FIGHTER ACE

Pilot's Operating Handbook

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Introduction

Envision the massive undertaking it takes to build a plane and testing the struts out of it. Luckily in the virtual world of Fighter Ace we don't need to place ourselves in a cockpit and push the envelope and risking our lives. This manual contains the specification of every plane modeled in Fighter Ace to this date.

The data was calculated over an extended period of time and many virtual planes were broken in the process. Had this been for real the total plane toll would have been in excess of 10 million aircraft. The envelope was pushed in all regards to unearth the data that is visualized in this manual. Doing this work manually in-game would have taken a team over 5 years and working 24/7 to complete.

The page layout was made to have a light introduction from the top and the gritty technical stuff at the bottom. You will find the star rating and the name of the plane at the very top of each even page. This is followed by text about the plane with pictures from different vantage angles to the left. The odd pages includes the technical data and the graphs on plane behavior at different altitudes.

The three graphs can be used to help in value judgments when flying in combat. For instance the Speed [SA] graphs can help you determine how effective your opponents plane is against yours. The SA graphs contain max level speed (Vtas) and stall speed which gives the plane an operating frame to work in. One can survive outside these limits although the maneuverability of the plane will be much tougher and the structural integrity of the plane may be damaged. These values are estimated within 5% of real in-game performance. The planes corner velocity is also included to show at what speed one can obtain the best turn rate. These values are estimated within 20% of real in-game performance. The climb rate [CR] graph is placed upper right and shows how weight-load and altitude effects climb-rate. It can be used by both fighter and bomber pilots. Bomber pilots will need to use CR to estimate their effective fuel range and how long their flight will be and if they can meet their objective. Fighter pilots can use CR in conjunction with SA to estimate if they need to engage in an E fight or turn fight against their current opponent. The CR values are estimated within 5% of real in-game performance. At the bottom there are fuel range [FR] graphs with various loads and speeds that help in calculating the effective fuel range once airborne. The FR values are estimated within 5% of real in-game performance.

How does one utilize these graphs to have an advantage? Learn the strong points of the plane your are flying. Engage in fights when you are close to these optimal operating points to increase the probability for a successful mission and combat. The graphs make it simpler for you to push the envelope in every aspect and should be easier to remember than a myriad of numbers. One can overlay these graphs with minor resizing to compare two or more aircraft. The graphs were optimized to show as much data granularity as possible but always to have the 40k feet ceiling.

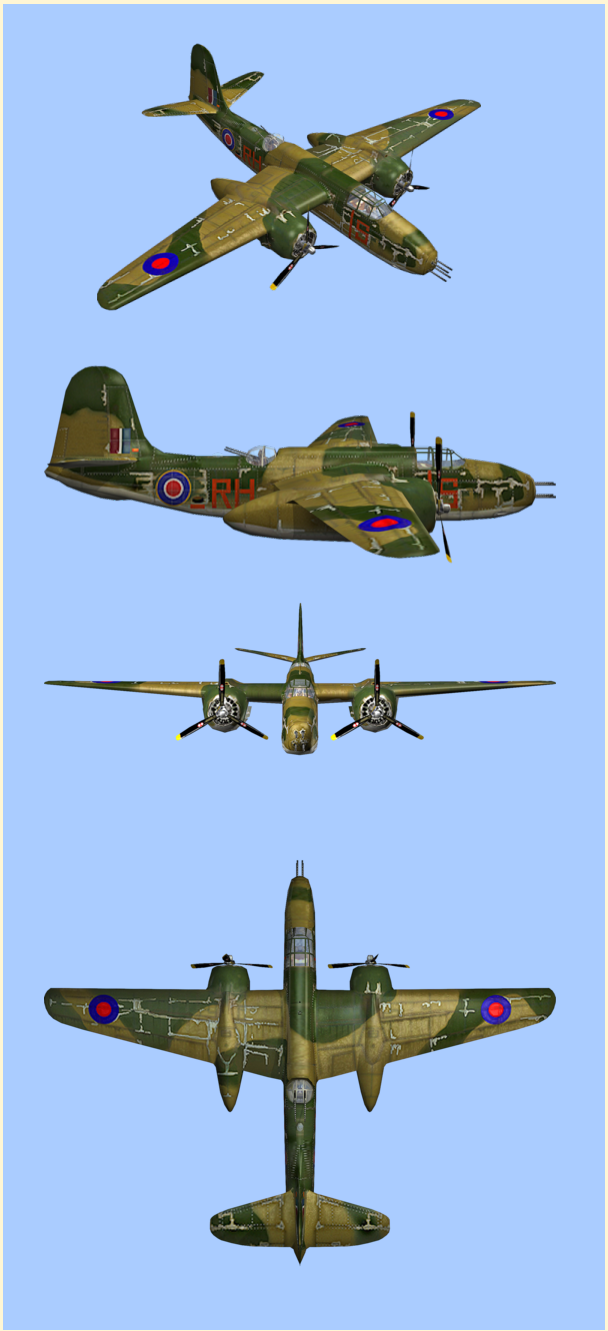
All values have been calculated using realistic physics parameters and all planes start parameters have been the same. This makes all graphs consistent and should be read relative to each other. Any graphs looking like real life data is not coincidental due to the nature of the Fighter Ace physics engine. However the planes have not been modeled exactly as their real world counterparts for a various of reasons. Game play being one and the difficulty to actually get real world data for some of the planes the other. In all the graphs should still be well within 20% of real world plane performance.

Buckle up and pop some struts!

Denko@HQ

Douglas DB-7B
Boston Mk.IV

Durability	☆☆☆☆☆	Speed	☆☆☆☆	Climb Rate	☆☆
Maneuverability	☆☆☆	Firepower	☆☆☆☆☆☆	Ground Attack	☆☆☆☆☆☆



The Boston Mk.IV was the functional equivalent of the US A-20G Havoc, which was a particularly potent ground attack plane.

Anticipating an Army Air Corps need for a light attack bomber, Donald Douglas, Jack Northrop, and Ed Heinnemann set about the task of developing an attack bomber with the help of Wright Field technicians. The Model 7A, as the project was known, was calculated to be able to reach a speed of 250 mph with a load of bombs, a crew of two and three .30 caliber machine guns in the nose.

However before they could complete the design, lessons learned from the Spanish Civil War made it apparent that the Model 7A would be inadequate for modern air combat. The existing design was scrapped, and work started on the Model 7B. With Northrop's resignation, Ed Heinnemann completed the design alone and the plane made its first flight in late 1938.

Shortly after completion of the first prototype, French purchasing agents arrived in California and placed an order for 100 planes, which they soon increased to 380. The French asked for so many changes that the result was almost a new plane, which the company designated the DB-7. The DB-7 was equipped with four 7.5mm machine guns around and under the glass nose and a single flexible 7.5mm in the dorsal and ventral tunnel positions. It could carry up to 1,764 lb. of bombs, and was powered by a pair of 1,200 hp Twin-Wasp engines.

During the initial production run, the French government requested an upgrade to a pair of 1,600 hp Cyclone engines and the new model was known as the DB-7A. However, France capitulated before many could be delivered and Britain's RAF took over the contract, dubbing the plane the "Boston".

Soon after the French order was made, the U.S. Army decided the plane met their specifications and placed an order for a variant modified to use turbo superchargers on the Wright engines, which they called the A-20. However, the superchargers were bulky and there was really no need for them on a low-level aircraft, so the A-20A reverted back to non-supercharged engines and 123 were ordered.

Replacing the .30 caliber guns with .50 caliber models, the A-20B also featured a redesigned bomb bay, which could carry an optional 200-gallon auxiliary fuel tank for long-range ferrying. Although 999 were ordered for USAAF use, the majority were shipped to Russia under the Lend Lease program. The A-20C reverted back to .30 caliber armament, but also introduced self-sealing fuel tanks and more crew armor protection. The D, E, and F variants were experimental models that never entered production.

Deliveries of the Boston Mk III to the RAF began in the spring of 1941. This turned out to be the most widely used version of the aircraft. It proved to be an ideal replacement for the Blenheim, a plane, which had been key to daylight bombing missions, but was quickly becoming obsolescent. Crews appreciated its speed (over 300 mph) and maneuverability.

The changes to the plane for the upcoming A-20G model were numerous. The glass nose was replaced by a solid nose containing either six .50 caliber machine guns or a pair of .50s and four 20mm cannon. The flexible machine gun mounting in the dorsal position was replaced by a Martin turret equipped with a pair of .50 caliber machine guns, and the .30 caliber gun in the ventral tunnel position was replaced by a .50 caliber model.

Internally, the A-20G featured greater fuel capacity and increased crew armor. A pair of hardpoints under the outer wing panels allowed the Havoc to carry up to four 500 lb. bombs externally, in addition to the 2,000 lb. internal load, making the Havoc a potent bombing platform. Over 2,850 A-20Gs were produced and Havocs served with both the British RAF and the Russian Red Army.

Sources:

Green, William; Famous Bombers of the Second World War, Second Series; Doubleday & Company, Garden City, New York; 1961.

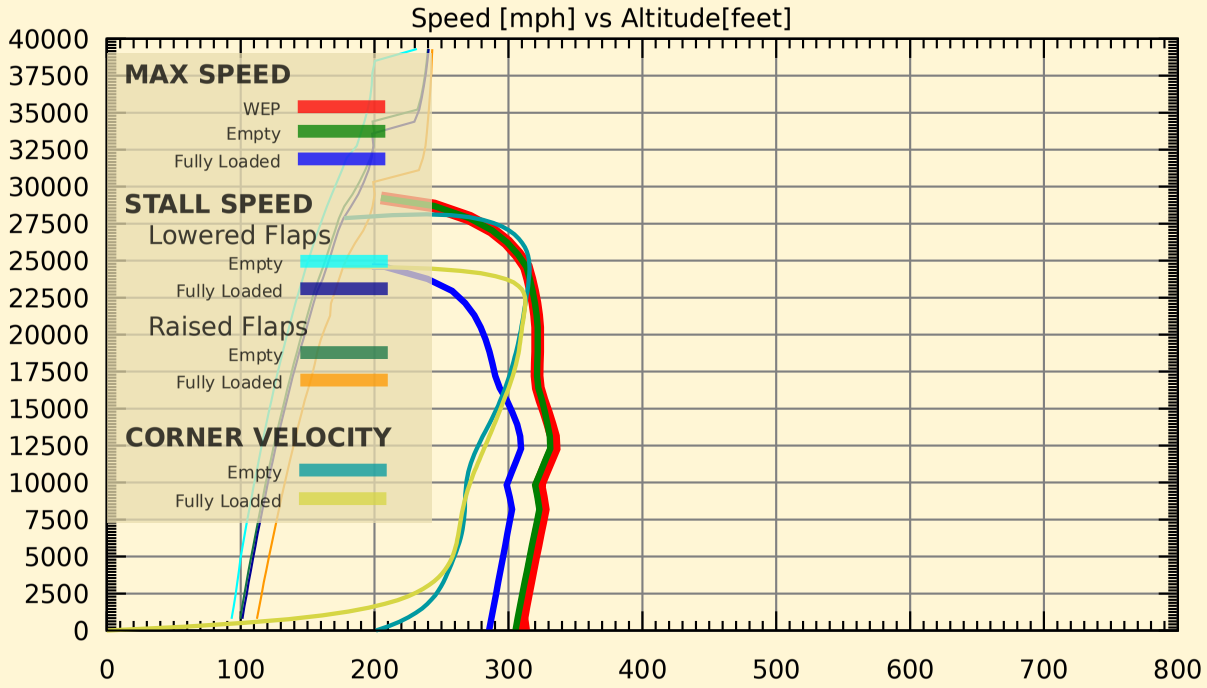
Mesko, Jim; A-20 Havoc In Action, Aircraft Number 144; Squadron/Signal Publications, Carrollton, Texas; 1994.

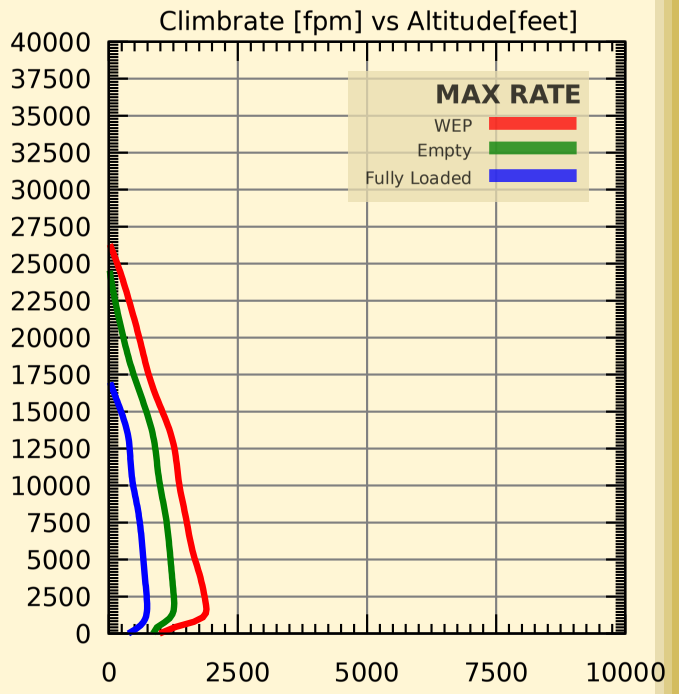
Name: Douglas DB-7B Boston Mk.IV
Role: Fighter Bomber
Crew: 3
Service Date: March 1943
Primary Guns: 2x Browning M2 0.5" machine guns with 350 rpg in nose
Secondary Guns: 4x Hispano Mk.II 20mm cannon with 60 rpg in the nose
Defensive Guns: NA
Ordnance: 8x 250 lb or 4x 535 lb or 2x 910 lb bombs or 1103 lb fuel tank in internal bomb bay, plus 4x 250 lb or 4x 535 lb bombs or 8x 84 lb A2G rockets on underwing pylons, or One 1548 lb Mk.XII torpedo

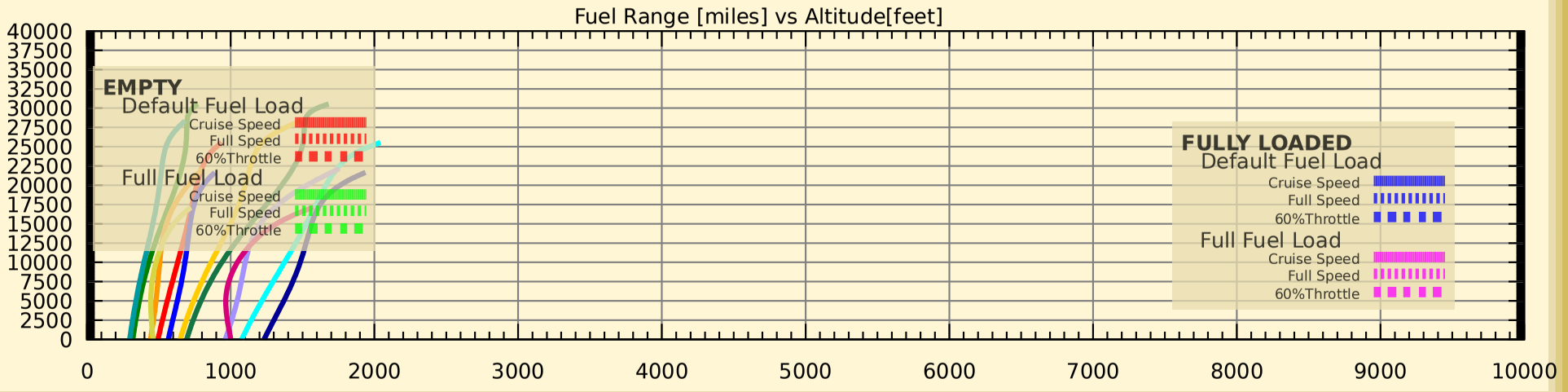
Length: 48.00 ft
Wing Span: 61.32 ft
Wing Area: 465 sq. ft

Power Plant: 2 X Wright R-2600-23
Power: 3070 lb s.t.
Internal Fuel: 4080 lb
External Fuel: 1103 lb internally in the bomb-bay

Empty Weight: 17372 lb
MTOW: 25794 lb

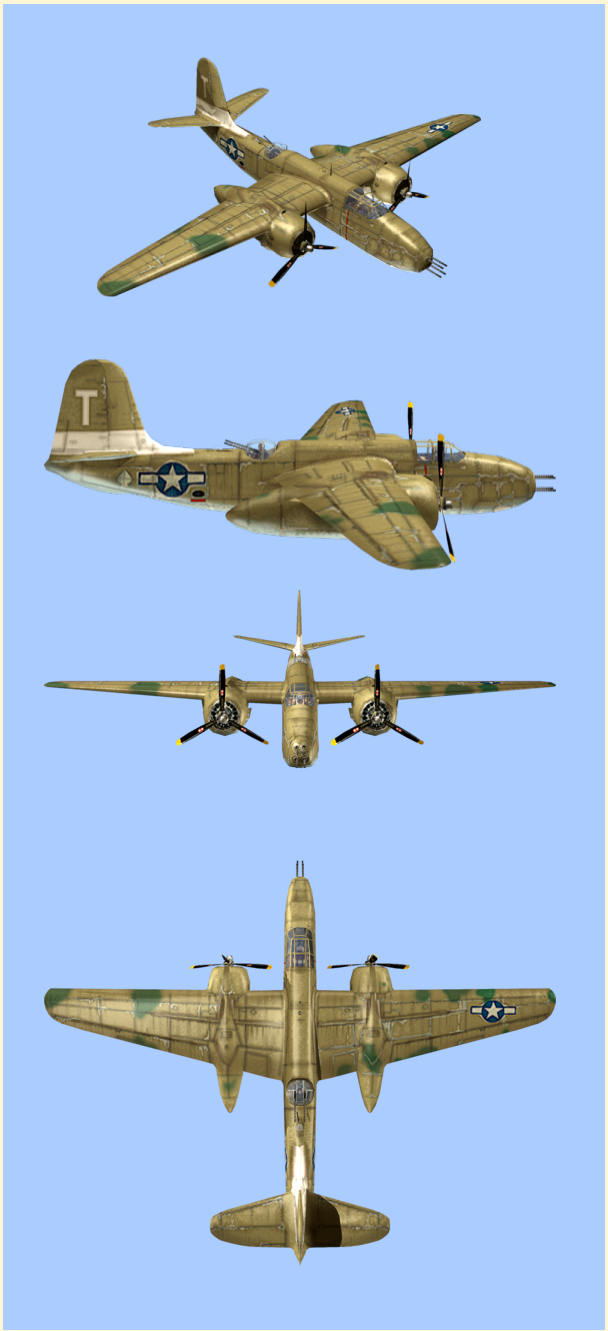






Douglas A-20G Havoc

Durability	☆☆☆☆☆	Speed	☆☆☆☆	Climb Rate	☆☆
Maneuverability	☆☆☆	Firepower	☆☆☆☆☆☆	Ground Attack	☆☆☆☆☆☆☆



Bomb Aiming - The A-20 didn't use a level bomb sight, so bombing accuracy was fairly low.

Anticipating an Army Air Corps need for a light attack bomber, Donald Douglas, Jack Northrop, and Ed Heinnemann set about the task of developing an attack bomber with the help of Wright Field technicians. The Model 7A, as the project was known, was calculated to be able to reach a speed of 250 mph with a load of bombs, a crew of two and three .30 caliber machine guns in the nose.

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The changes to the plane for the upcoming A-20G model were numerous. The glass nose was replaced by a solid nose containing either six .50 caliber machine guns or a pair of .50s and four 20mm cannon. The flexible machine gun mounting in the dorsal position was replaced by a Martin turret equipped with a pair of .50 caliber machine guns, and the .30 caliber gun in the ventral tunnel position was replaced by a .50 caliber model.

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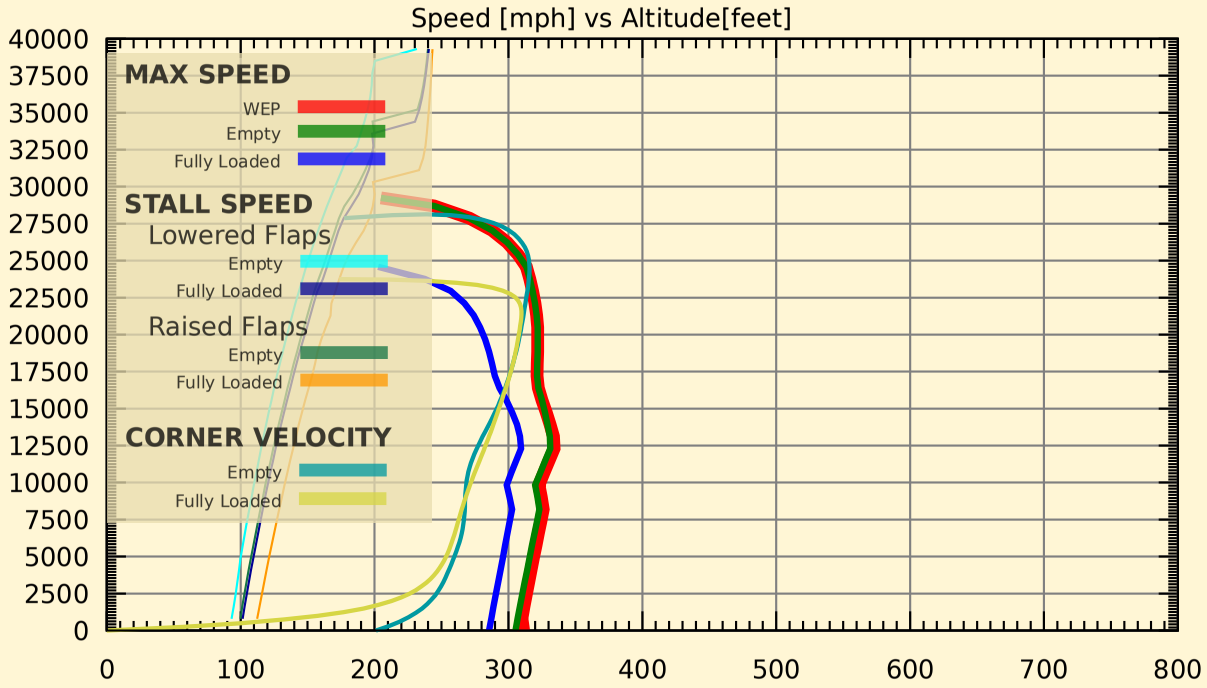
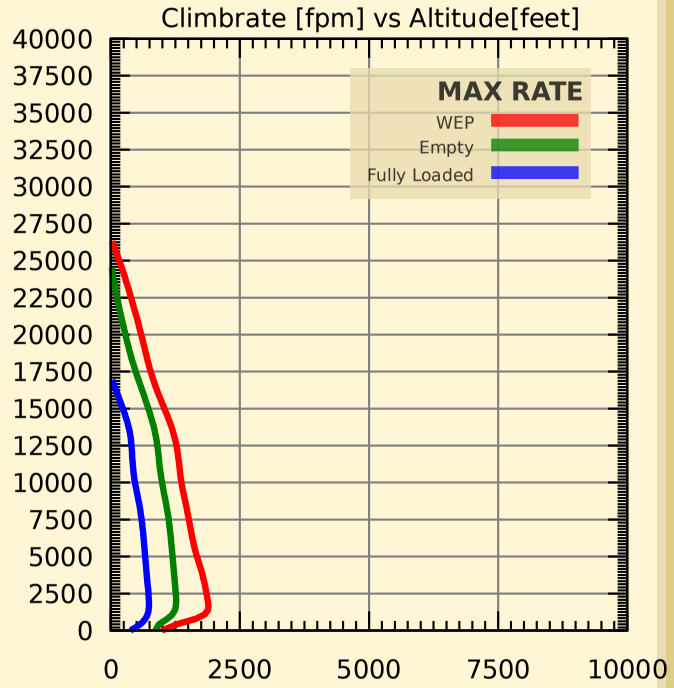
Name: Douglas A-20G Havoc
Role: Fighter Bomber
Crew: 3
Service Date: February 1943
Primary Guns: 2x Browning M2 0.5" machine guns with 350 rpg in nose
Secondary Guns: 4x Bendix AN/M2 (Hispano II) 20mm cannon with 60 rpg in nose
Defensive Guns: NA
Ordnance: 8x 250 lb or 4x 500 lb or 2x 1000 lb or One 2000 lb bombs or One 1102 lb internal fuel tank in internal bomb bay, plus 4x 250 lb or 4x 500 lb bombs or 8x 139 lb HVAR A2G rockets on underwing pylons, or One 2216 lb Mk.13

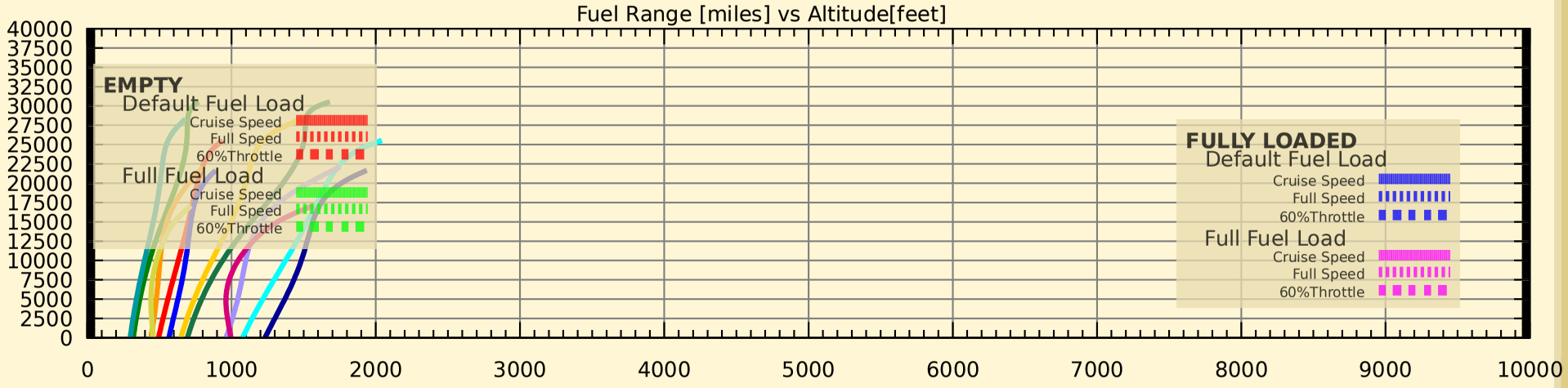
Length: 48.00 ft
Wing Span: 61.32 ft
Wing Area: 465 sq. ft

Power Plant: 2 X Wright R-2600-23
Power: 3070 lb s.t.
Internal Fuel: 4080 lb
External Fuel: 1103 lb internally in the bomb-bay

Empty Weight: 17372 lb
MTOW: 25353 lb







Douglas A-20G Boston

Durability	☆☆☆☆☆	Speed	☆☆☆☆	Climb Rate	☆☆
Maneuverability	☆☆☆	Firepower	☆☆☆☆☆☆	Ground Attack	☆☆☆☆☆☆

Bomb Aiming - The A-20 didn't use a level bomb sight, so bombing accuracy was fairly low.

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Internally, the A-20G featured greater fuel capacity and increased crew armor. A pair of hardpoints under the outer wing panels allowed the Havoc to carry up to four 500 lb. bombs externally, in addition to the 2,000 lb. internal load, making the Havoc a potent bombing platform. Over 2,850 A-20Gs were produced and Havocs served with both the British RAF and the Russian Red Army.

While most of the planes sent to Russia under Lend-Lease were of obsolete types, the A-20G was a different matter in that most of the first part of the production run was sent to the USSR instead of the USAAF.

Initially armed with four 20mm AN-M2 cannon with 60 round drum magazines and a pair of .50 caliber Brownings in the nose, the Red Air Force replaced the M2 cannons with ShVAK 20mm cannons fed by 100 round belts. The .50 caliber nose guns were retained, as were the .50 caliber guns in the dorsal turret. Additionally, rails were added under the wings to allow the Boston to carry eight RS-132 rockets.

Sources:

Green, William; Famous Bombers of the Second World War, Second Series; Doubleday & Company, Garden City, New York; 1961.

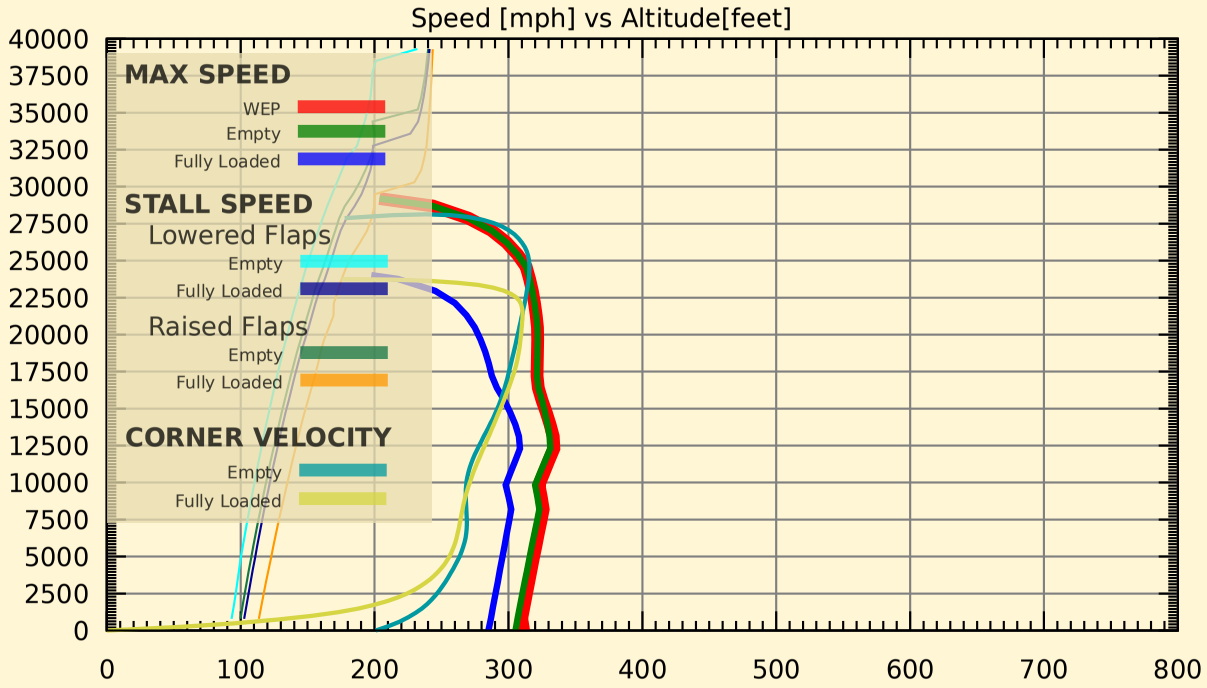
Mesko, Jim.; A-20 Havoc In Action, Aircraft Number 144; Squadron/Signal Publications, Carrollton, Texas; 1994.

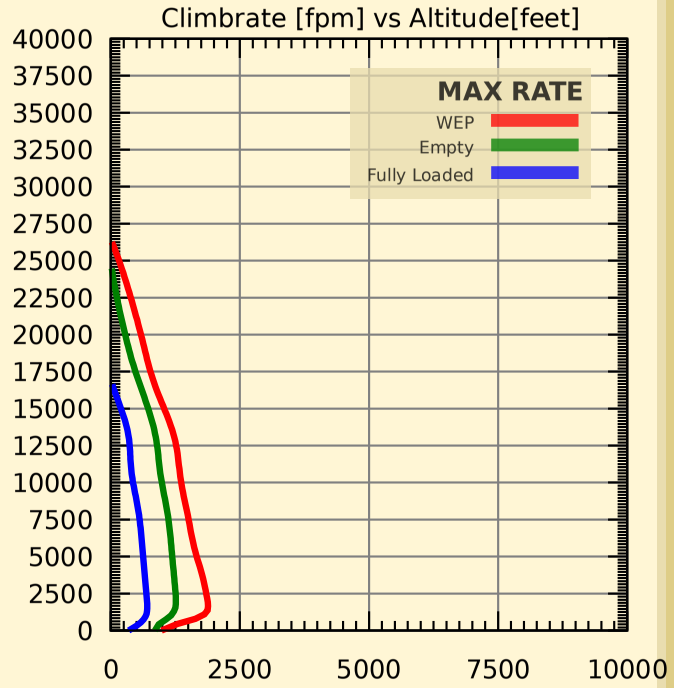
Name: Douglas A-20G Boston
Role: Fighter Bomber
Crew: 3
Service Date: February 1943
Primary Guns: 2x Browning M2 0.5" machine guns with 350 rpg in nose
Secondary Guns: 4x ShVAK 20mm cannon with 100 rpg in nose
Defensive Guns: NA
Ordnance: 8x 220 lb or 4x 551 lb or 2x 1103 lb or One 2205 lb bombs or 1103 lb fuel tank in internal bomb bay, plus 4x 220 lb or 4x 551 lb bombs or 8x 66 lb RS-132 A2G rockets on underwing pylons, or One 2095 lb 45-36AN torpedo

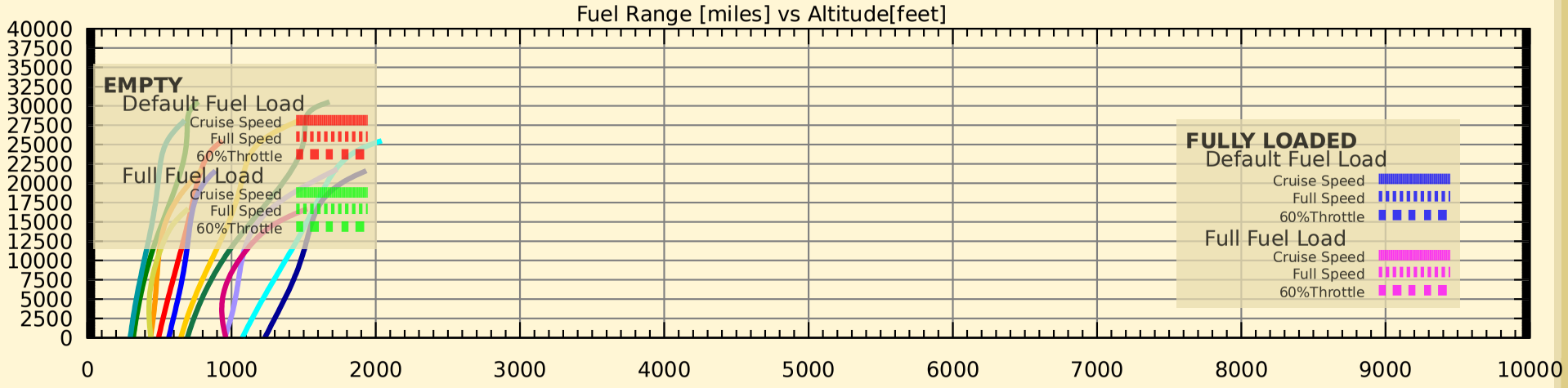
Length: 48.00 ft
Wing Span: 61.32 ft
Wing Area: 465 sq. ft

Power Plant: 2 X Wright R-2600-23
Power: 3070 lb s.t.
Internal Fuel: 4080 lb
External Fuel: 1103 lb internally in the bomb-bay

Empty Weight: 17372 lb
MTOW: 25573 lb

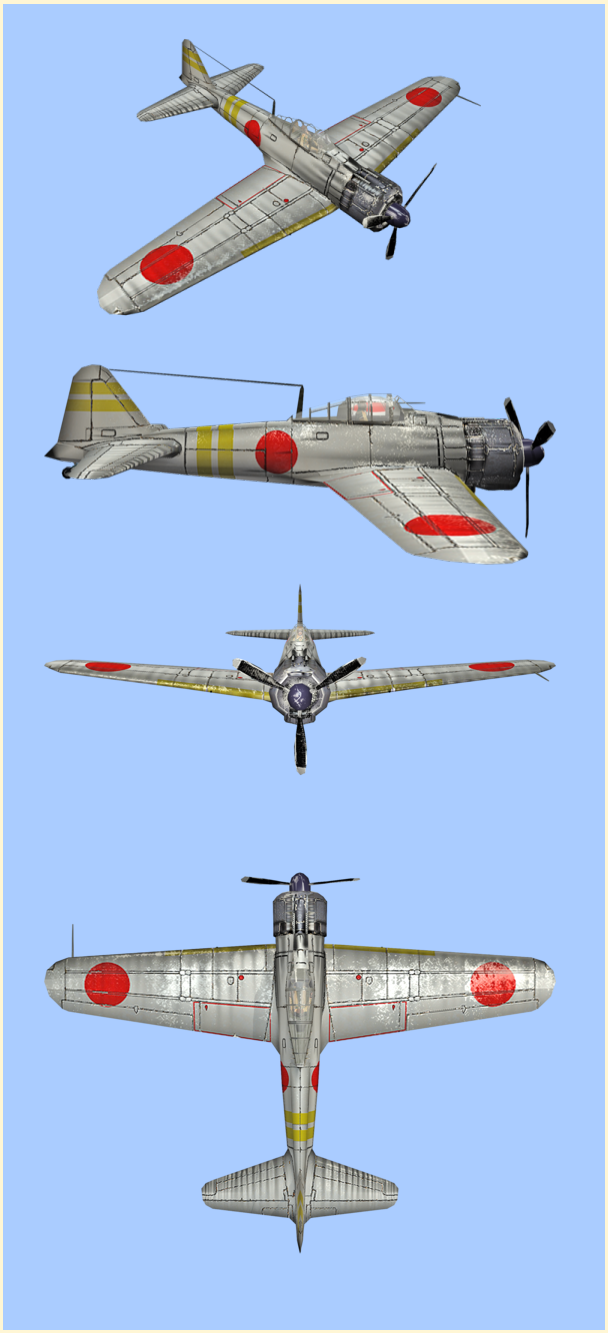






Mitsubishi A6M2 Zero

Durability	☆	Speed	☆☆☆☆☆	Climb Rate	☆☆☆☆☆
Maneuverability	☆☆☆☆☆☆☆☆	Firepower	☆☆	Ground Attack	☆☆



Durability - The complete lack of pilot and fuel protection makes that the Zero the easiest plane in the game to bring down.

With the A5M Claude just starting to enter service the Japanese Navy decided to task the nation's aircraft manufacturers with designing and building a superior replacement. Looking for a "state of the art" airplane that would exceed the performance of anything it was likely to meet, the Navy established stringent performance criteria. The new design had to be capable of a top speed of 310 mph and had to climb to 10,000 feet in 3 1/2 minutes. Armed with two cannons and two machine guns and having a range exceeding that of any current fighter, it had to be equal to or better than the Claude in maneuverability and handling. Nakajima immediately withdrew from the competition, stating that it was impossible to design such a plane. But Mitsubishi's Jiro Hirokoshi felt that it could be done and set about the task of designing the plane.

The team selected the company's own 780 hp Zuisei 13 fourteen-cylinder radial engine, partly because it was a Mitsubishi product, but mostly because of its small diameter and light weight. Special attention was paid to weight reduction with the plane utilizing the new Extra-Super Duralumin alloy developed for aircraft use by the Sumitoma Metal Industry Company. To simplify production and maintenance, the single spar wing and center fuselage section were built as a single piece and the front and rear portions of the fuselage were removable.

The first prototype was flown on April 1, 1939 and proved an immediate success with only a few minor problems, including a tenancy to vibrate excessively. After further testing and experimentation the two-blade prop was replaced with a constant-speed, three-blade propeller, which eliminated almost all of the vibration in the plane. The Navy accepted the first prototype for testing on September 14, 1939 as the A6M1 Type 0 Carrier Fighter, which in Japanese is Rei Shiki Sento Ki and was shortened to Rei-sen, literally "Zero Fighter". This prototype would end up making 119 flights with a total flight time of 43 hours 26 minutes!

Meanwhile, the Navy had accepted Nakajima's new 925 hp Sakae 12 engine into service. With its similar dimensions and weight to the Zuisei, the Navy ordered Mitsubishi to install the new engine on the third prototype, which was given the designation A6M2 to distinguish it from the Zuisei powered model. Flight tests of the A6M2 began on January 18, 1940, the additional power of the engine allowing the plane to far exceed the rigid performance specifications laid out by the Navy and so fifteen machines were ordered for use in Service Trials in China.

The 12th Kokutai stationed in Hankow received the new A6M2s and immediately used them on their first combat mission on August 19, 1940. However, they saw no action until their fourth mission when they encountered a formation of Chinese I-15s and I-16s. They turned and dove into the Chinese formation, shooting down all 27 enemy planes without suffering a single loss. Over the next few months 153 Rei-sen sorties resulted in the destruction of 59 Chinese planes in the air and 101 on the ground, without a single loss. Soon the Chinese Air Force declined to engage Rei-sen escorted bomber formations and the Japanese were allowed to roam at will over the country.

Claire Chenault, then serving as the air commander for the Nationalist Chinese, reported on the ability of this plane, but American commanders ignored the implications and thus the first appearance of the plane to Western forces came as a shock and a surprise. When it did show up, Allied intelligence gave it the code-name 'Zeke', but by then everyone knew its Japanese code-name and it was commonly called the 'Zero' by Allied troops.

Production of the A6M2 Model 11 had just begun when the wing spar on the second A6M1 failed, causing a fatal crash. As a result the wing spar was redesigned for greater strength and the new wing was incorporated into the production line starting with the 22nd plane. Carrier Trials Testing revealed a problem with the wingspan being too long to safely fit on the elevators, so starting with the 64th production machine the Model 21 was introduced with the outer 20 inches of wingtip able to be manually folded upwards, which allowed sufficient clearance for elevator operations.

By the time of the Pearl Harbor attack, the Navy had 126 Model 21s assigned to carrier duties and another 213 assigned to land-based squadrons. Over the next several months a myth of invincibility surrounded the Zero that masked its shortcomings. However, this was soon to change.

On June 3, 1942 Flight Petty Office Tadayoshi Koga took off in his brand-new A6M2 Model 21 for a raid on Dutch Harbor in the Aleutians. On the return flight he noticed he had lost too much fuel and decided to land on the small island that had been designated for emergency landings. Unfortunately the ground was soft and his plane flipped over onto its back, breaking his neck and killing him instantly. Several months later an American naval scouting party found the nearly intact plane, recovered it and shipped it back to the US for testing. This testing revealed its limitations and allowed US designers to tailor their designs to counter the Zero and the other light, highly maneuverable fighters the Japanese were fielding at the time.

Sources:

Francillon, Rene J.; Japanese Aircraft of the Pacific War; Naval Institute Press, Annapolis, MD; 1979.

Green, William; Warplanes of the Second World War, Fighters, Volume Three; Hanover House, Garden City, NY; 1960.

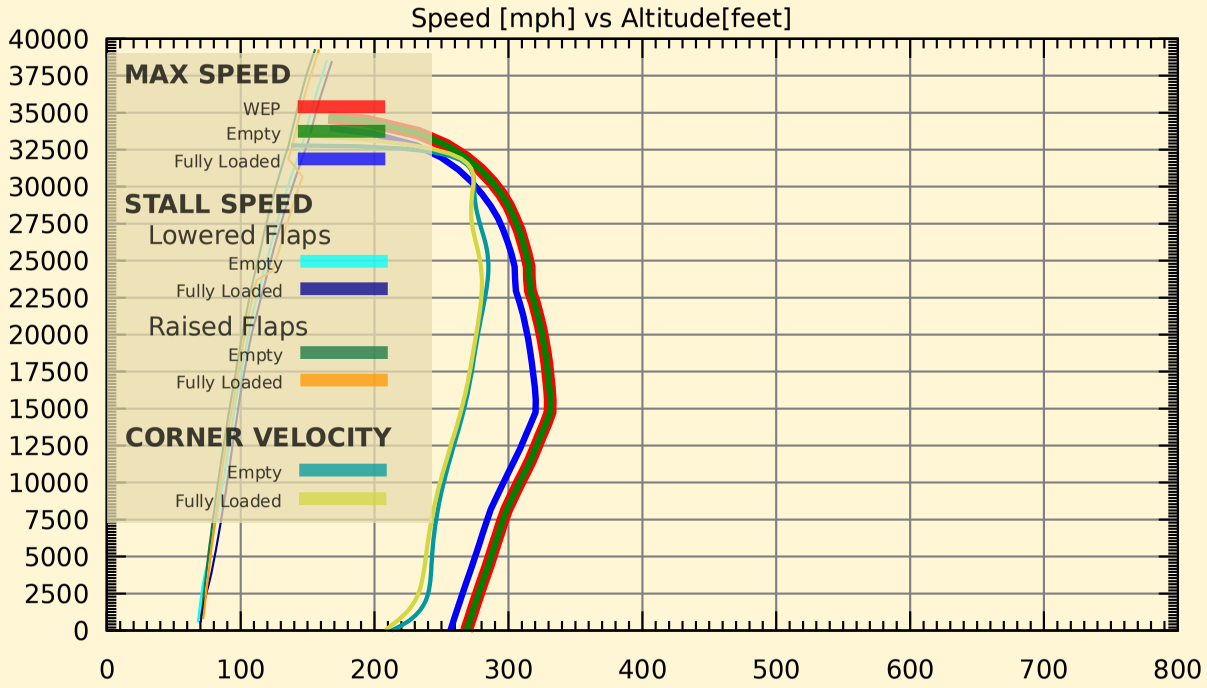
Green, William; Famous Fighters of the Second World War; Hanover House, Garden City, NY; 1960.

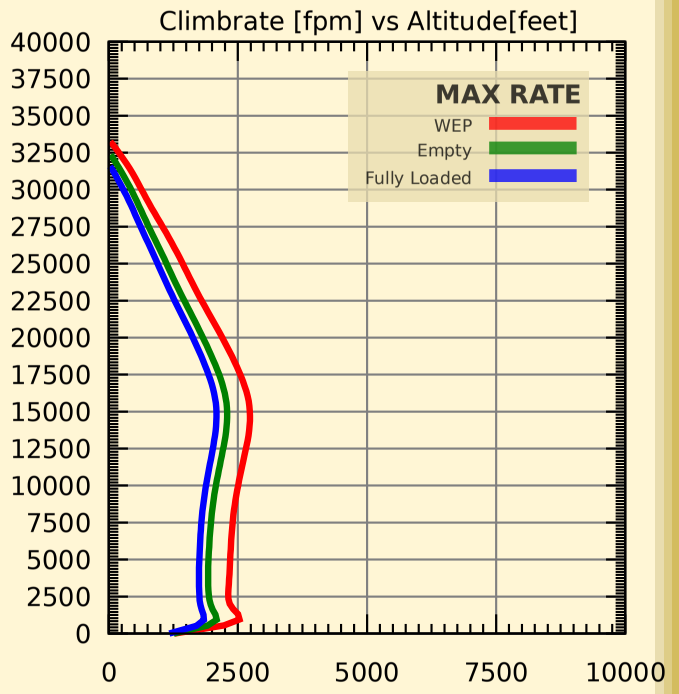
Name: Mitsubishi A6M2 Zero
Role: Fighter
Crew: 1
Service Date: October 1940
Primary Guns: 2x Type 97 7.7mm machine guns with 500 rpg in cowl
Secondary Guns: 2x Type 99-1 20mm cannon with 60 rpg in wings
Defensive Guns: NA
Ordnance: 2x 110 lb bombs under wings, plus One 523 lb drop tank under fuselage

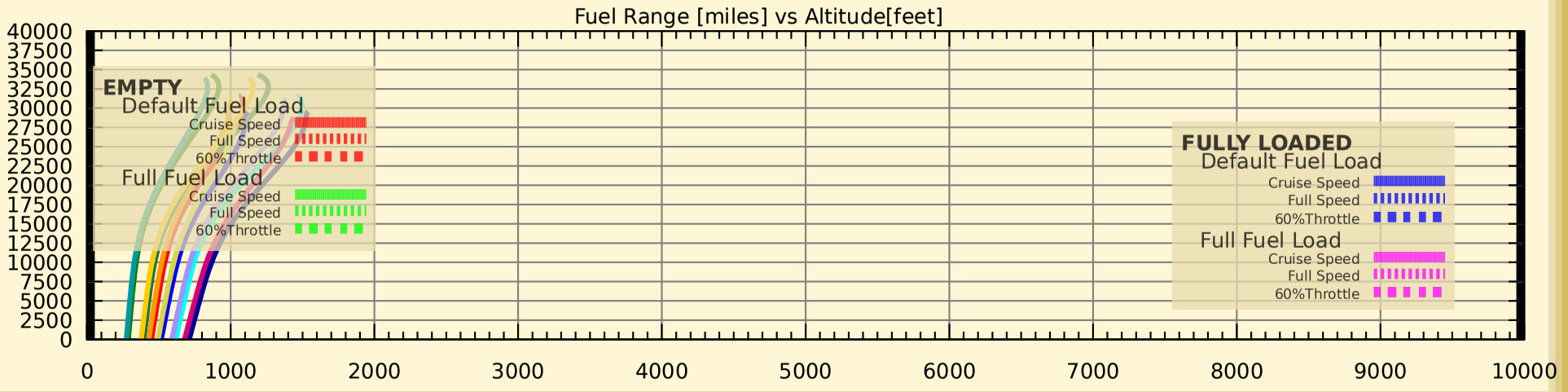
Length: 29.76 ft
Wing Span: 39.37 ft
Wing Area: 242 sq. ft

Power Plant: One Nakajima NK1C Sakae 12
Power: 2066 lb s.t.
Internal Fuel: 847 lb
External Fuel: 523 lb

Empty Weight: 3902 lb
MTOW: 5622 lb

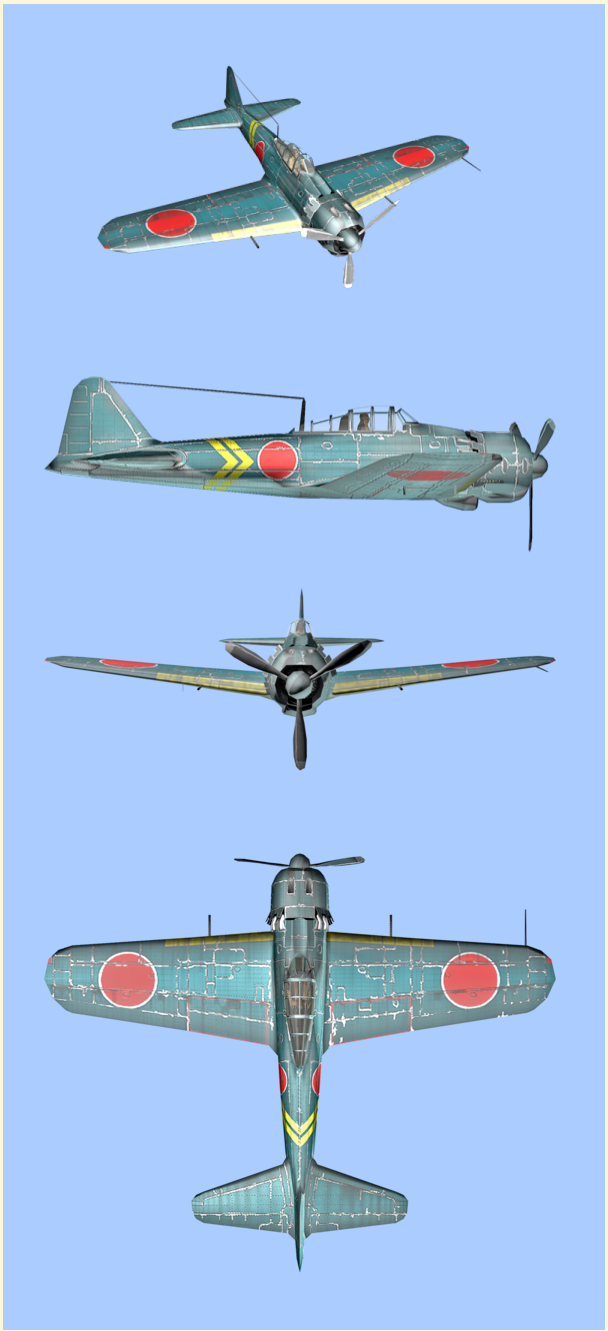






Mitsubishi A6M5
Zero

Durability	☆☆	**Speed**	☆☆☆☆☆	**Climb Rate**	☆☆☆☆
Maneuverability	☆☆☆☆☆☆	**Firepower**	☆☆	**Ground Attack**	☆☆☆



Speed - The A6M5's top speed of 351 mph at altitude leaves lagging behind all of its contemporaries.

In June 1941 the latest version of the Zero, the A6M3 Model 32, entered flight testing. Powered by the 1,130 hp Sakae 21 engine with a two-stage supercharger, the folding wingtips were removed allowing the "clipped" Zero to attain a speed of 341 mph at 20,500 feet.

First encountered over the New Guinea in September 1942, Allied flyers thought they had encountered an entirely new type and it was given the code-name 'Hap'. However, fears that this would offend General 'Hap' Arnold caused it to be changed to 'Hamp'. It was soon learned though that the new plane was merely a revised Zero and it became officially known as the 'Zeke 32'.

Unfortunately the new engine had required that the firewall be moved 8 inches to the rear, thus reducing the fuel capacity by 21 gallons. With the more powerful engine using more fuel than had been anticipated, several planes were lost when they ran out of fuel returning from missions over the Solomons. Complaints by these front-line units about the reduced range prompted Mitsubishi to install an 11.9 gallon fuel tank in each wing outboard of the cannon. To compensate for the greater weight of the full tanks, the folding wingtips were restored and the A6M3 Model 22 was born.

Originally retaining the same armament as the first A6M1, late in the production run of the Model 22 the wing cannon were upgraded to the Type 99-2 cannon, which had a higher muzzle velocity and was fed by a 100 round drum. The result was dubbed the A6M3a Model 22a and these started to appear during late 1942 to mid 1943.

By now, the Zero was due for replacement, but all existing projects were bogged down with problems and failures of various kinds, so the Navy asked Mitsubishi to upgrade the Zero yet again. The wing was redesigned to return to the shortened length of the Model 32, but with rounded tips and the new wing tanks. Although a more powerful engine was not available, top speed was boosted to 358 mph at 22,000 feet by installing "ejector" type exhaust stubs to provide a "ram" effect.

The prototype of the A6M5 Model 52 was completed in late 1943 and deliveries commenced in March 1944. The Model 52a, which soon replaced the Model 52 on the production line, featured upgraded cannon armament in the form of the belt fed version of the Type 99-2 cannon with 125 rpg. Additionally, strengthened wings allowed the plane's safe diving speed to be increased by over 50 mph, bringing it much closer to Western standards. Still the Zero was decidedly inferior to Allied fighters and its continued use reflected the desperation of the Japanese Navy to get even a tiny bit closer to the performance of the planes they were facing.

Sources:

Francillon, Rene J.; Japanese Aircraft of the Pacific War; Naval Institute Press, Annapolis, MD; 1979.

Green, William; Warplanes of the Second World War, Fighters, Volume Three; Hanover House, Garden City, NY; 1960.

Green, William; Famous Fighters of the Second World War; Hanover House, Garden City, NY; 1960.

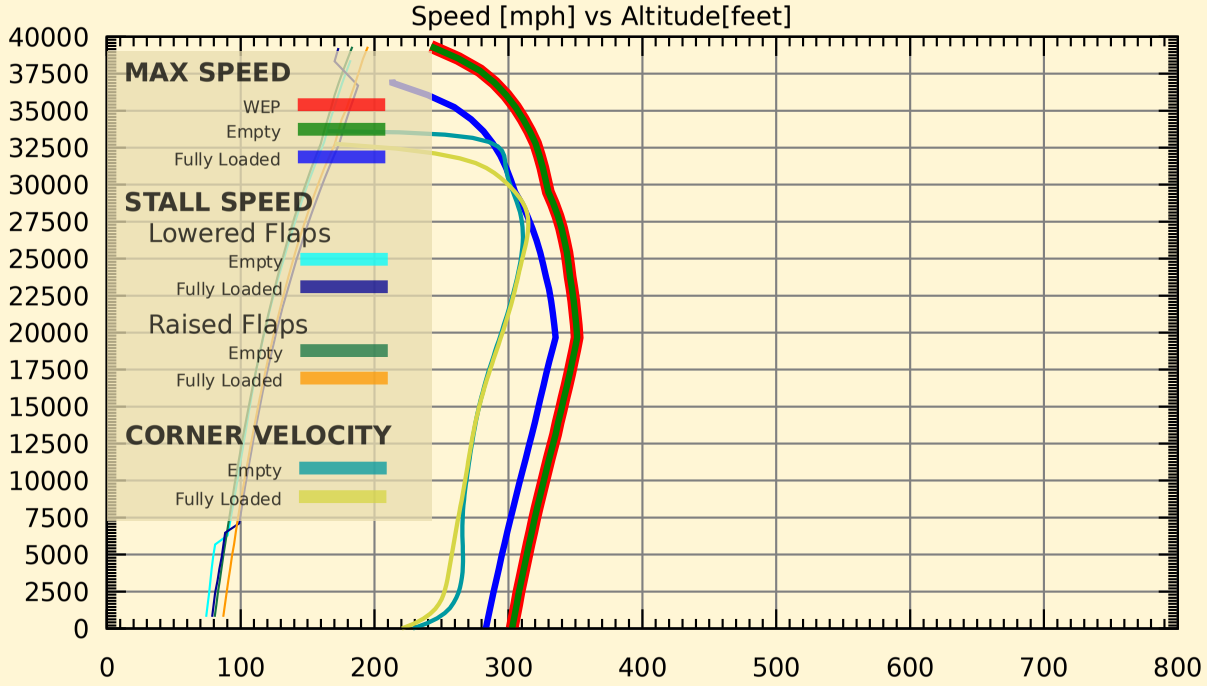
Nohara, Shigeru; A6M Zero In Action; Squadron/Signal Publications, Carrollton, TX; 1983.

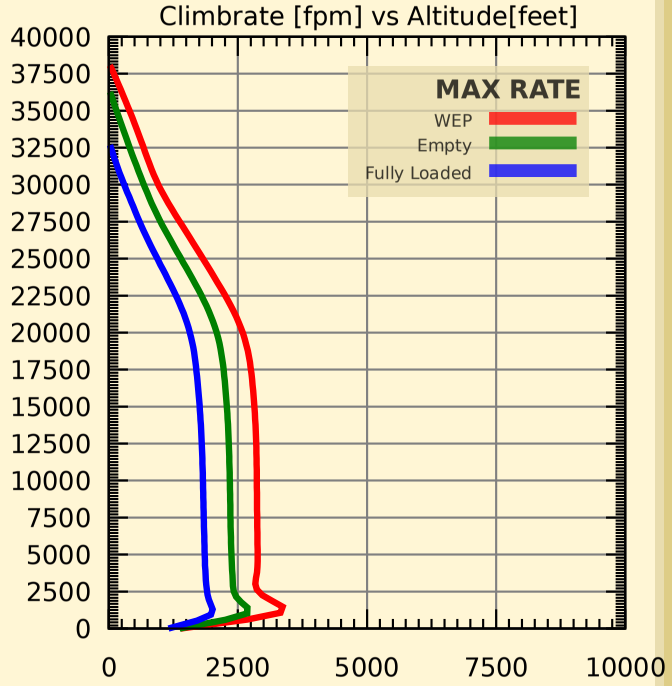
Name: Mitsubishi A6M5 Zero
Role: Fighter
Crew: 1
Service Date: October 1943
Primary Guns: 2x Type 97 7.7mm machine guns with 600 rpg in cowl
Secondary Guns: 2x Type 99-2 20mm cannon with 125 rpg in wings
Defensive Guns: NA
Ordnance: 2x 110 lb bombs or 2x 132 lb A2A rockets under wings, plus One 220 lb or One 550 lb bomb or One 523 lb drop tank under fuselage

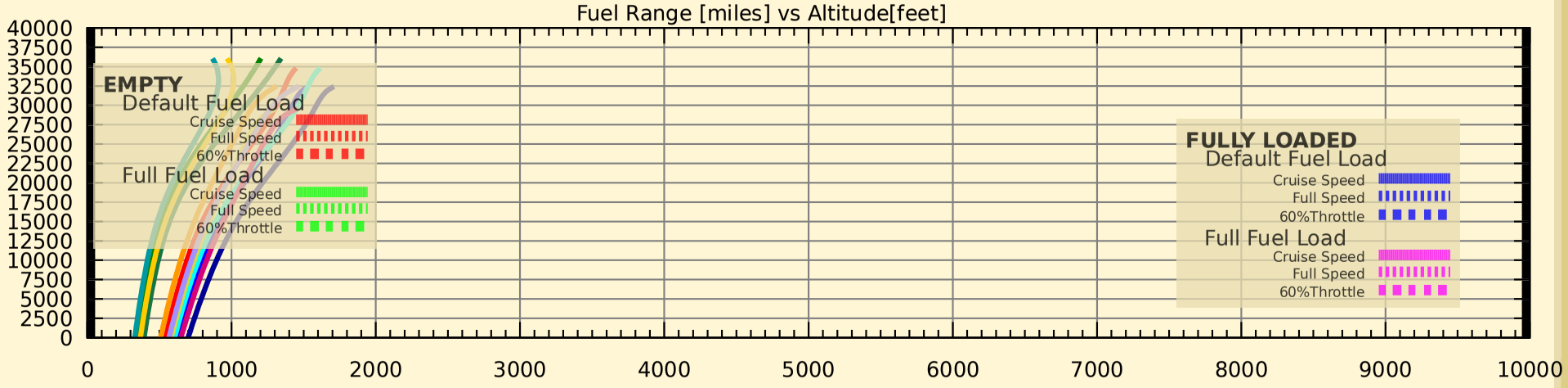
Length: 29.86 ft
Wing Span: 36.09 ft
Wing Area: 229 sq. ft

Power Plant: One Nakajima NK1F Sakae 21
Power: 2216 lb s.t.
Internal Fuel: 935 lb
External Fuel: 523 lb

Empty Weight: 4343 lb
MTOW: 6283 lb

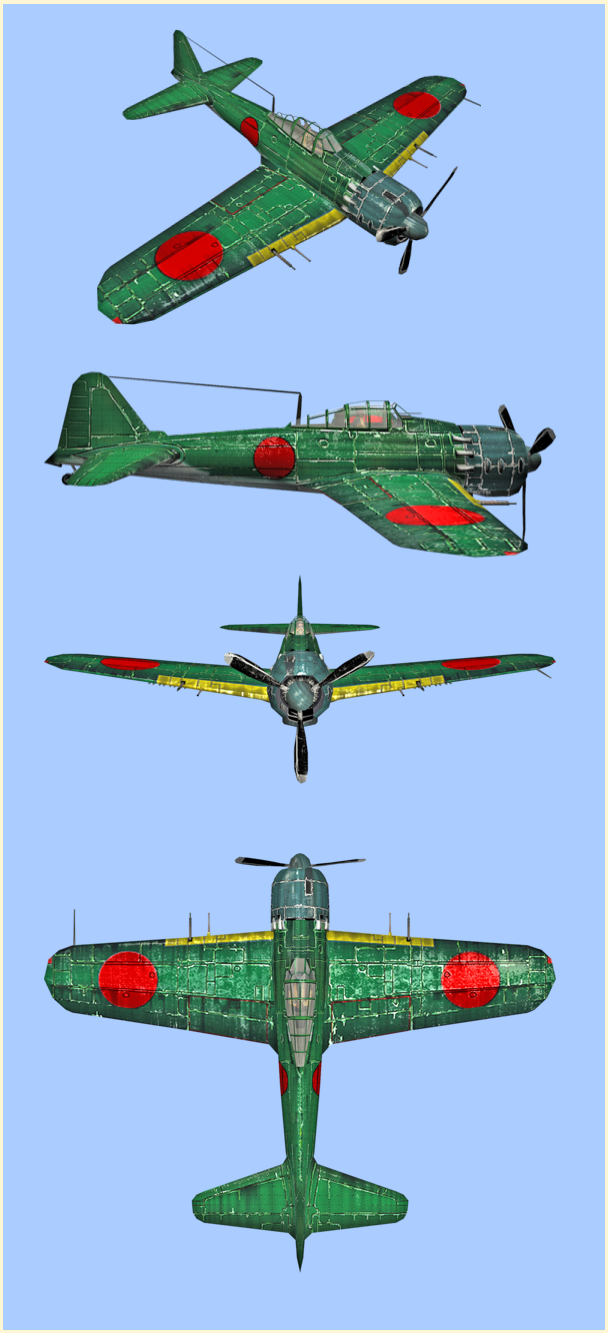






Mitsubishi A6M7 Zero

Durability	☆☆☆	Speed	☆☆☆☆☆	Climb Rate	☆☆☆
Maneuverability	☆☆☆☆☆	Firepower	☆☆☆	Ground Attack	☆☆☆



Speed - With a top speed of only 342 mph the A6M7 is nearly 100 mph slower than its contemporaries.

When it became apparent in the late summer of 1944 that their new A7M1 Reppu would not make it into production, the Mitsubishi design team decided to make yet another upgrade to the venerable Zero airframe. In order to make it more competitive against the American planes it was facing, the Zero had its guns and armor upgraded considerably.

A single Type 3 13mm machine gun with 240 rounds was placed outboard of each cannon in the wings and the pair of 7.7mm machine guns in the cowl was replaced with another 13mm machine gun. To upgrade the armor, an 8mm plate was installed behind the pilot's seat and a 55mm piece of armored glass was placed behind the pilot's head. For frontal protection, the windscreen was covered with a 45mm piece of armored glass.

Unfortunately, the Navy refused to allow Mitsubishi to use one of their more powerful engines in favor of a Sakae 21 engine upgraded to use water-methanol injection. However the new engine was not ready and so the A6M5c Type 52c, as it was known, had to use the original Sakae 21 and was thus left considerably underpowered.

To avoid loss of performance due to weight increase, the Sakae 31 engine with a water-methanol injection system was developed. The first installation of the Sakae 31 in the A6M6c Type 53c proved to be a failure, due to problems with the the water-methanol injection system. Thus the A6M7 was forced to use the Sakae 31a/31b series of engines without the water-methanol injection system. The additional weight however caused performance to degrade compared to previous models. The water-methanol injection system was finally ready in the Sakae 31c variant, but it was too late to see service.

The new A6M7 was more than a re-gunned fighter, it was a fighter-bomber featuring several improvements of its own. The lower/center fuselage section was strengthened to allow a bomb as large as 500 kg. to be carried. New wing racks outboard of the landing gear allowed the Type 62 to carry either a pair of 150 liter drop tanks, a pair of 50 kg. bombs or eight 10 kg. rocket projectiles.

The prototype of the A6M7 Type 62 first flew in May 1945. The chaos caused by the end of the war prevents any accurate determination of how many Type 62s were actually produced. In the late 1970s an A6M7 was found and recovered from Lake Biwa near Kyoto and was placed on display at the Arashiyama Museum.

Sources:

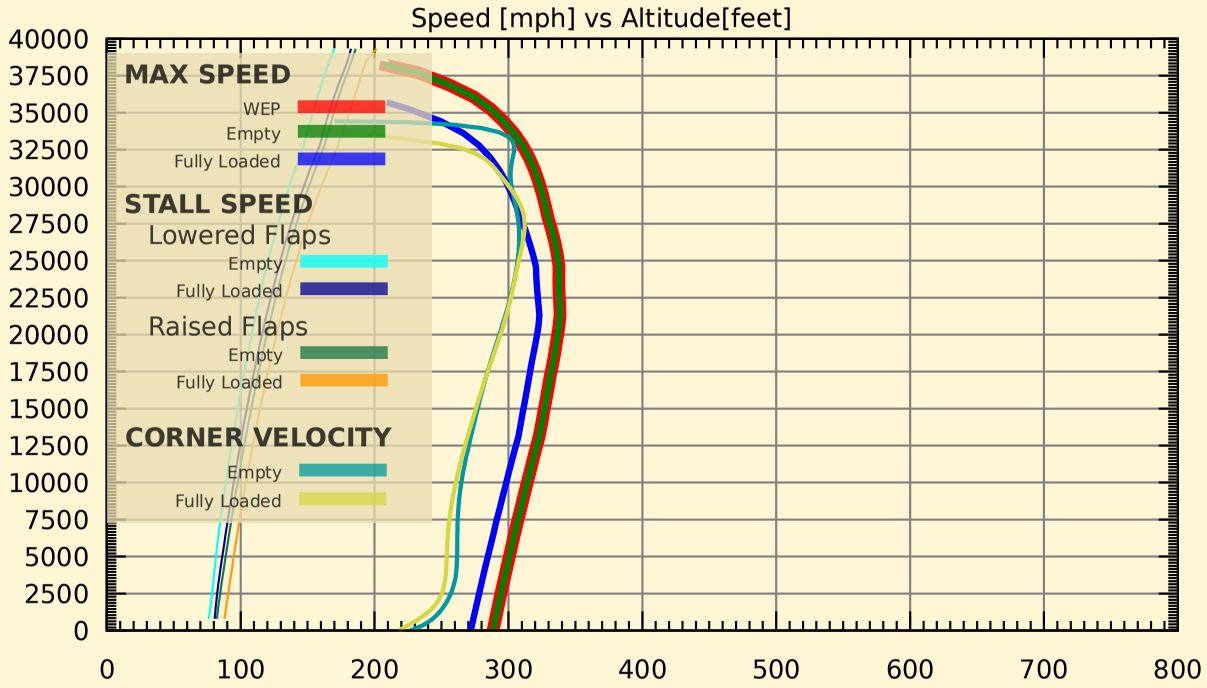
Francillon, Rene J.; Japanese Aircraft of the Pacific War; Naval Institute Press, Annapolis, MD; 1979.

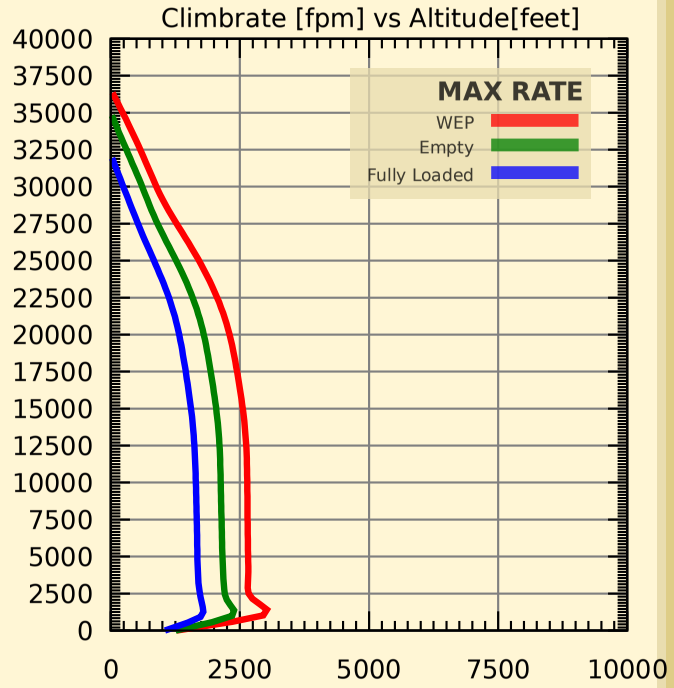
Green, William; Warplanes of the Second World War, Fighters, Volume Three; Hanover House, Garden City, NY; 1960.

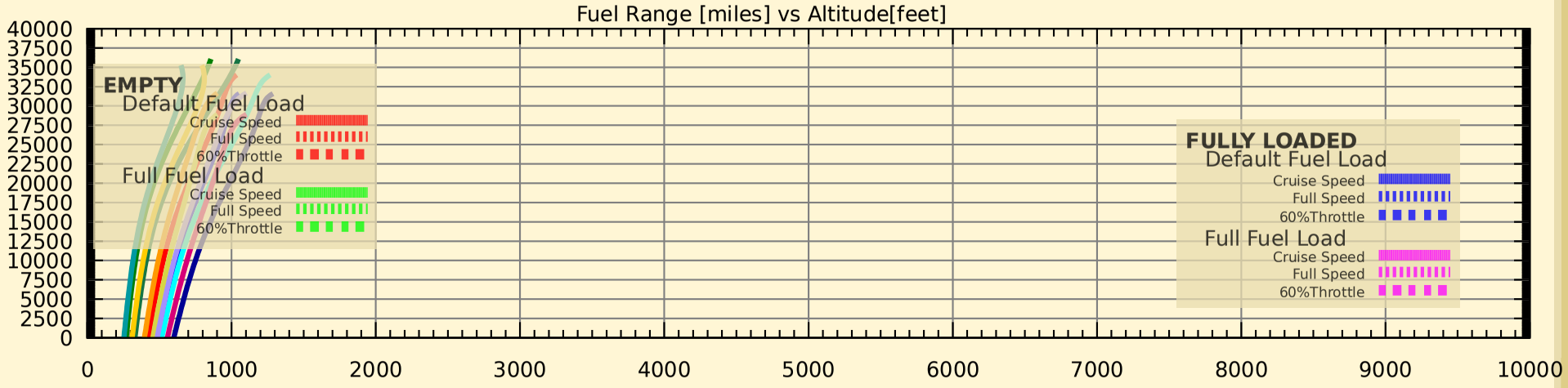
Green, William; Famous Fighters of the Second World War; Hanover House, Garden City, NY; 1960.

Nohara, Shigeru; A6M Zero In Action; Squadron/Signal Publications, Carrollton, TX; 1983.

Name: Mitsubishi A6M7 Zero
Role: Fighter
Crew: 1
Service Date: May 1945
Length: 29.86 ft
Wing Span: 36.09 ft
Wing Area: 229 sq. ft
Power Plant: One Nakajima NK1F Sakae 31b
Power: 2249 lb s.t.
Internal Fuel: 809 lb
External Fuel: 2x 238 lb
Empty Weight: 4630 lb
MTOW: 7253 lb
Primary Guns: One Type 3 13.2mm machine guns with 230 rpg in cowl and 2x Type 3 13.2mm machine guns with 240 rpg in wings
Secondary Guns: 2x Type 99-2 20mm cannon with 125 rpg in wings
Defensive Guns: NA
Ordnance: 2x 110 lb bombs or 8x 22 lb A2A rockets or 2x 238 lb drop tanks under wings, plus One 550 lb or One 1103 lb bomb under fuselage







Boeing B-17G Flying Fortress

Durability	☆☆☆☆☆☆☆☆☆	Speed	☆☆☆☆☆	Climb Rate	☆
Maneuverability	☆☆☆☆☆	Firepower		Ground Attack	☆☆☆☆☆☆☆☆☆

Climb Rate - When loaded, particularly when overloaded, the Fort has a horrible climb rate, often requiring 30-45 minutes to get to 20,000 feet.

Arguably the most famous bomber of World War II, the B-17 started life as the Model 299, a self-funded project by Boeing to meet an Army requirement for a multi-engine bomber in 1934. While all the other entrants for the contract were twin-engine designs, the Boeing stood out as massive and complex. Bristling with gun positions, a reporter commented that it looked like a "flying fortress" and the epithet stuck.

As the result of a crash of the prototype, due to the pilot's failure to remove a locking pin from the elevator controls, the contract went to the Douglas company for their B-18 Bolo. However, Army Air Corps interest in the big Boeing was obvious and an order was placed for thirteen YB-17s for evaluation. This evaluation period saw the new plane set many endurance and time records, including a long-range interception of the Italian passenger liner Rex, proving the value of aircraft for coastal patrol.

The first variant to see combat was the B-17C, which was part of a shipment of 20 planes sent to Britain for training purposes. However, the RAF pressed the plane into immediate service and soon lost most of them to a variety of mishaps. In the meantime, the "D" model was equipping USAAF squadrons just in time to be caught up in the Japanese tide that was sweeping through the Pacific. Combat soon revealed several weaknesses in the Fortress' defenses, which were addressed in the "E" model.

The most striking difference was a new vertical stabilizer and tail section, which accommodated a gun position equipped with two .50 caliber machine guns to defend the previously vulnerable tail. The ventral bathtub gun position was replaced initially by a Bendix remotely operated gun turret, but this was soon upgraded to the superior Sperry ball turret in which the gunner actually crawled into the turret. The beam blister gun positions were eliminated in favor of a simpler window arrangement and a Bendix turret was installed in the dorsal position, immediately behind the cockpit. All told, the new "E" model sported ten .50 caliber machine guns for defense.

The "F" model was more of an incremental upgrade with most improvements having to do with increasing the performance, range and carrying capacity of the plane. The "F" model was the first to allow the carriage of a pair of 4000 lb. bombs for short-range missions, bringing the total short-range bomb load to 17,600 lb. However, for most missions, the standard bomb load was 4000 lb.

At about this time, the 8th Air Force was suffering heavy losses on unescorted missions deep into Germany. Lacking a proper fighter escort, a plan was devised to create a long-range escort out of the Fortress. Several B-17s were stripped of their bomb racks and were outfitted with additional defensive guns and gun positions. The most striking additions were a new turret under the plane's "chin" and another top turret in place of the radio operator's position.

The YB-40 was a good idea, but while they were able to stay in formation on the ingress portion of the mission, they were much heavier than the regular B-17s after they had dropped their bombs and thus got left behind as the formation raced for home. While the YB-40 proved a failure, the Bendix chin turret proved a great success and it was soon being fitted to production "F" models.

Along with other minor modifications, including the staggering of the waist gun positions so that the gunners wouldn't keep bumping into each other, the "G" model was introduced on the production lines. In addition to the chin turret, the plane's defensive capabilities were enhanced by adding more ammunition to each gun position and by improving the tail gun position with better sights.

While the Fortress was not technically as capable as the Consolidated B-24 Liberator, it had a feature that endeared itself to its crews - survivability. B-17s were known as the most rugged plane of World War II, capable of sustaining incredible damage and still bringing her men home. Although strategic bombing by itself didn't defeat Germany, the USAAF and RAF bombing missions caused Germany to waste vast quantities of resources defending their factories and cities from aerial attack. More importantly, it drew the Luftwaffe into the defensive battle where it was chewed to pieces by the vast quantity of fighters that the Allies could field.

Sources:

Freeman, Roger, et. al,; The Great Book Of World War II Airplanes; Zokeisha Publishing, New York; 1984.

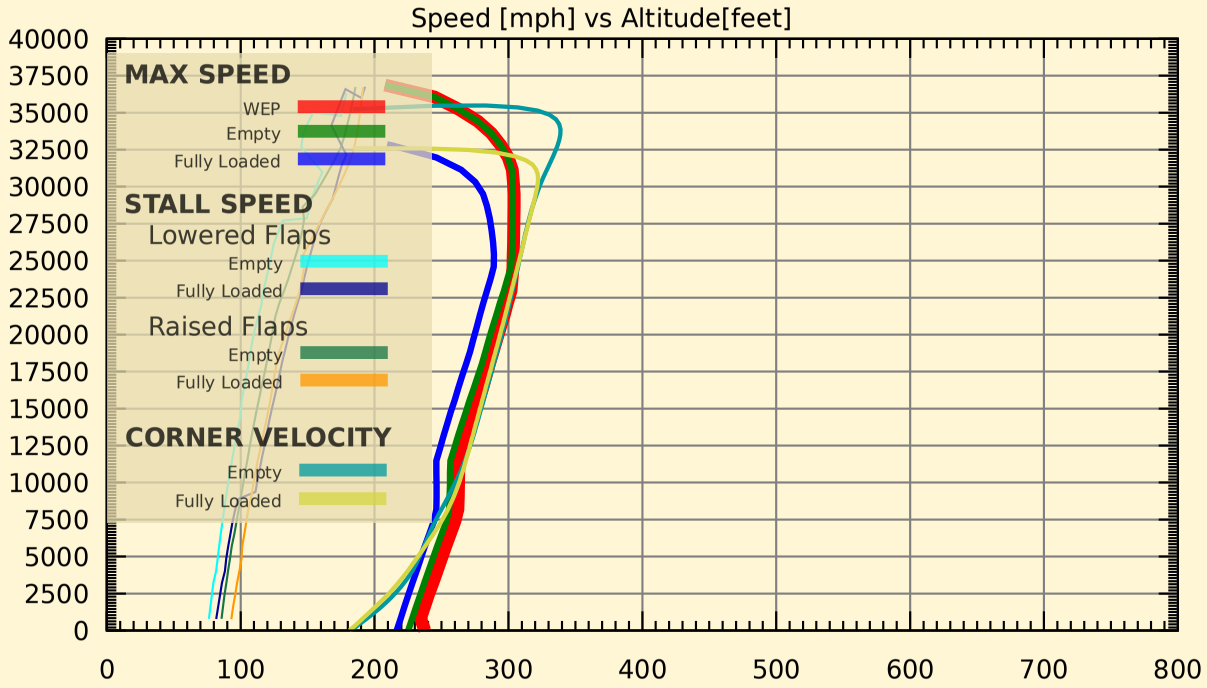
Green, William; Famous Bombers of the Second World War, Second Series; Doubleday & Company, Garden City, New York; 1961.

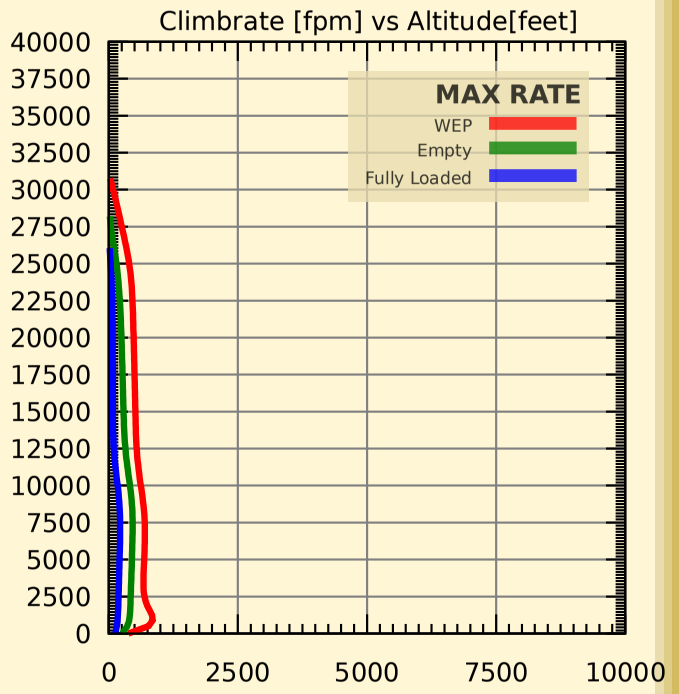
Name: Boeing B-17G Flying Fortress
Role: Heavy Bomber
Crew: 10
Service Date: November 1943
Primary Guns: NA
Secondary Guns: NA
Defensive Guns: NA
Ordnance: 24x 100 lb or 16x 250 lb or 12x 500 lb or 8x 1000 lb or 4x 2000 lb bombs in internal bomb bay, plus 2x 500 lb or 2x 1000 lb or 2x 2000 lb or 2x 3877 lb bombs on underwing racks. Maximum load of 17,600 lb for short-range

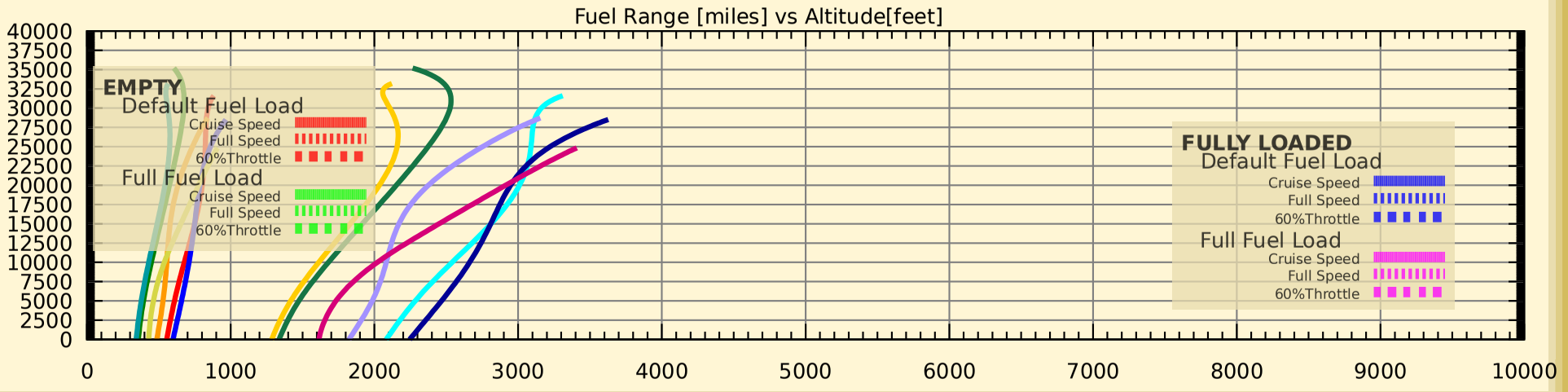
Length: 74.34 ft
Wing Span: 103.74 ft
Wing Area: 1420 sq. ft

Power Plant: 4 X Wright R-1820-97
Power: 2644 lb s.t.
Internal Fuel: 16542 lb
External Fuel: NA

Empty Weight: 37478 lb
MTOW: 65918 lb







North American B-25D Mitchell Mk.II

Durability	☆☆☆☆☆	Speed	☆☆☆☆	Climb Rate	☆☆
Maneuverability	☆☆☆	Firepower	☆	Ground Attack	☆☆☆

Defensive Guns - With only a single turret and flexible gun position, the gunners would be hard pressed to deal with more than one attacker at a time.

Named after Billy Mitchell, the outspoken and brash Army officer who was court-martialled for advocating the use of air power, the B-25 began life as the NA-40, a twin-engine medium bomber design intended to meet the 1938 Army Specification Number 98-102. The initial design featured a large greenhouse cockpit area extending above the fuselage line, which combined with low powered engines to produce a disappointing top speed of just 265 mph.

New engines were introduced to produce a meager increase in speed, but after the prototype was destroyed in a crash, North American decided to redesign the plane, which now bore the designation NA-62. Significant changes were introduced, the most notable of which was the shifting of the wing mounting point from the shoulder to mid-fuselage and the reduction in height of the cockpit area into a more streamlined, stepped arrangement with the bombardier's position in the nose.

With the outbreak of war in Europe, the Army accepted the new design without any further prototyping and the B-25 was born. The Mitchell grabbed headlines in 1942 when Lt. Col. Jimmy Doolittle led a group of volunteers in B-25Bs on a bombing mission of the Japanese home islands from the deck of the USS Hornet. While the attack resulted in insignificant levels of damage, the blow to Japanese security was such that four first-line fighter units were held for home defense over the next several months, precisely when they were needed in the Solomon Islands campaign.

By this time the new "C" and "D" models were coming off the production lines (the two models were identical, the only difference being the location of manufacture - Inglewood or Kansas City). Improvements included the addition of an autopilot, an increase in bomb capacity, better defensive and offensive firepower, and the ability to carry a torpedo for anti-shipping operations. These models were to serve in such far-flung outposts as Egypt, Tunisia, and New Guinea.

Because the Bendix Electric Ventral Turrets, which used a periscope sighting apparatus, were so hard to use effectively many C/D models had them removed in the field to save weight and improve performance. Additionally, most B-25C/Ds were equipped with wing racks, which raised the maximum bomb capacity to 5,000 lb. for short-range missions. Over 3900 C/D models were built.

Lacking a well-defended medium bomber for daytime use, the RAF acquired several different models of the B-25 for their own use. The first was a batch of 23 B-25Bs, christened the Mitchell I by the RAF. These were intended only for familiarization and never saw combat. Over 500 B-25C/D models were sent to the RAF as Mitchell IIs where they were used to outfit the 2nd Tactical Air Force for operations over occupied France and the Low Countries.

Sources:

Angelucci, Enzo and Matricardi, Paolo and Pinto, Pierrluigi; Complete Book of World War II Combat Aircraft; ERVIN s.r.l., Rome; 1988.

Green, William; Famous Bombers of the Second World War, Second Series; Doubleday & Company, Garden City, New York; 1961.

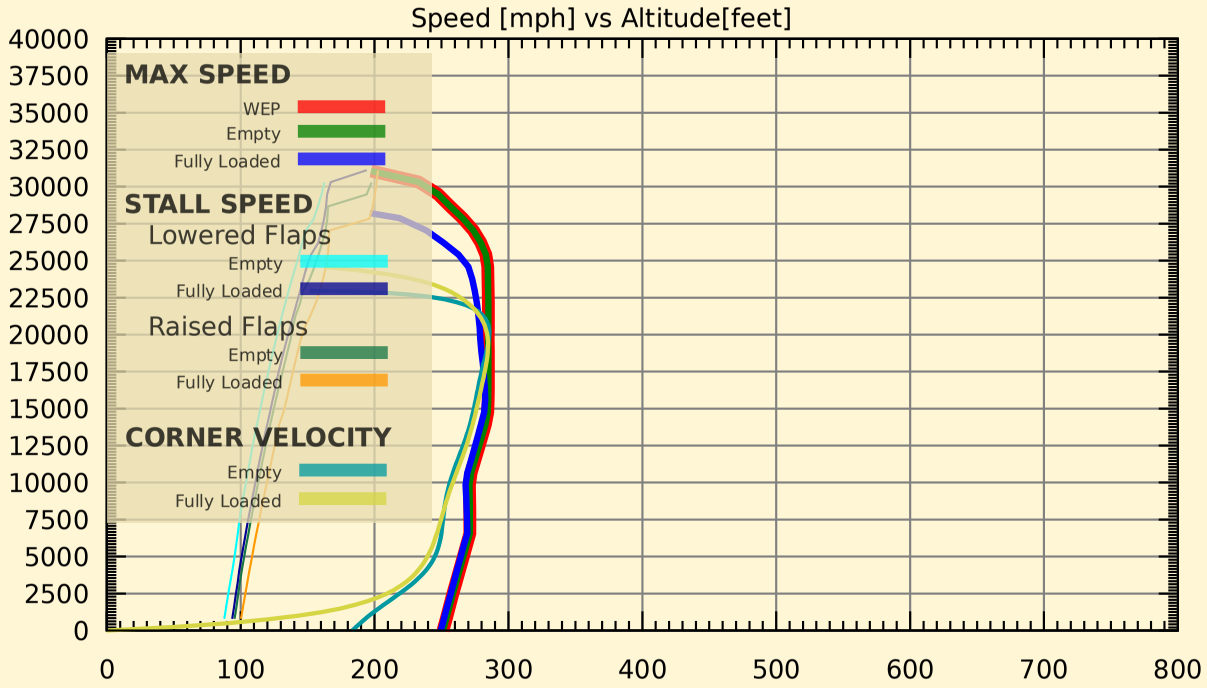
McDowell, Ernest R.; B-25 Mitchell in Action; Squadron/Signal Publications, Carrollton, Texas, 1978.

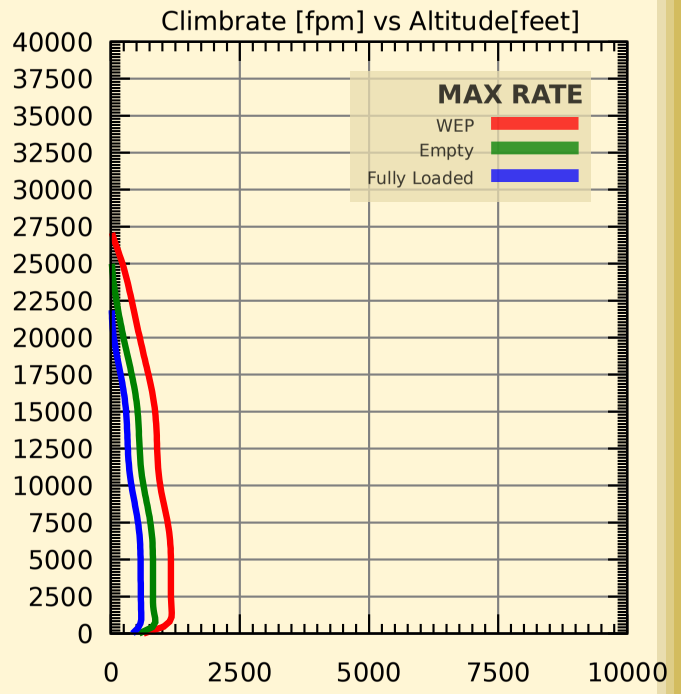
Name: North American B-25D Mitchell Mk.II
Role: Medium Bomber
Crew: 6
Service Date: February 1942
Primary Guns: One Browning M2 0.5" machine gun with 300 rpg in nose
Secondary Guns: NA
Defensive Guns: NA
Ordnance: 16x 120 lb or 8x 250 lb or 6x 535 lb or 3x 910 lb bombs in internal bomb bay or One 1550 lb Mk.XII torpedo slung under fuselage

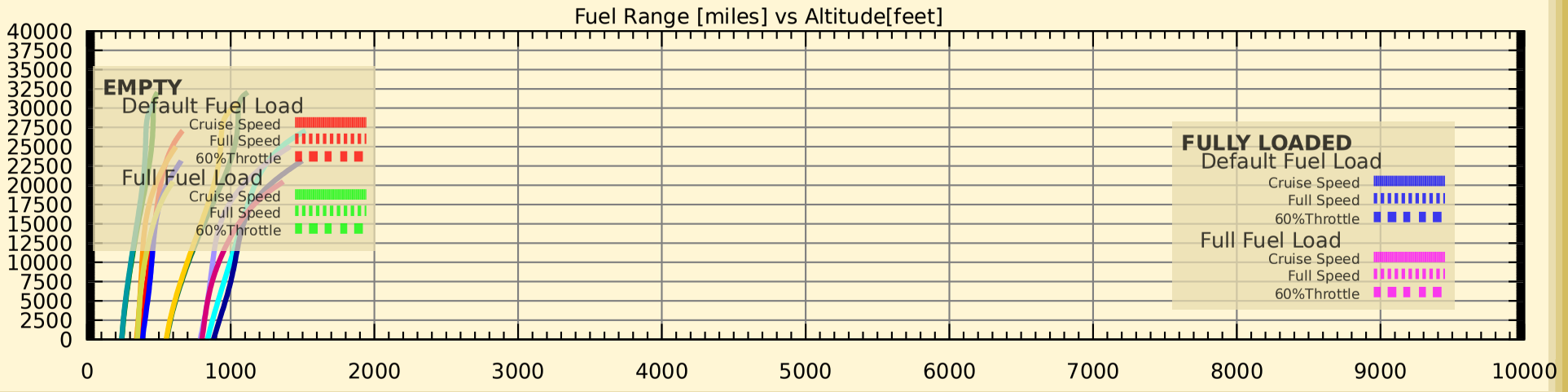
Length: 55.12 ft
Wing Span: 67.59 ft
Wing Area: 610 sq. ft

Power Plant: 2 X Wright R-2600-13
Power: 3628 lb s.t.
Internal Fuel: 4027 lb
External Fuel: 1295 lb

Empty Weight: 21385 lb
MTOW: 28660 lb







North American B-25D Mitchell

Durability	☆☆☆☆☆	Speed	☆☆☆☆	Climb Rate	☆☆☆
Maneuverability	☆☆☆	Firepower	☆	Ground Attack	☆☆☆☆

Defensive Guns - With only a single turret and flexible gun position, the gunners would be hard pressed to deal with more than one attacker at a time.

Named after Billy Mitchell, the outspoken and brash Army officer who was court-martialled for advocating the use of air power, the B-25 began life as the NA-40, a twin-engine medium bomber design intended to meet the 1938 Army Specification Number 98-102. The initial design featured a large greenhouse cockpit area extending above the fuselage line, which combined with low powered engines to produce a disappointing top speed of just 265 mph.

New engines were introduced to produce a meager increase in speed, but after the prototype was destroyed in a crash, North American decided to redesign the plane, which now bore the designation NA-62. Significant changes were introduced, the most notable of which was the shifting of the wing mounting point from the shoulder to mid-fuselage and the reduction in height of the cockpit area into a more streamlined, stepped arrangement with the bombardier's position in the nose.

With the outbreak of war in Europe, the Army accepted the new design without any further prototyping and the B-25 was born. The Mitchell grabbed headlines in 1942 when Lt. Col. Jimmy Doolittle led a group of volunteers in B-25Bs on a bombing mission of the Japanese home islands from the deck of the USS Hornet. While the attack resulted in insignificant levels of damage, the blow to Japanese security was such that four first-line fighter units were held for home defense over the next several months, precisely when they were needed in the Solomon Islands campaign.

By this time the new "C" and "D" models were coming off the production lines (the two models were identical, the only difference being the location of manufacture - Inglewood or Kansas City). Improvements included the addition of an autopilot, an increase in bomb capacity, better defensive and offensive firepower, and the ability to carry a torpedo for anti-shipping operations. These models were to serve in such far-flung outposts as Egypt, Tunisia, and New Guinea.

Because the Bendix Electric Ventral Turrets, which used a periscope sighting apparatus, were so hard to use effectively many C/D models had them removed in the field to save weight and improve performance. Additionally, most B-25C/Ds were equipped with wing racks, which raised the maximum bomb capacity to 5,000 lb. for short-range missions. Over 3900 C/D models were built.

Sources:

Angelucci, Enzo and Matricardi, Paolo and Pinto, Pierrluigi; Complete Book of World War II Combat Aircraft; ERVIN s.r.l., Rome; 1988.

Green, William; Famous Bombers of the Second World War, Second Series; Doubleday & Company, Garden City, New York; 1961.

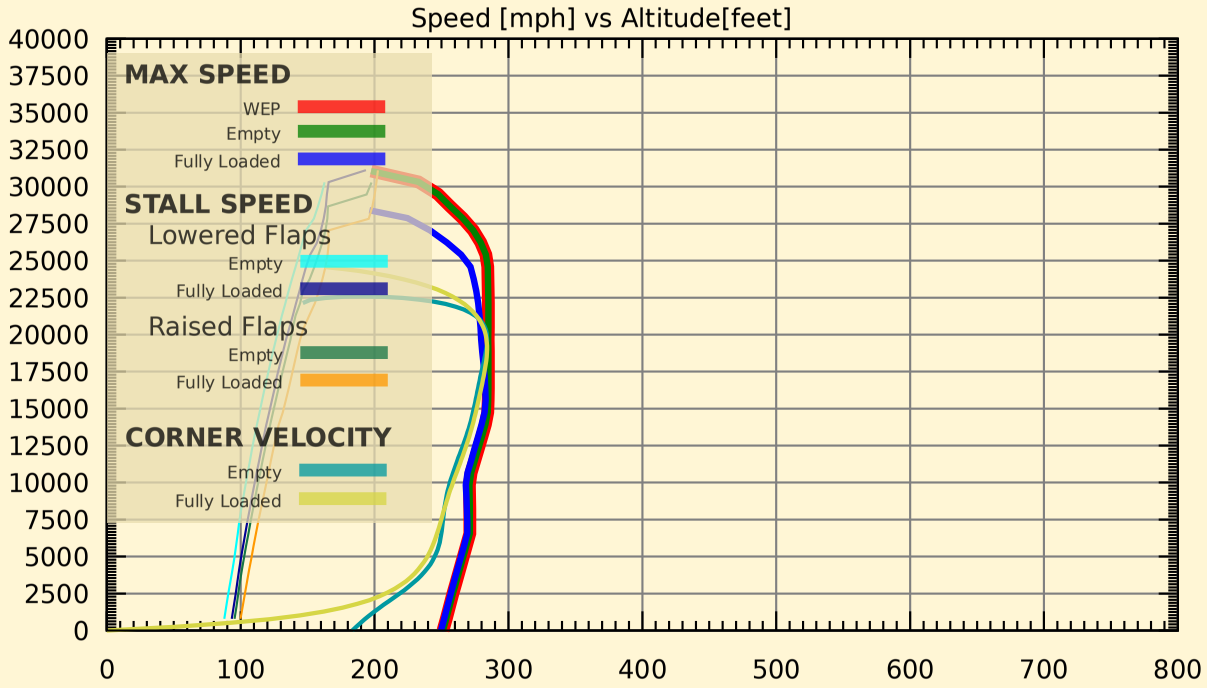
McDowell, Ernest R.; B-25 Mitchell in Action; Squadron/Signal Publications, Carrollton, Texas, 1978.

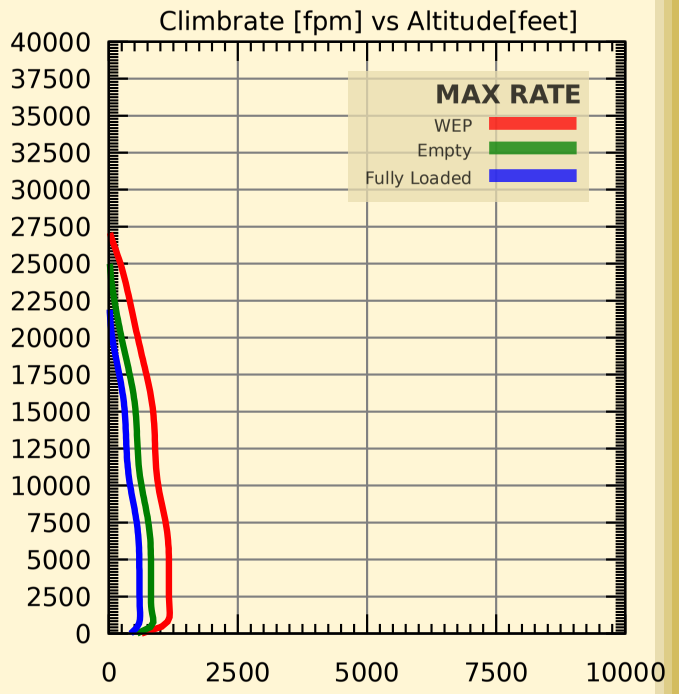
Name: North American B-25D Mitchell
Role: Medium Bomber
Crew: 6
Service Date: January 1942
Primary Guns: One Browning M2 0.5" machine gun with 300 rpg in nose
Secondary Guns: NA
Defensive Guns: NA
Ordnance: 16x 100 lb or 8x 250 lb or 6x 500 lb or 3x 1000 lb bombs in internal bomb bay or One 1927 lb Mk.13 torpedo slung under fuselage

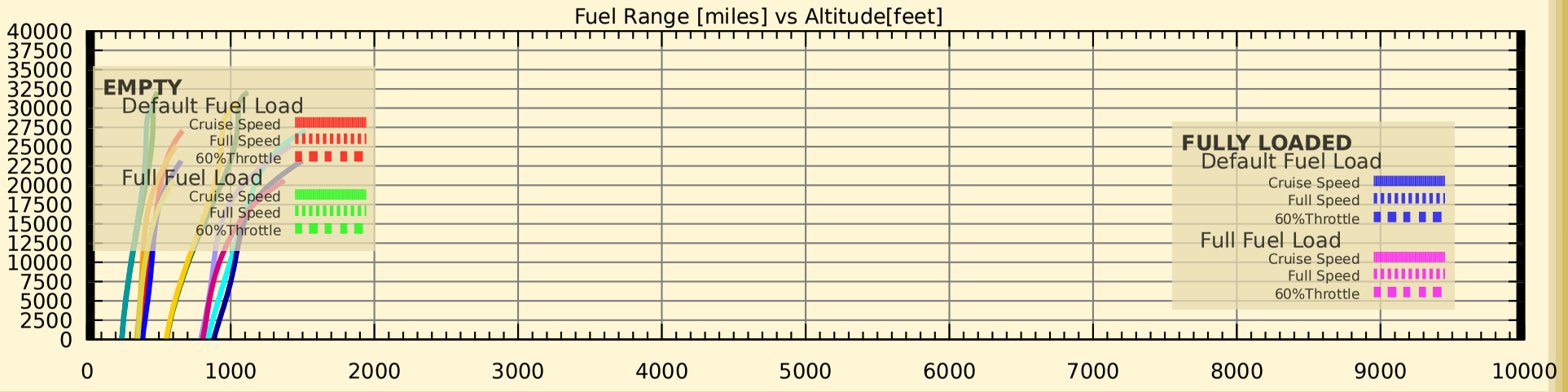
Length: 55.12 ft
Wing Span: 67.59 ft
Wing Area: 610 sq. ft

Power Plant: 2 X Wright R-2600-13
Power: 3628 lb s.t.
Internal Fuel: 4027 lb
External Fuel: 1295 lb

Empty Weight: 21385 lb
MTOW: 28660 lb







North American B-25J Mitchell

Durability	☆☆☆☆☆	Speed	☆☆☆☆	Climb Rate	☆☆
Maneuverability	☆☆☆	Firepower	☆☆☆☆☆	Ground Attack	☆☆☆☆

Speed - With a top speed of about 275 mph the Mitchell is outclassed by the German and Soviet medium-bombers.

After production of the B-25D model, several experimental models were produced to test various equipment additions. The most startling was the conversion of the bomber into a ground attack aircraft by sticking a 75mm field gun in the nose. Augmented by a pair of .50 caliber machine guns in the nose, the B-25G could pack a potent punch. However, the large gun installation was not an unqualified success. While it could certainly do serious damage to anything it hit, its low rate of fire and the need to fly slowly to aim the gun, made the Mitchell an attractive target for ground fire, which didn't endear the plane to its crews.

The "H" model replaced the 75mm gun with six .50 caliber machine guns, bringing the total to eight .50s. Additionally, the top turret was moved forward to a position just behind the cockpit where its guns could also be brought to bear on the pilot's target. A new tail gun position was added and the troublesome remotely operated belly turret was officially removed (it was usually removed in the field to save weight). Finally, rocket rails were optionally installed under the wings, allowing it to fire eight 5" rockets as part of its forward barrage.

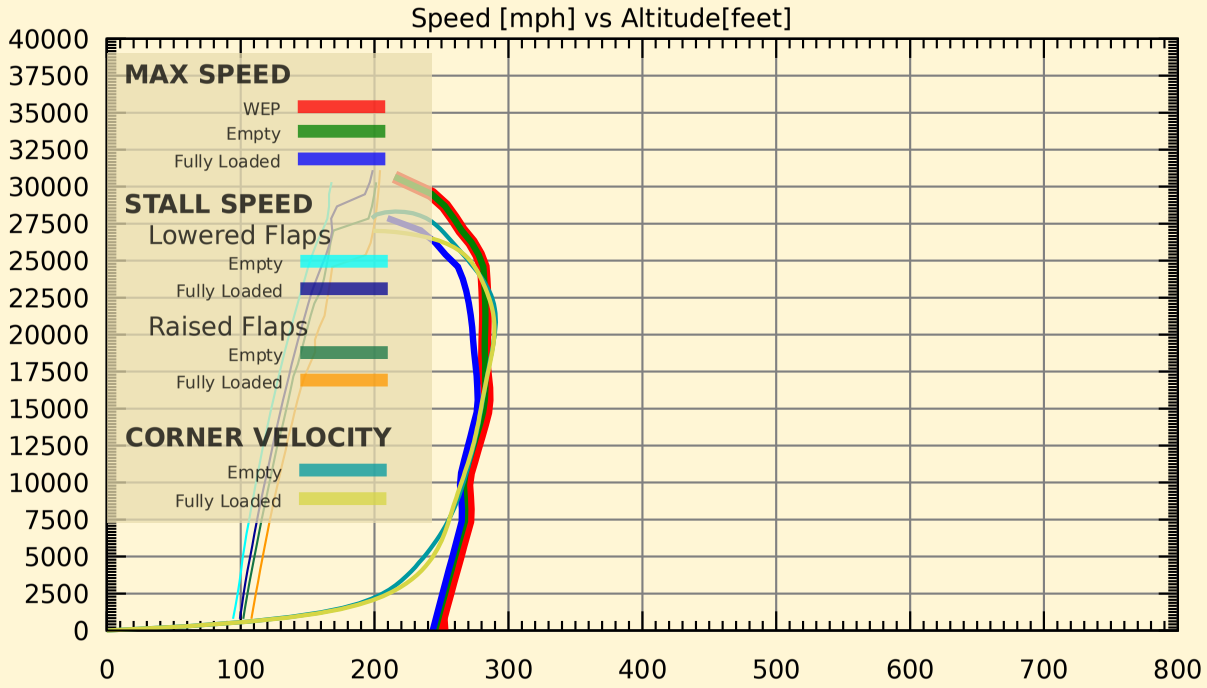
As the selection of targets changed, the 75mm gun became increasingly useless and the "J" model featured a return to the glazed nose and bombardier station. The forward firepower of the plane was retained by mounting two .50 caliber machine guns in the right side of the nose to augment the four in the blisters on the sides of the fuselage. Over 4300 "J" models were produced, making it the most numerous of Mitchell variants.

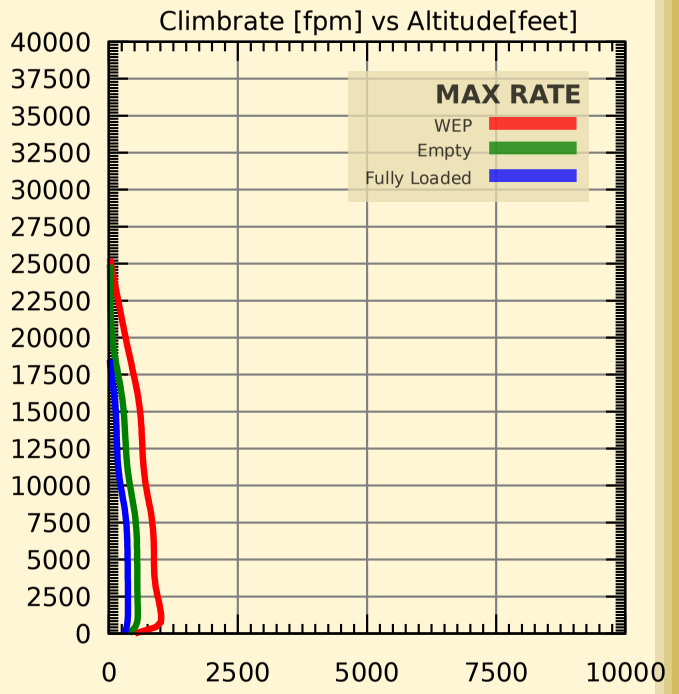
Sources:

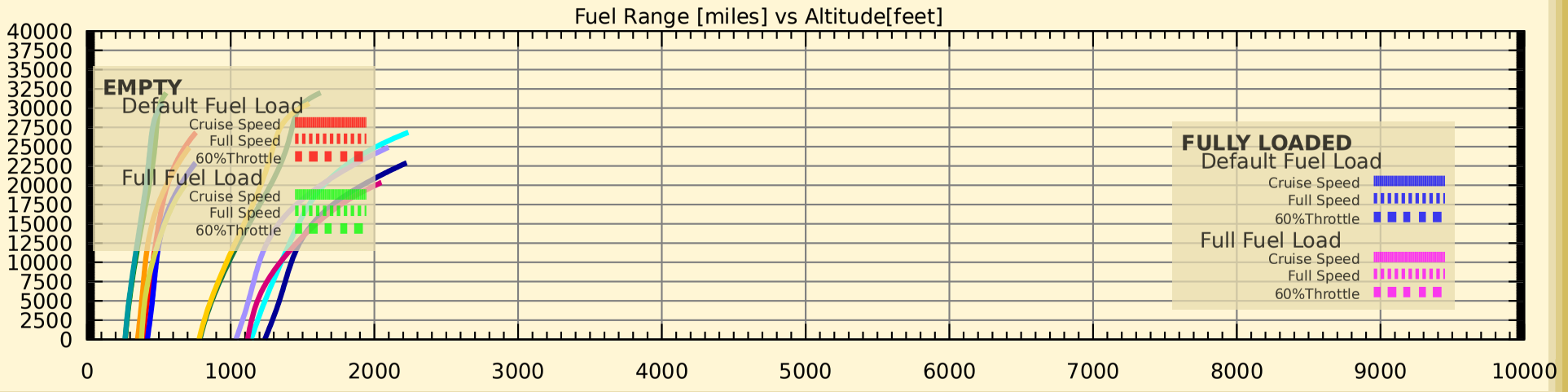
Green, William; Famous Bombers of the Second World War, Second Series; Doubleday & Company, Garden City, New York; 1961.

McDowell, Ernest R.; B-25 Mitchell in Action; Squadron/Signal Publications, Carrollton, Texas, 1978.

Name: North American B-25J Mitchell
Role: Medium Bomber
Crew: 6
Service Date: January 1944
Length: 55.12 ft
Wing Span: 67.59 ft
Wing Area: 610 sq. ft
Power Plant: 2 X Wright R-2600-29
Power: 3608 lb s.t.
Internal Fuel: 5844 lb
External Fuel: NA
Empty Weight: 21826 lb
MTOW: 32849 lb
Primary Guns: 2x Browning M2 0.5" fixed machine guns with 300 rpg in nose
Secondary Guns: 4x Browning M2 0.5" fixed machine guns with 400 rpg alongside fuselage
Defensive Guns: NA
Ordnance: 12x 250 lb or 6x 500 lb or 4x 1000 lb bombs in internal bomb bay or One 2216 lb Mk.13a torpedo under bomb bay, plus 8x 138 lb 5" HVAR A2G rockets under wings. Maximum load of 4000 lb possible.







North American B-25J Mitchell Mk.III

Durability	☆☆☆☆☆	Speed	☆☆☆☆	Climb Rate	☆☆
Maneuverability	☆☆☆	Firepower	☆☆☆☆☆	Ground Attack	☆☆☆☆

Weaknesses:

Speed - With a top speed of about 275 mph the Mitchell is outclassed by the German and Soviet medium-bombers.

After production of the B-25D model, several experimental models were produced to test various equipment additions. The most startling was the conversion of the bomber into a ground attack aircraft by sticking a 75mm field gun in the nose. Augmented by a pair of .50 caliber machine guns in the nose, the B-25G could pack a potent punch. However, the large gun installation was not an unqualified success. While it could certainly do serious damage to anything it hit, its low rate of fire and the need to fly slowly to aim the gun, made the Mitchell an attractive target for ground fire, which didn't endear the plane to its crews.

The "H" model replaced the 75mm gun with six .50 caliber machine guns, bringing the total to eight .50s. Additionally, the top turret was moved forward to a position just behind the cockpit where its guns could also be brought to bear on the pilot's target. A new tail gun position was added and the troublesome remotely operated belly turret was officially removed (it was usually removed in the field to save weight). Finally, rocket rails were optionally installed under the wings, allowing it to fire eight 5" rockets as part of its forward barrage.

As the selection of targets changed, the 75mm gun became increasingly useless and the "J" model featured a return to the glazed nose and bombardier station. The forward firepower of the plane was retained by mounting two .50 caliber machine guns in the right side of the nose to augment the four in the blisters on the sides of the fuselage. Over 4300 "J" models were produced, making it the most numerous of Mitchell variants.

Lacking a well-defended medium bomber for daytime use, the RAF acquired several different models of the B-25 for their own use. The first was a batch of 23 B-25Bs, christened the Mitchell I by the RAF. These were intended only for familiarization and never saw combat.

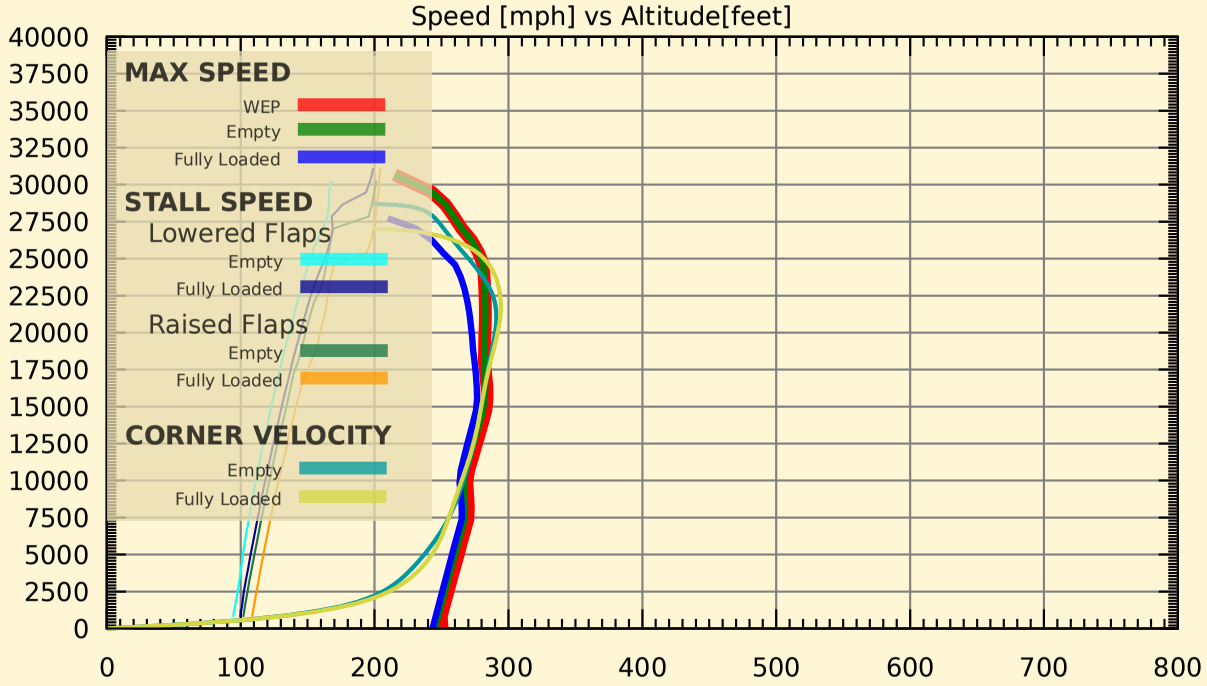
Over 500 B-25C/D models were sent to the RAF as Mitchell IIs where they were used to outfit the 2nd Tactical Air Force for operations over occupied France and the Low Countries. When the B-25J model entered production, 314 examples were sent to the RAF as Mitchell IIIs, again principally for the use of the 2nd T.A.F.

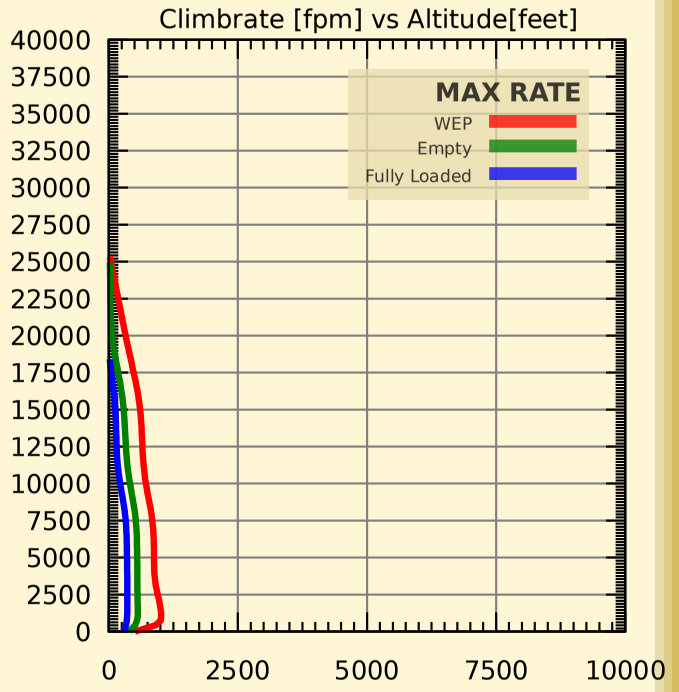
Sources:

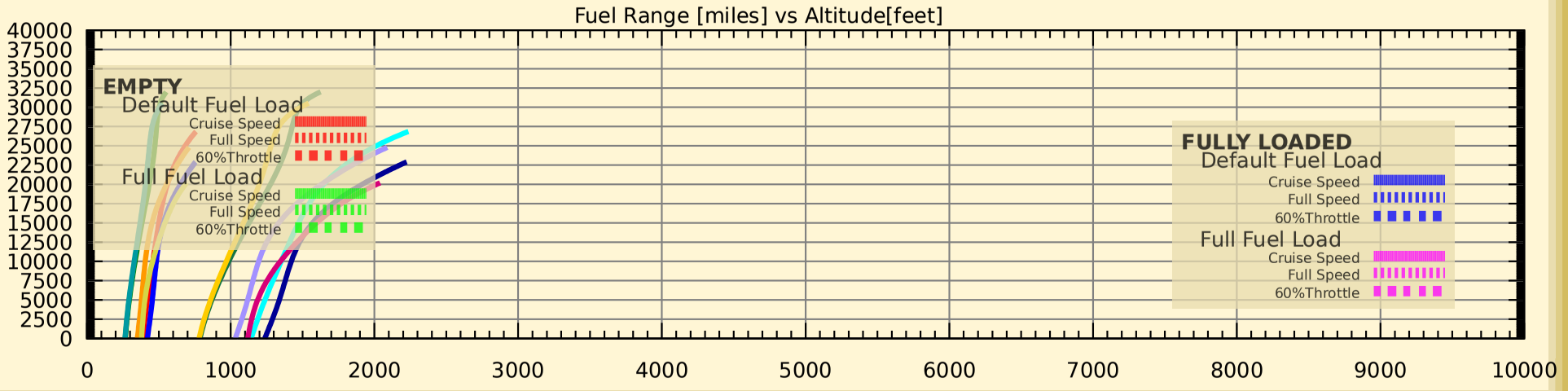
Green, William; Famous Bombers of the Second World War, Second Series; Doubleday & Company, Garden City, New York; 1961.

McDowell, Ernest R.; B-25 Mitchell in Action; Squadron/Signal Publications, Carrollton, Texas, 1978.

Name: North American B-25J Mitchell Mk.III
Role: Medium Bomber
Crew: 6
Service Date: August 1944
Length: 55.12 ft
Wing Span: 67.59 ft
Wing Area: 610 sq. ft
Power Plant: 2 X Wright R-2600-29
Power: 3608 lb s.t.
Internal Fuel: 5844 lb
External Fuel: NA
Empty Weight: 21826 lb
MTOW: 32849 lb
Primary Guns: 2x Browning M2 0.5" fixed machine guns with 300 rpg in nose
Secondary Guns: 4x Browning M2 0.5" fixed machine guns with 400 rpg alongside fuselage
Defensive Guns: NA
Ordnance: 12x 250 lb or 6x 535 lb or 4x 910 lb bombs in internal bomb bay or One 1802 lb Mk.XIV torpedo under bomb bay, plus 8x 84 lb A2G rockets under wings. Maximum load of 4000 lb possible.

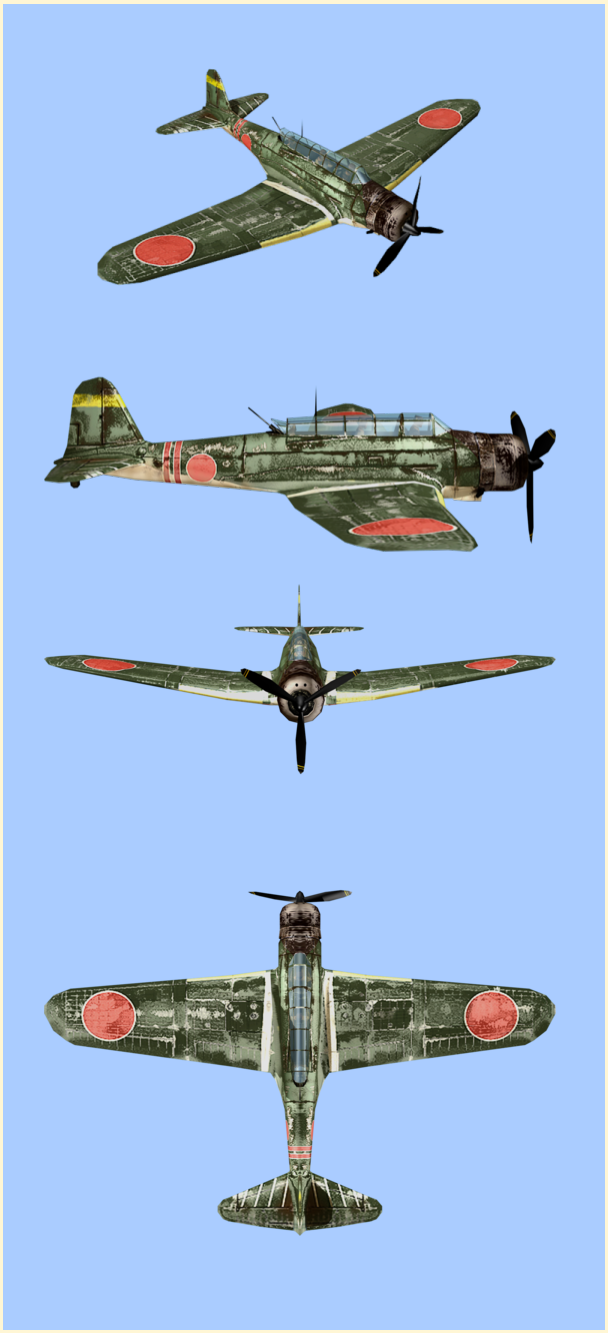






Nakajima B5N2
Kate

Durability	☆☆☆	**Speed**	☆☆☆☆	**Climb Rate**	☆☆
Maneuverability	☆☆☆☆☆☆☆	**Firepower**	☆	**Ground Attack**	☆☆



Speed - Being only slightly faster than the Val is not much of a recommendation.

In 1935 the Japanese Navy issued a specification for a Carrier Attack Bomber with folding wings to enable it to fit on a carrier elevator. The plane was also to have the ability to carry a 800 kg. torpedo or the equivalent weight in bombs, a top speed of 207 mph at 6,560 ft, a crew of three and use of either the Nakajima Hikari or Mitsubishi Kinsei radial engines. Nakajima conceived an advanced design with hydraulically operated folding landing gear and wings, fowler flaps, and a variable-pitch propeller.

Bearing the designation of B5N1 and powered by the Hikari 2 engine, the prototype made its first flight in January 1937, but problems with the hydraulic system delayed testing. The plane was capable of a top speed of 230 mph, far exceeding the specification, but the Navy was worried about its maintainability. As such, the Navy initially preferred the simpler Mitsubishi design with fixed, spatted landing gear and it was ordered into production as the B5M1 while Nakajima made changes to their prototype.

The second prototype had the hydraulic wing folding mechanism replaced by a manually folding one, the fowler flaps replaced with conventional models and the variable-speed prop replaced with a constant-speed one. To increase range additional fuel tanks were added to the wings. In this guise the plane was ordered into production as the B5N1 Navy Type 97 Carrier Attack Bomber Model 1, later changed to Model 11.

While carrier units were being equipped with the B5N1 several land-based units operated in China in the tactical support role, the plane proving quite successful despite its lack of crew and fuel protection. However, as more modern fighters were being deployed against them in China, it became obvious that the plane needed upgrading.

First flown in December 1939, the B5N2 was powered by the more reliable and powerful 1,000 hp Mitsubishi Sakae 14-cylinder radial engine. The smaller engine diameter allowed engineers to rework the cowl to give the pilot better over-the-nose visibility, but despite the additional power the performance was not appreciably better. However, the more reliable engine was a plus for a carrier-based plane and the Navy accepted it into service as the Type 97 Model 22.

By the time of Pearl Harbor the B5N2 had almost completely replaced the B5N1 and obsolete B4Y1 in first-line service. Participating in every major carrier action in the first part of the war, it was code-named "Kate" by the Allies and was credited with sinking the US carriers Lexington, Yorktown and Hornet.

Last used as a torpedo bomber in the Philippine campaign of 1944, the Kate's long range and three-man crew allowed it to serve a valuable role as a reconnaissance and submarine-spotting plane in areas where Allied fighters weren't likely to be found. Later some B5N2s were fitted with Air-to-Surface Vessel Radar and others were fitted with the Jukitanchiki Magnetic Airborne Submarine Detection devices. Other war-weary B5N2s were used for gunnery training as both the gunner's mounts and the target-towing planes.

Sources:

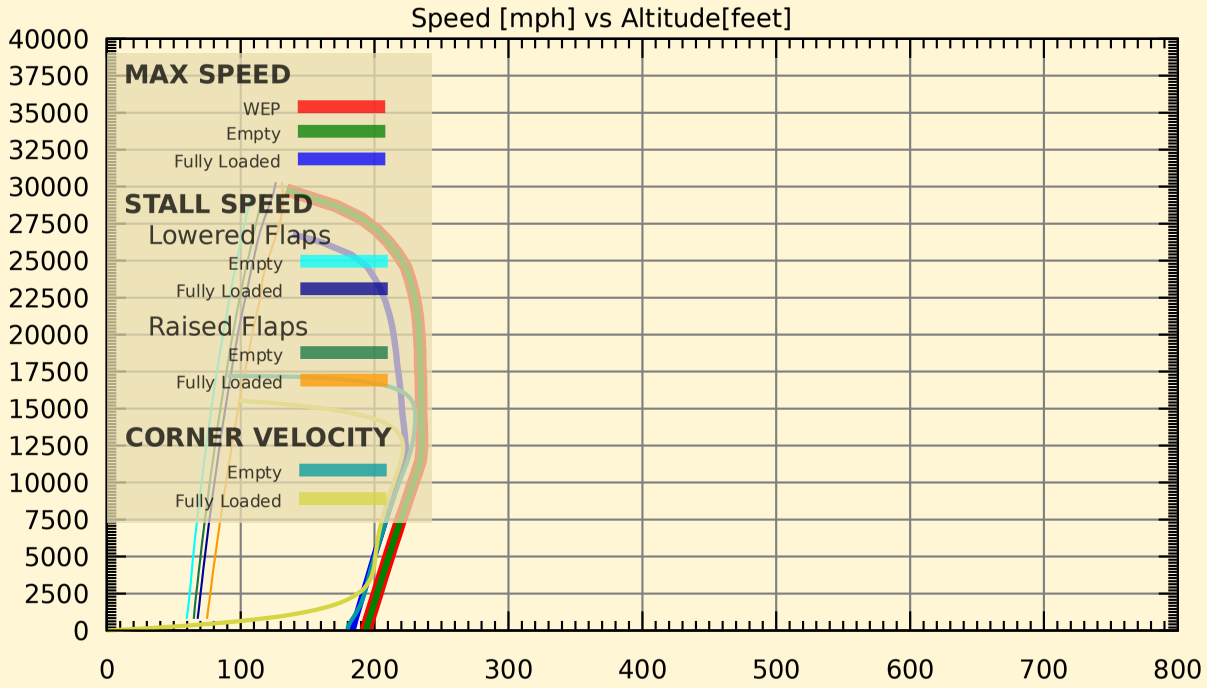
Francillon, Rene J.; Japanese Aircraft of the Pacific War; Naval Institute Press, Annapolis, MD; 1979.

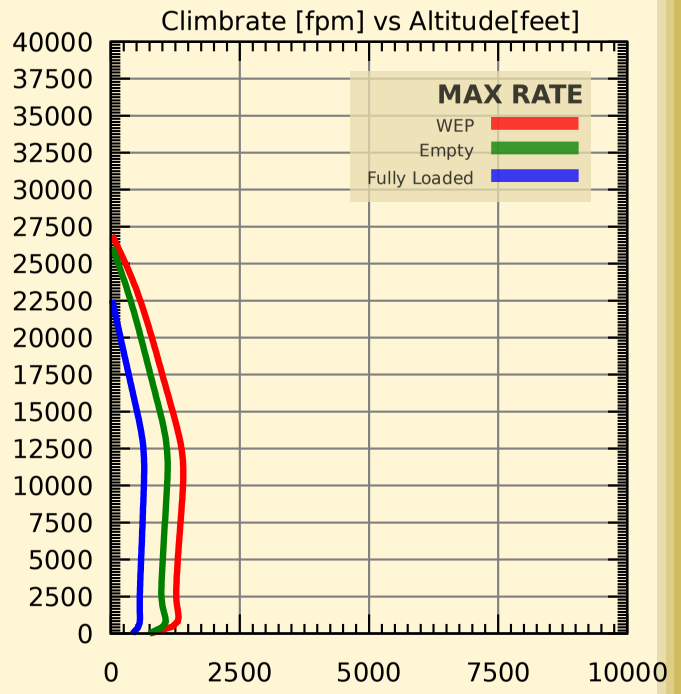
Name: Nakajima B5N2 Kate
Role: Diving Bomber
Crew: 3
Service Date: April 1940
Primary Guns: One Type 97 7.7mm machine gun with 400 rpg in cowl
Secondary Guns: One Type 97 7.7mm machine gun with 400 rpg in cowl
Defensive Guns: NA
Ordnance: One 1842 lb torpedo or 3x 550 lb bombs or One 1764 lb bomb

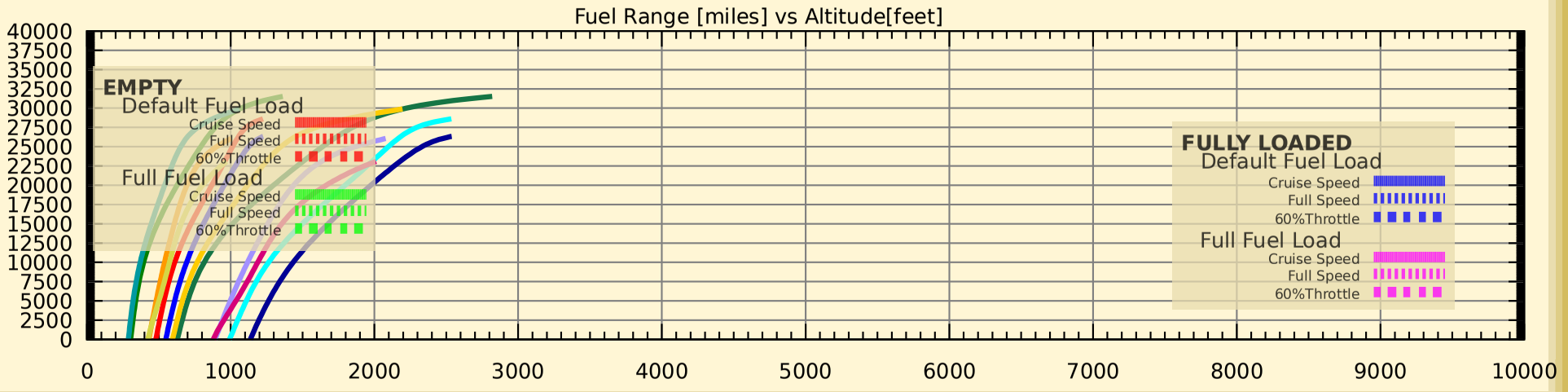
Length: 33.79 ft
Wing Span: 50.92 ft
Wing Area: 406 sq. ft

Power Plant: One Nakajima NK1B Sakae 11
Power: 2117 lb s.t.
Internal Fuel: 1962 lb
External Fuel: NA

Empty Weight: 5313 lb
MTOW: 9039 lb

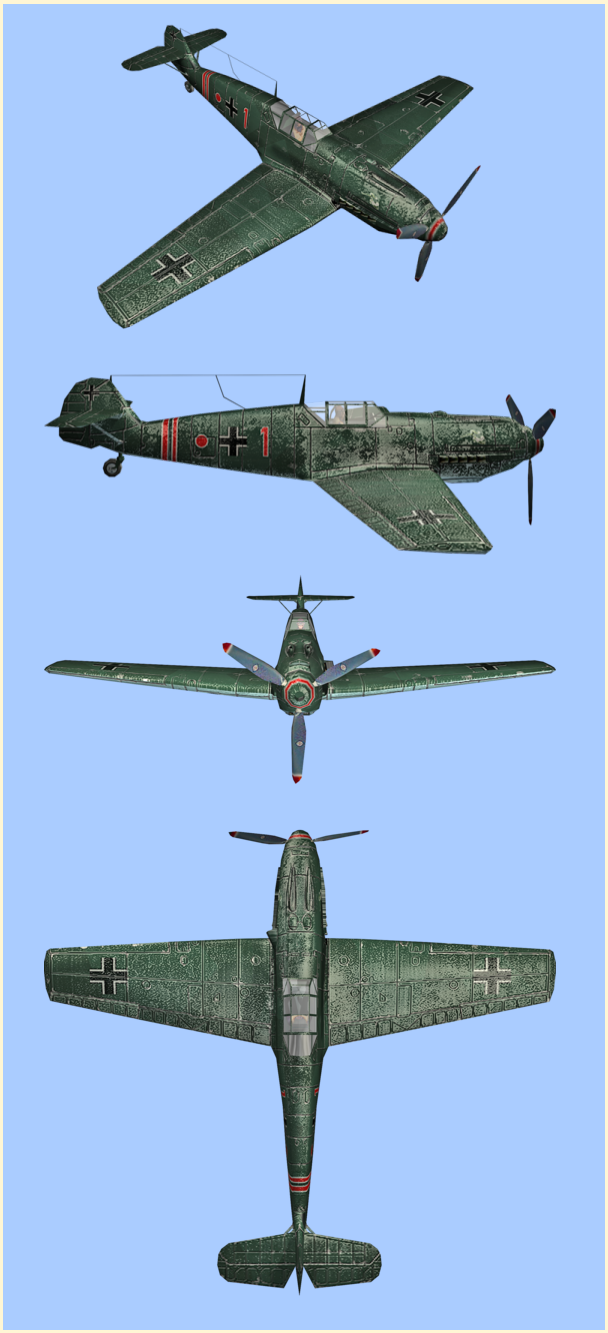






Messerschmitt Bf-109E-1/B Emil

Durability	☆☆	Speed	☆☆☆☆☆	Climb Rate	☆☆☆☆
Maneuverability	☆☆☆☆☆	Firepower	☆	Ground Attack	☆



Durability - The 109 was a small plane and not capable of absorbing much combat damage.

Willy Messerschmitt's masterpiece, the Bf-109, was the prototypical modern fighter at the beginning of the war and was still going strong at war's end six years later. Ironically, the plane was almost rejected before it was submitted. Due to several previous run-ins over a previous transport design, Erhard Milch, the Reich Commissioner for Aviation, flatly stated that Bayerische Flugzeugwerke and Willy Messerschmitt wouldn't be allowed to build anything but other peoples' designs.

Despite assurances he would never get a contract, Messerschmitt went ahead and entered the competition to provide a new front-line fighter for the Luftwaffe. Besides using the most advanced technology available in 1934, the Bf-109A was designed to be able to use either the Junkers Jumo 210 or the Daimler-Benz DB-600 engine, both of which were under development at the time.

With the new engines undergoing developmental delays, a Rolls Royce Kestrel engine was installed in the prototype and the Bf-109V-1 first took to the air in September 1935. A month later the Jumo 210A became available and was used to power the second prototype, which commenced flight testing in January 1936. With the completion of the third prototype with the Daimler Benz engine in June, the Luftwaffe was impressed enough to order ten pre-production machines.

By the time the fourth prototype was undergoing testing, the guns had been installed and the Bf-109 was officially a fighter. The initial guns arrangement consisted of a pair of MG-17s in the cowl and another MG-17 firing through the propeller hub.

In late 1936 the third, fourth, and fifth prototypes were sent to Spain for combat evaluations against the Polikarpov I-15 fighters, which were outclassing the older He-51 biplanes. After three months of successful testing, the prototypes were returned to Messerschmitt to allow continuation of the development program.

The first official production machine, the Jumo 210Da powered Bf-109B-1, was delivered in February 1937. The planes were assigned to JG 132 Richtofen and after hasty training, the unit was sent to Spain to counter the I-15s and the new I-16 Ratas that were just starting to appear. Throughout 1937 B models were hurriedly produced, brought into service, and shipped off to the Condor Legion in Spain.

Using the more powerful Jumo 210Ga, the Bf-109C-1 made its first appearance in the early spring of 1938. Originally intended to mount an MG-FF 20mm cannon in the propeller hub, problems with the gun required another alternative to be used, resulting in the installation of an MG-17 in each wing, outboard of the wheel wells.

Thinking that the new Daimler Benz DB-601 was ready for production, the new "D" model was introduced, but engine production delays meant that the Jumo 210Da had to be used for the Bf-109D-1 "Dora". In the summer of 1938, the DB-601A-1 was ready and the first Bf-109E-1 "Emils" started to roll off the production line by the end of the year. As with the C-1 and D models, the E-1 was fitted with a pair of MG-17s with 1000 rpg in the cowl and another pair of MG-17s with 420 rpg in the wings.

The more heavily armed E-3 version, with a pair of 20mm MG-FF cannon in wings in place of the MG-17s, began to reach front-line units in the fall of 1939. However, the E-1 remained the primary version in service throughout the war in Poland, Scandinavia, the Lowlands and France in 1940. By the time of the Battle of Britain, most of the E-1s had been replaced by the E-3 and E-4 models and were thus relegated to training duties. However, the machine-gun armed Emil filled an important gap and helped seed the reputation that would soon enshroud Willy Messerschmitt's little fighter.

Sources:

Beaman Jr., John R. and Campbell, Jerry L.; Messerschmitt Bf 109 In Action, Part One; Squadron/Signal Publications, Carrollton, TX; 1980.

Green, William; War Planes Of The Second World War: Fighters Volume One; Doubleday and Company, Garden City, NY; 1970.

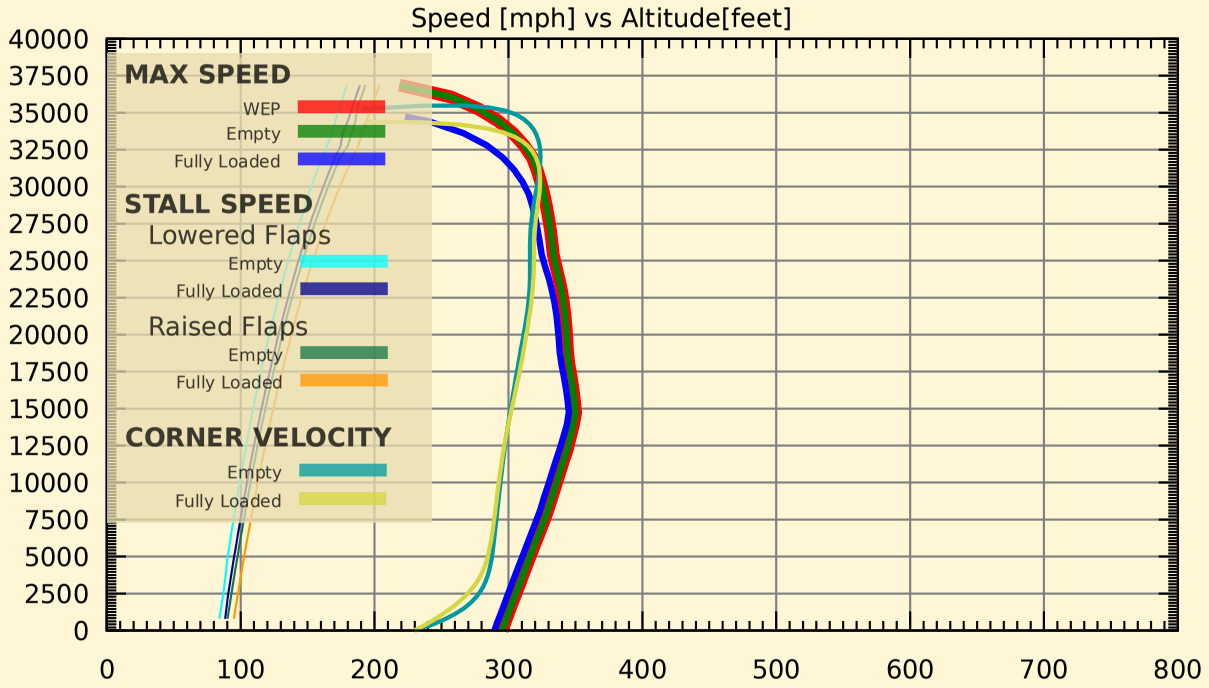
Green, William; Warplanes of the Third Reich; Doubleday and Company, Garden City, NY; 1970.

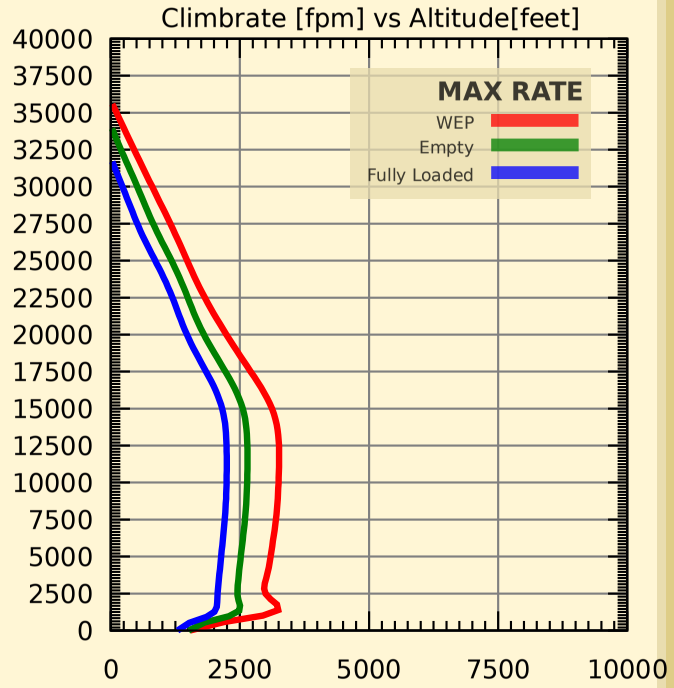
Name: Messerschmitt Bf-109E-1/B Emil
Role: Fighter
Crew: 1
Service Date: March 1939
Primary Guns: 2x MG17 7.9mm machine guns with 1000 rpg in cowl
Secondary Guns: 2x MG17 7.9mm machine guns with 420 rpg in wings
Defensive Guns: NA
Ordnance: One 551 lb bomb or One 475 lb drop tank

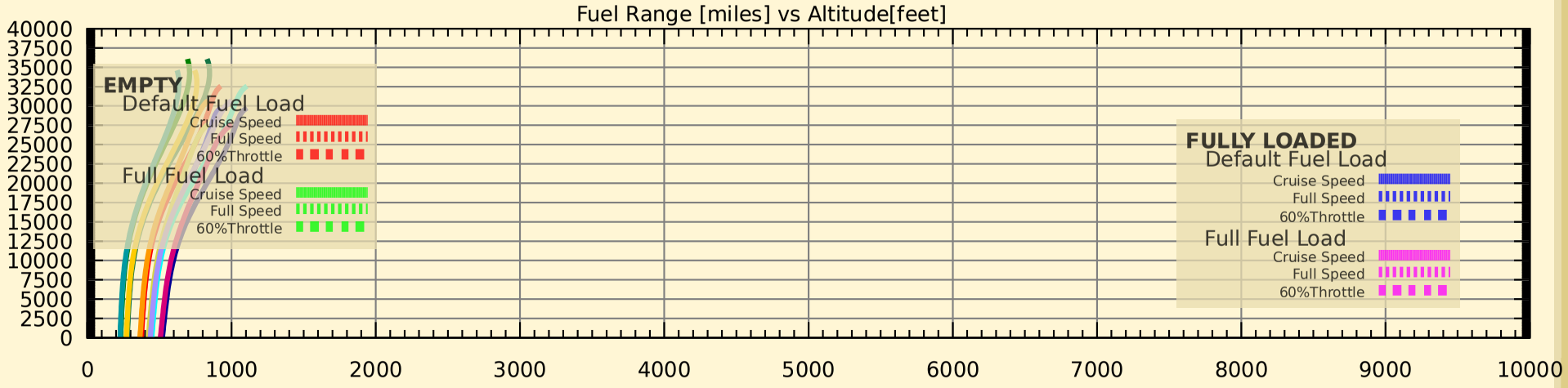
Length: 28.22 ft
Wing Span: 32.48 ft
Wing Area: 174 sq. ft

Power Plant: One DB-601Aa
Power: 2680 lb s.t.
Internal Fuel: 634 lb
External Fuel: 476 lb

Empty Weight: 4519 lb
MTOW: 5798 lb







Messerschmitt Bf-109G-6/R6 Gustav

Durability	☆☆	Speed	☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆
Maneuverability	☆☆☆☆☆	Firepower	☆☆☆☆☆☆	Ground Attack	☆☆

Durability - The 109 was a small plane and not capable of absorbing much combat damage.

To get better performance out of their basic engine design, Daimler-Benz created the DB-605A engine by maximizing the bore size of the DB-601 without changing the bore-center locations. This resulted in a normal take-off output of 1,475 hp. However, the compression ratio was also increased, which necessitated the return to 96 octane fuel.

Because of the larger size and heavier weight of the 605 engine, the Gustav series was produced with heavier engine supports and a redesigned cowling. While the armament remained the same as that of the Franz, the Gustav series was outfitted to use the GM-1 nitrous injection system as standard equipment.

The G-1 utilized a pressurized cabin while the simultaneously produced G-2 deleted the pressurization equipment to save weight. Delivered to front-line units at about the same time as the G-1 and G-2, the G-3 and G-4 differed mainly in the installation of an upgraded radio and larger wheels, necessitating bulges in the upper surface of the wing to accommodate them.

Experience with the 20mm MG-151 cannon in North Africa revealed that it could overheat and jam, leaving the pilot with only a pair of 7.9mm guns, which was hardly adequate for anything except strafing soft targets. The G-1/Trop was intended to rectify this problem by replacing the rifle caliber machine guns with larger 13mm models. This required the addition of bulges in the cowling to cover the larger breeches and pilots promptly dubbed it "Beule" ("Bump").

The G-5 incorporated the larger guns into a pressurized G-3 with some examples utilizing the DB-605AS engine, which used the larger supercharger from the DB-603. The pressurization however was found to be fairly useless and the G-6 abandoned the feature to save weight.

The GM-1 nitrous system could be replaced with the far more useful MW50 methanol system, which boosted takeoff power from 1,475 to 1,800 hp. MW50 could be used for 10 minutes at a time, but required 5 minutes between uses. However, this increased fuel consumption by almost 40%, severely reducing range.

The G-6 was the first version intended from the outset to employ a variety of RnstStz field conversion kits. The /R6 kit added a 20mm gun pod with 125 rpg under each wing, more than doubling the plane's effective firepower. However, their additional weight had a severe impact on handling and roll rate.

Sources:

Beaman Jr., John R. and Campbell, Jerry L.; Messerschmitt Bf 109 In Action, Part Two; Squadron/Signal Publications, Carrollton, TX; 1980.

