THE INTER SERVICES

AIRCRAFT RECOGNITION *Journal*

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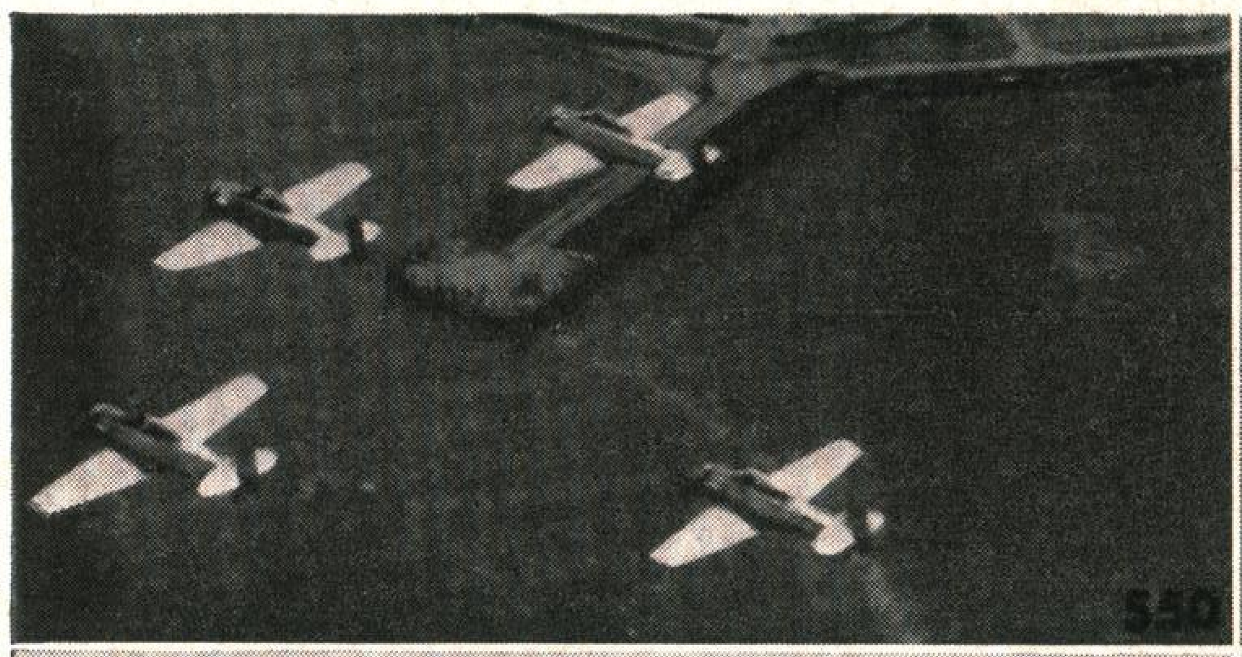
Vol. 3 FEBRUARY 1949 No. 7

ELEMENTARY SPOTTING

Recognition Test No. 87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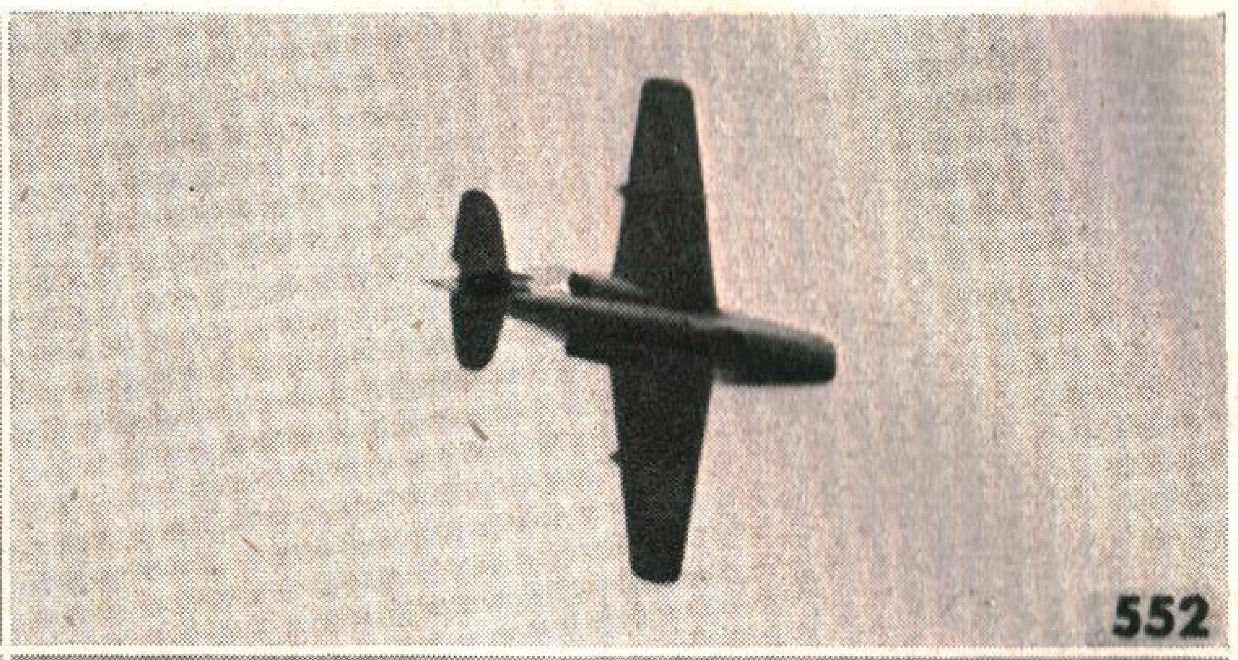
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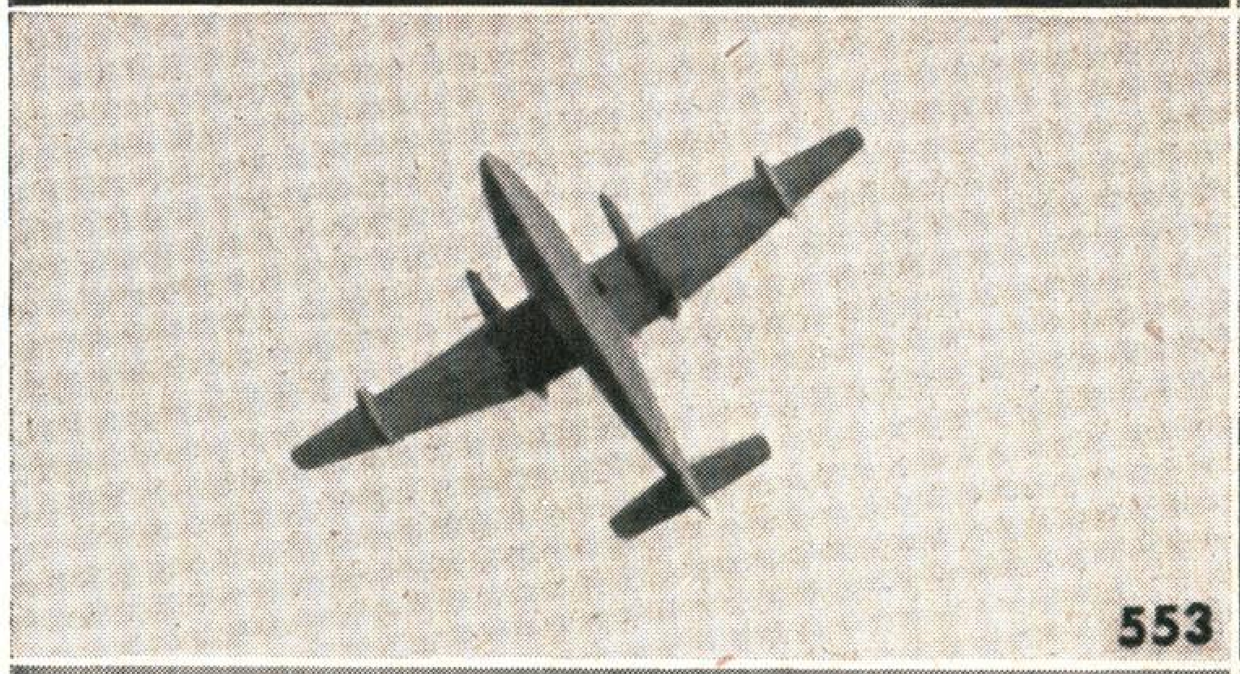
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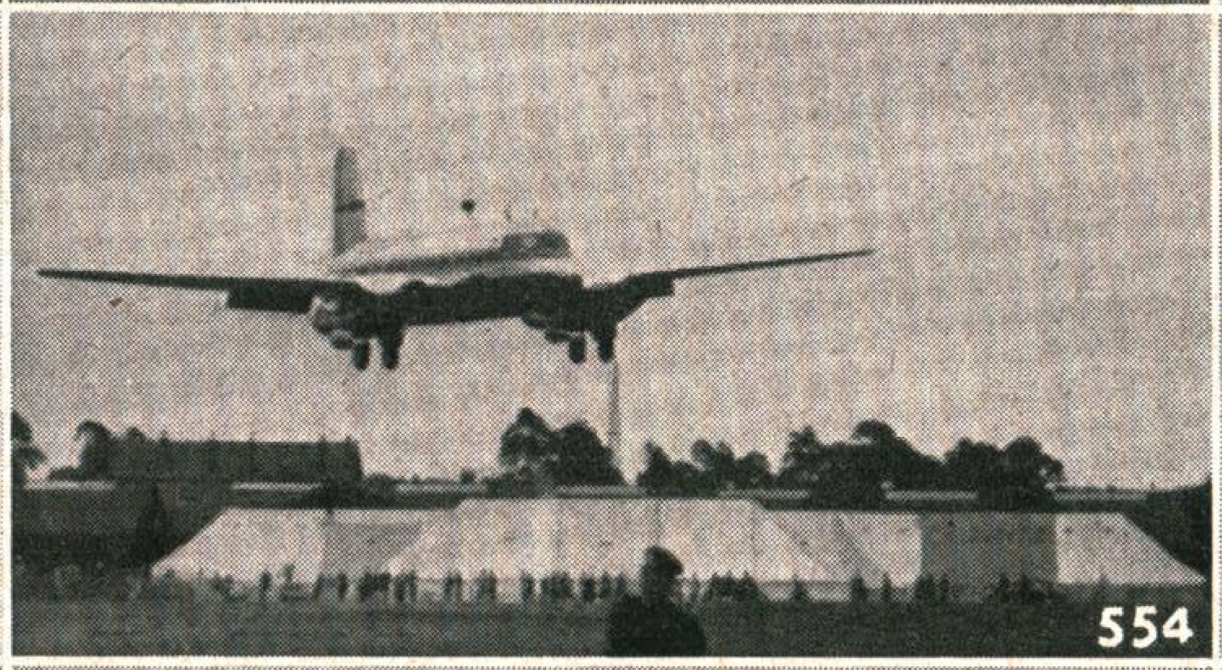
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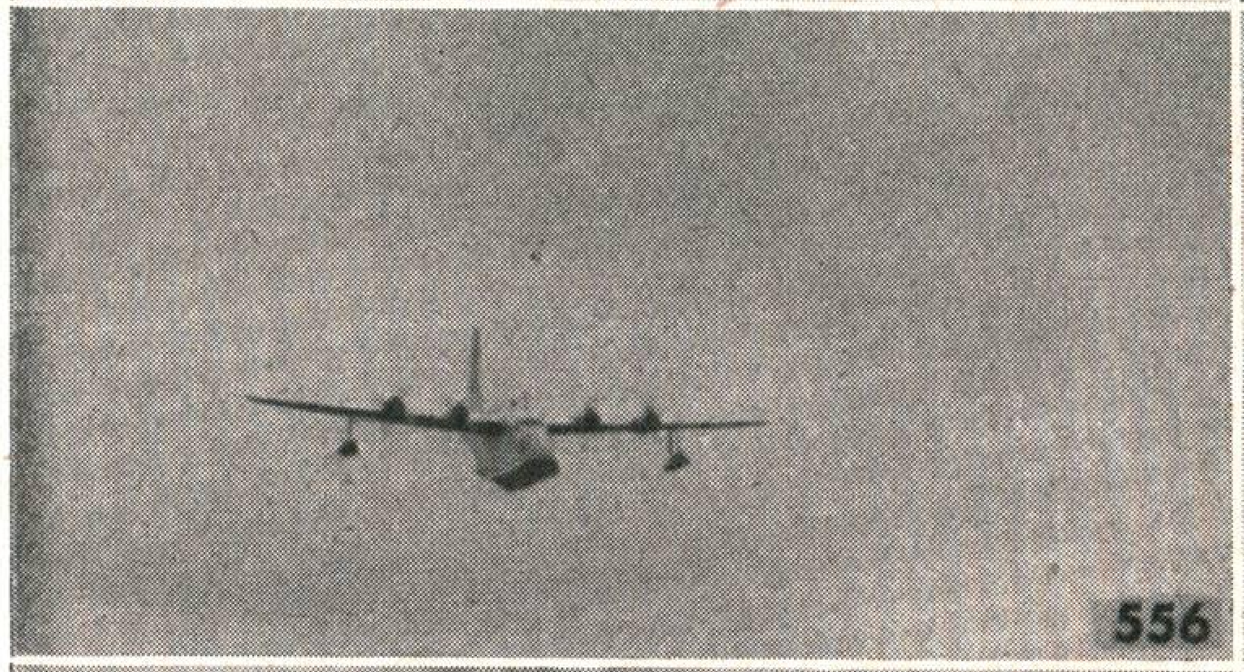
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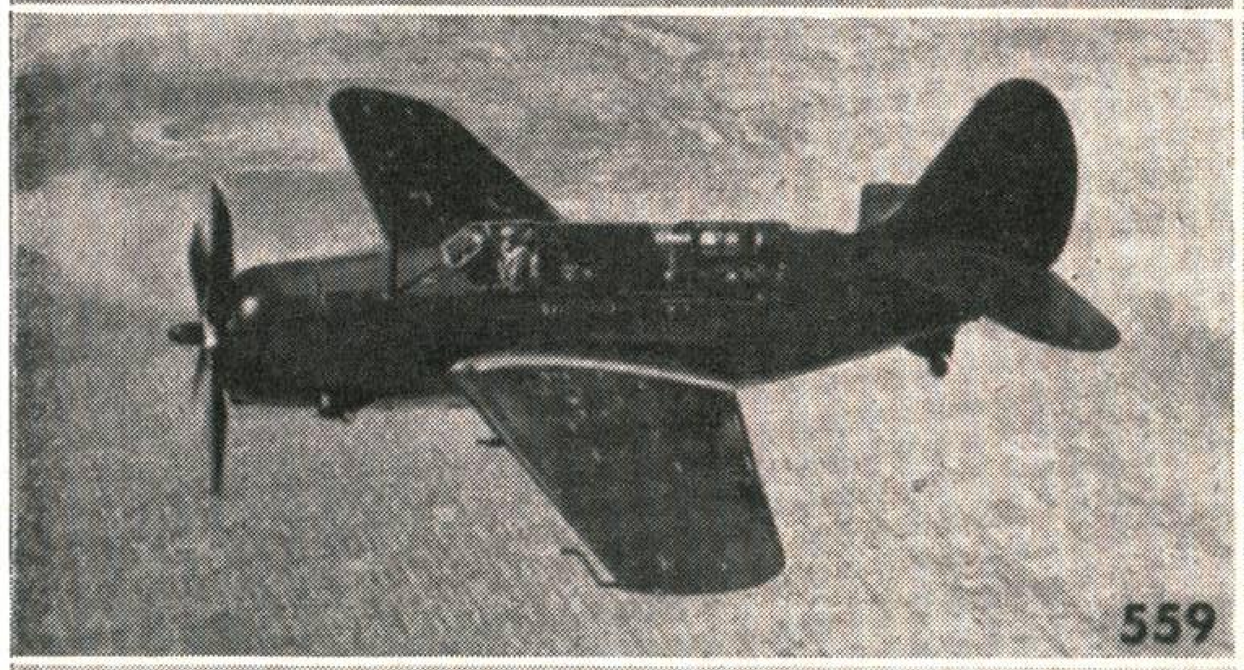
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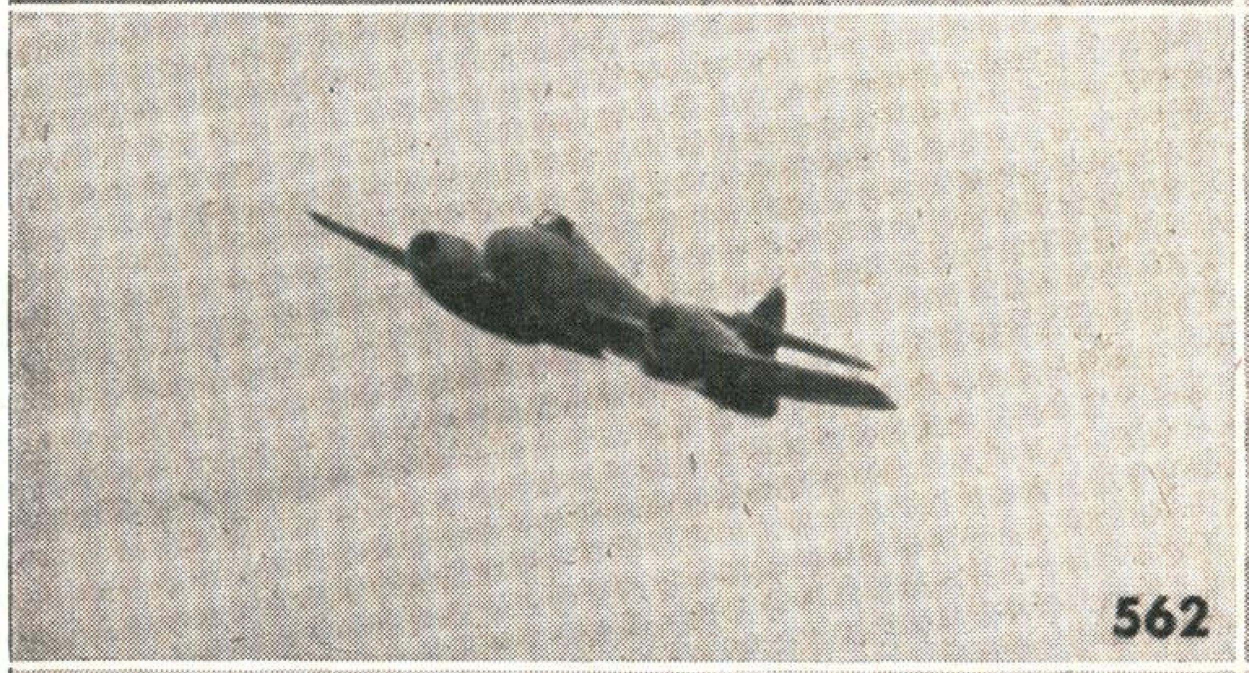
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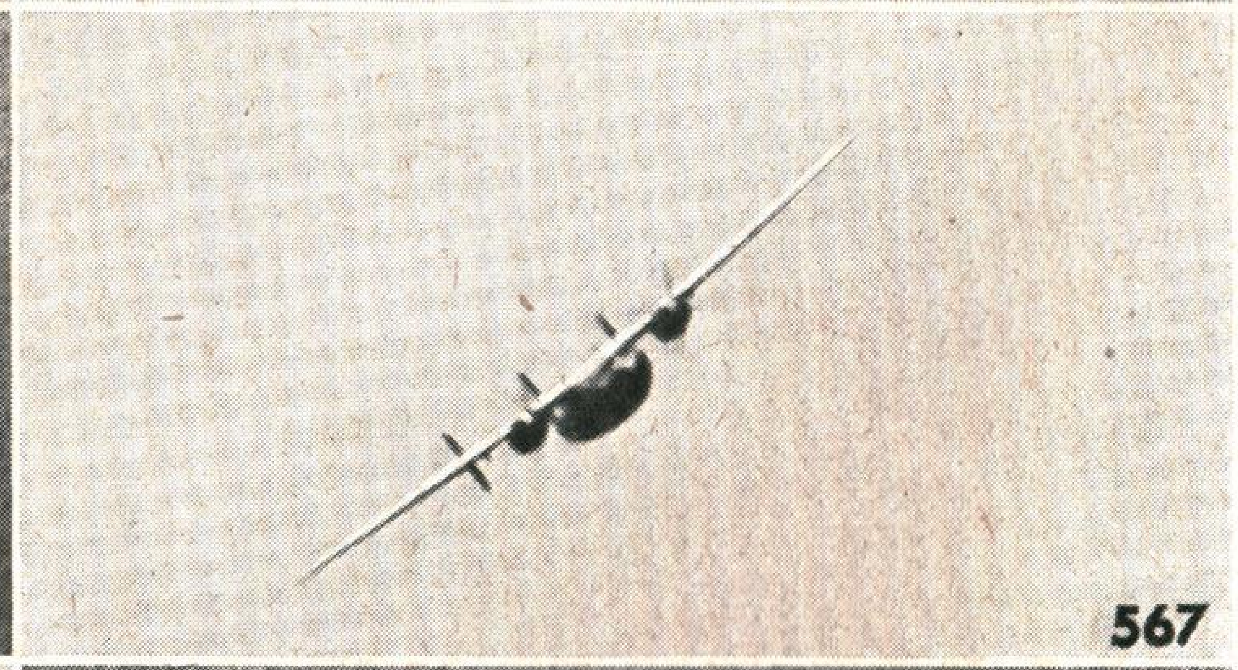
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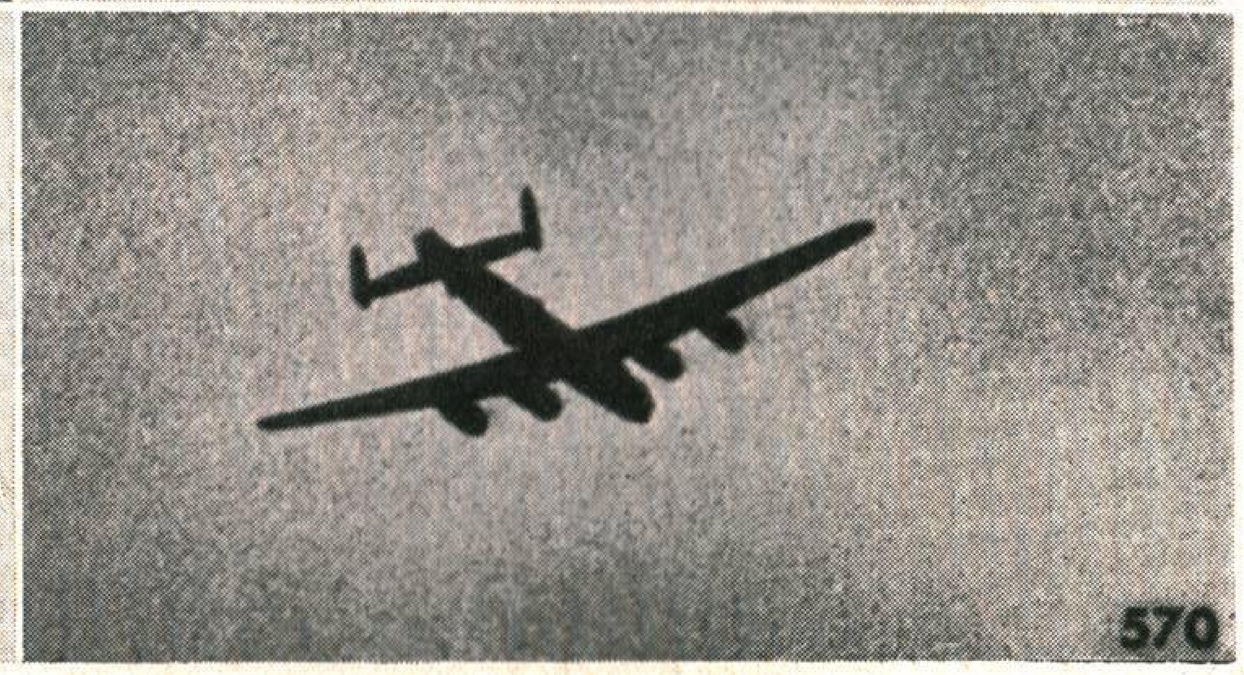
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FEBRUARY 1949 Vol. 3 No. 7

THE INTER SERVICES
AIRCRAFT RECOGNITION JOURNAL

The man of a thousand Gen-books

WELL, perhaps he hasn't a thousand—but it's not very far off that figure. And the man? He's the librarian in charge of the Photographic Library which supplies photographs for the *Inter-Services Aircraft Recognition Journal*.

Our librarian's job, to cut short a long and interesting story, calls for the handling of large numbers of photographs of aeroplanes for a hundred-and-one occasions and demands. To handle all these photographs effectively they have to be sorted away into albums according to type, so that selection can be made as and when required. This daily contact with so many photographs has given him an intensive experience in appreciating the differences in appearance of aeroplanes, and he has acquired a considerable book-knowledge of all types.

He came to the job about a year ago—knowing little about aeroplanes. As he put it, he didn't know " a Seagull from a seagull ", though he certainly does now. In fact his knowledge is such that he is able to recognize photographs of all the aircraft on all the training lists at a glance and many more besides.

● There are a few points worthy of notice here. First, his knowledge has been acquired without much conscious effort. Secondly, starting with only a passive interest in aeroplanes, he has acquired a very active interest in aircraft and in the subject of aircraft recognition. The third point, and possibly the most important one to all of us, is that such an extensive repertoire requires a positive effort to turn it to practical spotting account. He admits that he has had some difficulty in translating his knowledge into reality, and he is not yet an expert spotter. It should be remembered, of course, that he had had no synthetic training with the aid of an epidiascope or flash trainer, but, by practice at the real thing, he is making steady spotting progress. It's rather a striking lesson, which we can all read, mark and learn, that someone, starting from scratch, should be able to acquire this great amount of knowledge and keen interest in aeroplanes in a space of twelve months.

● This edition of the *Journal* contains the first part of an article on the simplified facts of life about aeroplanes. It is aimed at those of you who, like our librarian friend, start from scratch, and who may have the guiding hand of an instructor only occasionally. It is intended to help you establish an initial contact with aeroplanes so that you can help yourselves to become experienced spotters. You will not have a thousand gen-books to help you—you don't need them anyway. But you can keep one containing details of the comparatively few aeroplanes you need to know about ; and you should make as many other contacts with those aeroplanes as possible. But don't forget, it is essential to be practical about this business and to tie up the book-knowledge you acquire with some practical experience. You must keep an eye on the sky all the time.

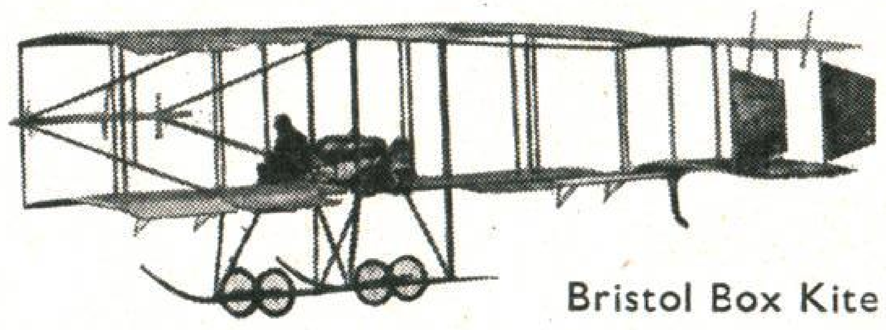
The Man of a Thousand Gen-Books says : " We must be practical about our recognition—keep an eye on the sky all the time."

FIRST STEPS IN AIRCRAFT RECOGNITION

(PART ONE)

Aircraft Recognition is something more than memorizing countless aeroplane shapes; it embraces a much broader field. Generally speaking, almost anything we see of, or read about aeroplanes, and any contact we have with them is useful. For this reason, "First Steps" must include a working knowledge of how an aeroplane flies, how it is made, why it is fashioned and formed the way it is, and a presentation of the technical terms employed in discussing aeroplanes in general and their recognition characteristics in particular. That is the aim of the whole article. This part of it discusses airframes. The second part, which will appear next month, deals with engines and minor structure details affecting aeroplane appearances.

If you have ever flown a box-kite, you will realise what an easy thing it is to fly. This is because it is inherently stable in the air. The "lifting-boxes" at either end maintain each other in an attitude in which they will continue to lift. Because of the ease with which the "box-kite" can be flown, some types of air/sea rescue dinghies pack them to raise a wireless aerial.



Bristol Box Kite

Some early types of aeroplane were built like box-kites and even acquired that name. But it was soon discovered that they did not need so large a "box" at the rear as at the front; in fact, it was seen that complete "boxes" at both ends were unnecessary. The front "box" developed into a pair of wings (biplane wings) which were held in a flying attitude by a much smaller "box" or set of flying surfaces at the rear end or, as we now call it, the tail. Designs developed, through the biplane, until the current type of aeroplane, the monoplane, was reached.

The Simple Aeroplane

All aeroplanes, however complex they may appear at first, have the same basic elements. They are, a power-plant, a wing, a body or fuselage, and a tail or stabilizing unit. Aircraft recognition revolves round variations upon this simple set-up. Variations occur in wing-shape, wing-position, tail-shape and form, fuselage-form and power-plant shape and arrangement. In short, recognition is the perception of form—aeroplane form.

Now let us tear apart some of these forms.

The Wing

In recognition, we are interested in the shape, thickness and position of a wing. A wing is constructed of spars and ribs made of metal or wood, and is covered by a skin of wood, metal or fabric. The spars, or beams, pass from wing-tip to wing-tip, generally through the fuselage of the aeroplane. Wing-ribs are built round the spars to give the wing its "lift" form. (Fig. 1). Shape and form influence wing-lift as does the angle at which the wing meets the airflow. (Angle of Attack: see Fig. 2.) Wing area and the forward speed of the aeroplane also influence it considerably.

