CARF-Models Spitfire
Building Instructions

Building Instructions for CARF-Models Spitfire

Thank you very much for purchasing our CARF Models Spitfire all composite aircraft, made in total area vacuum sandwich (TAVS) technology. Skilled craftsmen and experienced modelers have finalized the shapes and contours as well as the details of the plane before the production mold was made. This high-tech marvel of production tooling is a precise, handcrafted set of molds, which will allow us to supply precision composite parts for many years to come. Before you get started building and setting-up your aircraft, please make sure you have read this instruction manual several times, and understood it. If you have any questions, please don't hesitate to contact us. Below are the contact details:

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Liability Exclusion and Damages

You have acquired a kit, which can be assembled into a fully working R/C model when fitted out with suitable accessories, as described in the instruction manual with the kit. However, as manufacturers, we at CARF-Models are not in a position to influence the way you build and operate your model, and we have no control over the methods you use to install, operate and maintain the radio control system components. For this reason we are obliged to deny all liability for loss, damage or costs which are incurred due to the incompetent or incorrect application and operation of our products, or which are connected with such operation in any way. Unless otherwise prescribed by binding law, the obligation of the CARF-Models company to pay compensation is excluded, regardless of the legal argument employed. This applies to personal injury, death, damage to buildings, loss of turnover and business, interruption of business or other direct and indirect consequent damages. In all circumstances our total liability is limited to the amount which you actually paid for this model.

BY OPERATING THIS MODEL YOU ASSUME FULL RESPONSIBILITY FOR YOUR ACTIONS.
It is important to understand that CARF-Models Co., Ltd, is unable to monitor whether you follow the instructions contained in this instruction manual regarding the construction, operation and maintenance of the aircraft, nor whether you install and use the radio control system correctly. For this reason we at CARF-Models are unable to guarantee or provide a contractual agreement with any individual or company that the model you have made will function correctly and safely. You, as operator of the model, must rely upon your own expertise and judgment in acquiring and operating this model.

Supplementary Safety Notes

Pre-flight checking:
Before every flying session check that all the model's working systems function correctly, and be sure to carry out a range check. The first time you fly any new model aircraft we strongly recommend that you enlist the help of an experienced modeler to help you check the model and offer advice while you are flying. He should be capable of detecting potential weak points and errors. Be certain to keep to the recommended CG position and control surface travels. If adjustments are required, carry them out before operating the model. Be aware of any instructions and warnings of other manufacturers, whose product(s) you use in this particular aircraft, especially engine and radio equipment. Please don't ignore our warnings, or those provided by these other manufacturers. They refer to facts and processes which, if ignored, could result in permanent damage or fatal injury.

Attention !

This Scale-Aircraft is a high-end product and can create an enormous risk for both pilot and spectators, if not handled with care, and used according to the instructions. Make sure that you operate your Spitfire according to the AMA rules, or those laws and regulations governing the model flying in the country of use. The engine, servos and control surfaces have to be attached properly. Please use only the recommended engines, servos, propellers, and accessories supplied in the kit. Make sure that the 'Centre of Gravity' is located in the recommended place. Use the nose heavy end of the CG range for your first flights, before you start experimenting with moving the CG back. If you find that you need to relocate your batteries or even add weight in the aircraft to move the CG to the recommended position, please do so and don't try to save weight or hassle. A tail heavy plane, in a first flight, can be an enormous danger for you and all spectators. Fix any weights, and heavy items like batteries, very securely to the plane. Make sure that the plane is secured properly when you start the engine. Have at least 2 helpers hold your plane from the tail end, or from behind the wing tips, before you start the engine. Make sure that all spectators are behind, or far in front, of the aircraft when running up the engine. Make sure that you range check your R/C system thoroughly before the first flight. It is absolutely necessary to range check your complete R/C installation first WITHOUT the engine running. Leave the transmitter antenna retracted, and check the distance you can walk before 'fail-safe' occurs. Then start up the engine, run it at about half throttle and repeat this range check with the engine running. Make sure that there is no range reduction before 'fail-safe' occurs. Only then make the 1st flight. If you feel that the range with engine running is less then with the engine off, please contact the radio supplier and the engine manufacturer and DON'T FLY at that time. If you fly with 2.4 GHz technology, please follow the radio manufacturer's instructions for range checking. Always check range before a flying session!

Packing Checklist (include in box)

Amount	Description English	Check
1	Fuselage	
1	Rudder	
1	Right wing (with LG Housing installed)	
1	Left wing (with LG Housing installed)	
1	Wing tube anodized Ø40 x 580 mm long	
1	Right aileron	
1	Left aileron	
1	Cowling	
1	Canopy frame	
1	Clear canopy	
1	Elevator	
1	Cowling	
1	Stabilizer assembled	
2	Wing radiator	
1	Air intake	
1	Oil cooler (Option)	
1	Hardware pack	
1	Instruction Manual and photo sheets (English)	

Hardware
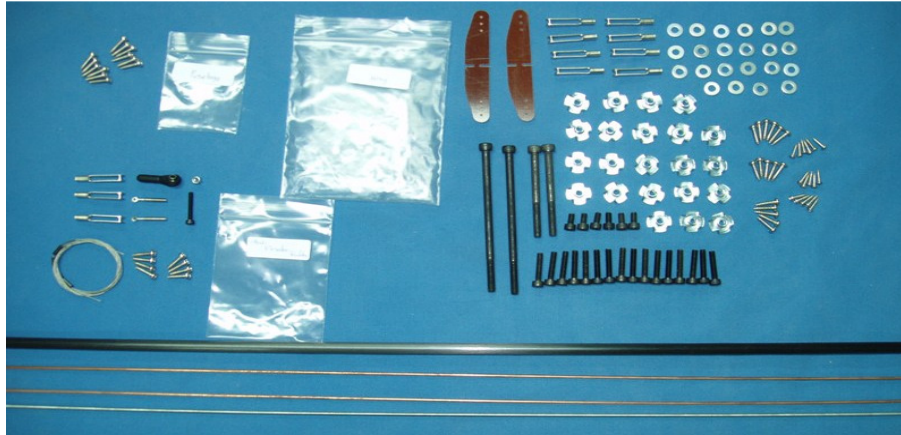
Wing pack

Quantity	Description	
2	Allen screw M5 x 60 Wings mount rear	
2	Allen screw M5 x 100 Wing mount front	
1	Plywood 3 x15 x 500mm Strip for servo hatches	
4	Phenolic small control for Aileron and Flap	
8	Steel spring clevises M3 for Aileron and Flap	
6	T-Nut M4 for plywood servo mount	
16	T-Nut M4 for Landing gear mount	
6	Allen screw M4 x 8mm for plywood servo mount	
16	Allen screw M4 x20mm for Landing gear mount	
22	Washer M4 for all M4 screws	
16	Sheet metal screws 2.2 x 9.5 for mount servo hatches	
16	Sheet metal screws 2.9 x 13 for servo mount	
1	All thread M3 x 1000mm Long for all linkage	Separate
4	Plywood 3 mm servo mount set milled for Aileron, Flap	Pack
1	Plywood 1.5 x 13 x 600mm Strip for Aileron, Flap servos mount	

