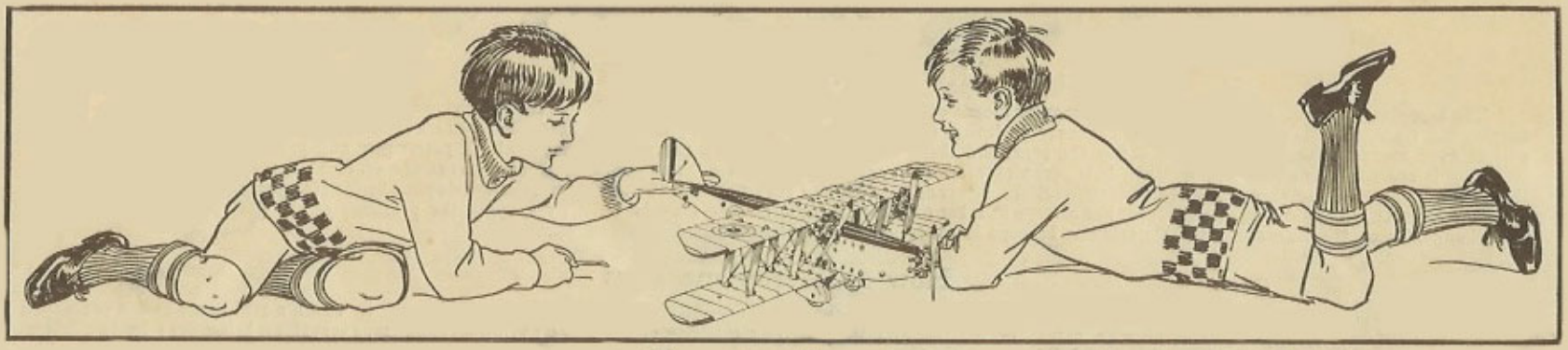


MECCANO

AEROPLANE CONSTRUCTOR

INSTRUCTIONS

FOR OUTFIT

No. 2

Price 6d.

No. 32-2AC

2/732/18.5 (IP)

MECCANO

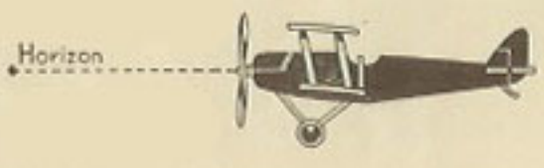
AEROPLANE CONSTRUCTOR

The aeroplane is rapidly taking its place as a regular means of high speed transport, and the time is not far distant when we shall use it as readily as to-day we employ the train, the steamship, and the motor car. In future we shall cross the oceans in giant flying boats that will traverse well-marked routes. Overland routes will be even more numerous than those across the seas, and these will be thronged with aeroplanes carrying both passengers and goods.

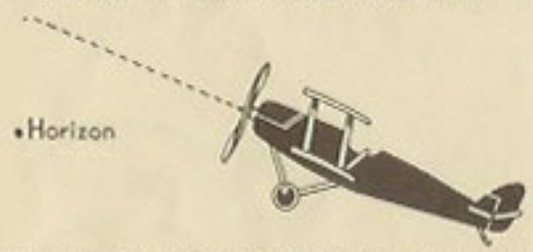
Now is the time for every boy to learn how aeroplanes are designed and constructed, and to recognize at a glance the different types. The best way of doing this is for a boy to build aeroplanes for himself, and the Meccano Aeroplane Constructor Outfits have been designed specially for this purpose. This Manual shows how to construct twenty different machines, but a large number of other splendid models may be built by varying the positions of the parts. These parts are all interchangeable on the Meccano principle and can be used in conjunction with the standard Meccano parts.

How an Aeroplane Flies

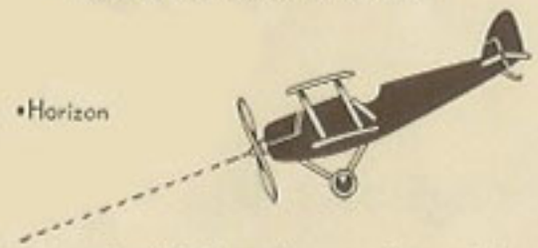
The fun of building with Meccano Aeroplane Constructor Outfits is greatly increased if you know something of the way in which a real aeroplane is controlled in flight. What strikes anyone examining an aeroplane for the first time is the simplicity of the manœuvring mechanism, everything being done by two levers. The first of these, the control column or "joy-stick," is not unlike the gear lever of a motor car, and is connected to two controls, the ailerons and the elevators. The ailerons are small movable flaps arranged along the trailing or rear edge of the wings, and the elevators form one of the two main parts of the tail unit. The other lever, the rudder bar, is near the floor of the cockpit and operated by the feet. This bar controls the rudder, which is the second main portion of the tail unit.



When the control column or "joy-stick" is vertical, the elevator is horizontal, and the machine flies parallel with the ground.



When the stick is pulled back, the elevator is raised and the machine climbs.



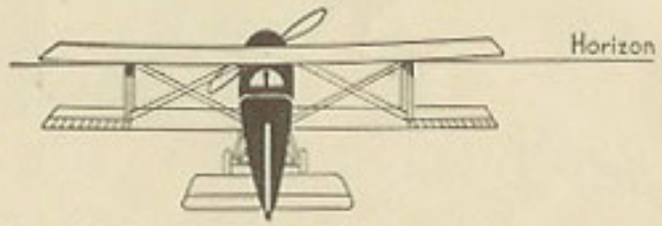
Pushing the stick forward causes the machine to put down its nose and dive.

Joy-Stick and Rudder

The joy-stick is the most fascinating factor in the control of an aeroplane. If you wish to fly level, you keep the stick in a central and vertical position. If you move it forward, the elevators are depressed and the machine promptly puts down its nose and tries to dive. If you pull the stick backward, the elevators are raised and the nose of the machine rises. Movement of the stick to left or right brings the ailerons into action. If you move it to the left, the left wings will go down; if you move it to the right, the right wings will drop. This raising and lowering of the wings is termed "banking."

If you find that the aeroplane is veering to the left, you put on right rudder by moving the right foot gently forward: and similarly veering to the right is corrected by applying left rudder. If you wish to turn the aeroplane round, however, you must not attempt to do it by rudder alone, because in that case the machine would skid in a similar manner to a motor car racing round a bend on an unbanked road. You cannot bank the air, so you bank the aeroplane. That is to say, you apply rudder and bank together in the direction in which you wish to turn.

When a pilot has entered the cockpit of his machine, and ascertained that his engine is running well, the chocks are removed from under the wheels, and the machine is taxied into the wind. It is kept pointing in the correct direction by means of the rudder, and the pilot prevents the tail from rising and the machine going on to its nose by keeping the joy-stick a little back from the neutral position. As the speed increases, the stick is slowly moved to the point at which all controls are neutral, and when the correct speed has been attained the machine almost imperceptibly becomes air borne. In alighting, these operations are reversed, the machine gliding to land with the engine cut out.



When the joy-stick is vertical the machine flies on an even keel, the wings being parallel with the horizon.

When the stick is moved over to the left, the ailerons on that side are raised and the wings drop, producing left bank.

A right bank is brought about by moving the stick to the right.

INSTRUCTIONS

How to Build Model Aeroplanes with Meccano Aeroplane Constructor Parts

Commence by building up the Fuselage, the details of which are clearly shown in the illustrations. The manner in which the propeller drive is arranged is shown in Fig. A. The Propeller is secured to one end of the 6½" Axle Rod 1, and the Rod is then pushed through the lower hole in the Fuselage Front. A ½" Pulley 2 is placed on the Rod together with the Rubber Driving Band 5. The end of the Axle Rod 1 is then pushed through the hole in the Propeller Shaft Bracket 3. The 6½" Axle Rod 1 is kept in place by means of the Collar 4. The 3½" Axle Rod (part No. P62) is pushed through one Undercarriage Vee Strut and Wheel Shield and a ½" Fast Pulley 6 is placed on the Axle. A Rubber Tyre is now fitted to one Landing Wheel and the complete wheel is then placed in the Wheel Shield of the second Undercarriage Vee Strut. The end of the 3½" Axle is then passed through the hole in the Undercarriage Vee Strut and through the centre hole in the Landing Wheel. A Rubber Tyre is next fitted to the second Landing Wheel and the complete wheel is placed in its Wheel Shield. To do this the 3½" Axle is drawn slightly to one side and is then pushed back so that one end of the Axle passes into the centre hole of the Landing Wheel. Each Landing Wheel is locked in position on the Axle by rolling the Rubber Tyre to one side with the fingers so that the grub-screw is exposed and may then be rotated by the Screwdriver.

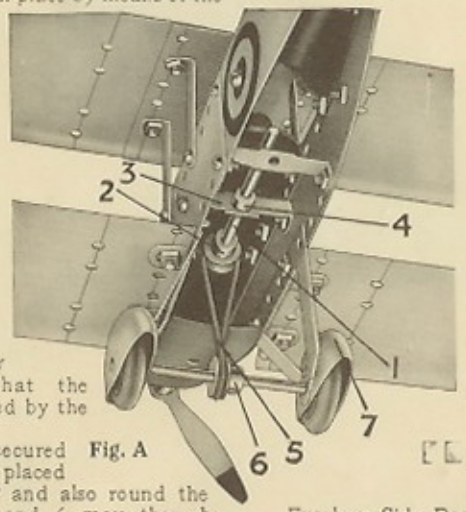


Fig. A

After the Landing Wheels have been secured in place the Driving Band may be placed round the groove in the ½" Pulley 2 and also round the groove of the Pulley 6. The Pulleys 2 and 6 may then be locked in position on their respective Pulley Rods by means of the grub-screws in their bosses.

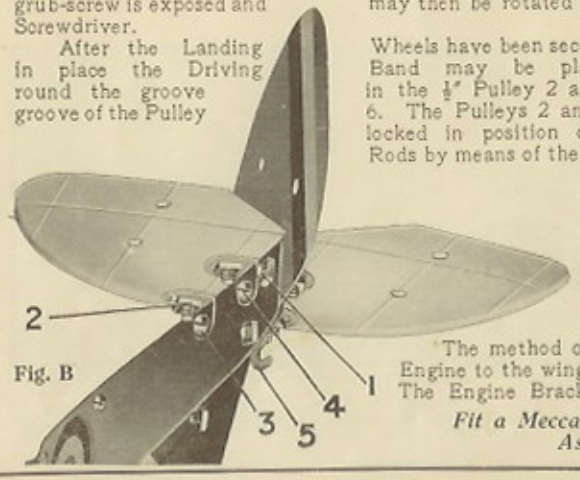


Fig. B

Fitting the Radial Engine Units and Engine Casings. (Water-cooled type)

The method of fitting the Radial Engine to the wing is shown in Fig. C. The Engine Bracket 1 is first of all bolted to the wing. A Nut is screwed on to the projecting screwed shank 2 of the Radial Engine and the shank 2 is then passed through the hole in the Engine Bracket 1. The Nut 3 is now screwed into place thus locking the Engine in position.

When the water-cooled type of engine is to be represented, the Engine Casing unit is used separately. First bolt the Engine Casing Base to the wing by two Bolts. Next pass a Pivot Bolt through the boss of a small Propeller and screw a Nut on the end of it. Pass the projecting end of the Pivot Bolt through the hole in the front of the Engine Casing Base and lock the Bolt in place by another Nut. The Engine Casing Top is placed over the Base piece, and a 1" Screwed Rod is passed through the holes in the sides of the Top and through the perforated lugs in the Base. A Nut is screwed to each end of the Rod to hold it rigidly in position.

Assembling the Tail Planes and Rudder

The method of assembling the Tail Planes and Rudder will be followed from Fig. B. Two Angle Brackets are bolted to each Tail Plane, and the front Bracket 2 of each Tail Plane is secured to the fuselage by a 7/32" Bolt 3. A ⅜" Bolt 4 is passed through the rear Angle Bracket of one Tail Plane, through the Fuselage Side Rear sections, and through the rear Angle Bracket of the second Tail Plane. A Nut is placed upon the end of the Bolt and the Bolt is screwed up tightly so that the Tail Planes are locked rigidly to the rear of the fuselage of the model. The Tail Skid 5 of the machine is held in place between the Fuselage Side Rear sections by means of a 7/32" Bolt.

The Rudder is pushed into position between the ends of the Fuselage Side Rear sections, the lug on the front portion fitting into the slot in the Fuselage Top Rear section. It is held in place by the 7/32" Bolt 1.

When the Landing Wheels are mounted independently, a Pivot Bolt is first passed through the Wing Stay. A Landing Wheel with Rubber Tyre is placed in the Wheel Shield. The Pivot Bolt is then passed through the Wheel Shield and Landing Wheel and is held in position by means of two locknuts.

