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# *1938 TO 1940 — THE GRUMMAN XF4F AND XF5F*

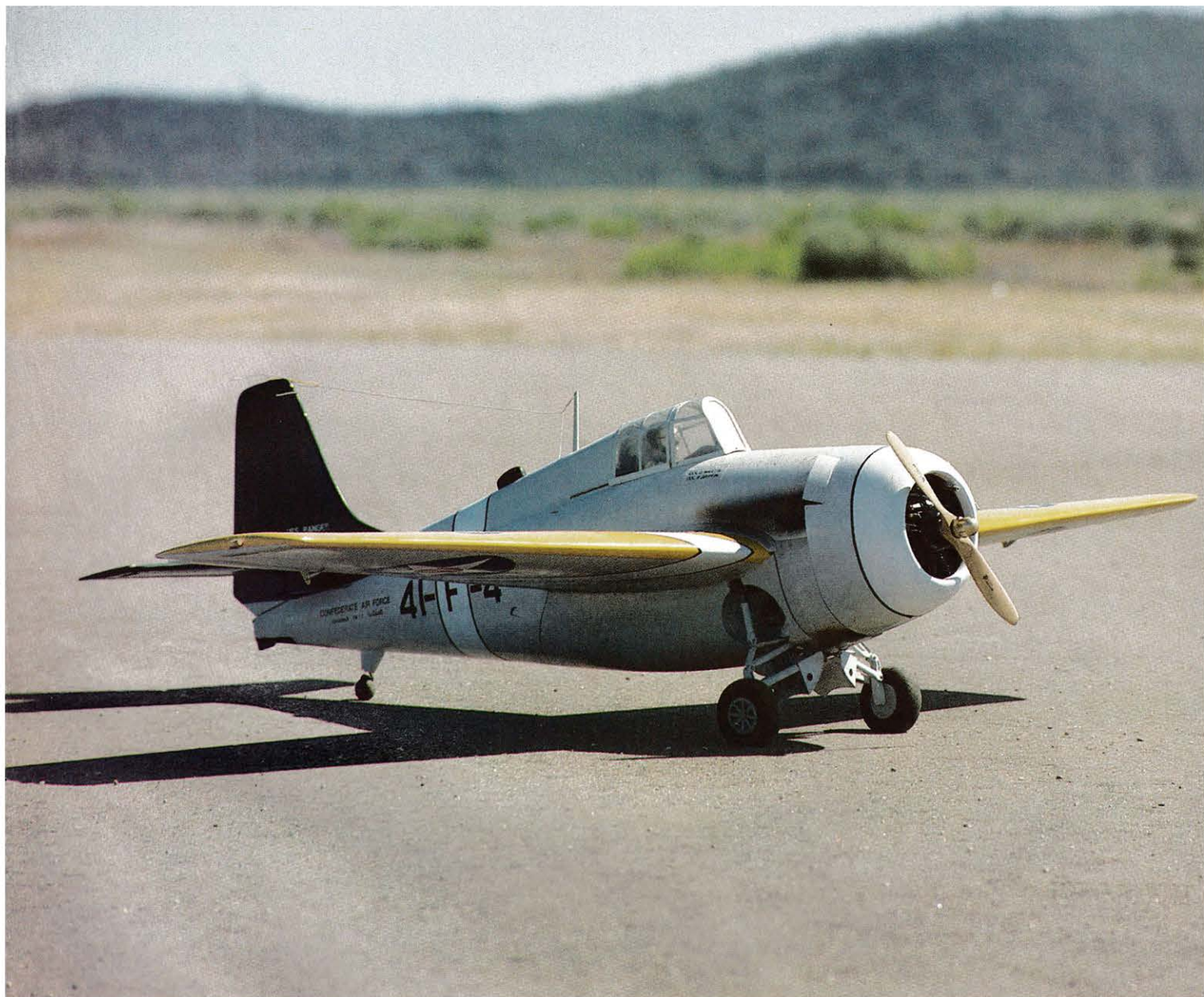
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**WHEN GRUMMAN WENT FROM BIPLANES  
TO MONOPLANES—AND TO TWINS FROM  
SINGLES, ALL DID NOT GO WELL.**