Thick and Thin

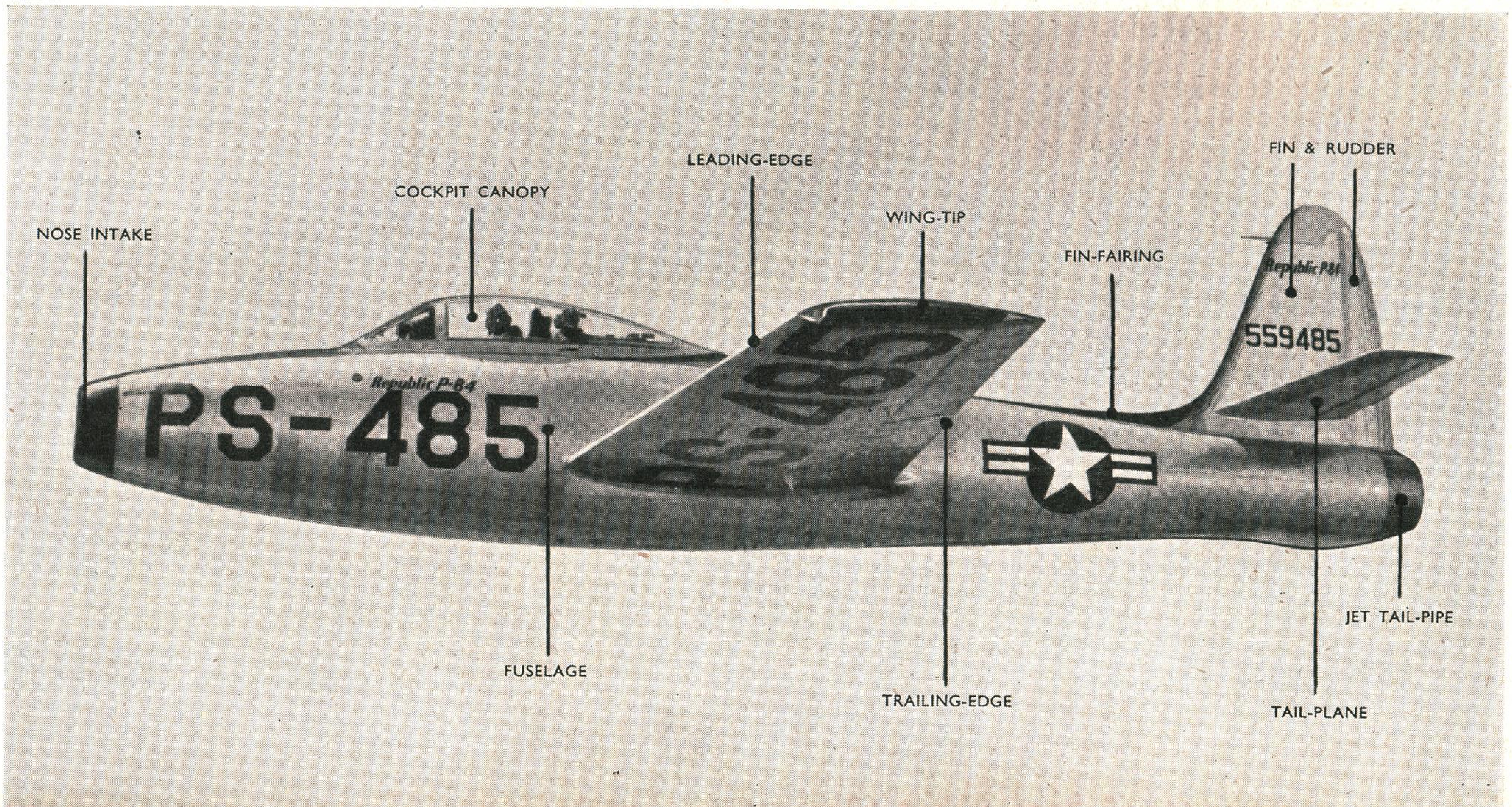
The thick wing (speed for speed) wants more power to get it through the air than the thin one because it creates more drag (drag is the resistance of air to the passage of a body through it). The advantage of a thick wing is that, in the lower speed ranges, it gives more lift and also has plenty of room inside in which equipment can be stowed.

The thin wing has comparatively little stowage space, but it has comparatively low drag at higher speeds.

Generally speaking, the thick wing-section is used in transport aeroplanes requiring to lift heavy loads over long distances at moderate speeds: whilst the thin wing-section is used for those requiring high speeds. (Fig. 3.)

The thickness of a wing, recognitionally speaking, must be viewed in relation to its span.

The Republic F-84 Thunderjet fighter is a good example of the conventional monoplane reduced to a simple form.



Outline and Shape

Most aeroplane wings are wider and deeper at the root than they are at the wing-tip because the loads are concentrated at the roots and in the centre-section of the wing. They are said to taper. A wing can usually be made more efficient by tapering. Whether the wing is tapered backwards or forwards is influenced by all sorts of factors structural and aerodynamic. For example, the designer might find it convenient to have wing spars crossing the fuselage in one position and yet at the same time find it aerodynamically necessary to have the centre of pressure (a focal or resultant point of all pressures, but which can

Fig. 1

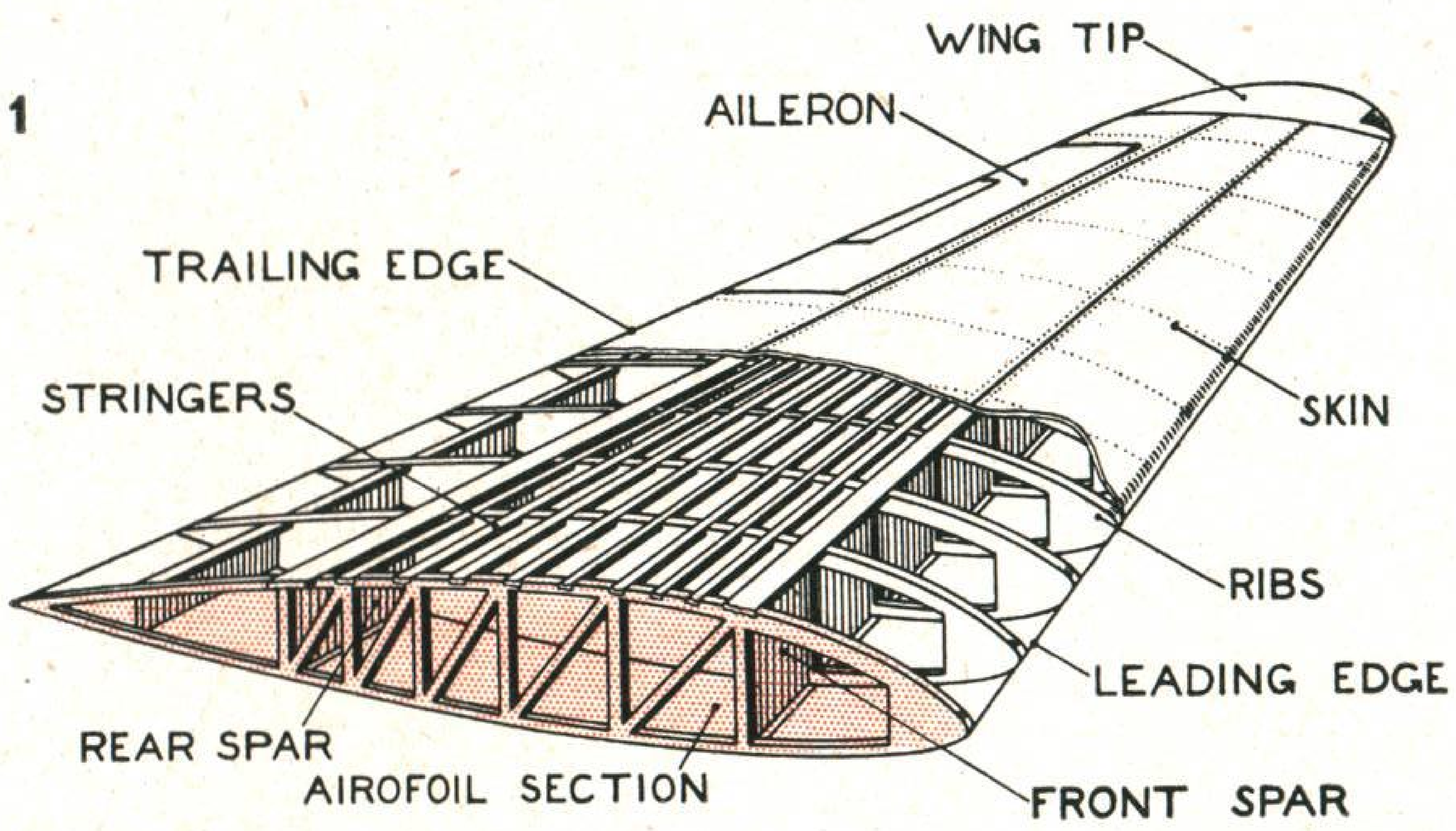


Fig. 2 (a)

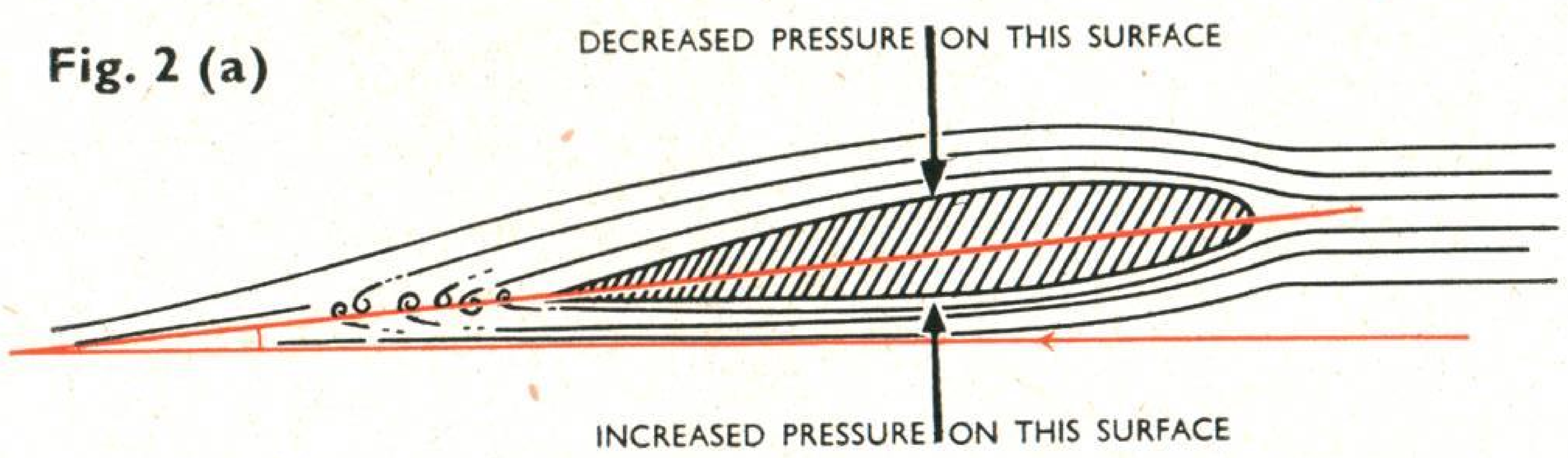
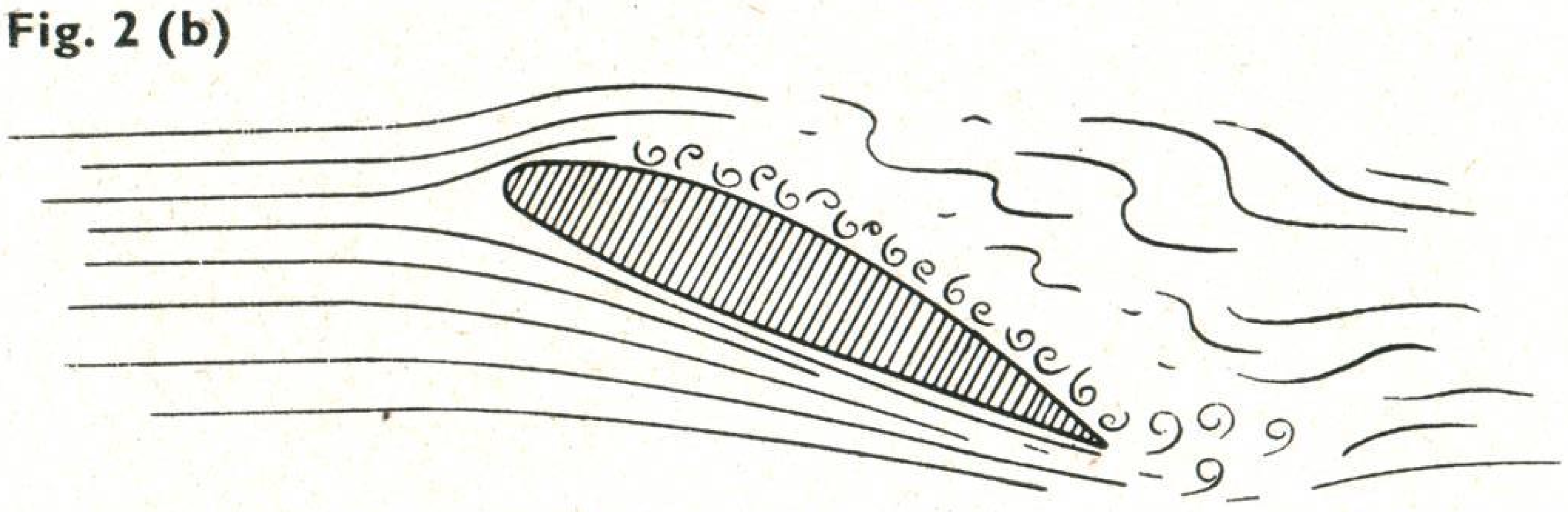


Fig. 1 shows how the wing is formed so that when it moves through the air, or, when air flows over it, as shown in Fig. 2(a), it will induce the air to lift it. The angle (called Angle of Attack and shown in colour) at which the wing meets the airflow is also of great importance to lift, but if the angle is made too steep, as in Fig. 2 (b) below, the flow breaks down and the lift is lost.

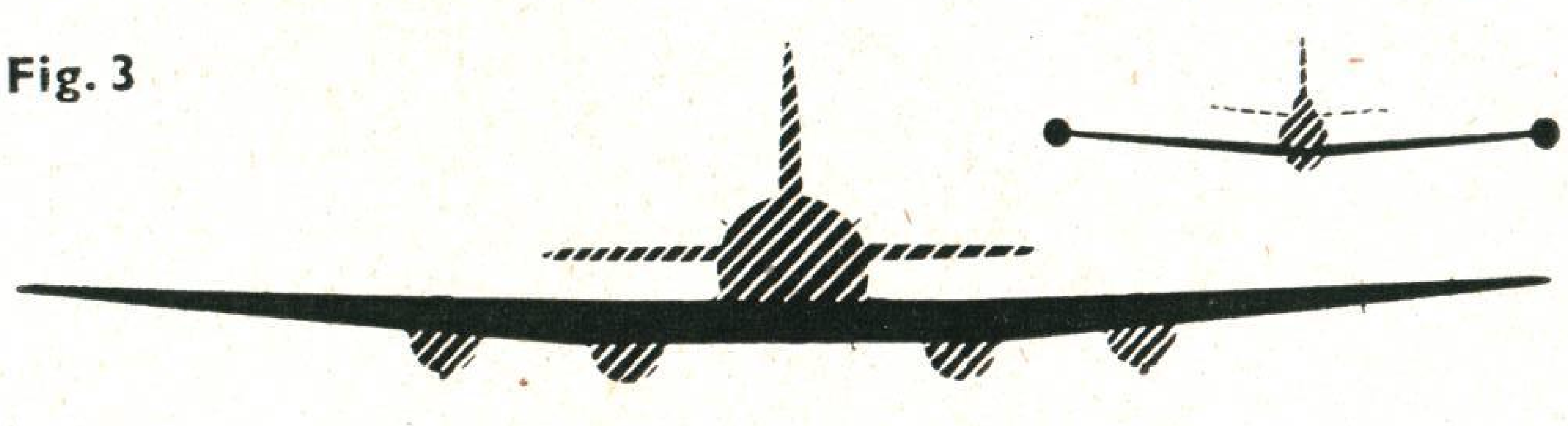
Fig. 2 (b)



move about) confined within certain limits. By placing the spar as near as possible to the aerodynamically satisfactory position and by sweeping the taper backwards or forwards both needs are met. This, of course, is only broadly true; there are other factors to influence wing-shape such as weight distribution and the speed at which it will fly.

The question as to whether wing edges are made curved or straight is a matter of design and experiment; it depends upon the type of aeroplane being built. The aerodynamic advantages gained from curved wing-edges are usually small, and are outweighed by the lower cost of manufacturing straight-edged ones. An exception is

Fig. 3



The thick wing of the Handley Page Hastings transport (larger silhouette) is compared with the very thin wing of the Republic F-84 fighter. With a fuselage full of turbojet and such thin wings, the F-84 cannot carry enough fuel internally. Its wing-tip tanks, to give it range, are to some extent a help in recognition.

the curved wing of the Spitfire, which was found to be highly efficient. Most aircraft today have straight-edged wings.

Swept-back wings, as on the North American F-86 and the Boeing B-47 are designed to allow aeroplanes to approach the speed of sound more closely. (See *Journal* for April, 1948.) Our diagram (Fig. 4) illustrates different types of wing-shape and the varying degrees of taper.

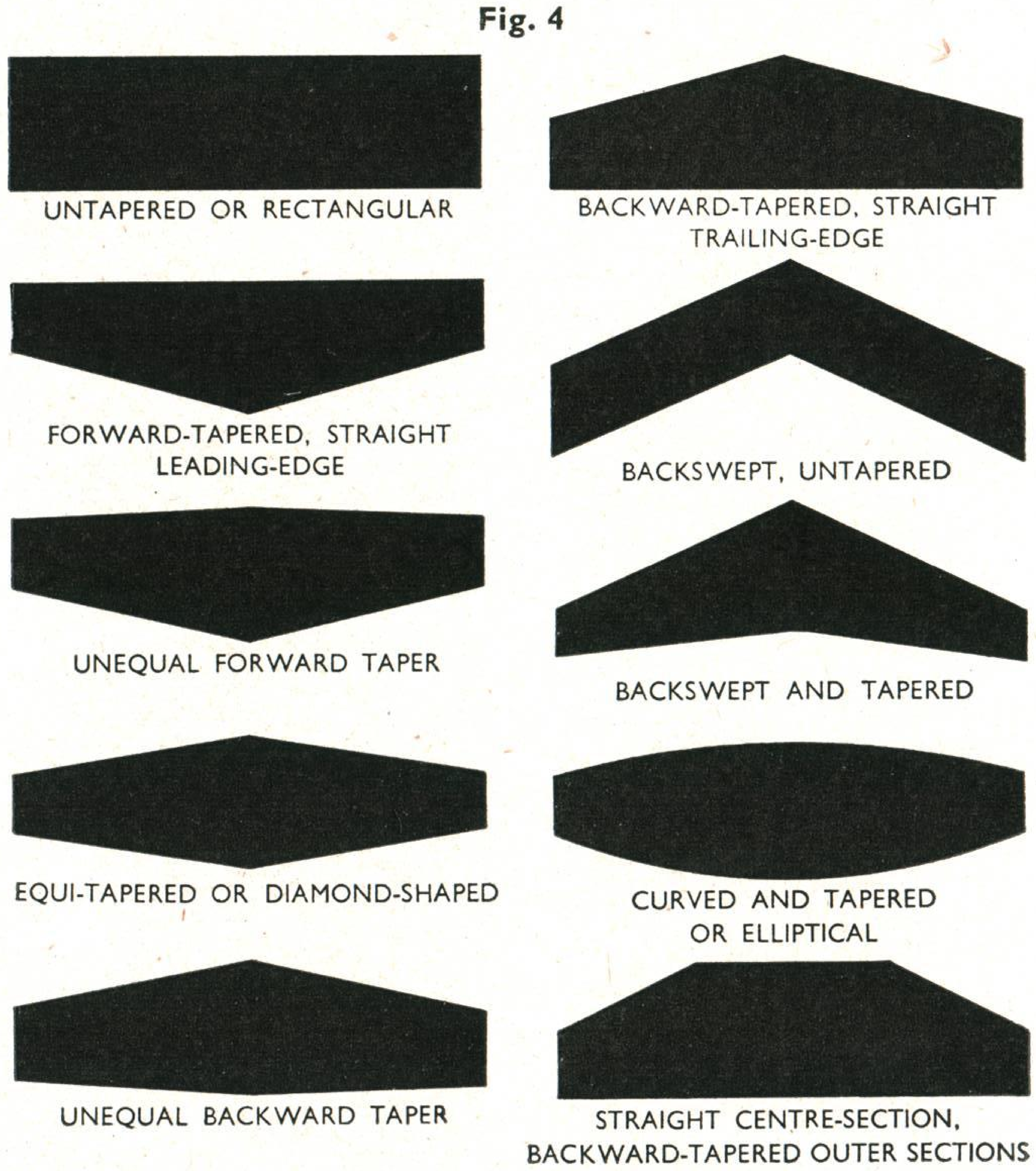
Wing-Tip Design

There is a difference in the speeds of the airstreams over and under a wing (incidentally this is the reason why a wing derives lift from the airstream). Unless a wing is ended off neatly and in conformity with aerodynamic rules there would be turbulence at the wing-tip. Turbulence spells more drag. The wing would have to be tapered out to extremely fine proportions in plan and depth—in fact it would have to be tapered out to " nothing " —to reduce the turbulence. If this were done, of course, the last few yards of wing would not be worth their weight in lift. So wing-tips are moulded to minimize turbulence and to get the last ounce of efficiency out of the wing.

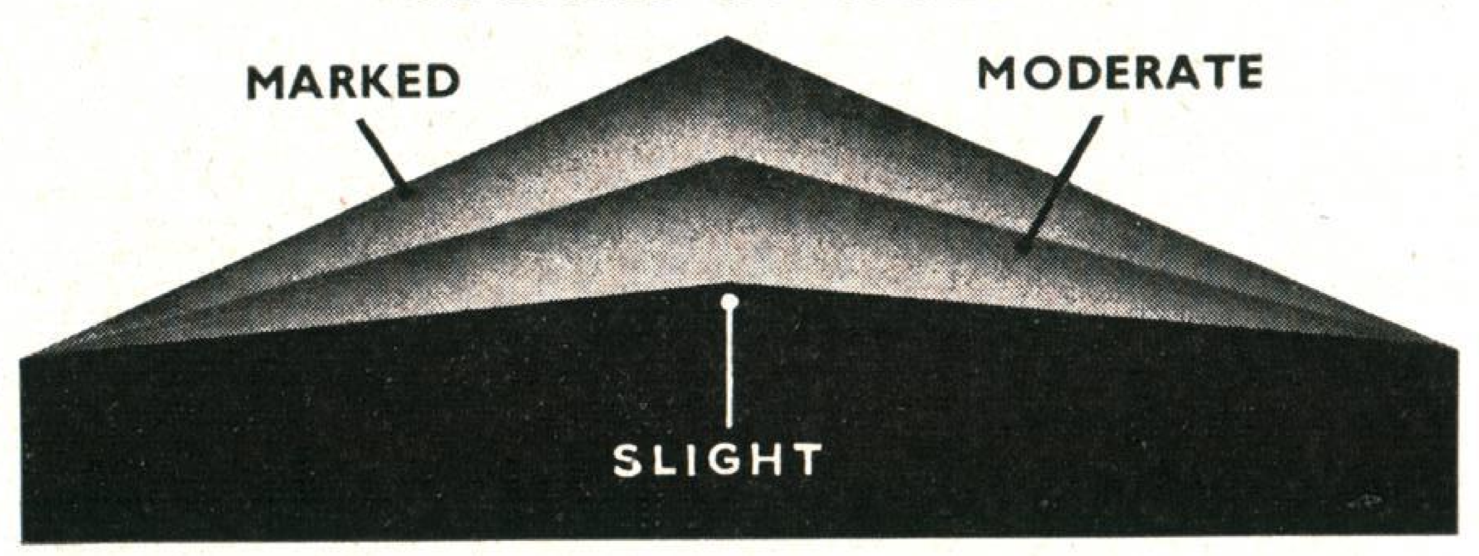
Their shape is largely a matter of experiment and design. Clipped wing-tips, as worn by many fighter aircraft, aid aerobatics—particularly rolling. Typical wing-tip shapes are illustrated in Fig. 5 overleaf. Wing-tips should always be thought of as they affect the appearance of the whole wing; for example, if you examine the wing-tip of Consolidated B-36 on its own it looks curved; considered with the whole wing it appears pointed. It is the idea, or the impression, which is more important than the fact. (Fig. 6.)

TYPES OF TAPER

Fig. 4



DEGREES OF TAPER



Angle of Dihedral or Anhedral

Looking at an approaching aeroplane it will be seen that almost all of them have the wings swept upwards towards the tips, as though the weight of the fuselage were causing the wing to sag (see Fig. 7). This is called the wing dihedral-angle. It is set in the wing in various ways and in varying amounts to produce stability in the lateral sense, that is, to prevent the aeroplane from rolling over on to its back.

Sweep-back in wings also provides lateral stability. In some swept-wing aircraft there would be over-stabilization, if wings were not " drooped ". They are said to have an anhedral angle (see *Journal* for April, 1948).

The apparent change of shape, when a wing which has a dihedral or anhedral angle, and is viewed foreshortened and in perspective, is illustrated in Fig. 8.

Wing-high—Wing-low

No passenger wants a wing spar in his lap, so most passenger-carrying aeroplanes have a high or low-wing position. By this means a spar can be concealed under the floor or made to pass across the cabin roof. Cargo-carrying aircraft also need clear fuselages for ease of loading and stowage. A high wing gives a good view downwards from the cabin, but such a wing position means that, unless the undercarriage is fixed to the fuselage, it will be long and heavy and perhaps require large engine-nacelles to retract into.

Bombs are not dropped over the side in these days : generally they hang in neat rows from a bomb-beam which is suspended from the main spar and built into the belly of the fuselage lengthwise. So most heavy-bombers have mid-wings. So have America's large troop-carriers, the Boeing XC-97, Consolidated XC-99 and the Lockheed Constitution. When an aeroplane is very large, as these are, it is structurally easier and more convenient to make them double-decked and mid-wing jobs at the same time.

Many small " sport " and private owner types of aircraft have high wings, thus providing good downward view from the cabin. Most single-seat single-engine fighters have low or low-mid wings because there is less undercarriage to be stowed within the (usually thinner) wing. Wing positions as they are seen from ahead are shown in Fig. 9.

TYPES OF WING-TIP

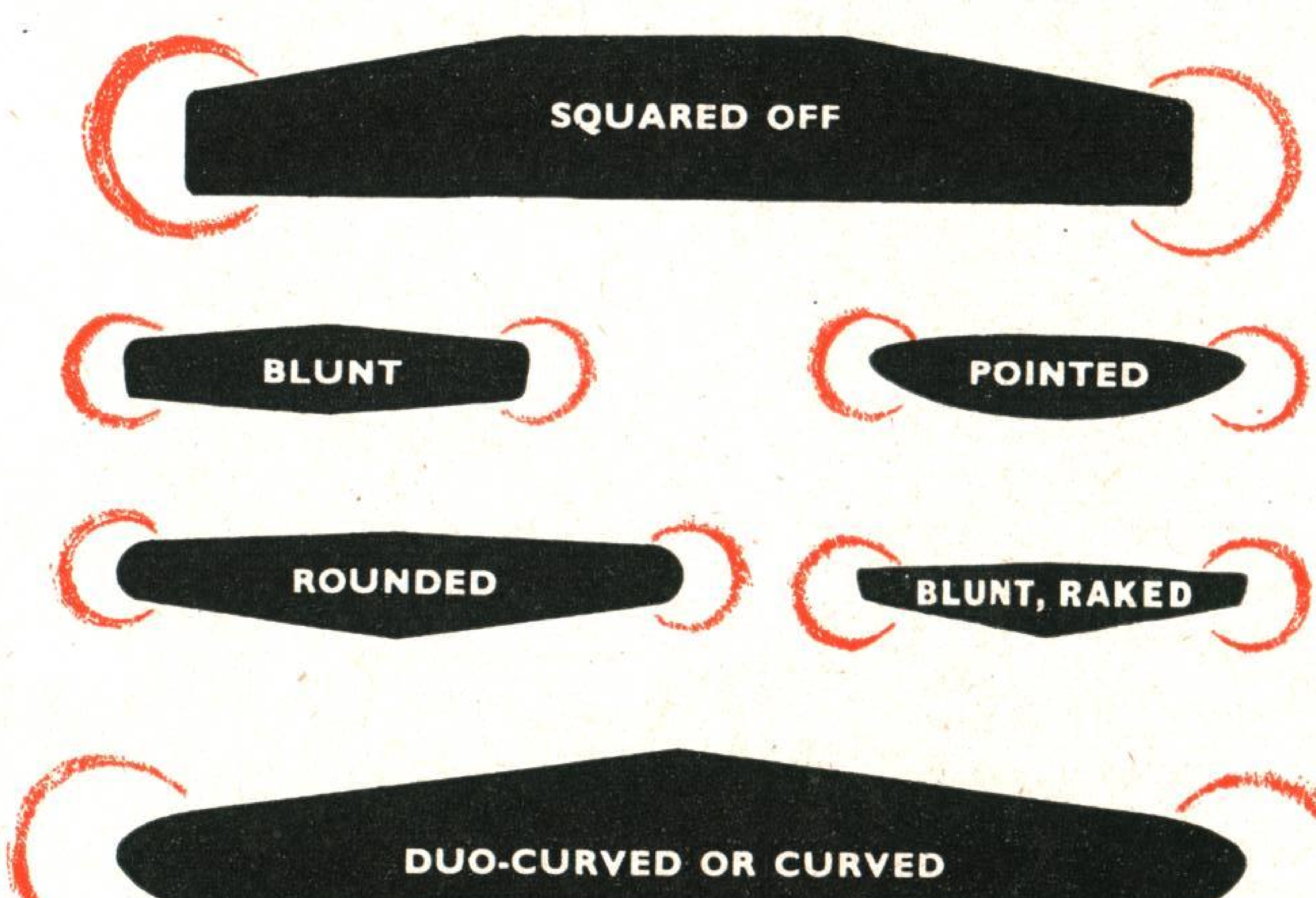
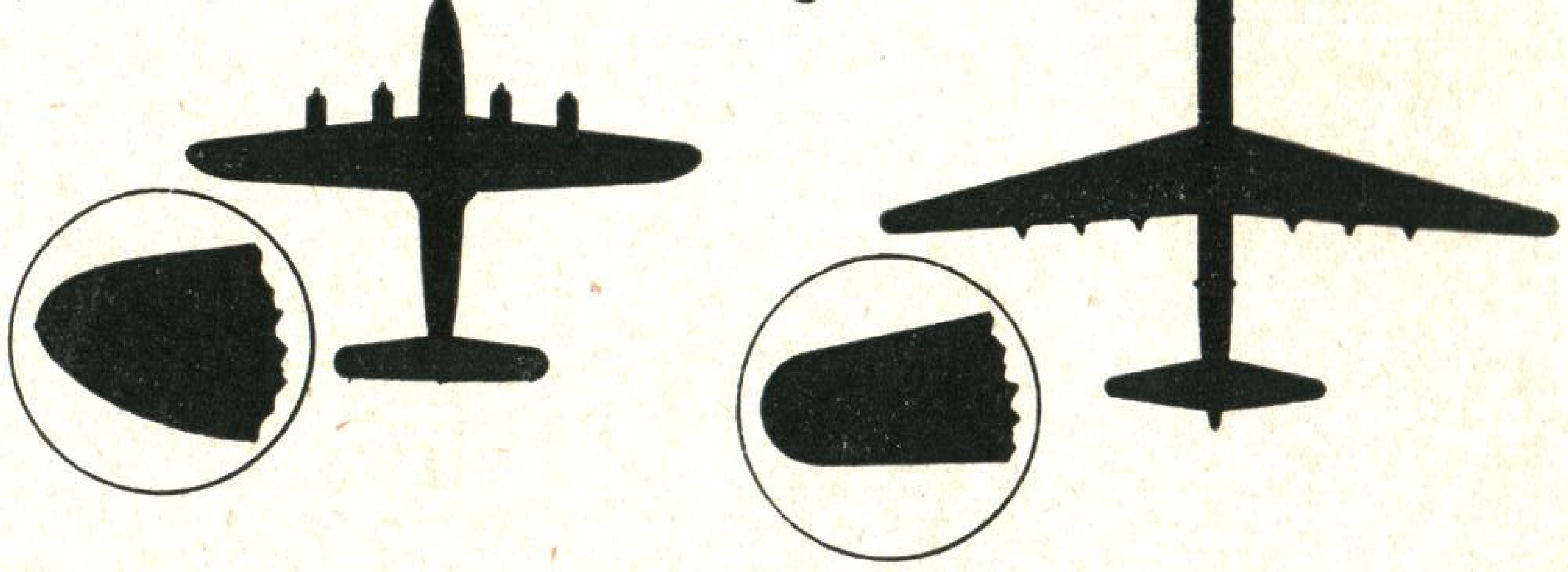


Fig. 5

Fig. 6



Though we have drawn attention to wing-tip shapes it is important always to view them with the whole wing. Note the general pointed impression of the wings of the Lockheed Constellation and the Convair B-36 bomber. If the wing-tips are divorced from their wings (as encircled) quite a different impression is given.

