

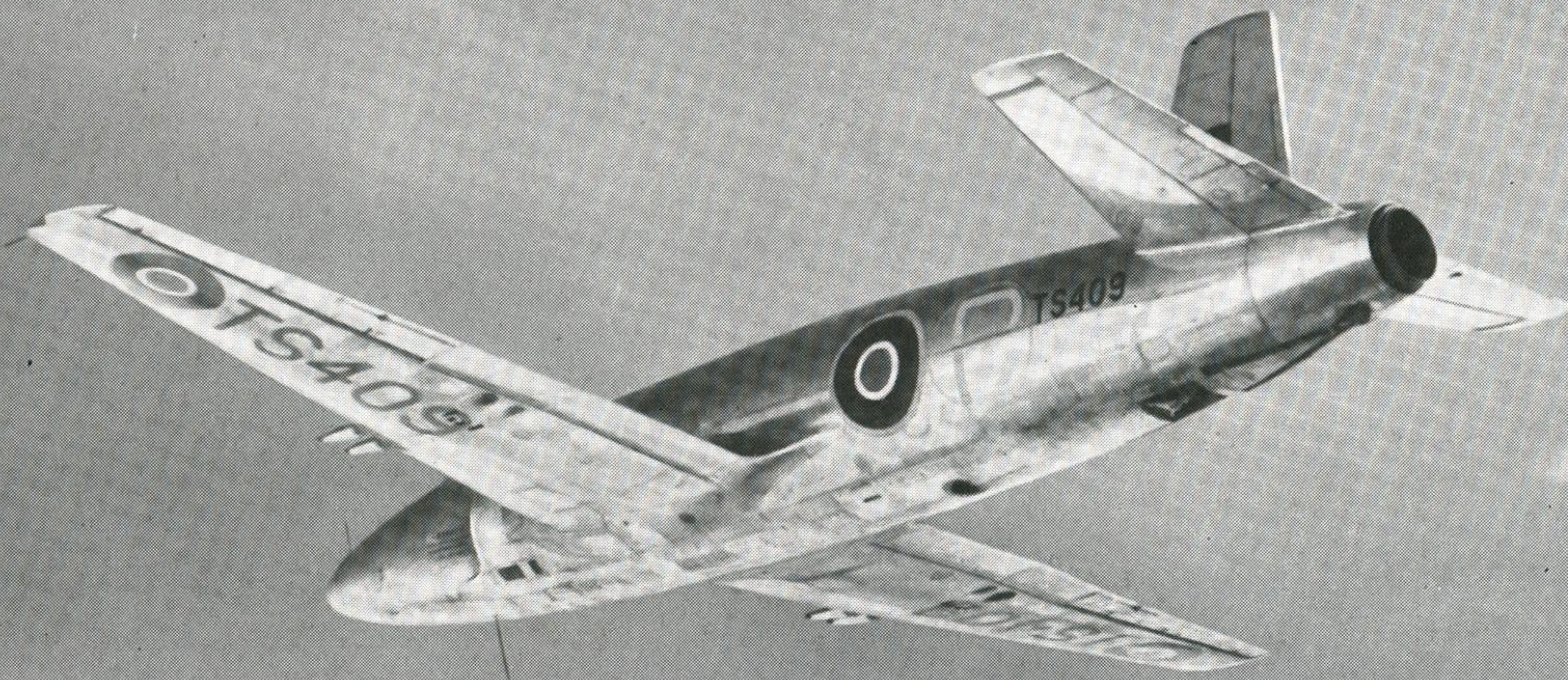
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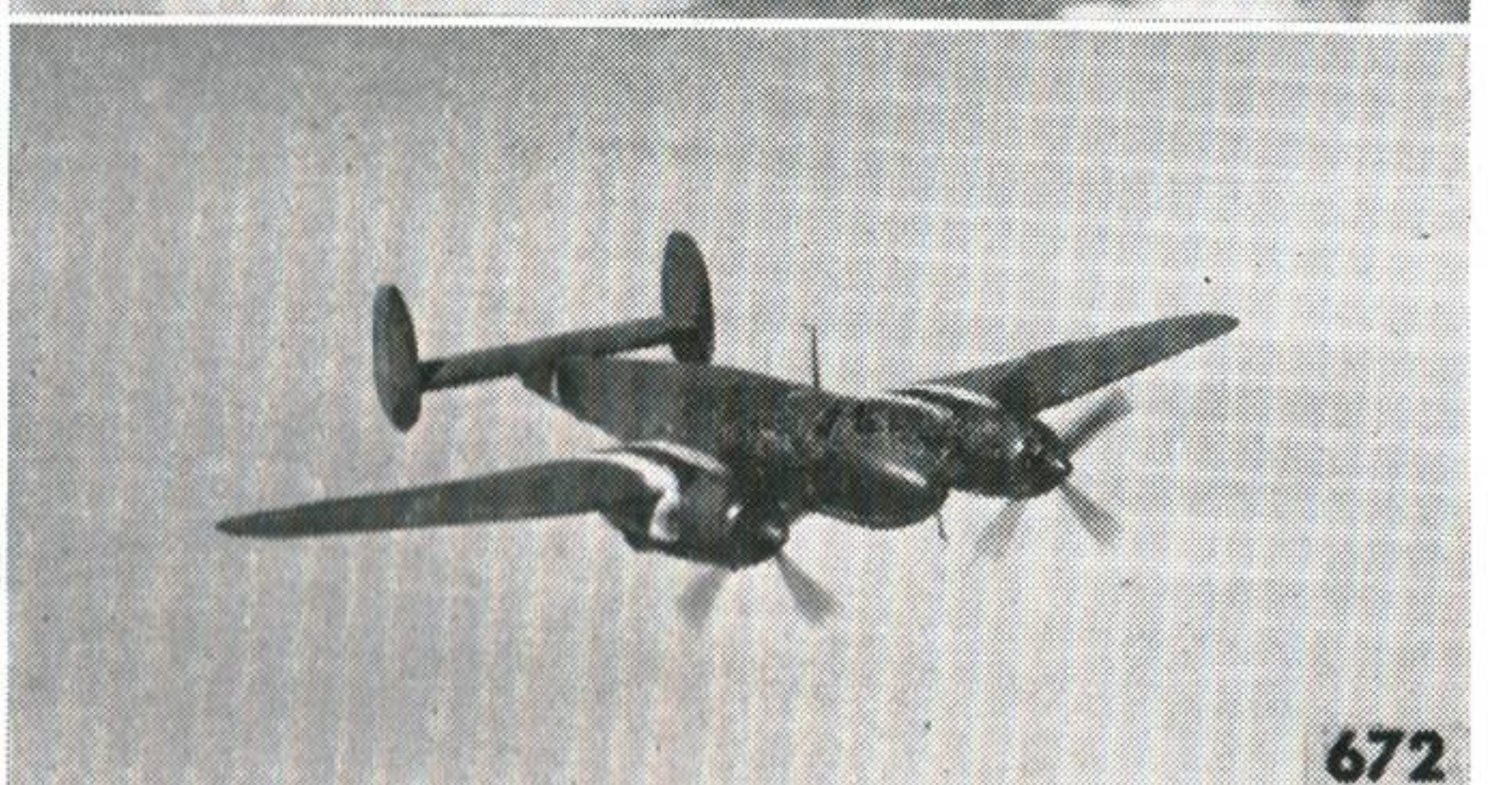
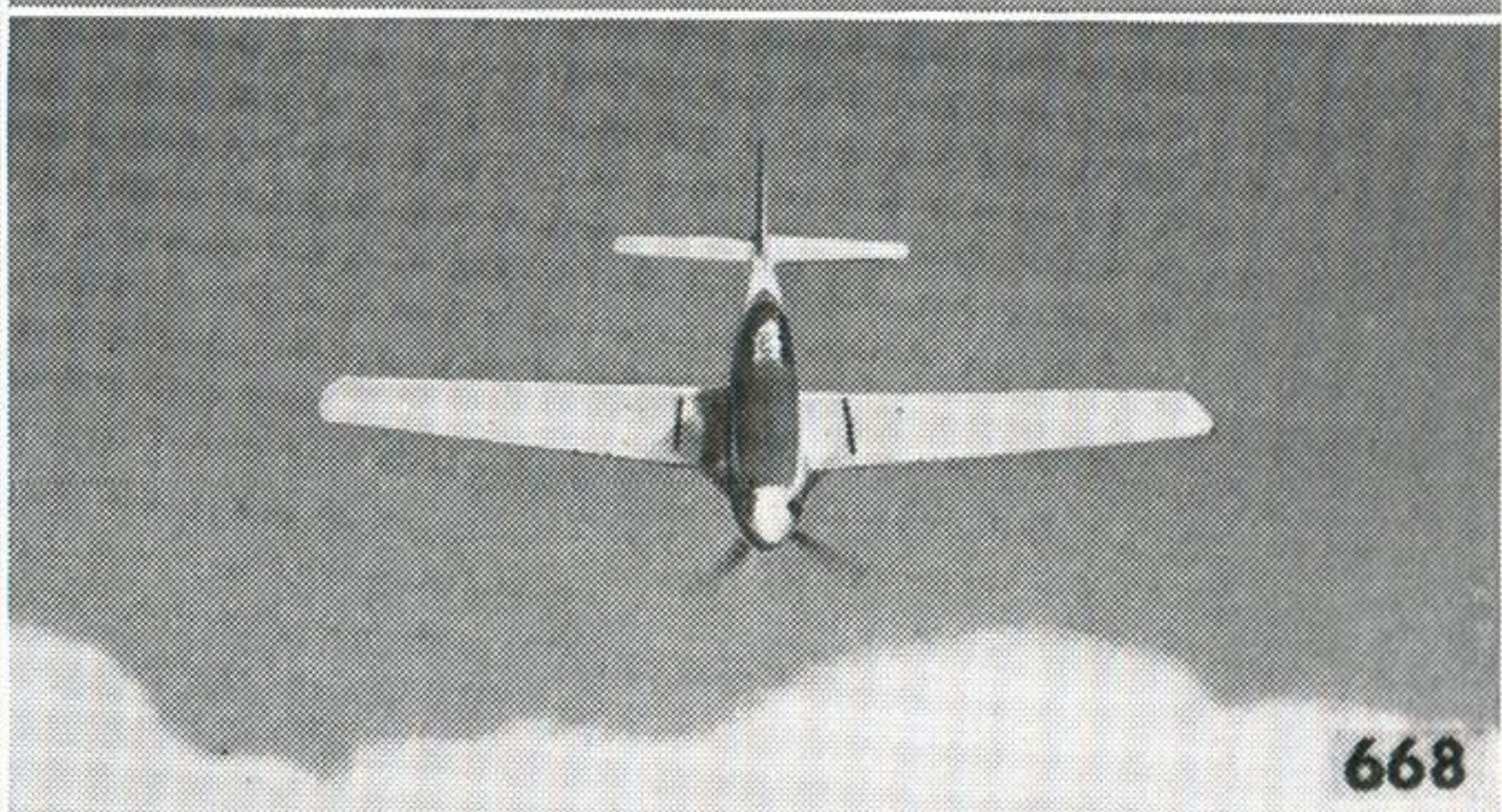
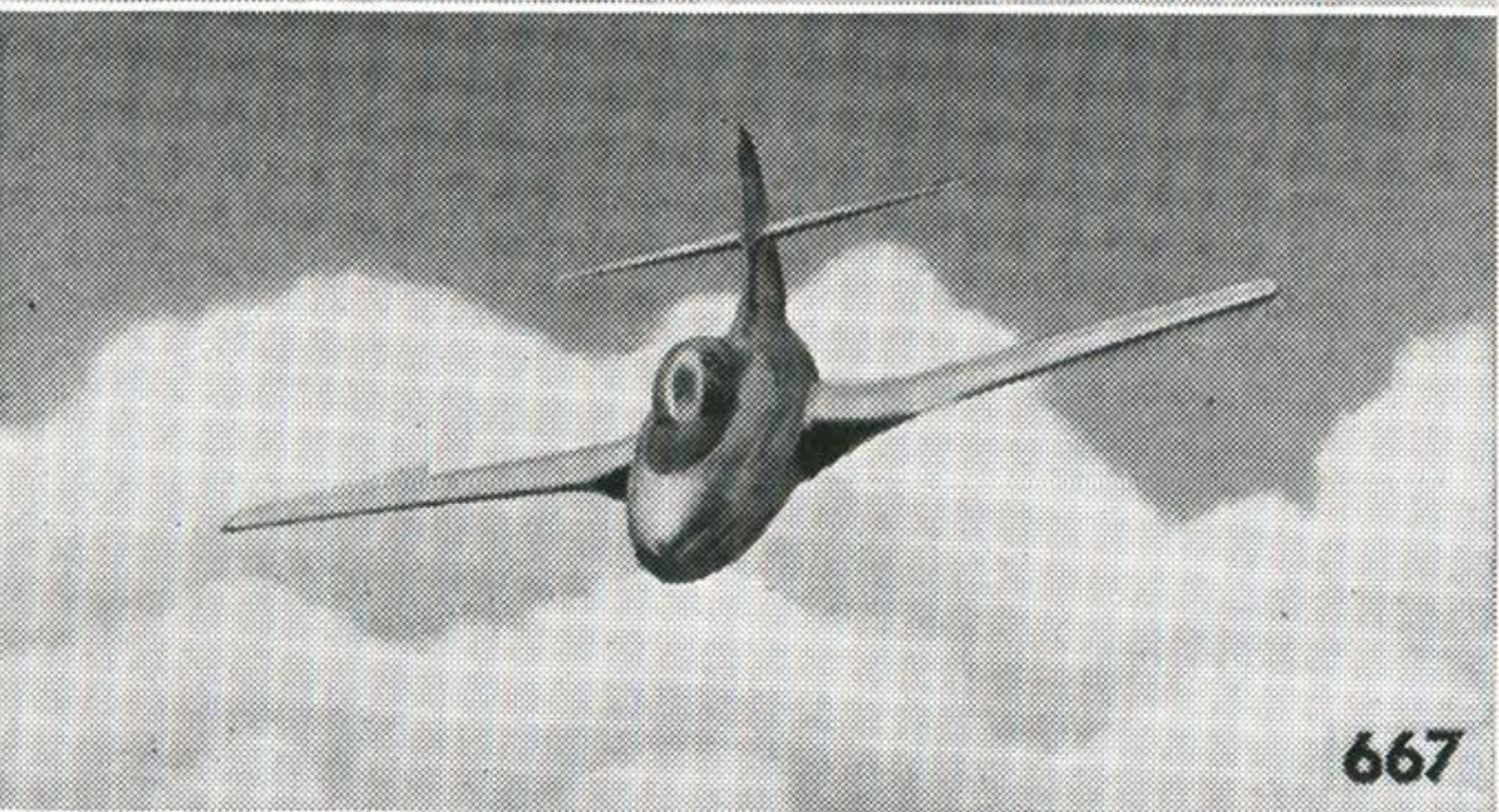
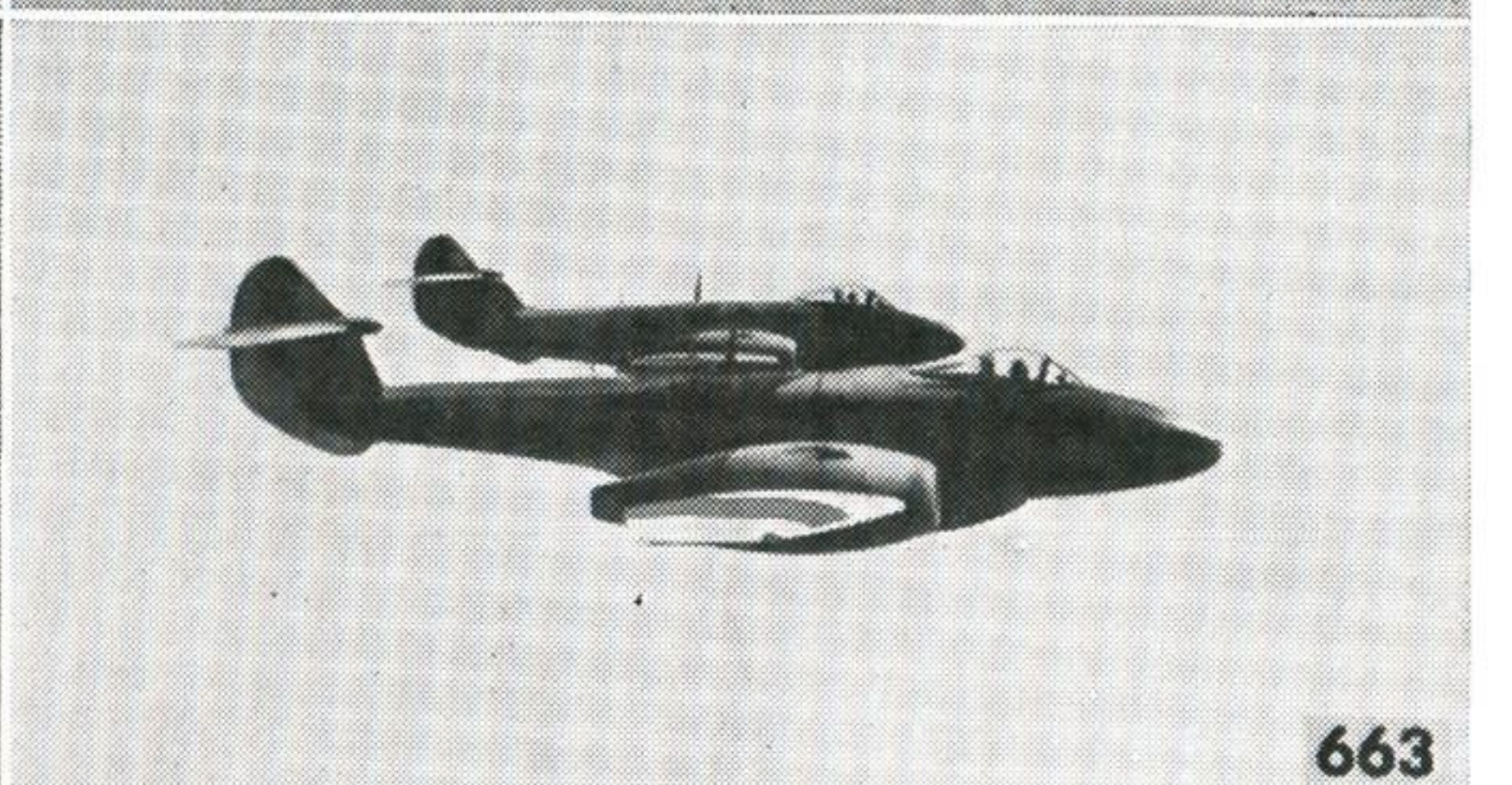
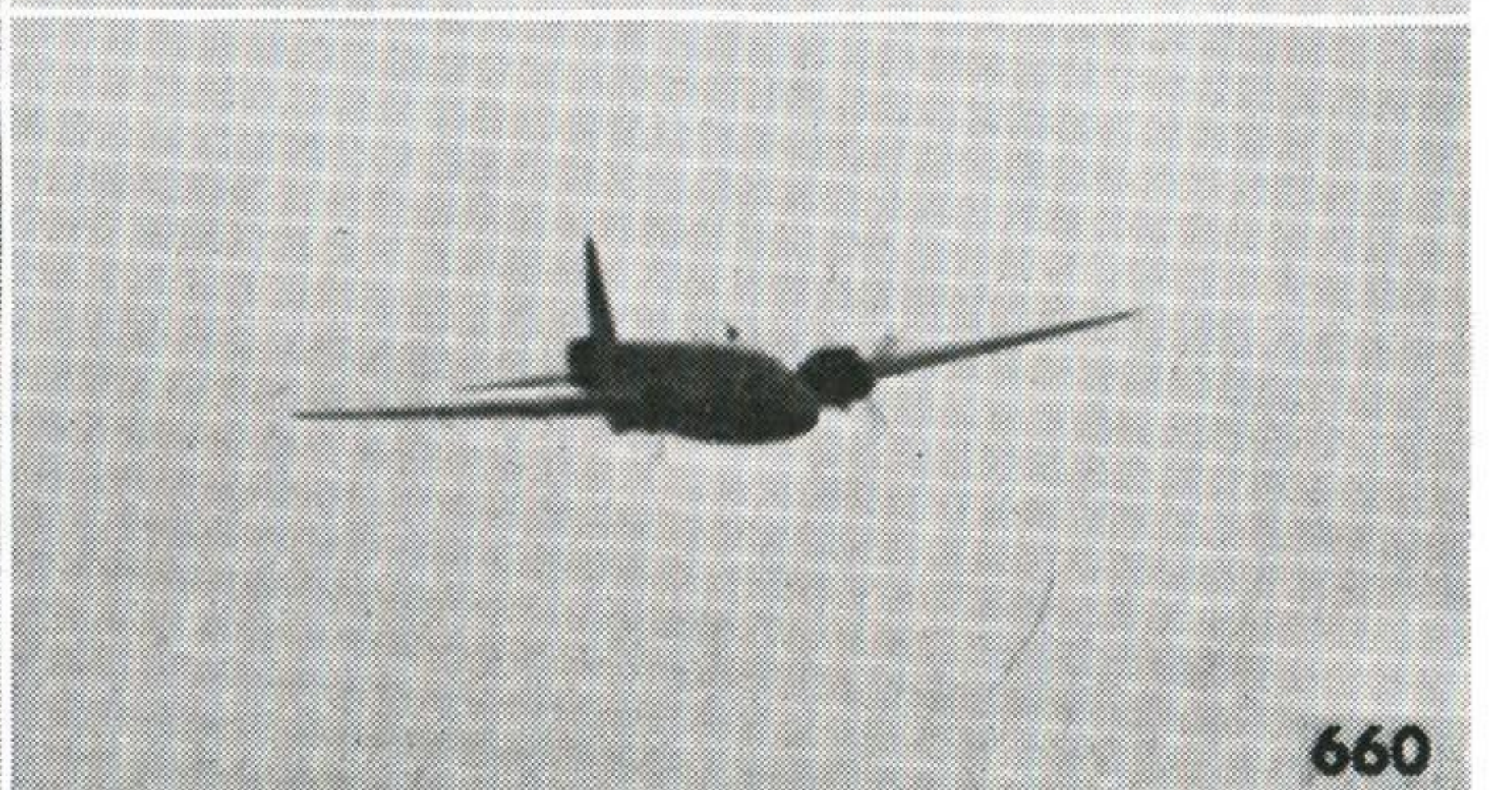
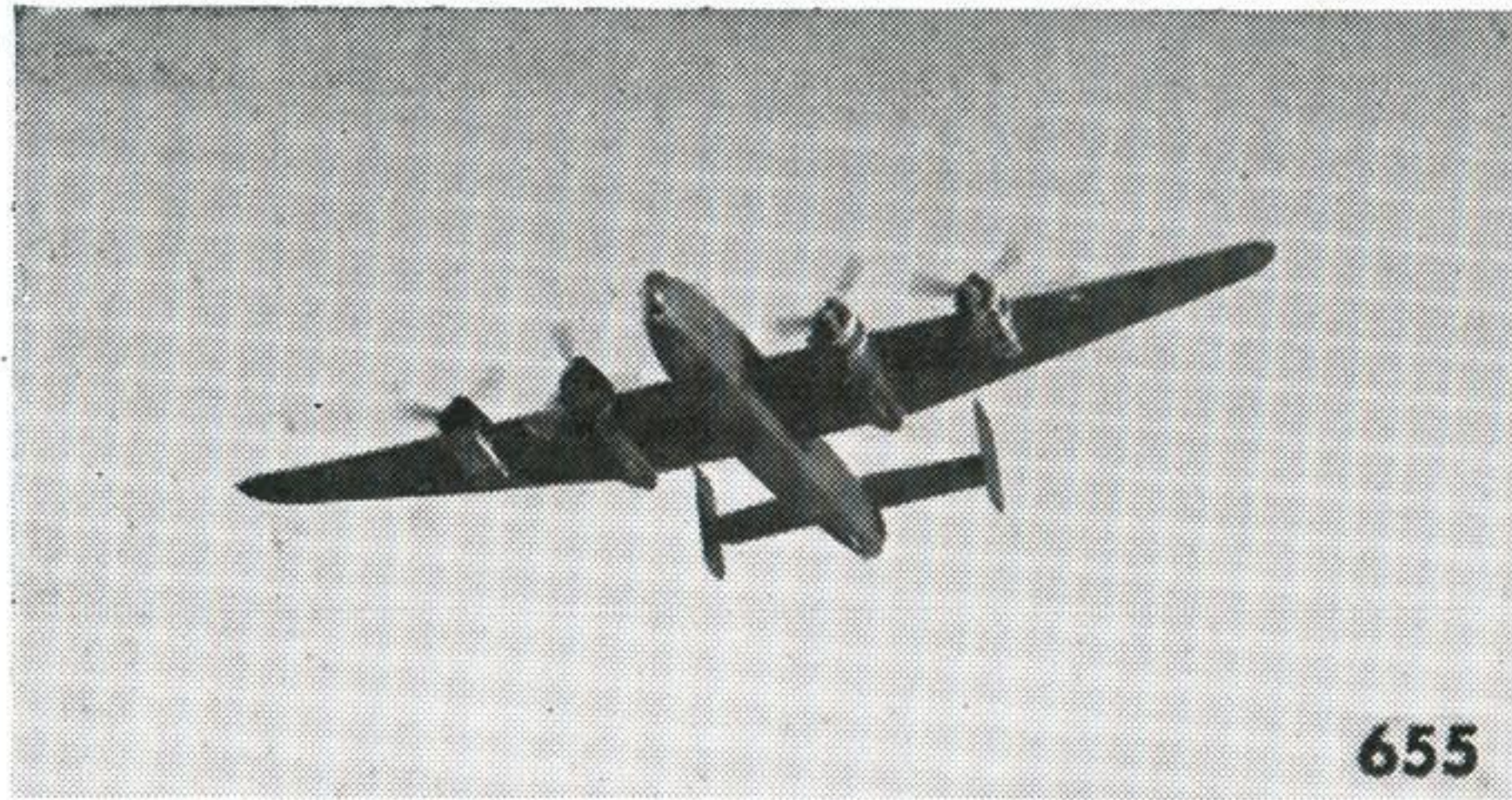
# AIRCRAFT RECOGNITION

*Journal*



Vol. 4 OCTOBER 1949 No. 2

# ELEMENTARY SPOTTING





## SPRING IN THE AIR

THE Tenth Flying Display and Exhibition of the Society of British Aircraft Constructors at Farnborough has been the wonder of the whole World—and no doubt the envy of much of it—for it has demonstrated that the design of British aeroplanes and engines is second to none, and that they also lead in technical excellence. It also showed that just as our sailors and shipbuilders established our reputation as a Nation of Seafarers, so our airmen and aircraft builders are establishing a Nation of Airfarers.

To select a high spot in the exhibition would be invidious: it was all high spots in every sense of the expression. One knew not whether to admire most the smooth, swift darts of the needle-nosed Vickers 510—with its delicious sound of ripping silk—or the gigantic vertical circuits of the sleek Hawker P.1052: the majestic sky-sweeping of the glittering de Havilland Comet, or the over-shadowing greatness of the giant Brabazon from Bristol. Even the most indifferent could hardly remain unmoved at the thundering rocketing performance of the so-called re-heat Meteor and Vampire as the heat—or re-heat—was turned on; or at the astounding performance of the Avon-Meteor both with and without power.

Perhaps the most incredible flying machine present was the Cierva Air Horse—it was certainly the most complex in structure—and raised a laugh as it hoisted itself into the air with elephantine grace amidst a mass of whirling “bladery,” which is not to belittle its performance. By contrast, the Avro 707 single-seat jet-driven delta-wing type was the most advanced aeroplane present, at least in shape; and of this, one might say the eternal triangle now enters the field of active aircraft recognition.

A very great attraction and, to many, an inspiration, was the brilliant array of four-engined air-liners—the Armstrong Whitworth Apollo, the de Havilland Comet, the Handley Page Hermes IV and Hermes V, and the Vickers Viscount. The broad wings of many of these aeroplanes will be the main support of our air transport in the future and, it is hoped, that of other countries too. With them appeared the Handley Page Mamba-Marathon, and the elegant Airspeed Ambassador which is also destined to play an important part in our future airline operations.

For all these attractions however, and many others of equal merit, one felt that, after all, there was a higher high spot: there was an aeroplane which on all counts excited the greatest and most enthusiastic comment, and that was the English Electric Canberra. The fact that Great Britain's first jet-bomber had at last shed its

cocoon of secrecy, and the news that it is to replace our present R.A.F. bombers, gave many the deepest sense of satisfaction and comfort, though certainly not of contentment. This sense of satisfaction was strengthened when it took the air, and the enthusiasm over its appearance was increased by its “jet-fighter” performance.

Stimulating and encouraging as this great display has been, it should not be forgotten that it was primarily a shop window. The cold hard fact is that many of these magnificent aeroplanes will not become available for service for some time—they are not laurels upon which to rest: they are foundations upon which to build—though good solid ones. For a true assessment of the situation, we think the words of the Chief of the Air Staff, Marshal of the Royal Air Force, Lord Tedder, when he spoke of the Exhibition to the Society of British Aircraft Constructors on the eve of the display, summed up the feelings of most. He said, “. . . One swallow does not make a summer—or one Canberra a Striking Force, but it does mean that we are emerging from the Winter of our discontent”. May we add? . . . and what a Winter it has been!

The English Electric Canberra B. Mk. 1.



