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AMERICAN AIRCRAFT

By ROBERT M. EWING, '32

Aviation's advance has been so rapid in the last few years that few people not connected with the industry have been able to keep up with all its phases. Records have been made and then broken in such quick succession that the interested spectator is left gasping for breath and wondering whether the last endurance flier stayed up 246 hours or 420 hours, or whether that was the amount of time that it took the Graf Zeppelin to circumnavigate the globe. New planes have been put on the market, old ones improved, prices changed, and old ideas, about air pockets and the like, blasted, until the American public hardly knows where it stands on the subject of aviation.

The following article is an attempt to describe a few of the planes now in use in America. Detailed specifications have not been included, the descriptions being general in character. For convenience in writing this article the planes discussed have been divided into four classes: military, large transport, small transport, and small commercial planes. These classifications are very broad and could be subdivided many times over, but they are sufficient for this article. In describing the aircraft of America no mention has been made of the balloon or dirigible since the author does not feel qualified to discuss them at the present time.

MILITARY PLANES

Without doubt the greatest development in aircraft design in this country has been in the field of military aviation. The reason for this is that the government has appropriated large sums of money to be used in experimenting with and developing military aircraft, whereas the commercial operators have had to earn with their present equipment the funds necessary for experimentation with new types. Only within the past year or two has commercial aviation begun to rival military flying in its material.

The army planes are divided into six classes: pursuit, observation, attack, bombing, primary training, and cargo. The pursuit plane is the plane that is used on patrols, in protecting the clumsier cargo, bombing, and photographic planes, and in all the jobs where a light, fast ship is required. It is a single-seated, high-powered plane, equipped with machine guns and capable of speeds over 150 miles an hour. The makes in use at the present time are the Curtiss "Hawk" and the Boeing pursuit. The majority of the Army's "Hawks" are equipped with the Curtiss D-12, 430 h. p., 12-cylinder, water-cooled engine, while the Boeings are mostly powered by the 9-cylinder Pratt & Whitney "Wasp," a radial, air-cooled motor developing 420 h. p. One of the major purposes of these planes is attacking in squadrons.

The observation plane is larger than the pursuit, there being a seat for an observer who handles a camera, makes maps, or directs troop movements and artillery fire with a wireless key. Curtiss "Falcons" and the Douglas O-2 family make up the bulk of the planes used in this service.



Sikorsky Amphibian

The Douglas is powered by the Liberty motor, a water-cooled, 12-cylinder engine that was developed for military use during the late war, and which is now being gradually discarded because of its inefficiency in comparison with later motors. The "Falcons" are equipped with either the Liberty or the D-12.

The attack plane is nearly as speedy as the pursuit, the main difference lying in its extra capacity. It is a two-seated ship, the job of the extra man being to manipulate the machine guns that are mounted on the rear cockpit. Their function is attack, and they are equipped with machine guns synchronized to fire through the propeller as in the pursuit planes. The Curtiss "Falcon" is used almost exclusively in this capacity, as is the D-12 motor. The distinguishing feature of the "Falcon" is the sweepback of the upper wing, giving it an appearance of great speed.

The bombing planes of the army are huge two-motored craft, engined for power rather than speed and capable of lifting enormous weights in the form of bombs. When out on bombing expeditions, these ships are always accompanied by fighting planes, usually pursuits, as they are too heavy and cumbersome to be able to protect themselves in a fight with smaller planes. They are, however, equipped with a machine gun mounted on a rack well back on the fuselage over a cockpit for the gunner. The Keystone bomber is the favored one at the present time; it is powered with either two Wright "Cyclones" of 525 h. p. or two Pratt and Whitney "Hornets" of the same power rating. The government is experimenting at the present time with a new Curtiss bomber, the "Condor," which uses two water-cooled Curtiss "Conqueror" engines, each developing 635 h. p. At the rear of each of the engine nacelles, which are mounted on the lower wing, is a small gunner's cockpit with a swivel-mounted machine gun, which affords extra protection for the ship and its death-dealing cargo of bombs. The "Condor" has a cruising speed of 104 m. p. h., a high speed of 130 m. p. h., and lands at 45. The pilot's cockpit is located just ahead of the wings, while the bombing compartment, also equipped with machine guns, is in the nose of the ship.

The cargo or transport plane is not yet being

used extensively by the army, although it owns a number of them. Chief among these is the Fokker tri-motor transport, the Douglas single-motor cabin plane, and the Ford tri-motor plane.

The remaining plane to be discussed under the military heading is the primary training or PT ship in which the novice army flier gets his training. The plane that is in use at the army schools at the present time is the Consolidated PT-1, a two-seated biplane using a Wright E 180 h. p. motor, water cooled and having 8 cylinders, and the PT-3 similar to the PT-1 except for its motor, which is a Wright "Whirlwind" radial motor of 235 h. p.

The Navy's planes are very similar to those of the Army, although some different makes are used, including the Vought "Corsair" and the Loening amphibian as observers, and the Martin torpedo and bombing ships. The chief difference lies in the Navy's almost exclusive use of radial engines and its many pontoon equipped planes.

LARGE TRANSPORT PLANES

The large transport plane is one of the most interesting of all the types. A few years ago aeroplanes carrying twenty passengers were unheard of, yet today they are common sights at the large metropolitan airports. Passenger service from coast to coast in two days is now an actuality. Passengers travel by train at night and by plane in the daytime. The two most favored ships in this service at the present time are the tri-motored monoplanes built by Ford and by Fokker.

The Ford is constructed of metal throughout, the entire covering of the plane being corrugated sheet duraluminum instead of the conventional doped fabric. It is a monoplane of the high-wing type, with one motor mounted in the nose and the other two suspended from the wings one on each side of the cabin. Air-cooled radial motors are used, the standard on the Ford being three 425 h. p. Pratt and Whitney "Wasps." This plane carries 14 passengers and 2 pilots.