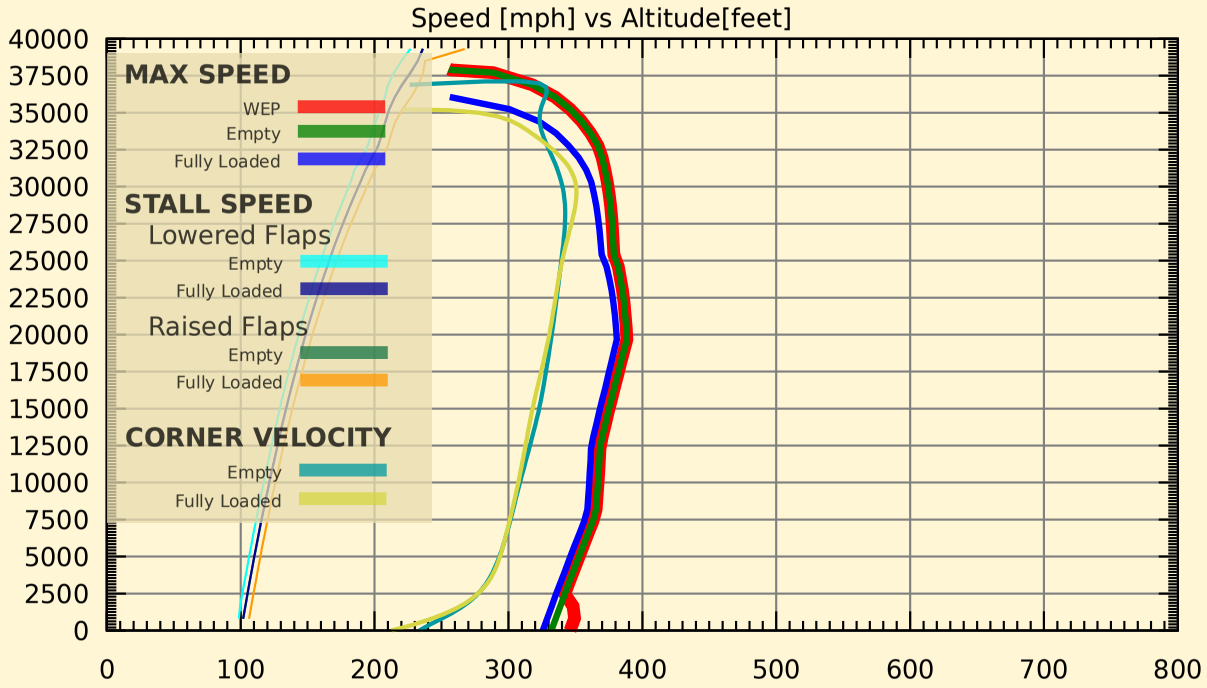
Green, William; Warplanes of the Third Reich; Doubleday and Company, Garden City, NY; 1970.

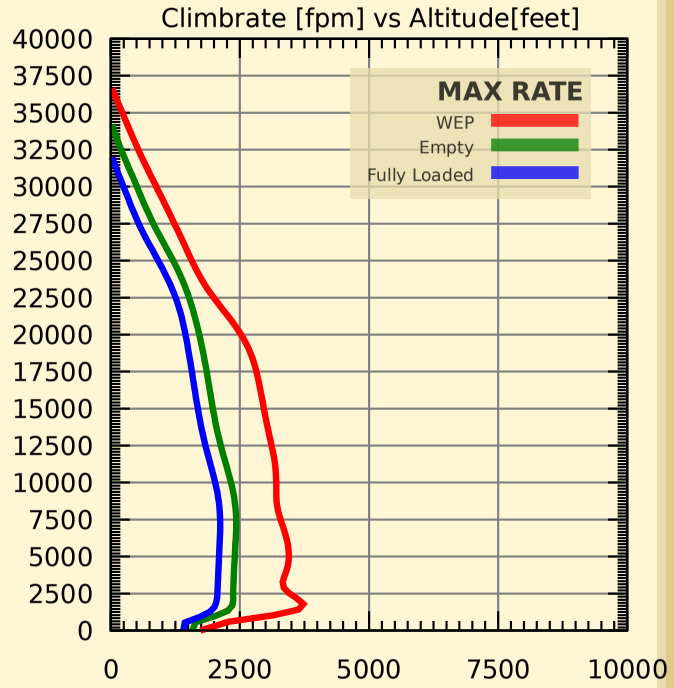
Name: Messerschmitt Bf-109G-6/R6 Gustav
Role: Fighter
Crew: 1
Service Date: March 1944
Primary Guns: 2x MG131 13mm machine guns with 300 rpg in cowl and One MG151/20 20mm cannon with 150 rpg in hub
Secondary Guns: 2x MG-151/20 20mm cannon with 125 rpg in underwing pods
Defensive Guns: NA
Ordnance: One 551 lb bomb or One 475 lb drop tank

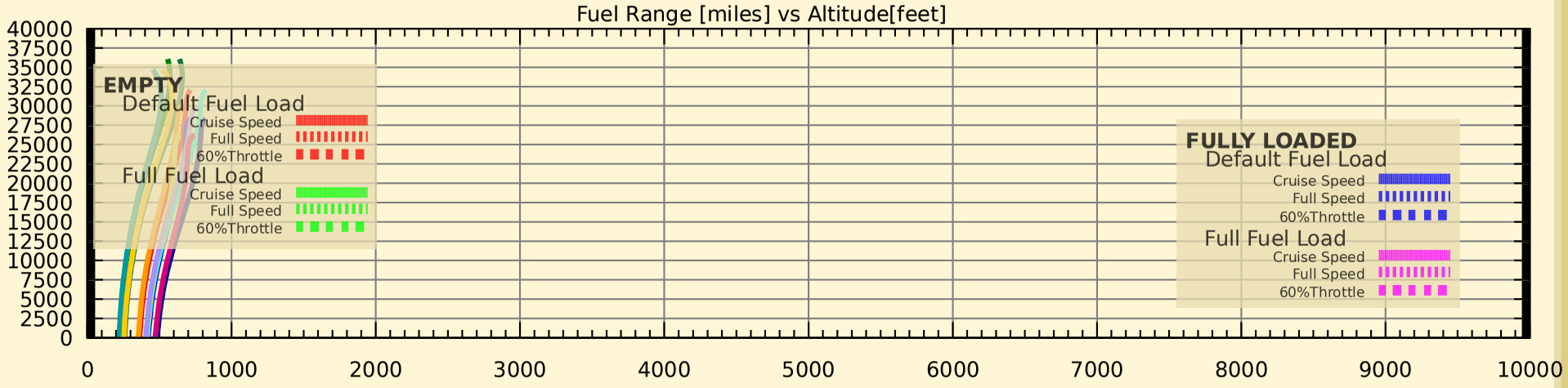
Length: 29.56 ft
Wing Span: 32.71 ft
Wing Area: 173 sq. ft

Power Plant: One DB-605A
Power: 3308 lb s.t.
Internal Fuel: 634 lb
External Fuel: 475 lb

Empty Weight: 6393 lb
MTOW: 7716 lb

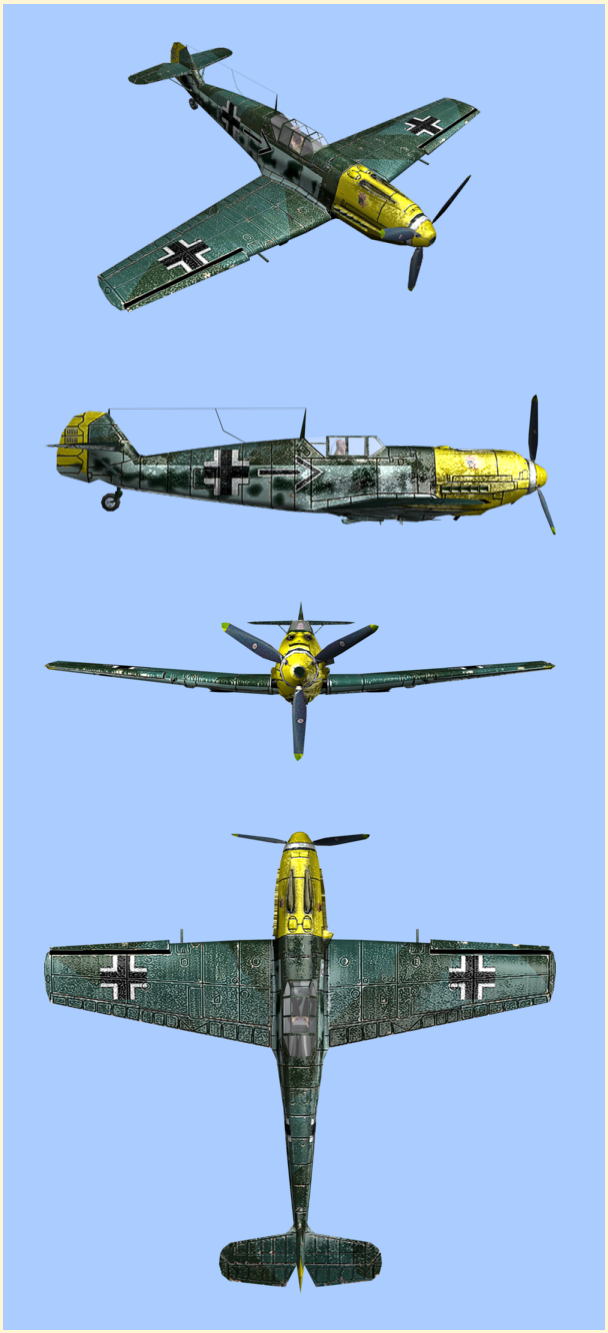






Messerschmitt Bf-109E-4/B Emil

Durability	☆☆	Speed	☆☆☆☆☆	Climb Rate	☆☆☆☆
Maneuverability	☆☆☆☆☆	Firepower	☆☆	Ground Attack	☆☆



Durability - The 109 was a small plane and not capable of absorbing much combat damage.

During the fall of 1939 Luftwaffe front-line units started to receive the new Bf-109E-3 model equipped with a pair of 20mm MG-FF cannon with 60 rpg in place of the MG-17s in the wings. In addition to the upgraded armament, the 1,175 hp DB-601Aa was installed, boosting top speed from 334 to 348 mph.

A pair of E-3s fell into French hands in early May 1940 and after examination by the French Air Force, were shipped to England on May 14 for trials and evaluations. The lessons learned about the performance of the Spitfire versus the Messerschmitt enabled the RAF to employ improvements to their fleet in time for the Battle of Britain and influenced future development.

During the French campaign several lessons were learned and the E-4 model was intended to incorporate these improvements. In addition to increasing the pilot's armor protection by about 75 lb., the new MG-FF/M cannon, which employed a more powerful "mine" shell, were mounted in place of the older models.

Additionally, experiments were made with mounting a rudimentary bomb rack on E-3s in combat. This proved successful enough that a bomb rack was mounted on the special E-4/B model at the factory, which was used to equip Erpobungsgruppe 210 for field testing. In addition to bombs, the rack could carry a 300 liter drop tank, thus increasing the range of the fighter.

The E-5 and E-6 models were reconnaissance versions of the E-4, but the E-7 was a fighter variant which incorporated the bomb and drop tank carrying capacity of the E-4/B into the main production run, thus giving all planes the same capability.

The E-4 was the first variant to be "tropicalized" for use in the Western Desert. The conversion consisted of adding a dust filter to the supercharger air intake and installing an emergency desert survival kit in the cargo space of the fuselage, which even included a carbine for personal protection.

Sources:

Beaman Jr., John R. and Campbell, Jerry L.; Messerschmitt Bf 109 In Action, Part One; Squadron/Signal Publications, Carrollton, TX; 1980.

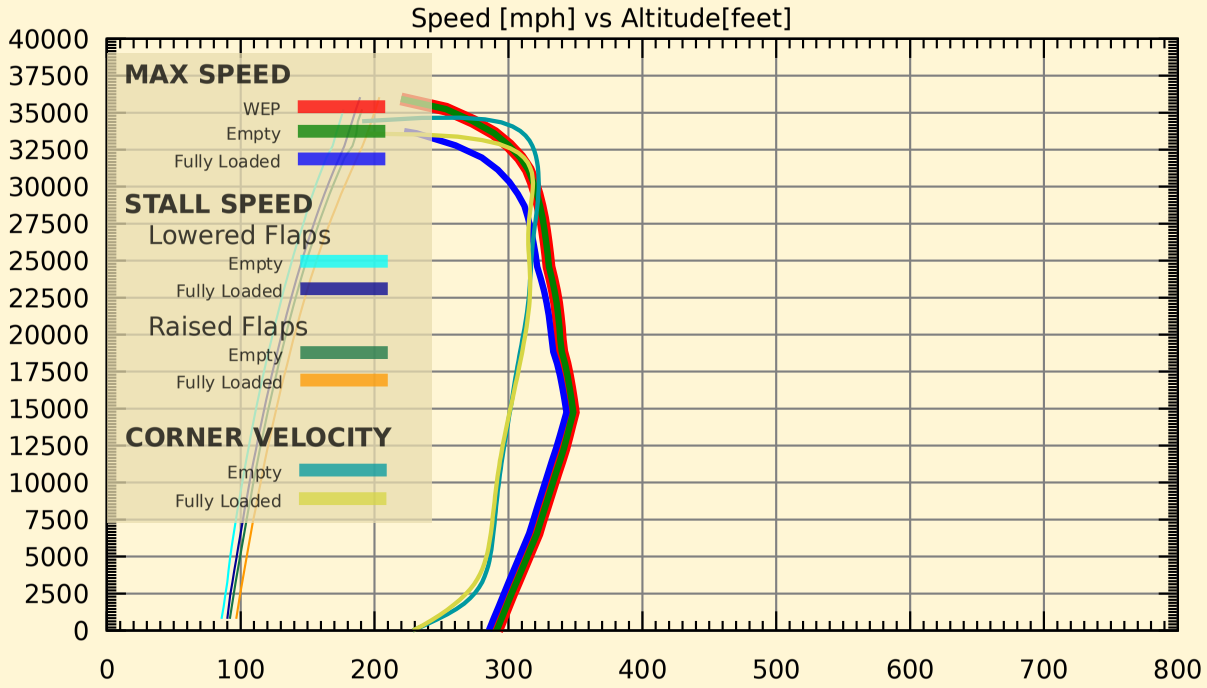
Green, William; Warplanes of the Third Reich; Doubleday and Company, Garden City, NY; 1970.

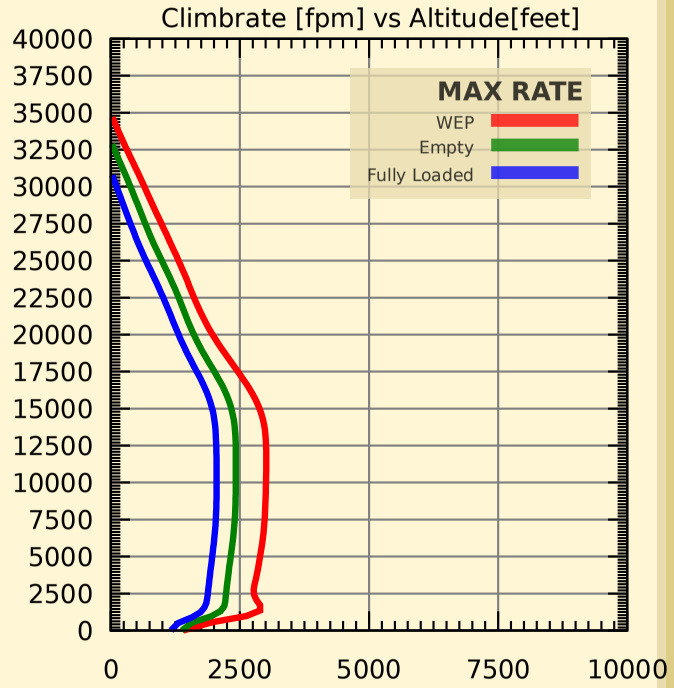
Name: Messerschmitt Bf-109E-4/B Emil
Role: Fighter
Crew: 1
Service Date: January 1940
Primary Guns: 2x MG17 7.9mm machine guns with 1000 rpg in cowl
Secondary Guns: 2x MG-FF/M 20mm cannon with 60 rpg in wings
Defensive Guns: NA
Ordnance: One 551 lb bomb or One 475 lb drop tank

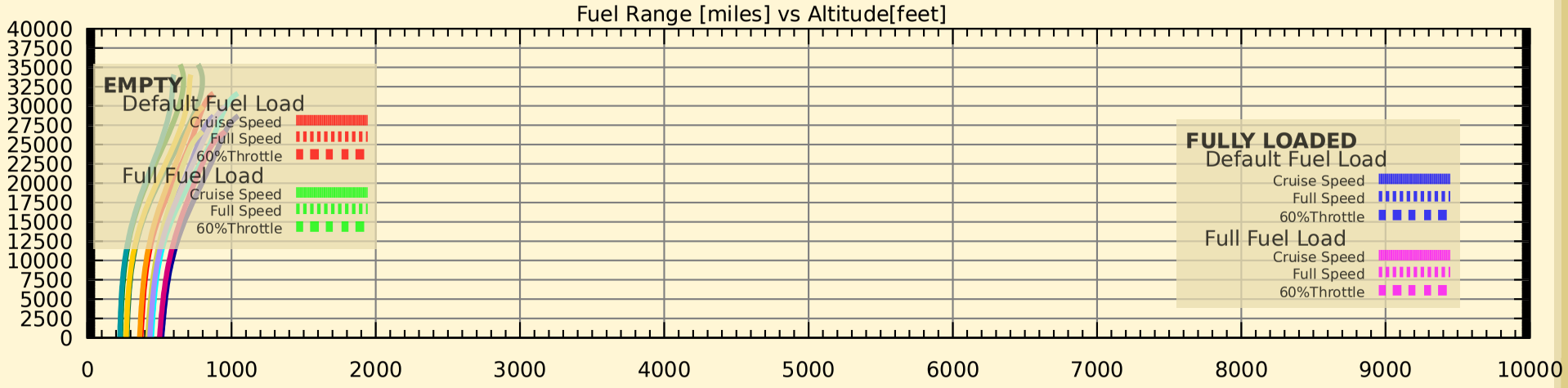
Length: 28.22 ft
Wing Span: 32.48 ft
Wing Area: 174 sq. ft

Power Plant: One DB-601Aa
Power: 2713 lb s.t.
Internal Fuel: 634 lb
External Fuel: 475 lb

Empty Weight: 4674 lb
MTOW: 6063 lb

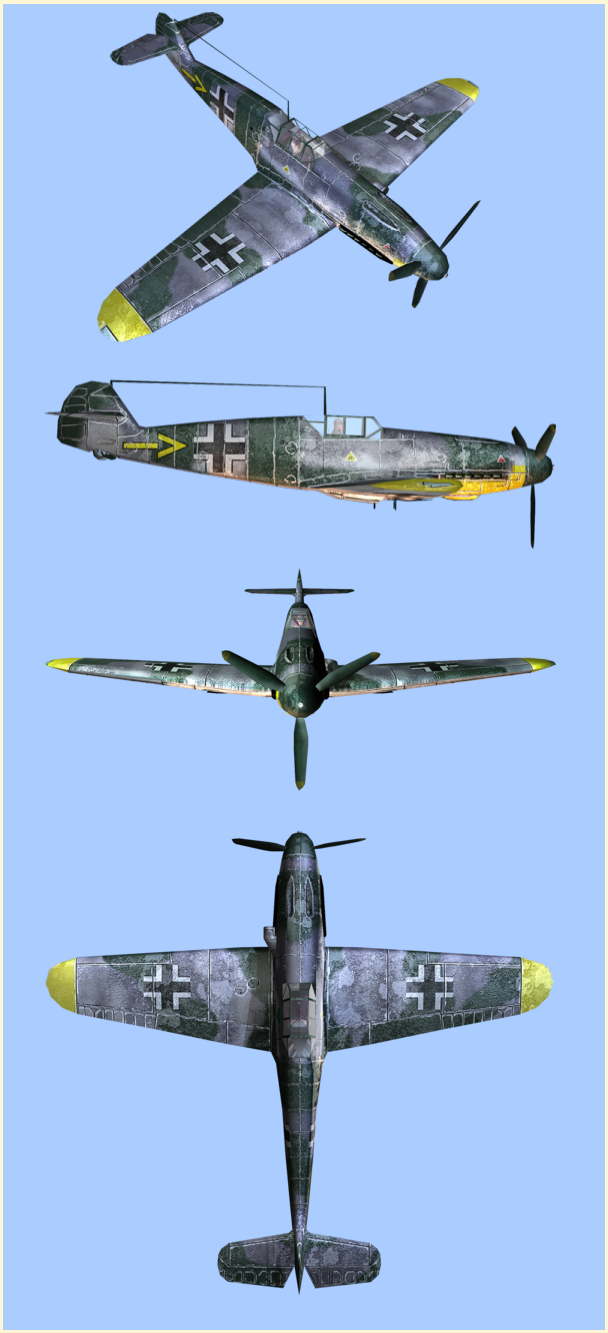






Messerschmitt Bf-109F4 Friedrich' ('Franz', 'Fritz')

Durability	★☆	**Speed**	★★★★★★	**Climb Rate**	★★★★★☆
Maneuverability	★★★★★☆	**Firepower**	★★☆	**Ground Attack**	★☆



Durability - The 109 was a small plane and not capable of absorbing much combat damage.

Early in 1940 the Augsburg Messerschmitt factory began work on improving the aerodynamic shape and streamlining of the design in order to obtain maximum performance. Four prototypes were built from the E-4 production run, each intended to test one or more of the changes.

The first change was to the shape of the nose with a steady even slope down to the spinner replacing the "stepped" look of the Emil. The spinner was enlarged and rounded to provide a smooth aerodynamic shape. Finally, the supercharger air intake was changed from square to round and was placed away from the fuselage to improve the ram effect.

The tail section saw a reduction in the size of the rudder from 8.1 to 7.5 sq. ft. and the horizontal stabilizer was moved slightly forward and down, with the elimination of the support struts being the most visible change. This later proved to be a problem when sympathetic vibrations from the engine caused metal fatigue to set in, which resulted in failure of the fuselage just forward of the tail. Installation of external braces in the field fixed the problem for existing planes while production changes were made to improve structural strength.

The largest drag reduction came from a redesign of the under-wing radiators, which were both reduced in height and were recessed into the wing. A boundary layer bypass system was devised to collect turbulent air in front of the radiators, leading it over the radiators and out through a duct in the inner flaps.

The V-21 and V-22 prototypes had the wingspan reduced by two feet but this had a detrimental effect on handling. The V-23 prototype installed a pair of detachable, semi-elliptical wingtips that restored all but 2.16 sq. ft. of the original wing area. This worked well and the wingtips were incorporated as a standard part of the wing on all subsequent versions.

Initially intended to use the 1,375 hp DB-601E, the engine wouldn't be ready for a full year after F-series production commenced. So in the meantime Messerschmitt used 1,200 hp DB-601N, which achieved its performance partly through the use of higher compression ratios and 96 octane fuel.

Similarly, the plane's armament was to be considerably changed from that of the Emil. Replacing the pair of wing-mounted MG-FF/M cannon was to be a single MG-151 cannon, which would be produced in both 15mm and 20mm versions. The higher rate of fire, greater hitting power and higher ammo loads were considered to provide an overall greater firepower. Additionally, removal of the wing-mounted guns improved roll performance, which was a welcome change to pilots. However, the MG-151 wasn't yet ready and a single engine-mounted MG-FF/M was used instead.

This version went into production as the F-1 with the first examples rolling off the assembly line in November 1940. By March and April 1941 JG 2 and JG 26 on the channel coast were converting in large numbers to the F-1 and the newer F-2s, which utilized the 15mm MG-151, the 20mm model not yet being ready.

At the beginning of 1942 the F-3 started coming off the production line using the now available DB-601E. The lower compression ratio of the 601E allowed 87-octane fuel to be used, which was more readily available. Simultaneous with F-3 production was the F-4, which utilized the heavier hitting 20mm MG-151, with the ammo load being reduced from 200 to 150 rounds. Further improvements included additional self-sealing to the fuel tanks and additional pilot armor. The F-4/B added the capability of carrying bombs or a drop tank, while the F-4/Z utilized an experimental nitrous-oxide injection system.

A number of F-4s were used to experiment with various engine and landing gear installations. These included a tricycle landing gear system as well as experiments in using the BMW-801 radial and Junkers Jumo 213 inline with annular radiator (the same as used in the FW-190D).

Despite the increased weight of the Franz over the Emil, the performance of the Franz was considerably better. Many pilots considered the Franz to be the zenith of 109 development, with the best combination of speed, firepower and turn-rate.

Sources:

Beaman Jr., John R. and Campbell, Jerry L.; Messerschmitt Bf 109 In Action, Part One; Squadron/Signal Publications, Carrollton, TX; 1980.

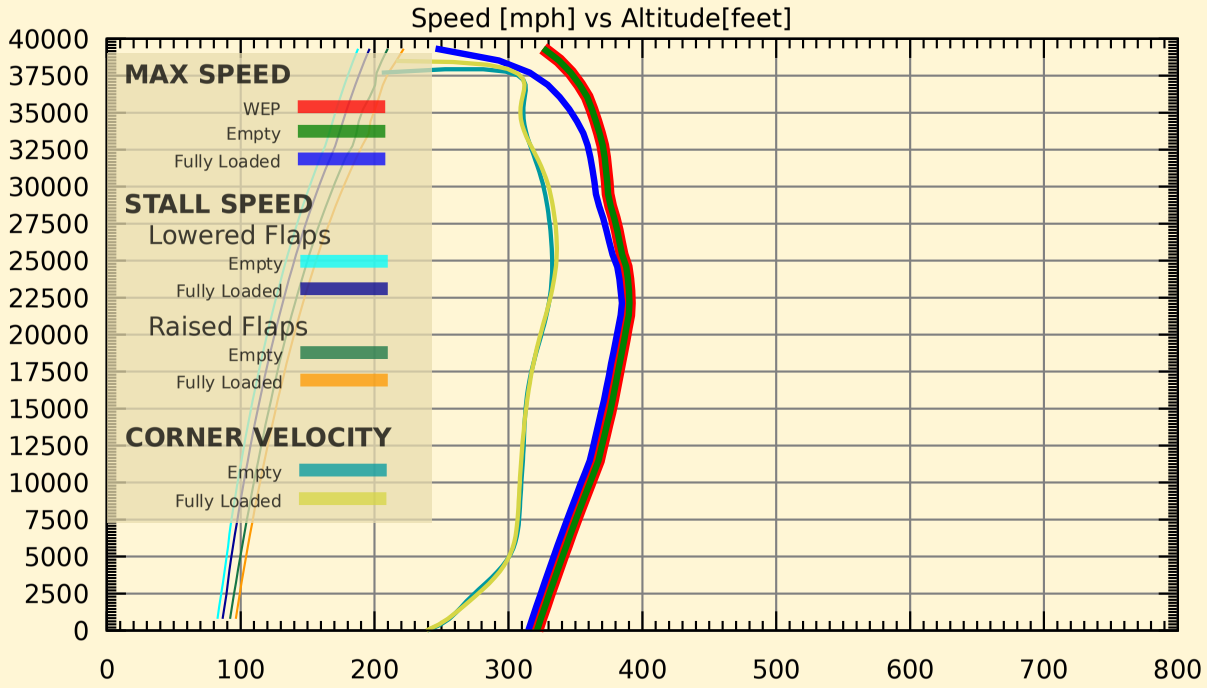
Green, William; Warplanes of the Third Reich; Doubleday and Company, Garden City, NY; 1970.

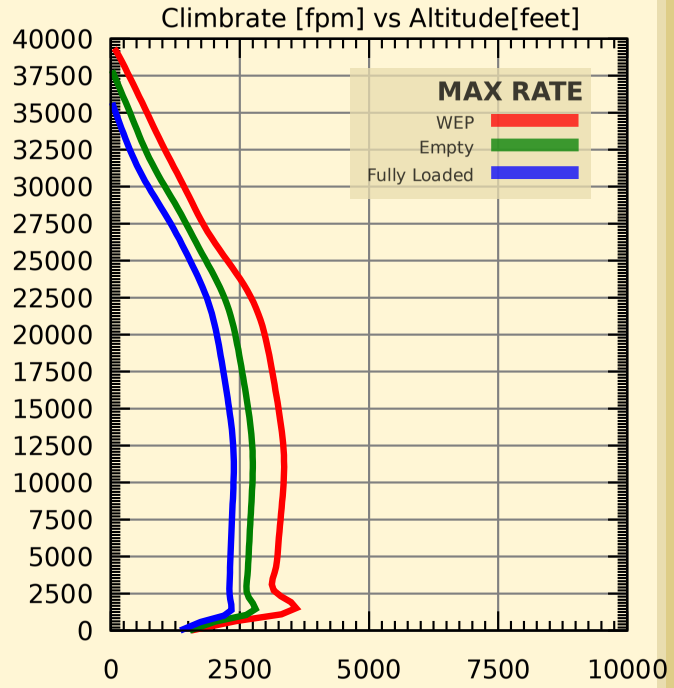
Name: Messerschmitt Bf-109F4 Friedrich' ('Franz', 'Fritz')
Role: Fighter
Crew: 1
Service Date: August 1941
Primary Guns: 2x MG17 7.9mm machine guns with 500 rpg in cowl
Secondary Guns: One MG151/20 20mm cannon with 200 rpg in hub
Defensive Guns: NA
Ordnance: One 551 lb bomb or One 475 lb drop tank

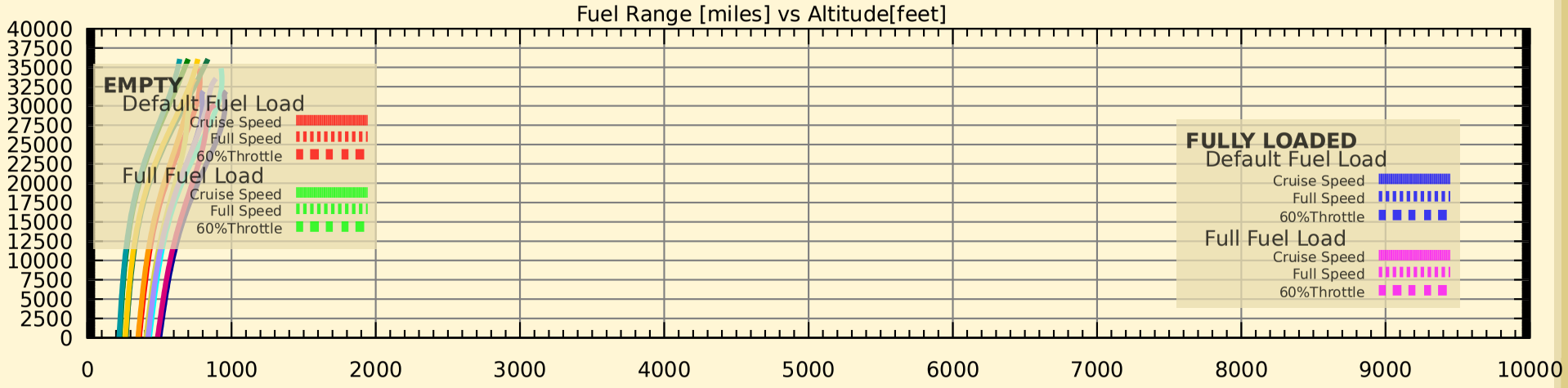
Length: 28.22 ft
Wing Span: 32.48 ft
Wing Area: 186 sq. ft

Power Plant: One DB601E-1
Power: 2860 lb s.t.
Internal Fuel: 634 lb
External Fuel: 475 lb

Empty Weight: 5445 lb
MTOW: 6834 lb

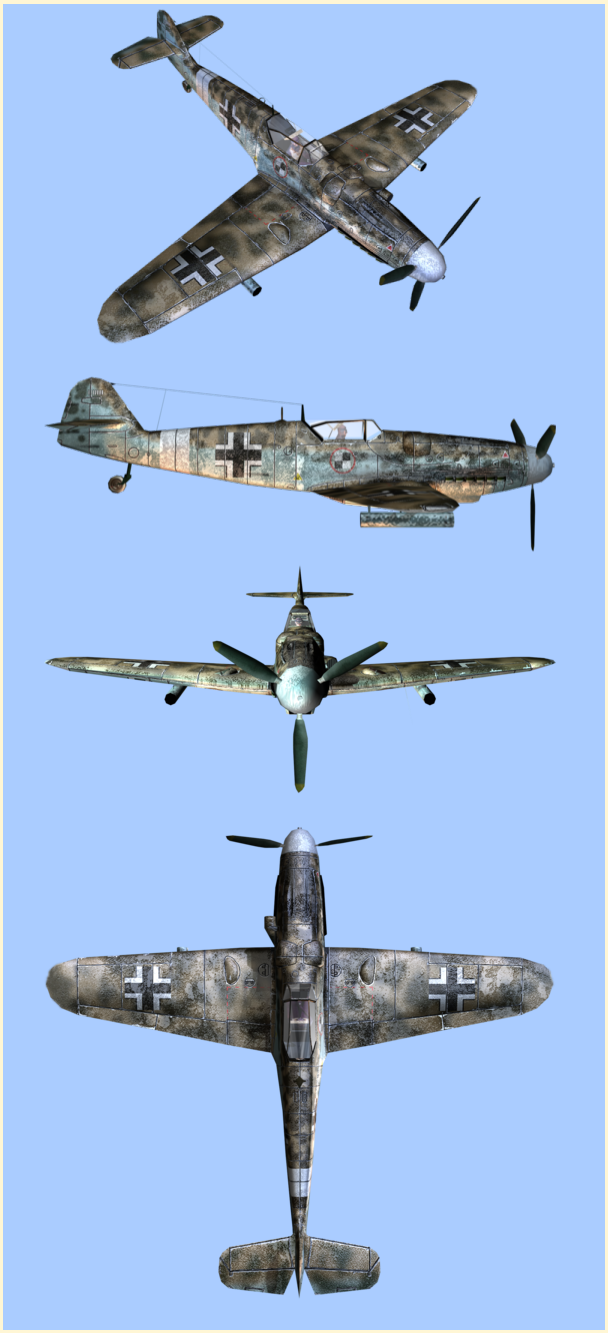






Messerschmitt Bf-109G-6/R2 Gustav

Durability	☆☆	Speed	☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆☆
Maneuverability	☆☆☆☆☆	Firepower	☆☆☆☆	Ground Attack	☆☆☆



Durability - The 109 was a small plane and not capable of absorbing much combat damage.

To get better performance out of their basic engine design, Daimler-Benz created the DB-605A engine by maximizing the bore size of the DB-601 without changing the bore-center locations. This resulted in a normal take-off output of 1,475 hp. However, the compression ratio was also increased, which necessitated the return to 96 octane fuel.

Because of the larger size and heavier weight of the 605 engine, the Gustav series was produced with heavier engine supports and a redesigned cowling. While the armament remained the same as that of the Franz, the Gustav series was outfitted to use the GM-1 nitrous injection system as standard equipment.

The G-1 utilized a pressurized cabin while the simultaneously produced G-2 deleted the pressurization equipment to save weight. Delivered to front-line units at about the same time as the G-1 and G-2, the G-3 and G-4 differed mainly in the installation of an upgraded radio and larger wheels, necessitating bulges in the upper surface of the wing to accommodate them.

Experience with the 20mm MG-151 cannon in North Africa revealed that it could overheat and jam, leaving the pilot with only a pair of 7.9mm guns, which was hardly adequate for anything except strafing soft targets. The G-1/Trop was intended to rectify this problem by replacing the rifle caliber machine guns with larger 13mm models. This required the addition of bulges in the cowling to cover the larger breeches and pilots promptly dubbed it "Beule" ("Bump").

The G-5 incorporated the larger guns into a pressurized G-3 with some examples utilizing the DB-605AS engine, which used the larger supercharger from the DB-603. The pressurization however was found to be fairly useless and the G-6 abandoned the feature to save weight.

The GM-1 nitrous system could be replaced with the far more useful MW50 methanol system, which boosted takeoff power from 1,475 to 1,800 hp. MW50 could be used for 10 minutes at a time, but required 5 minutes between uses. However, this increased fuel consumption by almost 40%, severely reducing range.

The G-6 was the first version intended from the outset to employ a variety of RnstStz field conversion kits. The /R2 kit installed a pair of Wfr.Gr.21 rocket tubes under the wing for busting up American bomber formations.

Sources:

Beaman Jr., John R. and Campbell, Jerry L.; Messerschmitt Bf 109 In Action, Part Two; Squadron/Signal Publications, Carrollton, TX; 1980.

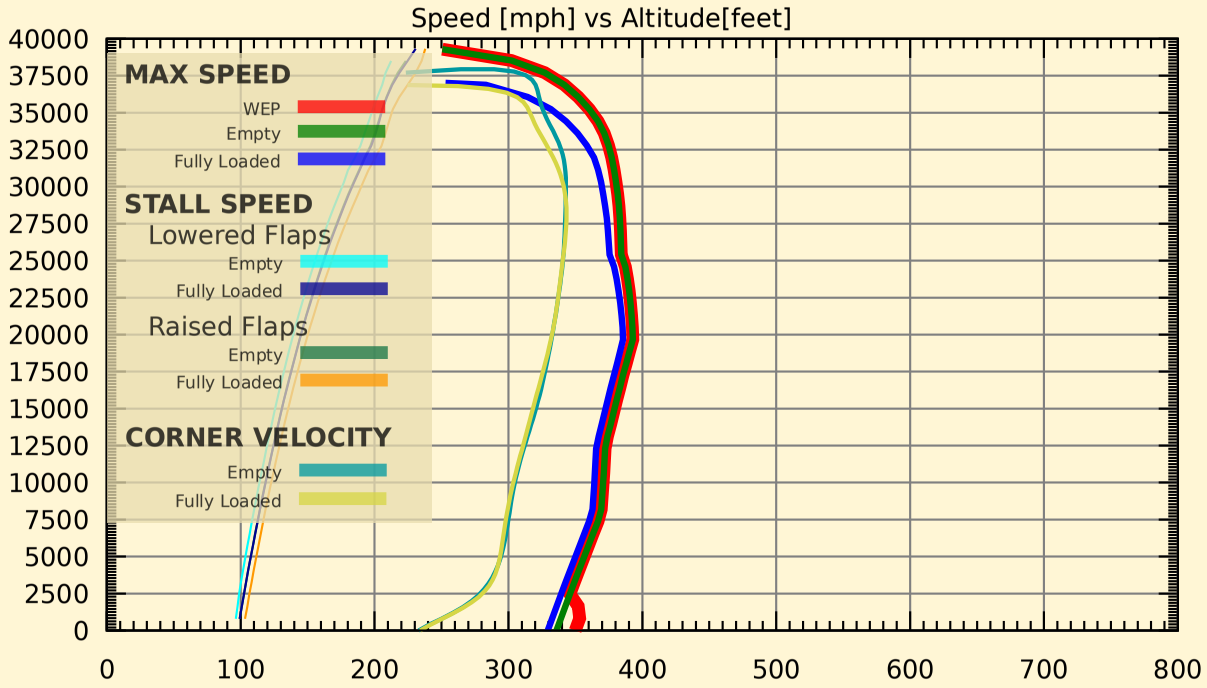
Green, William; Warplanes of the Third Reich; Doubleday and Company, Garden City, NY; 1970.

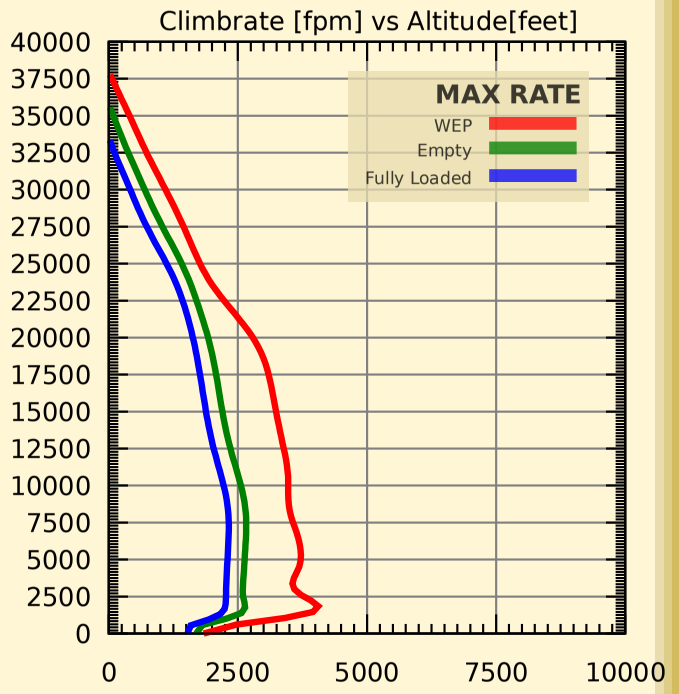
Name: Messerschmitt Bf-109G-6/R2 Gustav
Role: Fighter
Crew: 1
Service Date: July 1943
Primary Guns: 2x MG131 13mm machine guns with 300 rpg in cowl
Secondary Guns: One MG151/20 20mm cannon with 150 rpg in hub
Defensive Guns: NA
Ordnance: One 551 lb bomb or One 475 lb drop tank under fuselage, or 2x 245 lb WGr.21 rockets under wings

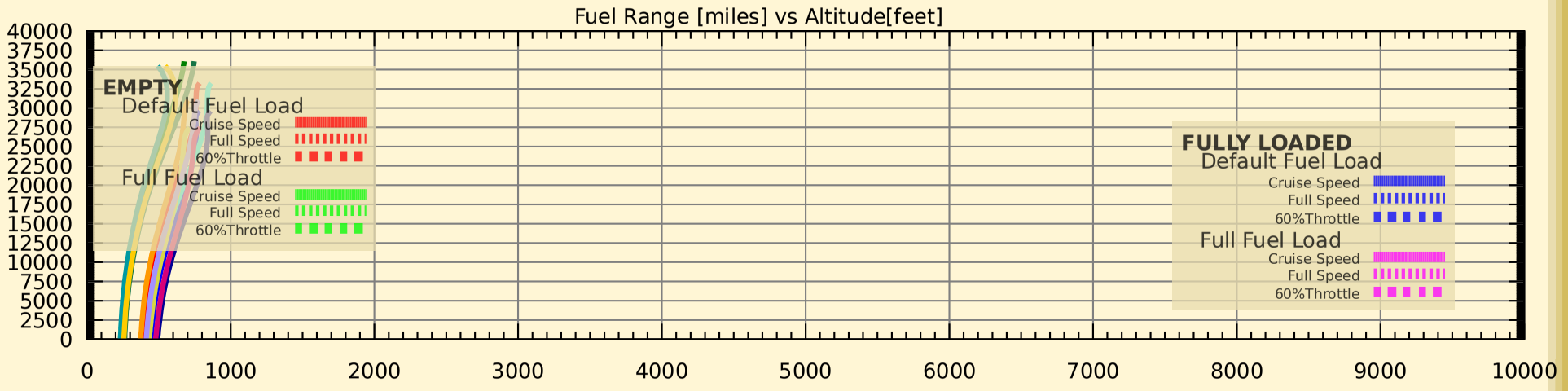
Length: 29.56 ft
Wing Span: 32.71 ft
Wing Area: 173 sq. ft

Power Plant: One DB-605A
Power: 3308 lb s.t.
Internal Fuel: 634 lb
External Fuel: 475 lb

Empty Weight: 6173 lb
MTOW: 7474 lb

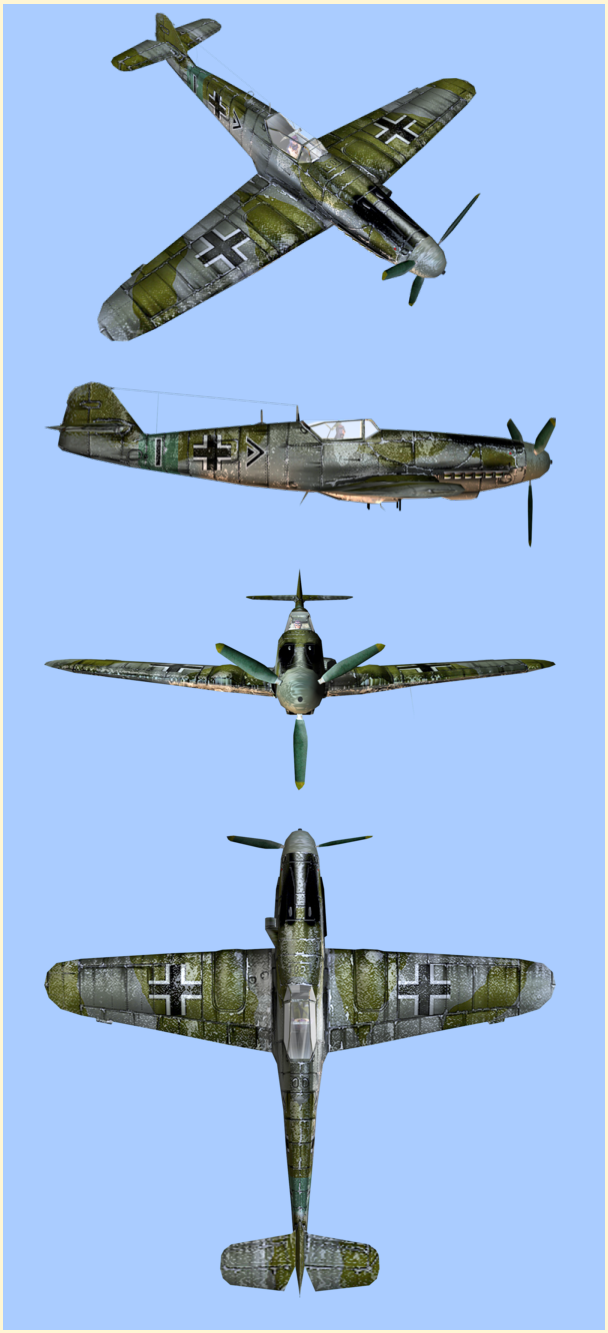






Messerschmitt Bf-109K-4 Kurfürst' ('Karl')

Durability	☆☆	Speed	☆☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆☆☆☆
Maneuverability	☆☆☆☆☆	Firepower	☆☆☆☆☆☆☆	Ground Attack	☆☆



Durability - The 109 was a small plane and not capable of absorbing much combat damage.

By 1944 the Gustav had become both slow and heavy, which combined with poor pilot training to create ever higher fighter losses. Additionally, the dispersal of the German aircraft industry caused by the American daylight raids had resulted in a sort of chaos in 109 production that was impacting aircraft availability. This chaos also meant that different versions of the same production series began to appear in service, complicating maintenance.

The K series was an attempt to incorporate all the various improvements found in the G-14 and G-10 versions, as well as a few improvements of its own. Coming from the G-10 was the 2,000 hp DB-605DCM, which was a modification of the DB-605AS utilizing a larger supercharger.

Also standard were the high-visibility Erla Haube canopy (also known as the "Galland" hood), the taller wooden tail and retractable tail wheel. The 30mm Mk-108 had been tried in various versions of the Gustav, including the G-6. But problems with jamming prevented its widespread use. However with these problems finally fixed, it replaced the 20mm MG-151 as the standard engine cannon. Equipped with 60 rounds, its hit was devastating and finally gave the 109 bomber-killing power without the use of RnstStz kits.

Only about 700 K-4s were produced, but it served with a number of different units, including JG 2, JG 3, JG 27, JG 51, JG 52, JG 53 and JG 77.

Sources:

Beaman Jr., John R. and Campbell, Jerry L.; Messerschmitt Bf 109 In Action, Part Two; Squadron/Signal Publications, Carrollton, TX; 1980.

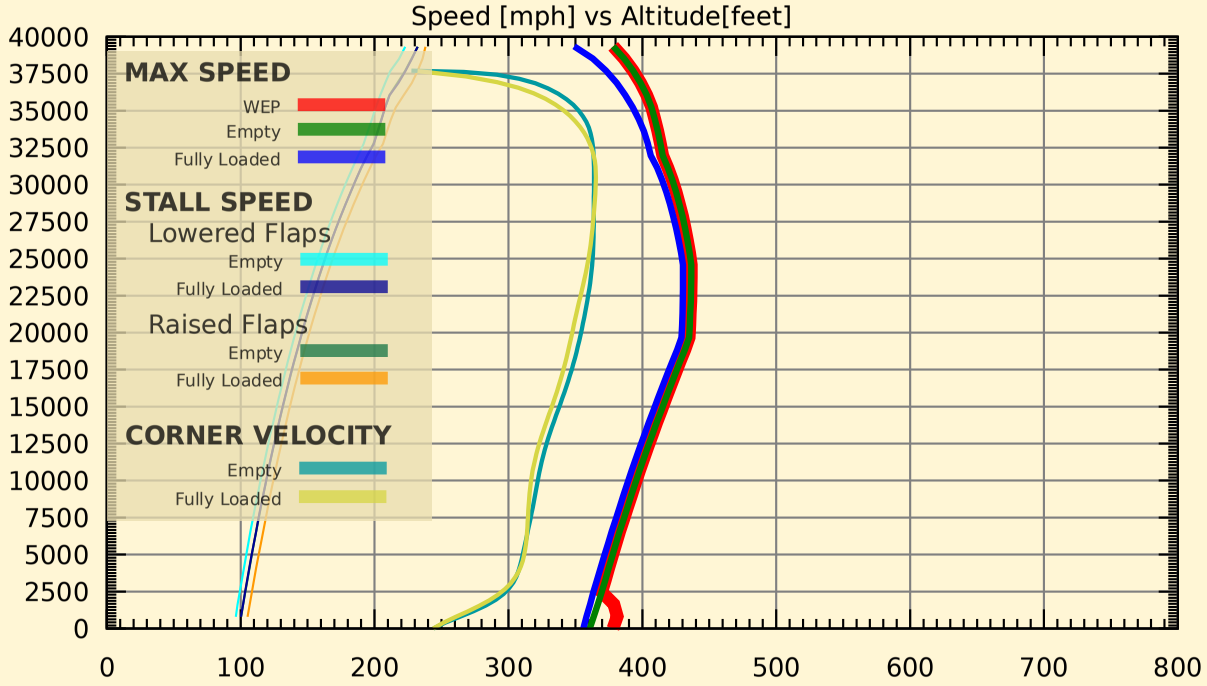
Green, William; Warplanes of the Third Reich; Doubleday and Company, Garden City, NY; 1970.

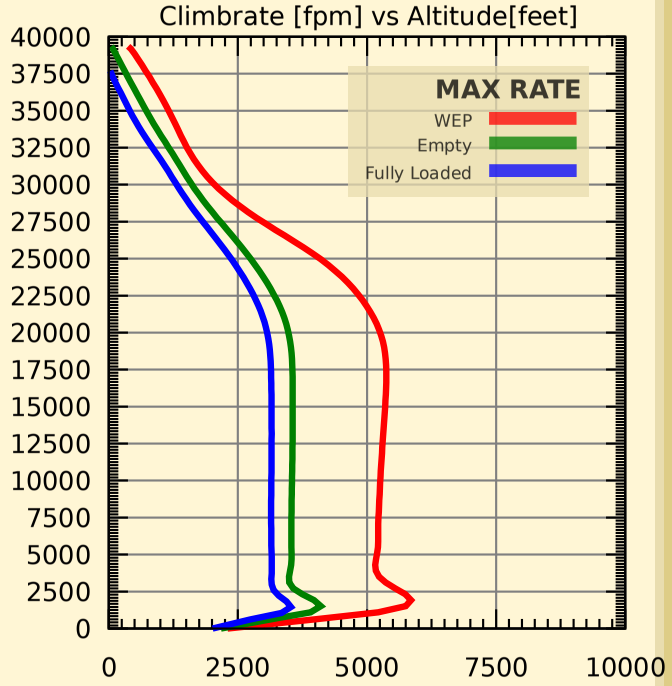
Name: Messerschmitt Bf-109K-4 Kurfürst' ('Karl')
Role: Fighter
Crew: 1
Service Date: November 1944
Primary Guns: 2x MG131 13mm machine-guns with 300 rpg in cowl
Secondary Guns: One Mk108 30mm cannon with 65 rpg in hub
Defensive Guns: NA
Ordnance: One 550 lb bomb or One 475 lb drop tank

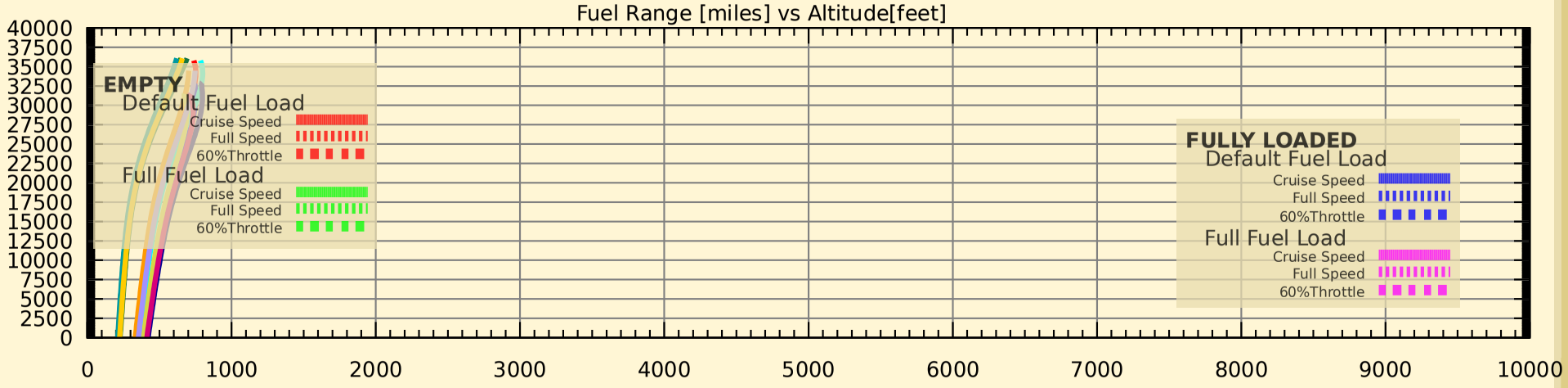
Length: 29.04 ft
Wing Span: 32.71 ft
Wing Area: 173 sq. ft

Power Plant: One DB-605DCM
Power: 3610 lb s.t.
Internal Fuel: 634 lb
External Fuel: 475 lb

Empty Weight: 6283 lb
MTOW: 7716 lb

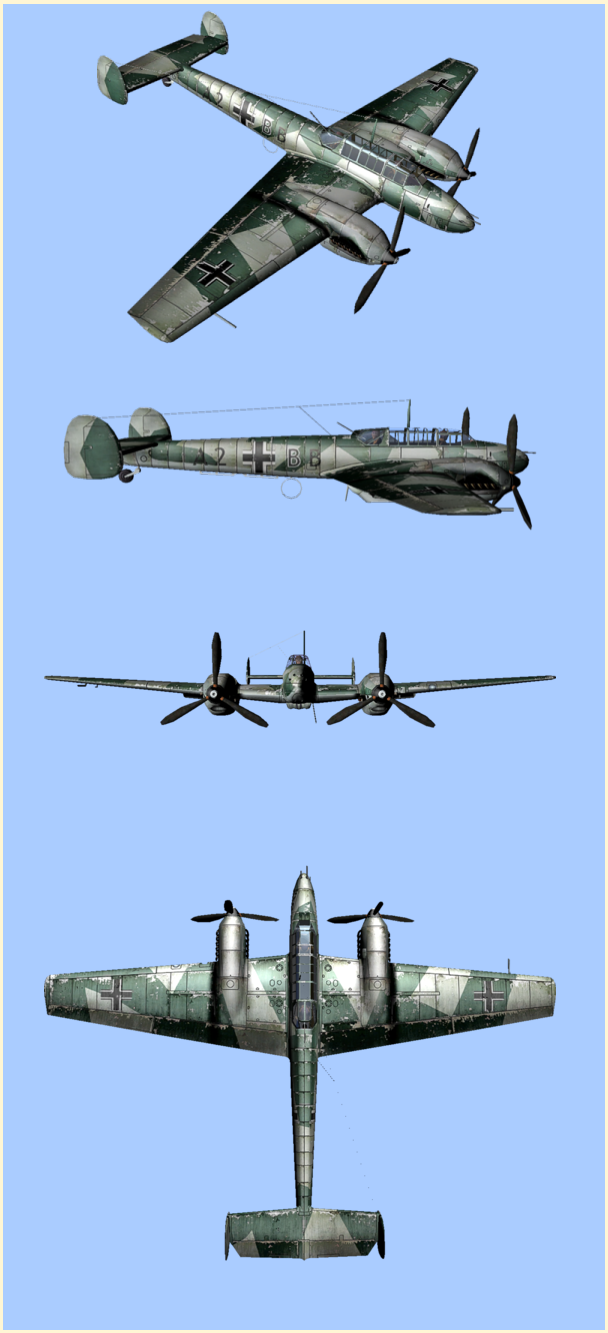






Messersshmitt Bf-110C-4/B
Zerstörer

Durability	☆☆☆☆☆	**Speed**	☆☆☆☆☆	**Climb Rate**	☆☆☆☆
Maneuverability	☆☆☆☆	**Firepower**	☆☆☆☆	**Ground Attack**	☆☆☆☆



Maneuverability - The slow roll rate makes dogfighting in the Zerstörer a losing proposition.

Driven by the need for a dual role, long-range escort and ground-attack fighter, the RLM initiated a design competition between the various German aircraft manufacturers. While other manufacturers submitted designs that were more light-bomber than fighter, BFW (Bayerish Flugzeugwerke) chief designer Willy Messerschmitt designed a sleek, streamlined plane that earned the contract.

Unfortunately, the Daimler-Benz 600A series engines on which the design was based, were unsuitable for fighter use and the first prototypes had to use the much less powerful Junkers Jumo 210C engine. However, using the lower powered engines gave the design team a chance to test the airframe and make changes that would result in better streamlining and reduced drag.

With the imminent release of the more powerful DB-601A on the horizon, the assembly line and production machines were set up in the early spring of 1938. However, as with the DB-600, the new powerplant proved problematic and the Jumo 210Ga was substituted for "B" series production, of which about 45 planes were built for training purposes.

Finally in late 1938 the DB-601A-1 engine was certified for fighter use and the first Bf-110C-1s rolled off the production line by the end of January 1939. By mid-summer, front-line units began receiving their C-1s, just in time for the invasion of Poland.

Despite misgivings about the plane's maneuverability, it performed well against the slower and more maneuverable Polish fighters. It also served well in the Norway campaign where its longer range allowed it to operate where the smaller Bf-109 couldn't reach.

However, when it came to combat against superior single-engine fighters such as the Spitfire, the Zerstörer's lack of maneuverability spelled its doom. Unable to fight effectively against the more maneuverable British planes, the erstwhile escort fighter found itself in the embarrassing position of needing escort of its own.

The changes in the "C" series were minor. The C-2 introduced a new radio, the C-3 had improved MG-FF cannon, and the C-4 added about 500 lb. of crew armor. The C-4/B model was fitted with an ETC-250 bomb rack under the fuselage, which allowed the carriage of two 250 kg. bombs. To offset the additional drag, the more powerful DB-601N engine was used in place of the DB-601A.

Sources:

Campbell, Jerry L.; Messerschmitt Bf-110 Zerstörer In Action; Squadron/Signal Publications, Carrollton, TX; 1977.

Chant, Chris; German Warplanes Of World War II; Amber Books, Ltd., London; 1999.

Donald, David; Warplanes Of The Luftwaffe; Aerospace Publishing, London; 1994.

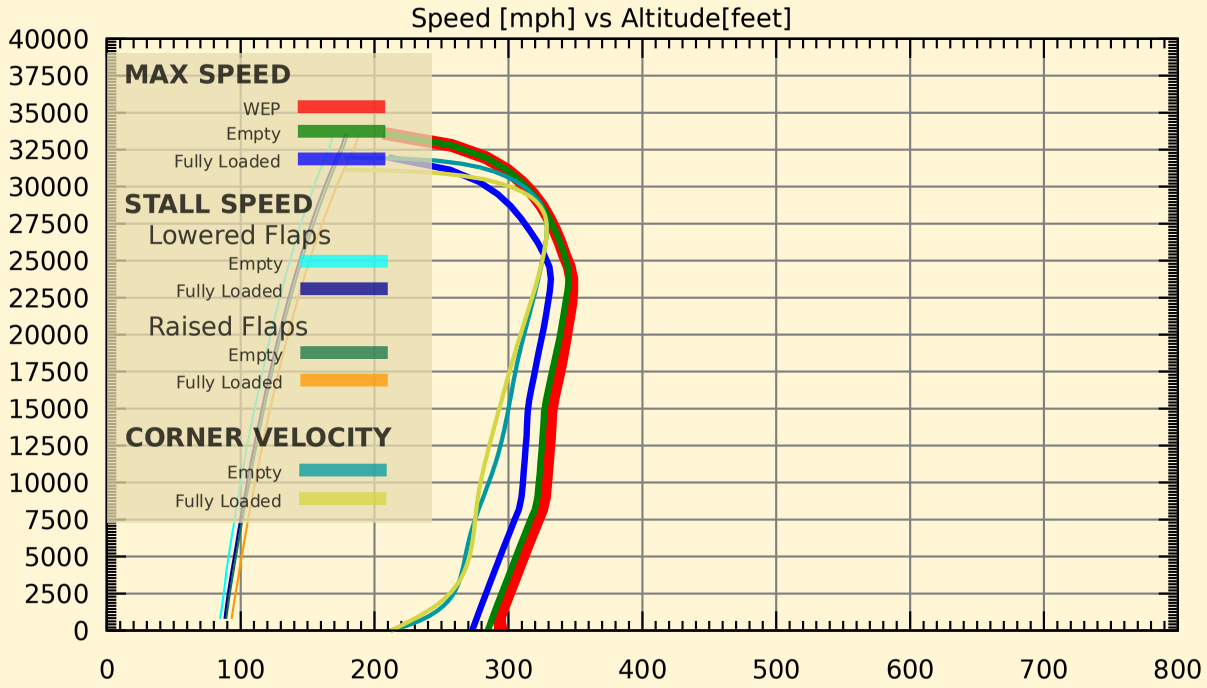
Green, William; Warplanes of the Third Reich; Doubleday and Company, Garden City, NY; 1970.

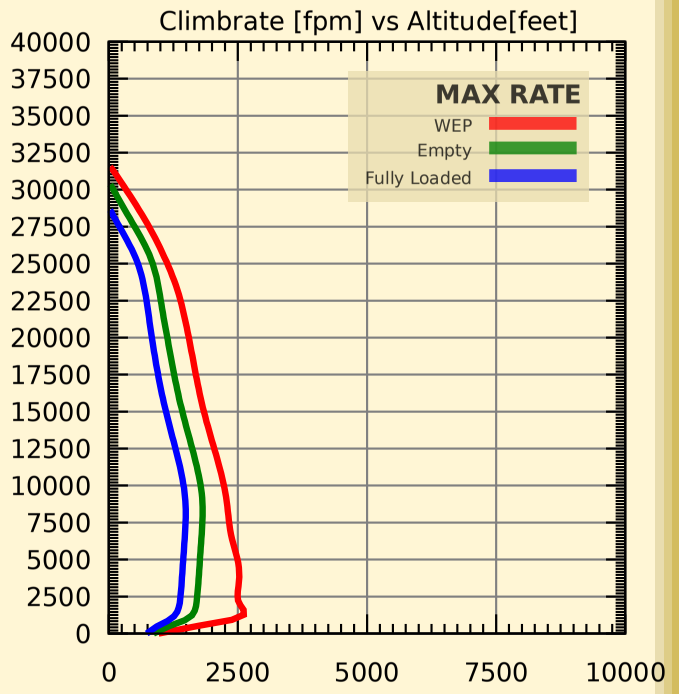
Name: Messersshmitt Bf-110C-4/B Zerstörer
Role: Fighter
Crew: 2
Service Date: June 1940
Primary Guns: 4x MG17 7.92mm machine guns with 1000 rpg in nose
Secondary Guns: 2x MG-FF 20mm cannon with 180 rpg in nose
Defensive Guns: NA
Ordnance: 2x 551 lb bombs

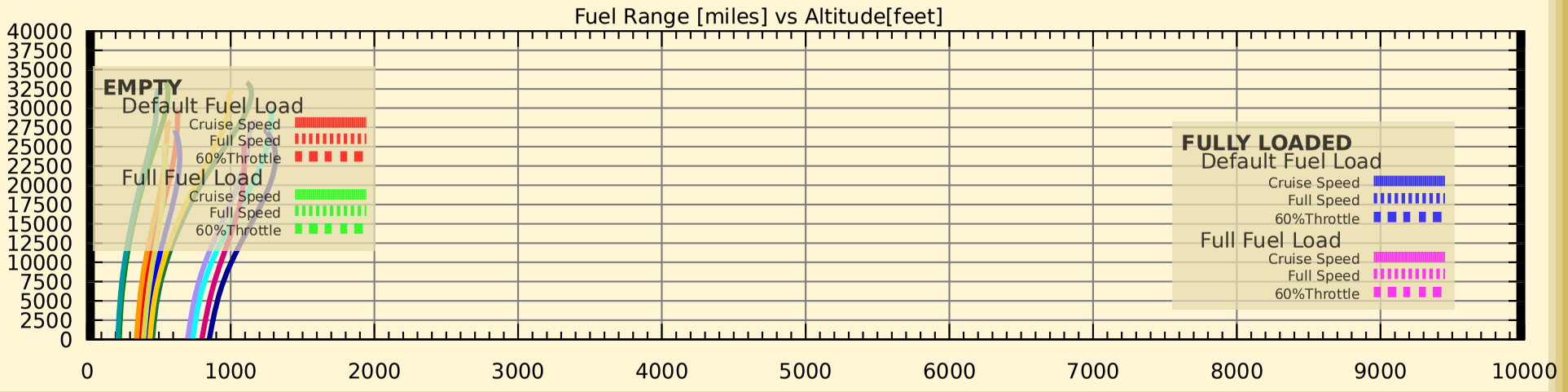
Length: 39.90 ft
Wing Span: 53.25 ft
Wing Area: 413 sq. ft

Power Plant: 2 X DB-601N
Power: 2437 lb s.t.
Internal Fuel: 2016 lb
External Fuel: NA

Empty Weight: 11111 lb
MTOW: 14661 lb

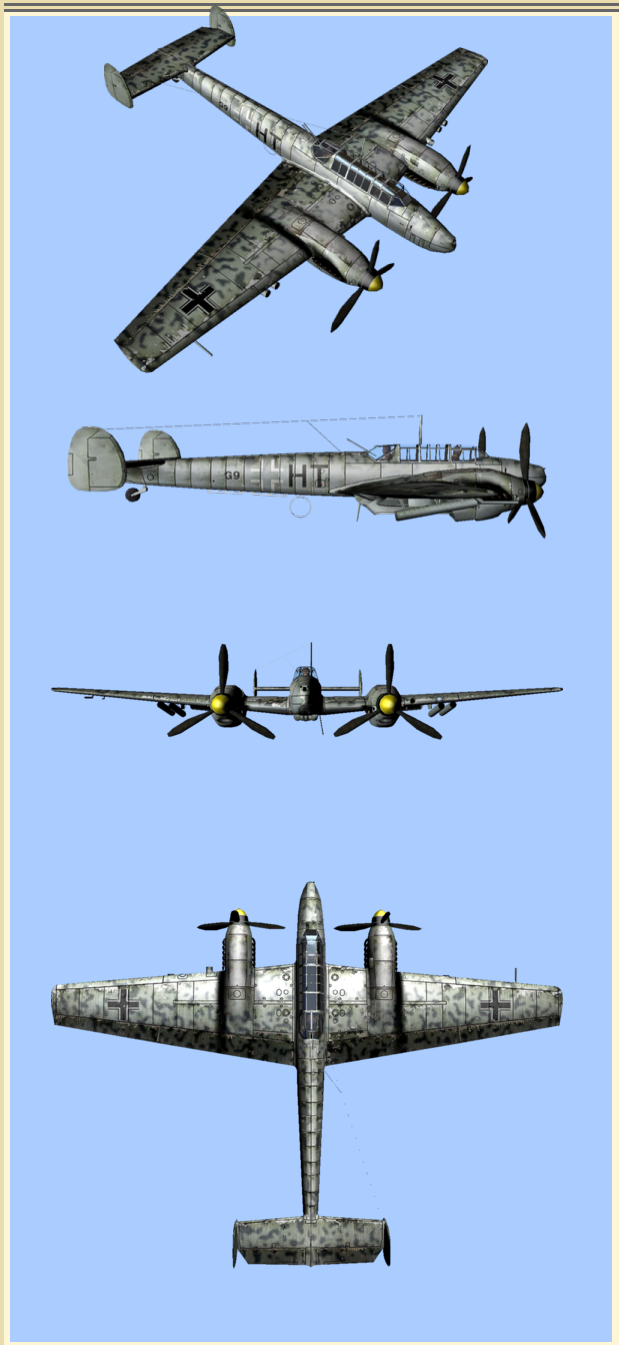






Messersshmitt Bf-110G-2/R3
Zerstörer

Durability	☆☆☆☆☆	**Speed**	☆☆☆☆☆	**Climb Rate**	☆☆☆☆
Maneuverability	☆☆☆☆	**Firepower**	☆☆☆☆☆☆	**Ground Attack**	☆☆☆☆☆☆



Speed - With a top speed of 342 mph and it being even slower when fully loaded, the Bf-110G-2 can't run from anything except the slowest of early war fighters.

As it became more and more apparent that the Zerstörer was not capable of fighting against single-engine planes on an equal basis, the type began to be used more and more for the ground-attack role. The D, E, and F versions made incremental improvements to the engine power and carrying capacity until the bomb load exceeded 4,400 lb.

With the failure of the Messerschmitt Me-210 as a replacement, work began on a more powerful version of the Bf-110 powered by the new Daimler-Benz DB-605 engines. The armament of the initial Bf-110G-0, as it was known, was the same as in the final D and F versions, four MG-17 7.9mm machine guns and two MG-FF 20mm cannon in the nose, but the MG-FF were replaced with the more powerful MG-151/20s in the production G-1 version. However, the G-1 was soon supplanted by the G-2, which was designed to use a variety of RnstsStze field conversion kits.

The /R4 variant was designed as a heavy ground-attack and bomber-interceptor. The four nose-mounted MG-17 machine guns were replaced with a pair of 30mm MK-108 cannon with 135 rpg. The large 30mm "mine" shells were devastating to bombers and soft ground targets, while the MG-151/20s provided decent penetration against lightly armored targets.

Sources:

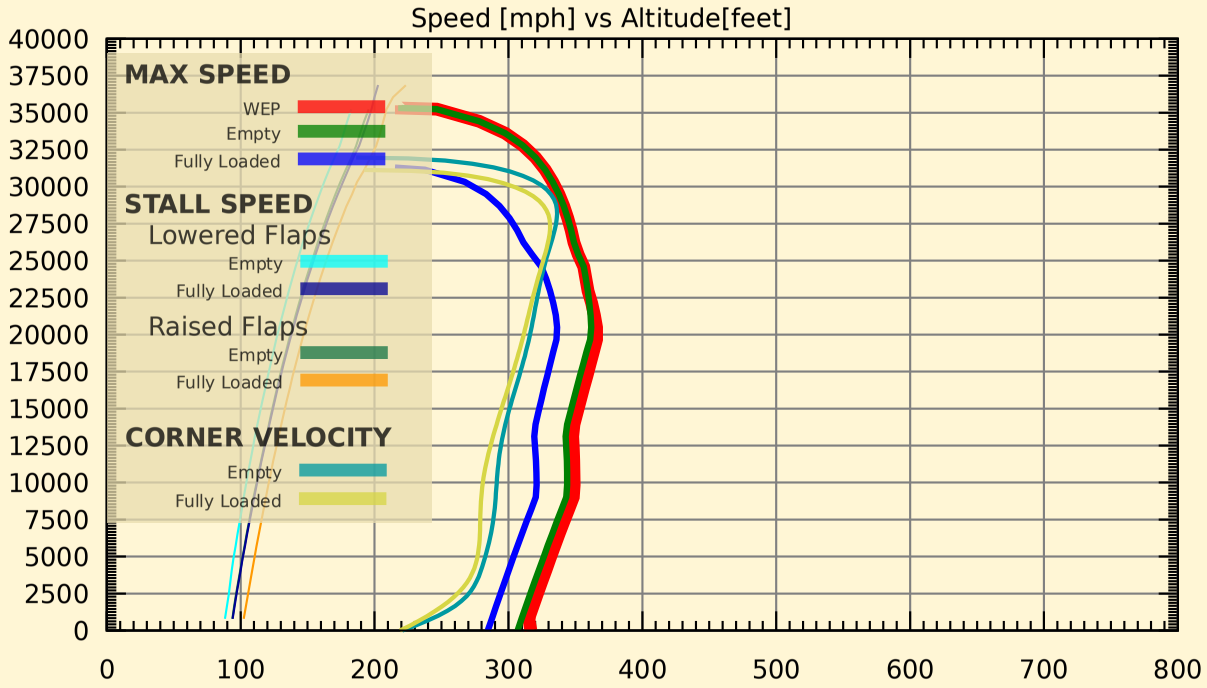
Campbell, Jerry L.; Messerschmitt Bf-110 Zerstörer In Action; Squadron/Signal Publications, Carrollton, TX; 1977.

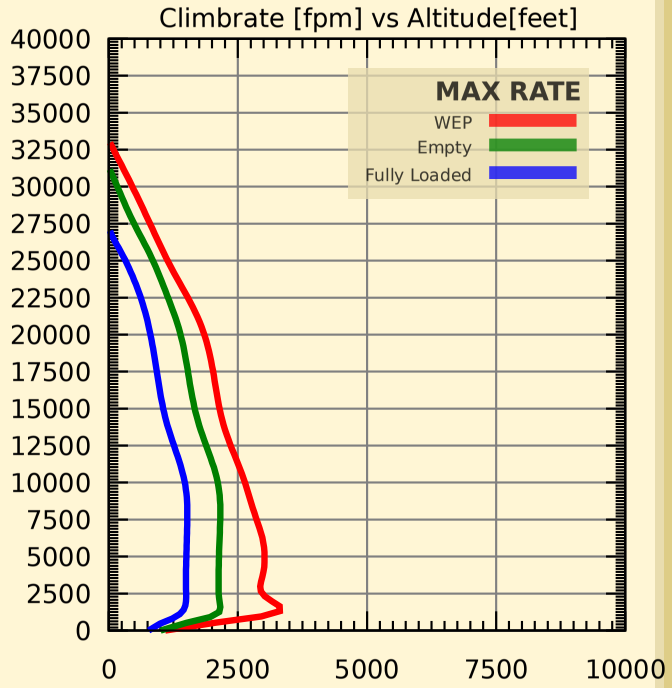
Chant, Chris; German Warplanes Of World War II; Amber Books, Ltd., London; 1999.

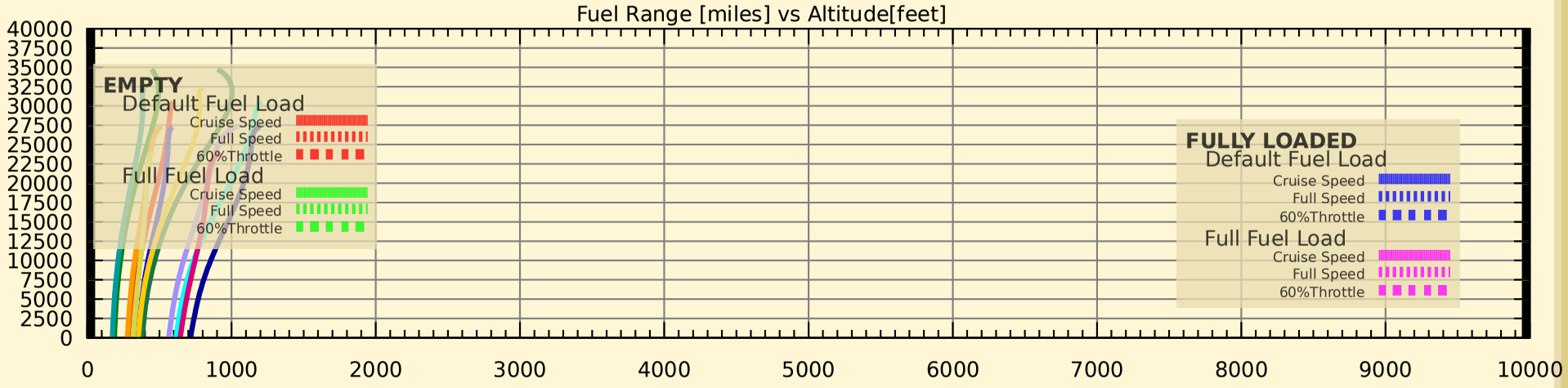
Donald, David; Warplanes Of The Luftwaffe; Aerospace Publishing, London; 1994.

Green, William; Warplanes of the Third Reich; Doubleday and Company, Garden City, NY; 1970.

Name: Messersshmitt Bf-110G-2/R3 Zerstörer
Role: Fighter
Crew: 2
Service Date: December 1942
Length: 39.90 ft
Wing Span: 53.25 ft
Wing Area: 413 sq. ft
Power Plant: 2 X DB-605B
Power: 3253 lb s.t.
Internal Fuel: 2016 lb
External Fuel: 950 lb
Empty Weight: 11993 lb
MTOW: 18188 lb
Primary Guns: Primary Guns: 2x MG151/20 20mm cannon with 300 (port) and 350 (starboard) rpg in nose
Secondary Guns: 2x MK 108 30mm cannon with 135 rpg in nose
Defensive Guns: NA
Ordnance: 2x 551 lb bombs or 2x 1103 lb under fuselage, plus 4x 121 lb or 2x 551 lb or 4x 245 lb WGr.21 rockets under wings. Maximum load of 4410 lb.

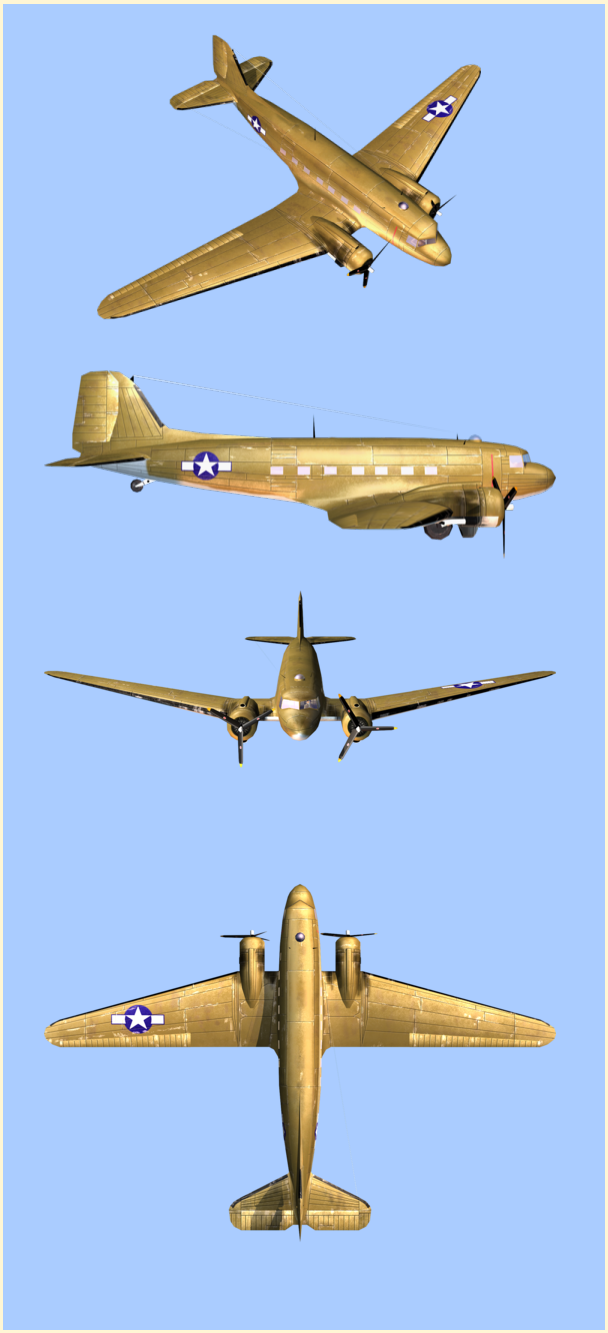






Douglas C-47A Skytrain

Durability	★★★★★★	Speed	★★★★	Climb Rate	★★
Maneuverability	★★★★★★★	Firepower		Ground Attack	★★★★★



Defense - Lacking completely in defensive guns, the only defense a C-47 can offer is to turn tail and run.

In 1932, United Airlines thought it had engineered a coup that would leave it in position to control the American air travel market. Most airlines operated ancient Ford and Fokker "tri-motor" planes, which were both slow and costly to operate and maintain. Boeing, the parent company of United, had just rolled the new Model 247 off the production line and every airline wanted one. However, United's order would tie up the production line for over a year and all the other airlines would just have to wait.

TWA, realizing that this would put them out of business, promptly issued a specification to aircraft manufacturers in order to develop a modern airliner of their own. The specification called for a tri-motor design in order to allow the plane to take-off with a full load despite the loss of an engine. All major aircraft manufacturers, except Boeing, were invited to submit a design.

The design from Douglas aircraft, known as the Douglas Commercial One or DC-1, was unique in that it allowed passengers to walk upright in the fuselage. But it was a twin-engine design and thus would have to be able to take-off on one engine to meet the specification. Despite reservations, TWA was excited by the commercial possibilities and contracted for a single example.

The new airliner had seats for only ten passengers, but it incorporated a galley and the first aerial lavatory for luxury on long flights. In order to prove the ability to take-off with only a single engine, the test pilots took off from Albuquerque, NM, flew to Winslow, AZ and landed entirely on one engine. The plane thus passed certification and TWA issued an order for twenty "improved" DC-1s in December 1938.

The "improved DC-1" was known as the DC-2 and it incorporated a few changes requested by TWA. The fuselage length was extended two feet to allow the installation of another pair of passenger seats, bringing the total capacity to twelve passengers. Other changes included a new rudder assembly, wheel brakes, wing flaps and stressed-skin construction.

About this time the plane started to attract the attention of the military, which was still using the old Ford and Fokker tri-motors. The DC-2 was undergoing military evaluations when the war broke out. In response to their immediate need for planes, twenty-four civilian DC-2s were drafted into service from the airlines by the Army as the C-33 transport.

In the meantime, American Airlines had been left out of the DC-2 revolution and wanted a plane of their own. But rather than the more pedestrian transports used by the other airlines, American wanted a "flying Pullman", a plane designed for more luxury than the DC-2 could deliver. By modifying the DC-2 design, Douglas was able to produce the Douglas Sleeper Transport, a plane equipped with either fourteen sleeper berths, as the DST, or twenty-eight standard seats as the DC-3.

Rather than continue with the smaller DC-2 design, the Army ordered the DC-3 to be produced as the C-47A, which was equipped with a large cargo door in place of the standard passenger entryway. Equipped with folding canvas seats, the C-47 could carry 28 fully laden combat troops (limited in game to 14) or up to 6000 lb. of supplies. Returning to the original civilian design of the Douglas Sleeper Transport, the C-47A could be outfitted with fourteen bunks for use as an aerial ambulance and the cargo area was roomy enough to hold a jeep and a 37mm gun. The C-47 served the USAAF with distinction, taking part in every major airborne operation, including Sicily, D-Day and Market Garden.

Sources:

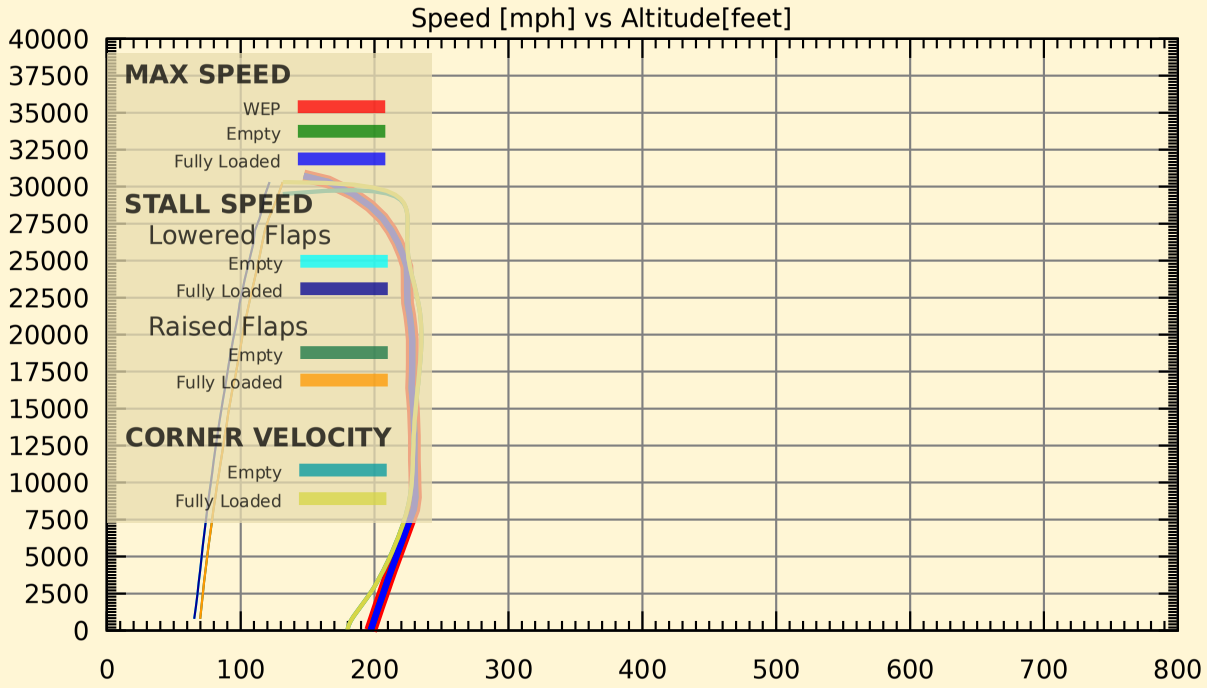
Davis, Larry; C-47 Skytrain In Action; Squadron/Signal Publications, Carrollton, Texas, 1995.

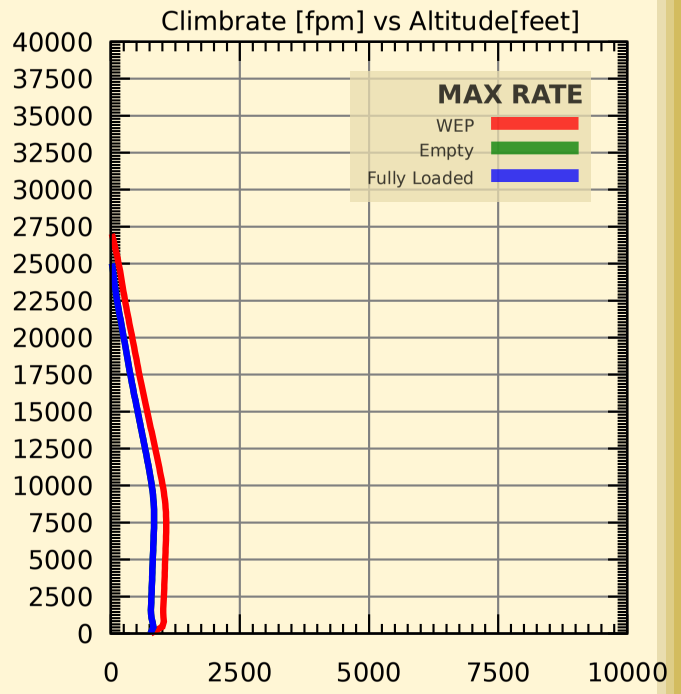
Name: Douglas C-47A Skytrain
Role: Transport
Crew: 3
Service Date: December 1941
Primary Guns: NA
Secondary Guns: NA
Defensive Guns: NA
Ordnance: up to 6065 lb of freights or 14 paratroopers

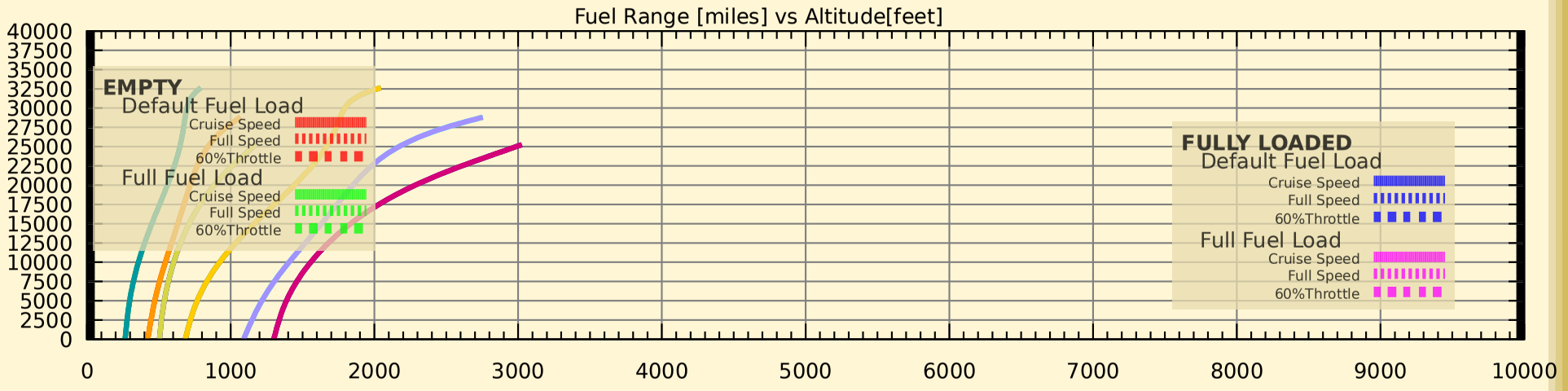
Length: 64.50 ft
Wing Span: 95.05 ft
Wing Area: 987 sq. ft

Power Plant: 2 X P&W R-1830-92
Power: 2644 lb s.t.
Internal Fuel: 4835 lb
External Fuel: NA

Empty Weight: 17372 lb
MTOW: 27998 lb







Aichi D3A1
Val

Durability	☆☆☆	**Speed**	☆☆☆☆	**Climb Rate**	☆☆☆
Maneuverability	☆☆☆☆☆☆☆	**Firepower**	☆	**Ground Attack**	☆☆

Bomb Load - The maximum bomb load of only 1,100 lb. makes it hardly worth the effort or time it takes to get to the target.

Obsolete at the time, the Aichi D3A1 was the first Japanese plane to bomb an American target when it participated in the attack on Pearl Harbor. However, by the end of the war it had sunk more Allied fighting ships than any other Axis plane.

During the summer of 1936 the Japanese Navy issued a specification calling for a monoplane dive-bomber capable of replacing the Aichi D1A2 then in service. Aichi Tokei Denki K.K., Nakajima Hikoki K.K. and Mitsubishi Jukogyo K.K. each submitted design proposals and the Navy authorized each to build two prototypes.

Aichi's design was inspired by the Heinkel He-70 and utilized the same type of low-mounted elliptical wings. A fixed spatted undercarriage was used to keep weight to a minimum and to simplify maintenance, the resulting drag not being considered enough to offset the disadvantages. Powered by a 710 hp Nakajima Jikari 9-cylinder radial the first prototype was completed in December 1937 with flight trials commencing the following month.

The prototype's performance was rather disappointing, with a noticeable directional stability problem and an alarming shuddering in the dive brakes when fully deployed. Further, a tendency to snap-roll during tight turns marred the plane's otherwise good handling characteristics.

To correct these flaws the second prototype was extensively modified. Power was increased by installing a 840 hp Mitsubishi Kinsei 14-cylinder radial with a redesigned cowling and the dive brakes were both enlarged and strengthened. More importantly, the length and shape of the wings were modified to eliminate the tendency to snap-roll and after winning head-to-head trials against the Nakajima D3N1, the Navy awarded Aichi a contract for the D3A1 Navy Type 99 Carrier Bomber Model 11.

Prior to production numerous other changes were made to the airframe, including slightly smaller wings, a more powerful 1,000 hp Mitsubishi Kinsei 43 (or 1,070 hp Kinsei 44) and structural changes necessary to increase loaded weight to over 8,000 lb. The directional stability problem was finally solved by installing a large dorsal fin in front of the vertical stabilizer, making the plane even more maneuverable than it already was. The normal offensive load was a single 250 kg. bomb under the fuselage and a 60 kg. bomb under each wing. Armed with a pair of 7.7mm machine guns in the cowl, it was often used as a fighter because of its extreme maneuverability.

After passing carrier qualification trials aboard the Kaga and Akagi in 1940, the D3A1 was used in limited quantities in China prior to the opening of hostilities with the West. The
Val", as it was dubbed by Allied intelligence, took part in every major carrier action in the first ten months of the war. Their pilots were known for their remarkable accuracy, including 87% of bombs on target when attacking the cruisers HMS Cornwall and HMS Dorsetshire and 82% on target against the carrier HMS Hermes during, the campaign in the Indian Ocean.

With losses to the Japanese carrier force and their most experienced pilots, more and more Vals came to be assigned to land-based Kokutais. The D3A1's lack of range kept the Val out of the Solomons campaign, prompting the design of the D3A2, which soldiered on to the end of the war.

Sources:

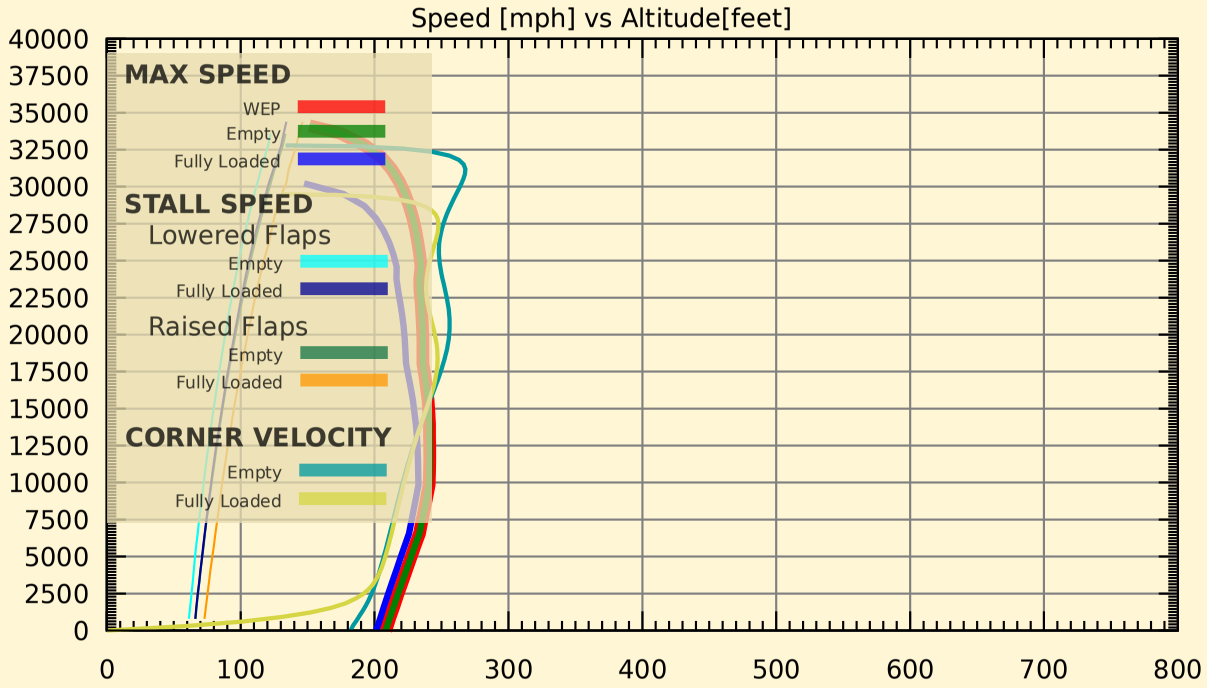
Francillon, Rene J.; Japanese Aircraft of the Pacific War; Naval Institute Press, Annapolis, MD; 1979.

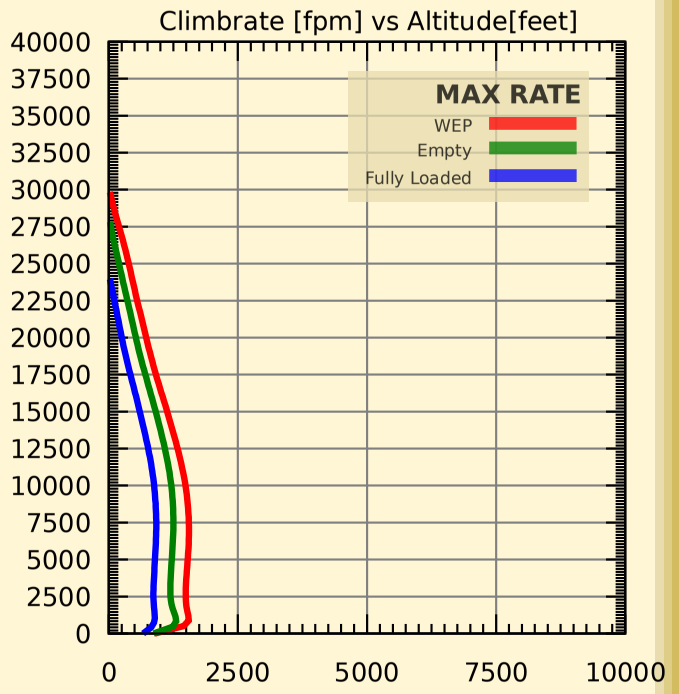
Name: Aichi D3A1 Val
Role: Diving Bomber
Crew: 2
Service Date: January 1940
Primary Guns: One Type 97 7.7mm machine gun with 400 rpg in cowl
Secondary Guns: One Type 97 7.7mm machine gun with 400 rpg in cowl
Defensive Guns: NA
Ordnance: One 110 lb or One 220 lb or One 551 lb bombs under fuselage, plus 2x 110 lb or 2x 220 lb or 2x 551 lb under wings; maximum ordnance weight 1103 lb

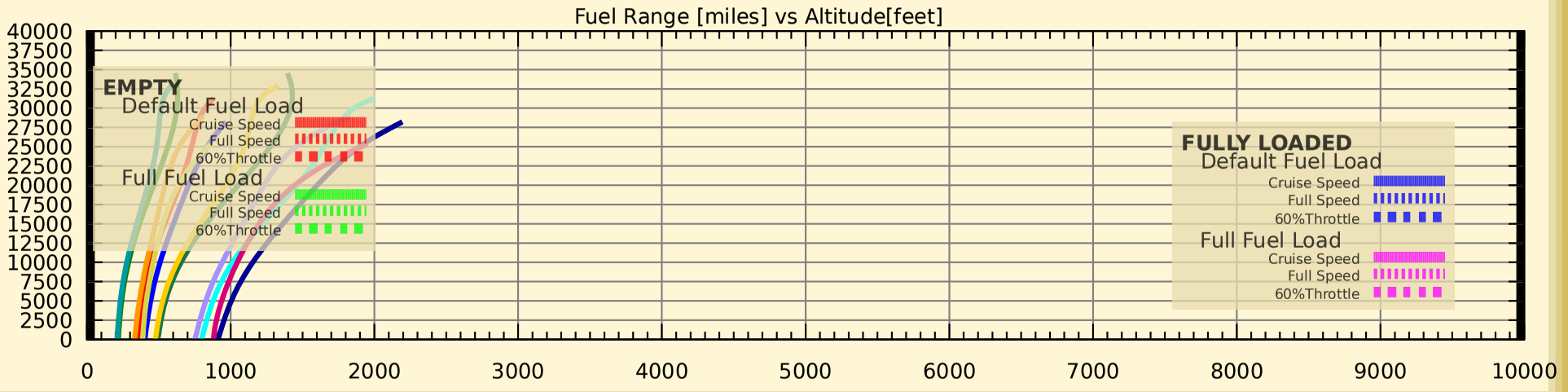
Length: 33.46 ft
Wing Span: 47.11 ft
Wing Area: 376 sq. ft

Power Plant: One Mitsubishi Kinsei 44
Power: 2382 lb s.t.
Internal Fuel: 1500 lb
External Fuel: NA

Empty Weight: 5732 lb
MTOW: 8598 lb

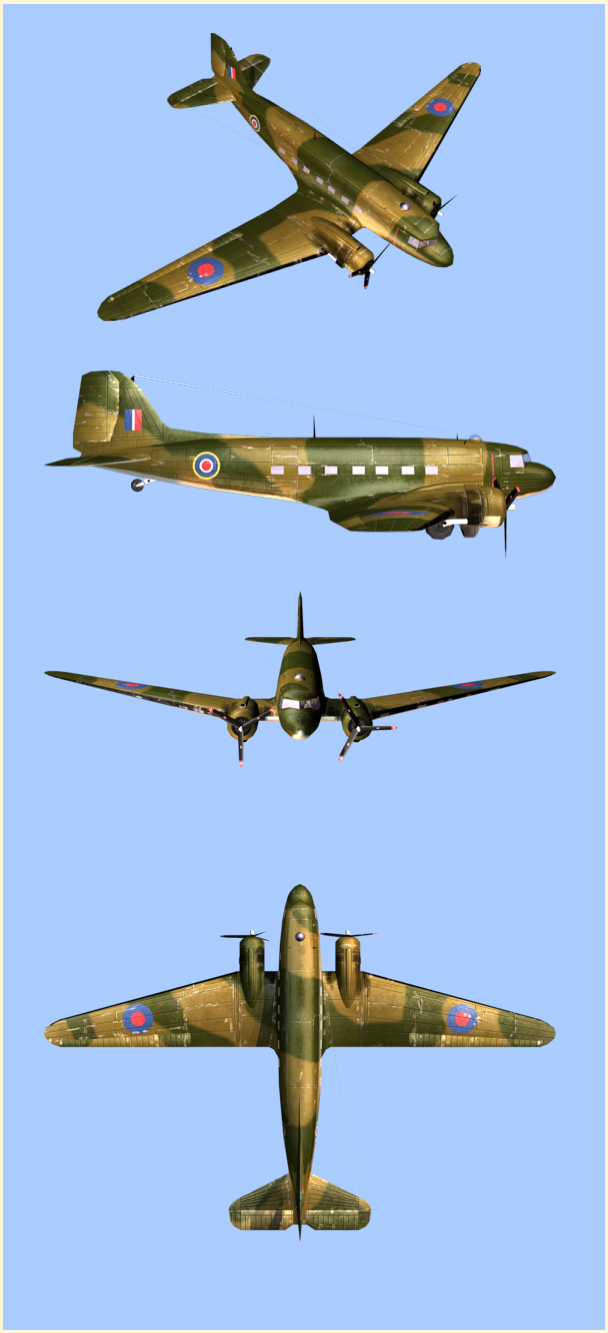






Douglas Dakota Mk.II

Durability	☆☆☆☆☆☆	Speed	☆☆☆☆	Climb Rate	☆☆
Maneuverability	☆☆☆☆☆☆	Firepower		Ground Attack	



Defensive Firepower - Lacking completely in defensive guns, the only defense a Dakota can offer is to turn tail and run.

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The design from Douglas aircraft, known as the Douglas Commercial One or DC-1, was unique in that it allowed passengers to walk upright in the fuselage. But it was a twin-engine design and thus would have to be able to take-off on one engine to meet the specification. Despite reservations, TWA was excited by the commercial possibilities and contracted for a single example.

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The "improved DC-1" was known as the DC-2 and it incorporated a few changes requested by TWA. The fuselage length was extended two feet to allow the installation of another pair of passenger seats, bringing the total capacity to twelve passengers. Other changes included a new rudder assembly, wheel brakes, wing flaps and stressed-skin construction.

About this time the plane started to attract the attention of the military, which was still using the old Ford and Fokker tri-motors. The DC-2 was undergoing military evaluations when the war broke out. In response to their immediate need for planes, twenty-four civilian DC-2s were drafted into service from the airlines by the Army as the C-33 transport.

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Not having a purpose-built transport design of their own, the RAF accepted numerous C-47s through Lend Lease, which they dubbed the "Dakota". Dakotas were used in Europe for the usual airborne operations as well as for drops of special agents into enemy territory under the auspices of the Special Operations Executive. The RAF Dakotas were identical to their USAAF counterparts in capacity and performance.

Sources:

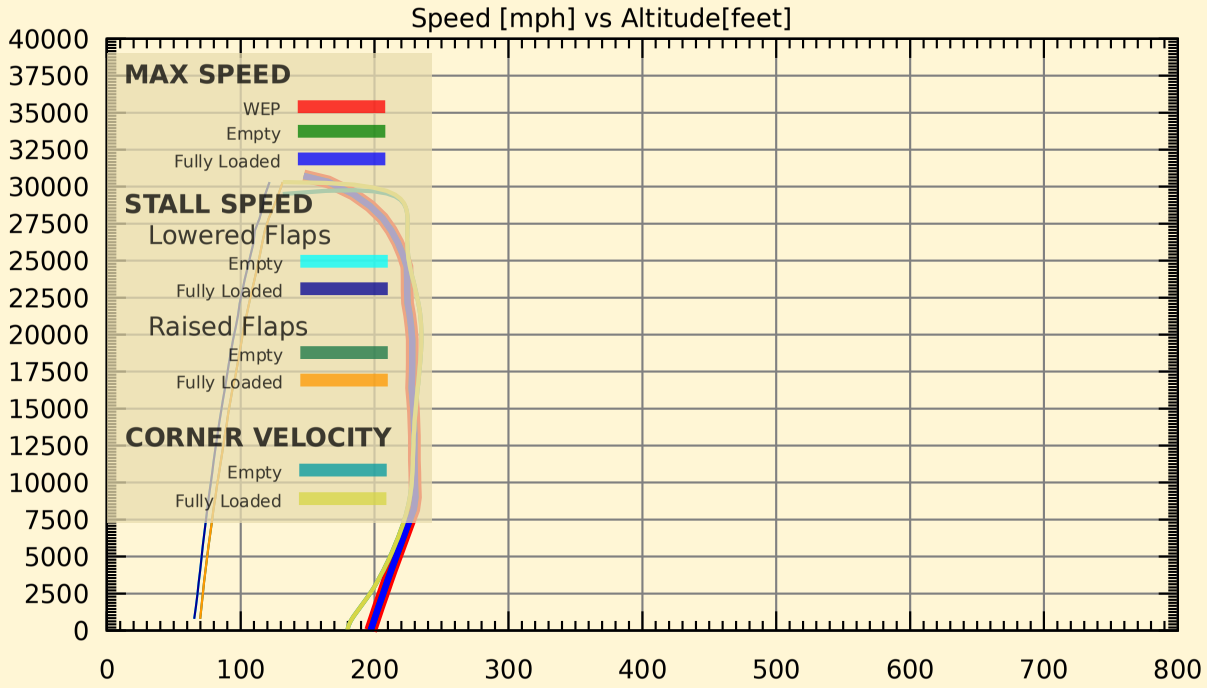
Davis, Larry; C-47 Skytrain In Action; Squadron/Signal Publications, Carrollton, Texas, 1995.

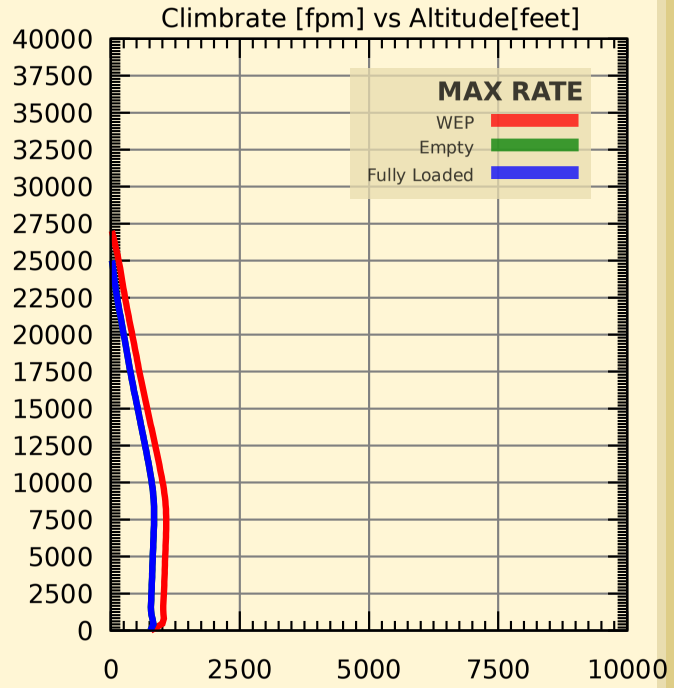
Name: Douglas Dakota Mk.II
Role: Transport
Crew: 3
Service Date: April 1942
Primary Guns: NA
Secondary Guns: NA
Defensive Guns: NA
Ordnance: up to 6065 lb of freights or 14 paratroopers

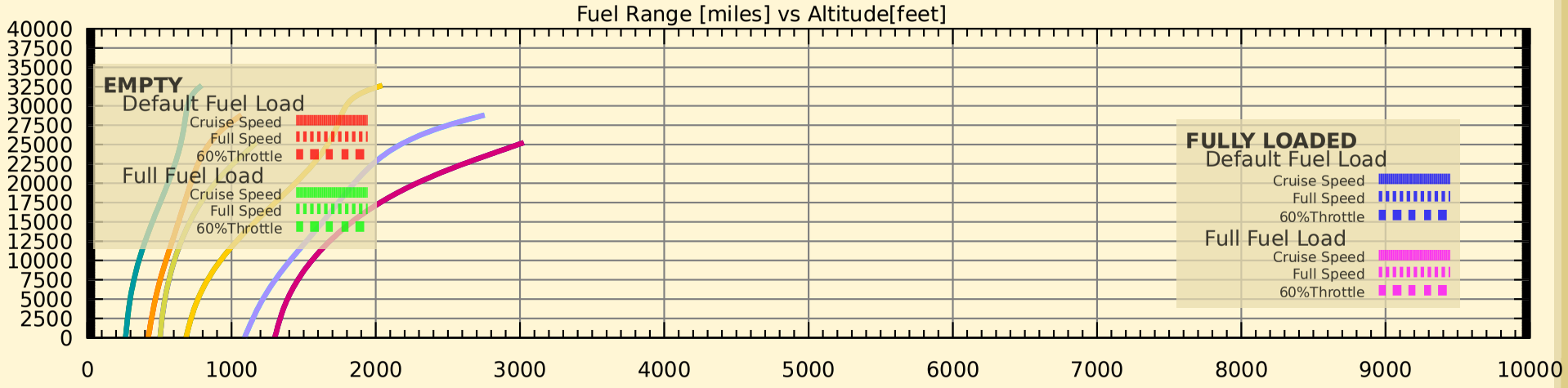
Length: 64.50 ft
Wing Span: 95.05 ft
Wing Area: 987 sq. ft

Power Plant: 2 X P&W R-1830-92
Power: 2644 lb s.t.
Internal Fuel: 4835 lb
External Fuel: NA

Empty Weight: 17372 lb
MTOW: 27998 lb

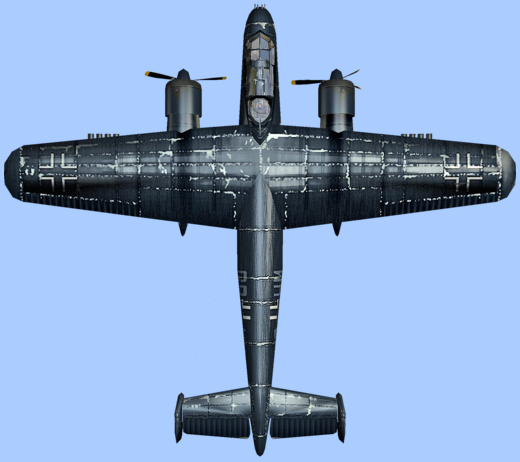






Dornier Do-217J-1

Durability	☆☆☆☆☆☆	Speed	☆☆☆☆☆	Climb Rate	☆☆
Maneuverability	☆☆☆	Firepower	☆☆☆☆☆	Ground Attack	☆☆☆☆☆☆



Defensive Firepower - With fewer guns than the bomber variant, the night-intruder version is even less capable of defending itself.

With the first 1,000-bomber raid on Cologne in 1942 the Luftwaffe High Command knew that they had to improve defenses quickly. The bulk of the night-fighter force at that time was the Bf-110, which was deemed a mere temporary solution. The Ju-88C night-fighter was the preferred plane, but the bulk of production went to bomber models, with only a few night-fighters trickling in to the Nachtjagdgeschwaders.

Do-17Zs and Do-215Bs had been successfully converted to the night-fighter role with the addition of a solid nose containing forward firing armament, so RLM ordered Dornier to convert the Do-217E into a night-fighter. The first version, designated J-1, was only a partial conversion, intended for use as both a night-fighter and an intruder.

The glass nose was replaced with a solid one containing four 7.9mm machine guns and four 20mm MG-FF cannon. The forward half of the bomb bay was filled with a fuel tank to increase endurance, but the rear half was retained for night-intruder missions. Lacking radar the Do-217J-1 was only a temporary solution and the bulk of J-1s were transferred to training units in 1942 when the radar equipped J-2s began to arrive.

Sources:

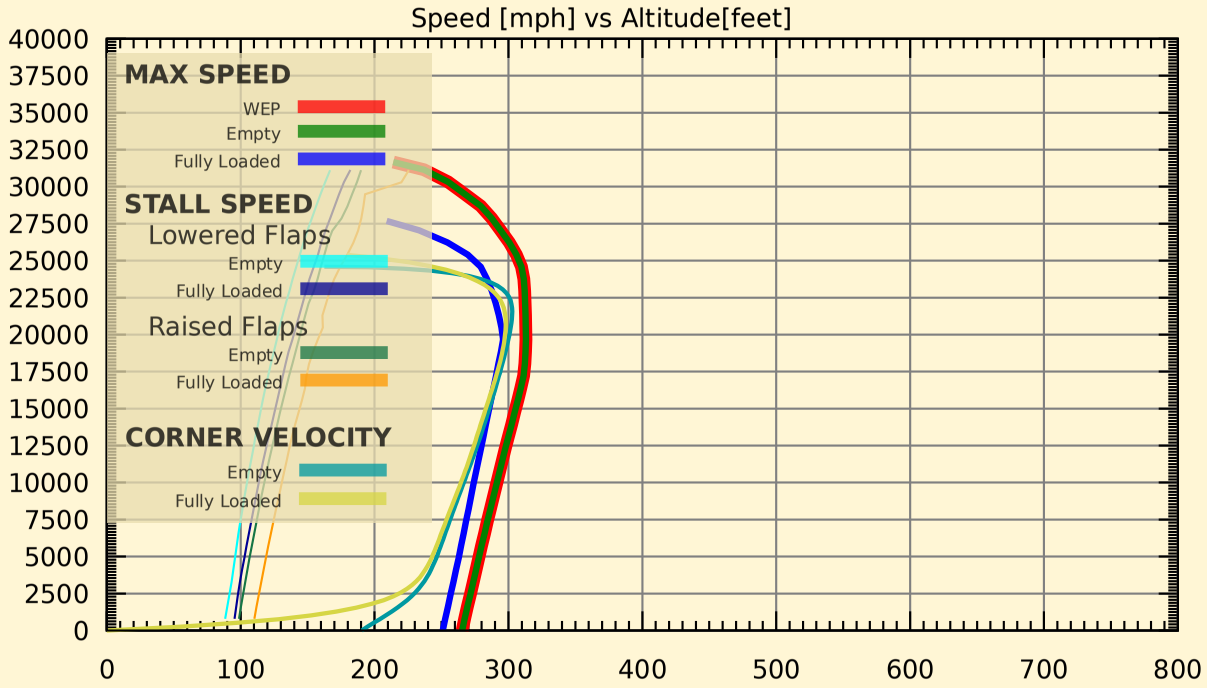
Green, William; Warplanes of the Third Reich; Doubleday and Company, Garden City, NY; 1970.

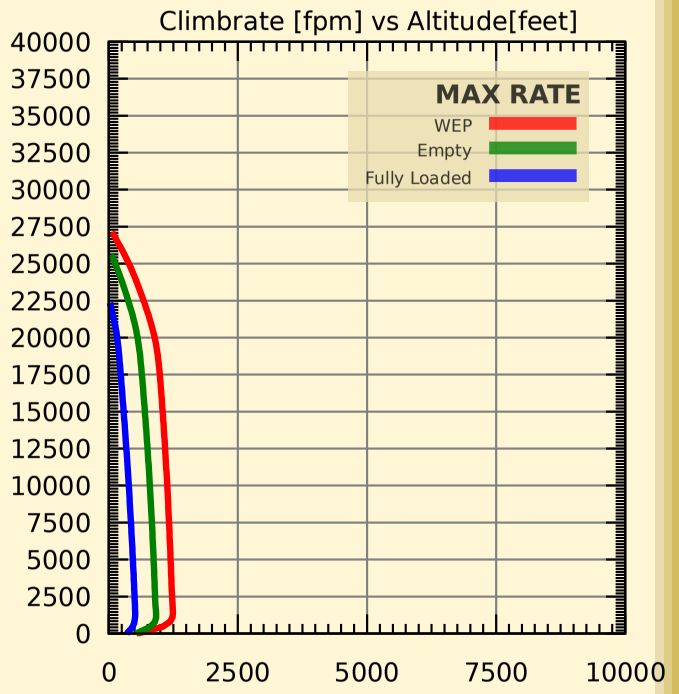
Name: Dornier Do-217J-1
Role: Medium Bomber
Crew: 3
Service Date: February 1942
Primary Guns: 4x MG17 7.9mm machine guns in nose with 1000 rpg
Secondary Guns: 4x MG FF 20mm cannon with 100 rpg
Defensive Guns: NA
Ordnance: 4x 551 lb or 2x 1103 lb bombs in internal bomb bay, plus 4x 551 lb or 2x 1103 lb bombs or 8x 245 lb WGr.21 rockets

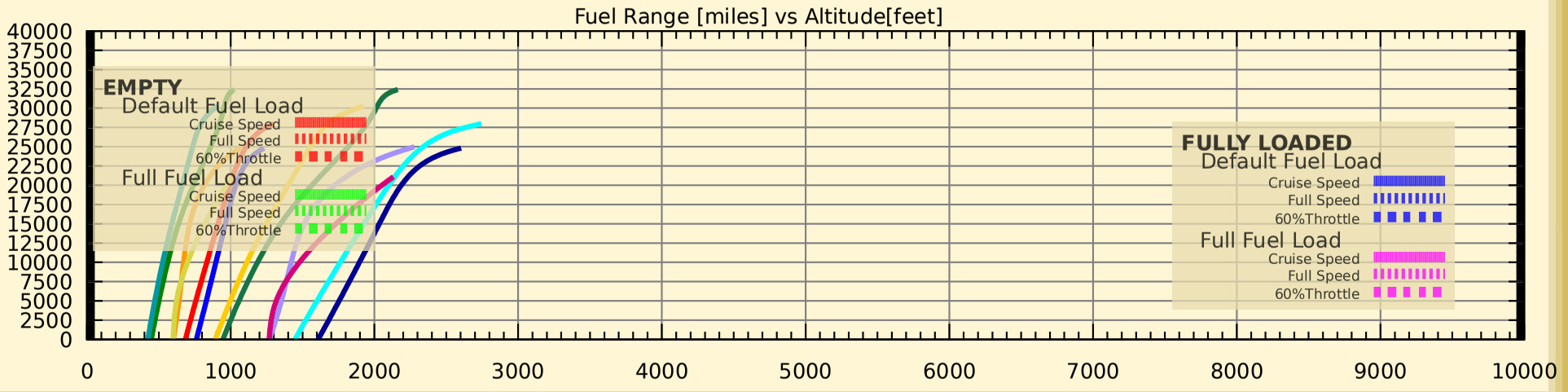
Length: 59.71 ft
Wing Span: 62.34 ft
Wing Area: 592 sq. ft

Power Plant: 2 X BMW 801ML
Power: 2682 lb s.t.
Internal Fuel: 6523 lb
External Fuel: NA

Empty Weight: 20723 lb
MTOW: 31967 lb

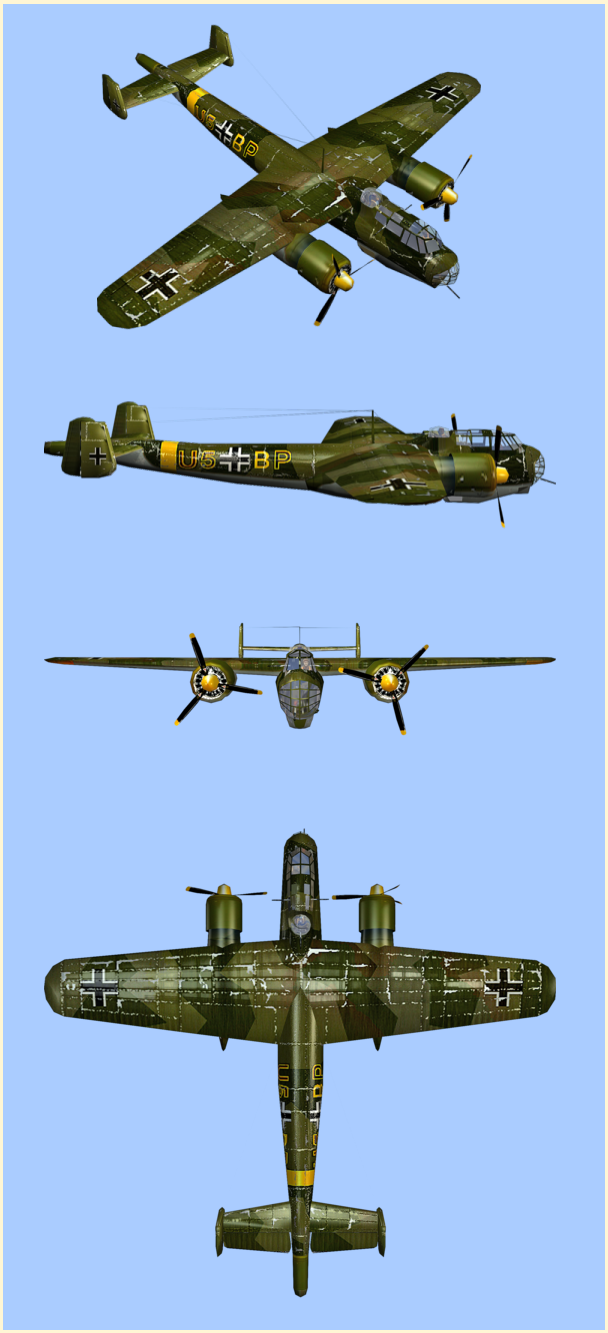






Dornier Do-217E-2

Durability	☆☆☆☆☆☆	Speed	☆☆☆☆☆	Climb Rate	☆☆
Maneuverability	☆☆☆	Firepower	☆☆	Ground Attack	☆☆☆☆☆☆☆☆



Defensive Firepower - As with the other German bombers, the defensive firepower is quite inadequate.

Although it closely resembled the Do-17 and bore a similar appellation, the Do-217 was in fact an entirely new plane designed from the outset to be a heavy bomber. The RLM ordered prototypes to be made in the summer of 1937 and a year later the V-1 prototype was flown using a pair of 1,075 hp Daimler-Benz DB-601A engines. But due to the need to use DB-601 engines for fighter development, the second and third prototypes used the less powerful Jumo-211.

The most innovative feature of the new plane was a novel dive-brake in the tail composed of a series of panels that, when activated, extended out into the air stream in a manner resembling the opening of an umbrella. However, the weight of the plane caused the tail section to warp and buckle and so the dive-bombing requirement was temporarily waived to allow Dornier to concentrate on basic airframe development. By this time the team had turned to the 1,550 hp BMW 801MA radial engine, which greatly improved performance and handling.

However, the RLM was still concerned that the internal bomb load was insufficient and in early 1940 a radically modified prototype was flown. The most significant change was a deepening of the middle third of the fuselage to provide a bomb bay measuring 14'10" by 5'8", which with a small extension made it large enough to carry a torpedo internally. A single 15mm MG-151 was installed in the nose for strafing purposes and defensive armament consisted of five 7.9mm MG-15 machine-guns. Having built a small number of production machines with the original fuselage under the A and C designations, the new version was dubbed the Do-217E-1.

While it proved successful in combat, several suggestions for improvement to the defensive armament and armor protection were received from operational units. The changes to the production line resulted in the E-3 model, which sported a flexibly mounted 20mm MG FF cannon for anti-shipping work and no fewer than seven MG 15s for defense. However, the radio operator was supposed to handle five of the guns by himself, so although the range of coverage was increased, the weight of fire remained the same.

Meanwhile, the RLM was determined to see the plane used in the dive-bombing role and an improved dive-brake was devised for the tail. However, the system never functioned satisfactorily and eventually it was abandoned, remaining production machines being fitted with a simple tail-cone. However, the most significant improvement to the E-2 model was the introduction of a powered turret in the dorsal position with a single 13mm MG-131 machine gun. This alone improved defensive firepower, but the ventral MG-15 was also replaced with a MG-131 and a pair of MG-81Js were mounted in the sides of the cockpit for lateral coverage.

II/KG 40 was the first unit to equip with the new bomber in 1941, but early in 1943 they traded in their Do-217s for Me-410s, becoming V/KG 2. Meanwhile KG 2's three original gruppes had converted to the Do-217 and was joined by a fourth Do-217 gruppe, all based in the Netherlands and operating against North Sea shipping as well as performing periodic bombing raids on England.

Sources:

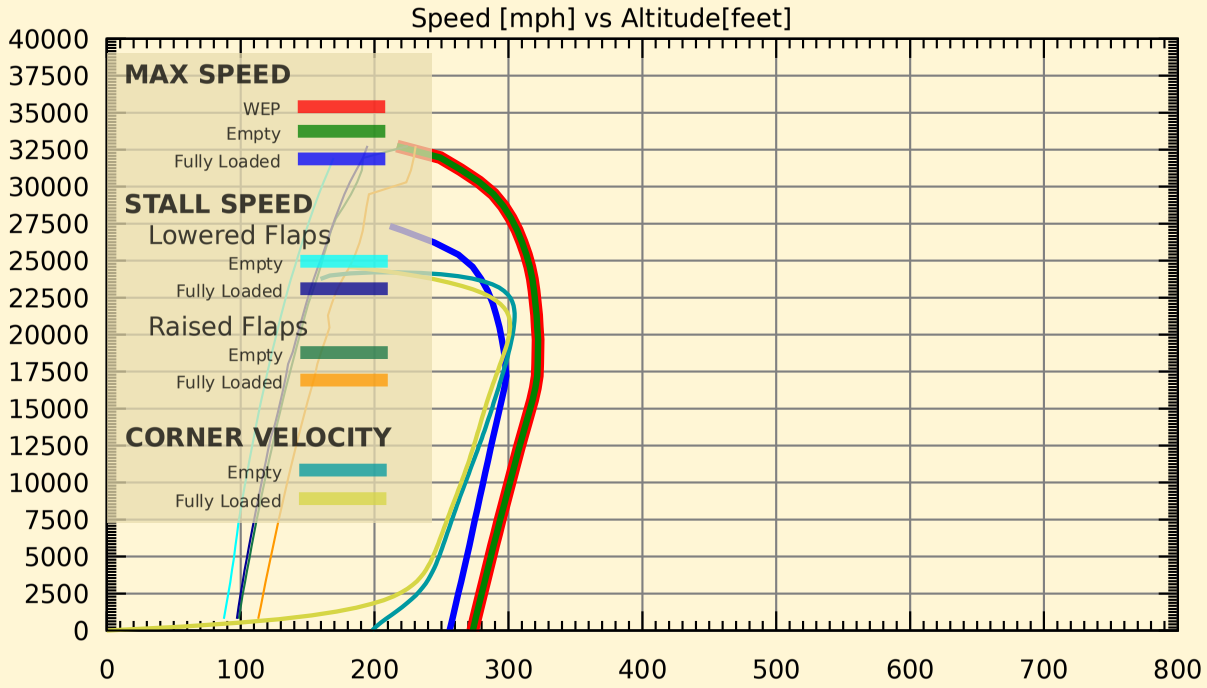
Green, William; Warplanes of the Third Reich; Doubleday and Company, Garden City, NY; 1970.

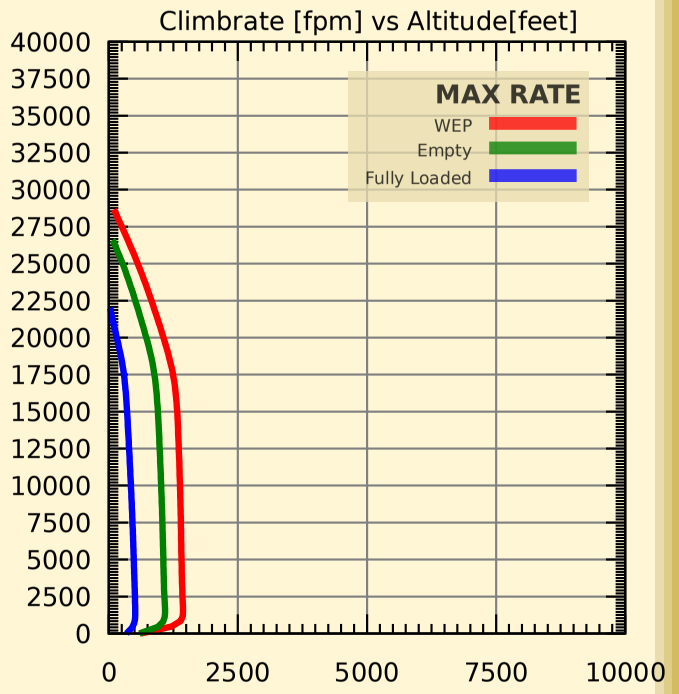
Name: Dornier Do-217E-2
Role: Medium Bomber
Crew: 5
Service Date: March 1941
Primary Guns: One MG151 15mm cannon with 250 rpg fixed in nose
Secondary Guns: NA
Defensive Guns: NA
Ordnance: 8x 551 lb or 4x 1103 lb or 2x 2205 lb bombs or One 1625 lb F5 torpedo in internal bomb bay, plus 4x 551 lb or 4x 1103 lb or 2x 2205 lb or 2x 3970 lb bombs externally on underwing wing racks

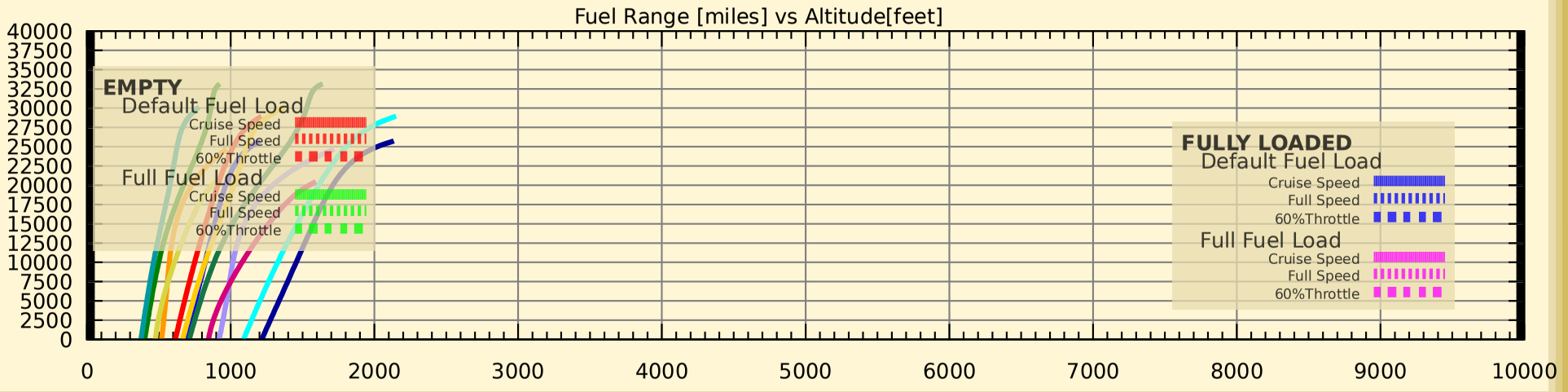
Length: 59.71 ft
Wing Span: 62.34 ft
Wing Area: 592 sq. ft

Power Plant: 2 X BMW 801ML
Power: 2874 lb s.t.
Internal Fuel: 4687 lb
External Fuel: NA

Empty Weight: 20282 lb
MTOW: 31967 lb

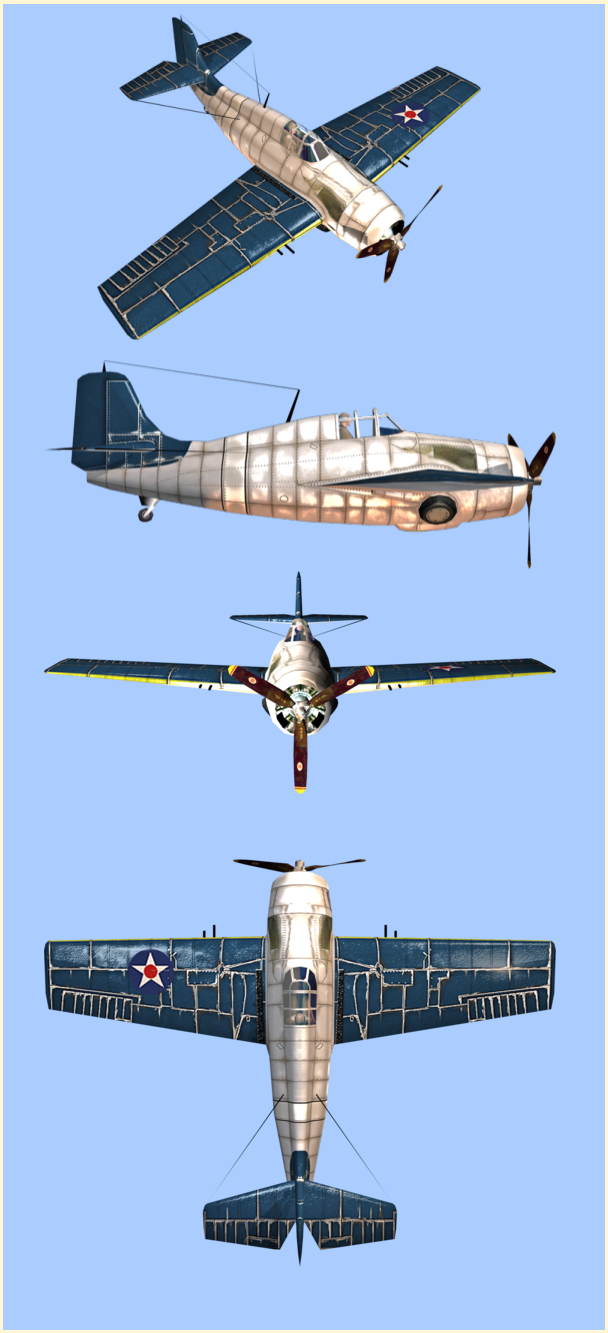






Grumman F4F-3 Wildcat

Durability	☆☆☆	Speed	☆☆☆☆☆	Climb Rate	☆☆☆☆
Maneuverability	☆☆☆☆☆☆☆	Firepower	☆☆☆	Ground Attack	☆



Speed - Although not as slow as the A6M2 Zero or Hurricane IA, the F4F-3 Wildcat is not going to run away from or catch contemporary planes like the Bf-109E, I-16, Yak-1b and P-40C.

In 1936 the US Navy began looking for a successor to Grumman's F3F carrier-based biplane fighter. They commissioned prototypes of a biplane from Grumman and a monoplane from the Brewster company, playing it safe in case the new monoplane design couldn't stand up to the rigors of carrier operations. Grumman's new design was designated the F4F Wildcat and retained much of the F3F's design features, including the Wright Cyclone 9-cylinder radial engine and the distinctive fuselage-mounted, retractable landing gear. However, after a design review revealed that the new plane would be only marginally superior to the existing F3F, the Navy asked Grumman to build a monoplane instead.

The new plane, designated XF4F-2, was first flown on September 2, 1937 and proved inferior to Brewster's XF2A-1 Buffalo, which won the contract in June 1938 for the new Navy fighter. However, three months later, Grumman received permission to begin work on a second prototype, the XF4F-3, which was redesigned around the new Pratt & Whitney 14-cylinder "Double Wasp" radial engine equipped with a two-speed supercharger. The first flight proved the superiority of the reworked Wildcat fighter over the Buffalo and after extensive evaluation, the Navy finally awarded Grumman a contract for 54 Wildcats.

Prior to delivery of the first batch of Wildcats to the US Navy in December 1940, the British Royal Navy took over a French Navy order for 81 of the new planes. Designated the Martlet, they were put into action over Scapa Flow on Christmas Day 1940, downing a Junkers Ju-88. By the time of the Pearl Harbor attack a year later, the US Navy and Marine Corps had a total of 248 F4F-3s in service.

The Wildcat's main claim to fame was earned on Wake Island, when four VMF-211 F4F-3s repulsed Japanese air attacks for two weeks - and even managed to sink a cruiser and a submarine with 100 lb. bombs. The last two Wildcats were destroyed on December 22, 1941, the day the Japanese finally managed to land on the island and overcome its meager defenses.

Sources:

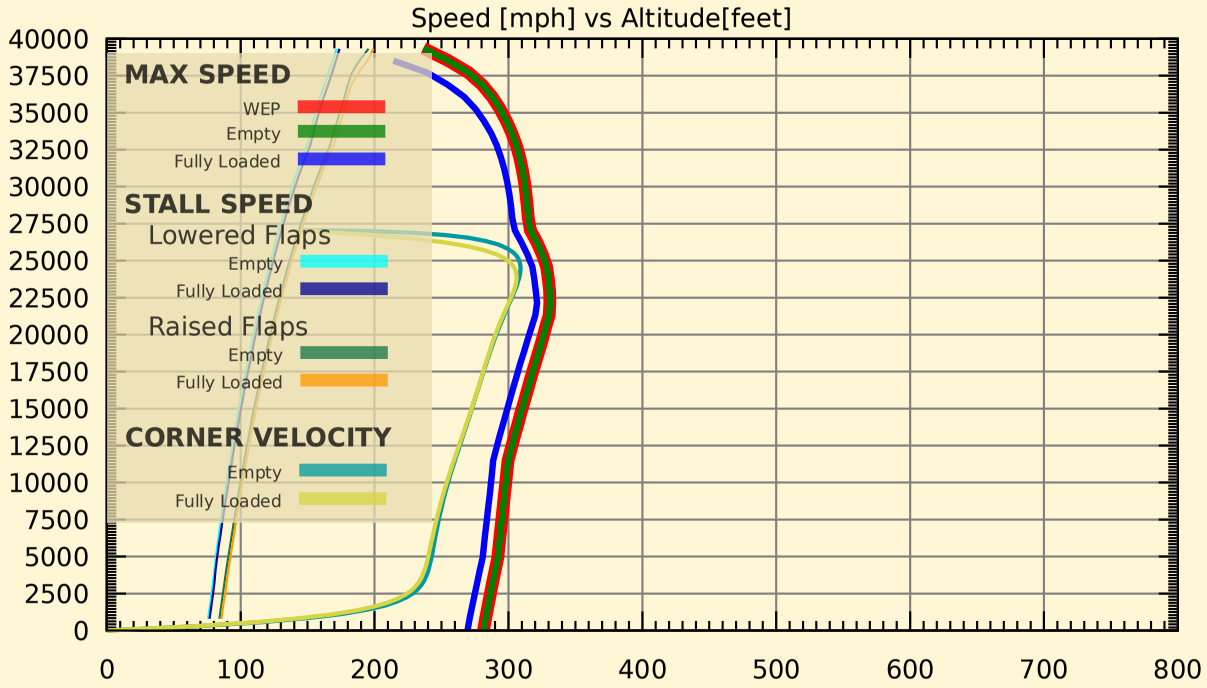
Green, William; War Planes Of The Second World War: Fighters Volume Four; Macdonald & Co., London; 1961.

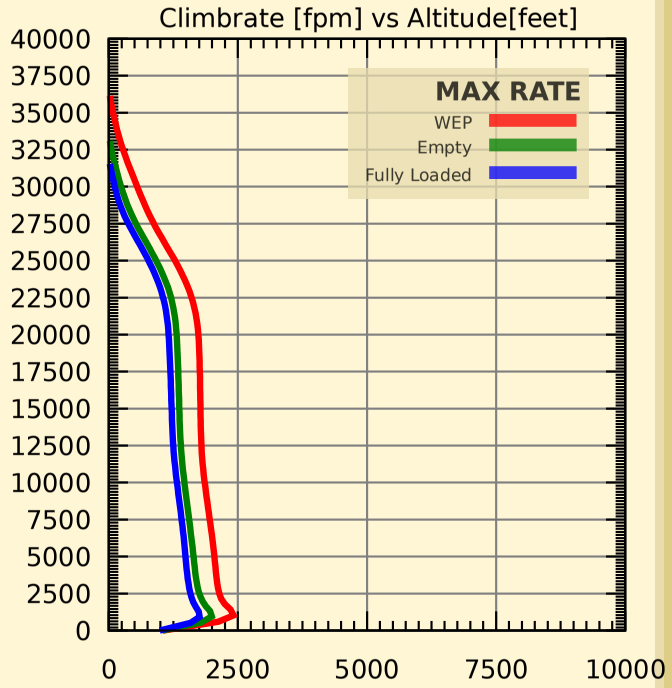
Name: Grumman F4F-3 Wildcat
Role: Fighter
Crew: 1
Service Date: December 1940
Primary Guns: 2x Browning M2 0.5" machine guns with 430 rpg in wings
Secondary Guns: 2x Browning M2 0.5" machine guns with 430 rpg in wings
Defensive Guns: NA
Ordnance: 2x 100 lb bombs or 2x 348 lb drop tanks

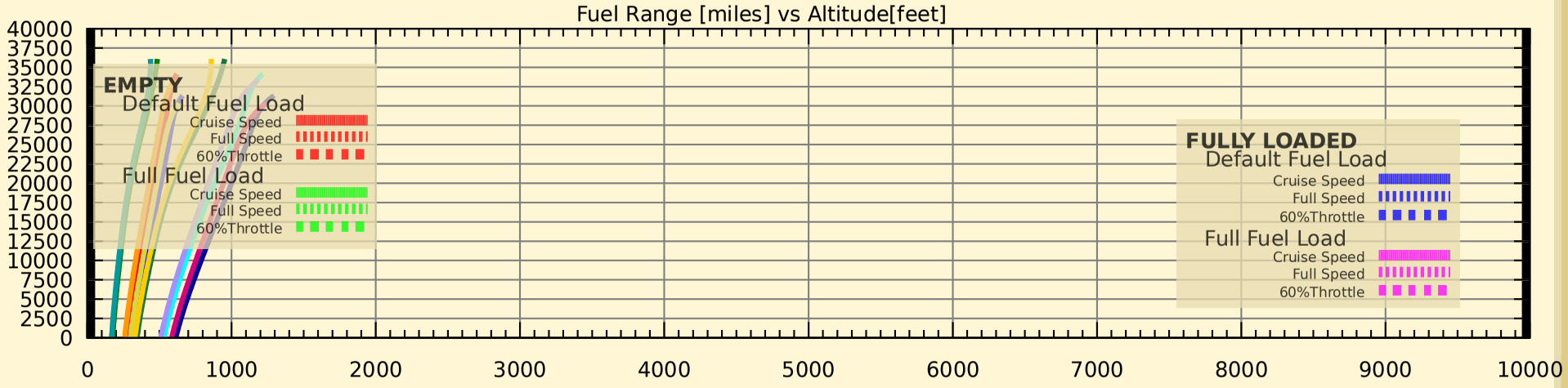
Length: 28.94 ft
Wing Span: 38.06 ft
Wing Area: 260 sq. ft

Power Plant: One Pratt-Whitney R-1830-76
Power: 2496 lb s.t.
Internal Fuel: 864 lb
External Fuel: 696 lb

Empty Weight: 5512 lb
MTOW: 7363 lb







Grumman F4F-4 Wildcat

Durability	☆☆☆	Speed	☆☆☆☆☆	Climb Rate	☆☆☆☆
Maneuverability	☆☆☆☆☆☆☆	Firepower	☆☆☆☆☆	Ground Attack	☆

Speed - The F4F-4 Wildcat is slightly slower than the -3 model due to its extra weight and thus is in even worse straits against its contemporaries.

During the middle of the initial F4F-3 production cycle Grumman made several changes to the basic design, which resulted in the F4F-4 variant. The primary change from the -3 model was the addition of manually folding wings, allowing more planes to be stowed in carrier hanger decks. An additional .50 caliber machine gun was also mounted in each wing, outboard of the wing hinge, giving the Wildcat the same 6-gun punch found on most late-war US fighters. These changes gave the plane an additional 400 lb. to carry around, which somewhat reduced its maneuverability and speed.

The F4F-4 model was just reaching service units at the time of Pearl Harbor. It was the principle carrier-based fighter in service throughout the first year of the war, helping to turn the tide against the Japanese at Coral Sea, Midway and the Solomons. The Lend-Lease version of the -4, known as the Martlet IV, saw combat with the Fleet Air Arm against Vichy French forces at the landings in Madagascar and alongside American Wildcats during the landings in French North Africa in late 1942.

Grumman produced 1,445 Wildcats and Martlets in 1942 and a further 100 in 1943 before production was assumed by General Motors to allow Grumman to produce the next model in its "Cat" line, the F6F Hellcat. General Motors continued to produce the Wildcat throughout the rest of the war as the FM-1 and FM-2 models. Being smaller than subsequent fighters, the Wildcat served throughout the war as the principal fighter on escort carriers.

Sources:

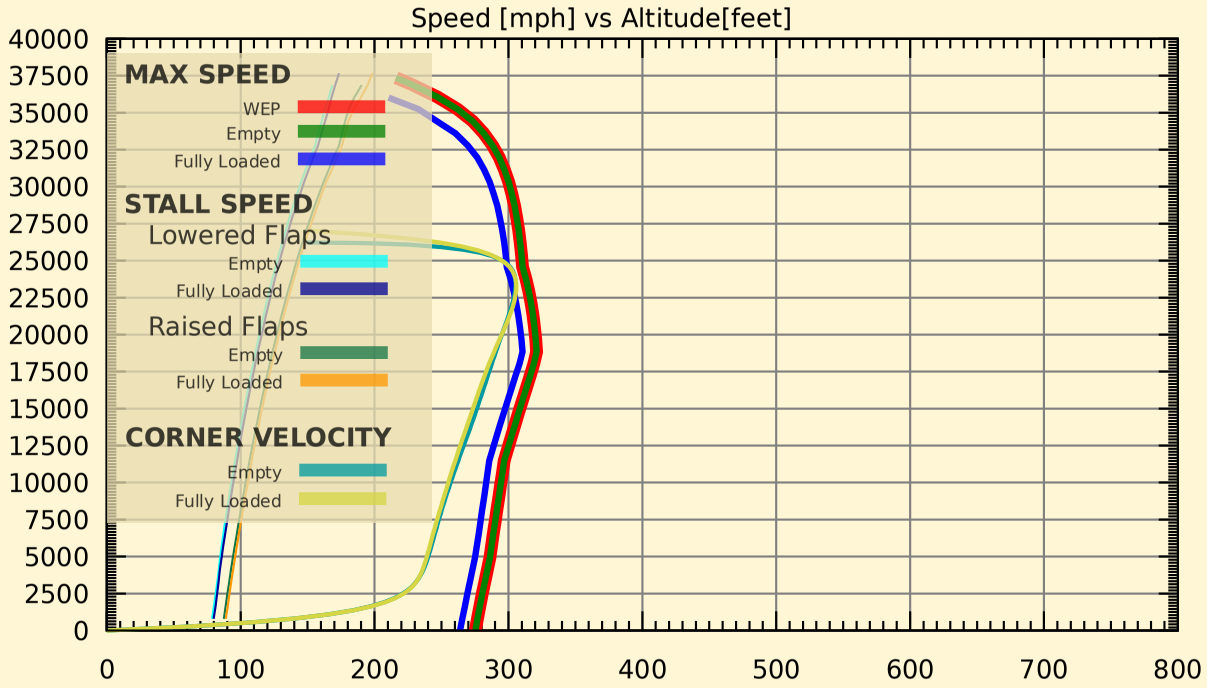
Green, William; War Planes Of The Second World War: Fighters Volume Four; Macdonald & Co., London; 1961.

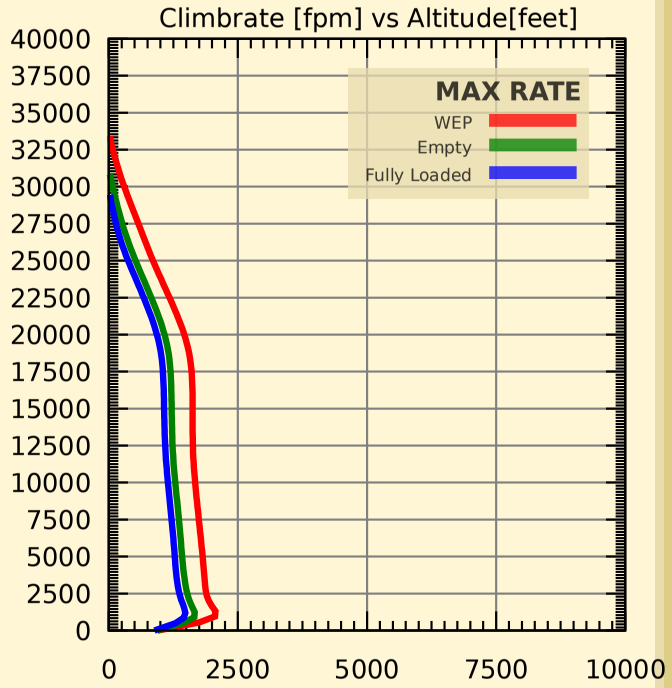
Name: Grumman F4F-4 Wildcat
Role: Fighter
Crew: 1
Service Date: June 1942
Primary Guns: 2x Browning 0.5" machine guns with 240 rpg in wings
Secondary Guns: 4x Browning 0.5" machine guns with 240 rpg in wings
Defensive Guns: NA
Ordnance: 2x 100 lb bombs or 2x 348 lb drop tanks

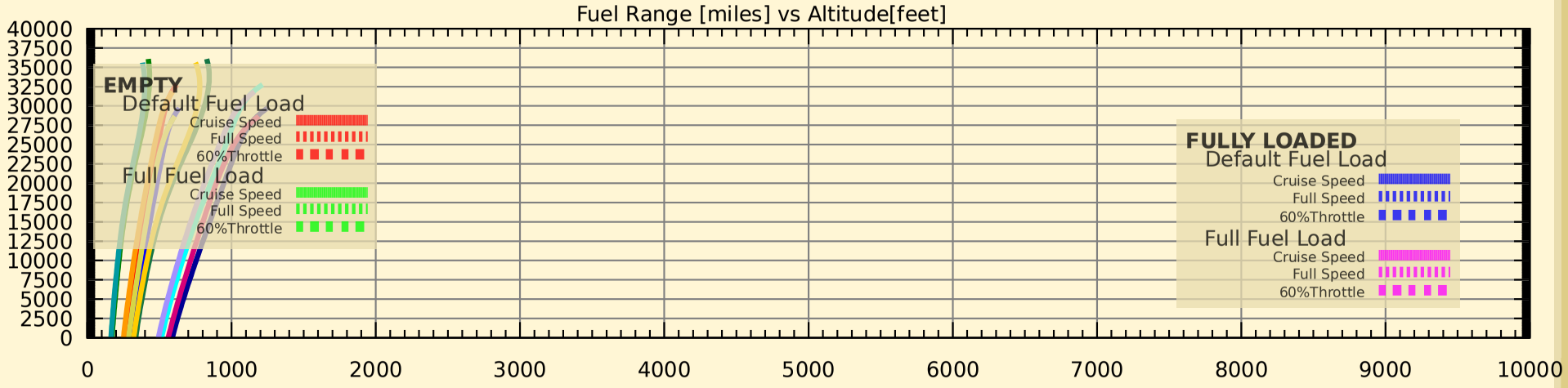
Length: 28.94 ft
Wing Span: 38.06 ft
Wing Area: 260 sq. ft

Power Plant: One Pratt-Whitney R-1830-86
Power: 2490 lb s.t.
Internal Fuel: 864 lb
External Fuel: 696 lb

Empty Weight: 5952 lb
MTOW: 8091 lb







Martlet Mk.I
Grumman F4F-3

Durability	☆☆☆	**Speed**	☆☆☆☆☆	**Climb Rate**	☆☆☆☆
Maneuverability	☆☆☆☆☆☆☆	**Firepower**	☆☆☆	**Ground Attack**	☆

Speed - Although not as slow as the A6M2 Zero, the Martlet is not going to run away from or catch contemporary planes like the Bf-109E, I-16, Yak-1b and P-40C.

