Giant Scale Model For 1.8-3.0 Engines

BEECHCRAFT T-34 MENTOR

Part I

By Mark Frankel

Joe Weizer with prototype #001.

Taxing at sunset with landing lights on.

Mark's T-34 at Top Gun.
Both Jim's and Mark's airplanes weighed about 40 lbs.

Introduction

Truman was in the White House, DiMaggio was in centerfield, the Russians, Red Chinese and North Koreans were getting really cranky. In this environment, the Army Air Force and Navy Training Commands found themselves using high-time airframes from another era to train a generation of aviators who were destined to spend most of their careers in jets. The AT-6 SNJ fleet of 911 aircraft was suffering nearly 200 groundloops per year. The bent landing gear, bent wingtips, and bent propeller blades drove primary training costs out of sight.

Jay Sarver with his full-scale T-34B and Mark's 1/4 scale model.

Jim Sandquist with his "scaled out" Toledo show winner.

BEECHCRAFT T-34 MENTOR

DESIGNED BY:
Mark A. Frankel
TYPE AIRCRAFT
1/4 Scale Competition
WINGSPAN
98.25 Inches
WING CHORD
16.25 Inches (Avg.)
TOTAL WING AREA
1598 Sq. Inches
WING LOCATION
Low Wing
AIRFOIL
NACA 23016.5 Root — 23012 Tip
WING PLANFORM
Double Taper
DIHEDRAL, EACH TIP
T-34A - 6°; T-34B - 7°
OVERALL FUSELAGE LENGTH
77.25 Inches
RADIO COMPARTMENT SIZE
(L) 20" x (W) 8" x (H) 3.5"
STABILIZER SPAN
35.5 Inches

STABILIZER CHORD (inc. elev.)
9.5 Inches (Avg.)
STABILIZER AREA
336 Sq. Inches
STAB AIRFOIL SECTION
Symmetrical
STABILIZER LOCATION
Slightly Above Thrust Line
VERTICAL FIN HEIGHT
15.5 Inches at Rudder Hinge
VERTICAL FIN WIDTH (inc. rud.)
11 Inches (Avg.)
REC. ENGINE SIZE
1.8 Cu. In. - 3.6 Cu. In.
FUEL TANK SIZE
32 Oz.
LANDING GEAR
Tricycle/Retractable
REC. NO. OF CHANNELS
6-10
CONTROL FUNCTIONS
Rud., Elev., Throt., Ail., Flap
C.G. (from L.E.)
7" at Fuselage (22.5% M.A.C.)

ELEVATOR THROWS
20° Up — 15° Down
AILERON THROWS
20° Up — 20° Down
RUDDER THROWS
25° Left — 25° Right
SIDETHRUST
0° Rt
DOWNTHRUST/UPTHRUST
0°
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Fiberglass & Ply
Wing ..... Foam, Balsa, Vacuum-formed Plastic Skin on Control Surfaces
Empennage ..... Foam, Balsa, Vacuum-formed Plastic Skin
Wt. Ready To Fly ..... 29 Lbs. (prototype)
41 Lbs. (detailed competition model)
Wing Loading .. 42.2 Oz./Sq. Ft.@ 29 lbs.
59.6 Oz./Sq. Ft.@ 41 lbs.

In 1948, during a rare moment of cooperation, the Navy joined with newly formed USAF Procurement Division to evaluate three new primary trainer aircraft: the Fairchild T-31, the Beechcraft T-34, and the Temco T-35. A well researched article by Don Pellegreno in the winter 1995 Journal of the American Aviation Historical Society argued that the Fairchild T-31 was the best aircraft, but the T-34 was selected because of its tricycle landing gear.

Regardless of the reason, the Eisenhower administration ordered the T-34 into production in 1952. In 1953, the USAF received its first modern primary trainer, the T-34 Mentor. Ultimately, the Air Force received 353 T-34A's from Beechcraft and another 100 from the Canadian Car and Foundry Company where they were built under license. Canada also built another 25 aircraft for their own armed forces.

The Navy ordered 424 T-34B's which differed from the Air Force A's in the following ways:

(a) an additional 1 degree of dihedral;

(b) a non-steerable castoring nose wheel;

(c) seat and rudder pedal difference;

(d) removal of the fillet at the base of the rudder;

(e) a bulge in the battery compartment door.

Over time, the T-34 became an enormously successful program. While the service life of the Air Force A's was relatively short (1953-1961), due to the Air Force's decision to develop an all-jet syllabus; the Navy used their T-34B's for nearly 20 years. In 1973, the Navy extended their commitment to the T-34 by converting to the turboprop variant, the T-34C which remains in active service.

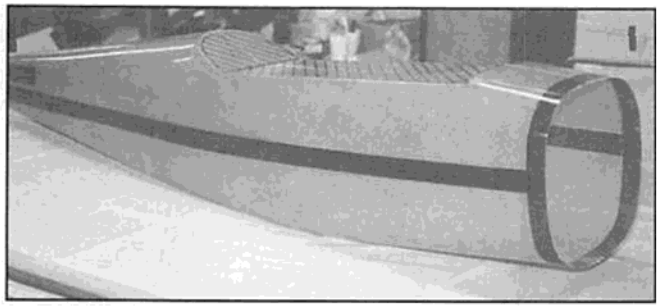
The Mentor was used by several foreign services, especially the Japanese, who built a large number of T-34A's under license.

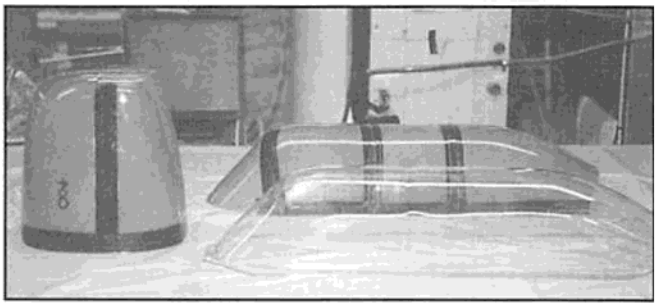
In the 1960's, T-34 began appearing in Civil Air Patrol service, Forestry service, and military base flying clubs. A few found their way into civilian hands and often received uprated engines, modernized avionics, and enlarged fuel systems.

The Sarver Restoration

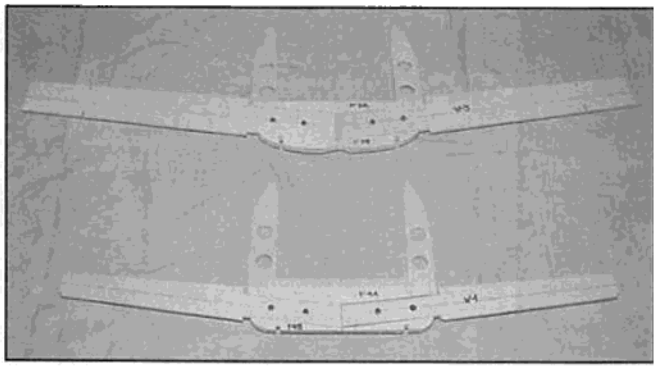
I may not remember where I was when Kennedy was shot, but I certainly remember where I was when I decided to design a 1/4 scale T-34 replica.

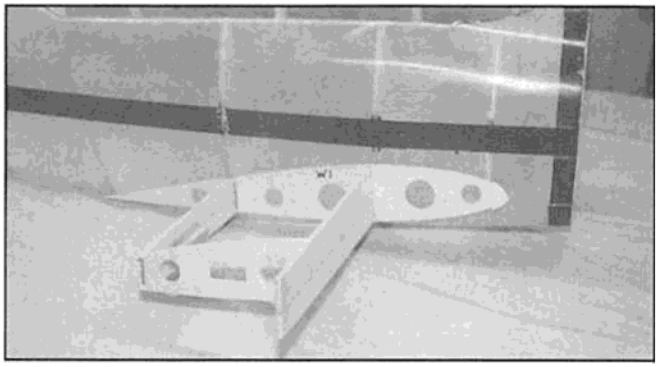
It was a clear October day in 1985 at Sky Manor airport in central New Jersey during an EAA event. Among the homebuilts, antiques, aerobats,



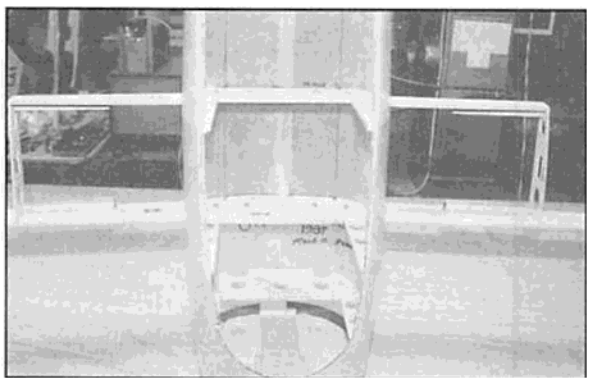


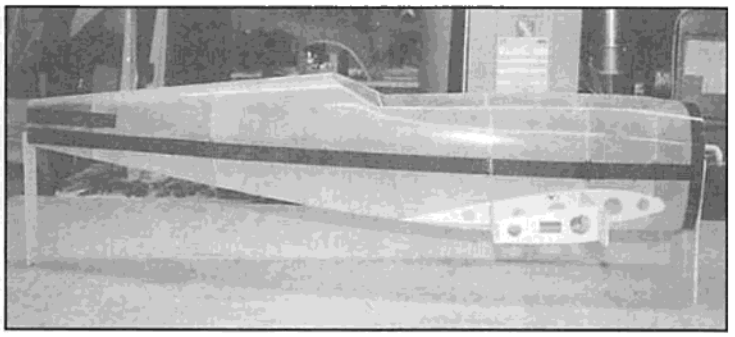
(L): Fiberglass fuselage shell with carbon fiber reinforcement. The ink-lined cockpit area is cut out before construction begins. (R): The cowl, canopy frame, and clear canopy.



