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.



2

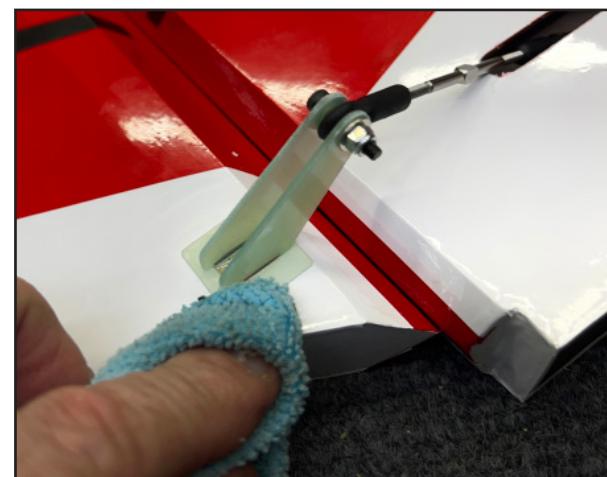
Locate the wheel axles, wheels and hardware. Install the axles onto the landing gear as shown, making sure the machines flat spot in the axles points DOWN toward the runway. Assemble the wheel apnt savers as shown, install the wheel onto the axle and install the pant savers by tightening the setscrew. Use loctite thread locker on these setscrews. Install the wheel pant over the wheel as shown and use loctite on the bolt which holds the pant. Apply epoxy glue or Gorilla clear bond between the pant saver and pant.



### 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.

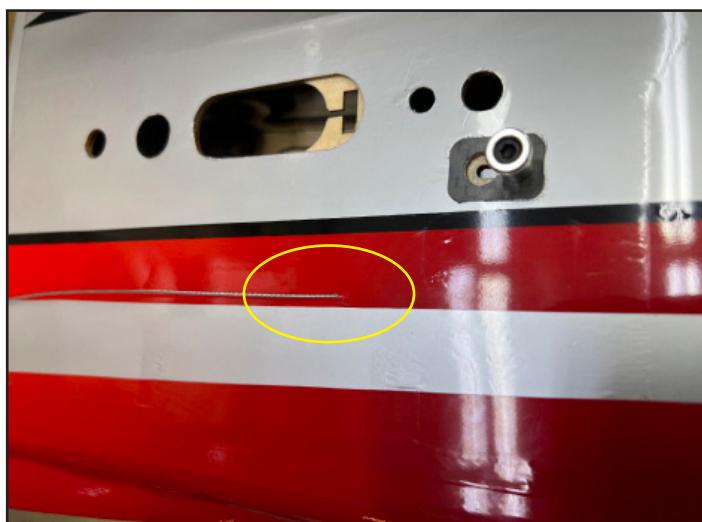
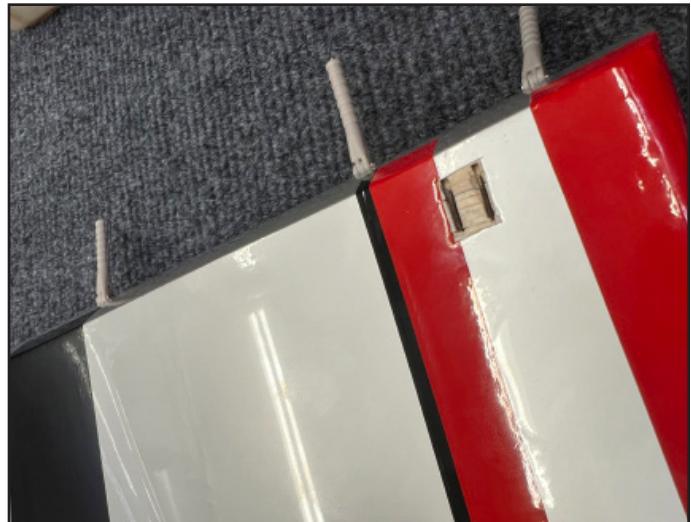
Begin by scuffing the area of the control horn which will be inserted into the control surface with sandpaper (any grit 120-220 is fine) as shown. This cleans the horn and provides a rough surface for the epoxy glue to grab on to. Then, assemble the horns with the trim plates and correct pushrod assembly 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. Here we are using an epoxy gun, which is convenient but not necessary. When you install the horn, some epoxy should squeeze out, clean up any excess with denatured alcohol and a rag.



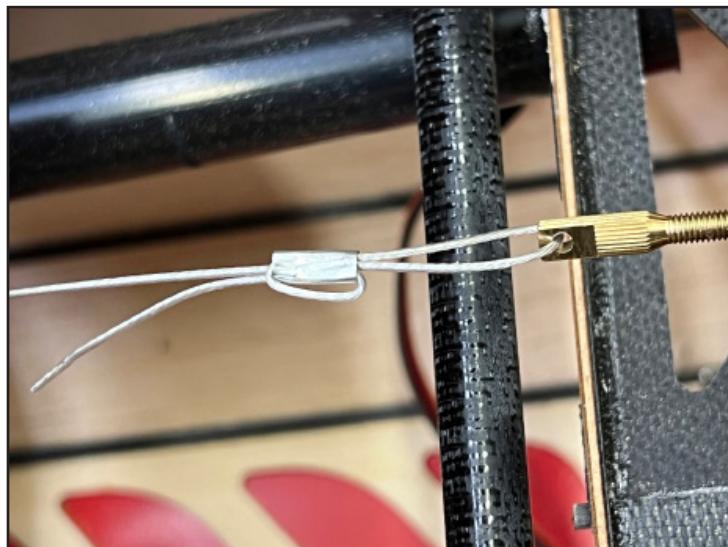
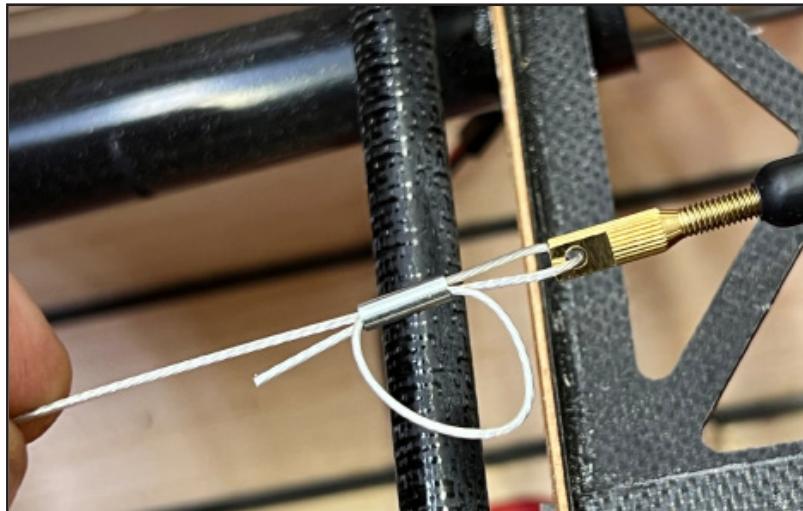
## 4