With the war breaking out in Europe in 1939, Grumman approached the French and British governments with the offer to sell them some of the new F3F-3 Wildcat fighters that were being built for the US Navy. The French Navy ordered 81 aircraft with the intention of using them on their aircraft carriers, one of which had been completed.

However, before the order could be delivered, the French capitulated and Britain's Royal Navy purchased the entire content of the original French order. The planes began to reach England in August 1940 and were assigned to Number 804 Squadron.

Initial trials revealed some unexpected difficulties, primarily related to the narrow-track landing gear. The plane had a tendency to tip over onto the wingtip during taxiing if turns were taken too quickly. Additionally, it was susceptible to crosswinds and had poor directional stability on the ground.

But in the air the Martlet, as it was called by the Fleet Air Arm, was a joy to fly. In flight trials at Boscombe Downs in 1940 the Martlet proved to be more maneuverable with a greater initial climb than either the Hurricane or Spitfire, with the two British designs owning an edge in speed.

The plane drew its first blood when a pair of Martlets forced down a Junkers Ju-88 bomber over Scapa Flow on Christmas Day 1940. Martlets went on to serve the Royal Navy throughout the remainder of the war, particularly in the Mediterranean in 1942.

Sources:

Brown, Eric; Wings Of The Navy: Flying Allied Carrier Aircraft of World War Two; Naval Institute Press, Annapolis, Maryland, 1980.

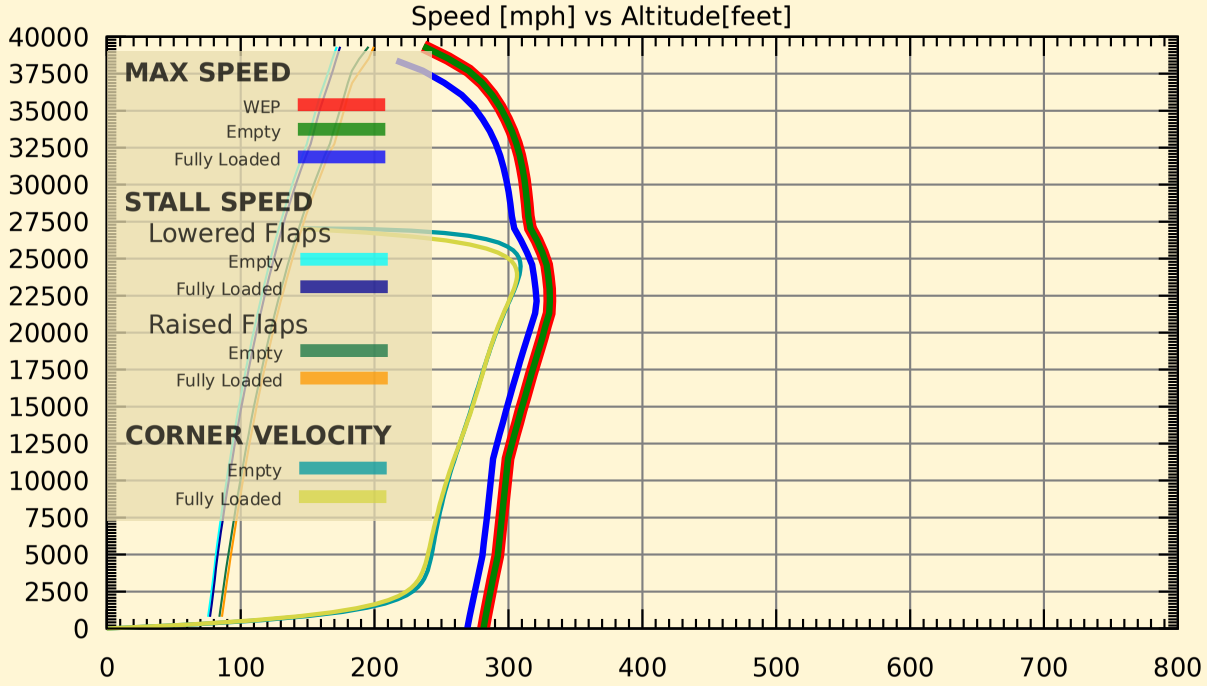
Green, William; War Planes Of The Second World War: Fighters Volume Four; Macdonald & Co., London; 1961.

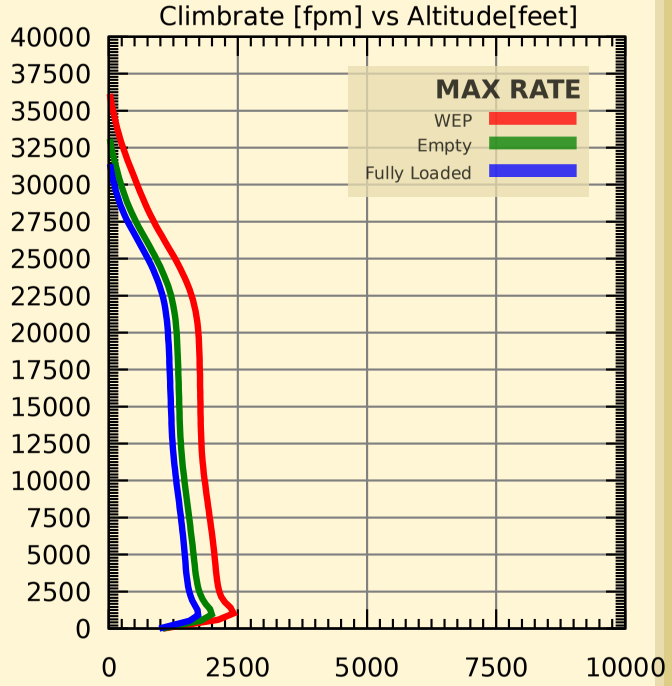
Name: Martlet Mk.I Grumman F4F-3
Role: Fighter
Crew: 1
Service Date: September 1940
Primary Guns: 2x Browning M2 0.5" machine guns with 430 rpg in wings
Secondary Guns: 2x Browning M2 0.5" machine guns with 430 rpg in wings
Defensive Guns: NA
Ordnance: 2x 119 lb bombs or 2x 348 lb drop tanks

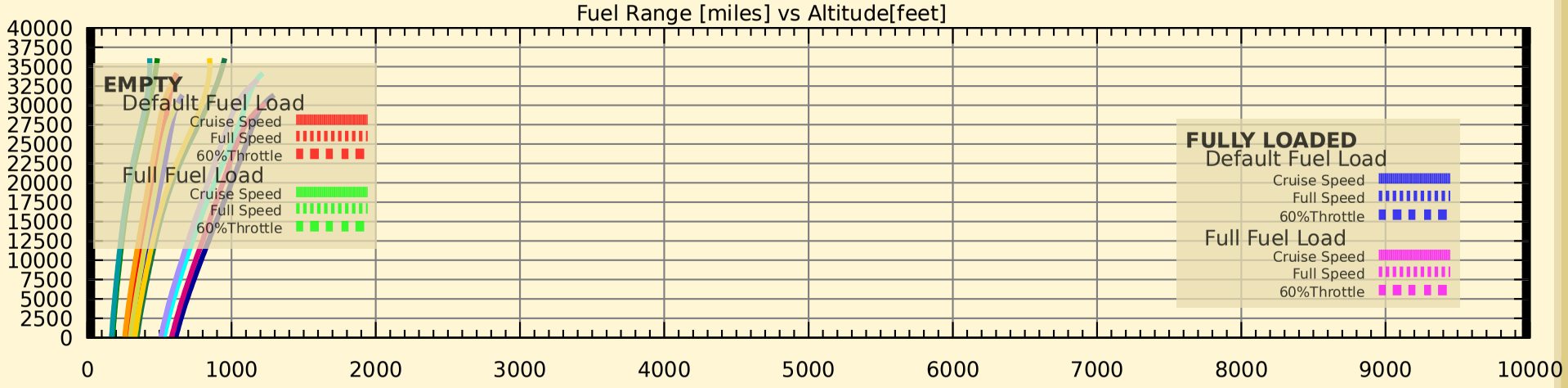
Length: 28.94 ft
Wing Span: 38.06 ft
Wing Area: 260 sq. ft

Power Plant: One Pratt-Whitney R-1830-76
Power: 2496 lb s.t.
Internal Fuel: 864 lb
External Fuel: 696 lb

Empty Weight: 5512 lb
MTOW: 7363 lb







Chance Vought F4U-1a Corsair

Durability	☆☆☆☆	Speed	☆☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆
Maneuverability	☆☆☆☆☆	Firepower	☆☆☆☆	Ground Attack	☆

Carrier Landings - The long nose of the Corsair makes carrier landings difficult for novice pilots.

In February 1938 the US Navy opened design competition for a new single-seat shipboard fighter. Chance-Vought responded with a design based around the new Pratt & Whitney XR-2800 18-cylinder radial. The plane, dubbed the XF4U-1 Corsair, featured a distinctive "inverted gull" wing shape, necessitated by the diameter of the Hamilton Standard propeller and the need to keep the landing gear sturdy enough to withstand carrier landings.

On October 1, 1940, the prototype Corsair ran a speed course between Stratford and Hartford, Connecticut and attained a top speed of 404 mph, making the Corsair the first plane to exceed 400 mph in level flight. Naturally the Navy was quite impressed and ordered a production version for further testing.

Standard armament on the XF4U-1 was intended to be a pair of .30 caliber machine guns in the cowl and a .50 caliber machine gun in each wing. But developments in Europe pointed to the necessity for heavier armament. Because a larger gun wouldn't fit in the cowl, the cowl guns were eliminated and three .50 caliber machine guns were mounted in each wing.

The space needed for the wing-mounted guns and their ammunition loads meant that the wing fuel tanks had to be removed. In order to retain the same fuel load a large 237-gallon tank was installed in the fuselage. To prevent the need for trim changes as fuel was used, the fuel tank had to be mounted as close to the center of gravity as possible, which resulted in the cockpit being moved about three feet aft of its original position. The repositioned cockpit resulted in severely reduced forward visibility, which made it even more difficult to land on a rolling and pitching aircraft carrier deck.

Corsairs started to come off the production line in the summer of 1942, and the US Marine Corps squadron, VMF-124, was formed on September 7, 1942 to be the first unit equipped with the big fighter. By December 28, 1942 VMF-124 was declared combat ready and was moved to Guadalcanal, where the Corsair flew its first combat mission on February 13, 1943.

Acting on the obvious flaws in the design, Vought replaced the "birdcage" canopy design with a taller, single-frame "clear-view" canopy. This allowed the pilot to sit 7 inches higher than in the previous version, which helped alleviate the visibility problem. Further changes included the use of the new R-2800-8W engine equipped with water-injection and structural changes designed to increase directional stability at low speeds. The new variant was dubbed the F4U-1A with almost 2,000 being built by Vought by the end of 1943.

Sources:

Green, William; War Planes Of The Second World War: Fighters Volume Four; Macdonald & Co., London; 1961.

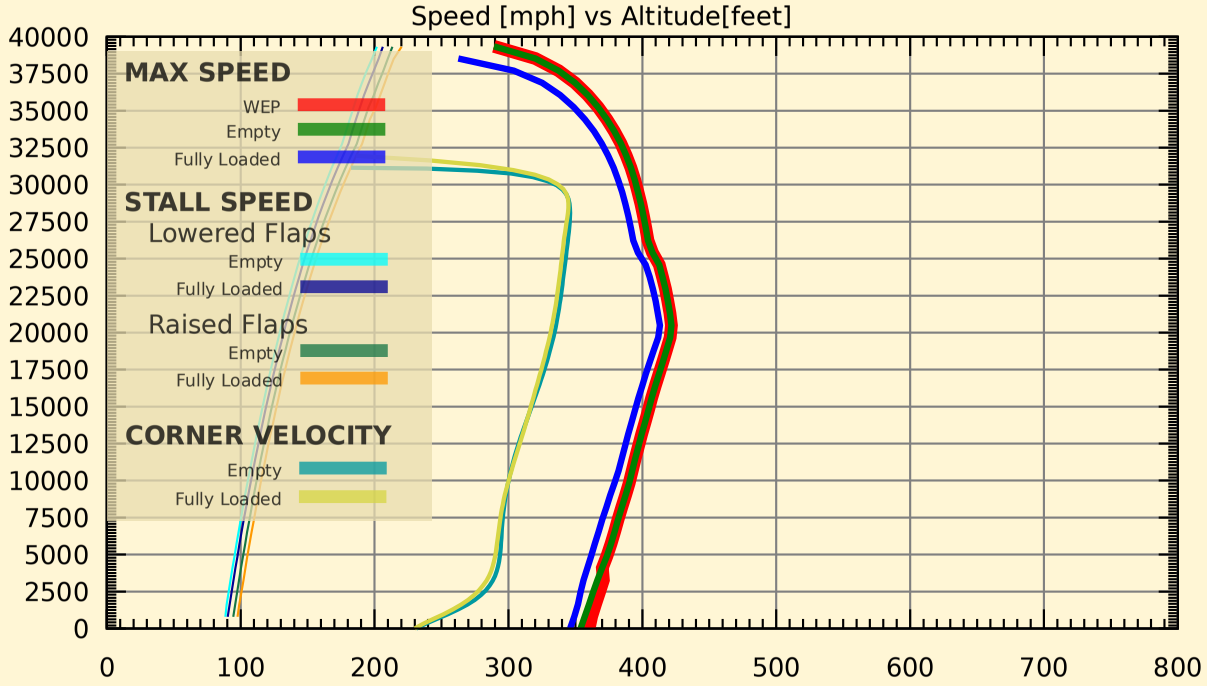
Sullivan, Jim; F4U Corsair In Action, Aircraft Number 145; Squadron/Signal Publications, Carrollton, Texas; 1994.

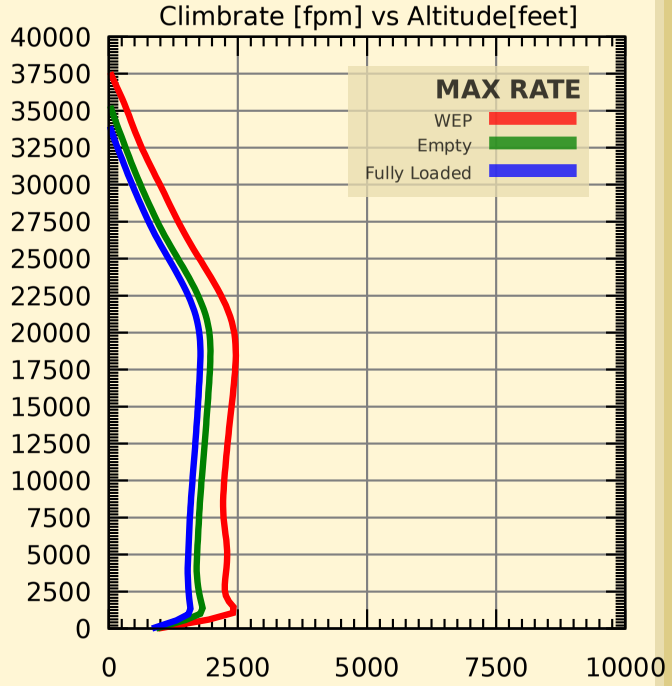
Name: Chance Vought F4U-1a Corsair
Role: Fighter
Crew: 1
Service Date: July 1942
Primary Guns: 2x Browning M2 0.5" machine guns with 375 rpg in wings
Secondary Guns: 4x Browning M2 0.5" machine guns with 400 rpg in wings
Defensive Guns: NA
Ordnance: One 250 lb or One 500 lb bomb under fuselage

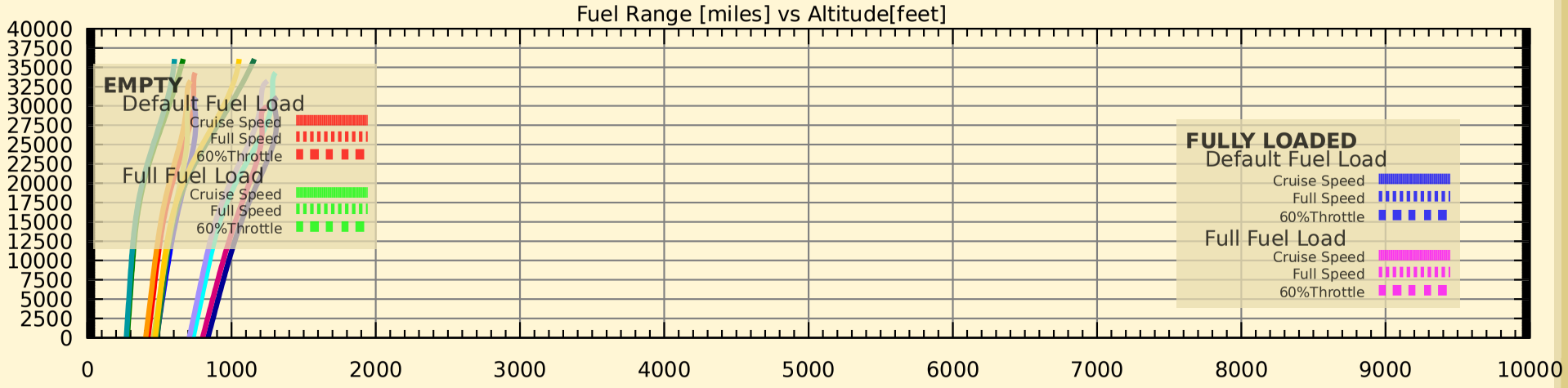
Length: 33.79 ft
Wing Span: 40.98 ft
Wing Area: 334 sq. ft

Power Plant: One Pratt-Whitney R-2800-8W
Power: 4620 lb s.t.
Internal Fuel: 1422 lb
External Fuel: NA

Empty Weight: 9700 lb
MTOW: 12258 lb

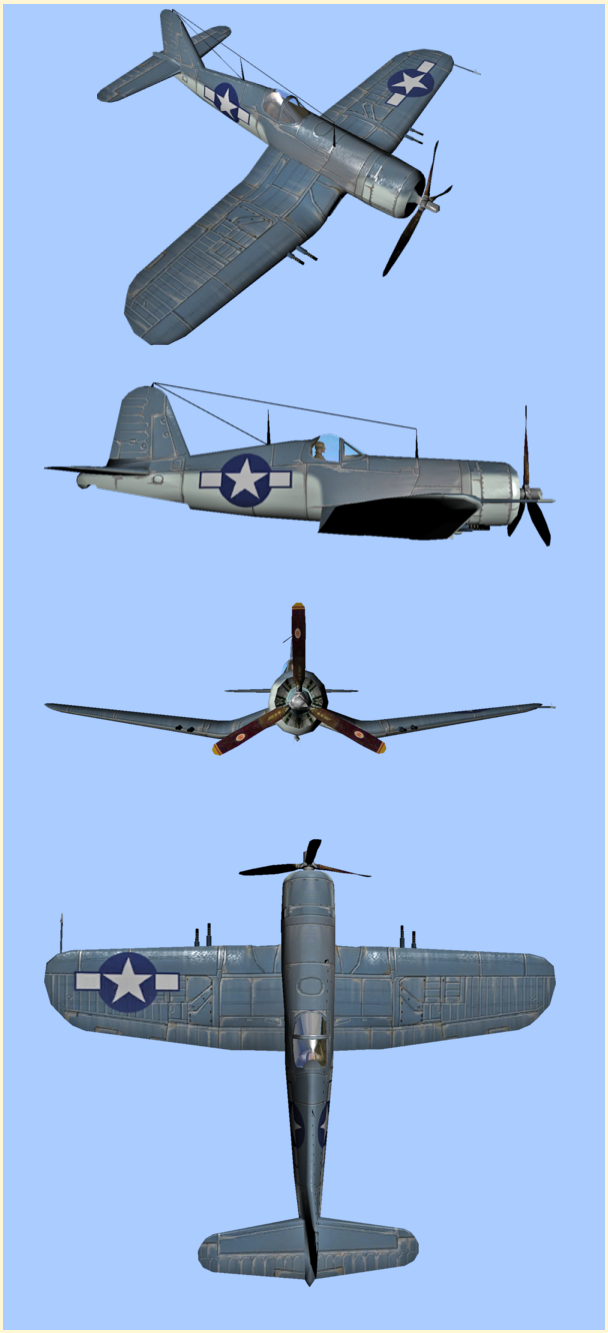






Chance Vought F4U-1c Corsair

Durability	☆☆☆	Speed	☆☆☆☆☆☆	Climb Rate	☆☆☆☆
Maneuverability	☆☆☆☆☆	Firepower	☆☆☆☆☆	Ground Attack	☆☆☆



Carrier Landings - The long nose of the Corsair makes carrier landings difficult for novice pilots.

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The space needed for the wing-mounted guns and their ammunition loads meant that the wing fuel tanks had to be removed. In order to retain the same fuel load a large 237-gallon tank was installed in the fuselage. To prevent the need for trim changes as fuel was used, the fuel tank had to be mounted as close to the center of gravity as possible, which resulted in the cockpit being moved about three feet aft of its original position. The repositioned cockpit resulted in severely reduced forward visibility, which made it even more difficult to land on a rolling and pitching aircraft carrier deck.

Corsairs started to come off the production line in the summer of 1942, and the US Marine Corps squadron, VMF-124, was formed on September 7, 1942 to be the first unit equipped with the big fighter. By December 28, 1942 VMF-124 was declared combat ready and was moved to Guadalcanal, where the Corsair flew its first combat mission on February 13, 1943.

Acting on the obvious flaws in the design, Vought replaced the "birdcage" canopy design with a taller, single-frame "clear-view" canopy. This allowed the pilot to sit 7 inches higher than in the previous version, which helped alleviate the visibility problem. Further changes included the use of the new R-2800-8W engine equipped with water-injection and structural changes designed to increase directional stability at low speeds. The new variant was dubbed the F4U-1A with almost 2,000 being built by Vought by the end of 1943.

Based on the F4U-1A production run a modified version of the Corsair, known as the F4U-1C, was delivered on August 30, 1943. This version featured a quartet of 20mm cannons in the wings in place of the six .50 caliber machine guns found on the -1A model. Additionally, a new canopy was introduced, which eliminated the last of the metal frames.

The cannon armed Corsair allowed the plane to knock out heavily armored aircraft and tanks. However, the Japanese had no heavily armored aircraft or tanks and pilots tended to prefer the greater ammunition loads of the machine gun armed Corsairs to the heavier hitting power of the 20mm guns. Only 200 F4U-1Cs were produced.

Performance-wise, the F4U-1C is identical to the machine gun armed F4U-1A.

Sources:

Green, William; War Planes Of The Second World War: Fighters Volume Four; Macdonald & Co., London; 1961.

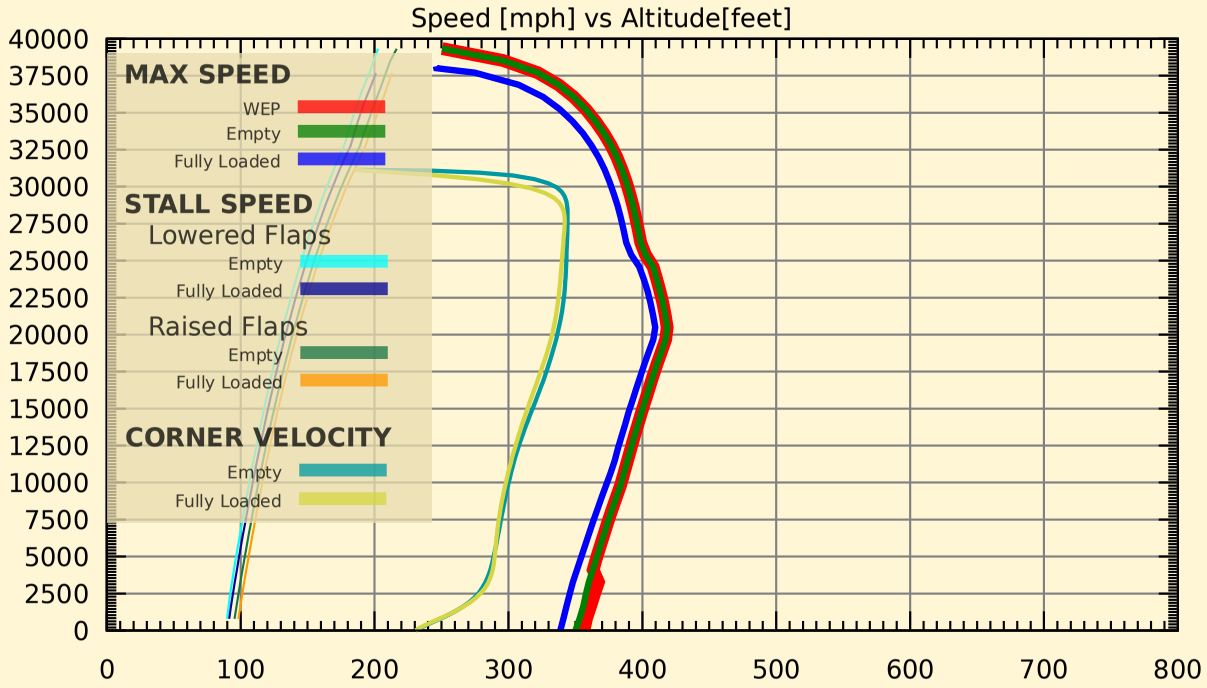
Sullivan, Jim; F4U Corsair In Action, Aircraft Number 145; Squadron/Signal Publications, Carrollton, Texas; 1994.

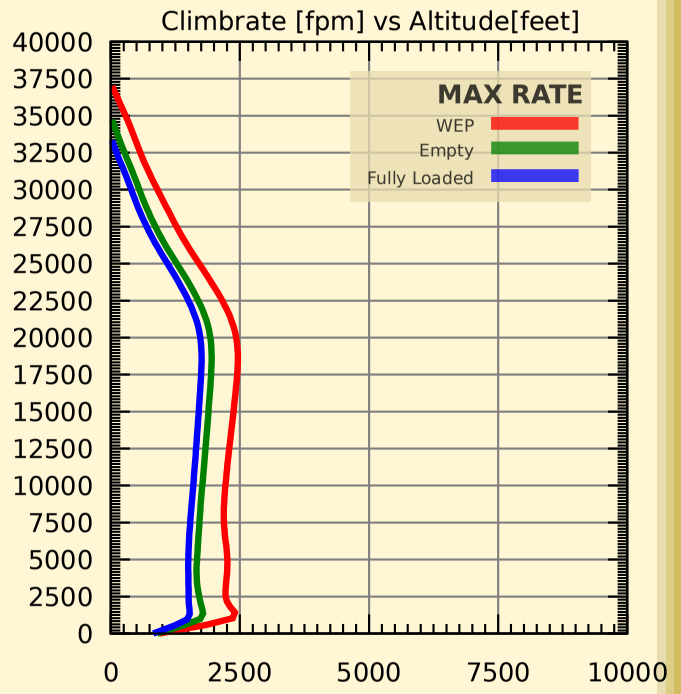
Name: Chance Vought F4U-1c Corsair
Role: Fighter
Crew: 1
Service Date: December 1943
Primary Guns: 2x Bendix M2 (Hispano II) 20mm cannon with 180 rpg in wings
Secondary Guns: 2x Bendix M2 (Hispano II) 20mm cannon with 140 rpg in wings
Defensive Guns: NA
Ordnance: One 250 lb or One 500 lb or One 1000 lb bomb under fuselage

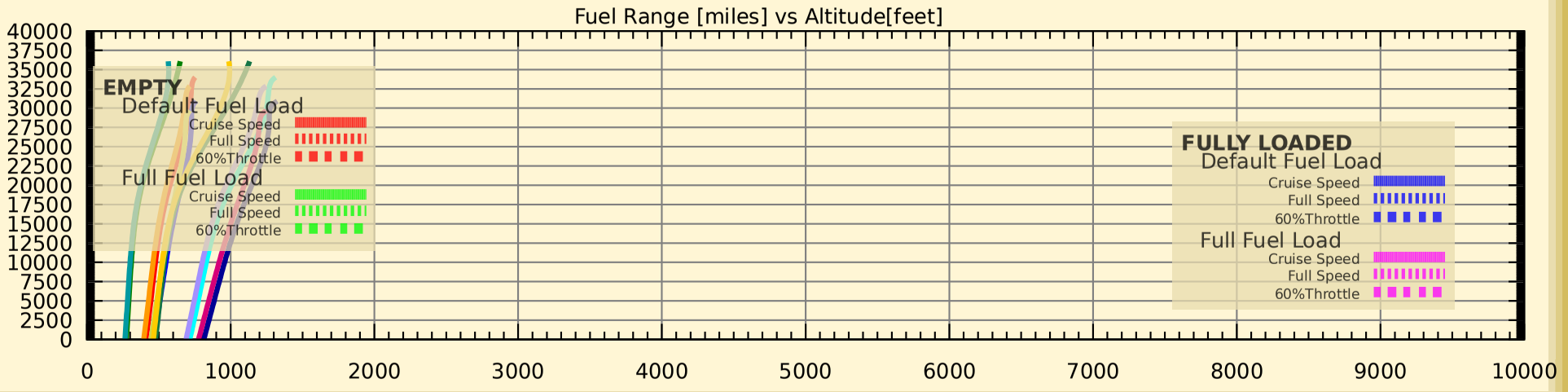
Length: 33.79 ft
Wing Span: 40.98 ft
Wing Area: 334 sq. ft

Power Plant: One Pratt-Whitney R-2800-8W
Power: 4620 lb s.t.
Internal Fuel: 1422 lb
External Fuel: 990 lb

Empty Weight: 9810 lb
MTOW: 12676 lb







Chance Vought F4U-4C Corsair

Durability	☆☆☆☆	Speed	☆☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆☆☆
Maneuverability	☆☆☆☆☆	Firepower	☆☆☆☆☆☆	Ground Attack	☆☆☆☆☆

Weaknesses:

Carrier Landings - The long nose of the Corsair makes carrier landings difficult for novice pilots.

Accepted by the Navy in October 1944, the F4U-4 was the last production model of the Corsair to see service in WWII. The principle difference from earlier versions was the installation of an even more powerful Pratt & Whitney "Double-Wasp" engine, the R-2800-18W, and later the R-2800-42W.

This new power plant was capable of producing 2,100 hp and with water injection could produce 2,450 hp! Attached to the new engine was a new 4-blade, thirteen-foot propeller. When all was said and done, the F4U-4 was capable of reaching 450 mph in level flight, could climb at almost 4000 feet per minute, and could reach an altitude of 41,500 feet.

In addition to the new prop and engine, the F4U-4 could be distinguished from the F4U-1 by the addition of a small air scoop at the bottom of the engine cowling. Like the F4U-1D, the F4U-4 was equipped with a pair of ordnance pylons at the wing roots and four "zero-length" HVAR rocket launch stubs under each wing. Each wing root pylon could hold a 154-gallon drop tank or a 500 lb. or 1,000 lb. bomb, which allowed the Corsair to assume the close support role for the Navy and Marines.

The F4U-4C was fitted with the heavier armament used on the F4U-1C, which consisted of four Bendix M3 20mm cannon with 231 rpg.

Sources:

Green, William; War Planes Of The Second World War: Fighters Volume Four; Macdonald & Co., London; 1961.

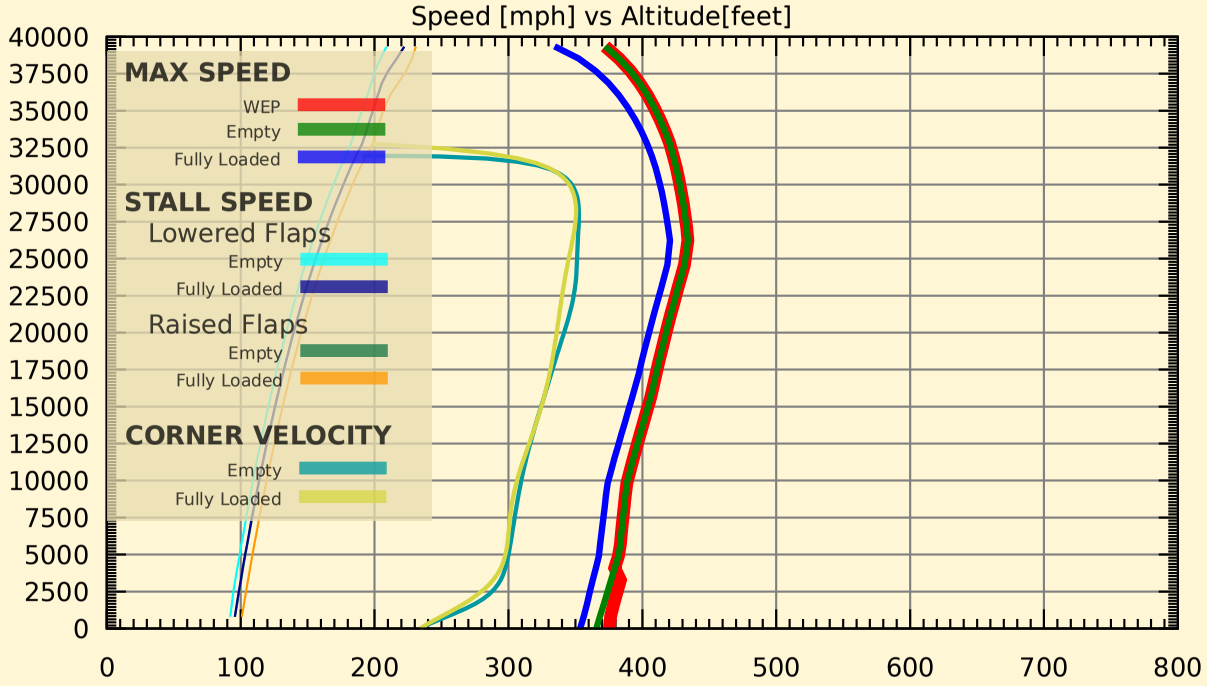
Sullivan, Jim; F4U Corsair In Action, Aircraft Number 145; Squadron/Signal Publications, Carrollton, Texas; 1994.

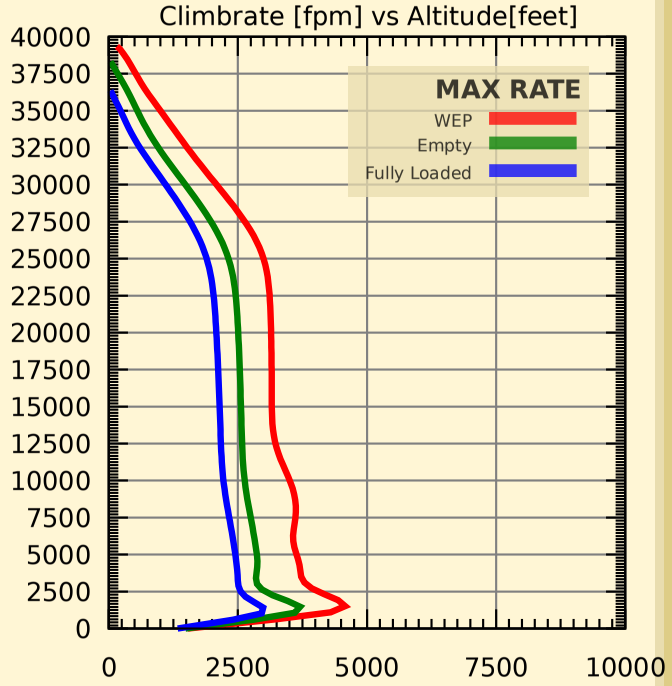
Name: Chance Vought F4U-4C Corsair
Role: Fighter
Crew: 1
Service Date: June 1945
Primary Guns: 2x Bendix M3 20mm cannons with 231 rpg in wings
Secondary Guns: 2x Bendix M3 20mm cannons with 231 rpg in wings
Defensive Guns: NA
Ordnance: 2x 250 lb or 2x 500 lb or 2x 1000 lb bombs or 2x 924 lb drop tanks on inner wing pylons, plus 8x 138 lb 5" HVAR rockets under outer wing

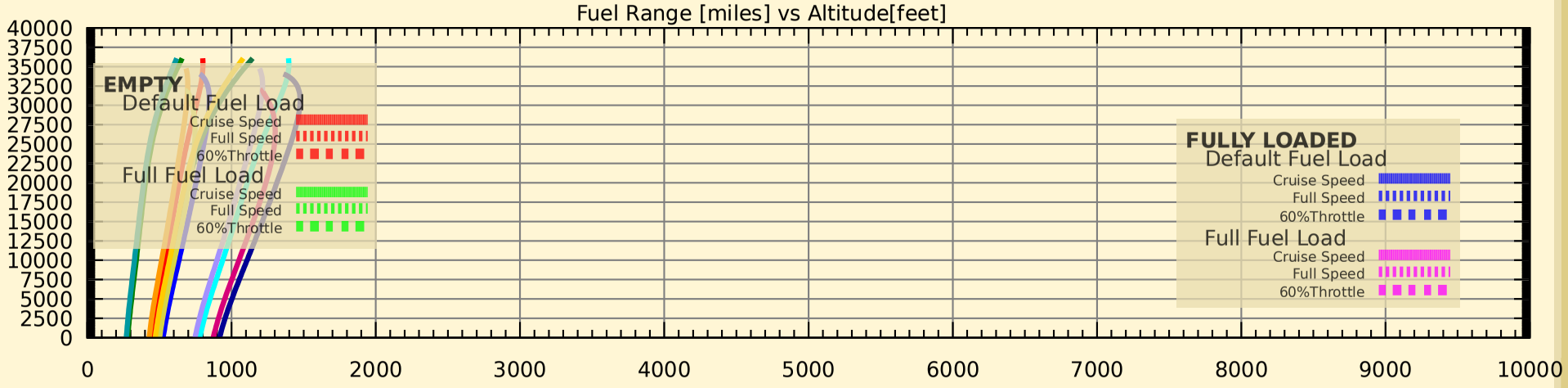
Length: 33.79 ft
Wing Span: 40.98 ft
Wing Area: 314 sq. ft

Power Plant: One Pratt-Whitney R-2800-18W
Power: 4675 lb s.t.
Internal Fuel: 1422 lb
External Fuel: 1848 lb

Empty Weight: 9788 lb
MTOW: 13933 lb







Chance Vought F4U-4 Corsair

Durability	☆☆☆☆	Speed	☆☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆☆☆
Maneuverability	☆☆☆☆☆	Firepower	☆☆☆☆	Ground Attack	☆☆☆☆

Carrier Landings - The long nose of the Corsair makes carrier landings difficult for novice pilots.

Accepted by the Navy in October 1944, the F4U-4 was the last production model of the Corsair to see combat in WWII. The principle difference from earlier versions was the installation of an even more powerful Pratt & Whitney "Double-Wasp" engine, the R-2800-18W, and later the R-2800-42W. This new power plant was capable of producing 2,100 hp and with water injection could produce 2,450 hp! Attached to the new engine was a 4-blade, thirteen-foot propeller. When all was said and done, the F4U-4 was capable of reaching 450 mph in level flight, could climb at almost 4000 feet per minute, and could reach an altitude of 41,500 feet.

In addition to the new prop the F4U-4 could be distinguished from the F4U-1 by the addition of a small air scoop at the bottom of the engine cowling. Like the F4U-1D, the F4U-4 was equipped with a pair of ordnance pylons at the wing roots and four "zero-length" HVAR rocket launch stubs under each wing. Each wing root pylon could hold a 154-gallon drop tank or a 500 lb. or 1,000 lb. bomb, which allowed the Corsair to assume the close support role for the Navy and Marines. The F4U-4 was equipped with the standard US armament of six .50 caliber machine guns in the wings with an ammunition load of 400 rpg.

Sources:

Green, William; War Planes Of The Second World War: Fighters Volume Four; Macdonald & Co., London; 1961.

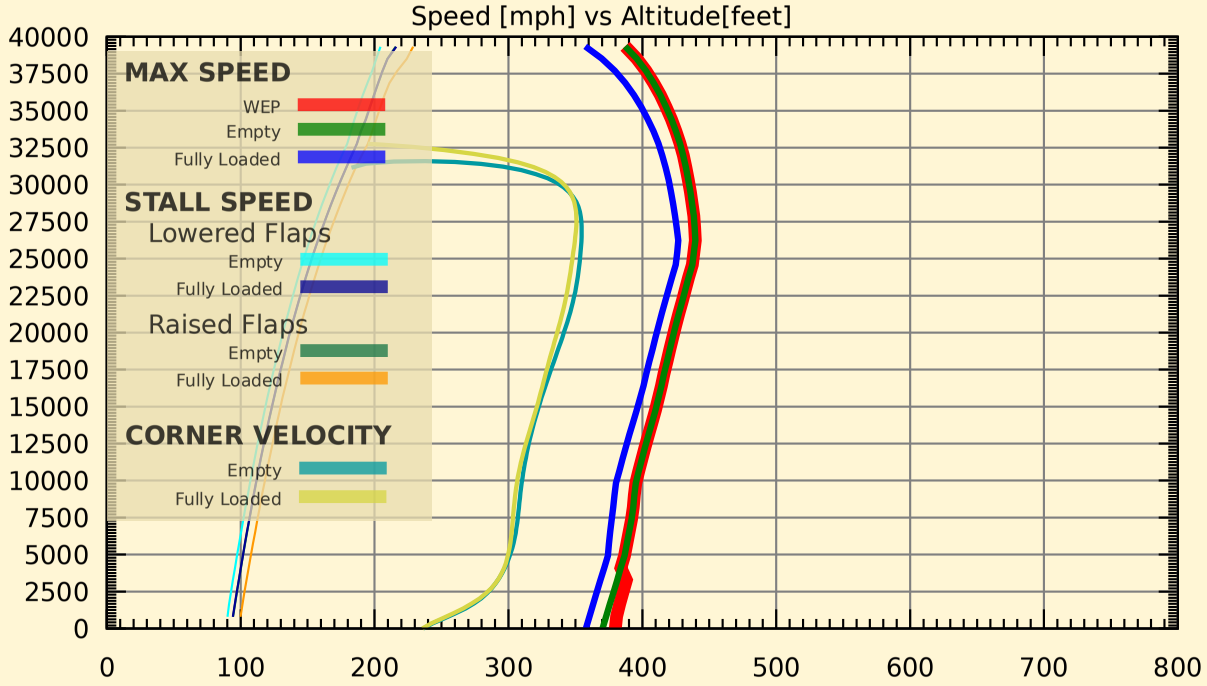
Sullivan, Jim; F4U Corsair In Action, Aircraft Number 145; Squadron/Signal Publications, Carrollton, Texas; 1994.

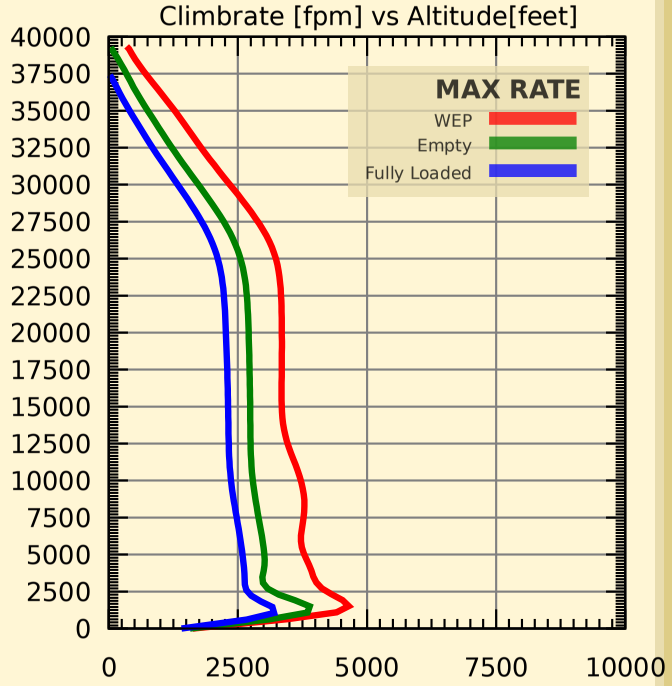
Name: Chance Vought F4U-4 Corsair
Role: Fighter
Crew: 1
Service Date: November 1944
Primary Guns: 2x Browning M2 0.5" machine guns with 375 rpg in wings
Secondary Guns: 4x Browning M2 0.5" machine guns with 400 rpg in wings
Defensive Guns: NA
Ordnance: 2x 250 lb or 2x 500 lb or 2x 1000 lb bombs or 2x 924 lb drop tanks on inner wing pylons, plus 8x 138 lb 5" HVAR rockets under outer wing

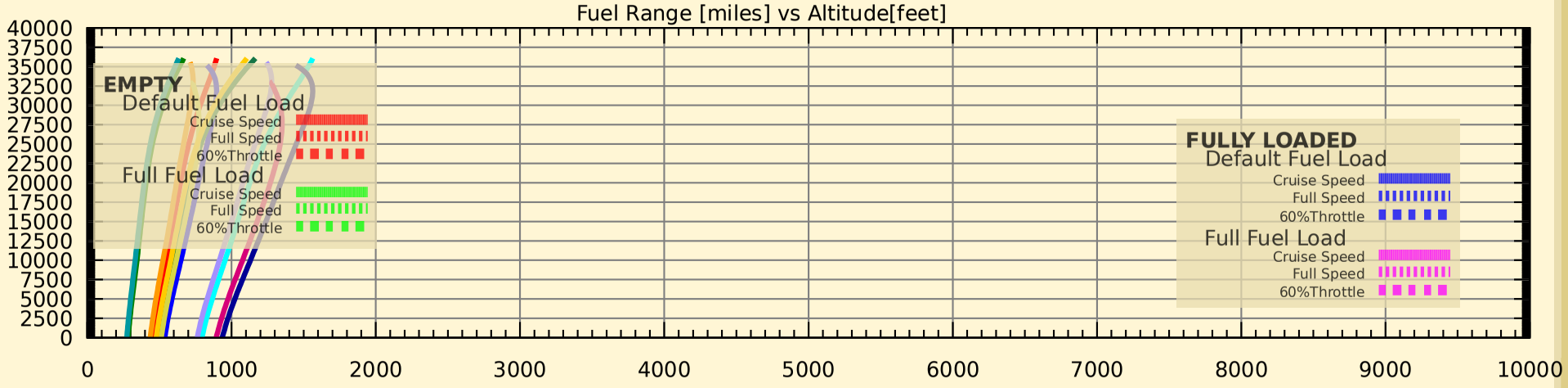
Length: 33.79 ft
Wing Span: 40.98 ft
Wing Area: 314 sq. ft

Power Plant: One Pratt-Whitney R-2800-18W
Power: 4675 lb s.t.
Internal Fuel: 1422 lb
External Fuel: 1848 lb

Empty Weight: 9590 lb
MTOW: 13757 lb







Grumman F6F-3 Hellcat

Durability	☆☆☆	Speed	☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆
Maneuverability	☆☆☆☆☆☆	Firepower	☆☆☆☆	Ground Attack	☆☆

Ground Attack - Unable to carry bombs or rockets, the F6F-3 cannot contribute to the ground war in any meaningful way, except as a point defense fighter.

The XF6F-1 was originally ordered on June 30, 1941 as a potential successor to the Wildcat, but Grumman engineers went back to the drawing board after Pearl Harbor to look into improvements suggested by actual combat experience in the Pacific. The modifications were extensive enough to warrant changing the designation of the prototype to XF6F-3, the XF6F-2 being a version with a turbo-supercharged R-2800-21 engine.

The new prototype was first flown on June 26, 1942 and the first production version was flown only four days later. By the end of 1942, the Hellcat was being delivered to US Navy combat units. VF-9 of the USS Essex was the first recipient, but the Hellcat was first blooded in combat with VF-5 operating from the USS Yorktown on August 31, 1943.

Equipped with a 2,000 hp Pratt & Whitney R-2800-10 "Double Wasp", the Hellcat could reach 315 mph at sea level and 380 mph at altitude. Armed with the standard US fighter armament of six .50 caliber machine guns with 400 rounds per gun, the F6F-3 could knock out the competition with relative ease. As with the Wildcat, the Hellcat could absorb a significant amount of combat damage and keep on flying. These attributes were perhaps best illustrated by David McCampbell on October 23, 1944 when he shot down nine enemy fighters on a single mission, the only damage to his Hellcat being dents in the wings from flying through the debris of his victims.

Possessing a combination of good speed and maneuverability, the F6F-3 was well suited to combat against the highly maneuverable Japanese Zero fighters. While not as fast as contemporary US Army aircraft or the phenomenal Corsair, the Hellcat is a great dogfighter that can be adapted to either turn or energy fighting by an experienced pilot.

Sources:

Green, William; War Planes Of The Second World War: Fighters Volume Four; Macdonald & Co., London; 1961.

Spick, Mike; The Ace Factor; Naval Institute Press, Annapolis, MD; 1988.

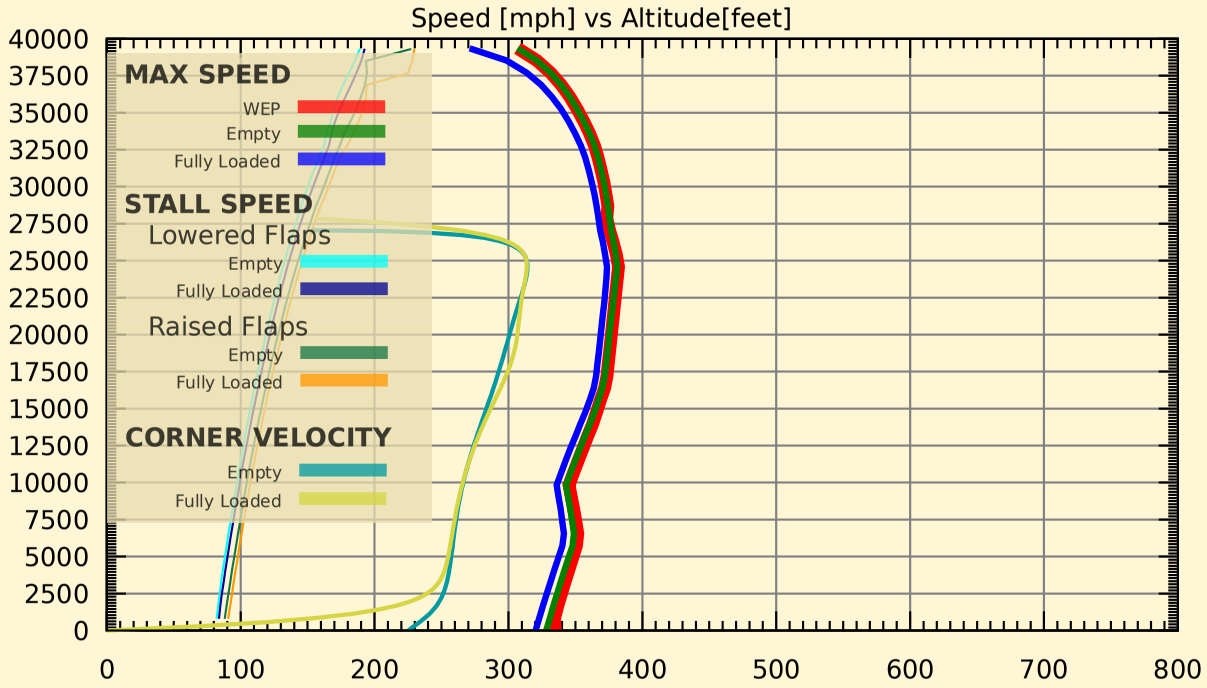
Sullivan, Jim; F6F Hellcat In Action, Aircraft Number 36; Squadron/Signal Publications, Carrollton, Texas; 1979.

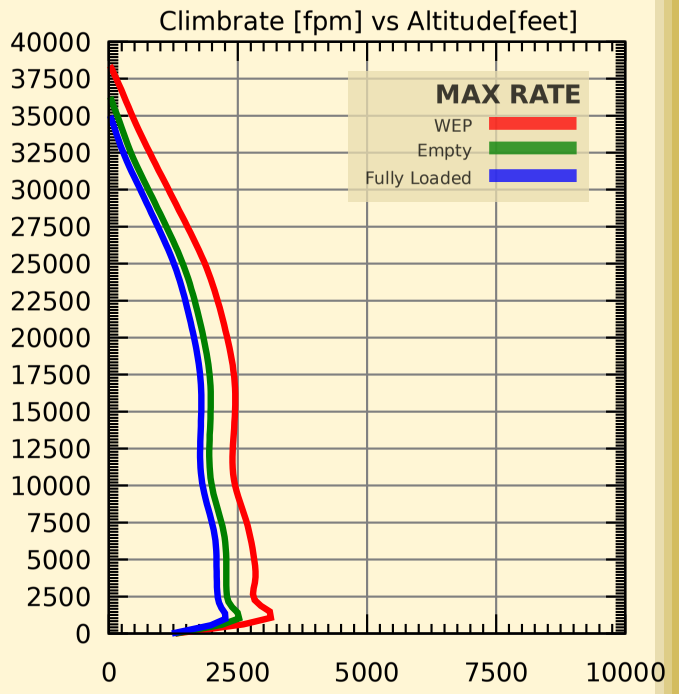
Name: Grumman F6F-3 Hellcat
Role: Fighter
Crew: 1
Service Date: January 1943
Primary Guns: 2x Browning M2 0.5" machine guns with 400 rpg in wings
Secondary Guns: 4x Browning M2 0.5" machine guns with 400 rpg in wings
Defensive Guns: NA
Ordnance: One 250 lb or One 500 lb or One 1000 lb bomb or One 900 lb drop tank

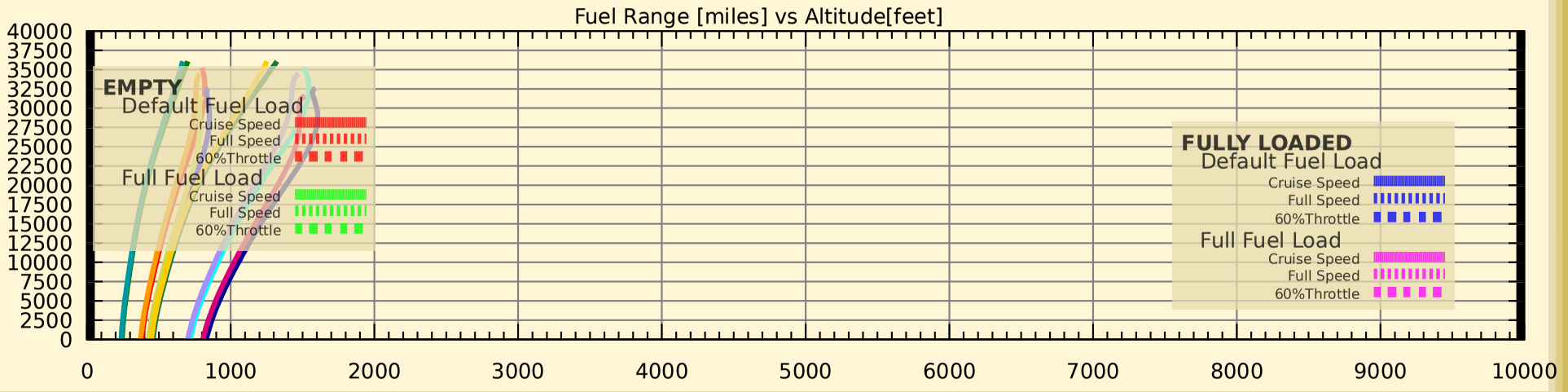
Length: 33.60 ft
Wing Span: 42.81 ft
Wing Area: 334 sq. ft

Power Plant: One Pratt-Whitney R-2800-10W
Power: 4312 lb s.t.
Internal Fuel: 1410 lb
External Fuel: 900 lb

Empty Weight: 9259 lb
MTOW: 12213 lb







F86E Sabre

Durability	☆☆☆☆	Speed	☆☆☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆☆☆☆
Maneuverability	☆☆☆☆	Firepower	☆☆☆☆☆☆	Ground Attack	☆☆☆

Wind tunnel tests on the swept wing showed that that the design reduced drag and increased lift at high-speeds, but it came at the expense of low-speed handling. Further examination of the translated German research documents showed that the use of leading edge slats (aka LES or slats), which were used on the Bf-109, would improve handling when extended at low-speeds.

Storm designed a new wing for the XP-86, which used a 35 degree sweep for speed and full-span slats for handling. NAA built a mockup of the wing and fitted it to the XP-86 mockup. Tests in a low-speed wind tunnel revealed that it had satisfactory low-speed stall characteristics and that it would have an estimated top speed of 650 mph.

The USAAF authorized the design on 20 November 1945, but the design research delayed the project and the first prototype (45-59597) rolled out of NAA's Ingelwood plant on 8 August 1947. The XF-86 was described as a "pilot's aircraft", a natural flying plane that if it ever got out of control, all a pilot had to do was release the stick and, if he had enough altitude, it would stabilize itself. Additionally, the pilot's view from the cockpit was nearly perfect.

One of the prototypes was re-engined with the new General Electric J47-GE-3 engine, which produced 5,200 lbt at 7950 rpm, a 36% increase in available thrust. After initial flight tests, this prototype was flown through the sound barrier on 25 April 1948. Like the Mustang before it, the addition of a new engine had turned an average fighter into a one of the best fighters in the world and the USAF decided to issue a contract for production 221 F-86A Sabres.

The first production F-86A-1 flew on 20 May 1948 and was armed with six Browning M3 .50 cal machine guns in the nose, three on each side of the fuselage, with 300 rounds of ammunition each, sufficient for 15 seconds of fire. Only 33 F-86A-1s were built, almost all being used for testing and experimental purposes. One of these was flown by Major Robert L Johnson on 15 September 1948 when he set a new World's Speed Record of 670.98 mph.

The F-86A-5 was the first version considered by the USAF to be combat capable fighter and was the first to be assigned to combat units. It was the first variant to be equipped with two hard points for carrying either 2x 500 lb or 1000 lb bombs or 2x 120-gal Combat fuel tanks or 206.5-gal Ferry tanks. The A-5 model also had four zero-length rocket launcher stubs under each wing to allow up to eight 5" HVAR rockets to be carried. Two HVAR rockets could be carried when the 120-gal combat tank was used, but otherwise rockets were used instead of underwing stores.

When war broke out in Korea the MiG-15 surprised Western experts in outclassing everything in the Far East Air Force (FEAF) inventory. It was a full 75 mph faster than the F-80C Shooting Star then serving in the front-line fighter role, so Air Force commanders decided to commit the Sabre into combat. The 4th FG and their F-86A-5s were packed aboard Navy ships and sent directly to Korea. On December 17th they saw their first action when Baker flight, led by LtCol Bruce Hinton, jumped a flight of MiGs near Sinuiju. In the skirmish that followed Hinton bagged one of the MiGs for the first of 792 Sabre victories over MiG-15s, at a cost of only 78 F-86s.

The addition of the "flying tail" from the F-86D Sabre Dog to the F-86A-5 production line caused the Air Force to designate the result a new model and the F-86E-1 was born. The first F-86E was flown on 23 September 1950.

With increasing demand for Sabres in the skies over Korea, the USAF purchased sixty Canadair Sabre Mk. 4s, which were identical to the F-86E-1, except for the use of RCAF radios. These were designated F-86E-6 by the USAF and after the war, many of them were later transferred to the Michigan ANG. The F-86E-10 introduced an optically-flat, armored windscreen to replace the previous v-shaped windscreen and improved air conditioning.

Although NAA only made 456 E models, at a flyaway cost of $219,457 each, it was the most numerous type to see combat in Korea and it scored the most victories, despite being slightly inferior to the MiG-15 in performance.

Sources:

Angelucci, Enzo; The Rand McNally Encyclopedia of Military Aircraft 1914 to the Present; Crescent Books, New York; 1980.

Batchelor, John, and Cooper, Bryan; Fighter: A History of Fighter Aircraft; Charles Scribner's Sons, New York; 1973.

Davis, Larry; F-86 Sabre In Action; Squadron/Signal Publications; Carrollton, TX; 1992.

Davis, Larry; Walk Around F-86 Sabre; Squadron/Signal Publications; Carrollton, TX; 2000.

Franks, Norman; Aircraft Versus Aircraft; Barnes & Noble Books, 1998.

Green, William, and Swanborough, Gordon; The Complete Book Of Fighters; Smithmark Publishing, New York; 1994.

Taylor, Michael J.H.; Jane's Encyclopedia of Aviation; Crescent Books, New York; 1989.

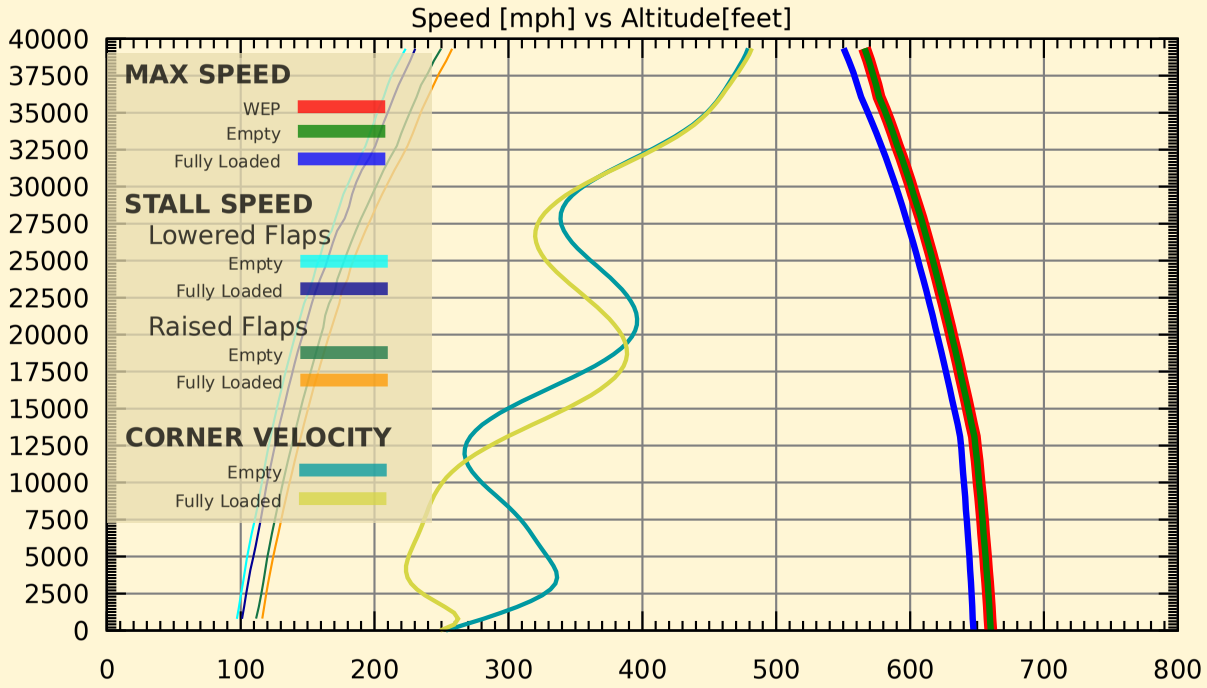
Williams, Anthony G.; Rapid Fire; Airlife Publishing Ltd; Shrewsbury, England; 2000.

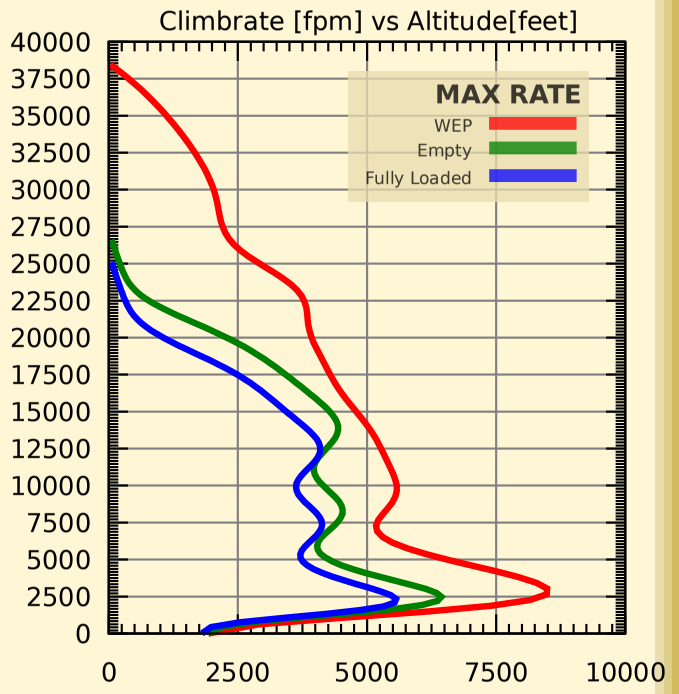
Name: F86E Sabre
Role: Fighter
Crew: 1
Service Date: December 1950
Primary Guns: 2x Browning M3 .50 cal machine guns with 300 rpg in nose
Secondary Guns: 4x Browning M3 .50 cal machine guns with 300 rpg in nose
Defensive Guns: NA
Ordnance: 2x 100 lb bombs or 2x 250 lb bombs or 2x 500 lb bombs or 2x 1000 lb bombs or 8x 5" HVAR rockets or 2x 120 gal drop tanks or 2x 206.5 gal drop tanks or 2x 120 gal drop tanks and 2x 5" HVAR rockets

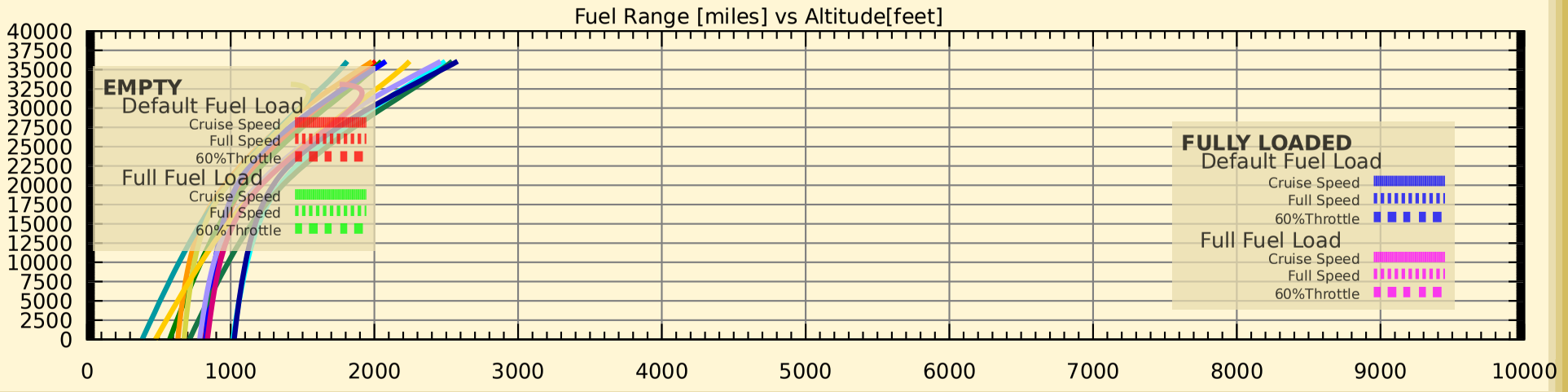
Length: 37.47 ft
Wing Span: 37.07 ft
Wing Area: 288 sq. ft

Power Plant: One General Electric J47-GE-27
Power: 5972 lb s.t.
Internal Fuel: 2871 lb
External Fuel: 1584 lb

Empty Weight: 10950 lb
MTOW: 17804 lb

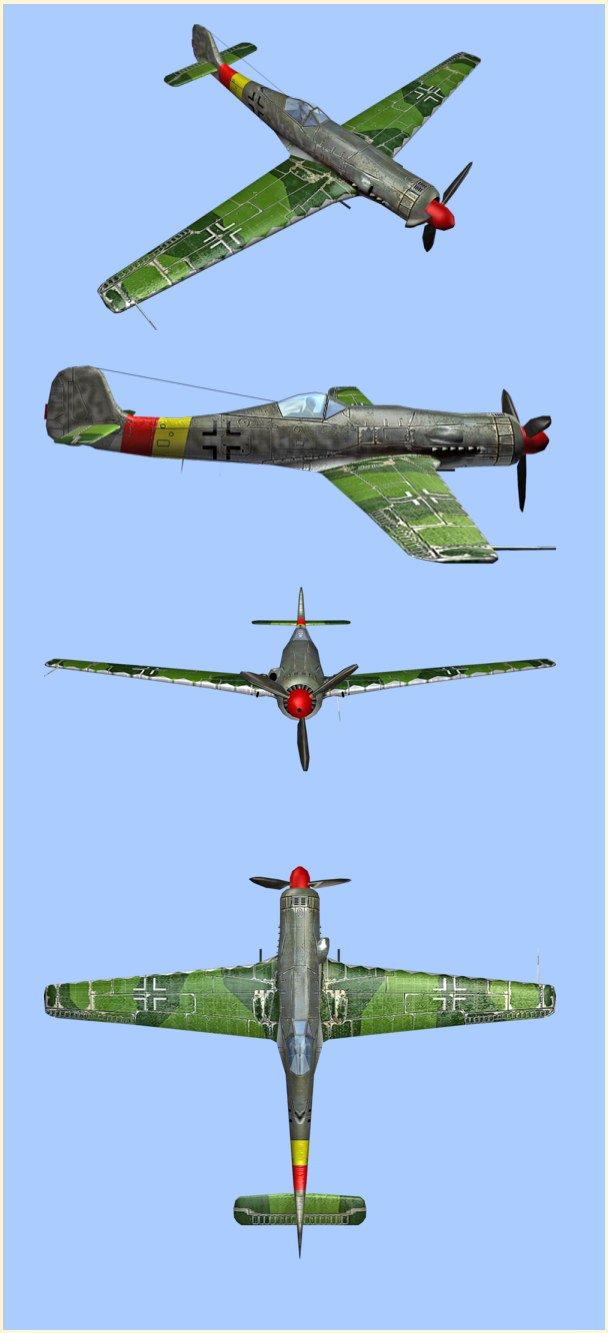






Focke-Wulf Ta-152H-1

Durability	★★★★	Speed	★★★★★★★★	Climb Rate	★★★★★★★★
Maneuverability	★★★★★	Firepower	★★★★★★★★	Ground Attack	★



Ground Attack - Without the ability to carry ordnance of any kind, the Ta-152 has only its guns to help with the ground war.

With it becoming increasingly obvious that high-altitudes were the domain of air combat in Europe, the Focke-Wulf and Messerschmitt companies were asked in late 1942 to submit proposals for a Hochleistungsjager, of High-Performance Fighter. The plan was for a two-stage development with the first fighter being based on an existing model, using many common parts, and the second being built from the ground up.

Kurt Tank submitted two proposals (Ra-2 and Ra-3) for the first stage based on the Jumo-213 powered FW-190D and a third (Ra-4D), which although it was based broadly on the 190, was to incorporate numerous structural and aerodynamic improvements. Although Messerschmitt submitted a design, the Me-155B, officials thought that Messerschmitt had too many projects in work already to devote sufficient time to the task.

The Ra-2 and Ra-3 prototypes were essentially the same as the FW-190D-9s, except that they used the Jumo-213E with a three-speed, two-stage turbo-supercharger and induction cooler for improved high-altitude performance. MW50 methanol injection was installed and hydraulics replaced electric components for the flaps and landing gear. The fuselage was lengthened to improve internal capacity and, to compensate for the change in cg, the fuselage was moved aft 16 inches. Each plane was armed with a single 30mm Mk 108 engine-mounted cannon and a pair of 20mm MG 151 cannon in the wing roots. In addition, the Ra-2 prototype was fitted with another pair of MG 151s in the cowl.

By this time in the war Kurt Tank's reputation in the Luftwaffe was riding high and in his honor, and at his request, the plane was designated the Ta-152 instead of being included in the FW-190 lineage. Ra-2 was dubbed Ta-152B and Ra-3 became Ta-152H. Meanwhile, the Ra-4D model, or Ta-153 as it was now known, had begun development out of the FW-190C project. Of particular note was it's wing, which although it offered only marginal aerodynamic improvements, was much simpler and easier to build and had a much greater internal capacity for fuel tanks. Because of these advantages it was decided that this wing would be transferred over to the Ta-152 project, with the H version having extended wing panels.

A Ta-152H production line was setup at Cottbus and the first two production prototypes were produced in June and July 1944. Joining them on the production line were the five remaining FW-190C prototypes, which were slated for conversion to the Ta-152H. Conversion and testing of these prototypes continued through November while twenty pre-production Ta-152H-0s were also built and delivered, these differing from the production H-1s only in having their wing tanks deleted.

The Ta-152H was armed with a single engine-mounted Mk 108 with 90 rounds and a pair of 20mm MG 151s with 175 rpg in the wing roots. Internal fuel capacity could be increased by mounting an ETC-503 rack on the fuselage, which could hold a 300 liter tank. The H-0 weighed in at 10,420 lb. loaded while the H-1 with its internal tanks weighed 11,502 lb.

More than 150 Ta-152H-1 fighters were produced at Cottbus between January 1945 and the facility being overrun by the Soviet army. While no Jagdgruppen had converted fully to the machine, several Jagdstaffeln operated the plane alongside their D-9s and the Stabsschwarm of JG 301 was known to use the plane to provide top cover for Me-262 bases. However, the majority were likely destroyed on the ground by strafing Allied fighters while waiting to be accepted by the Luftwaffe.

Sources:

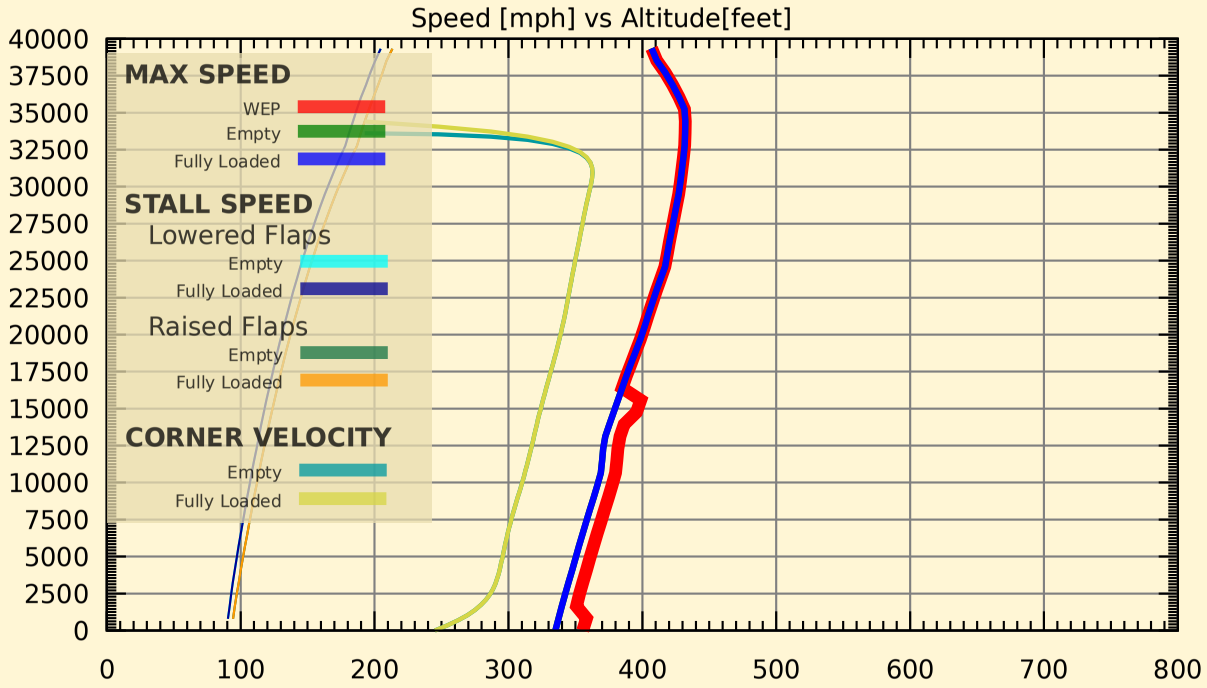
Green, William; Warplanes of the Third Reich; Doubleday and Company, Garden City, NY; 1970.

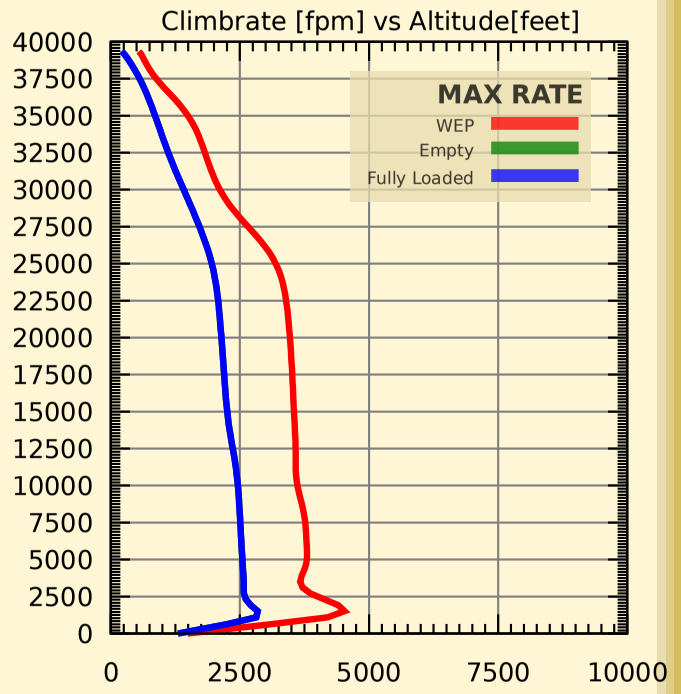
Name: Focke-Wulf Ta-152H-1
Role: Fighter
Crew: 1
Service Date: March 1945
Primary Guns: Primary Guns: 2x MG151/20 20mm cannon with 175 rpg in wing roots
Secondary Guns: One Mk108 30mm cannon with 90 rpg in hub
Defensive Guns: NA
Ordnance: One 463 lb drop tank

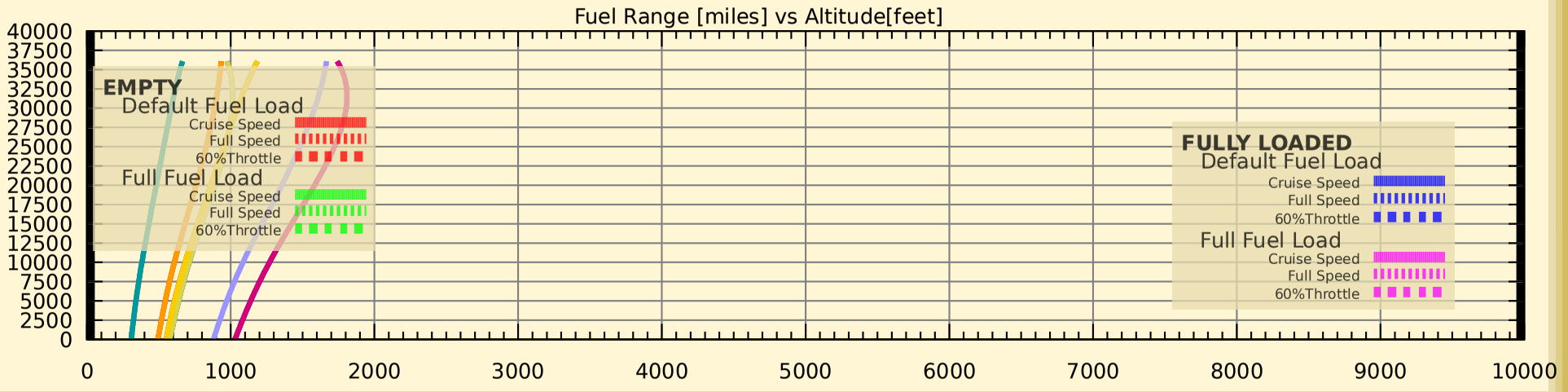
Length: 35.43 ft
Wing Span: 47.57 ft
Wing Area: 253 sq. ft

Power Plant: One Jumo 213F-1
Power: 3529 lb s.t.
Internal Fuel: 1573 lb
External Fuel: 463 lb

Empty Weight: 8377 lb
MTOW: 10803 lb

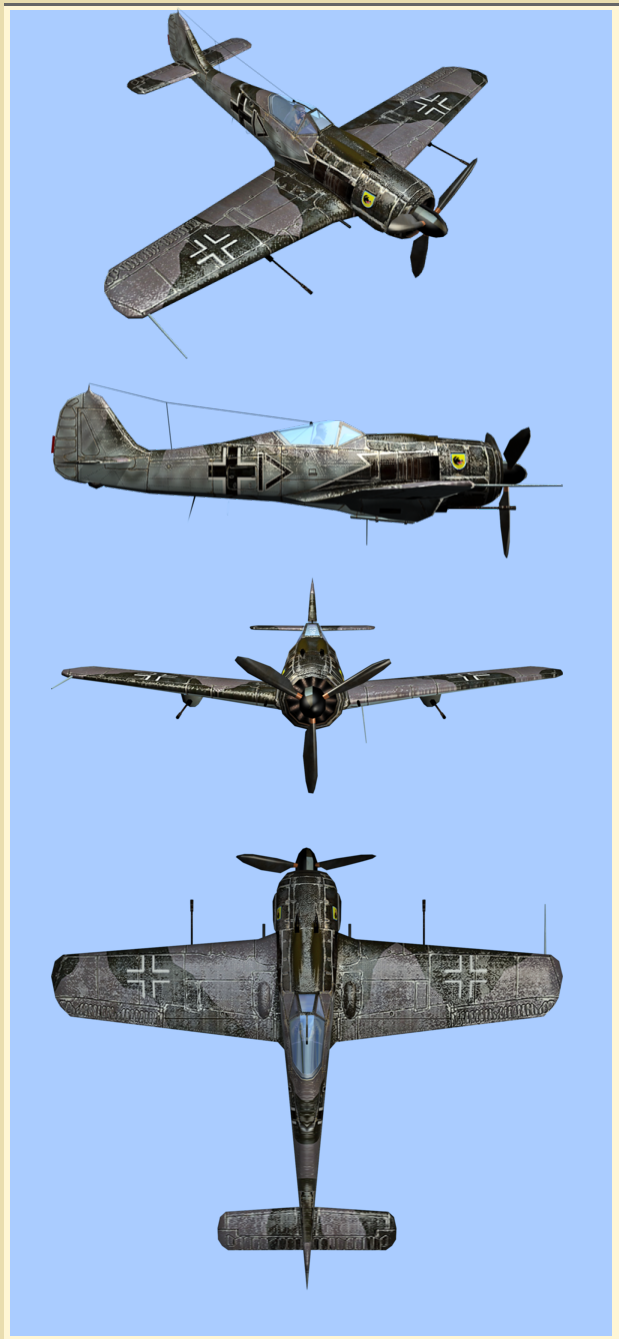






Focke-Wulf FW-190A-8/R3
Würger

Durability	☆☆☆☆☆	Speed	☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆
Maneuverability	☆☆☆☆	Firepower	☆☆☆☆☆☆☆	Ground Attack	☆☆☆☆



Turn Rate - With its high wing-loading the Wurger can't turn with planes like the Spitfire or La-7.

The 190 was the dominant plane in the skies of Europe in 1942, but further refinements were in order. With each increase in weight, the center of gravity of the plane had shifted and now it became apparent that it was too far aft. To alleviate this problem, the engine mount was extended forward about six inches in the A-5 model. Several A-5s were shipped to Japan in 1943 for evaluations and although the Japanese didn't adopt it into service, the Allies spotted it and gave it the code-name "Fred".

By now the 190 was weighing in at over 9,000 lb. and in an effort to reduce weight somewhat, Kurt Tank redesigned the wing. This new wing was mounted to an A-5 test bed, then was introduced into service with the A-6 in late 1943. While the new wing's appearance was virtually identical to the previous one, it was able to mount MG-151/20 cannon in the outboard positions previously occupied by the MG-FF. Fed by 125 round belts, these new guns greatly increased the firepower available to the pilot.

The A-7 was originally intended to be a high-speed photo reconnaissance version, but the needs of combat units changed those plans. Nothing more than an interim version, only 80 A-7s were produced, but it was the first version to replace the 7.92mm machine guns in the cowl with 13mm MG-131s with 400 rpg.

The A-8 was soon introduced with a host of minor refinements and changes, including the addition of removable fuel cells behind the pilot's seat as an alternative to the MW50 methanol injection system. By this time, the system of Umrust Bausaze factory conversion kits had been completely replaced by the Rustatz field conversion kits.

The /R3 kit involved removal of the outboard MG-151s and the installation of a 30mm Mk 103 gun pod with 35 rpg under each wing. Although it had a low rate of fire, the Mk 103 had a very high muzzle velocity, allowing it to be used as a stand-off weapon against bomber formations.

Sources:

Filley, Brian; FW 190A, F, and G In Action; Squadron/Signal Publications, Carrollton, TX; 1999.

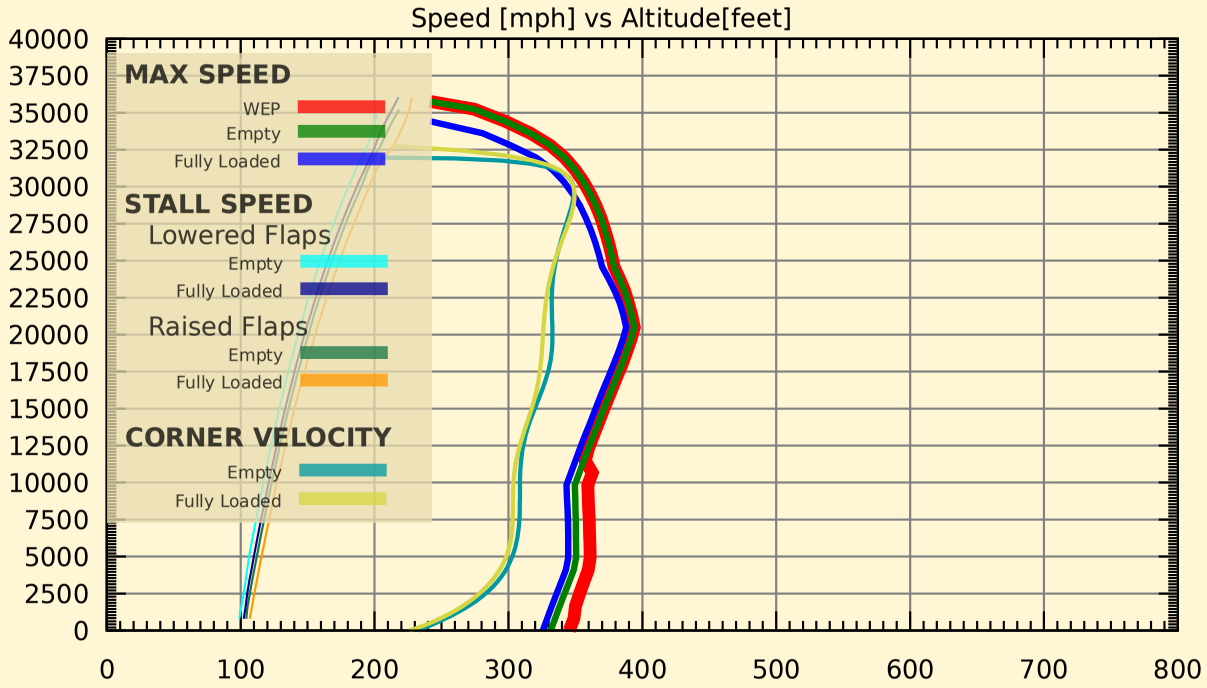
Green, William; Warplanes of the Third Reich; Doubleday and Company, Garden City, NY; 1970.

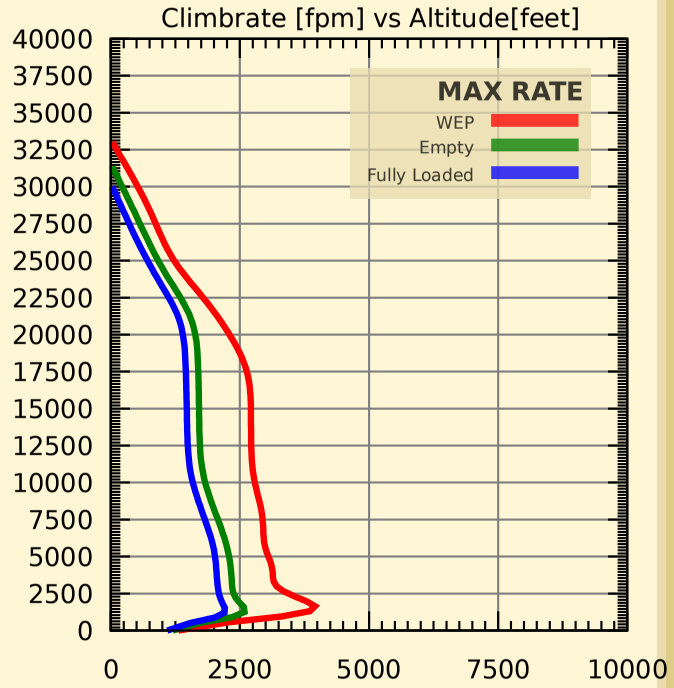
Name: Focke-Wulf FW-190A-8/R3 Würger
Role: Fighter
Crew: 1
Service Date: March 1944
Primary Guns: 2x MG131 13 mm machine guns with 400 rpg in cowl and 2x MG151/20 20mm cannon with 250 rpg in wing roots
Secondary Guns: 2x Mk103 30mm cannon with 35 rpg in underwing pods
Defensive Guns: NA
Ordnance: 4x 121 lb or One 551 lb bomb or One 475 lb drop tank

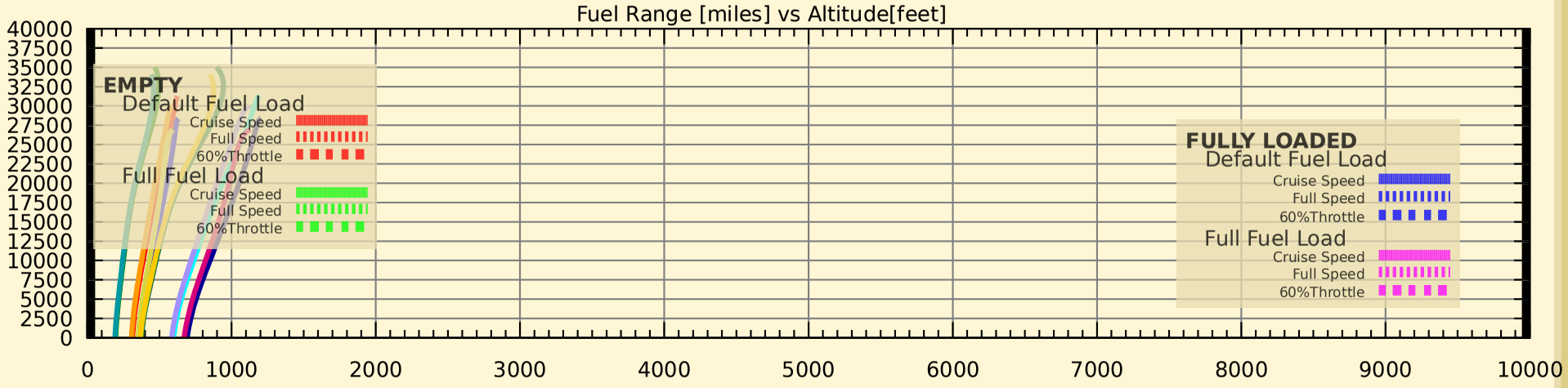
Length: 29.04 ft
Wing Span: 34.45 ft
Wing Area: 197 sq. ft

Power Plant: One BMW-801D-2
Power: 3749 lb s.t.
Internal Fuel: 1010 lb
External Fuel: 475 lb

Empty Weight: 7363 lb
MTOW: 9458 lb

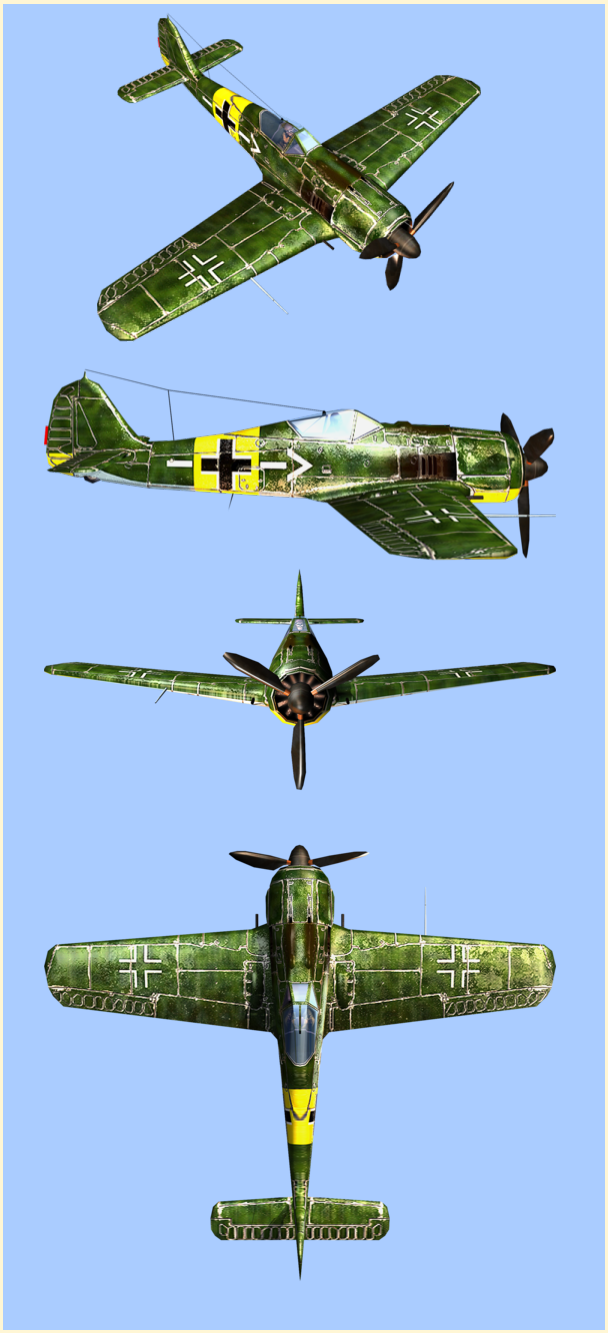






Focke-Wulf FW-190A-4/U3 Würger

Durability	☆☆☆	Speed	☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆☆
Maneuverability	☆☆☆☆	Firepower	☆☆☆☆	Ground Attack	☆☆☆



Ordnance Versatility - With only wing racks, the A-4 pilot has to choose between drop tanks and bombs and cannot opt for a lighter loadout like the later A-8 and F-8 models could.

The Luftwaffe had barely begun receiving their new Bf-109Bs when discussions about a possible successor started appearing. Many in the Luftwaffe hierarchy felt such a project would be a waste of time because of the vast superiority of the 109 over the fighters of other nations. But updated intelligence about the various British and French fighter projects, including the Hurricane, combined with the teething problems of the new 109s to convince everyone that it would be wise to design a backup.

As with other designers, Kurt Tank preferred the streamlined shape afforded by using a high-performance in-line engine, but both the Daimler-Benz 601 and the Junkers Jumo 211 were already in short supply. So he turned to the unpopular radial engine design. The 18-cylinder BMW-139 then under development was already putting out more power than either the DB-601 or Jumo-211 were projected to create in two years time and the engine showed great development potential. Further there were no immediate needs for the engine, so production wouldn't impact any other projects.

Tank's design was a small, compact plane built to minimal dimensions around the engine. It utilized a special, ducted spinner that was designed to provide increased airflow to the engine and reduce drag. In order to reduce overall length, the engine was mounted as close to the main spar as possible, with the cockpit immediately behind the forward bulkhead.

Because of this proximity to the engine and because the canopy had to be kept closed during ground tests and during flight, the temperature in the cockpit rose as high as 131 degrees and exhaust leakage forced the use of oxygen during all testing. Meanwhile, BMW was having problems with getting the promised power out of the 139 and had turned their attention to their new 801 design.

After a series of discussions between the military and the two manufacturers it was decided to convert the 190 design to accept the new engine. Despite the similar dimensions of the two engines the 801 was 350 lb. heavier and thus an extensive redesign of the plane was required. The most visible change was that the cockpit was moved aft to compensate for the cg changes brought about by the heavier engine. This had the ancillary effect of eliminating the cockpit overheating problem and providing sufficient room between the engine and cockpit to allow for the installation of guns in the cowl.

Meanwhile, the V-1 and V-2 prototypes using the 139 engine had rolled off the assembly line, the latter being armed with a pair of 7.92mm machine guns in the wing roots. The plane proved to be capable of 369 mph in level flight and earned praise from the test pilots for its excellent handling characteristics. The V-2 prototype also had the special ducted fan installed, but the engine still overheated and tests proved that it had only a marginal effect on drag, so it was abandoned. The V-3 and V-4 prototypes were likewise abandoned due to the engine change.

The V-5 prototype with the new BMW-801C engine arrived at RLM for testing in April 1940 and without armament it was 25% heavier than the V-2 had been. Although the engine put out an impressive 1,600 hp, the wing loading had risen from 38 to 47 lb./sq.in., with a commensurate rise in weight per horsepower. The climb rate and maneuverability were thus severely impaired over what had once been a promising design.

But Tank had foreseen this and a new wing of increased area was already in the works. When a taxiing accident damaged the V-5's wing, the opportunity was taken to replace it with the new wing. FW-190A-0s were already in production and the new wing was applied starting with the 8th aircraft produced. Taken into combat trials testing by members of II/JG 26, the A-0 and A-1 models were armed with a pair of 7.92mm machine guns in the cowl and another pair in the wing roots. This was augmented in the field by installing a 20mm MG-FF cannon in each wing outboard of the landing gear.

The A-2 was equipped with the much more reliable BMW-801C-2 engine and was the first to be equipped with the MG-151/20 cannons with 200 rpg in the wing roots. The two machine guns with 1000 rpg were retained in the fuselage. The ammo canisters for the cannons were also located in the fuselage. Most A-2s were retrofitted with outboard MG-FF to increase firepower. The A-2 proved to be immediately superior to the Spitfire Vs it was facing and JG 26 was completely converted to the 190 by early 1942.

The BMW-801D-2 was almost identical to the C-2, but its compression ratio had been raised from 6.5 to 7.1:1 and the two supercharger ratios were also modified. The result was an increase to 1,700 hp at sea level and an increase in top speed to 418 mph at 21,000 feet. The A-3, equipped with the 801D-2 took over the production line and was the first to be fitted with Umrnst BausStze factory conversion kits. These allowed various configurations to be easily fitted at the factory, producing the first bomb carrying 190s.

With the addition of the MW50 methanol-water injection system as standard equipment, the A-4 began to roll off the assembly line. The MW50 system provided greater power below the rated altitude by acting as an anti-detonant, which allowed greater boost pressure to be used without destroying the engine. As with the A-3, the A-4 had several Umrnst BausStze kits, including the U3 Jabo kit, which included the bomb/drop tank racks under the wings and additional pilot and engine armor. Although shipped with the outboard MG-FF from the factory, these were almost always removed in the field to improve performance. This version eventually led to the development of the FW-190F-1, the first of the dedicated ground attack variants.

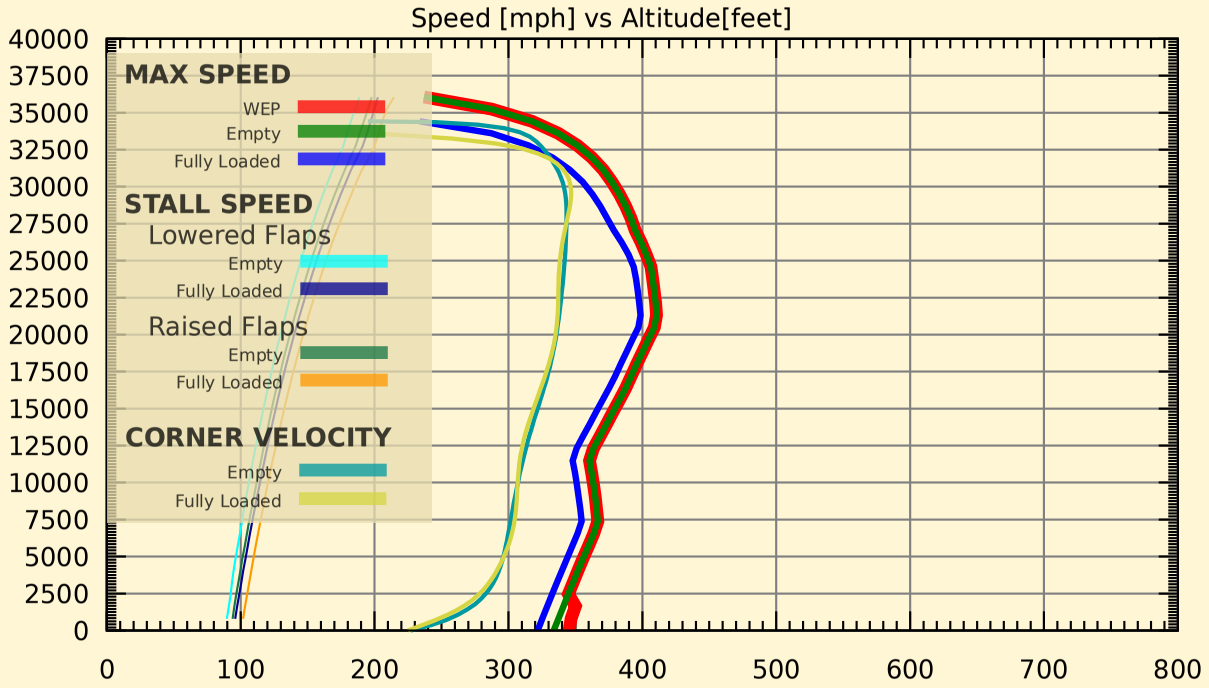
Sources:

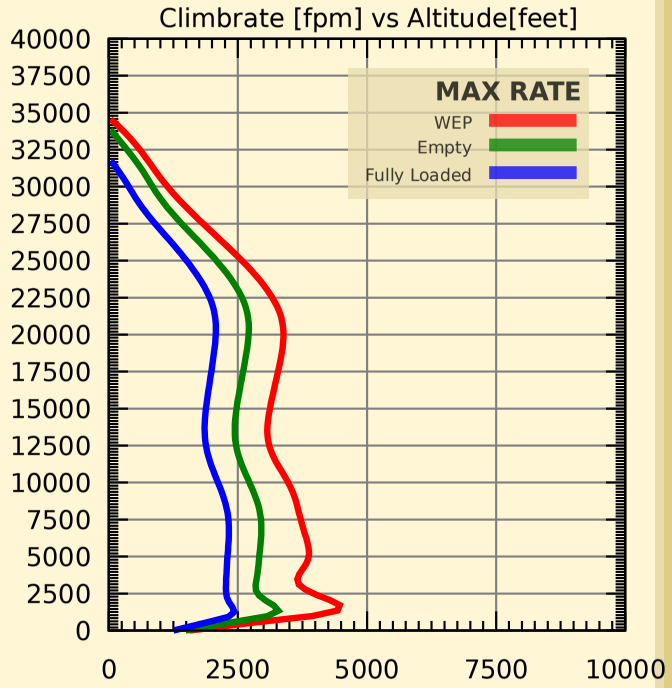
Name: Focke-Wulf FW-190A-4/U3 Würger
Role: Fighter
Crew: 1
Service Date: July 1942
Primary Guns: 2x MG17 7.9mm machine guns with 1000 rpg in cowl
Secondary Guns: 2x MG151/20 20mm cannon with 250 rpg in wing roots
Defensive Guns: NA
Ordnance: 4x 121 lb or 2x 551 lb or 2x 475 lb drop tank

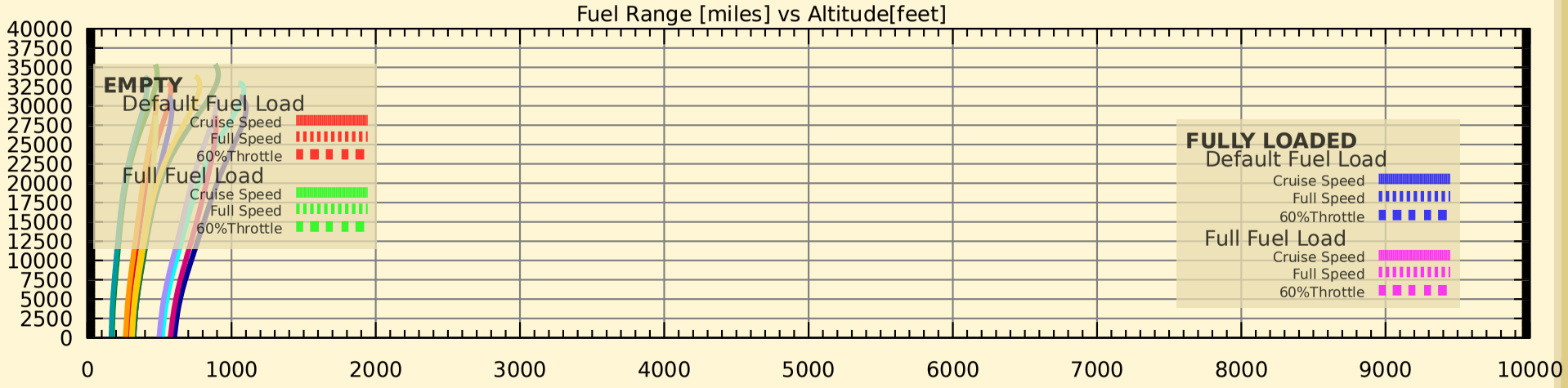
Length: 29.04 ft
Wing Span: 34.45 ft
Wing Area: 197 sq. ft

Power Plant: One BMW-801D-2
Power: 3683 lb s.t.
Internal Fuel: 828 lb
External Fuel: 950 lb

Empty Weight: 6173 lb
MTOW: 8377 lb

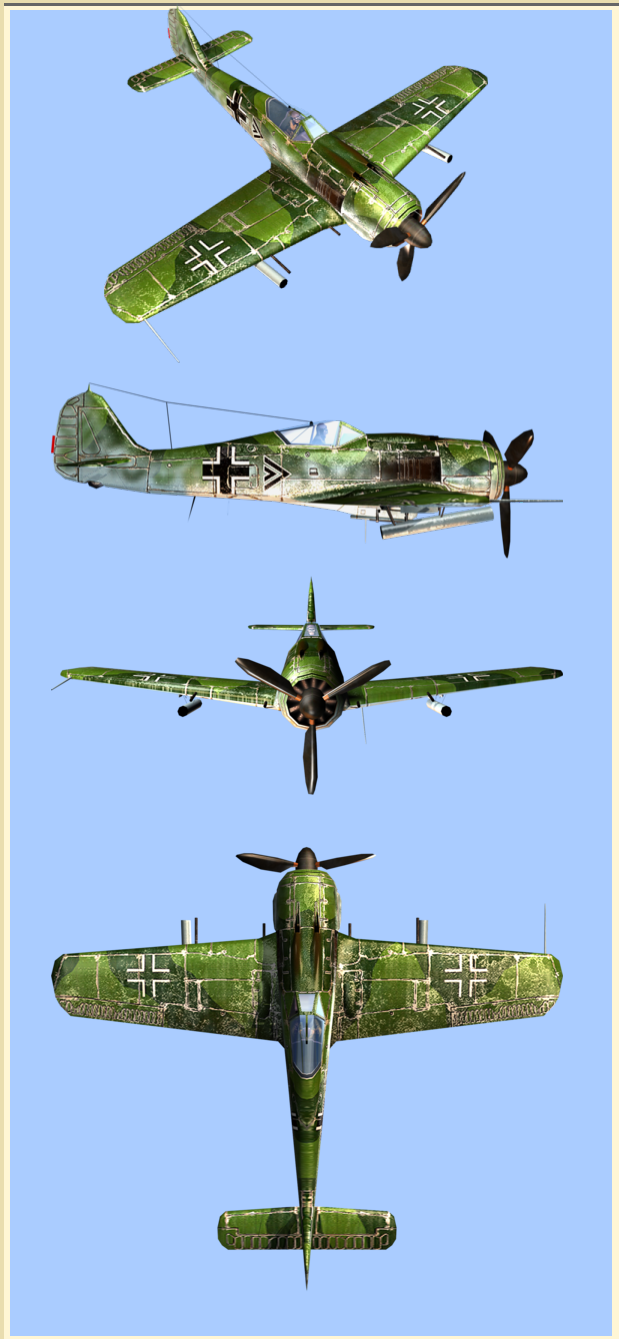






Focke-Wulf FW-190A-8/R6
Würger

Durability	☆☆☆☆☆	Speed	☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆
Maneuverability	☆☆☆	Firepower	☆☆☆☆☆☆	Ground Attack	☆☆☆



High Altitude Performance - Above 20,000 feet the A-8 is outclassed by contemporary planes like the Spitfire and Mustang.

The 190 was the dominant plane in the skies of Europe in 1942, but further refinements were in order. With each increase in weight, the center of gravity of the plane had shifted and now it became apparent that it was too far aft. To alleviate this problem, the engine mount was extended forward about six inches in the A-5 model. Several A-5s were shipped to Japan in 1943 for evaluations and although the Japanese didn't adopt it into service, the Allies spotted it and gave it the code-name "Fred".

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The A-7 was originally intended to be a high-speed photo reconnaissance version, but the needs of combat units changed those plans. Nothing more than an interim version, only 80 A-7s were produced, but it was the first version to replace the 7.92mm machine guns in the cowl with 13mm MG-131s with 400 rpg.

The A-8 was soon introduced with a host of minor refinements and changes, including the addition of removable fuel cells behind the pilot's seat as an alternative to the MW50 methanol injection system. By this time, the system of Umrust Bausaze factory conversion kits had been completely replaced by the Rustatz field conversion kits.

The /R6 kit allowed for the optional mounting of a pair of Wfr.Gr.21 rocket tubes under the wing. While not accurate enough for anti-tank work, the 21cm rocket projectile was fired into the middle of the tight American bomber formations. A direct hit would down a plane while a close hit would cause about the same damage as a close flak burst. But the biggest result was the break-up of the tight formation, degrading its defensive firepower and allowing the fighters to more easily get within gun range.

Sources:

Filley, Brian; FW 190A, F, and G In Action; Squadron/Signal Publications, Carrollton, TX; 1999.

Green, William; Warplanes of the Third Reich; Doubleday and Company, Garden City, NY; 1970.

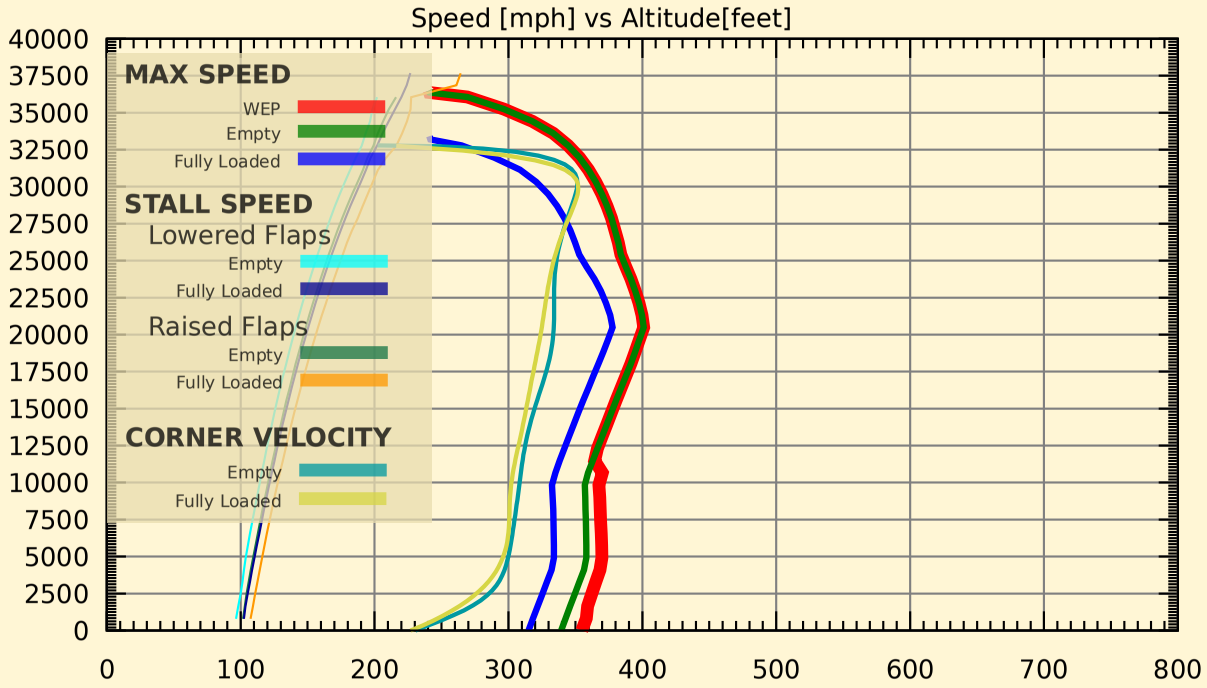
Name: Focke-Wulf FW-190A-8/R6 Würger
Role: Fighter
Crew: 1
Service Date: February 1944

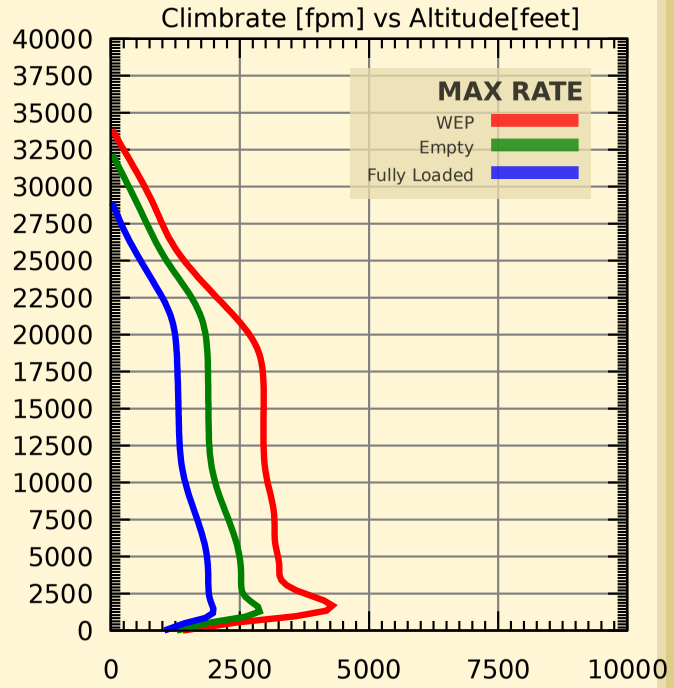
Length: 29.04 ft
Wing Span: 34.45 ft
Wing Area: 197 sq. ft

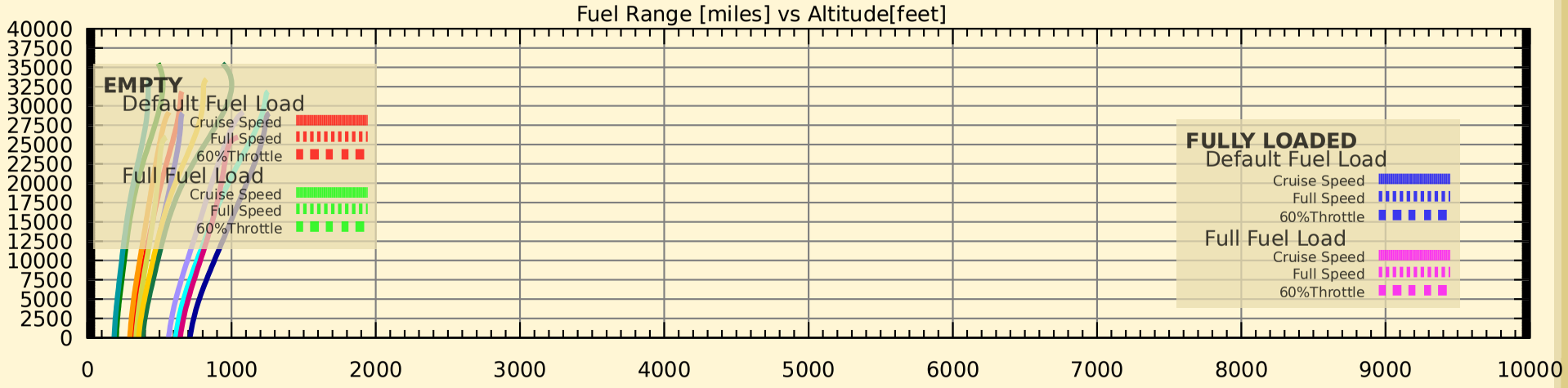
Power Plant: One BMW-801D-2
Power: 3749 lb s.t.
Internal Fuel: 1010 lb
External Fuel: 475 lb or 950 lb or 1425 lb

Empty Weight: 7033 lb
MTOW: 10009 lb

Primary Guns: 2x MG131 13 mm machine guns with 400 rpg in cowl
Secondary Guns: 2x MG151/20 20mm cannon with 250 rpg in wing roots and 2x MG151/20 20mm cannon with 125 rpg in wings
Defensive Guns: NA
Ordnance: 4x 121 lb or One 551 lb or One 1103 lb bomb or One 475 lb drop tank under fuselage, plus 4x 121 lb or 2x 475 lb drop tanks or 2x 245 lb WGr.21 rockets under wings

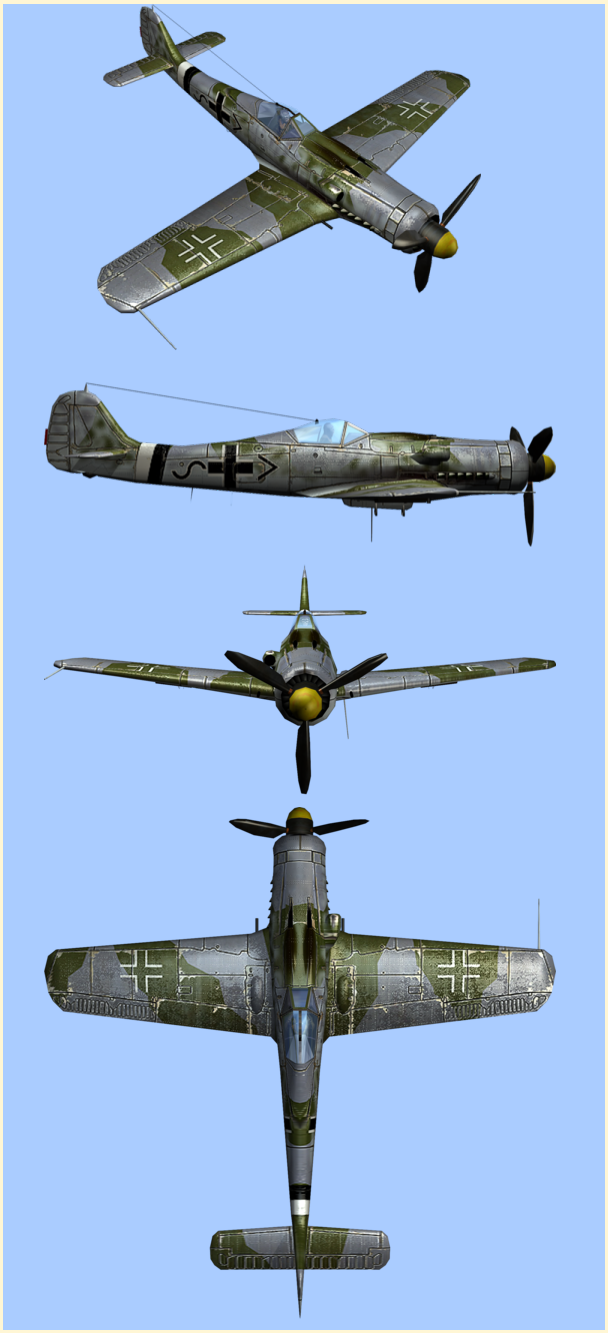






Focke-Wulf FW-190D-9
Dora

Durability	☆☆☆☆☆	Speed	☆☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆☆☆
Maneuverability	☆☆☆☆	Firepower	☆☆☆☆	Ground Attack	☆☆☆☆



Turn Rate - With its high wing-loading the Dora can't turn with planes like Spitfire or La-7.

A-series production was in full swing in 1942 when it was decided to find a solution to the Wnrger's poor high-altitude performance. The GM-1 nitrous system was able to boost performance up to about 26,000 feet, but there wasn't enough nitrous to use it for more than a short time and the weight of the system was equal to the entire armament package!

Kurt Tank had always viewed GM-1 as a temporary measure and decided to re-engine the 190. He initially wanted to use the new Daimler-Benz DB-603 in-line engine, but it had been developed without official sanction and the RLM made it clear that they would view such a project with extreme disfavor.

Despite this unpleasant fact, the regard for Tank was so high that they allowed him to experiment with the engine, with the understanding that it would be thought of as a back-up measure only. Two other engine proposals were also considered, one using a turbo-supercharged BMW-801 and the other using the new Jumo-213 in-line.

The B-series designation was used for the turbo-supercharged BMW-801 installation. In addition to the turbo-supercharger, the B-series was intended to use a pressurized cabin and a new wing with 11% greater area. Unfortunately, BMW was nowhere close to releasing a turbo-supercharger, so this model was re-fitted with the DB-603A with an annular radiator. Although it was able to reach 39,000 feet, the requirement had been increased to 46,000 feet.

The C-series designation was reserved for the DB-603Aa installation with a large ventral turbo-supercharger. Despite the additional drag of the supercharger intake the prototype clocked in at 447 mph at 29,530 feet and 404 mph at 39,370 feet! The Focke-Wulf team felt this engine offered the best high-altitude performance, but engine availability was the primary operating factor and the C-series was abandoned.

The D-series was originally intended as a medium-altitude variation of the basic A-series 190 and was to use the new Jumo-213 in-line engine. Many pilots considered this engine to be nothing more than a bomber engine forced on the manufacturer by the RLM and Tank considered the Dora to be an "emergency solution" until his new Ta-152 could be delivered. However, the D-9 outperformed the A-8 at all altitudes and pilot misgivings were swept away.

The D-9's armament consisted of a pair of 13mm MG-131s mounted in the cowl with 475 rpg and a pair of MG-151 20mm cannon with 250 rpg in the wing roots. The outboard cannon of the A-series was deleted to save weight and improve roll performance. With an ETC-504 rack under the fuselage and a pair of ETC-503s under the wing, the D-9 could carry a single bomb as large as 1,100 lb. or up to three 550 lb. bombs.

Sources:

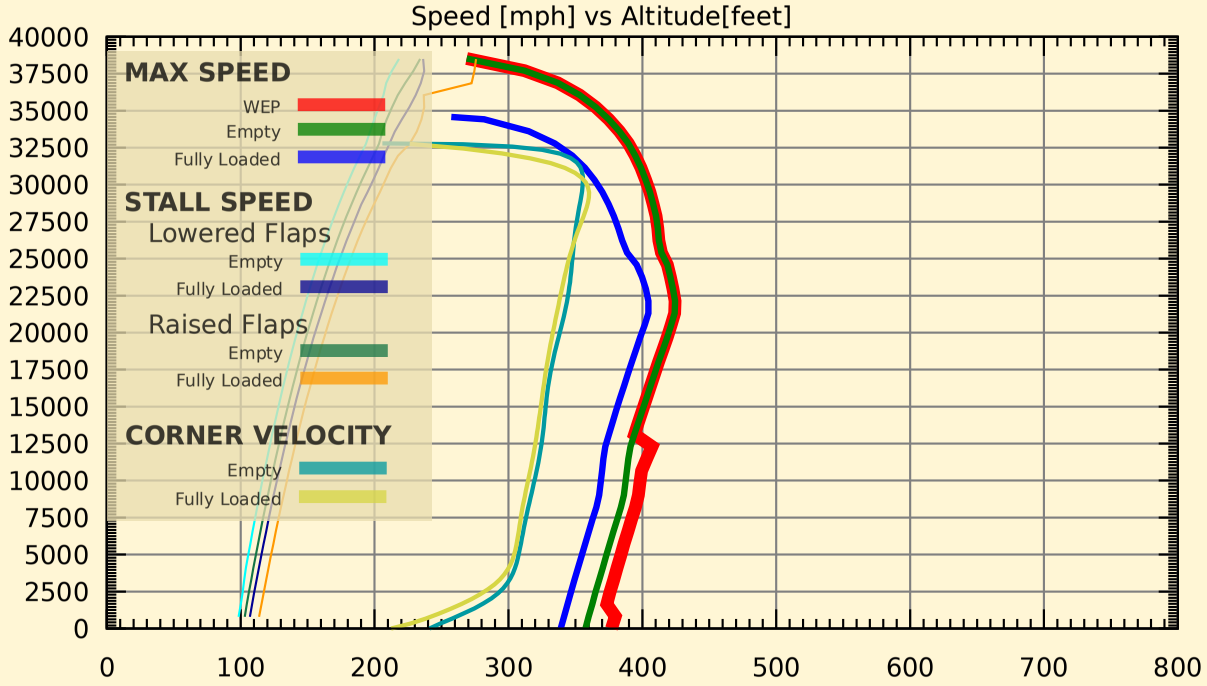
Green, William; Warplanes of the Third Reich; Doubleday and Company, Garden City, NY; 1970.

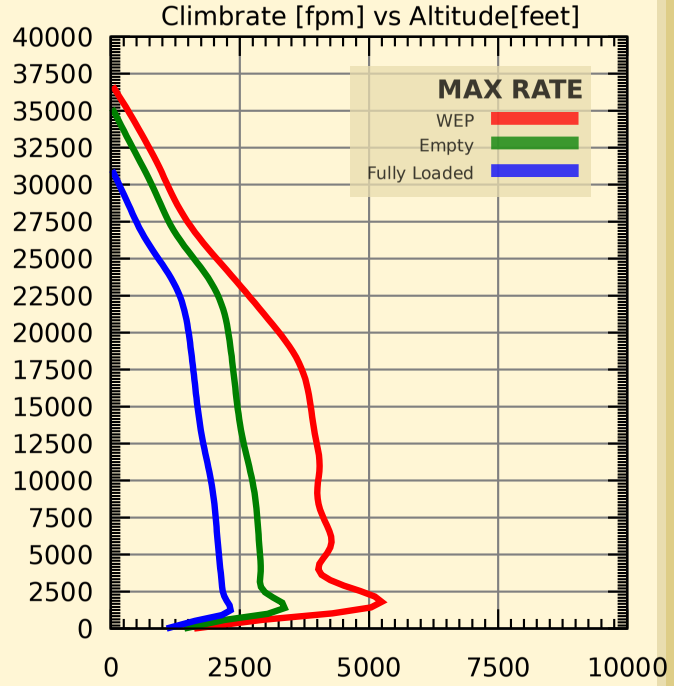
Name: Focke-Wulf FW-190D-9 Dora
Role: Fighter
Crew: 1
Service Date: August 1944
Primary Guns: 2x MG131 13mm machine guns with 475 rpg in cowl
Secondary Guns: 2x MG151/20 20mm cannon with 250 rpg in wing roots
Defensive Guns: NA
Ordnance: One 551 lb or One 1103 lb bomb or One 475 lb drop tank under fuselage, plus 2x 551 lb bombs or 2x 475 lb drop tanks under wings

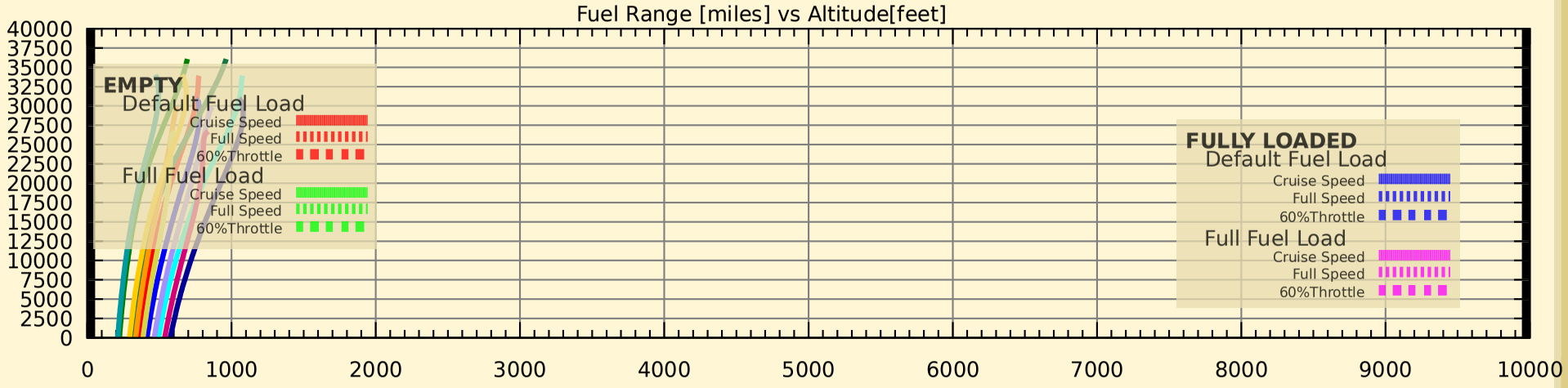
Length: 33.53 ft
Wing Span: 34.45 ft
Wing Area: 196 sq. ft

Power Plant: One Jumo 213A-1
Power: 3584 lb s.t.
Internal Fuel: 828 lb
External Fuel: 475 lb or 950 lb or 1425 lb

Empty Weight: 7385 lb
MTOW: 10582 lb







Focke-Wulf FW-190F-8
Würger

Durability	☆☆☆☆☆	Speed	☆☆☆☆☆☆	Climb Rate	☆☆☆
Maneuverability	☆☆	Firepower	☆☆☆☆	Ground Attack	☆☆☆

Handling - When fully loaded the F-8 is very sluggish and handles poorly.

With the FW-190A having proven itself a potent ground-attack plane, the Luftwaffe decided to develop a dedicated series of ground-attack versions of the plane at the factory. These "F" versions were to incorporate as standard equipment several of the Rustatz field modifications that were available for the "A" series as well as several specific modifications intended to make the plane more survivable during low level attacks.

Chief among these was the addition of a considerable quantity of 5mm, 6mm, and 8mm armor plate to the underside of the fuselage to protect the engine, cockpit, and fuel tanks from small caliber gunfire. To help counterbalance the additional weight from the armor, the outboard 20mm cannon were eliminated and streamlined covers replaced the previous breech bulges and case ejection holes. Still the "F" was noticeably heavier than the "A" model, the F-8 weighing in at 11,905 lb. loaded, and so the undercarriage was strengthened to handle the heavier loads.

The ETC-501 fuselage rack, which allowed carriage of up to 1,100 lb. of bombs or fuel, was standard on the F-8. Wing bomb racks were installed as standard equipment, allowing four 110 lb. bombs to be carried. Alternatively, the wing bomb racks could be replaced by a pair of rocket racks, which allowed the F-8 to carry twelve Panzerblitz 2 anti-tank rockets. Because of the tremendous empty weight of the F-8, the total ordnance load was limited to 1,100 lb.

Sources:

Filley, Brian; FW-190A, F, and G In Action; Squadron/Signal Publications, Carrollton, TX; 1999.

Green, William; Warplanes Of The Third Reich; Doubleday and Company, MacDonald Publishing, London; 1960.

Green, William; War Planes Of The Second World War: Fighters Volume One; Doubleday and Company, Garden City, NY; 1970.

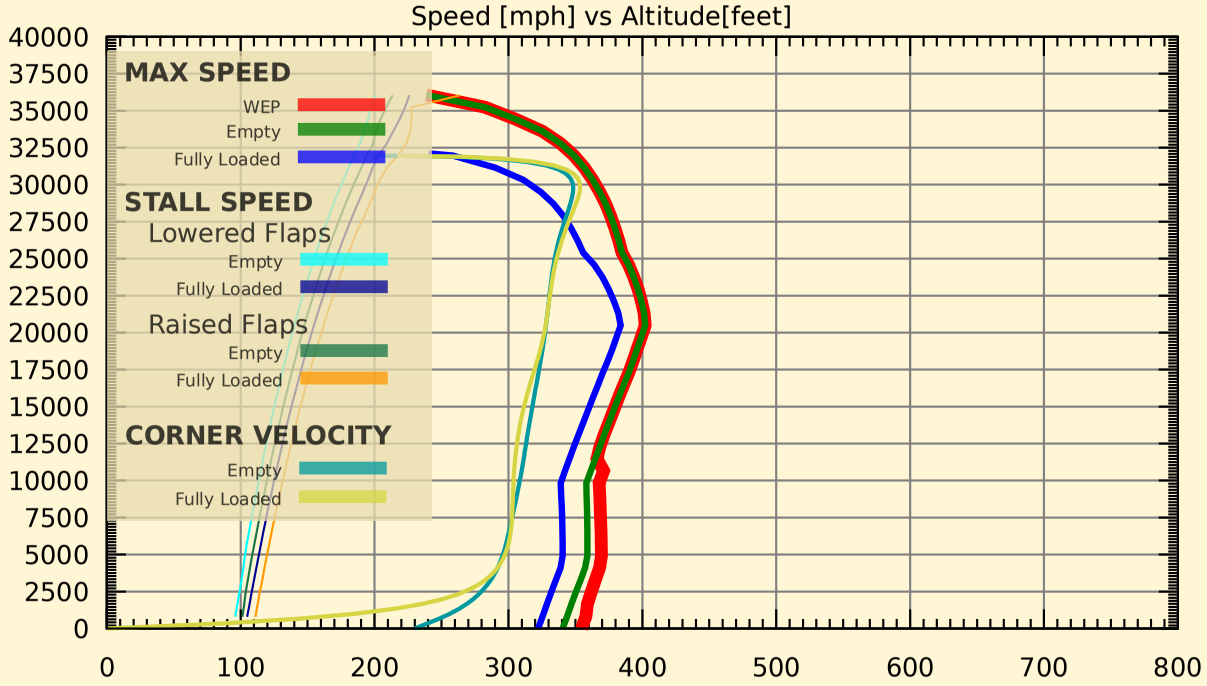
Laing, Malcolm and Ryle, E. Brown; Walk Around FW-190A/F; Squadron/Signal Publications, Carrollton, TX; 2000.

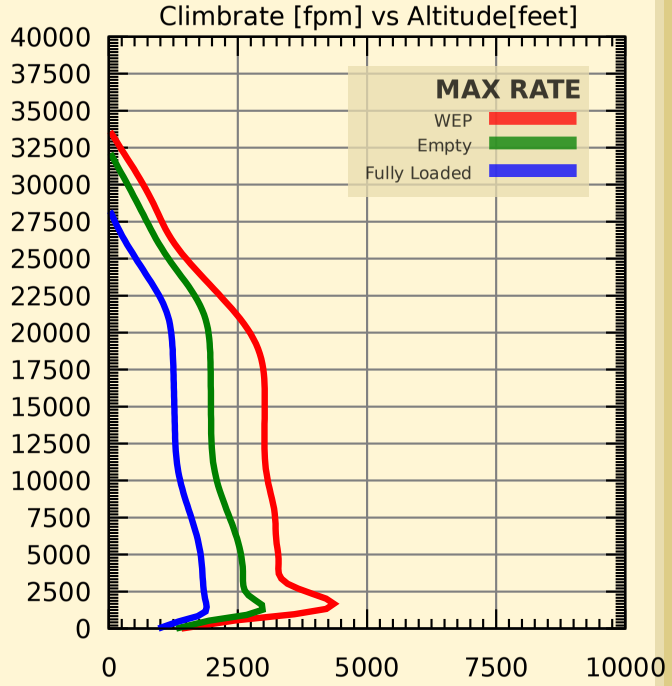
Name: Focke-Wulf FW-190F-8 Würger
Role: Fighter
Crew: 1
Service Date: February 1944
Primary Guns: 2x MG131 13mm machine guns with 400 rpg in cowl
Secondary Guns: 2x MG151/20 20mm cannon with 250 rpg in wing roots
Defensive Guns: NA
Ordnance: 4x 110 lb or One 551 lb or One 1103 lb or One 2205 lb bomb or One 475 lb drop tank under fuselage, plus 4x 110 lb or 12x Panzerblitz 2 anti-tank rockets under wings. Maximum load of 2205 lb possible.

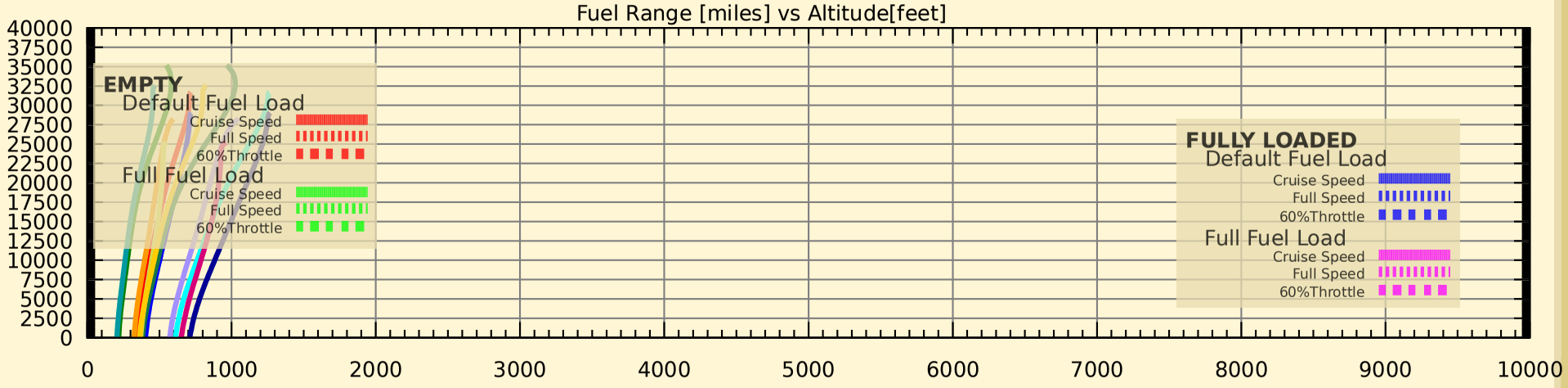
Length: 29.04 ft
Wing Span: 34.45 ft
Wing Area: 197 sq. ft

Power Plant: One BMW-801D-2
Power: 3749 lb s.t.
Internal Fuel: 1010 lb
External Fuel: 475 lb

Empty Weight: 7055 lb
MTOW: 10251 lb

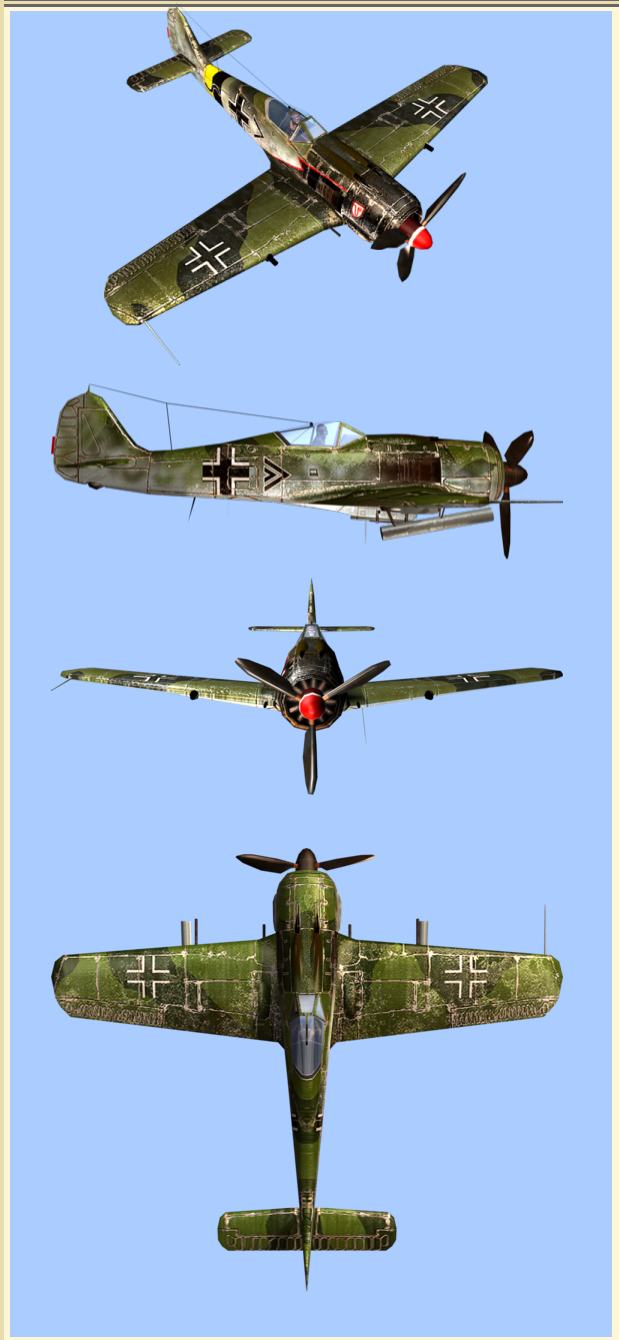






Focke-Wulf FW-190A-8/R2
Würger

Durability	☆☆☆☆☆	Speed	☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆
Maneuverability	☆☆☆	Firepower	☆☆☆☆☆☆☆	Ground Attack	☆☆☆



Weaknesses:

Turn Rate - With its high wing-loading the Wurger can't turn with planes like Spitfire or La-7.

The 190 was the dominant plane in the skies of Europe in 1942, but further refinements were in order. With each increase in weight, the center of gravity of the plane had shifted and now it became apparent that it was too far aft. To alleviate this problem, the engine mount was extended forward about six inches in the A-5 model. Several A-5s were shipped to Japan in 1943 for evaluations and although the Japanese didn't adopt it into service, the Allies spotted it and gave it the code-name "Fred".

By now the 190 was weighing in at over 9,000 lb. and in an effort to reduce weight somewhat, Kurt Tank redesigned the wing. This new wing was mounted to an A-5 test bed, then was introduced into service with the A-6 in late 1943. While the new wing's appearance was virtually identical to the previous one, it was able to mount MG-151/20 cannon in the outboard positions previously occupied by the MG-FF. Fed by 125 round belts, these new guns greatly increased the firepower available to the pilot.

The A-7 was originally intended to be a high-speed photo reconnaissance version, but the needs of combat units changed those plans. Nothing more than an interim version, only 80 A-7s were produced, but it was the first version to replace the 7.92mm machine guns in the cowl with 13mm MG-131s with 400 rpg.

The A-8 was soon introduced with a host of minor refinements and changes, including the addition of removable fuel cells behind the pilot's seat as an alternative to the MW50 methanol injection system. By this time, the system of Umrust Bausaze factory conversion kits had been completely replaced by the Rustatz field conversion kits.

The /R2 kit replaced the outboard MG-151s with 30mm Mk 108 cannons with 55 rpg in the wings. While it retained the hitting power of the /R6, the Mk 108's low muzzle velocity limited the effective range and the "mine" type HE rounds it used were unsuited for anti-armor work.

Sources:

Filley, Brian; FW 190A, F, and G In Action; Squadron/Signal Publications, Carrollton, TX; 1999.

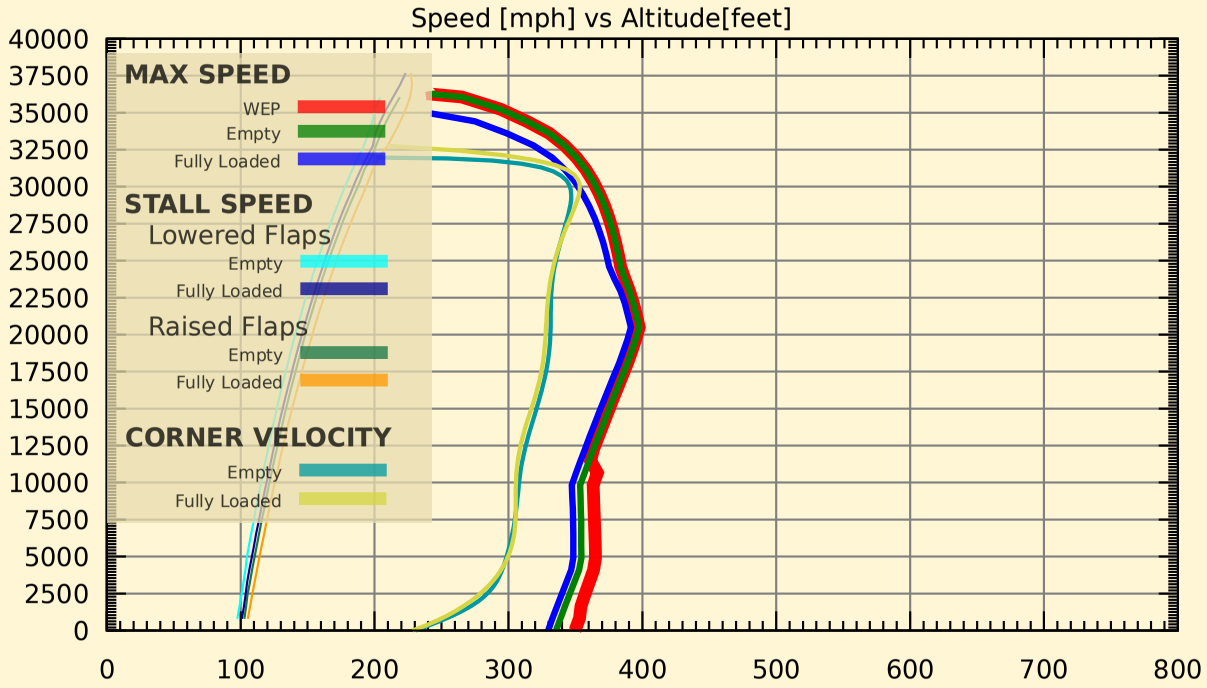
Green, William; Warplanes of the Third Reich; Doubleday and Company, Garden City, NY; 1970.

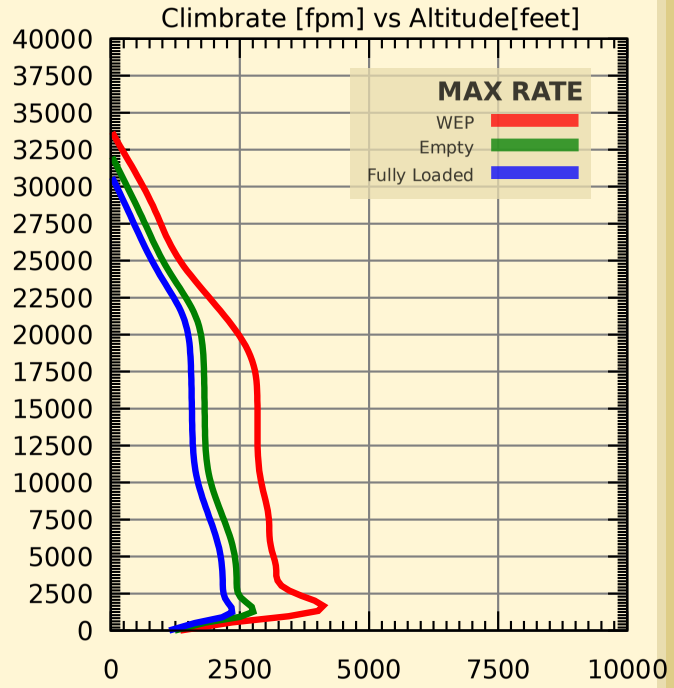
Name: Focke-Wulf FW-190A-8/R2 Würger
Role: Fighter
Crew: 1
Service Date: March 1944
Primary Guns: 2x MG131 13 mm machine guns with 400 rpg in cowl and 2x MG151/20 20mm cannon with 250 rpg in wing roots
Secondary Guns: 2x Mk108 30mm cannon with 55 rpg in outer wings
Defensive Guns: NA
Ordnance: 4x 121 lb or One 551 lb bomb or One 475 lb drop tank

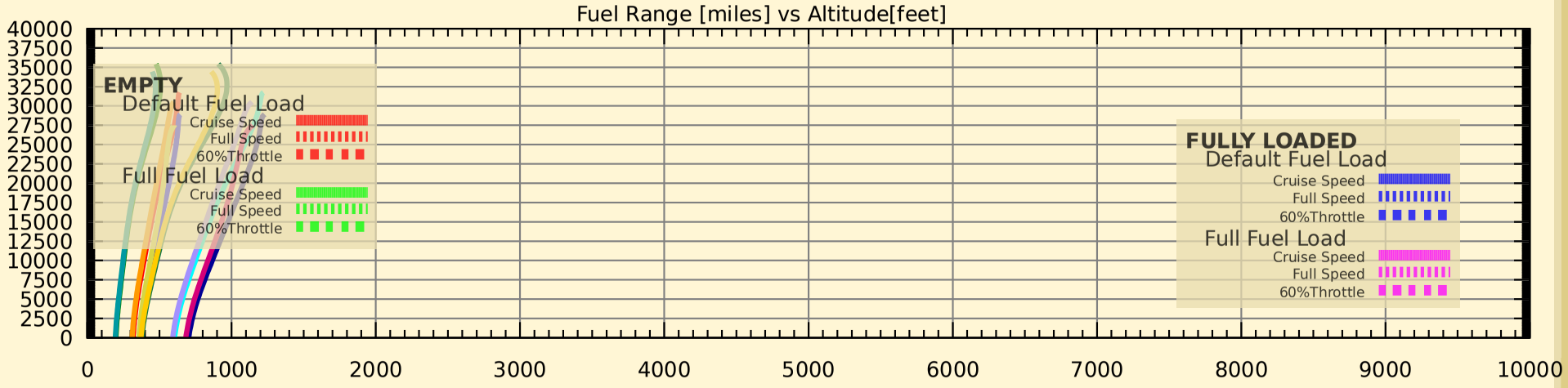
Length: 29.04 ft
Wing Span: 34.45 ft
Wing Area: 197 sq. ft

Power Plant: One BMW-801D-2
Power: 3749 lb s.t.
Internal Fuel: 1010 lb
External Fuel: 475 lb

Empty Weight: 7143 lb
MTOW: 9348 lb

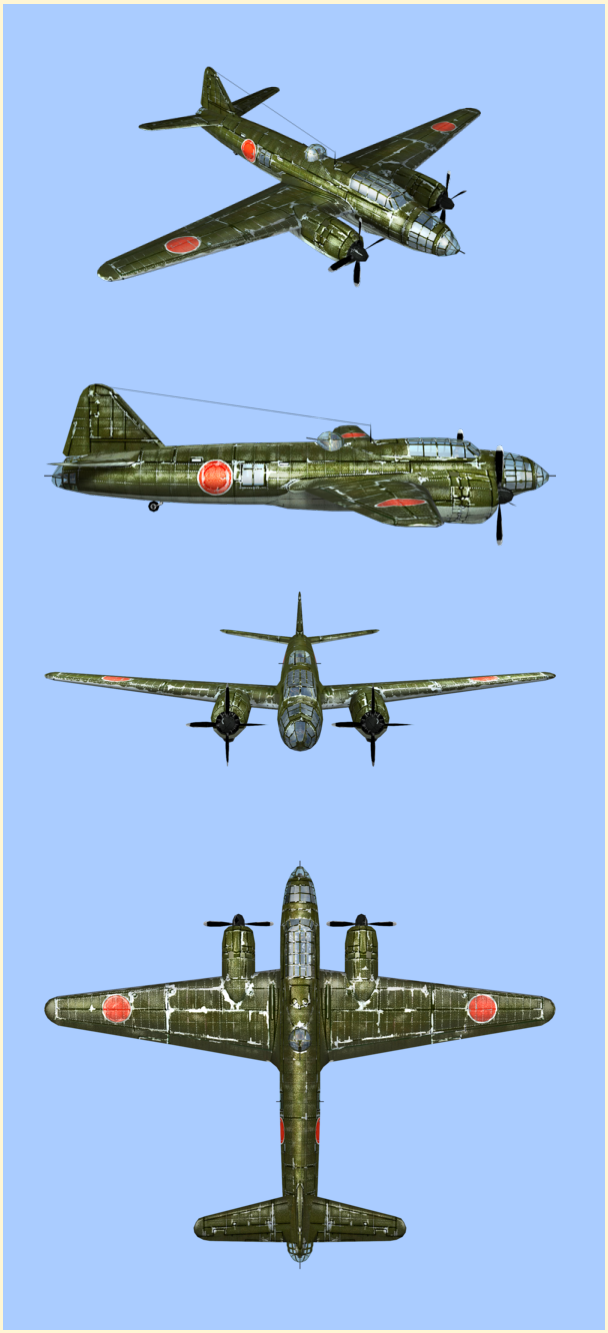






Mitsubishi G4M2
Betty

Durability	☆☆☆☆☆	**Speed**	☆☆☆☆	**Climb Rate**	☆☆
Maneuverability	☆☆☆☆☆☆	**Firepower**	☆	**Ground Attack**	☆☆☆☆☆



Speed - Its top speed of only 272 mph at altitude means that the Betty won't be making fast hit and run attacks.

