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F6F

**T**he F6F Hellcat was one of the most lethal fighters of WW II, and Giantscaleplanes.com's Hellcat model brings the excitement of this classic dogfighter to the pilot who does not want to invest countless hours at the workbench. Although not exact scale, this model is a cut above the average film-covered ARF, and it is an excellent choice for a modeler who wants to build his or her first warbird.



*Beautiful detail and flight manners to match*

*by Peter Abbe*

# Hellcat



PHOTOS BY PETER ABBE & CHERI SASSMAN

*by Peter Abbe*

## KIT CONTENTS

This kit features a fiberglass fuselage, cowl and belly pan with molded panel lines, hatch detail and cutout positions. The wing, ailerons, flaps and tail feathers are built-up balsa covered with Solartex. All of these components are beautifully painted in a matte finish with a two-tone color scheme, and the clear plastic canopy is also painted. The included two large sheets of self-adhesive decals will give the Hellcat a finished appearance. All of the parts are sealed in plastic bags; the only damage I found was a small ding in the vertical fin and on the tip of the right aileron.



The O.S. .91FX easily fits the factory-supplied, two-piece engine mount. A plywood block is mounted to the firewall to allow proper engine space and add additional strength.

The kit includes most of the hardware needed to complete construction: a plastic-composite engine mount, a fuel tank, wire landing gear, main wheels and a tailwheel, various hardwood mounting blocks and screws, bolts, pushrod dowels and wires, control horns and clevises.

The 13-page construction manual contains only line drawings and brief notes; experienced builders should have no difficulty completing the model, but novice builders would benefit from a more thorough manual.

## ENGINE AND SERVO INSTALLATION

Minimal work is required to prepare the

fuselage for the engine and servos, but you'll need some type of cradle to hold the fuselage while you install the radio components and engine. The plywood formers, servo tray and firewall are preinstalled. The provided plywood spacer block ensures that the engine is mounted the proper distance from the firewall. This block significantly increases the firewall's strength and should not be omitted. I used the two-piece plastic-composite engine mount supplied with the kit; this mount will easily accommodate any engine in the manufacturer's suggested range of .91 2-stroke or .91 to 1.20 4-stroke.



The stabilizer is mounted to an aluminum-tube spar that runs through the fiberglass fuselage.

After you've mounted the engine, you can accurately position the cowl and attach it to hardwood blocks that you must glue to the firewall. To ensure that the muffler would fit inside the cowl, I substituted a Davis diesel Soundmaster for my O.S. .91FX's stock unit. Because I also used a Du-Bro exhaust deflector, I needed only to cut a small hole in the bottom of the cowl for the exhaust exit.

Servo installation is straightforward: simply drop the servos into the plywood tray, drill the mounting holes and then screw them into place. Make the pushrods using the supplied dowels and pushrod wire and secure the wires to the dowels with the included heat-

## SPECIFICATIONS

MODEL: F6F Hellcat

DISTRIBUTOR: Giantscaleplanes.com

TYPE: scale warbird

WINGSPAN: 70 in.

WING AREA: 825 sq. in.

WEIGHT: 10.5 lb.

WING LOADING: 29.3 oz./sq. ft

LENGTH: 53.5 in.

RADIO REQ'D: 5 to 6 channel with 6 to 7 servos

RADIO USED: Futaba T6XA with JR Expert SL500 servos on ailerons and flaps; Futaba 3003 servos for the other controls.

ENGINE REQ'D: .91 2-stroke or .91 to 1.20 4-stroke

ENGINE USED: O.S. .91FX

PROP USED: APC 14x6

FUEL USED: Powermaster 10-percent nitro

PRICE: \$350

**FEATURES:** the Hellcat features a fiberglass fuselage (with integral vertical fin), cowl, belly pan and built-up and sheeted, Solartex-covered wings and tail feathers. These components are all painted in an authentic two-tone scheme. Provisions are made for retract installation. Hardware, engine mount, fuel tank, fixed landing gear and wheels are included.

**COMMENTS:** this ARF offers the modeler an easy-to-build warbird that can be assembled in a few weeks. The high quality and completeness of this kit is makes it well worth the price. The Hellcat would be an excellent choice for a first warbird.

## HITS

- High-quality components.
- Easy construction.
- Beautiful finished appearance.
- Fantastic flight performance.