Wing Flaps

Along the trailing edge of most aeroplane wings, in addition to the control surfaces, are sets of flaps. In Fig.10 the two main types of flap which affect aeroplane appearances are illustrated. They are the Miles flap, and the Fairey-Youngman flap. The Fairey Firefly has a flap which can be " stepped " for use at cruising speeds and for manœuvring. In many Miles aircraft, the flaps are permanently displayed, for example, in the Aerovan, the Gemini and the Messenger.

Almost every aeroplane has some sort of flap, though most are contained within the wing form, and are seen only on take-off and on alighting. The idea of the flap is to increase the lift at take-off and in the approach to touch-down and landing. When a flap is fully extended the extra drag acts as a brake during the landing run. A small amount of flap on take-off gives extra lift for only a small increase in drag, hence quicker take-off. A large amount of flap on landing gives, in addition to extra lift, a large increase in drag.

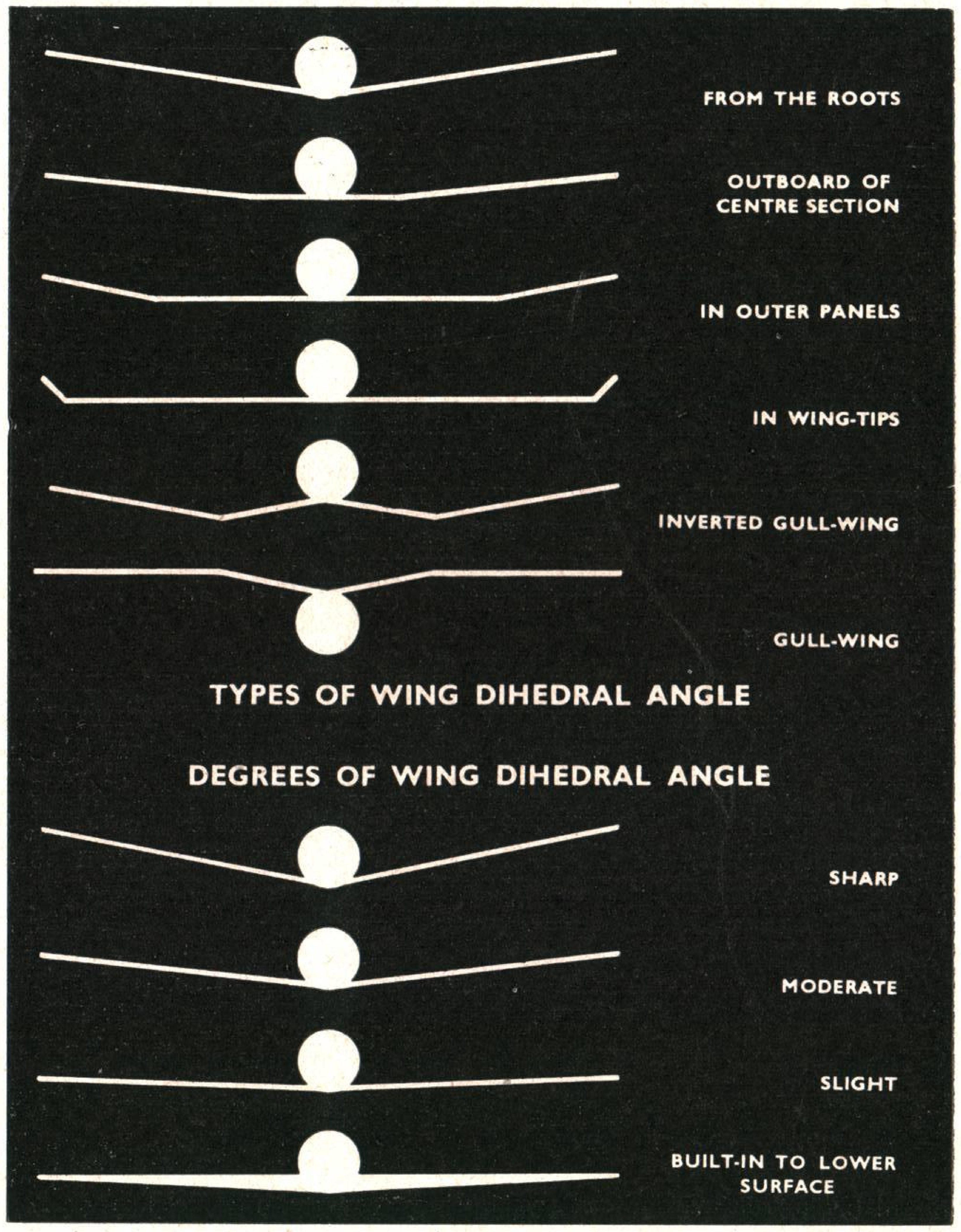


Fig. 7

THE ROYAL OBSERVER CORPS GAZETTE

Vol. 2. No. 9 FEBRUARY 1949

THE OFFICIAL ORGAN OF THE ROYAL OBSERVER CORPS

MASTER TEST AHEAD!

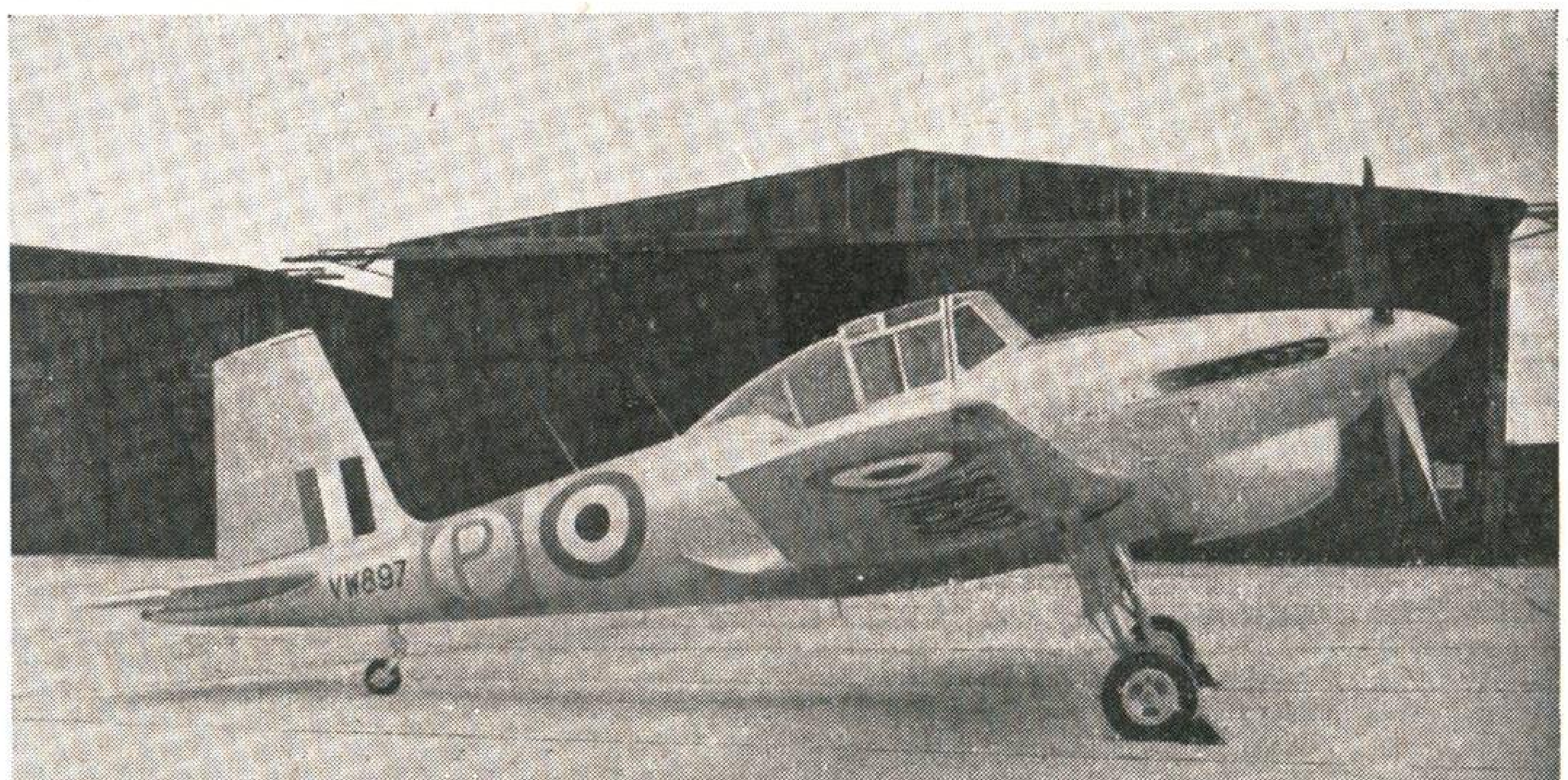
April the 24th is the date, and the aircraft on the test film will number 100. All aircraft will have been illustrated in the *Journal* or the *Gazette,* though some only sparsely. This special pictorial edition of the *Gazette* features some of those less-favoured aircraft. We have added a few hints, tips, quips, and " corny " jests, and in some cases a little rudeness about their features, as well as reference to previous illustrations in the *Journal*. All this is to aid you, as far as we may, to pass the test in a masterly manner.

But don't forget that to spot successfully, spotting practice is the thing that counts in the end. If you don't see many aircraft in your neighbourhood, get cracking on synthetic spotting, by epidiascope, shadowgraph or flash-trainer. If you have no flash-trainer, use the epidiascope with shortened exposures. A "classroom" knowledge of aeroplanes is a good thing, but speed in real spotting is better—in fact it is the object of all our efforts.

BRITISH

Balliols Mk. 2, 1, and (P)

Balliol Mk. 2



Balliol Mk. 1

Boulton Paul (P.108) Balliol Mk.s 1, 2, and Prototype

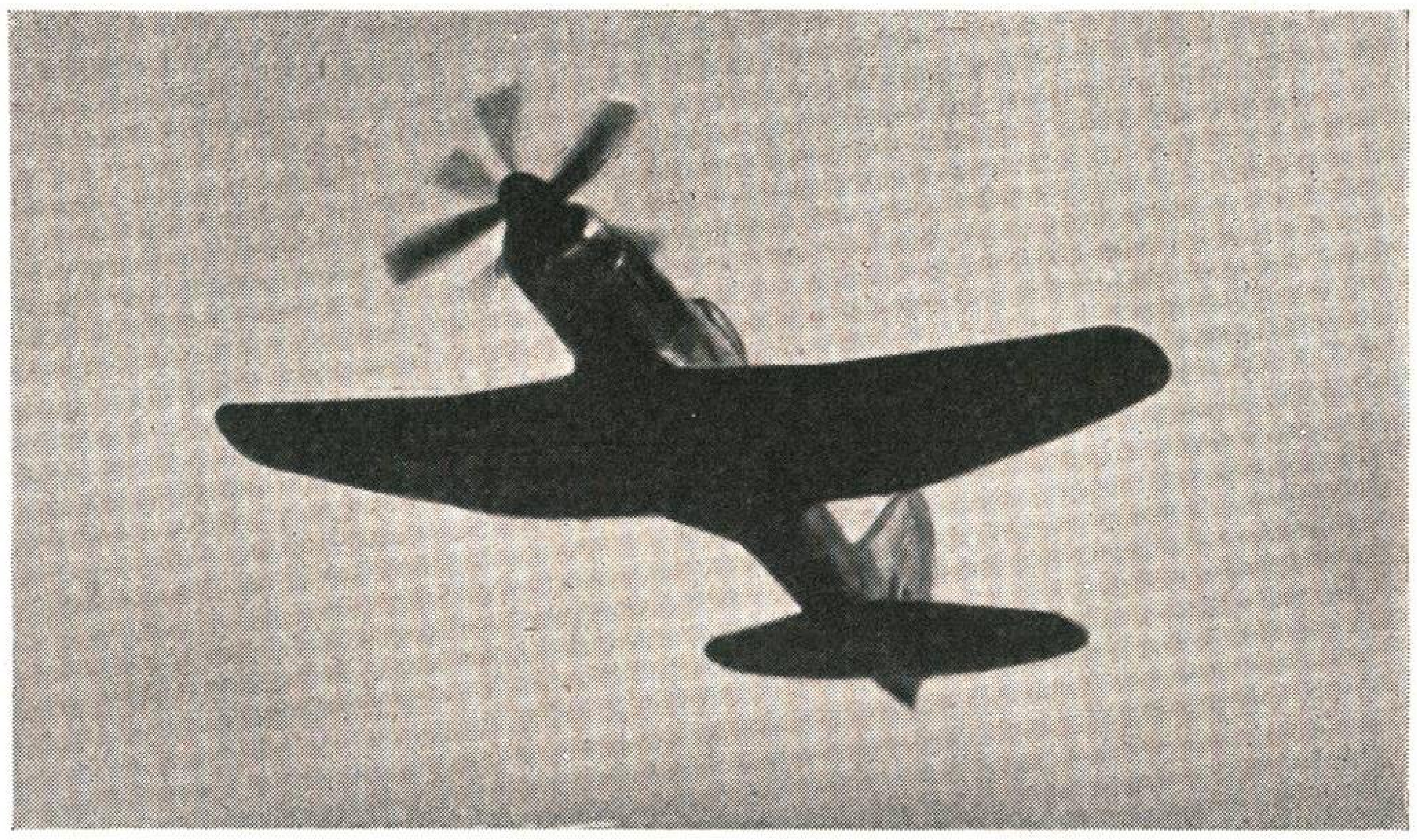
Balliol (advanced trainer) airframes may be seen with one of three different engines. The prototype sports a Bristol Mercury (blunt nose with small spinner); the Mk. 1 has an Armstrong Siddeley Mamba turboprop (conical nose, with a small spinner); the Mk. 2 has a Rolls-Royce Merlin (pointed nose, with a large radiator on its " chin "). Look closely at the cockpit shapes, too!

(*Photos on previous page.*)

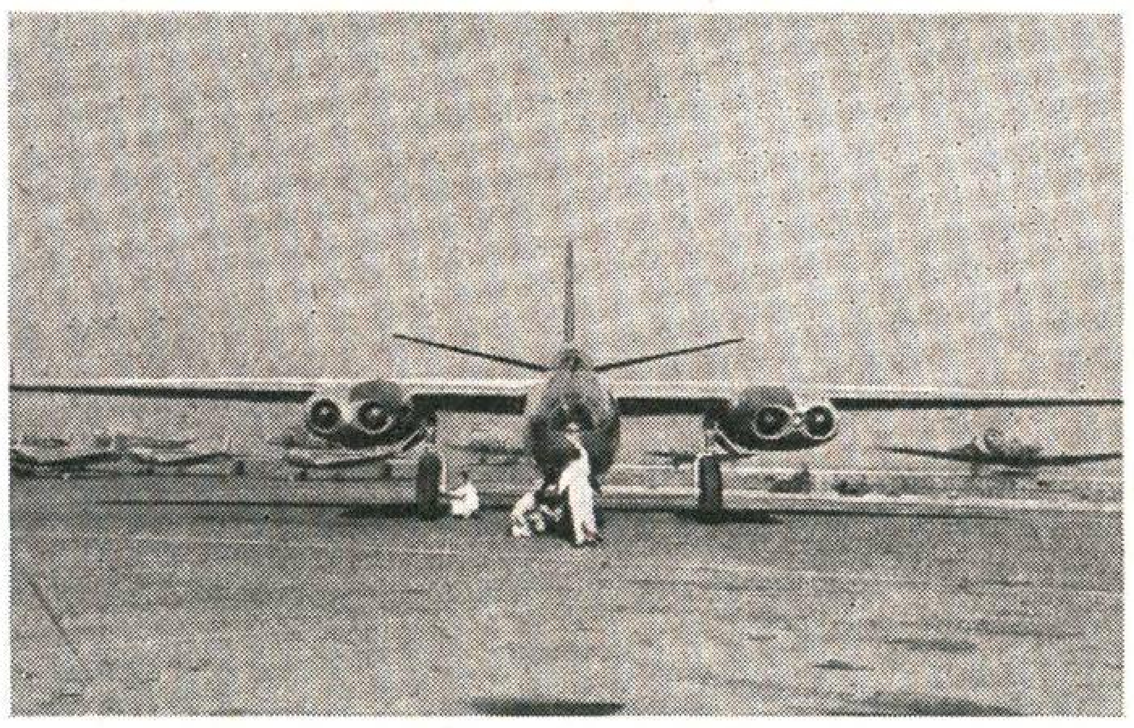
Westland Wyvern T.F. Mk. 1

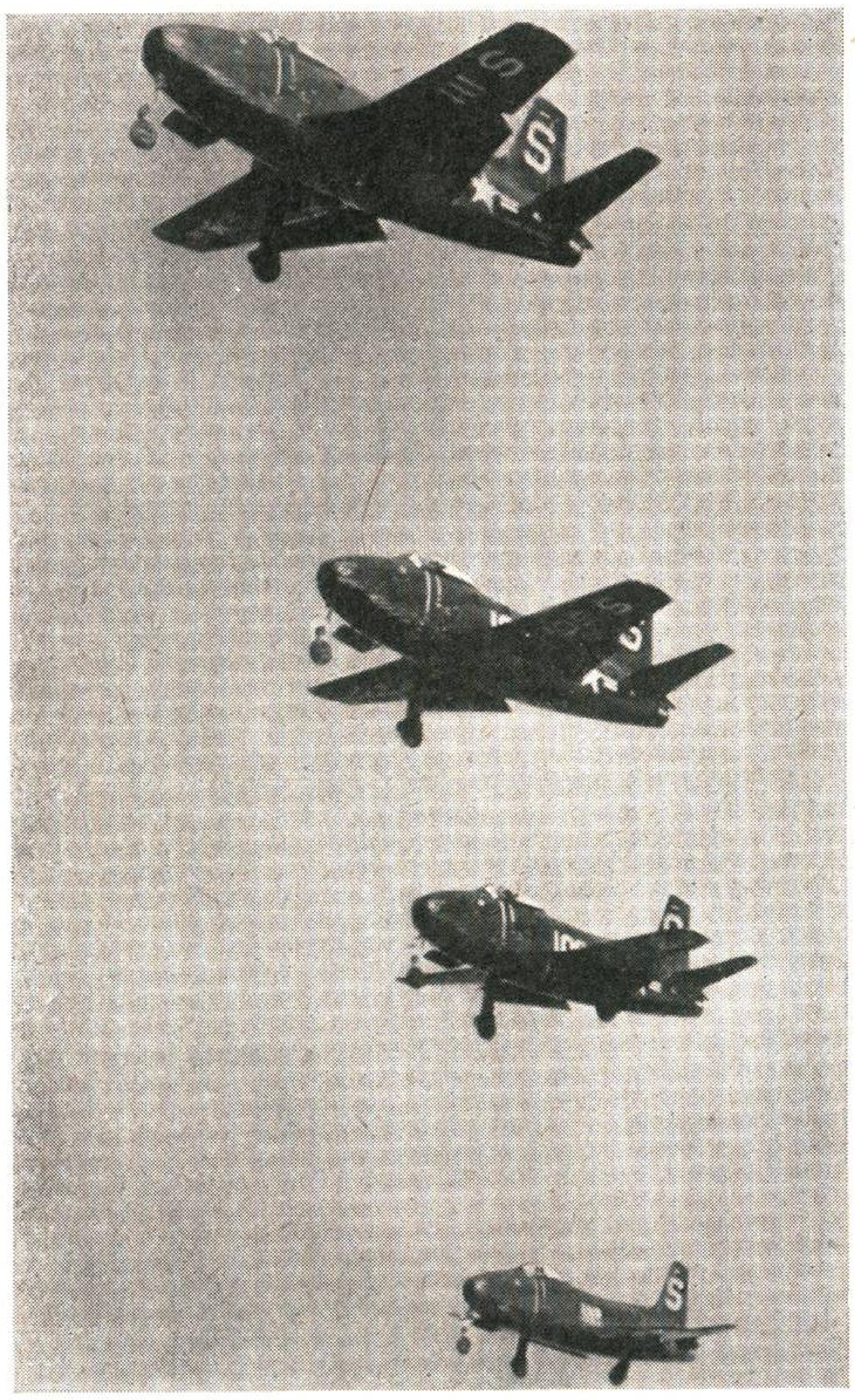
(One Rolls Royce Eagle In-line)

Wyvern of mythology had a head and tail of a dragon, wings, and two legs. This one (torpedo-fighter) has high-humped body, tapered and cranked wings (box-radiators on centre section) and, in our warped view, a " pig-snout " (cowling a Rolls-Royce Eagle) adorned with a large spinner. This Wyvern will do more damage than its mythological namesake, too.



AMERICAN





North American B-45 ↑

(Four Turbojets)

B-45 (jet-bomber) tell-tale features are " drooping" shoulder wings, twin twin-jet underslung power-packs and sharp dihedral in the tail plane (see September, 1948 *Journal*).

← **North American FJ-1 Fury**

(One J-35 Turbojet)

FJ-1 Fury (U.S. Navy fighter) features are: " barrel-body ", large, squared-off flying surfaces and sharp dihedral angle in tail-plane. Later models carry tip-tanks (see November, 1948 *Journal*).

Martin 2-0-2

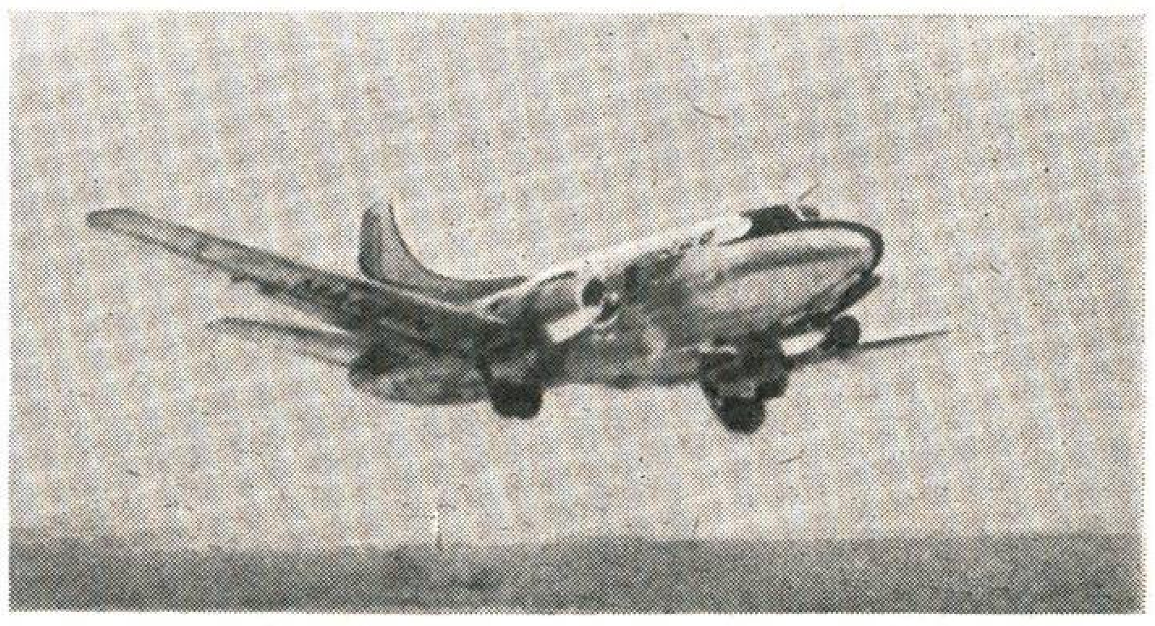
(Two P & W Double Wasp Radials) →

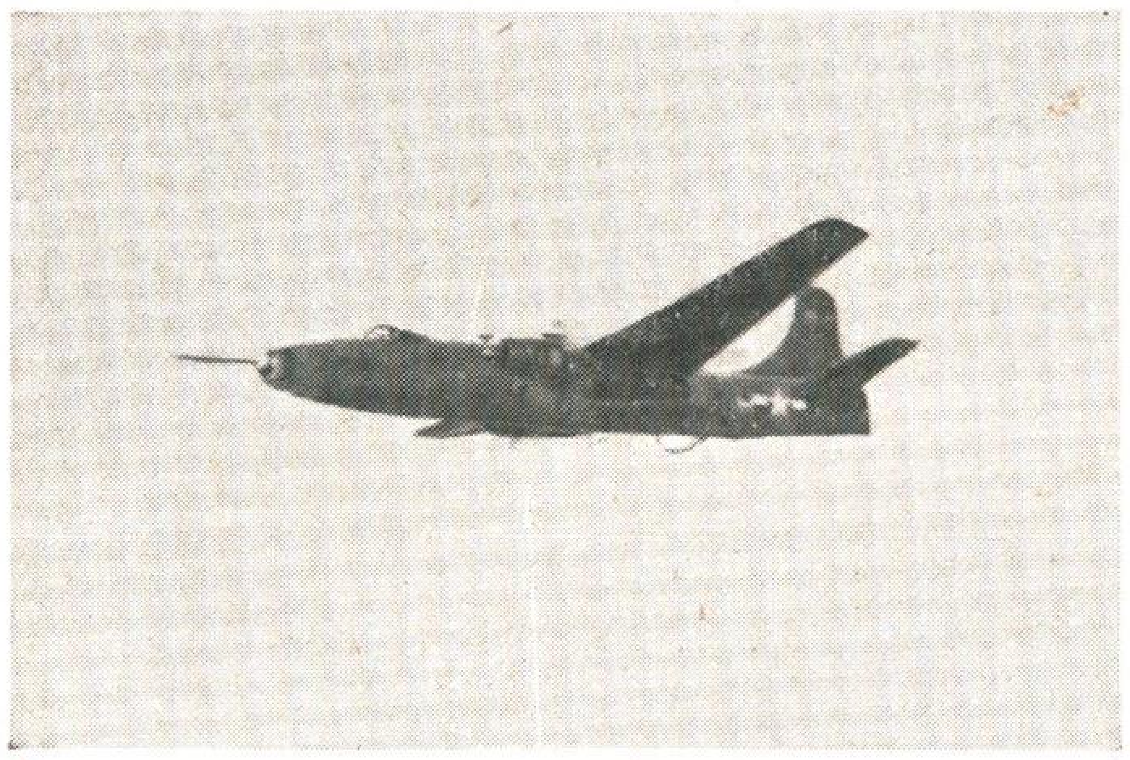
Martin 2-0-2 (civil transport) displays a fat tubular fuselage, seeming to sit heavily upon wings and tail-plane dihedral angles in both, generous wing root fillets and a fin-fairing to end all fin-fairings (see January, 1948 *Journal* for silhouette).

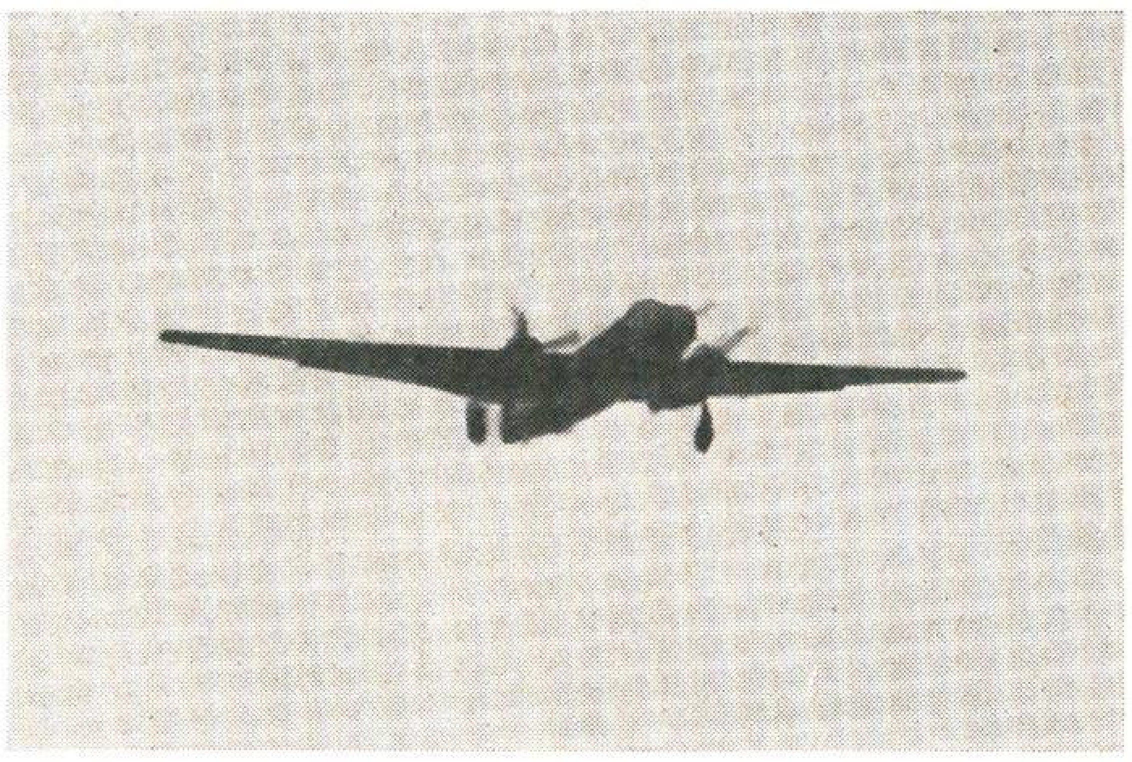
Martin P4M-1 Mercator

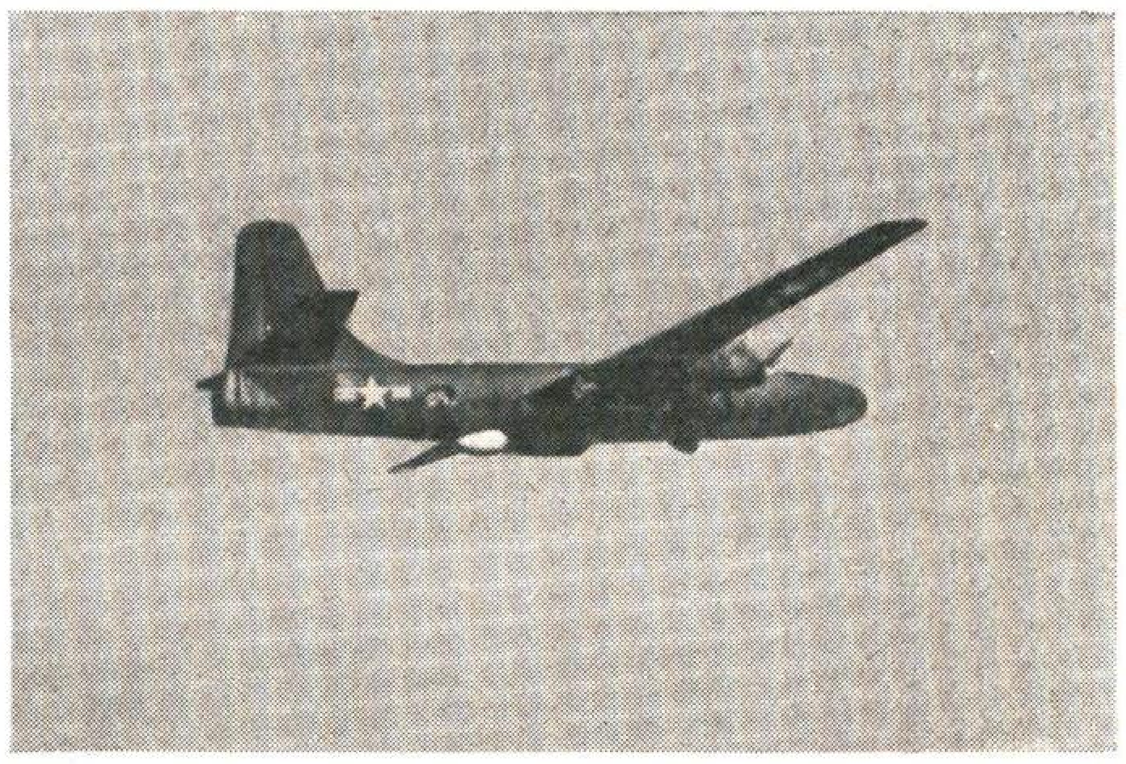
(Two P & W Radials and Two Turbojets) ↓

Mercator (U.S. Navy patrol) will make history out of geography (as did its historical namesake) ranging over oceans seeking hostile submarines. Has Warwick-like layout with a large number of small differences (see November, 1948 *Journal*.)



