



116"

LASER



Assembly Manual



www.apexaerotech.com

Congratulations on your new Apex Aerotech aircraft, and thank you for supporting our brand! We're excited to welcome you to the Apex Aerotech community. Our team is dedicated to creating high-quality, high-performance aircraft, and we can't wait for you to enjoy everything your new model offers.

While each aircraft is built with care and precision, these are advanced machines that must be handled responsibly. As the builder and pilot, you are fully responsible for the assembly, setup, and safe operation of your model. Because we cannot verify how each aircraft is completed or flown, Apex Aerotech cannot accept liability for injury, property damage, or any other loss resulting from the use of this product. By operating this aircraft, you agree to accept full responsibility for its use.

To encourage safe and responsible flying, we recommend joining the Academy of Model Aeronautics (AMA) or the equivalent organization in your home country. These groups offer helpful guidelines, legal protections, insurance coverage, and access to approved flying sites.

For safety, always land your aircraft immediately if any part becomes loose, detaches, or if the model behaves unusually. This helps prevent potential/further damage and unsafe situations.

Thank you again for choosing Apex Aerotech. We appreciate your support and wish you safe flights and many great experiences with your new aircraft!

Apex Aerotech Contact

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www.apexaerotech.com





The Apex Aerotech 116" Laser is here to raise the bar in the 40% class! The Laser is a truly legendary platform, known for its championship-winning performances and airshow routines flown by the famous Leo Loudenslager in the full-scale aerobatic world. The Laser quickly became a historic platform due to its ability to perform innovative maneuvers, deliver a wide flight envelope, and present an unmistakable presence in the air. The 116" Laser perfectly embodies that legacy!

The 116" Laser is designed for 150–200cc+ engines and is easily compatible with both two-cylinder and four-cylinder engines in that range, with no modifications necessary. Apex Aerotech has performed extensive design work and testing with a single goal in mind: to close the gap between 120cc and 40% aircraft agility while maintaining all of the unique and acclaimed characteristics that 40% aircraft have long been known for. The Laser checks every box, including high-level IMAC capability, low-and-slow classic 40% 3D performance, and impressive high-energy XA tendencies that were previously only known from smaller aircraft. The combination of a commanding presence and agility that feels like a smaller aircraft is truly eye-catching!

The Laser is available in two perfectly fitting color schemes: the "Retro" and "Velocity" liveries designed by Clint Sweet. Both schemes complement the aircraft's iconic lines beautifully, with the Retro livery paying tribute to the classic Laser appearance while adding a modern twist, and the Velocity livery delivering a bold, attention-grabbing, high-performance look.

The 116" Laser also includes a variety of features that make the assembly of a 40% aircraft simple, straightforward, and convenient. Without a doubt, the 116" Laser truly raises the bar in the 40% class, from its versatile flight performance to its unmatched convenience!

RECOMMENDED EQUIPMENT:

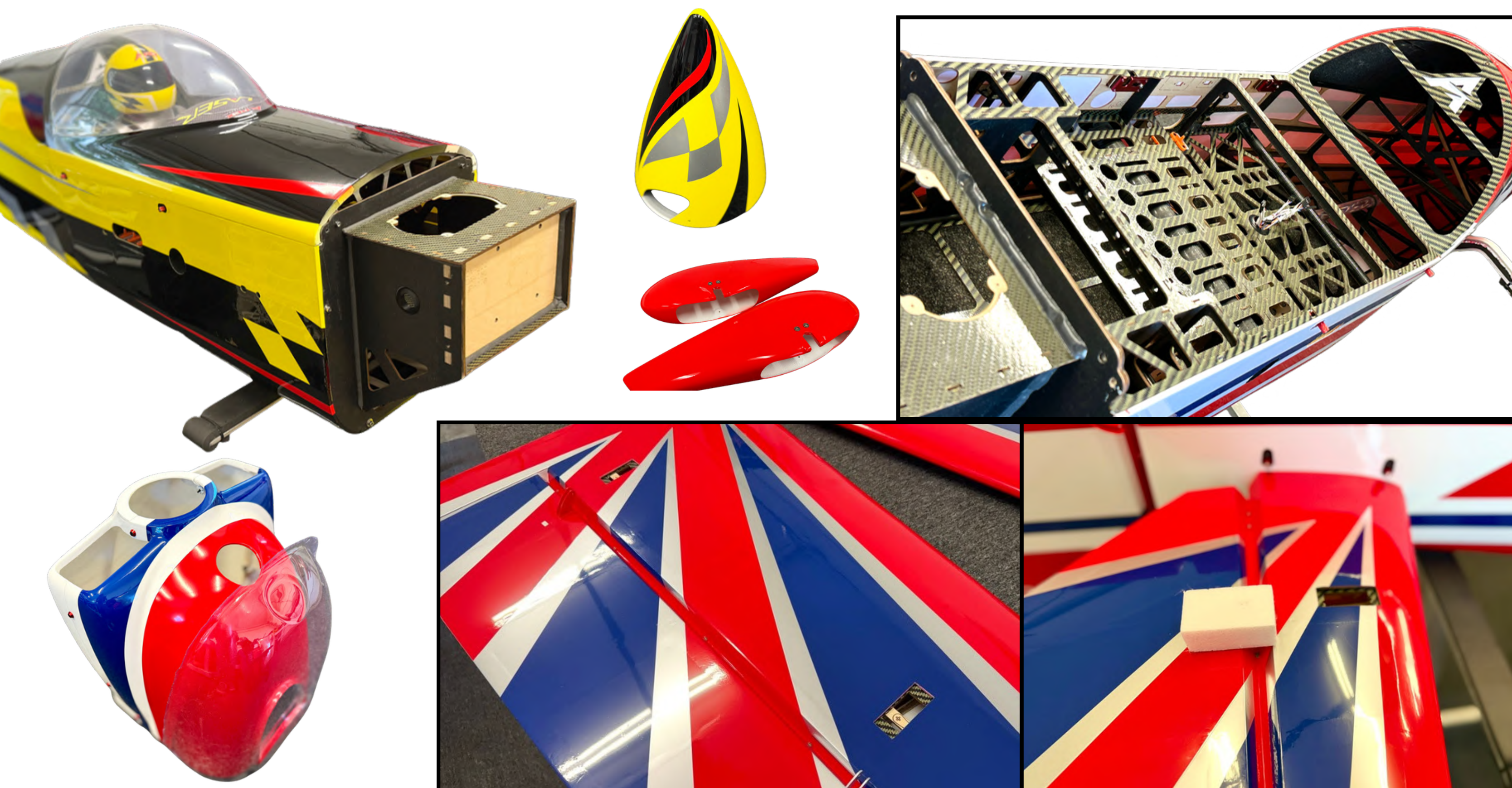
- **150-240CC GAS ENGINE (TESTED WITH DA-180) AND 30-34" PROPELLER**
- **2-CYLINDER ENGINE MOUNT INCLUDED, APEX/DUALSKY 200CC ENGINE MOUNT RECOMMENDED FOR 4-CYLINDER (25MM 4-CYLINDER STANDOFF)**
- **QTY. 2-3 SERVOS PER WING (MINIMUM 600 OZ.IN. TORQUE)**
- **QTY. 1-2 SERVOS PER ELEVATOR (MINIMUM 600 OZ.IN. TORQUE)**
- **QTY. 2 SERVOS PER RUDDER (MINIMUM 600 OZ.IN. TORQUE)**
- **QTY. 1 SERVO FOR THROTTLE (HIGH SPEED RECOMMENDED)**
- **12-20 CHANNEL RECEIVER**
- **90MM HEADER DROP**



SERVO ARM SETUP:

- **QTY. 4-6 1.25" APEX ALUMINUM CLAMPING STYLE M3 ARMS (AILERONS)**
- **QTY. 2-4 2.0" APEX ALUMINUM CLAMPING STYLE M3 ARMS (ELEVATOR)**
- **QTY. 2 2.0" APEX ALUMINUM CLAMPING STYLE M3 ARMS (RUDDER)**
- **QTY. 1 1.25" APEX ALUMINUM CLAMPING STYLE M3 ARM (THROTTLE)**





Unboxing and Prep

Before beginning assembly, it's important to prepare the aircraft's covering. Each model experiences multiple environmental changes during transit from the factory, to our headquarters, and finally to your door. These shifts in temperature and humidity can naturally affect the covering and underlying wood structure.

We highly recommend taking a few minutes to inspect all covering seams and surfaces to ensure they are fully secure. Using a covering iron with its supplied cover or sock, lightly go over any seams or areas that need tightening. A heat setting of approximately 250-270°F is ideal. Avoid excessive heat—overheating can cause unnecessary shrinking or distortion. If you are new to working with film-covered aircraft, start with a lower heat setting and increase gradually as needed.

Some wrinkles are normal on newly manufactured wood aircraft. The amount of visible wrinkling depends largely on the wood's moisture content. Aircraft stored or shipped in higher-humidity environments may show fewer wrinkles due to the wood swelling slightly, while lower-humidity environments may allow the wood to contract, and covering to produce more visible wrinkles.

You may use a heat gun to remove certain wrinkles if you are experienced and comfortable with the technique. However, it is strongly recommended to attempt correction with the iron first, as it offers more control and reduces the risk of overheating or distorting the covering.

Taking the time to properly prep the covering will help ensure a clean finish and long-term durability of your aircraft. Additionally, we recommend taking a few moments to inspect all glue joints throughout the airframe. If desired, reinforce any joints with a small amount of CA adhesive.

Apex Aerotech aircraft also feature numerous factory-installed components, including—but not limited to—control horns, hinges, and other pre-installed items. Before flying, carefully inspect these components to ensure they are secure, properly bonded, and operating correctly. While every aircraft is thoroughly inspected during manufacturing, shipping and handling can occasionally affect factory-installed components, making this final inspection an important step in the assembly process.

LASER COVERING CODES (MANUFACTURED BY FLFRC)

RED/BLUE ("RETRO")

-009-1 DARK RED

-011-1 DARK BLUE

-016-1 SILVER

-014-1 WHITE

YELLOW ("VELOCITY")

-010-2 CADMIUM YELLOW

-009-2 RED

-015-1 BLACK

-016-1 SILVER

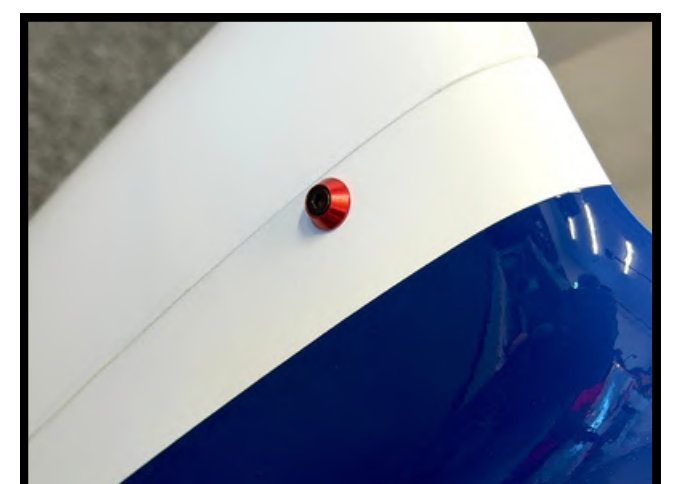
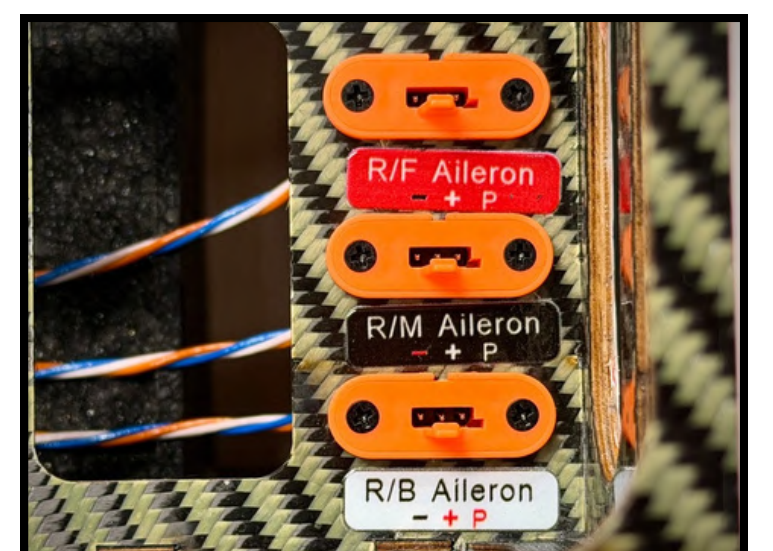
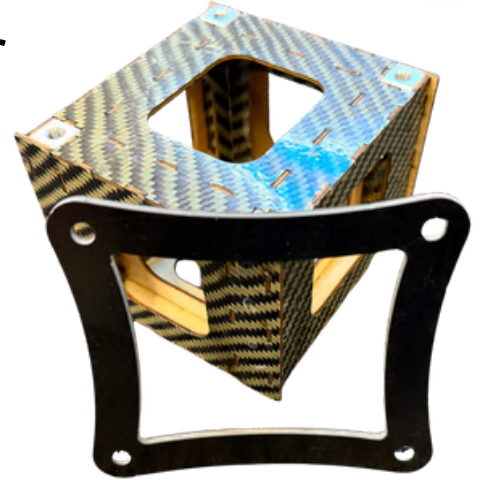


116" LASER FEATURES

In addition to its revolutionary flying characteristics, the 116" Laser raises the bar for inclusions and convenience in a 40% size aircraft!

Features:

- Pre-hinged and sealed control surfaces
- Pre-installed, painted control horns
- Removable rudder
- Quick attach/release system for the wings, canopy, and stabs
- Exhaust cutting template included for the cowling
- Engine baffling included for both two-cylinder and four-cylinder engines
- Motor box extension included for two-cylinder installations
- Two-piece cowling for easy four-cylinder engine access
- Enhanced cowling structure for improved rigidity and integrity of the two-piece design
- Pre-installed pilot figure and cockpit set
- Livery-matched carbon fiber spinner
- 50 oz fuel tank
- Rudder and elevator servo extensions pre-installed and labeled
- Aileron servo extensions included and labeled
- Pre-installed and labeled aileron servo lead connectors
- Pre-installed elevator servo lead connectors
- Accommodates 2–3 servos per wing and 1–2 servos per elevator half
- Aluminum receptacles for canopy pins
- Wing bags, canopy cover, and stab bags included
- Removable hatches for convenient fuselage access
- Foam pipe tunnel
- Carbon fiber/Kevlar-laminated structure throughout
- Painted carbon fiber landing gear
- High-quality decal package
- Blind nuts pre-installed in the wingtips for night lights
- Pre-cut cowling pressure-relief opening for hot air exit



Specifications:

Wingspan: 116"

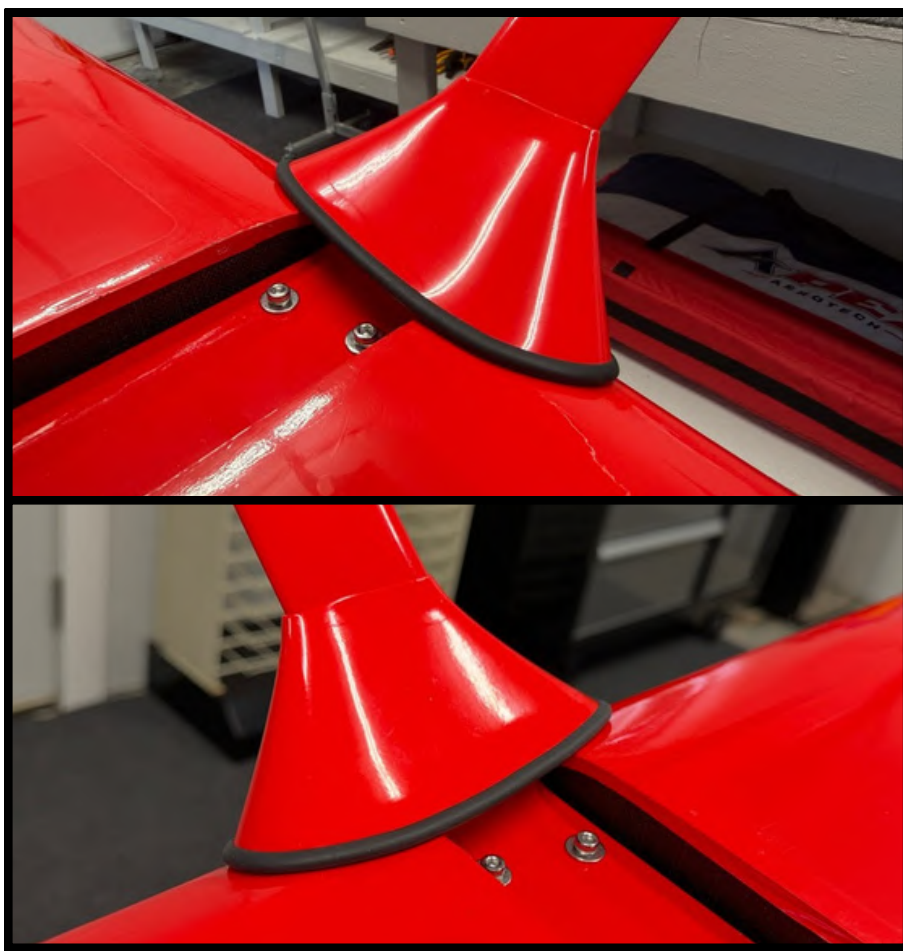
Length w/spinner: 115"

Weight: 38-41lbs

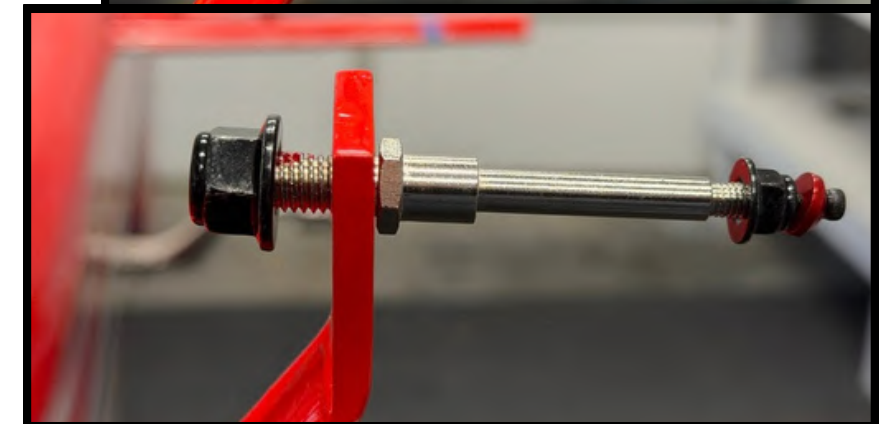
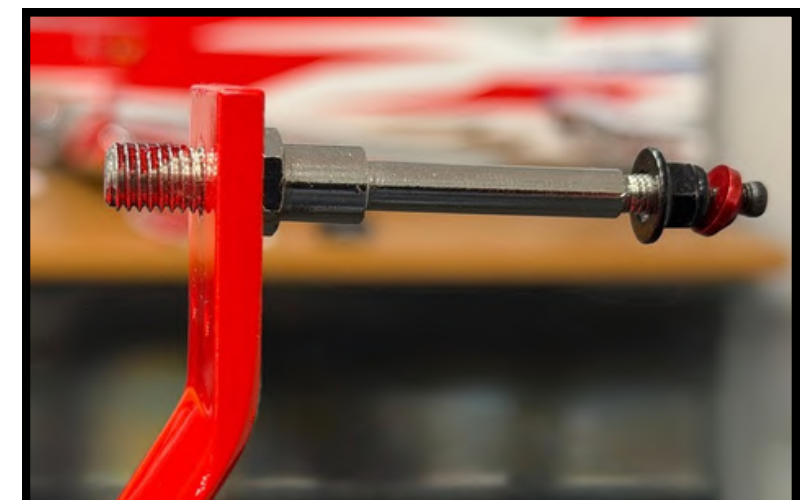
LANDING GEAR INSTALLATION



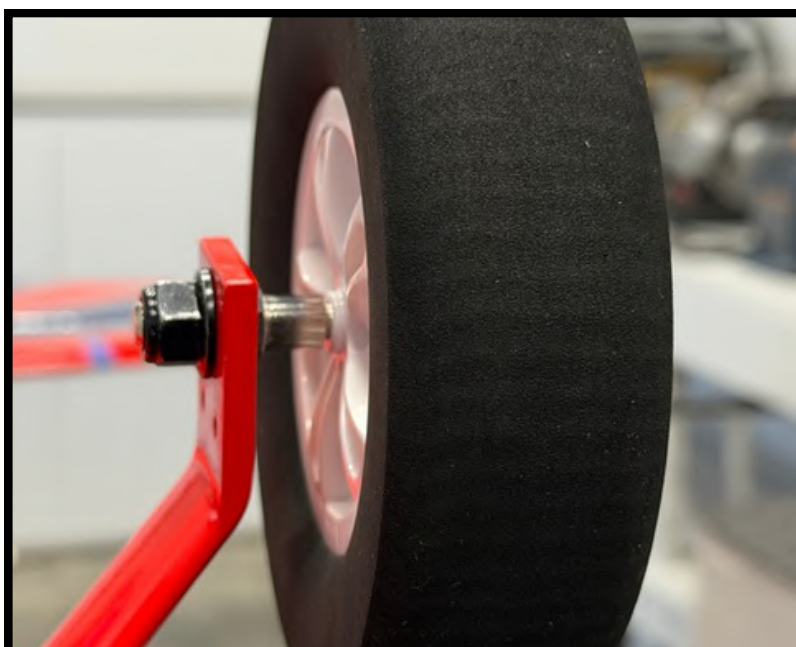
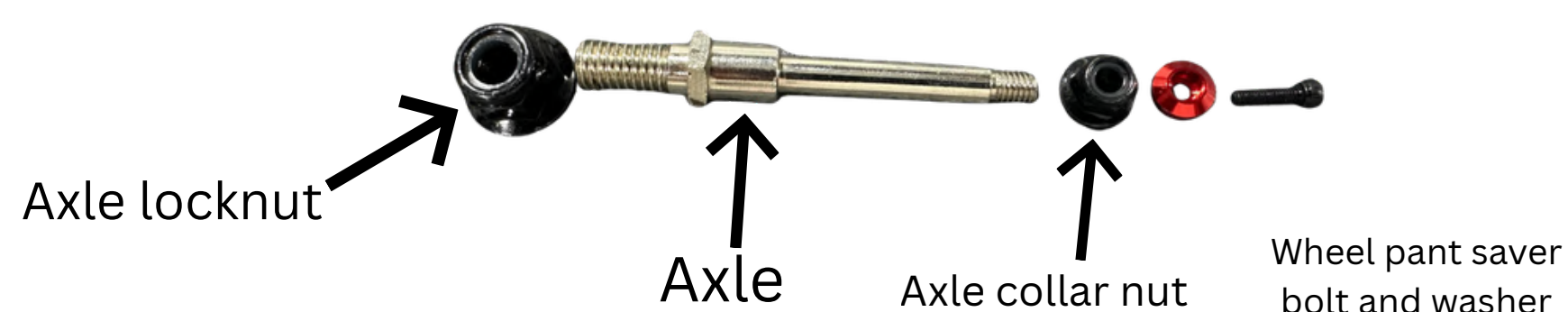
The main landing gear is secured with four bolts. The bolt pattern is keyed to ensure correct installation orientation. It is recommended to apply blue Loctite to these bolts before installation.



Before installing the axles, now is a good time to slide the landing gear cuffs onto the gear legs.



First, slide the threaded end of the axle into the landing gear leg. Install and tighten the axle locknut. Align the axle so the hex portion is oriented vertically. This orientation ensures the wheel pant can be installed correctly.

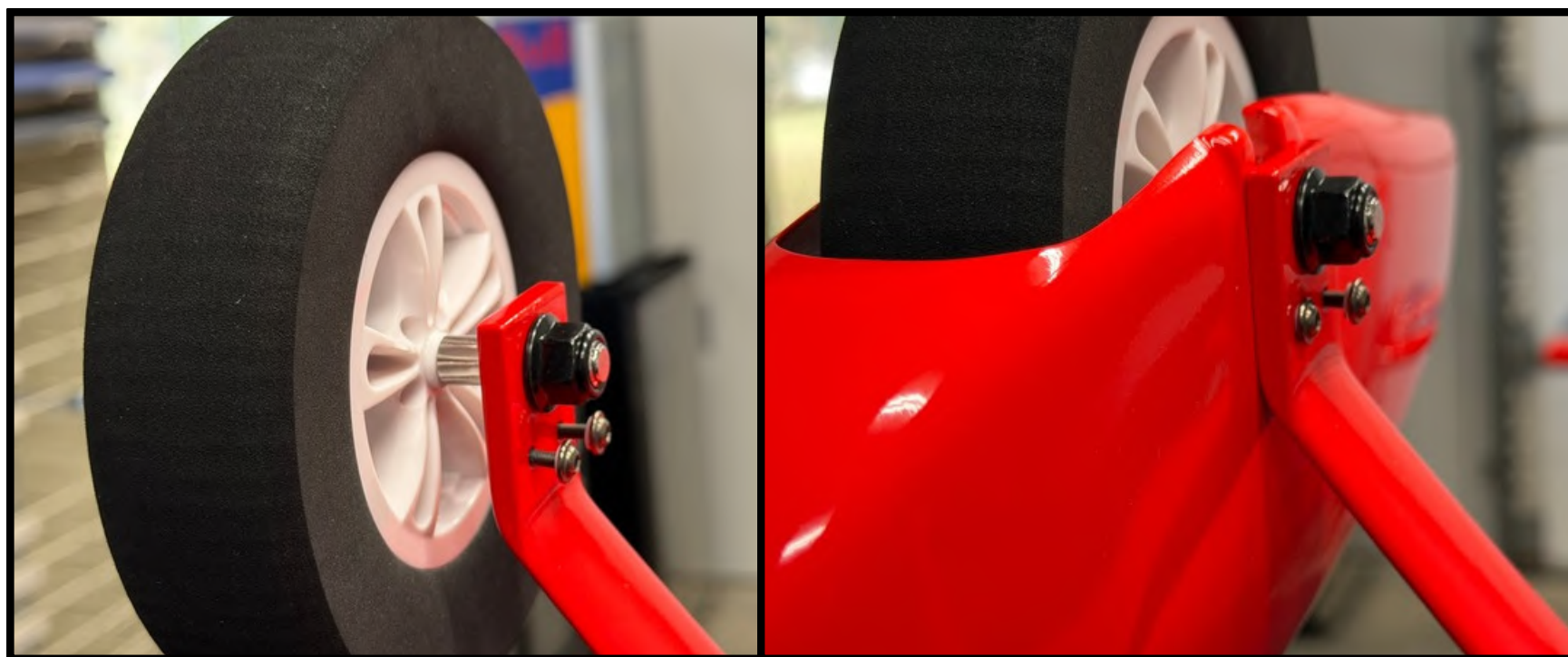


Once the wheel is installed on the axle, install and tighten the axle collar nut.



Next is the wheel pant installation. Locate the wheel pants, the two mounting bolts, and the wheel pant saver bolt and washer.





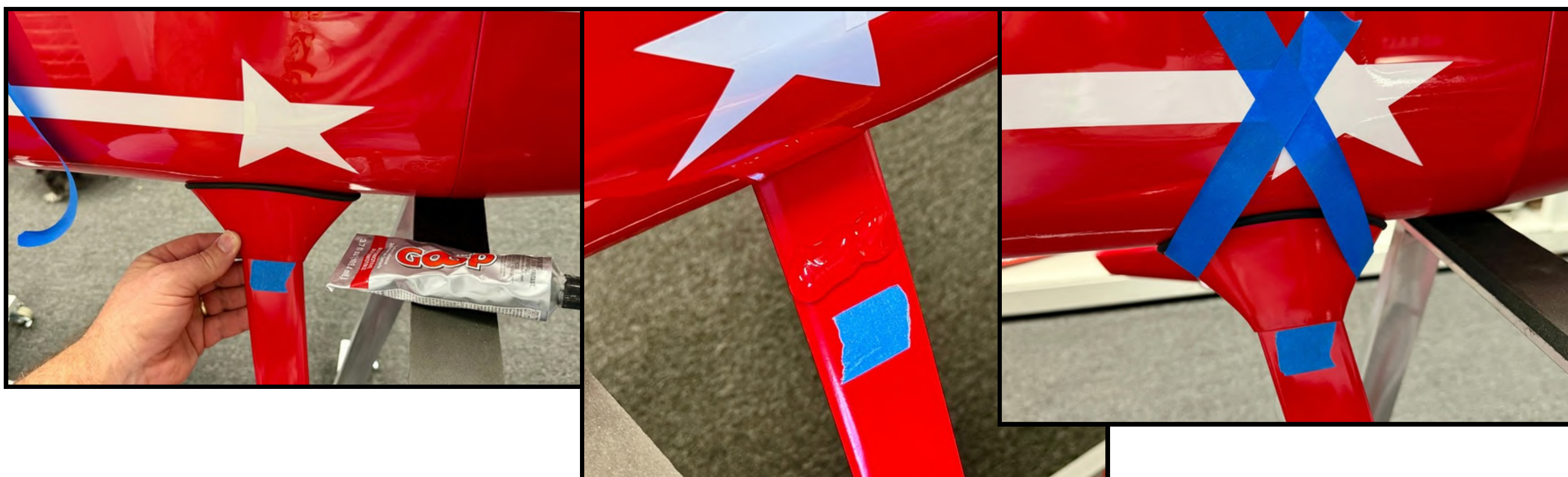
Insert the two wheel pant mounting bolts into the provisions in the landing gear leg. Position the wheel pant and thread the bolts into the wheel pant. It is recommended to apply blue Loctite to the wheel pant mounting bolts before installation.



Apex Aerotech aircraft feature a built-in wheel pant saver system. Thread the wheel pant saver bolt and washer into the end of the axle. Make sure the hole on the wheel pant is aligned with the threaded axle opening.

