Fei Bao Jets


(Flight Photos by Joseph Balabon)

1/5.5 Scale Mig-21 Fishbed (J)

Specifications:

Length: 98-1/2” (2500 mm)
Wingspan: 55-1/4” (1400 mm)
Weight: 24lbs (10.9 Kg) empty
Thrust Class: 20 – 28 lbs (9 – 12 Kg)
Radio: Minimum 7 channels

Written by Jim McEwen
In collaboration with RC Jet Models

DISCLAIMER

THIS 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 one 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 could even get hurt. So pause every once in a while when building it and double-check your workmanship.

A. 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 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.

B. Adhesives

The correct adhesive to use for most 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 sufficiently mix this glue, 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 MiG-21 Fishbed.

C. Using Pneumatic Systems

The Fei Bao MiG-21 Fishbed 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 or Tidi-strips 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 as well as the paint on the bottom of your model.

D. Additional Items Required

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

Flight Controls Recommended Servo List
Ailerons (2): JR 3421
Elevator (2): JR 8611
Rudder (1): JR DS3301, DS3421sa or equivalent
Flaps (2): JR8611
NWS (1): JR 8611 or equivalent size and appropriate torque.
Matchbox (2) – elevators & flaps as required depending on transmitter/receiver selection.

Pneumatic Systems
The air kit comes with servo driven spool valves for retracts, air brakes, and wheel brakes but there are many "aftermarket" components available which can be used for these functions. Several possible solutions are listed below. The individual builder may choose one of these solutions or provide their own solution based on their experiences and preferences.

Retracts/Gear Doors
Solution #1
Retracts: Provided spool valve & JR 341 servo or equivalent
Gear doors: Pushbutton valve such as BVM #5753 Air Micro Switch

Solution #2
Retracts: Provided spool valve & JR 341 servo or equivalent
Gear doors: Provided spool valve & JR 341 servo or equivalent
Electronic sequencer

Solution #3
Ultra Precision UP-3 valve & JR 341 servo or equivalent

Solution #4
Retracts: Jet-Tronics Dual Action electronic pneumatic valve
Gear doors: Jet-Tronics Dual Action electronic pneumatic valve
Electronic sequencer

Wheel Brakes
Solution #1
Provided spool valve & JR 341 servo or equivalent (non-proportional brakes)

Solution #2
Proportional brake valve (Ultra Precision UP-6 or BVM Smooth-Stop) & JR341 servo or equivalent

Solution #3
Jet-Tronics Low Loss electronic brake valve

Airbrakes
Solution #1
Provided spool valve & JR 341 servo or equivalent

Solution #2
Jet-Tronics Dual Action electronic pneumatic valve

Other Pneumatic Components
Many builders prefer to install pressure gauges in the retract and brake systems to easily monitor system pressure. Dual fill valves may be installed to maintain isolation between these two systems.

Other Parts
Ultimate Air Trap (UAT)
Fuel tank vent fitting
Manual fuel shutoff valve
Safety wire
Blue thread-locker
Glues: cyanoacrylate (CA) glue (thin, medium, and thick), Loctite Hysol, Zap-a-Dap-a-Goo
Batteries (Receiver and ECU)
Regulator and switch
Servo extensions (length may vary, depending on receiver placement)
Control linkage hardware as preferred by the builder
Fuel tubing (4mm, 6mm, Tygon, BVM 2084 inside tank tubing)
Velcro
Spot putty & touch up paint
Sandpaper (various grits)
Tidi-strips/tie wraps
Metal tape
BVM Heat Shield
Miscellaneous hardware

Additional Required Tools
X-Acto knife, #11 blades
Acetone/alcohol swabs
Felt-tip marker
Pencil
Ruler (metric and imperial)
Drill
Drill bits
Pin Vice
Sandpaper (course and fine grades)
Pliers
Side cutters
Double-sided tape
Jewelers files (various shapes)
Thread locker (blue)
Dremel tool and assorted bits
Phillips screwdriver
Various balsa and hardwood stock (servo rails)
Dubro 5/32" Tube Bender

Rudder Servo Installation and Rudder

Plywood mounts for the rudder servo have been pre-installed in the fin. A mid-mount style servo such as the JR DS3301 can be screwed directly to the plywood. A couple of strips of ply or hardwood should be glued to the back side of the ply mounts to increase the thickness and give the servo screws bit more grip.

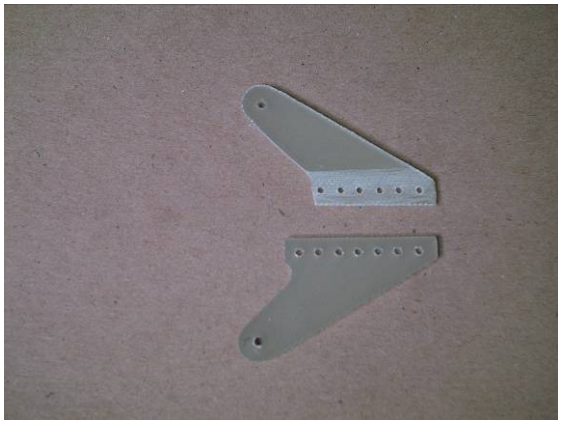
A JR DS3421sa servo which has a bit more torque can also be used. This servo only has traditional mounts molded into the servo case and will require that the plywood mounts in the fin be cut/ground back and hardwood blocks glued in place (contacting the fin skin, ply mounts, and then reinforced with balsa angles). The servo is mounted to aluminum or carbon fiber reinforced plastic angles which are, in turn, screwed to the hardwood blocks in the fin.

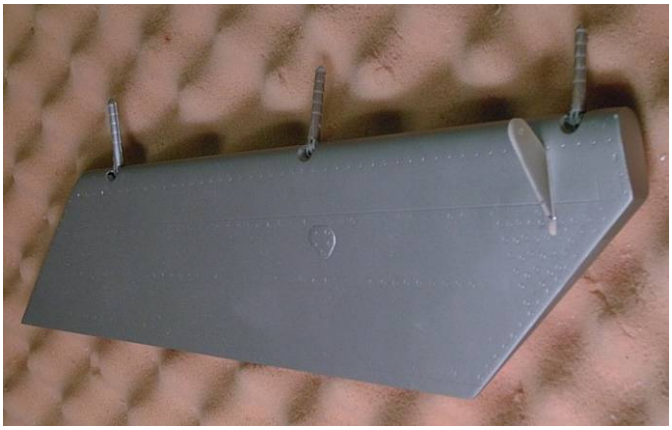
The servo lead routes out to the fin root without the need for a short extension.

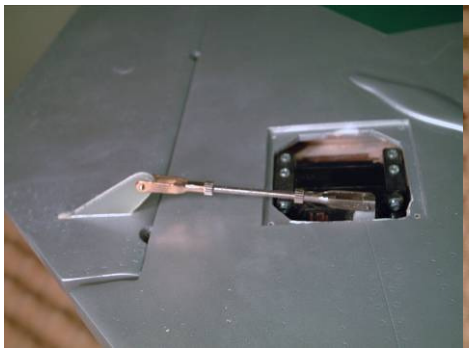
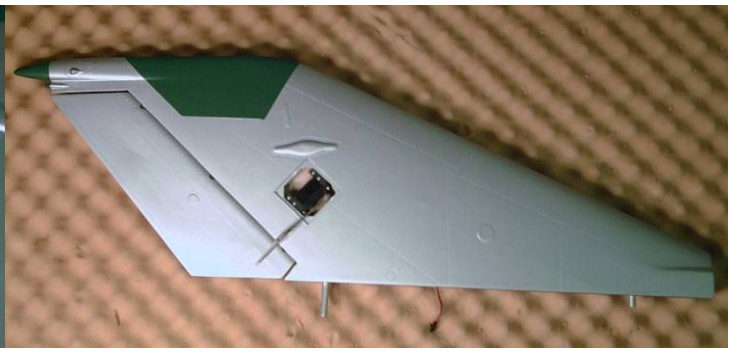
Control Horn - A slot has been precut in the rudder to receive the control horn. The horn itself needs to be trimmed slightly at the front so that the clevis hole aligns with the hinge line. The photo below shows the trimmed rudder horn and a "stock" horn. The horn is roughened up with a Perma-Grit file and Hysol'd in place. An alcohol swab is used to clean any residual Hysol from the area.

Hinges - Three "point" style hinges are pre-glued into the rudder with the matching holes pre-drilled in the fin. Apply a drop of light oil to the hinge pin to prevent glue from jamming the hinge. Apply Hysol to the barbed portion of the hinge and install the rudder into the fin. Do not push the rudder too far into the fin but ensure that the rudder can freely move to the recommended travel limits.

Linkage - The kit includes linkages (rods with 4-40 threads, jam nuts, a threaded clevis at one end, and a blue anodized aluminum rod end at the other) but the builder may choose to use other linkage components based on their own preferences. Final adjustment of the pushrod, centering the rudder, and installation of the servo cover will be done when setting up the control throws.

