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NOTES ON THE IDENTIFICATION OF AEROPLANES

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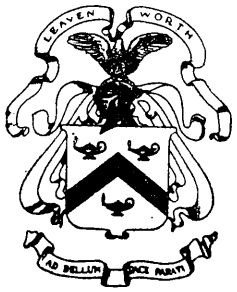
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WAR DEPARTMENT,
WASHINGTON, *November 8, 1917.*

The following pamphlet, entitled "Notes on the Identification of Aeroplanes," is published for the information of all concerned.

[062.1, A. G. O.]

BY ORDER OF THE SECRETARY OF WAR:

JOHN BIDDLE,
Major General, Acting Chief of Staff.

OFFICIAL:
H. P. McCAIN,
The Adjutant General.

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NOTES ON IDENTIFICATION OF AEROPLANES.

DEFINITIONS.

Monoplane.—An aeroplane with one wing on each side of the body.

Biplane.—An aeroplane with two wings on each side of the body.

Triplane.—An aeroplane with three wings on each side of the body.

Tractor machines.—Machines having the air screw in front of the wings.

Pusher machines.—Machines having the air screw behind the wings.

Nacelle.—The term used in pusher machines for the body which carries the engine, controls, observer, and pilot. The *Caudron*, although it is a tractor, is constructed after the pusher type. In "pusher" machines, the nacelle projects well in front of the wings.

Under carriage.—The part of the structure connecting the wheels to the nacelle.

Fuselage.—The body of a tractor machine, which carries the pilot, observer, and engine, and extends back as far as the tail. All fuselages now are covered with canvas or three-ply wood.

Tail.—The small horizontal plane at the end of the fuselage.

Rudder.—The small vertical plane or planes attached to the tail.

Fin.—A small vertical fixed plane on the top of the fuselage and tail. The rudder is usually attached to the near end of the fin.

Dihedral.—An aeroplane is said to have dihedral when the wings, as seen from the front, are set at angle to each other on either side of the body.

Stagger.—An aeroplane is said to have stagger when the lower wings are not set vertically below the upper wings.

Leading edge.—The front edge of the wings of an aeroplane.

Trailing edge.—The rear edge of the wings of an aeroplane.

Ailerons.—Flaps fitted to the trailing edge of the main plane in order to give lateral control. Ailerons are sometimes very conspicuous.

Overhang or extensions.—An aeroplane is said to have overhang when the upper wings are longer than the lower wings.

Sweep back.—An aeroplane is said to be swept back when the wings, as seen from above or below, are not set in a straight line. Sometimes the leading edge is swept back while the trailing edge is straight.

Cut back.—When the trailing edge is longer than the leading edge.

Wedge shape.—When the leading edge is longer than the trailing edge.

Struts.—The wooden supports joining the upper wings to the lower wings.

These notes should be studied in conjunction with the latest edition of "Silhouettes of Aeroplanes."

GENERAL INSTRUCTIONS.

1. Success in the identification of aeroplanes can only be attained by an exact knowledge of the characteristics of the different types of plane and by constant practice in observing all types of machines at all angles of flight.

Machines which can easily be identified at some angles often present at other angles no distinguishing characteristics to any but a trained observer. In order to pick up the characteristics of the different types the observer should employ a definite system of identification, and he should be acquainted with the specific purpose for which each type is employed.

Even a moderately trained observer should be able to distinguish between a hostile and a friendly machine at a distance of not less than 5,000 yards. If an observer is not able to do this, machine-gun detachments will continually be having to "stand to" only to dismiss a minute later when it is realized that the plane is friendly; while for antiaircraft artillery work it is essential that on a clear day planes should be identified at ranges of not less than 10,000 yards.

CLASSIFICATION.

2. Aeroplanes can be divided into two main classes—those designed for reconnaissance, artillery observation and bombing work, and those designed as chasers and scouts.

The former are usually comparatively large, stable, two-seater machines. Modern two-seater machines have a speed as high as 120 m. p. h. The *R. E. 8* has a speed of about 90 m. p. h.

Although artillery machines may fly at heights from 8,000 to 10,000 feet, the machines doing long recon-

naissance will frequently get much higher, i. e., to 18,000 feet.

Scouts are smaller and faster machines, carrying a pilot only. Their flying speed is anything from 80 to 140 miles an hour; the normal height for scouts is over 12,000 feet, and for the later types usually over 15,000 feet. These machines are essentially fighters, and by adopting offensive tactics on the enemy side of the lines seek to prevent his machines from doing their work and to enable our own to do theirs. Very often they fly at great heights in order to be able to dive effectively on to slower machines flying at lower heights.

CHARACTERISTICS.

3. Many allied machines employ tail booms, while up to date there are no German machines of this type of construction. No doubt therefore should be entertained of any machine having an open structure connecting the wings to the tail. This open structure is frequently referred to as open fuselage.

The wings, being the most conspicuous part of an aeroplane, are usually examined first.

The special characteristics of British reconnaissance machines are dihedral and stagger; of French reconnaissance machines, great span, i. e., length from wing tip to wing tip compared to width of planes, and open-tail booms; of German reconnaissance machines, overhang with closed fuselage. In the majority of modern German machines the top and bottom planes are of equal length.

Only four allied machines when flying show both these German characteristics. They are, *B. E. 2E, R. E. 8, Caudron R. 4,* and *Caudron G. 6.*

With regard to the scouting class it is impossible to lay down any hard and fast rule by the wings alone.

The tail and rudder, for most types, are the surest guide for distinguishing allied from hostile machines.

The vast majority of allied machines have rectangular or modified rectangular tails, while the German machines have in most cases either the fish tail or the heart-shaped tail.

These distinctions apply equally to reconnaissance and scout machines.

4. MACHINES EMPLOYED FOR RECONNAISSANCE WORK.

ALLIED.	GERMAN.
F. E. 2*B*.	Albatros.
F. E. 2*D*.	Aviatik.
B. E. 2*E*.	D. F. W. Aviatik.
R. E. 8.	Rumpler.
Morane Parasol.	L. V. G.
Martinsyde.	Gotha.
Armstrong Whitworth Beardmore.	New Type.
De Havilland 4.	
Bristol Fighter.	
Handley Page.	
Voisin.	
Maurice Farman.	
Farman Freres.	
Single Caudron.	
Twin Caudron.	
Caudron R. 4.	
Caudron G. 6.	
Paul Schmitt.	
Avion A. R.	
Letord.	
French Morane.	
Moineau.	

MACHINES EMPLOYED FOR FIGHTING PURPOSES.

ALLIED.	GERMAN.
De Havilland 5.	Fokker.
Sopwith Biplane.	Roland.
Sopwith Scout.	Halberstadter.
Sopwith Triplane.	Albatros Scout No. 1.
Sopwith Camel.	Albatros Scout No. 2.
S. E. 5 with clipped wings.	S. S. W.
*Nieuport.	
*S. P. A. D.	
†Morane Monocoque.	

WINGS.

5. In examining the wings of an aeroplane there are six characteristics for which the observer should be on the lookout:

(*a*) Dihedral.	(*d*) Overhang.
(*b*) Sweep back.	(*e*) Wing tips.
(*c*) Stagger.	(*f*) Ailerons.

6. Dihedral is most noticeable in a machine coming straight in or going away. It is also distinctly noticeable when traveling obliquely, but at certain angles machines with swept-back wings may appear to have dihedral. Care is required to differentiate between these two characteristics.

7. Sweep back is seldom noticeable until a machine has reached an angle of sight of about 45°, except when banking. A very critical examination should always be made of a machine when banking, as many

*Flown by both British and French.
†Flown by French only.

special characteristics, such as the shape of the wing tips and tail can then be best observed.

The *Nieuport* is, at present, the only allied plane having swept-back wings.

8. Stagger is most conspicuous when an aeroplane is traveling obliquely or at right angles to the observer. In those positions the inclination of the struts is very obvious.

The effect of stagger is to cause the planes to appear rather wide apart.

The *Roland* and *Halberstadter* machines have slight stagger; otherwise stagger can be regarded as a characteristic of allied aeroplanes. In the *De Havilland 5*, *Avion A. R.*, and *Letord* the stagger is reversed—i. e., the top plane is behind the lower plane.

9. Overhang is best seen when a machine is coming straight in or going away. On oblique courses it is difficult to decide whether a machine has overhang or not.

10. Wing tips may be divided into four main classes—round, square, cut back, and wedge shape.

The wings of British machines are chiefly of the round, cut-back, and wedge-shape types, the only exception being the *S. P. A. D.*

French machines have either square or cut-back tips.

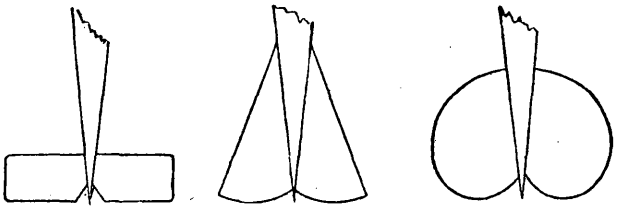
Many German machines have square tips, but the *Fokker*, *Roland*, *Halberstadter*, and *Albatros Scout No. 2* have the cut-back type.

11. Few machines have ailerons which can be detected from the ground, with the noticeable exception of the *Voisin*.

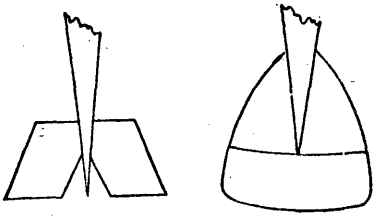
Old types of *Albatros* had noticeable ailerons. These took the form of a thickening of the wing tips. A lookout should be kept for ailerons in new pattern German machines.

TAILS.

12. There are five main types of tail, although there are many variations of these types.

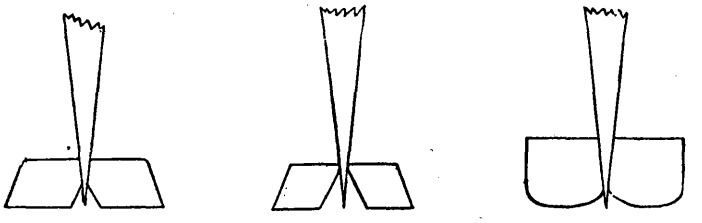


A. B. C.



D. E

Type A is the rectangular. It is by far the commonest British type. It becomes modified into the following three types:



X. Y. Z.

Two German machines, the *Halberstadter* and the *Fokker*, have tails of type Y.

Types B and C are essentially German, but one British machine, the *De Havilland*, has a tail of type C.

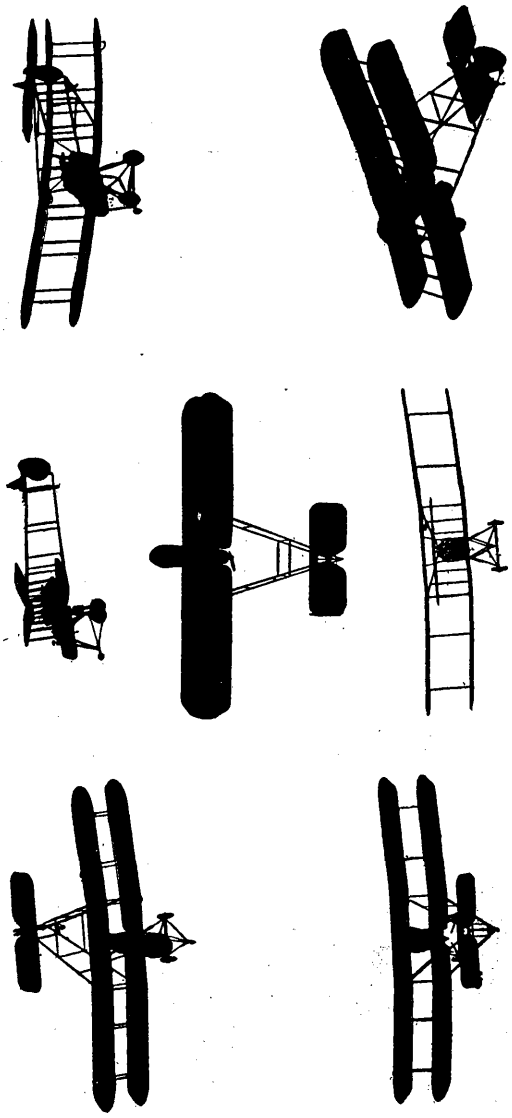
Type C has developed into type E, which is now one of the commonest types of hostile tails.

