

PT Military Trainer

R/C Scale Model Instructions



CONTACT INFORMATION

The PT Military Trainer was designed by: M.K. Bengtson
Prototype by: Brian Allen

Manufactured and Distributed by:
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Web Site: www.aerodromerc.com

PT Military Trainer

Thank you for purchasing the AerodromeRC PT Military Trainer model for electric flight.

THE MODEL

A semi 1/8th scale adaptation of the PT Military Trainer, this model is designed to be easy to build and exciting to fly.



Finished Model by Brian Allen

POWER SET UP

The AXI 2820/12 Direct Drive and a 112/8 APC prop power the model. Battery power pack is 3100 mah 3s2p lithium pack

MODEL SPECIFICATIONS

More than 295 laser cut parts

Scale:	1/8
Channels:	R/E/A/T
Wingspan:	48"
Wing Area:	636 sq in
Weight:	~62 oz
Power System:	AXI 2820/10 power
Prop:	14x7
Wheels:	Balsa & plywood, Neoprene foam tires rudder steerable tail wheel
Airfoil Type:	Clark Y
Cowl:	Soft balsa
Decals:	Available on the website

BUILDING THE MODEL

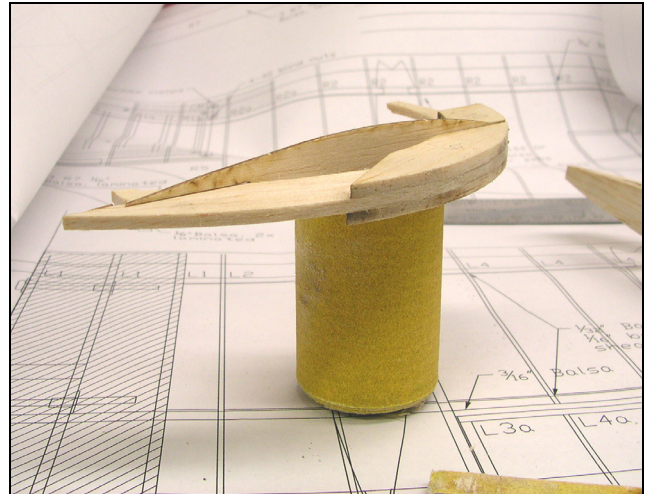
A note about the photos: The photos were taken of a prototype and the parts supplied may look slightly different from them. However, the concepts illustrated are the same.

Brian Allen built the PT Military Trainer prototype.

WING CONSTRUCTION

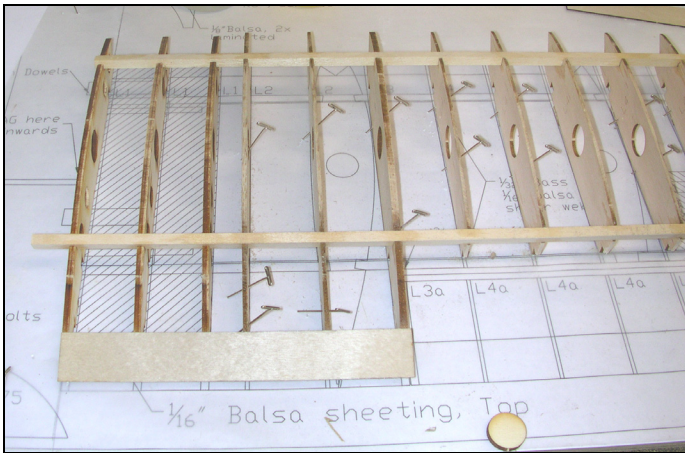
Build the wings from the top side down.

- 1) Put the front leading edge in place on the root ribs and end ribs (aileron joint on bottom wing or last wing rib on top wing)
 - 2) Glue in the top TE ply, now we have a framework to hold the other internal ribs.
 - 3) Put the other ribs in place on plan inside the frame. They all have tabs on their bottoms so that they stand securely.
 - 4) Add the top spars.
 - 5) Finish the wing tips.
 - 6) Remove from board and add the bottom spars.
 - 7) Add bottom TE ply and remove rib tabs.
- Wing tips are best assembled separately and attached to the wing panels.



Wing Tip Construction Detail

The top 1/32" plywood trailing edges are attached while the wing panels are on the board and the bottom ply parts are attached after the wing panels are removed from the board.



Trailing Edges

Use 1/2" square balsa leading edge stock and sand to a rounded shape after removing the panels from the board. The ribs have removable tabs that facilitate the building process. They are to be cut/sanded off to the marking line after the panels are removed from the building board.

