

F6F Hellcat

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U.S. Navy Grumman F6F-3 Hellcat

Type [Fighter aircraft](#)

Manufacturer [Grumman](#)

Maiden flight [26 June 1942](#)

Introduced [1943](#)

Retired [1954](#), USN

Primary users [United States Navy](#)
[United States Marine Corps](#)
[Fleet Air Arm](#)
[French Navy](#)

Produced 1942-1945

Number built 12,275



Grumman F6F-3 Hellcats on [1 January 1943](#)



F6F-5 ready in catapult on [USS Randolph](#)



Grumman F6F-3 Hellcat on the flight deck of [USS Yorktown \(CV-10\)](#) prior to take off, having its wings extended



Grumman F6F-3 Hellcats in tricolor scheme on the flight deck

The **Grumman F6F Hellcat** was a [fighter plane](#) descended from the earlier [F4F Wildcat](#), but was a completely new design sharing only a familial resemblance to the Wildcat. Some tagged it as "Wildcat's big brother" ^[1]. The Hellcat and the Vought [F4U Corsair](#) were the primary [United States Navy carrier](#) fighters in the second half of [World War II](#).

The Hellcat proved to be the most successful aircraft in naval history, destroying 5,163 aircraft in service with the US Navy and US Marine Corps, plus 52 with the [Royal Navy's Fleet Air Arm](#) during World War II. Postwar, the Hellcat aircraft was rapidly phased out of frontline service, finally retiring in 1954 as a night-fighter in composite squadrons.

Design and development

Grumman was working on a successor to the F4F Wildcat well before the Japanese attacked Pearl Harbor. While the F4F was a capable fighter, early air battles revealed the Japanese [A6M Zero](#) was more maneuverable and possessed a better rate of climb than the F4F. The F4F did have some advantages over the Zero. Wildcats were able to absorb a tremendous amount of damage compared to the Zero, and had better armament. The F4F was also much faster in a dive than the Zero, an advantage Wildcat pilots used frequently to elude attacking Zeros. These advantages carried over into the F6F and, combined with other improvements, created a fighter that outclassed the Zero almost completely. The contract for the prototype **XF6F-1** was signed on [30 June 1941](#). The F6F was originally to be given the [Wright R-2600 Cyclone](#) engine of 1,700 hp (1,268 kW), but based on combat experience of [F4F Wildcat](#) and Zero encounters, Grumman decided to further improve their new fighter to overcome the [Mitsubishi Zero's](#) dominance in the Pacific theater. ^[1] Grumman installed the [Pratt & Whitney R-2800 Double Wasp](#) 2,000 hp (1,500 kW) estimating a 25% increase in performance would result. ^[1] The first, Cyclone-equipped prototype (02981) flew on [26 June 1942](#) while the first Double Wasp-equipped aircraft, the **XF6F-3** (02982) had its first flight on [30 July 1942](#).

Proposed at the same time as the first Hellcat prototypes, the **XF6F-2** incorporated a turbo-supercharger but performance gains were only slight and until fleet demands for improvements in speed, this variant, along with the two-speed supercharger-equipped **XF6F-3**, languished. However, later **F6F-4** and **F6F-5** variants did benefit from these initial development programs.

Like the Wildcat, the Hellcat was designed for ease of manufacture and ability to withstand significant damage. A total of 212 lb (96 kg) of cockpit armor was fitted to aid pilot survival, as well as a bullet-resistant windshield and armor around the engine oil tank and oil cooler. ^[2] [Self-sealing fuel tanks](#) further reduced susceptibility to fire and often allowed damaged aircraft to return home. The US Navy's all-time leading ace, Captain [David McCampbell](#) USN (retired) scored all his victories in the Hellcat. He once described the F6F as "...an outstanding fighter plane. It performed well, was easy to

fly and was a stable gun platform. But what I really remember most was that it was rugged and easy to maintain." ^[3]

The first production aircraft off the line, designated F6F-3s, flew on [3 October](#) 1942 with the type reaching operational readiness with VF-9 on [USS Essex](#) in February 1943. ^[2]

Two night fighter subvariants of the F6F-3 were also developed. The **F6F-3E**, converted from standard -3 frames, featured the AN/APS-4 radar in a fairing in the starboard wing. The later **F6F-3N**, first seen in July of 1943, was fitted with the AN/APS-6 radar in a similar fairing. By November of 1943, Hellcat night fighters had seen their first action. ^[4] Fitting AN/APS-6 radar fairings to F6F-5s resulted in the night fighter **F6F-5N**, and a small number of standard F6F-5s were also fitted with camera equipment for reconnaissance duties as the **F6F-5P**. ^[5]

Instead of the Wildcat's narrow-track [undercarriage](#) retracting into the fuselage requiring awkward hand-cranking by the pilot, the Hellcat had hydraulically-actuated undercarriage struts set wider and retracting backward, twisting through 90° into the wings ^[6]. The wing was low-mounted instead of mid-mounted and folded the same way as the later versions of the Wildcat, allowing the Hellcat to take on a compact, tucked-in appearance on a flight deck. ^[7]