Type D is employed by two allied machines, the *Nieuport* and *Moineau*, and by one German machine, the *Roland Scout*.

Tails can best be observed when a machine is banking or is directly overhead.

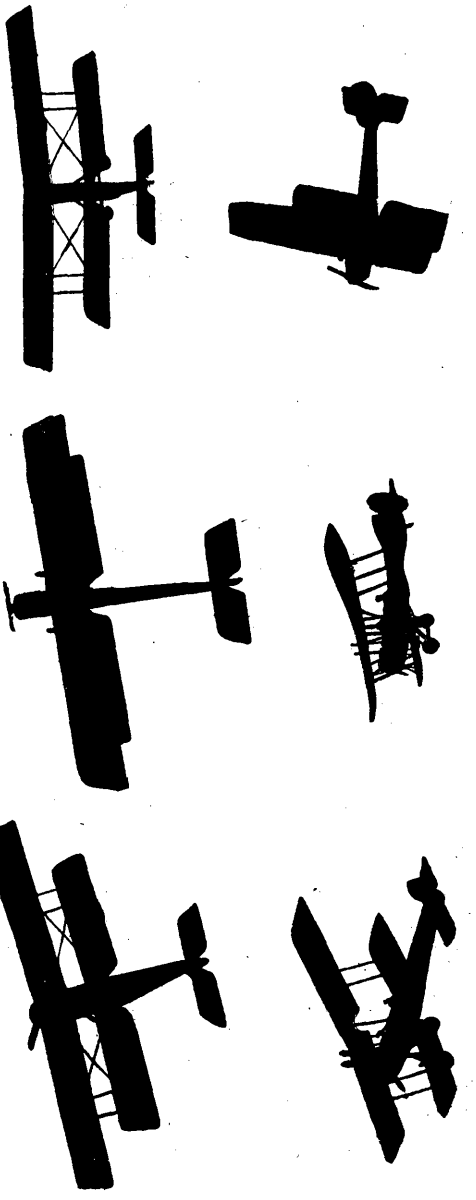
SHORT DESCRIPTION OF AEROPLANES.

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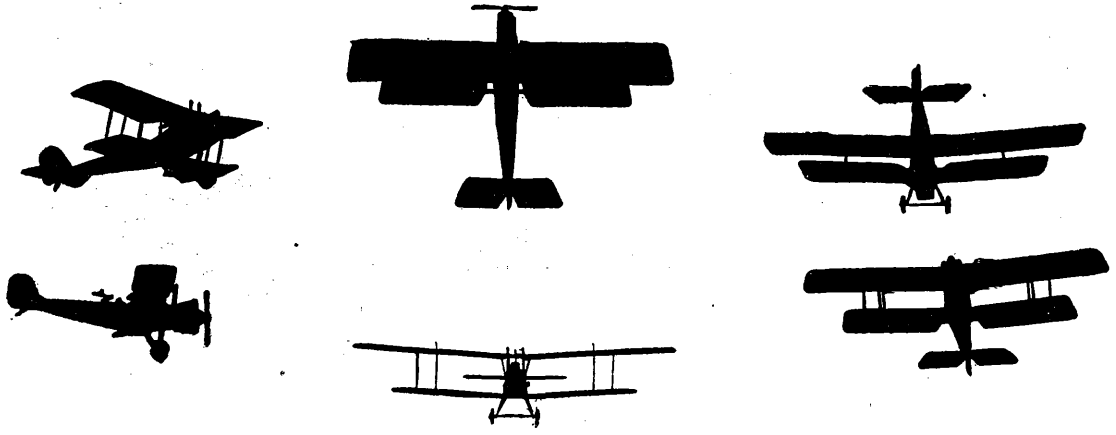
BRITISH.

F. E. 2b and 2d.—There are a considerable number of machines of this type. They are easily distinguished by their large size, open-tail booms, and marked dihedral. The engine also has a loud purr, which is readily distinguishable after a time.



BRITISH.

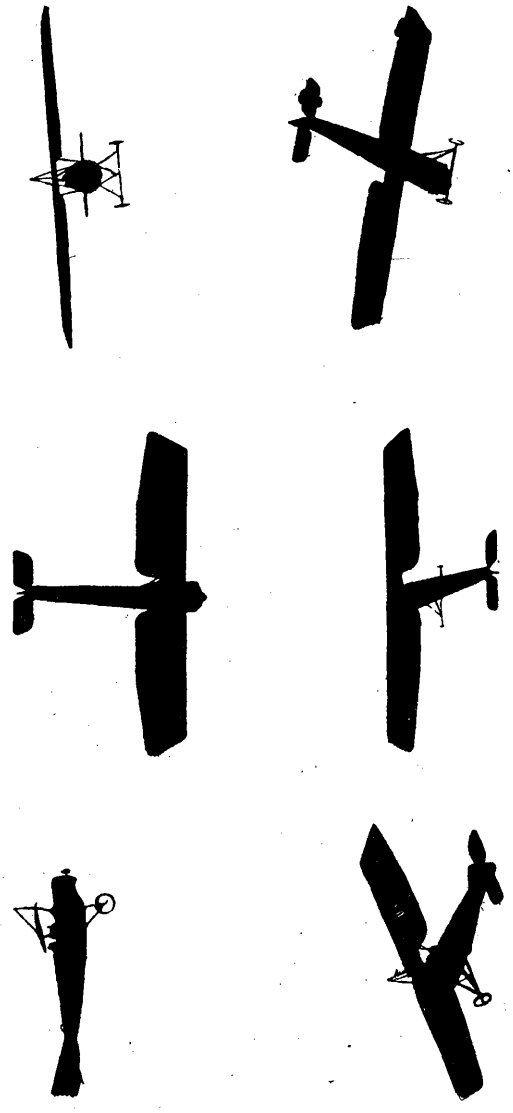
B. E. 2e. and R. E. 8.



BRITISH.

B. E. 2e and R. E. 8.—These machines, except for a difference in the rudders, are difficult to distinguish. Their characteristics are marked stagger, dihedral, and overhang and the particularly blunt cut-back tips to their wings. The engine is fairly silent.

The rudder of the *R. E. 8* joins the fuselage almost at right angles, while that of the *B. E. 2e* has a fin in front of it which slopes away to the fuselage.

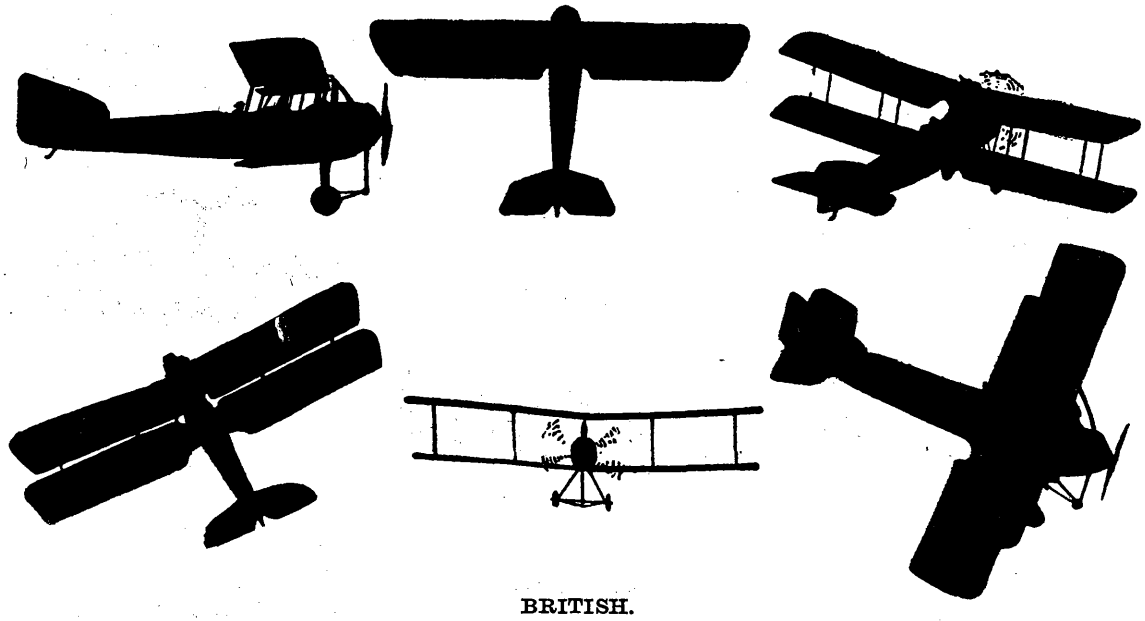


BRITISH.

Morane Parasol.—The *Morane Parasol* is a large two-seater monoplane with the fuselage suspended well below the wings, giving it the form of a cross when approaching and receding.

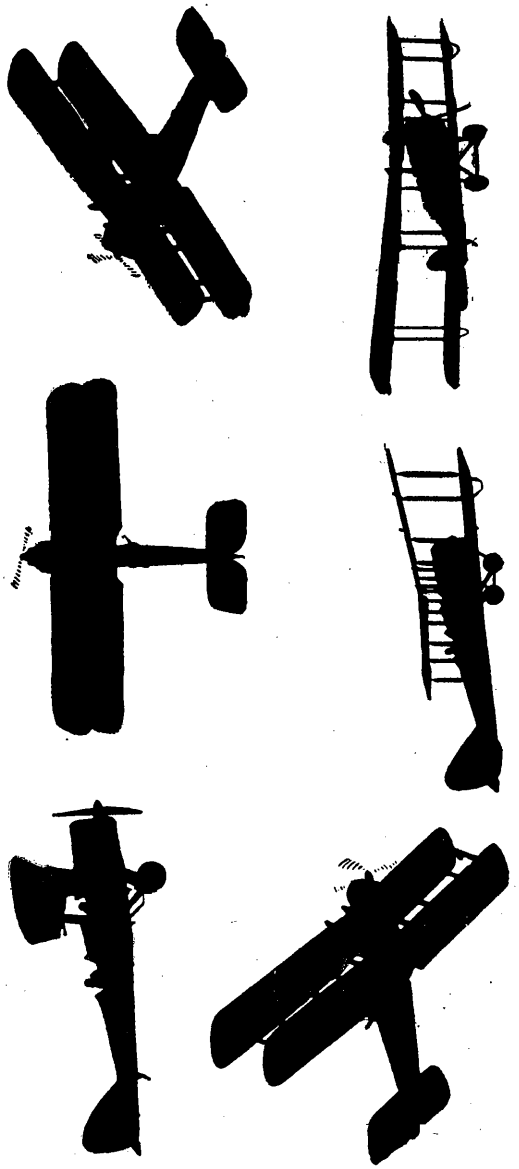
BRITISH.

Martinsyde.—The *Martinsyde* is a twin-seater used for bombing purposes. It has slight dihedral and stagger, deep wings with a marked cutaway by the fuselage, and pronounced cut-back wing tips. It has a tail of type X (par. 12).



BRITISH.