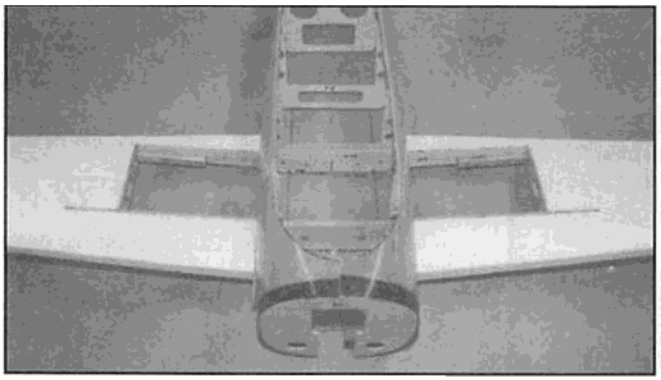


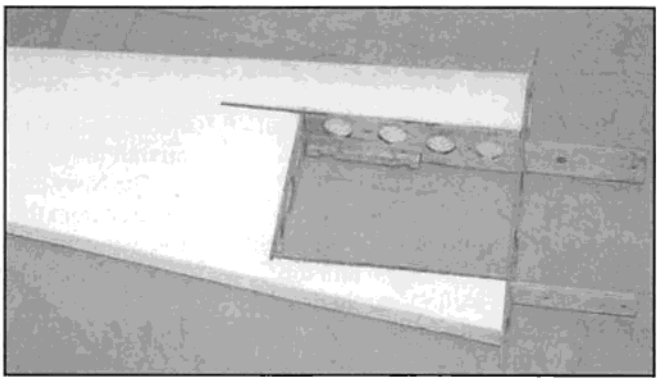
(L): F3 and F4 with spars W3 and W4 temporarily bolted in place for proper alignment. (R): Spars W3 and W4 bolted in place, with W1 and W2 tack glued in position. The wing core is epoxied to the structure.



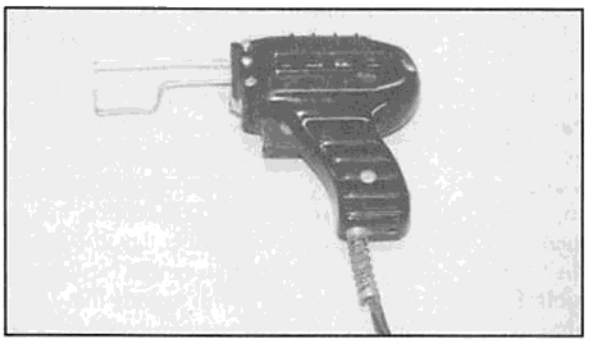


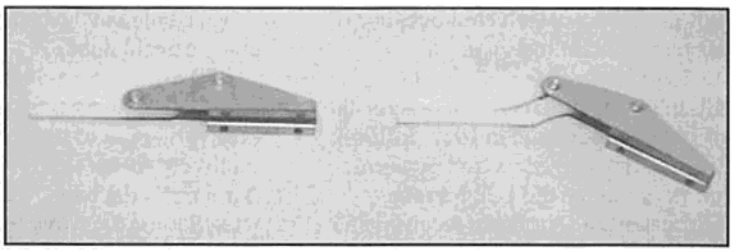
LEFT: The fuselage is standing upright to check the alignment W3 and W4. ABOVE: Fuselage jigged level to check W1 incidence at +4°.



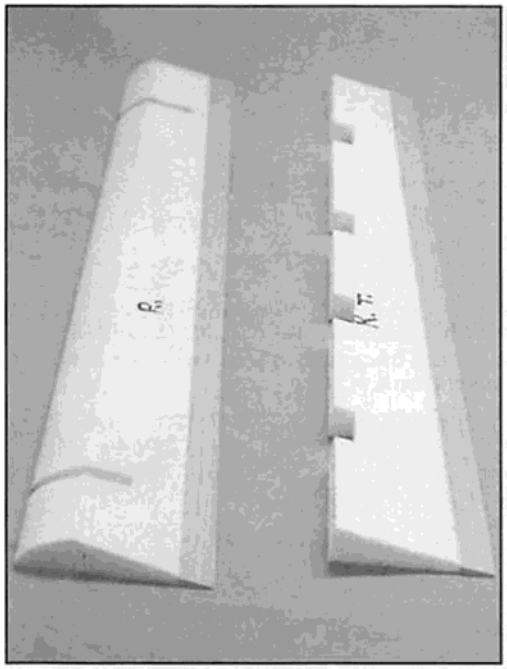


(L): The wing cores are epoxied to the spar structure. (R): The wing core after it is epoxied to spars W3 and W4 with root rib W1 and W4 installed.



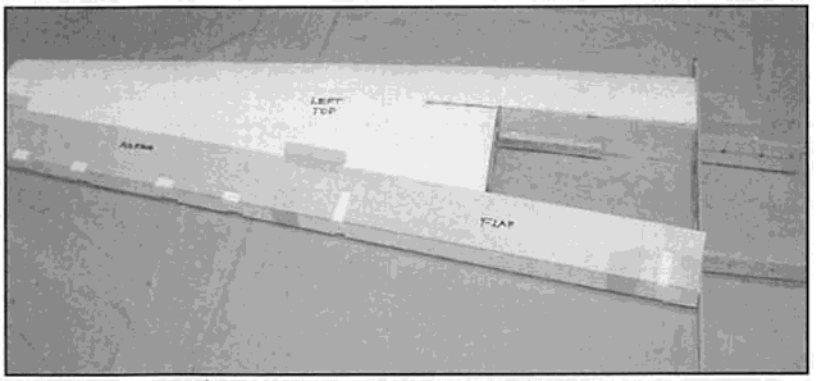


LEFT: A soldering gun with a copper tip is used to cut slots for flap tracks and aileron hinge blocks. ABOVE: Flap tracks available from Robart Manufacturing.

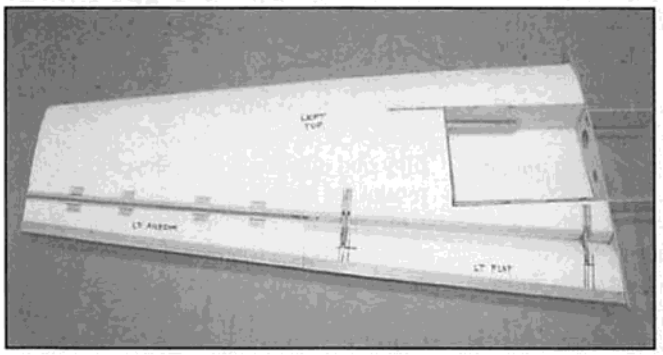


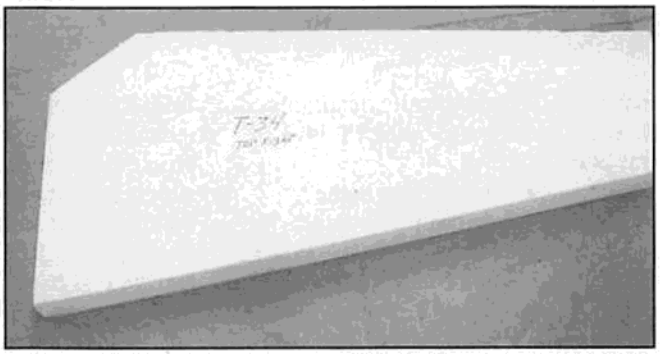
The right flap and aileron notched for hinges prior to sheeting.

The lower surface of the flap prepared for the flap track and the 1/8" plywood mount.



A template can be made from 1/8" lite plywood to locate cutouts for flap track and aileron hinge mounts.





(L): Flap and aileron assemblies test fit in position. Note flap and aileron hinge blocks all glued in place. (R): A wing core shell with the leading edge extension area cut away to permit the proper contour of the wing skin when the shell is used to hold the skin in place.

ultralights, and warbirds was an airplane that seemed to glow. It was a T-34B in the original 1950's training command scheme of chrome yellow and green anti-glare panel with a polished aluminum spinner and canopy frame. I was in the middle of burning off several rolls of film when the owner, Jay Sarver, asked me if I'd like to see the interior of the engine compartment. This was no ordinary T-34 restoration, this was a Beechcraft that could bring tears to Walter Beech's eyes.

According to Jay, his Mentor recently returned from Oshkosh where it was entered in the T-34 competition. The judges were so stunned by Sarver's attention to detail that he was moved into the Best Warbird category where he placed third. If you think third means that he was second best of the losers, it is important to note that Best Warbird category typically includes some serious heavy metal bombers, transports, fighters, and attack aircraft. Never in EAA history had a primary trainer scored so high. Later that year, Jay's Mentor went on to win Sun 'n Fun and trophy at every air show where it appeared.

My decision to model this T-34 was sealed when I learned that Sarver's airplane was hangared 40 minutes from my home, and I was promised unlimited access to it.

Designing The Model

I have a preference for working in fiberglass and foam because of the speed of construction, the high strength to weight ratio, the ease of alignment, the repairability, and the ability to generate numerous identical airframes.

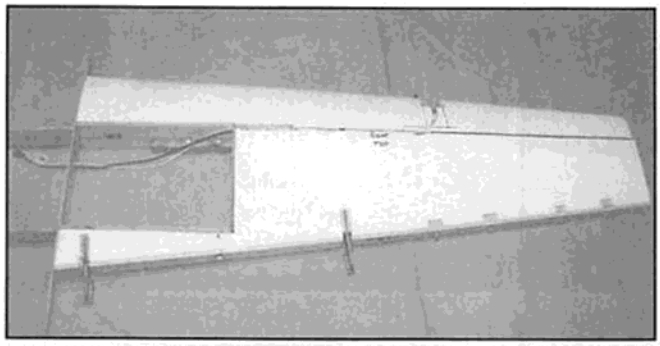
I thought long and hard about the corrugated magnesium skins on the tail and control surfaces, finally deciding to vacuum-form them over an aluminized epoxy mold. The project really started moving when Bob Walker of Robart Manufacturing agreed to fabricate the landing gear. Another intimidating issue was forming the canopy which had to be nearly 36" long and 6" deep. Nick Ziroli Jr. assured me that he had equipment large enough to do it, so I began "cutting metal," as they say in the airframe business.

