Our '63 National C/L scale champ is a versatile model man, witness the two speed jobs in the picture. He also won ½A Open speed with small one on left and 4th in class C with other one.

SUPER SCALE! LOCKHEED P-38

ANOTHER IN M.A.N.'S GALAXY OF SUPER SCALE CONTROL-LINE WINNERS. 1963 NATIONALS OPEN WINNER TOOK TWO YEARS TO PROPERLY PREPARE ARTICLE FOR PUBLICATION.

Power generated by the two Torp .35s is shown clearly in face of Don's 8-year-old son, Allan, as he holds plane while Pop, at handle, is getting ready to signal for release of plane.

By DON YEAROUT

► The prototype XP-38 designed to meet Army Air Force requirements for a high altitude, high speed interceptor, was ordered in June of 1938. The Lockheed design team, headed by Hall Hibbard, considered six different configurations before selecting the radical twin engine-twin boom layout. This configuration was deemed necessary because no single engine was available at that time which would give sufficient power to meet the design requirements. This unusual aircraft was the first single seat-twin engine fighter, first fighter equipped with turbo superchargers and first with counter rotating propellers. Flown for the first time in January 1939, the XP-38 was an immediate success and was ordered into large scale production before the first Y models were even test flown. Production rate was extremely slow in building up due mainly to the complexity of the ship. It was the summer of 1941 before planes were coming off the assembly line in any great number. The "Lightning" underwent many design modifications during its production history and the last model, the P-38M night fighter was still in production on V-J Day. Altogether, more than 10,000 P-38's were built.

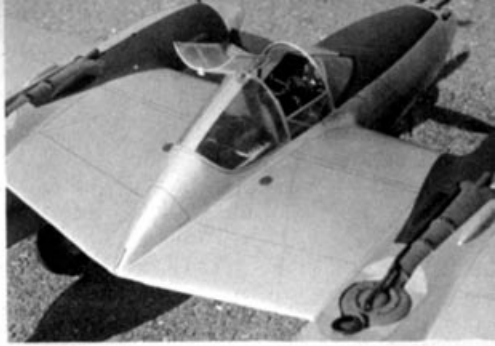
Used in every World War II theater, P-38's were destined to bring down in aerial combat more Japanese aircraft than any other Allied plane in the war. Both the first and second ranking American fighter aces of World War II flew P-38's. Major Richard Bong had forty aerial victories and Major Thomas McGuire thirty-eight.

Without doubt the most versatile fighter plane of the war, the P-38 was used as a bomber escort, fighter-bomber, high altitude bomber (with a bombardier in the nose), night fighter, photo-reconnaissance plane, and even as a personnel transport.

Of the many variations of the P-38, the J model was the fastest and the one produced in the largest numbers. Making its first appearance in August 1943, the J model introduced a beard radiator under each engine prop shaft giving the plane its distinctive, deep, bathtub cowling that was characteristic of all subsequent models. The P-38J was powered by two 1,425 hp Allison V-1710-89/91 V12 liquid-cooled engines, giving it a maximum speed of 414 mph at 25,000 feet with a rate of climb of 2,500 feet per minute. It was armed with four 50 caliber machine guns and one 20 mm cannon.

After the war many surplus "Lightnings" were stripped down and refitted for racing. Lockheed test pilot Tony LeVier was perhaps the best known and most successful P-38 racing flier, making an excellent showing in both the 1946 and (*Continued on next page*)

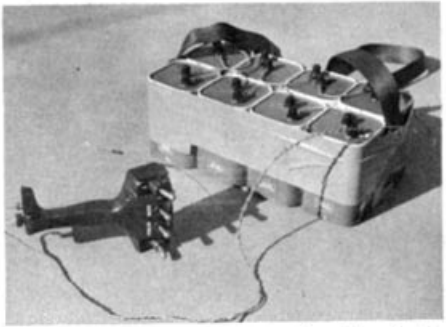
Exciting side profile of Lightning sitting at rest on tarmac. Details do make the big difference!