By 1937 Japan was already deeply entrenched in the "China Incident" and there was a real possibility of eventual conflict with the United States. However, if they were seen to be openly preparing for a war against the West, the US would cut off all shipments of the vital raw materials and specialized equipment they needed to affect the build-up. To solve this dilemma, the decision was made to continue with the build-up, but under a cloak of extreme secrecy. To this end, an expansion program was launched at Mitsubishi with a series of Army and Navy planes being developed entirely in secret.

Along with the specification for the A6M Zero, the Navy issued a demand for a long-range strategic bomber capable of carrying a standard Bomb Load of 800 kg. to a distance of over 2,300 miles. Utilizing one of their most talented design crews headed by Kiro Honjo, Mitsubishi originally proposed a four-engine design, but the Navy frowned on the idea and suggested they accomplish the task with a twin-engine plane.

Design of the fuselage section was given to the 1st Naval Arsenal, which turned out a fuselage large enough for a four-engine plane, which visiting Heinkel engineers commented upon in 1939. Meanwhile, Mitsubishi designed a two-spar wing utilizing the same patented "Mitsubishi 118" airfoil section that they used on the Rei-sen. To get the necessary power the team chose the new 1,530 hp Mitsubishi Kasei 14-cylinder radial engine.

The first prototype G4M was completed in September 1939 with flight tests the following month revealing only a few minor problems that needed to be corrected before the plane entered quantity production. However, events in China were to delay production of the bomber for a year.

The G3M2 bombers then in service in China were having a tough time defending themselves against the ever larger and improving Chinese Air Force. A few outspoken officers thought that the best solution was to design a "fighter-gunship" that could fly in the same formation and thus escort the bombers to and from their targets. Over their strenuous objections, the G4M1 was converted into a "long range convoy fighter" and given the designation G6M1. However, as the USAAF would learn three years later over the skies of Europe, the "convoy fighter" was heavy, difficult to fly, and was left behind when the bombers dropped their bombs and headed for home. After building thirty examples of the G6M the folly of the idea was realized and the planes were relegated to training and paratroop transport duties.

Production of the G4M1 Navy Type 1 Attack Bomber Model 11 was finally authorized in April 1941 and the first production plane was completed before the month was over. Six weeks later the 1st Kokutai completed conversion and launched the G4M's combat career with an attack on Chunking, which also marked the combat debut of the A6M2. Operating against deep range targets throughout the summer, both planes enjoyed considerable success.

Prior to commencing hostilities against the West, twenty-seven G4M1s were transferred to Indo-China with another ninety-three being sent to Formosa. After only a week of combat the "Betty", as it was known to the Allies, had sunk the HMS Prince of Wales and HMS Repulse and had completely eliminated Allied air-power in the Philippines. But at Port Moresby the G4M1 came up against better prepared air defenses and losses mounted sharply due almost entirely to the lack of crew and fuel protection.

To address these deficiencies design on the Model 22 was undertaken. The wing was completely redesigned to use a new, laminar-flow airfoil section and the engines were replaced with the improved 1,800 hp Kasei 21, which featured water-methanol injection. A new 350-gallon fuel tank was installed in the fuselage, which was protected from leakage by layers of runner sheeting. Rubber sheeting was installed on the underside of the wing tanks and a carbon-dioxide fire extinguishing system was installed. Defensive armament was greatly improved by the addition of a hydraulically-operated dorsal turret mounting a 20mm Type 99-1 cannon.

By late 1943 the G4M2 had completely replaced the G4M1 in front-line service, the older plane being relegated to reconnaissance, transport and training duties. Meanwhile, various improvements to the defensive armament were made in the Model 22A and 22B, the latter possessing four 20mm Type 99-2 cannon distributed in the dorsal turret, tail cone and both beam positions.

In May 1944 the Model 24 was introduced using the 1,850 hp Kasei 25 engine, which not only had more power but also much better fuel consumption than the Kasei 21. The Models 24A and 24B had armament identical to the Models 22A and 22B, while the Model 24C replaced the 7.7mm machine gun in the nose with a 13mm Ho-103 machine gun.

Numerically the Models 24B and 24C were the most important of the G4M2 and by the end of the war 2,479 G4Ms had been built. The Betty's last mission ended at 12:44 pm on August 19, 1945. Painted white all over and wearing large green "surrender crosses" on their wings, fuselages and tails, a pair of G4M1s delivered Lt. Gen. Torashiro Kawabe and the rest of the surrender delegation to Ie Shima.

Sources:

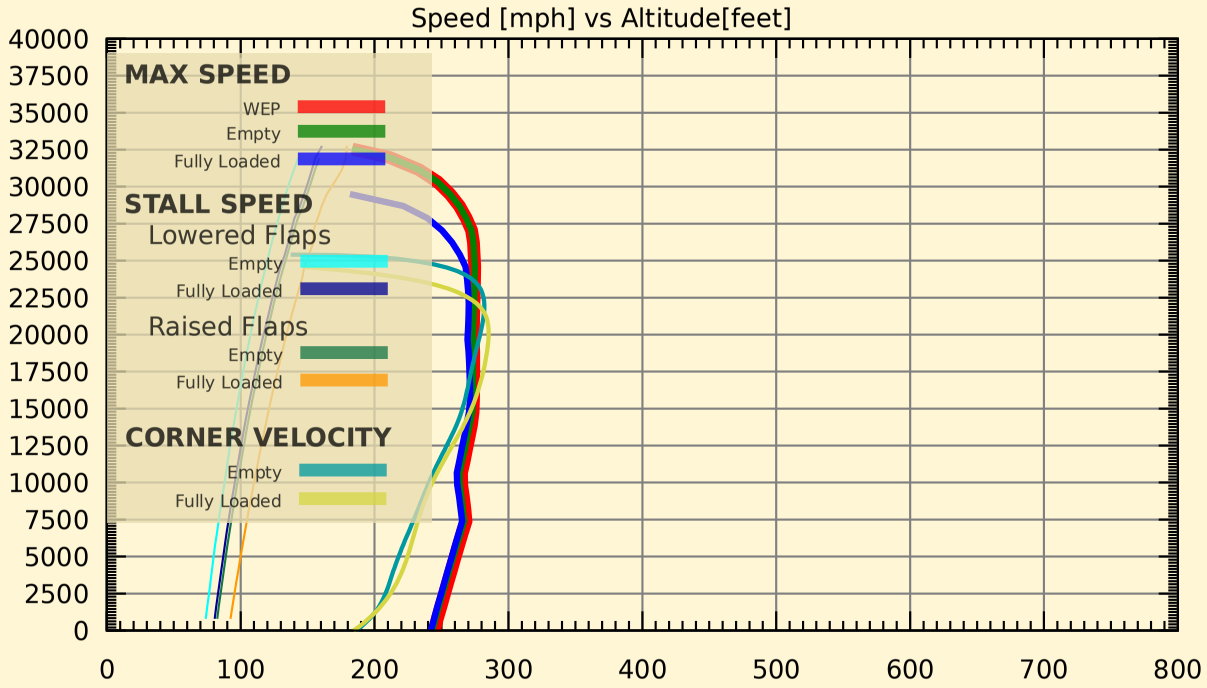
Francillon, Rene J.; Japanese Aircraft of the Pacific War; Naval Institute Press, Annapolis, MD; 1979.

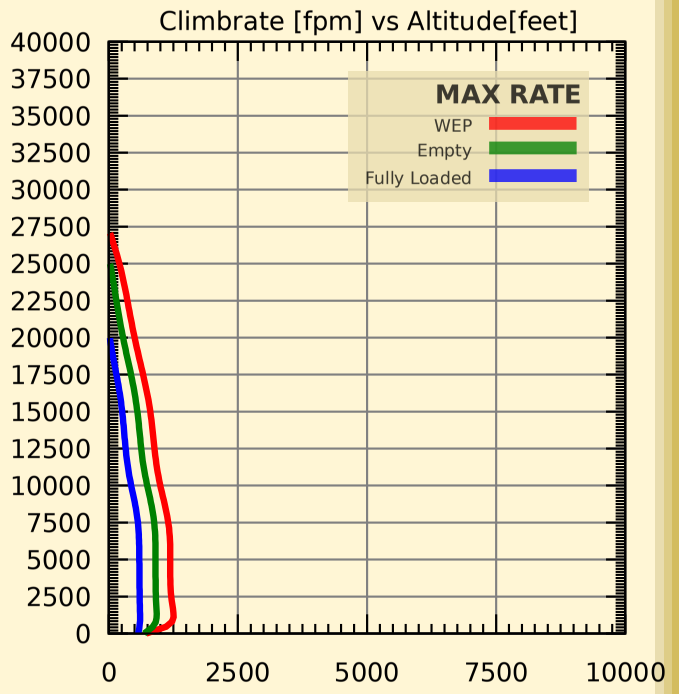
Name: Mitsubishi G4M2 Betty
Role: Medium Bomber
Crew: 7
Service Date: September 1943
Primary Guns: Primary Guns: One Type 92 7.7mm flex machine gun with 1000 rpg
Secondary Guns: NA
Defensive Guns: NA
Ordnance: One 1842 lb torpedo or 3x 1764 lb or 4x 1103 lb or 8x 551 lb or 18x 220 lb or 24x 110 lb bombs

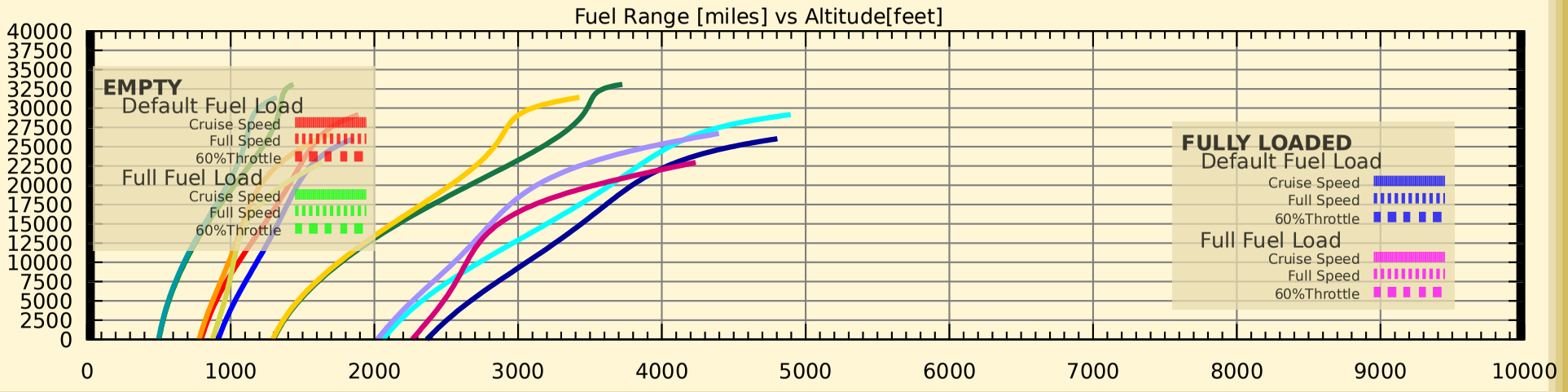
Length: 64.63 ft
Wing Span: 81.69 ft
Wing Area: 841 sq. ft

Power Plant: 2 X Mitsubishi MK4P Kasei-25
Power: 3793 lb s.t.
Internal Fuel: 10282 lb
External Fuel: NA

Empty Weight: 18122 lb
MTOW: 33510 lb

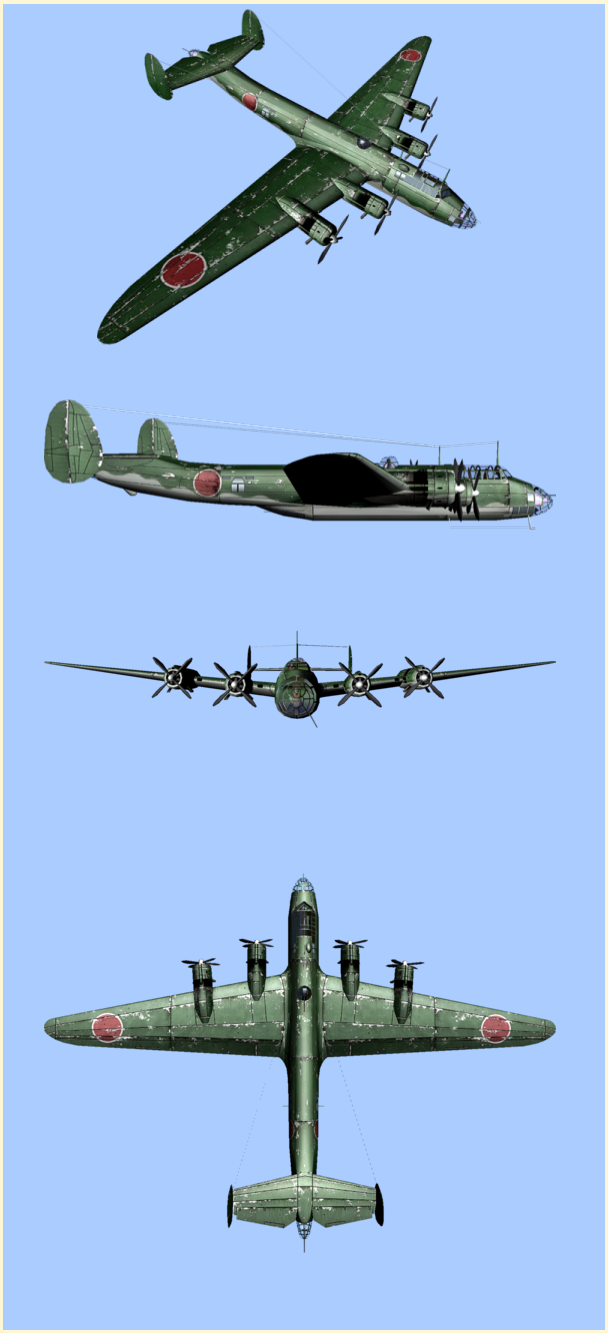






Nakajima G5N1
Liz

Durability	☆☆☆☆	**Speed**	☆☆☆☆	**Climb Rate**	☆☆
Maneuverability	☆☆☆☆	**Firepower**		**Ground Attack**	☆☆☆☆☆☆☆☆



Speed - Fully loaded, the G5N is lucky to reach 200 mph in level flight.

Rejected by American Airlines, the sole prototype of the Douglas DC-4E was purchased by the Japan Air Line Company (Nippon Kiku K.K.) in 1938 as a front for the Imperial Navy. The Navy wanted a long-range, heavy bomber and planned to design it around the Douglas prototype.

The new plane, designated G5N, retained the original wing, engine, and landing gear designs, while featuring a new fuselage and tail assembly. It also marked a milestone in Japanese aviation history as being the first four-engine plane designed for the Navy and the first Japanese plane to feature a tricycle landing gear arrangement.

However, the Nakajima engineers lacked experience in designing such large planes and the result was an overweight and underpowered disappointment. In an effort to keep the project alive the plane was re-engined, but that too was a unsatisfactory and the four G5N prototypes ended their careers as freight transports.

Designer's Note: In order to provide JP with a four-engine bomber capable of carrying a heavy bomb load, the performance of this plane was increased above that of the historical model. However, the G5N remains the slowest and least durable heavy bomber in the Fighter Ace inventory.

Sources:

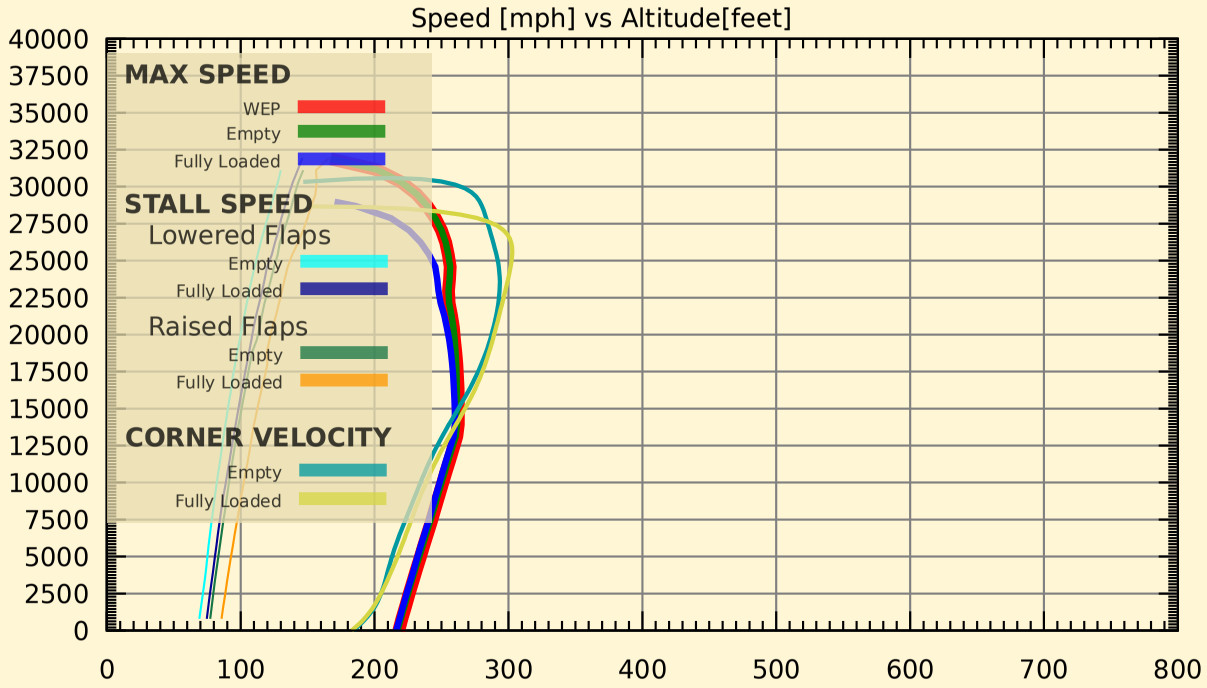
Francillon, Rene J.; Japanese Aircraft of the Pacific War; Naval Institute Press, Annapolis, MD; 1979.

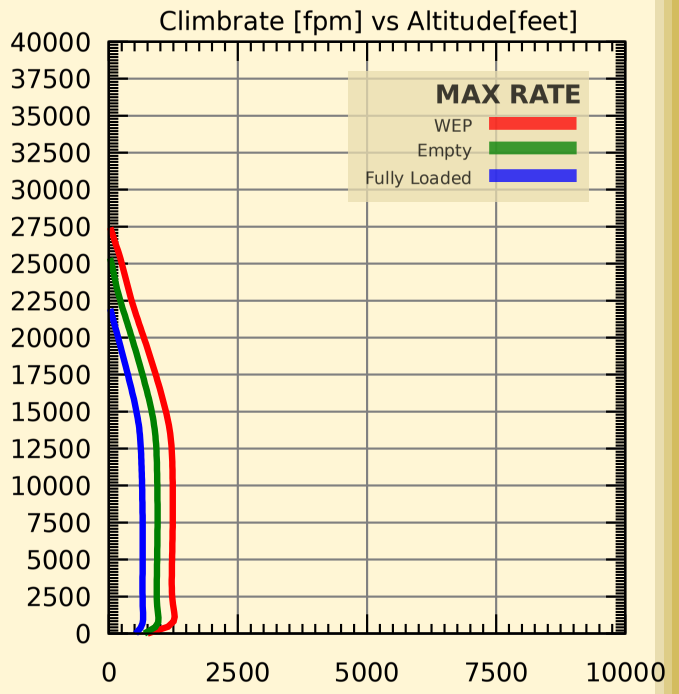
Name: Nakajima G5N1 Liz
Role: Heavy Bomber
Crew: 8
Service Date: April 1941
Primary Guns: NA
Secondary Guns: NA
Defensive Guns: NA
Ordnance: 40x 110 lb or 32x 220 lb or 16x 551 lb or 8x 1103 lb or 4x 1764 lb or 2x 3970 lb bombs

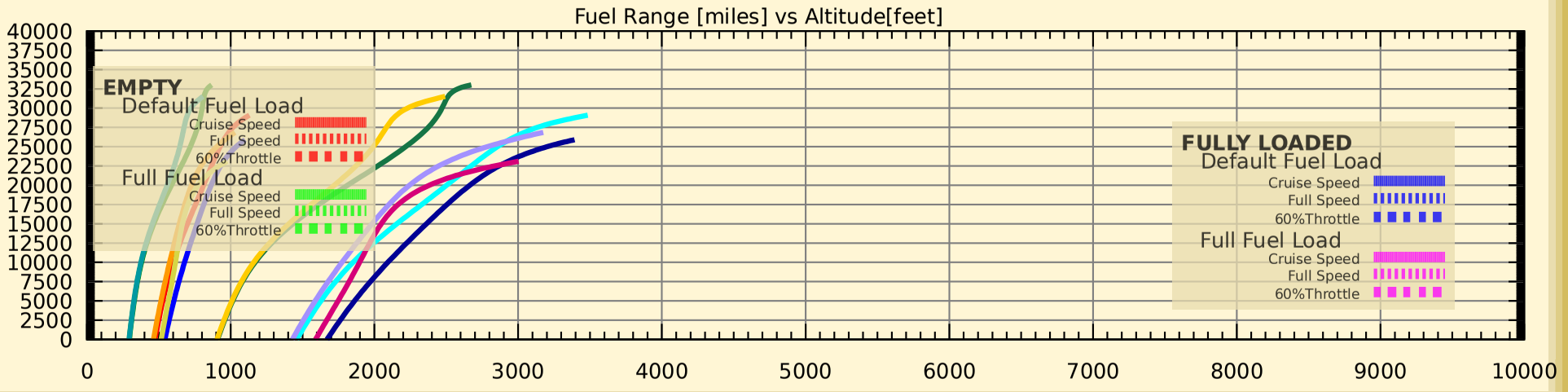
Length: 101.77 ft
Wing Span: 138.25 ft
Wing Area: 2172 sq. ft

Power Plant: 4 X Nakajima NK7A Mamoru-11
Power: 3948 lb s.t.
Internal Fuel: 16314 lb
External Fuel: NA

Empty Weight: 45856 lb
MTOW: 70547 lb

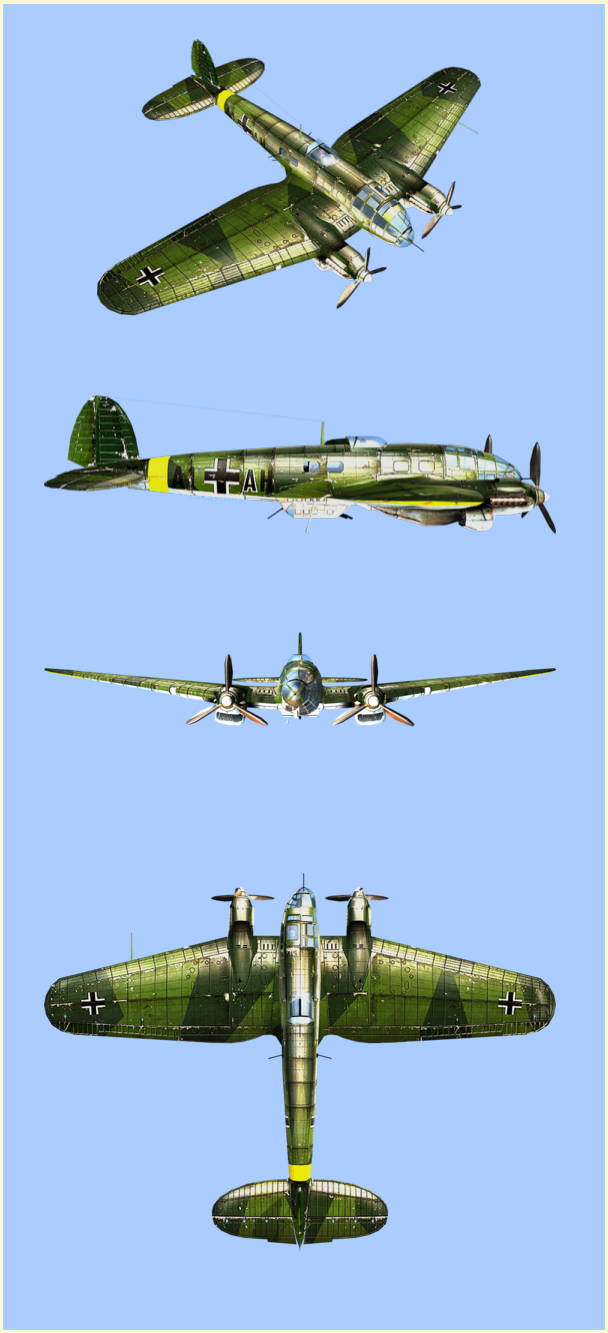






Heinkel He-111H-6

Durability	☆☆☆☆☆	Speed	☆☆☆☆	Climb Rate	☆☆
Maneuverability	☆☆☆	Firepower	☆	Ground Attack	☆☆☆☆



Speed - With a maximum unloaded speed of only 258 mph, the He-111 needs fighter escort to survive.

Although it was commonly believed that the He-111 was originally conceived as a passenger liner, in fact the first prototype was a bomber version and pre-production bomber variants were coming off the assembly line at the same time the civil version was introduced to the public. The initial production version He-111A was capable of carrying 2,200 lb. of bombs mounted vertically in what was the smoking section of the civil variant and was equipped with a retractable "dustbin" gun position under the fuselage. However, the plane was seriously underpowered and the Luftwaffe refused to purchase it. Looking to get some return on his investment, Ernst Heinkel obtained permission to sell the He-111A to the Chinese government, bringing some much needed foreign currency to Germany's economy.

The He-111C soon followed as a dedicated passenger liner equipped with the same underpowered engines as the "A" model. Lufthansa promptly refused the plane as being too slow and expensive to be profitable. Despite this rejection, numerous propaganda photos were taken of the He-111C with Lufthansa markings and a series of "route-proving" flights were made to Britain, France, and the Soviet Union. In fact the planes had actually been transferred to a secret division of the Luftwaffe and the "route-proving" flights were actually long-range photographic reconnaissance missions.

Meanwhile, the He-111B was introduced with a pair of Daimler-Benz DB-600C engines and it was this variant that first saw action in Spain with the Condor Legion. A new "D" version followed with even more powerful DB-600Ga engines rated for 1,050 hp at take-off. A civil version of the "D" model was made as the He-111G, but again it was rejected by Lufthansa and the plane's civil "career" was finally over.

DB-600 engines were desperately needed for Bf-109 and Bf-110 production so the He-111E was introduced. Equipped with a pair of Junkers Jumo 211A engines, the E model offered many aerodynamic improvements and was able to reach a top speed of 267 mph. The He-111F introduced a simplified, tapered wing design, which permanently replaced the elegant elliptical wings fitted to preceding variants.

From their combat experience in Spain, German air leaders concluded that their fast bombers would always get through enemy air defenses, a theory that would prove disastrously wrong in the skies over Britain. As a result no effort was made to increase the inadequate defensive armament of the He-111 other than to replace the retractable ventral "dustbin" position with a more streamlined "bathtub" position on the new He-111P model.

The "P" model differed radically from previous versions. The standard "stepped" cockpit arrangement was replaced by a glazed and streamlined nose section, which housed the pilot, bombardier and forward gunner. To provide better forward visibility, the pilot was seated off to left side and the gun position was situated to the right, resulting in the plane's characteristic asymmetrical appearance. The "P", which was based on the earlier "D" model was equipped with DB-601A and was capable of carrying up to eight 550 lb. bombs.

However, once again the needs of the Messerschmitt fighters took precedence and the definitive He-111H model was introduced with the same Junkers Jumo 211 engines used on the E and F models. Subsequent sub-variants introduced more powerful Jumo engines, additional defensive gun emplacements, and external bomb racks. The He-111H-6 was the first variant equipped to carry torpedoes for anti-shipping attacks, a role to which it took like a duck to water. I/KG 26 was the first unit to be equipped with the new H-6 model and they were deployed in northern Norway, where they contributed to the destruction of convoy PQ17.

Twice taken out of mass production, the He-111 was reintroduced when its "replacements" failed to materialize. A durable, capable aircraft, the He-111 soldiered on until the end of the war and served in a wide variety of roles.

Sources:

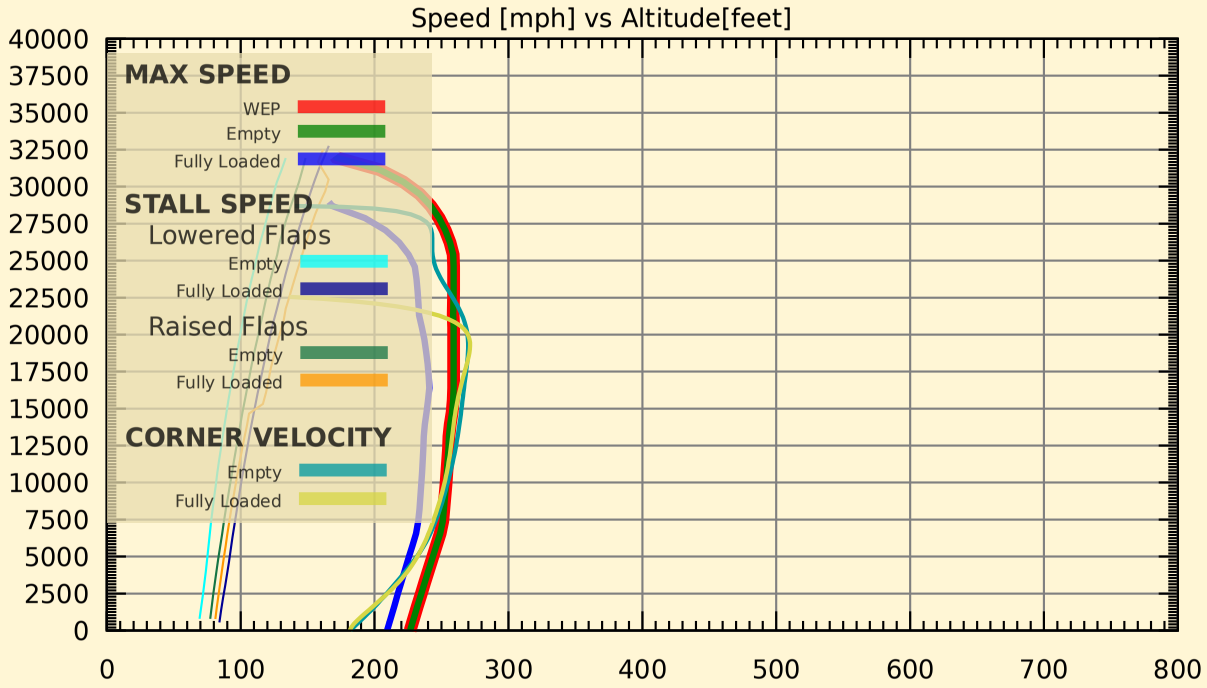
Green, William; Famous Bombers of the Second World War; Doubleday & Company, Garden City, New York; 1959.

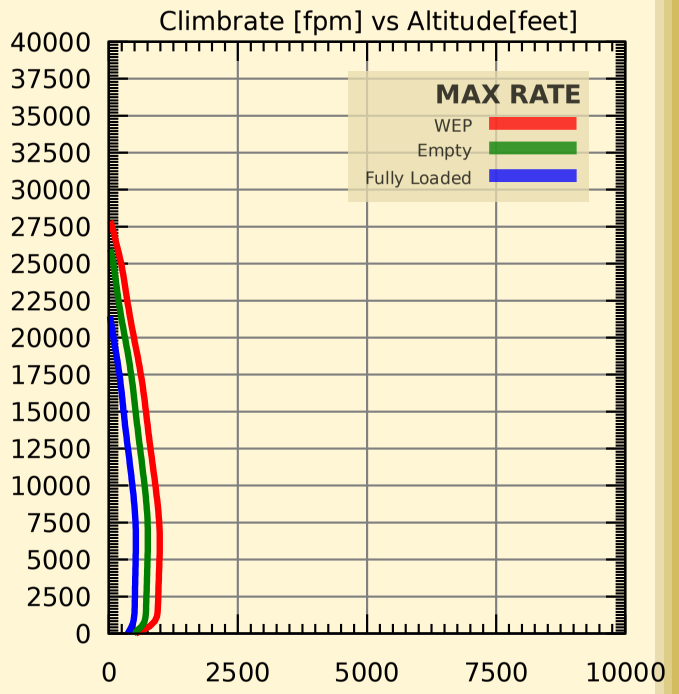
Name: Heinkel He-111H-6
Role: Medium Bomber
Crew: 6
Service Date: October 1941
Primary Guns: NA
Secondary Guns: NA
Defensive Guns: NA
Ordnance: Ordnance: 32x 121 lb or 8x 551 lb bombs in bomb bay, or 4x 551 lb or 2x 2205 lb bombs or 2x 1790 lb F5b torpedo on external racks

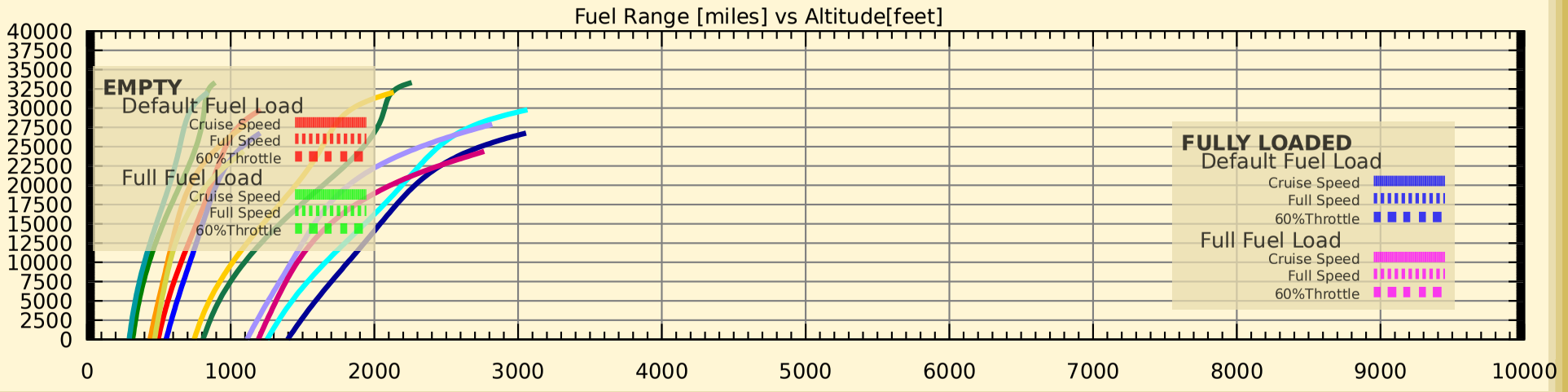
Length: 54.46 ft
Wing Span: 74.11 ft
Wing Area: 943 sq. ft

Power Plant: 2 X Jumo 211F-1
Power: 2812 lb s.t.
Internal Fuel: 5479 lb
External Fuel: NA

Empty Weight: 19621 lb
MTOW: 30864 lb

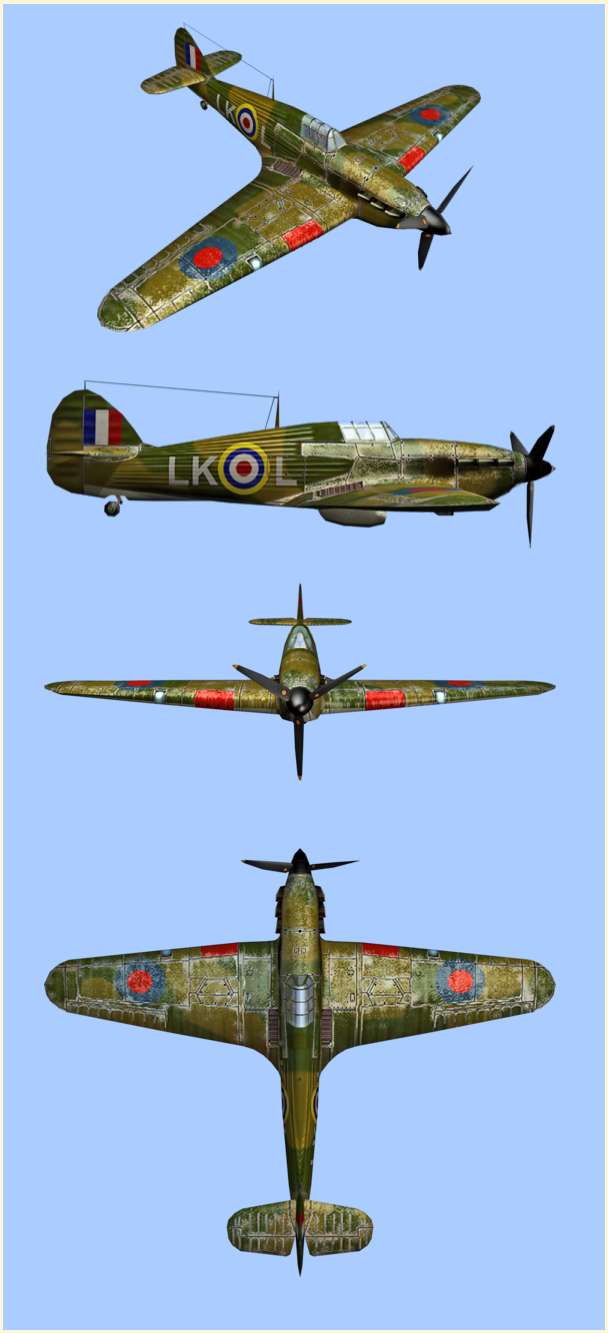






Hawker Hurricane Mk.Ia

Durability	☆☆☆	Speed	☆☆☆☆☆	Climb Rate	☆☆☆☆
Maneuverability	☆☆☆☆☆☆☆	Firepower	☆☆	Ground Attack	



Firepower - Even with a brace of eight, the .303 Browning just didn't have enough punch to make it a viable fighter weapon.

Hawker Aircraft Ltd. had a long history of producing single-engine warplanes with origins that reached back to the famous Sopwith Camel. Hiring Sydney Camm as their chief designer proved to be a stroke of good luck that resulted in the production of Hawker's most famous plane - the Hurricane.

Immediately upon assuming the role of chief designer in 1925, Sydney Camm started work on a monoplane design. While it was never built, Camm never let the idea drop from his mind and in 1933 he directed the company to begin work on a monoplane based around the Rolls Royce Goshawk steam-cooled engine and using lessons learned from the Hawker Fury biplane. Working with Rolls Royce, Camm found out that they were working on an even more powerful engine, known at the time as the PV-12.

While the new design incorporated many advanced features, it used the standard Hawker construction techniques that they used on their biplanes, namely a tubular frame construction covered by doped fabric. The biggest impediment to development was the lack of reliability in the new Rolls Royce powerplant, but finally in February 1936 the first prototype was delivered to the RAF for official trials.

So confident were they that the Air Ministry would accept the plane, Hawker's directors, including T.O.M. Sopwith, decided to start a large-scale production program. This proved to be a fortuitous move as they were able to deliver over 500 planes by the time the war started on September 3, 1939.

The first half of the production order of 600 planes was powered by the Merlin II fitted with a two-blade, fixed pitch Watts wooden prop. However, the second half of the production run was equipped with the newer Merlin III engine and either a Rotol or deHavilland three-bladed, multi-pitch metal prop. The fabric-covered wings were also giving way to metal covered versions and earlier versions of the Mk.I were usually retrofitted with the newer engine, prop and wing when they underwent depot level repairs and refits.

At the beginning of the Battle of Britain RAF Fighter Command had 30 squadrons of Hurricanes and 19 squadrons of Spitfires, which meant that the Hurricanes bore the brunt of the fighting. Because the Spitfire was faster and more agile, it was targeted towards fighters while the slower but more durable Hurricanes were sent after the bombers. However, despite the greater notoriety of the Spitfire and its pilots, it was a Hurricane pilot of No. 249 Squadron, Flt. Lt. J.B. Nicholson, who won the only Victoria Cross awarded to a member of Fighter Command.

Sources:

Green, William; Famous Fighters of the Second World War; Hannover House, Garden City, NY; 1960.

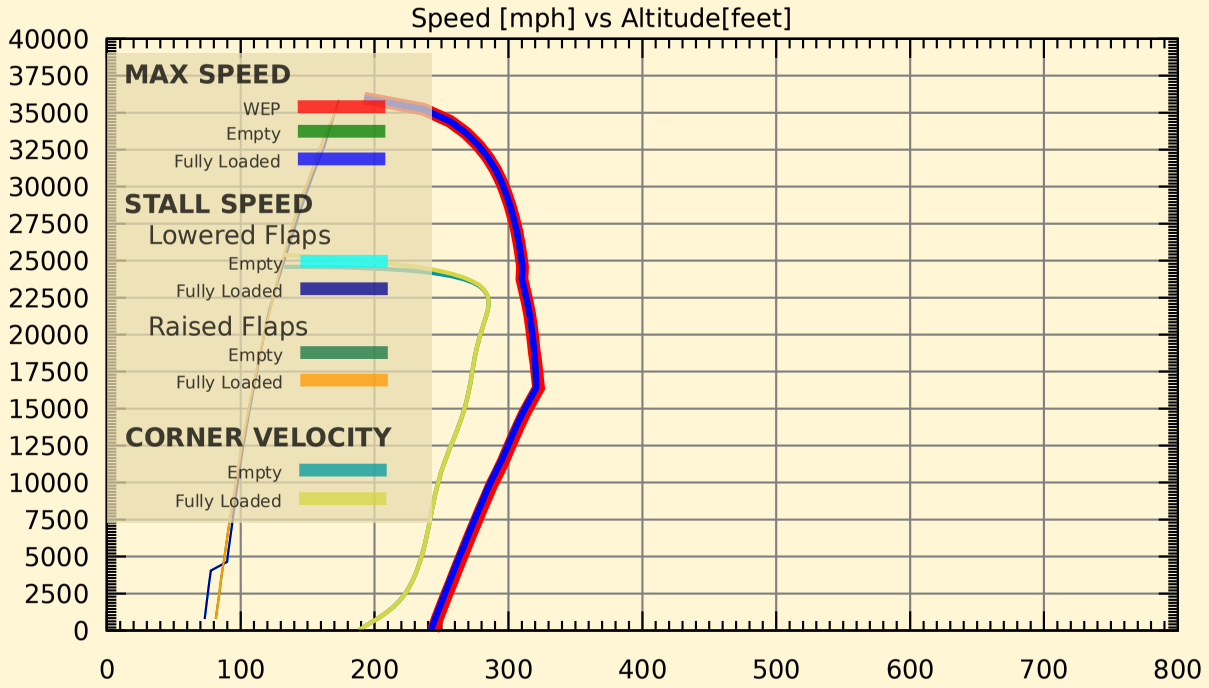
Scutts, Jerry; Hurricane In Action; Squadron/Signal Publications; Carrollton, TX; 1986.

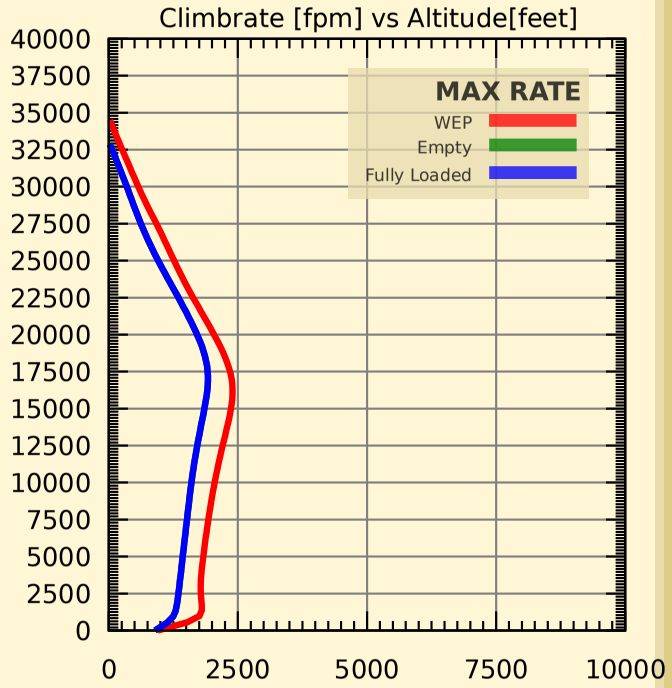
Name: Hawker Hurricane Mk.Ia
Role: Fighter
Crew: 1
Service Date: March 1938
Primary Guns: 4x Browning 0.303" machine guns with 334 rpg in wings
Secondary Guns: 4x Browning 0.303" machine guns with 334 rpg in wings
Defensive Guns: NA
Ordnance: NA

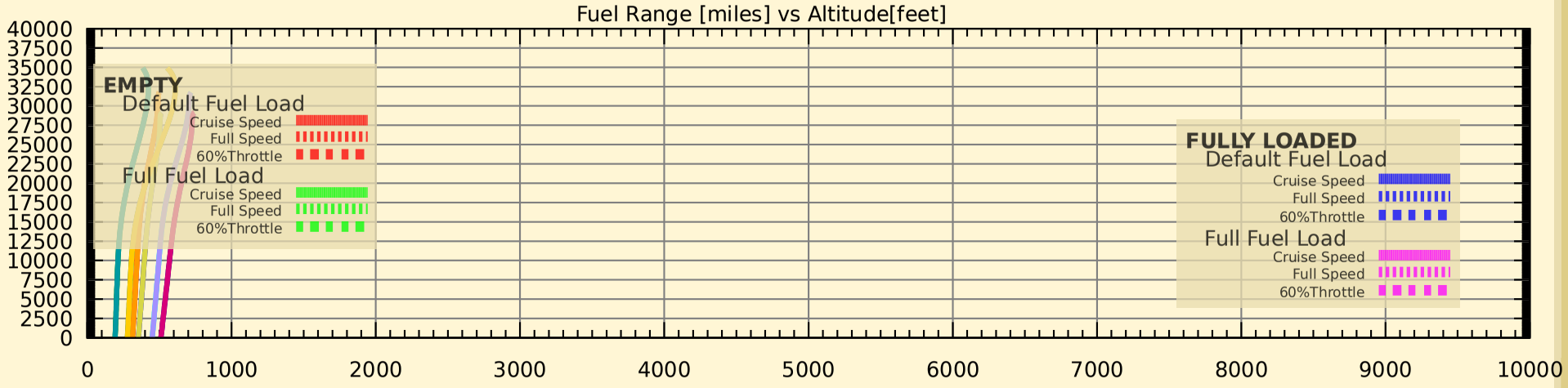
Length: 33.14 ft
Wing Span: 41.01 ft
Wing Area: 257 sq. ft

Power Plant: One Rolls-Royce Merlin-III
Power: 2439 lb s.t.
Internal Fuel: 698 lb
External Fuel: NA

Empty Weight: 5842 lb
MTOW: 6724 lb







Hawker Hurricane Mk.IIb

Durability	☆☆☆	Speed	☆☆☆☆☆	Climb Rate	☆☆☆☆
Maneuverability	☆☆☆☆☆☆	Firepower	☆☆☆☆	Ground Attack	☆☆☆

Performance - By the time it got to Russia the Hurricane was easily outclassed by the newer Messerschmitt and the Focke-Wulf fighters.

In August 1941 No. 81 and 134 Squadrons of the RAF were combined to form 151 Fighter Wing. They and their planes, 12-gun Hurri-Bombers, were packed onto ships and were shipped to Vaenga, near Murmansk in northern Russia. Their task was to provide operational training to help convert Soviet pilots to the Hurricane.

After several months of training, including taking part in several bomber escort missions, the Wing packed their things and went back to England, leaving their Hurricanes for the Soviets. These were the first of about 3,000 Hurricanes (over 20% of the production line) that would be shipped to the Soviet Union under "lend-lease".

While the planes were certainly welcome, the .303 armament was fairly useless when trying to shoot down bombers, even with twelve guns. To solve this problem, most of these Hurricanes were retro-fitted with a pair of 20mm ShVAK cannon with 100 rpg and a pair of 12.7mm Beresin machine guns with 250 rpg in place of the twelve Browning .303s. Additionally, rails were fitted under the wings to allow carriage of six RS-82 rockets, which combined with the two 250 kg. bombs to provide a good ground attack capability.

Sources:

Bowyer, Chaz; Hurricane At War; Ian Allen Ltd., London; 1974.

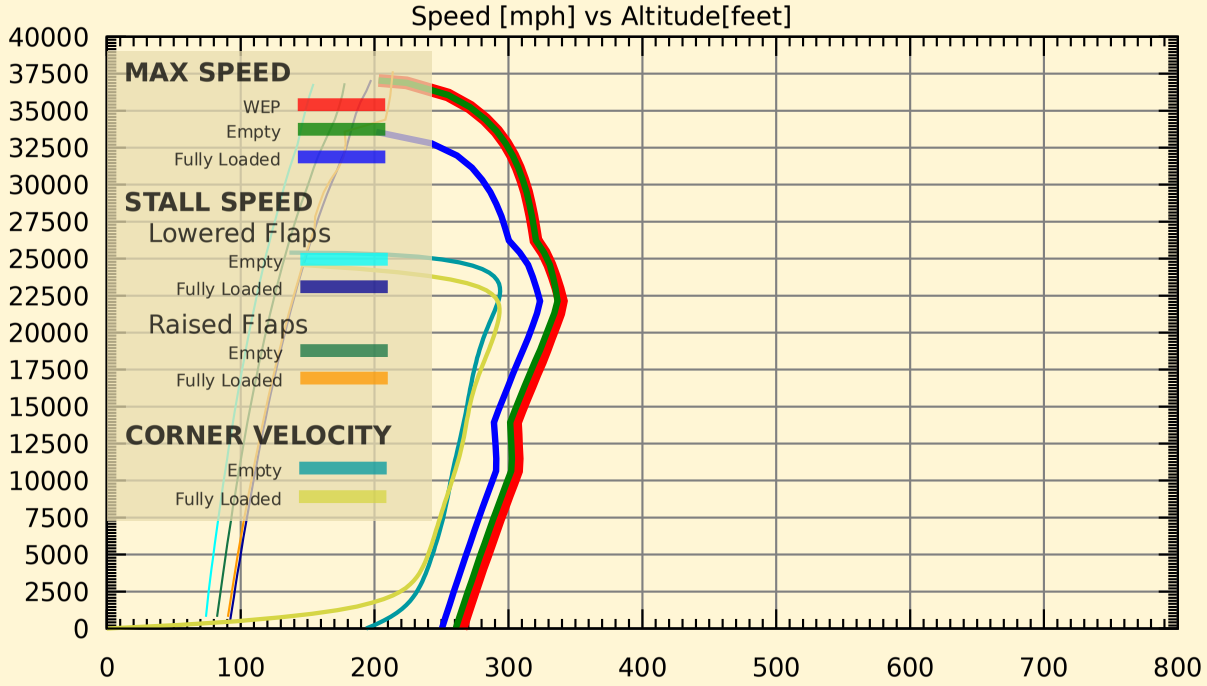
Scutts, Jerry; Hurricane In Action; Squadron/Signal Publications, Carrollton, TX; 1986.

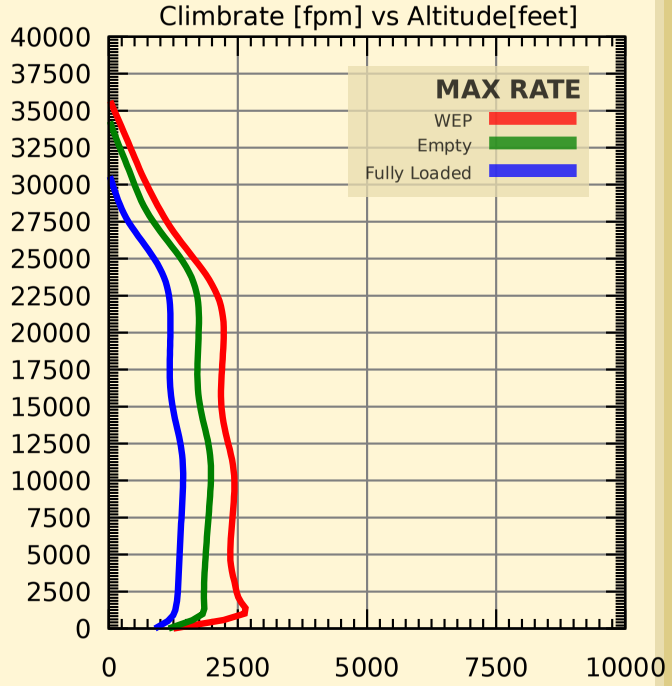
Name: Hawker Hurricane Mk.IIb
Role: Fighter
Crew: 1
Service Date: February 1942
Primary Guns: 2x Beresin (UB) 12.7mm machine guns with 250 rpg in wings
Secondary Guns: 2x ShVAK 20mm cannon with 100 rpg in wings
Defensive Guns: NA
Ordnance: 2x 220 lb or 2x 551 lb or 2x 317 lb drop tanks, plus 6x 33lb RS-82 rockets

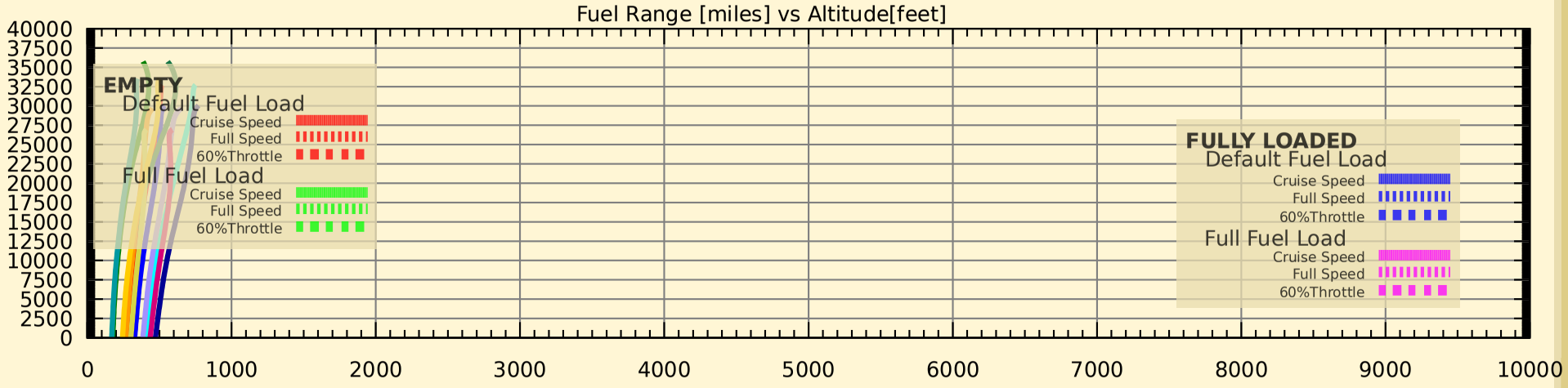
Length: 33.14 ft
Wing Span: 41.01 ft
Wing Area: 257 sq. ft

Power Plant: One Rolls-Royce Merlin-XX
Power: 2781 lb s.t.
Internal Fuel: 698 lb
External Fuel: 634 lb

Empty Weight: 5732 lb
MTOW: 7760 lb

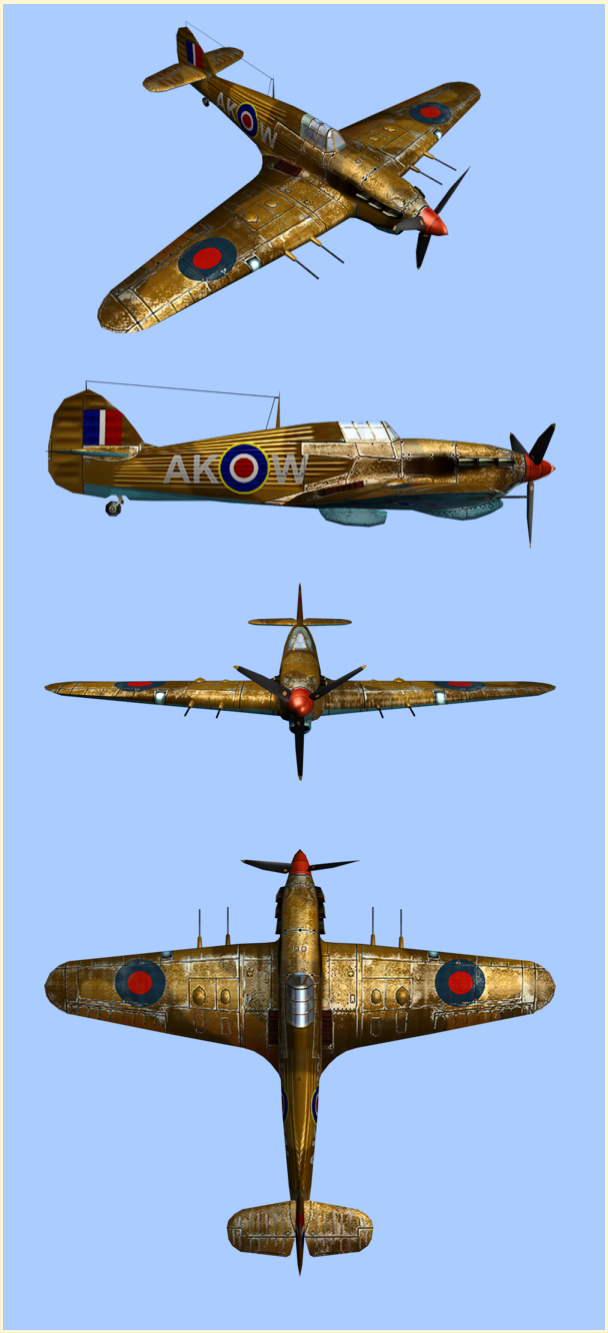






Hawker Hurricane Mk.IIC

Durability	☆☆☆	Speed	☆☆☆☆☆	Climb Rate	☆☆☆
Maneuverability	☆☆☆☆☆☆	Firepower	☆☆☆☆☆☆	Ground Attack	☆☆☆



Speed - By mid-war, the Hurricane was outclassed by the German fighters it was facing.

Looking for a way to improve both the performance and the firepower of the Hurricane, Hawker engineers started work in January 1940 on a version to be powered by the new Merlin XX engine featuring a brace of twelve Browning .303 machine guns. The first stage of this development culminated in the introduction of the Hurricane Mk.IIA, which was fitted with the new engine but retained the eight-gun armament of the Mk.IA.

The second stage resulted in the development of two different wings, each of which was stressed to carry a pair of 500 lb. bombs. The first wing was fitted with the originally intended twelve machine guns, however the second wing was designed around an armament of four 20mm Hispano cannon.

The Mk.IIC, as the cannon-armed version was known, proved to be the most useful and widely used variant of the Hurricane, with 4,711 examples being produced. Additionally, most IIA and IIB machines were retrofitted with the IIC wing and were thus redesignated as IIC models. In 1943 the IICs were themselves retrofitted with four rocket rails under each wing, allowing the plane to carry eight air-to-ground 3" rockets.

Sources:

Green, William; Famous Fighters of the Second World War; Hannover House, Garden City, NY; 1960.

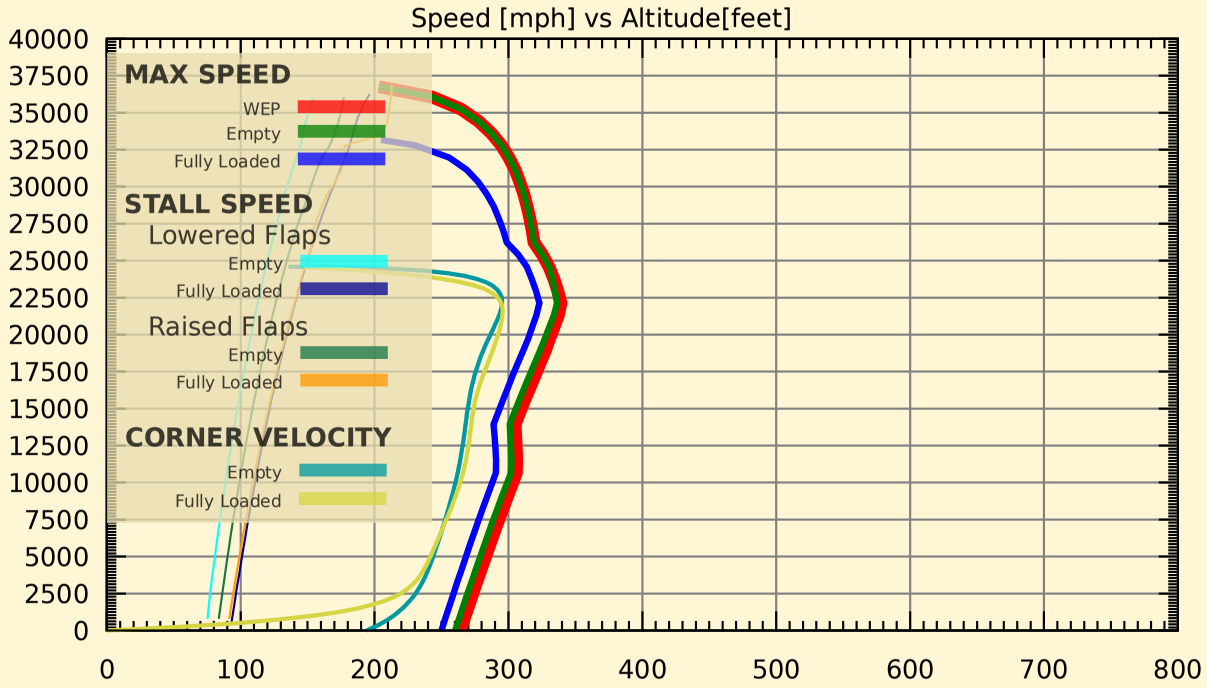
Scutts, Jerry; Hurricane In Action; Squadron/Signal Publications; Carrollton, TX; 1986.

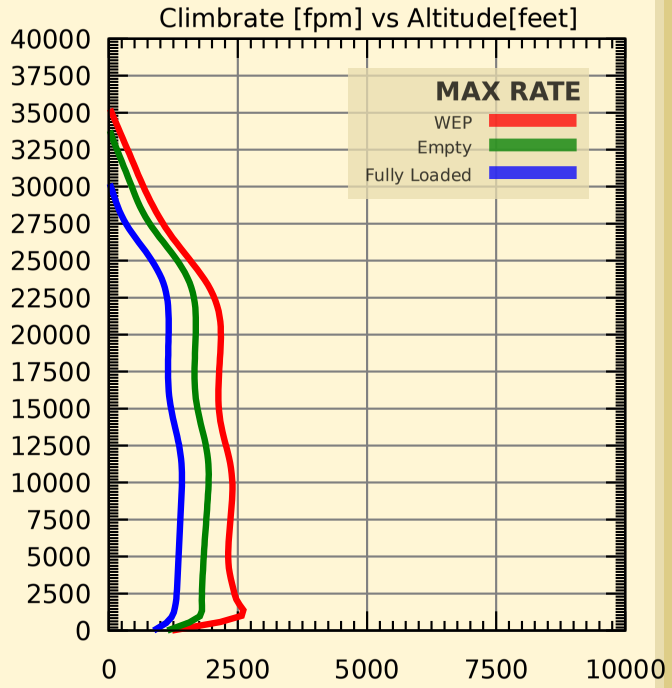
Name: Hawker Hurricane Mk.IIC
Role: Fighter
Crew: 1
Service Date: April 1941
Primary Guns: 2x Hispano Mk.II 20mm cannon with 90 rpg in wings
Secondary Guns: 2x Hispano Mk. II 20mm cannon with 90 rpg in wings
Defensive Guns: NA
Ordnance: 2x 250 lb or 2x 535 lb bombs or 2x 317 lb drop tanks, or 8 x 84 lb A2G rockets

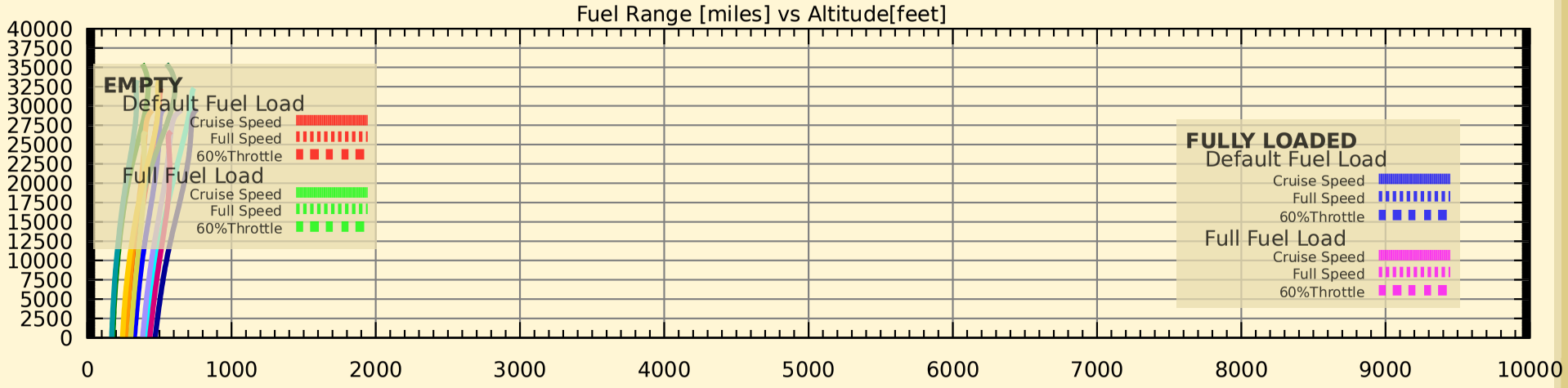
Length: 33.14 ft
Wing Span: 41.01 ft
Wing Area: 257 sq. ft

Power Plant: One Rolls-Royce Merlin-XX
Power: 2781 lb s.t.
Internal Fuel: 698 lb
External Fuel: 634 lb

Empty Weight: 5842 lb
MTOW: 7826 lb







Hawker Hurricane Mk.IID

Durability	☆☆☆	Speed	☆☆☆☆☆	Climb Rate	☆☆☆☆
Maneuverability	☆☆☆☆☆☆	Firepower	☆☆☆☆☆☆	Ground Attack	☆☆☆☆

Durability - With the armor plating removed, the Hurricane IID is very vulnerable to small caliber gunfire.

With the failures of the British tank industry to develop a main gun that could penetrate the panzers of the Afrika Korps, the military services began looking for an alternative. Along with the various ad-hoc tank destroyers, made by mounting an anti-tank gun on the back of a flatbed truck, the RAF began experimenting with mounting anti-tank guns on the versatile Hurricane airframe.

Designated the Hurricane Mk.IID, the anti-tank fighter was initially fitted with a pair of belt-fed Rolls-Royce 40mm guns, but that was soon supplanted by a pair of 40mm Vickers Type 'S' guns with a higher capacity 15-round drum feed. To accommodate the extra weight of the Vickers guns the machine gun armament was reduced to a single Browning .303 in each wing for sighting purposes.

Despite the removal of all but a pair of machine guns, the IID was still too heavy, so the armor plating for the engine, radiator, and pilot compartment was removed. This made the IID extremely vulnerable to small caliber ground fire. Still, despite these weight savings, the IID was a full 1,000 pounds heavier than a fully loaded IIC, with the expected degradation in performance and maneuverability.

The standard attack maneuver was to dive on the target from 5000 ft, which allowed the plane to get up to its maximum speed of 254 mph at sea level. The pilot would fire .303 rounds until they hit the target then would pop off a pair of 40mm rounds, which threw off his aim. The process of firing and re-aiming could be done two or three times on each high speed pass, ensuring that a good pilot could get at least two hits on his target, with devastating results.

Sources:

Boyer, Chaz; Hurricane At War; The Promotional Reprint Company, London; 1997.

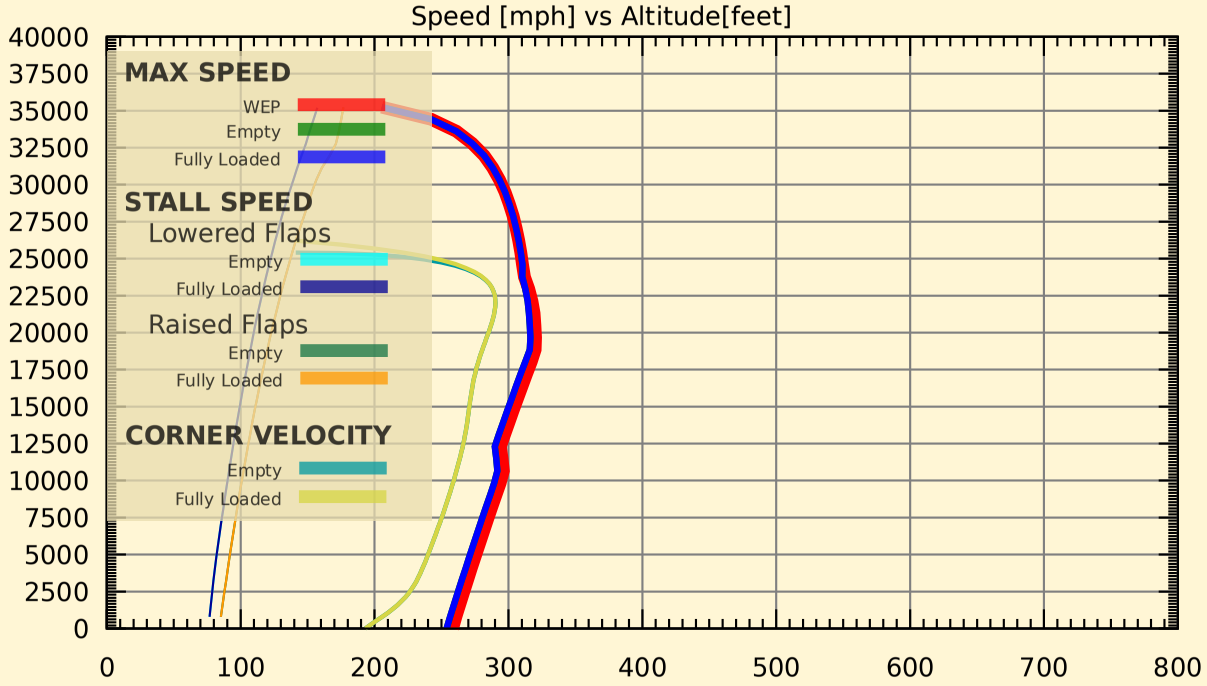
Scutts, Jerry; Hurricane In Action; Squadron/Signal Publications, Carrollton, TX; 1986.

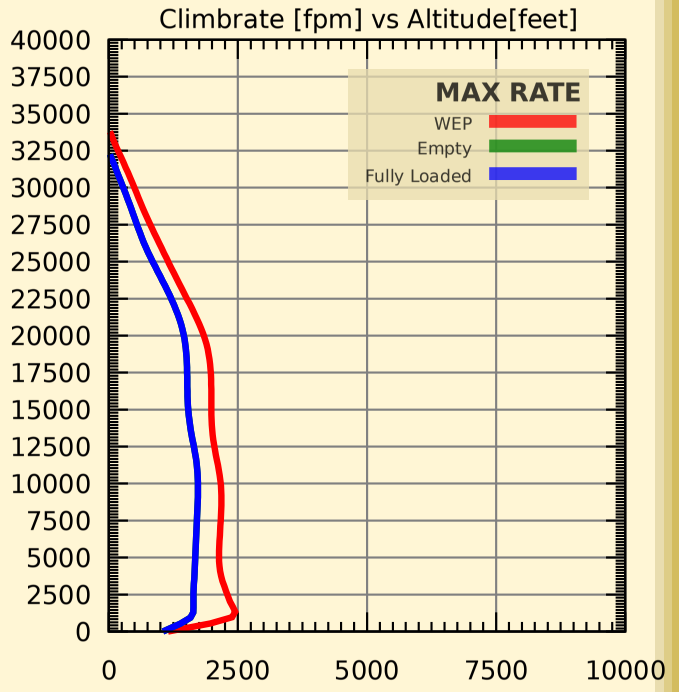
Name: Hawker Hurricane Mk.IID
Role: Fighter
Crew: 1
Service Date: September 1941
Primary Guns: 2x Browning 0.303" machine guns with 334 rpg in wings
Secondary Guns: 2x Vickers 'Class S' 40mm cannon with 15 rpg in wings
Defensive Guns: NA
Ordnance: NA

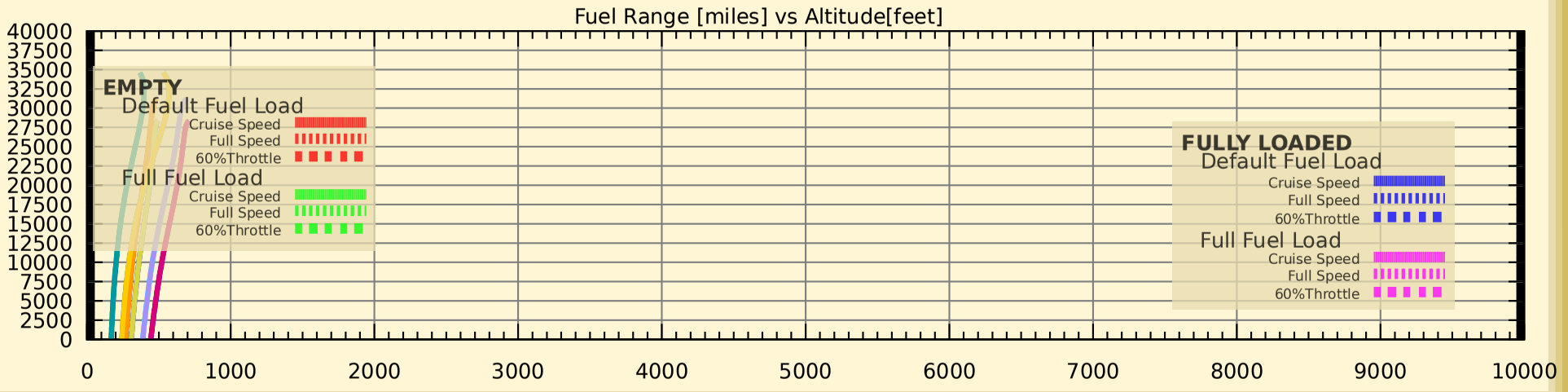
Length: 33.14 ft
Wing Span: 41.01 ft
Wing Area: 257 sq. ft

Power Plant: One Rolls-Royce Merlin-XX
Power: 2779 lb s.t.
Internal Fuel: 698 lb
External Fuel: NA

Empty Weight: 6085 lb
MTOW: 7033 lb

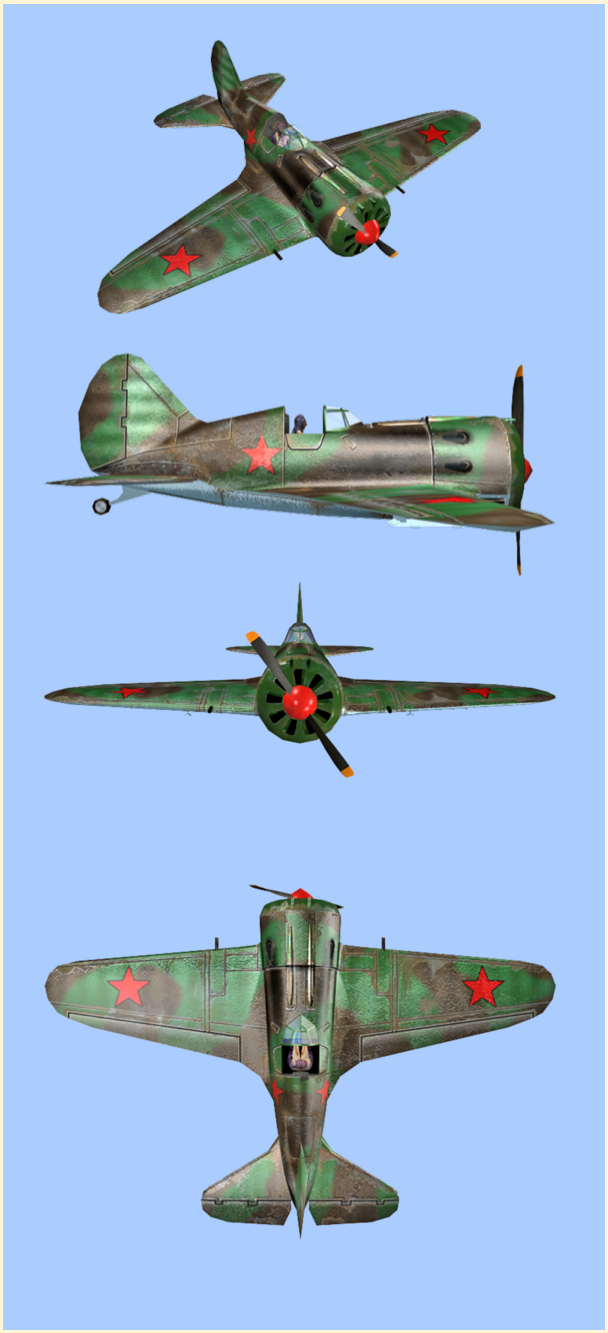






Polikarpov I-16/28
Ishak

Durability	☆☆	**Speed**	☆☆☆☆☆	**Climb Rate**	☆☆☆☆☆
Maneuverability	☆☆☆☆☆☆☆	**Firepower**	☆☆☆☆	**Ground Attack**	☆☆☆



Speed - The I-16 is the slowest fighter in the game and can only outrun the slower, early war bombers such as the Stuka and Val.

Convinced that the monoplane design was necessary in order to attain high speeds in a fighter, Nikolai Polikarpov's design team was commissioned to produce a monoplane fighter in May 1933. The prototype was designed around two engines; with the TsKB-12 being based on the 480 hp M-22 nine-cylinder radial (a copy of the Bristol Jupiter VI) and the TsKB-12bis using the 600 hp American-made Wright-Cyclone SGR-1820-F2 engine of the same configuration.

The plane used a variety of construction methods, including an all-wood fuselage covered in birch ply skin and wings made of two-stainless steel trussed spars with duralumin ribs and leading edges, all covered by fabric. The streamlining was made even more effective by the use of retractable landing gear, the first to appear on a production fighter. Initially the armament consisted of a pair of 7.62mm PV-1 machine guns with 900 rpg mounted in the wings.

After replacing the fabric wing covering with stressed duralumin sheet and fixing a few other bugs, acceptance trials were successfully completed and production began on the I-16 Type 4 in 1934 at the GAZ-39 factory in Khodinka. Because the Wright-Cyclone engine wasn't yet available in quantity, the Type 4 used the proven, but less-powerful M-22 engine.

Meanwhile, with diplomatic relations between the United States and Soviet Union thawing, the Soviet government obtained a license to build a copy of the improved Wright-Cyclone SGP-1820-F3 engine. Designated the M-25 it was rated for 700 hp at take-off and was finally cleared for production in October 1936. The first version to use this new engine was the I-16 Type 5, which was able to reach a top speed of 283 mph, about 50 mph faster than the Boeing P-26A Peashooter then in service with the US Army.

The Type 5 also saw its armament improved by replacing the 7.62mm PV-1 machine guns, which had a rate-of-fire of about 780 rounds per minute, with the new 7.62mm ShKAS machine-guns, which had a rate of fire of about 1800 rounds per minute. Additionally, racks under the wings were installed so that it could carry up to 440 lb. of bombs. The Type 5 was the principle version flown in combat in Spain and was still in active service when the Nazis invaded Russia on June 22, 1941.

Improvements to the design and powerplant continued with each major revision being designated as a new "Type". The Type 6 introduced a more powerful, 730 hp version of the M-25 and the Type 10 added a pair of 7.62mm ShKAS machine-guns with 650 rpg in the cowl. The M-10 was also the first version that could use retractable ski-landing gear, thus making the plane a true "all-weather" fighter.

The Type 17 saw the most radical improvement in firepower by replacing the wing-mounted machine-guns with 20mm ShVAK cannon equipped with 150 rpg. But while the weight kept increasing with each new type, engine power was not keeping pace and the top speed was now only 264 mph. The Type 18 was the answer to this need for more power. It used the new 1000 hp M-62 engine, another Wright-Cyclone based design. The M-62 was equipped with a two-stage supercharger and top speed was raised to 288 mph with the ceiling being increased to over 31,000 feet.

The I-16 Type-28 had the M-62 engine replaced by the 1,100 hp Shvetsov M-63 and was accepted in the first half of 1940. By this time, over 2000 I-16s were in operation in the Soviet Air Force and it remained the principle type in service at the time of the invasion.

Sources:

Gordon; Yefim and Khazanov, Dmitri; Soviet Combat Aircraft of the Second World War Volume One: Single-Engined Fighters; Midland Publishing Limited, Leicester, England; 1998.

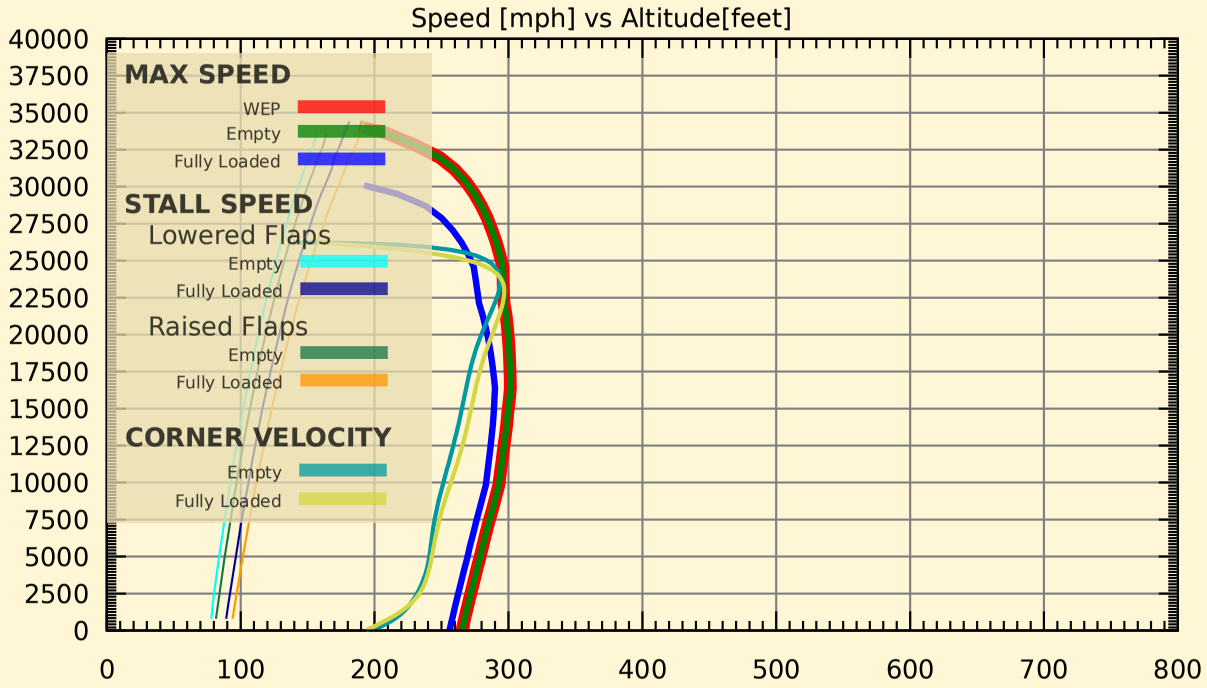
Stapfer, Hans-Heiri; Polikarpov Fighters In Action, Part 2; Squadron/Signal Publications, Carrollton, TX; 1996.

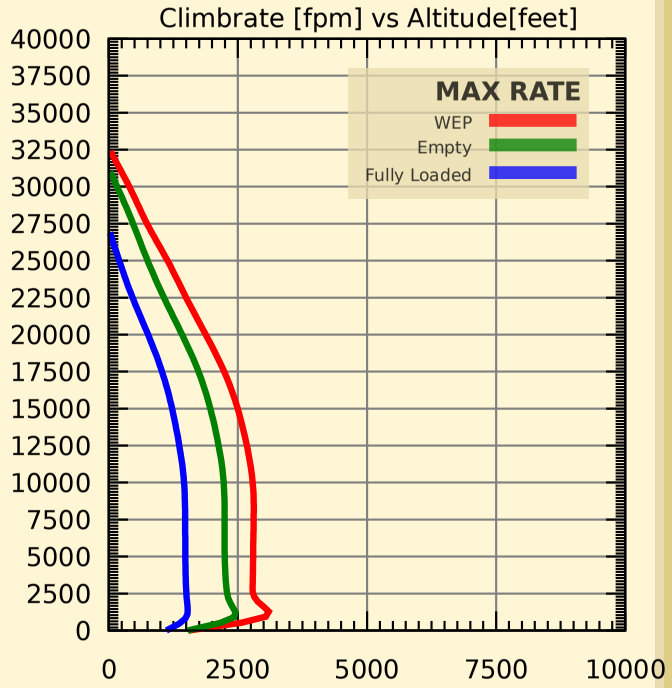
Name: Polikarpov I-16/28 Ishak
Role: Fighter
Crew: 1
Service Date: June 1939
Primary Guns: 2x ShKAS 7.62mm machine guns with 650 rpg in cowl
Secondary Guns: 2x ShVAK 20mm cannon with 150 rpg in wings
Defensive Guns: NA
Ordnance: 2x 110 lb or 2x 220 lb or 2x 550 lb bombs or 2x 317 lb drop tanks, plus 6x 33 lb RS-82 rockets

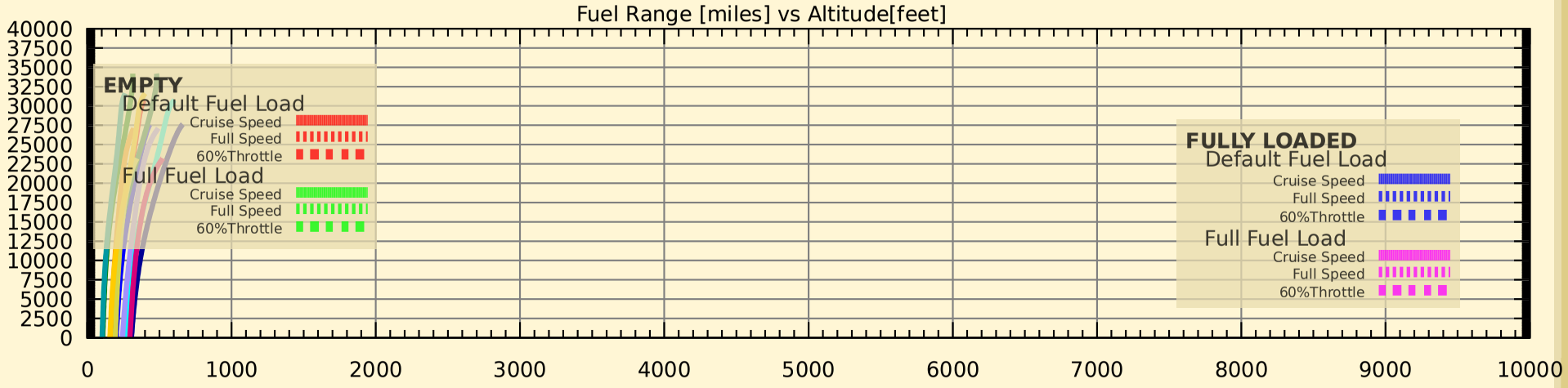
Length: 20.11 ft
Wing Span: 29.53 ft
Wing Area: 160 sq. ft

Power Plant: One Shvetsov M63
Power: 2296 lb s.t.
Internal Fuel: 403 lb
External Fuel: 634 lb

Empty Weight: 3682 lb
MTOW: 5313 lb

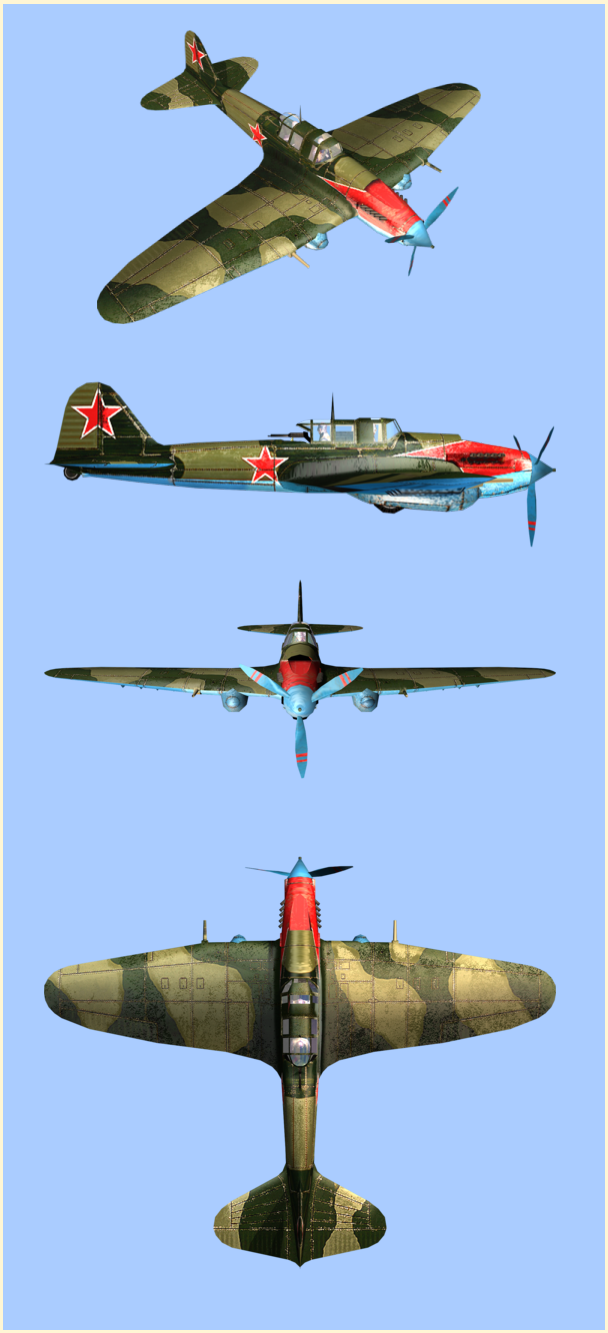






Ilyshin IL-10
Stormovik

Durability	☆☆☆☆☆☆	Speed	☆☆☆☆☆	Climb Rate	☆☆☆
Maneuverability	☆☆☆☆	Firepower	☆☆☆☆☆☆	Ground Attack	☆☆☆☆



Speed - Despite being considerably faster than the Il-2, with a load of bombs and/or rockets the Il-10 is easy prey for marauding fighters.

In August 1943 design work began on the replacement for the Il-2 utilizing the 2,000 hp Mikuln M-42 engine. As with the original prototype of the IL-2, the Il-10 was designed to have an integrated armor system that enclosed both the pilot and gunner. As a result, the gunner was moved forward from the Il-2 position so that he sat back-to-back with the pilot, separated by an armor plate. The main fuel tank was moved from between the crew to the area between the cockpit and engine.

Numerous structural changes were made including a reduction in wingspan and overall length. The gunner's position now utilized a VU-8 turret, which gave an excellent field of fire and also served to reduce drag. With many streamlining improvements the Il-10 had 50% less aerodynamic drag than the Il-2. This combined with the more powerful engine to give the Il-10 a top speed of 342 mph at sea level, an increase of 93 mph over the Il-2.

The refined aerodynamic shape and extra power made the plane considerably more maneuverable as evidenced during a mock combat between a La-5FN and an Il-10. The Il-10 was piloted by Captain A Sirotkin from the converted attack squadron while the La-5FN was piloted by Hero Of The Soviet Union Captain V Popkov, who ended the war with 41 victories.

During the twisting, turning combat, which took place at low and medium altitudes, the La-5FN was only just barely able to get close to the Il-10's tail once, and only after sharp, high-G maneuvering. By comparison, the Il-10 gunner's camera showed 10 clear firing opportunities on the fighter. Popkov's comment after landing was, "It is a good attack aircraft, almost a fighter and a deserving rival for the La-5FN."

The Il-10 made its first combat sortie on February 18, 1945. However, problems with the engine prevented it from being widely deployed before the war ended. Several Il-10s did operate against Japanese shipping in the two days following the USSR's declaration of war and the Japanese surrender. This included a raid on the port of Rasin in which six Il-10s sunk a torpedo boat destroyer and shot down a defending Japanese fighter.

Sources:

Gordon; Yefim and Khazanov, Dmitri with Medved, Alexander; Soviet Combat Aircraft of the Second World War Volume Two: Twin-Engined Fighters, Attack Aircraft and Bombers; Midland Publishing Limited, Leicester, England; 1999.

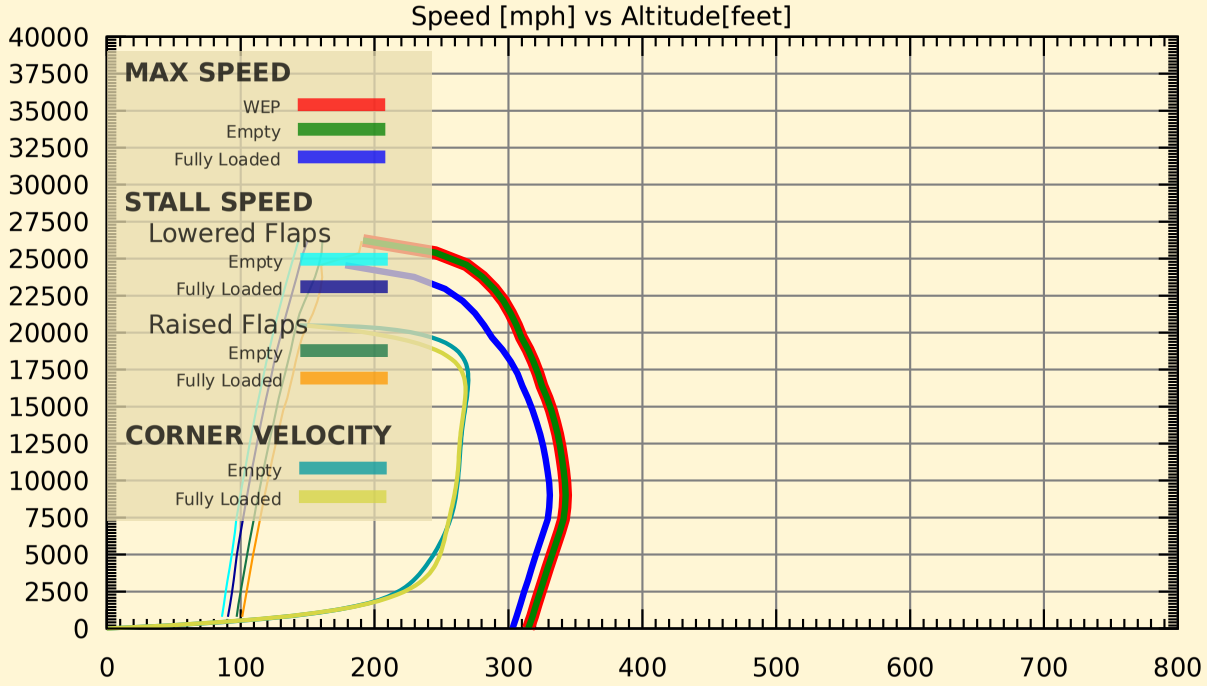
Stapfer, Hans-Heiri; Il-2 Stormovik In Action; Squadron/Signal Publications, Carrollton, TX; 1995.

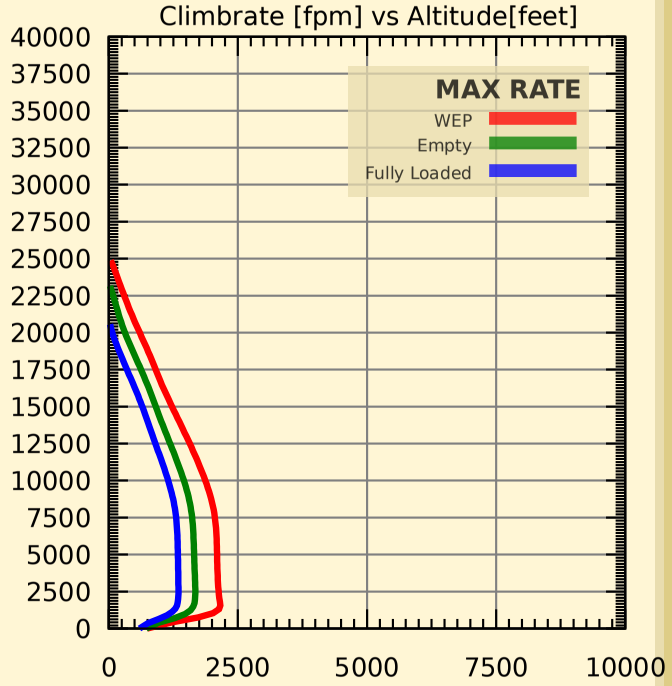
Name: Ilyshin IL-10 Stormovik
Role: Fighter Bomber
Crew: 2
Service Date: January 1945
Primary Guns: 2x ShKAS 7.62mm machine guns with 750 rpg in wings
Secondary Guns: 2x VYa-23 23mm cannon with 150 rpg
Defensive Guns: NA
Ordnance: 4x 110 lb or 4x 220 lb or 2x 551 lb or 2x 1103 lb bombs, plus 8x 33 lb RS-82 or 8x 66 lb RS-132 rockets

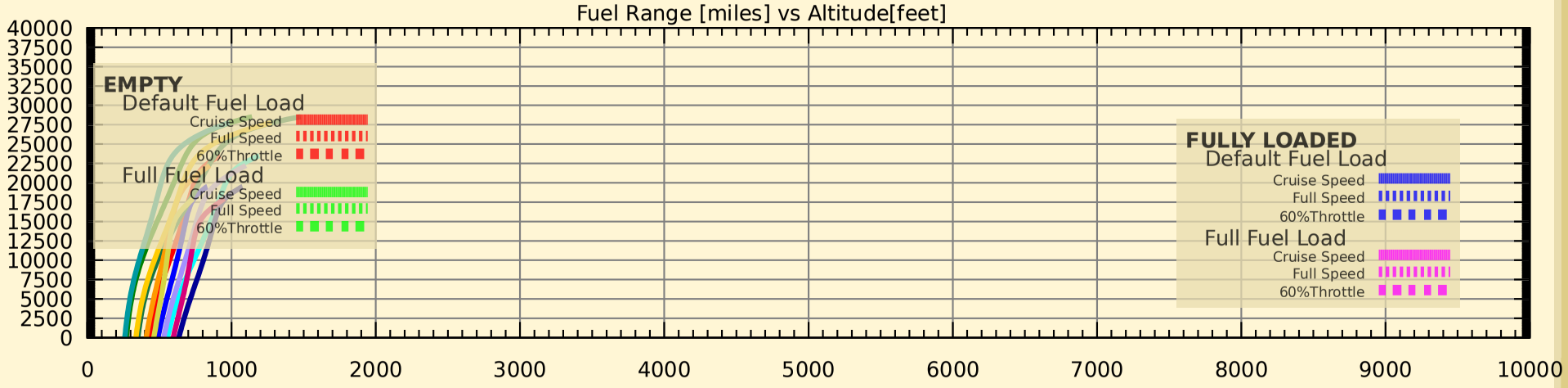
Length: 36.48 ft
Wing Span: 43.96 ft
Wing Area: 323 sq. ft

Power Plant: One Mikulin AM-42
Power: 4100 lb s.t.
Internal Fuel: 1142 lb
External Fuel: NA

Empty Weight: 10692 lb
MTOW: 14330 lb







Ilyshin IL-2m3
Stormovik 'Bark

Durability	☆☆☆☆☆	**Speed**	☆☆☆☆	**Climb Rate**	☆☆
Maneuverability	☆☆☆☆☆☆	**Firepower**	☆☆☆☆☆☆☆	**Ground Attack**	☆☆☆☆

Speed - With a top speed of a little over 200 mph, the Il-2 requires fighter escort to make it to the target.

In 1937 Sergei Ilyushin's idea of building a 'special low-altitude attack aircraft with powerful attack armament was approved for experimental manufacture. Originally designed as a two-seat monoplane with semi-retractable landing gear, the most notable feature was its integrated armor plating. The forward fuselage, from the engine to the crew compartment, was an armored steel tub between 4-8mm thick, which could deflect .30 cal bullets as well as larger rounds fired from an oblique angle.

Originally intended to use the AM-34FRN engine, it was changed to use the AM-35 high-altitude engine. However, the power drain from driving the supercharger harmed low altitude performance. Additionally, the engine's critical altitude of 14,750 ft was far higher than the plane's intended operating altitude. The Mikuln design team therefore set about making a non-supercharged version of the engine, designated the AM-38, which was capable of putting out 1,600 hp.

On orders from the Commissar for the Red Air Force, the BSh (Boronirovaniy Stormovik - armored attack aircraft) was converted to a single-seat version, along with other improvements called for by flight testing of the prototype. The armament was improved to two ShKAS 7.62mm machine-guns with 750 rpg and two PTB-23 cannon, but the recoil of the new cannon was twice as high as promised and it was quickly replaced with the ShVAK 20mm cannon with 500 rpg.

Production was finally authorized in December 1940, but by the time the Nazis invaded there were only 18 aircraft in the hands of the 4th Attack Air Regiment at Voronezh. These pilots had only had time to make a few circling flights themselves and, being originally intended as a training squadron, had no operational experience or even combat weapons training. However, the needs of the situation threw them into the fray and they had to develop both the skills and tactics. Throughout the war Il-2 pilots would always be under-trained with as little as ten hours type experience before being committed to combat.

Combat with the plane revealed several weaknesses, including a tendency of the wing-mounted ShVAK cannon to jam. This was solved by the introduction of the new 23mm VYa cannon with 300 rpg. The bigger problem though was that the planes were extremely vulnerable to attack from the rear. Because of their slow speeds and the inexperience of the pilots, they were sitting ducks for the experienced Luftwaffe Jagdgruppen. The clamor from the front lines demanded some sort of rear defense.

Ironically enough, the original design was to be a two-seater, but by now the production lines were running with single-seat versions and designing an updated integral "tub" armor system was out of the question. Several attempts were made with various turrets and installations at the factory, including the use of an M-82 radial engine to save weight.

In the end the gunner's position was placed outside of the integrated armor and was given its own armor plating. This caused the center of gravity to be shifted dangerously to the rear and increased the total weight of the plane by almost 2,000 lb., necessitating a reduction in the ammo load of the VYa-23s . Several minor modifications were made to improve stability, but the Il-2M, as it was known, was ordered into production in order to get the rear defense to the front as soon as possible.

While production shifted to the Il-2M, a more satisfactory solution was devised. This included a more elevated gun position to allow the gunner a better field of fire, a semi-enclosed gun position, and most notably, a distinct sweep back to the forward edge of the outer wings. The Il-2 Type 3 also used an upgraded AM-38F engine, which put out more power at a lower compression ratio, thus allowing the use of lower octane fuels.

Despite their heavy armor plating, Il-2s were vulnerable to enemy ground fire and fighters, with 1 in every 26 sorties resulting in a lost plane. Early in the war, Il-2 pilots were awarded the "Hero Of The Soviet Union" medal upon the completion of just 10 successful missions. Later this was raised to 100 missions, which gives an idea of the improvements to both the Il-2's survivability and the rise in Soviet air superiority.

In a famous telegram threatening a factory director for not producing enough Il-2s, Stalin wrote that, "The Il-2 aircraft are necessary for our Red Army now, like air, like bread." This was proven by its prolific use with over 35,000 Il-2s being built, more than any other aircraft in World War II.

Sources:

Gordon; Yefim and Khazanov, Dmitri with Medved, Alexander; Soviet Combat Aircraft of the Second World War Volume Two: Twin-Engined Fighters, Attack Aircraft and Bombers; Midland Publishing Limited, Leicester, England; 1999.

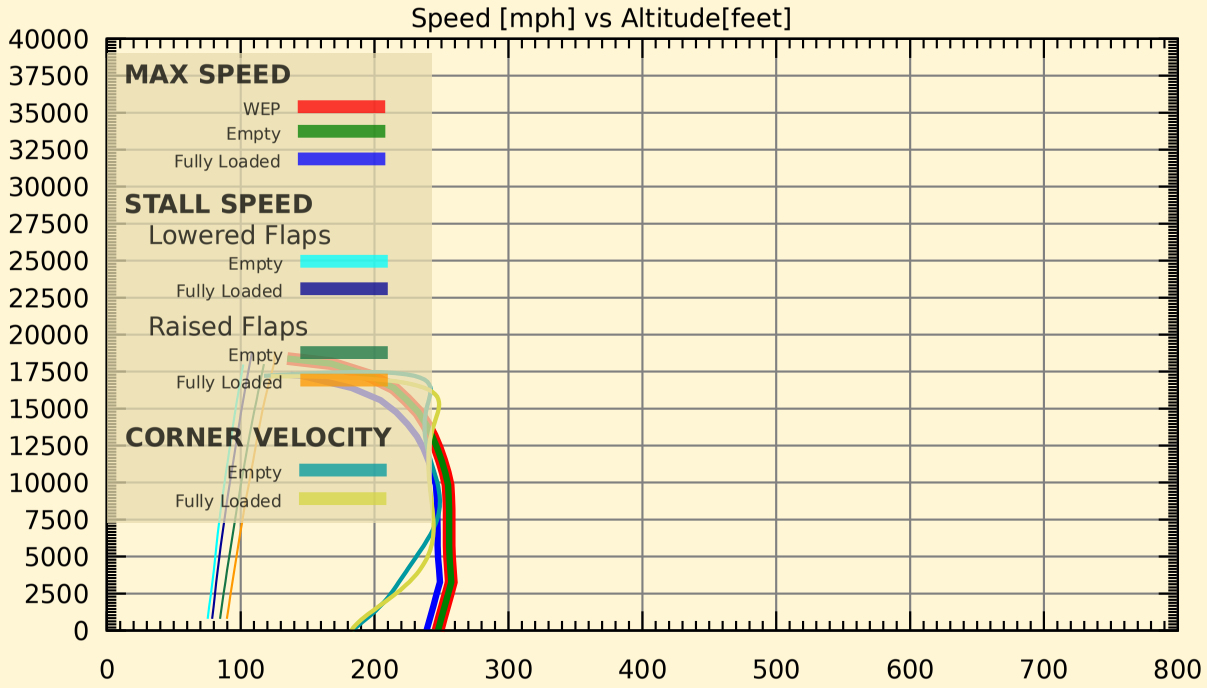
Stapfer, Hans-Heiri; Il-2 Stormovik In Action; Squadron/Signal Publications, Carrollton, TX; 1995.

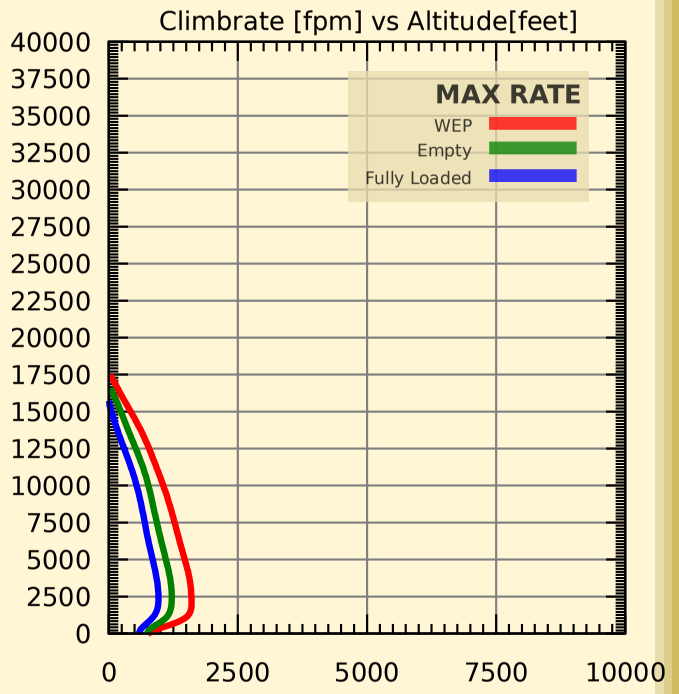
Name: Ilyshin IL-2m3 Stormovik 'Bark
Role: Fighter Bomber
Crew: 2
Service Date: December 1942
Primary Guns: 2x ShKAS 7.62mm machine guns with 750 rpg in wings
Secondary Guns: 2x VYa-23 23mm cannon with 150 rpg in wings
Defensive Guns: NA
Ordnance: 4x 110 lb or 4x 220 lb or 2x 551 lb bombs or 8x 33 lb RS-82 or 6x 66 lb RS-132 rockets. Maximum load of 1500 lb.

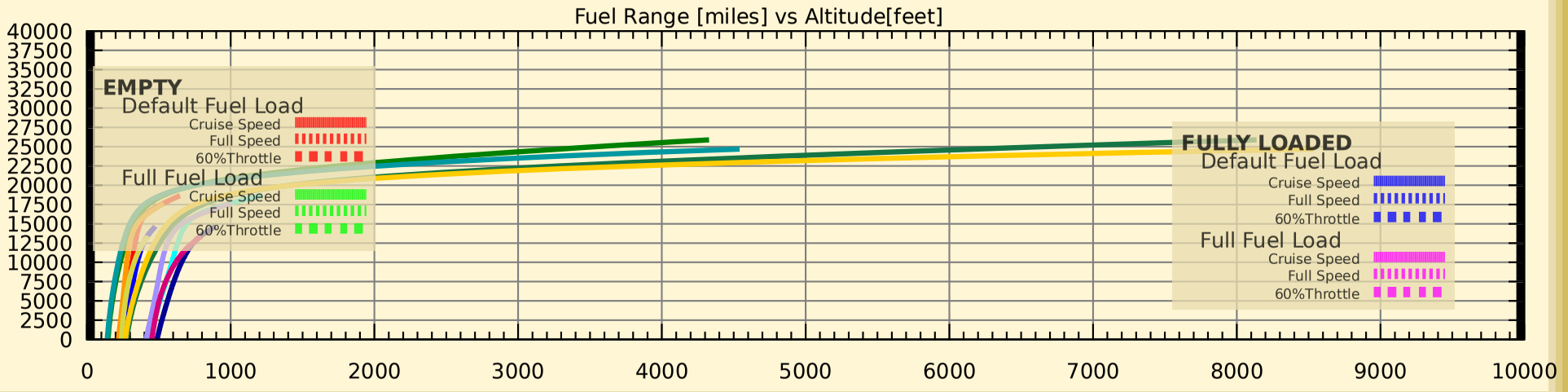
Length: 38.22 ft
Wing Span: 47.90 ft
Wing Area: 414 sq. ft

Power Plant: One Mikulin AM-38F
Power: 3727 lb s.t.
Internal Fuel: 1037 lb
External Fuel: NA

Empty Weight: 10141 lb
MTOW: 13228 lb







Mitsubishi J2M3
Jack

Durability	☆☆	Speed	☆☆☆☆☆	Climb Rate	☆☆☆☆☆
Maneuverability	☆☆☆☆☆	Firepower	☆☆☆	Ground Attack	☆☆

Speed - A top speed of only 371 mph at altitude leaves the Jack outclassed by contemporary fighters, which were well over 400 mph by the time it saw service.

Showing remarkable foresight, the JNAF decided to build a land-based interceptor, with Mitsubishi's Jiro Horikoshi being consulted about the project as early October 1938. However, the needs of the A6M project kept the interceptor idea on hold until September 1939 when the specifications were first drawn up.

The specification called for strict takeoff performance characteristics, with the plane having to take off in overload condition in under 300m. With an endurance of 45 minutes, it was supposed to be able to attain a speed of 600 kph at 6,000m (373 mph at 19,685 ft) and had to climb to that altitude in less than 5 1/2 minutes. For the first time the Navy included a requirement for protective pilot armor and, remarkably, the specification included no maneuverability requirement at all.

Intended to use the same Mitsubishi Kasei engine as they had used in the Zero, the Raiden was designed for maximum streamlining and drag reduction. The engine was mounted further back from the front of the cowl than normal, allowing the cowl to be tapered to keep drag to a minimum. A long shaft connected the engine to the propeller gear and an engine driven fan was installed in front of the engine to maximize airflow for cooling. The wing had a low aspect ratio and was designed with a laminar flow cross-section, while the cockpit canopy was low and wide with curved glass, all intended for drag reduction.

The low-priority of the project combined with cooling and laminar flow problems so that the first J2M1 prototype wasn't flown until March 20, 1942. Numerous problems plagued development including the inability to raise the landing gear at speeds greater than 100 mph! However, the airframe was stable and had good controllability at all speeds from stall to 325 mph, with the ailerons getting a little heavy over that speed, so the decision was made to go ahead with Service Trials.

As expected, pilots complained about the curved canopy glass that distorted their view during landings and the propeller pitch change mechanism was unreliable. The speed and climb rate fell far short of specifications and so Mitsubishi was ordered to try and improve on these characteristics.

The first change was to replace the Kasei 13 with a more powerful Kasei 23a modified to accept a water-methanol injection system. The complicated and unreliable extension shaft was deleted and the cowl length was reduced to improve over-the-nose visibility. The curved glass problem was fixed by adopting a new canopy and windscreen that utilized optically flat armored glass at a slight cost in increased drag. To further improve speed, the collector exhaust was replaced with individual "ejector" stacks designed to produce a small "jet" effect.

The J2M2 was accepted for service in October 1942, but again A6M priorities coupled with problems to delay production. The engine smoked excessively at maximum power and at certain power settings sympathetic vibrations set in that in some cases shook the plane apart in mid-air. This was fixed by reducing the rigidity of the engine mounts while increasing the rigidity of the propeller blades.

The second J2M2 was destroyed and the pilot killed shortly after take off on June 16, 1943. Mitsubishi engineers were unable to determine the cause of the crash until the tenth J2M2 had a similar mid-air incident. Fortunately the pilot immediately put the landing gear down and was able to make a safe landing. It was found that the tail-wheel shock strut was pressing against the elevator controls when retracted, causing the plane to nose over and the problem was rectified immediately.

By March 1944 only a little over 150 Raidens had been produced, the whole program being delayed by teething problems and the priorities of other projects. Along with the introduction of the J2M2 to squadron service, the first J2M3 was produced. While it retained the same engine as the previous model, it had a stronger wing. The new wing allowed the armament to be improved by removing the 7.7mm machine guns in the cowl and augmenting the two 20mm Type-I cannon in the wings with a pair of improved, faster-firing 20mm Type II cannon.

However, performance still fell well below specifications and the Navy decided to phase out the Raiden and to concentrate their efforts on the Kawanishi Shiden to fill the interceptor role. A small number of Raidens served in the Philippines campaign where they earned the code-name 'Jack', but most were used in the home defense role where their heavy armament and pilot protection made them better suited to the bomber interception than to duty under tactical conditions.

Sources:

Francillon, Rene J.; Japanese Aircraft of the Pacific War; Naval Institute Press, Annapolis, MD; 1979.

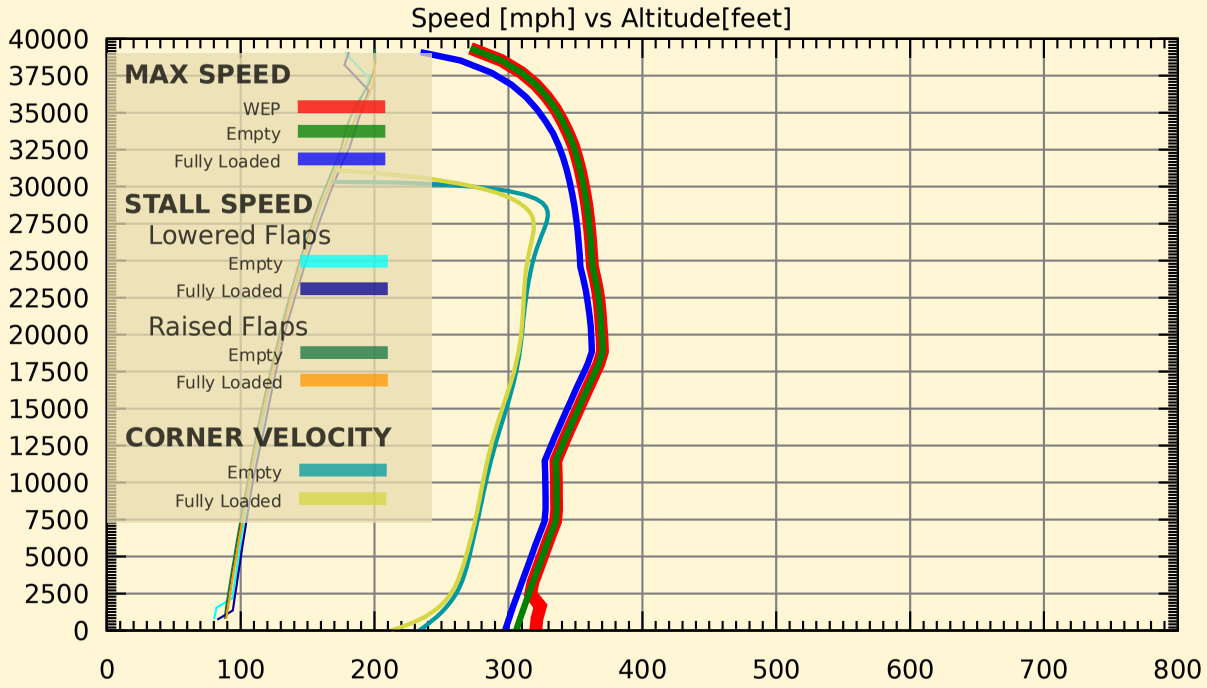
Green, William; Warplanes of the Second World War, Fighters, Volume Three; Hanover House, Garden City, NY; 1960.

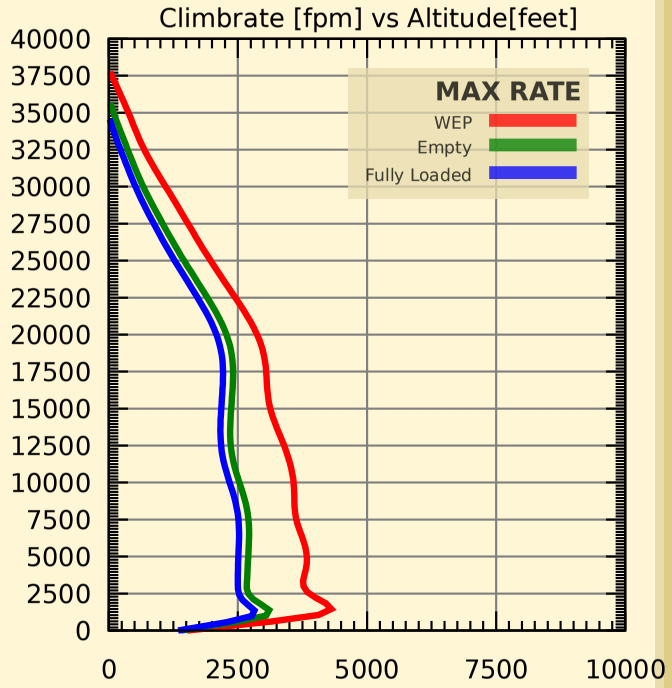
Name: Mitsubishi J2M3 Jack
Role: Fighter
Crew: 1
Service Date: February 1944
Primary Guns: 2x Type 99-I 20mm cannon with 210 rpg in wings
Secondary Guns: 2x Type 99-II 20mm cannon with 190 rpg in wings
Defensive Guns: NA
Ordnance: 2x 110 lb bombs or One 317 lb drop tank

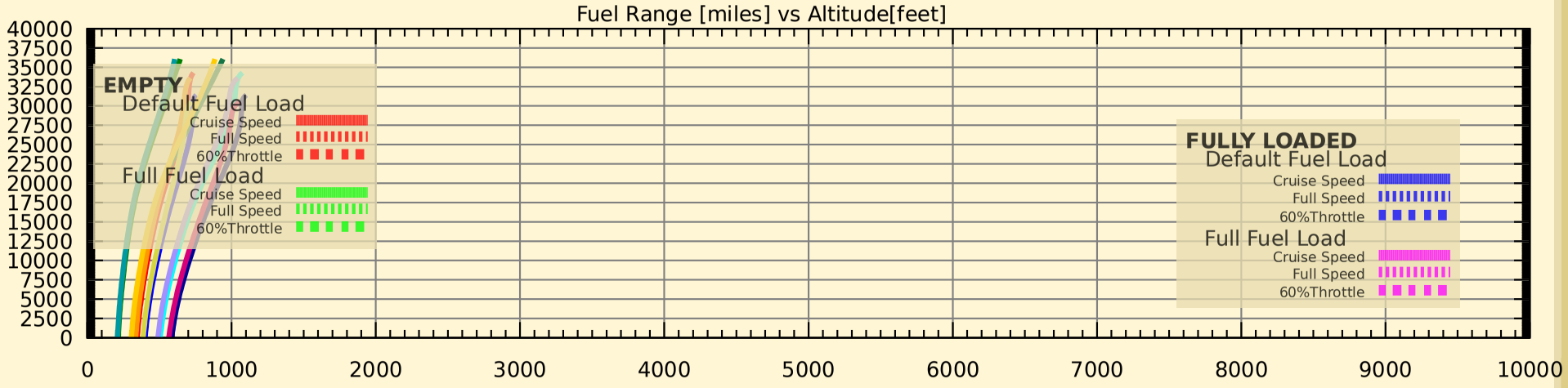
Length: 32.61 ft
Wing Span: 35.43 ft
Wing Area: 216 sq. ft

Power Plant: One Mitsubishi MK4R-A Kasei-23a
Power: 3749 lb s.t.
Internal Fuel: 924 lb
External Fuel: 403 lb

Empty Weight: 5600 lb
MTOW: 7606 lb

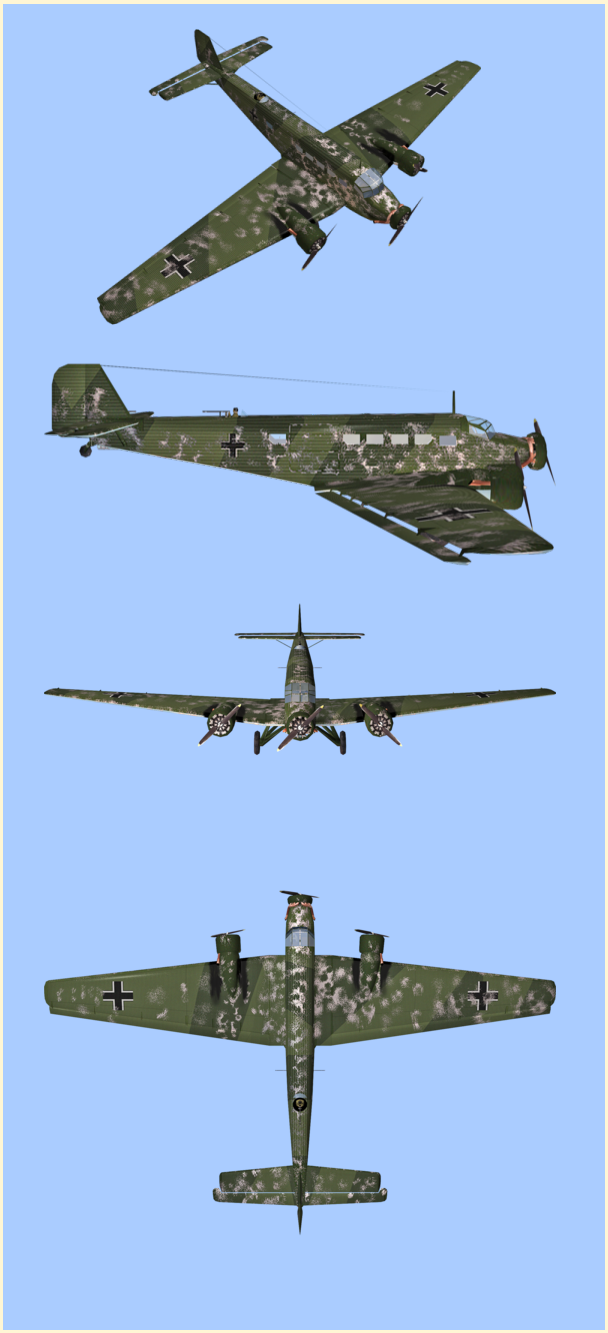






Junkers Ju-52/3mg5e
Tante Ju

Durability	☆☆☆☆☆	Speed	☆☆	Climb Rate	☆
Maneuverability	☆☆☆☆☆☆☆☆	Firepower		Ground Attack	☆☆☆☆☆



Defensive Armament - Three .30 caliber machine guns is better than nothing, but not by much.

The Junkers aircraft company was one whose history extended back to the years before World War I. Hugo Junkers, the company's founder, patented a technique in 1910 to use corrugated sheet metal in the construction of aircraft. His "J" series of two-seat ground attack planes were known for their rugged durability both from enemy fire and the stresses associated with flying.

After the war, Junkers turned his attention to building aircraft for civil use, but he soon became convinced that the potential military market was as lucrative as the civil market was and all future designs were built with both civil and military needs in mind. First flown as a single-engine prototype in 1930, the Ju-52 airframe was adapted to accept three Pratt & Whitney Hornet radial engines. The new plane flew for the first time in April 1931 and after a few minor modifications, was ordered by Lufthansa as a passenger airliner.

Meanwhile, the still-secret Luftwaffe was building up their squadron strength with the Dornier Do-11 being planned to fill the bomber role. But production delays and unsatisfactory performance out of the expected bomber caused them to look for a suitable substitute, with the Ju-52 being selected. Having already been planned for military usage, the conversion of the civil airliner into a bomber was relatively easy. The three cargo bays, which had been previously used to hold luggage and air freight, were modified to accept ten 110 lb. or two 551 lb. bombs each, for a total of 3,306 lb. of bombs. A bomb aiming station was installed beneath the fuselage and a pair of defensive guns were added, one flexibly mounted in a dorsal cutout atop the fuselage and the other in a retractable "dustbin" behind the bomb aiming station.

The Ju-52 was soon blooded in the Spanish Civil War, where it was used as both a troop transport and heavy bomber. Its first bombing mission took place on August 14, 1936, with the target being an airfield near Madrid. Its operational life as a bomber however, was rather short as it was soon replaced in the Condor Legion ranks by the new Heinkel He-111 and Dornier Do-17 designs.

By the start of the Second World War in September 1939, the Ju-52 had been almost completely supplanted in the bomber units by newer designs. Existing models were turned over to the transport and training units and production was shifted to meet the new need of supplying air transport for the fledgling Fleigerkorps.

By this time, the g5e variant was in production. Changes from the g3e version included the elimination of the "dustbin" defensive position in the belly of the plane, its firepower being replaced by a MG15 machine gun in a flexible mount in each of the two side windows. The g5e military transport variant was capable of carrying 18 fully laden combat paratroopers (limited in game to 10) or almost 4,000 lb. of cargo. Even in this guise, the Ju-52 was still capable of carrying ten 110 lb. or two 551 lb. bombs instead of cargo or troops. By the end of the war, the Ju-52 had served with distinction for long past its expected useful life.

Sources:

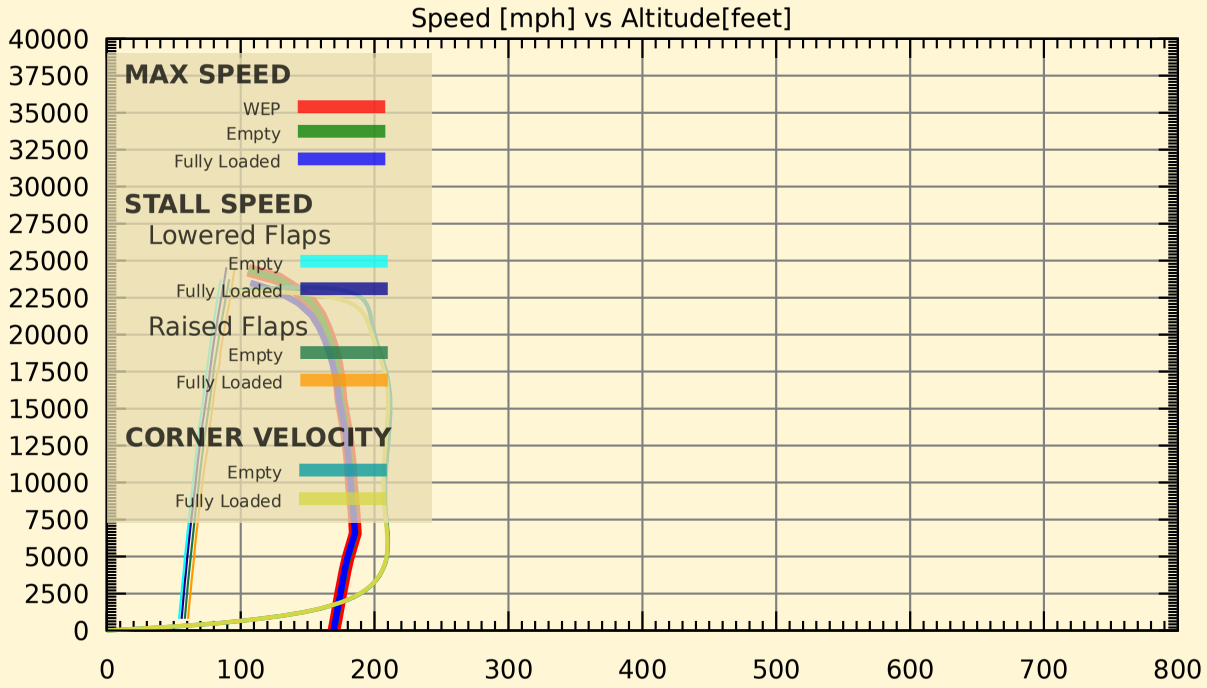
Green, William; Warplanes Of The Third Reich; Doubleday & Company Garden City, New York, 1972.

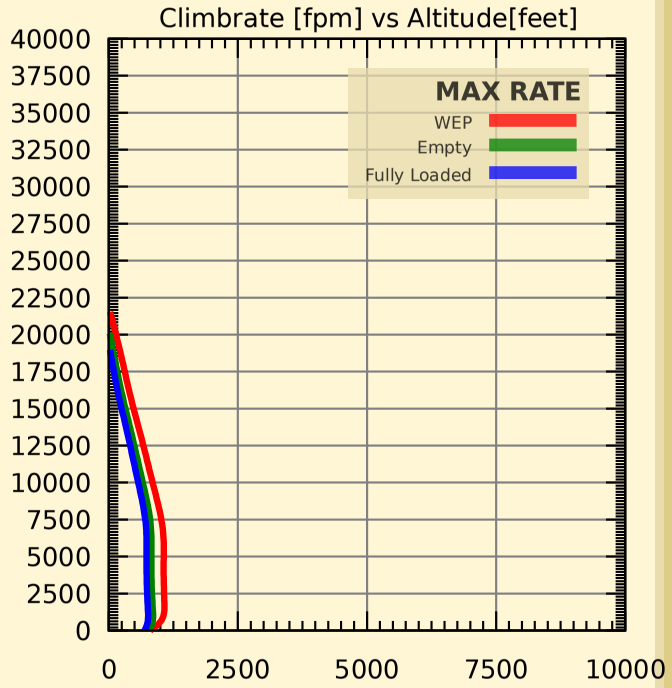
Name: Junkers Ju-52/3mg5e Tante Ju
Role: Transport
Crew: 3
Service Date: August 1939
Primary Guns: NA
Secondary Guns: NA
Defensive Guns: NA
Ordnance: 10x 121 lb or 2x 551 lb bombs in bomb bay or 3308 lb of freight or 10 paratroopers

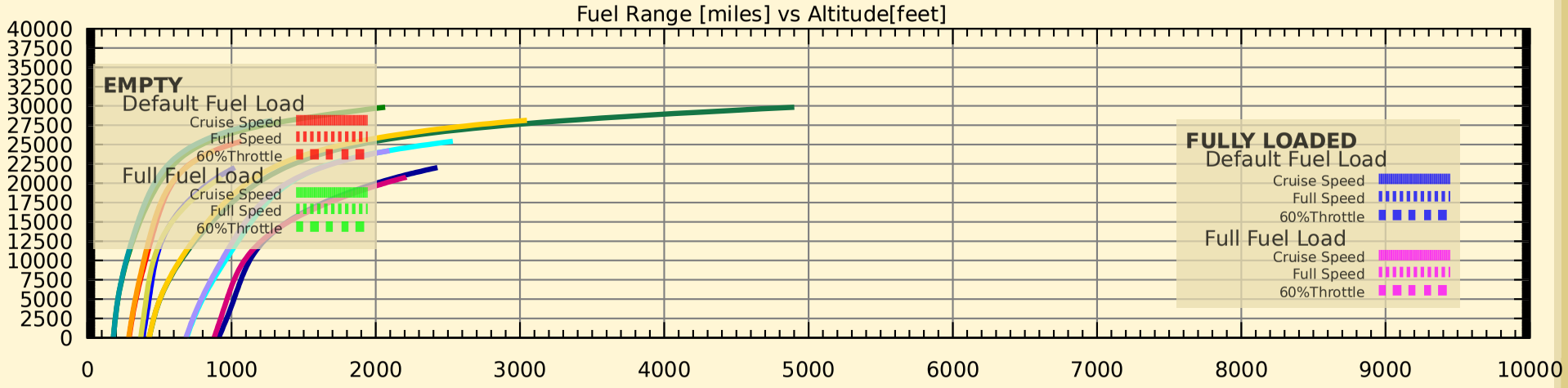
Length: 62.01 ft
Wing Span: 95.96 ft
Wing Area: 1189 sq. ft

Power Plant: 3 X BMW 132T-2
Power: 1707 lb s.t.
Internal Fuel: 3926 lb
External Fuel: NA

Empty Weight: 14594 lb
MTOW: 22707 lb







Junkers Ju-87G-2
Stuka

Durability	☆☆☆☆☆	Speed	☆☆☆☆	Climb Rate	☆
Maneuverability	☆☆☆☆☆	Firepower	☆☆☆☆	Ground Attack	☆☆☆☆

Speed - With an unloaded top speed of only 255 mph at altitude, the Stuka needs skies cleared of enemy fighters to make it to the target and back.

Facing ever-increasing numbers of Russian tanks, the RLM considered using airborne, large bore, anti-tank cannons. One of the planes considered for use in this role was the Ju-87 and so a production D-3 was fitted with two 600 lb., 37mm Bk-37 cannons in streamlined pods under the wings. Equipped with a pair of 6-round clips held in trays on each side of the weapon, the 3 lb. shells used either Wolfram Core armor-piercing rounds or blunt-nosed High-Explosive shells for soft targets. To compensate for the increased weight of the plane without bombs, one of the wing machine guns was removed with the other being retained for aiming purposes.

Tests were successful and production began by converting finished D-3s to this role, the result being dubbed the Ju-87G-1. Several G-1s were shipped to Russia to form Panzerjagdkommando Weiss for field service evaluations. Among the pilots who flew the new machine was Hans-Ulrich Rudel, who was to eventually be credited with 519 tank kills while flying the G-1.

While the G-1 was a conversion, the G-2 was made on the production line using the basic D-5 airframe and extended wings. The major difference, other than the wing, was that the wing bulge and fairing for the removed wing machine gun were themselves removed for a slight reduction in drag.

Although the G series was successful against the tanks it faced, it needed local air superiority to operate with impunity and that became increasingly rare as the Red Air Force increased in size and effectiveness. Eventually, the tank-busting role was to be largely replaced by the faster FW-190F and G models, but the Stuka continued to soldier on until the end of the war.

Sources:

Filley, Brian; Ju-87 Stuka In Action; Squadron/Signal Publications, Carrollton, TX; 1986.

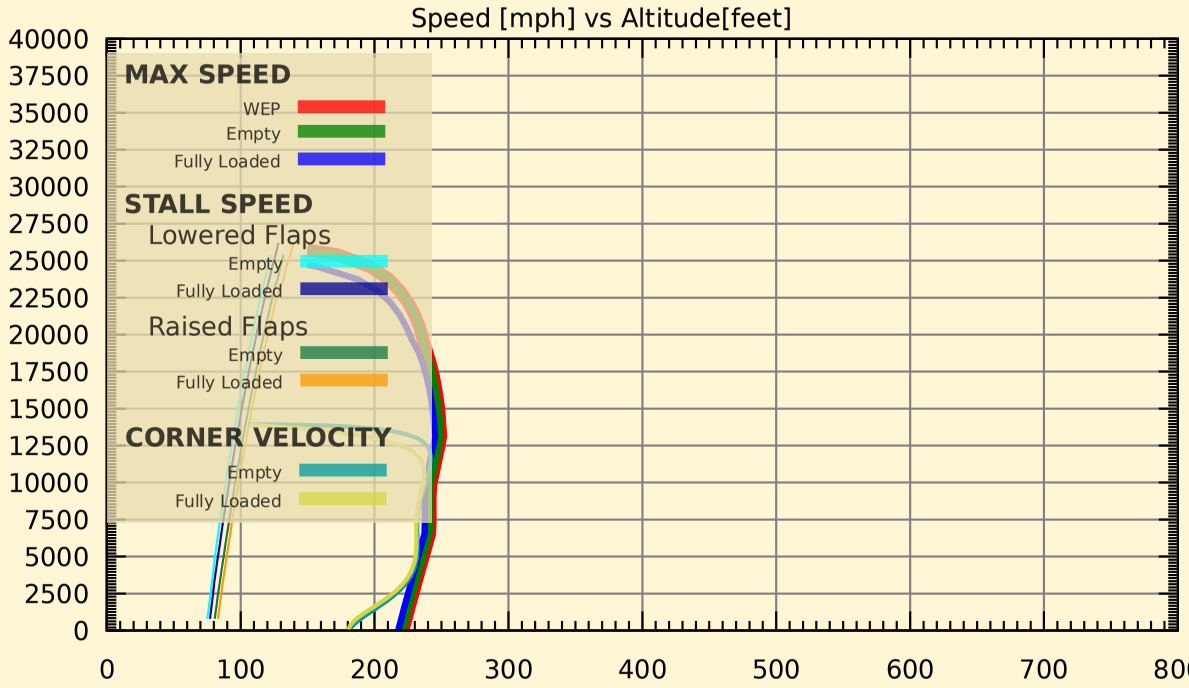
Green, William; Warplanes of the Third Reich; Doubleday and Company, Garden City, NY; 1970.

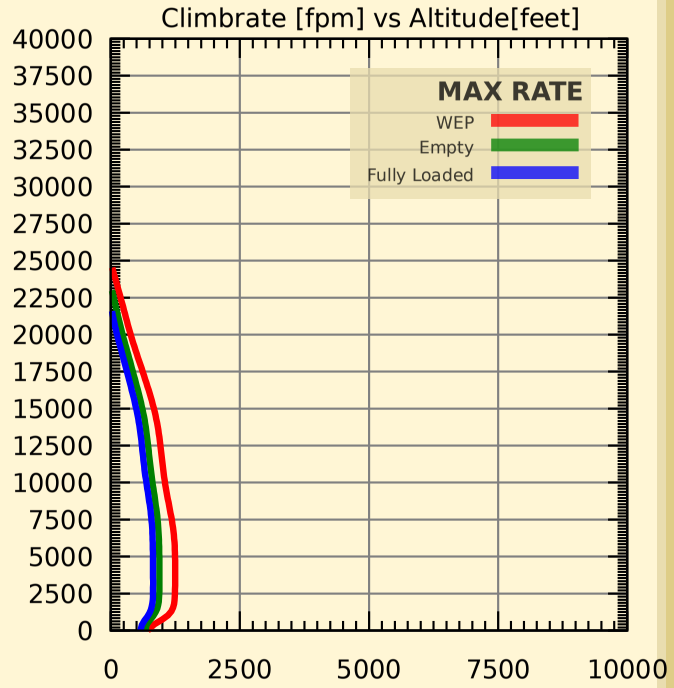
Name: Junkers Ju-87G-2 Stuka
Role: Fighter Bomber
Crew: 2
Service Date: February 1943
Primary Guns: One MG17 7.92mm machine gun with 900 rpg in wing
Secondary Guns: 2x Bord Kannon 3.7 cm cannon with 16 rpg under wings
Defensive Guns: NA
Ordnance: One 551 lb or One 1103 lb bomb under fuselage.

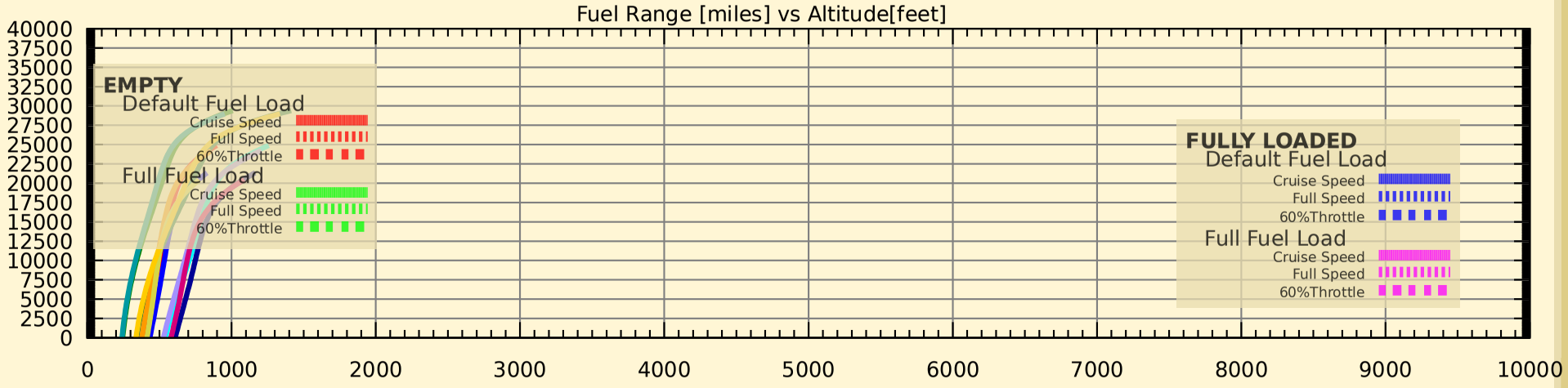
Length: 34.45 ft
Wing Span: 46.26 ft
Wing Area: 363 sq. ft

Power Plant: One Jumo211J-2
Power: 2887 lb s.t.
Internal Fuel: 1236 lb
External Fuel: NA

Empty Weight: 8929 lb
MTOW: 10251 lb







Junkers Ju-87D3
Stuka

Durability	★★★★★	Speed	★★★★	Climb Rate	★★
Maneuverability	★★★★★	Firepower	★	Ground Attack	★★★★

Speed - With an unloaded top speed of only 255 mph at altitude, the Stuka needs skies cleared of enemy fighters to make it to the target and back.

Having seen a demonstration of US Navy dive-bombing techniques, Ernst Udet was convinced that the same principle should be used by the secret air force that was being assembled even before the Nazis came to power in 1933. The new RLM issued an order for a two-phased development program to produce a Sturtzkampfflugzeug, or diving battle plane. The first phase was to employ a simple biplane design to allow for training and the development of tactics, with the Henschel 123 being selected as the primary model for this role.

The second phase of development envisaged an all-metal monoplane capable of carrying up to 1,100 lb. of bombs into combat. At about this time, Hugo Junkers was forced into retirement because of his anti-Nazi political views and the company was taken over by the government. Because of this direct control by RLM, the official rules of competition were bypassed and Junkers started development on their entry for the second phase before the specification was even drawn up.

Unsurprisingly, the Ju-87, as the design was known, won the competition handily, exactly matching the specifications that had been devised based on its anticipated performance. Three months after being awarded the contract, the first V-1 prototype was rolled out of the factory. Owing to the lack of quality German engines, the V-1 prototype was powered by a 525 hp Rolls-Royce Kestrel V-12 in-line engine.

To save weight the landing gear was fixed and to decrease drag the wings utilized an inverted gull configuration. This allowed the landing gear to be as short as possible while still allowing a large diameter propeller to be used. Initially fitted with a twin-fin tail arrangement, the Ju-87V-1 first flew on September 17, 1935. But a fatal crash caused by the separation of the right fin from the horizontal stabilizer on January 24, 1936 resulted in a hasty redesign of tail into the familiar cruciform, with braced horizontal stabilizers for additional strength during dive pullout.

In addition to the new tail, the V-2 prototype utilized the 610 hp Jumo-210Aa engine. The inverted V shape of the engine enabled the forward portion of the cowl to be sloped down, increasing over-the-nose visibility. In March the V-2 prototype entered the "competition" and unsurprisingly won the production contract. The Stuka, as it came to be known by friends and enemies alike, was equipped with a unique automatic pullout device, which was enabled by bomb release but could be easily over-ridden by the pilot simply by taking control of the stick.

The A-0 pre-production models began to roll off the assembly line before the end of 1936, quickly followed by production A-1s in early 1937. In the spring I/StG 162 Immelmann started converting from their Hs-123s and later that year a Kette of three Ju-87A-1s and pilots was sent to Spain to test combat tactics. Despite the maximum Bomb Load with gunner being only 550 lb. and having an unloaded speed of only 199 mph, the Stuka proved immediately successful.

Late in 1937 the A-2 began to come off the production line using the 680 hp Jumo-210Da, but further development hopes were pinned on the 1,100 hp Jumo-211A. Introduced in the B-1 model, the new engine required a complete redesign of the cowl to accommodate the oil cooler located atop the engine. At the same time the canopy was redesigned with the heavy central brace being removed to improve visibility. But the most notable change was to the shape of the fixed main gear as the heavily-braced and cowled, forward-swept gear was replaced by a more vertical single cantilever legs with teardrop-shaped spats covering the tops of the wheels.

The more powerful engine allowed the full 1,100 lb. bomb load to be carried along with the gunner. Additionally, four ETC-50 bomb racks were installed under the outer wing panels to allow for a 550 lb. main bomb to be supplemented with four 110 lb. secondary bombs. B-1s began rolling off the assembly line in October 1938 and by the time the war started over 260 B-1s had been delivered with Ju-87As being relegated to training duties.

By December 1939, the upgraded 1,200 hp Jumo-211Da engine began arriving and production was converted to the B-2. However, the new model wouldn't make it to front-line units until after the Battle of Britain, where they were largely used to replace the B-1s lost in combat. Developed in parallel with the B-2, the Ju-87R was equipped with additional fuel tanks, being intended for the Long Range role. Both the "B" and "R" models could be tropicalized for use in dusty and sandy conditions.

Although plans for a replacement were made as early as the end of the campaign in Poland the new designs, such as the Me-210, were not anywhere near completion. So plans were made to improve the Ju-87 by using the 1,400 hp Jumo-211J, which became available in February 1941. Among the requirements issued by RLM were to include significant aerodynamic improvements, a greatly increased Bomb Load, improved range, more armor protection and better defensive armament.

The first Ju-87D-1 entered service with I/StG 2 on the Russian Front in January 1942. To solve drag problems, the large radiator under the engine had been replaced with smaller radiators situated beneath the inboard wing panels. The canopy was redesigned with a sharply tapered rear turret installation for reduced drag. This new position used a MG-81Z twin 7.9mm machine gun installation with 1,000 rpg, but gunners hated the more cramped quarters they were forced to endure.

