Fei Bao MB–339 Instructions

DISCLAIMER

T**HIS IS NOT A TOY**. This is a high-performance miniature aircraft, capable of high speeds and damage to life, limb, and property. The manufacturer and its distributors cannot control how you assemble this model, what equipment you use to fit it out, or how you fly it, and can assume no liability whatsoever for any damages that may occur when you fly your aircraft. By assembling this model, you are agreeing to indemnify and hold blameless the manufacturer and/or his agents from any and all torts and liability associated with the use of this product. Please inspect all parts before beginning assembly. If any parts appear to be suspect, contact your dealer or the manufacturer for repair or replacement BEFORE you begin. Once you have assembled the aircraft, you are the pilot in command and assume any and all responsibility for the use of the model and any damages that might occur by flying or attempting to fly this aircraft. R/C model jets require a high level of skill in both their assembly and their flying. If you do not feel confident in either your building or flying skills, PLEASE seek assistance from more experienced modelers. It is a wise idea, no matter what level of skills you possess, to have a second experienced modeler go over your installation after assembly. A second set of eyes may spot a problem you have missed. If you have not flown a model like this before, it is HIGHLY recommended that you get an experienced turbine pilot to do your maiden flight. Very often, the first few seconds of a maiden flight are critical until the aircraft is trimmed out, and having an experienced pilot at the controls can make the difference between a wrecked aircraft and once that enjoys many hundreds of flights. Be sure to select a suitable field for flying...take the time to find a large paved runway if at all possible, especially for test flights, until you feel comfortable getting the aircraft in and out of smaller grass fields.

Before you begin

Keep this in mind as you proceed:
Look at EVERY assembly step you finish, and ask yourself:
"Is this going to crash my airplane?"
A chain is only as strong as its weakest link, and this is a high-performance aircraft that will be very intolerant of sloppy assembly techniques. Even the smallest component is important and can cause the loss of your airplane, so take the time to do things right. Or REdo them if they are wrong. Careful work will result in a long-lasting plane that gives you years of pleasure, one loose component could result in the complete loss of the aircraft and all the components inside it, and someone can even get hurt. So pause every once in a while when building it and double-check your workmanship.

Introduction

You have chosen a model that represents the pinnacle of ARF technology. While there is not a lot of building to do, there is enough to keep you busy for a few evenings.
Even if you have assembled maybe other ARF jets, we highly recommend following our assembly sequence and procedures anyway. Chances are it will save you a lot of time, prevent you from running down dead ends, and perhaps remind you of a few small things that might end up saving your aircraft.

We have tried to arrange a construction sequence that will allow you to keep moving forward, rather than standing around waiting for glue to dry before you can proceed to the next step.
Just because the model is almost completely built does not mean you can rush through the final assembly.

You need to employ fine craftsmanship every step of the way,

turbine models are critical. Keep this in mind with everything you do, every part you install...look at the work you just did, evaluate it critically, and ask yourself "is this going to potentially crash my airplane?" If there is any doubt about the work you have done, back up, and re-do it properly.

Adhesives

The correct adhesive to use for all procedures is Loctite Hysol 9462. This is a very strong white epoxy that is thixotropic. "Thixotropic" means it does not run at all, but stays only where you put it. It is infinitely superior to regular epoxy, even slow-setting epoxy, for our purposes, because of this characteristic. Regular epoxy will run downhill with gravity as it dries, taking it away from where it is supposed to be. A good example is in the hinges...using regular epoxy, a good portion of the glue will migrate down away from the hinge into the inside of the wing as it dries, and you won't even know it is happening. Hysol stays where you put it. The downside of Hysol is it takes overnight to dry properly, but we have tried to arrange things to keep you busy while waiting for glue to dry.

We also highly recommend that you only use a proper Hysol dispensing gun, and only the long-type mixing nozzles.
The short nozzles do not mix this glue enough, and only a thin nozzle and gun will let you fill the hinge and control horn holes properly with glue, you can't do it mixing your Hysol on a flat surface and trying to get the glue in the proper place by a brush or stick.
You can buy a complete Hysol setup with a gun, nozzles, and two cartridges of glue from your dealer for approximately $60.
Consider it a great investment, the glue is the best you will use.
One cartridge is plenty to assemble your MB339.

Working with pneumatic systems

The MB339 uses pneumatic brakes and retracts. If you follow a few tips, you should have very reliable, leak-free operation. Neatness counts. All airlines should be secured to the airframe to keep them from flopping around or getting kinked. Use tie wraps for this.
The other very important thing is to cut off the end of each airline dead square before installing it on the nipple. This is VITAL. You can either purchase a professional tubing cutter from your dealer (they are approximately $10), or you can make up a little jig to hold the airline and keep a sharp, new razor blade perfectly upright as you cut. Either one works, just ensure that all ends of all airlines are cut off dead square. Make sure all airlines are pushed ALL THE WAY onto their nipples. They should not need to be secured otherwise, but you can add fine wire safety wraps if you like. Make sure all left and right matching airlines are the same length, particularly the brake lines, or you will get uneven retraction or braking action.
It's worth taking the time to get everything pneumatic right the first time, as having your landing gear fail to retract is not THAT bad, but having it fail to deploy can really ruin you day and the paint on the bottom of your model.

Construction

Preliminary steps

- Clean and inspect all parts. Inventory them against the parts list at the end of the manual and notify the kit supplier of any missing components as soon as possible.
- If the paint scheme you have selected is glossy, it is recommended that you apply a coat of wax. This will help resist dirt, stains and fingerprints during construction, and will provide some limited protection against errant glue.
- Vacuum out the remnants of packing materials that remain in the fuselage.

