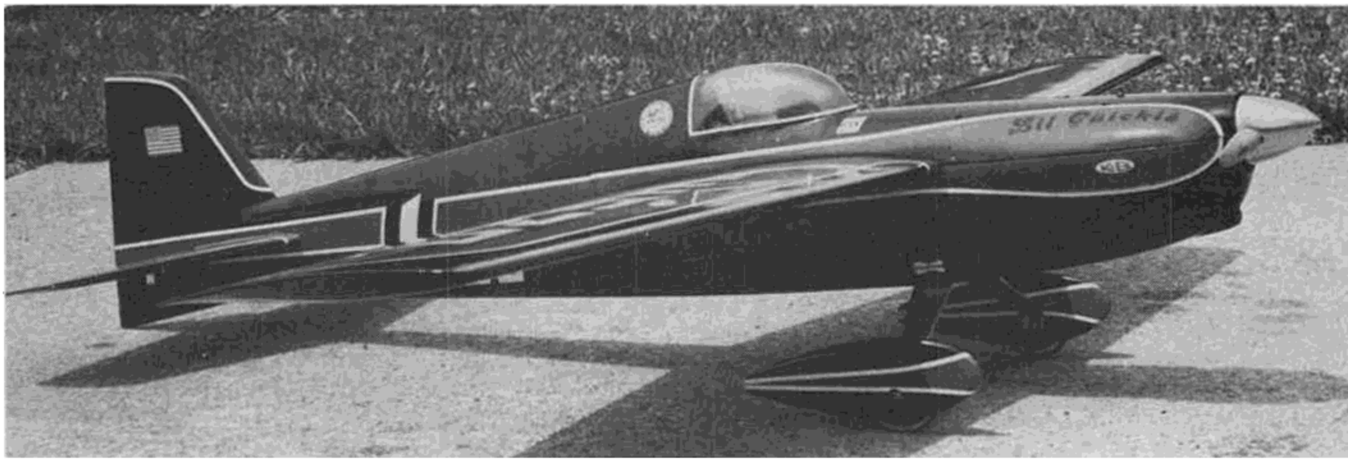


GEORGE OWL'S FORMULA I "Lil' Quickie"

By HAL deBOLT . . . A Formula I pylon racer doesn't have to made of fiberglass and foam to be good. Here's a very competitive aircraft that can be built with materials purchased from your local hobby shop.

• If you read this, you probably are interested in Formula I racing. If you are engaged in Formula I already, and you get your "kicks" only from the thrill of racing and winning, the story may offer little to you. If all you wish to do is race competitively, you can go down to the store and purchase a plastic bird which will do that for you.

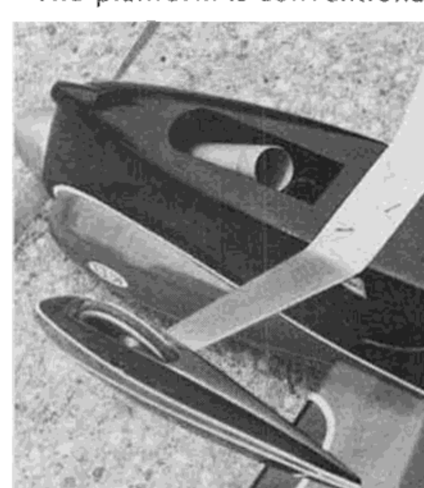
If instead, your interest is in enjoying ALL that Form I offers, then this story IS FOR YOU. What is great about Form I, of course, is the racing. What could be more exciting than that? What makes the event go deeper is the variety of aircraft we can use for racing. If you are an avid modeler, you enjoy using DIFFERENT designs; you enjoy the challenge of finding something which may be superior; you get another "kick" out of showing your buddies that it can be done. Form I offers this opportunity, with the great number of full scale aircraft from which the rules allow us to scale. Some of these designs use unusual features which can add to the performance of a model. There is a great deal of satisfaction to be had in showing this to be true.

