

南京航空航天大学民航学院空中交通管理专业系列教材

飞行专业 英语阅读

Aviation English Reading for Pilot Students

刘继新 主编
胡彬 杨春艳 夏晶 副主编



国防工业出版社

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内 容 简 介

《飞行专业英语阅读》是一本以提高民航飞行人员专业语言技能为主要任务的实用型专业教材。文章内容主要选取近年来英美原版航空科技书籍,并结合网络资源,取材具有一定的代表性、时效性和实用性。可为飞行学员进一步的理论和实践学习做好语言和航空基础知识的储备。

本书可供飞行学员和其他各类民航专业的学生使用。

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前 言

《飞行专业英语阅读》是一本以提高民航飞行人员专业语言技能为主要任务的实用型专业教材。本教材力求使飞行学员了解基本的与飞行原理、飞机结构和系统、航空气象、导航系统、空管、机组资源管理和机场等相关的航空英语专业知识,为学员进一步的理论和实践学习做好语言和基础知识的储备。

本教材主要针对民航院校飞行学员和其他各类民航专业的学生,为他们提供相关的行业引导;对飞行感兴趣的其他人士,也可以将本教材作为一本基础读物使用。

本教材作为民航院校飞行学员航空英语课程的基础教材,文章内容主要选取近年来英美原版航空科技书籍,并结合网络资源,取材具有一定的代表性、时效性和实用性。编者在保持原文特色和严谨性的基础上,对内容做了大量的编辑和整理工作,并编写了与选文内容相关的练习,以供学员学习和巩固。通过本教材的学习,可以提高学员的专业英语能力,拓展学员的飞行专业基础知识。飞行学员可以通过阅读本教材扩大飞行专业英语词汇量,提高阅读技能,增强未来对于各种飞行专业资料的阅读和理解能力。

本教材由南京航空航天大学刘继新副教授主编,胡彬、杨春艳和夏晶讲师担任副主编。在编写过程中得到了南京航空航天大学民航学院相关领导和专家的关心和指导,空管专业 2013 届多名优秀学生也参与了教材的选材工作,在此一并表示感谢。

由于编者水平有限,书中难免存在错漏和不足,敬请各位行业专家和读者批评指正。

编者

二零一三年十月于南京

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Lesson One

History of Aviation

Aviation is defined as the design, manufacture, use, or operation of aircraft—in which the term aircraft refers to any vehicle capable of flight. Aircraft can either be heavier-than-air or lighter-than-air: lighter-than-air craft including balloons and airships, and heavier-than-air craft including airplanes, autogiros, gliders, helicopters, and ornithopters.

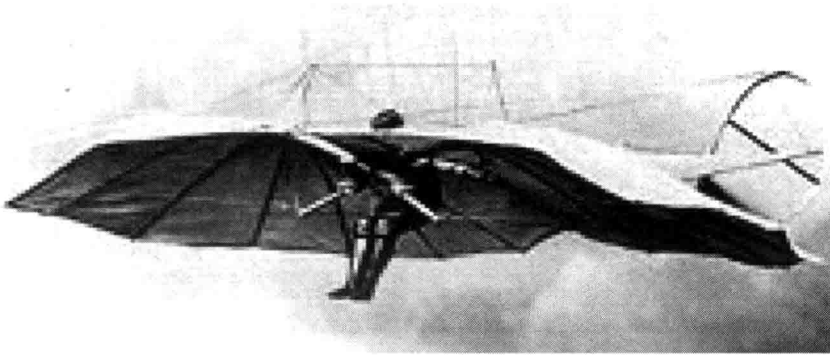


Fig. 1 - 1 Glider made by Otto Lilienthal (Father of Modern Aviation)

For centuries man has dreamed to soar with the birds. Famous inventors such as Leonardo da Vinci, John Stringfellow, and Lawrence Hargrave have conjured up ideas of how to get some of the strangest machines to fly long before the Wright brothers' famous first flight at Kitty Hawk.

From 1903 to today, it's remarkable how far aviation has come. On December 17, 1903, at 10:35 a. m. , the Wright brothers (Orville at the controls) made the first heavier-than-air, machine-powered flight which lasted 12 seconds and spanned 120 feet. They did what every man and woman has dreamed for centuries ... they flew. Yet, not all flights were victorious. On September 17, their aircraft crashed, injuring Orville and his passenger (Lieutenant Thomas E. Selfridge). Selfridge later died of a concussion and was the first person to be killed in a powered airplane. Yet the show went on and Wilbur went to France in August 1908; on De-



cember 31, 1908, he completed a 2 hour 20 minute flight which demonstrated full control over his Flyer. The Flyer was purchased on August 2 and became the first successful military airplane. It remained in service for around two years and was retired to the Smithsonian Institution where it rests today.

