

B-26K INVADER

An unusual twin, with plenty going for it on the contest trail. This 96-inch beauty turns out to be a reliable performer.

By Bob Parcell

J. R. Naidish photos



The Douglas A-26 Invader had a very long and illustrious career. It was one of the few aircraft used during WWII to have been entirely designed and produced during the war years (first flight was 10 July, 1942), and then to continue its career through Korea and Vietnam (first flight of the revised B-26K was in February, 1963). Once WWII ended, all interest in the Invader was dropped by both Douglas and the military. Yet, there were A-26s found in combat units in Vietnam some 33 years after they were first delivered! During its career, the plane was

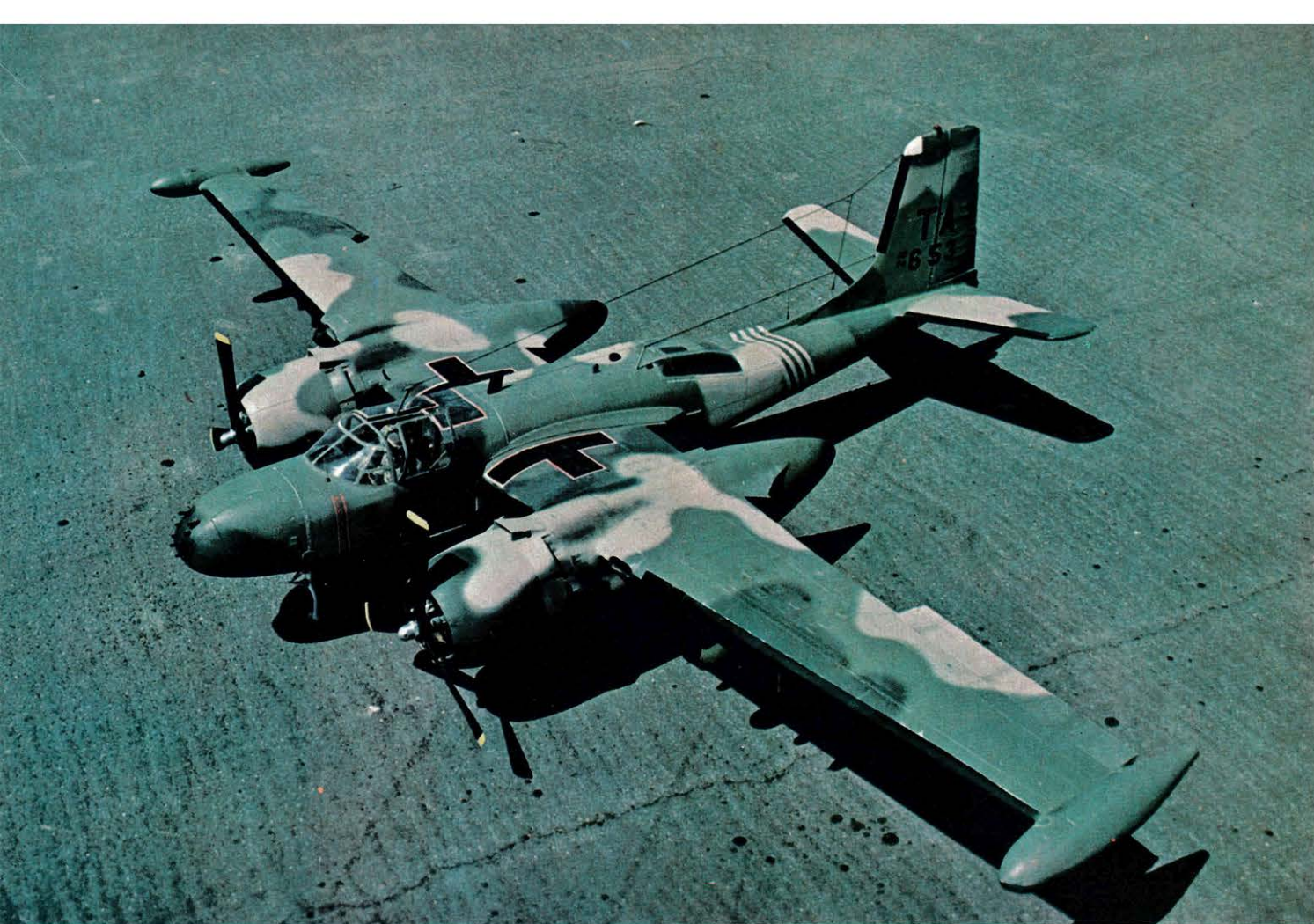
known as the A-26, B-26, JD-1, B-26K and finally A-26A.

