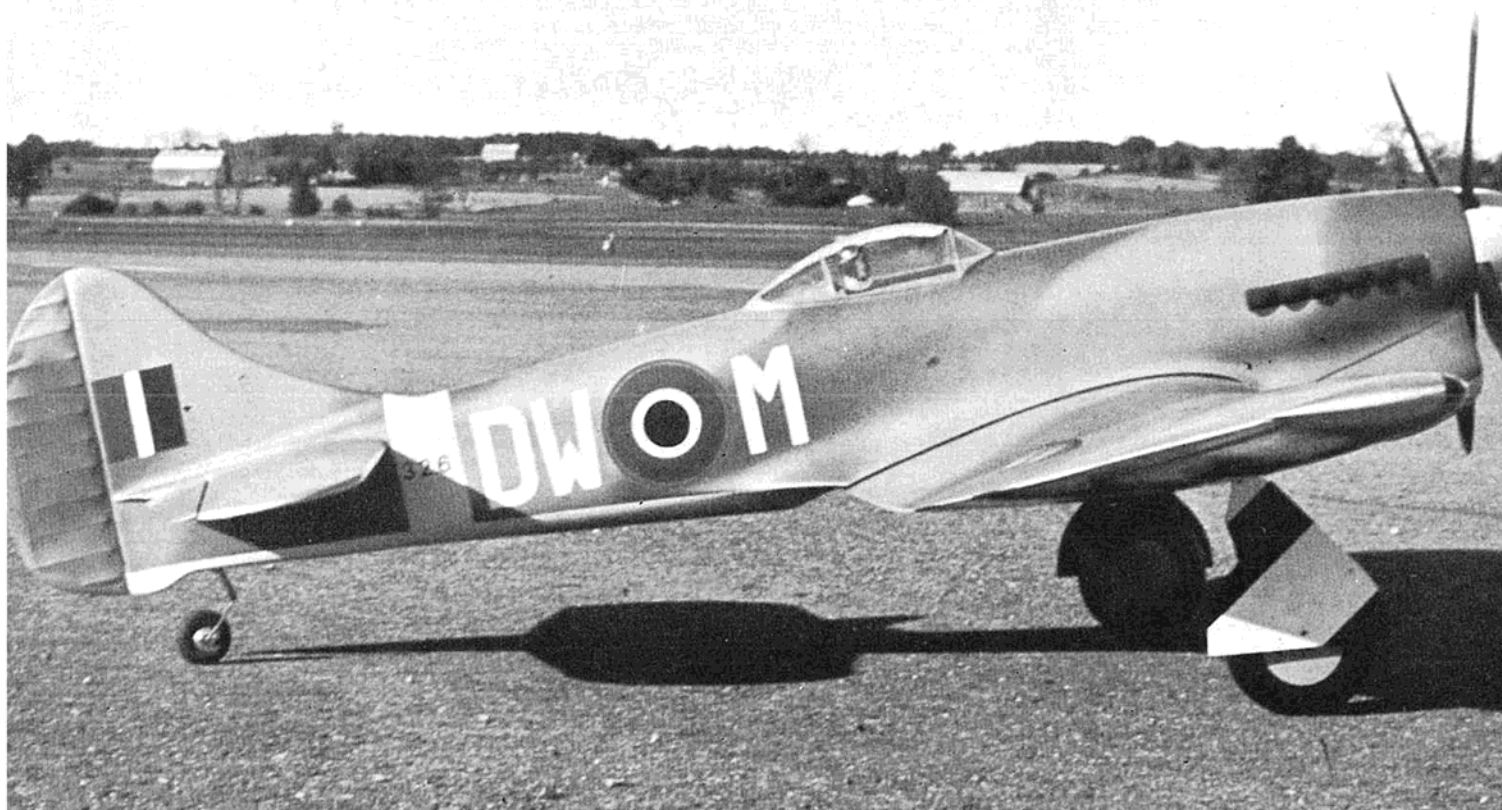


# HAWKER TEMPEST



By Don W. McTaggart

AN RCM CONSTRUCTION FEATURE



The Hawker Tempest marked the end of the second era for a thoroughbred breed of aircraft.

