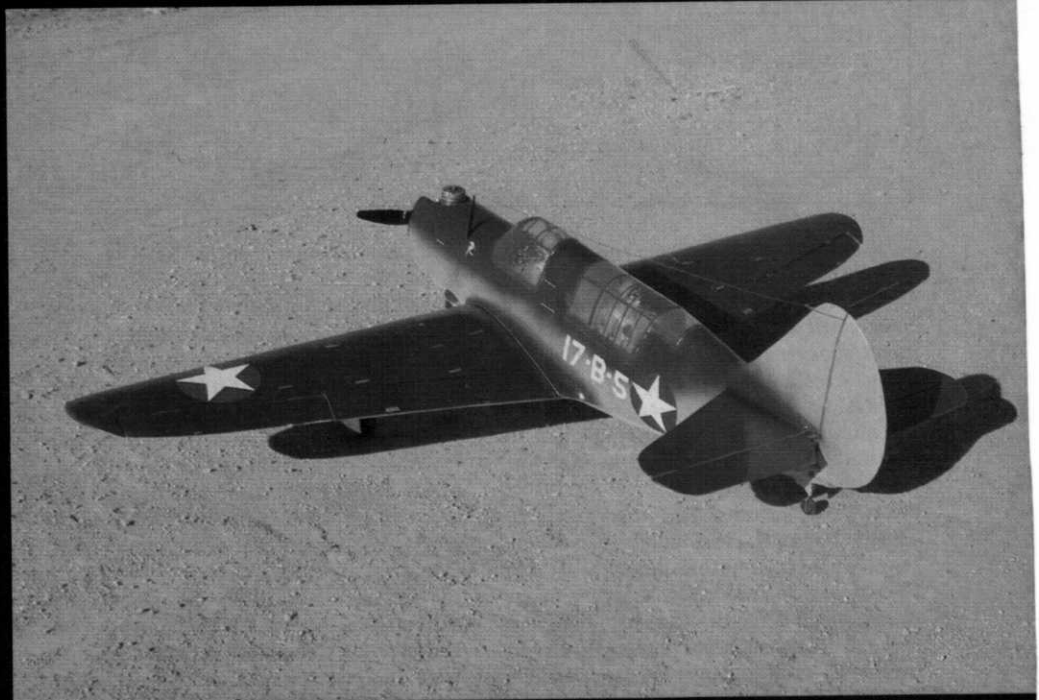




**The first RC Stand-Off Scale model of the famous Helldiver, which was used in carrier based combat raids against Rabaul, Kwajalein, Entiwetok, The Marshalls, and the Marianas in World War II.**

**BY DON WILLIAMS**



**This .60 powered version of the Curtiss SB2C-1 is extremely easy to build for a scale model and flies quite realistically. It has no inherent bad flight characteristics and will make you look like even a better pilot.**

# CURTISS SB2C-1 HELLDIVER

I have been modeling for thirty-one years and I cannot recall ever seeing the Helldiver modeled before — either in C/L or R/C — although I could be wrong in the C/L area as I haven't kept up with this phase of our sport/hobby for several years.

As for R/C, I cannot see why it hasn't been done since it has a lot of potential. Although it is a taildragger it has a wide track landing gear and this makes for relatively easy ground handling. It has ample wing area and a thick airfoil section which adds up to excellent flying characteristics as well as very slow stall speeds. It has a huge tail section which doesn't hurt anything at all. The upper portion of the fuselage is about half canopy and is very easy to duplicate as most of it is wrap-over type. An added plus are the nice big fillets which streamline the aircraft and make it very clean looking as well as reducing drag. The fuselage is large enough to accommodate any equipment you wish to use. The wing span is 60" which is roughly 1¼" to the foot and designed to utilize a .56 to .60 engine.

The XSB2C-1 Helldiver was conceived in 1938, test flown the first time in 1940, and delivered to the Navy for carrier operation in 1942. It was used in combat for the first time in 1943 in raids against the Japanese held Rabaul. It was also used at Kwajalein, Eniwetok, the Marshalls, and the Marianas.

In addition, it was tested by the Army and was known as the A-25A Shrike. Marine Squadrons also received Helldivers for use as land based dive bombers. For armament the Helldiver carried two .30 caliber machine guns in the rear cockpit and four .50 caliber machine guns in the wings. It could carry two 1000 lb. bombs internally and two 500 lb. bombs externally in the wing racks, and travel at a speed over 300 mph.

It was not a small aircraft. It had a wing span of roughly 49' and a length of approximately 36'. There are

a few added inches to these figures but I just rounded them off into approximate feet for this Stand-Off Scale model.