As a bomber, the original A-26B was very successful. It was faster than anything else around, since it came out 700 pounds lighter than originally estimated. Next to the renowned Mosquito, it was the fastest bomber in the sky. It was the first bomber to use laminar airflow wings and double-slotted flaps. It also introduced the new concept of remote-controlled gun turrets. Because of its speed and marvelous defensive powers, the A-26 suffered the lowest loss rate in the European theater.

In 1948, the old workhorse B-26 Marauders were officially removed from the active rosters, and the Invaders were renamed B-26. The Korean Conflict saw some 450 Invaders in use, and the B-26K (reengineered by On Mark Engineering) was one of the preferred night fighter aircraft on the Ho Chi Minh trail. At 350 mph, the A-26A (the official redesignation of the B-26K) could deliver 11,000 pounds of bombs. The career of the Invader didn't end until 1977, when air forces from some six countries finally retired them.

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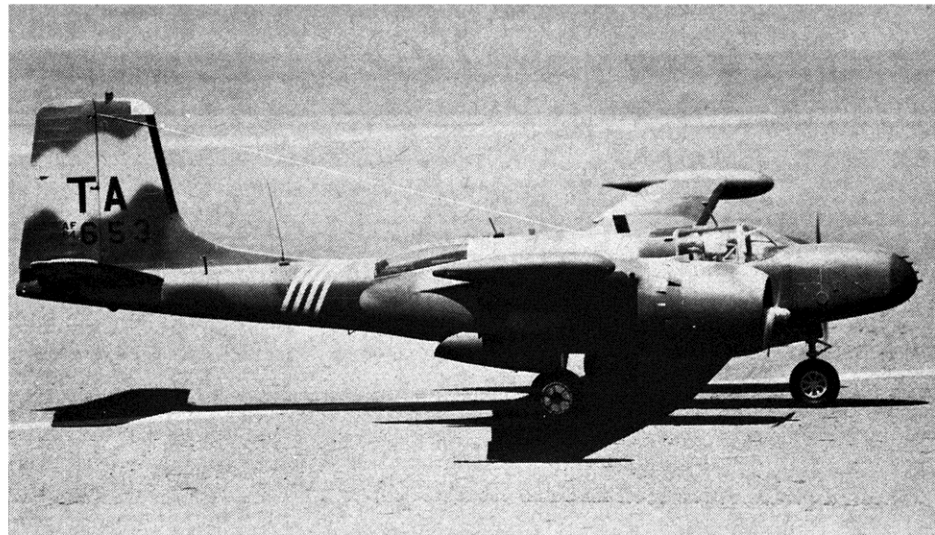
Ask anyone who has built one and they'll tell you, there is simply nothing in the world like a twin. Those synchronized engines barking out their throaty roar sends chills up one's spine. When a twin flies, the whole crowd comes to its feet. There's risk and danger . . . what if an engine flames out?! The noise, alone, is enough to get anyone's attention. If you have a good twin, you can really thrill 'em with some spectacular maneuvers. Even a simple loop looks ten times more difficult when done with a twin (and, if the model is not trimmed properly, it *can* be ten times more difficult!).

I had just successfully competed for a full season with my Royal B-25. After looking over the Summer's static and flight scores, and the number of trophies the plane had won, I knew that I just had to build another twin-engined subject.

I decided to search the hobby shop for likely subjects. Of course, you could count the number of scale twin kits available on one hand, so I wasn't expecting to find something out-of-the-box. However, I use the hobby shop like a browsing library. I thumb through all of the documentation books on hand, purchasing the ones which look promising. As I browsed through the pages, I set some vague parameters. It must be military, of course (no civilian twin is going to win a contest).

One of the prime dictates of any twin is as much wing area as possible, to keep wing loading within practical parameters. For the same reasons, it had to be clean . . . most twins are aerodynamically very clean, out of necessity. Lastly, the plane had to be something out of the ordinary . . . not another run-of-the-mill B-25 . . . but not so strange that it looked ugly.