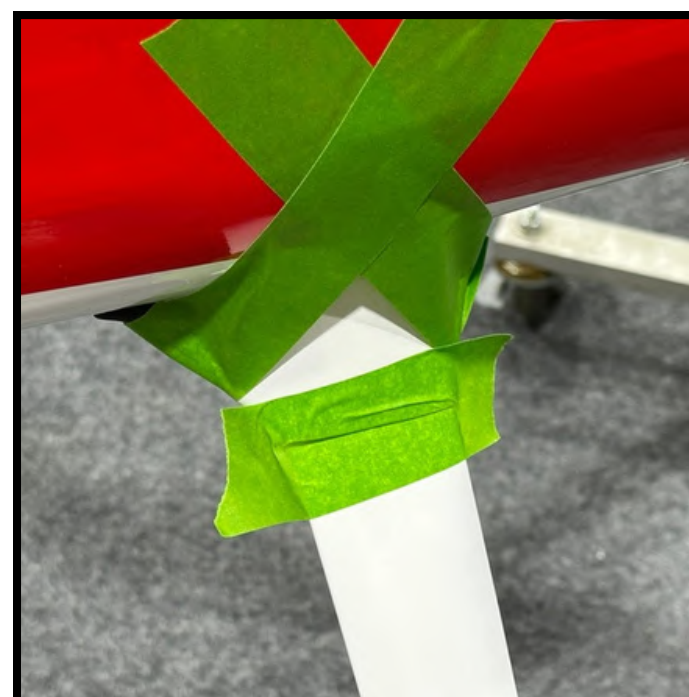


Apply blue Loctite



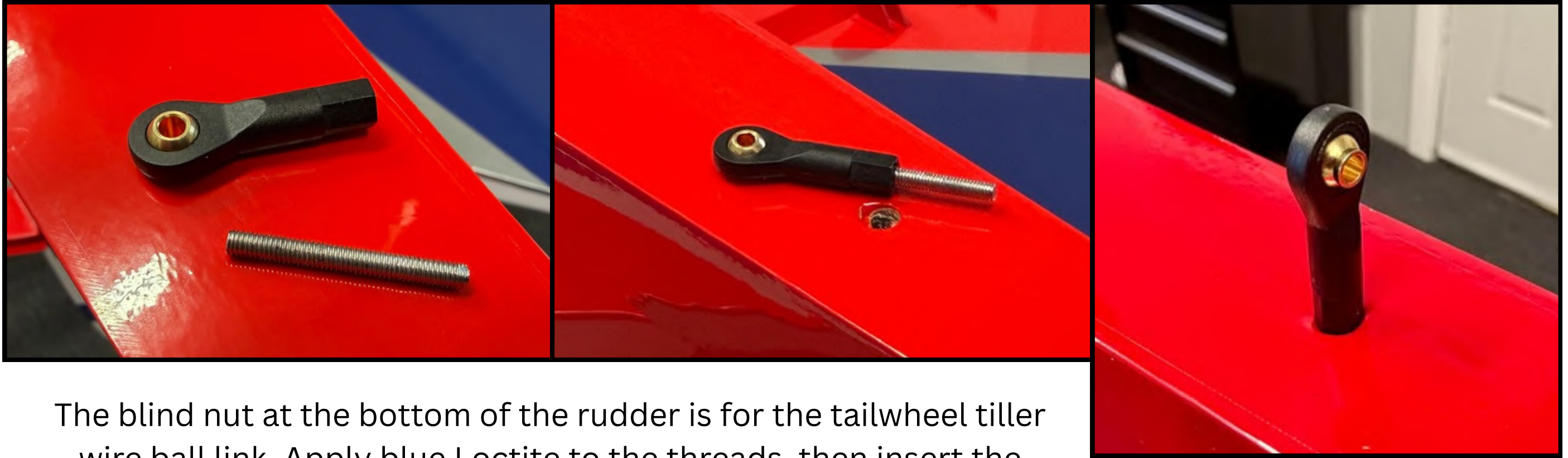
Landing gear cuff installation requires GOOP (or a similar rubberized adhesive) along with masking tape to hold the cuffs in position while the adhesive cures. The gear cuff is glued to the landing gear only, not the fuselage. This allows the landing gear to be removed later if needed.

- Slide the landing gear cuff up against the fuselage until it is properly positioned. Use a piece of masking tape to mark the location of the gear cuff for reference.
- Slide the cuff back down the gear leg. Apply a bead of GOOP to both sides of the landing gear leg, just above the reference mark, then slide the cuff back up into position against the fuselage.
- Use masking tape to hold the gear cuff in place up against the fuselage. If desired, place a piece of tape and crease it along the joint between the bottom of the gear cuff and the gear leg to help prevent excess GOOP from spreading.



**Keep the aircraft in an upright position while the adhesive cures to prevent any adhesive from dripping onto the fuselage.*

TAILWHEEL AND RUDDER INSTALLATION



The blind nut at the bottom of the rudder is for the tailwheel tiller wire ball link. Apply blue Loctite to the threads, then insert the threaded tiller wire ball link into the provisional blind nut.



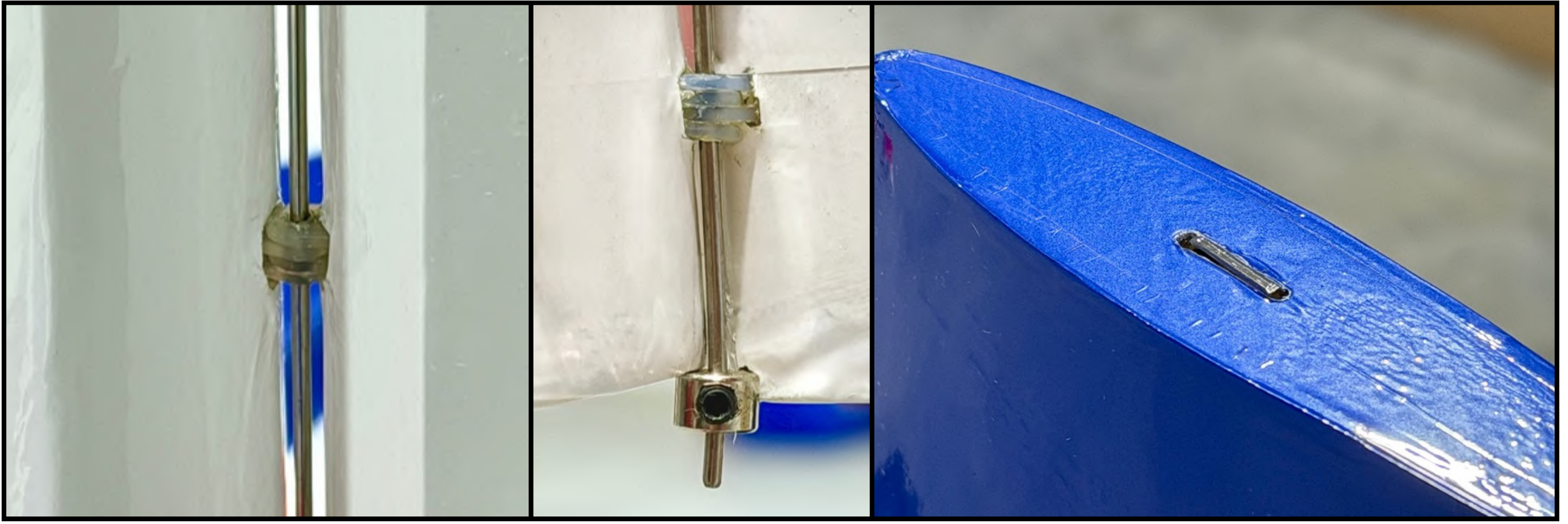
The tailwheel is installed using two bolts. Apply blue Loctite to the bolts before tightening.

Be sure to install the flat portion of the tiller wire into the tailwheel swivel mount. Apply Loctite to the set screw before tightening.



Bend the tiller wire so it aligns with the opening of the ball link. Applying heat while the wire is off and away from the aircraft is a simple and effective method to achieve the correct bend.

Verify that the rudder moves freely and achieves full deflection in both directions.



The Laser features a removable rudder. To install:



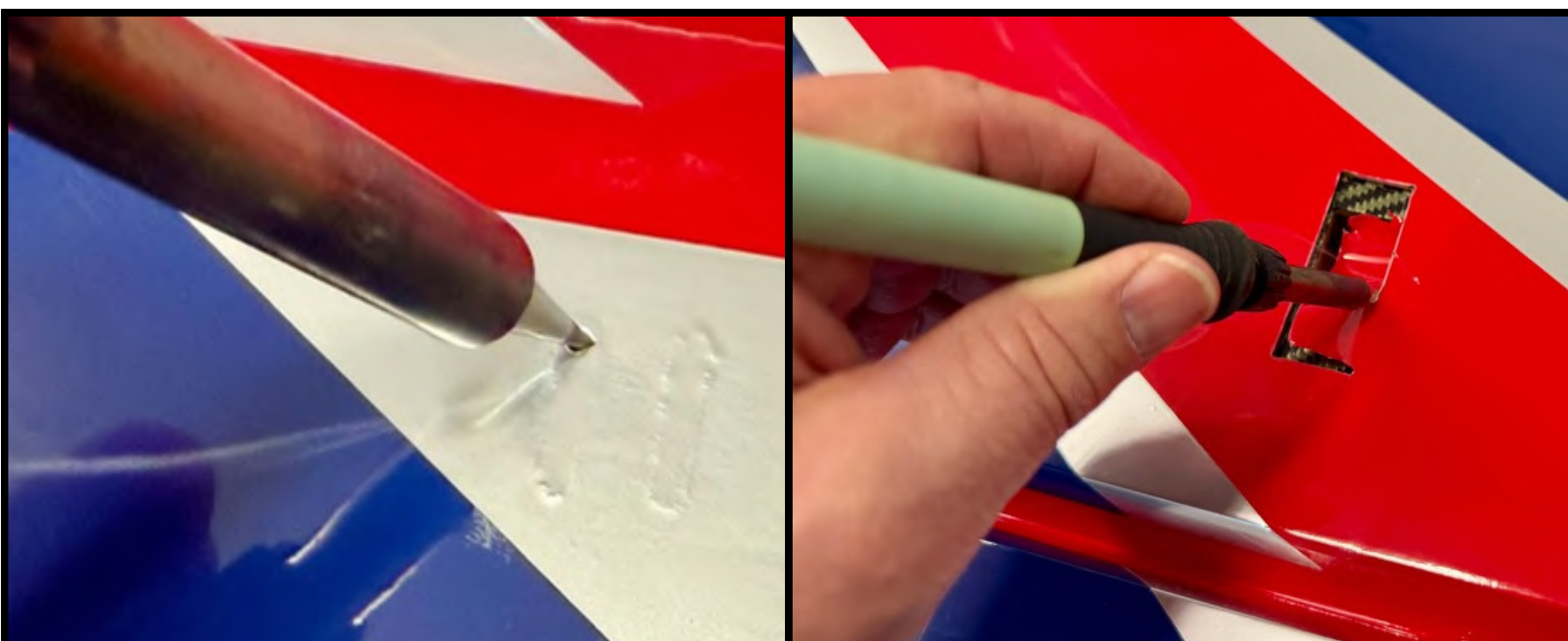
1. Align the rudder hinges.
2. Slide the hinge pin through the opening at the top of the rudder and down through the hinge holes.
3. The 90-degree bend at the top of the wire will sit in the provision at the top of the rudder.
4. At the bottom, secure the hinge wire with the collar and set screw. Apply blue Loctite to the set screw.

AILERON SERVO INSTALLATION

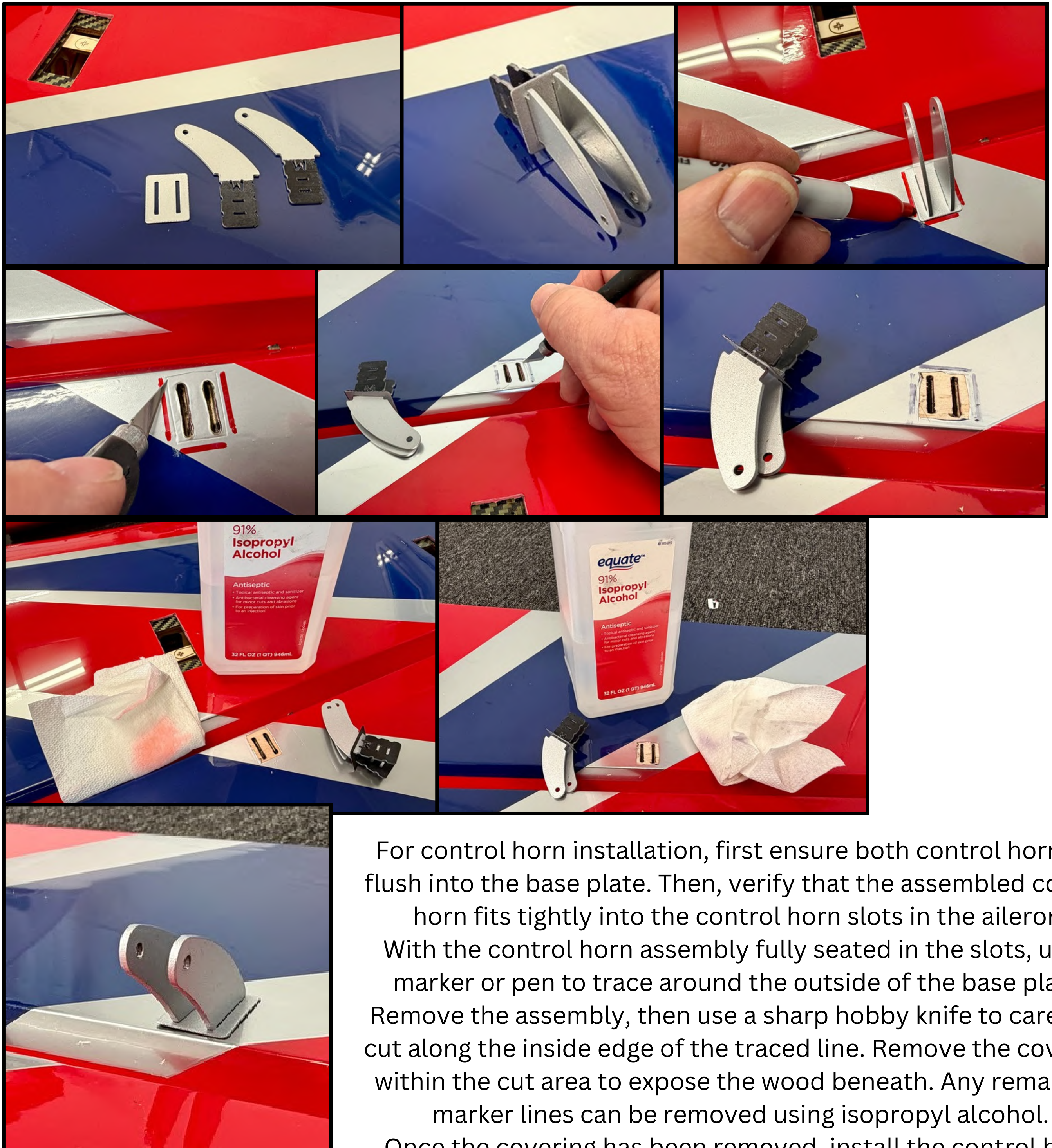


The 116" Laser features optional aileron servo configurations, allowing either two or three servos per wing. The inboard and outboard aileron control horns come pre-installed. The center aileron control horns are included separately and are pre-painted to match the aircraft.

If installing three aileron servos per wing, locate the hardware bag labeled for the wing. Before cutting the covering, we recommend tightening the covering over the center aileron servo and control horn locations using a covering iron.



If installing the center aileron servo, remove the covering from the servo mounting and control horn provisions. This can be done using a sharp hobby knife or a soldering iron.



For control horn installation, first ensure both control horns fit flush into the base plate. Then, verify that the assembled control horn fits tightly into the control horn slots in the aileron.

With the control horn assembly fully seated in the slots, use a marker or pen to trace around the outside of the base plate. Remove the assembly, then use a sharp hobby knife to carefully cut along the inside edge of the traced line. Remove the covering within the cut area to expose the wood beneath. Any remaining marker lines can be removed using isopropyl alcohol.

Once the covering has been removed, install the control horn assembly using a high-quality epoxy, such as Hysol EA 608.



Note: It is highly recommended to sand or scuff the mounting tabs of each control horn before installation. This will promote maximum epoxy adhesion and ensure a strong, reliable bond.



Turnbuckles and ball links



Control linkage items:

- Turnbuckle
- Ball Link
- Bolt
- Locknut



Turnbuckle wrench



Assembled control linkage. The flanged ball link will be positioned against the servo arm.

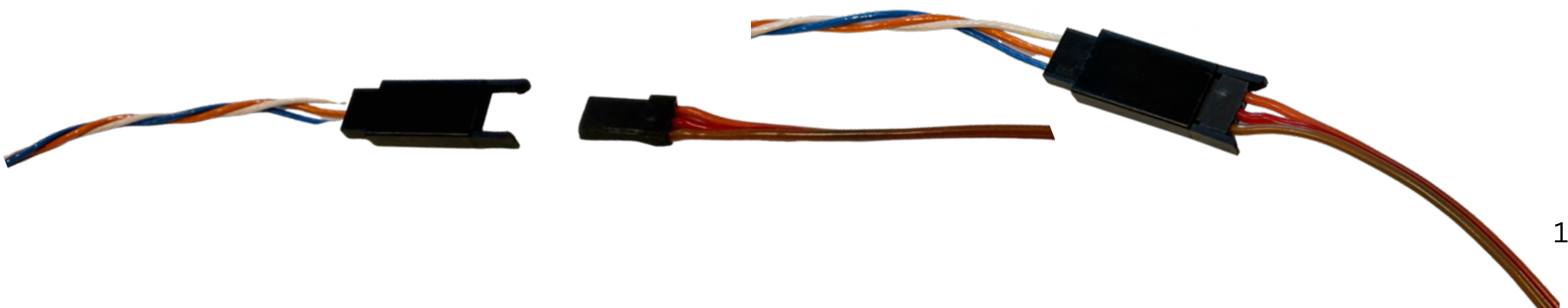


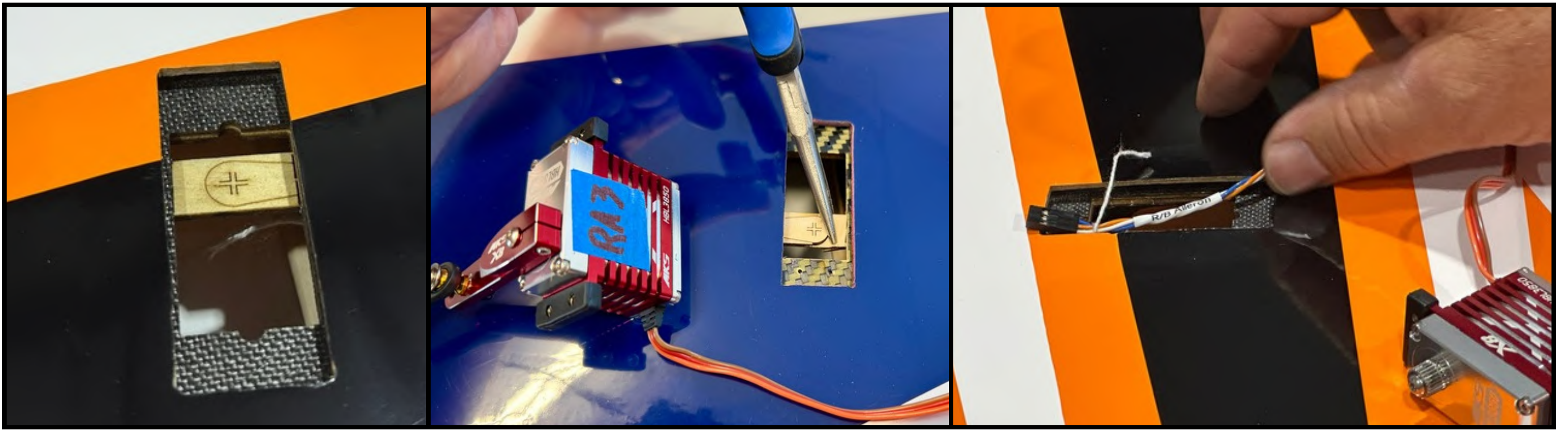
The Laser includes servo extensions and pre-installed aileron servo lead connectors. Each extension and connector is clearly labeled for easy identification:

- “L” / “R” indicate left and right wing
- “F” indicates front (inboard)
- “M” indicates middle (center)
- “B” indicates back (outboard)

For example, “L/B” identifies the left outboard aileron connection.

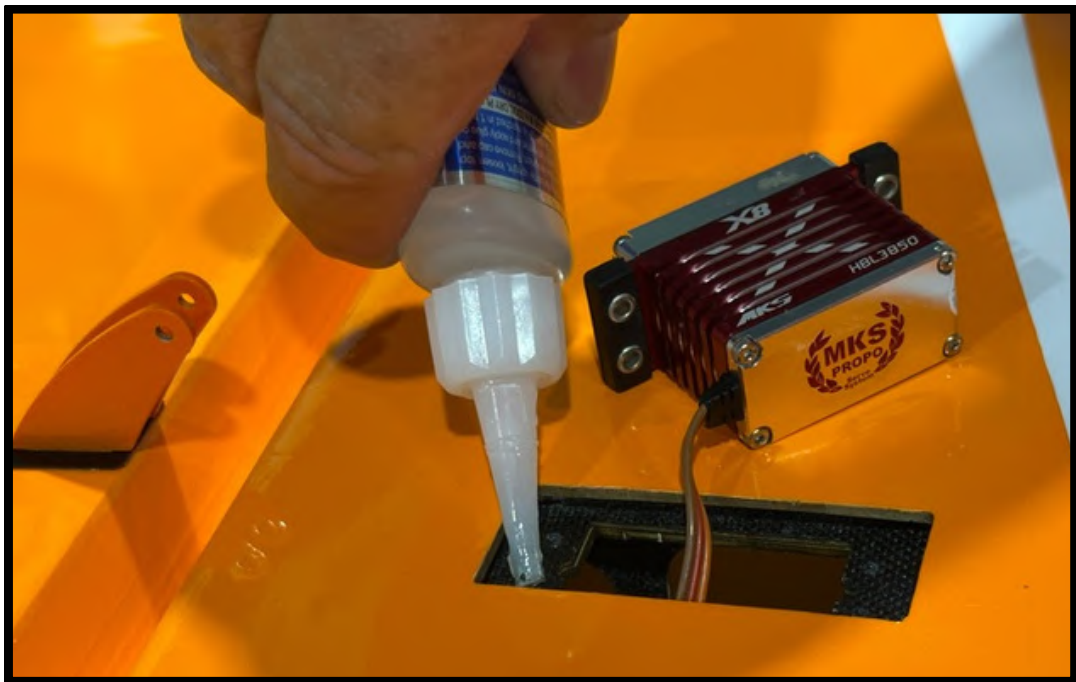
Only the outboard and center aileron servos require extensions (provided in the bag)



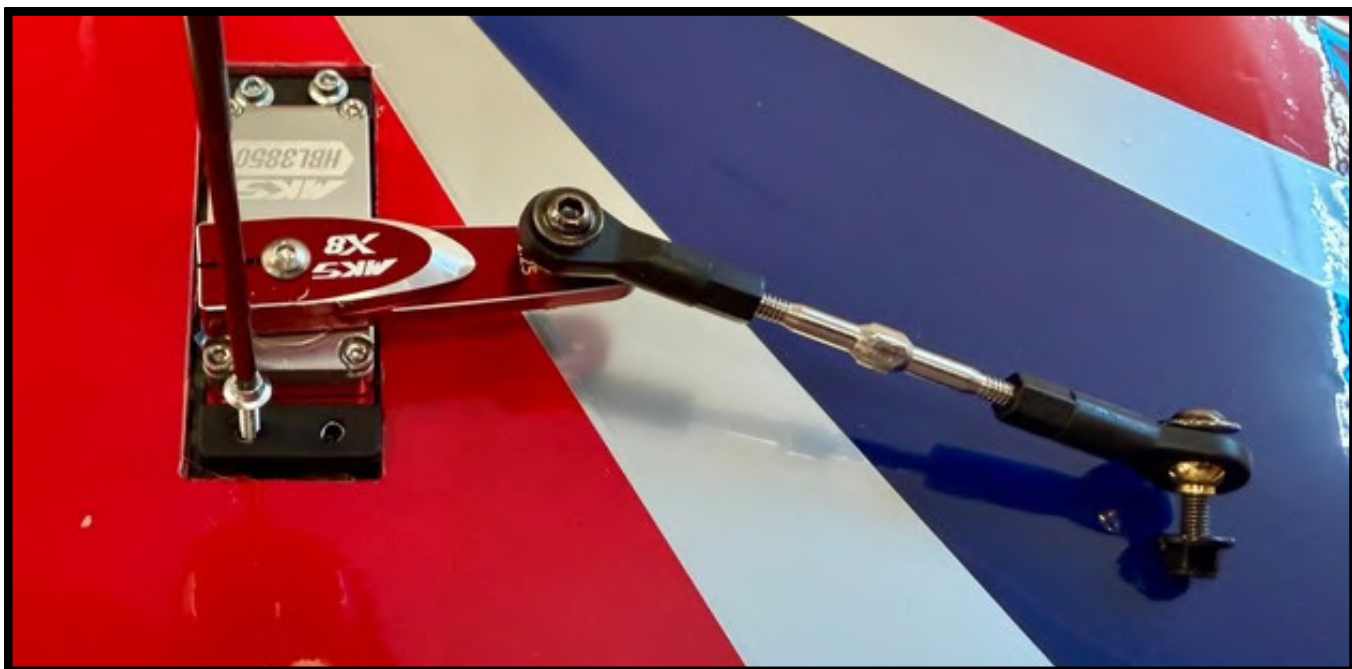


Each servo pocket includes a wooden insert that indicates the correct servo arm orientation. Remove this piece before installing the servos.

For the outboard and center servos, connect the servo extension first. A string is provided inside the wing to help guide the extension through the wing during installation.

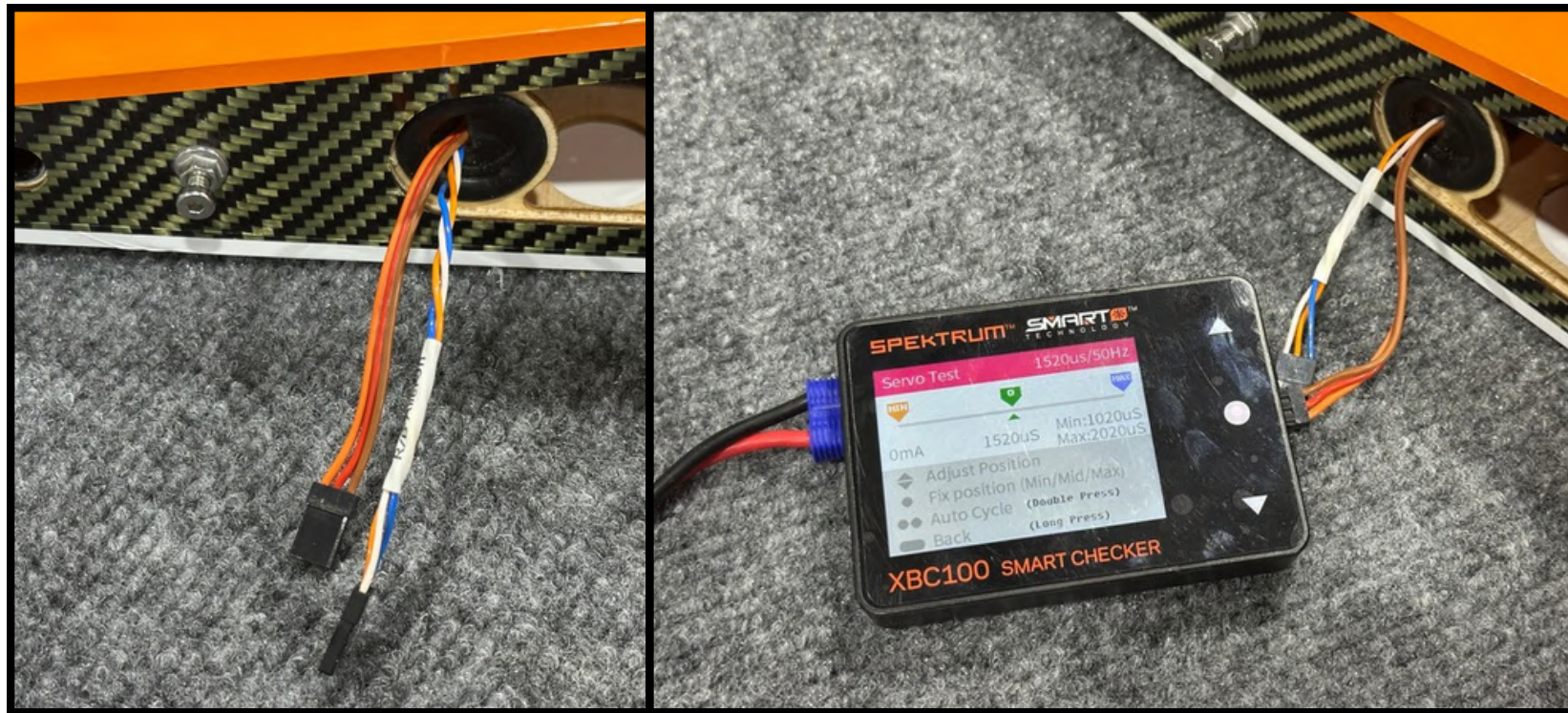


To install the servos, first run the servo screws into the mounts to create the threaded holes. Remove the screws, then apply thin CA into the holes to harden the threads and help prevent stripping. Once the glue has cured, reinstall the servos.





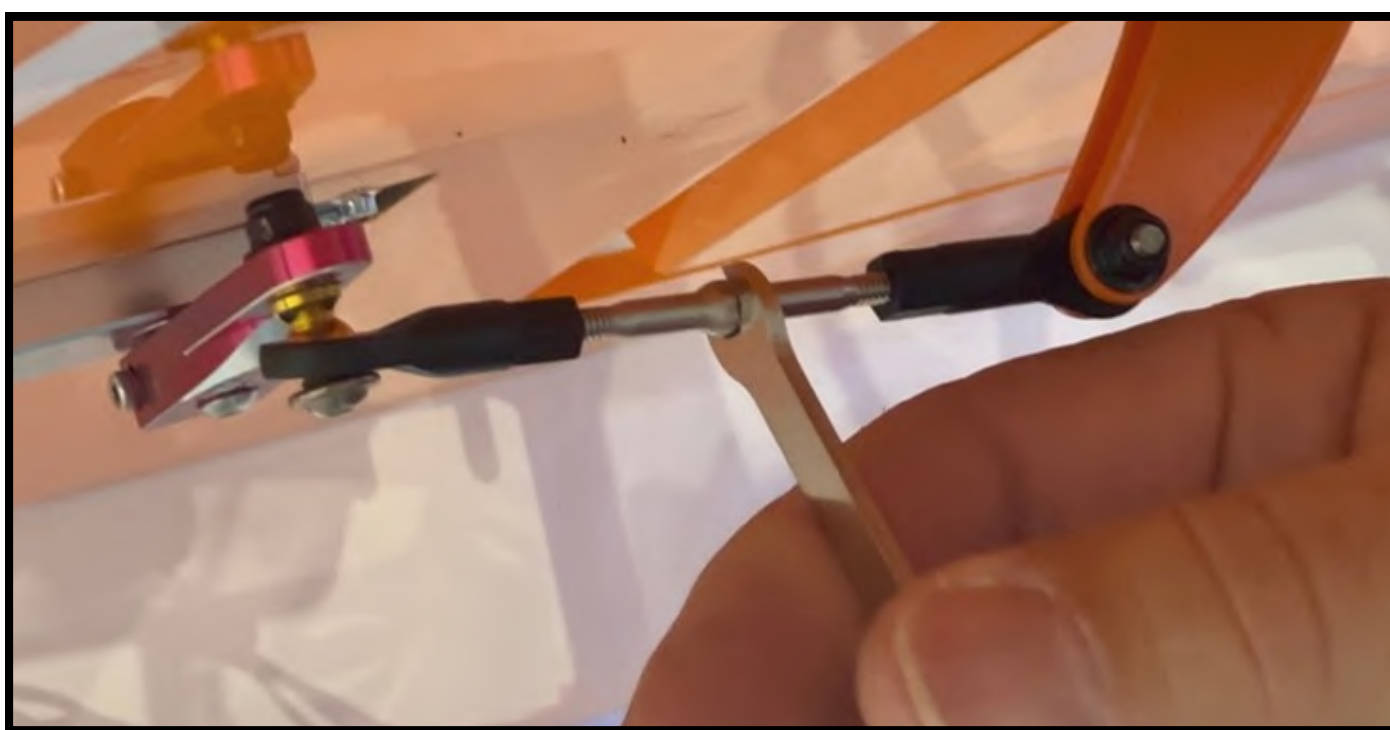
Note that the flanged ball link is installed against the servo arm. Apex hardware features built-in flanges, eliminating the need for additional washers.



Guide the servo leads through the pre-installed rubber grommet. For convenience, you may use a servo centering tool (such as the Spektrum Smart Checker) to center the servos before installing the servo arms. Mount the servo arm as close to 90 degrees to the servo casing as possible.



For best performance and optimal resolution, install the control linkage at the 1.25-inch hole on the servo arm.