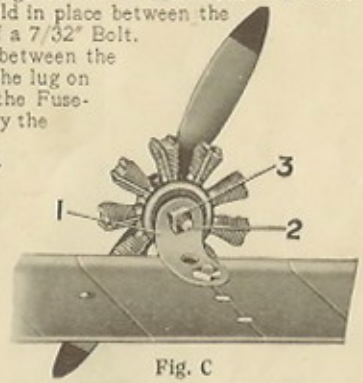
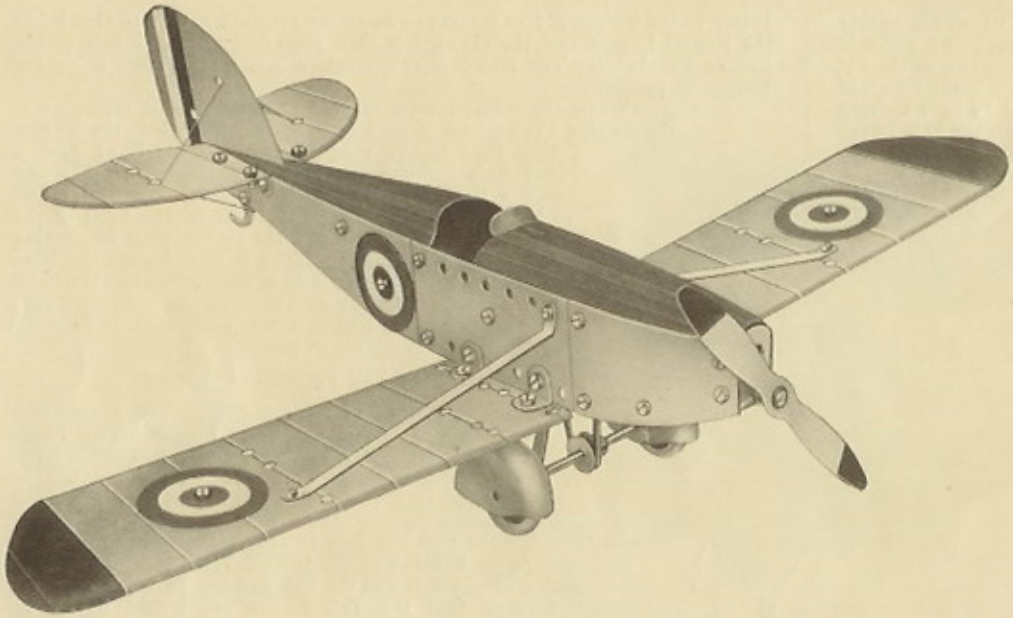


Fig. C

Model No. 1 Low Wing Monoplane



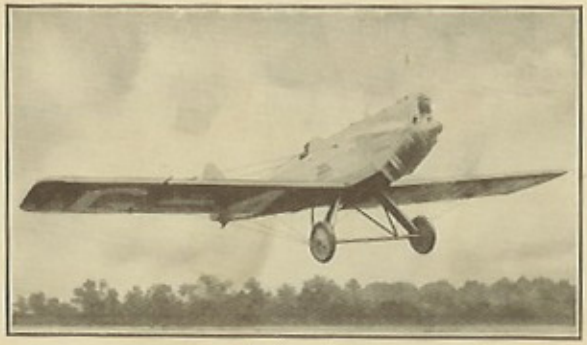
Aeroplanes are of two main types, monoplanes, having only one wing, and biplanes having two wings. Monoplanes may be sub-divided into three classes, known respectively as the low wing, the high wing, and the parasol types. They are usually faster than biplanes of similar weight with engines of equal power, and a better view is to be obtained from them. The landing speed of monoplanes is generally higher, however, and biplanes are more stable in the air.

Model No. 1 is a monoplane of the low wing type. Machines of this type are often regarded as the best for speed, and they are largely used on German air lines.

A typical British low wing machine is the Avro "Avian Monoplane." Other notable British monoplanes of this type are the D.H. interceptor fighter, the Blackburn-Segrave "Meteor," the Hendy 302, and the Monospar, the last three being of the cabin type.

Parts required :

1 of No. P1	2 of No. P31	1 of No. P62
1 „ „ P2	1 „ „ P32	2 „ „ P101
1 „ „ P10	1 „ „ P34	2 „ „ P102
1 „ „ P11	2 „ „ P44	6 „ „ 12
1 „ „ P13	1 „ „ P52	1 „ „ 14
1 „ „ P15	2 „ „ P53	2 „ „ 23a
2 „ „ P16	1 „ „ P54	43 „ „ 537a
2 „ „ P17	1 „ „ P55	42 „ „ 537b
2 „ „ P18	2 „ „ P56	1 „ „ 540
1 „ „ P19	1 „ „ P58	1 „ „ 611c
1 „ „ P20	1 „ „ P59	



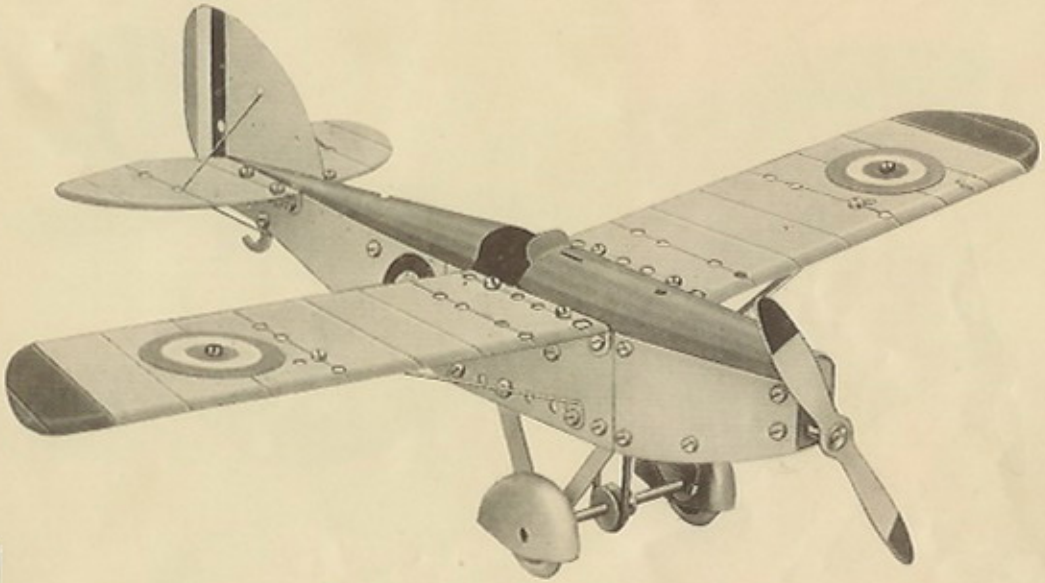
An Avro Avian Monoplane landing. This is a monoplane of the low wing type.

Model No. 2 High Wing Monoplane

High wing monoplanes are probably the most popular monoplane aircraft. They are usually more stable than the low wing type, and the view downwards is much better, being practically unobstructed.

Machines of this type are used in all parts of the world, and they range from small single-seater machines to huge aircraft seating as many as 30 people. The "*Spider*" machine that was employed by the Duchess of Bedford on her numerous famous flights is of this type.

The de Havilland "Puss Moth" is a good British example of a high wing monoplane, while other notable machines include the Comper "Swift," the Desoutter Coupé, the D.H. "Hawk Moth," the Civilian Coupé, the Avro V and VI, the Vickers "Viastra," and the Westland "Wessex."

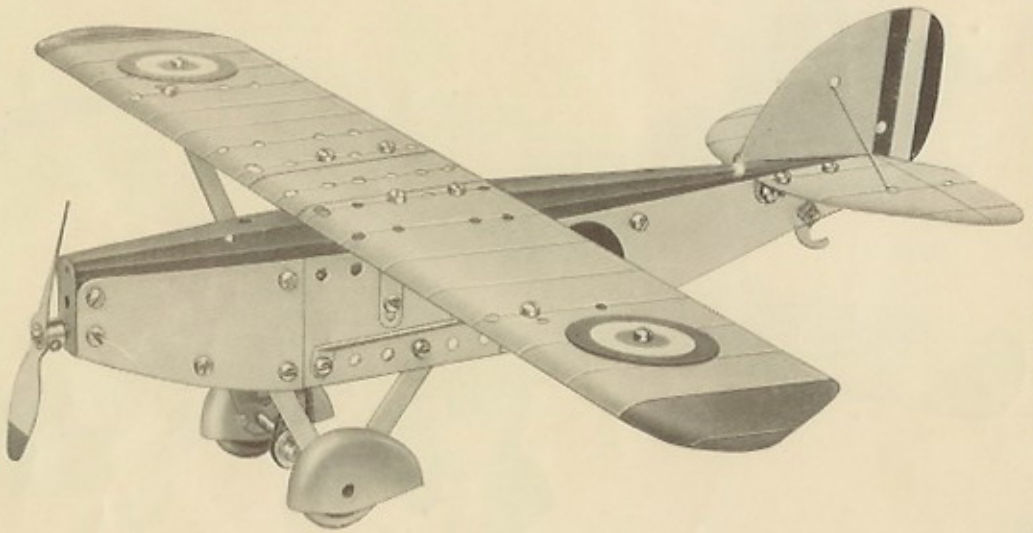


The Desoutter monoplane fitted with "Cirrus Hermes" engine. This machine has numerous excellent flights to its credit.

Parts required :

1 of No. P1	2 of No. P31	1 of No. P62
1 „ „ P2	1 „ „ P32	2 „ „ P101
1 „ „ P10	1 „ „ P34	2 „ „ P102
1 „ „ P11	2 „ „ P44	8 „ „ 12
1 „ „ P13	1 „ „ P52	1 „ „ 14
1 „ „ P15	2 „ „ P53	2 „ „ 23a
2 „ „ P16	1 „ „ P54	47 „ „ 537a
2 „ „ P17	1 „ „ P55	46 „ „ 537b
2 „ „ P18	2 „ „ P56	1 „ „ 540
1 „ „ P19	1 „ „ P58	1 „ „ 611c
1 „ „ P20	1 „ „ P59	

Model No. 3 Parasol Monoplane



Parasol monoplanes may really be included in the high wing category. The characteristic feature of this type is that the wing is raised above the fuselage and is connected to it by means of struts. This method of constructing aircraft is employed mostly on small machines, for in many ways it is inferior to the type of construction in which the wing is bolted firmly to the fuselage. One great disadvantage is that the struts required to keep the plane in position offer great resistance to the wind and thus detract considerably from the all-round performance of the machine.

Typical British prototypes are the Boulton and Paul "Phœnix" and the Westland "Widgeon." These are both light aeroplanes and each possesses accommodation for two people.

Parts required :

1 of No. P1	2 of No. P29	1 of No. P62
1 „ „ P2	2 „ „ P31	2 „ „ P101
1 „ „ P8	1 „ „ P32	2 „ „ P102
1 „ „ P10	1 „ „ P34	4 „ „ 12
1 „ „ P11	2 „ „ P44	1 „ „ 14
1 „ „ P13	1 „ „ P52	2 „ „ 23a
1 „ „ P15	2 „ „ P53	41 „ „ 537a
2 „ „ P16	1 „ „ P54	40 „ „ 537b
2 „ „ P17	1 „ „ P55	1 „ „ 540
2 „ „ P18	2 „ „ P56	1 „ „ 611c
1 „ „ P19	1 „ „ P58	
1 „ „ P20	1 „ „ P59	

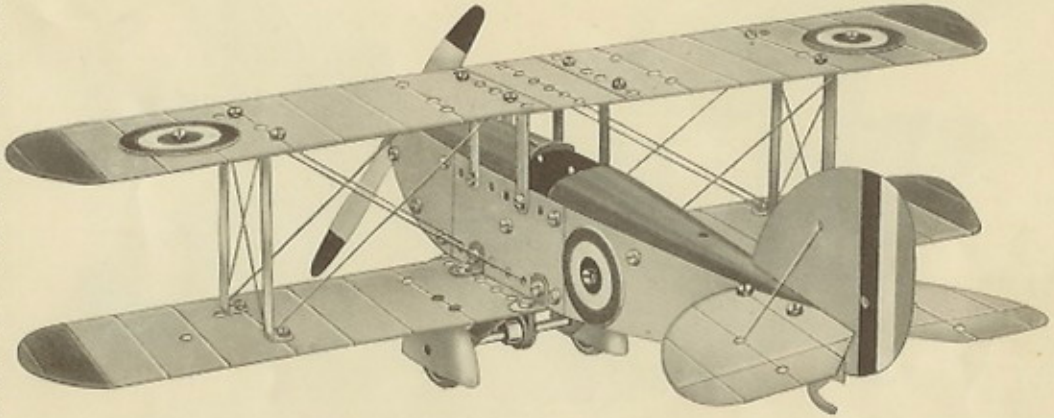
The Westland "Widgeon," a typical parasol monoplane. This machine is a two-seater and is made by the Westland Aircraft Works Ltd.

Model No. 4 Standard Light Biplane

In England biplanes are still more numerous than aeroplanes of the monoplane type. For many purposes it is almost essential that a machine should be fitted with two wings. A Service aeroplane, for instance, must not only be fast, but also capable of carrying a good load at both high and low altitudes. The great wing area of a biplane, although it involves a slight decrease in speed, gives the machine a greater carrying capacity.

