# Pietenpol

by Pat Tritle | photos by the author

The Pietenpol Air Camper is a two-seat, high-wing parasol homebuilt monoplane designed in 1932 by Bernard Pietenpol and was featured in a four-part series titled *1932-33 Flying and Glider Manual*. The prototype was powered with an Ace four-cylinder, liquid-cooled engine, but the Ford Model A later became the engine of choice.

In the 1960s, a number of modern car engines were used. The best choice was the Chevrolet Corvair air-cooled flat-six. Since that time, a number of engines have been used in the Air Camper, including conventional Continental and Lycoming airplane engines.

The Air Camper is a relatively small airplane with a 29-foot wingspan. The airplane is built primarily from wood with a few metal fittings that need to be fabricated by the builder. In many cases, motorcycle wheels are used on the landing gear. With a top speed of 100 mph and a cruise speed of approximately 75 mph, the Air Camper is not fast, but after spending some time in one, flying low and slow in an open cockpit is an experience not soon to be forgotten.

## The Model

The model was designed with a 48-inch wingspan at 1:7.25 scale and is a lightweight, electric-powered park flyer that is well suited for small fields and parks, and can be easily flown within the confines of a soccer field or a baseball diamond. With a wing loading of slightly more than 5 ounces per square foot, the model is a slow and docile flier, and although not particularly large, the Pietenpol is big enough to add plenty of scale detail without adding unnecessary weight that could rob it of its inherent gentle flying qualities.

# Air Camper

## Construct your own "homebuilt" aircraft

The Pietenpol is finished and ready for its maiden flight.

Power is provided by an economical Suppo 2208 series outrunner motor with four-channel control using four submicro servos to run the rudder, elevator, and ailerons.

The design is basically old school in that the fuselage and tail section are "stick framed" much like old Comet kits. The egg-crate-style built-up wing has the ribs notched into vertical spars to make building it quick and easy.

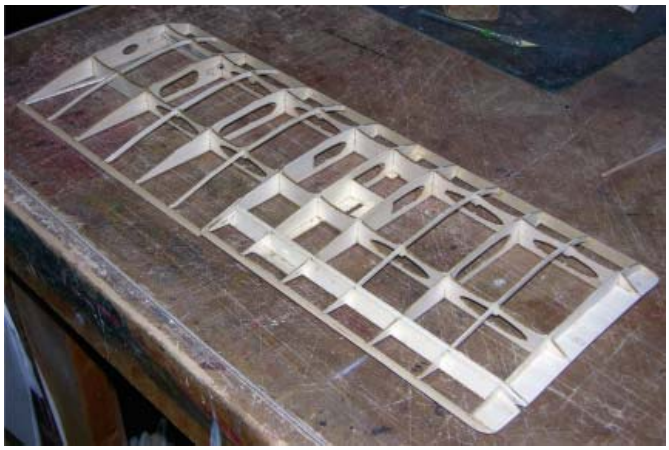
To maintain scale rib spacing, false ribs are used between each of the full ribs to keep the weight in check. The model features plug-in wings and lift struts that can be quickly and easily removed for transport without needing tools or easily lost hardware.

Full-size parts patterns are provided on the plans for scratch builders. For those of us who prefer laser-cut parts, a wood pack is available from Manzano Laser Works.

With all of that stated, let's build a Pietenpol!

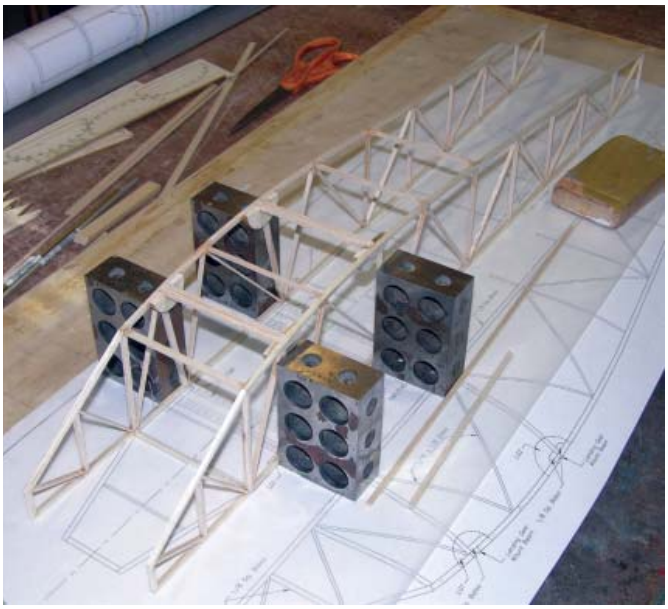
In flight, the Air Camper is a gentle and docile flier that is well suited to smaller flying venues.

