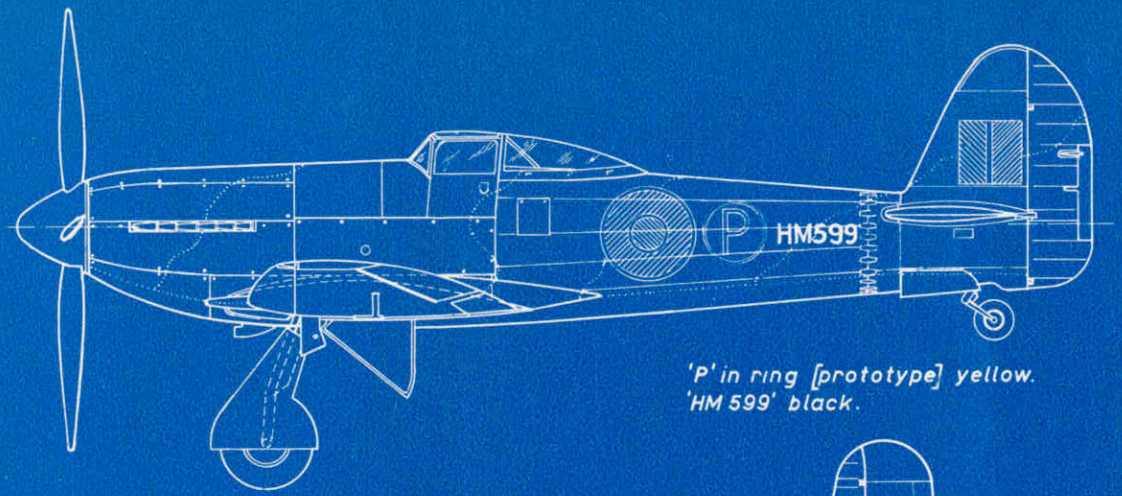
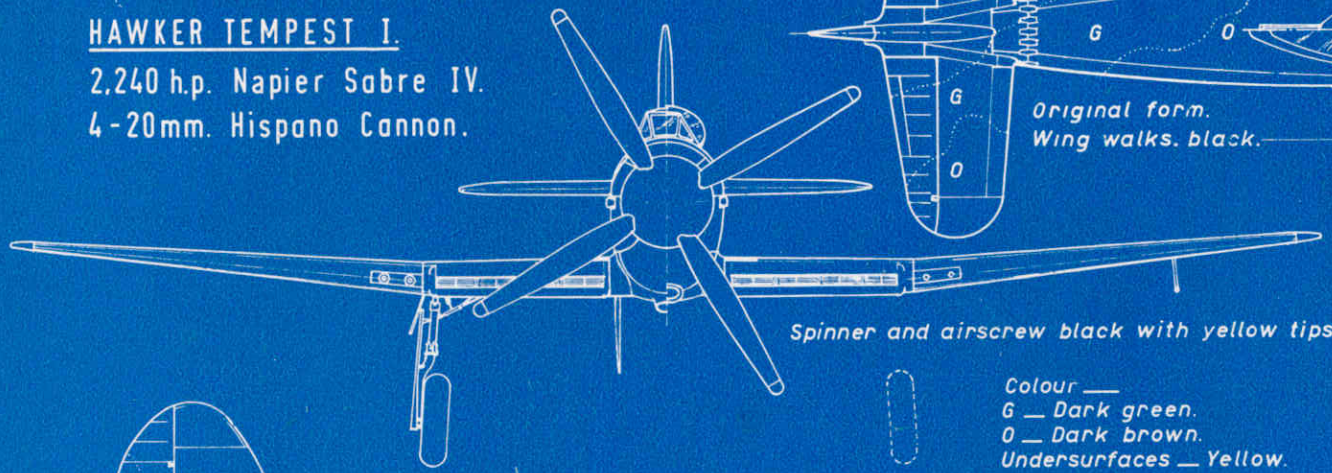


'P' in ring [prototype] yellow.
'HM 599' black.