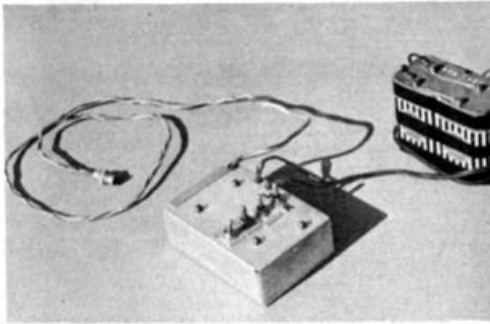
Canopy open to show excellent cockpit details.

1947 Thompson Trophy Races.

The model presented here is of the J version mentioned earlier. It was selected because the deep cowlings made it possible to completely cowl-in the engines. Several months were spent on the ground-work, especially in the design of the gear retraction mechanism before any actual construction was begun. This was to be a labor of love as the P-38 had long been the author's favorite airplane. Retractable landing gear, throttle control, operating position lights, and cockpit detail were to be included in the model. A great deal of time was spent searching through old model magazines and library books, collecting information that would be useful in the construction of the model. Snapshots taken of a privately owned P-38 at the local airport were extremely useful during construction of the model. A few years after the model was completed, a beautiful set of P-38 plans in ¾" to the foot scale became available from Superscale, Arlington, Texas. These plans drawn by LeRoy Weber, would be most useful to any modeler building a P-38 in any scale.



Battery pack and control handle with throttle and landing gear control switches clearly marked.



Ground test box with starting battery used to test throttles and landing gear operations.

One inch to the foot scale was decided upon because of its handy size allowing .29 or .35 cubic inches displacement (*Continued on page* 50)

Super Scale! Lockheed P-38

(*Continued from page* 12)

engines to cowl in completely and is not too small for extreme cockpit detail. .35 size engines were chosen due to their greater horsepower output for practically the same physical size, and it is wise to have an abundance of power in any scale ship. K&B Torpedo 35's with intake throttle controls were selected because one was already on hand and it throttled well. Another was ordered from the K&B factory; this one with the crankshaft ported for reverse rotation because the P-38 had counter rotating propellers. This seemed to be a natural place to acquire additional scale operating points and a feature that isn't seen every day on a model. Nothing detracts so much from an otherwise nice scale job as non-scale propellers, and it is therefore recommended that three-bladed propellers be used. Original model had three blade 11" diameter 6" pitch propellers which are very close to scale in size and appearance while causing very little, if any, reduction in the flying ability of the ship. Although these propellers take a little time to make, the final result is well worth the effort. The left, clock-wise rotating propeller was carved from birch using templates made from the right one. Carve a spare propeller while you are at it. If you have a spare you probably won't need it so it's good insurance. Paint the propellers flat black with yellow tips and make sure they are still balanced after painting. The right hand prop is made from 11-6 power propellers cut apart at the hub and spliced together as shown on the plan. Three propellers can be cut apart to make two three-bladed ones.

A few words about the retractable landing gear system used in the ship. While it really adds that extra professional touch to the model it also was the greatest problem in building and flying the plane. It was also extremely time consuming, taking up an extra six months in design and construction. The first landing gear system was operated by the single servo in the center pod with bellcranks and pushrods running out to the main gear. That system proved unreliable so the plane was refitted with one additional servo on each main gear. Due to space limitations and long operating throws, the servos must, of necessity, be specially designed and constructed, which is no small chore. If you wish rectracting gear you may follow the details set forth here but a superb model may still be built from these plans without the retractable landing gear at a saving of much time and about one pound in weight. Decide which way you are going before beginning construction. The same holds true for the throttles, lights, and other operating extras shown on the plans. Once you have decided what the configuration will be, begin construction.

First note unusual method of construction in certain areas. Ship has .032" sheet metal internal frame that ties center pod and nose gear to engine and main gear mounts in each boom through two metal-reinforced wing spars. This results in an exceptionally strong rigid structure and eliminates surface cracks in the finish caused by flexing between parts. The sacrifice in weight is not great and although time required to build these parts is considerable, but is well worth the effort. The rest of the construction is typical of most scale models using balsa formers, planking, wing sheeting and solid balsa tail surfaces. The engine cowlings and radiator fairings are molded from fiberglass but more about that later.

