



PHOTOGRAPHY: DAN REISS

A head-on view showing the engine installation on the TBD. Any good 60 sized engine should comfortably power this model of one of World War II's most valiant aircraft. Read Dan's account of their combat history.

a Sport Scale . . .

Douglas TBD Devastator

By Dan Reiss

The unwitting hero of the battle of Midway
recreated for R/C in balsa and foam.

The low, slow, and lumbering Douglas TBD Devastators probably changed the tactical aspects of naval warfare more than any other single weapons system in any arsenal. It also contributed almost single handedly to the total reversal of the Japanese offensive in the Pacific. This all occurred in 1942 and started in May of that year in the Coral Sea, just northeast of Australia.

The Battle of the Coral Sea was history's first naval engagement in which the participating warships never saw nor fired upon their opponents. It was fought entirely by carrier aircraft.

In May, 1942, the Japanese launched an armada of 70 ships whose primary objective was to occupy Port Moresby on the southern coast of New Zealand facing Australia. Included with these ships were three aircraft carriers. They were the light carrier Shoho and the two fleet carriers Shokaku and Zuikaku.

Since the Americans had broken the Japanese naval code early in the war, they were well aware of the Japanese intentions. To counter this thrust, the Americans sent the carriers Lexington and Yorktown into the Coral Sea on May 1. For the next several days the adversaries frantically tried to lo-

cate the enemy's position. On May 6, the Shokaku and Zuikaku entered the Coral Sea traveling in a southerly direction. They actually passed within 70 miles of the Americans who were traveling north at that time. For no apparent reason, their search planes did not spot each other.

During the morning of May 7, the Lexington and Yorktown launched a strike at what they thought was a force including the two large carriers. An assortment of F4F Wildcat fighters, TBD Dauntless dive bombers and 22 TBD Devastators was sent. What they found instead was the light carrier Shoho and her escorts. In a diving, climbing, twisting melee, as many as 93 American planes attacked. After being hit with many bombs and torpedoes, the Shoho settled beneath the surface within a half an hour. Upon withdrawal, one of the American pilots radioed ahead the immortal statement "Scratch one flattop". Later that afternoon the Shokaku and Zuikaku launched an attack at the Americans that completely missed their target, and this, when they were only 50 miles apart. Both sides retired for the night.

On May 8, predawn-launched search planes from both sides spotted their targets at about the same time. In a bold stroke, the Japanese had launched their strike force

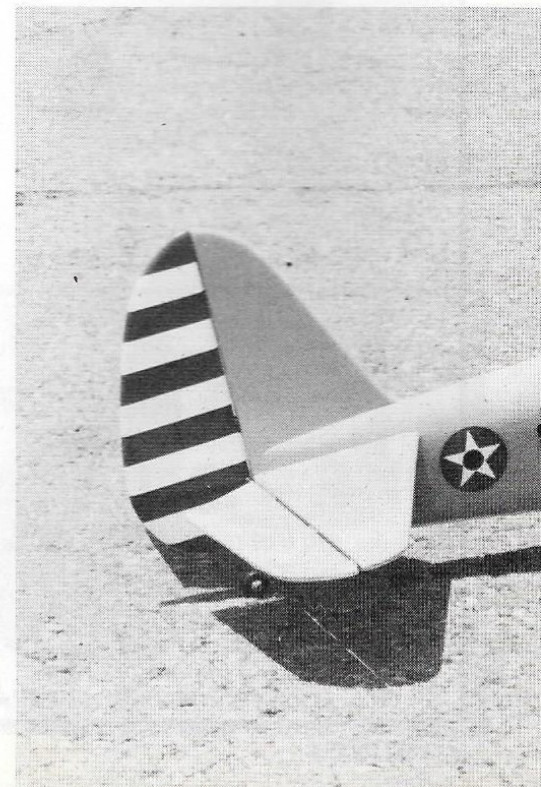
even before their search planes located the Americans. In a more conventional tactic, the Americans waited until a positive contact was made and launched their strike at 8:30 AM. A force of dive bombers, fighters and 20 Devastators was sent. The fighters and dive bombers arrived first and orbited over the Japanese for a half an hour until the much slower Devastators arrived. This delay permitted the Shokaku to turn into the wind and launch some more Zeros and allowed the second carrier, the Zuikaku to disappear into a heavy rain squall where it evaded the entire attack. The Devastators went in first but since they were not properly deployed when they launched their torpedoes, not a single one struck the Shokaku. However, about three of the dive bombers hit their target, putting the Shokaku out of the war for several months.