The 78" NG has an option for installing the rudder servo, either at the rear using a pushrod or under the canopy using pull-pull cables. For most typical installations of gas or electric power, we recommend the pull-pull installation to easily achieve proper CG. Both setups are detailed on subsequent pages.

For the pull-pull installation horns install into the rudder from both sides as shown. If your kit includes the pictured wooden jigs, you can use them to center the horns, if not a ruler is sufficient to check the spacing of the horns. Once the horns are cured, place epoxy (at least 15 minutes cure time) into the 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. Locate the opening under the fuselage covering for the pull-pull cable exit, make a slit with a hobby knife and install the cable as shown.



Run the cables forward into the fuselage, crossing them once to form an “X” shape. The cable ends are built from the pictured components, screw the nylon Du-Bro ball links onto the metal cable ends as shown (we use a cordless drill to make this easier). Install the rudder servo into the fuselage as shown and install the double-sided aero arms. Attach the cable end assemblies onto the arm in the sequence: bolt, washer, ball link, tapered spacer, arm, locking nut (or use loctite). Thread the cables through the metal crimp sleeve and cable end as shown, pull tight, and crimp the sleeve flat with pliers. Add one drop of thin CA to the sleeve. Install the cable ends onto the rudder horns. Center the rudder servo and the rudder. Pull each cable taut to remove all slack and sag, and install the cable and crimp sleeve as you did at the front. To adjust the tension on the cable, spin the metal cable end into or out of the plastic ball links. We want the cables to be just taught, with no slack, but we do not need them to be “banjo string” tight. This only serves to wear out components and rob servo torque.



The pull-pull rudder setup is the best choice for all typical power systems, but if you decide to use the rear-mounted push-pull system, begin by locating the rudder servo mount on the **RIGHT** side of the fuselage as shown. The mount is recessed into the fuselage. NOTE: the mount is recessed and, for some servo/arm combinations, you will need to space the servo up from the mount. On this installation of SAVOX 1270 and EF arm, we used approx 2mm of spacers under the forward servo mount pads.

Install the control horn only on the right side of the rudder. Attach the pushrod as shown.



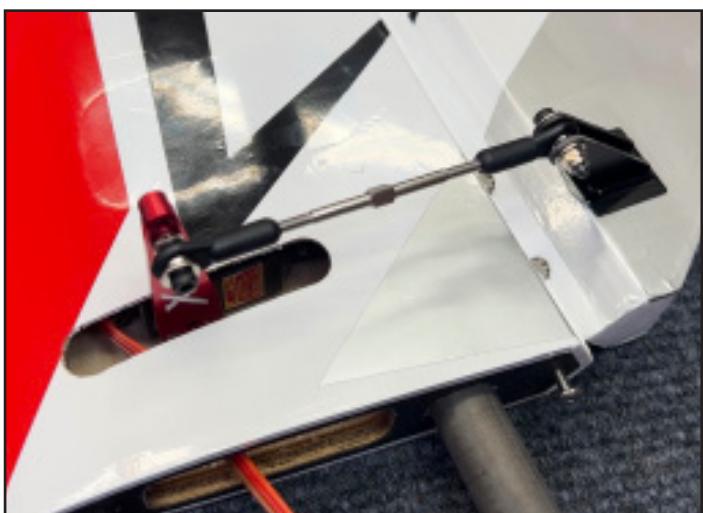
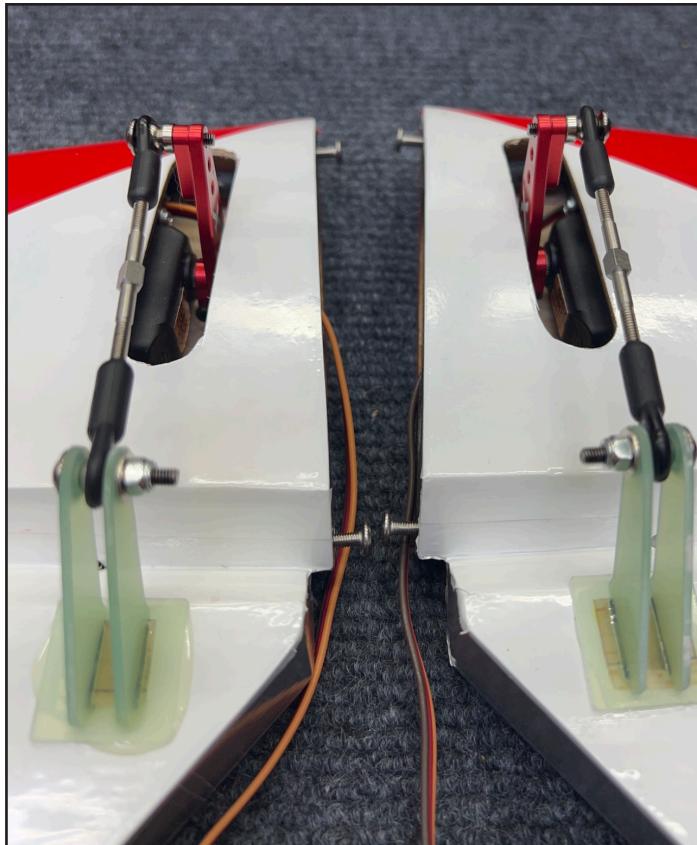
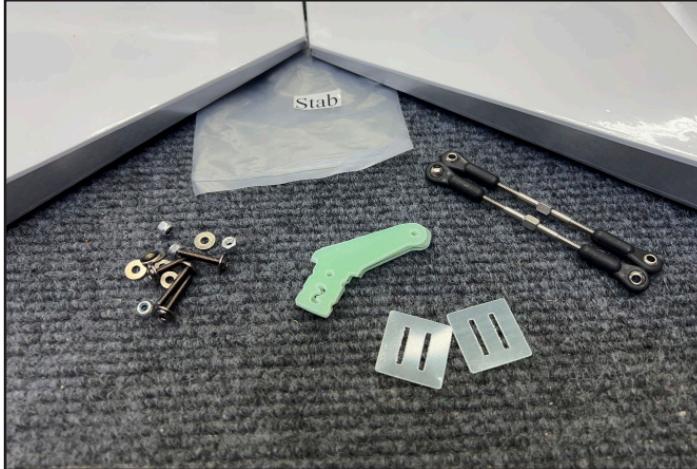
## 5.