Stab/Elevator/Rudder pack

Quantity	Description	
3	Steel spring clevises M3 for Elevator 1pc, Rudder 2 pcs	
2	Thread end with hold for Rudder	
1	Pull-Pull wire dia 0,65 x 1200 mm. Long for Rudder	
4	Camp tube for pull-pull wire	
8	Sheet metal screws 2.9 x 13 for servo mount	
1	Plastic ball ink M3 for Elevator	
1	Allen screw M3 x 20 mm. for Elevator control horn	
1	Stop nut M3	
2	Hinge pin 1 meter long	
1	Carbon Tube OD8, ID6 1000 mm long for Elevator	Separate
1	Plywood 3 mm servo tray milled for Rudder and Elevator	Pack

Fuselage pack

Quantity	Description	
12	Sheet metal screws 2.9 x 13 mm. for cowling mount	
1	Throttle servo mount milled	Separate
2	Plywood 3 mm. firewall milled	Pack
1	Plywood 3 x15 x 500mm Strip for servo cowling mount	

Wood Bag
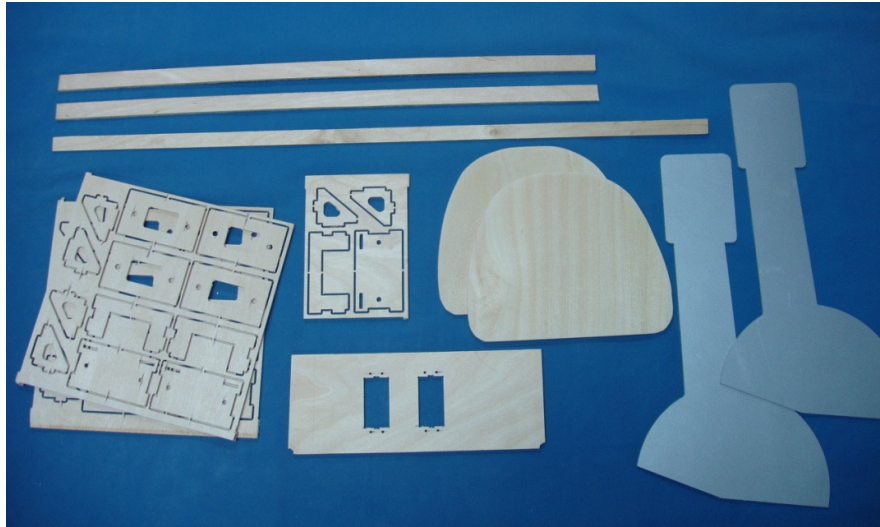
| Quantity	Description
2	Ply wood strip 3x15x500 mm.
1	Ply wood strip 1.5x15x600 mm.
4	Aileron and Flap servo mounting
1	Throttle servo mounting
2	Firewall plate
1	Elevator and Rudder servo mounting
2	Gear door left and right

Canopy Assembly and Installation

The canopy should only be installed after all the work on the inside is complete to avoid damaging it. Using a Dremel tool, trim the excess material from the canopy frame as shown in the photo. **Do not** cut out the window opening at this time. Sand rough edges from the inside of the canopy frame where it will contact the fuse. An easy way to center the frame to the fuse is to use a piece of masking tape. Align the tape with the bottom of the cockpit opening in the fuse and mark down from the top 7/16"(10mm). Use this as a guide to center the canopy in the rear. In the front, measure the distance from the outside edge to the center of the fuse. Once the canopy frame is centered, mark it at the center line of the fuse. Remove the tape from the sides of the fuse and reinstall the canopy frame. Line up the marks to the center line and move the frame fore and aft to the best fit to the fuse. Once in place, tape the canopy frame to the fuse in the front and rear only. Using masking tape, outline the position of the frame on the fuse. This will help with alignment later and help keep glue from getting on the fuse when installing the canopy.

After the canopy frame is fit to the fuse, carefully cut out the window openings. Take your time here as the frame will be delicate until the canopy is glued in. With the windows cut out, sand the rest of the inside canopy frame for better adhesion of the canopy. For the best fit, the windows and the bubble canopy will be cut apart and installed individually. *continued*
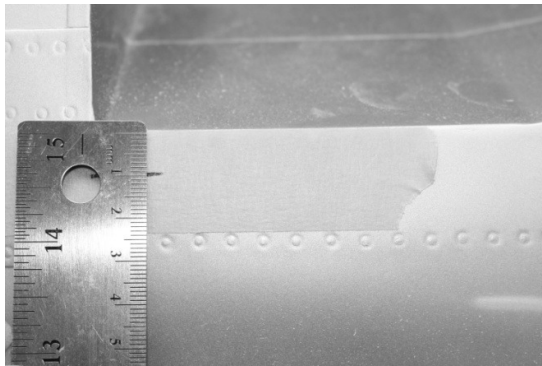
Canopy assembly and installation cont.

Carefully cut out the windows and canopy so as to have about 1/8"(3mm) overlap on the inside for gluing. Once you are satisfied with the fit, scuff the area of the windows that will mate to the frame. Work from the inside using Plasti Zap and a fine glue tip **Note** Do not use an accelerator when gluing windows or the clear windows may fog. Starting with the front window, slowly work your way around the window making sure to get no glue on the outside Repeat for the two side windows and the bubble canopy.

After all the windows and the canopy are glued in to the frame, the canopy can be installed on the fuse. Note, if you plan to install a cockpit, you may want to do so before installing the frame. The canopy in our prototype will be glued in place using a slow setting epoxy. Using the masking tape applied earlier as a guide, scuff the mating area of the fuse where the canopy will attach. Glue the frame to the fuse and tape in place until the epoxy cures.
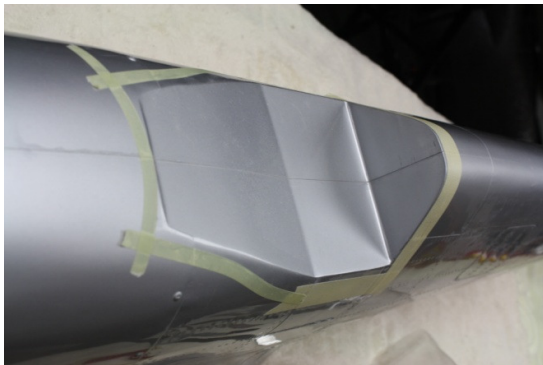
Cowl Installation