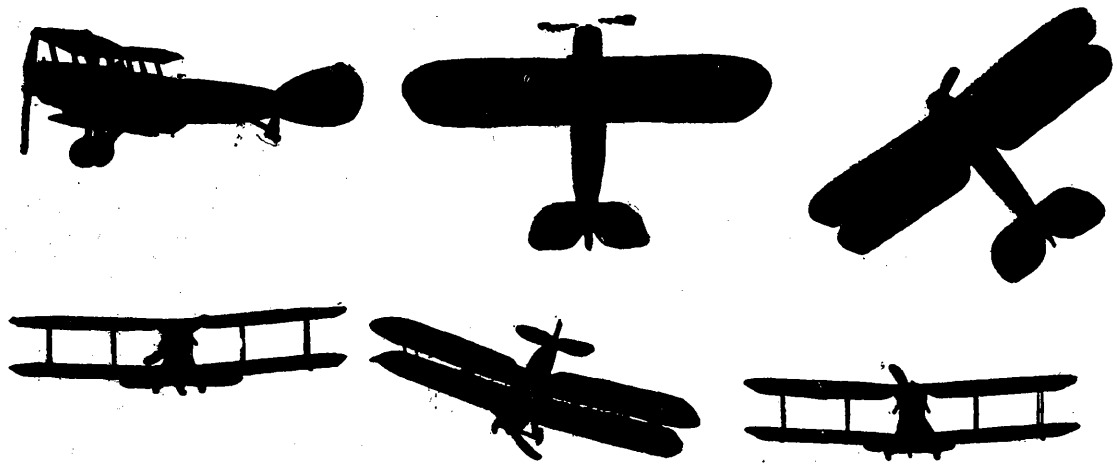
Armstrong Whitworth.—This is very similar to a *B. E. 2c*, but it is larger and the planes have a much greater width from front to rear in proportion to their length (from wing tip to wing tip), the tips being markedly wedge-shaped.



BRITISH.

De Havilland 4.—This machine is also similar to the *B. E. 2c*, but the nose is very square and projects a considerable distance in front of the planes.

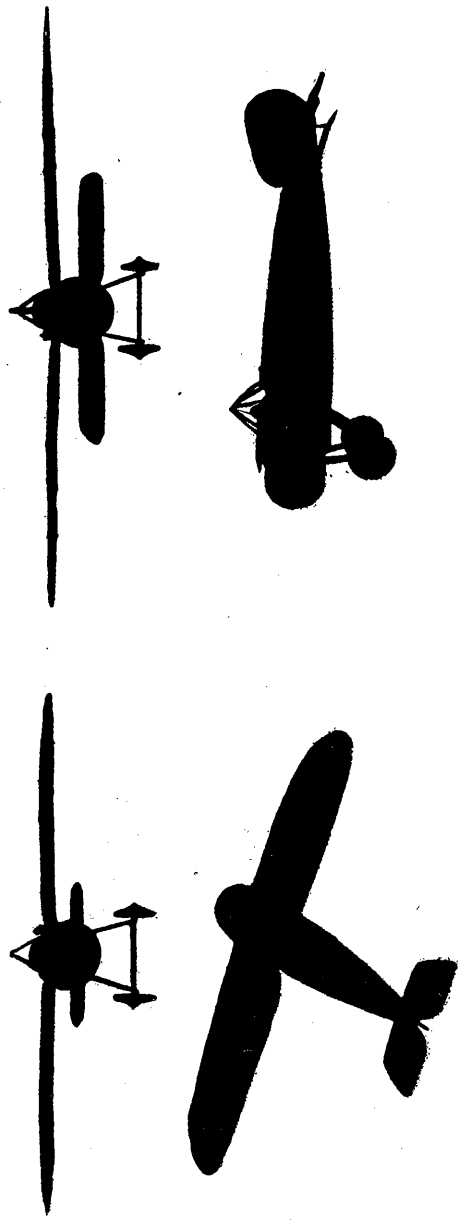
The tail plane is also slightly different and the wing tips are cut back.



BRITISH.

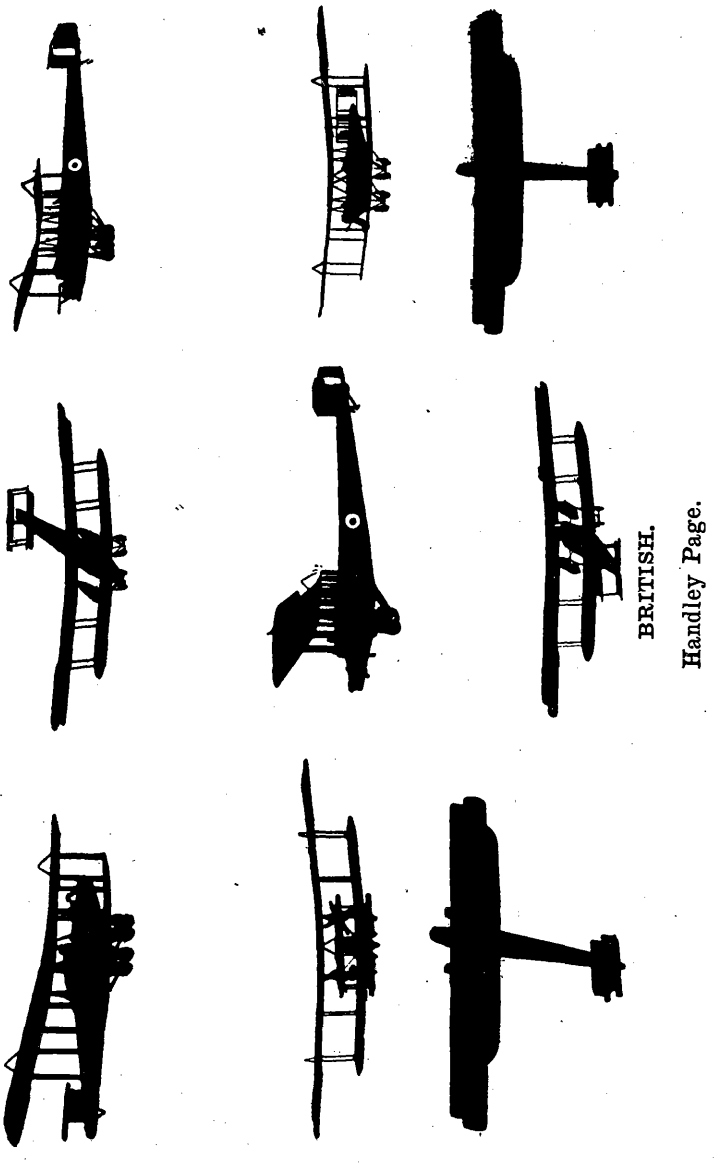
Bristol Fighter.—The *Bristol Fighter* is a two-seater tractor biplane with closed fuselage.

The leading edges of the planes are longer than the trailing edges, the tips of the wings are rounded, it has dihedral and stagger, and the tail is of type D (par. 12) but with the corners rounded off.



BRITISH.

Bristol monoplane.



BRITISH.

Handley Page.

BRITISH.

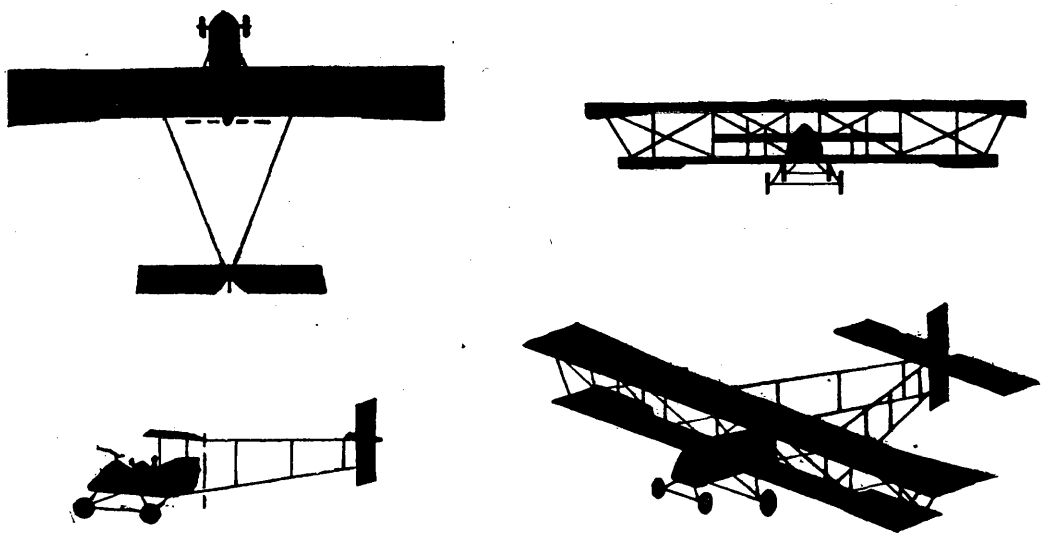
Handley Page.—Single fuselage machine with biplane tail and elevator.

Two rudders, one on each side of the fuselage, mounted between top and bottom tail planes.

Two engines mounted stream line nacelles, projecting beyond the chord of the planes on either side of the main body and driving tractor propellers.

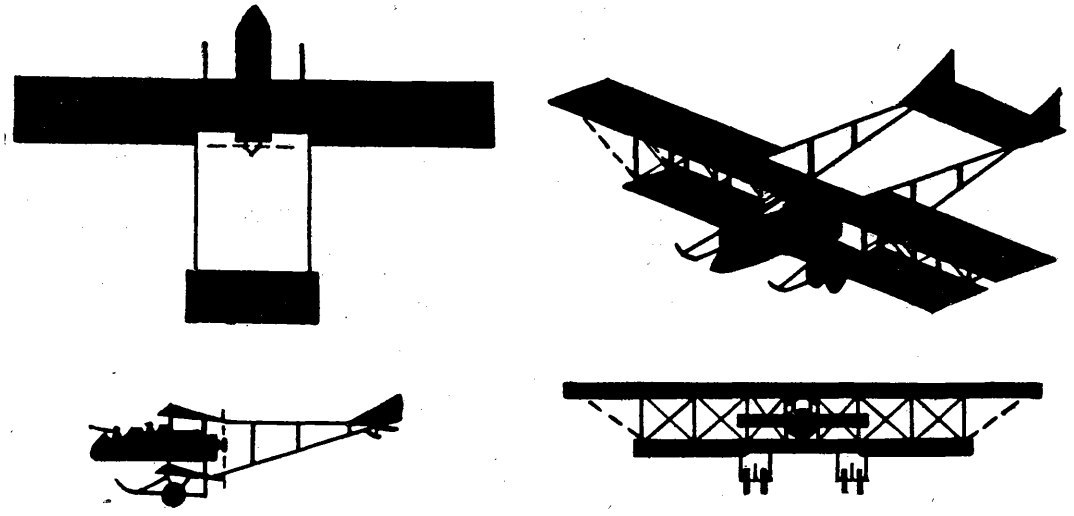
At close ranges the projection formed by the balance portion of the aileron is very marked.

From the ground tail appears to be very small and the front of the fuselage snoutlike in appearance.



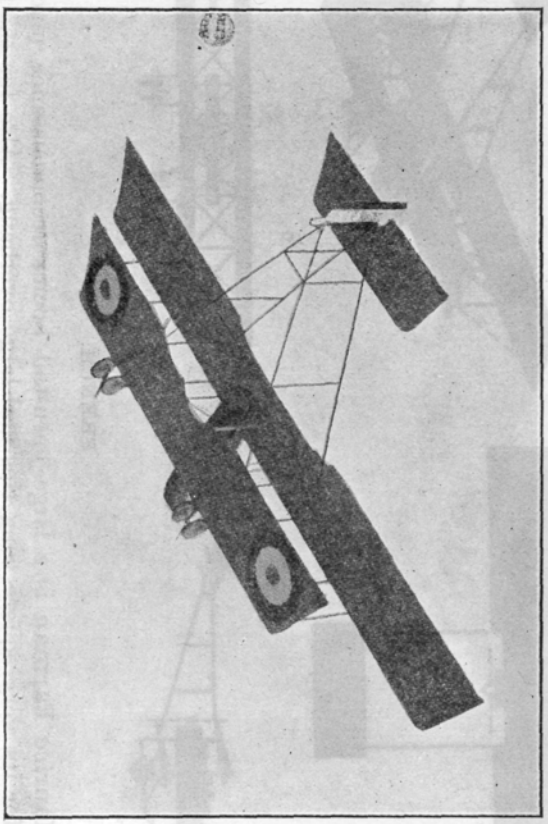
FRENCH.

Voisin.—The *Voisin* is another large open-tail booms machine, chiefly flown on long reconnaissances. It is easily picked up by its marked ailerons and by its long and narrow tail. The tail, with the long, narrow rudder, forms a perfect cross. It has slight overhang. This machine has a very noisy engine. The planes are very long in comparison with the vertical distance between them.



FRENCH.