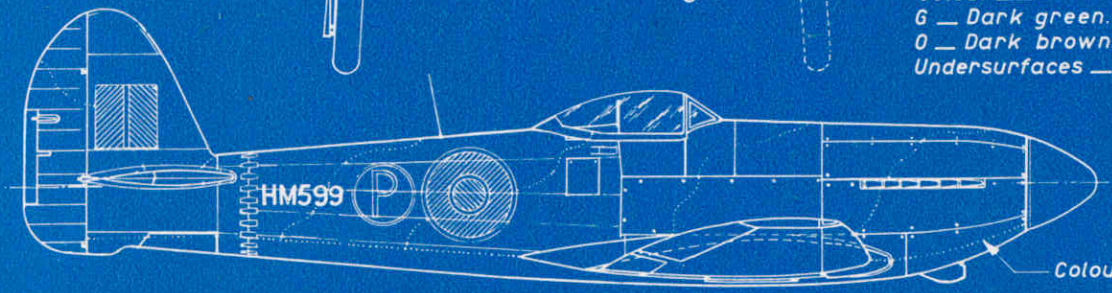
Original form with long canopy and projecting cannon.

HAWKER TEMPEST I.

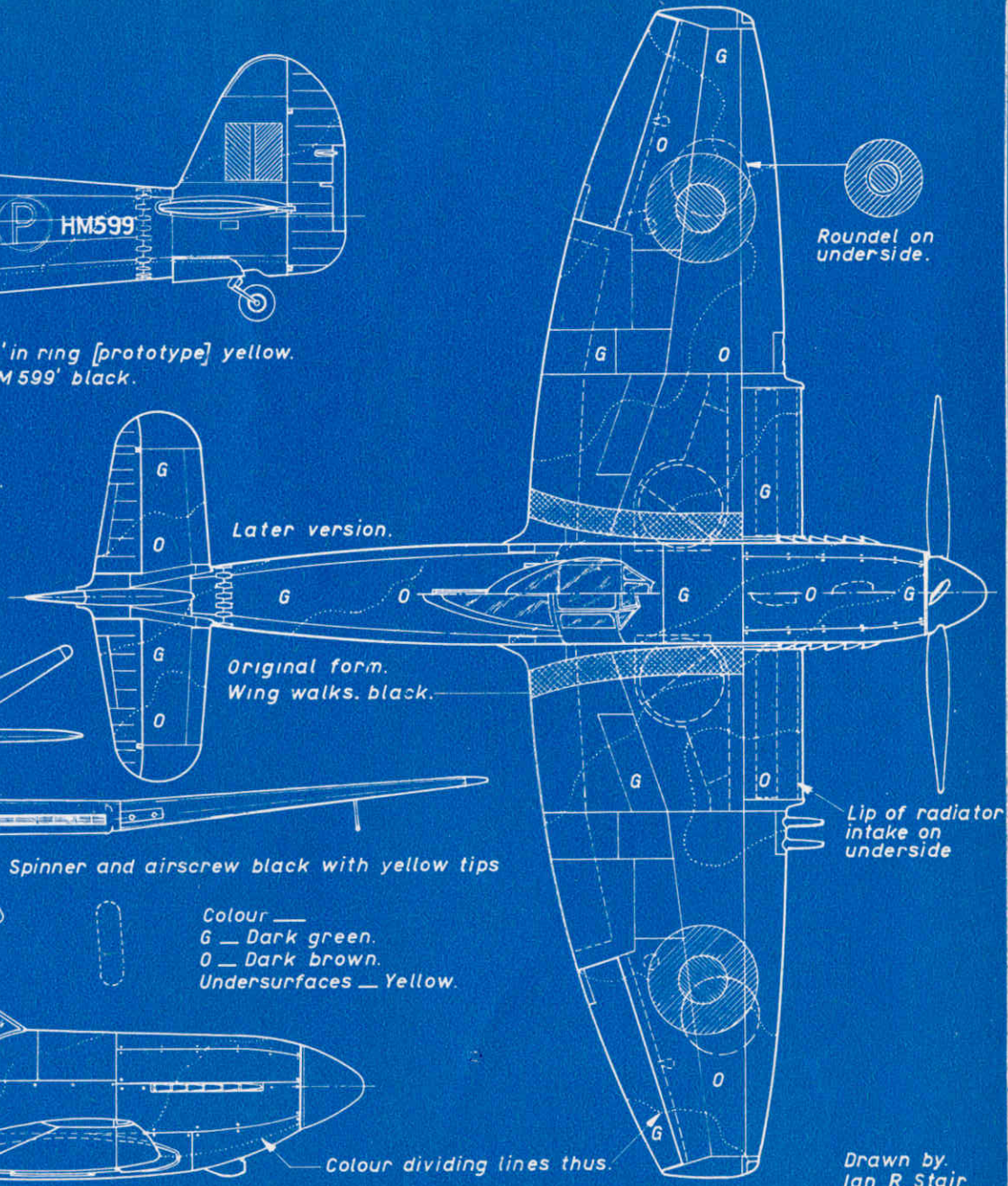
2,240 h.p. Napier Sabre IV.
4-20mm. Hispano Cannon.



