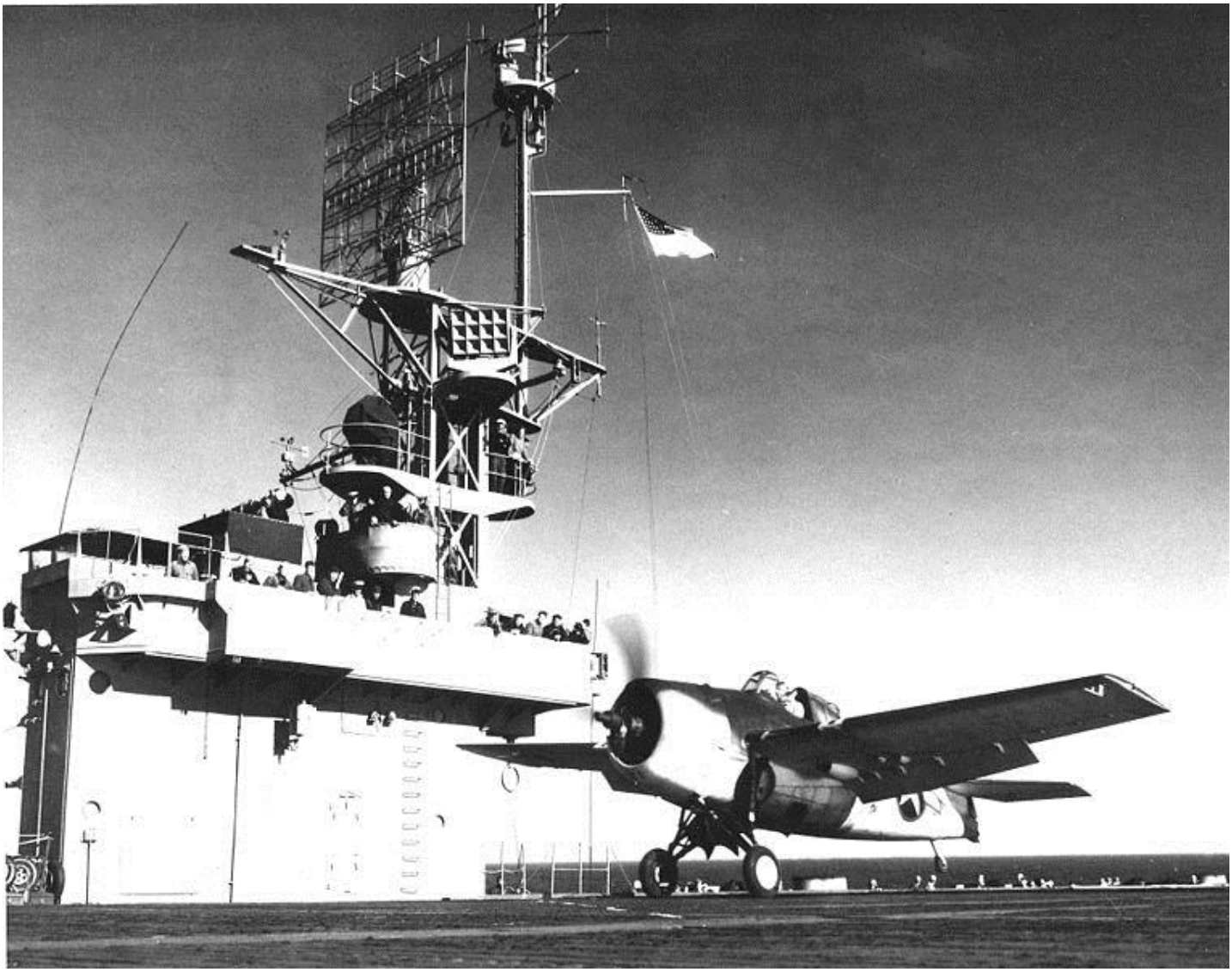
Grumman F4F Wildcat



Grumman F4F Wildcat (FM-1) de l'US Navy

Dès 1935 et à la demande de l'US Navy, la firme Grumman commença à plancher sur un successeur à son F3F, le G-16. Celui-ci dérivait de toute une famille de chasseurs embarqués et était lui-même biplan à l'origine. La Navy lui préféra dans un premier temps le Brewster F2A Buffalo, un monoplan, puis le G-16 fut tout de même commandé sous la désignation XF4F-1 au cas où le F2A se révèle médiocre. Il était flagrant que les biplans étaient dépassés, et le XF4F-1 ne dépassa pas le stade de la planche à dessin. Grumman décida d'en dériver une version monoplan : le G-18, désigné XF4F-2. Il en reprenait le fuselage, ainsi que le train d'atterrissage très particulier présent depuis le FF. La voie étroite de ce train d'atterrissage valait aux pilotes des sueurs froides au moment de l'appontage. Il vola pour la première fois le 2 septembre 1937 entre les mains de Bob Hall. Les évaluations officielles commencèrent en avril 1938. Le XF4F-2 se révéla un peu plus rapide, mais moins maniable que le F2A. Grumman ne se découragea pas et se lança dans l'étude du G-36, ou XF4F-3. L'aile et l'empennage furent entièrement redessinés, Grumman se décida pour une version à compresseur (double étage) du Pratt & Whitney R-1830 "Twin Wasp". Le prototype du XF4F-3 était le XF4F-2 modifié et agrandi, et vola pour la première fois sous cette forme le 12 février 1939. Il sera perdu par accident le 16 décembre 1940. Le nouvel appareil intéressa la France, qui en commanda 81 exemplaires sous la désignation G-36A. Ceux-ci étaient propulsés par un Wright R-1820 "Cyclone 9" et devaient équiper les futurs porte-avions Joffre et Painlevé. La France fut vaincue par l'Axe avant de pouvoir être livrée et les appareils furent reçus par la Grande-Bretagne, qui les utilisa dès 1940 sous la désignation Martlet I (merlette, du nom d'un oiseau représenté de profil en héraldique). La Fleet Air Arm reçut le Martlet comme avion d'intérim à partir du 27 juillet 1940, afin de remplacer le Fulmar et en attendant le Seafire. En définitive, près de 1200 Martlet serviront au sein de la Fleet Air Arm, de 1940 à 1945. Il fut le premier avion britannique de construction américaine à abattre un avion allemand, en l'occurrence un Ju 88 au-dessus de Scapa Flow le jour de Noël 1940.

