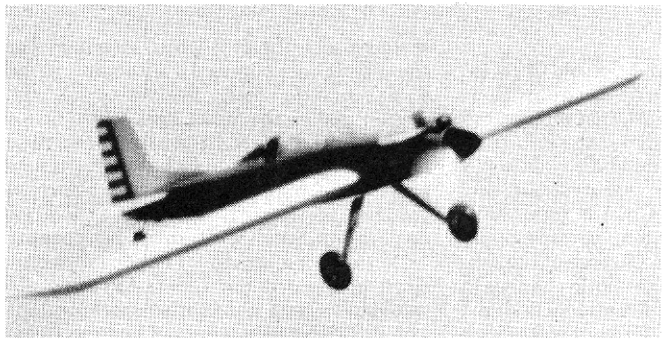
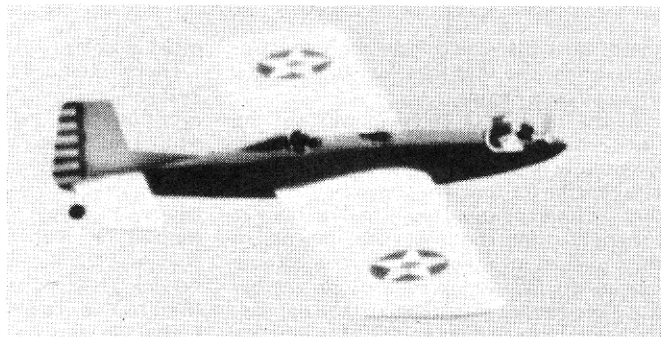