The **Maurice Farman** is a large open-tail booms reconnaissance machine. It is noticeable for its very square wing tips and large overhang. Also for the fact that the struts of the fuselage joined to the extremities of the large rectangular tail are parallel. It has two rudders on top of the tail.



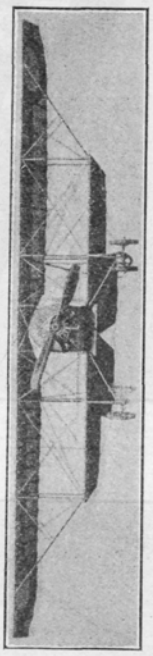
FRENCH.

Farman Freres.

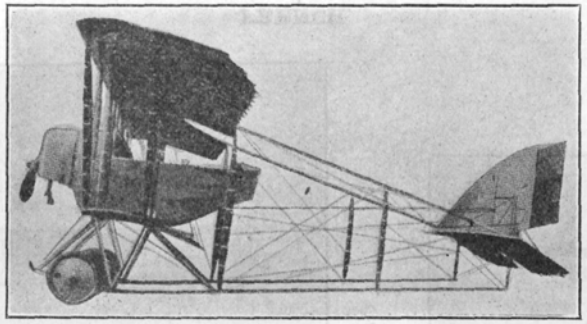
FRENCH.

Farman Freres.—The *Farman Freres* is a large open-tail booms reconnaissance machine with a big overhang. It can be readily identified by its cut-back wing tips, cut-back tail, and the long rudder, which is entirely below the tail.





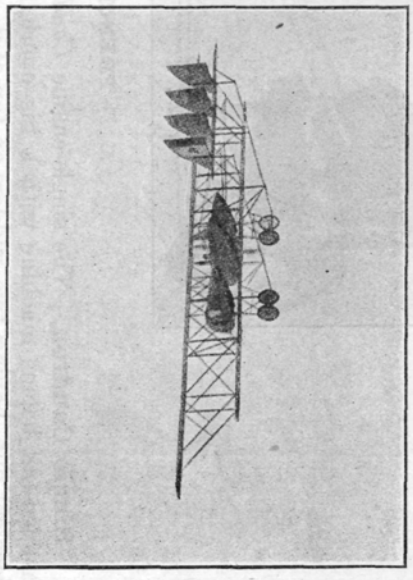
FRENCH.
Single Caudron.



FRENCH.

Single Caudron.—The single-engine *Caudron* is not flown much nowadays. It is an open-tail booms machine with a big overhang. The tail is rectangular, with a big piece cut out, having two rudders on top of it.

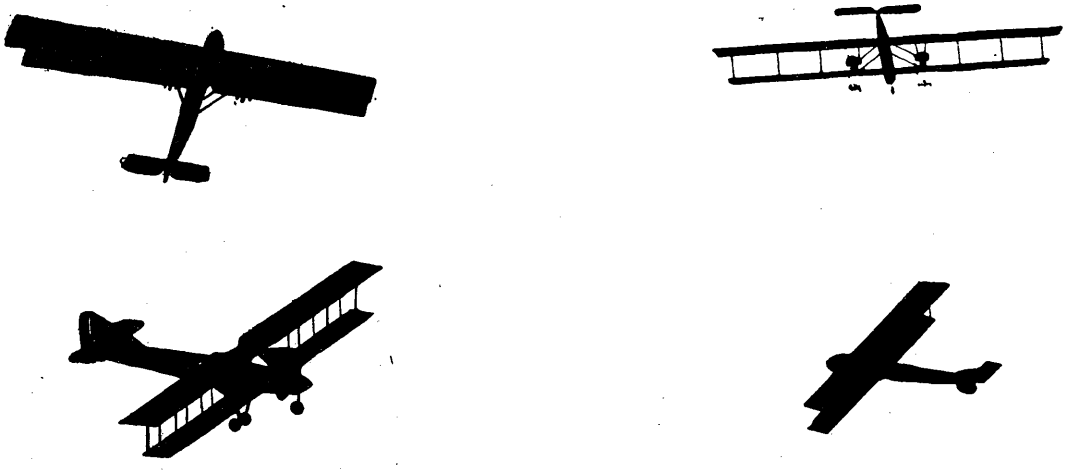




FRENCH.
Twin Caudron.

FRENCH.

Twin Caudron.—The double-engined *Caudron* is a reconnaissance machine, and is usually identified by its huge size, great overhang, narrow wings, and twin engines. It is an open-tail booms machine, and is remarkable for having four rudders on top of its large rectangular tail. (Type A, par. 12.)

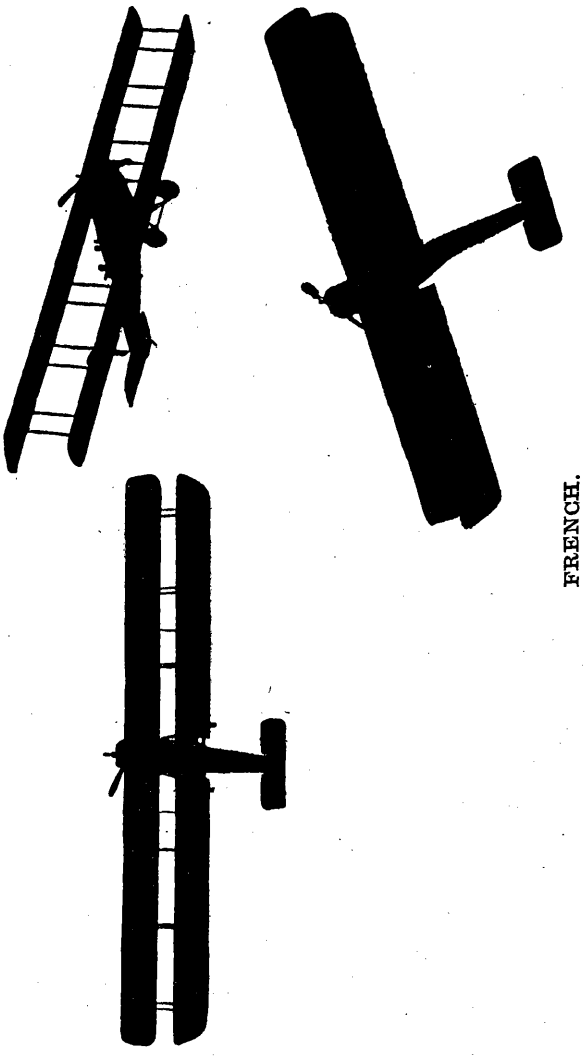


FRENCH.

Caudron R. 4.—The *Caudron R. 4* is another twin-engine reconnaissance machine of very large size. It has very long and narrow wings with a slight overhang, and has a closed fuselage. The tail is rectangular, very long and narrow, type Y (par. 12), with a single rudder and fin.

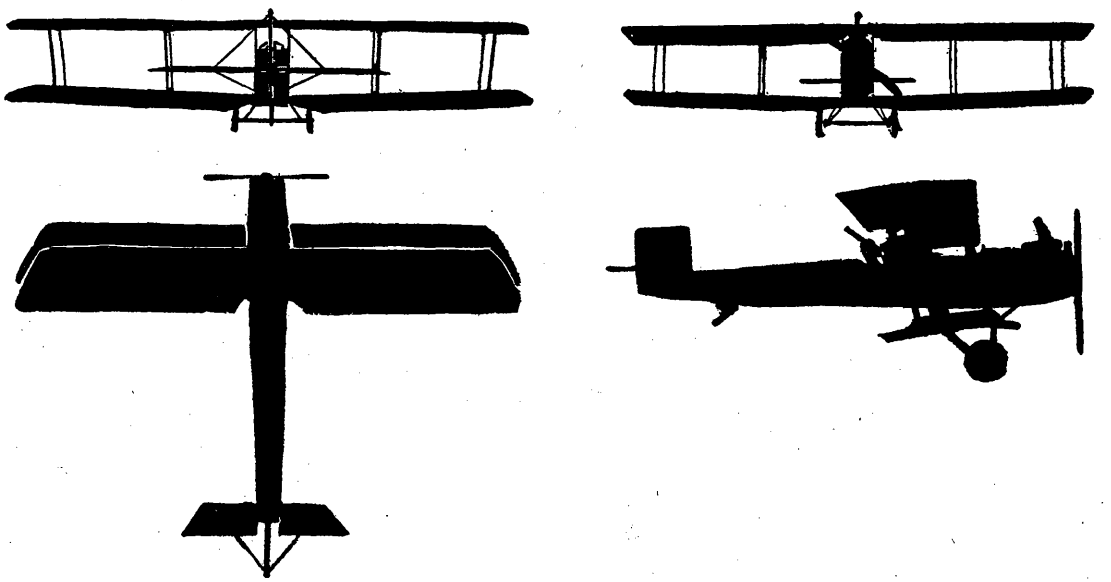
FRENCH.

The Caudron G. 6 is a large twin-engine tractor reconnaissance machine, with a big overhang, closed fuselage, and tail of type Y.



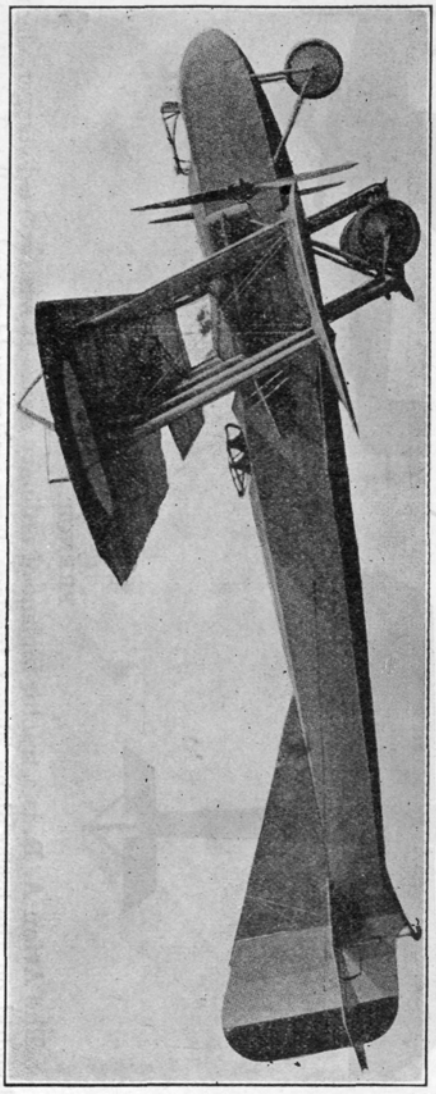
FRENCH.

The Paul Schmitt (type VI) is a big tractor reconnaissance machine, with closed fuselage, rectangular tail, and square rudder. The tips of the upper plane are cut back and those of the lower plane wedge-shaped.



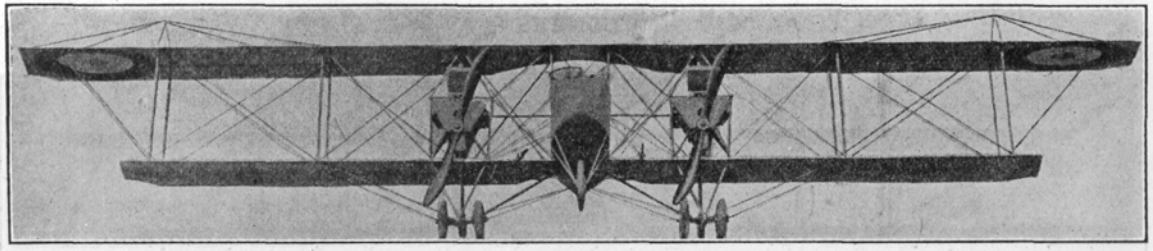
FRENCH.

The Avion A. R. is a tractor biplane of ordinary size. It has reversed stagger, slight dihedral on the lower plane, closed fuselage, large square rudder, and small tail similar to type Y.

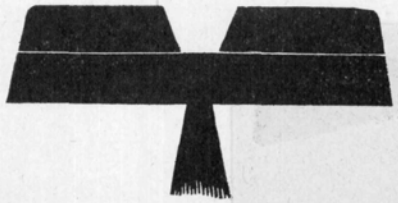


FRENCH.

