

P-38 Lightning

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Type [Heavy fighter](#)

Manufacturer [Lockheed](#)

Designed by [Kelly Johnson](#)

Maiden flight [27 January 1939](#)

Introduction 1941

Retired 1949

Primary user [United States Army Air Force](#)

Produced 1941–45

Number built 10,037^[1]

Unit cost US\$134,284 when new^[2]

Variants [Lockheed XP-49](#)
[XP-58 Chain Lightning](#)

The [Lockheed P-38 Lightning](#) was a [World War II American fighter aircraft](#). Developed to a [United States Army Air Corps](#) requirement, the P-38 had distinctive [twin booms](#) with forward-mounted engines and a single, central [nacelle](#) containing the pilot and armament. The aircraft was used in a number of different roles, including [dive bombing](#), level [bombing](#), ground [strafing](#), photo [reconnaissance](#) missions,^[3] and extensively as a long-range escort fighter when equipped with droppable fuel tanks under its wings. The P-38 was used most extensively and successfully in the [Pacific Theater of Operations](#) and the [China-Burma-India Theater of Operations](#), where it was flown by the American pilots with the highest number of aerial victories to this date. The Lightning called "Marge" was flown by the ace of [aces Richard Bong](#) who earned 40 victories. Second with 38 was [Thomas McGuire](#) in his aircraft called "Pudgy". In the [South West Pacific theater](#), it was a primary fighter of [United States Army Air Forces](#) until the appearance of large numbers of [P-51D Mustangs](#) toward the end of the war.^{[4][5]}

Design and development



Lockheed YP-38 (1943)

[Lockheed](#) designed the P-38 in response to a 1937 [United States Army Air Corps](#) request for a high-altitude [interceptor aircraft](#), capable of 360 [miles per hour](#) at an [altitude](#) of 20,000 [feet](#), (580 [km/h](#) at 6100 [m](#)).^[6] The [Bell P-39 Airacobra](#) and the [Curtiss P-40 Warhawk](#) were also designed to meet the same requirements.

The Lockheed design team, under the direction of [Hall Hibbard](#) and "[Kelly](#)" [Johnson](#), considered a range of configurations,^[7] before incorporating a number of designs different from existing fighter aircraft. The Lockheed team chose twin booms to accommodate the [empennage](#) and the engines, with a central nacelle for the pilot and armament. The nose was designed to carry two [Browning](#) .50" (12.7 mm) machine guns with 200 rounds per gun, two .30" (7.62 mm) Brownings with 500 rounds per gun, and an [Oldsmobile](#) 37 mm cannon with 15 rounds. Clustering all the armament in the nose meant that unlike most other US aircraft with wing-mounted guns, where the trajectories were set up to criss-cross at several points in a "convergence zone," Lightning pilots needed to aim more precisely. For example, [Dick Bong](#), the United States' highest-scoring World War II air-ace, would fly directly at his targets to make sure he hit them, in some cases flying through the debris of his target. However, the nose-mounted guns did not suffer from having their useful ranges limited by pattern convergence, meaning good pilots could shoot much farther. A Lightning could reliably hit targets at any range up to 1,000 yards, whereas other fighters had to pick a single convergence range between 100 and 250 yards. The clustered weapons had a "buzz-saw" effect on the receiving end, making the aircraft effective for strafing as well.

The design was the first fighter to utilize [tricycle undercarriage](#), and featured two 1000 [hp](#) (746 [kW](#)) [turbo-supercharged](#) 12-cylinder [Allison V-1710](#) engines fitted with counter-rotating propellers to eliminate the effect of engine [torque](#), with the superchargers positioned behind them in the booms.^[8]



P-38J flying over California.

Lockheed won the competition on [23 June 1937](#) with its **Model 22**, and was contracted to build a prototype **XP-38**.^[9] Construction began in July 1938 and the XP-38 first flew on [27 January 1939](#).^[10] The [11 February 1939](#) flight to relocate the aircraft for testing at [Wright Field](#) was extended by [General Henry "Hap" Arnold](#), commander of the USAAC, to demonstrate the performance of the

aircraft. It set a cross-continent speed record by flying from [California](#) to [New York](#) in seven hours and two minutes,^[8] but landed short of the Mitchel Field runway in Hempstead, New York, and was wrecked. However, on the basis of the record flight, the Air Corps ordered 13 **YP-38s** on [27 April 1939](#).^[11]

Manufacture of the YP-38s fell behind schedule – the first aircraft was not completed until September 1940, first flying on [16 September 1940](#),^[11] and the last YP-38 was delivered to the Air Corps in June 1941. They were substantially redesigned and differed greatly in detail from the hand-built XP-38. They were lighter, included changes in engine fit, and the propeller rotation was reversed, with the blades rotating outwards (away) from the [cockpit](#) at the top of their arc rather than inwards as before. This improved the aircraft's stability as a gunnery platform.^[10]

Test flights revealed that tail [flutter](#) was a problem. During high-speed flight, especially during dives, the airplane's tail would begin to shake violently and the nose would drop. Once caught in this dive the plane would enter a [compressibility stall](#) and the controls would lock up, leaving the pilot no option but to bail out. During one flight on [4 November 1940](#), the tail structure fell apart during a high-speed dive; killing YP-38 test pilot, Ralph Virden. On another, USAAC Major Signa Gilkey managed to stay with a YP-38 in a compressibility lockup, riding it out until he reached denser air, where he recovered using elevator trim.^[8] The initial fix was to attach mass balances to small booms in the middle of the elevator, but the buffeting eventually proved to be due to the abrupt straight connection of the wing-root to the fuselage pod. A few aerodynamic changes, most particularly the addition of a wing-root fillet, resolved the problem in the P-38J variant. Nonetheless, the external balances were a feature of every P-38 built from then on.^[12]

Johnson later recalled:

“ I broke an ulcer over compressibility on the P-38 because we flew into a speed range where no one had ever been before, and we had difficulty convincing people that it wasn't the funny-looking airplane itself, but a fundamental physical problem. We found out what happened when the Lightning shed its tail and we worked during the whole war to get 15 more knots [28 km/h] of speed out of the P-38. We saw compressibility as a brick wall for a long time. Then we learned how to get through it.^[13] ”



Mechanized P-38 conveyor lines.