## MISSES

- Instruction manual lacking in detail.
- Belly pan didn't fit well.

## RETRACT INSTALLATION



The Century Jet Models Centurion retractable gear, 11-ounce air cylinder and adjustable selector valve comprise a rugged, easy-to-install system. This gear is an excellent choice for the Hellcat's undercarriage.

Century Jet Models (CJM) Centurion rotating retracts are robust and easy to install. The air-actuated units feature T-6 aluminum bodies, stainless steel cams and positive up and down locks. The functional oleo struts are custom-sized at the factory to the length required for the Hellcat. Weighing only 14 ounces with the air system, this gear can support up to a 15-pound aircraft.

Installing this gear in the Hellcat does require minor wing modifications. Hardwood mounting blocks that come with the kit are epoxied into a plywood landing gear box that is installed in the wing. Before you glue these blocks in place, remove a small portion of the inboard block to provide clearance for an air nipple and its air line. Then, slightly sand down the blocks to accommodate the width of the landing-gear's body. The bottom interior of the box also needs to be enlarged with a sanding drum on a rotary tool.

You must remove the rear center portion of the box to accommodate the undercarriage's air cylin-

der. After I had ground approximately 1/16 inch off the mounting flanges, the gear dropped into position perfectly.

The CJM air system consists of an 11-ounce air cylinder, a filler valve, 10 feet of air lines, T-connectors and four quick disconnects. The heart of this system is a four-way selector valve that controls the speed at which the gear retracts and extends. Four setscrews allow independent control of each gear. The valve is bolted to an 1/8-inch plywood plate next to a retract servo. This unit is then attached inside the fuselage with silicone adhesive.

Although this valve can be used with a conventional radio, a computer radio greatly simplifies setting the precise amount of control movement necessary to properly actuate the valve. The Hellcat's cavernous fuselage easily accommodates the valve and the air cylinder. You can cycle fully-charged gear four times before the system needs more air. A larger air cylinder would increase the number of cycles per charge.



# F6F Hellcat:

## KING OF THE PACIFIC

successful fighter of WW II was sleeker and sexier than a Hellcat. When it comes to fighters, however, beauty is “in the doing,” and the Hellcat could do it in spades! In terms of what it contributed to victory, it was the uncontested king of the Pacific.

The Hellcat was unique among almost all WW II fighters because, from the beginning, it was designed to be flown and maintained by teenagers who were barely out of high school. Grumman wanted all of its airplanes to provide outstanding performance while allowing a huge margin for error in the hands of 200-hour pilots and recently trained mechanics. This meant that simplicity in both its aerodynamics and mechanical design had to be foremost in the designers’ minds right from the get-go.

Another goal was that the plane had to go together easily and quickly, and that is why the Hellcat looks as if it had been assembled by a locomotive manufacturer, with rivet heads sticking out everywhere. There was an elegance in the way LeRoy Grumman directed his engineers: apply sophistication only where it’s needed. For instance, only the leading edges of the wings were flush riveted, where this would have the most effect.

When you compare the Hellcat fuselage with those on a Mustang and Corsair, you can see their ineffectual complexity. The Hellcat’s curves are accomplished with a multitude of narrow, flat sheets—much like an armadillo’s armor—that can be produced in minutes, versus the hours of tooling and production required to stretch-form compound-curved sheets.

With its 2,000hp R-2800 Pratt and Whitney engine and huge wing area, the Hellcat was one of the fastest climbing airplanes of the war (3,500 feet per minute), and the wings that helped it climb, also helped it turn. It could fight the Zero on its own terms. More important, it could absorb enormous punishment and still

bring home its young (and probably scared) pilot.

Incidentally, let’s dispel an aviation legend right here: the F6F Hellcat was not designed after a Zero was captured intact during attacks on Aleutian islands early in the war. By that time, the Hellcat’s prototype was already flying, and the primary value of the captured Zero was in telling the Navy and Grumman Aircraft that their basic design assumptions had been dead on the money.

With a down-sloping cowl and high pilot position, the visibility over the Hellcat’s nose was superb in the air and on approach to the carrier. Those features, combined with its excellent slow-speed handling and docile stall characteristics, made it one of the easiest airplanes ever designed to land on a carrier. Many airplanes and pilots lived to fight another day because LeRoy Grumman had a firm rule that the airplane should have no vices whatsoever in the carrier environment and that anyone should be able to fly it.