The stabilizers come with number tags in place over the elevator servo opening. Snip these away and discard. Install the elevator horns and pushrods.

Elevator servos mount inside the horizontal stabilizers as pictured. Often, threading the servo wire into position and seating the servo will require some patience. Note that the servo orientation will be correct when the servo arm is located in the center of the slot in the stabilizer, for the 78" NG the servo output shaft goes to the front.

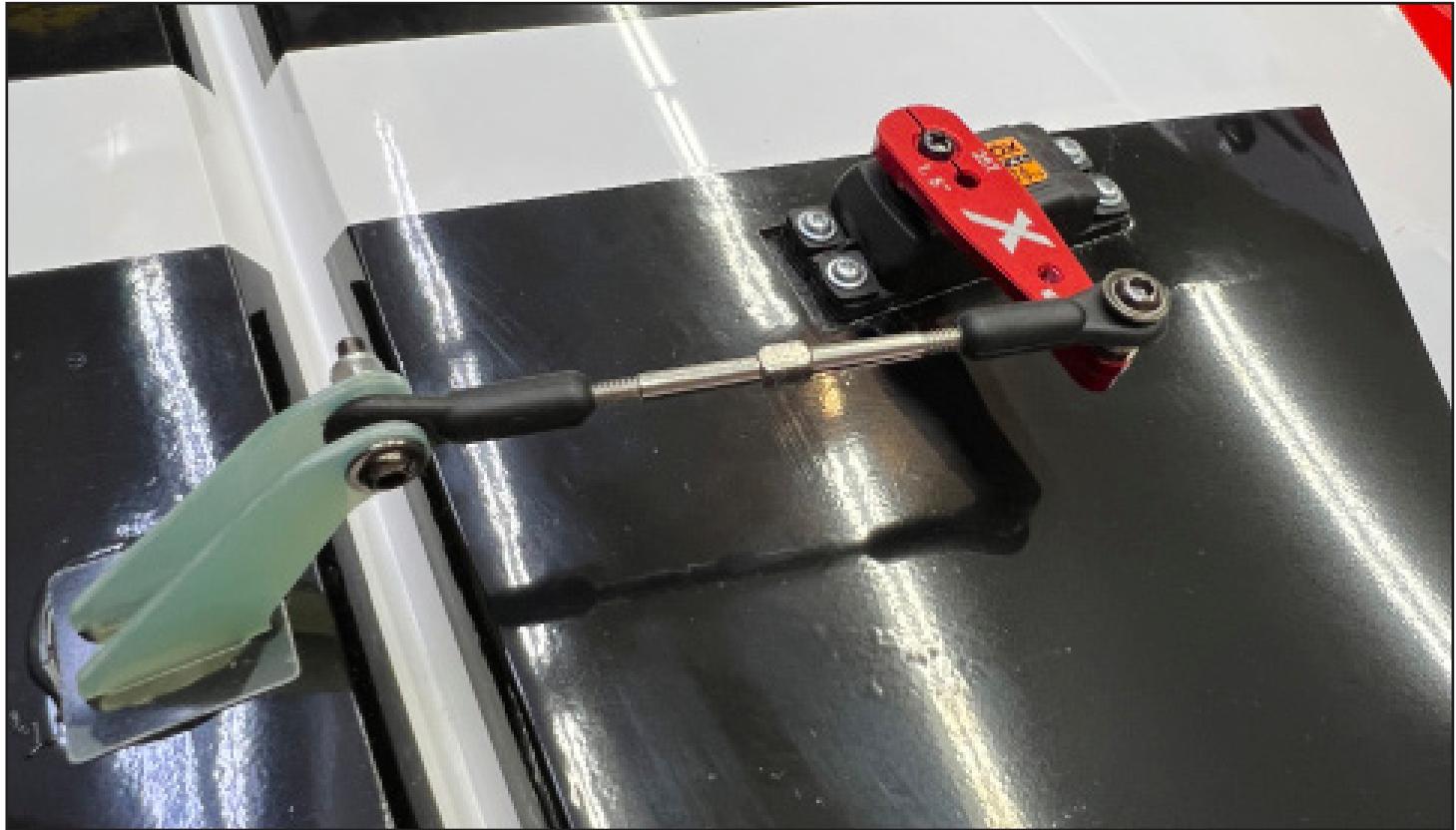
Install the servo, then install the arm, rotating the servo arm to allow tightening the pinch bolt on the servo arm.

The slots in the stabilizers are cut for the most common servo/arm combinations, but some combinations will require either shims between the servo and the mount to move the servo, or trimming the slot to widen it.