Another issue with the P-38 was that both engines were "critical" engines — losing one on takeoff, which often occurred, created "critical torque", rolling the plane towards the live engine's wingtip, rather than the dead engine's. Normal training in flying twin-engine aircraft when losing an engine on takeoff, would be to push the remaining engine to full throttle; in the P-38, the resulting critical torque produced such an uncontrollable [asymmetric roll](#) the aircraft would flip over and slam into the ground. Eventually, procedures were devised to allow a pilot to deal with the situation by reducing power on the running engine, feathering the prop on the dead engine, and then increasing power gradually until the aircraft was in stable flight.

The engine sounds were a unique, rather quiet "whuffle," because the [exhausts](#) were [muffled](#) by the [General Electric turbochargers](#) of the twin [Allison V12s](#). There were early problems with cockpit temperature regulation; pilots were often too hot in the tropics as the canopy could not be opened without severe buffeting, and were often too cold in northern Europe as the distance of the engines from the cockpit prevented effective heating. However, later variants of the P-38 received modifications that solved these problems.



P-38 at sunset.

On [20 September 1939](#), before the YP-38s had been built and flight tested, the USAAF ordered 66 initial production P-38 Lightnings, 30 of which were delivered to the USAAF in mid-1941, but not all these aircraft were armed. The unarmed aircraft were subsequently fitted with four .50s (instead of the two .50 and two .30 of their predecessors) and a 37 mm cannon. They also had armor glass, cockpit armor and [fluorescent](#) cockpit controls.^[14] One was completed with a pressurized cabin on an experimental basis and designated **XP-38A**.^[15] Due to reports the USAAF was receiving from Europe, the remaining 36 in the batch were upgraded with small improvements such as [self-sealing fuel tanks](#) and enhanced armor protection to make them combat-capable. The USAAF specified that these 36 aircraft were to be designated **P-38D**. As a result, there never were any P-38Bs or P-38Cs. The P-38Ds main role was to work out bugs and give the USAAF experience with handling the type.^[16]

In March 1940, the [French](#) and the [British](#) ordered a total of 667 P-38s, designated **Model 322F** for the French and **Model 322B** for the British. The aircraft would be a variant of the P-38E, without turbo-supercharging (due to a U.S. government export prohibition), and twin right-handed engines instead of counter-rotating, for commonality with the large numbers of [Curtiss Tomahawks](#) both nations had on order. After the fall of France in June 1940, the British took over the entire order and re-christened the plane *Lightning I*. Three of the unturbocharged Lightning Is were delivered to the UK in March 1942 and, after discovering that they had a maximum speed of 300 miles per hour (480 km/h) and had poor handling characteristics, the entire order was canceled. The remaining 140 Lightning Is were completed for the USAAF with counter-rotating engines but still minus turbo-superchargers. They were relegated to [United States Army Air Forces](#) training units under the designation **RP-322**.^[17] These aircraft helped the USAAF train new pilots to fly a powerful and complex new fighter. The RP-322 was a fairly fast aircraft at low altitude and well suited as a trainer. The other positive result of this fiasco was to give the aircraft the name "Lightning". Lockheed originally dubbed the aircraft [Atalanta](#) in the company tradition of naming their planes after mythological and celestial figures, but the RAF name won out.

Operational service



P-38s deck-loaded on CVE. Plane shipment ready to go. Planes, hooded against salt water, rest on the deck of a baby flat-top berthed at the New York Port of Embarkation.

The first unit to receive P-38s was the [1st Fighter Group](#). After the [attack on Pearl Harbor](#), the unit joined the 14th Pursuit Group in San Diego to provide West Coast defense.^[18]

Entry to the war

The first Lightning to see active service was the F-4 version, a P-38E in which the guns were replaced by four cameras. They joined the 8th Photographic Squadron out of [Australia](#) on [4 April 1942](#)^[10]. Three of the F-4s were operated by the [Royal Australian Air Force](#) in this theater for a short period beginning in September 1942.

On [29 May 1942](#), 25 P-38s began operating in the [Aleutian Islands](#) in [Alaska](#). The fighter's long range made it well-suited to the campaign over the almost 1,200 mile(2,000 km)–long island chain, and it would be flown there for the rest of the war. The Aleutians were one of the most rugged environments available for testing the new aircraft under combat conditions. More Lightnings were lost due to severe weather and other conditions than enemy action, and there were cases where Lightning pilots, mesmerized by flying for hours over gray seas under gray skies, simply flew into the water. On [9 August 1942](#), two P-38Es of the 343rd Fighter Group, Eleventh Air Force, at the end of a 1,000 mile (1,600 km) long-range patrol, happened upon a pair of [Japanese Kawanishi H6K](#) "Mavis" flying boats and destroyed them,^[10] making them the first Japanese aircraft to be shot down by Lightnings.