Letord.

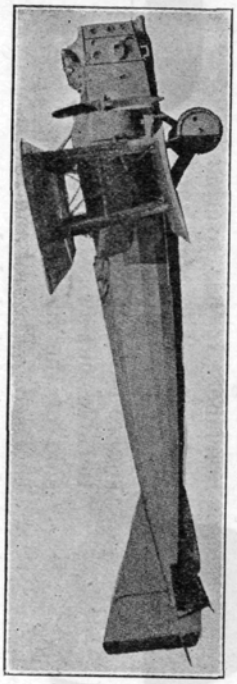


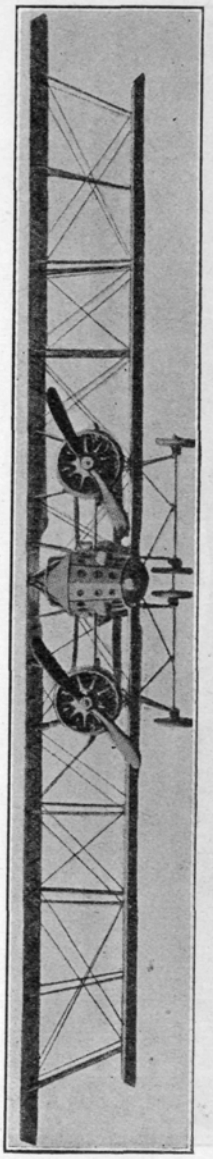
FRENCH.



The Letord is a very large twin-engine reconnaissance machine. It has overhang and reversed stagger, but no dihedral. The wing tips are square cut. There is a noticeable cut-away on each side of the fuselage, which is closed. The tail and rudder are particularly large.





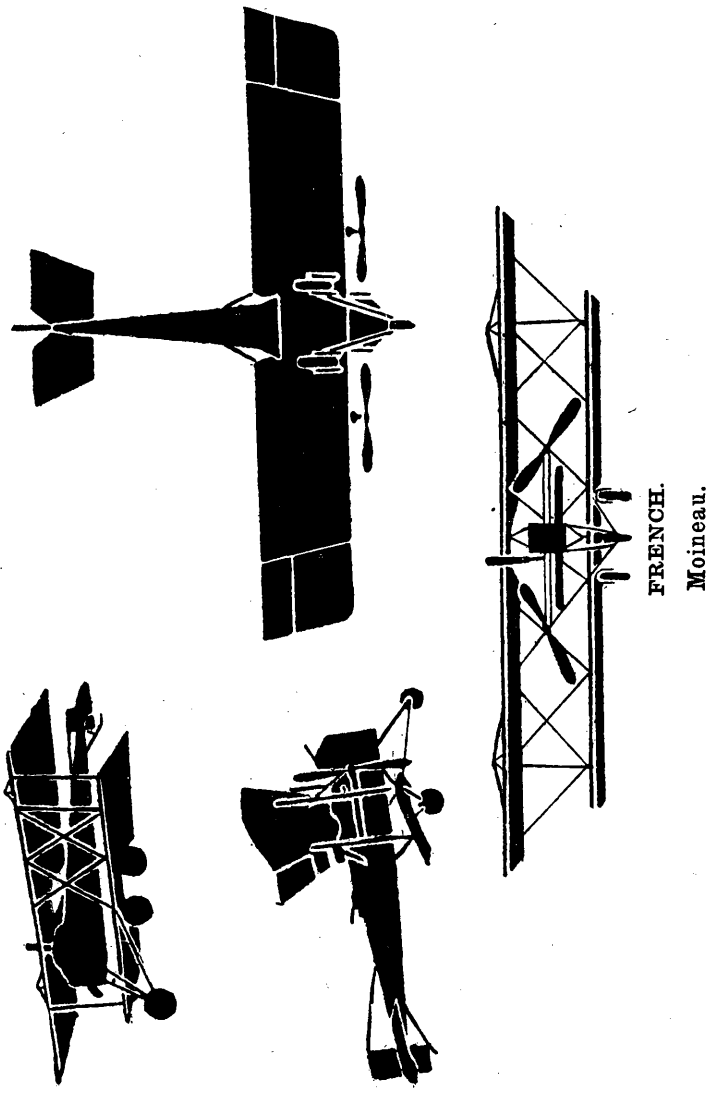


FRENCH.

Morane.

FRENCH.

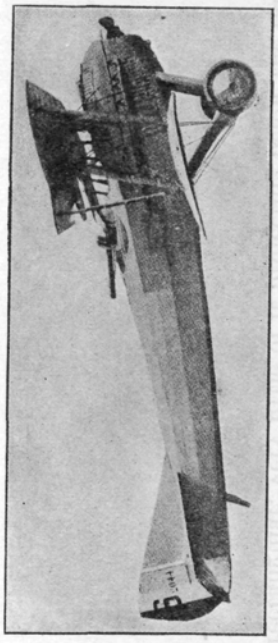
The French Morane is a very large, three-seater, twin-engine biplane. It has slight overhang, no dihedral, and no stagger. The wing tips are cut back and there are five pairs of struts (including the engines) on each side of the fuselage. The fuselage, tail, and rudder are of the ordinary *Morane* type.



FRENCH.
Moineau.

FRENCH.

The Moineau is a three-seater reconnaissance machine. It has overhang, but neither stagger nor dihedral. The wing tips are square cut; it has one pair of struts on each side of the fuselage, which is closed, and the bracing wires are very conspicuous. It has two tractor propellers geared to one engine. The tail is of type D; the fin is triangular, and the rudder is rectangular, very little of it projecting below the tail.



FRENCH SPAD (2-seater tractor biplane).

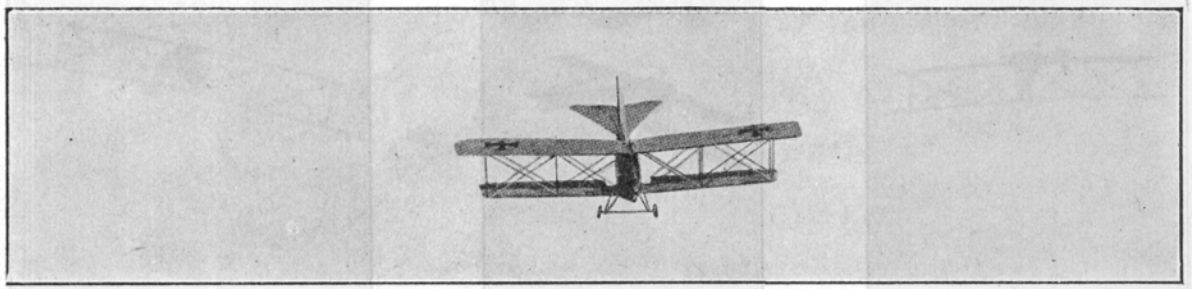
FRENCH.

The Morane Monocoque is a single-seater monoplane flown by the French. It is not a parasol. The wing tips are cut back, and there is no piece of the planes cut away near the fuselage. The tail is of type Y, the rudder projecting considerably beyond it.

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GERMAN.
Albatros.

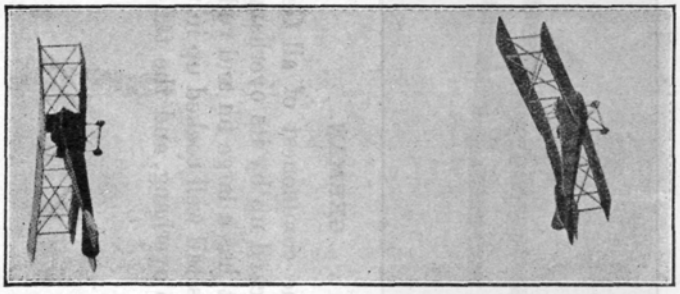


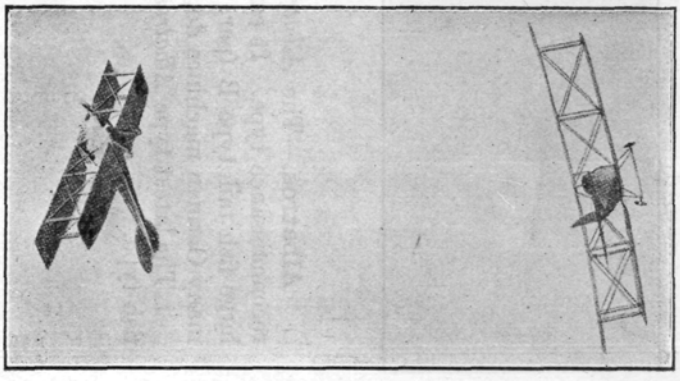
GERMAN.

Albatros.—The *Albatros* is the commonest of all German machines, and is a fast reconnaissance type. It can be picked up by its overhang, squarish wing tips, and very large fish tail, type B (par. 12). It has a large fin and rudder above the tail, and flies, as many German machines do, with its tail well cocked up in the air.

The latest type *Albatros* has no overhang, and the tail is of a blunter, more rounded fish type.





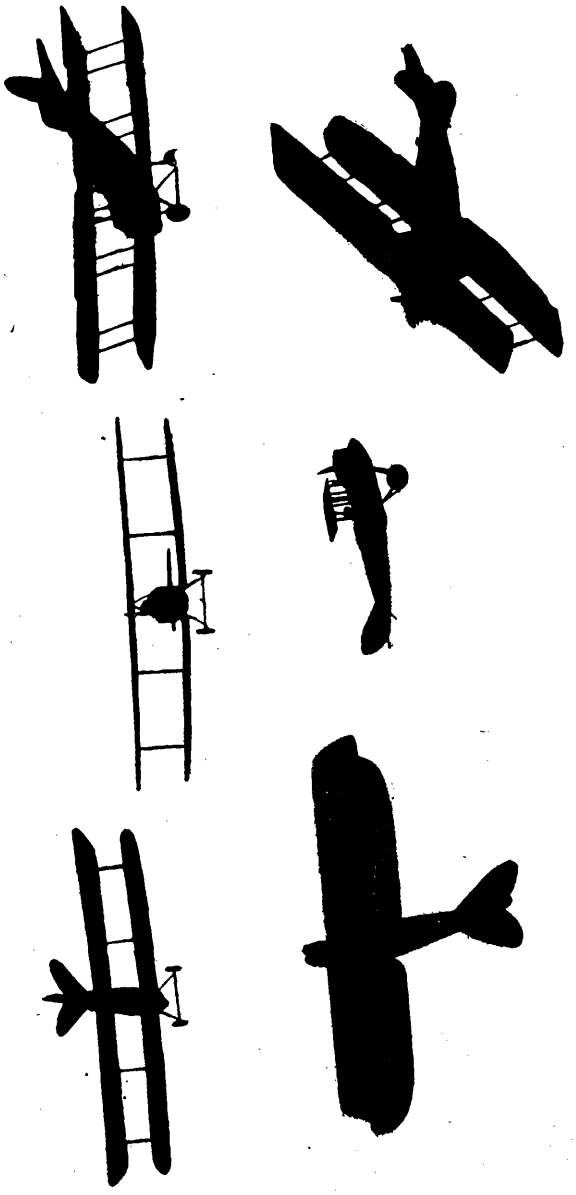


GERMAN.
Aviatic.

GERMAN.

Aviatik.—The *Aviatik* is also very similar to the *Albatros,* the main difference being the tail, which is kidney-shaped. (Type C, par. 12.) The wings are slightly swept back.

These three German reconnaissance machines are all very similar, and close observation is needed to differentiate one from the other. However, by reason of their overhang, coupled with the closed fuselage, their large and easily distinguished tails, and their habits of flying with the latter cocked up, they are not difficult to recognize as hostile machines.