En janvier 1944, le nom de Martlet fut abandonné en faveur du nom de Wildcat, utilisé par l'US Navy depuis le 1er octobre 1941. En mars 1945, les Wildcat anglais descendirent leurs dernières victimes de la guerre, 4 Bf 109.

Grumman F4F Wildcat (FM-2) de l'US Navy de profil

L'US Navy commanda 54 F4F-3 le 8 août 1939 et reçut ses premiers exemplaires en février 1940. Il fut le chasseur le plus performant de la flotte américaine et remplaça peu à peu le F2A Buffalo. Malgré tout, il fut surclassé par le Zero, et il fallut à la fois compter sur sa robustesse (blindage et réservoirs auto-obturants) et sur de nouvelles techniques de chasse (trouvées par John S. Thach) pour qu'il puisse continuer à tirer son épingle du jeu. La version F4F-4 apparut en 1941. Le 1er octobre 1941, l'US Navy décida de donner un surnom à ses matériels et le nom de Wildcat fut attribué au F4F. Entrée en service en 1942, elle resta en service jusqu'en 1943 et son remplacement par le F6F Hellcat. Il participa donc à la défense de l'île de Wake en décembre 1941, participa aux batailles de la mer de Corail et de Midway, ainsi qu'à la campagne de Guadalcanal en 1942 et 1943. Grumman cessa de produire le F4F dès 1943. Mais General Motors produisit des F4F-4 sous la désignation FM-1 (avec 4 mitrailleuses) et des F4F-8 sous la désignation FM-2. A partir de 1943, il fut relégué aux missions d'attaque au sol ou contre les sous-marins. Malgré tout, il continua à escorter les flottes et à descendre des appareils ennemis, chasseurs, bombardiers ou kamikazes. Ils effectuèrent une sortie désespérée lors de la bataille de Samar le 25 octobre 1944, où ils mitraillèrent la passerelle du Yamato. Il fut également déployé dans l'Atlantique, et fut utilisé par les porte-avions d'escorte américains. Il sera engagé contre les forces de Vichy lors de l'opération Torch et à Madagascar, puis contre l'Axe en Sicile et lors du débarquement en Provence. La Belgique, la France et la Grèce ne reçurent jamais leurs avions. Outre la Fleet Air Arm, l'US Navy et l'US Marine Corps, le Canada utilisa 14 Martlet à partir de février 1945. 7898 Wildcat seront construits au total, dont 5927 par General Motors jusqu'en août 1945. Il effectua 15553 missions de guerre, dont 14027 à partir de porte-avions. Il engrangera 1327 victoires pour 191 pertes. Restant un pur chasseur d'escorte, il ne larguera que 154 tonnes de bombes. En définitive, il fut peut-être le seul avion américain à avoir servi pendant tout le conflit. Au moins 18 Wildcat sont toujours en état de vol aujourd'hui, dont un en Grande-Bretagne. Au moins 15 autres sont exposés (surtout aux États-Unis) et 3 autres sont en cours de restauration.

Source : https://aviationsmilitaires.net/v3/kb/aircraft/show/1831/grumman-f4f-wildcat

Version anglaise Wikipédia

The **Grumman F4F Wildcat** is an American carrier-based fighter aircraft that entered service in 1940 with the United States Navy, and the British Royal Navy where it was initially known as the **Martlet**.[2] First used by the British in the North Atlantic, the Wildcat was the only effective fighter available to the United States Navy and Marine Corps in the Pacific Theater during the early part of the Second World War. The disappointing Brewster Buffalo was withdrawn in favor of the Wildcat and replaced as aircraft became available. With a top speed of 318 mph (512 km/h), the Wildcat was outperformed by the faster (331 mph (533 km/h)), more maneuverable, and longer-ranged Mitsubishi A6M Zero. US Navy pilots, including John "Jimmy" Thach, a pioneer of fighter tactics to deal with the A6M Zero, were greatly dissatisfied with the Wildcat's inferior performance against the Zero in the battles of the Coral Sea and Midway.[3][4][5] The Wildcat has a claimed air combat kill-to-loss ratio of 5.9:1 in 1942 and 6.9:1 for the entire war.[6] Lessons learned from the Wildcat were later applied to the faster F6F Hellcat. While the Wildcat had better range and maneuverability at low speed,[7] the Hellcat could rely on superior power and high speed performance[8] to outperform the Zero. Wildcat production continued throughout the remainder of the war, with Wildcats serving on escort carriers, where the larger and much heavier Hellcat could not be used.

Design and development

The XF4F-3 in 1939; it was written off in a fatal accident on 16 December 1940

Grumman fighter development began with the two-seat Grumman FF biplane. The FF was the first U.S. naval fighter with a retractable landing gear. The wheels retracted into the fuselage, leaving the tires visibly exposed, flush with the sides of the fuselage.

Two single-seat biplane designs followed, the F2F and F3F, which established the general fuselage outlines of what would become the F4F Wildcat. In 1935, while the F3F was still undergoing flight testing, Grumman started work on its next biplane fighter, the G-16. At the time, the U.S. Navy favored a monoplane design, the Brewster F2A-1, ordering production early in 1936. However, an order was also placed for Grumman's G-16 (given the navy designation XF4F-1) as a backup in case the Brewster monoplane proved to be unsatisfactory.[9][10] It was clear to Grumman that the XF4F-1 would be inferior to the Brewster monoplane, so Grumman abandoned the XF4F-1, designing instead a new monoplane fighter, the XF4F-2.[9][11] The XF4F-2 would retain the same, fuselage-mounted, hand-cranked main landing gear as the F3F, with its relatively narrow track. The unusual manually-retractable main landing gear design for all of Grumman's U.S. Navy fighters up to and through the F4F, as well as for the amphibious Grumman J2F utility biplane, was originally created in the 1920s by Leroy Grumman for Grover Loening.[12][N 1] Landing accidents caused by failure of the main gear to fully lock into place were distressingly common.[13]