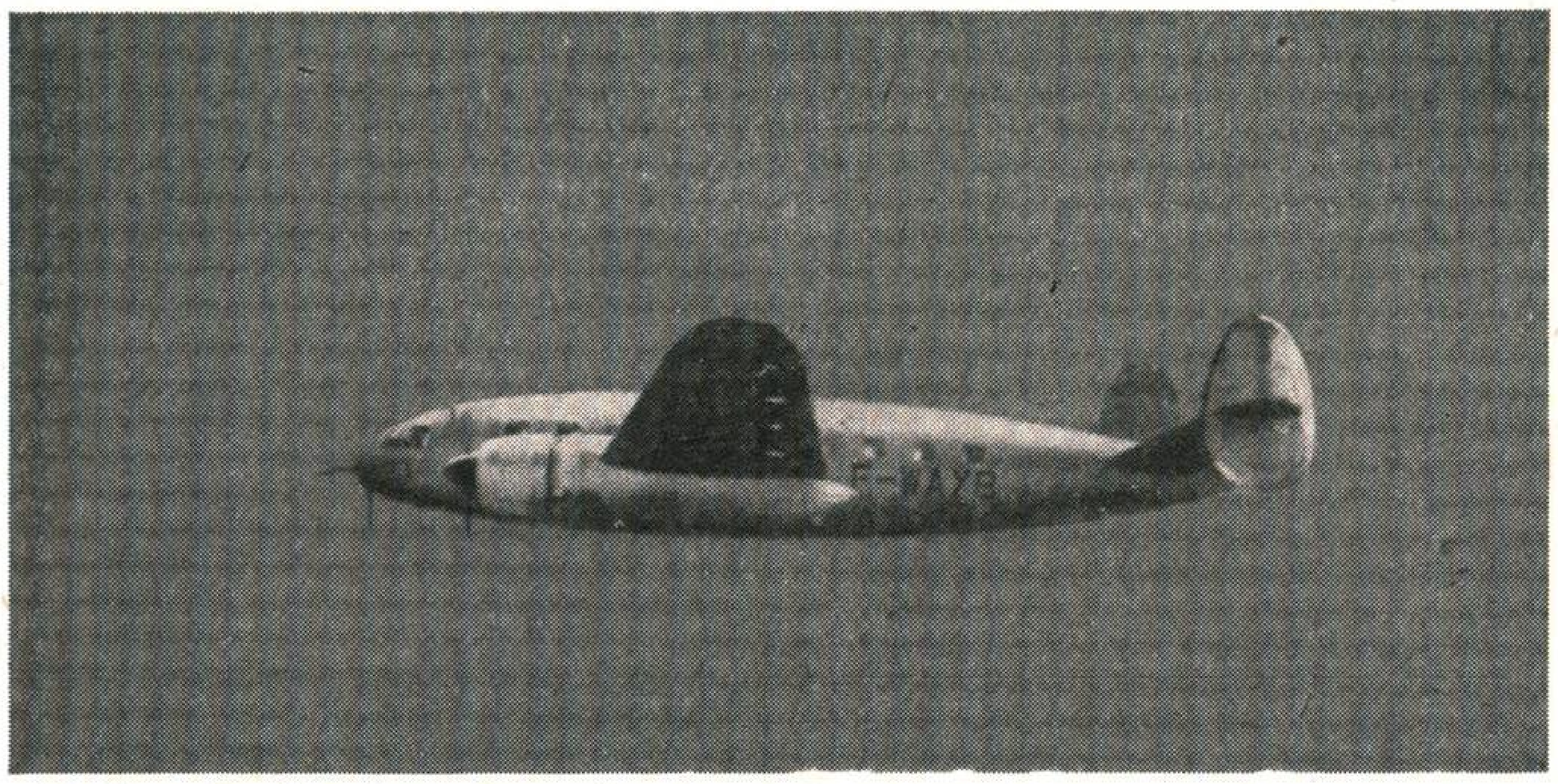


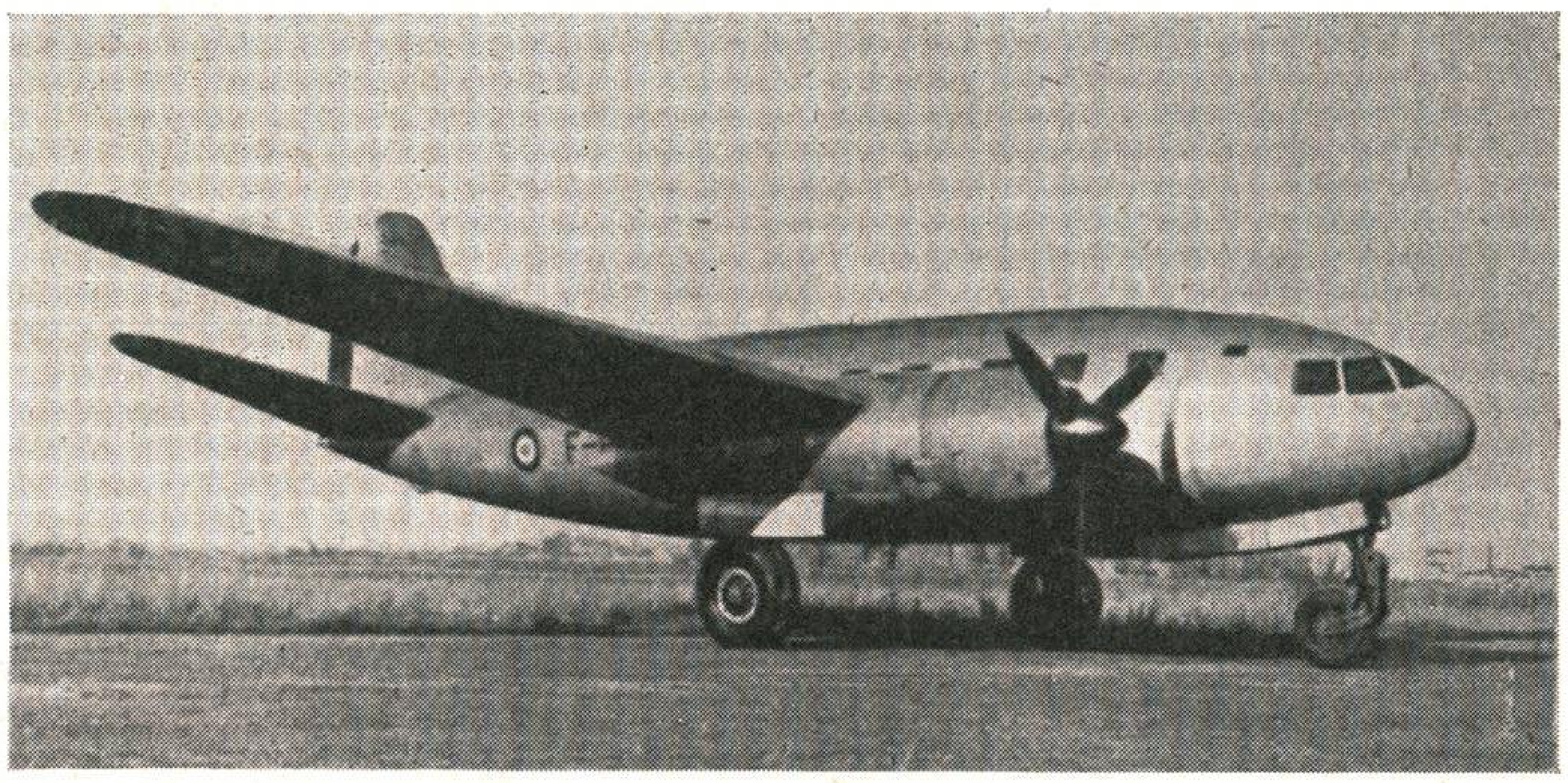




FRENCH

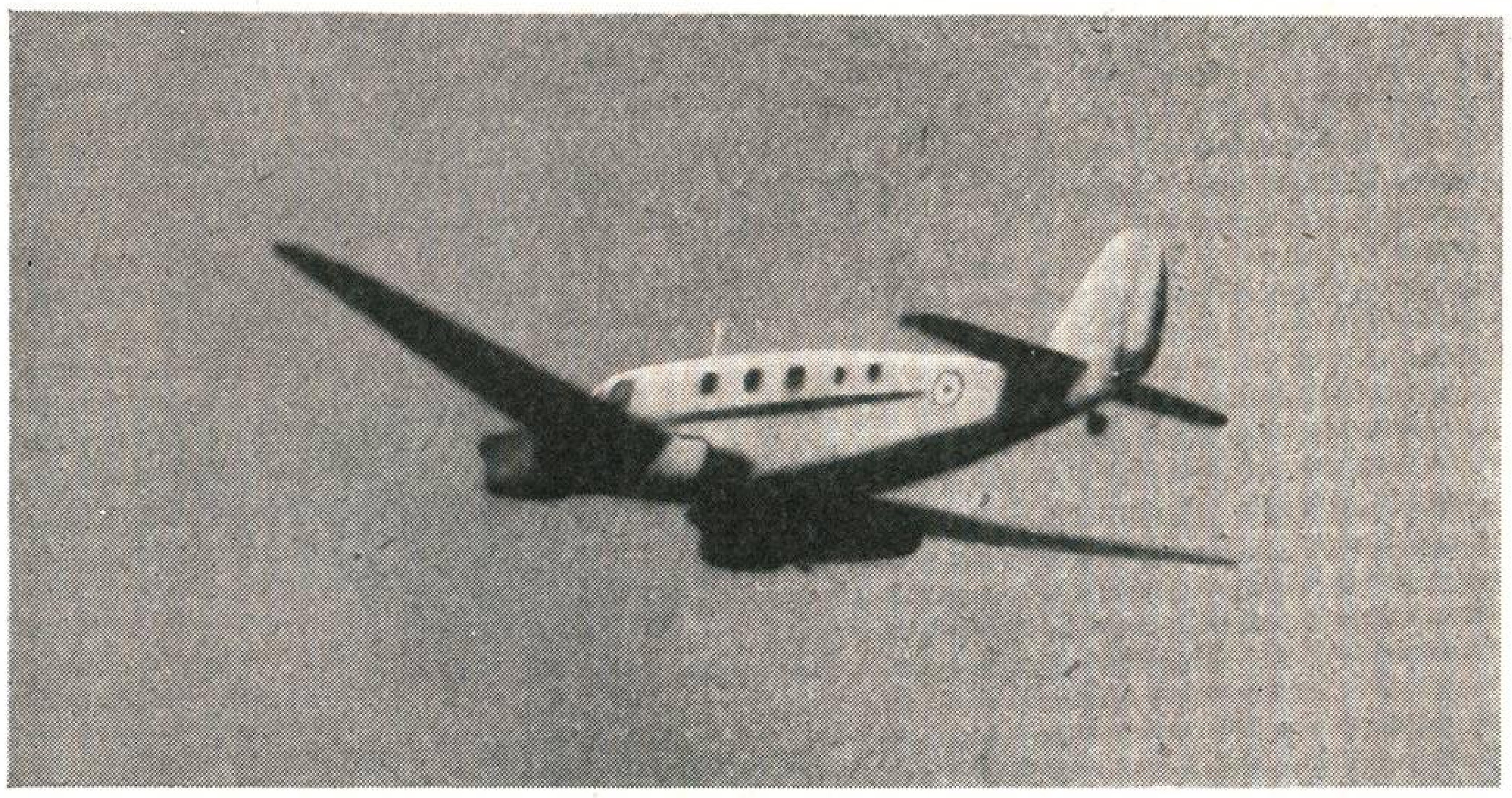
Bellatrix S.O. 30 R (Two Gnome-Rhone Radials)

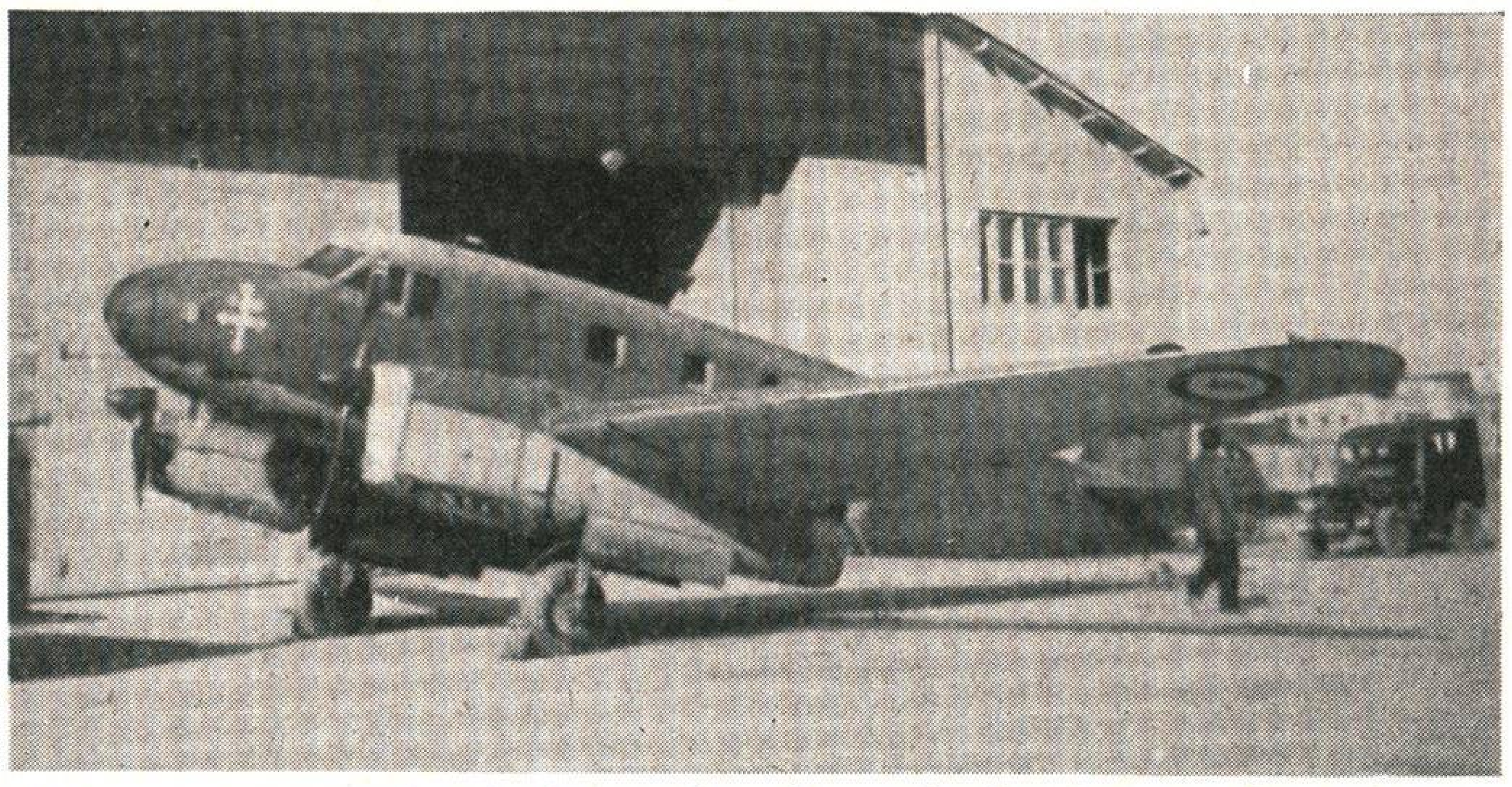




Bellatrix (civil transport): Beautiful tricks (excuse us!) have been played with its shapes since the prototype stage. It has grown twin fins (which lean towards each other). It scores a point for unbroken fuselage lines maintaining all the beauty of a gherkin, which it resembles. Its pointed wing (shape repeated in tail plane) is " cranky ". The impression one gets is that Bellatrix's body weighs heavily upon (his, her or its) flying surfaces (see June, 1948 *Journal* also). Right, the first prototype ; left, the R-2.

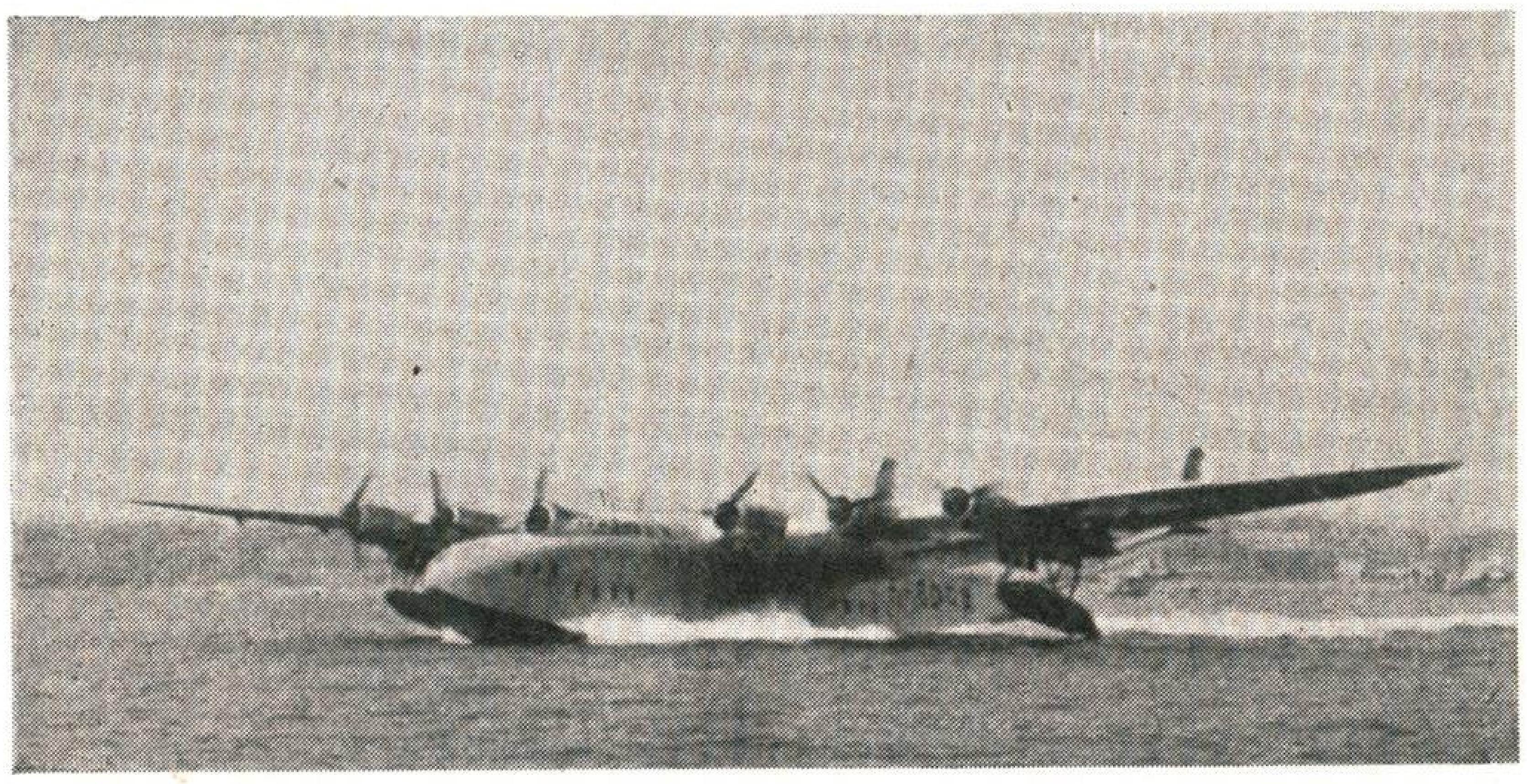
Caudron C 445 Goeland (Two Renault In-lines)

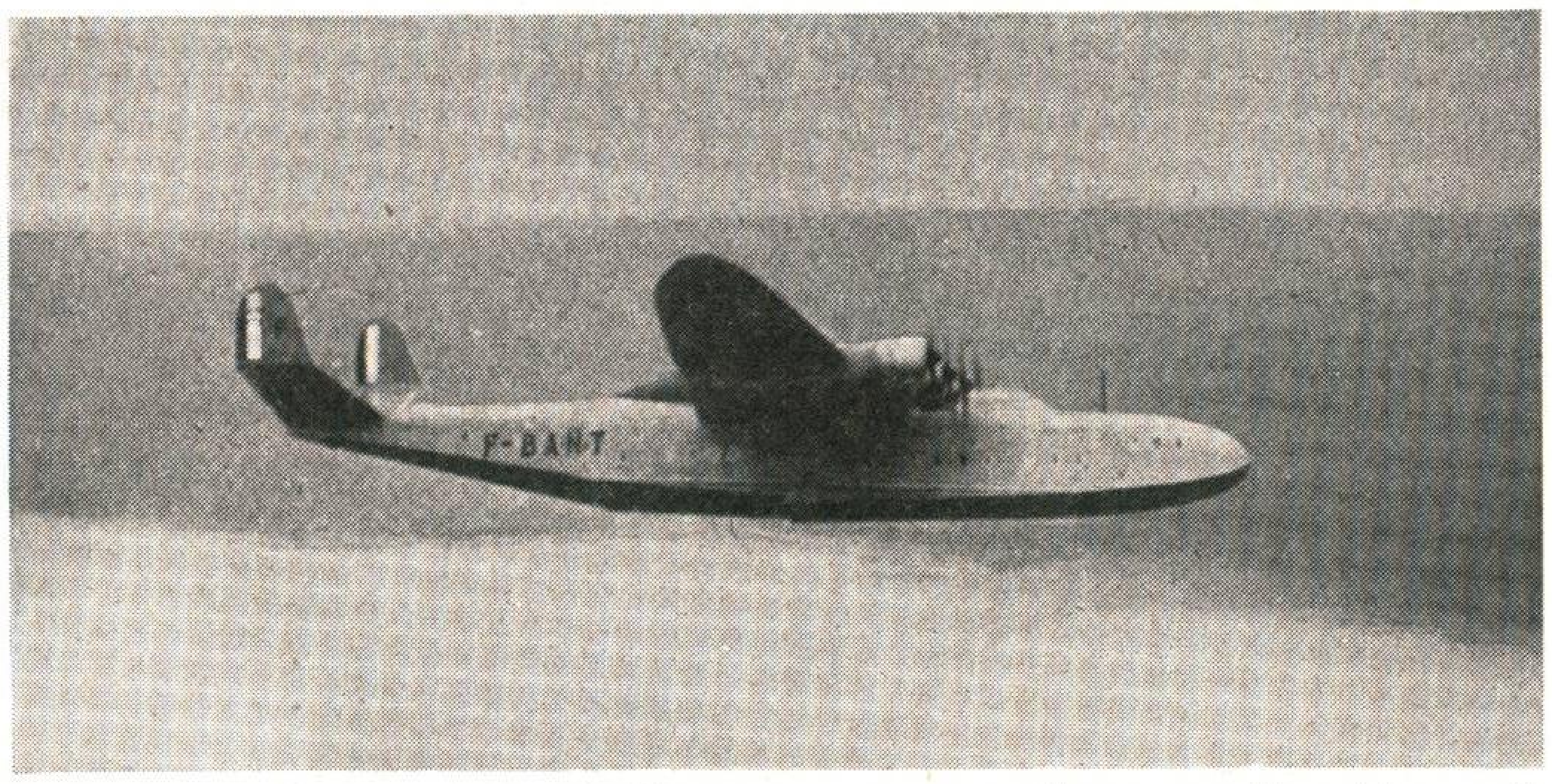




Goeland's (light transport) points are high-riding fin and rudder far behind back-tapered tail-plane ; sharply cut back wing panels, and two long narrow boat-like engine nacelles. The Goeland looks rather severely cut generally. (Silhouette : June, 1948 *Journal*).

Latécoère 631 (6 Wright Radials)

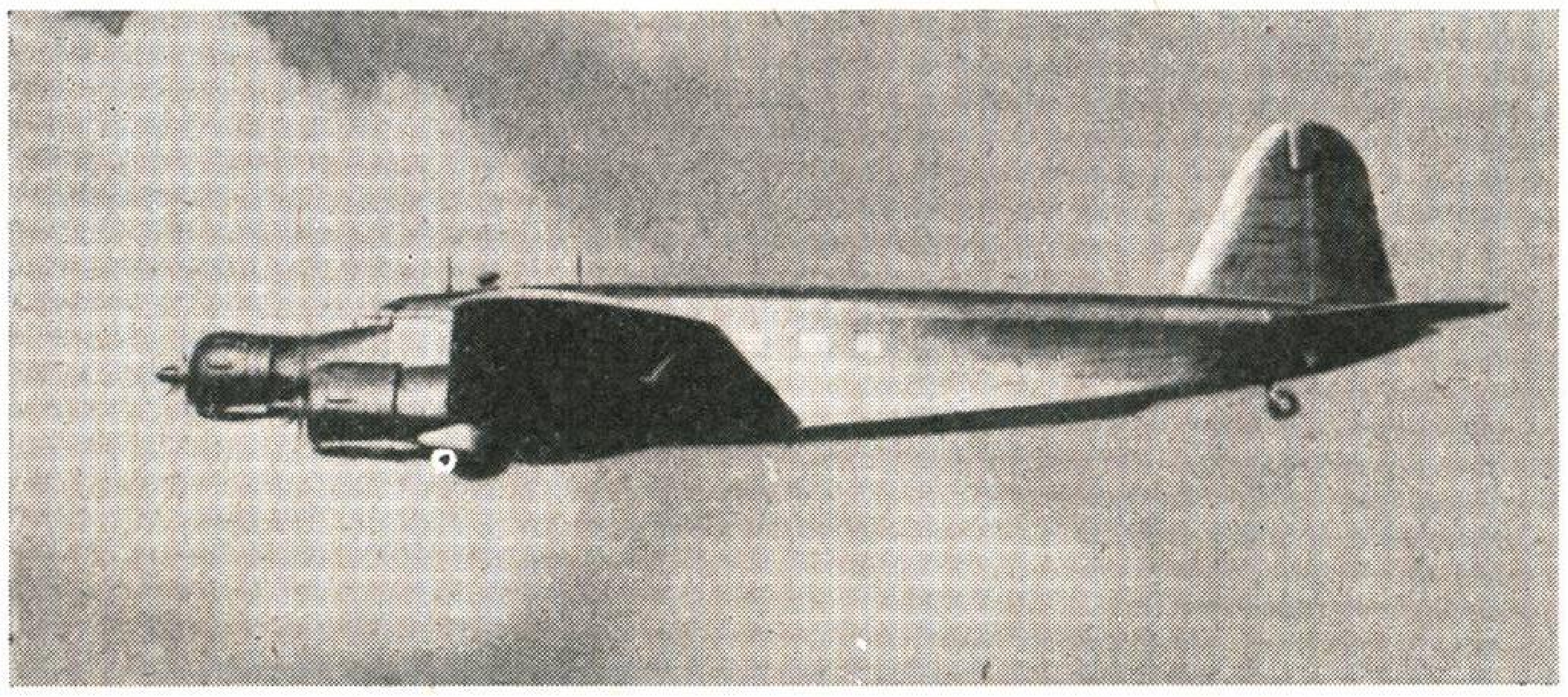




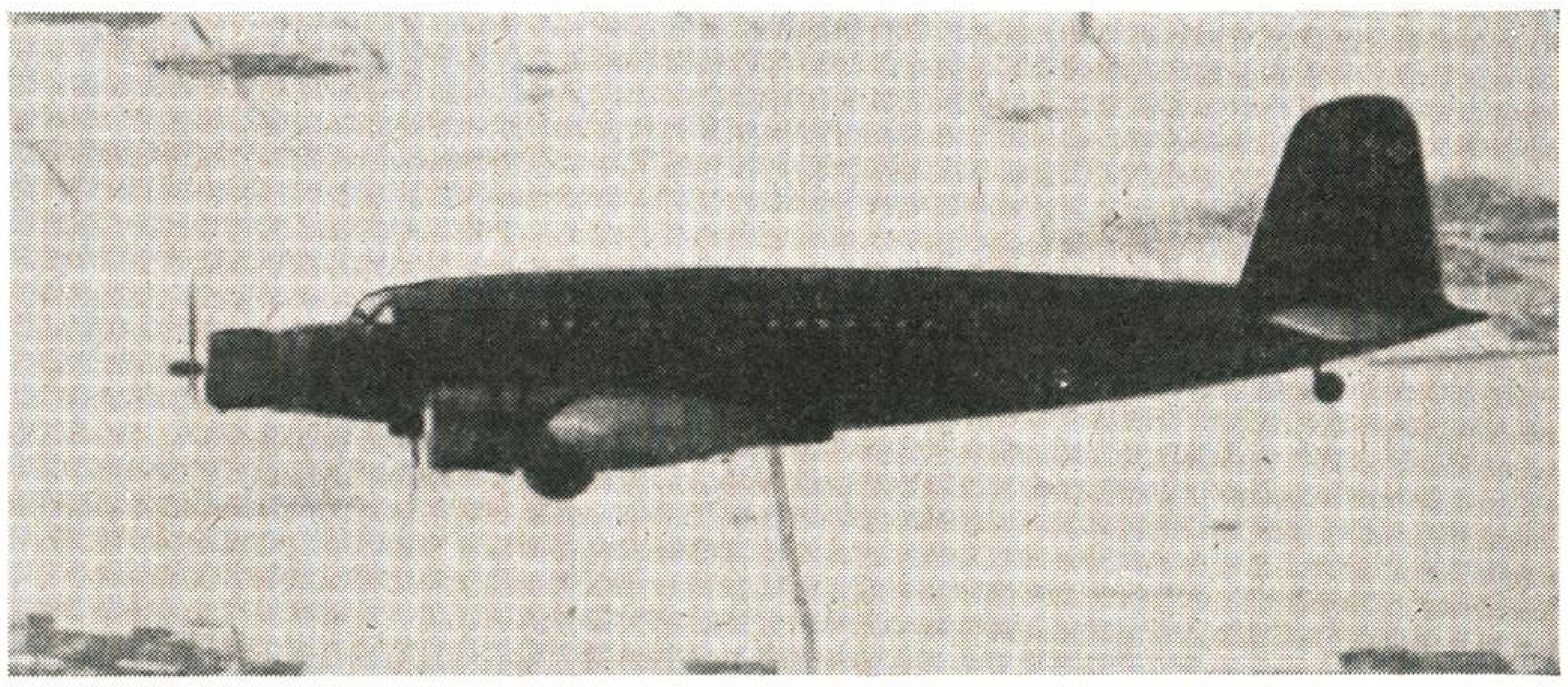
Laté 631 (transatlantic transport). Two-stepped and stately, she has enough adornments for title "once seen never forgotten". Unusual tail configuration, six radial engines, retracting floats are but few of the features possessed by this elegant French "type transatlantique" to qualify for a low confusability factor.