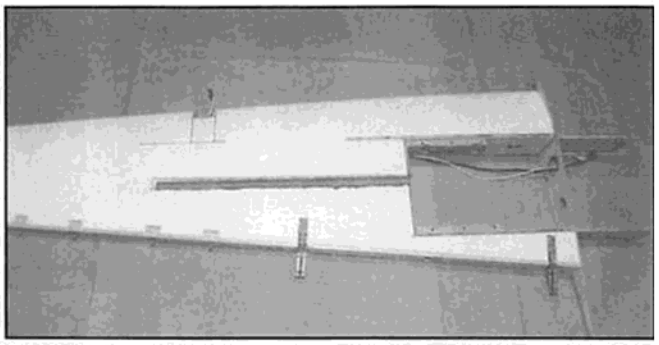
The First Example

The molds were completed and the components were assembled by the fall of 1995. Joe Weizer, a long time friend and highly respected modeler in my neck of the woods, agreed to build serial number 001. After wrestling with a fuselage that was too flimsy and a wing core that had a serious bow in one panel, Joe turned out a 29 lb. miracle. He installed an O.S. BGX 3500, which fit neatly in the cowl, and provided reliable scale-like power for this first example. Joe's model was demonstrated at various model events during the spring and summer of 1996 and it continues to serve as a reliable practice airplane.

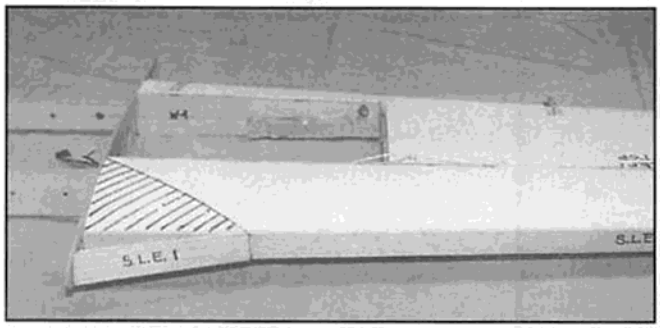
The Toledo Winner

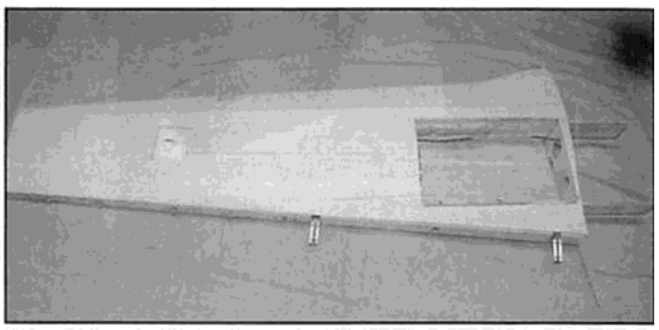
Jim Sandquist is many things, among them he is an artist. He's probably the most gifted "cockpit guy" I have ever met. He obsesses about things like





(L): Wing core prior to sheeting. Note that the navigational light wiring is in place and the flap tracks and aileron hinges are attached. (R): The wing core lower surface prior to sheeting. Note that the aileron servo wire conduit tube is in place.



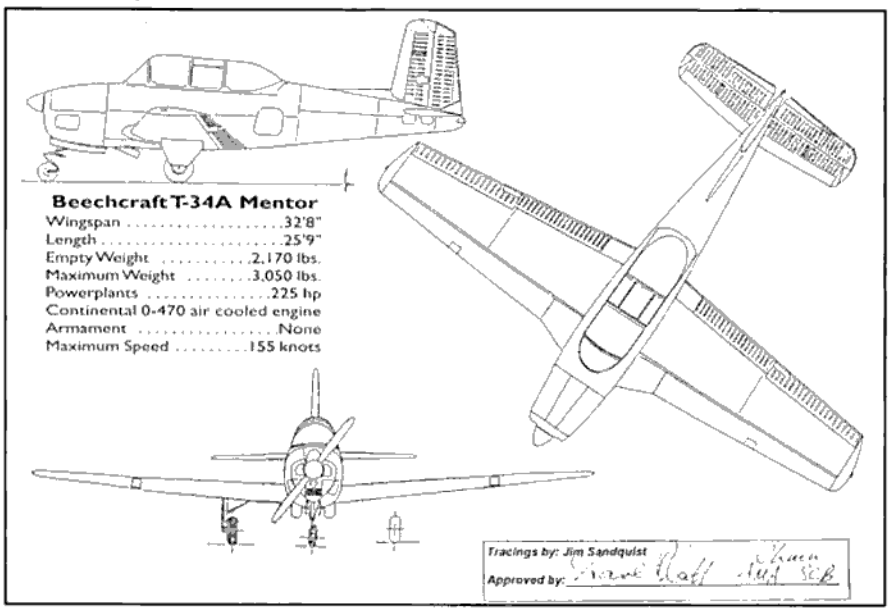


(L): The lined area indicates where the balsa skin will not contact the core.(R): The lower skin has the section between W3 and W4 removed. The aileron servo bay is cut out.

rudder pedals and throttle quadrants. So when he chose to build a T-34, I was elated.

Jim finished his Mentor in the handsome blue and white "recruiter scheme" used by the Navy in the 1980's. He included a sliding canopy and opening cowl hatches to display a scale engine installation using an O.S. Pegasus 4 cylinder engine. Jim added two dummy cylinders to the Pegasus so that the engine appears to have a 6 cylinder Continental 0-470 mounted in it. The effect is stunning! Jim's reward for all of this effort was a first place trophy at the 1998 Toledo Exposition.

The T-34 plan set is available direct from RCM (plan #1268) and will include the complete construction article text. The fuselage construction is simply a matter of bonding nine bulkheads into the molded fiberglass fuselage shell. The foam wing cores receive 1/4" plywood blade spars and a 3/32" balsa skin. The flap, ailerons and tail surfaces are skinned with a combination of balsa and vacuum-formed plastic to simulate the corrugated magnesium skins of the full-sized aircraft. The stabilizer and fin are attached to the fuselage and the engine/nose gear mount is attached to the firewall. The engine mount dimensions can be varied to fit the length of the engine you select. The cockpit is fabricated in a 1/8" lite plywood tub which also serves as a mount for the canopy.

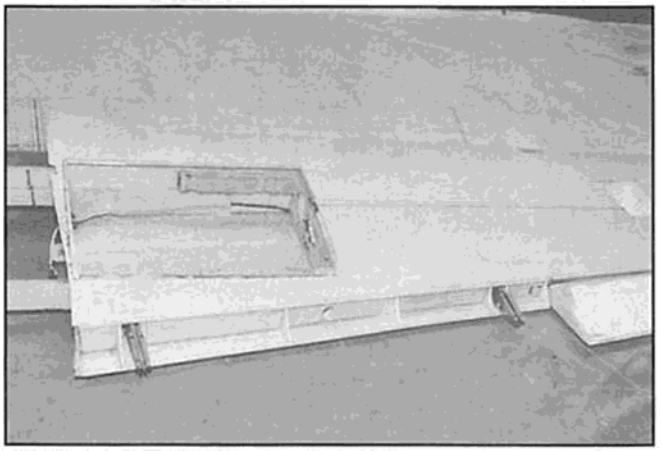


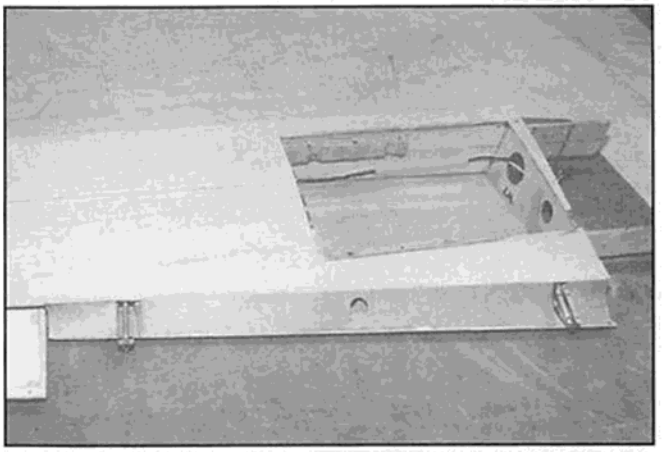
Components For The Project

The molded fiberglass, foam flying surfaces, vacuum-formed canopy and skins will be available on a custom order basis from Model Specialties, 1220 Sylvan Rd., West Chester, PA 19382, (610) 692-4139. The scale retractable landing gear, flap tracks, offset door and control surface hinges are available from Robart Manufacturing Co., P.O. Box 1247, St. Charles, IL 60174, (630) 584-7616. A complete wood kit is available from All-American Kit Cutters, 365 Dutch Neck Rd., Hightstown, NJ 08520 (609) 443-3175. A detailed cockpit kit is available from Jim Sandquist, 507 Linden Dr., St. Joseph, IL 61873, (217) 469-7231. Scale markings can be obtained from Pro Mark Model Graphics, 751 Airport Rd., Metropolis, IL 62960, (618) 524-2440, or Aeroloft Designs, 7919 E. Mawson Rd., Mesa, AZ 85207, (602) 380-4799.

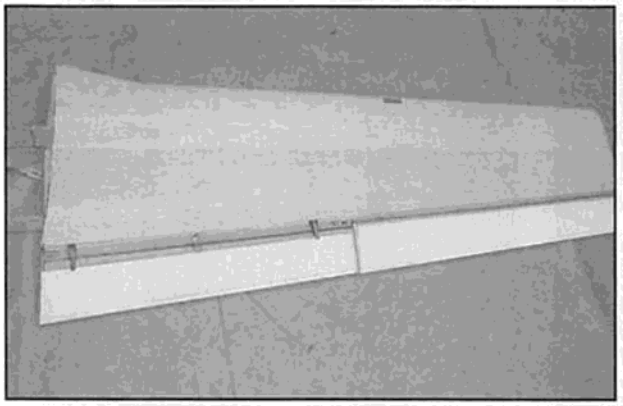
Future Installment

In Part II, I will discuss scale documentation, color schemes, systems installation, and flight test. If you are considering the T-34 project, your first decision should be power plant selection. Since the cowl is narrow near the face bowl, cylinder head clearance may be an issue with some engines. A cylinder height of 4-1/2" (measured from the engine centerline) should fit