To date, Formula I has been outstandingly successful because IT IS an event which envolves more than speed and piloting ability. Some of us seem to have forgotten that fact. The rest of us need more new material with which to work, and the offerings have been pretty lean in recent times. The "Lil' Quickie" offers some most interesting new ideas, which are not only unusual, but also add to its performance, just as we would hope. The pilot who is looking for a different airplane, which is most interesting, and one that can win for him, should read on!

The full-scale "Lil' Quickie" has been national Formula I champion for several years running, you cannot do much better than that! The "Lil' Quickie" comes from a stable of designs which have been pouring off the design board of George Owl in recent years. George has become the most outstanding designer of Form I aircraft that we have.

"Lil' Quickie" is one of the latest Owl racers, and thus incorporates many of the lessons learned from those which have gone before. In addition, it uses some new features of its own which have proven most successful, even for model usage. The general arrangement is, of course, a shoulder wing, just as it has been with the more successful racers over the years. The shoulder wing configuration simply creates the least drag and allows the maximum use of power for forward flight. Nothing could be better than not having to use part of your power to compensate for an aerodynamic deficiency.

The planform is conventional,



Engine cooling air system is new and unique for both prototype and model use. Air enters through annular ring around spinner, and is channelled so it passes over entire engine, feeds carburetor, and exits through same duct used for exhaust pipe. Jim Kirkland had it on pattern ship about '70.

nothing radical to detract from efficiency. The fuselage is minimum, just enough to cover the pilot and enclose the needed equipment. The landing gear is simplicity. With an excellent engine and the right prop, you have to go! But George did not stop here, he went on with that "little bit more."

Note the "different" surface tips. They are developed from the Hoerner ideas, with the objective being to reduce tip vortices and remove drag. They do work. Most outstanding is the engine cooling system and the method of taking in the cooling air. The "Lil' Quickie" design admits the cooling air through an annular ring about the spinner. You have to think a minute to understand the real advantage. Normally, cooling air is admitted through slots in the nose of the cowling . . . a slot on each side. When air enters a slot, it disturbs the air about it. We wish a smooth flow of air about a cowl to reduce drag. When you disturb the flow at its inception, it remains disturbed while it flows back, thus drag is increased. With the annular intake, you have a smooth airflow over the cylinder cowls. With a revolving propeller, even with a spinner on it, you will have disturbed air where the prop joins the spinner. No way to prevent it. With the annular intake, the air is taken in where disturbed air already exists, you add little drag with your air intake.

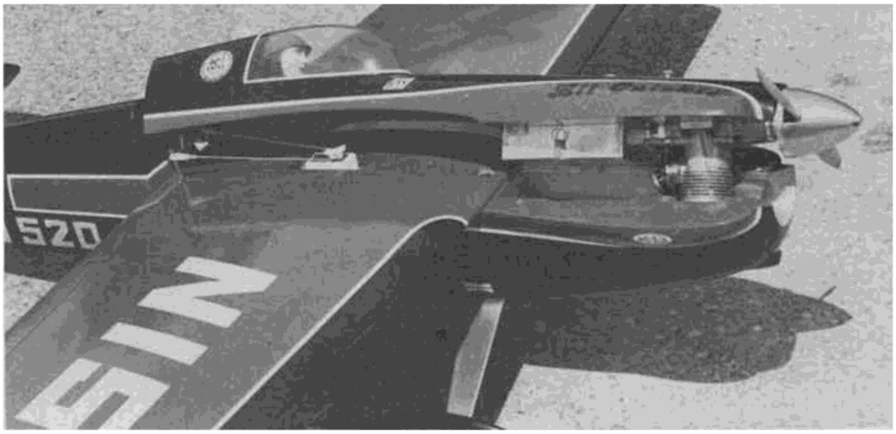
Whether these facts have any value for our models is questionable, we louse things up much worse than that in other areas! However, this method of air intake has proven to be of great value in other ways. For the first time we can have a forced airflow over our ENTIRE engine . . . we can positively cool the whole engine. This annular intake is much larger than the normal slot, thus you have more cooling air to begin with.