ITALIAN

G.12L

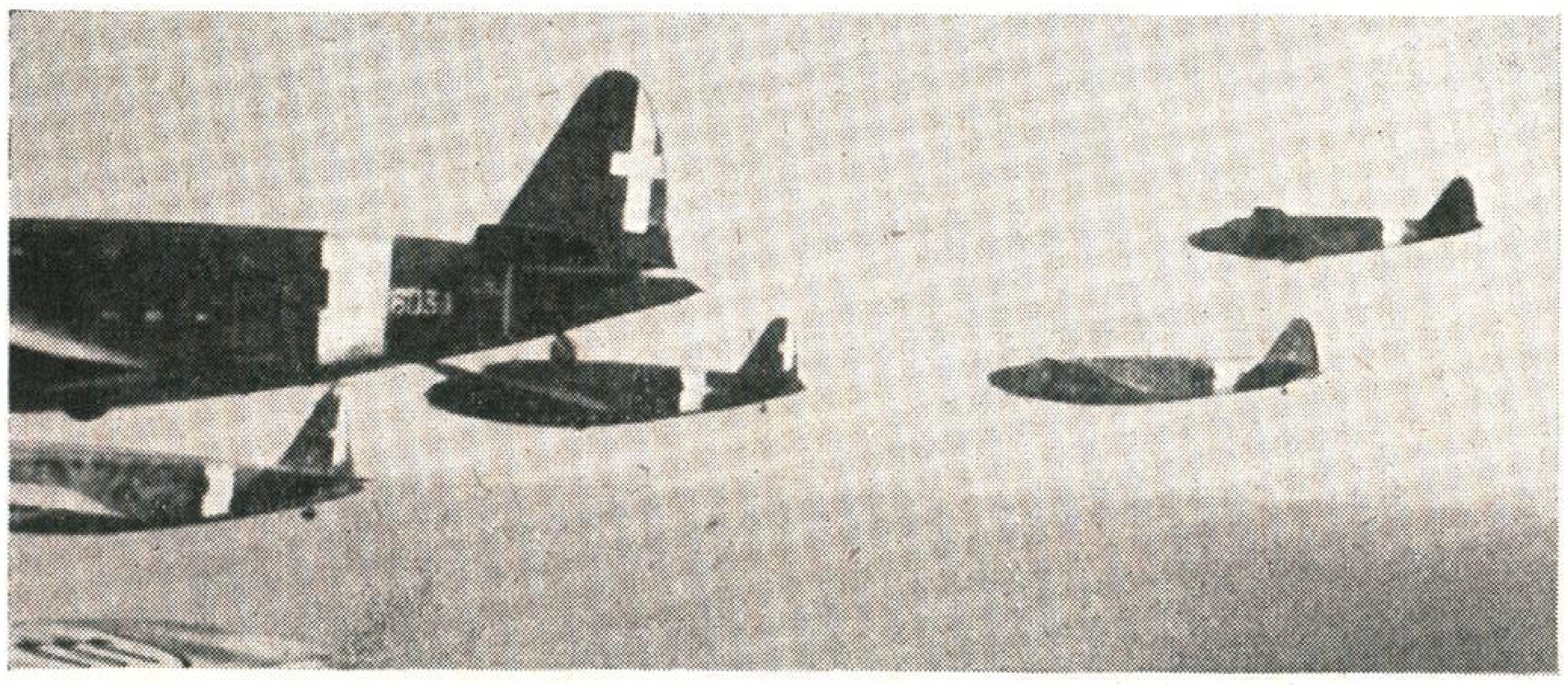


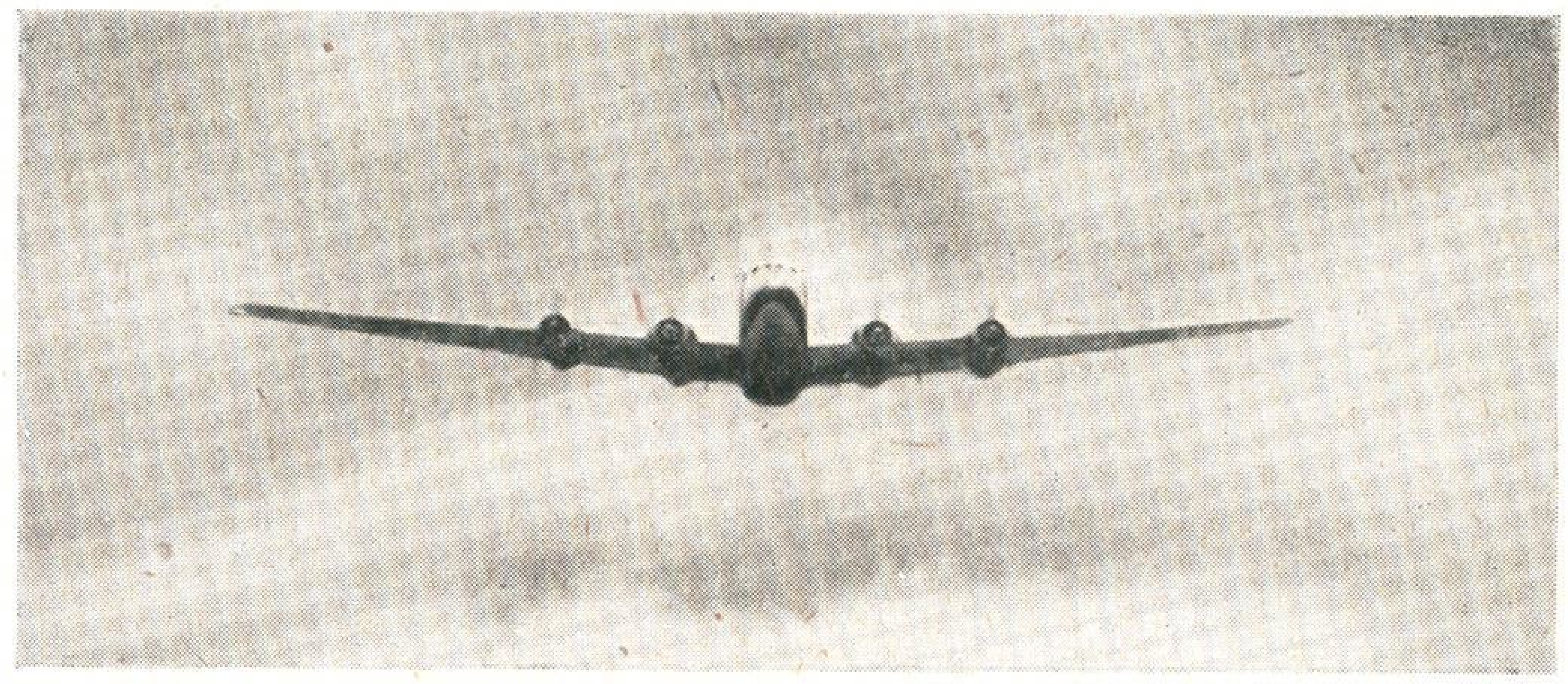
G.212



Fiat G.12L (Three Alfa Romeo Radials) and **G.212** (Three P & W Radials)

G.12L and **G.212** are two of a tri-motored tribe with a bias for long " box-car " bodies, equi-tapered wings, large single fins and pig-snouts. Differences, which are small, and may be seen in comparative silhouettes (*Journal* for July, 1948), include engines, fin, tail-plane and wing shapes.





S.I.A.I. S.M.82 (Three Alfa Romeo Radials)

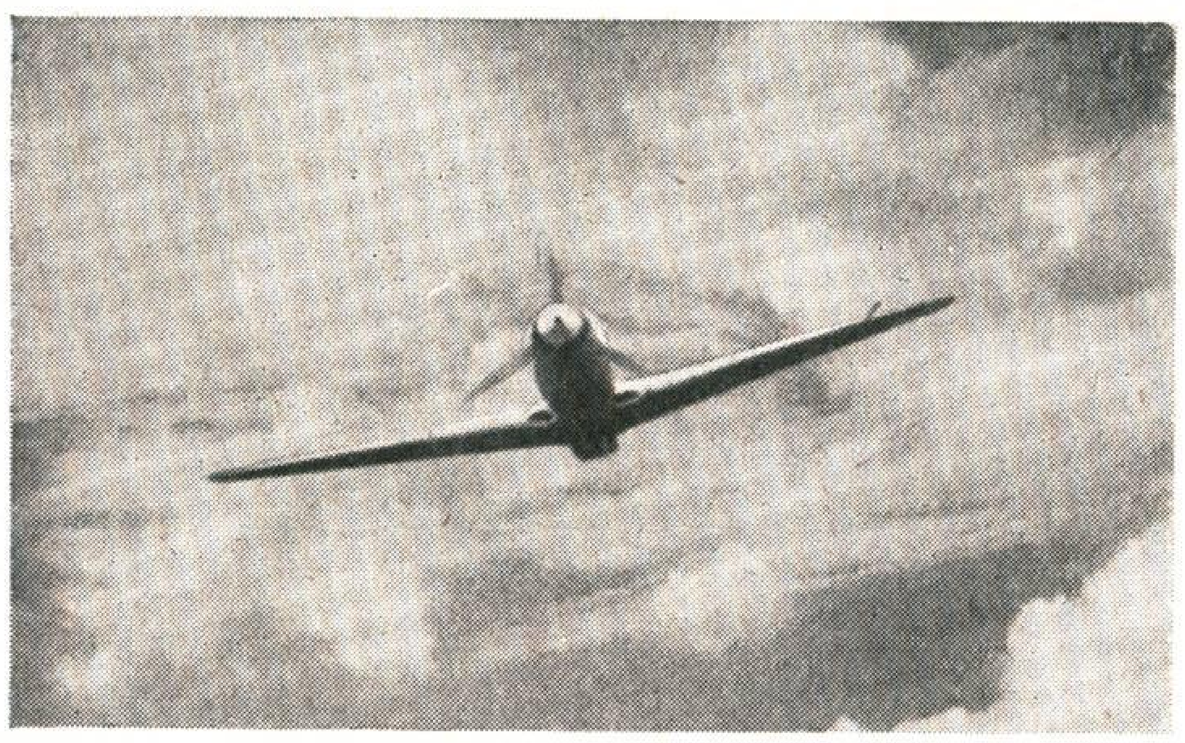
S.M.82 (transport). Another tri-motored type in the same recognition class as the Fiats above-mentioned. Comparison of silhouettes of all three (see July, 1948 *Journal*) will pay recognition dividends. Differences are small but clear, one of the most useful being the Marchetti fan-tail.

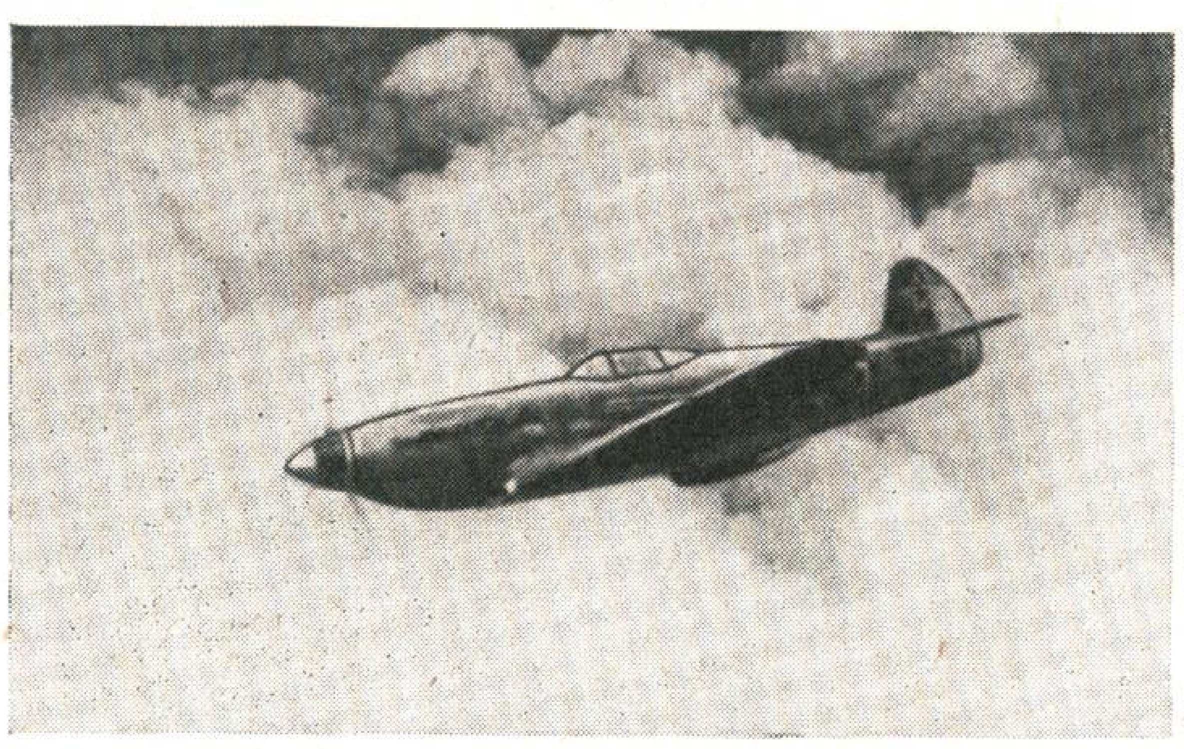
S.M.95 (Four Alfa Romeo Radials)

S.M.95 (transport). Four motors and a fan-tail mark out this more shapely Marchetti model. Exchanging a nose-radial for two extra on the wings lends point to its nose, better lines to its fuselage, more power all round and less confusability (see July, 1948 *Journal*).

RUSSIAN

YAK-3

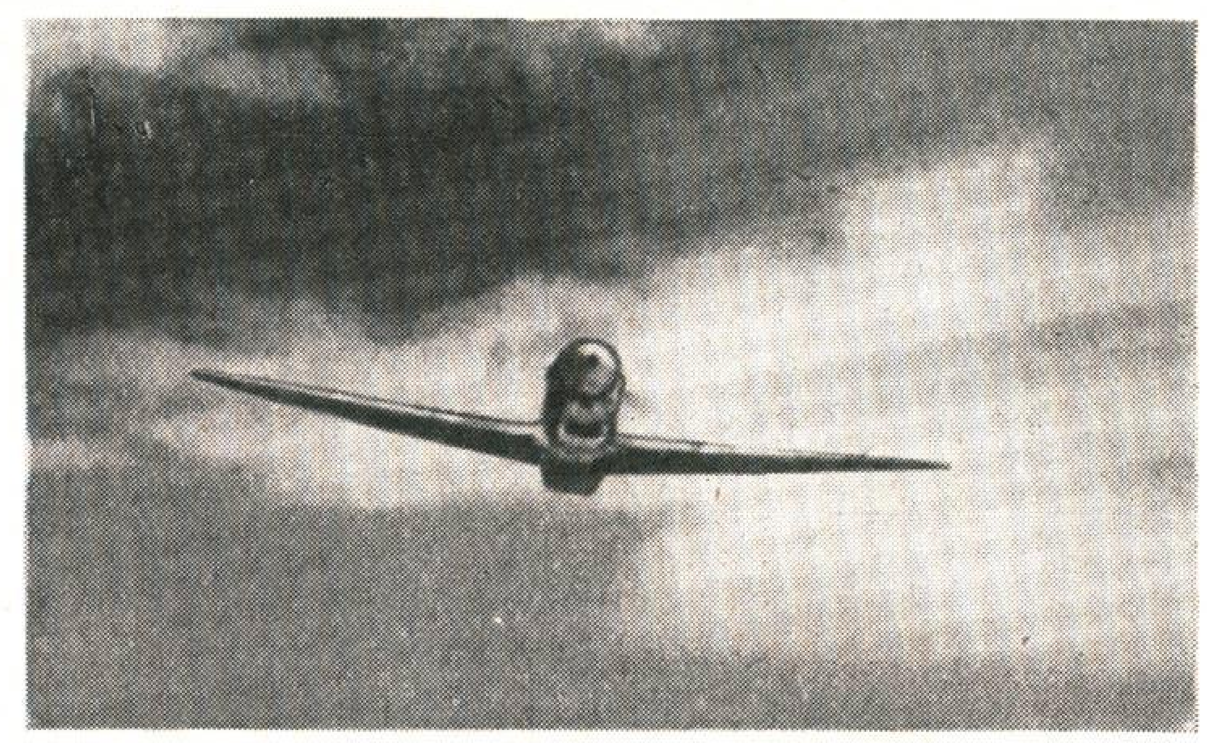


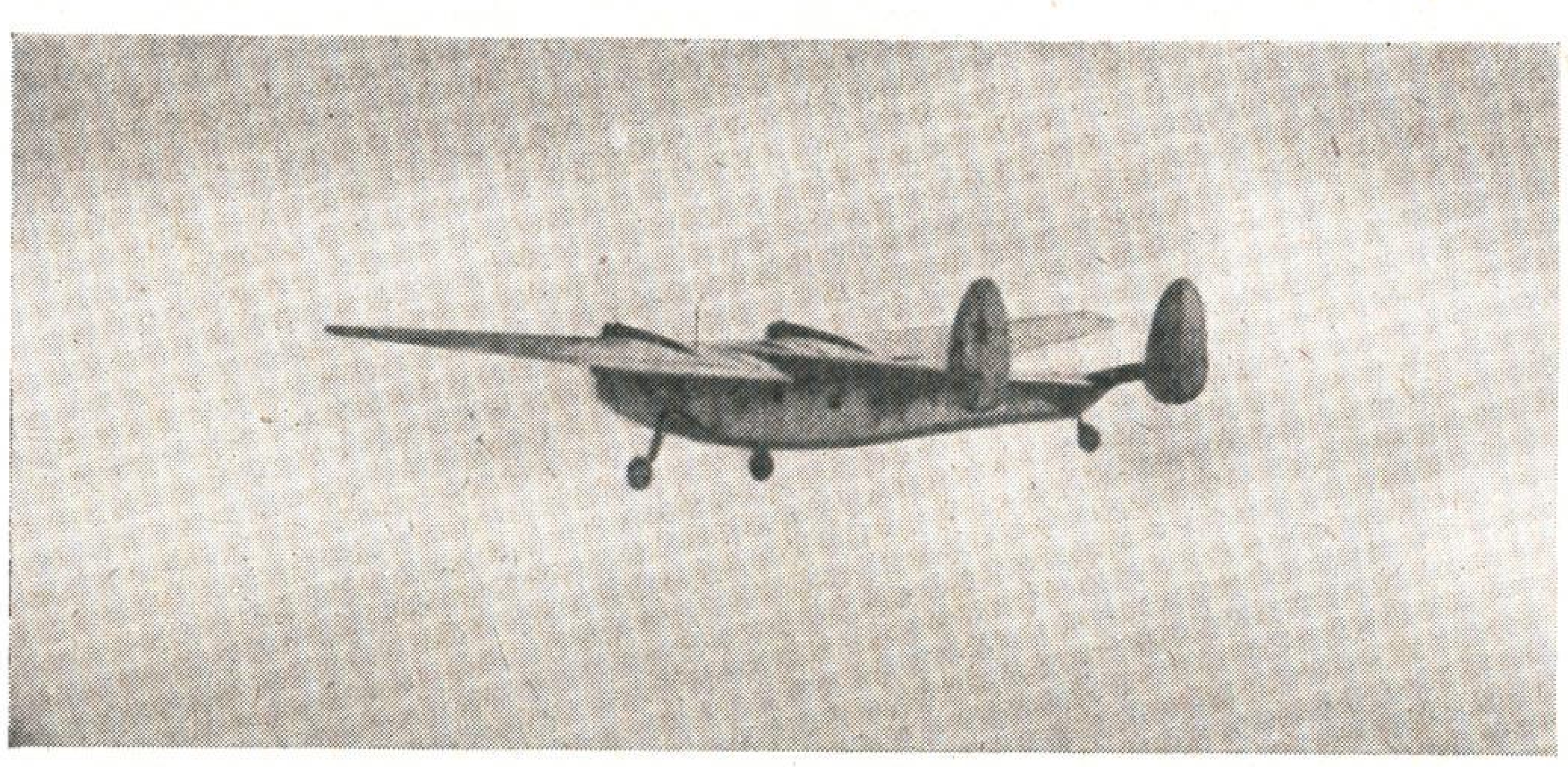


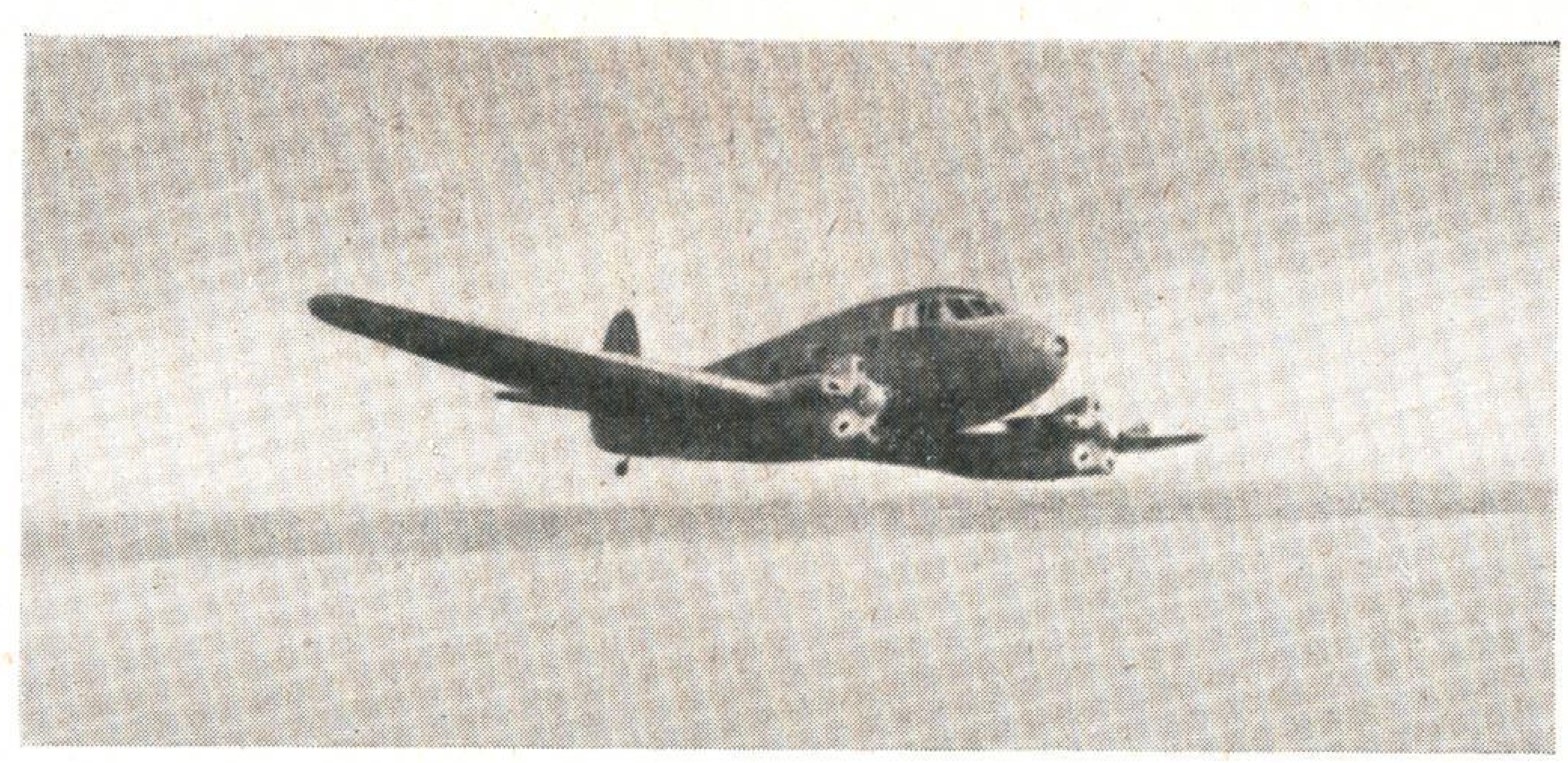
YAK 3 (One VK-105 In-line)
YAK 9 (One VK-107 In-line)

YAKS 3 and **9** are comrades in arms. Comrade Three is slightly smaller in span but not so old in the tooth. He has wing-root intakes in place of comrade Nine's single scoop under the nose, and he also has differently shaped wing-tips. Comrade Nine sports a wireless mast aft of his cockpit. There the differences appear to end, and, as well as a radiator beneath each fuselage, in that characteristic Yak fighter trademark, the fin, they all lean together (see *Journal* for May, 1948).

YAK-9







Shcherbakov SHCHE-2 (2 M-11 Radials)

SHCHE-2 (pronounced SHAY-TOO) (light transport) used in the Polish Air Force for the high-jump, that is, to train parachutists; sports two large ear-like fins and rudders, a high wing, two five-pot radial engines, and a fixed undercarriage.

YAK-8 (Two M-11 Radials)

YAK-8 eight-seater transport is hardly a menace to World Peace, yet is instructive and interesting. Our friend Yakovlev seems to favour "The sign of the Leaning Fin" and incorporates it in as many models as possible (see December, 1948 *Journal* for silhouette).

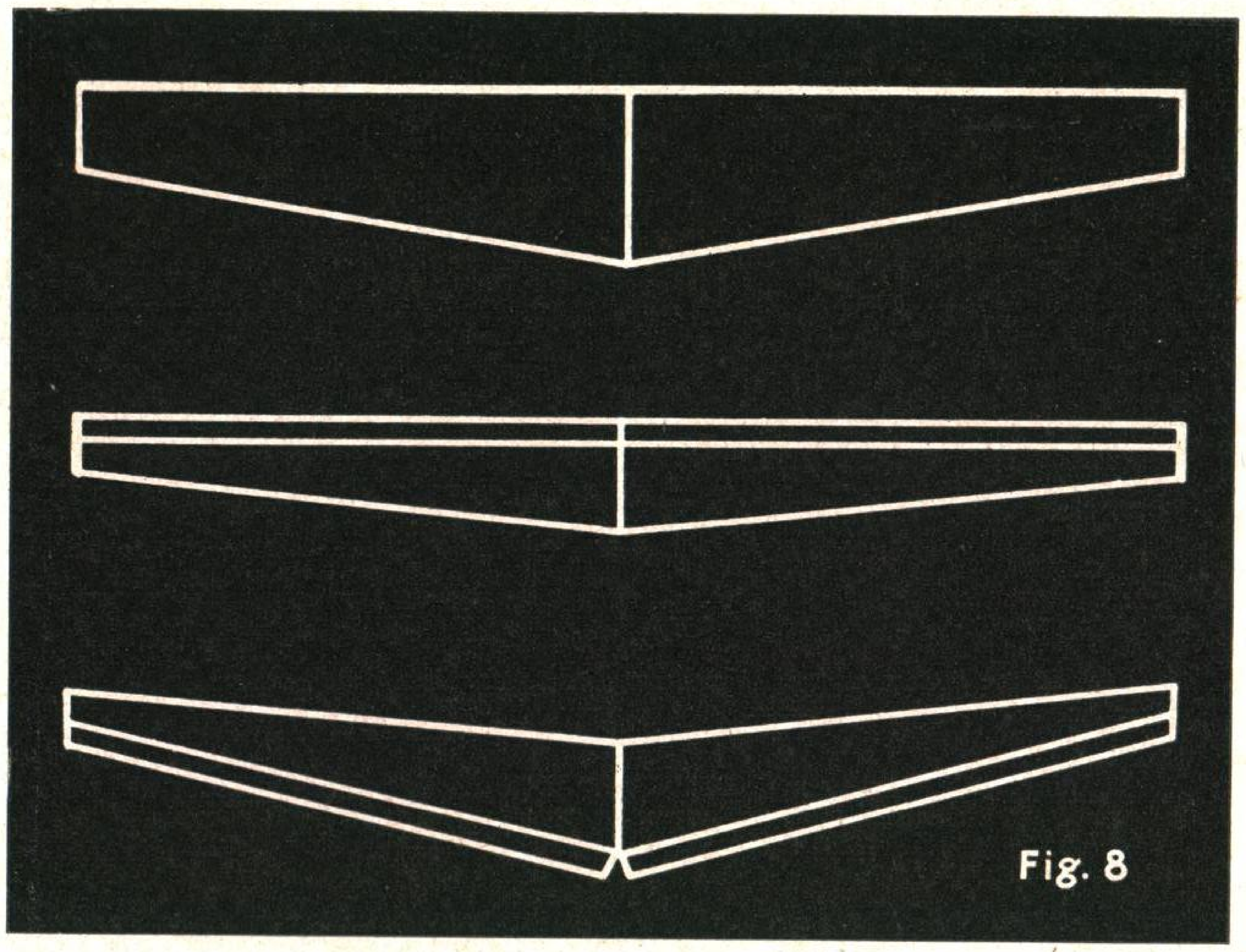
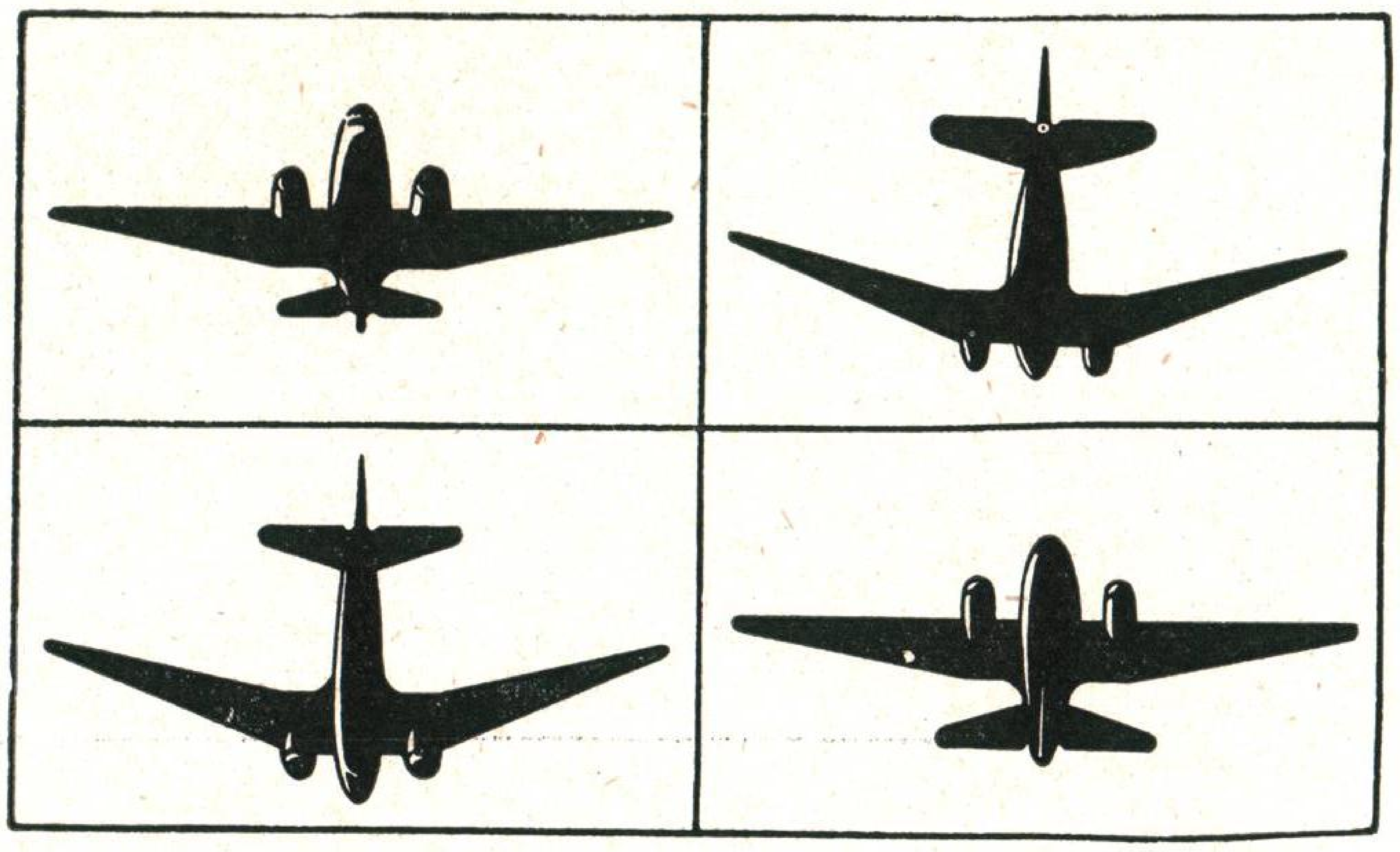


Fig. 8 represents a block of wood shaped like a wing. It shows it in plan, in perspective, and the effect of dihedral angle upon its appearance. The diagrams below show the different aspects which the wing shape of a Dakota can assume when viewed from below and above. The tail-plane does not follow suit because it has no dihedral angle.