Just about the time this attack was taking place, the Japanese planes that were launched early in the morning located the American carriers and dealt them a deadly blow. The Yorktown was severely damaged and the Lexington was sunk.

On May 9, the two forces could not locate each other and on May 10, they vacated the area, drawing to a close the first naval battle fought entirely with aircraft. It was a strategic victory for the Americans since the invasion of Port Moresby was cancelled. It was also the first loss suffered by the Japanese after a long string of many victories. They never won any other offensive.

The Devastators and their pilots still had one more opportunity to prove their mettle before the planes were relegated to the junk heap and the pilots to martyrdom. The coming action further added to the total reversal of the complexion of the war. It occurred only one month later as the Japanese sent another task force to invade the island of Midway located about 1000 miles west of Hawaii.

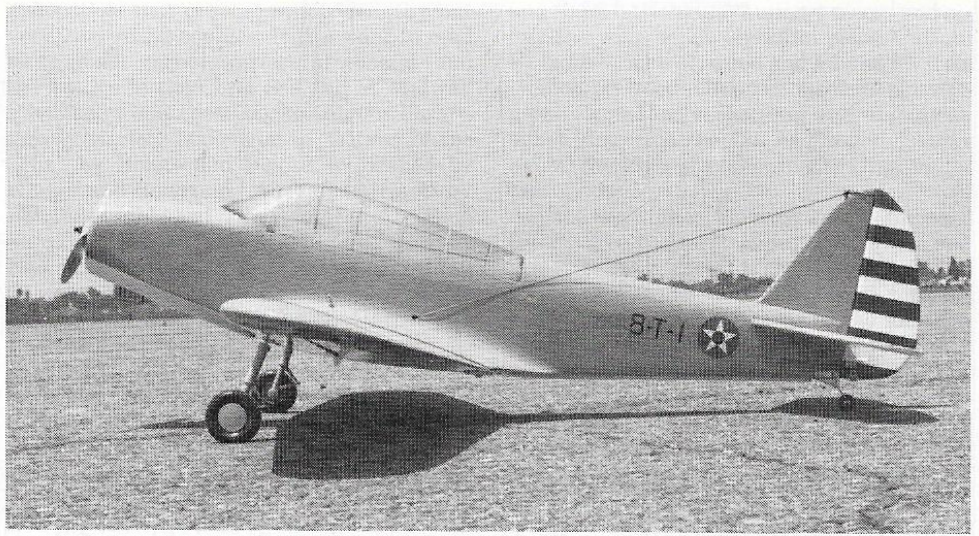
Once again the Navy crypto-analysts pieced together enough intercepted information to become well aware that the Japanese planned an invasion of Midway on June 4. Included in the invasion force were the large carriers Kaga, Hiryu, Akagi and Soryu, all



veterans of the attack on Pearl Harbor. Pitted against this force, the Americans had the carriers Hornet, Enterprise, and Yorktown which had been quickly repaired at Pearl Harbor after being heavily damaged during the Battle of the Coral Sea.