An early F4F-3 with prop spinner and cowl guns

The overall performance of Grumman's new monoplane was felt to be inferior to that of the Brewster Buffalo. The XF4F-2 was marginally faster, but the Buffalo was more maneuverable. The Buffalo was judged superior and was chosen for production.[11] After losing out to Brewster, Grumman completely rebuilt the prototype as the XF4F-3 with new wings and tail and a supercharged version of the Pratt & Whitney R-1830 "Twin Wasp" radial engine.[11][14] Testing of the new XF4F-3 led to an order for F4F-3 production models, the first of which was completed in February 1940. France also ordered the type, powered by a Wright R-1820 "Cyclone 9" radial engine, but France fell to the Axis powers before they could be delivered and the aircraft went instead to the British Royal Navy, who christened the new fighter the Martlet. The U.S. Navy officially adopted the aircraft type on 1 October 1941 as the Wildcat. The Royal Navy's and U.S. Navy's F4F-3s, armed with four .50 in (12.7 mm) Browning machine guns, joined active units in 1940.[14] On 16 December 1940, the XF4F-3 prototype, BuNo *0383*, c/n 356, modified from XF4F-2, was lost under circumstances that suggested that the pilot may have been confused by the poor layout of fuel valves and flap controls and inadvertently turned the fuel valve to "off" immediately after takeoff rather than selecting flaps "up". This was the first fatality in the type.[15]

Operational history

A Fleet Air Arm Wildcat in 1944, showing "invasion stripes"

Even before the Wildcat had been purchased by the U.S. Navy, the French Navy and the Royal Navy Fleet Air Arm (FAA) had ordered the Wildcat, with their own configurations, via the Anglo-French Purchasing Board.

Royal Navy

The F4F, initially known in British service as the Martlet, was taken on by the FAA as an interim replacement for the Fairey Fulmar. The Fulmar was a two-seat fighter with good range but operated at a performance disadvantage against single-seater fighters. Navalised Supermarine Spitfires were not available because of the greater need of the Royal Air Force.[16][*page needed*] In the European theater, its first combat victory was on Christmas Day 1940, when a land-based Martlet destroyed a Junkers Ju 88 bomber over the Scapa Flow naval base.[17] This was the first combat victory by a US-built fighter in British service in World War II.[17] The type also pioneered combat operations from the smaller escort carriers.[18] Six Martlets went to sea aboard the converted former German merchant vessel HMS *Audacity* in September 1941 and shot down several Luftwaffe Fw 200 Condor bombers during highly effective convoy escort operations.[19][20] These were the first of many Wildcats to engage in aerial combat at sea, including Convoy HG 76 to Gibraltar, in December 1941. The British received 300 Eastern Aircraft FM-1s giving them the designation **Martlet V** in 1942–43 and 340 FM-2s, (having changed to using the same name as the US) as the **Wildcat VI**.[21] Nearly 1,200 Wildcats were flown by the FAA and by January 1944, the Martlet name was dropped and the type was identified as the Wildcat.[22][18][N 2] In March 1945, Wildcats shot down four Messerschmitt Bf 109s over Norway, the FAA's last Wildcat victories.[20] I would still assess the Wildcat as the outstanding naval fighter of the early years of World War II ... I can vouch as a matter of personal experience, this Grumman fighter was one of the finest shipboard aeroplanes ever created.

The last air raid of the war in Europe was carried out by Fleet Air Arm aircraft in Operation Judgement on May 5, 1945. Twenty eight Wildcat VI aircraft from 846, 853 and 882 Naval Air Squadron, flying from escort carriers, took part in an attack on a U-boat depot near Harstad, Norway. Two ships and a U-boat were sunk with the loss of one Wildcat and one Grumman Avenger torpedo-bomber.

US Navy and Marine Corps

Pacific

The Wildcat was generally outperformed by the Mitsubishi Zero, its major opponent in the early part of the Pacific Theater but held its own partly because, with relatively heavy armor and self-sealing fuel tanks, the Grumman airframe could survive far more damage than its lightweight, unarmored Japanese rival.[23] Many U.S. Navy fighter pilots were saved by the Wildcat's ZB homing device, which allowed them to find their carriers in poor visibility, provided they could get within the 30 mi (48 km) range of the homing beacon. (However, the Zed Baker was wildly inconsistent in practice, especially during the Battle of Midway, when an entire squadron of Wildcats crashed in the sea after failing to locate their carriers).[24][25] In the hands of an expert pilot with a tactical advantage, the Wildcat could prove a difficult opponent even against the formidable Zero.[26] After analyzing Fleet Air Tactical Unit Intelligence Bureau reports describing the new carrier fighter, USN Commander "Jimmy" Thach devised a defensive tactic that allowed Wildcat formations to act in a coordinated maneuver to counter a diving attack, called the "Thach Weave".[27] The most widely employed tactic during the Guadalcanal Campaign was high-altitude ambush, where hit-and-run maneuvers were executed using altitude advantage. This was possible due to an early warning system composed of Coastwatchers and radar.[28] On rare occasions, when Wildcats were unable to gain altitude in time, they would suffer many losses. On 2 October 1942, a Japanese air raid from Rabaul was not detected in time and the Cactus Air Force lost six Wildcats to only one Zero destroyed.[29] During the most intense initial phase of the Guadalcanal Campaign, between 1 August and 15 November, combat records indicate that US lost 115 Wildcats and Japanese lost 106 Zeros to all causes; the Japanese lost many more pilots compared to the US.[30] Thach was greatly dissatisfied and a vocal critic of the Wildcat's performance during the war (as were many US carrier pilots), stating in his Midway action report;[5] It is indeed surprising that any of our pilots returned alive. Any success our fighter pilots may have had against the Japanese Zero fighter is not due to the performance of the airplane we fly but is the result of the comparatively poor marksmanship of the Japanese, stupid mistakes made by a few of their pilots and superior marksmanship and team work of some of our pilots. The F4F airplane is pitifully inferior in climb, maneuverability and speed. Four U.S. Marine Corps Wildcats played a prominent role in the defense of Wake Island in December 1941. USN and USMC aircraft formed the fleet's primary air defense during the Battle of Coral Sea and the Battle of Midway and land-based Wildcats played a major role during the Guadalcanal Campaign of 1942–43.[11] It was not until 1943 that more advanced naval fighters capable of taking on the Zero on more even terms, the Grumman F6F Hellcat and Vought F4U Corsair, reached the South Pacific theater.