## CONSTRUCTION

I usually start with the wing first as I really hate to build them (sound familiar?). It's a job that has to be done so get it out of the way. Besides you will need the wing as soon as the fuselage is constructed.

Start the construction by cutting out all the parts. Build the wing up side down so as to keep the top flat. Pin the top main spar to the plan and glue all the ribs in place. Next, glue the bottom main spar in place and the 3/16" square rear bottom spar. Then glue the 1/4" square leading edge to the ribs and let dry. The second wing panel is built in the same manner and the two are joined with the 1/8" ply dihedral brace and the 1/8" ply gusset at the leading edge.

The pushrods may be installed at this time and, when this is done, cover the entire wing with 3/32" sheet balsa starting with the bottom trailing edge sheet. Next do the top trailing edge sheet, the bottom leading edge sheet and so on. If fixed gear are to be used, be sure to install the landing gear blocks before the wing is sheeted. Retracts are another story but the wing is deep enough to accept most any retracts on the market today.

### Fuselage:

Begin the fuselage construction by cutting out the sides. These will have to be made from 1/8" x 8" sheet or you will need to laminate a 4" sheet to a 3" sheet in order to have a sheet that is wide enough. Just make sure that, whichever way you decide, the sheets match as closely as possible. Near the tail you will have a double curve and it is very important that both side sheets have, as nearly as possible, the same tension.

Glue the fuselage doublers in place. (Be





sure to make a left and a right fuselage side.) Glue the 1/4" square along the bottom of the fuselage sides aft of the wing saddle and the 1/8" x 1/4" along the top as shown on the plan. Set these aside to dry and cut out all the fuselage bulkheads and the 1/8" x 1/4" spreader for the tail. Glue the 1/4" square cockpit floor support to F-3 and the 1/8" x 1/4" stiffeners to the top and bottom of F-6, F-7, and F-8.

Next, glue the fuselage together at the tail, inserting the 1/8" x 1/4" spreader in-between. Do not taper the spreader. Clamp the tail together, making certain the sides are square. When this assembly is dry, dampen the sides and glue bulkhead F-5 in place. Use masking tape or rubber bands to pull the sides in and let dry. Dampen the sides again and add bulkheads F-6, F-7, and F-8, using the same method to pull the sides in around the formers. The hard part is now done.

Glue the firewall in place and then F-2, F-3, and F-4, dampening the sides and pulling in with the masking tape. After all this is dry, and the tape is stripped off, the cockpit floor slipped in. Notice that it is cut cross-grain and is in several pieces. Slip all the pieces in from the front and slide them back in place. Now glue them from the bottom. Everything becomes rigid at this point so make absolutely certain your fuselage is in perfect alignment before gluing. Do not force fit any of these parts. In fact, it would be better if they were a little on the loose side since a force fit can misalign all your beautiful work. I had to cut mine loose twice before I discovered what was happening!

Now install F-3T, F-4T, and F-6T. F-3A, F-4A, and F-6A, are 1/8" ply canopy frames and will be installed much later. When F-3T and F-4T are dry, cover with 1/8" sheet balsa. At this point you should drill the holes for the engine mount, fuel lines and throttle pushrod while the firewall is still hanging out there in the open.

The upper front and the turtle deck are now strip planked with 1/8" x 3/8" strips. It may be suggested that you cut your own strips for this. In this way they will be more

**CURTISS SB2C-1  
HELLDIVER**  
Designed By: Don Williams

**TYPE AIRCRAFT**

Stand-Off Scale

**WINGSPAN**

60 Inches

**WING CHORD**

12 1/2" Root — 5 3/8" Tip

**TOTAL WING AREA**

531.5 Square Inches

**WING LOCATION**

Low Wing

**AIRFOIL**

Semi-Symmetrical

**WING PLANFORM**

Swept T.E.

