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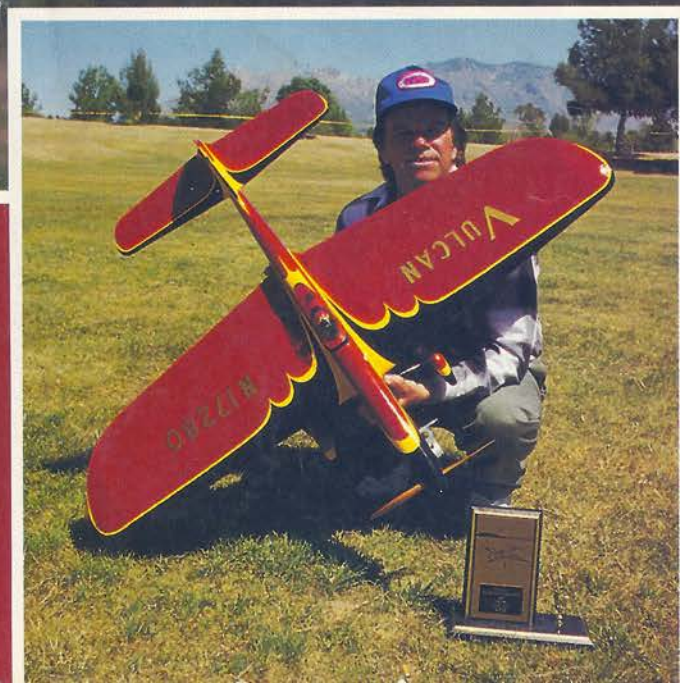
Double Impact
R/C Sport Twin

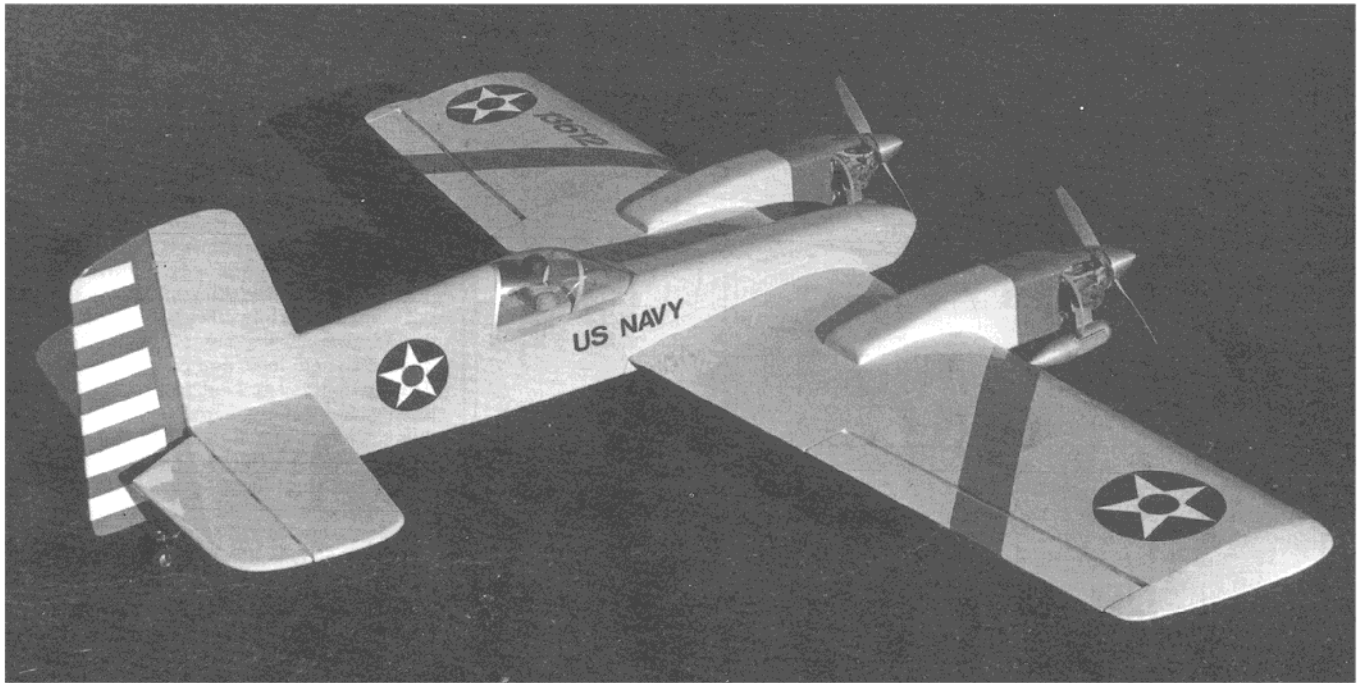
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PHOTOGRAPHY: DICK SARPOLUS

There's a little bit of the Grumman F5F *Skyrocket* and the Hal deBolt A/2 *Twin* in Dick's latest project, a twin for two .40s.