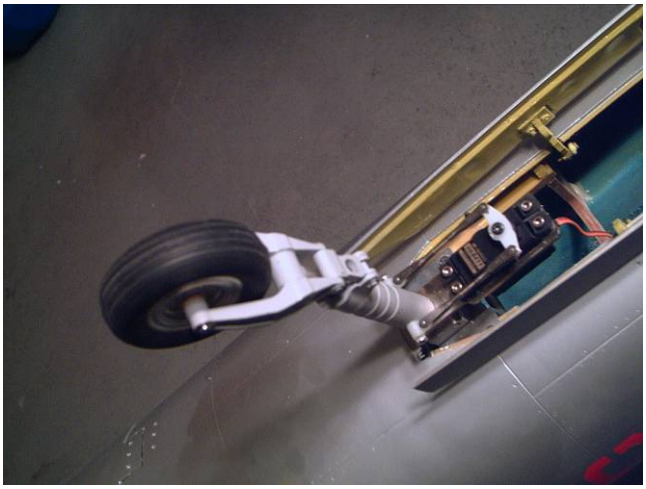




Nose Wheel Steering Servo Installation

Using 3mm bolts and blue Loctite, install the NWS servo mounts into the plated steel frame attached to the nose gear strut. Adjust the NWS pushrods to the correct length to engage the servo arm and connect the NWS pushrods to the servo.

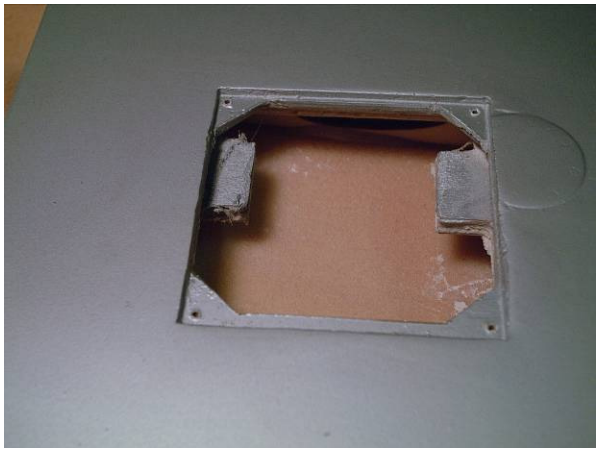
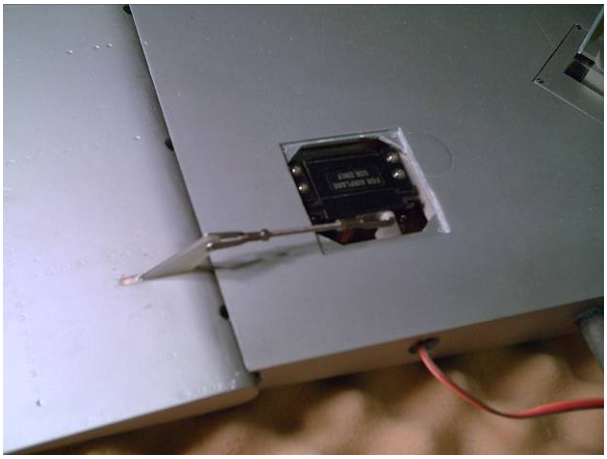
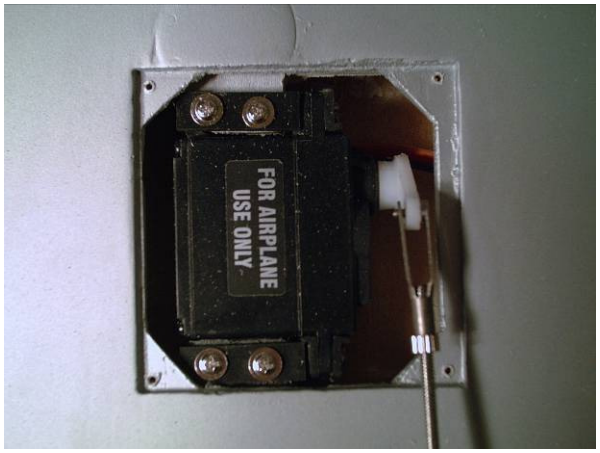



Flap Servo and Control Horn Installation

The plywood mounts for the flap servos are also preinstalled. The servos are mounted to the supplied CF angles which are pre-drilled to accept the 3mm supplied mounting screws. This assembly is then positioned in the servo cutout, 1/16" pilot holes drilled in the plywood mounts, and the assembly is screwed down.

The flap control horn needed to be modified by grinding it away slightly at the front (see rudder control horn section) such that it fit properly in its precut slot. Be sure to sand the sides of the horn before Hysol'ing it into place.

Connect the flap control horn to the servo arm using the provided hardware or the builder's preferred hardware. Final adjustment of the pushrod, centering the flap, and installation of the servo cover will be done when setting up the control throws.

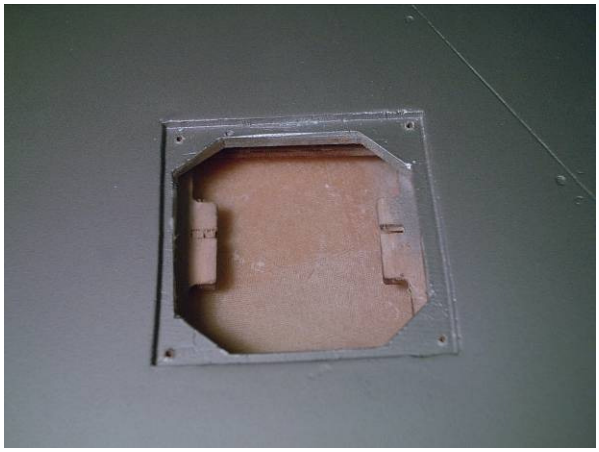
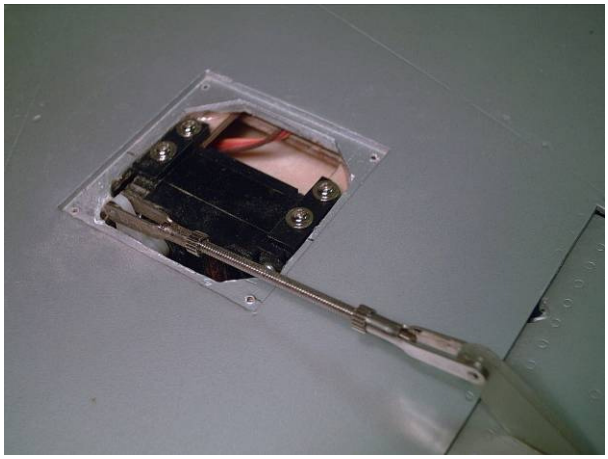
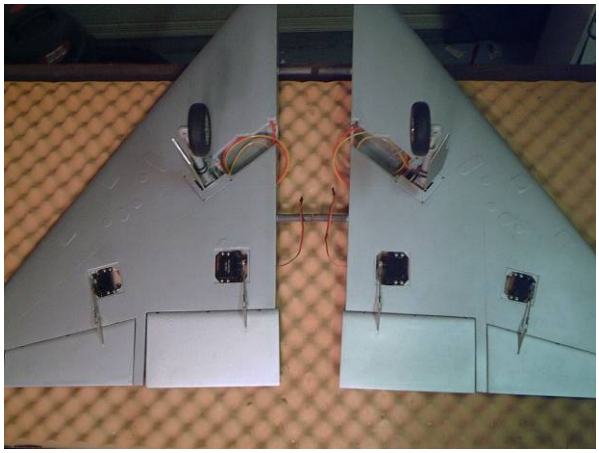





Aileron Servo and Control Horn Installation

Like the rudder servo, the aileron servo plywood mounts are set up for a mid-mount style servo (eg JR DS3301) which can be quickly and easily screwed directly to the plywood. A couple of strips of ply or hardwood should be glued to the back side of the ply mounts to increase the thickness and give the servo screws a bit more grip.

A JR DS3421sa servo which has a bit more torque can also be used but will require the servo cutout to be modified to accept the servo mounts. Trim the pre-installed ply mounts, glue two pieces of 3/16" plywood (1-1/4" x 3/4") to the inside surface of the lower wing skin, add some hardwood blocks to support the new mounts and tie them to the pre-installed ply and the inner surface of the upper wing skin. Trim the kit-supplied CF angles and drill new holes to match the servos. 1/16" pilot holes were drilled into the mounts and the angles screwed in place. If the servo cover contacts the head of the screws, countersink the holes in the CF angles and substitute the stock screws with countersunk screws.

The control horn was trimmed at the front (like the rudder and flap horns) and Hysol'd in place. Connect the aileron control horn to the servo arm using the provided hardware or the builder's preferred hardware. Final adjustment of the pushrod, centering the aileron, and installation of the servo cover will be done when setting up the control throws.

Fuel Tanks

Note: The fuel tanks may be purchased pre-plumbed by the factory. It is recommended that you inspect the tanks to ensure that the clunk will pick up fuel regardless of the attitude of the tank.