# NORTH AMERICAN B-45



by ROY McLEAVY

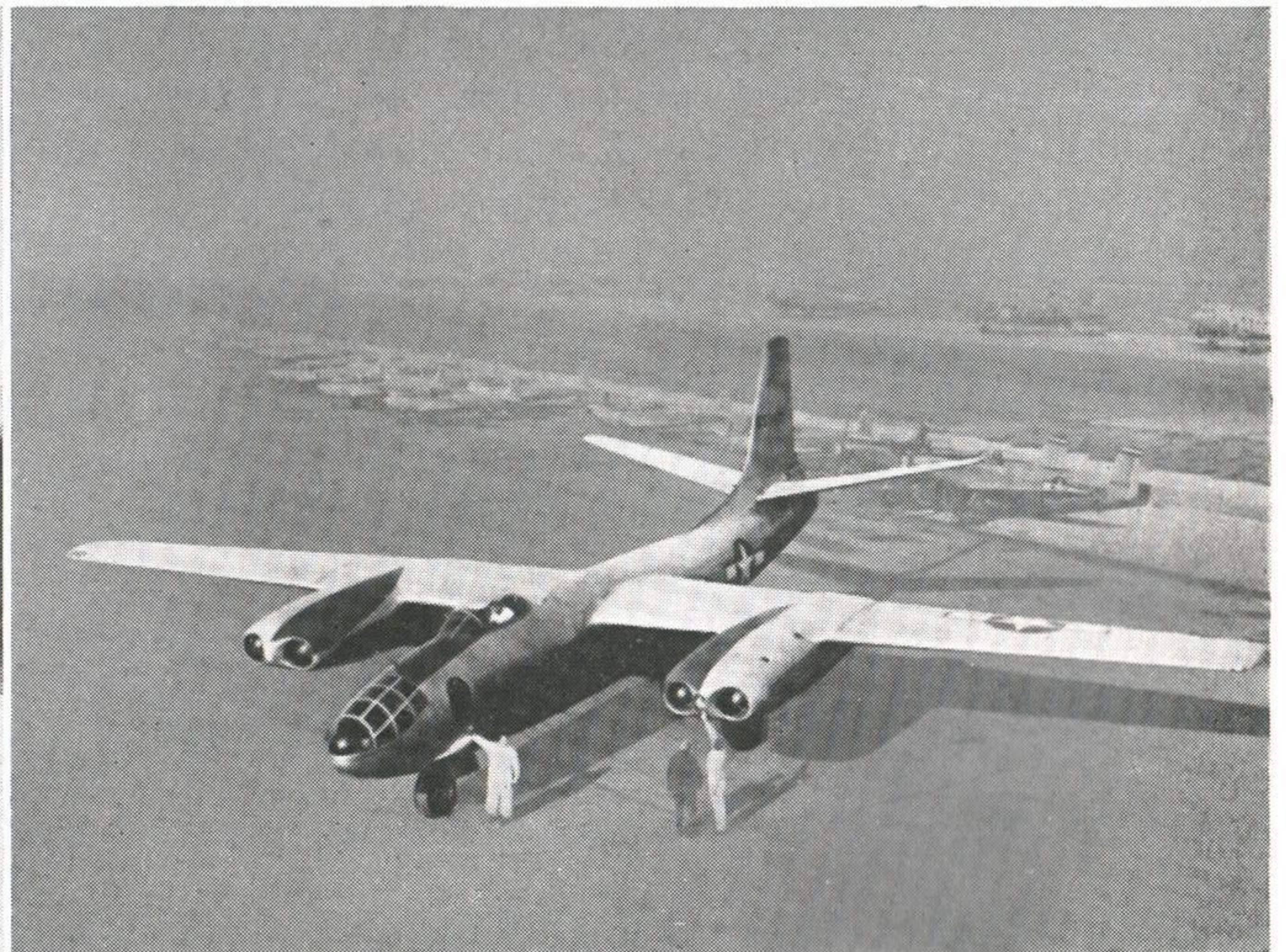
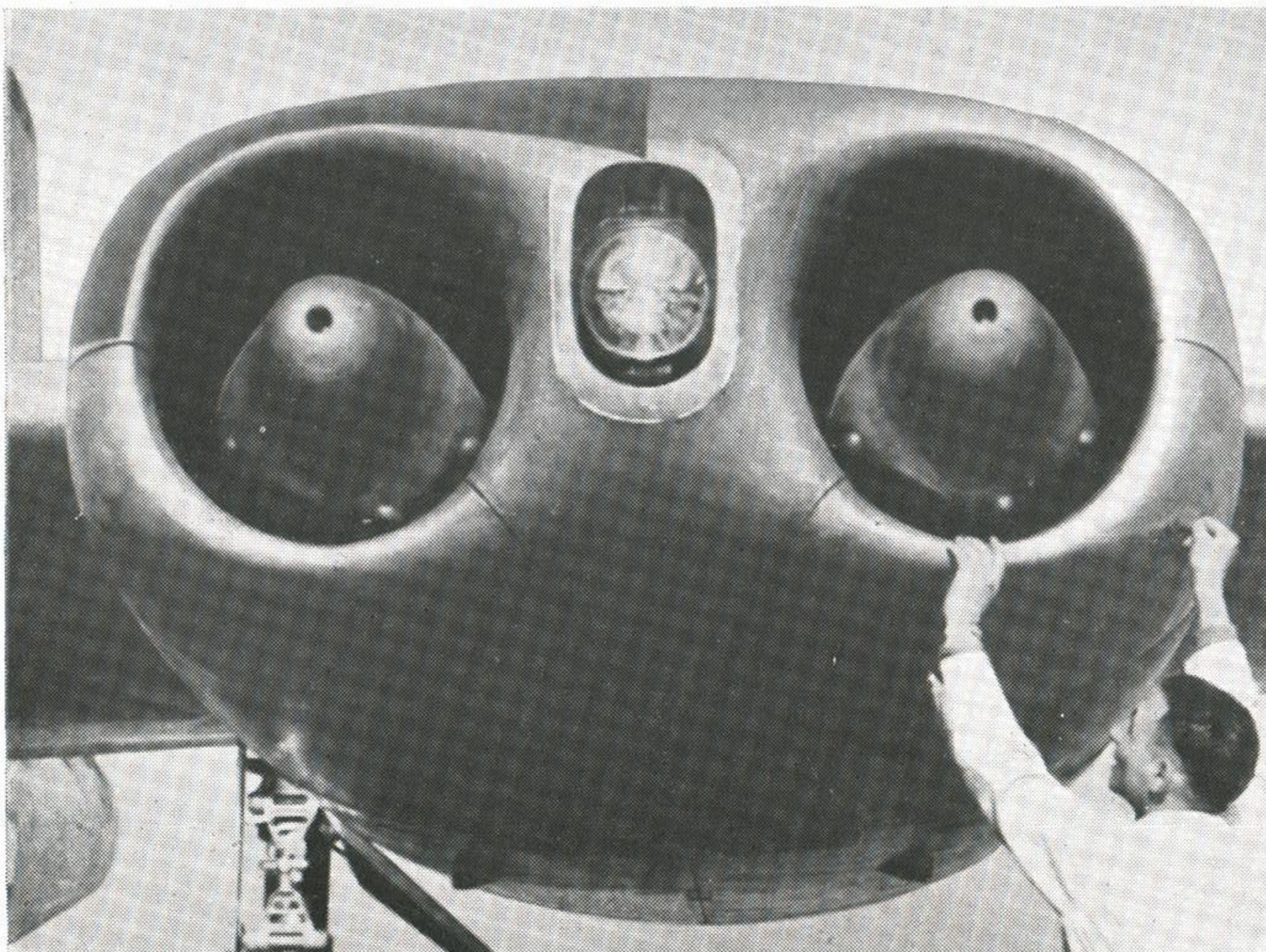
**F**IRST multi-jet aircraft to fly in the United States, the prototype Tornado (XB-45) made its initial flight on March 17th, 1947. Following the successful completion of flight trials, an order for ninety-six was placed by the United States Air Force, and late in 1947, production of the B-45A commenced at North American's Long Beach plant. The order now stands at one hundred and thirty-nine, and many of these are now in service with operational squadrons of the U.S.A.F.

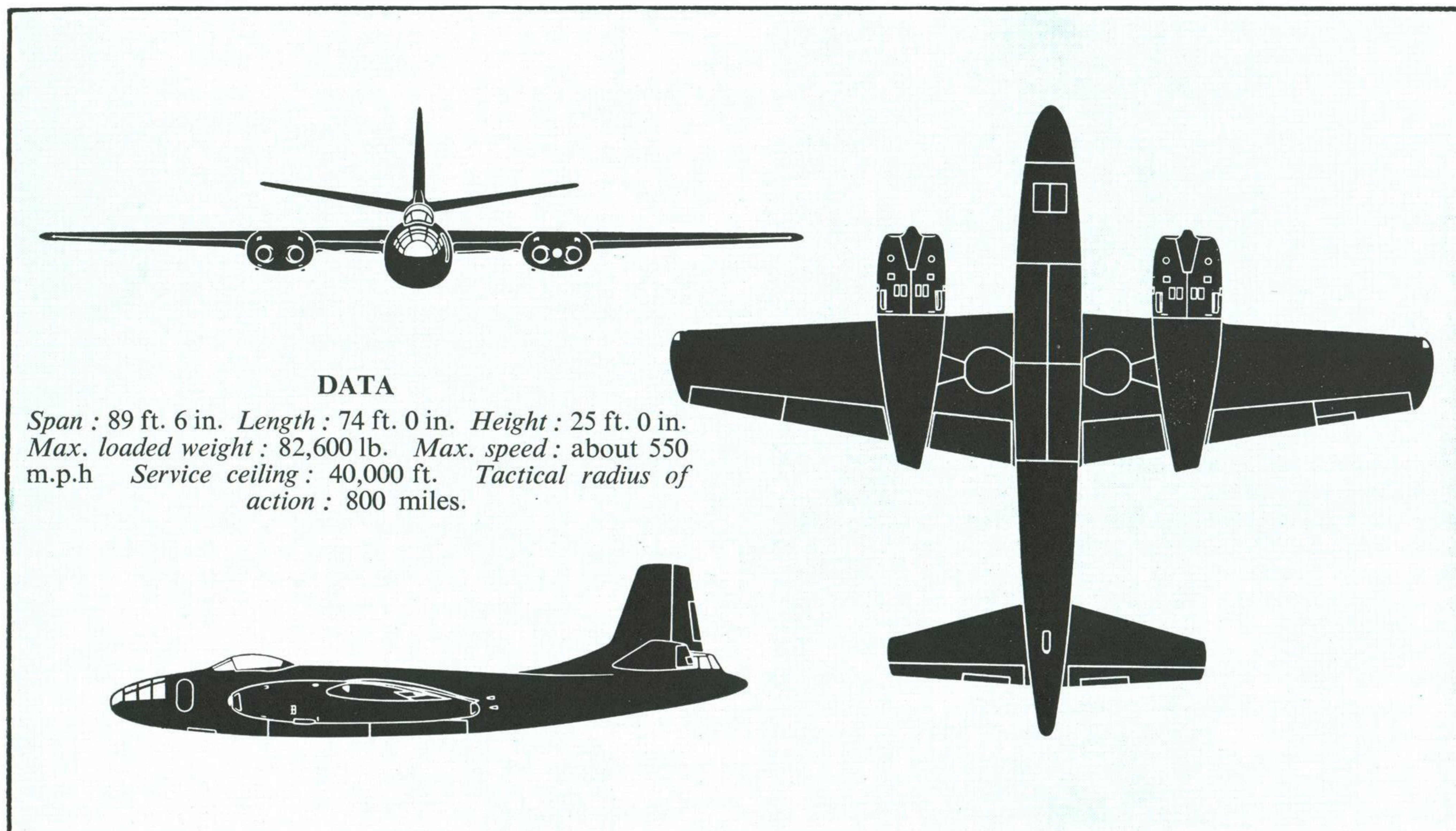
Power for the XB-45 was provided by four 4,000 lb. s.t. General Electric TG-180 turbojets, but the latest production versions of the Tornado are being fitted with the more powerful TG-190 (J-47A), with an output of 5,000 lb. s.t. at sea level. The turbojets, arranged in pairs, are housed in two large underslung nacelles, and

to facilitate maintenance the jet-engines themselves are installed ahead of the leading edge of the wing. Further modifications to recent production models include a re-designed nose and rudder.

A sign of the times in military aviation is the classification of the Tornado as a light bomber, although in most characteristics it is comparable with World War II "heavies". A bomb load of ten tons may be carried, and the tactical radius of action is about 800 miles. A useful quality is its exceptional turn of speed; flying from Elmendorf Field, Anchorage, Alaska, in March this year, and assisted by a tail wind, a Tornado piloted by Captain Lewis H. Stokes, U.S.A.F., averaged 675 m.p.h. over a 270-mile hop to Ladd Field, Alaska. The flight took 24 minutes and was made at an altitude of 16,000 ft.

Twin-jet "pods" are set well out on the wing and underslung.





**DATA**

*Span : 89 ft. 6 in. Length : 74 ft. 0 in. Height : 25 ft. 0 in.  
 Max. loaded weight : 82,600 lb. Max. speed : about 550  
 m.p.h Service ceiling : 40,000 ft. Tactical radius of  
 action : 800 miles.*

The B-45 is pressurised, and during military operations will carry a crew of four, consisting of pilot, co-pilot, bomb-aimer and gunner. The pilot and co-pilot have ejector-seats. Defensive armament consists of two .5 inch machine guns mounted in a Fortress-type tail position.

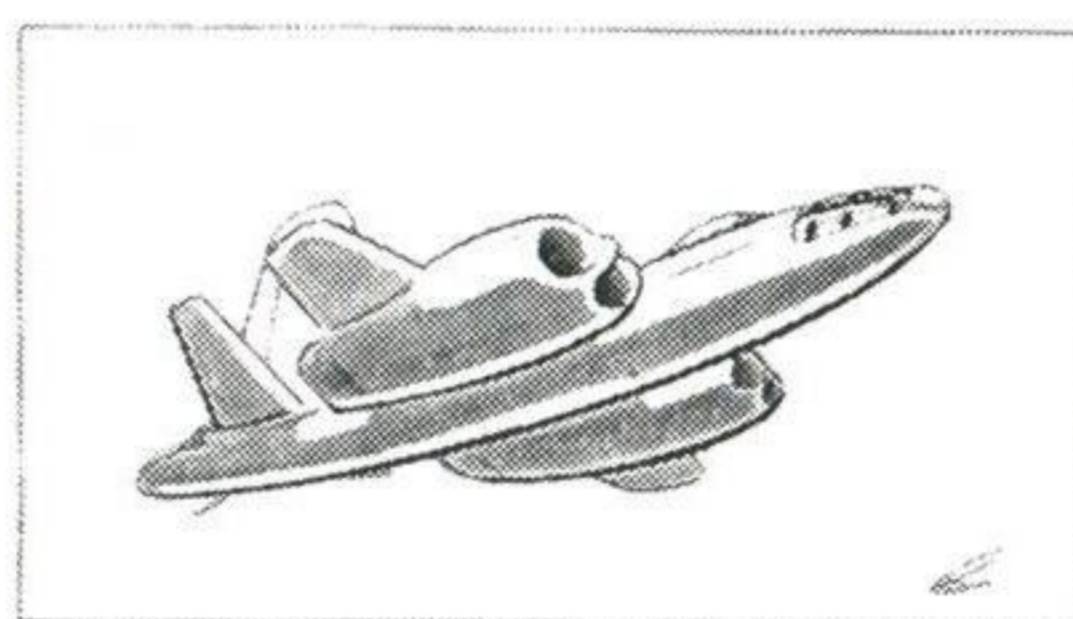
Control surfaces on the Tornado are actuated by a hydraulic boost system, so that only 5 per cent of the total energy required for moving them in high-speed flight is exerted by the pilot. Both the nosewheel-type undercarriage and flaps are hydraulically operated. The main undercarriage wheels are housed in the wings and retract inwardly.

From the recognition angle, the Tornado is a comparatively easy aircraft to identify, and has several

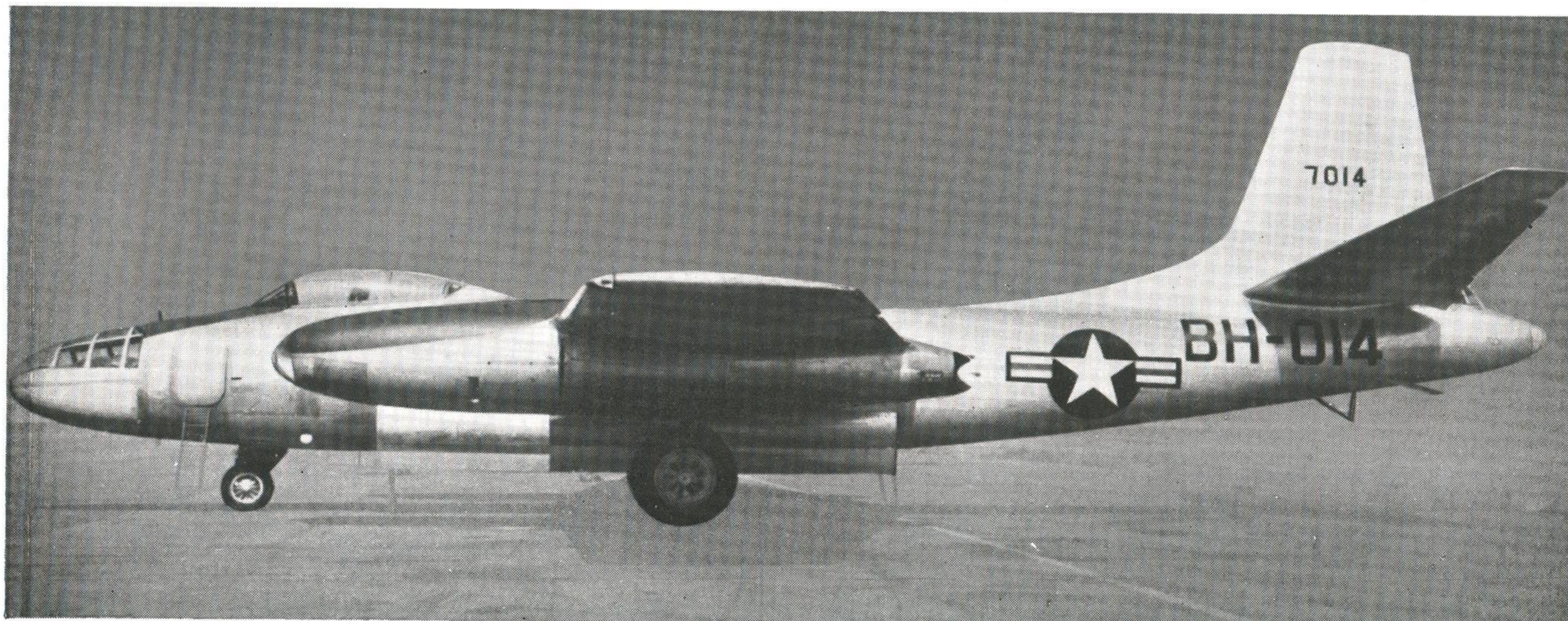
features worthy of note. A glance at the head-on view reveals a high mid-wing of drooping appearance, as if weighed down by the two enormous jet-nacelles. The fuselage, round in section, has a true cigar form, the

only protuberance being the plastic bubble which covers the pilot and co-pilot who are seated in tandem. Tell-tale feature denoting the Tornado's North American parentage is the large angular fin and rudder. The high-mounted tailplane has marked dihedral. A rear-gunner's position is situated immediately below the rudder, with .5 inch machine

guns mounted in it. In all, the Tornado seems to be a valuable addition to the striking power of the U.S.A.F. and its introduction marks the commencement of a new era in light bomber design.



This view tells the tale of the North American tail. Remember the Mustang? Inset above is an exaggerated view of the aeroplane.



## BOOK REVIEWS

by JOHN W. R. TAYLOR

As a schoolboy in those far-off days before the war, one of my most dog-eared possessions was the Oxford University Press's **New Book of the Air**—a collection of magnificent photographs, articles on every aspect of aviation and stirring tales of dog-fights between Sopwith Camels and Fokker D VII's.

This pot-pourri of aviation has now been re-juvenated as **The New Book of Flight**, edited by that old friend of all keen spotters, C. H. Gibbs-Smith. The fiction, alas, has gone; but the articles on subjects ranging from rockets and helicopters to airships and air stamps are again written by experts, and maintain the high standard of the pre-war version. The whole book is lavishly illustrated with first-class photographs and drawings, including pictures and specifications of 150 present-day aircraft. It is, in fact, a good fifteen shillings-worth for anyone wishing to acquire a sound basic knowledge of aeronautics.

**The Air League Book**, produced for the Air League of the British Empire by the Foley House Press, is a companion rather than a competitor to the **New Book of Flight**, as the majority of its articles deal with the people who make and use aircraft, both military and civil, rather than with the aircraft themselves. Its quality can be gauged from the names of the 14 contributors—each an outstanding expert in some branch of British aviation—and who include Air Chief Marshal Sir Philip Joubert, Vice-Admiral Sir Thomas Troubridge, Whitney Straight, Philip Wills and Sir Robert Watson-Watt.

This is, perhaps, not a book for those who would like to see our nationalised airlines supplied by a nationalised aircraft

industry. But if you believe that, in spite of recent setbacks, British aviation is still second-to-none in the World, an hour or two with **The Air League Book** will convince you that you are in good company.

Finally, a book which ought to be read by every person in this country—**Berlin Air Lift**, an account of the British contribution, published by His Majesty's Stationery Office at one-and-sixpence. It traces the whole story of the Air Lift from the day in June, 1948, when the Russians closed the last surface route into Berlin from the West, until the time when they realised that Allied air power had beaten them, just as surely as it had once beaten the Germans, and re-opened the roads, railways and canals from the Western Sectors. It is a magnificent story, told in a simple, honest-to-goodness manner, and illustrated by dozens of excellent new photographs and diagrams. There is even a "Page for Spotters," depicting ten of the aircraft types used on the Air Lift, although any reader who cannot recognise all ten in four seconds deserves to be drummed out of the "Brownies". More important, is to recognise the moral of the Air Lift itself, that a strong Air Force is just as necessary to preserve a peace as to win a war. If we have not learned that great lesson of the Air Lift, all the sacrifice and effort so proudly described in this book may well have been in vain.

"THE NEW BOOK OF FLIGHT," edited by C. H. Gibbs-Smith. Oxford University Press. 288 pp. 15s. net.

"THE AIR LEAGUE BOOK," published by The Foley House Press. 96 pp. 12s. 6d. net.

"BERLIN AIR LIFT," an account of the British Contribution. His Majesty's Stationery Office. 64 pp. 1s. 6d. net.

## GET INTO LINE!

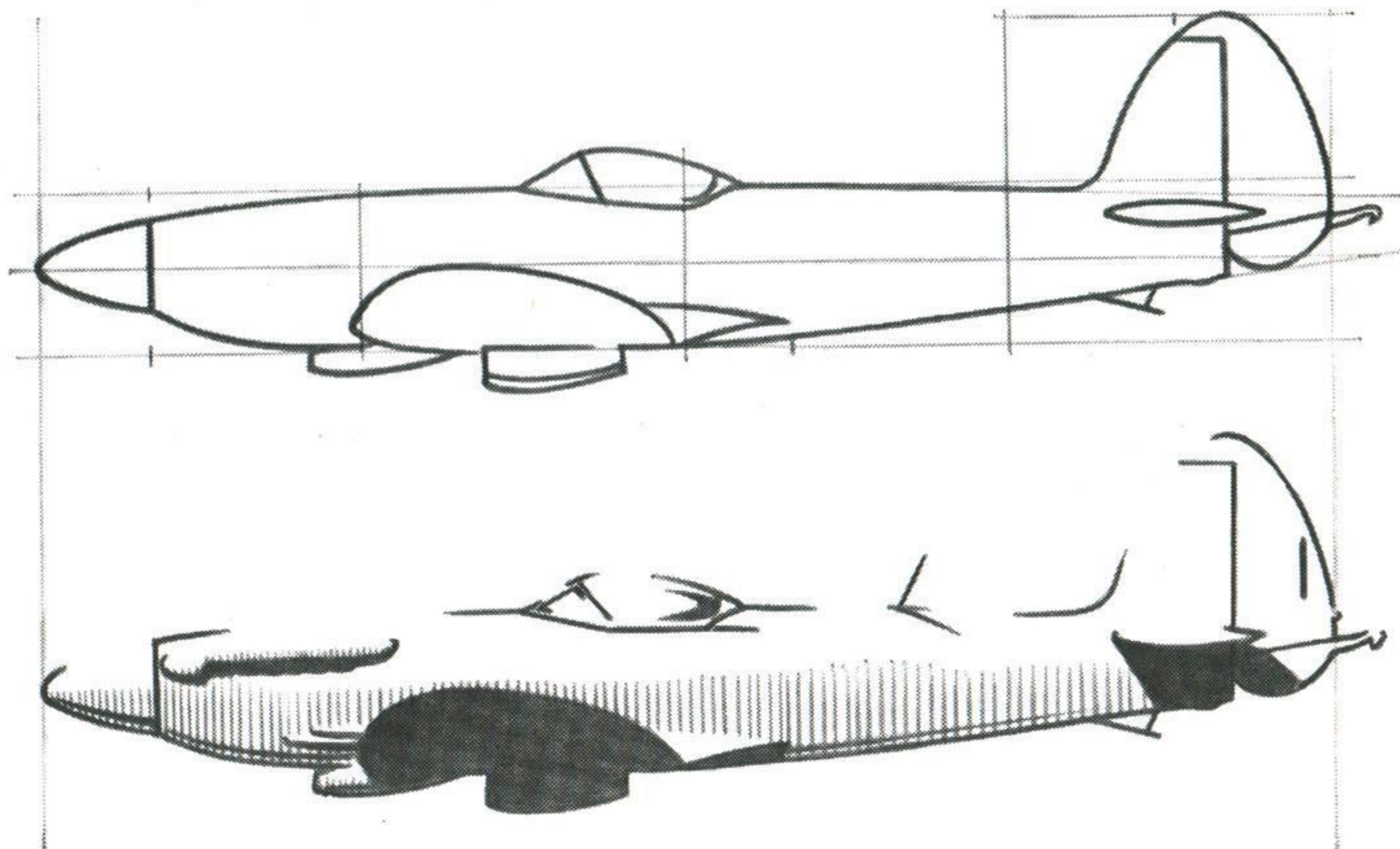
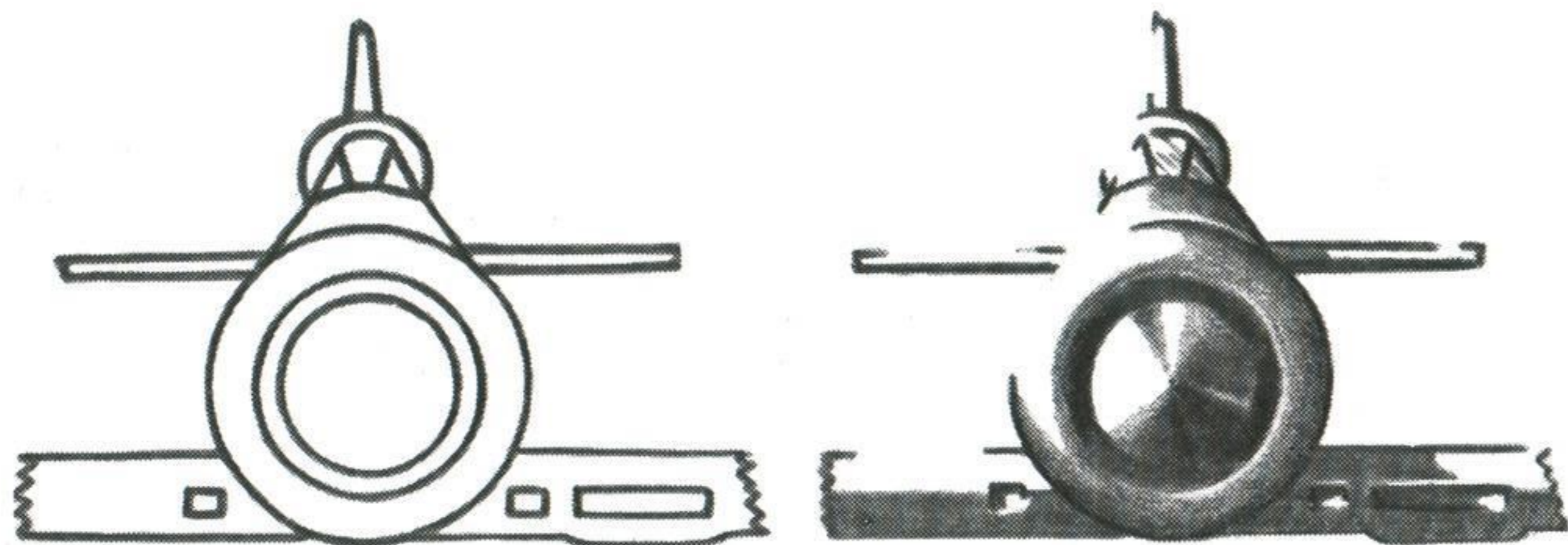
But if . . . you are inclined—late in life though it be—to reconnoitre a foreign sphere of limitless extent, then be persuaded that the first quality that is needed is Audacity. There really is no time for the deliberate approach. Two years of drawing-lessons, three years of copying woodcuts, five years of plaster casts—these are for the young. They have enough to bear. And this thorough grounding is for those who, hearing the call in the morning of their days, are able to make painting their paramount lifelong vocation. The truth and beauty of line and form which by the slightest touch or twist of the brush a real artist imparts to every feature of his design must be founded on long hard, persevering apprenticeship and a practice so habitual that it has become instinctive. We must not be too ambitious. We cannot aspire to masterpieces. We may content ourselves with a joy ride in a paint box. And for this Audacity is the only ticket.

*An extract from "Painting as a Pastime" by the Right Honourable Winston S. Churchill.*

THESE WORDS OF INSPIRATION apply equally to drawing, and drawing aeroplanes is one of the best aids in recognition training. If you have not

because they give form and solidness to the flat shape, as our illustrations show.

In a system of intersecting shapes and forms, such as



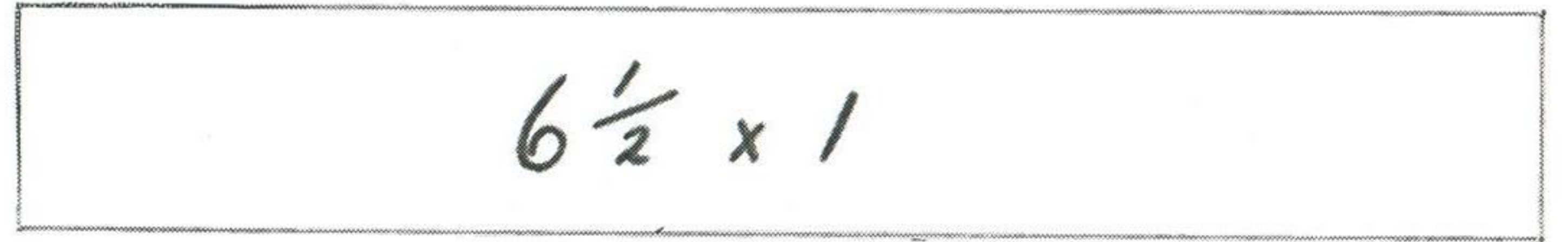
reconnoitred this field as yet, "be persuaded that . . . Audacity is the only ticket," get out your pencil and start now. We may not aspire to masterpieces but greater interest and satisfaction result from the use of simple shadows and shading in these outline drawings

those of an aeroplane, the tricks of high-lights, shadows, shading, reflected lights, colours and tones can be bewildering. But by assuming a single source of light, the details of one of the simple views (head on, plan, or side) can be made to stand out in relief and

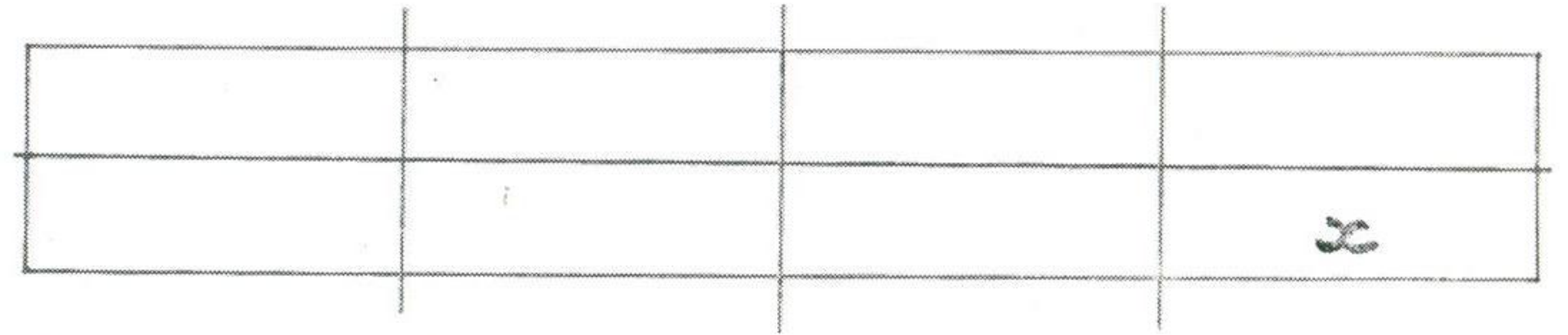
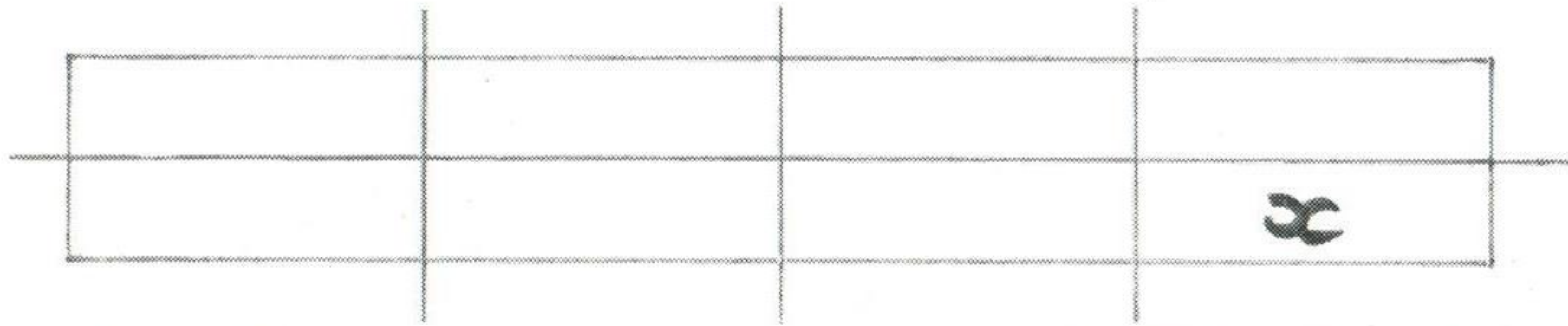
to assume vividness and life. Strangely enough what is left out of the drawing matters as much as what is put into it.