The cowl is already fit to the fuse at the factory and only requires a small amount of work to complete, Test fit the cowl to the fuse. A small amount of sanding may be necessary at the aft end of the cowl for a perfect fit Once satisfied with the fit, tape the cowl to the fuse. The cowl is held in place with nine 3mm by 20mm screws and blind nuts. Starting at the top, drill an 1/8"(3mm) hole at the seam, in line with the scale dummy screws. Install screw and blind nut and tighten. Continue working your way down installing screws after each hole is drilled to maintain proper alignment. Remove the cowl. On the inside of the fuse, scuff the area around the holes you just drilled. The blind nuts are install to the fuse with the flat part of the nut against the fuse. The blind nut is held in place with fiber reinforced epoxy built up around the nut. Install the cowl and tighten all screws. Apply epoxy as shown in the photo and allow glue to cure. Use photo below as a guide to cut out the hole in the front of the cowl, the cooling holes and exhaust holes if necessary. Leave about 3/8" (10mm) around the outside for support.
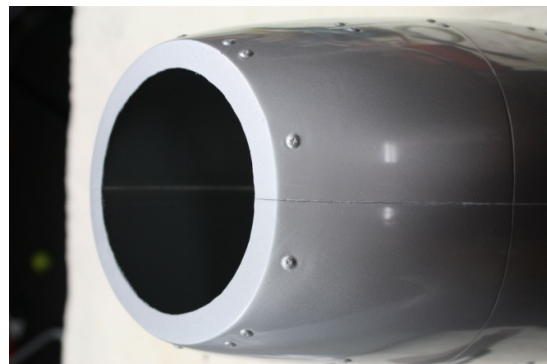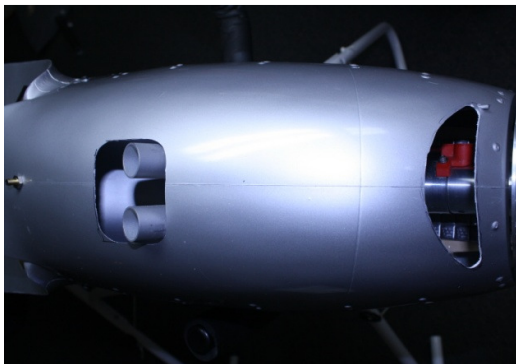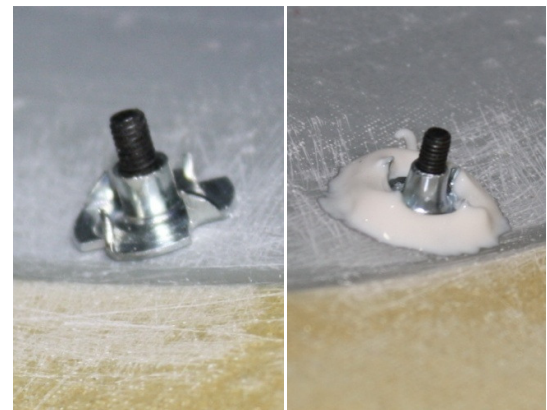
Firewall and Engine Installation

There are many engines and exhaust combination that will work in the Spitfire, including a soon available canister system for the DA 85. This is intended as a guide and the measurements for your engine may differ The engine we will install in our prototype is a DA 50 with a pitt's style muffler and will provide very scale performance. **NOTE**, If you intend to use a canister exhaust be sure cutout cooling holes in the fuse for air to exit.

The plywood firewall is precut and ready to install. Scuff the back side of the plywood and the nose of the fuse with 50 grit sandpaper. Use a slow drying epoxy or laminating resin to glue firewall in place. Tape and allow to cure.

The seam in the fuse will provide us with the vertical center line. Mark this onto the firewall, To find the horizontal center line, use a straight edge on top of the fuse and measure down 80 mm. Use a square from the vertical line to transfer the horizontal line to the firewall. This is the exact center point and measurements for the engine mounting holes will be made from these lines. Your engine manufacturer may have a template you can use to easily mark your bolt hole positions, if not this is can be done with a few measurements. Measure the distance of your engine mounting holes from center to center. Using the photo as a guide transfer the measurement to the firewall.
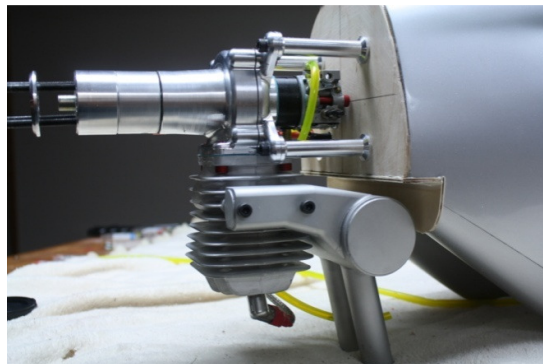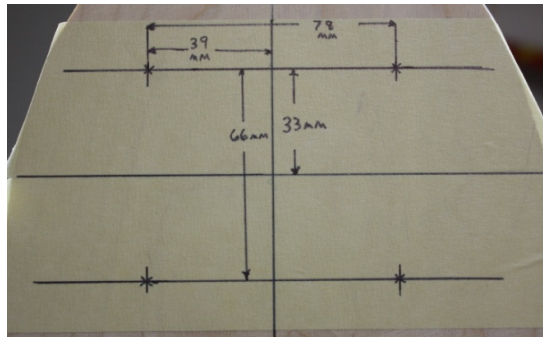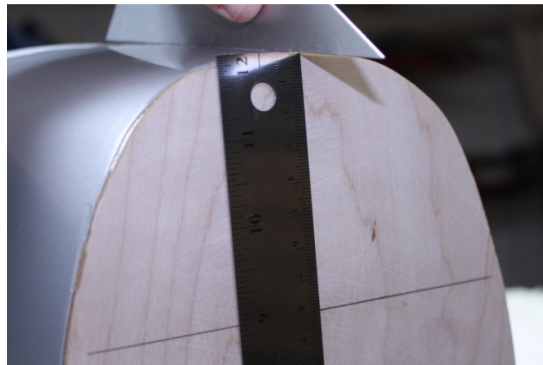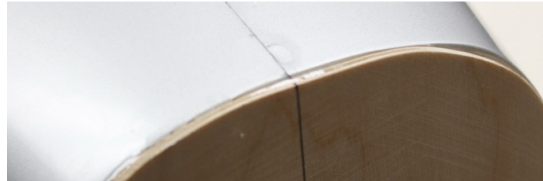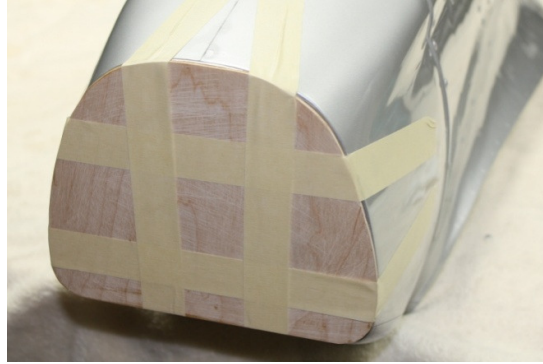
## Horizontal Stab Installation

The horizontal stab will be install using a slow setting, fiber reinforced epoxy. Start by test fitting the stab into the fuse. The stab is installed by sliding it in from the side, not the back and without the elevators installed. Install a ball link into the elevator control horn, and then mount the elevator onto the stab with the 1mm wire provided. The control horn will center the stab in the fuse as shown in the photo. A measurement will be taken from the center seam of the fuse, at a panel line to the tip of the stab which will insure the stab is perpendicular to the fuse. Compare the measurement from side to side moving the front of the stab until both sides are equal. With the stab in position, apply tape to the stab around the fillet making alignment easer when gluing the stab in later. Install the wing. This will help us to check the horizontal alignment. Looking at the plane from the rear, make sure the stab is parallel with the wing. Once satisfied with the fit, remove the stab. Using the tape as a guide, scuff the area of the stab that will be glued to the fillet. Also, scuff the inside of the fillet