Spinner and airscrew black with yellow tips



Later modification with bubble canopy.



Colour —
G — Dark green.
O — Dark brown.
Undersurfaces — Yellow.

Drawn by.
Ian R. Stair.

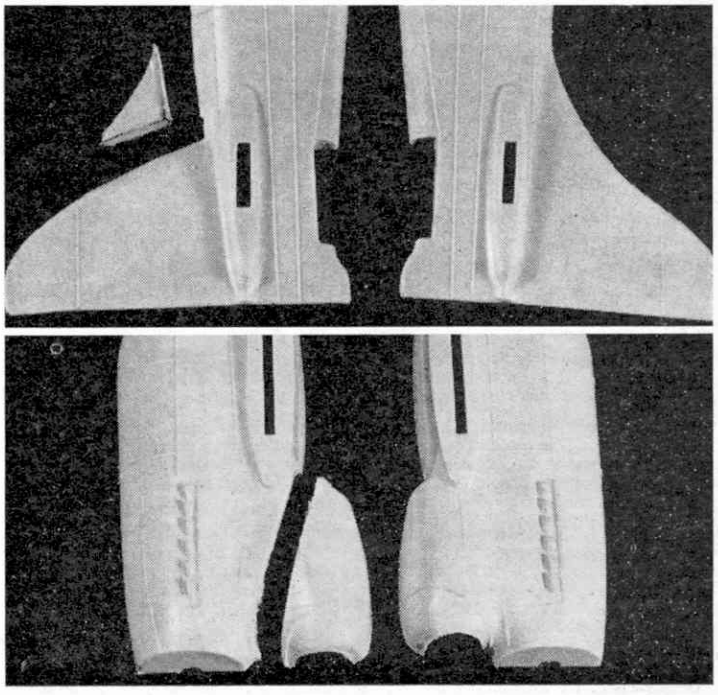
Scale.
12" 0 1' 2' 3' 4' 5' 6' 7' 8' 9' 10'

Hawker's Beauty

Plastic kit conversion addicts can have a field day with the latest Frog 1/72 scale Tempest V. There were numerous experimental revisions of the Tempest, any of which would make highly interesting model projects, but Doug McHard chose the very first Tempest I prototype, for this month's feature not only for it's sleek 'Spitfire-like' lines but also because it is a fairly uncomplicated conversion. Our heading photo shows the results of our labours 'flying' in formation with a Tempest V built straight from the kit, in the colours of French ace Pierre Closterman. The beautiful shape of the prototype was, as you can see, largely lost in the production machine, but there's no denying the bulldog-like aggressiveness of this classic aeroplane. John Taylor writes about it on page 24.

1 The fin must be cut down to remove the dorsal fairing. Use a knife or razor saw and restore the streamlined leading edge shape with file and fine abrasive paper

2 The 'beard radiator' must be sawn off, but be careful to leave the circular nose section un-cut



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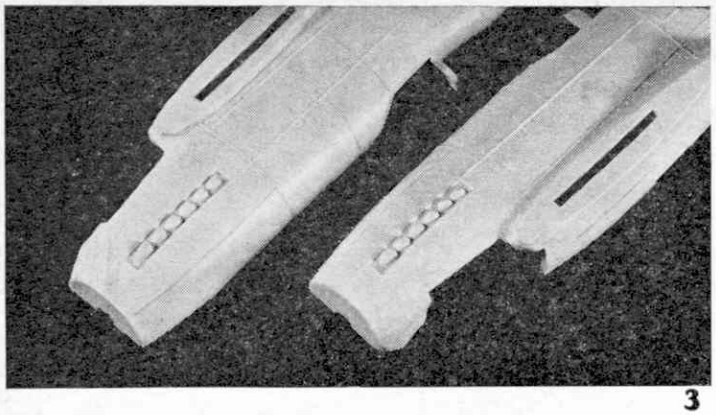