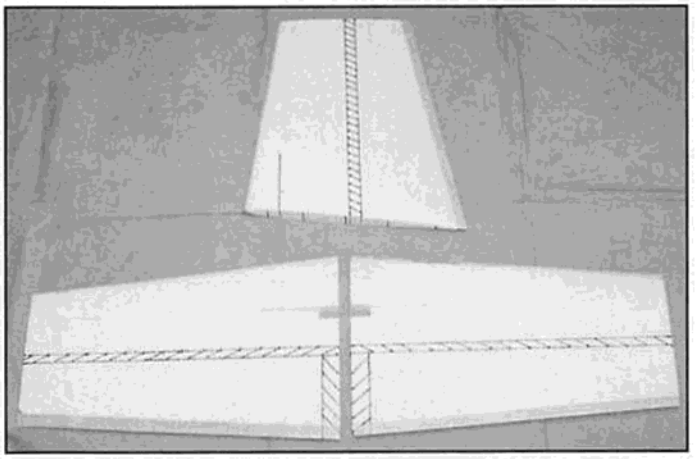


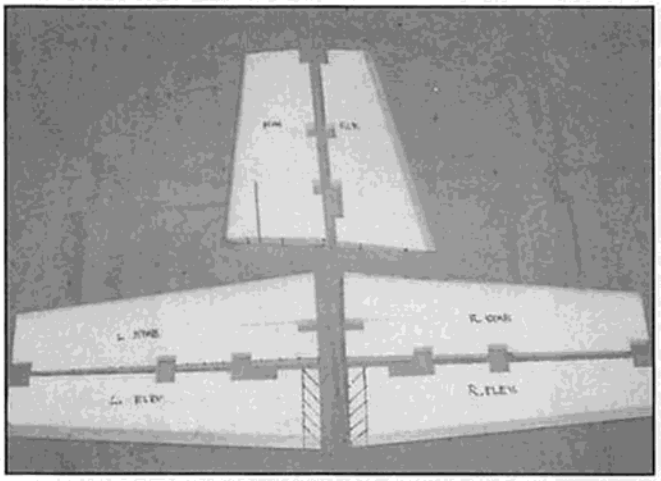


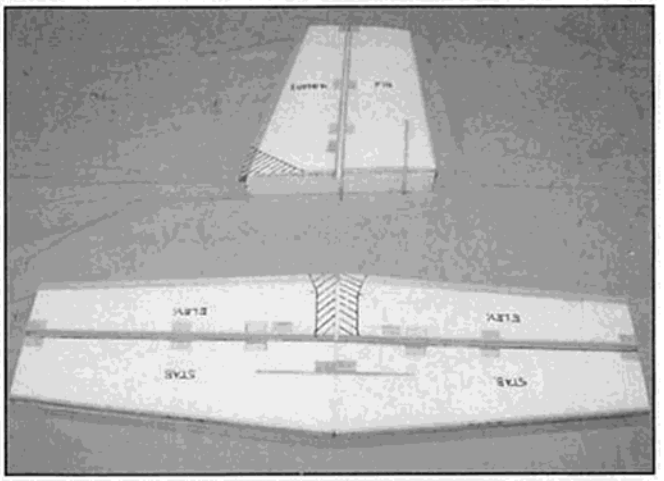
(L): The flap cove is formed with the extension of the upper surface skin and lite ply ribs (R): The flap cove receives a skin of 1/64" plywood.



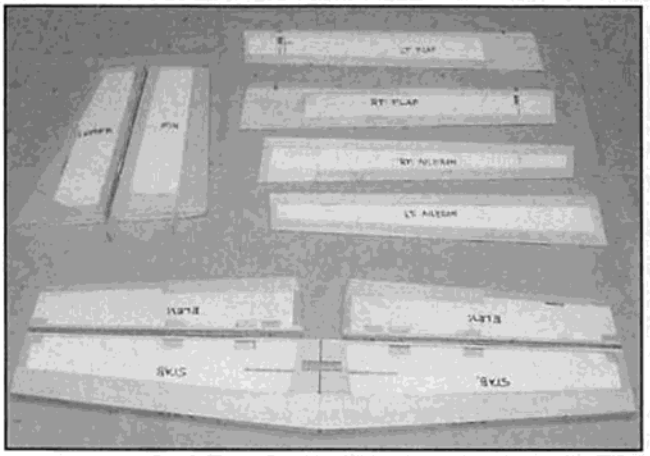
ABOVE: A skinned core with the flap and aileron attached.
RIGHT: The tail cores. Lined areas are cut away.

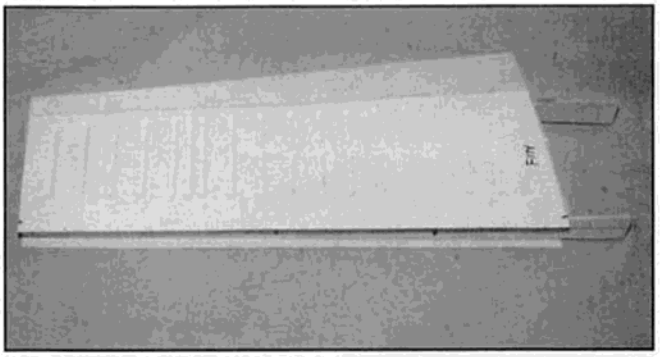




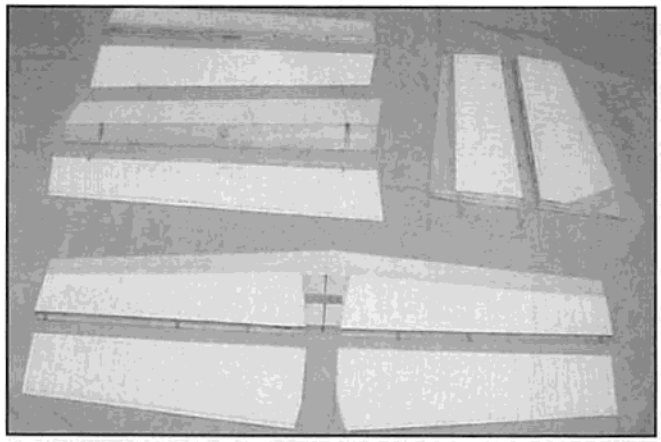


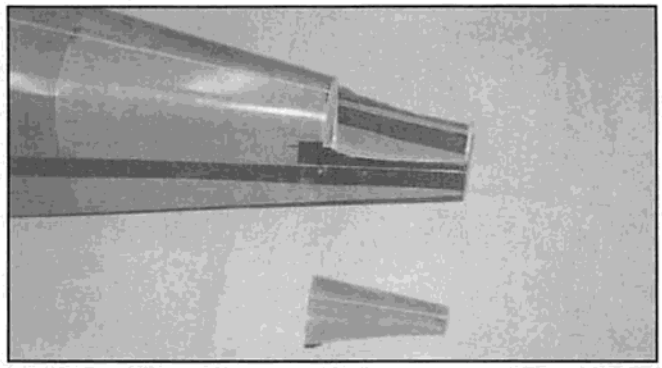
(L): The tail cores notched for hinge and control horn mounting blocks. (R): Tail cores with hinge blocks in place.



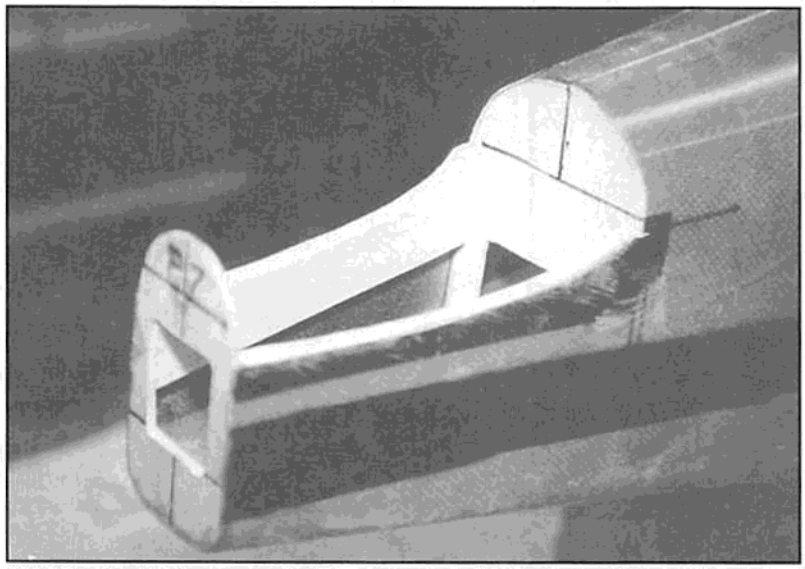


LEFT: The control surfaces with 1/16" balsa in place prior to applying plastic corrugated skins. ABOVE: Plastic corrugated skin epoxied to fin. Note the overhang beyond FN2 to provide a cove for the rudder.

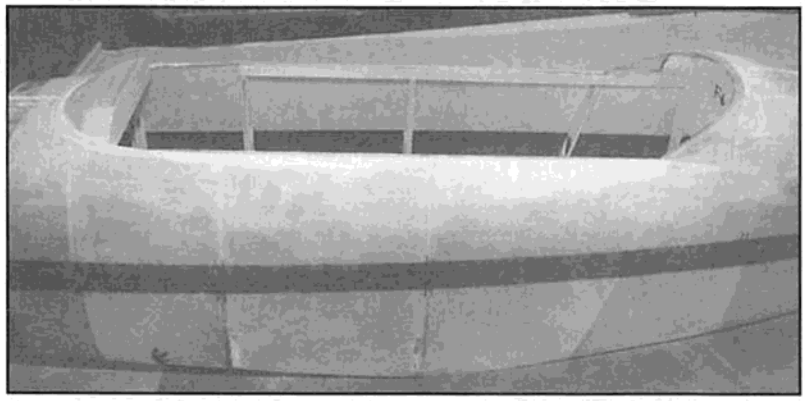


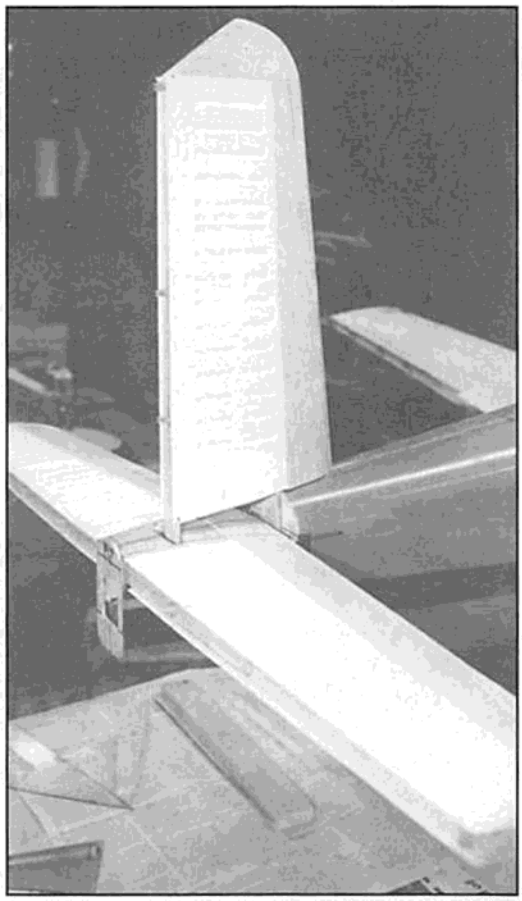


LEFT: All control surfaces with plastic corrugated skins applied. ABOVE: Fiberglass skin between F8 and F9 removed to allow installation of stabilizer.