The stab can now be installed and glued in. With the stab installed, slide it rearward about 1inch. This will expose the glue area of the stab. (see photos on next page) We would recommend a slow setting epoxy here to allow plenty of working time. Apply glue to the stab and to the areas of the fuse you have access to. *continued,*
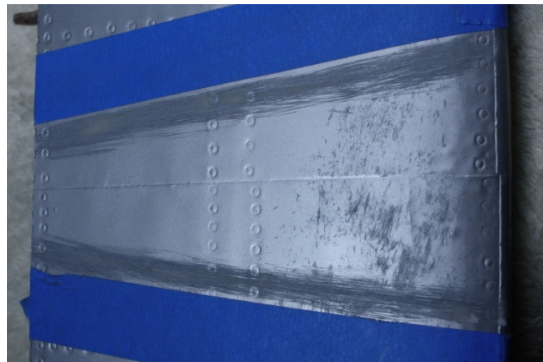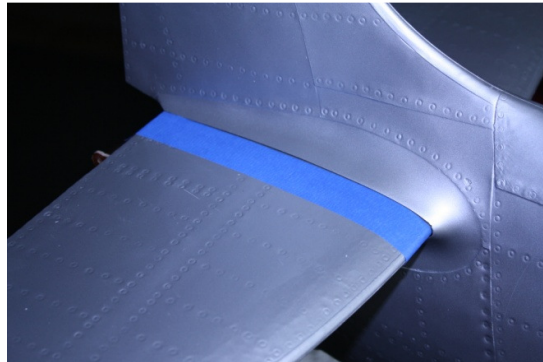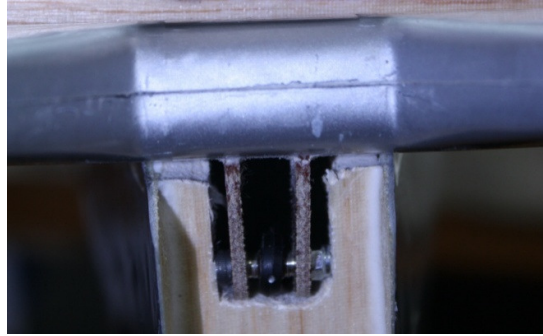
Horizontal Stab Installation continued

Slide the stab back into position and recheck all measurements, then tape into position. A small fillet of glue on the inside of the fuse is recommended for a stronger bond. We use a small syringe with a piece of brass tubing attached to apply glue to the inside of the fuse.
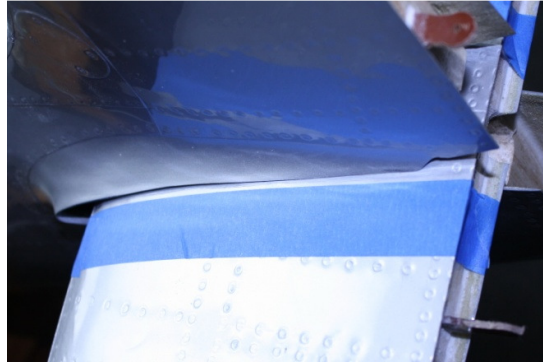
Control surface/servo installation

Before we install the control surfaces, we need to install the tail servo tray. The servo tray is installed right behind the rear wing mount support, about 4"(101mm) down from the rear wing saddle. Scuff the contact area of the fuse and the edge of the mount. Spot tack in place with CA, then glue in place with a bead of reinforced epoxy. After the glue cures, install the servos as shown in the photo. Note that the elevator servo is installed from the bottom to allow room for the rudder servo arm to clear. We now need to construct the elevator push rod. The push rod is made up from a one meter long carbon rod included in your kit. You may need to cut the rod to length so test fit it before you proceed. Start by drilling a 3mm hole in the carbon rod about 5/8" from the end. Drill slowly as not to crack the rod. *Continued*
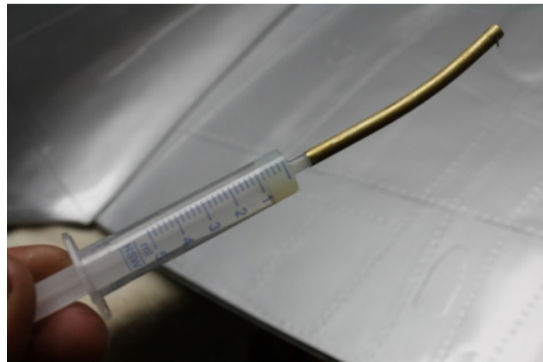
Control surface/servo installation cont.

Take a two inch piece of 3mm threaded rod and bend the end as shown. Scuff the last one inch of the rod on both the inside and outside. Insert the 3mm rod and tack glue with CA to hold it centered in the carbon rod. We wrapped the last one inch of our rod with thread soaking it with thin CA for extra reinforcement. Reinforced epoxy should be worked in to the end of the tube with a T-pin working your way around the 3mm rod. Be sure to clean off the excess glue from the threaded rod.

Once the glue has cured, install a 3mm ball link onto the threaded rod. Bolt the ball link to the elevator with a 3mm screw and lock nut. Now the elevator can be installed. Insert the control rod through the hole in the rear and guide up to the servo while aligning the elevator. The elevator is hinged with a 1mm rod cut to length. Guide the rod through the elevator and the holes in the hinges. The rod can be held in place with a small dab of epoxy. Should you need to remove the elevator later you can just grind out the epoxy. With the elevator installed, you can now hook up the elevator servo using a ball link bolted to a servo arm. After the elevator is installed we can install the rudder.

NOTE: Use a piece of scrap plywood to make a support for the elevator pushrod about half way back and mount it to the fuse.

The only work required to the rudder is the installation of the control horns.
*Continued*
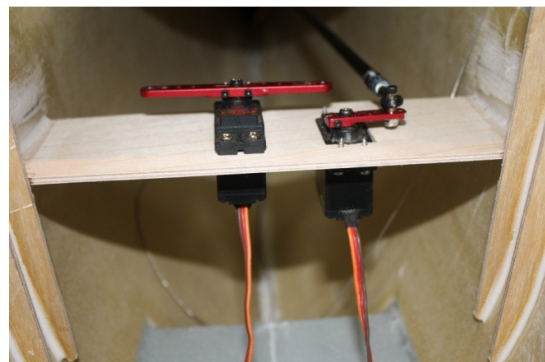
**Control surface/servo installation cont.**

You must first mill the holes in the rudder. Measure up from the bottom of the rudder 2 3/8" (60mm) and back from the front 3/4" (19mm) This will be the front lower point of the slot. The slot will be parallel with the horizontal panel line on the rudder. Mark back from this point 5/8" (16mm) and up 1/8" (3mm). The slot will go all the way through the rudder. With the slot milled, we can fit the control horns. Slowly trim the control horns until they protrude from the rudder 5/8" (16mm) The controls horns should touch together in the center of the rudder. The rear of the horn will be trimmed so the control horn can angle forward slightly. Check proper alignment by viewing from the front and bottom of the rudder. When happy with the fit, glue the horns in with fiber reinforced epoxy and allow to cure.