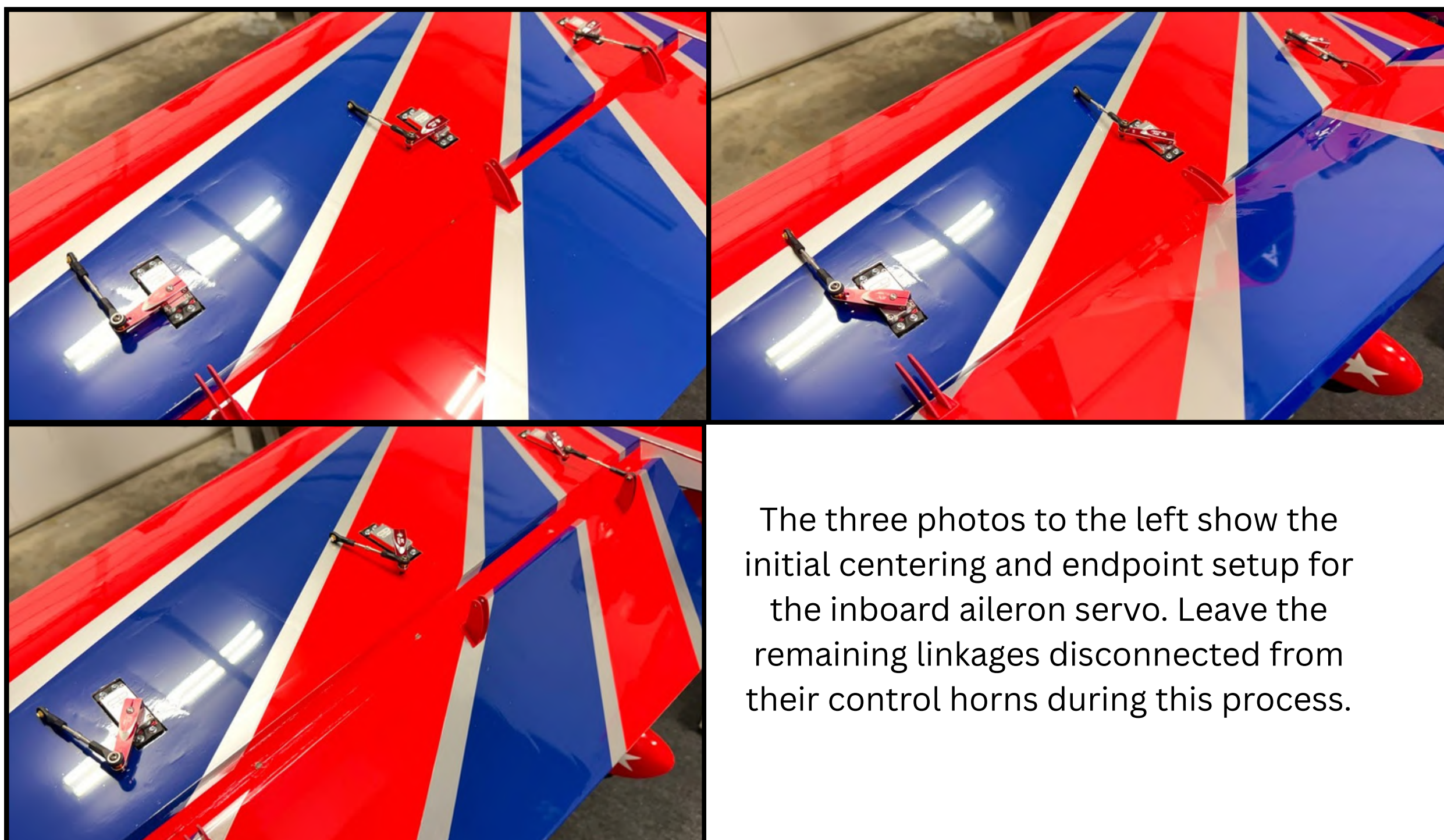
For setup, start with the inboard servo. First, adjust the turnbuckle mechanically to roughly center the control surfaces. Then, use your radio to fine-tune sub-trim for precise alignment.



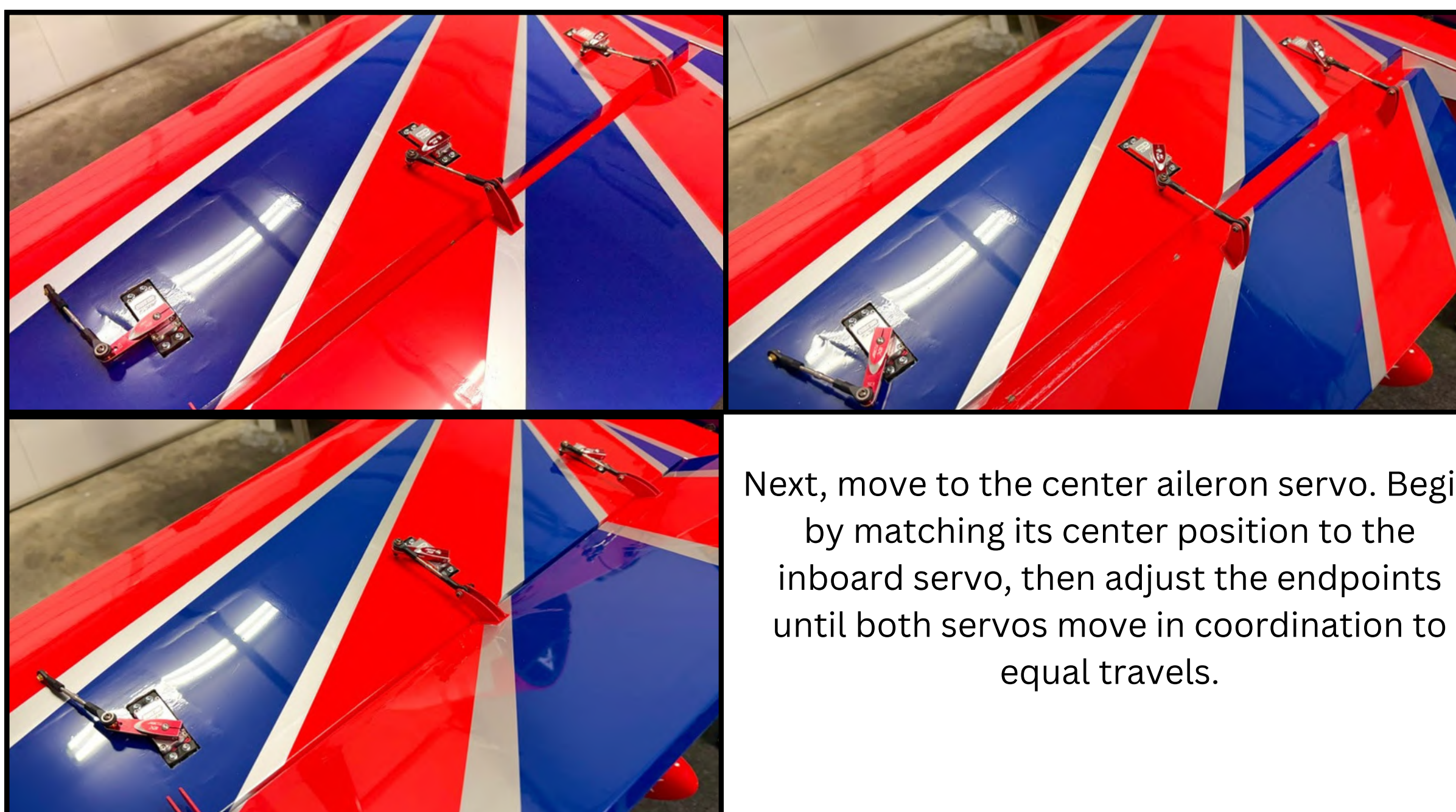
To match each servo to the inboard servo, align one at a time in three phases:

1. Neutral – use sub-trim to center the control surface.
2. Left endpoint – adjust travel so the surface matches the inboard servo.
3. Right endpoint – adjust travel similarly.

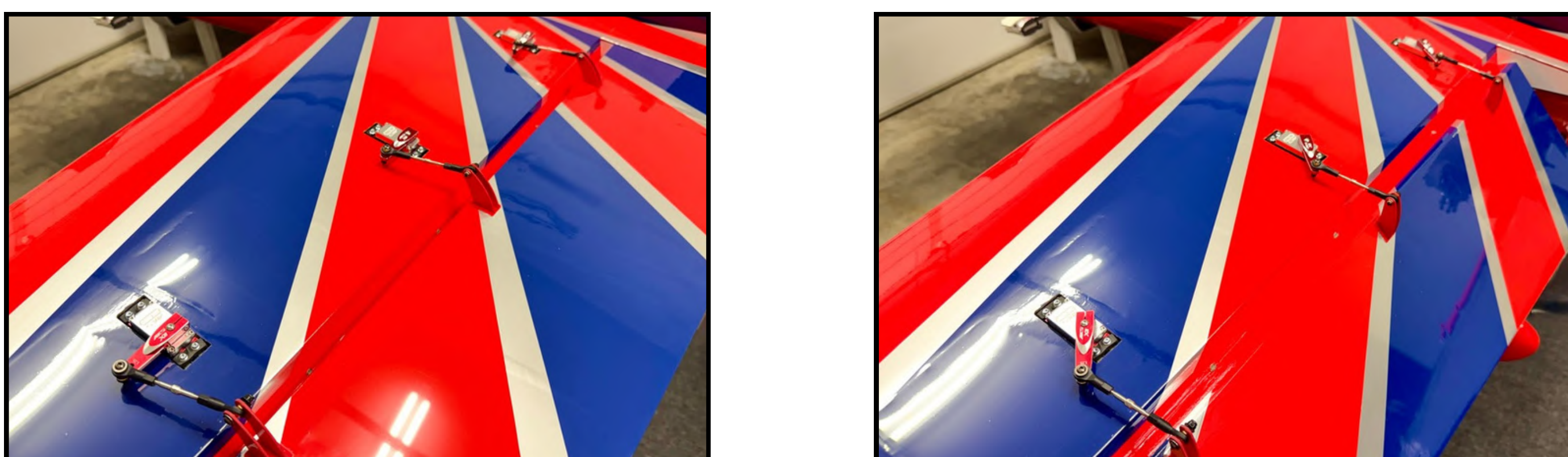
You can use the control horn bolt to ensure proper alignment with the ball link at each phase.



The three photos to the left show the initial centering and endpoint setup for the inboard aileron servo. Leave the remaining linkages disconnected from their control horns during this process.



Next, move to the center aileron servo. Begin by matching its center position to the inboard servo, then adjust the endpoints until both servos move in coordination to equal travels.



Finally, match the outboard aileron servo to the other servo(s). First, match the center position, then adjust the endpoints until all servos move identically.

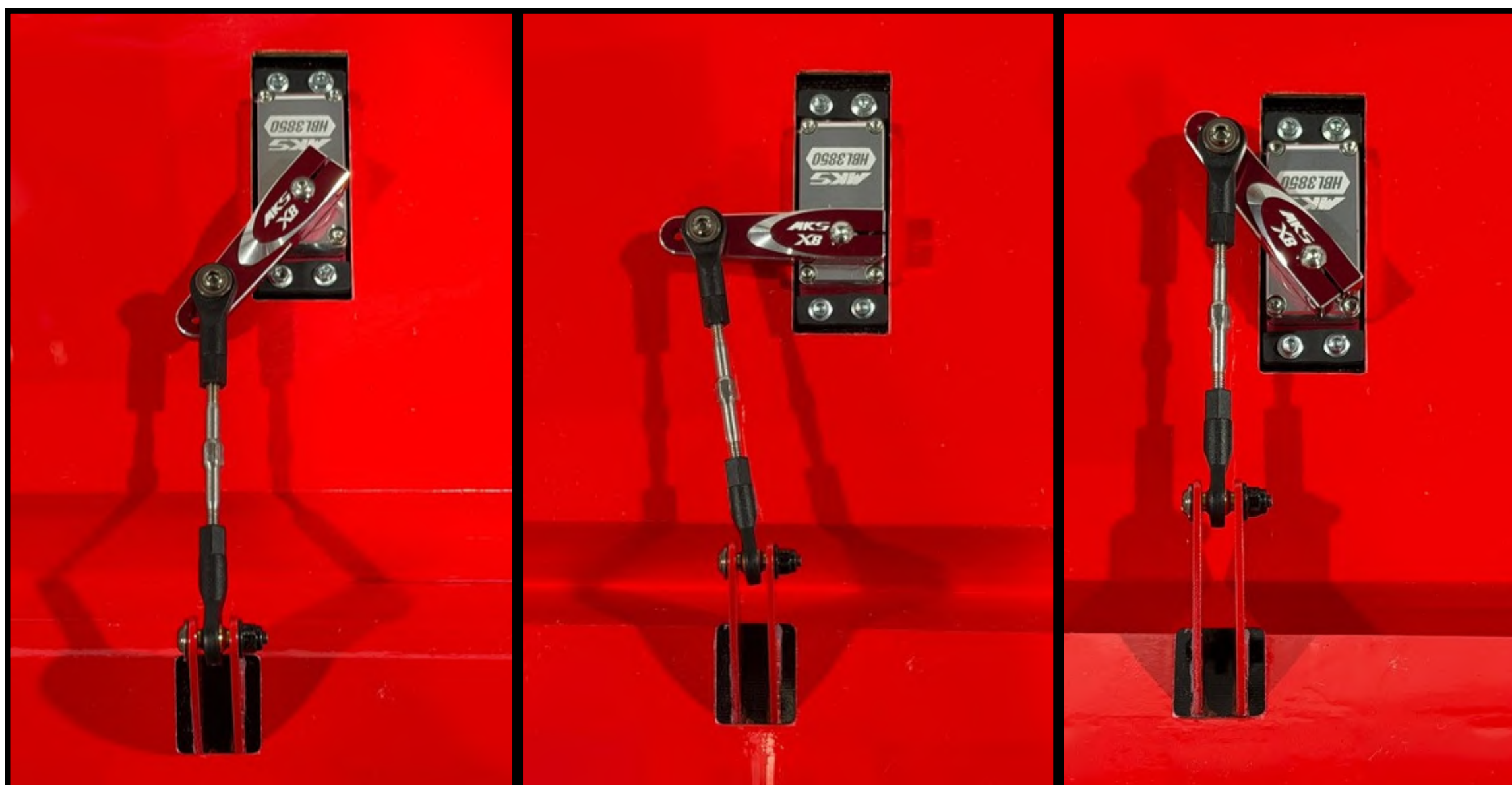


Always apply blue Loctite to all servo arm bolts.



It is highly recommended to use an aluminum clamping-style servo arm on all surfaces (for example, the Apex Standard aluminum servo arm).

PROPER AILERON LINKAGE GEOMETRY



UP

NEUTRAL

DOWN

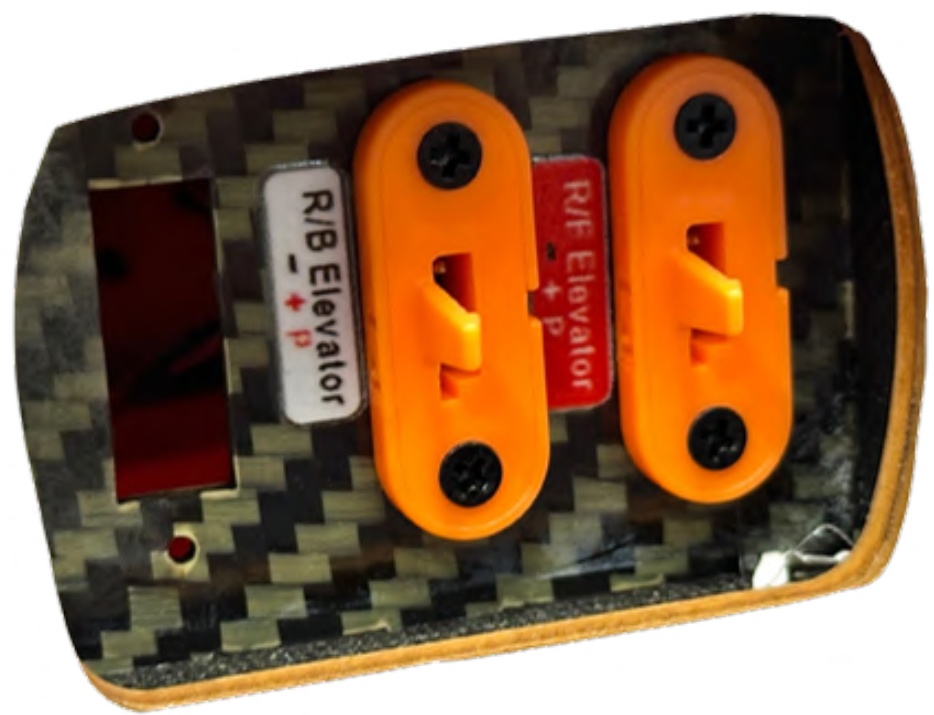
ELEVATOR SERVO INSTALLATION



The 116" Laser also features optional elevator servo configurations, allowing either one or two servos per elevator. A single servo per elevator is sufficient for most applications.

However, two servos per elevator can be installed to aid in center of gravity balance, such as when using a four-cylinder engine.

To install a second elevator servo, first install the additional control horns using the same procedure described for the aileron control horns. Locate the control horns labeled for the elevator. The second elevator servo mounting location is positioned inboard of the pre-installed, color-matched control horns and the pre-cut servo opening.



To accommodate the optional two-servo-per-elevator configuration, each elevator is equipped with pre-installed, labeled servo lead quick connectors, similar to those used in the ailerons. These connectors simplify servo installation and identification.



Mount the elevator servo using the same method as the aileron servo. Feed the servo lead back through the root of the horizontal stabilizer. As before, a servo centering tool may be used to center the servo prior to installing the servo arm.

Position the flanged ball link against the servo arm.

Install the linkage at the 1.75" position on the servo arm.



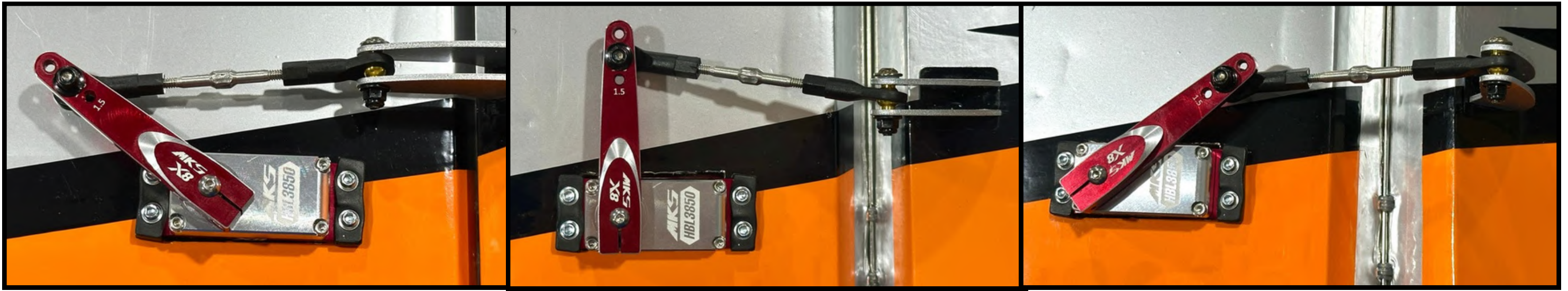
RUDDER SERVO INSTALLATION



We recommend using two rudder servos installed in the tail of the 116" Laser, with one servo mounted on each side of the fuselage. During installation, refer to the servo arm orientation indicator to ensure the servos are installed correctly.

The pre-installed rudder servo extensions feature integrated locking clips for a secure connection. A pull string is attached to each servo extension inside the fuselage and can be used to route the extension through the guide tube after the servo has been installed.

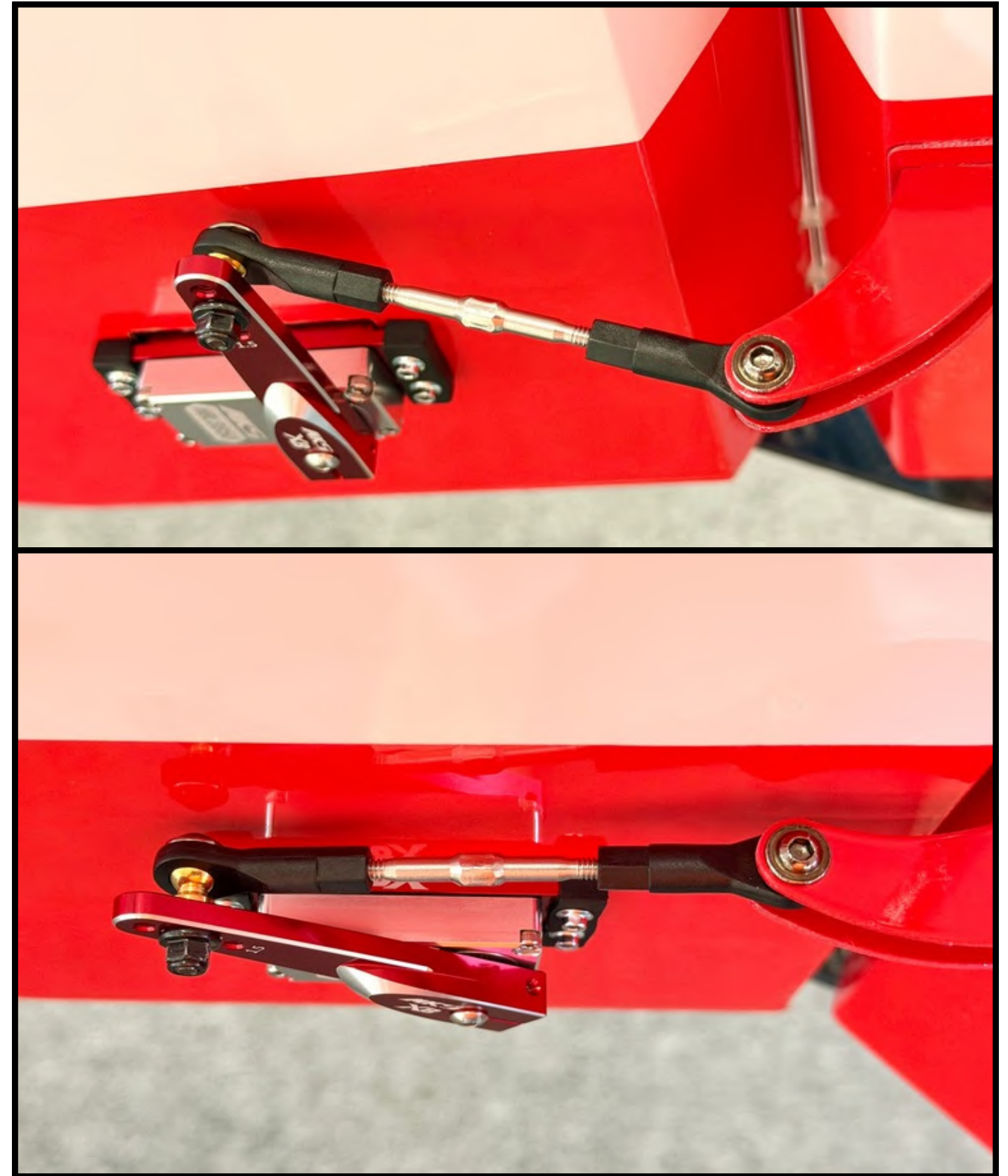
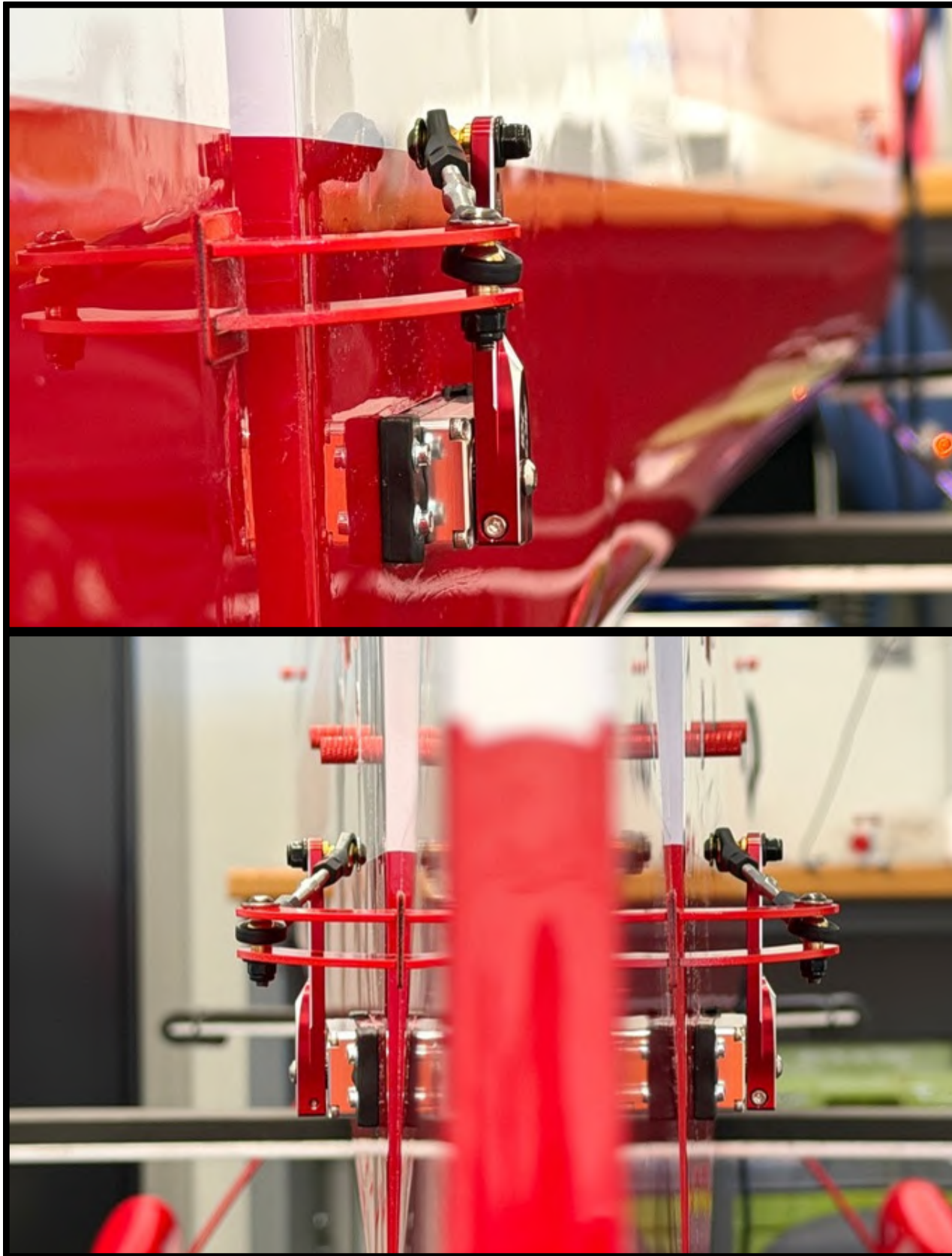
Rudder Servo Linkage Installation and Geometry



LEFT

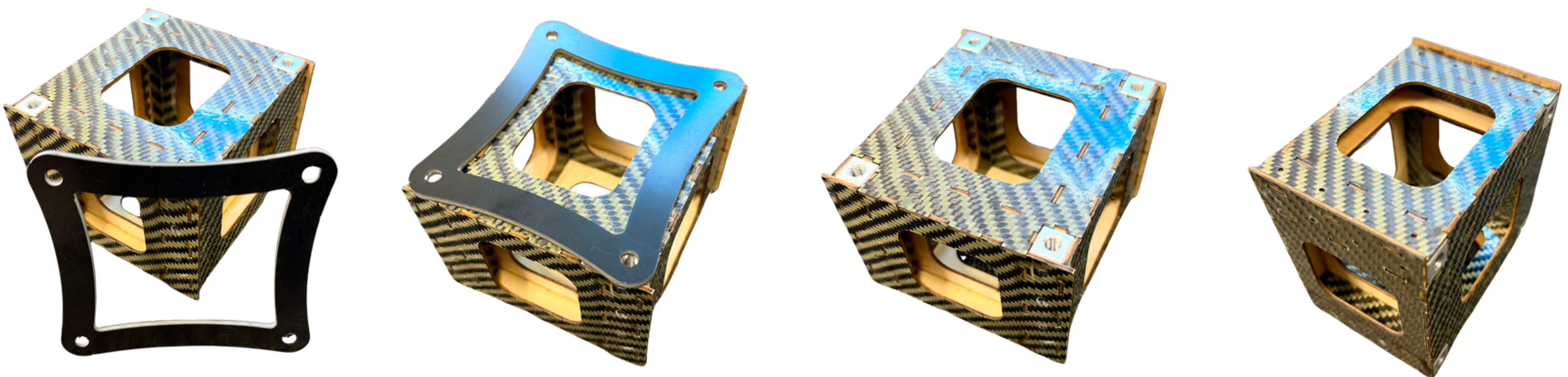
NEUTRAL

RIGHT



Notice the angle when viewing the linkage at neutral from behind (tail view). The linkage will straighten as it is deflected in either direction.

ENGINE INSTALLATION

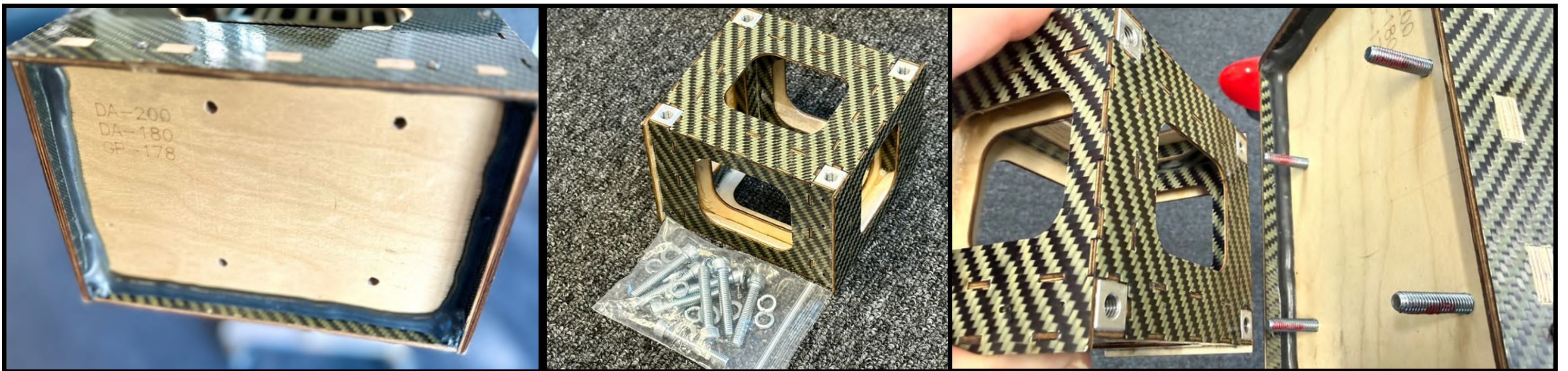


For two-cylinder engine installations, such as the DA-180 or GP-178, the supplied motor box extension provides the correct engine spacing. We recommend installing the included composite spacer between the firewall and the motor box extension to achieve the proper spinner gap while protecting the firewall from wear.