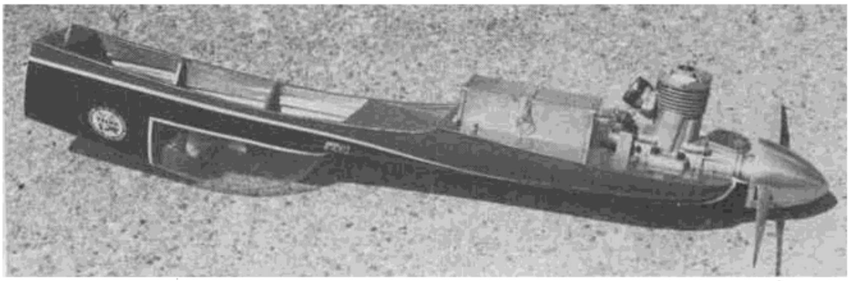
Part of the intake flows past the crankcase and lower cylinder, exiting through the exhaust duct. Part of this same air is used by the carburetor. The remaining portion is channeled to the cylinder fins and head, being forced through the fins by the close baffling. This portion also exits through the exhaust duct. The exhaust pipe is also in this duct, nothing in the breeze. Obviously, the pipe is also cooled, resulting in less heat transfer to the engine. This system can be interesting, because it is different from the "norm". What is important is that, in practice, it has proven to be the finest cooling system I have ever seen for a model engine, and I do not believe there are any which I have not tried!

What are the other interesting features of this Form I model? First, of course, has to be the "power pod" that I have successfully used for so many years. Anyone will certainly subscribe to the utility of it, there is no other way to compare to it in that respect. With the "Lil' Quickie", it is hard to see any other way to take full advantage of the cooling system offered.

People often question me about the value of a power pod. After a while you begin to think that you may be right, when few others follow in your footsteps. A couple of years ago I had the lesson driven home to me until it hurt. For a whole season, I flew aircraft with the normal side mounting and installation. These were top line aircraft. The result was that normal maintenance during the year required more than double my usual time, disturbed my radio installations, and cost me a couple of races because I could not get at a problem between heats, which would have been a lead pipe cinch with a pod. I guess you have to go both routes before you appreciate a power pod. . .

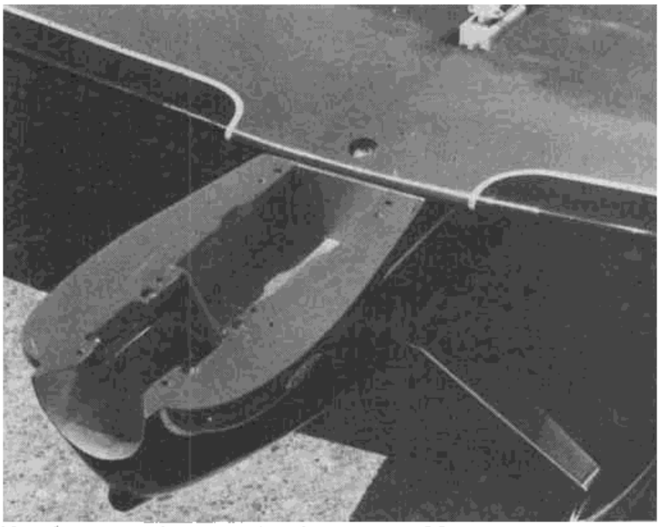
Fuselage cross section is always important in reducing drag. The "Lil' Quickie" was shaped around the pilot's front profile, thus it is minimum. Fortunately, the shape is easy to duplicate, and allows the greatest advantage to be taken of our cross-section rule. The basic fuselage is widest at this point and tapers drastically bore fore and aft, resulting in the absolute minimum possible.