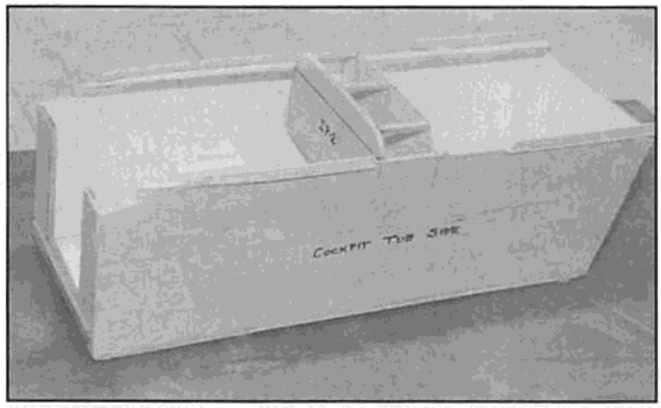


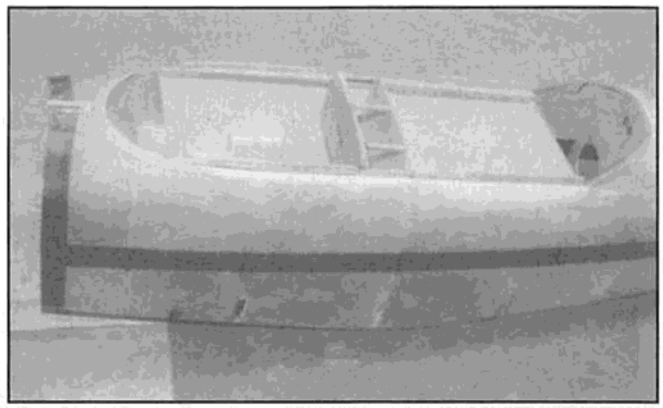
1/8" lite ply stabilizer mount reinforcements added between F8 and F9.





ABOVE: Stabilizer and fin installed. Note that FN1 is epoxied to F8, and FN2 is epoxied to S1, while S2 is epoxied to F9. LEFT: 1/8" x 1/2" plywood rail is glued between F3 and F6.





(L): The cockpit tub is assembled. The sides and floor are lined with vacuum formed parts available from Jim Sandquist. (R): The cockpit tub is fit into the fuselage. It is secured by #2 screws that thread into the 1/8" plywood rails at the top of F3 and F6.

within the cowl. Anything larger will require some "on-site engineering." Engines that have been used successfully in models built to date include: O.S. BGX; Moki 1.8; Moki 3.6 twin; and O.S. Pegasus 4 cylinder. Zenoah 445 twin cylinder engines are being fit in three T-34's now under construction. This installation requires a crankshaft extension to locate the engine near the firewall, thereby providing more clearance for the cylinder width.

CONSTRUCTION

Fuselage

The fiberglass fuselage is prepared to receive bulkheads F1 through F9 by cutting away the cockpit area. Bulkheads F3 and F4 carry the wing spars in channels formed by doublers F3A, F3B, F4A, and F4B. These doublers are epoxied over F3 and F4 to provide a snug fit for the spars, W3 and W4. Note that W3 is positioned on the aft side of F3 while W4 is positioned on the forward side of F4. Carefully align W3 and W4 on F3 and F4 before the bulkheads are glued in the fuselage, and drill through these spars and bulkheads to receive 8-32 bolts and blind nuts. Remove W3 and W4 from F3 and F4, then tack-glue F1 through F5 in position in the fuselage. This should be a temporary bond to obtain proper fit and alignment. Cut the spar slot openings in the fiberglass fuselage at F3 and F4.

Wing Alignment

Prepare the wing cores by cutting slots for the flap and aileron hinge mounting blocks with a razor saw or a hot wire. These balsa blocks are glued to the cores and the 1/4" balsa T.E.1 is glued in place. Sub leading edge, S.L.E.2, is also glued to the front of the core. Now bolt spars W3 and W4 in position on F3 and F4, with W1 and W2 tack-glued to W3 and W4.

The cores are now ready for attachment to the spar structure. To ensure proper alignment of the wing cores, stand the fuselage on a flat level work surface with F1 facing down. The fuselage center seam should be 90° to the work surface. Spars W3 and W4 should be parallel to the work surface. Using a slow curing epoxy, glue each core to W1, W2, W3, and W4, taking care that no epoxy touches the fuselage. The wing root should be checked with an angle finder to be +4° at the root and +1° at the tip.

After curing, unbolt the spars and remove the wings from the fuselage. S.L.E.1 can be added to form the leading edge extension. Glue the aileron servo conduit in place and, if you intend to use navigation and landing lights, glue a conduit in place for that wiring.

Sheeting The Wing

Prepare the wing skins from 3/32" light balsa. Leave enough material to allow for the proper overhang at the root and over the flap cove.

Use Z-Poxy Finishing Resin to attach the skins to the cores. Note that the skin does not contact the core at the leading edge root extension, rather it is bonded to W1 and S.L.E.1.

Hold the skins in position with masking tape, then align the assembly in the core shells to act as a mold as the epoxy cures. Since the skin does not touch the core in the area of the root extension, you will have to cut a triangular section from the shell to allow the skin to contour over W1 and S.L.E.1. Weight the shells with a layer of books and allow the epoxy to cure.

When cured, trim the overhang at the tip and glue W5 in place. Trim the aileron cove to leave a 1/4" overhang beyond T.E.1 on the upper and lower skin. Trim the flap cove overhang on the upper surface to 1-1/4" beyond T.E.1 at the root and to 1" beyond T.E.1 at the aileron intersection. The lower skin should be trimmed even with T.E.1 along the flap cove area. The 1/2" balsa leading parts, L.E.1 and L.E.2, are glued in place and shaped.

The wing is repositioned on the fuselage to obtain the correct fit of the skin at the fuselage intersection. The main gear well between W3 and W4 is cut from the lower skin, and the aileron servo bay is opened.

The 1/8" plywood flap bracket mounts are epoxied flush with the lower surface of the flap. Screw the flap hinge assembly to this plywood mount and align the flap track blades in the 3/16" balsa spacers mounted in the wing. Use the trailing edge of W1 to determine the position of the flap when it is retracted. The blades are epoxied to the spacers, and when cured, the flap is removed by unscrewing the brackets from the plywood mounts.

The flap cove is constructed by fitting seven ribs between T.E.1 and the upper skin overhang. Note that the ribs should be sanded slightly smaller as they progress outboard due to the taper of the wing. The flap cove is skinned with 1/64" plywood, leaving openings for the flap track blades and the flap pushrod.

Returning To The Fuselage

Bulkheads F1 to F5 can be permanently epoxied in place. Bulkheads F6 to F9 are also permanently attached at this time. Start with F9 and work forward to F6 for best access.

The 1/8" x 1/2" plywood rail is glued to the upper edges of F3 to F6. This rail acts as a stiffener and as a mounting base for the screws that will hold the cockpit tub in place.

The cockpit tub is assembled from 1/8" lite plywood and fit in position between bulkheads F2 and F5. The fuselage belly hatch is cut from F3 to F5 and the hatch formers H1 and H2 are glued in place.

The engine box and nose gear mount are assembled from parts E1 to E4. These parts are designed for a Moki 1.80 installation. You can modify the engine box to fit your specific power plant. Temporarily mount the engine, muffler, and nose gear to ensure proper fit within the cowl. The cowl is attached to the fuselage with four positioning dowels and four 8-32 bolts that hold the cowl ring, C1, to the firewall, F1.

Sheeting the Corrugated Surfaces

Cut the elevator from the stabilizer core and the rudder from the fin core, leaving clearance for the leading and trailing edges of these surfaces. Trim the leading edge of the aileron core by 3/4". Provide slots for the 1/2" balsa hinge point mounts and the maple horn blocks. Glue leading edge parts S.L.E.4 to the stabilizer and S.L.E.3 to the fin. Glue 1/8" balsa facing to the leading edge of the rudder, elevators, and ailerons. Glue 1/8" x 1/2" trailing edge stock to the rudder and elevators. Glue 3/16" x 3/4" trailing edge stock to the flaps and ailerons. Glue 1/16" balsa sheet to the areas indicated on the corrugated skin layout drawing. Join the stabilizer halves with S1 and S2.

Using 100 grit sandpaper, scuff all areas of the corrugated skins that will come in contact with the 1/16" balsa or foam. Using Z-Poxy Finish Resin, coat the plastic skin only in the areas that will contact balsa or foam. Be sure to coat the trailing edge flanges where the upper

and lower skin will bond. After aligning the upper and lower skins, hold in place with strips of masking tape. Then cure the assembly in its appropriate foam shell pressed together with weight.

Glue the 1/4" balsa rudder, elevator, and aileron leading edge stock in place, and shape in accordance with the sectional drawings. Likewise, glue the fin and stabilizer leading edges, L.E.3 and L.E.4, in position and carve to shape.

Install the control horns and Robart hinge points with the pins removed. Use a .055 strip of music wire as the hinge pin for each surface. This is easily removed from the hinges to allow detachment for painting or maintenance.

The fin and stabilizer tips are glued in position and carved to shape.

Mounting The Tail

Remove the fiberglass fuselage section between F8 and F9 that will cover the top of the stabilizer saddle between F8 and F9. Install the two 1/8" lite ply S3 stabilizer saddles. To achieve proper alignment of the stabilizer, remount the wings on the fuselage and support the assembly on a flat surface, ensuring that the wings are level. The stabilizer is epoxied into its saddle so that it is also level with the work surface.