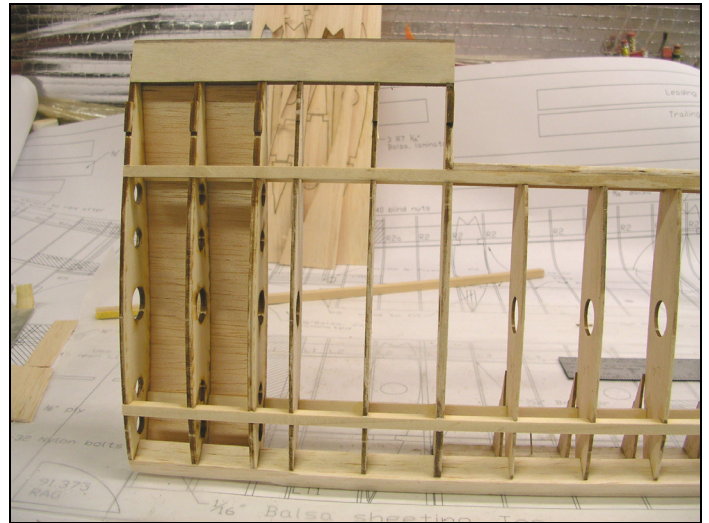
The top wing is built in three pieces, two outer panels and a center section. Build the sections and join them later. Insert the 4-40 blind nuts and glue into the plywood cabane strut mounts. Upper IP strut mounts are built into laminated plywood ribs. The Dubro gear straps are inserted into pockets formed in the laminated ply rib. The one outer 1/8" ply rib, R2c, should be glued in place while the wing panel is on the building board. After removal of the panel from the board, then add the center 1/32" ply, R2b, and other outer 1/8" ply rib, R2c along with the Dubro strap. Use 2-56 nuts and bolts to secure the strap in place. Brian added additional straps on adjacent ribs to serve as attachment points for rigging wires.



Top Wing Construction Detail

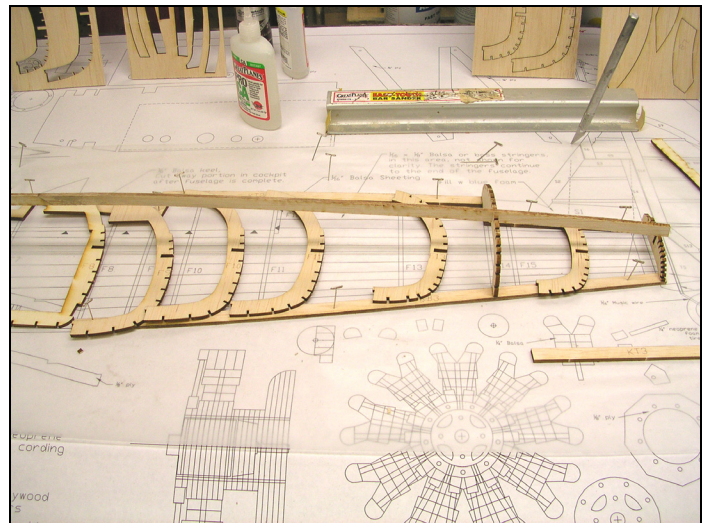
For the lower wing panels, the root rib L1 is angled to allow for dihedral, and the kit includes a template to set the dihedral angle.

Lower root ribs are to be top sheeted with 1/16" balsa.



Lower Root Ribs Construction Detail

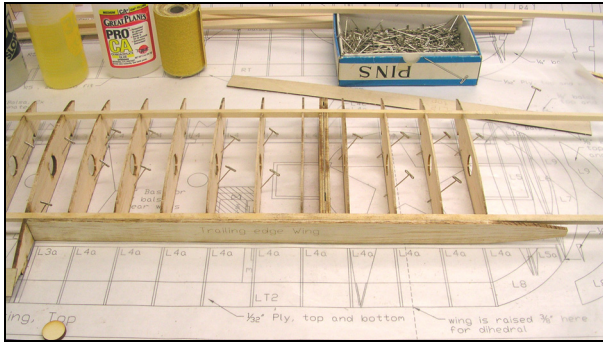
To facilitate wing mounting, 8-32 blind nuts are installed in the holes provided in the root L1 rib. 4-40 nylon bolts secure the lower wing panels in place on the finished model. 3/8" diameter birch dowels locate the wing in the correct alignment on the fuselage and are glued into holes provided in the L1 ribs.



