Searchlight in the Sky

By John W.R. Taylor

Above: the flat nose and matt black colour scheme distinguishes this Turbinlite-fitted machine, which is the subject of Ian Stair's scale plan on page 24. Below right: this is what it looked like from the pilot's seat

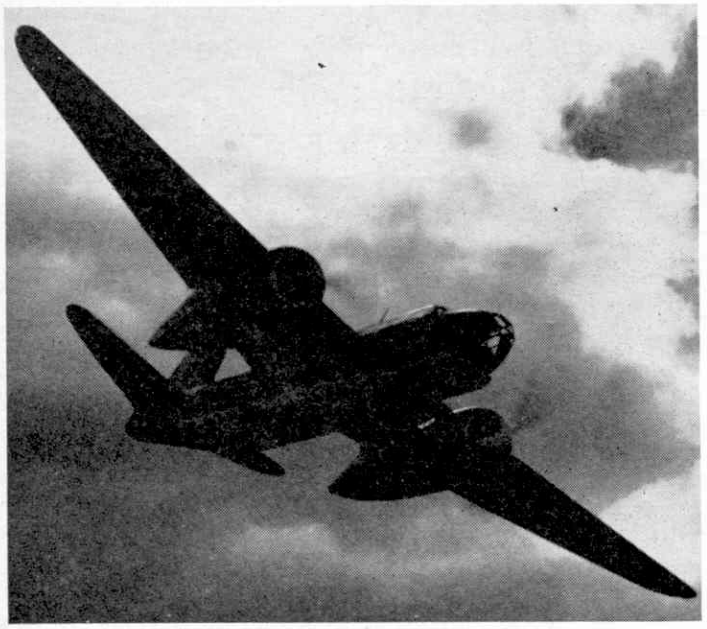
SEARCHLIGHTS, probing the night sky for enemy bombers, were a familiar sight in 1942. However, I was startled one evening when, during a walk by the river at Kingston upon Thames, I saw a searchlight suddenly switched on—not where it ought to have been, on the ground, but several thousand feet up in the air.

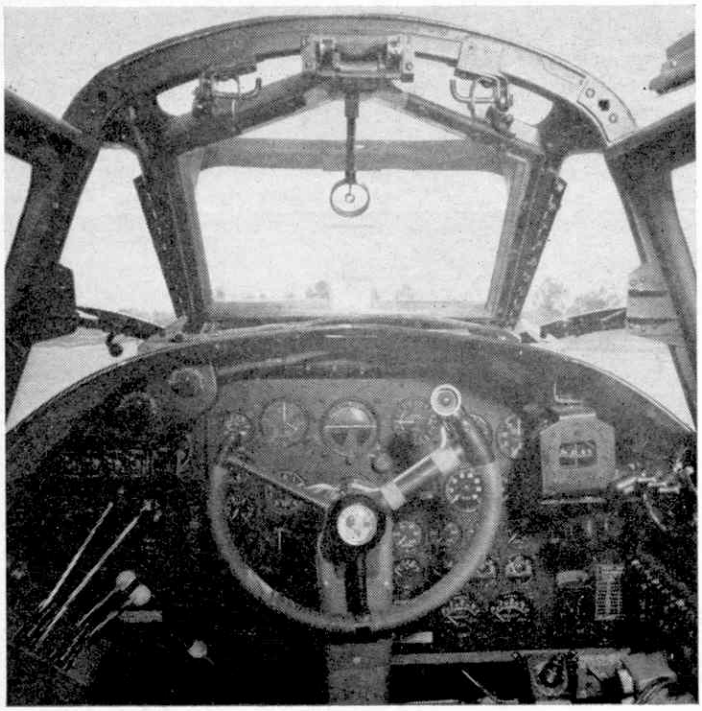
If flying saucers had been in the news at that time, I might have imagined that the Martians, undaunted by Hitler's failure, had decided to invade England. But we were concerned then with large aeroplanes marked with black crosses rather than with little green men with their eyes on stalks! The searchlight that I had seen in the sky was, in fact, only one of many ideas that were being tried out to deal with the German bombers that had trespassed in our night skies for too long.

It was small consolation that the *Luftwaffe* had sought the cover of darkness only because it had been driven from the daylight skies during the Battle of Britain. Bombs are just as unpleasant whether they are dropped by day or night, and at first the enemy had paid only a small price for his heavy attacks on London and other cities.