The incidence of the stabilizer should be set at 0°, while the wing root is set at +4°, and the wingtip washes out to +1°.

Reinstall the fiberglass skin between F8 and F9 after cutting a slot for FN1 and FN2 to pass through. The fin is attached by epoxying FN1 to F8 and FN2 to S1. The fin must be perpendicular to the stabilizer.

With the stabilizer and fin glued in place, the rudder and elevators are re-hinged to ensure clearance of all control horns, and freedom of movement. Fit the fiberglass tailcone to F9 with #2 sheet metal screws that screw into 1/8" plywood strips glued to each side of F9. This permits removal of the tailcone for access to the control horns.

Final Assembly

The fundamental structure is now complete. The cockpit tub is detailed in accordance with the Sandquist directions that are provided with the cockpit kit. The canopy frame is prepared by cutting away the clear areas. Fit the clear canopy under the fiberglass frame and hold in place with a few drops of Pacer 560 Canopy Glue. This should be a temporary bond since it is easier to finish the frame apart from the clear canopy. Align the canopy on the fuselage and hold the assembly in place with #2 sheet metal screws that pass through the frame and canopy into the 1/8" plywood rails on the cockpit tub side caps. The entire canopy assembly and cockpit tub are removable from the airframe for access to the fuselage interior.

The fiberglass wingtips are secured to the wing with #2 sheet metal screws similar to the tailcone attachment method.

The main landing gear doors are cut from the fiberglass skin that is screwed between W2 and W3. I use Usher Enterprises stand-off hinges for all gear doors with .055" music wire as the hinge pin. Two hinges are used on each door. If you are building a simplified sport model, the inner gear doors and the nose gear doors can be eliminated.

The Battery Compartment

The battery compartment of the full-sized T-34 is located on the right side of the fuselage just aft of the cowl line. This makes a convenient spot to conceal the receiver switch, air valve, and charging jack on the model. The hatch area is held shut with a Violett Hatch Latch (part #5510) which passes through the firewall. Additionally, a strip of Velcro along the upper edge will help hold it in place.

(continued next month)

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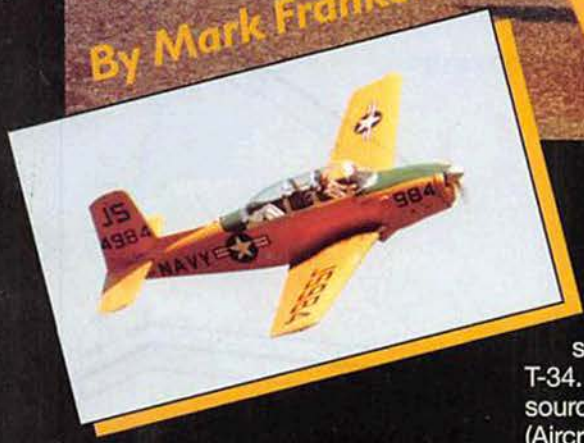
BEECHCRAFT

By Mark Frankel



Part II: Finish, Detail, and Flight Test

Color Scheme Selection

If you intend to use your Mentor in scale competition, select a specific color scheme at this point. There are probably more than 300 Mentors on the civilian register; therefore, it should not be hard to find an airworthy example to replicate.

The catalogs of both Bob Banka's Scale Model Research, 3114 Yukon Avenue, Costa Mesa, CA 92626, (714) 979-8058, and Jim Pepino's Scale Plans and Photo Service, 3209 Madison Avenue, Greensboro, NC 27403, (910) 292-5239, list several photo studies of the T-34. An excellent background source is T-34 Mentor in Action (Aircraft No. 107), by Lou Drendel, Squadron/Signal Publications, Inc., 1115 Crowley Drive, Carrollton, TX 75011-5010, (972) 242-1485.

The T-34 Association provides a wealth of information. Not only will the association help you locate specific T-34's, but its quarterly newsletter, The Mentor Monitor, publishes excellent photography of T-34's in service around the world. You can join by contacting Julie Clark, 3114 Boeing Road, Cameron Park, CA 95682.

When you have selected a target subject, you can contact Aeroloft Designs, 7919 E. Mawson Rd., Mesa, AZ 85207, (602) 380-4799, or Pro Mark Model Graphics, 751 Airport Road, Metropolis, IL 62960, (618) 524-2440, to obtain the graphics for your model. Remember that some of the markings, such as tail codes, will be applied over corrugated skins. Rub-on markings are difficult to apply over this surface, so you will have to use a paint mask or liquid masking film to airbrush these markings. Likewise, if you intend to add rivet detail to your model, you will have to paint any large markings that lay over high concentrations of rivets.

Painting

Separate the airframe into its removable components. The control

Allan Smith's T-34B in a scheme based on the prototype T-34C.

Laurie Forte's T-34 in the Navy Training Command Scheme of the 1970's.

T-34 MENTOR

Giant Scale Model For 1.8-3.0 Engines

surfaces are unhinged, the cowl is removed, and the clear plastic canopy is separated from its frame.

Cover all exposed balsa skin on the wings and tail surfaces with 3/4 oz. fiberglass cloth and Z-Poxy Finishing Resin. On the tail surfaces, take care that the resin does not flow onto the corrugated plastic skins. When cured, sand the fiberglassed areas smooth and scuff all surfaces with 220-grit sandpaper.

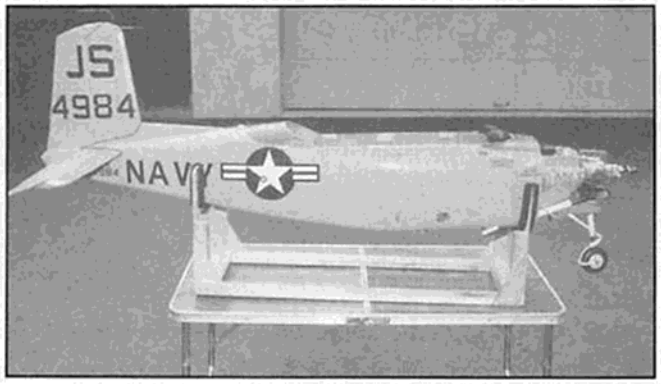
Spray a light coat of primer over the entire airframe and fill any imperfection. I use Evercoat Polyester Glazing Putty which is easy to apply, sands within 15 minutes of application regardless of thickness, and blends to a feather edge.

Re-prime to be sure all surface imperfections are filled, then wet-sand with 400-grit sandpaper.

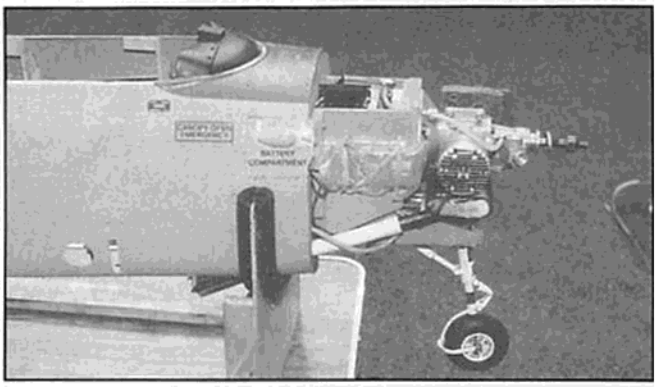
Panel line and rivet detail should be added at this time. I drafted full-sized drawings of the model from all elevations (right, left, top and bottom), depicting the position of the skin panels and the rivet rows. You can obtain copies of this series of drawings from Model Specialties, Inc., 1220 Sylvan Road, West Chester, PA 19382, (610) 692-4139. The Mentor has overlapped skin panels and raised rivets. These can be reproduced by drawing the panel lines on your primed airframe with soft pencil and a flexible straightedge. To form a raised panel edge, simple apply a double layer of electrical tape (this gives a sharper edge than masking tape) on the low side of the panel line. Generally, the forward panels overlap the aft panels, and the upper panels overlap the lower panels. Squeegee a light line of putty (either Evercoat Polyester Glazing Putty, or 3M Acrylic Glazing Putty) over the tape edge so that it overlaps approximately 1/2 of the tape and feathers gradually onto the exposed panel. When dry, block-sand the putty until there is none left on the tape and the portion remaining on

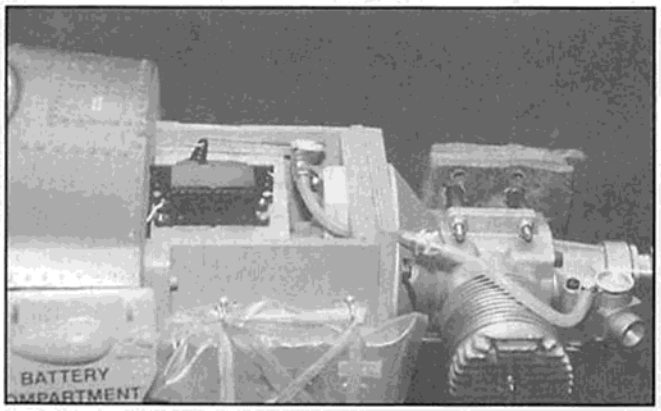
Jay Sarver's authentic restoration in 1950's Navy Training Command Scheme.

A Skywarrior T-34 used for civilian air combat training. INSET: The prototype T-34 model built by Joe Weizer of Havertown, PA.

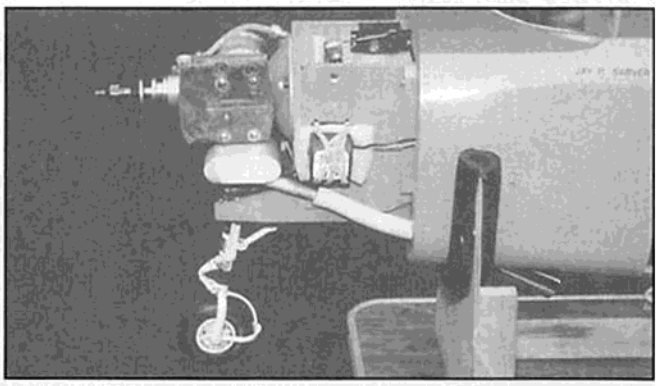


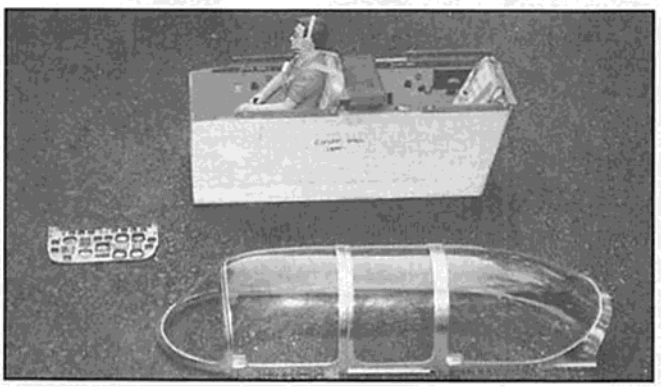
Fuselage with canopy, cowl, and wings removed.

