Photos by Clancy C. Arnold and Jack Sheeks

P-38

This Control Line Scale model for twin .35s is detailed after the Confederate Air Force's N25Y. It can use either mechanical or U/Tronics controls. ■Clancy C. Arnold

IN THE OPINION of many, the Lockheed P-38 Lightning was the best fighter aircraft of World War II. I might be willing to concede that the P-51 was the best in the second half of the war, but the P-38 was operational much earlier and still much in the thick of it at the end.

Just how good was the P-38? After a long over-water flight, it intercepted an aircraft carrying Admiral Yamamoto (planner of the Pearl Harbor attack), shot it down, and returned. Richard "Dick" Bong was (and still is) America's top ace with 40 victories while primarily flying P-38s. Thomas B. McGuire, Jr., America's No. 2 ace with 38 victories, also flew P-38s. Vividly showing its toughness, in no other fighter I know of could Lt. Thomas W. Smith have rammed an Me 109 head on, deep over Germany, and still returned to his home base in England.

With four 50-cal. machine guns plus a 20mm cannon, all concentrated in the nose, the P-38 earned the German nickname, *Gavel-Schwanz Teufel,* "Fork-Tailed Devil." Oberleutnant Franz Stiegler, a 28-victory ace for Germany, once stated: "One cardinal rule we never forgot was to avoid fighting a P-38 head on. That was suicide. Their armament was so heavy and their firepower so murderous that no one ever tried that type of attack more than once."

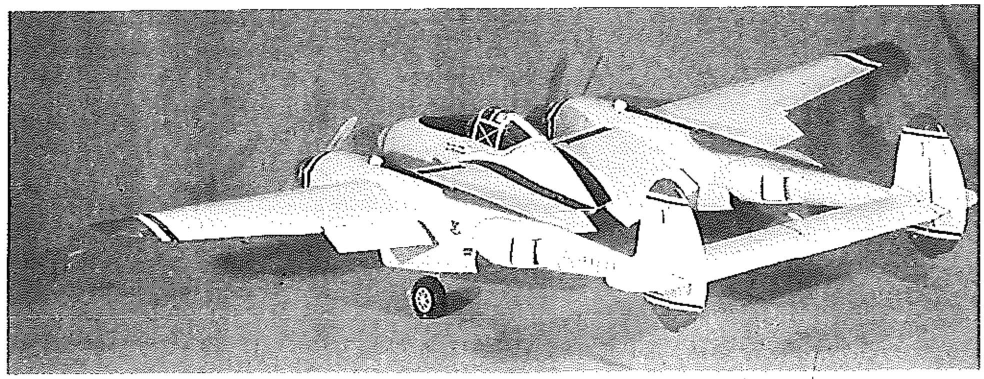
Of course, our model isn't that tough, but the way I fly at times, it ought to be in order to survive.

The specific aircraft I have modeled is the Confederate Air Force's P-38 with the civilian designation of N25Y, devoid of any armament. Consequently, it could be considered as being in either the military or civilian category. (If you think modeling is an expensive hobby, Lefty Gardner—sponsor and pilot of N25Y—budgets $20,000 per year just for maintenance. It burns $150 of fuel per hour!)

Functions I have incorporated into this model are independent throttles, proportional Fowler flaps, retracts, landing lights, and wheel brakes. The landing lights are controlled by a microswitch on the retract servo, and the brakes are standard Du-Bro No. 157 nose wheel brake units mounted on the main gear with a single servo mounted in the fuselage to activate them.

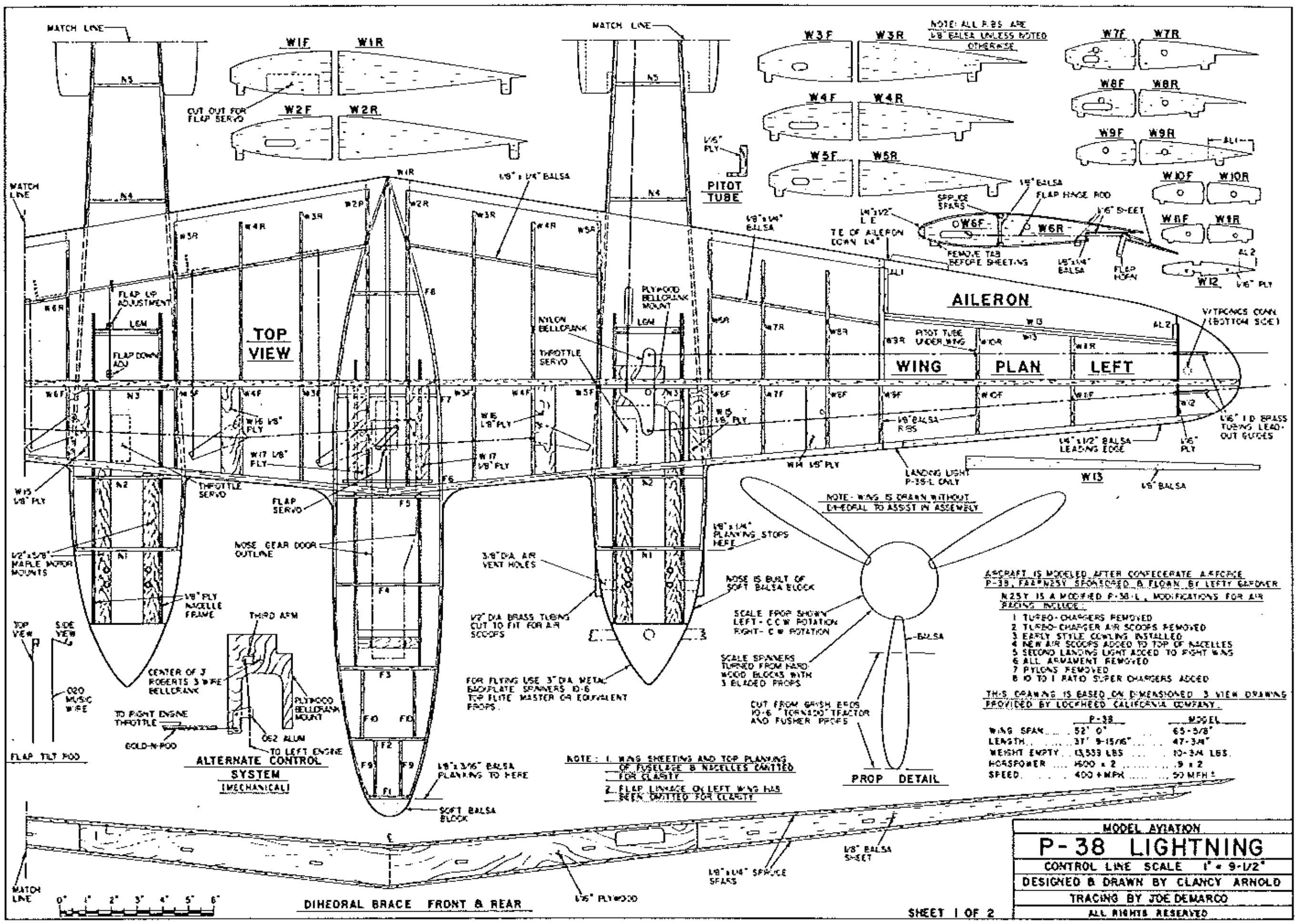
I have entered my model in several major contests. It generally receives a high static score, but I haven't yet acquired the piloting skills to show the model's full potential. I even tried flying it in 1983 contests with engines that weren't broken in—something that no one should do. To top that, if you were at the 1983 Nats you may have seen what happens when a flier forgets his plane has independent throttles and only firewalls the outboard engine on takeoff. You guessed it—a ground loop.