an R/C version of the C/L

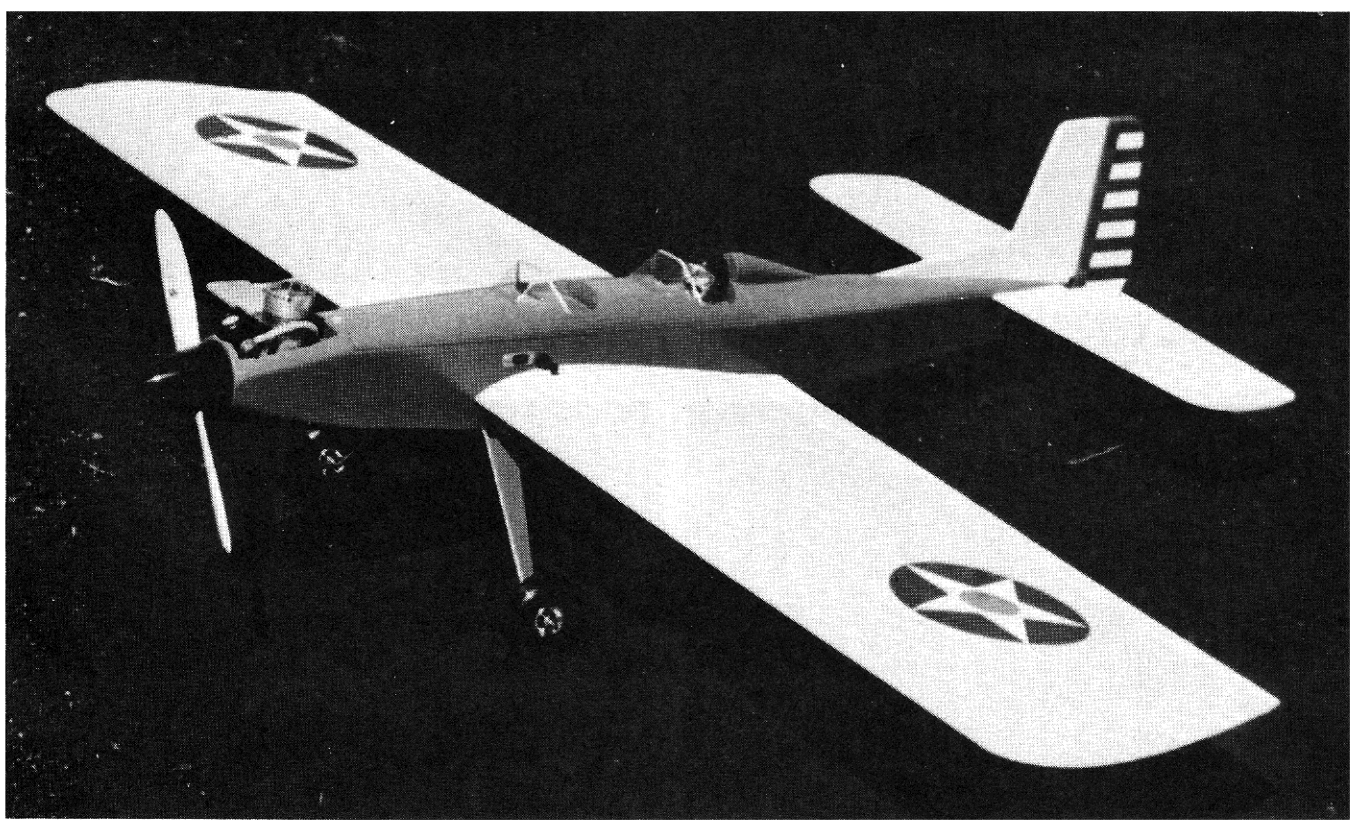
Chief

A new twist to the Old Timer theme, an R/C version of a famous C/L Stunter originally designed by Bob Palmer/**Ron Farkas**

PHOTOGRAPHY: RON FARKAS AND BOB ABERLE

For several years I had been thinking of building a radio control version of one of the control-line planes that I learned to fly on. I missed the era of the ignition engines and the evolution of control-line airplane design. Some of my friends who were modelers back then have, in the past, told me very interesting stories that often got me in the mood to start building something new. So one day, while I was visiting my good friend, Hank Stumpf, I spied a Veco Warrioer hanging up on the wall and my brain started working. This was my first stunt airplane with a built-up fuselage, but somehow it sure looked bigger when I was a kid. Hank suggested that the Chief would make a better R/C conversion because it was considerably larger. When Hank produced a dusty box containing a complete Chief kit, I couldn't possibly put the project off any longer. This particular kit was produced by Dumas who had taken over the original Veco line. The kit is no longer in production but you might still see one buried in the back of a hobby shop. That's quite a record for a design that goes back to around 1950.

I just had to know more about the Chief so I contacted the original designer, Bob Palmer. The story goes something like this. Up to around 1949 the usual stunt airplane was small and fast with a big ignition .60 for power. Bob's Chief was larger than average and he initially intended to use an Orwick .60 engine. Hi Johnson did the drafting work and Bob did the building and flying. Around this time Bob was teaching a buddy to fly with a Go-devil so they put an Ohlsen .23 in it to slow it down. To everyone's amazement the plane flew a better stunt pattern at this speed, so the inspiration was born. Also around this time Bob severely injured his hand, requiring a special mitt to enable him to fly U-control at all. Flying with a .60 was too much strain on Bob's injured hand so,



based upon his experiences with the Godevil, he decided that the Chief should use a .19 to .35 size engine.

At the 1949 Nats Bob demonstrated the Chief with both McCoy .19 and .29 engines. Eventually he settled on the Fox .35 as the ideal engine for this size plane. Bob showed that the lower powered plane could generally turn tighter than the .60 powered ones and so the Chief set an example that soon became universally followed in competition aerobatics. Considering this trend and the increasing availability of glow engines, the ignition .60 soon disappeared from the market. Glow engines produced more power for their size and did not require the payload of battery, coil, etc.

Another trend-setting innovation on the Chief was the use of full span flaps coupled with the elevator. They really tightened up the turns. The use of flaps became a standard feature that still survives today. You really must have flaps to be competitive in Stunt. When the Chief was kitted it was the first production design to have flaps. Bob had many contest wins with the Chief which was followed by his famous Smoothie and Thunderbird designs. So it appears that the world of competition control-line aerobatics owes a great deal to Bob Palmer and his Chief.

Bob is still active in the hobby and flies R/C with a special transmitter arrangement. His specialty is making patterns, molds and fiberglass fuselages with a lot of his work going to kit manufacturers. It was a pleasure to correspond with Bob as he is a truly dedicated modeler.

