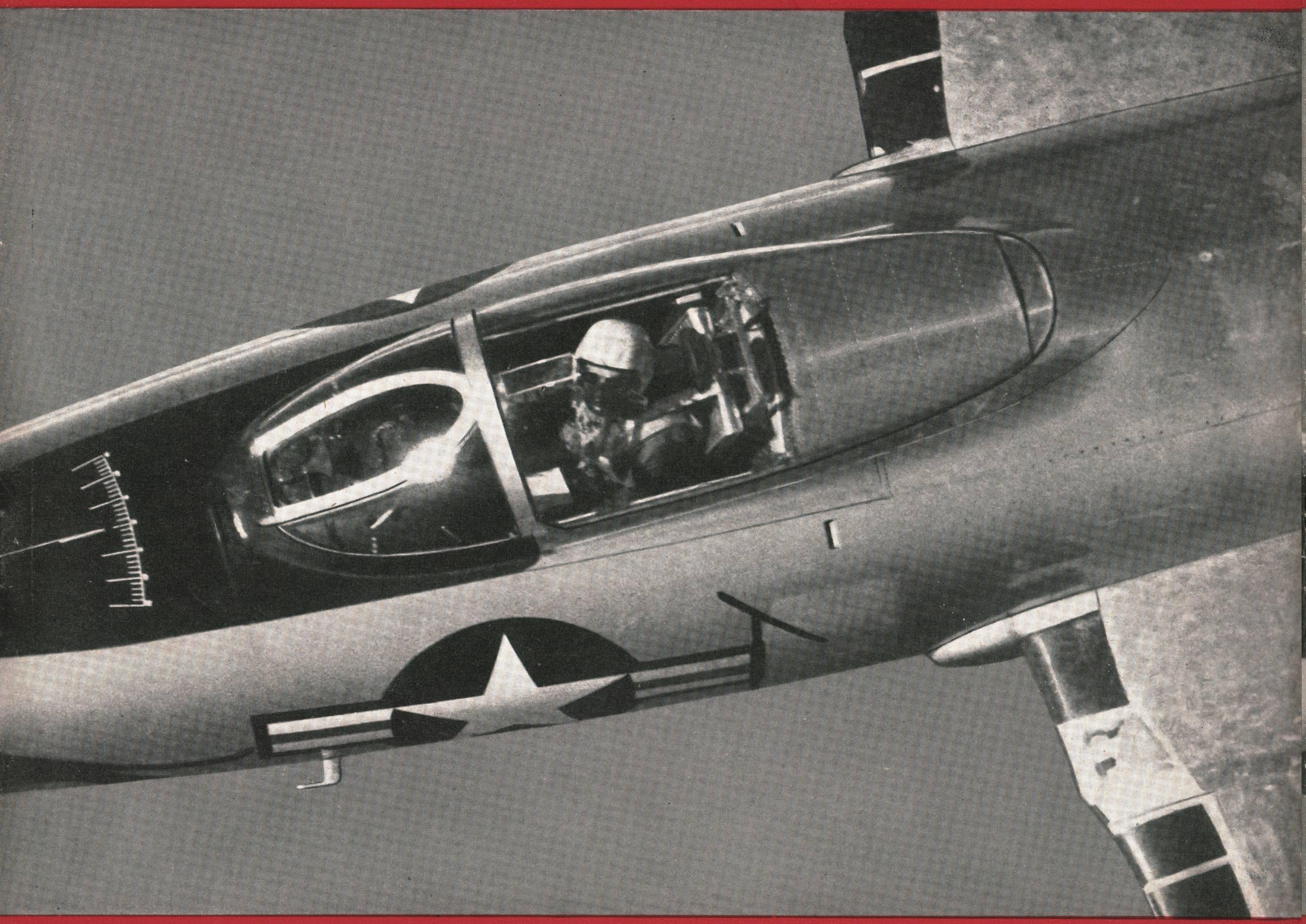
THE INTER SERVICES

# AIRCRAFT RECOGNITION

## *Journal*



Vol. 3 JUNE 1949 No. 10

# IRON CURTAIN AIRCRAFT IN THE NEWS

TU-2, LA-9 & MIG-9

**TU-2** and **LA-9** " shot down in flames " by **MIG-9** jet-fighter (*top-right very small and indistinct*) in " battle " over Moscow on Aviation Day in July, 1948. (see Centre-spread also). Characteristic wing-shape (diamond) of TU-2 is clearly seen as aircraft dives : so are its long radial engine nacelles. The LA-9 seems to match a nose-heavy appearance by a performance of the same order in this view. (Silhouettes : TU-2, January, 1947 *Journal* : LA-9, March, 1949 *Journal*.)

**UT-2** This two-seat S.A.F. trainer was designed by Yakolev, but is *not* a YAK-11, as reported in some publications. UT-2 sports uncowled five-cylinder radial engine, fixed undercarriage, usual yak-fin and rudder and strutted tailplane. Large number in service. (Silhouette appearing later.)

**YAK-16** Close-up of nose and engine (Two ASH 21 radials) of this ten-seater "baby-Dak" shows cockpit and cabin window details, and neat and " clean " aspect of design. Engine weather-covers ill-conceal simple cylindrical nacelle forms. Few YAK-16s in service, if any. (Silhouette : February, 1949 *Journal*).

**LA-7** View of Lavochkin " two-seat single-seater " shows almost " bulbous " radial engine (note oil-cooler beneath cowling) wide-track undercarriage, wing and cockpit detail. (Silhouette : LA-7, May, 1948 *Journal*).

**MDR-6** This flying-boat (designer unknown) of pre-war domestic Russian design, is used for fishery patrol work such as spotting shoals of fish and calling up trawlers. Could do mine-spotting : calling up sweepers as necessary. (Silhouette : none issued.)

**SOVIET-BUILT B-29s** (centrepiece) escorted by **LA-9s** impressing the Soviet Public—and others—on Aviation Day, 1948. (Silhouette : as for U.S. built B-29.)

UT-2

MDR-6



YAK-16



LA-7

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**NICE DAY !** Northrop B-35 Flying-wing bombers being converted from piston to turbojet power in the open air. They will be known as RB-35Bs. The turbojets installed will be of a type similar to that installed in the B-49 Flying-wing bomber. Thirty more RB-49 eight-jet flying wings have recently been ordered by the U.S.A.F.

# "LITTLE AND OFTEN"

BY

## Wing-Commander R. B. WARD

**We recently heard of a unit aircraft recognition instructor who consolidated his recognition instruction in one long solid session per month. Between classes nothing was done. Whilst it has its points, this scheme does not make for efficiency and is quite often a waste of time. To be of value recognition instruction needs to be given a little at a time and often ; every effort should be made to devote some time to it, if not every day, at least once a week, and more often if possible. If this is difficult, definite self-instruction tasks must be set so that the value of instruction given in class is consolidated, and interest and enthusiasms are maintained. Seized with the importance of the " Little and Often " theme we asked Wing Commander Ward (Chairman of the Inter-Services Aircraft Recognition Journal Editorial Committee) if he could quote an analogous situation which would help us to put it across. This is what he wrote :—**

IT might appear, at first sight, that there is not much in common between rearing young ducklings and teaching aircraft recognition, anyone who has done both successfully, however, will realise, after a few minutes' cogitating, that indeed the two things are not dissimilar.

Young ducklings are voracious eaters and one could make a bucketful of mash and feed it all to the youngsters at one go and then give them nothing else for a week. This would feed them up alright—for a time—but they would probably eat so much at once that their little bellies (if a duckling can be said to have such a thing) would become distended and most of the ducklings would die, or at any rate would not grow up to be fully fledged ducks and drakes.

On the other hand one could get the same amount of mash with all the proteins, vitamins, carbohydrates and what-have-you and feed it to the youngsters little and often so that it would last the whole week. At the end of the fledgling period they would have had the same amount of mash, but they would have digested it in small portions and would not have had too much at any one time to make them fed up.

The majority of these young ducklings would grow up to be fine upstanding Khaki-Campbells, Indian Runners and Aylesbury ducks and drakes, ever on the search for more fodder and, by their enthusiasm, producing more and more searchers and spotters.

Now a somewhat similar situation exists with regard to Aircraft Recognition pupils. They are not as a rule so attractive to look at and their feeding habits are somewhat different but the same sort of thing applies. Get a skein of students, fill them up with recognition training mash, a month's supply in one session, and what do you eventually get ? No fully fledged spotters, but a gaggle of bewildered individuals fed up to the back teeth and completely lacking in enthusiasm.

On the other hand, where instruction, including its proteins, vitamins, and carbohydrates, is served up little and often, most of it is taken in and digested with relish, and the subjects become seekers and searchers after more. They become fully fledged spotters and their enthusiasm is catching.

So whether you are rearing ducklings or spotters you will get the best results always by feeding them the appropriate mash a little at a time—and often.

**Which seems to sum it up nicely.—ED.**

# LOUGHEAD *Lockheed*

IT'S A LONG STORY—and a good one—starting in 1912, when the Loughead Brothers, Alan and Malcolm, flew their first machine, a float seaplane (featured opposite) from San Francisco Bay. The flight was in a way the inauguration ceremony of the organization which has now grown into the Lockheed Aircraft Corporation of Burbank, California, U.S.A. The Loughead Brothers were Scotsmen ; they began building aeroplanes in a one-room factory, and by hard work, enterprise and initiative, extended their plant until, at the period of peak production during World War II, the Lockheed plant covered hundreds of acres and employed over 100,000 people.

During the last 36 years, Lockheeds have produced many famous aeroplanes which have linked fortunes with equally famous pilots, including Colonel Charles Lindbergh, Amelia Earhart, Sir Hubert Wilkins, Wiley Post and many others, to make pioneering, record, and many other historic flights.

In 1927, when the Loughead Brothers changed their name to the more-phonetic *Lockheed*, they also changed their designs from biplanes into monoplanes, and, employing a moulded-plywood type of monocoque construction, introduced a series of handsome, streamlined and rather advanced-looking monoplanes—for those days. The first was the famous Lockheed Vega monoplane, which, in the hands of the late Wiley Post, was to make the first round-the-world solo flight in 1933. The Vega was record-prone from the start and before it disappeared from the active aviation scene many years later, it had made the headlines frequently. Then followed the Lockheed Air Express, the Sirius (achieving fame equally with Colonel and Mrs. Charles Lindbergh), to be followed by the Orion, and the Altair, which came out in 1931. From our illustrations of these monoplanes it will be seen that they all bear the distinct Lockheed family characteristics of that period.

**War**

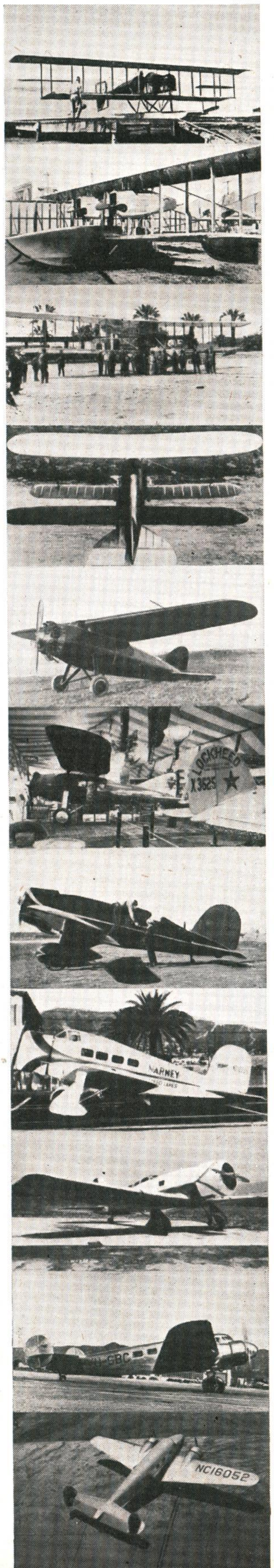
In 1932, Dr. Hall L. Hibbard became Assistant Chief Designer to Lockheed Aircraft. A year later, he became Vice-President and Chief Engineer. From that date designs changed, and in 1934 Lockheeds produced the first of a series of twin-engine, all-metal aeroplanes of a distinct and easily recognizable design—the Lockheed model 10 Electra. This twin-engine low-wing twin-fin and rudder design of 1943 became, in a way, the basic recognition pattern for eight other designs of Lockheed aircraft produced during the next eleven years ; these were : the Lockheed 12, 14, XC-35, A-29, or Hudson, Lodestar, Ventura, Ventura PV-1, and Harpoon PV-2 which came out in 1945. Some versions of almost all these types still fly today in many parts of the world. Probably the most famous of them all was the Lockheed Hudson, which was the first American aeroplane to attain war service.

Perhaps one of the most interesting aeroplanes of World War II was the famous Lockheed P-38 Lightning fighter. It ran through 18 different versions in its career, serving as an interceptor-fighter, bomber, fighter-bomber, tank-buster, photo-reconnaissance aircraft, and was even pressed into service on occasions as an ambulance. It ended its war career packing fire-power equal to the broad-side of a six-inch gun cruiser and had a bomb-carrying capacity greater than the earlier B-17 Fortress. It was also able to pass the 400 m.p.h. mark, a considerable performance for its day, and, like so many other Lockheed types, took ocean crossings as a matter of form.

**Post-War**

A post-war aeroplane of wartime design, the Lockheed P2V Neptune is a search/patrol type. As in so many earlier Lockheed types, long-range and ocean-crossings come naturally, and the Neptune flew into front-page news two






**Loughead Seaplane Model G—1912**
*Wing span :*
**Upper : 46 ft. 0 ins. Lower : 36 ft.**
*Engine :*
**Curtiss " O " Liquid-Cooled V-8**
*Speeds :*
**Cruising : 51 m.p.h. Max. : 63 m.p.h.**

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**Loughead F-1 Flying Boat—1916**
*Wing span :*
**Upper : 74 ft. Lower : 47 ft.**
*Engines :*
**2 Hall-Scott 160 h.p.**
*Speeds :*
**Cruising : 70 m.p.h. Max. 84 m.p.h.**

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**Loughead HS2L—1916**
*Wing span :*
**Upper : 74 ft. Lower : 62 ft.**
*Engines :*
**2 Liberty-12 330 h.p.**
*Speeds :*
**Cruising : 55 m.p.h. Max. : 91 m.p.h.**

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**Loughead S-1 Biplane—1919**
*Wing span :*
**Upper : 28 ft. Lower : 24 ft.**
*Engine :*
**1 Loughead XL-1 2 cylinder 24 h.p.**
*Speed :*
**Max. : 75 m.p.h.**

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**Lockheed Vega—1927**
*Wing span :*
**41 ft.**
*Engine :*
**Wright J-6, 220 h.p.**
*Speeds :*
**Cruising : 115 m.p.h. Max. : 154 m.p.h.**

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**Lockheed Air Express—1926**
*Wing span :*
**43 ft.**
*Engine :*
**Pratt & Whitney R1340:CL or 5C1**
*Speeds :*
**Cruising : 150 m.p.h. Max. : 180 m.p.h.**

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**Lockheed Sirius—1929**
*Wing span :*
**42 ft., 9¼ in.**
*Engine :*
**Wright Cyclone SR1820-F2 710 h.p.**
*Speeds :*
**Cruising : 150 m.p.h. Max. : 185 m.p.h.**

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**Lockheed Orion—1930**
*Wing span :*
**42 ft. 9¼ ins.**
*Engine :*
**Pratt & Whitney Wasp C-1, 5C-1 420 h.p.**
*Speeds :*
**Cruising : 200 m.p.h. Max. : 226 m.p.h.**

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**Lockheed Altair—1931**
*Wing span :*
**42 ft. 9¼ ins.**
*Engine :*
**Pratt & Whitney Wasp SD, SC-1 450 h.p.**
*Speeds :*
**Cruising : 200 m.p.h. Max. : 230 m.p.h.**

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**Lockheed 10 Electra—1934**
*Wing span :*
**55 ft.**
*Engines :*
**2 Pratt & Whitney R985-SB3 450 h.p.**
*Speeds :*
**Cruising : 190 m.p.h. Max. : 202 m.p.h.**

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**Lockheed 12—1936**
*Wing span :*
**49 ft. 6 ins.**
*Engines :*
**2 Pratt & Whitney R985-SB3 450 h.p.**
*Speeds :*
**Cruising : 206 m.p.h. Max. : 219 m.p.h.**

years ago when a model named the " Truculent Turtle " flew non-stop from Perth, Western Australia, to Columbus, Ohio, U.S.A., a distance of 11,250 statute miles—in fact, a world record for non-stop flight.

In the post war fighter sphere, Lockheeds have produced the F-80 Shooting Star in two main variants. The single-seat fighter (F-80A & B) and the two-seat fighter-trainer known as the TF-80C. The F-80 fighter arrived too late in U.S.A.F. service for operational use in World War II, but has, nevertheless, reached the public eye and imagination in no uncertain manner through at least one aspect of its performance which is in keeping with Lockheed traditions, that is its capacity for ocean-crossings. To be exact, sixteen F-80's flew from the U.S.A. to Great Britain across the North Atlantic Ocean in 1948, shortly after the first jet crossing of the Atlantic, by the D.H. Vampires, in the reverse direction.

**Big Stuff**

Of wartime construction, the Lockheed Constellation spent three years as a transport of the Air Transport Command of the (then) U.S.A.A.F. before coming into airline service. It is probably true to say of the Constellation that it is the most popular aeroplane in airline service today. Whether it will remain so as newer types appear is another matter ; certainly, it is one of the most numerous four-engine types in use at present and without question it is the most elegant. Its tail makes it one of the easiest aeroplanes to recognize too. By successive engineering refinements and the redesign of detail, the model 749 Constellation has had its performance continually improved since it first came into regular service.

In the year 1946 Lockheeds brought out the Constitution, one of the largest transport aircraft the world had then seen. A four-engine double-deck monoplane having a gross weight of 184,000 lbs., it was designed and built as a transport for the U.S. Navy. It can carry 180 passengers or 40,000 lb. of cargo. So far, only two Constitutions (with piston-engines) have been built, but the design is so arranged that gas-turbine engines, when suitable ones are available, can be fitted. This large transport aeroplane has a pressurized cabin and almost every known flying aid including the most complete navigational radar equipment ever installed in any aeroplane. The Constitution has a top speed of over 300 m.p.h. with its present Pratt and Whitney Wasp Major radial engines.

**Heritage**

Since Dr. Hibbard became designer for Lockheeds, certain family characteristic shapes have been repeated throughout almost the whole range of Lockheed aircraft. The first and most noticeable, which we have illustrated here, is the elongated diamond-shaped wing which, starting with the Lockheed 10 Electra, appears in every Lockheed model except the P2V Neptune. Some purist is probably going to remind us that the Constellation's wing is not diamond-shaped. This is true, but if the wing-plan of the Constellation is compared with that of any of the " Lodestar " class, it is difficult not to see the same designing hand behind it. The same type of wing-tip is seen throughout nearly the whole range of aircraft from 1937.

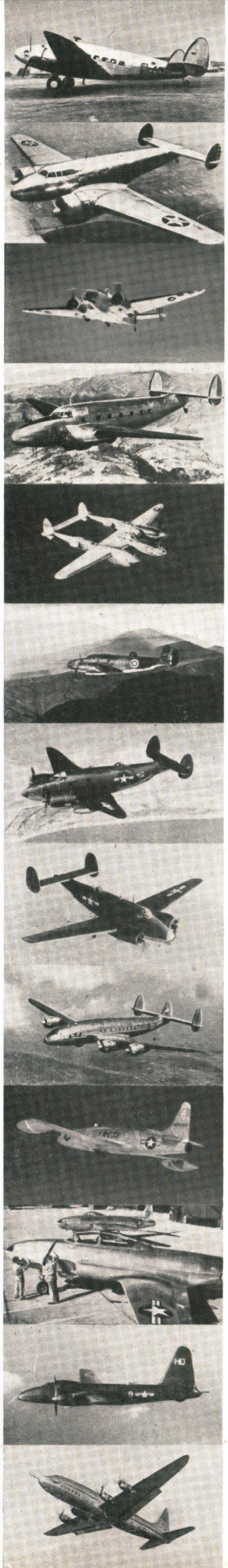
In tail-units, the same wide span, round-tipped, slightly tapered tailplane with its twin fins and rudders of ovoid shape, have come right through from the Lockheed 10 to the Constellation—omitting the Neptune, the F-80, and the Constitution and, if the purists insist, the PV-2 Harpoon.

In the post-war designs, it is interesting to observe that where the single fin and rudder has been used, some similarity shows —the Neptune, the F-80 and the Constitution being the aircraft under consideration. Each displays a straight-tapered fin with a rounded top and a general tendency for the fin to lean backwards. And is it pure imagination that if you compare the side view of the Constitution's vast fuselage with that of the Shooting Star, you can see roughly the same lines ? We think not.

**Supersonics**

In the field of supersonic flight, Lockheeds have not been idle, and although no details are yet available they have, at the moment, the XF-90 experimental fighter under construction. We have no idea what this aeroplane will look like, but it is a fair guess that what we recognize as " Lockheed " characteristics will not disappear completely.