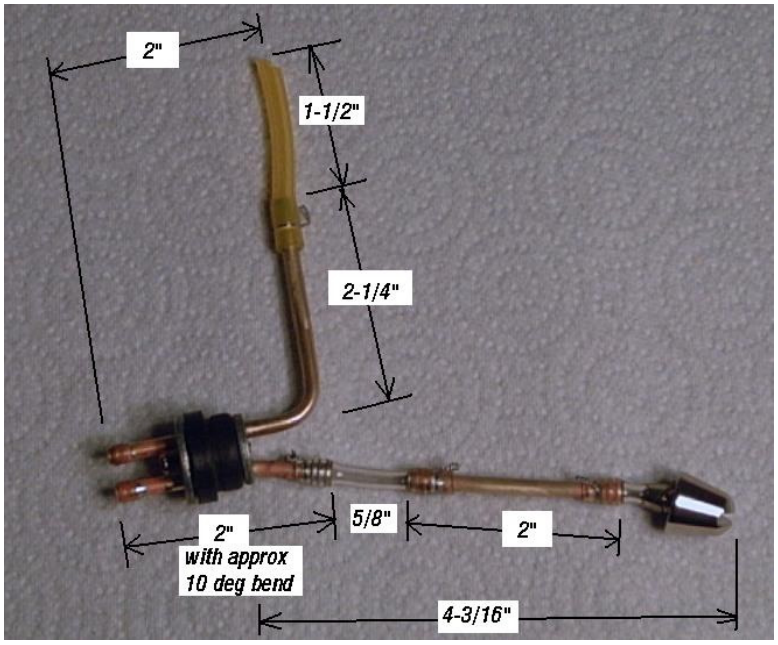
The saddle tanks are approximately 5" long x 7" high x 2" wide (at the widest point) and have a capacity of 30 ounces each (60 ounces per pair). The length of the tank is less than its height which makes it a bit of a challenge to plumb the clunk line to reach the bottom, back, and top of the tank so that fuel flow would be maintained regardless of the attitude of the model when flying.

The photos below show the fuel lines within the saddle tanks. The 5/32" brass tubing was annealed using a blowtorch to allow it to be easily bent using a Dubro tube bender. Dubro fuel line barbs were soldered to each end of the brass pieces. BVM #2804 Fuel Line was used to connect the individual pieces of the clunk line since it maintains flexibility even when immersed in kero for long periods. This fuel tubing will grow in length with exposure to kero so ensure that you take this into account when plumbing the tanks. Tygon tubing was used as an extension for the vent line since it tends to stiffen with long-term exposure to kero. All connections are secured with safety wire.

The 2" length of brass tubing helps to prevent the clunk line from falling forward but also reduces the clunk's ability to reach the bottom and top of the tank. A slight bend (approx 10 degrees) in the brass tubing at the stopper as shown in the photo below will bias the line allowing the clunk to reach the bottom of the tank.

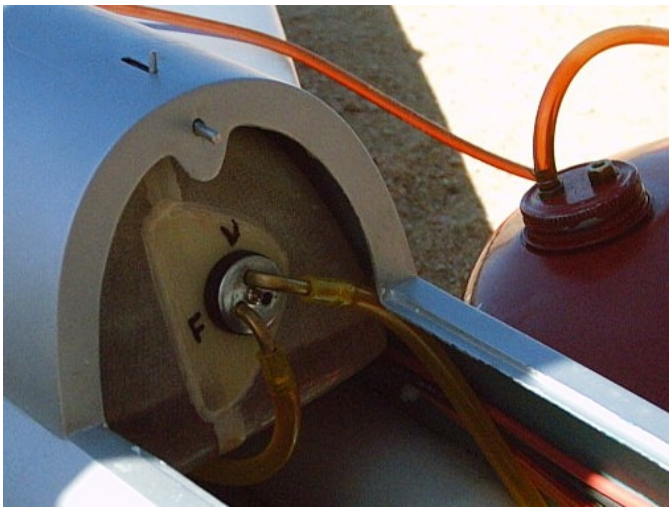
The bend prevents the clunk from reaching the last 4 oz of fuel in each saddle tank when the plane is inverted. This should not be an issue since the saddle tanks are fed with fuel from the main tank and you likely will not be flying inverted when you only have 8oz of fuel on board (by this time you should be on final approach, if not already on the ground).

Tip: Mark the exterior of the tank with an F (fuel) or V (vent) to help prevent connection errors when installing the fuel lines to the tanks.



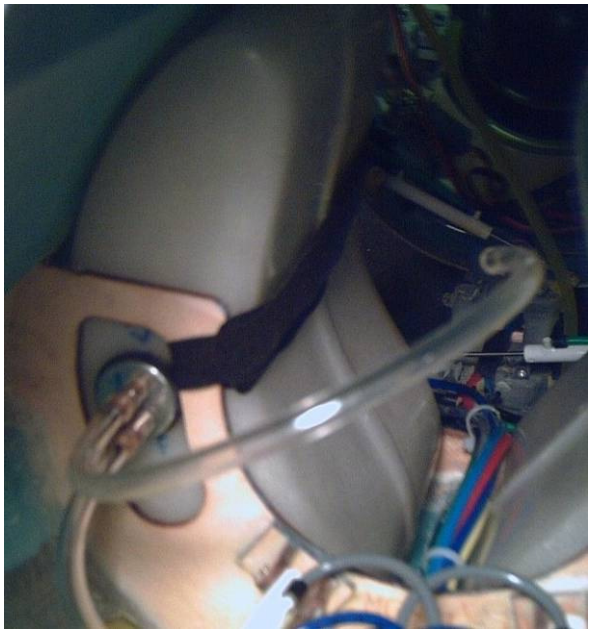
The main fuel tank has a capacity of approximately 60oz and is long and narrow so the internal plumbing arrangement is more typical. A length of brass tubing in the clunk line (similar to the 2" length of tubing used in the saddle tanks) will help prevent the clunk from falling to forward in the tank and will also limit the amount that the clunk line grows in length.

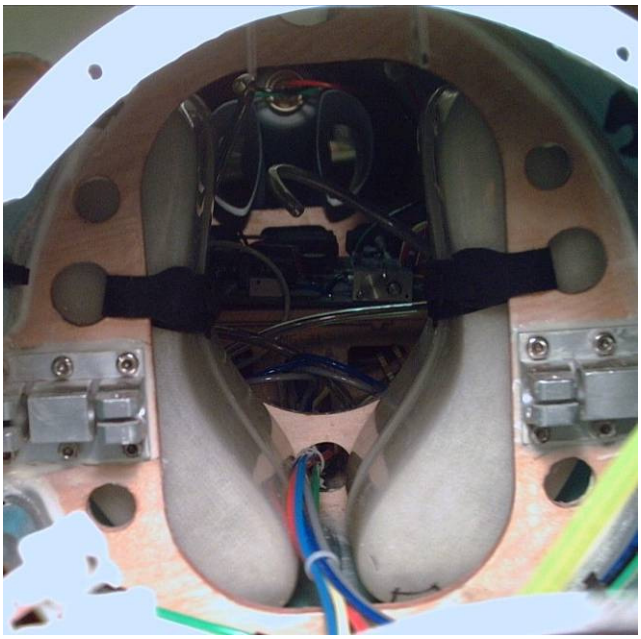
The forward face of the main tank, when installed in the model is quite close to the rear face of the cockpit. As such, a 90 degree bend in the fuel and vent lines prevents any interference between the lines and the cockpit.



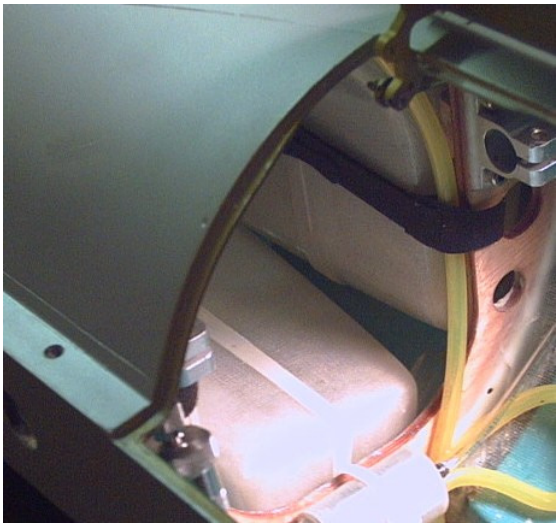
Fuel Tank Installation

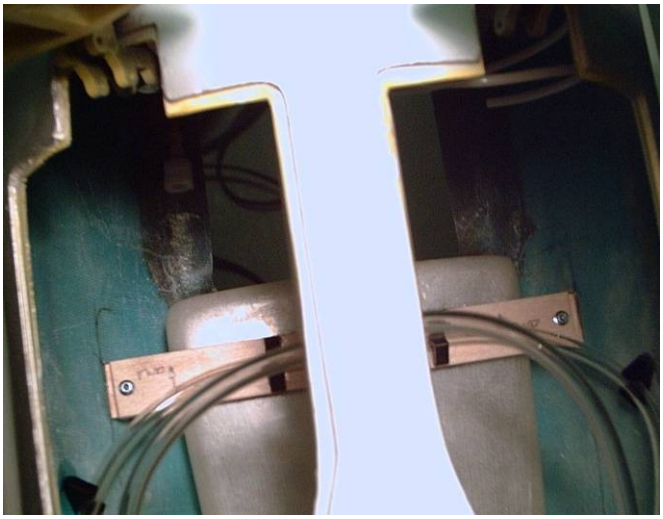
The saddle tanks fit between two bulkheads installed in the fuselage with the stopper fitting in the slot in the forward bulkhead. Use a Dremel tool to widen/lengthen the slot as necessary to fine-tune the fit of the tanks. There should be approximately ½" gap between the tanks at the base. Velcro straps through the slot in the forward bulkhead and the hole in the rear bulkhead can be used to hold the tanks in position. A piece of scrap balsa should be installed between the rear of the saddle tanks and the rear bulkhead to prevent the tanks from potentially moving rearwards and chaffing against the ends of the bolts for the wing mounting brackets.