European theater



P-38 participating in the Normandy campaign as evidenced by the [D-Day](#) invasion stripes.

After the [Battle of Midway](#), the USAAF began redeploying fighter groups to Britain to take part in [Operation Bolero](#), and Lightnings of the [1st Fighter Group](#) were flown across the [Atlantic](#) via [Iceland](#) to England. On [14 August](#), a P-38F and a P-40 operating out of Iceland shot down a Focke-Wulf [Fw](#)

[200 Condor](#) shipping raider over the Atlantic. This was the first [Luftwaffe](#) aircraft destroyed by the USAAF.^[19]

P-38 Lightnings had a number of lucky escapes, exemplified by the arrival of the 71st fighter squadron at [Goxhill \(Lincolnshire, England\)](#) in July 1942. The official handover ceremony was scheduled for mid-August, but on the day before the ceremony, Goxhill experienced its only air raid of the war. A single German bomber flew overhead and dropped a very well aimed bomb right on the intersection between the two newly concreted runways, but it didn't go off and the aircraft were able to continue their mission. (As it turned out, the bomb could not be removed and, for the duration of the war, aircraft had to pass over it every time they took off.)

After 347 sorties with no enemy contact, the 1st, 14th and 82nd Fighter Groups were transferred to the 12th Air Force in North Africa as part of the force being built up for [Operation Torch](#). On [19 November 1942](#), Lightnings escorted [B-17s](#) on a raid over Tunis. On [5 April 1943](#), 26 P-38Fs of the 82nd destroyed 31 enemy aircraft, helping to establish air superiority in the area, and earning it the German nickname "der Gabelschwanz-Teufel" – the Fork-Tailed Devil.^[18] The P-38 remained active in the [Mediterranean](#) for the rest of the war.

Experiences in Germany had shown a need for long-range escort fighters to protect the [8th Air Force's](#) heavy bomber operations. The P-38Hs of the 55th Fighter Group were transferred to the 8th in England in September 1943, and were joined by the 20th, 364th and 479th Fighter Groups soon after.

The P-38 performed well in the ETO despite being outnumbered 10 to 1 and suffering from the poorly refined British fuel. Frequent engine failures were attributed to parts that could not tolerate the European, low-grade fuel. Many of the aircraft's problems were addressed by the P-38J variant, but by September 1944, all but one of the Lightning groups in the 8th Air Force had converted to the [P-51](#). The 8th did continue to operate the F-5 recon variants with more success.^[18]

Pacific theater



Col. MacDonald and Al Nelson in the Pacific.

The P-38 was used most extensively and successfully in the Pacific theater, where it proved ideally suited, combining excellent performance with very long range. The P-38 was credited with destroying more Japanese aircraft than any other USAAF fighter.^[11] Freezing cockpits were not a problem in the warm tropics. In fact, since there was no way to open a window while in flight as it caused buffeting by setting up turbulence through the [tailplane](#), it was often too hot, and pilots would fly stripped down to shorts, tennis shoes, and parachute. While the P-38 could not out-maneuver the [Mitsubishi Zero](#) and most other Japanese fighters, its speed and rate of climb gave American pilots the option of choosing to fight or run, and its focused firepower was even more deadly to lightly-armored Japanese warplanes than to the Germans'. Jiro Horikoshi, designer of the Zero, wrote: "The peculiar sound of

the P-38's twin engines became both familiar and hated by the Japanese all across the South Pacific."

General [George C. Kenney](#), commander of the USAAF Fifth Air Force operating in [New Guinea](#), could not get enough P-38s, though since they were replacing serviceable but inadequate P-39s and P-40s, this might seem like guarded praise. Lightning pilots began to compete in racking up scores against Japanese aircraft, including one of the most famous missions of the war, the interception on [18 April 1943](#) of Admiral [Isoroku Yamamoto](#), the architect of Japan's naval strategy in the Pacific, including the [attack on Pearl Harbor](#). When American [codebreakers](#) found out that he was flying to [Bougainville Island](#) to conduct a front-line inspection, 16 Lightnings were sent on a long-range [mission to intercept and kill Yamamoto](#), flying 700 km (435 miles) at heights from 3-15 m (10-50 ft) above the ocean to avoid detection. The Lightnings met Yamamoto's [Mitsubishi G4M](#) "Betty" bomber and escorting [Zero](#) fighters just as they arrived. Four attacked the bombers, shooting the G4M down over the jungle, while the other 12 provided top cover.^[20]

On 2-4 March 1943, P-38s flew top cover for Fifth Air Force and Australian bombers and attack-planes during the [Battle of the Bismarck Sea](#), a crushing defeat for the Japanese. Two P-38 aces from the 39th Fighter Squadron were killed on the second day of the battle: Bob Faurot and Hoyt "Curley" Eason (a veteran with five victories who had trained hundreds of pilots, including Dick Bong).

Service record

The P-38's service record shows mixed results. On the negative side, most variants were certainly harder to fly than the best single-engine fighters, and in early models, pilots suffered badly from the cold in northern climates. Also, the twin turbocharged Allison engines had problems – a good portion of Lightnings were lost during the war due to engine difficulties rather than by enemy gunfire, which contributed to the plane's relatively low kill-ratio. Up until the "J-25" variant, P-38s were often "sitting ducks" to [Luftwaffe](#) fighters because of the problematic engines and the lack of dive flaps to counter compressibility in dives. German fighter pilots would often go into steep dives because they knew that the Lightnings would be reluctant to follow.