The drawing of the Seafire 47 is constructed on the usual piece of "fence". The fence is then removed with parts of the outline upon which the high-lights

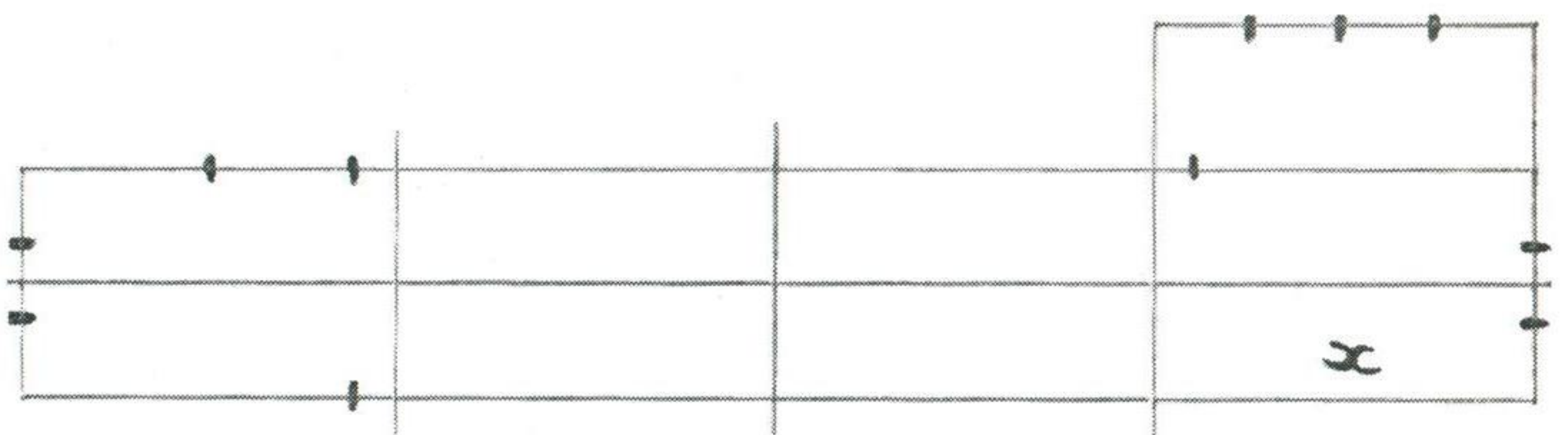
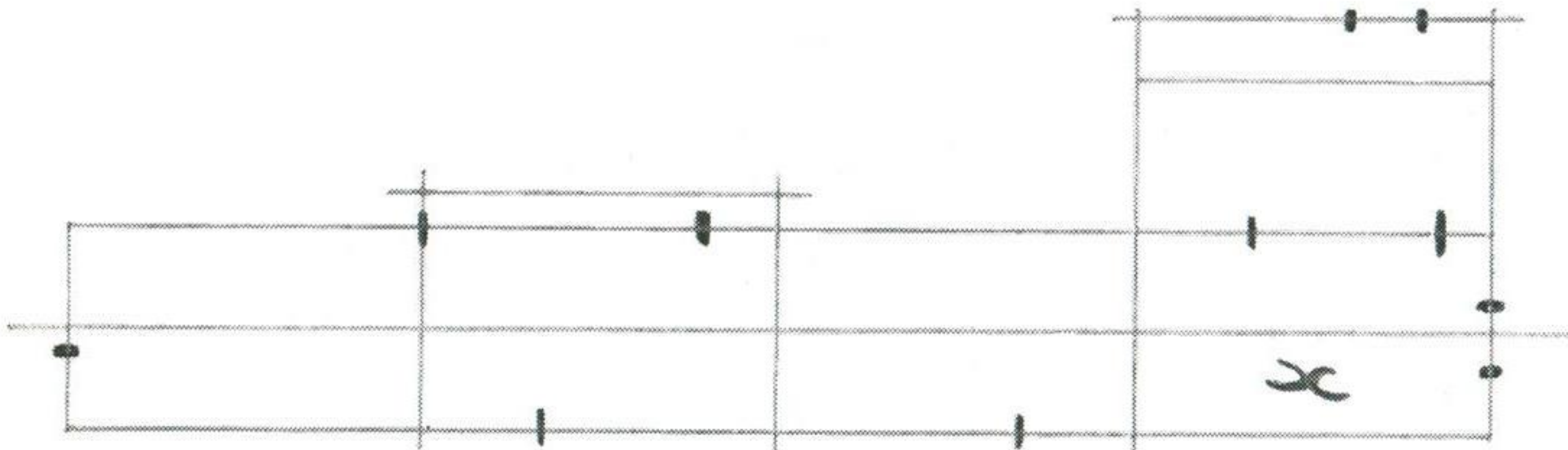
play. The lines on the sides away from the source of light are thickened, and the shadows cast, as by sunlight, are filled in solid. A series of light vertical lines extending halfway up the fuselage will impart a roundedness to it. Now produce the drawings shown below and apply these ideas to them.



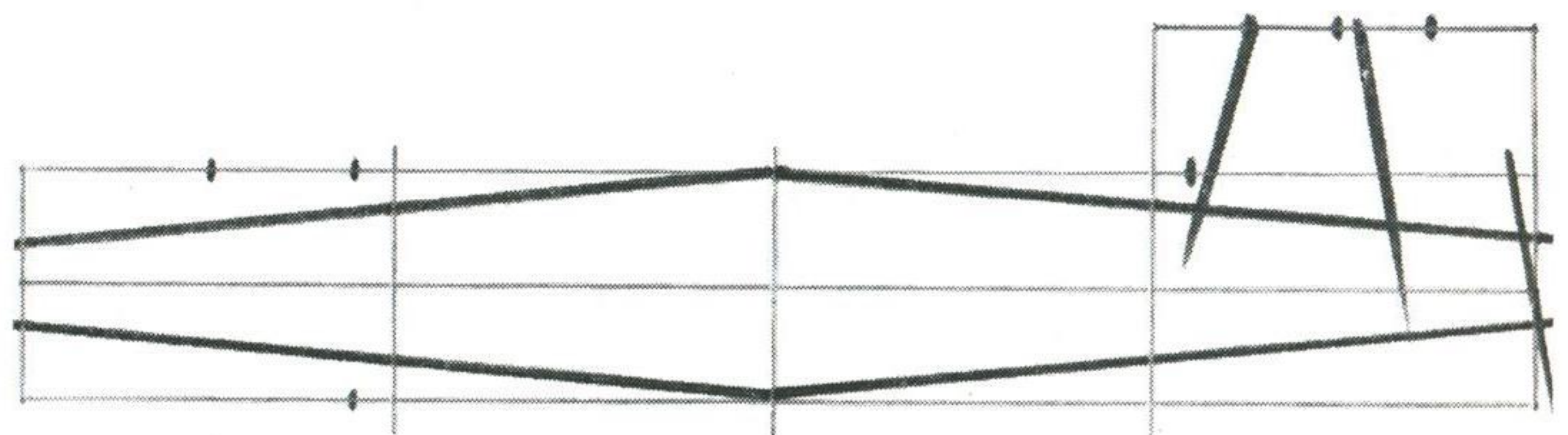
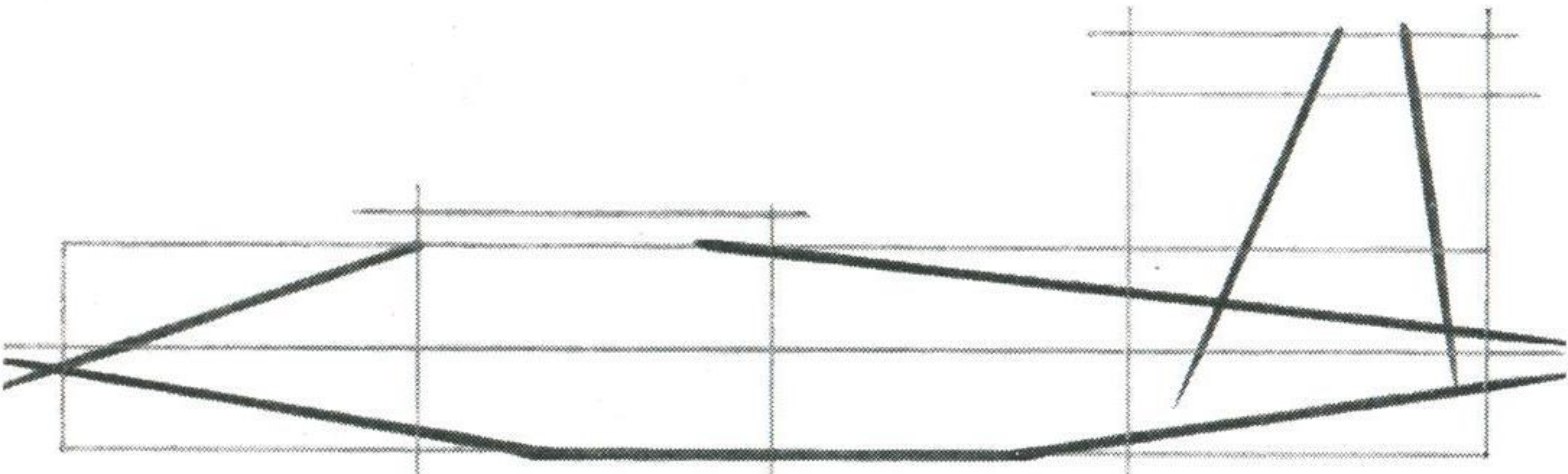
Stage 1. Construct a rectangle to the proportions indicated. Draw larger than this.



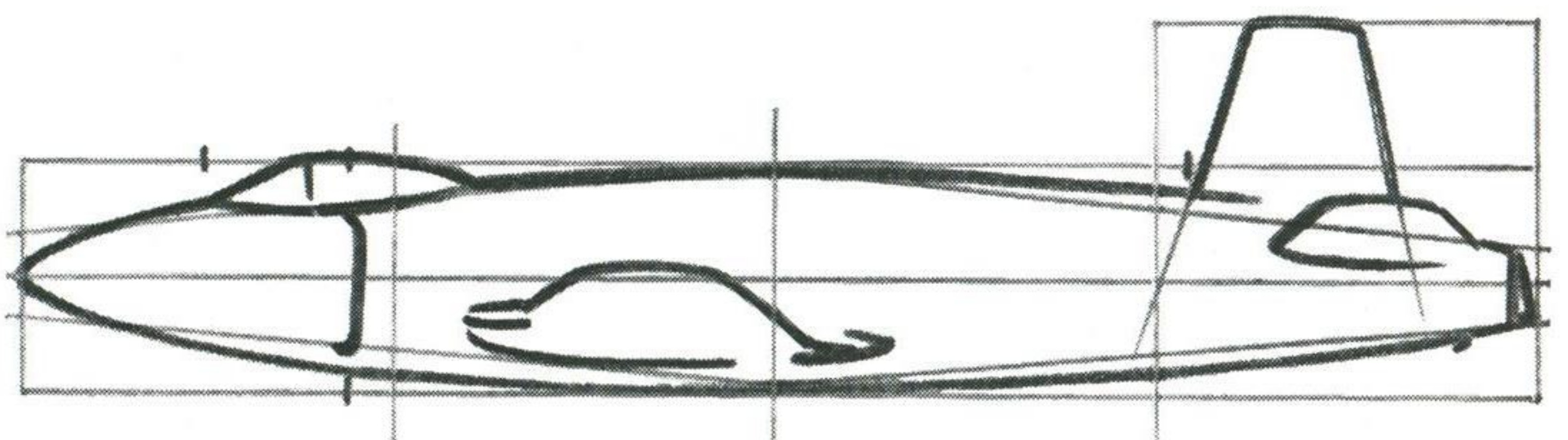
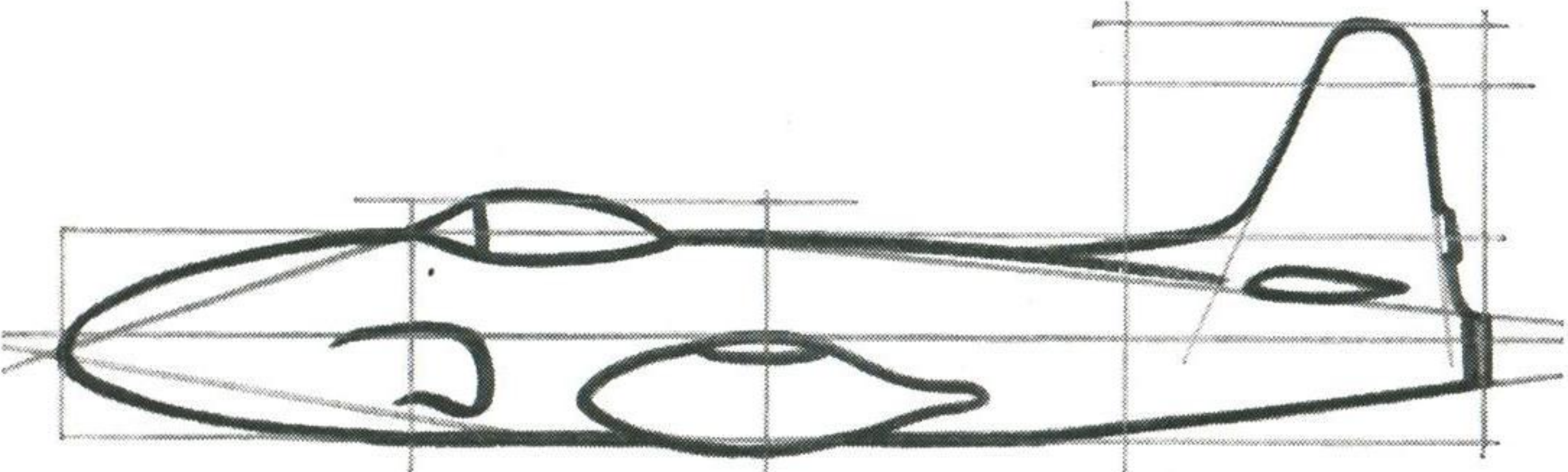
Stage 2. Sub-divide it into eight equal parts as shown here.



Stage 3. Make the sub-division marked x into a square.



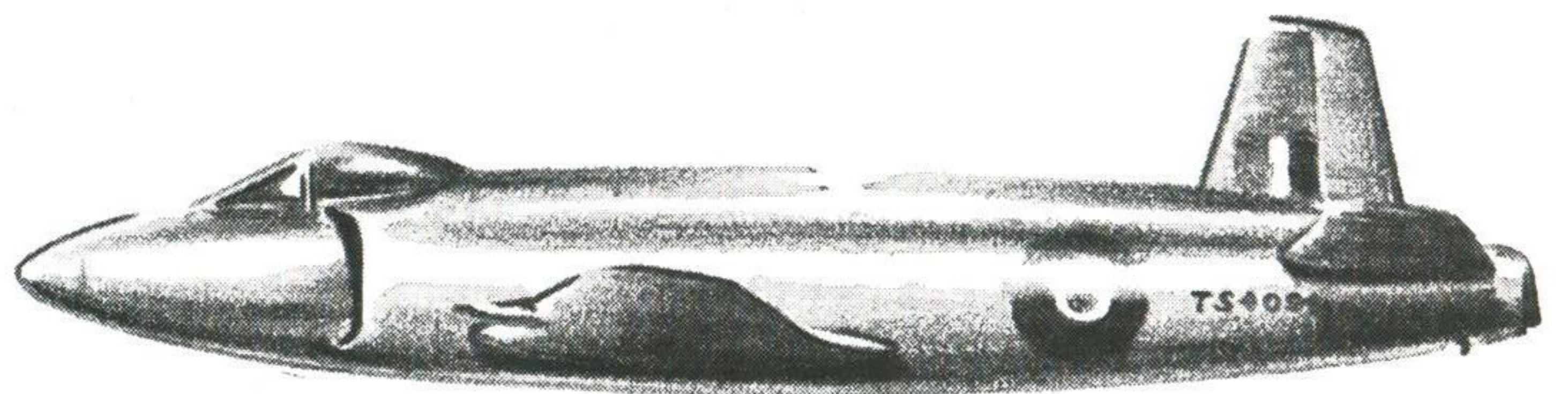
Stage 4. Add these lines and guide marks.



Stage 5. Complete outline.