By this time you should have made up your mind how elaborate your P-38 will be and should eliminate the sections of this article dealing with the unwanted features. Start with the metal fuselage framework. Trace the outline and details of the metal skeleton of both the center pod and engine booms. Transfer these to 1/32" sheet aluminum. Do not use an annealed (condition O) aluminum as it is too soft to be worked without deforming. Cut out the parts with a fine bladed saw or a metal shear. Do not use tin snips as they will ruin the flatness of the sheet aluminum. Assemble metal framework with small machine screws or rivots. 0-80 screws were used on the original. At this point, mount the landing gear pivot hubs although gear legs need not be put in now, it is easier to install pivot brackets and slide locks on main gear now than later. If a fixed gear is to be used, pivot shafts need not pivot but should be mounted the same way for strength. Also, install main gear slide lock brackets at this time if building the retractable landing gear. If not, landing gear brace rods can be fastened permanently later by attaching them to side of metal framework. Landing gear legs are built from music wire with brass tubing used to help simulate the scale appearance. Next, make the two wing spars from hard balsa wood and glue the 1/32" aluminum reinforcement to them. Use epoxy glue if you can as it bonds to metal much better and stronger than standard model cement.

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Build pod and boom framework next. Pin the ¼" by 3/16" balsa crutch directly on the plan, cement on the formers for the left side and glue one planking strip 1/16" by ¼" down the center of the outer former contour to give rigidity to the assembly. Make pod and both booms in this fashion. After removing the assemblies from the plan, glue on the other side formers except for the ones that go over the inner metal skeletons. Now fit and glue metal crutches in place using epoxy glue. Cement the rest of the side formers and a planking strip down the right side as you did on the left. Using spring clothes pins or some other small clamps, fasten pod and boom assemblies to wing spars. Carefully line up and position all the parts so that all are straight, square and in their proper locations. Take plenty of time with this particular assembly since nothing can be repositioned later on. After you are certain everything lines up, take one at a time of the six spars to fuselage joints and epoxy glue it. When the spoxy has cured, drill two small holes through each joint and put a small bolt through each. Use a piece of plywood on the balsa side of the spars to keep the nuts from pulling through. Next it is a good idea to make the stabilizer-elevator assembly and install it to strengthen booms. Use 5/16" medium grade balsa. Carve and sand to shape and cross section shown. Saw elevator loose from stabilizer. Build and install hinges and control horn as shown and cement the stabilizer in place, being careful to get the incidence at the correct angle.

At this point there are many things that can be done. Let's put the elevator control in next. Either use a 3" commercial bellcrank or cut one from 1/16" sheet aluminum. The mount is made from aluminum angle stock and fastened to the main wing spar with 4-40 screws with a piece of 1/16" plywood against the balsa side of the wing spar. Use epoxy in all joints for added strength. Scale models are subjected to monstrous pull tests, although in flight the pull of the P-38 is quite small, probably not exceeding ten pounds, I recommend flexible cable lead-outs to prevent a fatigue point at the wing tip guides. Attach them to the bellcrank and let them dangle until you later finish the wing. A 1/16" music wire push-rod completes the control system although if you are to run gear and throttle servo voltage down the lines, you will need to attach a flexible wire to the lead outs. Next, work on the landing gear. Build up the landing gear legs as shown and attach them to the pivot blocks by installing the ⅛" wire axles. You will need to drill through one side of the .040 aluminum crutch to slide the axle into place. Then seal the hole with a drop of epoxy to prevent the axle from coming out. For fixed landing gear, the gear brace arms extending forward on the main gear may be attached permanently to the slide lock bracket by epoxying in place. Make the nose gear brace so there is no hinge joint the center of brace. For the retractable landing gear, care must be taken so that all pivot joints are free and smooth. Install the slide lock mechanism on the main gear and the retracting bellcrank on the nose gear. Build the retracting servos as shown. Here, use some of your own ingenuity as very few standard commercial parts were used in the original plane and no attempt was made to keep track of all the individual parts such as gears, shafts, bearings, etc. The servo drawings are therefore intended to be used as a guide and not detailed instructions. Install the servos and hook up the wiring to them. Use about #22 insulated stranded wire. Locate the limit switches so as to give the correct gear positions when both extended and retracted and fasten them securely. Now is a good time to build the ground test box and install the plug receptacle in the plane. A miniature radio control socket was used on the original.