I walked away with a few ideas, but nothing that really grabbed me enough to dedicate a building season to. One day, when passing by the hobby shop, I saw a new diorama of plastic models being put on display. In the midst of the other models was an A-26 Invader. What caught my eye was that the plane was painted in camouflage, while most of the ones I had seen were either the stark all-silver or blue typical of this fighter/bomber. After some research, I discovered that when the B-26K variant of the twin evolved, the paint job was altered to make it more suitable for the jungles of Vietnam. A fringe benefit of the "K" variant was that the rebuilt rudder was much larger, giving more lateral area behind the C.G.—some-



Look at all of that dihedral! It's no wonder that the Invader is so stable in the air.



Off on its maiden voyage, the B-26K proved to be one of the most docile twins the author had ever flown.

thing that is crucial for good one-engine performance on any twin.

I ordered a set of the Wylam three-view drawings. I had assumed that these would be very accurate, but was later to learn otherwise. I built the first prototype of the B-26 from these drawings. I didn't realize the inaccuracies until the model was done (a lesson learned in not having done all of the documentation research beforehand!). The drawings show a wing dihedral of 6-7 degrees, while the actual plane had only five degrees. This doesn't sound like much of an error, until you visualize it on an eight-foot span wing! The model looked like some sort of trainer, with all of that dihedral.

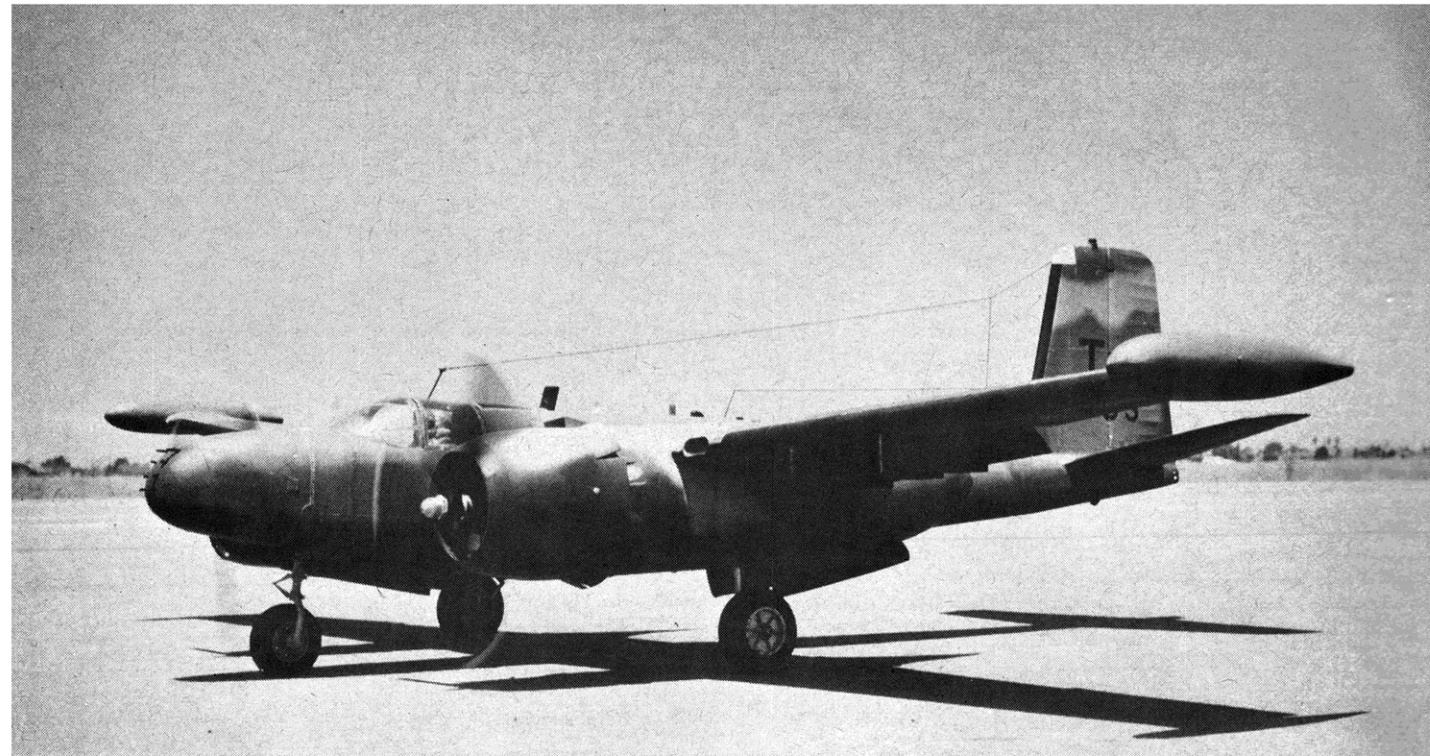
The second discrepancy was that the nacelles on the Wylam drawings were too tapered. In reality, the nacelles stay round until they are

fairly well back into the wing. This is a big help, since it allows extra space for the retracts and those large wheels.