The built-up tail section is traditional stick-frame-style construction. A tail wheel was incorporated, rather than using the original tail skid to improve ground handling.



The egg-crate-style built-up wing makes building quick and easy. False ribs simulate the scale rib spacing without adding unnecessary weight.

The finished wing panels are plugged into the center section for a trial fit after all of the components have been built.



The fuselage side frames are built up then joined, beginning with the landing gear beams. Squaring blocks are used to ensure that the assembly starts out straight and true.

## Tail Section

Lay out the vertical and horizontal stabilizers directly over the plans. The perimeters and hinge spars are $^1/_8$-inch square balsa with the ribs laid in using $^1/_{16}$ x $^1/_8$-inch balsa and scrap $^1/_8$-inch balsa to make up all of the corner gussets. Hinges are made from small strips of CA hinge stock and slotted into the spars using a hobby knife. They are dry fitted in the spars.

## Wing

With all of the wing parts at hand, pin the servo-mount plate A3 in place over the plans. Dry fit ribs R1 through R7 over the main spar A1 and rear spar A2, pin the assembly in place over the plans, and then secure each point of contact with thin CA adhesive.

Align and glue R4A and A5 in place followed by the $^3/_{32}$ x $^1/_4$-inch balsa trailing edge (TE) and $^3/_{16}$ x $^3/_8$-inch balsa leading edge (LE). Fit and glue A8A and A8B in place using the R7 rib detail drawing for reference. Align and glue A4 in place on A3, and the $^3/_{32}$-inch square balsa diagonal brace at the root aligned with the TE and the top of A2. Finally, align and glue each of the FR1 and FR2 false ribs in place.

Build the ailerons in place on the wing assembly. Begin by sanding the bevel into the bottom of A5 using the R5 rib detail drawing for reference. Align and glue AR1 in place followed by the outboard AR2 rib and pin the assembly in place on the TE followed by the remaining AR2 ribs and A8C. Sand a bevel into the front edge of A9 and glue it in place flush with the bottom of the aileron.

Remove the wing assembly from the board and sand it into rough shape. Align and glue A7 in place and sand the assembly to final shape. Cut the ailerons free from the wing assembly and sand it to final shape. Cut the hinges from CA hinge stock and fit them into the spars referring to the R5 rib detail drawing.

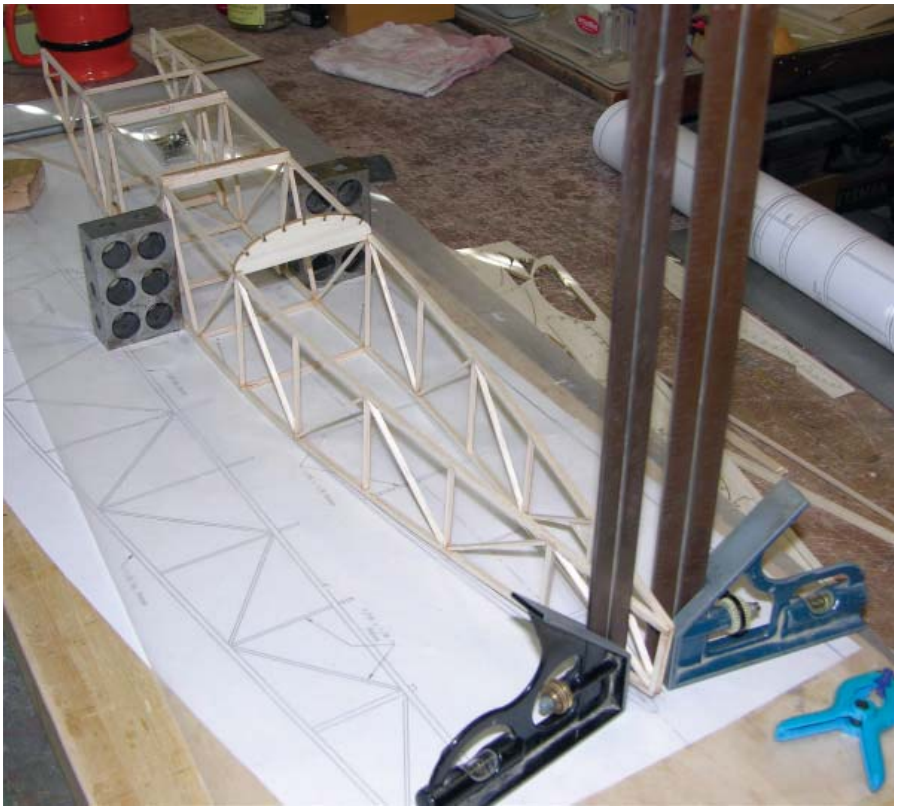
Tack glue the $^1/_{16}$-inch outer-diameter (OD) aluminum strut retention tubes in place on A3 and A7, lash the tubes in place with nylon thread, and harden it with thin CA. Cut the $^3/_{16}$-inch OD aluminum wing retainer tubes to length and glue in place at R1 and R2. Mount the aileron servos using silicone caulk. When that is dry, run in the extension leads to complete the wing assembly.