Model No. 4 is a biplane of the light type. These machines are used mostly for civilian flying, although they are also employed in the R.A.F. It was on light aeroplanes that the wonderful flights to Australia were made by Mr. Bert Hinkler, Air Commodore Kingsford-Smith, and Mr. C. W. A. Scott, and from Australia by Mr. J. A. Mollison.

The most popular British light biplane is the D.H. "Moth." Other typical machines of this type are the Avro "Avian," the Blackburn "Bluebird," and the Robinson "Redwing."

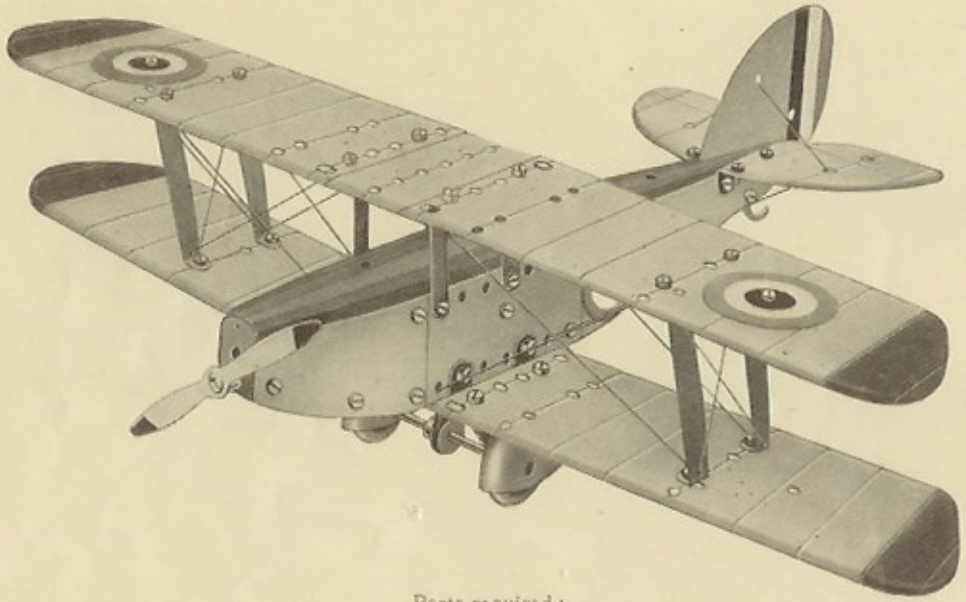


The de Havilland "Gipsy Moth," the most popular light aeroplane in the world.

Parts required :

2 of No. P1	4 of No. P28	1 of No. P62
2 „ „ P2	4 „ „ P29	2 „ „ P101
1 „ „ P8	1 „ „ P32	2 „ „ P102
1 „ „ P10	1 „ „ P34	8 „ „ 12
1 „ „ P11	2 „ „ P44	1 „ „ 14
1 „ „ P13	1 „ „ P52	2 „ „ 23a
1 „ „ P15	2 „ „ P53	57 „ „ 537a
2 „ „ P16	1 „ „ P54	56 „ „ 537b
2 „ „ P17	1 „ „ P55	1 „ „ 540
2 „ „ P18	2 „ „ P56	1 „ „ 611c
1 „ „ P19	1 „ „ P58	
1 „ „ P20	1 „ „ P59	

Model No. 5 Single-Seater Fighter



Single-seater fighter machines are very fast aeroplanes, the function of which is to patrol certain sections of sky so that no enemy aircraft can pass. Recently a new type of machine known as the interceptor fighter has been produced. This is an extremely fast craft, capable of climbing high enough to intercept enemy bombers intent on raiding London, and whose approach is not discovered until they pass the coast. In these aeroplanes military load and fuel capacity are sacrificed to an exceedingly fast climb and a high maximum speed.

The world's best single-seater fighter is probably the Bristol " Bulldog," a machine that is used in the R.A.F. and in the Air Forces of many foreign countries. At present the Hawker " Fury " is the only type of single-seater interceptor fighter used in the R.A.F.

Parts required :

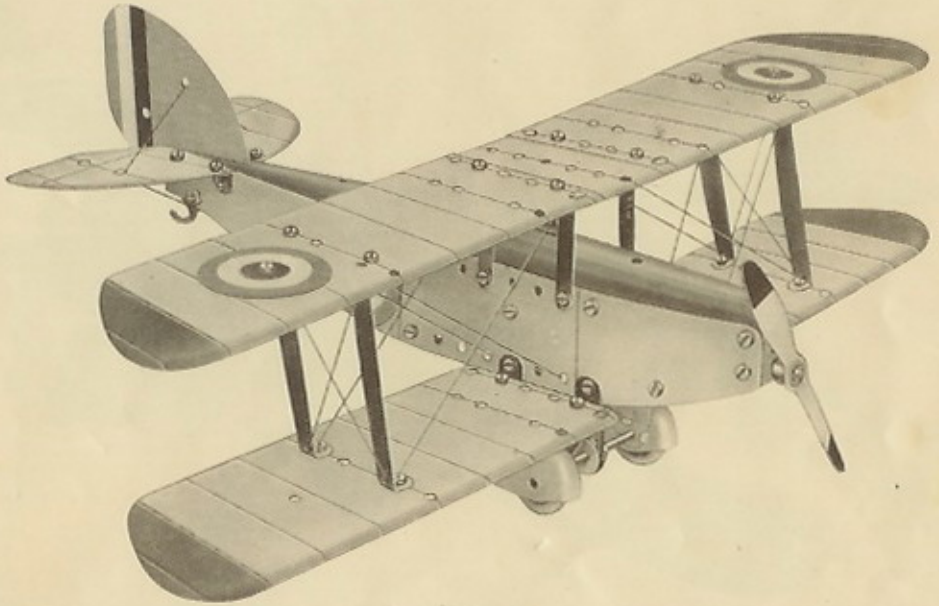
2 of No. P1	2 of No. P24	1 of No. P59
2 „ „ P2	2 „ „ P25	1 „ „ P62
1 „ „ P8	4 „ „ P29	2 „ „ P101
1 „ „ P10	1 „ „ P32	2 „ „ P102
1 „ „ P11	1 „ „ P34	8 „ „ 12
1 „ „ P13	2 „ „ P44	1 „ „ 14
1 „ „ P15	1 „ „ P52	2 „ „ 23a
2 „ „ P16	2 „ „ P53	55 „ „ 537a
2 „ „ P17	1 „ „ P54	54 „ „ 537b
2 „ „ P18	1 „ „ P55	1 „ „ 540
1 „ „ P19	2 „ „ P56	1 „ „ 611c
1 „ „ P20	1 „ „ P58	

The Bristol " Bulldog," which is claimed to be the world's best standard single-seater fighter aeroplane.

Model No. 6 Training Biplane

The requirements of a good training machine are many. It must be easy to fly and must be stable; its maximum speed must be fairly high, while its landing speed should be low. A biplane is best suited to comply with these conditions, and ordinary light aeroplanes are now frequently employed.

A training machine has been taken as a prototype for Model No. 6. The most famous machine of this type is the Avro 504, first designed and constructed in 1913. Since then it has been in constant service in all parts of the world, and it is still one of the best aircraft for its particular purpose. A more modern training machine is the Avro "Trainer," and another typical school aeroplane is the Hawker "Tomtit."

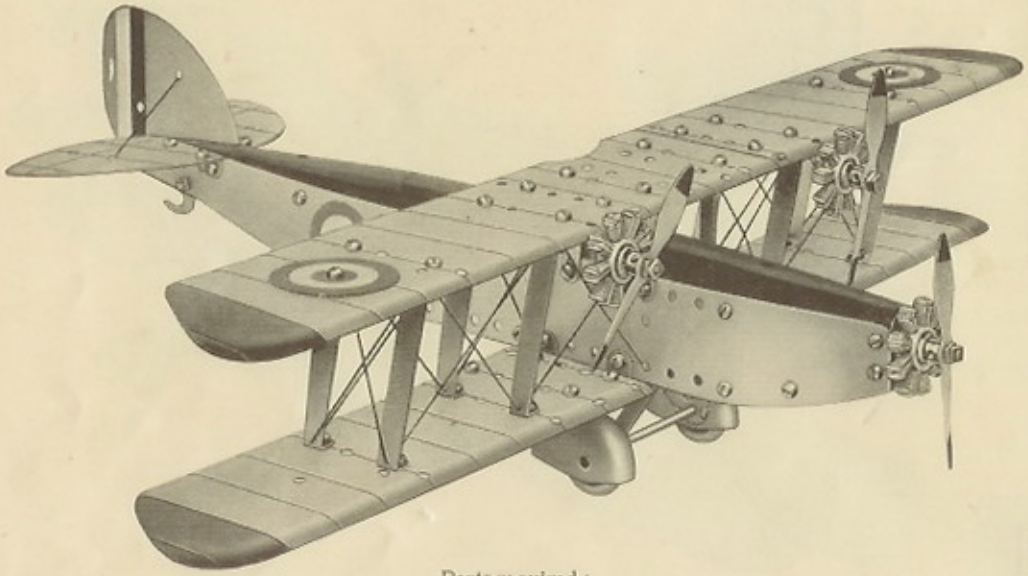


A pupil undergoing instruction in the Avro 626, the most up-to-date training machine produced by the famous firm of A. V. Roe & Co. Ltd.

Parts required:

2 of No. P1	2 of No. P24	1 of No. P59
2 „ „ P2	2 „ „ P25	1 „ „ P62
1 „ „ P8	4 „ „ P29	2 „ „ P101
1 „ „ P10	1 „ „ P32	2 „ „ P102
1 „ „ P11	1 „ „ P34	8 „ „ 12
1 „ „ P13	2 „ „ P44	1 „ „ 14
1 „ „ P15	1 „ „ P52	2 „ „ 23a
2 „ „ P16	2 „ „ P53	53 „ „ 537a
2 „ „ P17	1 „ „ P54	52 „ „ 537b
2 „ „ P18	1 „ „ P55	1 „ „ 540
1 „ „ P19	2 „ „ P56	1 „ „ 611c
1 „ „ P20	1 „ „ P58	

Model No. 7 Triple-engined Air Liner



All the passenger-carrying machines employed on the cross-Channel services of Imperial Airways Ltd., are equipped with at least three engines. This is to ensure the safe operation of the services, for these machines can maintain flight with one engine out of commission. Thus in the event of engine failure while the machine was over the water, land could be reached without mishap.

Model No. 7 is a triple-engined biplane similar to those used by Imperial Airways Ltd. and by many other air line companies all over the world.

The only triple-engined biplane air liner constructed in Britain is the Armstrong Whitworth "Argosy," a machine that is fitted with Armstrong Siddeley "Jaguar" engines. The "Argosy" has seating accommodation for 20 passengers, a maximum speed of 110 m.p.h., and an endurance of 5½ hours at a speed of 95 m.p.h.

Parts required :

2 of No. P1	1 of No. P19	1 of No. P58
2 „ „ P2	1 „ „ P20	1 „ „ P59
1 „ „ P7	4 „ „ P24	2 „ „ P61
2 „ „ P8	4 „ „ P25	1 „ „ P62
1 „ „ P10	4 „ „ P29	2 „ „ P101
1 „ „ P11	1 „ „ P32	2 „ „ P102
1 „ „ P13	3 „ „ P35	8 „ „ 12
1 „ „ P14	3 „ „ P43	87 „ „ 537a
1 „ „ P15	2 „ „ P44	74 „ „ 537b
2 „ „ P16	2 „ „ P53	1 „ „ 540
4 „ „ P17	1 „ „ P55	1 „ „ 611c
2 „ „ P18	2 „ „ P56	

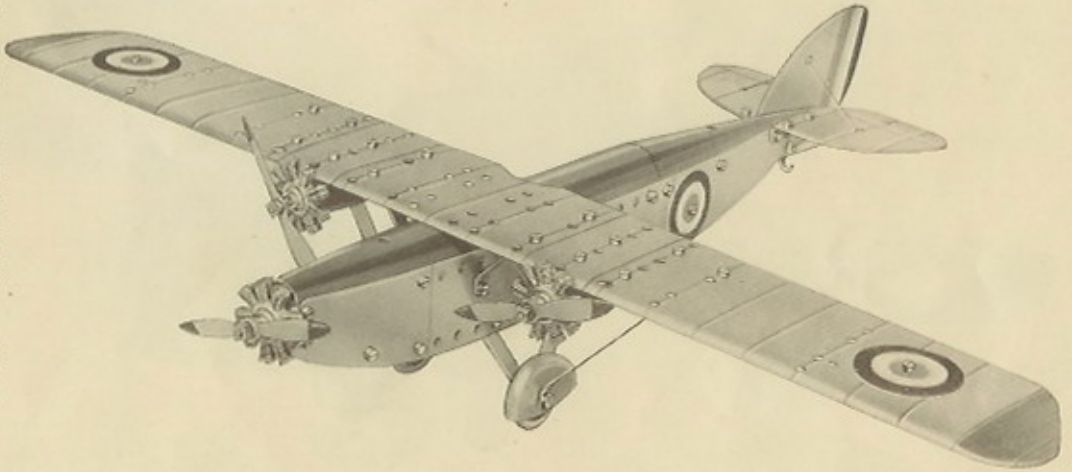
An Armstrong Whitworth "Argosy" taking off from an aerodrome. These machines are used on the "Silver Wing" cross-Channel services of Imperial Airways Ltd.