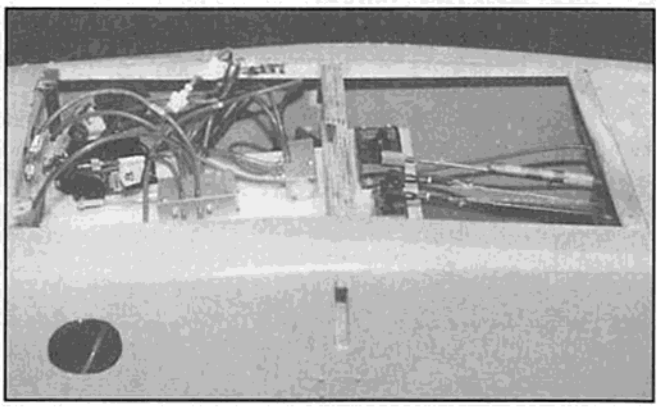

Engine box showing Moki 1.80 installation.



Remote needle valve assembly and servo.


Left side of the Moki 1.80 installation. Note the lead plates bolted to the engine to achieve correct balance.


The canopy and cockpit tub removed from the fuselage. Note that the forward instrument panel is also removed to allow removal of the cockpit tub.


The fuselage belly hatch which provides access to radio components, the retract valves, and wing attachment.

Cowl showing C1, the cowl attachment ring.

the panel is smooth and even. Remove the tape, leaving a sharp ridge which simulates the overlapped skin.

Rivet lines are drawn in place and small drops of flexible white glue such as Pacer 560 Canopy glue are syringed in place. Work on one surface at a time before rotating the part to rivet the opposite side.

Spray the base color followed by any trim colors. Add the markings followed by a clear coat to seal the entire finish.

Equipment Installation

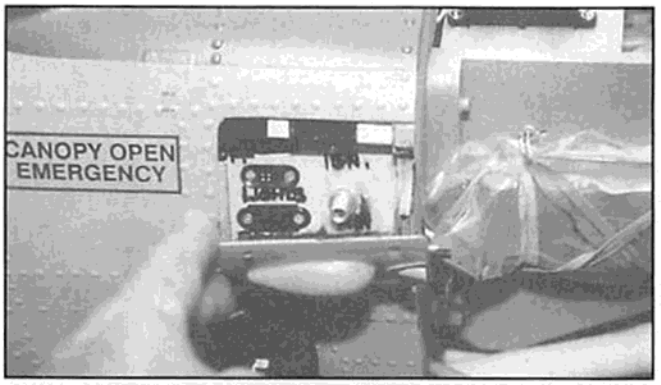
The radio, power plant, and landing gear systems are now installed. If you use the inner gear doors and nose gear doors, Ultra Precision air valves U.P.2 and U.P.4 will properly sequence the entire system. I used two large Robart #192 pressure tanks hooked together with a "T" fitting. This provides at lease ten reliable cycles when filled to 100 p.s.i.

The control surfaces should be rigged to deflect to the angles shown on the plans. These deflections are scale and provide very smooth control responses.

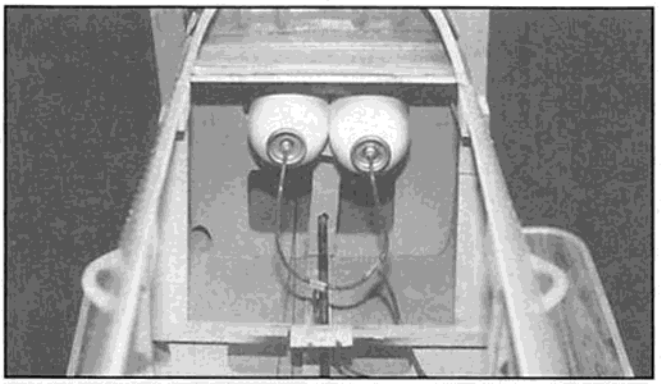
Flight Test

Aside from the alignment and structural integrity of the airframe, the most important preflight consideration is obtaining the proper Center of Gravity. The model should balance just aft of F3. You will probably have to add nose weight since the Mentor has a long tail moment with a short nose moment. The Moki 1.80 installation is so light that I had to add nearly 3-1/2 lbs. of lead to achieve the correct balance.

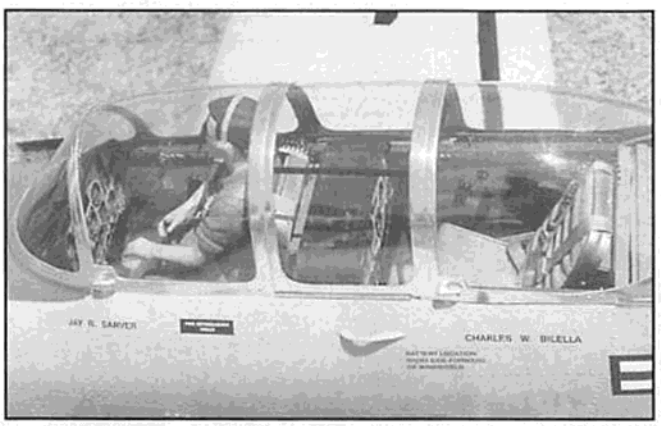
Become totally familiar with your engine before attempting a flight. Be sure that it runs in all attitudes: nose up, nose down, and steeply banked. Be certain also, that the idle is reliable and that you can return to full power instantly after a prolonged idle.



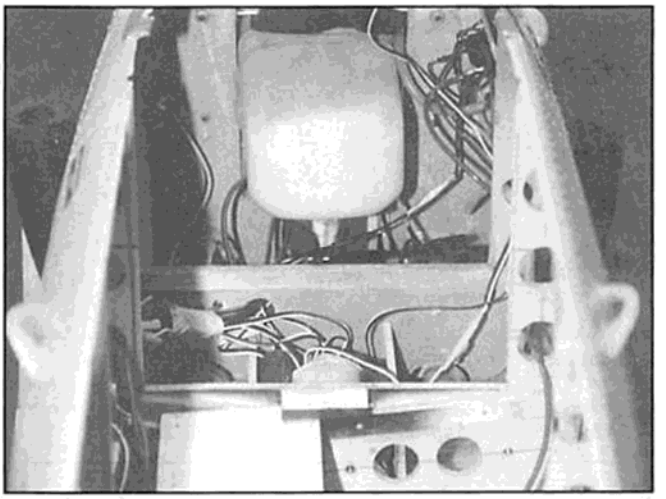
Battery compartment hatch provides access to switches, air filler valve, and charging jacks.



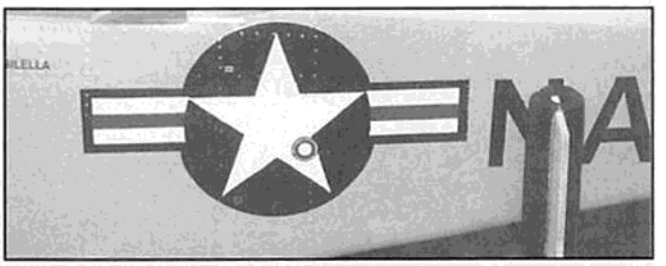
Fuselage interior with cockpit tub removed looking aft. Twin air tanks are visible.



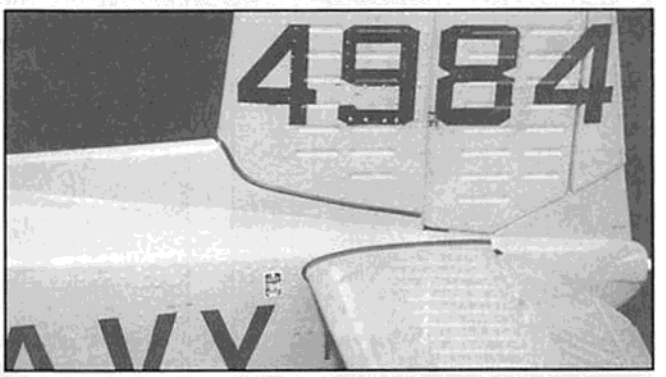
Cockpit and canopy details on my model. (Photo by Dick Slutz.)



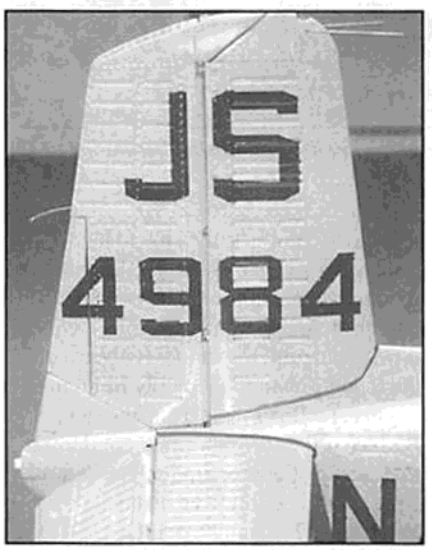
Interior of fuselage with cockpit tub removed showing fuel tank installation.



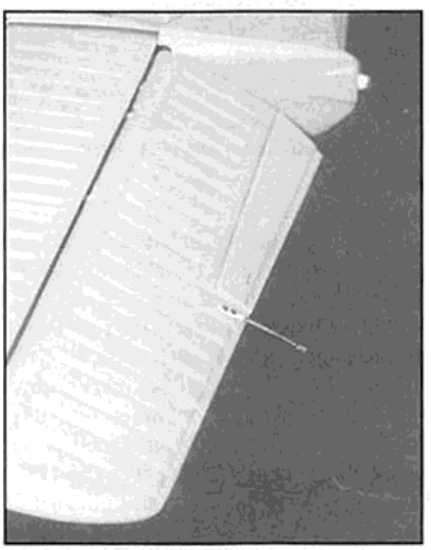
Large markings, such as the national insignia, are painted with precut masks to avoid wrinkling over raised rivets.



