

# *F9F Panther* *Construction Manual*

(Version 1.4/2005)

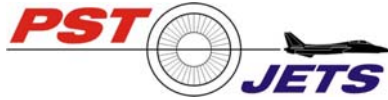


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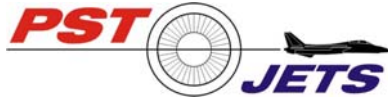
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## F9F Panther Construction Manual

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## F9F Panther Construction Manual

### Introduction

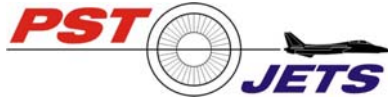
Thank you for purchasing the PST Jets F9F Panther kit. The PST Panther is designed for use with 12 to 18 lb turbine engines. The PST Panther is based on an accurate scale outline of the F9F-2, and was derived from our 3D cad design system. The Panther design in prototype model form has been tested and refined in over 200 flights prior to the institution of our production runs. The kit itself is produced at the PST factory using advanced vacuum molding techniques for the fuselage, tail group and wings. Panel lines and surface detail have been incorporated into the manufacturing process and are accurate to the 3 view drawings supplied with your kit. The PST Panther may be assembled as a sport jet, or may be detailed to a full scale competition class model. The Panther kit contains a very high level of prefabrication to make assembly of your model a fun, easy and straight forward process. The model is not difficult to build, but it is important that you follow the instructions. We strongly recommend that you completely familiarize yourself with this manual prior to the commencement of assembly. You will be rewarded with a model that faithfully reproduces the appearance of the original F9F and gives you many hours of fun, reliable flight.

**Notice:** Your Panther kit is designed for use with our PST 600R turbine which produces 14.3 lbs of thrust, but is suitable for use with any good quality 12 to 18 lb turbine engine. We specifically recommend against the use of any engine that is not within this power class, and advise you that it is dangerous to use an engine outside of the class of engine recommended by us. Use of an engine outside of this class may result in failure of the airframe, loss of control, damage to third parties, or personal injury. If you are uncertain of the potential usage of a certain type of engine contact your dealer or PST directly for advice. It also goes without saying, but we will say it anyway! A turbine model jet requires experience both in setup and flying. If you do not have adequate experience, please seek assistance from someone who does. Any model jet if operated incorrectly can be hazardous to you and those around you. Have fun! But fly and build safely.

### About This Manual

Every effort has been made to make this manual as clear a guide to assembly of your model as possible. Please follow each section for assembly. If you require any assistance please contact your dealer or PST for advice.

**Notice:** While every effort has been made to make the assembly of your Panther as easy as possible, PST is unable to monitor your actual assembly of the Panther. PST assumes no liability or responsibility for the finished Panther Kit. PST assumes that by purchase of this product you have the necessary skill and experience to assemble the product, and to use the product. If you are unsure of your abilities we strongly recommend that you seek assistance from an experienced modeler and model jet pilot. It is necessary that you follow all regulations required within the area you live in and obtain all necessary approvals prior to flying your Panther.



## F9F Panther Construction Manual

### Products Needed To Complete Your F9F Panther

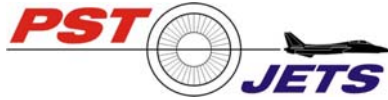
1. Optional PST Retractable Landing Gear System, Wheels and Brakes are available from PST or your dealer.
2. Turbine engine, thrust tube and Accessories available from PST or your dealer. We recommend the PST 600 R turbine engine; the Panther was designed around this engine and tested with it.
3. Radio gear and Gyro (not really needed but will provide easier ground handling)
4. Fuel tubing and plumbing accessories
5. 30 Minute Epoxy Glue (High Quality, We recommend either ZAP products, BVM Aeropoxy, or West Systems Epoxy). We also recommend you purchase a small jar of milled fiberglass such as that sold by BVM or West Systems to thicken the epoxy in certain instances.
6. Cyanoacrylic Glue (We recommend ZAP products, thin, medium and slow).
7. Paint suitable for your chosen color scheme. The Panther gel coat is known to be compatible with Acrylic Lacquer, PPG, 2K, and 2 part epoxy paints.
8. Optional Graphics and Insignia's
9. Optional Cockpit kit (please contact us for availability)
10. Optional sliding canopy kit (please contact us for availability)

**Notice:** When cutting or sanding fiberglass we recommend that you always use a mask such as filtered painter's mask. It is hazardous to your health to inhale fiberglass dust or particles. When cutting always wear safety glasses to protect your eyes. When cutting always mark the lines first with some form of non permanent marker, this will allow you to maintain accuracy.

### Recommended Tools And Supplies

We recommend that you have the following tools:

1. Screw driver set, both flat head and Philips
2. Hex Key set
3. Fine and coarse file set, we use Permagrait in both the small and large size flat, rectangular and circular types, and the needle set and Permagrait sanding blocks.
4. Sandpaper 80 grit, 240 grit and 400 grit wet/dry type available at Automobile paint supply shops.
5. Dremel tool with Permagrait or similar 1/8 inch coarse and fine heads, dremel fiber cutting disks (such as 409) or 1/32 inch thick diamond coated cutting disk available from numerous suppliers including Micromark.
6. Hand power drill and drill bit set ranging from 1/16 inch to 1/2 inch.
7. Number 11 knife blades and knife
8. Razor Saw (Zona or similar)
9. Fillers, Light weight auto body filler such as Evercoat Euroglaze or similar available from Automobile Refinishing shops.



## F9F Panther Construction Manual

### Servo Recommendations

There are many possible choices of servo for the various control surfaces. The followings are the servos torque we used in our prototypes. While the choice of brand may vary, we recommend that you utilize servos with equivalent torque ratings.

1. Aileron servos – DS3401; minimum 4.3kg cm (60 oz in)
2. Flap servos, we prefer non digital servos on flaps. It prevents over current draw, and possible burn out – ES579; minimum 6.0kg cm (83 oz in)
3. Elevator servo – DS8411; minimum 8kg cm (111 oz in)
4. Rudder servo – ES579; minimum 6kg cm (83 oz in)
5. Nose steering servo – ES579; minimum 6kg cm (83 oz in)
6. Retract servo should be chosen to easily actuate your chosen retract valve. We use DS3201 small 4kg cm (55 oz in) torque servo for our retract valve.
7. Hydraulic Brakes - 11kg cm (153 oz in) servo. Yes we know it sounds like a lot, but our brake system is truly proportional. The PST brake system is hydraulic, using an oil cylinder, and pressure to the brakes requires servo pressure. Servos such as the JR DS8411 work well in this application. If you are not using PST retracts, or have changed to other wheels using airbrakes, use a servo suitable for the type of air actuated brake system you have chosen.

**Note:** Turbine jet models are of substantial investment, please use the most reliable radio gear that you can find. We recommend JR PCM 10X or PCM 9XII radio system and servos.

### A Brief Overview Of Your Kit

Your Panther kit comes highly prefabricated. The Wing panels are vacuum molded out of a sandwich of fiberglass and high grade balsa wood. The wing has already had the hinge slots for flaps and ailerons precut for you, and will use the hinges in the supplied hardware package. The control surfaces of the wing (ailerons and flaps) have also been predrilled and slotted for the appropriate hinges. Hard points for linkages have been preinstalled and are shown later in this manual. The Wing panels also have the servo bays precut for you along with precut hatch covers. Most importantly the wing tubes and anti rotation pins have been preinstalled and pre-aligned for you at the factory. Retract mounts are also preinstalled and reinforced. As we mentioned in the introduction a lot of testing was done on this kit prior to production to ensure that the kit goes together well and flies well.

The Tail group has been predrilled for hinging from the provided hardware package. Servo mounts for the elevators and rudders have been preinstalled. The Stabilizer assembly is pre-aligned at the factory with the tube and anti rotation pin. We recommend a permanent assembly which is shown in this manual. The fuselage of your Panther had the formers and equipment support trays pre-installed during the molding process; this includes the nose cone assembly which houses an equipment tray.

A high quality hardware package has been provided that consists of hinges and linkages that you will need.