FUSELAGES

" Body-Form "

The fuselage of an aeroplane is generally nothing more than an elaborated box to contain crew, cargo, ancillary gear such as radio, and often, the power-plant. Its main function, however, is to link the tail-unit with the rest of the aeroplane and to hold the wings in correct flying relationship with the tail. Thus it need sometimes be no more than a boom or set of booms, as in the De Havilland Vampire opposite.

WING POSITIONS

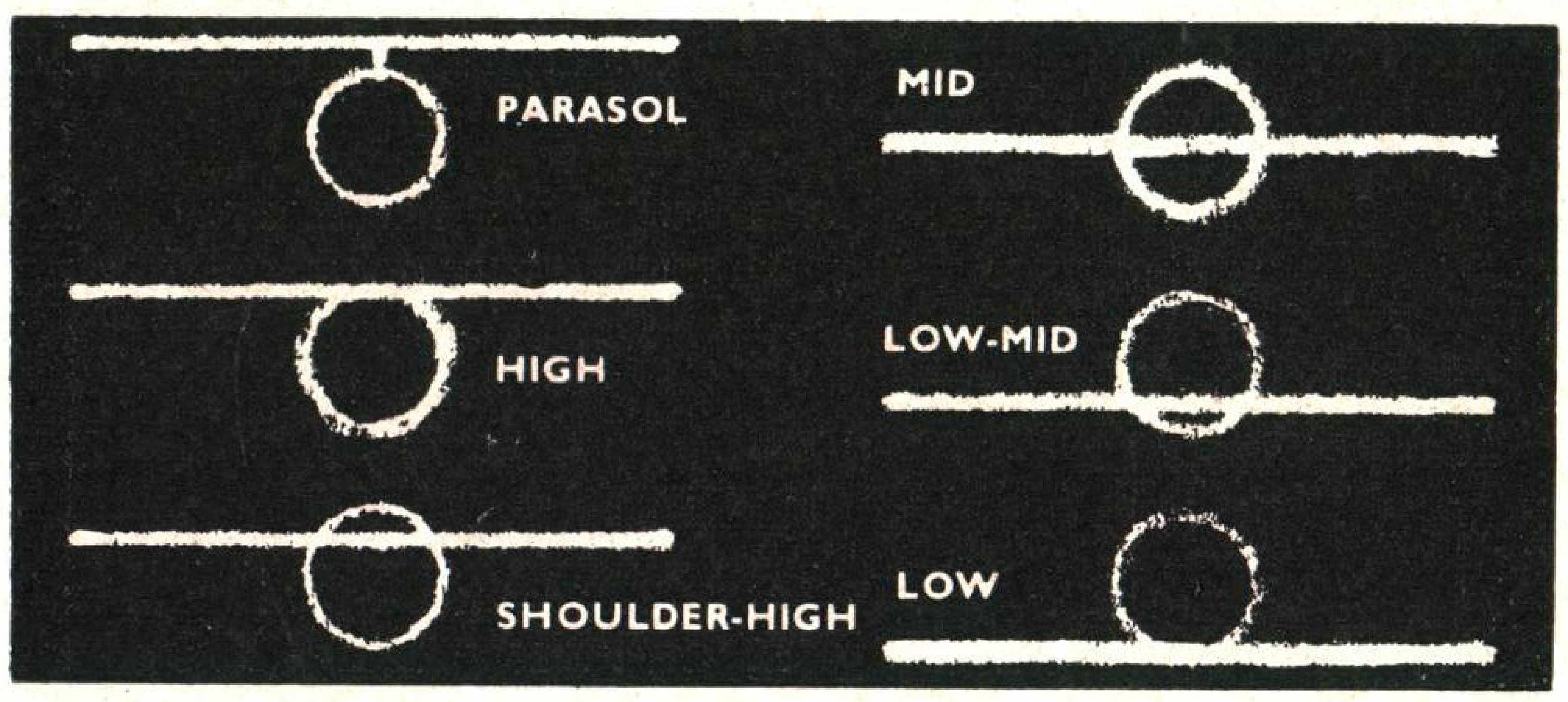


Fig. 9

The form it takes depends upon the function of the aeroplane, and, in general, it can be said that the faster the aeroplane, the more slender the fuselage proportions, and there is a tendency for fighters and fast types to have fuselages of an elongated form, whilst transports and bombers tend to bulkiness. However, as the sizes of aircraft increase, heavy transport types assume more slender proportions and still retain sufficient space within their fuselages for stowing cargo.

WING FLAPS

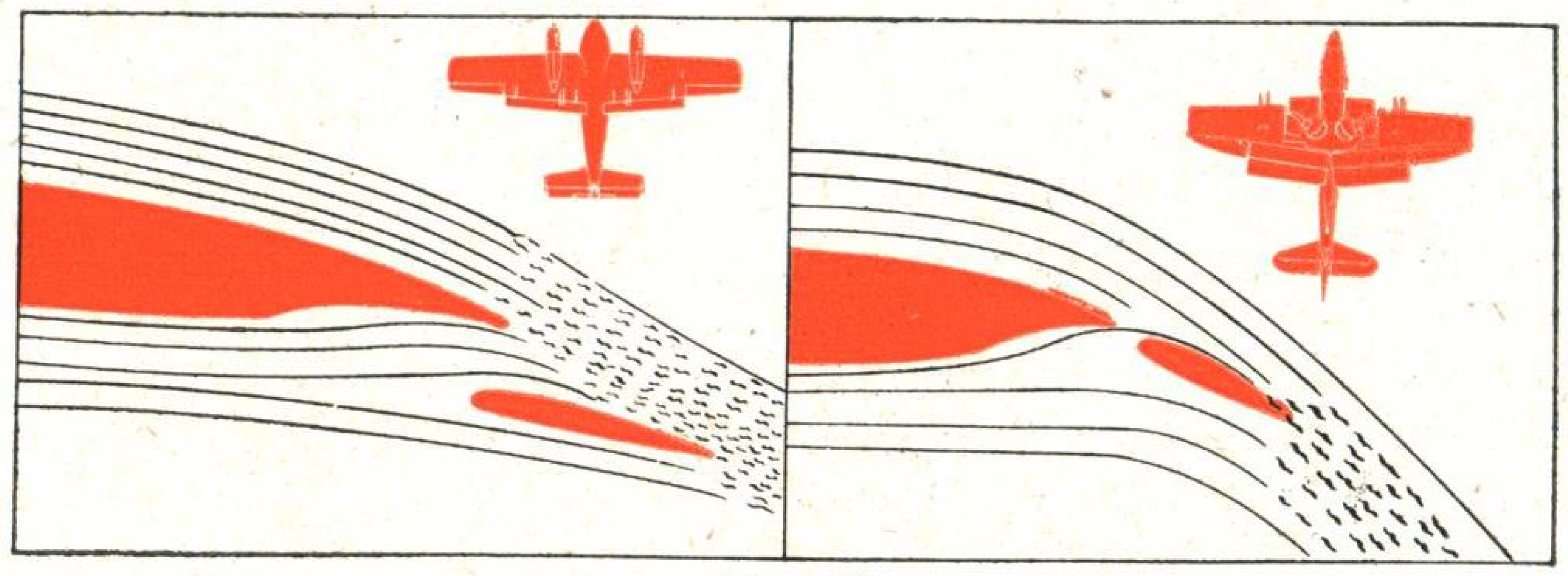


Fig. 10

The Miles Gemini (left) displays its flaps permanently: the Fairey Firefly 4 (right) does so when taking off, cruising, or alighting.

On the other hand, a utility transport of the Fairchild C-82 Packet type and the Bristol Freighter, have box-like proportions. But however box-like it is, the fuselage must always conform to certain aerodynamic laws ; it must be streamlined to offer the least resistance to the airflow and, if possible, add something to the lift. Its shape, is, therefore, a compromise between the aerodynamic and functional needs.

Frame-up

The main parts of a fuselage are frames, stringers and skin. The frames and stringers are formed into a sort of basket-weave to which the skin is attached. The most common type of construction in use today is what is called monocoque, or stressed skin. It is made of wood or metal. In this form of construction the frames and skin are " knit " together in one whole piece, so that the strains and stresses which occur in flight are taken by the "shell" so formed.

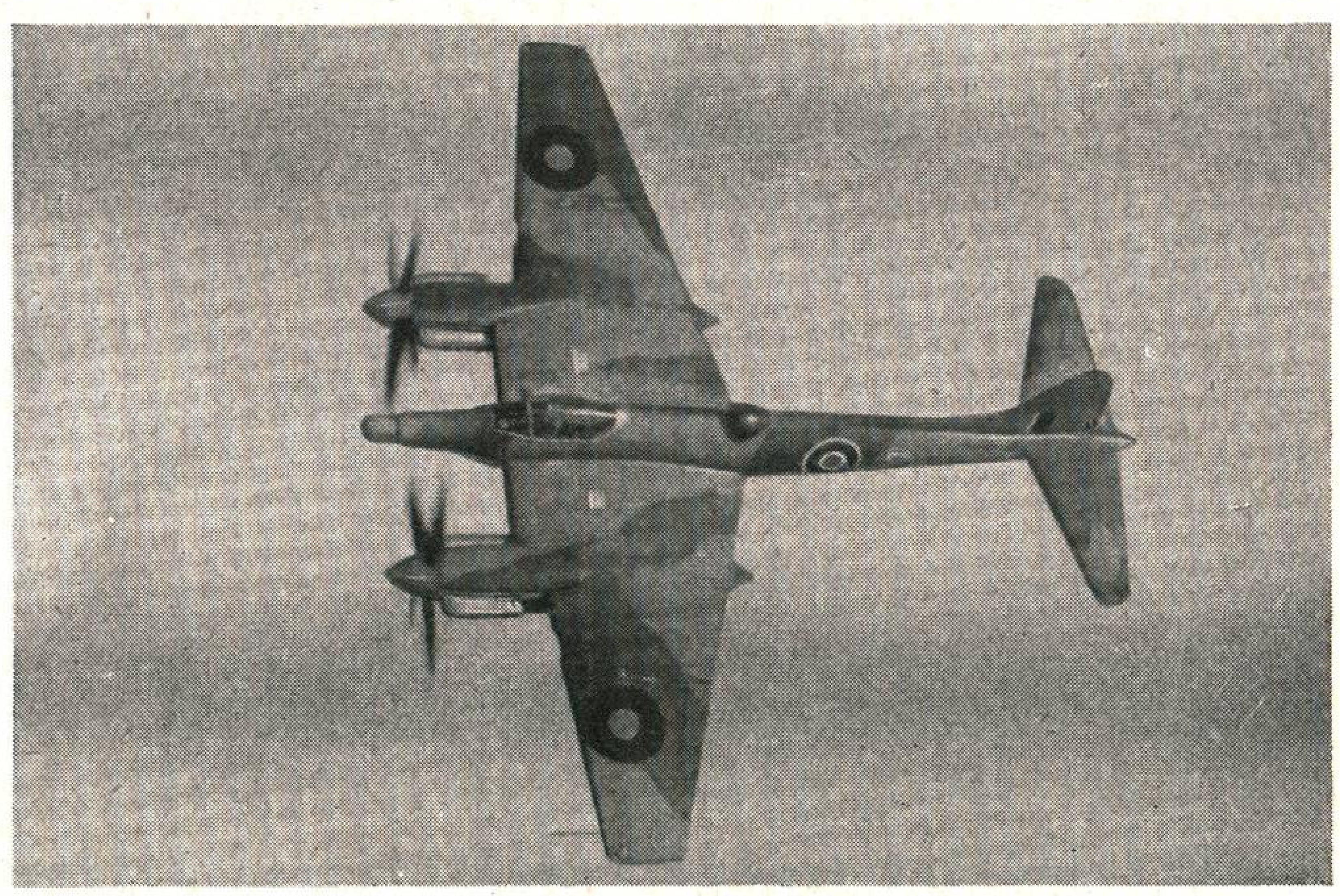
The older form of construction, which consisted of main members called longerons, frames and bracing wires, put together rather after the fashion of a box-kite and covered with fabric, is now confined to use in a few light types of aircraft.

.. . a set of booms: the D.H. Vampire F.Mk. 3

Simple Geometry

Many fuselages have simple basic forms (see Fig. 11). We have mentioned the " box " frequently. In the Bristol Freighter the basic shape is roughly rectangular though the ends are shaped and faired.

The " body-form " of the D.H. Sea Hornet 21 has extreme proportions.

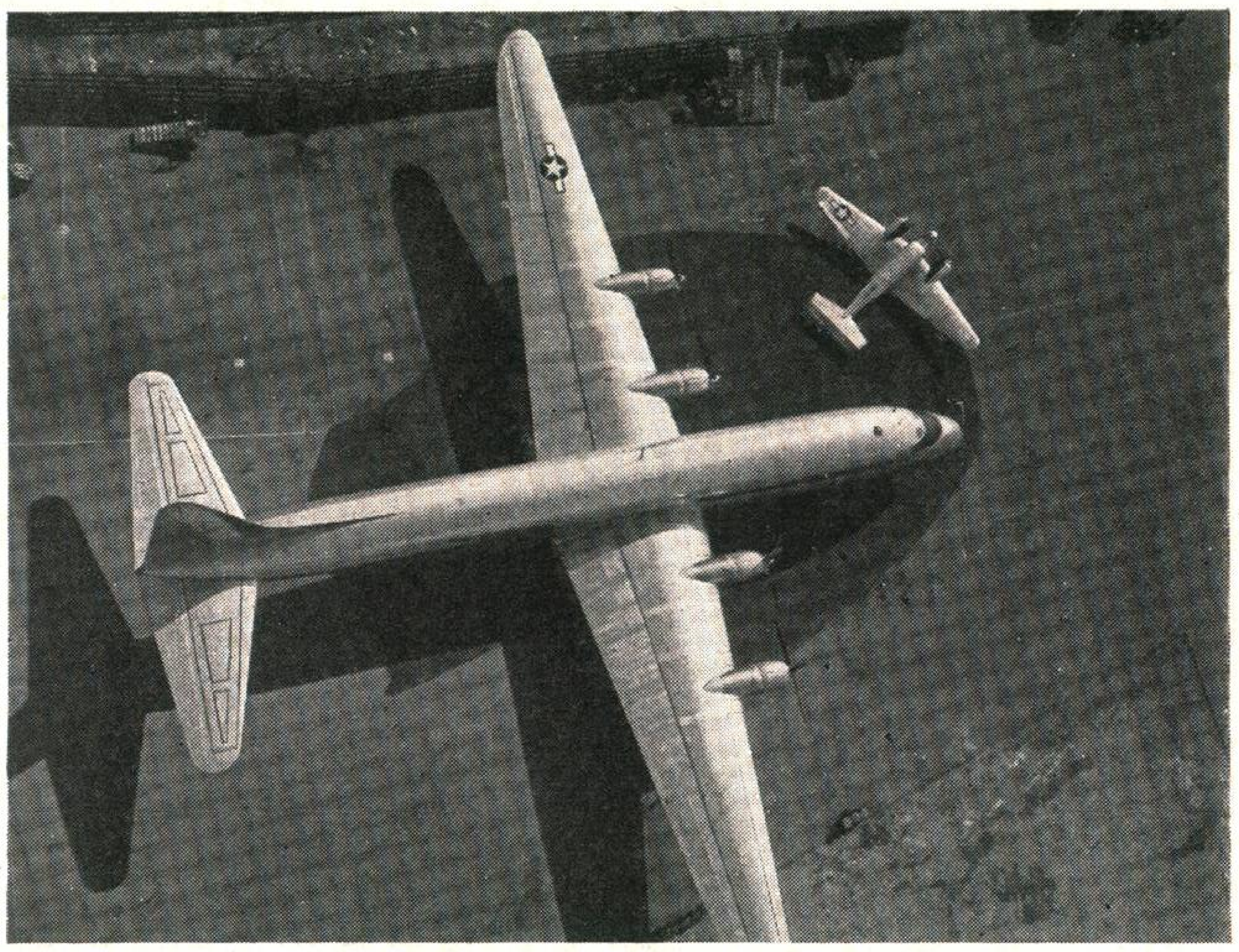


Another simple fuselage form, even more common than the box, is the cylinder ; the Avro Tudor provides a good example. This tube-form, or something like it, lends itself easily to pressurization, and is to be found in many other transport types, *i.e.*, Hermes, Hastings and Viscount.

The egg-form is also common : and is, in fact, the best streamline form. The fuselage of the Viking and the central body of the Vampire are not far removed from the ordinary idea of the egg-form (we take a hen's egg to be the standard), and many other variations of the form can be seen in other aircraft.

There are few aircraft fuselages, great or small, which cannot be simplified and connected with one basic form or another.

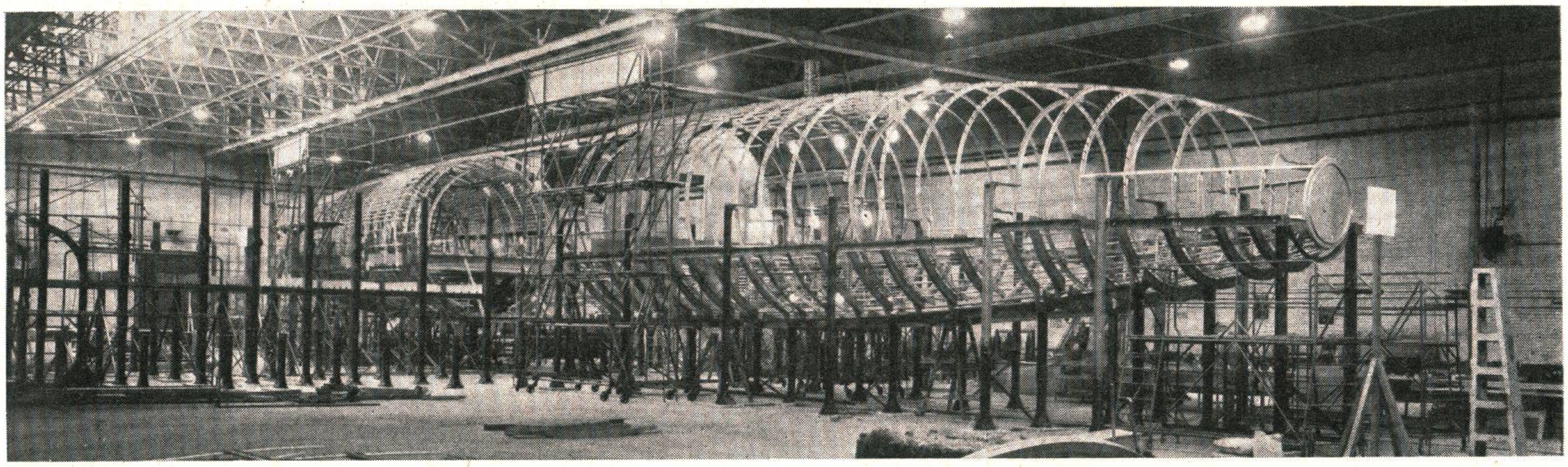
This brings us to the tail-end.



Bulk and Beauty : This view of the Lockheed Constitution shows that aircraft designed as weight-lifters are not necessarily unbeautiful in body-form. Incidentally you will see that wing shape (including the tip) in many other Lockheed types.

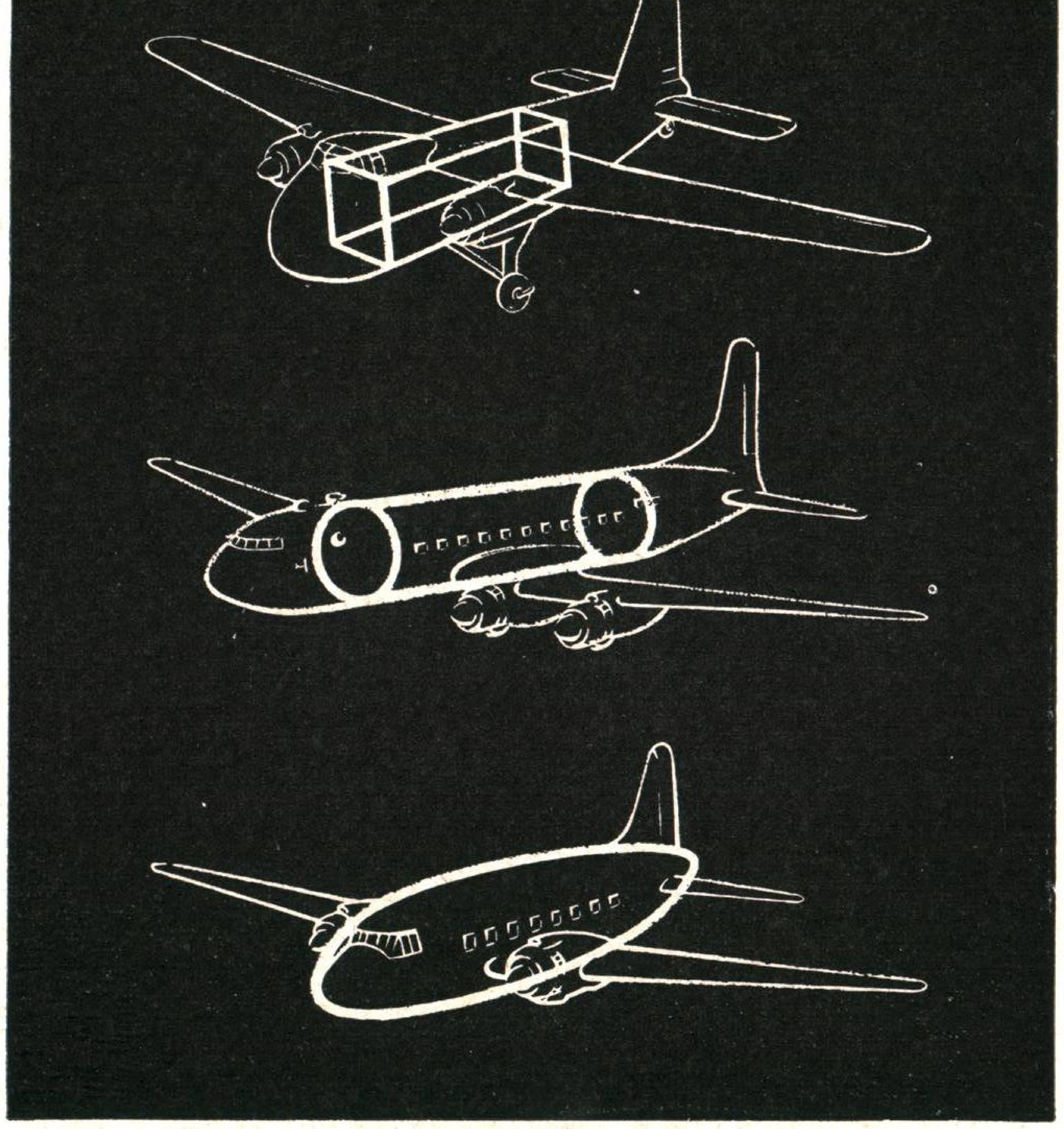
Tell Tail

The tail-unit of any aeroplane is often its most helpful recognition feature. For example, in views of the Lockheed Constellation, in which the triple fins and rudders are visible, it is almost always first recognised by that feature alone. However, as tail units have a habit of being obscured in other views, particularly from ahead, it is not advisable to rely upon such features altogether.



A view of the Bristol Brabazon fuselage under construction, showing frames and stringers.

Fig. 11



(*Top to bottom*). **Box, Tube and Egg or, Bristol Wayfarer, Avro Tudor, and Vickers Viking.**

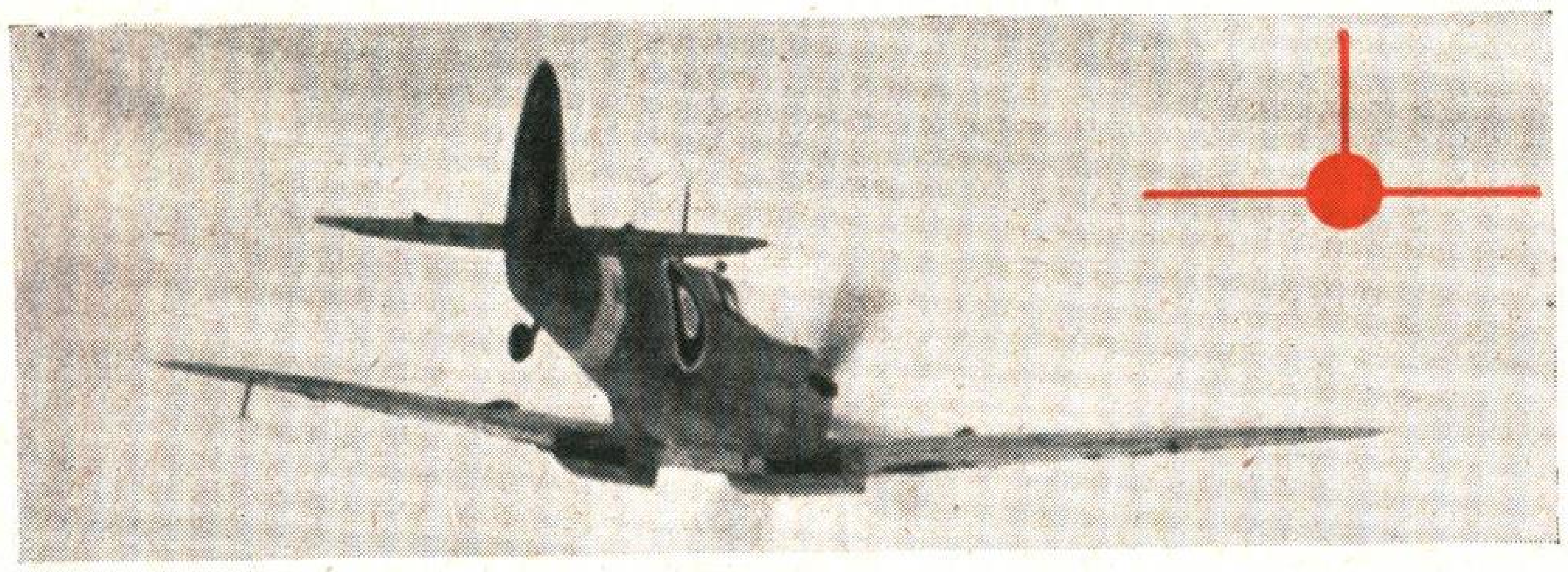
The simplest kind of tail-unit consists of a horizontal tailplane " passing-through " a vertical fin and rudder. The vertical surface is a keel-surface designed to keep the aeroplane on a straight course. The size of the vertical tail-surface is governed largely by how much of the aeroplane is ahead of the centre of pressure (roughly, the centre of the wing). It is now quite common for aeroplanes to have fin-fairings stretching along the backs of their fuselages. Such fin-fairings aid stability and control generally, particularly in asymmetric flying ; that is, flying with less power on one side than the other.

The horizontal tail surface supports the rear of the aeroplane and a part of it, the elevators, control diving and climbing.

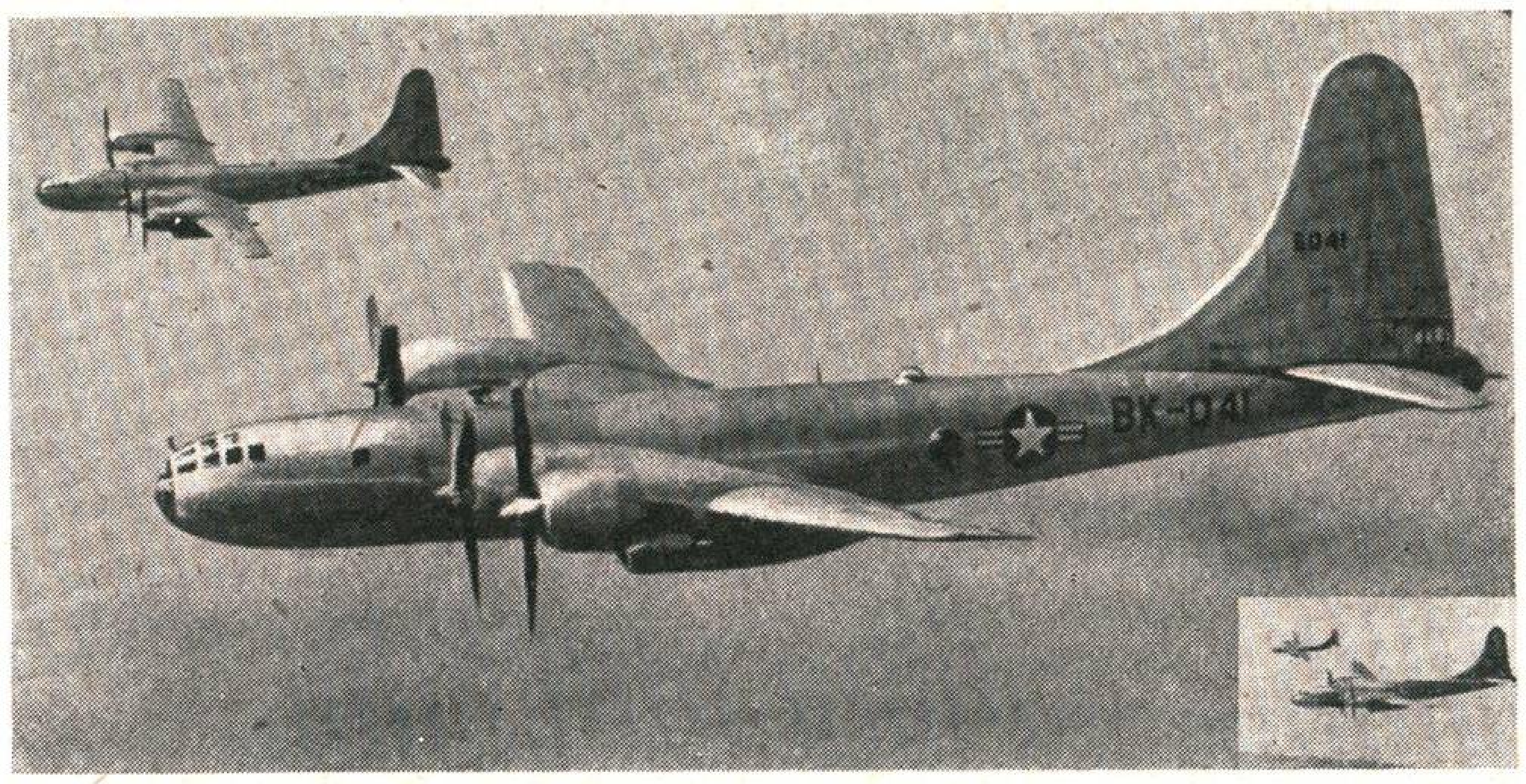
Tail Shapes

For control purposes, both vertical and horizontal tail surfaces have hinged sections, and these hinged sections themselves have smaller hinged sections for " trimming ". However, as these various sections are usually contained within a complete and recognizable geometric shape we are only concerned with their appearance as a whole.