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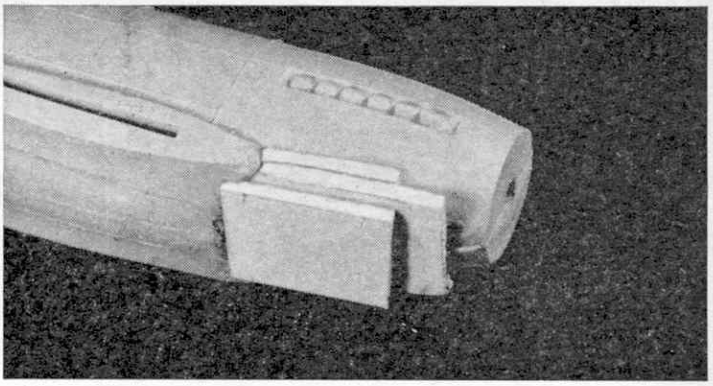

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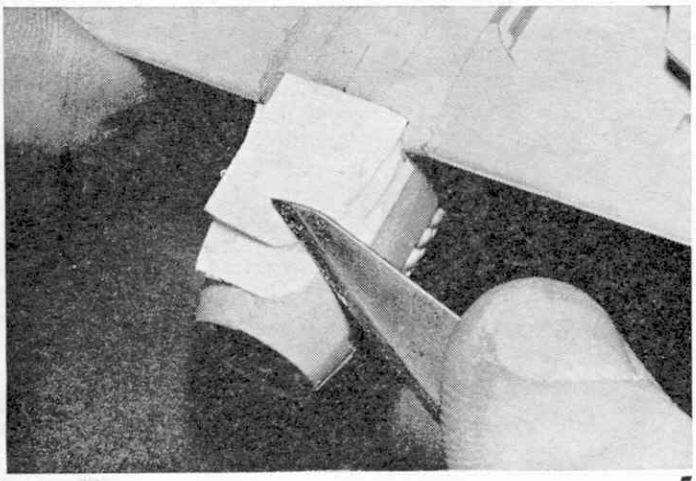

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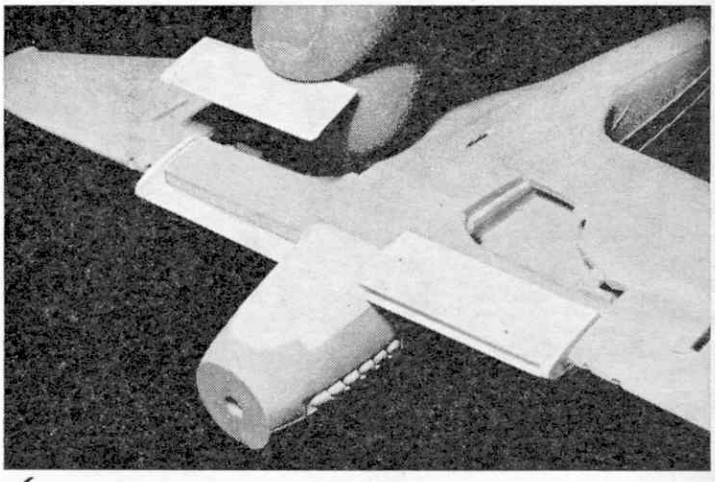