Harry Hawker had been there in the beginning of the "Age of Flight" at the turn of the century. He had helped Sopwith produce the Camel that proved to be one of the most important fighters in the first war in the air. From the Camel, Sopwith had developed the Snipe, which has been described as the "best single-seater scout of the Allied air forces". However, the Snipe was in active service for only a few months before 1918.

Harry G. Hawker is not often associated with those early years, but his pilot's license number 297 attests to his pioneering. Before 1914 he had joined Sopwith after leaving his native Australia. He and T. O. M. Sopwith worked together in the construction of many famous Sopwith airplanes.

There was a striking parallel in the second era. Hawker produced the Hurricane, which, like the Camel, proved to be one of the most outstanding aircraft in the second war in the air.

As the Snipe was the final war-time evolution from the Camel, so was the Tempest the final war-time descendant of the Hurricane. It was the last, and probably the ultimate medium and low-level piston-driven aircraft of World War II. Sir Sidney Camm, the chief designer for Hawker had developed it as a replacement for the Hurricane — hero of the Battle of Britain — and the Typhoon.

The prototype Tempest flew in September, 1942, and exceeded 477 m.p.h. In June, 1944, Tempest V's made contact with enemy aircraft for the first time, and destroyed three ME109G fighters without loss of their own.

To the end of the war the Tempest was the fastest medium-altitude fighter in production, other than the Gloster Meteor and ME262 jets, and the rocket ME263. In fact when the Meteor was first put into service the Tempest could actually overtake it. Tempests destroyed twenty ME262's, and 638 ram jet "Buzz bombs" in addition to assorted aircraft, boats, and ground targets, according to official records. This spectacular performance was made possible by the 24-cylinder Napier Sabre engine which developed from 2,400 to 3,055 brake horsepower. With a span of 41 feet, this 7-ton aircraft had an initial rate of climb of 4,700 feet a minute from level flight. It had an official speed of 435 m.p.h. at 17,000 feet. At 4,600 feet it would do 416 m.p.h. An interesting thought for unlimited pylon!

The R. C. A. F. had Typhoon squadrons but Tempests were issued only to the R. A. F. However, a number of R. C. A. F. pilots serving in the R. A. F. flew the Tempest. They include some who became "aces":

- Flying Officer D. E. Ness, D. F. C.,
- Flying Officer J. W. Garland, D. F. C., and an American in the R. C. A. F., Squadron Leader D. C. Fairbanks, D. F. C. and two Bars.
- Wing Commander J. F. Edwards D. F. C. and bar, D. F. M.

I wonder where they are now? The Tempest remained in service until 1953.

I must admit that the powerful, fast look of the Typhoon and Tempest has intrigued

me since the first day I saw one. In 1943 when we arrived in Bournemouth with the R. C. A. F. these aircraft would fill us with envy by "shooting up" the new arrivals. After skimming the wave tops they would fly right into the town park from the sea, then pull up to a vertical roll, and disappear in a dot overhead, — well over 10,000 feet in less than 3 minutes!

The Tempest easily lends itself to a scale radio-controlled model. It has a wide-track undercarriage, and the large diameter wheels help on our rough flying field north of Toronto. It has a longer nose-moment than the Typhoon. The cowl gives ample protection for an inverted engine. I did feel it necessary to increase the area of the stabilizer.

It was a pleasant surprise to find that the model needed no trim adjustment and on the first couple of flights it wheeled in

saw after sheeting, then fitted and covered with the wing.

**The Empennage:** The stab and rudder are straightforward. After the covered stab has been inserted and epoxied into the hole in the fuselage, the elevator is attached and the trailing edge added. The fillets can be finished with polyester putty. Nylon hinges are pinned in with sharpened tooth-picks and flush finished. The rudder post was extended to the bottom of the fuselage for strength and as a support for the nylon hinge.