Double Impact

By Dick Sarpolus

Some scale appeal, easy handling, and easy construction make this a perfect first twin. Plus, it's economical since it uses two inexpensive sport .40 engines.

Most modelers would agree that twin engined aircraft are fun. There's that different, neat, twin engine sound, out of the ordinary appearance, plenty of power, and so on. Plenty of reasons to fly a twin; but relatively few people build and fly them. Why? More work to build, harder to fly, big problems when one engine stops—these are the reasons given by those who don't go for a twin.

I don't agree. Over the years I've built about a dozen twins, both C/L and R/C, with engines from .19s up to Quadras, and I sure enjoyed every one of them. Scale twins... sure, they can be plenty of work, but us sport fliers can build an easy twin with very little more work than a single engined aircraft.

Hard to fly? Absolutely not; a good design flies well, whether it's a single or a twin. Big problem if an engine stops? Yes, if it's a scale P-38 or something; best thing to do is cut back the remaining engine and head for the field. But, with a well designed sport aircraft twin, you can go right on flying with one engine running. And the engines today are so darn reliable that with reasonable attention, you'll very rarely have an engine-out situation to contend with.

My most recent aircraft project before the

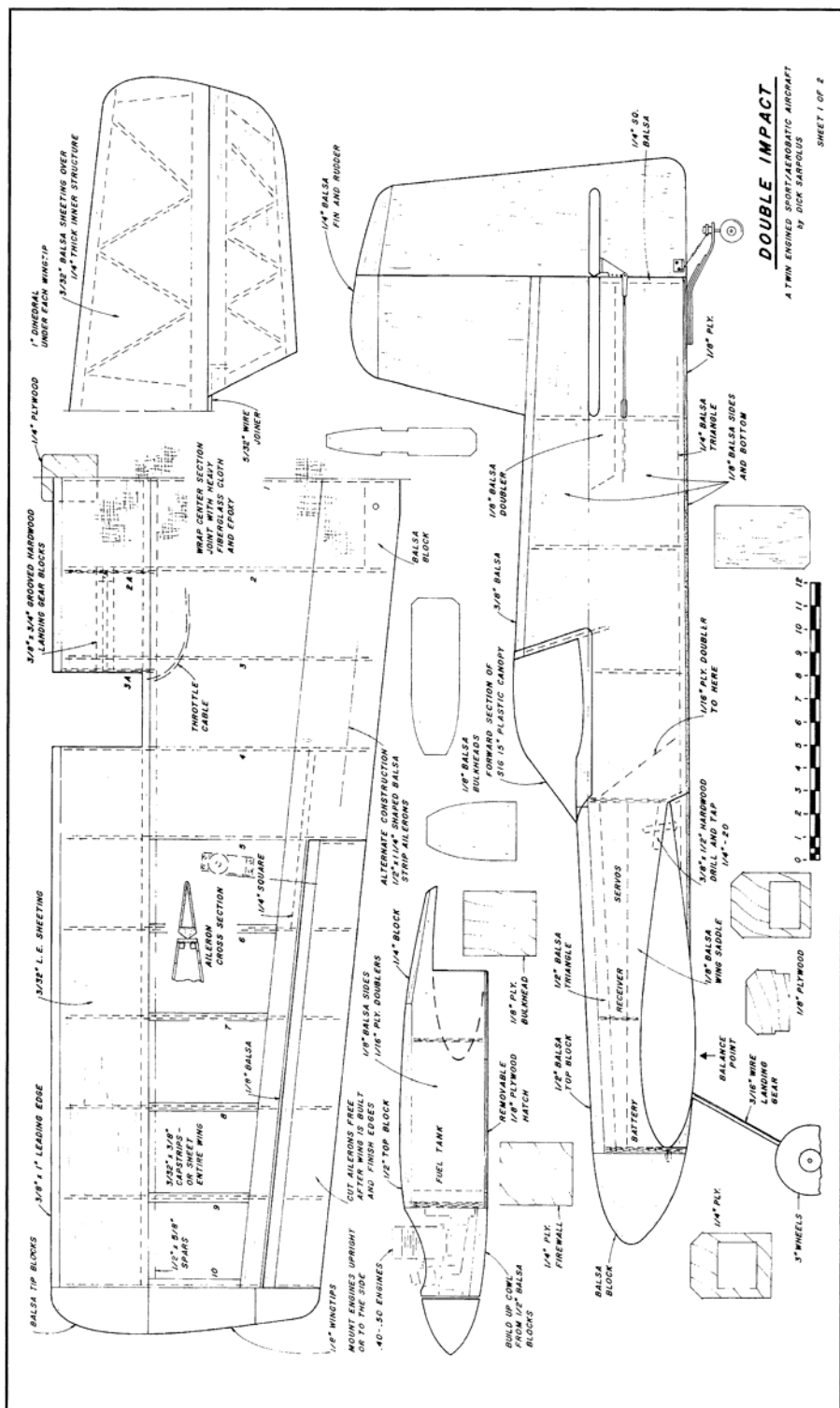
Double Impact was a 12-foot wingspan, 43-pound DC-3; yes, it was fun, but I don't want to go for anything that big again. This time around, I wanted an easy to handle, easy to transport, quick building project. About 18 years ago I did the twin .40 powered *Magnum 80*; it was published in *FLYING MODELS* (Sept., 1978; CF-483), and I still hear about them being built today. I decided to go with twin .40s again, but with milder performance than that hot *Magnum* provided. Maybe the 18 years have mellowed this flier a bit. The *Magnum* had about 800 square inches of wing area, and a pretty thin airfoil. This new twin has the same power of two .40s, but on about 1000 square inches of wing and a generously thick airfoil. Still a hot performer, but more relaxing to handle.