Fuselage Formers

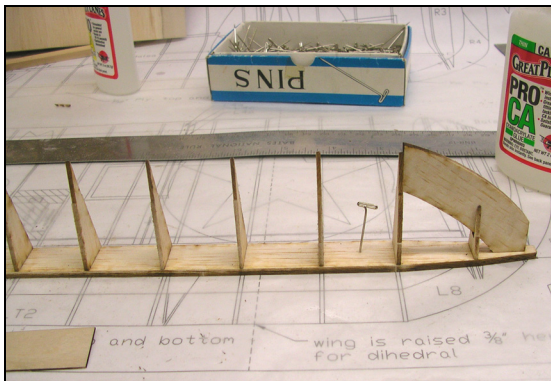
The lower IP strut mounts are similar to their upper wing counterparts however these can be pre built and glued in place during rib attachment. Aileron servo mounts are incorporated into 1/32 laser cut ply covers that are

screwed into 1/4" sq. bass/hard balsa rails mounted between the ribs. Add the aileron control horn after the ailerons are covered.



Lower Wing Aileron Section

Aileron leading edges should be sanded to a rounded shape to allow freedom of movement in both directions. The trailing edge of the wing in that section is left flat. Attach the ailerons at the centerline with CA hinge material.



Aileron Tip Construction

IP struts are constructed from laminated laser cut 1/8" and 1/32" thick plywood. Sand to Shape.



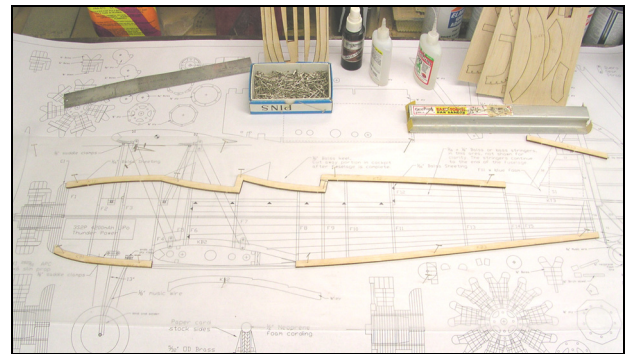
IP Strut Detail

The inner layer is 1/32" birch plywood with cut-outs for the Dubro gear straps installed in the top and bottom wings. These straps should be bent at a ~ 10 degree angle to facilitate proper insertion into the IP strut pockets. Optional reinforcing the mounting area is possible, small pieces of 1/32" plywood are provided.

FUSELAGE CONSTRUCTION

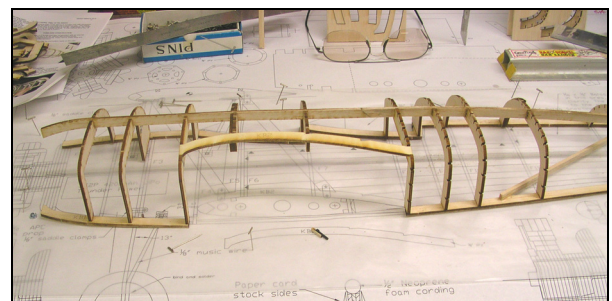
The fuselage is of former and keel construction with an internal ply riser that serves to fix the cabane attachment points, undercarriage attachment points, lower wing and battery into a unified structure.

Begin by assembling the top and bottom keels on the plan.



Fuselage Keels

Build the left fuselage side frame over the plan including the side keel. Add the front former F2 and the last former F16 then the side keel. Using the side keel, the other formers are added making the vertical alignment easy. Keel parts KL's are on the left side (from the "pilots" point of view) KR's on the right side. The keels determine the motor thrust alignment, so be careful to use the correct side keel in construction. Add the 1/8" plywood wing crutch, KB2. Also add a temporary 1/4" sq. balsa stock diagonal brace before removing the assembly from the board. Do not add the stringers at this point.

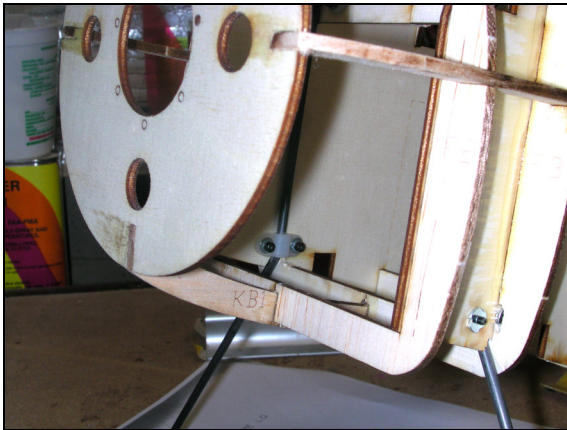


Keel Added

Glue the internal riser. It is important to attach this fuselage frame BEFORE adding the stringers and most of the right side formers. Otherwise, it will be impossible to insert the riser after these are attached.