On May 30, the three American carriers were out at sea heading rapidly for Midway. They were stationed about 325 miles northeast of Midway on June 2. During the morning of June 4, the Japanese were about 240 miles north of Midway and at 4:30 AM began launching their air attack against the island. At that time they were only 200 miles from the American carriers. Bent on the notion that they had achieved total surprise and not expecting that the Americans had any force in the area to counter their attack, the Japanese launched only half-hearted and much delayed air searches. Having overheard a transmission from a Midway based PBY that had located the Japanese carriers, the Americans knew where the enemy was at 5:30 AM. They quickly raced in the direction of the spotting and launched their first attack at 7:00 AM. The Hornet and the Enterprise launched a maximum strength attack of Wildcats, Dauntless's, and 29 Devastators and, at 8:30 AM, the Yorktown launched her strike force which included 12 Devastators.

While all this was going on, the Japanese planes that had been launched at 4:30 AM hit Midway at 6:30 AM. They inflicted heavy but not total damage and at 7:00 AM the leader of the Japanese carrier planes radioed his carriers that a second attack was necessary to neutralize the enemy's defenses. That call was received just about the time the Japanese carriers were under attack themselves by land based planes which had taken off from Midway at 6:00 AM. Although they sustained no hits, the Japanese were convinced that another strike at Midway was absolutely necessary. At 7:15 AM they began rearming their planes which had been prepared for an attack on naval targets. This was an arduous task requiring the removal of torpedoes and their replacement with bombs. This usually takes about an hour. At 7:45 AM, after receiving ambiguous reports of



The outlines of this model Devastator are close to the original and would lend themselves to additional scale details such as bomb sight, antenna masts, carrier landing hook, panel lines, etc.

sightings of American carriers in the area, the Japanese rescinded the order to re-arm with bombs and began changing the planes armament back to torpedoes for attacks on naval targets. They planned to launch their attacks at the Americans at 10:30 AM. The exchange of armament was further delayed when at 8:00 AM they had to beat off another attack by planes from Midway. At 9:00 AM the Japanese Midway attack force returned and were recovered. All the carriers busied themselves re-arming their planes for an attack against the carriers. 10:30 AM came but the Japanese never launched their attack. Their luck and fortune had run out. Here is what happened.

Under the command of Lieutenant Commander John Waldron, the fifteen Devastators of the Hornet's Torpedo Squadron Eight saw the enemy's flattops at 9:20 AM. Having become separated from their fighters and dive bombers, they went in for the attack alone and unescorted. This is how the Hornet's commanding officer described the attack:

"Beset on all sides by the deadly Zero fighters which were doggedly attacking them in force, and faced with a seemingly impenetrable screen of cruisers and destroyers, the squadron dove in valiantly at short range. Plane after plane was shot down by fighters. Anti-aircraft bursts were searing faces and tearing out chunks of fuselage and still the squadron bore in. Those who were left dropped their torpedoes at short range".