For the overall design appearance and styling of this new project, I first thought of the Grumman *Skyrocket*; I remembered the F5F-1s flown by the Blackhawks in their comic book adventures. But then I thought of a similar appearing twin, kitted in the 1950s by Hal deBolt; his A/2 *Twin*. His design may have been influenced by Grumman's *Skyrocket*. I always liked Hal's twin .049-powered control line ship, and went for its overall styling. I ended the fuselage just ahead of the wing, since the use of a tail-

dragger landing gear setup meant a nose gear wouldn't be needed. The engine nacelles extended forward ahead of the wing, without a center fuselage, made for a unique appearance. More about the length of those nacelles later. The rear-located canopy, high turtledeck, and large fin and rudder, like deBolt's A/2 *Twin*, made this thing look like it could have been a military fighter. So, this one got a 1930s style military trim scheme; red and white stripes on the rudder, early military insignia, yellow and gray colors; could have been a late '30s Navy job.

The moderately tapered wing has a straight leading edge; all the taper is in the trailing edge for a different appearance. The thick, fully symmetrical airfoil is the same as used in my larger *Hammer* designs. The aircraft is fully aerobatic; maybe not in contest winning style, but plenty capable for sport flying and hot dogging. With the power of two .40s, it'll go straight up forever. And with the light loading and thick airfoil, it slows way down for easy landings. I'm very happy with it. The *Double Impact* doesn't have the speed of the *Magnum 80*, but I don't want that much speed for fun flying. The structure is very rugged; two .45s or .50s would be practical and would provide even more speed, plenty for the adventurous.

Double Impact



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No foam cores; I felt like working with wood this time around. For a twin, I thought it'd be easier to install the two nacelles, landing gear blocks, throttle cables, throttle servo, and aileron servos in a built-up structure than it would be to reinforce a foam core for all that stuff. The wing is a basic two spars, sheeted leading and trailing edges type. It's easy to build; building "feet" on the

back ends of the ribs mean easy construction with little chance of warps. The nacelles are balsa sides, plywood doublers, two formers; just two box structures to glue into the wing. The fuselage is again very basic; a box, rounded in the front, with sheeted turtledeck sides, flat bottom. Stab and elevators are built-up and sheet covered, as are the sheet fin and rudder. Can't get much

easier to build than this.