Standard armament on the F6F consisted of six .50 caliber (12.7 mm) Browning [machine guns](#) with 400 rounds each; later aircraft gained three hardpoints to carry a total bombload in excess of 2,000 lbs. (900 kg). The center hardpoint also had the ability to carry a single 150 U.S. gallon (568 L) disposable [drop tank](#). Six 5 in. (127 mm) HVARs (High Velocity Aircraft Rocket) could be carried; three under each wing. ^[8]

The next and most common variant, the F6F-5, featured improvements such as all-metal control surfaces, replacement of rear windows with armor, improved visibility through the windshield, and numerous other minor advances ^[6]. Another improvement in the F6F-5 was the availability of more potent armament than the standard six .50 caliber (12.7 mm) machine guns. Trials with cannon-armed Hellcats were not followed up by a production version, although the armament mix of a pair of Hispano 20 mm (0.79 in.) cannon carrying a minimum effective load of 220 rounds each, along with two pairs of .50 caliber (12.7 mm) machine guns; each armed with 400 rounds was later used on many F6F-5N night fighters. ^[9] All production F6F-5s had the ability to be fitted with the different armament configurations, but only F6F-5N night-fighters, equipped with radar, ever used the latter gun fit ^[9].

Two F6F-5s were fitted with the 18-cylinder 2,100 hp (1,567 kW) Pratt and Whitney R-2800-18W two-stage blower radial engine which was also used by the F4U-4 Corsair. The new Hellcat variant was fitted with a four-bladed propeller and was called the XF6F-6. The aircraft proved to be the best performer in the series with a top speed of 417 mph ^[6]. Plans for mass production of this variant were cancelled with the advent of VJ day. ^[10]

The last Hellcat rolled out in November 1945, the total production figure being 12,275, of which 11,000 had been built in just two years. ^[11] This impressive production rate was credited to the sound original design, which required little modification once production was underway.

Operational history



Grumman F6F-3 Hellcat in late 1942 non-specular blue-grey over light-grey scheme



[USS Yorktown \(CV-10\)](#) during the Marcus Island raid on 31 August 1943: CAG-5 Lt. Cmdr. "[Jimmy Flatley](#)" in his F6F-3 Hellcat before takeoff. Aviation Boatswain Mate stands ready to remove chock from wheels



Grumman F6F-3 Hellcats on the flight deck with wings folded, Grumman Avenger on landing approach

The Hellcat first saw action against the Japanese on [1 September 1943](#) when fighters off the USS *Independence* (CVL-22) shot down a snooping seaplane.^{[[citation needed](#)]} Soon after, on [23 November](#), Hellcats engaged Japanese aircraft over [Tarawa](#), shooting down a claimed 30 [Mitsubishi Zeros](#) for the loss of one F6F.^{[[citation needed](#)]} Over [Rabaul, New Britain](#), on [11 November 1943](#), Hellcats were engaged in day-long fights with many Japanese aircraft including [A6M Zeros](#), claiming more than 100 victories while losing few F6Fs.^{[[citation needed](#)]} The "[Thach Weave](#)" had developed into a formation tactic by that time. Each time an enemy fighter made a run at a section of US fighters, the pursued Hellcats would break towards the opposing formation who would cross over and force the Japanese to break off or expose themselves to the Hellcat's weapons.^{[[citation needed](#)]} This was the beginning of "wingman" tactics which are still used to this day, allowing less maneuverable US aircraft such as the Hellcat to deal with much more nimble Japanese opponents.^{[[citation needed](#)]}

Hellcats were involved in practically all engagements with Japanese air power from that point onward. Navy and Marine F6Fs flew 66,530 combat sorties (45% of all fighter sorties of the war, 62,386 sorties were flown from aircraft carriers^{[[12\]](#)]}) and destroyed 5,163 enemy aircraft (56% of all Naval/Marine air victories of the war) at a cost of 270 Hellcats (an overall kill-to-loss ratio of 19:1).^{[[13\]](#)} The aircraft performed well against the best Japanese opponents with a 13:1 kill ratio against

[Mitsubishi A6M](#), 9.5:1 against [Nakajima Ki-84](#), 28:0 against [Kawanishi N1K-J](#), and 3.7:1 against [Mitsubishi J2M](#) during the last year of the war.^[14] In the ground attack role, Hellcats dropped 6,503 tons of bombs.^[13]

The F6F became the prime ace-maker aircraft in the American inventory, with 306 Hellcat aces.^[15] It was the major U.S. Navy fighter type involved in the [Battle of the Philippine Sea](#), where so many Japanese aircraft were shot down that Navy aircrews nicknamed the battle [The Great Marianas Turkey Shoot](#). The F6F accounted for 75% of all aerial victories recorded by the U.S. Navy in the Pacific.^[citation needed] [Radar](#)-equipped Hellcat night fighter squadrons appeared in early 1944.