**And now...a little History**

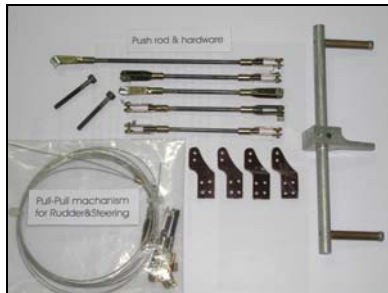


The Grumman F9F Panther (also known as Panther jet) was a single-seat, single-engine, carrier-based, jet fighter used by the US Navy and Marine Corps during the Korean War. A prototype of the Panther first flew on 24 November 1947, and the first F9Fs reached the Navy fleet in 1949 powered by two Rolls-Royce Nene engines providing 5,000 pounds of thrust. Panthers were the first carrier jets to see action in Korea and performed almost half of all attack missions for the Navy and Marine Corps. An F9F of VF-51 flew the Korean War's first jet sortie from an aircraft carrier on 3 July 1950, and Panthers served throughout the entire Korean War. The F9F Panther was the most widely used naval jet fighter of the Korean War, equipping seventeen US Navy fighter squadrons, six US Navy reserve fighter squadrons, and two US Marine Corps fighter squadrons. Armament included four 20mm cannon plus two bombs or an assortment of rockets.

Among the major Panther variants were the F9F-2B, a modified ground attack version with hard points for under wing stores and the F9F-5, the most numerous model, of which 655 were built; and the F9F-5P, an unarmed photo-surveillance version. A swept-wing model, the F9F-6 Cougar with higher speeds, would enter service in late 1951. Apart from the five prototypes (2 XF9F-2, 1 XF9F-3, 1 XF9F-4, 1 XF9F-5), a total of 477 F9F-2s, 69 F9F-3s, 655 F9F-5s and 28 F9F-5Ps (reconnaissance aircraft) were built.

Production of the F9F ended on 13 January 1953 after 1,388 were delivered to the Navy. The last Panthers were flown by the US Marines until 1957, while some Naval Reserve craft remained in service a few years longer. Some (mostly-2s) were also used for advanced pilot training, while a few -5s were modified to F9F-5KD drones. Navy records indicate that, in one form or another, Panthers were still on the books as late as 1962. Some of the Panther were converted to target drone or drone controller F9F-5KD (redesignated as DF-9Es in 1962). Civilian pilots seem also to have been fascinated by the F9F, with some still flying as late as 1996. At least two Panthers have been restored to airworthy condition and operated as privately-owned war birds, both in the USA, but only one remains airworthy today.

**Parts List**



1. Main fuselage with formers	12. Nose Cone
2. L & R Wings/Ailerons/Flaps	13. Hatch
3. Drop Tanks	14. Cockpit Tub
4. L & R Stabilizers/Elevators	15. Canopy
5. Stabilizer Joiner Rod	16. Fuel Cell (assembled)
6. Elevator Joiner Torque Rod	17. Tail Pipe Rear Former F17
7. Upper/Lower Rudder	18. Aileron Servo Mounts
8. Rudder Joiner Torque Rod	19. Flap Servo Mounts
9. Hardware Package (see photo)	20. Gear Panels Supports
10. Gear Doors (1 Nose + 2 Mains)	21. Retention Band for Fuel Cell
11. F1 Former (with F1B and bolt)	

**Specifications**

**Scale** – 1/6.3

**Wing Span** – 185cm

**Length** – 185cm

**CG** – 9.53 cm (3.75 inches) from wing leading edge where the wing joins the fuselage.  
(Gear down and empty fuel tank)



**Control throws / Set up:**

Elevators: 19mm Up/Down (16mm Low rate) - measured from fuselage line

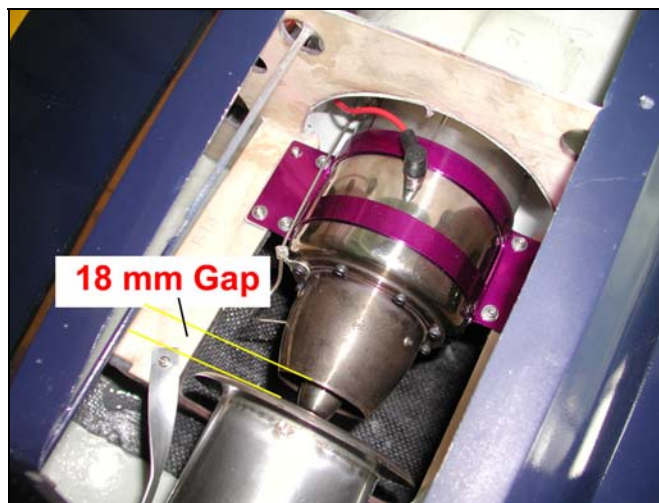
Ailerons: 20mm Up/Down (17mm Low rate) - measured with reference to flaps up

Rudders: 15mm L/R

Flaps: Takeoff - 25 degrees; Landing - 45 degrees

Nose Steering: 20 degrees left and right (a gyro may be used on the steering if you wish)

Clearance between turbine tail cone (outer, large one) and pipe - 18mm (See picture below)

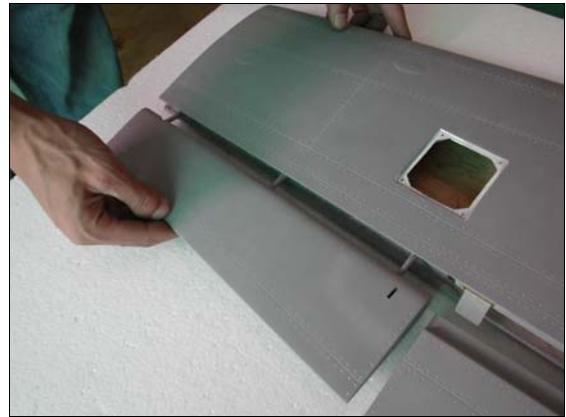




## Wings

Let's get started with the wings. We will show you the right wing, both wings are identical, and should be assembled in the same way. First, place the wing on a clean soft surface to avoid any damage.

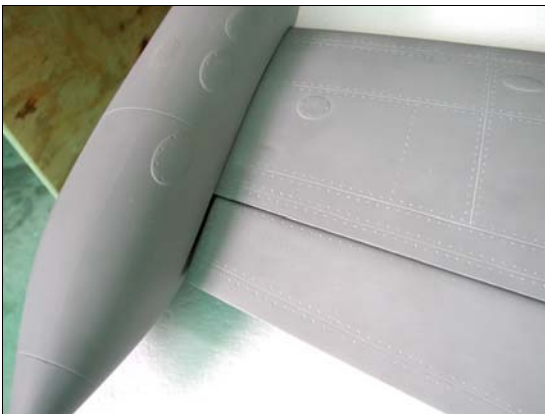
1. We will start with the aileron and flaps. Locate the right aileron and right flap. Locate 3 hinge points and 3 flat hinges. These will be used for the aileron and flap respectively. We recommend that you oil or grease the pin area to make sure that no glue penetrates the pivot joint. Test fit the hinges in the aileron and the flap, and dry assemble these to the trailing edge of the wing. If necessary clear any of the hinge slots and holes to allow for a full but snug fit. Make sure the flap and aileron move freely on the hinges. In the case of hinge points do not forget to keep the pivot point at a right angle to the control surface and to ensure that all pivot points are in line with each other. When satisfied with the fit, epoxy three point hinges (ailerons) and 3 flat hinges (flaps) to the wing's trailing edge. **NOTE: Roughen the hinge surface to improve bonding strength**, also remember that we are using 30 minute epoxy, do not cut corners and use faster curing epoxy.
2. Leave to cure. Make sure that no epoxy has run into the hinge joint, if it has, clean immediately with isopropyl alcohol.



3. After the hinges have cured, epoxy the hinges to the aileron and flap. Use masking tape to hold the control surface in position so that the hinges do not partially slide out. As mentioned above, make sure that no epoxy has run into the hinge point pivot joint.
4. Check alignment carefully.
5. Make sure that ailerons can move at least 20mm up/down and that flaps have at least 45 degrees downward movement.
6. Locate the aileron and flap linkage horns; we have premarked the location of where the horns go on each control surface.
7. Mill a slot for each control horn; take care to ensure a neat clean fit. The control horn should extend from the slot as shown in the photo below
8. Generously epoxy the linkage horns to ailerons and flaps where marked. Make sure that L & R side horns are standing up at equal height. We use a 30 minute epoxy mixed with a small amount of milled fiber such as the BVM milled fiber glass. This gives a consistency similar to syrup and a stronger joint. Wipe off any excess epoxy that may come out of the slot, clean with alcohol as necessary. Let this assembly cure.