The main fuel tank is supported at the rear by the saddle tanks. A front support can be made from 1/8" plywood screwed to hardwood blocks Hysol'd to the fuselage. Adhesive-backed Velcro applied to the tank and support can be used to secure the tank from moving forward/aft.

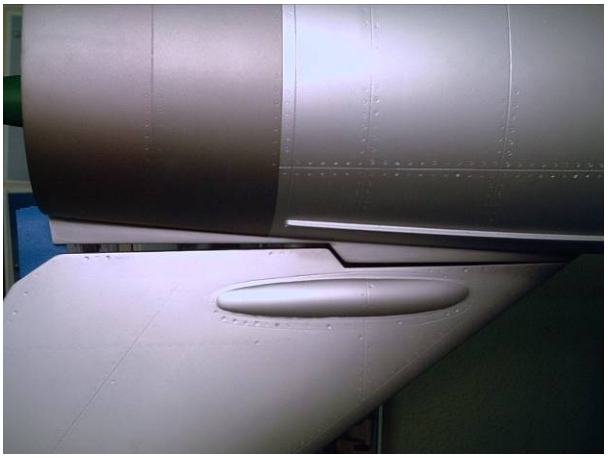




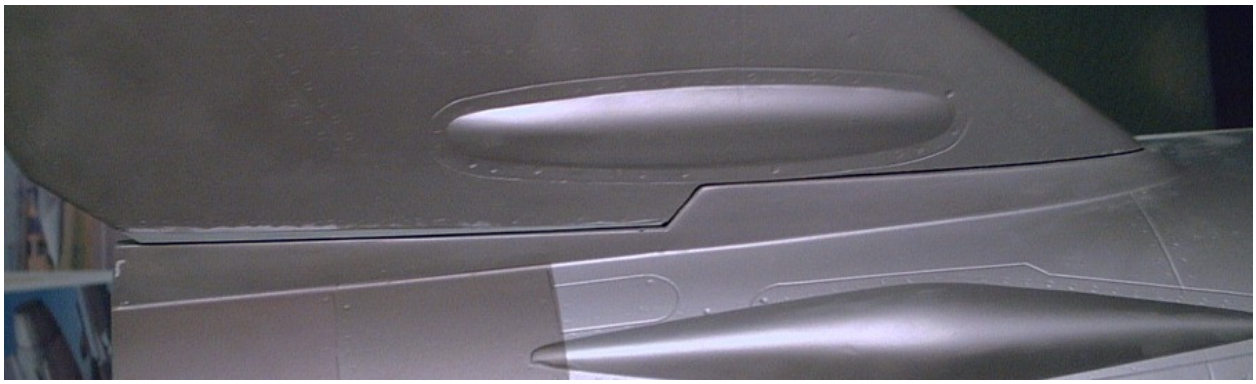
Horizontal Stabs – Fitting

Trial fit the H-stabs by sliding the axle into the trunnion bearing blocks which are pre-installed on a fuselage former. The axles have a notch for alignment with the control horn. The stab root chord has a "Z-bend" which fits into a matching notch in the fuselage. This scale notch makes the H-stab install a bit more of a challenge to install if you want to minimize the gap between the stab and the fuselage yet allow the stab to rotate through the required travel.

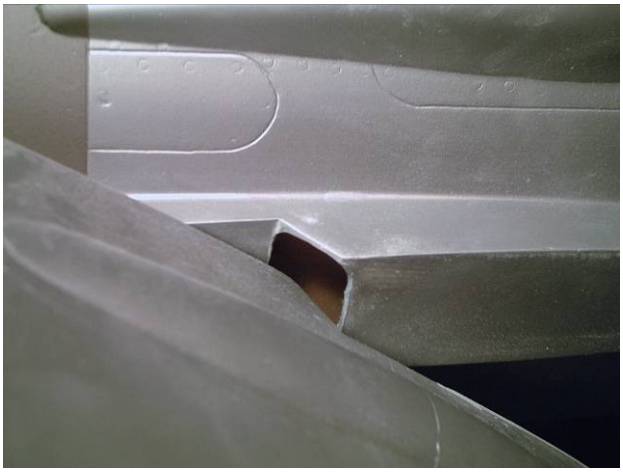
Due to manufacturing tolerances installing the axle in the stab and the bulkhead in the fuselage, the stab root chord may not perfectly match the fuselage. See "Before" photos below.



Portions of the root chord may be sanded down or build up using spot putty, as required, to adjust the H-stab root contour such that it matches the fuselage. This will allow the stabs to be installed with only a 1/32" gap between the stab and the fuselage which will enhance the look of your model. Use touchup paint to blend any spot putty visible. See "After" photos below.



Cut away the vertical face of the notch at the fuselage root as shown below to allow the H-stab to rotate. This area is covered by the stab so it's not visible when the stabs are at neutral.

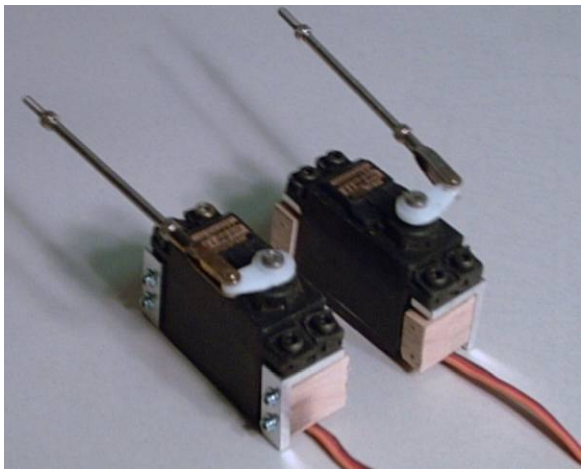
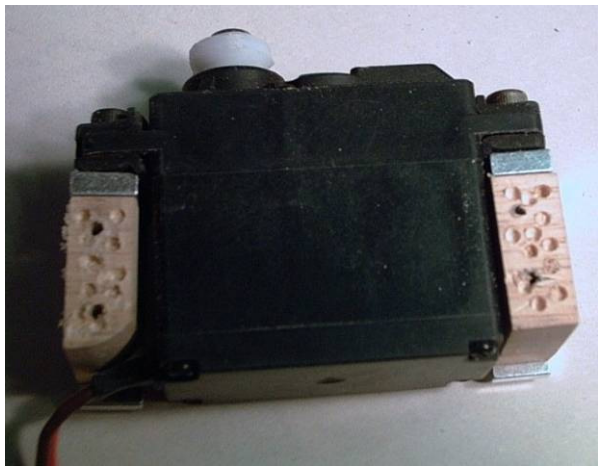