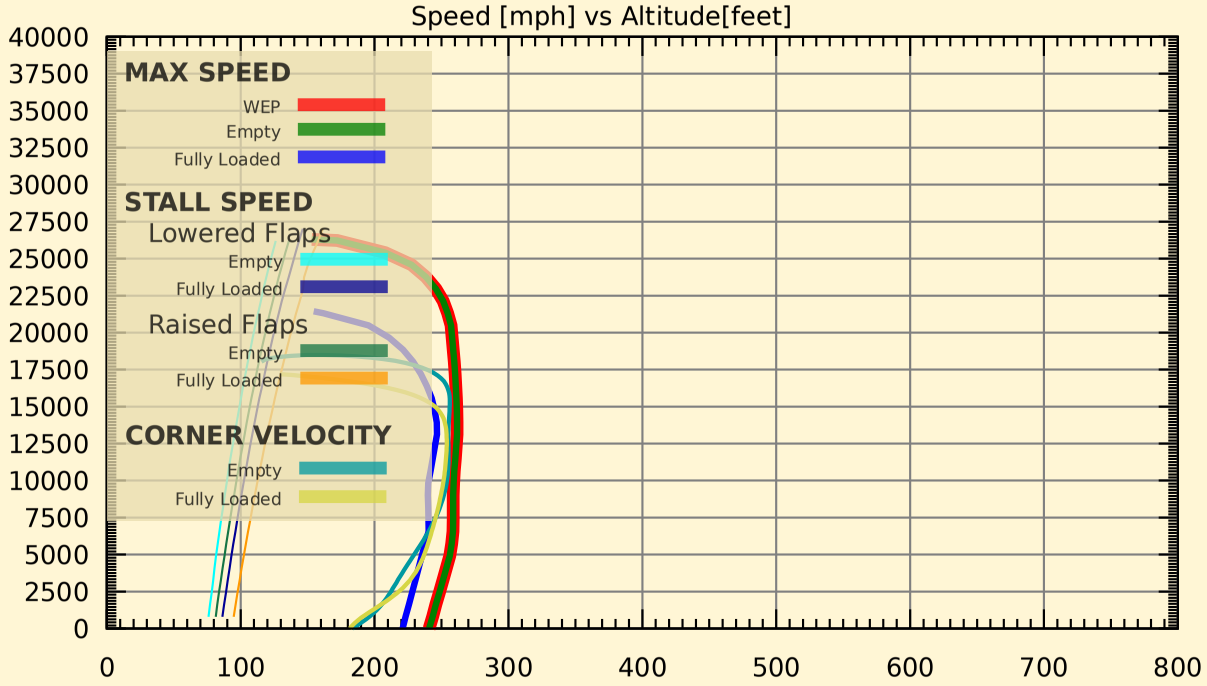
Most importantly the bomb load was greatly increased, the plane now being able to carry a maximum of 3,500 lb. without leaving the gunner behind. D-3s were introduced in May 1942 with increased internal armor protection for the engine and crew and the final

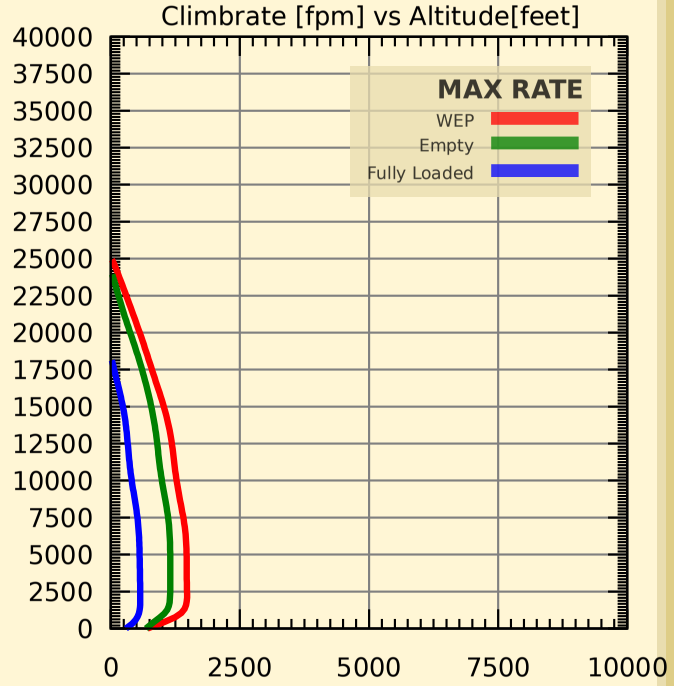
Name: Junkers Ju-87D3 Stuka
Role: Diving Bomber
Crew: 2
Service Date: July 1941
Primary Guns: One MG17 7.92mm machine gun with 900 rpg in wings
Secondary Guns: One MG17 7.92mm machine gun with 900 rpg in wings
Defensive Guns: NA
Ordnance: One 551 lb or One 1103 lb or One 2205 lb bomb under fuselage, plus 4x 551 lb or 2x 1103 lb bombs under wings. Maximum load of 3500 lb.

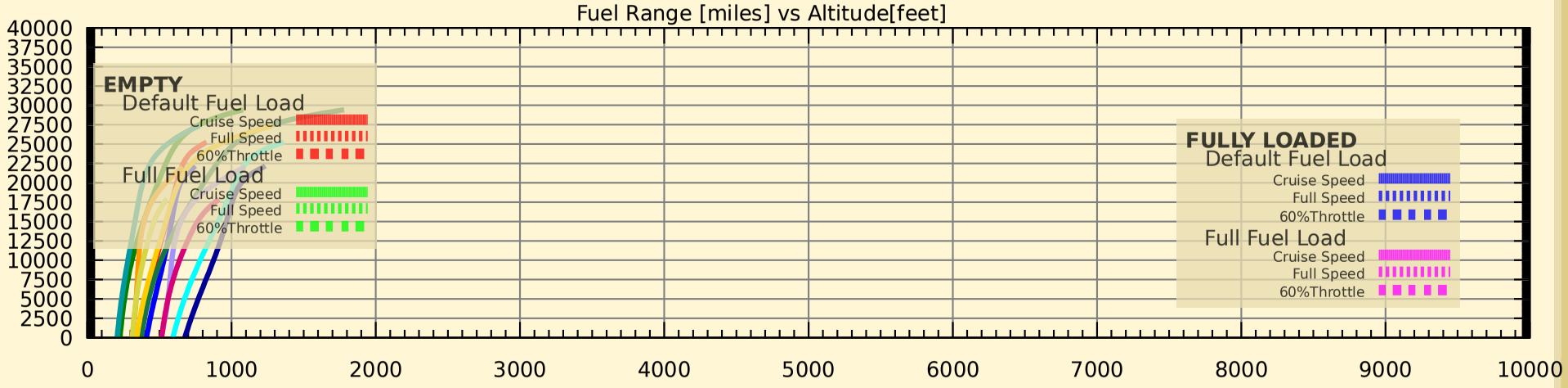
Length: 34.45 ft
Wing Span: 45.28 ft
Wing Area: 343 sq. ft

Power Plant: One Jumo211J-2
Power: 2887 lb s.t.
Internal Fuel: 1236 lb
External Fuel: NA

Empty Weight: 8708 lb
MTOW: 13448 lb

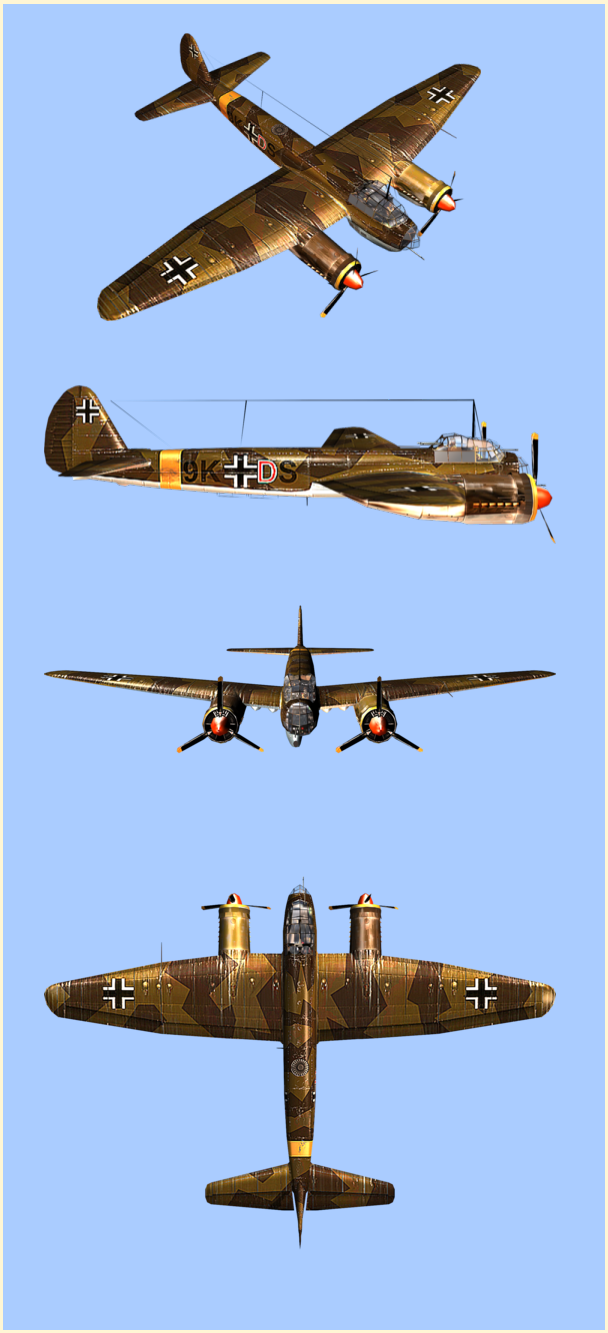






Junkers Ju-88A4

Durability	☆☆☆☆☆	Speed	☆☆☆☆	Climb Rate	☆☆
Maneuverability	☆☆☆	Firepower	☆	Ground Attack	☆☆☆☆☆



Defensive Firepower - The Ju-88 has many blind spots in its defensive screen and can be brought down quite easily.

In 1935 the RLM requested submissions from the major German aircraft manufacturers for a schnellbomber, literally a fast-bomber, with a top speed of 310 mph and a bomb carrying capacity of at least 1,100 lb. Focke-Wulf declined to enter the competition but designs were submitted by Messerschmitt, Henschel and Junkers.

The Junkers Company wanted to win this contract and hired designers W.H. Evers and Alfred Gassner, each of whom had experience working with stressed-aluminum skin construction in the United States. Two design proposals were submitted, one with a twin- tail arrangement called the Ju-85 and another with a single rudder called the Ju-88. RLM approved the Ju-88 design and ordered three prototypes to be constructed.

The first prototype, powered by two 1,000 hp Daimler-Benz DB-600Aa engines, was first flown on December 21, 1936. The first prototype had the cockpit glass work barely protruding above the fuselage deck and a pointed nose for optimal aerodynamics. However, visibility was poor and the fourth prototype adopted the familiar glass-nosed and raised-cockpit shape that it would become recognized by. The fifth prototype was used for winning a speed record and utilized a pointed nose again, but the sixth prototype, which first flew on June 18, 1938, was the first of the A-0 pre-production machines.

Now being powered by 1,200 hp Jumo-211B-1 engines, the plane was outfitted with dive brakes and automatic pullout gear similar to that installed in the Ju-87. Provision was made for three defensive MG-15 machine guns, one in the nose operated by the bombardier, one in the dorsal position operated by the engineer and the last in the ventral position operated by the radio operator. The nose gun could be clamped down and used as a fixed gun fired by the pilot. Two internal bomb bays could house up to twenty-eight 110 lb. bombs or additional fuel tanks and two external racks could each carry a 1,100-lb. bomb. The maximum bomb load was 3,960 lb. under normal conditions and up to 5,284 lb. under short-range overload conditions.

Deliveries of the production A-1 models commenced in August 1939 and I/KG 30 made its first operational sortie with a mixture of A-0 and A-1 models on September 26, 1939. Despite its operational status, the A-1 had plenty of problems, which were to be resolved in the next main production model. But meanwhile, the A-2 was introduced using the Jumo-211G-1 engine and attachment points for rocket-assisted take-off boosters. The A-3 was a trainer with dual controls and instruments.

The Ju-88A-4 was to be the culmination of a series of improvements, including a revised wing with 5 feet longer span and 1,400 hp Jumo-211F or J engines. The additional power allowed for the installation of increased armor protection for the crew. However, problems with the new engines delayed the project and the Luftwaffe ordered the improvements incorporated into the production line utilizing the existing engines. This version was designated the A-5 and deliveries began in time to see service in the Battle of Britain.

Because of battle experiences with survivability, the defensive armament for the A-4 was considerably improved over that of the A-5. The drum-fed MG-15s were replaced by belt-fed MG-81s, which also had a higher rate of fire than the MG-15. Two MG-81s were mounted in separate armored window bulges in the dorsal position, the ventral position got a MG-81Z twin-gun installation and the nose gun was upgraded to a 13mm MG-131.

Sources:

Filley, Brian; Junkers Ju-88 In Action Part 1; Squadron/Signal Publications, Carrollton, TX; 1988.

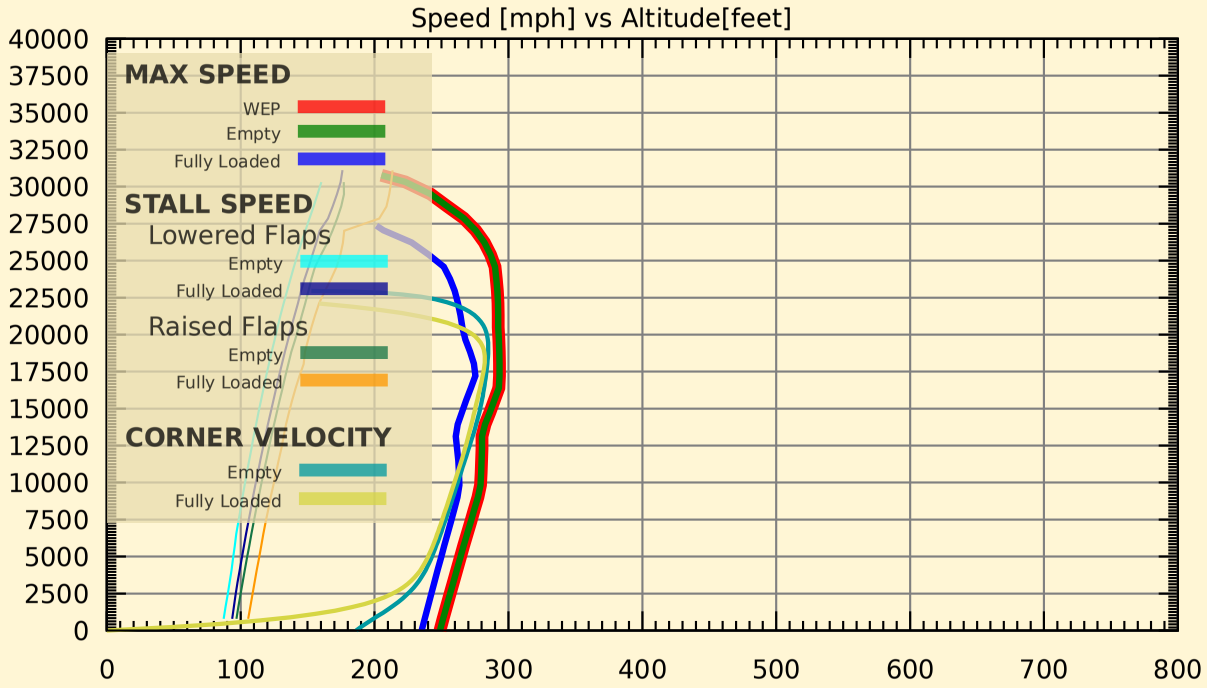
Green, William; Warplanes of the Third Reich; Doubleday and Company, Garden City, NY; 1970.

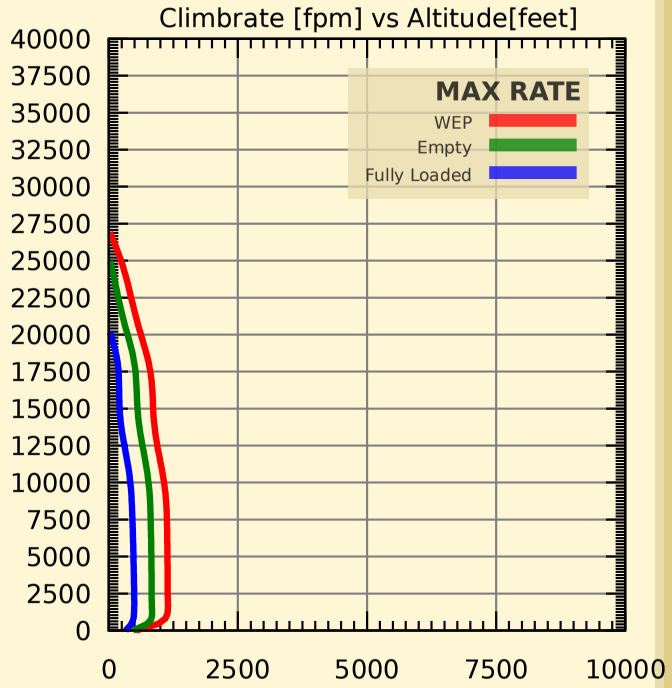
Name: Junkers Ju-88A4
Role: Medium Bomber
Crew: 4
Service Date: February 1941
Primary Guns: One MG81 7.92mm flex or fixed with 750 rpg in windscreen
Secondary Guns: NA
Defensive Guns: NA
Ordnance: 10x 121 lb or 2x 551 lb bombs in bomb bay, plus 4x 551 lb or 4x 1102 lb bombs or 2x 1790 lb F5b torpedo or 2x 1429 lb drop tanks on external wing racks

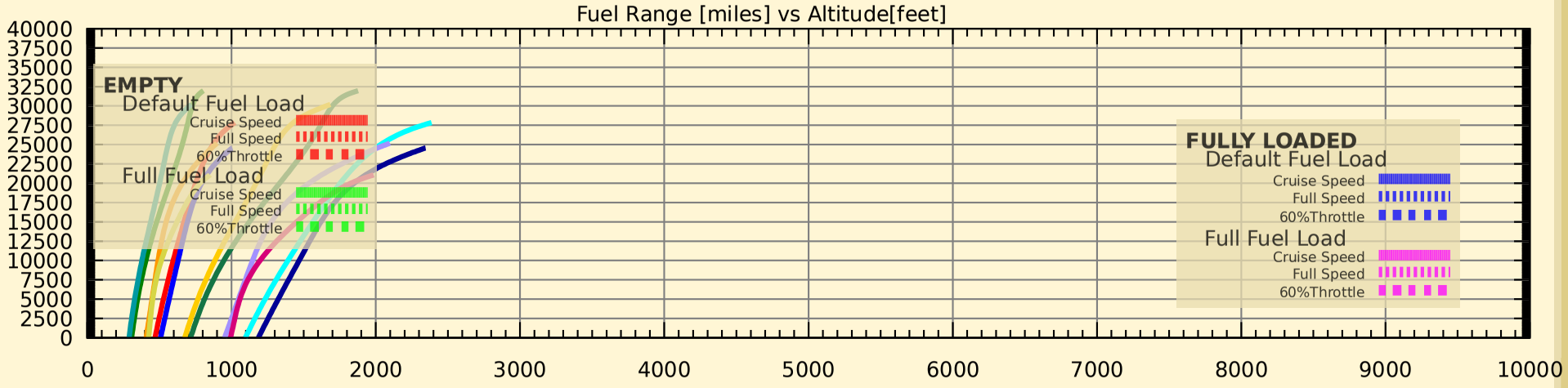
Length: 47.05 ft
Wing Span: 65.75 ft
Wing Area: 587 sq. ft

Power Plant: 2 X Jumo 211J-1
Power: 2768 lb s.t.
Internal Fuel: 4632 lb
External Fuel: 2858 lb

Empty Weight: 19400 lb
MTOW: 29542 lb

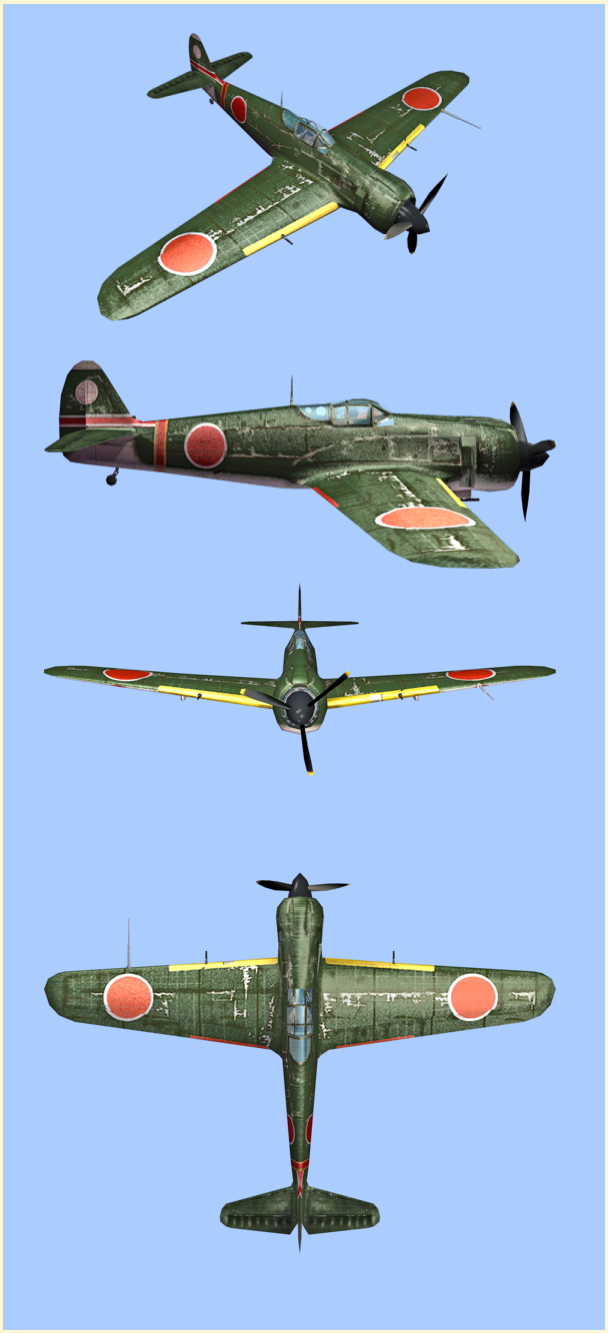






Kawasaki Ki-100-Ia
Tony

Durability	☆☆	Speed	☆☆☆☆☆	Climb Rate	☆☆☆☆☆
Maneuverability	☆☆☆☆☆	Firepower	☆☆☆	Ground Attack	☆☆☆



Performance - By the time it reached front-line service, it was totally outclassed by Allied fighters at all altitudes.

Seeking to upgrade the output of the 1,100 hp Ha-40 engine, Kawasaki started working on a 1,500 hp replacement, the Ha-140. This new engine was intended to be used in an upgraded version of the Ki-61 with larger wings for improved maneuvering. However, the engine encountered terrible teething problems, including a weak crankshaft and the wings were subject to failure during high-performance altitude testing.

With improvements to the wing and an increase in fuselage length, the Ki-61-II-KAI was ready for production, but the engines were still having problems. However, the Ministry of Munitions was confident that the engine problems would be solved and ordered Kawasaki to start building airframes.

By June 1944 the problem of home defense was becoming acute and while good engine-less airframes were sitting unused at the factory, operational Sentais were being forced to use older, less capable planes. Finally, in November 1944 the Munitions Ministry instructed Kawasaki to search for a suitable replacement for the ill-fated Ha-140.

Being designed around an inline engine, the Ki-61-II airframe was only 2'9" in diameter where the engine was mounted. All other engines of similar size were already spoken for and the only engine of even similar diameter and power output was the 4 foot diameter Ha-112-II radial engine then being used for bombers. After studying the FW-190A engine mount, which also married a large engine to a small airframe, work began on three Ki-61-II-KAI airframes. The result was called the Ki-100 and first took flight on February 1, 1945.

Due to the lighter weight of the engine, the plane came in at about 800 lb. less than the Ha-140 powered Ki-61. The power output was the same and performance was identical in all respects except top speed, which was reduced somewhat due to the additional drag of the radial engine. Eventually 271 Ki-61-II airframes would be converted to Ki-100s with the remainder Ki-100s being purpose-built.

The appearance of the new Tony came as a complete and unpleasant surprise to Allied aircrews and Japanese pilots hailed it as the best and most reliable fighter they had. Its easy handling characteristics were particularly welcome to the Army as younger pilots often had less than 100 hours total flight time before being assigned to combat units.

Sources:

Francillon, Rene J.; Japanese Aircraft of the Pacific War; Naval Institute Press, Annapolis, MD; 1979.

Green, William; Warplanes of the Second World War, Fighters, Volume Three; Hanover House, Garden City, NY; 1960.

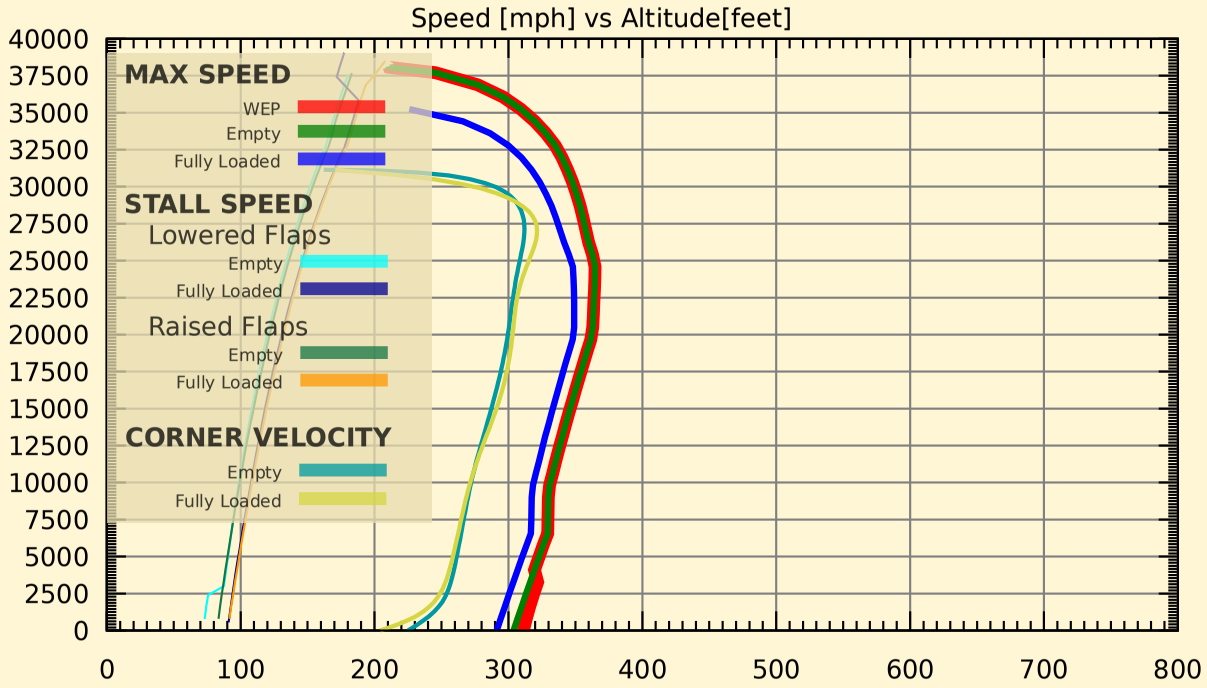
Green, William; Famous Fighters of the Second World War; Hanover House, Garden City, NY; 1960.

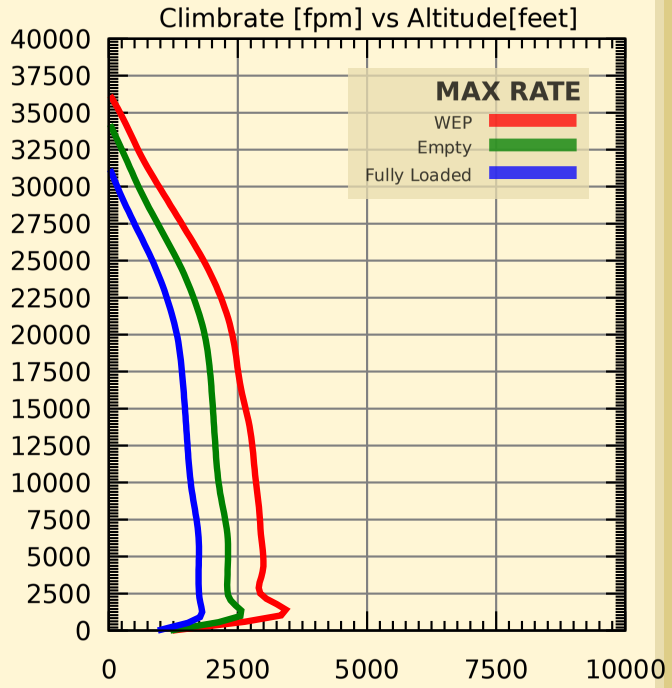
Name: Kawasaki Ki-100-Ia Tony
Role: Fighter
Crew: 1
Service Date: April 1945
Primary Guns: 2x Ho-103 Type 1 12.7mm machine guns with 250 rpg in wings
Secondary Guns: 2x Ho-5 Type 1 20mm cannon with 200 rpg in cowl
Defensive Guns: NA
Ordnance: 2x 220 lb 2x 550 lb bombs or 2x 317 lb drop tanks under wings

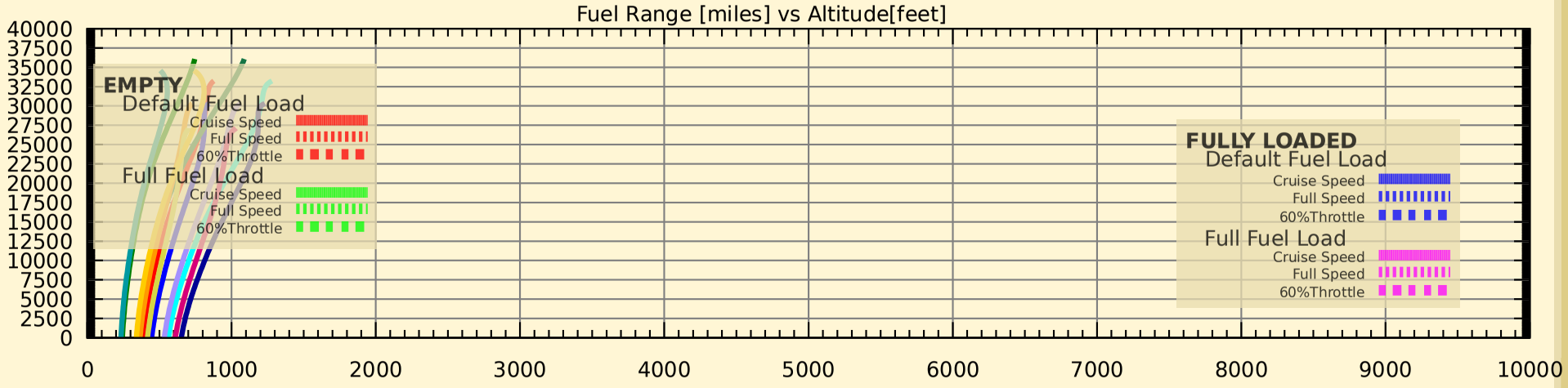
Length: 29.27 ft
Wing Span: 39.37 ft
Wing Area: 215 sq. ft

Power Plant: One Mitsubishi Ha-112-II
Power: 3306 lb s.t.
Internal Fuel: 966 lb
External Fuel: 634 lb

Empty Weight: 5489 lb
MTOW: 7937 lb

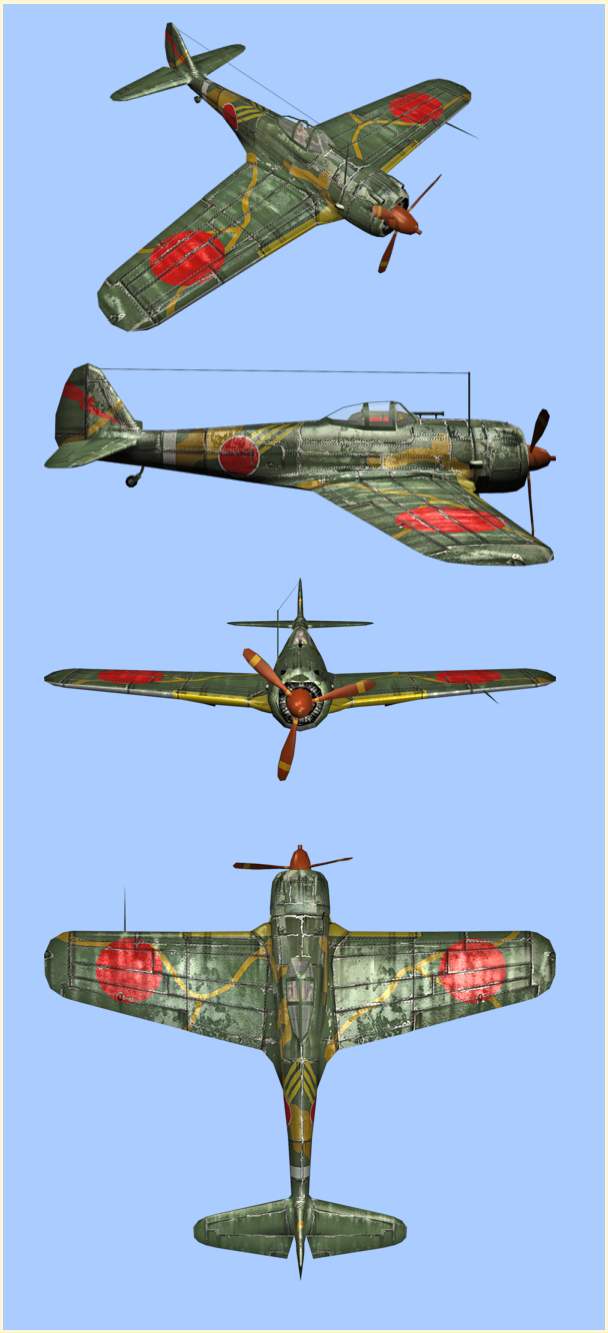






Nakajima Ki-43-IIa Hayabusa
Oscar

Durability	☆☆	Speed	☆☆☆☆	Climb Rate	☆☆☆☆
Maneuverability	☆☆☆☆☆☆☆	Firepower	☆☆	Ground Attack	☆☆



Firepower - A mere two 12.7mm machine guns leaves the Oscar incapable of doing much damage to enemy planes.

By 1937, the Japanese Army had abandoned the use of competitive contracts to obtain aircraft designs and Nakajima was ordered to build a new fighter to replace the Ki-27 then in service. The specifications called for a fighter capable of reaching a top speed of 500 kph (311 mph), a climb rate of 5 minutes to 5,000m (16,405 ft), a range of 800 km, an armament of two 7.7mm machine guns and maneuverability at least as good as the Ki-27.

Within a year the team of designers, led by Hideo Itokawa, had completed the first prototype, which was rolled out of the factory on December 12, 1938. Over the next several months the company tested the new prototype, which was joined by two others, and a short time later the three prototypes were shipped to the JAAF for Service Trials. The plane met all the requirements except that pilots, still thinking that future combats would be classic turn fights, were unhappy with its maneuverability.

The JAAF decided to test another ten planes and Nakajima was ordered to build them in November 1939. The eighth of these prototypes was fitted with an experimental Nakajima Ha-105 radial engine and a pair of 12.7mm machine guns in place of the 7.7s. But the next prototype was to see the introduction of butterfly type flaps that could be deployed in combat to improve lift and turn rate. This arrangement proved popular with pilots and following extensive tests, the Koku Hombu ordered the Ki-43 put into production.

The Ki-43-Ia model was powered by a 950 hp Nakajima Ha-25 radial engine and was armed with a pair of 7.7mm Type 89 machine guns in the cowl. This model was delivered to the 59th and 64th Sentais, which were moved to China shortly before Pearl Harbor. Alternative versions were also coming off the assembly line, the -Ib with a single 7.7mm and a 12.7mm machine gun, and the -Ic with two 12.7mm Ho-103s.

Although it lacked self-sealing fuel tanks or pilot armor and the armament was weak, particularly on the -Ia, the Ki-43 was a shocking success in the early part of the war. When it was seen in the Southwest Pacific it was code-named 'Oscar' and when seen in China it was thought to be a different plane and given the code-name 'Jim'. But the 'Oscar' designation was retained when it was learned that the two planes were the same.

Five Ki-43-Is were fitted with the 1,150 hp Ha-115 radial engine in February 1942 and after dealing with a few minor engine teething problems, the upgrade was deemed successful and production of the Ki-43-IIa was ordered in November. To help improve low altitude speed, the wingspan was reduced by about 2 feet. Additionally, the wing was strengthened to allow a 250 kg. bomb to be carried under each wing outboard of the landing gear legs. Just as important, a rudimentary form of self-sealing fuel tank was installed as well as 13mm armor plate for the pilot.

But by this time, JAAF pilots were facing faster and more heavily armed American and Australian planes and the type was outclassed. However, more Ki-43s served in the JAAF than any other plane and it continued to be improved and produced throughout the war. After the war, salvaged Hayabusas were used by the Indonesian People's Security Force against the Dutch and by the French against Communist insurgents in Indo-China.

Sources:

Francillon, Rene J.; Japanese Aircraft of the Pacific War; Naval Institute Press, Annapolis, MD; 1979.

Green, William; Warplanes of the Second World War, Fighters, Volume Three; Hanover House, Garden City, NY; 1960.

Green, William; Famous Fighters of the Second World War; Hanover House, Garden City, NY; 1960.

Military Magazine "Maru" Editorial Desk; Mechanism of Military Aircraft, No. 12, "Hayabusa" / "Shoki" / Type 97 Fighter; Kojinsha, Tokyo, Japan; 2000.

Nozawa, Tadashi; Encyclopedia of Japanese Aircraft 1900-1945, Vol.5, Nakajima Aircrafts; Shuppan-Kyodo Publishers, Tokyo, Japan; 1983.

Famous Airplanes of the World, No. 65, Army Type 1 Fighter "Hayabusa"; Bunrindo, Tokyo, Japan; 1997.

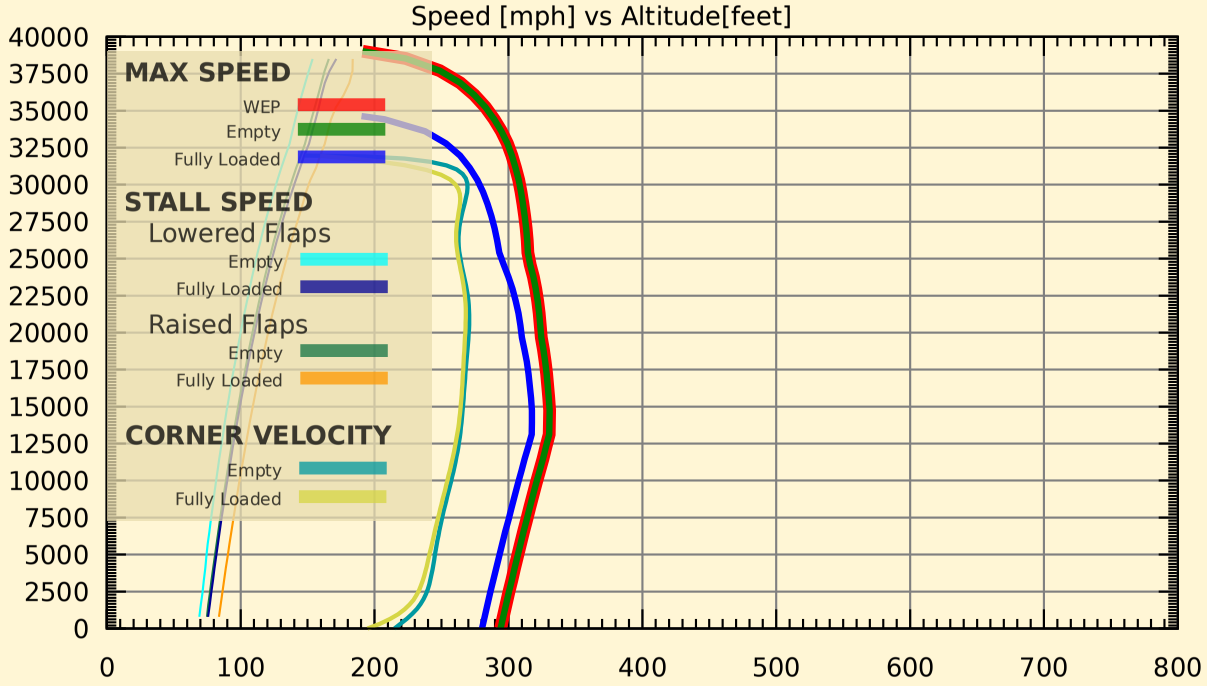
Human Acts in the History, Pacific War Series, Vol. 52, Type 1 Fighter "Hayabusa"; Gakken, Tokyo, Japan; 2005.

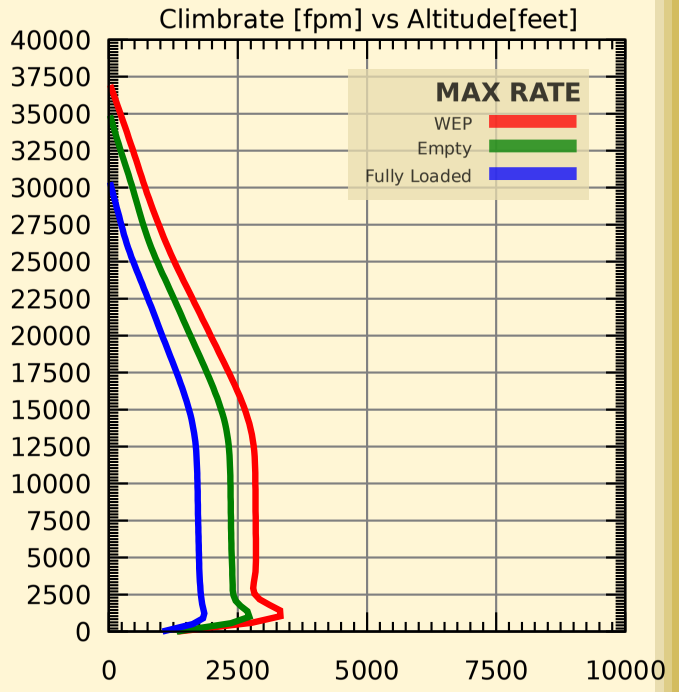
Name: Nakajima Ki-43-IIa Hayabusa Oscar
Role: Fighter
Crew: 1
Service Date: October 1942
Primary Guns: One Ho-103 Type 1 12.7mm machine gun with 270 rpg in cowl
Secondary Guns: One Ho-103 Type 1 12.7mm machine gun with 270 rpg in cowl
Defensive Guns: NA
Ordnance: 2x 220 lb or 2x 551 lb bombs or 2x 317 lb drop tanks

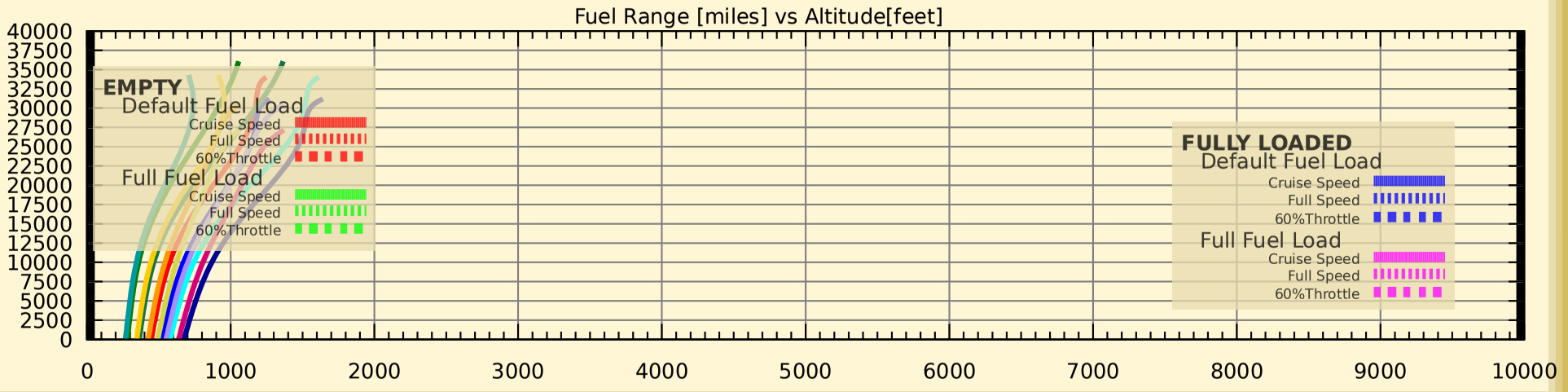
Length: 29.27 ft
Wing Span: 35.53 ft
Wing Area: 230 sq. ft

Power Plant: One Nakajima Ho-115-1
Power: 2172 lb s.t.
Internal Fuel: 855 lb
External Fuel: 634 lb

Empty Weight: 4387 lb
MTOW: 6448 lb

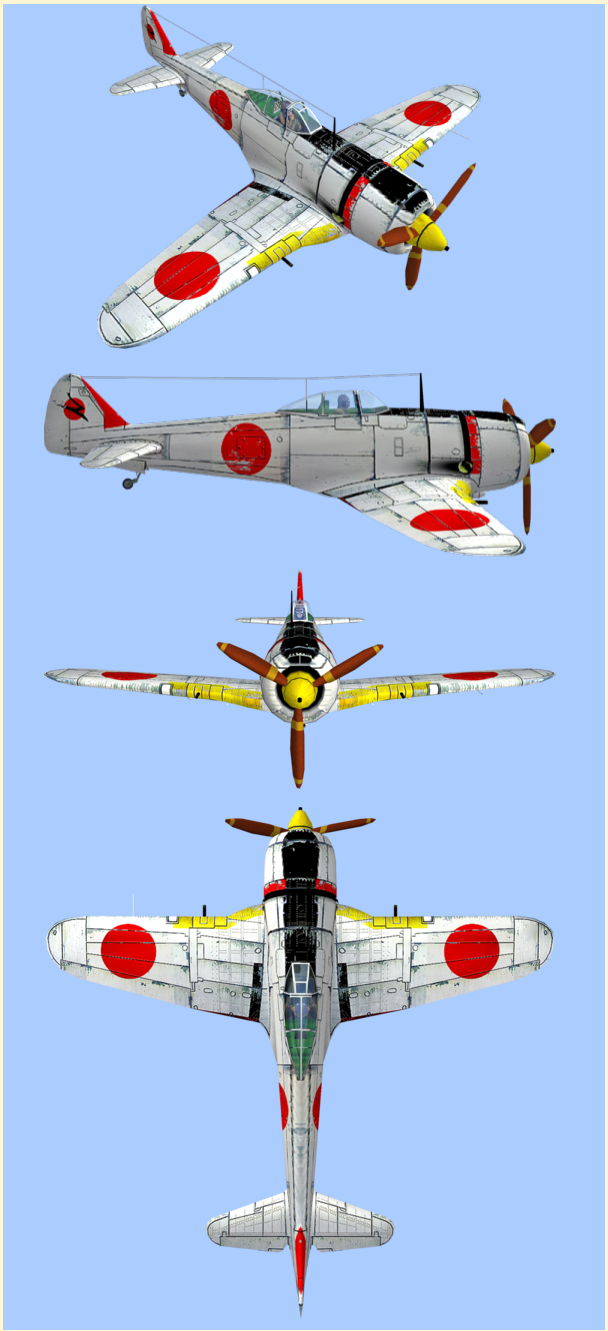






Ki-44-IIc Shoki
Tojo

Durability	★★★	Speed	★★★★★★	Climb Rate	★★★★★★
Maneuverability	★★★★★	Firepower	★★★★★	Ground Attack	★★★



Maneuverability - With wing loading higher than contemporary US Navy fighters, the Ki-44 pilot is best advised to use energy fighting tactics except when dealing with the heavier and faster late-war designs.

Faced with an increase in B-29 raids from China and the Marianas, the Japanese Army issued specifications for a high-speed, high-altitude fighter capable of intercepting the American bombers. Unlike other design specifications issued by the Japanese armed forces, this one emphasized speed and climb rate over all other considerations.

Nakajima decided to base the new design around their own Ha-41 engine, a large fourteen-cylinder engine used primarily on bombers. The new design featured a streamlined cowl and a broad fuselage side and large tail fin to provide for a more stable gun platform.

Performance trials of the new design proved disappointing. The plane failed to meet the required speed and time to altitude trials and along with difficulties in the Ki-43 project, Nakajima was in trouble. Back in the factory numerous changes were made to the cowl in an effort to improve streamlining and coax some more speed out of the design. After installing a new firewall for improved cooling, five cooling vents on the side of the cowl were able to be covered over and with the reduced drag, the Ki-44 was able to exceed the performance requirements specified by the Army.

By September 1942 all trials and tests had been completed satisfactorily and the Army accepted the plane into service. The initial version, which had been in production since January and known as the Ki-44-Ia, was fitted with a pair of 7.7mm machine guns in the cowl and a 12.7mm machine gun in each wing. The next variant, the Ki-44-Ib, had the 7.7mm guns replaced by 12.7mm models for a total of four 12.7mm guns.

Despite being the fastest fighter in either Army or Navy service, the plane was incapable of catching up with the Army's Ki-46 reconnaissance plane. Nakajima responded by installing a more powerful engine, the Ha-109, which had the same dimensions as the Ha-41 and thus required no changes to the airframe. Production of this version, known as the Ki-44-IIa, commenced in August 1942 with armament similar to the -Ia variant. Few -IIa's were built with production shifting almost immediately to the Ki-44-IIb, which was armed with only a pair of 12.7mm machine guns in the cowl and no guns in wings.

The Ki-44-IIc was introduced with four 12.7mm Ho-103 guns. Even with this armament, it was not enough powerful against the B-29s. 20mm cannons were requested by the pilots, but in the end were not used in the -II series.

Sources:

Francillon, Rene J.; Japanese Aircraft of the Pacific War; Naval Institute Press, Annapolis, MD; 1979.

Green, William; Warplanes of the Second World War, Fighters, Volume Three; Hanover House, Garden City, NY; 1960.

Nozawa, Tadashi; Encyclopedia of Japanese Aircraft 1900-1945, Vol.5, Nakajima Aircrafts; Shuppan-Kyodo Publishers, Tokyo, Japan; 1983.

Famous Airplanes of the World, No. 16, Army Type 2 Fighter "Shoki"; Bunrindo, Tokyo, Japan; 1989.

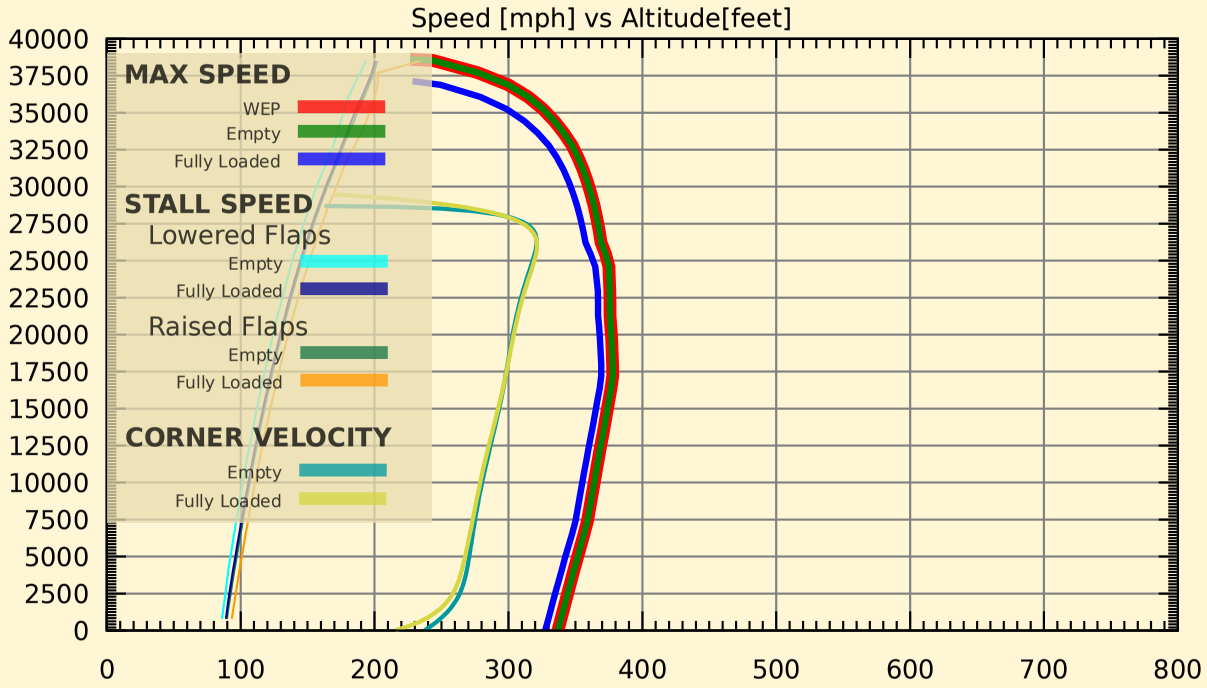
Military Magazine "Maru" Editorial Desk; Mechanism of Military Aircraft, No. 12, "Hayabusa" / "Shoki" / Type 97 Fighter; Kojinsha, Tokyo, Japan; 2000.

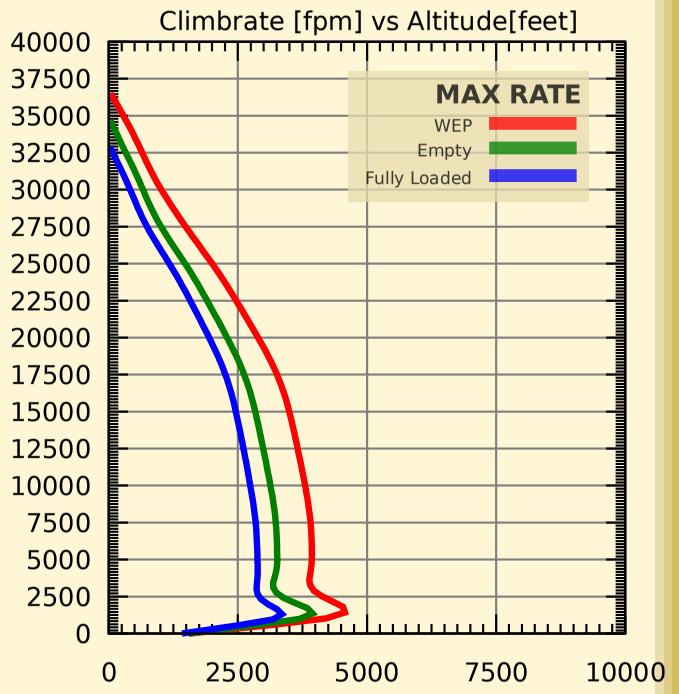
Name: Ki-44-IIc Shoki Tojo
Role: Fighter
Crew: 1
Service Date: February 1943
Primary Guns: 2 x Ho-103 12.7 mm machine guns with 250 rpg in cowl
Secondary Guns: 2 x Ho-103 12.7 mm machine guns with 250 rpg in wings
Defensive Guns: NA
Ordnance: 2x 110 lb or 2x 220 lb bombs or 2x 207 lb drop tanks

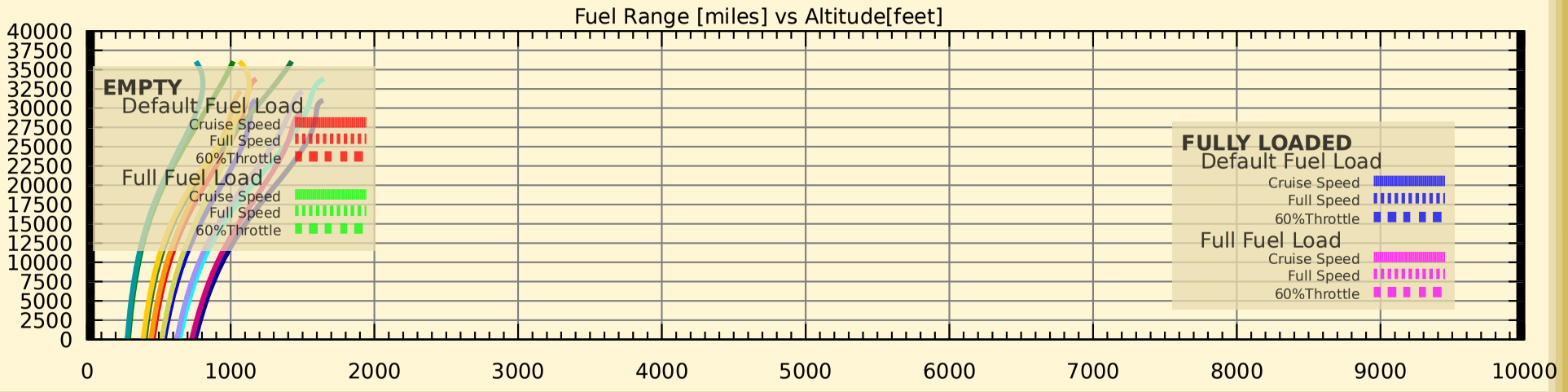
Length: 28.74 ft
Wing Span: 31.00 ft
Wing Area: 161 sq. ft

Power Plant: One Nakajima Ha-109
Power: 3176 lb s.t.
Internal Fuel: 802 lb
External Fuel: 415 lb

Empty Weight: 4674 lb
MTOW: 6393 lb

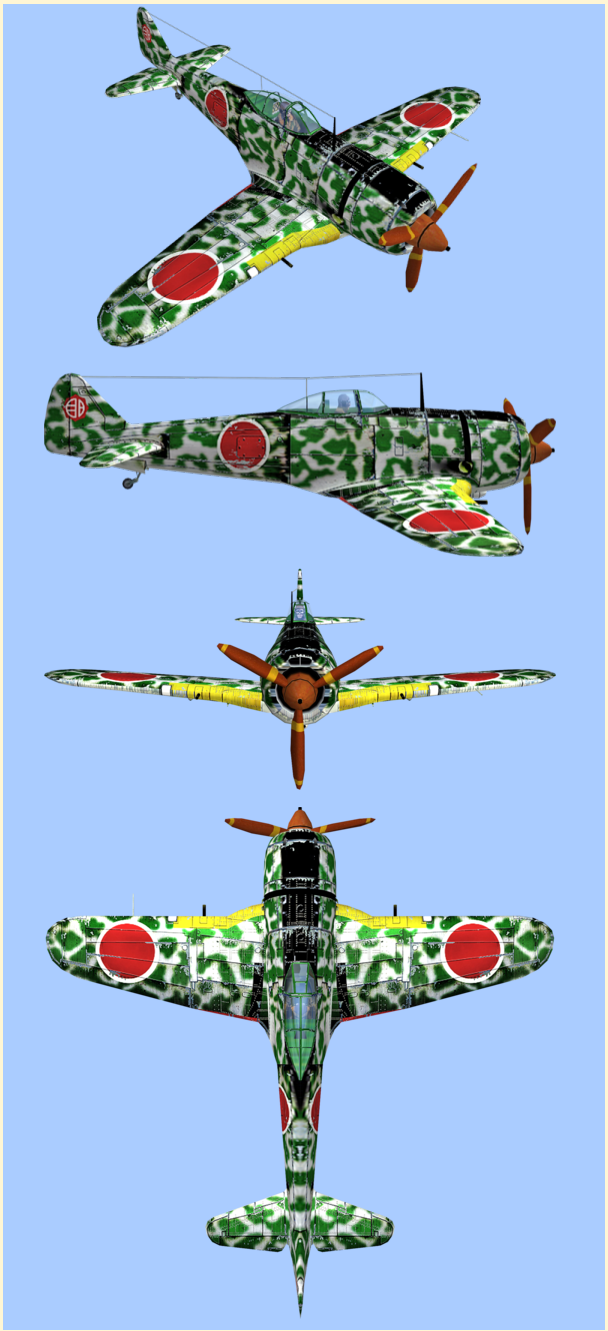






Ki-44-IIc37 Shoki
Tojo

Durability	☆☆☆	**Speed**	☆☆☆☆☆☆	**Climb Rate**	☆☆☆☆☆☆
Maneuverability	☆☆☆☆☆	**Firepower**	☆☆☆☆☆	**Ground Attack**	☆☆☆☆



Maneuverability - With wing loading higher than contemporary US Navy fighters, the Ki-44 pilot is best advised to use energy fighting tactics except when dealing with the heavier and faster late-war designs.

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Performance trials of the new design proved disappointing. The plane failed to meet the required speed and time to altitude trials and along with difficulties in the Ki-43 project, Nakajima was in trouble. Back in the factory numerous changes were made to the cowl in an effort to improve streamlining and coax some more speed out of the design. After installing a new firewall for improved cooling, five cooling vents on the side of the cowl were able to be covered over and with the reduced drag, the Ki-44 was able to exceed the performance requirements specified by the Army.

By September 1942 all trials and tests had been completed satisfactorily and the Army accepted the plane into service. The initial version, which had been in production since January and known as the Ki-44-Ia, was fitted with a pair of 7.7mm machine guns in the cowl and a 12.7mm machine gun in each wing. The next variant, the Ki-44-Ib, had the 7.7mm guns replaced by 12.7mm models for a total of four 12.7mm guns.

Despite being the fastest fighter in either Army or Navy service, the plane was incapable of catching up with the Army's Ki-46 reconnaissance plane. Nakajima responded by installing a more powerful engine, the Ha-109, which had the same dimensions as the Ha-41 and thus required no changes to the airframe. Production of this version, known as the Ki-44-IIa, commenced in August 1942 with armament similar to the -Ia variant. Few -IIa's were built with production shifting almost immediately to the Ki-44-IIb, which was armed with only a pair of 12.7mm machine guns in the cowl and no guns in wings.

The Ki-44-IIc was introduced with four 12.7mm Ho-103 guns. Even with this armament, it was not enough powerful against the B-29s. 20mm cannons were requested by the pilots, but in the end were not used in the -II series.

A small number of -IIb variants used the unique Ho-301 40mm cannon in the wings. This gun was unique in that it used caseless ammunition, the propellant charge being contained in the projectile itself. However, the muzzle velocity was so low that the weapon only had an effective range of 150 meters, making it virtually useless against the heavily defended American bombers.

A small number of -IIc's were converted to use the 37mm Ho-203 cannon in the wings. This high velocity weapon had a range of 1,000 meters and fired a high explosive projectile weighing almost half a kilogram. Each cannon was fed by a belt containing only 25 rounds, but it could fire only about 2 rounds per second, so pilots had to be sure of their aim.

Sources:

Francillon, Rene J.; Japanese Aircraft of the Pacific War; Naval Institute Press, Annapolis, MD; 1979.

Green, William; Warplanes of the Second World War, Fighters, Volume Three; Hanover House, Garden City, NY; 1960.

Nozawa, Tadashi; Encyclopedia of Japanese Aircraft 1900-1945, Vol.5, Nakajima Aircrafts; Shuppan-Kyodo Publishers, Tokyo, Japan; 1983.

Famous Airplanes of the World, No. 16, Army Type 2 Fighter "Shoki"; Bunrindo, Tokyo, Japan; 1989.

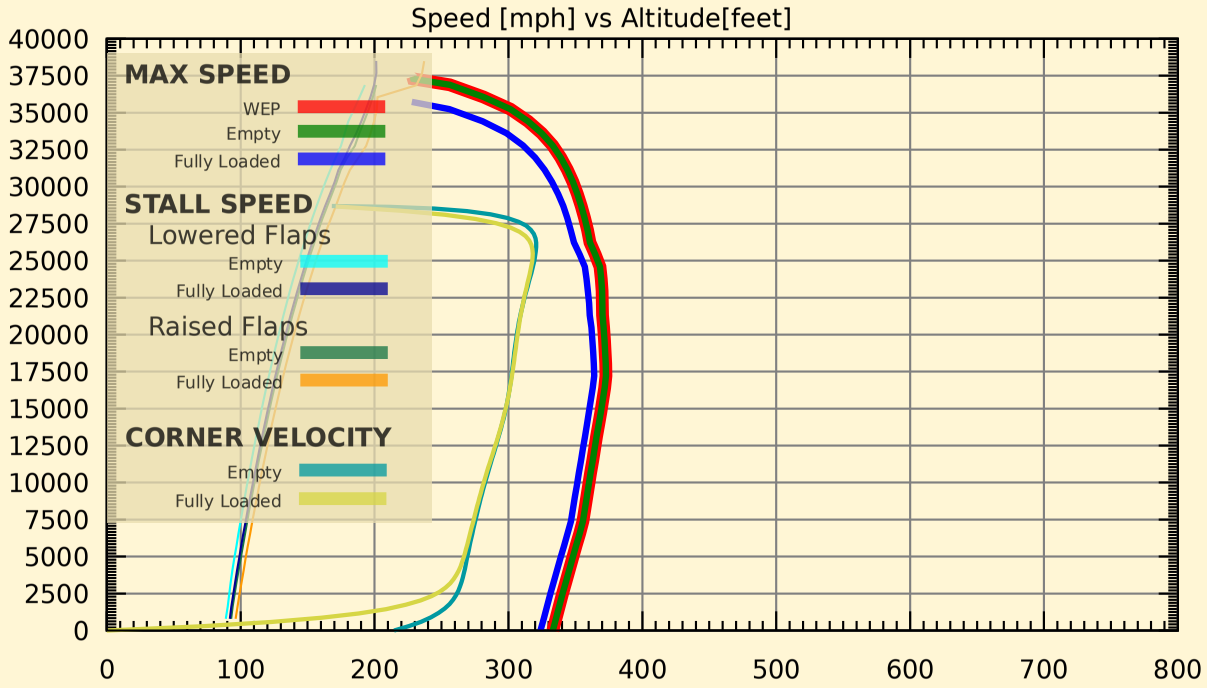
Military Magazine "Maru" Editorial Desk; Mechanism of Military Aircraft, No. 12, "Hayabusa" / "Shoki" / Type 97 Fighter; Kojinsha, Tokyo, Japan; 2000.

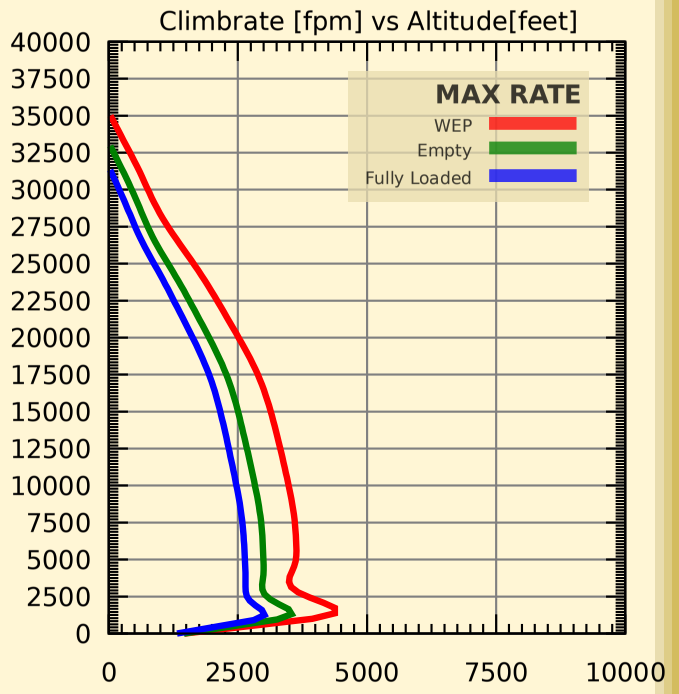
Name: Ki-44-IIc37 Shoki Tojo
Role: Fighter
Crew: 1
Service Date: May 1943
Primary Guns: 2 x Ho-103 Type 3 12.7mm machine guns with 250 rpg in cowl
Secondary Guns: 2 x Ho-203 37mm cannons with 25 rpg in wings
Defensive Guns: NA
Ordnance: 2x 110 lb or 2x 220 lb bombs or 2x 207 lb drop tanks

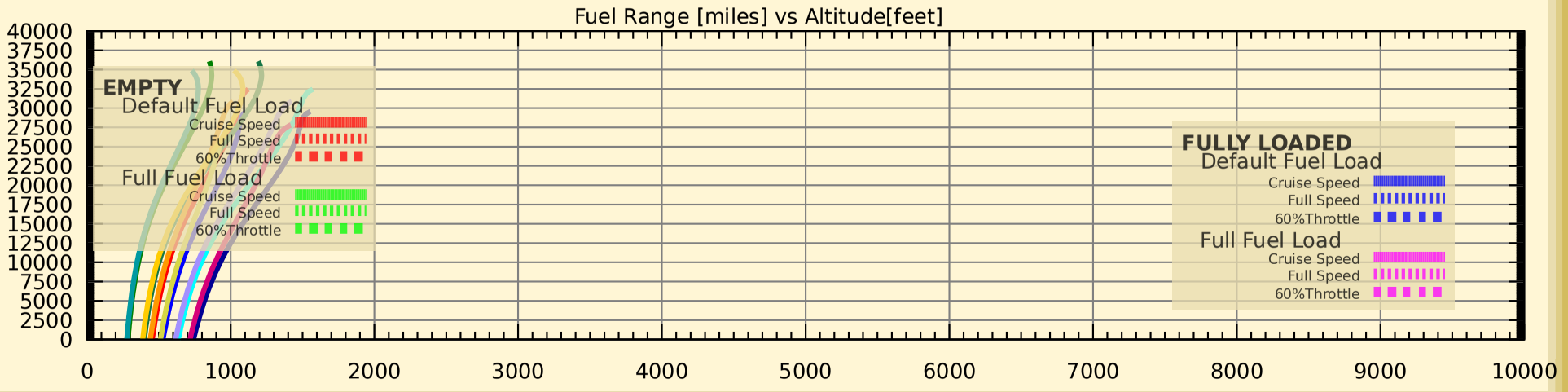
Length: 28.74 ft
Wing Span: 31.00 ft
Wing Area: 161 sq. ft

Power Plant: One Nakajima Ha-109
Power: 3176 lb s.t.
Internal Fuel: 802 lb
External Fuel: 415 lb

Empty Weight: 4918 lb
MTOW: 6526 lb







Kawasaki Ki-61-Id
Tony

Durability	☆☆	**Speed**	☆☆☆☆☆	**Climb Rate**	☆☆☆
Maneuverability	☆☆☆☆☆	**Firepower**	☆☆☆☆	**Ground Attack**	☆☆

Speed - Its top speed of only 302 mph at sea level and 366 mph at altitude means that the Tony has to rely on outmaneuvering planes of its era.

The Kawasaki company had long been a proponent of the use of liquid-cooled engines for fighters and was sorely disappointed when their Ki-28 design lost out to Nakajima's Ki-27. Looking for a better alternative to the BMW V-1 they had been using, they entered negotiations with Daimler-Benz to build the DB-601A under license. Negotiations were completed in April 1940 and they received both blueprints and working examples to use for production templates.

The Ha-40, as the copy was known, had an output of 1,100 hp and was proposed to be used in two different fighter designs - the Ki-60 heavy interceptor and the Ki-61 light, multi-role fighter. With the success stories coming out of Europe of inline engine fighters, the Koku Hombu approved the latter of the two designs.

The Ki-61 showed its European influence, using a wing of high-aspect ratio and large area to provide maximum maneuverability and fuel economy. Particular attention was paid to streamlining and drag reduction as well as keeping weight down to a minimum. Armed with a pair of 12.7mm machine guns in the cowl and a pair of 7.7mm machine guns in the wings, the first prototype was flown in December 1941.

Pre-production testing revealed a top speed of 367 mph at 19,685 feet and while pilots were wary of the high wing loading of almost 30 lb./sq.ft., they were highly impressed with the plane's high diving speed, its armor protection and its armament. In competitive trials against an imported Bf-109E, a Ki-43-II, a Ki-44-I, and a captured P-40E, the Ki-61 was judged to be the best overall weapon of the group.

After successful service trials production was ordered late in 1942 and the first deliveries were made in February 1943. Two models were produced, the 1A with the original armament and the 1B with the 7.7mm machine guns in the wings being replaced with 12.7mm models. Combat operations began two months later with 68th and 78th Sentais in New Guinea. The plane immediately proved to be much more suited to combat against the faster American and Australian planes than the Ki-43s then in service.

To improve offensive armament, 388 Ki-61-Ibs were modified to accept a 20mm Mauser MG-151 in each wing. This necessitated mounting the guns on their sides with bulges in the wings to cover the breeches. However, this was only a temporary solution until the 20mm Ho-5 cannon was available for production. The Ki-61-Id was thus produced with a pair of these guns replacing the machine guns in the cowl.

Production of the Ki-61-Id began in January 1944 and over half of all Ki-61s produced were of this type. The type saw action in the New Guinea and Rabaul area but was most active in the Philippines and over Formosa before being relegated to home defense.

Sources:

Francillon, Rene J.; Japanese Aircraft of the Pacific War; Naval Institute Press, Annapolis, MD; 1979.

Green, William; Warplanes of the Second World War, Fighters, Volume Three; Hanover House, Garden City, NY; 1960.

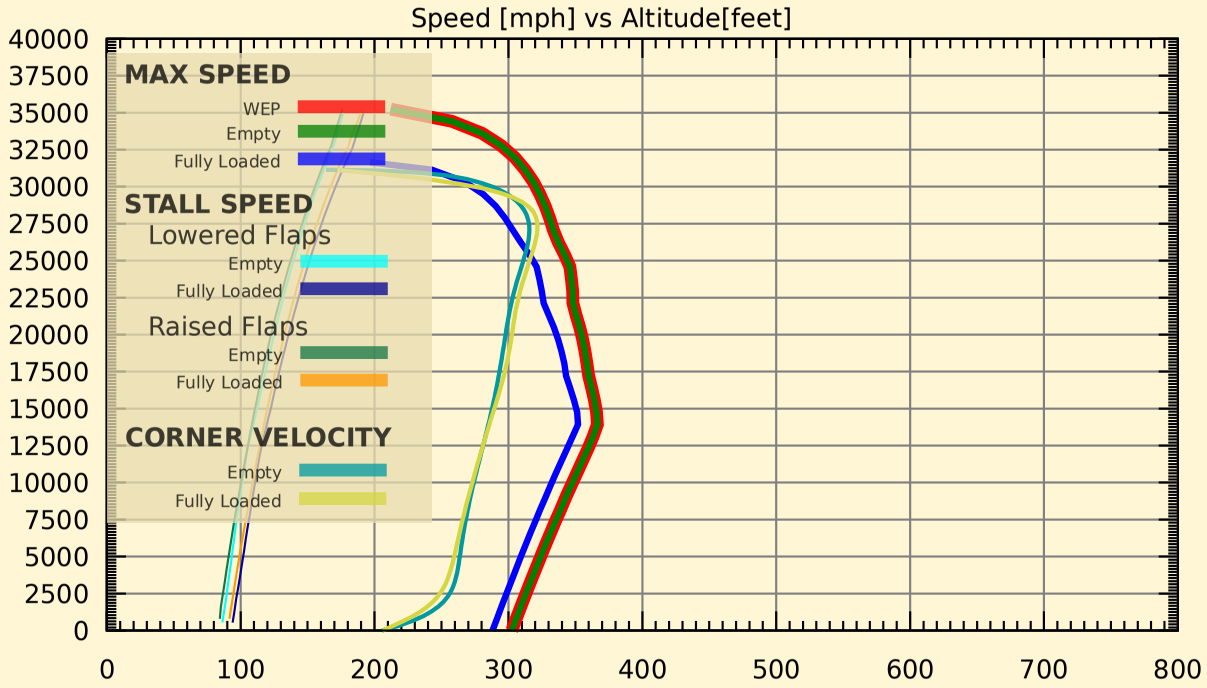
Green, William; Famous Fighters of the Second World War; Hanover House, Garden City, NY; 1960.

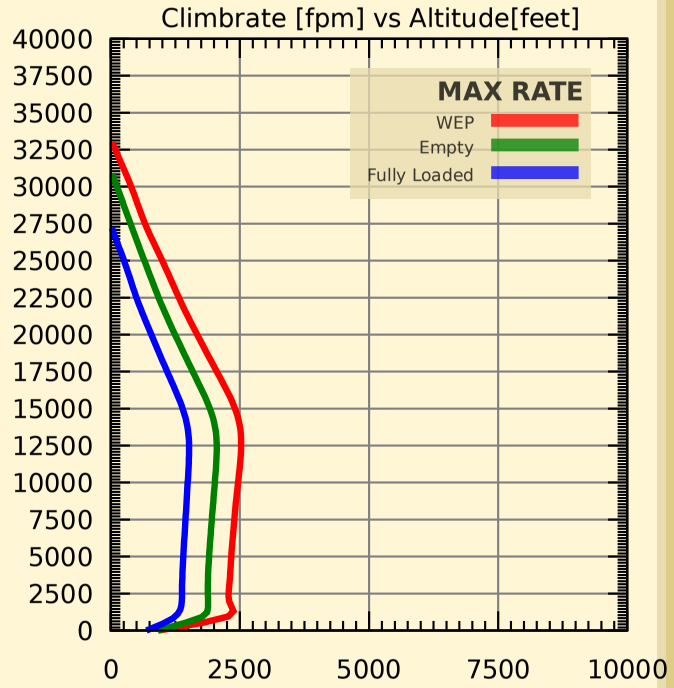
Name: Kawasaki Ki-61-Id Tony
Role: Fighter
Crew: 1
Service Date: January 1944
Primary Guns: 2x Ho-103 Type 1 12.7mm machine guns with 250 rpg in wings
Secondary Guns: 2x Ho-5 Type 1 20mm cannon with 120 rpg in cowl
Defensive Guns: NA
Ordnance: 2x 551 lb bombs or 2x 317 lb drop tanks under wings

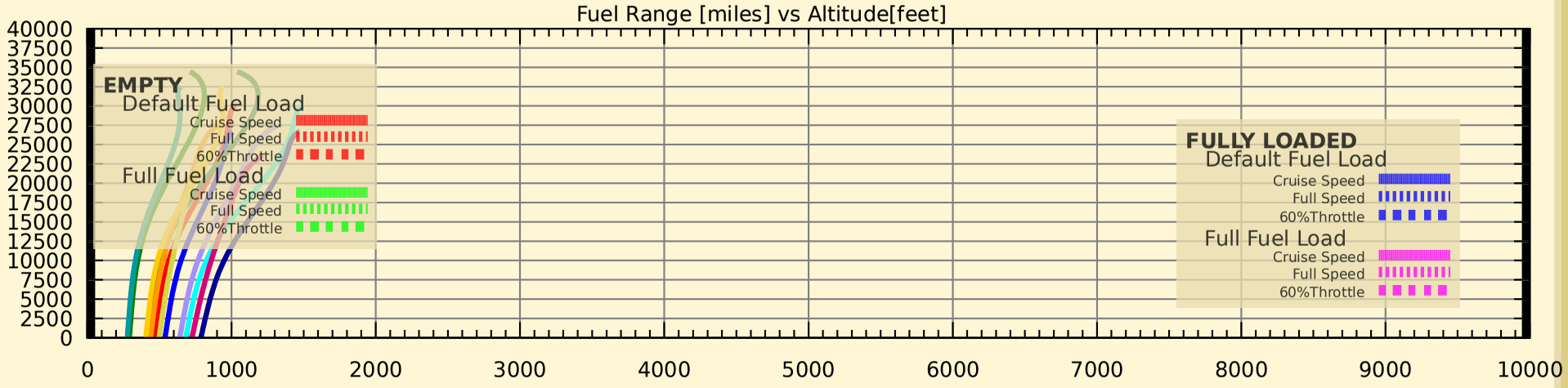
Length: 29.33 ft
Wing Span: 39.37 ft
Wing Area: 215 sq. ft

Power Plant: One Kawasaki Ha-40
Power: 2602 lb s.t.
Internal Fuel: 966 lb
External Fuel: 634 lb

Empty Weight: 5622 lb
MTOW: 7782 lb

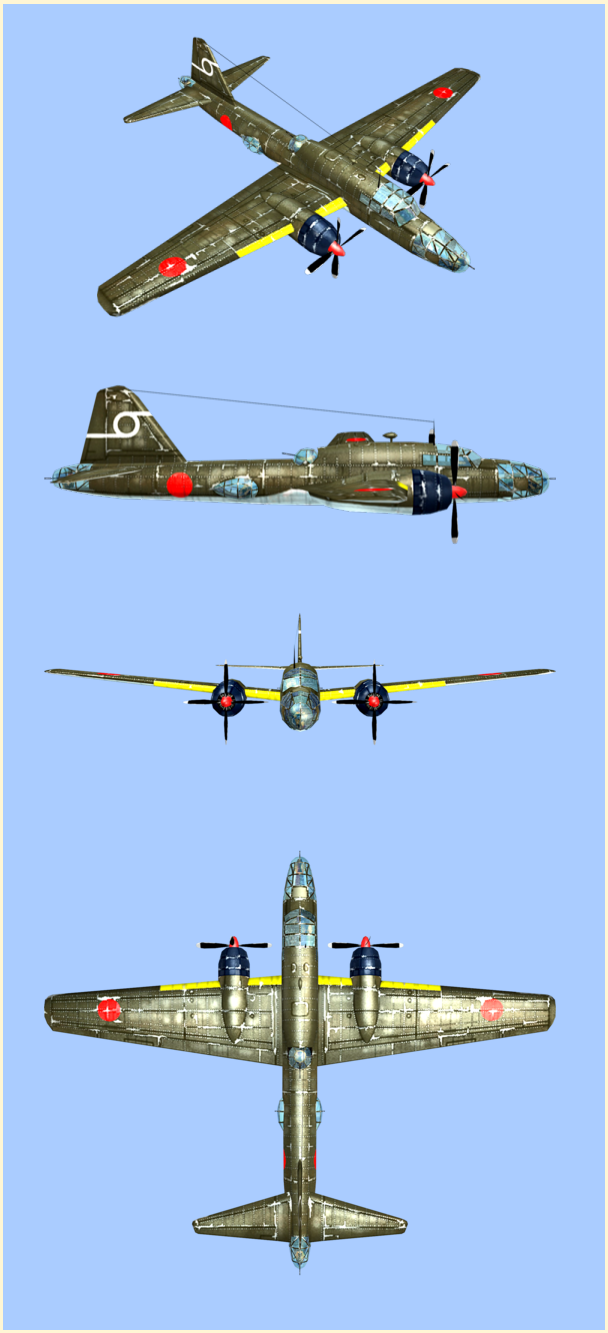






Mitsubishi Ki-67
Peggy

Durability	☆☆☆☆☆	Speed	☆☆☆☆☆	Climb Rate	☆☆
Maneuverability	☆☆☆☆	Firepower		Ground Attack	☆☆☆☆



Bomb Load - With a maximum load of only 2,200 lb. the Peggy needs to run at least two missions to equal one of its contemporaries.

With Nakajima's Ki-49 starting to replace their Ki-21 in JAAF service, Mitsubishi feared that they were about to lose their position as chief bomber supplier to the Army. So when the Army issued a specification in 1941 for a heavy-bomber able to carry more bombs and fly further, higher and faster than anything else then in service, they jumped on the opportunity.

Mitsubishi assembled a team of their best designers under Chief Engineer Ozawa Kyonosuke, who had become known for his work on the Ki-21 bomber. Joining Ozawa was Yoshio Tsubota, a young engineer who had been trained at the California Institute of Technology. Given free-reign to meet the specification, the team gave a high priority to crew and fuel tank protection, with three-ply rubber sheeting being applied to all fuel and oil tanks, plus armor protection for the crew. As important in the long run, the plane was designed for modular construction, allowing it to be constructed in dispersed facilities.

Cheating somewhat on the specification, the team opted to use the new Ha-104 18-cylinder radial engine then under development at Mitsubishi. Equipped with a two-speed supercharger and fan assisted cooling, the Ha-104 could produce 1,900 hp for take-off. First flown on December 27, 1942 the Ki-67 handled remarkably well, being capable of doing loops and vertical turns when not carrying bombs.

Understandably the Army was excited about the project and despite entering production in 1943, an endless series of modifications conspired to keep production down. By April 1944 a mere twenty-one planes had been built and so the Army froze development to increase production. However, modifications continued to be made and incorporated into production until the end of the war.

To augment JNAF anti-shipping capabilities, the Army ordered that 100 planes be produced with torpedo racks. But after successful torpedo testing, the contract for 100 special torpedo carriers was canceled and all Ki-67s were ordered to be so equipped, resulting in the model change from -Ia to -Ib.

First encountered during the furious air-sea battle fought off Formosa in 1944, the Allies identified it as a new Naval type. However, downed examples in China and captured planes in the Philippines revealed its true identity. They also revealed the JAAF's newfound dedication to aircraft survivability and marked the resurgence of the JAAF, which had lagged the JNAF in aircraft development, from laughing-stock to a serious threat.

Production of the Hiryu was given highest priority and several Mitsubishi plants were assigned to build them. However, a massive B-29 raid combined with the devastating Earthquake of December 1944 to completely wreck the Oe-Machi plant, thus shifting all production to the Chita factory. Production was also hampered by a shortage of engines caused by the other projects that were all vying for the Ha-104.

Sources:

Francillon, Rene J.; Japanese Aircraft of the Pacific War; Naval Institute Press, Annapolis, MD; 1979.

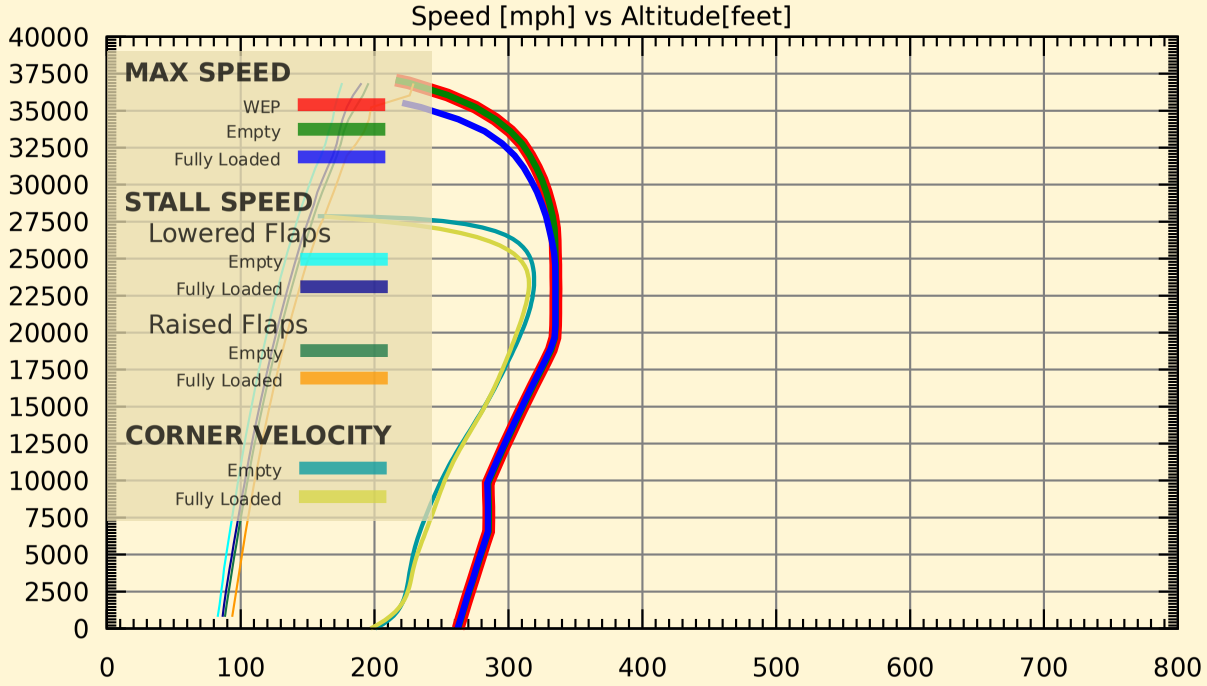
Green, William; Famous Bombers of the Second World War. Second Series; Hanover House, Garden City, NY; 1960.

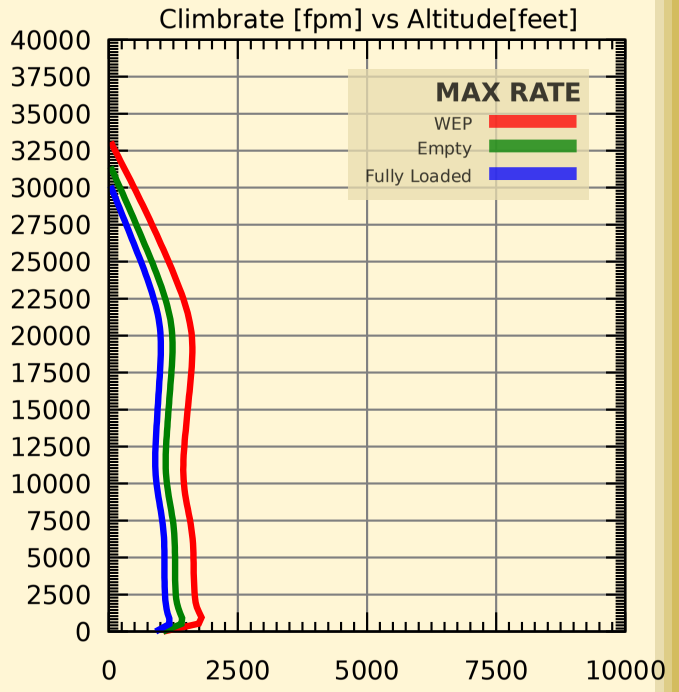
Name: Mitsubishi Ki-67 Peggy
Role: Medium Bomber
Crew: 7
Service Date: July 1944
Primary Guns: NA
Secondary Guns: NA
Defensive Guns: NA
Ordnance: 8x 220 lb or 4x 551 lb or 2x 1103 lb or 2x 1764 lb bombs or One 2031 lb torpedo

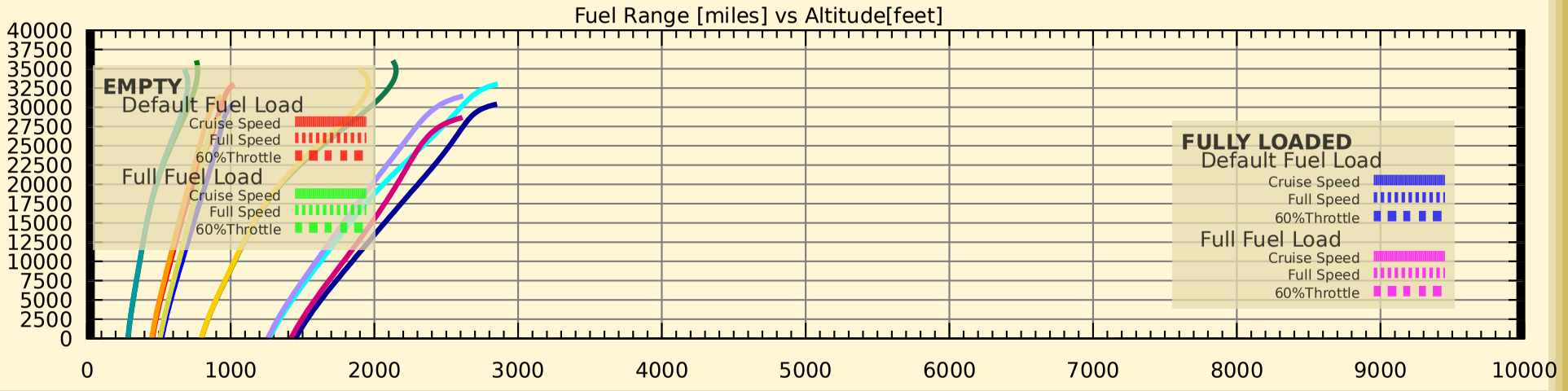
Length: 62.66 ft
Wing Span: 73.82 ft
Wing Area: 708 sq. ft

Power Plant: 2 X Mitsubishi Ha-104
Power: 4168 lb s.t.
Internal Fuel: 6156 lb
External Fuel: NA

Empty Weight: 19621 lb
MTOW: 28660 lb

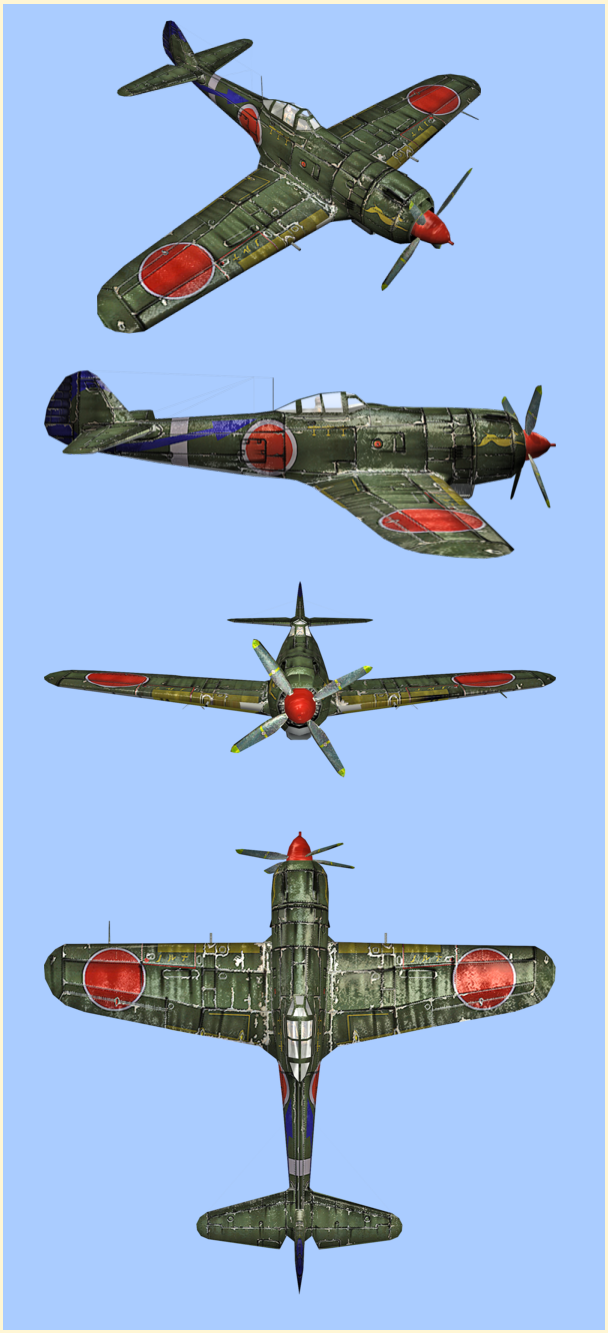






Nakajima Ki-84-1a Hayate
Frank

Durability	☆☆☆	Speed	☆☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆
Maneuverability	☆☆☆☆☆	Firepower	☆☆☆☆	Ground Attack	☆☆☆



Ground Attack - With a capacity of only two 550 lb. bombs, the Frank-Ia is a less capable fighter-bomber than contemporary planes.

Ki-43s were only just starting to see action when the Koku Hombu ordered Nakajima to develop a replacement. The specifications called for a top speed of at least 640 kph (398 mph) and range long enough to allow it to operate at combat settings for 1 1/2 hours 400 km from base. Provision for pilot armor and self-sealing fuel tanks was required and the armament was to consist of a pair of 12.7mm Ho-103 machine guns in the cowl and a pair of 20mm Ho-5 cannon in the wings.

Design work began in early 1942 and in April 1943 the first prototype, powered by the 18-cylinder Ha-45 radial engine, took to the air. Testing proceeded smoothly and by June the first machines were handed over to the JAAF for Service Trials. Pilots by now were recognizing the value of speed and durability and although the top speed was a bit lower than required, at 624 kph (388 mph) it was the best plane the Army had available for immediate production.

Eighty-three pre-production machines were built between August 1943 and March 1944, with minor changes to the structure being made throughout the process. Upon completion of Service Trials the Ministry of Munitions ordered the plane into production as the Ki-84-Ia. A second batch of pre-production machines was then started with the final changes to the airframe structure, which included a rack under each wing capable of carrying a 300 liter drop tank or a 250 kg. bomb. The experimental Chutai, which had operated the Ki-84 during Service Trials, was disbanded with most members being used to form the 22nd Sentai, which was equipped with Hayates and shipped to China to face off against Chenault's 14th Air Force.

Five weeks after being sent to China, the 22nd Sentai was transferred to the Philippines where they joined five other Hayate Sentais in head-to-head combat with the best Allied fighters of the time. Quickly dubbed the 'Frank' by the Allies, it was found to be slower than the P-51s and P-47s it faced, but could climb and turn much quicker than either American fighter and was therefore considered a formidable opponent. However, the engine was difficult to maintain and the hydraulic system suffered from sudden failures. This combined with a weak main gear that often collapsed on landing, caused by poor manufacturing standards, to render many aircraft unserviceable without even having seen action.

Sources:

Francillon, Rene J.; Japanese Aircraft of the Pacific War; Naval Institute Press, Annapolis, MD; 1979.

Green, William; Warplanes of the Second World War, Fighters, Volume Three; Hanover House, Garden City, NY; 1960.

Green, William; Famous Fighters of the Second World War; Hanover House, Garden City, NY; 1960.

Nozawa, Tadashi; Encyclopedia of Japanese Aircraft 1900-1945, Vol.5, Nakajima Aircrafts; Shuppan-Kyodo Publishers, Tokyo, Japan; 1983.

Famous Airplanes of the World, No. 19, Army Type 4 Fighter "Hayate"; Bunrindo, Tokyo, Japan; 1989.

Military Magazine "Maru" Editorial Desk; Mechanism of Military Aircraft, No. 7, "Hayate" / Type 97 Heavy Bomber / Type 2 Flying-boat; Kojinsha, Tokyo, Japan; 1999.

Human Acts in the History, Pacific War Series, Vol. 46, Type 4 Fighter "Hayate"; Gakken, Tokyo, Japan; 2004.

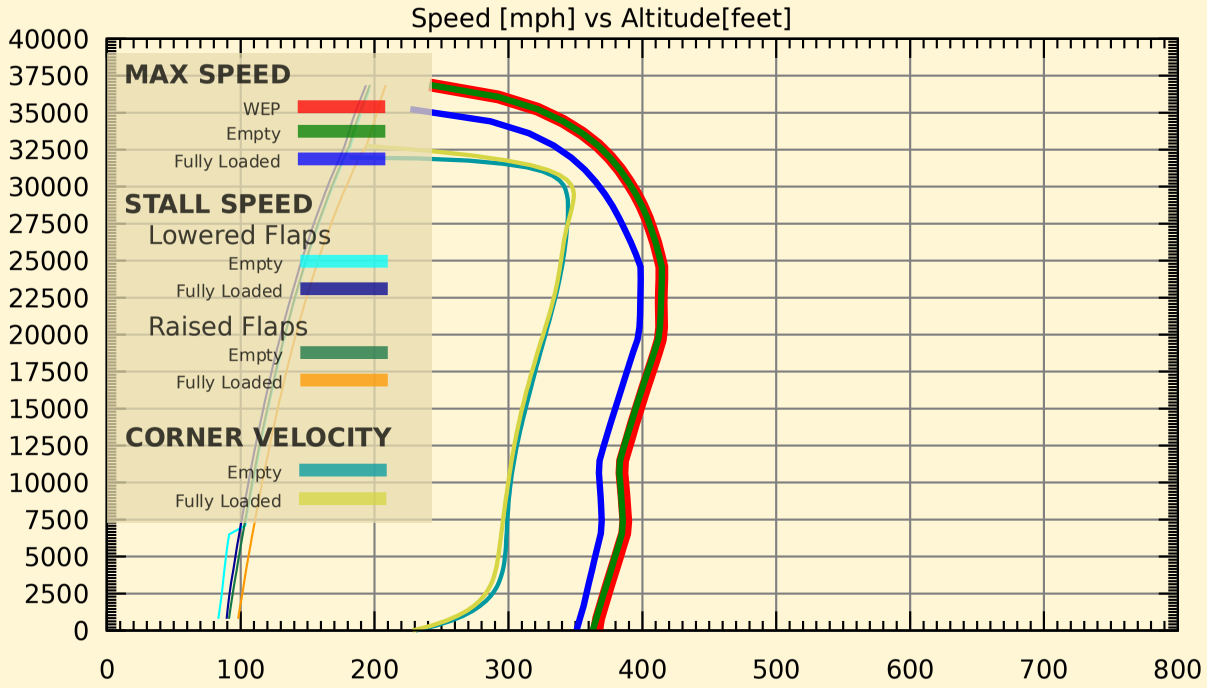
Human Acts in the History, Pacific War Series, Vol. 31, Experimental Fighters of Army and Navy; Gakken, Tokyo, Japan; 2001.

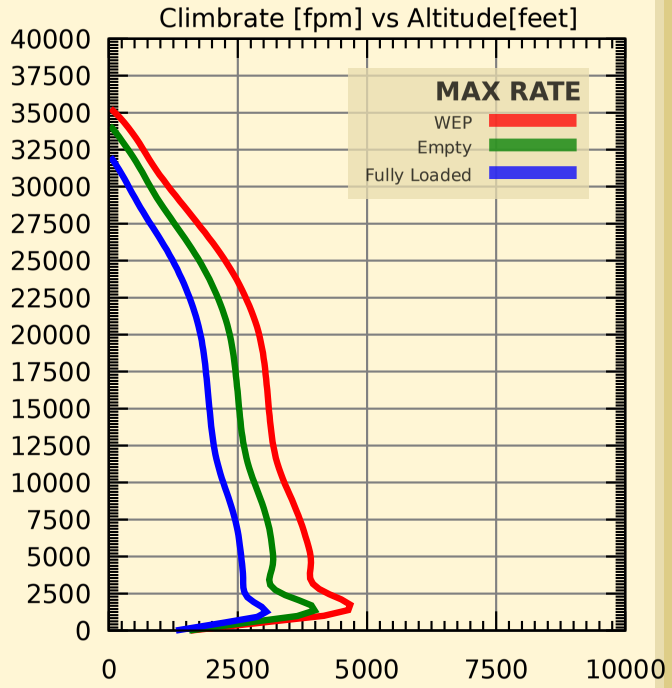
Name: Nakajima Ki-84-1a Hayate Frank
Role: Fighter
Crew: 1
Service Date: June 1944
Primary Guns: 2x Ho-103 Type 1 12.7mm machine guns with 350 rpg in cowl
Secondary Guns: 2x Ho-5 Type 1 20mm cannon with 150 rpg in wings
Defensive Guns: NA
Ordnance: 2x 220 lb or 2x 550 lb bombs or 2x 317 lb drop tanks

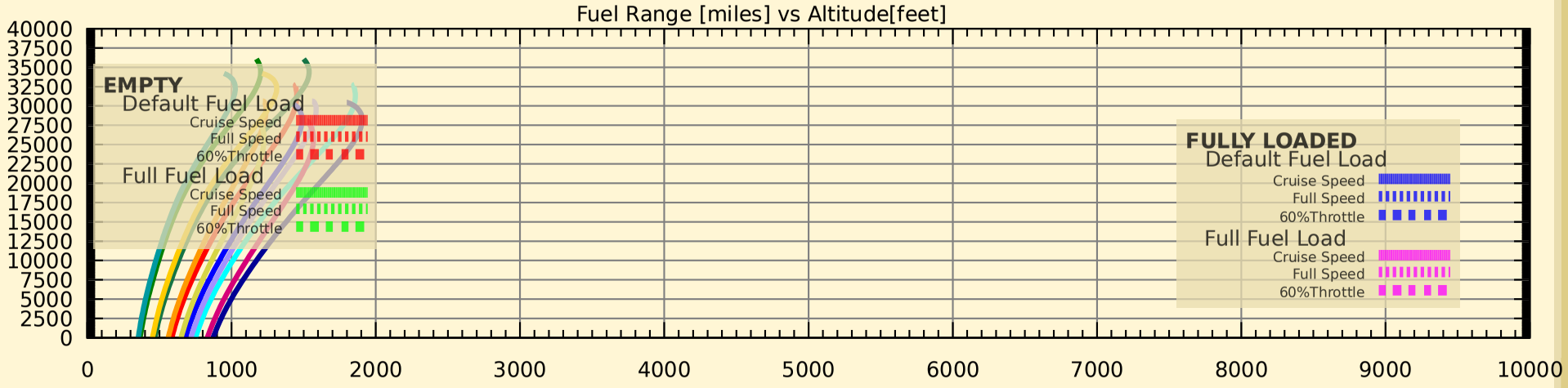
Length: 32.58 ft
Wing Span: 36.81 ft
Wing Area: 226 sq. ft

Power Plant: One Nakajima Ha-45/21
Power: 3948 lb s.t.
Internal Fuel: 1126 lb plus 282 lb of methanol-water mixture
External Fuel: 634 lb

Empty Weight: 6195 lb
MTOW: 8929 lb

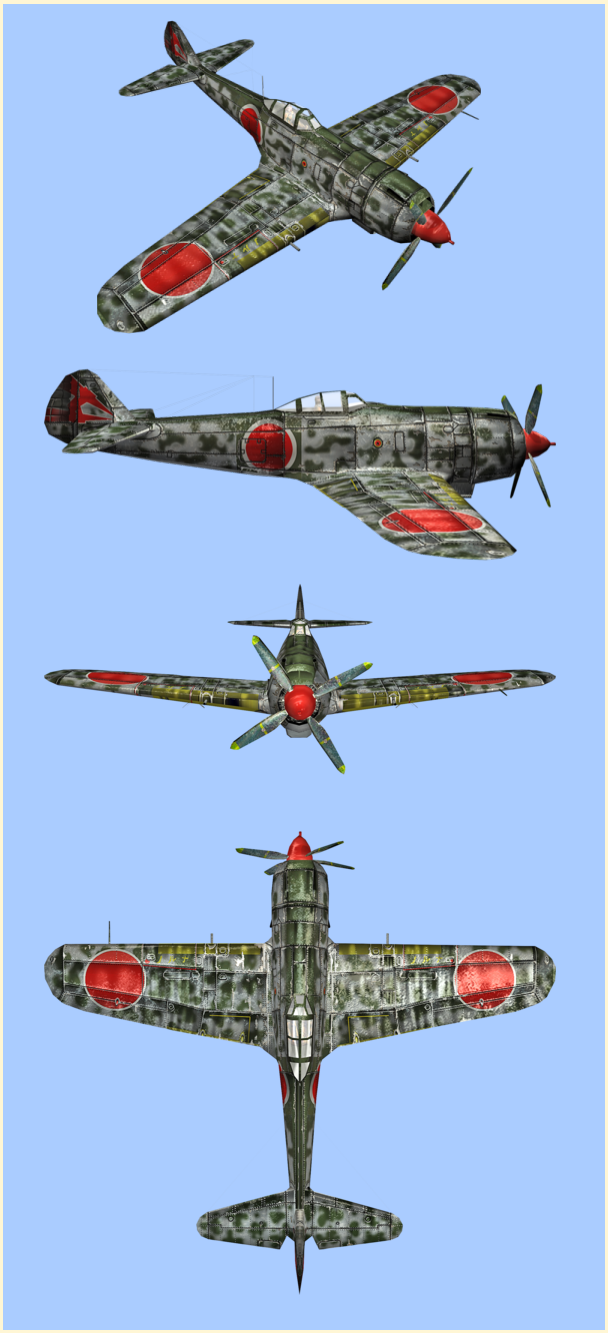






Nakajima Ki-84-1c Hayate
Frank

Durability	☆☆☆	Speed	☆☆☆☆☆☆	Climb Rate	☆☆☆☆
Maneuverability	☆☆☆☆☆	Firepower	☆☆☆☆☆☆	Ground Attack	☆☆☆☆



Bomb Load - With a capacity of only two 551 lb. bombs, the Frank-Ic has to rely on its guns to make it a capable ground-attack fighter.

Ki-43s were only just starting to see action when the Koku Hombu ordered Nakajima to develop a replacement. The specifications called for a top speed of at least 640 kph (398 mph) and range long enough to allow it to operate at combat settings for 1 1/2 hours 400 km from base. Provision for pilot armor and self-sealing fuel tanks was required and the armament was to consist of a pair of 12.7mm Ho-103 machine guns in the cowl and a pair of 20mm Ho-5 cannon in the wings.

Design work began in early 1942 and in April 1943 the first prototype, powered by the 18-cylinder Ha-45 radial engine, took to the air. Testing proceeded smoothly and by June the first machines were handed over to the JAAF for Service Trials. Pilots by now were recognizing the value of speed and durability and although the top speed was a bit lower than required, at 624 kph (388 mph) it was the best plane the Army had available for immediate production.

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Five weeks after being sent to China, the 22nd Sentai was transferred to the Philippines where they joined five other Hayate Sentais in head-to-head combat with the best Allied fighters of the time. Quickly dubbed the 'Frank' by the Allies, it was found to be slower than the P-51s and P-47s it faced, but could climb and turn much quicker than either American fighter and was therefore considered a formidable opponent. However, the engine was difficult to maintain and the hydraulic system suffered from sudden failures. This combined with weak main gear that often collapsed on landing, caused by poor manufacturing standards, to render many aircraft unserviceable without even having seen action.

Shortly after the introduction of the Ki-84-Ia to combat, the company introduced another two variants to the production line, which would be assembled in parallel with the Ia. The Ib model had the two cowl mounted 12.7mm machine guns replaced by pair of 20mm Ho-5 cannon, while the 1c model replaced the wing mounted Ho-5s with 30mm Ho-155s instead. The Ic model was intended to be used as a heavy bomber interceptor, with its 30mm cannon capable of bringing down a B-29 with only a few hits.

Sources:

Francillon, Rene J.; Japanese Aircraft of the Pacific War; Naval Institute Press, Annapolis, MD; 1979.

Green, William; Warplanes of the Second World War, Fighters, Volume Three; Hanover House, Garden City, NY; 1960.

Green, William; Famous Fighters of the Second World War; Hanover House, Garden City, NY; 1960.

Nozawa, Tadashi; Encyclopedia of Japanese Aircraft 1900-1945, Vol.5, Nakajima Aircrafts; Shuppan-Kyodo Publishers, Tokyo, Japan; 1983.

Famous Airplanes of the World, No. 19, Army Type 4 Fighter "Hayate"; Bunrindo, Tokyo, Japan; 1989.

Military Magazine "Maru" Editorial Desk; Mechanism of Military Aircraft, No. 7, "Hayate" / Type 97 Heavy Bomber / Type 2 Flying-boat; Kojinsha, Tokyo, Japan; 1999.

Human Acts in the History, Pacific War Series, Vol. 46, Type 4 Fighter "Hayate"; Gakken, Tokyo, Japan; 2004.

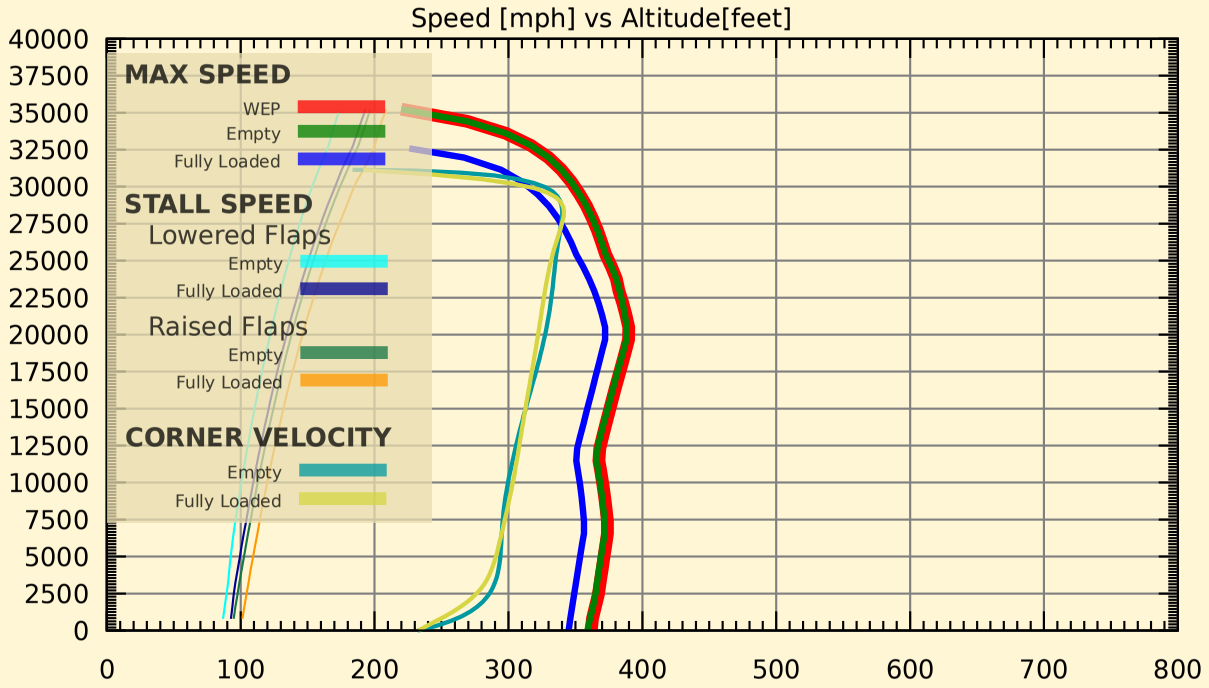
Human Acts in the History, Pacific War Series, Vol. 31, Experimental Fighters of Army and Navy; Gakken, Tokyo, Japan; 2001.

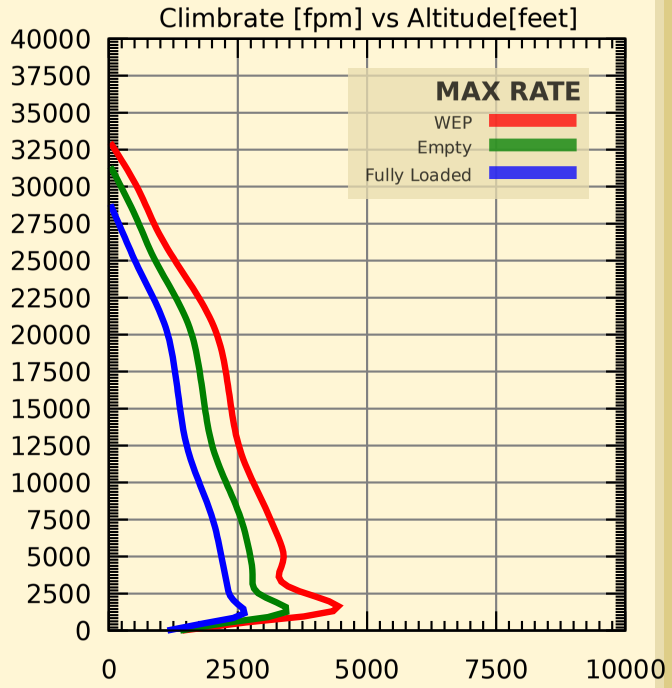
Name: Nakajima Ki-84-1c Hayate Frank
Role: Fighter
Crew: 1
Service Date: January 1945
Primary Guns: 2x Ho-5 Type 1 20mm cannon with 110 rpg in cowl
Secondary Guns: 2x Ho-155 30mm cannon with 80 rpg in wings
Defensive Guns: NA
Ordnance: 2x 220 lb or 2x 550 lb bombs or 2x 317 lb drop tanks

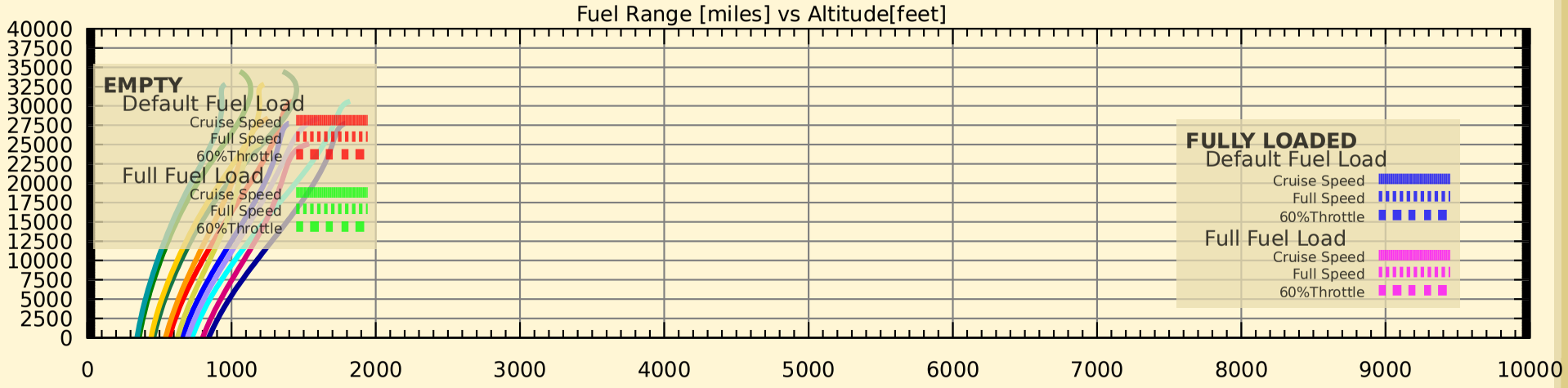
Length: 32.58 ft
Wing Span: 36.81 ft
Wing Area: 226 sq. ft

Power Plant: One Nakajima Ha-45/23
Power: 3793 lb s.t.
Internal Fuel: 1126 lb plus 282 lb of methanol-water mixture
External Fuel: 634 lb

Empty Weight: 6548 lb
MTOW: 9039 lb

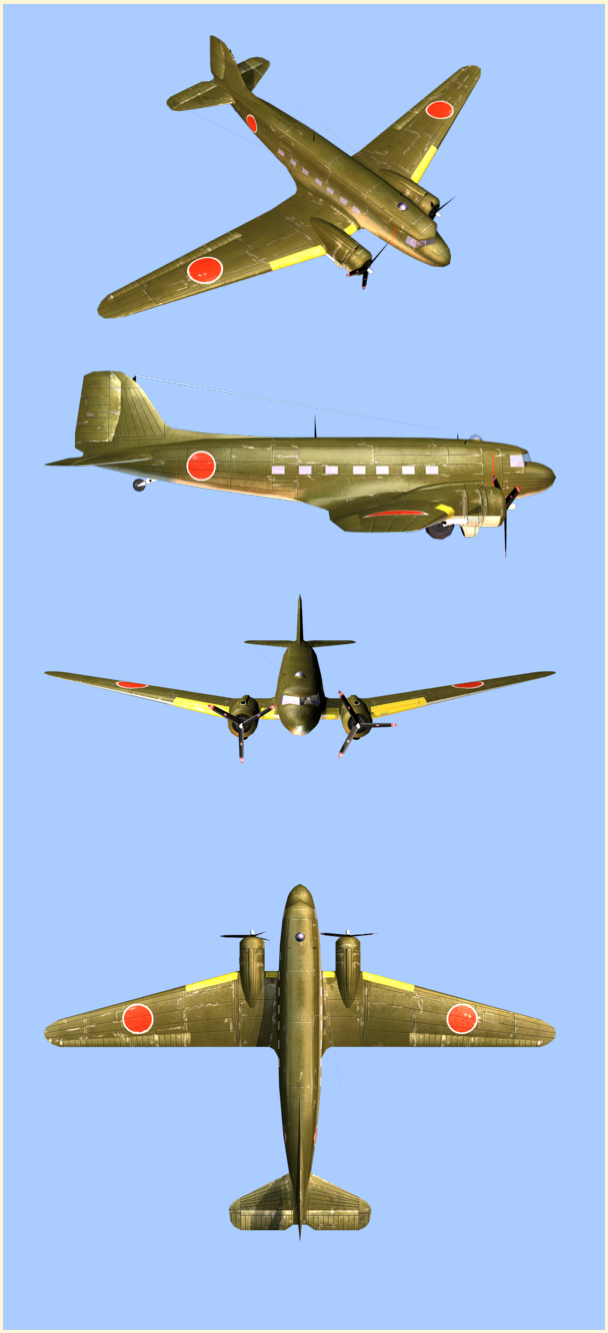






Showa L2D2 'Tabby'
Tabby

Durability	☆☆☆☆☆☆	**Speed**	☆☆☆	**Climb Rate**	☆☆
Maneuverability	☆☆☆☆☆☆	**Firepower**		**Ground Attack**	☆☆☆



Defensive Firepower - Lacking completely in defensive guns, the only defense an L2D can offer is to turn tail and run.

Prior to the start of the war, Mitsui And Co., Ltd. of Japan had purchased rights from Douglas to build the DC-3, while Nakajima had purchased rights to build the DC-2. After purchasing twenty American built DC-3s, Mitsui shipped them to Japan and hired Showa to use them as patterns to set up a production line.

Powered by the Mitsubishi Kensei 43, a license-built copy of the Pratt & Whitney R-1830 Twin Wasp, over 400 Showa L2Ds served with the Imperial Japanese Navy. Because of the lower powered engines, the L2D was limited to carrying 22 combat troops (limited in game to 11) or up to 4500 lb of cargo.

Sources:

Francillon, Rene J.; Japanese Aircraft of the Pacific War; Naval Institute Press, Annapolis, MD; 1979.

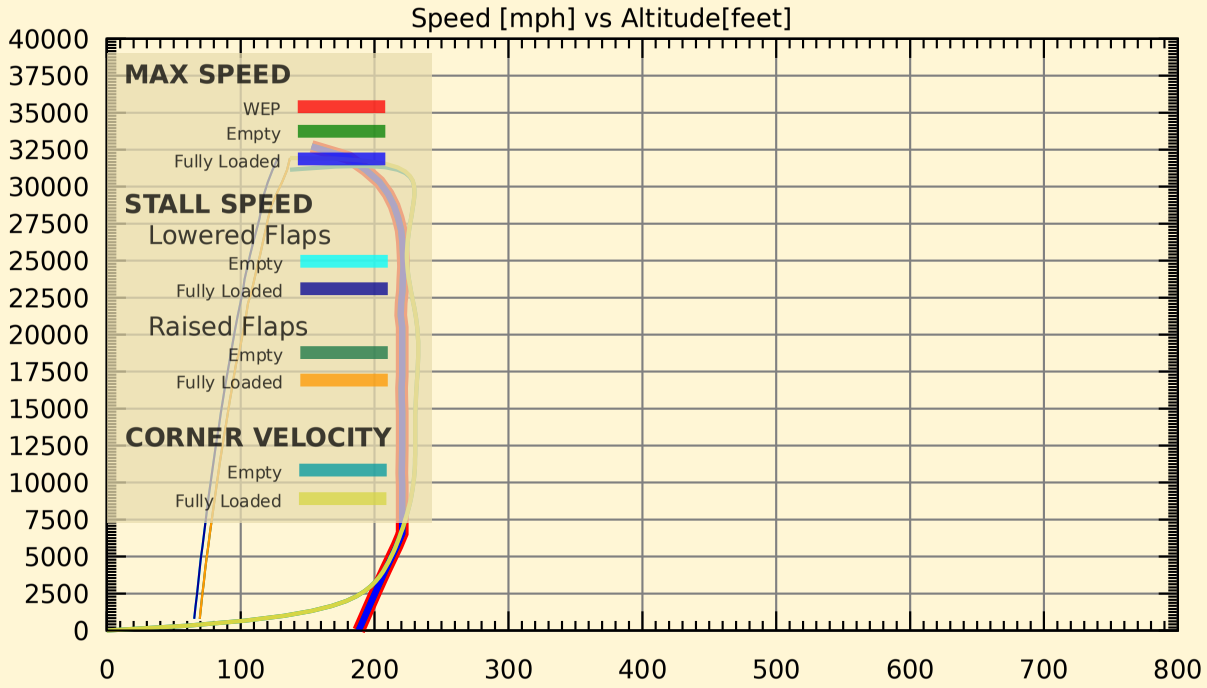
Green, William; Famous Bombers of the Second World War; Hanover House, Garden City, NY; 1960. Davis, Larry; C-47 Skytrain In Action; Squadron/Signal Publications, Carrollton, Texas, 1995.

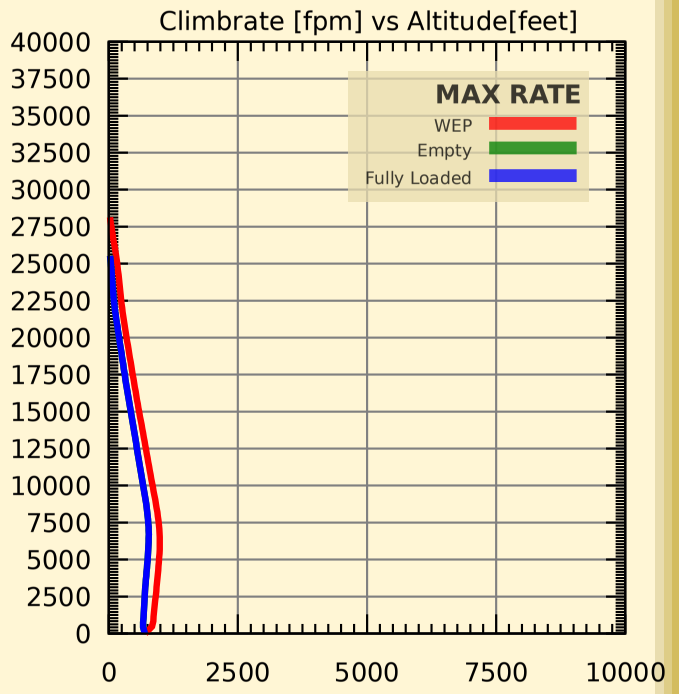
Name: Showa L2D2 'Tabby' Tabby
Role: Transport
Crew: 3
Service Date: February 1941
Primary Guns: NA
Secondary Guns: NA
Defensive Guns: NA
Ordnance: up to 4410 lb of freight or 11 paratroopers

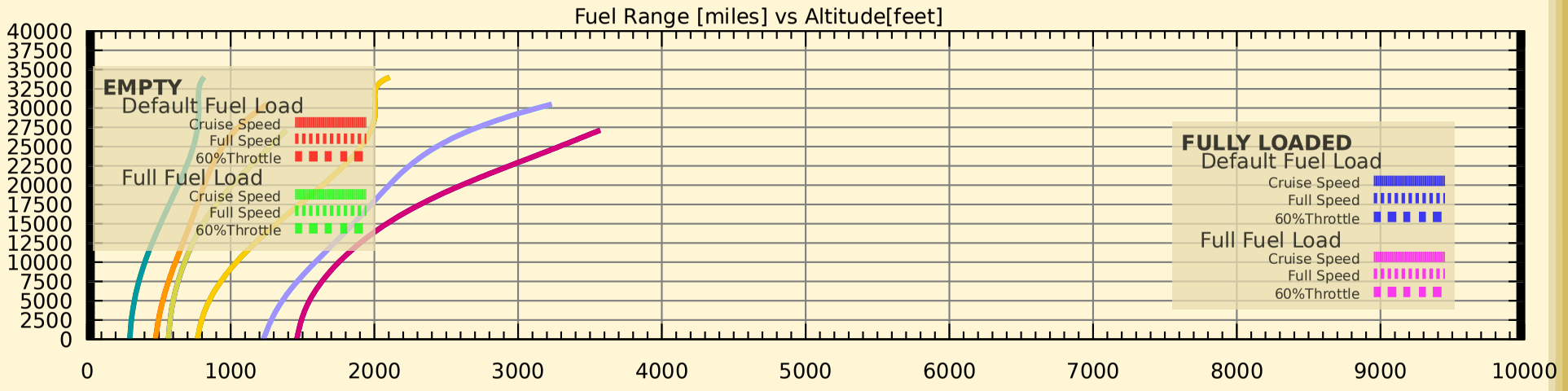
Length: 64.50 ft
Wing Span: 95.05 ft
Wing Area: 987 sq. ft

Power Plant: 2 X Mitsubishi Kinsei 43
Power: 2382 lb s.t.
Internal Fuel: 4835 lb
External Fuel: NA

Empty Weight: 17196 lb
MTOW: 27558 lb

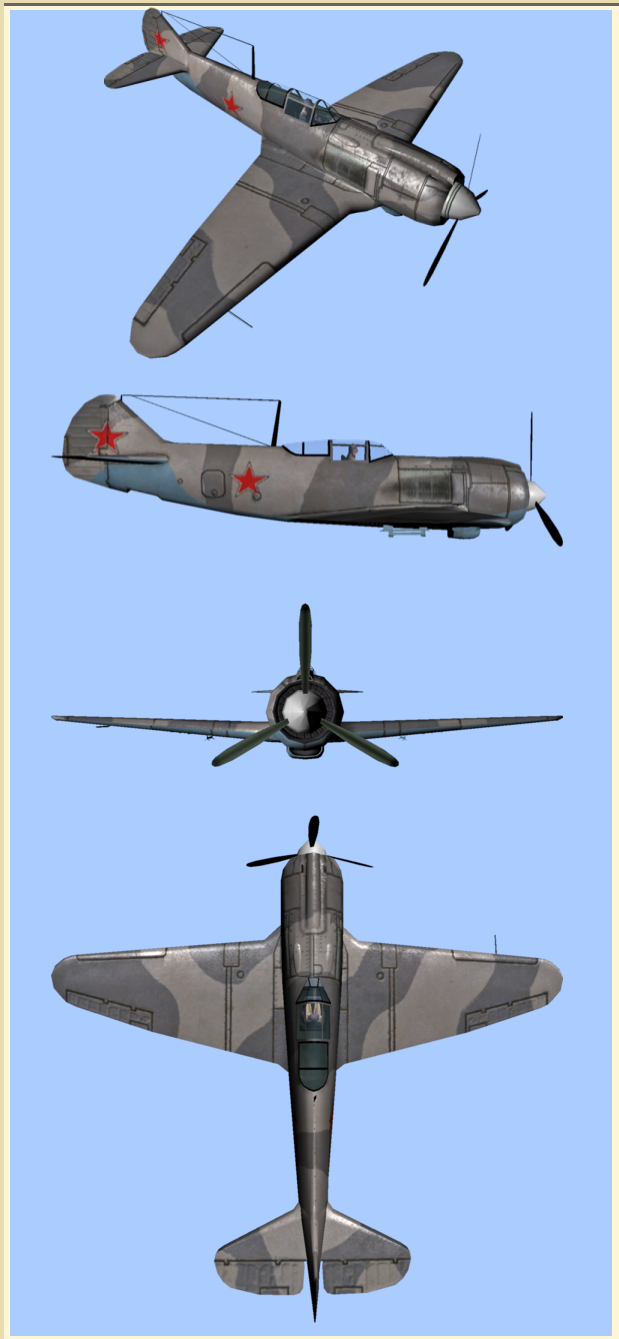






Lavochkin La-5FN

Durability	★☆	Speed	★★★★★★	Climb Rate	★★★★★★
Maneuverability	★★★★★	Firepower	★★★★	Ground Attack	★☆



Durability - Designed more for early war opponents, the wood and fabric covered fuselage and wings were less durable than the heavier metal planes like the FW-190.

With many vital factories in the path of the invading German forces the order was given to move them to the east. Among these were the Klimov and Mikuln engine factories. To prevent the interruption of fighter production the Yakovlev, Lavochkin, and Mikoyan design teams were ordered to adapt their designs to accept the 1,676 hp Shvetsov M-82 14-cylinder radial engine, which was manufactured in Perm and was thus not threatened by the Nazi advance.

Being occupied with improving the reliability and survivability of the LaGG-3, the Lavochkin design team didn't even start their conversion until after the converted MiG and Yak prototypes had already flown. Neither previous project had shown any improvement in performance and both were abandoned.

With hundreds of his engines piling up in his factory, Arkady Shvetsov was desperate to find a use for them. Meanwhile, the combat failings of the LaGG-3 were such that there was talk of converting production to the new Yak-7B fighter, which would give Yakovlev a monopoly on fighter production in the Soviet Union. The end result of their meeting was that Shvetsov sent top engineers to the Lavochkin factory to lend assistance in the conversion process and to help solve any problems that were discovered during testing.

The conversion wasn't easy. The Shvetsov engine was a 1 1/2 feet wider than the widest portion of the LaGG fuselage and weighed 500 lb. more than the Klimov inline, thus altering the center of gravity. However, the results more than justified all the hard work as the prototype was declared an immediate success and was ordered into series production.

The plane was not without its problems however, chief among those was the one of weight. The heavier engine and heavier armament (2x 20mm ShVAK with 170 rpg in the cowl) gave it an empty weight of almost 7,500 lb. and it was obviously inferior to the Bf-109F-4s and FW-190A-4s the pilots were facing.

Because the resin required to make Delta Wood was imported from Germany, the supply was starting to dry up, so during the La-5 production run the wing spars were changed from Delta Wood to ordinary pine, which were necessarily larger, but weighed the same. However, weight savings were to be found almost everywhere else on the plane and when combined with the new M-82F boosted engine, performance was improved such that the production planes were outperforming the original prototype.

The new La-5F was visibly different from La-5s in that the visibility to the rear had been improved by cutting down the decking and adding transparent panels. In combat it was a noticeable improvement, except in the armament, which had been reduced to a single 20mm cannon and a 12.7mm machine-gun. But this was only intended to be an interim version of the plane.

The improved M-82FN engine employed direct fuel injection as well as the boosted supercharger of the "F" model, improving performance at all altitudes. Replacing the two large wooden wing spars with a single metal spar saved weight while improving structural strength. A host of other weight savings improvements were made and with the additional engine power the armament was raised back up to two 20mm cannon with 200 rpg.

The La-5FN was noticeably superior to the FW-190A-4 and the newer Bf-109G-2 fighters at all altitudes up to 13,000 feet and Luftwaffe pilots learned to avoid combat with the new Lavochkin. Since the La-5FN was visually identical to the inferior La-5F, that plane also enjoyed the benefit of having an enemy on the defensive at low altitude.

Sources:

Gordon; Yefim and Khazanov, Dmitri; Soviet Combat Aircraft of the Second World War Volume One: Single-Engined Fighters; Midland Publishing Limited, Leicester, England; 1998.

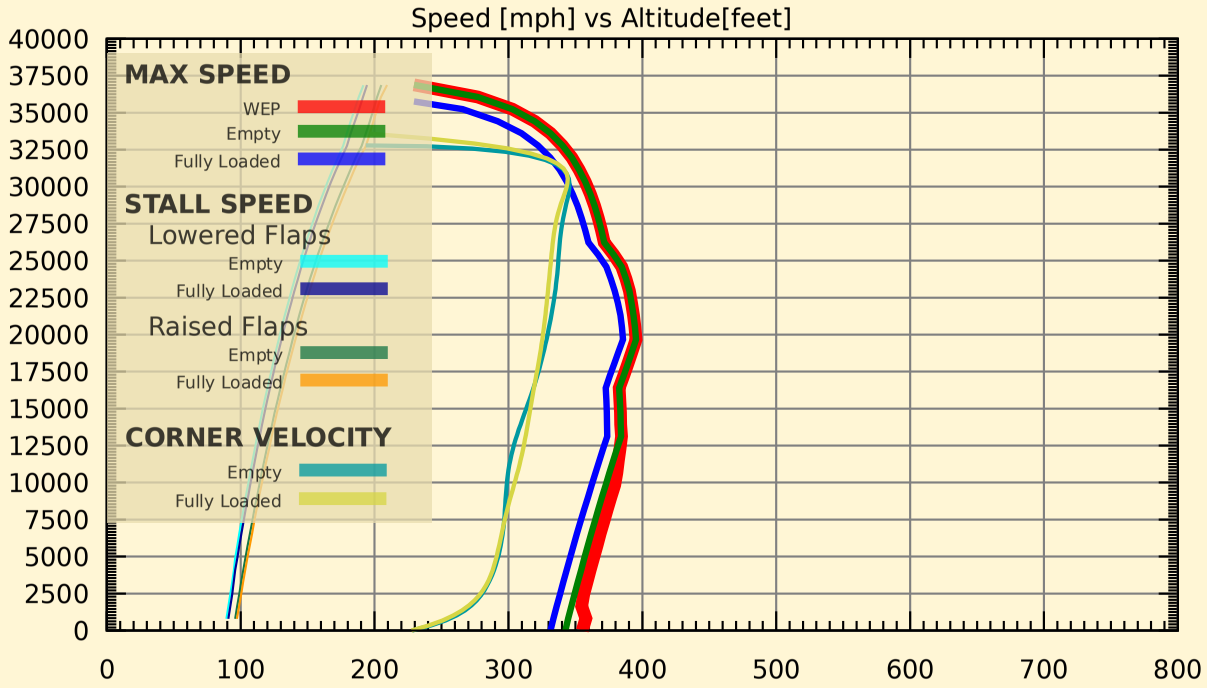
Stapfer, Hans-Heiri; La 5/7 Fighters In Action; Squadron/Signal Publications, Carrollton, TX; 1998.

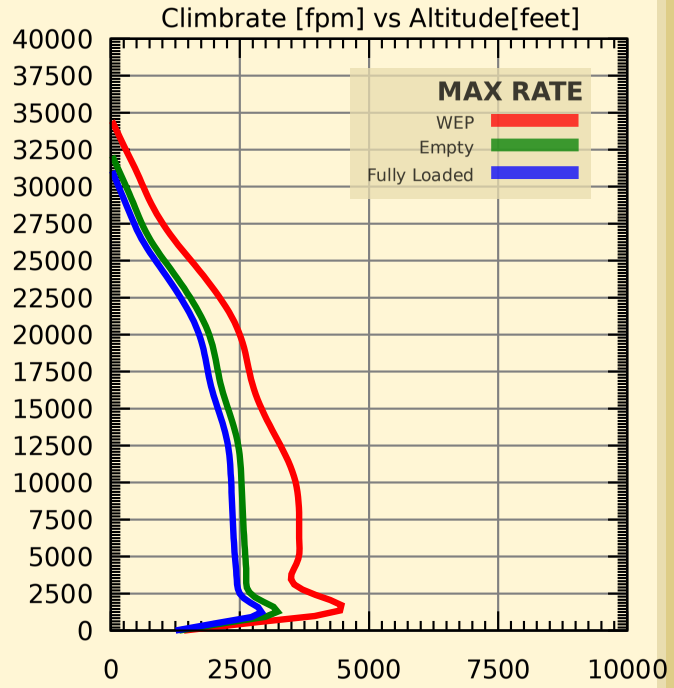
Name: Lavochkin La-5FN
Role: Fighter
Crew: 1
Service Date: September 1942
Primary Guns: One 20-mm ShVAK 20mm cannon with 200 rpg in cowl
Secondary Guns: One 20-mm ShVAK 20mm cannon with 200 rpg in cowl
Defensive Guns: NA
Ordnance: 2x 110 lb bombs and 6x 33 lb RS-82 rockets

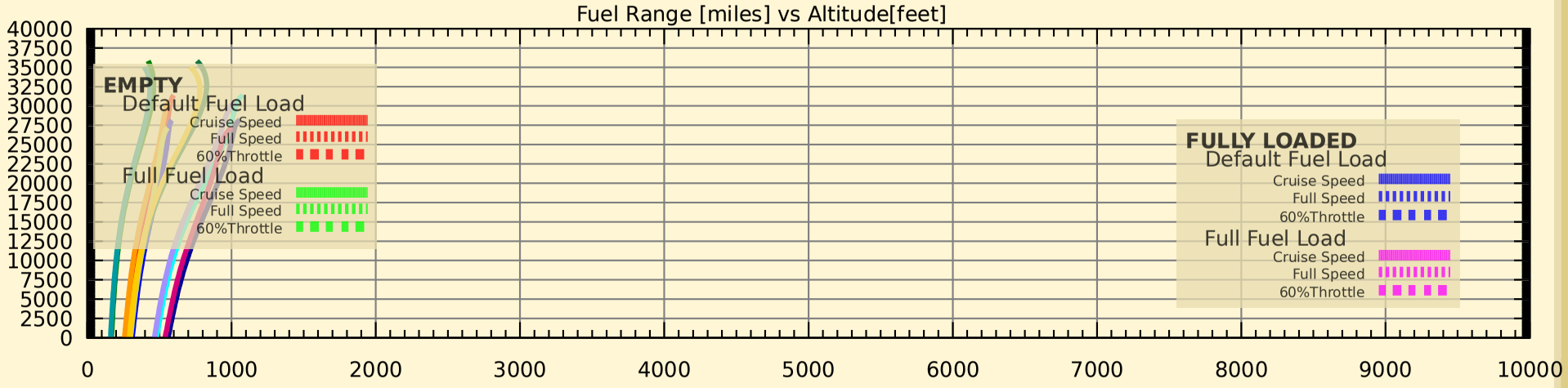
Length: 28.44 ft
Wing Span: 32.15 ft
Wing Area: 189 sq. ft

Power Plant: One M-82FN
Power: 3180 lb s.t.
Internal Fuel: 793 lb
External Fuel: NA

Empty Weight: 6129 lb
MTOW: 7496 lb







Lavochkin La-7

Durability	☆☆☆	Speed	☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆☆
Maneuverability	☆☆☆☆☆	Firepower	☆☆☆☆☆	Ground Attack	☆☆☆

Durability - The retention of wooden components gave the La-7 a durability disadvantage over the all-metal fighters it faced.

By 1943, the power output of the modified, improved and injected M-82 engine was as high as it would ever get. Hopes for improved performance in the Lavochkin fighter were thus pinned on adopting the new M-71 radial, but development problems with the engine kept it from entering service until after the war.

That left the Lavochkin team with making improvements to the airframe in order to get better performance. Working with a basic La-5 airframe, considerable changes were made to aerodynamic structure by moving inlets and a careful redesign of the cowl. Replacement of some wooden parts with lighter metal ones resulted in an overall weight savings, which combined with the improved aerodynamic shape to give the prototype a 40 mph improvement in top speed over the production La-5FN.

Initial versions were fitted with a pair of 20mm ShVAK cannon with 200 rpg in the cowl, but when the lighter Beresin B-20 cannon became available, production was switched to include three of these weapons with 150 rpg. The La-7 was both faster and more maneuverable than the FW-190A-8 at all altitudes up to 20,000 feet and a total of 5,905 La-7s were delivered.

Sources:

Gordon; Yefim and Khazanov, Dmitri; Soviet Combat Aircraft of the Second World War Volume One: Single-Engined Fighters; Midland Publishing Limited, Leicester, England; 1998.

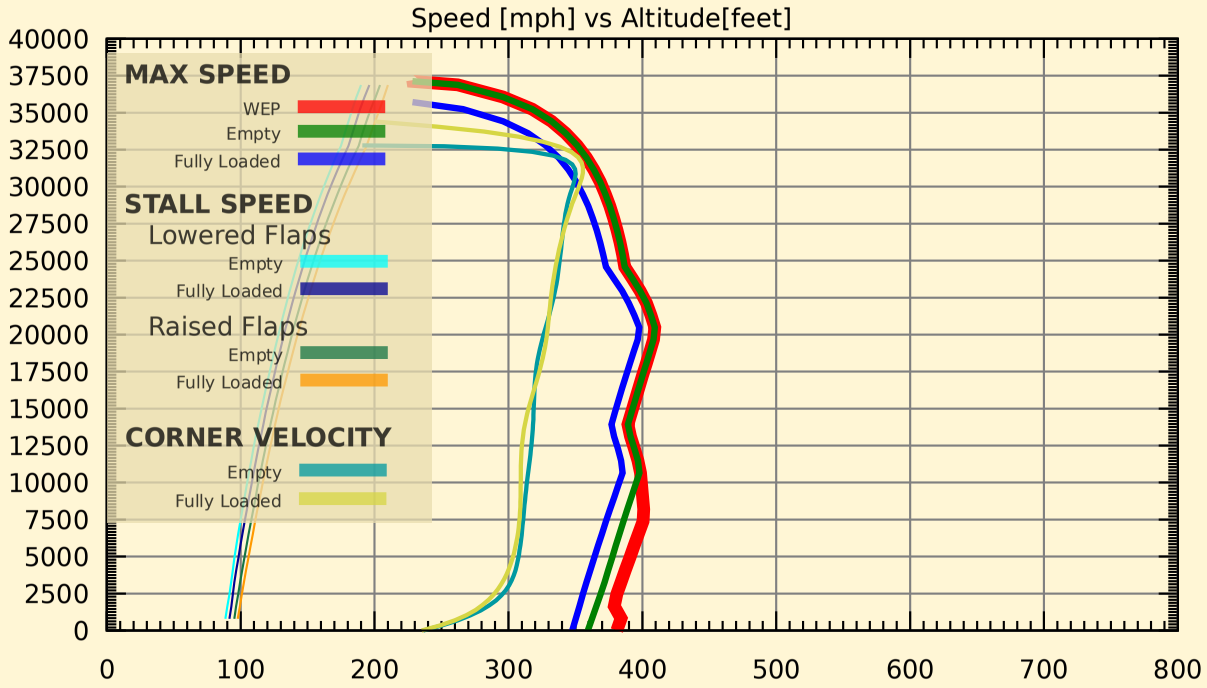
Stapfer, Hans-Heiri; La 5/7 Fighters In Action; Squadron/Signal Publications, Carrollton, TX; 1998.

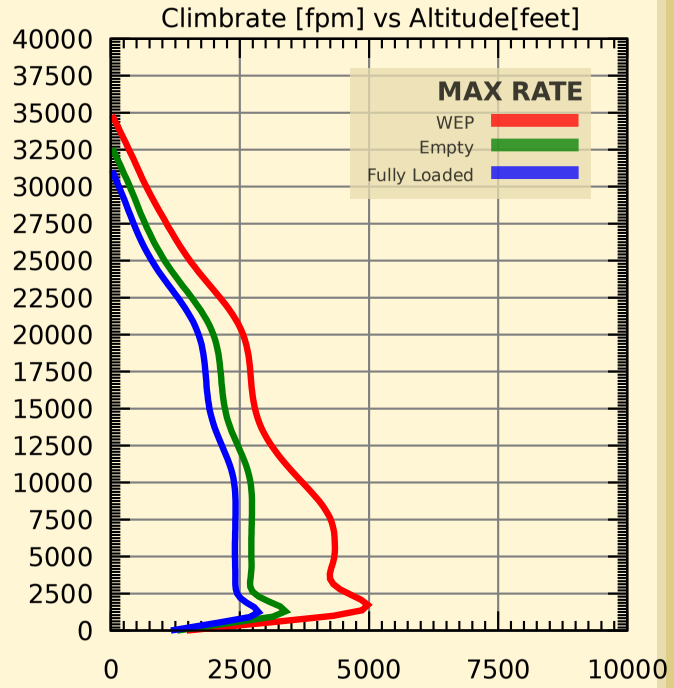
Name: Lavochkin La-7
Role: Fighter
Crew: 1
Service Date: May 1944
Primary Guns: One 20mm Beresin B-20 cannon with 150 rpg in cowl
Secondary Guns: 2x 20mm Beresin B-20 cannon with 150 rpg in cowl
Defensive Guns: NA
Ordnance: 2x 110 lb or 2x 220 lb bombs or 6x 33 lb RS-82 rockets

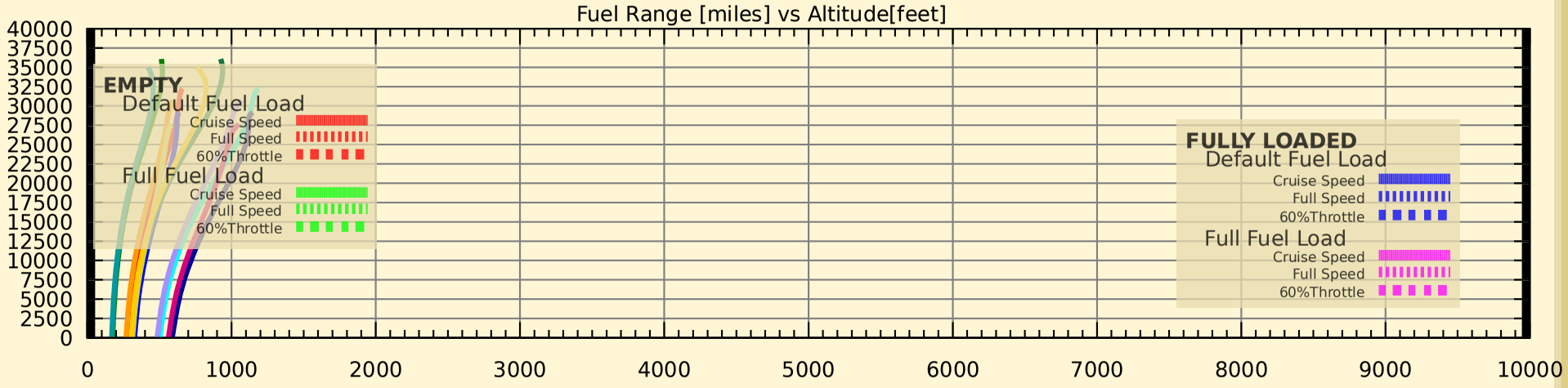
Length: 28.44 ft
Wing Span: 32.15 ft
Wing Area: 189 sq. ft

Power Plant: One ASh-82FNV
Power: 3584 lb s.t.
Internal Fuel: 793 lb
External Fuel: NA

Empty Weight: 5952 lb
MTOW: 7606 lb







Lavochkin LaGG-3

Durability	☆☆	Speed	☆☆☆☆☆	Climb Rate	☆☆☆
Maneuverability	☆☆☆☆☆	Firepower	☆☆☆	Ground Attack	☆☆

Speed - The LaGG's weight caused it to be the slowest of the three planes ordered in the 1939 design competition.

With combat reports from Spain revealing that the new German Bf-109 was totally outclassing the I-16 Ishak, the Soviet government put out a request in January 1939 for a new type of fighter design that would compete with the Messerschmitt's performance. Ten design teams responded to this request and three planes were eventually ordered into production: the LaGG-3, the MiG-3, and the Yak-1.

A year before the design specification had been issued Semyon Lavochkin, Vladimir Gorbunov, and Mikhail Gudnov had begun work on their mostly wooden fighter design and submitted their design into the competition. Remarkably, none of the three had ever designed an aircraft before, but barely 14 months after submitting their design, the I-301 prototype made its maiden flight.

Because of their extensive experience in plasticized wood construction, they proposed that most of the plane be made of a Bakelite-wood compound called Delta Wood, which had twice the density of organic wood compounds and was thus strong enough to be used for main spars. However, the technical skills required to work with Delta Wood meant that gearing up for production would be a slow and laborious process, requiring extensive training to get the work force up to speed. However, the immediacy of the Nazi threat meant that less than ideal conditions were more acceptable and despite this shortcoming the type was ordered into series production on July 29, 1940.

The first three production series were fitted with a standard armament of three 12.7mm Beresin machine-guns with 220 rpg and two 7.62mm ShKAS machine-guns with 325 rpg, all arranged in the nose, one of the 12.7mm machine guns being engine-mounted. On the fourth production series a single 20mm ShVAK cannon with 120 rpg was mounted between the engine cylinder heads to fire through the propeller hub, necessitating the removal of two of the 12.7mm machine guns.

One noteworthy feature of the LaGG was that it used a unique fire-retardant system achieved by pumping inert gases from the port exhaust into the fuel tanks, thus depriving potential fires of oxygen. However, the LaGG was a difficult fighter to fly and thus saw much less success than either the Yak-1 or MiG-3. In fact pilots used to joke that "LaGG" stood for Lakirovanny Garantirovanny Grob, or the "Varnished Guaranteed Coffin".

On the plus side, the Delta Wood construction was extremely durable and was able to sustain a large amount of combat damage and still return home. But the additional weight of this dense material reduced performance and LaGG production always involved a fight to keep overall weight down.

Sources:

Gordon; Yefim and Khazanov, Dmitri; Soviet Combat Aircraft of the Second World War Volume One: Single-Engined Fighters; Midland Publishing Limited, Leicester, England; 1998.

Stapfer, Hans-Heiri; LaGG Fighters In Action; Squadron/Signal Publications, Carrollton, TX; 1996.