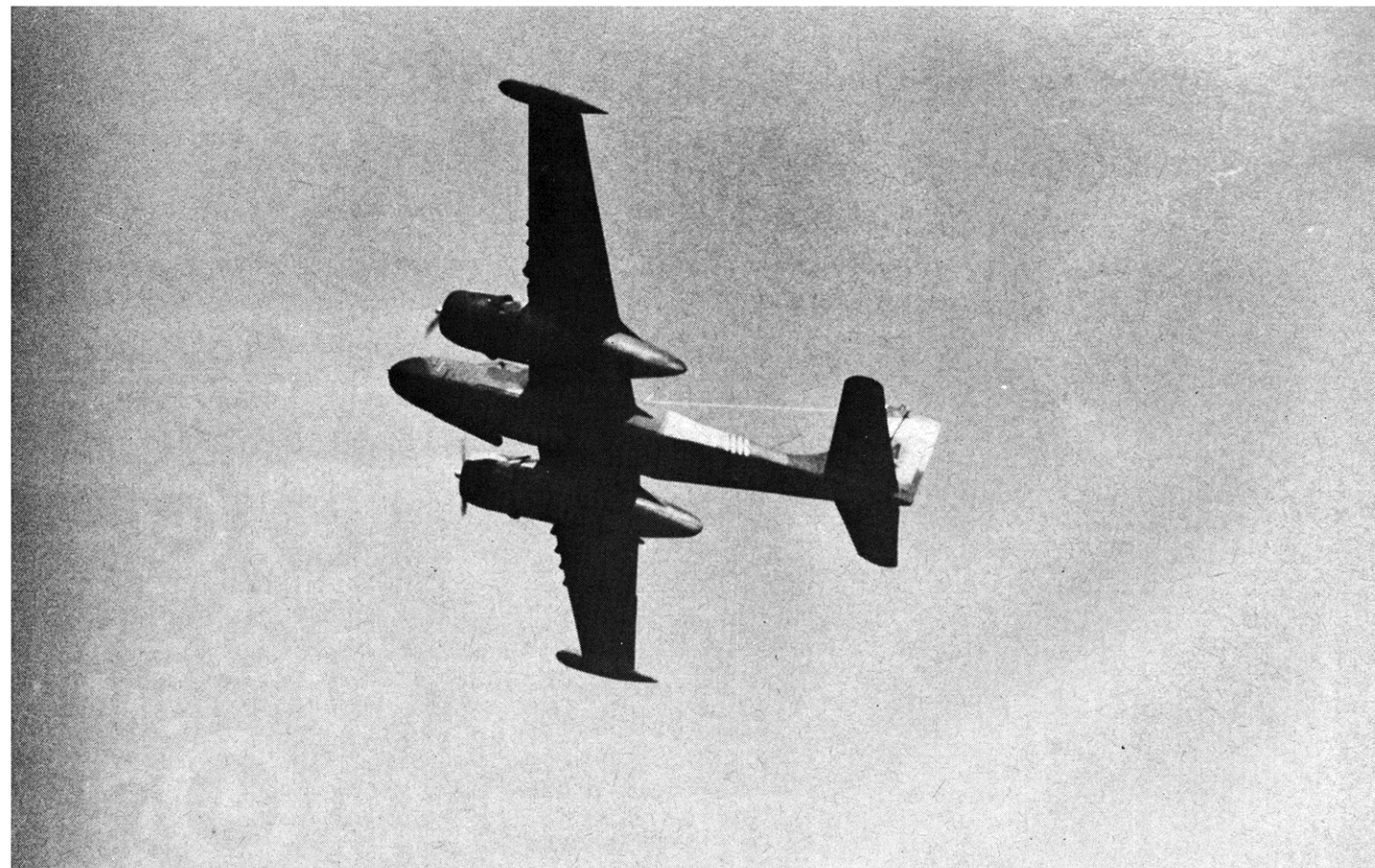
Not only were there scale discrepancies on the first prototype, but I made a few strategic errors in construction and engineering. I selected a very thin airfoil, thinking that I would get more speed. That worked satisfactorily, except that the trade-off for the thin wing section was also a nasty tendency for the model to tip stall . . . this eventually caused the demise of the plane.