Although not the best dogfighter, the Lightning's greatest virtues were long range, heavy payload, high speed, fast climb-rate and concentrated firepower. The P-38 was a formidable interceptor and attack aircraft and, in the hands of a good pilot, could be dangerous in air-to-air combat. In the Pacific theater, the P-38 downed over 1800 Japanese aircraft, with more than 100 pilots becoming aces by downing five or more enemy.^[20]

Postwar operations

The end of the war left the USAAF with thousands of P-38s, rendered obsolete by the jet-age. Fifty late-model Lightnings were acquired by [Italy](#) and operated for several years, with a dozen sold to [Honduras](#). The others were put up for sale for \$1,200 USD apiece, and the rest were scrapped.

Lockheed test pilot Tony LeVier was among those who bought a P-38, turning it into an air racer. The Lightning was a popular contender in the air races from 1946 through 1949, with brightly colored Lightnings making screaming turns around the pylons.

F-5s were bought by aerial survey companies and used for aerial mapping. From the 1950s on, the use of the Lightning steadily declined, and only a little more than two dozen still exist, with few still flying. One example is a P-38L owned by the [Lone Star Flight Museum](#) in [Galveston](#) in [Texas](#),

painted in the colors of Charles MacDonald's *Putt Putt Maru*. Two other examples are F-5G's which were owned and operated by Kargl Aerial Surveys in 1946, and are now located in Chino, California (Yank's Air Museum), and McMinnville, Oregon (Evergreen Aviation Museum).

Variants

Over 10,000 Lightnings were manufactured in all; it was one of the few US combat aircraft that had been in production throughout the entire duration of American participation in [World War II](#). The Lightning had a major effect on other aircraft, such as the fact that its wing, in a scaled-up form, was used on the [L-049 Constellation](#).^[22]

The first combat-capable Lightning was the **P-38E**, which featured improved instruments, and electrical and hydraulic systems. Part-way through production, the older Hamilton Standard Hydromatic hollow steel propellers were replaced by new Curtiss Electric duraluminum propellers. The definitive armament configuration, featuring four 12.7 mm machine guns with 500 rounds per gun and a [Hispano](#) 20 mm cannon with 150 rounds instead of the unreliable Oldsmobile 37 mm gun, was standardized.

While the machine guns had been arranged symmetrically in the nose on earlier variants, they were "staggered" in the P-38E and later versions, with the muzzles protruding from the nose in the relative lengths of roughly 1:4:6:2. This was done to ensure a straight ammunition-belt feed into the weapons, as the earlier arrangement led to jamming.

The first P-38E rolled out of the factory in October 1941. Over a hundred P-38Es were completed in the factory or converted in the field to a photo-reconnaissance variant, the **F-4**, in which the guns were replaced by four cameras. Most of these early reconnaissance Lightnings were retained stateside for training, but the F-4 was the first Lightning to be used in action in April 1942. After 210 P-38Es were built, they were followed, starting in April 1942, by the **P-38F**, which incorporated racks inboard of the engines for fuel tanks or a total of 2,000 pounds (900 kg) of [bombs](#). A total of 527 P-38Fs were built.

The P-38F was followed in early 1943 by the **P-38G**, utilizing more powerful Allison's of 1,400 hp (1,040 kW) each and equipped with a better radio. The P-38G was followed in turn by the **P-38H**, with further updated Allison's (1,425 hp [1,060 kW] each), an improved 20 mm cannon and a bomb

Production numbers ^[21]		
Variant	Produced	Comment
XP-38	1	Prototype
YP-38	13	Evaluation planes
P-38	30	Initial production plane
XP-38A	1	Pressurized cockpit
P-38D	36	
P-38E	210	
F-4	100+	recons based on P-38E
Model 322	3	RAF planes
RP-322	147	USAAF trainers
P-38F	527	
F-4A	20	recons based on P-38F
P-38G	1,082	
F-5A	180	recons based on P-38G
XF-5D		1 converted F-5A
P-38H	601	
F-5C	123	based on P-38H
P-38J	2,970	new radiator style
F-5B	200	based on P-38J
F-5E	605	P-38J/L conversion
P-38K	1	paddle props
P-38L-LO	3,810	
P-38L-VN	113	
F-5F		based on P-38L
P-38M	75	night-fighter
F-5G		

capacity of 3,200 pounds (1,450 kg). These models were also field-modified into **F-4A** and **F-5A** reconnaissance aircraft. An F-5A was modified to an experimental two-seat reconnaissance configuration, with additional cameras in the tail booms.

Early variants did not enjoy a high reputation for maneuverability, though they could be agile at low altitudes if flown by a capable pilot, using the P-38's forgiving stall characteristics to their best advantage. From the P-38F-15 model onwards, a "combat maneuver" setting was added to the P-38's [Fowler flaps](#). When deployed at the eight-degree maneuver setting, the flaps allowed the P-38 to out-turn many contemporary single-engined fighters at the cost of some added drag. However, early variants were hampered by high aileron control forces and a low initial rate of roll.

[\[edit\]](#) Lightning in maturity: P-38J, P-38L



Four P-38s flying in formation.