Between September 7 and November 13, 1940, the *Luftwaffe* had flown more than 12,000 night sorties, directed mainly at London. In all this time, the defences had claimed only 81 German aircraft destroyed —54 by guns, 8 by fighters, 4 by balloons and the rest by other causes. This represented a loss rate of under one per cent of the aircraft sent to attack Britain. As the *Luftwaffe* had more than 1,400 long-range bombers in first-line service, with another 300 a month coming from the Dornier, Heinkel and Junkers factories, it could obviously keep up its raids indefinitely.

Even when R.A.F. fighter pilots were guided by radar stations and the Royal Observer Corps on the ground, it was difficult for them to track down enemy aircraft in the night sky. Consequently, many of the devices tested in 1940-42 were designed to fill the sky with invisible 'curtains' into which the bombers would fly and be destroyed.





One of the first was P.A.C., standing for Parachute and Cable. This consisted of a line of rockets which were fired simultaneously in the path of approaching enemy aircraft. Attached to each rocket was a parachute, with a light steel cable dangling from it. The idea was that the rockets would carry the P.A.C. to a height of about 600 feet, where the parachutes would open so that the cables formed a deadly spider's web of steel in which the bombers would become entangled.

P.A.C. had been used successfully in daylight, before the start of the night 'blitz'. On August 18,1940, a Dornier Do 17 bomber was brought down during a raid on the fighter airfield at Kenley. But the device could be used only against low-flying enemy aircraft and was effective for only the brief period of time taken for the parachutes to descend from 600 feet.

Prime Minister Winston Churchill, backed by the Admiralty, suggested a method of overcoming one of the limitations of P.A.C. Known by the rather unimaginative code-name of 'Mutton', it entailed dropping from high-flying aircraft a series of 'long aerial mines', each consisting of 2,000 feet of piano wire, with a parachute at the top end and a small bomb at the bottom. If any German bomber had been unlucky enough to fly into one of these wires, the pull of the parachute would, in theory, have brought the bomb up against its wing, where it would have exploded and blown the aircraft to pieces.

Test pilots from the Royal Aircraft Establishment, Farnborough, spent many hours flying into unarmed, practice versions of 'Mutton'; but they were the only aircrew to whom the device ever presented any real hazard. The sky is so vast that the possibility of the long aerial mines and enemy raiders being in the same spot at the same moment was remote. Pilots of twin-engined Douglas Havoc Mk. I fighters of No. 420 Flight, based at R.A.F. Middle Wallop, tried desperately to make the idea work, without any success, and it was eventually abandoned. So was a similar scheme which involved hanging a curtain of mines from barrage balloons that were cut adrift and allowed to float into the path of approaching enemy aircraft.

It was against this background of experiment and failure that Wing Comander W. Helmore put forward his suggestion of using airborne searchlights to locate and illuminate enemy bombers, making them sitting ducks for R.A.F. night fighters. G.E.C. were given the task of producing the searchlights, which was known as a Turbinlite. This was no easy job, as a beam of 2,700 million candlepower had to be obtained from equipment compact and light enough to fit into the nose of a high-speed aeroplane.

The problems were solved remarkably quickly, but it had been clear from the start that no fighter would be able to carry radar to track down the target, a Turbinlite to illuminate it *and* armament. It was decided, therefore, to fit the searchlight and radar in the comparatively large Havoc fighter and leave the shooting to the pilots of single-engined Hurricanes who would fly in formation with the Havoc.

Altogether, 31 Mk. I and 39 Mk. II Havocs were fitted with Turbinlites. Vee-shaped A.I. (airborne interception) radar aerials sprouted from each side of their flat noses, and their bomb-bays were packed with batteries to power the searchlight. No fewer than ten squadrons (Nos. 530-539), as well as No. 1422 Flight, operated these aircraft in 1942-43, with little success. The main enemy attack had been called off by then, as a result of the growing losses inflicted on the *Luftwaffe's* night bomber force by the R.A.F.'s radar-equipped Beaufighters and Mosquitoes; the latter aircraft, in particular, were much faster and more effective than the Havoc-Hurricane combinations. One Mosquito Mk. II was fitted experimentally with a Turbinlite; but the airborne searchlight achieved real success only when it was added to the anti-submarine equipment of Coastal Command and used to locate and illuminate surfaced German U-boats at night.