I also tried to get away with 3/16-inch diameter landing gear wire. This was totally unacceptable. The model would sway back and forth while on the ground, looking as if the gear were going to fold at any time. On takeoff, it looked like a drunkard trying to get airborne! I've seen Gooney birds which looked more graceful!

By the time I got to the second scale r/c modeler 37



Two .50s provide more than enough raw power. The Invader is a likely candidate for a pair of four-cycles.



The unmistakable profile of the Invader. The author wanted a twin which stood out in the crowd, and the B-26 certainly does that.

model, which would be the definitive one for the contest season, I had worked out all of the bugs. The wing's airfoil was nice and thick, with a significantly rounded leading edge. This has proven to be very successful, with absolutely no tendencies to tip stall. At full flaps, the model floats and doesn't want to come down, but at half flaps, the B-26 settles in quite comfortably.

Since I was using Giezendanner retracts, I was stuck with the 3/16-inch landing gear struts. I modified the main gear to accommodate the Robart shock-absorbing struts. I also glued hardwood blocks to the bulkhead, so that when the gear is down, the strut wire is captured in a slot between the blocks. This helps tremendously in eliminating the swaying tendencies, and I have had no problems with the gear at all.

The construction of the B-26 is really nothing unique. Mike Beaulieu has done a remarkable job of translating my original scribbles and templates into a very usable set of plans. The plans come on two large sheets, and all the pieces are neatly laid out and easy to use. You can order the plans directly from Mike: Beaulieu's Plan Service, 84 University Street, Presque Isle, Maine 04769. Price \$19.95 (folded, or add \$3.00 for rolled plans shipped in a tube). Mike also has several other plan sets for sale.

The fuselage is a typical built-up structure. On the first prototype, I selected hard 1/4-inch sheeting, thinking that all of the strength was in the skins. On the final prototype, I opted for lighter wood, and saved a full pound of weight, without sacrificing any strength. The 5/32-inch Lite Ply doublers at the wing seat are where all the strength is. These pieces form the basis for the entire fuse, and are used for alignment, along with the belly pan. The belly pan is glued in as a one-piece affair, and carefully cut out later. Once you have all of the balsa sheeting in place, go to it with the No. 80 sandpaper. The wood may get a little thin in a few places, but don't let that concern you.

I used a balsa nose block, but you could just as easily use a foam block, which would be glassed. Don't go out of your way to save any weight here, for the model will most likely come out tail-heavy. I got lucky and both of my models came out just right on the C.G. Of course, the battery pack will be placed inside this nose block.

One discrepancy in scale is that the aft location of the cockpit window line was "fudged" just a bit, to

allow the proper structural integrity for the wing leading edge tie-in.

Next, the Giezendanner retracts are fitted. These are heavy-duty units, which have a very realistic five-second transit time. Get the mechanical option which allows the nose gear to pivot flat as it rotates into the fuse. Because the B-26 was such a small bomber, the wheel had to rotate and lay flat inside the fuse, because there simply was no room below the cockpit floor. I would suggest ordering the tiller arm which will simplify the nose gear steering when in the folded position. If you are planning ahead, you will allow for a small access door in the bottom of the nose block. This will allow access to the mounting hardware for the nose gear, as well as access to the battery pack.

The Giezendanner gear have a unique "anti-stripping" system, which essentially is a slip clutch. If the gear should ever jam on the way up, this clutch slips and prevents the motor from burning out. This assembly is a sort of plastic gear over a brass hub, which twists the gear up and down. Once the gear's "clutch" mechanism has been used a few times, there is a tendency for these parts to slip too easily . . . and the gear may not retract or extend completely.

The easy fix for this is to remove the press-fit gear, and run a very thin bead of ZAP along two sides of the brass shaft, almost as if you were making splines. Let the glue dry thoroughly, then carefully press the gear back in place. The glue should not bond the two parts together, but rather just serve as a shim to give extra gripping surface to the mating parts. Just use the slightest amount of glue . . . too much and the two parts won't go back together. If the gear jam and start to slip excessively again, I repeat the procedure. I understand that Giezendanner has a 1/4-scale version of the gear, which certainly would warrant looking into.