This model, like the full-size P-38, can be flown on one engine once the plane is in the air. I accidentally experienced this during the 1983 FAI Team Trials when the inboard engine quit on the third lap; I had no trouble completing the necessary 10 laps to



Top Picture: The model outfitted with its static display props and spinners. Note the simple U/Tronics connection plugged in under the wing tip. Above: We see the Fowler flaps at full extension. Their operation is one of the fascinating aspects of the author's P-38 model.

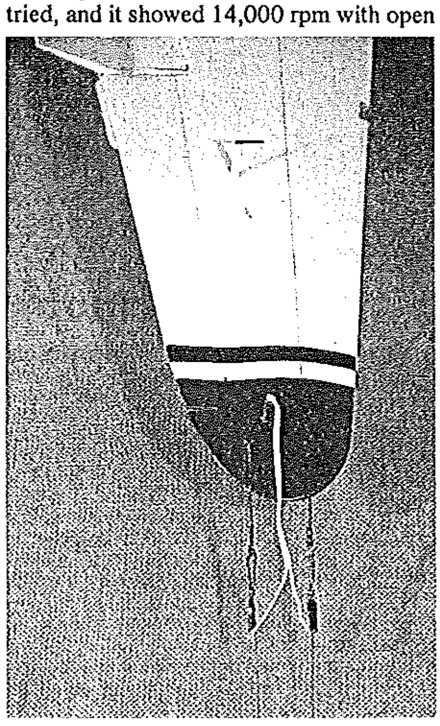
505

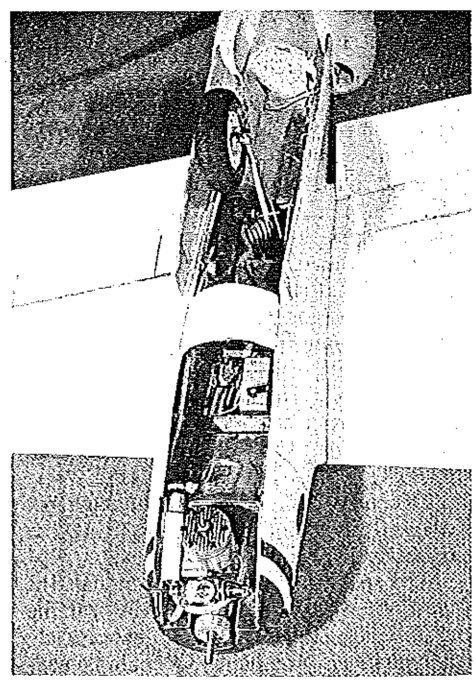


qualify the flight. Clarence "Kelly" Johnson, designer of the P-38, knew what he was doing when he placed a rudder in line with each engine when laying out the basic design in 1937.