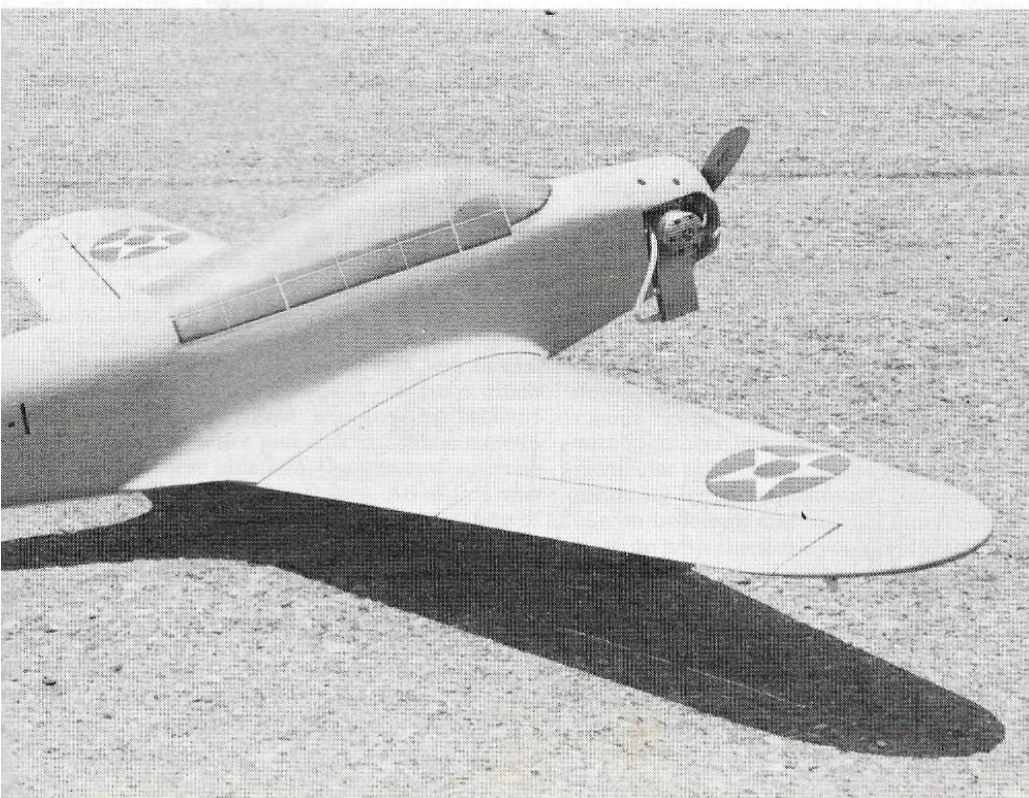
Not one of the Devastators survived the attack nor did any one of the torpedoes hit their targets. Only one member of the entire squadron lived through it all. He was ensign George Gay who was rescued the next day and went on to become a national hero.

Even before the smoke had cleared, Torpedo Six from the Enterprise showed up under the command of Lieutenant Commander Eugene E. Lindsey. The fourteen Devastators bored in amidst another deadly hail of fire from the ships and Zeros. Only four of the planes survived, Lindsey not among them. Once more, none of the torpedoes hit their targets.

Not believing their own eyes, the Japanese gunners were amazed to see yet another group of torpedo bombers coming in. This time it was the twelve Devastators of Torpedo 3 from the Yorktown under the command of Lieutenant Commander Lance E. Massey. Although they had taken off later than the Hornet's and Enterprise's planes, they caught up with them since the earlier launched planes had spent more time locating the enemy fleet. Like the two previous attacks, they went in undefended by fighter planes. All but two were shot down without scoring a single hit.

Of the forty one Devastators that attacked the Japanese ships, only six survived the massacre. Not one torpedo struck any Japanese ship. However, their supreme sacrifice was not in vain. They had performed the overture that set the stage of the action that was about to change the war.

Before releasing a torpedo, a Devastator must make a long, slow, straight run in at wave-top level aiming itself at the target. This maneuver makes the plane a sitting duck for anti-aircraft fire and defending fighters. The consecutive attacks by the Devastators had drawn all of the defending Zero fighters down to their level, leaving the carriers with virtually no combat air cover. With



all their attention focused at sea level and lacking radar, the Japanese did not notice the swarm of Dauntless dive bombers that were collecting above their carriers. At 10:20 AM they pushed over in their dives. They were totally unopposed. It was all over in a few minutes.

Even though their bombing attacks were not that accurate, they were accurate enough. The Japanese were in the process of rearming their planes and were getting ready for their 10:30 AM launch. Their carriers were very vulnerable at the time the dive bombers struck. The decks were covered with planes that were armed and fueled. Bombs and torpedoes were left unsecured from the early morning re-arming. Gas lines were full of volatile high octane aviation gas. It took a minimum of bomb hits to start uncontrollable conflagrations. By 10:29 AM the carriers Kaga, Akagi and Soryu were blazing infernos. Only the Hiryu got away unscathed.

The Americans had lost 67 planes. For this the Japanese paid dearly with their three carriers and still the day's battles were not over.

At 10:40 AM the Hiryu finally launched her delayed attack. Her planes followed the retiring Americans back to their carriers. They located and damaged the Yorktown at twelve noon. At 12:45 PM the Hiryu launched another strike. They too located the Yorktown and added to the damage already incurred.