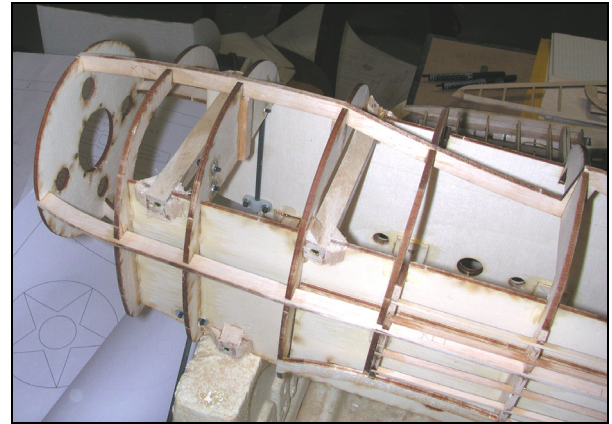
Use the left side of the fuselage with attached internal riser and attached the right hand F2 and F16 formers. Place the right side riser inside the fuselage and add the right keel KR. Use the keel as a brace to hold/align the other formers in place while gluing. This operation is done free hand, i.e. the structure is not on the building board.

The front landing gear is mounted using 1/8" landing gear straps and 4-40 bolts into the blind nuts installed in the F3 former inside the fuselage. Refer to the later section on construction of music wire parts.

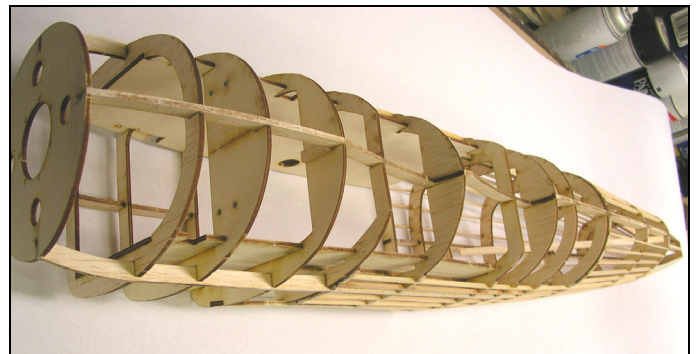


Front Landing Gear Mounts

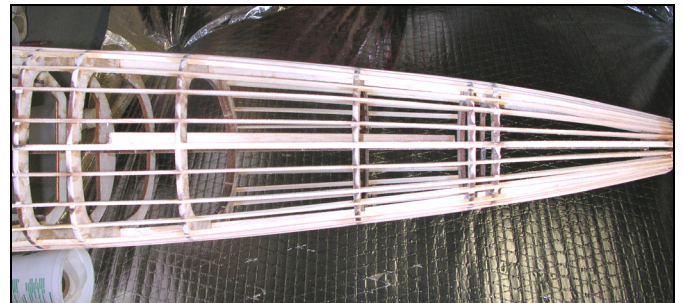
Next, 4-40 or 2-56 blind nuts are installed on the inside surface of the firewall. Down and right thrust are incorporated into the fuselage by the position of the laminated 1/8" ply firewall sections included in the dummy motor kits. Attach the laminated 1/8" ply firewall. Sand to shape and harden the firewall with thin CA.



It is at this stage that the stringers are attached. Install them alternately, left and right in a symmetrical fashion to avoid a banana fuselage.

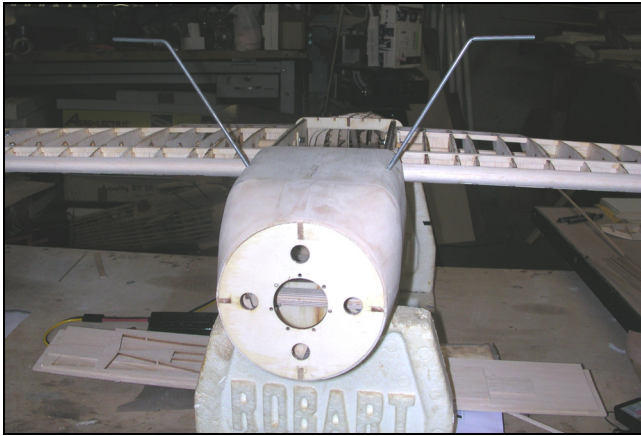


Fuselage Stringered



Aft Fuselage with Stringers

1/16th light balsa sheeting shown on the plan. The outlines of the sheeted areas are indicated by black triangles. On the forward bottom section near the firewall, use soft scrap balsa fill and sand to shape.