# 6.

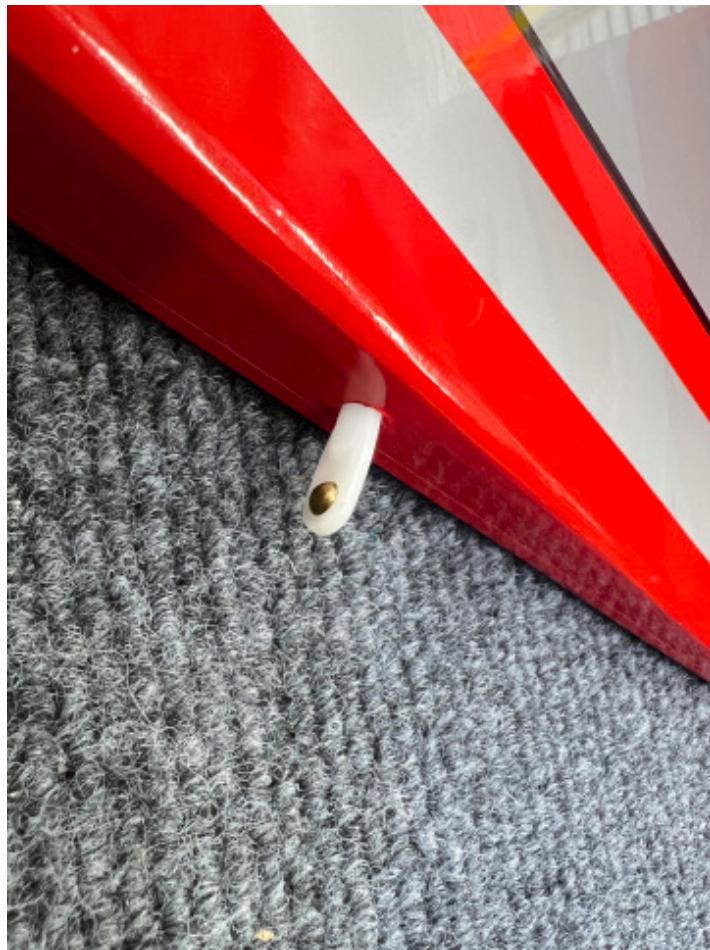
Install the aileron horns, linkage and servos with any necessary wire extensions. Note that these control linkages are “crooked” at the neutral position and become “straight” at full deflection. This is by design, to minimize side loading of the horns at full deflection/load.



70

Install the ball-link rudder wire tiller holder into the bottom of the rudder with epoxy glue.

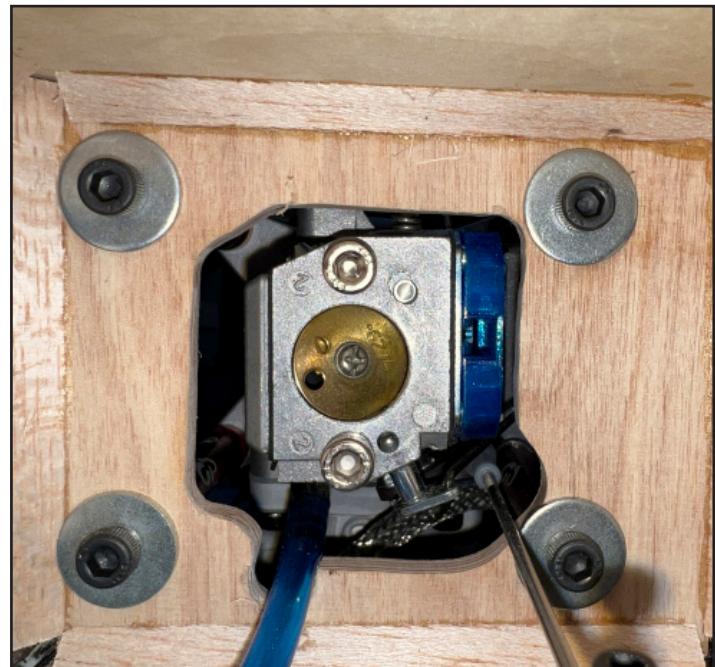
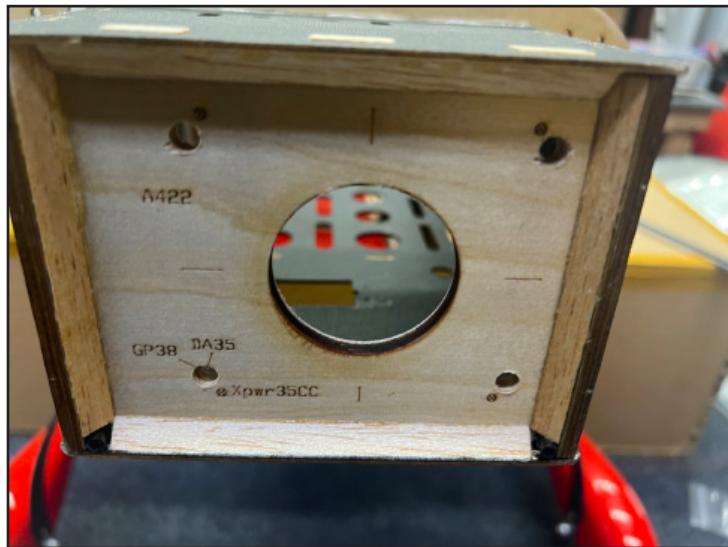
Install the tail wheel with the included bolts and loctite.



## 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 from the manufacturer's website. Drill first with a small drill bit (1/16" or 2mm) and then move to the final size.