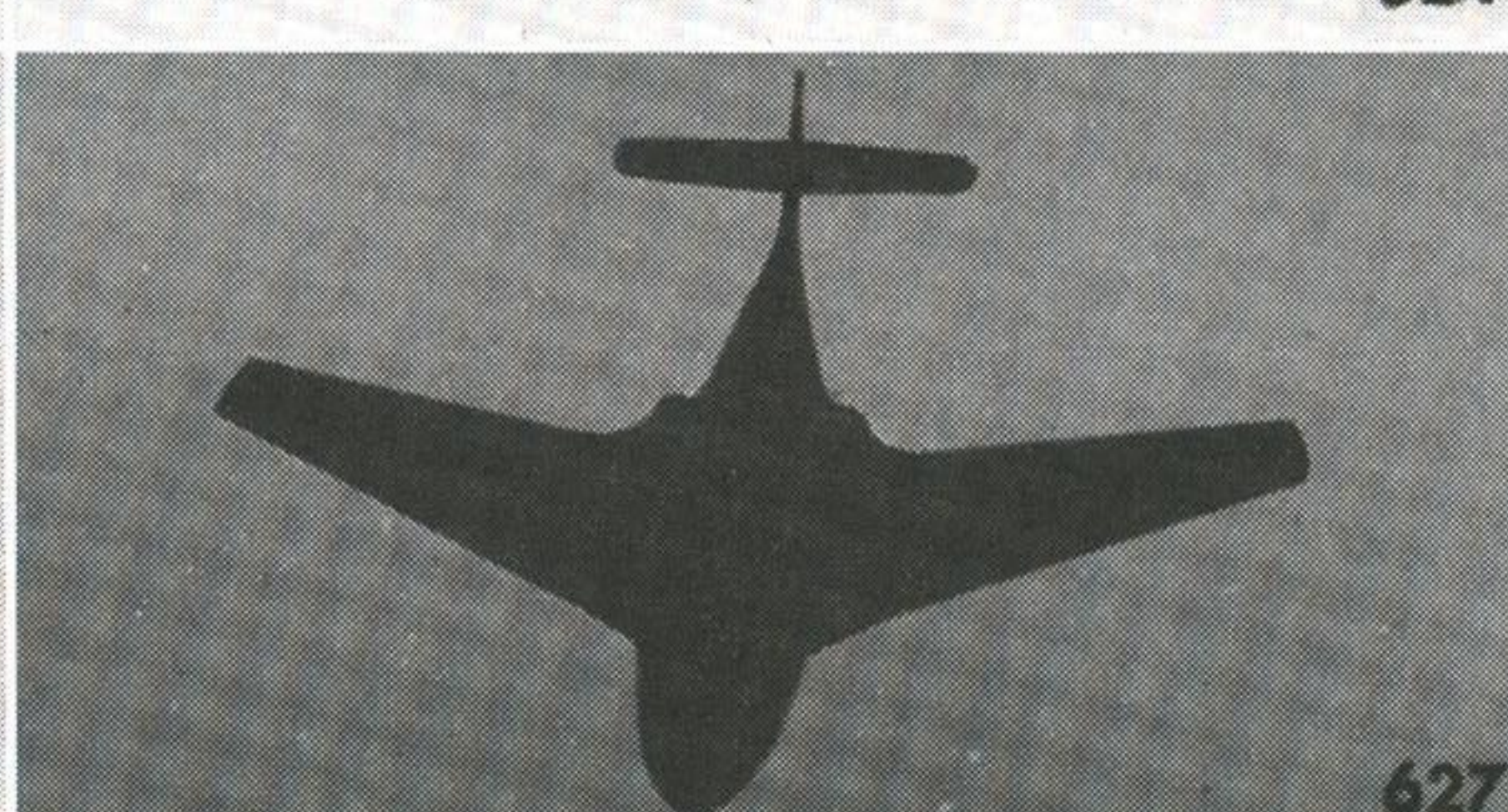
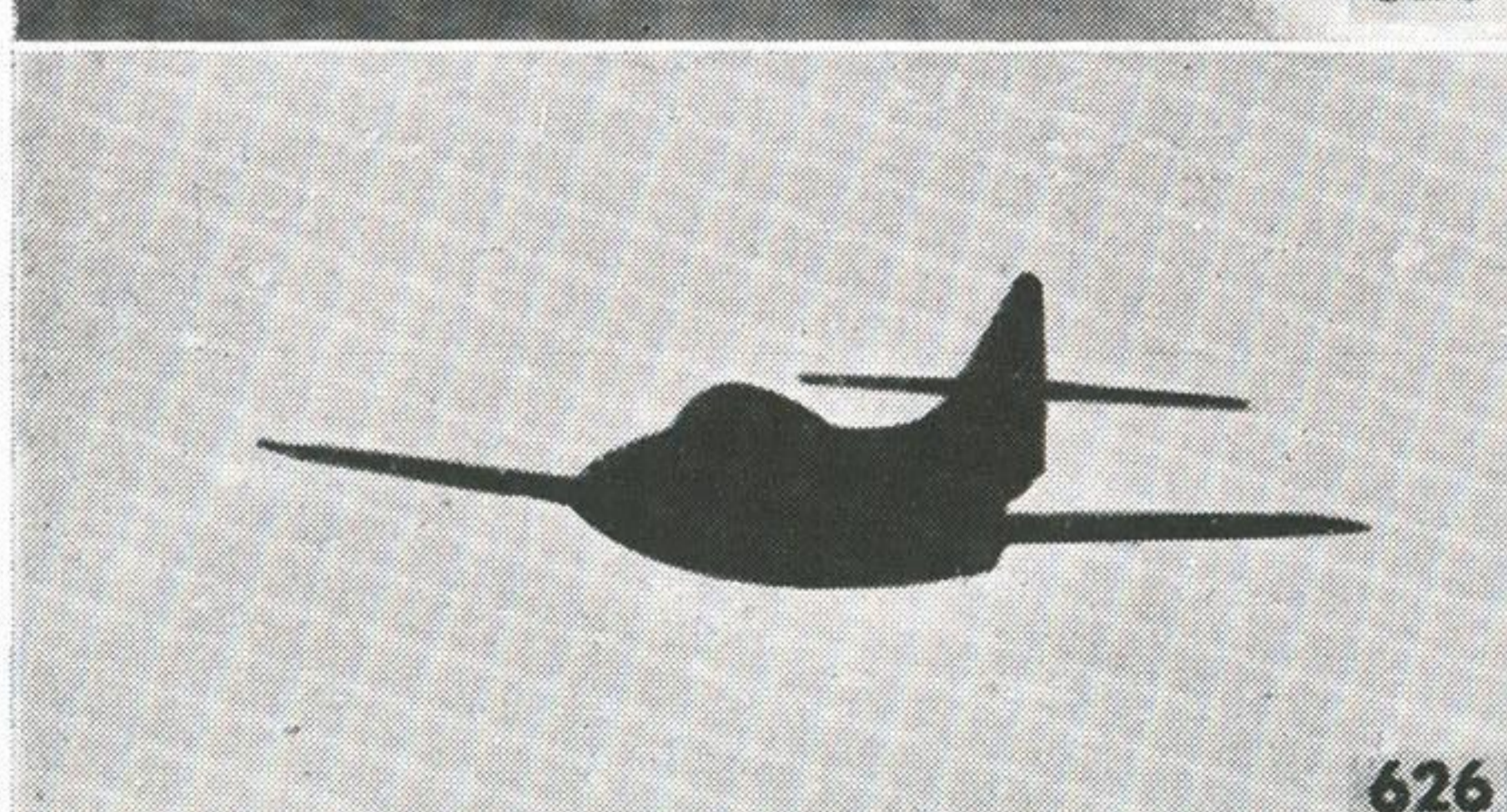
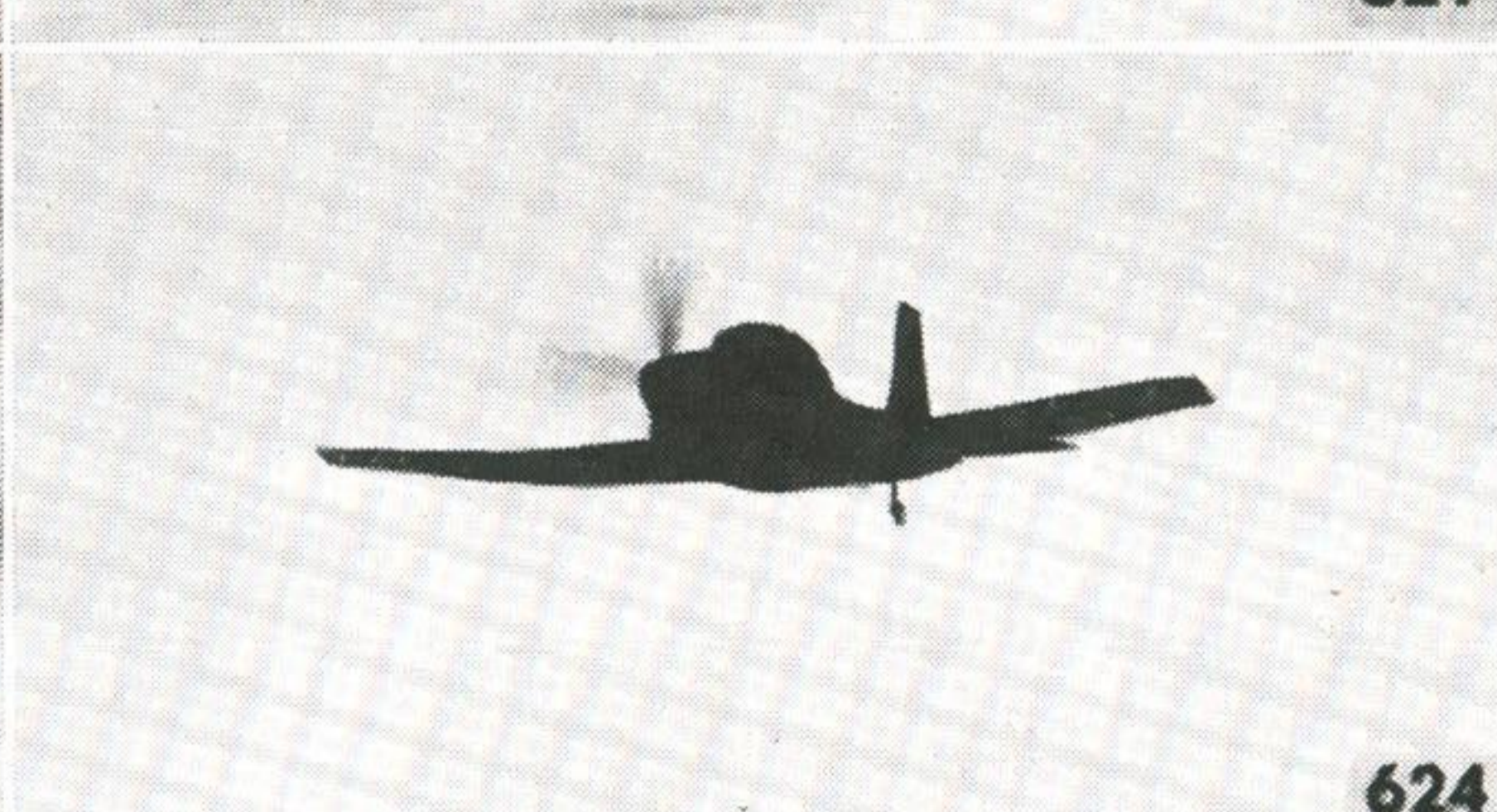
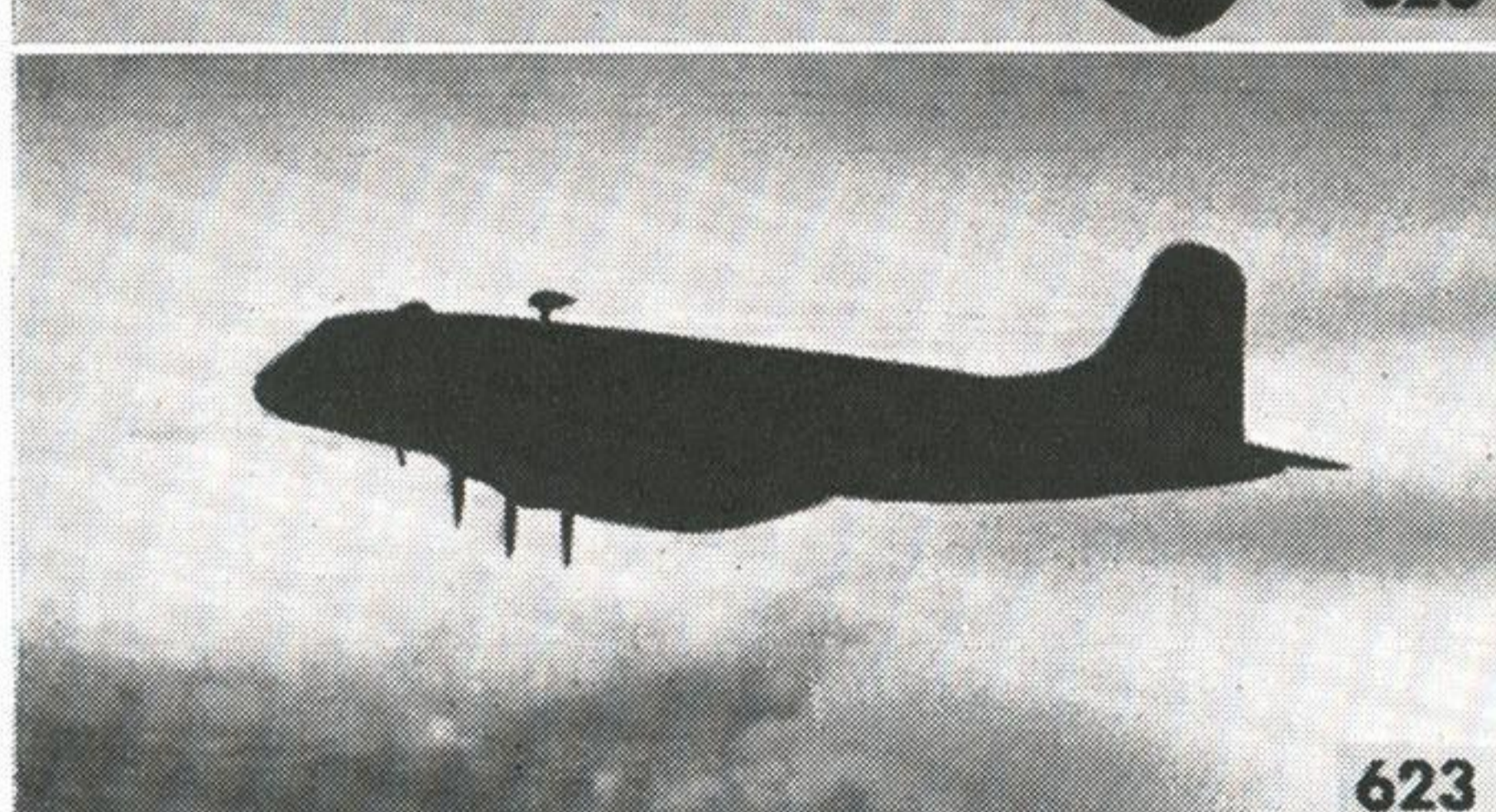
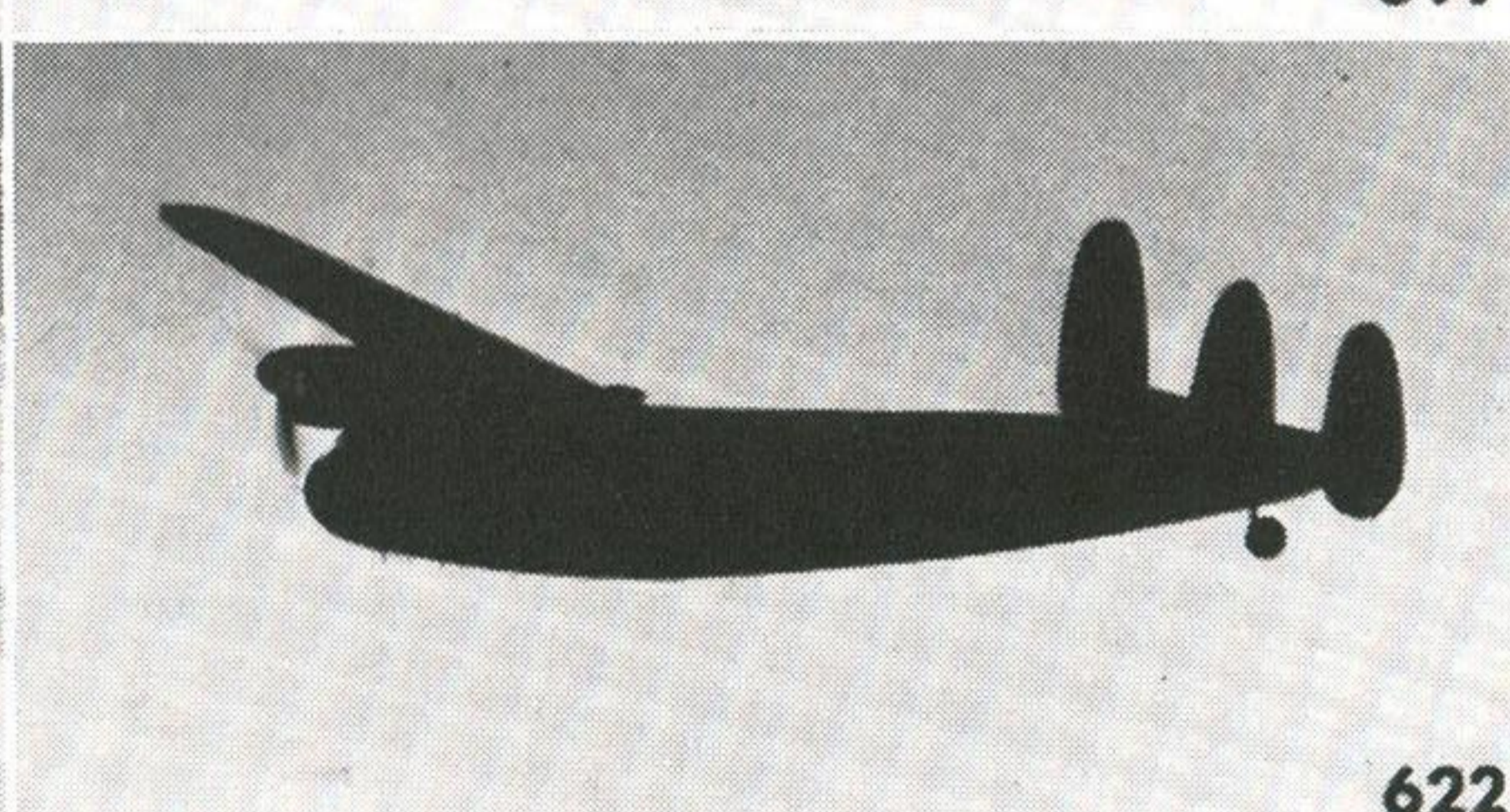
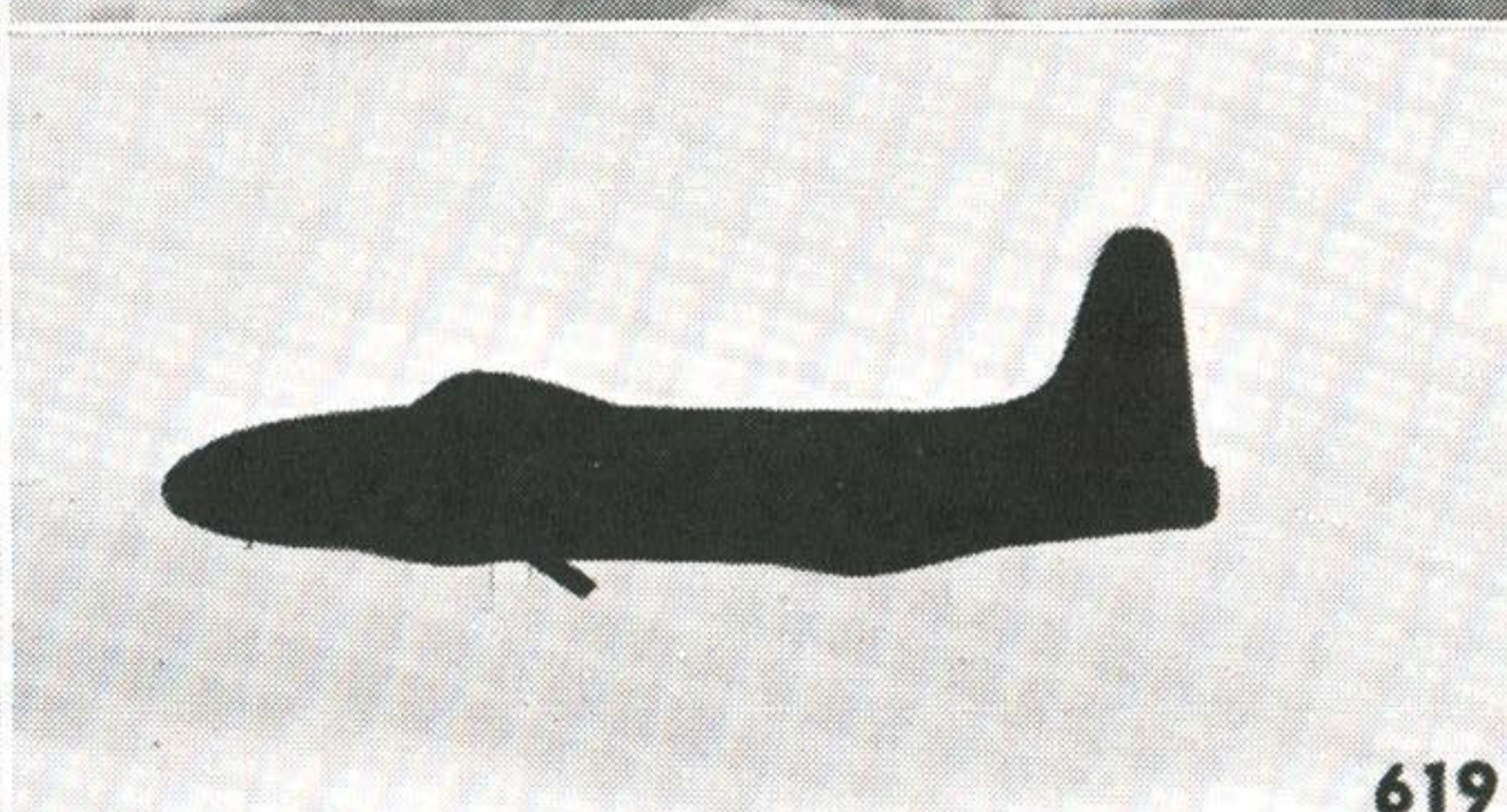
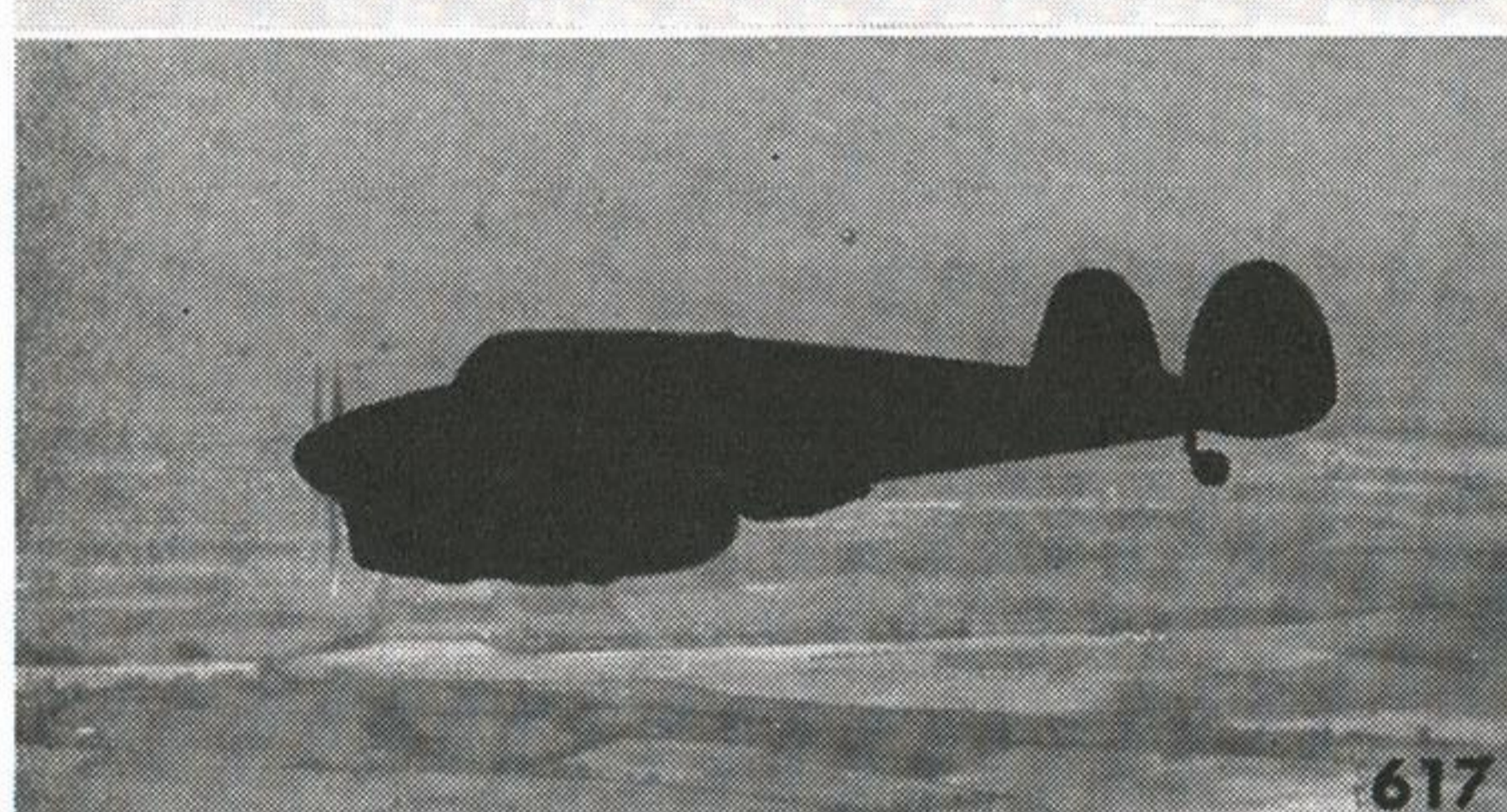
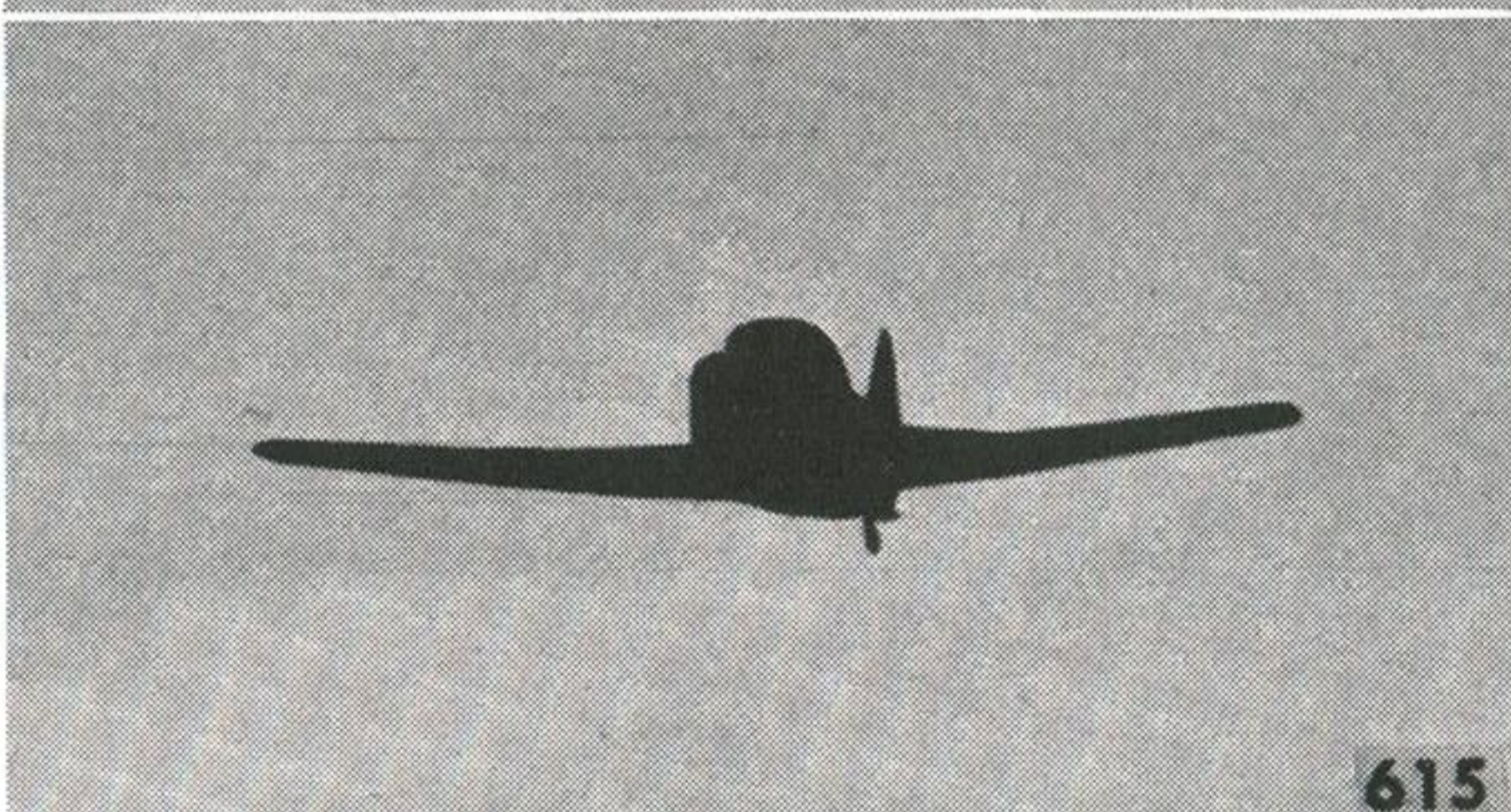
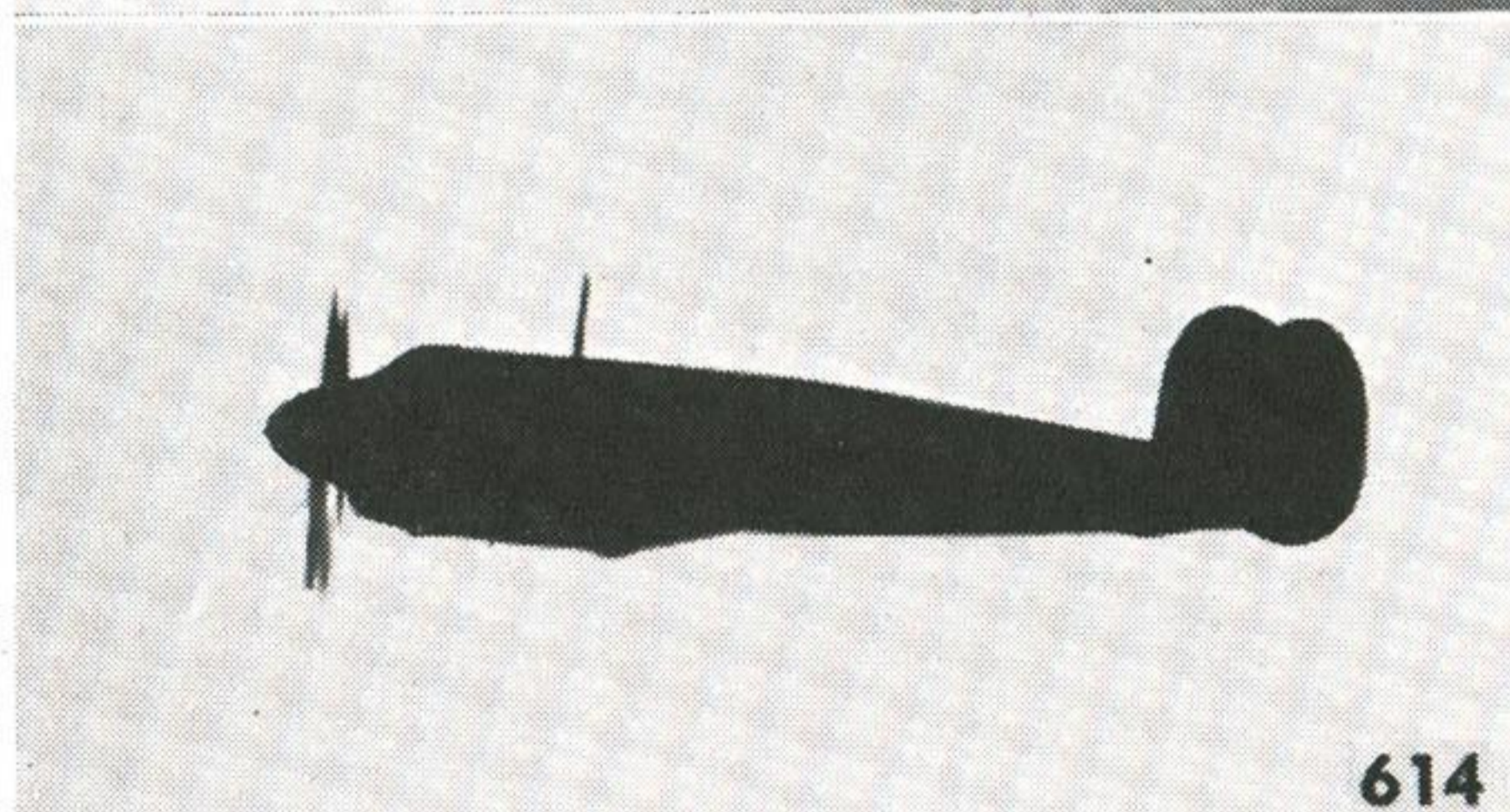
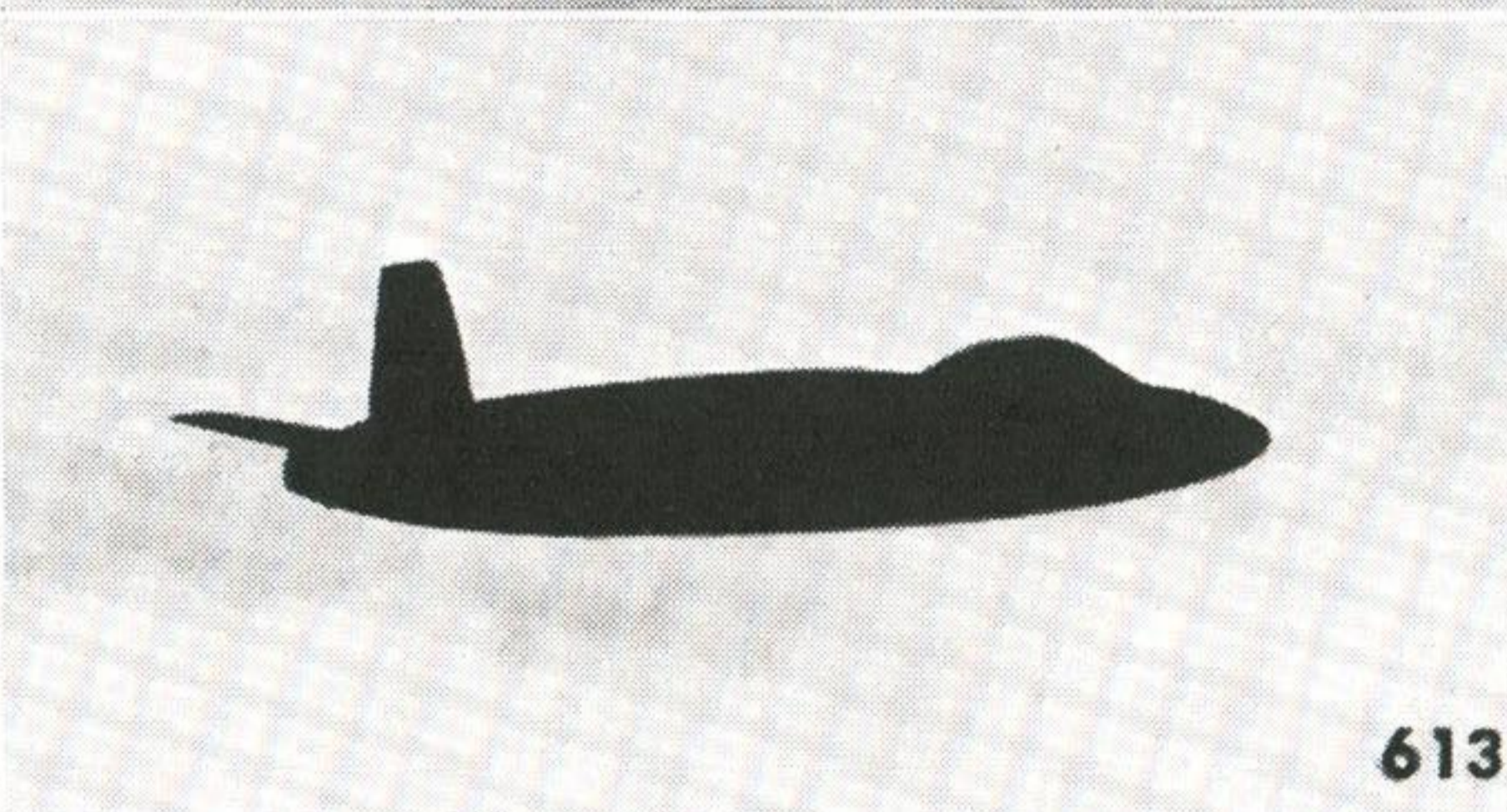
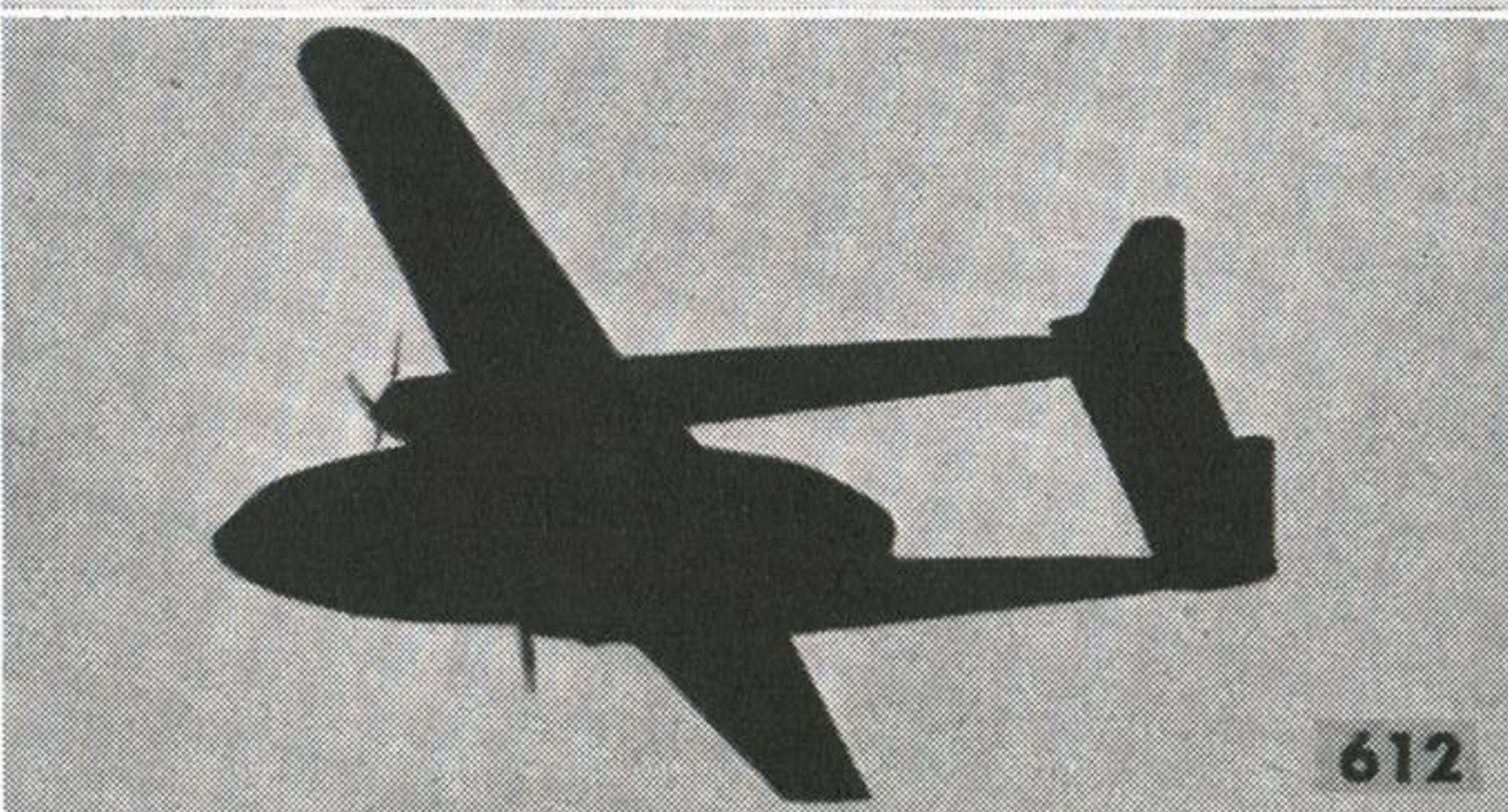
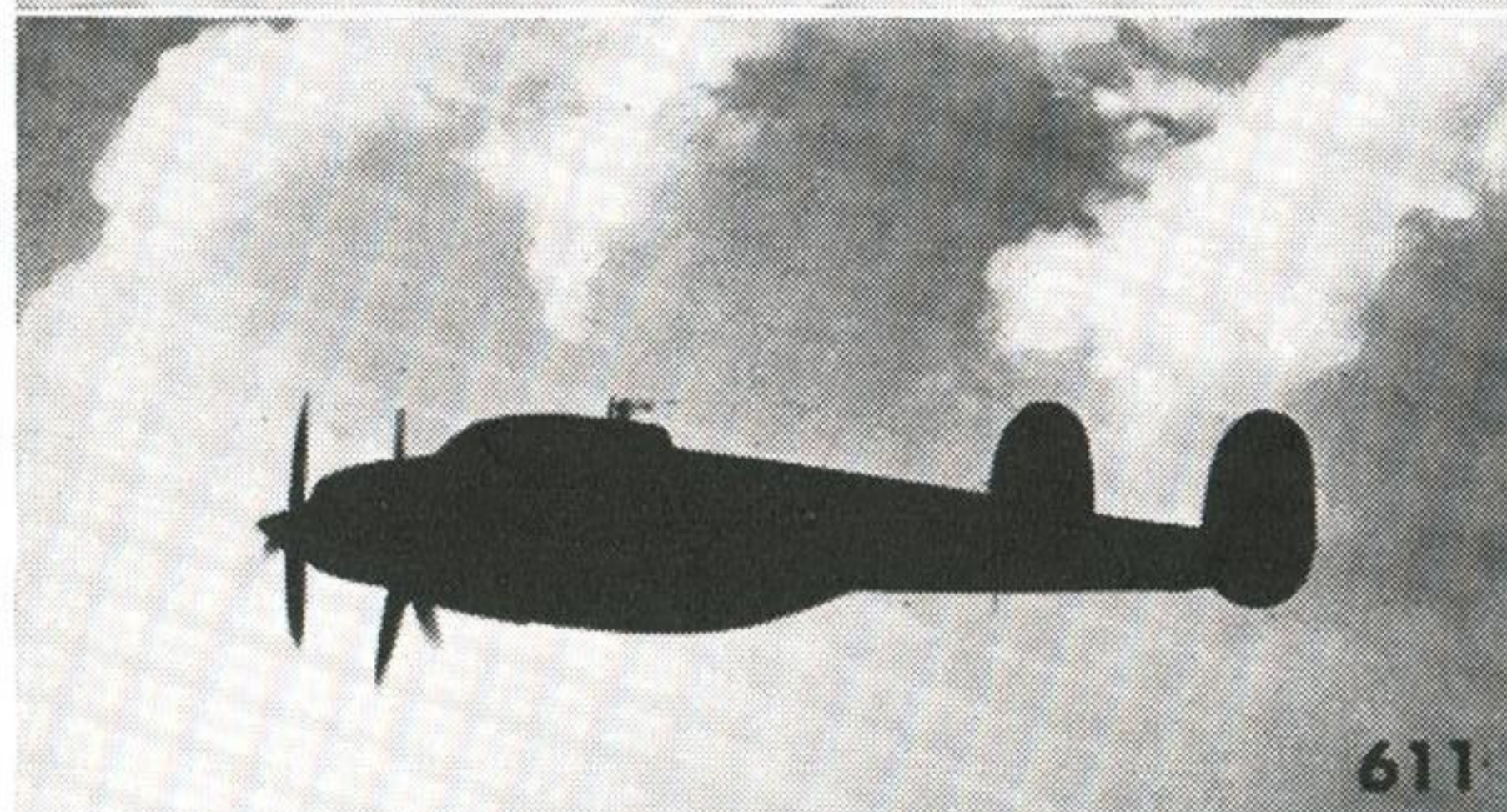
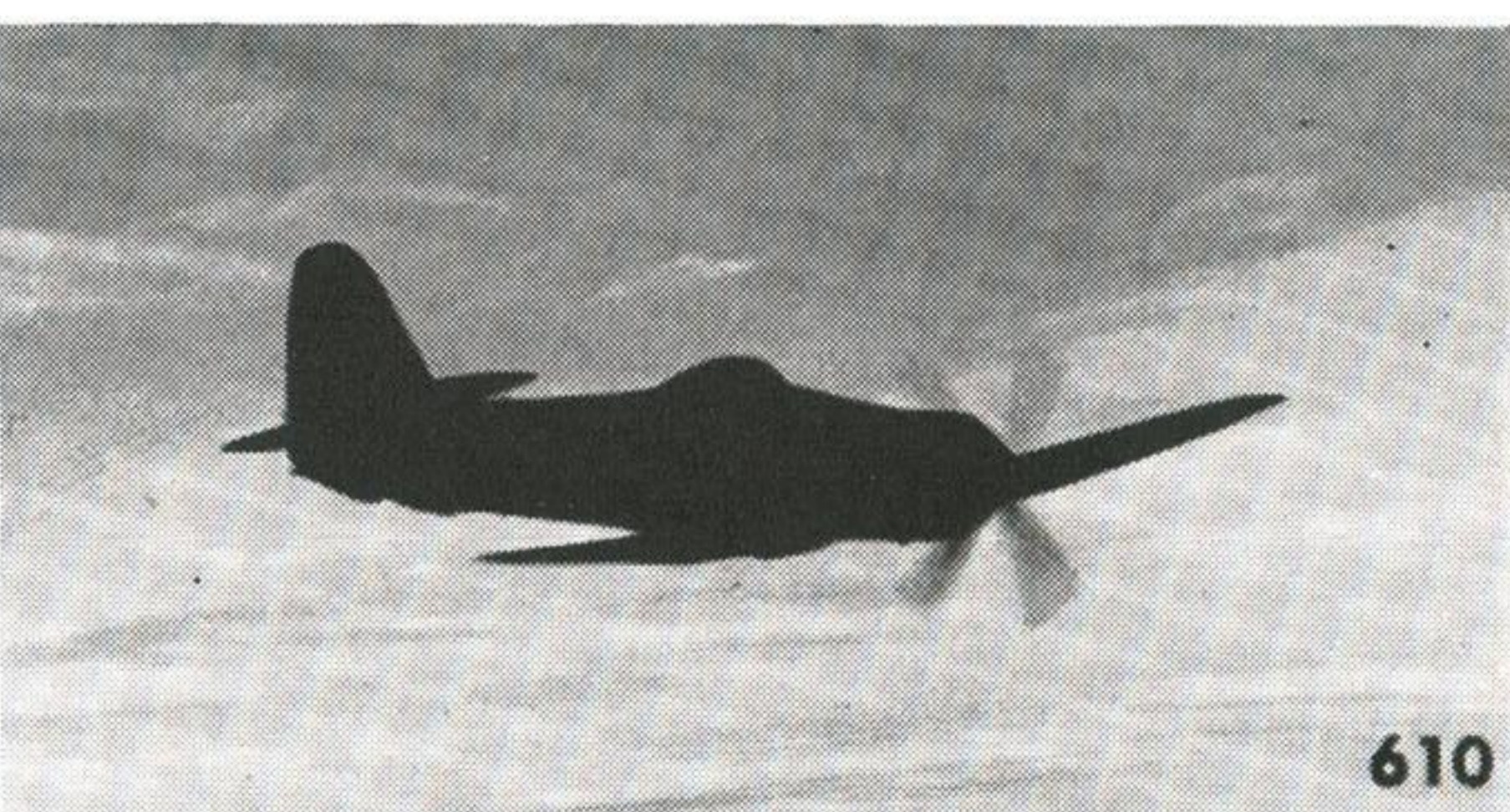
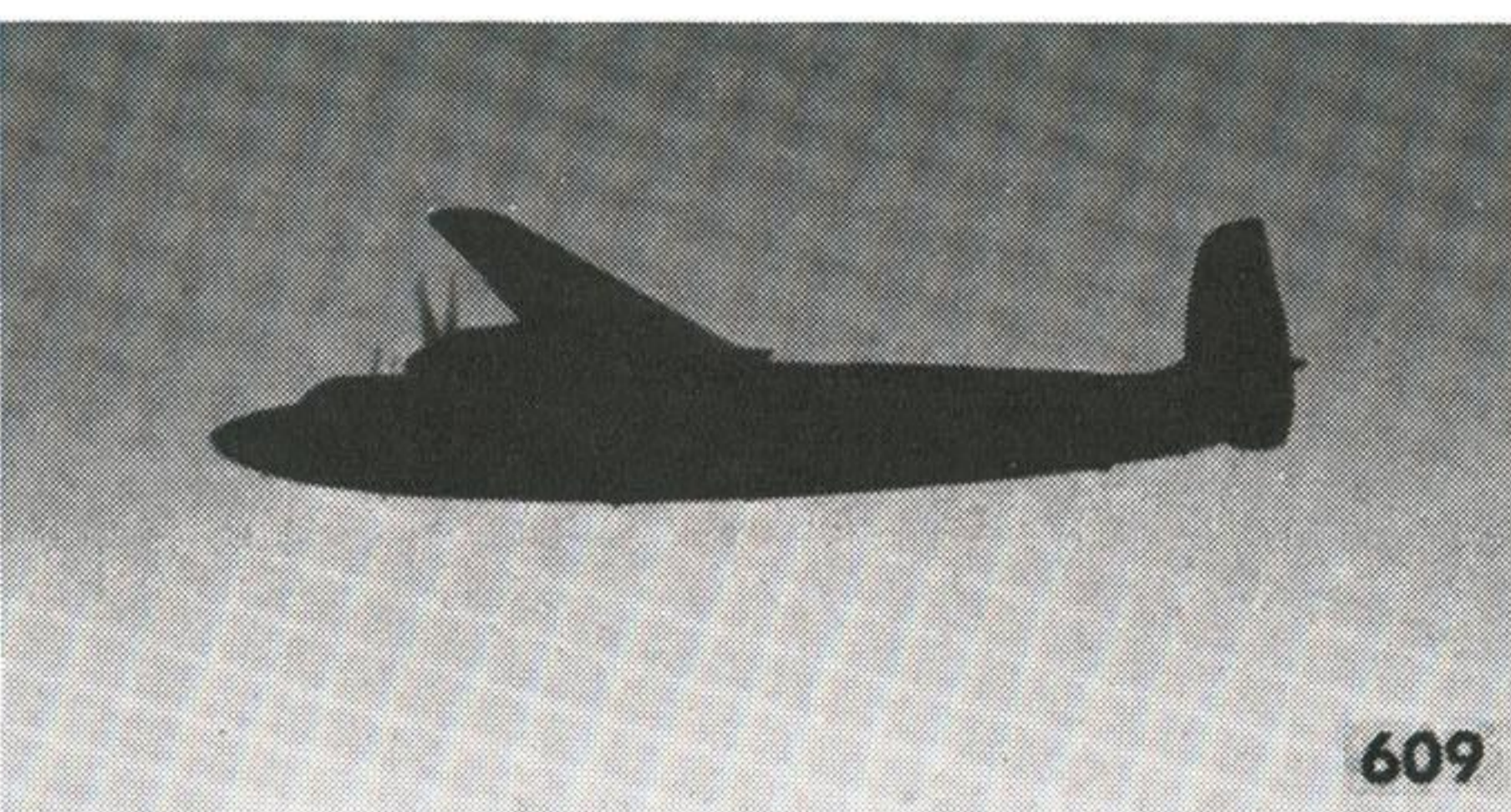


Stage 6. Remove construction lines. Assume a source of light and remove parts of outline to indicate high-lights. Add black shadows beneath wings, tail, etc.