**Lockheed 14—1937**
*Wing span :*
**65 ft. 6 ins.**
*Engines :*
**2 Pratt & Whitney Hornet S1EG 850 h.p. each.**
*Speeds :*
**Cruising : 223 m.p.h. Max. : 244 m.p.h.**

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**Lockheed XC-35—1937**
*Wing span :*
**55 ft.**
*Engines :*
**2 Pratt & Whitney R985-SB3 450 h.p.**
*Speeds :*
**Cruising : 190 m.p.h. Max. : 202 m.p.h.**

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**Lockheed Hudson Bomber—1938**
*Wing span :*
**65 ft. 6 ins.**
*Engines :*
**2 Wright GR1820-G102a 1,100 h.p.**
*Speeds :*
**Cruising : 175 m.p.h. Max. : 246 m.p.h.**

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**Lockheed Lodestar—1939**
*Wing span :*
**65 ft. 6 ins.**
*Engine :*
**1 Pratt & Whitney R1830-S1C3-G 1,200 h.p.**
*Speeds :*
**Cruising : 241 m.p.h. Max. : 263 m.p.h.**

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**Lockheed P-38 Lightning—1939**
*Wing span :*
**52 ft.**
*Engines :*
**2 Allison V1710-F30 1,475 h.p.**
*Speed :*
**Max. : 415 m.p.h.**

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**Lockheed Ventura—1940**
*Wing span :*
**65 ft. 6 ins.**
*Engines :*
**2 Pratt & Whitney R-2800-S144-G 1,850 h.p.**
*Speeds :*
**Cruising : 272 m.p.h. Max. : 312 m.p.h.**

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**Lockheed PV-1 Ventura—1942**
*Wing span :*
**65 ft. 6 ins.**
*Engines :*
**2 Pratt & Whitney R-2800-25BG 2,000 h.p.**
*Speeds :*
**Cruising : 193 m.p.h. Max. : 316 m.p.h.**

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**Lockheed PV-2 Harpoon—1945**
*Wing span :*
**75 ft.**
*Engines :*
**2 Pratt & Whitney R-2800-2SBG 2,000 h.p.**
*Speed :*
**Max. : 301 m.p.h.**

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**Lockheed Constellation—1943**
*Wing span :*
**123 ft.**
*Engines :*
**4 Wright Cyclones or 4 Pratt & Whitney Double Wasps.**
*Speed :*
**Max. : Over 300 m.p.h.**

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**Lockheed F-80—1944**
*Wing span :*
**38 ft. 10½ ins.**
*Engine :*
**1 General Electric turbojet.**
*Speed :*
**Max. : Over 550 m.p.h.**

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**Lockheed TF-80C—1945**
*Wing span :*
**38 ft. 10½ ins.**
*Engine :*
**1 Allison turbojet.**
*Speed :*
**Max. : Over 550 m.p.h.**

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**Lockheed P2V Neptune—1945**
*Wing span :*
**100 ft.**
*Engines :*
**2 R-3350 Wright Duplex Cyclone radial engines.**
*Speeds :*
**Cruising : 170 m.p.h. Max. : More than 300 m.p.h.**

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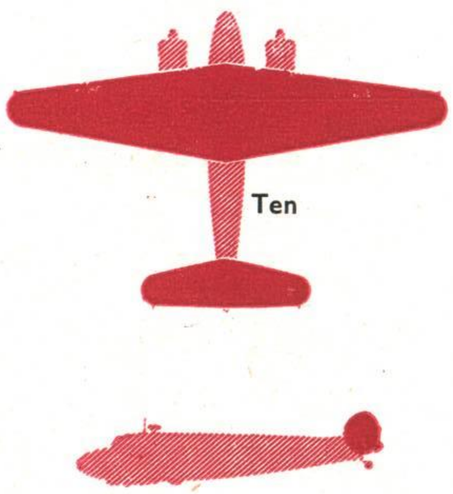
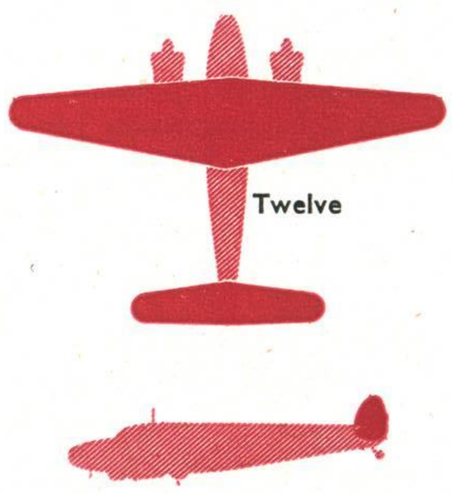
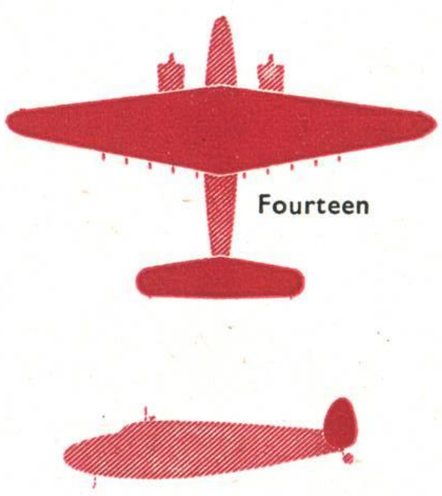
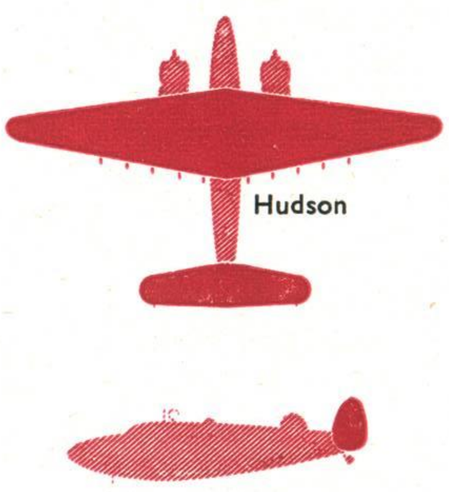
**Lockheed Constitution—1946**
*Wing span :*
**189 ft. 1 in.**
*Engines :*
**4 Pratt & Whitney Wasp Major TSB1-G.**
*Speeds :*
**Cruising : 286 m.p.h. Max. : Over 300 m.p.h.**

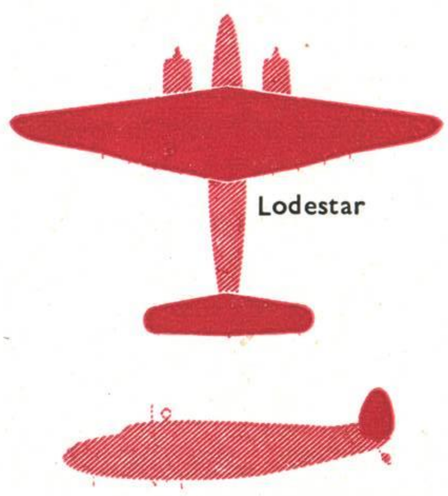
(*Top*) A close-up of the Constellation's most tell-tale feature—its tail-unit. Dr. Hibbert's liberal ration of egg-shapes in its fins not only aids recognition but adds to the beauty of the whole aeroplane. Note also the graceful fuselage "skyline". (*Lower left*) Colonel David Schilling, leader of the Atlantic flight, touches down at Odiham in his F-80A after the ocean crossing. The rounded nose, large wing-root turbojet intake, small rear-view cockpit canopy, and tall lean-back fin and rudder of this fighter are helpful recognition features. We, incidentally, seem to see an expression of great pain on its "face" as it alights gently, almost gingerly, on the runway. (*Lower right*) A two-seat version of this fighter is called the TF-80C. It retains all the main F-80 recognition characteristics, but has a lengthened fuselage and a much longer cockpit canopy.

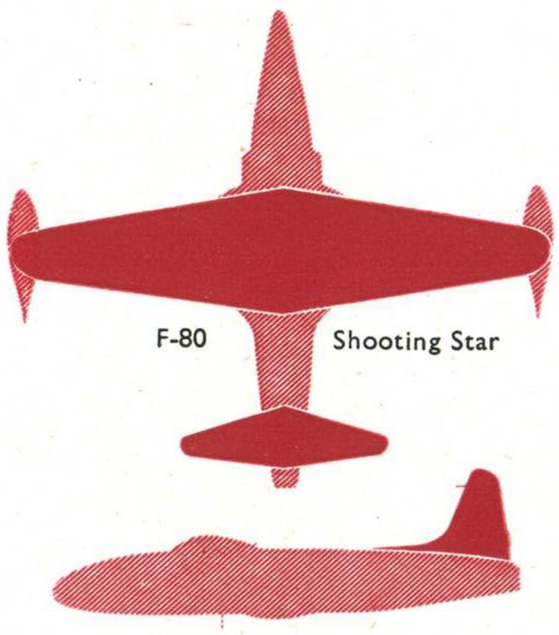


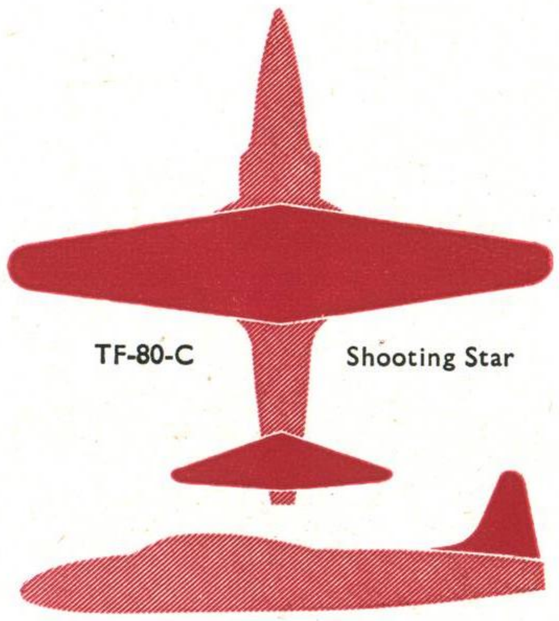



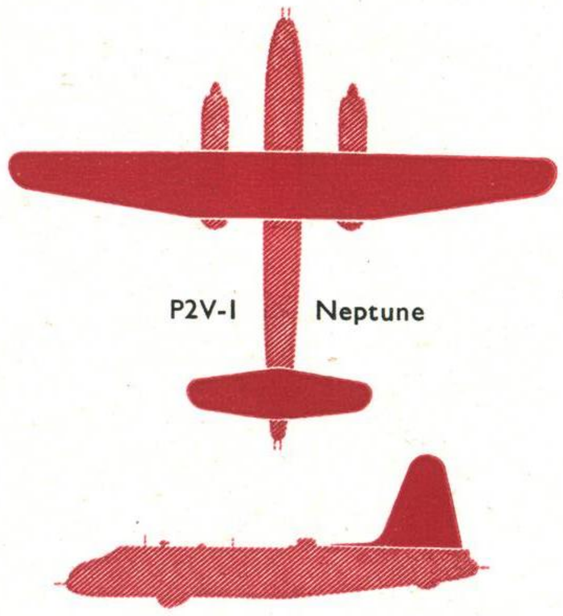



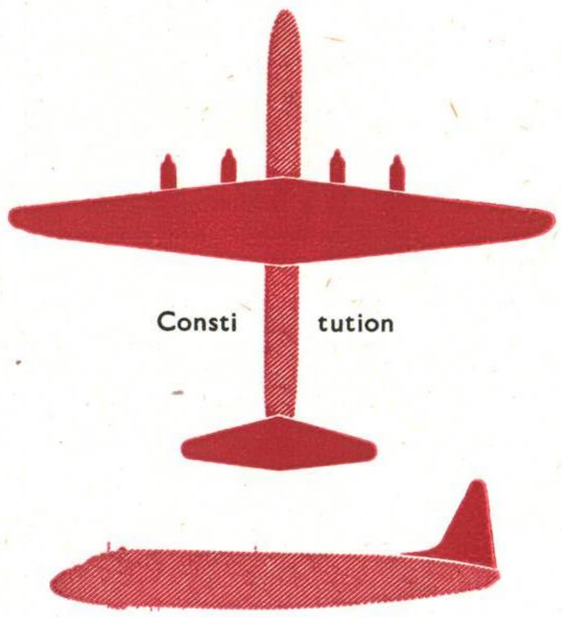



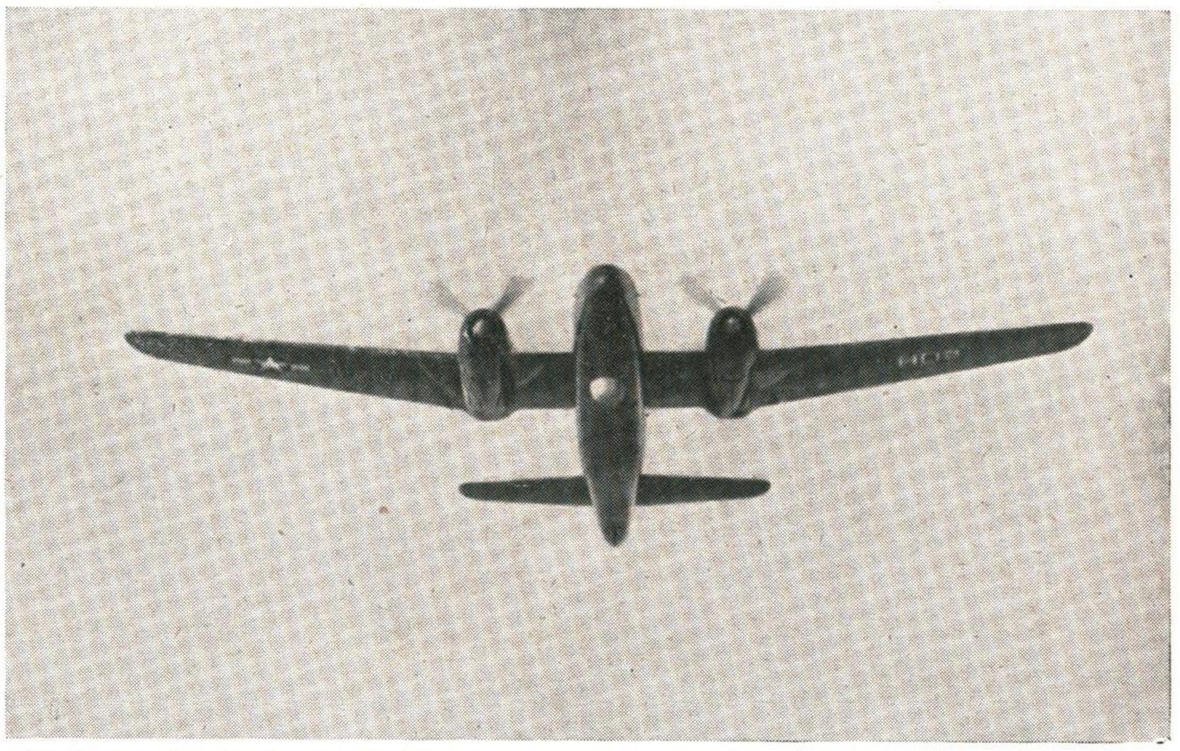





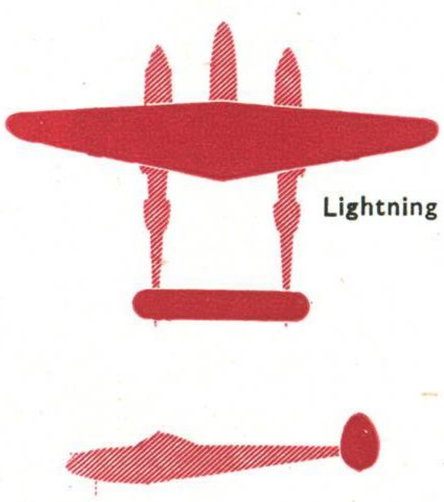



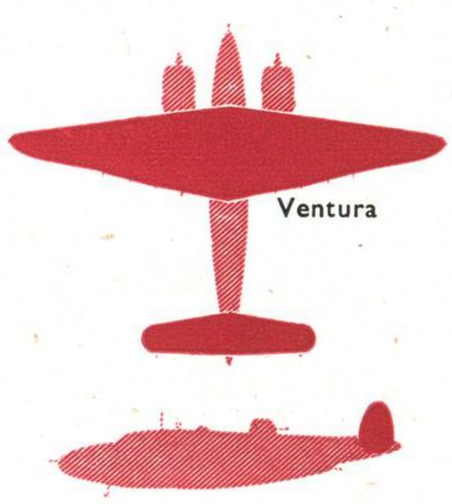



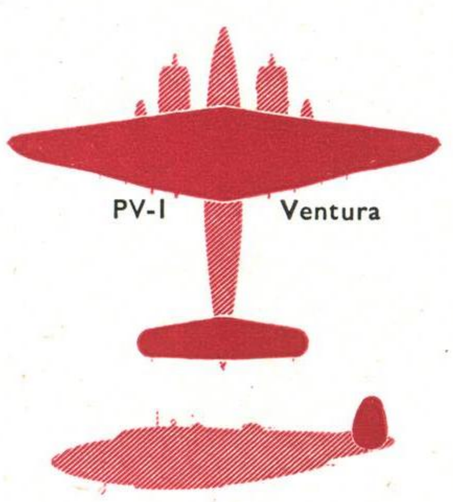


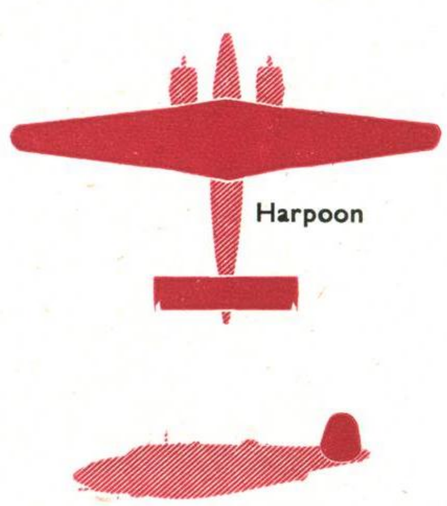
Neptune, according to the Romans, was Ruler of the Sea and of all Marine matters. Mythology has it that he was recognizable by his flowing beard and his trident, and that he was drawn along in his chariot on the surface of the sea by many horses. The Neptune we know is also a ruler of the sea, by authority of rockets, guns and bombs, or torpedoes, or depth charges, or sea mines. The horses drawing this Neptune are contained in two long cowlings which aid recognition, as does the long span narrow chord wing and the large triangular sail-like fin.

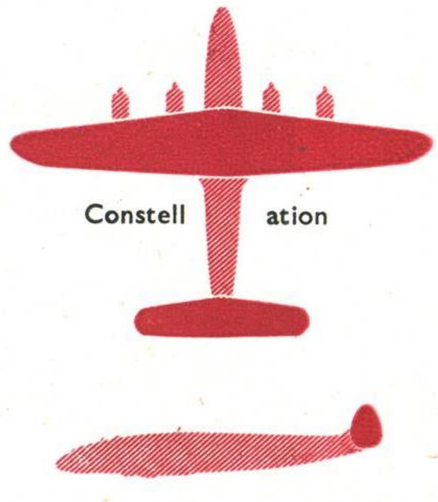
The apparent bulk of the Constitution comes of its double-bubble body form. In reality it is shapely and has slender fuselage proportions (see diagram above). Its four Wasp Major radial engines are dwarfed by the giant airframe. As we go to press there are rumours that a turboprop version of this 180-seater, 184,000 lbs., double-decked colossus is under consideration. Its "skyscraping" fin and rudder literally constitutes another recognition point. Note the typical "tipped-up" aspect of the wing-tip, also to be seen in the Constellation.