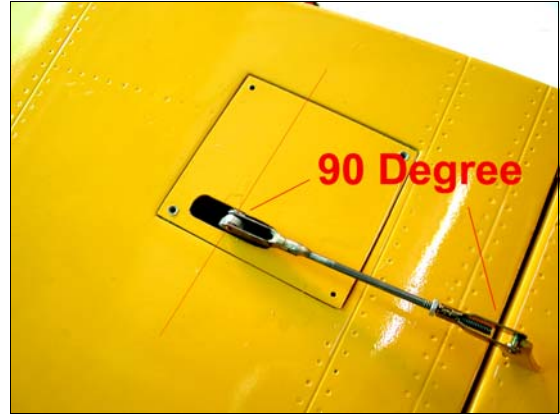
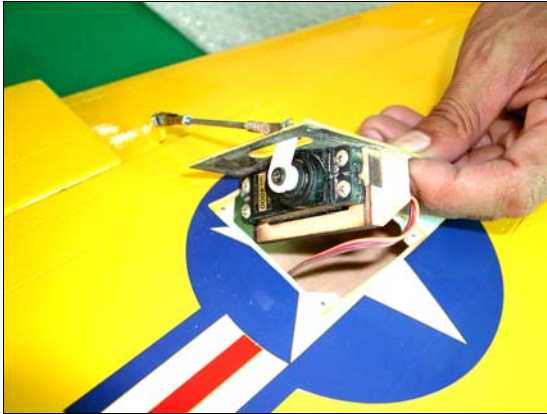
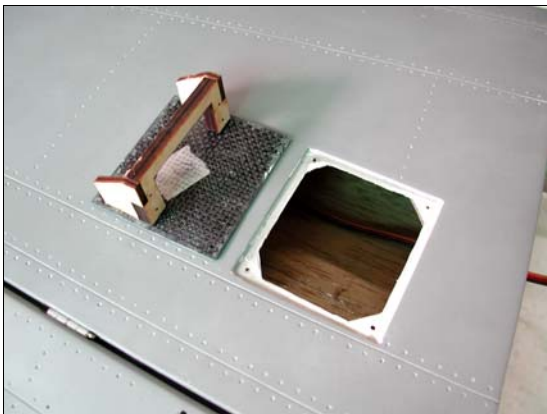


9. Locate the tip tank. Your tip tanks have alignment pins pre installed, and the tip rib of the wing has predrilled mating holes to accept the tip tank.
10. Dry fit the tip tank and make sure that it is aligned with the wing tip rib. Also make sure that the aileron assembly does not bind against the tip tank. If necessary enlarge the hold to adjust the fit of the tip tank. The angle of the tip tank should be a right angle to the wing.
11. Epoxy in the tip tanks. Place epoxy both on the alignment pins and the face of the tip rib. Roughen the mating surfaces with sand paper before applying epoxy. The intent here is to remove the paint but not cut through the fiberglass.



12. Locate the hatch covers for the aileron and flap servos. Locate two servo mounting brackets.
13. Mount the aileron and flap servo mount brackets to the hatch covers as shown in the photo. Use 30 minute epoxy or slow zap to do this.
14. Cut out slots on the cover plates for servo control horns as shown in the photo.
15. Make sure that the control rods are 90 degrees with respect to the ailerons and flaps. The servo should be energized and set to center position.
16. With the Ailerons aligned with the tip tanks, make sure that the aileron servo horns are standing straight up with equal movement to both directions. Use servo horns that are long enough to get at least 20mm up/down movement on the control surface as measured from the neutral point against the tip tank.

17. With the Flaps fully retracted (aligned with aileron), make sure that the flap servo horns are pointing slightly toward the wing trailing edge thus allowing greater movement for flap extension. Again make sure you have energized the servo, and that it is in its neutral position when you mount the servo horn. The neutral position is important. Many computer radios have the full up position of the flap control in the servos neutral position. If you set the servo to the full in position you will have great difficulty adjusting it later.
18. Insert aileron servo lead extensions. (user provided)
19. Secure the cover plates with the provided screws.



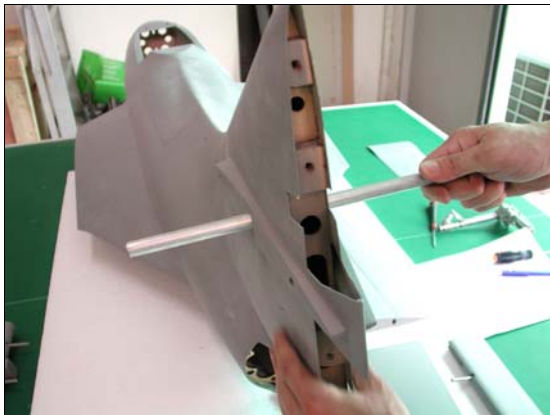
Repeat the above steps for the left wing.

Congratulations you have completed the wings. We will cover wing fitting to the fuse later in this manual.

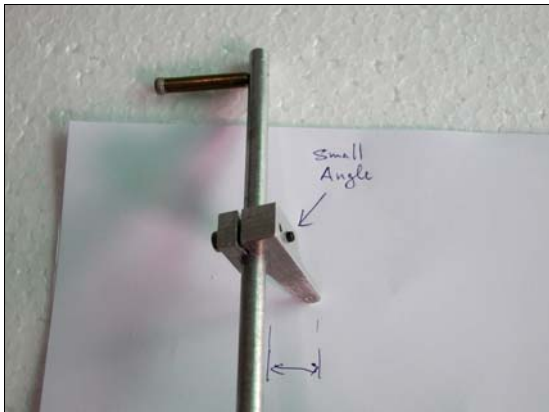
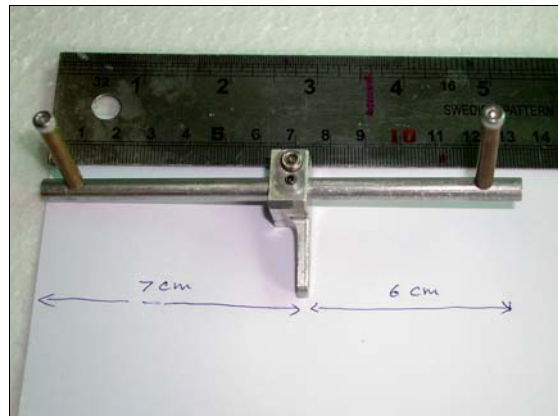
### Tail Section

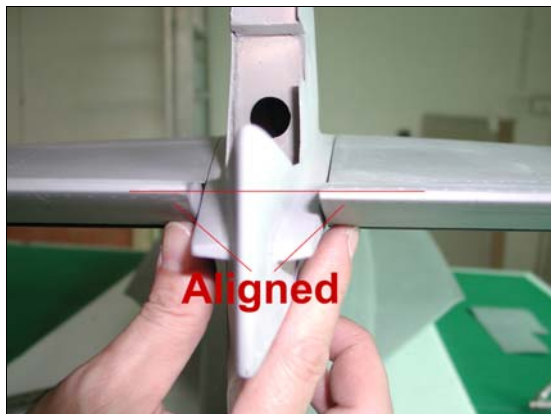
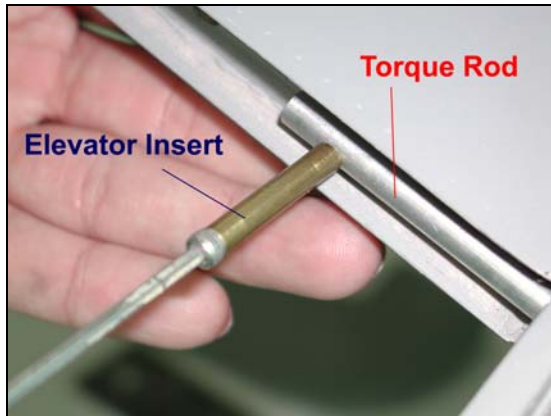
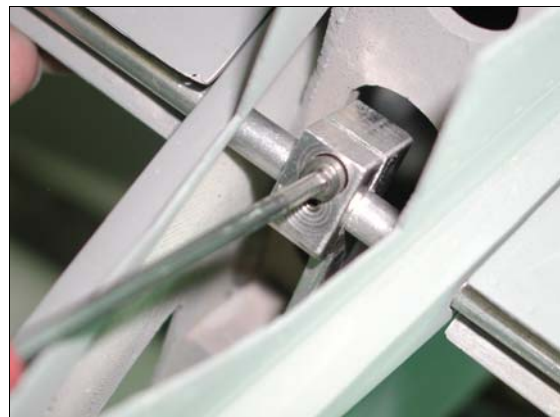
Let's move on to the tail section.