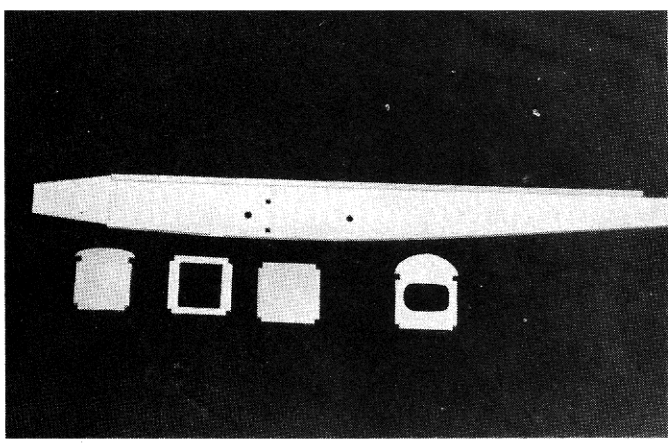
I never intended to build that old Chief kit as it will be a collector's item some day. However I used it to get the original dimensions while I completely redesigned the structure. Several problems confronted me right away like moments, balance, construction and equipment layout. The Chief is very short-coupled for an R/C airplane yet any major change would defeat the purpose of the conversion. I decided to make subtle changes in the direction of a more conventional design. I placed the wing an inch forward of its original location and the stabilizer a half inch rearward. The flight control surfaces were very large so I moved the elevator hinge line back by a half inch and trimmed down the chord of the flaps (which are now ailerons). I widened the fuselage to account for the radio equipment, fuel tank and a modern .40 size engine. The depth of the wing is so great in proportion to the fuselage that I chose to mount it permanently and provide radio access through a removeable top hatch. Otherwise the fuselage would have been rather weak through the midsection and the radio installation would be very tight. Two spruce spars and two fiberglass shafts pass through the fuselage and tie everything together very securely. The lack of a removeable wing is only a minor aggravation in transporting the model. Just about all other modifications involve building practices, in which case I looked for stronger, more modern or just plain easier methods.

The power, moments and generous control surfaces give the R/C Chief a spunky personality. It does not need a .40 engine, in fact a .30 would do nicely. The very thick wing section makes the R/C Chief gentle at low speeds. Still, it is too responsive for an absolute beginner. It would be best to have some experience on an aileron trainer before advancing to the R/C Chief. It is a great airplane for Sunday afternoon hot-dogging.

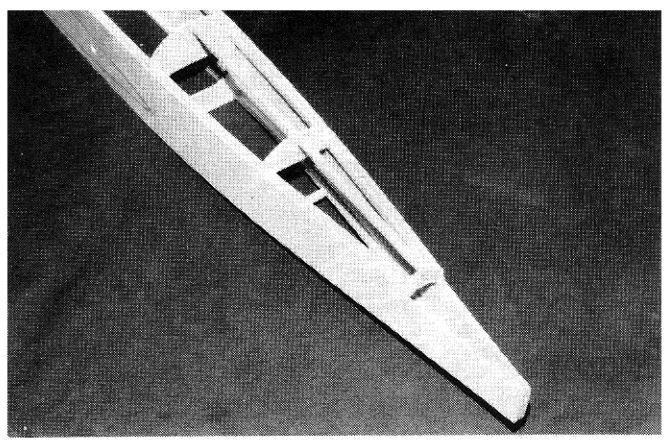
I sincerely believe that I have captured the spirit of the original Chief. Anything else would have been just another sport airplane. The R/C Chief gets plenty of favorable comments and it is amazing how many modelers recognize it right away. If the Chief brings back fond memories for you, or if you just want something a little different from your last kit, then I suggest that you read on.

Construction

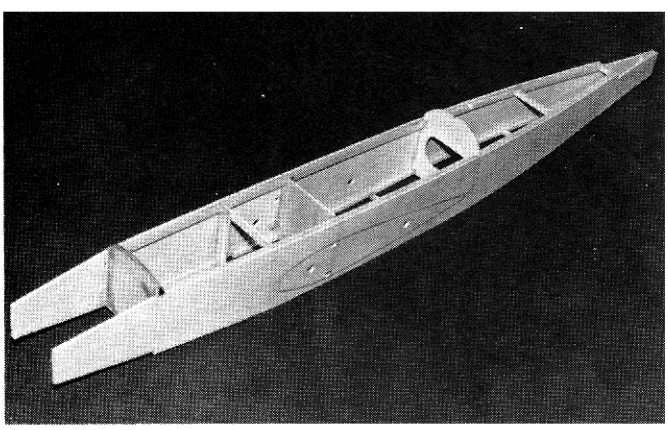
Having chosen to make the wing fixed, and needing all the available fuselage space for the radio, I decided to butt the wing panels up against the sides. The spruce spars enter the fuselage and are spliced together by utilizing one of the main formers. Two fiberglass arrowshafts pass completely through the fuselage, joining the wing panels. The ideal way to build a symmetrical wing is on a jig and in this case the jig rods become built-in spars. The result is a wing that is very strong in spite of having an "empty" center section. Since this construction technique requires holes to be drilled in the fuselage I selected Sig Lite-Ply for the sides. If you substitute balsa then you absolutely must use plywood