Build the wing center section directly over the plans. Begin by pinning CSM2L and CSM2R in place over the plans. Dry fit CSR1 and CSR2 in place on CS1 and CS2 and pin the assembly in place over the plans. Secure each point of contact with thin CA glue.

Align and glue the LEs and TEs in place, then remove the assembly from the board and sand to shape. Fit and glue the two CSM1s in place, sand to final shape, and then fit and glue the $^5/_{32}$-inch OD brass wing joiner tubes in place.

## Fuselage

Build the right-hand fuselage side frame directly over the plans. Pin the $^1/_8$-



The frame assembly is pinned to the board right side up and the tail section pulled together using machinist's squares to ensure proper alignment.

inch square balsa longerons and vertical and diagonal bracing in place, followed by all of the $^1/_{16}$ x $^1/_8$-inch vertical and diagonal bracing.

Glue PRG in place flush with the outside edge. Remove the frame from the board and build the left-hand frame. Align and glue LG1 and LG2 in place on the inside of each of the frames. Make up the landing gear mount beams using the detailed drawing provided.

To join the frames, pin them upside down over the top/bottom view drawing and glue the landing gear beams in place. Use squaring blocks to ensure that the frames remain vertical.

Lift the frame from the board and pin it over the drawing at the rear landing gear mount beam. Support the aft end with a balsa or blue foam block and glue formers 1 and 2 in place on the top of the frame, followed by the $^1/_{16}$ x $^1/_8$-inch bottom crosspieces from former 2 forward.

Using the squaring blocks, pull the tail ends together and glue. Add formers 3, 4, 5, and 6 and the bottom $^1/_{16}$ x $^1/_8$ balsa crosspieces.

Build up the cabane strut mounts from CSM1 and CSM2 and glue them in place on the frame. Fit and glue each of the $^1/_{16}$ x $^1/_8$-inch balsa stringers in place between the two forward and two aft former 1s and from former 2 through former 6. There are no stringers in the front and rear cockpit sections.

Remove the $^1/_8$-inch square balsa vertical brace where shown on the framing plans and fit the firewall FW in place. Build up the motor mount from MM and two MM1s and glue it in place on FW. Next, crack the longerons at FW and glue the $^1/_8$-inch balsa crosspieces in place at the front. Again, glue the longerons at the breaks, and then mount the motor and ESC.

Align and glue the servo mount rails in place, followed by the rudder and elevator servos, using the servos to determine the beam spacing. Run in the elevator pushrod tube supported at the rear PRG and the front and a couple of points in between using the PRSO stand-offs. Using the continuous rudder pull/pull cable routing diagram, run the rudder cables into the fuselage. Tape the tail section in place, tie off the rudder cables to the control horn, and mark the

## AT A GLANCE ...

### SPECIFICATIONS

| | |
|---|---|
| **Wingspan:** | 48 inches |
| **Length:** | 30.25 inches |
| **Wing area:** | 400 square inches |
| **Flying weight:** | 14.7 ounces |
| **Wing loading:** | 5.3 ounces per square foot |
| **Power system:** | Suppo 2208/17T brushless outrunner; Suppo 18-amp ESC; APC 9 x 6 DD propeller |
| **Battery:** | Hobby People 1,300 mAh 2S LiPo |
| **Radio system:** | JR XG8 transmitter; RG411B receiver; four Suppo 6-gram submicro servos; one 11-inch servo Y lead; two 9-inch servo extension leads |