The Havocs used as Turbinlite carriers had an interesting history. They had been ordered originally for the French Air Force, as Douglas DB-7 light bombers. After the fall of France in 1940, they were taken over by the R.A.F., which was so short of night fighters large enough to carry the cumbersome new A.I. radar that it decided to convert the DB-7's for this rôle.

The result was the Havoc Mk. I, powered by two 1,200 h.p. Pratt and Whitney R-1830-S3C4G Twin Wasp engines and carrying a crew of two or three. The version used as a specialised night fighter was armed with eight 0·303 in. Browning machine-guns in a 'solid' nose. There was also an intruder fighter version, with a glazed nose, no radar and only four forward-firing guns, but with accommodation for 2,400 lb. of bombs in its bomb-bay and a single Vickers machine-gun in the rear cockpit.

The intruders gained more success than the night fighters, which is hardly surprising in view of the fact that the DB-7 had been designed as a bomber. They were followed in R.A.F. service by more than 1,200 four-seat day-bombers, known as Bostons, with more powerful engines. By this time, America had entered the war, and when production of the DB-7 series ended on September 20, 1944, a total of no fewer than 7,385 Havocs and Bostons, and U.S.A.A.F. A-20's had been delivered. No other U.S.A.A.F. aircraft in the 'attack' category was built in such numbers.

Data (Havoc Mk. I): Span, 61 ft. 4 in.; length 46 ft. 11¾ in.; height, 15 ft. 10 in.; wing area, 464.8 sq. ft.; weight empty, 11,400 lb., loaded 19,040 lb.; maximum speed, 295 m.p.h at 13,000 ft.; service ceiling 25,800 ft.; maximum range 996 miles.

The lamp that failed

by
J. D. McHard

Despite its two thousand, seven hundred million candle-power searchlight, the 'Turbinlite' Havoc never managed to illuminate the night raiders for long enough to permit the attendant 'Hurricanes' to shoot them down. On the contrary, the 'afterglow' from the Havoc's arc light continued so long after switching off that it made itself a perfect target for enemy gunners!

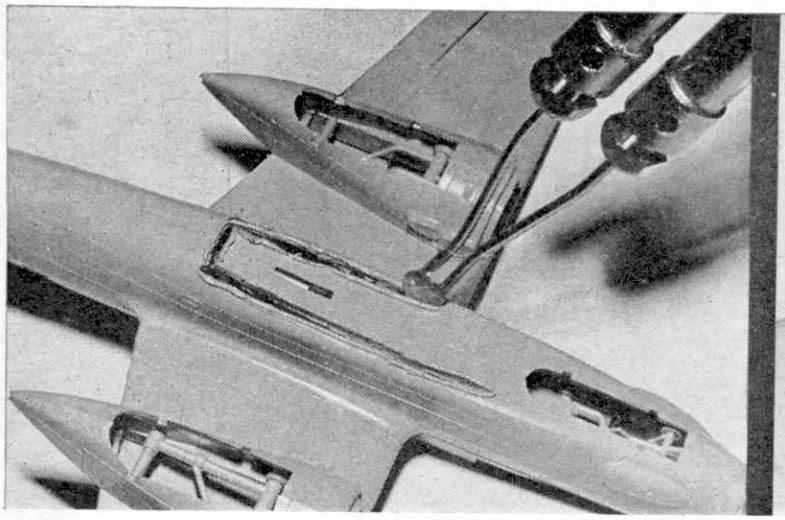
In an effort to overcome this snag, Venetian blind-like shutters were fitted over the light to extinguish the glow immediately, but before this refinement was installed, several Havocs were lost to enemy gun fire.

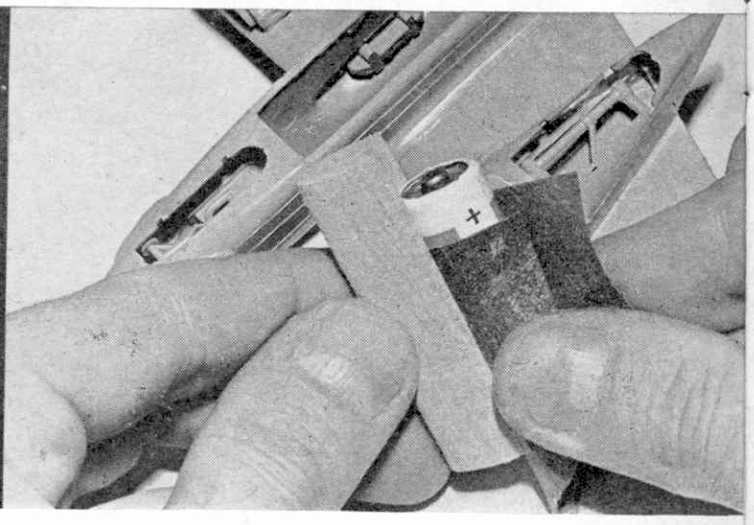
So the flying searchlight was just one more good idea that went wrong, but even so, it makes a most interesting and unusual subject for this month's conversion, using the basic Frog 'Boston' kit as raw material. A pencell works the light —the original one used a ton of batteries!