**The Fuselage:** The fuselage, spinner, and chin radiator cowl were made of fiberglass as described in the February, 1966 issue of R. C. M. All joining was done with commercial epoxy adhesive (available in pints) or the faster hardening Hobby-poxy glue. The motor and firewall were positioned by screwing the motor to its

**T**HE two attacking aircraft were now too close behind to outmaneuver with steep turns. His speed had dropped almost to the critical 300 m.p.h. where the German aircraft had the advantage of a tighter turning radius than his Tempest. They would soon be able to turn inside the arcs of white vapour forming at his wing tips. He feared the moment when they would get enough deflection to score with their devastating 30 mm. cannon, and fear made seconds seem like minutes.

He kicked his aircraft into a tight spiral dive. The speed built up to almost 500 m.p.h. — then up into a perpendicular climb that blacked him out for another minute-long second. The acceleration of the seven ton Tempest going down, and its fantastic climb with its 3,000 h.p. Sabre engine enabled him to position himself for attack after a roll off the top. At 8,000 feet he removed his feet from the top of the rudder pedals where he had placed them in anticipation of the high "G" force of the pull-out. He was more deliberate now. The two black-crossed aircraft were below him. They had been unable to follow, and had lost him momentarily.

As they turned away from him he became the hunter. With a fast shallow dive he carefully crept the dimly glowing outer ring of his gun sight over his quarry. He held the deflection and felt the Tempest shudder as he fired the Fan cannon and broke away below the wreckage.

as smooth as a kitten's wrist. Some of my subsequent flights were not so uneventful, but she's still in one piece.

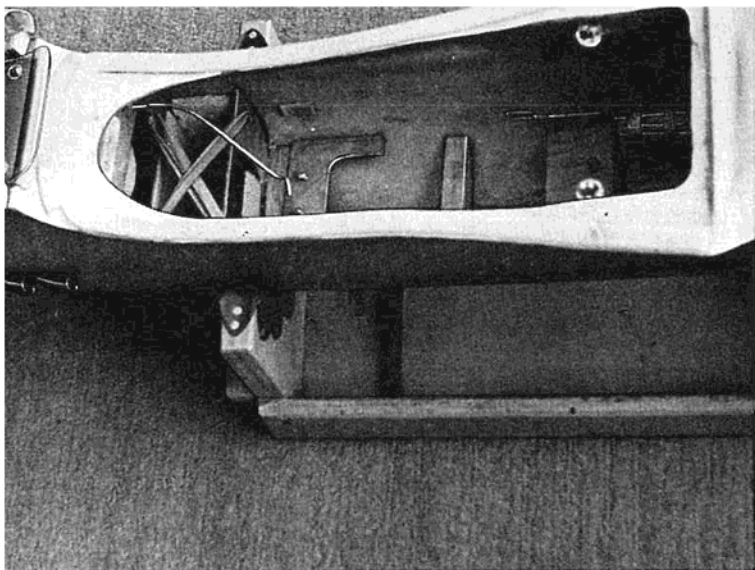
#### Construction

**The Wing:** The construction was not unusual excepting the flat center panel and elliptical shape. Note the break-away feature for cam-locks. The center panel was of heavier build than may be necessary. It supports the main undercart which has to be rugged when I am landing. The Top-Flite type of torsion-bar gear was used and all hardwood parts were epoxied or white glued for strength. Be sure the center section is built flat. The outer panels, however, should be jiggled for  $\frac{3}{8}$ " washout at the tips, i.e. negative incidence, to prevent "tip-stall". The wing tip blocks are large and should be hollowed.

When joining the three sections, trim the outer ones to give  $3\frac{1}{2}$ " dihedral at each tip. Be sure the incidence is the same on both sides. The entire wing is sheeted with  $\frac{3}{32}$ " balsa. Strips of  $\frac{1}{8}$ " square balsa were glued inside the leading edge as shown in the photograph. They supported the sheeting at the front of the wing. The center section, and section joints were covered with fiberglass and resin with a double layer where the fuselage meets the wing. Fiberglassing can be done without showing by using the fine grade of cloth from Sig. When smoothed, the wing should be silked and doped. Ailerons were built integrally with the wing and cut out with an X-acto