While the kit is comprehensive, there are additional parts required, as follows:

- Recommended Servo List (JR)
  - Elevators: (2) 8611a
  - Aileron: (2) 8611a
  - Flaps: (2) 8611a
  - Rudder: (1) 8411
  - Nose Steering: (1) 8611a
  - Retracts: depends on retract and door solution selected
  - Speed Brake: (1) 351 or equivalent
  - Brakes: (1) 351 or equivalent, or an electronic brake unit
- Other Parts
  - BVM UAT (optional)
  - Fuel tank vent fitting
  - Festo fuel shutoff valve
  - Wire twist tie (optional)
  - Blue Loctite
  - Glues: Thin CA, 5 minute epoxy, 30 minute epoxy, Aeropoxy, Zap-a-Dap-a-Goo
  - Electronic gear sequencer, or UP2/UP4 combination
  - Brake valve
  - Batteries, regulator and switch
  - Matchboxes, Powerbox, Smartfly EQ10 or equivalent
  - Servo extensions (length may vary, depending on receiver placement)

General Construction Notes

The order of construction may be changed to suit your personal preference, however, the model is more easily worked in a tight space if work is completed on each fuselage section before they are joined. The tail surfaces must be attached before the aft fuse is joined to the forward fuse, as the pipe must be in place during this step and it blocks access for wiring.

The retract system doors operate in two different ways. The main gear doors and the large nose gear door open, the landing gear cycle either up or down, and the doors close again. For this action, you will need two separate valves with a sequencer or an Ultra Precision UP-2 valve. The small doors that bracket the nose wheel strut must remain open when the gear is extended. There are two ways this may be accomplished. The simple approach is to connect the cylinder open line to the gear down line, and the door close line to a pressure switch that is connected to the gear up line and activated by the nose gear steering servo when in the retracted position. This is the method that is shown in these instructions. If you use a UP-2 valve for the larger doors, you can add a UP4 valve to the system for the smaller nose gear doors.

You will likely need to match twin rudder and twin elevator servos. This may be accomplished with servo reversing "Y" harnesses, JR Matchboxes, the Smartfly EQ10, a Champion Powerbox or equivalent gear.

Step 1: Check Forward Fuselage

- ❑ Remove the fuel tanks from the fuselage.
- ❑ Also remove the two forward component boards. Now would be a good time to put a coat of paint on these parts if you would like to protect the wood surfaces.
- ❑ Vacuum and thoroughly clean the fuselage.
- ❑ If the nose gear was installed at the factory with bolts and lock washers, check these for security now.
- ❑ Put a very small dab of thin CA on the three nuts that secure the nose gear door cylinders to the door actuating arms. A small toothpick helps limit the amount of glue applied.
- ❑ Repeat this step for the three nuts that attach the door cylinders to their respective mounting blocks.
- ❑ Check all door hinges for security.
- ❑ Newer kits have carbon fiber reinforcement in the nose section. Older kits will require that this be added. Start adjacent to the intakes and epoxy carbon fiber strips forward to the nose.
- ❑ Run a bead of Aeropoxy down the sides of the three nose formers to reinforce the joint with the fuselage side. See *photo 1.*

photo 1 – optional fuse strengthening

Step 2: Prepping the Fuel System

Disassemble and inspect the tank cap hardware. As *photo 2* shows, the process used to cut the tubes may leave behind a rim that constricts fuel flow and could result in excess tank pressure and leakage. The vent tube to the top of the picture shows what the constriction looks like before repair, while the fuel tube on the lower left shows what the tubing should look like after clean up. If the tubing is not constricted, skip forward to the leak check.

photo 2 – correct tube constriction if necessary

- ❑ Loosen the Philips head screw and remove the stopper assembly from the tank.
- ❑ Use a small, round Perma-Grit rat tail file or an Exacto knife to remove the excess metal. You will need to inspect the ends of all tubes.
- ❑ When finished, make sure to blow out the metal fragments and clean up any sharp edges.
- ❑ While the components are apart, check the Tygon pickup line for equal lengths in both saddle tanks. They should be long enough to reach the back of the tanks without being so long as to restrict their ability to move to the top of the tank when the aircraft is inverted. Allow a small amount of play to allow the tubes to stretch slightly over time.

- You should also notch the vent tube with a small file to provide for continued air flow should the tube come into contact with the top of the tank.
- Make sure the bends to the vent tubes applied at the factory have not restricted airflow to any significant extent. Also, check the Tygon for any nicks or cuts and secure to the tubing with wire ties before re-assembly.
- Reassemble and mark the tank for vent and fuel for later reference.
- Once the tanks are back together, they should be leak checked before installation in the aircraft. Connect extra lengths of fuel tubing to the fuel and vent lines and submerge the tank in water. Pinch off one line and gently pressurize the tank by blowing into the other, looking for signs of air bubbles. If the tank shows evidence of air leakage around the vent cap, tighten the Philips head screw and check again. If you have a stubborn leak, you can re-tap the inner plate for a slight larger 6/32 cap head bolt.

Step 3: Tank Installation

photo 3 – lower foam support

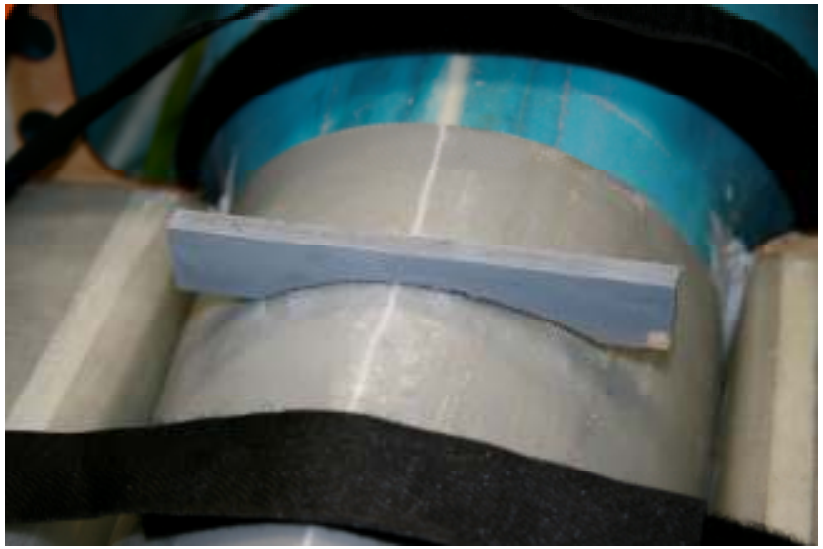
- Re-attach the Tygon tubing to the main saddle tanks. Make sure the lines are of equal length. Exercise care not to break the tanks while fitting the Tygon. Slowly wiggle the tubing into place. Wire tie for security.
- Cut a scrap piece of fairly stiff foam 3″ x 5″ x ½″ and secure to the bottom of the fuse at the rear of the saddle tank bay with a few drops of thin CA (*photo 3*).
- Insert the saddle tanks into position, slipping the Velcro hold-down strap into place as you do.
- Cut another piece of scrap foam 2″ x 3″ x ¾″ and slip it between the saddle tanks at the bottom of the fuse.
- Cut two pieces of scrap foam 2″ x 3″ x 1″ and secure these to the sides of the fuse at the rear upper corner of the tanks with a few drops of CA to provide added support (*photo 4*).