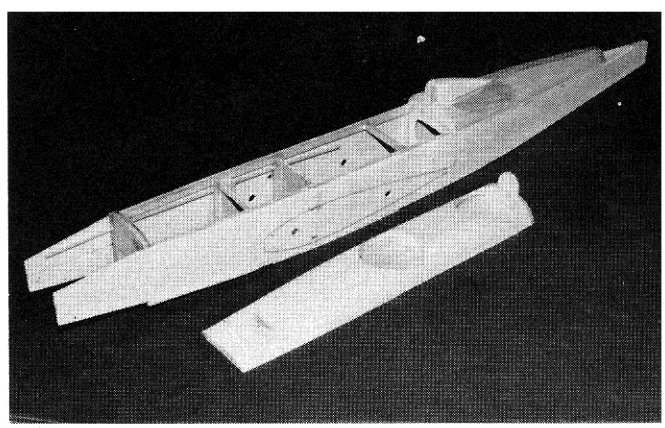


The fuselage sides are shown here with the longerons installed and formers F1 through F4 (**above**). Note the pre-cut holes for the fiberglass shafts. The fuse sides joined with the formers (**below**). Align well.



The fuselage aft section with formers F5 and F6 installed and the top longeron added (**above**). Fully assembled fuse with the hatch removed (**below**). Note that former F4A determines headrest shape.





doublers through the midsection. The original Chief did not use capstrips or trailing edge sheeting but I did to aid torsional rigidity. I expect that this airplane can withstand a lot of rough treatment.

That covers my construction philosophy. The remainder of the construction should look pretty familiar. You should find this to be a very easy project, with only a few steps requiring special attention.

Wings

The wings must be built on a jig that uses two rods that are blocked up an equal distance off the workbench. We are using 5/16" fiberglass arrowshafts marketed by Sullivan for use as pushrods. Cut a rib pattern out of 1/16" ply and rill the jig rod holes. You may alter the spacing of the rods a little to suit the size of your radio equipment. Remember that these rods will go through the radio compartment. Cut 14 ribs from 1/16" sheet and 4 from 3/16" sheet. Thread the ribs onto the arrowshafts and lock the assembly in the jig. Do not glue the ribs to the shafts since this will be done during final assembly of the airframe. Glue in the 3/16" sq. spruce spars, allowing them to extend 1½" beyond the root rib. Taper the 3/16" sq. balsa trailing edge spar and glue it to a piece of 1/16" x 2" trailing edge sheet. Do this step on a flat workbench using a straightedge to align the spar and you can be sure that the trailing edge will be true. Then glue this sheet to the underside of the ribs so you can see that there is good contact at all glue joints. Add the hinge blocks and the top trailing edge sheet. Glue on the ⅛" balsa sub-leading edge and sand it to match the rib contour. Now sheet the top and bottom leading edges. Add the ½" triangle stock leading edge and sand to airfoil shape. Sheet the center section and install capstrips. Remove the wing panel from the jig and glue on the ¼" sheet wing tip. This construction technique has proven to be the fastest for me. If you like it then the second panel should take less time than the first.

Fuselage

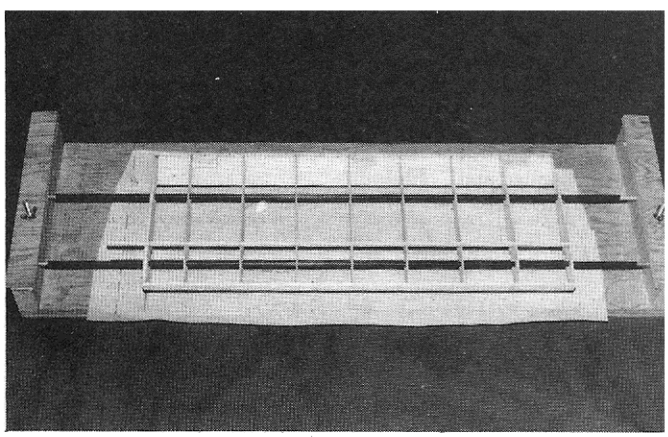
Cut two fuselage sides from ⅛" Sig Lite-Ply. Using the rib template, mark and cut out the holes for the main spars and the two arrowshafts. Add the balsa longerons, being careful to make a left and right side. Cut the firewall (F-1) from ¼" aircraft ply and the remaining formers from ⅛" Lite-Ply, except F-4A which is 1/16" ply. Drill firewall for engine mount, throttle cable and fuel lines. Note that the thrust line shown on plans is lower than dead center. Assemble the sides to formers F-2, F-3 and F-4 using a slow cure epoxy. Temporarily insert the shafts through the fuselage and make sure that everything is perfectly square while the epoxy cures completely. Next, position the fuselage over the top view, add the firewall and pull the sides together with the spacer at the tail. Again slow cure epoxy is recommended. Glue in the cross pieces and formers F-5 and F-6, followed by the 3/16" sq. top stringer. Now sheet the aft deck with 1/16" balsa using a separate piece for each side. Epoxy the uprights behind the firewall and install the landing gear trunion blocks. The lower block extends 3/32" below the sides so it will be flush with the bottom sheet, and the grooves in the vertical pieces must be staggered. Do not sheet the bottom until final assembly.