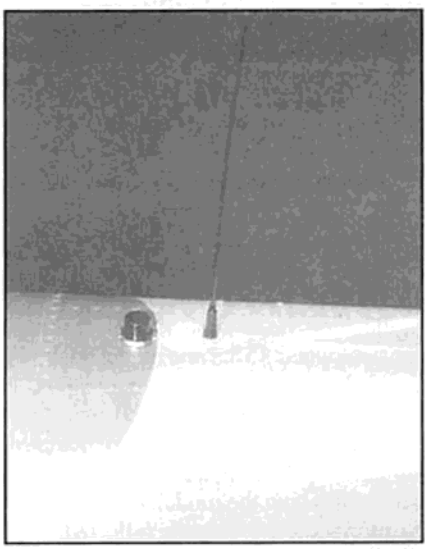
The rubber combing at the base of the fin, the stabilizer root, and the wing root are available from Fourmost Products, 4040 24th Avenue, Forest Grove, OR 97116, (503) 357-2732.



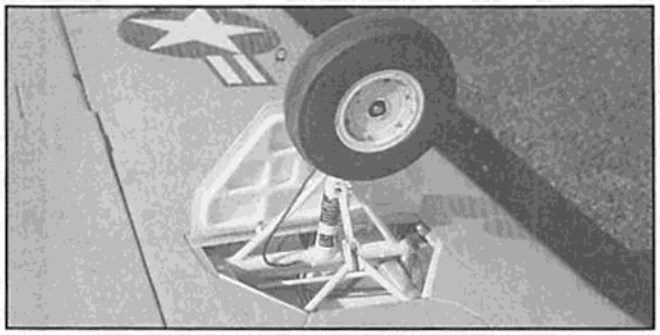
Fin and rudder lettering must also be painted.



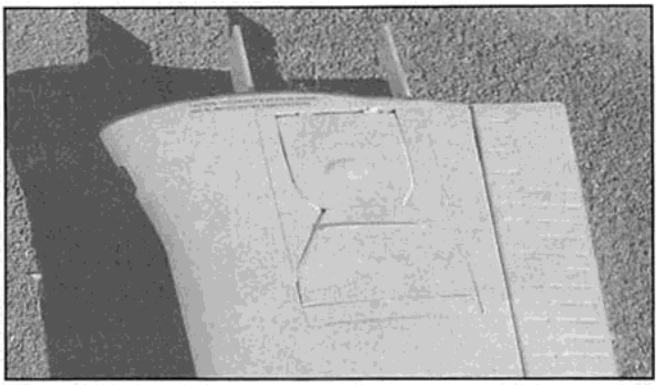
Elevator detail. The wire near the trim tab is a static electricity discharge wick.



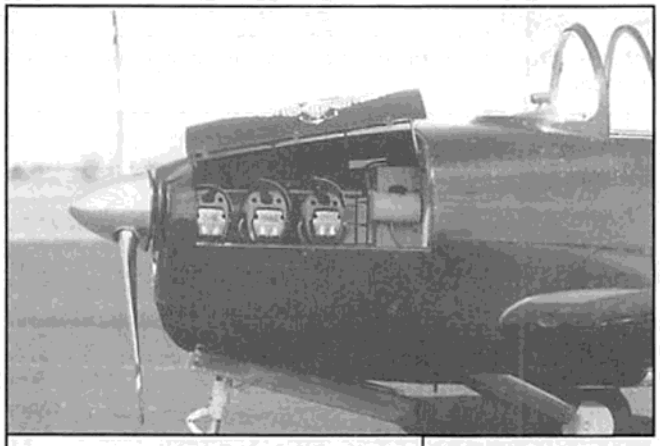
The rotating beacon cover is available from Radio Shack.

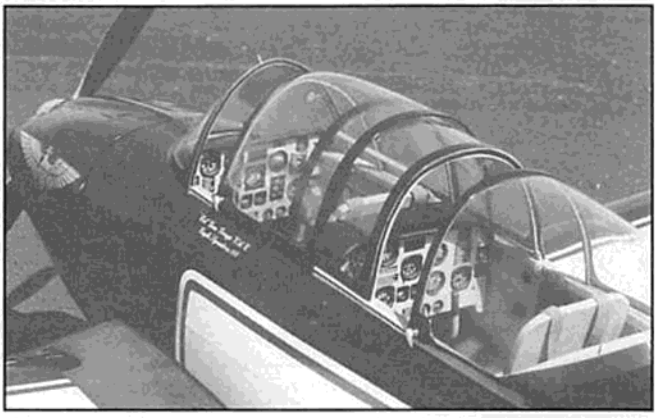


The landing gear is available from Robart Manufacturing, P.O. Box 1247, St. Charles, IL 60174, (630) 584-7616. Scale tires, spinner, and brakes are available from Tudor Model Engineering, RD #3, Box 424, Glen Rock, PA 17327, (717) 235-2997.

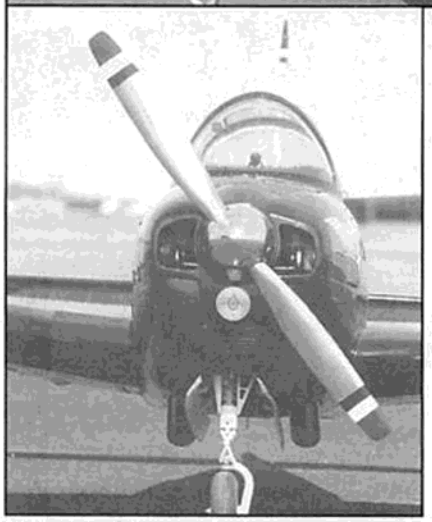


The landing gear doors are formed from the fiberglass sheet that fits between the two spars W3 and W4.

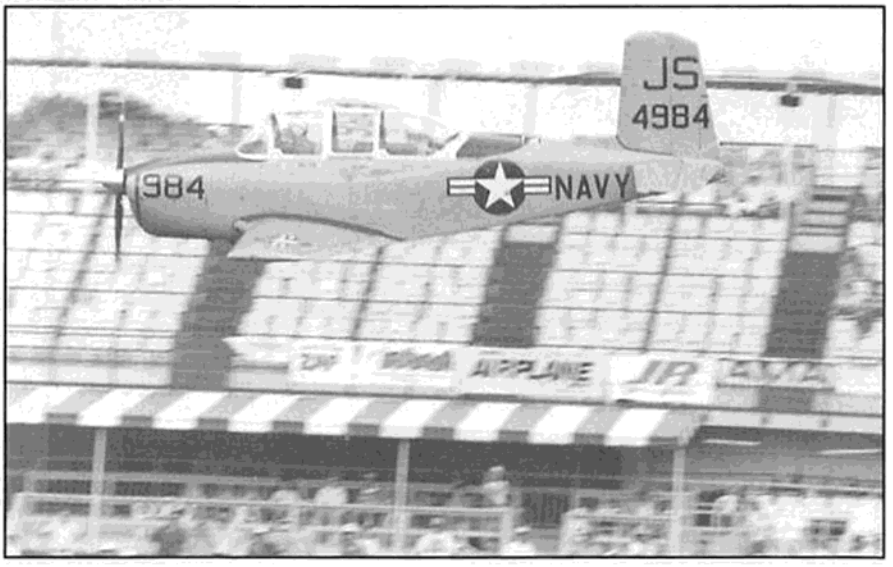




Cockpit and sliding canopy on Jim's highly detailed aircraft.



Jim Sandquist's T-34 which is powered by a 4-cylinder O.S. Pegasus. The last two cylinders are dummies which gives the engine the appearance of a 6-cylinder Continental.



Jay Sarver makes a pass in the full-sized Mentor during the flag raising ceremony at Top Gun, 1997.

When you are satisfied with the engine operation, conduct a series of taxi tests. Be sure that the model steers positively without too much sensitivity. Also, align the nose wheel so that the model tracks perfectly straight with no control input.

When this is accomplished, you are ready for a first flight. Flaps are not used for take off. A gradual application of power allowing the model to accelerate to approximately 40 mph, followed by slight elevator back pressure will rotate the Mentor and allow it to lift off. Maintain a gradual climb angle to about 200'. When the model is stable and well-trimmed, cycle the landing gear and execute a series of turns to the right and left of increasingly steep banks. Climbing up to about 400', you can slow the model and become familiar with its stall. Both of the prototype models exhibit very benign stalls, even the 41 lb. example. The stall occurs straight ahead with no tendency to drop either wing. This is the result of the pronounced wash-out used in Beechcraft wings.

The Mentor is truly a joy to land. A typical approach is flown by dropping the landing gear at approx. 100' with the engine at 50% power. Descend downwind until the model is abeam of the touch-down point. Apply full flap and begin a gentle turn onto the base leg. Reduce power to 25% while continuing to descend. Another gradual turn onto final should be followed by back pressure to present a level angle of attack. As the model crosses the runway threshold, you should have 10' to 15' of altitude.

Reduce power to allow the model to settle, while holding more back pressure to elevate the nose. When executed properly, the Mentor will touch down on its main gear and roll nose high for several yards.

Like the full-sized Mentor, the model is capable of a wide array of aerobatics. I have seen several hours of Navy training films on the T-34B and I am astonished at how accurately the model simulates the full-size aircraft in roll rate, turning radius, and vertical ability.

The full-sized Mentor is famous for its airframe durability and the model seems to be very rugged, also. However, if you work at it, you can break the model. So, fly it with care.

Future Considerations

I always select subjects that afford a wide choice of color schemes since I enjoy researching and duplicating attractive finishes. There are many new schemes I hope to replicate from Julie Clark's polished aluminum Mopar aircraft to the early high visibility markings of the VT-1 Training Squadron when dayglo red-orange was in fashion.

If you really want to get carried away by detail, you should consider a sliding canopy, an opening cowl to reveal a scale engine installation, and an opening baggage compartment.

The T-34, as I have always suspected, makes an excellent 1/4 scale project. It is very docile, very durable, and uncannily real in the air.

Feel free to contact me through R/C Modeler, or Model Specialties, 1220 Sylvan Rd., West Chester, PA 19382, (610) 692-4139, if you have any questions about the project.

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