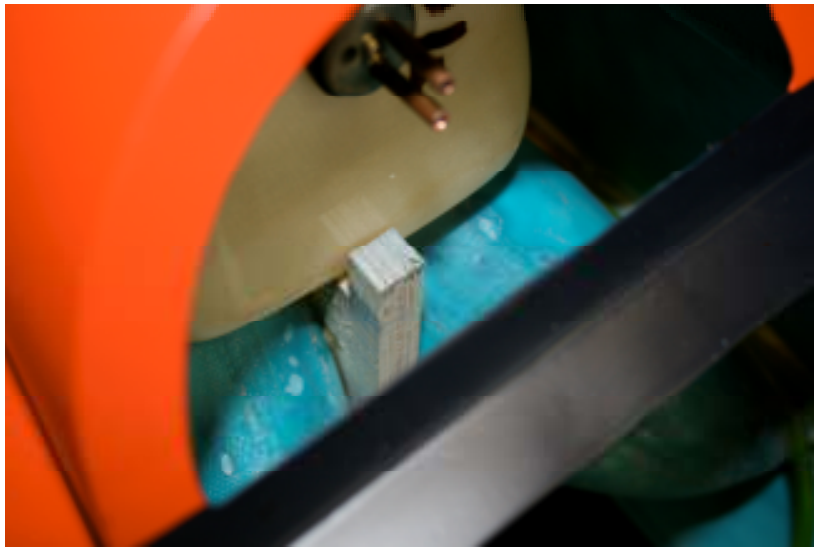
photo 4 – side foam support

You will need to make two center tank supports from scrap ply. The tank needs to sit far enough back from the cockpit for fuel lines to clear the back of the main hatch area. It also needs to incline slightly from rear to front to insure adequate clearance for the engine hatch.

- Temporarily position the lower engine bypass on the mounting rails.
- Slip the intake extension into place and secure with the aft Velcro strap.

- ❑ Position the center tank on top of the intakes, far enough aft of the canopy area to allow clearance for the fuel lines.
- ❑ Fashion a rear tank support from ¼" scrap ply and position it on top of the intake extension. You will need to radius this piece slightly with a Dremel tool to match the incline of the extension tube.





photos 5 and 6 – rear and front center tank supports

- ❑ Check the position of the tank once more with the engine hatch in place. When satisfied, tack glue the tank support in place with a few drops of CA (*photo 5*).
- ❑ Shape a front tank support from scrap ply. The ply piece will be glued between the intakes and should be notched at the top to keep the tank from slipping forward during flight (*photo 6*). Secure with a few drops of CA.

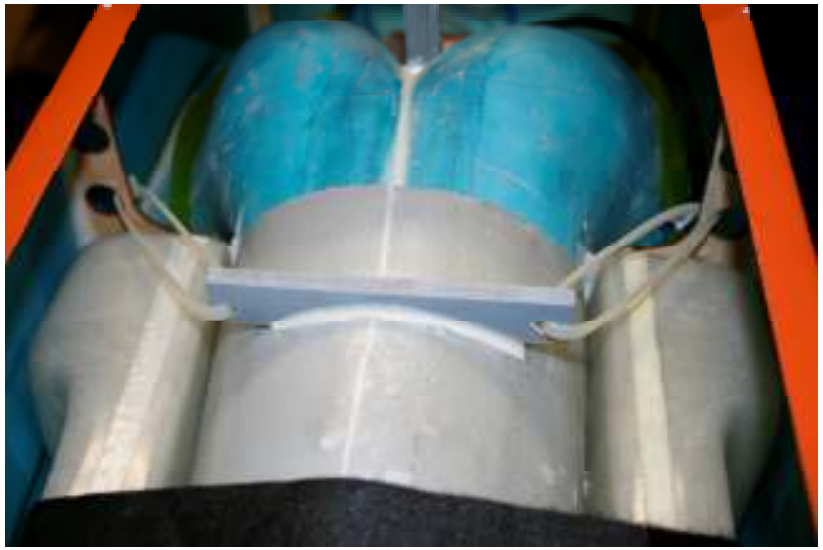
photo 7 – Aeropoxy tanks supports in place

- ❑ Remove the center tank and secure these tanks supports in place with a generous amount of Aeropoxy (*photo 7*).
- ❑ There are various ways to secure the intake in place to keep it from sliding toward the rear of the plane, but the simple way to do it is to attach it to the forward former with wire ties. This makes it immediately removable in the event the saddle tanks must be serviced (*photo 8*).
- ❑ Fashion a rear tank stop from scrap wood and attach it to the intake at this point. Secure with Aeropoxy. Replace the center tank and secure the Velcro hold-down strap. (*photo 9*).

Check the fuel lines for nicks and cuts as you proceed through the next steps.

- ❑ Connect the two fuel pickup lines from the saddle tanks together with a "T" fitting.