Now build the throttle servo and install it leaving the limit switches loose so that they can be set later after the engines are installed. Construct the throttle linkage and install it. You should mount the engines temporarily to assist in the correct positioning and operating limits of the servo.

If you are going to use lights, wire them up at this time although the bulbs cannot be actually installed until later when the rudders and wing tips are put on. Check out the lights thoroughly with the bulbs temporarily hooked on.

Much of the cockpit details are more easily installed at this time. Instrument panel, rudder pedals, control column, throttle quadrant, pilot's seat, etc., can be put in now.

Next, finish wing structure. After installing the ribs, cement roughly shaped leading edge in place and attach upper and lower sheeting, making sure you are not to build in any warps. Block in around the ailerons and carve and attach the wing tips after having put the light bulbs in and having checked them out again. Carve leading edge to final shape and sand wing thoroughly. Put rudders on next. Install and check light bulbs as you did with the wing.

Now comes one of the biggest jobs: planking. Due to the many compound curves and small radii, the planking is not easy but by working slowly and carefully, a good job can be done. 3/32" by ¼", 3/32" by 3/16", and 3/32" by 1/8" balsa was used to plank the original model. After the planking is finished, cement on the roughed nose block and sand it along with planking strips. Carefully add wing fillets. Use plastic balsa and smooth them out with a finger dipped in thinner. Also fill any voids or low spots in the planking and fillet around the stabilizer and rudders at this time. Give all surfaces a couple of coats of balsa filler coat to help show up surface irregularities. Aero Gloss cement and paints were used throughout on the original. To add strength and help smooth the surface, cover wing and fuselages with Silkspan doped on wet in small sections. When the Silkspan has dried, give two coats of clear dope and set the model aside.

Both the engine cowlings and radiator housings on the engine booms are made from fiberglass. You may carve them out of balsa if you prefer but this is how they were built on the original plane. Carve a balsa block into the exact cowling shape, be sure it mates properly with both firewall and spinner. Sand it smooth, give it two coats of balsa fillercoat, sand again. Coat the cowling pattern with a light coating of commercial mold release or grease (silicone grease works very well). Find a couple of containers slightly larger than the pattern (coffee cans were actually used). Mix up a batch of soupy plaster of Paris, pour it in one of the containers and push the pattern down into it nose first leaving the rear edge flush with the surface of the plaster. Hold it or clamp it in position until the plaster hardens. Peel the container away from the

plaster and cut the plaster in half on the vertical center line using a fine saw and separate the mold, removing the pattern. Coat the inside of the mold with the same grease used on the pattern and clamp the halves together. Wrapping them with rubber bands works very well. Purchase some fiberglass cloth and polyester resin. Both are sold in boat stores and also some hobby shops. There are some nice kits on the market containing all necessary materials with which to build fiberglass parts. Place some of the glass cloth inside the mold and work it into position until if fits snugly into all the corners. You may have to use several smaller pieces rather than one large one for each layer. Put on two or three layers of cloth. It is wise to use a fine weave cloth first in the mold then use a couple of layers of coarse heavy cloth over that to give a smooth surface finish to the cowling. Now slop up the surface of the cloth with resin (don't forget to mix in the hardener) using a cheap small paintbrush to work the resin well into the cloth until all white patches disappear, again pay special attention to the corners. Let the cloth and resin stick out of the mold, which is the rear of the cowling, and trim it off later. After resin cures, take mold apart. It may be stuck fast, therefore break off plaster mold and make another one for the other cowling. Now fill any external voids with resin and file and sand cowlings smooth.