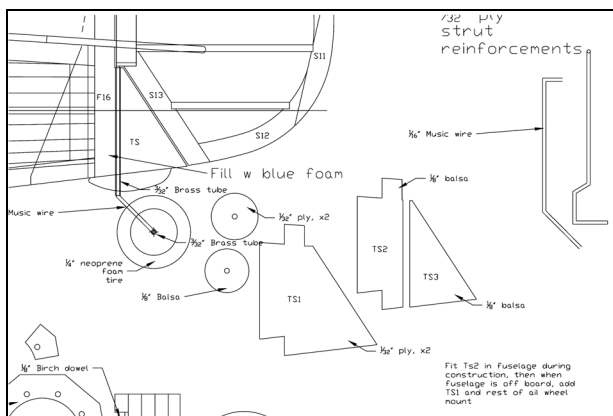


Fuselage Nose Soft Balsa Fill

When the stringers have been added to the fuselage, it is safe to remove the reinforcing 1/4" balsa brace. Cut it away with a sharp blade and be careful not to damage the keels. Since the covering will hide it, leaving a bit of extra balsa stump material will do no harm.

Fit Ts2 in fuselage during construction, and when fuselage is off board, add TS1 and rest of tail wheel mount. The music wire for the rudder driven tail wheel is left free until the rudder is added. Do not use balsa fill in the tail area, instead use blue or pink foam. The model gets tail-heavy very easily. Every bit of extra weight will need ten or twenty times as much balance in the short nose of this model.

Add some reinforcing balsa from scrap at the junction of KT3 with F16 and sand down the aft end to provide clearance to free up elevator's downward movement.



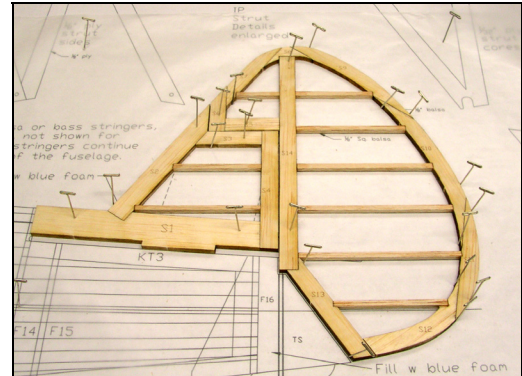
Tail Wheel Mount Detail

Fashion a removable soft balsa battery hatch in the bottom of the fuselage to fit between the wings using neo magnets as holding devices.

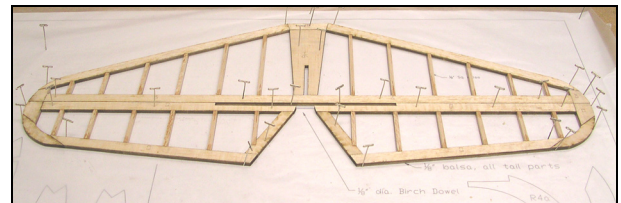
TAIL SURFACE CONSTRUCTION

Lay out and glue parts of the tail surfaces on the plans.

Sand the tail parts, rounding off all edges. Don't add the horns or hinge the surfaces until after covering is complete.