- ❑ Connect this "T" fitting to the vent line of the center tank.
- ❑ Connect the two vent lines together from the saddle tanks with a "T" fitting.



photos 8 and 9 – securing intake and rear tank stop

- ❑ Attach this "T" fitting to a fuselage vent fitting. It is suggested you place this just ahead of the right intake, slightly up from the bottom of the fuse. This will prevent "catching" the fitting if you slide the fuselage on a foam transport pad. Reinforce the fuselage with a scrap piece of carbon fiber to add a little strength to this area (*photo 10*).

photos 10 and 11 – vent tube reinforcement and UAT installation

- ❑ Connect the fuel pickup from the center tank to the optional UAT or to the fuel pump. In the prototype, the UAT is located just above the right intake. (*photo 11*).

Step 4: Nose gear

- ❑ Working from inside the aircraft, screw the nose steering servo to the bracket (*photo 12*). Do not use rubber grommets and make sure to use Loctite on the screws. The servo is oriented with the output spindle toward the top of the plane. If your servo has a reinforcing ridge on the mounting tab, you may need to remove it with a razor knife to allow the servo to sit flat.

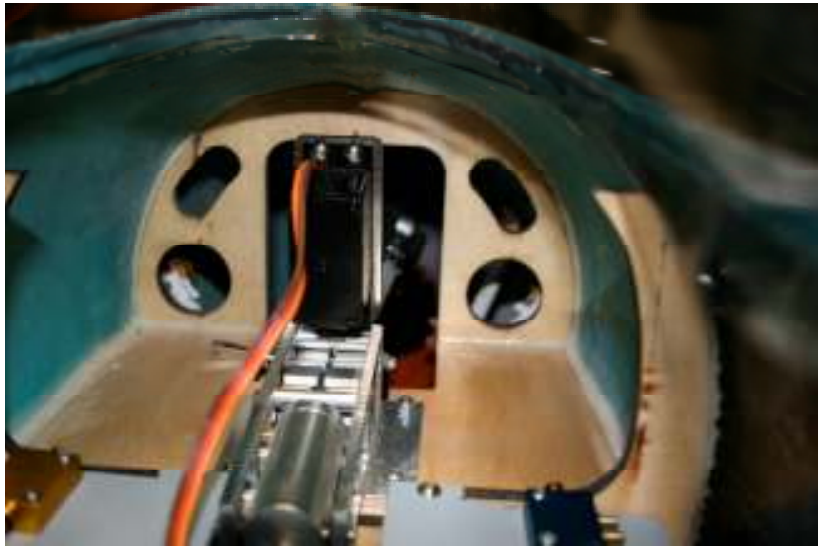


photo 12 – installing nose gear steering servo

- ❑ Lower the gear.
- ❑ Adjust the steering arm clevises until they are approximately the same length, with the servo arm positioned on the servo spindle.
- ❑ Using a Matchmaker or similar device, center the servo and mount the arm. Readjust the clevis if there is any evidence of binding (*photo 13*).
- ❑ When satisfied, use a small drop of thin CA on each clevis to lock it on to the threaded rod.

Step 5: Nose Doors

It will be helpful at this point to locate the positioning of the air system valves. A sample installation is shown in *photo 14.*

photo 13 – nose gear steering linkages

photo 14 – sample layout of air systems on forward component board .. leave room for cockpit above and air tanks below

In the prototype, the larger of the three air tanks serves the gear and doors, while the smaller tanks serve brakes and air brake respectively.

- ❑ Refer to the general construction tips for an explanation on gearing up the air systems.
- ❑ Install three air tanks in the space beneath the forward component board, with the large tank in the middle. Use several dots of a silicone based glue such as Zap-a-Gap-a-Goo. Don't overdo the glue, however, as you may want to remove the tanks in the future and the component board will hold the tanks partially in place in any case.
- ❑ When the glue is dry, run air system lines to the tanks. In the prototype, all air and fuel fill lines are run to the rear hatch so that the cockpit may be left in place while servicing the plane.
- ❑ Lay out the air system components on the forward component board and then bolt the board into place with four small wood screws.
- ❑ Run air lines to the nose gear and nose door cylinders. A little patience and good skills with a forceps will be required. Test each line as you go with a hand pump for leaks. It will also help to follow a color coding scheme for future line identification and trouble shooting.

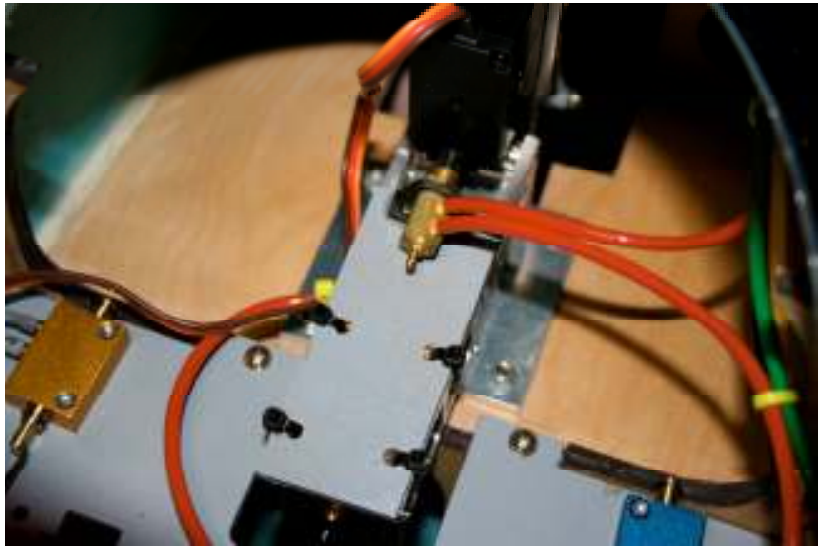


photo 15 – air micro switch to active small nose gear doors

- ❑ As described in the general notes, the twin doors that flank the nose gear strut in the prototype are activated by an air micro switch. Make a small platform of scrap ply and attach the micro switch with a wire tie or a bracket. Push the switch up against the bottom of the steering servo when it is in the retracted position and secure to the top of the retract unit with wire ties (*photo 15*).

Step 6: Vertical Fin and Rudder

Before attaching the aft section of the fuse, the vertical fin and horizontal stabilizers need to be attached and the wires run from the servos. This is because the pipe must be in the aft section when installed, and access to the wiring is restricted once the pipe is in place.