Of course, there is no need to go the whole hog and actually fit a working light; the job is much simplified if a purely external conversion is done, and many modellers will prefer this anyway. But for those who like gimmicks, it would need a long search to find a more likely subject than this one, with its operating Turbinlite that comes on when the top aerial is pressed. In the next three pages Doug. McHard shows how he tackled this interesting project. Accurate working drawings by Ian Stair appear on page 24 and John Taylor starts the story of this and other 'secret weapons' on page 20.

1. Make a rectangular opening in the fuselage underside $2\frac{1}{4}$ in. long. We used a Weller solder gun with the plastic cutting tip to speed the operation, but you can, of course, do it the hard way with a saw and knife if you prefer! If you decide to use the Weller gun, practice on an old piece of plastic first—it really *does* cut like a hot knife through butter!

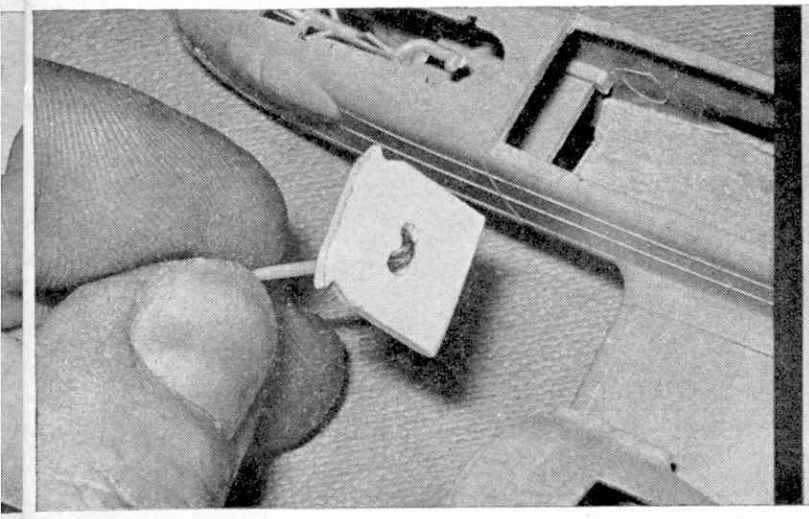
2. File the edges of the opening smooth, and shape from a piece of $\frac{1}{2}$ in. by $\frac{1}{2}$ in. balsa a block to fit neatly into the top half of the fuselage. Using sandpaper wrapped round a pencil, shape the underside of this block to a concave section then cement it in place with a 50/50 mixture of plastic cement and balsa cement. Drill a hole through the block to take a short length of 22 gauge brass tubing to act as a 'bush' for the aerial 'switch'. (See line drawing on page 25.)