All newly designed aircraft don't always fly "right off the building board." It's nice when they do, but this wasn't one of those times for me. As first designed and built, my prototype turned out tail heavy. I added lead to both nacelles for balance, quite a bit of lead, and flew the plane. It hunted in pitch and was much too sensitive to elevator inputs. I knew it was still tail heavy, and didn't want to add any more lead. So, I took the brand new plane home after one flight, removed the engines, and cut the nacelles off. Had to do it, to make it right. Spliced in 1½ inches additional length, used plywood doublers for strength, refinished the reworked areas, removed the lead weights and flew the plane the following weekend with the balance where it should be. Flew great; problem solved. The plans depict the way the plane is now. If you use engines heavier than the OS .40s, the nacelles could be shortened a bit.

Another bit of rework was needed; I first had the 3/16-inch landing gear coming down from the wing panels just outboard of the engine nacelles for a nice wide track. But the long run of wire in the grooved wing block acted as too much of a torsion bar, and the gear was too flexible. An easy fix was to bend new gear wires with the legs coming down just inboard of the nacelles; it made the gear stiffer, and it works fine. If you really wanted a wider track, the gear blocks could be run only between ribs 3 and 4 rather than between 2 and 3. The bottom of the nacelles then would be shortened to accommodate the landing gear wires. Either way would be fine. Another option for easier building would be to use strip ailerons rather than the tip types. It's more work, but I like the inset tip ailerons better. That's up to the builder.

Why do test flights have to be made in cold, windy weather? I spent a year working in southern California and watching guys flying in beautiful weather, then got back in New Jersey just in time to finish the plane and test fly it on a cold December day. I used my insulated Radio Glove for the test flying; kept my hands warm on a cold and windy day. That Radio Glove is a good idea; try one.

The exact specs on the *Double Impact* came out at a 76 inch wingspan with 970 square inches, 55-inch length, and a weight of 9¼ pounds. That works out to a wing loading of 22 ounces per square foot, pretty darn light. The moments and overall layout are similar to most sport/aerobatic designs, but the appearance is certainly different. That's the story on the aircraft design; if you're interested, I'll get on with the construction notes.

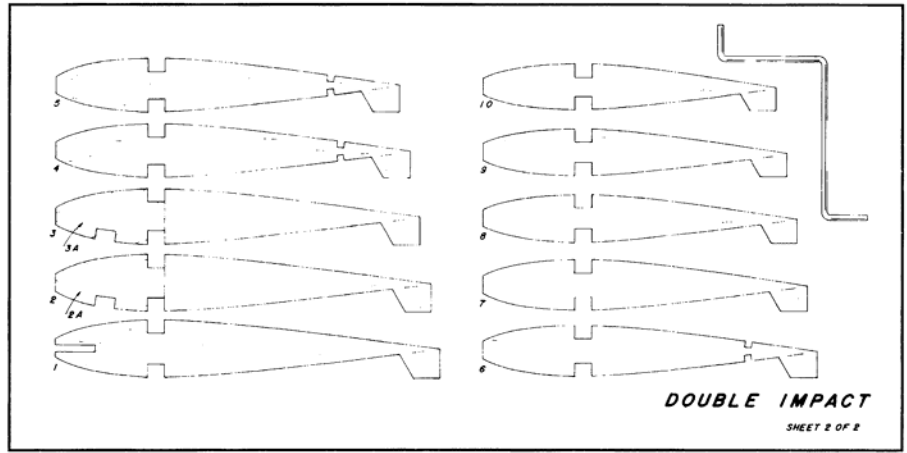
Get out the tools

Before beginning construction on this one, I took my time, cut out all the parts, gathered up all the needed strip and sheet stock, and really made a complete kit up. I don't know if this really saved any time overall, but it let the assembly work progress smoothly. I built the wing up first, knowing that after it was done, the rest would be easy. Using the traditional waxed paper over the plans on my building table, I laid down the bottom spar, added the ribs, upper

spar, leading edge, short spar by the aileron cutout, the trailing and leading edge sheeting, and the cap strips. Removing the wing panel from the table, I trimmed the feet off the ends of the ribs, and added the trailing edge planking. Next came the plywood rib doublers and landing gear blocks, epoxied securely in place, followed by the leading edge planking. I rounded off the leading edge strip with a small plane and sanding block. The leading edge sheeting was cut out back to the spars for the engine nacelles to be installed.

At this point, I assembled the nacelles which were made up of 1/8-inch balsa sides, 1/16-inch plywood doublers, the plywood firewall and one bulkhead plus the balsa top blocks. They go together quickly. I drilled the firewalls for the radial engine mounts before I glued them in place. The balsa blocks around the engines were added later, and shaped to fair into the spinners. The nacelles are glued into the wing panels, perpendicular to the wing. No side thrust, no up or down thrust.