Trying to locate the fourth Japanese carrier that had escaped in the morning and which still represented an obvious threat to the fleet, the Americans launched a multitude of search planes. They spotted the Hiryu at 2:20 PM. At 3:30 PM the Enterprise launched a strike which was shortly followed at 4:00 PM by one from the Hornet. None of the remaining Devastators took part. The Hiryu was attacked and mortally wounded at 5:00 PM. Upon recovering their airplanes, the Hornet and Enterprise hastily vacated the area to avoid a naval engagement during the night of June 4-5.

The five carriers began sinking during the evening of June 4. The first to go was the Soryu at 7:20 PM. Next went the Kaga at 7:25 PM. The Akagi and Hiryu remained afloat until June 5. They sunk at 4:55 AM and at 8:20 AM, respectively. The last to sink was the Yorktown. It was still afloat and under tow on June 6 when a Japanese submarine dealt the coup de grace by firing two torpedoes into the wounded ship. That spelled the doom for the Yorktown and she sunk at 6:00 AM on June 7.

The battle was over. The Americans had lost one carrier while the Japanese lost four. The Japanese lost 250 planes as compared to 150 American aircraft. Those were the tactical aspects. Strategically, the invasion of Midway was cancelled. It was truly a great American victory, a defeat that was devastating for the Japanese and one from which they never recovered. Due to some brilliant American tactics and luck and some incredible Japanese blunders, the destined outcome for the Japanese was failure. All of this was initiated by that inadvertent decoy action of those valiant Devastators that had drawn the entire Japanese combat air patrol to sea level leaving the carrier force exposed to that devastating high level dive bombing attack. It was the Devastator's last appearance. Over the years their contribution to the war's effort has been all but forgotten.

The information you have just read is a

synopsis of that covered in four lengthy but very interesting sources. If you want to read more about carrier warfare in general, and the battles in the Coral Sea and at Midway specifically, add these books to your library. Carrier warfare is covered in "Titans of the Seas" by Belote and Belote, (published by Harper and Row) and "Aircraft Carriers" by Polmar, (published by Doubleday). "Blue Skies and Blood" by Hoyt (published by Erikson) is a superb book about the Coral Sea engagement. The incredible "Incredible Victory" by Lord (published by Harper and Row) is an accumulation of eye witness accounts from both sides of the entire battle at Midway. Walter Lord puts you right in the middle of all the action.

The Model

With that bit of warfare history behind us, let's get on with building the model. The construction is fairly conventional and should not be particularly challenging to anyone who has already built an R/C ship or two.

Start with the wing first. Cut out the foam cores using the supplied templates. Glue on the $\frac{1}{4} \times \frac{1}{2}$ inch balsa trailing edge. Carve and sand it to shape. Use some masking tape over the foam to protect it while you are shaping the balsa. Cut out the recess for the $\frac{1}{4} \times 1$ inch balsa hinge support and cement it in place. Make sure it is level with the top surface of the wing. Install the aileron bellcrank at the wing tip as shown on the plans. Make up the aileron pushrods to suit your needs and put them in place. Sheet the wing with $\frac{1}{16}$ inch balsa. Cut a small slot in the wing skin at the bellcrank where the pushrod to the aileron will protrude. Temporarily locate the aileron control horn in position and bend a Du-Bro Kwik Link and rod with a "Z" bend in it to go into the bellcrank. Check for a good fit and the correct length and make sure you can get the pushrod in and out of the bellcrank through that slot in the skin. Remove the pushrod and lay it aside until you are practically finished with the airplane. Make a mark on the bellcrank mount to indicate the position at which the bellcrank is perpendicular to the smaller aileron pushrod. Glue on the wing tips and sand them to shape. Epoxy two pieces of $\frac{3}{8} \times \frac{3}{4}$ inch maple motor mounts together for the landing gear blocks and when cured, slot them for the landing gear. Cut out the foam wing for the landing gear blocks and epoxy them in place.