The definitive **P-38J** was introduced in August 1943. The [turbocharger intercooler](#) system on previous variants had been housed in the leading edges of the wings and had proven vulnerable to combat damage and could explode if the wrong series of controls were mistakenly activated. In the P-38J model, the streamlined engine nacelles of previous Lightnings were changed to fit the intercooler radiator between the oil coolers, forming a "chin" that visually distinguished the J model from its predecessors. While the P-38J used the same V-1710-89/91 engines as the H model, the new core-type intercooler more efficiently lowered intake manifold temperatures and permitted a substantial increase in rated power. The leading edge of the outer wing was fitted with 55-gallon fuel tanks, filling the space formerly occupied by intercooler tunnels.

The final 210 J models, designated P-38J-25-LO, alleviated the compressibility problem through the addition of a set of electrically-actuated dive recovery flaps just outboard of the engines on the bottom centerline of the wings. With these improvements, a USAAF pilot reported a dive speed of almost 600 miles per hour (970 km/h), although the reported air speed was later corrected for compressibility error, and the actual dive speed was lower.^[23]

The P-38J-25-LO production block also introduced hydraulically-boosted ailerons, one of the first times such a system was fitted to a fighter. This significantly improved the Lightning's rate of roll and reduced control forces for the pilot. With a truly satisfactory Lightning in place, Lockheed ramped up production, working with subcontractors across the country to produce hundreds of Lightnings each month.

There were two **P-38Ks** developed in 1942–1943. The first was a modified P-38E test mule fitted with paddle-bladed "high activity" Hamilton Standard propellers similar to those used on the P-47. The new propellers required spinners of greater diameter, and the thrust line was also slightly higher. New cowlings were fashioned to properly blend the spinners into the nacelles. The aircraft also received the chin intercoolers developed for the P-38J.

The first prototype's performance led to the development on the second aircraft, a modified P-38G-10-LO (re-designated P-38K-1-LO) fitted with the aforementioned propellers and new Allison V-1710-75/77 (F15R/L) powerplants rated at 1,875 bhp at War Emergency Power. In tests, the P-38K-1 achieved 432 mph at military power and was predicted to exceed 450 mph at War Emergency Power with a similar increase in rate of climb, load, ceiling and range. However, the War Production Board refused to authorize P-38K production due to the two to three-week halt in production necessary to implement cowling modifications for the revised spinners and higher thrust line.

The **P-38L** was the most numerous variant of the Lightning, with 3,923 built, 113 by [Consolidated-Vultee](#) in their [Nashville](#) plant. It entered service with the [USAAF](#) in June of 1944, in time to support the Allied invasion of France on [D-Day](#). Lockheed production of the Lightning was distinguished by a suffix consisting of a production block number followed by "LO," for example "P-38L-1-LO", while Consolidated-Vultee production was distinguished by a block number followed by "VN," for example "P-38L-5-VN."

The P-38L was the first Lightning fitted with zero-length [rocket](#) launchers. Seven HVARs (high velocity aircraft rockets) on pylons beneath each wing, and later, ten rockets on each wing on "Christmas tree" launch racks. The P-38L also had strengthened stores pylons to allow carriage of 2,000 pound (900 kg) bombs or 300 US gallon (1,140 liter) drop tanks.



F-5B, reconnaissance version of P-38.

Lockheed modified 200 P-38J airframes in production to become unarmed **F-5B** photo-reconnaissance aircraft, while hundreds of other P-38Js and P-38Ls were field-modified to become **F-5Es**, **F-5Fs**, and **F-5Gs**. A few P-38Ls were field-modified to become two-seat **TP-38L** familiarization trainers.

Late model Lightnings were delivered unpainted, as per USAAF policy established in 1944. At first, field units tried to paint them, since pilots worried about being too visible to the enemy, but it turned out the reduction in weight was a minor plus in combat.

The P-38L-5, the most common sub-variant of the P-38L, had a modified cockpit heating system which consisted of a plug-socket in the cockpit into which the pilot could plug his heat-suit wire for improved comfort. These Lightnings also received the uprated V-1710-111/113 (F30R/L) engines, and this dramatically lowered the amount of engine failure problems experienced at high altitude.

[\[edit\]](#) **Pathfinders, Night Fighter and other variants**

The Lightning was modified for other roles. In addition to the F-4 and F-5 reconnaissance variants, a number of P-38Js and P-38Ls were field-modified as formation bombing "pathfinders" or "droopsnoots", fitted with a glazed nose with a [Norden bombsight](#), or a [H2X radar](#) "bombing through overcast" nose. A pathfinder would lead a formation of other P-38s, each overloaded with two 900 kg (2,000 pound) bombs; the entire formation releasing when the pathfinder did.

A number of Lightnings were modified as night fighters. There were several field or experimental modifications with different equipment fits that finally led to the "formal" **P-38M** night fighter, or *Night Lightning*. Seventy-five P-38Ls were modified to the Night Lightning configuration, painted flat-black with conical [flash hiders](#) on the guns, an AN/APS-6 radar pod below the nose, and a second cockpit with a raised canopy behind the pilot's canopy for the radar operator. The headroom in the rear cockpit was limited, requiring radar operators who were preferably short in stature.

The additional external clutter imposed surprisingly little penalty on the P-38M's performance, and it remained faster than the purpose-built [Northrop P-61 Black Widow night fighter](#). The Night Lightnings saw some combat duty in the Pacific towards the end of the war, but, verifiably, none engaged in combat.



Lockheed 422 P-38M Night Lightning (44-27234 c/n 422-8238).