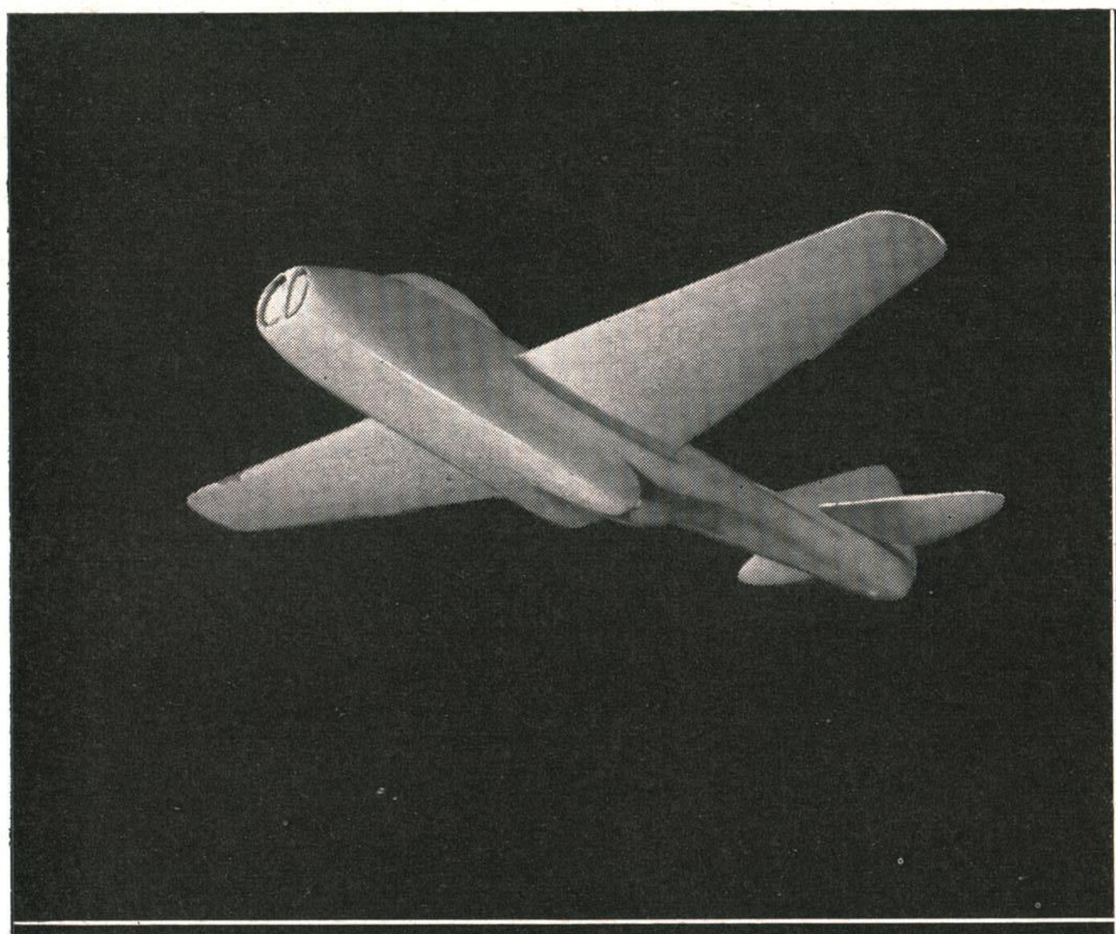



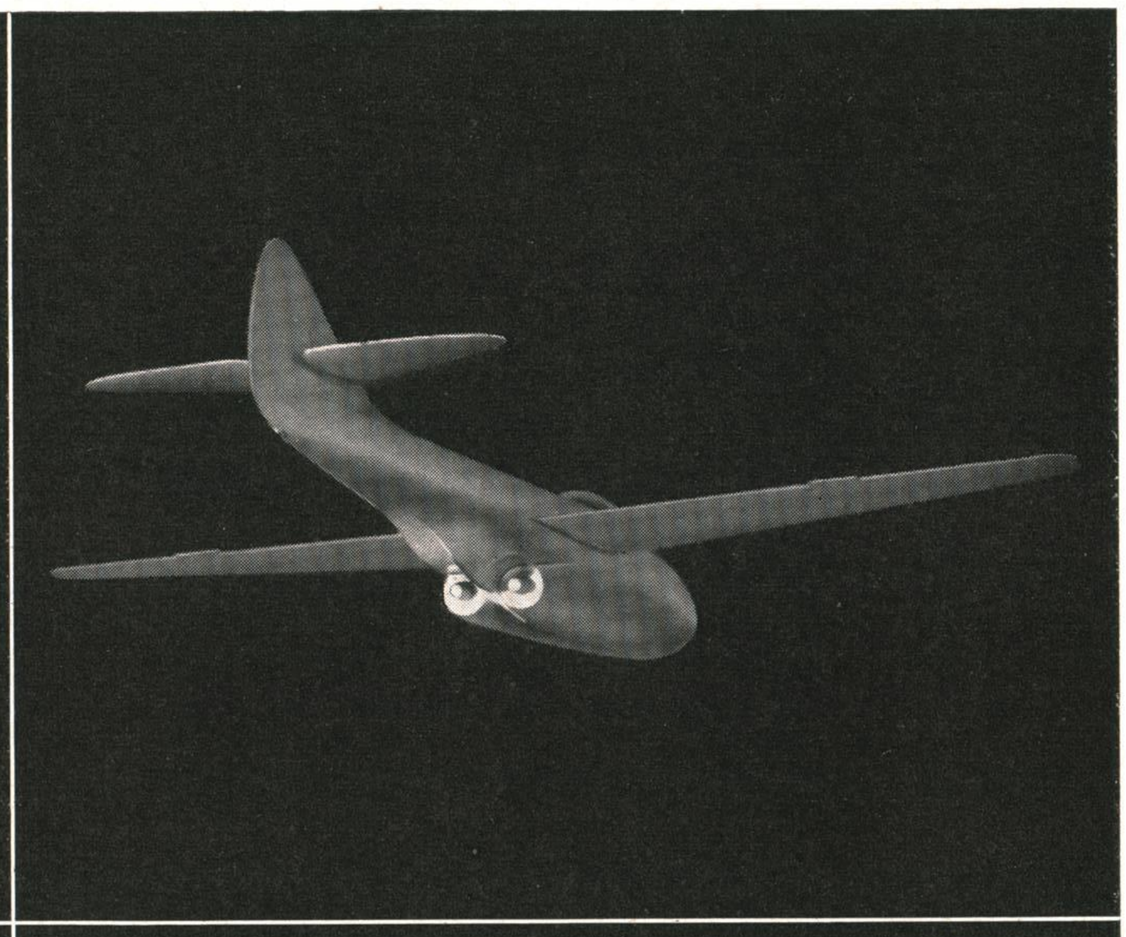



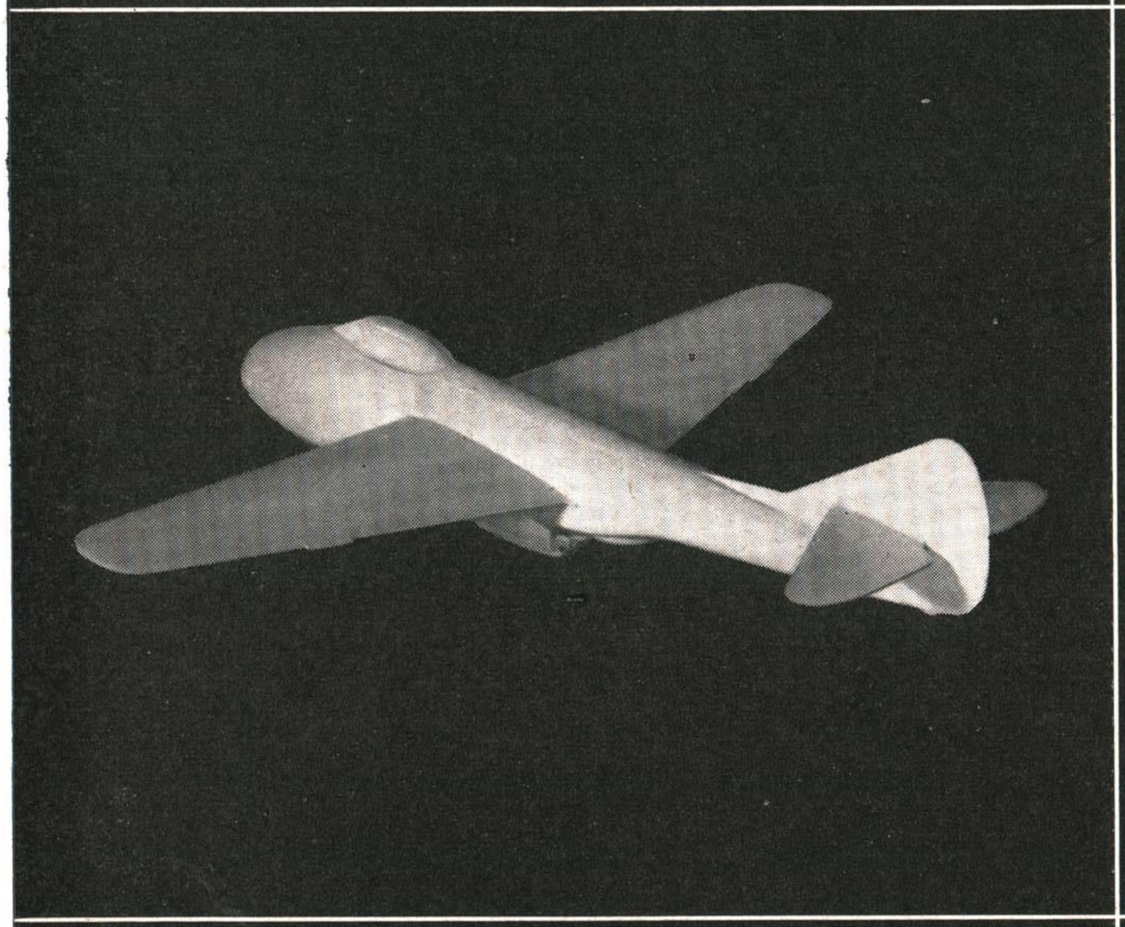



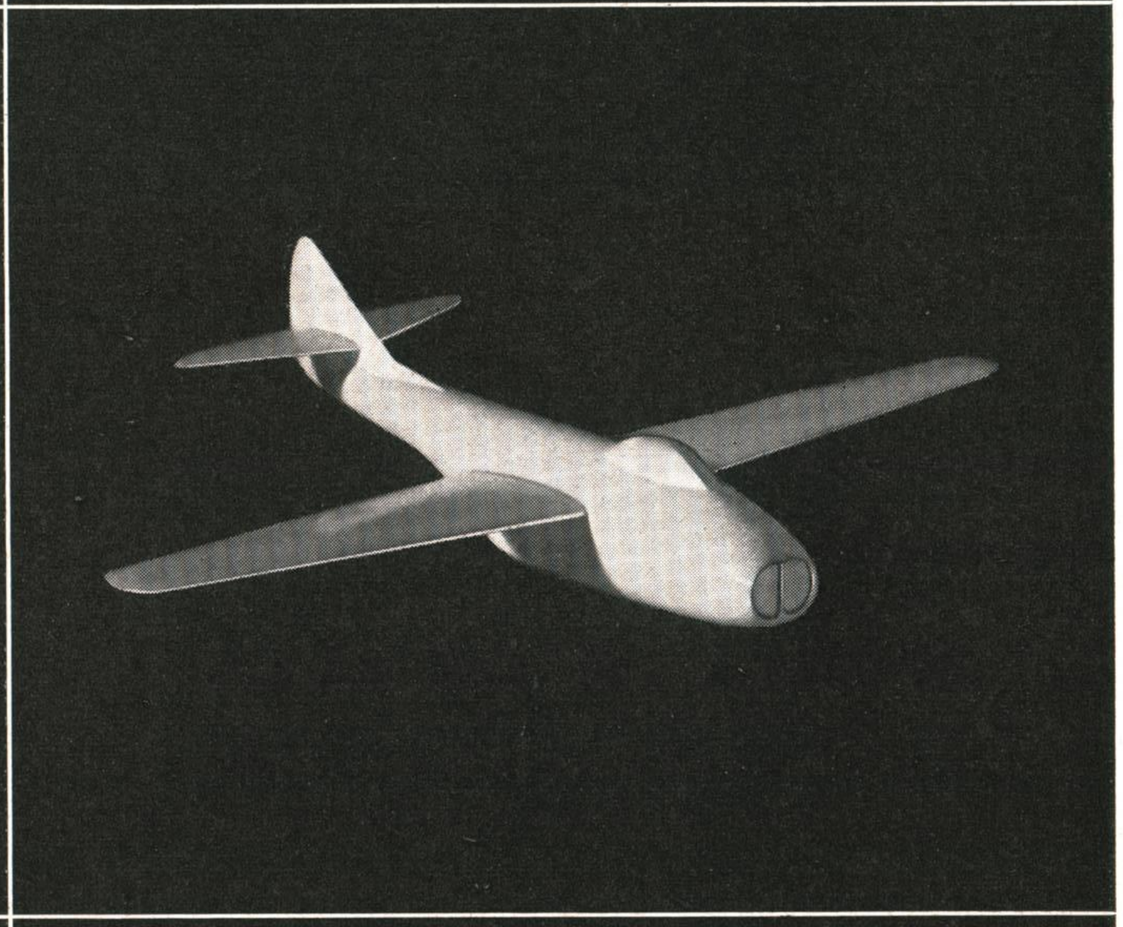



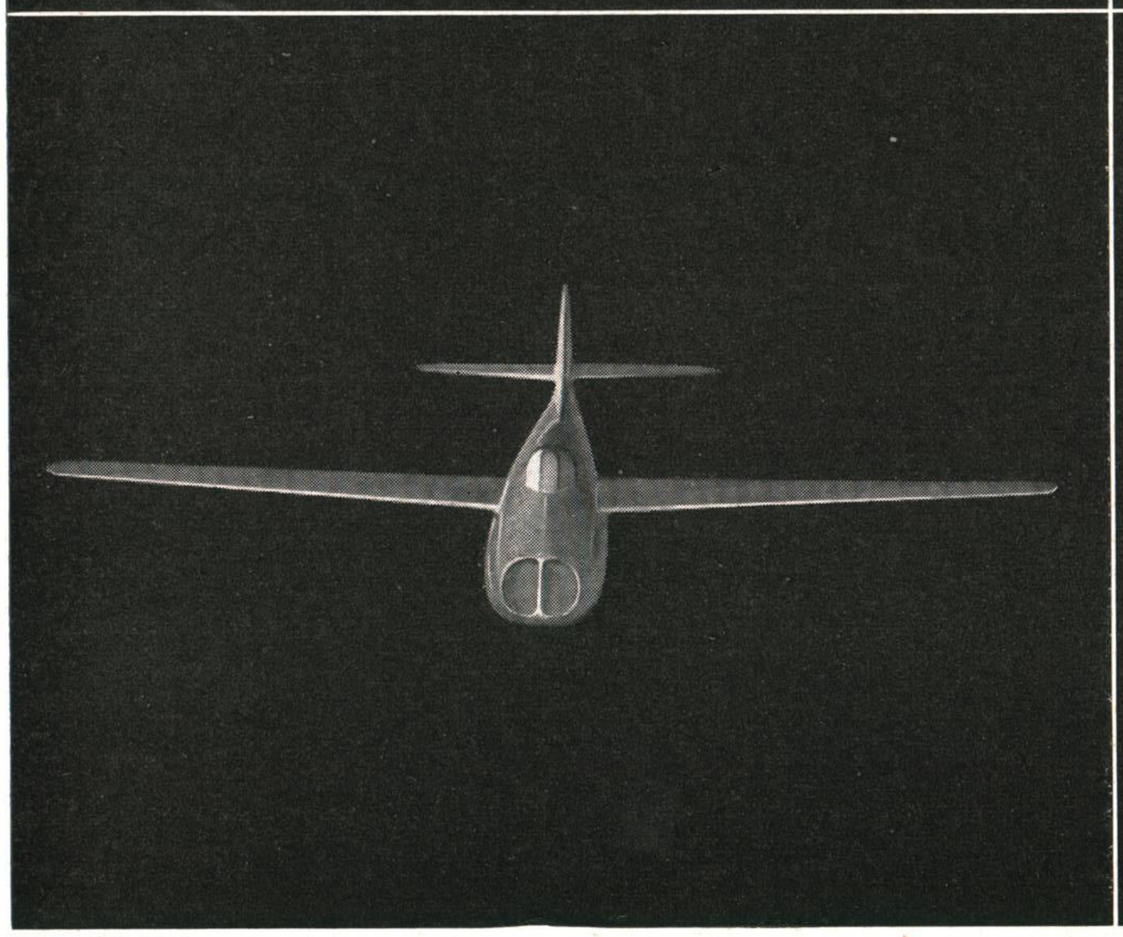
# MIG - 9

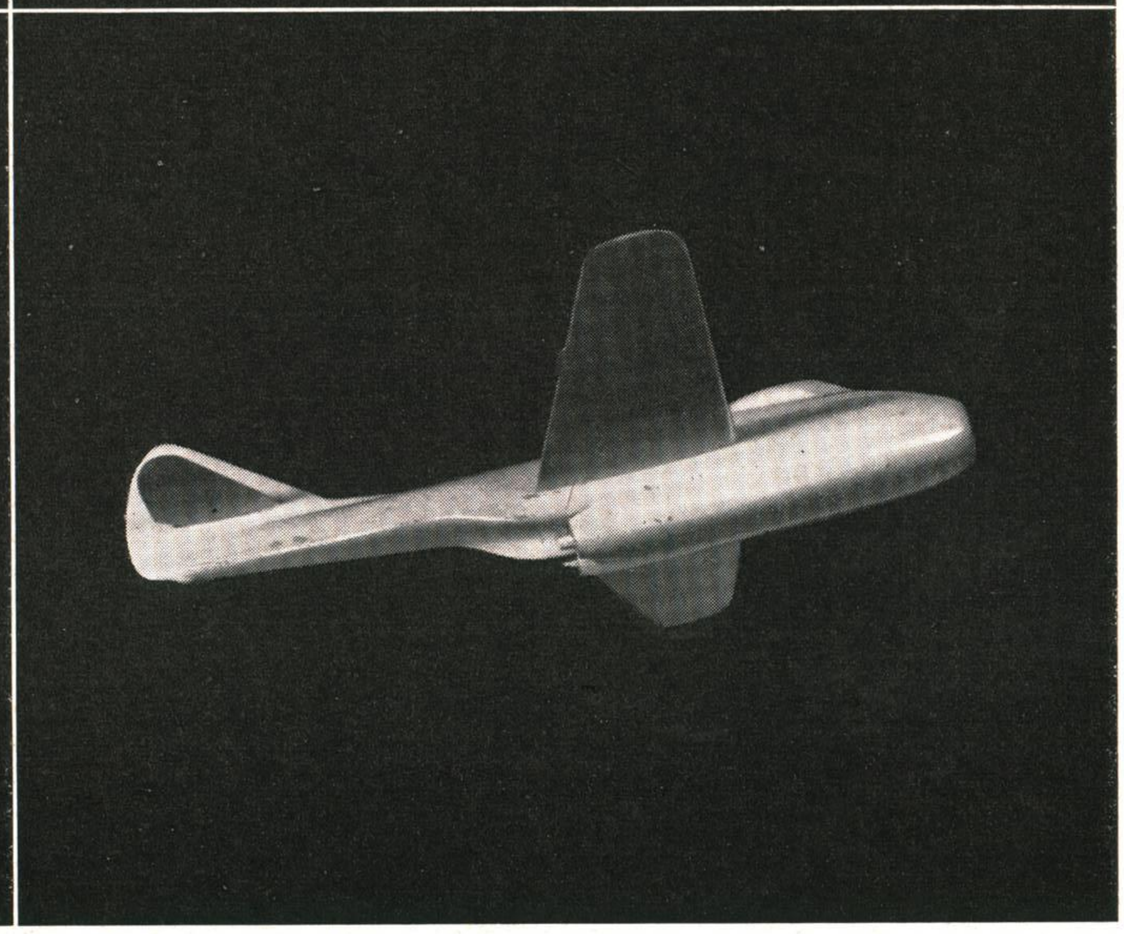


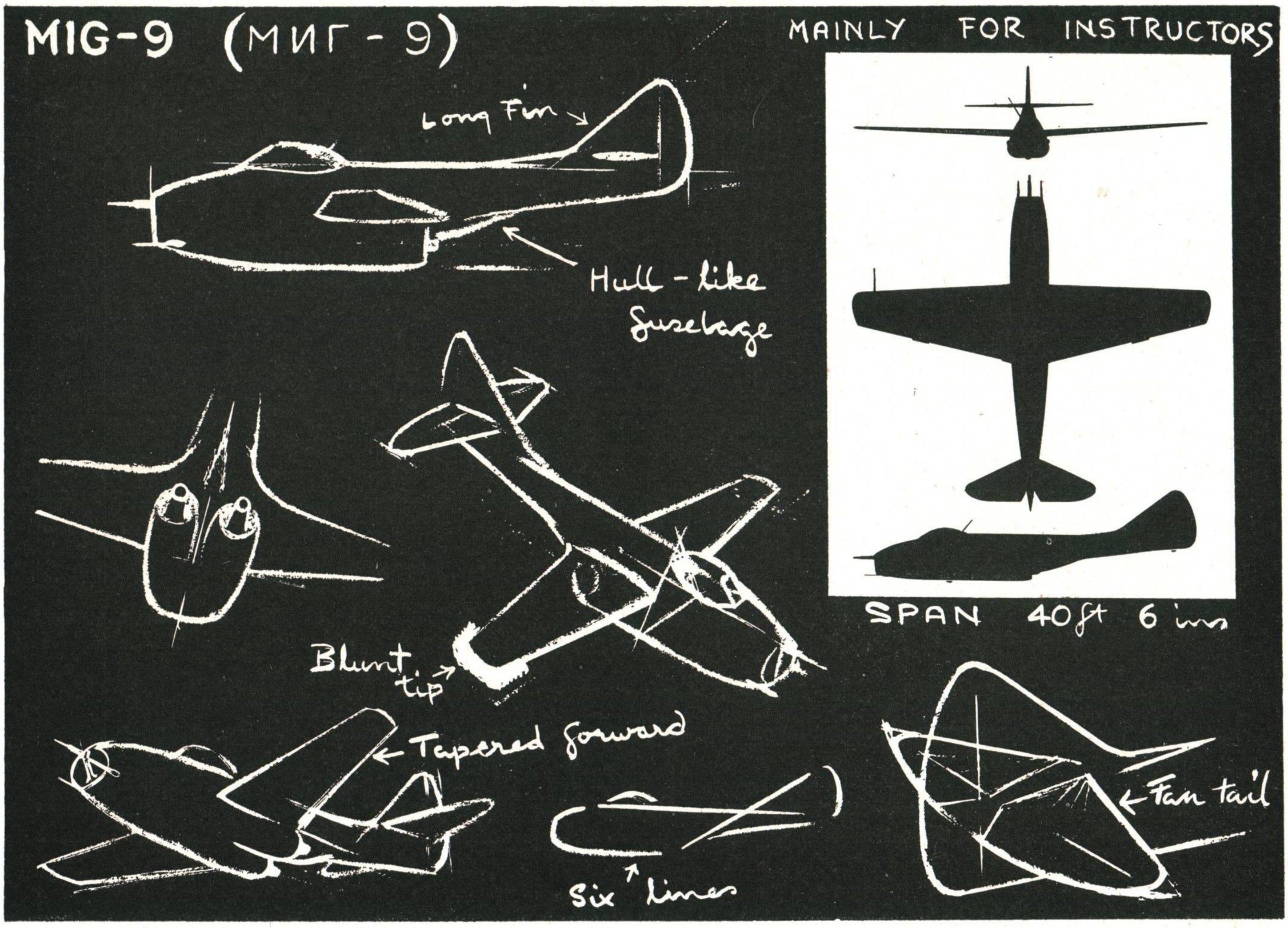













THE Royal Air Force and the Luftwaffe were the only Air Forces with jet-fighters in operation at the end of World War II. The Soviet Air Force (S.A.F.) had none, and wished heartily that it had, but immediately the Russians overran and swallowed up a large area of Germany they had part of the wherewithal in the form of comparatively well-tried turbojets of Junkers and B.M.W. (Bayerishche Motorenwerke) design. They had the other part in a well-tried Russian airframe, that of the YAK-9. So, arranging a marriage of convenience, they produced the YAK-15. Their other jet-fighter, the MIG-9, the subject of this lecturette, is possibly a slightly later job, and although originally Russian in design has always been powered by a turbojet of German original design. But whereas one could call the YAK-15 an interim model, or, less politely a " lash-up ", designed to get jet-fighters into squadron service at the earliest moment, the MIG-9 probably is not, at least, not to the same extent.

A. I. Mikoyan and M. I. Gurevitch (pronounced respectively MIKKO-YAAN and GOORAVICH) have long worked as a design team specializing in producing fighters. Readers will recall the MIG-1 and MIG-3 and in February last we illustrated their odd experimental tail-first design, the " UTKA ". They also designed a MIG-5 twin-engined fighter about which little is known and of which success was probably in like measure. As to what aeroplanes the missing mig-numbers between 5 and 9 represent is anybody's guess. Whatever they were, this designing pair have at least preserved in the MIG-9 something of the recognition characteristics of the tail-units of their earlier MIG-fighters 1 and 3.

It was during the Aviation Day Flying Display at Moscow in 1946 that a single jet aeroplane of the fighter type flitted tantalizingly across that particularly interesting strip of Moscow sky, over Tushino airport—a target for millions of eyes—and was gone. It was probably the prototype MIG-9. At the next year's show it came again with others of its kind, and on Aviation Day, 1948, even more were seen. The MIG-9 is probably now in squadron service in the S.A.F.

It may have some connection with the design of this fighter or it may not ; but it is significant, and seems to show at least that someone is pleased with the work of the MIG design team because in both 1947 and 1948 there were awarded Stalin Prizes (1st Class) of 150,000 roubles " for the creation of a new type of fighter ".

## TECHNICAL DATA :

*Type :* **Mid-wing monoplane with twin jets beneath fuselage and single fin and rudder.**

*Duties :* **Fighter.**

*Designers :* **A. I. Mikoyan and M. I. Gurevitch.**

*Engine :* **Probably 2 B.M.W. 003s of about 1,800 lbs. s.t. each.** (The MIG-9 will probably be re-engined as turbojets are improved in service.)

*Performance :* **Top speed 600 m.p.h. (250 knots).**

*Armament :* **One large cannon and two smaller cannon in nose.**

## RECOGNITION DETAILS.

*Wings :* **Mid, with dihedral from roots. In plan tapered (sharp) forward. Blunt wing-tips.**

*Engine :* **Twin jet units mounted below forward fuselage.**

*Fuselage :* **Long nose " bristling " with guns. From ahead appears to have onion-shape cross-section. From the side it is " stepped ", like flying boat hull tapering up towards stern.**

*Tailplane :* **Roughly fan-shaped like earlier Mig tailplanes and set on fin.**

*Fin and Rudder :* **Long sloping leading edge, rounded trailing edge—like half-open fan.**

*Main features :* **" Stepped " fuselage ; mid-set forward tapered wing, fan-tail set on cocked-up fin and rudder.**

# "BATTLE" OF MOSCOW

THE ROYAL OBSERVER CORPS GAZETTE

Vol. 2. No. 10 JUNE 1949

THE OFFICIAL ORGAN OF THE ROYAL OBSERVER CORPS

# A MESSAGE

FROM

## Air Commodore R. B. JORDAN,

C.B., D.F.C., A.D.C.