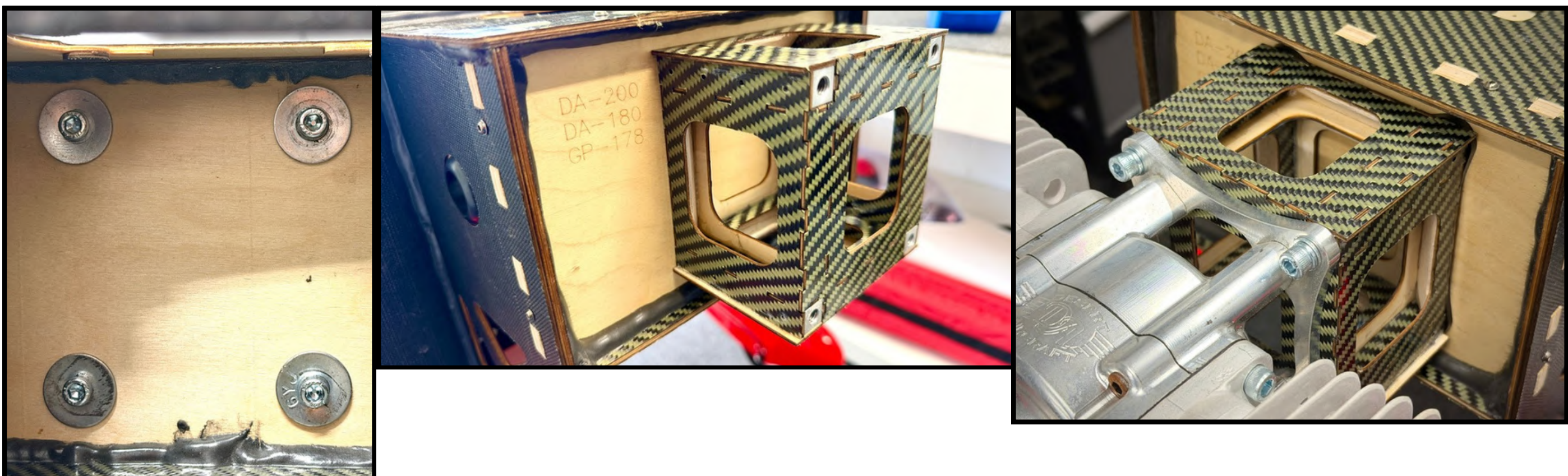


For four-cylinder engine installations, we recommend using the Apex/Dualsky 200cc aluminum engine mount.

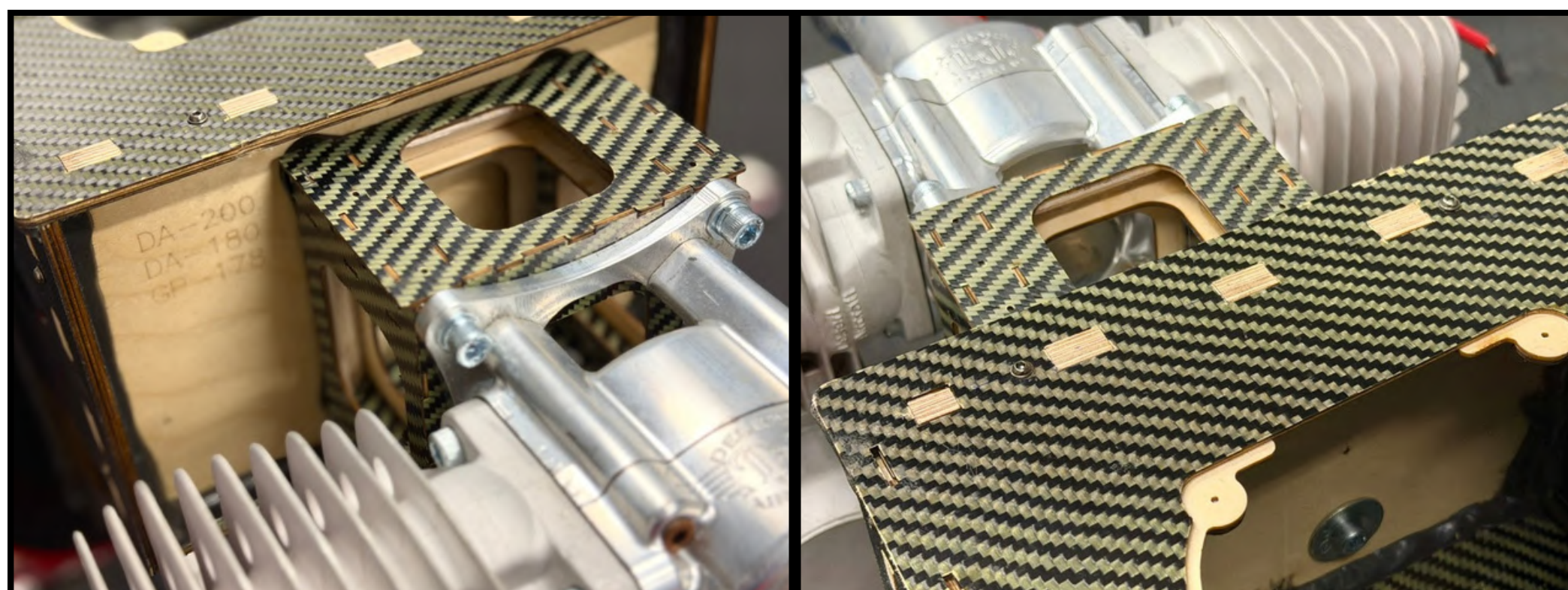
Two-Cylinder



The firewall features pre-cut engine mounting bolt pattern holes for added convenience. First, install the motor box extension onto the firewall using the supplied hardware. We recommend applying red Loctite to the mounting bolts before installation.



The engine can then be mounted to the motor box extension using the provided mounting hardware.





Notice the composite spacer installed between the firewall and the motor box extension.

Four-Cylinder



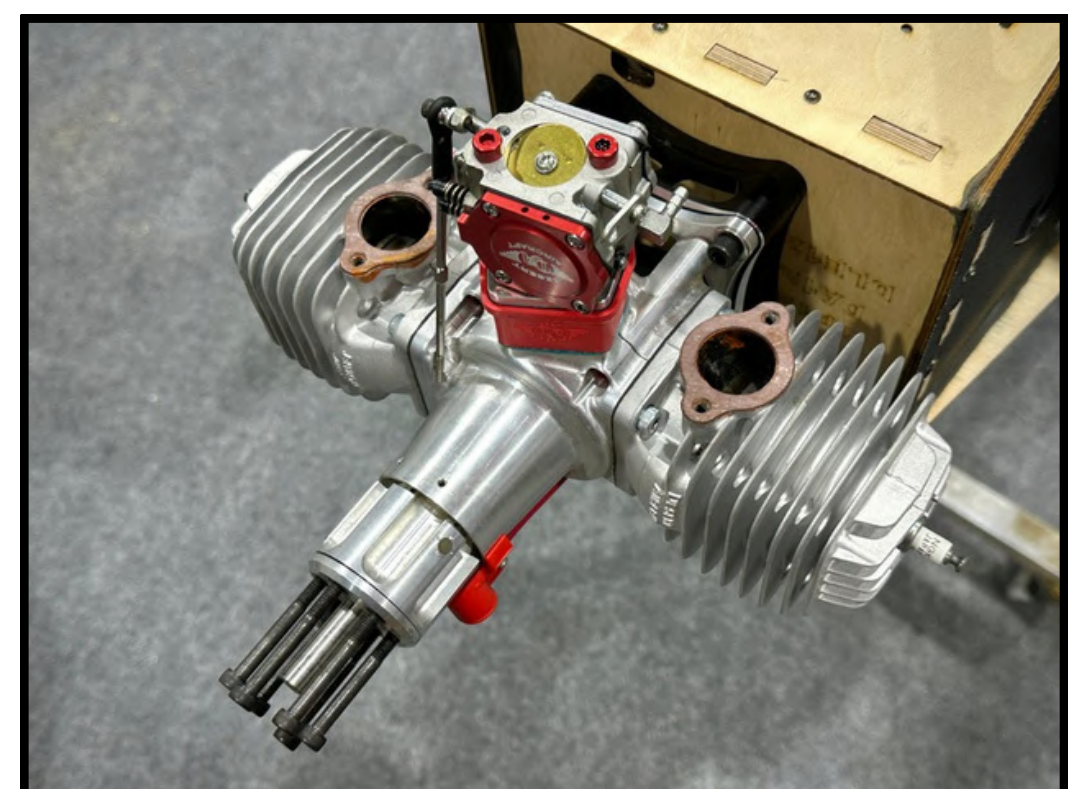
Here, the Desert Aircraft four-cylinder engine is installed using the Apex/Dualsky aluminum engine mount and the supplied Delrin spacers.



EXHAUST INSTALLATION



Shown will be the installation of the stock exhaust mufflers. Required items include two mufflers with mounting hardware, gaskets, RTV, and red Loctite.



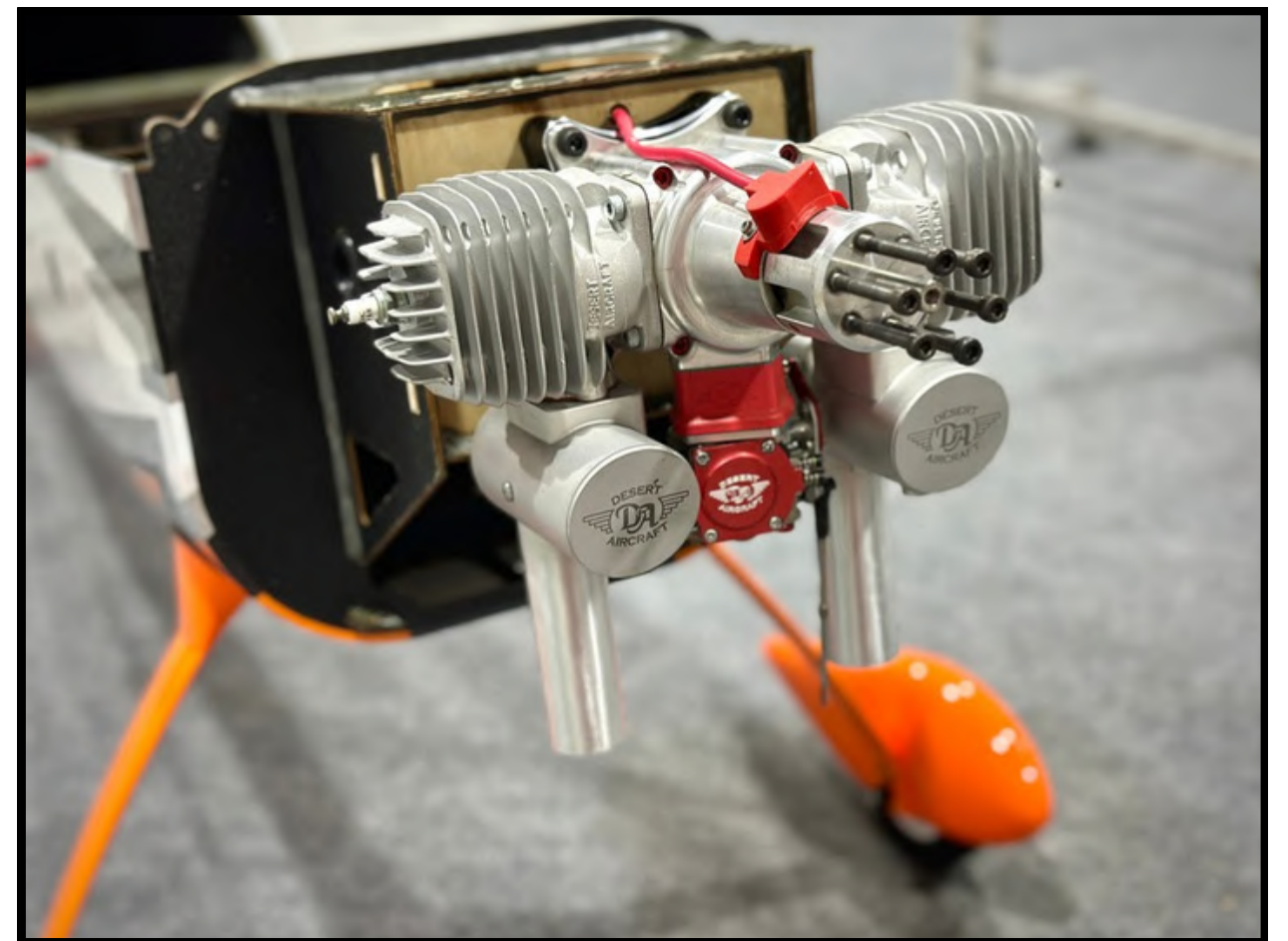
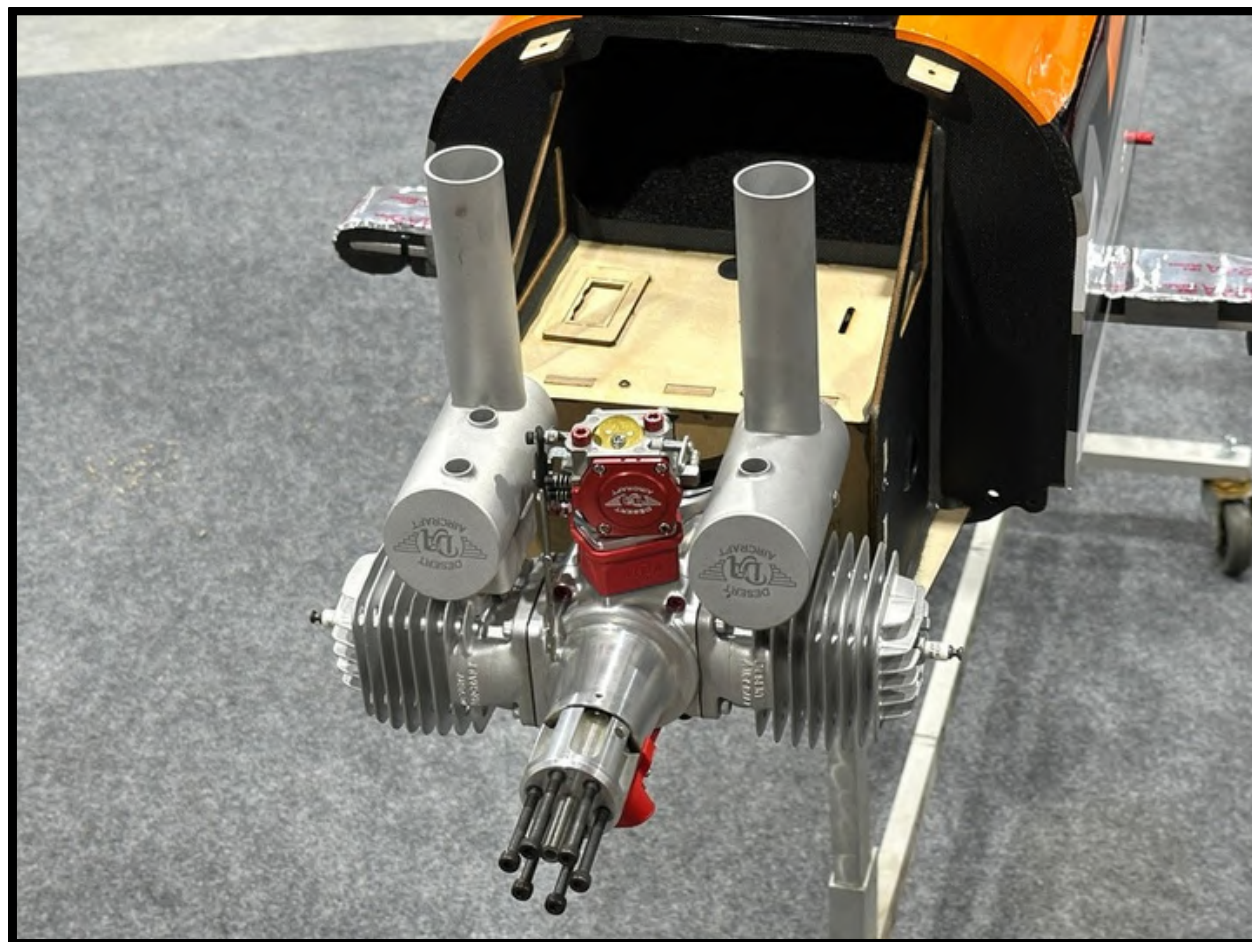
Apply a thin layer of RTV around the engine exhaust port. Do not apply excess RTV, as this may allow material to enter the exhaust port. Place the gaskets over the exhaust ports.



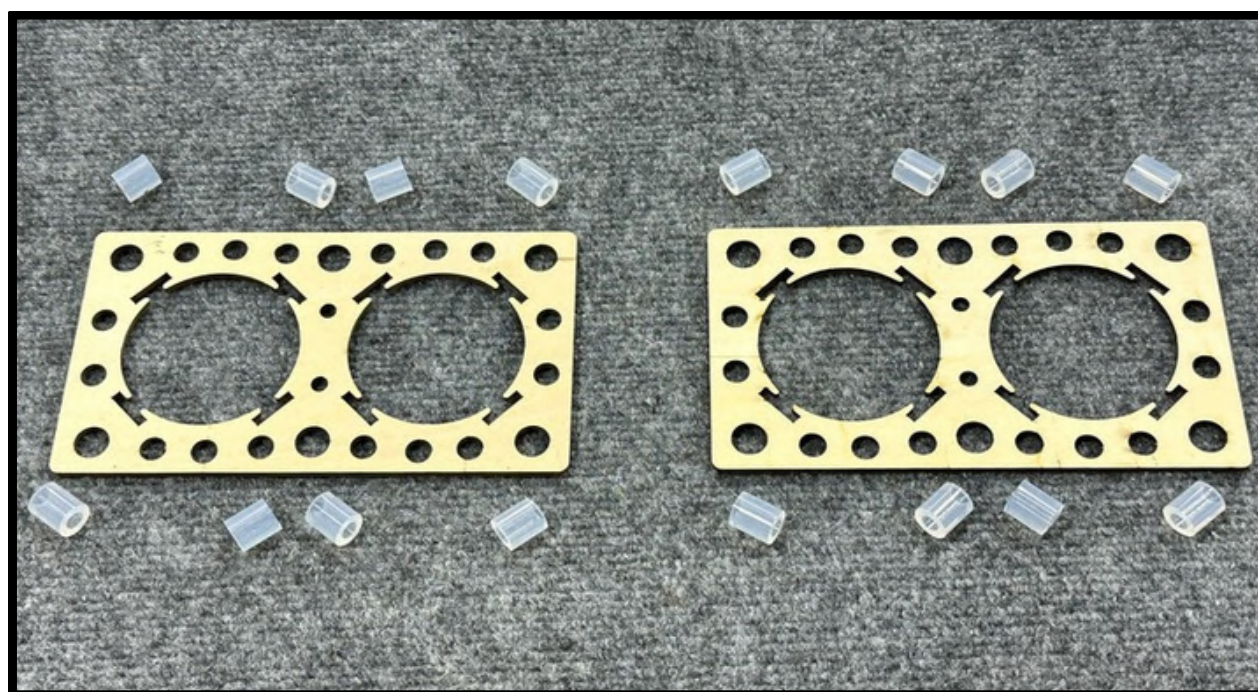
Red Loctite will be used for the muffler bolts



Ultra Copper RTV by Permatex is used for gasket application



Install the mufflers using the provided hardware (bolts and lock washers). Apply red Loctite to the threads. If experienced, an impact driver with an extension may be used. Due to bolt positioning, it may be easiest to insert the bolts through the muffler before placing the muffler on the engine.

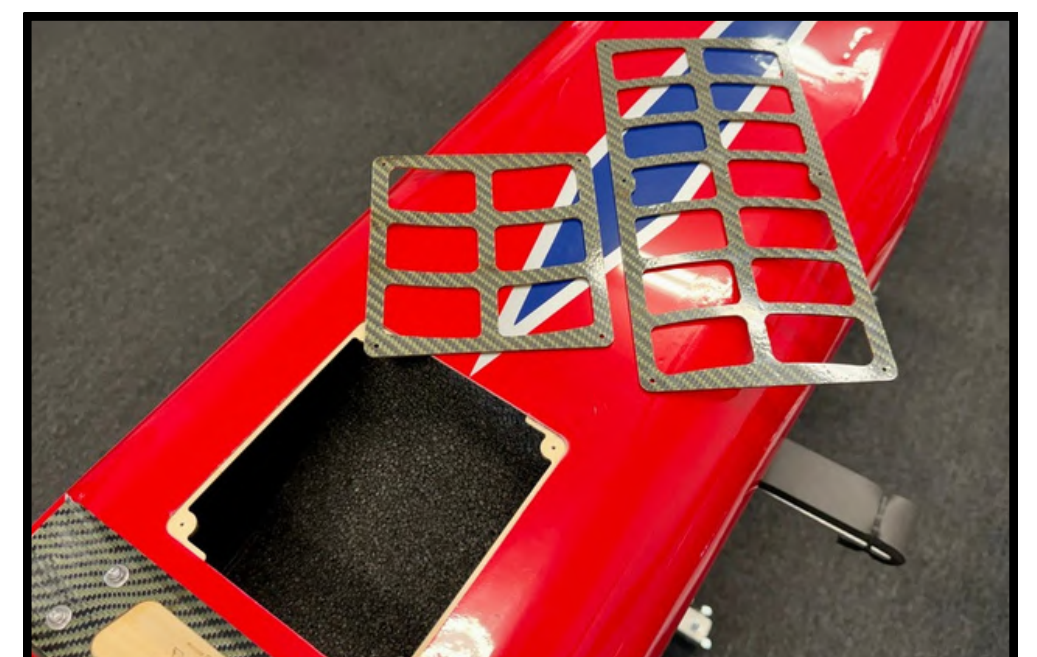


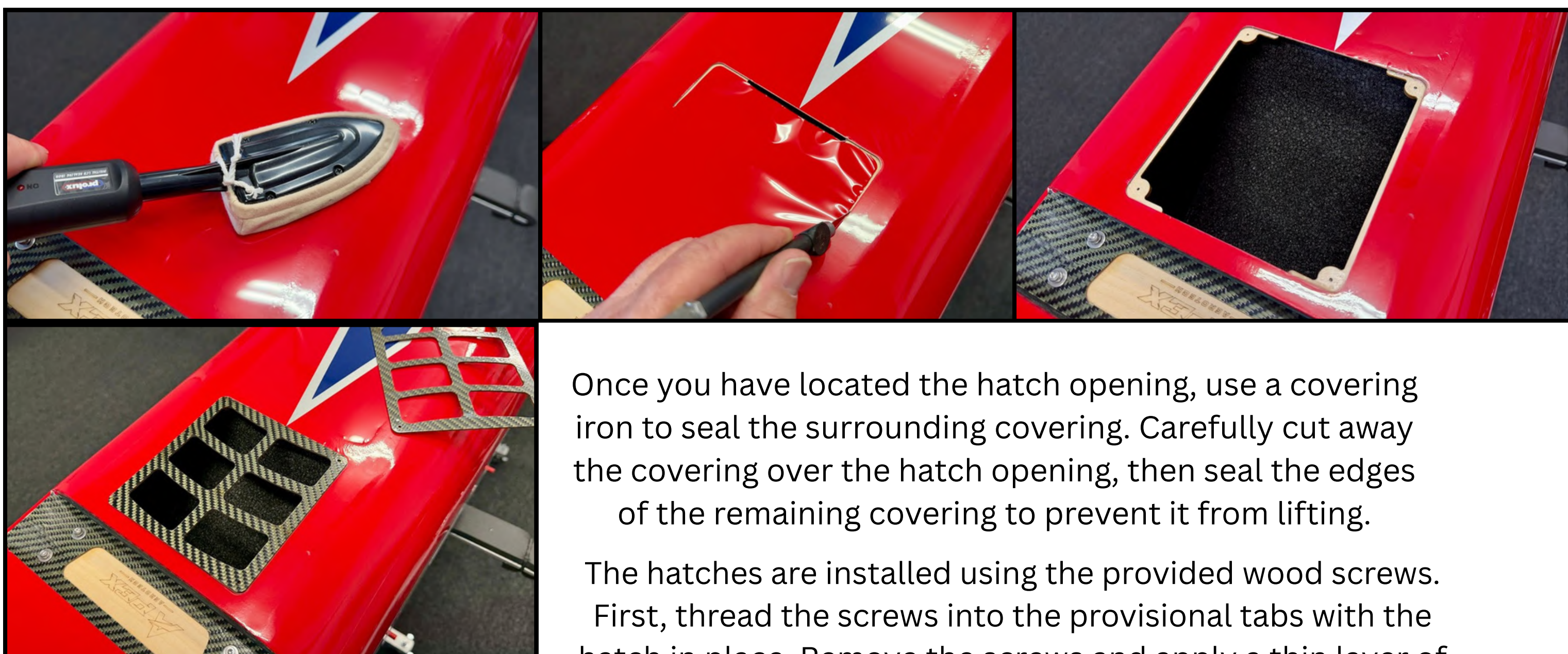
The Laser includes mounts for both canister and tuned pipe installations. It also features a foam tunnel designed to isolate the exhaust system and keep it away from onboard electronics. To install the mounts, align them with the carbon-laminated brackets in the tunnel and secure them with wood screws. Apply CA to harden the screw threads. For access through the bottom of the fuselage, use the hatches as described in the next section.

HATCH INSTALLATION



Fuselage hatches are multi-purpose. The Laser offers several options for hatch placement. As noted, they are required for canister or tuned pipe installation and can also assist with hot air exit when using stock exhaust mufflers. In all cases, we recommend installing them to ensure optimal engine performance and longevity.





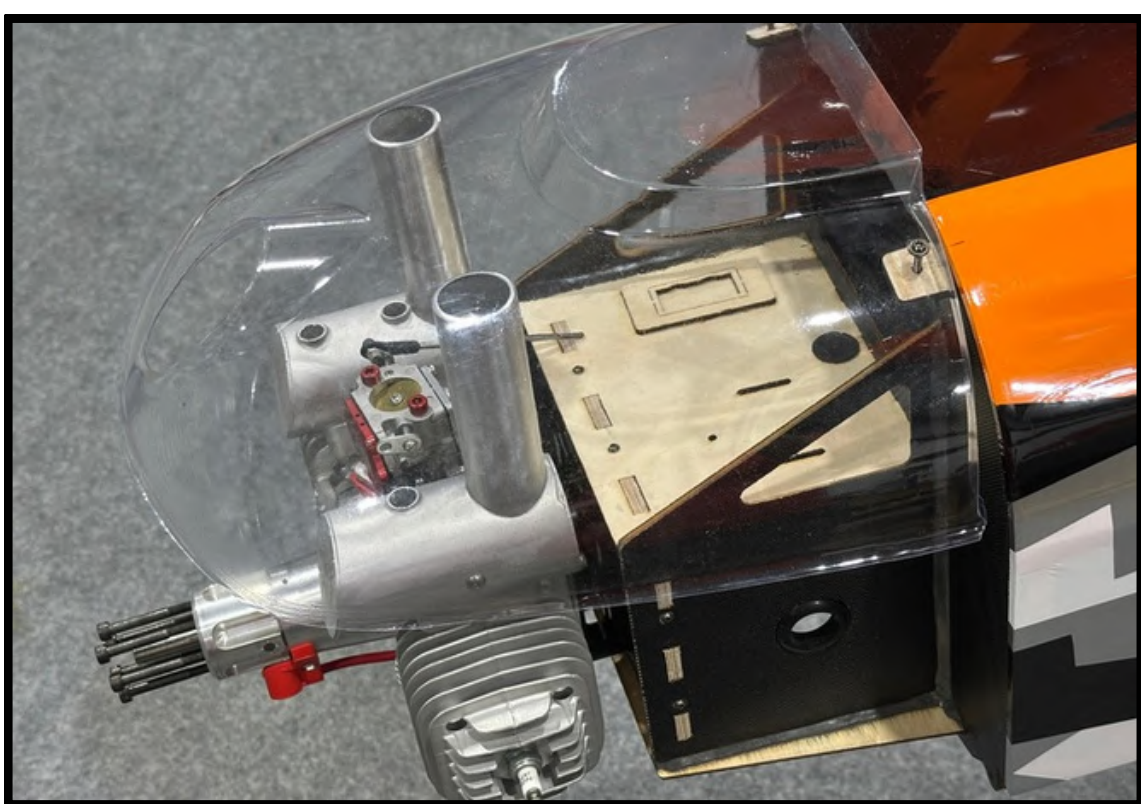
Once you have located the hatch opening, use a covering iron to seal the surrounding covering. Carefully cut away the covering over the hatch opening, then seal the edges of the remaining covering to prevent it from lifting.

The hatches are installed using the provided wood screws. First, thread the screws into the provisional tabs with the hatch in place. Remove the screws and apply a thin layer of CA to the threads. Finally, reinstall the hatch securely.

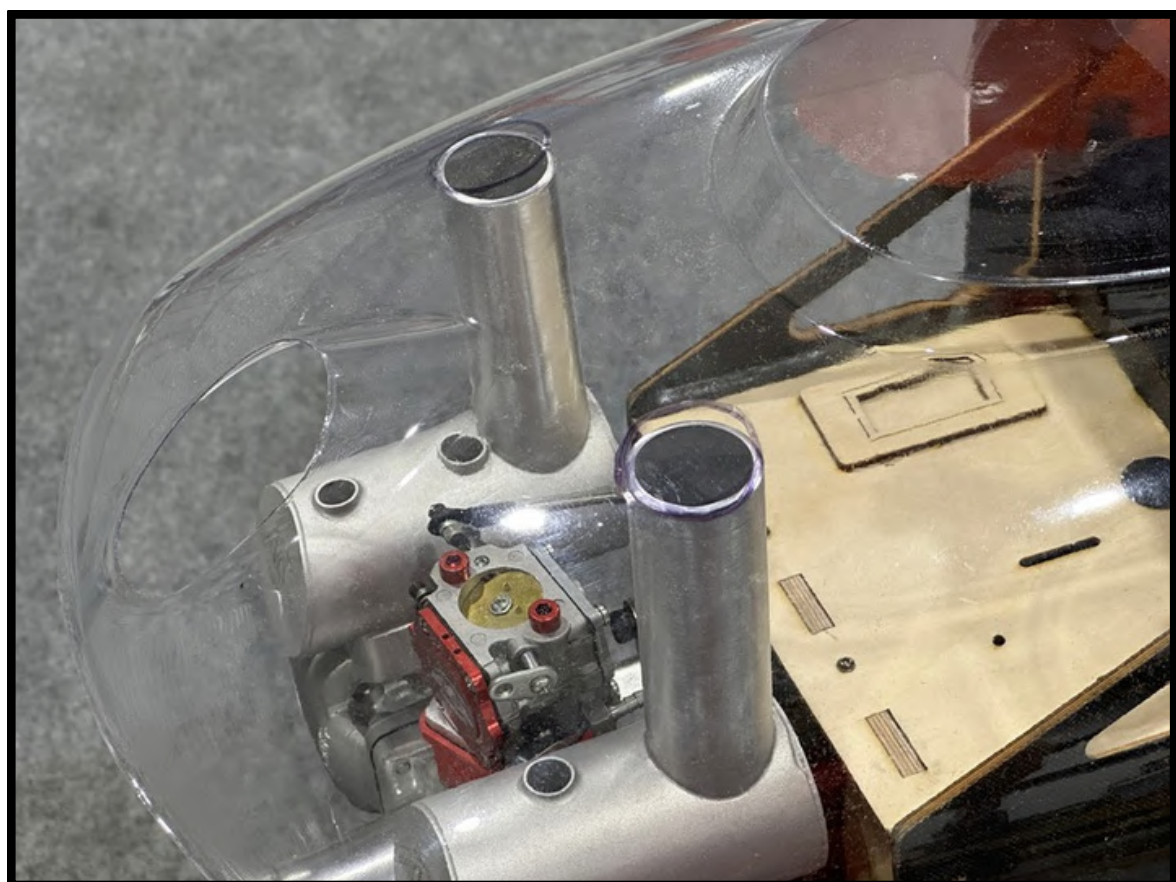
COWLING INSTALLATION



The 116" Laser features a split (two-piece) cowl, allowing for easier installation of four cylinder engine baffling. The Laser also includes a clear cowl-cutting template to simplify exhaust cutouts.



Align the clear template with the cowl bolt holes. Mark the locations and drill holes in the template. This will allow the template to be mounted in the correct position.



- Mark the exhaust openings on the clear template.
- Cut the openings from the template.
- Reinstall the template onto the cowling and use it to mark the cut locations on the cowling.
- Fit and adjust as needed to ensure smooth cowling installation and removal.