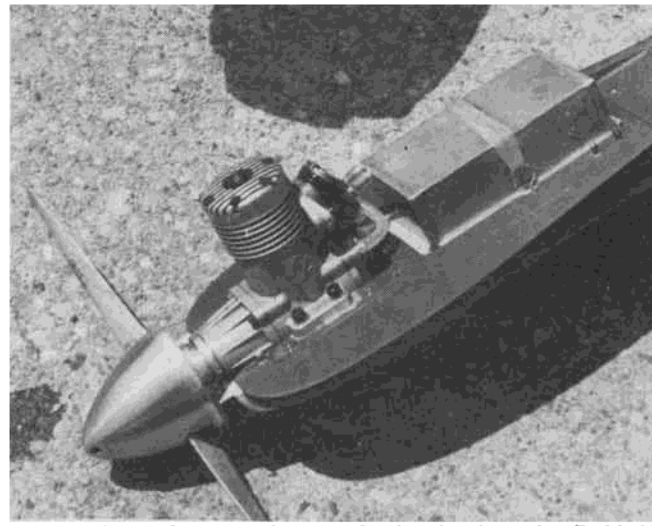




Removable engine pod allows complete power plant checks, even between heats. Radio system also becomes quickly accessible, making for easy maintenance.

Although the wing is larger than on most Form I models, there is less drag and more lift, which keeps the model from "sliding out" and losing speed in turns. Uses stressed skin construction.





Use of power pod combined with a portion of fuselage solves wing removal problem. Power force transferred to fuselage by shear pins. Pod held in place with screws, wing with Camloc.

With shoulder-wing models, the construction of the portion of the fuselage that is on top of the wing is always a pain. To do it well, the construction usually involves working with the wing attached to the fuselage and, of course, the wing is always in the way. A removable engine pod also creates other problems in this case.

We found a real neat solution with the "Lil' Quickie". The power pod was combined with the portion of the fuselage above the wing so that the whole bit is removable. Construction becomes real simple. The *entire* fuselage is assembled as one unit, the wing cut out made, and then the extended pod is removed. The wing does not become involved in the fuselage assembly!

A little more thought than normal was given to the wing configuration, with good results. The outline is fixed by scale. The minimum thickness and area is fixed by the rules. Otherwise, we have a free hand. Normally thinking, you would expect a wing of minimum area and thickness to have the least drag and develop sufficient lift. The usual minimum wing has a maximum chord of 11 inches and a span of 48 inches . . . area 450 sq. in. The thickness rule allows the use of about a 9% airfoil. Such a wing will have a front plate area of about 38 sq. in. . . . Most of us have used such wings in the past, and have noticed the model "drop out" in the high speed turns. Obviously, more lift would help in the turns. We found sufficient lift by increasing the airfoil to about 12% in thickness. This increased the front plate area to 48 sq. in., but we did get better lap times.

The "Lil' Quickie" does not drop out in turns, instead it seems to be accelerating out of the turn, at times. The reason? We obtained 50 more inches of area, an 11% increase in lift, while adding only 2 sq. in. to the minimum front plate area, and having only an 8.4% airfoil.

The airfoil used is the highly efficient, low drag NACA 65009, slimmed a bit to meet the rules. This foil is extremely stable, as well as fast. There are no problems with it when slowed down for landings, or in high speed stall conditions.

CHOICE OF POWERPLANT. . .

The "Lil' Quickie" power pod and cowl arrangement adapts easily to any of the current Formula I engines. The K&B 9001 rear rotor and 9020 front rotor can be interchangeable, if the cowl is shaped to the front rotor engine. Unfortunately, no easy way has been found to make the ST X-40 interchangeable with the K&B. However, the installation adapts to this engine just as easily as it does to the other two. The choice is yours.