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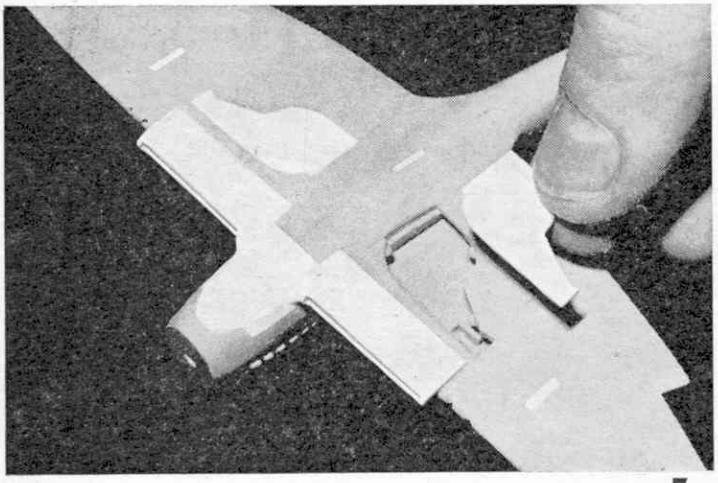

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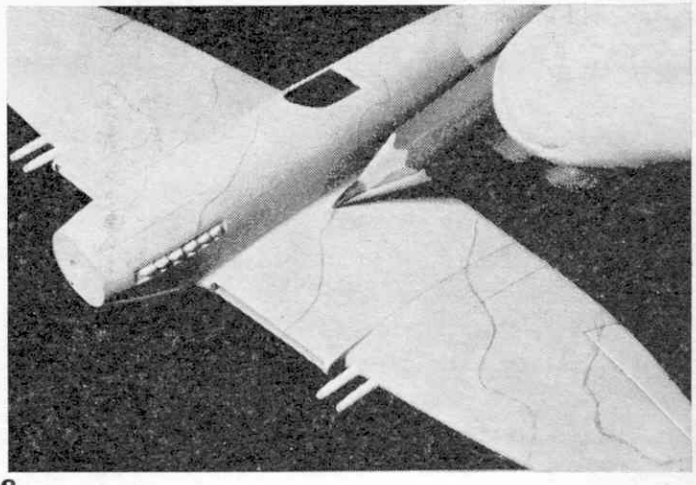


8

3 Cut away the remainder of the radiator side bulges and file the resulting cut-out to a 'square' shape

4 Cement the fuselage sides together and fill in the nose underside with small pieces of $\frac{1}{16}$ in. styrene sheet (Plastikard). We needed three small rectangles to do the job. Use a liquid cement such as Mek Pak rather than a tube cement and allow to dry overnight

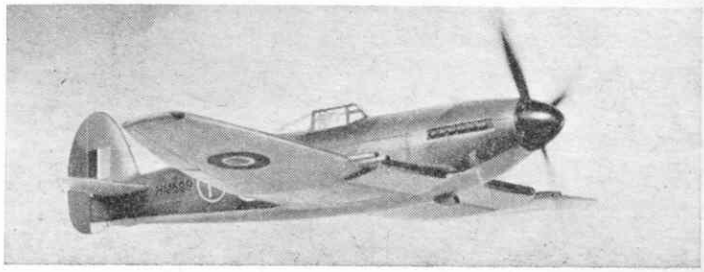
5 When you are sure the cement is *completely* dry (tube cement will take much longer than liquid), carve and file the nose to its new shape. Use body putty to fill in any gaps that remain after shaping.

6 The inner wing leading edges are now filed flat and the radiator divisions scored on the front face. The top and bottom of the wing radiators are cut from thin (20 or 30 thou.) styrene sheet and outer end plates cut to fit. The rear edge of the top radiator piece is filed to a feather edge to blend with the wing upper surface, but the lower piece is left un-tapered

7 Radiators and nose complete. A further refinement (if the wheels are to be 'retracted') is to cut a new wheel-well cover in thin styrene to replace the two-part covers supplied with the kit. Notice that the underwing slots for the external armament, and the fuselage slot for the stand have been filled in with styrene wedges and smoothed over. The inner end of the wing radiator is also 'faired in' with body putty. (Compare with photo 6)

8 The wing cannon barrels are made from the unused 'rockets' supplied with the original kit and the wing gun blisters must be cut off. After painting all the upper surfaces in dark earth, the areas to be coloured dark green are marked with a soft pencil. All undersides are painted yellow