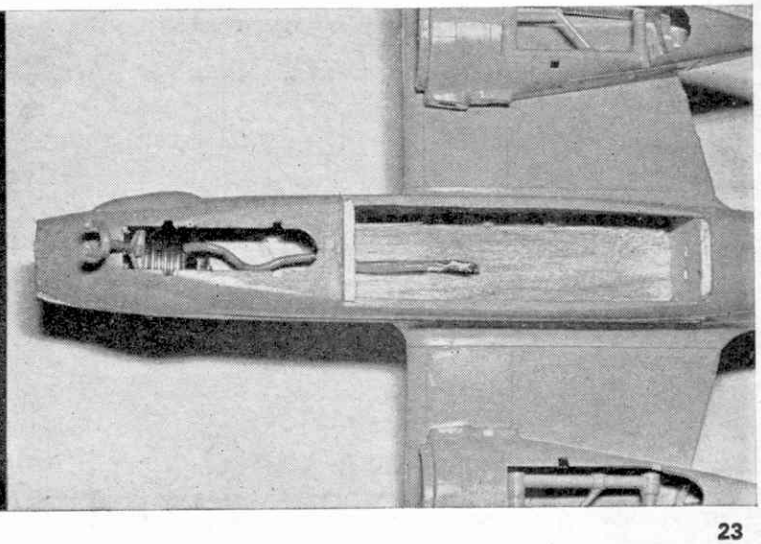


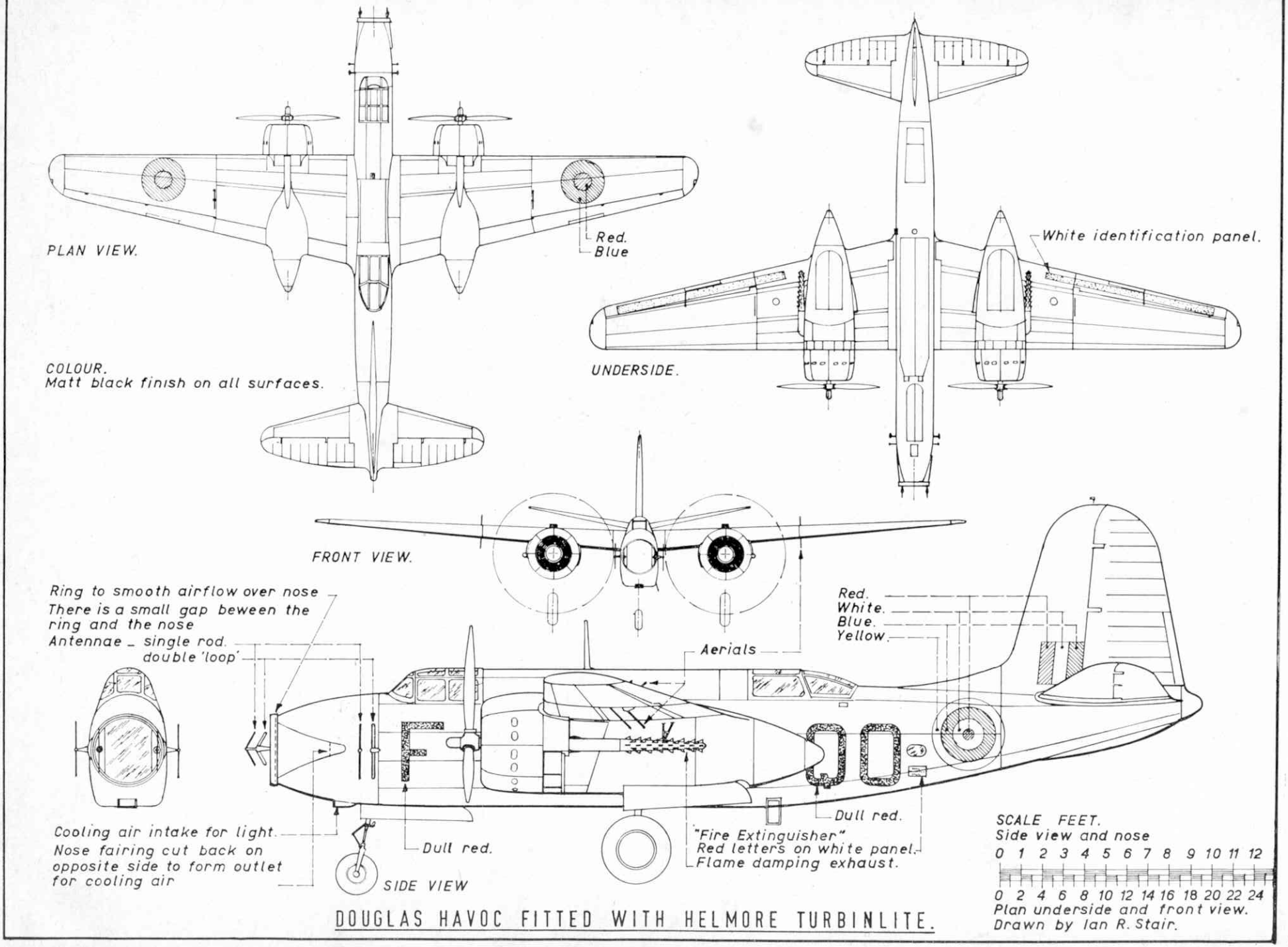


3. With the top block in position, cut a piece of 30 thou. plastic sheet to the pattern shown to form the front end of the bomb bay/battery box. Take a 3 in. long piece of plastic covered radio hook-up wire, bare the end and thread it through the two holes, as shown, to act as the positive battery contact. Now cement it firmly in place, taking the wire forward through the nose wheel bay. Notice that this bulkhead sticks out $\frac{1}{16}$ in. *below* the level of the lower fuselage.