Before World War I, airplane design greatly improved. Pusher biplanes (two-winged airplanes with the engine and propeller behind the wing) were succeeded by tractor biplanes (two-winged airplanes with the engine and propeller in front of the wing). Monoplane designs were rare, and when World War I began, huge biplane bombers with two to four engines were developed. Airmail was also started, although it only lasted a week. The first airmail officially approved by the U. S. Post Office Department began on September 23, 1911, and the pilot (Earle Ovington) would carry the mail on his legs and tossed the bag overboard when he reached his destination. Also in 1911, the first transcontinental flight across the U. S. was completed by Calbraith P. Rodgers. His flight from New York to California took 3 days, 10 hours, and 14 minutes, and was by a Wright aircraft.



Fig. 1 - 2 Pusher biplane

Between 1919 and 1926, some amazing progress in record breaking for aviation took place. Captain E. F. White made a nonstop flight from Chicago to New York (727, or 1,170km) in 1919, and Lieutenant Oakley Kelly and Lieutenant John A. Macready made the first nonstop transcontinental flight from May 2 to May 3, 1923. This flight was made from Roosevelt Field, Long Island to Rockwell Field, San Diego. The first round-the-world flight was made from April 6 to September 28, 1924. Also in 1919, the first nonstop transatlantic flight was made by John William Alcock and Arthur Whitten Brown on June 14 to June 15. It took a little over 16 hours to complete and they won the "London Daily Mail" prize of \$50,000.

During World War II, aircraft became a decisive factor in warfare. The largest operator of all international airlines in operation at this time was Pan American Airways. Pan American served



46 countries and colonies linking all continents and nearly all oceans. Small aircraft production increased significantly. Before World War II only about 193,000 people were employed in the aviation industry, and during 1941 the number increased to 450,000; also, around 3,375,000 passengers were transported by 18 U. S. airlines at this time, around 1 million more than in 1940. Airmail and express cargo would also increase by around 30 percent. But by the end of World War II, a new frontier of flight would take shape, jet and rocket propelled aircraft.

After World War II and by 1947, all the basic technology needed for aviation had been developed: jet propulsion, aerodynamics, radar, etc. Civilian aircraft orders drastically increased from 6,844 in 1941 to 40,000 by the end of 1945. One of the minor military contractors was the Boeing Company who later became the largest aircraft manufacturer in the world. With all the new technologies developed by this time, airliners were larger, faster, and featured pressurized cabins. New aerodynamic designs, metals, and power plants would result in high-speed turbojet airplanes. These planes would later be able to fly supersonically and make transoceanic flights regularly.

One of the more famous record-breaking flights around this time was the Voyager, developed by Burt Rutan. The aircraft held 1,200 gallons (4,500 liters) of fuel in its 17 fuel tanks. It weighed about 9,750 lb (4,420kg) at takeoff and only 1,858 lb (840kg) upon landing. The flight, maintaining an average speed of 115.8 mph (186.3km/h), lasted 9 days, 3 minutes, 44 seconds and covered 25,012 miles (40,254km) and was completed in December 1986.

Words and phrases:

- aviation *n.* 航空; 飞行术; 飞机制造业
- vehicle *n.* 车辆; 交通工具
- balloon *n.* 气球
- airship *n.* 飞艇
- autogiro *n.* 旋翼飞机
- glider *n.* 滑翔机
- helicopter *n.* 直升机
- ornithopter *n.* 扑翼机
- soar *v.* 高飞; 高耸
- conjure up 想起, 使在脑海中显现; 用魔法召唤
- victorious *adj.* 胜利的; 凯旋的
- concussion *n.* 冲击; 震荡; 脑震荡
- purchase *n.* 购买
- military *adj.* 军事的; 军方的
- retire *n.* 退休; (飞机) 退役
- biplane *n.* 双翼机
- propeller *n.* 螺旋桨