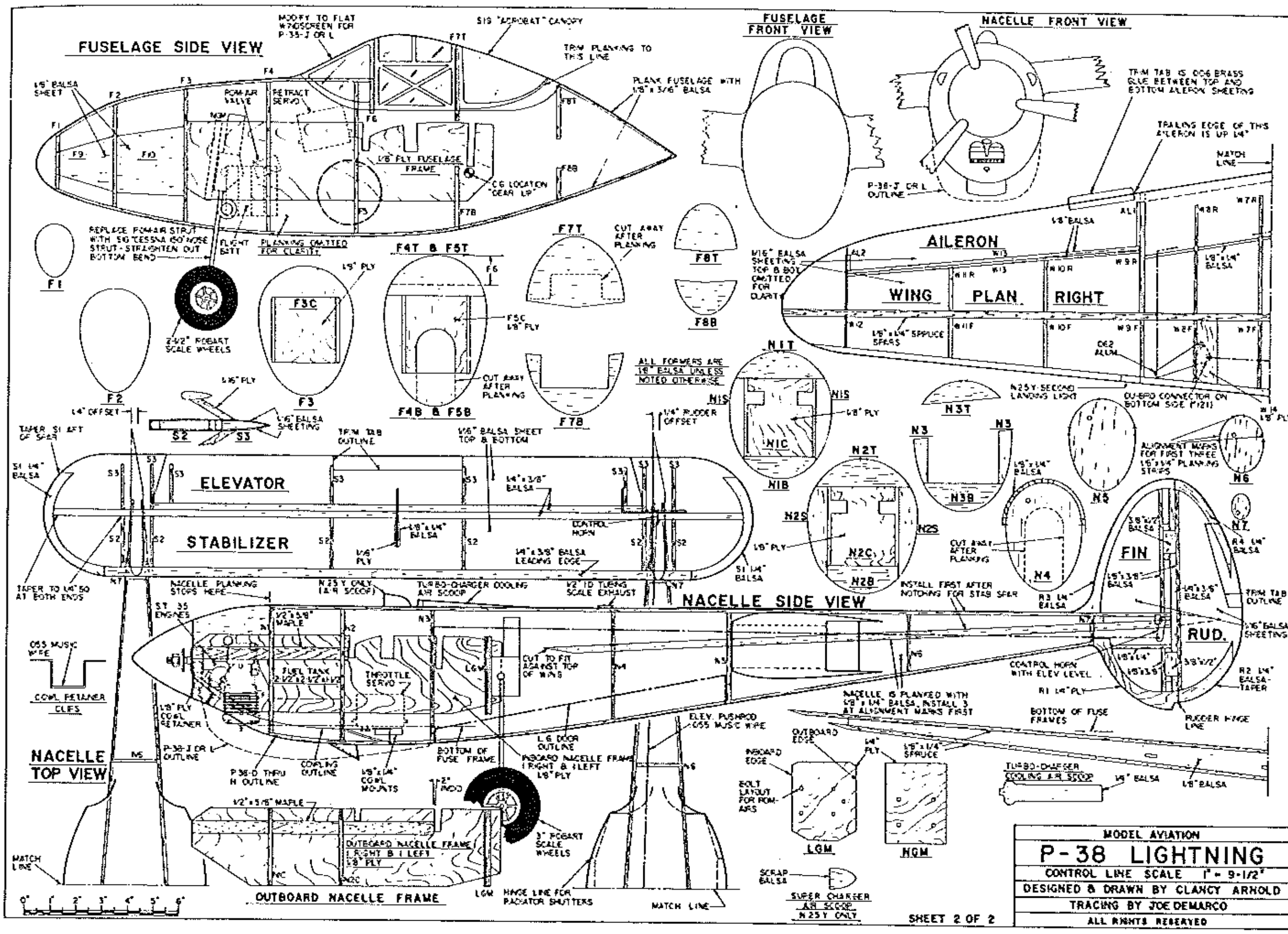
My model is powered by two Supertigre .35 PDPs, but early on I thought of using larger engines and conducted some tests which may interest you. Using 10%-nitro fuel and a 10-6 Top Flite Master prop, the ST .35 turned 11,000 rpm with open exhaust and 10,000+ with my scale exhaust system connected. The ST .46 was tried, and it showed 14,000 rpm with open exhaust but only 10,000 with the scale exhaust system (⅜-in. I.D.) connected. Also, the .46 would overheat in 30 sec. at full throttle when using the scale exhaust. Back pressure apparently was too high with


One advantage of the U/Tronics control is being able to bring the control handle to the airplane to check all systems before starting the engine. Don't check the retracts though!


Author's simple and uncluttered U/Tronics control connection. Of course, the model can be built for mechanical-only controls.


We see one of the custom exhaust headers that connects the engine and scale exhausts through 18 in. of ½-in. I.D. tubing. Servo is connected to the throttle and, through two holes in Former N5, to the radiator shutters to simulate engine temperature control.

Full-Size Plans Available . . . See Page 164



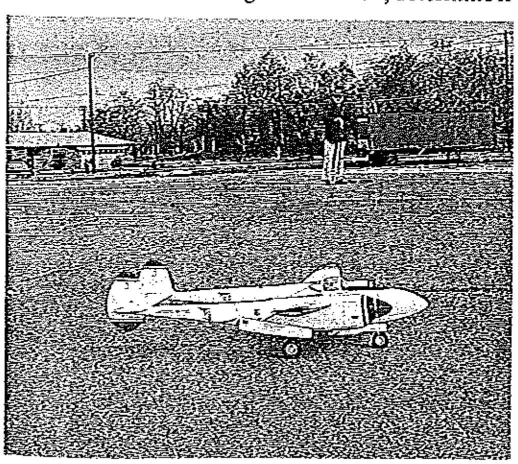
the larger engine, and much later I speculate about how the .46 might have done with larger (⅝-in. I.D.) exhaust pipes.

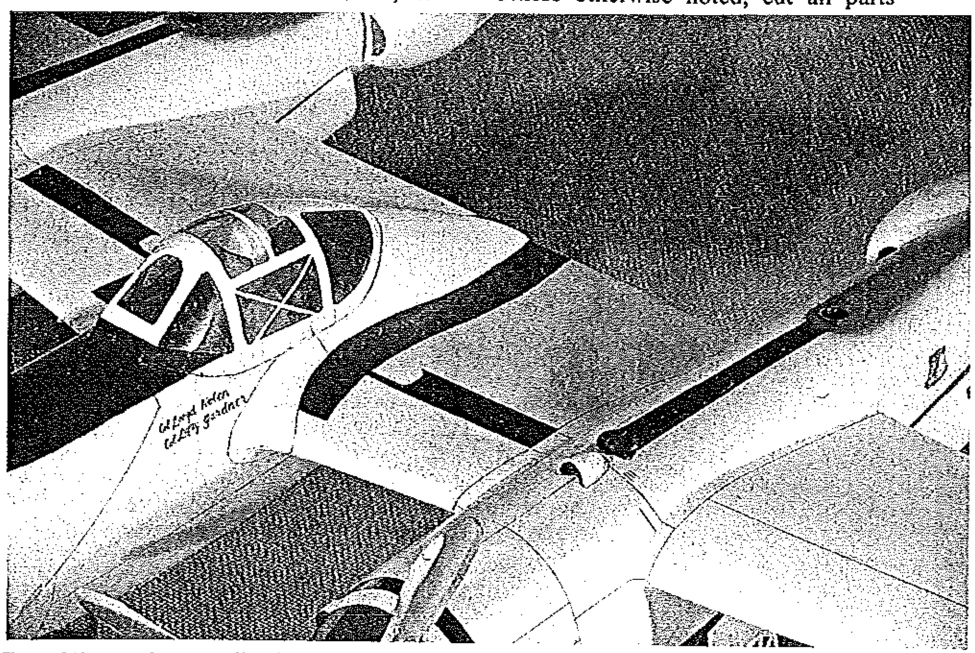
With all systems working, my P-38 model is an enjoyable but busy airplane to fly. Therefore, the pilot needs to practice, practice, practice. The model, like the full-size P-38, has a high wing loading, and even with the scale Fowler flaps back and down, substantial airspeed must be maintained. Remember that the plane will be lifting a lot of weight (mine weighs 10¾ lb., less fuel, though yours could be lighter with careful choice of materials) with only 500 sq. in. of wing area and 56 sq. in. of flaps.