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By Norm Goyer, Bob Holman, Eldon Wilson  
and Bob Morrissey





In 1936, the U.S. Navy put out the word that they were interested in acquiring a new series of monoplane fighters to equip their two new, new aircraft carriers. In fact, the XF4F-1 was to be a *biplane*, but because the Navy liked the *monoplane* fighter design, the XF2-2, as submitted by Brewster, they ordered fifty-four of the F2As. This order almost terminated the Grumman factory's fighter production right there. Brewster's design used the single-row nine-cylinder Wright R-1820 Cyclone engine, and the new design by Grumman had the double-row, *fourteen-cylinder* Pratt & Whitney R-1830 twin *Wasp* powerplant.

The new Grumman XF4F-2 retained the *barrel-shaped fuselage* of

the biplane fighter, the F3F, which had been in the Navy's inventory for many years, and also kept the *landing gear*, but the new fighter was all-metal, except for its fabric-covered control surfaces. The first XF-4 did not have folding wings, and, during the fly-off tests of the new model, they were seriously threatened by crankshaft failures. This kept the Wildcat on the ground for long periods of repair time, while testing on the competitor Brewster Buffalo, and Seversky's NF-1 (a Navy version of the Army's successful P-35 pursuit fighter) advanced. And, during one test flight on February 14, 1938, while flying at 10,000 feet, a fire occurred in the aft fuselage. The aircraft landed safely, and

damage was light, with the plane back in the testing within a few days. On April 11, misfortune struck the Cat once more . . . while on landing during a simulated deck approach, the engine quit, and the XF4-2 made a forced landing which severely damaged the landing gear, cowling, prop, right wing and tail. The bent bird was shipped back to Bethpage, Long Island factory, repairs were rapidly made to the prototype, and it was flying again in less than two weeks.

Because the Seversky lacked sufficient speed, being able to attain only 250 mph (much short of the requirements of the Navy) that air-

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# GRUMMAN

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craft was eliminated from the competition for fighter contracts.

Meanwhile, the Brewster suffered from slow speed as well, but extensive wind-tunnel tests, in the new full-size wind tunnel at Langley Field, Virginia, indicated that, by simple changes in the fairings around the fuselage guns and landing gear fairings, about 20 mph could be added. So, these changes by Brewster, and the elimination of Severson, plus the troubles suffered by Grumman, prompted the Navy to order fifty-four of the Brewster Buffalo. This proved to be a big mistake because, as they were severely out-classed by other fighters, they were extremely unpopular.

As the Navy *had* done business with Grumman before, they *knew* that that company could produce a good airplane, and that they were a dependable, well-financed factory with good production capabilities, so, in October of 1938, they awarded Grumman a development contract for a more advanced version of their basic design under the designation XF4-3. Encouraged, Grumman scrapped most of the other prototypes except the fuselage and undercarriage, and built a practically all-new airplane. First, they removed the powerplant and installed a Twin-Wasp engine with a two-stage supercharger, driving a Curtiss electric prop. This combination offered 1200 horsepower for takeoff; 1050 hp at 11,000 feet, and 1000 hp at 12,000 feet. This new power combination developed a few cooling problems at first, but these were quickly resolved. And (as is often done with model aircraft), in order to increase the stability, Grumman increased the tail areas, surfaces were balanced, dihedral angle was increased, and the ailerons decreased in area. Also, parts of the fuselage around the engine were cut out in order to improve cooling.

After the Navy was convinced that Grumman had finally got their act together, they ordered fifty-four F4F-3 fighters, matching the order given to Brewster. Even though the final speed of the Wildcat was only 330 mph (not the 350 mph originally guaranteed by Grumman), the Navy was satisfied that they finally had a modern, well-designed, well-built monoplane fighter.

In the meantime, the *French* gov-



ernment ordered a similar Wildcat from Grumman, but they specified a Wright R-1820 engine with a two-stage supercharger. The usual changes to instruments and controls were denoted, and included six 7.5 machine guns. When Germany opened their campaign to dominate France on May 10, 1940, the day before the first Grumman was destined for delivery to France, the contract was quickly switched to England, with all necessary changes in guns (four 0.5-inch wing guns), and the throttle modified to operate in conventional British fashion, the first aircraft being delivered on July 27, 1940, with the English designation "Martlet."