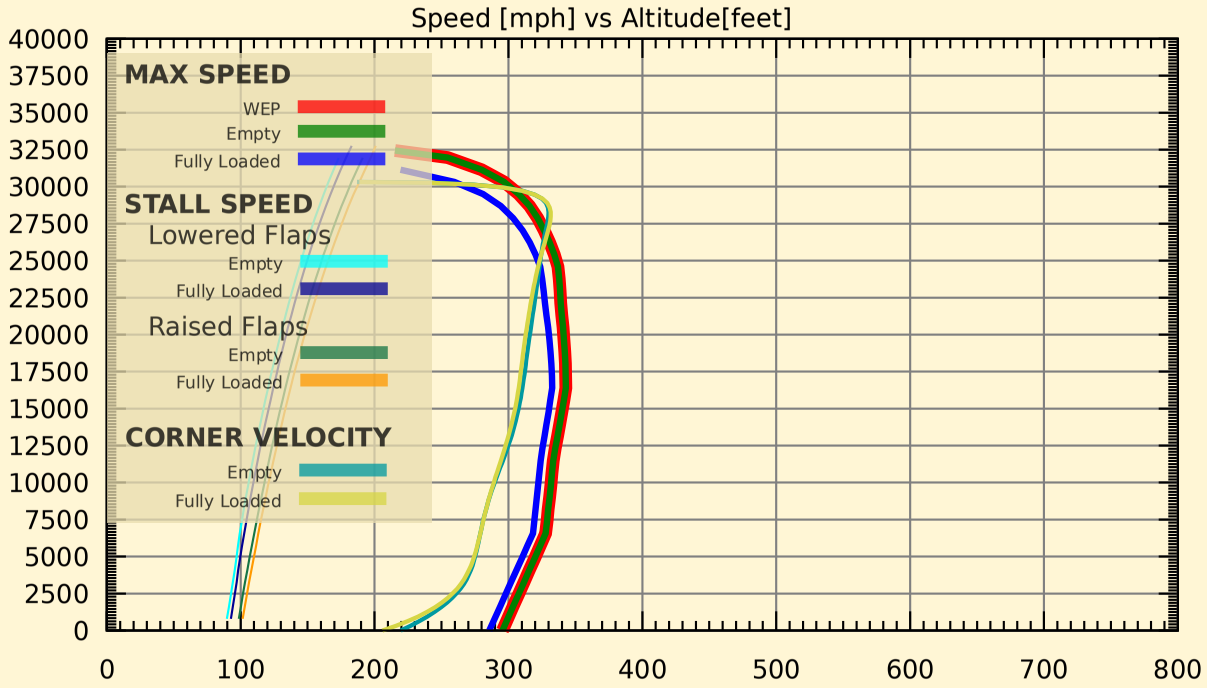
Name: Lavochkin LaGG-3
Role: Fighter
Crew: 1
Service Date: June 1941

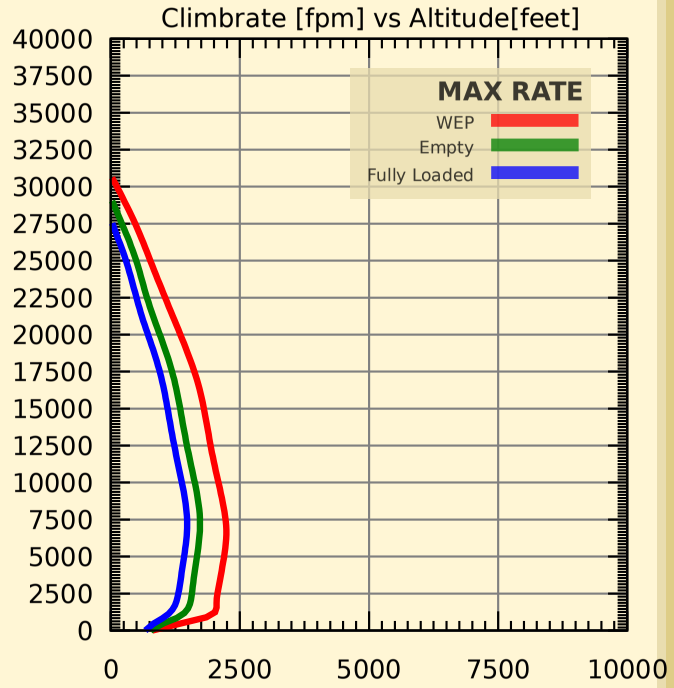
Length: 28.94 ft
Wing Span: 32.15 ft
Wing Area: 190 sq. ft

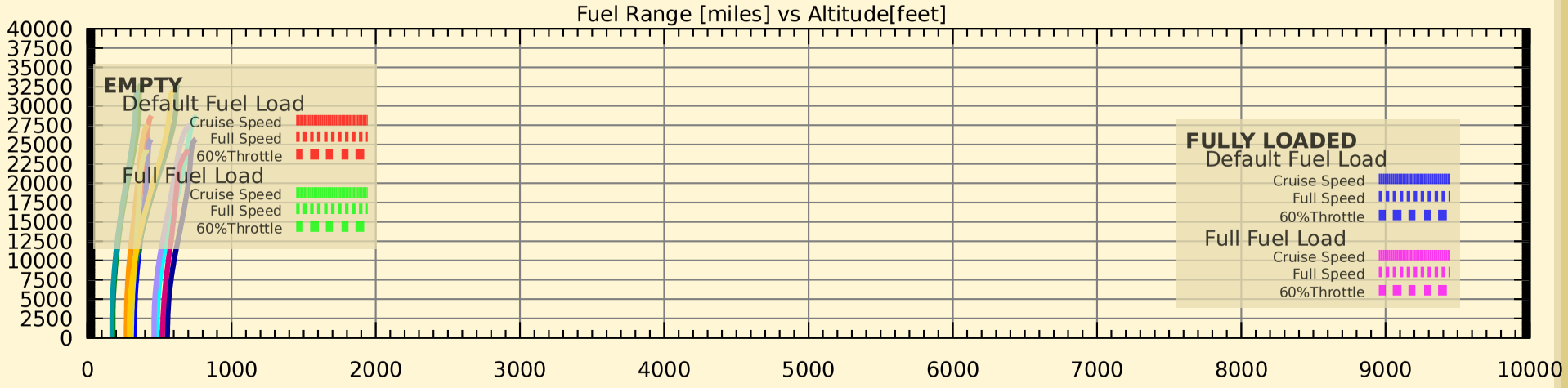
Power Plant: One M-105P
Power: 2680 lb s.t.
Internal Fuel: 639 lb
External Fuel: 2x 159 lb

Empty Weight: 6614 lb
MTOW: 7716 lb

Primary Guns: One Beresin (UBS) 12.7mm machine gun with 220 rpg and 2x ShKAS 7.62mm machine guns with 300 rpg in cowl
Secondary Guns: One ShVAK 20mm cannon with 120 rpg in propeller hub
Defensive Guns: NA
Ordnance: 2x 110 lb or 2x 220 lb bombs or 2x 159 lb drop tanks or 6x 33 lb RS-82 rockets







Avro Lancaster Mk.IB

Durability	☆☆☆☆☆☆☆	Speed	☆☆☆☆☆	Climb Rate	☆
Maneuverability	☆☆☆	Firepower		Ground Attack	☆☆☆☆☆☆☆☆

Defensive Firepower - With only .303 machine guns for defense, the Lancaster is a nice, fat target for marauding fighters.

It is ironic that Britain's most successful bomber of the war was born out of the ashes of one of its most dismal failures. An Air Ministry specification issued in May 1936 called for a twin-engine bomber design capable of carrying a maximum bomb load of 12,000 lb., a single 8,000 lb. bomb, or a pair of torpedoes.

Handley-Page and Avro both submitted proposals, with the Handley-Page being based on the Rolls-Royce V-12 engines while the Avro was based on a new 24-cylinder Rolls-Royce engine created by mating two Kestrals together at the crankshaft. Because of the anticipated shortage of V-12 engines, the Avro was selected.

The first prototype flew on July 25, 1939 and after only 17 minutes of flight it was obvious that the Manchester suffered from the less-powerful-than-anticipated engines and an extremely high wing loading. This inauspicious beginning served only as a harbinger of problems to come. The Manchester was plagued by a series of difficulties, but the lack of reliable engines was the most telling and its service ceiling of only 10,000 feet made it a fat target for German AA gunners.

In the meantime, Avro was working on two alternative solutions to the lack of reliable and sufficiently powerful engines, one using a pair of 24-cylinder Napier Sabre engines and another that utilized four Rolls-Royce Merlin engines mounted on a modified wing. The four-engine version was completed first and proved so successful that development of the Sabre version was suspended.

Known initially as the Manchester III, the increase in engine power meant that the plane could carry up to 14,000 lb. of bombs and operating range was almost doubled from 1,200 miles to 2,350 miles. Reclassified the Lancaster, the new plane was put into production and deliveries commenced immediately.

Defensive armament consisted at first of four manually operated gun turrets with two or four .303 caliber machine guns each. However, the ventral gun turret was soon abandoned due to difficulties in aiming and to save weight, leaving just three gun turrets for defense. The thirty-three foot long bomb bay could carry up to three 4000 lb. "cookie" bombs or as many as forty-eight 250 lb. bombs.

Sources:

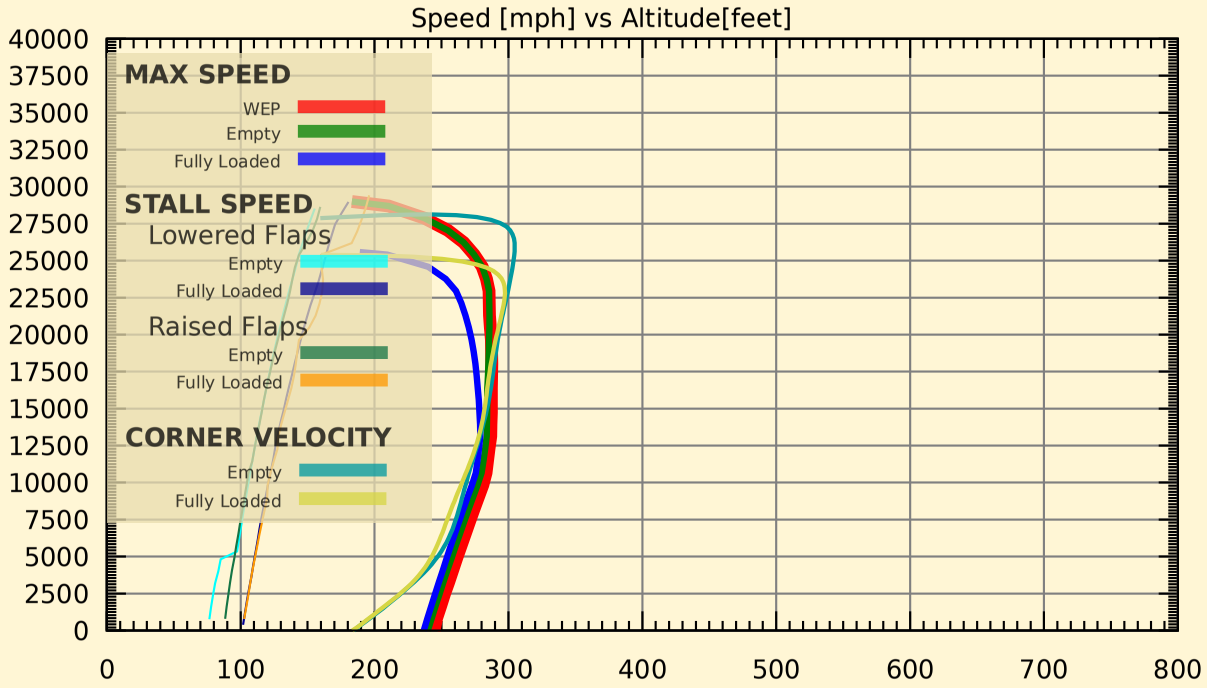
Mackay, R.S.G.; Lancaster In Action; Squadron/Signal Publishing, Carrollton, TX; 1982.

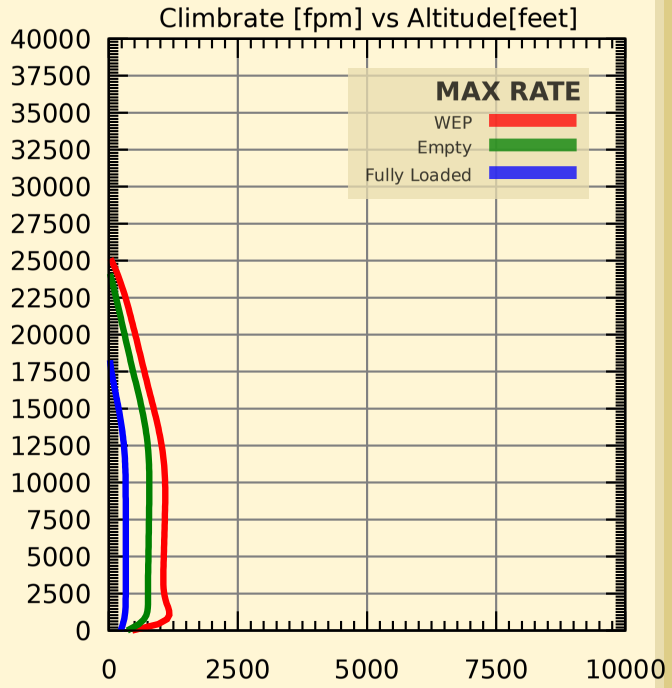
Name: Avro Lancaster Mk.IB
Role: Heavy Bomber
Crew: 7
Service Date: February 1942
Primary Guns: NA
Secondary Guns: NA
Defensive Guns: NA
Ordnance: 48x 250 lb or 24x 535 lb or 14x 910 lb or 3 x 4000 lb bombs in internal bomb bay or One 1801 lb Mk.XIV torpedo under the fuselage

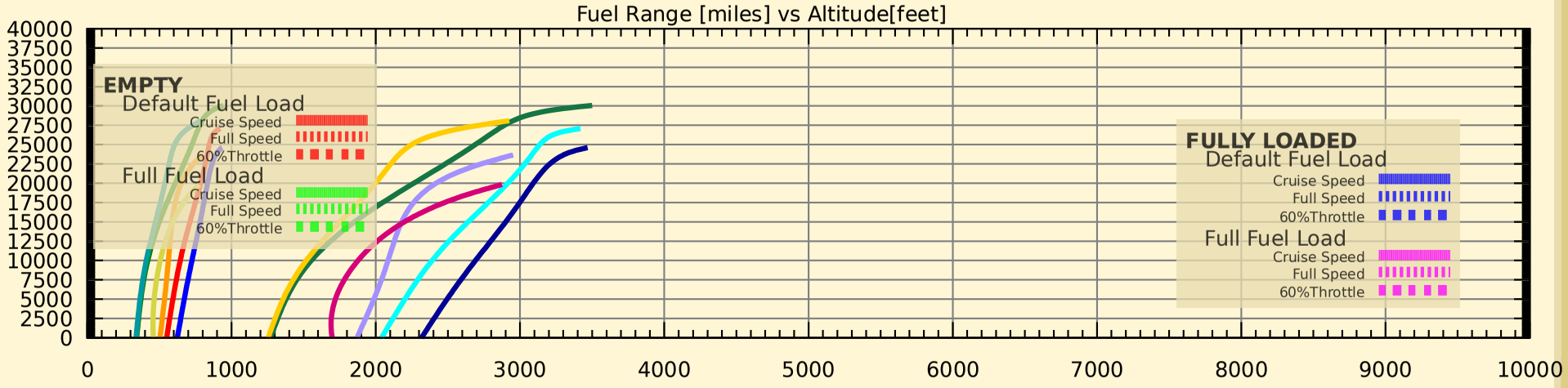
Length: 69.49 ft
Wing Span: 102.00 ft
Wing Area: 1309 sq. ft

Power Plant: 4 X Rolls-Royce Merlin-XX
Power: 2812 lb s.t.
Internal Fuel: 15540 lb
External Fuel: NA

Empty Weight: 37478 lb
MTOW: 65036 lb

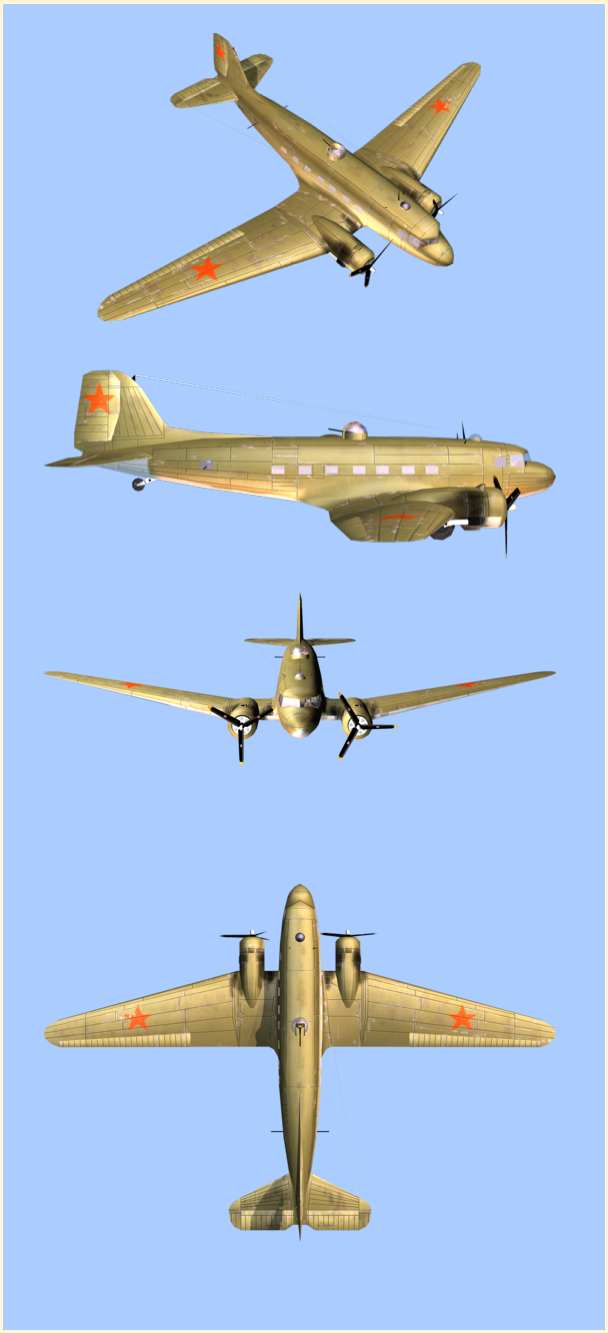






Lisunov Li-2

Durability	☆☆☆☆☆☆	Speed	☆☆☆	Climb Rate	☆
Maneuverability	☆☆☆☆☆☆☆	Firepower		Ground Attack	☆☆☆☆☆



Speed - As with the other transports, the Li-2 can't run from its problems.

Soviet civil airlines were already using a license-built variant of the DC-3 when the war started and these were immediately pressed into military service. The Lisunov company was assigned the task of producing a purpose-built military variant.

The Li-2, as it was called, was powered by a pair or Shvetsov M-62 engines, which were license-built copies of the Wright R-1820 Cyclone. Several changes to the original design were readily apparent. Unlike the original, the Li-2 was given some defensive armament in the form of a manually-operated dorsal gun turret equipped with a single 12.7mm machine gun. The cargo door was moved forward and a pair of gun positions were placed in the beam behind the cargo door, each equipped with a single 7.62mm machine gun.

Bomb racks enabled the Li-2 to carry up to 500 kg of bombs, while still capable of carrying a full load of 26 fully laden paratroopers (limited in game to 13) or 2000 kg of cargo. The additional weight of the defensive armament and heavier construction resulted in poorer overall performance than the original C-47.

Sources:

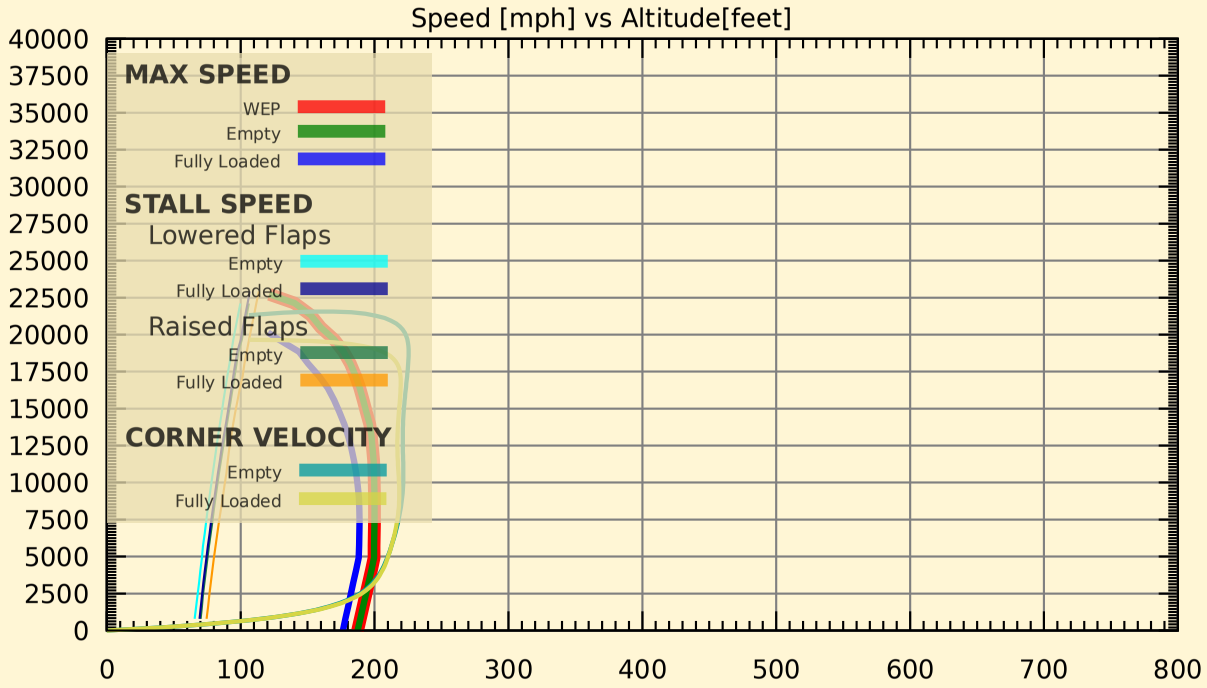
Davis, Larry; C-47 Skytrain In Action; Squadron/Signal Publications, Carrollton, Texas, 1995.

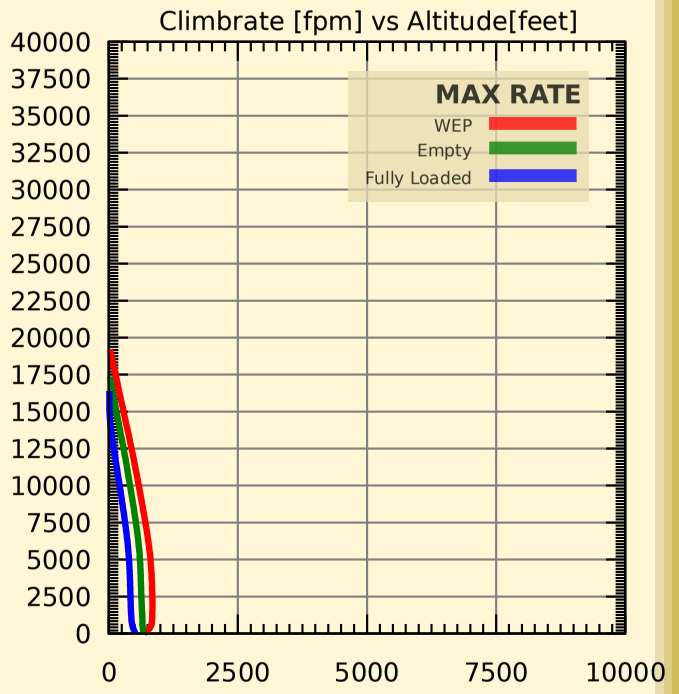
Name: Lisunov Li-2
Role: Transport
Crew: 5
Service Date: December 1941
Primary Guns: NA
Secondary Guns: NA
Defensive Guns: NA
Ordnance: 4x 220 lb or 4x 551 lb or 2x 1103 lb bombs or 4410 lb of freight or 13 paratroopers

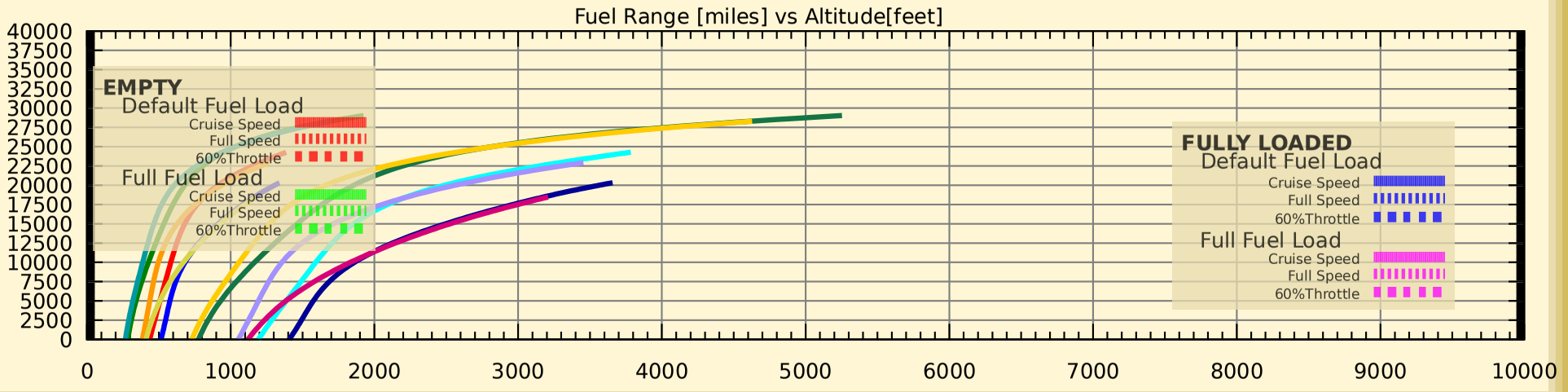
Length: 64.50 ft
Wing Span: 95.05 ft
Wing Area: 987 sq. ft

Power Plant: 2 X M-62IR
Power: 2084 lb s.t.
Internal Fuel: 5117 lb
External Fuel: NA

Empty Weight: 17416 lb
MTOW: 27558 lb







Messerschmitt Me-163B-1 Komet

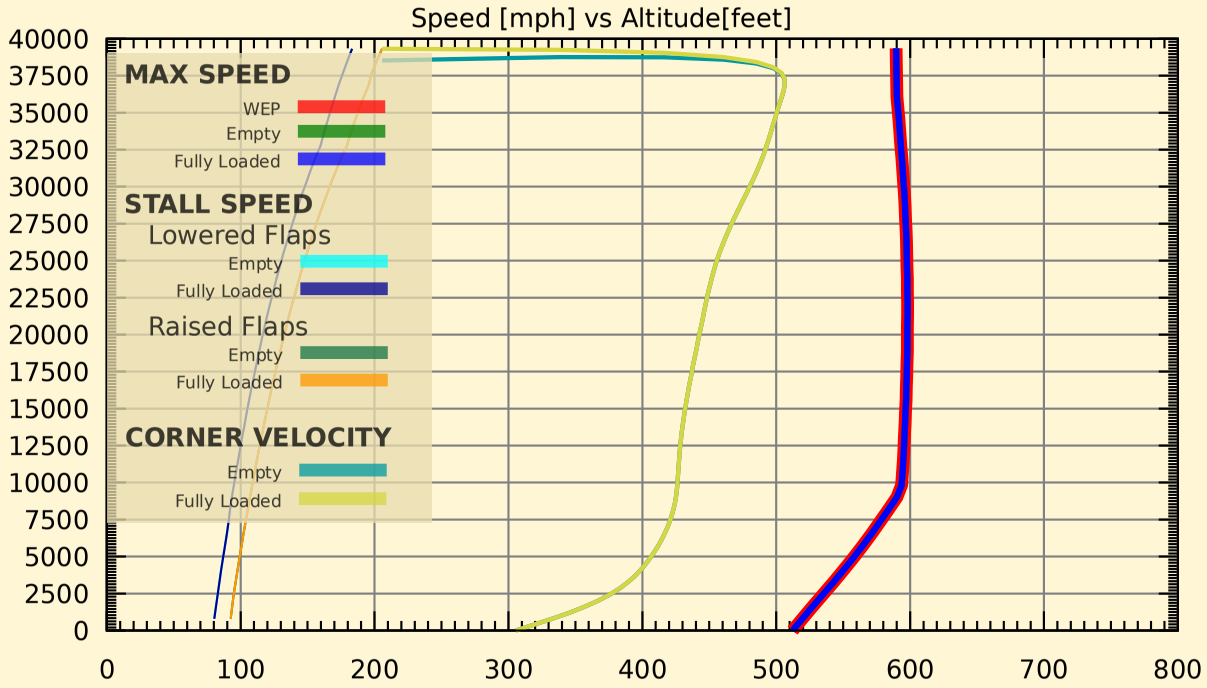
Durability	Speed	Climb Rate	
Maneuverability	Firepower	Ground Attack	

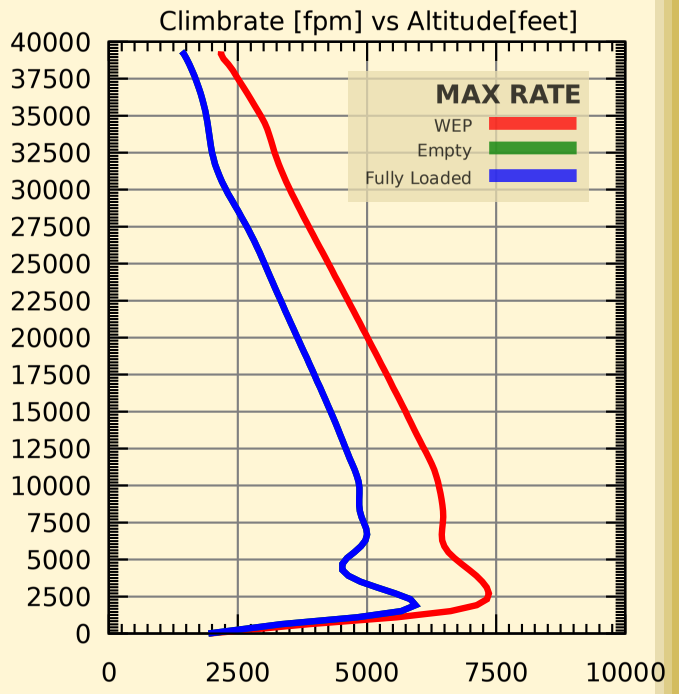
Name: Messerschmitt Me-163B-1 Komet
Role: Fighter
Crew: 1
Service Date:
Primary Guns: NA
Secondary Guns: NA
Defensive Guns: NA
Ordnance: NA

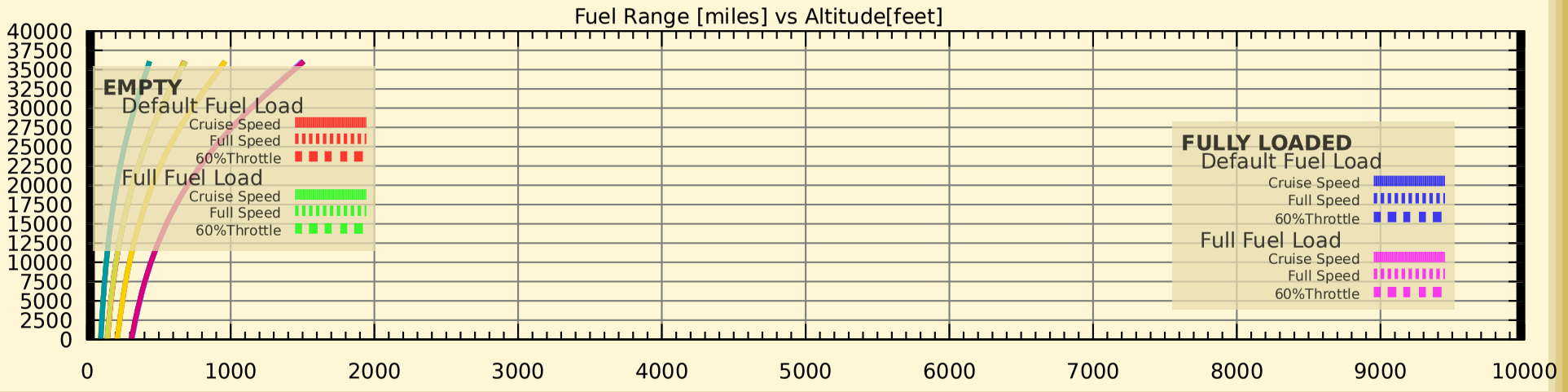
Length: 19.03 ft
Wing Span: 30.51 ft
Wing Area: 202 sq. ft

Power Plant: One Walter HWK-109-509A-2
Power: 3749 lb s.t.
Internal Fuel: NA
External Fuel: NA

Empty Weight: 4519 lb
MTOW: 7650 lb







Messerschmitt Me-262A-1 Schwalbe

Durability	☆☆	Speed	☆☆☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆
Maneuverability	☆	Firepower	☆☆☆☆☆☆☆☆	Ground Attack	☆☆☆☆☆

Acceleration - Once it is slowed down, the 262 is slow to regain its speed, leaving it prey to the quicker accelerating piston-engine planes.

The basic design concept of the Me-262 was begun in late 1938 when the RLM issued an order to Messerschmitt for a plane capable of using the new axial-flow turbojets being developed by BMW. BMW estimated that their new P3302 engine would produce 1,320 lb. of thrust and would be available for installation by December 1939.

The Messerschmitt design team began work and on June 7, 1939 submitted their proposal to RLM as Project 1065. Utilizing two P3302 engines, the 1065 was projected to have a top speed of 560 mph. After inspecting the mock-up in January 1940, the RLM issued an order for three airframes for static and flight testing.

By now of course, BMW had failed to deliver the 003 engine, as the P3302 had been redesignated, and its size was appreciably larger than anticipated. The lack of availability was a time issue, but the larger size was a design issue as it had originally been planned to mount the engines in the wing roots. A complete redesign was in order and the result was a larger plane with the engines mounted in nacelles under the wings. The new design was accepted in June 1940.

Meanwhile bench tests of the BMW 003s revealed their output to be less than 570 lb. of thrust, less than half of what they had promised. Fortunately, Junkers had also begun work on a turbojet, the Jumo 004. But although it was successfully run on the bench in November 1940, it too had problems and the first prototype was thus fitted with a single Junkers Jumo-210G in-line engine in the nose for flight testing of the airframe. It was in this form that the plane first flew on April 18, 1941 and although it could only reach 260 mph, the airframe displayed pleasant handling characteristics. Further tests revealed some minor buffeting problems in a dive, which were subsequently resolved.

The first flight-worthy BMW-003s arrived at Augsburg in November 1941 and were mounted in the nacelles of the 210G powered 262. After static testing it was declared flight-worthy and on March 25, 1942 the plane thundered down the runway under the power of all three engines. However, the plane was barely airborne before first one, then the other engine flamed out. Despite the increased weight and drag of the dead engines, the test pilot was able to make a circle and land safely. Upon inspection it was learned that the compressor blades had inexplicably broken and the engineers returned to BMW to work out the problems. As it turned out the BMW-003 had to be completely redesigned and would not fly again until late 1943.

Soon Junkers had resolved most of the problems in their turbojet and the pre-production Jumo-004A-0 was delivered to Augsburg for installation. Being larger and heavier than the BMWs the Jumos required larger nacelles and a larger rudder to compensate for the expected disruption to lateral stability. Finally, on July 18, 1942 the Jumo-powered 262 was ready to fly and the team commenced high-speed taxiing trials. After some aborted attempts to raise the tail-wheel off the ground it was suggested to the pilot that he tap the brakes to "kick" the tail into the air. This worked and at 8:40 in the morning the Me-262 took to the air on turbojet power alone.

After completing seven additional short test flights it was felt that the plane could be turned over to a Luftwaffe test pilot for evaluation. After being told the take-off procedure the pilot tried to take off, but had difficulty getting the tail up in time. He barely had gotten airborne by the end of the runway, when he plowed through a hedge and into a manure pile, causing a ground loop from which he, but not the plane emerged safe. This set back the development program by a good six months while the prototype and new pre-production engines were rebuilt.

During 1943 flight-testing showed the engines to be extremely susceptible to either flaming out or burning the turbine blades. The plane required precise manipulation of the throttle with mistakes resulting in disaster. Even an excessive side-slip could cause an engine failure as they found on the second test flight of the reconstructed prototype when it crashed, killing the pilot.

On November 2, 1943 Goring visited the Messerschmitt firm to ask if the Me-262 could carry bombs. Messerschmitt replied that the plane had always been envisaged to carry two 551 lb. or a single 1102 lb. bombs, but that the equipment had not yet been installed. Goring then asked how soon the bomb-carrying version could be ready for delivery, to which Messerschmitt replied that the equipment hadn't actually been designed yet. Pressed further as to how much of a delay would be incurred, Messerschmitt amazingly replied, "Oh, not very long - two weeks perhaps. It isn't really much of a problem; just a matter of camouflaging the clips." Goring gullibly bought this excuse and left with the impression that the plane would soon be capable of carrying bombs.

On November 26, Goring returned to Augsburg with Hitler for a demonstration of the Me-262. It was at this meeting that Hitler is purported to have asked if the plane could carry bombs and on learning that it could, proclaimed it to be the new Blitzbomber. However a subsequent telegram from Hitler's Luftwaffe aide to Goring revealed a desire to get as many "fighter-bombers" into front-line service as fast as possible and his feeling that "a delay in our jet fighter program would be tantamount to irresponsible negligence". Several months later when he learned that the planes delivered were not capable of carrying bombs, he flew into a rage and ordered that all Me 262s coming off the line be so equipped.

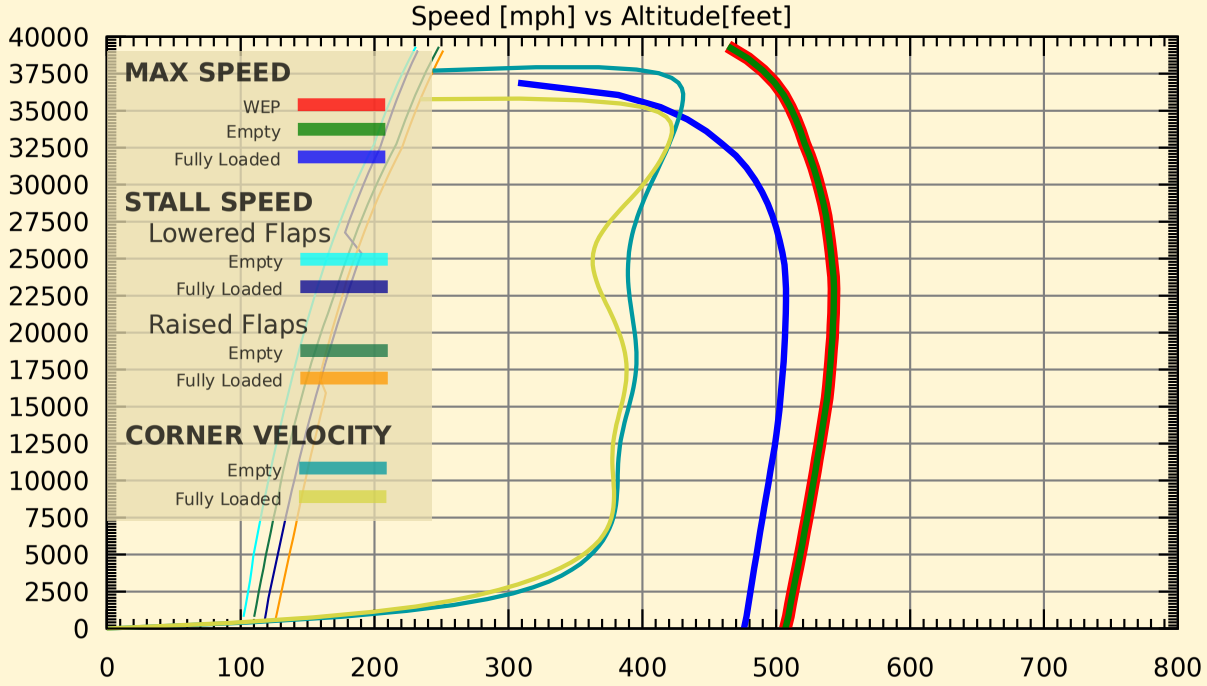
But regardless of whether the plane was able to carry bombs or not the simple fact was that the revised Jumo-004B was still nowhere close to entering large-scale production. Only a few engines had been delivered by June 1944 when development was "frozen" in order to devote all resources to production of what they had achieved by that time. Further, the trickle of engines that flowed from the factory had to be split between the twin needs of the Me-262 and the Arado Ar-234 jet bomber.

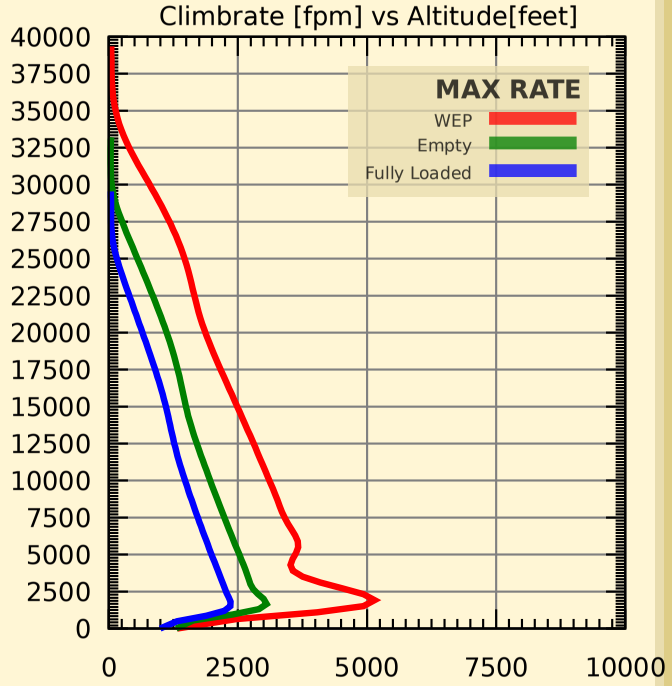
Name: Messerschmitt Me-262A-1 Schwalbe
Role: Fighter
Crew: 1
Service Date: July 1944
Primary Guns: 2x Mk108 30mm cannon with 80 rpg in nose
Secondary Guns: 2x Mk108 30mm cannon with 100 rpg in nose
Defensive Guns: NA
Ordnance: 2x 551 lb bombs or 2x 475 lb drop tanks or 24x 9lb R4M rockets

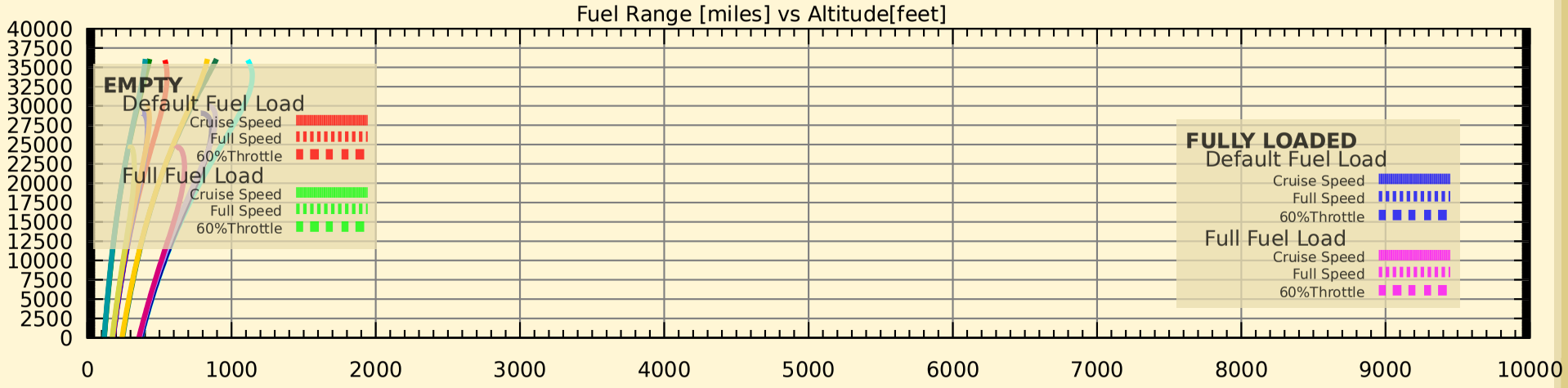
Length: 34.78 ft
Wing Span: 41.01 ft
Wing Area: 234 sq. ft

Power Plant: 2 X Junkers Jumo-004B-1
Power: 107 lb s.t.
Internal Fuel: 2736 lb
External Fuel: 950 lb

Empty Weight: 8686 lb
MTOW: 13228 lb

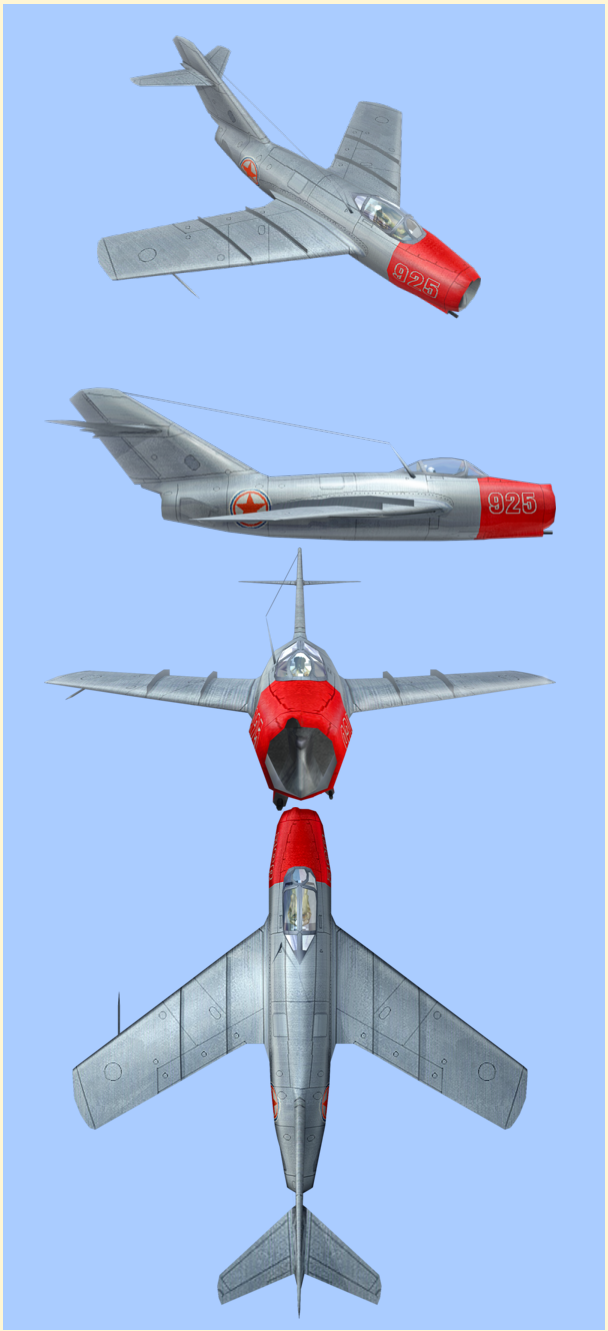






Mikoyan & Gourevich MiG-15

Durability	☆☆☆	Speed	☆☆☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆☆☆☆
Maneuverability	☆☆☆	Firepower	☆☆☆☆☆☆☆☆	Ground Attack	☆☆☆☆☆



During the Great Patriotic War the Soviet Central Aero-Hydrodynamics Institute (TsAGI) was given examples of lend-lease and captured German, Italian and Japanese aircraft for evaluation and technology mining, while the Ramenskoye Test and Research Center was responsible for flight testing captured German aircraft. When the war ended a bounty of captured German research material and preproduction aircraft helped boost the pool of technology available to Soviet designers.

Among the aircraft captured was the Focke Wulf Ta-183, a swept-wing, single-engine jet fighter with a T-tail and an estimated performance of almost 600 mph and a service ceiling of 47,000 feet. The Ta-183 was mostly made of wood and had a thin wing with a 35 degree sweep. A team of Mikoyen-Gurevich (MiG) scientists began wind tunnel testing on the swept wing.

At that time the only jet engine available was the axial-flow RD-10 (RD = Reaktivny Dvigatel = Reaction Engine), a copy of the Junkers Jumo 004, and the expectation of more than tripling the engine's original power rating was unrealistic so the project was delayed until a suitable replacement could be found.

Salvation to the project was found in the unlikely form of the British Empire. Against strong opposition from the Royal Air Force and the Defense Ministry, about 30 Rolls-Royce Derwent Mark V and 25 Rolls-Royce Nene Mark I engines were sold to the USSR. The Klimov team in Leningrad was given the task of producing a Soviet copy of the Nene, and built the RD-45, which produced 5000 lb thrust.

The first I-310 prototype was powered by one of the original Rolls-Royce Nene engines imported from the UK and had a full armament package of 1x 37 mm NS-37 cannon and 2x 23 mm NS-23 cannons mounted under the nose. The design was cleared for mass production at the State Aircraft Factory #1 in late-1948 as the MiG-15 and the first production MiG-15 was flown on 30 December 1948 by company test pilot VN Yuganov.

The MiG-15 was produced in the USSR between late 1948 through early 1950 and was armed with a single 37 mm NS-37 cannon with 40 rpg and two 23 mm NS-23 cannons with 80 rpg in the nose. A BDK-2-48MIG bomb rack under each wing allowed the plane to carry either bombs or 250 liter or 300 liter drop tanks. Once NATO identified the type, it was initially given the codename FALCON. However it was soon renamed FAGOT, probably due to a naming conflict with a NATO plane. Soviet pilots called it the Samoljot-Soldat (Aircraft of the Soldier), while Hungarian pilots dubbed it the Jaguar.

A significant number of variations and experimental versions were employed, most of which were designed to increase the plane's range by adding external fuel tanks of ever increasing size. A two-seat training version was also created, which had full controls for both cockpits and employed either a single 12.7 mm machine gun or a single NR-23 cannon for training purposes. The training version, known internally as the MiG-15UTI, was code named MIDGET by NATO and served as the training aircraft for the MiG-17 and MiG-19 fighters.

After successfully copying the Rolls-Royce Nene in the form of the RD-45 and RD-45F engines, Klimov set to work on improving the basic design. The resulting VK-1 engine employed larger combustion chambers, turbine blades and tail pipe confined within the original dimensions of the Nene/RD-45. The new engine produce 5,950 lb of thrust, almost 20% more than the RD-45F (5,005 lbt), and passed State Acceptance Trials in November 1948. The VK-1 was quickly followed by the VK-1A, which slightly improved reliability, fuel consumption and power output to 5,952 lbt.

With official acceptance of the new engine, Mikoyan-Gurevich started work on Project SD, an improved version of the MiG-15 using the new engine. The first MiG-15bis production run was virtually identical to the last MiG-15, with the exceptions being the new engine, a weight reduction program that made the new plane almost 200 lb lighter, and larger speed brakes.

Internal fuel capacity was increased by 160 liters by using a larger main fuselage tank. The new variant used the then standard wing tank system that allowed for use of 250, 300 and 400 liter slipper tanks or 600 liter teardrop tanks. Because of their weight when full, 600 liter drop tanks were limited to use from long, hard runways and pilots were prohibited from landing with full 600 liter tanks.

During 1951 the guns package was upgraded significantly. The NS-23 cannons were replaced with the lighter NR-23 cannons and the NS-37 was replaced with the N-37 model. The N-37 had the same muzzle velocity as the NR-23 and ammunition capacity was slightly increased from 40 to 45 rounds. NATO gave the improved model the code-name FAGOT B, and amended their designation of the MiG-15 to Fagot A. Hungarian pilots dubbed the improved model the Sas (Eagle).

Sources:

Angelucci, Enzo; The Rand McNally Encyclopedia of Military Aircraft 1914 to Present; Crescent Books; New York; 1990.

Batchelor, John, and Cooper, Brian; Fighter; Charles Scribner's Sons; New York; 1973.

Franks, Norman; Aircraft Versus Aircraft; Grub Street; London; 1999.

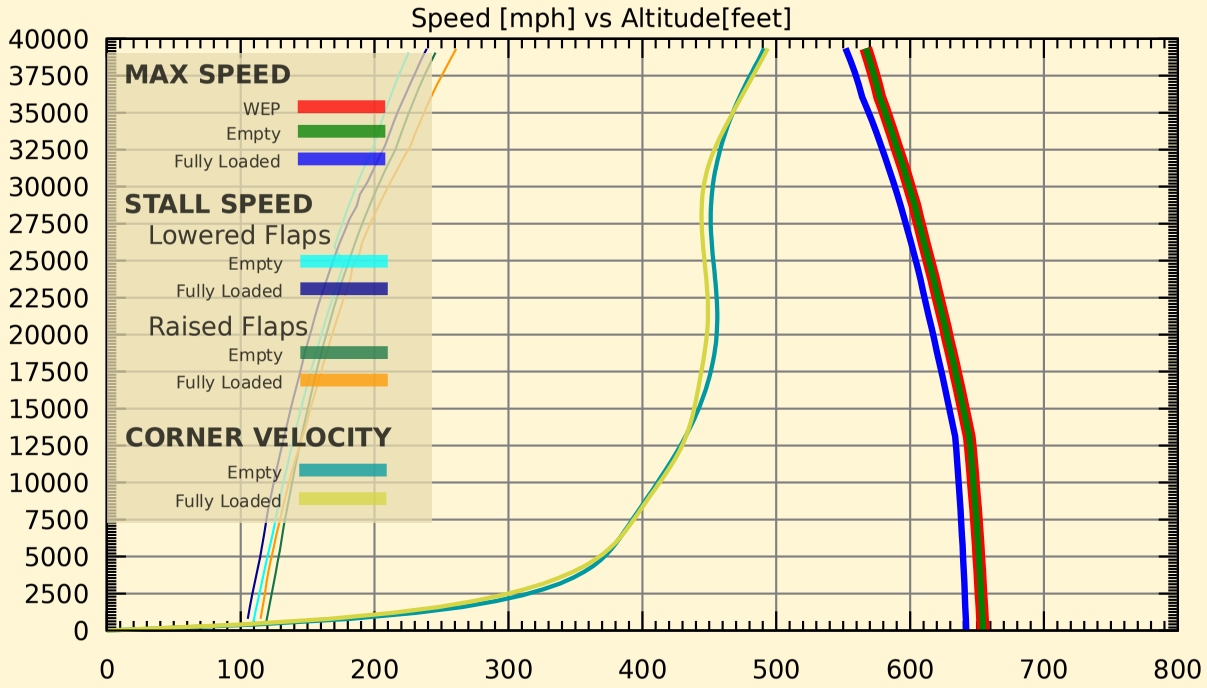
Green, William, and Swanborough, Gordon; The Complete Book Of Fighters; Smithmark Publishers Inc.; New York; 1994.

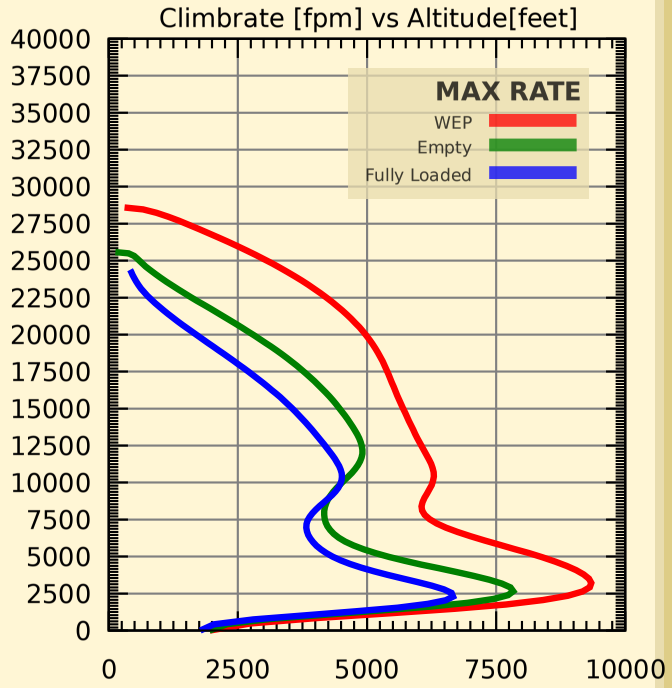
Name: Mikoyan & Gourevich MiG-15
Role: Fighter
Crew: 1
Service Date: January 1950
Primary Guns: 2x NR-23 23mm cannons with 80 rpg in nose
Secondary Guns: One N-37 37mm cannon with 45 rpg in nose
Defensive Guns: NA
Ordnance: 2x 50 kg bombs or 2x 100 kg bombs or 2x 250 kg bombs or 2x 500 kg bombs or 2x 260 liter drop tanks or 2x 300 liter drop tanks or 2x 400 liter drop tanks or 2x 600 liter drop tanks

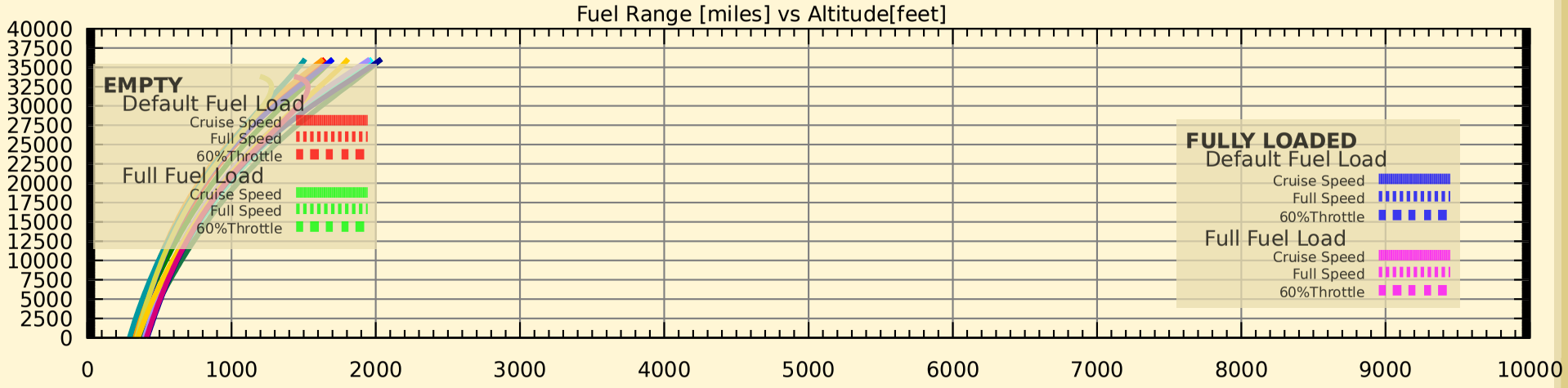
Length: 36.94 ft
Wing Span: 31.59 ft
Wing Area: 243 sq. ft

Power Plant: One Klimov VK/1FA
Power: 5844 lb s.t.
Internal Fuel: 2641 lb
External Fuel: 974 lb or 1123 lb or 1499 lb or 2247 lb

Empty Weight: 9220 lb
MTOW: 13955 lb







Mikoyan & Gourevich MiG-3

Durability	★☆	Speed	★★★★★★	Climb Rate	★★★★☆
Maneuverability	★★★★☆	Firepower	★★★☆	Ground Attack	★

Early Soviet air combat theory was centered around the concept of using fast monoplanes to catch up with and engage enemy aircraft so that the slower and more maneuverable biplane fighters to catch up and finish them off. The speed half of this theory was provided by the Polikarpov I-16 with the maneuver half being composed of the Polikarpov I-15 and I-153 fighters.

Late in 1939 Nikolai Polikarpov proposed the idea of making a new "maneuver" plane designed around the Klimov M-105P in-line engine with a 20mm ShVAK cannon firing through the propeller hub. However, upon evaluation of combat trends in Europe, including the disappointing results of the Soviet philosophy in Spain, the goal of the design was changed to that of a high-speed, high-altitude fighter using the new AM-37 engine then being developed by the Alexander Mikuln Design Bureau.

The task of designing and building a prototype for the new fighter, designated the I-200, was given to a Special Design Department under the leadership of Artyom Mikoyan. Included among Mikoyan's deputies was a young engineer named Mikhail Gurevich. The young design team made good use of being situated in the Soviet Union's most advanced aircraft factory and soon produced a prototype of composite construction (mixed wood and metal) built around the AM-35A engine, due to the AM-37's unavailability. Because the ShVAK 20mm cannon would not fit between the cylinder heads of the new engine, the armament was downgraded to a single Beresin 12.7mm and two ShKAS 7.62mm synchronized machine guns in the cowl.

The new fighter, now dubbed the MiG-1, had more than its share of teething problems. The first problems to surface were related to engine cooling, which was so bad that full engine power could not be used. However, the most serious problems were due to a lack of longitudinal and lateral stability. Experienced test pilots continually commented on how often they came close to disaster.

After state trials, a list of 112 required improvements was submitted and in October 1940, while in the process of implementing these improvements, a batch of 25 MiG-1s was completed and sent to the 146th Fighter Air Regiment for operational trials. In February 1941 the first MiG-3s, as the improved version was known, were delivered to training units. After further crashes it was suggested that biplane flight techniques were not suited to the new high-speed fighters and after several trials, it was proved that over-correction during loops would result in a spin.

By April 1941, MiG-3s were coming off the production line at a rate of nine per day. Despite this, improvements continued to be made, including the addition of a Beresin 12.7mm machine gun in a pod under each wing.

Although over 900 MiG-3s were distributed along the western front in June 1941, only a few squadrons had managed to master the aircraft. When the Germans attacked on June 22, 1941 the Luftwaffe paid particular attention to destroying any MiG-3s they found. Just days before the attack the 9th Mixed Air Division had received 233 new MiG-3s, but they lost 347 of 409 operational aircraft on the first day of the war with almost all of the MiG-3s destroyed on the ground by bombs.

However, reinforcements were soon forthcoming and new MiG units began to arrive on the front almost every day. In combat with the Luftwaffe, the MiG proved it could hold its own at low altitudes while at higher altitudes the MiG-3 completely outclassed the Bf-109E.

The MiG's greatest success came in the defense of the capitol from 1941 through 1943. Of 8,278 sorties directed against Moscow, only 207 bombers managed to get through. The MiG also proved to be the only Soviet fighter capable of operating at extreme altitudes as was proven on September 28, 1941 when a MiG-3 of the 124th Fighter Air Regiment downed a German reconnaissance plane at over 32,000 feet.

But with more promising designs on the drawing board and the need the use the new AM-38 engine on the Stormovik, the decision was made to cease production of the MiG fighter. The MiG's record didn't help matters and neither did the fact that it was being made by the Soviet Union's most prestigious aircraft factory.

Sources:

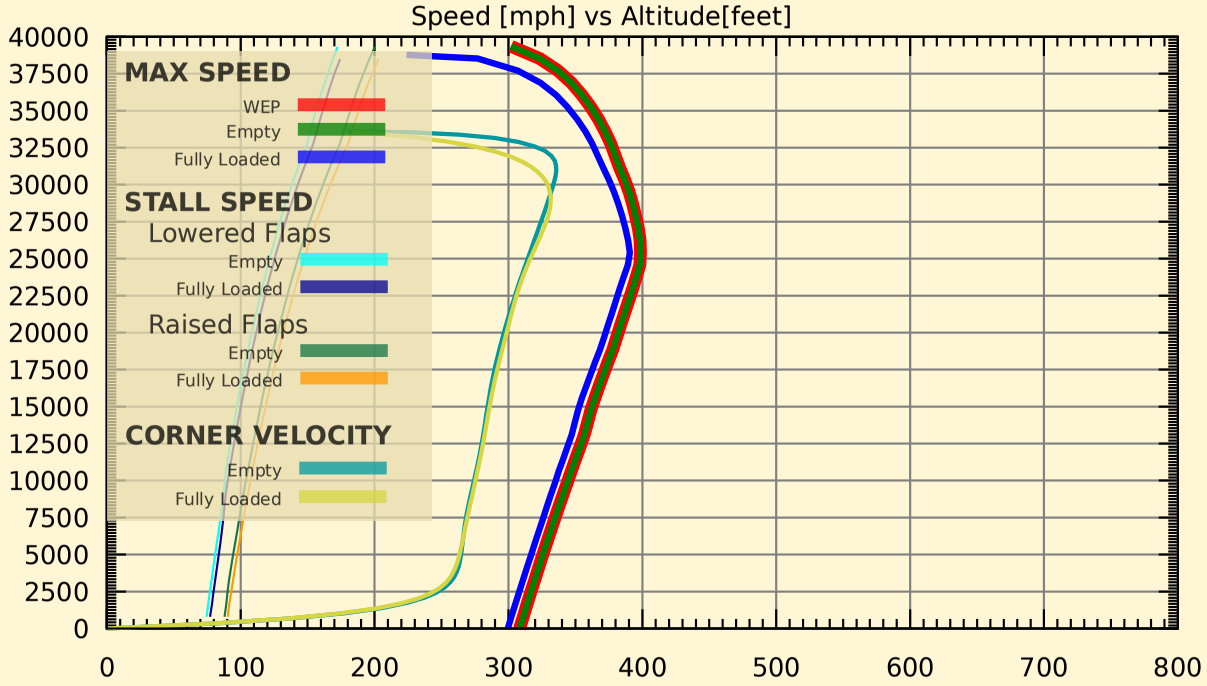
Gordon, Yefim, and Khazanov, Dmitri; Soviet Combat Aircraft of the Second World War Volume One: Single Engined Fighters; Midland Publishing, Leicester, England, 1998.

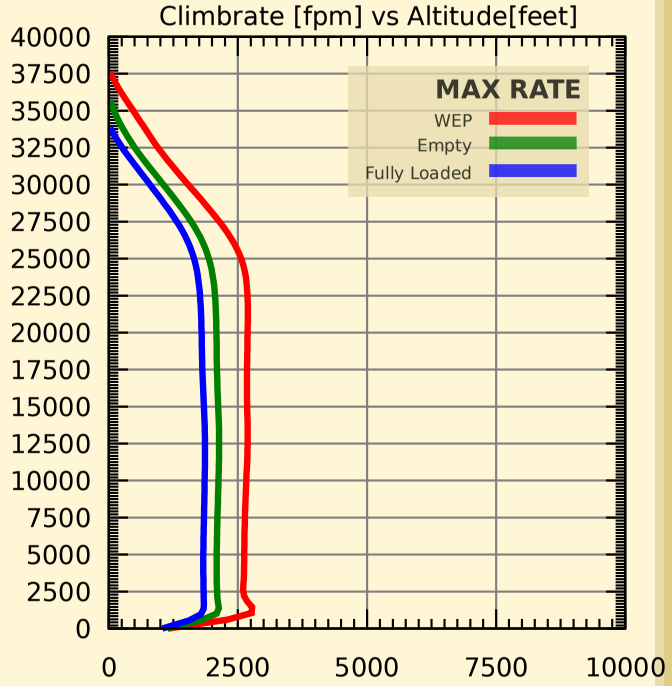
Name: Mikoyan & Gourevich MiG-3
Role: Fighter
Crew: 1
Service Date: March 1941
Primary Guns: One Beresin (UBS) 12.7mm machine gun with 360 rpg in cowl and 2x ShVAK 7.62 mm machine guns with 350 rpg
Secondary Guns: 2x Beresin (UBK) 12.7mm machine gun with 145 rpg under wings
Defensive Guns: NA
Ordnance: 6x 33 lb RS-82 rockets or 2x 110 lb bombs or 2x 220 lb bombs

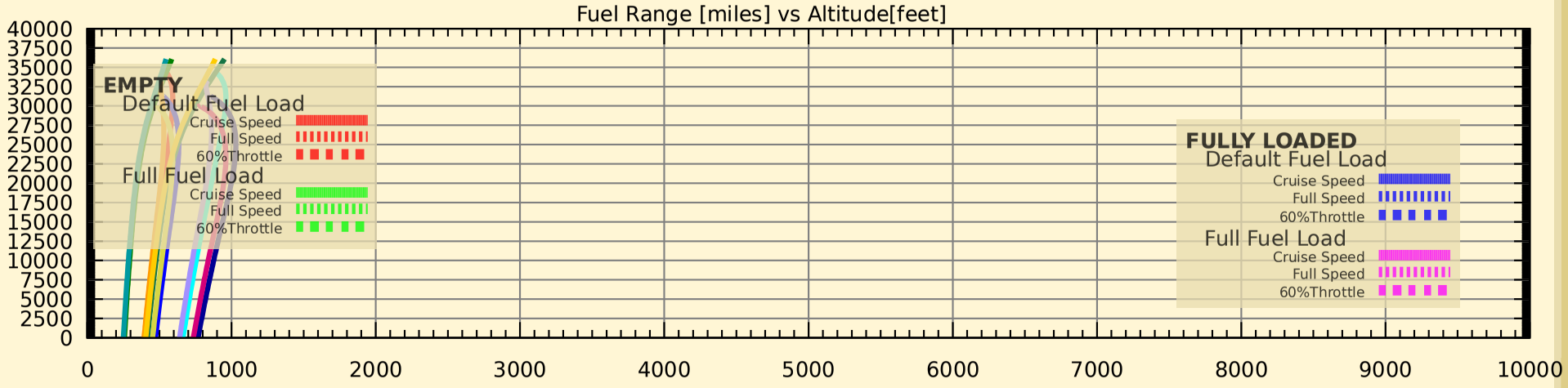
Length: 27.10 ft
Wing Span: 33.46 ft
Wing Area: 188 sq. ft

Power Plant: One AM-35A
Power: 2922 lb s.t.
Internal Fuel: 1039 lb
External Fuel: NA

Empty Weight: 6173 lb
MTOW: 7716 lb

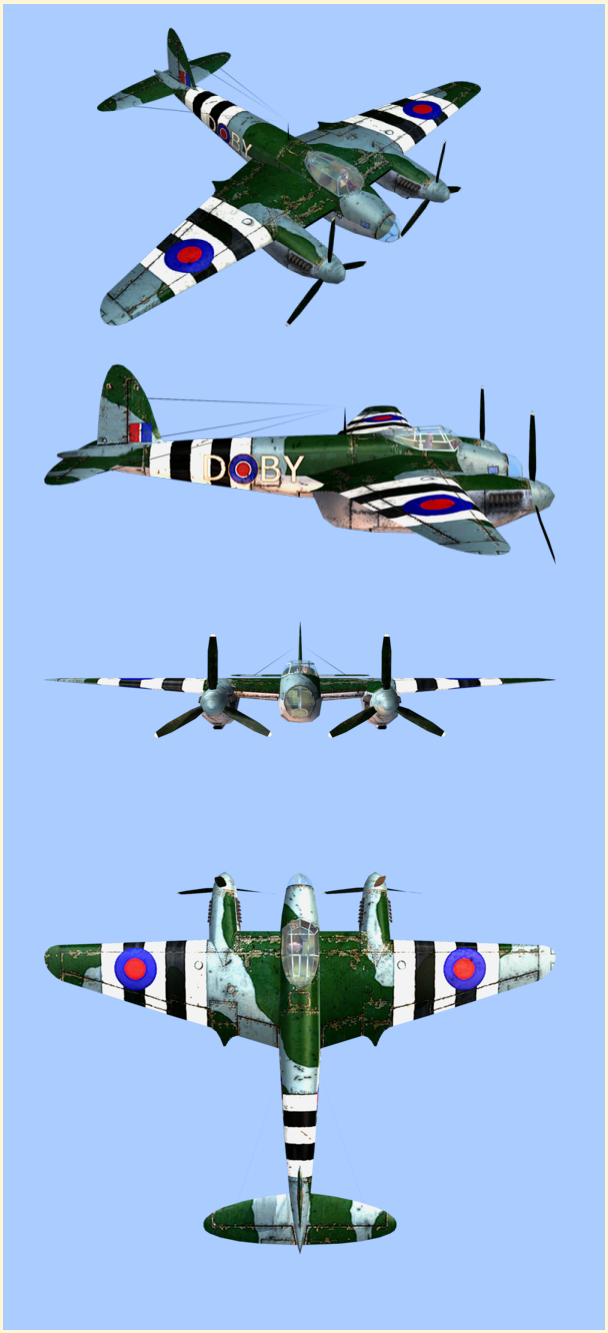






Mosquito DH.98 B Mk.IX

Durability	☆☆☆☆☆	Speed	☆☆☆☆☆☆	Climb Rate	☆☆☆
Maneuverability	☆☆☆	Firepower		Ground Attack	☆☆☆☆



Defense - Without defensive guns, the Mosquito must rely on its speed to evade enemy planes.

In 1942 deHavilland installed a pair of Merlin 61s to a Mosquito Mk.IV. Rated for 1,680 hp and equipped with a two-stage supercharger and four-bladed props, the Mosquito reached an altitude of 40,000 feet and a top speed of 432 mph, 52 mph faster than the production Mk.IVs.

This more powerful model was designated the Mk.IX and series production commenced using the Merlin 72 engine and three-bladed props, the four-bladed versions having been found to cause engine surging. The Mk.IX also sported the "universal" wing, which was originally designed for the aborted Mk.V model. The "universal" wing was stressed to carry either a pair of 50-gallon drop tanks or a pair of 500 lb. bombs, which gave the plane a total bomb load of 3,000 lb. A total of fifty-four Mk.IX bombers were built.

Sources:

Green, William; Famous Bombers of the Second World War; Doubleday and Company, Garden City, NY; 1959.

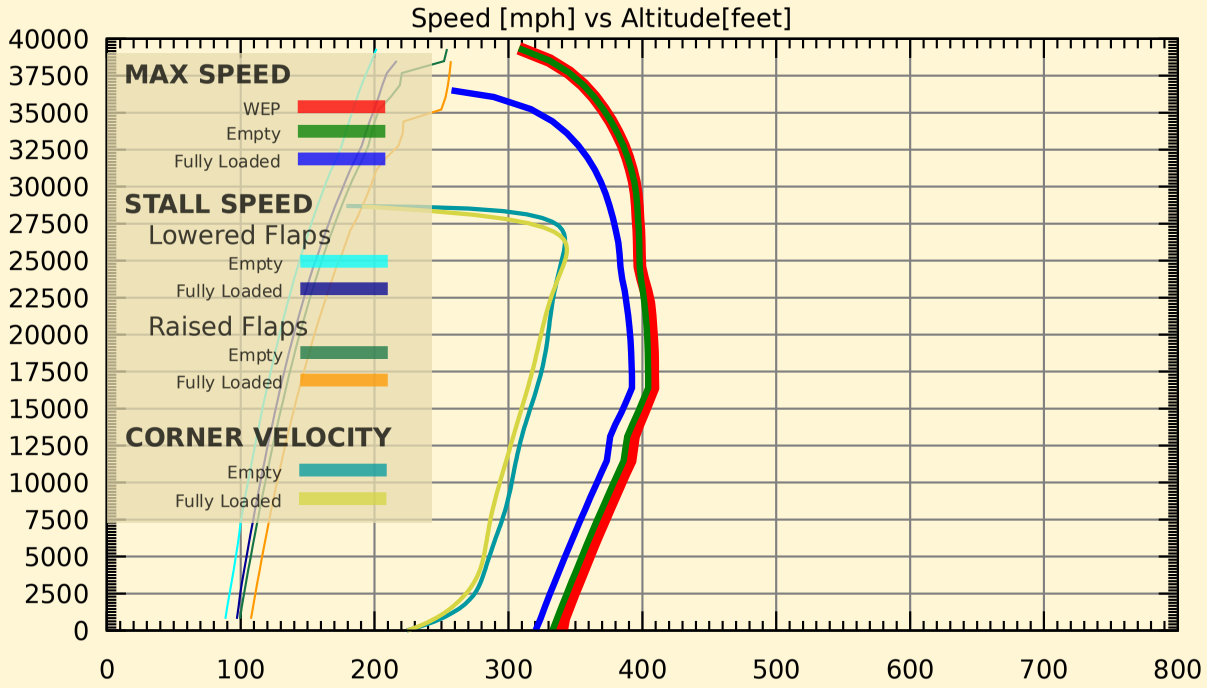
Scutts, Jerry; Mosquito In Action Part I; Squadron/Signal Publications, Carrollton, TX; 1992.

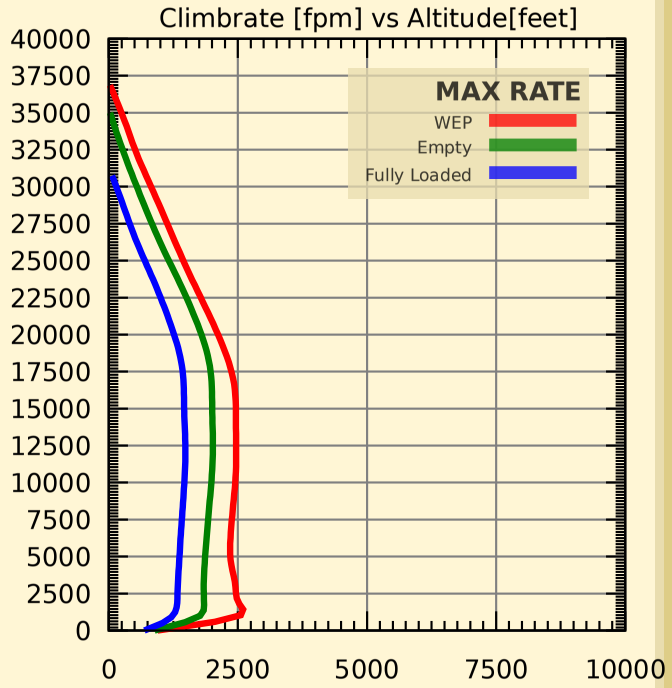
Name: Mosquito DH.98 B Mk.IX
Role: Diving Bomber
Crew: 2
Service Date: May 1944
Primary Guns: NA
Secondary Guns: NA
Defensive Guns: NA
Ordnance: 4x 250 lb or 4x 535 lb bombs internally and 2x 250 lb or 2x 535 lb bombs or 2x 360 lb drop tanks on wing racks

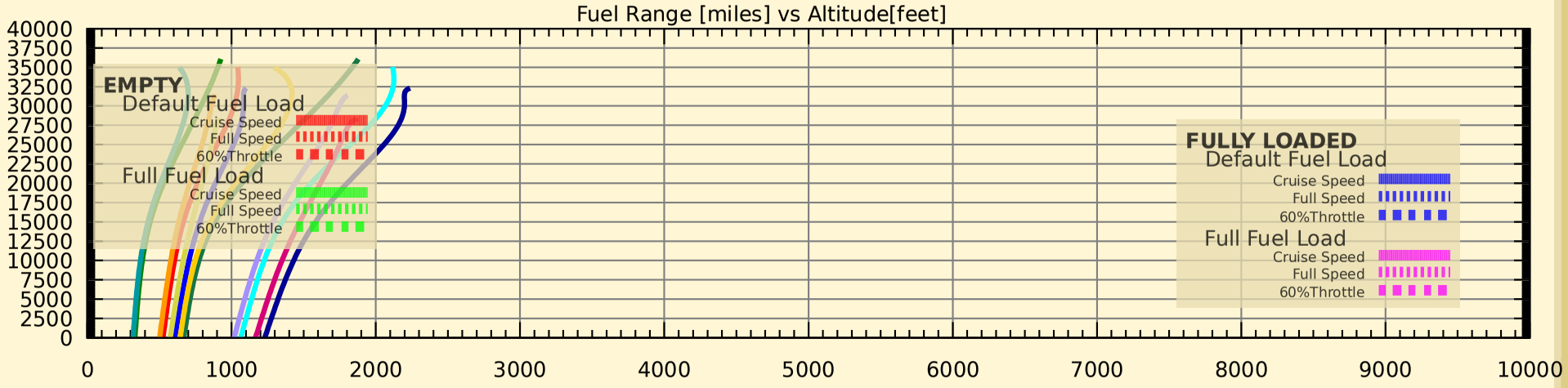
Length: 41.83 ft
Wing Span: 54.20 ft
Wing Area: 454 sq. ft

Power Plant: 2 X Rolls-Royce Merlin-72
Power: 3749 lb s.t.
Internal Fuel: 3578 lb
External Fuel: 720 lb

Empty Weight: 15432 lb
MTOW: 21826 lb

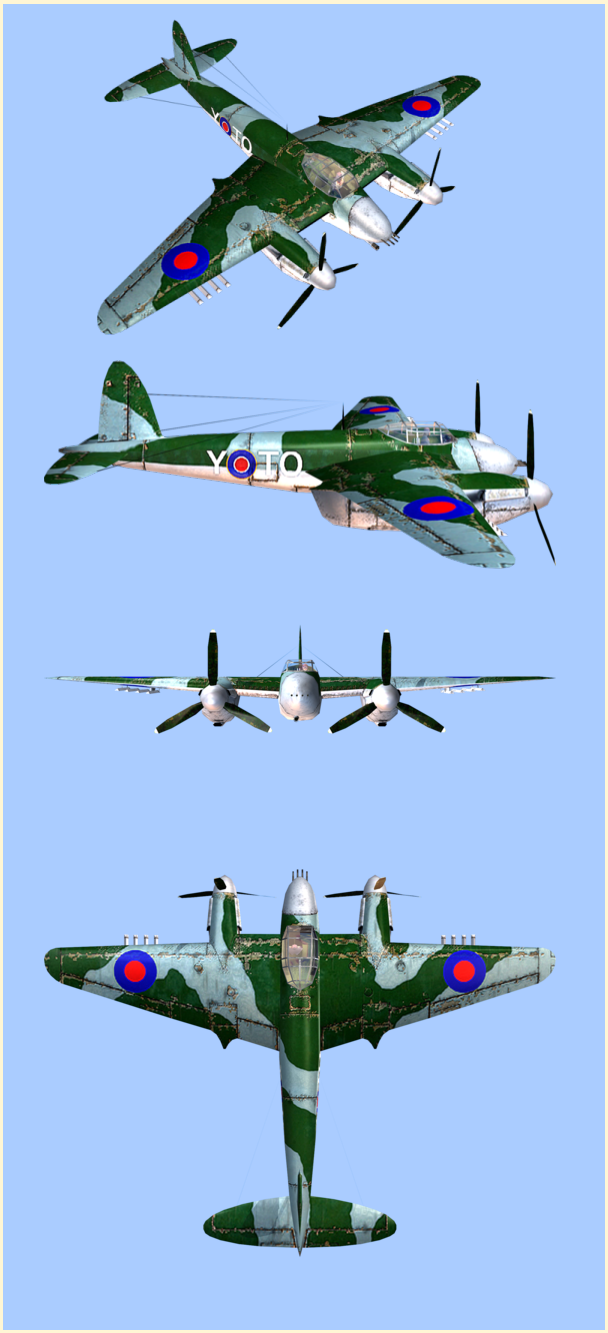






Mosquito DH.98 FB Mk.XVIII
Tse-Tse

Durability	☆☆☆☆☆	Speed	☆☆☆☆☆☆	Climb Rate	☆☆☆
Maneuverability	☆☆☆☆	Firepower	☆☆☆☆☆	Ground Attack	☆☆☆☆☆



Defense - Without defensive guns, the Mosquito must rely on its speed to evade enemy planes.

In the Battle of the Atlantic, the German U-boats were being equipped with better and more numerous anti-aircraft installations and as a result aircraft losses increased. In an effort to turn the tables the Air Ministry caught the idea of installing a large caliber howitzer in the Mosquito for standoff attacks beyond range of the U-boats' AA defenses.

The engineers at deHavilland did their calculations and figured that the FB Mk.VI could be easily modified to carry a standard 6-pounder gun. The new prototype flew as the FB Mk.XVIII and firing trials on June 12, 1943 proved that the concept would work.

The production version used either a 57mm Moulins or Vickers "S" quick-firing, anti-shipping gun in place of the four 20mm cannons, with the .303 machine-guns being retained. Additionally, the Mk.XVIII could carry the same bomb and rocket load of the Mk.VI.

Despite some operational successes, the RAF found that a salvo of rockets was just as effective at sinking U-boats as a hit from the 6-pounder and they were easier to aim and fire, as well. This development, combined with increasing Allied air-superiority, meant that the Mk.XVIII would see only limited service.

Sources:

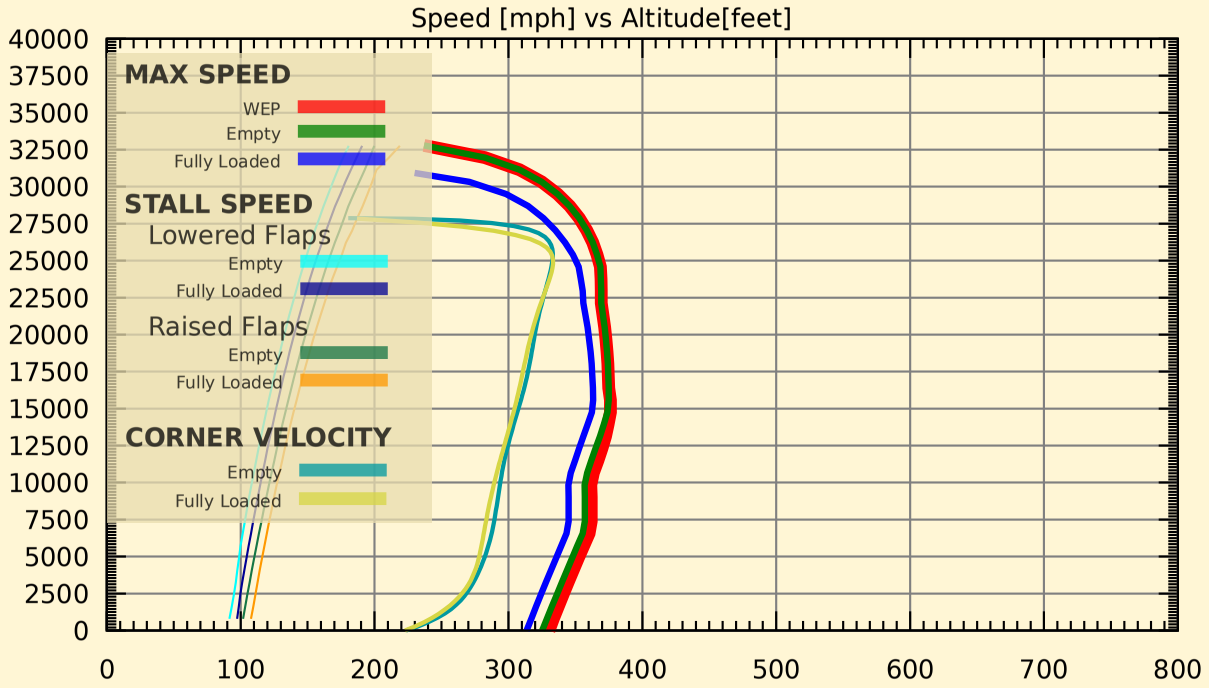
Scutts, Jerry; Mosquito In Action Part 2; Squadron/Signal Publications, Carrollton, TX; 1993.

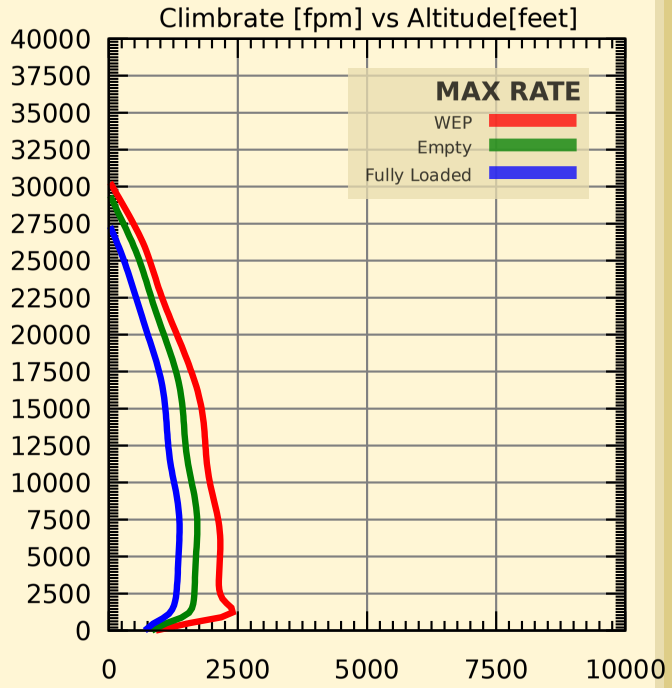
Name: Mosquito DH.98 FB Mk.XVIII Tse-Tse
Role: Fighter Bomber
Crew: 2
Service Date: June 1943
Primary Guns: 4x Browning 0.303" machine guns with 500 rpg in nose
Secondary Guns: One Molins 57mm cannon with 25 rpg in nose
Defensive Guns: NA
Ordnance: 2x 250 lb or 2x 535 lb bombs internally and 2x 250 lb or 2x 535 lb bombs or 2x 360 lb drop tanks or 8x 83 lb RP-3 A2G rockets under wings

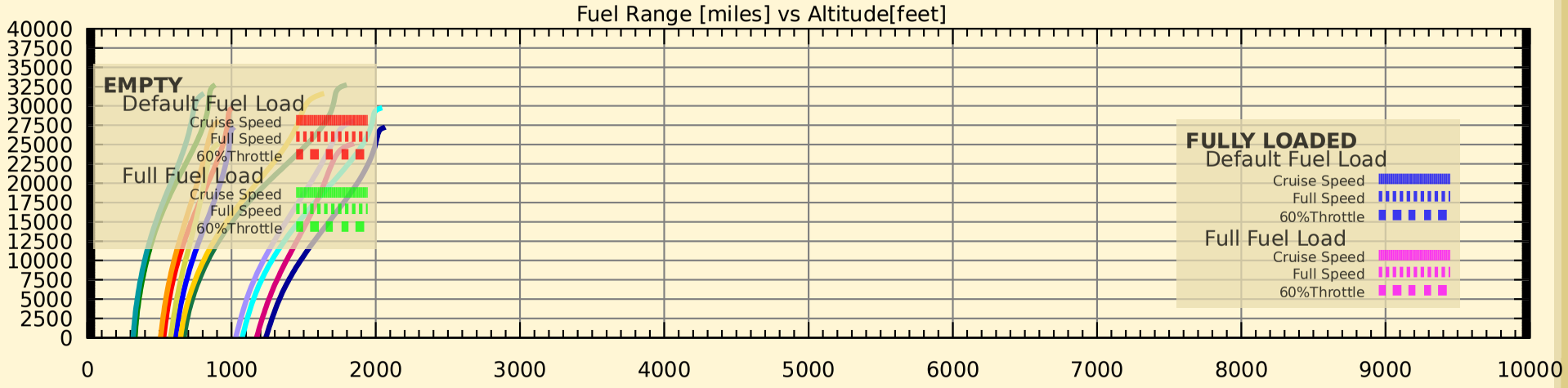
Length: 41.83 ft
Wing Span: 54.20 ft
Wing Area: 454 sq. ft

Power Plant: 2 X Rolls-Royce Merlin-25
Power: 3617 lb s.t.
Internal Fuel: 3578 lb
External Fuel: 720 lb

Empty Weight: 15873 lb
MTOW: 21826 lb

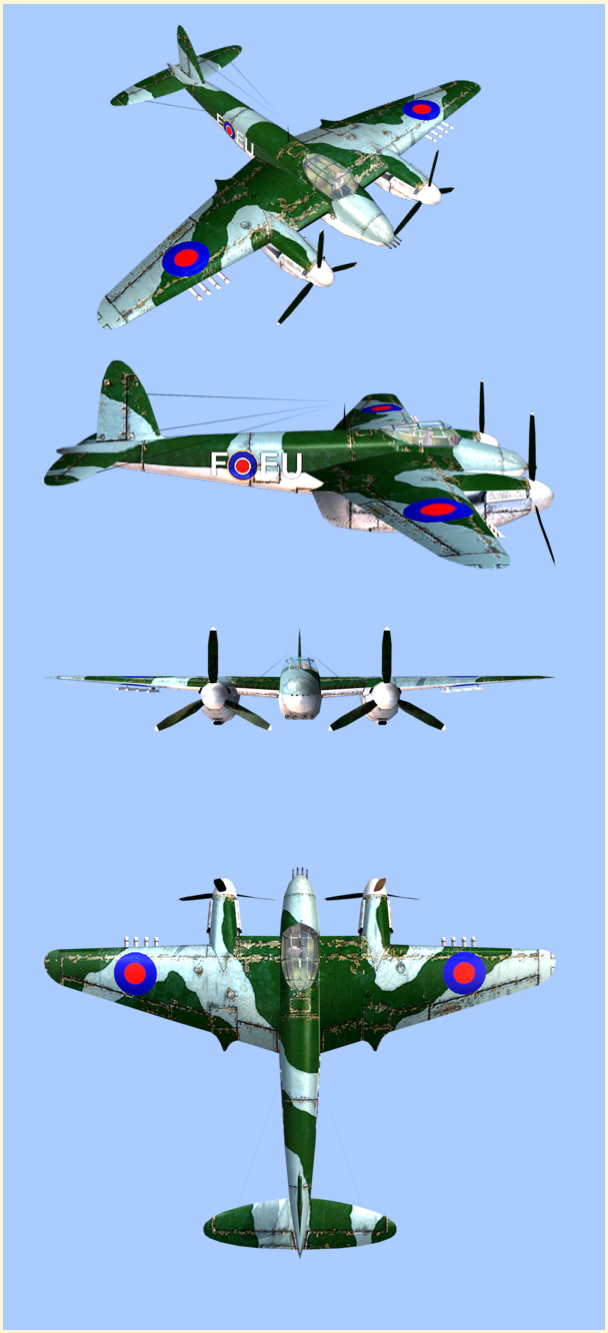






Mosquito DH.98 FB Mk.VI

Durability	☆☆☆☆☆	Speed	☆☆☆☆☆☆	Climb Rate	☆☆☆
Maneuverability	☆☆☆	Firepower	☆☆☆☆☆☆	Ground Attack	☆☆☆☆☆



Defense - Without defensive guns, the Mosquito must rely on its speed to evade enemy planes.

In July 1941 the RAF queried deHavilland about the possibility of building a Mosquito that combined the heavy armament of the Mk.II night-fighter and as much of the bomb-load of the Mk.IV bomber as possible.

Known as the FB Mk.VI, the Mosquito fighter-bomber was equipped with the same four .303 machine-gun and four 20mm Hispano cannon forward firing armament as on the Mk.II. The cannon installation occupied the forward half of the bomb bay,allowing the plane to carry two 250 lb. or 500 lb. bombs in the remaining half.

The first FB Mk.VI made its maiden flight during February of 1943 and production soon commenced. The FB Mk.VI was the most produced variant of the Mosquito with nearly a third of all Mossies being FB Mk.VIs.

Soon after its introduction experiments were made with installing rocket rails on the undersides of the wings. These proved successful and soon all Mk.VIs were converted to carry rockets as well as its full complement of bombs and guns.

Sources:

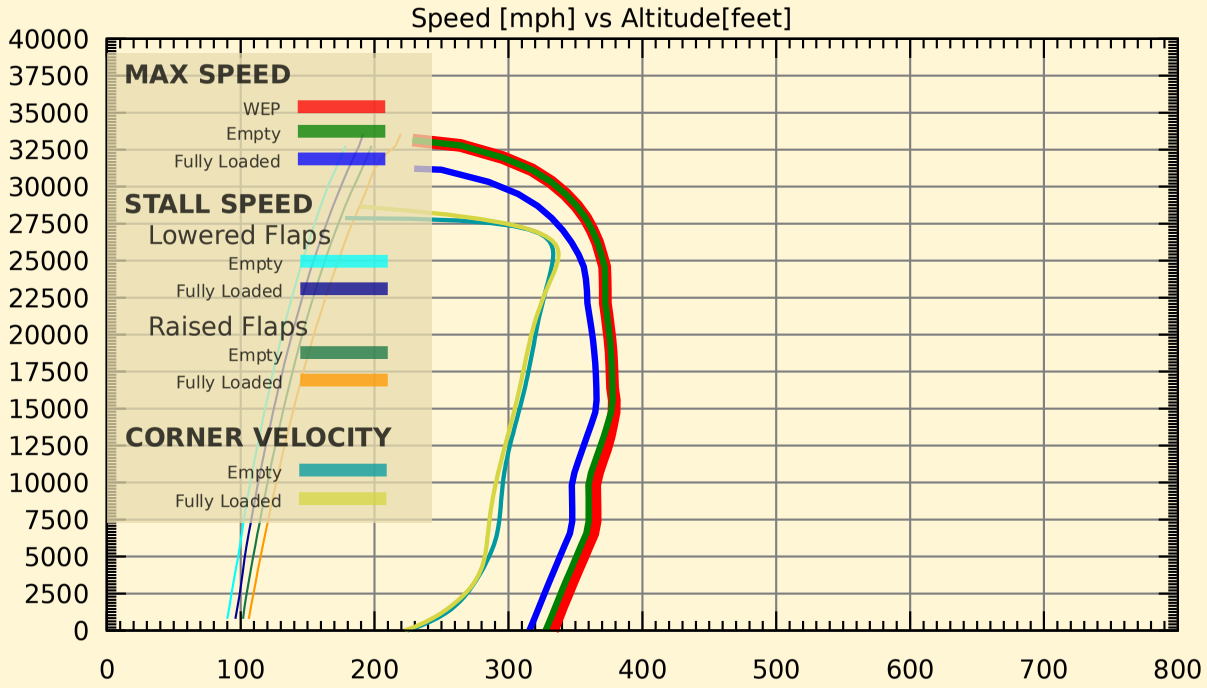
Scutts, Jerry; Mosquito In Action Part 2; Squadron/Signal Publications, Carrollton, TX; 1993.

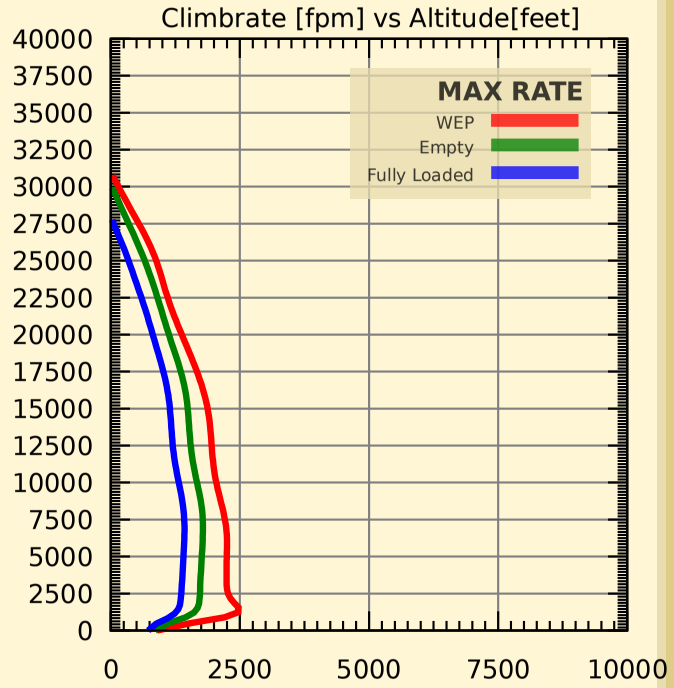
Name: Mosquito DH.98 FB Mk.VI
Role: Fighter Bomber
Crew: 2
Service Date: May 1943
Primary Guns: 4x Browning 0.303" machine guns with 500 rpg in nose
Secondary Guns: 4x Hispano Mk II 20mm cannon with 150 rpg in nose
Defensive Guns: NA
Ordnance: 2x 250 lb or 2x 535 lb bombs internally and 2x 250 lb or 2x 535 lb bombs or 2x 360 lb drop tanks or 8x 83 lb RP-3 A2G rockets under wings

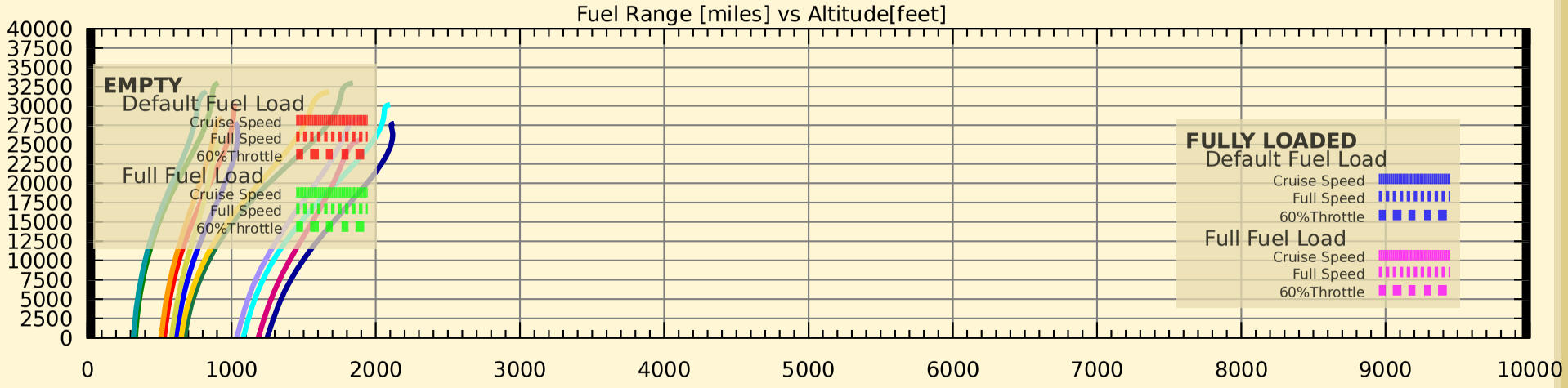
Length: 41.83 ft
Wing Span: 54.20 ft
Wing Area: 454 sq. ft

Power Plant: 2 X Rolls-Royce Merlin-25
Power: 3617 lb s.t.
Internal Fuel: 3578 lb
External Fuel: 720 lb

Empty Weight: 15432 lb
MTOW: 21605 lb

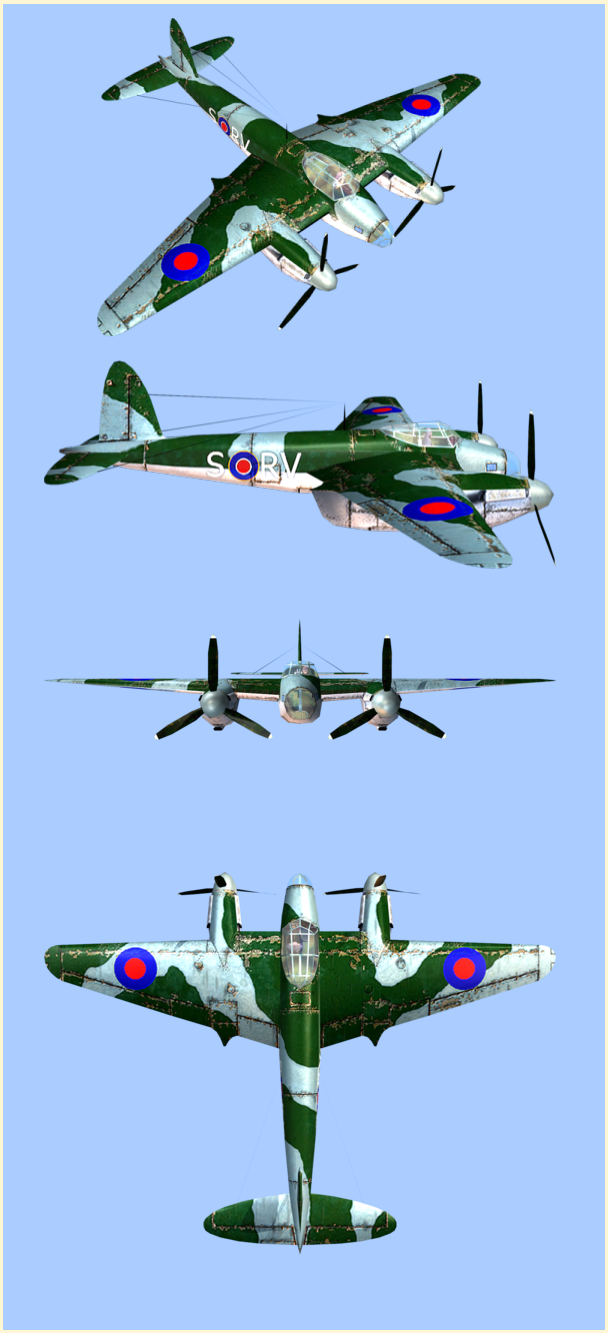






Mosquito DH.98 B Mk.IV

Durability	☆☆☆☆☆	Speed	☆☆☆☆☆☆	Climb Rate	☆☆☆
Maneuverability	☆☆☆	Firepower		Ground Attack	☆☆☆



Defense - Without defensive guns, the Mosquito must rely on its speed to evade enemy planes.

The idea of having a bomber that was fast enough to outrun fighter opposition was not a new one and in most cases was not a successful idea. The lone except to this rule in WWII was the deHavilland Mosquito, a plane that is revered for both its aesthetic lines and its war record.

The Mosquito's genesis can be traced back to a 1936 Air Ministry specification calling for a bomber with a range of 3,000 miles, a payload of 4,000 lb. and a cruise speed of 275 mph. Of course, aircraft engines weren't powerful enough then to fulfill this requirement and deHavilland's entry fell short by 15 mph.

By September 1939 the Air Ministry and deHavilland compromised on a specification calling for a reconnaissance/bomber weighing less than 20,000 lb with a ceiling of 32,100 feet and a top speed of 397 mph. Work on the design for the DH 98, as the model was called, began in earnest. However, with the fall of France in 1940, all efforts were geared towards defense of the home islands and the Mosquito was shelved.

However, being made primarily of wood and thus not having an impact on production of existing plane designs, the company was allowed to continue development of the airframe. Finally, on November 25, 1940 the first prototype, bearing a bright yellow paint job, made its maiden flight.

Despite being designed as a bomber, the prototype was tested for the reconnaissance role and the plane's agility and performance sparked interest in using the Mosquito as a heavy fighter. The original production order for fifty bombers was thus amended to be ten Mosquito I photo-recon planes, thirty Mosquito II night fighters and ten Mosquito IV bombers. The Mosquito III designation was reserved for a dual-control training version to be produced sometime in the future.

One problem that was discovered during the initial production run was excessive tail buffeting caused by disturbed airflow over the engine nacelles. Therefore, in the subsequent production runs, the nacelles were lengthened so that they extended beyond the trailing edge of the wing. The ten Mk.IV bombers produced under the original production run were thus designated as "Series I", while subsequent Mk.IVs were designated "Series II" aircraft.

Originally designed to carry four 250 lb. bombs, it was found that four 500 lb bombs could be fit into the bomb bay if they had their stabilizing fins shortened. The first Mosquito raid took place on May 31, 1942 when four Mk.IVs made an attack on Cologne the day after the first "thousand bomber" raid. The Mosquito soon gained a reputation for making high-speed, precision attacks on high-value targets.

Sources:

Green, William; Famous Bombers of the Second World War; Doubleday and Company, Garden City, NY; 1959.

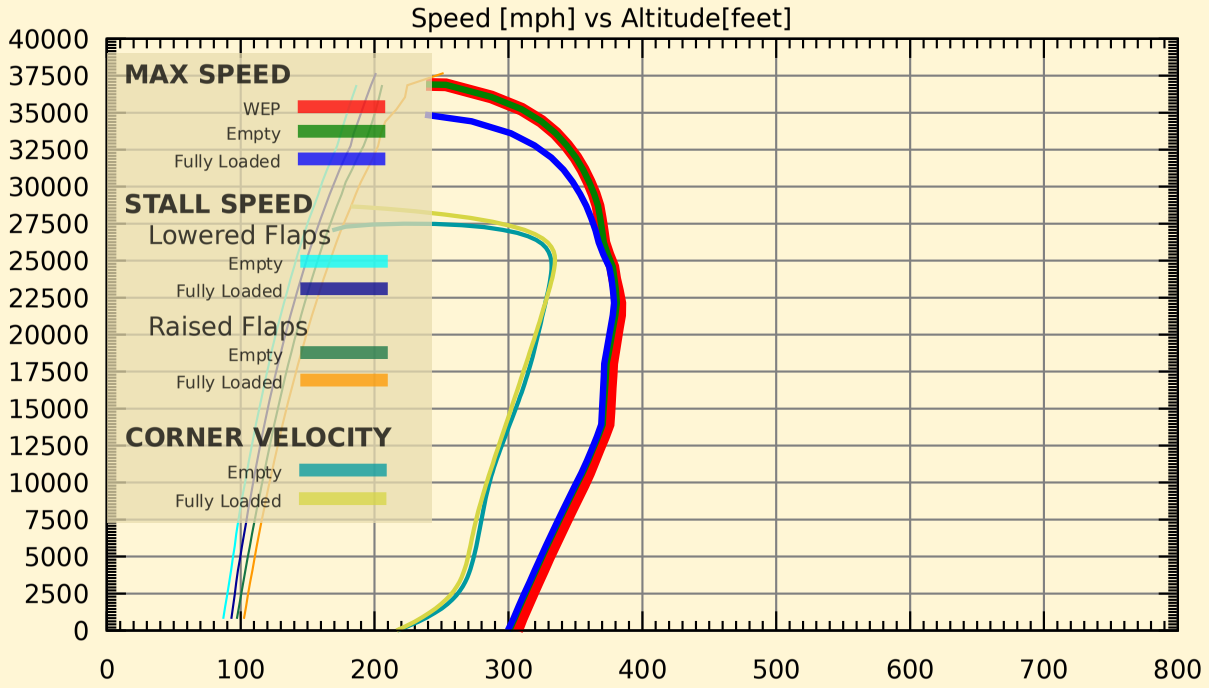
Scutts, Jerry; Mosquito In Action Part I; Squadron/Signal Publications, Carrollton, TX; 1992.

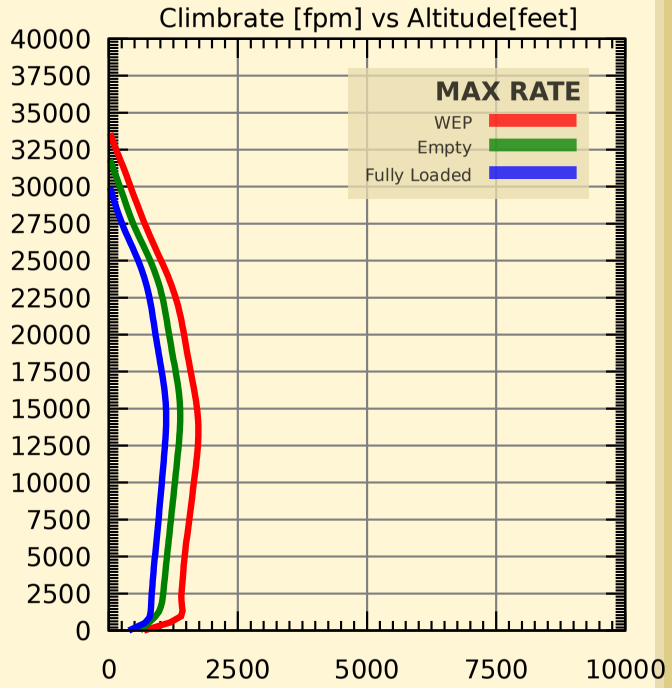
Name: Mosquito DH.98 B Mk.IV
Role: Diving Bomber
Crew: 2
Service Date: December 1941
Primary Guns: NA
Secondary Guns: NA
Defensive Guns: NA
Ordnance: 4x 250 lb or 4x 535 lb bombs

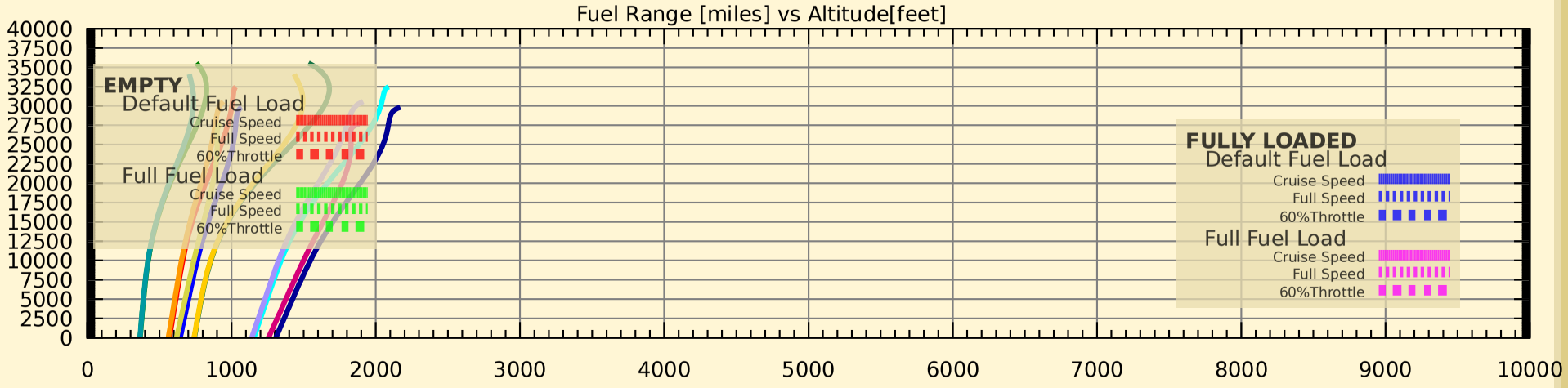
Length: 41.83 ft
Wing Span: 54.20 ft
Wing Area: 454 sq. ft

Power Plant: 2 X Rolls-Royce Merlin-21
Power: 2955 lb s.t.
Internal Fuel: 3578 lb
External Fuel: NA

Empty Weight: 14771 lb
MTOW: 20503 lb

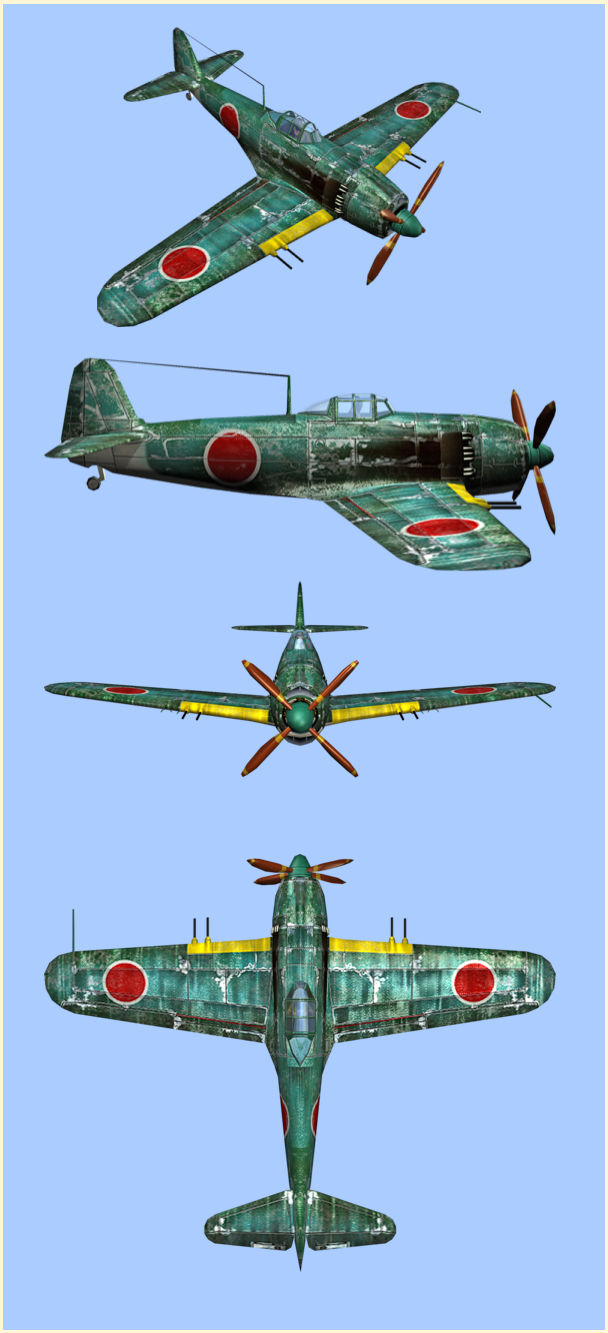






Kawanishi N1K2-J Shiden Kai
George

Durability	☆☆☆	**Speed**	☆☆☆☆☆	**Climb Rate**	☆☆☆☆☆
Maneuverability	☆☆☆☆☆	**Firepower**	☆☆☆☆☆	**Ground Attack**	☆☆☆☆



Speed - As with most late-war Japanese fighters, the speed was considerably less than that of the Allied fighters it faced.

Japanese Naval offensive strategy in 1940 envisaged the need for fighter support in areas that had no airfields and which were not well suited to carrier operations. To fill this need, a series of floatplane fighters was ordered from the various manufacturers. While Nakajima was tasked with converting the A6M2 Zero into a floatplane fighter, Kawanishi was to design and build one from the ground up.

To help offset the effects of engine torque on take off the initial prototype used a pair of two-bladed, contra-rotating props. However, troubles with the gearbox system resulted in the replacement of this complicated system with a standard Kasei radial driving a three-bladed prop on the second prototype. The resulting torque effects made takeoffs dicey for all but the most experienced pilots, but despite this problem the Navy accepted the plane for service trials in August 1942. Service trials were successful and the Navy ordered the N1K1 Kyofu floatplane fighter into production, the first machines being delivered in Spring 1943.

Meanwhile Kawanishi engineers felt that their design would also serve as the basis for a successful land-based fighter. Lacking a contract and official approval, the company decided to fund development themselves. Although they initially planned to make no changes other than to replace the floats with retractable landing gear, it eventually was decided to replace the 14-cylinder Kasei radial with the new 2,000 hp 18-cylinder Nakajima Homare engine driving a four-bladed prop almost 11 feet in diameter. Because of the mid-fuselage wing mounting and large diameter propeller, the plane had to use extremely long landing gear, which had to be contracted using a complicated double-folding mechanism in order to fit into the wheel-wells.

On December 27, 1942 the first flight of the Model X-1 Experimental Land-based Fighter took flight at Itami Airport. Armed with a pair of 7.7mm machine guns in the cowl and a single 20mm Type 99-2 cannon in a gondola under each wing, the prototype was plagued from the start by engine and landing gear problems. However, once in the air the plane displayed excellent handling characteristics and, with the automatically deployable combat flaps, was almost as maneuverable as the Zero. Despite the fact that it was a private venture and the top speed was not up to expectations, it was still the fastest fighter then available, so the Navy ordered it into production as the N1K1-J Shiden Interceptor Fighter.

Seventy N1K1s had been built by the end of 1943, these having an additional 20mm cannon mounted in each wing, just outboard of the under-wing gondolas. Despite the continued engine and landing gear problems, the Navy authorized quantity production to begin. Just prior to the American landings in the Philippines the 201st Kokutai transferred to Cebu where many Shidens were destroyed on the ground and many others destroyed by engine and landing gear failures. However, the ones that did get into the air proved the plane to be an exceptional fighter, more than capable of meeting the American planes on equal terms. The Allies gave it the code-name 'George'.

Development of the Shiden continued during production and in addition to an upgraded Homare 21 engine the armament was continually upgraded. The -Ja model had the machine guns in the cowl removed and all four cannon mounted inside the wing. The -Jb model added a pair of bomb racks under the wing stressed for 250 kg each and the -Jc upped the total to four bomb racks along with the four internal wing-cannon. However, Kawanishi viewed these as only stop-gap measures while they worked on an advanced version of the fighter.

The primary reason for designing the N1K2-J Shiden Kai was to eliminate the need for the long, complicated landing gear legs. To accomplish this the wing was moved from the center-fuselage position to underneath the fuselage. This required a complete redesign of the fuselage and tail section, as well as new landing gear legs. The first N1K2-J prototype was first flown on December 31, 1943.

By April 1944 the prototype was handed over to the Navy for Service Trials. Although it had been mostly redesigned, the N1K2-J retained all of the excellent handling characteristics of the previous version and the Navy authorized quantity production before Service Trails had been completed. Along with the final seven prototypes, the first production machine rolled off the line in June 1944. Initially produced without bomb racks, the N1K2-Ja with four bomb racks soon assumed prominence on the production line.

In combat the N1K2-Ja proved to be as good as anything the Allies could put into the sky. In the hands of an experienced pilot the Shiden Kai could deal with the American planes handily, as evidenced by Warrant Office Kinsuke Muto of the 343rd Kokutai in February 1945. In a lone encounter with twelve F6F Hellcats, he shot down four before the others broke off combat to run for safety. Unfortunately for the Japanese the B-29 raids destroyed many of the plane's manufacturing facilities and only a little over 300 N1K2-J fighters were produced before the war ended.

Sources:

Francillon, Rene J.; Japanese Aircraft of the Pacific War; Naval Institute Press, Annapolis, MD; 1979.

Green, William; Warplanes of the Second World War, Fighters, Volume Three; Hanover House, Garden City, NY; 1960.

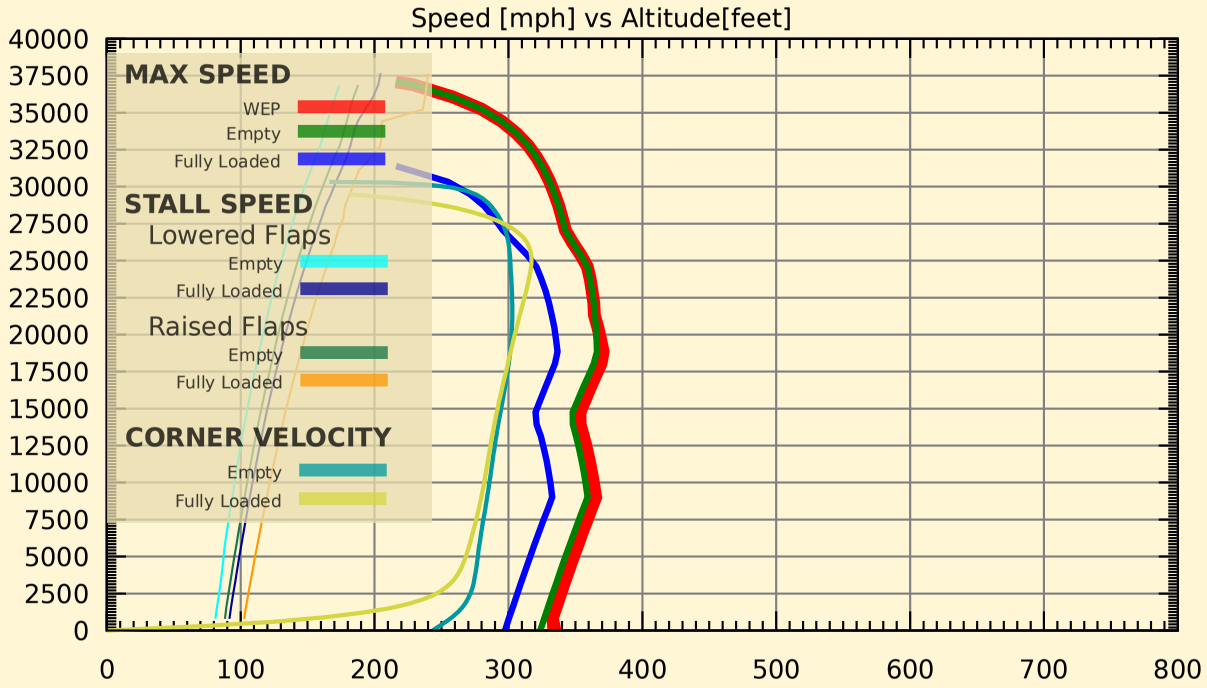
Green, William; Famous Fighters of the Second World War; Hanover House, Garden City, NY; 1960.

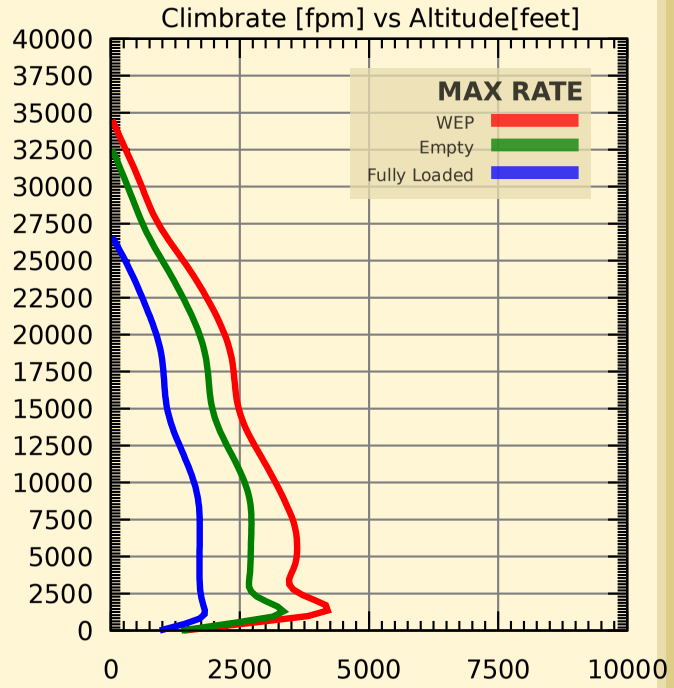
Name: Kawanishi N1K2-J Shiden Kai George
Role: Fighter
Crew: 1
Service Date: June 1944
Primary Guns: 2x Type 99-2 20mm cannon with 250 rpg in wings
Secondary Guns: 2x Type 99-2 20mm cannon with 200 rpg in wings
Defensive Guns: NA
Ordnance: 4x 220 lb or 4x 551 lb bombs under wings, plus One 635 lb drop tank

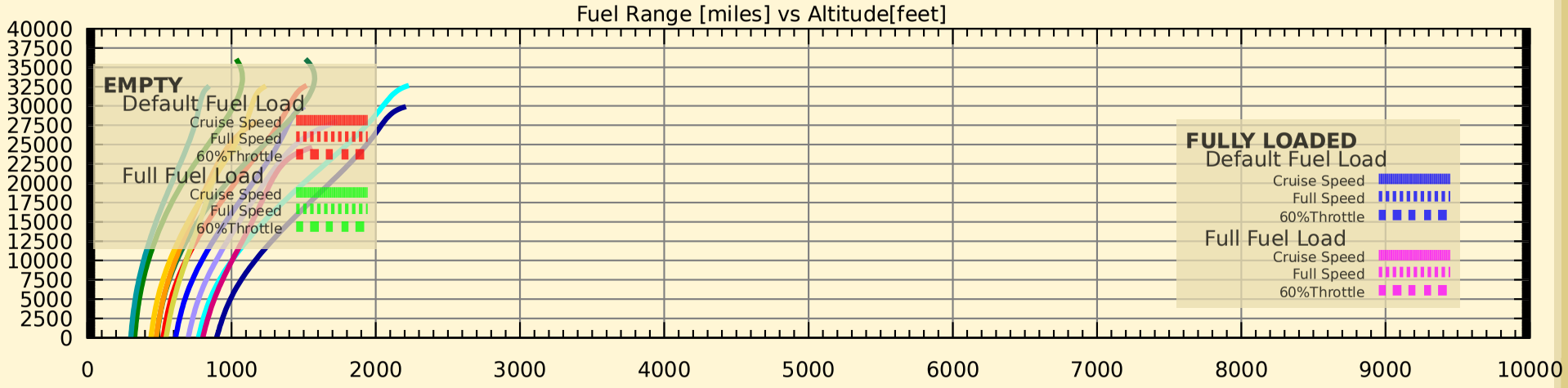
Length: 30.68 ft
Wing Span: 39.37 ft
Wing Area: 253 sq. ft

Power Plant: One Nakajima NK9H-21
Power: 3782 lb s.t.
Internal Fuel: 1160 lb
External Fuel: 644 lb

Empty Weight: 5952 lb
MTOW: 9700 lb

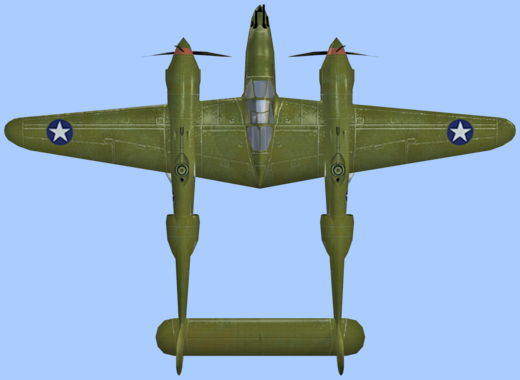






Lockheed P-38G Lightning

Durability	★★★★☆	Speed	★★★★★★	Climb Rate	★★★★★★
Maneuverability	★★★☆	Firepower	★★★★★	Ground Attack	★★★☆



Maneuverability - The P-38 is a large plane and thus can't compete effectively in a turn fight.

Known to the Germans as Der Gabelschwanz Teufel (The Fork-Tailed Devil) and to the Japanese as "Whispering Death", the Lockheed P-38 Lightning was one of the most unique and distinctive aircraft to see service in World War II. The brainchild of Lockheed's brilliant Chief Engineer Clarence L. "Kelly" Johnson, the Lightning was designed to meet the US Army's difficult X-608 Interceptor specification. The spec called for a fighter capable of 360 mph at 20,000 feet, the ability to fly at full throttle for over an hour, and the ability to take off and land over a 50-foot obstacle within 2,200 feet.

Johnson realized that with the current state of power plant technology, no single-engine aircraft could meet these specifications. So he set about working on a series of twin-engine designs, finally submitting the Lightning design to the Army on April 13, 1937 as the "Model 22 Pursuit Plane". Based on this proposal, the Army awarded Lockheed a contract for a single prototype, to be designated the XP-38.

Besides the obviously unique twin-boom configuration, the Lightning featured several design innovations that allowed it to serve as one of the few really successful twin-engine fighters of WWII. The effect of engine torque, doubly problematic than on single engine planes, was eliminated by using engines that allowed the propellers to rotate in opposite directions. P-38 pilots learned that they could turn tighter than normal by decreasing throttle on one side, thereby allowing engine torque to help roll the plane in the desired direction.

Another innovation was the use of "Fowler flaps" that extended out of the wing instead of simply dropping down into the air stream. These effectively increased the wing area, which lowered the stall speed. At the same time, they created a slot between the wing and flap, which allowed the wing to fly at a much greater angle of attack without stalling.

Originally intended to carry a 23mm cannon and four .50 caliber machine guns in the nose, the first production Lightnings were armed with a single 37mm cannon and four .50 caliber machine guns. The 37mm cannon was eventually replaced with a single 20mm Hispano type cannon in the P-38E.

The center wing section of the P-38F was stressed for two ordnance pylons, each capable of carrying either a 165-gallon drop tank or a 1,000 lb. bomb. The P-38G further stressed the center wing pylons to allow them to each carry a 300-gallon drop tank, which increased the Lightning's range to over 2,000 miles.

One problem associated with the Lightning was poor cockpit heating at high altitude, which made combat missions in the Northern European Theater particularly unpleasant. However, the P-38 saw extensive service in the Mediterranean and South Pacific theaters, and was the mount in which Major Dick Bong scored 40 aerial victories, more than any other American ace in any war.

Sources:

Davis, Larry; P-38 Lightning In Action, Aircraft Number 109; Squadron/Signal Publications, Carrollton, Texas; 1990.

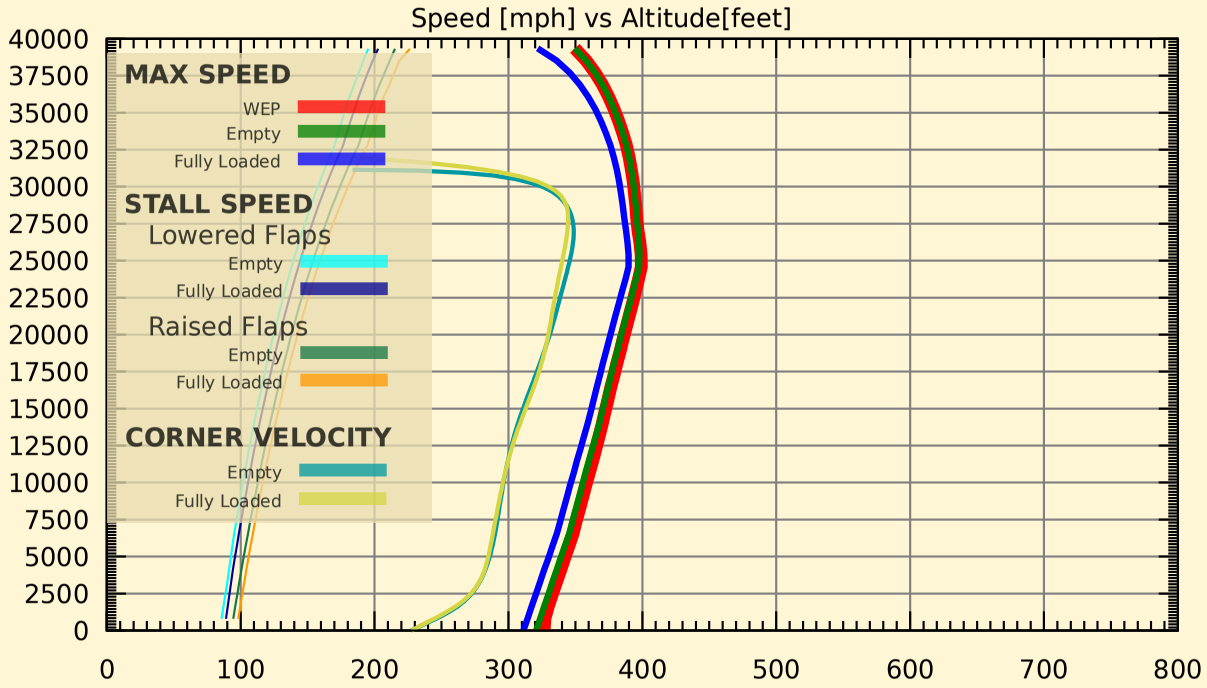
Green, William; War Planes Of The Second World War: Fighters Volume Four; Macdonald & Co., London; 1961.

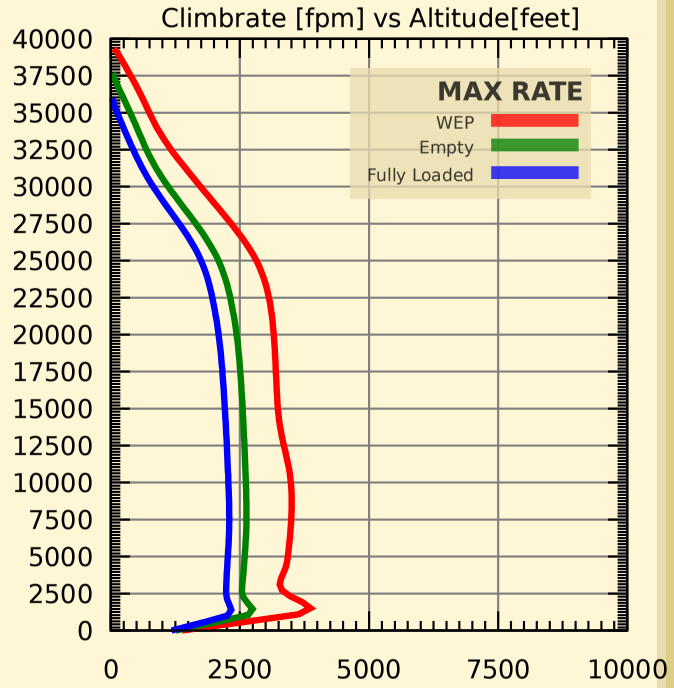
Name: Lockheed P-38G Lightning
Role: Fighter
Crew: 1
Service Date: August 1942
Primary Guns: 4x Browning M2 0.5" machine guns with 500 rpg in nose
Secondary Guns: One Bendix M1 20mm (licensed Hispano II) cannon with 150 rpg in nose
Defensive Guns: NA
Ordnance: 2x 250 lb or 2x 500 lb or 2x 1000 lb bombs or 2x 1927 lb Mk.13 torpedoes or 2x 990 lb drop tanks on underwing pylons

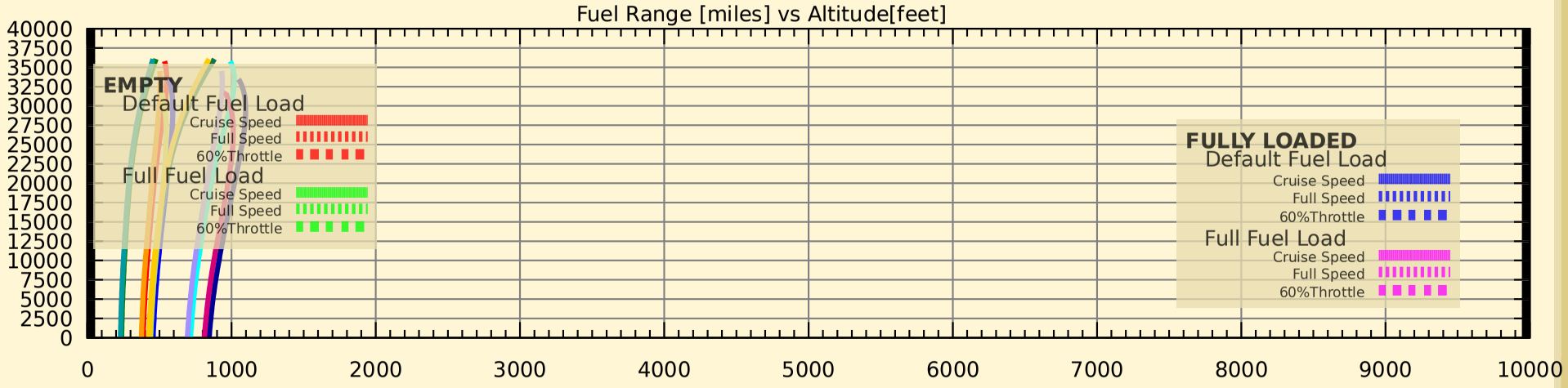
Length: 37.89 ft
Wing Span: 52.00 ft
Wing Area: 334 sq. ft

Power Plant: 2 X Allison V-1710-51/55
Power: 3061 lb s.t.
Internal Fuel: 2042 lb
External Fuel: 1980 lb

Empty Weight: 12125 lb
MTOW: 18673 lb







Lockheed P-38L Lightning

Durability	☆☆☆☆☆	Speed	☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆☆☆
Maneuverability	☆☆☆	Firepower	☆☆☆☆☆	Ground Attack	☆☆☆☆☆

Maneuverability - Despite the addition of powered ailerons, the P-38 is still a handful and the successful pilot will avoid turn fights.

Between the "G" and "L" models, the P-38 saw several improvements made to its combat capabilities. In the "H" model, the center wing pylons were further strengthened to allow bombs of up to 2,000 lb. weight to be carried. Additionally, the Lightning was successfully tested carrying one or two torpedoes, but was seldom used in combat as there were more suitable aircraft available for such duty.

The "J" model added two more fuel tanks, bringing the total internal capacity to over 400 gallons. More powerful Allison engines were introduced and for the first time, the clean lines of the Lightning were changed with the addition of large "chin" radiators under each engine. While the larger surface area increased drag somewhat, the improved engine cooling gave the plane more power, which more than compensated for the additional drag. The improved Lightning was capable of reaching a top speed of over 420 mph at altitude.

In an effort to improve overall maneuverability, the "J" model featured hydraulically operated ailerons, the first example of power-operated controls on a fighter. Additionally, a small electrically operated dive flap was introduced, which helped offset problems due to compressibility in high-speed dives.

With the P-38L version came even more powerful engines, with an output of 1,475 hp for take-off and 1,600 hp war emergency power. This version also saw the introduction of underwing racks enabling the use of ten 5-inch HVAR rockets. Initially mounted flush with the bottom of the wing, the rocket rails eventually were formed as a "tree", which hung down under the wing. The P-38L began to appear in squadron service in June 1944 and delivery continued until the end of the war. The "L" model was the last day-fighter variant to see service in WWII.

Sources:

Davis, Larry; P-38 Lightning In Action, Aircraft Number 109; Squadron/Signal Publications, Carrollton, Texas; 1990.

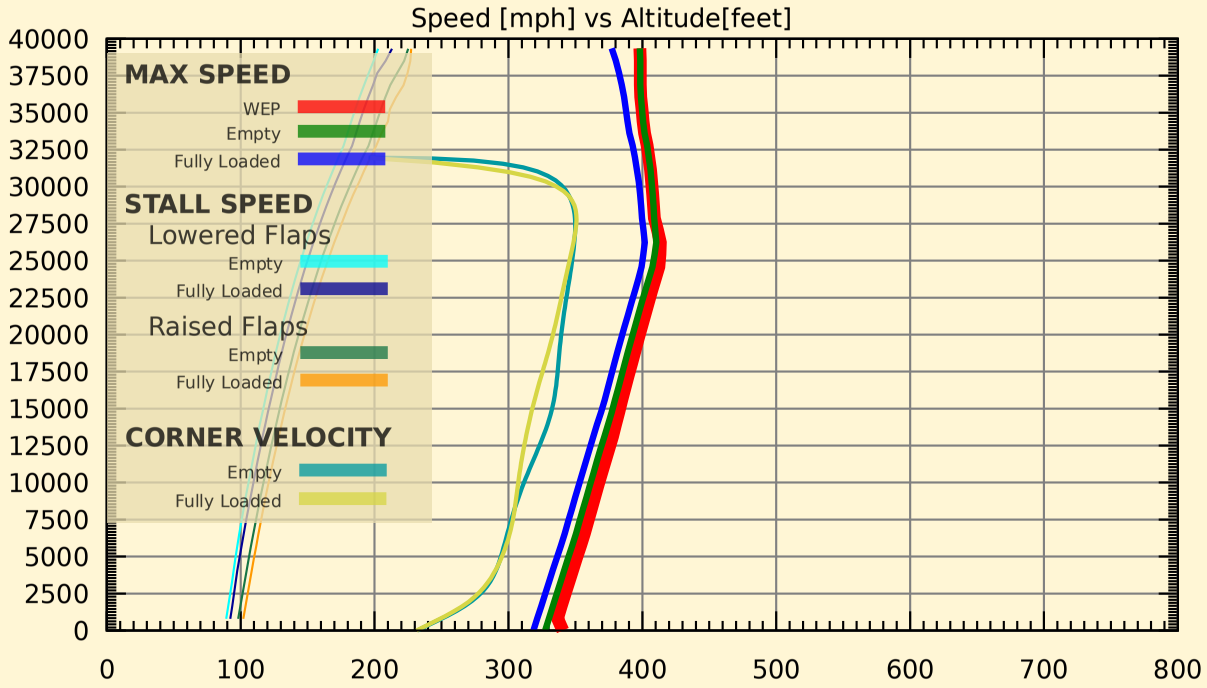
Green, William; War Planes Of The Second World War: Fighters Volume Four; Macdonald & Co., London; 1961.

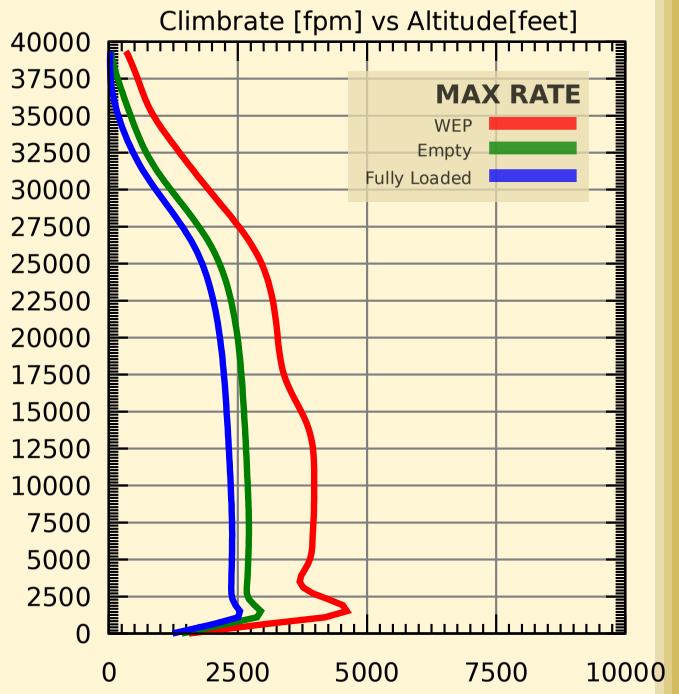
Name: Lockheed P-38L Lightning
Role: Fighter
Crew: 1
Service Date: April 1944
Primary Guns: 4x Browning M2 0.5" machine guns with 500 rpg in nose
Secondary Guns: One Bendix M2C 20mm (licensed Hispano II) cannon with 150 rpg in nose
Defensive Guns: NA
Ordnance: 2x 250 lb or 2x 500 lb or 2x 1000 lb or 2x 2000 lb bombs or 2x 2216 lb Mk.13a torpedoes or 2x 990 lb drop tanks on underwing pylons, plus 10x 136 lb 5" HVAR rockets

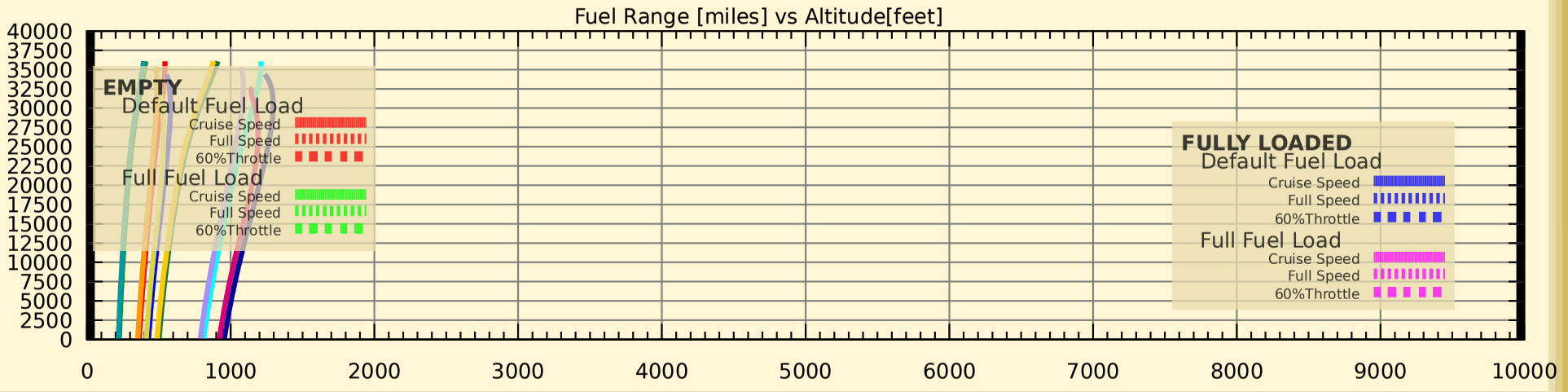
Length: 37.89 ft
Wing Span: 52.00 ft
Wing Area: 328 sq. ft

Power Plant: 2 X Allison V-1710-111/113
Power: 3253 lb s.t.
Internal Fuel: 2460 lb
External Fuel: 1980 lb

Empty Weight: 13007 lb
MTOW: 20569 lb

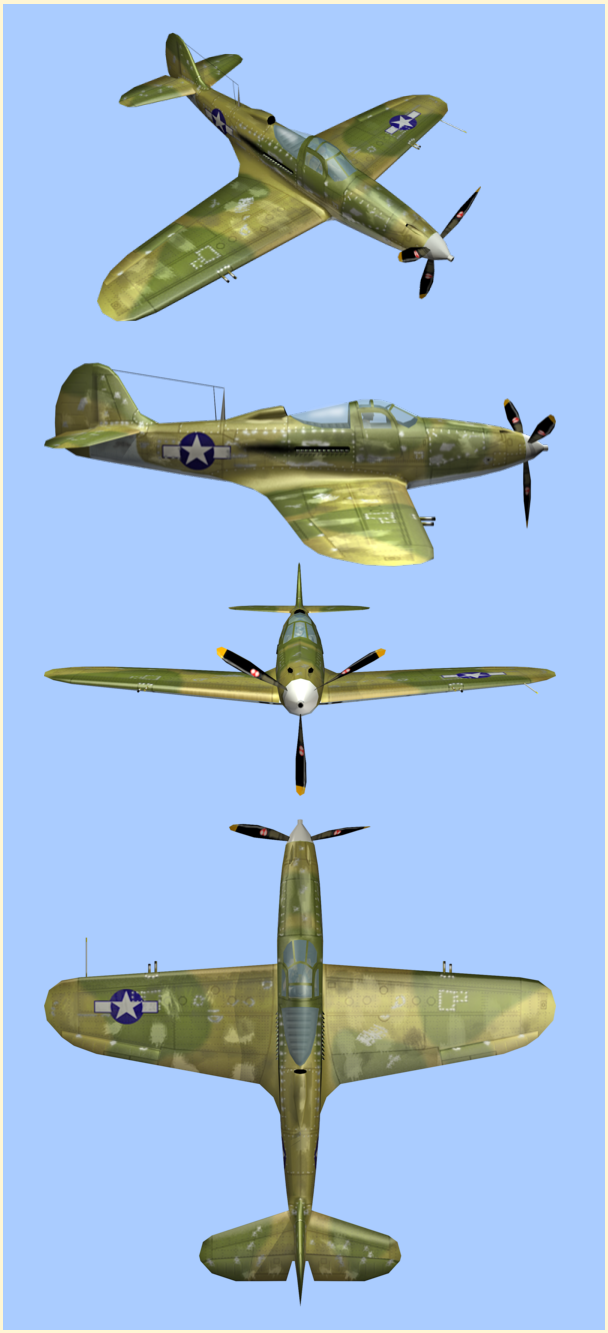






Bell P-39D Airacobra

Durability	☆☆☆	Speed	☆☆☆☆☆	Climb Rate	☆☆☆
Maneuverability	☆☆☆☆☆	Firepower	☆☆☆☆☆	Ground Attack	☆☆☆



Speed - While fairly fast on the deck, especially when compared to its contemporaries, the Airacobra's performance above 15,000 feet was dismal at best.

When Bell's engineers set about the task of designing a fighter plane in 1936, they settled on the unorthodox idea of mounting the engine behind the cockpit. Such an arrangement allowed the cockpit to be further forward than normal, for good over-the-nose visibility, and allowed the use of extremely heavy nose-mounted armament.

The new fighter, designated the XP-39, was powered by the new Allison V-1710-17 engine fitted with a B-5 turbo-supercharger, which gave the initial prototype a top speed of 390 mph at 20,000 feet. At this point the plane was handed to the evaluation team at Langley for wind tunnel testing. The Army thus requested numerous design changes to the airframe, but most puzzling was the decision to replace the 1,150 hp, supercharged V-1710-17 with a 1,090 hp, non-supercharged V-1710-39. This modification made the plane "practically useless" above 17,000 feet, turning a promising heavy interceptor into a low-level ground support plane.

The plane was originally intended to carry a 25mm cannon in the nose, but Bell decided to use the new Oldsmobile 37mm M4 cannon instead. Unfortunately, the cannon had a tendency to jam if fired while maneuvering and it only carried 30 rounds of ammunition.