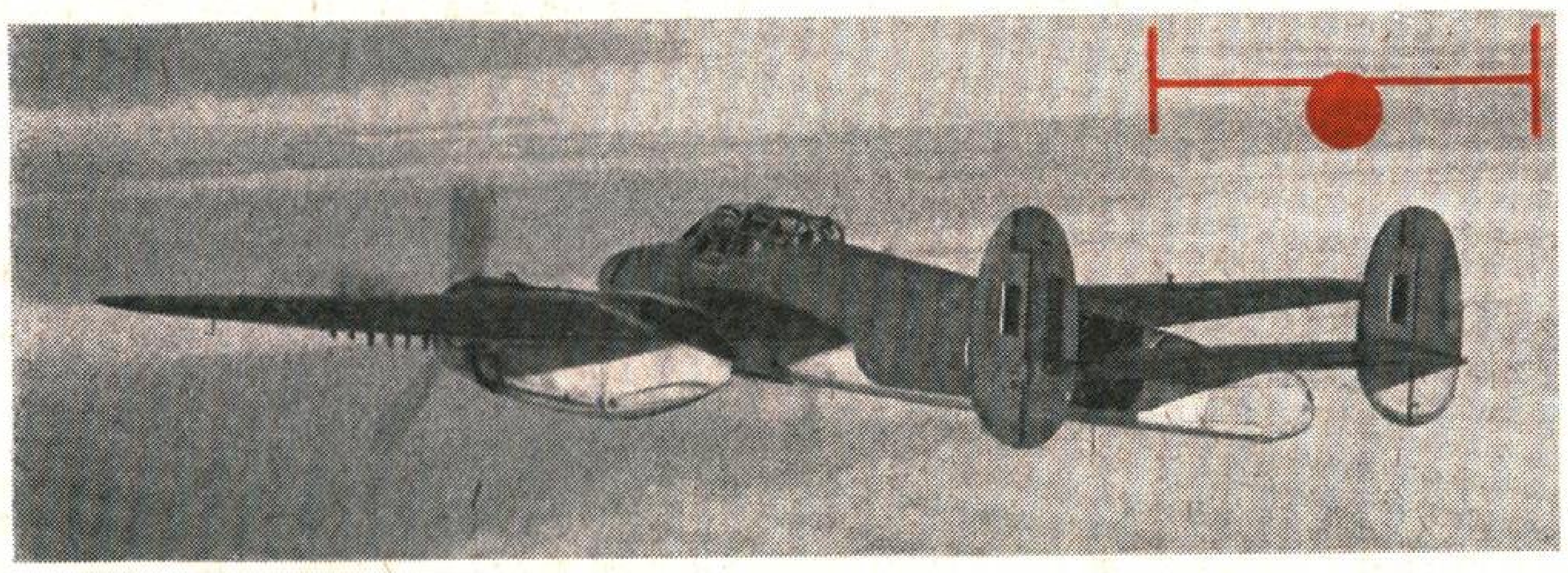
Vertical stabilizing areas are often divided into two or more fins and rudders because better control and stability can be obtained if the surfaces are set out to get the maximum effect from the propeller slipstream. (Mostly in



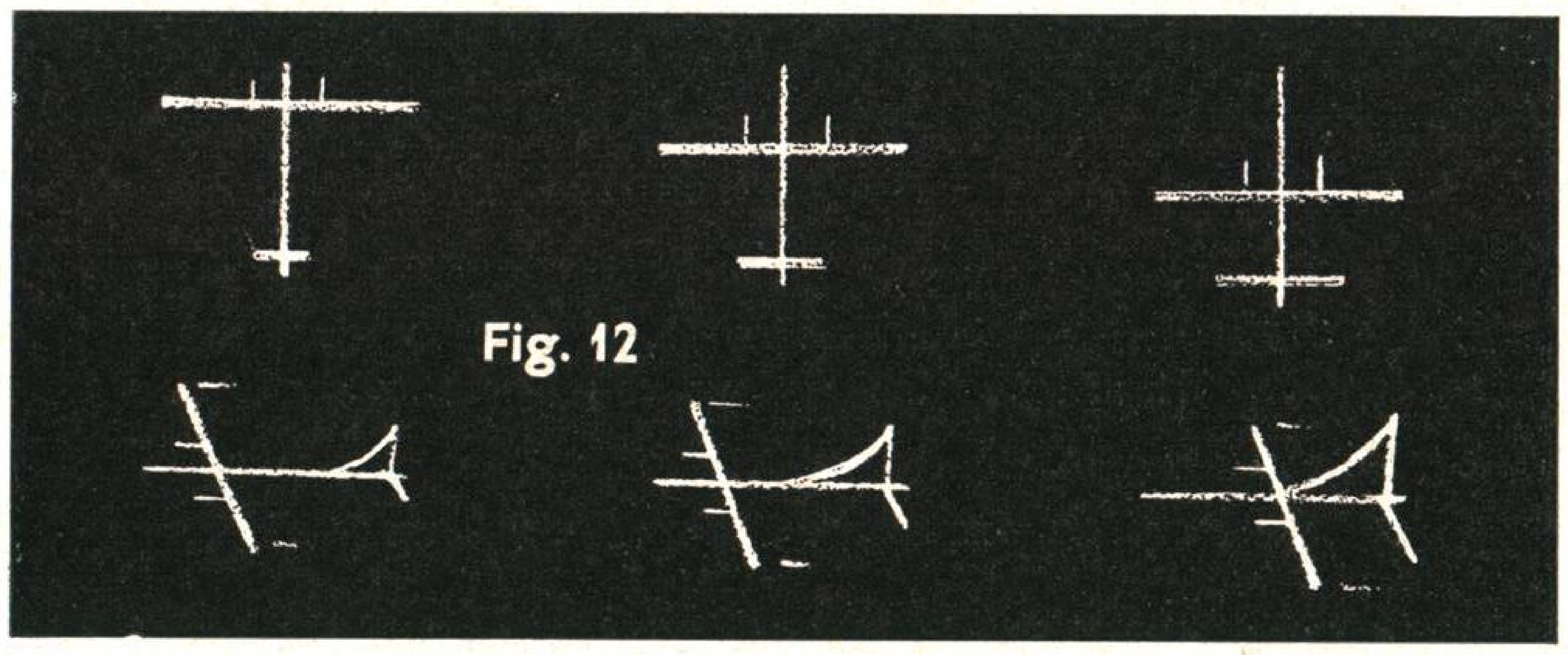
The Spitfire's tail-unit is of the simplest and most common type—horizontal and vertical surfaces intersecting.



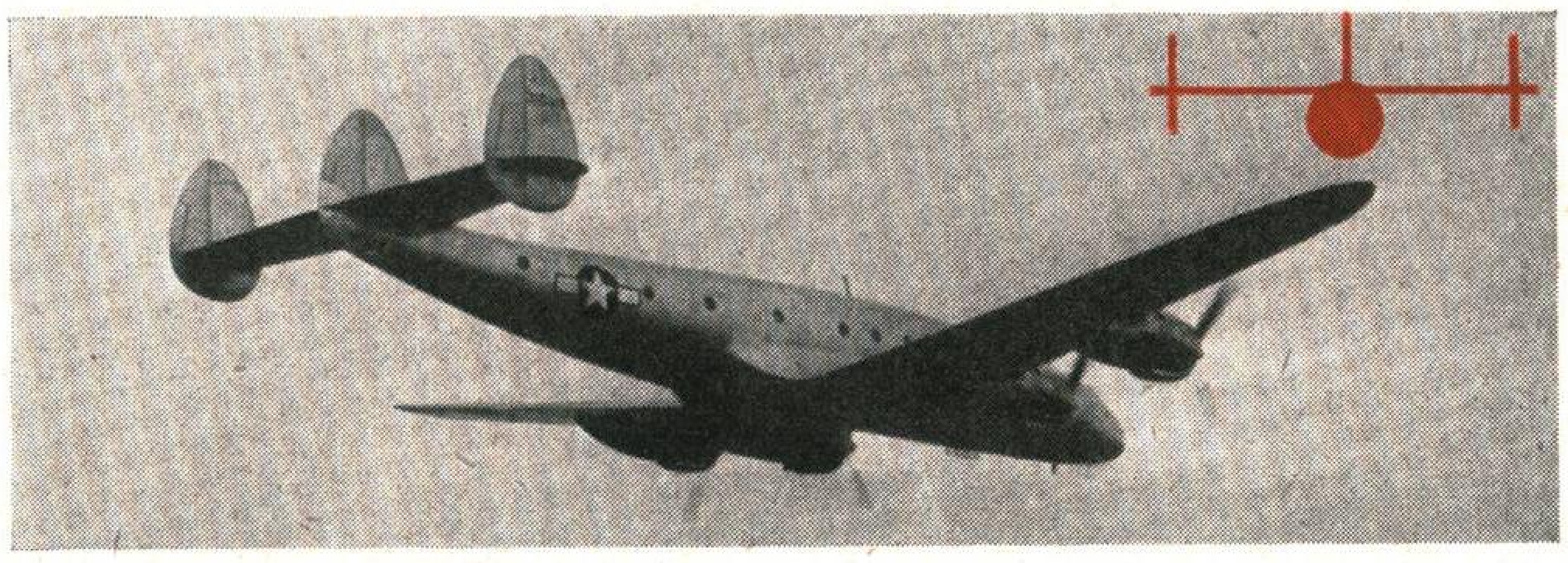
Big Fin. The Boeing B-50 has a fin and rudder which must be, proportionally, the largest any aeroplane ever had—it rises like a great sail. Its value as a tell-tail are obvious in the small view. Notice also how much of the aeroplane's structure is ahead of the wing.



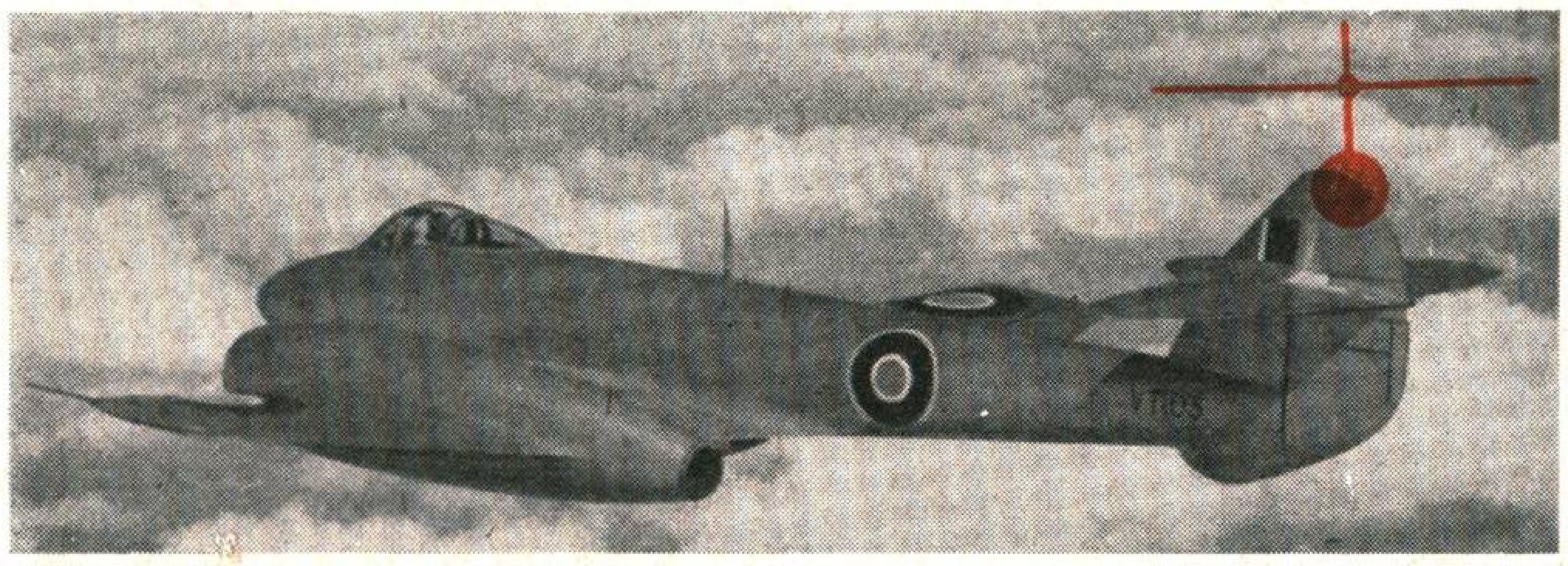
The Bristol Brigand's tail-unit, is known as the "out-rigged twin fin and rudder" type.



The tendency for the wing position to affect the size of tail-plane and the fin and rudder is illustrated here. Other things affect it also, of course; the weight of a tail-turret will make for a larger tail-plane, and a deep fuselage, as it acts as keel surface, will help reduce the size of a fin and rudder.



The Lockheed Constellation has the "triple fin and rudder" type, the outer surfaces being inset from the tailplane tips.



The Meteor's tail is also of the simple type but unusual in arrangement (to clear jet blast) and is said to be cruciform (form of a cross.)

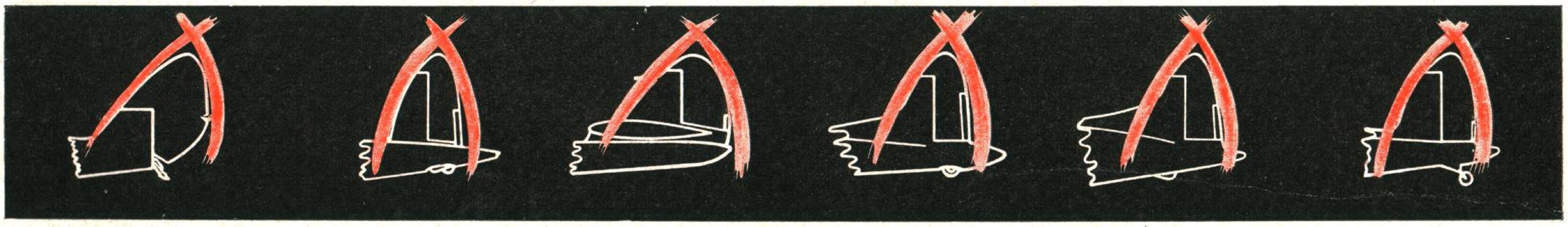
multi-engined types.) On the other hand, tailplanes are almost always of the monoplane type, and are placed clear of the most turbulent parts of the slipstream and also clear of jet blast. This is because the tailplane has some lifting to do and requires smooth air in which to work and in jet aircraft hot gas jets would damage it.

Tailplane shapes, broadly speaking, vary for much the same reasons as wings. They are also built upon the same principles of spars, ribs and skin. Tailplane size partly depends upon distance from the centre of pressure, that is, upon the amount of leverage it (the tailplane) can exercise over the wing through the fuselage length. Thus, a long distance between wing and tail unit often means a small tailplane, whilst a short length of fuselage means a large tailplane. (See Fig. 12.) The same thing is often true of fins and rudders, though not always, but it can be seen to be so in many types of aeroplanes illustrated here.

The individual shapes of fins and rudders are legion. But it has been said that so long as the required area is present, the outline matters little, so the fin and rudder can become a sort of designer's trademark. This is always helpful in recognition. One of the most remarkable instances of the perpetuation of a fin and rudder shape throughout a long series of designs occurs in De Havilland aircraft.

(To be continued.)

The De Havilland aircraft all seem to sport a "wishbone" motif in their fins and rudders. Family characteristics are a great help in recognition. The aircraft shown here are (left to right) D.H. Tiger Moth, Mosquito, Vampire 3, Hornet, Dove and Chipmunk.



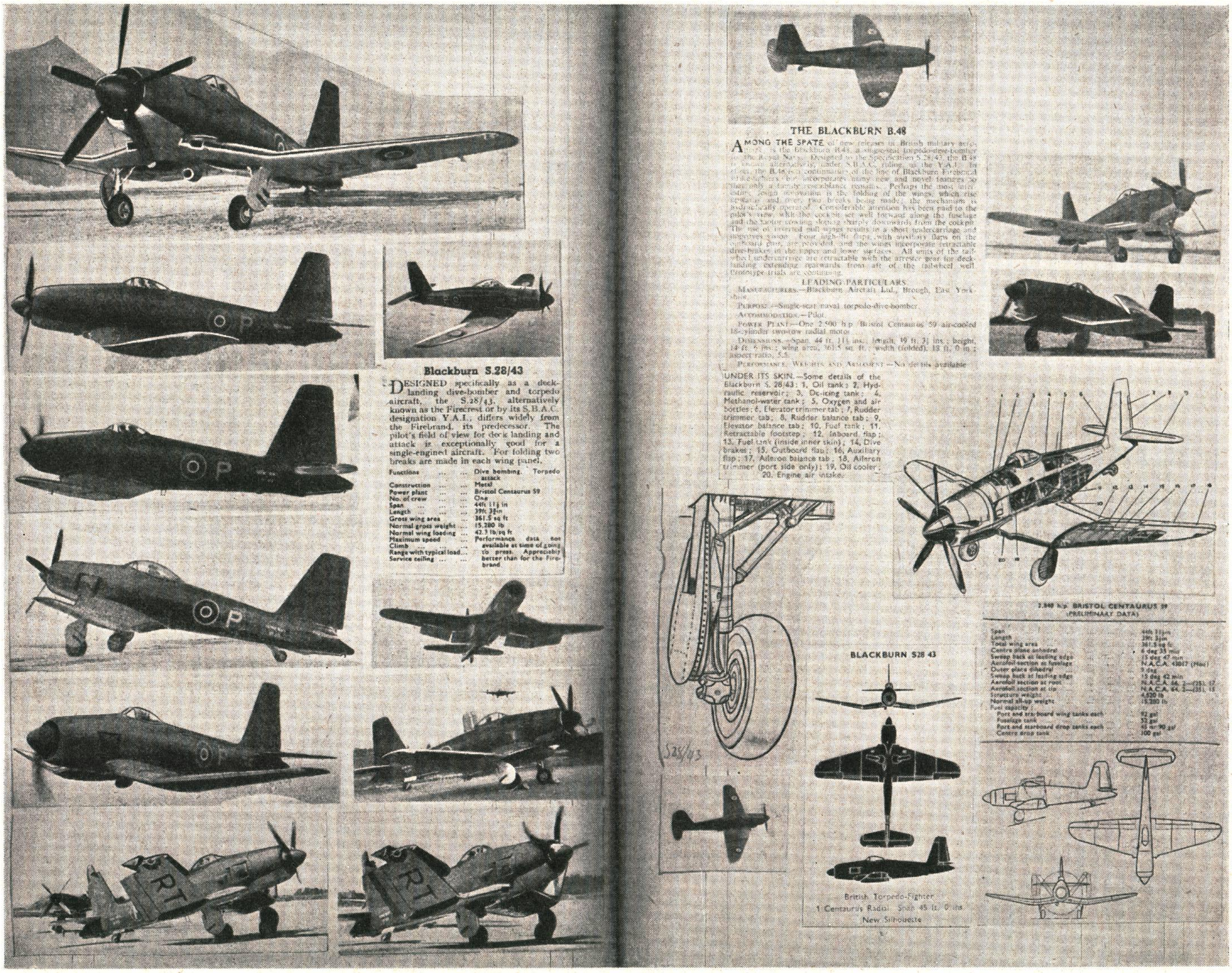
START A GEN-BOOK!

THE value of the gen-book or scrap-book lies not entirely in its completion as a book of reference, useful as it may be in that respect, as in the education and exercise it gives you in preparing it. Remember, the chickens which scratch the hardest seeking food lay the best eggs. By hunting pictures, paragraphs and write-ups for your gen-book, you are continually " spotting ". To scan the papers daily and the technical journals regularly for items for your gen-book ; to size-up, cut-out, sort-out, sift, study and consider each picture before finally sticking it down in its appropriate place in your gen-book, is soon going to deepen your knowledge and generally awaken your awareness and interest in aeroplane appearances as nothing else can. It is, in fact, one of the best and easiest ways of becoming familiar with aeroplanes.

The design and layout of a gen-book are a matter for your discretion. The simple ones are best ; they teach most and are easiest to maintain. It is unnecessary to buy an expensive news-cutting book, in fact one of the best gen-books we ever saw was home-made of brown paper, which was so arranged that it could be expanded when necessary. The ordinary exercise book is also quite suitable.

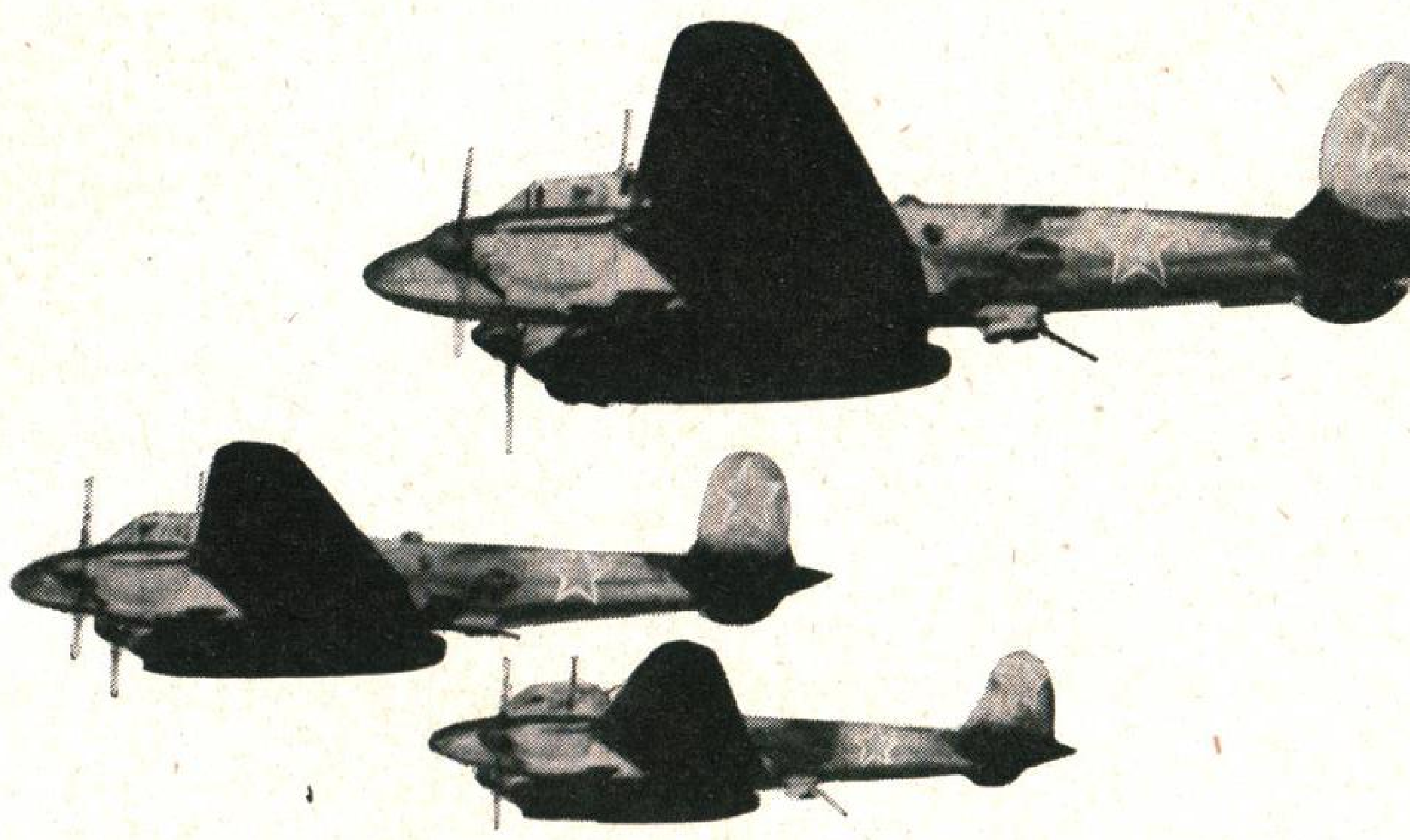
Devote at least a page to each aeroplane, and aim at variety in photographic view-points. Include a three-view silhouette and a few notes on special recognition points and interest matter.

Once framed-up, thirty minutes a day at your gen-book will keep it—and you—up to date on your aeroplanes.



This is a picture of a page taken from a gen-book made out of a cash-book. The distance across the double page is about 15 inches.

IRON CURTAIN AIRCRAFT
IN THE NEWS



PE-2 (*above*) **TWIN FINS,** long sharp noses and pointed wings characterize Petlyakov's twin-engine attack-bomber. Note also ventral gun position and high cockpit canopy. Two M-105 in-line engines, 1,100 h.p. each, make it one of the fastest Soviet propeller-driven aircraft. Some in service with Polish and Czech Air Forces.

IL-10 **THE DROOPING** pointed nose, short but high cockpit close over it, and large, backward-tapered fin and rudder show clearly in this formation of IL-10s, Soviet Air Force ground attack aircraft. In production since before the end of the war, it replaces the IL-2 Stormovik.

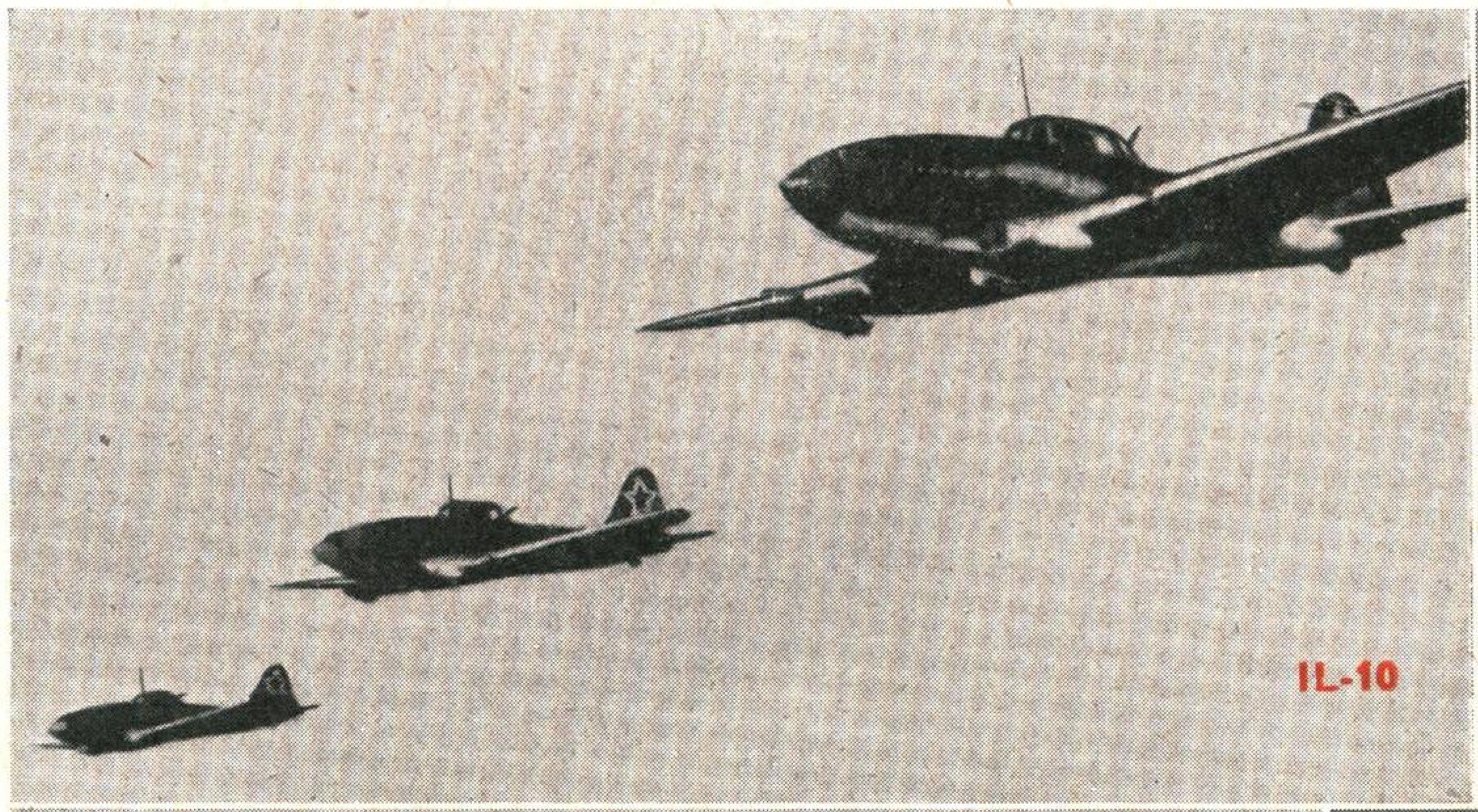
YAK-15 **FAMILIAR FEATURES** of earlier **YAK** fighters: forward-falling fin and rudder, fuselage form and sharp-tapered wing shape are clear in this shot of one of the Soviet Air Force's many jet-fighters. Long deep nose forming the intake and underslung turbojet is also a helpful feature. Top speed of YAK-15 is said to be about 525 m.p.h., slightly inferior to that of De Havilland Vampire.

TU-2 **TWO TU-TWOS** over Tushino. This attack-bomber, replacing PE-2s in Soviet service, is distinguishable by a diamond-shaped wing and a back-tapered tailplane with twin outrigged fins and rudders. Note long nacelles to twin radial engines. Under-gun position beneath rear ends of fuselages can just be seen. TU-2 is in service solely with Soviet Air Force.