Back in the States, the F4F-3 was still suffering from supercharger problems in the twin Wasp, so the engine was switched to a Wright with a single-stage supercharger, similar to the British version. Development of the *Wildcat* by Grumman continued until August of 1942, when production was turned over to General Motors so that Grumman could concentrate work on the F6F *Hellcat* (which was later destined to dominate air warfare in the Pacific).

Excluding prototypes, 7,898 Wildcats were produced (including the 5,927 manufactured by General Motors), and this ungainly-looking fighter was credited with the destruction of 905 enemy aircraft in the fighting between 1941 and 1943, with losses of only 178 Wildcats; a ratio of 6.9 to 1; not too bad for a relatively obsolete design which was usually completely out-classed and out-powered by its enemies. The Wildcat participated in all of the major battles of the Pacific War, including Wake, Midway, Guadalcanal, Coral Sea and The Solomons. This pugnacious little fighter established an enviable operational record, flying from shore bases and carriers, large and small

This F-4 belongs to Eldon Wilson, of San Angelo, Texas. Mr. Wilson has been flying early naval fighters for many years. He scratchbuilds everything himself, including the complex gear systems. Eldon also FLIES his fighters extremely well.

alike, and making a significant contribution to Allied victory. It is claimed that no other fighter made a greater effort in World War Two.

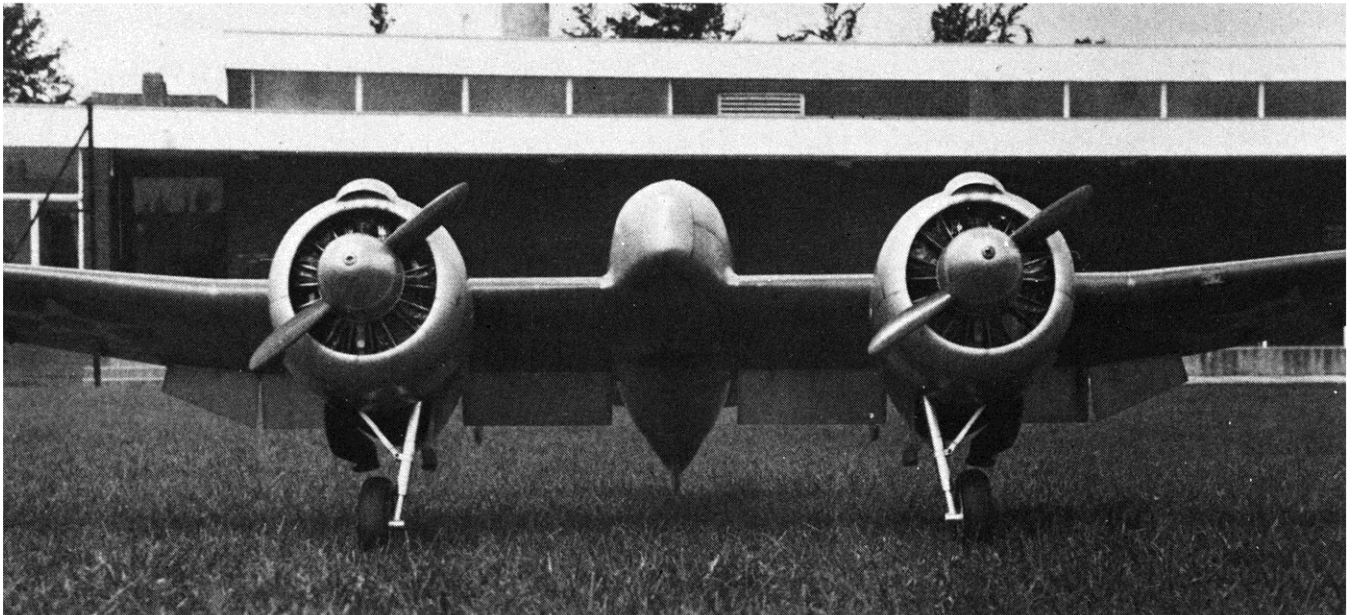
#### Reporter's Notes:

"Most of the Wildcats seen at today's Warbird Airshows are the FM-2 type, manufactured by General Motors. Anyone who has ever flown a Wildcat remembers the hand-crank, chain-driven landing gear, and the delightful way in which the barrel-shaped fighter would do its graceful rolls (because of its mid-wing configuration design).