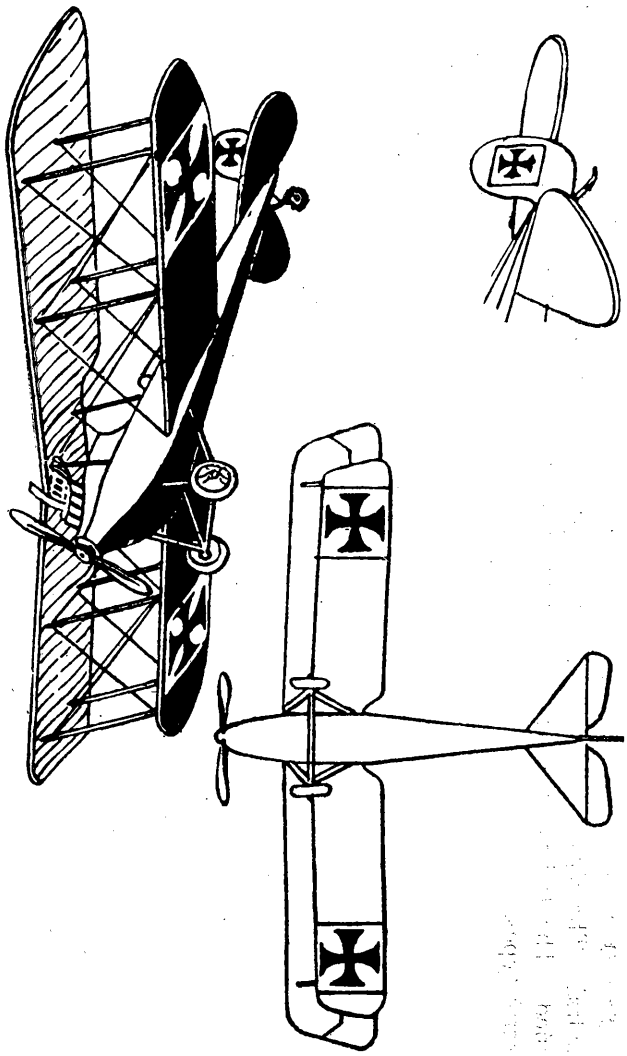


GERMAN.

D. F. W. Aviatik.

GERMAN.

The D. F. W. Aviatik is a machine with planes of equal length, no stagger, and no dihedral. The tips of the upper plane are cut back, and those of the lower plane wedge-shaped. The tail is of a rounded fishlike appearance—a cross between the *Albatros* and *Aviatik* types.

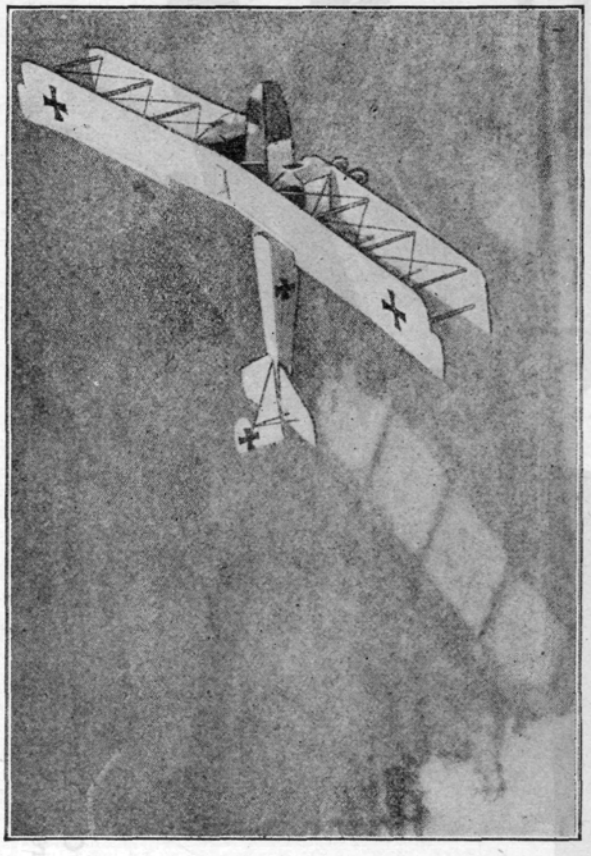


GERMAN.

The Rumpler is a two-seater tractor machine with slight overhang; the upper plane is cut back and the lower plane nearly square. The tail is of the fish type.

GERMAN.

L. V. G.—The *L. V. G.* is similar to the *Albatros* except that it is somewhat larger, with a more pronounced overhang. The leading edges of the wings are markedly swept back.



GERMAN.

Gotha.

GERMAN.

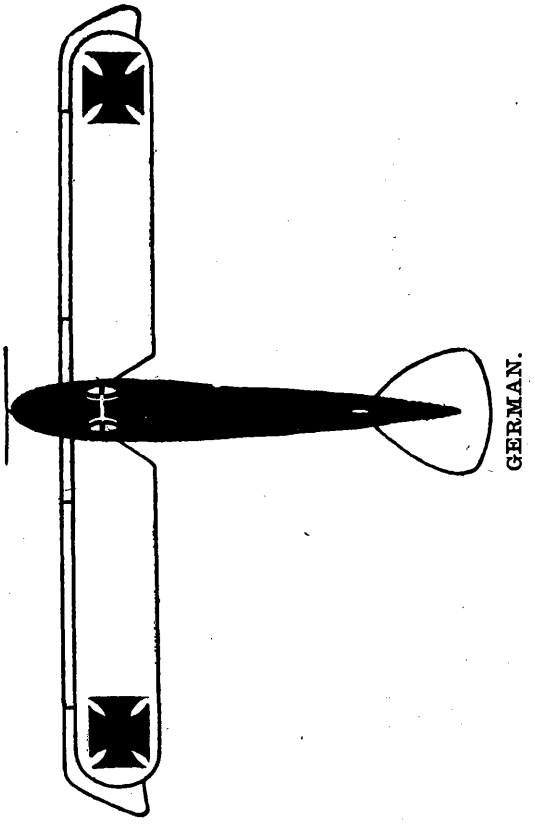
The Gotha is a very large twin-engine machine. The wings are markedly swept back and have a slight overhang. The fuselage is closed and the tail and rudder are very distinctive, as under.



Tail.

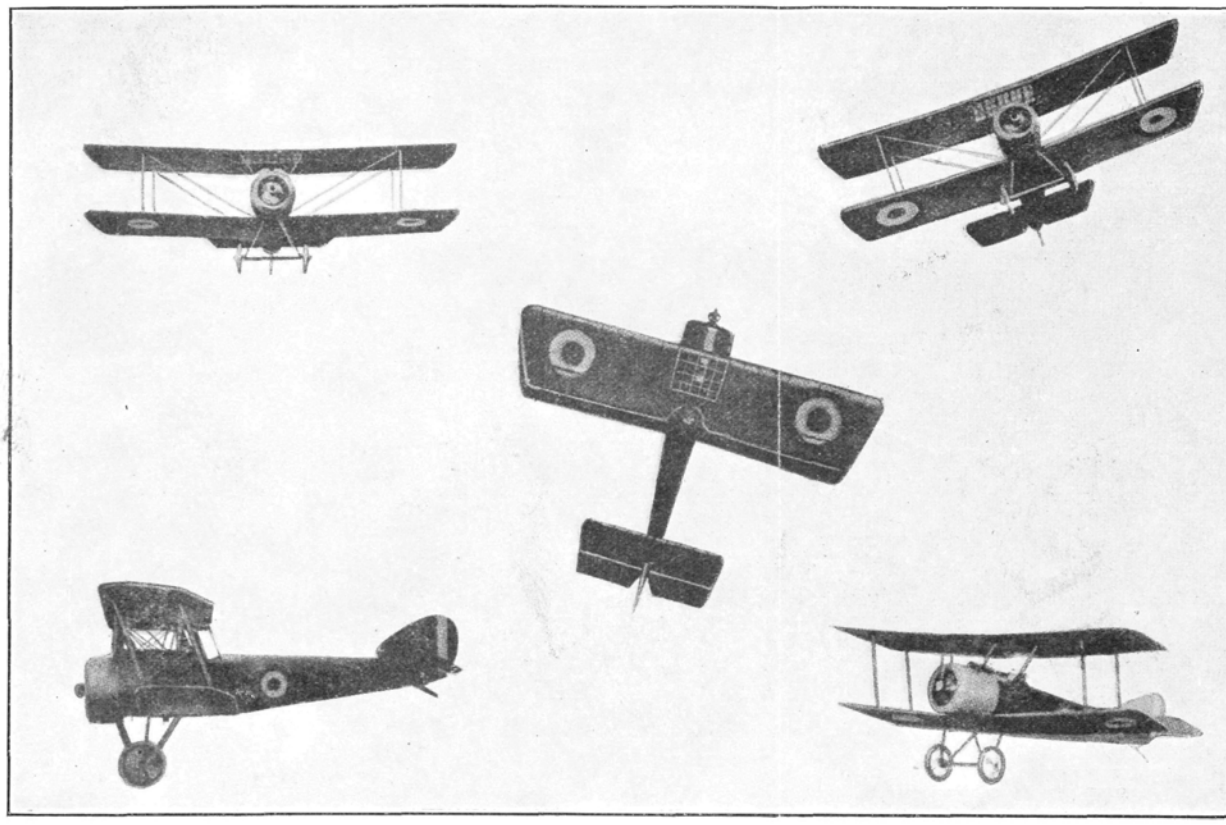


Rudder and fin.



GERMAN.

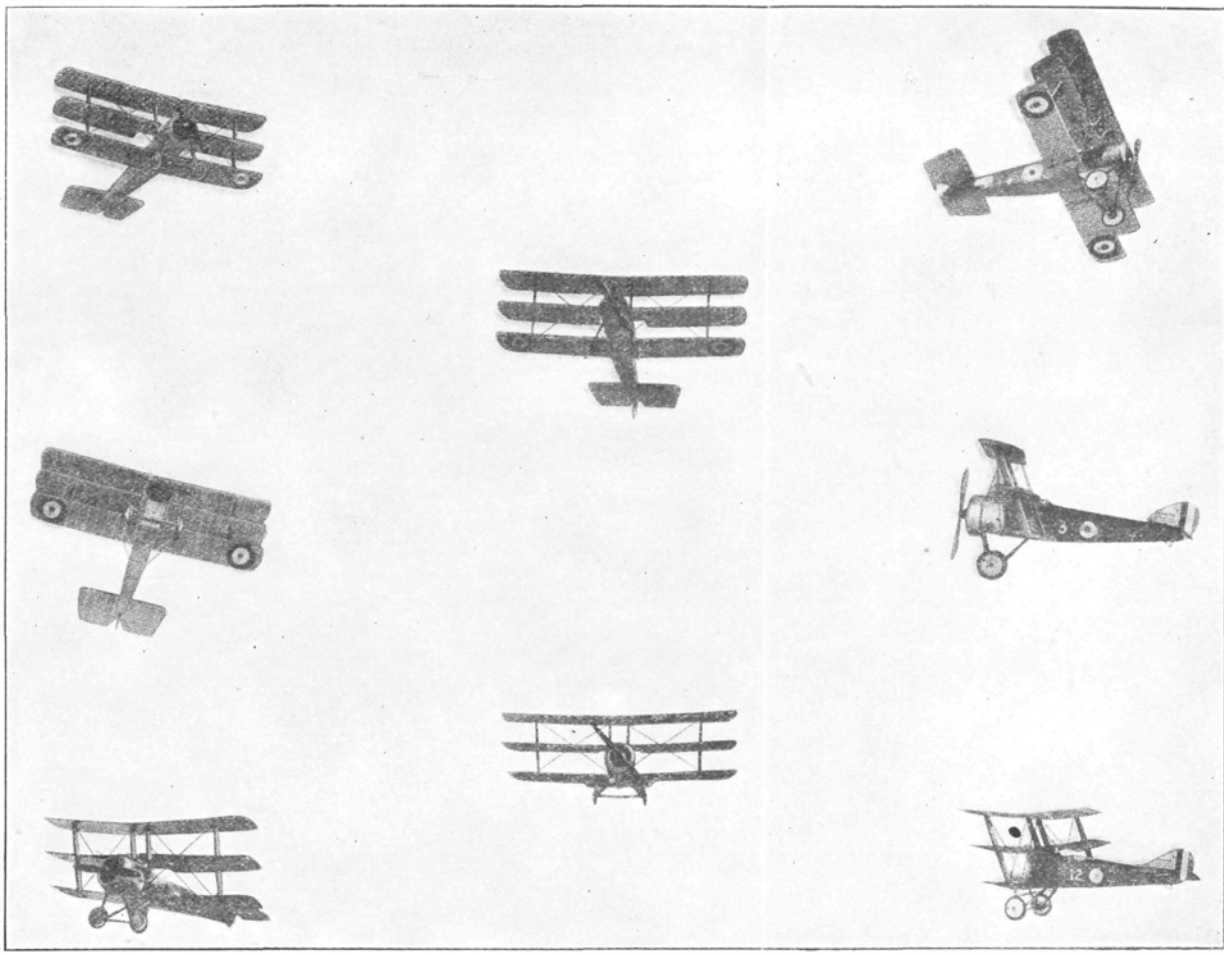
New Type (probably *Albatros*).—This machine has slight overhang and no dihedral or stagger. The upper plane is cut back, the lower plane rounded. The tail is of the *Albatros Scout* type and the rudder of the ordinary *Albatros* type.