### MATERIALS LIST

**Wood**

- Nine 1/16 x 1/8 x 36-inch balsa
- One 1/16 x 3/16 x 36-inch balsa
- One 1/16 x 3/8 x 36-inch balsa
- One 3/32 square x 36-inch balsa
- Two 3/32 x 1/4 x 36-inch balsa
- One 1/8 x 1/4 x 36-inch balsa
- Nine 1/8 square x 36-inch balsa
- Nine 3/16 x 3/8 x 36-inch balsa
- One round toothpick

**If Laser-Cut Parts Pack Is Not Used**

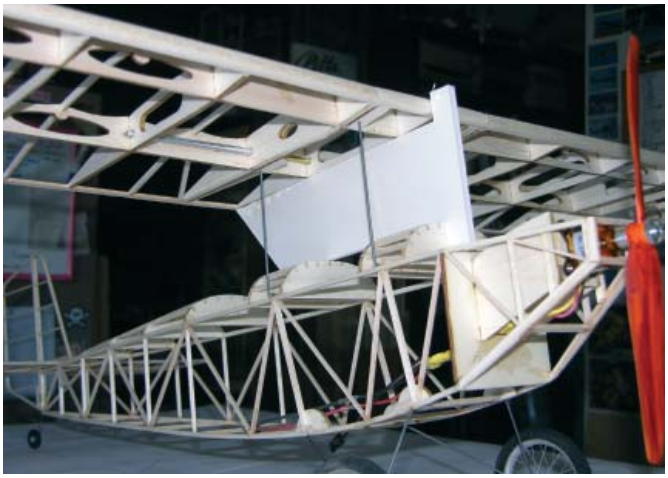
- Two 1/16 x 4 x 36-inch balsa sheet
- Two 3/32 x 4 x 36-inch balsa sheet
- One 1/8 x 4 x 36-inch balsa sheet
- One 1/8 x 4 x 10-inch light plywood
- One 1/32 x 2 x 4-inch plywood

**Metal**

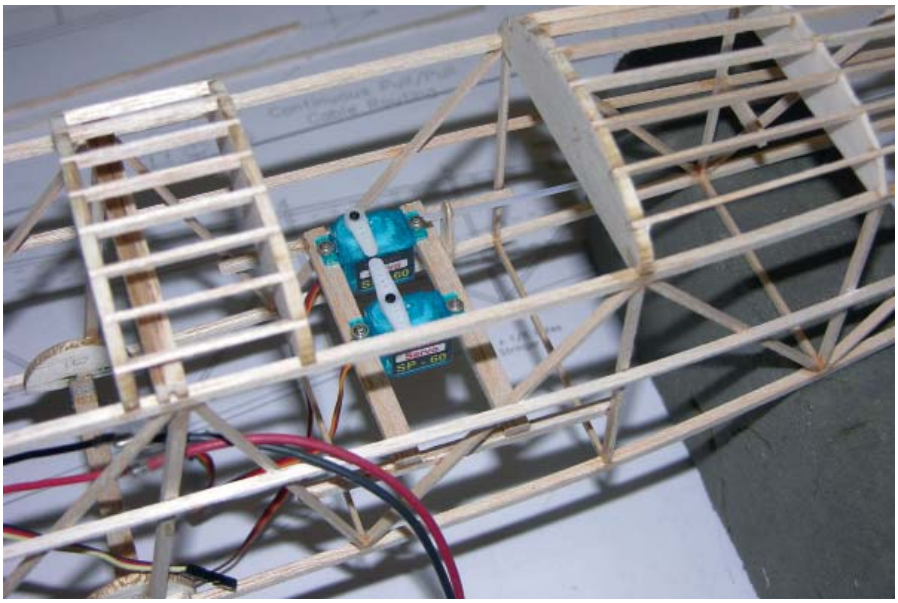
- One .025 diameter x 18-inch steel wire
- One .032 diameter x 24-inch steel wire
- One .062 diameter x 36-inch steel wire
- One 1/16 OD x 6-inch aluminum tube
- One 5/32 OD x 24-inch brass tube
- One 3/16 OD x 18-inch aluminum tube