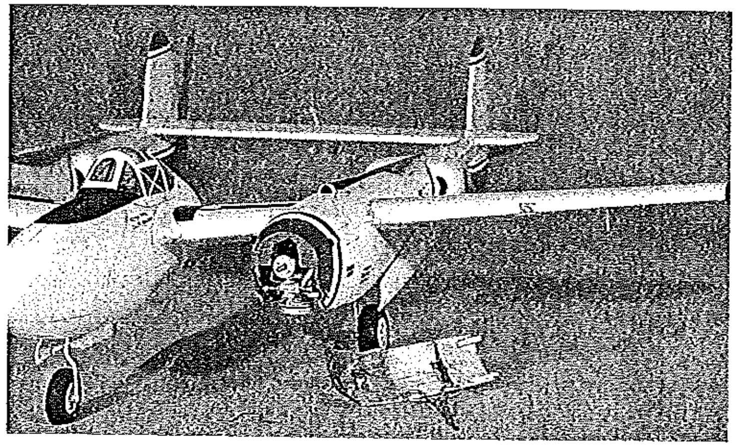
Before starting construction, determine if your hobby room is large enough for building a one-piece, fixed-wing model of 4-ft. length by 5½-ft. span (better check your means of transportation, too). If not, build a bigger hobby room (but don't charge the cost against the P-38!).

Wing construction. As in most models, the wing is the heart of the design. This one is different from most, though, as all ribs (except the tip ones) are in two pieces. Start with the spar. This is built full span; if your workbench isn't 66 in. long, work on the floor, laying a strip of wax paper over the plans.

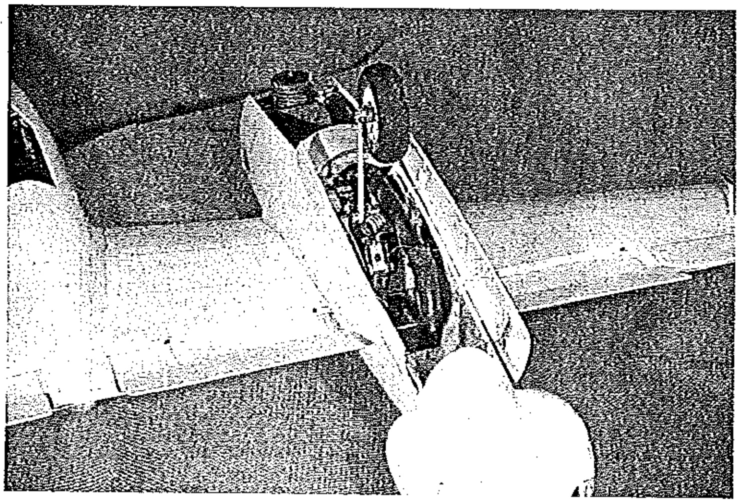
Unless otherwise noted, cut all parts

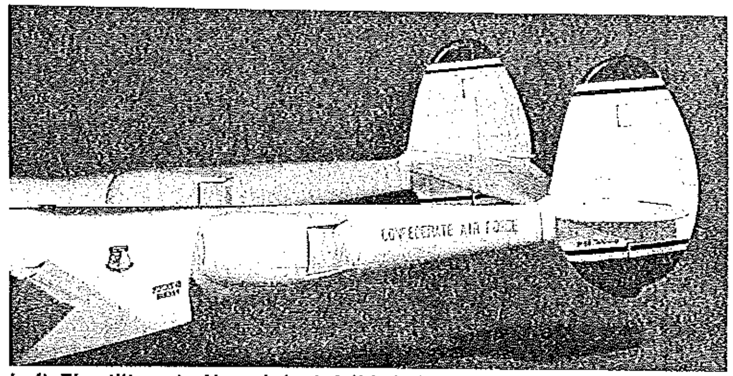

Engines idling and brakes set after taxiing to the "judges' position," the P-38 is ready for taking off, Clancy Arnold at the controls.


Top of the engine nacelle showing the scale exhaust and supercharger and turbocharger air scoops. Note the anti-skid walk areas and the canopy detailing. Lettering of pilot names was done on Scotchcal and then applied to the model. Colonels Lloyd Nolan and Lefty Gardner are two of the five founding members of the Confederate Air Force show group.