Stage 7. Complete to taste. With practice, quite a professional aspect can be imparted to these drawings.

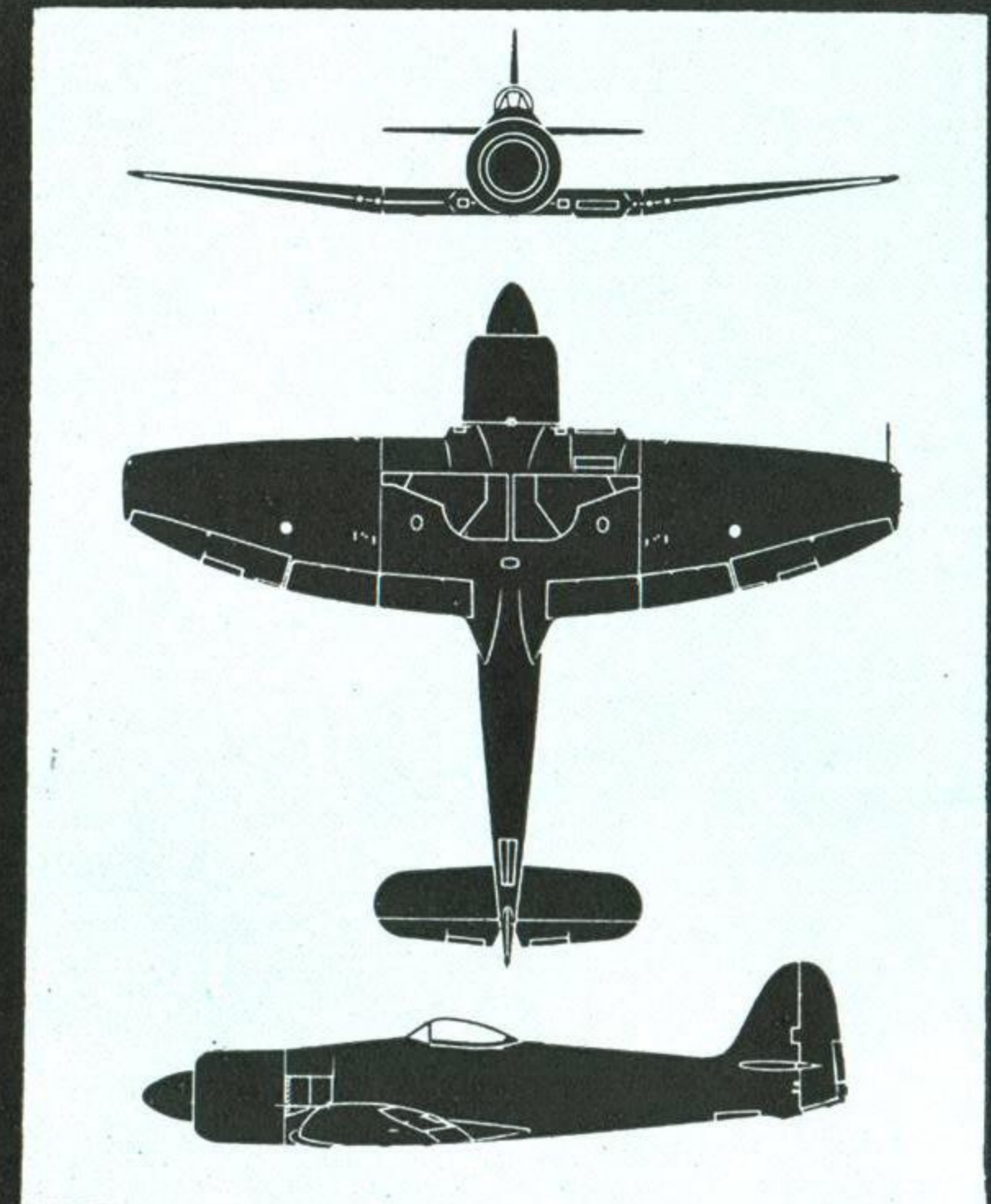
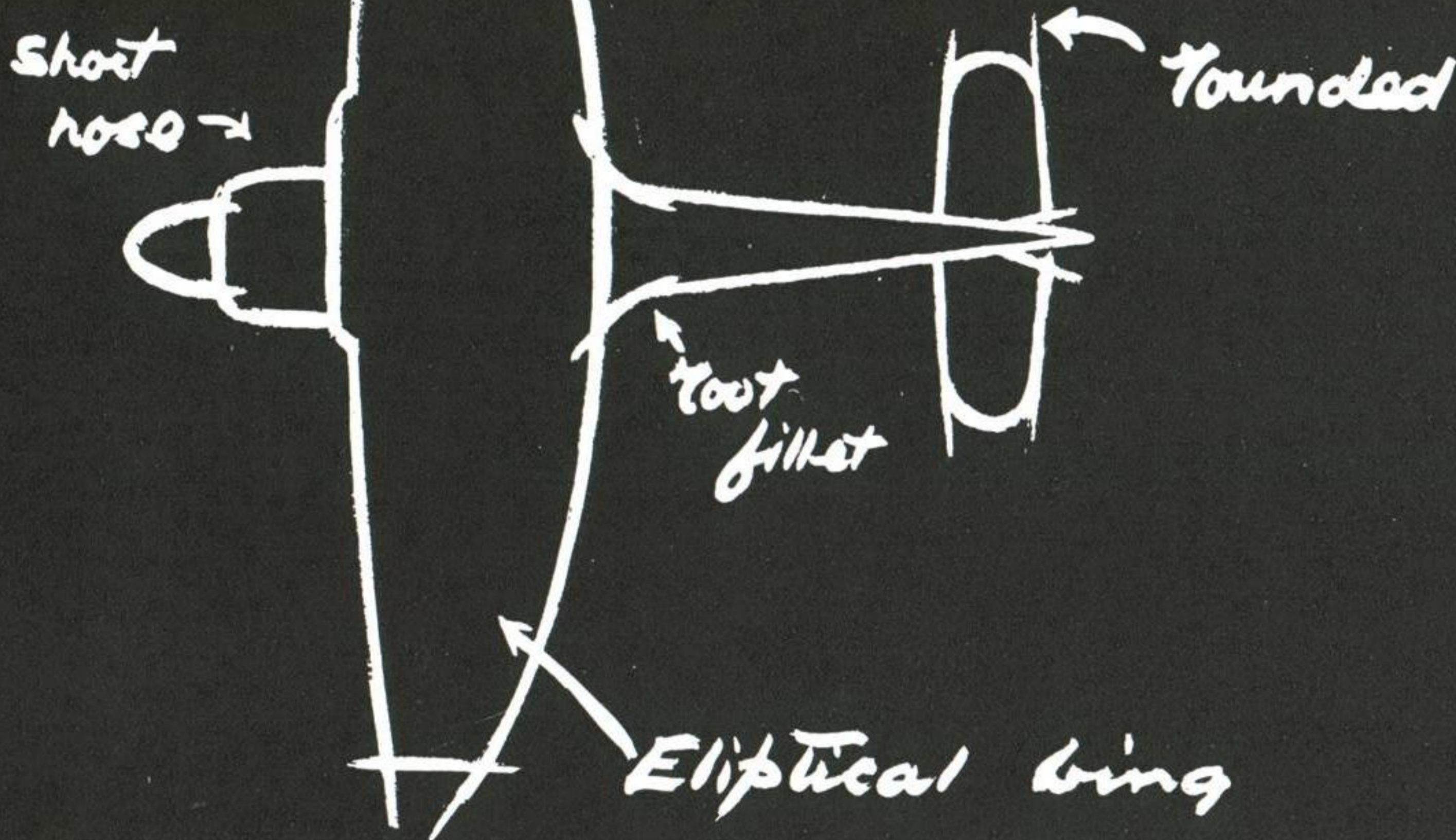
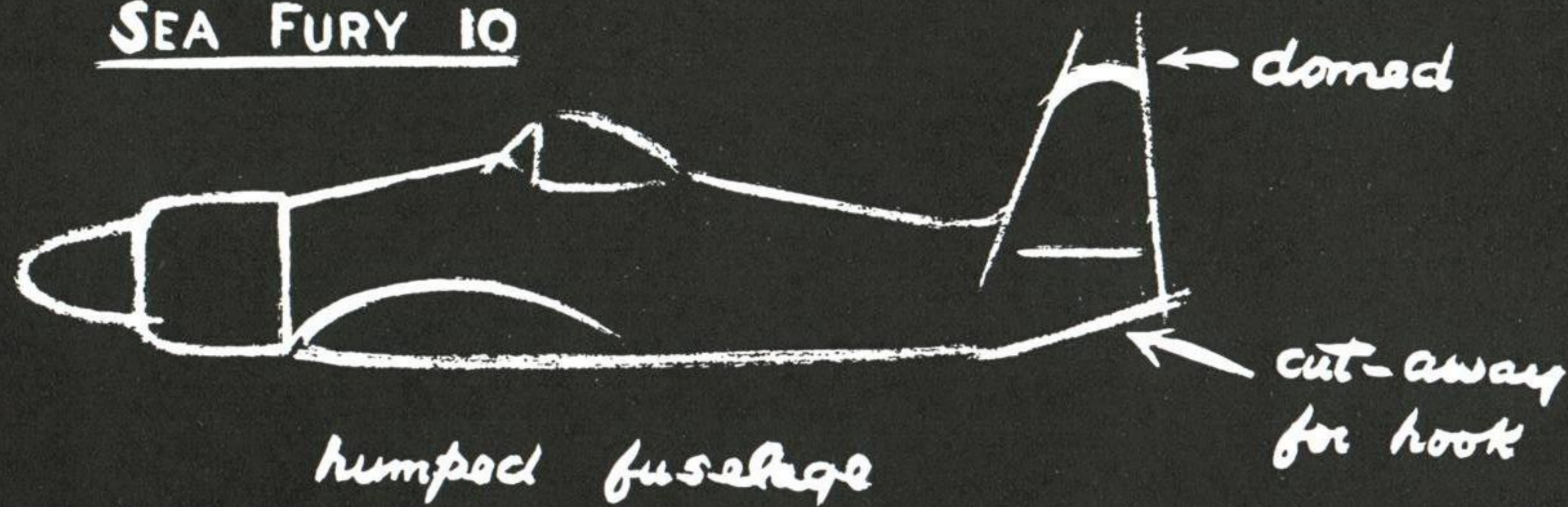
# SILLOGRAPHS



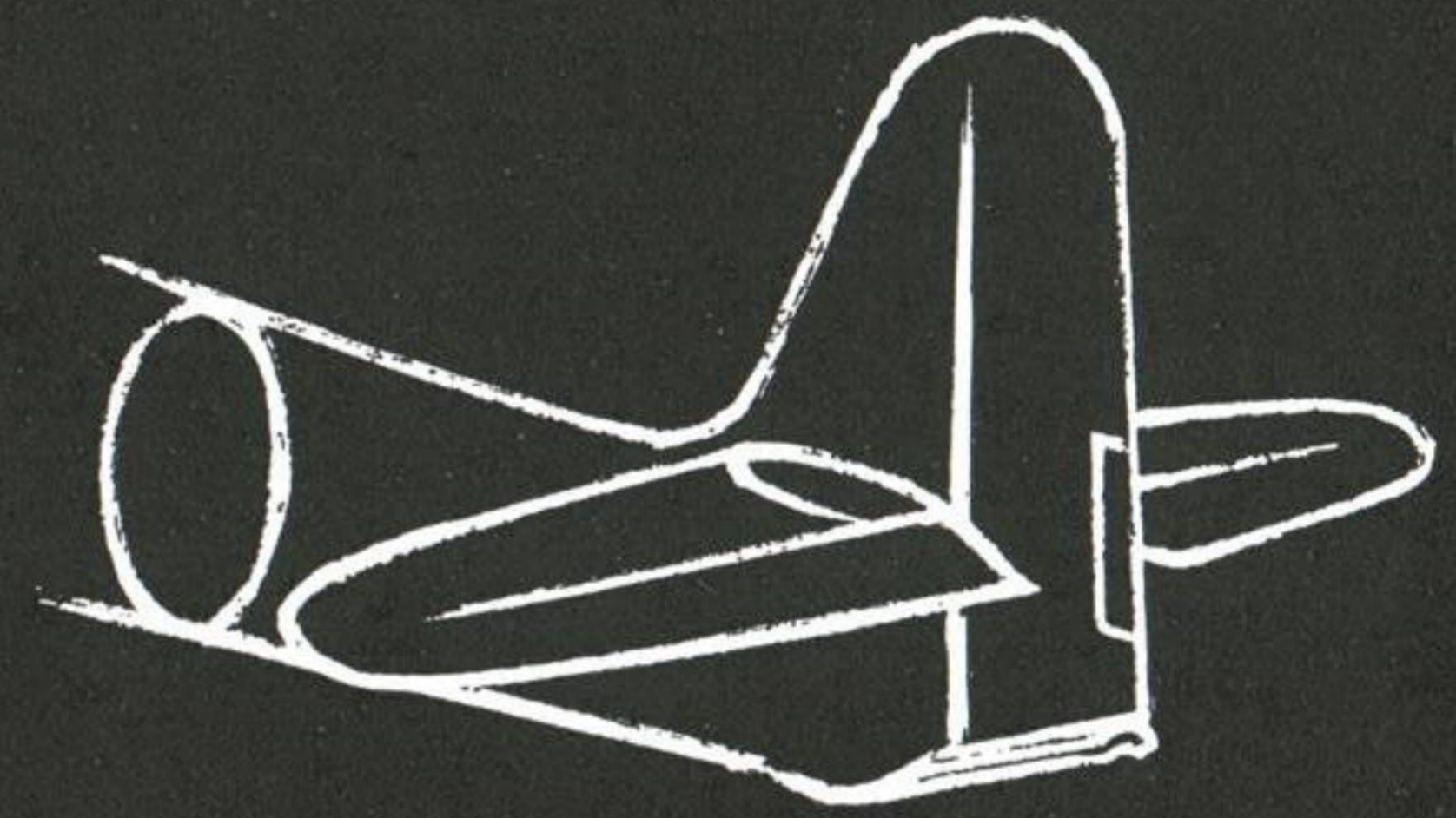
# LECTURETTE—HAWKER SEA FURY

MAINLY FOR INSTRUCTORS

HAWKER  
SEA FURY 10



SPAN 38' 5"



HURRICANE ! TYPHOON ! TEMPEST ! Many an enemy failed to weather the storms of devastation and destruction wreaked by these Hawker fighters during the war—and they are the direct ancestors of the Hawker Sea Fury. So, by breeding at least, this snub-nosed, thickset, hump-backed, aggressive looking fighter should have what it takes to make a good Naval aeroplane.

From the article on page 32 by Mr. Sidney Camm, it is obvious that the Sea Fury embodies all that is best of the hard lessons learned in more than 30 years of Naval Aviation. The Fury design, from which the Sea Fury stems, was projected in 1943. It made use of the Tempest's special wing (which was developed when Tornados and Typhoons began to encounter compressibility). The first prototype Sea Fury was a standard Fury fitted with a deck-hook. It did deck-landing trials in 1945. The Sea Fury F. Mk. 10 followed—a fully navalized version with hydraulic wing-folding (outer panels). Forty-nine Sea Fury F. Mk. 10s were built. The fiftieth and subsequent production models, incorporating a number of small internal modifications, became the Sea Fury F.B. Mk. 11. A two-seat trainer version is known as the T. Mk. 20.

The Sea Fury and Fury trainer have together indulged in several long-distance flights sufficiently interesting to reach the daily-paper columns. For instance, on July 19th this year, four Hawker Sea Fury F.B. Mk. 11s flew from London to Malta, a distance of some 1,310 miles, in 3 hours 32 mins. at an average speed of 400 miles per hour, establishing a record for the route. This flight was a normal routine replacement flight of aircraft for the Mediterranean Fleet and not in any way specially arranged. Furies and Sea Furies and Fury trainers for foreign buyers are invariably delivered by air to destinations as far afield as Iraq, Pakistan and Egypt, and could go much further. (The illustrations above, though titled Sea Fury 10, apply to F.B.11 also).

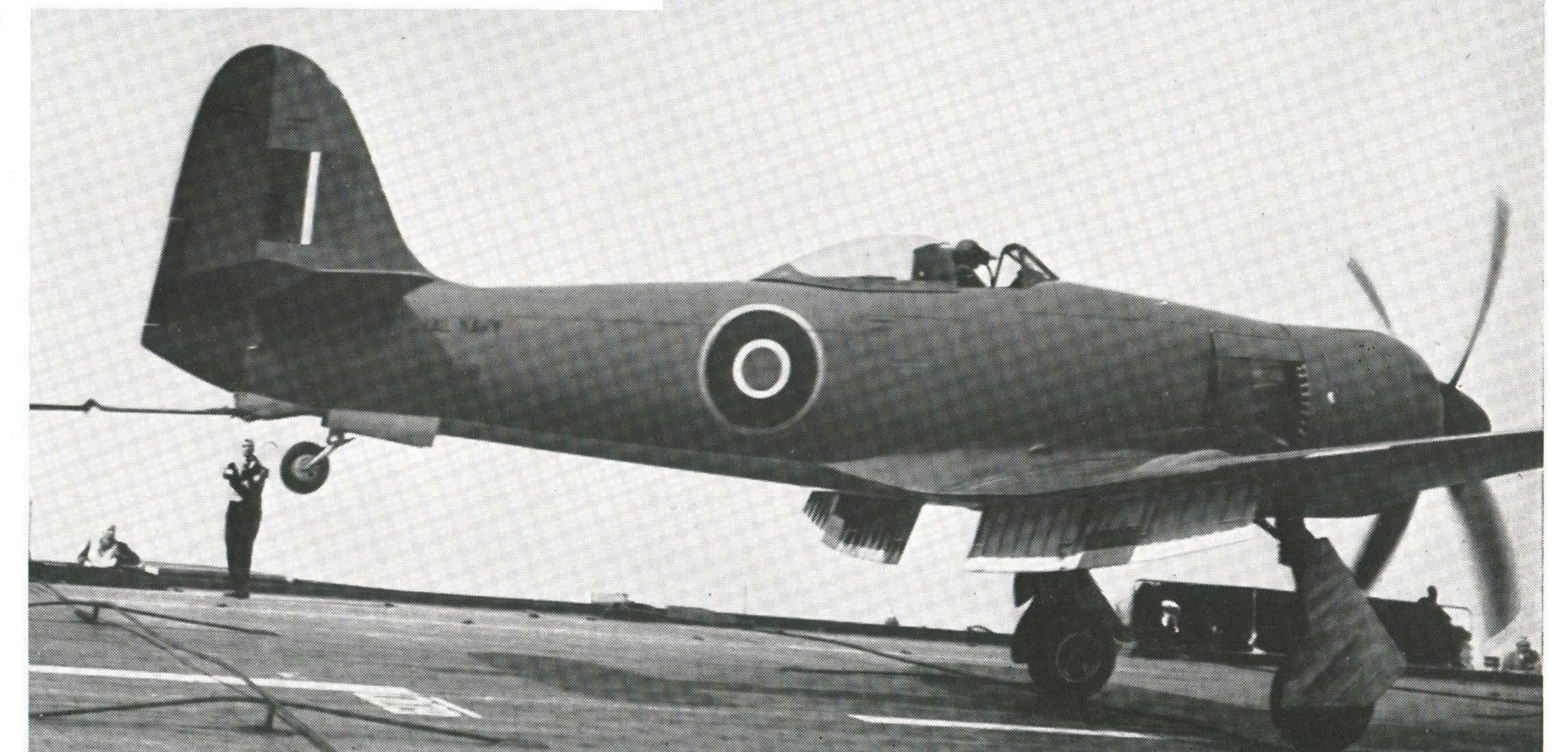
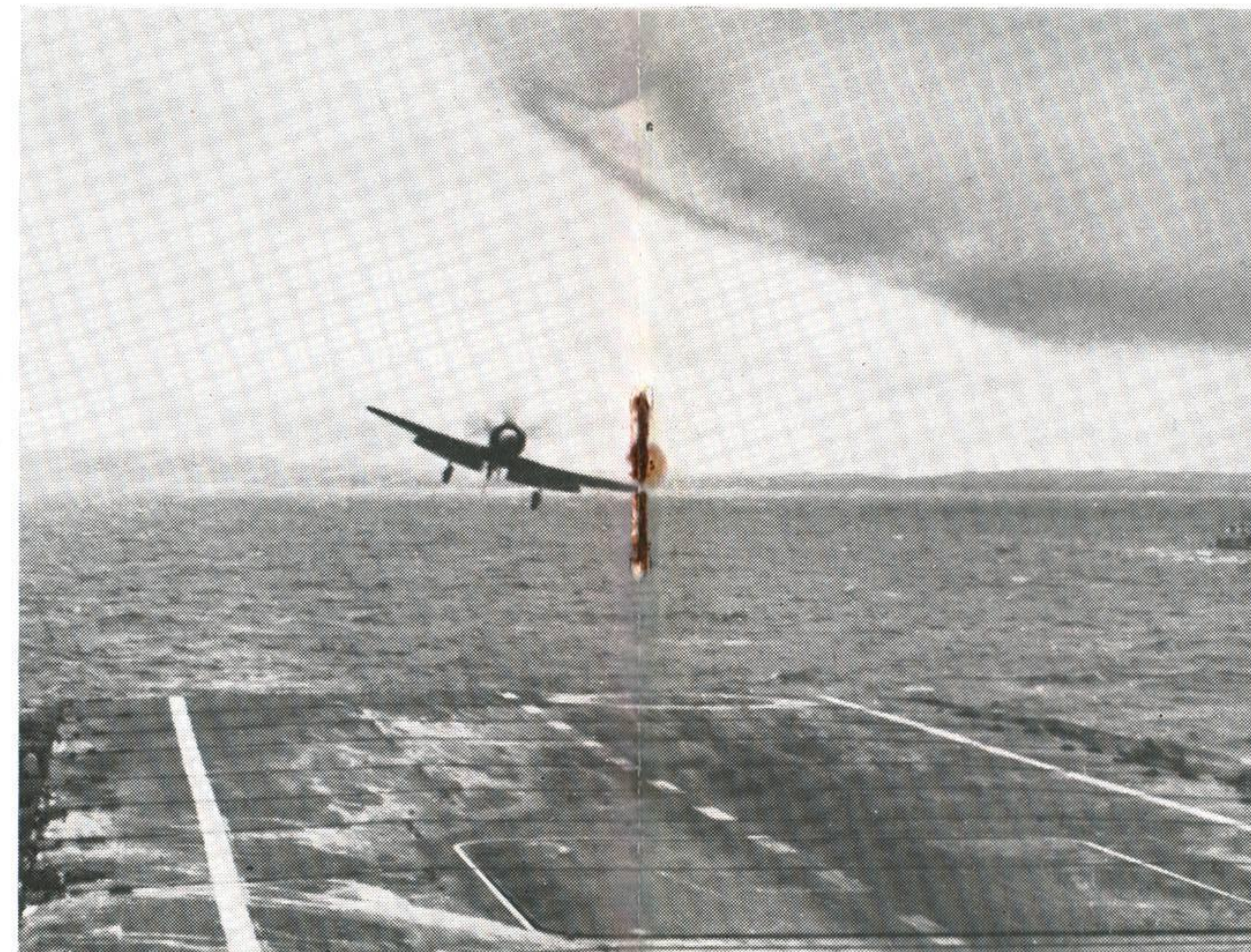
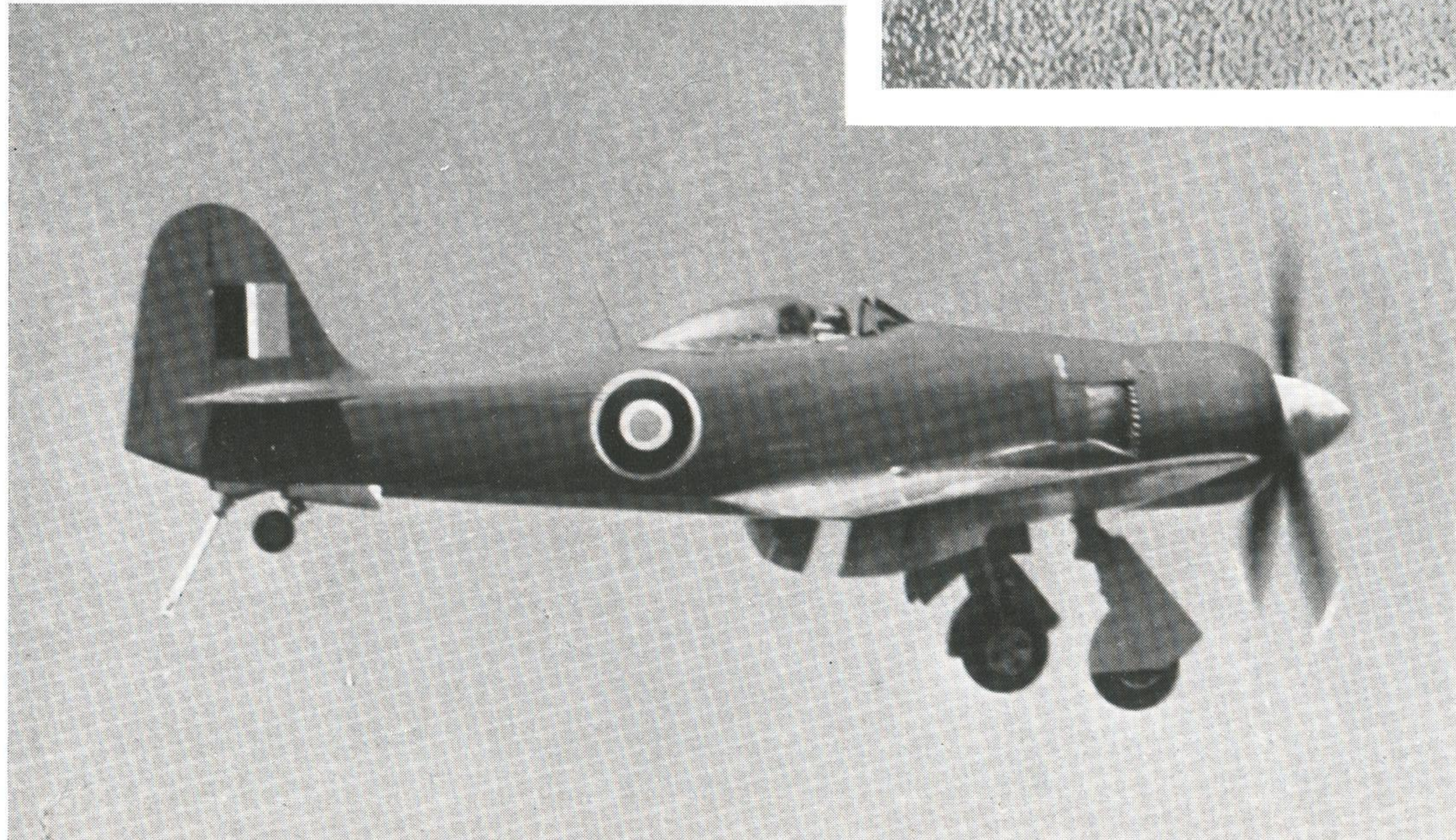
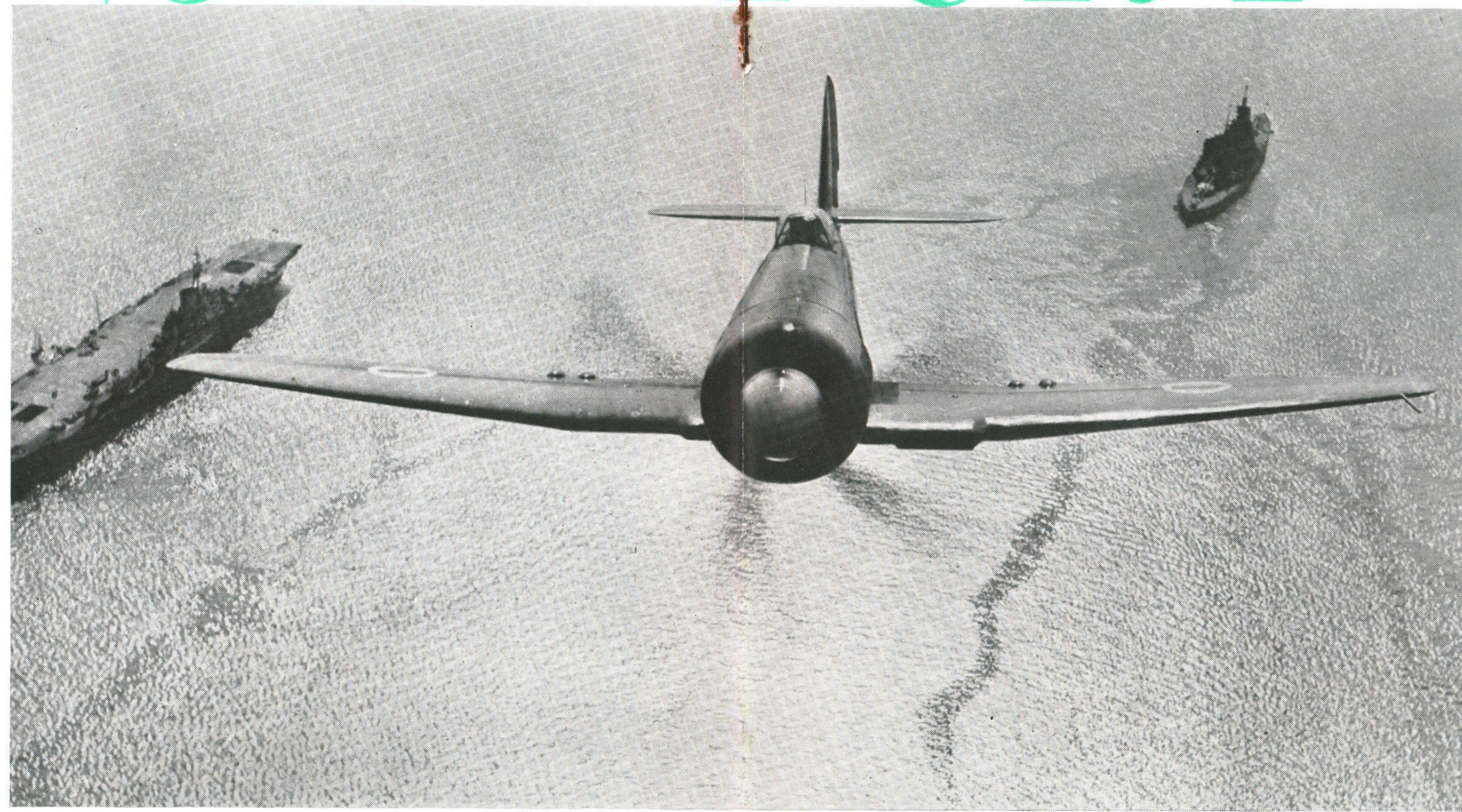
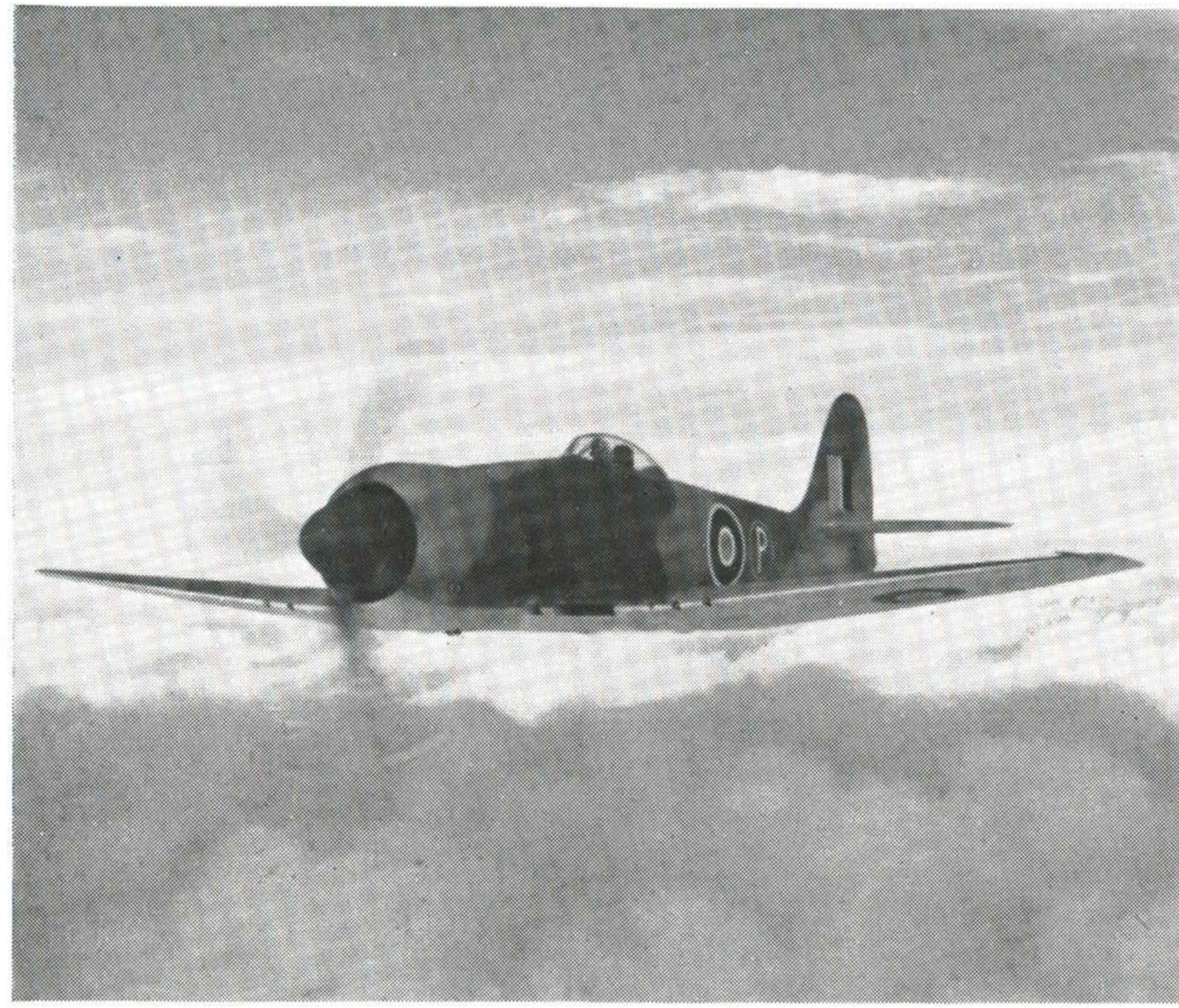
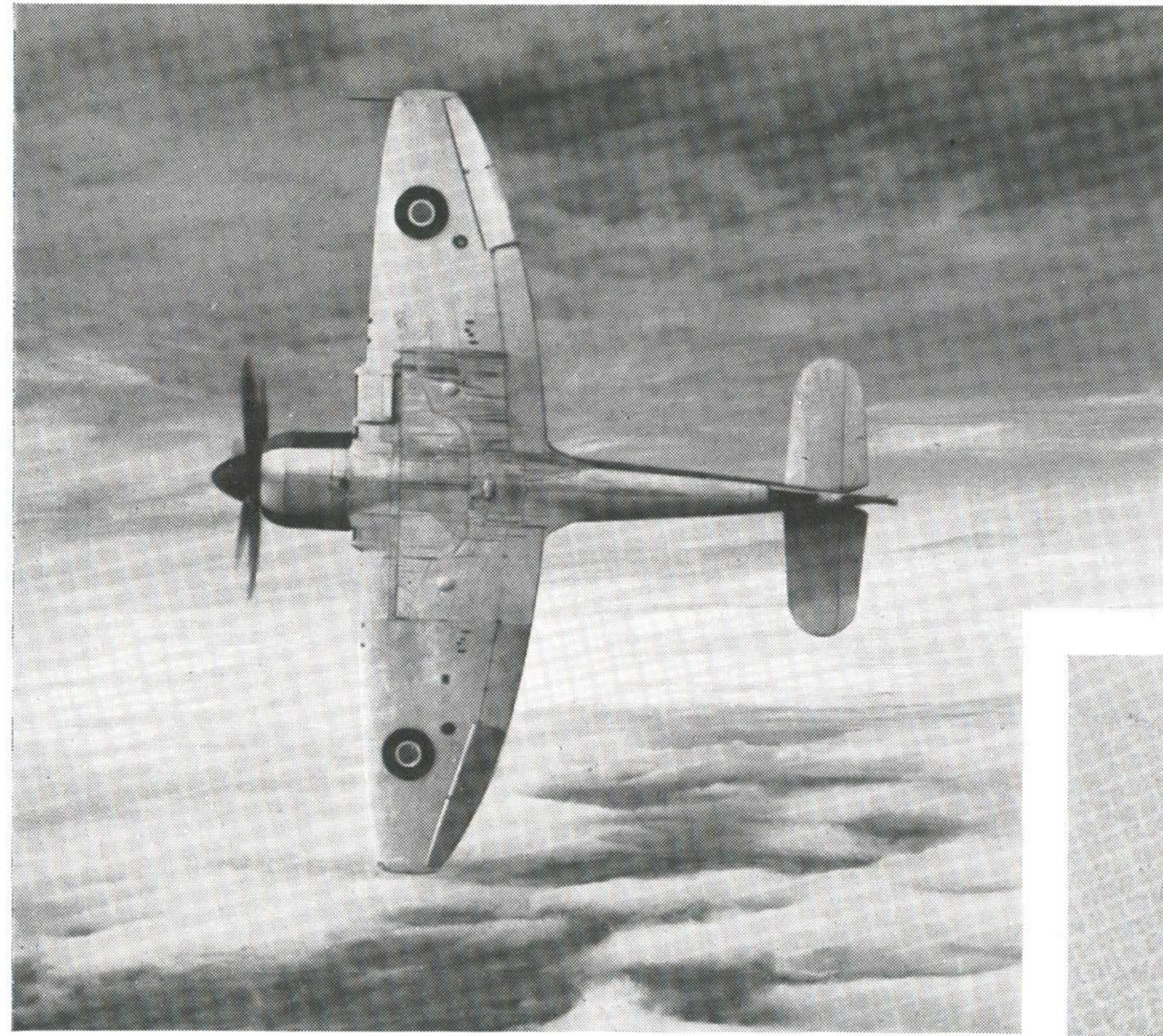
## TECHNICAL DATA :