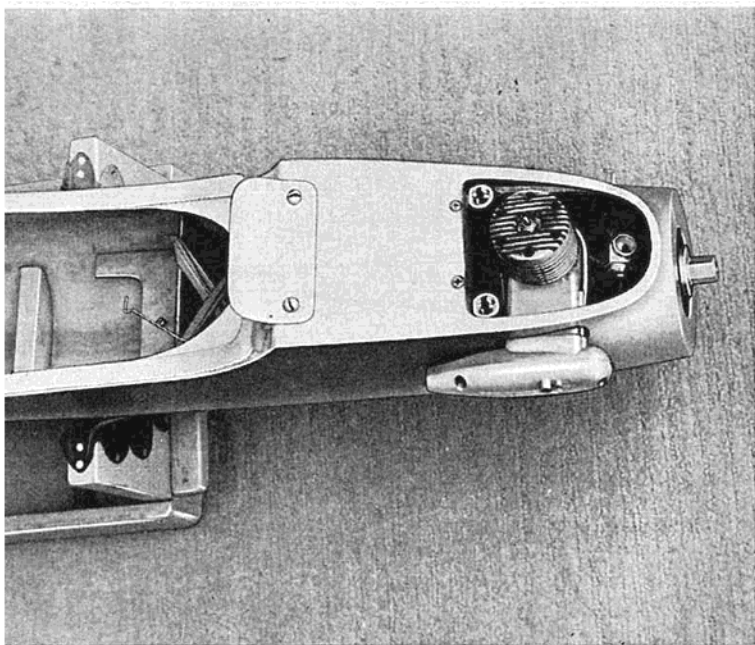
Tatone mount and mounting the prop shaft through the center of a metal disc (the disc was also used to align the fuselage halves when they were being joined) before putting the motor into the fuselage. This disc was then screwed to the front of the fuselage (which was the same diameter). By doing this the motor and mount were suspended within the fuselage in precisely the right location. It was only necessary to move the firewall forward flush with the back of the Tatone mount (which was wet with epoxy), and epoxy the firewall to the interior of the fuselage. When the resin had hardened the Tatone mount was in place on the firewall, and the firewall was accurately located in the fuselage. The disc was then removed, and the Tatone mount was drilled and bolted securely. I had elected to cant the motor a few degrees for better accessibility and muffler location.

The chin cowl was fastened through its plywood frame with cam-lock screws to the fittings on the fuselage firewall. To achieve accurate positioning of the cowl it was fitted, then assembled while on the finished fuselage. The plywood frame was cam-locked in place, over a protective sheet of Saran wrap to prevent getting epoxy on the fuselage. Generous amounts of epoxy glue were used to join the cowl to the edge of the frame. Small wood screws were used to hold it in place. After the epoxy had hardened they were