We can now install the rudder. The rudder is held in place using the same method as the elevator. After the rudder is installed we can run our pull-pull cables. On our prototype we ran the wires directly to the rudder without the use of a clevis for a more scale appearance. Keep in mind if you do it this way the cables will need replacement if you need to remove the rudder. The holes for the pull cables will be aligned with the control horns 3"(76mm) from the front of the horn. Mark and drill an 1/8"(3mm) hole in the fuse at this location. With a small file, slowly work the hole into a slot in the fuse. (see photo). *Continued*
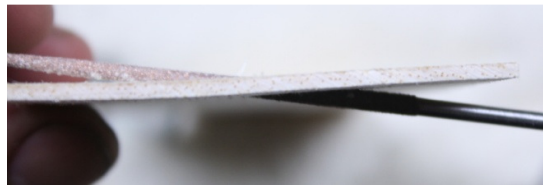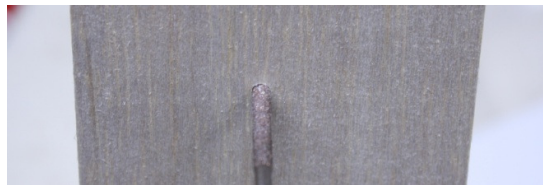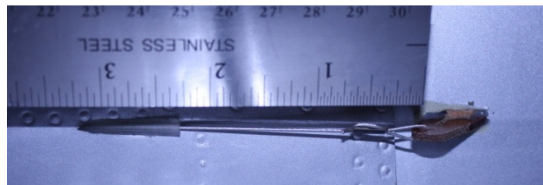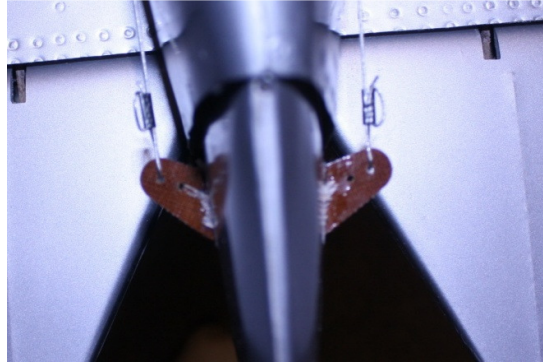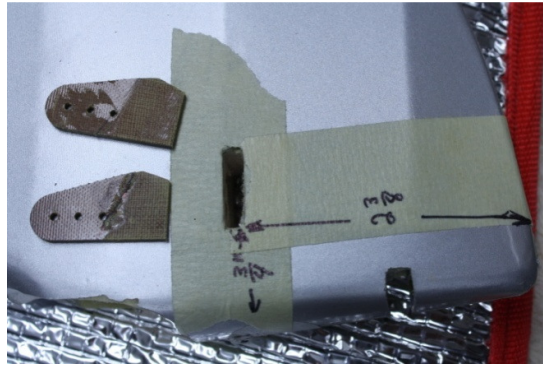
Control surface/servo installation cont.

A piece of 1/8"(3mm) plastic tube can be used as a cable guide. Glue the tube to the fuse and run the cable. Use two tension adjusters to attach the cables to the servo control arm. Note we are using the inside holes for the cables. The two springs in the photo are used to control our tail wheel assembly.
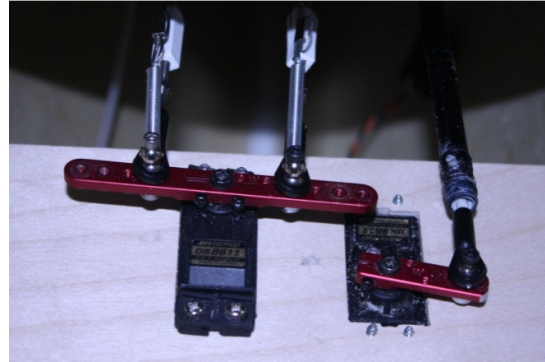
Wing assembly (Landing Gear)

We'll start with the installation of the landing gear. Please note our proto type did not have the wheel wells pre-installed at the time this manual was written. Assemble of the strut requires only installation of the wheel. Temporarily install the axle into the wheel and onto the strut. It may be necessary to install some spacers for proper wheel clearance. Once satisfied mark the axle, remove and cut to length. Grind a flat spot on the axle for the set screw and re-install. The strut can now be installed into the retract mechanism. Wheel alignment can be done with the wings Installed on the fuse.
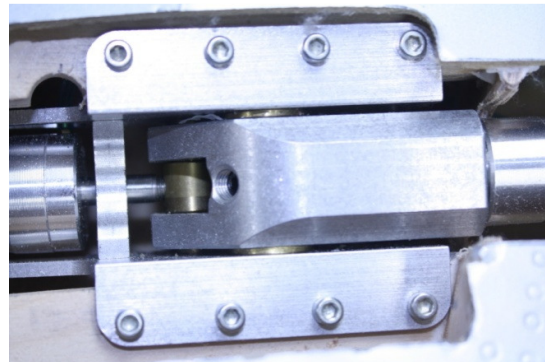
The mounts are pre-installed and only require drilling the holes for the retract unit. It may also be necessary to remove a small amount of material from the former to allow clearance for the strut. Note the small cutout in the LG mount right behind the retract to allow the air line to pass. The mechanism is mounted as far outboard as it will go in the hole. When satisfied with the fit, mount the retract unit with 8, 6-32 wood or sheet metal screws.

Wing assembly (Strut Covers)

The strut covers were not available at the time this manual was written. These instructions will help with the installation of your covers. The landing gear comes with four brackets that will be used to attach the cover. NOTE the lower gear door bracket needs to be installed over the lower strut retaining pin to hold it in place or the pin will fall out Temporally install the brackets on the strut and install the landing gear into the wing in the fully retracted position. Use a straight edge across the opening in the wing for the strut. Take a measurement from the straight edge to the mounting bracket. This will be the size of the spacers needed to mount the cover. Use the photos as a guide to help you understand this procedure. We used brass tubing for our spacers. Start with the spacers a little on the long side and sand to the correct length for a good fit of the cover.
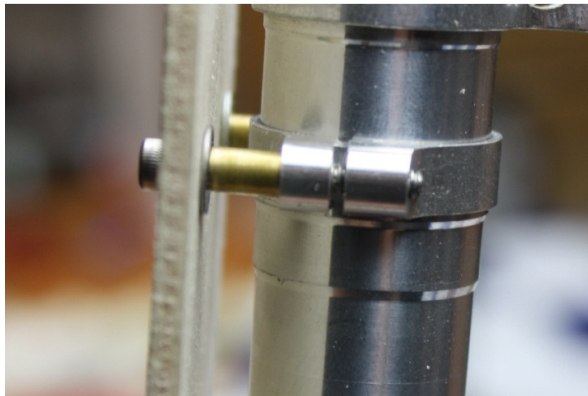
Wing assembly (Servo mounts)

Do not change the order of the following steps. The flaps and ailerons are pre-hinges at the factory and only the servos and control horns need to be installed to complete. Let's start with the assembly of the servo mounts. Please take care to scuff all mating areas that will be glued and use only a fiber reinforced epoxy. Failure of a glue joint here is not an option. Use the top photo as a guide to identify the parts. The lower part (right) will be assembled and glued to the top of the wing. The upper part (left) will be mounted to the lower part using two 3mm screws and blind nuts.