**MISCELLANEOUS**

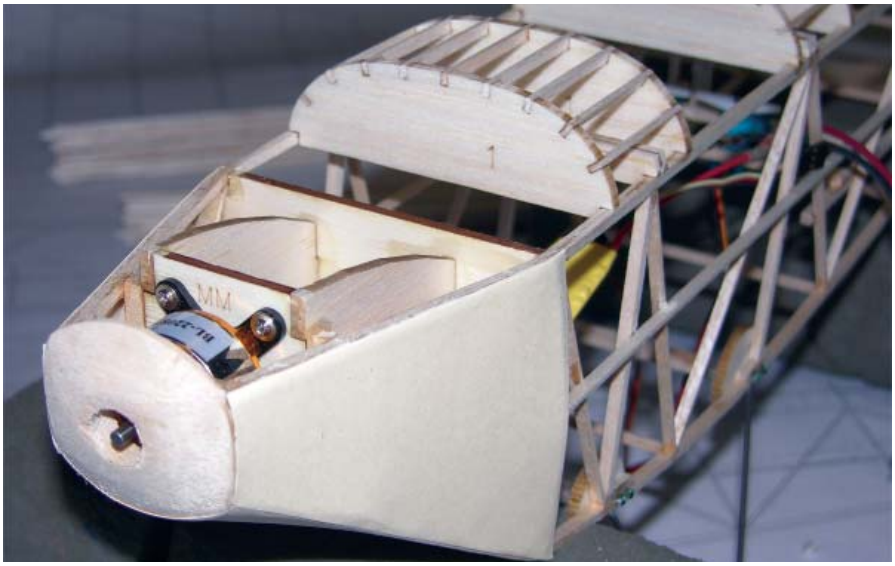
- One pair 3-inch spoke wheels
- One 3/4-inch tail wheel
- One .032-inch inner diameter x 14-inch plastic tube
- 10 feet of heavy-duty nylon thread
- One blue foam block
- One 2 x 4-inch window screen
- One manila file folder
- One .008 x 2 x 4 acetate sheet



The cabane struts are fitted into the fuselage and a wing alignment jig is used to ensure the proper incidence when the wing is installed. Dry fit the wing to check for proper cabane strut alignment before the model is covered.



The rudder and elevator servos are located in the rear cockpit for easy access. The elevator is driven using a pushrod and the rudder uses pull/pull cables.



The motor is mounted and then the cowl skinned using file folder paper. The upper cowl section will be added after the center section has been installed to allow clearance for the alignment jig.

exact location on the plans where the cables exit the fuselage.

Align and glue the $^1/_{16}$ x $^1/_8$-inch balsa side stringers in place, followed by the balsa fill at FW. Make up the paper side, bottom cowl skins, and the cockpit fairings from file folder paper and glue them in place. Follow that with the nose block to complete the fuselage assembly.

Bend the landing gear to shape and solder it together directly on the fuselage. Lash the gear to the mount beams with nylon thread and harden with thin CA. Align and glue the $^1/_{16}$-inch OD aluminum tube strut fittings in place, lash them with nylon thread, and secure the assembly with thin CA glue.

Bend the cabane struts to shape using the provided patterns and slip them into their respective mounts. Make up the wing alignment jig and pin it in place on the fuselage centerline. Slip the wings onto the center section and fit the wing assembly onto the cabane struts. Build up the lift struts according to the assembly drawings and fit the struts in place.

## Covering the Model

Before applying the covering, do a final dry run to ensure that everything fits and functions properly. If you find any problems, fix them now while things are still easy to access. Do a final detail sanding to remove any flaws.

All of the frames are covered except for the top of the wing's center section. When all of the covering is attached, glue the hinges in place.