Use a Dremel tool to cut the fiberglass cowling. Be aware that this will generate significant fiberglass dust.

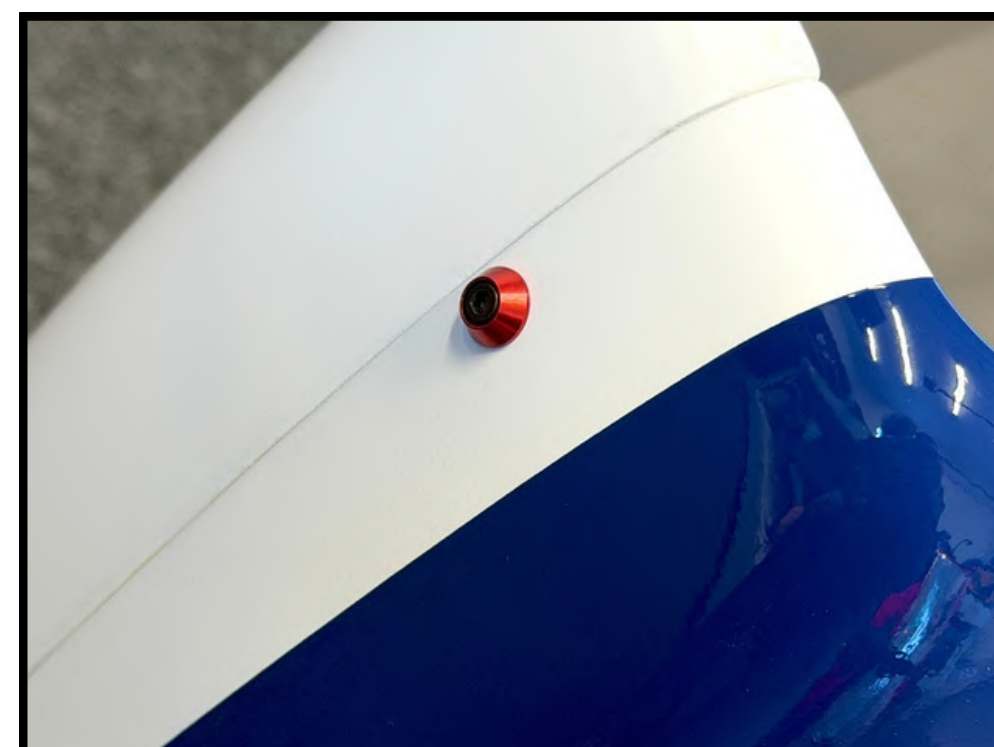
Two-Cylinder



Four-Cylinder



The Laser cowling also features a pre-cut pressure lip opening to promote efficient hot air evacuation from the cowling, improving cooling performance.



The cowling is secured using bolts that fasten both cowling halves to the fuselage. The lower cowling mounting bolts are accessed through the cowling, while the upper mounting bolts are accessed from inside the fuselage. The cowling joiner bolts are equipped with anodized washers for a clean, finished appearance.

We recommend applying blue Loctite to all cowling mounting bolts before installation.

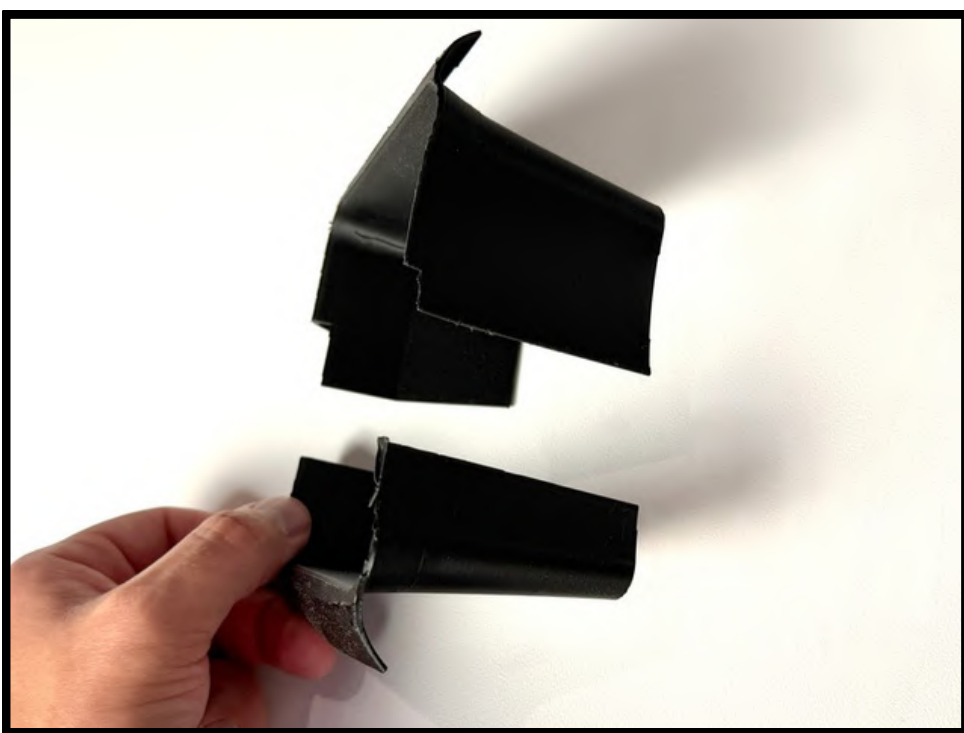
BAFFLING INSTALLATION



The 116" Laser includes engine baffling kits for both two-cylinder and four-cylinder engine installations.

The four-cylinder baffling kit consists of a laser-cut wooden assembly with the required mounting brackets and hardware. The two-cylinder baffling kit includes four joining baffle pieces that assemble to match the outline of the cowl's cylinder inlet openings, directing cooling air through the engine.

Two-Cylinder



The two-cylinder baffles are designed to direct cooling air directly to the engine cylinders. Because the 116" Laser features a two-piece cowling, the baffling consists of four individual pieces. This design allows the cowling to be removed with the baffles installed while maintaining full bonding surface contact with the inside of the cowling.

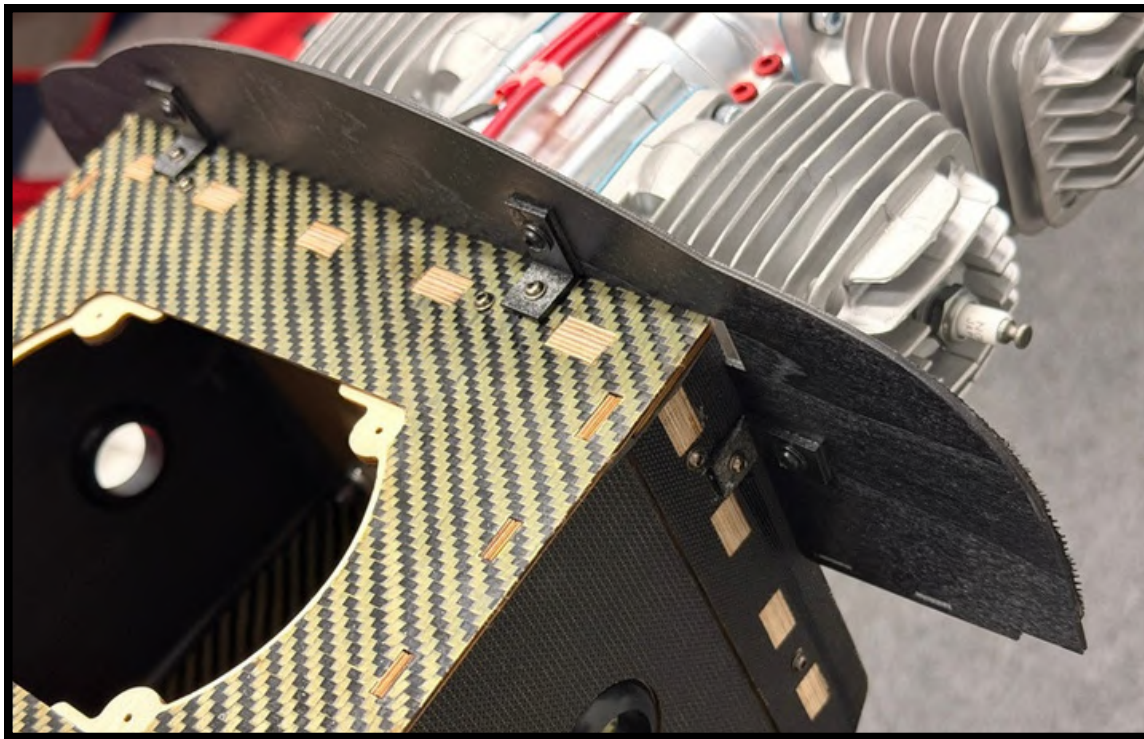
The baffles can be installed using a rubberized adhesive such as GOOP. Before applying adhesive, test-fit all baffle pieces to ensure proper alignment. Be sure to observe the cylinder offset when placing each baffle, as they are different depths to match the cylinder locations.



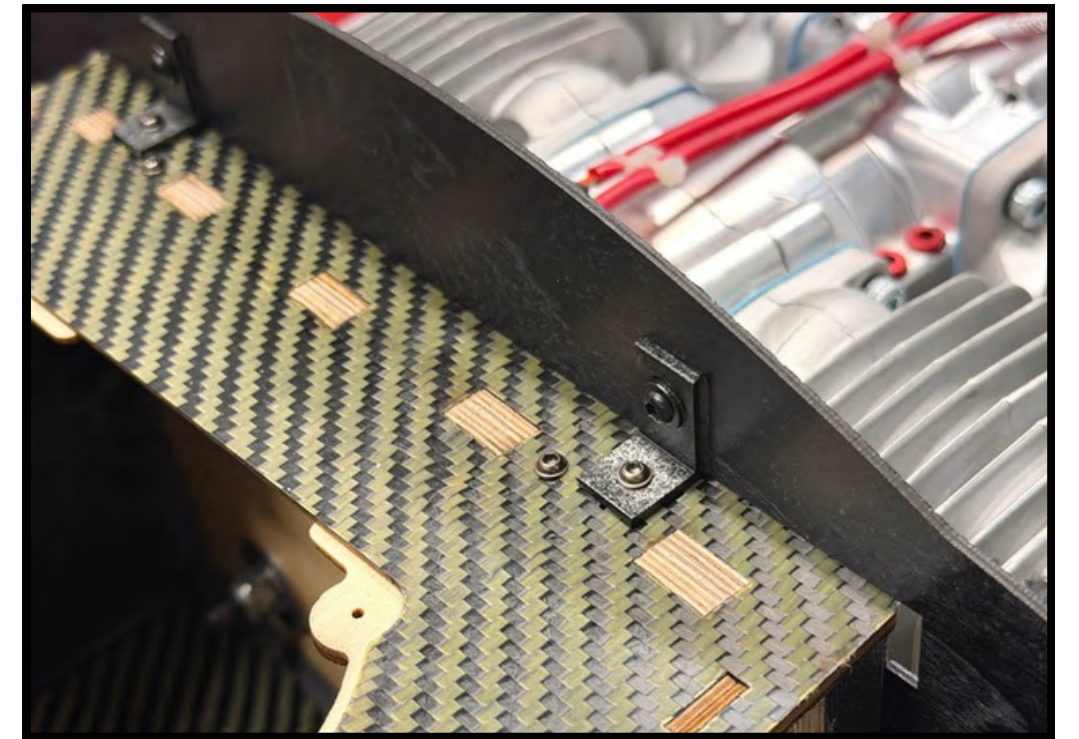
Four-Cylinder



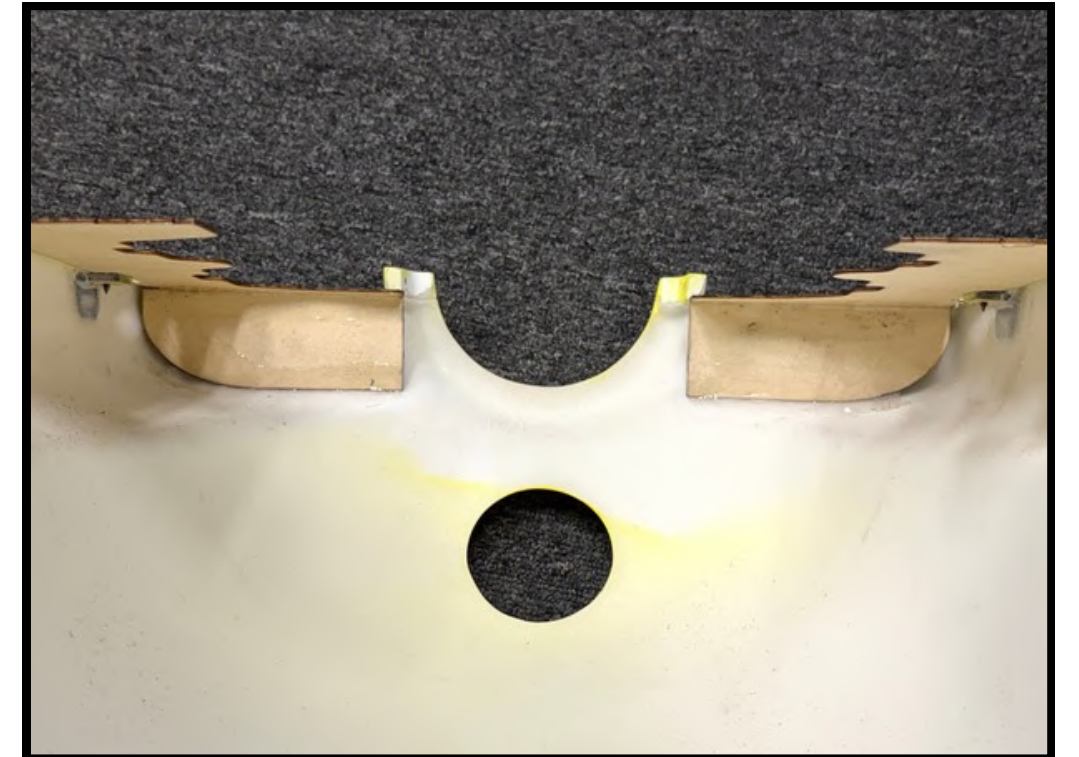
The four-cylinder baffling is designed to direct air using a pass-through technique to reach the rear cylinders. The cowling inlets are 50% blocked so the air passes over the top of the front cylinders before being directed to the rear cylinders. Additionally, the baffling is designed to keep the air contained around the cylinders. The horizontal baffle pieces prevent air from escaping off the sides of the front cylinders before reaching the rear cylinders. The baffling also includes a vertical backplate that mounts to the motor box for additional airflow direction. The baffling kit features slotted joints for precise fitment of the individual pieces.



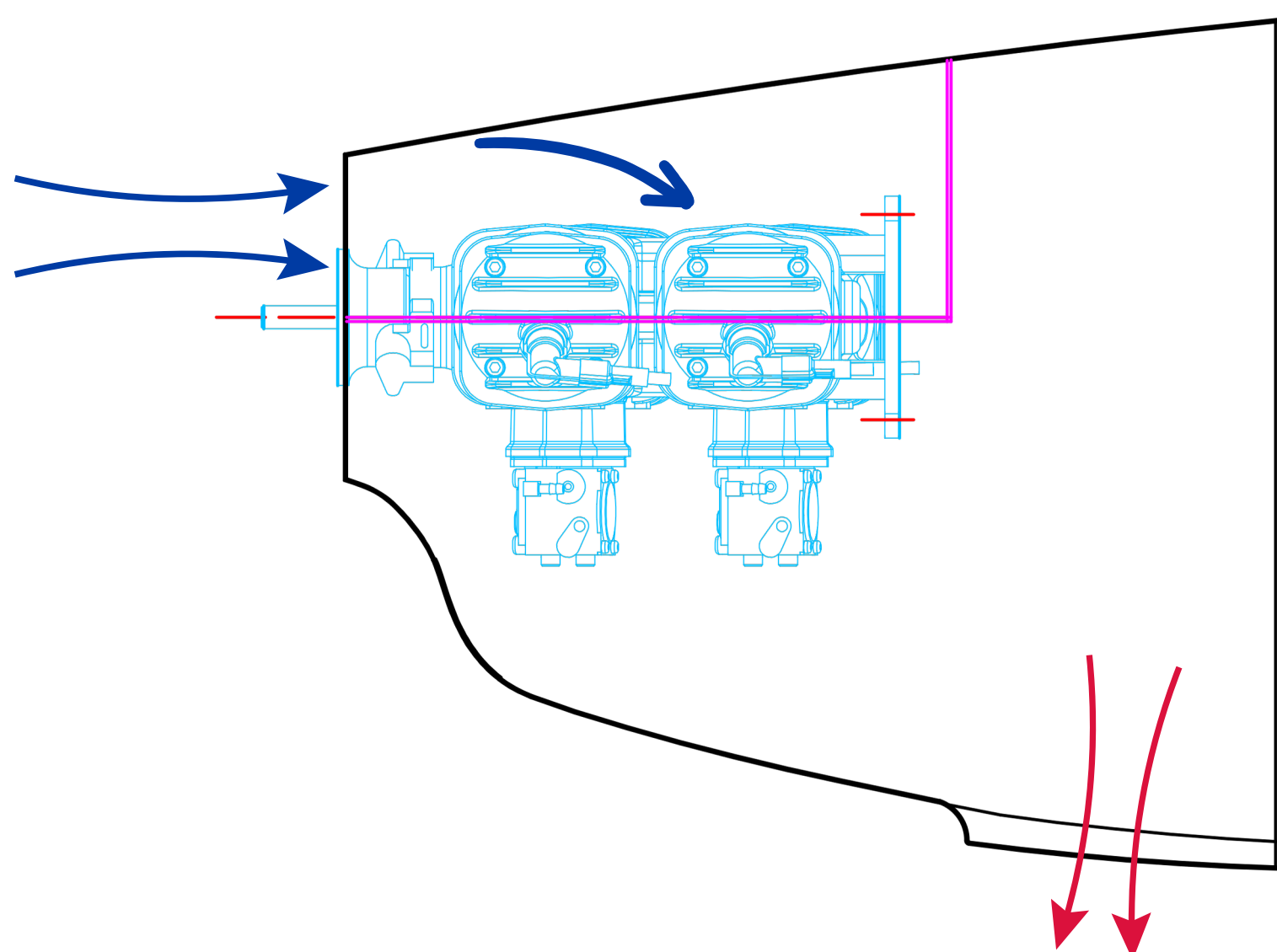
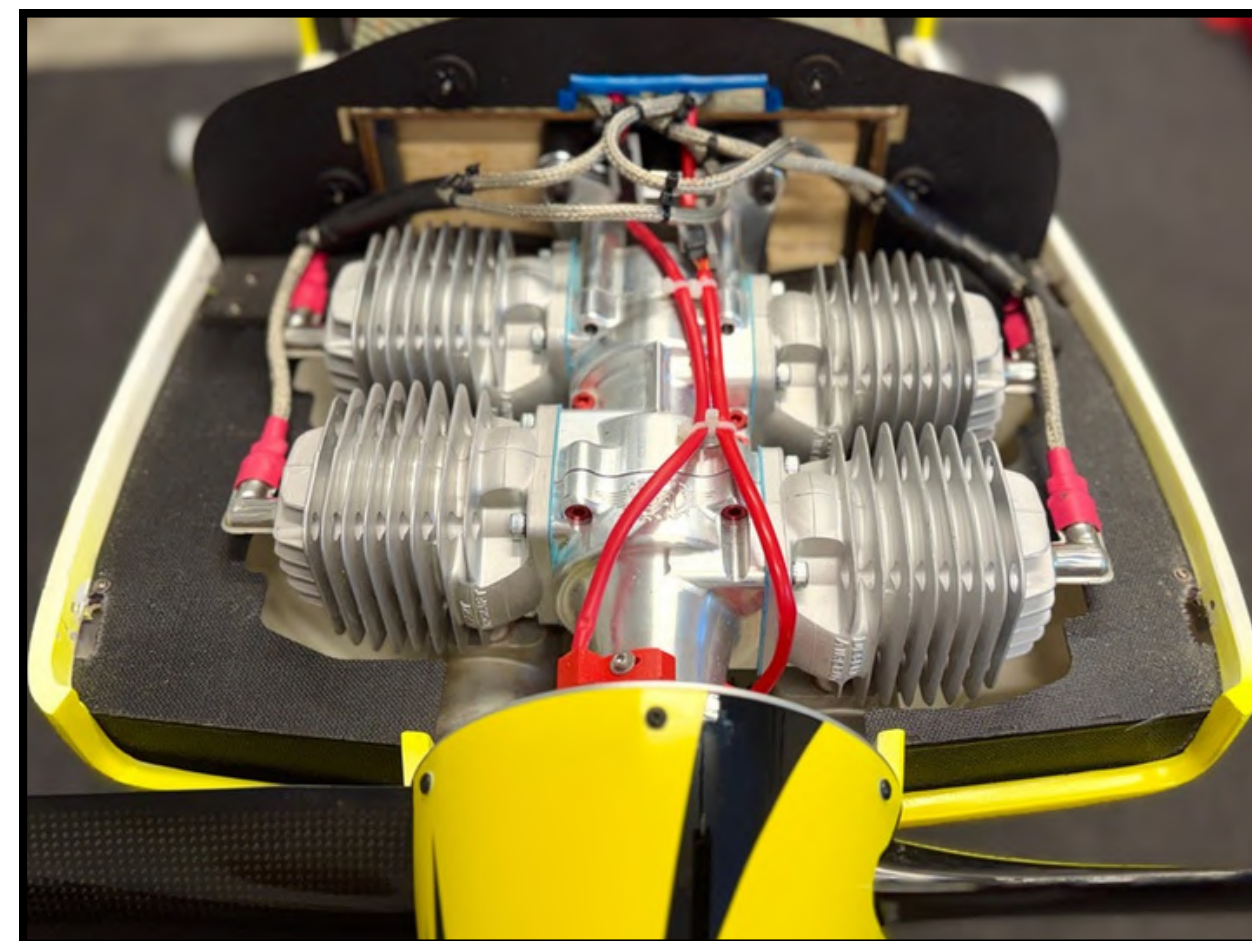
The vertical baffling plate is mounted using the provided 90-degree brackets and hardware.



Front inlet plates installed.



The Laser features pre-installed tabs in the cowling for the four-cylinder baffling installation. These tabs are used to mount the horizontal baffling pieces.



This diagram represents the cooling technique used by the four-cylinder baffling design.

THROTTLE SERVO INSTALLATION



The Laser features a heavy-duty throttle servo linkage. Install the provided ball links onto each end of the linkage.



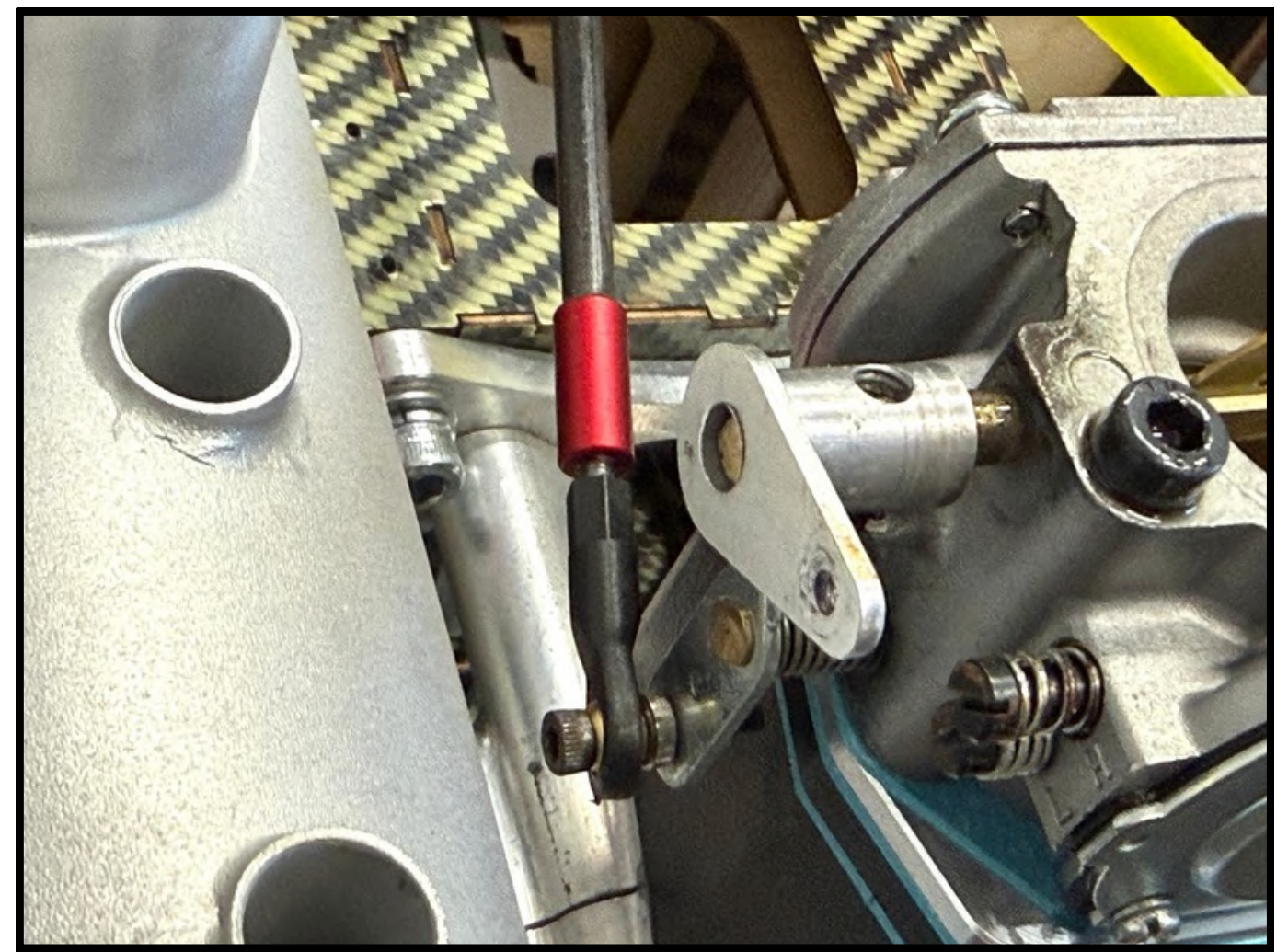
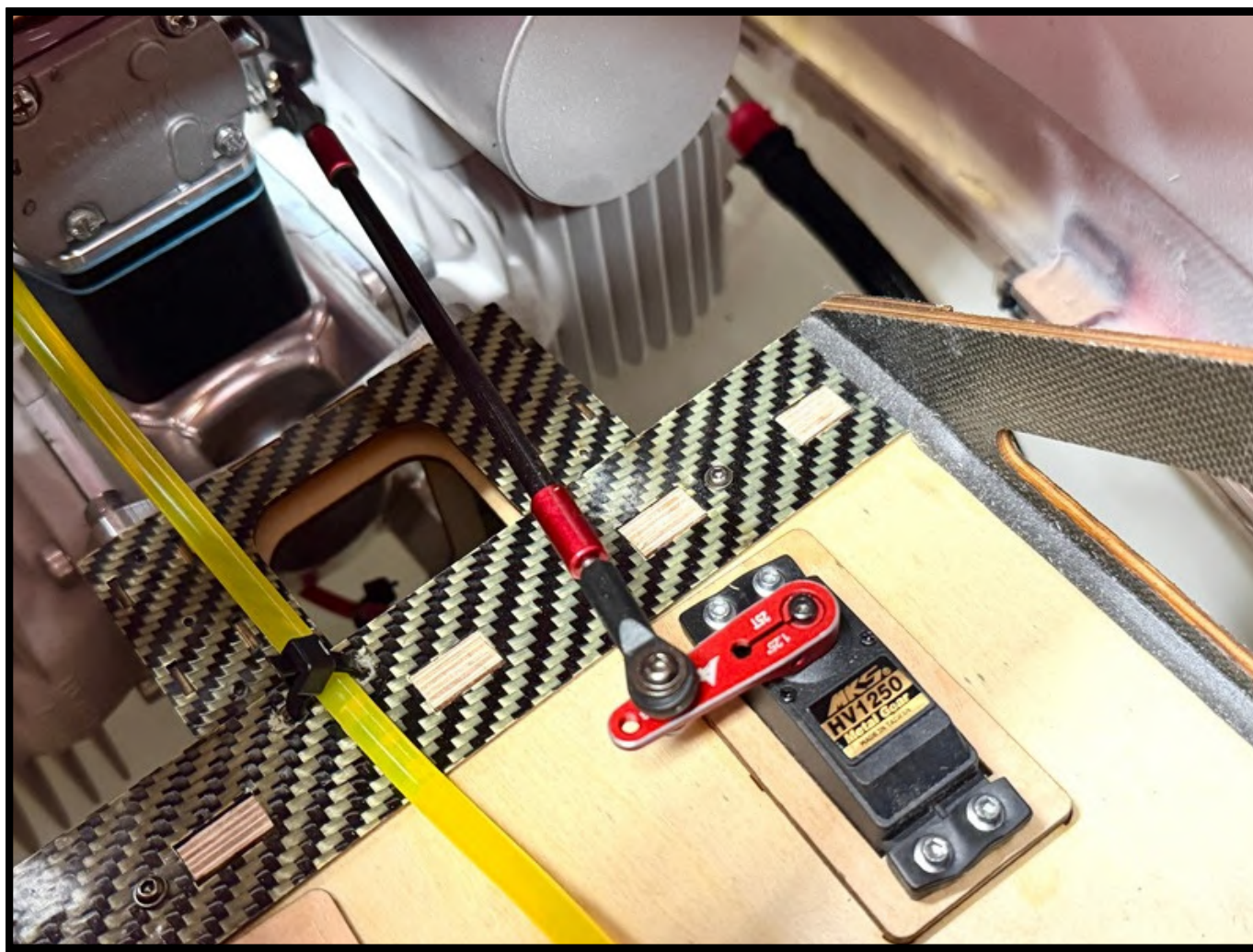
We recommend installing the ball link at the 1" mark on the servo arm to ensure optimal resolution and geometry.

Servo torque is not critical for a throttle servo. Ideally, select a servo with fast speed and use the 1" servo arm location to achieve the best possible resolution while maintaining necessary travel.