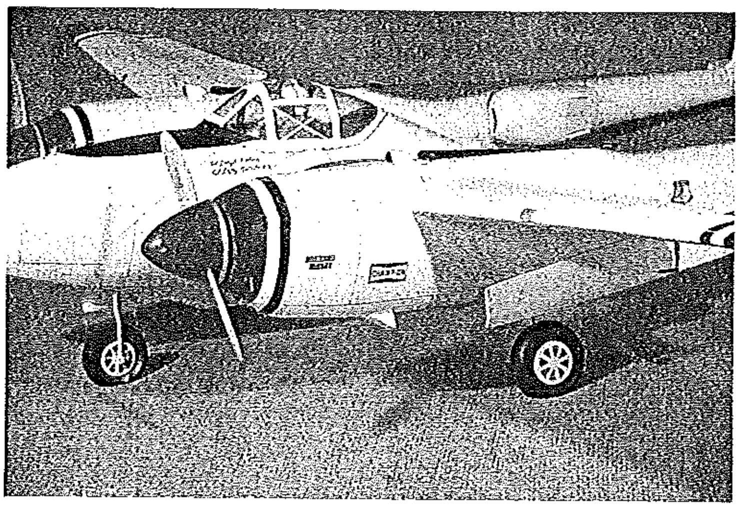


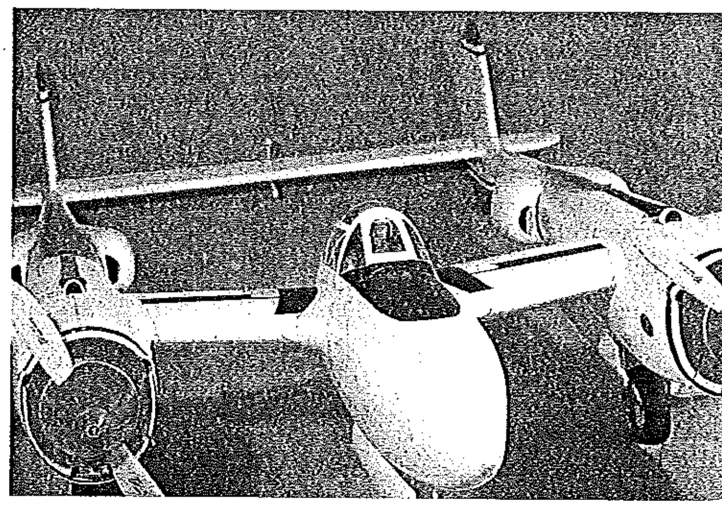
Left: Forceps are hooked to the cowl retainer clip ready for removing the cowl. Only the front of the Supertigre .35 PDP head shows when spinners are installed. Right: With cowl removed, it's easy to see the cooling air outlet hole and baffle. Also note the balsa cowl retainers.





Left: Flap tilt control horn is just visible in front of the exhaust pipe. A length of monofilament fishing line is connected to the gear doors so that the gear doors are pulled closed when the Rom Air retracts are actuated. The doors are spring-loaded in the open position with torsion-bar springs formed from .025 music wire. Above: Close-up of the booms and tails shows markings used on our author's P-38.





Left: Flying props and spinners were installed for this picture. Note how the scale oil radiator shutters make a nice cooling air outlet shroud. Right: Oval area on the inboard side of the engine nacelle (both of them) simulates pilot viewing access for landing gear operation. At and behind the scale exhaust, the "scorched paint" was air-brushed with flat camouflage tan over the model's white polyurethane finish.

from 1/8-in. sheet balsa. The spar is made of 1/8-in. balsa and capped, top and bottom, with 1/8 x 1/4-in. straight-grained spruce; the center 24 in. is laminated, front and rear, with 1/16 ply. After assuring proper fits, assemble the pieces over the plans with slow-curing epoxy. When the epoxy has cured, cut slots in the spar for the elevator bellcrank mount and the flap pushrods.

Position one side of the spar (on its edge) over one side of the wing top view, and secure it with weights. The "feet" on each rib half provide the proper leading edge (LE) and trailing edge (TE) height. All ribs except W1F and W1R are installed perpendicular to the bottom surface of the wing panels.

Use regular (fast) cyanoacrylate glue (CyA) to secure rib halves W2F through W11F and W12 to the spar. Glue on the balsa LE, and bevel its top to conform with the shape of the ribs. Similarly, glue the rear ribs to the spar. Install both halves of W1, tilted to half the dihedral angle (so that W1 will be vertical when the wing tips are level).

Edge-glue six sheets of 1/16 x 3 x 36 balsa to make one large piece for the wing top sheeting. Place the spar and rib feet on a flat building surface. Align the sheeting with the LE, and trim it at the center to rest halfway on W1. Glue on the top sheeting

Continued on page 155

quick kill, was it really that much of a win? In real war situations, the enemy would have lurked over the poor ground troops (the pit crews?) for the majority of the time. Our Combat events are based on the idea of what would happen in the real battle arena, so staying on the ground or mid-airing the competition doesn't seem like much of a solution.

On becoming a star. Tired of being a big wheel in your area but being an unknown on the National scene? Many good Combat fliers have gone unnoticed because they didn't know how to promote themselves. If you don't win the big meets, where there is national press coverage (Ha-ha, me!), then drop me a line with a nice photo of you and your plane and some information on what you've done.

Charlie Johnson, 3716 Ingraham St., San Diego, CA 92109.

CL Navy Carrier/Perry

Continued from page 73

John's works of art. They are all different in some detail—the result of continuing evolution in the design. I have neither the knowledge nor the column space to provide detailed fabrication specifications (this is not a construction article); instead, I will describe the mechanics of these throttles so that anyone with the inclination, imagination, and equipment can attempt their own. John does not make these throttles for sale (the price would be too high); they are, for him, an enjoyable part of the sport and more a labor of love.

John started making his throttles as a means of both shortening the length of his rear-intake engines and providing a larger-diameter intake to improve performance. A side benefit is the significantly-improved fuel economy, which results from better control of fuel mixture at intermediate throttle settings.

The slide valve which controls the air intake is a piece of thin brass sheet which is a loose fit between the fuel manifold block (¼-in. aluminum) and the rear cover plate of the throttle. A brass rod passes vertically through the fuel manifold block and performs a variety of functions. It operates the slide valve by means of a lever at the bottom of the throttle. It progressively closes off the multiple fuel jets as the throttle is closed, thus providing effective fuel metering throughout the range of engine speeds. It also vents the crankcase pressure line (which passes through the fuel manifold block on its way to the fuel tank) when the throttle is near the closed position, because the crankcase pressure at that point in the speed envelope is too low and too variable for consistent operation on pressure.

