

Hawker Tempest

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Hawker Tempest II, RAF Museum, Hendon

Type Fighter/Bomber

Manufacturer [Hawker Aircraft Limited](#)

Maiden flight [2nd September 1942](#)

Introduced [1944](#)

Status Retired

Primary users [Royal Air Force](#)
[Royal New Zealand Air Force](#)

Number built 1,702

The **Hawker Tempest** was a [Royal Air Force](#) (RAF) [fighter aircraft](#) of [World War II](#), an improved derivative of the [Hawker Typhoon](#), and one of the most powerful fighters used in the war.

Development

While [Hawker](#) and the RAF were struggling to turn the Typhoon into a useful aircraft, Hawker's [Sidney Camm](#) and his team were rethinking the design at that time in the form of the **Hawker P. 1012** (or **Typhoon II**). The Typhoon's thick, rugged [wing](#) was partly to blame for some of the aircraft's performance problems, and as far back as March 1940 a few engineers had been set aside to investigate the new [laminar flow](#) wing that the [Americans](#) had used in the [P-51 Mustang](#).

The laminar flow wing had a maximum [chord](#), or [ratio](#) of thickness to length of the wing [cross section](#), of 14.5 %, in comparison to 18 % for the Typhoon. The maximum thickness was further back towards the middle of the chord. The new wing was originally longer than that of the Typhoon at 43 ft (13.1 m), but the wingtips were clipped and the wing became shorter than that of the Typhoon at 41 ft (12.5 m).

The new wing cramped the fit of the four [Hispano 20 mm cannon](#) that were being designed into the Typhoon. They had to be moved back further into the wing, and the wing was extended into an [elliptical](#) shape to accommodate the cannons and the 800 rounds of [ammunition](#). The new elliptical

wing had greater area than the Typhoon's. Camm, who was noted for a sharp sense of humor, later remarked: "The Air Staff wouldn't buy anything that didn't look like a [Spitfire](#)."

Another important feature of the new wing was that [radiators](#) for the new [Napier Sabre IV](#) engine were fitted into the [leading edge](#) of the wing inboard of the [landing gear](#). This eliminated the distinctive "[beard](#)", chin radiator associated with the Typhoon and improved [aerodynamics](#), but also displaced [fuel tanks](#) that had been fitted into the leading edge of the Typhoon's wing at the same location. This greatly reduced fuel capacity but Hawker engineers found they could stretch the fuselage 53 cm (21 in) ahead of the [cockpit](#) to accommodate more fuel storage in the [fuselage](#)—giving a maximum of 360 [gallons](#) and an operational radius of 500 [miles](#), almost double that of the Spitfire IX.

The undercarriage was both longer and had a wider spread (16 feet) to improve stability at the high landing speed of 110 [mph](#) (180 km/h) and to allow for a new four-blade [propeller](#) of almost 12 feet in [diameter](#). The main gear also needed new thin [tyres](#) in order to fit within the wing.

The new design was basically solid by October 1941 and the [Air Ministry](#) issued [specification F.10/41](#) that had been written to fit the aircraft. A contract for two initial [prototypes](#) was issued the next month. The aircraft was originally named the *Typhoon Mark II* but was renamed *Tempest* in January 1942 when more prototypes with various experimental configurations were ordered. The problems experienced with delivery of engines led the Air Ministry to ask for six prototypes with different engines so that if a delay hit one engine an alternative would be available. This gave the Mk I (aircraft HM599) with a Sabre IV, two Mk IIs (LA602 and LA607) with the Centaurus IV, Mk III (LA610) with a Griffon IIB, Mk IV (LA614) with a Griffon 61 and the Mk V (HM595) with the Sabre II.

The first Tempest prototype, the Mark V, flew on [2 September](#) 1942. This aircraft was really just a Typhoon fitted with the new elliptical wing and retained the Typhoon's frame [canopy](#), [automobile](#)-style door, the Sabre II engine, and "beard" radiator. It was quickly fitted with a [bubble canopy](#) like the later Typhoons and a modified [vertical tailplane](#) that almost doubled the control surface area.



 The Tempest I *HM599*

[Test pilots](#) found the Tempest a great improvement over the Typhoon in performance, although it was "pretty tricky to fly". The Air Ministry had already ordered 400 Tempests in August but production of the new Sabre IV engine ran into protracted problems and delays. The second prototype, the "Tempest Mark I" with the Sabre IV did not fly until [24 February 1943](#). This prototype also had at first the older Typhoon cockpit and vertical tailplane. Elimination of the "beard" radiator did much to improve performance and the Tempest Mark I was the fastest aircraft Hawker had built to that time, attaining a speed of 750 km/h (466 mph).