(*Commandant, Royal Observer Corps.*)

THREE YEARS have now elapsed since the announcement of the reorganization of the Royal Observer Corps and considerable progress has been made in the rebuilding of it. But your Corps is still only about half the size it should be and I am writing this in the hope that far greater efforts will be made to increase recruiting of both men and women. Especially do we need far more of the so-called "weaker sex". It is, as you know, in the Centres that we need the women most for duty as Plotters, Tellers, etc. During the last war, women played a very important part in the Royal Observer Corps, as they did everywhere else, and I feel confident that they will come to our aid and help put the R.O.C. back on its feet again.

I should like every man and woman now in the Corps to try to get at least one recruit each of either sex during the year 1949. If this is done, and it doesn't really appear a very big thing to do, we will double our present strength. There will, however, always be a certain number of personnel who will leave the Corps each year.

Now I should like to emphasize the tremendous importance to the operational efficiency of the Corps in putting everything we have into a recruiting drive for observers and especially for women observers. Without adequate numbers of women to man our Centres, our observers at their Posts are useless, because their information cannot be collected and passed upward to the R.A.F. Operations Rooms of Fighter Command.

You all know what a weak link there is in this respect at the moment. It is, therefore, the very first thing that we have to put right if the Royal Observer Corps is going to carry out its duties to the nation and prove that a voluntary citizen force, even in these days, is still second to none.

So let each one of us make the resolve to procure at least one recruit during 1949 for the R.O.C., and let our recruiting slogan be "Ladies first" until we have closed the gap at the Centres.

R. B. Jordan

## ROYAL OBSERVER CORPS CAMP

**R.A.F. Station, Thorney Island,**

**23rd August to 24th September, 1949**

As most members of the Royal Observer Corps will already know, the annual camp, which proved so valuable and so popular last year, is to be repeated again this year on a somewhat larger scale. There will be, in fact, five separate camps, each of four days' duration: each camp will accommodate 600 R.O.C. officers, men and women observers on each occasion. Thus, something like 3,000 members of the Royal Observer Corps will have the opportunity of being at camp with their fellow observers and have a good chance of exchanging experiences, and of enjoying the camp's amenities and entertainments. On the instructional side there will be a number of lectures from prominent personalities in the Services, the British Aircraft Industry and its associated Industries. They will talk on all sorts of matters of interest to observers including such things as meterology, aircraft recognition, post and centre procedures and so on. Films will also be shown.

The five camps assemble and disperse on the following dates :—

| | | | | |
|---|---|---|---|---|
| 1st | Camp : assemble | 23rd August, | disperse | 28th August. |
| 2nd | ,, ,, | 29th August | ,, | 3rd September. |
| 3rd | ,, ,, | 5th September | ,, | 10th September. |
| 4th | ,, ,, | 12th September | ,, | 17th September. |
| 5th | ,, ,, | 19th September | ,, | 24th September. |

It is hoped that all who attend the camp will have an enjoyable and instructive time.

# THE MEANING AND USE OF CLOUDS

**by Wing-Commander R. M. POULTER, O.B.E.**

" I pray thee, put into yonder port,
For I fear a hurricane.
Last night the moon had a golden ring,
And to-night no moon we see !"

LONGFELLOW : "*The Wreck of the Hesperus.*"

FIRST OF ALL we must divide our clouds into two categories ; those of fair and those of bad weather. We will consider fair weather clouds first.

**Fair Weather Clouds**

Cumulus clouds—like tufts of cotton wool in spring and summer skies—are fair weather clouds and have a definite message for those who can read them aright (Fig. 1). They form on sunny spring and summer mornings with a base at about 2,000 ft., the cloud base being at the condensation level. This is the level at which rising air is saturated with water vapour and the vapour condenses out in the form of clouds. We can find this condensation level if we know

Fig. 1. Fair weather cumulus.

the air temperature in the shade at ground level and the dew point. (The dew point is the temperature at which the air will hold no more water vapour and, if the air is cooled beyond this point, the vapour condenses to form cloud. Dew is condensation taking place at the earth's surface.) Thus, if on a sunny spring morning we have a temperature of 50° F. and a dew point of 40° F., by multiplying the difference between these two figures by 220 we get the answer of 2,200—which is the height of the cloud base in feet. Similarly on a bright summer morning we may find the air temperature to be 60° F. and the dew point 50° F., this again gives 2,200 ft. for the condensation level—i.e. the cloud base. By the afternoon, however, it is probable that the air temperature will have gone up to 70° F. though the dew point has probably remained at 50° F. and by working out our sum again we find that the cloud base has gone up to 4,400 ft., having risen progressively with the temperature. Thus we have some sort of yardstick for judging the height of aeroplanes in the lower levels of the atmosphere.

The tops of cumulus clouds vary according to the instability of the atmosphere : broadly speaking, unstable air is air which is easily upset by warming from the ground—bubbles of air rise rather like the bubbles in boiling water—the cumulus clouds being the tops of the bubbles (see diagram 1(a)). Temperature readings taken aloft indicate the extent of the instability. The tops of small cumulus clouds may be at 4,000 ft. ; those of large cumulus clouds at from 6/10,000 ft. ; whilst, when developed into towering cumulo-nimbus clouds giving showers and thunderstorms, tops may go up to 20,000 ft. and, in severe conditions, to 30,000 ft. or higher. Incidentally, the blackness of a thundercloud is not due to discolouring, it is simply due to the absence of light. On the sunny side most of the light is reflected and

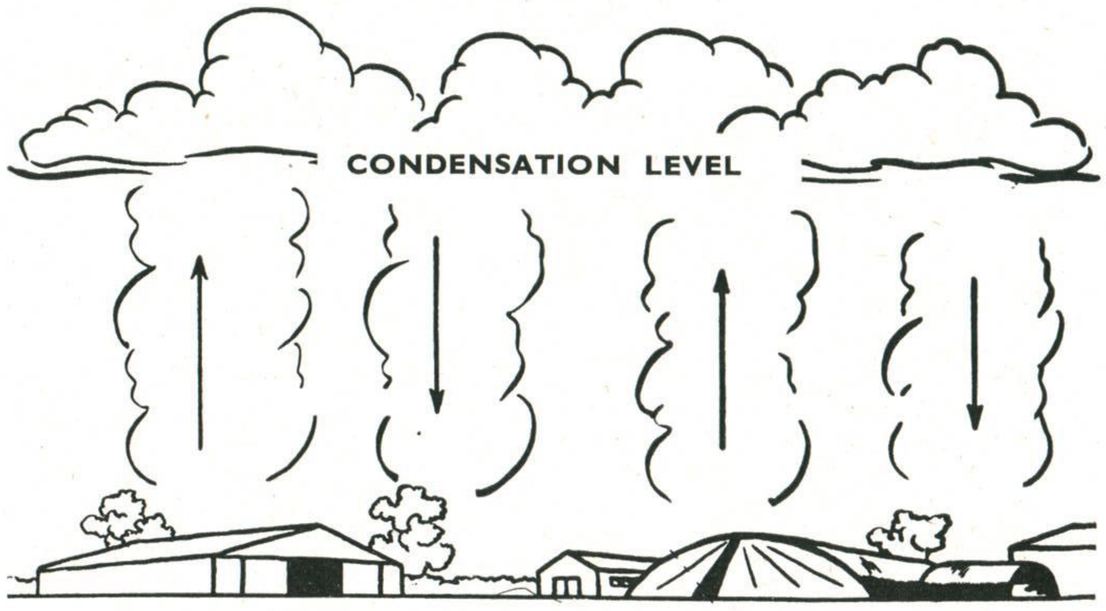



Fig. 1 (a). How air " boils up " to form cumulus clouds.

Fig. 2. A towering shower cloud. (Photo : G. J. Jefferson).

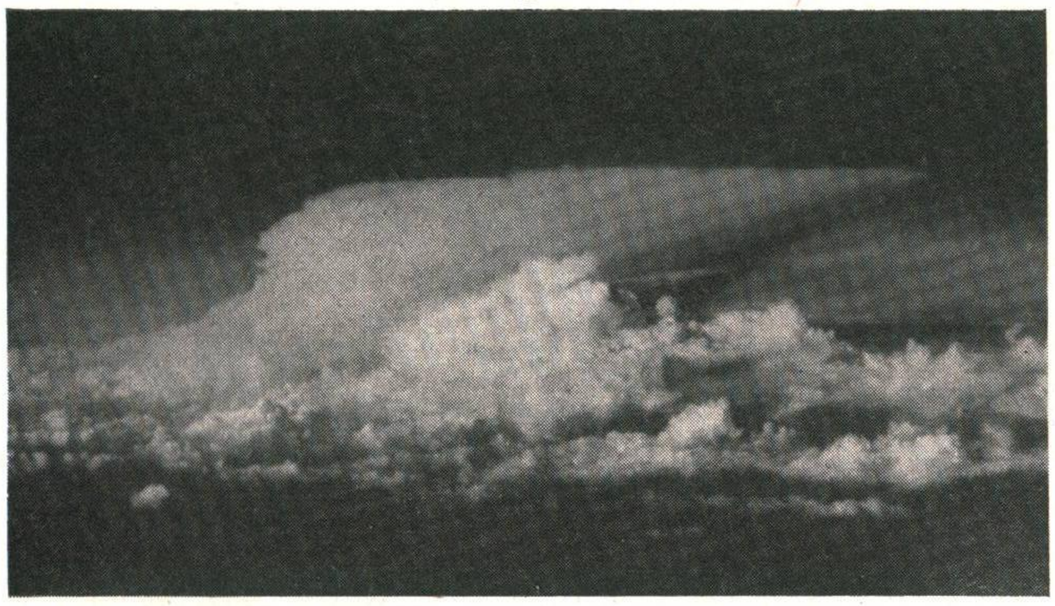


Fig. 3. A giant cumulo-nimbus cloud.

very little light gets through to the other side or to the base, so it remains dark. It is a ready indication of its depth.

The striking picture above, taken by a navigator of 1409 Flight, shows an enormous cumulo-nimbus cloud over Sussex at 1810 hours on 6th August, 1944 ; its base was at about 6,500 ft. and the top of the " anvil " reached 34,000 ft. On this particular occasion thunderstorms were reported from Surrey. (Figs. 2 and 3).

**" Such Stuff as Dreams are made On "**

Most of the clouds we see are composed of water drops. In the clean air at cloud levels, water vapour condenses into water drops (*not* ice crystals) even down to temperatures as low as −40° F. This is quite surprising when we are accustomed to find ice forming on the roads and trees at a little below freezing point (32° F.). For this reason a knowledge of the height of the freezing level in the atmosphere is of no help in estimating cloud heights by visual methods.

Cirrus clouds are the only ones composed of ice particles. They are the clouds which form haloes round the sun and the moon ; they also form " marestails " and occur mostly at heights of 5-6 miles above the ground.

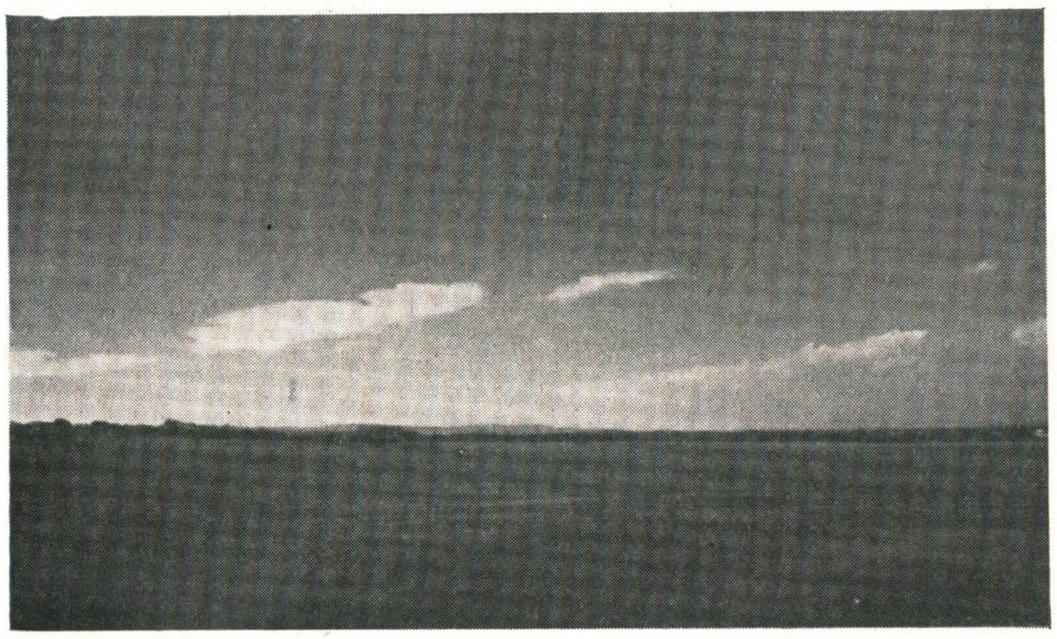


Fig. 4. Cirrus at 32,000 ft. seen from Farnborough.

The actual height of these clouds is often deceiving. Early on the morning of 29th September, 1937, at South Farnborough, a patch of opaque white cirrus cloud was seen slowly approaching from the south-west ; judging by its whiteness, its height was estimated at about 20,000 ft. By mid-day it was overhead and appeared as a characteristic " tangled web " cirrus. By good luck Flight Lieutenant White, a test pilot, was going up to 33,000 ft. so that it was possible to describe the cloud to him and ask him to make all the observations he could on it. He found no cloud until he was at about 32,000 ft., and although the cloud was clearly visible from the ground it was invisible at his eye level, but slightly below him there seemed to be an almost imperceptible film which might easily have been overlooked. The pilot put out his hand to feel, if possible, whether ice crystals or anything like it were present : he felt an extremely fine dry powdery dust of ice crystals blowing against his hand (Figs. 4 and 5).

**Haloes for Everyone**

The near-full moon on the 8th February, 1949, shining from an apparently clear sky was seen, from the Home Counties, to be surrounded by a large perfect circle of light which lasted all the evening. It was a lunar-halo formed by the ice particles in a thin sheet of cirro-stratus cloud at a height of some 30,000 ft. Had there been no moon to shine through the Cirrus and produce the halo, this cloud would have been undetected by an observer on the ground. (The photo by G. A. Clarke gives an impression of such a halo.) This particular halo was the forerunner of rain, of which it gave 12 hours' warning.

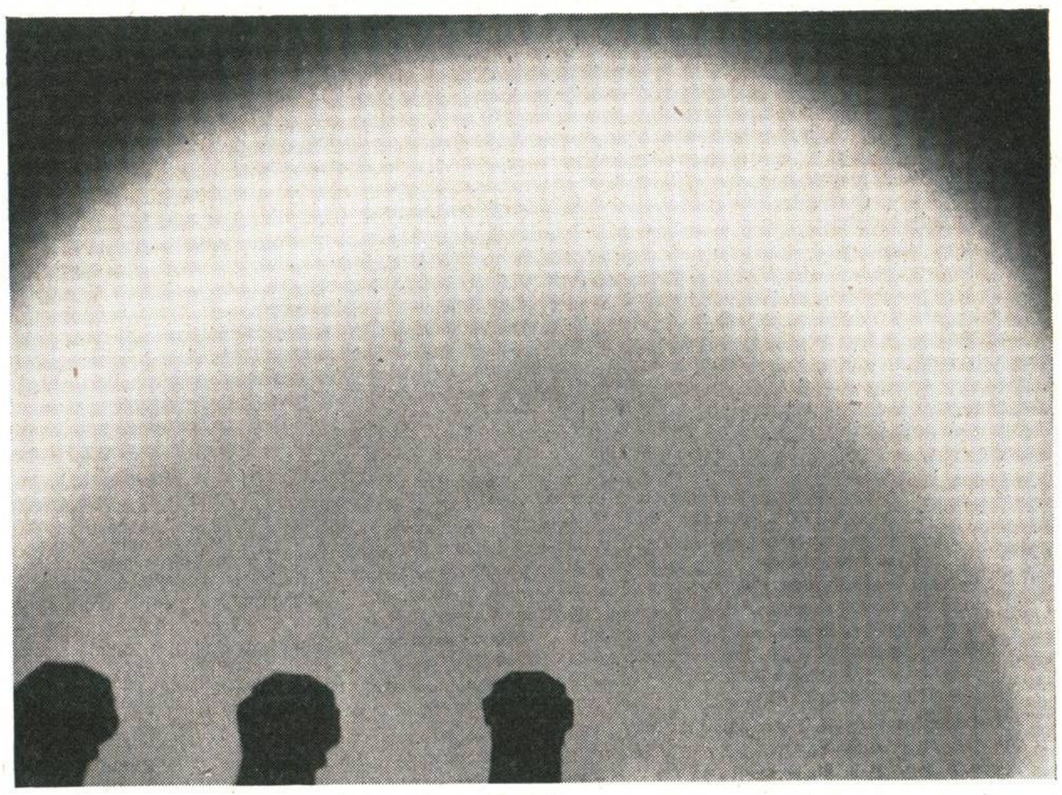


Fig. 5. Photo of halo. (Photo : G. A. Clarke).

Haloes (lunar or solar) should not be confused with coronæ (a halo is made by ice crystals ; a corona by water droplets). You can be sure it is a halo by taking a hand measurement. Extend your arm (towards the sun or moon as the case may be) with thumb and little finger spread as wide as possible. With the thumb nail covering the sun or moon, the little finger will rest upon the circumference of the halo ; if it is a 22° halo. If the little finger fails to reach the circumference, it may a 46° halo (a very rare phenomenon).

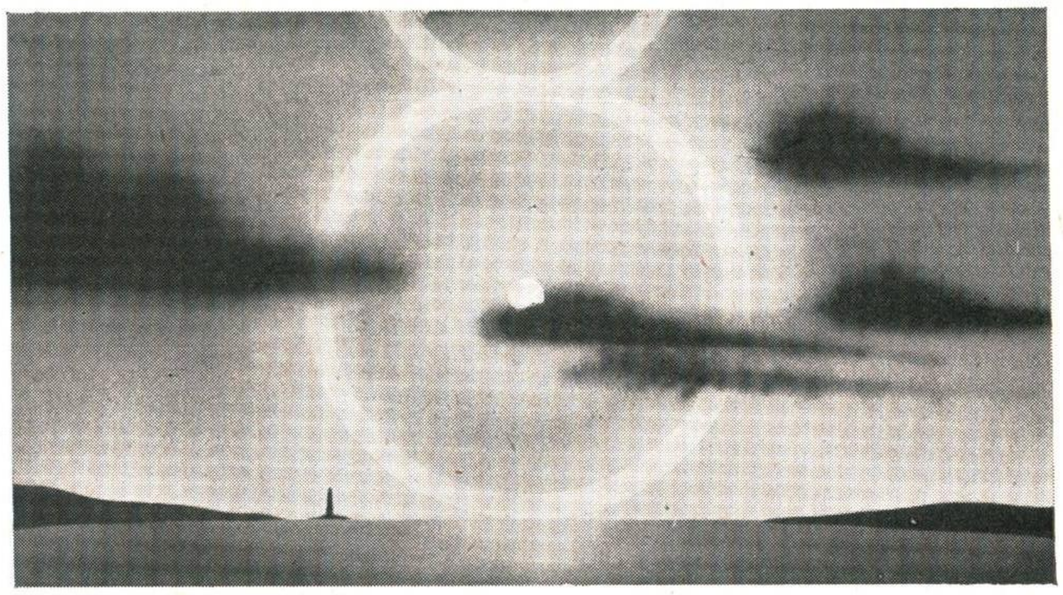


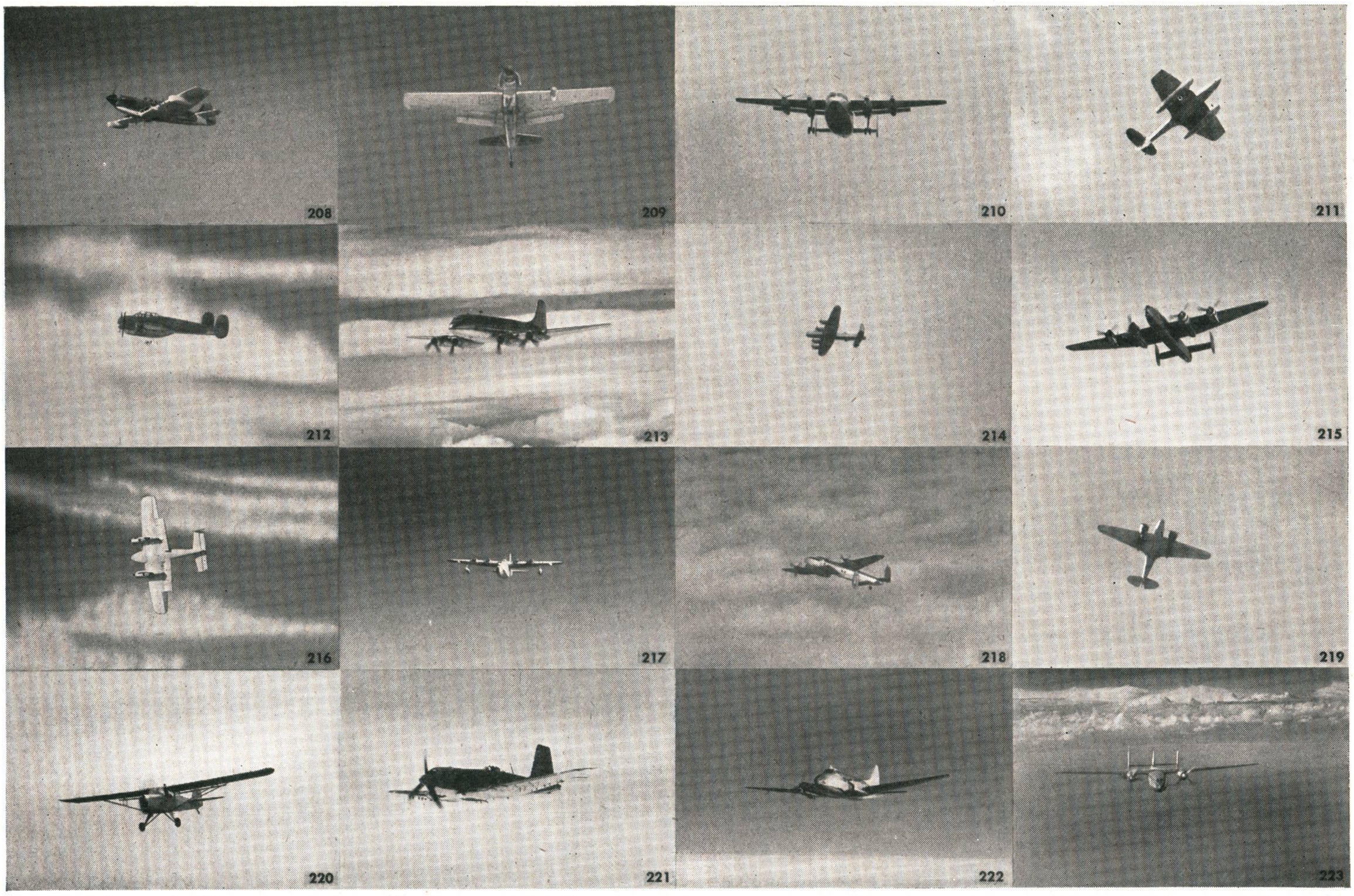
Fig. 5 (a). Drawing of a full halo. (No ordinary camera can take in a full halo).