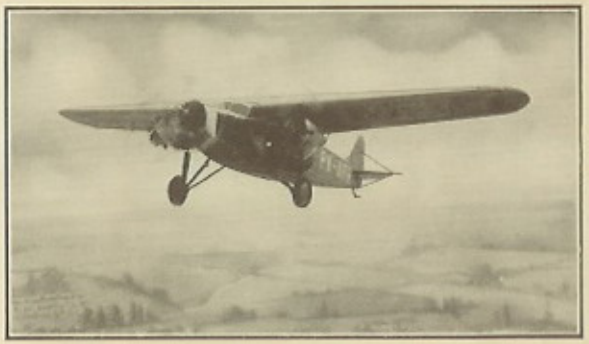
Model No. 8 Triple-engined Cabin Monoplane

The high wing monoplane is rapidly increasing in favour with air line companies, and it is possible that before long it will completely oust the biplane. One fact that makes it popular with passengers is that from the interior an unobstructed view of the country over which the machine is flying can be obtained.

Undoubtedly the most famous triple-engined commercial monoplane is the Fokker F.VII-3m, for machines of this type, in addition to being extensively used on the air lines of the world, are similar to the famous "*Southern Cross*" on which Air Commodore Kingsford-Smith has made so many record-breaking flights.

Model No. 8 is based on a machine of this type. Such machines are usually fitted with radial air-cooled engines, although very occasionally water-cooled engines may be employed.



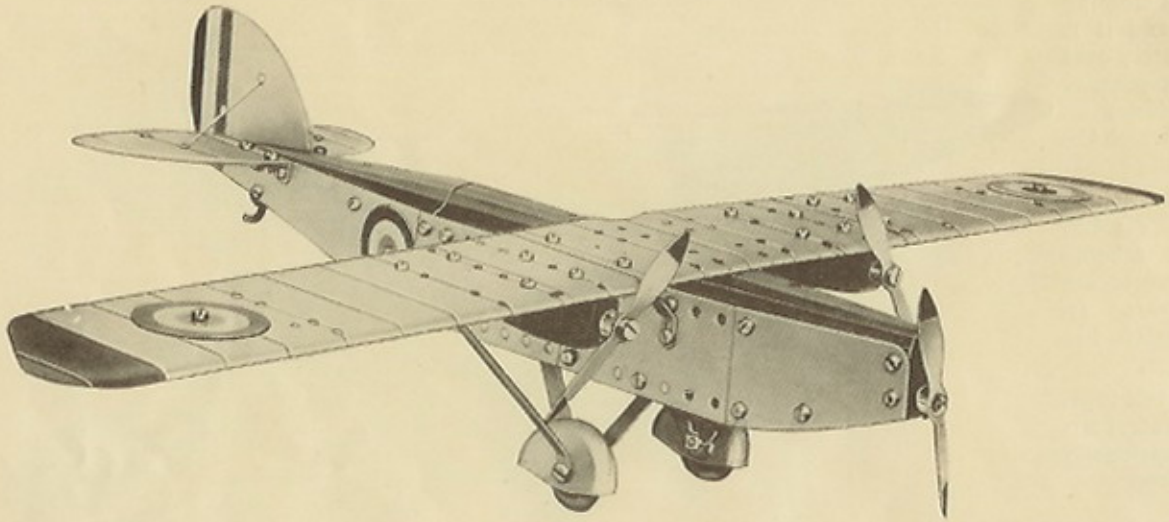


This machine, a Fokker F.VII-3m. monoplane, is of the same type as Air Commodore Kingsford-Smith's famous "Southern Cross."

Parts required :

1 of No. P1	1 of No. P19	2 of No. P56
1 „ „ P2	1 „ „ P20	1 „ „ P58
1 „ „ P7	2 „ „ P30	1 „ „ P59
2 „ „ P8	2 „ „ P31	2 „ „ P60
1 „ „ P10	1 „ „ P32	2 „ „ P101
1 „ „ P11	3 „ „ P35	2 „ „ P102
1 „ „ P13	2 „ „ P40	4 „ „ 12
1 „ „ P14	2 „ „ P41	2 „ „ 82
1 „ „ P15	3 „ „ P43	69 „ „ 537a
2 „ „ P16	2 „ „ P44	56 „ „ 537b
4 „ „ P17	2 „ „ P53	1 „ „ 540
2 „ „ P18	1 „ „ P55	1 „ „ 611c

Model No. 9 Triple-engined Cabin Monoplane

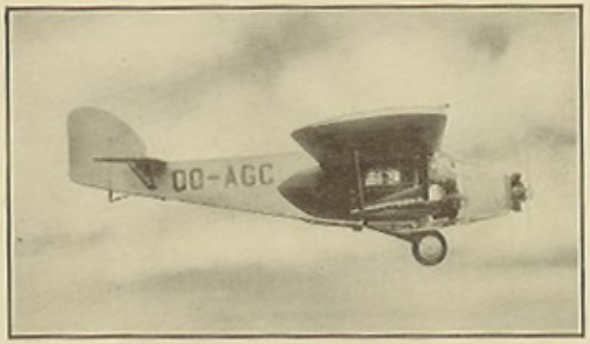


Model No. 9 shows a monoplane in which the air-cooled engines have been replaced by three of the water-cooled type. An example of this is the Bordelaise D.B.70, which can be fitted with either three 700 h.p. Lorraine "Orion" air-cooled engines, or three 600 h.p. Hispano-Suiza water-cooled engines. This machine is of special design, being fitted with twin fuselages.

Several types of triple-engined monoplanes are constructed in this country. These include the Avro "Five," "Six," and "Ten," which are based on the Fokker F.VII—3m; the Vickers "Viastra" and the Westland "Wessex."

Parts required :

1	of No.	P1	1	of No.	P20	1	of No.	P59
1	„ „	P2	2	„ „	P30	4	„ „	P60
1	„ „	P7	2	„ „	P31	2	„ „	P101
2	„ „	P8	1	„ „	P32	2	„ „	P102
1	„ „	P10	3	„ „	P35	4	„ „	12
1	„ „	P11	2	„ „	P40	1	„ „	14
1	„ „	P13	2	„ „	P41	2	„ „	82
1	„ „	P14	2	„ „	P44	59	„ „	537a
1	„ „	P15	1	„ „	P52	54	„ „	537b
2	„ „	P16	2	„ „	P53	1	„ „	540
4	„ „	P17	1	„ „	P55	1	„ „	611c
2	„ „	P18	2	„ „	P56			
1	„ „	P19	1	„ „	P58			

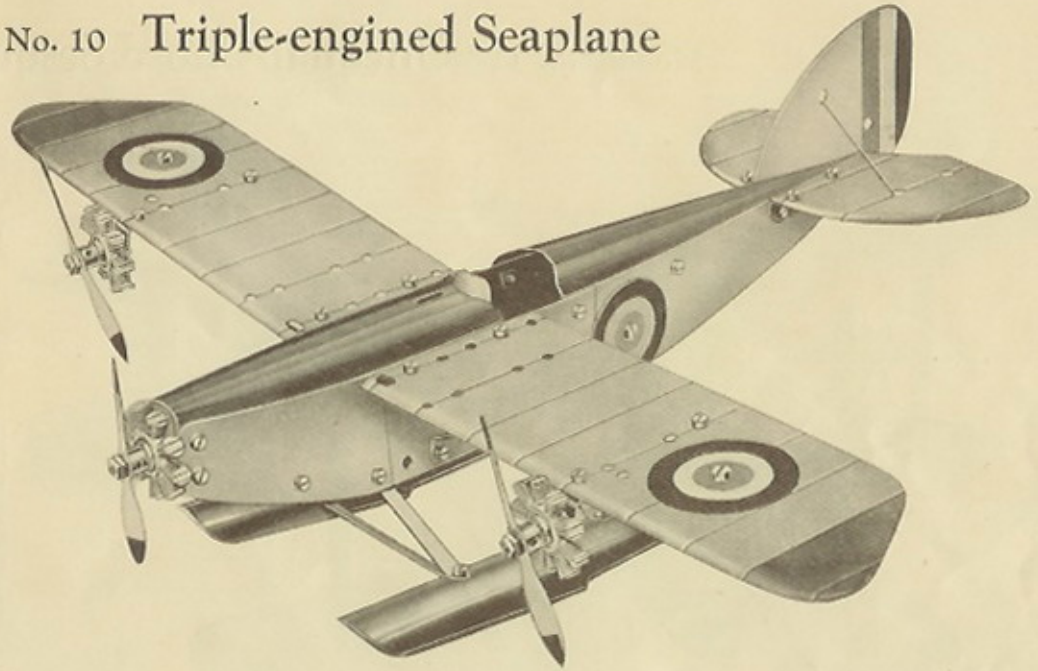


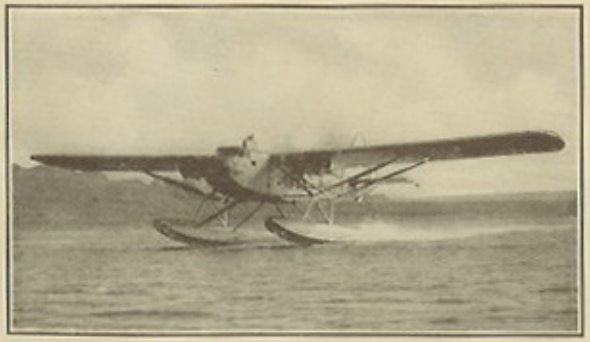
A triple-engined monoplane, the Westland "Wessex." This machine has been constructed for "Sabena," the Dutch air line company.

Model No. 10 Triple-engined Seaplane

All aircraft of the multi-engined type are naturally safer to fly than single-engined machines, for if one of the engines should fail the machine can still carry on, and it is not necessary for a forced descent to be made. Seaplanes and flying boats that are passing over water can usually alight safely on the surface, except during stormy weather, but there is always the danger that if the machine is not found very quickly a storm may spring up that it is unable to survive. For this reason forced descents are to be avoided if possible, and a triple-engined machine is therefore the safest type for marine work.

A seaplane of the multi-engined type is shown in Model No. 10, which is modelled on the Short "Valetta," the world's largest seaplane. It was in a "Valetta" that Sir Alan Cobham made his latest survey flight in Africa.

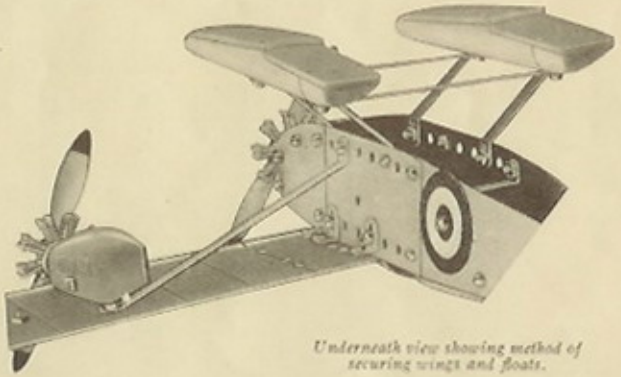




The world's largest seaplane, the Short "Valetta," taxi-ing. The small wake left by the machine should be noted.