The entire top from F-1 to F-4 is a removeable hatch. Carve it from a soft block and hollow it out for extra lightness. Cut out the cockpits and add their walls and floors. Glue F-4A to the rear of the hatch to add rigidity and form a part of the headrest. The hatch is retained by fore and aft nylon screws tapped into hardwood blocks mounted across the fuselage. Before mounting the aft block plan its location so it won't interfere with the radio installation. If you are going to use a pilot then consider using a screw on each side of him.

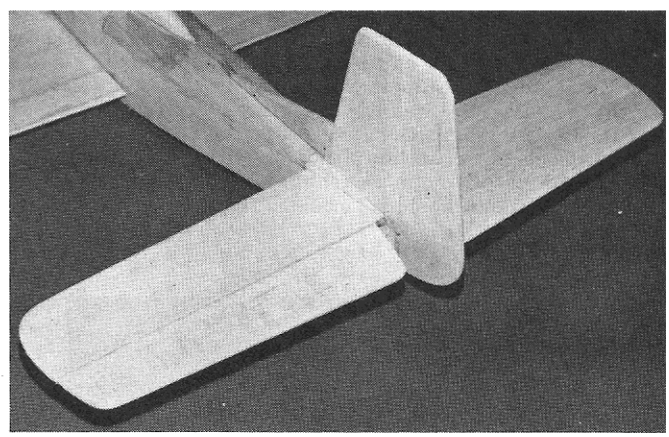
Temporarily mount the engine. Install nose ring and bottom ½" sheet. Remove engine and add the triangle stock and top sheet. Shape the nose and relieve the top as necessary for engine access. Don't forget an oil drain hole in the bottom.

Final assembly

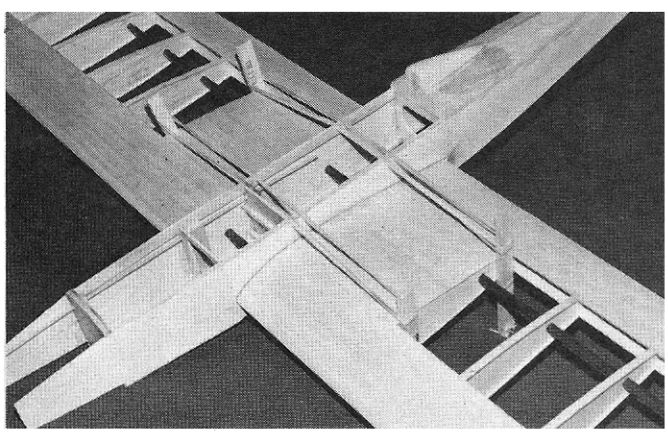
Push the fiberglass shafts through the fuselage and center them. Trial fit wings in place and double check alignment and zero degrees of incidence. If there is any misalignment now then your only recourse is to rework the holes in the fuselage. Make sure that you haven't forgotten the holes for the aileron torque rods. When you are satisfied with the fit, epoxy the root ribs to the fuse-