There is plenty of room in the pod for an 8 oz. fuel tank, with its ample supply. The tank should be bedded in foam and can be held in place

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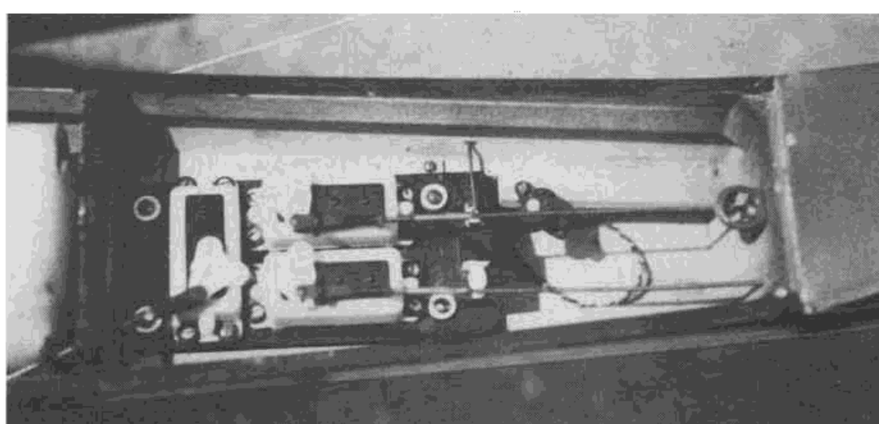

Radio installation is purposeful throughout. Servos mounted in tray, which is fastened to aluminum rails that are screwed to wood rails on side of fuselage. Antenna well away from servos.

The "Lil Quickie" was designed by George Owl as a successor to the "Pogo" and "Fang". It has been National Champion in full scale for several years.

with a rubber band. You will note that the annular air intake has removed the need for the careful mating of the spinner to the fuselage, always time consuming. At least *SOMETHING* has become easier!

WING CONSTRUCTION

You can use a foam wing if you like, of course, the necessary templates are there. However, you can have a stronger, lighter, and more efficient wing with about the same effort, if you follow the prototype. This wing uses a stressed skin for its strength, similar to foam. As such, even though it is sheet covered, the use of filling resin or stretchable plastic covering is not sufficient. It must be covered with fabric which is tightly adhered to the wood, forming a laminate. The simple way is Silron and dop, it goes on easily and fills quickly. If desired, 3/4 oz. fiberglass cloth and resin is fine also.

The newly developed saddle jigs are used for assembly, and the major structure is completed before it is removed from the jigs. The jigs are secured in place on a straight building board, automatically forming the correct dihedral and wing taper. Constant vigilence while assembling is not necessary, if the board is true, the resulting wing will also be true.

To begin assembly, the top sheeting is glued up and trimmed to size. This is forced down into the saddles with the spar and appropriate ribs. All remaining structure is stuck in place and the main structure finished off by planking the bottom with 3 inch sheeting. After removing it from the jigs, the leading and trailing edges, etc., are added to complete the assembly.

TAIL

For a tail to do its work, it must develop lift. The greatest lift with the least drag is created by an airfoil. Therefore, airfoils are used in the tail. The tail could be assembled using the saddle jigs if you like, however the "centerline" method shown is even simpler for these smaller structures. This method uses overly wide leading and trailing edges with centerlines on them and the ribs. With the leading and trailing edges in place, the ribs are cemented between them, using the centerlines for alignment. The sheeting is added, when dry, it is flipped over for the remaining sheeting. Hacking down and shaping the edges completes it.

FUSELAGE

A shape with as many curves as this one can be tedious to reproduce with balsa. In this case, a crutch was used, making it relatively simple. The crutch is laid out first, the *LOWER* bulkheads erected on it with all of the substructure. Then the 3/32 siding is warped around it. With the bottom portion completed, the top goes on easily. The section at the cabin is planked instead of sheeting as there are so many compound curves in the area.

The maple crutch for the pod may seem formidable, but it actually shapes up quickly if you can get to a jig or saber saw. Even a drill press will do. Drill a million holes around the outline, break away the scrap and finish to size with a straight sided router bit. If you use 5/4 (1-1/8 inch) maple, you can shape two at once and split them on a table saw.