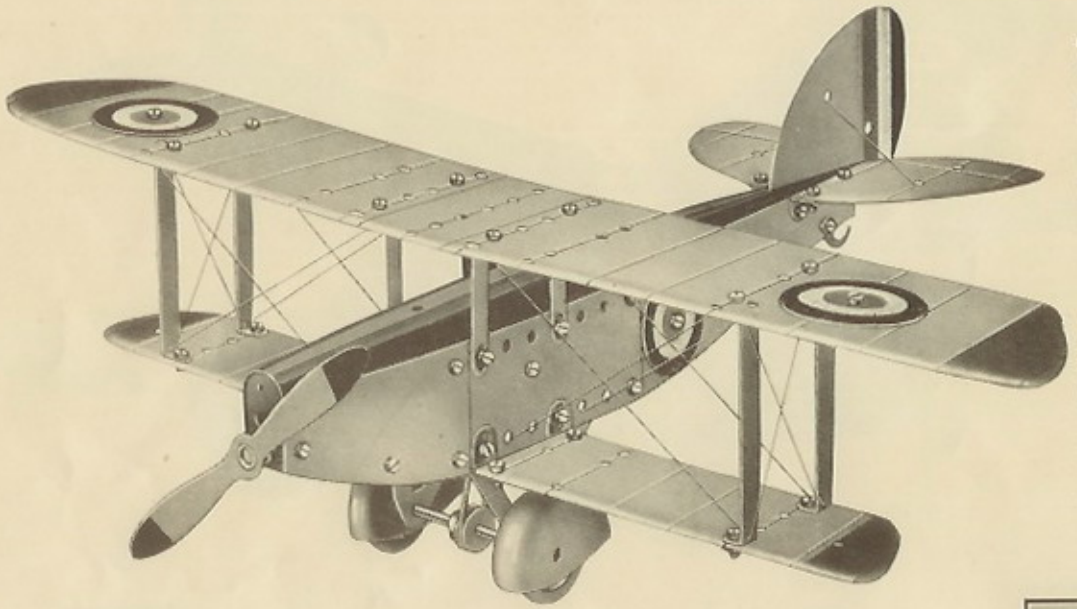
Parts required :

1	of No.	P1	
1	„	P2	
1	„	P10	
1	„	P11	
1	„	P13	
1	„	P15	
2	„	P16	
2	„	P17	
2	„	P18	
1	„	P19	
1	„	P20	
4	„	P30	
2	„	P31	
1	of No.	P32	
3	„	P35	
2	„	P40	
2	„	P41	
2	„	P42	
3	„	P43	
2	„	P57	
2	„	P101	
2	„	P102	
8	„	12	
57	„	537a	
48	„	537b	
1	„	540	
1	„	611c	



Underneath view showing method of securing wings and floats.

Model No. 11 Unequal-Chord Sesquiplane

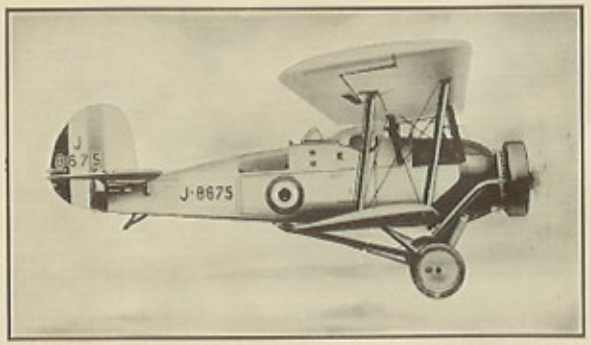


A sesquiplane is, literally, a machine with one-and-a-half wings. In general practice, however, the term is applied to all biplanes in which one plane is shorter than the other. This method of construction is particularly favoured for fighting machines, and for other aeroplanes where a good "speed range" is required. This means that the machine must have a fairly high maximum speed, together with a low stalling point.

A machine of this kind has been taken as the prototype for Model No. 11. The most famous British unequal-chord sesquiplane is the Handley-Page "Gugnunc," the machine that took part in the last Guggenheim Safety Contest in America. Other typical examples are the Armstrong Whitworth "Atlas" Army co-operation machine and the Bristol "Bulldog" single-seater fighter.

Parts required :

1	of No.	P1	1	of No.	P19	1	of No. P58
1	" "	P2	1	" "	P20	1	" " P59
1	" "	P3	4	" "	P28	1	" " P62
1	" "	P4	4	" "	P29	2	" " P101
1	" "	P8	1	" "	P32	2	" " P102
1	" "	P10	1	" "	P34	8	" " 12
1	" "	P11	2	" "	P44	1	" " 14
1	" "	P13	1	" "	P52	2	" " 23a
1	" "	P15	2	" "	P53	55	" " 537a
2	" "	P16	1	" "	P54	54	" " 537b
2	" "	P17	1	" "	P55	1	" " 540
2	" "	P18	2	" "	P56	1	" " 611c

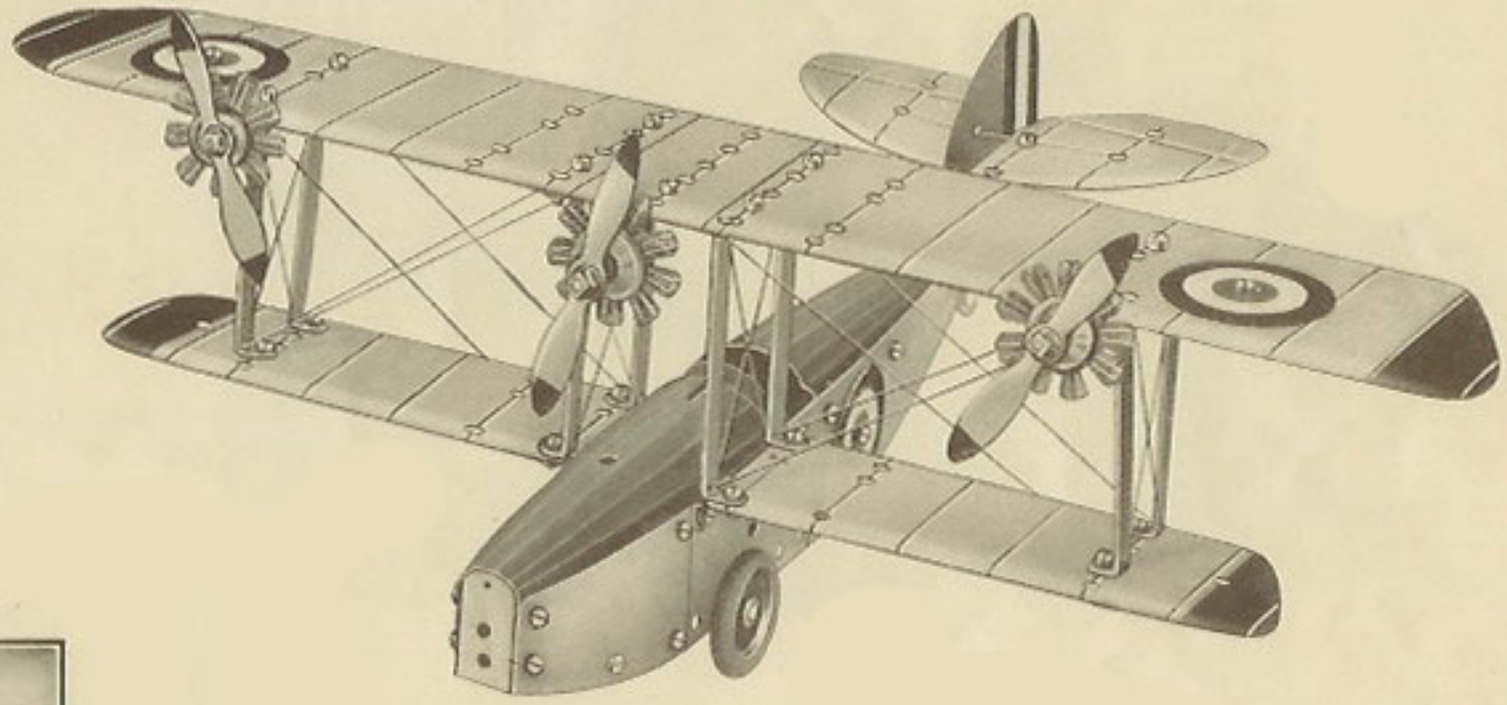


Armstrong Whitworth "Atlas" machines similar to the one illustrated are extensively used in the R.A.F. for Army co-operation purposes.

Model No. 12 Triple-engined Flying Boat

The triple-engined type is probably the most popular flying boat constructed in this country. The use of three engines makes it possible for a heavy load to be carried and also adds greatly to the security of the machine, for even if one engine gives out, the other two are sufficient to maintain the machine in flight.

Model No. 12 shows a triple-engined flying boat fitted with beaching wheels. An early British machine similar to this model was the Saunders "Valkyrie," while modern types are the Blackburn "Iris" and the Supermarine "Southampton Mark X." The "Iris" is fitted with three Rolls-Royce "Condor" water-cooled engines, while the "Southampton Mark X" employs Armstrong Siddeley "Panthers." An unusual feature of this machine is that the hull is flanked with stainless steel up to the chine or water line.

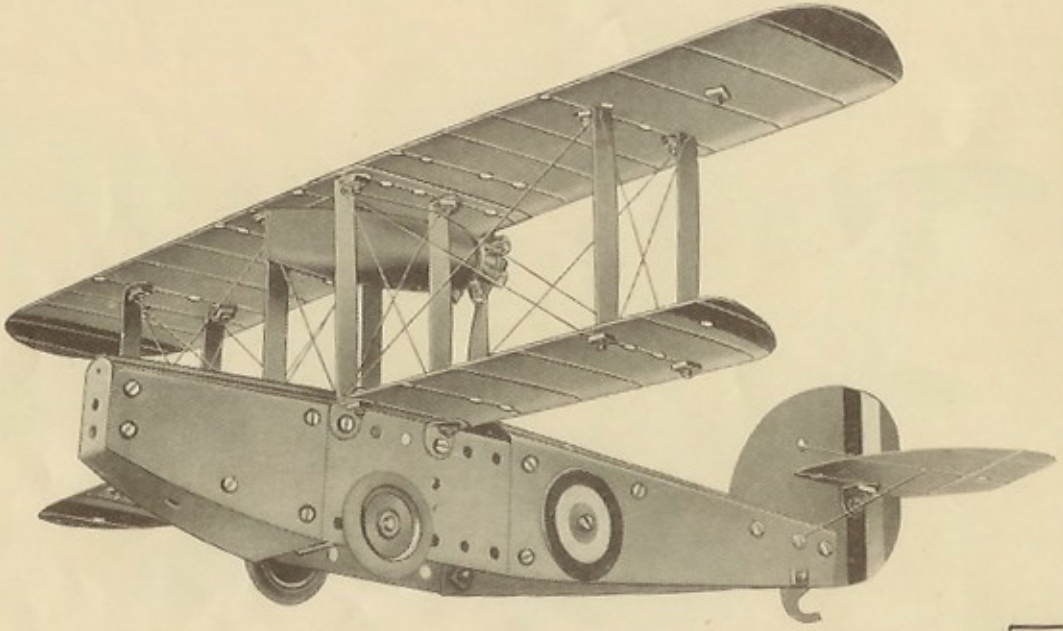


Taking off in the Supermarine "Southampton Mark X," a flying boat fitted with Armstrong Siddeley "Panther" engines.

Parts required:

1 of No. P1	2 of No. P17	1 of No. P55
1 „ „ P2	2 „ „ P18	1 „ „ P56
1 „ „ P3	1 „ „ P19	3 „ „ P61
1 „ „ P4	1 „ „ P20	2 „ „ P101
1 „ „ P8	8 „ „ P28	2 „ „ P102
1 „ „ P10	1 „ „ P32	6 „ „ 12
1 „ „ P11	3 „ „ P35	1 „ „ 16a
1 „ „ P13	3 „ „ P43	61 „ „ 537a
1 „ „ P15	2 „ „ P44	49 „ „ 537b
2 „ „ P16	2 „ „ P53	1 „ „ 540

Model No. 13 Single-engined Biplane Amphibian



Single-engined biplane flying boats and amphibians are constructed in Canada, America, France and Italy, although in this country there is not a great deal of attention paid to them, British designers having more faith in marine aircraft of the multi-engined type. A single-engined amphibian was produced in this country as early as 1912, however, and since then many similar machines have been constructed. The Supermarine "Seagull," "Sea Eagle," and "Scarab," and the Canadian Vickers "Vedette" are all of this type. The Schneider Trophy was won in a single-engined Supermarine "Sea Lion" flying boat in 1922.

The majority of single-engined flying boats employ pusher airscrews and are usually constructed so that they are easily adapted for use either as flying boats or amphibians. They can be obtained with either air-cooled or water-cooled engines and Model No. 13 shows a single-engined flying boat fitted with an air-cooled engine and a pusher airscrew.