Other points to note. A small air intake under the nose must be made from spare plastic moulding sprue. Our heading photo shows the modified model as the *first* prototype which had the original Typhoon-type long cockpit canopy. Details of cockpit moulding were given in the April 1966 Meccano Magazine for those who wish to duplicate our efforts. However, it would be equally correct to employ the hood supplied with the kit, since the prototype Tempest was later fitted with this. If this version is made, the cannon barrels should be omitted, and the small nose intake should be moved forward slightly. The registration HM 599 remains the same



From Typhoon to Tempest

The Typhoon, a troublesome aeroplane at first, paved the way for its remarkable successor, the Tempest. This month, John W. R. Taylor describes the machines which caught and destroyed enemy flying bombs during the last exciting days of the piston-engined fighter.

OF all the aircraft developed by the Hawker company during the 40 years when Sir Sydney Camm led its design team, only one suffered structural failure. This was the Typhoon single-seat fighter.

Unlike its predecessor, the Hurricane, the Typhoon had a more modern metal-covered semi-monocoque rear fuselage. The prototype took off for the first time on February 24, 1940, powered by a 2,100 h.p. Napier Sabre engine. A few weeks later, on May 9, while it was being flown by Hawker's Chief Experimental Test Pilot, Philip Lucas, the fuselage cracked open just behind the cockpit. Instead of baling out, Lucas stayed with the aircraft, which might have broken up completely at any moment, and landed it safely. His courage earned him the George Medal and enabled the cause of the failure to be determined quickly.

Unfortunately, this was not the end of the Typhoon's troubles. Persistent failure of the insufficiently-developed Sabre engine led to so many forced landings that pilots began to talk scathingly of 'Typhoon gliders'. Even worse, the aircraft showed a horrible tendency to lose its whole tail when dived at high speed and several pilots were killed when this happened.

Hawker's design team could hardly be blamed for this. Over in America the same thing was happening to Lockheed's P-38 Lightnings, for the same reason. The Typhoon was the first over-400 m.p.h. British fighter. In a dive, it reached 500 m.p.h., at which speed the airflow over the thick wing approached near enough to the speed of sound for the aircraft to run into 'sound barrier' problems. Shock-waves of air buffeted the airframe like blows from a mighty sledge-hammer until, eventually, the loads on the aircraft became so great that the tail snapped off.

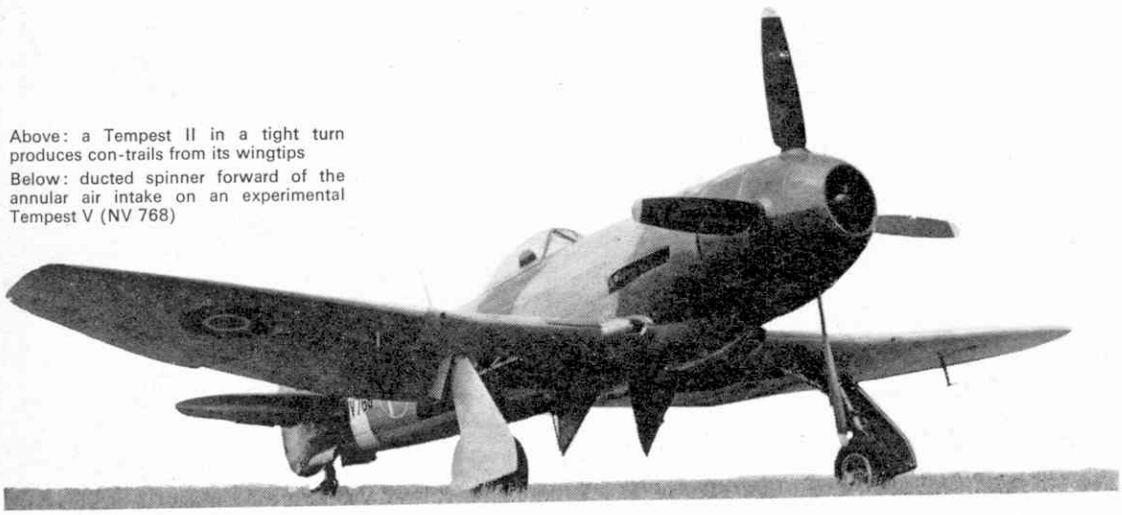
By strengthening the rear fuselage, Hawker's made the Typhoon completely airworthy and it ended up as one of the most effective ground attack fighters of the war, sweeping a path through Northern France for the Allied armies in 1944-45. But Camm had realised as early as 1940 that the real answer to the problem was to fit a thinner wing, which would eliminate the shock-wave problems at the kind of speeds attainable with piston-engined fighters.