**DIHEDRAL, EACH TIP**

3° (1-7/16" at tip rib)

**O.A. FUSELAGE LENGTH**

44 Inches

**RADIO COMPARTMENT AREA**

(L) 9" X (W) 4 1/2" X (H) 2 1/2"

**STABILIZER SPAN**

22 Inches

**STABILIZER CHORD (incl. elev.)**

6 Inches (Average)

**STABILIZER AREA**

132 Square Inches

**STAB AIRFOIL SECTION**

Flat

**STABILIZER LOCATION**

Top of Fuselage

**VERTICAL FIN HEIGHT**

7 1/4 Inches

**VERTICAL FIN WIDTH (incl. rudder)**

8 Inches (Average)

**REC. ENGINE SIZE**

.56-.61 Cubic Inch

**FUEL TANK SIZE**

12-14 Ounces

**LANDING GEAR**

Conventional

**REC. NO. OF CHANNELS**

Five

**CONTROL FUNCTIONS**

Rudder, Elev., Ailerons, Throttle, Flaps

**BASIC MATERIALS USED IN CONSTRUCTION**

Fuselage ..... Balsa, and Ply

Wing ..... Balsa and Ply

Empennage ..... Balsa

Weight Ready-To-Fly ..... 104-112 Ounces

Wing Loading ..... 29.27 Oz./Sq. Ft.

uniform in overall consistency. Start at the bottom and place one on each side. Continue in this manner until it is all covered and then glue the chin block in place.

Sand the bottom of the fuselage flat and lay it on the 3/4" bottom block. Mark along the fuselage sides with pen or pencil and cut to shape. The 3/4" block may seem heavy but once it's hollowed out it's light enough. If NyRod type pushrods are to be used, now is the time to install them. Now glue the bottom block in place. Cut the cowl sides from 1" block and glue in place along the front chin filler piece. At this time you can also drill a 1/8" hole for the tail wheel strut. This hole will later be filled with a piece of inner NyRod. It is easier to drill the hole now than after the rudder is installed. Try it, you'll like it.

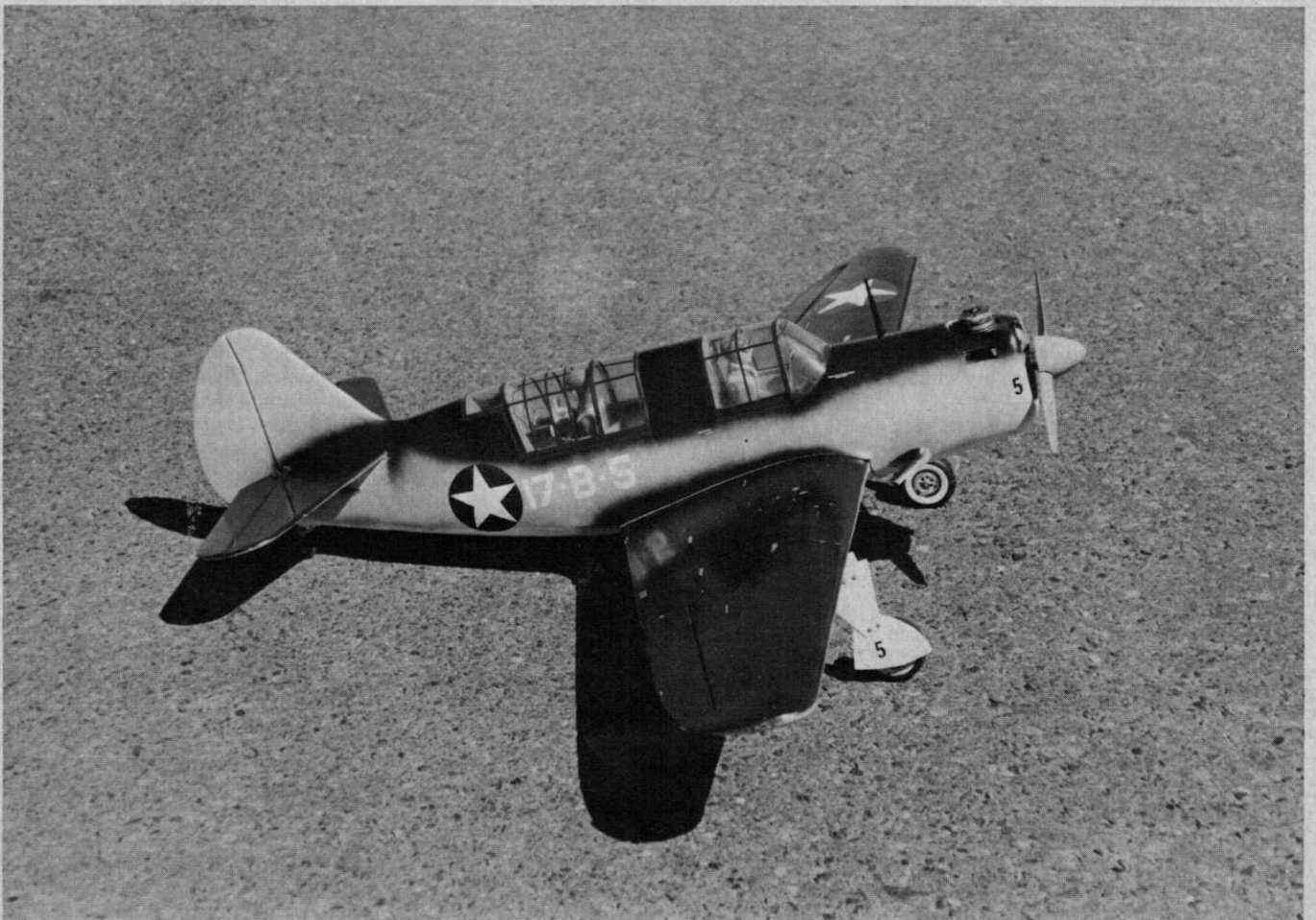
Carve and sand the fuselage to shape. Cut the stabilizer and elevator from 1/4" sheet and install the stab. Cut the rudder from 1/4" sheet and install it also. When this is dry, cut out the filler blocks and glue on top of the stabilizer, one on each side of the rudder. Let dry and carve and sand to shape. Sand the whole fuselage down nicely and fill any cracks with Dap spackling compound and sand again.