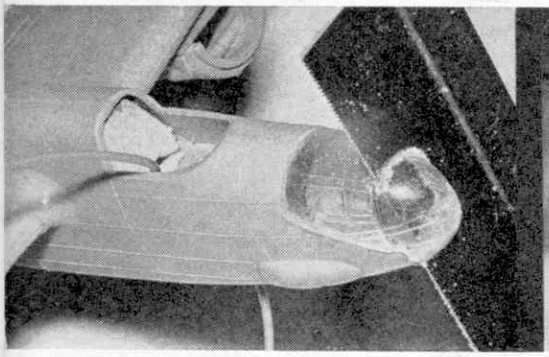
4. The negative battery contact is made with the lower end of a piece of 22 gauge brass or steel wire which is bent to an 'L' shape and forms the top radio aerial. Solder a second length of stranded hook-up wire to the lower end of this 'aerial', laying the wire in a groove cut in the balsa block forward of the aerial hole. The wire is then taken out of the battery box over the cockpit floor and into the nose. The nosewheel can still be retracted if required.



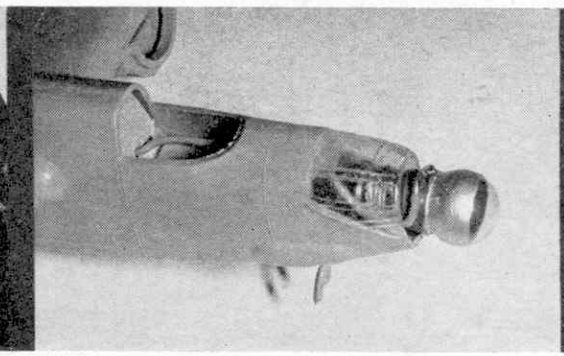




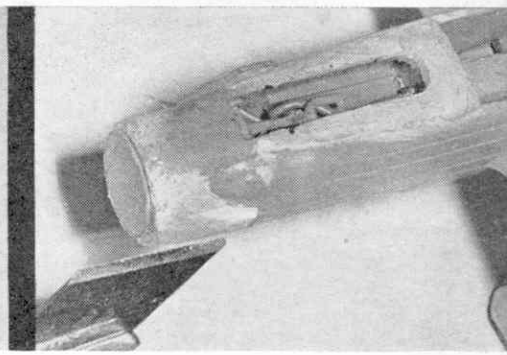
DOUGLAS HAVOC FITTED WITH HELMORE TURBINLITE.



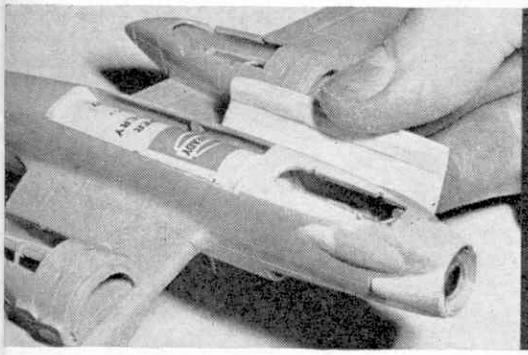
5. Here, you can see the two wires emerging from the battery box. The nose transparency is now sawn off at the point shown after ensuring that the cement holding it is quite dry.



6. The two wires are now brought out through the nose and soldered to a 1·5 volt torch bulb. Clean the metal parts of the bulb with fine sandpaper and use only a mere touch of the soldering iron (which must be very hot) to secure the wires. Paint the rear part of the actual bulb glass with two coats of silver paint to act as a reflector.



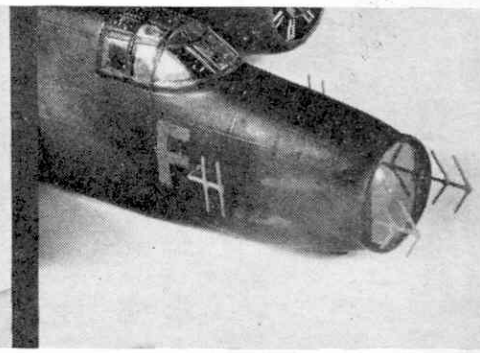
7. Push the bulb back into the nose and temporarily cement a $\frac{1}{2}$ in. disc of card to the nose to act as a shaping template. Build up the side contours and the lower fuselage ahead of the raised forward battery box bulkhead with body putty and allow to dry overnight. Build up the putty above the final level required to allow for shrinkage. Sand and carve to shape.