Any other circular image of any kind surrounding the sun or moon inside the circumference upon which the little finger is resting is probably a corona. (Fig. 5(a).).

(*To be continued.*)

# AIRBORNE HEADACHES

**No. 9**




The answers to Airborne Headaches No. 9 must be sent on a postcard to reach Group Headquarters by 15th August, 1949. Group Headquarters will forward answers so as to reach Area Training Officers by 22nd August, 1949.

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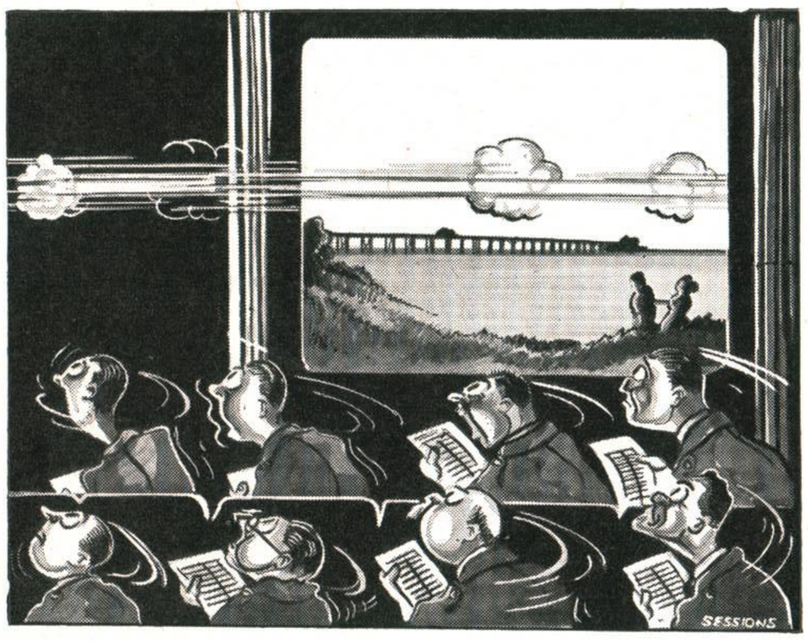
## R.O.C. INTERMEDIATE TRAINER COMPONENTS

| *Aircraft* | *Structure* |
|---|---|
| 1. Stratocruiser | Nose |
| 2. PE-2 | Cockpit |
| 3. Avenger | Mid-upper turret |
| 4. Sea Otter | Engine nacelle |
| 5. YER-4 | Wing and engine |
| 6. Black Widow | Cockpit |
| 7. Invader | Rear cockpit |
| 8. King Cobra | Intake on fuselage |
| 9. Hastings | Fin and rudder |
| 10. Ambassador | Fin and rudder |
| 11. Windsor | Tail-turret |
| 12. Ventura (Harpoon) | Central gun position |
| 13. Privateer | Gun-blister |
| 14. Invader | Under-gun |
| 15. Hastings | Fuselage door |
| 16. Wellington | Side window |
| 17. A-7 | Tail-skid |
| 18. Mitchell | Turret |
| 19. Sea Hawk | Float |
| 20. IL-4 | Nose |
| 21. Tiger Cat | Engine and nacelle |
| 22. Shetland | Wing float |
| 23. Spearfish | Wing |
| 24. Helldiver | Undercarriage door |
| 25. Sea Fury | Wing root intake |
| 26. PE-8 | Engine and nacelle |
| 27. Corsair | Undercarriage door |
| 28. Mercury (M.28) | Flap |
| 29. Mariner | Tail plane |
| 30. Ventura (Harpoon) | Wing-flap |
| 31. LA-9 | Undercarriage door |
| 32. Bearcat | Undercarriage door |
| 33. Wayfarer | Outer wing panel |
| 34. Mercury (M-28) | Undercarriage fairing |
| 35. Mariner | Wing float |
| 36. King Cobra | Wing gun |
| 37. Dove | Engine and nacelle |
| 38. YAK-6 | Engine and nacelle |
| 39. Shooting Star | Intake |
| 40. MDR-6 | Wing |



## THE MASTER TEST

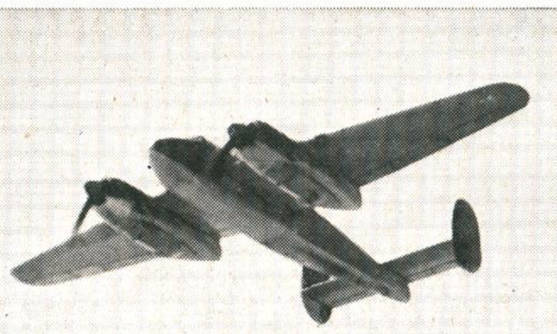
***Laugh it off***

***with Sessions !***

" There I was . . ." A MIG-9 jet-fighter, pride of the Soviet Air Force " shoots down " two twin-engine Tupolev Tu-2 bombers with all the ease and grace of a well rehearsed act—which it probably was. It looks as if the fighter would have got a third bomber if the TU's smoke-making plant had functioned more quickly. The " attack " is not due to bad recognition on the part of the fighter-pilot ; the whole thing was a friendly affair for the benefit of spectators at Moscow's Air Display on the 21st July, 1948. This view gives excellent impressions of the aircraft taking part in the " battle " : the MIG-9, looking rather like an aerobatic tadpole at this distance, displays fin and rudder characteristics dear to the MIG design team. The Pride of Tupolev shows a diamond-shape wing ; long radial engine nacelles and the stubby tail-plane with end-plate type fins and rudders. Closer views of some of these TU-2s were published in the February, 1949 *Journal*, and an enlargement of this shot of the MIG-9 appeared in the March edition (Silhouettes : MIG-9, previous page ; TU-2, January, 1948 *Journal*.)

# ELEMENTARY SPOTTING

Recognition Test No. 94



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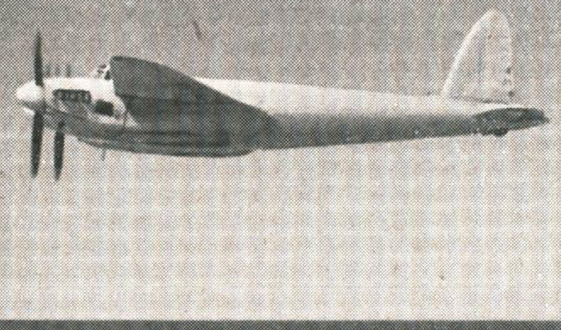

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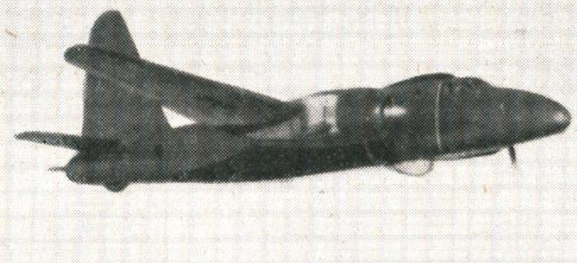

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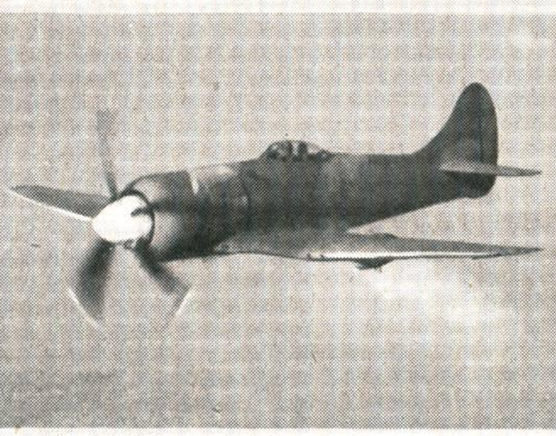

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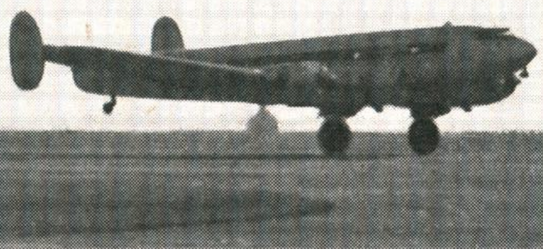

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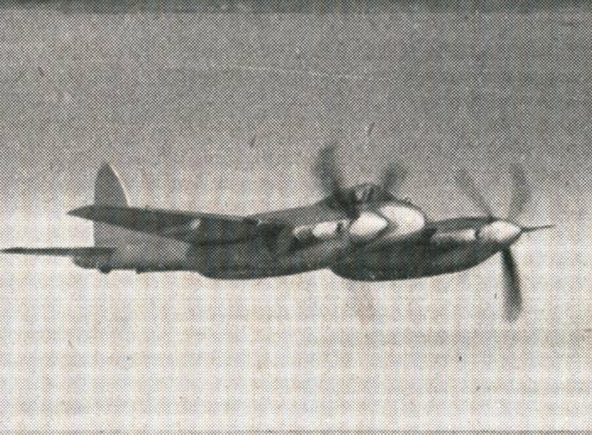

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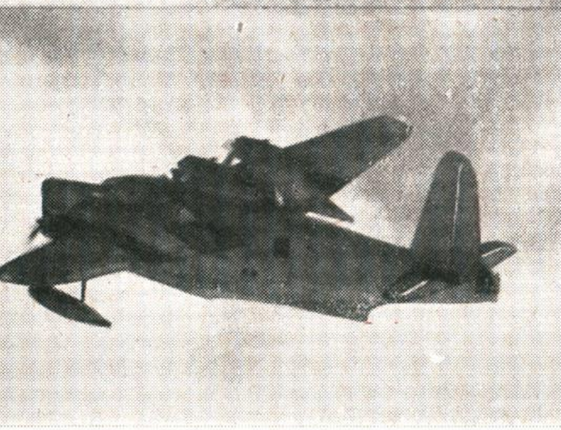

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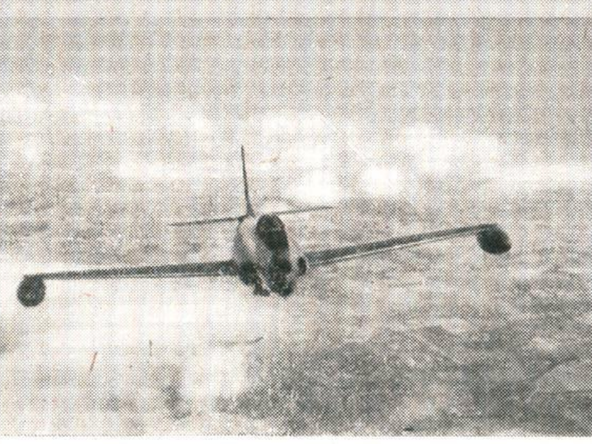

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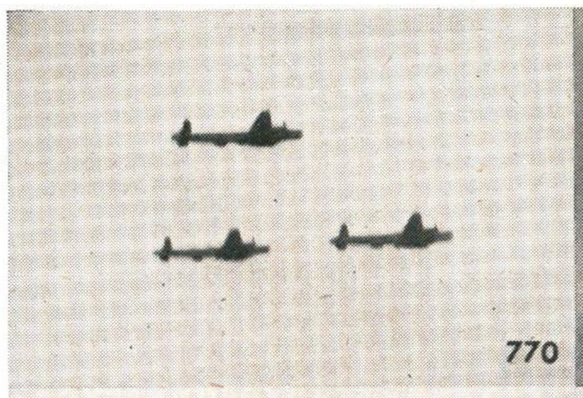
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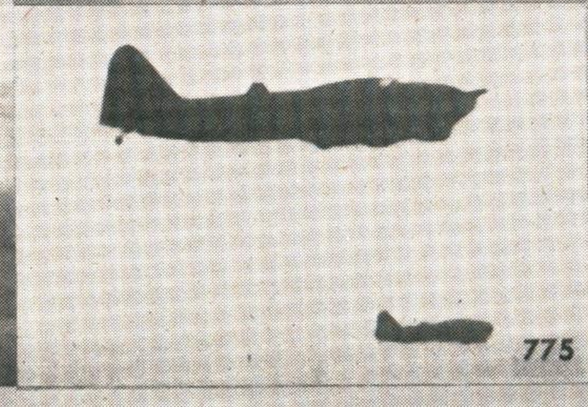
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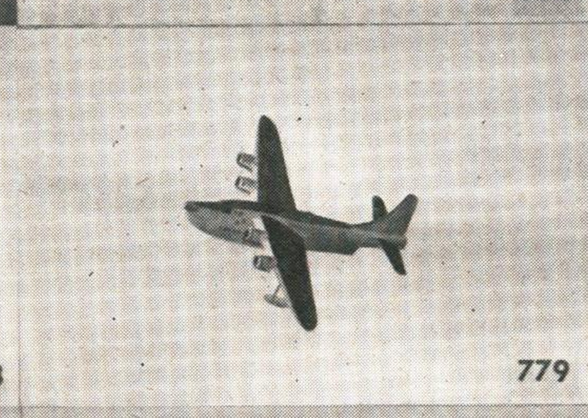
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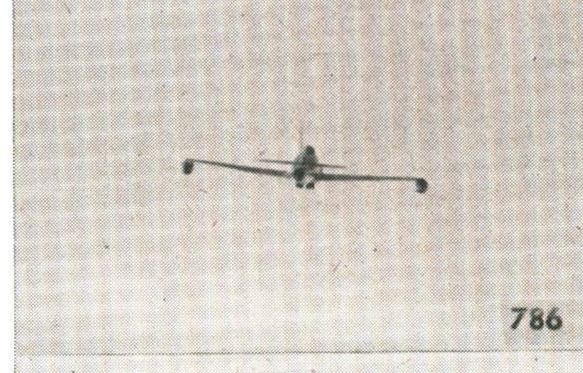
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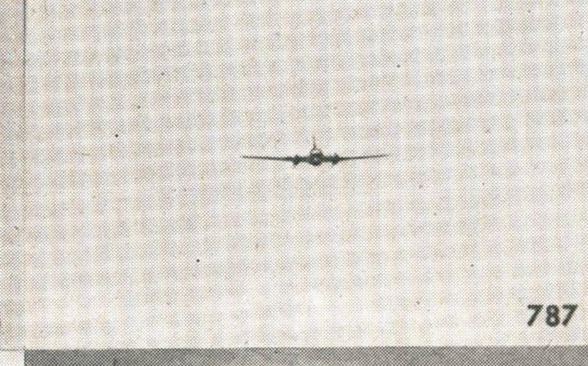
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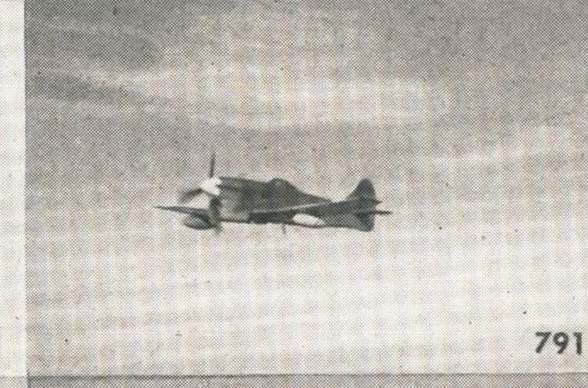
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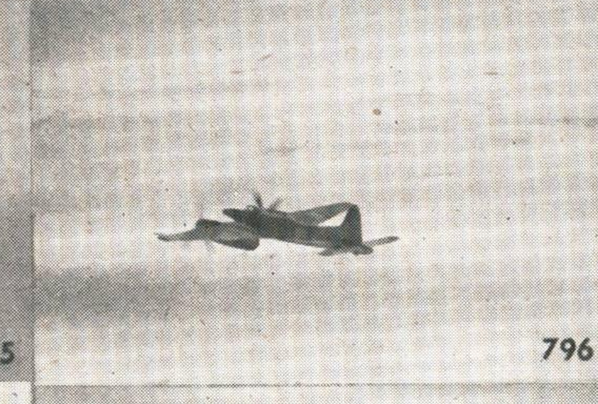
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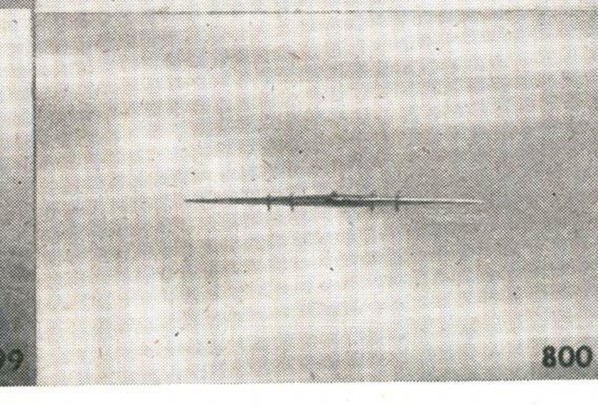
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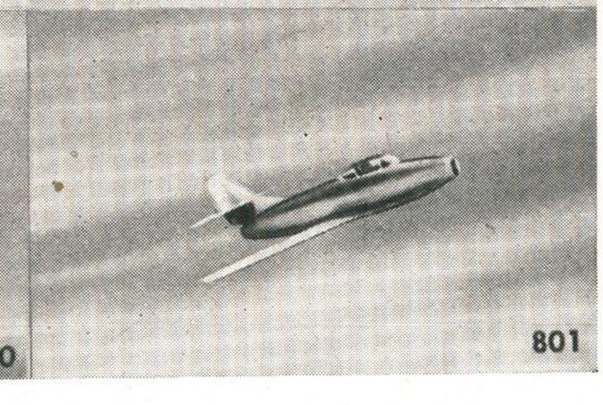
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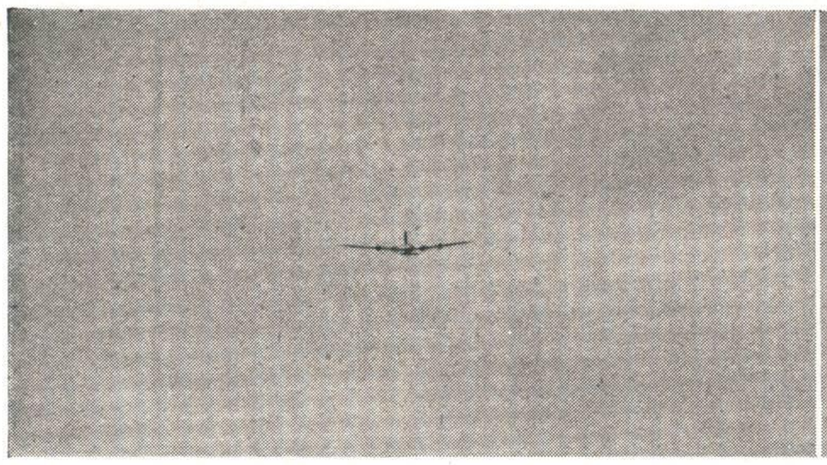
# ADVANCED SPOTTING