F4F-4s on Guadalcanal, 1942

The Japanese ace Saburō Sakai described the Wildcat's capacity to absorb damage:

> I had full confidence in my ability to destroy the Grumman and decided to finish off the enemy fighter with only my 7.7 mm machine guns. I turned the 20 mm cannon switch to the "off" position, and closed in. For some strange reason, even after I had poured about five or six hundred rounds of ammunition directly into the Grumman, the airplane did not fall, but kept on flying. I thought this very odd—it had never happened before—and closed the distance between the two airplanes until I could almost reach out and touch the Grumman. To my surprise, the Grumman's rudder and tail were torn to shreds, looking like an old torn piece of rag. With his plane in such condition, no wonder the pilot was unable to continue fighting! A Zero which had taken that many bullets would have been a ball of fire by now.

—*Saburo Sakai, Zero*[23]

Grumman's Wildcat production ceased in early 1943 to make way for the newer F6F Hellcat but General Motors continued producing Wildcats for U.S. Navy and Fleet Air Arm use. At first, GM produced the **FM-1** (identical to the F4F-4 but with four guns). Production later switched to the improved **FM-2** (based on Grumman's XF4F-8 prototype, informally known as the "Wilder Wildcat") optimized for small-carrier operations, with a more powerful engine and a taller tail to cope with the increased torque.[24] From 1943, Wildcats equipped with bomb racks were primarily assigned to escort carriers for use against submarines and attacking ground targets, though they would also continue to score kills against Japanese fighters, bombers and kamikaze aircraft. Larger fighters such as the Hellcat and the Corsair and dive bombers were needed aboard fleet carriers and the Wildcat's slower landing speed made it more suitable for shorter flight decks.[31] In the Battle off Samar on 25 October 1944, escort carriers of Task Unit 77.4.3 ("Taffy 3") and their escort of destroyers and destroyer escorts found themselves as the sole force standing between vulnerable troop transport and supply ships engaged in landings on the Philippine island of Leyte and a powerful Japanese surface fleet of battleships and cruisers. In desperation, lightly armed Avengers and FM-2 Wildcats from Taffys 1, 2 and 3 resorted to tactics such as strafing ships, including the bridge of the Japanese battleship *Yamato*, while the destroyers and destroyer escorts charged the enemy. Confused by the fierce resistance and having suffered significant damage, the Japanese fleet eventually withdrew from the battle.

Atlantic

U.S. Navy Wildcats participated in Operation Torch. USN escort carriers in the Atlantic used Wildcats until the end of the war. In October 1943 F4Fs participated in Operation Leader, an anti-shipping strike on Norway.

Totals

In all, 7,860 Wildcats were built.[23][N 3] During the course of the war, Navy and Marine F4Fs and FMs flew 15,553 combat sorties (14,027 of these from aircraft carriers[32]), destroying a claimed figure of 1,327 enemy aircraft at a cost of 178 aerial losses, 24 to ground/shipboard fire, and 49 to operational causes[33] (an overall claimed kill-to-loss ratio of 6.9:1).[34] True to their escort fighter role, Wildcats dropped only 154 tons of bombs during the war.[34]

Variants

U.S. Navy Wildcats

F4F-1/-2

The original Grumman **F4F-1** design was a biplane, which proved inferior to rival designs, necessitating a complete redesign as a monoplane named the **F4F-2**. This design was still not competitive with the Brewster F2A Buffalo which won initial U.S. Navy orders, but when the **F4F-3** development was fitted with a more powerful version of the engine, a Pratt & Whitney Twin Wasp R-1830-76, featuring a two-stage supercharger, it showed its true potential.[35]

F4F-3

U.S. Navy orders followed as did some (with Wright Cyclone engines) from France; these ended up with the Royal Navy's Fleet Air Arm after the fall of France and entered service on 8 September 1940. These aircraft, designated by Grumman as **G-36A**, had a different cowling from other earlier F4Fs and fixed wings, and were intended to be fitted with French armament and avionics following delivery. In British service initially, the aircraft were known as the **Martlet I**, but not all Martlets would be to exactly the same specifications as U.S. Navy aircraft. All Martlet Is featured the four .50 in (12.7 mm) M2 Browning machine guns of the F4F-3 with 450 rpg. The British directly ordered and received a version with the original Twin Wasp, but again with a modified cowling, under the manufacturer designation **G-36B**. These aircraft were given the designation **Martlet II** by the British. The first 10 G-36Bs were fitted with non-folding wings and were given the designation **Martlet III**. These were followed by 30 folding wing aircraft (F4F-3As) which were originally destined for the Hellenic Air Force, which were also designated Martlet IIIs.[20][36] On paper, the designation changed to **Martlet III(A)** when the second series of Martlet III was introduced. Poor design of the armament installation on early F4Fs caused these otherwise reliable machine guns to frequently jam, a problem common to wing-mounted weapons of many U.S. fighters early in the war.[37][N 4] An F4F-3 flown by Lieutenant Edward O'Hare shot down, within a few minutes, five Mitsubishi twin-engine bombers attacking *Lexington* off Bougainville on 20 February 1942. But contrasting with O'Hare's performance, his wingman was unable to participate because his guns would not function.[38][N 5]

F4F-3s of VF-5, 1941

A shortage of two-stage superchargers led to the development of the **F4F-3A**, which was basically the F4F-3 but with a 1,200 hp (890 kW) Pratt & Whitney R-1830-90 radial engine with a more primitive single-stage two-speed supercharger. The F4F-3A, which was capable of 312 mph (502 km/h) at 16,000 ft (4,900 m), was used side by side with the F4F-3, but its poorer performance made it unpopular with U.S. Navy fighter pilots. The F4F-3A would enter service as the **Martlet III(B)**.

At the time of Pearl Harbor, only *Enterprise* had a fully equipped Wildcat squadron, VF-6 with F4F-3As. *Enterprise* was then transferring a detachment of VMF-211, also equipped with F4F-3s, to Wake. *Saratoga* was in San Diego, working up for operations of the F4F-3s of VF-3. 11 F4F-3s of VMF-211 were at the Ewa Marine Air Corps Station on Oahu; nine of these were damaged or destroyed during the Japanese attack. The detachment of VMF-211 on Wake lost seven Wildcats to Japanese attacks on 8 December, but the remaining five put up a fierce defense, making the first bomber kill on 9 December. The destroyer *Kisaragi* was sunk by the Wildcats,[39] and the Japanese invasion force retreated. In May 1942, the F4F-3s of VF-2 and VF-42, aboard *Yorktown* and *Lexington*, participated in the Battle of the Coral Sea. *Lexington* and *Yorktown* fought against the fleet carriers *Zuikaku* and *Shōkaku* and the light carrier *Shōhō* in this battle, in an attempt to halt a Japanese invasion of Port Moresby on Papua. During these battles, it became clear that attacks without fighter escort amounted to suicide, but that the fighter component on the carriers was completely insufficient to provide both fighter cover for the carrier and an escort for an attack force. Most U.S. carriers carried fewer than 20 fighters.