The lower part is made up from two pre-cut parts and two strips that we will cut from a piece of 1/8" (3mm) X 1/2" (13mm) plywood. Install the two blind nuts as shown in the photo. Glue together the two pre-cut parts and the two side strips and clamp. Assemble the upper mount by tack gluing the parts together with CA and then applying a bead of epoxy to all joints as shown.
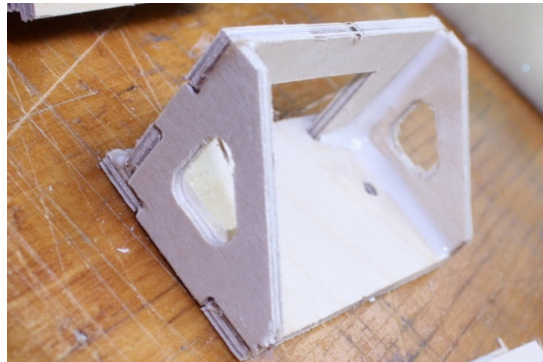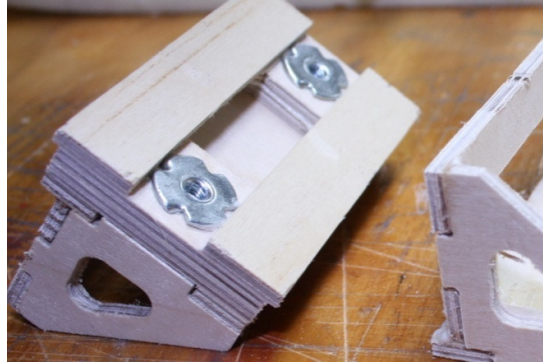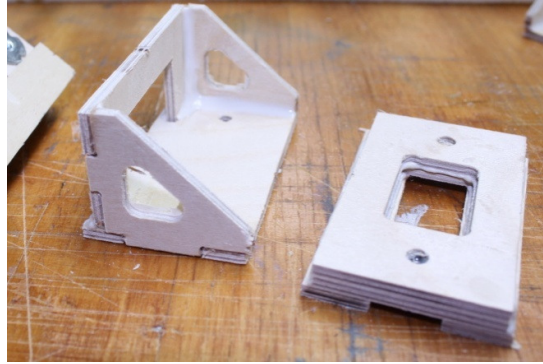
Wing assembly (control horns)

The control horns will be installed next as they are used as a guide for servo installation. Apply masking tape to the inboard, bottom side of the aileron Make a line 1"(25mm) in from the inboard end of the aileron. From the aft edge of the aileron, measure up 4 1/8" (105mm). This will be the forward inside point of the hole for our control horn. From here measure in 1/8"(3mm) and back 5/8"(16mm). Use a dremel to mill out the hole using care not to go through the aileron.
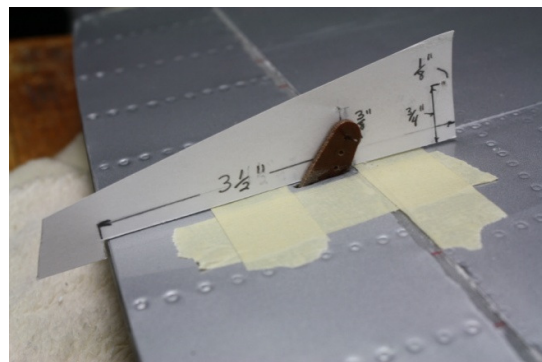*Continued*
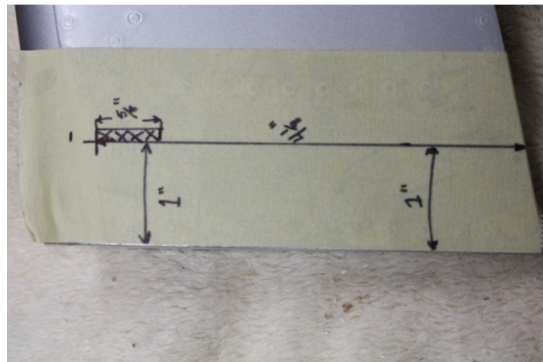
Wing assembly (Control horns)Cont.

Using a piece of card stock we'll make up a jig to align the aileron control horn. Use the photo as a guide. Measure back from the front 4 1/2"(114mm) and make a notch as shown. From the same edge measure back 1/8"(3mm) and up from the bottom 3/4"(19mm). This will be the location of the outer hole in the control horn. Push a T-pin through the paper at this location. Be sure to keep the jig on the line you made earlier or the control horn alignment will not be correct. Adjust the hole in the wing or the length of the horn if necessary for proper alignment. Be sure to have at least a 1/2"(13mm) of control horn in the aileron. When satisfied, scuff the horn and glue in with reinforced epoxy.
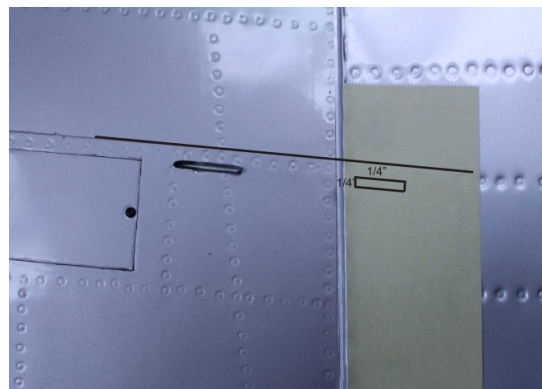
Next we can do the flap control horn. Note that the control horn is parallel to the panel line on the wing, not the hinge line for the flap. Also note the panel line is 8 1/4"(209mm) from the aileron. Transfer the panel line to the flap as shown in the photo. The hole for the control horn will be 1/4"(6mm)from this line and 1/4"(6mm) from the hinge line. Mark for the cutout as shown in the photo. The cut out is 5/8"(16)mm by 1/8"(3mm). We'll use the jig made for the aileron control horns and remark it for the flap horn as shown. Measure from the notch 3 1/2(89mm) forward and up 3/8"(10mm) and insert T-pin which will be the outer hole in the flap horn. Make a mark on the control horn at the surface of the flap. Use as a guide to cut the control horn to length. There should be a 1/4"(7mm) left inside the flap for gluing.
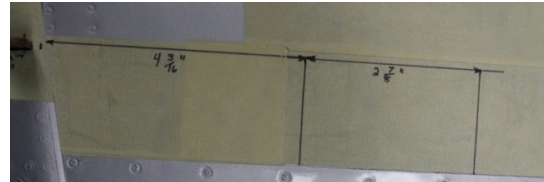*Continued*

Wing assembly (Control horns)Cont.

Tack glue the flap control horn in place with CA and final glue with a bead of epoxy on both the inside and outside of the flap.
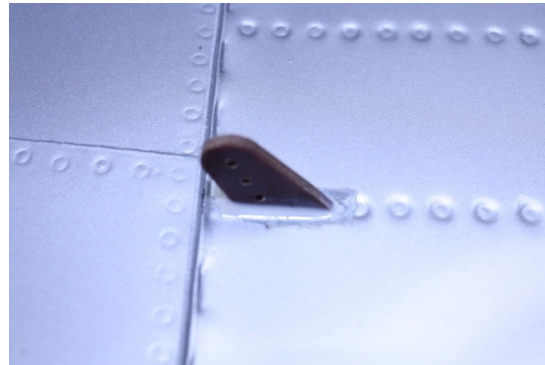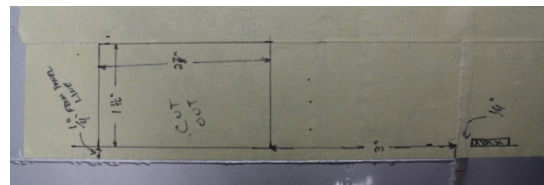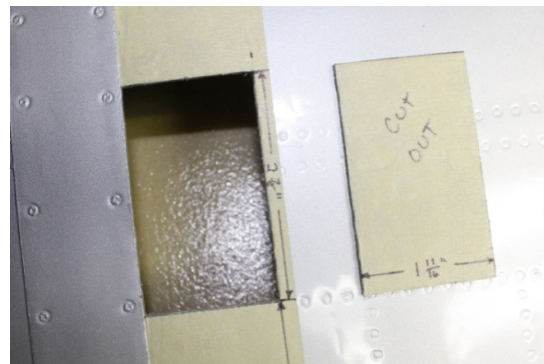
Wing assembly (servo pockets)

We now can mark and cut out the holes for the servos. Let's start with the aileron. Apply masking tape to the wing and transfer the line made earlier for the control horn as shown. This will be the edge of our pocket. Measure from the aileron cutout in the wing 4 3/16" (106mm) forward. This will be the back edge of our pocket. From here, mark the forward line 2 7/8"(73mm) The width of the hole will be 1 11/16" (43mm). Use an Xacto knife to cut out the hole. Many light passes with the knife will result in a very clean cutout.