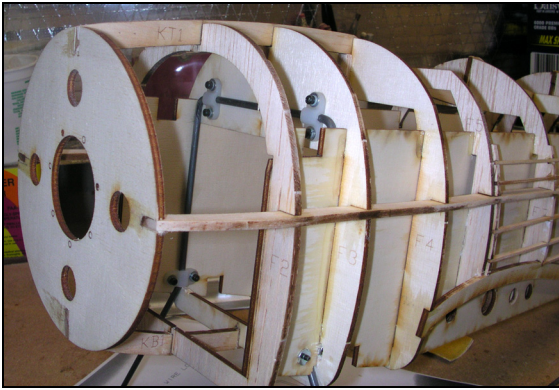
Rudder and Vertical Stabilizer



Horizontal Stabilizer and Elevator

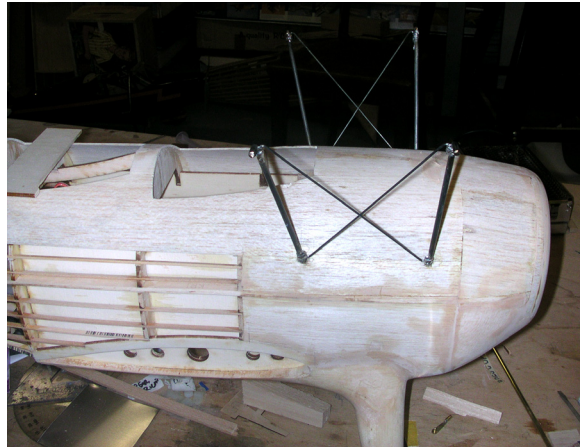
LANDING GEAR and CABANE STRUTS

These parts are made from 1/8" music wire. Music wire of this diameter can be bent using a hammer and vice. Bending can be done by hand, with pliers, if the joint is heated to the red-hot stage with a propane or butane torch. Take care to get these parts made correctly, small deviations will show up in a model that sits oddly on the runway. Some modellers make a jig from scrap wood to assemble the parts.



Music Wire Landing Gear

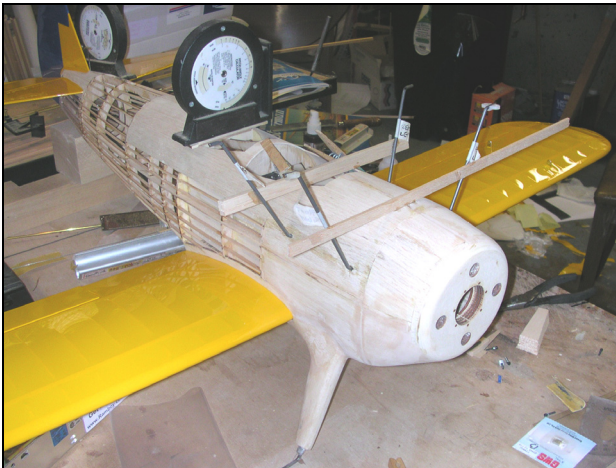
The front and rear legs of the landing gear are bound together with brass or copper wire and soldered together. Fabricate pants with scrap 1/8" thick scrap balsa and sand to shape. Use flexible polyethylene foam for the joining area with the fuselage.



Cross Rigging Cabane Struts

DUMMY ENGINE CONSTRUCTION

The dummy engine serves as the AXI motor mount and is made from 1/8", 1/32" plywood and 1/4" balsa. The crankcase structure is a set of stacked "rings" with holes for alignment/ motor attachment. Careful assembly is important as the clearance of the electric motor to the dummy motor is tight. Some sanding may be necessary to make a proper fit. Dry fit the rings on the motor to be sure that the fit is OK. The lite ply needs to be hardened using thin CA after assembly.

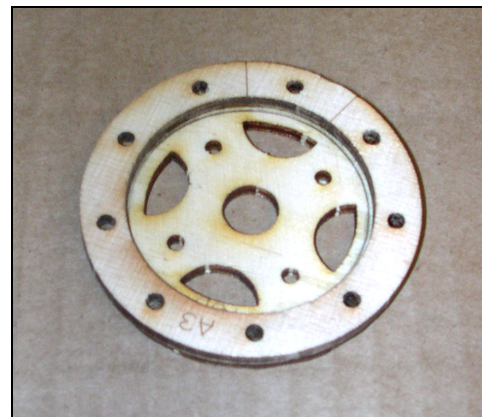


Align Cabane Struts

The cabane struts are dry fitted into the brass tubing mounts in the fuselage. Attaching the top wing and putting it in proper alignment, allows the cabanes to be glued in place with a drop of thin CA. At this stage, the wing may be removed. Cross rigging with Kevlar thread or 1/32" diameter music wire is suggested to keep the top wing in perfect alignment.