Parts required :

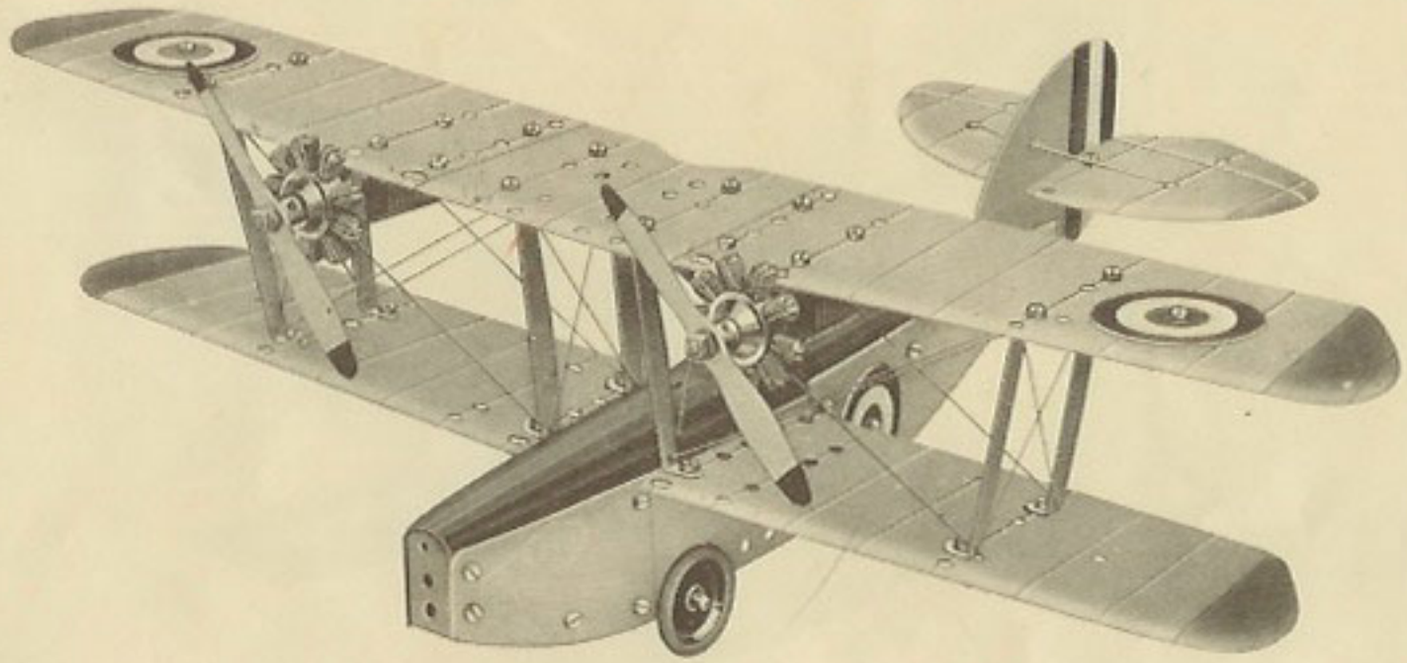
1 of No. P1	2 of No. P18	1 of No. P55
1 „ „ P2	1 „ „ P19	1 „ „ P56
1 „ „ P3	1 „ „ P20	2 „ „ P101
1 „ „ P4	8 „ „ P28	2 „ „ P102
1 „ „ P8	1 „ „ P32	6 „ „ 12
1 „ „ P10	1 „ „ P35	1 „ „ 16a
1 „ „ P11	1 „ „ P40	1 „ „ 82
1 „ „ P13	1 „ „ P41	58 „ „ 537a
1 „ „ P15	1 „ „ P43	52 „ „ 537b
2 „ „ P16	2 „ „ P44	1 „ „ 540
2 „ „ P17	2 „ „ P53	

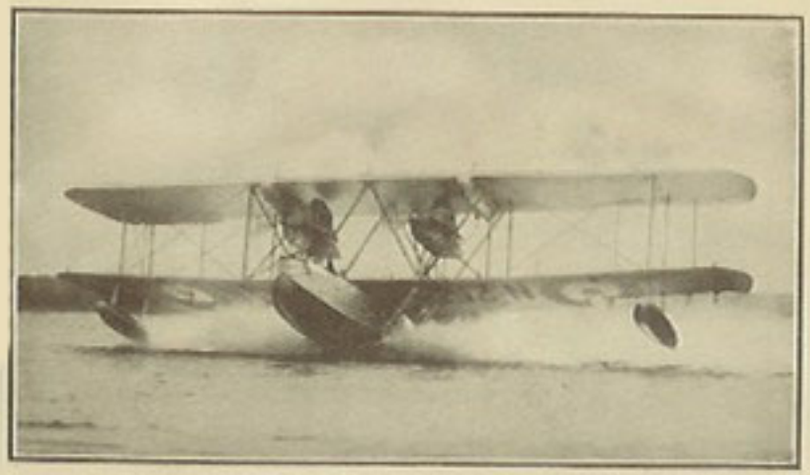
Machines similar to the Canadian Vickers "Vedette," shown above, can be put down on either land or water.

Model No. 14 Twin-engined Amphibian

An amphibian flying boat is a machine capable of taking off from, or alighting on, either land or water. The landing gear for use when alighting on an aerodrome is in actual practice so arranged that it can be raised or lowered while the aeroplane is in flight. This type of machine is of particular value for operation over country such as that experienced in Canada, where often no safe landing ground can be found on which to make a forced descent, but where an airman will nearly always be able to find a sufficiently large stretch of water on which to alight.

In this country designers of flying boats specialise mostly on large machines, but several amphibians similar to Model No. 14 have been constructed here. Among them may be mentioned the Supermarine "Swan" commercial flying boat, and the Supermarine "Seamew" military amphibian. Of the larger twin-engined flying boats it is probable that the Supermarine "Southampton" is the most reliable type in the world.





Another Supermarine flying boat. This is the "Southampton" that is extensively used by the R.A.F.

Parts required :

2 of No. P1	1 of No. P20	1 of No. P55
2 „ „ P2	2 „ „ P26	1 „ „ P56
1 „ „ P7	2 „ „ P27	2 „ „ P101
1 „ „ P10	4 „ „ P28	2 „ „ P102
1 „ „ P11	1 „ „ P32	6 „ „ 12
1 „ „ P13	2 „ „ P35	1 „ „ 16a
1 „ „ P15	2 „ „ P40	2 „ „ 82
2 „ „ P16	2 „ „ P41	68 „ „ 537a
2 „ „ P17	2 „ „ P43	56 „ „ 537b
2 „ „ P18	2 „ „ P44	1 „ „ 540
1 „ „ P19	2 „ „ P53	

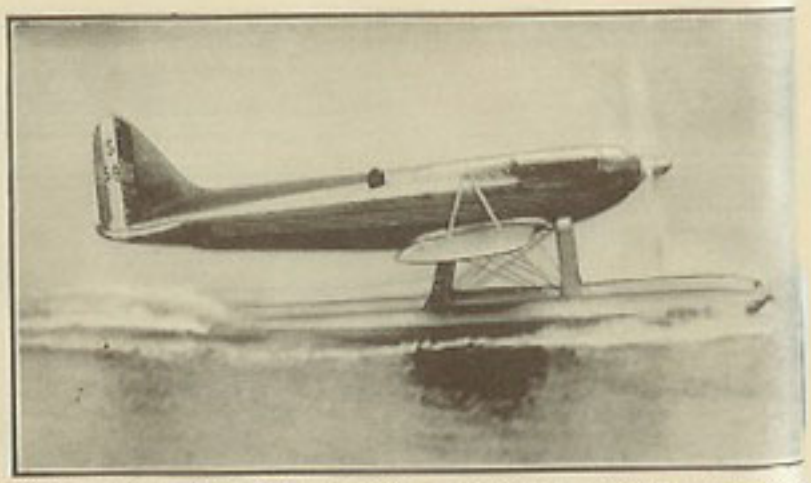
Model No. 15 Racing Seaplane

In recent years the low-wing monoplane seapla has become the accepted type where high speeds a required, and even the Gloster Aircraft Co. Ltd who for many years favoured the biplane constru tion for their Schneider Trophy machines, have last abandoned it in favour of the monoplane. model of the low-wing racing seaplane type machine is shown on this page.

The Vickers-Supermarine Rolls-Royce S.6E winner of the Schneider Trophy Contest in 193 and holder of the world's air speed record, is of th type. The high-speed machines of other countrie also are usually of the monoplane seaplane typ and a particularly interesting one is the Italia Macchi M-67. This machine, which is fitted wit an Isotta-Fraschini engine, was produced for th Schneider Trophy Contest in 1929.

Parts required :

1 of No. P1	1 of No. P19	2 of No. P57
1 „ „ P2	1 „ „ P20	2 „ „ P101
1 „ „ P10	4 „ „ P30	2 „ „ P102
1 „ „ P11	2 „ „ P31	8 „ „ 12
1 „ „ P13	1 „ „ P32	1 „ „ 14
1 „ „ P15	1 „ „ P34	46 „ „ 537a
2 „ „ P16	2 „ „ P42	49 „ „ 537b
2 „ „ P17	1 „ „ P52	1 „ „ 540
2 „ „ P18	2 „ „ P56	1 „ „ 611c

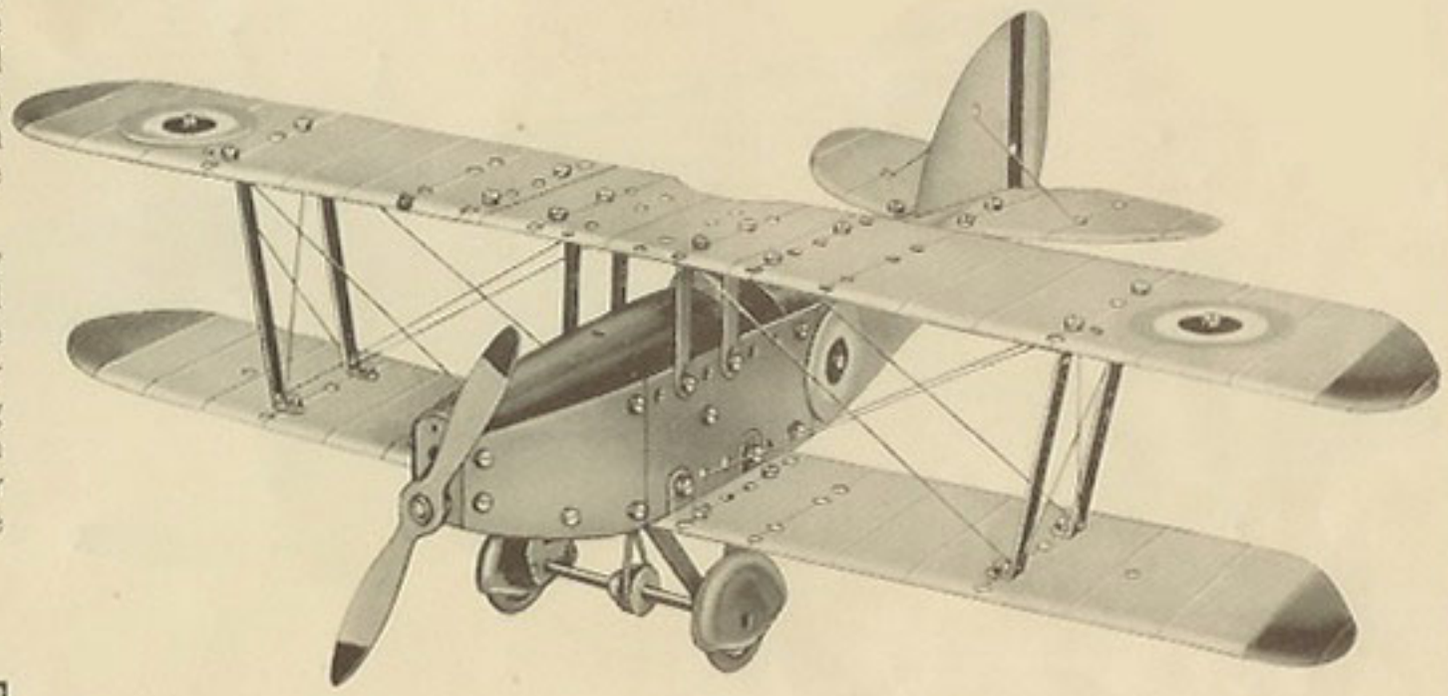


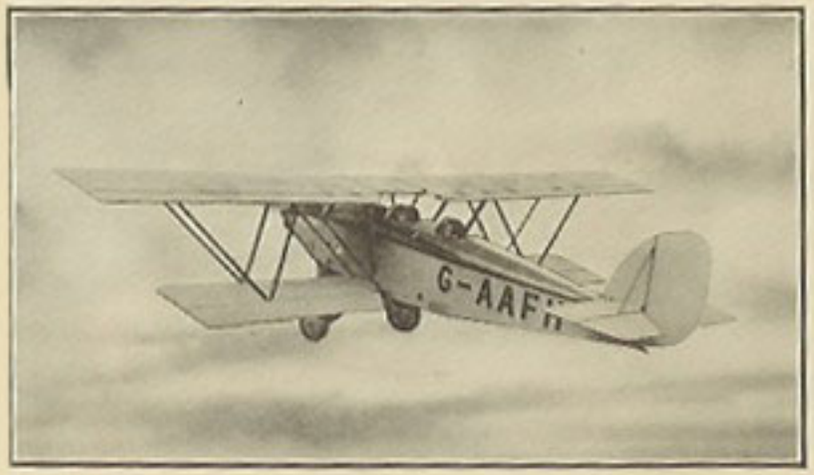
Taxi-ing before taking off in the Vickers-Supermarine Rolls-Royce S.6B, o which a new record for the Schneider Trophy Contest was set up in 1931.

Model No. 16 Unequal Span Biplane

Biplanes of unequal span, or sesquiplanes, vary considerably in individual design, although the principle on which they are constructed is the same in all cases. Model No. 16, for instance, should be compared with Model No. 11. In the latter model the span of the lower plane is considerably less than that of the upper one, while the chord, or the width of the plane from the leading or front edge, to the trailing or rear edge, differs in the two planes.