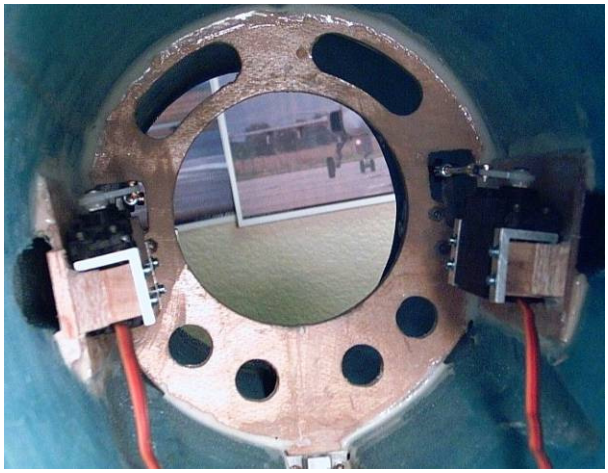
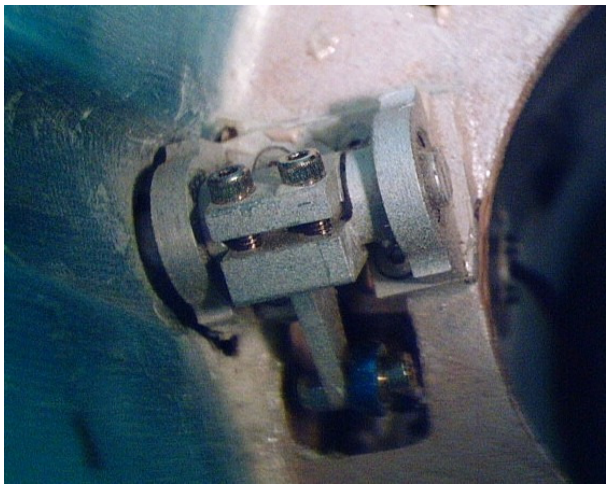
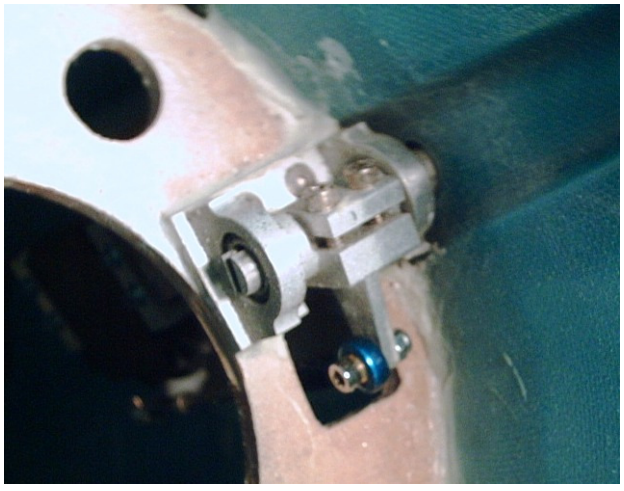
Horizontal Stabs - Servo/Pushrod Install

The H-stab servos are mounted on plywood plates that are pre-installed in the fuselage. Roughen the surface of the plates with some course grit sandpaper. Use angle brackets and hardwood blocks as servo mounts as well as the clevis and pushrods that come with the kit to make a servo "sub-assembly" on the workbench. Drill a series of little holes in the back face of the hardwood blocks which will be glued to the ply plates in the fuselage. The FB blue anodized rod ends were then attached to the control horns and locknuts installed.

Place the servo sub-assembly into the rear fuselage and attached the rod ends to the stab control horns. Use tape to lock the H-stabs at neutral to give the required fore/aft position of the servo sub-assembly on the plywood plate. Position the servo sub-assembly such that the control rod is horizontal. Place a strip of 1/4" square balsa against the servo and tack-glued it to the plywood plate. The strip serves as a jig to quickly locate the servo when gluing the mounting blocks in place. Check to ensure the left and right stab servo positions matched, and glue the hardwood blocks to the plates using super thick CA. Remove the servos and reinforce the glue joints between the hardwood blocks and the plywood using fillets of Hysol and 3/4" balsa triangle stock.

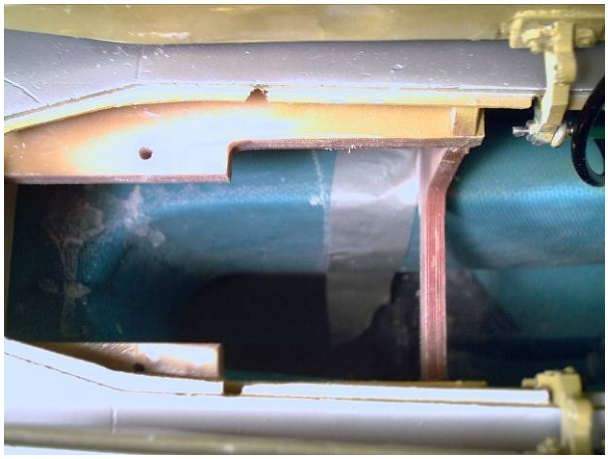
Grind the edges of the H-stab trunnion blocks as necessary to match the curvature of the opening in the bulkhead for the exhaust duct.

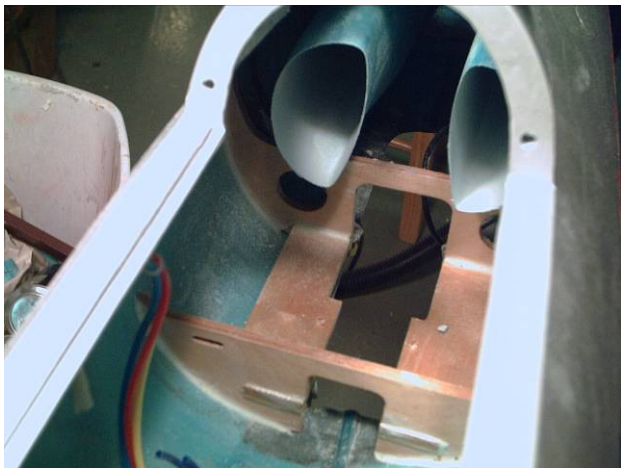



Inlet Duct Modification

While the model is equipped with full inlet ducting and a bypass, the builder may choose to eliminate the inlet duct to simplify access to the internal components to facilitate any maintenance. The split portion of the duct can be cut off approx 1" behind the forward former for the nose gear unit.



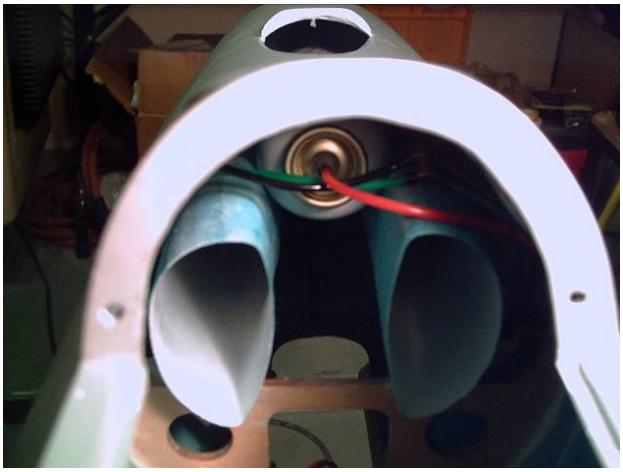


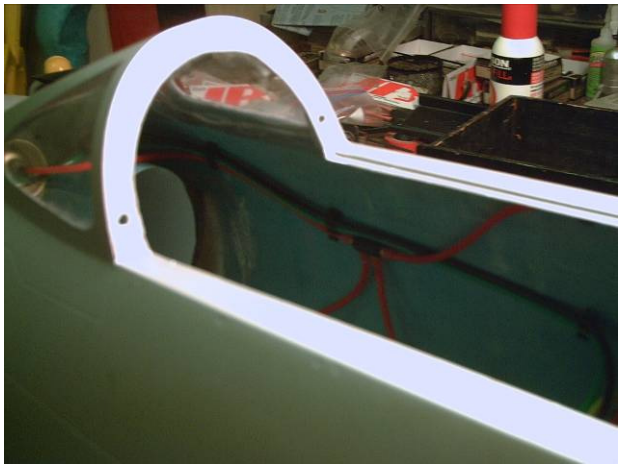
Pneumatic Tubing Install - Retracts/Gear Doors/Speed Brakes

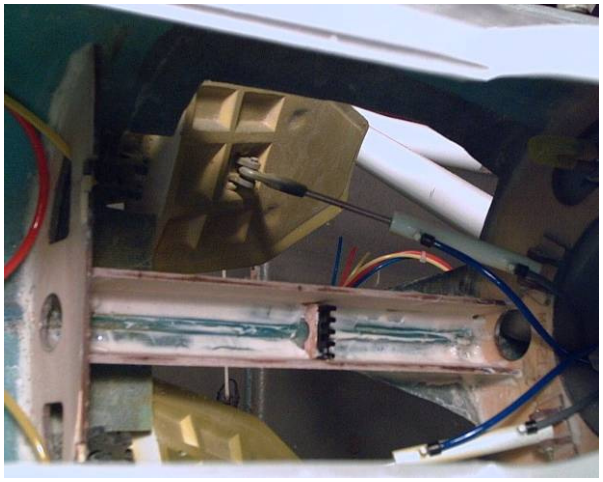
While this model is 98" long, the fuselage is only 7-1/2" wide and 8-1/2" high and the hatch for the engine compartment is only 5" wide and 12" long. Fortunately, the main gear doors and speed brakes provide a bit more access but there isn't a lot of room to work and a long pair of surgical hemostats (clamp) makes things a lot easier. Tidi-Strips are invaluable in making a clean installation. Jets N Stuff Airline Safeties save a lot of time over using safety wire.