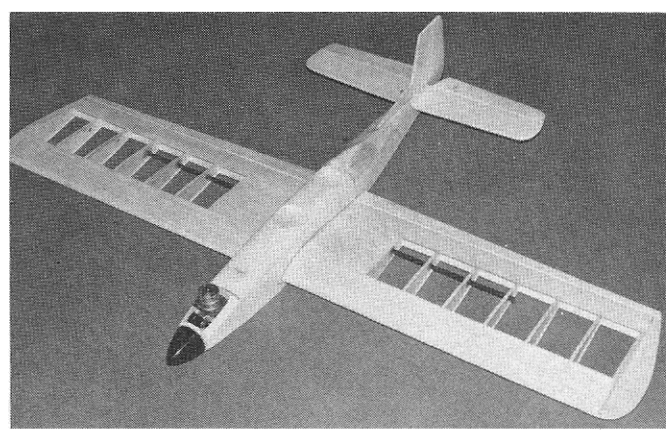


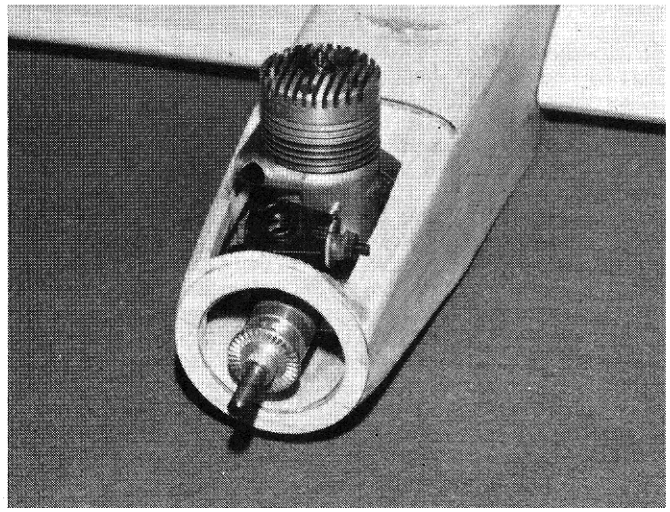
The wing is shown here under construction in the jib (**above**). The fiberlgass shafts will be used as spars in the final assembly. The wings are being mated to the fuse (**below**). Rubber bands insure a tight fit.

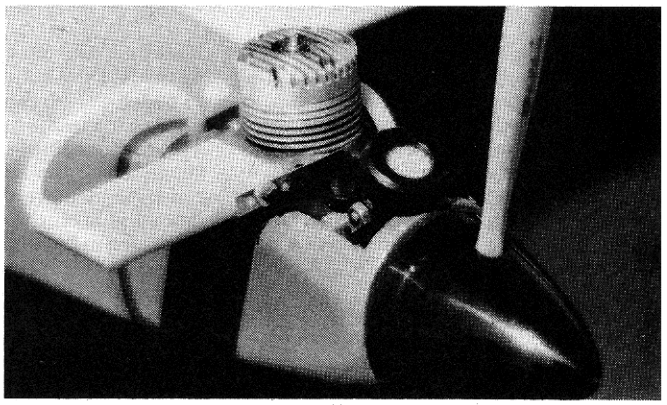


The tail section is installed on the fuselage (**above**). Soft fillet blocks are installed at this time. Here is the completed airframe (**below**). Note that the fiberglass shafts end short of the end of the wing.









A close-up of the nose showing the engine installation (**left**). Another view of the engine compartment on the completed model (**above**). Note the spinner fit, muffler with pressure line and air cleaner on carb. The fuse hatch is removed here to show the radio installation (**below**).

lage sides. Make a glue fillet where the shafts pass through each rib. Note that the shaft length is not full-span but this won't affect the strength of the wing to any degree.

Inside the fuselage install a 3/16" web between the spars and sandwich the whole works between F-3 and a 1/8" Lite-Ply plate. Cut a piece of 1/4" x 1/2" hard balsa for the aileron torque rod mount and cut slots for the bearings. I used Du-Bro pre-bent rods. Install the rods and block permanently now.

Cut all tail components from 1/4" medium balsa sheet. Glue stabilizer to fuselage, followed by fin and dorsal. Shape soft balsa fillet blocks and glue in place. Join elevator halves with a piece of 3/32" music wire. Temporarily hinge all control surfaces. The tailwheel is held in place by an aileron rod bearing fitted into the tailpost. Next install servos and pushrods. I was able to get three Kraft KPS-14 servos abreast in the aft-most compartment. These are the flight control servos, with the aileron in the center. Moving ahead of the arrowshaft I mounted the throttle servo against the right side and that left plenty of room for the receiver. The battery stands upright between the landing gear blocks.

With all the radio components located and pushrods installed you can sheet the bottom of the fuselage. Bend main landing gear from 5/32" music wire and attach the fairings. Wrap the fairings with silk to prevent them from being easily knocked off at the field. Remove all equipment in preparation for finishing.