1. Locate the left and right stabilizers; each side is marked as left and right. Again put these on a clean soft surface to prevent damage and marking.
2. The stabilizer mounts to the fuse using a joining rod and a rear alignment pin.
3. We recommend that the stabilizer assembly be permanently mounted to the fuse.
4. Dry fit the stabilizers and make sure that they line up correctly against the fillet extending from the fuselage. Your stabilizers were pre aligned at the factory, in the unlikely event that line up is not correct, use a Permagrit round file to slightly open the hole in the fuse fillet to allow correct alignment.
5. When satisfied with your stabilizer alignment, rough up the aluminum joining rods with sandpaper to create a keyed surface for bonding. To ensure a good bond, sand the stabilizer and fuselage joining surfaces slightly to remove paint and primer.
6. Smear a light coat of epoxy on the rods and insert the stabilizer joining rods and epoxy the stabilizers in place coating the stab root with epoxy. Pay attention and ensure that you have correctly place the left and right sides as marked. Please be careful to cleanup any excess epoxy that comes out of the joint.
7. Check alignment and set aside for the epoxy to cure. You may wish to use masking tape to hold the stabilizer in place while it cures.



8. Locate the left and right elevators.
9. The elevators will be joined with the provided joiner/horn torque rod mechanism.
10. As shown in pictures below, the left and right side of the joiner are 7cm and 6cm from the horn, respectively. The horn is also angled slightly forward when the elevators are centered (see pictures below).
11. Disassemble the torque rod and insert the rod through the stabilizers and the fuselage while placing the horn in the position as described above and shown in the photos. (This is inside the rear of the fuselage).
12. There are 3 set screws to secure the horn to the torque rod. There is a mark on the rod for proper positioning of the set screws.
13. Secure all set screws and elevator inserts with thread lock.
14. Please note that you have not yet mounted the torque rod to the elevators, the right angle extension will be inserted into the elevators at a later step.





15. The left and right elevators are marked. Locate three hinge points for each elevator. The elevators are predrilled to accept these hinge points. Grease the pivots on the hinge points to prevent glue from getting into the joint, then epoxy the hinge points in place in each elevator, make sure the hinges are at right angles to the control surface and are fully seated. The pivot points must all be in line with each other.
16. Secure the elevators to the stabilizers with epoxy on the hinges and the torque rod (you are gluing the right angle extension of the torque rod into the elevators only).
17. Check that the left and right elevators are aligned and move freely before the epoxy sets. Be careful not to get epoxy into the hinge joints or on the moving part of the torque rod. If necessary wipe away excess epoxy with isopropyl alcohol.
18. Prepare your elevator push rod. Make sure it is the correct length to reach the elevator servo. We use 3/8 inch hollow thick walled carbon push rods with 4-40 ends. We recommend that you mount the elevator servo now, and actuate and center the servo. With the servo arm in the neutral position you can properly dimension your elevator push rod arm and clevises. Place the elevator push rod on the horn with the secure clip now. It is quite difficult to install the rod after the rudders are secured.
19. Finish securing the pushrod to the servo side. Center the servo horn and make sure the elevators can move at least 20 mm up and down.



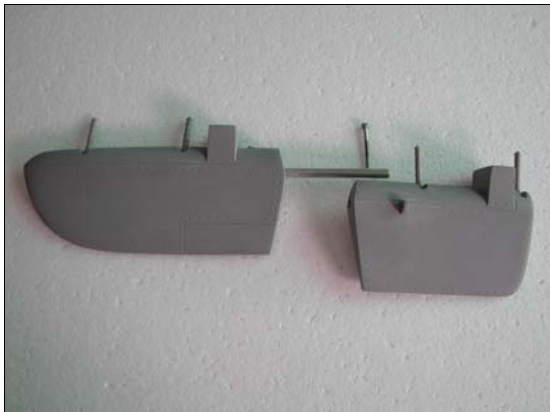
Congratulations, you have finished the stabilizers and elevators.

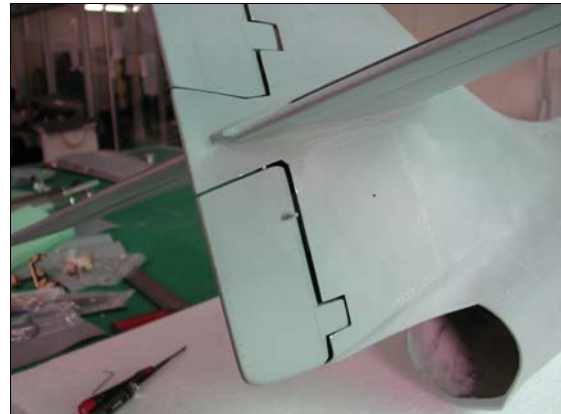
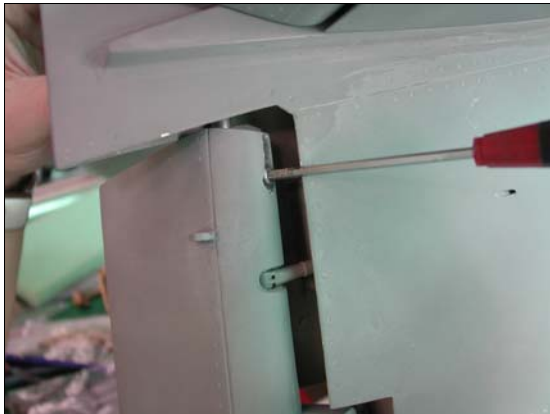


## Rudders

We will now assemble and install the rudders. The Panther had a split rudder; we use a joiner assembly to actuate both rudders (top and bottom)

1. Locate the upper and lower rudders, and place on a soft clean surface.
2. The upper rudder and the joiner are factory set and glued.
3. Locate 4 hinge points.
4. Epoxy the point hinges to the upper and lower rudders. We recommend that you grease the hinge pivots to avoid glue getting in the joint. Pay attention to the direction of rotation of the rudder hinges. The pivot points must pivot inline with the control surface.
5. When the epoxy is set, position the upper rudder and joiner as shown in the photo below.
6. Position the lower rudder while making sure that the hinges are positioned inside the holes on vertical fin.
7. Trial fit the rudders into position. Check for proper fit and alignment.
8. Remove the lower rudder.
9. Place epoxy (30 minute with a small amount of milled fiberglass) on the joiner and inside the upper and lower rudder hinge holes.
10. Reposition the lower rudder to the joiner.
11. Position the rudder to one side and screw in the lower rudder set bolt.
12. Tighten the set bolt and check for proper fit and alignment.
13. Allow the epoxy to cure.

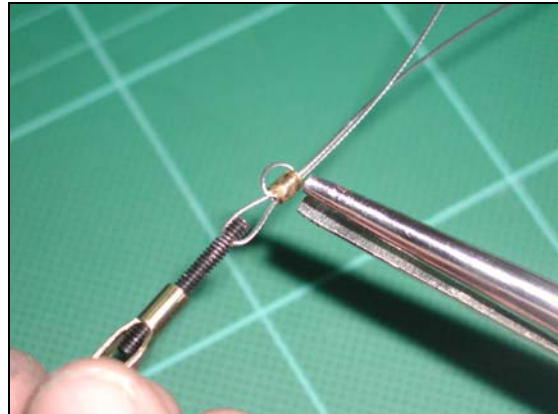




14. Install your rudder servo in the preinstalled mount located in the fuse as shown in the photo below. This is on the rear right side of the central hatch.



15. The rudder operates with a pull-pull wire system.
16. Assemble two pull-pull cables as shown in the photo below. These cables are adjustable in small increments to have adequate tension, but should be premeasured to ensure accuracy.
17. The cables are routed through the 2 installed rods.
18. One end of the cable is secured to the servo horn and the other end to the rudder horn as shown below.