Glue the 1/32" ply fillet bases in place and, when dry, add the 1/16" sheet balsa fillets. Sand and fill with more Dap.

**Finishing:**

The aircraft should now be ready for covering, using your favorite method. I will describe here how I do it. You do as you like, but I find this method easiest for me.

Brush on two coats of clear dope, letting each dry and sanding between coats. At this point you can cover the aircraft with whatever you wish. I use silkspan, heavy on the wings, medium on the fuselage, and light on the tail. I use silkspan religiously because I have found that other coverings can cause a lot of internal damage in a hard prang where you have a broken wing, etc. On the other hand, with silkspan, and with the same break, the damage is usually in the immediate stress area and nowhere else so repair is much easier. Also, the repaired



area is much easier to conceal than with other types of covering. By tearing the paper rather than cutting it will feather right in almost by itself with no raised edges to have to sand down or fill around. I have also found that it goes on, (at least for me), a lot easier than the other coverings and fills very rapidly so you don't add a lot of weight by having to put on coat after coat. It only requires about three coats of clear dope and you're ready to go on to the next step.

Spray on a coat of "Hot Rod Grey" auto primer and let dry. Sand this down with 320 wet-or-dry used wet. The primer sands very easily so be careful while sanding. Sand only until you see light spots showing through the primer. These are high spots and if you sand any further you will be sanding into the covering. At this point, wash the aircraft with clean water and dry with a tack cloth. Let it set for at least 1/2 hour to make sure any other moisture has evaporated and spray on a second coat of primer. Sand this coat lightly and watch for any light spots. If there are any, repeat the process a third time. If there are none you are ready for the color.

Since the "Helldiver" is depicted in the 1943 naval camouflage color scheme it is tri-colored — two shades of blue and white.

Spray the light colors first, starting with the white. Spray the bottom of the fuselage and stabilizer, also the wing to just past the landing gear struts. The strut covers will also need to be painted white. Now, when the white is dry, spray on a light blue. Spray the underside of the outer wing panels, the fuselage sides, and the rudder this color. When this is dry, spray dark blue on top of the fuselage, upper surfaces of the wing and stabilizer. None of these colors should be masked so the over-spray will give a fading, one into the other effect. Don't overdo the over-spray, though, or you can ruin the effect. Practice on something else until you can do it reasonably well and then apply it to the aircraft. The insignia and large lettering is cut from trim MonoKote. For color scheme refer to Profile Publication #124.

#### **Cockpit Detail:**

At least some cockpit detail is a must on this aircraft. It just looks too empty without it.

An instrument panel and pilot were used in the front cockpit, and guns in the stored position, and a gunner in the rear cockpit. These add quite a bit to the overall effect.

To make a very simple instrument panel that looks good, take a piece of black plastic and cut to shape. Next, using different size brass tubing in your drill, cut the instrument holes. A word of caution is due here. Place the brass tubing where you want the hole to be and add some pressure before starting the drill. Otherwise the tubing may "walk" and ruin your panel. Also clean the piece of plastic out of the tubing before cutting the next hole or the same thing may occur.

When cutting the hole, you will get a slightly raised edge around each hole. Do not trim this off. It makes a dandy rim around the instrument.

Now that all the holes are cut, cut a piece

of white plastic to the same shape as the black piece and glue to the backside of the black one with plastic cement. Take a simple "Flair" pen and draw the instrument in each hole and you're all done unless you want to add a few knobs and switches here and there as I did. You'll be surprised how good it looks and the difference it makes in the overall appearance.