I prefer side mounting of the engines, so the mufflers can exhaust beneath the wing. With the nacelles in place, the throttle cables are added, after cutting holes in the ribs where they are needed. The throttle servo is

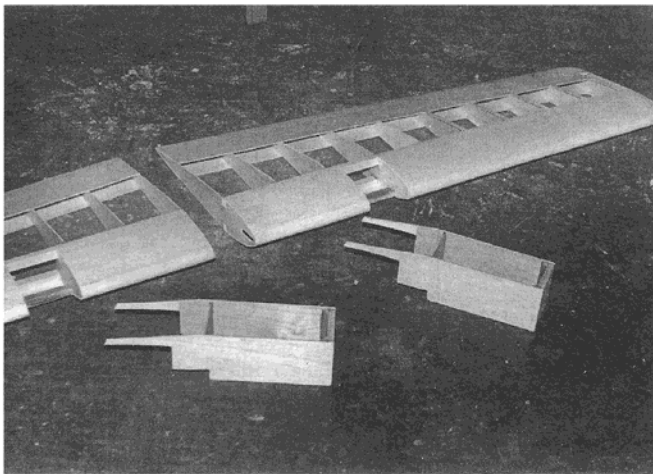


mounted in the center of the wing just behind the spars, with the cables connecting to each end of the servo output arm. Adjust the cable length so both engine throttle barrels open and close together. The removable plywood bottom hatches can be installed later.

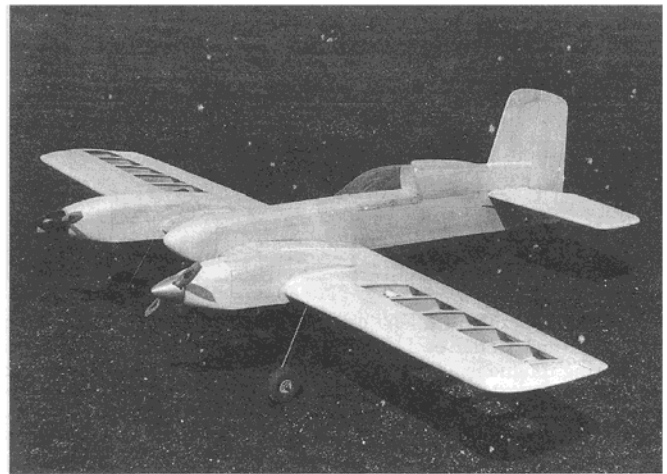
I mount the aileron servos with 1/8-inch plywood mounting trays cut to fit between ribs 5 and 6, and have the center section planking extend to rib 6 on the bottom surface, with holes cut for the servo positions. I rolled up paper tubes and cut holes in the ribs for the tubes to lead the servo extension

cables to the center of the wing, behind the throttle servo position. With the cable tubes and throttle cables installed, the center section planking can be added.

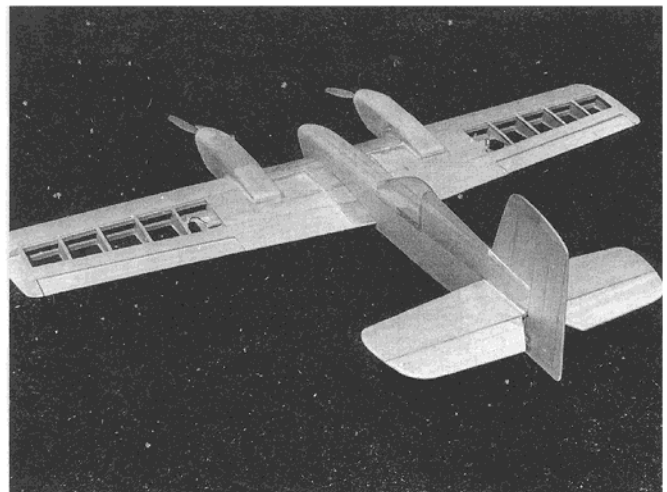
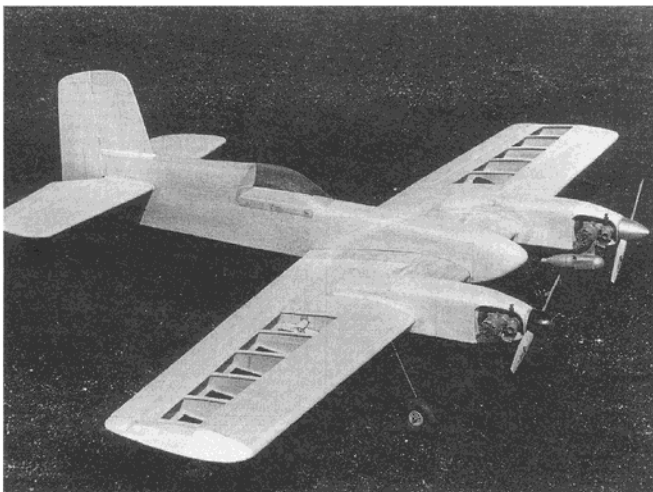
The ailerons are cut free of the completed wing panels, and trimmed back so the edges can be finished off. If you prefer hinging along the upper edge rather than along the center line as I did on the prototype, that would be fine. Strip ailerons could be used if you like, but I'd still suggest separate servos for each aileron. The wingtips are added and shaped, and the wing panels can be joined.