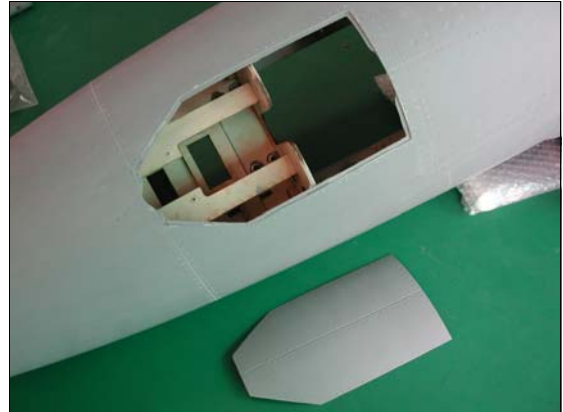
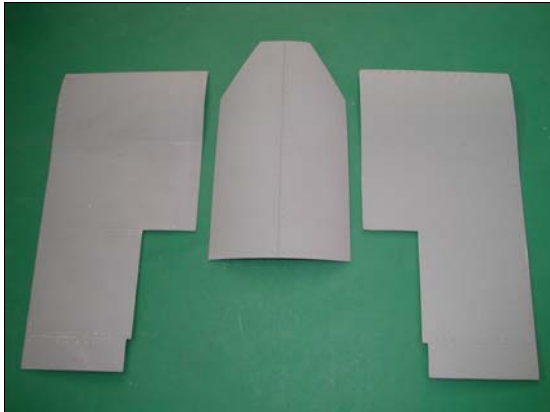


19. Secure cable end carefully (make sure it is well crimped) and make sure that there is no kink in the cable line.
20. Adjust the cable for firm tension equivalent to the nose gear steering cable.
21. Make sure you have at least 15mm movement to the left and right, if you cannot achieve this then your servo control horn is not wide enough. Stock 3cm (1.25 in) or wider servo horn will provide the required movement.

The rudder assembly is now complete.

**Landing Gear**

1. We have provided separate molded gear doors. For modelers wishing to use gear doors. The doors may be hinged with Robart door hinges and actuated by either a servo or air ram. The doors are provided for optional installation to improve the scale fidelity of your model. Page 34 shows photographic examples of installation.



2. A simple method of sport gear panel covers rather than doors is shown in the installation in the photos below.



3. Your Panther was designed to use the optional PST scale retracts. Other manufacturers retracts may fit, or may fit with modification to both the gear and the mounts. The nose gear requires 100 degrees of retraction and the main gears require 70 degrees of retraction. For best fit, we recommend PST landing gear set which is available as an option. The complete landing gear set comes with a pneumatic retract system, scale nose oleo, main struts, alloy nose and main wheels (rims/tires), and a hydraulic brake set.
4. The following instructions are for installation of the PST scale retracts.
5. Locate and glue the supplied gear panel support squares and triangles as shown in the photo below.



6. The landing gear formers and supporting blocks are factory installed. The mounts are made for the PST landing gear set but may accept other retracts with modification as necessary.
7. Drill a hole at the door panel for the Wing Mounting Bolt. Make sure that it is positioned correctly for easy access. The hole should be slightly larger than the wing bolt. The photo below shows the location of the hole.

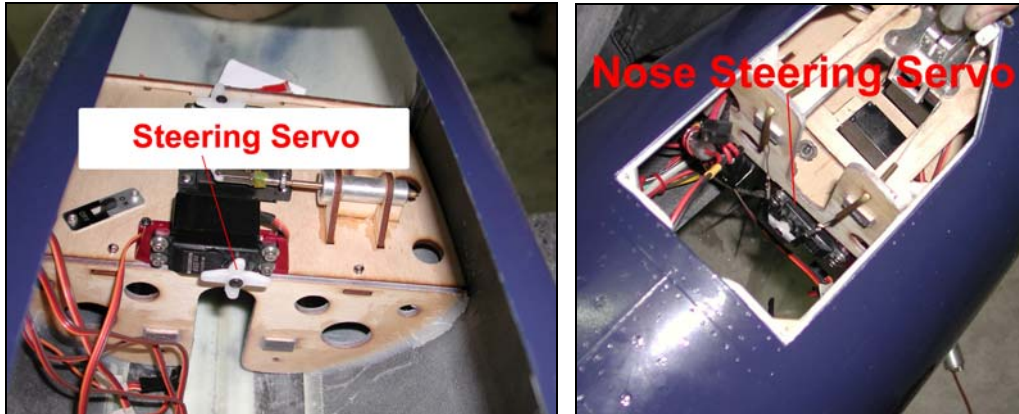


8. We will shortly install the nose gear, but to maintain centering it is necessary to install two nose steering guides. The two nose gear steering guides should be epoxied in place as shown in the picture below.



9. You may now seat the nose gear as shown in the photo above. Mark and drill holes for the nose gear. There are two possible methods of mounting. You may either use blind nuts and bolts. When using blind nuts, use some epoxy to hold the flange in place so it does not work loose. You may also mount with heavy duty wood/sheet metal screws. (number 6 or greater-steel) Prior to mounting your nose gear, we recommend that you install the air lines in place.

10. After mounting the nose gear, install your steering servo as shown in the photo below.



11. Prepare two pull cables which will route from the steering collar on the nose wheel assembly to the steering servo. This is shown in the photo above.
12. Now for the main gear. Drill a small Access Hole as shown in the photo below. This is to allow you to tighten the rear corner retract screw.



13. Fit the main retract assemblies to the right and left sides respectively. Mark the mounting holes, and drill the holes. Install the main retracts using either of the two methods used for the nose gear. We recommend that you install the air lines prior to mounting the gear. The photo below shows the left and right gear and before and after installation.



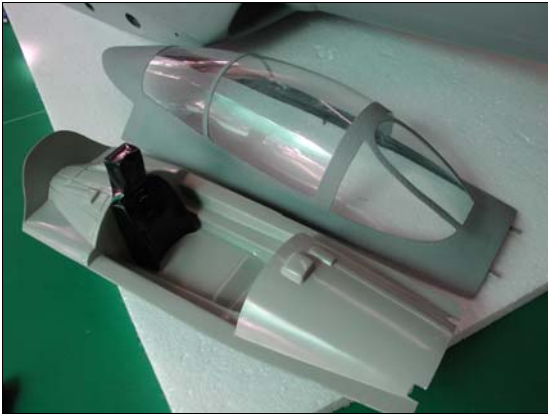
14. If using PST retracts, separate instructions are provided for hookup of the brake system and the retraction valve system. If you use third party valve systems such as Ultra Precision, BVM or Robart, follow the instructions provided with these valves.
15. The air tank and air valve for retracts in our prototype Panther was installed as shown in the photo below.



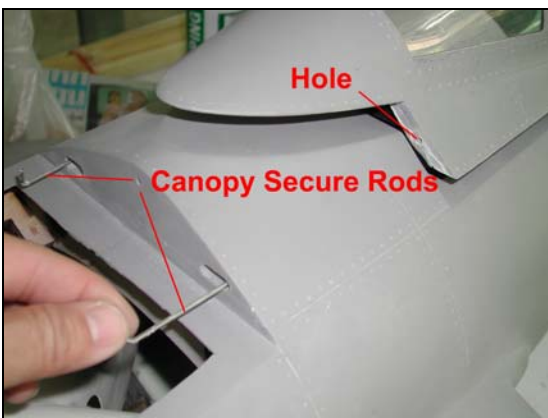


**Canopy / Hatches**

1. We plan to eventually offer a full cockpit kit. However at this juncture we do not offer such a kit. We provide a few basic parts only. It is possible to detail a cockpit using a variety of available materials. Make all the cockpit and instrument details before gluing the cockpit to the canopy.
2. Place the cockpit tub into position in the fuselage.
3. Test fit the canopy and trim as necessary to have a good fit to the cockpit tub.



4. The canopy is secured by two wire rods (provided) which are accessible from the engine bay. (central hatch). Holes are predrilled in the fuse for these rods. You will need to align the hatch and mark the holes. The rod runs from the rear of the canopy hatch through the holes in the fuse in front of the canopy hatch. We have provided you with two rod sleeves which should be aligned and epoxied into the canopy hatch to allow the rods to pass smoothly from rear to front. Please see the photos below.