The pilots were 2" scale and a balsa block had to be added to the bottom of each one and carved to shape in order to make them high enough for the cockpit. You could add a lot more detail to the aircraft than I did but even with very little it looks good.

The antenna post on the cowl side is detachable and the receiver antenna goes up through it and back to the tail for a further scale look. I had originally intended for the rear cockpit to be open and the guns sticking out in the open air but then I thought of all the oil and dirt that would collect there with hardly any way to clean it so the guns were placed in the stored position and the cockpit closed in. It looks good this way and it's sure a lot cleaner!

The only part of the canopy that should be molded is the front canopy and this is very easily done, as I will explain further on. The rear canopies are cut from .015 clear plastic and simply wrapped over the canopy frame and glued. Tape was used to simulate the frames on the outside.

The front canopy was molded over a balsa block mold right on top of my wife's kitchen range. This can be done if you have an electric range. If not you will have to go back to the "old oven trick."

Set the mold up on blocks so that when it is raised about 6" it will give you plenty of room to work. When the coils on the range are red hot, hold the plastic 12" to 15" above the burner, using gloves. It only takes seconds so be careful. Now, when the plastic sags (it may even smoke a bit) flop it onto the mold and push down as evenly as you can. Hold for a few seconds till it cools and — presto — a canopy! Now just trim and fit it to the aircraft. The hardest part of the whole thing is carving the mold and that's not really hard either, being balsa. Glue in place and use tape for the canopy frames. The front canopy was molded from .030 clear plastic.

#### **Flying:**

The day I picked to test fly the "Helldiver" was beautiful. The sun was shining brightly and the temperature was in the lower 60's with a light breeze blowing. How's that for mid-Winter? By the time I called a friend of mine and we got to the flying field, however, the winds had become much stronger and were somewhat gusty. As luck would have it we also had a cross wind. These were certainly not very good conditions for testing a new aircraft! Several of the fellows were already there and, after some picture taking, I decided to go ahead with it. This meant that I would have to take-off across the runway and clear a barbed wire fence.

After taxiing around a little I gathered up

my nerve and moved out to the edge of the runway, turned into the wind, and let her rip. There was no problem. I cleared the fence by at least 20 feet but I had a bad left turn and had to pick the left wing up quickly. The aircraft was taken to altitude and trimmed out. It was found that it is fast and very responsive to the controls but not overly so. I also remembered that I had forgotten to balance the wing. The left panel was heavy and that explained the left turn. The rest of the flight was uneventful and the first landing was not bad at all considering the wind conditions. I had to land at an angle to the wind and turned into it at the very last second. As luck would have it, I didn't even scrape a wing tip.

The next weekend the ship was taken out again and no problems were encountered at all. I have only had one mishap with this aircraft since its maiden flight and that was because I got one wheel into very soft dirt on a dead stick landing and it flipped over. There is still a small flat spot on top of the rudder that I never fixed as a reminder not to get into soft dirt with a taildragger.

Don't let the idea of this aircraft being conventional geared scare you off. It handles so easily on the ground that almost anyone could handle it. All that is necessary for take-off is to line up into the wind, add power gradually, but steadily, and make minor corrections with the rudder if necessary.

Once you are airborne, climb on out and get a little altitude (that's the best friend you have with a new aircraft), and trim the ship out. Fly around some and get the feel of it. Now bring her in low and fast right in front of you so you can get a look at it. Looks good doesn't it? The aircraft is pretty big and doesn't look as if it's moving very fast at altitude but that low pass proved differently didn't it? It's pretty fast isn't it?

Now throttle back and set up an approach for a landing. There's no need to be afraid that it will stall, so slow it down to where you need just enough power that it won't land. I believe you will find that you can almost walk that fast. How's that for slow flight?

On your next flight do some rolls. Fly inverted — it will fly beautifully that way. Stall it — the stall should be straight forward and very gentle. This aircraft has no bad tendencies that I have found and could even make you look like a better flier than you really are. Good airplanes are that way and this is a good one. Besides it looks nice and will get plenty of comment at the flying field.

Just to give you an idea of how good this aircraft really is, there is a fellow club member who is a devout pattern flier and who rarely builds scale type models but liked the Helldiver so much he is building the second prototype model of which he only lacks painting at his writing.

Two things make this project worthwhile to me and those are: (1) It looks like an aircraft and (2) it flies well. Yours should fly as well if built according to the plans.

Good luck and happy landings. □