One of the initial production P-38s had its turbochargers removed, with a secondary cockpit placed in one of the booms to examine how flightcrew would respond to such an "asymmetric" cockpit layout. One P-38E was fitted with an extended central nacelle to accommodate a tandem-seat cockpit with dual controls, and was later fitted with a laminar flow wing.

Very early in the Pacific War, a scheme was proposed to fit Lightnings with floats to allow them to make long-range ferry flights. The floats would be removed before the aircraft went into combat. There were concerns that salt spray would corrode the tailplane, and so one P-38E was modified with a raised tailplane and a rearward-facing second seat for an observer to monitor the effectiveness of the new arrangement. This P-38E was never actually fitted with floats, and the idea was quickly abandoned as the US Navy proved to have enough [sealift](#) capacity to keep up with P-38 deliveries to the South Pacific.

Still another P-38E was used in 1942 to tow a [Waco troop glider](#) as a demonstration. However, there proved to be plenty of other aircraft, such as [C-47s](#), available to tow gliders, and the Lightning was spared this duty.

Standard Lightnings were even used as crew and cargo transports in the South Pacific. They were fitted with pods attached to the underwing pylons, replacing drop tanks or bombs, that could carry a single passenger in a lying-down position, or cargo. This was a very uncomfortable way to fly. Some of the pods weren't even fitted with a window to let the passenger see out or bring in light, and one fellow who hitched a lift on a P-38 in one of these pods later said that "whoever designed the damn thing should have been forced to ride in it."

Lockheed proposed a carrier-based **Model 822** version of the Lightning for the [United States Navy](#). The Model 822 would have featured folding wings, an arresting hook, and stronger undercarriage for carrier operations. The Navy wasn't interested, as they regarded the Lightning as too big for carrier operations and didn't like liquid-cooled engines anyway, and the Model 822 never went beyond the paper stage. However, the Navy did operate four land-based F-5Bs in North Africa, inherited from the USAAF and redesignated **FO-1**.

A P-38J was used in experiments with an unusual scheme for [mid-air refueling](#), in which the fighter snagged a drop tank trailed on a cable from a bomber. The USAAF managed to make this work, but decided it wasn't practical. A P-38J was also fitted with experimental retractable snow ski landing gear, but this idea never reached operational service either.

After the war, a P-38L was experimentally fitted with armament of three 15.2 mm (0.60 in) machine guns. The 15.2 mm cartridge had been developed early in the war for an infantry "anti-tank rifle," a type of weapon developed by a number of nations in the 1930s when tanks were lighter but, by 1942, the idea of taking on a tank with a large-caliber rifle was considered to be somewhere between "outdated" and "suicidal."

The cartridge wasn't abandoned, with the Americans designing a derivative of the German [MG 151](#) 15 mm aircraft automatic cannon around it and designating the weapon the "T17," but though 300 of these guns were built and over six million 15.2 mm rounds were manufactured, they never worked out all the bugs, and the T17 never saw operational service. The cartridge was "necked up" to fit 20 mm projectiles and became a standard US ammunition after the war. The T17-armed P-38L did not go beyond unsuccessful trials.

Another P-38L was modified after the war as a "super strafer," with eight 12.7 mm machine guns in the nose and a pod under each wing with two 12.7 mm guns, for a total of 12 machine guns. Nothing came of this conversion, either.

A P-38L was modified by [Hindustan Aeronautics](#) in [India](#) as a fast VIP transport, with a comfortable seat in the nose, leather-lined walls, accommodations for refreshments and a glazed nose to give the passenger a spectacular view.

Military operators



P-38s of [449th Fighter Squadron](#), [Chengkung](#), 1945.

 [Australia](#)

- [Royal Australian Air Force](#)^[24]

 [China](#)

- [Chinese Nationalist Air Force](#) flew 15 P-38Js and P-38Ls and, postwar, they also received a similar number of F-5Es and F-5Gs.^[24]

 [Dominican Republic](#)

 [France](#)

- [Free French Air Force](#) operated F-5As in Group 2/23^[25]

 [Germany](#)

- [Luftwaffe](#) operated few captured aircraft.

[Honduras](#)

Operated 12 aircraft postwar.

[Italy](#)

- [Regia Aeronautica](#) captured intact single P-38G during the war when the pilot accidentally landed at an Italian base. This Lightning was flown in combat against Allied aircraft, but was quickly grounded due to lack of parts.
- [Italian Air Force](#) after capitulation flew F-5A photo-reconnaissance missions with 3rd Aerobrigata RT and 4th Aerobrigata^[26], postwar operated 50 late model aircraft.

[Portugal](#)

- [Portuguese Air Force](#) operated two interned Lightnings that were forced to land in [Lisbon, Portugal](#), while on a ferry flight from England to Algeria.^[24]

[Soviet Union](#)

- [Soviet Air Force](#) operated few aircraft.

[United Kingdom](#)

- [Royal Air Force](#) performed evaluation test only.^[24]

[United States](#)

- [United States Army Air Force](#)

[\[edit\]](#) **Noted or surviving P-38s**



P-38J Lightning *YIPPEE*

YIPPEE

The 5,000th Lightning built, a P-38J, was painted bright vermilion red, and had the name *YIPPEE* painted on the underside of the wings in big white letters as well as the signatures of hundreds of factory workers. This aircraft was used by Lockheed test pilots [Milo Burcham](#) and [Tony LeVier](#) in remarkable flight demonstrations, performing such stunts as slow rolls at treetop level with one prop feathered to show that the P-38 was not the unmanageable beast of legend. Their exploits did much to reassure pilots that the Lightning might be a handful, but it was no "widow maker."