On Model No. 16, however, the wings are nearly of equal length, while the chords of the upper and lower planes are equal. If machines of equal size similar to these models were fitted with similar engines of the same power, the one resembling Model No. 11 would have the higher maximum speed, and that similar to Model No. 16 the slower landing speed. The first one would have the better speed range.



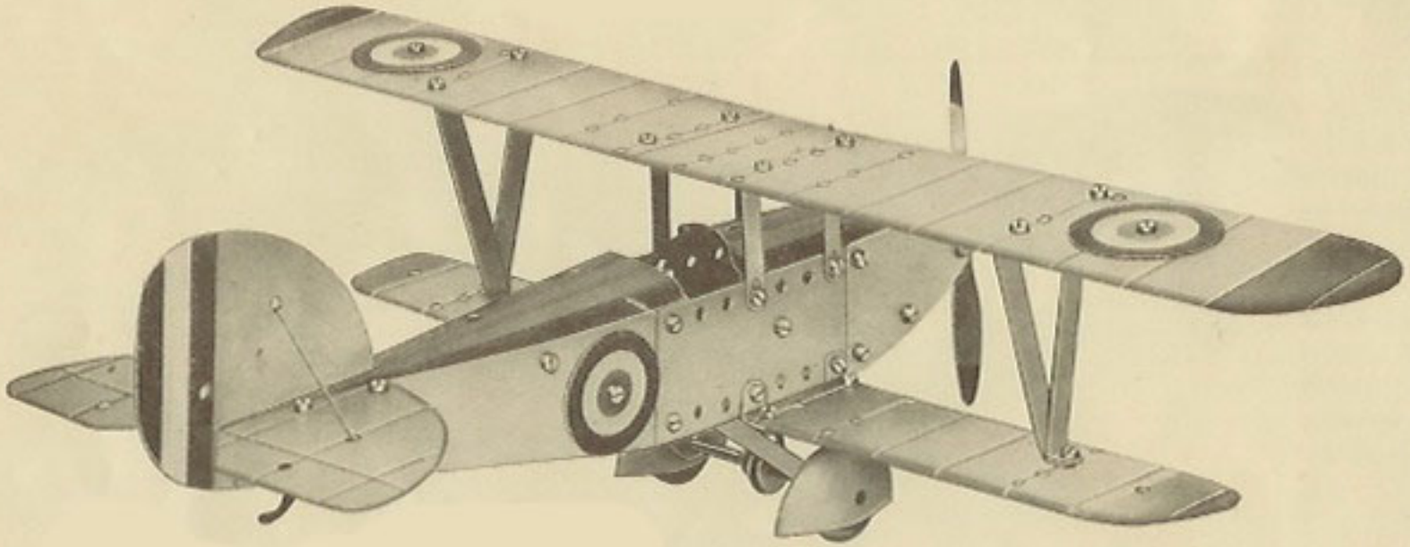


This unequal span biplane, the Parnall "Elf," is a light machine specially designed to provide the maximum safety for its occupants.

Parts required :

2 of No. P1	2 of No. P26	1 of No. P59
2 „ „ P2	2 „ „ P27	1 „ „ P62
1 „ „ P7	4 „ „ P29	2 „ „ P101
1 „ „ P10	1 „ „ P32	2 „ „ P102
1 „ „ P11	1 „ „ P34	8 „ „ 12
1 „ „ P13	2 „ „ P44	1 „ „ 14
1 „ „ P15	1 „ „ P52	2 „ „ 23a
2 „ „ P16	2 „ „ P53	59 „ „ 537a
2 „ „ P17	1 „ „ P54	58 „ „ 537b
2 „ „ P18	1 „ „ P55	1 „ „ 540
1 „ „ P19	2 „ „ P56	1 „ „ 611c
1 „ „ P20	1 „ „ P58	

Model No. 17 Single-Seater Fighter

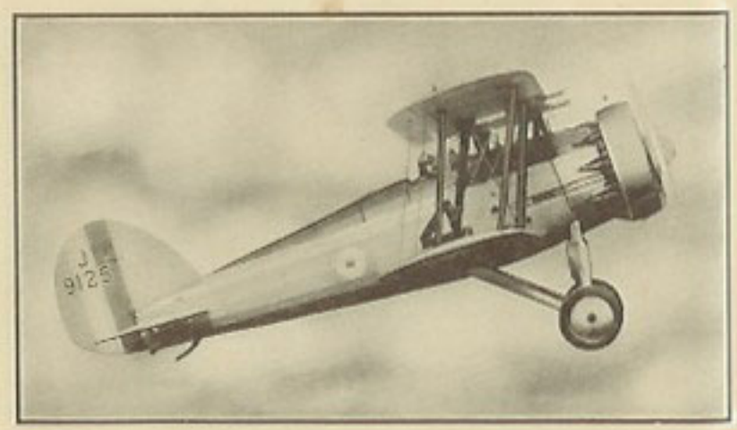


There are a great many types of single-seater fighting aeroplanes produced in various parts of the world. The model illustrated on this page resembles the Armstrong Whitworth "Siskin" machine which until recently was used extensively in the Fighter Squadrons of the Air Defence of Great Britain. It has been replaced by such machines as the Bristol "Bulldog" and the Hawker "Fury" interceptor fighter.

Purely fighting machines have a greater endurance than the interceptor fighters mentioned in describing Model No. 5, for their duty is not to wait on the aerodrome until enemy machines approach, but to make regular patrols and to ensure that no enemy craft passes through their own section. Thus their powers of climb may be sacrificed to speed.

Parts required :

1 of No. P1	1 of No. P20	1 of No. P59
1 „ „ P2	2 „ „ P24	1 „ „ P62
1 „ „ P3	2 „ „ P25	2 „ „ P101
1 „ „ P4	4 „ „ P29	2 „ „ P102
1 „ „ P8	1 „ „ P32	8 „ „ 12
1 „ „ P10	1 „ „ P34	1 „ „ 14
1 „ „ P11	2 „ „ P44	2 „ „ 23a
1 „ „ P13	2 „ „ P52	53 „ „ 537a
1 „ „ P15	2 „ „ P53	52 „ „ 537b
2 „ „ P16	1 „ „ P54	1 „ „ 540
2 „ „ P17	1 „ „ P55	1 „ „ 611c
2 „ „ P18	2 „ „ P56	
1 „ „ P19	1 „ „ P58	

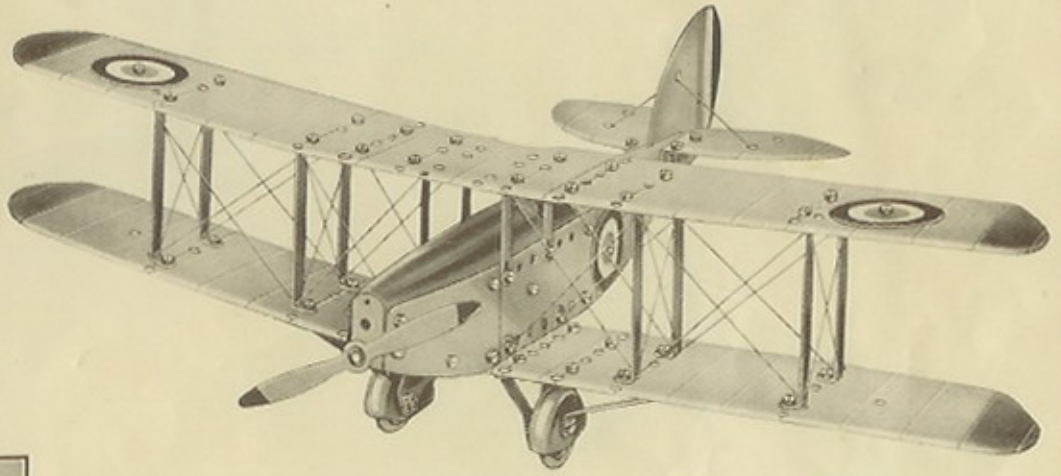


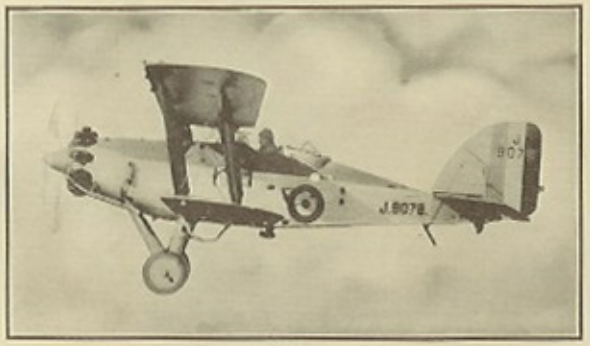
One of the world's deadliest fighting machines, the Gloster S.S.19. It is equipped with six machine guns.

Model No. 18 General Purpose Military Machine

General purpose machines are, as their name implies, aeroplanes that have been specially designed to enable them to be used for various military purposes with the very minimum of alteration. Thus they can be used for bombing, Army co-operation, reconnaissance and many other purposes, while a machine designed expressly for one of these services would not be able to carry out the others as efficiently. The two most popular general purpose machines used in the R.A.F. are the Fairey 111F and the Westland "Wapiti." These machines are used by various squadrons, the "Wapiti" being employed greatly by those stationed in Iraq, in which country it has seen much war service.

The model illustrated on this page depicts a general purpose machine. It will be seen that it bears a striking resemblance to the Westland "Wapiti" also illustrated.



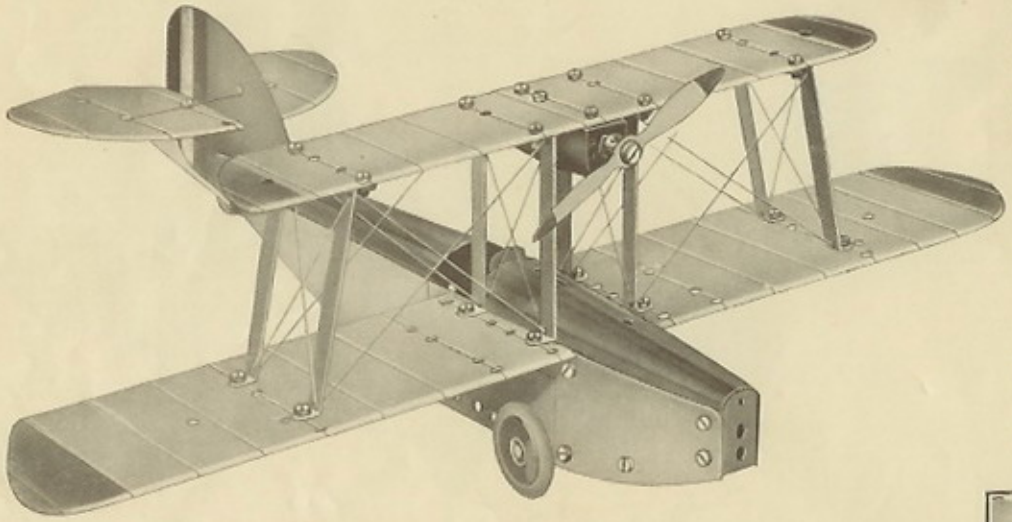


A general purpose machine, the Westland "Wapiti," used by many squadrons of the R.A.F. in various parts of the world.

Parts required :

2 of No. P1	1 of No. P20	1 of No. P59
2 „ „ P2	8 „ „ P28	2 „ „ P60
1 „ „ P7	4 „ „ P29	2 „ „ P101
2 „ „ P8	2 „ „ P31	2 „ „ P102
1 „ „ P10	1 „ „ P32	8 „ „ 12
1 „ „ P11	1 „ „ P34	1 „ „ 14
1 „ „ P13	2 „ „ P44	71 „ „ 537a
1 „ „ P15	1 „ „ P52	70 „ „ 537b
2 „ „ P16	2 „ „ P53	1 „ „ 540
2 „ „ P17	1 „ „ P55	1 „ „ 611c
2 „ „ P18	2 „ „ P56	
1 „ „ P19	1 „ „ P58	

Model No. 19 Italian Bomber



Sesquiplanes similar to Model No. 19 are not constructed in this country nor in many others, this type being favoured most particularly by the Italian Società Italiana Caproni, although not all the machines constructed by this firm are sesquiplanes. The most unusual feature of the type depicted in our model is that the longer wing is the lower and not the upper one. The machines of this design at present constructed by the Caproni firm are all bombers, and are fitted with anything up to six engines. The six-engined bomber is known as the Caproni Ca.90P.B. This machine is the largest bombing aeroplane at present in existence, and is the possessor of six world's records. It is equipped with six 1,000 h.p. Isotta-Fraschini "Asso-1,000" engines. This huge aeroplane has a loaded weight of about 66,000 lb., but in spite of this it has a maximum speed of 127.3 m.p.h. and a stalling speed of only 55.9 m.p.h.