The Fokker is very similar to the Ford except that it is not metal covered. The usual doped fabric is used. The Ford has large luggage compartments in the wings which accommodate the hand baggage of the travelers. The Ford has a high speed of 135 miles per hour and cruises at about 100. It has a cruising radius of from 580 to 650 miles. The equipment on these planes also includes buffet, toilet, running water, and electric lights.

SMALL TRANSPORT PLANES

This classification embraces the larger single-motored ships and the smaller ones using more than one motor. This type of plane is popular with the commercial operators whose business is not sufficient to warrant the use of the large transport ships. Practically all the planes of this type are cabin planes, although in a few the pilot's cockpit is open. The motors used on these planes are the same as those used on the larger ships. There are the "Wasp" and "Hornet," the J-5 and J-6 "Whirlwinds," and the "Cyclone"; and on the smaller ships, the Curtiss "Challenger," the Warner "Scarab," and others.

A popular 7-place ship is the Fairchild "71," using a "Wasp" motor. This plane will go 138 miles per hour, but fully loaded it cruises at 110.

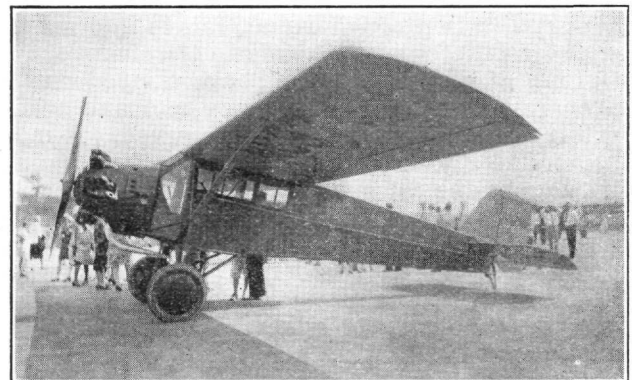
On this plane the wings can be folded back against the fuselage, thus facilitating storage. Other planes of this type are the Stinson-Detroiter, the Travel-Air monoplane, the Buhl Airsedan, the Flamingo, and the Hamilton, both all-metal monoplanes, the Stearman light transport, and the Boeing "40." In the two last named, the pilots' cockpits are open and to the rear of the passenger cabin. These planes will hold four people besides the pilot and are used extensively in the mail service, mail compartments supplanting the passenger space. The Kreutzer Air Coach is a 6-place tri-motored monoplane, while the American Eagle of this size uses but two motors. The multi-motored ship of small capacity, however, is not very popular at present. In summary it might be said that the intermediate size of plane is the most popular plane with the commercial operators at the present time and will probably continue to be so until air traffic increases considerably.

SMALL COMMERCIAL PLANES

The planes grouped under this heading are the single-motored ships with a seating capacity of not more than four people and a small amount of baggage. Into this class fall many privately owned ships and most of the primary training planes. These planes can be and are equipped with both radial and water-cooled engines of all horse-powers, although the majority of them are not over 200 h. p. The water-cooled Curtiss OX-5, 8-cylinder motor is still a popular one. The other popular water-cooled engine for use in small planes is the Hispano-Suiza or Hisso made with several different ratings, the 180 h. p. being the most used. Among the radial engines are the Kinner 5-cylinder 100 h. p., the Curtiss "Challenger" with 6 cylinders staggered, developing 170 h. p., the LeBlond 60 and 90, the "Whirlwind" J-6 and J-5, and the 7-cylinder Warner "Scarab" of 110 h. p. There are also two small engines containing four cylinders in line and air-cooled that are fast becoming popular in light planes. They are the Wright "Gypsy," developing from 85 to 100 h. p., and the American "Cirrus Mark III," rated at 95 h. p.

The most popular type of plane with the training schools and small plane owners is the open cockpit biplane. These ships seat either one, two, or three people, and some have a space for baggage. Of this type some of the most used are the three-place Waco, Travel-Air, Commandaire, American Eagle, Fairchild K-R, Eaglerock, and

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Curtiss "Robin"

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the Swallow, while some even smaller are the two-place Fleet, Bird, Gypsy "Moth," Whittelsey "Avian," and others. Most of those named can be obtained with several choices of motors, and some offer a choice of different types of wings. The popular Waco can be had with a choice of five different motors and with either straight or tapered wings. The Curtiss "Fledgling" is a two-place training plane recently placed on the market.

The open monoplane is not very common in this country yet, although there are several models on the market. One of the best known of these is the two-place Davis V-3, powered with the LeBlond 60 or 90 radial engine. It is a trim little monoplane popular with private owners and trainers. The Berliner-Joyce Company also offers a plane of this type. Another example is the Heath "Super-Parasol" which sells as low as \$500 and can be bought in parts and built at home. It is a small plane not meant for speed or power but capable of short flights around the home port. These three just described are all of the high-wing type. There are also several open low-wing monoplanes being built in this country, including the Aeromarine Klemm and the Barling N-B 3.

In the field of the small closed plane, the Curtiss "Robin" is one of the most outstanding and the present holder of the refueling endurance record of the world. The "Robin" is a high-wing monoplane with seats for two passengers and a pilot. Its cabin is furnished similar to an automobile. It is made in two models, one powered with the OX-5 engine and selling at \$4000 and the other equipped with a "Challenger" for \$7500. Of the same type but carrying one more passenger is the speedy Cessna. The General "Aristocrat" is also very similar to the "Robin" and uses the Scarab motor. One of the most interesting planes of this type is the Monocoupe. It is a two-place monoplane in which the pilot and passenger ride side by side. The plane is very small and uses a Velie radial motor of 5 cylinders.