Only one Mark I was built. With the Sabre IV unavailable, Camm simply went into production with the Sabre II engined "Tempest V". The first rolled off the production line on [21 June](#) 1943. The first 100 Tempest Vs delivered had the long-[barrelled](#) Mark II 20 mm Hispano cannon, and such aircraft were referred to as "*Tempest V Series I*". Later production, providing a total of 800 aircraft known as "*Tempest V Series II*", used the short-barrelled [Mark V Hispano cannon](#), eliminating the protruding barrels - though these had not been as prominent as on the Typhoon.

Tempest Mark V



The Tempest V *JN729*

In his book *The Big Show*, French ace [Pierre Clostermann](#), who flew Mk. Vs with Nos. [274](#) and [3](#) squadrons of the RAF in 1944-45, quotes much higher top speed figures: 780 km/h (485 mph / 421 kts) at maximum rated power (2,850 hp) and 820 km/h (510 mph / 443 kts) on emergency power (3,040 hp). These figures, though plausible, seem somewhat optimistic given the fact that the holder of the official world speed record for a piston engine aircraft, a modified [Grumman Bearcat](#) named [Rare Bear](#), needed more than 4,000 hp to reach 850 km/h (528 mph / 459 kts) in 1989.

The jump from Tempest Mark I to Tempest Mark V raises the question of what happened to Marks II, III, and IV. Mark II was a Centaurus-powered Tempest, and as will be explained in the next section, it did reach production. Marks III and IV were to be powered by different variants of the [Rolls-Royce Griffon](#) V-12 engine. One Mark III prototype was built with a Griffon 85 engine it would later be modified to become the prototype [Hawker Fury \[1\]](#). The Mark IV prototype was cancelled in 1943.

The Mk. V was a much different Tempest in comparison with the Mk. I with many improvements over such preceding variants. The Mk. V's received the initially problem-plagued Napier Sabre engine developing in excess of 2,000 hp with its 24 cylinder setup. The Mk. V had (in Series 1) long-barrel Mk.II Hispano cannon. The Series 2 had more versatility with its ability to hold up to 2,000 lb. (908 kg.) of external stores, a detachable rear fuselage and four short-barrel Mk. V Hispano cannon each with 150 rounds - unlike the Series 1 sub-variant. Unlike the Mk. I aircraft, the 'beard' radiator replaced the wing root oil coolers which were deleted to allow a larger fuel load. Its shape was similar to that of the Typhoon once again, the presence of a dorsal fin being one of the few noticeable differences. This extended the Mk. V's internal fuel range to 740 miles (1,190km).

Tempest V in combat

The Tempest V was in the hands of operational squadrons by April 1944 ([No. 3](#) and [No. 56](#) Squadrons based at [RAF Newchurch, Kent](#)), where it profitably carried on in the low-level attack tradition of the Typhoon, which it was replacing as Tempest production increased. In June 1944, however, the first German [V-1](#) flying bombs were launched against [London](#) and the Tempest's excellent low-altitude performance made it one of the preferred tools for dealing with the small fast-

flying unmanned missiles. Tempest squadrons racked up a considerable percentage of the total RAF kills of the flying bombs (638 of a total of 1,846 destroyed by aircraft).

Early Tempests suffered numerous engine problems mainly due to the 150 octane fuel being inadequate. There were also problems with the induction system, the lubricating system, and the carburettor air intake (a simple backfire could lead to an explosion).

The Tempest was also deployed in support of the Allied armies advancing across northern Europe and engaged [Luftwaffe](#) aircraft when they could be found. The Tempest force was part of No. 122 Wing, based at [Volkel airfield](#) near [Uden, Netherlands](#) and comprised of [No. 486 Squadron, Royal New Zealand Air Force](#) (the only non-RAF unit to be equipped with the Tempest), [80](#), [56](#), and [274](#) Squadrons. In December 1944, the first month of operations, 52 German fighters were downed and 89 trains destroyed, for the loss of 20 Tempests. Following the surprise Luftwaffe raids of [January 1, 1945 \(Operation Bodenplatte\)](#), 122 Wing bore the brunt of fighter operations for the [Second Tactical Air Force](#), and came under intense pressure, losing 47 pilots that month.