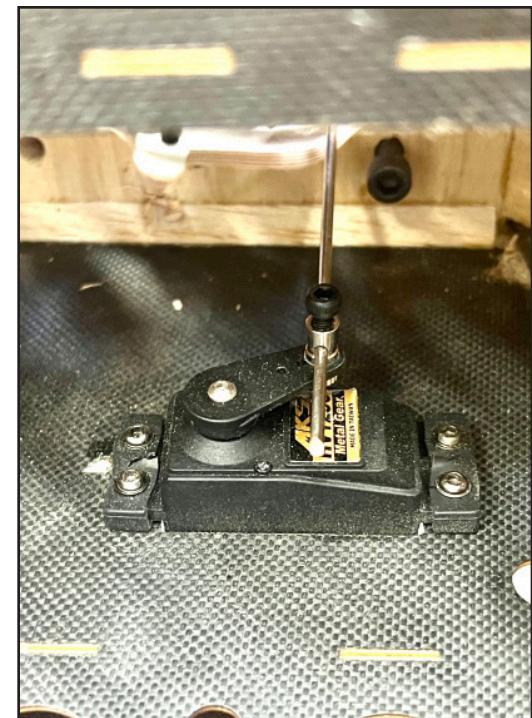
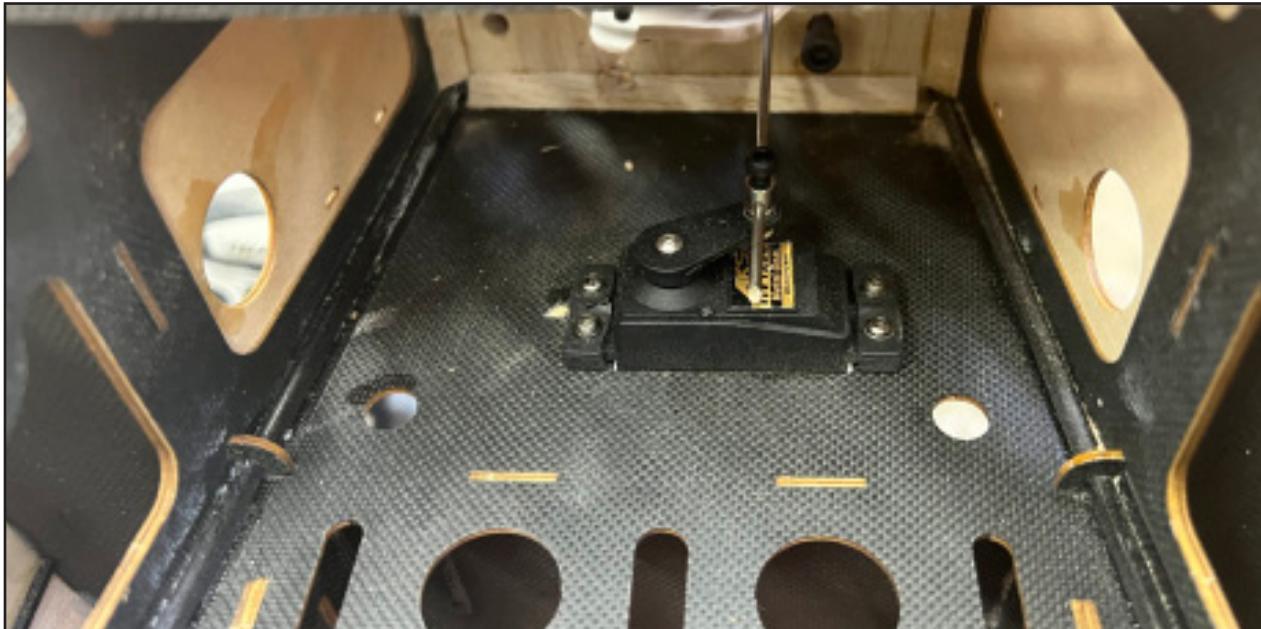
The firewall has a generic round center hole cut into it, you will need to make any modifications which fit your particular engine's connections and controls as shown. We recommend a Dremel-type rotary tool for this job. Mount the engine, using washers on the back side of the wood firewall as shown,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