F4F-3P

In June 1942, 17 F4F-3s and one F4F-3A (18 total) were converted into **F4F-3P** photoreconnaissance planes. The F4F-3Ps were for short-range tactical reconnaissance, as their reserve fuel tanks were removed and replaced with Fairchild F-56 cameras.[40] The F4F-3Ps retained their machine guns and were mainly flown by VMO-251 on air defense missions from Espiritu Santo in the South Pacific, arriving in July 1942.[41] In October 1942, long-ranged and unarmed F4F-7s began replacing the F4F-3Ps, but a detachment of three F4F-3P from VMO-155 operated from the *Bogue*-class escort carrier USS *Nassau* (CVE-16) during the amphibious invasion of Attu Island in May 1943.[42] Boston, MA, USA: Little, Brown and Co./Atlantic Monthly Press [41][43]

F4F-3S "Wildcatfish"

The F4F-3S "Wildcatfish", a floatplane version of the F4F-3. Edo Aircraft fitted one F4F-3 with twin floats.

This floatplane version of the F4F-3 was developed for use at forward island bases in the Pacific, before the construction of airfields. It was inspired by appearance of the A6M2-N "Rufe", a modification of the Mitsubishi A6M2 "Zeke". BuNo 4038 was modified to become the **F4F-3S "Wildcatfish"**. Twin floats, manufactured by Edo Aircraft Corporation, were fitted. To restore the stability, small auxiliary fins were added to the tailplane. Because this was still insufficient, a ventral fin was added later.[44] The F4F-3S was first flown 28 February 1943.[45] The weight and drag of the floats reduced the maximum speed to 241 mph (388 km/h). As the performance of the basic F4F-3 was already below that of the Zero, the F4F-3S was clearly of limited usefulness. In any case, the construction of the airfields at forward bases by the "Seabees" was surprisingly quick. Only one was converted.

F4F-4

One of the main features of the F4F-4 were the Sto-Wing-design folding wings, a Grumman patented design

A new version, the **F4F-4**, entered service in 1941 with six machine guns and the Grumman-patented Sto-Wing folding wing system,[46][47] which allowed more aircraft to be stored on an aircraft carrier, increasing the number of fighters that could be parked on a surface by more than a factor of 2. The F4F-4 was the definitive version that saw the most combat service in the early war years, including the Battle of Midway. Navy F4F-3s were replaced by F4F-4s in June 1942. During the Battle of Midway, only VMF-221 still used F4F-3s. VF-42 of the Yorktown was the last carrier group converted to the F4F-4, and that was done as it left Pearl Harbor on the way to the Battle of Midway as VF-3 flew in new F4F-4s with Commander Thach.[48] The F4F-4 version was less popular with American pilots because the same amount of ammunition was spread over two additional guns, decreasing firing time.[49] With the F4F-3's four .50 in (12.7 mm) guns and 450 rpg, pilots had 34 seconds of firing time; six guns decreased ammunition to 240 rpg, which could be expended in less than 20 seconds.

The increase to six guns was attributed to the Royal Navy, who wanted greater firepower to deal with German and Italian foes. Jimmy Thach is quoted as saying, "A pilot who cannot hit with four guns will miss with eight."[50] Extra guns and folding wings meant extra weight and reduced performance: the F4F-4 was capable of only about 318 mph (512 km/h) at 19,400 ft (5,900 m). Rate of climb was noticeably worse in the F4F-4; while Grumman optimistically claimed the F4F-4 could climb at a modest 1,950 ft (590 m) per minute, in combat conditions, pilots found their F4F-4s capable of ascending at only 500 to 1,000 ft (150 to 300 m) per minute.[24] Moreover, the F4F-4's folding wing was intended to allow five F4F-4s to be stowed in the space required by two F4F-3s. In practice, the folding wings allowed an increase of about 50% in the number of Wildcats carried aboard U.S. fleet aircraft carriers. A variant of the F4F-4, designated **F4F-4B** for contractual purposes, was supplied to the British with a modified cowling and Wright Cyclone engine. These aircraft received the designation of **Martlet IV**.

F4F-5 Wildcat

Two F4F-3s (the 3rd and 4th production aircraft, BuNo 1846/1847) were fitted with a Wright R-1820-40 engine and designated XF4F-5.