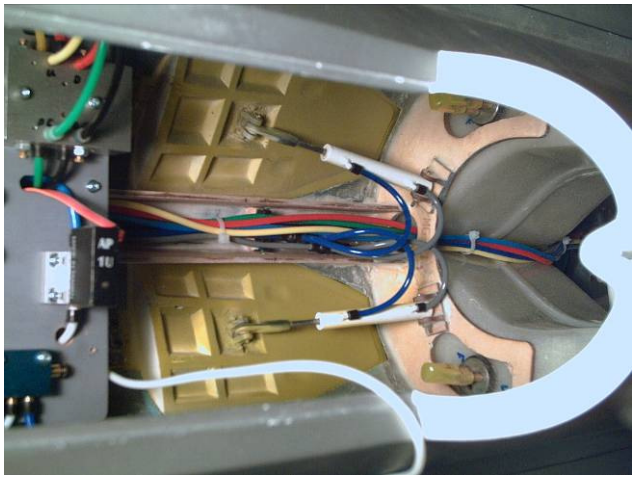
Safety wiring the pneumatic lines to the nose gear door cylinders is very difficult due to limited access through the gear door opening. Airline Safeties are much easier to use in tight areas and a puller tool (made by putting a 90 degree bend in a Dubro Ball Link Release Tool and gluing it to a strip of hardwood) made it easy to pull the Safety over the fittings.

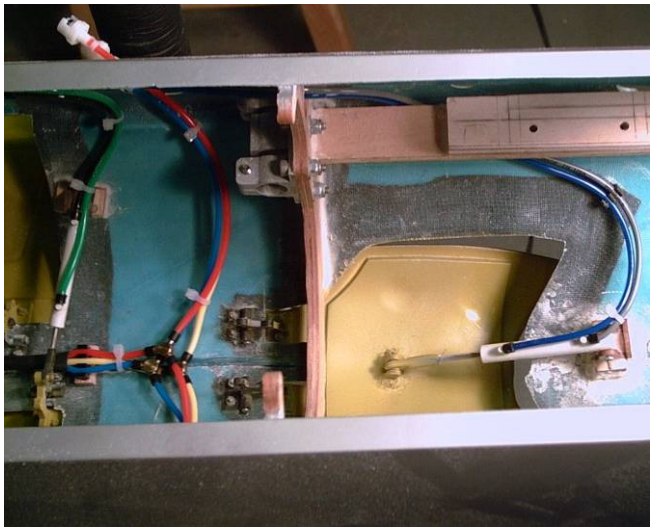
There are many possible layouts/routing for the air lines. One possibility is shown in the photos below but it is up to the builder to determine what works best for them and their choice and location of the valves. Two pieces of plywood can be installed between the forward air brakes to create a trough that will assist in retaining the bundle of air lines between the speed brakes.

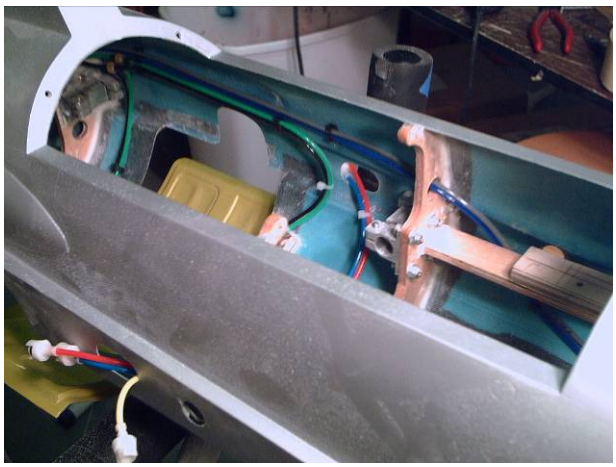


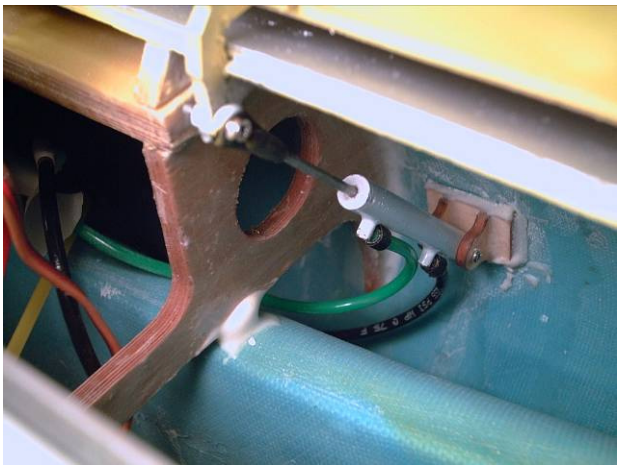






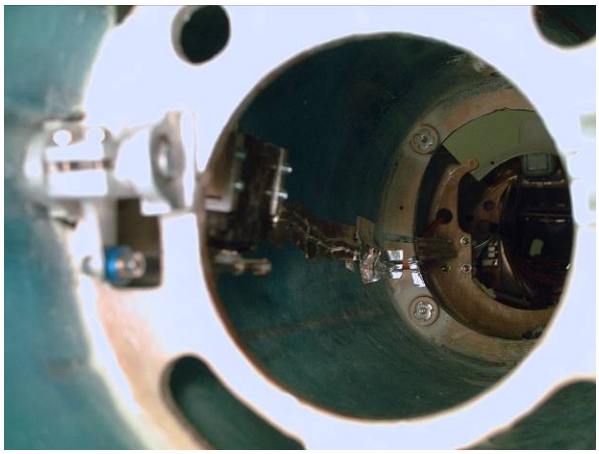






Servo Wire Routing

H-Stab and rudder servo wires in the rear fuselage should be protected from heat. Metal tape and/or a ceramic blanket can be used to cover the servo wires.

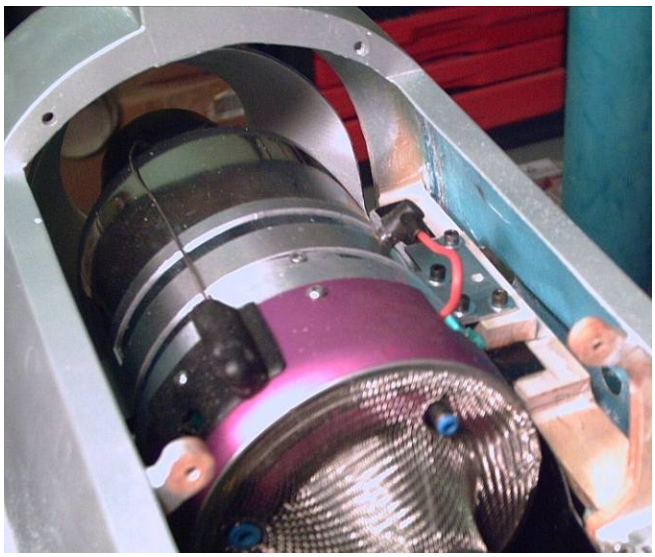


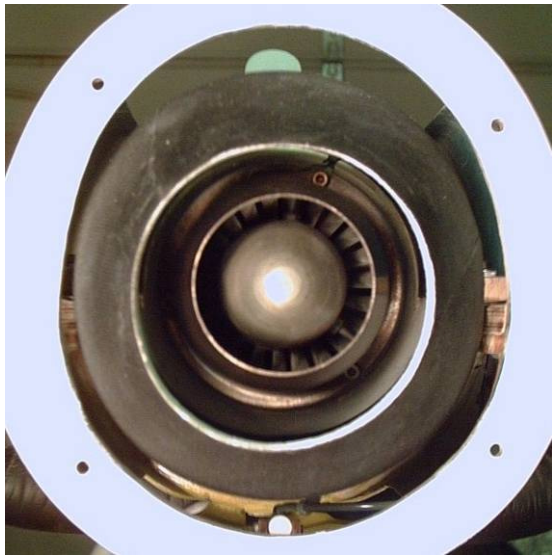
The aileron and flap servo wires are routed from the cutout in the wing root forward over the cutout for the gear strut. This area can become easily congested as several pneumatic lines route through this area. Ensure that the air lines and servo wires are routed such that they are not chaffed by the main wheels when the landing gear is retracted.

Bypass and Turbine Installation

The builder may opt to install a full bypass, or forgo the bypass and use a bell-mouth to smooth airflow into the exhaust duct. A lower bypass installation (as pictured below) has the advantage of providing some FOD protection, blending the airflow into the exhaust duct, yet allows for easy access to the turbine without the need to remove the top cover. The bypass installation is simplified if it's performed prior to bolting on the rear fuselage.

Install a 1" wide x 3/8" thick piece of plywood to the top of the turbine mounting rails to center the bypass in the fuselage. An additional 3/8" plywood spacer over the bypass flange is required to center a JetCat P-120 turbine in the bypass since the flanges on JetCat mounting straps are above the turbine centerline. Mount the turbine using screws or bolts and blind nuts.