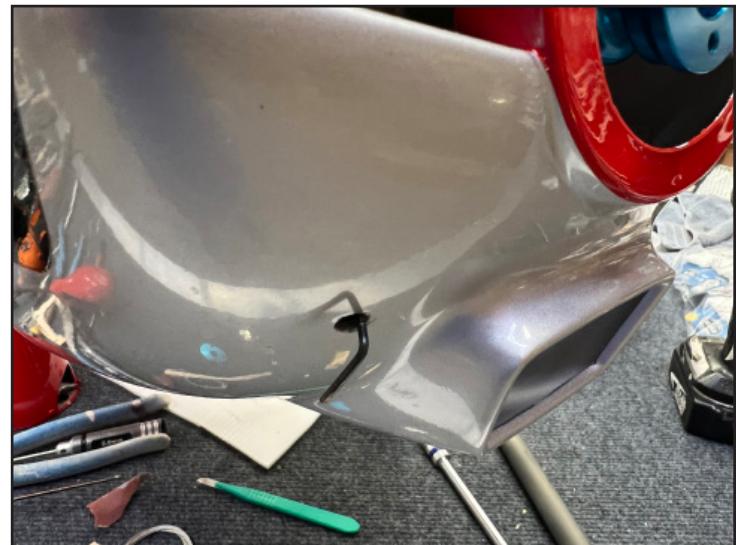
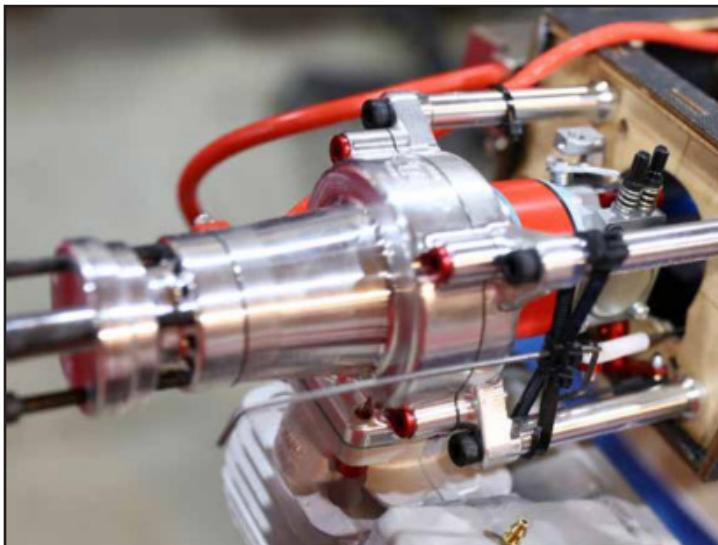
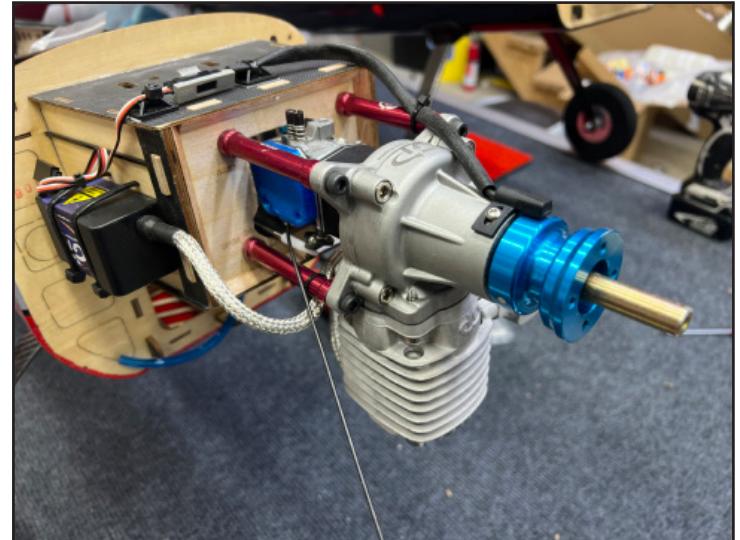
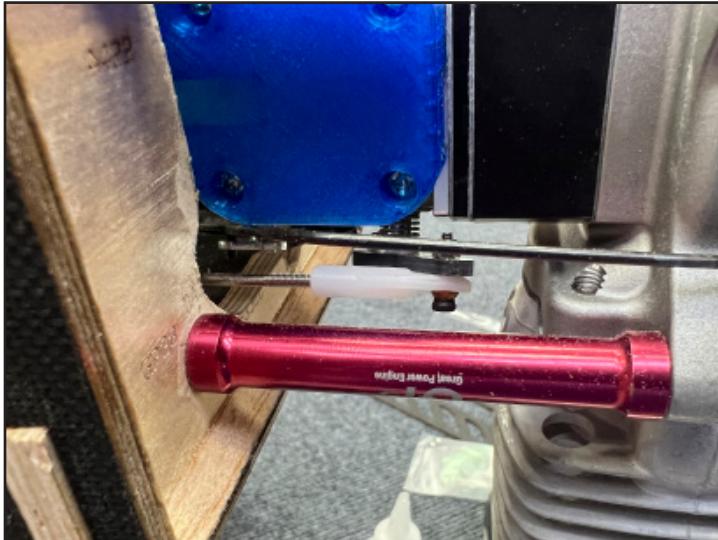
Mount the throttle servo as shown.

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.