In most kits, the hinges are preinstalled in the control surfaces, but must be glued into the flight surface.

When removing the servo well covers, label appropriately for proper re-installation.

- ❑ Trial fit the rudder into the vertical stab. You may need to snip about 1/8 inch off the bottom hinge as it butts up against the rear aluminum spar. Trim and sand to achieve the maximum throw your servo arm will allow.
- ❑ Attach two aluminum "L" brackets to an 8411 servo or equivalent. Position the brackets such that the spindle of the servo faces forward when installed in the servo well. Do not use the rubber grommets supplied with the servo, but bolt it directly to the brackets. Use Loctite.
- ❑ Using a JR Matchmaker or your receiver, power up the rudder servo and set it at neutral. Attach the control arm at a vertical position.
- ❑ Position the servo on the two ply mounting tabs and attach the "L" bracket with 15mm wood screws.
- ❑ Run the servo wire out of the bottom of the vertical stab.
- ❑ Trial fit the phenolic control arm in the slot routed in the rudder at the factory. You may need to use a small carbide cutter to enlarge the slot slightly for a good fit. Be careful not to route through the other side of the control surface. A small piece of

tape wrapped around the cutter at the proper depth will help prevent a mishap.

- ❑ Roughen the surface of the control arm where it will glue into the rudder with 100 grit sandpaper.
- ❑ Tape around the slot with masking tape and apply a liberal amount of Aeropoxy into the slot (*photo 16*).

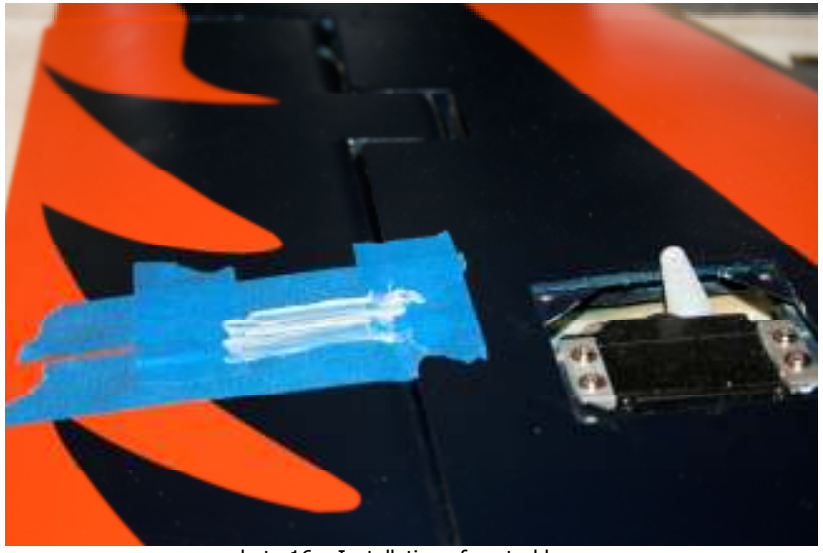


photo 16 – Installation of control horns

- ❑ Secure the hinges into the vertical stab and the control horn into the rudder with Aeropoxy. Remove the masking tape and allow to dry overnight. Make sure to check the vertical stab for any glue marks or fingerprints before setting it aside.
- ❑ Locate two 15mm bolts and large washers. Trial fit these in the vertical stab mounting posts.
- ❑ Insert the vertical stab into the aft section of the fuselage and secure with the two bolts.
- ❑ Install a servo extension of the proper length to reach your receiver and secure the connection with a large piece of heat shrink or tape.

Step 7: Horizontal Stabilizers

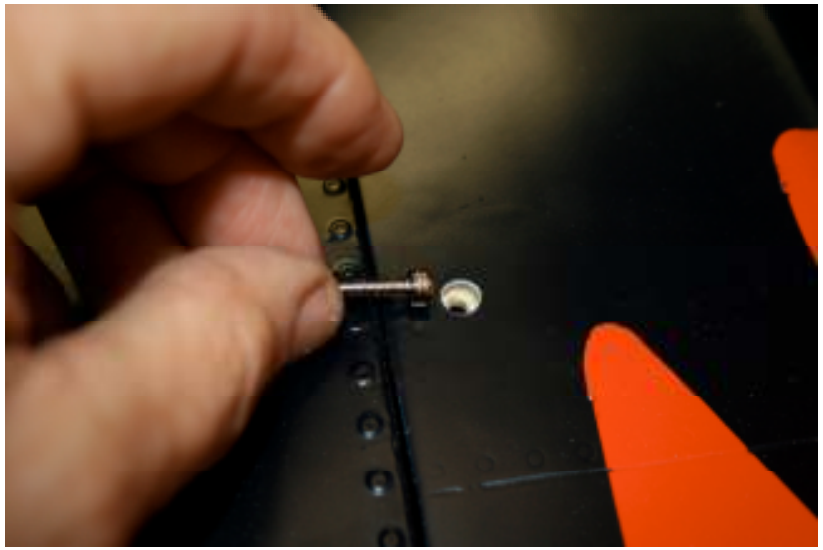
- ❑ The horizontal stabs build up in a similar fashion to the vertical stab. Repeat all steps, including the installation of the servos, elevator hinges and control horn.
- ❑ Before installing the servos, use a Matchmaker or equivalent to center the servos and match the positions of the control arms. If you are using JR Heavy Duty Arms and the positions don't match, try rotating one arm 180 degrees before deciding which half of the arm to trim off.
- ❑ If you are installing 8611 servos, you will need to trim the ply mounting tabs and metal arms to get a good fit (*photo 17*).