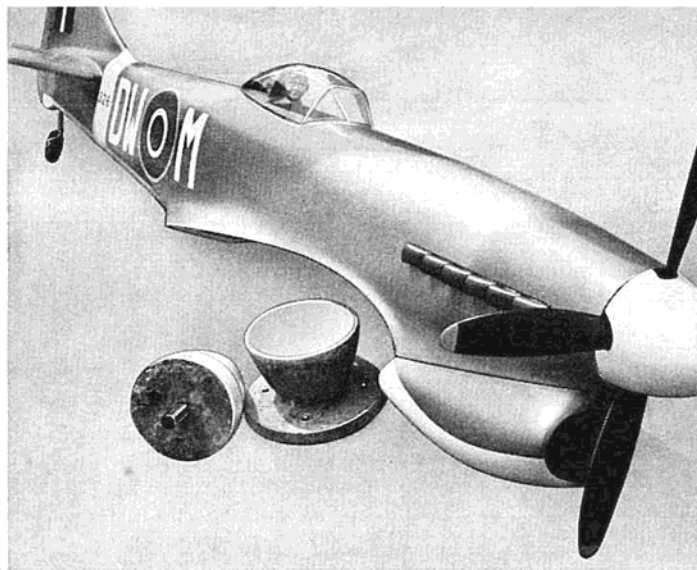
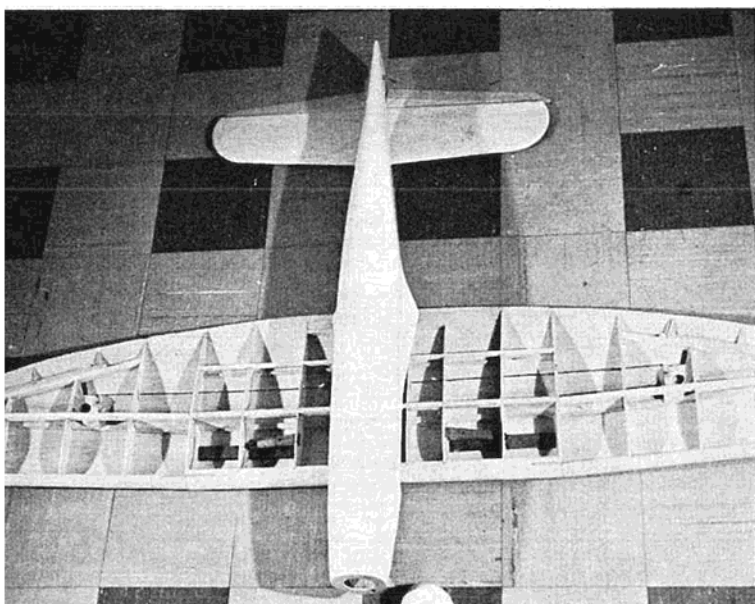


The wing saddle and Cam-Locks, receiver and servo mounts, the base of the fuel tank shows through the bulkhead. The cowling is positioned at the rear by the aluminum wing support.

Detail of the motor mounting and muffler. The chin cowl has been removed and the Cam-lock fittings can be seen on the firewall. Close attention to detail pays off in points!

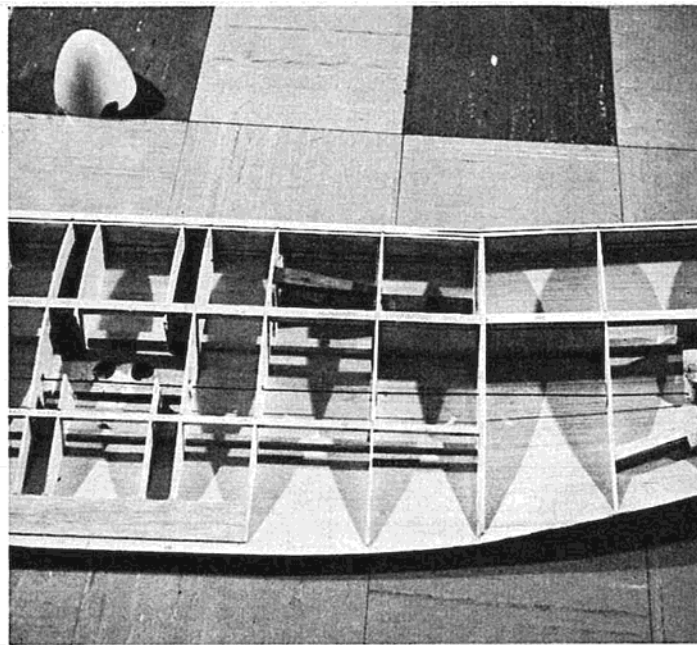


The unfinished Tempest parts before fitting.



The Pine "Plug" for the female mold. A plywood disc was fiber-glassed to the mold to attach to the lathe face-plate. This made it possible to turn the inside of the finished spinner.

The detail of the wing before covering. The servo on the left, Bellcrank and Aileron on the right. Center section modified later for "Break-Away" discs.



The Camouflage on the upper surface is olive drab and gray.