The flap servo hole will be the same size. Use the photo as a guide to locate the hole Apply masking tape to the wing. Mark a line 1/4"(6mm) from the panel line directly in front of the flap control horn as shown. This will be the edge of our pocket. From the flap hinge line, measure up 3"(76)mm. This will be the back edge of our pocket. Measure and mark the remaining lines and cutout.

Wing assembly (servo installation)

We will use the holes just cut as a guide for the servo location. A 1/2"(13mm) servo arm is all that's required for the ailerons. Mount the servo arm to the servo and mount the servo to the servo mount, then mount to the lower section. Use the photo as a guide for servo orientation,note the output shaft is in the rearward position.
Continued

Aileron cutout marks shown above

Flap cutout marks shown above

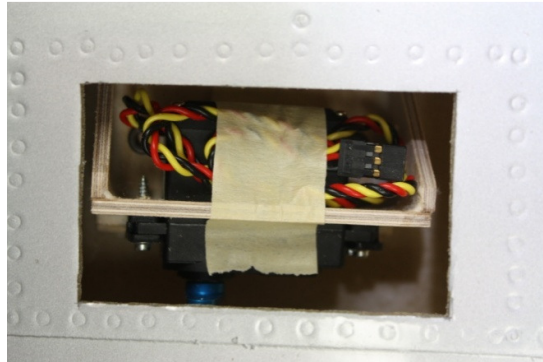**Wing assembly (Servo installation)Cont.**

The servo will be centered fore and aft in the hole, The servo arm will line up with edge of the pocket as shown. Scuff the top of the wing where the servo will be glued. Tape the servo lead to the servo so you do not get glue on it. and glue into position. Use only fiber reinforced epoxy here. Once the glue has cured we can cut the hole for the push rod

Use the photo as a guide to locate the position of the push rod exit. We'll do the aileron first. Mark two lines from either side of the control horn to the servo arm. Measure back from the servo pocket 7/8"(22mm). This is the front of our hole. Measure back from here 1 3/8"(35mm). Cut out slot for the control rod. Use the 3mm threaded rod supplied in the kit for the push rod with 3mm clevises as shown. Note the small relief on the wing, in front of the control horn for additional aileron throw.

Use the same method for the flap control rod with the following measurements. From the servo pocket back, measure 1/2"(13mm) to the front of the slot. From here measure back 1"(25mm). Cut out a slot and make control rod as you did for the aileron.

We can now trim out the pockets for installation of the cover. Use two 3/8" (10mm)strips of either 1/32" plywood or poly ply along the sides of the pockets. Be sure to only have 1/16 (1.5mm) showing in the pocket or you will not be able to remove the servo. Apply a small piece to the front of the cover as shown.
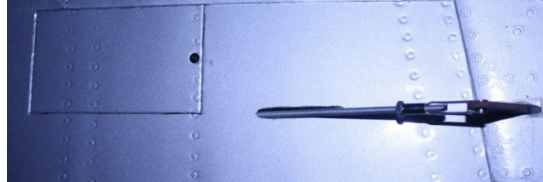
Aileron shown above

Continued
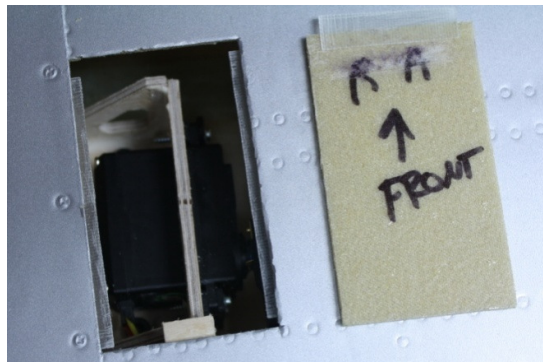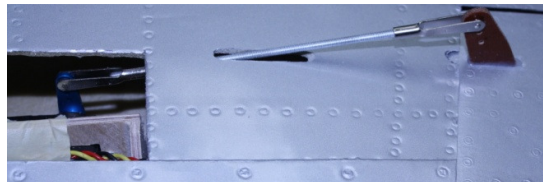
Wing assembly (Servo installation)Cont.

Use a 1/2'(13mm) square piece of 1/8" (23mm) at the rear of the pocket to screw down the cover

Wing assembly (Pocket reinforcement)

Do not skip this step, it is necessary to reinforce the servo pocket or flutter of the control surfaces will occur. Using 1/4"(6mm) balsa make up the reinforcements as shown. Be sure the grain of the balsa runs from the top skin to the bottom. Use photo as a guide to locate balsa blocks. Measurements are shown in the photos as a starting point. Light sanding of the block may be required for a good fit. Once the blocks are fit scuff the wings and glue in place.
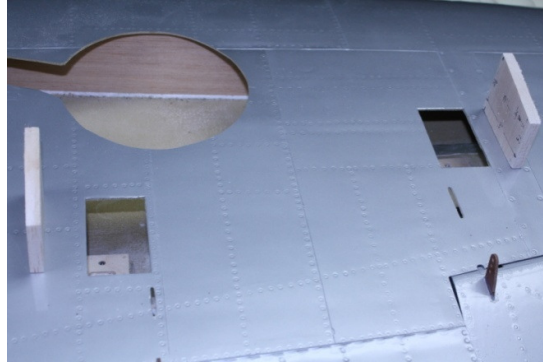
On the top side of the wing, 2 1/2" (63MM) in front of the spar tube we need to make an exit hole for the wires and air lines. It's best to split the hole between the top and side to make installing the wing easier. See photos below
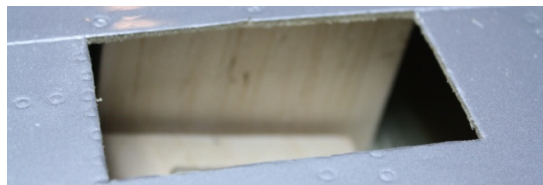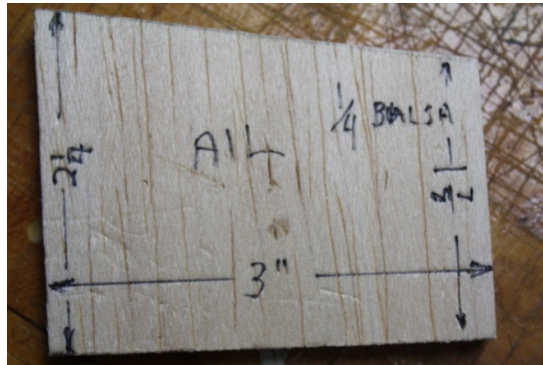
Wing assembly (Aileron installation)