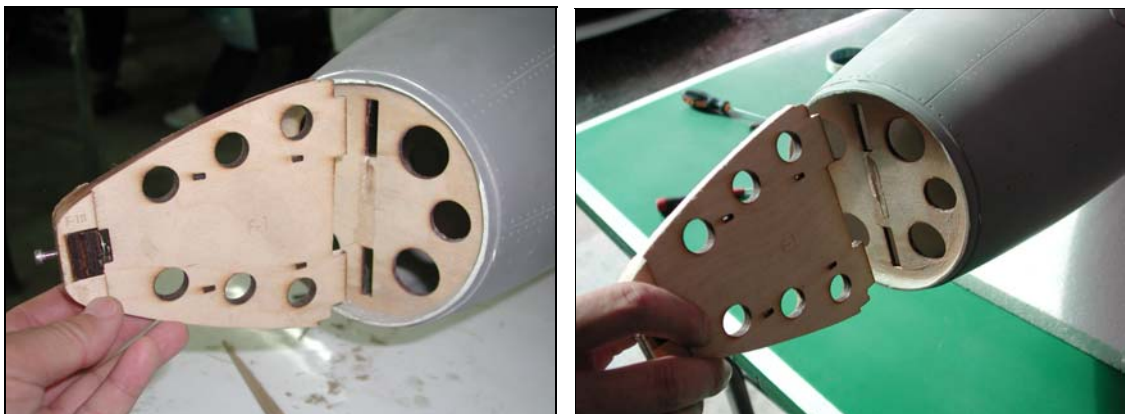


5. When the above assembly fits correctly you may glue the cockpit tub into the canopy assembly. Use epoxy to do this.
6. Use masking tape to maintain alignment.

7. The engine bay hatch is factory finished but may require slight trimming.
8. Test fit the hatch and trim or sand as necessary.

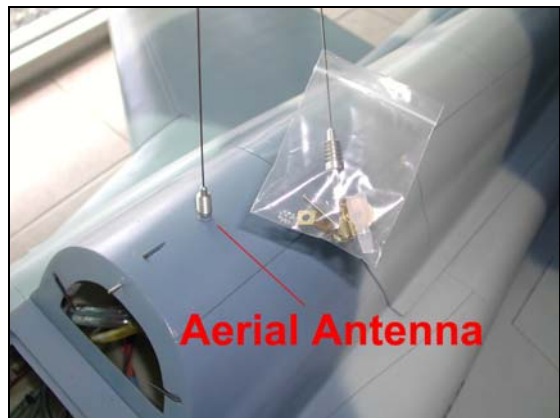
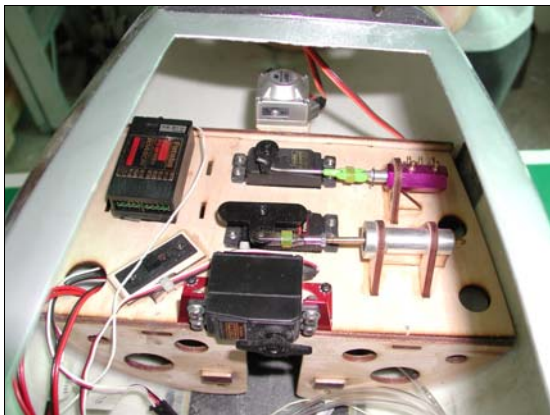
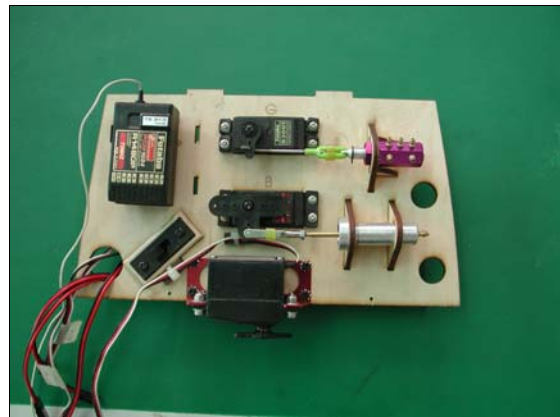
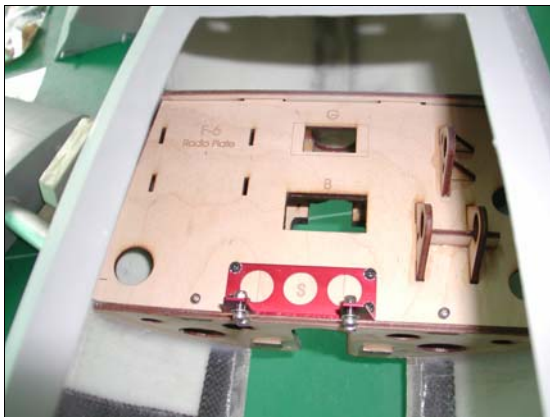


9. Locate former F1 which is the nose cone retention former as shown in the photo below.
10. The F1B former and mounting block are factory preinstalled.
11. Epoxy the F1 former in place with the nose cone mounted using the nose cone bolt to ensure proper fit.



**Equipment**

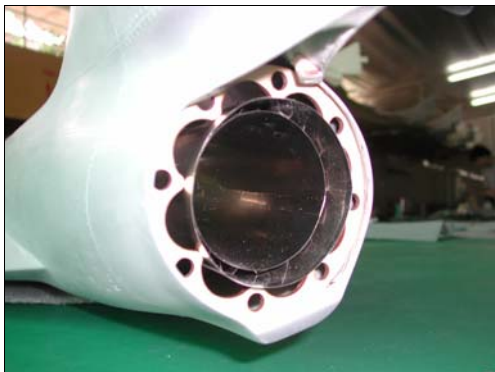
1. We installed most of the radio gear, retract valves, and brake on the F6 radio plate.
2. The F1 former is designed to accept battery pack(s) and any nose ballast required for balancing to obtain a correct center of gravity.
3. You will find ample space inside for easy radio and accessory installation. The photos below show our installation.



4. We recommend the use of a Hayes whip antenna or similar for aerial installation as shown in the photo above. This minimizes possible radio interference from inside the aircraft due to shielding or equipment cross talk and reduces the possibility of reception drop out.

**Turbine / Tail Pipe**

1. The Panther is designed around the PST J600R turbine. However, the layout will accept most other 5-8kgs thrust turbines in the market today.
2. A custom double walled stainless steel tail pipe is available from PST and is designed to fit the Panther giving optimum thrust performance.
3. To mount the thrust tube, insert the thrust tube, and then insert the F17 thrust tube retention former as shown in the photo below. This former is located at the extreme end of the fuse. Match the mounting holes of the former to the thrust tube, and tack glue the former to the fuse with cyanacrylic glue (slow zap).
4. Remove the thrust tube and epoxy the former in place. Leave to cure.
5. Screw the heat shield plate in place as shown below.

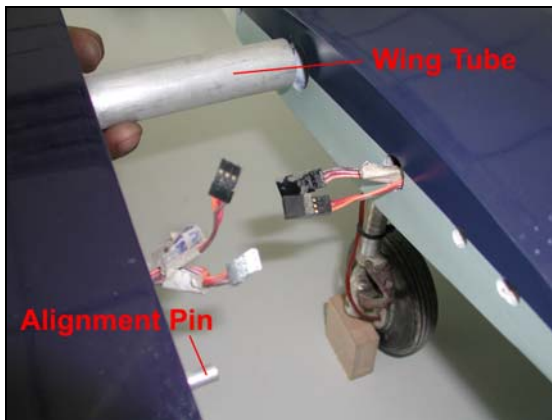


6. Install the thrust tube. Screw it to the engine mount former as shown in the photo below. Note that there are 4 mounting straps that must be bent to fit.



**Wing Mount**

1. The wing mounting bolts are already preset for alignment and fit from the factory. We have drilled the hole in the wing tube and tapped it to accept the bolt. See the photos below.
2. The wing mounts by sliding the wing tubes through the preinstalled wing sleeves in the fuselage and then into the wing tube sleeves in the wings. This is shown in the picture below.



3. Cut a small hole through the left and right main gear door panels so that a small Allen key can reach and tighten the wing mounting bolts.
4. Make holes in the root rib of the wing for the servo wires to pass through and make a matching hole on the fuselage side.
5. Make sure that servo extension wires are securely plugged in before joining the wings. Secure the joint with tape.