The canopy plastic is a simple pull of butyrate over an easy-to-carve plug. I opted for an openable canopy on this model for two reasons. First, an openable canopy always seems to impress the static judges (it's one of the easiest ways to get a few extra points). The second reason that I made them operational is that I always wind up getting balsa dust and other dirt inside the cockpit, no matter how meticulous I am. This way, I could leave the cockpit detailing till last, and I can clean out the loose debris anytime. The cockpit trim is lithographers' plate, from the print

shop. I used epoxy to bond it in place, but I think something more flexible, like a contact cement, might be a better choice.

The flying surfaces are all made from blue construction foam. This material is readily available at any insulation or building supply yard, is easy to cut (there have been volumes written on how to make your own foam cores), and saves a tremendous amount of time. Once the contour of the fin has been established, use the sheeted assembly as a guide for making the ribs for the rudder. Instead of calculating each rib, I simply made the outline of the rudder, and installed oversized ribs. Then, I tack-glued the rudder to the sheeted fin assembly, and used a long sanding block to contour the ribs to their proper profile. I used Robart hinges, and I did glue in some scraps of foam into the rudder to give the hinges a better gripping area. Note that, on the stab, the sheeting skins overhang the elevator, to give a closed gap appearance.

When it comes to bonding the balsa sheeting skins to the foam, I used Hi Johnson's adhesive tape. This works very well, and adds no weight. All the flying surfaces were covered with Fabrikote.

The wing is also a foam affair. I used two 1/4x1/4-inch balsa spars, which I have found adequate. However, I did use 3/32-inch sheeting on the areas inside the nacelles, as well as 1.5 oz. glass cloth in this center area. You might be able to get away with 1/16-inch sheeting and 1/4-ounce cloth . . . I just don't know. From an engineering point of view, it would be best to join the top and bottom spar with a full-depth sheer web, at least out to the nacelles. This would give a "D" tube spar, which would be much more structurally sound than the open "C" tube spar. In maneuvers, especially, there's a lot of torque applied to the center section of the wing via those two massive nacelles and the engines turning inside them.

You'll notice on the plans that the flaps are slightly recessed into the trailing edge of the wing, i.e., the top sheeting should protrude enough to cover the flap hinge gap. The full-size aircraft had a semi-Fowler flap arrangement. To do it the right way would have meant a complex scissor-type hinge setup. I was in a hurry, so I simply bottom hinged the flaps. On the original, I used the discarded section of foam cut from the trailing edge to make the flaps and ailerons. I would suggest that, even though it's more work, that you take the time and cut some little riblets for

built-up control surfaces.

I used Swingee invisible control hinges to actuate the flaps. These seemed like the ideal method, since they were totally concealed and also formed the hinge. However, in time, these lost a lot of their original rigidity and there developed an appreciable amount of "slop" in the up-flap configuration. Although the concept is slick, I'd advise going to a more conventional bellcrank arrangement for the flaps.

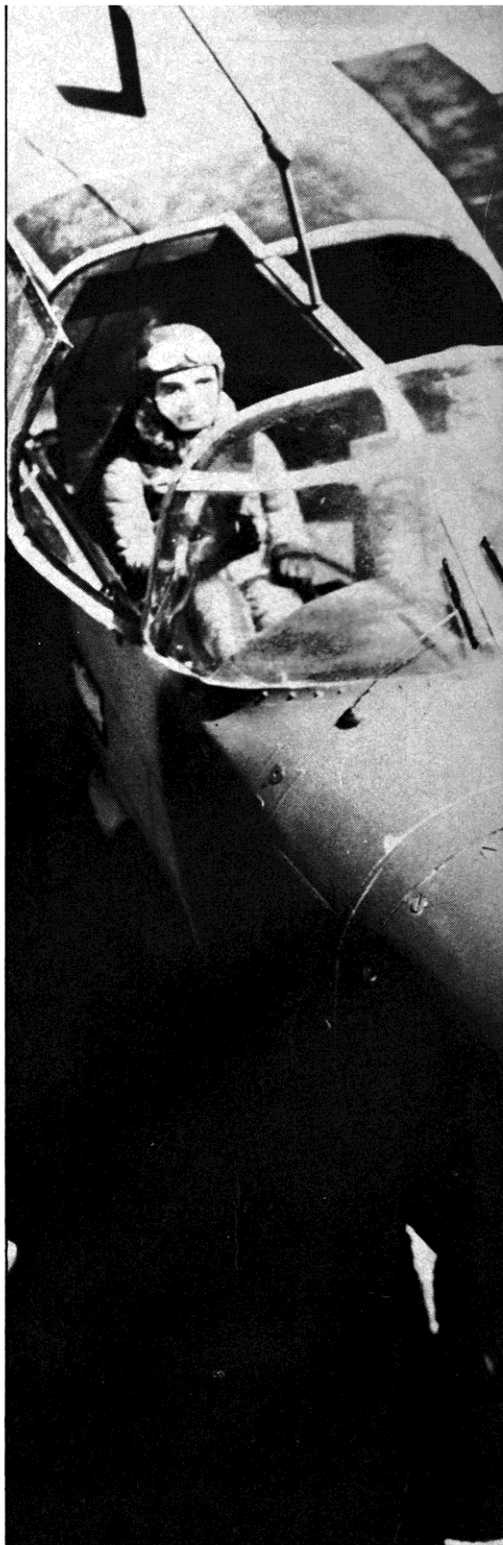
On the ailerons, I fabricated them in a built-up fashion, shaping them with a long sanding block just as I did the rudder ribs. I then used Fabrikote to cover them. If you don't want the hassle, you can fully sheet them and simulate the ribs with trim tape.