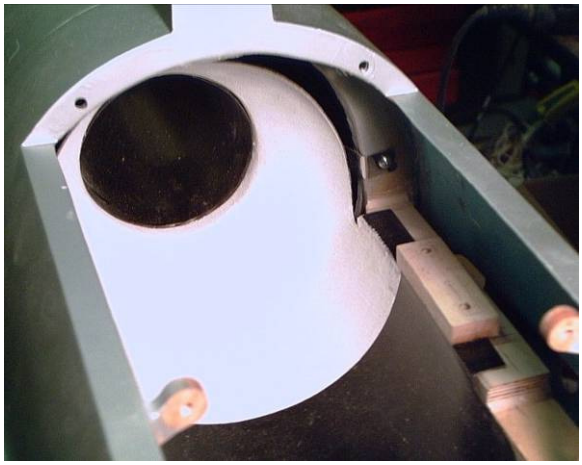


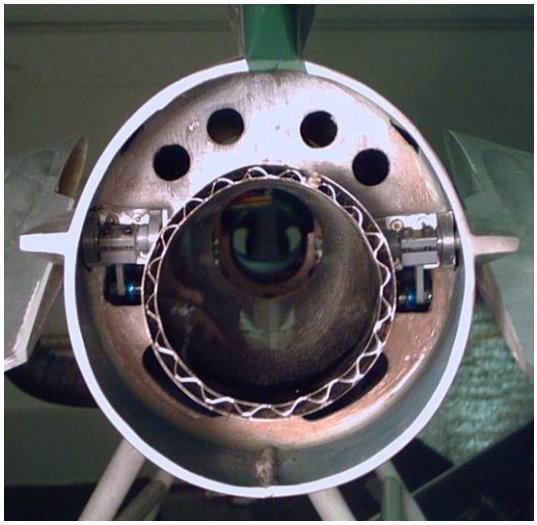
Fuselage Joining/Exhaust Duct Installation

Remove the turbine and lower bypass and join the front and rear fuselage using the provided bolts/washers. Test fit the double walled exhaust duct in the rear fuselage. The outer diameter tapers slightly and the pipe should be installed such that the rear of the duct is approximately 5/8" forward of the fiberglass tailpipe to preserve the scale look of the plane. Use a Dremel tool with a sanding drum to adjust the size of the duct cutout in the fuselage former as required. Reinstall the lower bypass.

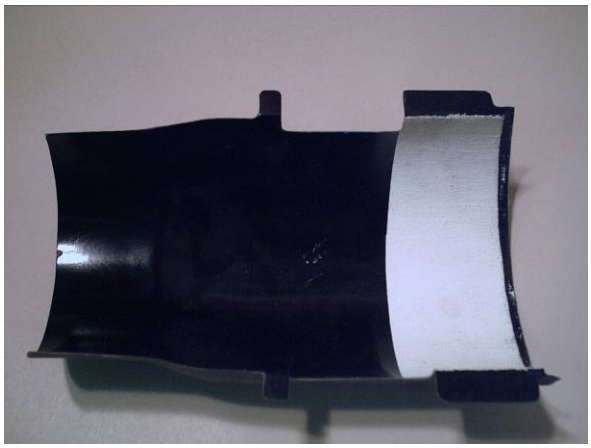
The forward end of the exhaust duct should extend approximately 3/8" inside the bypass. Mark and cutoff the inner duct as required. Cut off the forward end of the outer duct approximately ½" aft of the inner duct (not shown in photo below). This will allow cooling air from within the fuselage to be drawn into the exhaust duct and then out of the model. Use high temperature RTV silicon to fill any gap between the cutout in the bypass and the inner exhaust duct.

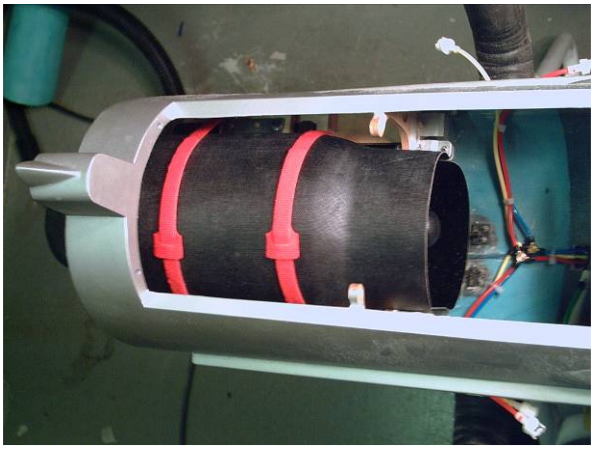
Two exhaust duct mounts are spot-welded to the front of the exterior duct. Mark the location where they intersect the fuselage bulkhead and bend each mount 90 degrees. Cut off any extra material and drill a hole in the mount. Match drill holes in the bulkhead and use socket head screws to retain the exhaust duct.





Apply several couple of coats of BVM Heat Shield to the aft area of the bypass. The upper portion of the bypass, if used, may be trimmed to suit the particular turbine installed and retained with Velcro straps.



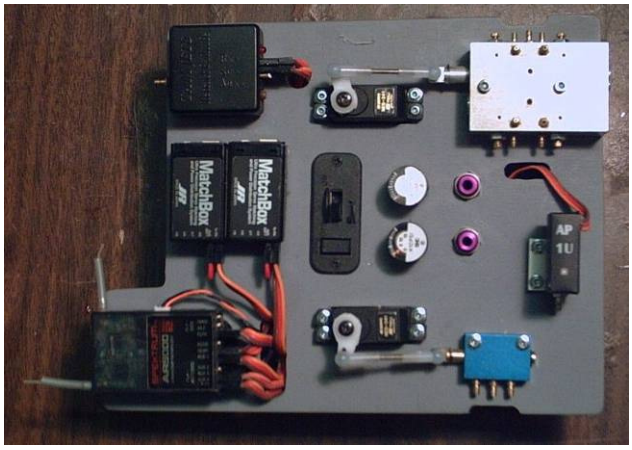


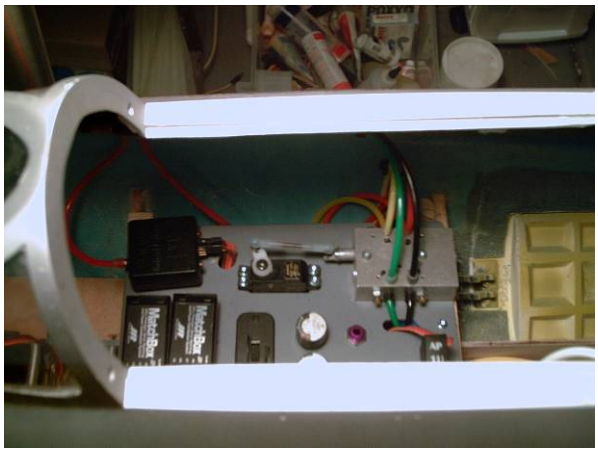
Equipment Tray and Battery Mounting

The equipment tray layout is dependant upon the equipment selected and the builder's preferences. Many layouts are possible with only one pictured below. Items to consider when laying out your equipment tray and locating other components within the model are ease of access to components for maintenance or adjustment, length of leads, routing of air lines and servo wires, visibility, and effect on center of gravity.

Locate heavy components to assist in balancing the model on the required C.G. location. In the model pictured, the ECU and receiver batteries were installed in the nose of the model (forward of the nose gear door) using adhesive-backed Velcro and foam.

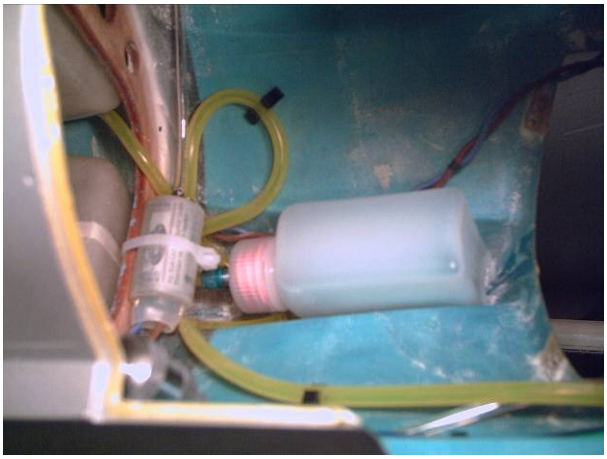
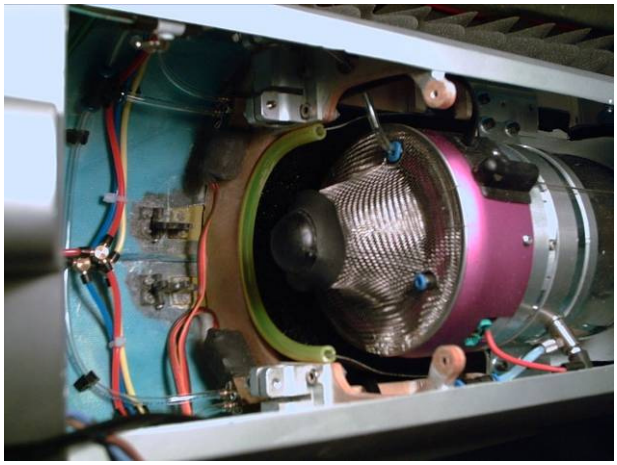
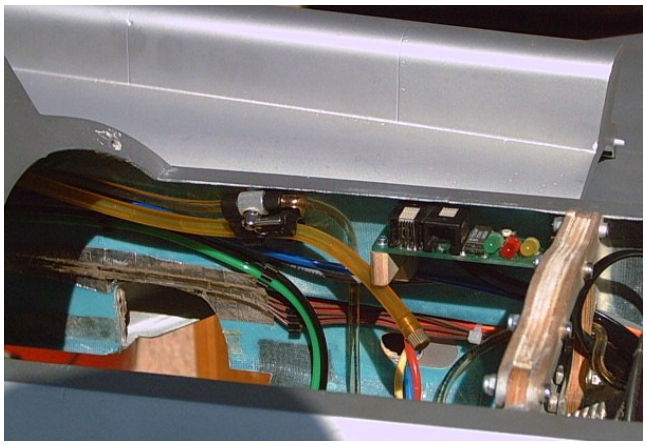
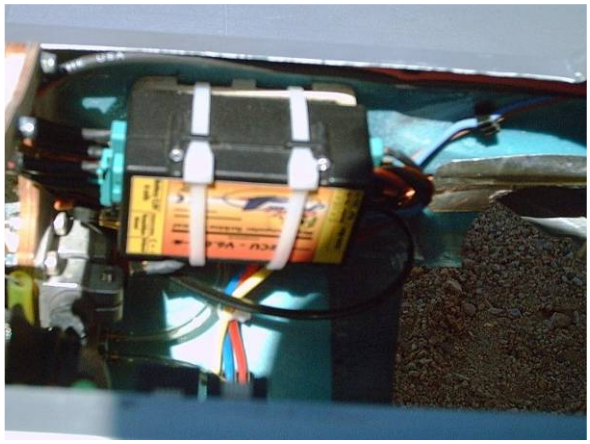
A 3/8" thick piece of hardwood was glued to the top of the rear former supporting the equipment tray so that the installed tray would be approximately level.