Cut out the ailerons and cover all of the exposed edges with $\frac{1}{16}$ inch sheet balsa. Check the ailerons for a proper fit, sanding them where necessary. Epoxy the $\frac{1}{8}$ inch plywood aileron horn mounts in place.

Make a groove along the chord line at the root of each wing panel for the $\frac{1}{4}$ inch diameter wing dowel. Epoxy the wing halves together, leaving that groove as clear as possible. Cut out the foam for the aileron servo. Epoxy in the $\frac{1}{8}$ inch plywood rear wing dowel support and the $\frac{1}{4}$ inch plywood servo mount. Solder the aileron pushrods together with whatever linkage you need to get your particular type of servo. You can check your centering by peering through the slot at the aileron bellcrank and making sure that it is lined up with the mark you previously made. Now, some work needs to be done on the fuselage.

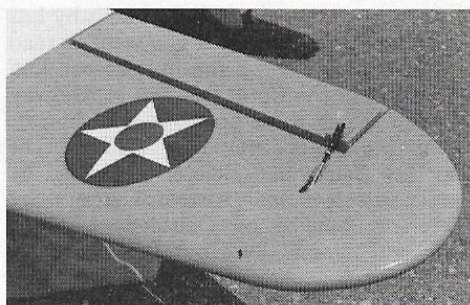
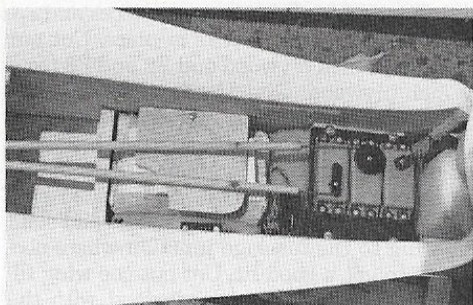
Fuselage

Cut the fuselage sides from $\frac{1}{4}$ inch sheet balsa. Contact cement the $\frac{1}{8}$ inch Sig Lite Ply doubler to the sides. Glue on the $\frac{1}{4}$ inch

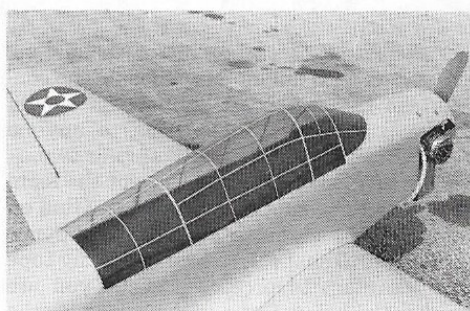
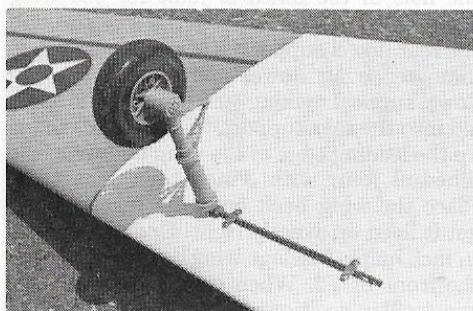
and $\frac{1}{2}$ inch triangular support pieces and epoxy the wing screw blocks in place. Cut out F1 from $\frac{1}{4}$ inch plywood and F2 and F3 from $\frac{1}{8}$ inch plywood. Glue the fuselage sides together, constantly checking the alignment. When dry, glue the tail end together, once again checking the alignment. Glue in the tank floor.