[\[edit\]](#) **Glacier Girl**



P-38 *Glacier Girl*

P-38F-1-LO s/n 41-7630 (now called *Glacier Girl*), flown by 1st Lt. Harry L. Smith, Jr., 94th Fighter Squadron, was one of six P-38 fighters of the [1st Fighter Group](#) escorting two B-17 bombers on a ferry flight to the [United Kingdom](#) as part of [Operation Bolero](#) on [July 15, 1942](#). While enroute over Greenland, bad weather caused the eight aircraft to turn back, the entire flight attempting to land together before they ran out of fuel. Although one P-38 overturned, the flight successfully belly-landed. The crews were rescued within a few days, but the airplanes were abandoned and, over the years, they were covered by ice.

A few attempts to salvage the airplanes were made but were unsuccessful. Eventually, Roy Shoffner, a businessman from Middlesboro, Kentucky, acquired the salvage rights and in 1992, 50 years after the planes landed, a P-38 recovery mission was undertaken. Using photos taken by the original crews while they were awaiting rescue as well as modern seismographic equipment, the salvage workers located the buried squadron and selected the least damaged of the planes. They reached it by boring a hole using hot water through the layer of ice 268 feet thick. The airplane was transported to Middlesboro, where a ten-year restoration began using many parts from late model aircraft. Nicknamed *Glacier Girl*, the restored P-38F Lightning made its first post-restoration flight on 26 October 2002. ^[27]

Unknown

A lone P-38 is interred indefinitely at the EAA Museum in Oshkosh, Wisconsin in an exhibit featuring the exploits of [Majors Richard I. "Dick" Bong](#). It is unknown if it is flight ready or only a rolling shell.

Porky II

Another surviving P-38J at the [Planes of Fame](#) Museum in [Chino, California](#) (s/n 4-23314) painted in the colors of "Porky II" is still airworthy.

Noted P-38 pilots



Major [Richard Bong](#) in his P-38.

The American ace of aces and his closest competitor both flew Lightnings as they tallied 40 and 38 victories each. [Majors Richard I. "Dick" Bong](#) and [Thomas J. "Tommy" McGuire](#) of the [USAAF](#) competed for the top position, a rivalry made interesting by the contrast in personalities of the two men. Both Bong and McGuire were unbelievably aggressive and fearless in the air. After dogfights, their P-38s would be warped out of shape by overstress. On the ground, they were completely

different men. Dick Bong was a modest, quiet, almost shy man, while the egotistical McGuire was "an unpleasant individual with a talent much bigger than he was," as one of his colleagues remembered him.

Bong was rotated back to the States as America's ace of aces, after making 40 kills. He was killed on [6 August 1945](#), the day the atomic bomb was dropped on Japan, when his [P-80 Shooting Star](#) jet fighter flamed out on [takeoff](#). McGuire had been killed in air combat in January 1945, over the [Philippines](#), after racking up 38 confirmed kills, making him the second-ranking American ace. Both men were awarded the [Medal of Honor](#).



Major Bong's P-38, "Marge".

The famed aviator, [Charles Lindbergh](#), worked in the South Pacific for Lockheed as an operational test pilot, where he shot down at least one Japanese aircraft with his P-38. He was instrumental in extending the range of the P-38 through improved throttle settings, or engine-leaning techniques, and notably by reducing engine [RPM](#) to 1600 rpm, which had prior been considered dangerous, because it was thought this would upset the fuel mixture and cause an explosion.^[28]

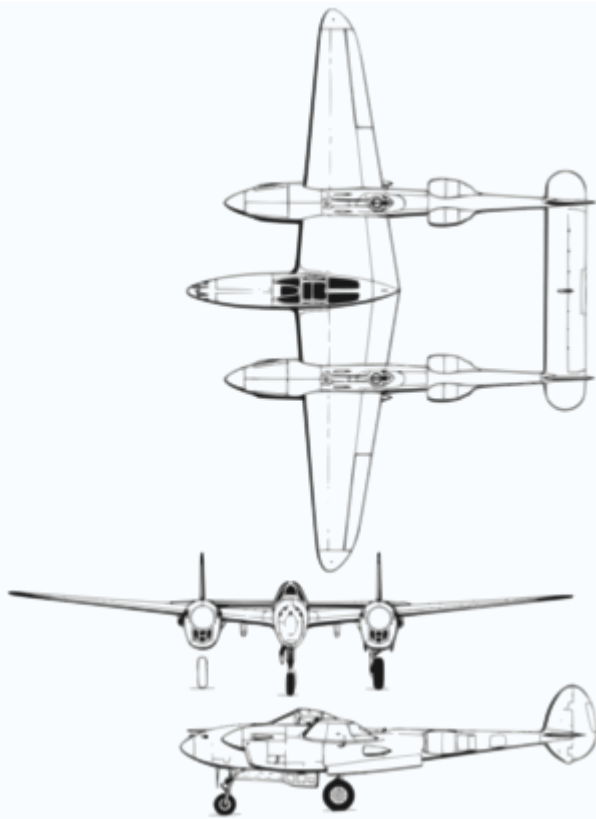
The seventh-ranking American ace, Charles MacDonald, also flew a Lightning against the Japanese, scoring 27 kills in his famous aircraft, the "Putt Putt Maru."