Finishing

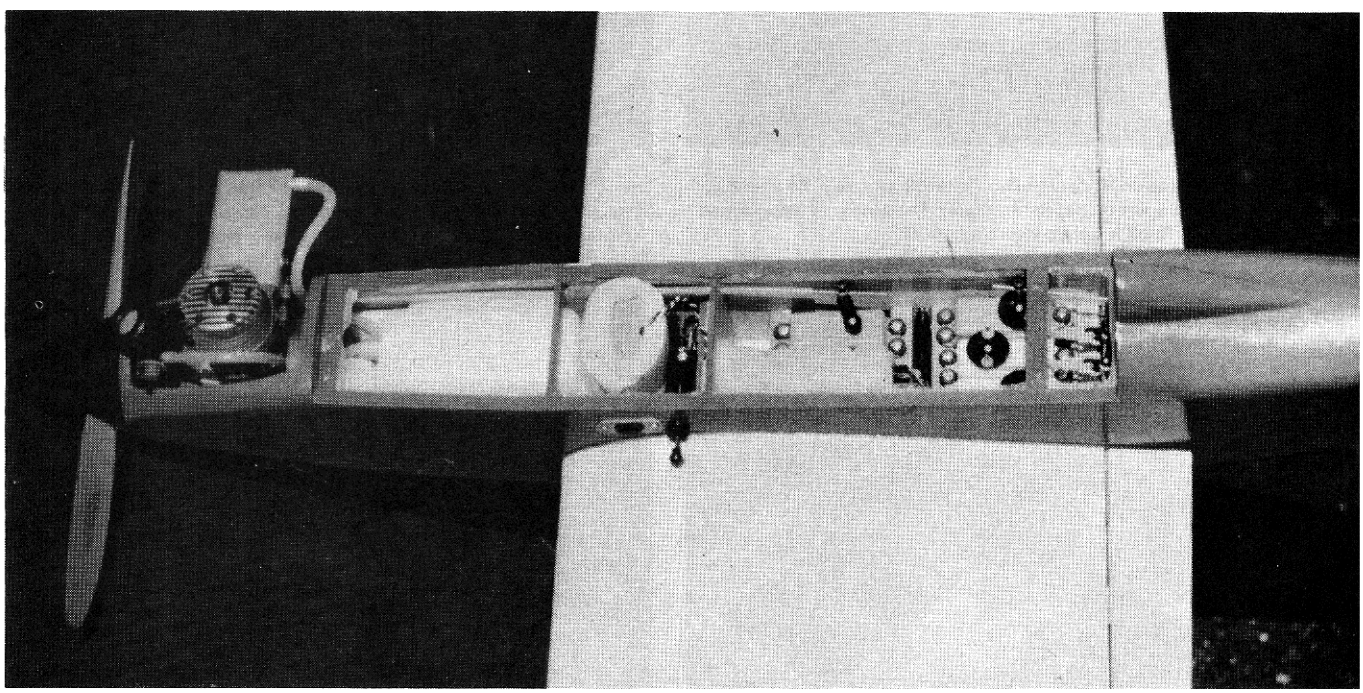
Do whatever final sanding is necessary for the type of finish that you have chosen. Silk and dope would certainly be appropriate for this model. I used a more modern technique that still provides that fabric covered look. The wings and horizontal tail were covered with iron-on Permagloss Coverite. It has a pre-painted finish. The fuselage and vertical tail were covered with silkspan, applied and sealed with clear nitrate (non fuel-proof) dope. These were each sprayed with K&B Superpoxy paint. The color scheme is yellow wings and tail with a blue fuselage. The Army Air Corps insignia are available in Mono-Kote from Top Flite Models Inc.

I cut the windscreens from .030 acetate sheet which is fairly heavy gauge so it holds its shape well. They are glued right to the painted surface with Wilhold R/C-56 glue. This glue is a heavy bodied, milky colored liquid that grabs fast and dries clear. The partial frame was made by slitting a small diameter aluminum tube and pushing it over the edge of the acetate sheet and then squeezing it flat.