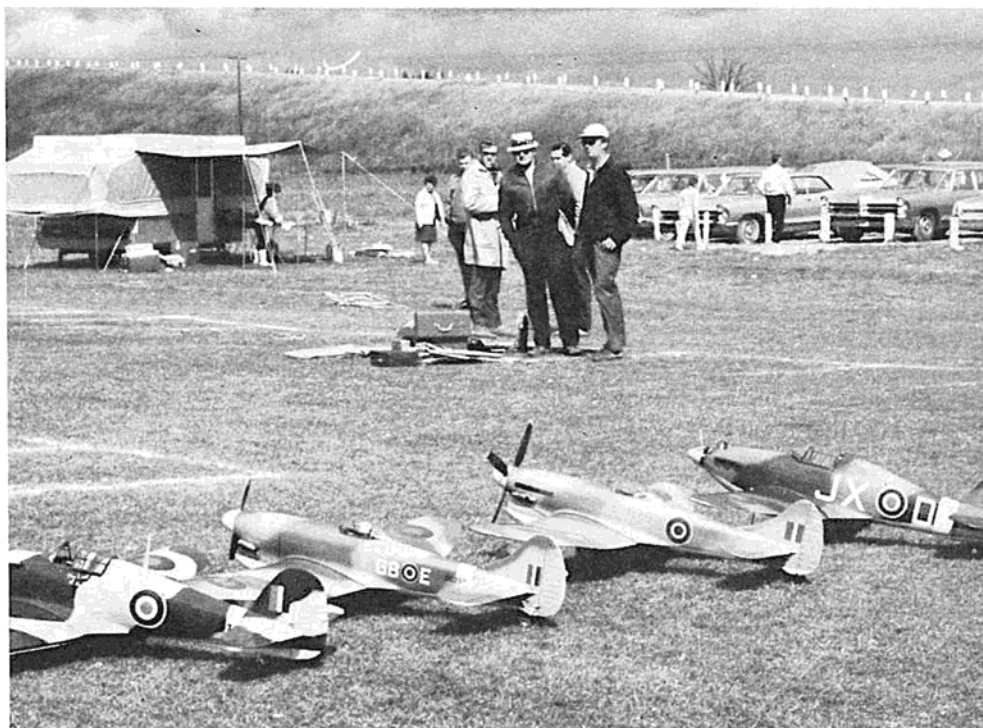
removed and the holes filled. The aluminum wing support also served to keep the cowl straight when positioned between the ends of the plywood frame.

The spinner was a problem. The first one blew apart from centrifugal force, but thicker walls solved that problem. The master spinner "plug" was turned on a lathe. The female mold was mounted on a plywood disc, then turned true before releasing from the "plug." This enabled me to mount the mold containing the final spinner on the face-plate of the lathe. The inside of the spinner was turned in the mold before releasing it. A little turning on the inside takes off the rough spots and makes it easier to balance. It is also necessary to cut a groove for the aluminum back plate. The  $\frac{5}{8}$ " hole for the retaining cone was started on the lathe for centering, but completely drilled through only after the spinner was released. This prevented damaging the mold. You can turn a retaining cone from aluminum, or use one from a Veco spinner. The connecting spindle is a length of  $\frac{1}{4}$ " rod (actually a section from a stove bolt). If you are concerned about weight it can be made of aluminum. In either case, they should be threaded with a  $\frac{1}{4}$ " 28 tap. Spinner balancing was done in the same fashion as for a prop. A shaft was turned to a point at both ends, and supported the spinner in a "U"-shaped frame. Polyester putty applied to the interior of the spinner was used as a counterbalance. The back plate was also checked for balance and metal drilled out where necessary. It is not essential to use a propeller shaft extension, but it will give easier access to the fuel tube and throttle.

The undercarriage is not radically different. The elbow bend in the front gear prevents the undercarriage covers from turning on the undercarriage rod. The galvanized tin clamps are held with self-tapping screws. The undercarriage covers were cut from an aluminum cake pan. The tail wheel rod was mounted in a birch block and the metal horn soldered around the top end of the shaft and drilled. The unit was positioned over the control rod slot in the fuselage and epoxied in place before the two halves were joined. The linkage should be adjusted to give the wheel less throw than the rudder.