When the numbers were tallied, an incredible 12,000-plus Hellcats were built, and they downed more Japanese aircraft than any U.S. fighter in the war with a 19:1 kill ratio. There wasn’t even a close second. Equally as important, it carried huge bomb, rocket and napalm loads down to the deck and proved itself to be the very embodiment of the term “fighter-bomber.” It did it all, it did it well, and it did it while providing as much safety as a combat fighter pilot could reasonably expect from his mount.

King of the Pacific; yeah, that’s the Hellcat. —Budd Davisson

*[Editor’s note: besides having logged more than 6,000 hours in nearly 300 types of planes, including many WW II fighters, Budd Davisson is the editor-in-chief of our sister publication, Flight Journal.]*

shrink tubing. I used the provided quick connectors to attach the pushrods to the servo arms and added thread-lock to secure the retaining nuts to the connectors. Using Z-bends in the pushrod wires instead of these connectors would provide a simpler, more secure linkage.

The cutouts for the pushrod exits are molded into the fuselage. Carefully open these areas using a cutoff wheel in a Moto-Tool (if you use a hobby knife, you could chip the paint). The throttle arm’s location on my O.S. .91 FX made it necessary for me to reverse the positions of the throttle and rudder servos; I also had to cut the rudder’s pushrod exit on the opposite side of the fuselage.

I glued pieces of 1/8-inch plywood inside the fuselage to reinforce the canopy mounting locations and attached the canopy with four screws. For added realism, I installed a Giantscaleplanes.com no. 5 pilot figure in the cockpit. To make him the proper height, I ground approximately 1/2 inch off the base of the figure.

### TAIL FEATHERS

Before you attach the tailwheel, drill a hole through the bottom of the fuselage just aft of the vertical fin to accommodate the brass bushing that supports the tail-gear’s wire. After you pass the wire through the bushing, create a 90-degree bend at the top of the wire and drill a hole in the rudder’s leading edge to accept the wire.

The stabilizer is supported by an aluminum-tube spar that runs through the fuselage. Outer fiberglass tubes have been factory installed in the stabilizer. Use a rotary tool to cut out the molded “holes” in the fuselage sides to accept the spar. For a more secure glue joint, sand the paint off the fuselage where it mates with the root of the stabilizer before you apply the epoxy. Masking tape applied to the fuselage around this joint will help prevent excess adhesive from oozing on the surface.

At this point, the rudder and elevators can be attached. It is much easier to install the control horns before you permanently attach these surfaces. I replaced the included control horns with Du-Bro adjustable control horns, which I find much easier to install and adjust. The hinges included with the kit are for position only and must be replaced as well; I used Du-Bro pinned hinges.

### WING HALVES

The wing halves are fully sheeted with balsa; handle them carefully to avoid damaging them. The holes for the servos, landing gear mounts and wheel wells have been cut out at the factory; just remove the covering from these areas with a sharp hobby knife. Save these scraps of covering for future repairs.

Each aileron’s servo is screwed into the plywood plates that are beneath the

**FLIGHT PERFORMANCE**

I set the control throws to the maximum prescribed by the manual (aileron and elevator +/- 20mm, rudder +/- 30mm, flaps -35mm). The Hellcat was easy to control on the ground, but it tended to nose over in rough grass. Moving the plane to a paved runway quickly solved this problem.

**TAKEOFF AND LANDING**

Advance the throttle slowly, and the Hellcat tracks very smoothly. A small amount of right rudder is needed to maintain its heading. I made all takeoffs with the flaps up and engine at 1/2 to 3/4 power. This is a solid flying aircraft!

Landings are as effortless as takeoffs. Just line the plane up, lower the gear and flaps, and reduce power. The Hellcat settles nicely, slowing down to a very comfortable landing speed. With careful throttle management, you can have very precise and controlled touchdowns. The Century Jet undercarriage easily handled all landing loads.

**LOW-SPEED FLIGHT**

Simply put, the Hellcat handles like a pussycat. Its slow-speed performance is very much like that of a lightly loaded sport plane. With flaps and gear down, it cruises comfortably around the sky with the engine at less than 1/2 throttle. I am very impressed with this model's low-speed performance and haven't noticed any bad habits.

**HIGH-SPEED FLIGHT**

With the gear up and flaps up, this airplane can cover a lot of ground quickly. At full throttle, it is very smooth and responsive, without any sign of control-surface flutter. Low, high-speed passes are exciting and true to scale.