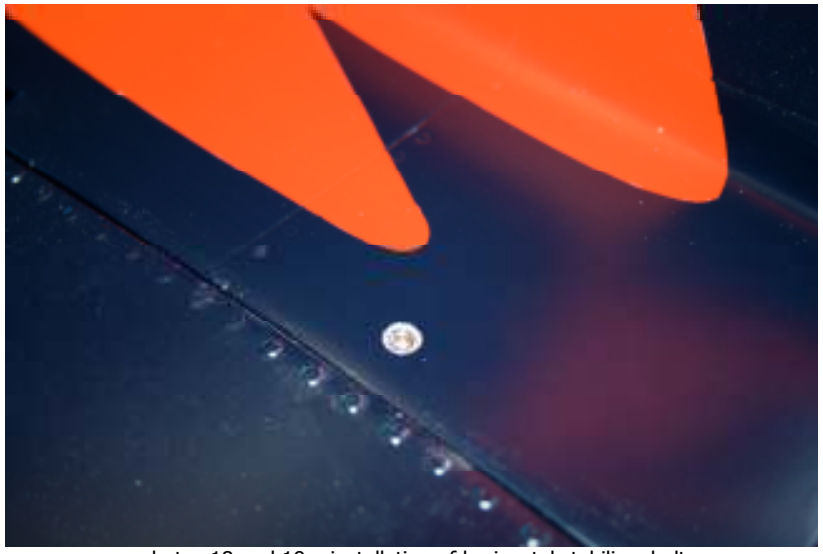
photo 17 – elevator servo installation

- ❑ You can make the horizontal stabs easier to remove if you install the servo extension such that the servo plugs in at the fuse joint.
- ❑ Install the two carbon fiber spars through the aft fuse.
- ❑ Find the 20mm horizontal stab mounting bolts and trial fit into the metal threaded tabs.
- ❑ Working carefully, enlarge the hole in the top of the aft fuse such that the stab mounting bolt will sit flush with the top of the fuse. Do not drill this hole straight through, but make it just large enough for the head of the bolt. In the prototype, the

proper diameter was achieved with a conical bit and then the depth was cut with a small carbide cutter (*photo 18*).

- ❑ Slip one horizontal stab on the spars and secure with a bolt (*photo 19*). Loctite.





photos 18 and 19 – installation of horizontal stabilizer bolt

- ❑ Push the spars fully into the stab that you just mounted, and then slip the other stab on the spars, securing with a bolt. Loctite.
- ❑ Run all extensions forward through the aft fuse, making sure they are adequately secured away from the pipe.

Step 8: Hatch Covers and Linkages

- ❑ Cut slots for the control arms in the servo covers for the vertical and horizontal stabs and reinstall.
- ❑ You may want to paint the control horns to match the paint scheme at this point.
- ❑ With control arms in the vertical position and the control surface centered, adjust the linkages to the proper length for both elevators and the rudder.
- ❑ With the two elevator servos activated through the Matchmaker, set the length of control linkage such that the elevators are equally centered and attach (*photo 20*). Make sure not to over-tighten the bolts such that the arm binds.

photo 20 – elevator linkage

Step 9: Aft Fuselage

- ❑ Drill a hole in the pipe mounting tabs at their mid-point.
- ❑ Position the pipe on the rear of the lower bypass. The tabs are slightly offset to one side of the pipe … this is the top.
- ❑ With the pipe fully on the lower bypass, and the mounting tabs equally spaced from the top, drill holes through the lower bypass for the tab mounting bolts.
- ❑ Trim the mounting tabs back a bit if necessary to insure they don't interfere with the fit of the upper bypass.
- ❑ Insert the pipe into the aft fuse.
- ❑ Attach the aft fuse to the forward fuse with four bolts. Loctite.
- ❑ Secure the wire harness to the side of the fuse to keep it away from the pipe (*photo 21*).

photo 21 – mounting aft fuselage

Step 10: Engine and Pipe

Clean the fuselage thoroughly before installing the engine. If you need to trim the intake for engine clearance, use a vacuum while you work. This will reduce the chance of a foreign object finding its way into your engine.

- ❑ Move the pipe aft and position the lower bypass on the mounting rails. Trim the engine rails as necessary for a good fit.
- ❑ Bolt the pipe mounting tabs to the lower bypass.
- ❑ Position the aft end of the exhaust pipe even with the lower fuse at the rear exhaust opening. (*photo 22*).
- ❑ Trim the intake such that it extends inside the lower bypass by approximately ¼ inch.
- ❑ Slide the pipe/bypass assembly to the rear again, and slip your engine into the lower bypass. Move the entire assembly forward into position.

photo 22 – position of aft pipe

- ❑ Adjust the location of your engine to obtain the clearance specified by the manufacturer between the exhaust cone and the pipe mouth. It is likely it will extend into the intake.

photo 23 – engine mounted in lower bypass

- Shim the engine as necessary to make sure it is centered in the pipe and is aligned with the slope of the pipe from front to rear.
- When you are satisfied, bolt the engine to the side frames with wood screws. Remove the screws and coat the thread holes with thin CA. This will harden the wood. Connect service lines to the turbine and bolt permanently in place (*photo 23*).

photos 24 and 25 – rear component board. Note receiver position on upper right.

- Drill and secure the bypass to the engine mounting rails with four wood screws if necessary.
- If the pipe is loose as it passes through the rear former, glue a piece of ply at the top of the former to hold the pipe more firmly in place. Access is from the rear.
- Complete the installation of engine components on the rear component board. Remember to leave clearance for the cockpit above. The placement of components in the prototype, including the smoke system, is shown in *photos 24* and *25*. The rear component board has been raised slightly for installation of smoke tanks beneath.
- Resist the temptation to hide wires away under the component boards, as it will make future maintenance more difficult. Keep things neat but accessible.

Step 10: Wing Landing Gear and Doors

- You will find it easier to route air and servo lines if you enlarge the access hole in the wing root with a carbide cutter (*photo 26*).

photo 26 – enlarge air line and servo wire access hole in wing root

photo 27 – optional repositioning of main door cylinder attach bolt

- ❑ Extend main gear, remove the small screw that attaches the strut cover linkage to the strut, and remove the main gear.
- ❑ Put a drop of thin CA into each screw hole to strengthen the ply in the area of the bolts.
- ❑ If not already done, attach air lines to the main gear and check for leaks with a hand pump.
- ❑ Attach brake line and check for operation of the brakes and leaks with a hand pump.
- ❑ Optional step: The gear door cylinder may be attached to a small extended "ear" on the door hinge. To reduce the risk that this ear fails, you may wish to move the ball link attach point to the hole immediately next to the "ear", but drilled through the main arm itself. If you undertake this optional step, you will also need to move the bolt location on the cylinder base mounting plate so as to maintain appropriate throws (*photo 27*).