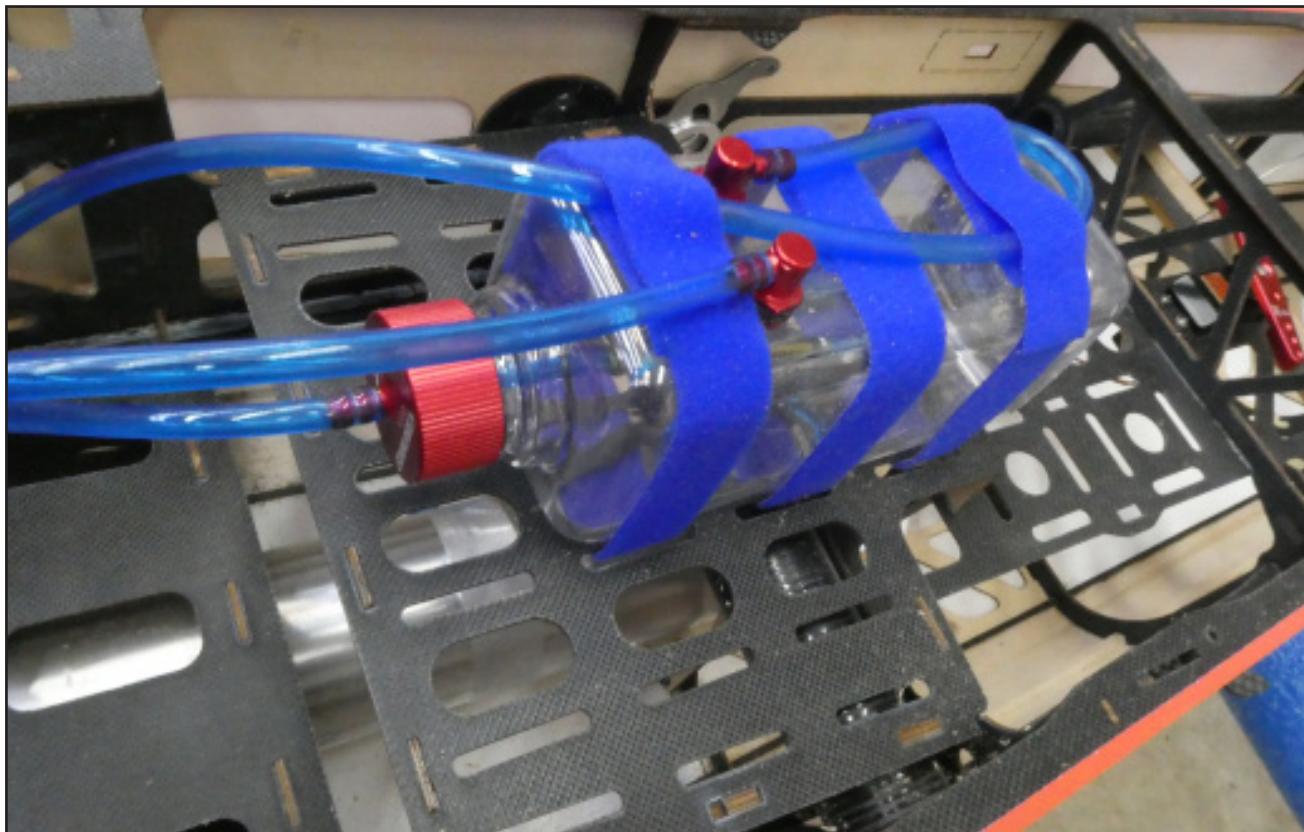
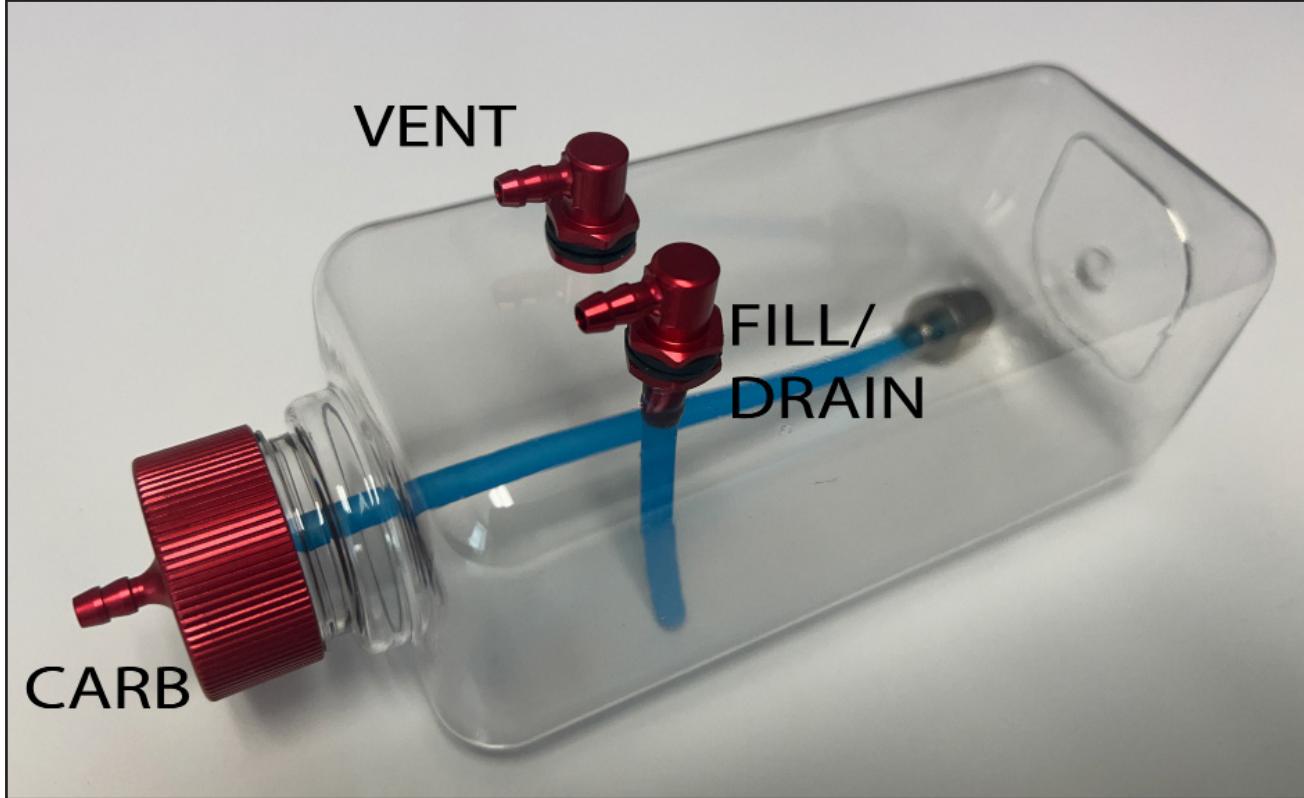
There are many options for choke actuation. You can run the linkage to the rear, you can install a choke servo; here we show a very simple forward choke rod installation. A forward choke rod may need a middle support, one convenient method is to make an "x" from zip ties around the engine standoffs, see photo. Install your fuel filler dot as shown.



9.

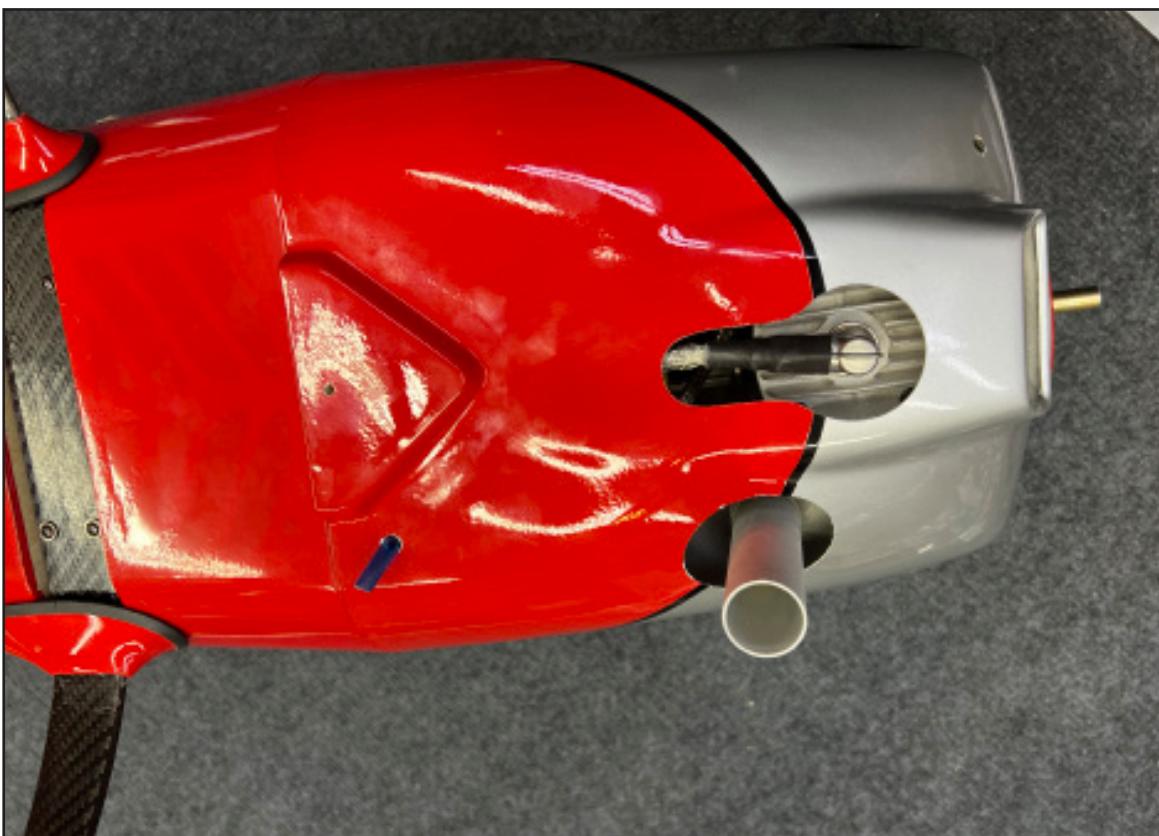
For plumbing your aircraft, we recommend Extreme Flight Flowmaster fuel tanks, fuel line, and fuel dot connectors. There are three primary connections on your gasoline fuel system: Fuel clunk to carburetor, fill/drain line to fuel dot, and vent. Extreme Flight fuel tubing is designed to grab onto barbed 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.