Once you have the crutch, the shear pin holes are drilled in it. The crutch is aligned and clamped to the fuselage mount. Using the crutch as a drill guide, the mount holes are drilled for perfect alignment.

The pod block should have enough internal clearance at the engine to allow the intake air to flow past the lower case to the carburetor. The fuel tank section should have sufficient clearance for a 1/4 inch foam cushion, as well as the tank. The layer-built cowl accommodates any of the engines easily. With the pod and engine in place, a hole is hacked into the first inch-thick layer. When this is slipped on over the cylinder, the clearance necessary for the lower cylinder and case can be determined and created.

With the first layer in place, a 1-1/2 inch hole is neatly made in another piece of 1 inch stock. This should be a tight fit when slipped over the cylinder. Additional internal clearance will be necessary for the exhaust pipe and carburetor, if the front rotor engine is used.

The last layer simply caps off the cylinder head and fairs into the fuselage. These layers may be roughed to shape on the outside as they are laid up, or just left. Once the lay-up is completed, there will be a big gob of balsa that can be easily hacked off to rough shape with a carving knife. Some care should be used during final shaping to get the size to minimum and have smoothly flowing curves.

A template is made for the wing cut-out. The upper edge of the crutch is used for incidence reference, when the cut-out is made. With the pod off, the wing saddle is carefully fitted and the mounting installed. Note that the aft Camloc hold-down plate is part of the pod, thus it holds the pod and trailing edge. The pod is carefully fitted to the top of the wing so there is no clearance when the pod mount screws and aft Camloc are tightened.

COVERING AND FINISH

In Formula I, you need a good finish to obtain handicap points and keep drag down. It helps if it is simple and durable. This method does the job well with the least effort. The wing is covered with Silron fabric, doped in place. Very little filling is required. The pod and fuselage, back to the trailing edge of the wing, is covered with 3/4 oz. fiberglass cloth, applied with finishing resin, for durability and fuel-proofing. The aft fuselage and tail gets Silkspan paper and dope for simplicity. After sealing the covering down with a coat or two of dope, a heavy coat of Super Poxy primer is applied. Once sanded out, colored epoxy paint is applied as desired. After all trim is on, the whole bit is sealed with a coat of clear epoxy. The clear can be sanded out and repeated until you have just as super a finish as you desire.

CONCLUSION

Some random ideas and hints can be welcome: While the factories build splendid engines these days, it always helps to check their "set-up" closely. Clarence Lee and Terry Prather do excellent jobs of this with their appropriate brands. The cost is worthwhile. Spinner balancing is something any of us can do, and is often of help. An inverted engine can be accidently flooded while filling the tank and waiting. This can be prevented if the pressure line is arranged so that it is higher than the fuel, at some point, and the shutoff is kept closed until starting. If a socket wrench is used for plug removal, a tight hole in the cowl will allow plug removal simply. If the Prather-type wheels and pants are used, they will stay in place much better if the aluminum gear is tapped and threaded for the screw, and a lock nut used. When flying off grass fields, it helps to have the wheels extend a bit further, also. The push-rods used are simple 1/16 wire passing through bulkhead guides. These will not vibrate. If another type is used, be sure to add guides to prevent vibration.

FLYING

There isn't much one can tell about a fine flying airplane. As you will note, control movements are minimum and yet effective. The amount of movement should be just enough to do the job as you personally like it, and no more. Excessive movement only creates over-control at times. Right rudder is used to start the takeoff, and the rudder remains effective even in crosswinds. Mechanical trimming should be used until "neutral transmitter" is straight and level. Then the model will stabilize itself out of turns.

When landing, you will find a very low sink rate, and the capability to be slowed down without problems. Do be sure of enough time to accomplish it. Not much more can be added, except to ask you to treat the "Lil' Quickie" like the thoroughbred that it is . . . and HAVE FUN!●