- ❑ Attach air lines to the door cylinder if not already accomplished. Test for leaks.
- ❑ Put a drop of thin CA on the small nuts at both door cylinder bolt locations to reduce the risk that they loosen over time.
- ❑ Route all air lines to the wing root.
- ❑ Reinstall main gear. Check for smooth operation with a hand pump.
- ❑ Wire tie the brake line to the main strut and check operation of the gear once more to make sure brake line has adequate length and clearance.
- ❑ Reinstall small bolt to secure door linkage. Use a small amount of thin CA to secure bolt into strut. Also put a drop on the nut attaching the linkage to the door itself.
- ❑ See *photo 28* for picture of completed main gear and door cylinder installation.
- ❑ Wire tie and then cut off air lines at wing root. Install quick disconnects. It is recommended you leave some extra length, particularly on the brake line, in case lines need to be removed and the ends clipped for maintenance or to repair a leak.
- ❑ Repeat all steps for the other wing.

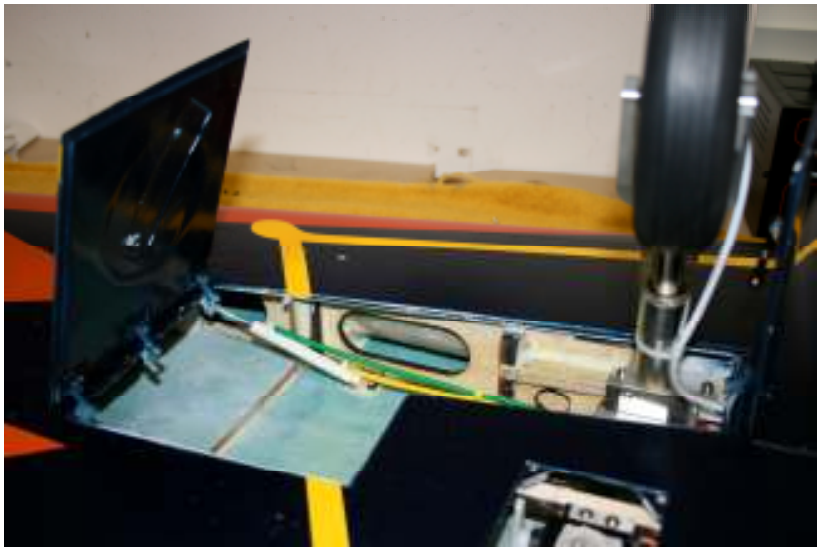


photo 28 – completed main gear and door installation

photo 29 – flap servo installation

Step 11: Aileron and Flap Servos

- ❑ Remove the aileron and flap servo covers. Mark the inside front of the covers so you will know how to orient them for re-assembly.
- ❑ Attach the aluminum L brackets to the servos as you did for the tail surfaces. The servos will face in opposite directions and the servo spindle is positioned toward the front of the wing.
- ❑ Using your receiver or JR Matchmaker, find servo neutral and attach the heavy-duty servo arms to obtain matching positions. If you are using a double-sided arm, you may find that rotating the arm 180 degrees achieves a better match, so complete this step before trimming off the unused side of the arm.
- ❑ Temporarily fit the ailerons and flaps to the wing if not already completed at the factory.
- ❑ Position the servos onto the mounting tabs, paying attention to the position of arm relative to the control horn slot marked on the control surface.
- ❑ Using great care not to pierce through the top of the wing, drill and bolt the servos in place (*photo 29)*.
- ❑ You will need to use an extension on the aileron servo lead. Make sure to tape the connection and secure the wiring to ribs as it passes through the gear door compartment to prevent fouling of the extension on the wheel. Label the servo wires for aileron or flaps.
- ❑ Trim the servo covers for the servo arms and reinstall.
- ❑ Repeat for the other wing.

Step 12: Flaps and Ailerons

- ❑ Measure the throws for ailerons and flaps. Make sure you can achieve 45 degrees of throw on the flaps and at least 20 mm in either direction on the ailerons. Carefully trim away the gap cover if needed to get the appropriate travel. Also make sure there is no binding at the point that the flaps and ailerons come together.
- ❑ When satisfied, Aeropoxy the hinge points into the wing permanently.
- ❑ With a small carbide cutter, route out the slots for the control horns.
- ❑ Rough up the mounting surface of the control horn, tape around the slot and glue the horn into each control surface with Aeropoxy.

- ❑ Set the wings aside for the glue to cure. Double check to make sure there are no fingerprints or excess glue on the wing surfaces.
- ❑ When the glue has cured, install the linkages.
- ❑ Insert the wing tip tanks into the mounting holes. When the pins are fully inserted, tighten the locking clamp bolts through the small holes in the bottom of the wing.
- ❑ Locate the spar tube. Note there are holes drilled and tapped at both ends of the tube through the hardwood filler block. Insert the tube into one wing and check to see if the hole aligns. If not, remove the tube and invert. When you find the proper orientation, mark the tube for left and right for future reference.
- ❑ Run the spar tube through the fuse, connect service lines and bolt wings in place.
- ❑ Air up system and connect a Matchmaker or similar device to the retract servo. Test the system, correcting any leaks or other issues at this time.

Step 13: Wing Fences

There is one large wing fence and two smaller wing fences on each wing. The two smaller fences are located toward the outer tip and the large fence is approximately two thirds of the way to the tip.

- ❑ The locations for the fences are molded in the top surface of the wing.
- ❑ Mark the locations of the mounting tabs on the fences on the wing surface
- ❑ Route the tab slots in the wing, working carefully with a razor knife.
- ❑ Insert the fence into the slots and wick thin CA into the tab area. Tilt the wing and let the CA wick down the length of the fence, being careful not to apply so much that it puddles or runs at the end of the fence. Take your time on this step.
- ❑ Repeat for the remaining fences.