*Type* : Low-wing, single-engine monoplane with single fin and rudder.  
*Duties* : Naval Fighter-Bomber.  
*Builders* : Hawker Aircraft Ltd.  
*Designer* : Sidney Camm.  
*Engine* : One Bristol Centaurus XVIII 18 cylinder two row radial of 2,470 h.p.  
*Performance* : Max. speeds : 450 m.p.h. (390 knots) at 20,000 feet.  
 Max. range : 1,850 miles at sea level.  
*Armament* : 4 20 mm. Hispano guns fixed in wings. 12 60 lb. rockets or 2 100/1,000 lb. bombs, or various combinations of bombs, flares, depth charges, smoke curtain and "window" containers.

## RECOGNITION DETAILS :

*Wings* : Low-set, long straight centre-section, elliptical in plan form, dihedral in outer panels only. Blunt wing-tips ; asymmetrical arrangement of wing root intakes ; trailing edge root fillets.  
*Engine* : Short blunt radial type—large "acorn" spinner.  
*Fuselage* : Short, sharply tapered in plan, humped in side view, cockpit on hump.  
*Tailplane* : Set on fuselage "through" fin base ; slight equi-taper to edges, rounded tips.  
*Fin and Rudder* : Straight tapered and "leaning backwards" ; blunt top ; rudder cutaway to accommodate deck-hook.  
*Main Features* : Short nose—low-elliptical wing—humped fuselage and general thick-set aspect. It flies tail high.

# SEA HAWKER FURY





(Photo: Imperial War Museum)

One of the earliest deck-landings ever made—in fact the first on a ship under way. The aeroplane is a Sopwith Pup, the pilot Commander Dunning, the ship H.M.S. Furious, and the date August, 1917.

# NAVAL FIGHTER DEVELOPMENT

by SYDNEY CAMM, C.B.E., F.R.Ae.S.

Mr. Camm needs no introduction to our readers, for part of our business is knowing who designs the aeroplanes we recognise—indeed recognition of the designing hand is of some value in studying aeroplane shapes. Mr. Camm joined Hawkers in 1923 and became chief designer in 1925. His long list of successful designs include the Hawfinch, Hornet, Hart, Fury (biplane), Demon, Audax, Harrier, Hector, Henley, Hotspur, Hurricane, Typhoon, Tempest, Fury and P.1040; and the following Naval designs: Horsley, Nimrod, Osprey, Sea Fury, the Naval P.1040. There were other variants and experimental types and, doubtless Mr. Camm has new designs up his sleeve which we shall see in due course. We are greatly indebted to Mr. Camm for his interest in our JOURNAL. Also to Mr. Gisbert D. S. Garret, Editor of the Hawker Siddeley Review for the loan of diagrams and photographs for this article.

IN RECENT YEARS the importance of Naval aircraft, and particularly the single-seater fighter, has received world-wide emphasis. The development of the Naval single-seater, with which this article deals, is of extreme interest and few realise that some of the earliest experiments were carried out more than 30 years ago by the Royal Naval Air Service. The first take-off from the forward deck of the aircraft carrier *Vindex* was made by Flt. Lt. H. F. Towler, R.N.A.S., in a Bristol "Scout" biplane in November, 1915. The first landing on a ship under way was made in August 1917 by Flt. Cmdr. Dunning, R.N.A.S., in a Sopwith "Pup" biplane on the aircraft carrier *Furious*. From that time development has proceeded intensively, although there have been periods when the single-seater fighter has lost its position in favour of the two-seater. The table opposite gives a number of particulars of the main naval single-seater fighters and compares them with their contemporary R.A.F. types.

The naval fighter must, of course, embody all the desirable features of the land fighter plus special requirements associated with its work with the Fleet, as follows:—

- (i) special facilities for landing.
- (ii) special facilities for take-off.
- (iii) longest possible duration of flight.
- (iv) ability to be folded to small dimensions so that the maximum number can be carried.
- (v) best possible pilot's view.
- (vi) good slow flying qualities.

Before examining the implications of these requirements it would be of interest to take a glance at the development stages over the years. Although in the early '20s the flying speeds were sufficiently low to permit landing without external assistance, this state did not last for long. Maximum level speed was soon increased, bringing with it an inevitable increase

YEAR	R.A.F. TYPE			NAVAL TYPE			
	Name	All-up weight	Max. speed	Name	All-up weight	Max. speed	Remarks
1923	Armstrong Whitworth "Siskin"	3,000 lb. (47 gall.)	153 m.p.h.	Fairey "Flycatcher"	3,030 lb. (53 gall.)	134 m.p.h.	No folding wings or arresting gear. Had flaps to reduce landing speed. Similar wing area.
1933	Hawker "Fury" (biplane)	3,350 lb. 50½ gall.)	214 m.p.h.	Hawker "Nimrod"	3,870 lb. (69 gall.)	195 m.p.h.	No folding wings or arresting gear. Had flotation bags, etc. Similar equipment. Increased wing area.
1943	Hawker "Fury" (monoplane)	11,830 lb. (200 gall.)	455 m.p.h.	Hawker "Sea Fury"	12,350 lb. (200 gall.)	450 m.p.h.	Folding wings, arresting and assisted take-off gear. Heavier equipment. Similar wing area.
1948	Immediate development	Over 11,000 lb.	Over 600 m.p.h.	Immediate development	Over 12,000 lb.	Approx. 600 m.p.h.	Folding wings, arresting and assisted take-off gear. Special flaps. Much heavier equipment. Increased wing area.

Fig. 1. Comparison of land and Naval fighter characteristics covering the period of the last 25 years.

in stalling speed, and it became necessary to introduce some arrangement for arresting the aeroplane on landing. This led to the introduction on board ship of arrester gear which, in its original form, consisted of a number of cables attached to sandbags. On the aeroplane the arrester gear was an "A" frame hook attached some way along the rear fuselage and lowered by the pilot in the process of landing. In those days, as will be seen by reference to Fig. 1, the all-up weight varied between 3,000 and 4,000 lb. The problem was thus comparatively easy compared with that of today, when the weight of fighters has approximately quadrupled and the landing and take-off speeds have almost doubled. Since the space for landing is limited these developments have resulted in much larger decelerating loads being applied to the aeroplane and this, together with the necessity for reducing the complexity of loads, has led to the present design of arrester hook which now takes the form of a fully articulated strut attached to the extreme rear of the fuselage.

Immediately following the early experiments in arresting came the development of the catapult for take-off. The catapult arrangement consisted of a trolley which ran along rails, the aeroplane being supported on lugs arranged two on either side of the fuselage, the average length of run being about 80 ft. from standstill to free flight. This proved much too cumbersome in operation since the aeroplane had to be lifted off the deck and mounted on the trolley. A very much simpler method has been developed which consists of pulling the aeroplane along the deck on its own wheels by the aid of a single or double towing bridle attached to a trolley, which is mounted underneath the deck, the towing bridle running through a slot. In operation the aeroplane is held back by a stop at its rear end which breaks at a previously pre-determined pull of the towing bridle depending upon the weight and take-off speed of the aeroplane.

Other problems met with between the years 1920 and 1935 were the necessity for providing sufficient buoyancy to enable the aircraft to float after a forced landing on the sea, and also the provision of an alternative seaplane undercarriage. While wood remained the main material of construction the buoyancy requirements were fairly easy to attain, but the change-over to metal construction in 1926 aggravated the problem, the solution being to provide containers in the wings. These requirements were embodied in most Naval aircraft up to the "Nimrod", the standard Naval fighter in the 1935 period. Another development at about this time was the inflatable dinghy. This was often installed inside the wing section and on immersion was inflated automatically from a CO<sub>2</sub> bottle.

The War in 1939 led to the conversion of the "Hurricane" and "Spitfire" fighters for Naval use, but these aircraft did not fold their wings and the buoyancy requirements had to be abandoned in favour of the inflatable dinghy.

The post-war period has been marked by the introduction of the Hawker "Sea Fury", which was developed from the Royal Air Force fighter of the same name. In these aircraft wing folding by power operation was introduced for the first time. The wing assembly of the earlier biplane types such as the Hawker "Nimrod" was so light that manual folding was a practical proposition. With the advent of the heavier monoplane wing it soon became evident that power folding of the wing unit was essential. This is now normally achieved by an engine-driven hydraulic pump, the operation being completed in about 12 seconds.

A glance at the curve, Fig. 2, indicates vividly how performance has increased over this period of 25 years. Fig. 3

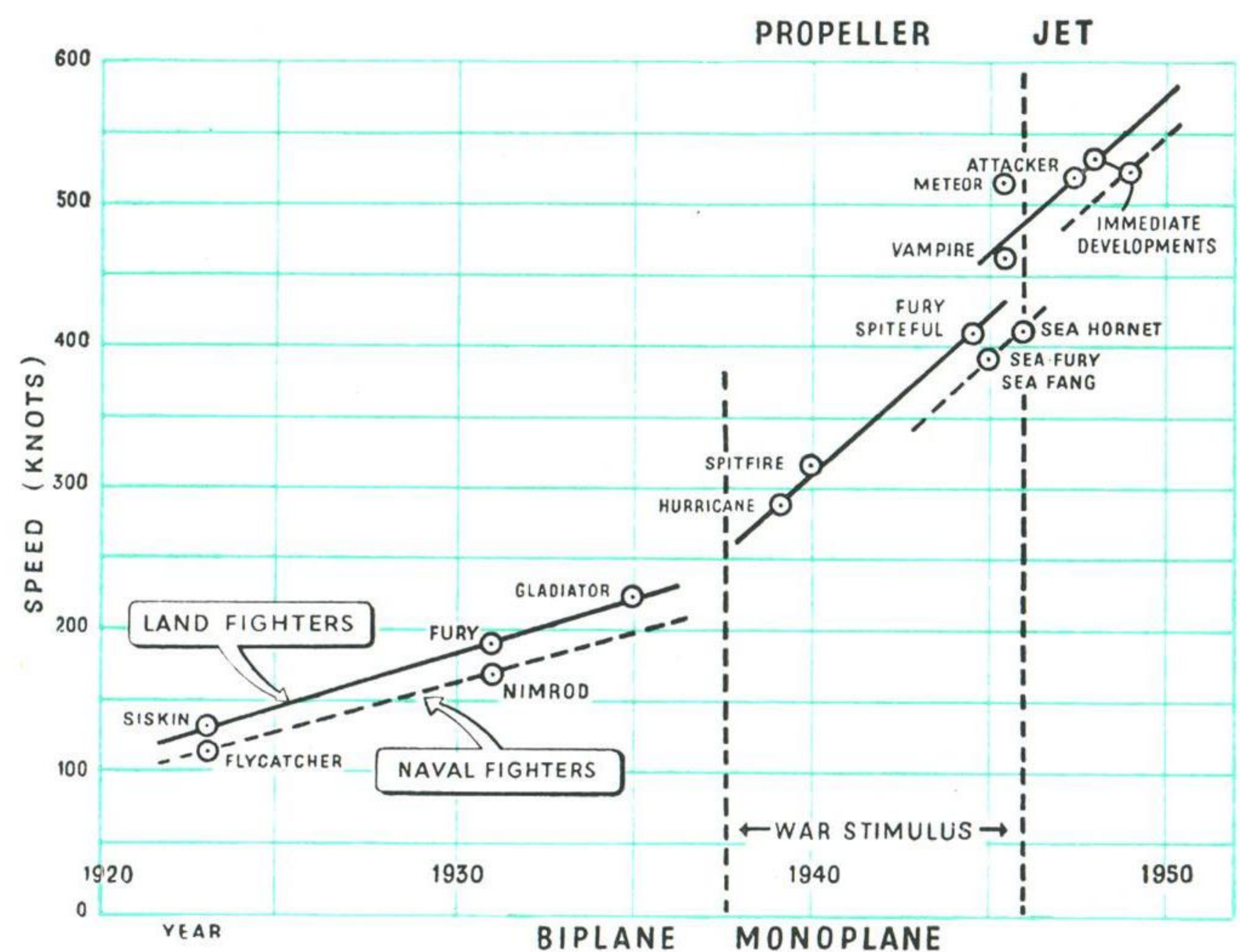


Fig. 2. Performance of Naval Fighters and land counterparts over 25 years.

shows the increase of take-off and approach speeds in the same period. From this it is interesting to observe that prior to 1930 stalling speeds were low enough to enable landing and take-off operations to be carried out unassisted. Note that the approach speed of the Fairey "Flycatcher" was about 50 knots. By 1932, the year when the "Nimrod" was introduced, the approach speed had increased to 60 knots.

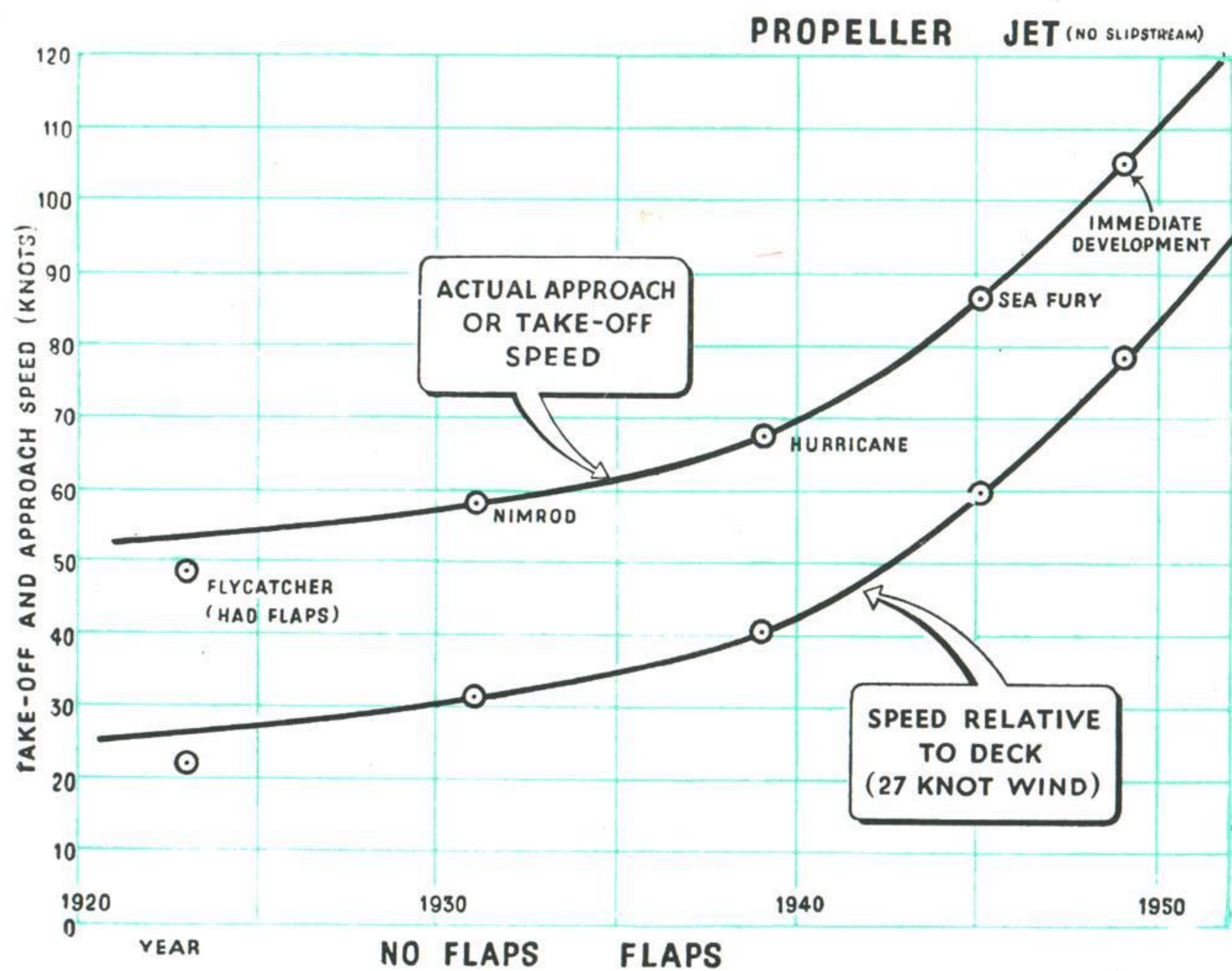


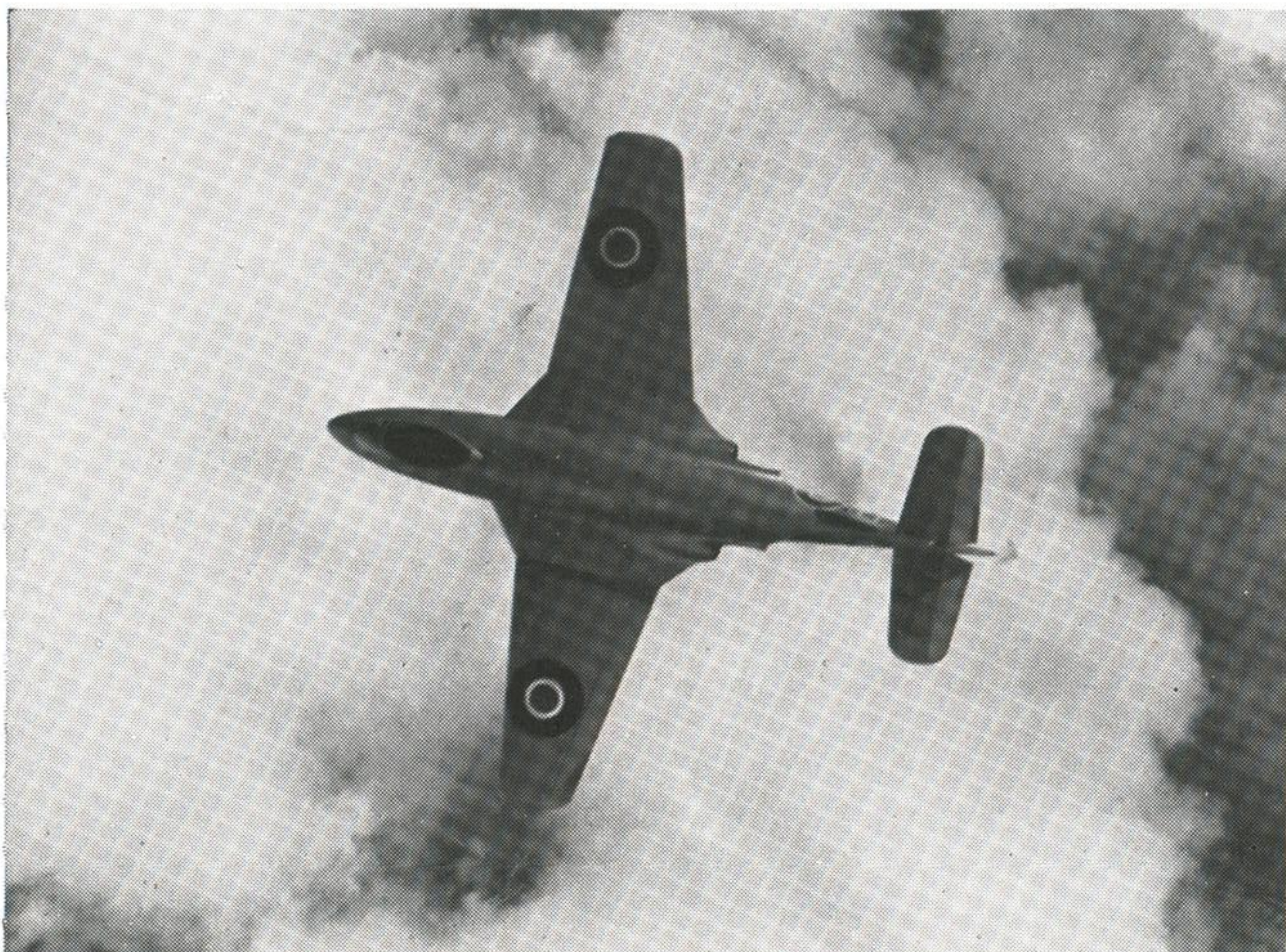
Fig. 3. Increase in take-off and approach speeds in the same period as Fig. 2.

The early war types such as the Hawker "Hurricane", Supermarine "Spitfire" and Gloster "Gladiator" had approach speeds of 68 knots, which was still fairly low due to moderate wing loading and the use of fairly large landing flaps. The stimulus of war forced increased wing loadings so that the later types of Hawker "Sea Fury", Supermarine "Sea Fang" and de Havilland "Sea Hornet" have approach speeds of about 87 knots.