Place the wing in the wing saddle and sand the wing to the fuselage junction where necessary to get a good fit. Cut out the wing fillet support from $\frac{1}{64}$ inch plywood with the grain running perpendicular to the fuselage. Glue it in place, using the wing to keep it molded to shape until the glue dries. Recess the wing leading edge to receive the $\frac{1}{8}$ inch plywood front wing dowel support. Clear out the hole in the dihedral joint for the wing dowel with a $\frac{1}{4}$ inch drill all the way through the rear dowel support. Epoxy in the $\frac{1}{4}$ inch diameter wing dowel and the front wing dowel support making sure the dowel is epoxied into the rear support. When cured, shape up the leading edge of the wing and wrap the dihedral joint with 3 inch fiberglass tape. Place the wing back onto the fuselage and get it lined up exactly right. Epoxy the $\frac{3}{8} \times \frac{3}{4}$ inch maple fuselage wing dowel support to the front of F2. When cured, and with the wing still in position, drill from the bottom of the wing through the screw blocks with a $\frac{5}{32}$ inch drill. Make the entry in from the bottom of the wing very accurately and be sure that you are drilling perpendicular to the bottom of the wing. Open up the holes in the wing to $\frac{3}{16}$ inch diameter and the holes in the blocks to $\frac{3}{16}$ inch. Thread the blocks with a $\frac{1}{4} \times 20$ tap. Cut out the wing screw supports from $\frac{1}{8}$ inch plywood and drill a $\frac{1}{4}$ inch diameter hole through them to provide a tight fit around your nylon wing screws. Place the wing on the fuselage again and re-align it. Mount the screw supports on the screws as if they were washers. Spread epoxy on the supports and screw the assembly through the wing into the blocks. Check your alignment once again and make sure it is right before the epoxy cures.

At this stage of the fuselage construction, it is a good time to lay out your radio installation. I used fiberglass arrow shafts for the rudder and elevator pushrods and Sullivan's cable pushrod for the throttle control. The necessary support structures were used to mount my Kraft KPS15-II servos. I mounted a derelict K&B 61 engine to a Kraft radial mount and screwed this to the firewall. A Kraft 13 ounce tank was fitted and the fuel line holes drilled in the firewall. After everything was checked out, I removed the servos and tank but left in the engine to assist with the shaping of the nose. Glue on the $\frac{1}{4}$ inch balsa sheet fuselage bottom behind F3 with the grain running crosswise. Add the soft balsa blocks to the top of the fuselage. The $\frac{1}{2}$ inch sheet balsa cockpit floor is glued on with the grain running crosswise. Screw a dummy cowl plate with the correct outside diameter and a $\frac{1}{4}$ inch diameter hole in the center on to the shaft of the engine and block in the nose around the engine in front of F1. Mark the outline of the plate on the balsa and remove the engine if it is one you care about. Epoxy the $\frac{1}{32}$ inch plywood sheet beneath F1 and F2 with the grain running lengthwise. The wing fillets are built up with layers of a mixer of microballoons and resin and are molded to the correct shape with an educated finger. Carve and sand the entire fuselage to shape. When you have the cowl carved close to its final form, glue the cowl ring in place



Dan's installation used KPS15-II servos (above left) along with fiberglass arrow shafts to control surfaces. Here's a different placement for the aileron linkage (above right). Bellcrank mounts at wingtip. The landing gear arrangement (below left) uses conventional wire with gear blocks in the wing. The canopy (below right) relies on creating a mold from urethane foam, glassing it, and vacuumforming.



The color scheme on the Devastator re-creates that of Commander Waldron's (see text) lead plane of Torpedo Eight. The overall light blue was a 50/50 mix of Superpoxy blue and white.

making sure that you have a sufficient amount of clearance for the propeller.

Cut out the tail surfaces from $\frac{3}{8}$ inch medium hard balsa sheet. Cut the elevators in one single piece and leave them joined together until you have the $\frac{1}{8}$ inch diameter wire connection epoxied in place. Sand all the pieces. Epoxy the $\frac{1}{8}$ inch plywood horn mounts in place.

Screw the wing onto the fuselage. Epoxy the horizontal stab in place using the wing as your reference and making all the measurements from it to the stab. Epoxy on the $\frac{1}{4}$ triangular stab supports. Cut the empennage blocks from soft balsa and sand them to shape. Epoxy them to the vertical stab, making sure that the stab stands perpendicular to a flat surface. Epoxy the assembly to the horizontal stab, checking the alignment constantly before the epoxy cures.