**AEROBATICS**

The Hellcat is a very capable airplane. With the O.S. .91FX up front, it has ample power for any scale maneuver; loops, barrel rolls, Cuban-8s and stall turns are effortless. Four-point rolls are fantastic, and inverted flight is very solid; it requires only a small amount of down-elevator.

At its specified settings, the aileron response was nearly perfect, however, the rudder authority was somewhat lacking. The elevator became more sensitive when the landing gear was retracted. This is obviously because the center of gravity shifted aft.

wing's surface. Trim the supplied plastic covers to size before you use them to cover the servos. The paint is easily chipped off of the cover's edges when you trim them; Giantscaleplanes.com will soon offer paint to touch up these areas.

The flaps are actuated by a servo mounted in the center of the wing. Two pushrod wires are soldered together and then connected to



The wing is joined using a tube spar, and an aluminum pin is used to align the two panels. Flaps are driven by a single servo that is connected by a split linkage to the two torque rods.

torque rods that run through the trailing edge and key into the flaps. This method is effective, but I found it impossible to remove all of the play from the torque rods.

**LANDING GEAR**

Installing the fixed landing gear is very simple. Epoxy the supplied, grooved hardwood blocks into the wing and slide the gear into place; retain it with smaller blocks. Instructions and bellcranks for mechanical retracts are included with the kit, and gear doors and plastic wheel wells are supplied to dress up the installation. I decided to install Century Jet Model retracts, but their size and shape prevented me from using the accessory parts (see "Retract installation").

Install the servos and undercarriage before you join the wing panels. Then join the wing halves, which are aligned with an aluminum

spar tube and a small aluminum pin. Use slow-curing epoxy to ensure this joint's integrity.

**FINAL ASSEMBLY**

Attaching the wing to the fuselage is straightforward. Epoxy two aluminum pins into the wing's leading edge; drill two holes into a former in the fuselage to accept these pins. After checking the alignment, drill the holes through the wing's trailing edge into the hold-down blocks in the fuselage. I replaced the included steel hold-down bolts and blind nuts with 10-26 nylon bolts because nylon



Aileron servos are concealed by plastic covers. Each aileron is driven by a separate servo.

bolts are less likely to be vibrated loose.

With the wing bolted to the fuselage, glue the fiberglass belly pan into place. This was the only component that didn't fit perfectly in position. I contacted Giantscaleplanes.com and was promptly sent a new belly pan, but the replacement fit the same. With a little bending and some minor modification, I was able to achieve an acceptable installation.

If you install retractable gear on the Hellcat, balance the plane with the gear retracted. Using a Harry Higley Big Hub and mounting a 1400mAh JR battery pack in front of the firewall, I balanced the model at the farthest aft suggested location. When the gear is extended, the balance point shifts much closer to forward center of gravity (CG) range.

**CONCLUSION**

The Giantscaleplanes.com Hellcat is an

excellent subject, and it is without question the finest ARF that I have ever assembled. Its simple construction, scale details and overall appearance is certain to appeal to those modelers who don't want to invest countless hours in building. This is a rewarding project that's guaranteed to attract much attention from your fellow club members. Now if only I could talk my club into building an aircraft carrier at the field ...



The fuselage interior is spacious; it has ample room for the radio gear, air cylinder and retract valve.

**APC Props; distributed by Landing Products (530) 661-0399; apcprop.com.**

**Century Jet Models (502) 266-9234; centuryjet.com.**

**Davis Model Products (203) 877-1670.**

**Du-Bro Products (800) 848-9411; dubro.com.**

**Futaba Corp. of America; distributed by Great Planes Model Distributors Co.; futaba-rc.com.**

**Great Planes Model Distributors Co. (800) 637-7660; greatplanes.com.**

**Giantscaleplanes.com (610) 282-4811; giantscaleplanes.com.**

**Harry Higley & Sons Inc. P.O. Box 532, Glenwood, IL 60425; http://members.aol.com/harryhig/MainMenu.htm.**

**JR; distributed by Horizon Hobby Inc. (800) 338-4639; horizonhobby.com.**

**O.S.; distributed by Great Planes Model Distributors Co.; osengines.com.**

**PowerMaster Hobby Products Inc. (512) 285-9595; powermasterfuels.com.**