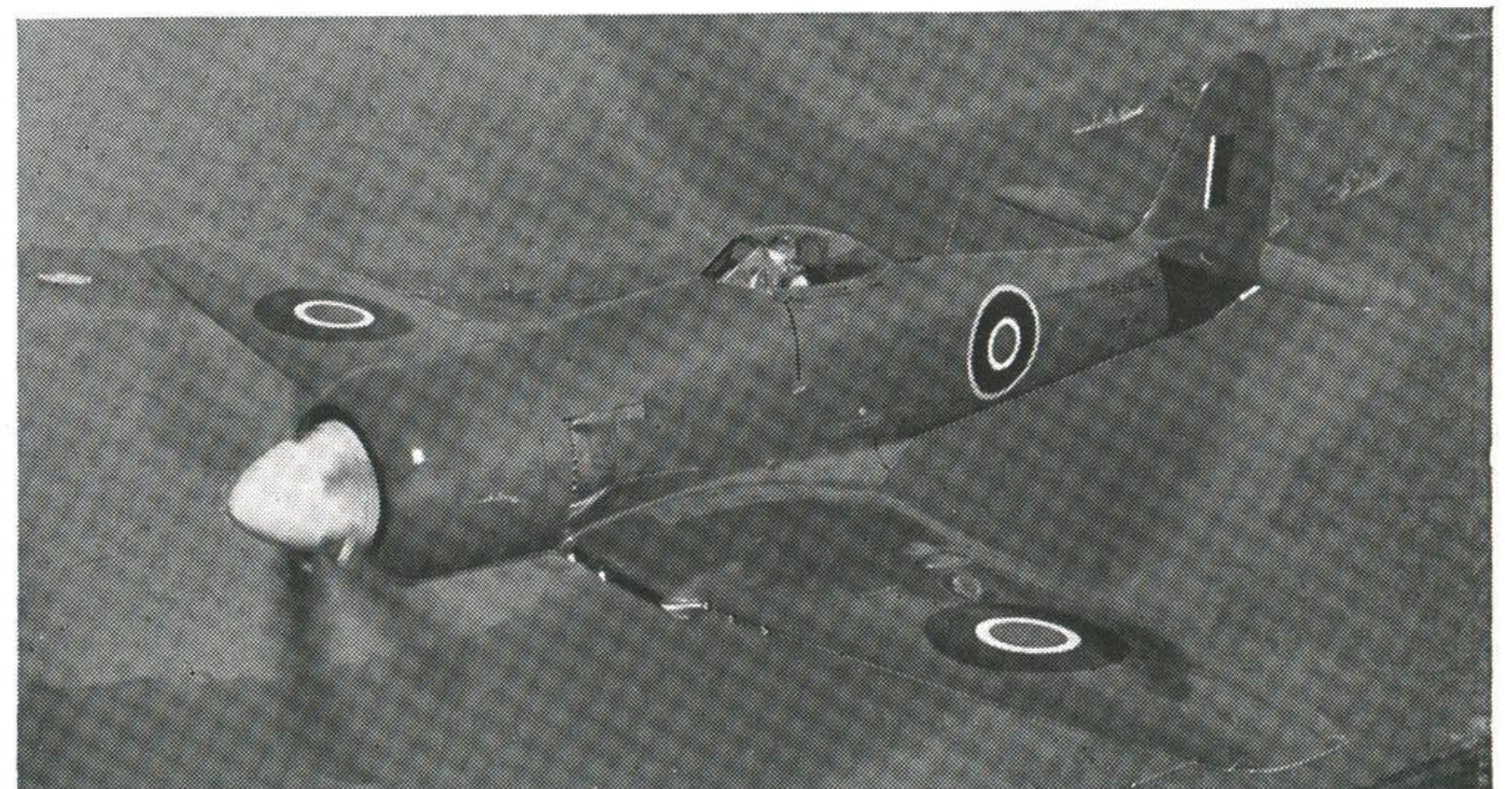
The introduction of jet engines has brought severe problems due to the absence of airscrew slipstream. The latter contributed greatly to the handling of the aeroplane during the approach and landing operations, as it could rapidly be turned on and off. With the jet engine the control over the variation of engine power is much less rapid, and, further, has no effect on lift at all. This lack of control over both speed and lift has made it necessary for jet fighters to approach at speeds corresponding to lift coefficients much lower than the maximum obtainable. The loss of lift control due to the absence of slipstream and large drag due to a windmilling propeller has made it necessary to introduce large drag-producing flaps which can be quickly controlled by the pilot. Nevertheless, in spite of this, the approach speeds have increased alarmingly, being over 100 knots for modern jet fighters.

As mentioned previously, the Naval fighter is basically a land fighter with emphasis on certain features as well as the attainment of the maximum possible performance in rate of climb, level speed and range. Unfortunately the special requirements of the Naval fighter involve a weight penalty which, in the case of a machine of the Fury class, is shown by the table in Fig. 4. It is clear, therefore, that an outstanding problem in Naval fighter design is to keep weight to the

Hawker P.1040



irreducible minimum. As range is vital, a further problem is that of providing sufficient volume in the aeroplane to house the equipment and also the fuel. Any increase in size over that of the basic fighter will, of course, reduce the performance and this long-standing difficulty in Naval fighter design is now intensified by the introduction of the jet fighter with which maximum speeds in excess of 600 m.p.h. with one engine are now possible. Unfortunately, equipment is becoming more complex and armament is certainly not lighter, so that we are now forced to examine the possibilities of radical changes in future design of single-seater Naval fighter aircraft. The most obvious of these seems to be the elimination of the undercarriage. In the case of a modern fighter such as the "Fury" or equivalent jet types, this will lead to a saving in weight of approximately 700 lbs.; of equal if not greater importance is that it will also release space for fuel and equipment.



Hawker Sea Fury F.B.11

From what has been said in the foregoing it is clear that given equal standards of design the Naval fighter will always have a performance inferior to that of its land-based counterpart. The elimination of the undercarriage, however, may well enable the position to be reversed and a Naval fighter to be produced with a superior performance until the shore-based fighter is able to follow suit.

The need for the best possible Naval fighter was well expressed by Admiral M. S. Slattery when he said, at the discussion following a survey of the technical problems of the design of Naval fighter aircraft held by the Royal Aeronautical Society: "From our experience in the Mediterranean it seems that one of the things we must have is carrier-borne fighter aircraft of the highest performance, comparable in every way to the aircraft which can be put up from the shore".

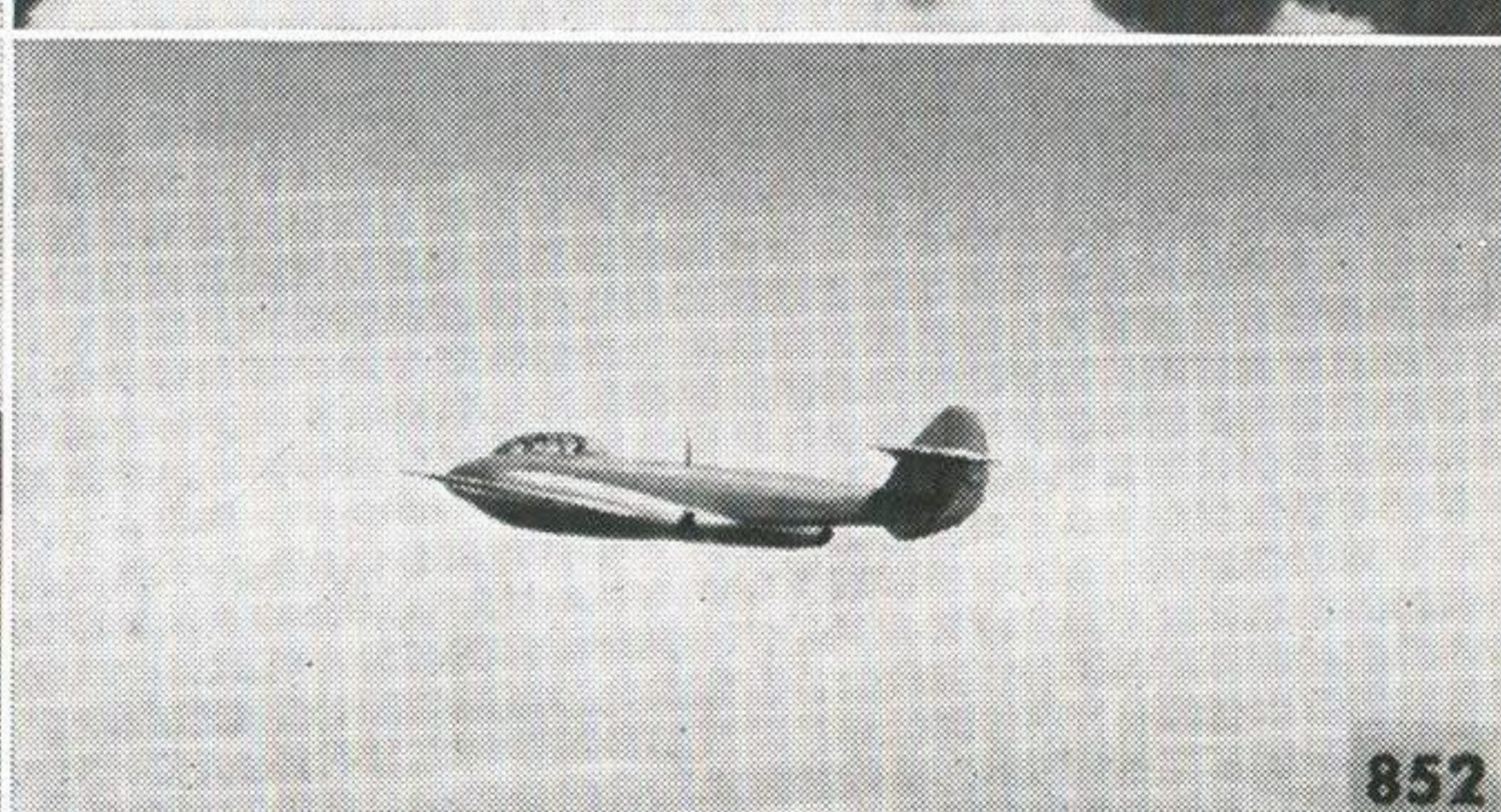
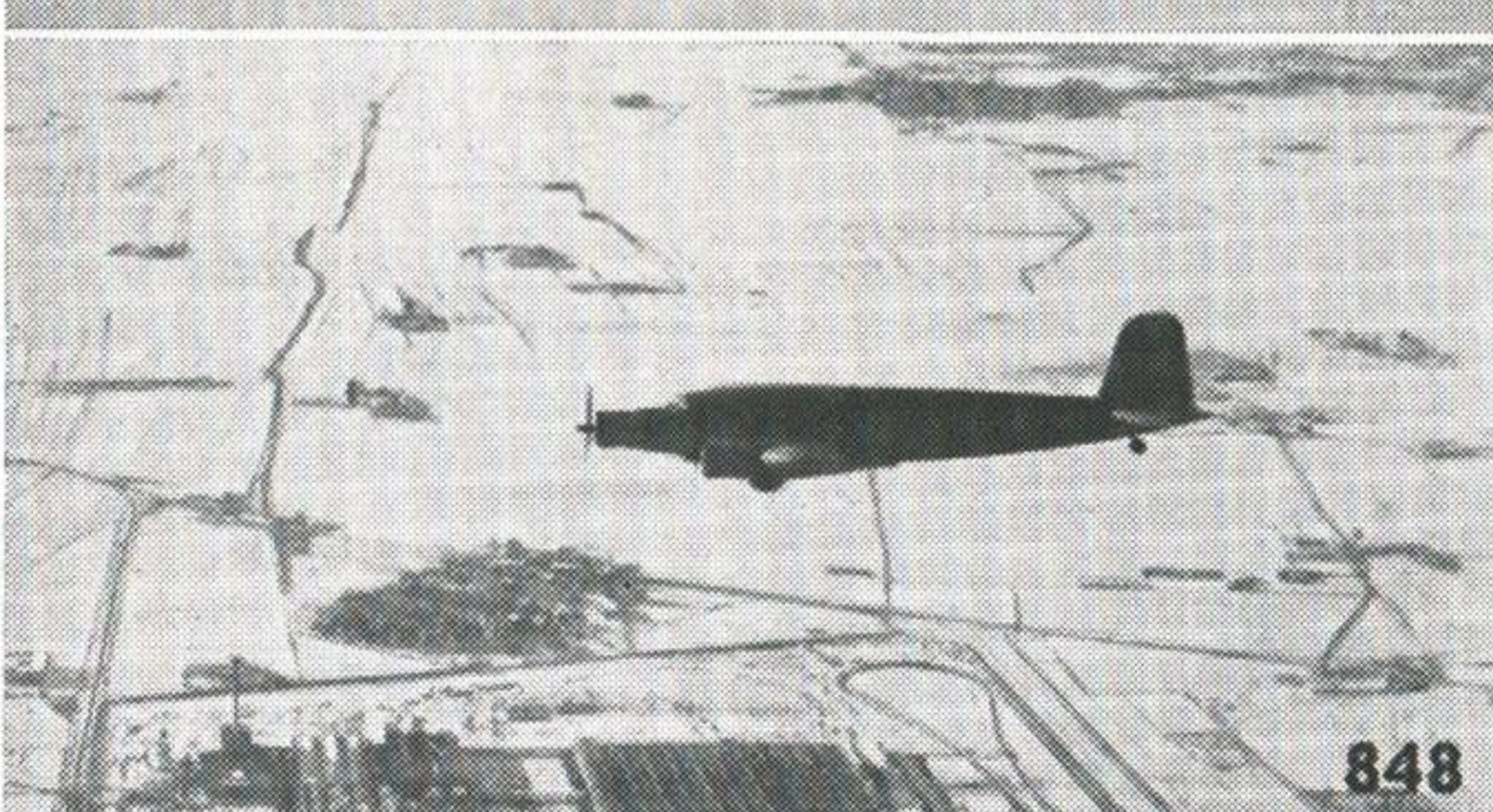
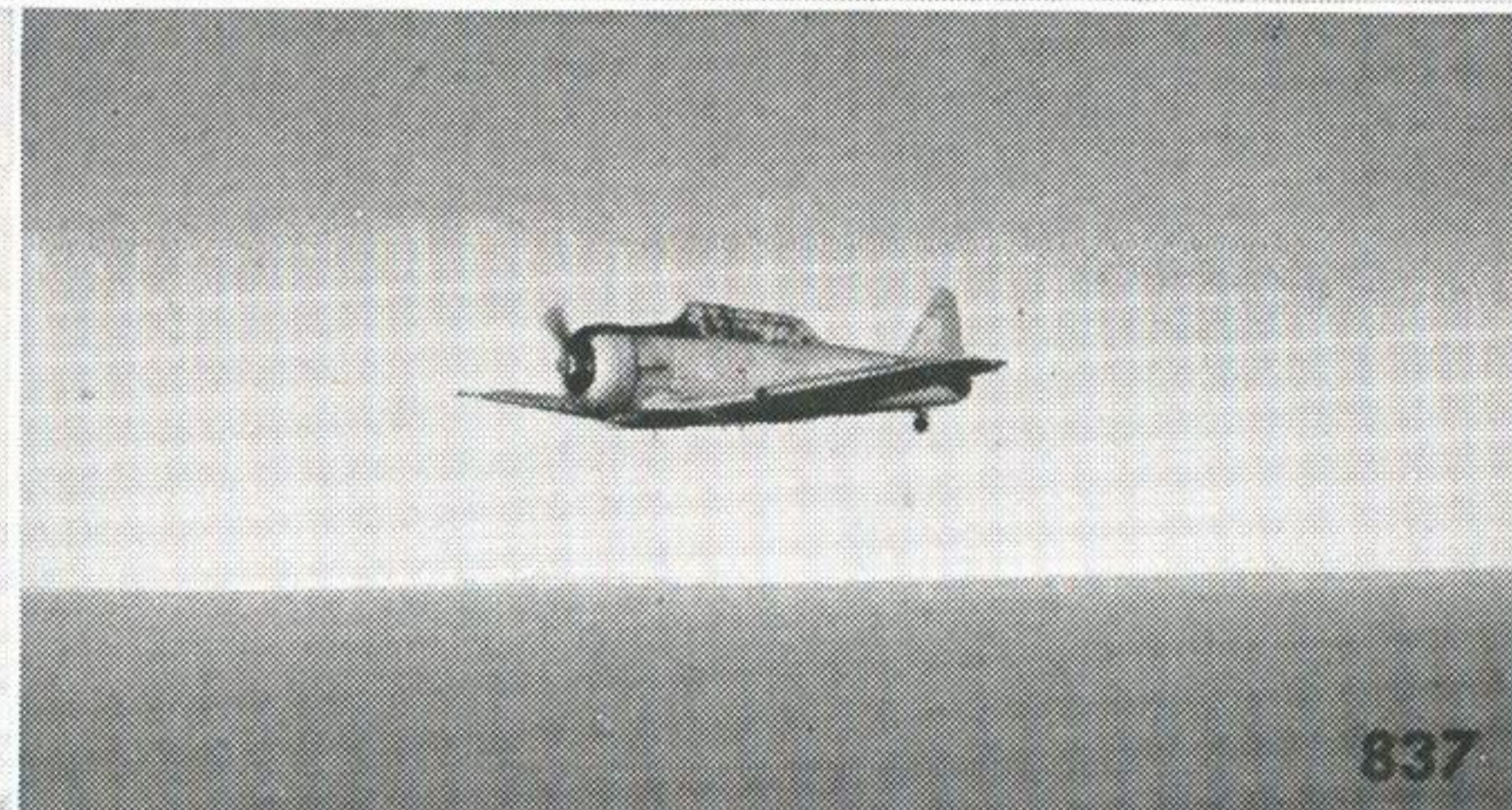
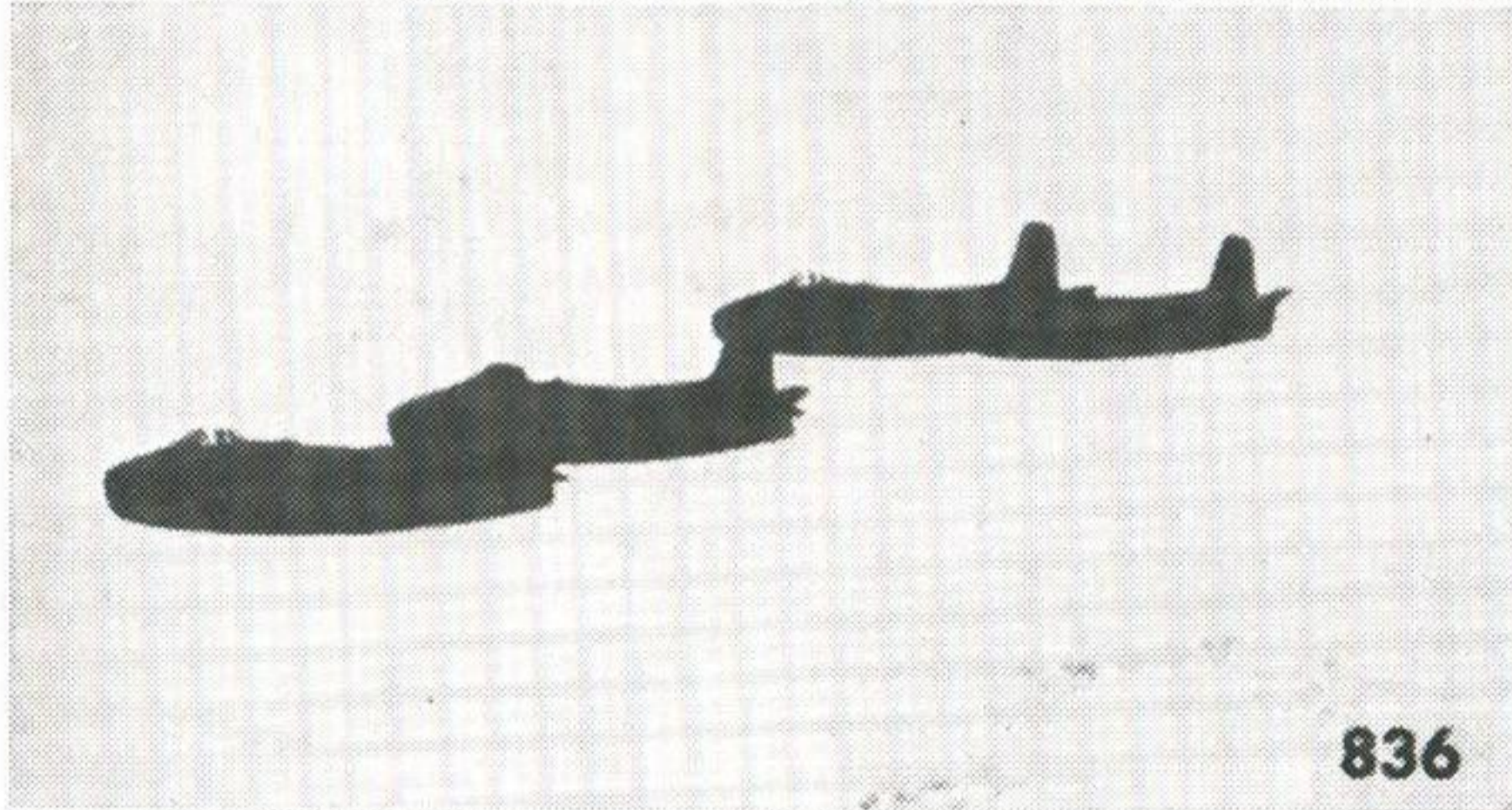
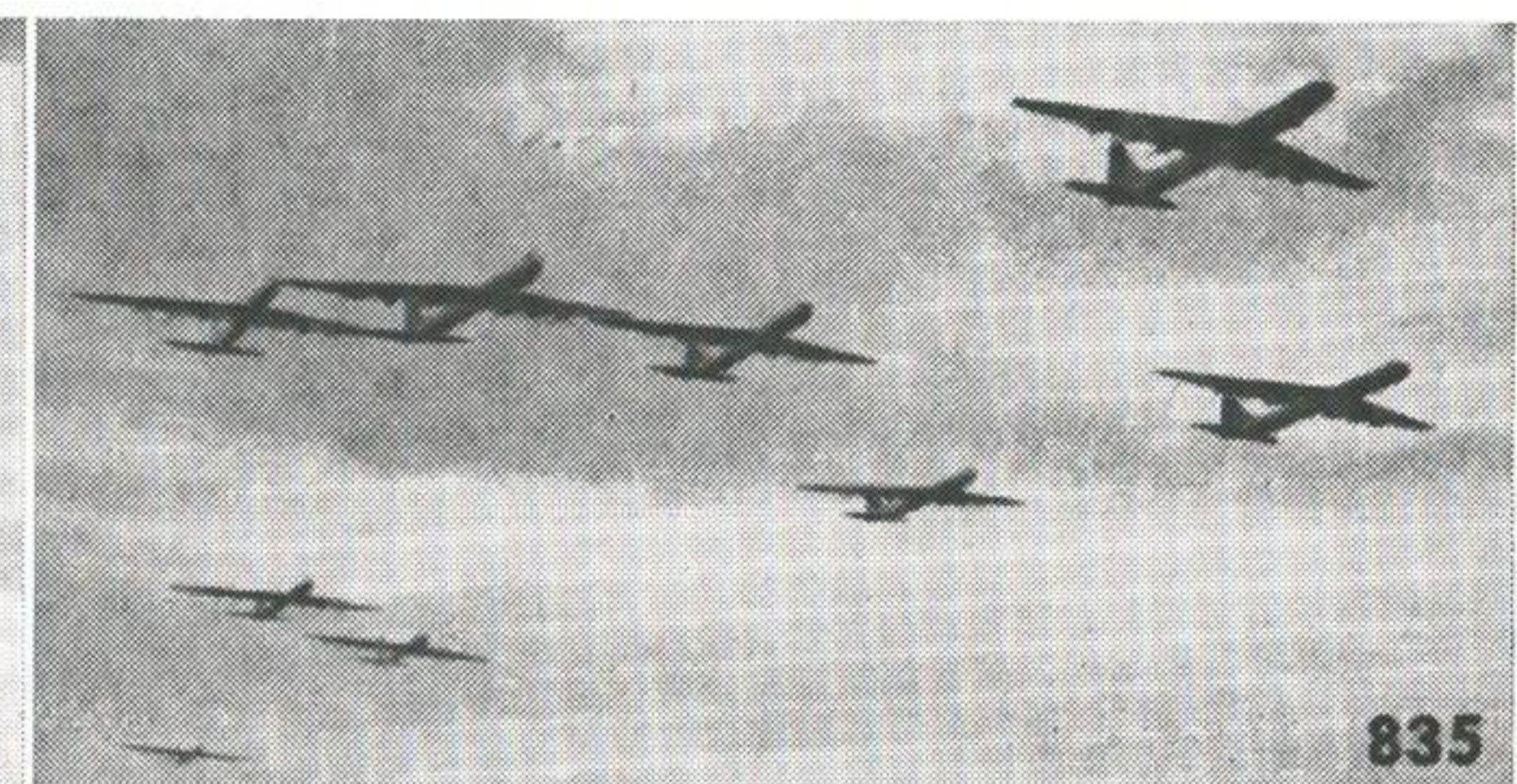
Fig. 4. Weight increase due to navalizing typical modern fighter

#### WEIGHT INCREASE DUE TO NAVALIZING TYPICAL MODERN FIGHTER

	LBS.
Wing folding and structural increase .. ..	212
Arresting gear and structural increase .. ..	62
Assisted take-off and structural increase .. ..	48
Undercarriage and structural increase (higher rate of descent) .. ..	87
Equipment :	
Radio .. ..	73
Instruments .. ..	5
Electrical .. ..	23
Oxygen (longer duration) .. ..	19
Miscellaneous (cameras & A.S.R., etc.)	13
<b>TOTAL</b>	<b>542</b>

NOTE: The above figures refer to a piston-engined fighter. If a jet-engined fighter is considered, further weight increases may be necessary.

# ADVANCED SPOTTING

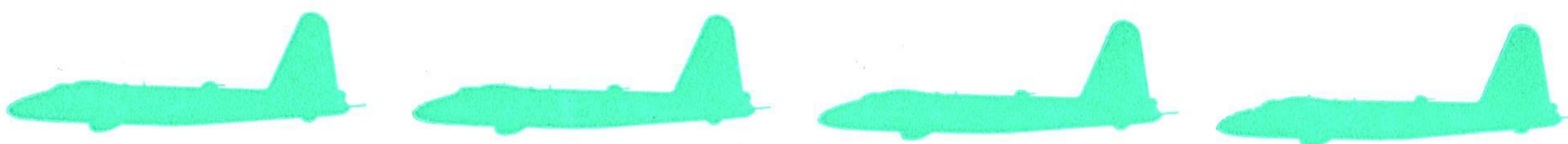
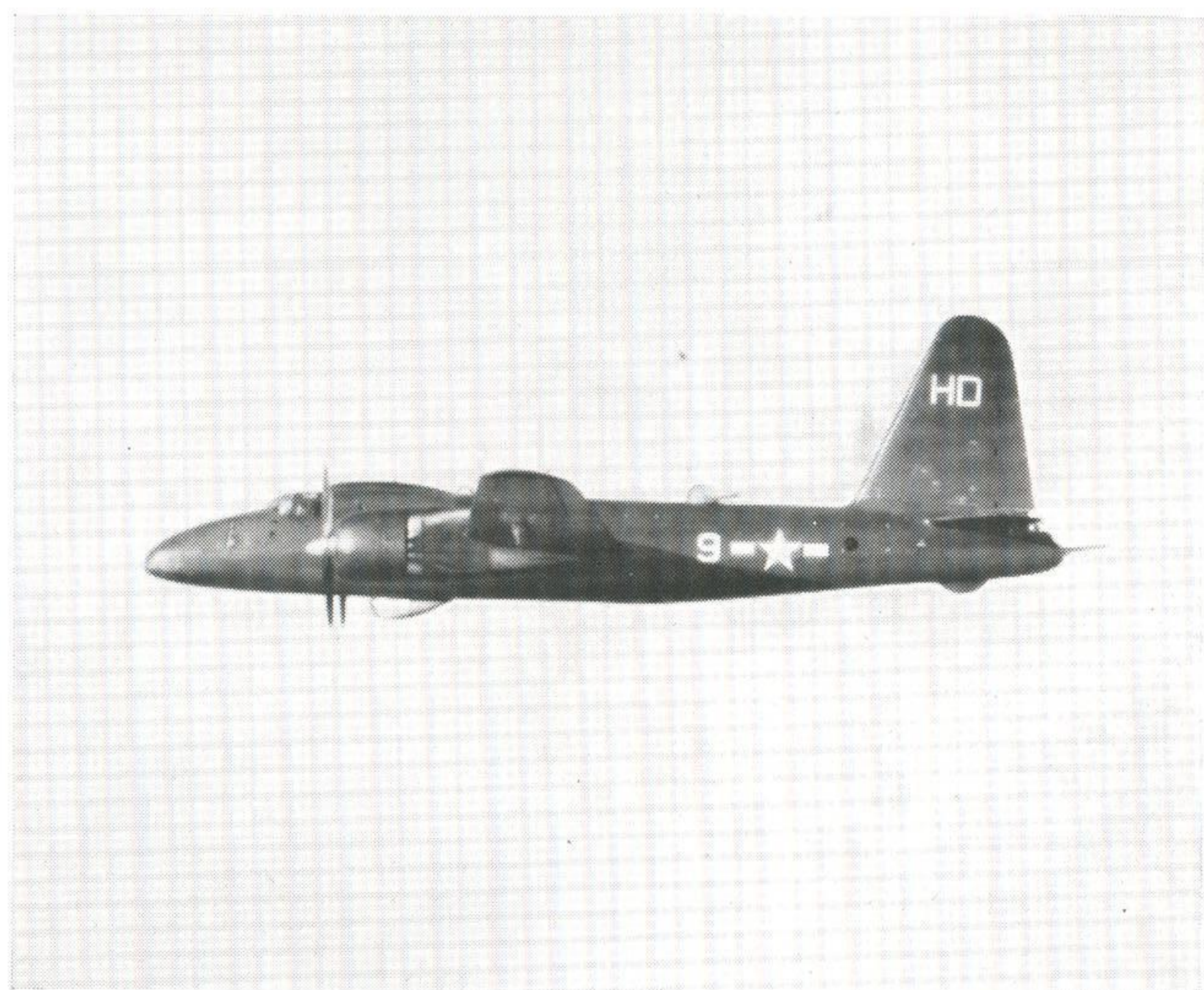


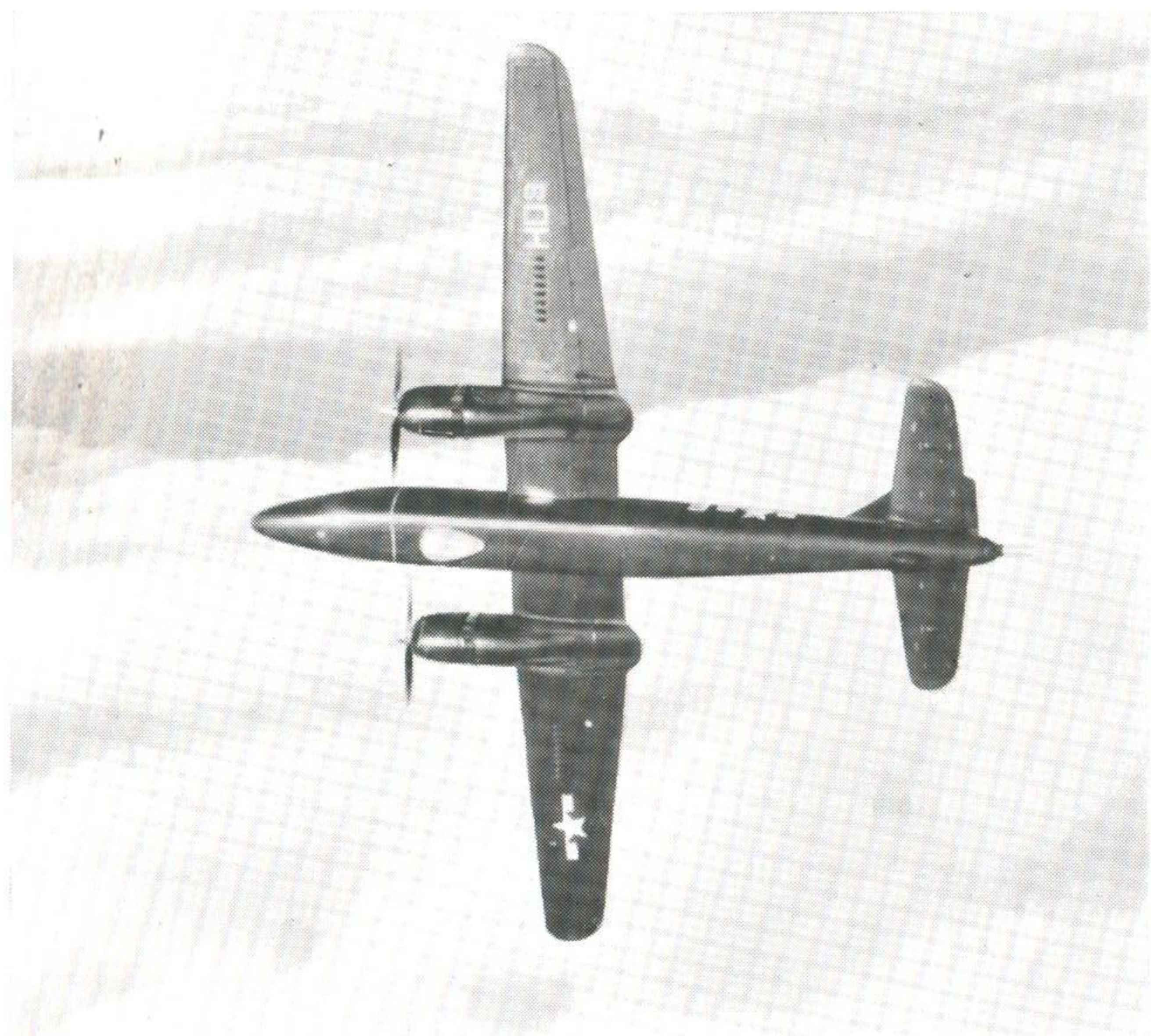


*The*

P2V-2

# NEPTUNE





## THE LOCKHEED NEPTUNE

by R. W. THOMAS, B.Sc.