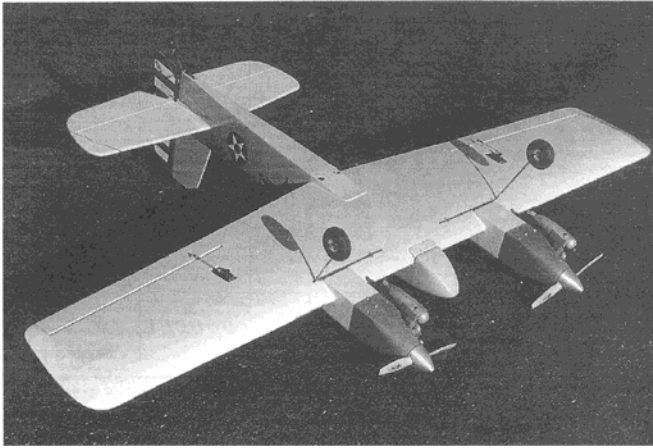
The wing is classic "D"-tube and the nacelles (above left) simple box structures with a firewall and single bulkhead. The completed nacelles slip into the wing cutout (above right) and are glued to ribs 2A and 3A, and to the wing spar.



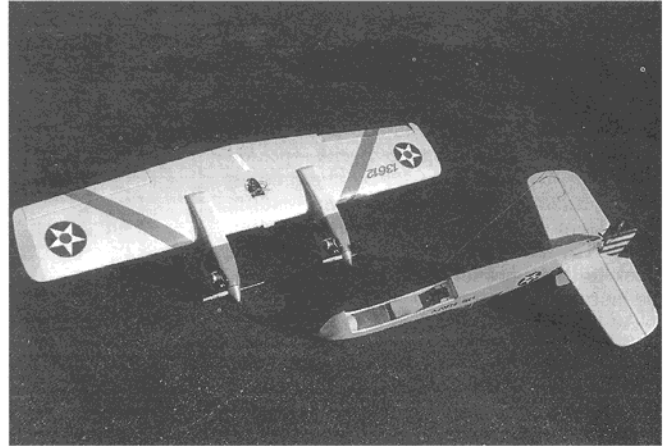
For extra strength, Dick glassed the wing three inches back from the leading edge, from nacelle to nacelle (below left). The ailerons (below right) are cut free from the wing after it's framed. Then the leading edge added and carved.



Double Impact



Using individual servos for the ailerons (**above left**) is easier to set up and adds more positive control. Instead of the more usual dowels in the leading edge, Dick favors a ply tongue (**above right**), and feels it's easier to install. This model



wasn't designed for screaming performance so a pair of reliable O.S. .40 FSRs (**below left**) worked quite well in the plane. Access for the fuel tanks comes through the hatch in the bottom of each nacelle (**below right**).