FM-1/-2 Wildcat

FM-2s from *White Plains*, in June 1944, with 58 gallon drop tanks

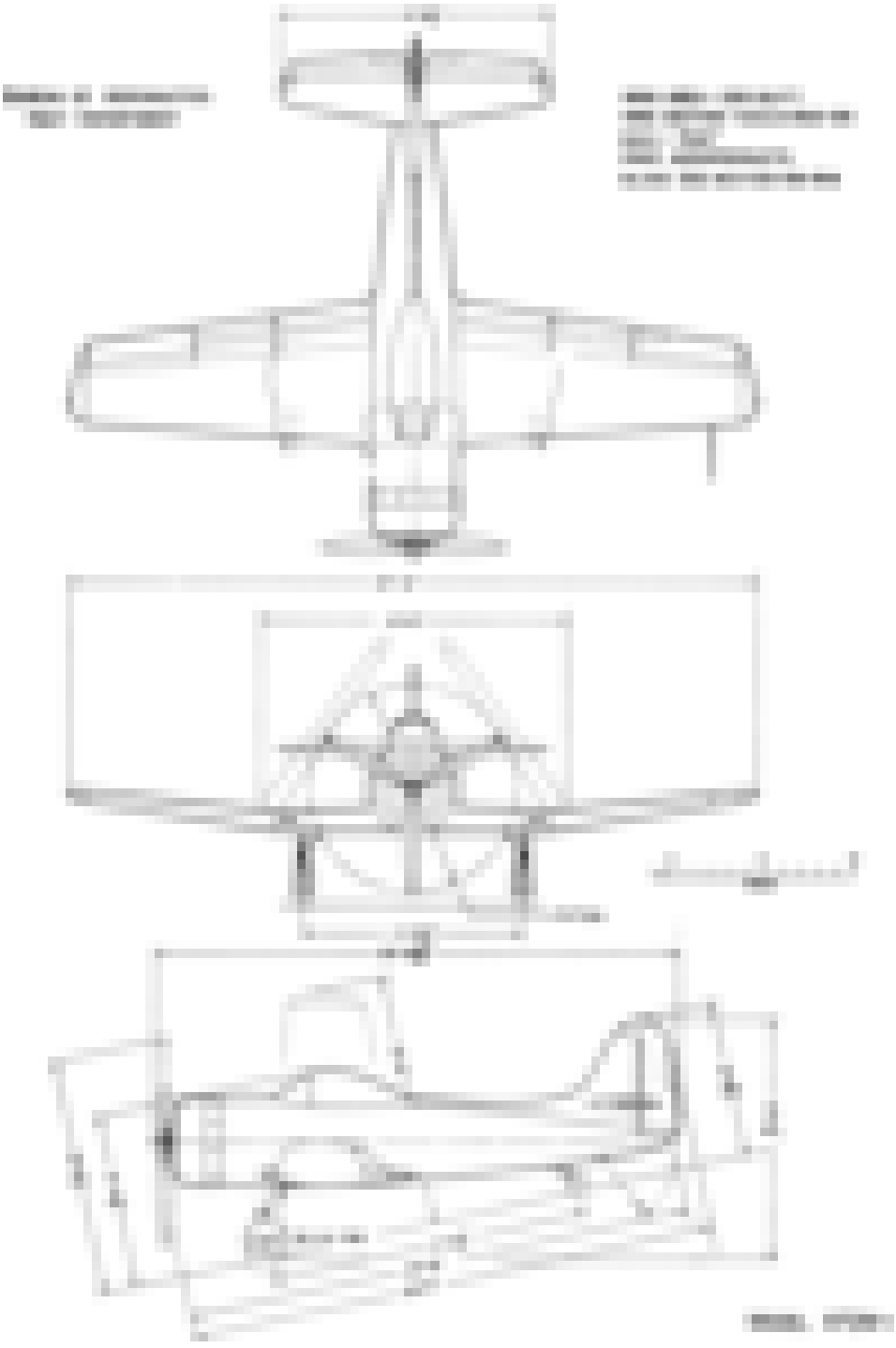
General Motors / Eastern Aircraft produced 5,280 FM variants of the Wildcat.[6] Grumman's Wildcat production ceased in early 1943 to make way for the newer F6F Hellcat, but General Motors continued producing Wildcats for both U.S. Navy and Fleet Air Arm use. Late in the war, the Wildcat was obsolescent as a front line fighter compared to the faster (380 mph/610 km/h) F6F Hellcat or much faster (446 mph/718 km/h) F4U Corsair. However, they were adequate for small escort carriers against submarine and shore threats.

These relatively modest ships only carried two types of aircraft, the Wildcats and GM-built TBM Avengers. The Wildcat's lower landing speed and ability to take off without a catapult made it more suitable for shorter flight decks.[31] At first, GM produced the **FM-1**, identical to the F4F-4, but reduced the number of guns to four, and added wing racks for two 250 lb (110 kg) bombs or six rockets. Production later switched to the improved **FM-2** (based on Grumman's XF4F-8 prototype) optimized for small-carrier operations, with a more powerful engine (the 1,350 hp (1,010 kW) Wright R-1820-56), and a taller tail to cope with the torque.[24]

F4F-7

The **F4F-7** was a photoreconnaissance variant, with armor and armament removed. It had non-folding "wet" wings that carried an additional 555 gal (2,101 L) of fuel for a total of about 700 gal (2,650 L), increasing its range to 3,700 mi (5,955 km). A total of 21 were built.[11]

F2M Wildcat



A three view drawing of the proposed XF2M-1.

The **F2M-1** was a planned development of the FM-1 by General Motors / Eastern Aircraft to be powered by the improved XR-1820-70 engine, but the project was cancelled before any aircraft were built.[18]

Royal Navy Martlets

Martlet Mk I

At the end of 1939, Grumman received a French order for 81 aircraft of model G-36A, to equip their new *Joffre*-class aircraft carriers: *Joffre* and *Painlevé*. The main difference with the basic model G-36 was due to the unavailability for export of the two-stage supercharged engine of F4F-3. The G-36A was powered by the nine-cylinder, single-row Wright R-1820-G205A radial engine, of 1,200 hp (890 kW) and with a single-stage two-speed supercharger.[51]

A G-36A at Grumman, 1940

The G-36A also had French instruments (with metric calibration), radio and gunsight. The throttle was modified to conform to French pre-war practice: the throttle lever was moved towards the pilot (i.e. backward) to increase engine power. The armament which was to be fitted in France was six 7.5 mm (.296 in) Darne machine guns (two in the fuselage and four in the wings). The first G-36A was flown on 11 May 1940.[52] After France's defeat in the Battle of France, all contracts were taken over by Britain. The throttle was modified again, four 0.50 in (12.7 mm) guns were installed in the wings and most traces of the original ownership removed.[53] The Martlets were modified for British use by Blackburn, which continued to do this for all later marks. British gunsights, catapult spools and other items were installed.[54] After attempts to fit British radio sets, it was decided to use the superior American equipment.[55] The first Martlets entered British service in August 1940, with 804 Naval Air Squadron, stationed at Hatston in the Orkney Islands. The Martlet Mk I did not have a wing folding mechanism and was therefore used primarily from land bases, with the notable exception of six aircraft of 882 Sqn aboard *Illustrious* from March 1942.[56] In April 1942 *Illustrious* transferred two Martlet I aircraft to HMS *Archer* while in port at Freetown. One of her four retained Martlet I aircraft were subsequently fitted with folding wings by ship's staff during passage to Durban.[56] In 1940, Belgium also placed an order for at least 10 G-36A's.

These were to be modified with the same changes to the French aircraft, plus the removal of the tailhook as they were to be landbased. Belgium surrendered before any aircraft were delivered and by 10 May 1940, the aircraft order was transferred to the Royal Navy.