**D**URING the last war, the chief land-based patrol plane used by the U.S. Navy was the Lockheed PV-1, well known to spotters over here in those days as the Ventura. This aircraft was later developed into the PV-2 Harpoon, which was the standard equipment at the end of the war. Both these types were developed from a civil air-liner, the Lockheed Lodestar, and although they were satisfactory and did very good work it became obvious that only a specially designed aeroplane could fully realise all the requirements of this type of aircraft. The result was the Lockheed P2V Neptune which first appeared in 1945. This was a complete departure from normal Lockheed practice in the twin motor field (principally in that it had a single fin and rudder and a nosewheel undercarriage) and was certainly at the time of its introduction

*(Turn over)*



and probably still is, the most advanced aircraft of its type in operation anywhere.

It is of orthodox all-metal construction but the tail-plane is unusual in that it carries a device known as "Varicam". This enables the camber of the horizontal tail surfaces to be adjusted to facilitate trimming. The undercarriage is of the tricycle type and the main wheels retract into the engine nacelles. Four-bladed Hamilton-Standard Hydromatic airscrews are fitted. All versions at present flying have two Wright Cyclone R-3350 engines of slightly varying types. Comprehensive radio and radar equipment is carried, and a rather peculiar feature is that the rear part of the H2S radome is divided, each half being fixed to the bomb doors. The normal armament in production models is six 20 mm. cannon fixed in the nose, two 0.5 Brownings in the dorsal turret and either two 20 mm. cannon or two 0.5 machine guns in tail position. Some of the earlier Neptunes had only two 0.5 machine guns in the nose on a flexible mounting. Sixteen rocket projectiles may be carried under the wings. The normal bomb load is 8,000 lbs. but numerous alternative loads can be carried such as two 21-inch torpedoes or twelve 325 lb. depth charges. Provision for cameras is made. Owing to the lengthy patrols which have to be made conditions of living for the crew of seven are very good. An example of this is that an electric cooking galley is installed.

### Record Holder

The Neptune first came into the public eye in September, 1946, when an early P2V-1, nick-named "Truculent Turtle", flew from Perth, Australia, to Columbus, Ohio, a great circle distance of 11,236 miles, thus breaking the World distance record for non-stop flight without refuelling. Early last year it was announced that a Neptune had been operated from an aircraft carrier, the U.S.S. Coral Sea. Take-offs at weights of up to 75,000 lbs. were made using American JATO units. The Neptune is the largest aeroplane ever to be flown off an aircraft carrier and it should be remembered that the wing span is only two feet less than that of our Lancaster. In May of this year, the "Truculent Turtle" flew to this country to commemorate the thirtieth anniversary of the first crossing of the Atlantic by U.S. Naval aircraft, and in January two P2V-2 Neptunes visited this country at the invitation of the Air Ministry and Royal Navy. Thus although the Neptune is not a common sight in this country it should be known by spotters as otherwise it may cause confusion when it does put in an appearance.

The different types of Neptune are generally similar from the recognition point of view, the main differences being in the engines, armaments and slight variations in the nose shapes. The P2V-1 (of which about 100 were ordered) is fitted with two Cyclone R.3350-8 motors, each giving 2,300 h.p. for take-off. The usual nose armament is two 0.5 machine guns although some have the six cannons. The "Truculent Turtle" was actually the third prototype P2V-1, but differs somewhat from the operational model in that it is intended to have an overload gross weight of 85,000 lbs. compared with the normal 58,000 lbs. The armament is removed and extra fuel tanks installed in the bomb bay and fuselage. On the record breaking flight disposable wing-tip tanks were carried.

The P2V-2, which is the present production version, is generally similar to the P2V-1, but is fitted with 2,500

h.p. Wright Cyclone R.3350-24W motors and has a much smaller dorsal tail fairing than on earlier types. This applies to all later models of the Neptune. Six 20 mm. cannon are fitted in the nose. There is a photographic reconnaissance version of this type known as the P2V-2P which has a glazed nose and carries numerous cameras. The latest type is the P2V-3 which has two Cyclone R-3350 26W engines, each giving 2,700 h.p. Armament is similar to that of the P2V-2 but the two machine guns in the tail have been replaced by two 20 mm. cannon. Still in the experimental stage is the XP2V-4, which is fitted with two Wright Turbo-Cyclones (turbines driving propellers). No other details are available.

### Easy to Spot

Recognitionally, there is little need to differentiate between the marks, but for those who wish to, the brief details given above should help. Careful examination of pictures will clarify these points. The Neptune is an easy aeroplane to recognise. From all angles except a true plan view the most obvious feature is the exceptionally tall single fin and rudder, the leading edge of which is well swept back. A rather peculiar point is the way in which the Neptune appears to look down its nose. This appearance, which is noticeable at considerable distances, is due to the curved, swept-down nose giving a very good view from the cabin. The dorsal turret breaks an otherwise straight top line to the fuselage and the radome is the only main bulge in the underside, although the small bulge under the tail (which is a buffer to protect the tail in the event of a tail-down landing) is also noticeable. In the plan view the long thin wing with a swept forward trailing edge outboard of the engines is a prominent feature. The wing is set rather higher than the mid position and carries the two fairly closely placed engines slightly underslung. The nacelles have semicircular ends which project beyond the trailing edge. These points make confusion unlikely but it is interesting to compare the Neptune with a more recent aircraft of a similar type—the Martin Mercator, which although strictly a four motor type (two in each nacelle) has several features in common with it.

### SPECIFICATION

*Span* : 100 ft. *Length* : 78 ft. 3 in. *Height* : 28 ft. 1 in.  
*Wing area* : 1,000 sq. ft. *Max. speed* : 263 knots (P2V-1)  
294 knots (P2V-3). *Max. range* : 3590 nautical miles at  
153 knots. *Crew* : Seven.

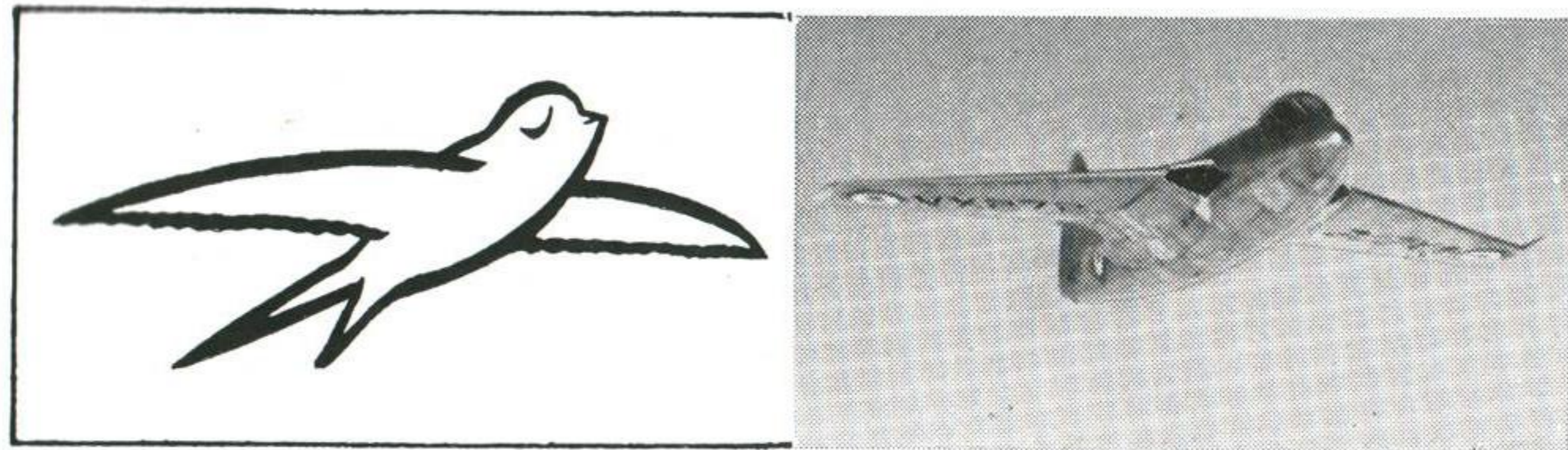


The Turtle called Truculent.

# IN PASSING . . .

## Facing It

We asked our artist to give us his impression of the "face" of the Hawker P.1052. This is what he did.



## Twenty Questions

If you read and digest the contents of this Journal you will be able to answer most of these questions without referring to the answers on back cover.

1. Name three British jet-driven aircraft with single fins and rudders and dihedral angles in their tailplanes.
2. The Mig-9 has (a) a high wing, (b) a mid wing, (c) a low wing?
3. Name the makers and give the function of two aircraft named Tornado.
4. A jet "pod" is (a) a new kind of ejector seat, (b) a newly-coined word for a turbojet nacelle, (c) a jumping bean?
5. The Meteor which created a record by remaining airborne for over 12 hours was refuelled by a . . . ?
6. How many engines have each of the following: B-47, Apollo, Canberra, Brabazon, TU.2, Tudor 8?
7. In which of the following does the fuselage appear to sit heavily on top of the wings: Lincoln, Hastings, Aerovan, York?
8. Name three direct descendants of the Beaufighter. In what main recognition feature do they differ from the Beaufighter?
9. The Stratocruiser weighs (a) 30 tons, (b) 40 tons, (c) 70 tons?
10. Name a Dutch single-engined trainer which might be confused with a Prentice.
11. How many fins and rudders have the following: Gemini, Shackleton, B-45, PE.2, Martin 202?
12. Two aeroplanes are coming towards you, one a Douglas Skyraider and the other a Martin Mauler. You note that the first has dihedral from the wing roots and the second has dihedral on the outer wing panels. Which is which?
13. The engines of the Convair-Liner are (a) underslung, (b) mid-set, (c) mounted on pylons?
14. Name five British flying boats in which the individual propeller thrust lines are slightly offset from the line of flight?
15. A Sea Otter has (a) a pusher propeller, (b) a tractor propeller?
16. An anemometer is (a) a device for detecting sea anemones, (b) an instrument for measuring the speed of wind, (c) a fuel gauge?
17. Do you know whether the twin fins and rudders of the following aircraft are inset or of the endplate type: Gyrodyne, Constellation, Brigand, C-119 Packet?
18. Name two Russian jet-fighters.
19. Which of the following has a prominent dorsal fin fairing, (a) Tempest 2, (b) LA-9, (c) Sea Fury?
20. Which large transport aeroplane is sometimes said to have the aspect of a bullfrog?

(Answers on rear cover)

## Daily Spotting Logs—Drought Ended

We are very gratified—and not a little bewildered—to be experiencing a heavy fall of extracts from Daily Spotting Logs since we mentioned them in July. At the same time we are puzzled as to how we shall be able to do justice to all of them. In truth we cannot, for there are enough of them already to fill a complete edition of the *Journal*. What we thought was the hobby of the enthusiastic few is apparently a thriving industry among many. We are now trying to devise ways and means of presenting some of the most interesting extracts sent us or of summarizing them. Meantime, we hope those who have sent them will be content with a word of thanks, and continue the good work of log-keeping.

## Topicality

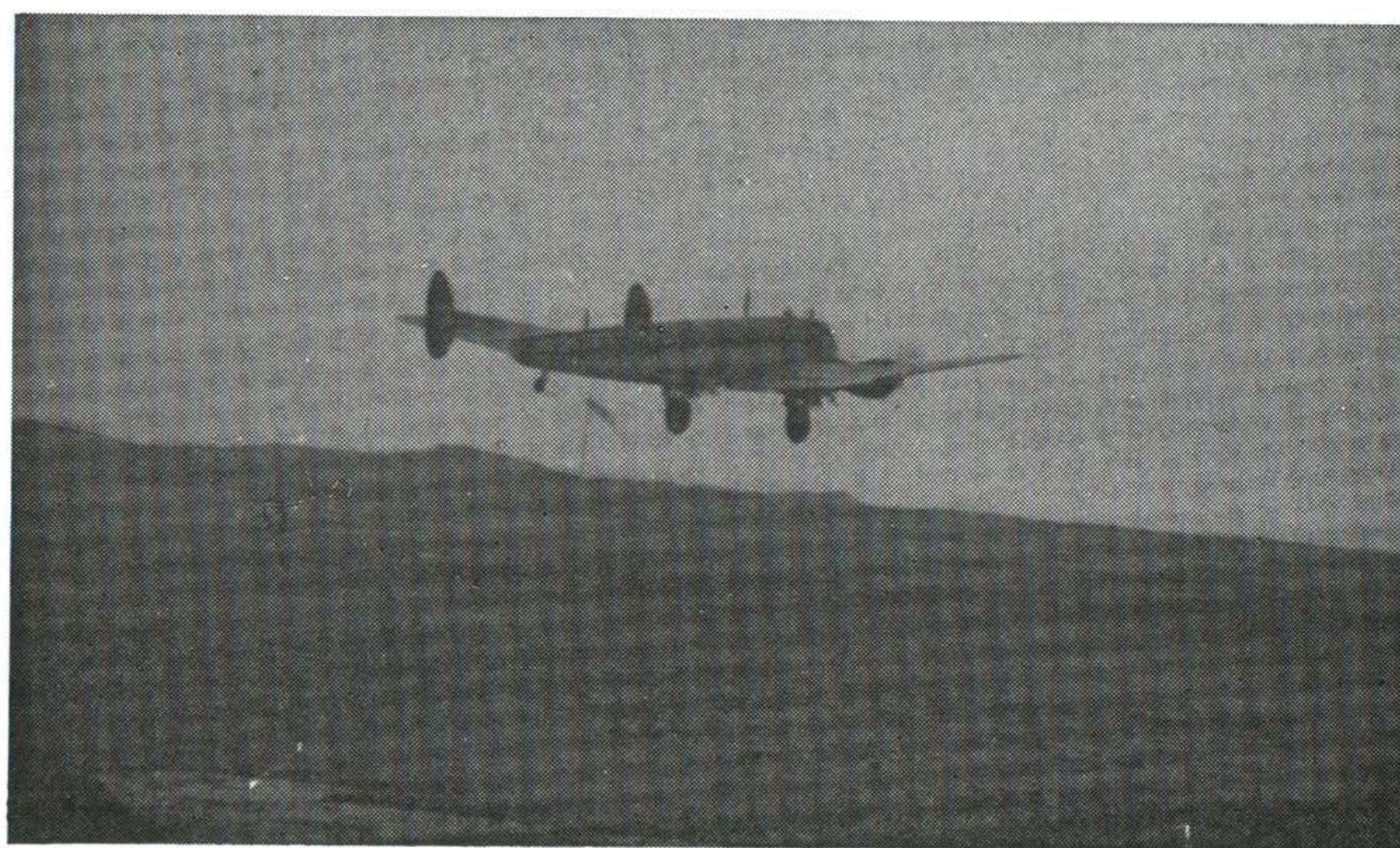
We are often asked why we are not more up to date in the *Journal* and keep abreast of events as does the weekly Aeronautical Press. The answer is that our aim is to teach aircraft recognition and not to compete with the Aeronautical Press. Whilst it would add considerable spice to the dish to introduce hot news items and last minute pictures it cannot be done for technical reasons. Most of the contents of this edition were prepared during August, the printing then occupies six weeks and the *Journals* are delivered about the middle of October, then they have to be despatched. So what is hot in August is pretty cool by October. We keep as topical as possible however and can occasionally squeeze in something lukewarm with the aid of the Printer, as for example our current Editorial on the S.B.A.C. Display.

## This Month's Nonsense

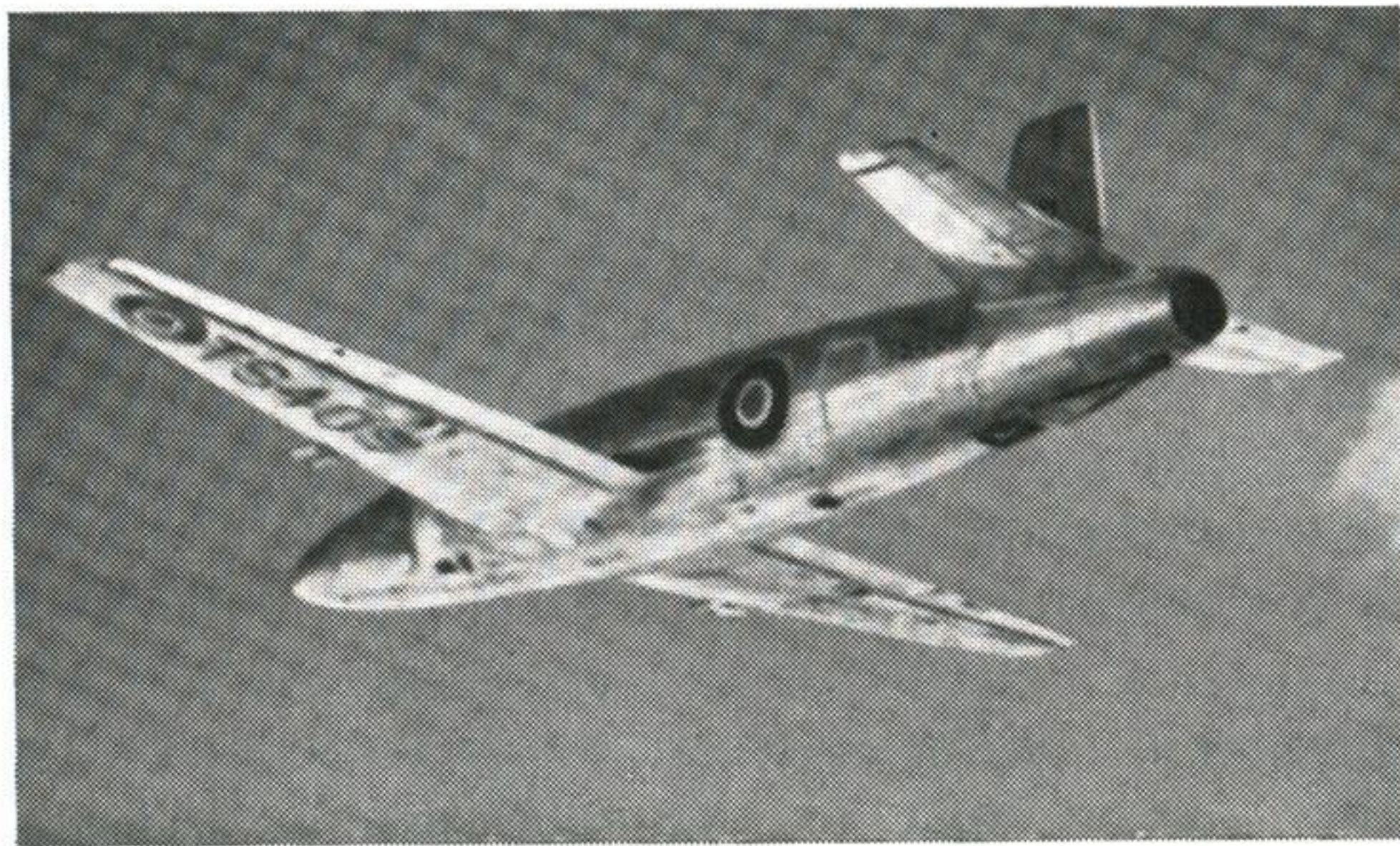
Of the typographical errors which have come before the fierce and searching editorial gaze we thought the following "gems" in aircraft nomenclature worth passing on. Slightly befuddled by the Firebrandy and not a little cut up by the Surgeon, we quickly recovered, however, when confronted with a Martini 202 and were completely restored by the Consolation. We found it difficult to see through the Black Window but the Bansheep was as clear as daylight, more so than the Hooverfly. The Liverator angered us no end but the Grumman Goofe and the Ario Lincoln\* restored the editorial good humour—well, humour anyway—well, anyway. We got fed up with Beancats, Skysteaks and Sea Cornets and fell Silent—a Short Silent—over the Sea Offer only to be aroused by the Ario Tuba, which, as any Panther will tell you, takes a lot of playing.

\* This went to the Printer as the Lincoon: see how easy it is for tips to pass in the slype!

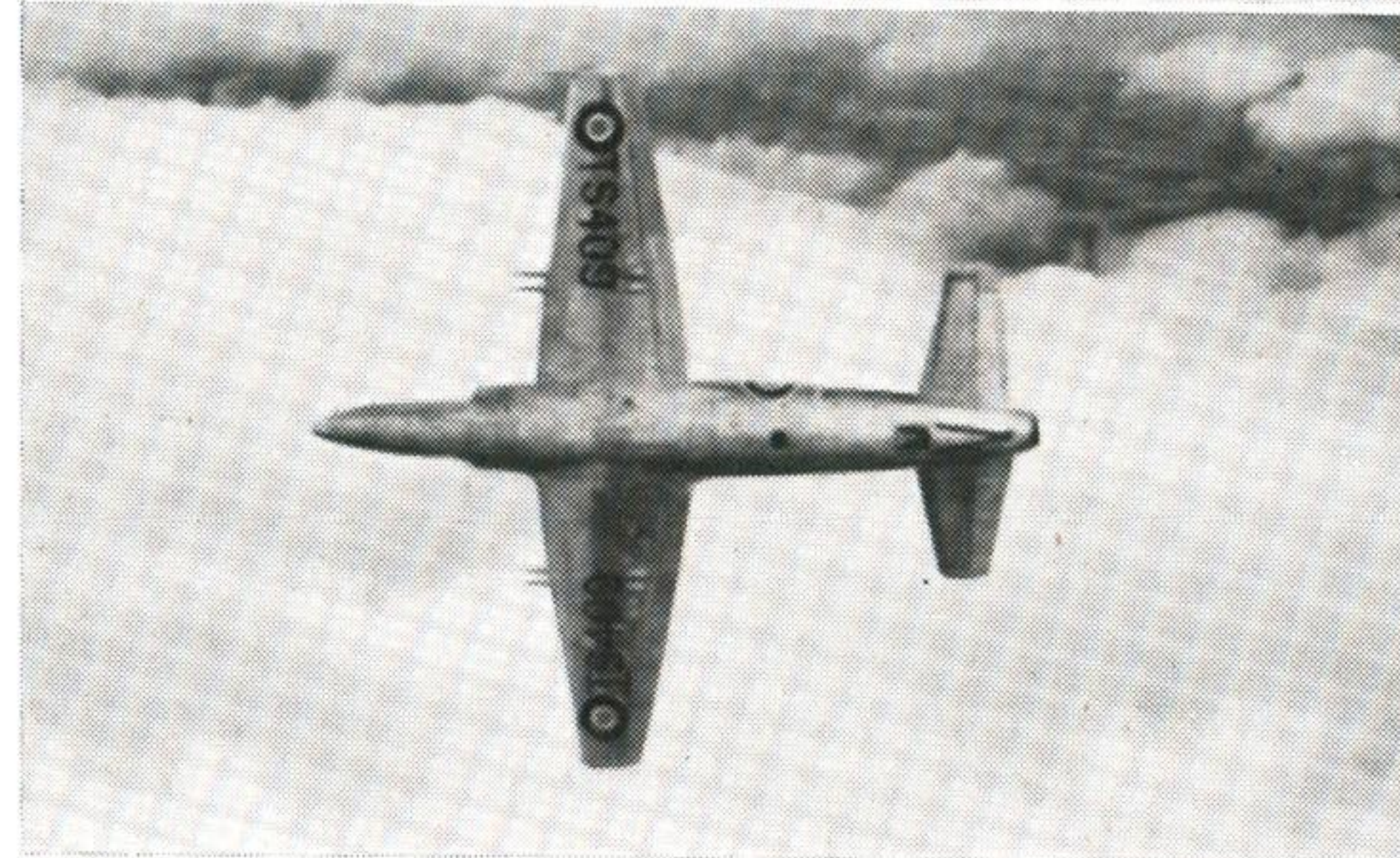
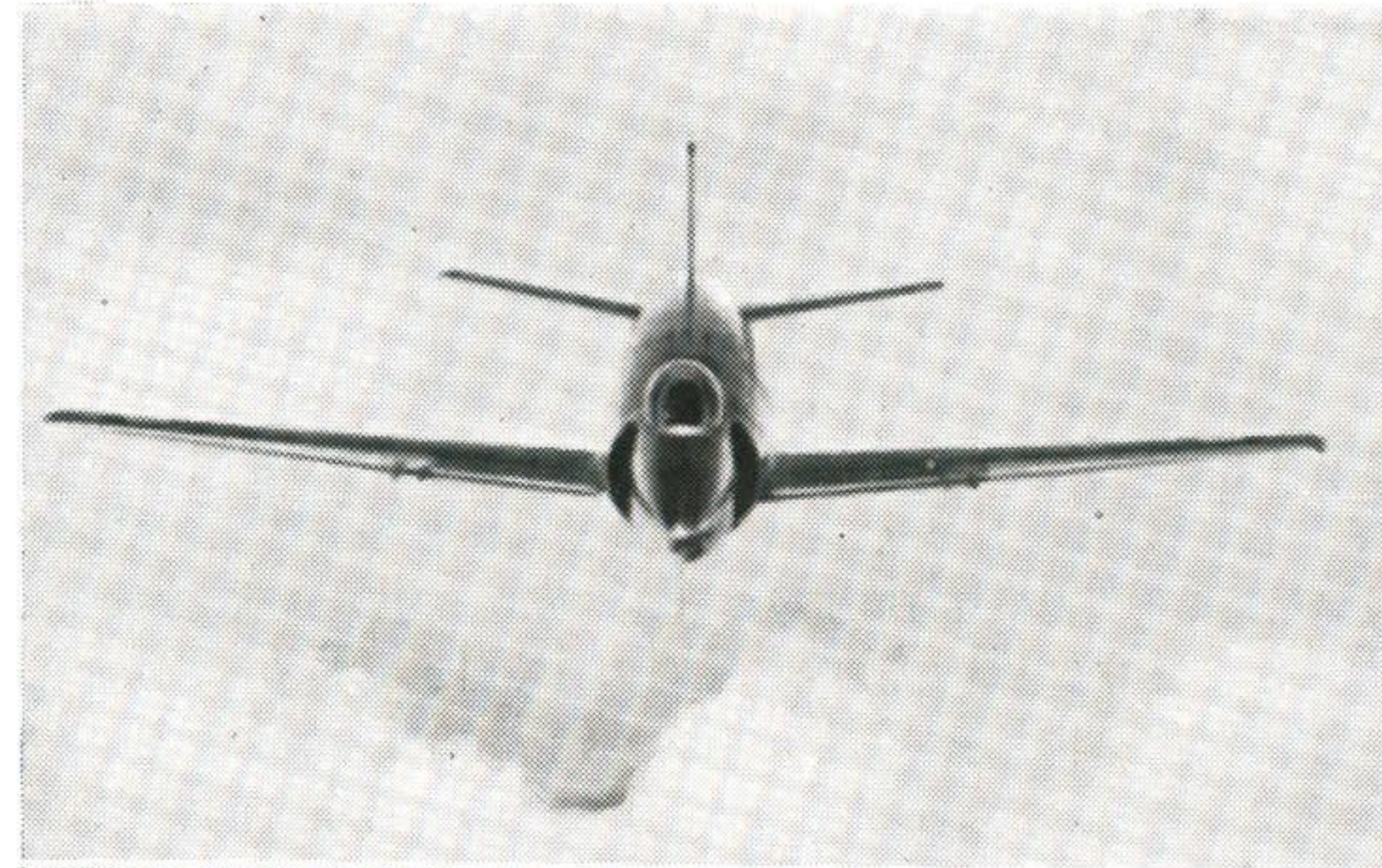
## Aerogram



A Nude Clog (Answer on back cover).



COVER PHOTO : The Vickers Attacker, which in this view reminds us of nothing so much as a winged-bullet. The lower views display other features, including a nose—resembling that of Mr. Punch—emerging from the tube-like body, and the characteristic clipped wing and tailplane shapes. A side view of the Attacker resembles a hatchet. Attackers are going into service with the Royal Navy.



## SOLUTIONS TO RECOGNITION TESTS IN THIS EDITION:

### ELEMENTARY

- 655. Halifax A. Mk.9
- 656. P.1052 (P)
- 657. Viking Mk.IB
- 658. Stratocruiser
- 659. Seagull (P)
- 660. Wellington T. Mk.10
- 661. Ambassador (P)
- 662. Barracuda T.BR. Mk.5
- 663. Meteor F. Mk.3
- 664. Navion
- 665. Hermes Mk. 4
- 666. Harvard T. Mk.2
- 667. F9F Panther
- 668. F51H Mustang
- 669. Vampire F.B. Mk.5
- 670. Mosquito T. Mk.3
- 671. Attacker
- 672. Buckmaster T. Mk.1
- 673. Proctor T. Mk.4
- 674. Meteor F. Mk.4
- 675. Hastings C. Mk.1

### SILLOGRAPHS

- 608. P.1050 (P)
- 609. Ambassador
- 610. Sea Fury F.10
- 611. Brigand B. Mk. 1
- 612. C-119 Packet
- 613. Attacker
- 614. Buckmaster T. Mk. 1
- 615. Athena T. Mk. 2
- 616. Mosquito P.R. Mk. 34
- 617. Gemini
- 618. Hermes IV (P)
- 619. F-80A Shooting
- 620. Aerocar
- 621. Tempest F.B. Mk. 2
- 622. York
- 623. Hastings C. Mk. 1
- 624. Balliol T. Mk. 2
- 625. Mosquito B. Mk.16
- 626. F9F-1 Panther
- 627. P.1052.
- 628. F-86A Sabre

### ADVANCED.

- 833. Balliol T. Mk. 2 (P)
- 834. Attacker
- 835. B-36A
- 836. FJ-1 Fury
- 837. Harvard T. Mk. 2
- 838. AM-1 Mauler
- 839. F9F-3 Panther
- 840. Spitfire PR. Mk. 19
- 841. P2V-2 Neptune
- 842. Spearfish (P)
- 843. Sunderland G.R. Mk. 5
- 844. Vampire F.B. Mk. 5
- 845. Sea Hornet N.F. Mk. 21 (P)
- 846. Languedoc 161
- 847. Sea Hornet P.R. Mk. 22 (P)
- 848. Fiat G.12L
- 849. Seafire F. Mk. 17
- 850. Sea Otter A.S.R. Mk. 1
- 851. Tiger Moth T. Mk.2
- 852. Meteor T. Mk. 7
- 853. F7F Tigercat

### TWENTY QUESTIONS

1. Comet, Canberra, Attacker.
2. (b).
3. North American B-45 Tornado—light bomber ; Hawker Tornado—experimental fighter contemporary with the Typhoon.
4. (b).
5. Lancaster.
6. Six, four, two, eight, two, four.
7. Hastings.
8. Buckingham, Buckmaster, Brigand ; all have twin fins and rudders.
9. (c).
10. Fokker S.II.
11. Two, two, one, two, one.
12. The first would be the Skyraider.
13. (b).
14. Sunderland, Sandringham, Seaford, Hythe, Solent.
15. Tractor.
16. (b).
17. Endplate, inset, endplate, inset.
18. Mig-9, Yak-15.
19. (a).
20. Hastings.

### AEROGRAM

A NUDE CLOG=LANGUEDOC.

### AUGUST EDITION—CORRECTIONS

The dimensions of the Russian-built B-29 quoted in the August edition were obviously wrong. It is probable that they are the same as for the Boeing B-29, i.e., Span : 141 ft. 3 ins. Length : 99 ft. The following were also misquoted and should read : Avro Lincoln, Span : 120 ft. Bristol Brabazon, Length : 177 ft.

### SEPTEMBER EDITION—CORRECTION

Page 6, Column 2, line 6 ; For Hermes V read Hermes VI.

### TRICKY TRIO

Bristol Brigand, PE.2. TU.2.



**Spoiled.** This view, in striking comparison with those opposite, shows how the Attacker's fine shapes are "spoiled" when it prepares to "land on".

## TRICKY TRIO