The radiator housings on each boom are made similarly except that a split mold is not necessary as the side next to the fuselage can be flat and trimmed to fit the fuselage contour when installing them.

To make the cockpit canopy first carve a balsa mold the same size and shape as the full canopy, noting the flat windshield section, and finish with several coats of balsa fillercoat. Any wood grain remaining visible will show in the finished canopy. Mount the canopy mold solidly on a pedestal at least six inches high with a firm base. Clamping in a bench vise works well. Heat a 6" by 9" sheet of 1/32" thick cellulose acetate sheet over a gas or electric stove burner while holding the plastic by each corner with a pair of pliers. Unless you happen to have four hands, get a friend to help. Keep the plastic sheet in motion while heating to allow even heating. When the sheet becomes rubbery, stretch it down over the mold and hold it until cool. If frosted spots or areas develop, the plastic was too hot. If it wrinkles or buckles near the bottom of the mold, the plastic was too cool. After a few attempts you should be able to mold canopies quickly and successfully each time. If you are not going to build a canopy that opens, trim edges to the proper fit and cement your molded canopy in place, after ascertaining that all the cockpit details are completed.

Cockpit sides, floor and instrument panel are flat black while the pilot's seat and armor plate are flat dark green. Cockpit details look more realistic when painted with flat paints than glossy ones. Instrument panel is made of aluminum and balsa wood with the instrument dials which are cut from magazine photographs sandwiched between. Holes are drilled in the aluminum panel face as shown on the plan and the dial faces cemented to the balsa wood in the appropriate positions. This construction method adds depth to the instrument panel and gives a realistic appearance. The finished panel is cemented to the cockpit sides and the fuselage upper planking. On the original model, the top panel of the cockpit canopy was made to hinge open and the two side panels were made so they could slide down as they do on the full size plane. Two brass strips, milled into "H" section pieces and bent to shape were used to form the slide channels for the side panels. The hinges and latch for the opening top panel were soldered to the channels also. The plastic molded canopy was then cut into sections and the front and rear sections cemented. The two sliding side windows had brass strips fastened to them to form the distinctive "X" bracing and top frame. The hinged top panel also had brass strips cemented around the edges and soldered at the corners. The hinges and latch were formed from thin brass sheet and soldered in place. All the brass strips were later painted with aluminum paint.

Before cementing engine coolant radiator fairings on the engine booms make and install some dummy radiators. On original model, aluminum honeycomb purchased from a scrap metal yard was used to simulate the radiators. The honeycomb was painted flat green before being cemented in place. The same material was used for the oil cooler radiators in the front of engine cowlings. These cowling radiators effectively hide engine cylinders while letting cool air through.

Finish. Use balsa fillercoat in abundance, about ten brushed on coats, sand thoroughly with 180 and 240 grit wet or dry paper between each coat. Any voids or low spots too large or deep to fill with the balsa fillercoat can be readily filled with regular water mix powdered crack filler. It was used in abundance on the original model, and was quite satisfactory. Six thin coats of Aero Gloss aluminum were sprayed on after the undercoat was finished. Lightly sand with 400 grit wet or dry between each coat to level out runs and rough spots. The anti-glare panels were sprayed on with flat black enamel which isn't entirely fuelproof, but with care it will last and looks much better than gloss black. Major panels of the aircraft's surface were marked by using flat black enamel in a drafting set inking pen. This is really a nerve wracking job but adds much to the appearance of the finished model.

Insignia and number decals add the final touch. The radio antenna was made from .012" nichrome wire which is strong and will not rust.

Flying the model takes no special precautions other than to be sure it is not high when the engines quit as the glide is practically non-existent. By setting the throttle control idle adjustment so that the engines will stop when in the full slow position, additional contest points may be earned for engine cut off although then you must be careful on the throttle switch.

All in all, this is a tremendous project but a very rewarding one. The original model has been flown many times and has failed to place first only once in a contest. The first place finish in the 1963 Nationals was a fitting reward for the many hours spent in the design and construction of the model.