Turbine Accessory Mounting

Location and mounting methods for the turbine accessories (ECU, solenoid valves, shutoff valves, etc) will depend on the equipment selected, the builder preferences, ease of access, and the available space. While this is a big model, the builder may run out of space quickly if the layout and routings are not well planned. The installation of a JetCat P-120 is shown in the photos below.

Center of Gravity and Control Throws

Balance the plane with the UAT full and the landing gear in the down position. The recommended C.G. location is 16-1/4" back from wing leading edge at the wing root chord.

Adjust all linkages such that the control surface is properly centered at neutral. Elevator, aileron, and flap servo arm positions and linkages should be mirror images so that the control surfaces deflect equally at all commanded positions (not just the end points).

The recommended control throws are as follows:

Rudder:	1" left and right measured at the base of the rudder
Ailerons:	3/8" up and down measured at the inboard trailing edge
Elevator:	2" up, 1-1/2" down measured at leading edge root chord
Take Off Flaps:	1" down measured at inboard trailing edge
Landing Flaps:	2" down measured at inboard trailing edge

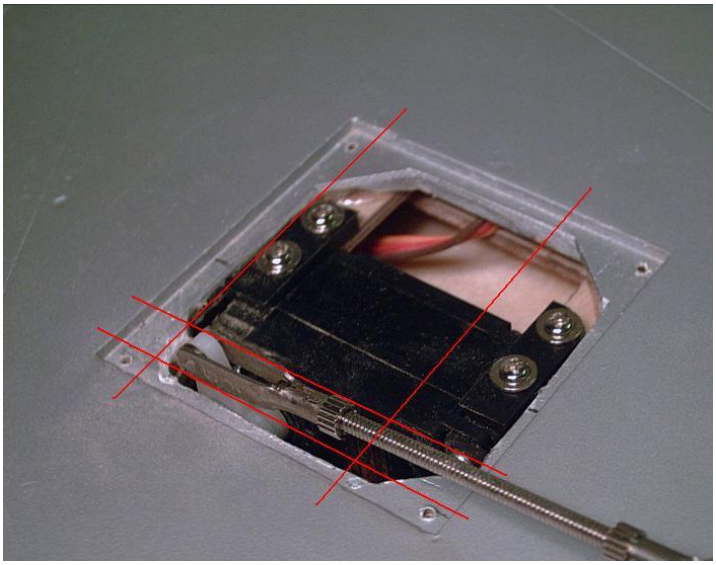
Elevator trim:

- For takeoff, elevators should be trimmed with "up elevator" such that the front of the stab is approximately 3/8" below the centerline of the molded stab root on the fuselage.
- No significant pitch re-trim is required with flap deployment. The plane may initially "balloon" when you lower the flaps to landing position depending on the airspeed.

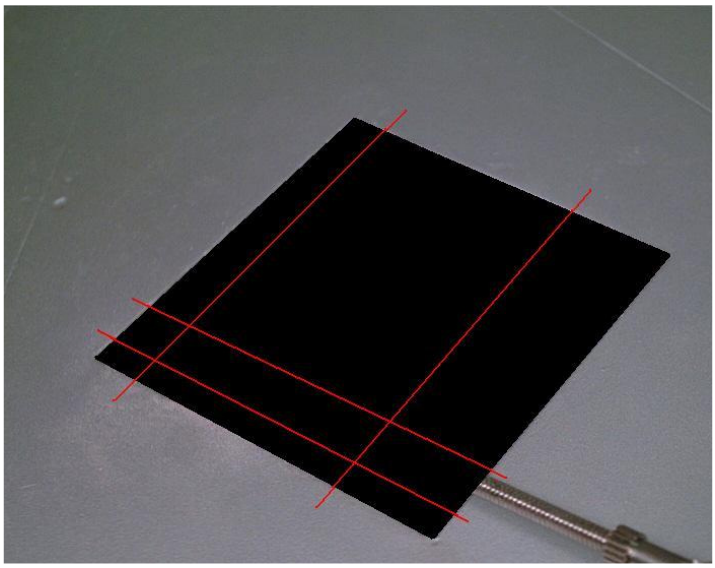
Servo Covers

Cutting the slots for the servo control horns should be done after the linkages, neutral, and control throws have been adjusted. This allows you to cut the minimum size required slot in the servo cover and helps to maintain the good looks of your model.

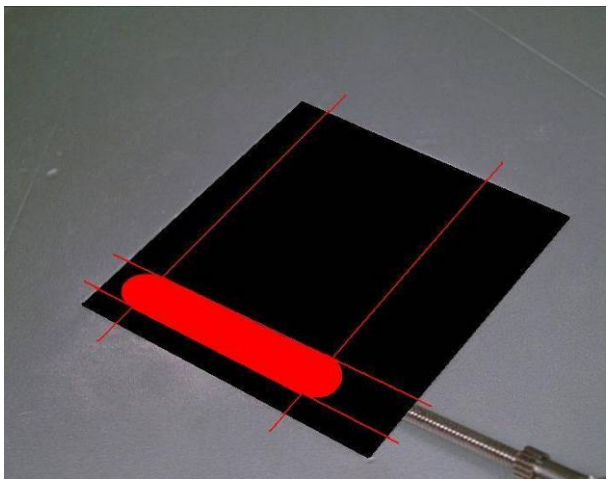
The method illustrated below can be used to determine the size, length, and location of the slot required in each servo cover. Move the servo arm to the maximum commanded deflection. Using a ruler and pencil, make pencils marks around the outside of the servo cutout to show the required size of the slot.



Remove the linkage from the servo arm, and rotate the arm below the level of the servo cover. Install the servo cover (illustrated in black below). Using the lines around the outside of the cutout, draw the extents of the required cutout as shown below.



Drill a hole at each end of the slot such that the drill diameter is the same as the width of the slot. Using a knife, saw, or cutoff wheel, remove the remaining slot material (colored in red in the photo below). Screw the servo cover into place and reattach the linkage to the servo arm. Check that the servo arm and linkage does not bind on the cutout. Trim/sand the edges of the slot as required.



Preparing for the Maiden Flight

Thoroughly examine all aspects of your model to ensure that you haven't missed or forgotten anything. Check that all fasteners are tight with blue Loctite (if applicable) applied to the threads. Make sure all wiring, air lines, linkages, and components are secure. Perform a leak check on the pneumatic systems to make sure that there are no leaks when the landing gear is down/up, brakes on/off, and airbrakes open/shut. Check that the landing gear retract/extend properly and that the gear doors and air brakes open/shut without binding. Fuel and defuel the

aircraft to ensure that all fuel tanks completely fill and completely empty. If you find any problems, correct them BEFORE flying.

> ***"It is far better for your model to be on the ground and you wishing it was in the air than it is for your model to be in the air and you wishing that it was on the ground!"***

Test run the engine to make sure that it starts and performs correctly. Conduct some taxi tests to ensure that the model tracks straight and that the wheel brakes evenly stop the model.

Maiden flights can be stressful enough without worrying about technical problems or potential surprises and equipment failures. It's generally far easier to fix a problem back in your workshop than at the flying field. Take your time and ensure that you have checked and tested all systems.

Congratulations, you've completed building your new Fei Bao MiG-21!