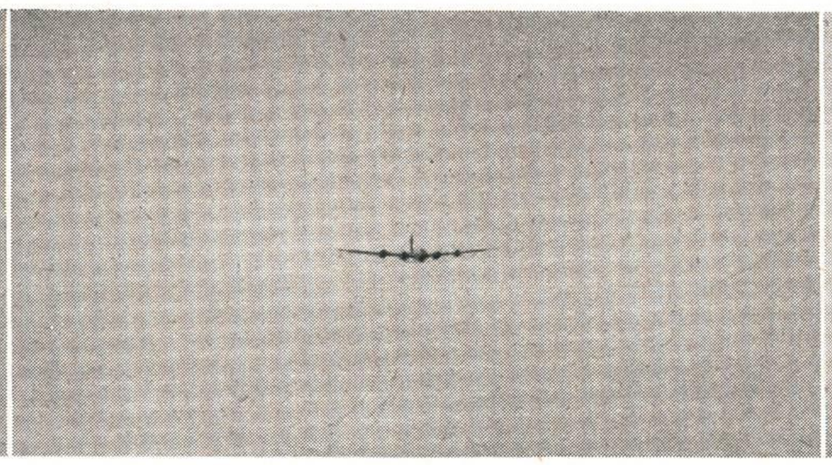
Recognition Test No. 95

# What's the score?

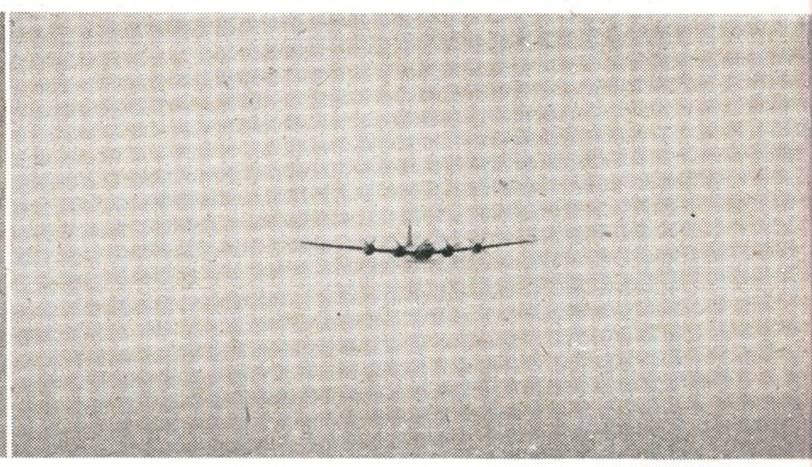
No. 4



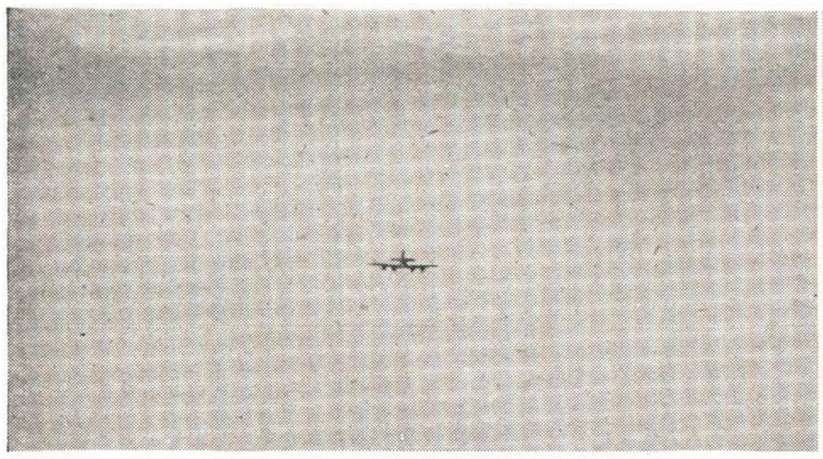
Four engines—? mid-wing——



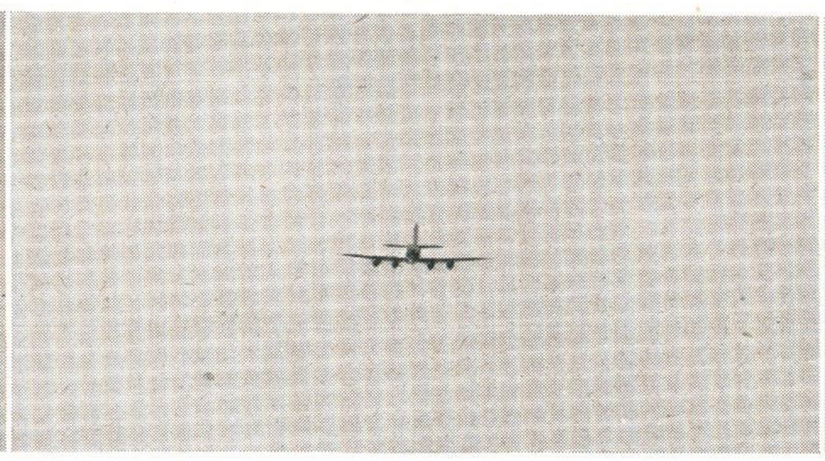
mid-wing with moderate dihedral angle from roots—single fin and rudder——



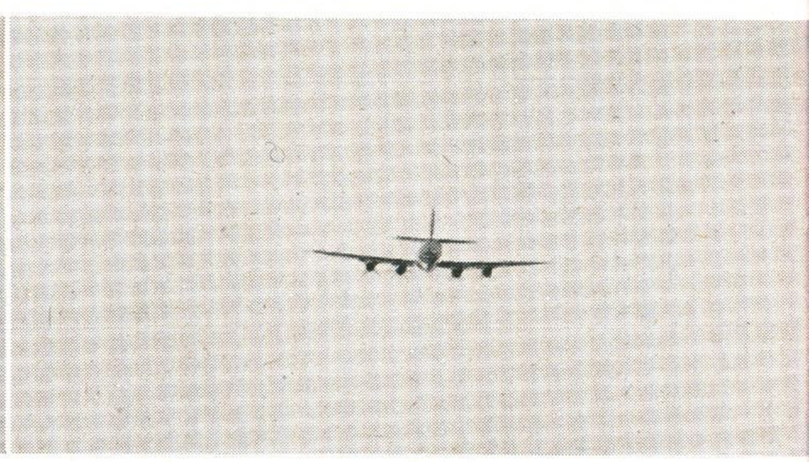
wide span wing—centrally mounted engines——



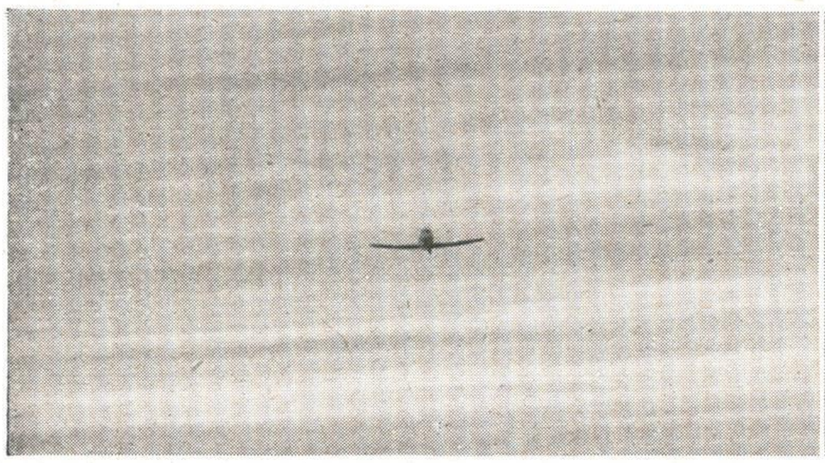
Four underslung engines on low wing——



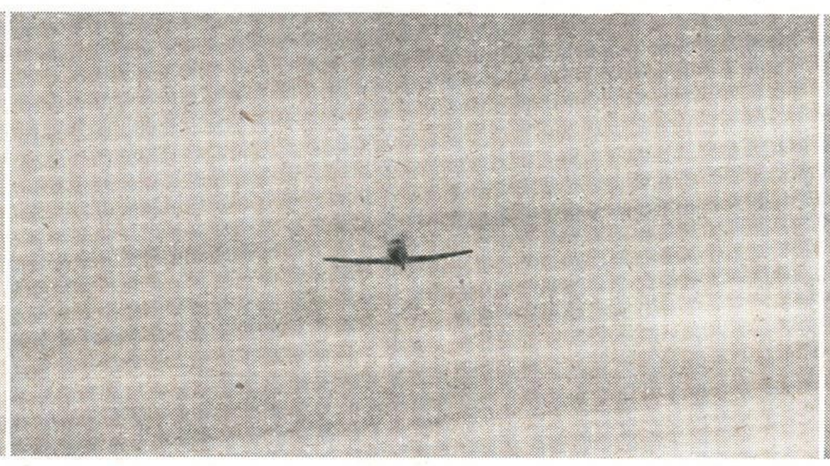
single fin and rudder—high tail—? thick wing——



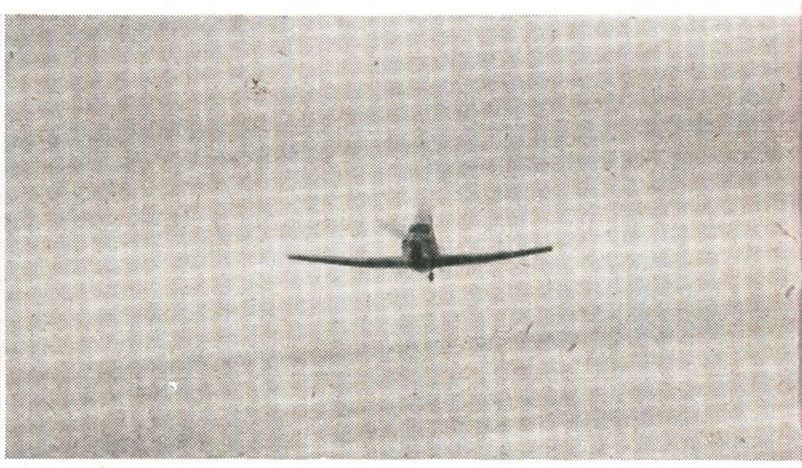
radial engines—slight wing dihedral angle——



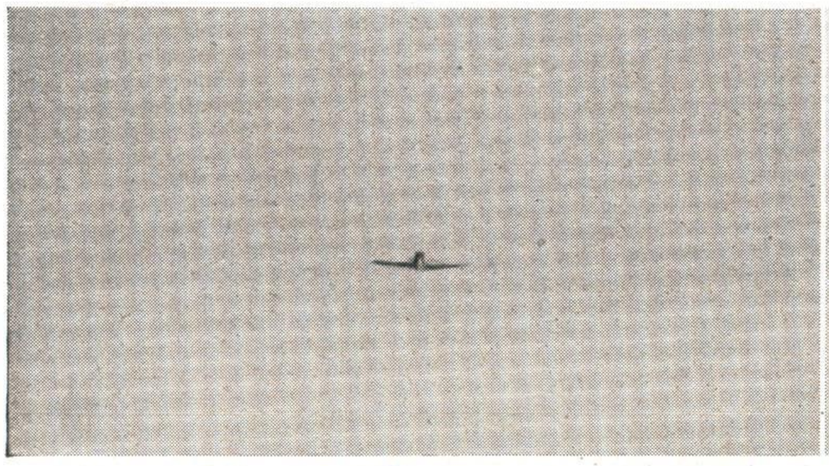
Single engine, ? radial—low wing with dihedral angle——



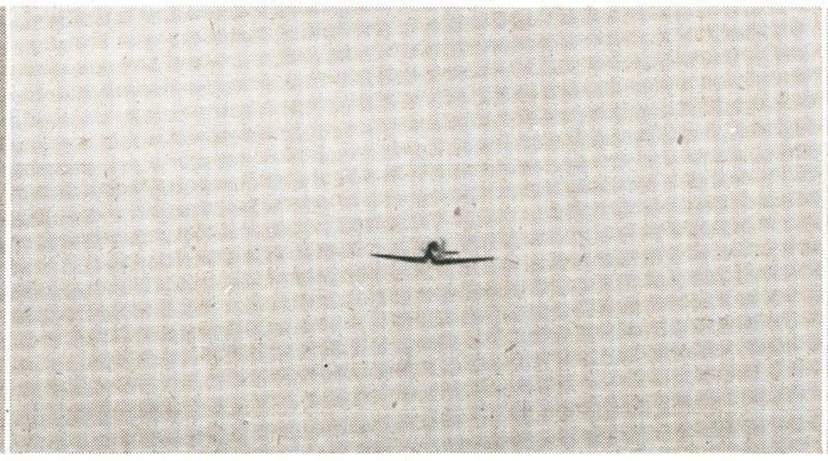
? cranked wing—high cockpit——



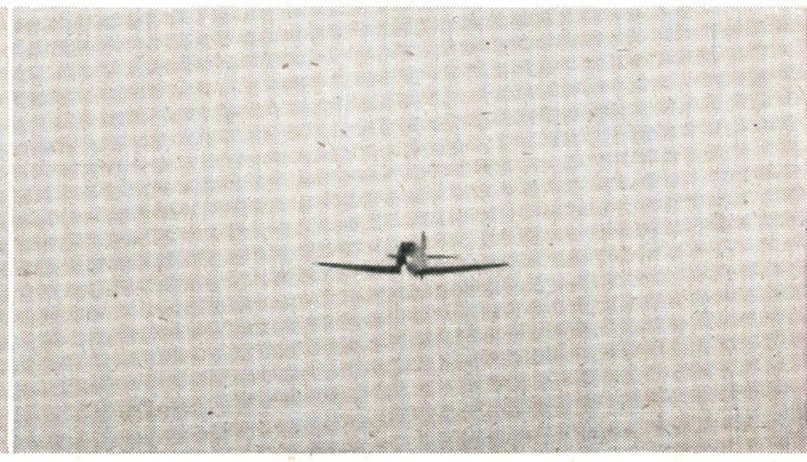
?Merlin-type engine—single fin and rudder——



Low wing—single engine—high cockpit—?shallow dihedral angle in wing——



single fin and rudder—only slight dihedral in wing——

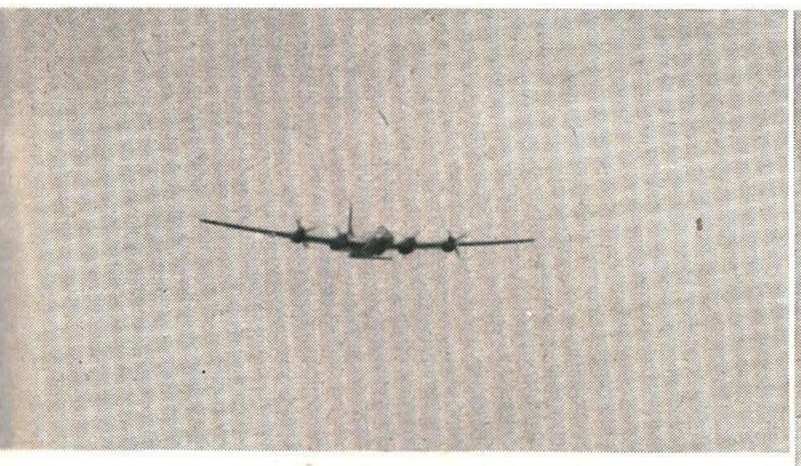


?Merlin-type engine—squarish cockpit canopy——

*Our views of multi-engine aircraft show how engine and wing arrangements aid recognition. Both aircraft are in the four radial-engine class but wing and power-pack arrangements produce tell-tale characteristics even at great distance. The first aeroplane, "five blobs threaded on a line," is a Boeing B-29 Superfortress (4 Wright-Cyclones). The second, consisting of "four blobs hanging and one sitting on a line" is a Handley Page Hastings C.Mk.1 (4 Bristol Hercules).*

*The lower views are of two similar single-engine trainers. Chief though small point of difference distinguishable (in this aspect) is the dihedral angle on the outer panels of the wing of the Boulton Paul Balliol T.Mk.2 (1 Rolls Royce Merlin in-line). The bottom strip illustrates the Avro Athena T.Mk.1 (1 Armstrong-Siddeley Mamba turboprop).*

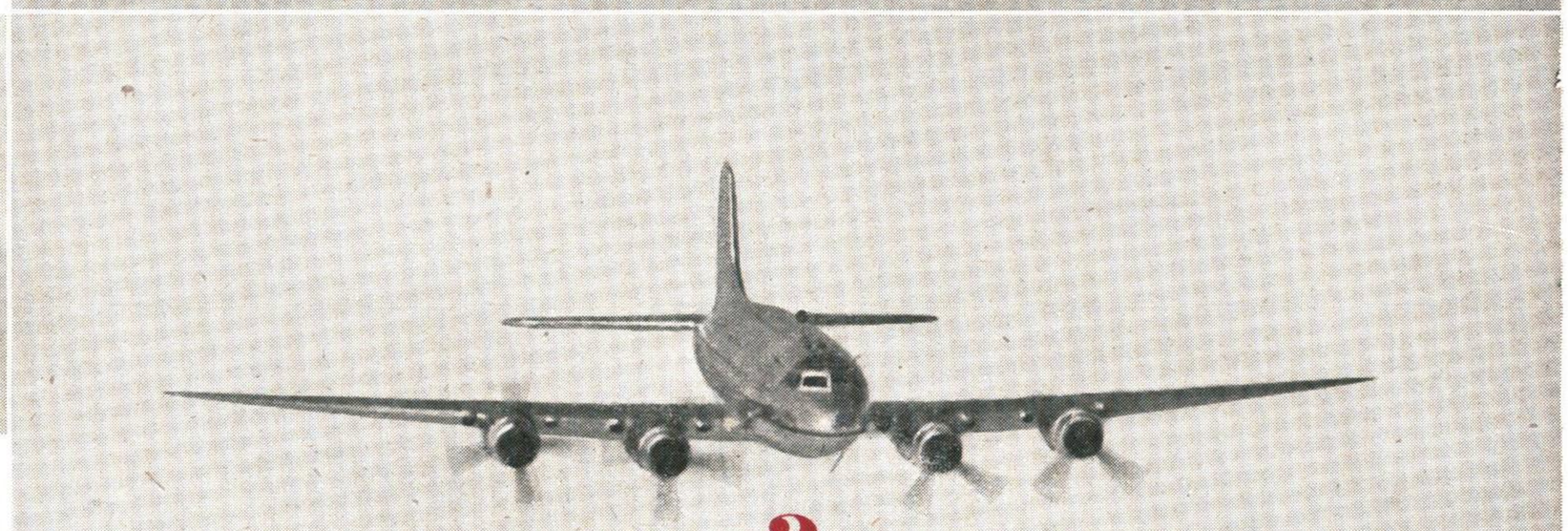
*Adding point to point in slow time, as we do here, is excellent familiarization practice on these types, but in active spotting it would be useless. The aircraft spotter must know his aircraft and get a snap answer as soon as it can be seen ; if he doesn't he may get bullets or bombs—or both.*



**small, circular cross-section fuselage—radial engines—large single fin and rudder :——**

?

**thick wing confirmed — tubular (pressurized type) body-form —tailplane centrally mounted:——**



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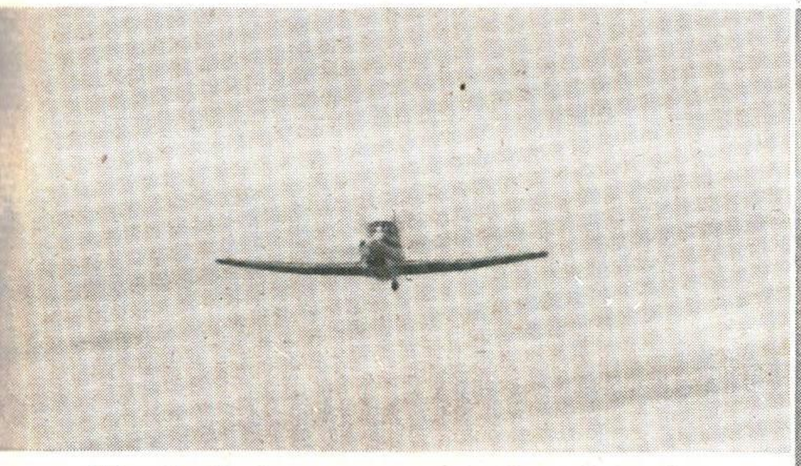
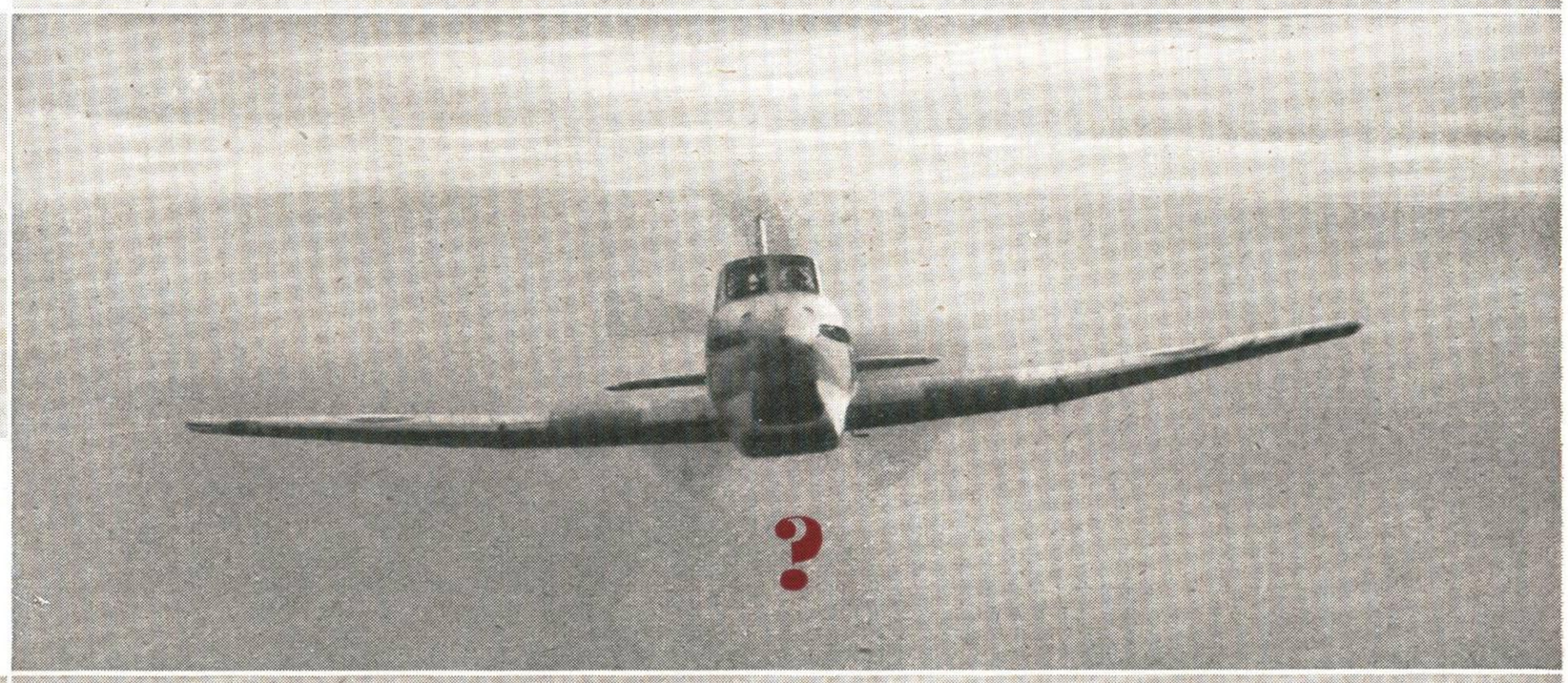