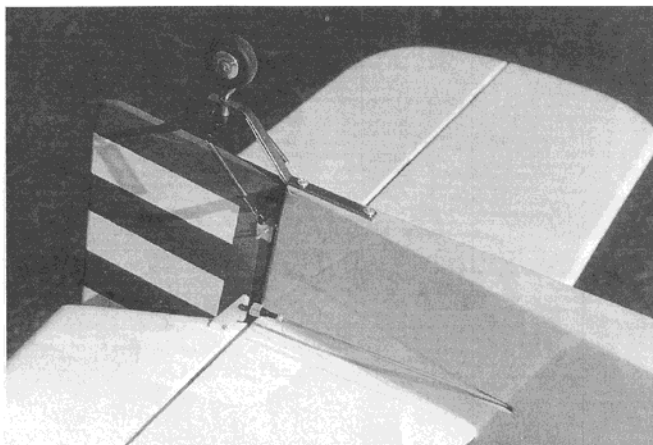
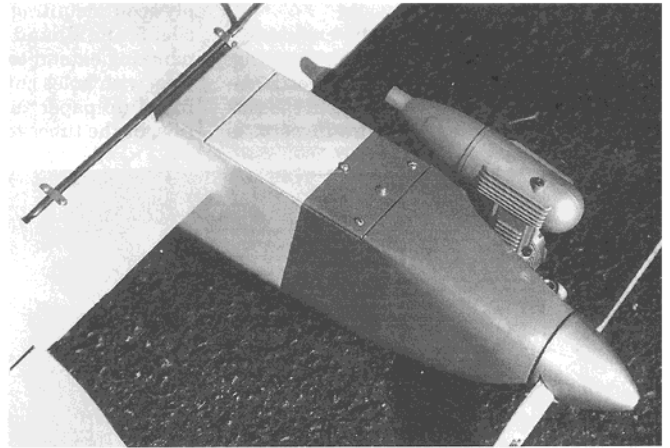


The amount of dihedral isn't critical; I used about an inch under each tip. The plywood mounting tongue is added; it's stronger and easier to fit to the fuselage than using one or two dowels. The center wing joint is reinforced with a wrapping of heavy fiberglass cloth and epoxy. It's probably overkill, but I also ran fiberglass cloth about three inches back from the leading edge out to the engine nacelles.

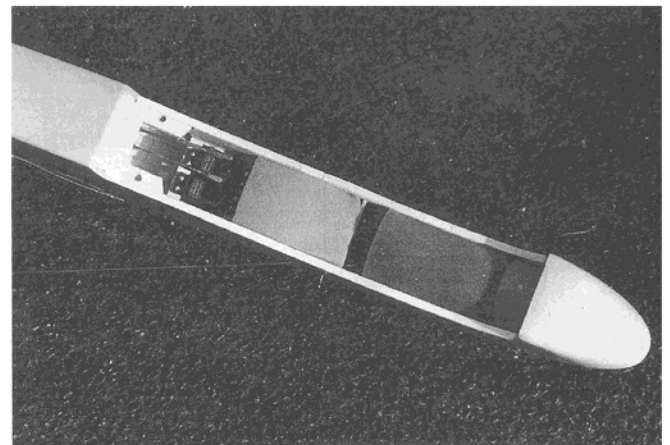
With the wing completed, I started the fuselage by gluing the plywood doublers to the two sides, along with the wing saddle pieces, hardwood wing mounting blocks, tail doublers, and triangle stock. The two sides are first joined with the three plywood bulkheads, and then the tail is pulled together and the rear bulkheads added. Keep the fuselage straight. The turtledeck sheeting is added, then the fuselage top blocks. With

the nose block in place, I use a small plane and sanding block to shape the top of the fuselage. I leave the fuselage bottom planking until last, after the bulkhead holes are cut for the rudder and elevator pushrods.