The canopy "plug" was fashioned in balsa and finished in epoxy. The simulated canopy frame was outlined clearly by using wire. Butyrate sheet was then heat formed over the mold. It is important that both the mold and the butyrate sheet are hot before pulling the sheet over the mold. This can be done in the kitchen oven when your wife is out to her bridge club!

Painting was done with a Miller air-brush after all blemishes were filled and fine sanded with loving care. Dope was used everywhere but on the spinner and undercarriage covers. These parts were painted with HobbyPox. The fuselage was sanded and all parts were sprayed with clear dope which proved to be adequate to ensure bonding. The camouflage pattern should be adhered to as it was standardized by the R.A.F. My references were photographs from the National Air Museum in Ottawa, and "Aircraft Camouflage" — Harborough. Profile Publications



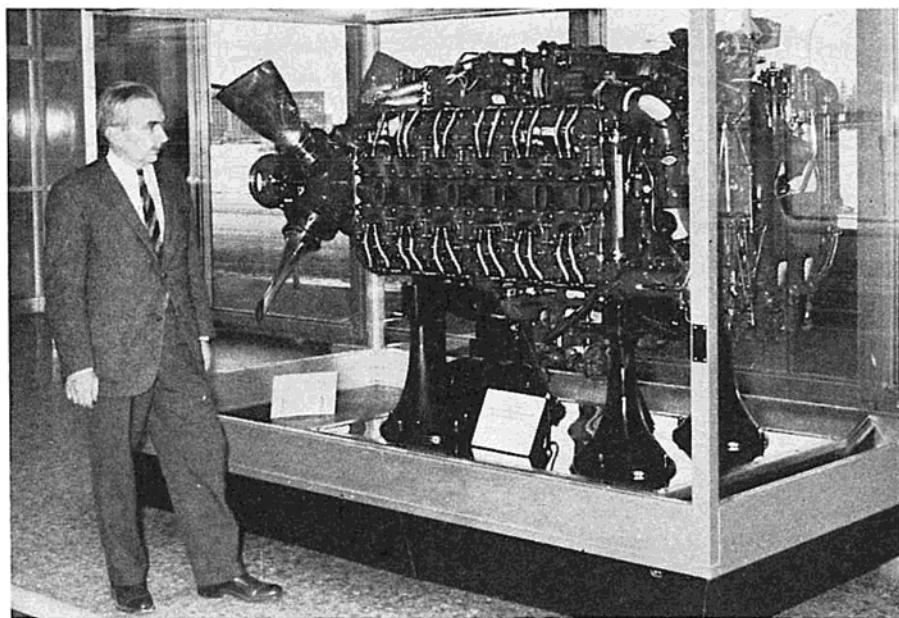
From L. to R.: Hurricane by Tom Deitrich of Kilchener, Ontario; Tempest by Warren Hitchcox of Oakville, Ontario; Tempest by Don McTaggart of Toronto; Hurricane by Ken Dwight of Toronto. Each one has been a winner at least once at various contests.

also has an issue featuring the Tempest. Camouflage colors were olive drab and grey. The belly and spinner were sky blue, and the tail band was robin's egg blue. The "D" Day markings on the underside of the wing were black and white stripes that are very spectacular in a loop or roll.

Flying the Tempest is a real thrill — it handles well and is very realistic. The Merco 61 with a muffler leaves a concentrated vapour trail that traces out the maneuvers. Take-off is a little tricky. There is noticeable torque pull to the left which can lead to a "prang" if you lift

off too quickly. I have evidence of the "prang" — and the vapour trails on 8 mm. color film! The model was featured coast-to-coast in the 1966 Dodge T.V. commercial for Chrysler of Canada. It won first for free style flying in our most recent club contest.

I have two "Tempests," now. The second wing was built of styrofoam quite successfully. Achieving the elliptical curve was done with a second cut with the hot wire. It was possible to trim the sheeting to retain the curve on the trailing edge. The next experiment will be a retractable undercarriage, and sliding canopy.



The 24 cylinder Napier Sabre engine. Mr. K. M. Molson, Curator of the National Aviation Museum in Ottawa was very helpful with information.