The fuel manifold block is depicted separately. It contains milled channels which direct the fuel from the bore of the metering rod to the air intake. This particular manifold is a five-jet configuration for a .65 engine in which the channels are cut about 0.004-in. deep. The width and depth of the channels controls the amount of fuel which can pass through, thus providing mixture control at intermediate speeds. The primary needle valve fits into a threaded hole in the side of the manifold and feeds fuel to the bore of the metering rod. The final (idle) fuel channel also includes a needle valve for precise setting of idle mixture. Any of the fuel channels could contain a needle valve, if the builder desired that feature.

The other two parts in the photograph are the engine backplate and the plate which separates that backplate from the milled channels on the face of the fuel manifold block. The backplate has been filled with epoxy and milled flat. The backplate mounting screws provide the necessary pressure to hold the throttle together and seal the fuel passages.

Richard L. Perry, 7578 Vogels Way, Springfield, VA 22153.

P-38/Arnold

Continued from page 78

with slow (gap-filling) CyA.

After the glue has set, turn the wing over and check that the top sheeting is fully glued to the spar and rib assembly. When satisfied, trim the top sheeting to the proper outline. Sheet the top of the flap pockets with 1/16-in. balsa; install 1/8 x 1/4-in. strips to form the front of the flap pockets and W13 to form the front of the aileron cutouts.

In a like manner, assemble rib halves for the opposite wing panel to the spar, and cover it with the top sheeting. Cut a slot in the top of the left wing for the elevator pushrod.

Assemble the .062 music wire (m.w.) elevator pushrod and control lead-outs to the elevator bellcrank, and bolt the bellcrank to its mount. Install and epoxy the mount assembly through the spar and to the LE.

This bellcrank mounting may seem excessive, but remember that CL Scale models are subjected to a high pull test for safety (at 10¾ lb., my P-38 has to withstand a 65-lb. pull test). X-Cell and Sig nylon bellcranks have worked well for me.

Make eight identical flap bellcranks from .062 aluminum sheet. Secure a Du-Bro No. 121 E-Z Connector to each flap bellcrank with solder. Bolt the flap bellcranks to W14 through W17 with 4-40 screws, washers, and *new* self-locking nuts. Make a Z-bend in one end of each of the eight .055 m.w. flap pushrods (do not bend the other ends at this time). Drill a 1/16-in. hole in the front of the flap pockets, centered on the 1/4-in. dimension.

Use the pushrod locations on the plans for spacing. After drilling, harden the holes with an application of CyA. Connect the flap pushrods to the bellcranks on W14 through W17, and insert them through the holes in the spar and the flap pocket fronts. Do not glue in W14 through W17 just yet. Place the screw of the E-Z Connector at W16 through the hole in a solder lug. Insert a length of .055 m.w. through the four E-Z Connectors in each wing.

Rotate the flap bellcrank at each W14 forward until it just touches the LE piece. Position the other three flap bellcranks in each wing panel parallel to the ones at W14. Tighten the screws in the E-Z Connectors. Glue mounts W14 through W17 to the spar, ribs, and LE with CyA.

Mount the flap servo (or mechanical control), and connect an actuating rod of .055 m.w. from each end of the servo arm to the solder lug on the screw in the E-Z Connector at each W16. Use stainless steel flux to solder the m.w. to the solder lug. With the servo actuated to the "flaps up" position, bend the aft end of each pushrod so that it is parallel to, and touching the front of, the flap pocket.

The flaps are made from a 1/8 x 1/4-in. balsa strip and 1/16 balsa sheets. Size them to fit the pockets, but notice that the flaps end at the inboard surface of W5 and the outboard surface of W6. Use eight 1-in. lengths of 1/16-in. I.D. brass tubing for hinges over the flap pushrod ends, and temporarily mount the flaps with tape. Be sure to install the flap control horn as drawn on the plans. Adjust the screws in the E-Z Connectors until all flaps retract together. Impressive, aren't they?

Nacelles. Cut the frames from 1/8-in. ply. Make two from the outboard outline and two from the inboard outline. Cut 3/8 x 1/2-in. maple engine mounts to length, and epoxy them to the nacelle frames. The inboard engine beams stop at the wing LE, but the outboard beams extend to the wing spar. Be sure to make one right- and one left-hand version of each inboard and outboard frame.

Epoxy the correct sets of frames (with engine beams) together over the plans with N1C, N2C, and the landing gear mount (LGM). N1C and N2C are 1/8-in. ply, and LGM is 1/4-in. ply (use two 1/8-in. ply sheets epoxied together when 1/4-in. ply is called for).

Fuselage. Cut two frames and assemble over the plans with F3C, NGM, and F5C. Drill holes for the engines and retracts, and trial-fit them (using blind nuts). After removing the engines and retracts, check to see if any of the blind nuts are loose; if so, secure them with epoxy.

Place the fuselage frame over the top view on a flat building surface. Place the nacelle frames over their appropriate top views, and support them 1/2 in. above the building surface with spacers. Trial-fit the wing and frames; when satisfied that it all lines up and flaps and elevator controls move freely, secure the wing and frames with epoxy. Also epoxy the elevator bellcrank mount to the nacelle frames. (It's beginning to fill up that new hobby room, isn't it?) Form and install two flap tilt rods with two small wheel collars on each, as indicated on the plans.

Tail parts. Build the frame of the horizontal stabilizer consisting of the LE, spar, S1 tips, and the four center S2s, then set it aside. Notch the first three ⅛ x ¼-in. nacelle planking strips as shown on the side view. Assemble upside down over the top view the aforementioned planking strips and nacelle formers N1T, N2T, and N4T through N7. N3T will be added later. Make alignment marks on the formers for the first three planking strips. Do it again for the second nacelle.

Place the fuselage frame and nacelle frames (spaced as they were for installing the wing) over the top view. Support the horizontal stabilizer at the height indicated in the side view. Trim the two lower nacelle planking strips as required to mate with the wing top sheeting. CyA-glue N1T, N2T, and the planking strips at the wing and stabilizer. Make sure the elevator pushrod is through N4 to N7. Repeat it all for the other nacelle.