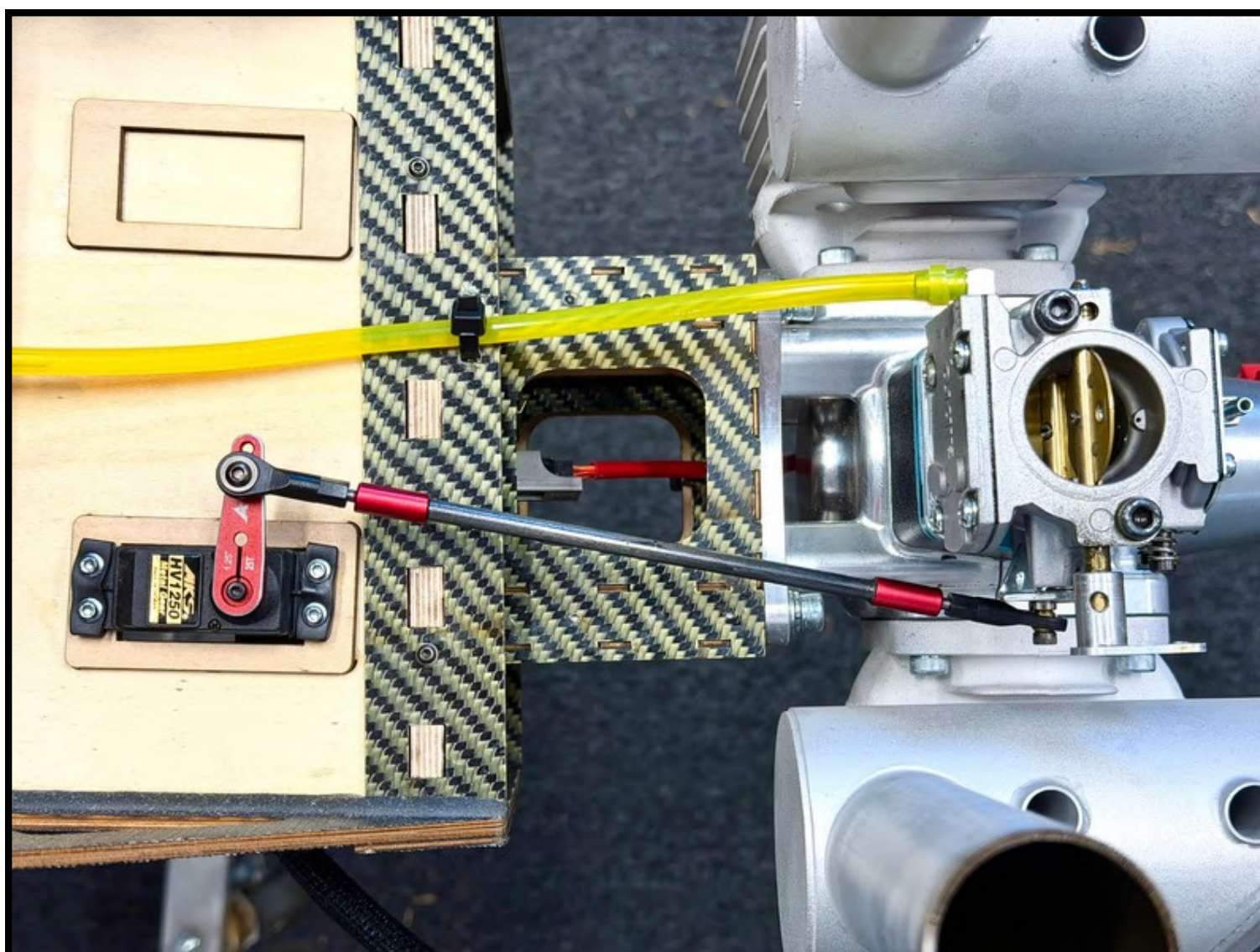


1" location on a 1.25" Apex clamping style servo arm

Based on personal preference and feel, you may choose to use a throttle curve in your radio setup, along with a high idle for flight and a low idle for landing and taxiing.



Connection of the ball link to the carburetor arm.



Throttle servo and linkage installed. This shows the proper geometry with the throttle servo arm positioned at 90 degrees to the servo case (half throttle).

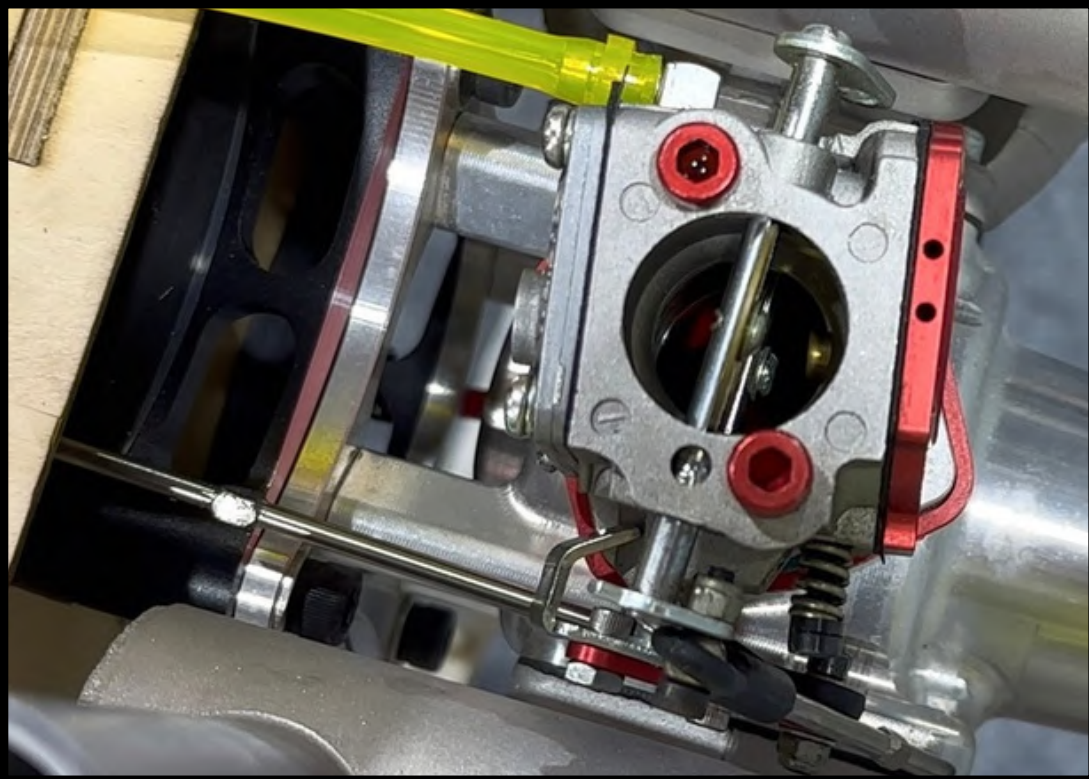
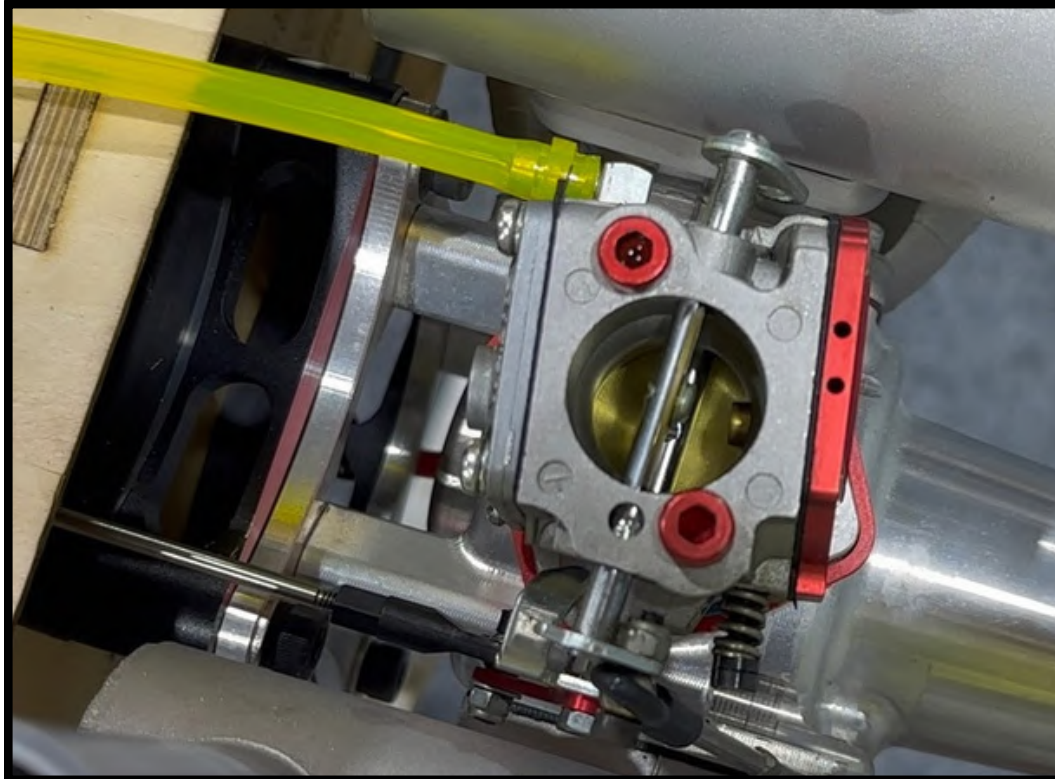


Both carburetors are joined together via a linkage for four-cylinder engine installations. This configuration allows a single throttle servo to operate both carburetors.

Idle

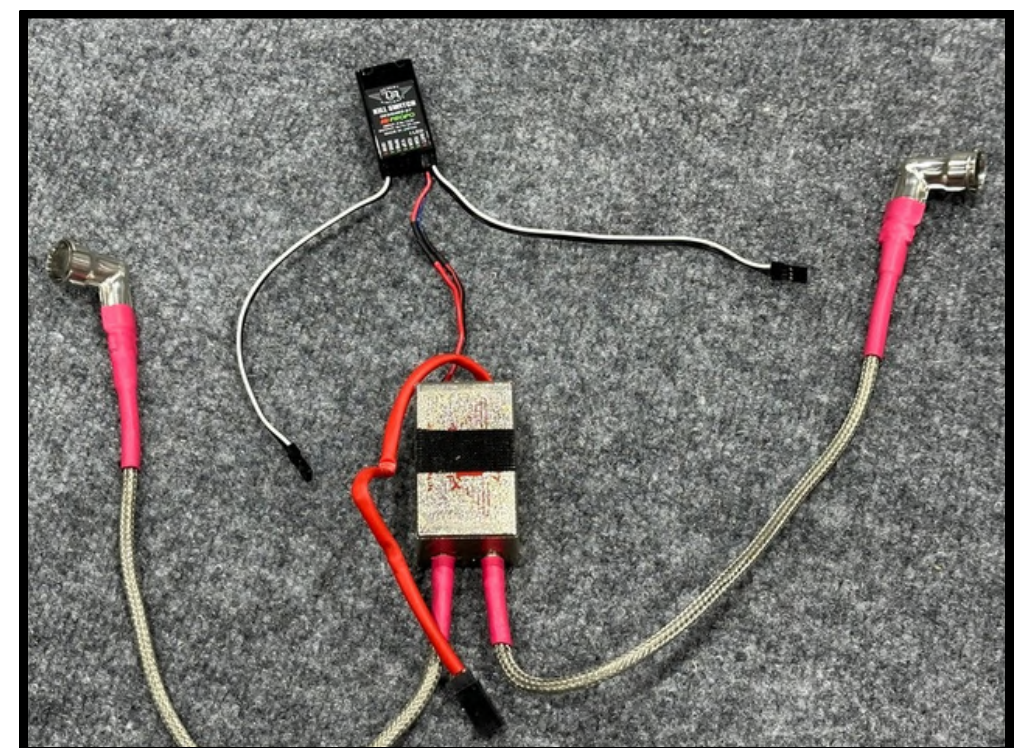


Full Throttle

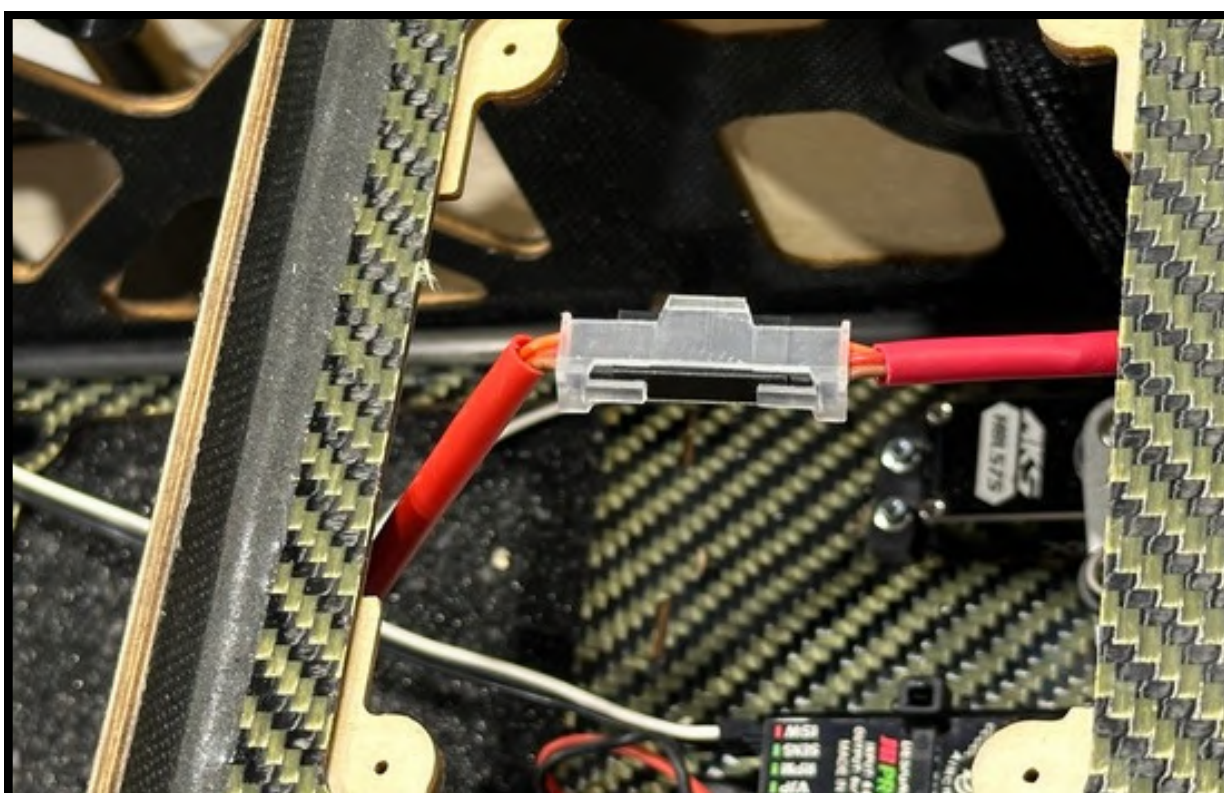


The goal of the throttle servo setup is to achieve similar values for both the positive and negative endpoints. At half throttle, the servo arm should be approximately 90° to the servo case. The turnbuckle can be adjusted mechanically to help achieve this alignment. Observe the position of the carburetor butterfly at each throttle setting to verify proper movement.

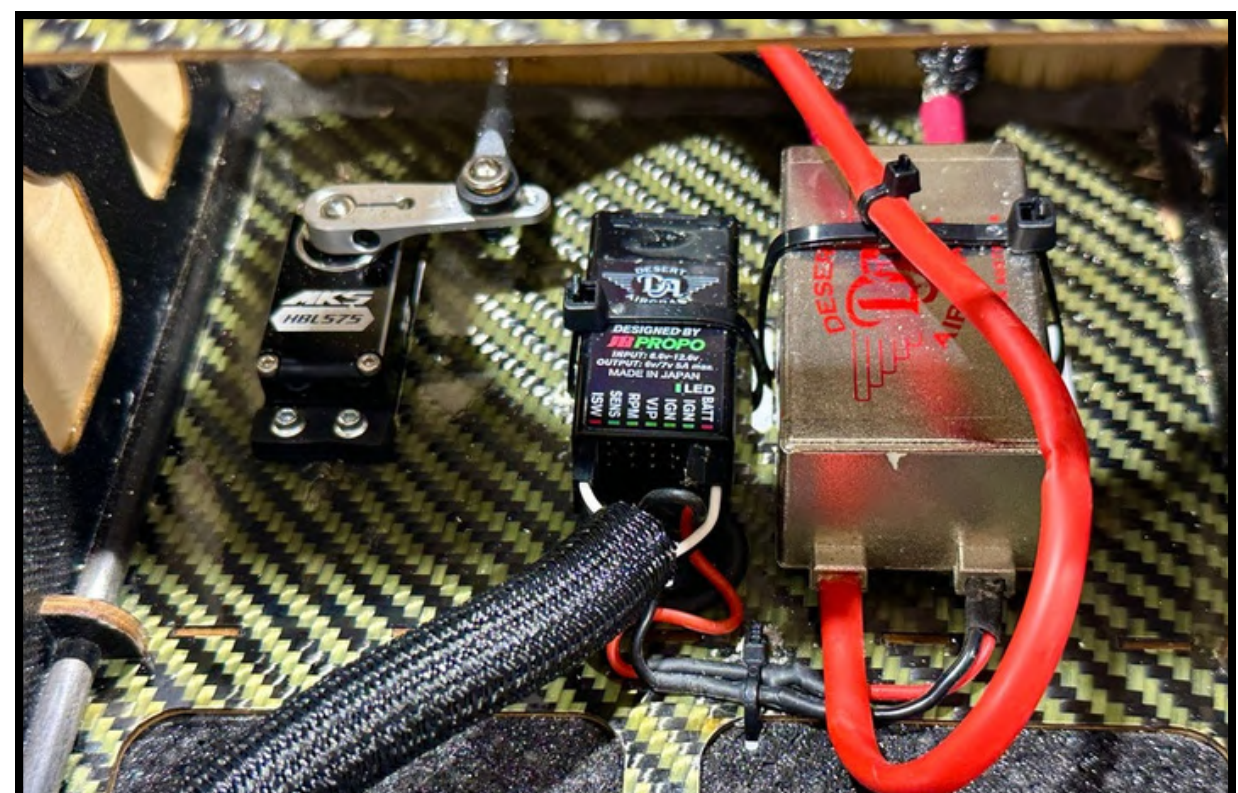
IGNITION INSTALLATION



It is recommended to use an ignition switch, such as an iBEC or a JR/DA kill switch. These units eliminate the need for a separate ignition battery (powered by the receiver). The layout shown illustrates the use of the JR/DA ignition switch.



Use a servo safety clip to connect the ignition wires from the ignition module to the engine.

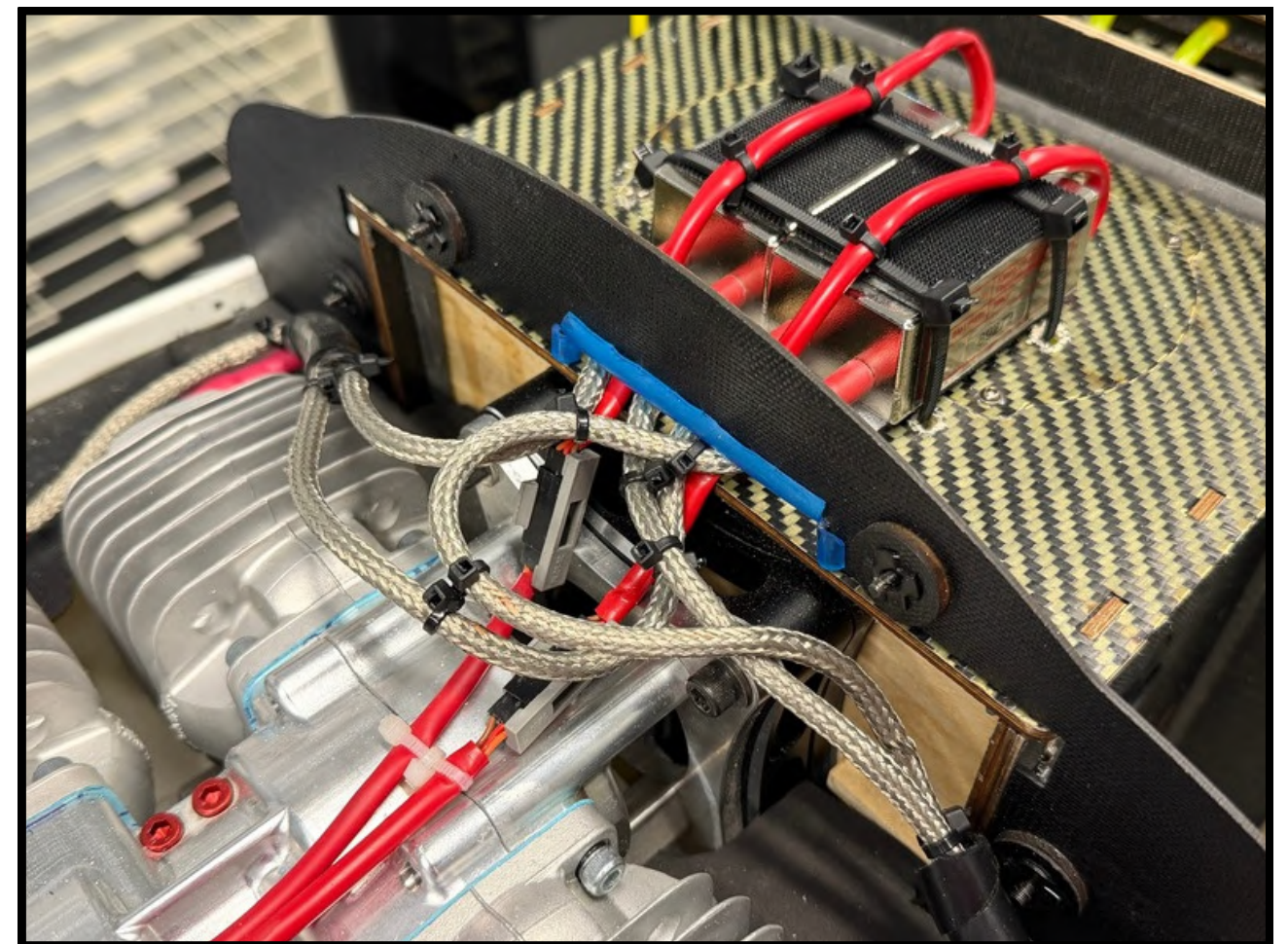
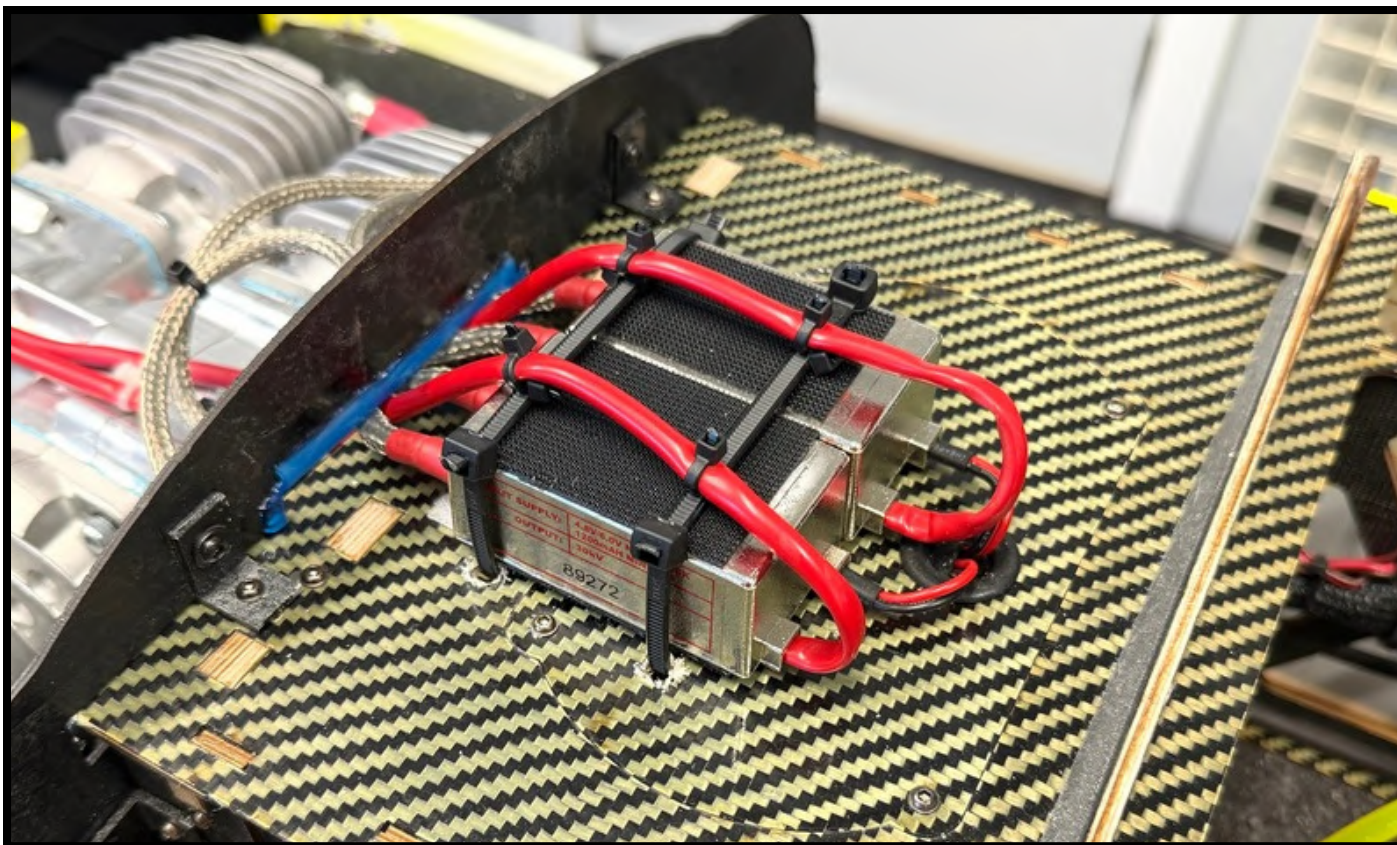


Use adhesive-backed Velcro to secure both the ignition switch and the ignition module. Additionally, use cable ties to further secure both components.



Route the ignition plug wires through the pre-installed holes on each side of the motor box, which are lined with rubber grommets.

These ignition switches feature an LED light that can be mounted anywhere on the aircraft. The LED indicates whether the ignition is on or off. We typically recommend mounting it on the side of the fuselage near the front, within easy view of the person starting the engine.

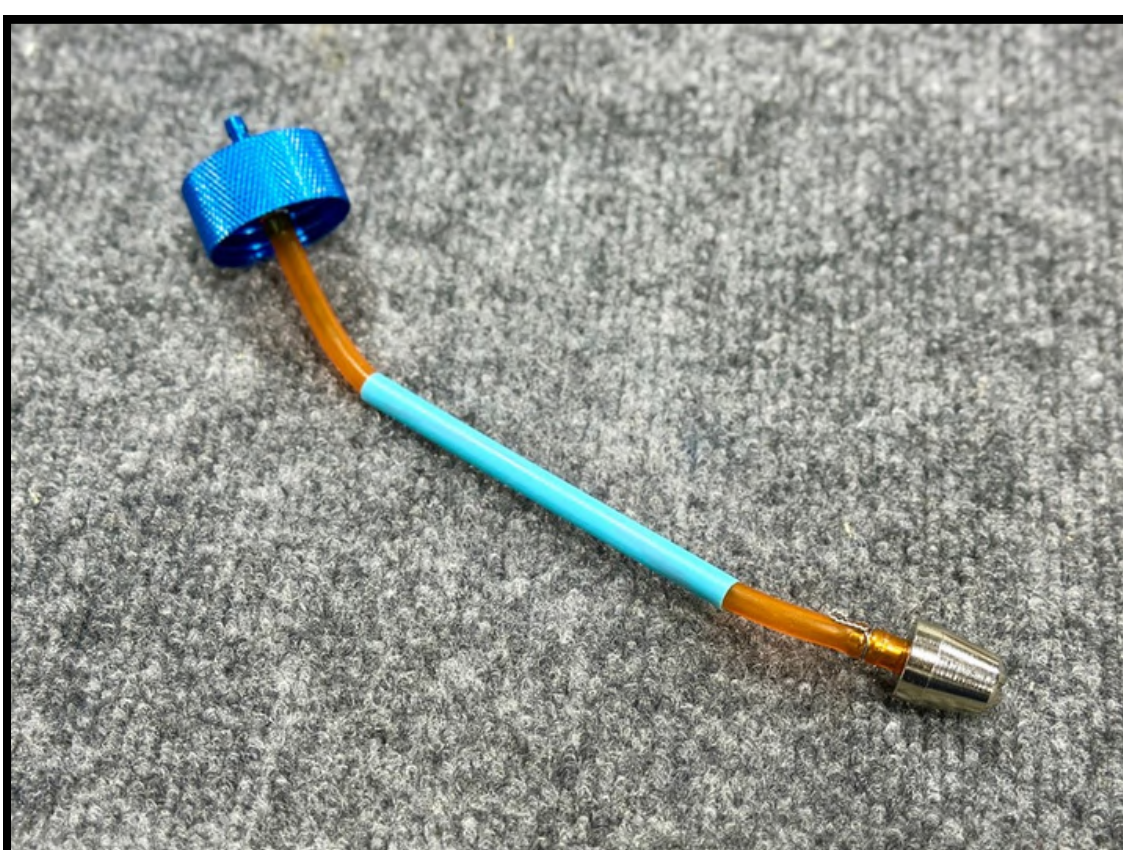


Ignition modules mounted for a four-cylinder engine installation.