**dihedral in outer panels—Merlin engine with "chin" radiator—large, square cockpit canopy — thick wing :——**



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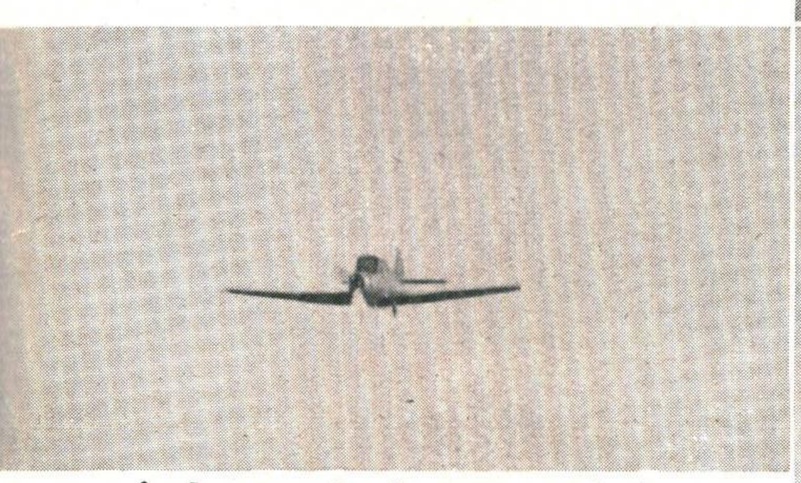
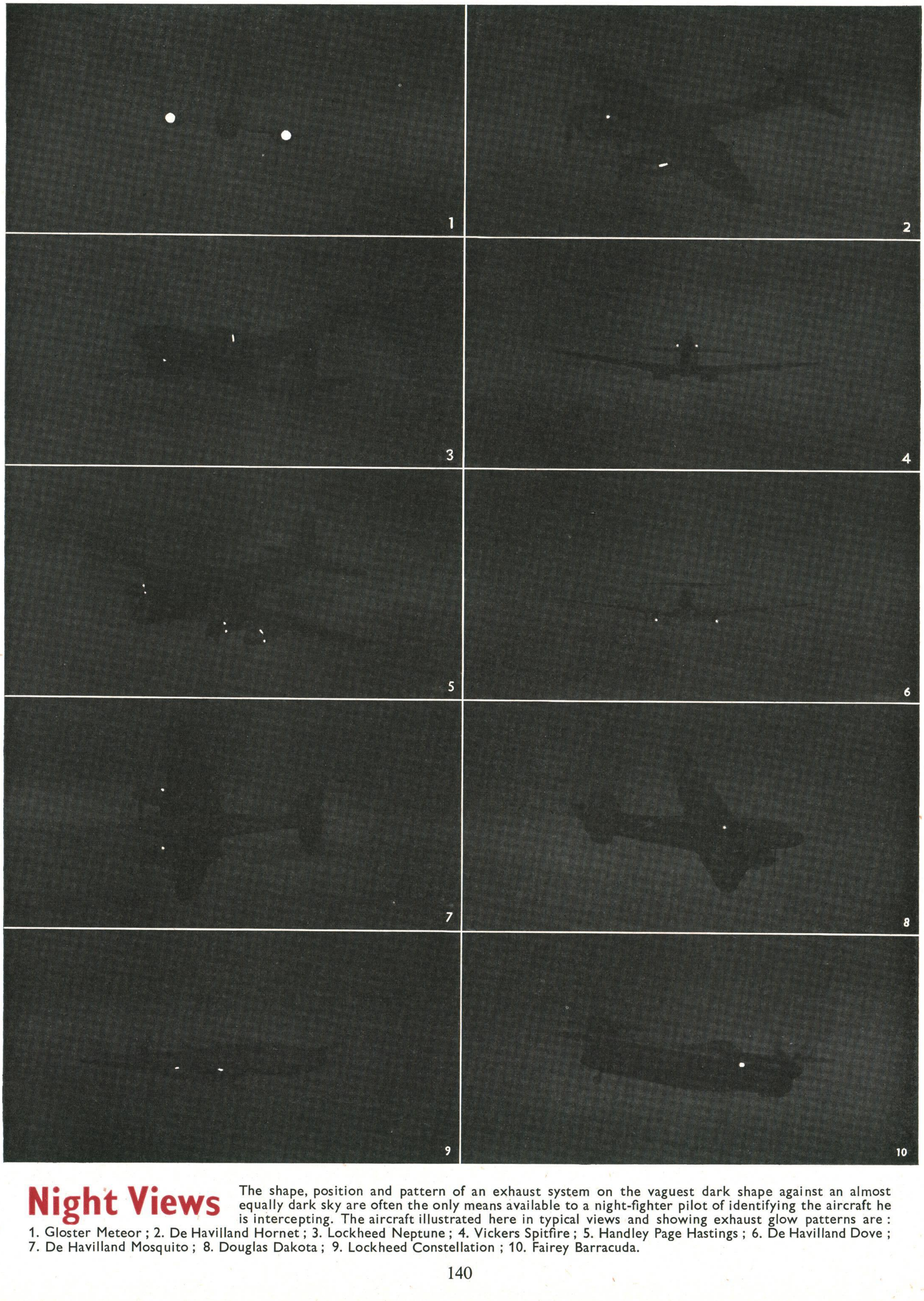


**conical nose (turboprop engine)—thickish wing—high tailplane :——**

?




**Night Views** The shape, position and pattern of an exhaust system on the vaguest dark shape against an almost equally dark sky are often the only means available to a night-fighter pilot of identifying the aircraft he is intercepting. The aircraft illustrated here in typical views and showing exhaust glow patterns are : 1. Gloster Meteor ; 2. De Havilland Hornet ; 3. Lockheed Neptune ; 4. Vickers Spitfire ; 5. Handley Page Hastings ; 6. De Havilland Dove ; 7. De Havilland Mosquito ; 8. Douglas Dakota ; 9. Lockheed Constellation ; 10. Fairey Barracuda.

# A MATTER OF MOMENTS

by

## JOHN A. SIZER

THERE is no standard form of aircraft yet. Some have long noses, others short, some have engines in long nacelles, others have them in short nacelles. An occasional design comes along with the pilot a long way ahead of the wing, but in another he may be a long way behind the wing. In quieter moments when there's nothing else in the sky to look at, a few thoughts on these anomalies can be helpful to aircraft recognition.

In the first place, it's all a question of balance : and balance is a matter of moments. The conventional aircraft is, in principle, a beam on a fulcrum, with everything laid on so that, in theory at least, it will stay level. The point of the fulcrum is the centre of gravity. And as the centre of gravity (C.G.) must be in the same range of movement as the main lift forces, the range of movement of the lifting forces is called the " Centre of Pressure travel ". Fig. 1 gives the general idea.

To obtain the correct balance means quite a lot of juggling with weights in the design stage. The weight of each component and piece of equipment must be multiplied by its distance from a given reference line (see Fig. 2) and all these " moments " are added together and divided by the all-up weight of the aircraft. The

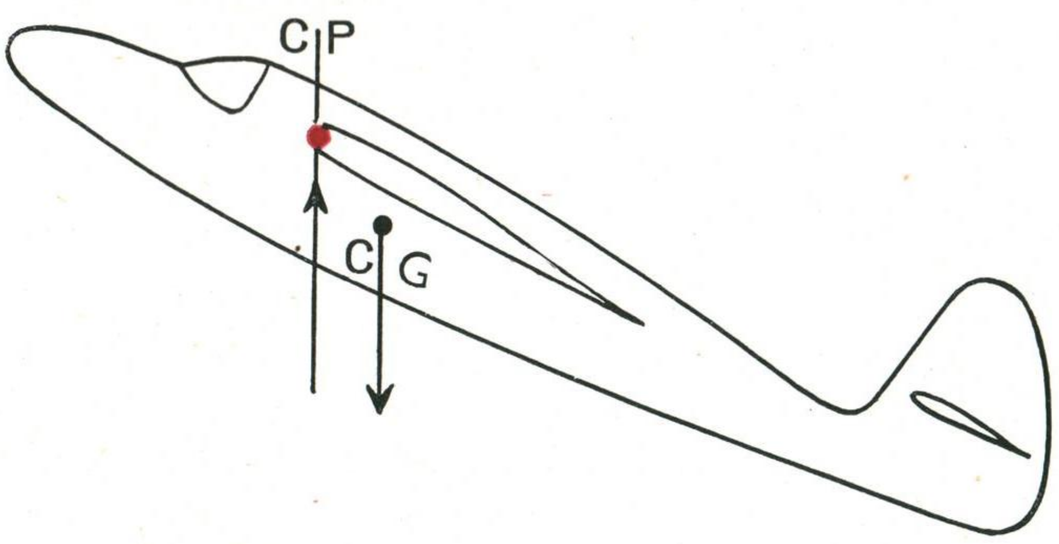
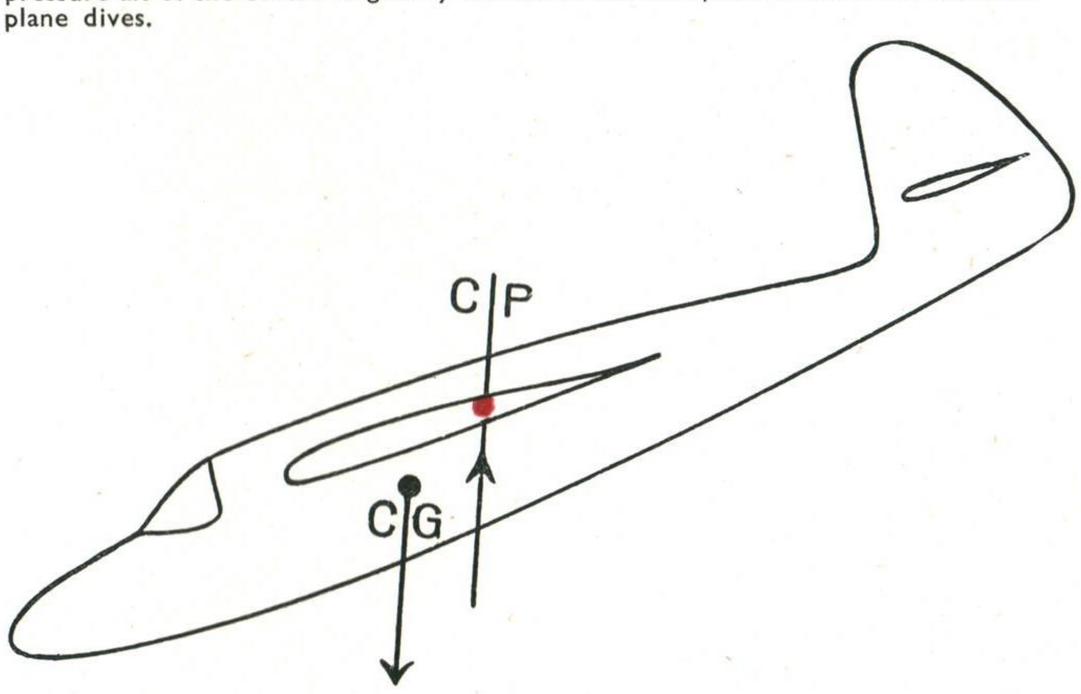



Fig. 1. As the centre of pressure (coloured spot) is ahead of the point of balance or centre of gravity the nose of the aeroplane is pulled up. With the centre of pressure aft of the centre of gravity the tail of the aeroplane is lifted and the aeroplane dives.



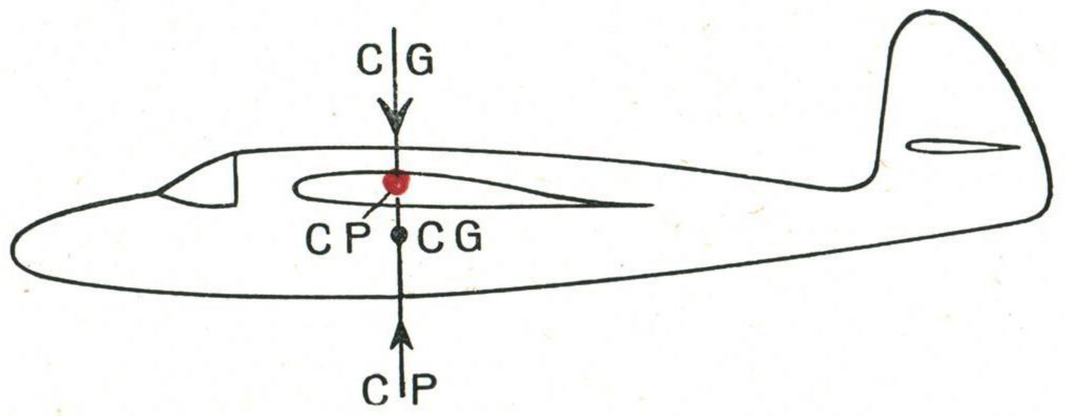




Fig. 2. When the centre of pressure (C.P.) and the centre of gravity (C.G.) coincide the aeroplane stays level.

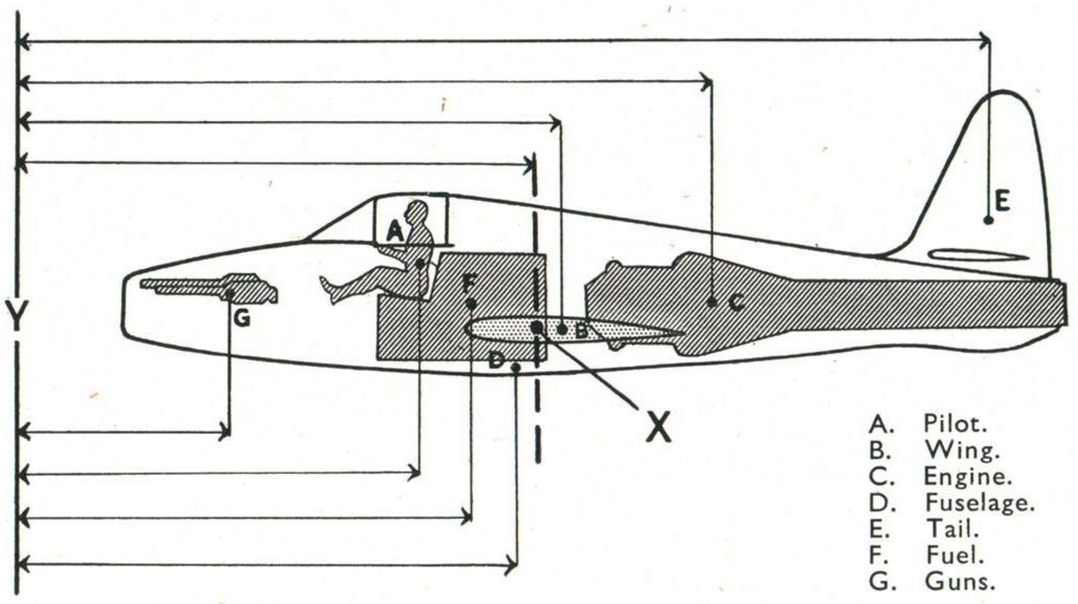



Fig. 3. Y is the reference line to which the weights of each component are related. The individual weights are multiplied by their distances from Y. All the answers are added together and divided by the all-up-weight of the aeroplane. The answer to that sum produces the distance of the C.G. from the reference line Y. It is indicated by " X " in the diagram.

result will give the distance of the aircraft's C.G. from the reference line. The job is to determine C.G. position horizontally and vertically, so there are two lots of sums to be done. When you've got the answer, it is quite likely that the wing will be found to be either too far back or too far forward. You can either move the wing, taper it forward or back, or shorten or lengthen the nose, or the rear fuselage. (*The term "nose" in this article means that part of the fuselage forward of the C.G. Since in recognition we cannot see the C.G., we use the term "nose" to mean that part of the fuselage, plus engine, if any, ahead of the leading edge of the wing.*)

Another way of achieving balance is to project the engines further forward or put them closer in to the wing (in multi-engined types). Another method is to move crew and/or equipment around until the moments produce the desired location of the C.G. Where powerful, and consequently heavy, engines are fitted, the result will be something like this :—Multi-engined types—short nose, long after-body. Example: De Havilland Sea Hornet (*see photo overleaf*). Single engine types —long nose, pilot well back. Example : Hawker Sea Fury (*see photo overleaf*), in fact, almost any orthodox fighter aeroplane. An exception to the above is such a design as the Vickers Sea Attacker (*see photo overleaf*). This design, having the engine in the rear, compensates what would be a tail down moment, by having the pilot well forward in the fuselage. Another design of interest in this way is the Convair B-36 (*see photo overleaf*).

Fuel is always carried so that the C.G. of tankage is at, or as close as possible to, the C.G. of the complete aircraft. If fuel were behind the C.G., the aircraft would become nose heavy, as fuel was used up. In many modern designs it is not possible to get the fuel in the best location. The aircraft has thus to be progressively " trimmed " as the flight proceeds. The same problems occur when locating ammunition containers, *i.e.*, as the ammunition is used up the centre of gravity must not be greatly affected. Of course the tail unit and even the body, contribute some lift in flight, and this additional lift force may worsen or improve an originally balanced design. But that's another story, which perhaps we'll think about when there's nothing in the sky to attract our attention.

Vickers Attacker

De Havilland Sea Hornet

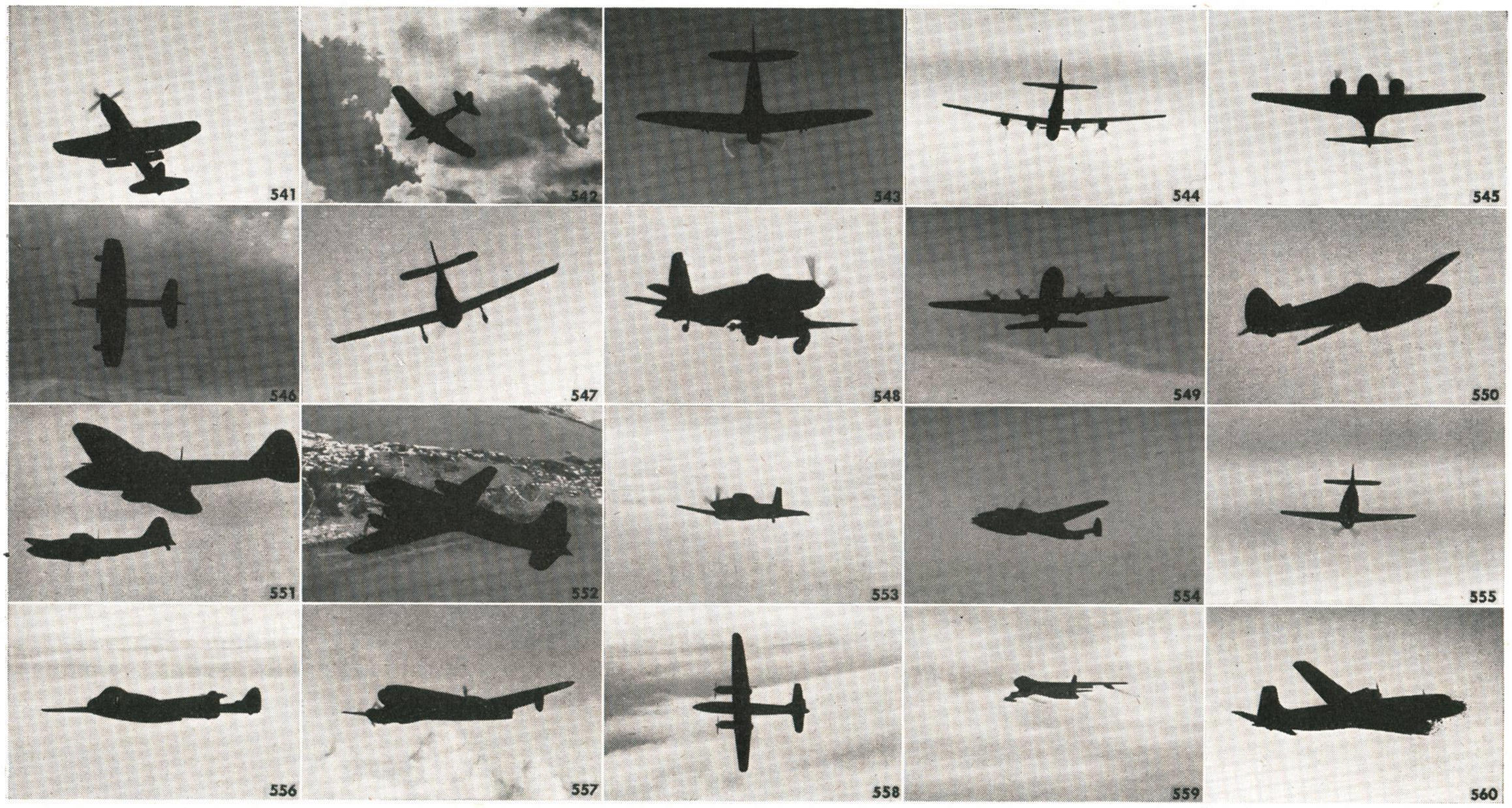
Hawker Sea Fury

Convair B-36

The B-36 is an example of an aeroplane with a long nose and short after-body. The placing of the engines calls for a " balance-weight " far ahead of the wing. Incidentally the " face ", formed by the cockpit and the observation domes, seems to express the utmost disapproval of those photographing it.