**Fuel System**

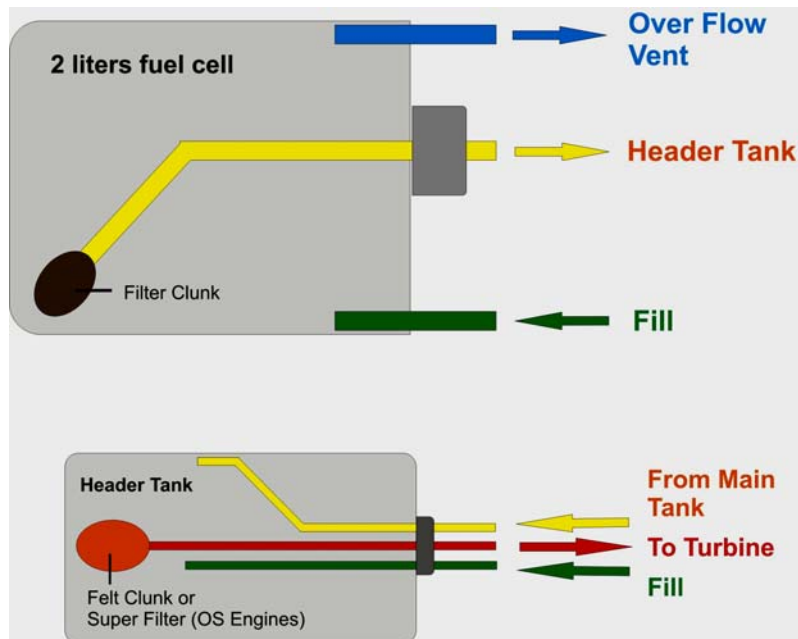
1. A custom 2 liter fuel cell is included.
2. The fuel tank cap is specially designed and fitted with an O-ring sealer.
3. Your tank is already assembled from the factory, however, upon removal of this cap, make sure that you put small amount of grease around the O-ring before screwing the cap back in.
4. The cap must be tightened firmly with the O-ring completely seated underneath. Please see pictures below.



5. The fuel tank is located inside the fuse just to the rear of the cockpit as shown in the photo on the next page.
6. The fuel cell is held in place by a rubber retention band through the tank seating former as shown. You may also use cable ties.
7. We recommend that you use a hopper tank (or similar device) to avoid air bubbles getting into the fuel line. An 8 oz hopper tank's set up is shown in the picture on the next page.



8. Fuel plumbing of the hopper tank is shown in the diagram below. The clunk shown is an OS Engine felt clunk to further minimize air bubbles.
9. Notice that we have two filling lines, one for the main tank and another for the hopper tank. From experience, we find that fueling directly into the main tank is faster than fueling through the hopper tank while minimizing unnecessary positive pressure to the hopper tank. Fueling from the bottom of the main tank also helps minimize foaming during refueling.
10. For a detailed discussion of engine installation, consult the manual supplied with your turbine engine, or contact the turbine manufacturer.

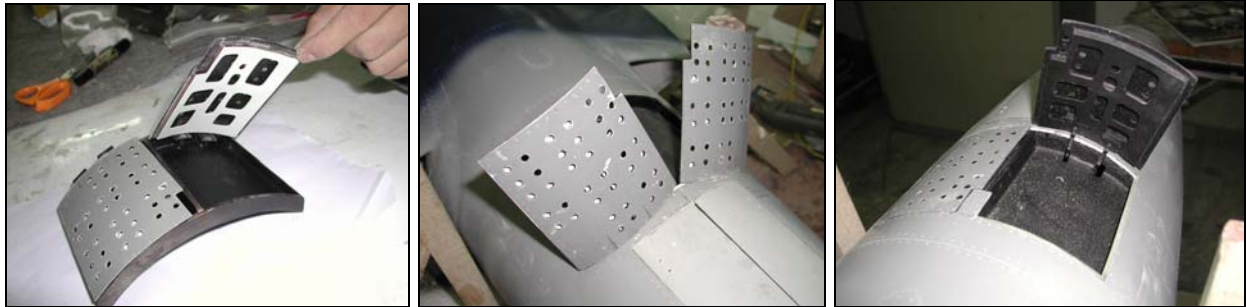


**Fueling Diagram**

**Advanced Features**

Gear doors, dive brakes, and speed brakes can be made. Pictures below illustrate the techniques. You can use either servos or pneumatic actuators to operate these surfaces. You may adapt your own techniques if you are comfortable with your skill and experience level, but feel free to call or email us for more details and suggestions.

**Dive Brakes:**



**Speed Brakes**



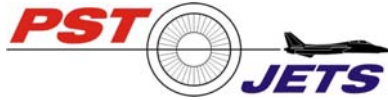
**Main Gear Doors**



**Nose Gear Doors**







## F9F Panther Construction Manual

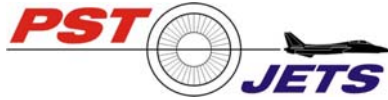
### Finishing the Panther

You have finished assembling your Panther. Inspect the joints in areas you have glued such as the stab assembly. Inspect for any chips in the gel coat. Use Euroglaze filler or similar to fill any gaps, chips or pin holes you may find. When cured sand smooth using a 240 grit sand paper.

Any exposed wood surfaces such as the thrust tube former should be given a light coat of finishing resin to weather proof it. Wood trailing edges on the wings, stab and fin were coated at the factory.

When painting your Panther you may use a variety of paints such as PPG basecoat/clear coat, or numerous other paints available in the market. It is important to go easy on the paint and keep the weight down. This is a model, not a car. If you do not have a lot of prior finishing experience, seek assistance from a friend that does. There are also a number of excellent tutorials available both on various internet sites, and from sources such as Dave Platt Models. Dave produces an excellent set of videos on aircraft finishing including painting and weathering which are well worth watching. These videos are available from RCJI Magazine, Traplet Publication Ltd., [www.traplet.com](http://www.traplet.com) or from Dave Platt Models directly.

One of the nice facets of your Panther is the wide range of color schemes available, and the range of scale details that may be incorporated. Information on details and color schemes is available through a number of books published on the Panther, including those by Squadron Signal.

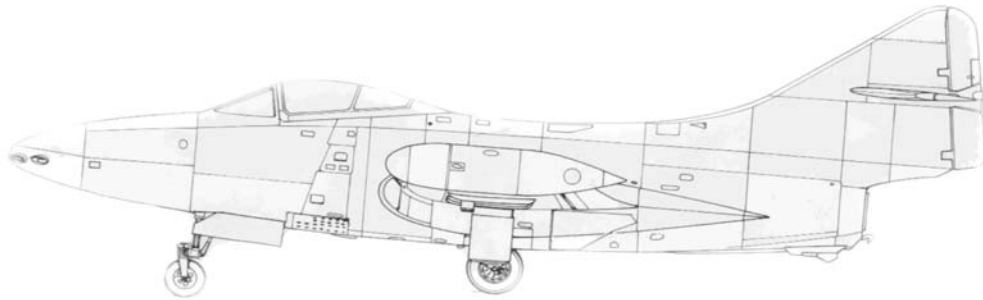
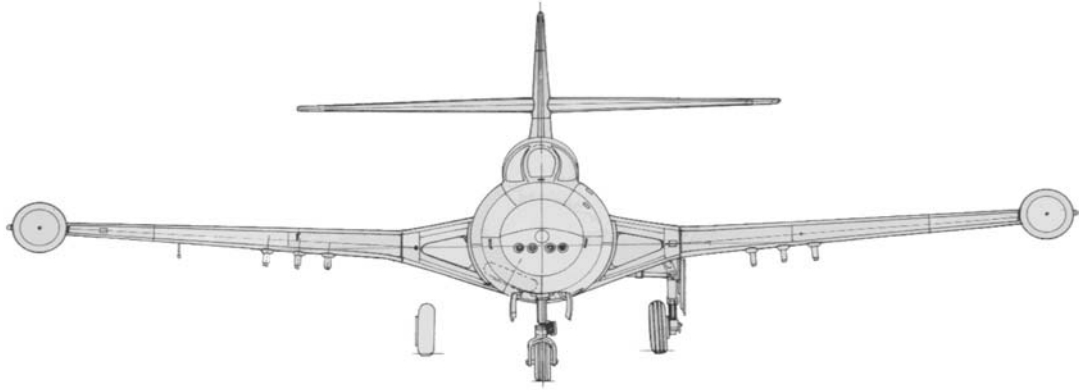