Martlet Mk II

Before the Fleet Air Arm took on charge the Martlet Mk Is, it had already ordered 100 G-36B fighters. The British chose the Pratt & Whitney R-1830-S3C4-G engine to power this aircraft; this too had a single-stage, two-speed supercharger. The FAA decided to accept a delay in delivery to get Martlets fitted out with the Grumman-designed and patented Sto-Wing folding wing system first fitted onto U.S. Navy F4F-4 Wildcats,[46] which were vitally important if the Martlet was to be used from the first 3 Illustrious class carriers which had elevators that were too narrow to accommodate non-folding wing aircraft. Nevertheless, the first 10 received had fixed wings. The first Martlet with folding wings was not delivered until August 1941. In contrast to the USN F4F-3, the British aircraft were fitted with armor and self-sealing fuel tanks. The Mk II also had a larger tailwheel. For carrier operations, the "sting" tail hook and attachment point for the American single-point catapult launch system were considered important advantages. Nevertheless, the Martlets were modified to have British-style catapult spools. Deliveries of the folding-wing G-36Bs began in August 1941, with 36 shipped to the UK and 54 shipped to the Far East; they were designated "Martlet Mark II". Aeroplane and Armament Experimental Establishment (A&AEE) testing of the Martlet II at a mean weight of approximately 7,350 lb (3,330 kg) showed a maximum speed of 293 mph (472 km/h) at 5,400 ft (1,600 m) and 13,800 ft (4,200 m), a maximum climb rate of 1,940 ft/min (9.9 m/s) at 7,600 ft (2,300 m) at 7,790 lb (3,530 kg) weight, and a time to climb to 20,000 ft (6,100 m) of 12.5 minutes. The service ceiling at 7,790 lb (3,530 kg) was 31,000 ft (9,400 m).[57]

A Martlet II from HMS *Formidable*, 1942

The Martlet was the second single-seat, monoplane fighter to operate from Royal Navy aircraft carriers following the introduction of the Sea Hurricane IB on HMS *Furious* in July 1941.[58] The majority of the

Martlet Mk IIs were sent to the Far East. The first shipboard operations of the type in British service were in September 1941, aboard HMS *Audacity*, a very small escort carrier with a carrier deck of 420 ft (130 m) by 59 ft (18 m), no elevators and no hangar deck. The six Wildcats were parked on the deck at all times. On its first voyage, it served as escort carrier for a convoy to Gibraltar. On 20 September, a German Fw 200 was shot down. On the next voyage, four Fw 200 *Condors* fell to the guns of the Martlets, and of the combined total, two of these five Condors were shot down by Eric "Winkle" Brown during his time aboard. Operations from *Audacity* also demonstrated that the fighter cover was useful against U-boats. *Audacity* was sunk by a U-boat on 21 December 1941, and of the pilots only Brown and one other survived,[59] but it had already proved the usefulness of escort carriers.[24] In May 1942, 881 and 882 squadrons on HMS *Illustrious* participated in operations against Madagascar. In August 1942, 806 NAS on HMS *Indomitable* provided fighter cover for a convoy to Malta. Later in that year they participated in the landings in French North Africa.[

Martlet Mk III

The first 30 F4F-3As were released for sale to Greece, after the Italian invasion in November 1940. However, at the defeat of Greece in April 1941 the aircraft had only reached Gibraltar. They were taken over by the FAA as Martlet Mk III(B). As these aircraft did not have folding wings, they were only used from land bases. They served in a shore-based role in the Western Desert. Ten fixed-wing G-36Bs were used by the FAA as Martlet III(A).

Martlet Mk IV

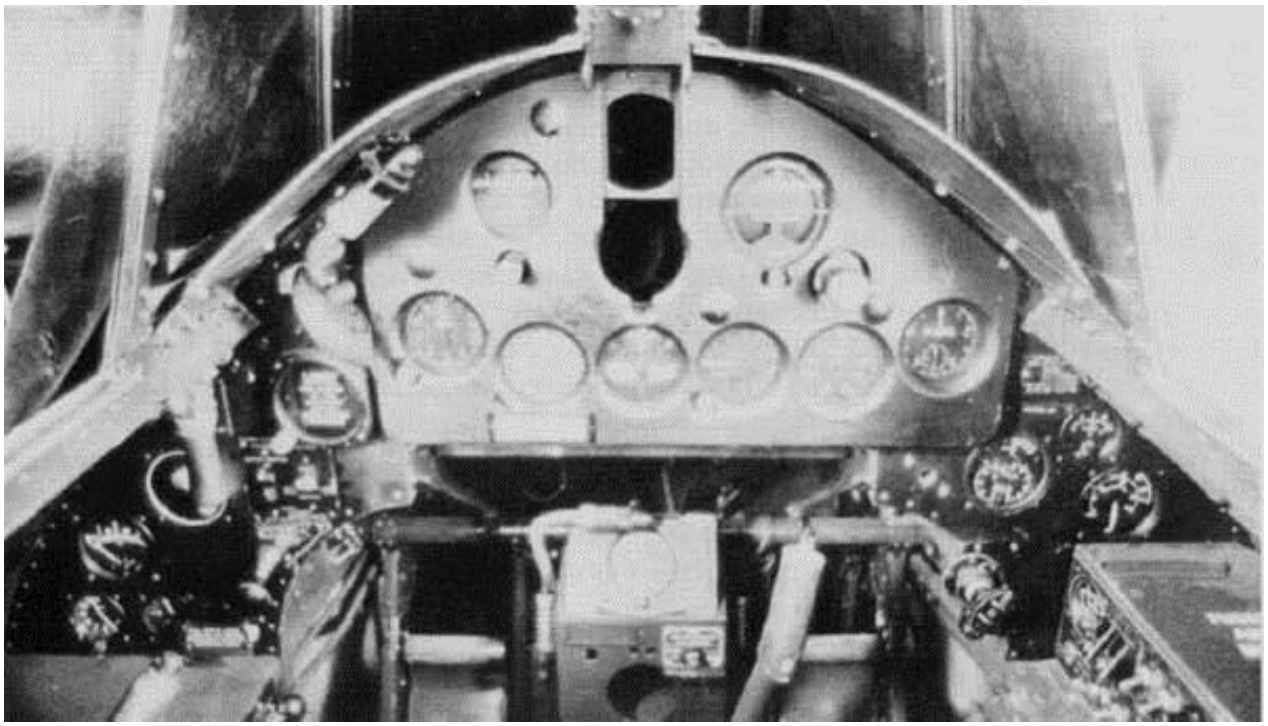
The Royal Navy purchased 220 F4F-4s adapted to British requirements. The main difference was the use of a Wright R-1820-40B Cyclone in a distinctly more rounded and compact cowling, with a single double-wide flap on each side of the rear and no lip intake. These machines were named Martlet Mk IV. Boscombe Down testing of the Martlet IV at 7,350 lb (3,330 kg) weight showed a maximum speed of 278 mph (447 km/h) at 3,400 ft (1,000 m) and 298 mph (480 km/h) at 14,600 ft (4,500 m), a maximum climb rate of 1,580 ft/min (8.0 m/s) at 6,200 ft (1,900 m) at 7,740 lb (3,510 kg) weight, and a time to climb to 20,000 ft (6,100 m) of 14.6 minutes. The service ceiling at 7,740 lb (3,510 kg) was 30,100 ft (9,200 m).[57]