BRITISH.

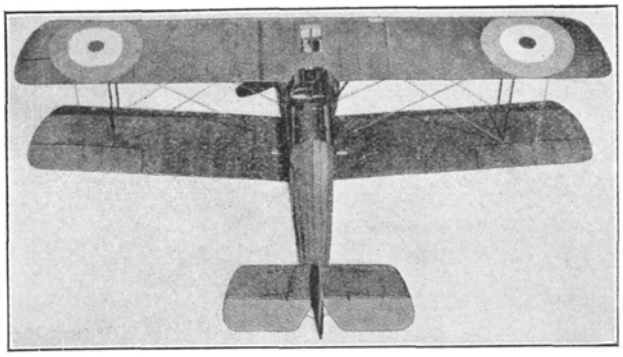
Sopwith Scout.—The *Sopwirth Scout* is a fast one-seater machine. The wing tips and tai
wedge shaped. It has stagger, dihedral, and closed fuselage.

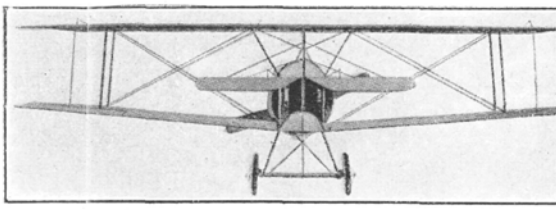
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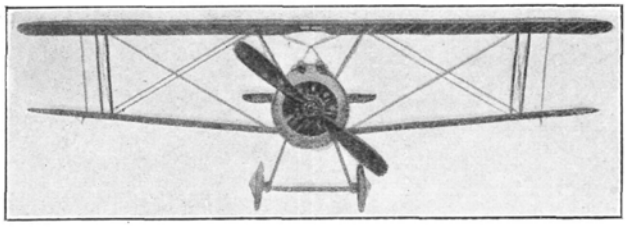


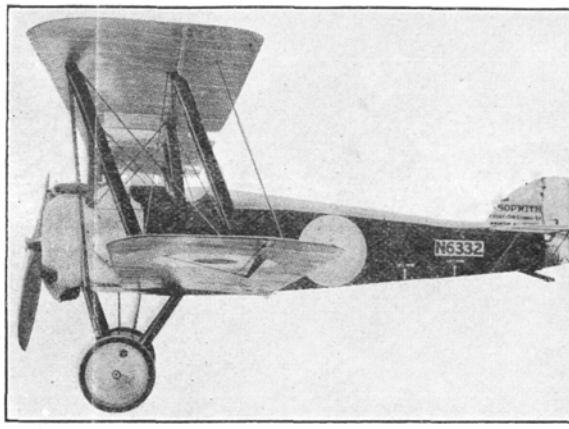
BRITISH.

Sopwith Triplane.—The *Sopwith Triplane* has three planes, and the wing tips are cut as in the *Scout,* except that the corners are very slightly rounded. The tail rudder are similar to hoset of the *Sopworth Scout.*









BRITISH.

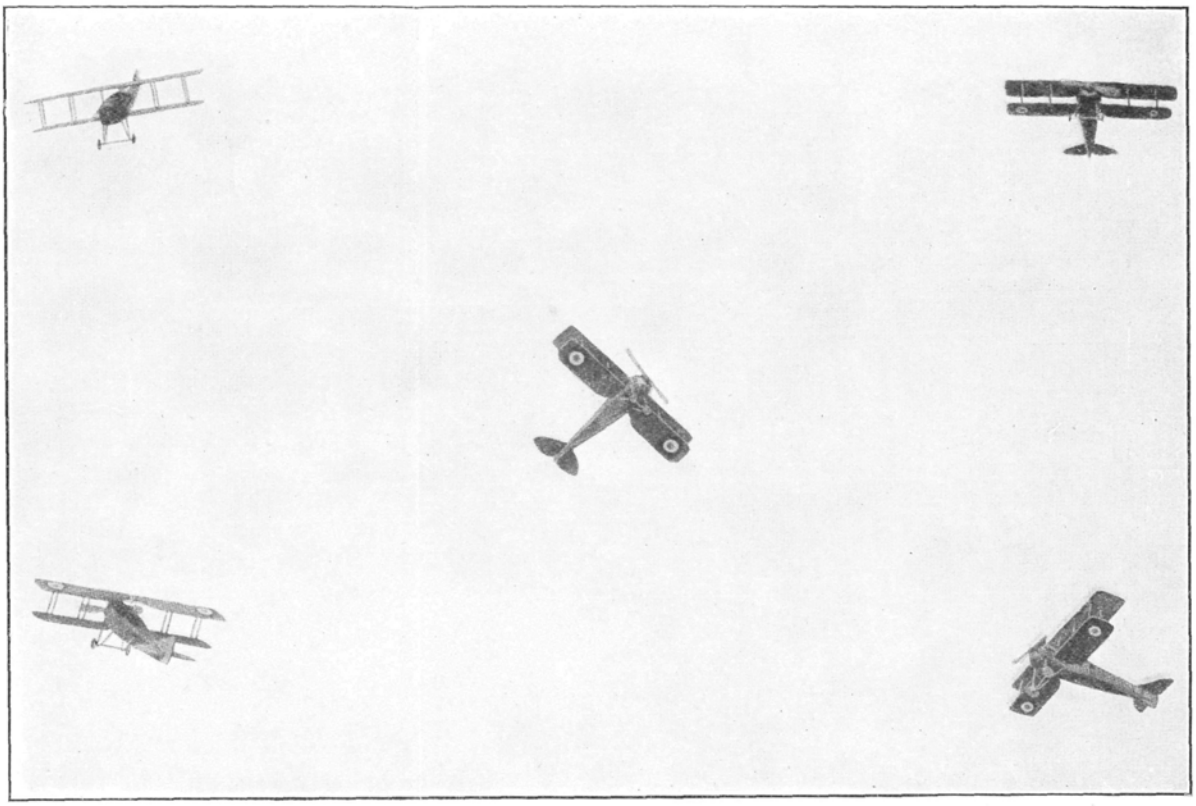
The Sopworth Camel is a small single-seater machine. It has stagger, but no overhang. upper plane is straight, but the lower has a marked dihedral, the tips of both being cut back. The is of type X, and the rudder is similar to that of the *Sopworth Scout.*

BRITISH.

De Havilland 5.—The *De Havilland 5* is a unique British type in that it has a reversed stagger. It also has a closed fuselage.

BRITISH.

Sopwith Biplane.—The *Sopwith Biplane* is a small and fast two-seater machine. It may be distinguished by closed fuselage, slight dihedral, stagger, and kidney-shaped rudder. It is also the only machine with a tail of type Z (par. 12). The engine has a loud and distinctive ringing note.



BRITISH.

S. P. A. D.—The *S. P. A. D.* is a tractor biplane with closed fuselage and is perhaps the most difficult of all allied planes to distinguish.

The wings are square cut; there are two pairs of struts on either side of the nacelle, which appear to be of equal length, but in reality there is a slight overhang.

The tail (see sketch) is the safest guide to the identity of this machine.

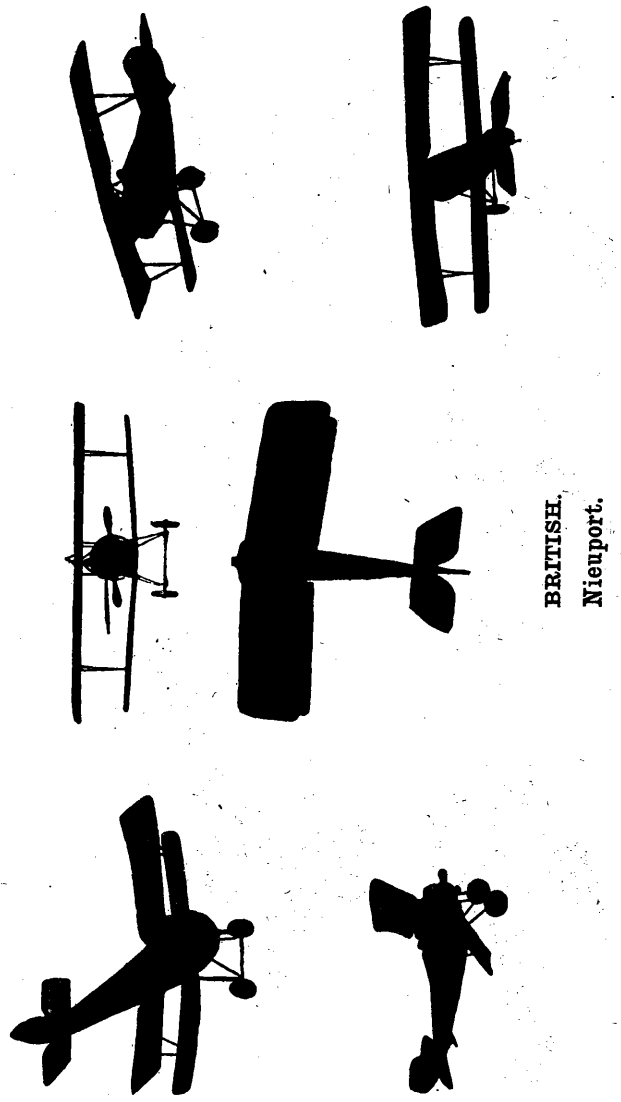


The *S. P. A. D.* is liable to be mistaken for a hostile plane by unskilled observers, and the greatest care must therefore be exercised in establishing its identity.

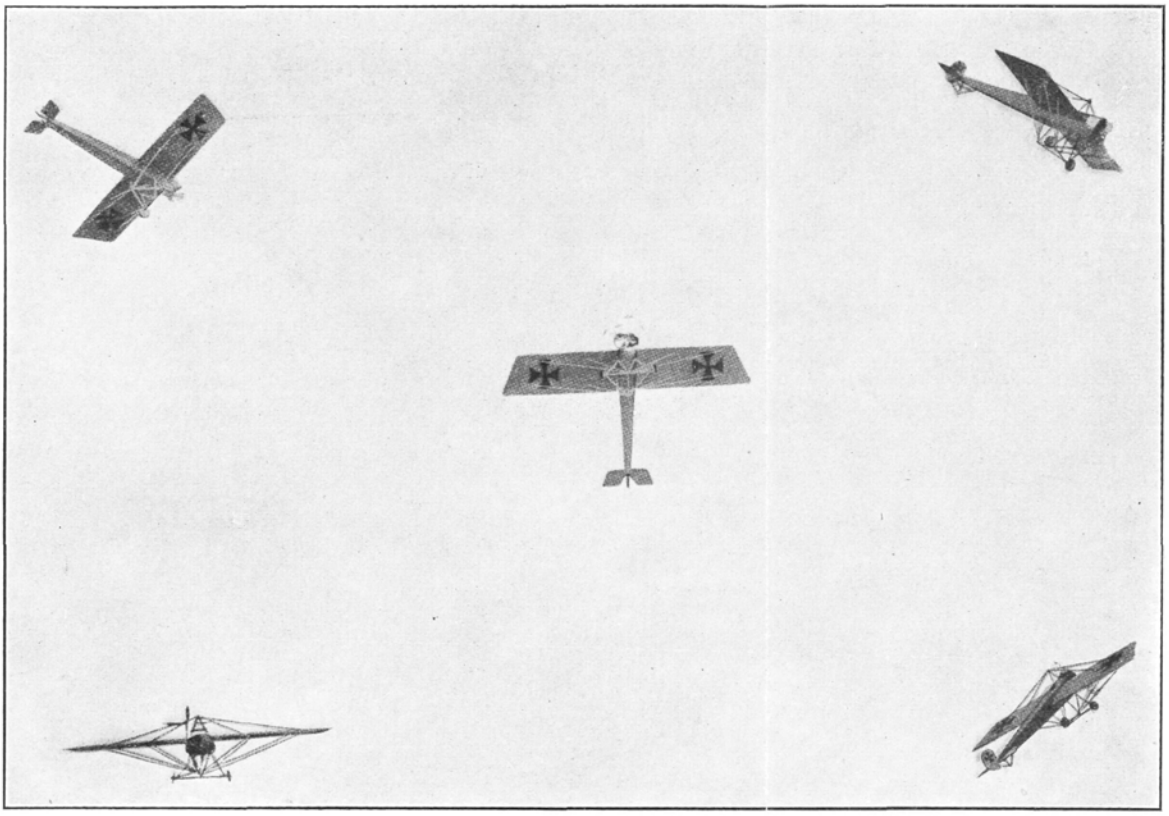
BRITISH.