In technical terms, the Typhoon wing had a thickness/chord ratio of 18 per cent. This means that, at the point where the wing was attached to the fuselage, its thickness was equivalent to nearly one-fifth of the distance from the leading-edge to the trailing-edge. Camm's staff designed a new wing with a thickness/chord ratio of only 14·5 per cent at the fuselage end, decreasing to 10 per cent at the tip. Maximum thickness was five inches less than that of the Typhoon's wing.

A Mark II version of the Typhoon was designed to utilise the new wing and was submitted to the Air Ministry as Hawker's answer to the requirements of the official Specification F.10/41. On November 18, 1941 two prototypes were ordered, followed soon by a contract for four more and then by an order for 400 production models in August 1942, before even the first prototype had flown. There could be no better indication of the confidence the R.A.F. had in Hawker products or of how desperately the new fighter was needed.

Above: a Tempest II in a tight turn produces con-trails from its wingtips

Below: ducted spinner forward of the annular air intake on an experimental Tempest V (NV 768)



To reduce the fire risk to the pilot, the Air Ministry had laid down some years earlier that all fuel should be carried in the wings of combat aircraft. However, the thin wings of the Typhoon II could not hold so much fuel as the thicker wings of the Mk. I; so an additional tank was installed in the fuselage, immediately behind the Sabre engine. It was soon decided that the two Marks were so different that the Mk. II ought to be renamed, and it became the Tempest.

Several different versions were designed, but the one that seemed to hold most promise was the Tempest Mk. I. This not only had the more powerful Sabre IV engine, but was fitted with new radiators, buried in the wing leading-edges, in place of the big 'chin' radiator of the Typhoon. Its engine could, therefore, be closely cowled, making it by far the most elegant of the Tempest family.

The Mk. II was designed around a 2,520 h.p. Bristol Centaurus radial engine, and the Mks. III and IV (which were not built) around Rolls-Royce Griffon engines.

In the event, the first prototype to fly, on September 2, 1942, was the Tempest Mk. V, HM595. This had the same 2,180 h.p. Sabre II engine, chin radiator, tail unit and cockpit canopy as the Typhoons then in production. Flight trials showed the need for a dorsal fin and increased tailplane area to 'balance' the longer nose; otherwise, the new aircraft proved every bit as good as had been expected. So, as the Sabre IV engine was giving trouble, the Air Ministry ordered the Tempest V into production instead of the Mk. I.

This was not so easy as it might have seemed. Britain's aircraft industry was so short of draughtsmen at the time that some of the design changes made in developing the Tempest from the Typhoon had been worked out by skilled craftsmen in the Experimental Workshops, without drawings to help them. They claimed that the result was a far better aeroplane; unfortunately, without a full set of drawings, it was almost impossible to build any more!

The only solution was to produce the missing drawings by taking measurements and other details from the prototype between test flights. Only one member of the design team could be spared to go to the production and test centre at Langley, in Buckinghamshire, for this job, and I was lucky enough to be chosen, although only twenty years old at the time. An Assistant Chief Draughtsman came to Langley once or twice a week to check progress and give me the benefit of his vastly superior experience.

In this way, all the necessary drawings were soon produced and the first production Tempest V (JN729) flew for the first time on June 21, 1943. The initial batch of 100 aircraft were each armed with four 20-mm. Hispano Mk. II cannon, the barrels of which protruded from the wing leading-edges, and were known as Tempest V Series 1 fighters. Later aircraft, with Hispano Mk. V guns fully enclosed in the wings, were designated Series 2. All had an improved, rearward-sliding canopy.