Martlet Mk V

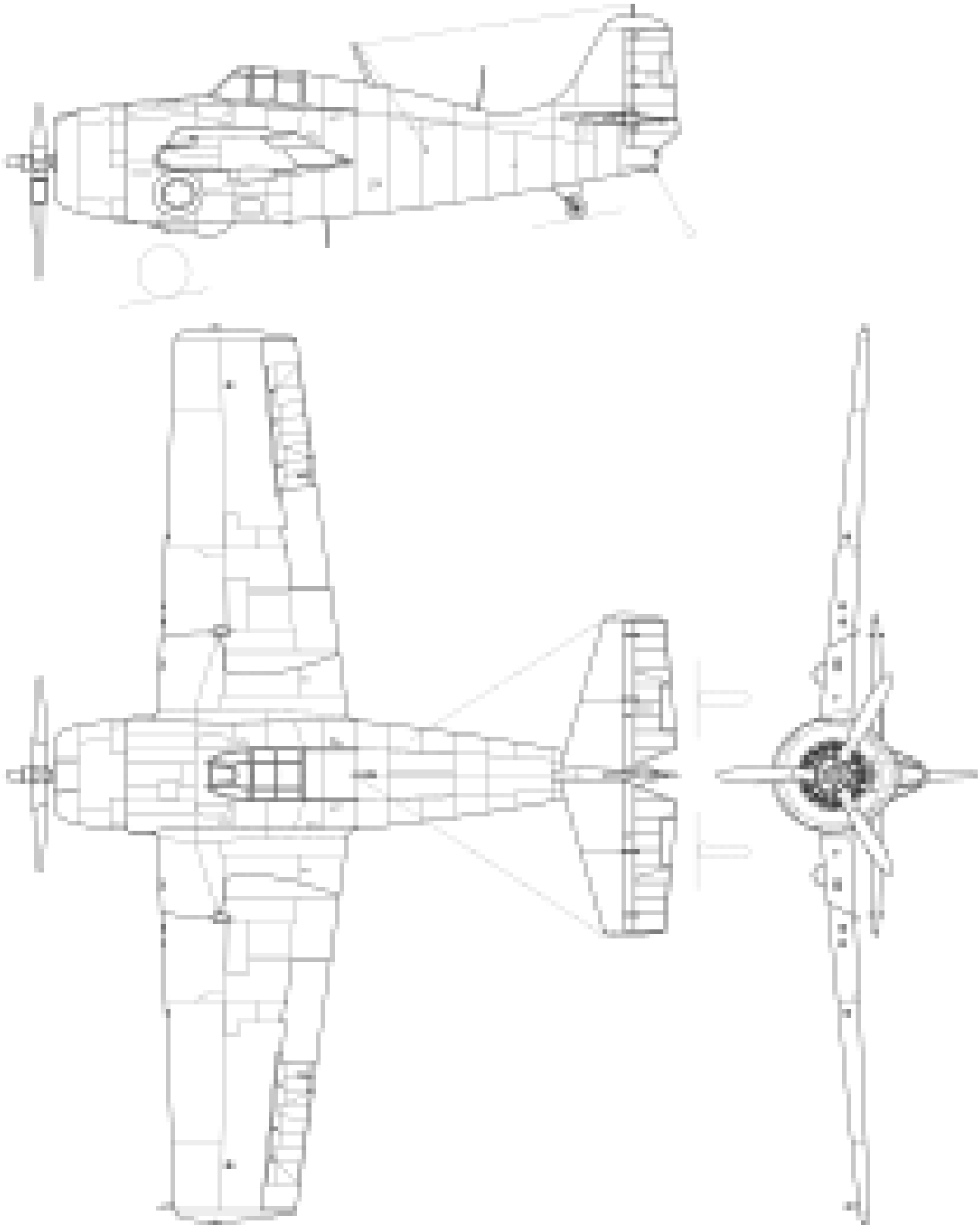
The Fleet Air Arm purchased 312 FM-1s, originally with the designation of Martlet V. In January 1944, a decision was made to retain the American names for US-supplied aircraft, redesignating the batch as the Wildcat V.

Wildcat Mk VI

The Wildcat VI was the Air Ministry name for the FM-2 Wildcat in FAA service.



Specifications (F4F-3)



General characteristics

- **Crew:** 1
- **Length:** 28 ft 9 in (8.76 m)
- **Wingspan:** 38 ft 0 in (11.58 m)
- **Height:** 11 ft 10 in (3.61 m)
- **Wing area:** 260 sq ft (24 m^2)
- **Airfoil: root:** NACA 23015; **tip:** NACA 23009[63]
- **Empty weight:** 4,907 lb (2,226 kg)
- **Gross weight:** 7,423 lb (3,367 kg)
- **Powerplant:** 1 × Pratt & Whitney R-1830-76 14-cylinder air-cooled radial piston engine, 1,200 hp (890 kW)
- **Propellers:** 3-bladed constant-speed propeller

Performance

- **Maximum speed:** 331 mph (533 km/h, 288 kn)
- **Range:** 845 mi (1,360 km, 734 nmi)
- **Service ceiling:** 39,500 ft (12,000 m)
- **Rate of climb:** 2,303 ft/min (11.70 m/s)
- **Wing loading:** 28.5 lb/sq ft (139 kg/m^2)
- **Power/mass:** 0.282 kW/kg (0.172 hp/lb)

Armament

- **Guns:** 4 × 0.50 in (12.7 mm) AN/M2 Browning machine guns with 450 rounds per gun
- **Bombs:** 2 × 100 lb (45.4 kg) bombs and/or 2 × 58 US gal (48 imp gal; 220 L) drop tanks

Source : https://en.wikipedia.org/wiki/Grumman_F4F_Wildcat