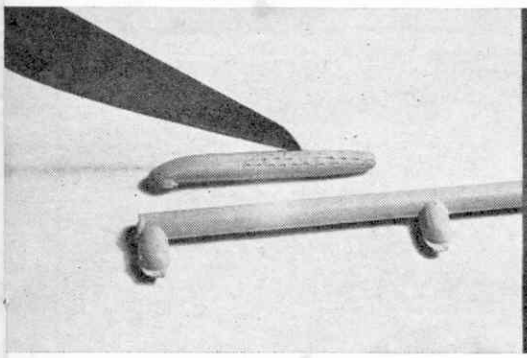
8. Remove the card nose disc after shaping. Bare the battery on one side to allow the negative contact to be made when the top aerial is depressed. A loose battery may be made more secure with a thin wedge of balsa against its back end.

A cover is now made for the bomb bay using 60 thou. plastic sheet on the inner side of which two narrow strips are cemented to clip it firmly in place.

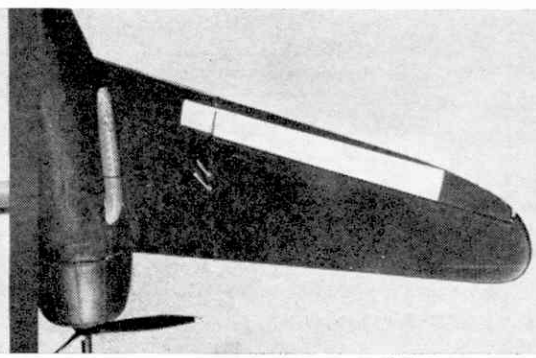
9. After painting, a clear acetate disc is fixed to the nose, and a thin strip of the same material is then formed into a ring which should be a good fit round the disc perimeter. The two pieces are then easily fixed together by running a little Johnson's film cement round the joint which is then effectively welded.



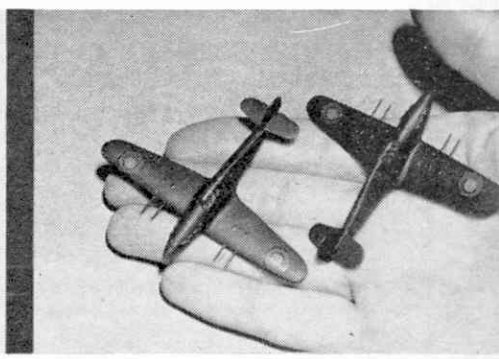
10. The nose aerials are made as shown in the accompanying line drawing or they can be soldered up from thin pieces of brass wire. They are fixed in place by drilling suitably sized holes in which the wire should be a tight fit. Contact adhesive can be used to secure the nose aerials and those on the sides can be fixed from the inside (through the nose wheel bay) with a good dollop of plastic cement.



11. Exhaust flame damper tubes are made from discarded plastic sprue shaped as shown. The exhaust 'fishtails' are simulated by indenting them with a knife blade. They are shown fitted in place in the next photograph.



12. Note also the white strip under the wing. The wing radar aerials are also shown here. They consist of two thin pieces of wire threaded through holes drilled right through the wing and then bent backwards as shown both above and below the wing.



13. Photographers may be interested in the two little 'Silhouette' Hurricanes which were used in our heading picture. They were carved from wood, using small drawings found in an aircraft recognition book. The small scale gives an illusion of distance without taking the models out of the depth of field.

New parts required for Turbinlite conversion.

1. Brass tube bush for aerial
2. Balsa block
3. Rear Plastikard bulkhead
4. Part of battery paper removed to bare zinc case
5. Steel wire aerial "switch"
6. Plastikard bomb bay cover
7. Front Plastikard bulkhead
8. Stranded wire soldered
9. 1·5 V bulb
10. Clear acetate disc
11. Acetate ring

The small sketch shows how stranded wire is divided up, twisted and coated in solder after bending to shape to represent the radar aerials. Stretched plastic sprue can be used as an alternative.