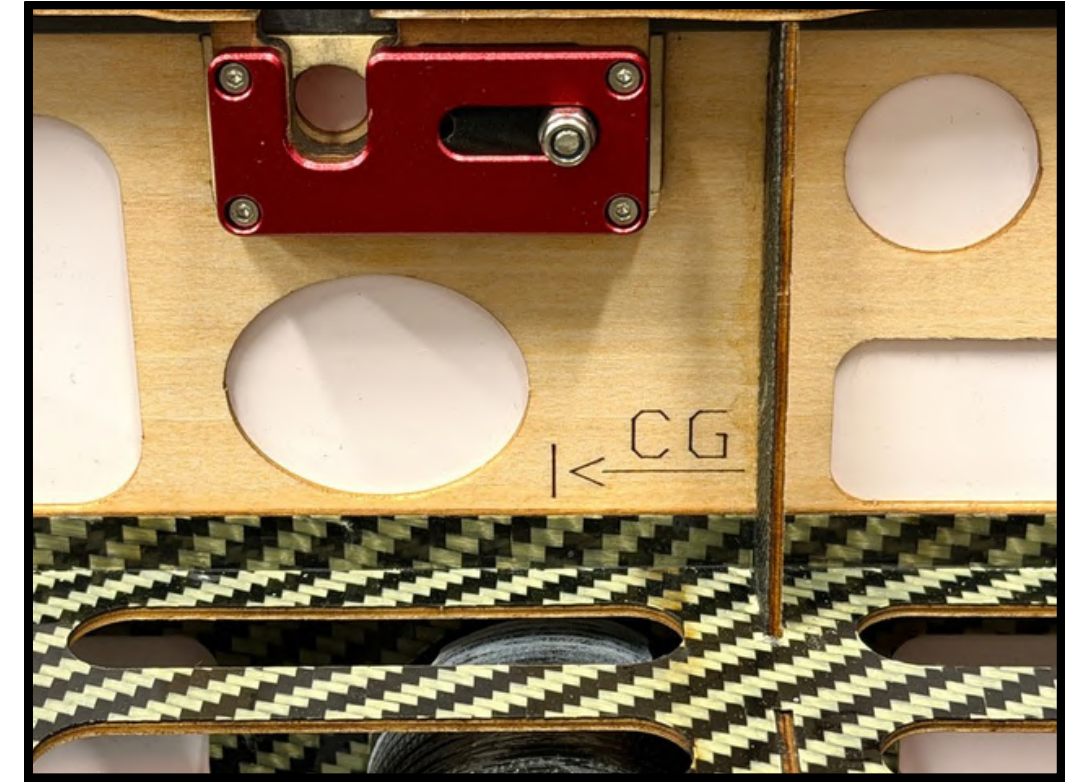
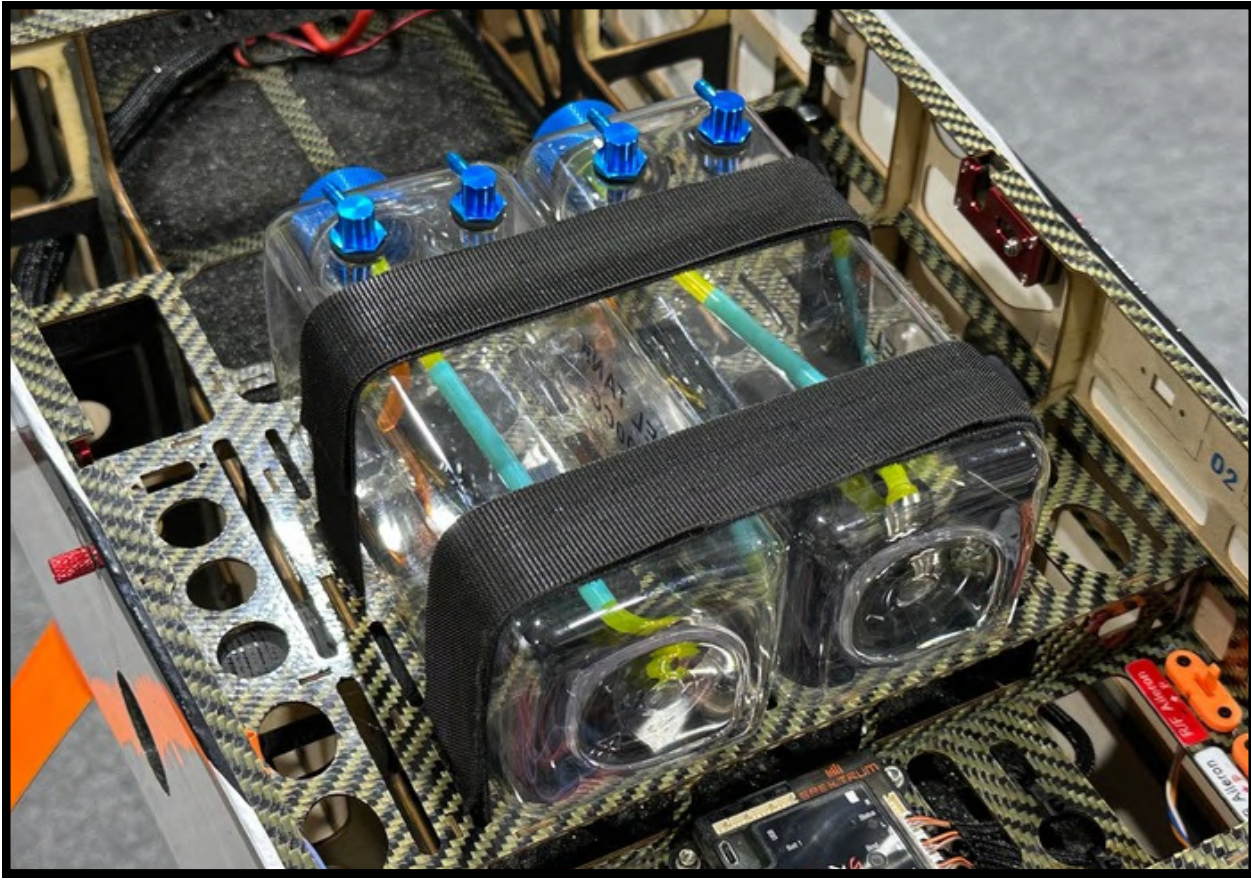
FUEL SYSTEM INSTALLATION



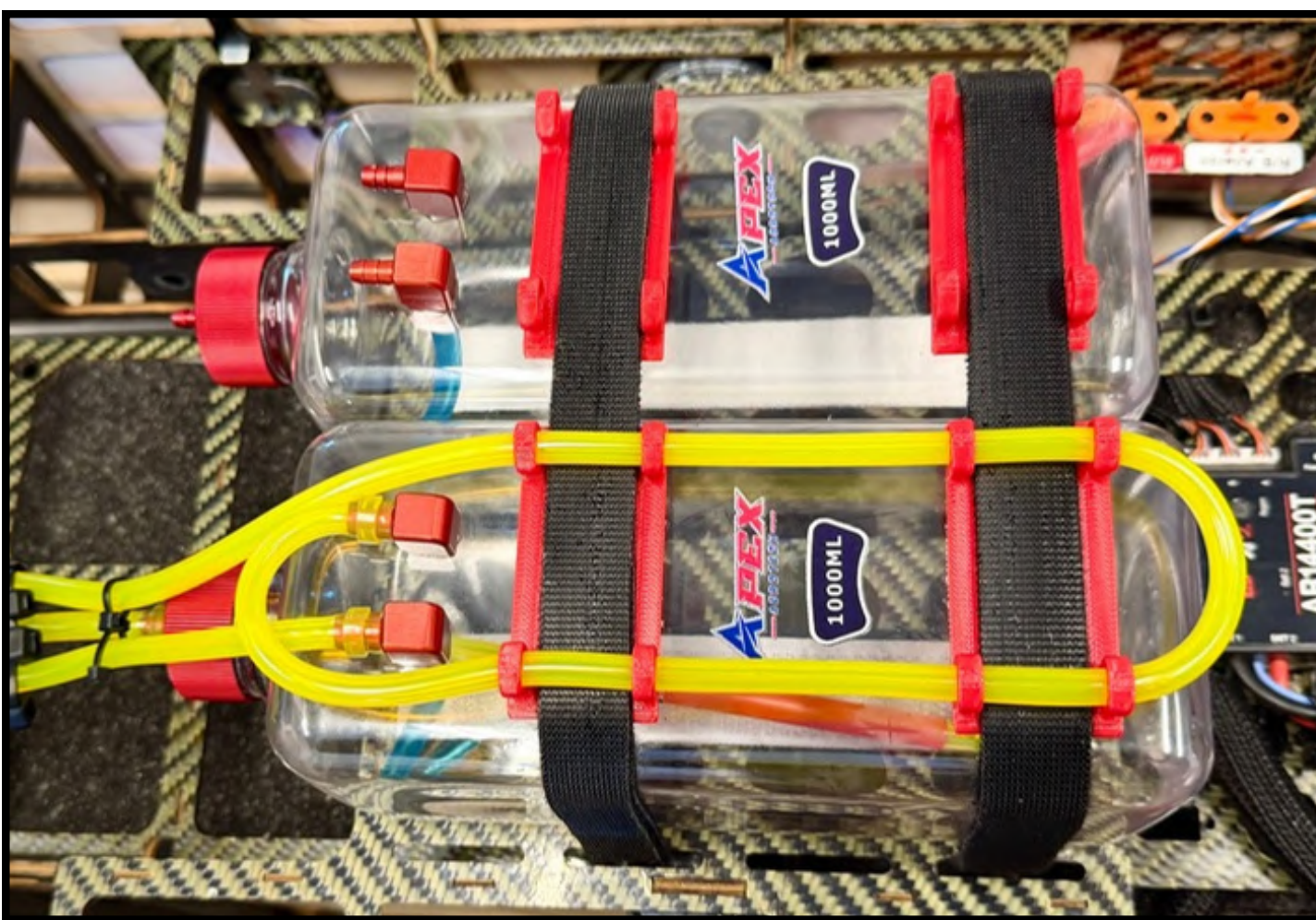
The 116" Laser features an included 50 oz (1500 ml) fuel tank. The diagram to the left illustrates the purpose of each fitting and fuel line.



It is recommended to install a plastic straw over the pickup line inside the tank to prevent it from wrapping around itself. Additionally, use safety wire or a small piece of fuel line to secure the fuel line to the tank cap and clunk.



Install the fuel tank on the tank tray located at the center of gravity (CG). The photo shows two tanks installed (one for smoke). If installing a single fuel tank, it may be placed in the center of the tray. Use adhesive-backed Velcro to attach the tank to the tray (one hook strip and one loop strip). Then use Velcro straps to firmly secure the tank to the tray. The tray includes provisions for routing the straps through.



The Laser features fuel tank vent line routing guides. These can be attached to the top of the fuel tank and allow for easy routing of the fuel vent line around the top of the tank. You can also route the Velcro straps through these guides to help secure the fuel tank.

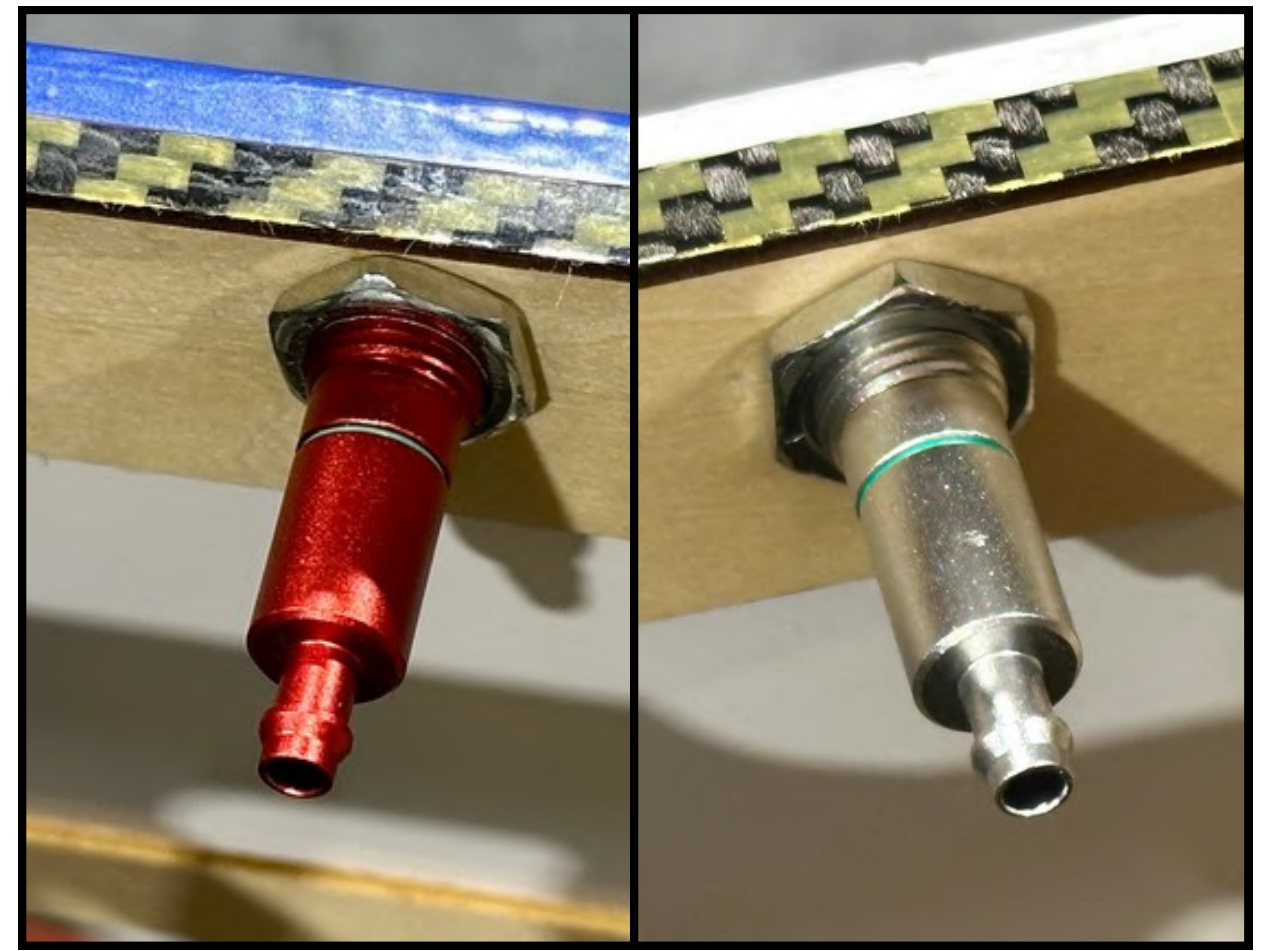
When routing the fuel lines, wrap the vent line around the top of the tank as shown. This helps prevent siphoning during flight. Be sure that all fuel line connections at the fittings, carburetor, and other components are secured with safety wire or a small piece of fuel line used as a clamp.



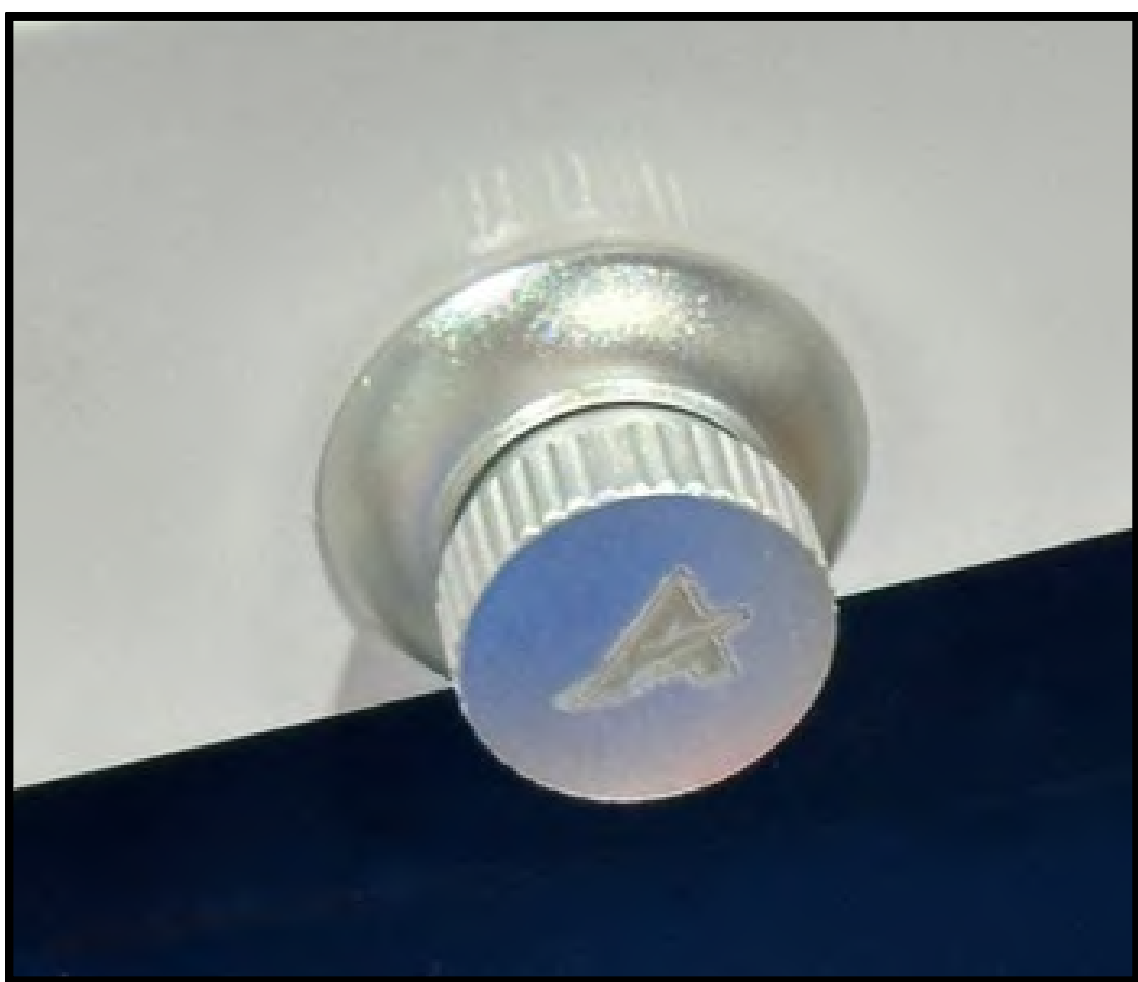
The Laser features several holes in the former located in front of the fuel tank for routing the fuel lines. Rubber grommets are also provided for routing the fill line to the fuel dot.



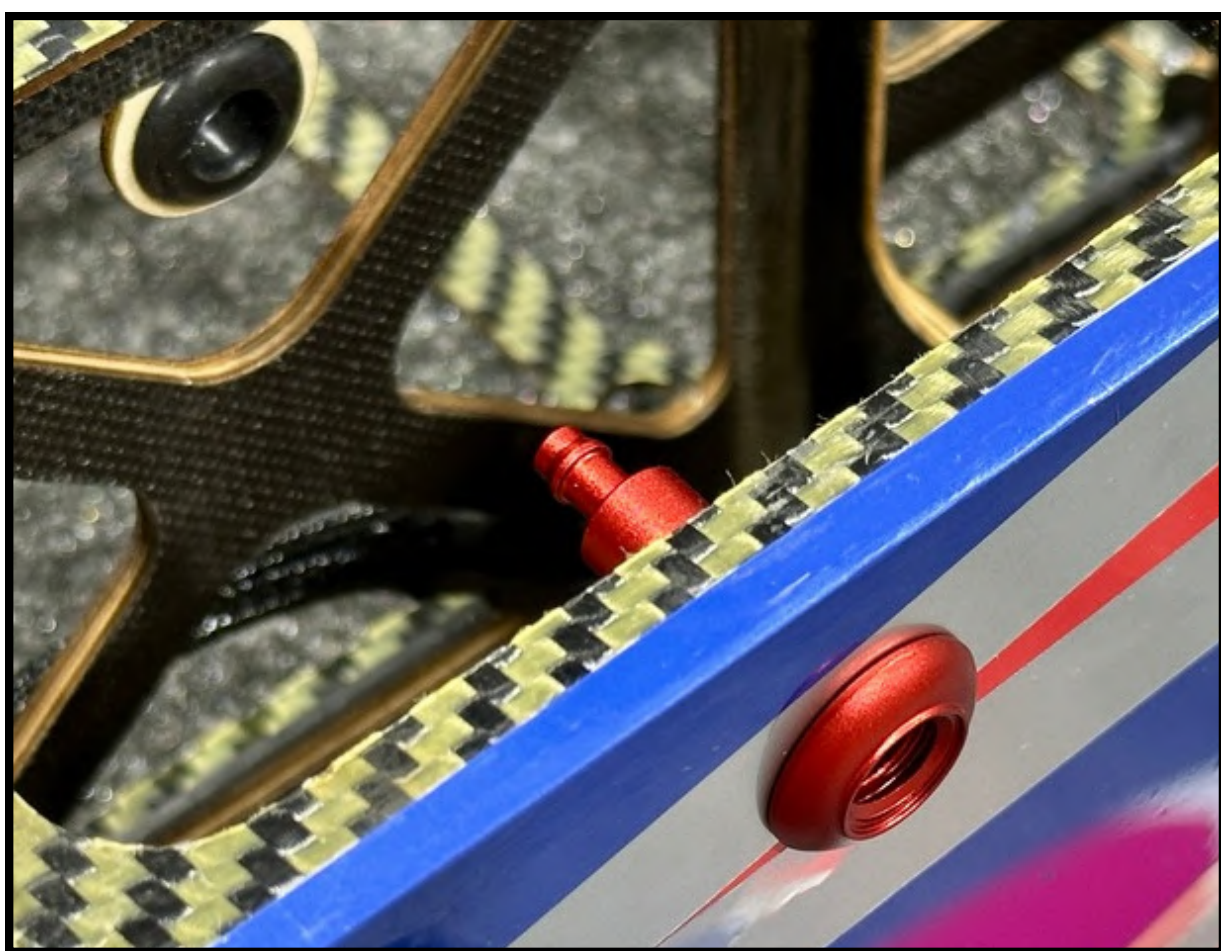
The Apex fuel dots are extremely beneficial for fast fueling and defueling. They allow the aircraft to be fueled without disconnecting any fuel lines. Simply insert the fueler into the receptacle and turn to tighten.



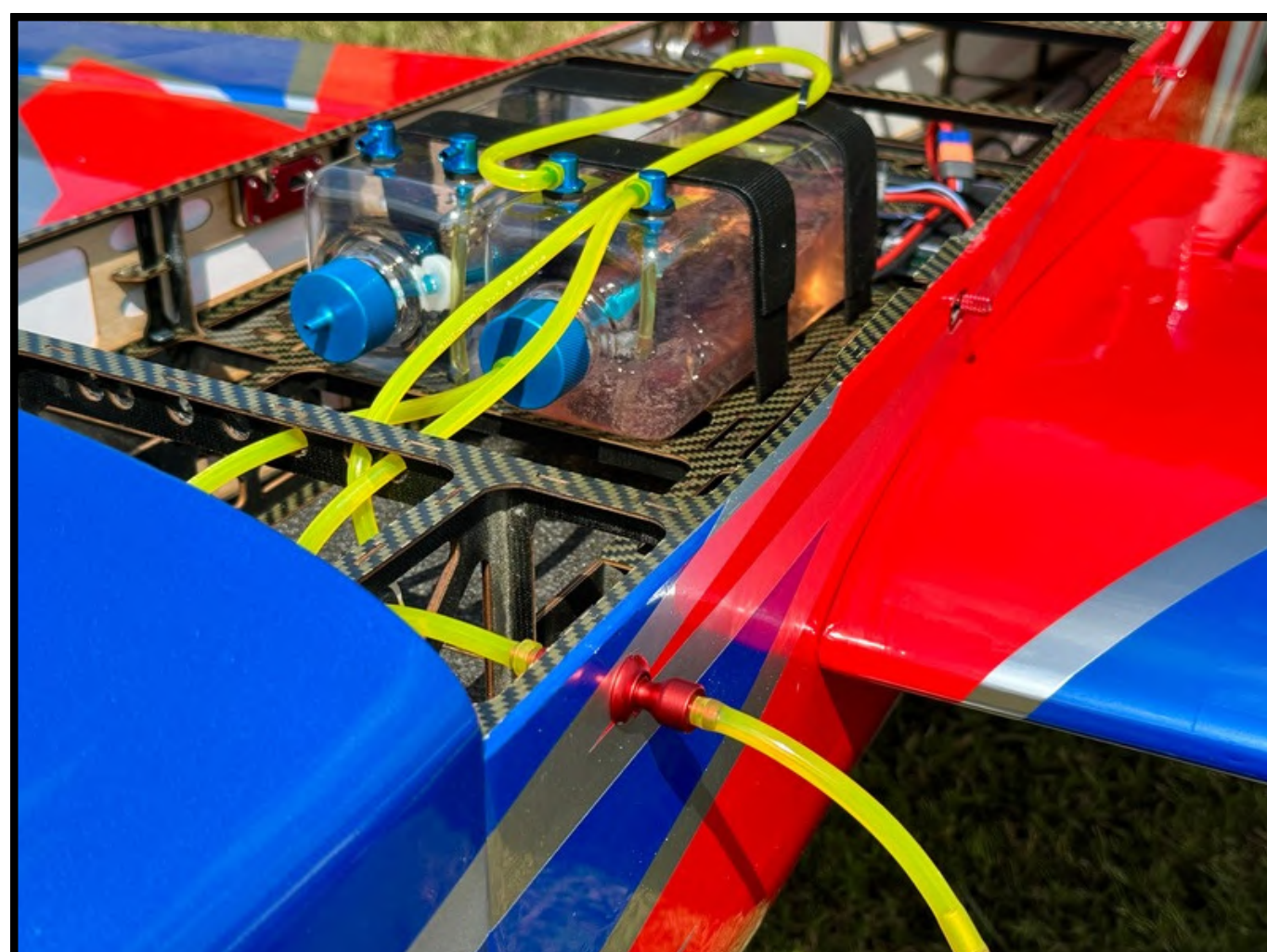
The Laser includes proper provisions for installing the fuel dot. Remove the covering and place the fuel dot into position. From inside the fuselage, tighten the nut against the fuselage to secure it in place.



For aesthetics, ensure that the logo is vertically aligned.



It is recommended to leave the cap off the fuel dot (the logo portion) during flight, as vibration may cause it to come off.



Connect the fueler portion of the fuel dot assembly to the fuel line that will attach to your fuel jug. Ensure the fueler is securely threaded into the fuel dot receptacle before turning on the fuel supply.



Fuel vent dots are also available from Apex. These install on the bottom of the aircraft using the three provided wood screws. The Laser includes mounting provisions along the bottom of the fuselage, just in front of the landing gear. There are also hole provisions for routing your vent line to these locations.

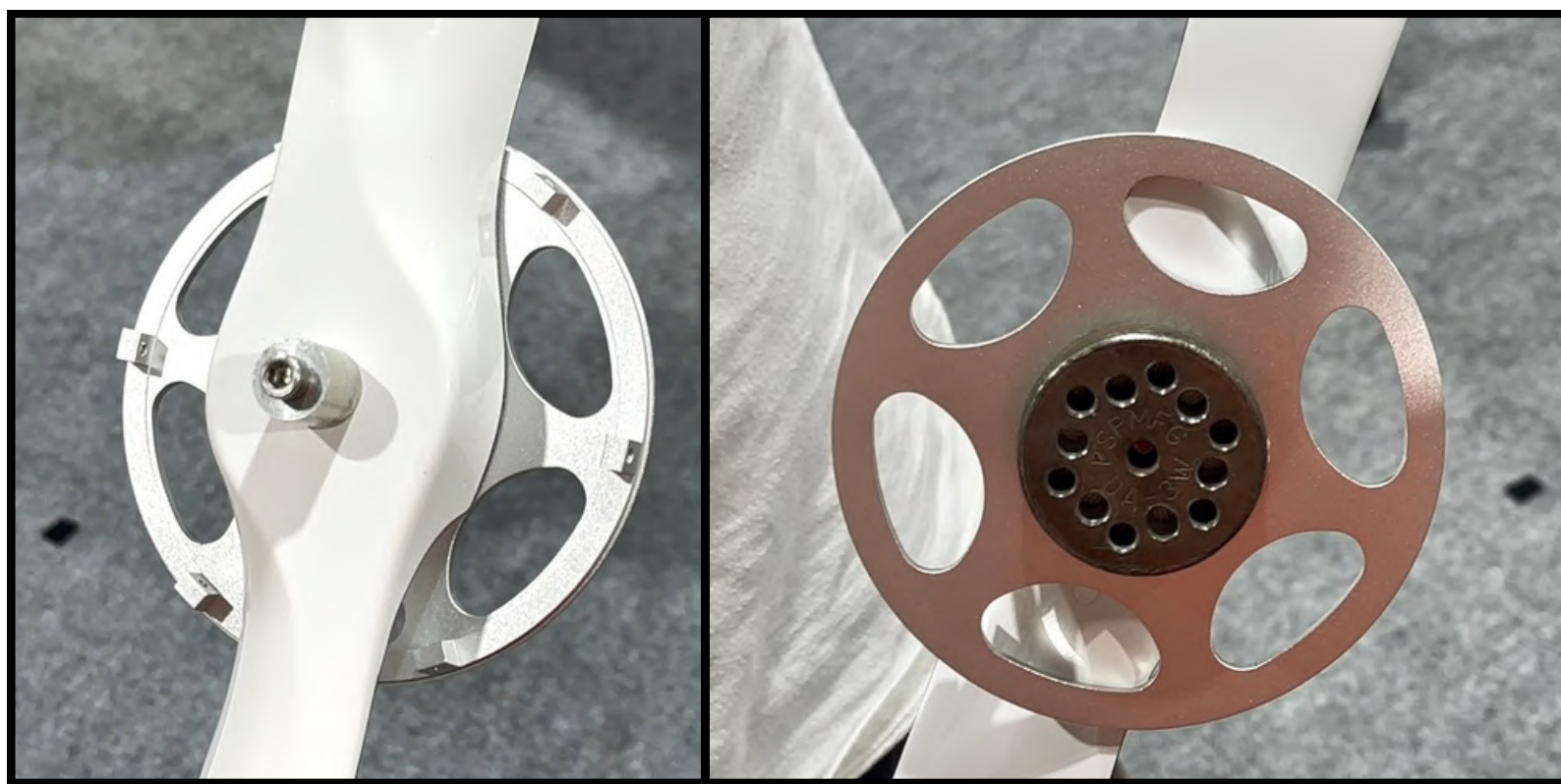


The vent dots come with a plug cap. Remove the cap before flight.

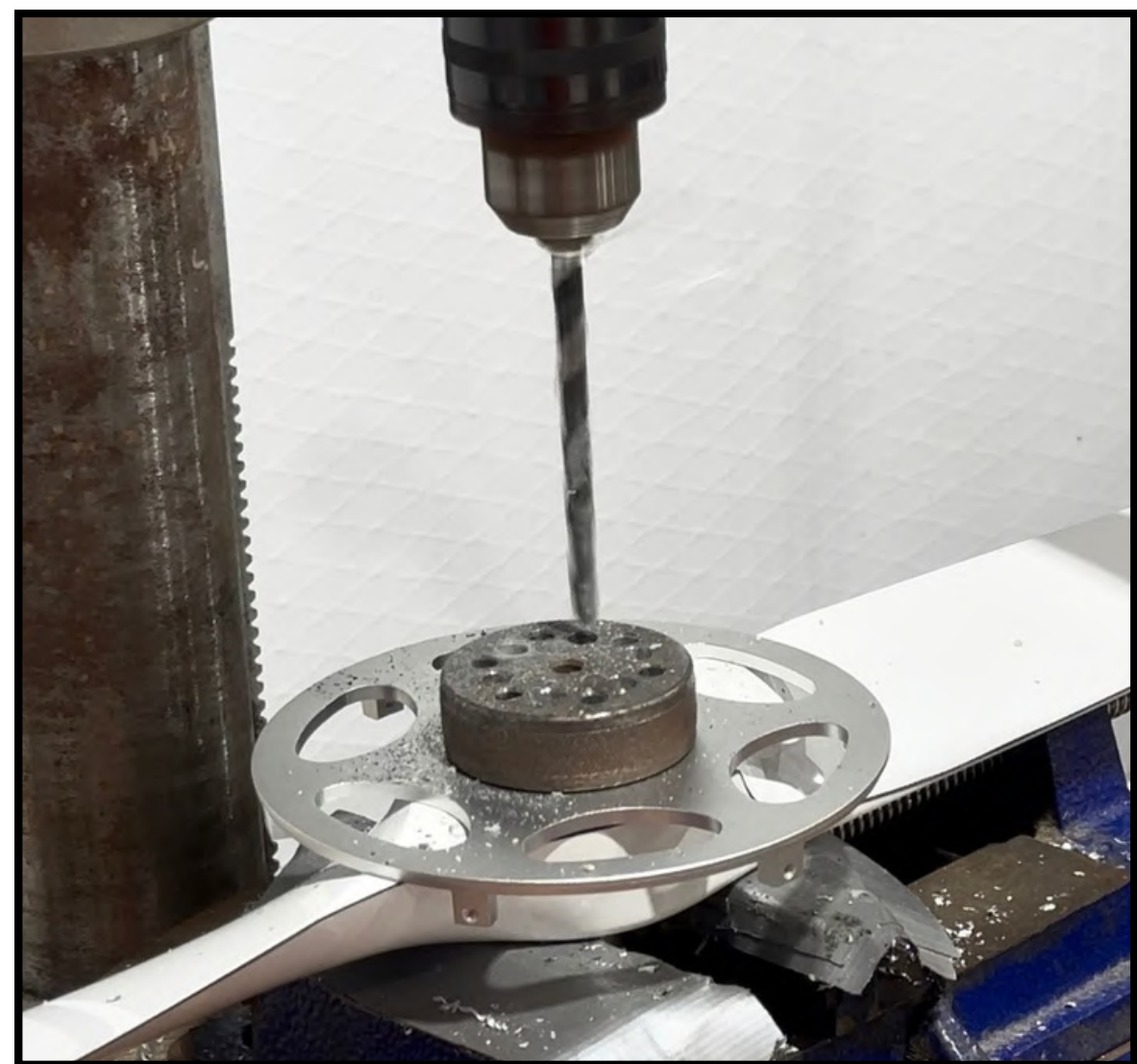
PROPELLER AND SPINNER INSTALLATION



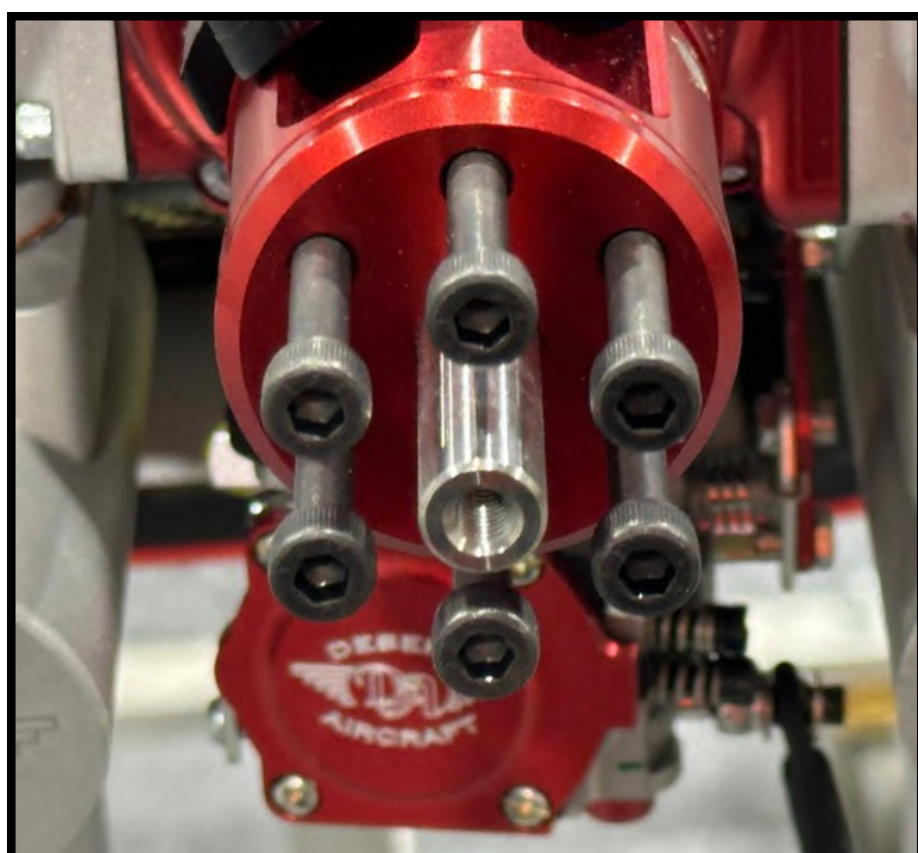
The Laser features an included painted, livery matched 5.5" carbon fiber spinner. Locate the backplate and the propeller.