UTKA **MIGOYAN'S "DUCK"** or tail-first monoplane was designed about 1944 and first appeared on Aviation Day, 1946. Some press reports speak of it as replacement for PO-2 training biplane, but there is no confirmation. Also said that when wings are removed and wheels replaced by skis it makes a handy prop-driven sleigh. Power is provided by five-cylinder radial engine.

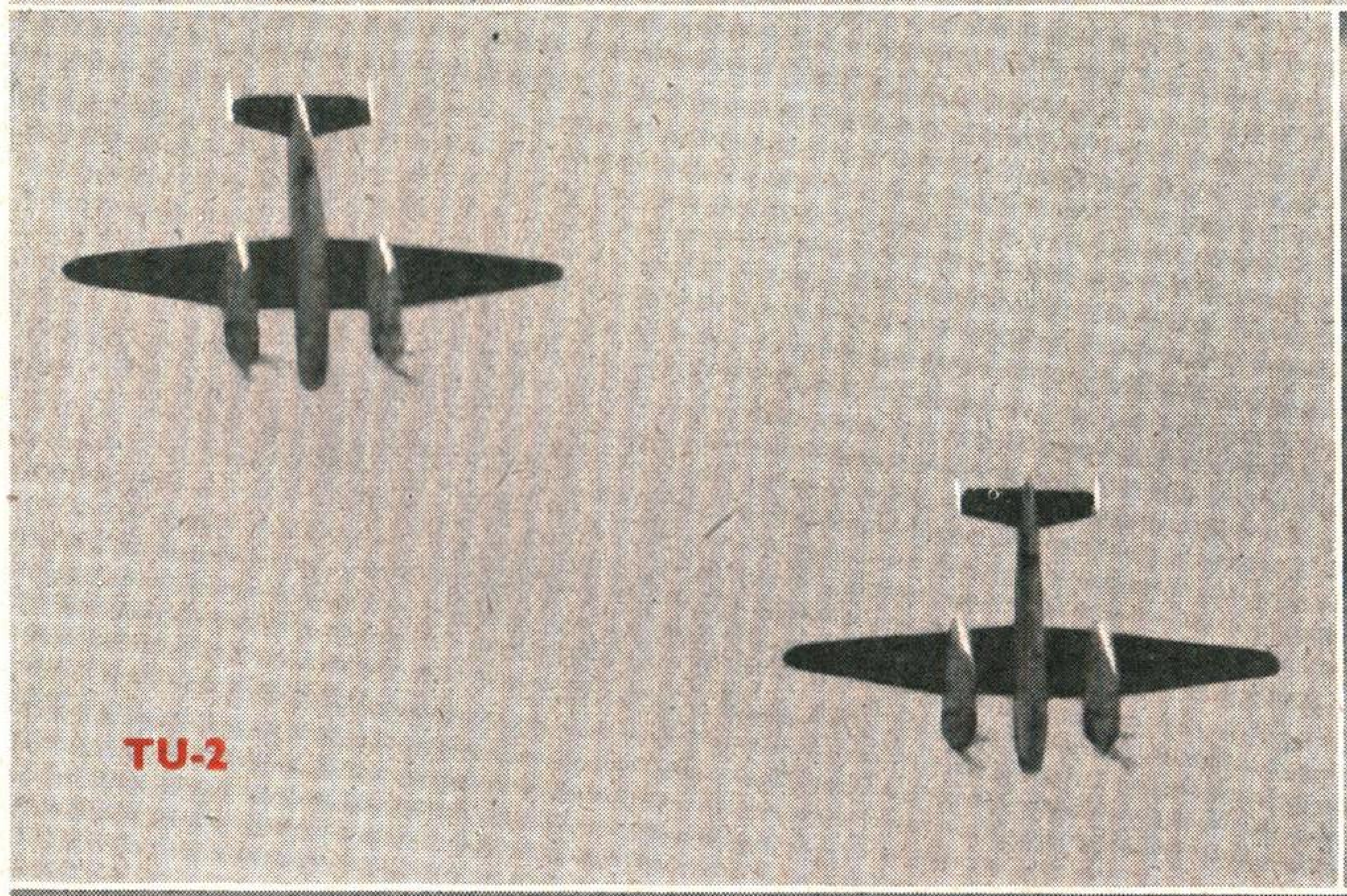
IL-12 **A NEW VIEW** of Ilyushin's elegant twin-engine transport displaying graceful lines to fuselage and large proportion of triangular fin. IL-12 is gradually replacing the LI-2 (Dakota) on the Soviet Internal Airways System and has been flown on exhibition in Soviet Satellites.

VS-43 **Vought Sikorsky** VS-43s commercial amphibians were acquired by the Russians before the war. Russian designation is unknown, VS-43 being the U.S. maker's number. There are only a few in existence.

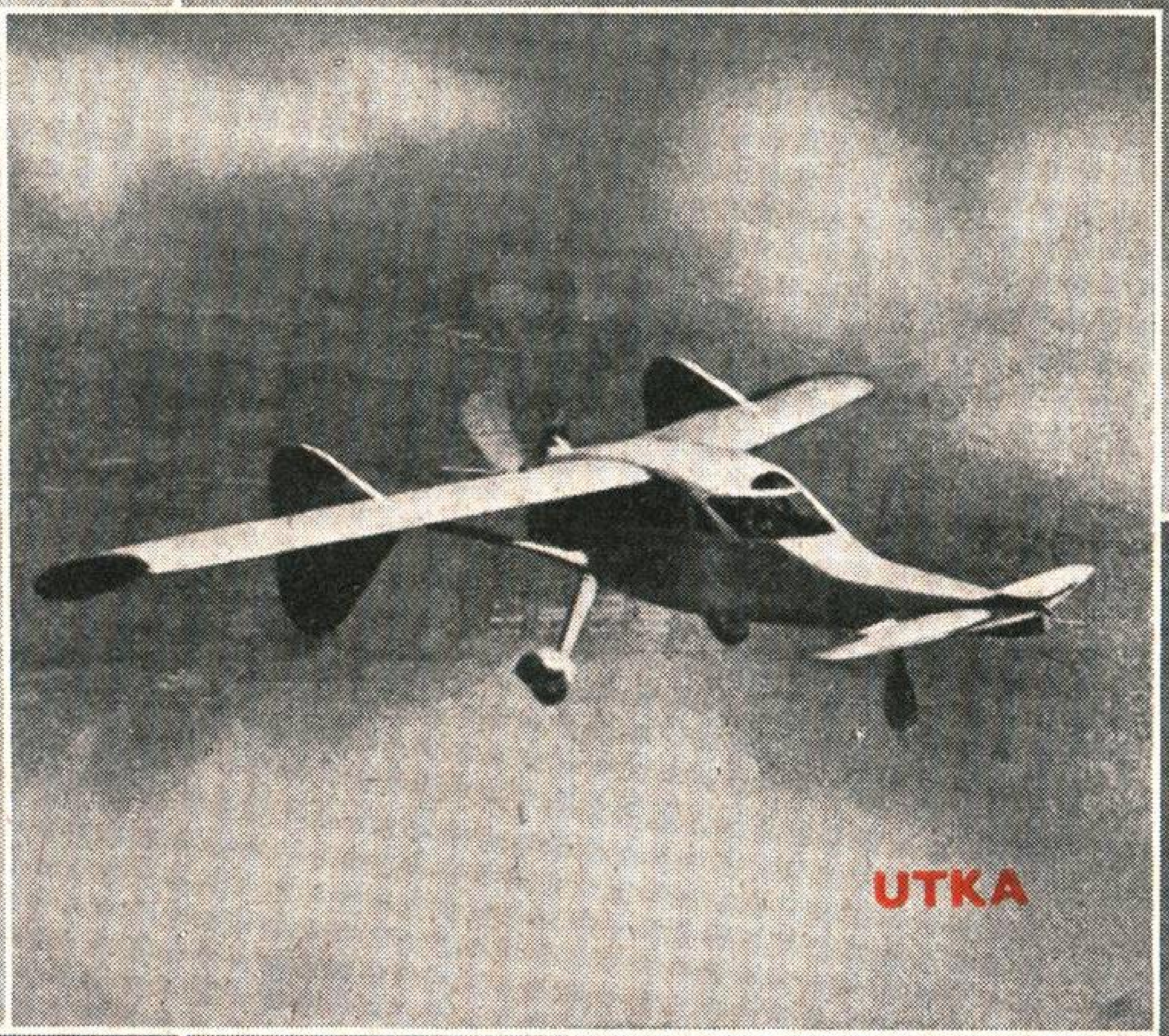


IL-10

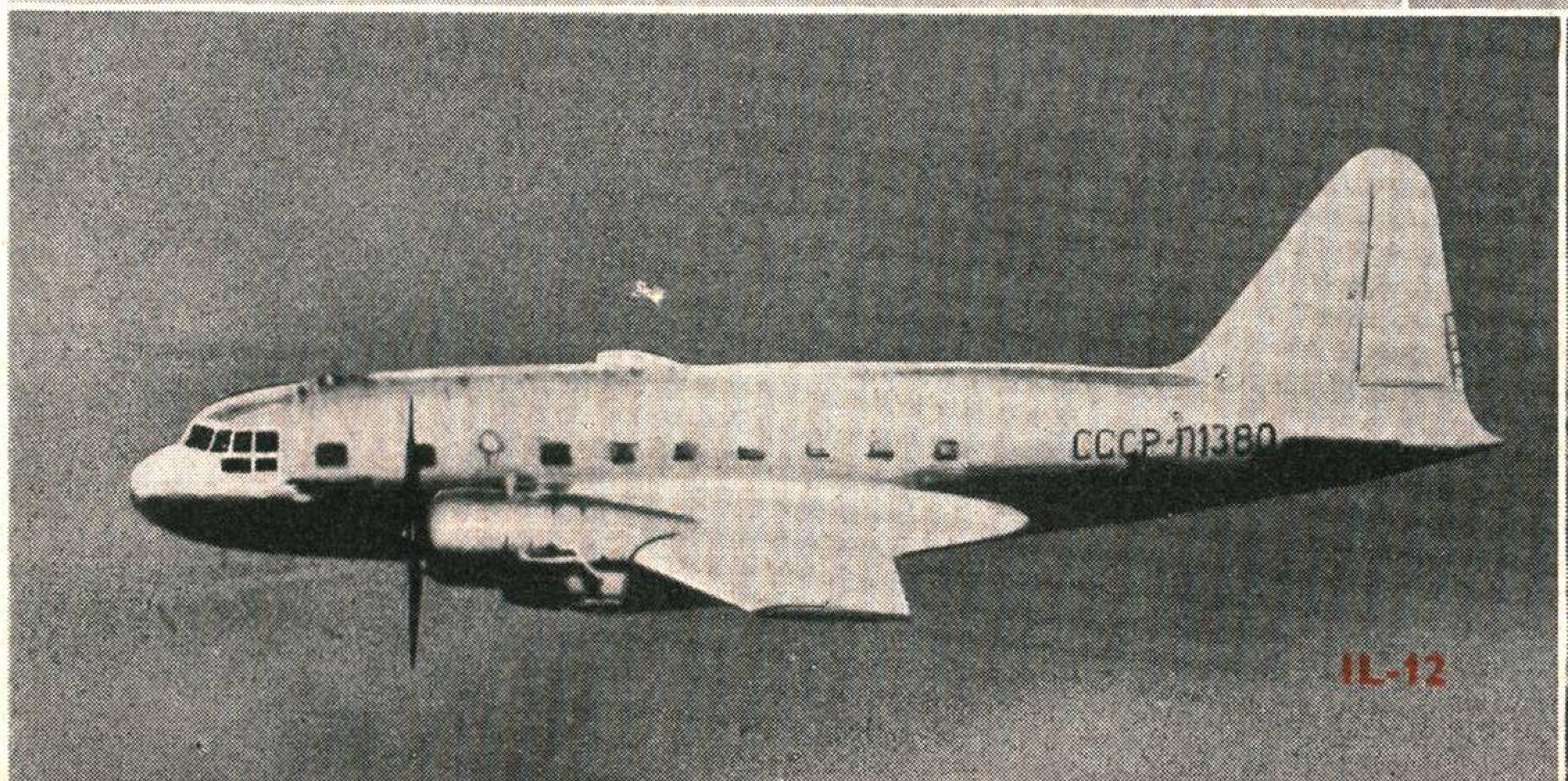
YAK-15



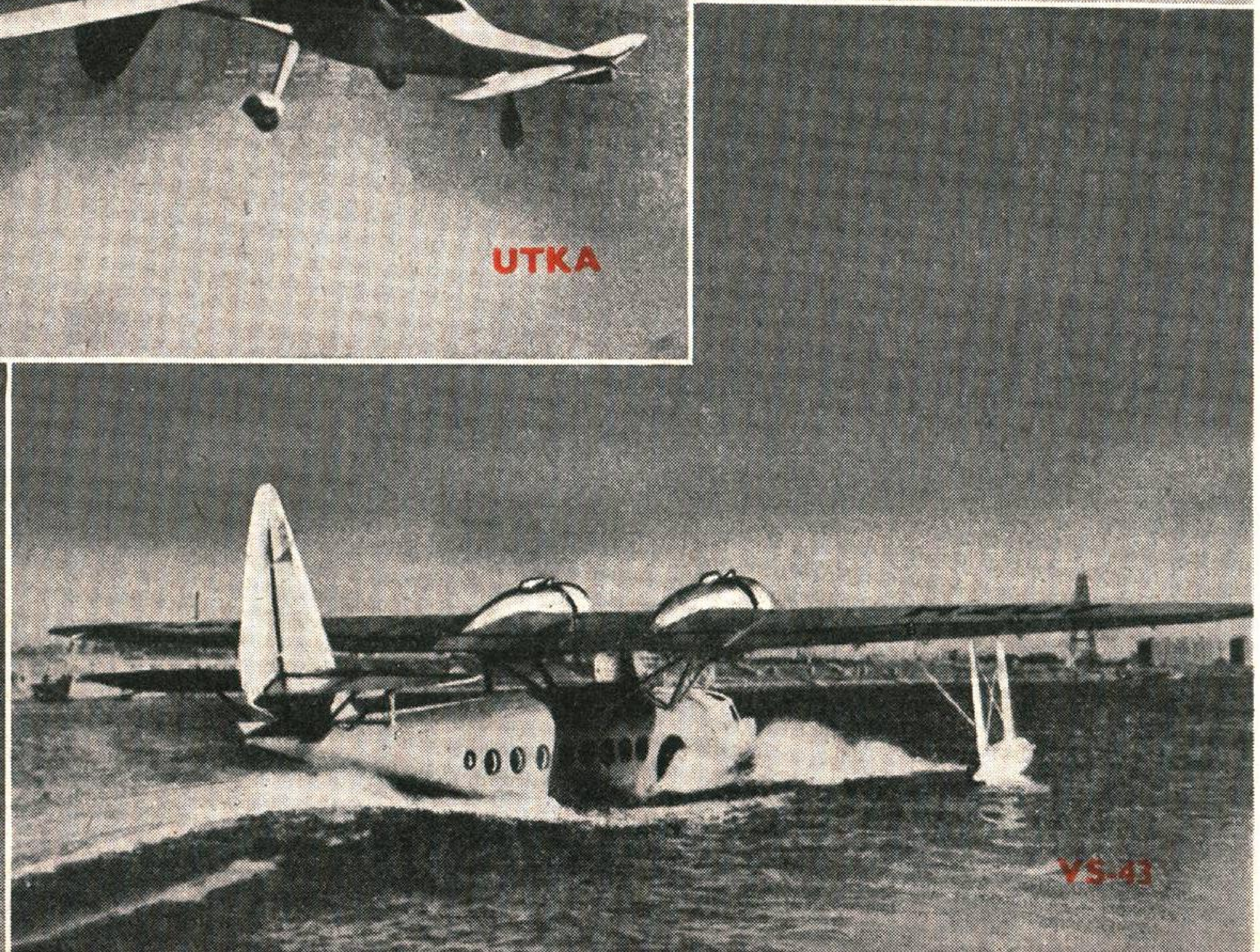
TU-2



UTKA



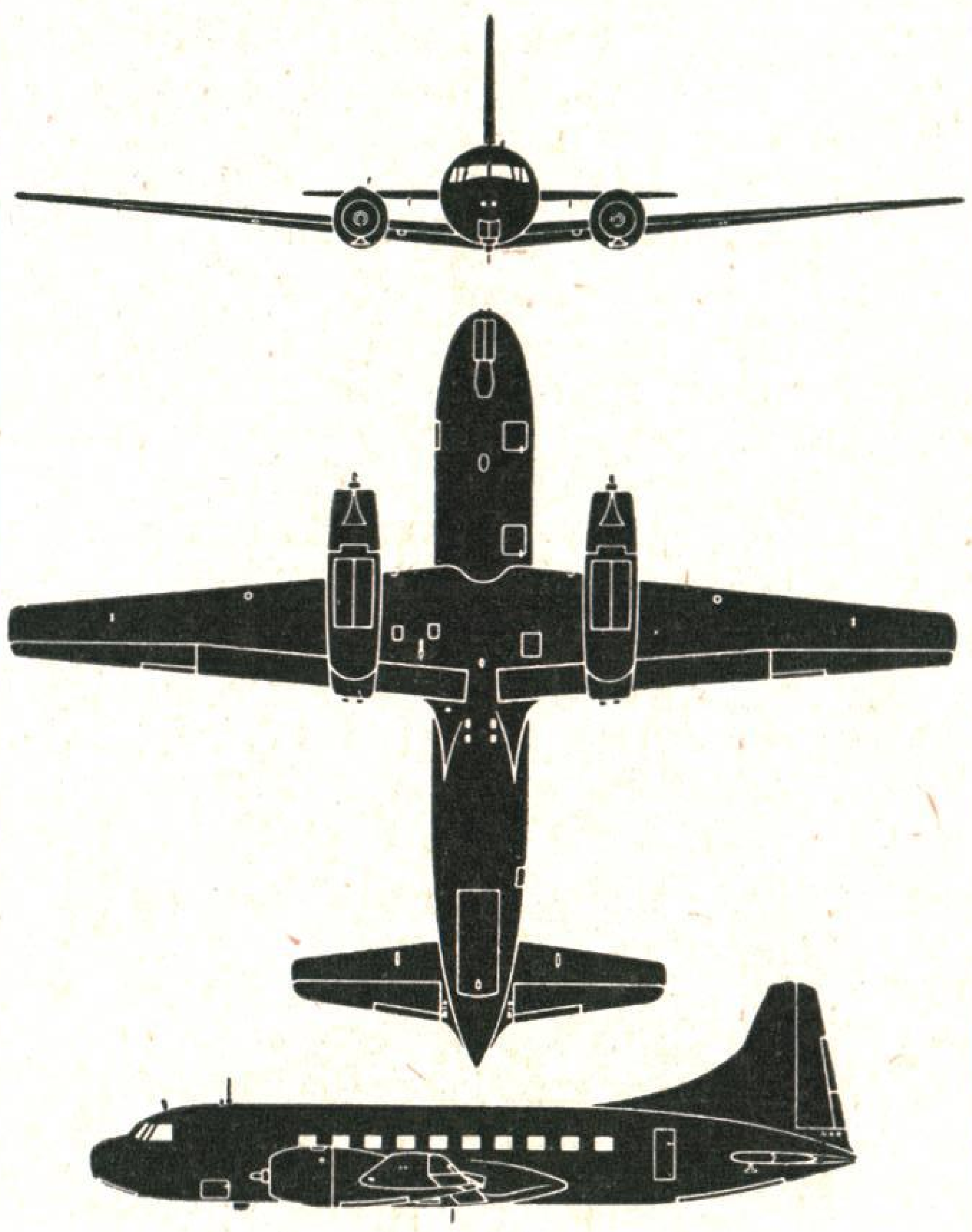
IL-12



VS-43

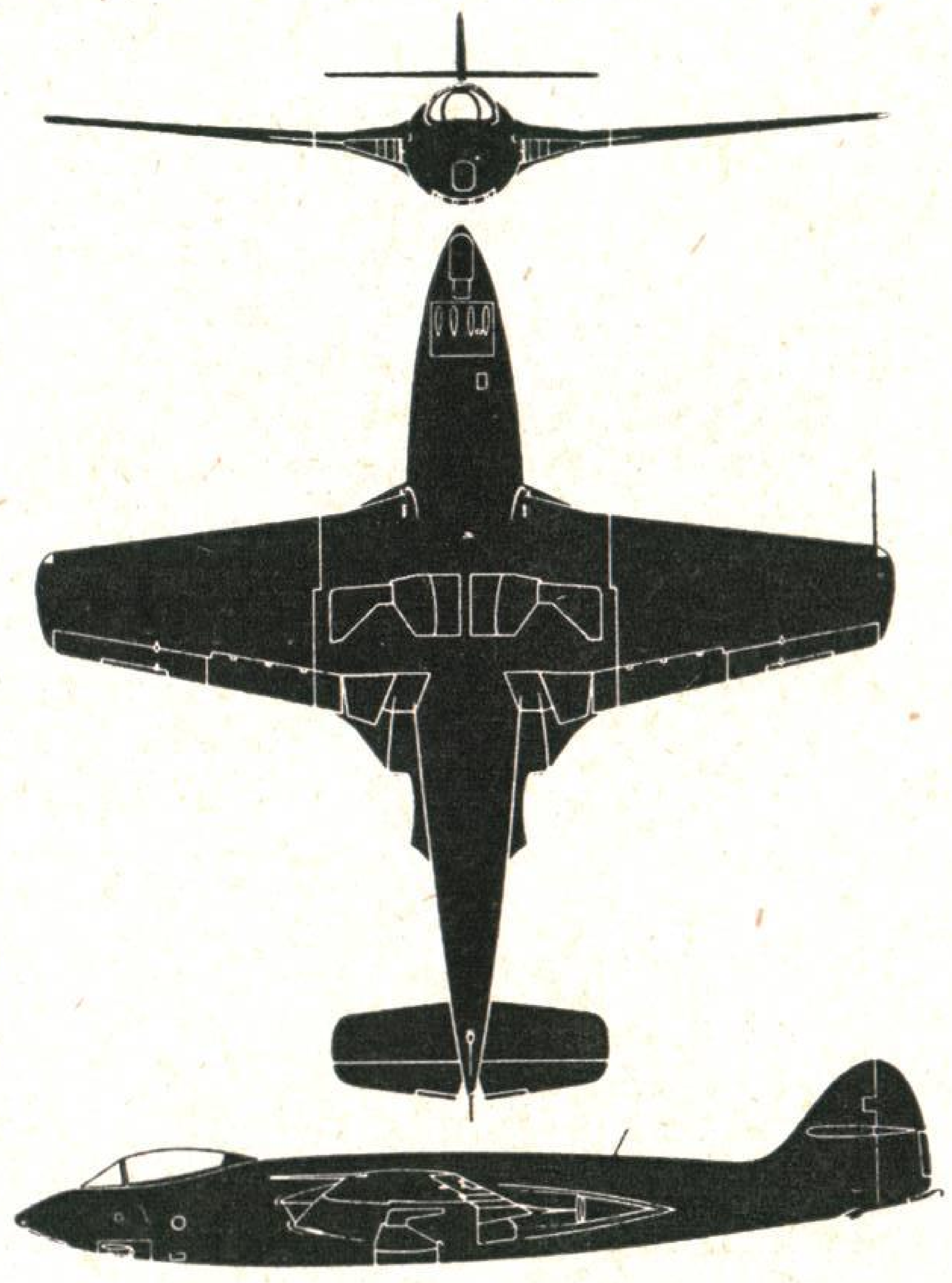
NEW and REVISED SILHOUETTES

CONSOLIDATED VULTEE CONVAIR LINER



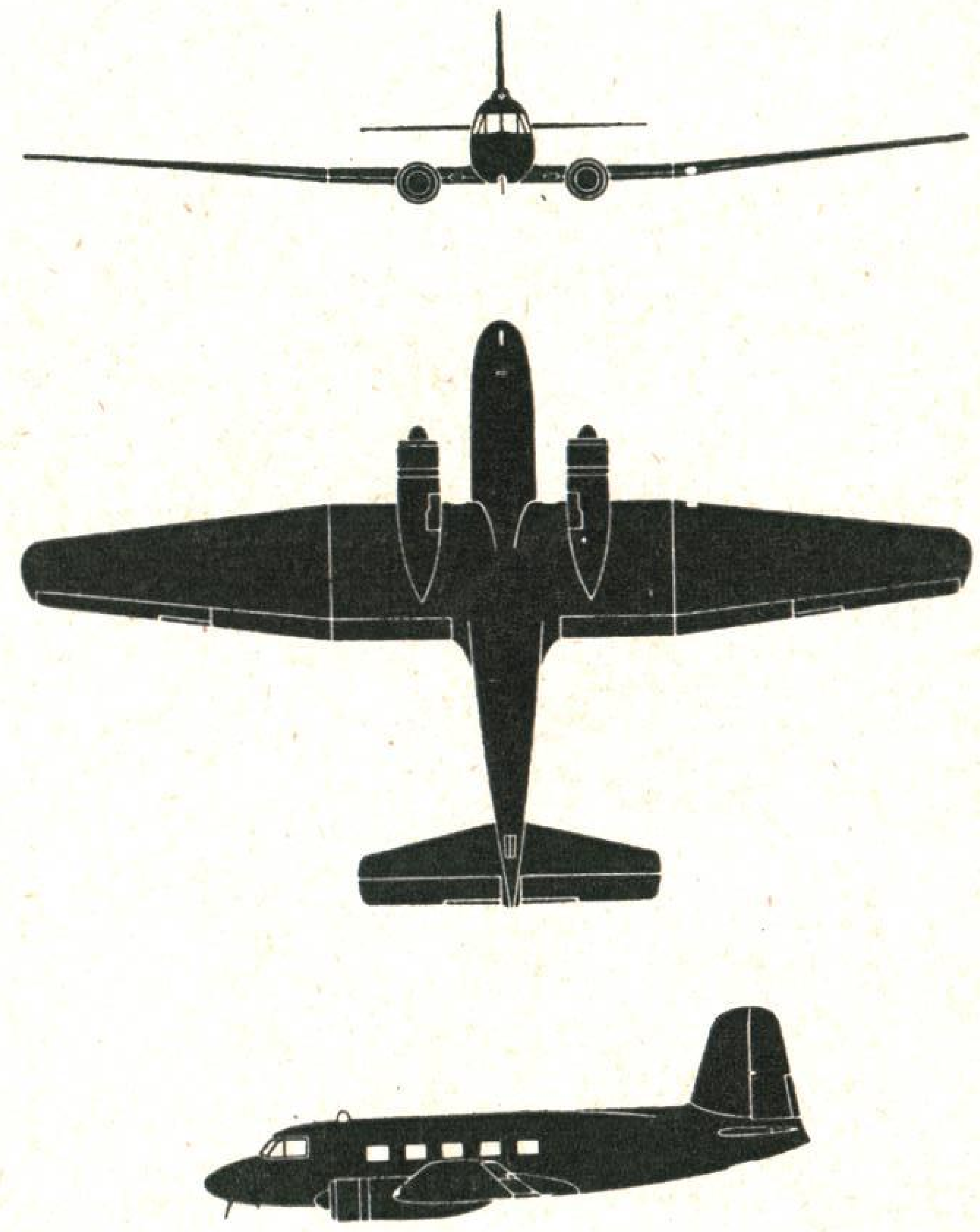
American Transport
Two Pratt and Whitney Radials.
Span : 91 ft. 9 ins.
New Silhouette

HAWKER N.7/46



British Fighter
One Nene Turbojet
Span 36 ft. 6 ins.
New Silhouette

YAKOVLEV YAK 16



Russian Transport
Two Ash 21 Radials
Span 56 ft.
New Silhouette

SOLUTIONS TO RECOGNITION TESTS IN THIS EDITION :

FRONT COVER : *Percival Prentice*

No. 87 (ELEMENTARY)

550. Harvards
551. Pioneer
552. S.R./A.I
553. Sealand
554. Viking ("Nene")
555. Bristol 170
556. Solent
557. Tudor 8
558. Launkönig
559. Helldiver
560. Vampire I
561. Gyrodyne
562. Meteor 4
563. LA-9
564. Hermes 4
565. Sea Hornet 20
566. A-26 Invader
567. Ambassador
568. A.W.52
569. Balliol
570. Lincoln

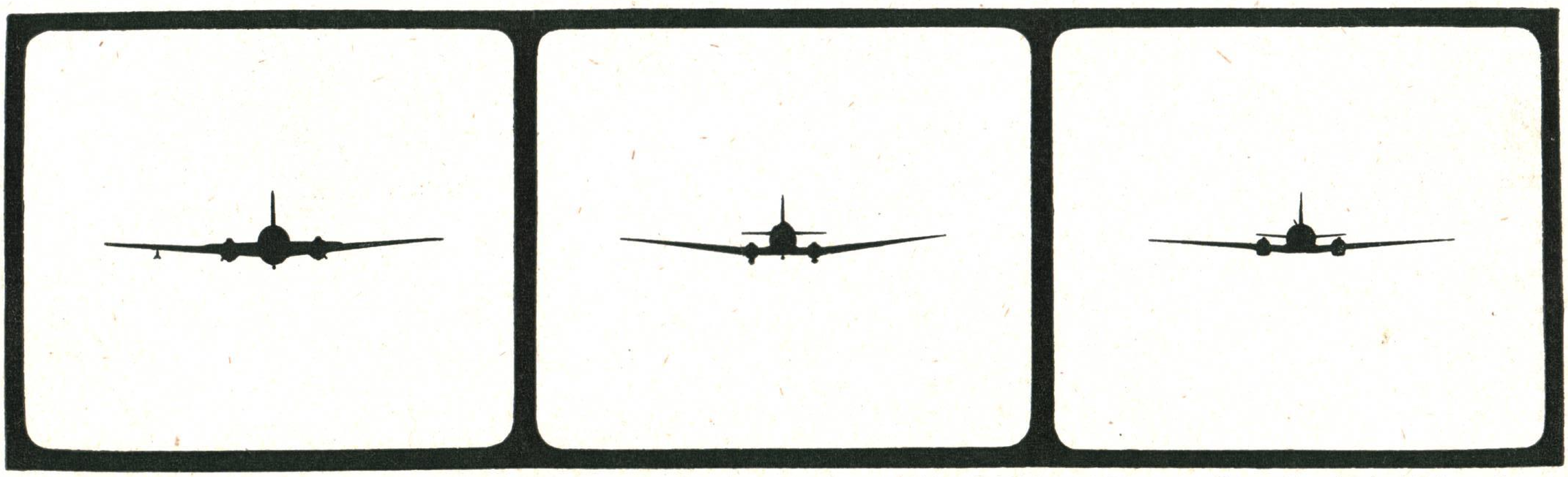
TRICKY TRIO VI

(Left to right) Vickers Viking, Douglas Dakota, Ilyushin IL-12

BEAUTY FROM BOEING

Big-finned Boeing B-50 super-superfortress bombers on a test flight near Seattle (home of Boeing) display great elegance of line and form as they turn. Note detail of engine installation (four Pratt-Whitney Wasp Major radials of 3,500 h.p. each). If you can imagine 14,000 horses in a large field (frankly we can't !) hauling on an airframe such as this, you will have some idea of the power they use and not marvel too much at a top speed of over 400 m.p.h. for a bomber of this size. The next instalment in this exciting series of aeroplanes will be the Boeing XB-54 (powered by Wasp Compound engines).

TRICKY TRIO—VI



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