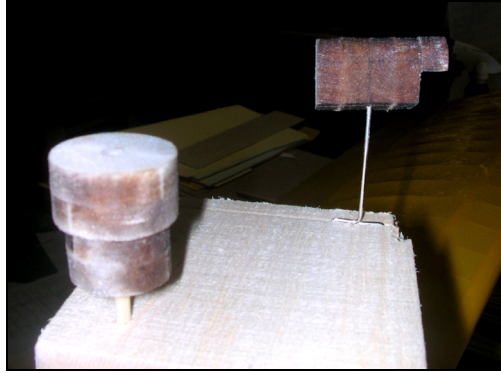


Slots for Cylinder Location Dowels

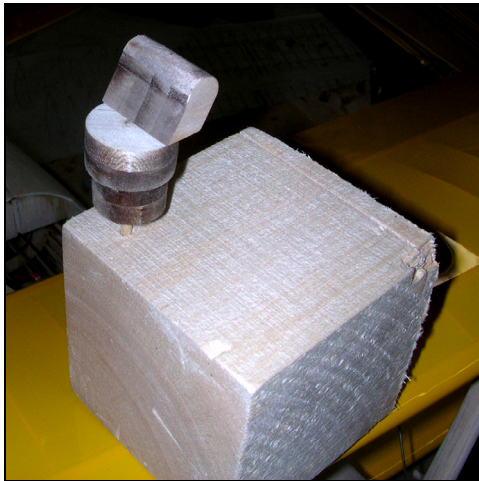


AXI Motor Mount Plate

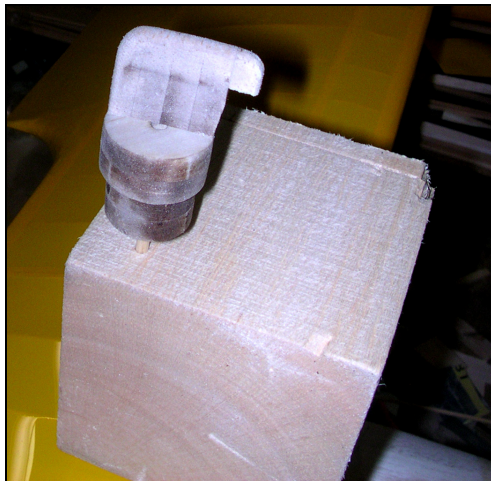
The cylinders are stacked sets of balsa aligned using an internal birch dowel. Refer to the drawing for the exact assembly. Assembly sequence is not important. Some sanding is required to finish the cylinder heads. Extra cylinders are included in the kits as replacement parts.



Cylinder and Header



Cylinder and Header



Cylinder and Header with Pushrod Mount

Four 4-40 or 2-56 bolts hold on the dummy motor.



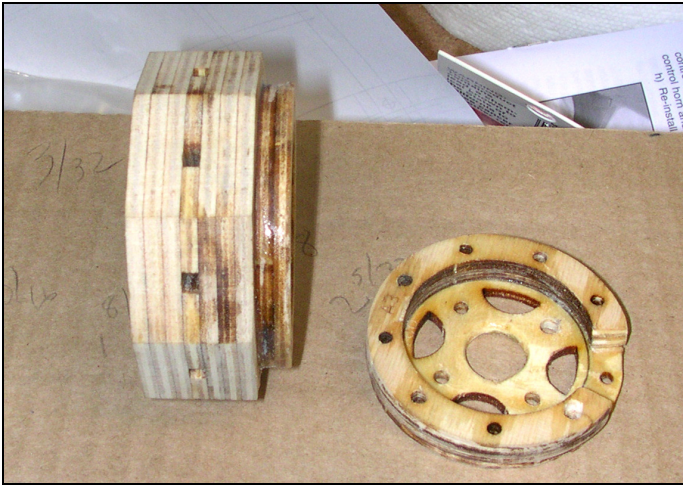
Engine Construction Detail

Care must be taken not to over tighten the mounting bolts or the wood can crush causing a weakening in the structure. This is also the case in all plywood mounts but it is useful to mention the issue here.

The laminated 1/8" plywood firewall of the PT Military Trainer is contained in both the Continental and Lycoming kits. The number of mounting holes is the primary difference in the firewalls. Blind nuts are installed on the inside surface of the firewall. The dummy motor should be fabricated so that it the motor cylinder section can be removed leaving the rear portion attachment in place on the airframe.

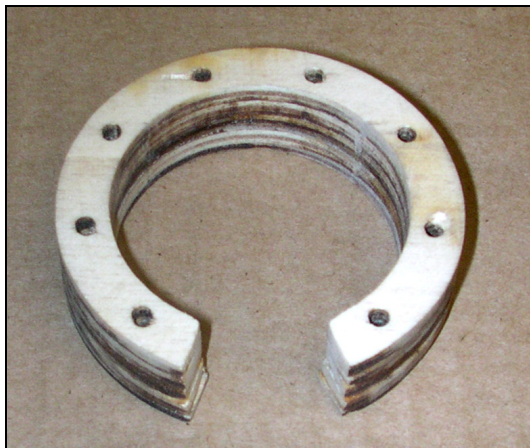


Crankcase and Motor Mount



Crankcase and Motor Mount

The mounts are designed for some freedom in mounting of the AXI motor. Depending on whether the motor is to be mounted in the conventional or reverse position, the laminated 1/16" ply motor mounts provided for the AXI electric motor are attached in the front, or in the middle of the dummy motor crankcase structure. The motor wires will exit the motor structure and enter the fuselage through the bottom hole in the firewall. Remove the section of the wood in the wire area of the crankcase to make an exit hole.