10.

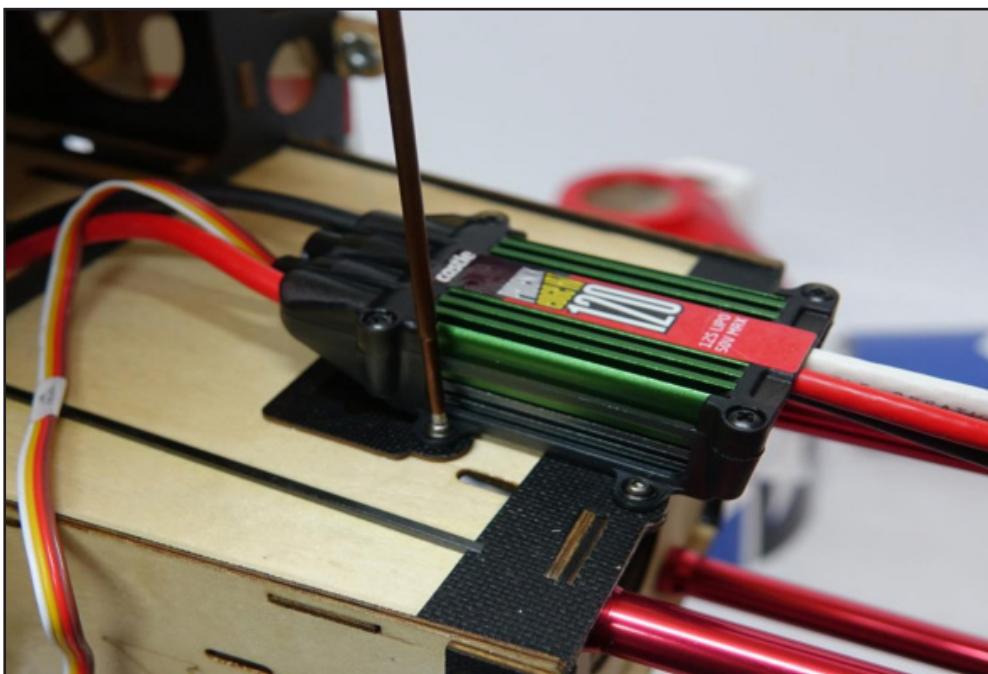
You will need to cut openings in the cowl for the cylinder head/spark plug and any muffler outlet pipes. We prefer to make a template out of paper or card stock, or in this case corrugated plastic, and mark the positions of the cylinder and pipe. We use the bottom cowl screw as a reference point and 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 78" Extra NG is a good match for the XPWR35 and XPWR40cc brushless motor, with our recommendation going to the 40cc for most pilots/applications. Use the LONG Blazing Star standoffs available from Extreme Flight RC. For either motor, drill on the XPWR35cc mounting hole locations. Use loctite on all motor mounting connections.

The underside of the motor box is a convenient place to mount the ESC with good cooling air access. Note that if using the Castle ESC with an XPWR motor, you should set your ESC firmware to version 4.22 using the castle link programmer.



For electric power, locate the clear plastic air deflectors in your kit, they are molded together in one piece. Cut them in the middle to separate the left scoop for the right and glue into the cowl with Clear Grip or other rubberized adhesive.



12.

The 78" Extra NG 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. If you need additional cooling, there are vents cut into the bottom sheeting of the fuselage, remove the covering over these vent holes with a sharp hobby knife or soldering iron tip to expose them.



# 13.

SFG's (side-force generators) are provided to mount on the wingtips. Their primary effect is to reduce unwanted rolling motions in 3D flight, they make harrier and other nasic 3D moves easier. Definitely try them if you are interested in the most stable 3D flight. Place the clear spacers in-between the wingtip and SFG as shown, to provide clearance for the ailerons to move. Rubber o-rings are provided to lock the thumb screws, and clear plastic washers to protect the face of the SFG. You can attach these washers to the SFG's with Clear Grip.



# 14.

The CG range of the Extra NG is extremely wide and you can get different flight characteristics, as desired, by moving the CG.

For basic sport flying and for precision flight, without 3D, balance on the wing tube. Support the aircraft, full assembled, by the wing tube, and it should hang approximately level. We recommend to do this with the fuel tank half-full on a gas installation. Because this is a forward CG, this may require some ballast. If you need to use ballast, we recommend plasticine modeling clay, sold for art students and as a children's toy.

For 3D and XA flight, balance the NG in a range from the back of the wing tube (the fuselage former behind the tube is a convenient place to support the plane for this) all the way back to 3/4" behind the tube or even more. For best 3D performance, try the NG with the CG in this range and tune to your liking.

Recommended control settings:

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

Our favorite control throw meter is the “level and measurement” app on our cell phones. We place the phone on the control surface, tap to zero the meter, and then deflect the surface.