Step 14: Cockpit

- ❑ Trim the edges of the cockpit area so that the rear tub sits down fully into the forward fuselage (*photo 30*).

photo 30 – trim the sides of the cockpit area such that the tubs drop in place

- ❑ Repeat for the forward tub. Make sure both tubs clear any electronic gear sitting on the component boards.
- ❑ At this point, you may wish to paint the tubs, rear instrument panel and glare shield with flat black paint.
- ❑ Position the rear tub over the canopy frame and trim the back panel to a size just slightly smaller than the rear of the canopy (*photo 31*).
- ❑ Trial fit the rear tub into the canopy. You may need to trim the lower cross member of the canopy slightly to move the tub fully aft. When satisfied, attach the tub to the canopy frame with several dots of Zap-a-Dap-a-Goo. When working with this glue, make sure not to get any "threads" of glue on the canopy itself.

photo 31- use the cockpit as a template to trim the back of the aft tub to shape

- ❑ Attach the rear instrument panel to the tub in the same fashion (*photo 32*).

photo 32 – glue the rear tub and instrument panel into the cockpit frame

- ❑ Carefully fit the front tub into place, trimming as necessary. Glue into place with Zap-a-Dap-a-Goo (*photo 33*). Recheck the fit of the canopy into the forward fuse before the glue fully dries.

photo 33 – front tub glued in place on top of canopy rails

- ❑ While the forward glare shield may be permanently glued in place, taping from inside will allow for easier access to batteries and nose gear for maintenance. Duct tape works well for this application.

Step 15: Radio Programming

- ❑ Complete the installation of your radio gear and batteries. In the prototype, the switches were mounted in the rear hatch area so as to be able to leave the cockpit in place for routine servicing. Batteries were mounted to the nose gear former.
- ❑ Set your radio for the following throws:

  Ailerons: 20 mm in either direction
  Elevators: 30 mm in either direction
  Rudder: max throw allowable
  Flaps: 15 degrees takeoff, 40-45 degrees landing

Step 16: Weight and Balance

- Test fuel the aircraft. Check for leaks, then drain.
- Set your CG. For the initial flights, the plane should balance slightly nose down with the CG on the wing spar, fuel in the UAT only, with the gear down.
- Adjust CG as necessary.

Step 17: Test Flight

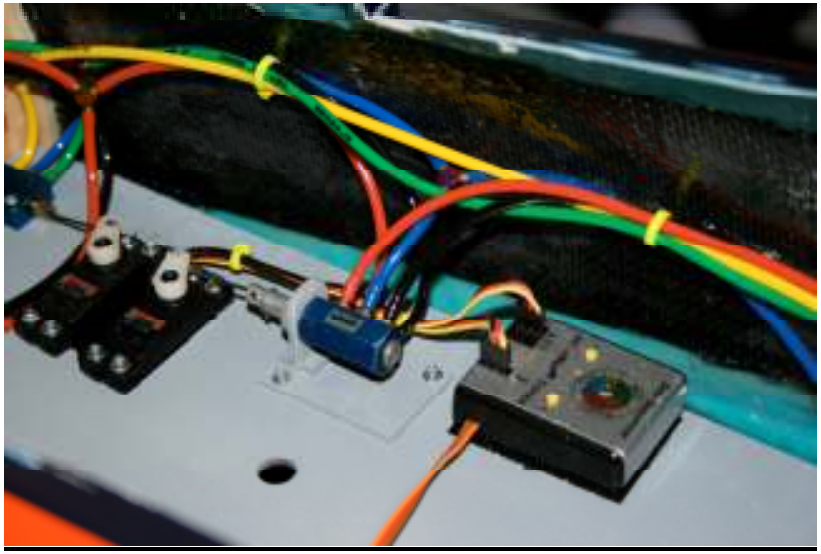
- Before any test flight, make sure all systems are fully tested on the ground and there are no known problems.
- Try to conduct test flights under ideal weather conditions, at a flying facility that offers plenty of "outs" in case of problems.
- During the first flight, spend the majority of time on slow flight and approaches. Your primary goal in the first few flights is to get a good feel for throws, CG and most importantly, the landing characteristics of the aircraft.
- This is a heavy aircraft, so make sure to carry sufficient power to touchdown to avoid wear and tear on the airframe.

Equipment Installation Photos

Equipment, including fueling tubes, switches, air fill, air gauges and remote ECU board were all installed in the aft hatch area so as to be accessible without removing the canopy. Also, the wiring for the ECU and for the servos were run down opposite sides of the fuselage to avoid interference. The receiver was mounted to the fuse side just to the left of the fuel tanks. This is a good location for both conventional receivers and 2.4 GHZ units, due to the central location, high mounting point and absence of carbon fiber in the area. If you are using multiple 2.4 receivers, this general location allows for additional units both fore and aft. The positioning also allows for the shortest run of extension wires.

Receiver and ECU batteries were located on either side of the nose gear former, secured with Velcro straps glued or screwed to the ply mounts.

Photos 34-37 show some of the installation details.



Photos 34 and 35 – right side – air systems and remote ECU board

Photos 36 and 37 – left side – receiver batteries, switches and air gauges

Parts List

- Forward Fuselage and Component Boards
- Aft Fuselage
- Engine Hatch
- Canopy
- Horizontal Stabs, Elevators (2)
- Carbon Fiber Spars for Horizontal Stabs (2)
- Vertical Fin, Rudder
- Wings, Flaps, Ailerons (2)
- Wing Tip Tanks (2)
- Main Spar Tube
- Main Landing Gear (2)
- Nose Gear with Integrated Steering Bracket
- Kevlar Saddle Tanks (2)
- Main Center Tank
- Fiberglass Intake Extension
- Front and Rear Cockpit Tubs, Rear Instrument Panel
- Glare Shield
- Dual Wall Exhaust Pipe with Mounting Tabs
- Upper and Lower Bypass
- Large Wing Fences (2)
- Small Wing Fences (4)
- Linkage Assemblies (7)
- Air Support Kit
- Hardware Kit