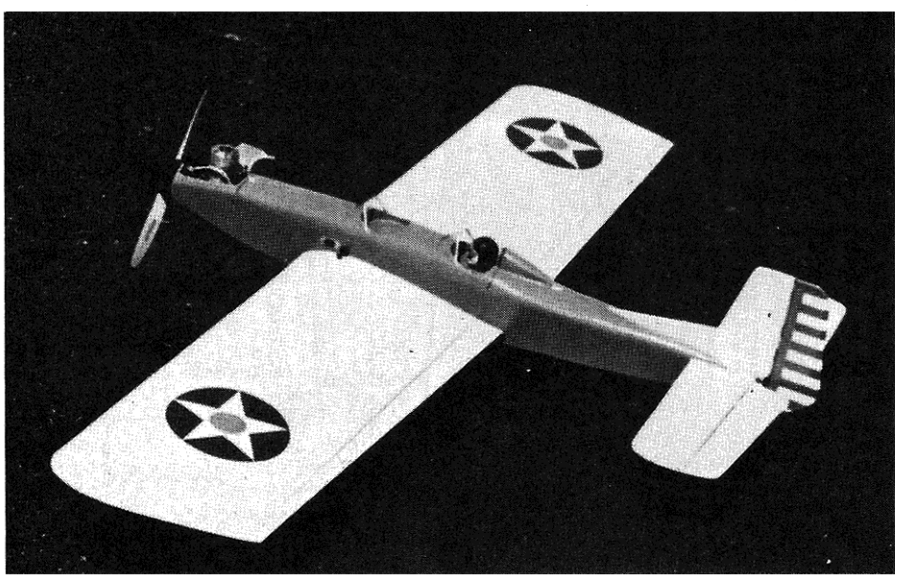
With all equipment installed the finished weight was 70 ounces. This includes three ounces of balance weight in the tank area. With a span of 53" and an area of 560 sq. in., the wing loading is a respectable 18 ounces per square foot.

Flying

The R/C Chief is short coupled and fairly



Ron is shown here enjoying the finished product (**above**). The R/C Chief is very stable as can be seen by this low fly-by. Only the switch, charging jack and the absence of leadout wires give it away as R/C



responsive but not at all difficult to fly. The .40 engine gives very spirited performance. At high throttle the plane flies steadily with no need to make corrections. Yet the light wing loading makes it easy to fly slowly. It can be landed with the nose high and with no fear of a tip stall.

Since the R/C Chief was a winter project I waited several weeks for a good day for test flying. Also it had to be a day when a couple of my fellow club members were available to help. For any first flight of a new airplane it is wise to get the opinions of some trusted advisors. And, of course, someone should be getting all this down on film in case disaster strikes later on in the day.

I made a mental note of a light crosswind coming from the right which would have a tendency to make a taildragger weathercock to the right. Since taildraggers normally need a little right rudder correction during takeoff I was a bit puzzled about how much to use. So when I finally hit the throttle the Chief veered to the right and took off like an Olympic ski jumper. It is really overpowered with a .40 but I tend to like my planes that way. After leveling off I found that it had a solid, comfortable feel which gave me the confidence to try some stunts right away. The loops, both inside and outside were very tight. Rolls were a bit sluggish but nice and axial. Slowing down to half throttle did not affect the maneuverability or the solid feel of the controls. Even with the engine almost at idle the elevator and aileron authority were good. With the c.g. at 25 percent (on the safe side) the stall was hardly more than a straight ahead mush. This was a good indication of how easy it would be to land. Indeed, that first landing was a gentle three pointer. On the next takeoff I had perfect control because I eased in the throttle and steered a straight course. Then I asked a friend to fly while I took some pictures. Before the flight was over I took the transmitter back to check out those great landing characteristics again.

The next weekend I made half a dozen flights, all just as successful even though a strong wind came up late in the day. After this I felt confident in moving the c.g. back to 30 percent. There were no detrimental effects on the stability. There was enough increase in maneuverability to permit spins and snap rolls. I am going to leave my c.g. there because I enjoy doing these hot-dog stunts. Both locations are shown on the plans, as are the control throws that I am using.

I often find myself flying the R/C Chief at 3/4 or even 1/2 throttle which provides a relaxing speed and equally good maneuverability. A .30 or a strong .25 would be a fine choice for this airplane. Since it is a sport ship the extra power of a .40 is not necessary, but is a matter of personal preference. Besides, I don't have a .30 right now so that made the choice easier for me.

As a final note, several people have asked me why I didn't use coupled flaps as the original controline version had. The answer is that I just did not have the courage to do so initially. Now I think that it would not be too outrageous to try. It could be done by rearranging the servos and using a Du-Bro V-tail mixer. This modification should be left to the experienced flyers, though. I will probably try it in the future just to satisfy my curiosity. Whichever way you go I'm sure that you will enjoy having an R/C Chief of your own.