Join the spinner backplate and propeller using the correct drill jig for your engine. Ensure the spinner cone is properly aligned by test-fitting it once the jig is bolted to the propeller and backplate.



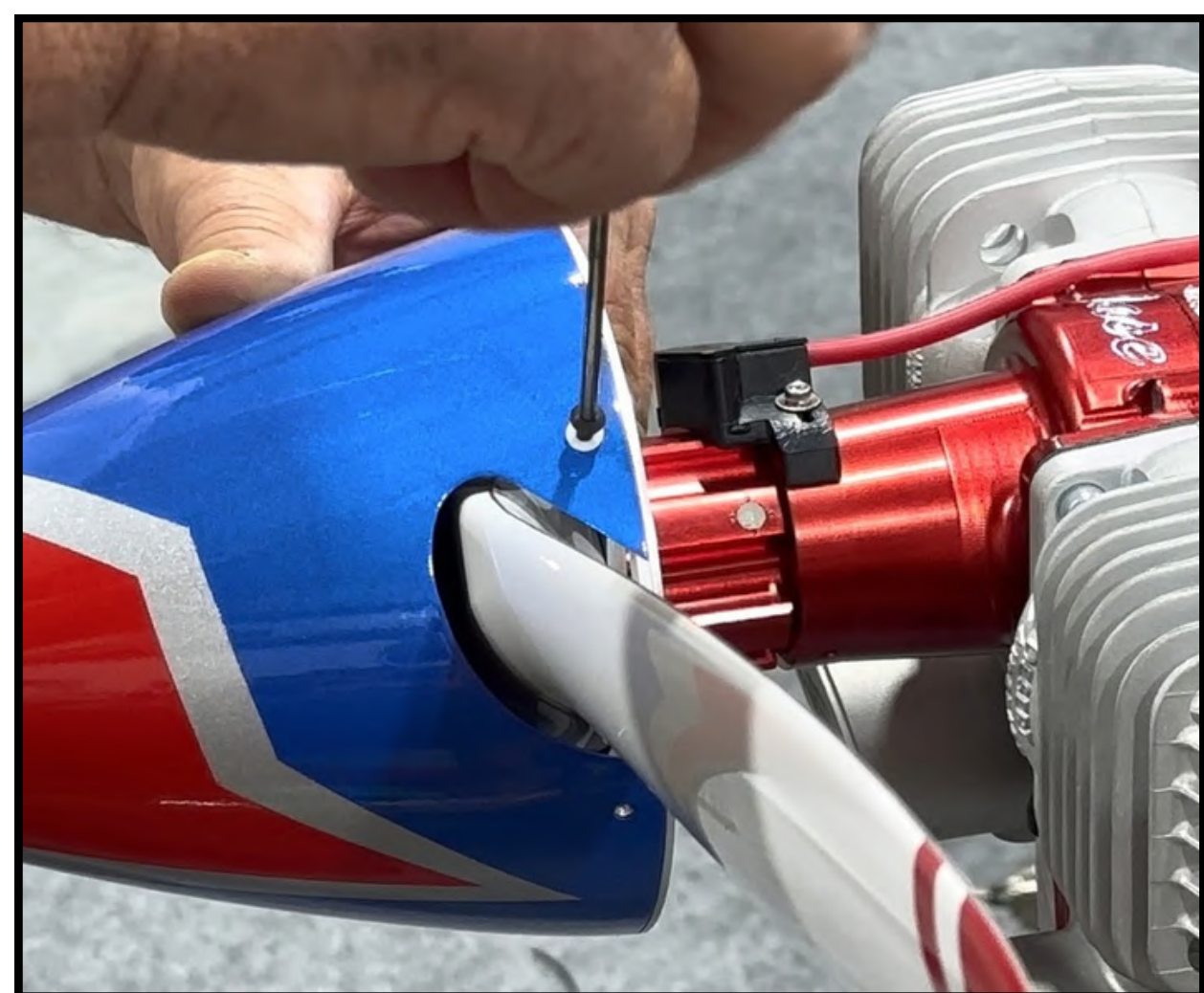
Using a drill press is recommended to achieve the cleanest and most accurately aligned holes.



Install the backplate first, followed by the propeller, and then the prop nut. Use the propeller mounting hardware supplied with your engine.

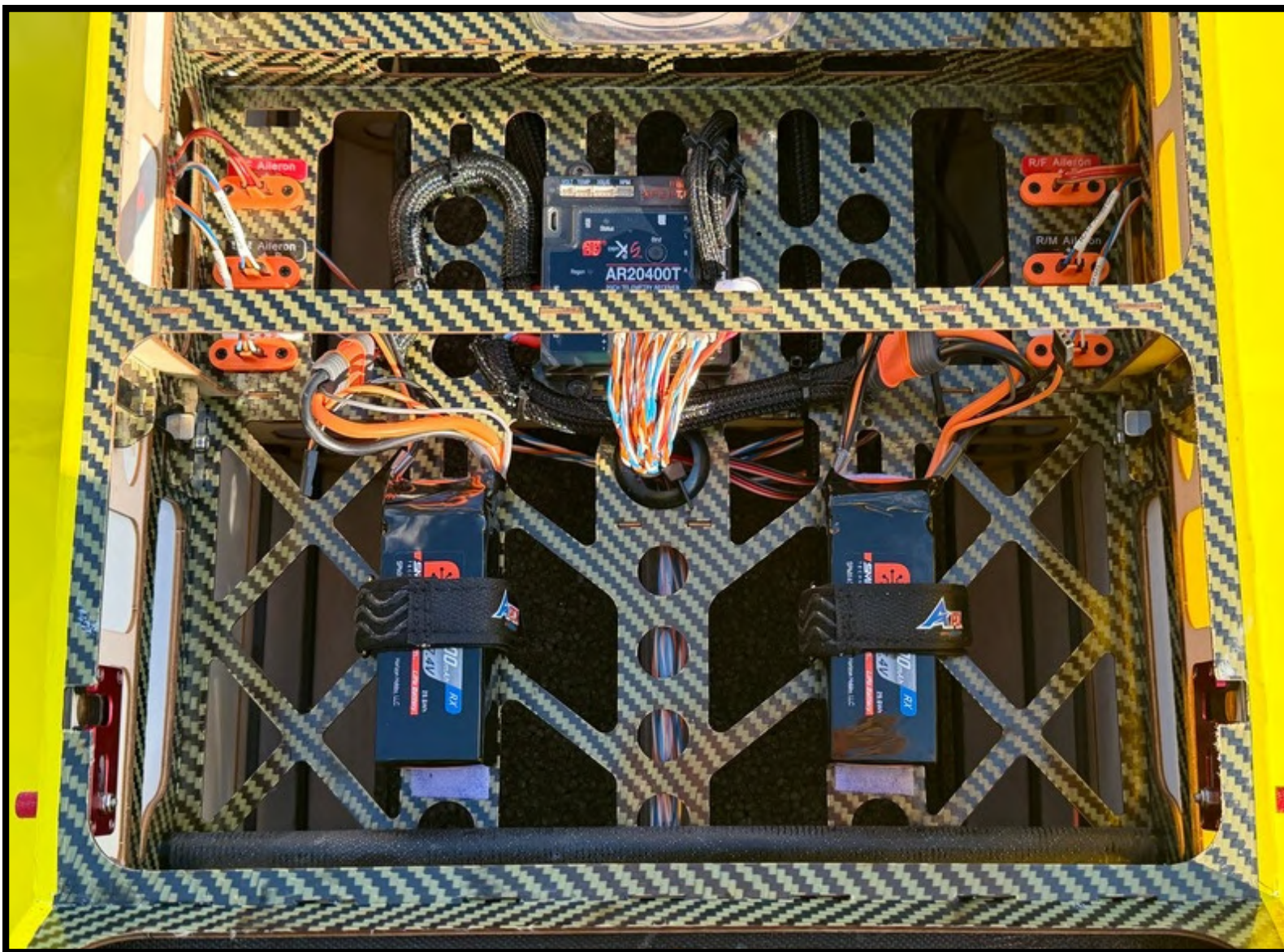
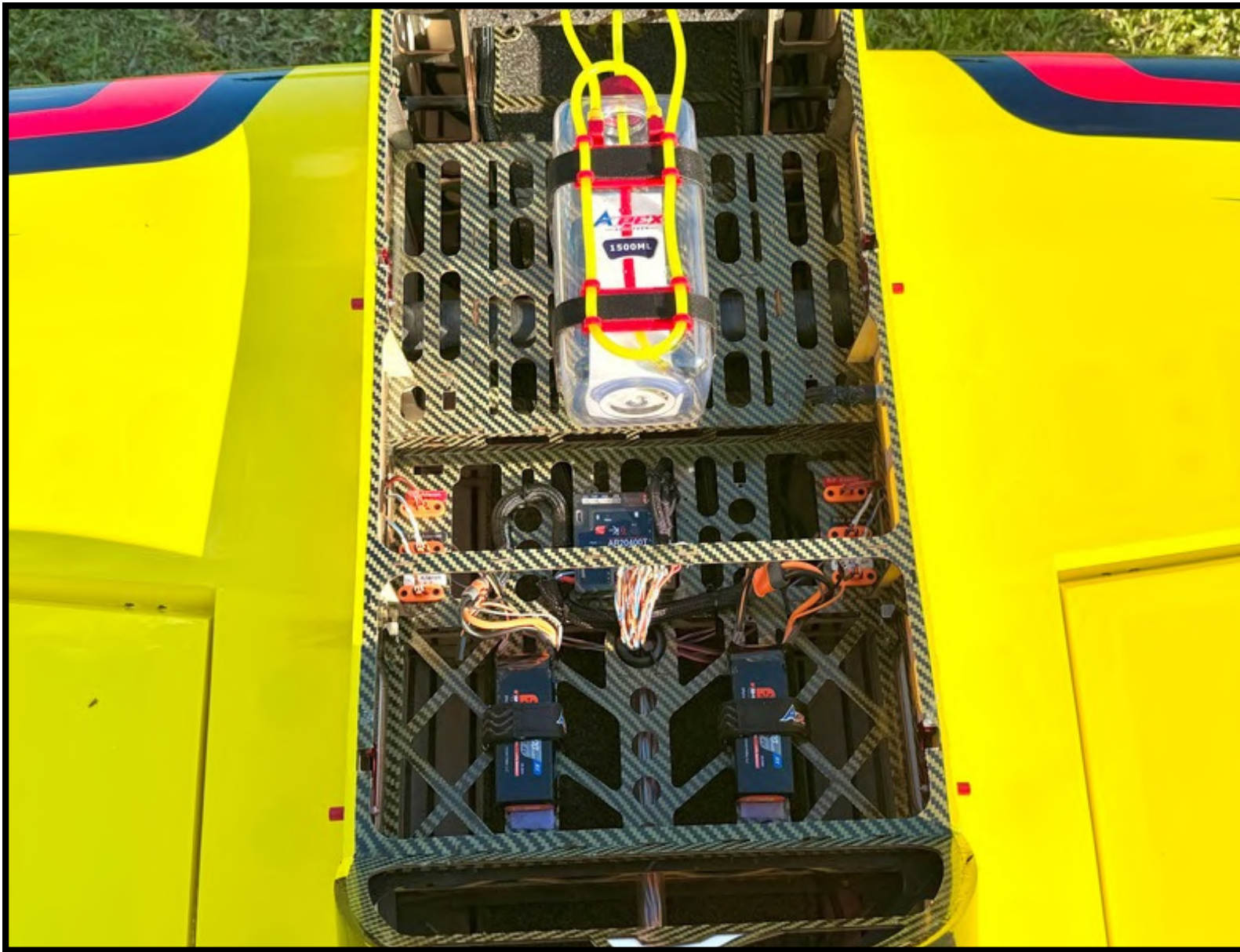


Use a torque wrench to evenly and correctly tighten the propeller bolts. Torque to approximately 95 in-lbs.



To install the spinner, use the supplied bolts and washers, and apply blue Loctite. Be careful not to overtighten the spinner bolts.

RADIO AND RECEIVER SETUP



These photos show the receiver mounting location along with the battery position for the recommended starting CG. Here, we are using two 2S 4000mAh batteries. Apex Aerotech aircraft have a wide and forgiving CG range. This placement is a solid starting point, and you can adjust the batteries to fine-tune the CG to your preference. We recommend using two receiver batteries for redundancy.



The recommended starting point for the Laser's CG is at the center of the wing tube. The Laser includes CG measuring tools that fit around the wing tube. Thread string through the small holes on top and lift from the center to perform a static CG measurement. Be sure to do this with the canopy installed.

CONTROL SURFACE SETUP:

SURFACE	HIGH RATES	LOW RATES
AILERON	38 DEG. UP, 37 DEG. DOWN 50-55% EXPO	20 DEGREES
ELEVATOR	55-60 DEGREES 50-55% EXPO	15 DEGREES
RUDDER	MAX WITHOUT BINDING 45-55% EXPO	20 DEGREES

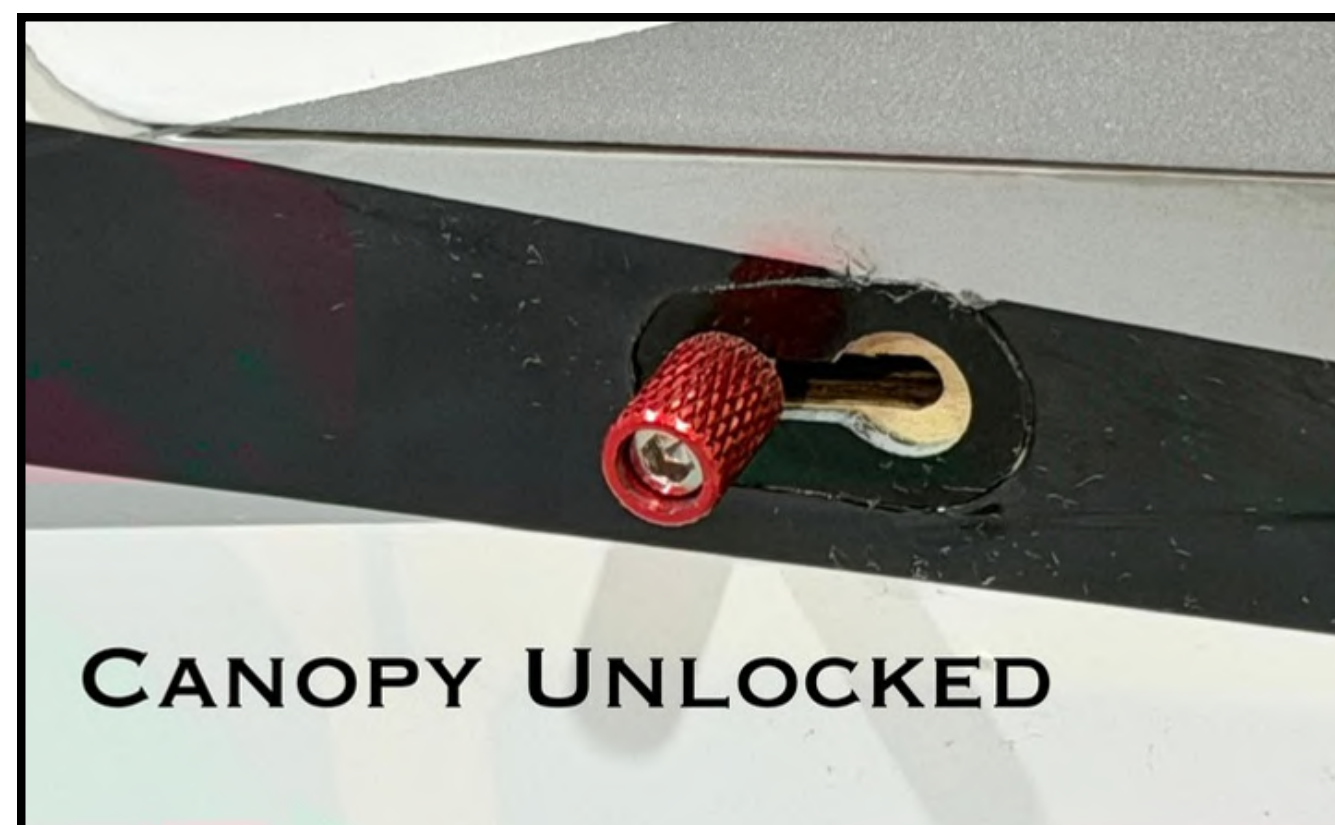
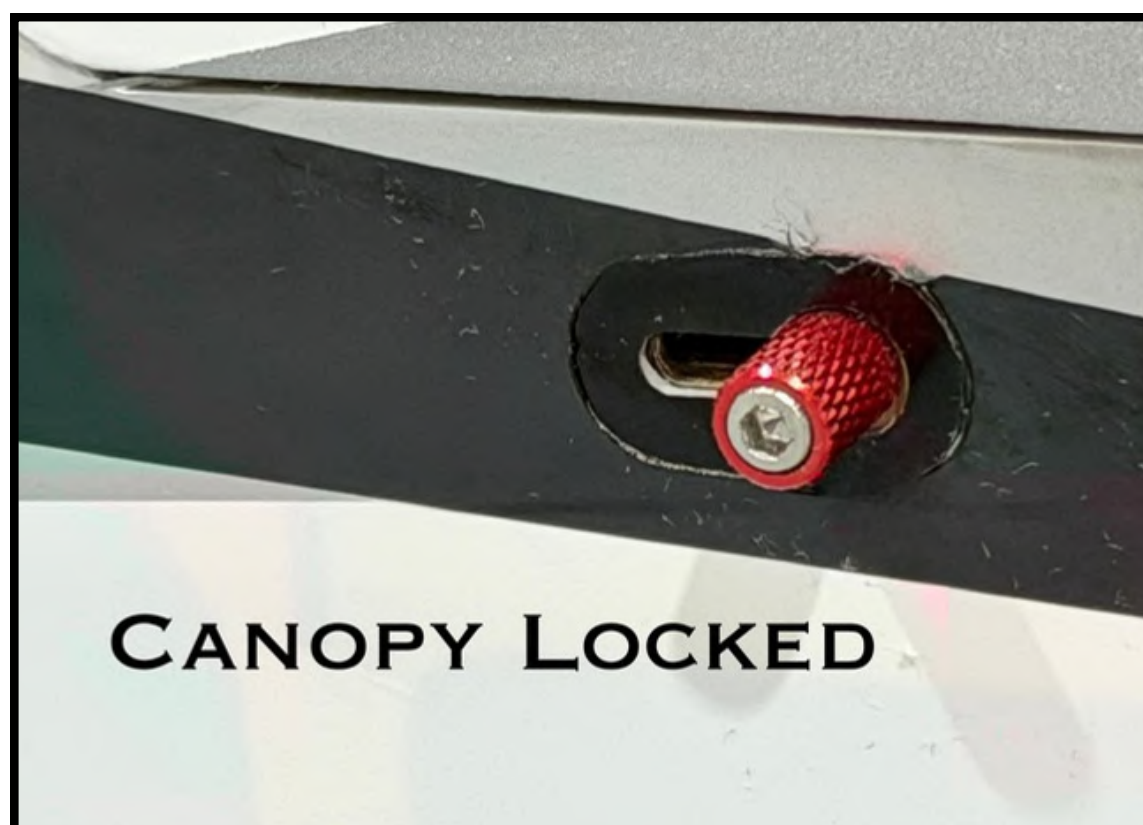


If you have an iPhone, you can easily set up control surface throws using the **Measure** app. Open the app and select the **Level** option. Make sure the value reads zero when the control surface is at neutral and your device is placed on it.

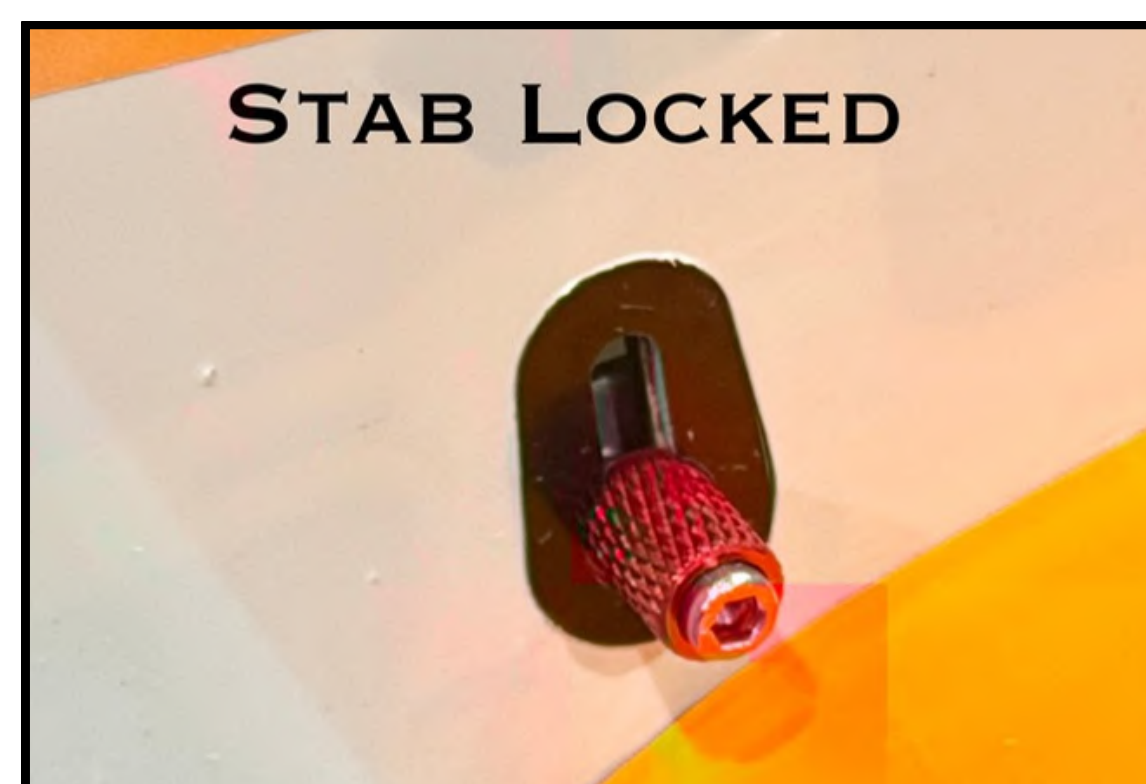
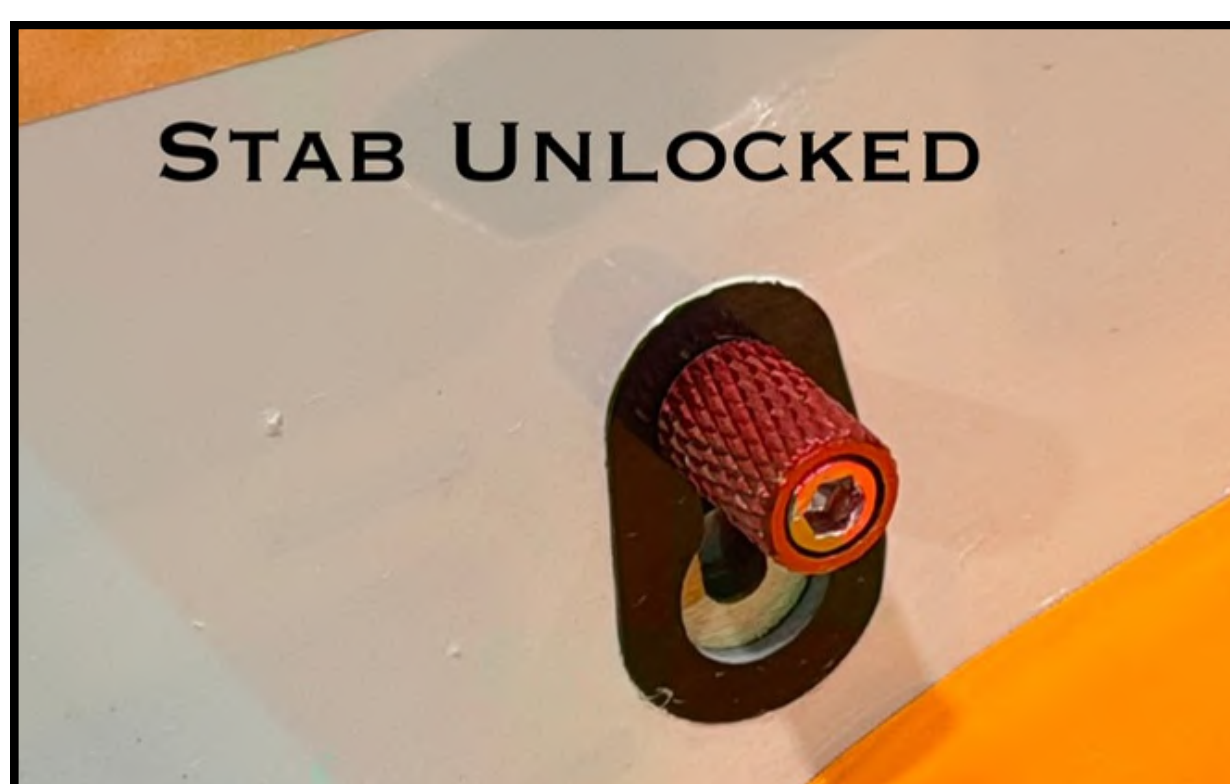
FIELD ASSEMBLY



Both the wings and horizontal stabilizers feature a double-tube anti-rotation system.

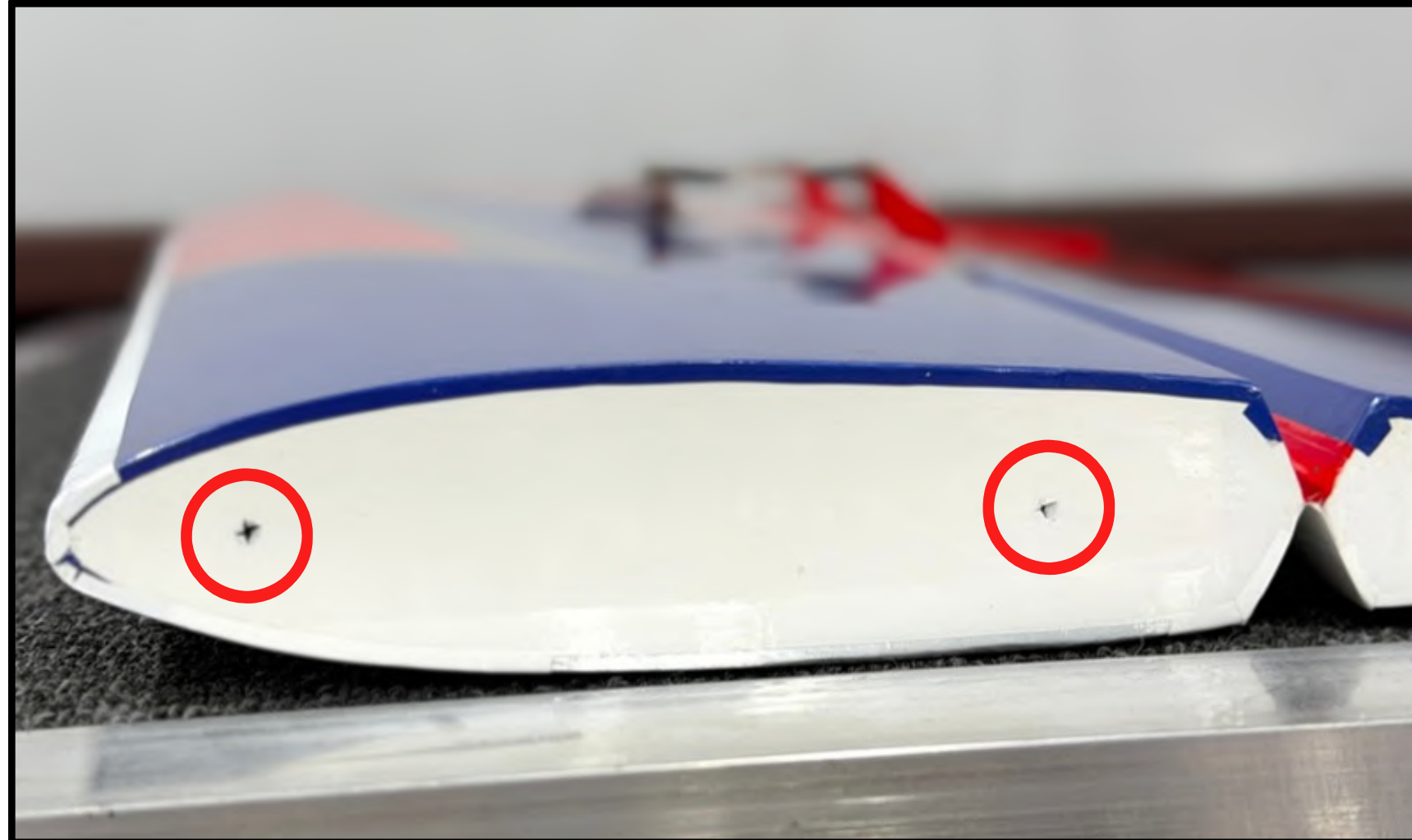


The Laser features a quick-attach/detach system for the canopy, wings, and horizontal stabilizers. Ensure that each mechanism is fully engaged.



The wing latches feature a black tab that prevents the canopy from being installed unless the wing is latched. To secure, use the metal handle and push it all the way down until the black tab is seated flush against the fuselage.

The Laser features blind nuts in the wingtips for installing night flying lights. Simply locate the blind nuts and cut a small hole in the covering large enough for the bolts to pass through.



DECAL INSTALLATION

The Laser includes a high-quality decal sheet that matches your color livery. Each decal is pre-cut for easy use. Simply peel the decal from the sheet, leaving the protective cover in place. After applying the decal, carefully remove the clear cover.

Make sure the surface where the decal will be applied is clean before installation.

CLEANING

It is recommended to take the time to clean your aircraft after use. This is also a good opportunity to inspect the aircraft, ensuring everything is tight and the covering is secure. For basic cleaning, use glass cleaner and paper towels. Spray wax can be applied for a more detailed shine.



Thank you, and congratulations on your 116" Laser! With the development and release of this aircraft, the expectations and capabilities of the 40% class have been completely reshaped! We wish you many great flights and countless hours of enjoyment with the Laser, whether it be IMAC competition, freestyle competition, classic 40% low-and-slow flying, or general sport flying!