Before sheeting the top of the wing, make sure that you have cut channels in the foam for the throttle servo wires (I used a throttle servo in each nacelle), and make sure that you have the linkages and/or wiring for the retracts. Don't forget that any long electrical leads for throttle or retract wires should be choked. I almost lost the plane mere weeks before the Masters qualifier because of glitches from the unprotected wires.

I strongly advocate running a separate servo in each nacelle. Linkages from a common servo don't have the linearity that you can achieve with tandem servos. If you have a real fancy radio, you can even set up independent trim adjustments on each servo, so that you can fine tune the engines in flight.

Think of the nacelles as if you were building two miniature fuselages. Start with a box, which houses the fuel tank and onto which the fire wall is attached. After that, simply add the appropriate formers, and sheet accordingly. Note that the sheeting varies, being ply in some places, and balsa in others. I waited until I had the nacelles glassed and primed before cutting out the landing gear doors.

The cowls can be made simply, using a homemade "lathe" arrangement. Chuck your electric drill into a vise, and mount a sanding disk to it. Contact cement a ply template of the correct diameter to the sanding disk (or mount the ply template with a bolt chucked into the drill). Glue blocks of blue foam to the template until the desired mass is achieved. Working in short bursts, use an X-Acto knife like a lathe cutter to bring the foam block into the proper contour. It might help to make a template to check your progress. Work slowly, since the foam really



The canopies are hinged, and a full cockpit is installed. While not apparent from this shot, the model is nicely detailed and weathered overall.

chews away quickly. You will cut this plug undersized by the thickness of the glass lay-up.

Once the foam plug looks right, cover the entire thing with the old stick-on type Monokote. Make sure that not the slightest area is left exposed, since the resin will readily attack the foam. Use two layers of heavy glass cloth (6-10 ounce), then

sand the exterior smooth and finish with filler and primer. After you have completed the second cowl, save the mold, for you can never tell when you'll want a replacement. I cut the cowl flaps off, and glued them in the open position using ZAP.

Even though this is a 96-inch span aircraft, two O.S. .50s are more than ample power. These engines are enough to easily pull the plane through any maneuver, and most of the time the Invader is cruising at partial throttle in level flight.

In the air, the Invader is clean and fast. Even though it is significantly larger than the Royal B-25, it easily surpasses it in speed and maneuvering. Being more lightly loaded, the A-26 can turn better and maneuver tighter. Of course, it also has a bit more power reserves for those verticals. While I thought that the B-25 was a pretty easy model to fly, the Invader is much less complicated and far more forgiving. It's a very honest airplane, and I've yet to be surprised or disappointed in any way. The engine-out performance is strictly by the book. Cut back the good engine and never turn into the dead engine. You can get the model back on the ground safely on one engine . . . and that's far more than can be said for most twins!

The model has done very well on the contest circuit. It is usually flown in Team Scale (under the skillful pilotage of Frank Kelly), and it seems to always wind up at the head of the trophy list at the end of the contest. Frank will have a pilot report on the Invader in the next issue. In all, the Douglas Invader is an exceptional choice for a contest-caliber twin. □