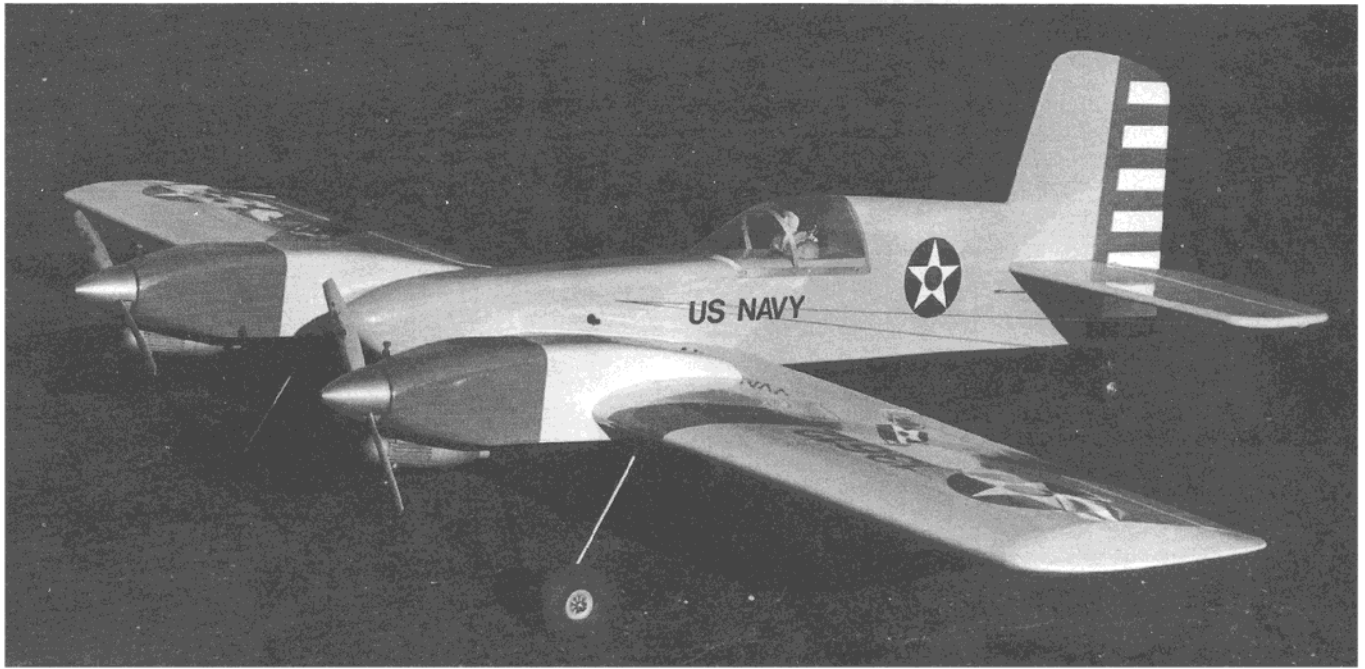
The tail surfaces are also easy. The stab bottom sheeting is laid down and the inner structure added over it, followed by the top sheeting. The edges are rounded, the leading edge of the elevators beveled to a point,



Select a good leaf spring tail wheel assembly, and mount it with screws into the bottom $\frac{1}{8}$ ply tail post sheeting (**above left**). Though the fuselage is relatively



narrow, the thick chord of the wing center section provides a sizable radio compartment (**above right**). Put the battery as far forward as possible.



Since the *Double Impact* has a bit of the Grumman *Skyrocket* in it, Dick chose a Navy military scheme that appeared on the experimental fighter.

As mentioned in the article, my idea for this twin came from a Hal deBolt Control Line design, the *A/2 Twin*. I contacted Hal and asked him for some comments

about that C/L design of his. As expected, he had gotten his design inspiration from the Grumman *Skyrocket*. In World War II, Hal spent a number of his Navy years stationed

at the Naval Air Test Center in Patuxent River, MD. There he got to see a lot of the Navy's new and experimental aircraft; the XF5F *Skyrocket* was one of them. Hal says he still remembers that it looked potent just sitting on the runway. On the base, the experimental *Skyrocket* was known to be one of the very fastest aircraft that the Navy had.

As an active control line modeler at the time, Hal was impressed enough to build a C/L ship with the same layout as Grumman's *Skyrocket*. He powered it with two Bunch Tiger Aero engines; I believe they were .46s. He recalls that it flew just fine, and he even won a Stunt event at the Philadelphia Flying Circus contest with it. It was while at Pax River that Hal developed his classic C/L biplane design, and after the war he went into the model aircraft kit business with that biplane; the rest is C/L, and later R/C, history.

Running his Dmecco kit company in the early 1950s, Hal was looking for something different as a kit project, and went back to the twin engined *Skyrocket* arrangement. This time, he did it in a small size and used two half-A glow engines; .049 engines had just come on the market. He called the new design the *A/2 Twin*; it was a very capable stunter in a small size, could fly on longer lines than the usual .049 ships, and had that neat twin engined sound. While not exactly a *Skyrocket* as he had gone to a single fin and rudder for simplicity, it did have that military fighter look. Hal says the kit did sell, but was not nearly as popular as many of his other designs. Of course, the *A/2 Twin* was produced along with his *All American* series, and the *All Americans* were some of the most popular C/L kits ever produced. I sure remembered it, and the result, 40 years later, was my *Double Impact* R/C design

Thanks, Hal.