About the hardest part of this model to come up with is the canopy. There is nothing around commercially that is close enough to fake it, so you will have to start from scratch.

Build up the cockpit area with polyurethane foam blocks that are easy to sand and are not attacked by polyester resins. Sand the foam to the cross sections shown on the plans and blend it smoothly into the balsa portions of the fuselage. Over sand the foam $\frac{1}{16}$ inch all around to account for the thickness of the finish you are going to apply and the canopy itself. Apply a coat of K&B Surfacing Resin to the foam. Sand lightly when cured. Cover the block with 4 ounce fiberglass cloth and brush resin through it. When cured, sand lightly. Continue adding coats of resin and sanding until you have a perfect surface. Finish-sand the foam canopy with 600 grit wet and dry paper, used wet. Even then, a good heavy coat of wax is needed for the final finish. If you do not have the facilities to vacuum form an object this size, and most of us do not, you will have to seek outside help. Look under "Vacuum-forming" in the yellow pages of your phone book where you might luck out and find a sympathetic proprietor who will pull a mold for you without charging

you an arm and a leg. Explain to him what it is for. It may help in the negotiations. If you have a friend in some industry that uses vacuum-forming, he may be able to "G job" it for you. No matter how you go about it, make the canopy from .030 inch clear plastic. When it is completed, glue it in place.

Finishing

Now that everything is built, it is time to make it look pretty. Go around the entire ship with lots of sandpaper and microballoons a couple of times until you are sure there is not a rough spot left. Put on two coats of K&B Surfacing Resin, trying to make a little go a long way. Press as much of it as you can into the wood as you spread it out as far as possible. Sand these two coats with 180 aluminum oxide sandpaper. When you are satisfied with the surface you have achieved, spray on a coat of K&B Primer. Sand this with 220 paper. Next, comes the color. A myriad of very colorful pre-war color schemes are available to choose from. They are extremely attractive and will certainly make your model stand out on the field and in the air. I chose the much more conservative early war paint scheme that was hastily applied soon after the outbreak of hostilities. In memory of, and in honor to Commander Waldron, I painted my model with the color scheme of the plane that he used to lead Torpedo Eight in that fatal first torpedo attack at Midway. The red and white rudder stripes were painted over with blue while at sea. This plane is presented in a gorgeous five view drawing in Profile Publication 171. The light blue is a 50/50 mix of K&B Superpoxy blue and white. The insignia roundels are available from Sig. The canopy framework is made from Sig's blue striping tape.

Not much more left to do but install your radio, engine and various pieces of hardware. A lot of models have been "crashed" even before they have gotten off the ground just because of a poor radio installation. Follow the manufacturer's directions to a "T" and you will never regret it. My Kraft airborne unit fit in with plenty of room to spare, so I made liberal use of foam rubber and routed all my wires as neatly as possible. Because my model came out a bit tail-heavy, I had to mount my servos as far forward as possible. To compensate for this, I shortened up the tail moment on the plans one inch. This should not affect the flight performance as it alleviates the tail-heavy condition.

Finally, the moment of truth is at hand. Start up the engine and taxi her out. Line up into the wind and hit the throttle. The tail will lift immediately and it might take a little bit of backpressure to keep her level. Apply rudder correction to keep her tracking straight. Once you have enough speed, lift her off and climb gently to altitude. If you have built her straight and have the CG as shown, the plane should fly practically "hands off". Mine flew "right off the board" and handles like a dream. Its performance is almost like a pattern ship. Don't be afraid to really wring her out on the first flight as the plane has no bad habits and is inherently stable. Landings are a breeze. Although the plane has a high wing loading of about 33 ounces per square foot, its stability, thick wing, and ease of handling convert this potentially tedious moment into a pleasurable one. With a 5 to 10 mile per hour wind you can land this plane at practically a standstill and still control her all the way to touchdown.