## F9F Panther Construction Manual

### Final Setup And Flying

1. Recheck all of your control linkages, make sure there is no slop, and that clevises are properly retained and will not come off.
2. Make sure that flight controls are set according to the recommended throws.
3. The CG (center of gravity) is at 3.75 inches from the leading edge of the wing at the wing root. This is balanced with the gear down and the fuel tank empty. You will need approximately 500-600 grams ballast in the nose depending on your radio equipment and cockpit configurations.
4. Remember that it is better to have a slightly nose heavy airplane than a tail heavy one. Please follow our CG until you have some experience with the aircraft.
5. Use takeoff flaps at 25 degrees. Apply takeoff thrust then wait until the nose wheel is obviously light and lifting before rotating the plane into a moderately shallow smooth climb out.
6. Retract the gear as soon as you have a positive rate of climb.
7. Flaps should be retracted after you come around on the downwind leg.
8. The Panther is generally very docile and easy to fly. It makes a great first jet; even in lieu of a trainer. However, until you have some experience with this aircraft please set control throws as recommended. Split S and loops should be gentle until you get the feel of the plane.
9. We recommend that prior to landing, you slow down to around 40 percent throttle (this assumes you are using a turbine of around 14 to 15 lbs thrust), and test the landing flaps to get a feel for how much the aircraft slows down. Do this at a safe altitude. The landing flaps will slow you down quite a bit, be ready for this.
10. Landing is by the book. Start on the downwind leg, extend the gear then select takeoff flaps. When you are lined up on the final approach, go to landing flaps. You will need around 30-35% power on base leg and 25 percent on final with the landing flap configuration. Keep a constant rate of descent with power and maintain landing attitude with elevators.
11. Remember that your turbine aircraft is not a propeller plane, there is some lag in spool up and spool down in any turbine. Learn to think ahead and anticipate what will come next as you fly. We have seen many mishaps take place due to pilots reacting too late to what their jet was doing.
12. As you come to the threshold of the runway, take your throttle to idle. Make sure that your height is correct for touchdown, or keep the throttle up and go around.
13. Your Panther likes a little speed on final especially in a crosswind.
14. Flare at touch down and allow touch down on the mains with the nose wheel gently settling as speed is bled off.
15. We have had a lot of fun flying our Panther prototypes. All in all, the Panther is a very docile yet fully aerobatic jet. We think you will really enjoy it!
16. Check your six, have fun, and fly safely.....Your PST Jets Team.

**F9F-2 Panther 3 Views**



**Supplementary**  
**Landing Gear**

PST Jets landing gear is designed specially for turbine powered aircraft. The following instruction is based on the F9F Panther landing gear set comprising of pneumatic retracts, struts, wheels, and hydraulic brakes.

**Components**

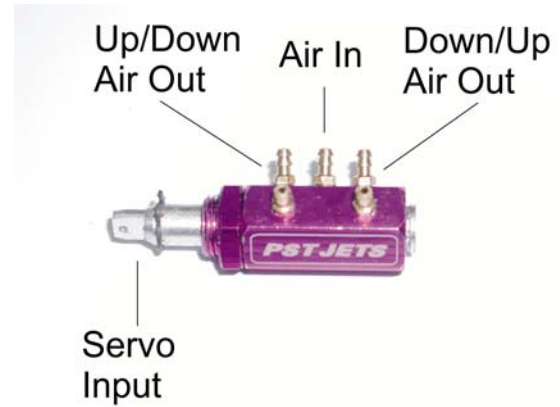


Your system consists of the followings:

1. Nose retract
2. Main retracts – L & R side
3. Nose strut with wheel and tire
4. Main struts with wheels, tires, and brakes
5. Retract air valve
6. Hydraulic brake actuator
7. Four 3-ways connectors
8. Air/Hydraulic tubing

**Retracts**

Standard pneumatic retract system installation.



## Brakes



**Notes:** Although this procedure is somewhat time consuming, once it's done right, hydraulic brakes are the greatest as you'll never again worry about losing brakes because of an air leak or only have a limited number of brake applications. On that note, air is the enemy of this system. This procedure will remove as much air as possible from the system, so that the master cylinder will not only apply brakes with authority, but, on the back stroke will release brakes on command....no more dragging brakes on release.

The other enemy of the system is dirt. Keep everything as clean as possible since any contaminants can cause leaks. Always keep all hydraulic parts in zip-lock bags or on clean paper towels/rags in a dust free area.

Items and tools you'll need but not supplied with the kit:

- 1/2 pint of light hydraulic oil. Household 3-in-1 oil or Jack Oil works well. Don't use ATF (attacks paint) or r/c car silicone strut oil (too thick),
- 2 hemostats/clamps,
- Syringe or eye dropper to transfer oil to master cylinder,
- and Safety wire tools.

## A. INSTALLATION



1. Disassemble brake calipers and master cylinder (m/c) and remove the 3 pistons from each slave "caliper" using air pressure (keep fingers on them so they don't fly out). Clean inner bores thoroughly with isopropyl alcohol and cotton swabs. Lube all o-rings with the oil you'll be using in the system. Set pistons aside in a clean place for now.
2. When installing brake tubing, consider leaving 6" or so of slack tubing at m/c and around 3" slack at the wheel wells for servicing.
3. Attach line to m/c and safety wire fitting with a double wrap. Safety wire t-connector also.
4. Assemble brake and wheel assembly without pistons in the slave cylinders. Don't tighten axles yet as you'll need to remove brake hubs several times during this procedure.
5. Attach lines to brake fittings and safety wire. Trim safety wire neatly as the fitting needs to fit through the hole in the hub to pull the caliper out in the next procedure.
6. Remove wheel and brake shoe and let the rest of the brake assembly hang loose for now.

## B. FILLING LINES WITH OIL (PRELIMINARY BLEED)

1. Place fuse upright in a model stand and put gear down.
2. Place a cup or paper plate under each caliper to catch dripping oil.
3. Hold m/c upright (clamp to fuse or have assistant hold it vertical) and fill with oil.

**Landing Gear Instruction Manual**



4. Allow oil to gravity feed and evacuate air from lines. Keep checking m/c and make sure it's topped off. If air enters, you'll have to start over.
5. Once all air removed from lines at brake end, clamp lines with hemostats.

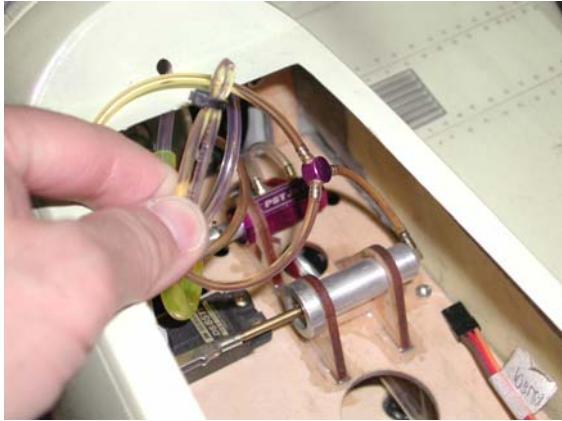
**C. FINAL BLEED OF CALIPERS**

1. With caliper pistons handy, hold one caliper with caliper bores facing up.
2. Remove hemostat on that side and allow caliper to completely with oil and no more air bubbles come out of the internal equalizing ports. Remember to keep the m/c full of oil or you'll have to start all over again if any air enters!
3. With oil flowing out the top of the caliper, slowly insert one of the brass pistons into the center port on the caliper. Install at an angle initially to purge air, and once o-ring seats, squarely push it in until it bottoms out.
4. Repeat with other 2 pistons in that caliper, keeping the other piston(s) seated with finger pressure.
5. Assemble brake into wheel unit and place it onto axle and strut (don't tighten anything yet). This just keeps the caliper/piston unit whole.
6. Repeat procedure C. with other wheel.

**FINAL AIR CHECK AND INSTALL M/C**







1. Top off m/c to the brim and insert plunger as per caliper pistons, insert at an angle to minimize air intrusion.

2. Actuate plunger by hand (place a towel or piece of scrap wood over plunger rod and push 10-20 lbs force) to check function of brakes and check for air in brake lines. (You might see little air bubbles come out of solution when you pull back on the m/c plunger...this is normal as long as the air goes back into solution (disappears) when you release the negative pressure.)

3. If air remains in lines at caliper, start over again at C. (You might have to disassemble and clean the caliper pistons as air might be pulling in through a piston o-ring).

4. If you see air in line at m/c end, start over again at B.

5. If no air in lines, install m/c in tray and hook up servo arm.

6. Adjust throw of m/c for about 1" from brakes off/zero pressure. If m/c overfilled (probable), you'll need to remove one brake unit, and holding the caliper with pistons facing up, carefully and slowly apply pressure to force to m/c to cause one piston to pop slightly and leak oil out of it's bore without popping it completely out.

7. Once m/c neutral is where you need it, re-seat piston.

8. Clean up both calipers and hubs with alcohol, easy on the brake lining though.

9. Reassemble brake units and tighten down axle set screws and check operation.

Enjoy dependable, efficient brakes.