When war broke out in 1939, Bell submitted their specifications to the British Direct Purchase Commission, which resulted in an immediate order for 675 P-39s. These planes, designated Airacobra I by the RAF, were equipped with a single Hispano 20mm cannon with 60 rounds in place of the 37mm Oldsmobile cannon. Additionally, the pair of .50 caliber machine guns in the cowl and the four .30 caliber machine guns in the wing were replaced with standard British .303 machine guns.

Unfortunately, the Airacobra failed to live up to the specifications submitted by Bell. After only a single strafing mission over France on October 9, 1940, the Airacobra was grounded and was removed from RAF service three months later. Of the 675 Airacobra Is ordered by the RAF, 212 were dispatched to the Soviet Union and 179 were taken over by the USAAF. The USAAF models were designated P-400 and served alongside standard P-39Ds over Port Moresby, New Guinea in April 1942.

The lack of supercharging meant that the P-39, which was rather nimble and responsive at low level, was sluggish and unresponsive at higher altitudes. But while it couldn't serve the high-level interceptor role originally intended for the design, the P-39 was found to be a good ground-attack plane, particularly with the 37mm cannon.

Sources:

Green, William; War Planes Of The Second World War: Fighters Volume Four; Macdonald & Co., London; 1961.

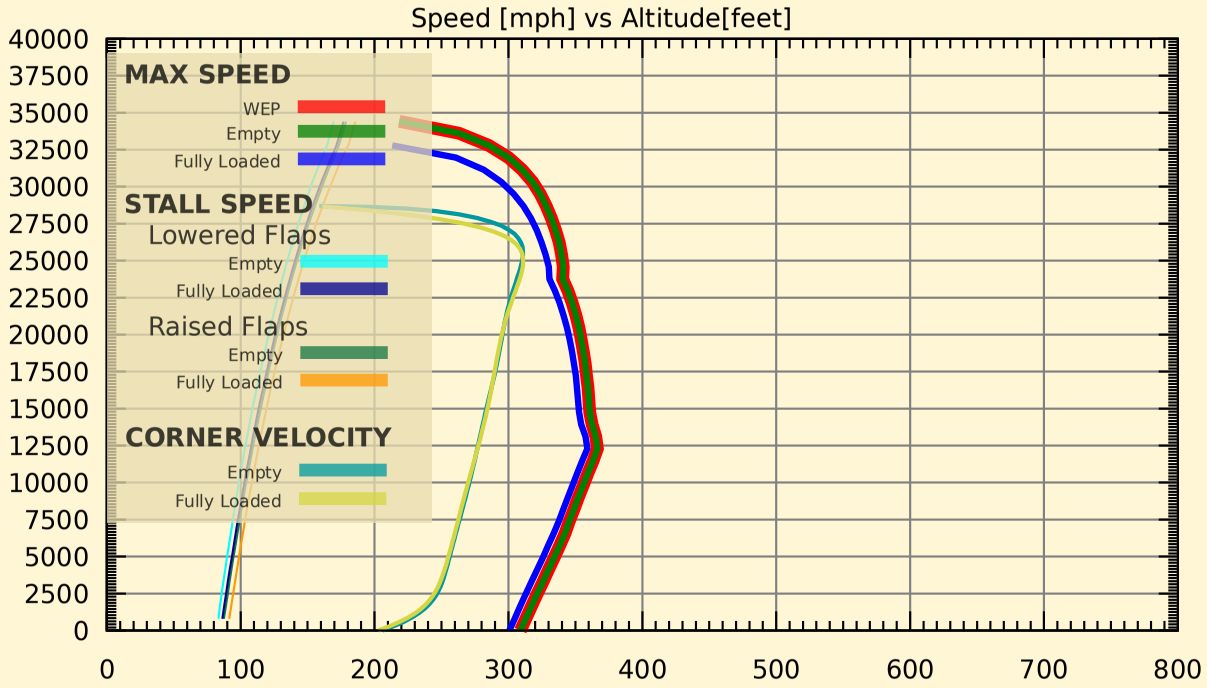
McDowell, Ernie; P-39 Airacobra In Action, Aircraft No. 43; Squadron/Signal Publications, Carrollton, Texas; 1980.

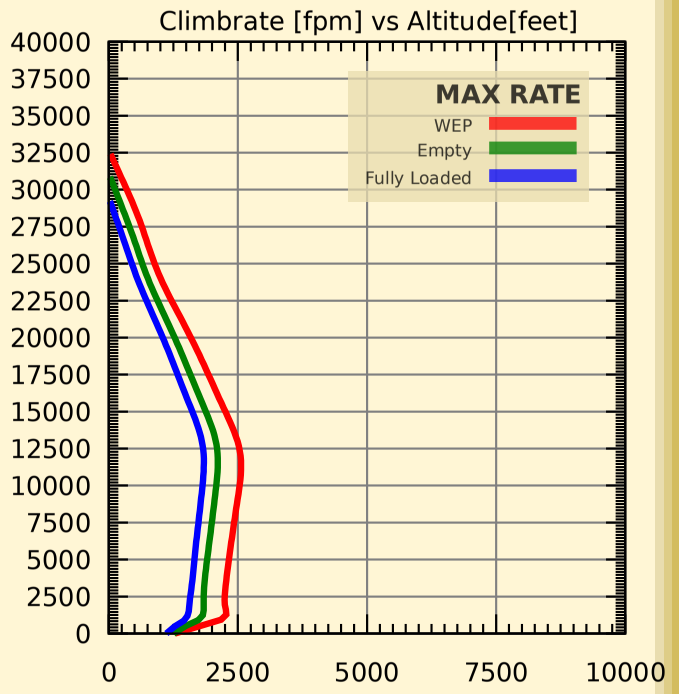
Name: Bell P-39D Airacobra
Role: Fighter
Crew: 1
Service Date: March 1941
Primary Guns: 4x Browning 0.3" machine guns with 1000 rpg in wings and 2x Browning M2 0.5" machine guns with 200 rpg in cowl
Secondary Guns: One Oldsmobile M4 37mm cannon with 30 rpg in the spinner
Defensive Guns: NA
Ordnance: One 250 lb or 500 lb bomb or One 450 lb drop tank

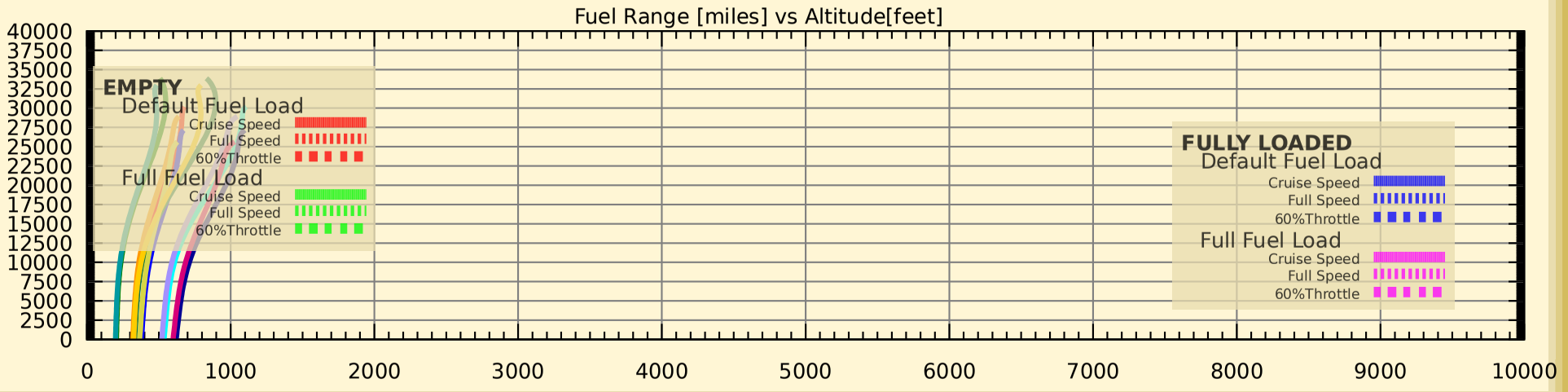
Length: 30.18 ft
Wing Span: 34.06 ft
Wing Area: 213 sq. ft

Power Plant: One Allison V-1710-35
Power: 2646 lb s.t.
Internal Fuel: 720 lb
External Fuel: 450 lb

Empty Weight: 5600 lb
MTOW: 7275 lb

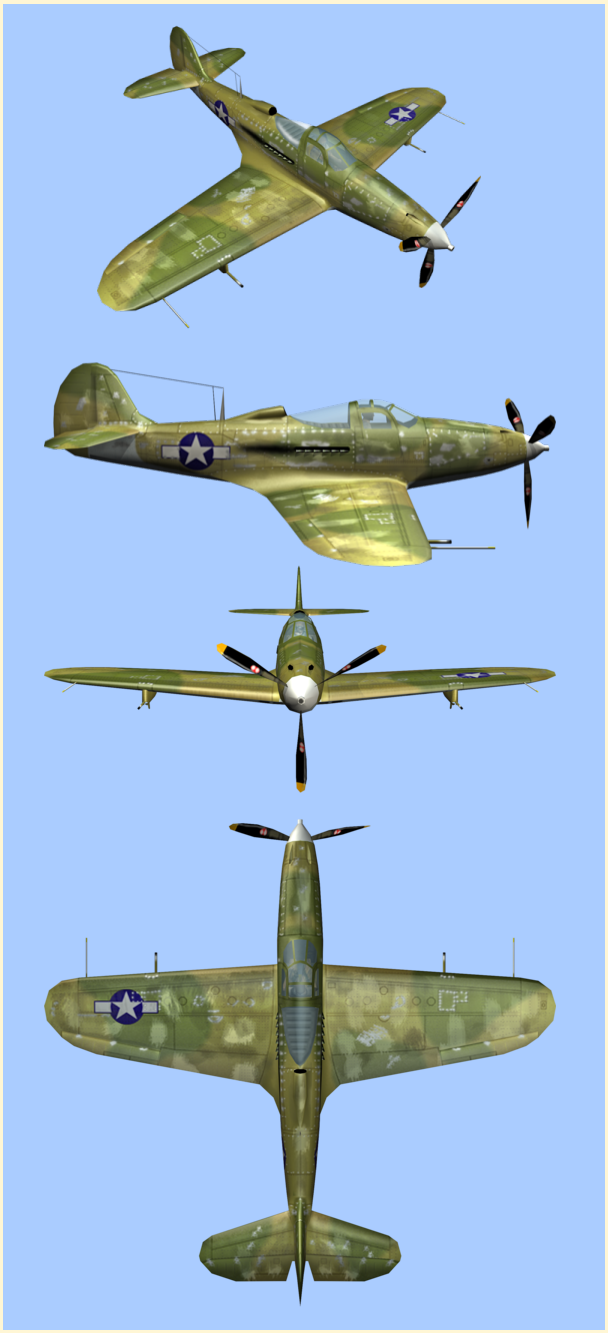






Bell P-39Q Airacobra

Durability	☆☆☆	Speed	☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆
Maneuverability	☆☆☆☆☆	Firepower	☆☆☆☆☆☆	Ground Attack	☆☆☆



High Altitude Performance - While handling on the deck was good, the Airacobra lacked the supercharging necessary to give it good, high-altitude performance.

At the height of P-39 development the "dash number" method of indicating minor changes in a model series was not yet in use. As a result, the letter suffixes following "P-39D" were used up rapidly as minor improvements in engine power or changes in propeller manufacturer occurred. During this period of time the internal fuel capacity and weight of protective armor of the plane varied up and down as range versus performance varied with each engine installation and pilots always clamored for more survivability.

The P-39Q model was the first that had any really significant changes from the configuration of the P-39D. The internal fuel capacity was retained at 87 gallons, with 75- and 175-gallon drop-tanks being available to extend the plane's range and the amount of protective armor plating was increased to over 230 lb. However, the most visible change was the removal of the four .30-caliber machine guns in the wings, each of which had 1,000 rounds of mostly useless ammunition, for a single .50-caliber machine gun with 300 rpg fitted in a pod beneath each wing.

Despite these improvements, the Airacobra was outclassed by newer designs and thus almost all P-39Qs were shipped to the Soviet Union. The last USAAF unit to use the P-39Q was the 332nd Fighter Group stationed in Italy. They were issued P-39Qs in February 1944 but were transitioned to Thunderbolts scarcely two months later.

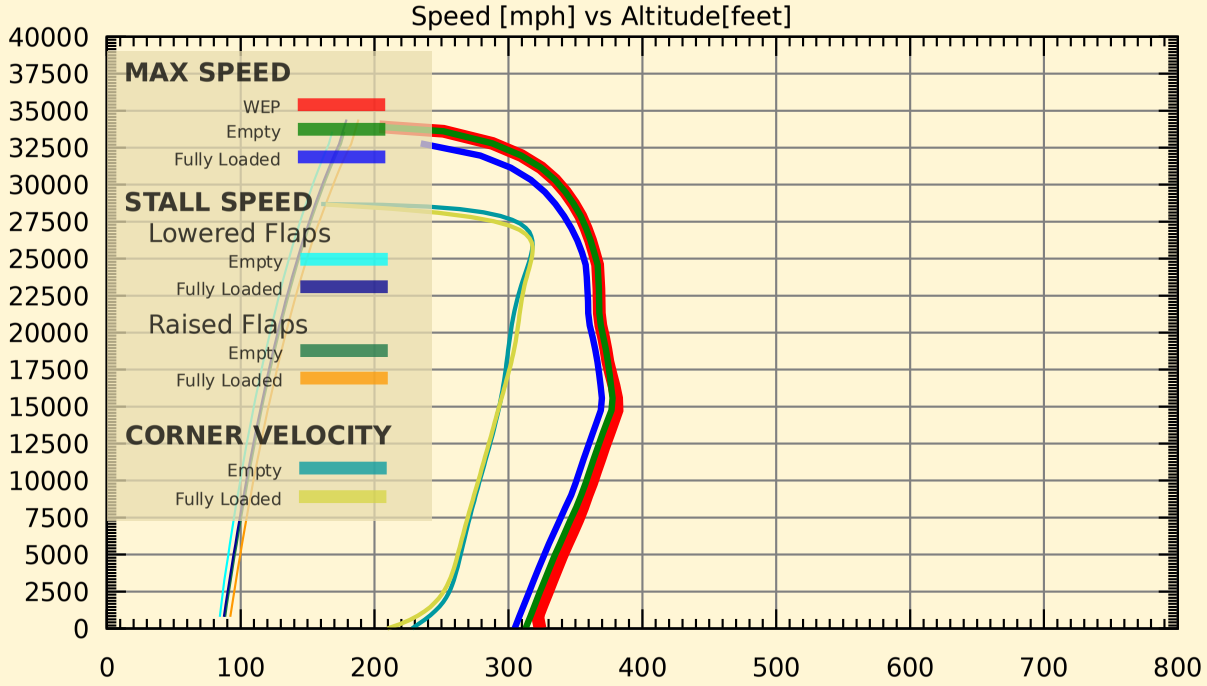
As with most imported designs, the Soviets installed rails under the wings to allow the plane to carry RS-82 rockets, in this case four of them. The Airacobra could also carry a 500 lb. bomb, which combined with the 37mm Olds cannon to give it a good ground attack and anti-tank capability. Almost 5,000 P-39Qs were built, making it the most numerous of the P-39 variants.

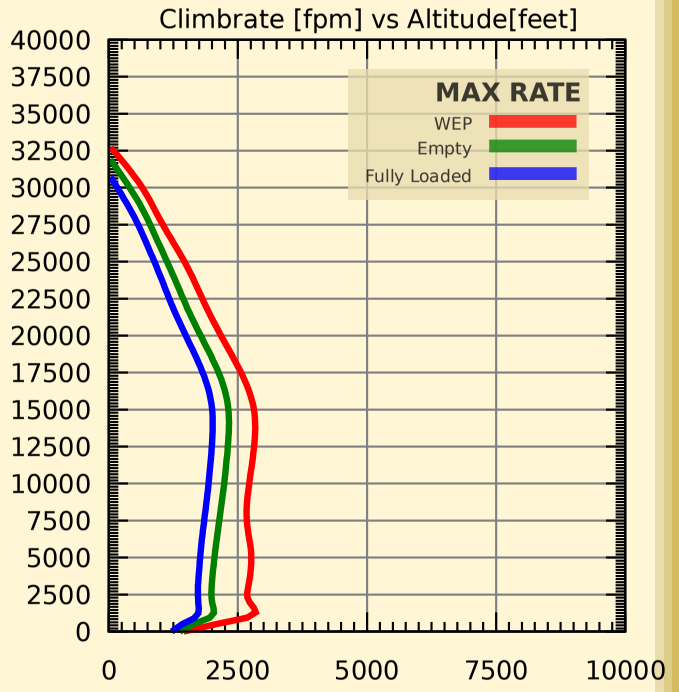
Sources:

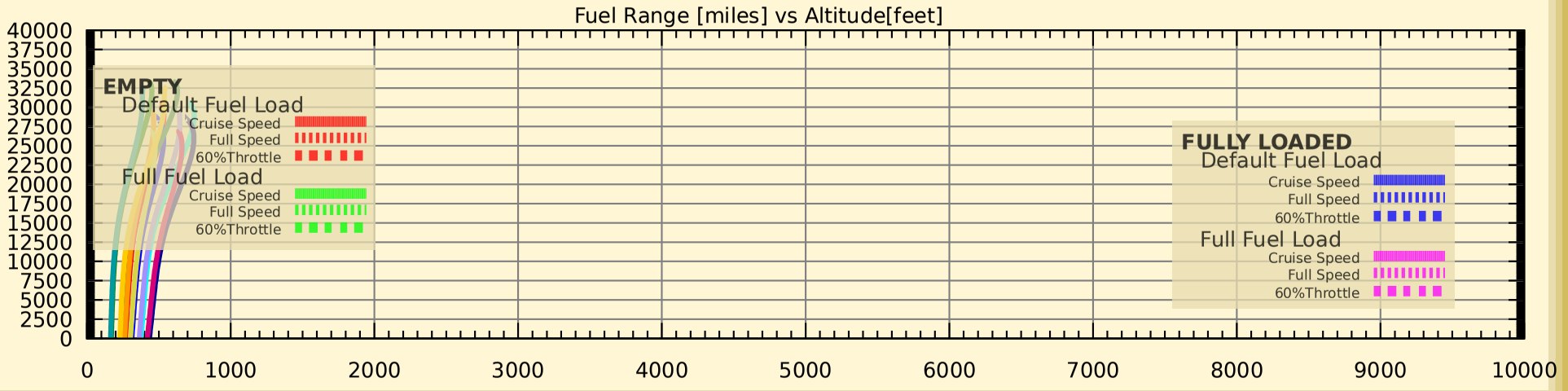
Green, William; War Planes of the Second World War: Fighters Volume Four; MacDonald and Company, London; 1961.

McDowell, Ernie; P-39 Airacobra In Action; Squadron/Signal Publications, Carrollton, TX; 1980.

Name: Bell P-39Q Airacobra
Role: Fighter
Crew: 1
Service Date: April 1943
Length: 30.18 ft
Wing Span: 34.06 ft
Wing Area: 213 sq. ft
Power Plant: One Allison V-1710-85
Power: 2691 lb s.t.
Internal Fuel: 522 lb
External Fuel: 450 lb
Empty Weight: 5842 lb
MTOW: 7430 lb
Primary Guns: 2x Browning M2 0.5" machine guns with 200 rpg in cowl and 2x Browning M2 0.5" machine guns with 300 rpg in wings
Secondary Guns: One Oldsmobile M4 37mm cannon with 30 rpg firing through propeller hub
Defensive Guns: NA
Ordnance: One 220 lb or One 550 lb bomb or One 450 lb drop tank, plus 4x 33 lb RS-82 rockets







Tomahawk Mk.IIb
Curtiss P-40C

Durability	☆☆☆	**Speed**	☆☆☆☆☆	**Climb Rate**	☆☆☆☆
Maneuverability	☆☆☆☆☆	**Firepower**	☆☆☆	**Ground Attack**	☆

High Altitude Performance - While it is nimble and agile at low altitudes, the lack of a decent supercharger makes the P-40 a sluggish performer above 10,000 feet.

During production of the Hawk 75 fighter for the US Army in 1937, Curtiss modified the original radial engine design to accommodate the new Allison V-1710 inline, liquid-cooled engine. The new design benefited from both streamlining and increased engine power, and was flown for the first time in October 1938 as the XP-40. Performance was so impressive that the Army ordered 524 production machines, which was at that time the largest-ever single production order for a US fighter.

The first production P-40s began to appear in May 1940, and the US Army elected to defer delivery of the new fighter to allow production and delivery of the export version (known as the Hawk 81A) to France. However, the initial production version was hardly combat ready, lacking armor protection and self-sealing fuel tanks, and deliveries weren't able to be made until September 1940. By then France had fallen and the RAF had taken over the production order from the French Air Force.

The British replaced the two .30 caliber Browning machine guns in the wings with guns chambered for .303, but retained the two .50 caliber machine guns in the nose. With some armor protection and self-sealing fuel tanks, the new machine was designated the "Tomahawk IIA" for RAF service, and was virtually identical to the USAAF's P-40B, which began to reach service units in early 1941.

For the next variant, the P-40C model (Tomahawk IIB to the RAF), improvements were made to the self-sealing fuel tanks and an additional .30 caliber machine gun was added to each wing, which increased gross weight and reduced the maximum speed. By the time the Japanese attacked Pearl Harbor, the Army had 62 P-40Bs and 11 P-40Cs, the majority of which were destroyed on the ground. However, several survived the initial attack and were able to score the AAFs first "kills" of the war. Two weeks later, on December 20, 1941, the American Volunteer Group, aka the "Flying Tigers", took to the skies in their P-40Cs and destroyed six of ten Japanese bombers attacking Kunming.

Sources:

Davis, Larry; Curtiss Army Hawks In Action, Aircraft Number 128; Squadron/Signal Publications, Carrollton, Texas; 1992.

Green, William; War Planes Of The Second World War: Fighters Volume Four; Macdonald & Co., London; 1961.

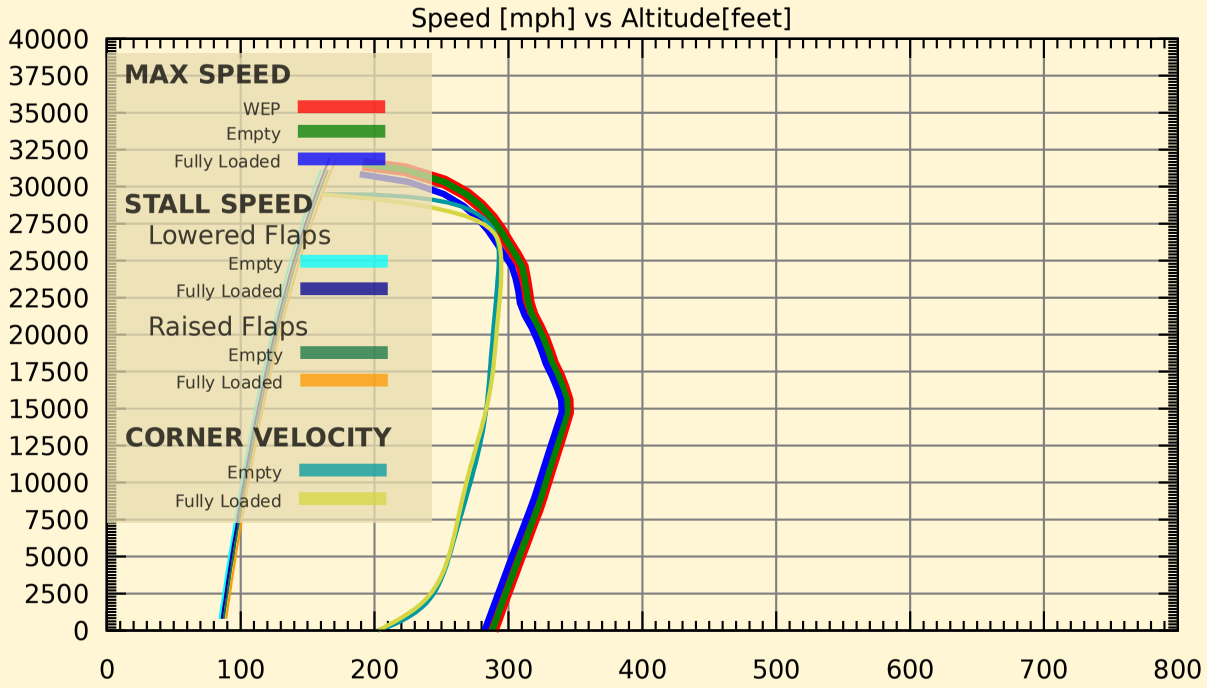
McDowell, Ernest R.; Curtiss P-40 In Action, Aircraft No. 26; Squadron/Signal Publications, Carrollton, Texas; 1976.

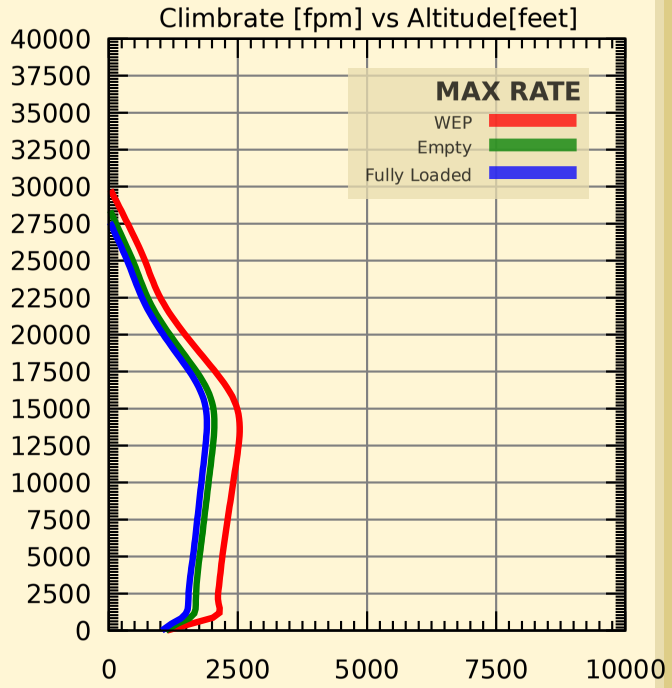
Name: Tomahawk Mk.IIb Curtiss P-40C
Role: Fighter
Crew: 1
Service Date: April 1941
Primary Guns: 4x 0.303" machine guns with 400 rpg in wings
Secondary Guns: 2x Browning M2 0.5" machine guns with 291 rpg in cowl
Defensive Guns: NA
Ordnance: One 250 lb bomb or One 312 lb drop tank

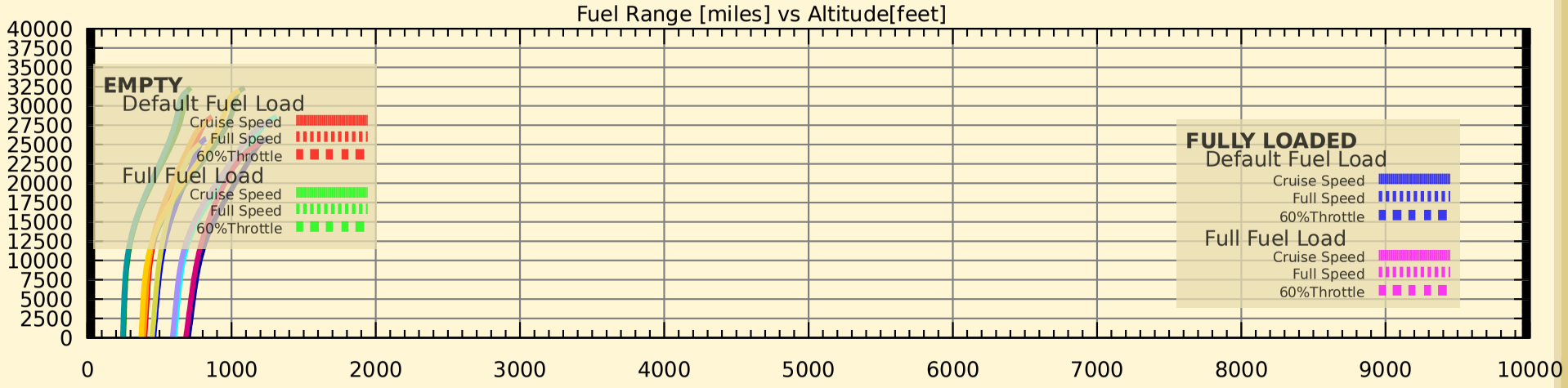
Length: 31.76 ft
Wing Span: 37.34 ft
Wing Area: 236 sq. ft

Power Plant: One Allison V-1710-33
Power: 2536 lb s.t.
Internal Fuel: 805 lb
External Fuel: 313 lb

Empty Weight: 6085 lb
MTOW: 7441 lb







Curtiss P-40C Tomahawk

Durability	☆☆☆	Speed	☆☆☆☆☆	Climb Rate	☆☆☆☆
Maneuverability	☆☆☆☆☆	Firepower	☆☆☆	Ground Attack	☆

High Altitude Performance - While it is nimble and agile at low altitudes, the lack of a decent supercharger makes the P-40 a sluggish performer above 10,000 feet.

During production of the Hawk 75 fighter for the US Army in 1937, Curtiss modified the original radial engine design to accommodate the new Allison V-1710 inline, liquid-cooled engine. The new design benefited from both streamlining and increased engine power, and was flown for the first time in October 1938 as the XP-40. Performance was so impressive that the Army ordered 524 production machines, which was at that time the largest-ever single production order for a US fighter.

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For the next variant, the P-40C model (Tomahawk IIB to the RAF), improvements were made to the self-sealing fuel tanks and an additional .30 caliber machine gun was added to each wing, which increased gross weight and reduced the maximum speed. By the time the Japanese attacked Pearl Harbor, the Army had 62 P-40Bs and 11 P-40Cs, the majority of which were destroyed on the ground. However, several survived the initial attack and were able to score the AAFs first "kills" of the war. Two weeks later, on December 20, 1941, the American Volunteer Group, aka the "Flying Tigers", took to the skies in their P-40Cs and destroyed six of ten Japanese bombers attacking Kunming.

Sources:

Davis, Larry; Curtiss Army Hawks In Action, Aircraft Number 128; Squadron/Signal Publications, Carrollton, Texas; 1992.

Green, William; War Planes Of The Second World War: Fighters Volume Four; Macdonald & Co., London; 1961.

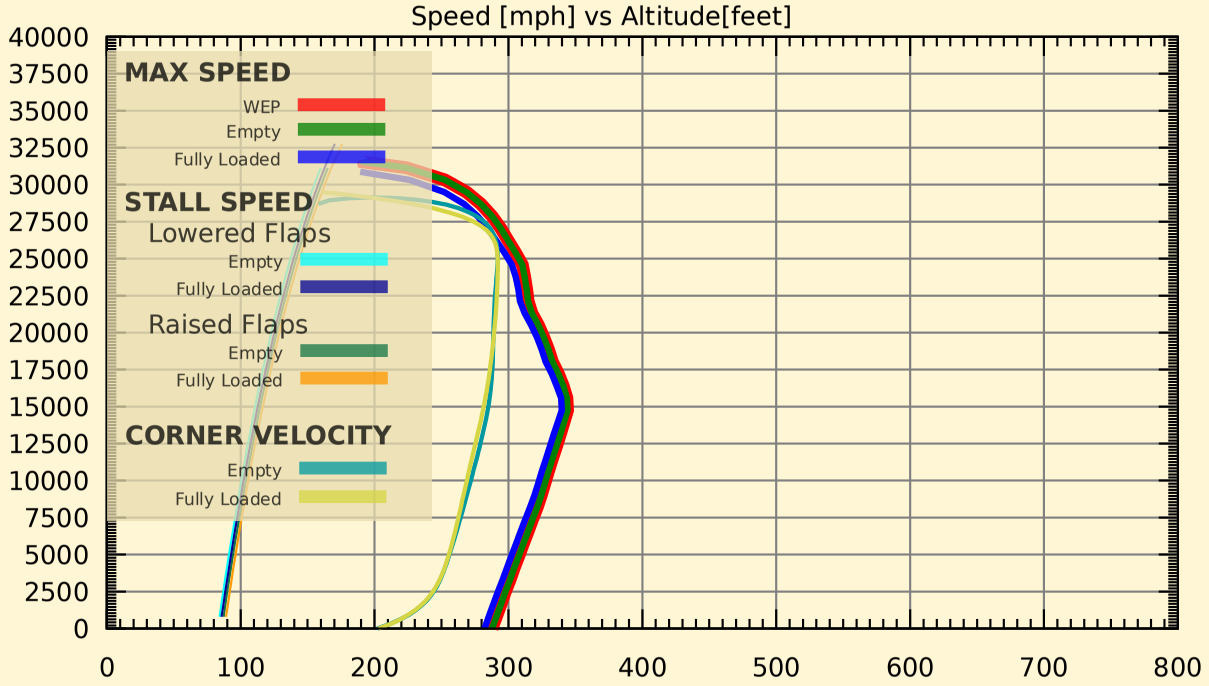
McDowell, Ernest R.; Curtiss P-40 In Action, Aircraft No. 26; Squadron/Signal Publications, Carrollton, Texas; 1976.

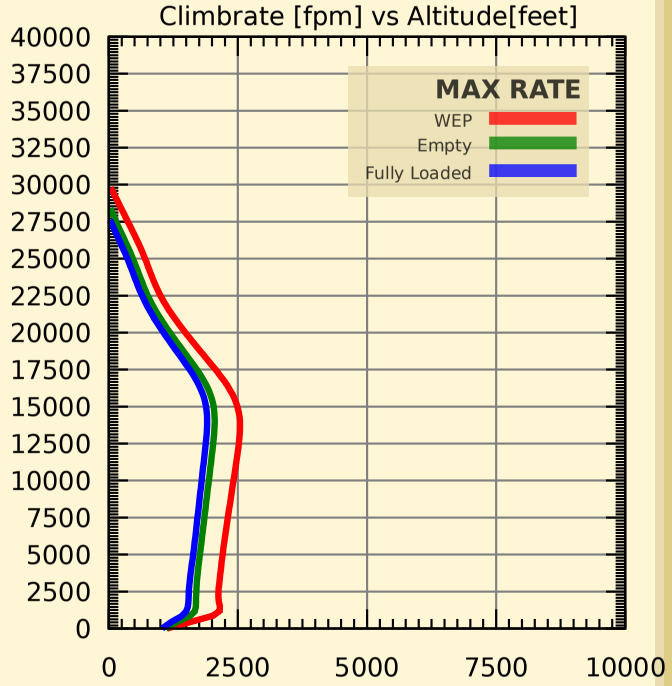
Name: Curtiss P-40C Tomahawk
Role: Fighter
Crew: 1
Service Date: June 1941
Primary Guns: 4x 0.3" machine guns with 400 rpg in wings
Secondary Guns: 2x Browning M2 0.5" machine guns with 291 rpg in cowl
Defensive Guns: NA
Ordnance: One 250 lb bomb or One 312 lb drop tank

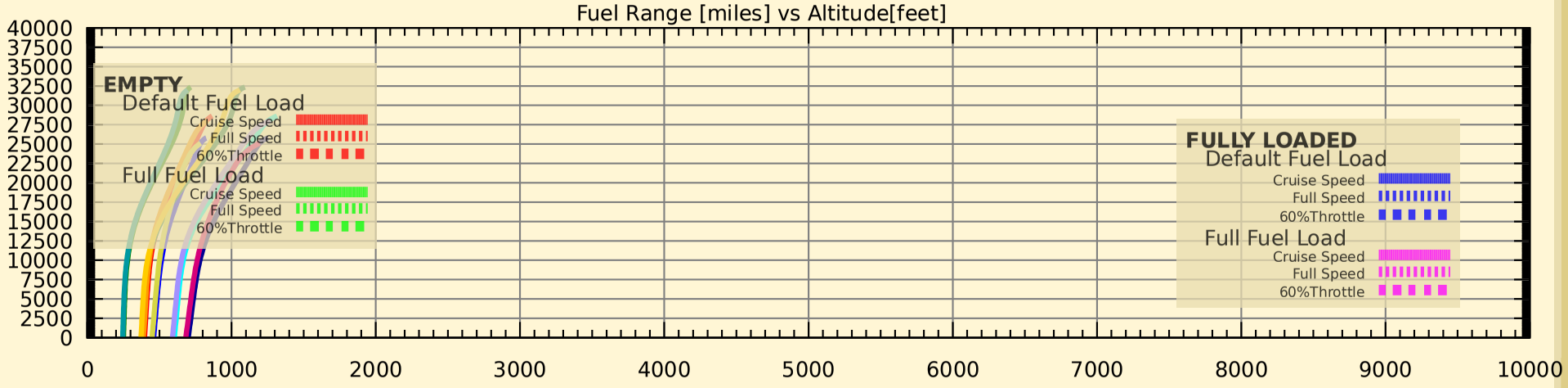
Length: 31.76 ft
Wing Span: 37.34 ft
Wing Area: 236 sq. ft

Power Plant: One Allison V-1710-33
Power: 2536 lb s.t.
Internal Fuel: 805 lb
External Fuel: 313 lb

Empty Weight: 6085 lb
MTOW: 7441 lb







Curtiss P-40E-1

Durability	☆☆☆☆	Speed	☆☆☆☆☆	Climb Rate	☆☆☆☆
Maneuverability	☆☆☆☆☆	Firepower	☆☆☆☆	Ground Attack	☆

High Altitude Performance - Despite the newer engine, the Kittyhawk is still rather sluggish and unresponsive at high altitude. In particular the climb rate and ceiling were poor compared to contemporaries such as the Spitfire and Bf-109.

Early in 1940 the new Allison V-1710-39 engine became available, and Curtiss set about redesigning the P-40 to accommodate the new power plant. The new P-40D model was visibly different from the P-40C, but in fact bore the new Curtiss development designation "Hawk 87A".

The most visible difference from earlier P-40s was the addition of a deeper radiator "chin" under the engine. This new engine arrangement necessitated the removal of the nose-mounted machine guns in favor of placement in the wings, two .50 caliber machine guns being mounted in each wing with 280 rpg.

After a production run of only 22 P-40Ds an extra .50 caliber machine gun was mounted in each wing, the subsequent model being designated the P-40E by the US Army and the Kittyhawk I by the RAF. In addition to the improved armament, the "E" model incorporated newer hydraulic gun chargers, which replaced the unreliable mechanical charging system that was generally bypassed in the field. Additionally, the P-40E could carry either a 52-gallon drop tank or a 500 lb. bomb under the fuselage.

Sources:

Davis, Larry; Curtiss Army Hawks In Action, Aircraft Number 128; Squadron/Signal Publications, Carrollton, Texas; 1992.

Green, William; War Planes Of The Second World War: Fighters Volume Four; Macdonald & Co., London; 1961.

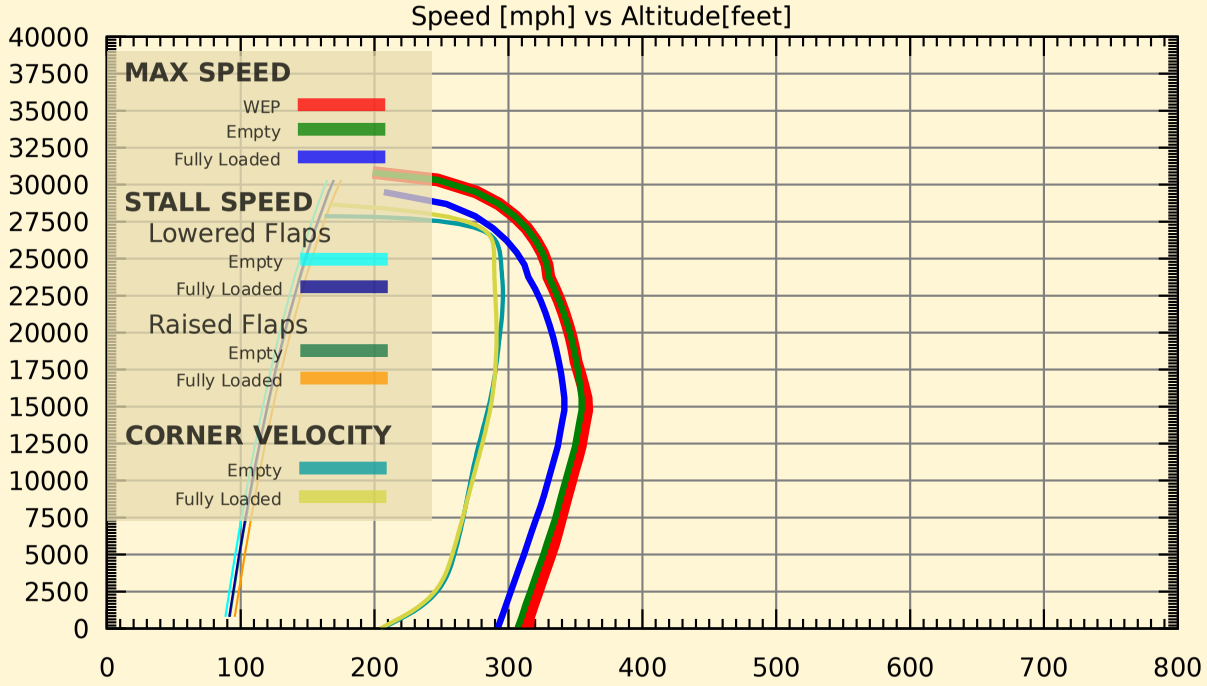
McDowell, Ernest R.; Curtiss P-40 In Action, Aircraft No. 26; Squadron/Signal Publications, Carrollton, Texas; 1976.

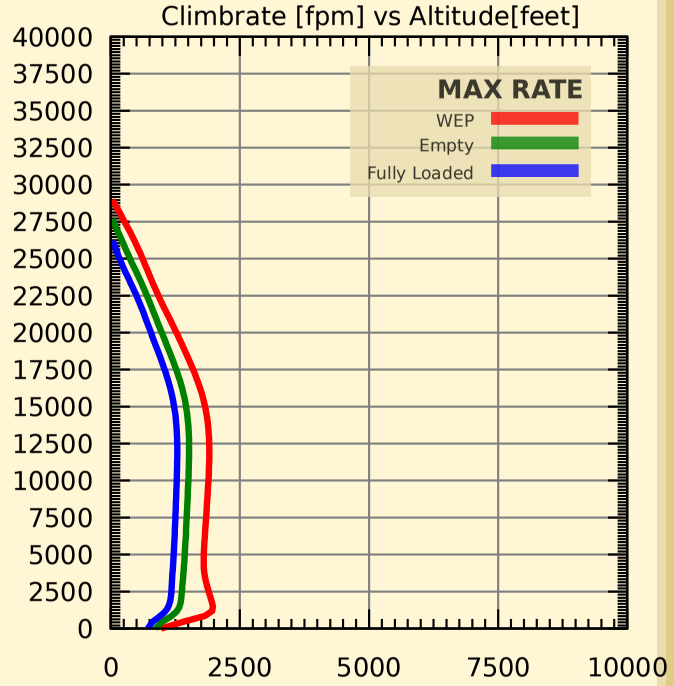
Name: Curtiss P-40E-1
Role: Fighter
Crew: 1
Service Date: October 1941
Primary Guns: 2x Browning M2 0.5" machine guns with 281 rpg in wings
Secondary Guns: 4x Browning M2 0.5" machine guns with 281 rpg in wings
Defensive Guns: NA
Ordnance: One 250 lb or One 535 lb bomb or One 312 lb drop tank under fuselage, plus 2x 119 lb bombs under wings; or 2x 250 lb bombs under wings

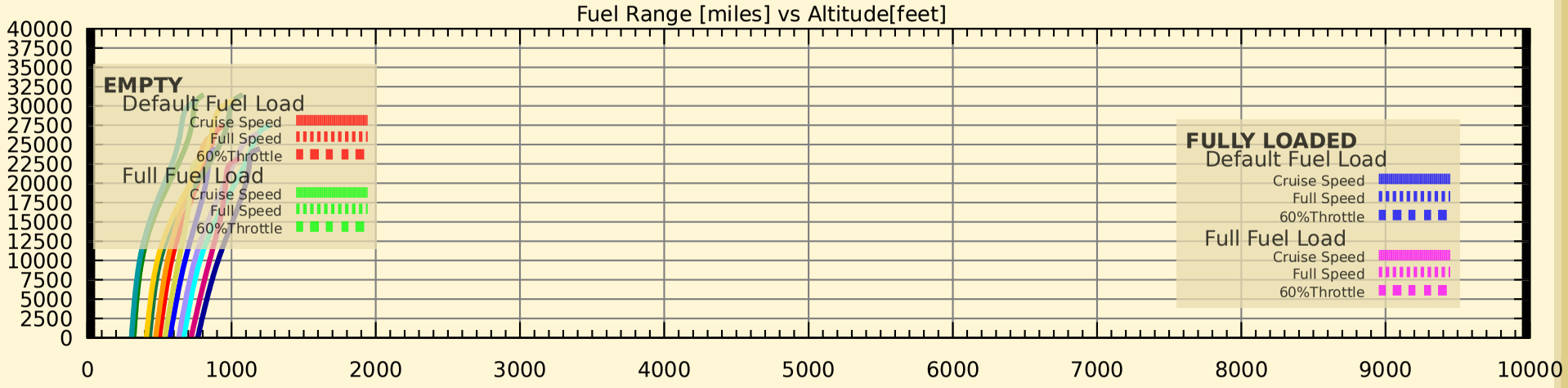
Length: 31.76 ft
Wing Span: 37.34 ft
Wing Area: 236 sq. ft

Power Plant: One Allison V-1710-39
Power: 2541 lb s.t.
Internal Fuel: 943 lb
External Fuel: 312 lb

Empty Weight: 6570 lb
MTOW: 8664 lb

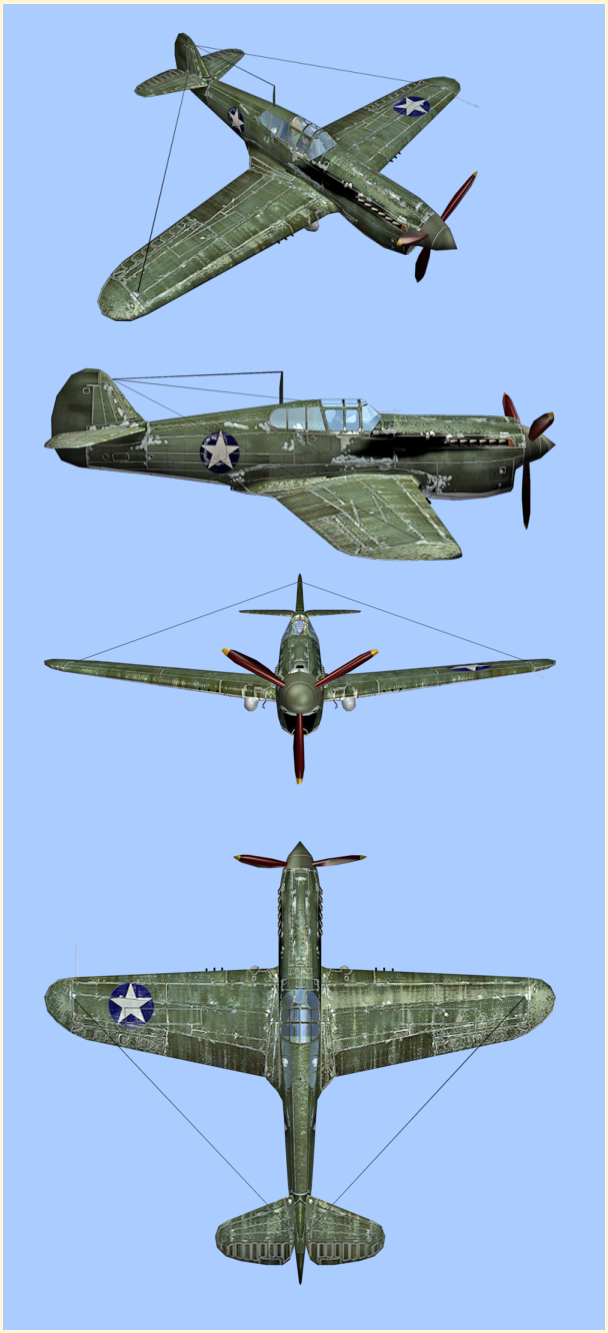






Curtiss P-40E-1 Warhawk

Durability	★★★☆☆	Speed	★★★★★	Climb Rate	★★☆☆☆
Maneuverability	★★★★☆	Firepower	★★★★☆	Ground Attack	★☆☆☆☆



High Altitude Performance - Despite the newer engine, the P-40E is still rather sluggish and unresponsive at high altitude. In particular the climb rate and ceiling were poor compared to contemporaries such as the Spitfire and Bf-109.

Early in 1940 the new Allison V-1710-39 engine became available, and Curtiss set about redesigning the P-40 to accommodate the new power plant. The new P-40D model was visibly different from the P-40C, but in fact bore the new Curtiss development designation "Hawk 87A".

The most visible difference from earlier P-40s was the addition of a deeper radiator "chin" under the engine. This new engine arrangement necessitated the removal of the nose-mounted machine guns in favor of placement in the wings, two .50 caliber machine guns being mounted in each wing with 280 rpg.

After a production run of only 22 P-40Ds an extra .50 caliber machine gun was mounted in each wing, the subsequent model being designated the P-40E by the US Army and the Kittyhawk I by the RAF. In addition to the improved armament, the "E" model incorporated newer hydraulic gun chargers, which replaced the unreliable mechanical charging system that was generally bypassed in the field. Additionally, the P-40E could carry either a 52-gallon drop tank or a 500 lb. bomb under the fuselage.

Sources:

Davis, Larry; Curtiss Army Hawks In Action, Aircraft Number 128; Squadron/Signal Publications, Carrollton, Texas; 1992.

Green, William; War Planes Of The Second World War: Fighters Volume Four; Macdonald & Co., London; 1961.

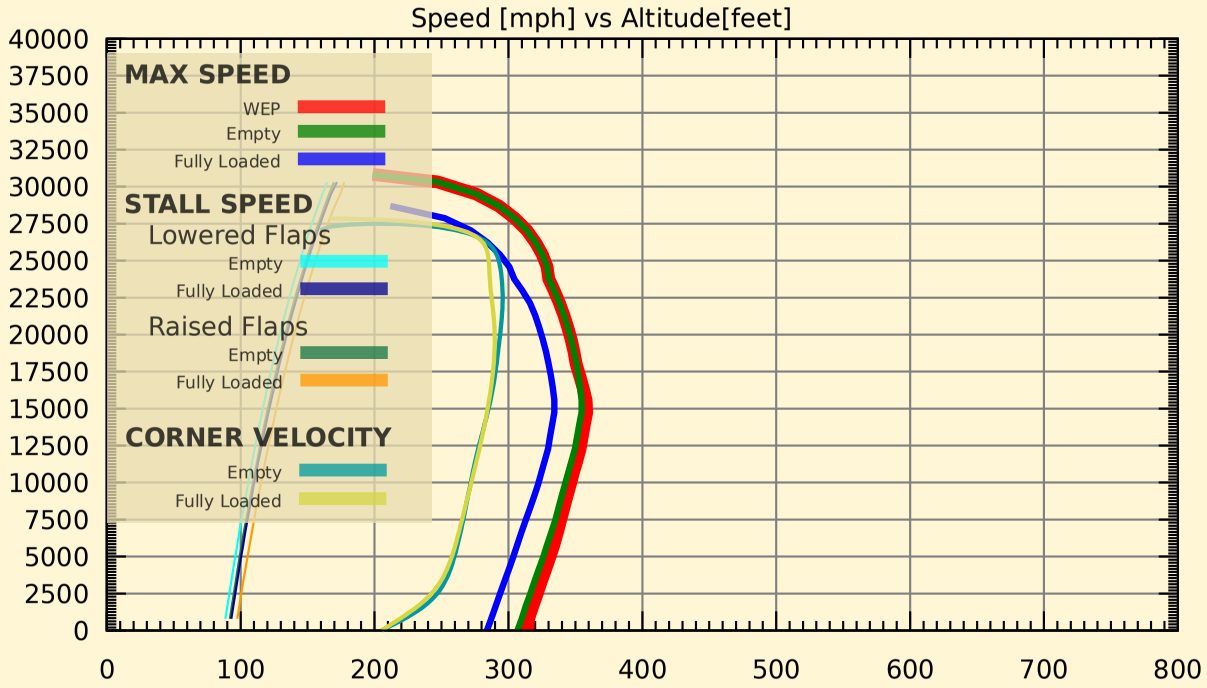
McDowell, Ernest R.; Curtiss P-40 In Action, Aircraft No. 26; Squadron/Signal Publications, Carrollton, Texas; 1976.

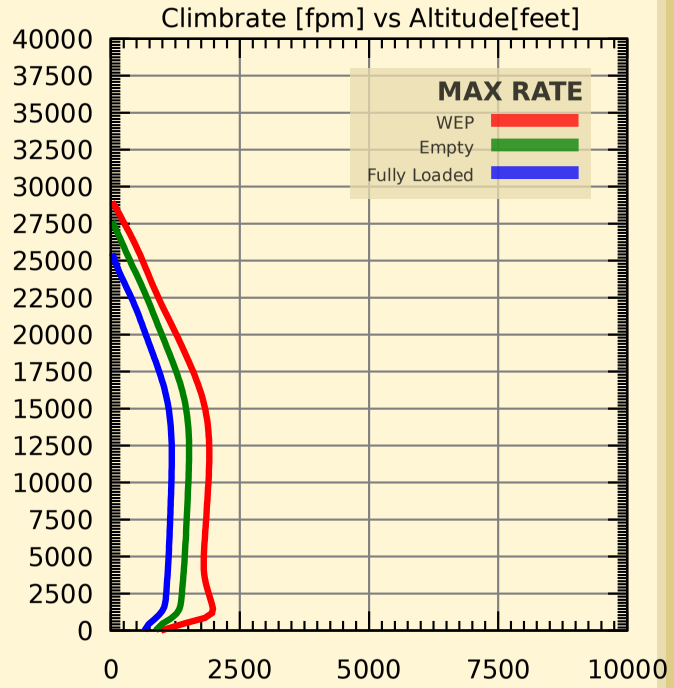
Name: Curtiss P-40E-1 Warhawk
Role: Fighter
Crew: 1
Service Date: December 1941
Primary Guns: 2x Browning M2 0.5" machine guns with 281 rpg in wings
Secondary Guns: 4x Browning M2 0.5" machine guns with 281 rpg in wings
Defensive Guns: NA
Ordnance: One 250 lb or One 500 lb bomb or One 312 lb drop tank under fuselage, plus 2x 100 lb bombs under wings

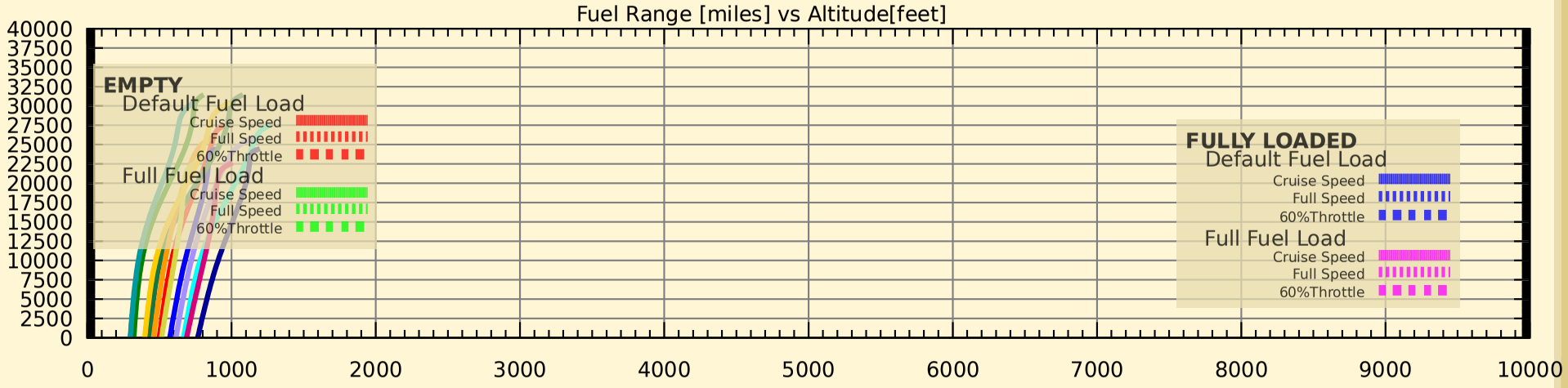
Length: 31.76 ft
Wing Span: 37.34 ft
Wing Area: 236 sq. ft

Power Plant: One Allison V-1710-39
Power: 2541 lb s.t.
Internal Fuel: 943 lb
External Fuel: 312 lb

Empty Weight: 6570 lb
MTOW: 8664 lb







Curtiss P-40E-1
Kittyhawk-Ia

Durability	☆☆☆	Speed	☆☆☆☆☆	Climb Rate	☆☆
Maneuverability	☆☆☆☆☆	Firepower	☆☆☆☆	Ground Attack	☆☆

High Altitude Performance - Despite the newer engine, the P-40E is still rather sluggish and unresponsive at high altitude. In particular the climb rate and ceiling were poor compared to contemporaries such as the Spitfire and Bf-109.

Early in 1940 the new Allison V-1710-39 engine became available, and Curtiss set about redesigning the P-40 to accommodate the new power plant. The new P-40D model was visibly different from the P-40C, but in fact bore the new Curtiss development designation "Hawk 87A".

The most visible difference from earlier P-40s was the addition of a deeper radiator "chin" under the engine. This new engine arrangement necessitated the removal of the nose-mounted machine guns in favor of placement in the wings, two .50 caliber machine guns being mounted in each wing with 280 rpg.

After a production run of only 22 P-40Ds an extra .50 caliber machine gun was mounted in each wing, the subsequent model being designated the P-40E by the US Army and the Kittyhawk I by the RAF. In addition to the improved armament, the "E" model incorporated newer hydraulic gun chargers, which replaced the unreliable mechanical charging system that was generally bypassed in the field. Additionally, the P-40E could carry either a 52-gallon drop tank or a 500 lb. bomb under the fuselage.

As P-40s were beginning to be phased out of US service, surplus aircraft were shipped to the Soviet Union under the "Lend-Lease" program. Despite being obsolescent as a front-line fighter, the P-40 was capable of carrying larger bombs than the native designs and was more durable, thus finding itself a place as a ground-attack fighter.

As with many other foreign designs, the plane's armament was augmented by the installation of rails to allow it to carry four RS-82 rockets. However, unlike the British Hurricane whose .303s were quickly replaced, the six .50 caliber guns were sufficiently heavy to wreak havoc on the numerous enemy soft-targets and installations.

Sources:

Davis, Larry; Curtiss Army Hawks In Action, Aircraft Number 128; Squadron/Signal Publications, Carrollton, Texas; 1992.

Green, William; War Planes Of The Second World War: Fighters Volume Four; Macdonald & Co., London; 1961.

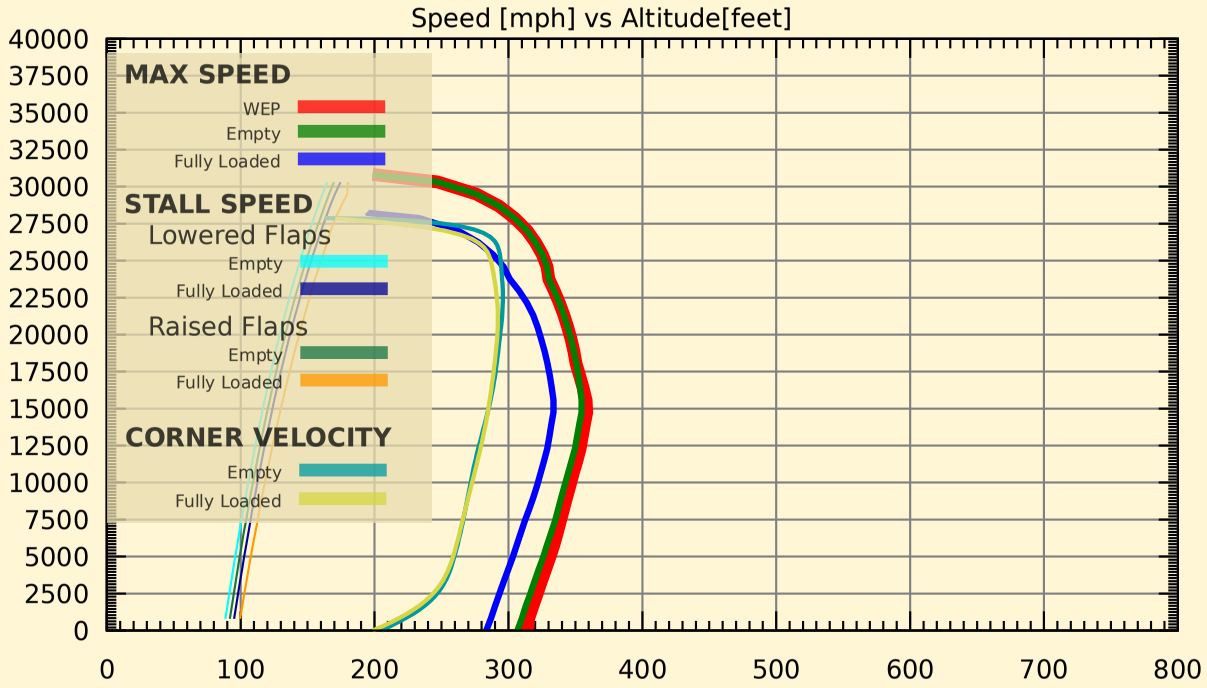
McDowell, Ernest R.; Curtiss P-40 In Action, Aircraft No. 26; Squadron/Signal Publications, Carrollton, Texas; 1976.

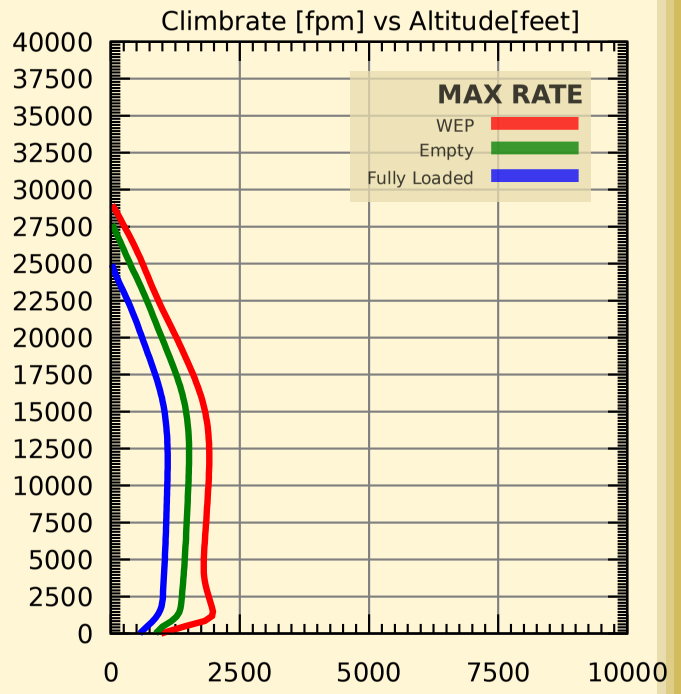
Name: Curtiss P-40E-1 Kittyhawk-Ia
Role: Fighter
Crew: 1
Service Date: March 1942
Primary Guns: 2x Browning M2 0.5" machine guns with 281 rpg in wings
Secondary Guns: 4x Browning M2 0.5" machine guns with 281 rpg in wings
Defensive Guns: NA
Ordnance: One 110 lb or One 220 lb or One 550 lb bomb or One 312 lb drop tank under fuselage, plus 2x 110 lb or 2x 220 lb or 4x 33 lb RS-82 rockets under wings. Maximum load of 1000 lb.

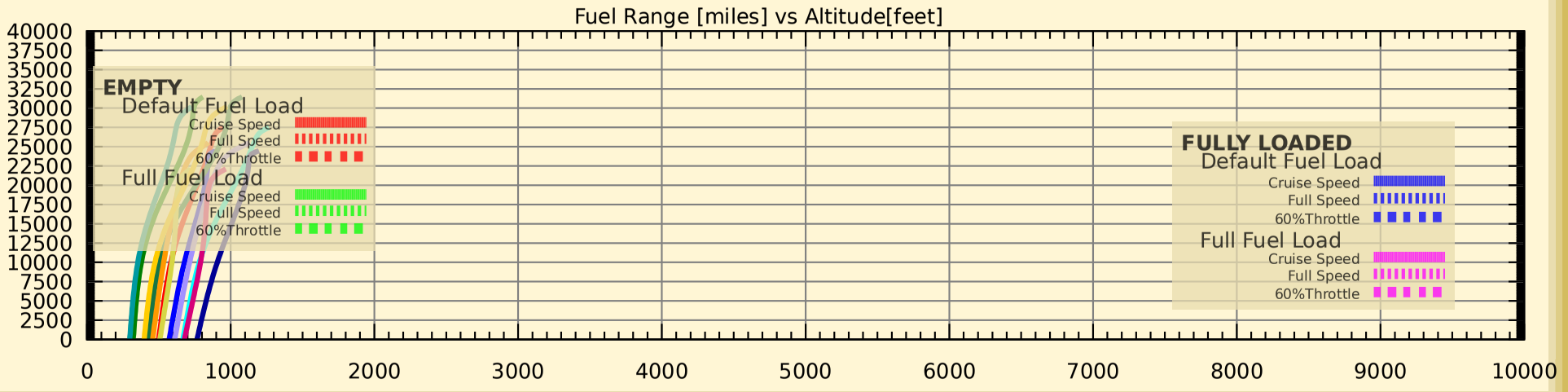
Length: 31.76 ft
Wing Span: 37.34 ft
Wing Area: 236 sq. ft

Power Plant: One Allison V-1710-39
Power: 2541 lb s.t.
Internal Fuel: 943 lb
External Fuel: 312 lb

Empty Weight: 6570 lb
MTOW: 8664 lb

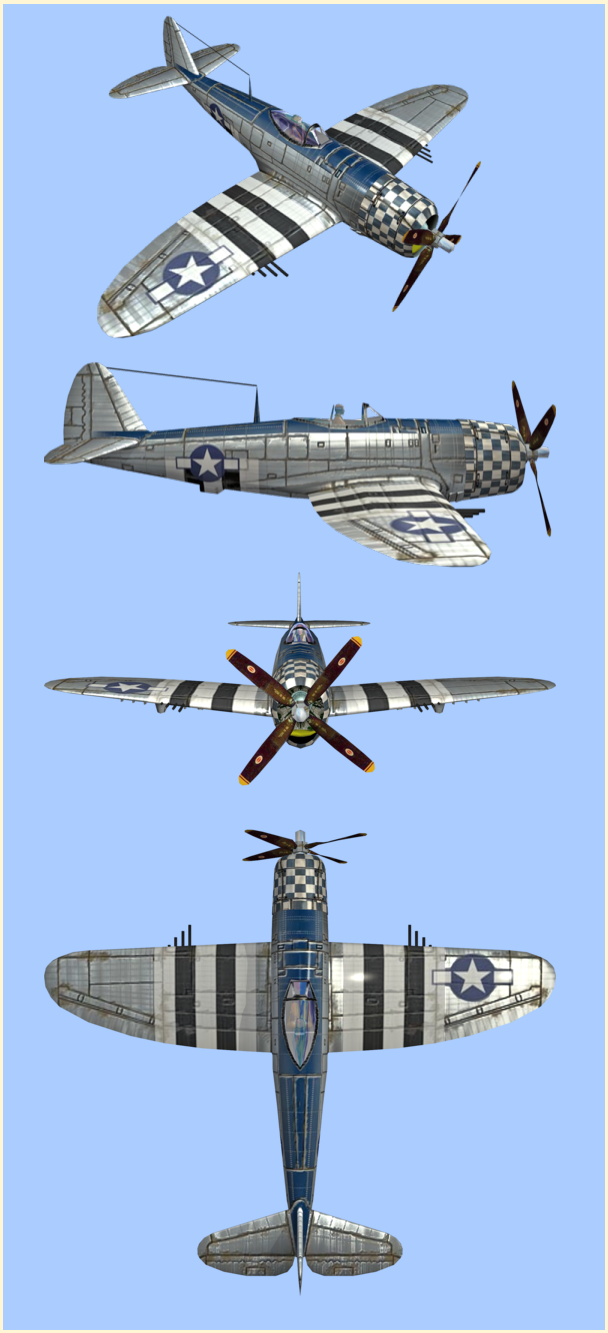






Republic P-47D Thunderbolt

Durability	☆☆☆☆☆	Speed	☆☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆
Maneuverability	☆☆☆☆	Firepower	☆☆☆☆☆	Ground Attack	☆☆☆☆☆



Climb Rate - As with acceleration and maneuverability, the Jug's large size keeps it from climbing as fast as some of its contemporaries.

The P-47 Thunderbolt, affectionately known as the "Jug" by its pilots, was the evolutionary pinnacle of the aircraft designed by Alexander De Seversky and Alexander Kartveli. De Seversky was a brilliant engineer who had served in the Russian air force in World War I. Despite losing a leg in a bomber crash, he went on to shoot down 13 German planes before he was delegated to serve on the Russian Naval Mission to the United States. Following the Revolution of 1917, he defected to the US and finally earned his citizenship in 1927.

Having already served as an adviser to General Billy Mitchell and consulting engineer for the US War Department, De Seversky, formed his own aircraft engineering company, the Seversky Aircraft Corporation, in 1931. Known as "Sasha" to his friends, he served as president, designer, and chief test pilot and was virtually a one-man company until he hired fellow TmigrT Kartveli.

The first military aircraft produced by Seversky was the BT-8 trainer, but a lack of power led to it be dropped in favor of North American's BT-9, which evolved into the excellent T-6 Texan. Their next effort was the P-35, which beat our Curtiss' P-36 Hawk for an army contract. With the Army looking for an improvement to the P-35, Kartveli combined Boeing's new turbo-supercharger with a Pratt & Whitney R-1830 engine to form the YP-43 Lancer, which was capable of reaching a speed of 350 mph and an altitude of 38,000 feet.

The XP-47 was initially designed as a streamlined, small, lightweight fighter built around the Allison V-1710 engine, but the overall performance figures were outdated by European fighter standards. Kartveli then decided to design the plane around a turbo-supercharged P&W R-2800 engine rated for 2,000 hp. The resulting design was given the XP-47B designation by the Army.

With its limited internal fuel capacity, the P-47B was unable to penetrate German airspace for very long, so in the "C" model a ventral drop tank/bomb mount was added, increasing range by about 50%. The "D" model introduced another pair of hard points under the wings, stressed to carry up to 1,000 lb. each. Alternatively, ten 5" HVAR rockets could be mounted on zero-length launchers under the wings in place of bombs or drop tanks.

Mid-way through production of the P-47D, a new "bubble" canopy was installed, which gave the pilot much better vision all around, particularly to the rear. Water injection and a newer "paddle-blade" propeller increased overall top speed and climb-rate. Eventually the Thunderbolt was replaced by the P-51 Mustang as the principal escort fighter, which allowed the Jugs to concentrate on ground attack missions, a role to which they took like a fish to water.

Featuring eight .50 caliber machine guns in the wings, the Jug was the heaviest armed fighter in the US inventory, and could slug it out with the heavy cannon armed fighters the Axis put into the sky. Although it could neither climb nor maneuver with Luftwaffe aircraft, nothing could dive faster than the P-47, a fact that saved many a pilot's life.

Sources:

Davis, Larry; P-47 Thunderbolt In Action, Aircraft Number 67; Squadron/Signal Publications, Carrollton, Texas; 1984.

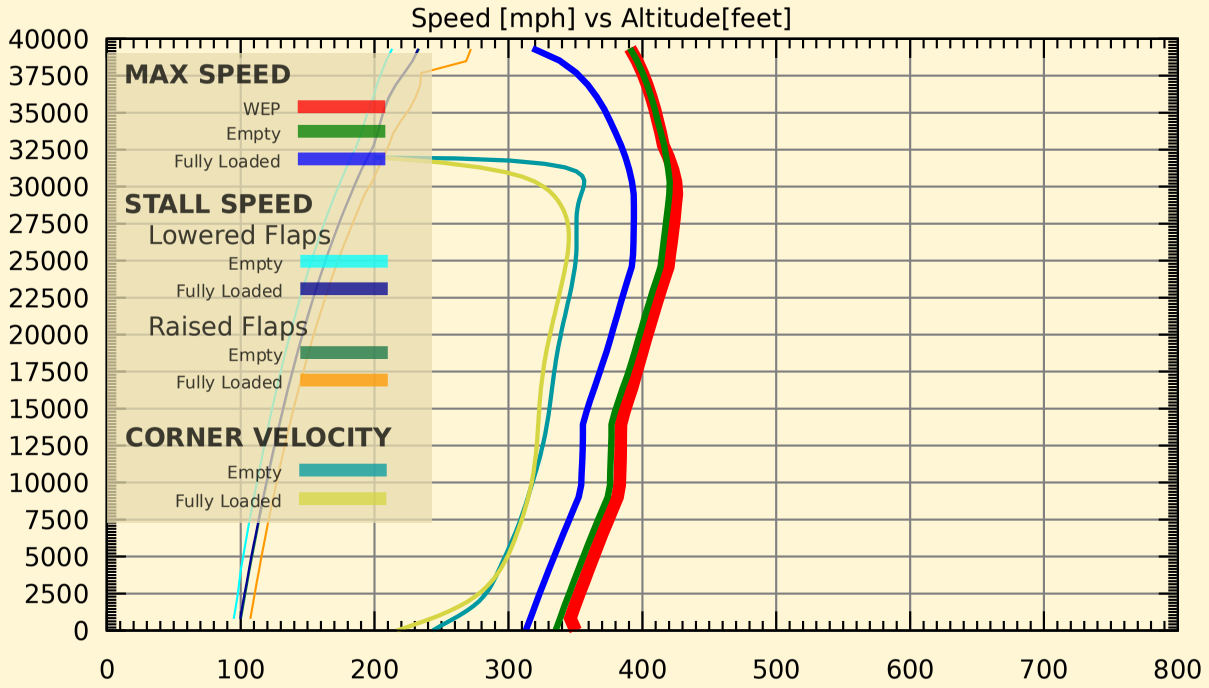
Green, William; War Planes Of The Second World War: Fighters Volume Four; Macdonald & Co., London; 1961.

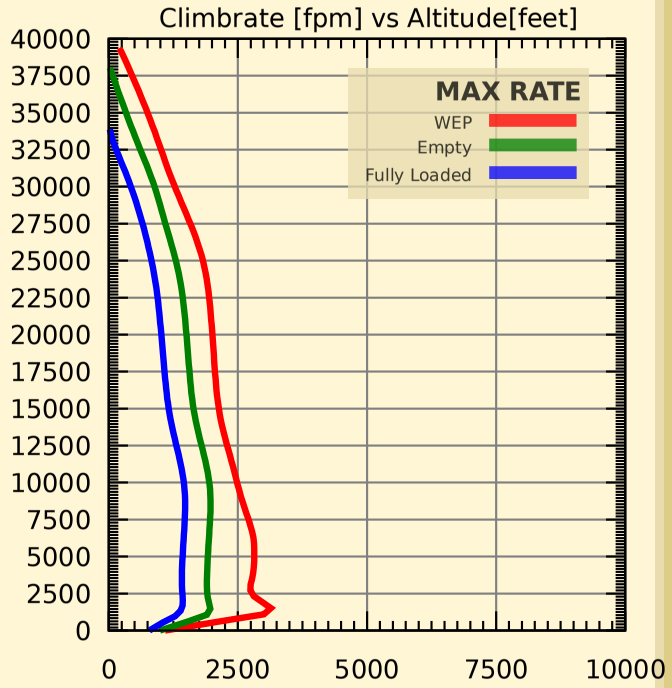
Name: Republic P-47D Thunderbolt
Role: Fighter
Crew: 1
Service Date: June 1943
Primary Guns: 4x Browning M2 0.5" machine guns with 425 rpg in wings
Secondary Guns: 4x Browning M2 0.5" machine guns with 425 rpg in wings
Defensive Guns: NA
Ordnance: One 250 lb or One 500 lb or One 1000 lb bomb or One 1200 lb drop tank under fuselage, plus 2x 250 lb or 2x 500 lb or 2x 1000 lb or 2x 450 lb drop tanks or 10x 138 lb 5" HVAR A2G rockets under wings. Total of 2580 lb of ex

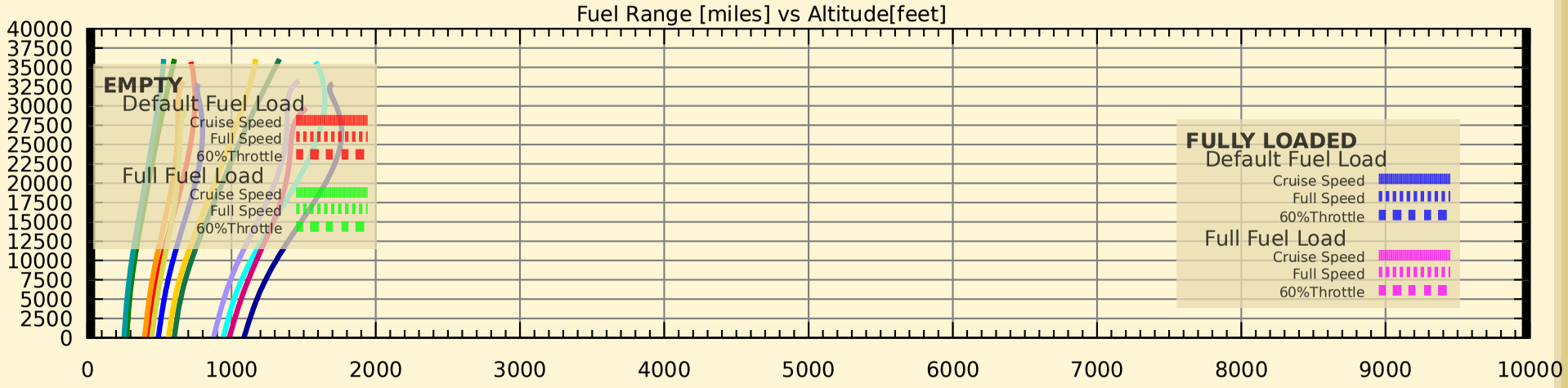
Length: 36.19 ft
Wing Span: 40.81 ft
Wing Area: 300 sq. ft

Power Plant: One Pratt-Whitney R-2800-59
Power: 5070 lb s.t.
Internal Fuel: 1944 lb
External Fuel: 1200 lb or 2x 450 lb or 2100 lb

Empty Weight: 10031 lb
MTOW: 15476 lb







North American P-51D Mustang

Durability	☆☆☆	Speed	☆☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆☆
Maneuverability	☆☆☆☆☆	Firepower	☆☆☆☆☆	Ground Attack	☆☆☆

Directional Stability - The high power-to-weight ratio made the Mustang a difficult plane to keep flying straight and level.

With their backs to the wall and in desperate need of combat aircraft, the British government turned its eye westward in 1940 to the vast manufacturing capacity of the United States. They wanted to buy Curtiss' latest "Hawk" but the U.S. Army needed every P-40 that Curtiss could produce.

However they did succeed in gaining permission to purchase license-built P-40s, providing they could find someone to build them. With this in mind, they approached North American engineering and asked them if they would build the Curtiss fighter under license. Instead of accepting outright, the company offered to design and produce a new fighter in less time than it would take to tool their factory for P-40 production. Having been impressed with North American's professionalism from previous contracts, the British agreed and dubbed the new design the Mustang.

A scant 127 days after the first piece of metal was cut, the Mustang airframe was rolled out of the factory and twenty days later the new Allison V-1710 engine had been installed. After several weeks of ground and engine testing, on October 26, 1940, the Mustang took to the air and flew for the first time.

Less than a year after getting the go-ahead, the first Mustang I rolled off the production line and, after acceptance testing, arrived in England and was assembled by the end of October 1941. Used primarily as a ground attack fighter, the Mustang I didn't draw its first blood until August 19, 1942, when an American volunteer, Pilot Officer Hollis Hills of Pasadena, California shot down an FW-190 during the failed invasion at Dieppe.

The U.S. Army eventually showed an interest and purchased 55 modified Mustang Is, which they designated the P-51 Apache. The P-51 differed from the Mustang I primarily in having the machine-gun armament replaced with two 20mm cannon in each wing. However, these were shipped to photo recon units in the Mediterranean and the fighter was again lost to the Army.

Impressed with the early success of the Stuka in Europe, the Army flirted with the North American design once again, this time fitted with dive brakes as the A-36 Apache. Armed with six .50 caliber machine guns (two in the nose under the engine and two in each wing) and shackles for a pair of 500 lb. bombs under the wings the A-36 saw action in Sicily and Italy in the summer of 1943 and was used in the defense of the Burma Road that autumn.

During this time, the "dive bomber" had accounted for over 84 enemy planes in the air in addition to its bombing duties, and the potential as a fighter was obvious. Fitted with an improved supercharged Allison V-1710-81, the new P-51A retained the same armament as the A-36, minus the nose guns. Equipped with 150-gallon drop tanks, the new Mustang could now be ferried over 2700 miles in a single leg. The P-51A was used primarily in the China-Burma-India Theater, performing fighter and ground-attack duties against the Japanese.

The one weakness of the Mustang was that it had a service ceiling considerably lower than that of contemporary European fighters, like the Spitfire and Bf-109. This was due entirely to the Allison engine's poor high-altitude performance without the bulky turbo-superchargers used on the Lightning. Convinced that the sleek airframe of the Mustang would be a winner if only it had more power, Rolls-Royce engineers began modifying a Mustang I to accept a Merlin 65 engine in place of the Allison.

The first flight tests revealed that what had once been a pleasant and easy aircraft to fly was now a spitting, kicking, bucking bronco of a plane that required constant control adjustments to keep trimmed. But the trade-off was a plane that traveled 50 mph faster and had a service ceiling 10,000 feet higher than the Allison-powered variant. Fitted for production with a Packard-built version of the Merlin, the new Mustang was designated P-51B by the U.S. Army and over 2,000 were ordered by the Army and the RAF.

Being unable to meet the production load with only their Los Angeles factory, North American retooled their Dallas, Texas factory from production of the B-24 Liberator and started producing P-51s. Although identical to the P-51B being built in California, the Texas-built planes were designated P-51Cs.

But the best was still yet to come! Looking to improve the visibility out of the cockpit, North American engineers devised a Plexiglas "bubble" canopy for use on the "D" model, which gave the pilot an all-around view unobstructed by any canopy "ironwork". The ammunition feed problem under heavy G-loading, which plagued the P-51B/C, was fixed by changing the mount angle of the guns, and another pair of .50s was added to the wing armament, giving the P-51D a total of six .50 caliber machine guns. Finally, the wings and wing hard-points were strengthened to allow loads of up to 1000 lb. per wing to be carried.

With additional internal fuel capacity and larger drop tanks, the Mustang could now reach deep into Germany and escort bombers all the way to their targets and back. The addition of zero-length rocket launchers allowed the Mustang to carry six air-to-ground rockets for ground attack duties. Over 9600 P-51Ds were built and over 45 squadrons in the 8th Air Force were equipped to fly Mustangs by the end of the war in Europe.

Sources:

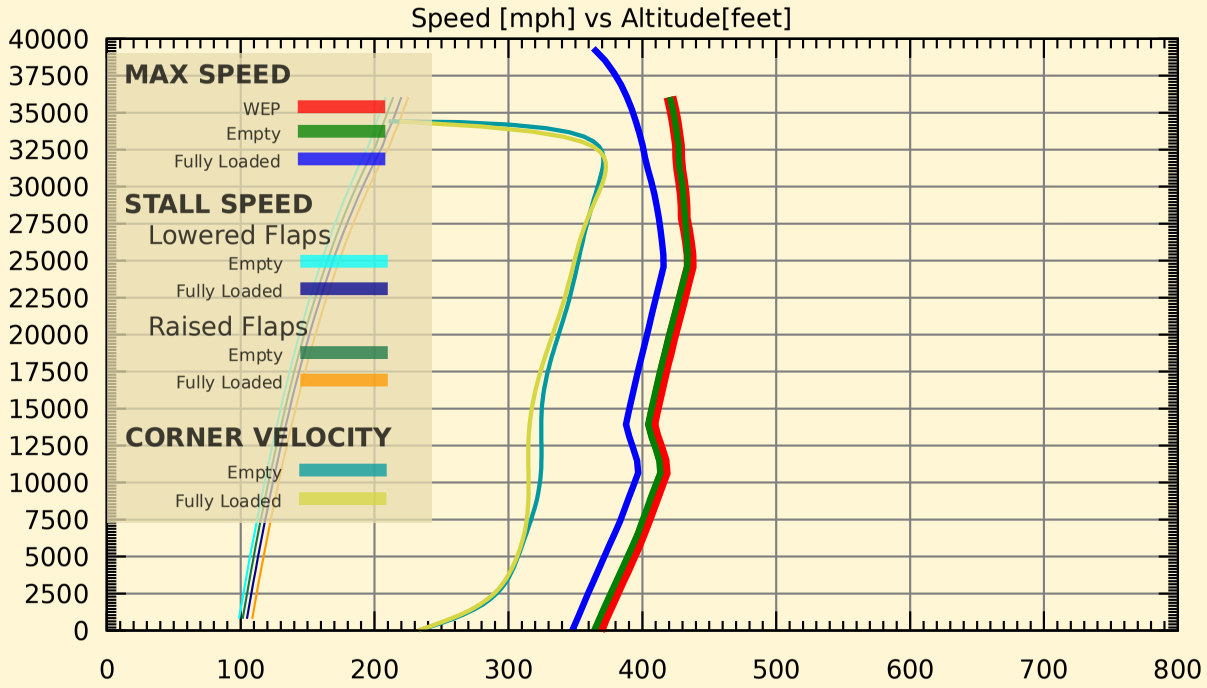
Davis, Larry: P-51 Mustang In Action, Aircraft No. 45; Squadron/Signal Publications, Carrollton, Texas; 1981

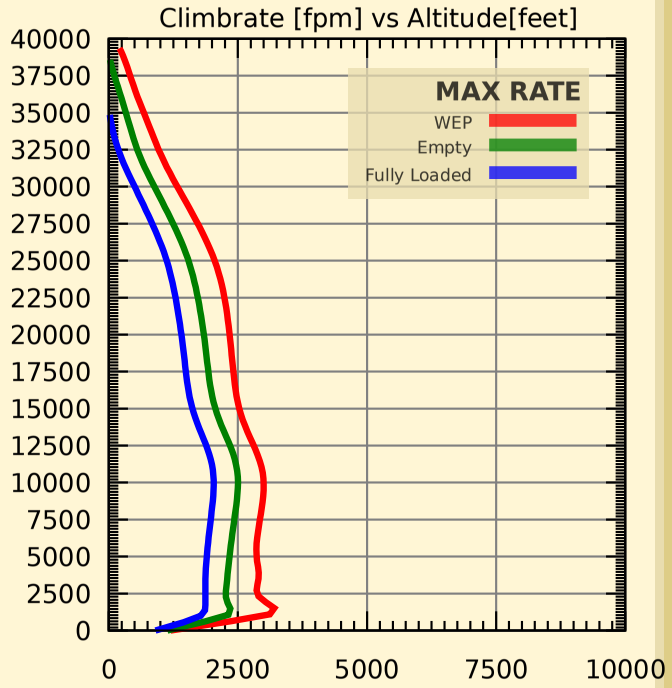
Name: North American P-51D Mustang
Role: Fighter
Crew: 1
Service Date: March 1944
Primary Guns: 2x Browning M2 0.5" machine guns with 400 rpg in wings
Secondary Guns: 4x Browning M2 0.5" machine guns with 270 rpg in wings
Defensive Guns: NA
Ordnance: 2x 250 lb or 2x 500 lb or 2x 1000 lb bombs or 2x 450 lb drop tanks under wings, plus 6x 138 lb 5" HVAR rockets under wings

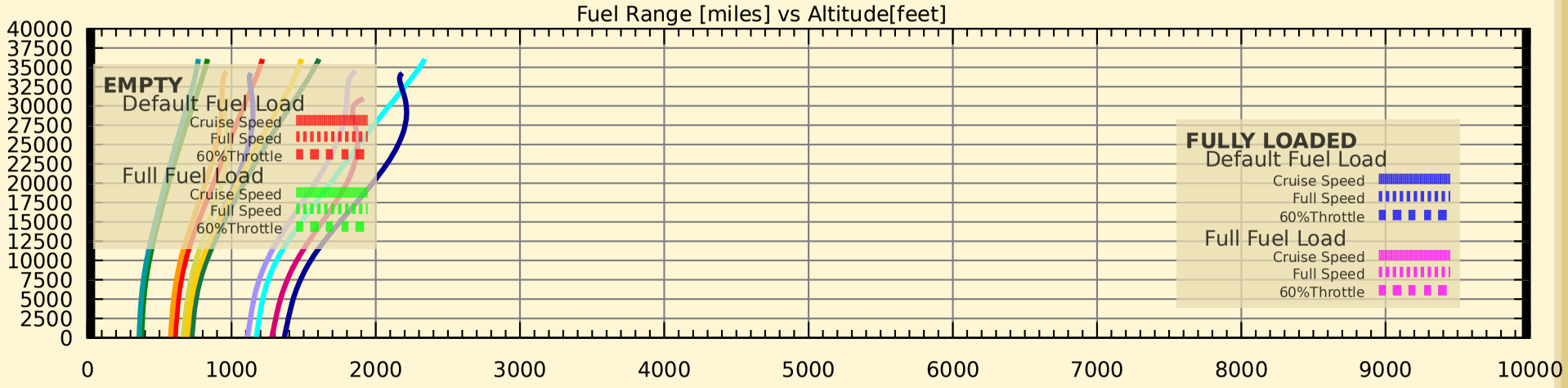
Length: 32.25 ft
Wing Span: 37.04 ft
Wing Area: 233 sq. ft

Power Plant: One Rolls-Royce V-1650-7
Power: 3573 lb s.t.
Internal Fuel: 1614 lb
External Fuel: 900 lb

Empty Weight: 7385 lb
MTOW: 11530 lb

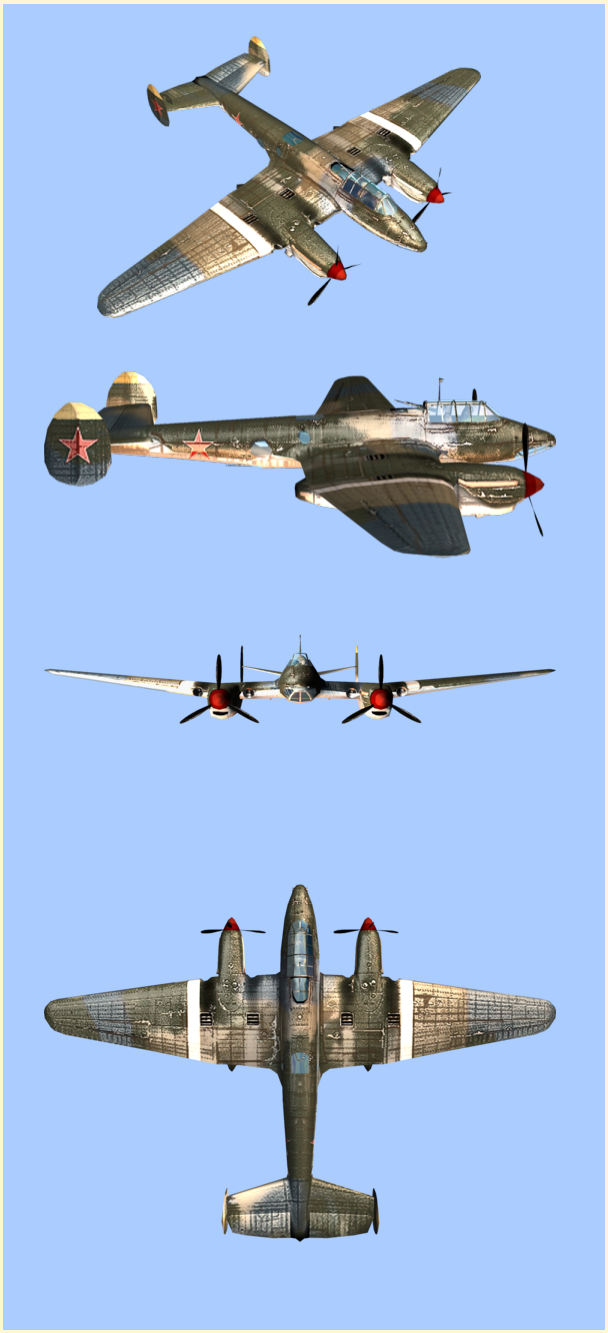






Petlyakov Pe-2

Durability	☆☆☆☆☆	Speed	☆☆☆☆☆	Climb Rate	☆☆☆
Maneuverability	☆☆☆☆	Firepower	☆☆	Ground Attack	☆☆☆☆



Defensive Firepower - Despite using 12.7mm machine-guns for defense, there are only two of them and they can avoided by making front quarter attacks.

During the brief period of cooperation with the Germans prior to Barbarossa, the Soviet aircraft ministry was able to purchase some German planes as well as get a better idea of what the Germans had in development. The phenomenal success of the Junkers 87 and 88 dive-bombers combined with the knowledge that the Germans had no high-altitude bombers to redirect the development of the Petlyakov VI-100 high-altitude interceptor into the PB-100, a high-speed dive-bomber in the tradition of the Ju-88.

In fact, the Ju-88 served as a model for many design features, among them the automatic dive pull-out mechanism and the electrically operated dive-brakes. Meanwhile, Vladimir Petlyakov's team had only 45 days to design the conversion. Through a superhuman effort under the guns of the NKVD (the team was in prison at the time), the design was completed in time, but it was all for naught as the factories lacked the technology of producing the Pe-2, as it had by now been renamed.

Again, the NKVD got what it wanted as the prototypes flew in time to save the lives, if not the jobs, of the directors in charge of the various production factories. However, the rush to service meant that the plane was full of problems, 175 deficiencies being reported on one of the prototypes and 100 on the second.

In the meantime, Andrei Tupolev's ANT-58 dive-bomber design was proving to have more potential than the converted Petlyakov fighter design. Despite this fact and the numerous design errors, the Pe-2 was ordered into production immediately. However, the Pe-2 was a complicated design using the most modern duralumin technology. As more women and children were drafted to work in the factories, the quality of production steadily decreased.

However, performance was good enough to absolve the negatives inherent in the design and production of the plane and it served well in the field, particularly during the defense of Moscow in 1941. Crew survivability was initially a large problem, which was relieved somewhat by the addition of armor plating at the expense of performance.

In an effort to improve performance the design team looked at a variety of alternatives to the M-105R engines. The M-107 looked to have promise, but developmental problems shelved that idea for some time. The second alternative involved the use of M-105F engines fitted with the TK-2F supercharger, which proved more successful, despite the excessive workload it placed on the pilot due to the lack of automatic supercharger controls.

Another change in the Pe-2F, as it was designated, was the change in the mounting position of the wing up to the middle of the fuselage from its previous low position. This was done to allow clearance of the externally mounted FAB-250 and FAB-500 bombs. With that out of the way, the next major revision involved a redesign of the gunner's position to allow for the use of a larger 12.7mm UBT machine-gun. This new mount could be retrofitted to existing Pe-2s in the field in as little as 6 hours, the result being designated the Pe-2FT. However, this temporary measure was redesigned to provide a better, more streamlined mount in new planes leaving the production line.

The Pe-2A was an attempt to extract more speed from the plane by more careful streamlining. These improvements allowed the plane to reach a top speed of 321 mph, just below that of the initial prototype. The addition of the more powerful M-105PF engines was one of two new features in the Pe-2B. The second was a new wooden wing, which replaced the Duralumin one used previously. Using a slightly redesigned shape and larger area, the new wing eliminated the troublesome stall and spin characteristics that had been the hallmark of the earlier design.

Sources:

Gordon; Yefim and Khazanov, Dmitri with Medved, Alexander; Soviet Combat Aircraft of the Second World War Volume Two: Twin-Engined Fighters, Attack Aircraft and Bombers; Midland Publishing Limited, Leicester, England; 1999.

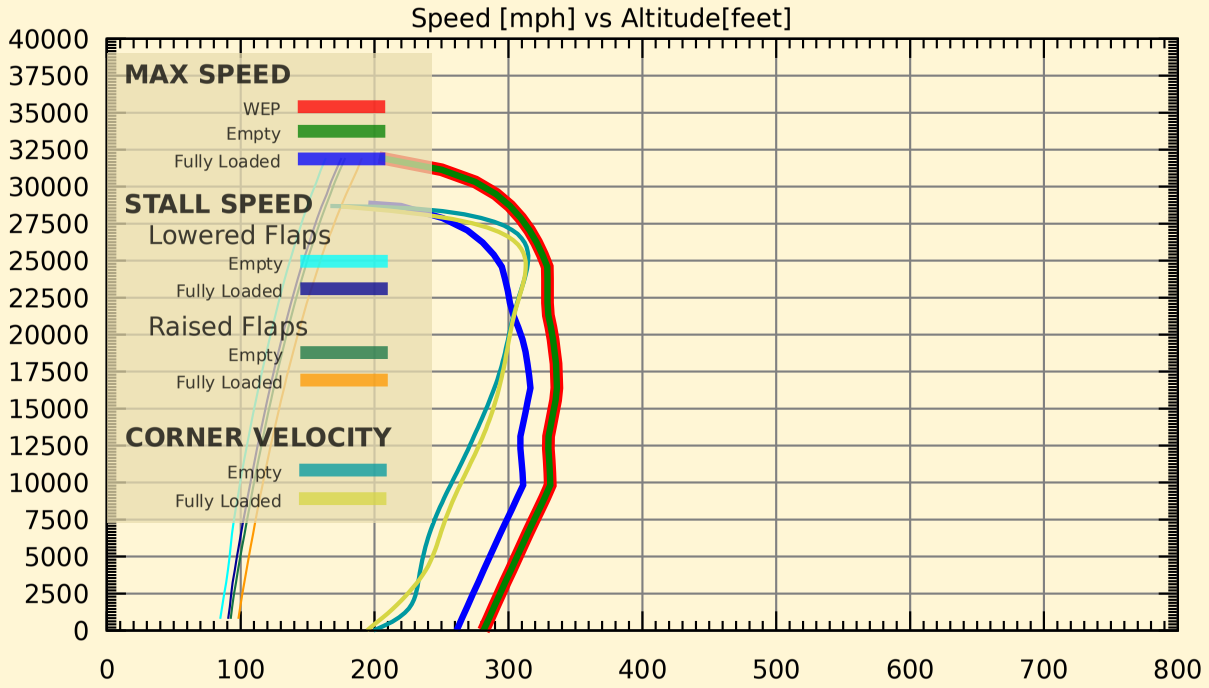
Stapfer, Hans-Heiri; Petlyakov Pe-2 In Action; Squadron/Signal Publications, Carrollton, TX; 2002.

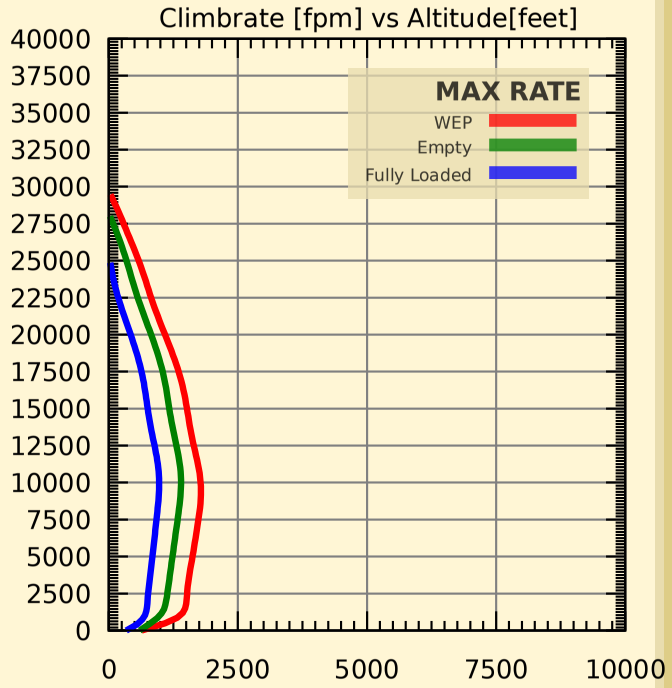
Name: Petlyakov Pe-2
Role: Diving Bomber
Crew: 3
Service Date: January 1941
Primary Guns: One ShKAS 7.62mm machine gun with 1000 rpg in nose
Secondary Guns: One Beresin 12.7mm machine gun with 300 rpg in nose
Defensive Guns: NA
Ordnance: 6x 110 lb or 4x 220 lb bombs in internal bomb bay, plus 4x 220 lb or 4x 551 lb or 2x 1103 lb bombs on underwing pylons.

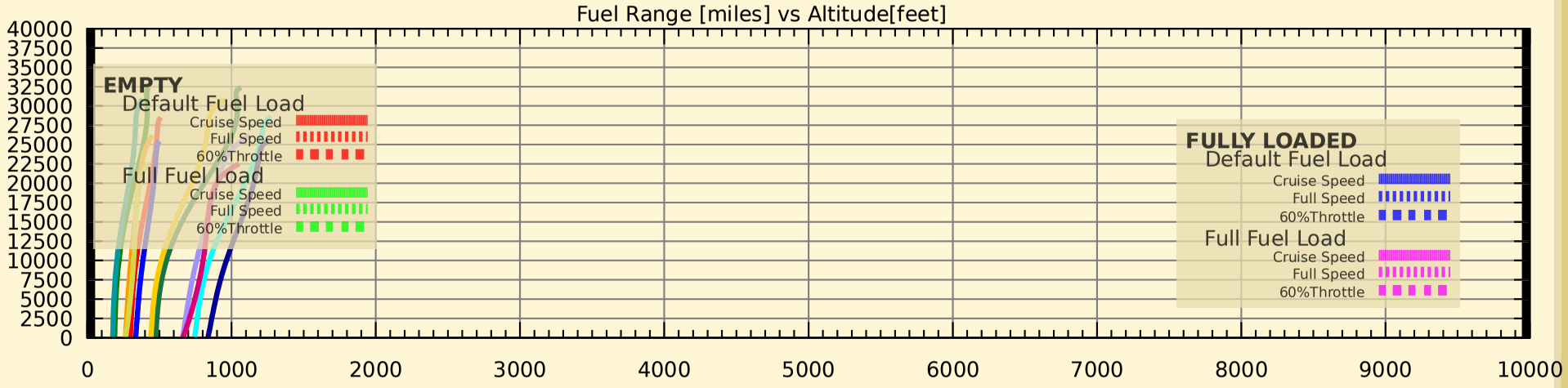
Length: 41.34 ft
Wing Span: 57.74 ft
Wing Area: 436 sq. ft

Power Plant: 2 X M-105P
Power: 2779 lb s.t.
Internal Fuel: 2205 lb
External Fuel: NA

Empty Weight: 14109 lb
MTOW: 18783 lb

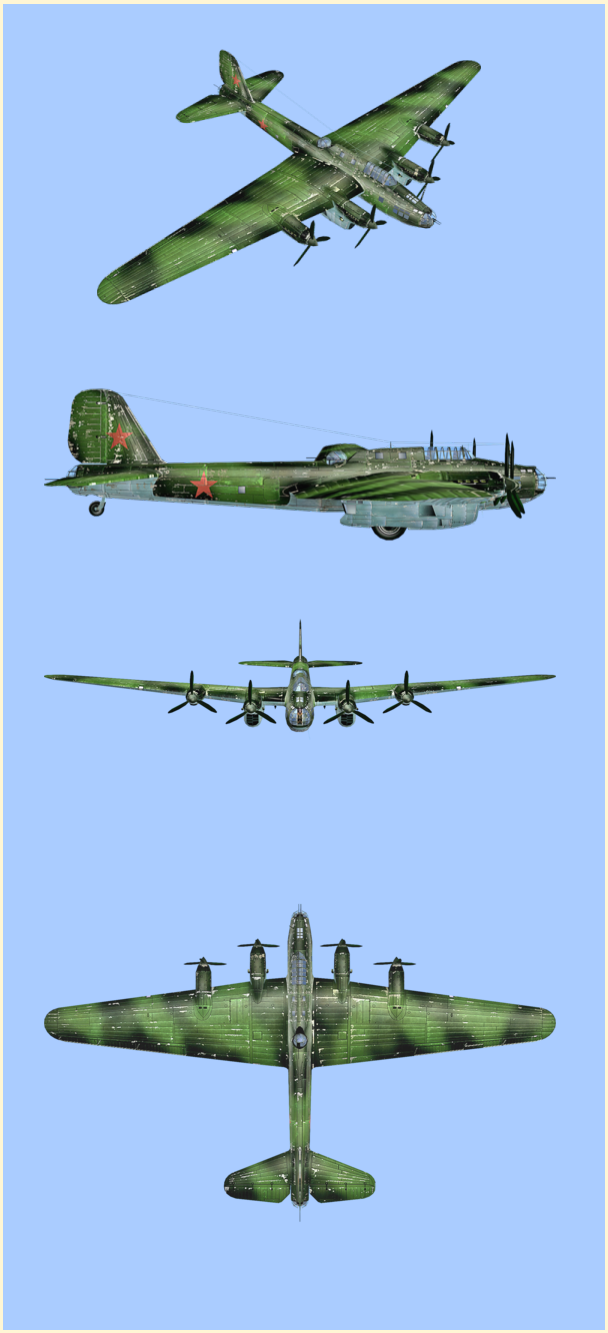






Petlyakov Pe-8
TB-7

Durability	☆☆☆☆☆☆	**Speed**	☆☆☆☆	**Climb Rate**	☆☆
Maneuverability	☆☆☆☆	**Firepower**		**Ground Attack**	☆☆☆☆☆☆☆☆



Performance - Being large and underpowered, the Pe-8 is one of the most sluggish planes in the game.

The fate of Vladmir Petlyakov's four-engine bomber design was, like that of many other aircraft designs, hampered by the lack of powerful, reliable engines. Designed as a replacement for the primitive TB-7 heavy bomber the Pe-8 was intended to be a high-altitude, fast, heavy bomber capable of hitting targets deep in enemy territory without the need for fighter escort.

The Mikuln AM-34 radial engines originally fitted to the Pe-8 were rated for only 800 hp each and were not designed for high-altitude work. Unable to fit supercharger compressors to the AM-34, the design team hit upon the idea of using an auxiliary engine, mounted above the bomb-bay dedicated to driving a supercharger compressor, which fed compressed air to all of the engines via six foot diameter air ducts in the wings.

The Pe-8 was designed to defend itself from enemy fighters and as a result employed one of the heaviest defensive armament packages ever used on a bomber. The nose turret was equipped with a pair of 7.62mm ShKAS machine guns while the dorsal and tail turrets employed a single 20mm ShVAK cannon each. Finally, a gun position was fitted in the rear of the inboard engine nacelles equipped with a single 12.7mm Beresin machine gun each.

With a maximum bomb load of over 8,000 lb. the Pe-8 was potentially as effective as the B-17 or Lancaster bombers of the Western Allies. However, the lack of engines started to plague the plane. A production series was built using M-30 and M-40 diesel engines. While in theory these would increase range, they proved so unreliable that losses from engine failures were as common as losses from enemy action.

The most successful variant employed four AM-35As and was not equipped with the M-100 driven supercharger. Unlike the earlier diesel variants, the AM-35A model could reach 16,000 feet, enough to avoid most flak. Production difficulties conspired with the lack of engines to mean that few Pe-8s reached active service. However, starting in July 1941, Pe-8s were used to strike targets as far away as Berlin, mostly in night operations.

By Spring 1944 the Pe-8 was being phased out in favor of the American-built North-American B-25 Mitchell. Remaining Pe-8s were relegated to the transport role until well beyond the war's end.

Sources:

Gordon; Yefim and Khazanov, Dmitri with Medved, Alexander; Soviet Combat Aircraft of the Second World War Volume Two: Twin-Engined Fighters, Attack Aircraft and Bombers; Midland Publishing Limited, Leicester, England; 1999.

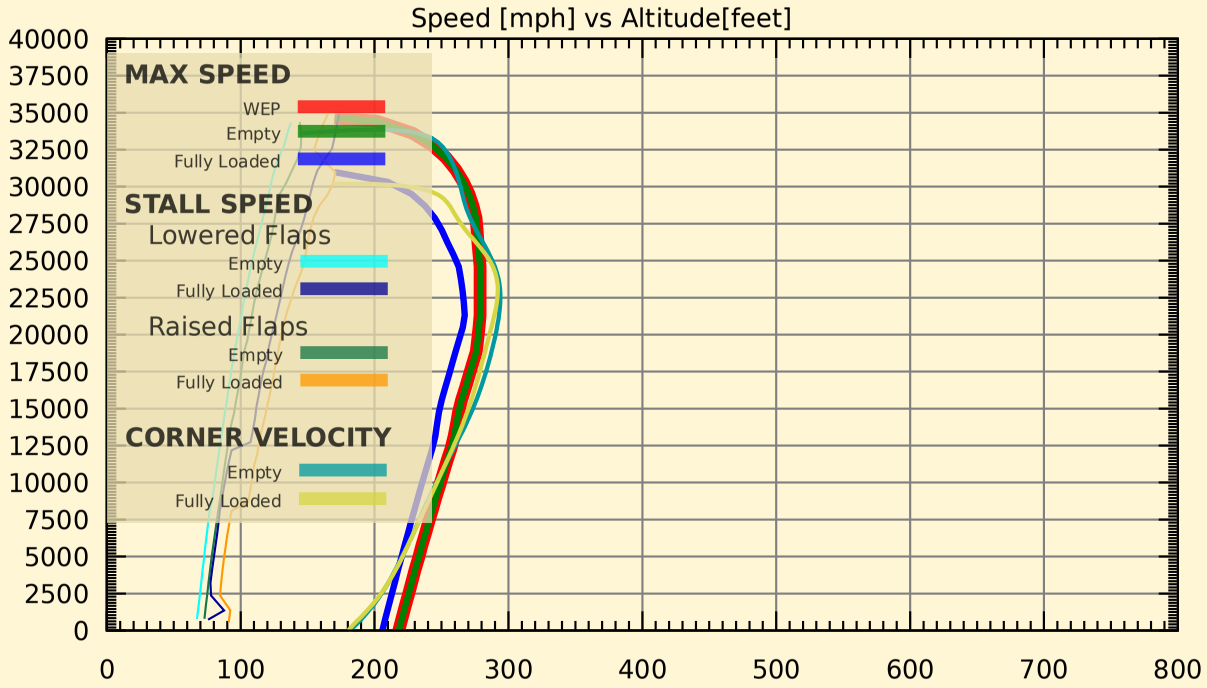
Stapfer, Hans-Heiri; Petlyakov Pe-2 In Action; Squadron/Signal Publications, Carrollton, TX; 2002.

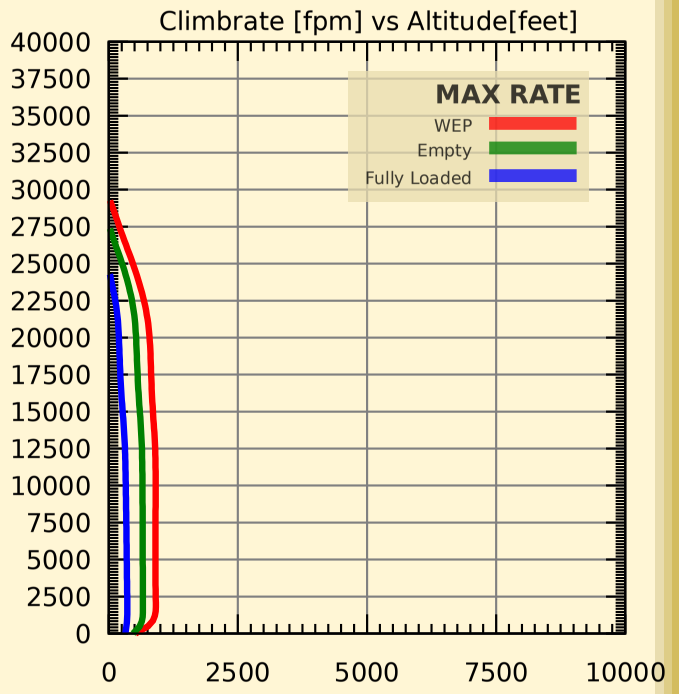
Name: Petlyakov Pe-8 TB-7
Role: Heavy Bomber
Crew: 9
Service Date: June 1940
Primary Guns: NA
Secondary Guns: NA
Defensive Guns: NA
Ordnance: 24x 110 lb or 24x 220 lb bombs or 12x 551 lb or 6x 1103 lb bombs or 2x 2205 lb bombs or One 4411 lb bombs in internal bomb bay and up to 4x220 lb bombs or 4x 551 lb or 2x 1103 lb bombs or 2x 2205 lb bombs in underw

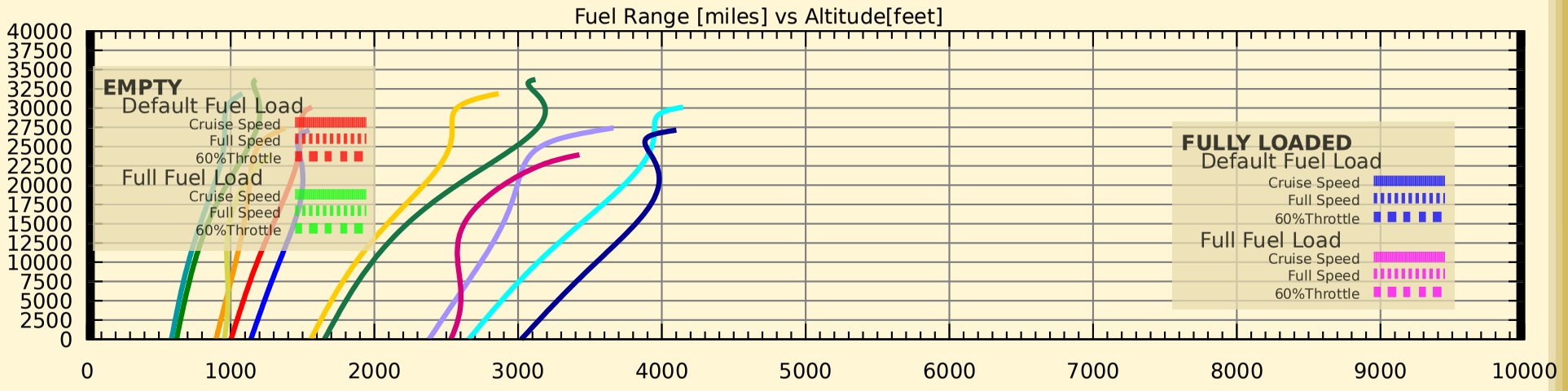
Length: 76.12 ft
Wing Span: 128.38 ft
Wing Area: 2031 sq. ft

Power Plant: 4 X AM-35A
Power: 2845 lb s.t.
Internal Fuel: 23379 lb
External Fuel: NA

Empty Weight: 41887 lb
MTOW: 69445 lb

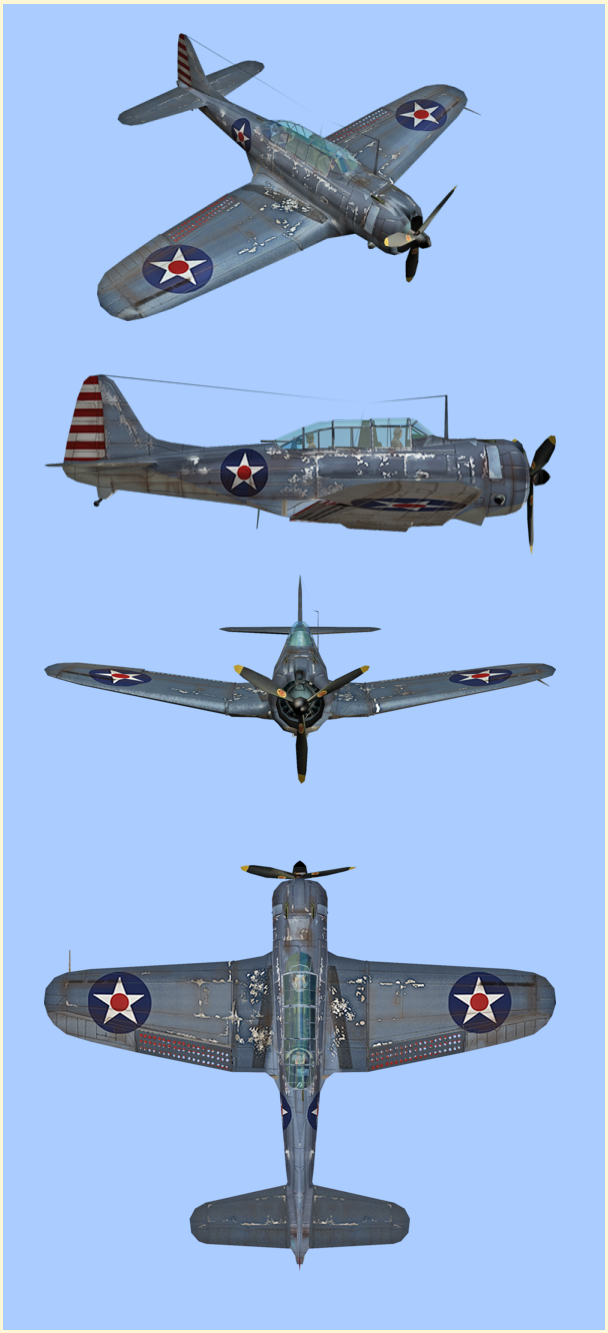






Douglas SBD-2 Dauntless

Durability	☆☆☆☆☆	Speed	☆☆☆☆	Climb Rate	☆☆
Maneuverability	☆☆☆☆☆☆	Firepower	☆☆	Ground Attack	☆☆



Speed - Known as the Slow But Deadly, the Dauntless could top out at about 250 mph.

Designed to meet the 1934 U.S. Navy design request for a new dive-bomber design, the Northrop XBT-1 was the progenitor of the "Slow But Deadly" Dauntless, which was the scourge of the Japanese Navy. The XBT-1 was designed for strength, using a multi-cellular wing structure but had horrible handling characteristics, which resulted in several fatal crashes.

Addressing these faults, Northrop took their revised XBT-2 design to the wind-tunnel at Langley and spent six months making the recommended changes. But before it could be completed, Jack Northrop resigned and the company's offices became Douglas Aviation's El Seguendo division. The XBT-2 was thus redesignated the XSBD-1 to reflect both the new company and the Navy's new Scout Bomber classification.

With the acceptance of the type by the Navy in February 1939, an order for 144 SBD-1s was placed and production commenced. The SBD-1 featured a pair of .50 caliber machine guns mounted in the cowl and firing through the propeller arc. The primary offensive armament was a single 1600 lb. bomb mounted on a special "crutch" under the fuselage. During a dive, the crutch could be swung down so that the bomb could clear the propeller.

Hard points under each wing allowed the SBD-1 to carry an additional pair of 100 lb. bombs or depth charges. For defensive purposes, the radio operator had a .30 caliber machine gun on a flex mount positioned to fire aft.

However, the 210-gallon internal fuel capacity was calculated to give an effective range of only 200 miles, once form-up and landing pattern times were added to the equation. Douglas said they could fix the problem and starting with the 58th production plane added 100 gallons of fuel, along with a few other minor changes, the result being designated the SBD-2.

By the time of Pearl Harbor, the Enterprise's VS-6 and VB-6 along with the Lexington's VS-2 and VB-2 squadrons were equipped with the SBD-2. On Wednesday, December 10, 1941, a Dauntless flown by Lt. C.E. Dickson of VS-6 scored the first enemy ship sunk by a Dauntless, the Japanese submarine I-70. During the coming year, the Dauntless would go on to sink more enemy shipping than all other aircraft combined.

The Dauntless was the only plane to participate in all five major carrier-only naval engagements in the Pacific and it broke the back of the Japanese Navy at Midway, sinking three enemy carriers in a space of less than 30 minutes. Although considered obsolescent when it was introduced, the Dauntless served as the principal U.S. Navy ship-based dive-bomber until late 1944 and also served with the Royal Navy.

Sources:

Brown, Eric; Wings Of The Navy, Flying Allied Carrier Aircraft of World War Two; Naval Institute Press, Annapolis, Maryland; 1980.

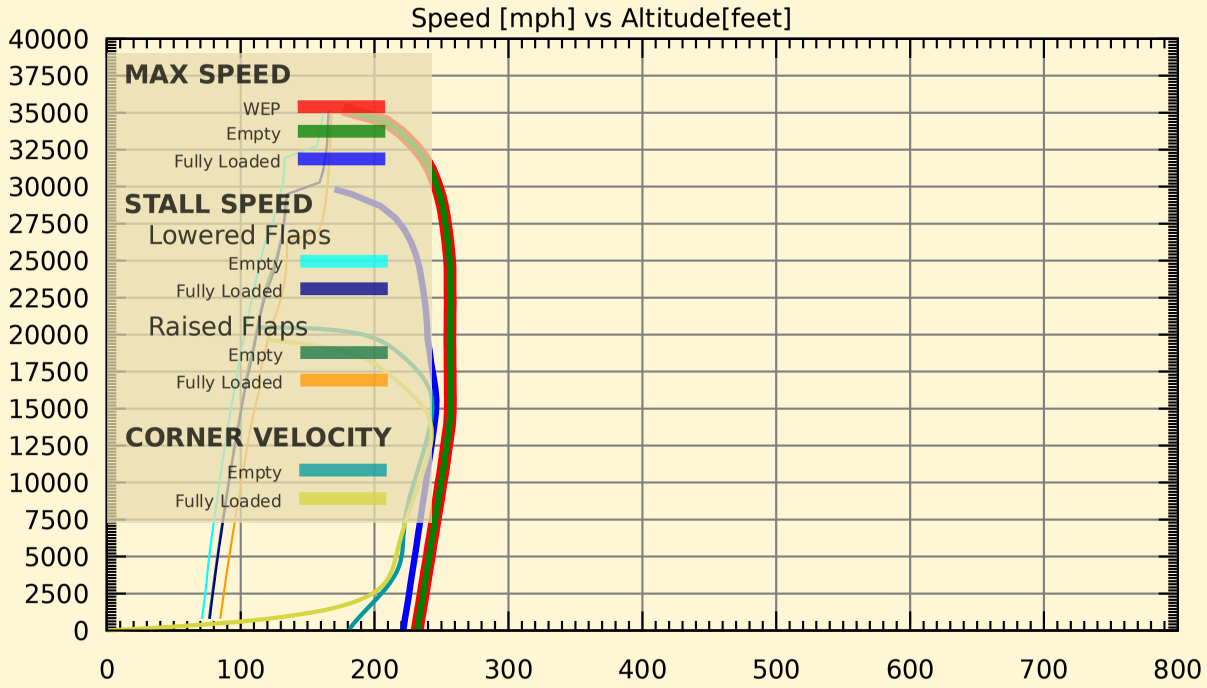
Stern, Rob; SBD Dauntless In Action, Aircraft Number 64; Squadron/Signal Publications, Carrollton, Texas; 1984.

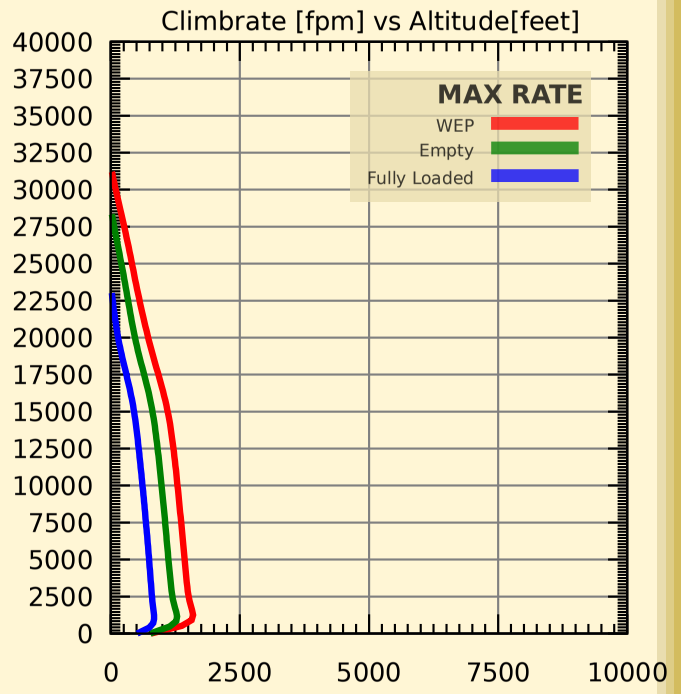
Name: Douglas SBD-2 Dauntless
Role: Diving Bomber
Crew: 3
Service Date: December 1940
Primary Guns: One Browning M2 0.5" machine gun with 250 rpg in cowl
Secondary Guns: One Browning M2 0.5" machine gun with 250 rpg in cowl
Defensive Guns: NA
Ordnance: One 250 lb or One 500 lb or One 1000 lb bomb under fuselage, plus 2x 100 lb or 2x 250 lb or 2x 500 lb bombs under wings. Maximum load of 1500 lb

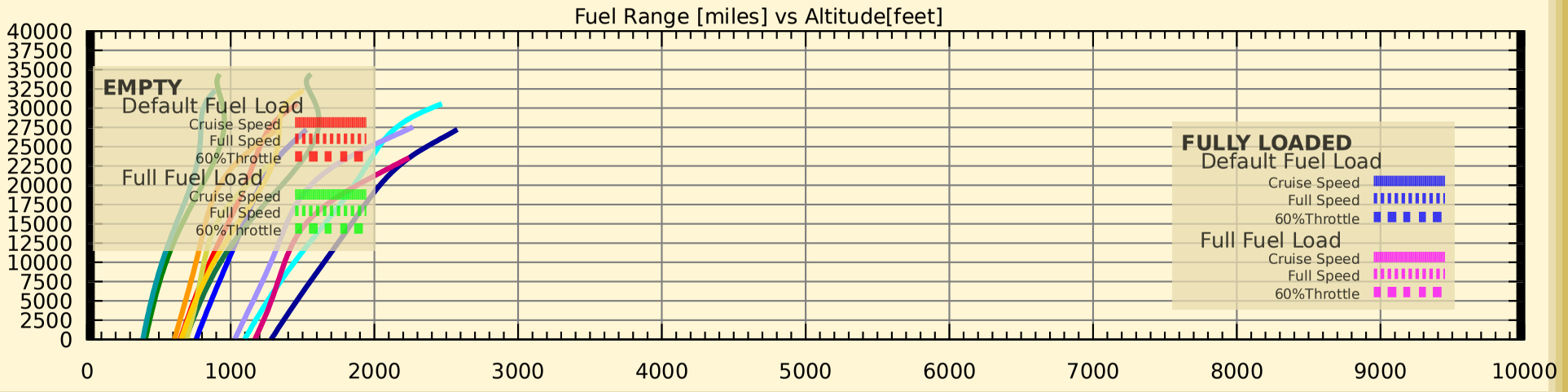
Length: 33.01 ft
Wing Span: 41.54 ft
Wing Area: 325 sq. ft

Power Plant: One Wright R-1820-32
Power: 1601 lb s.t.
Internal Fuel: 1860 lb
External Fuel: NA

Empty Weight: 6834 lb
MTOW: 10340 lb

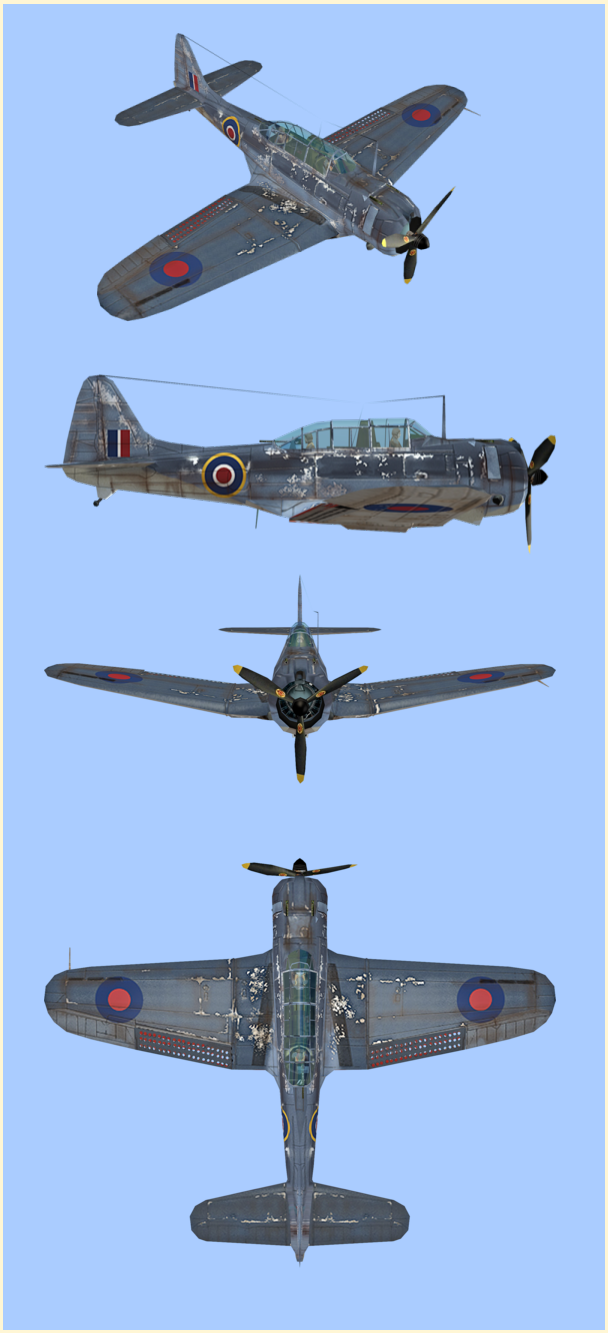






Douglas SBD-2 GB Dauntless

Durability	☆☆☆☆☆	Speed	☆☆☆☆	Climb Rate	☆☆
Maneuverability	☆☆☆☆☆☆	Firepower	☆☆	Ground Attack	☆☆



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Sources:

Brown, Eric; Wings Of The Navy, Flying Allied Carrier Aircraft of World War Two; Naval Institute Press, Annapolis, Maryland; 1980.

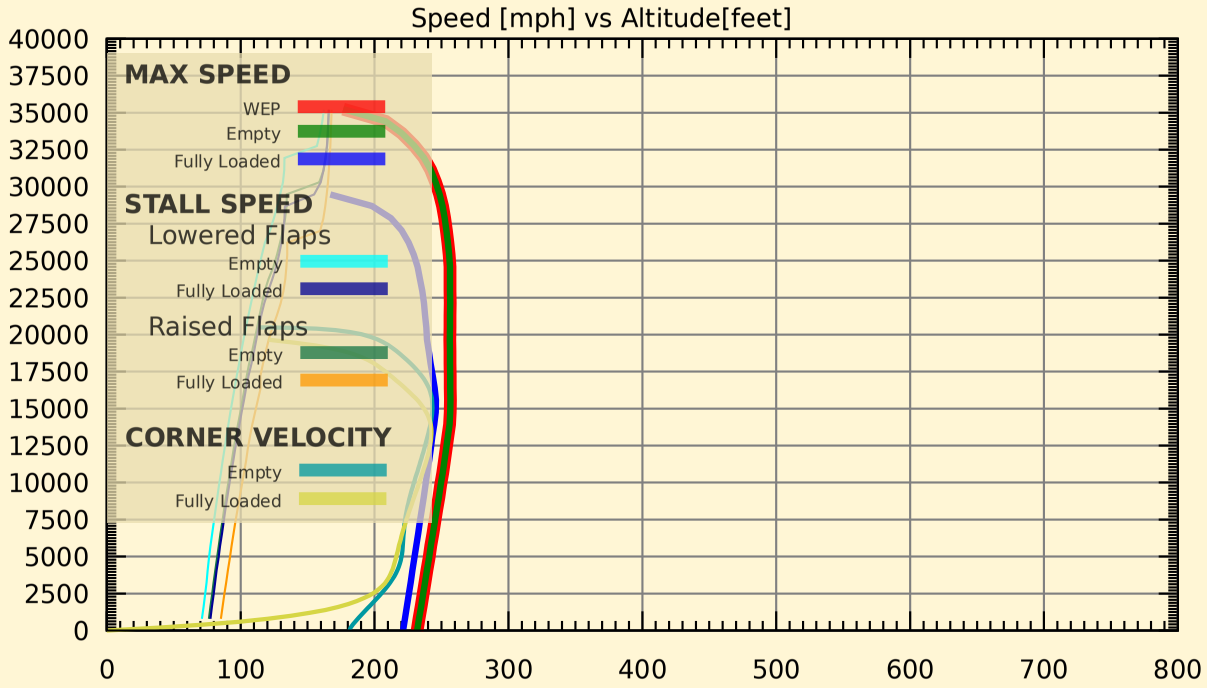
Stern, Rob; SBD Dauntless In Action, Aircraft Number 64; Squadron/Signal Publications, Carrollton, Texas; 1984.

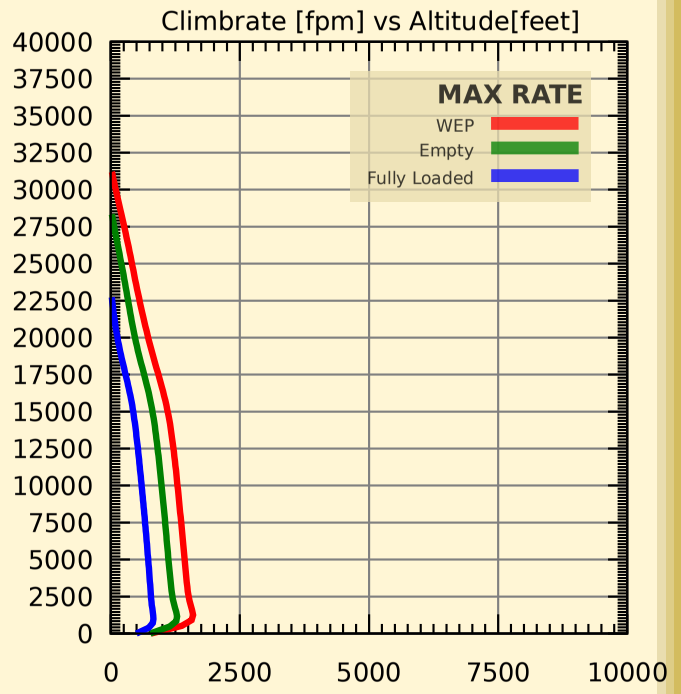
Name: Douglas SBD-2 GB Dauntless
Role: Diving Bomber
Crew: 3
Service Date: December 1940
Primary Guns: One Browning M2 0.5" machine gun with 250 rpg in cowl
Secondary Guns: One Browning M2 0.5" machine gun with 250 rpg in cowl
Defensive Guns: NA
Ordnance: One 250 lb or One 535 lb or One 910 lb bomb under fuselage, plus 2x 119 lb or 2x 250 lb or 2x 535 lb bombs under wings. Maximum load of 1500 lb

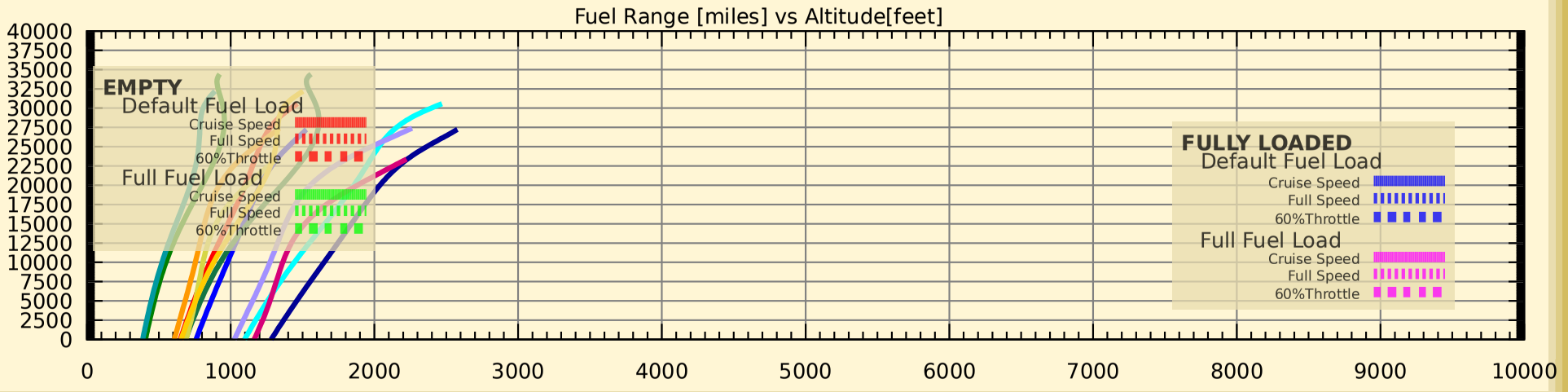
Length: 33.01 ft
Wing Span: 41.54 ft
Wing Area: 325 sq. ft

Power Plant: One Wright R-1820-32
Power: 1601 lb s.t.
Internal Fuel: 1860 lb
External Fuel: NA

Empty Weight: 6834 lb
MTOW: 10340 lb







Supemarine Seafire Mk.IIIb

Durability	☆☆☆	Speed	☆☆☆☆☆	Climb Rate	☆☆☆☆
Maneuverability	☆☆☆☆☆☆	Firepower	☆☆☆☆	Ground Attack	☆☆

Durability - Not a strong plane to begin with, the addition of the folding wing reduces the Seafire's strength even further.

At the start of the war the Fleet Air Arm was mainly equipped with Gladiator and Swordfish biplanes, which were hardly capable of meeting the Luftwaffe or any other modern air force on an equal basis. Lacking any purpose-built planes that could fill the air defense role, they elected to try converting the RAF's two stablemates to shipboard duty.

Because of its greater structural strength, the Hurricane was the first to be converted. It proved to be successful, so the Spitfire was next in line for conversion. Tests made by installing an A-frame arrestor hook to a standard Spitfire Mk.Vb proved that the Spitfire airframe could withstand the stress and another 166 were ordered to be converted. Initially dubbed the "hooked Spitfire", they were subsequently officially named the Type 340 Seafire.

While all Seafire Mk.IBs were conversions, 372 Seafire Mk.IICs were built at the factory using the "C" wing with its variable armament loads. The Mk.IIC saw combat during the landings at Sicily, however their lack of folding wings meant that they couldn't be deployed below decks on Royal Navy carriers.

The solution to this problem arrived in the form of a new folding wing, which increased weight by only 125 lb. while only suffering a 10% reduction in structural strength. This new wing was the centerpiece of the new Type 358 Seafire Mk.III and quantity production commenced, resulting in a total of about 1,220 machine being delivered.

Sources:

Green, William; War Planes of the Second World War: Fighters Volume Two; MacDonald & Company, London; 1961.

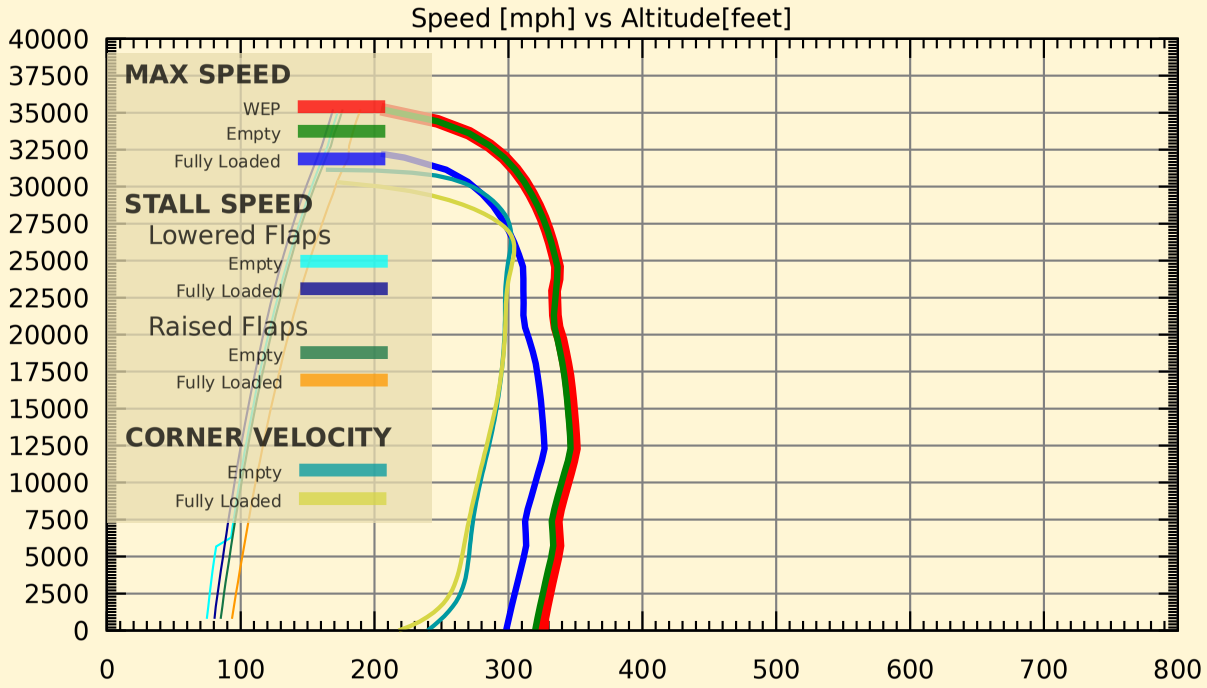
Scutts, Jerry; Spitfire In Action; Squadron/Signal Publications; Carrollton, TX; 1980.

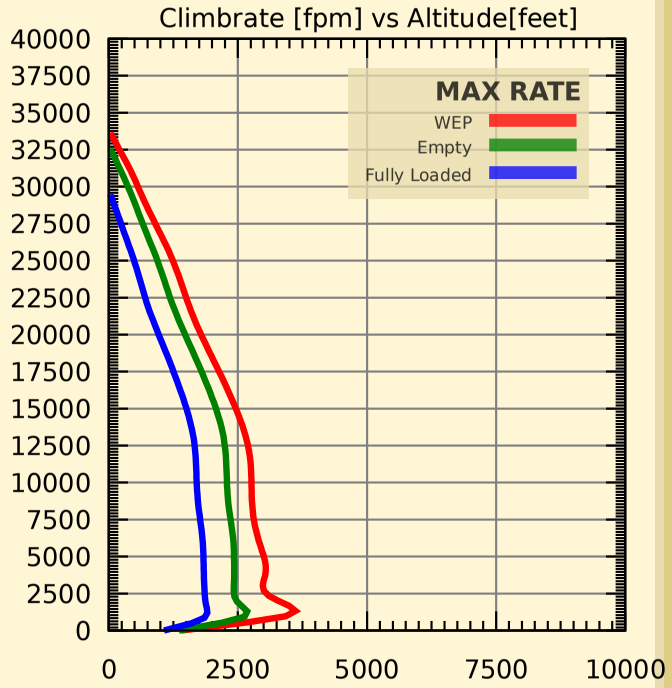
Name: Supemarine Seafire Mk.IIIb
Role: Fighter
Crew: 1
Service Date: August 1942
Primary Guns: 4x Browning 0.3" machine guns with 350 rpg in wings
Secondary Guns: 2x Hispano Mk.II 20mm cannon with 120 rpg in wings
Defensive Guns: NA
Ordnance: One 535 lb bomb or One 324 lb drop tank under fuselage or 2x 250 lb bombs under wings

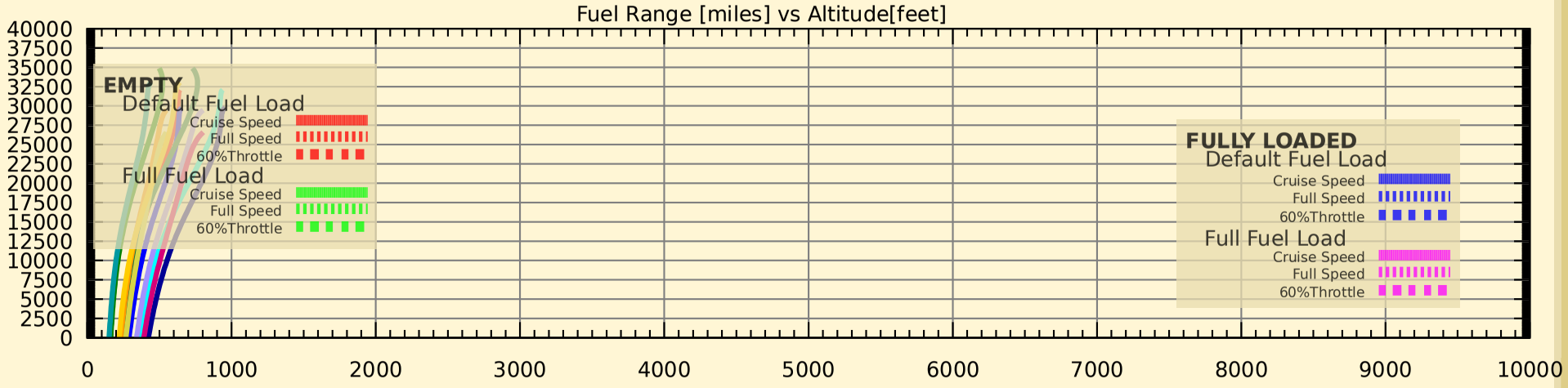
Length: 30.05 ft
Wing Span: 36.75 ft
Wing Area: 242 sq. ft

Power Plant: One Rolls-Royce Merlin-55
Power: 3059 lb s.t.
Internal Fuel: 612 lb
External Fuel: 324 lb

Empty Weight: 5379 lb
MTOW: 7099 lb

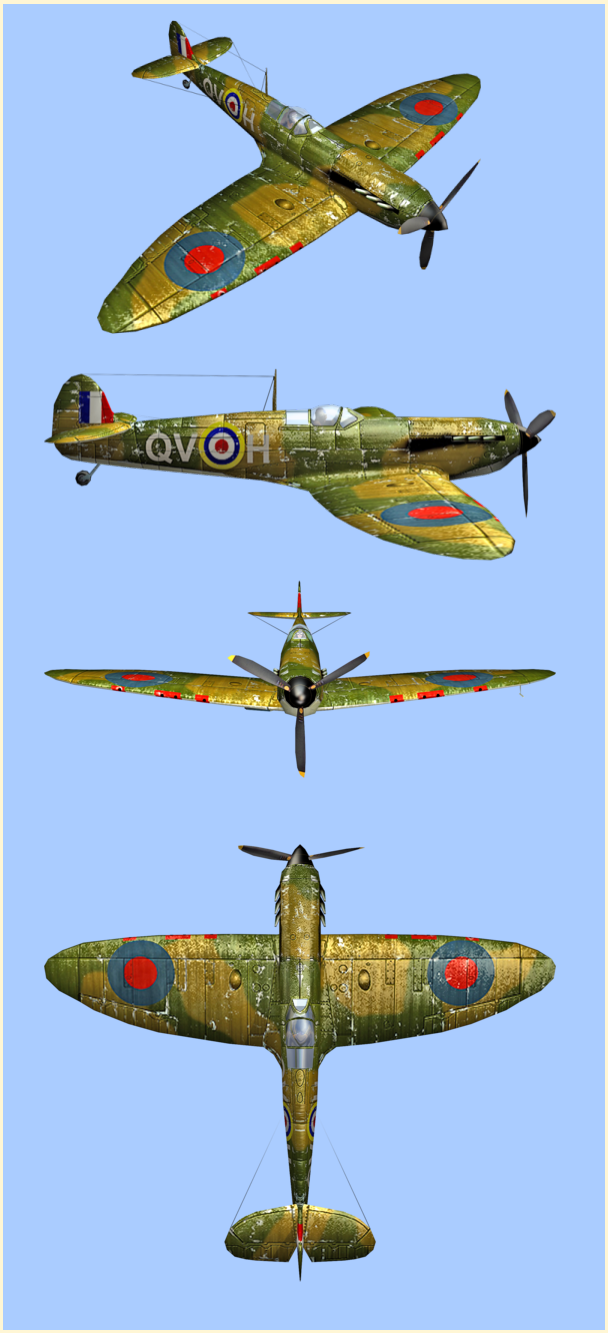






Supemarine Spitfire Mk.Ia

Durability	☆☆	Speed	☆☆☆☆☆	Climb Rate	☆☆☆
Maneuverability	☆☆☆☆☆☆☆	Firepower	☆☆	Ground Attack	



Ground Attack - Lacking the ability to carry ordnance of any kind and possessing only rifle caliber machine guns, the Spitfire Ia is useless against ground targets.

Unlike the Hurricane, whose pedigree was a long line of combat aircraft, the Supermarine Spitfire came from a long line of racing seaplanes. Similarly, it was the brainchild of a brilliant aerodynamics engineer, Reginald J. Mitchell, who worked himself literally to death to design the machine that would serve as the backbone of the RAF fighter force throughout World War II.

Built around the Rolls Royce PV-12, the progenitor of the famous Merlin, the Spitfire first flew on March 5, 1935. A little over a year later, the Air Ministry issued a production order for 310 machines, which was later increased to 510. By the beginning of the war, the RAF had accepted 306 Spitfires from Supermarine.

As with most first models, numerous improvements were made during production, including the addition of armor plating, the newer Merlin III and a three-bladed deHavilland propeller. The Spitfire Ia, with its eight .303 Browning machine guns, was the primary version used during the Battle of Britain. With its faster speed and superior turning radius, the Spitfire was sent after Luftwaffe fighters, leaving the slower Hurricanes to deal with the bombers.

Sources:

Green, William; Famous Fighters of the Second World War; Hannover House, Garden City, NY; 1960.