Determine what additional controls you want and where they will be installed. Add all interconnect wiring for U/Tronics control or the linkages for mechanical controls and tubing for Rom-Air retracts through the wing as required. Verify that the elevator and flap linkage is freely operating. CyA-glue all wires and tubing to the wing ribs they pass through. Inspect everything you have done to this point, and make any needed corrections before doing anything else.

Edge-glue six sheets of 1/16 x 3 x 36-in. balsa for the bottom wing sheeting. Trim the "feet" off the bottoms of the wing ribs. Bevel the bottom of the LE to fair in with the ribs. Apply the sheeting to the bottom of the wing from W12 to the outboard nacelle frame and from the inboard nacelle frame to the fuselage frame with slow-setting CyA. Do not sheet the bottom of the wing tips at this time.

Build the elevator, and attach it to the stabilizer with pinned nylon hinges. Support the elevator control horn with brass tubing epoxied in place (two places). Note the forward slope of the horn when the elevator is level. Complete the horizontal stabilizer except for the 1/16 sheeting aft of the spar.

Vertical stabilizer/rudders. Build as per the plans, noting that the hinge line frames are tapered from the horizontal stabilizer location to the top and bottom ends, as required, to mate with R1 through R4. The side view shows the clearance notch in the rudders for the TE of the horizontal stab.

Sheet the top of the vertical stabilizers with 1/16 balsa down to the bottom of R3 and the ⅛ x ⅜-in. vertical piece. Sheet the bottoms with 1/16 balsa up to a line from the top of R1 to the bottom of the nacelle side planking already installed. Verify elevator control clearance, and then install the vertical stabilizers. Sheet the rudders and mass balances with 1/16 balsa (do not install the rudders at this time). CyA-glue N3T on top of the wing and under the ⅛ x ¼-in. planking strip per alignment marks. Keep the top planking strip flat for its entire length. Install the remaining nacelle formers with CyA.

Planking. Alternating from side to side, top to bottom, and nacelle to nacelle, plank the entire nacelles from N1 to the aft post of the vertical stabilizers; use ⅛ x ¼-in. balsa strips for this. Secure the strips at the formers and ends only with fast CyA.

Install all formers and spacers F1 through F10 (except F6) with CyA. Alternating from side to side and top to bottom, plank the fuselage with ⅛ x 3/16 strips. Secure the planking strips at the formers and ends only with fast CyA. Stop the forward top planking just aft of the F6 location and the rear top planking at F7T. CyA-glue F6 in place as per the plans.

Finish sheeting of the horizontal stabilizer. Round the rudder fronts at the hinge line, and verify the fit around the horizontal stabilizer. Secure the rudders to the vertical stabs with CyA, maintaining ¼-in. offsets as per the plans.

Build the ailerons using the same construction as the flaps. Radius the aileron front edges, and glue in place with CyA (maintaining the offsets indicated on the plans; this aileron setting is required to assure tension of the control lines, because the lead-outs exit above the center of gravity; for the same reason there is *no* right thrust in the engines).

Rough-sand the nacelles and fuselage to blend the planking strips into smooth curves. Fine-sand the entire model, then vacuum the model clean. Mix small batches of slow-curing epoxy, and use old playing cards as spatulas to squeegee the epoxy over the entire model. Wipe all excess epoxy from the surface with playing cards.

Cut out the main and nose landing gear doors per the plans. The outline of the nose gear door is a top view, so be sure you are not cutting it out incorrectly. Cut away the lower part of the two N4s, F4, and F5 per the plans to clear the landing gear.

Trim the planking flush with the front of N1. Firmly glue balsa blocks as required to the top and sides of the nacelle frames with fast-setting epoxy. Add small scraps of balsa to fillet the corners at the front. Lightly tack-glue with CyA the balsa cowl blocks which have been hollowed out (to clear the engines) to the nacelle bottoms. Place a flight spinner backplate on each engine shaft, and mark the outline on the front of the blocks. Shape the blocks to contours shown on the plans from the planked area to the spinner outline. Carefully remove the cowl blocks, cut N1B and N2B free from the nacelle frames, and cut out the cowl from the planking. Cowl outline is in line with outer surfaces of the nacelle frames.

CyA-glue ⅛ x ¼-in. cowl retainer strips to the top rear corners of the cut-out cowl planking. Mark the cowls R and L to designate which nacelle each was cut from. Epoxy the lower nacelle blocks to the cowl planking. Blend the cylinder clearance hole in the cowl assembly to the inside surface of the planking by cutting away portions of N1B and the cowl blocks. Glue a nose block of balsa to F1 with CyA; contour to the proper outline, and blend it into the fuselage planking.

Make a rough outline cut-out of the cockpit as per the plans and flush with the aft surface of F6. Remove the top portion of F7T to the outline shown on the former drawing. The portion of F7T remaining is the back of the pilot's seat. Set a Sig Acrobat canopy on the fuselage, and mark the outline on the planking, then cut the planking ⅛ in. inside the mark. If your P-38 is to be a "J" or later version, use the side and front views to modify the canopy to a flat windscreen by cutting out and installing a new piece made from .020 (or thicker) clear plastic. Secure with a bead of epoxy on the inside (but be sure to keep epoxy off the window areas).

Drill ⅜-in. holes through the nacelle sides and relieve the front edges for engine crankcase cooling. Cut air scoops from ½-in. O.D. brass tubing, and install. Using front and side views, cut out the cooling air outlets in the cowl planking and N2B. Fabricate an air outlet baffle of 1/16 balsa from N2B to the planking and lower air outlet. The lower air outlet is the scale equivalent of the oil radiator shutter of N25Y. Cut air inlet holes in the cowl as shown in the front view. The two large round notches are the scale oil radiator air intakes. Cut holes for carburetor air to your engines, clearance for the glow plug starting connector, and clearance for needle valves (sorry, but these are not scale holes).