The S. E. 5 is a single-seater tractor biplane. It has a marked dihedral and stagger; the tips of the wings almost square cut, no overhang, and one pair of struts on either side.

The tail is the same as the *R. E. 8*, but the rudder is large and triangular with the top point cut off. Care must be taken not to mistake the machine for the *Halberstadter*.



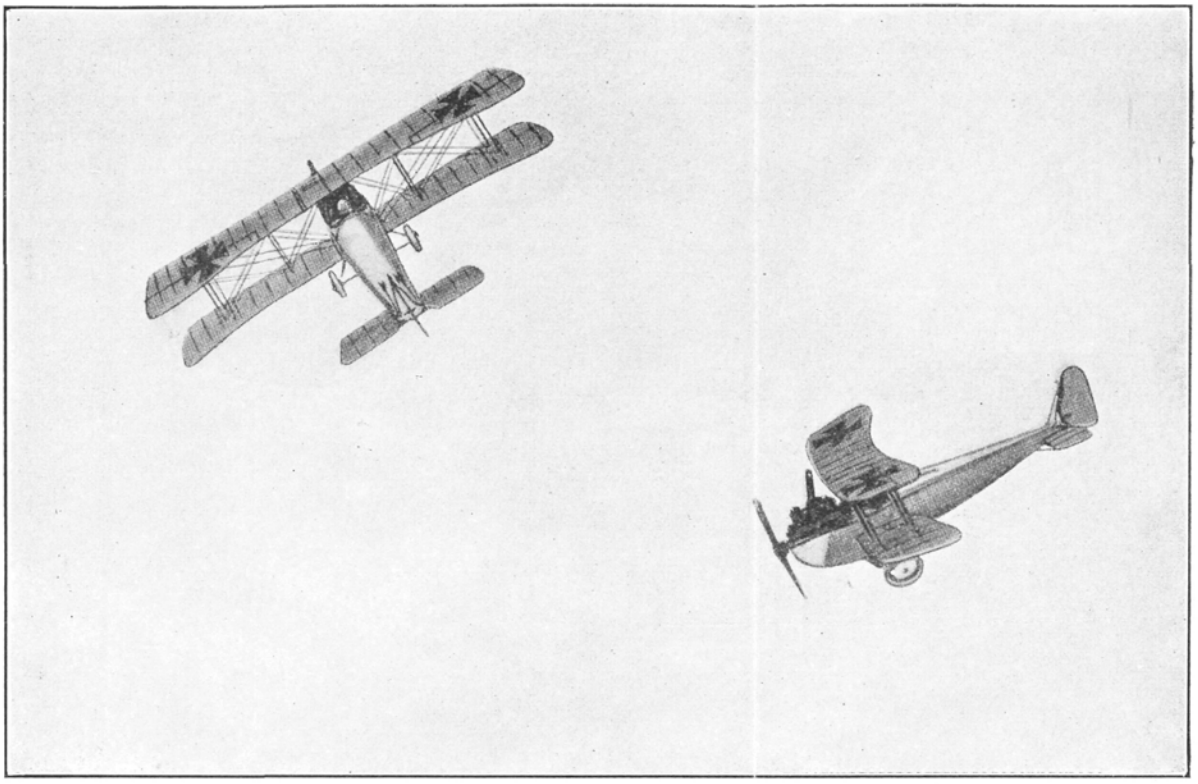
BRITISH.
Nieuport.



GERMAN.

Fokker.—The *Fokker* is a fast monoplane scout, having cut back wings and rectangular tail, type Y (par. 12). The round rudder cocked up above the tail is its chief characteristic.

24997°—18. (To face page 64.) No. 1



GERMAN.

Halberstadter.—The *Halberstadter* is a difficult machine to identify unless seen sideways, and then its high, triangular rudder is extremely prominent. Some uncertainty exists as to the exact structure, but most observers agree as to the slight dihedral and stagger, while the tail is certainly of type Y (par. 12), this having been a common cause of confusion when the machine first appeared. As soon, however, as the rudder can be seen, no further doubt is possible.

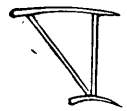
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BRITISH.

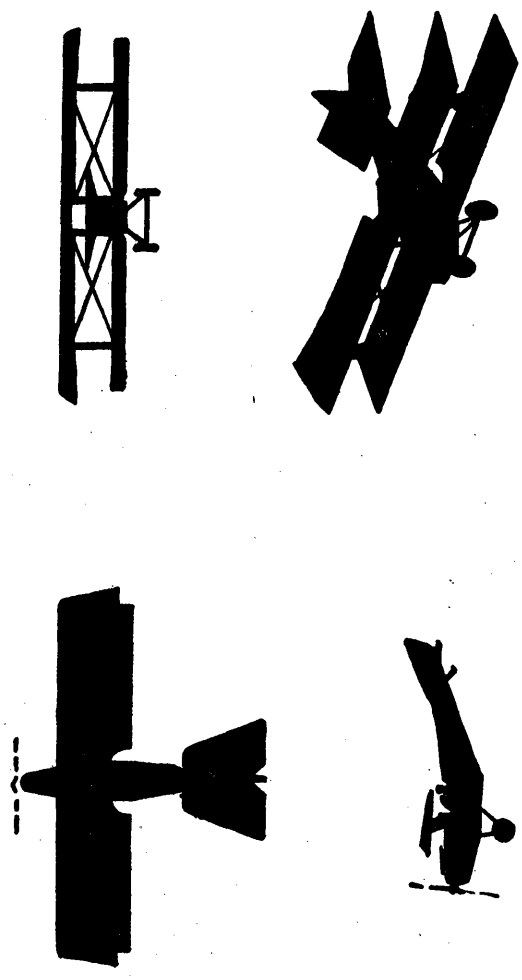
Nieuport.—The *Nieuport* is a fast, single-seater scout, very difficult to identify at certain angles.

Its most marked peculiarity is the very narrow under plane, which is shorter than the upper plane, and has dihedral. Once this is picked up doubt is at an end, but when coming straight in, the overhang and dihedral of the under plane give it an extremely Hun-like appearance.

The tail is of type D (par. 12) and must be carefully watched, but the rudder, which is on top of the tail and projects well in rear of it, is easily distinguishable. The wings are slightly swept back and the narrow under plane necessitates a distinctive placing of the struts, thus—

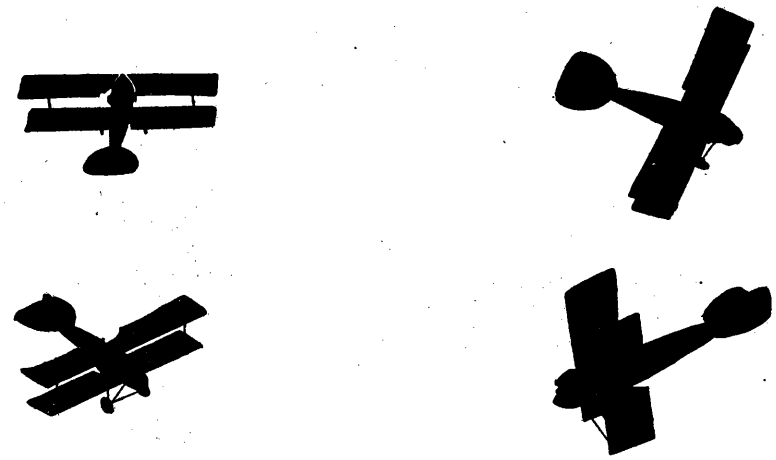


Despite these numerous peculiarities, the *Nieuport* has many times been mistaken for a German machine, and should always be carefully watched.



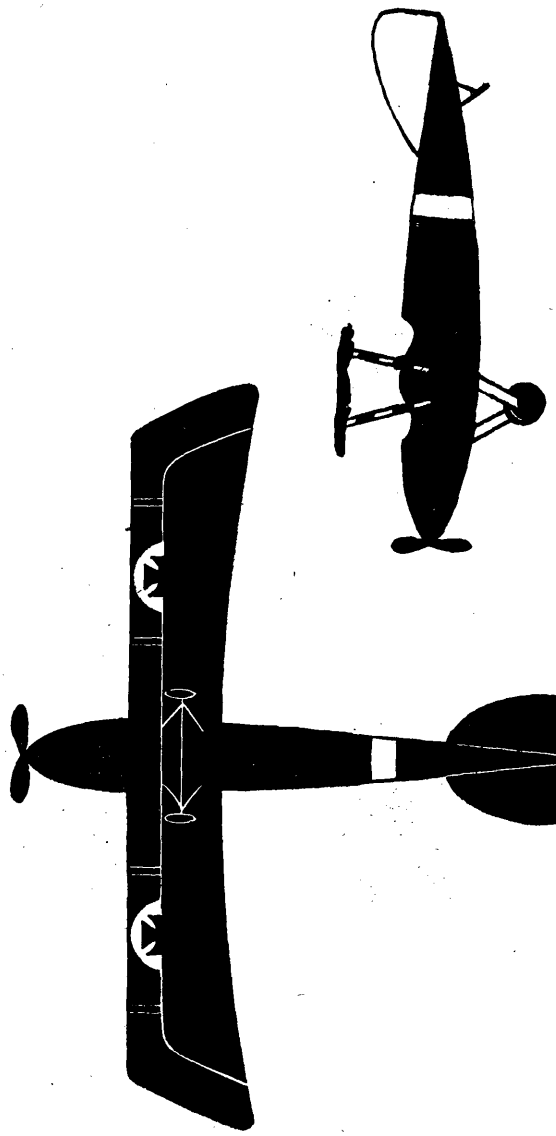
GERMAN.

Roland.—The *Roland Scout* is a fast machine. Its peculiarity is that it has one large strut on each side of the fuselage in place of the usual pair. The rudder is triangular, and the rather large tail is similar to type D (par. 12) with the rear edges rounded. This plane does not fly much nowadays.



GERMAN.

Albatros Scout.—The *Albatros Scout* is a small and very fast machine. It has a slight overhang, but is most easily distinguished by its pear tail, similar to type C (par. 12), although with a blunt end, there being no notch cut out in the middle for the rudder. It is very easy to mistake the *S. P. A. D.* for this machine if the tail is not visible, the chief point of difference being that the *S. P. A. D.* has two pairs of struts on each side of the fuselage, and the *Albatros Scout* only one.



GERMAN.

The Albatros Scout No. 2 resembles in many points the *Nieuport Scout.* It has overhang and a narrow under plane, necessitating the same arrangement of struts as on the *Nieuport.* The planes are not swept back; the tips are markedly cut back. The rudder is a cross between the usual *Albatros* type and the *Albatros Scout No. 1* type, while the tail is similar to that of the latter machine.

GERMAN.

The S. S. W. (Siemens Schuckert Werke) is almost an exact copy of the French *Nieuport*.

○