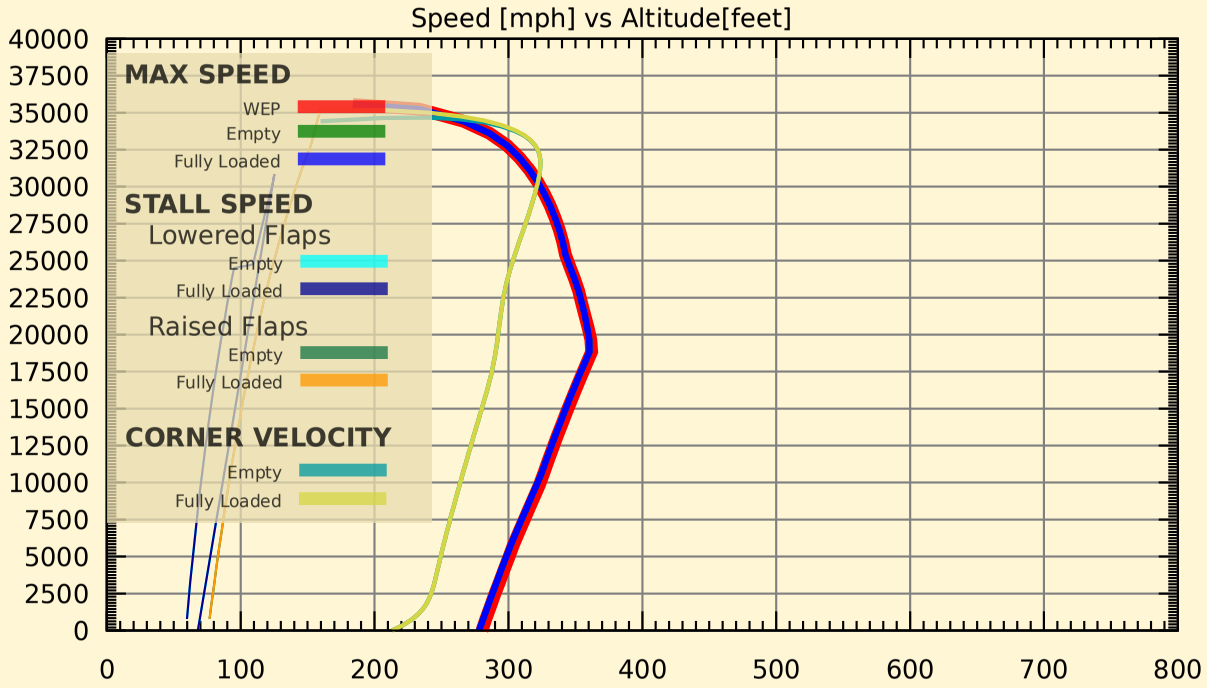
Scutts, Jerry; Spitfire In Action; Squadron/Signal Publications; Carrollton, TX; 1980.

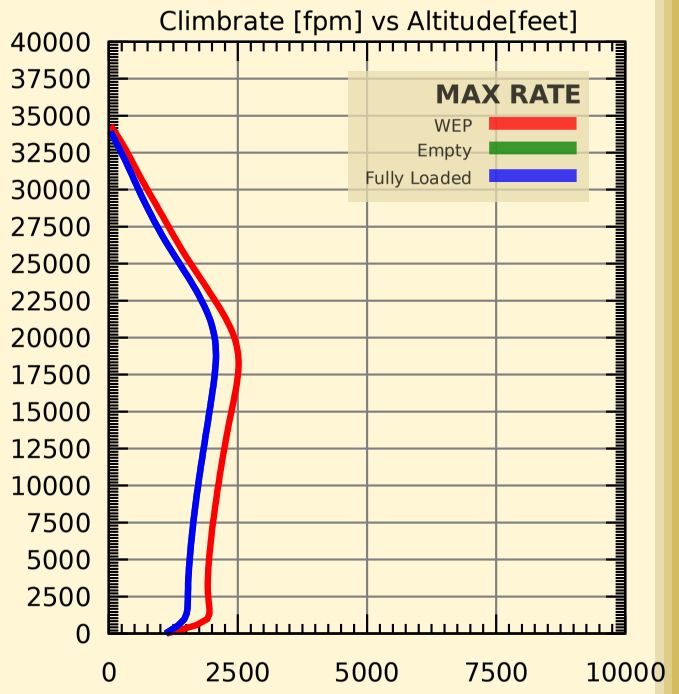
Name: Supemarine Spitfire Mk.Ia
Role: Fighter
Crew: 1
Service Date: December 1938
Primary Guns: 4x Browning 0.303" machine guns with 300 rpg in wings
Secondary Guns: 4x Browning 0.303" machine guns with 300 rpg in wings
Defensive Guns: NA
Ordnance: NA

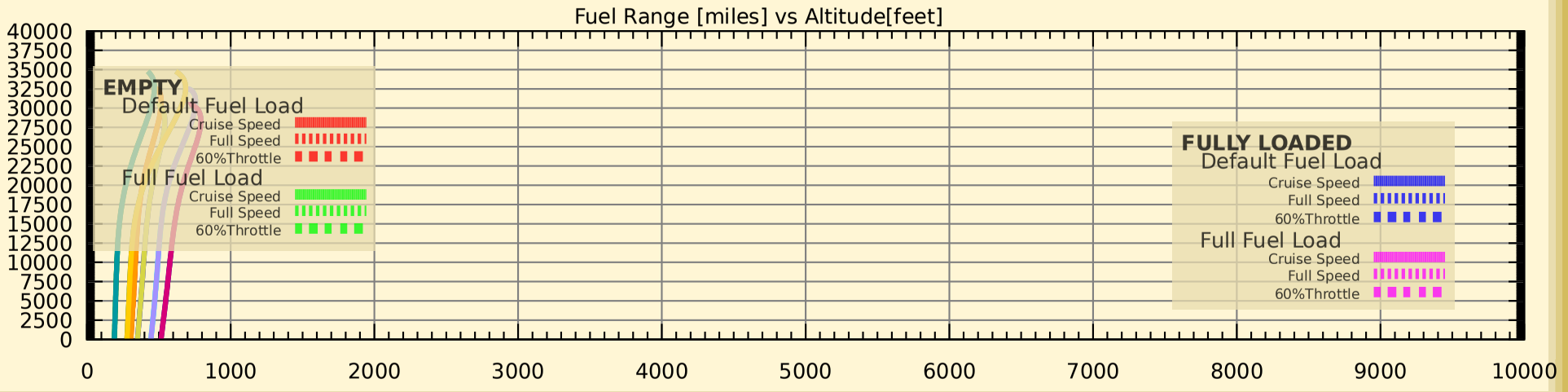
Length: 30.05 ft
Wing Span: 36.75 ft
Wing Area: 242 sq. ft

Power Plant: One Rolls-Royce Merlin-III
Power: 2322 lb s.t.
Internal Fuel: 612 lb
External Fuel: NA

Empty Weight: 5225 lb
MTOW: 5985 lb

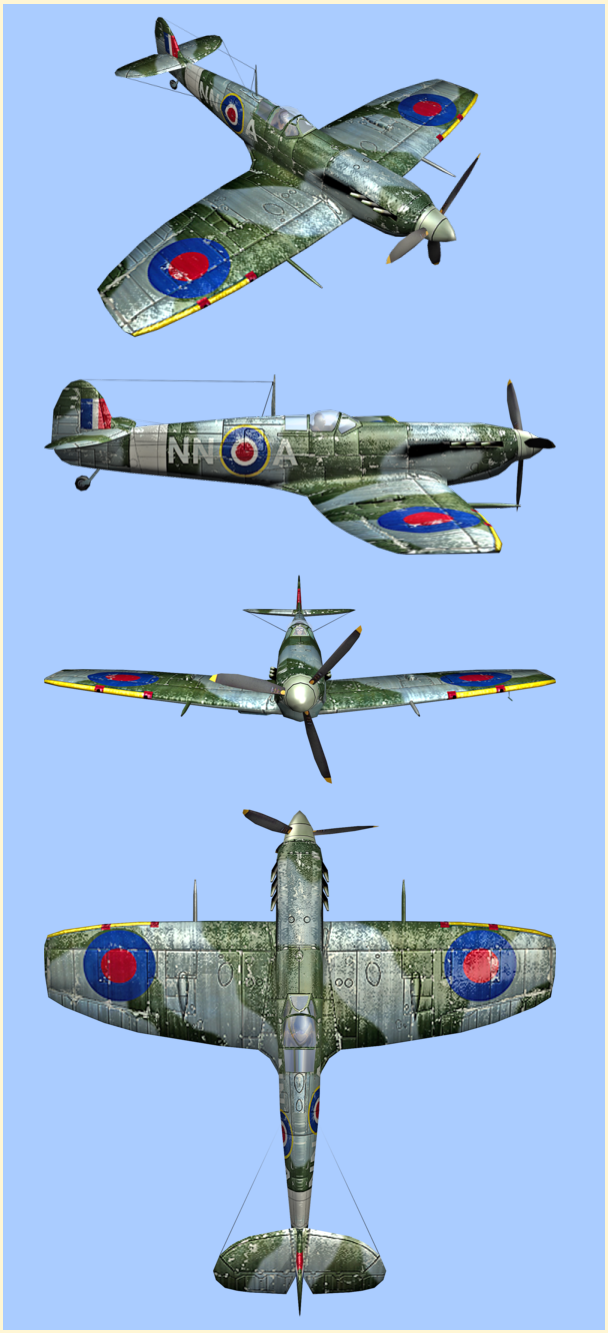






Supemarine Spitfire LF Mk.V B

Durability	☆☆	Speed	☆☆☆☆☆	Climb Rate	☆☆☆☆☆
Maneuverability	☆☆☆☆☆☆	Firepower	☆☆☆☆	Ground Attack	☆☆



Durability - Though efforts had been made to improve armor plating, the small Spitfire cannot absorb as much damage as other contemporary planes.

After having engaged in combat against the German Bf-109E, several deficiencies became apparent and work began on improvements to the basic Spitfire Mk.Ia. The Mk.II version employed the more powerful Merlin XII engine and included several other improvements, such as increased protective armor plating for the pilot and engine.

The Mk.II was also the first version to employ the use of alternate wings containing different armament options. The "a" wing standard, consisting of eight Browning .303 machine guns, was used to equip the first 750 Mk.IIs, while the final 175 examples used the "b" wing, which consisted of four Browning .303s and a pair of Hispano 20mm cannon.

Development of the Mk.III and Mk.IV variants was undertaken in parallel and although neither version was produced, they provided valuable research that contributed toward the development of the Mk.V. In addition to various wings as used on the Mk.II, the Mk.V was the first Spitfire model to employ a variety of different engines, each tuned to operate at different altitudes.

The "LF" variant was intended to serve as a low-altitude fighter-bomber, and as a result used an engine that was tuned for maximum performance at about 2700 feet. Besides the engine and basic wing armament, another factory option was introduced in the Mk.V; the ability to use clipped or extended wing tips. Clipping the wings reduced lift and turning radius slightly, but also allowed the plane to roll much faster, which improved overall maneuverability at low altitudes.

The wings on the Mk.V were stressed to allow carriage of two 250 lb. bombs. Alternatively, a 500 lb. bomb or a "slipper" fuel tank could be mounted under the fuselage centerline. The "slipper" tank was designed to mount flush with the fuselage and looked like a bulge on the underside of the plane. Mk.Vs were used extensively over France, in Egypt and over Malta.

Sources:

Green, William; Famous Fighters of the Second World War; Hannover House, Garden City, NY; 1960.

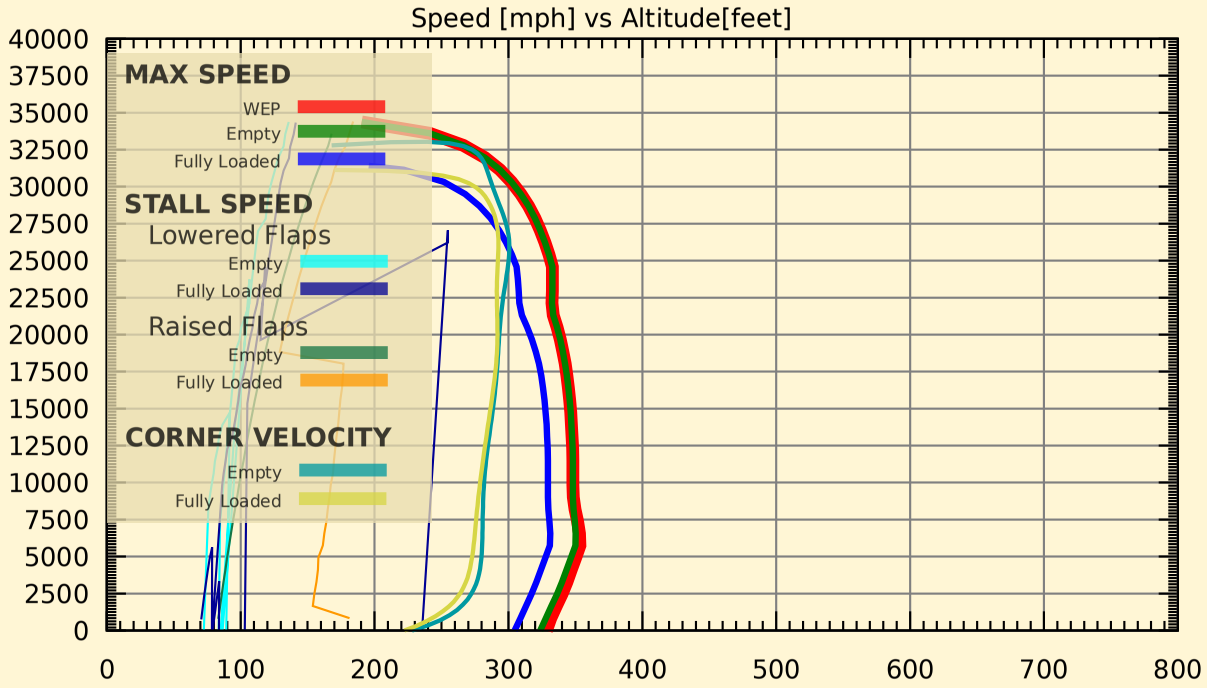
Scutts, Jerry; Spitfire In Action; Squadron/Signal Publications; Carrollton, TX; 1980.

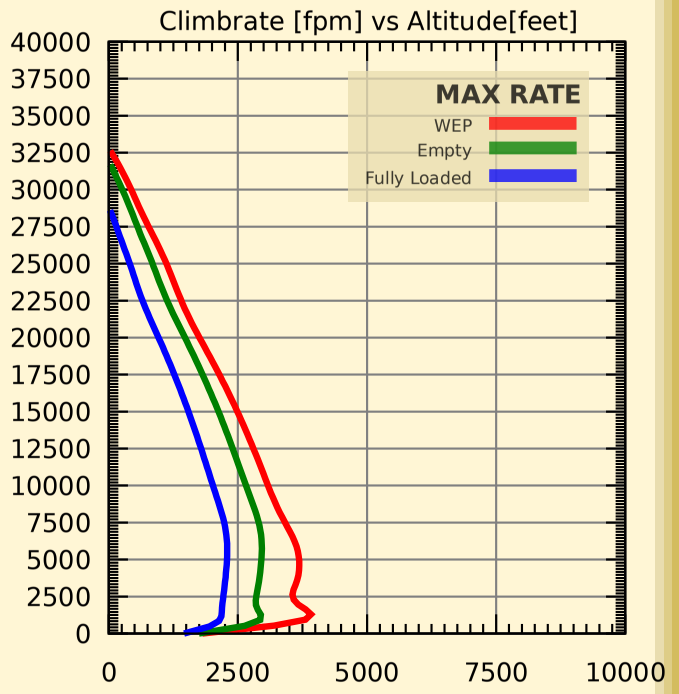
Name: Supemarine Spitfire LF Mk.V B
Role: Fighter
Crew: 1
Service Date: February 1941
Primary Guns: 4x Browning 0.303" machine guns with 350 rpg in wings
Secondary Guns: 2x Hispano Mk.II 20mm cannon with 120 rpg in wings
Defensive Guns: NA
Ordnance: One 535 lb bomb or One 324 lb drop tank under fuselage or 2x 250 lb bombs under wings

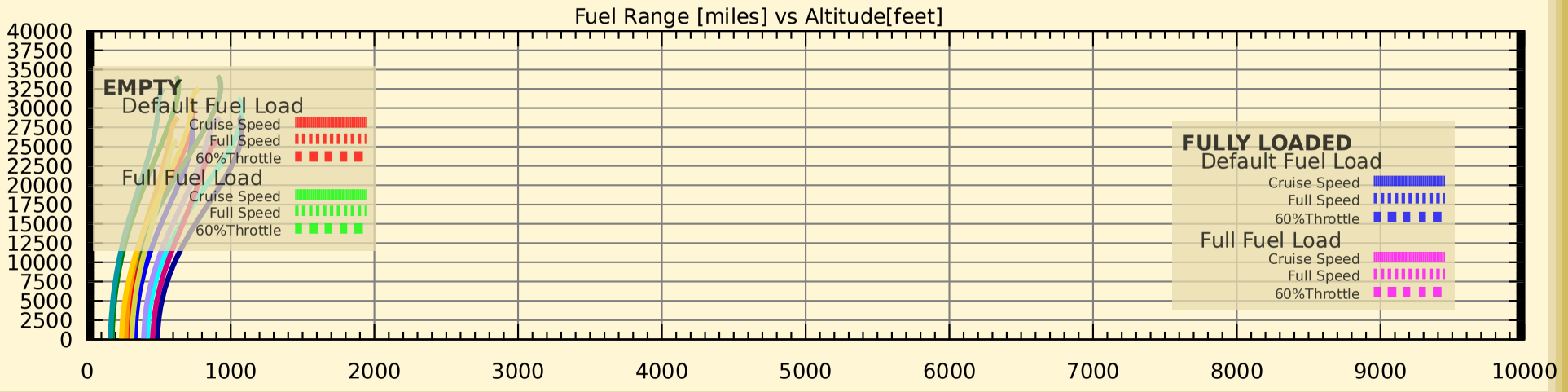
Length: 30.05 ft
Wing Span: 32.22 ft
Wing Area: 230 sq. ft

Power Plant: One Rolls-Royce Merlin-45M
Power: 3187 lb s.t.
Internal Fuel: 612 lb
External Fuel: 324 lb

Empty Weight: 5269 lb
MTOW: 7165 lb

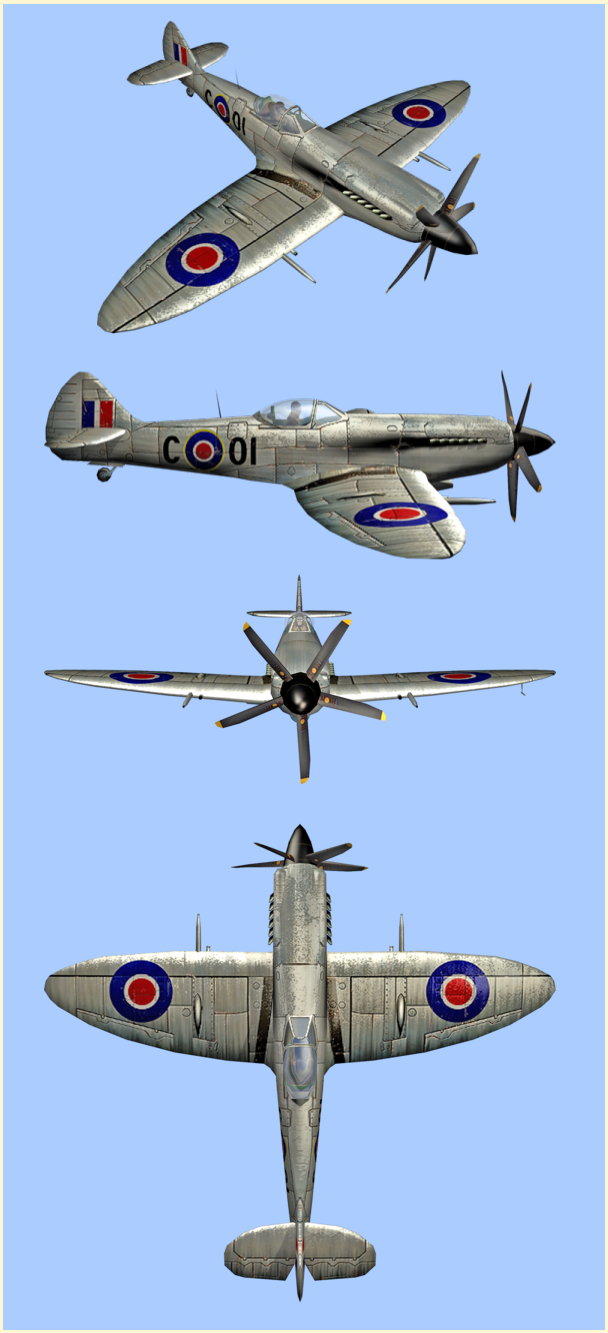






Supemarine F Spitfire Mk.XIVe

Durability	☆☆☆	Speed	☆☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆☆☆
Maneuverability	☆☆☆☆☆☆	Firepower	☆☆☆☆☆	Ground Attack	☆☆☆



Range - Even with drop tanks, the Spitfire runs out of fuel in a hurry and pilots should keep an eye on their fuel gauge.

With the success of the Mk.IX, the development of the Spitfire was able to take more radical turns. One such change was the replacement of the famous Merlin engine with the much more powerful Rolls-Royce Griffon fitted with the five-bladed Rotol propeller.

The Mk.XIVe was the first Griffon-based Spitfire to be produced in large numbers, with a total of 957 being built. Early versions used the "c" wing, though the "e" wing became the later standard. Similarly, the first production fighter versions had the standard stepped canopy design, while the photo recon versions used a bubble canopy, which was used on later model fighter variants.

To improve range a 13-gallon fuel tank was installed in the leading edge of each wing. More importantly, the Mk.XIV was stressed to allow up to 1000 lb. of bombs to be carried on wing and fuselage bomb mounts. The "e" wing armament of two .50 caliber machine guns and two 20mm cannon was more than sufficient to bring down the fighters and medium bombers the plane was expected to face.

Sources:

Green, William; Famous Fighters of the Second World War; Hannover House, Garden City, NY; 1960.

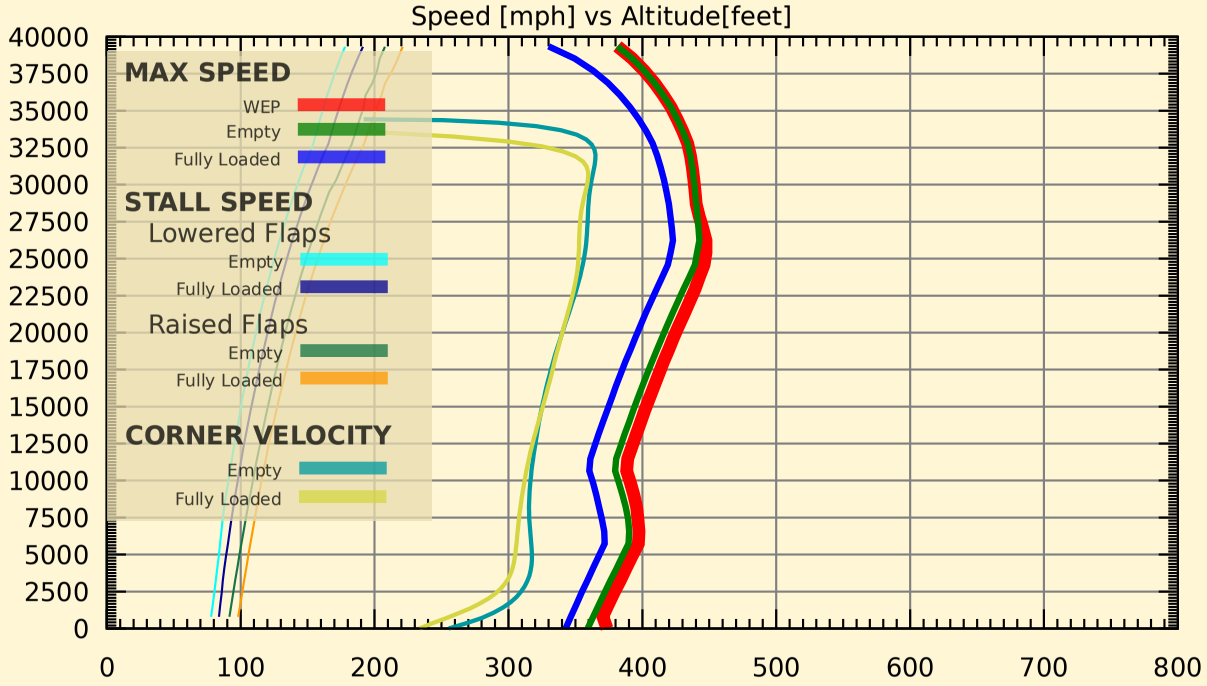
Scutts, Jerry; Spitfire In Action; Squadron/Signal Publications; Carrollton, TX; 1980.

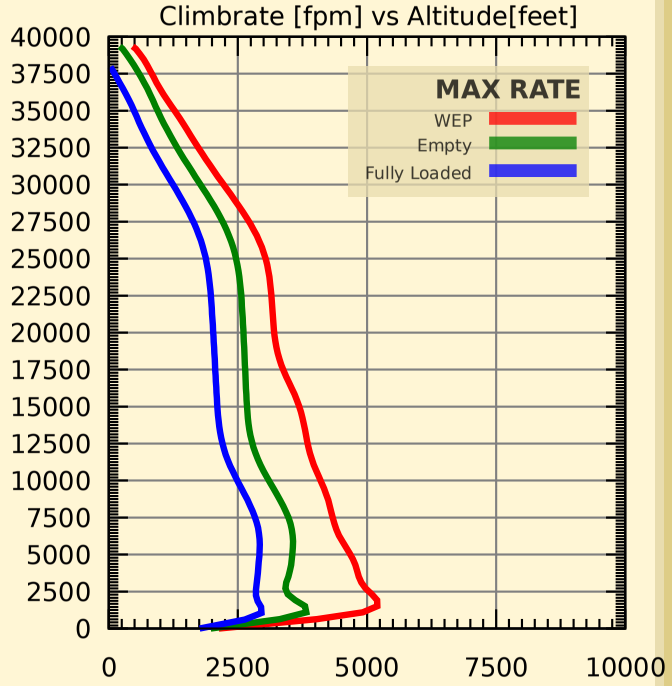
Name: Supemarine F Spitfire Mk.XIVe
Role: Fighter
Crew: 1
Service Date: April 1944
Primary Guns: 2x Browning M2 0.5" machine guns with 250 rpg in wings
Secondary Guns: 2x Hispano Mk.II 20mm cannon w/120 rpg in wings
Defensive Guns: NA
Ordnance: One 535 lb bomb or One 360 lb drop tank under fuselage and 2x 250 lb bombs under wings

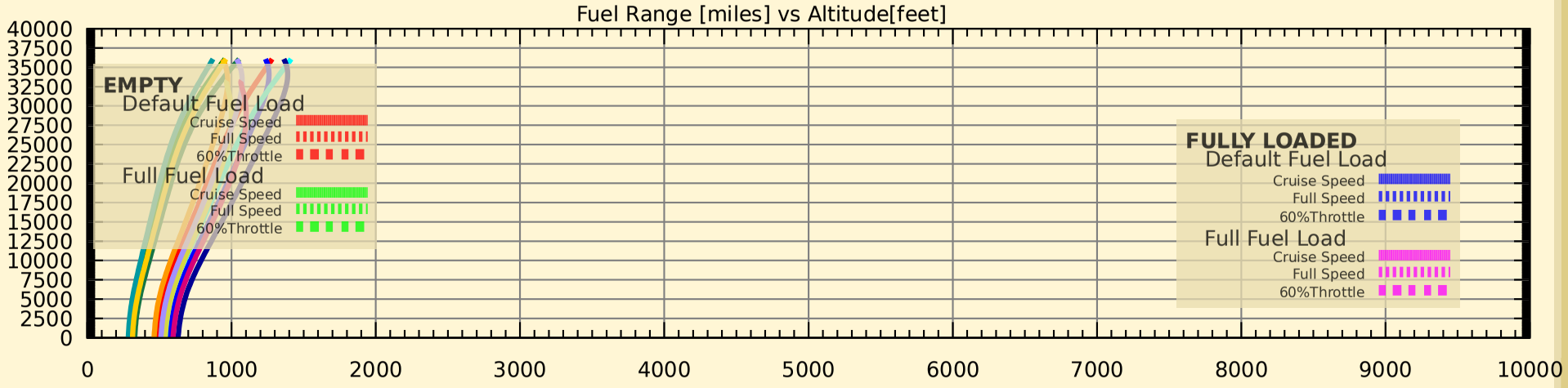
Length: 32.68 ft
Wing Span: 36.84 ft
Wing Area: 242 sq. ft

Power Plant: One Rolls-Royce Griffon-65
Power: 4190 lb s.t.
Internal Fuel: 851 lb
External Fuel: 360 lb

Empty Weight: 6724 lb
MTOW: 8907 lb

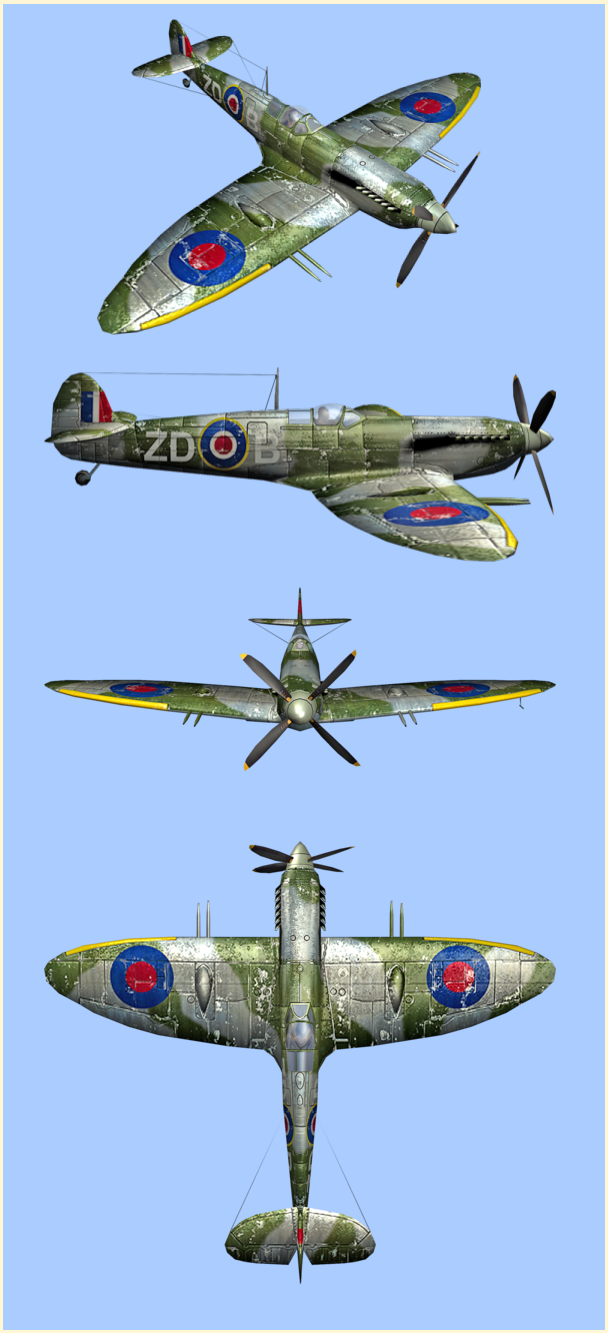






Supemarine Spitfire F Mk.IXc

Durability	☆☆☆	Speed	☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆☆
Maneuverability	☆☆☆☆☆☆	Firepower	☆☆☆☆☆☆	Ground Attack	☆☆☆



Durability - The Spitfire was a small machine and not capable of absorbing a great amount of damage.

In late 1941 the Focke-Wulf FW-190 started showing up in service with the Channel Coast Jagdgruppen and suddenly the Spitfire Mk.V was again outclassed by the competition. Something needed to be done fast to rectify the situation.

Making drastic changes to the Mk.V would take too long, so the solution was to simply install a more powerful version of the Rolls-Royce Merlin, the Merlin 61 rated for 1,565 hp at sea level, in the Mk.V airframe. The resulting Mk.IX would be considered by many to be the finest Spitfire "Mark" produced during the war.

The first versions of the Mk.IX were fitted with the "c" wing, equipped with four 20mm Hispano cannon, though often times this was reduced to two cannon to save weight. Additionally, this version was able to carry a 500 lb. bomb under the fuselage and a pair of 250 lb. bombs under the wings for ground attack duties. Although it was considered an interim or "stop-gap" type, the Mk.IX was produced in quantities second only to the Mk.V, with total production reaching 5,609 machines.

Sources:

Green, William; Famous Fighters of the Second World War; Hannover House, Garden City, NY; 1960.

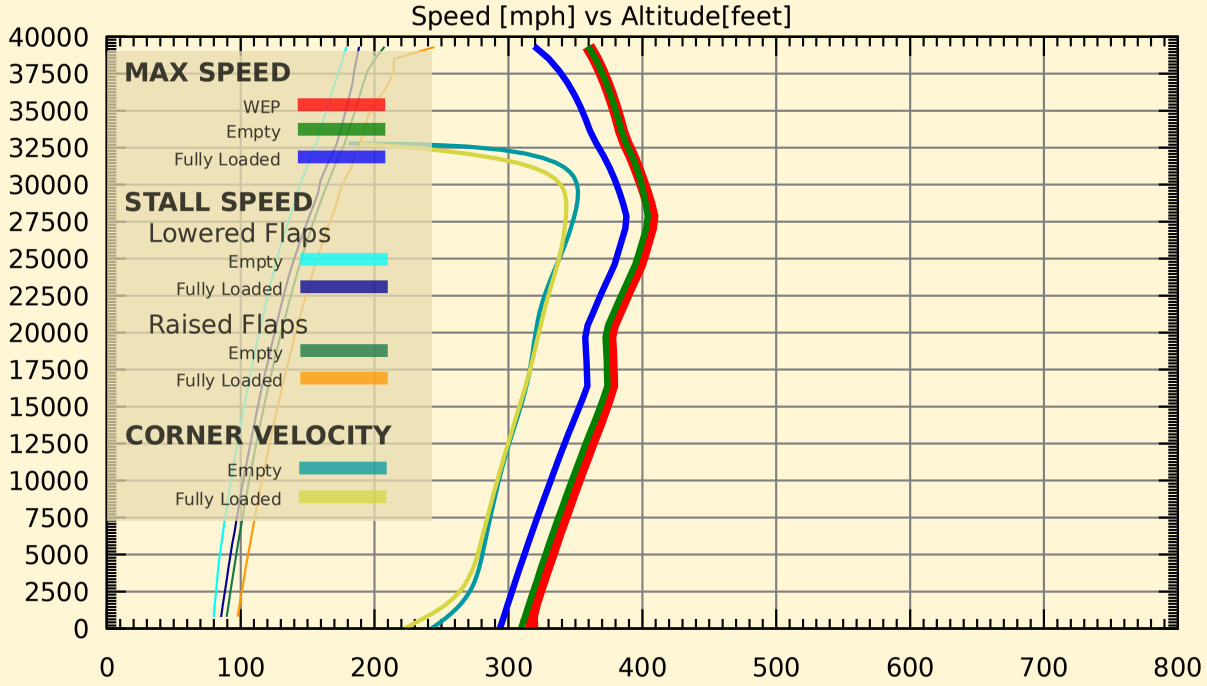
Scutts, Jerry; Spitfire In Action; Squadron/Signal Publications; Carrollton, TX; 1980.

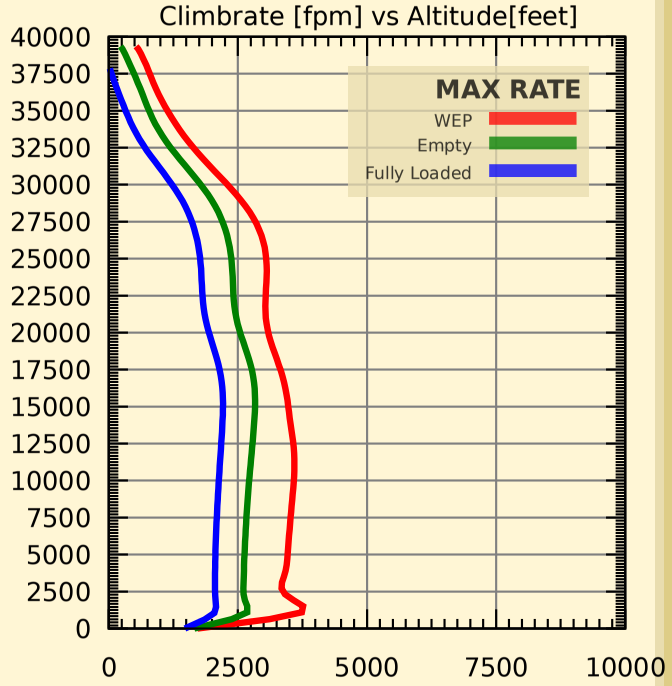
Name: Supemarine Spitfire F Mk.IXc
Role: Fighter
Crew: 1
Service Date: July 1942
Primary Guns: 2x Hispano Mk.II 20mm cannon with 100 rpg in wings
Secondary Guns: 2x Hispano Mk.II 20mm cannon with 120 rpg in wings
Defensive Guns: NA
Ordnance: One 535 lb bomb or One 360 lb drop tank under fuselage or 2x 250 lb bombs under wings

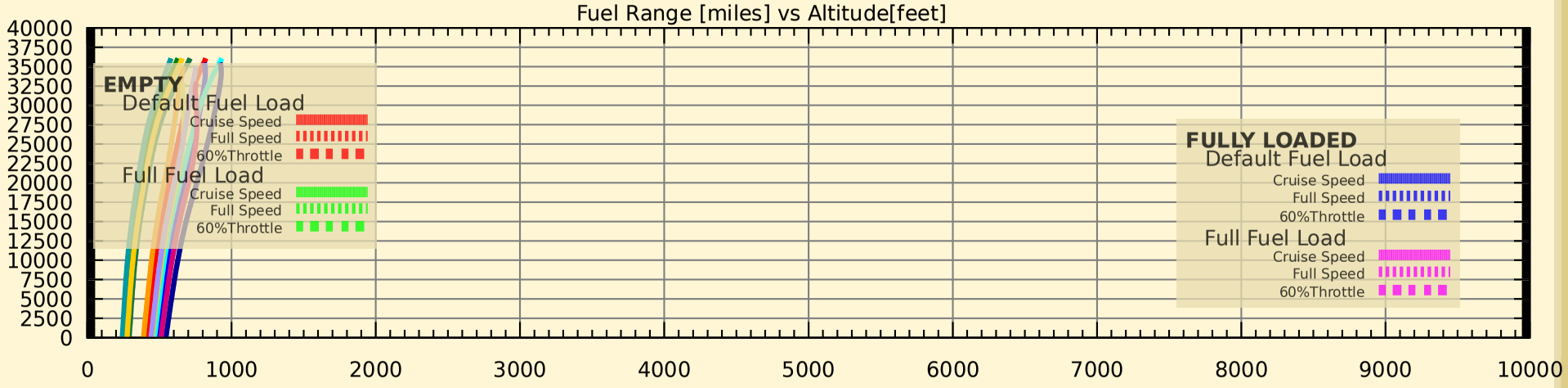
Length: 32.68 ft
Wing Span: 36.84 ft
Wing Area: 242 sq. ft

Power Plant: One Rolls-Royce Merlin-61
Power: 3418 lb s.t.
Internal Fuel: 801 lb
External Fuel: 360 lb

Empty Weight: 6063 lb
MTOW: 8267 lb

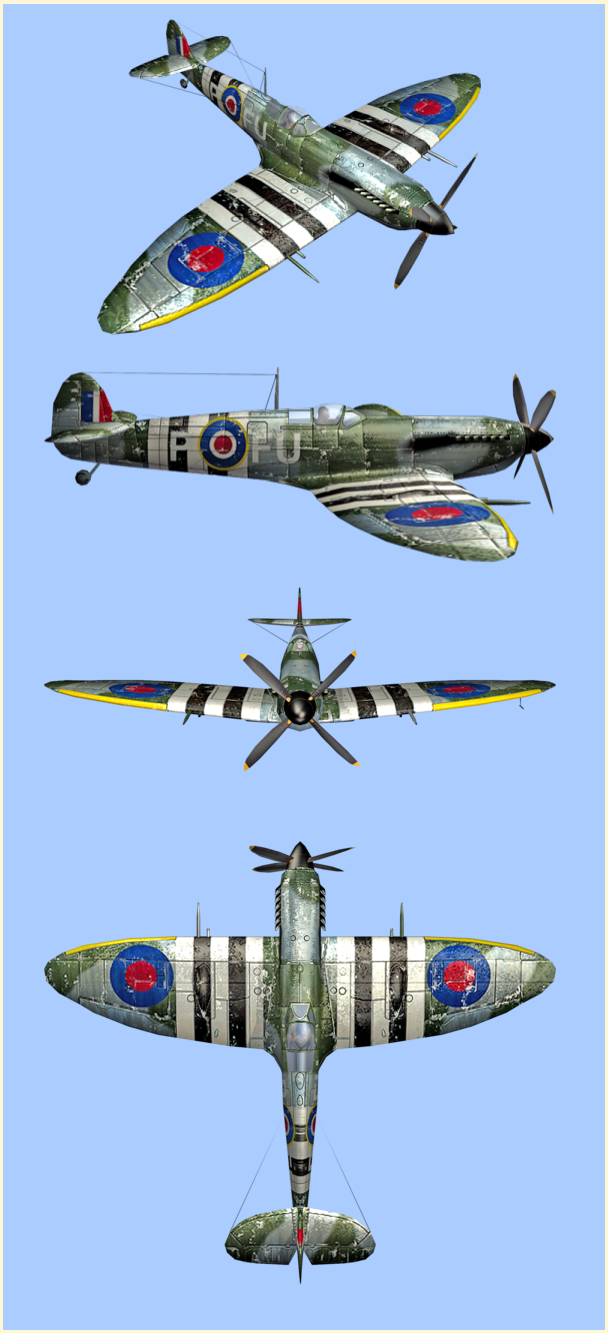






Supemarine Spitfire LF Mk.IXe

Durability	☆☆☆	Speed	☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆☆
Maneuverability	☆☆☆☆☆☆	Firepower	☆☆☆☆☆	Ground Attack	☆☆



Durability - The Spitfire was a small machine and not capable of absorbing a great amount of damage.

In late 1941 the Focke-Wulf FW-190 started showing up in service with the Channel Coast Jagdgruppen and suddenly the Spitfire Mk.V was again outclassed by the competition. Something needed to be done fast to rectify the situation.

Making drastic changes to the Mk.V would take too long, so the solution was to simply install a more powerful version of the Rolls-Royce Merlin, the Merlin 61 rated for 1,565 hp at sea level, in the Mk.V airframe. The resulting Mk.IX would be considered by many to be the finest Spitfire "Mark" produced during the war.

The first versions of the Mk.IX were fitted with the "c" wing, while later versions employed the "Universal" or "e" wing, which held a pair of 20mm Hispano cannons and a pair of .50 caliber Browning machine guns. Additionally, the Mk.IXe could carry a 500 lb. bomb under the fuselage and a pair of 250 lb. bombs under the wings for ground attack duties. Although it was considered an interim or "stop-gap" type, the Mk.IX was produced in quantities second only to the Mk.V, with total production reaching 5,609 machines.

Sources:

Green, William; Famous Fighters of the Second World War; Hannover House, Garden City, NY; 1960.

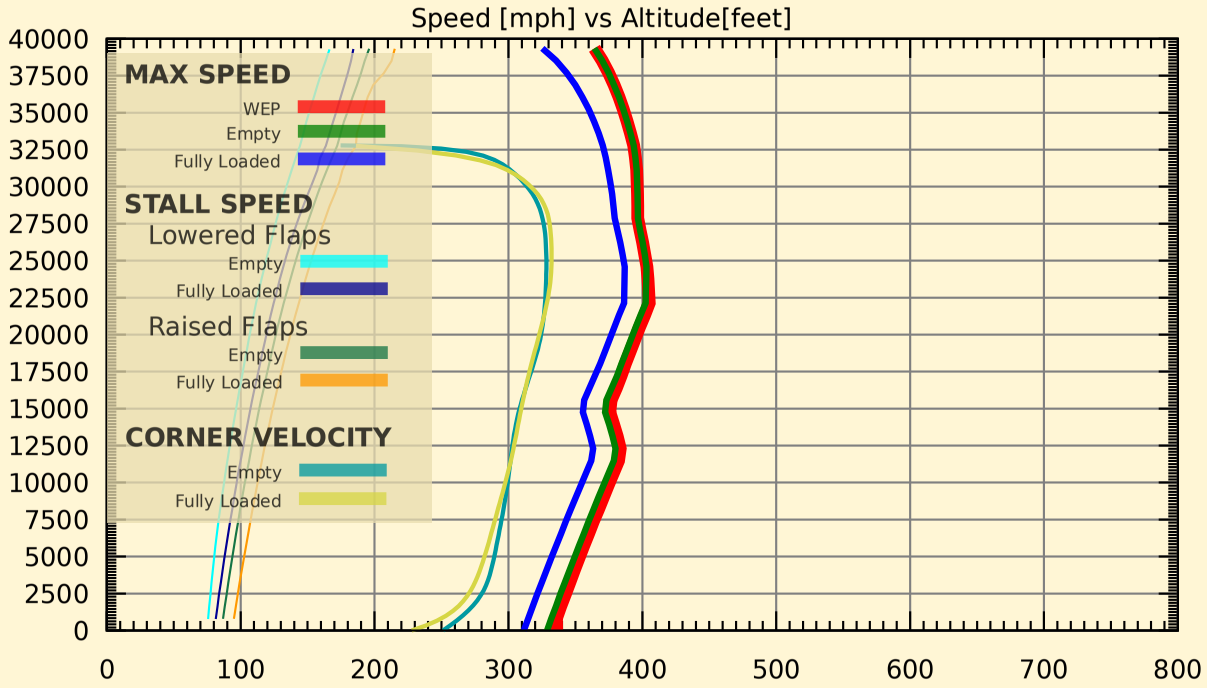
Scutts, Jerry; Spitfire In Action; Squadron/Signal Publications; Carrollton, TX; 1980.

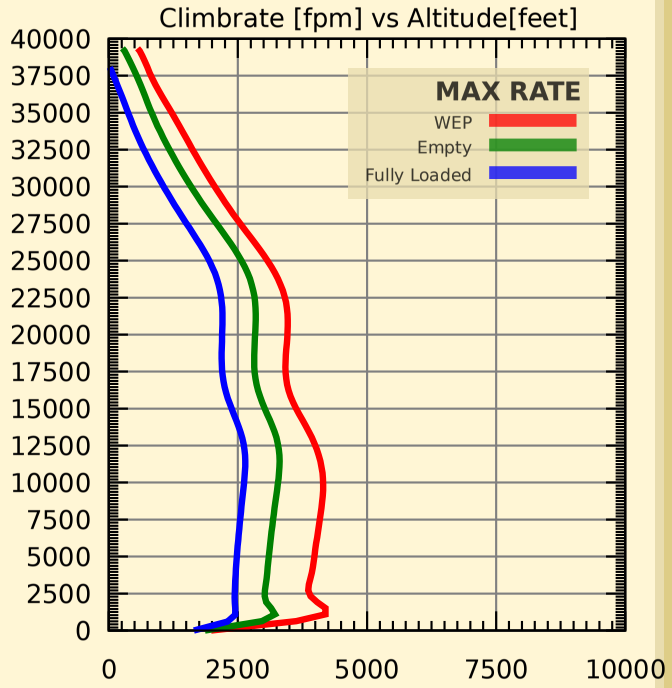
Name: Supemarine Spitfire LF Mk.IXe
Role: Fighter
Crew: 1
Service Date: April 1943
Primary Guns: 2x Browning M2 0.5" machine guns with 250 rpg in wings
Secondary Guns: 2x Hispano Mk.II 20mm cannon w/120 rpg in wings
Defensive Guns: NA
Ordnance: One 535 lb bomb or One 360 lb drop tank under fuselage or 2x 250 lb bombs under wings

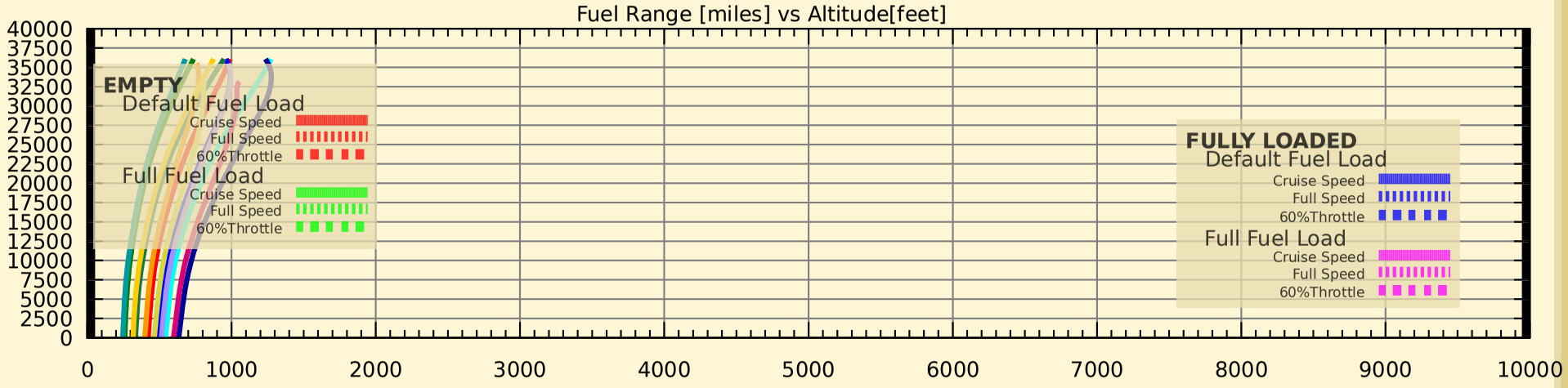
Length: 32.68 ft
Wing Span: 36.84 ft
Wing Area: 242 sq. ft

Power Plant: One Rolls-Royce Merlin-66
Power: 3992 lb s.t.
Internal Fuel: 909 lb
External Fuel: 360 lb

Empty Weight: 5908 lb
MTOW: 8267 lb







Supemarine Spitfire F Mk.Vc Trop

Durability	☆☆	Speed	☆☆☆☆☆	Climb Rate	☆☆☆☆☆
Maneuverability	☆☆☆☆☆☆	Firepower	☆☆☆☆	Ground Attack	☆☆

Durability - Though efforts had been made to improve armor plating, the small Spitfire cannot absorb as much damage as other contemporary planes.

After having engaged in combat against the German Bf-109E, several deficiencies became apparent and work began on improvements to the basic Spitfire Mk.Ia. The Mk.II version employed the more powerful Merlin XII engine and included several other improvements, such as increased protective armor plating for the pilot and engine.

The Mk.II was also the first version to employ the use of alternate wings containing different armament options. The "a" wing standard, consisting of eight Browning .303 machine guns, was used to equip the first 750 Mk.IIs, while the final 175 examples used the "b" wing, which consisted of four Browning .303s and a pair of Hispano 20mm cannon.

Development of the Mk.III and Mk.IV variants was undertaken in parallel and although neither version was produced, they provided valuable research that contributed toward the development of the Mk.V. In addition to various wings as used on the Mk.II, the Mk.V was the first Spitfire model to employ a variety of different engines, each tuned to operate at different altitudes.

The "F" variant was intended to serve as a general purpose, all-altitude fighter-bomber, and as a result used an engine that was tuned for maximum performance at about 9000 feet altitude. As an all altitude fighter, the "F" model Mk.V used the standard length Spitfire wings. The "S" designation refers to the installation of the Vokes tropical air filter, which kept sand out of the carburetor but which caused additional drag, thereby reducing performance slightly.

The wings on the Mk.V were stressed to allow carriage of two 250 lb. bombs. Alternatively, a 500 lb. bomb or a "slipper" fuel tank could be mounted under the fuselage centerline. The "slipper" tank was designed to mount flush with the fuselage and looked like a bulge on the underside of the plane. Mk.Vs were used extensively over France, in Egypt and over Malta.

Sources:

Green, William; Famous Fighters of the Second World War; Hannover House, Garden City, NY; 1960.

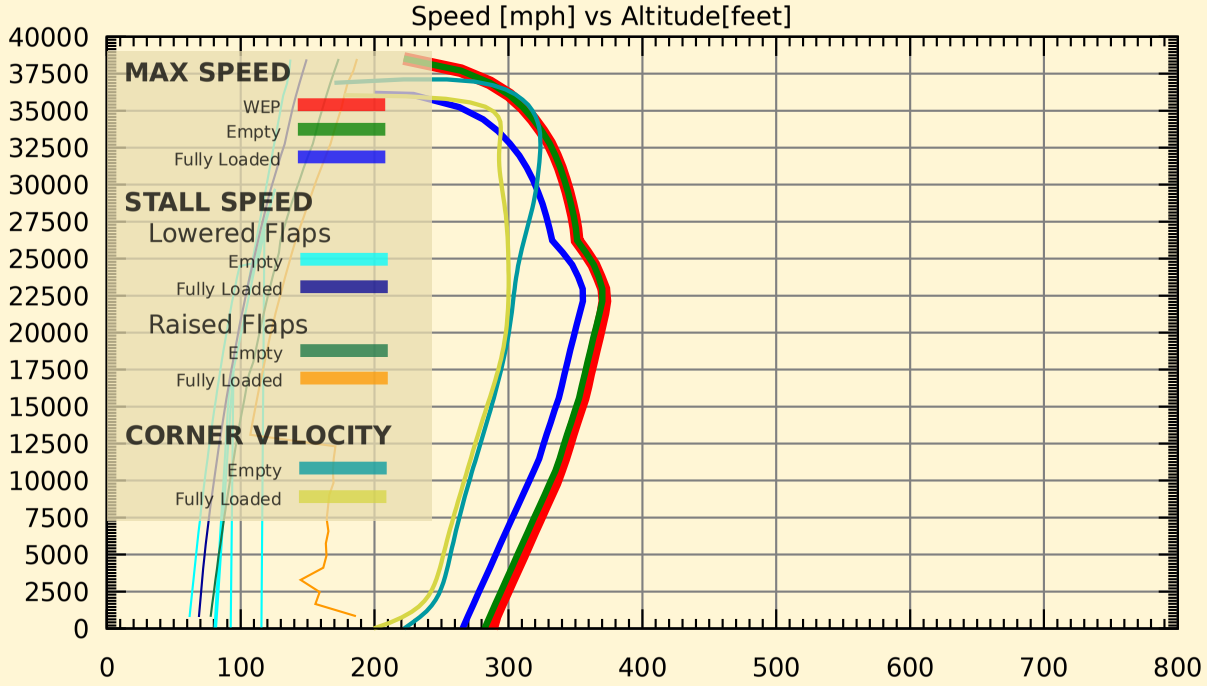
Scutts, Jerry; Spitfire In Action; Squadron/Signal Publications; Carrollton, TX; 1980.

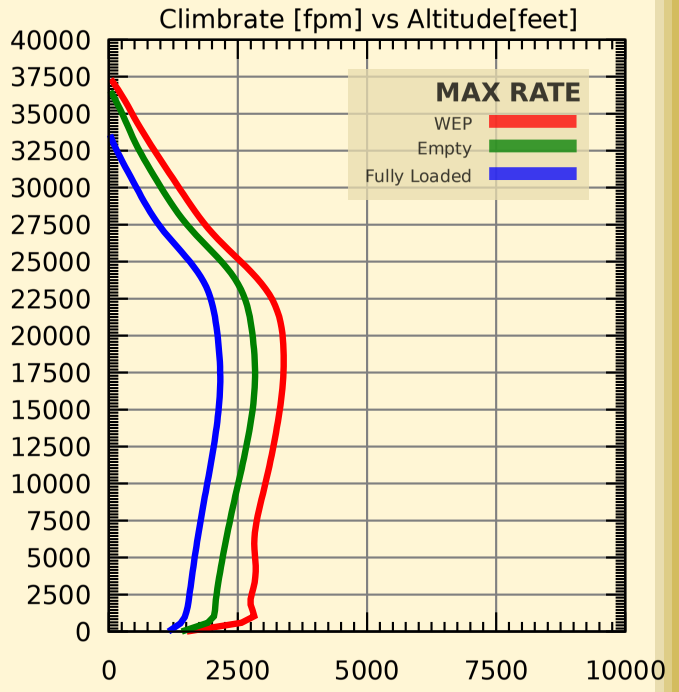
Name: Supemarine Spitfire F Mk.Vc Trop
Role: Fighter
Crew: 1
Service Date: August 1941
Primary Guns: 4x Browning 0.303" machine guns with 350 rpg in wings
Secondary Guns: 2x Hispano Mk.II 20mm cannon with 120 rpg in wings
Defensive Guns: NA
Ordnance: One 535 lb bomb or One 324 lb drop tank under fuselage or 2x 250 lb bombs under wings

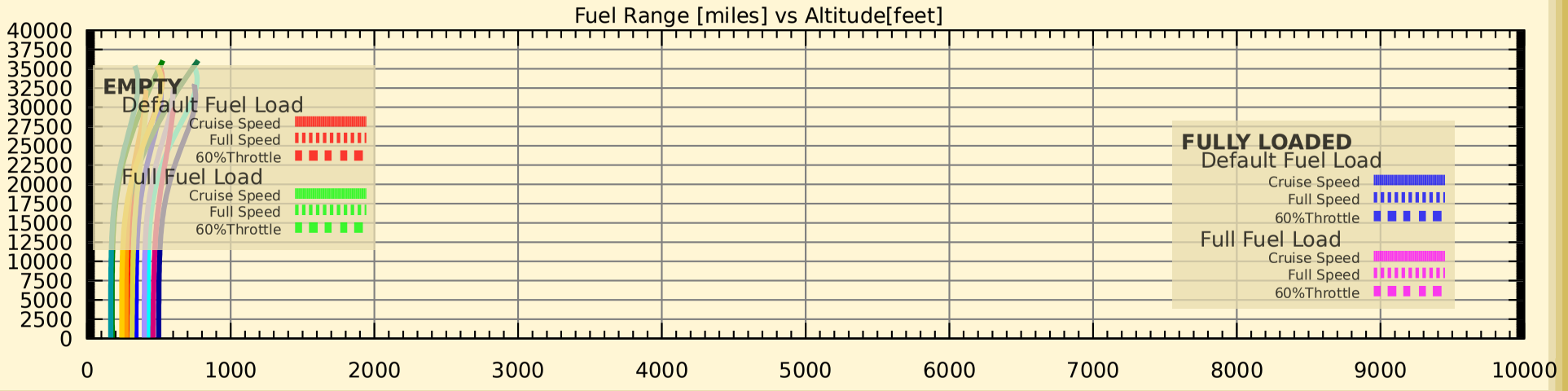
Length: 30.05 ft
Wing Span: 36.75 ft
Wing Area: 242 sq. ft

Power Plant: One Rolls-Royce Merlin-45
Power: 3253 lb s.t.
Internal Fuel: 612 lb
External Fuel: 324 lb

Empty Weight: 5269 lb
MTOW: 7209 lb







Grumman TBF-1c Avenger

Durability	☆☆☆☆☆	Speed	☆☆☆☆	Climb Rate	☆
Maneuverability	☆☆☆☆☆☆	Firepower	☆☆	Ground Attack	☆☆☆

Maneuverability - Don't let the single engine fool you, this is a big, heavy airplane and handles as such.

The Douglas TBD Devastator was slow and short-ranged and during the 1939 modernization of the carrier air arm, which saw the introduction of the SBD Dauntless and the F4F Wildcat, the need for a new torpedo-bomber was obvious. So in October, the Navy issued specifications for design proposals and out of all submissions, the Chance Vought and Grumman designs stood out as best.

Vought was primarily committed to their F4U fighter design and sold their torpedo-bomber design to Consolidated. Meanwhile, relying heavily on engineering from production of the Wildcat, the XTBF-1 exceeded the Navy's rigid specifications in all but top speed and 286 TBF-1s were ordered in December 1940. One of the deciding factors in the adoption of the TBF was the company's rearward folding wing design, which saved space and allowed more planes to be carried on the hanger deck.

Capable of a top speed of just of 270 mph, the XTBF had a three-man crew, including a dedicated gunner and a combined radio operator/bombardier/gunner in addition to the pilot. The internal bay could carry a single 2000 lb. torpedo, up to four 500 lb. bombs and a variety of other stores including depth charges, mines, and a 270-gallon fuel tank. Armament consisted of a single .50 caliber machine gun in the dorsal power turret, augmented by a .30 caliber flexibly mounted machine gun in the ventral position and another .30 mounted in the cowl. With final acceptance testing taking place right after Pearl Harbor, the plane was christened the Avenger and the Navy changed the contract from 286 to an open-ended production order with no limit.

With the expected clash at Midway about to happen, six TBF-1s were rushed to Midway where they attacked the Japanese fleet unsuccessfully, five being shot down with the sixth barely able to limp back to a crash landing on the island. However, despite the inauspicious beginning, all TBD units in the Navy were equipped with TBF-1s during the next sixty days.

Acting on field modifications to address the need for more forward firepower, Grumman added a single .50 caliber machine gun in each wing root outboard of the propeller arc to eliminate the need for interrupter gear. The new wing went into production on July 12, 1943 and the resulting modification was dubbed the TBF-1C. Later enhancements included the addition of four rocket rails under each wing to allow the use of 3" rockets, increasing the ground attack potential of the plane.

By this time Eastern Aircraft (a division of General Motors) was producing the majority of Avengers under the designation TBM. In December 1943, Eastern assumed full production of the Avenger and over 77 percent of Avenger production during the war would be done by Eastern, a total of 7,546 TBMs.

Sources:

Brown, Eric; Wings Of The Navy, Flying Allied Carrier Aircraft of World War Two; Naval Institute Press, Annapolis, Maryland; 1980.

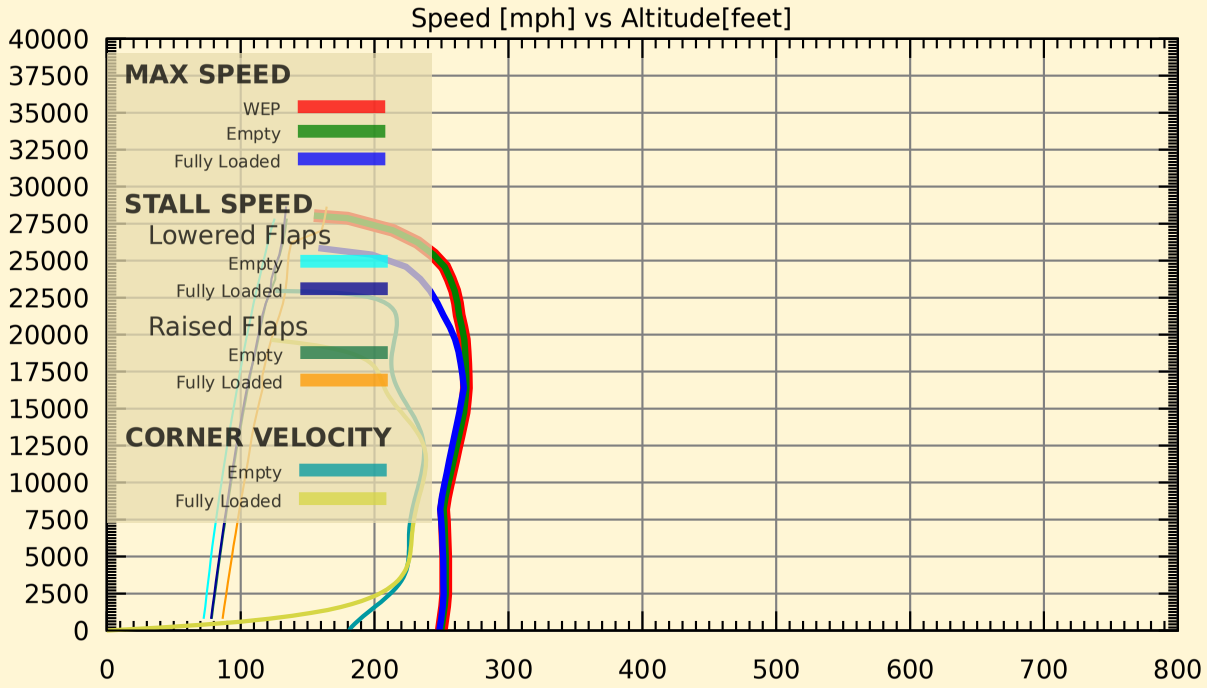
Scrivner, Charles L.; TBM/TBF Avenger In Action, Aircraft Number 82; Squadron/Signal Publications, Carrollton, Texas; 1987.

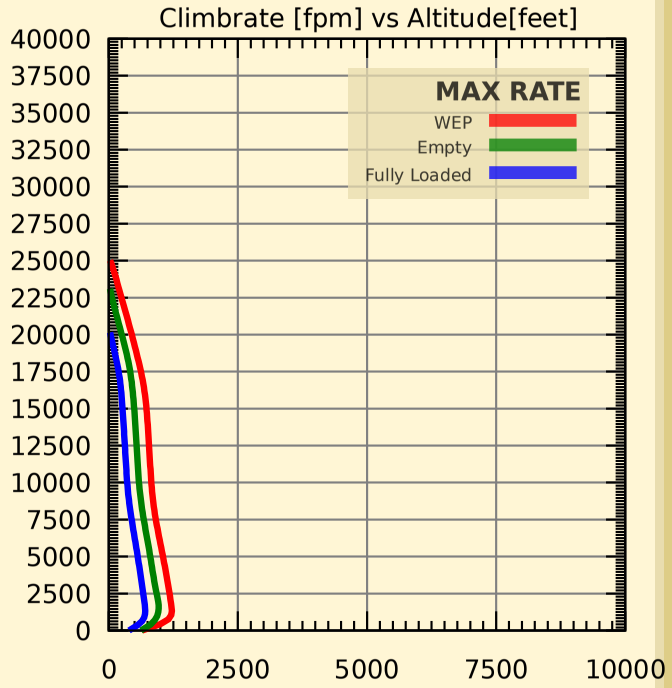
Name: Grumman TBF-1c Avenger
Role: Diving Bomber
Crew: 3
Service Date: May 1942
Primary Guns: One Browning M2 0.5" machine guns with 600 rpg in wing
Secondary Guns: One Browning M2 0.5" machine guns with 600 rpg in wing
Defensive Guns: NA
Ordnance: One 1927 lb Mk.13 torpedo or 12x 100 lb or 6x 250 lb or 4x 500 lb or 2x 1000 lb or One 2000 lb bombs in internal bomb bay, plus 2x 348 lb drop tanks under inner wings, plus 8x 55 lb 3.5" rockets under outer wings. Maximu

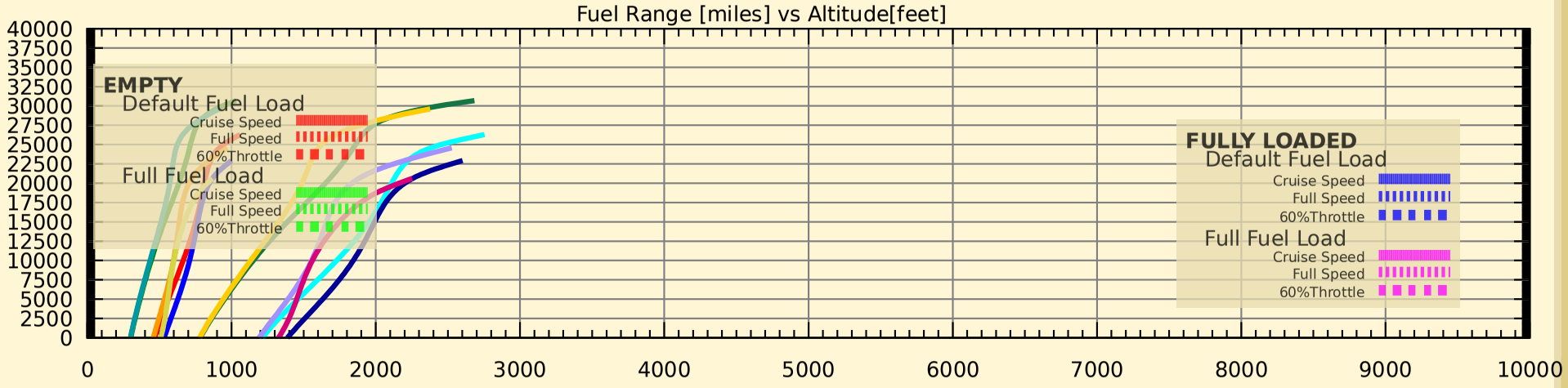
Length: 39.99 ft
Wing Span: 54.17 ft
Wing Area: 490 sq. ft

Power Plant: One Wright R-2600-8
Power: 3577 lb s.t.
Internal Fuel: 2010 lb
External Fuel: 696 lb

Empty Weight: 10913 lb
MTOW: 16667 lb

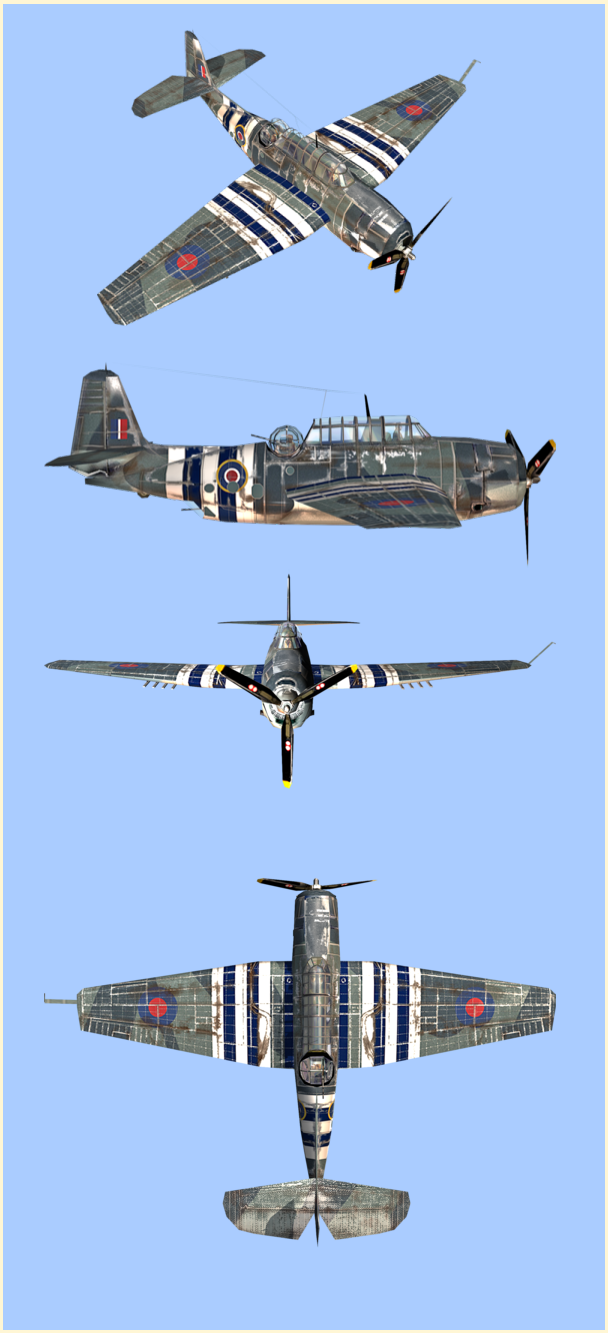






Grumman TBM-1c Avenger Mk.II

Durability	☆☆☆☆☆	Speed	☆☆☆☆	Climb Rate	☆
Maneuverability	☆☆☆☆☆☆	Firepower	☆☆	Ground Attack	☆☆☆



Maneuverability - Don't let the single engine fool you, this is a big, heavy airplane and handles as such.

In the early years of the war, the Royal Navy's Fleet Air Arm was definitely the red-headed stepchild of Britain's aircraft industry. While the RAF was showing off their latest Spitfire and Typhoon designs the FAA was stuck with aircraft of antiquated and inferior design, such as the Fairey Swordfish, the Gloster Sea Gladiator, and the Fairey Fulmar.

This sorry state of affairs was not the case in the US Navy where daring, purpose-built designs such as those coming from Grumman were prevalent. Recognizing the superiority of these American designs, the FAA made arrangements to purchase US Navy planes until such a time as the British aircraft industry could be geared towards more capable designs.

The first Avengers appeared in Britain early in 1943 at the Norfolk Naval Air Station with No. 832 Squadron taking delivery. Several months later, in April the squadron was assigned to the USS Saratoga to help provide support for landings in the Middle Solomons. Avenger squadrons operated primarily from land bases and escort carriers, such as those escorting the PQ convoys to Murmansk.

The largest deployment of Avengers occurred in early 1944 when they took part in "Operation Channel Stop", which was intended to deny the use of the English Channel to all enemy shipping. Avengers also served with the carrier Formidable in suppressing Japanese airfields on Formosa in support of the US Marine landings on Okinawa.

Sources:

Brown, Eric; Wings Of The Navy, Flying Allied Carrier Aircraft of World War Two; Naval Institute Press, Annapolis, Maryland; 1980.

Scrivner, Charles L.; TBM/TBF Avenger In Action, Aircraft Number 82; Squadron/Signal Publications, Carrollton, Texas; 1987.

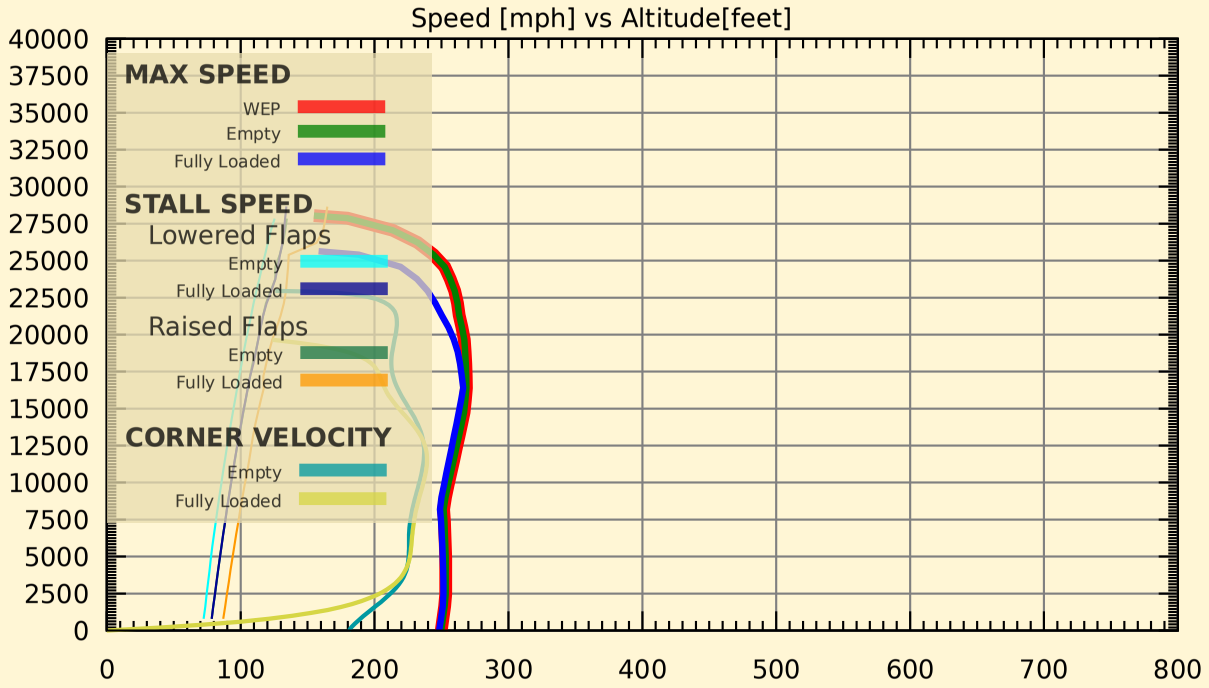
Name: Grumman TBM-1c Avenger Mk.II
Role: Diving Bomber
Crew: 3
Service Date: February 1943
Primary Guns: One Browning M2 0.5" machine guns with 600 rpg in wing
Secondary Guns: One Browning M2 0.5" machine guns with 600 rpg in wing
Defensive Guns: NA

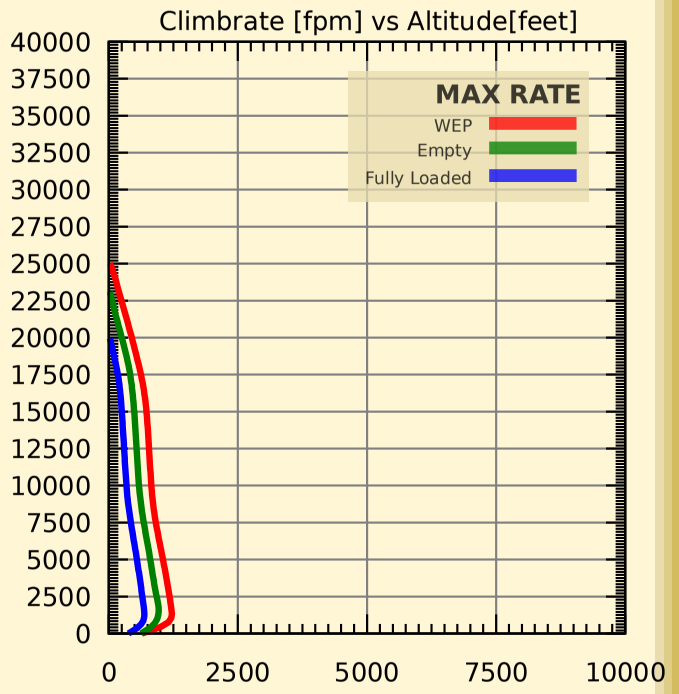
Length: 39.99 ft
Wing Span: 54.17 ft
Wing Area: 490 sq. ft

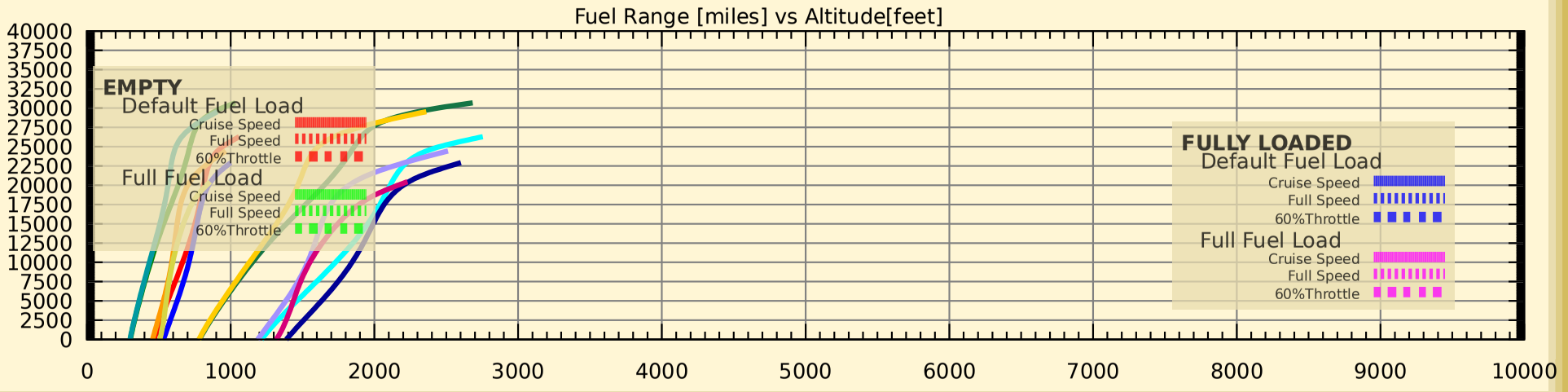
Power Plant: One Wright R-2600-8
Power: 3577 lb s.t.
Internal Fuel: 2010 lb
External Fuel: 696 lb

Empty Weight: 10913 lb
MTOW: 16667 lb

Ordnance: One 1548 lb Mk XII torpedo or 12x 119 lb or 6x 250 lb or 4x 535 lb or 2x 910 lb bombs in internal bomb bay, plus 2x 348 lb drop tanks under inner wings, plus 8x 84 lb rockets under outer wings. Maximum load of 2500 lb.

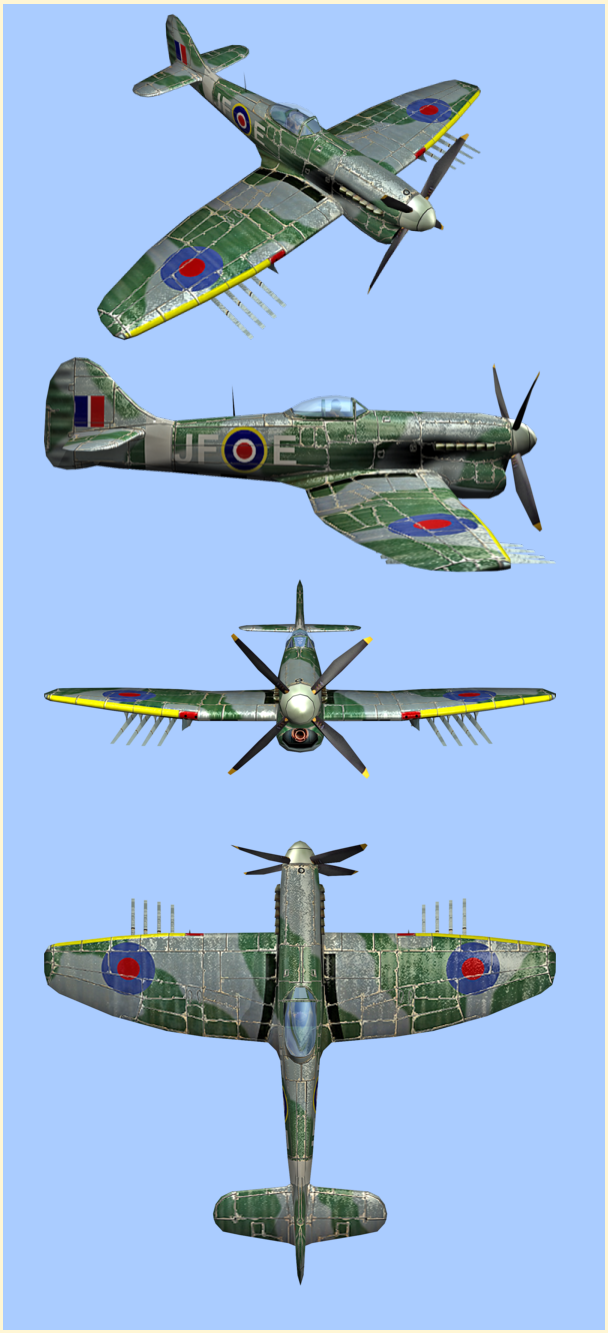






Hawker Tempest Mk.V

Durability	☆☆☆	Speed	☆☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆☆☆
Maneuverability	☆☆☆☆☆	Firepower	☆☆☆☆☆☆☆	Ground Attack	☆☆☆☆



High Level Performance - Above 20,000 feet, the Tempest is totally outclassed by most of its contemporaries.

During testing of the Typhoon it was found that the large, thick wing it used was susceptible to compressibility as speeds started to approach 500 mph. To compensate for this problem a thinner wing was designed.

Being so thin the new wing could no longer hold fuel tanks as the thicker wing could. So a new fuel compartment was designed into the fuselage, which resulted in it being extended by twenty-one inches in length. To compensate for changes in lateral stability, the tailplane and fin were also increased in size.

Originally designated the Typhoon II the name of the plane was soon changed to the Tempest V, the Tempest II being a version powered by an eighteen-cylinder Bristol Centaurus engine. The Tempest V Series I was fitted with Hispano Mk.II cannon, which protruded slightly from the wing. But the Series II was fitted with the shorter Hispano Mk.V cannon, which fit entirely within the wings.

Being the fastest plane in the RAF inventory at low altitudes, the Tempest was drafted into service to help defend England from the V-1 flying bombs. By war's end Tempests had destroyed over 800 "doodle-bugs" with about fifty-five pilots being able to claim to be "Diver" aces.

Sources:

Green, William; Famous Fighters of the Second World War; Hannover House, Garden City, NY; 1960.

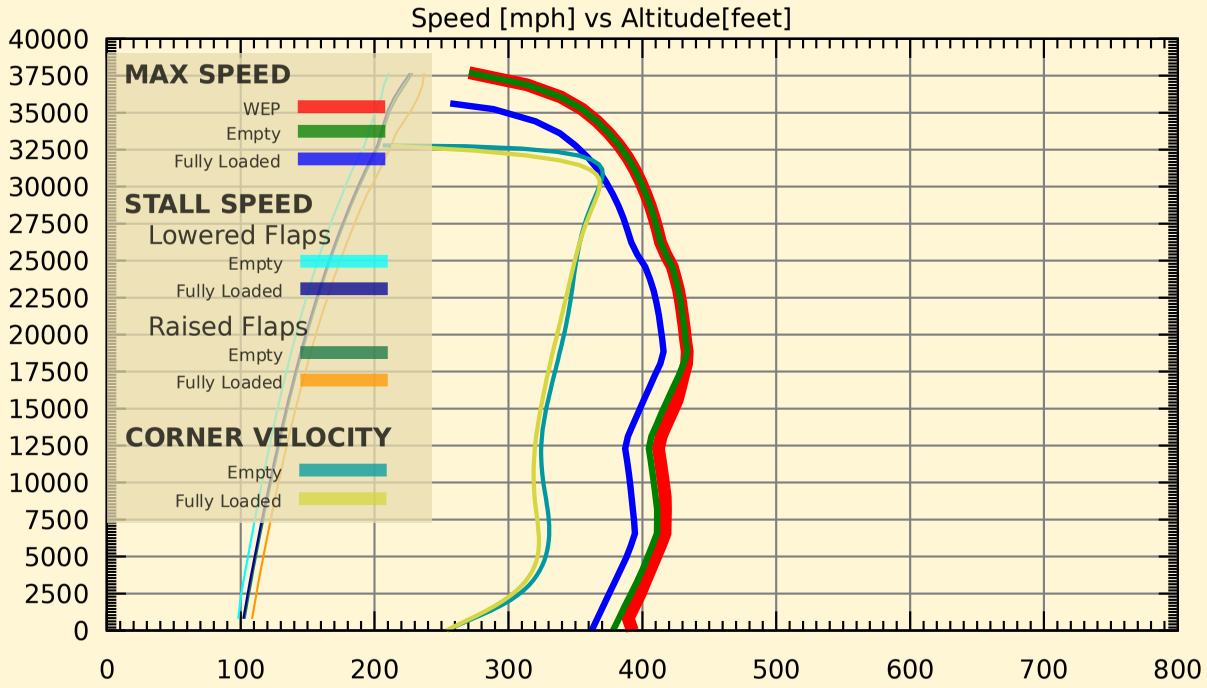
Scutts, Jerry; Tempest/Typhoon In Action; Squadron/Signal Publications; Carrollton, TX; 1990.

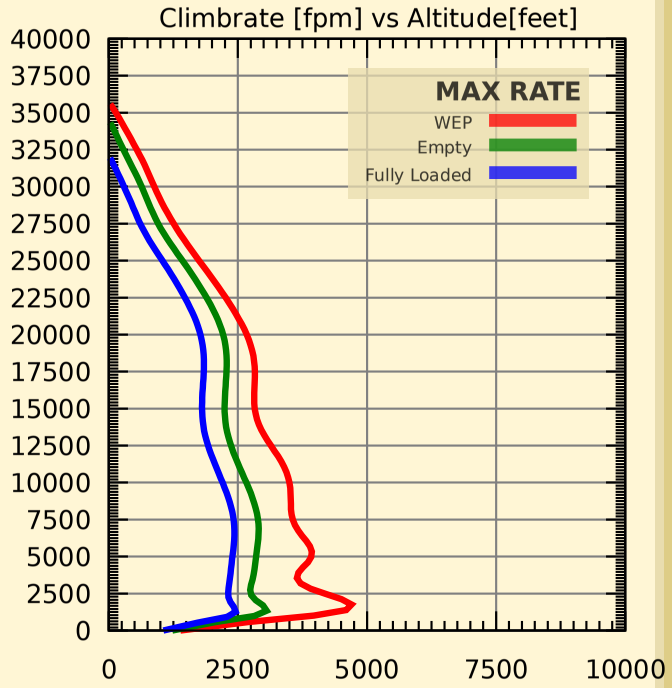
Name: Hawker Tempest Mk.V
Role: Fighter
Crew: 1
Service Date: June 1944
Primary Guns: 2x Hispano Mk.V cannon with 200 rpg in wings
Secondary Guns: 2x Hispano Mk.V cannon with 200 rpg in wings
Defensive Guns: NA
Ordnance: 2x 250 lb or 535 lb or 910 lb bombs or 2x 324 lb drop tanks

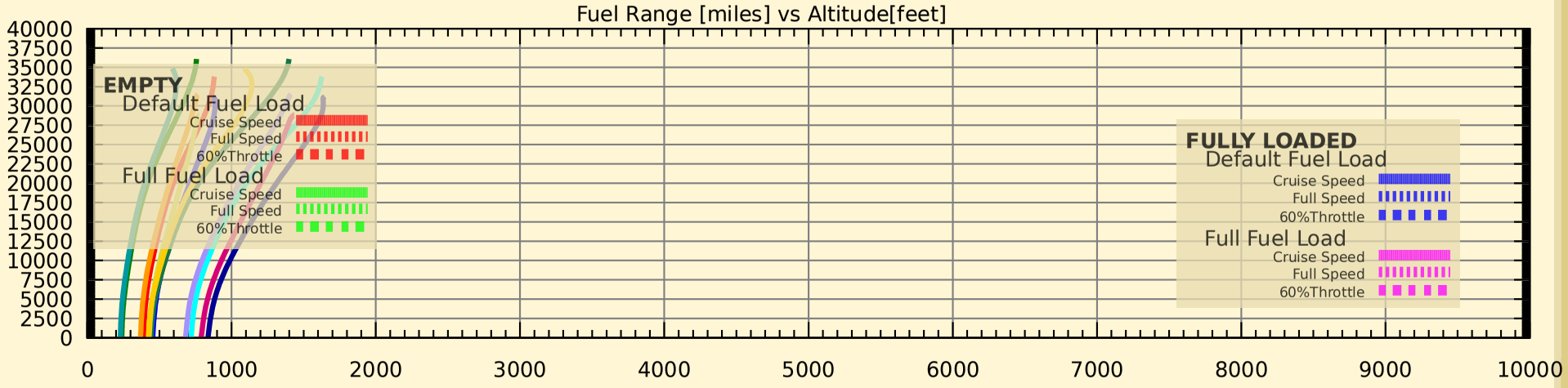
Length: 33.69 ft
Wing Span: 41.01 ft
Wing Area: 302 sq. ft

Power Plant: One Napier Sabre IIB
Power: 5293 lb s.t.
Internal Fuel: 1222 lb
External Fuel: 648 lb

Empty Weight: 9171 lb
MTOW: 12897 lb

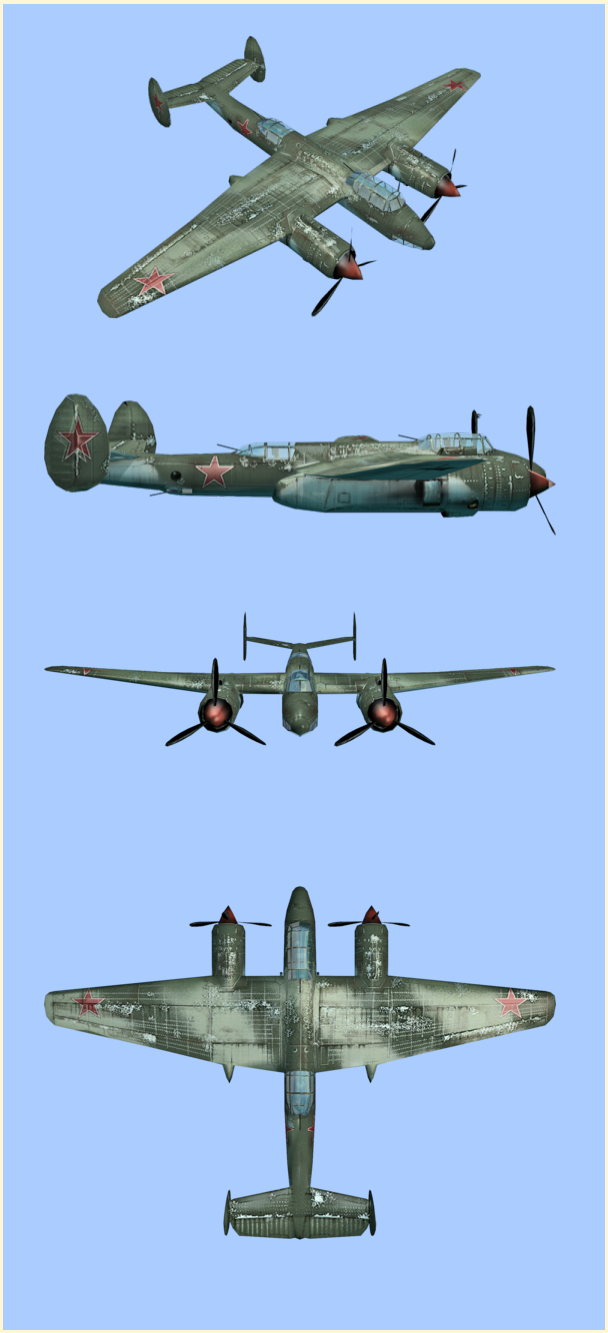






Tupolev Tu-2

Durability	☆☆☆☆☆	Speed	☆☆☆☆☆	Climb Rate	☆☆☆
Maneuverability	☆☆☆	Firepower	☆☆☆	Ground Attack	☆☆☆☆☆☆



Defensive Firepower - Although better than the Pe-2, the Tu-2 still doesn't approach the defensibility of the American and Japanese bombers with their all-quarters defense.

Given the same design requirement as that which resulted in the Pe-2, Andrei Tupolev and his design team began work on a new twin-engine, high-wing bomber called the ANT-58. Originally intended to mount the as-yet undeveloped Klimov M-120 engines, its design promised a range of 1500 miles, a bomb load of up to 4,400 lb. and a top speed of over 430 mph.

Design was completed in February 1940 and was approved for prototype development in April. The first prototype was powered by M-37 engines and during tests achieved a top speed of 335 mph, considerably lower than the specification. Problems with development of the M-120 engine shelved it and the team started looking for an alternate powerplant.

As with Lavochkin, Tupolev settled on the M-82 and later the M-82FN engine. In June 1943 the M-82FN powered Tu-2 tested in with a top speed of 352 mph at altitude and 328 mph on the deck. Capable of carrying a 1,000 kg. bomb load under normal circumstances and up to 3,000 kg in overload conditions, the Tu-2S was ordered into production. However, despite intensive efforts to get the Tu-2S into mass production, only a little over 1,000 were built before the end of the war.

Sources:

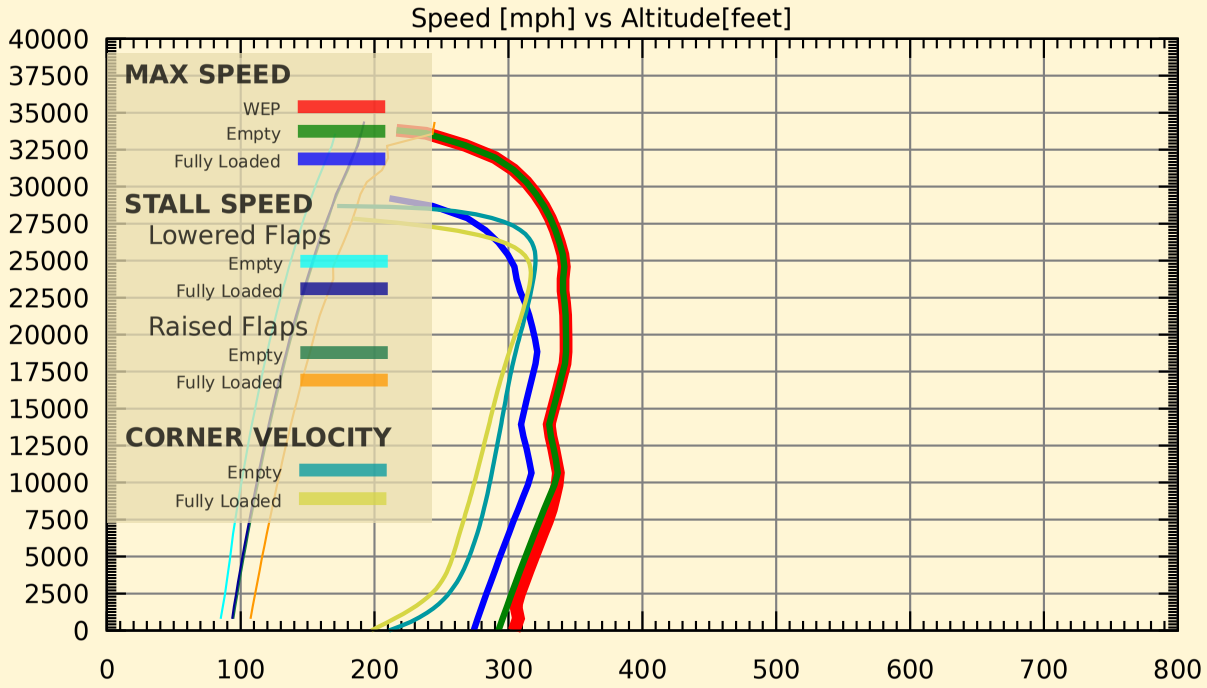
Gordon; Yefim and Khazanov, Dmitri with Medved, Alexander; Soviet Combat Aircraft of the Second World War Volume Two: Twin-Engined Fighters, Attack Aircraft and Bombers; Midland Publishing Limited, Leicester, England; 1999.

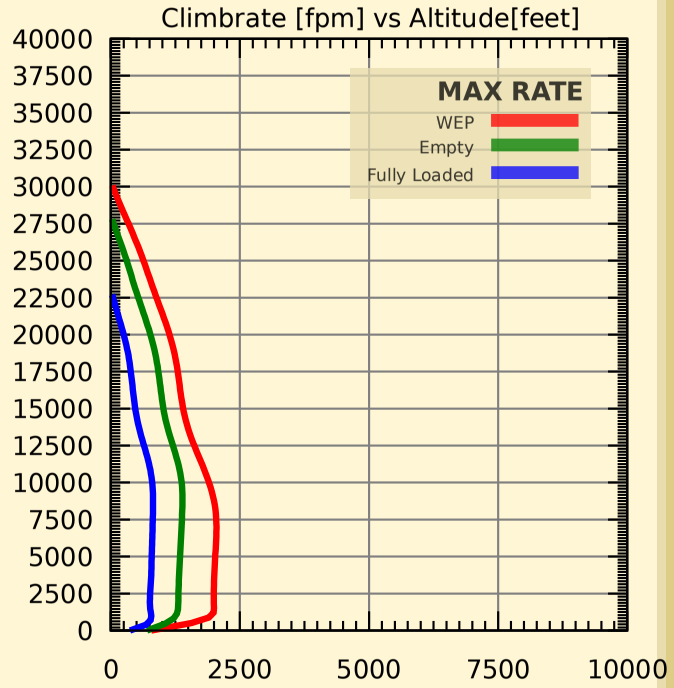
Name: Tupolev Tu-2
Role: Diving Bomber
Crew: 4
Service Date: January 1944
Primary Guns: One ShVAK 20mm cannon with 150 rpg in wing
Secondary Guns: One ShVAK 20mm cannon with 150 rpg in wing
Defensive Guns: NA
Ordnance: 12x 110 lb or 6x 220 lb or 4x 551 lb or 2x 1103 lb or One 2205 lb bombs in internal bomb bay, plus 4x 551 lb or 4x 1103 lb or 2x 2205 lb bombs or 2x 2095 lb torpedoes or 2x 993 lb drop tanks on underwing pylons

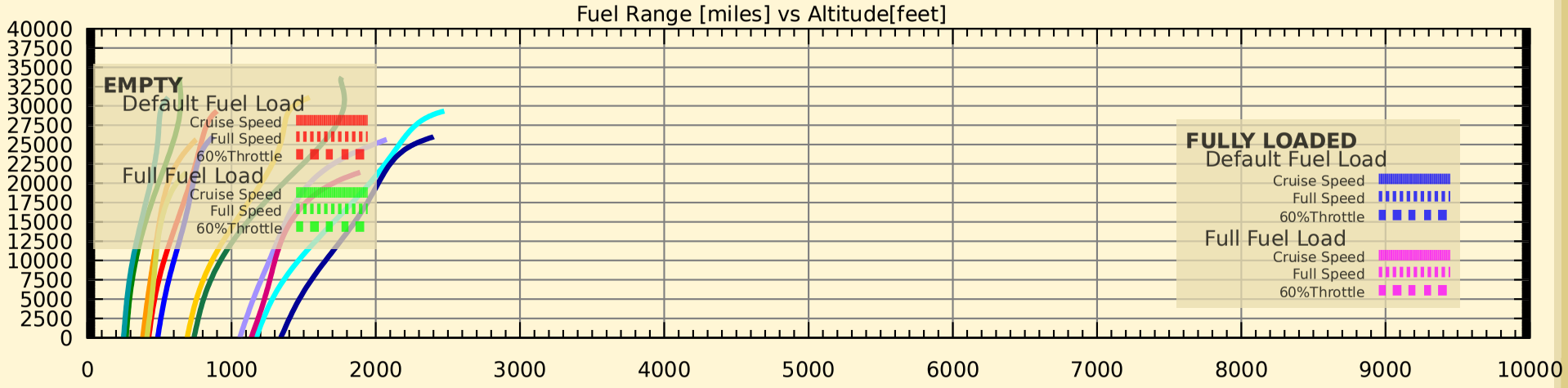
Length: 45.28 ft
Wing Span: 61.68 ft
Wing Area: 525 sq. ft

Power Plant: 2 X M-82FN
Power: 4003 lb s.t.
Internal Fuel: 4850 lb
External Fuel: 1990 lb

Empty Weight: 17416 lb
MTOW: 27558 lb

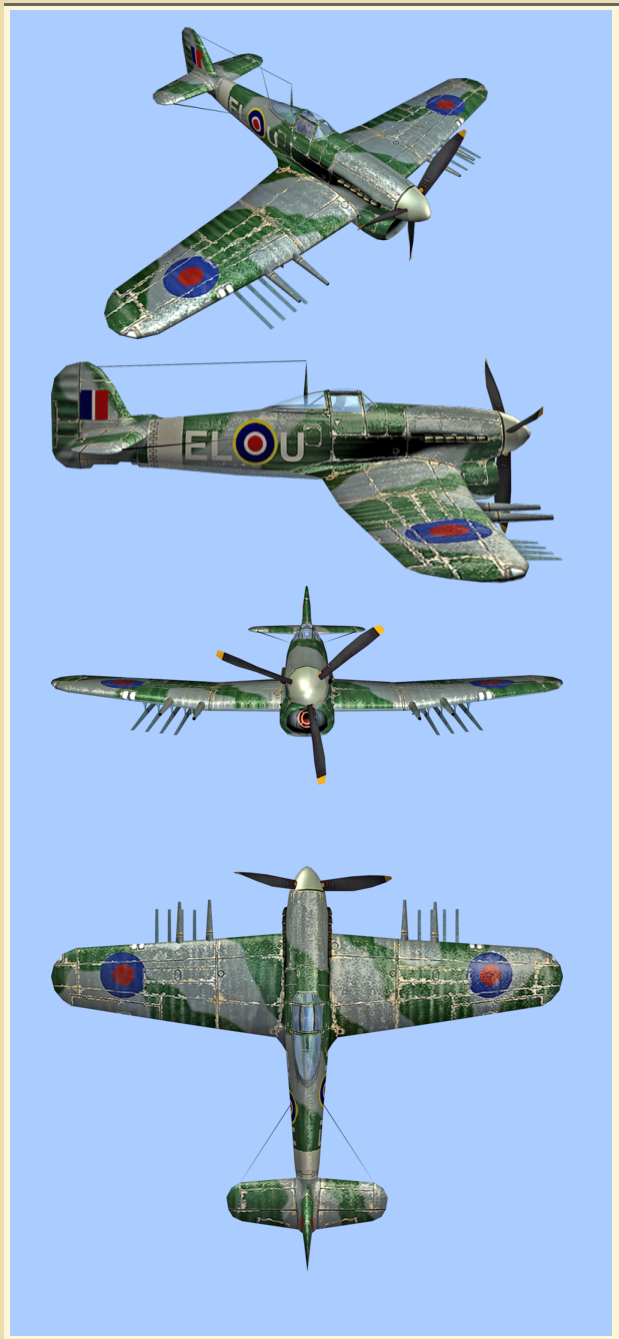






Hawker Typhoon Mk.Ib

Durability	☆☆☆	Speed	☆☆☆☆☆☆	Climb Rate	☆☆☆
Maneuverability	☆☆☆☆	Firepower	☆☆☆☆☆☆	Ground Attack	☆☆☆



Handling - At slow speeds the Typhoon is quite a handful and a stall can flip the plane over on its back.

Even before the production Hurricane had taken its maiden flight, the brilliant Sydney Camm was hard at work on his next design. Having heard about the new 24-cylinder power-plants that were being developed, Camm decided to focus his new design around one of these humongous engines.

Two months after the first Hurricanes were delivered, the Air Ministry issued specification F.18/37, which called for exactly the type of plane that Camm was designing, using either the Napier Sabre H-block engine or Rolls-Royce's Vulture, of X-block design. The Vulture engine was the first to be delivered and the resulting airframe was dubbed the "Tornado". The Tornado featured a ventral radiator beneath the wings, however flight tests revealed that the design caused buffeting and compressibility at speeds in excess of 400 mph and so the radiator was moved to the "chin" position under the engine.

The Napier engine was finally delivered on December 30, 1939 and the first Typhoon took to the air on February 24, 1940. However, due to wartime production needs, development of the Typhoon was delayed while the factories concentrated on churning out Hurricanes. This proved to be a boon for the fighter because of the teething problems of the new Sabre engine.

Finally in October 1940 interest in the project resumed and production was scheduled for the following year. The first production Typhoon IA was flown on May 26, 1941 with its standard armament of twelve Browning .303 machine guns. However, production of this version was very limited and it was mainly used for training and as a test bed for new equipment.

The Typhoon IB was fitted with four 20mm Hispano cannon in place of the .303s and Squadron delivery commenced in September 1941. Unfortunately, the Napier engine was still having reliability problems and combined with a tail assembly that tended to come off in high-speed power dives, it received a reputation as a plane as dangerous to its pilot as it was to the enemy. Its poor low-speed handling characteristics only helped cement this reputation.

Despite these problems, operations continued and as the Napier become more reliable, operational losses dropped back down to that of a "normal" fighter plane. With the addition of underwing bomb racks and rocket rails, the Tiffie as she was dubbed by her pilots, finally came into her own. By D-Day, the RAF was fielding twenty-six squadrons of Typhoons, being particularly useful in disposing of at least 137 tanks around the Avranches area during the Battle of Normandy.

Sources:

Green, William; Famous Fighters of the Second World War; Hannover House, Garden City, NY; 1960.

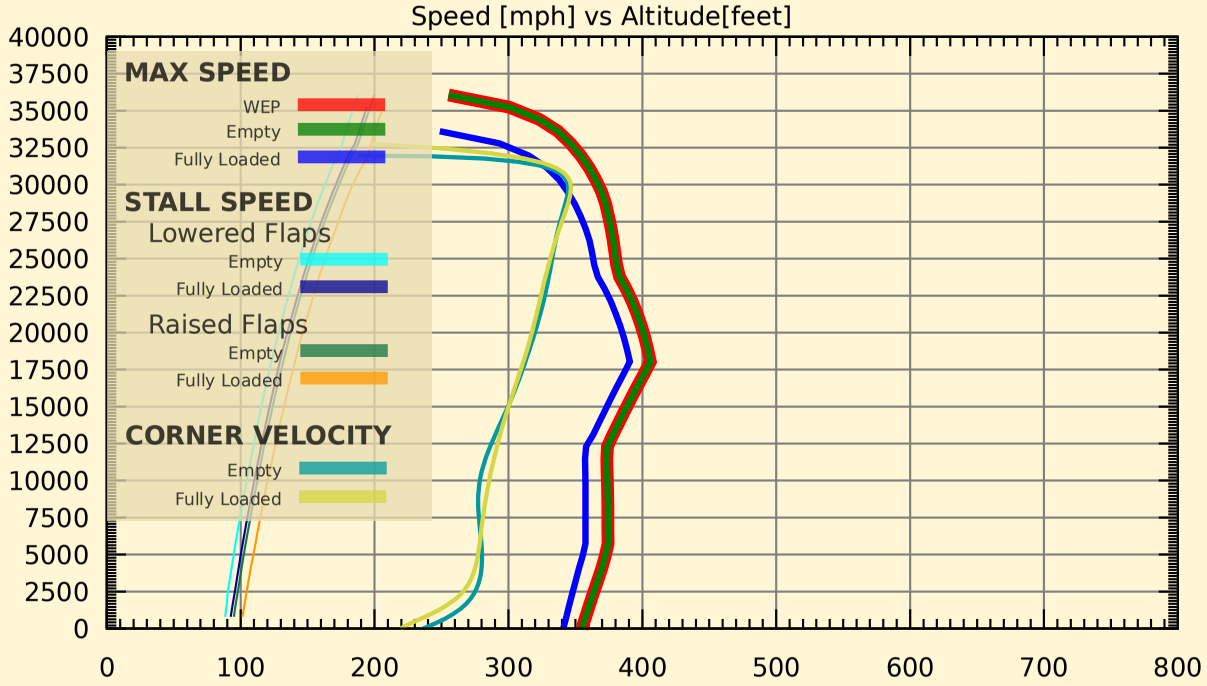
Scutts, Jerry; Tempest/Typhoon In Action; Squadron/Signal Publications; Carrollton, TX; 1990.

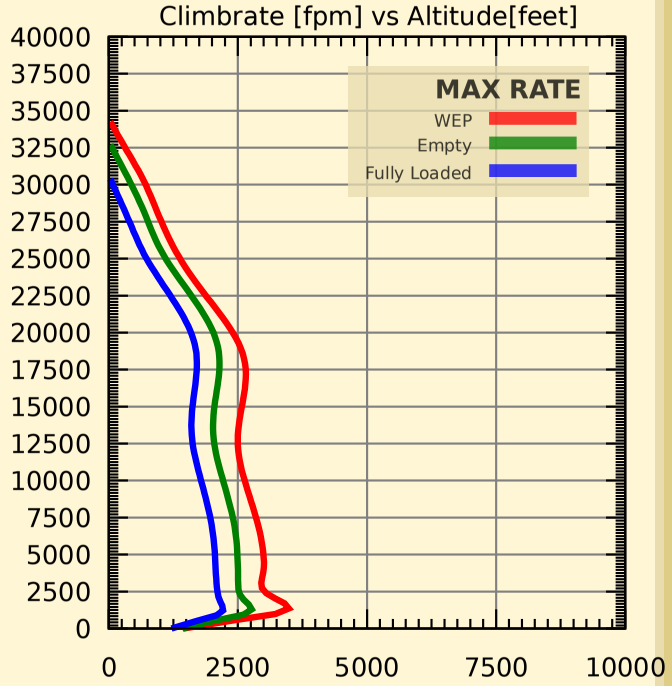
Name: Hawker Typhoon Mk.Ib
Role: Fighter
Crew: 1
Service Date: September 1941
Primary Guns: 2x Hispano Mk.II 20mm cannon with 140 rpg in wings
Secondary Guns: 2x Hispano Mk.II 20mm cannon with 140 rpg in wings
Defensive Guns: NA
Ordnance: 2x 535 lb or 2x 910 lb bombs or 2x 317 lb drop tanks or 8x 83 lb RP-3 A2G rockets under wings

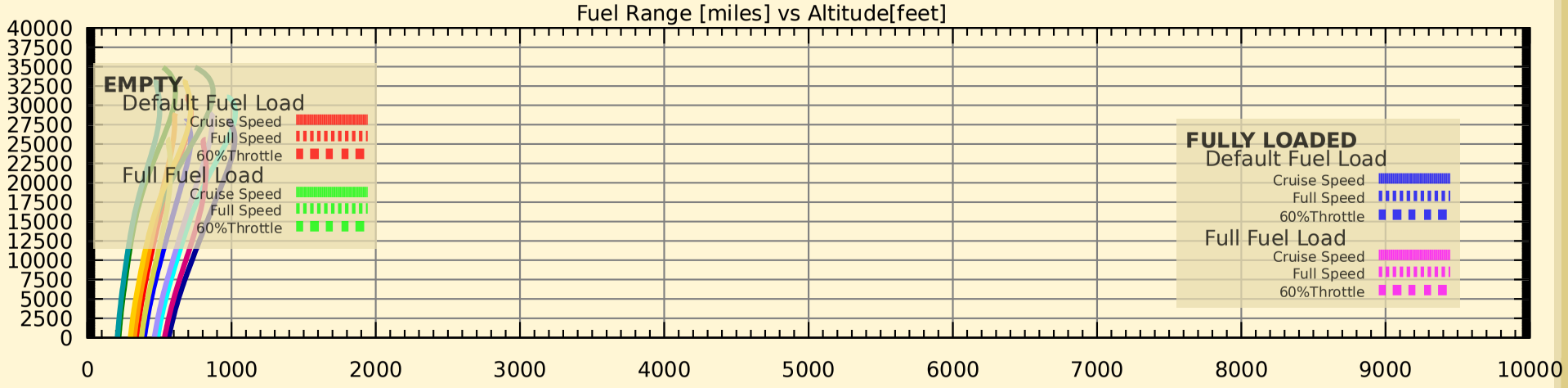
Length: 31.92 ft
Wing Span: 41.57 ft
Wing Area: 279 sq. ft

Power Plant: One Napier Sabre IIA
Power: 4565 lb s.t.
Internal Fuel: 943 lb
External Fuel: 634 lb

Empty Weight: 8874 lb
MTOW: 12059 lb

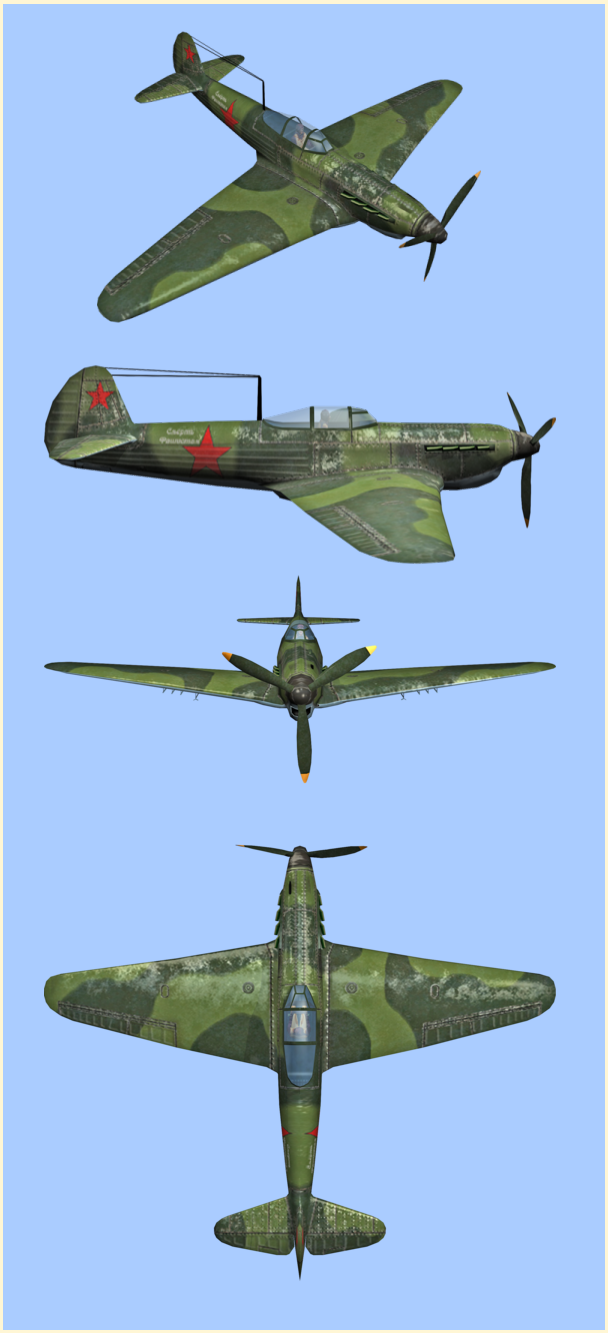






Yakovlev Yak-1b

Durability	☆	Speed	☆☆☆☆☆	Climb Rate	☆☆☆☆☆
Maneuverability	☆☆☆☆☆☆	Firepower	☆☆☆	Ground Attack	☆☆



Firepower - With only a single 12.7mm machine-gun to augment the engine-mounted 20mm cannon, the Yak-1 requires more time on target to get a kill than either the LaGG-3 or MiG-3.

A close personal friend of Josef Stalin, Alexander Yakovlev was given control of several aircraft factories in the Moscow region, which produced a series of basic trainers. In December 1938 a discussion between the two men centered on the possibility of building a fighter around the new Klimov M-105P 12-cylinder, water-cooled engine (a copy of the Hispano -Suiza HS-12Y). A month later the NKAP issued the design directive that also resulted in the LaGG-3 and MiG-3.

The I-26 prototype was made of mixed metal, wood, and fabric construction. The fuselage back to the cockpit was made of steel tubing covered by duralumin panels while the section aft of the cockpit was made of made of plywood spars covered by fabric. The wing was a one-piece affair utilizing a wooden box spar frame design with plywood skinning covered in varnished fabric.

As with the other designs culminating from this competition, the I-26 was rushed into production despite a laundry list of design flaws and production defects, which prevented it from meeting the design requirements. Initially fitted with a 20mm ShVAK cannon with 120 rpg firing through the propeller spinner and a pair of synchronized 7.62mm ShKAS machine-guns with 375 rpg in the upper cowl, the second series saw the 7.62mm ShKAS guns replaced with a single 12.7mm Beresin machine-gun with 250 rpg.

Redesignated the Yak-1 by Stalin in December 1941, the "B" version was an unofficial designation indicating the cut-down rear-cockpit design with transparent panels that was field modified by Major Shinkarenkov's regiment to improve visibility to the rear.

In combat the Yak-1 was considered to have superior handling characteristics to pilots that flew it and captured examples of the German Bf-109F and FW-190A and in action was the most successful of the three designs. Additionally, ground crews found it to be an easy plane to maintain, requiring as little as 20 minutes to refuel and rearm and only 6 hours to replace the engine-cannon assembly.

Sources:

Gordon; Yefim and Khazanov, Dmitri; Soviet Combat Aircraft of the Second World War Volume One: Single-Engined Fighters; Midland Publishing Limited, Leicester, England; 1998.

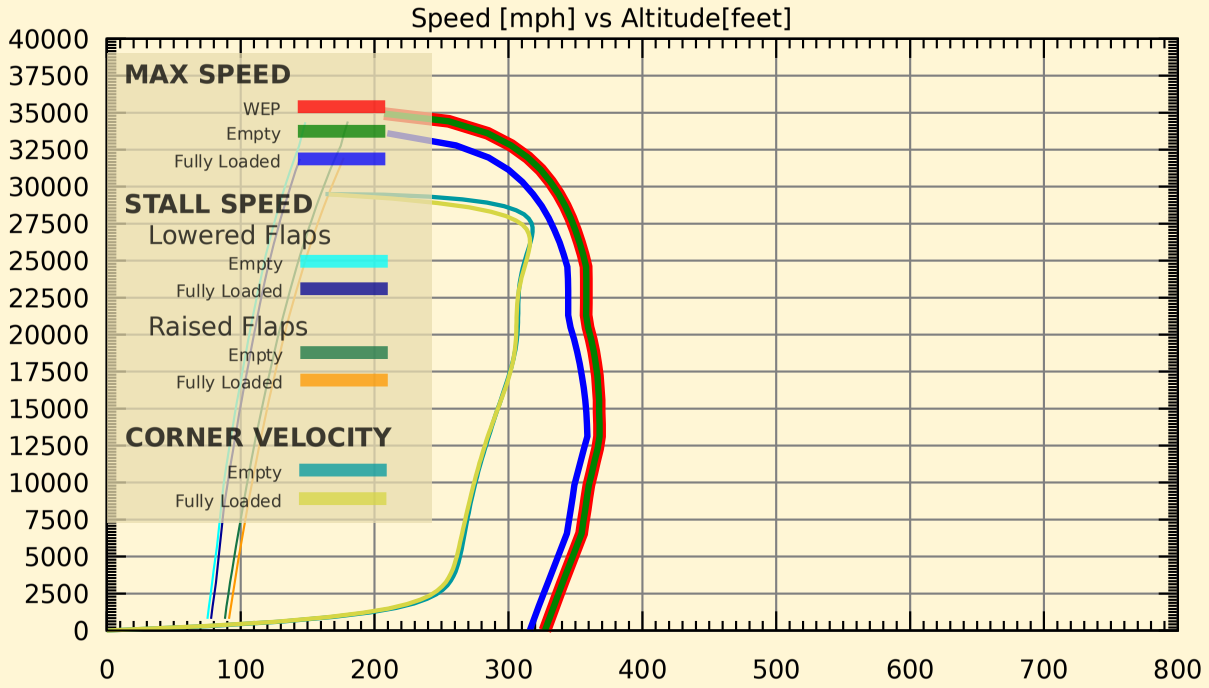
Stapfer, Hans-Heiri; Yak Fighters In Action; Squadron/Signal Publications, Carrollton, TX; 1986.

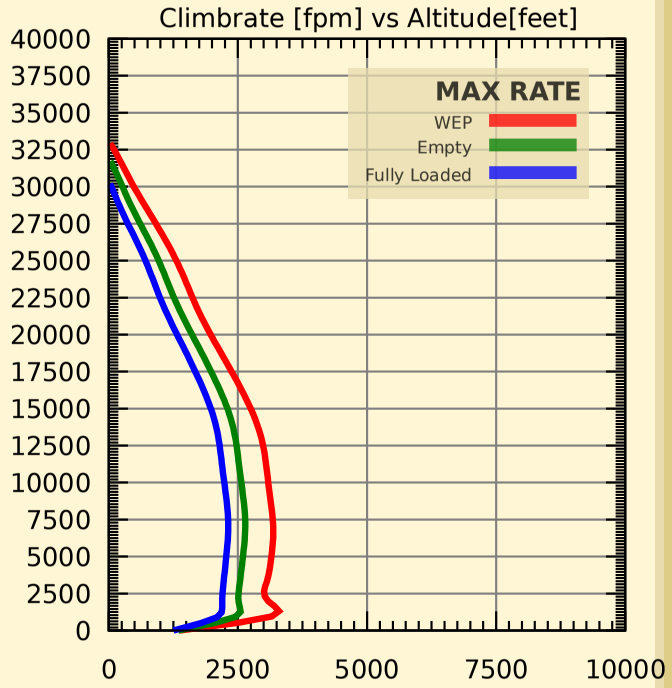
Name: Yakovlev Yak-1b
Role: Fighter
Crew: 1
Service Date: October 1942
Primary Guns: One Beresin (UBS) 12.7mm machine gun with 250 rpg in cowl
Secondary Guns: One ShVAK 20mm cannon with 110 rpg in propeller hub
Defensive Guns: NA
Ordnance: 2x 110 lb or 2x 220 lb bombs, plus 6x 33 lb RS-82 rockets. Maximum load of 500 lb.

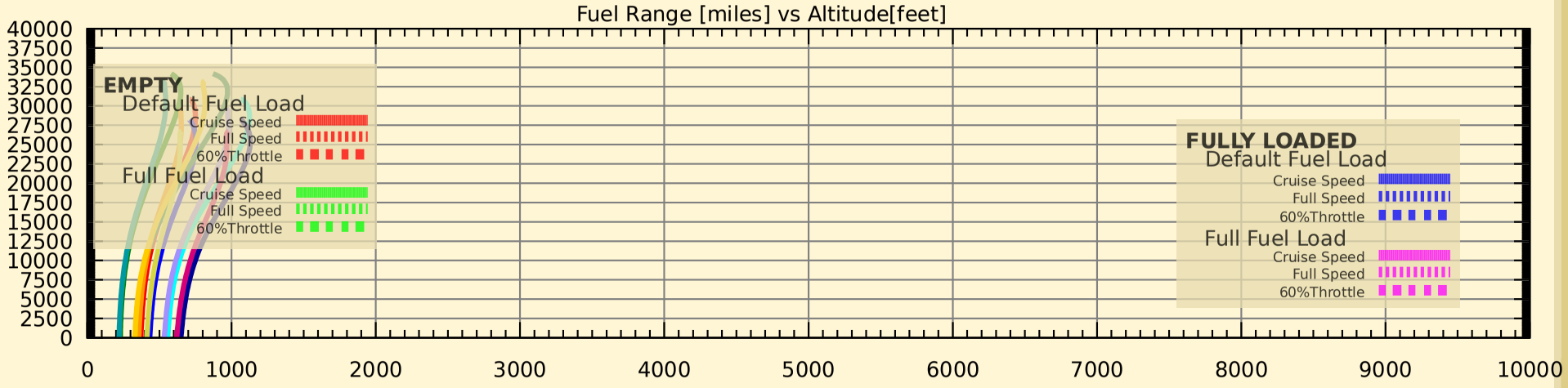
Length: 27.85 ft
Wing Span: 32.81 ft
Wing Area: 185 sq. ft

Power Plant: One M-105PF
Power: 2779 lb s.t.
Internal Fuel: 727 lb
External Fuel: NA

Empty Weight: 5269 lb
MTOW: 6570 lb







Yakovlev Yak-3

Durability	☆☆	Speed	☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆☆☆
Maneuverability	☆☆☆☆☆	Firepower	☆☆☆☆	Ground Attack	☆☆

Range - A thirsty engine and small fuel capacity limits the Yak's range.

With the problems inherent in the Yak-1 design and the coming war with Nazi Germany looming ahead, the Yakovlev team started work on a new prototype. Originally designed to use the Klimov M-105PD with two-stage Dollezhal Ye-100 supercharger, problems with the supercharger meant that the first prototype had to use the less powerful M-105P.

Potential top speed was increased by improving the airflow over the oil cooler and radiator inlets as well as a reduction in wingspan of about two and a half feet. But without the more powerful supercharger, performance was marginal at best. However, despite these problems the plane was ordered into production as the Yak-3.

Due to a variety of issues, Yak-3 production didn't actually begin for almost a year after the production order was issued. However, the delay had a positive side in that by the time production started, an even better engine, the M-105PF was available for installation. Further tests were conducted into boosting the engine power to wring every last ounce of horsepower out of the engine. When all was said and done, the Yak-3 would be able to top 420 mph at altitude.

Armament was initially the same as the Yak-1, but was later improved by adding a second 12.7mm machine gun to the cowl. The Yak still exhibited some handling quirks at low speeds, but overall the Yak-3 was an easy plane to fly with outstanding performance that outpaced the Bf-109G-2 at all altitudes up to 18,000 feet and the FW-190A-4 at all altitudes up to 27,000 feet.

Sources:

Gordon; Yefim and Khazanov, Dmitri; Soviet Combat Aircraft of the Second World War Volume One: Single-Engined Fighters; Midland Publishing Limited, Leicester, England; 1998.

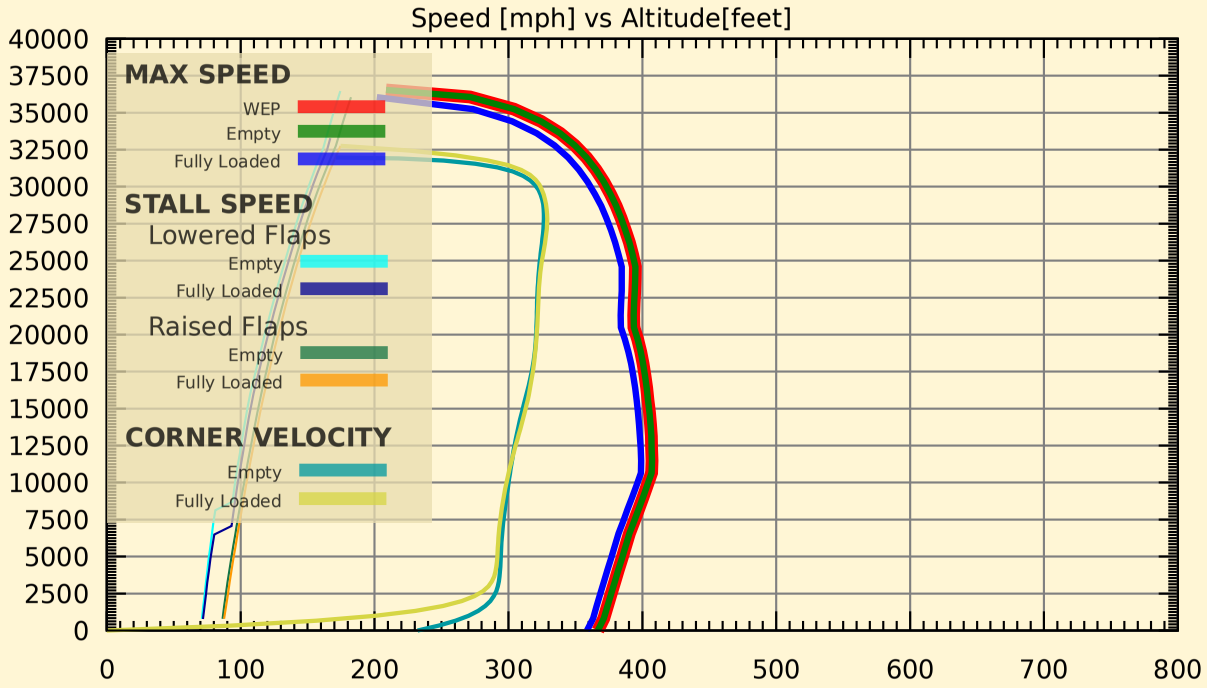
Stapfer, Hans-Heiri; Yak Fighters In Action; Squadron/Signal Publications, Carrollton, TX; 1986.

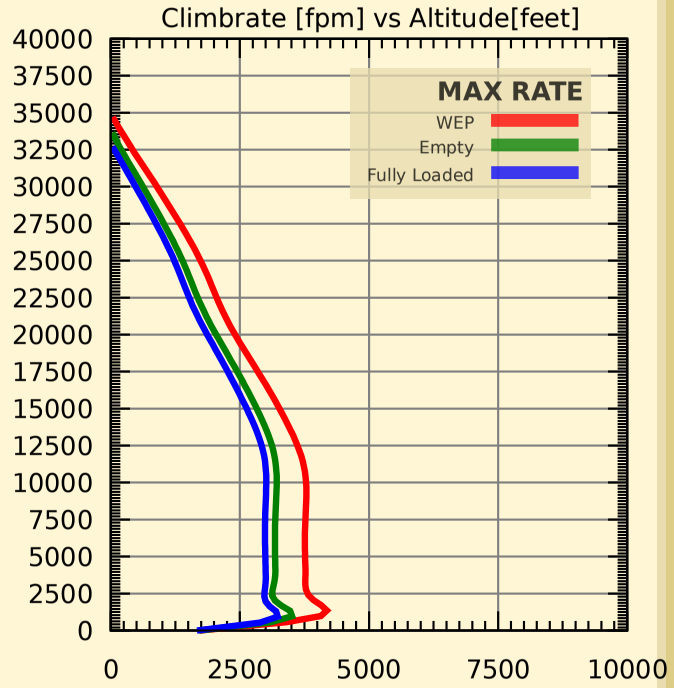
Name: Yakovlev Yak-3
Role: Fighter
Crew: 1
Service Date: October 1943
Primary Guns: 2x Beresin (UBS) 12.7mm machine guns with 250 rpg in cowl
Secondary Guns: One ShVAK 20mm cannon with 120 rpg in propeller hub
Defensive Guns: NA
Ordnance: 6x 33 lb RS-82 rockets

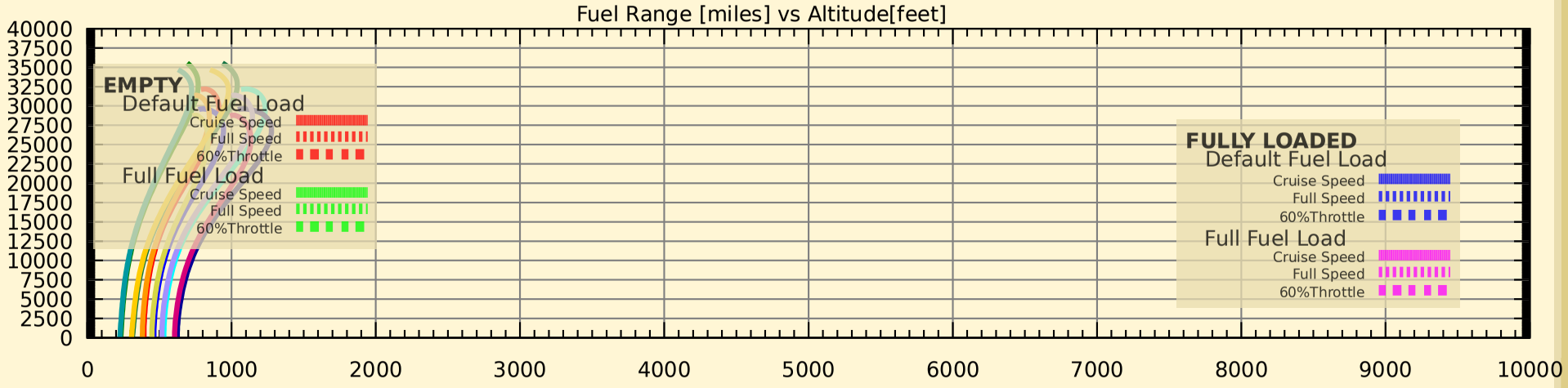
Length: 27.85 ft
Wing Span: 30.18 ft
Wing Area: 160 sq. ft

Power Plant: One VK-105PF2
Power: 2889 lb s.t.
Internal Fuel: 626 lb
External Fuel: NA

Empty Weight: 4806 lb
MTOW: 5831 lb







Yakovlev Yak-9U

Durability	☆☆☆	Speed	☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆☆
Maneuverability	☆☆☆☆☆	Firepower	☆☆☆☆	Ground Attack	☆☆

Rather than being a further development of the Yak-3, the Yak 9U was the culmination of improvements made to the two-seat trainer version of the original Yak-1. In fact, the first Yak-9 appeared in service before the Yak-3 project had gotten underway.

The UIT-26 prototype was developed in early 1940 and used many of the same components as the Yak-1. The wings were moved aft to compensate for the additional weight of the second cockpit and pilot, but otherwise it was basically a two-seat Yak-1. Of course this meant that it shared many of the same flaws and they were too numerous to allow novice pilots to fly the plane. However, it was thought that the type would serve as a good mount for experienced pilots making the conversion from the I-16 to the new Yak, LaGG and MiG fighters, and so it was ordered into production as the Yak-7UTI.

Armament consisted of the standard engine-mounted ShVAK cannon and a single 7.62mm ShKAS machine gun in the cowl and the plane had basically the same performance as the Yak-1s of the period. Soon, a tactical reconnaissance version of the plane was developed as the Yak-7R, which had an armored backrest and reduced the armament to just the 20mm cannon.

This plane proved to be very stable and much easier to fly than the Yak-1. The strengthened landing gear and overall structure allowed it to carry greater loads and it soon became obvious that it could be developed into a good long-range "heavy" fighter. The Yak-7 fighter was borne, with a single 20mm engine-mounted cannon with 120 rpg, two 7.62mm ShKAS machine guns with 750 rpg in the cowl and six rocket launch rails under the wings.

Initially retaining the second cockpit, the Yak-7 was eventually made into a true single-seat version. When the availability of duralumin became more widespread, the basic design was converted to use structural parts made of the new metal. The result was dubbed the Yak-9. Additional fuel tanks were installed in the metal wings, which increased range at the expense of weight and thus performance.

When the Klimov M-107A engine finally became available in early 1943 it was mated to a Yak-9D airframe with the result being called the Yak-9U. This new version had the armament increased by adding a second 12.7mm machine gun to the single 12.7mm and single 20mm gun armament of the Yak-9 and Yak-9D. Fuel capacity was increased even more and further improvements to the streamlining allowed the Yak-9U to exceed 400 mph at 18,500 feet. Overall, performance and handling were considered to be on par with the American P-51D Mustang.

Sources:

Gordon; Yefim and Khazanov, Dmitri; Soviet Combat Aircraft of the Second World War Volume One: Single-Engined Fighters; Midland Publishing Limited, Leicester, England; 1998.

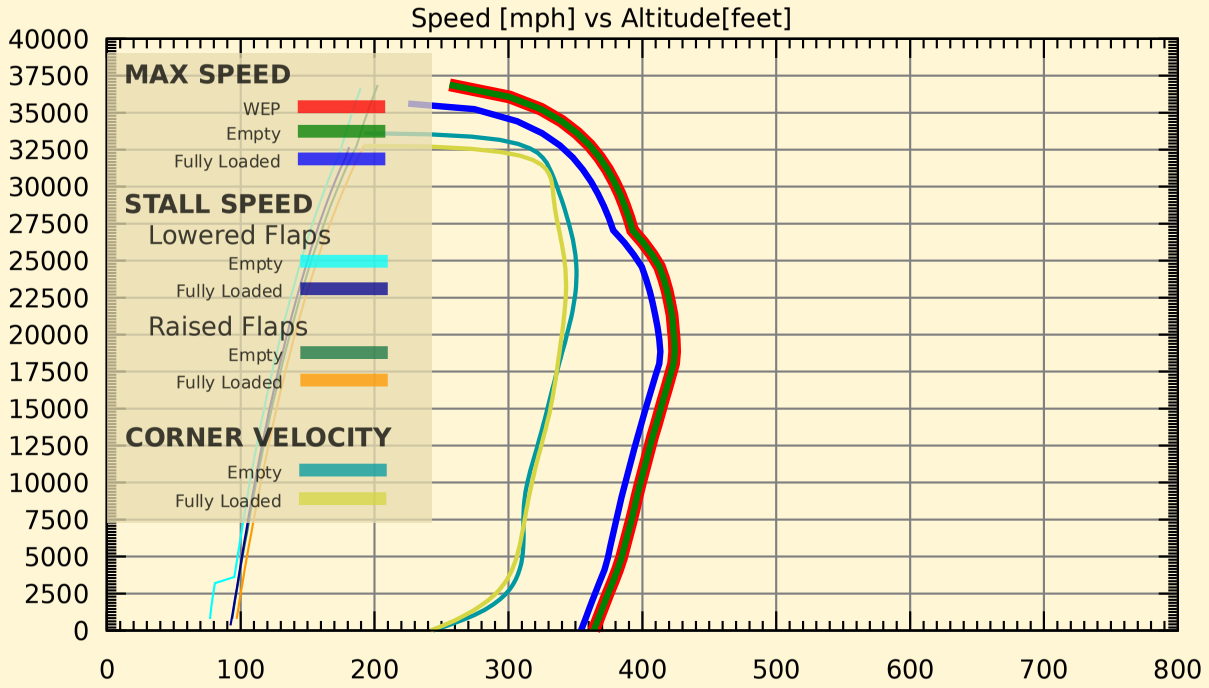
Stapfer, Hans-Heiri; Yak Fighters In Action; Squadron/Signal Publications, Carrollton, TX; 1986.

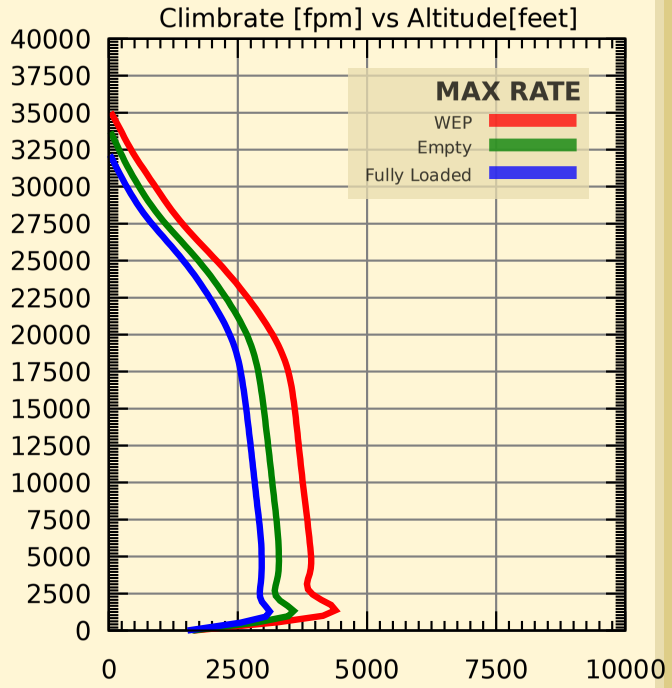
Name: Yakovlev Yak-9U
Role: Fighter
Crew: 1
Service Date: April 1944
Primary Guns: 2x Beresin (UBS) 12.7mm machine guns with 250 rpg in cowl
Secondary Guns: One ShVAK 20mm cannon with 150 rpg in propeller hub
Defensive Guns: NA
Ordnance: 2x 110 lb or 2x 220 lb bombs, plus 6x 33 lb RS-82 rockets. Maximum load of 500 lb.

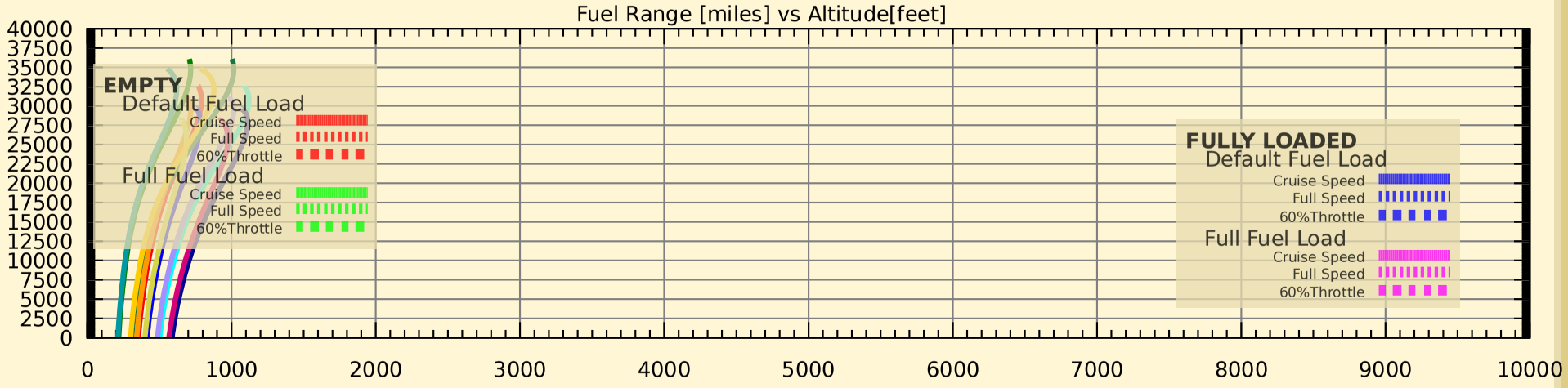
Length: 28.22 ft
Wing Span: 34.12 ft
Wing Area: 185 sq. ft

Power Plant: One VK-107A
Power: 3617 lb s.t.
Internal Fuel: 749 lb
External Fuel: NA

Empty Weight: 6129 lb
MTOW: 7540 lb







Yakovlev Yak-9UT

Durability	☆☆☆	Speed	☆☆☆☆☆☆	Climb Rate	☆☆☆☆☆☆
Maneuverability	☆☆☆☆☆	Firepower	☆☆☆☆☆☆	Ground Attack	☆☆☆☆

Ammo Load - The fast firing 37mm cannon goes through its supply of 30 rounds in a surprising hurry.

A further development of the Yak-9U, the Yak-9UT was designed to take advantage of the versatility of the airframe and its ability to mount a large gun between the engine cylinders. While not designed for field modification, a 23mm, 37mm, or 45mm gun could be easily substituted on the production line.

The hardest hitting of these variants was the one that used the new N-37 gun (the 45mm variant required removal of the two 20mm cannon, thus reducing the overall salvo weight). The N-37 was a smaller and lighter version of the NS-37 used in the Yak-9T. It was equipped with a highly effective muzzle break that eliminated up to 85% of recoil forces thereby eliminating the worst problem associated with large caliber gun installations.

Introduced in March 1945, the Yak-9UT saw limited duty in combat trials before the German surrender. But in that short time, the big-gunned Yak made an impressive showing. One unit had 19 encounters and shot down 27 FW-190A-8s and a Bf-109G-6 for the loss of only 2 of their own number.

Sources:

Gordon, Yefim and Khazanov, Dmitri; Soviet Combat Aircraft of the Second World War Volume One: Single-Engine Fighters; Midland Publishing Limited, Leicester, England; 1998.

Stepaniets, A.; 'Yak' Fighters of WWII Period; Mashinostroenie Publishing, Moscow; 1992.

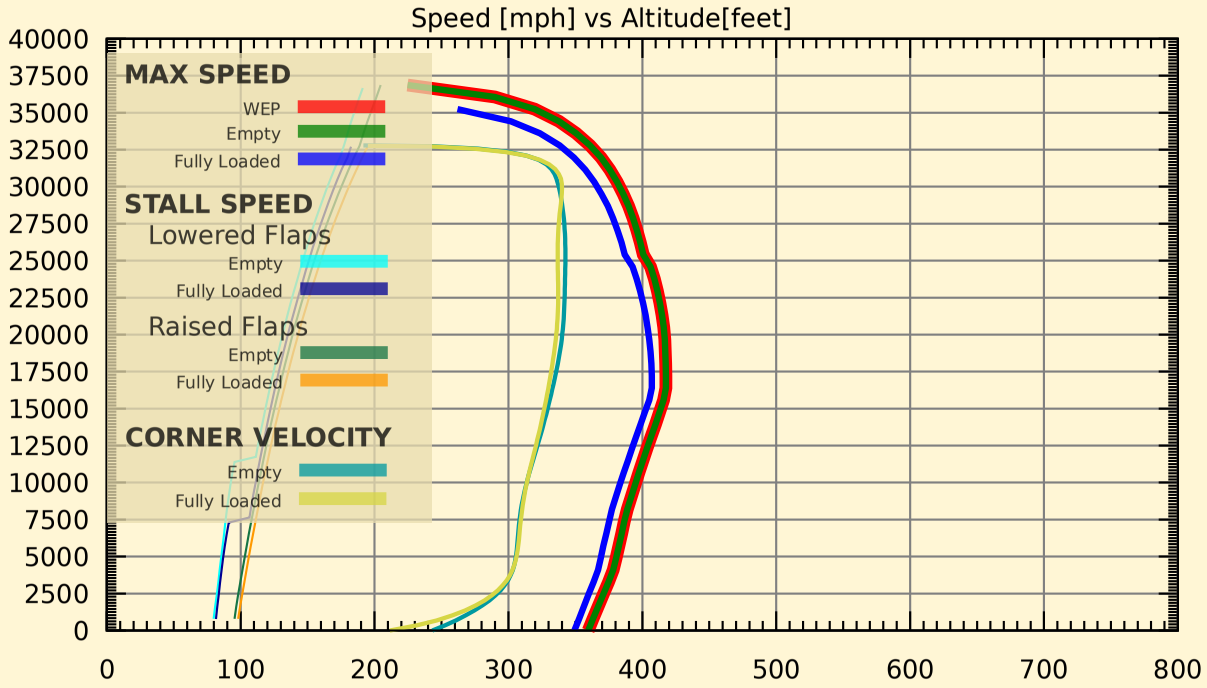
Stapfer, Hans-Heiri; Yak Fighters In Action; Squadron/Signal Publications, Carrollton, TX; 1986.

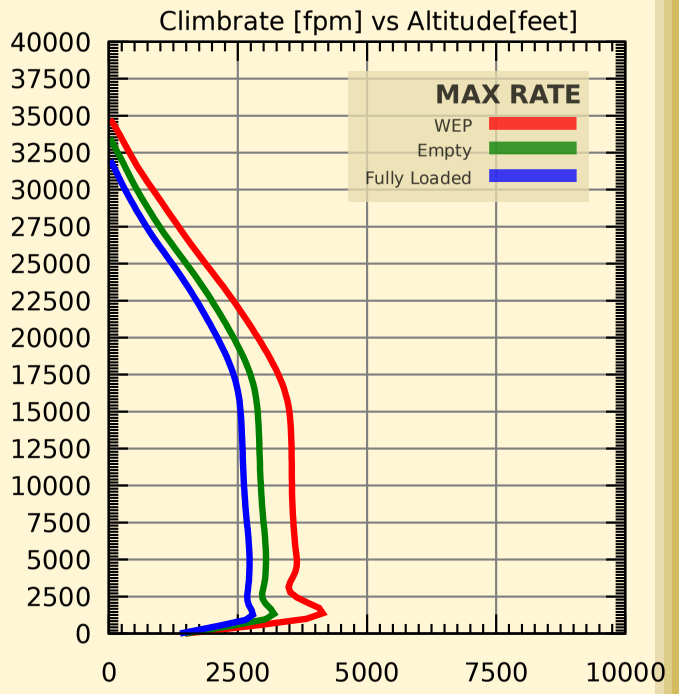
Name: Yakovlev Yak-9UT
Role: Fighter
Crew: 1
Service Date: March 1945
Primary Guns: 2x B-20S 20 mm cannons with 120 rpg in cowl
Secondary Guns: One N-37 37mm cannon with 30 rpg in propeller hub
Defensive Guns: NA
Ordnance: 2x 110 lb or 2x 220 lb bombs

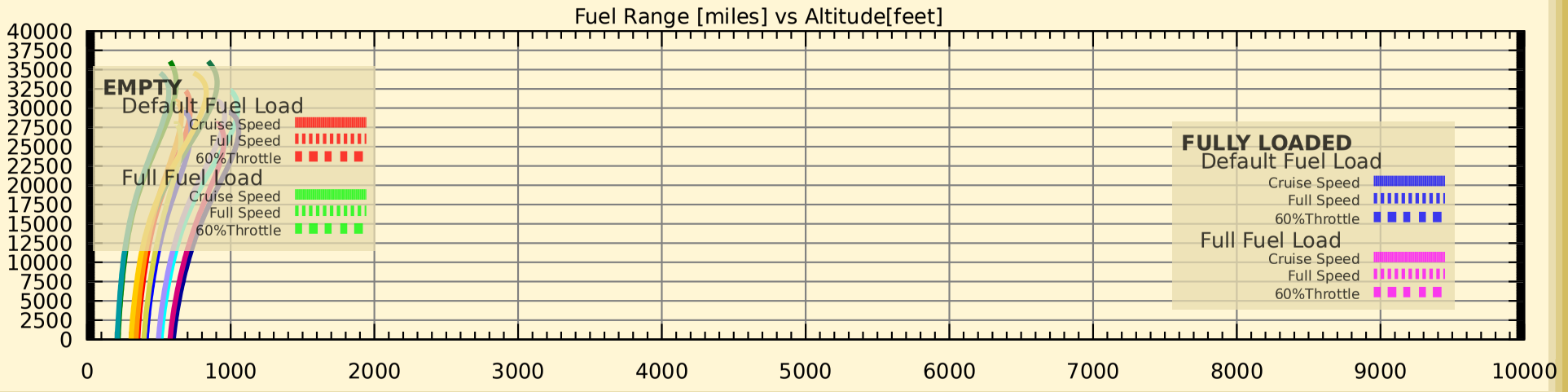
Length: 28.22 ft
Wing Span: 34.12 ft
Wing Area: 185 sq. ft

Power Plant: One VK-107A
Power: 3694 lb s.t.
Internal Fuel: 772 lb
External Fuel: NA

Empty Weight: 6283 lb
MTOW: 7672 lb







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