Cut four cowl retainers from 1/16 ply, and drill a 1/16-in. hole in each. Slot the cowl block to accept the cowl retainers, which fit flush against the inside of the nacelle frames just below the engine bearers. Epoxy the cowl retainers into the cowl blocks. Bend the cowl retainer clips from .055 m.w. These are installed above the engine crankshafts; they are simple, but in two years of flying, I've not had a single incident of a cowl coming loose.

Detailing. Carve four radiator pods, and glue with CyA to the nacelles. The shutter hinge line is shown, and I went the extra mile to install hinges and slave them to each throttle servo to simulate engine temperature control. This is covered in the FAI rules for a flight bonus award, but so far no judges have awarded points for it.

Epoxy 2 oz. of lead in the right wing tip against W12 and between the spruce spar strips. Epoxy two 1⅜-in. lengths of 1/16-in. I.D. brass tubing through W12 of the left wing for lead-out guides. Install U/Tronics connector or accessory mechanical lead-outs as required. Sheet the bottom of the wing tips with 1/16 balsa secured with CyA.

Due to the tension in the planking, you will notice that the landing gear doors will not fit in the holes they were cut from. Measure the amount of "growth" in the length of a door. Place the door lengthwise in a furniture clamp, and re-bow the door until it is short for its hole by the amount of its "growth" as measured. Coat the inside of the door with fast-cure epoxy, then heat the epoxy with a MonoKote heat gun to improve its flowing and absorption into the wood. When the epoxy has fully cured, remove the door from the furniture clamp, and it should then fit very closely. The photos show my hinge and closing technique, but I will not go into detail on it, as Bill Boss showed a much better way in his Control Line Scale column in the August and September 1984 issues of *Model Aviation*. Do not mount the doors at this time.

Cut the supercharger and turbocharger cooling air scoops from balsa. If you are modeling a different P-38 than the Confederate Air Force's, you will need to design and make a turbocharger air scoop for the outboard sides of the nacelles near the wing trailing edge in lieu of the supercharger air scoops. For information only, the plans include the scale outline of the P-38-J and later cowls. The method of construction will be left up to you.

Finishing. The airplane is now ready for final sanding and priming—less canopy, gear doors, flaps, Pitot tube, and elevator mass balances. What! Haven't you made the Pitot tube and elevator mass balances yet? They are cut from 1/16 ply, and the big ends on the mass balances are laminated with 1/8 x 1/4-in. balsa CyA-glued in place, then shaped. The Pitot tube and elevator mass balances are attached with CyA just prior to final painting.

My airplane is finished with white polyurethane and trimmed with red and blue stripes. The Champion sticker came with a set of automobile spark plugs. The balance of the markings were handmade.

Using slow-cure epoxy, liberally coat the inside of the engine compartments and cowls. Build and install the fuel tanks. Install and connect the engines to the tanks and throttle linkage. Install mufflers on the engines (the photos show custom mufflers installed on my engines which lead through 18 in. of 1/2-in. I.D. neoprene tubing to the "scale" exhausts.

Flying. Fill the tanks with 10%-nitro (or higher percentage nitro), and tune up the engines. You will need 10,000 rpm on the 10-6 wide-blade props for realistic flights.

Make sure that the flaps rotate down equally. A 39° setting when fully extended is to scale; unequal movement, and the flaps will act as ailerons.

Documentation. The name of the game is Scale. Books we can recommend on the P-38 include *Fork-Tailed Devil: the P-38*, by Martin Caidin; *Lockheed P-38 Lightning*, Aero Series Vol. 19; *P-38 Lightning in Action*, Squadron/Signal Publications Aircraft No. 25; and *P-38 Lightning*, by Jeffrey L. Ethell, illustrated by Rikyu Watanabe.

The location of known P-38s: One in Alaska; one owned by Col. Ross of CAF, which I understand is hangared in Milwaukee, WI; one at the front gate of McGuire AFB, NJ (detailed to match Tommy McGuire's last plane, "Pudgy V"); one at the USAF Museum, Dayton, OH; two at CAF Headquarters, N25Y and a parts carcass to support N25Y. Contact the CAF to find when and where N25Y or Ross' will be displayed in your area, as they travel all over the country to CAF air shows.

In total aircraft, the CAF is the 13th largest air force in the world, and considering that many of their planes are "one of a kind," every Scale modeler owes them a lot of support. In July 1982 I served as Lefty Gardner's crew chief on N25Y for the weekend, a true labor of love.

I would like to thank our "resident expert," Jack Sheeks, for encouraging me to design and build this model and for guidance in the general layout of the plans. Also, thanks to Al Pitts for breaking in my ST .35s right for me.

Happy flying.

China/McGinnis

Continued from page 82

of only 11 points out 10,787, the winning team's score.

Dave Brown had an engine mount give out midway in the contest; he received able assistance from the Chinese and Don Jehlik in its replacement. Don Lowe lost his best-performing prop early in practice and had to sort that out during competition. Steve Rojecki experienced flameouts that were critical to his placing higher, and Dean Koger had a radio failure that resulted in no last-round score for him. Only Dave Wilson and Chip Hyde experienced no mechanical problems with their well-used, finely-tuned planes and equipment.

Individual Scores:

1.	Pascal Malfait	France	3765
2.	Chip Hyde	U.S.A.	3725
3.	Fan Min	China	3624
4.	Ren Hong	China	3613
5.	Dave Brown	U.S.A.	3583
6.	Liu Aiqiang	China	3550
7.	Hong Wei	China	3534
8.	Tan Yebin	China	3486
9.	Dave Wilson	U.S.A.	3468
10.	Liu Hanmao	China	3427
11.	Don Lowe	U.S.A.	3358
12.	Christian Bossard	France	3290
13.	Andre Laffite	France	3262
14.	Steve Rojecki	U.S.A.	3260
15.	Dean Koger	U.S.A.	2875

Continued on page 160