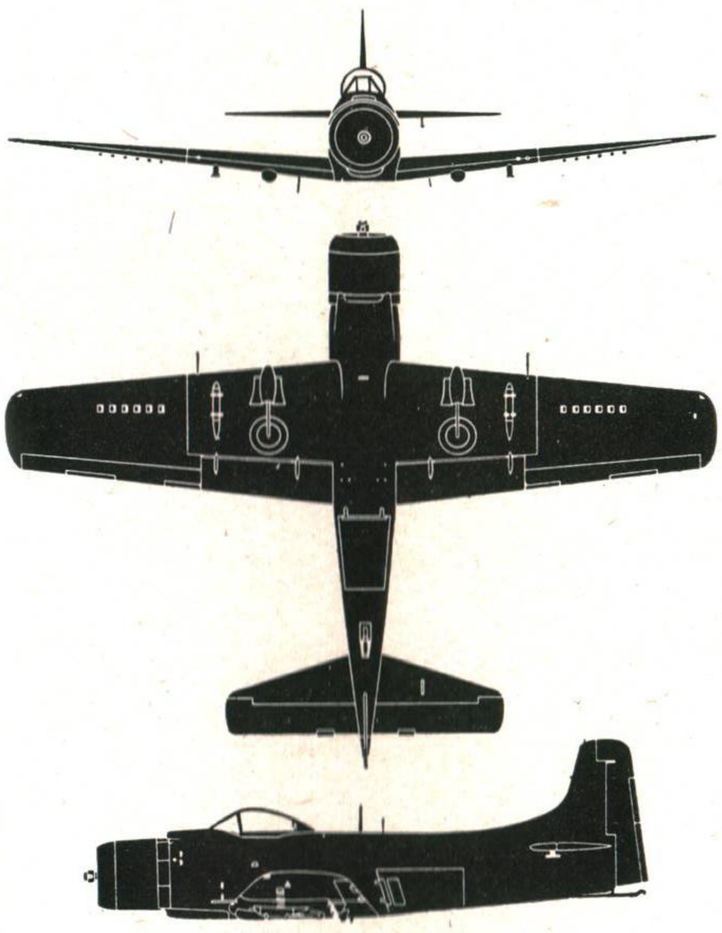
# SILLOGRAPHS

Recognition Test No. 96



# SILHOUETTES — NAVAL STRIKE AIRCRAFT

## DOUGLAS AD-1 SKYRAIDER

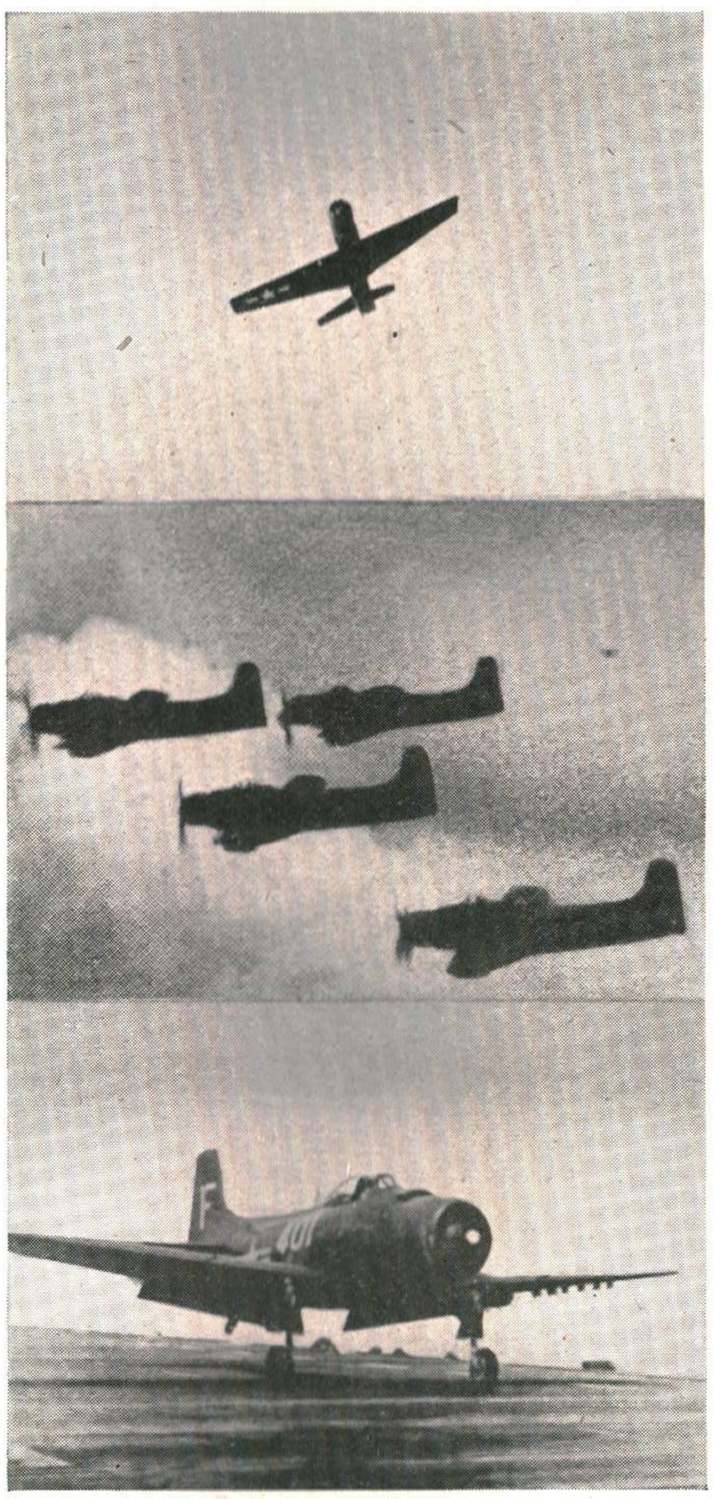


### American Naval Bomber

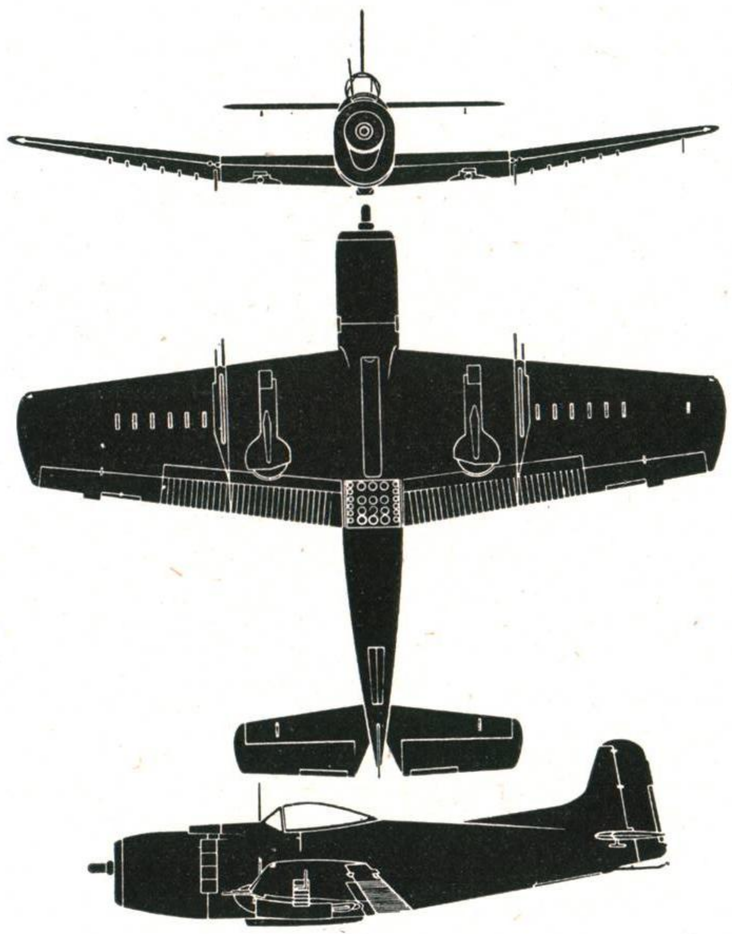
*Engine :* One Wright Cyclone Radial.

*Span :* 50 ft. 0 ins. *Length :* 38 ft. 9 ins.

*Recognition Points :* Short radial cowling—low wing, dihedral from roots, equi-tapered—back-tapered tail plane—fin fairing built into fuselage giving deep untapered side aspect—tall fin, blunt tip.



## MARTIN AM-1 MAULER



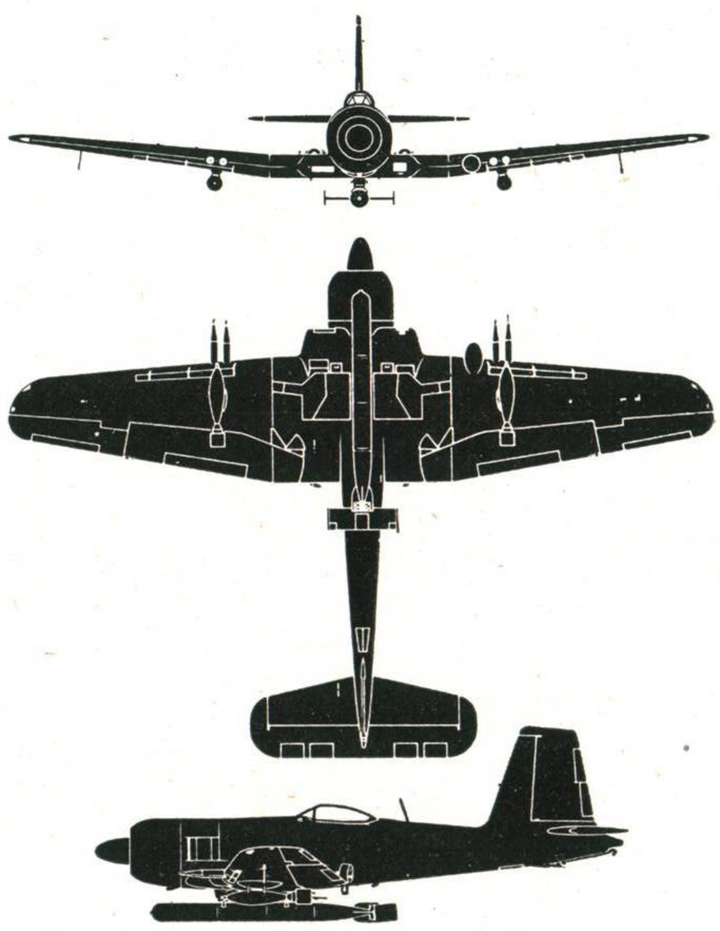
### American Naval Torpedo Bomber

*Engine :* One Pratt & Whitney Radial.

*Span :* 50 ft. 1 in. *Length :* 41 ft. 6 ins.

*Recognition Points :* Long, oval-section radial cowling—low, thick wing with long centre-section and sharp dihedral in outer-panels—equi-tapered wings and tailplane, blunt tips—vee cut out in tailplane—long straight fin fairing—blunt fin tip.

## BLACKBURN FIREBRAND TF. MK. V

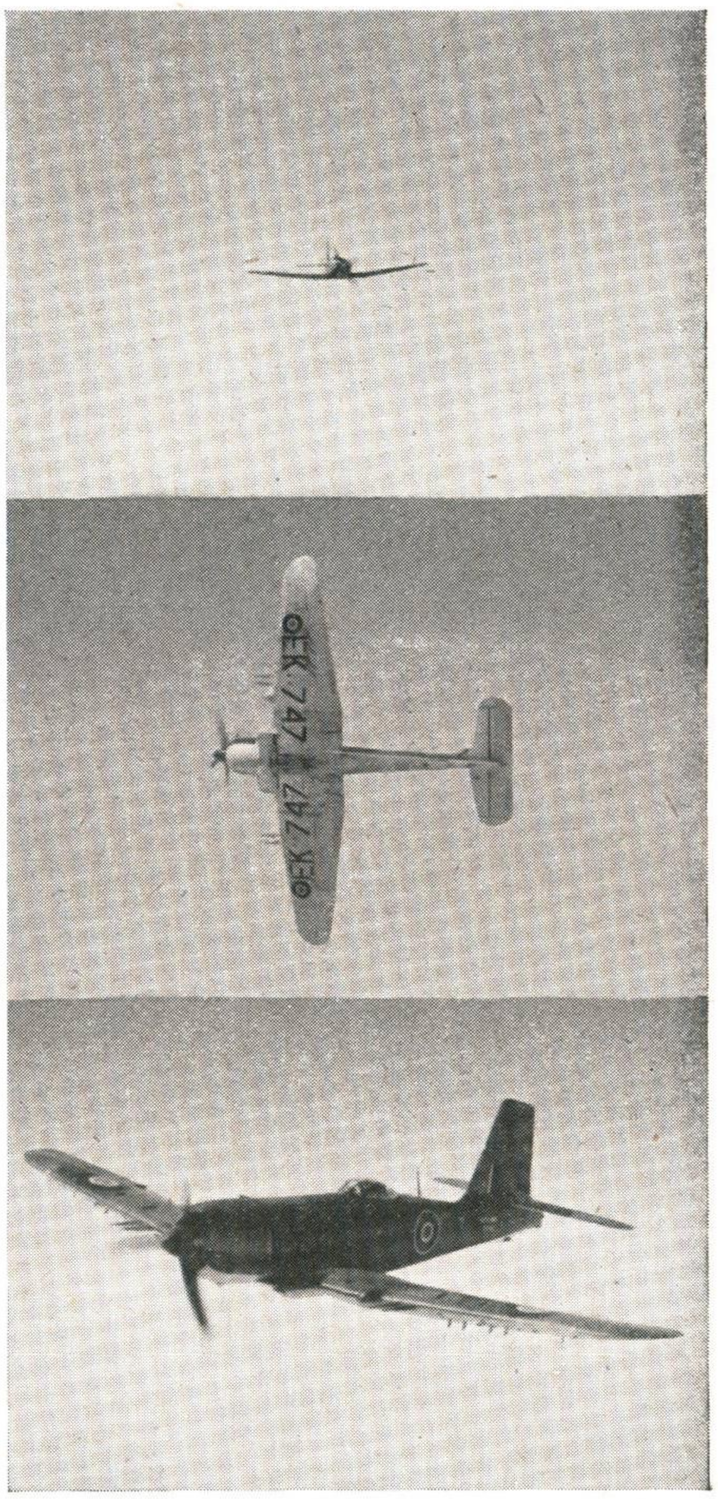


### British Torpedo Fighter

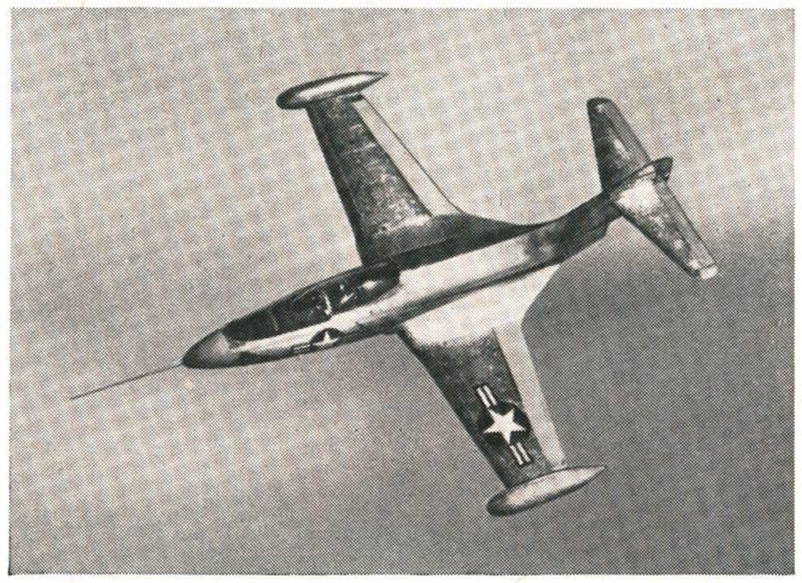
*Engine :* One Bristol Centaurus Radial.

*Span :* 51 ft. 3 ins. *Length :* 39 ft. 0 ins.

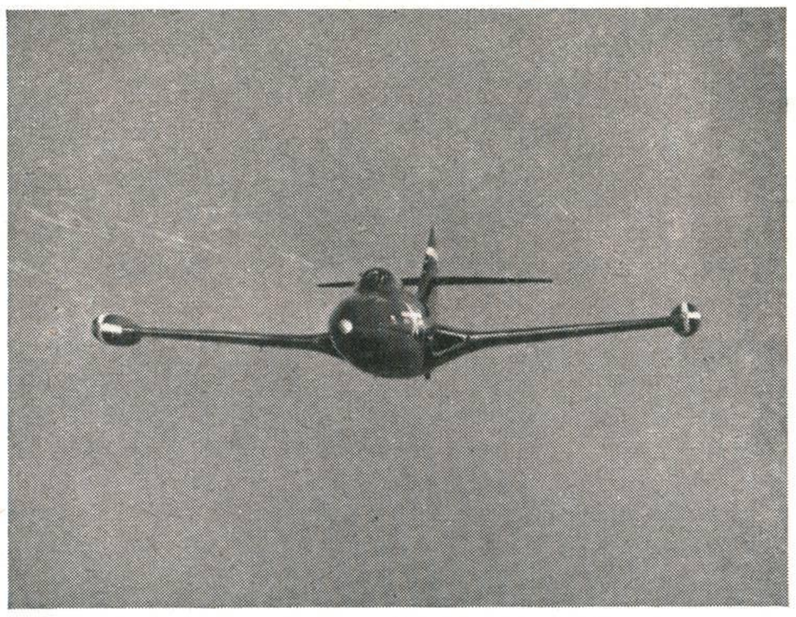
*Recognition Points :* Short radial cowling, distinctive wing-root intakes—low wing, straight centre-section, forward-tapered outer panels with sharp dihedral angle—sharply tapering fuselage—very large squared-off fin in advance of broad, back-tapered, round-tipped tailplane.

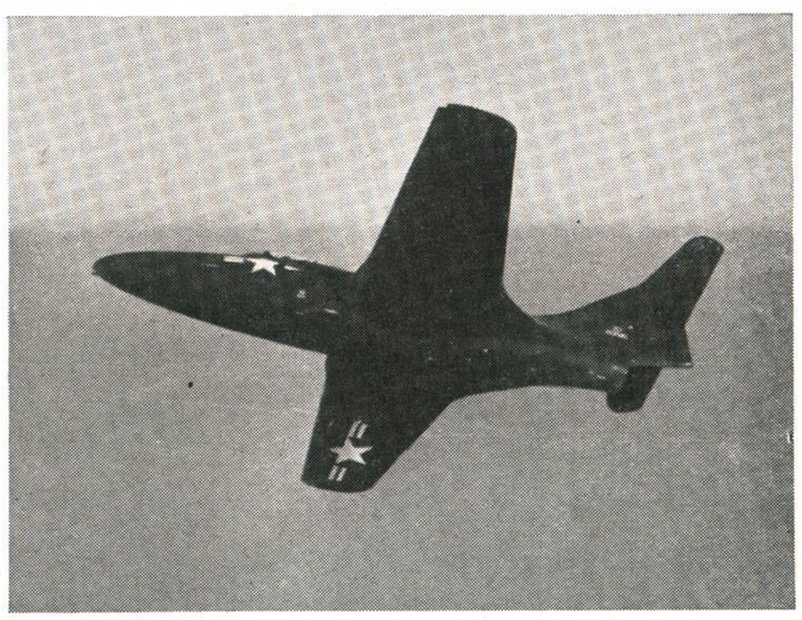


# SOLUTIONS TO RECOGNITION TESTS IN THIS EDITION:



**Cover Photo:** Grumman XF9F-3 Panther prototype close-up; this view shows it a ta safer distance. The pointer on the graduated scale on its nose indicates yaw. The XF9F-3 is the latest model of the Grumman Panther (Grumman G.79 design) having the Allison Model 400 (J-33) turbojet. Below, it is seen in its production coat of navy blue. These photographs and that on the Cover were taken by Harold G. Martin.





**No. 95 (ADVANCED)**

770. Lincoln B. Mk. 2
771. TBM-3 Avenger
772. S.R.A/1
773. Balliol T. Mk. 2
774. P2V-2 Neptune
775. IL-4
776. P.1040
777. Fiat G-55A
778. Sea Hornet P.R. Mk. 22
779. Seaford G.R. Mk. 1
780. XF7U-1 Cutlass
781. Seagull
782. Sea Otter A.S.R. Mk. 1
783. Shetland Mk. 2
784. Super Ace
785. B-29 Superfortress
786. F-80A Shooting Star
787. Viking Mk. 1B
788. Sea Fury F. Mk. 10s and a Vampire F. Mk. 20
789. Vampire F.B. Mk. 5
790. Tiger Moth T. Mk. 2
791. Tempest F. B. Mk. 6
792. Oxford
793. YAK-15
794. Prince
795. AD-1 Skyraider
796. Sea Hornet N. F. Mk. 21
797. York C. Mk. 1
798. Sea Fury F. Mk. 10
799. Meteor F. Mk. 4
800. YB-49
801. MD 450 Ouragan (French jet-fighter)

**Deletion—April/May Edition**

When the article "London Log" was written it was thought that Alitalia would soon operate SM-95s into "London". They continue, however, to operate into Northolt. Alitalia should therefore be removed from the list on page 120, and column two on page 121 should commence "... there are now 17 of 15 nations. ..."

**TRICKY TRIO IX**

(Left to right): Hawker Sea Fury 10; Lavochkin LA-9; Hawker Tempest 2.

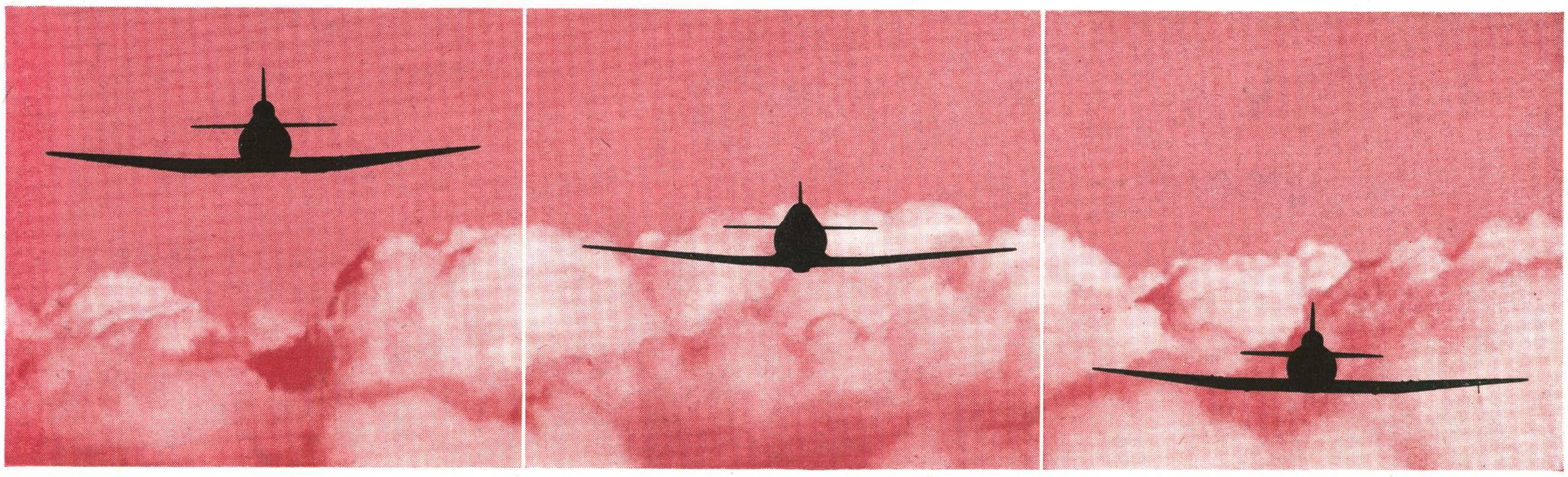
**No. 94 (ELEMENTARY)**

613. Buckmaster T. Mk. 1
614. Freighter or Wayfarer
615. Constellation
616. Bearcat
617. Balliol T. Mk. 2
618. Martin XP5M-1
619. Tiger Moth T. Mk. 1
620. DC-4 Skymaster
621. Convair Liner
622. Mosquito T. Mk. 3
623. P2V-2 Neptune
624. Viking Mk. 1B
625. Viscount
626. Tempest F. B. Mk. 2
627. Languedoc S.O. (S.E.) 161
628. F9F-1 Panther
629. Auster A.O.P. Mk. 6
630. Sea Hornet P.R. Mk. 22
631. Sunderland G.R. Mk. 5
632. B-29 Superfortress
633. F-80A Shooting Star

**No. 96 (SILLOGRAPHS)**

541. Wyvern F. Mk. 1
542. IL-10
543. Seafire F. Mk. 47
544. B-29 Superfortress
545. Anson 19
546. Firefly F. Mk. 4
547. Prentice T. Mk. 1
548. S.28/43 Firecrest
549. Hastings C. Mk. 1
550. YAK-15
551. IL-2
552. Canadair DC4M
553. Balliol T. Mk. 2
554. TU-2
555. Athena T. Mk. 1
556. Vampire F. Mk. 3
557. Languedoc S.O. (S.E.) 161
558. P2V-2 Neptune
559. B-47
560. DC-6

## TRICKY TRIO—IX



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