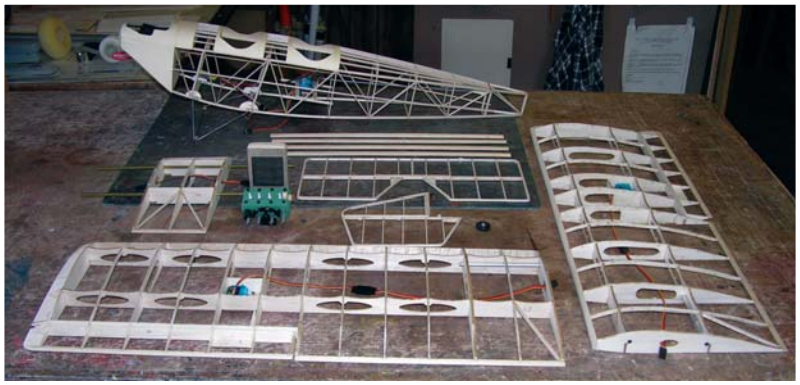
## Final Assembly

Pin the wing alignment jig in place, fit the wing assembly onto the cabane struts, and attach the front lift struts. Align and glue the center section in place, then pot the cabane struts in place on the inside. Fit the rear struts in place, which will set up the washout to roughly 1°.

Remove the struts and wing panels and run the aileron servo Y lead into the fuselage and center section and then cover the top of the center section. Reinstall the wings and struts and glue the tail section in place using the wing for reference.

The tail brace wires are added using

The wing struts are dry fitted to ensure proper alignment. The struts can be easily removed without tools or special hardware.



The subassemblies have been fitted and detail sanded in preparation for covering. The dry run is important because problems are much easier to correct before the covering goes on.

nylon thread. Run in the .025-inch elevator pushrod and secure it to the servo with a Z-bend.

Make a Z-bend at the elevator hinge line, align the control horn in the neutral position, and glue it in place. Run in the rudder cables and tie them off at the control horn. Connect the ailerons using a .032-inch steel wire pushrod with a Z-bend at both ends.

## Adding Details

Build up the scale Model A engine from blocks of blue foam, aluminum tubing, wood dowel, and whatever other parts will work. The radiator is built up from balsa and $^1/_{64}$-inch plywood or sheet styrene. Build up the dummy engine mount using the detail drawing for reference and tack glue it in place.

Glue the top cowl section in place followed by the scale engine, radiator, and any additional details desired. Make up the windshield from .008-inch acetate using the provided pattern and glue it in place.

Construct the landing gear fairings from $^1/_{16}$ x $^3/_8$-inch balsa and cabane strut fairings from $^1/_{16}$ x $^3/_{16}$-inch balsa and glue them in place. Make the cockpit combing from $^1/_2$A silicone fuel tubing and then mount the main wheels and tail wheel to complete the model.

## Balance and Control Setup

Balance the model $2^1/_2$ inches from the wing's LE using the battery to your best advantage.

Make the battery tray from $^1/_8$-inch light plywood and glue it in place. Velcro the battery to the tray.

Make up the battery hatch cover from .010-inch styrene and $^1/_8$ x $^1/_4$-inch balsa using the provided detail drawing. The hatch cover clips in place between the landing gear beams. Finally, set the control throws as shown on the plans, and the Pietenpol is ready to fly.

## Flying the Model

Before you fly your Pietenpol Air Camper, check again to ensure that the motor is turning in the right direction and that the control throw and movement are correct. With a freshly charged battery, point the model into the breeze and advance the throttle to roughly $^2/_3$ power.

When the aircraft is ready to fly, add a touch of up-elevator and it will lift off. Maintain a shallow climb to a safe altitude and trim the model for straight and level flight at a comfortable cruise speed. The model flies well, and is a gentle flier, and it responds nicely to control input with little or no adverse yaw from the ailerons. The Pietenpol also turns well only using the rudder.

After getting a feel for how the model handles, try a couple of stalls. I found the stall to be uneventful, and when carrying a bit of power, it will simply mush along. Set up the landing, reduce the power, and start the descent. Upon final approach, you'll want to carry a bit of power. At a foot or so above the runway, raise the nose slightly, gently back off the power, and let the model settle in for a three-point landing. The Air Camper also does well with wheel landings.

When you get used to how the Pietenpol handles at low speeds, try a few touch-and-gos.

If it's a nice, relaxing, well-mannered model you're looking for to fly on small fields, this classic 1930s-era homebuilt Air Camper is just what the doctor ordered.

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SOURCES:

Hot Deals
(503) 766-4119
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National Balsa
(413) 277-9500
www.nationalbalsa.com

Hobbylinc
(888) 327-9673
www.hobbylinc.com

Pat's Custom Models
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