The aileron is held in place with a 1mm rod. Make a Z bend in the end of the rod as shown in photo. Working through the opening under the flap, use a small bead of epoxy to glue the pin to the top of the wing.
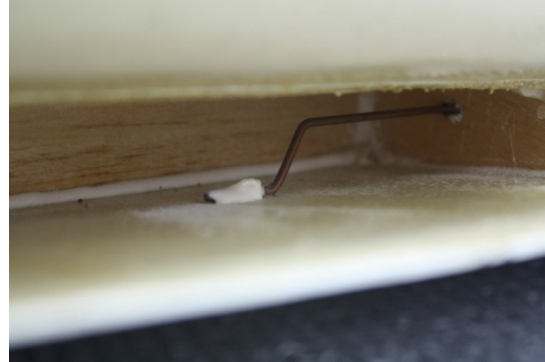
Tail wheel Installation

CARF offers a lightweight composite tail wheel assembly. A few photos are included to aid in installation of this unit. We chose an optional steerable tail wheel for our prototype. An access hole needs to be cut in the rear for installation of the tail wheel. Care must be taken to reinforce the rear of the fuse after cutting the hole. An 1/8 piece of plywood will need to be cut to fit in the location shown and will be attached to two hardwood rails glued to the side of the fuse. See photos below for details
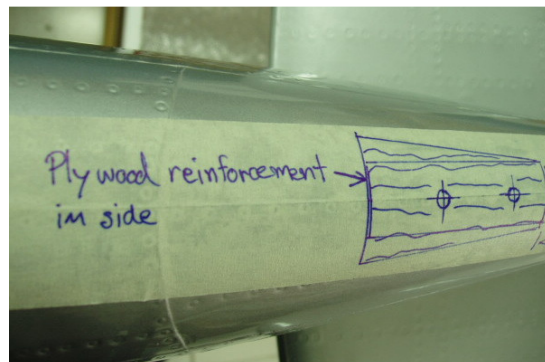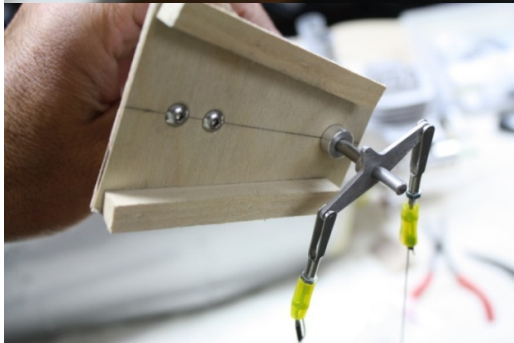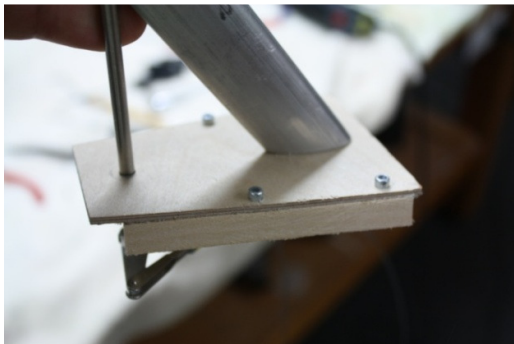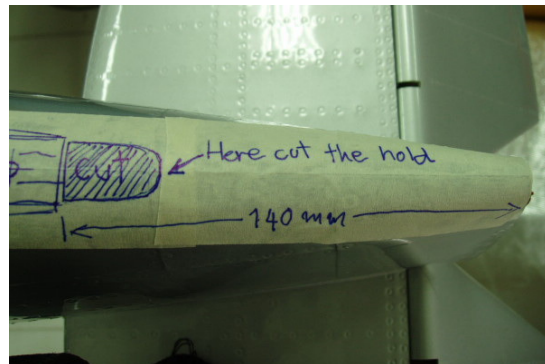
Finishing Up

On the left side of the fuse, right under the canopy is an outline of the door used to enter the plane. We decided to hinge and use it as a place to hide the switches and other miscellaneous service components. A small piece of music wire is run through the fuse and out the bottom to hold the door closed.

As with most scale airplane, and depending on your engine and equipment choice. Your spitfire will most likely require some nose weight. Since we decided to use a light weight Da-50 and the heaver steerable tail wheel in our prototype, we had to add about 4 lbs. The photo to the right shows a mount we made up to get the weight as far forward as possible Even with this weight we came out at only 30lbs.

We made two equipment trays out of scrap 1\8" (3mm) light plywood. Make sure the fuel tank is centered or ahead of the CG line. We centered ours and it seems to work fine. Your equipment install may differ depending on the engine and exhaust you choose.
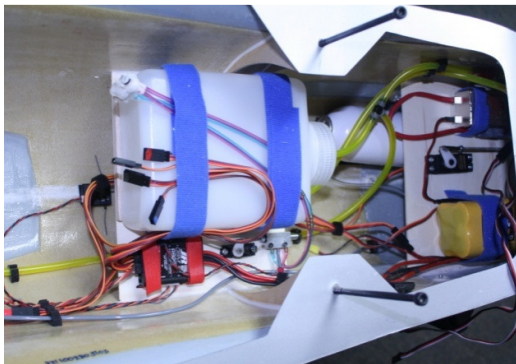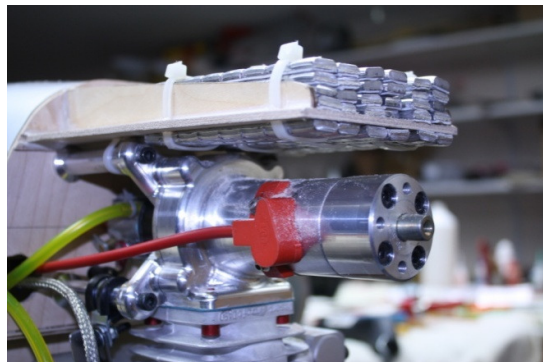
Set-up and flying your Spitfire,

CG

The Spitfire will be balanced inverted using the panel line on the top of the wing that runs from tip to tip. This is the exact balance point for the Spitfire and the CG should not vary from this line.

Control throws

We set up the ailerons and rudder on our proto-type for maximum throw with about 30 percent expo for the first flights. The Spitfire requires very little elevator. Measuring from the trailing edge of the elevator, we had about 1/2"(13mm) of throw on our low rate setting and 1"(25mm) on high rate. We found the low rate setting to be more than enough. The flaps on the full scale Spitfire are used only for landing with 85 degrees of throw. We setup ours the same.

Flying your spitfire

We found our proto type with a DA 50 has more than enough power and is very easy to fly The tail of the Spitfire will start flying very soon after it starts moving, Do not assume this means that it is ready to fly. Allow the plane to continue to build speed until it lifts off. Flaps are not required for take-off. We found our Spitfire to be very predictable and to have no tendency to stall. A small amount of elevator trim will be required with the flaps down. Do not stop flying the Spitfire until the tail wheel is back on the ground, doing so may allow the plane to nose over and the prop may hit the ground.