The British [Fleet Air Arm](#) received 1,263 F6Fs under the [Lend-Lease Act](#) and dubbed it [Gannet I](#). The name Hellcat was eventually retained in early 1943 for the sake of simplicity, with the F6F-3 being designated **Hellcat F I**, the F6F-5, the **Hellcat F II** and the F6F-5N, the **Hellcat NF II**. They saw action off [Norway](#), in the [Mediterranean](#), and in the [Far East](#). A number were fitted with photographic reconnaissance equipment similar to the F6F-5P, receiving the designation **Hellcat FR II**.^[16] FAA Hellcats, as with other [Lend-Lease](#) aircraft, were rapidly replaced by British aircraft after the end of the war, with only two of the twelve squadrons equipped with the Hellcat at VJ-Day still retained Hellcats by the end of 1945^[17]. These two squadrons were disbanded in 1946^[17]. In British service, the Hellcats proved to be a match even for the main Luftwaffe fighters, the Bf 109 and Fw 190.

Postwar, the Hellcat was succeeded by the Grumman [F8F Bearcat](#) which eclipsed the F6F in performance but was developed too late to see combat in World War II. The Hellcat soldiered on in a number of second line USN duties including training. The French [Aéronavale](#) was equipped with F6F-5 Hellcats and used them in [Indochina](#). The [Uruguay](#) Navy also used them until the early 1960s^[18].

Operators

-  [Argentina: Argentine Navy](#)
-  [France: Aviation Navale](#)
-  [Paraguay](#)
-  [United Kingdom: Fleet Air Arm](#)
-  [United States: United States Navy, United States Marine Corps](#)
-  [Uruguay: Uruguayan Navy](#)

Specifications (F6F-5 Hellcat)



Plane captains ready VF-82 Grumman F6F-5 for launch from [USS Bennington \(CV-20\)](#) off [Okinawa](#) in May 1945. Late-war production F6F-5 show the overall Glossy Sea Blue



Postwar service: A bright orange F6F-3K target drone

Data from *Quest for Performance*^[19], *Jane's Fighting Aircraft of World War II*^[20], and *Standard Aircraft Characteristics*^[21]

General characteristics

- **Crew:** 1
- **Length:** 33 ft 7 in (10.24 m)
- **Wingspan:** 42 ft 10 in (13.06 m)
- **Height:** 13 ft 1 in (3.99 m)
- **Wing area:** 334 ft² (31 m²)
- **Airfoil:** [NACA 23015.6 mod](#) root; NACA 23009 tip
- **Empty weight:** 9,238 lb (4,190 kg)
- **Loaded weight:** 12,598 lb (5,714 kg)
- **Max takeoff weight:** 15,415 lb (6,990 kg)
- **Powerplant:** 1x [Pratt & Whitney R-2800-10W](#) "Double Wasp" two-row [radial engine](#) with a two-speed two-stage [supercharger](#), 2,000 hp (1,500 kW)
- **Propellers:** 3-blade Hamilton Standard
 - **Propeller diameter:** 13 ft 1 in (4.0 m)
- **Fuel capacity:** 250 US gal (946 L) internal; up to 3x 150 US gal (568 L) external drop tanks
- **Zero-lift drag coefficient:** 0.0211
- **Drag area:** 7.05 ft² (0.65 m²)
- **Aspect ratio:** 5.5

Performance

- **Maximum speed:** 330 knots (380 mph, 610 km/h)
- **Stall speed:** 73 knots (84 mph, 135 km/h)
- **Combat radius:** 820 nm (945 mi, 1,520 km)
- **Ferry range:** 1,330 nm (1,530 mi, 2,460 km)
- **Service ceiling:** 37,300 ft (11,370 m)
- **Rate of climb:** 3,500 ft/min (17.8 m/s)
- **Wing loading:** 37.7 lb/ft² (184 kg/m²)
- **Power/mass:** 0.16 hp/lb (260 W/kg)
- **Time-to-altitude:** 7.7 min to 20,000 ft (6,100 m)
- **Lift-to-drag ratio:** 12.2
- **Takeoff roll:** 799 ft (244 m)

Armament

- **Guns:**
 - 6x 0.50 in (12.7 mm) [M2 Browning machine guns](#), 400 rounds/gun, or
 - 2x 20 mm cannon, 225 rounds/gun

- 4x 0.50 in (12.7 mm) Browning machine guns 400 rounds/gun
- **Rockets:**
 - 6x 5 in (127 mm) HVARs *or*
 - 2x 11¾ in (298 mm) Tiny Tim unguided rockets
- **Bombs:** 4,000 lb (1,800 kg) of ordnance, including:
 - **Torpedoes:**
 - 1x 2,000 lb (910 kg) bomb *or*
 - 1x Mk.13-3 torpedo under the centerline
 - **Underwing bombs:**
 - 1x 1,000 lb (450 kg) *or*
 - 2x 250 lb (110 kg)
 - 6x 100 lb (45 kg)

Related development

- [F4F Wildcat](#)
- [F8F Bearcat](#)

Comparable aircraft

- [Mitsubishi A7M](#)
- [Vought F4U](#)

Designation sequence

- [F3F](#) - [F4F](#) - [XF5F](#) - **F6F** - [F7F](#) - [F8F](#) - [F9F](#)

Related lists

- [List of aircraft of the Fleet Air Arm](#)
- [List of fighter aircraft](#)
- [List of military aircraft of the United States](#)