Tempests also scored a number of kills against the new German jets, including the [Messerschmitt Me 262](#). Hubert Lange, an Me 262 pilot said: "the Messerschmitt Me 262's most dangerous opponent was the British Hawker Tempest — extremely fast at low altitudes, highly-maneuvrable and heavily-armed." Some were destroyed with a tactic known as the "Rat Code". Tempests on immediate alert took off when an Me 262 was reported to be airborne. They did not intercept the jet, but instead flew to the Me 262 base, Rheine-Hopsten.^[1] The aim was to attack jets on their landing approach, when they were at their most vulnerable: travelling slowly, with flaps down and incapable of rapid acceleration. The Germans responded by creating a "flak lane" of over 150 quadruple 20 mm guns at Rheine-Hopsten, to protect the approaches.^[citation needed] After seven Tempests were lost to flak at Rheine-Hopsten in a single week,^[citation needed] the "Rat Code" was discontinued.

The top scoring Tempest pilot was Squadron Leader D.C. Fairbanks [DFC](#), an American who joined the [Royal Canadian Air Force](#) in 1941. By mid 1944, he was flying with 274 Squadron. When he was shot down and made a POW in February 1945, he had destroyed 12 German aircraft (and one shared) to make him the highest scoring Tempest ace.

Tempest II



The prototype Tempest II LA602

While Hawker was working toward the introduction of the Tempest V, Sydney Camm and his crew were also revisiting the [Bristol Centaurus radial engine](#), incorporating it into two other Tempest prototypes.

The first Centaurus powered Tempest, the "Tempest Mark II", flew on [28 June 1943](#) with a Centaurus IV, and was followed presently by the second. The radial engine installation owed much to examinations of a captured [Focke-Wulf Fw-190](#), and was unprecedentedly clean and effective. There were problems with vibration, but they were fixed by addition of six rubber shock mounts.

The Centaurus was generally regarded as superior to the Sabre, particularly in terms of reliability, and the Centaurus engine and Tempest airframe proved an excellent match. The combination looked so promising that a contract for 500 of the type was placed as far back as September 1942, but [Gloster](#) was overloaded with production of the Typhoon and development of the [Gloster Meteor](#), and there was no way the company could handle the additional load.

Tempest Mark II production ended up in the hands of [Bristol](#), and the switch delayed production even more. The first Tempest II was rolled off the line on [4 October 1944](#), but then production was shifted back to Hawker.

A total of 452 Tempest IIs were built, including 136 basic Mark IIs and 316 "Fighter Bomber Mark IIs" (FB.II). They were built mostly by Hawker and generally with Centaurus V engines, and of that number 300 were completed after the war. The Tempest II, despite its slightly improved performance and better reliability, never saw combat. Tempest IIs produced during the war were intended for combat against the [Japanese](#), and would have formed part of "Tiger Force" but the [Pacific War](#) ended before they could be deployed.

Eighty-nine Tempest FB.IIs were passed on from the RAF to the [Indian Air Force](#) in 1947, while another 24 were passed on to the [Pakistani Air Force](#).

Tempest VI



The production Tempest VI, NX135, pictured at Langley in 1945

Various engineering refinements that had gone into the Tempest II were incorporated into the last Tempest variant, the "Tempest VI", which was fitted with a Sabre V engine with 2,340 horsepower (1,700 kW). Hundreds of Tempest VIs were ordered, though only 142 were built. The last piston-engined fighter in RAF service was a Tempest VI. It and one other VI along with a number of Vs had been converted to target tugs and this was its role when it was retired in 1953.

[\[edit\]](#) Variants

- **Typhoon Mk II** : The original designation of the Hawker Tempest.
- **Tempest Mk I** : Prototype fitted with the Napier Sabre IV piston engine. One aircraft.
- **Tempest Mk III** : Prototype fitted with the Rolls-Royce Griffon piston engine.
- **Tempest Mk IV** : Tempest Mk III prototype re-engined with a Rolls-Royce Griffon 61 piston engine.
- **Tempest Mk V** : Single-seat fighter, fighter-bomber aircraft, powered by the Napier Sabre II piston engine.
 - **Tempest Mk V Series 1** : The first 100 production aircraft were fitted with four long-barrel 20-mm Mark II Hispano cannons.

- **Tempest Mk V Series 2** : the other 800 production aircraft were fitted with four short-barrel 20-mm Mark V Hispano cannons.
- **Tempest TT Mk 5** : After the Second World War a number of Tempest Mk Vs were converted into target tugs.
- **Tempest F Mk II** : Single-seat fighter aircraft for the RAF, powered by a Bristol Centaurus radial piston engine.
 - **Tempest FB Mk II** : Single-seat fighter-bomber with underwing pylons for bombs and rockets.
- **Tempest F Mk VI** : Single-seat fighter aircraft for the RAF.
 - **Tempest TT Mk 6** : After the Second World War a number of Tempest Mk. VI's were converted into target tugs.