Parts required :

1	of No.	P1	1	of No.	P19	1	of No.	P55
1	"	" P2	1	"	" P20	1	"	" P56
1	"	" P3	2	"	" P26	1	"	" P60
1	"	" P4	2	"	" P27	6	"	" 12
1	"	" P10	4	"	" P28	1	"	" 16a
1	"	" P11	1	"	" P32	1	"	" 82
1	"	" P13	1	"	" P35	49	"	" 537a
1	"	" P15	1	"	" P40	47	"	" 537b
2	"	" P16	1	"	" P41	1	"	" 540
2	"	" P17	2	"	" P44			
2	"	" P18	2	"	" P53			

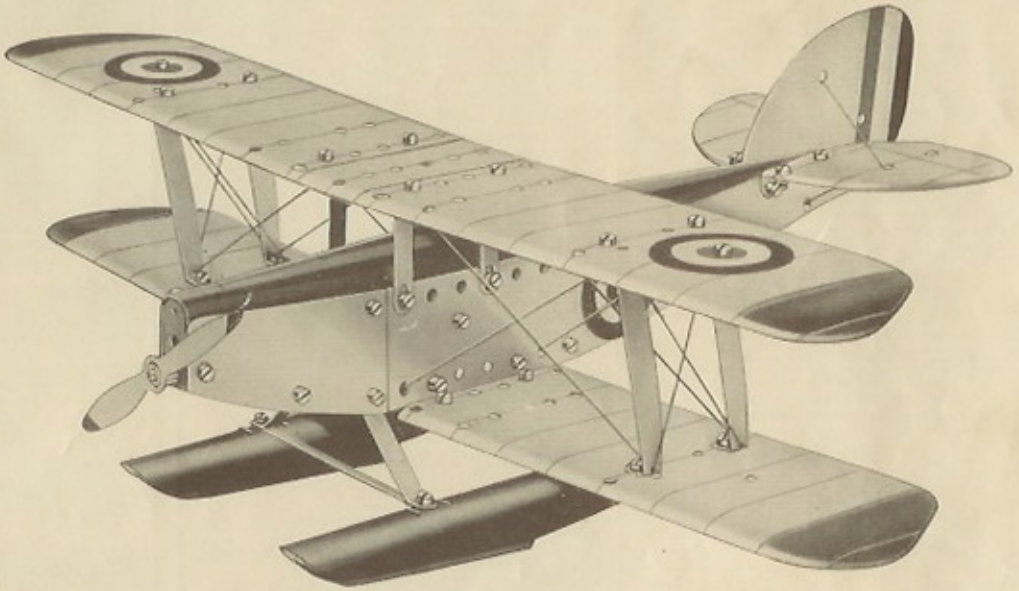
The six-engined Italian Caproni bomber, which is the world's largest bombing machine.

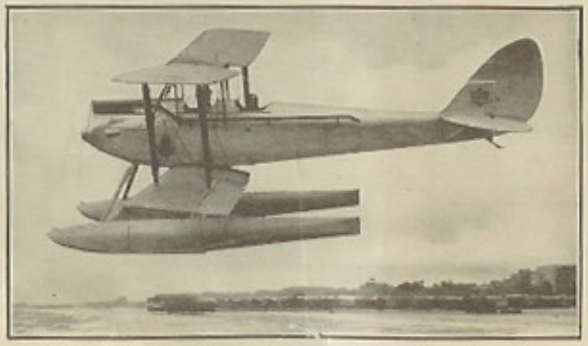
Model No. 20 Light Seaplane

Most of the light aeroplanes constructed in England can be obtained either as landplanes or fitted with floats for operation from water. The fitting of floats to a light aeroplane appreciably reduces the maximum speed, and makes the machine more difficult to fly. The floats are made of duralumin, an aluminium alloy that is exceedingly light and also does not readily corrode.

Seaplanes are not frequently seen in this country, but in Canada they and flying boats are almost the only types of aircraft used. In the winter the seaplanes have their floats removed and skis fitted in their place. The aeroplane is then able to take off from, or alight on, stretches of ice or frozen snow with perfect safety.

Model No. 20 shows a light aeroplane such as a "Moth," a "Bluebird," or an "Avian" fitted with floats in place of the normal land undercarriage.





A D.H. "Gipsy Moth" seaplane nearing the surface of the water.

Parts required :

2 of No. P1	1 of No. P19	2 of No. P56
2 „ „ P2	1 „ „ P20	2 „ „ P57
1 „ „ P8	2 „ „ P24	2 „ „ P101
1 „ „ P10	2 „ „ P25	2 „ „ P102
1 „ „ P11	4 „ „ P29	8 „ „ 12
1 „ „ P13	4 „ „ P30	1 „ „ 14
1 „ „ P15	1 „ „ P32	51 „ „ 537a
2 „ „ P16	1 „ „ P34	54 „ „ 537b
2 „ „ P17	2 „ „ P42	1 „ „ 540
2 „ „ P18	1 „ „ P52	1 „ „ 611c

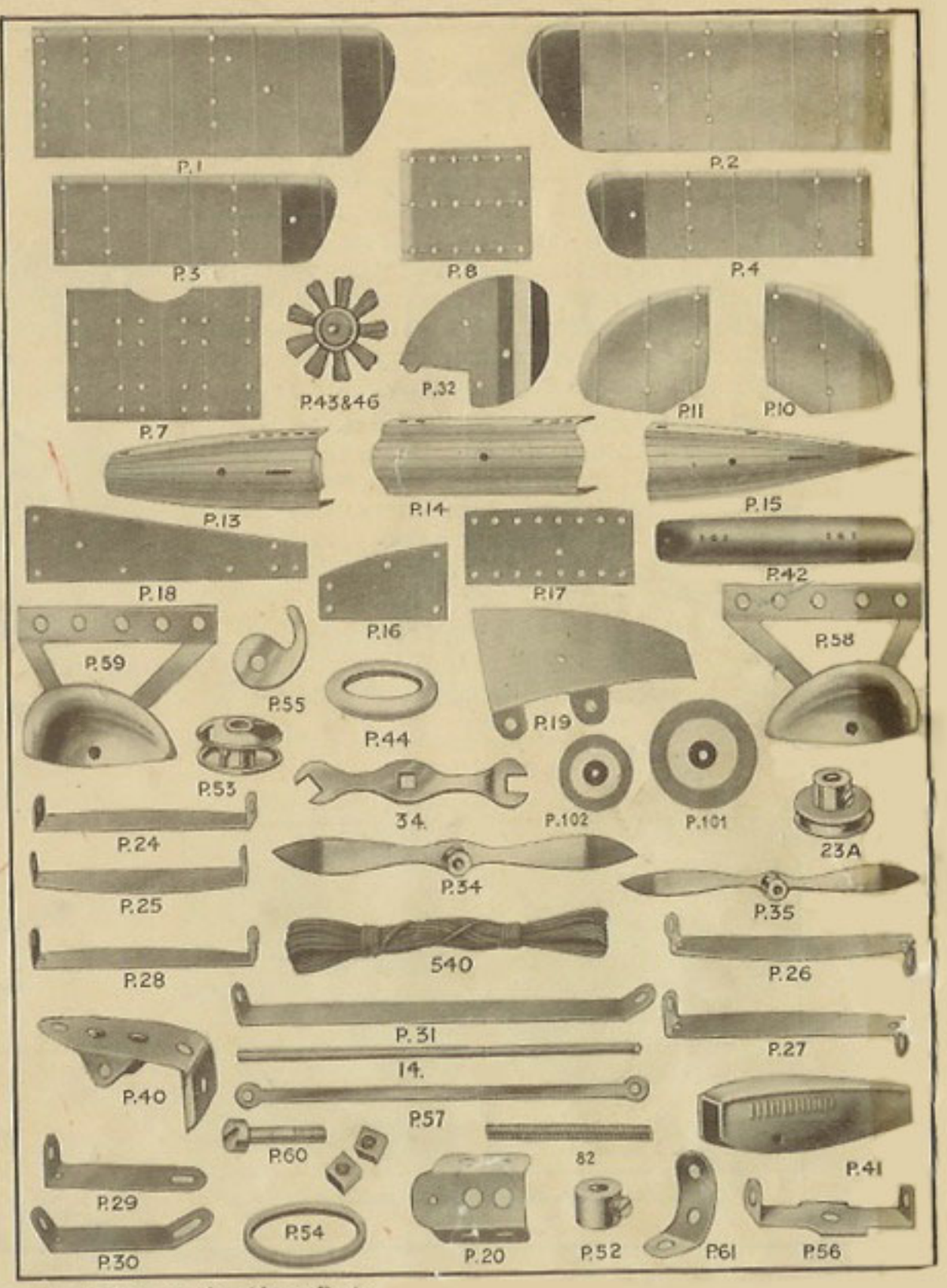
MECCANO AEROPLANE CONSTRUCTOR PARTS

No.		No.	
	Main Plane	P46	Radial Engine—Large ... ...
P1	Large—R.H. P2 L.H.	P52	Collar ... ...
P3	Small—R.H. P4 L.H.	P53	Landing Wheel ... ...
P7	Centre Section Plane	P54	Rubber Driving Band ... ...
P8	Extension Plane	P55	Tail Skid... ... ...
P10	Tail Plane—R.H.	P56	Rear Bracket for Propeller Shaft
P11	„ „ L.H.	P57	Tie Rod for Floats ... ...
	Fuselage Top	P58	Undercarriage Vee Strut and Wheel Shield—R.H.... ...
P13	Front P14 Middle P15 Rear	P59	Undercarriage Vee Strut and Wheel Shield—L.H.... ...
	Fuselage Side	P60	Pivot Bolt with Two Nuts ...
P16	Front P17 Middle P18 Rear	P61	Engine Bracket ... ...
P19	Fuselage Underside P20 Front	P62	Axle Rod, 3½" long ... ...
	Interplane Strut	P63	Screwdriver ... ...
P24	Staggered—R.H. P25 L.H.	*101	Identification Marking—Large
P26	Angled—R.H. ... P27 L.H.	*102	„ „ Small
P28	Interplane Strut—Straight ...	12	Angle Brackets, ½" × ½" ...
P29	Centre Section Strut—Straight	14	Axle Rod, 6½" long ... ...
P30	Float and Centre Section Strut—Angled	16a	„ „ 2½" „ ... ...
P31	Wing Stay P32 Rudder	23a	Fast Pulley, ½" diameter ...
P34	Propeller—Large	34	Spanner ... ...
P35	„ Small	82	Screwed Rod, 1" long ... ...
P40	Base for Engine Casing ...	537a	Nuts 537b Bolts, 7/32" long
P41	Top for Engine Casing	540	Hank of Cord ... ...
P42	Float, Complete...	611c	Bolts, ¾" long ... ...
P43	Radial Engine—Small		
P44	Rubber Tyre for Landing Wheels		

**The series includes identification markings in the correct colours of 16 different countries. Ask your dealer for full particulars.*

CONTENTS OF MECCANO AEROPLANE CONSTRUCTOR OUTFIT NO. 2

No.		Quantity	No.		Quantity
	Main Plane		P52	Collar	1
P1	Large—R.H. ... 2 P2 L.H. ...	2	P53	Landing Wheel	2
P3	Small—R.H. ... 1 P4 L.H. ...	1	P54	Rubber Driving Band	1
P7	Centre Section Plane	1	P55	Tail Skid...	1
P8	Extension Plane	2	P56	Rear Bracket for Propeller Shaft ...	2
P10	Tail Plane—R.H. ... 1 P11 L.H.	1	P57	Tie Rod for Floats	2
	Fuselage Top		P58	Undercarriage Vee Strut and Wheel Shield—R.H.	1
P13	Front ... 1 P14 Middle ... 1 P15 Rear	1	P59	Undercarriage Vee Strut and Wheel Shield—L.H.	1
	Fuselage Side		P60	Pivot Bolt with Two Nuts	4
P16	Front ... 2 P17 Middle ... 4 P18 Rear	2	P61	Engine Bracket	3
P19	Fuselage Underside	1	P62	Axle Rod, 3½" long	1
P20	„ Front	1	P63	Screwdriver	1
	Interplane Strut		101	Identification Marking—Large ...	2
P24	Staggered—R.H. 4 P25 Staggered—L.H.	4	102	„ „ Small ...	2
P26	Angled—R.H. 2 P27 Angled—L.H.	2	12	Angle Brackets, ½" × ½"	8
P28	Interplane Strut—Straight	8	14	Axle Rod, 6½" long	1
P29	Centre Section Strut—Straight ...	4	16a	„ „ 2½" „	1
P30	Float and Centre Section Strut—Angled	8	23a	Fast Pulley, ½" diameter	2
P31	Wing Stay	2	34	Spanner	1
P32	Rudder	1	82	Screwed Rod, 1" long	2
P34	Propeller—Large	1	537a	Nuts	100
P35	„ Small	3	537b	Bolts, 7/32" long	100
P40	Base for Engine Casing	2	540	Hank of Cord	1
P41	Top for Engine Casing	2	611c	Bolts, ¾" long	2
P42	Float, Complete...	2			
P43	Radial Engine—Small	3			
P44	Rubber Tyre for Landing Wheels ...	2			



Ask your dealer for a complete price list of Meccano Aeroplane Parts.