Top speed of these aircraft in level flight was 426 m.p.h., making them among the fastest of their day (faster than even the first Meteor jet-fighters). The Tempest I (HM599), which flew on February 24, 1943, was even faster, with a maximum speed of 466 m.p.h.; but the Sabre IV did not go into production and this version was abandoned. The first Tempest II (LA602) flew on June 28, 1943, and this version was built in considerable numbers, but was not ready in time to see any action in World War II.

The Tempest V, on the other hand, arrived in service at precisely the right moment. Fifty were delivered to Nos. 3 and 486 Squadrons in April 1944 and by mid-year No. 56 had also exchanged its Typhoons for Tempests. These three Squadrons made up the first Tempest Wing, based at Newchurch in Kent, under the leadership of Wing Cdr. R. P. Beamont, D.S.O., D.F.C., then one of the R.A.F.'s leading fighter aces and equally well known today as the man responsible for flight testing of the Lightning fighter and Canberra and TSR.2 bombers.

Initially these Squadrons flew their Tempests over Northern France, Holland and Belgium, leaving behind a trail of wrecked airfields, radar stations, rail targets, bridges and other objectives. Then the Germans launched their V-1 flying bomb attack on Britain and the Tempest Wing was switched to home defence.

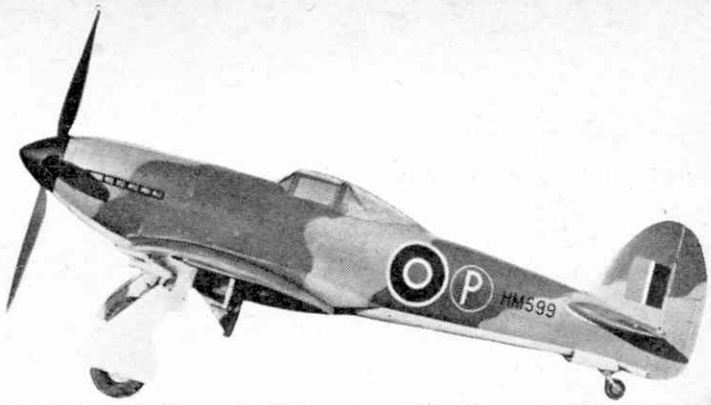
With an unrivalled cruising speed of 335 m.p.h., the Tempests needed to accelerate only a little to catch and destroy any V-1 spotted on its way to London. Between June 13 and September 5, 1944, eight Tempest V Squadrons destroyed 638 of the 1,771 flying bombs brought down by the R.A.F., Beamont alone claiming 32. Although the V-1's could not shoot back, the work was not without its hazards. Often the pilots had to fly through a cloud of flaming debris after their cannon-fire blew a V-1 to pieces, and we did not need to ask why when the Air Ministry requested us to coat the fabric tail surfaces of new Tempests with fireproof paint.

After the V-1's had been beaten, the Tempests were taken to France, where they achieved great success, not only in shooting up ground targets with guns, bombs and rockets, but in shooting down a number of the *Luftwaffe's* formidable Messerschmitt Me 262 jet fighters.

Only 805 Tempest V's were built, as many others were cancelled when the war ended. To them must be added 450 Tempest II's and 142 Tempest VI's which differed from the Mk. V in having a 2,340 h.p. Sabre V engine. All three versions remained in service for some years after the war. Many V's and VI's ended their days as target tugs and there were several experimental versions of the Tempest V, including one (SN354) armed with a pair of 40-mm. guns in underwing pods and another (NV768) with an annular radiator that made it look like a radial-engined aircraft.

Today, just two Tempests remain—a Mk. II in the R.A.F. Museum at Henlow and a Mk. V in the Skyfame collection—to remind us of the last great days of the piston-engined fighter

Data (Mk. V): Span, 41 ft. 0 in.; length, 33 ft. 8 in.; height, 16 ft. 1 in.; wing area, 302 sq. ft.; weight empty, 9,000 lb., loaded with two 1,000-lb. bombs, 13,540 lb.; max. speed, 426 m.p.h. at 18,500 ft.; climb to 15,000 ft. in 5 min.; service ceiling, 36,500 ft.; max. range, 1,530 miles.



Above: the original Tempest I with long canopy. Below: the same machine now fitted with blister hood. Bottom: a fine underside view of a Tempest V showing the white identification bands (compare with photo on Facing Page)