Operators



486 (NZ) Squadron at Volkel, Holland in 1945

[Canada](#)

- [Royal Canadian Air Force](#)
- Only one Hawker Tempest was ever operated by the [RCAF](#). The aircraft was in service from 1946 to 1947.

[India](#)

- [Indian Air Force](#)
 - [No. 1 Squadron, Indian Air Force](#)
 - [No. 3 Squadron, Indian Air Force](#)
 - [No. 4 Squadron, Indian Air Force](#)
 - [No. 7 Squadron, Indian Air Force](#)
 - [No. 8 Squadron, Indian Air Force](#)
 - [No. 9 Squadron, Indian Air Force](#)
 - [No. 10 Squadron, Indian Air Force](#)

[New Zealand](#)

- [Royal New Zealand Air Force](#)
 - [No. 486 Squadron RNZAF](#)

[Pakistan](#)

- [Pakistan Air Force](#)
 - No. 5 Squadron
 - No. 9 Squadron

- [Royal Air Force](#)
 - [No. 3 Squadron RAF](#)
 - [No. 5 Squadron RAF](#)
 - [No. 6 Squadron RAF](#)
 - [No. 8 Squadron RAF](#)
 - [No. 16 Squadron RAF](#)
 - [No. 20 Squadron RAF](#)
 - [No. 26 Squadron RAF](#)
 - [No. 30 Squadron RAF](#)
 - [No. 33 Squadron RAF](#)
 - [No. 39 Squadron RAF](#)
 - [No. 54 Squadron RAF](#)
 - [No. 56 Squadron RAF](#)
 - [No. 80 Squadron RAF](#)
 - [No. 152 Squadron RAF](#)
 - [No. 174 Squadron RAF](#)
 - [No. 183 Squadron RAF](#)
 - [No. 213 Squadron RAF](#)
 - [No. 222 Squadron RAF](#)
 - [No. 247 Squadron RAF](#)
 - [No. 249 squadron RAF](#)
 - [No. 274 Squadron RAF](#)
 - [No. 287 Squadron RAF](#)
 - [No. 349 Squadron RAF](#)
 - [No. 501 Squadron RAF](#)

Specifications (Tempest V)

Data from Jane's Fighting Aircraft of World War II^[2]

General characteristics

- **Crew:** One
- **Length:** 33 ft 8 in (10.26 m)
- **Wingspan:** 41 ft 0 in (12.49 m)
- **Height:** 16 ft 1 in (4.90 m)
- **Wing area:** 302 ft² (28 m²)
- **Empty weight:** 9,250 lb (4,195 kg)
- **Loaded weight:** 11,400 lb (5,176 kg)
- **Max takeoff weight:** 13,640 lb (6,190 kg)
- **Powerplant:** 1× [Napier Sabre](#) IIB liquid-cooled H-24 sleeve-valve engine, 2,400 hp (1,625 kW)

Performance

- **Maximum speed:** 435 mph at 17,000 ft (700 km/h at 5,180 m)
- **Range:** 1,530 mi (2,465 km) with drop tanks
- **Service ceiling:** 36,500 ft (11,125 m)
- **Rate of climb:** 4,700 ft/min (23.9 m/s)
- **Wing loading:** 37.75lb/ft² (184.86kg/m²)

- **Power/mass**: 0.21hp/lb (0.31kW/kg)

Armament

- 4x 20 mm [Mark II Hispano](#) cannons, 200 rounds per gun
- 2x 500 lb or 1,000 lb (227 kg or 454 kg) bombs
- 8x 3 in (75 mm) [RP-3](#) rockets

References

- This article is based on "The Hawker Typhoon, Tempest, & Sea Fury", version 1.1, by [Greg Goebel](#). The original version (placed in the public domain) can be accessed at: <http://www.vectorsite.net/avcfury.html> .
- Hubert Lange quote from <http://www.hawker-tempest.se/>

Related content

Related development

[Hawker Typhoon](#) - [Hawker Fury/Sea Fury](#)

Designation sequence

[Tornado](#) - [Typhoon](#) - **Tempest** - [Fury/Sea Fury](#) - [Sea Hawk](#)

Related lists

[List of aircraft of the RAF](#) [List of aircraft of the RNZAF and RNZN](#)