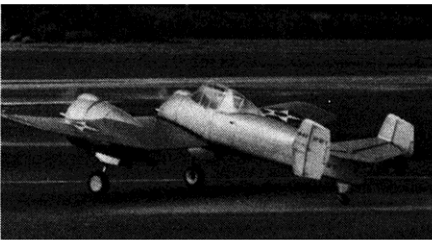
As a modeling subject, the Wildcat never achieved a great popularity, probably because no commercial model of its unusual landing gear configuration has ever been attempted."

While Grumman was having its share of troubles with the little Wildcat back in 1938, the Navy added to their woes by inviting bids for a twin-engine Navy shipboard single-place fighter.

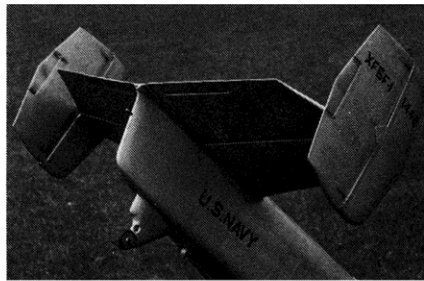
Utilizing some of the technology gained in the development of the Wildcat, Grumman designed a stubby, twin-radial-powered model, with a fuselage which stopped at the leading edge of the wing. And the tail had dihedral, and twin rudders. Unfortunately, Grumman used the same engine and cowling combination of the Wildcat, so the new design, called the "Skyrocket," inherited the same cooling and supercharger problems. This Navy model was desig-



Front view of the Coulson "Skyrocket," showing the very complex, multiple-flap arrangement, and the oddly-canted gear legs.



Short-nose model, as featured on the plans, about to lift off. This model has always appealed to hobbyists, but the full-scale aircraft was never accepted by the military services for many reasons.



Tail detail shows stabilizer with dihedral and twin rudders. Tail hook and tail wheel are also detailed.

nated the XF5-1, but as it was being tested, pilots on carrier approaches found that their cockpit position at the trailing edge of the large wing, with the two large radial cowlings on each side, made *seeing* the carrier beneath them on a standard approach almost impossible. Landing on a carrier is difficult enough, but landing on one you can't see underneath you is almost impossible. The Navy's XF5-1 made its test flight, prophetically, on April Fool's Day, 1940, and they were never quite satisfied with it.

The Army had also been interested in a twin-engine, single-place fighter from Grumman, having received delivery of many of Lockheed's P-38 Lightnings. So the Army's version was designated the XP-50, but the test model crashed soon after its initial flight, and the design was scrapped.

At the end of World War Two, the very successful successor to the Skyrocket, the F7F Tigercat, was taken into the Navy inventory. Used extensively in Korea, it also served for many years in fighting forest fires. It still retained the two massive radial engines, but sensibly, the fuselage was moved way forward for better visibility, and the twin tails were replaced with a massive vertical fin.

I believe that the entire free world owes those Grumman engineers of 1938 to 1940 a great debt of gratitude for having had the perseverance and tenacity to keep going back to their drawing boards until they got it right. Had they given up, we might never have had not only the Wildcats, but also the Hellcats, the Tigercats, the Bearcats; the Panthers of Korea, and the Tomcats of the '80s.

Modeling-wise, the Hellcat makes

a great-flying aircraft, as do the Tigercat and the Skyrocket. The Bearcat, with its short-coupled fuselage, is slightly harder to fly, but, with enough power, it makes a great project for an alert model pilot.

We were lucky to obtain permission from Fred Coulson, World Champion, International Scale of Bristol, England, to run the plans for his "Skyrocket" model, through Bob Holman Plans, P.O. Box 741, San Bernardino, CA 92402. Cost of the plans is \$30.00 plus \$2.00 shipping. If you wish the cowl and canopy, they're \$25.00; with plans coming UPS, rolled. ●