Cutout Section for Motor Wires



Crankcase Mounted



Crankcase and Motor Mount



Add Cylinders



Dummy Motor Complete

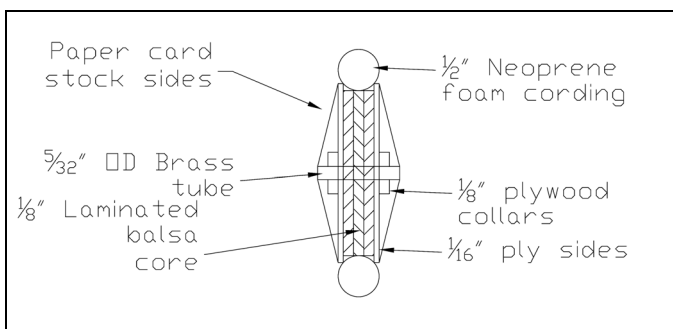
COVERING

Any lightweight covering material can be used. Polyspan with dope or Minwax™ Polycrylic makes a good choice. Litespan is also popular.

Outlines for basic decals for this model are available on our web site at www.aerodromerc.com/decals. Custom decals can be usually be obtained from Callie Graphics <http://www.hobbies-n-stuff.com/>

WHEEL CONSTRUCTION

Gluing the ply sides on the balsa core makes the basis for the wheels. Use the brass hub for alignment. Epoxy the hubs in place and add a sufficient amount of epoxy around the base of the hub to reinforce the connection of the hub to the ply. Plywood reinforcing hubs are provided that are to slip over the brass tubing as shown. Next, CA glue the neoprene cording together to form a "tire". Use thin CA sparingly as the CA bonds very aggressively to the rubber. Press the CA wetted ends together for an instant bond. The best way to align the ends is to glue them while they are in place on the wheel. Then attach the tires to the wheels and CA in place. A thin bead of CA around the rim makes for a secure tire.



Wheel Construction Detail

AILERON SERVO INSTALLATION

Aileron servos are mounted in wing and attached with short threaded rods to the ailerons. Use a "Y" wiring harness connector to wire the servos to a single radio connection. Alternately, the two-channel method can be used if the transmitter is equipped for this style of aileron control. If manually set differential aileron throws are desired, rotate each servo horn forward about 20 degrees, while maintaining the neutral position of the aileron. This should help alleviate adverse aileron yaw.

ASSEMBLY

The wings are removable. The lower wings are held on the fuselage using 4-40 bolts. The top wing attaches with 1/8" saddle clamps around the 1/8" music wire cabane struts.

The horizontal stabilizer sits on the top of the fuselage formed by F15 and F16. Stabilizing straps/wires are added to complete the scale look but are not strictly necessary. After the stabilizer has been attached, dry fit the elevator using CA hinges. The vertical stabilizer also fits into a slot in the horizontal stabilizer. When it is inserted and glued in place, fill in the area on top of the horizontal and beside the vertical stabilizer with blue or pink insulating foam. This makes the rounded detail of the tail. Do not use balsa, as extra weight in the tail is very hard to compensate for in balancing for C/G placement. The tail wheel music wire tab fit into the rudder at time of its installation. Epoxy it in place and use extra wide CA hinges for the rudder so the hinge can support the weight of the rear of the model. Fill in the rear of the fuselage in the TS area with insulating foam.

Slip the control horns onto the wire pushrod ends and, with both the servos and the control surfaces centered, glue the horns into their slots.

Use strong thread or Kevlar fishing line or elastic beading cording to simulate rigging wires. Use small screws, fishing hook eyes, straight pinheads or small eyelets to attach the lines. These "wires" can add a degree of strength to your model.

Balance the model at the C/G point shown on the plan.



Ready to Fly

FLYING

The model should ROG on grass, pavement or hard surfaces. Expect gentle flight characteristics with slow rolls. Aileron throws of 1/2" are a good starting point as the ailerons on the PT are not as sensitive as in some models. Rudder and elevator throws of 3/4", 1/2" are good starting settings.

Let the model gain altitude slowly off the runway. Applying too much up elevator at slow speeds risks a stall. Make your turns gently as tight turns risk tip stalling in any model. Don't expect the elevator to make the model climb. Think of the elevator as a device to change the attitude of the model. The wing and airspeed ultimately make the model climb. Often down elevator applied at stalling can avoid a major crash. The most important details for proper flight operations are:

- 1) CG location. Tail-heavy models never fly well or at all.
- 2) Down and right thrust
- 3) Straight and non-warped wings.

CONTACT INFORMATION

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