A P-38 piloted by Clay Tice was the first American aircraft to land in Japan after VJ-Day, when he and his [wingman](#) set down on Nitagahara because his wingman was low on fuel.^[citation needed]

Since F-5s operated alone, when their missions went wrong, they generally disappeared without a trace. The noted aviation pioneer and writer [Antoine de Saint-Exupery](#) vanished in an F-5 while on a flight over the Mediterranean, from Corsica to mainland France, on [31 July](#) 1944. Recently, a French scuba diver found the wreckage of a Lightning in the Mediterranean off the coast of [Marseille](#) in 2000, and it was confirmed in April 2004 as Saint-Exupery's.

The RAF's legendary photo-recon "ace," Wing Commander [Adrian Warburton](#) DSO DFC, was the pilot of a Lockheed F-5B borrowed from the USAAF that took off on [12 April 1944](#) to photograph targets in Germany. W/C Warburton failed to arrive at the rendezvous point and was never seen again. In 2003, his remains were recovered from his wrecked USAAF F-5B Lightning in Germany.

Specifications (P-38L)



Lockheed P-38L Lightning at the [National Museum of the United States Air Force](#).
Data from *Quest for Performance* ^[29]

General characteristics

- **Crew:** One
- **Length:** 37 ft 10 in (11.53 m)
- **Wingspan:** 52 ft 0 in (15.85 m)
- **Height:** 9 ft 10 in (3.00 m)
- **Wing area:** 327.5 ft² (30.43 m²)
- **Airfoil:** [NACA 23016](#) / NACA 4412
- **Empty weight:** 12,780 lb (5,800 kg)
- **Loaded weight:** 17,500 lb (7,940 kg)
- **Max takeoff weight:** 21,600 lb (9,798 kg)
- **Powerplant:** 2x [Allison V-1710](#)-111/113 liquid-cooled turbosupercharged V-12, 1,600 hp (1,194 kW) each
- **Zero-lift drag coefficient:** 0.0268

- **Drag area:** 8.78 ft² (0.82 m²)
- **Aspect ratio:** 8.26

Performance

- **Maximum speed:** 414 mph at 25,000 ft (667 km/h at 7,620 m)
- **Stall speed:** 105 mph (170 km/h)
- **Range:** 1,100 mi combat, 2,600 mi ferry (1,770 km / 3,640 km)
- **Service ceiling:** 44,000 ft (13,400 m)
- **Rate of climb:** maximum: 4,750 ft/min (1,448 m/min)
- **Wing loading:** 53.4 lb/ft² (260.9 kg/m²)
- **Power/mass:** 0.16 hp/lb (0.27 kW/kg)

- **Lift-to-drag ratio:** 13.5

Armament

- 1x [Hispano M2\(C\) 20 mm](#) cannon with 150 rounds (2 AP, 2 tracer and 2 HE ammo belt composition) and 4x Colt-Browning MG53-2 [0.50 in \(12.7 mm\)](#) machine guns with 500 rounds per gun. The rate of fire was about 650 rounds per minute for the 20x110 mm cannon round (130 g shell) at a muzzle velocity of about 880 m/s, and for the 12.7x99 mm MGs (43-48 g), about 850 rpm at 840 m/s velocity.
- 4x M10 three-tube 4.5 in (112 mm) rocket launchers or:
- 10x 5 in (127 mm) HVAR's (High Velocity Aircraft Rocket) and/or:
- either 2x 2,000 lb (908 kg) or 2x 1,000 lb (454 kg), 4x 500 lb (227 kg) or 4x 250 lb (114 kg) bombs



[Ruth Dailey](#), [WASP](#) climbs into a P-38.

External links

- [United States Air Force Museum P-38 page](#)
- [Usaaf.com P-38 photos](#)
- [The Flying Bulls P-38 Restoration at Ezell Aviation](#)
- [Lost Squadron Museum, home of "Glacier Girl," a P-38 recovered and restored to flying condition after being embedded in ice for 50 years](#)
- [P-38 Lightning Online: photos, pilots, strategies, the good and the bad about the famed Lightning](#)
- [P-38 National Association and Museum](#)
- [Whatever happened to the Lockheed P-38K?](#)

Related development

- [Constellation](#)
- [XP-49](#)
- [XP-58 Chain Lightning](#)

Comparable aircraft

Configuration

- [Fokker G.I](#)
- [Hughes D-2](#)
- [Hughes XF-11](#)
- [P-61 Black Widow](#)
- [Focke-Wulf Fw 189](#)

Performance

- [de Havilland Mosquito](#)
- [de Havilland Hornet](#)
- [Focke-Wulf Fw 187](#)
- [Grumman F7F Tigercat](#)
- [Westland Welkin](#)

Styling Influence

- Automobile [Tailfin](#)

Designation sequence

- *Pre-1948 USAAC/F:*
 - Pursuit: [P-35](#) - [P-36](#) - [XP-37](#) - **P-38** - [P-39](#) - [P-40](#) - [XP-41](#)
 - Photographic Reconnaissance: [F-1](#) - [F-2](#) - [F-3](#) - **F-4** - **F-5** - [F-6](#) - [F-7](#) - [F-8](#)
- *1922-1962 Navy:*
 - [FJ](#) - [FL](#) - [FM](#) - **FO** - [FO](#) - [FR](#) - [FS](#)
- *Post-1948 USAF:*
 - **F-38** - [F-40](#) - [F-47](#) - [F-51](#) - [F-59](#) - [F-61](#)

Related lists

- [List of military aircraft of the United States](#)
- [List of fighter aircraft](#)
- [List of Lockheed aircraft](#)