succeed *n.* 成功;继承;接替
pusher biplane 推进器双翼机
tractor biplane 拉式双翼机
monoplane *n.* 单翼机
bomber *n.* 轰炸机
airmail *n.* 航空邮件
overboard *adv.* 自飞机上落下,自船上落下;向飞机外,向船外
destination *n.* 目的地
transcontinental *adj.* 横贯大陆的,横穿大陆的
transoceanic *adj.* 横穿大洋的
nonstop flight 直达航班
round-the-world 环球的
transatlantic *adj.* 跨大西洋的
express cargo 快运货物
propulsion *n.* 推进力
aerodynamics *n.* 空气动力学
contractor *n.* 承包人;立契约者
pressurize *v.* 增压
power plant 动力装置
turbojet *n.* 涡轮喷气发动机
supersonic *adj.* 超声速的
record-breaking 破纪录的;非常优异的
fuel tank 油箱

Exercises:

I. Answer the following questions:

1. What does the term aircraft mean?
2. What happened on December 17, 1903 at Kitty Hawk?
3. How long did the first round-the-world flight last?
4. What are the basic technologies for aviation development?
5. Why was the Voyager a famous record-breaking flight?

II. Decide whether the following sentences are true or false:

1. Heavier-than-air craft include airplanes, autogiros, gliders, helicopters, and ornithopters.
2. Orville was the first person to be killed in a powered airplane.
3. Monoplanes were invented before biplanes.
4. Jet and rocket propelled aircraft developed quickly in World War I.
5. High-speed turbojet airplanes are the result of new aerodynamic designs, metals, and



power plants.

III. Translate the following phrases:

- | | |
|---------------------------|----------------------|
| 1. machine-powered flight | 2. pressurized cabin |
| 3. civilian aircraft | 4. jet propulsion |
| 5. transoceanic flight | 6. 航空器运行 |
| 7. 平均速度 | 8. 跨大陆飞行 |
| 9. 军用飞机 | 10. 环球飞行 |

IV. Translate the following sentences:

1. 最早的人造飞行器的形式是风筝, 已知最早的有关风筝飞行的记录出现在公元前200 年左右。
2. 滑翔机的实验为比空气重的飞行器的产生奠定了基础。
3. 第二次世界大战后, 商用航空迅猛发展, 当时主要使用以前的军用飞机运输旅客和货物。
4. 随着新技术的发展, 飞机尺寸更大, 速度更快, 并出现了增压客舱。
5. 多少年来, 人类一直梦想能像鸟类一样在空中翱翔, 这种梦想直到 1903 才由莱特兄弟实现。

Supplementary Reading

Aircraft Types

Modern airplanes are divided into five main types: 1) Commercial Transport Planes; 2) General Aviation Planes; 3) Military Planes; 4) Sea Planes; 5) Special Purpose Planes.

Commercial transport planes are large planes used for carrying passengers and sometimes cargo (also called airliners).

Four-engine jets are more powerful than most airliners. That's because most airliners only travel 500 to 600 miles per hour or 805 to 966 kilometers per hour, and four-engine jets can travel faster and farther.

The Boeing 747 is a four-engine jet that unlike most airliners, can carry more than 400 passengers. It can also carry six galleys (kitchens), twelve washrooms, and more than 47,000 gallons or 178,000 liters of fuel. In 1969, the Boeing 747 became the largest jet in the world. This airliner can fly 6,495 miles or 10,475 kilometers non-stop. That's farther than the distance between New York City and Tokyo.

Four-engine jets are not the only kind of commercial transport planes. There are also three-engine jets and twin-engine jets.

As you probably can imagine, three-engine jets don't travel as far as four-engine jets and need less runway to take-off and land. But some three-engine jets can carry as many passengers as four-engine jets.

Twin-engine jets are smaller than four or three-engine jets, but 90% of airliners today are



twin-engine jets because they cost less money to operate.

Most general aviation planes have two to six seats, and one engine. General aviation planes are used for many purposes. Sometimes people use them to teach students how to fly a plane, or they are used to take pictures from a high-up view. Sometimes people use them for transportation, and sometimes people use them for enjoyment. Some farmers use them for planting seeds, checking soil erosion, and counting livestock.

Military planes, as you probably know, are planes used by the military. Most military planes are used to attack enemies on the ground or in the air. Some military planes are used to carry equipment and soldiers to bases or battlefields.

Sea planes are divided into three types: 1) Float Planes; 2) Flying Boats; 3) Amphibians. Float planes have big floats instead of wheels. Flying boats are shaped like the hull of a boat, so they can stay on the water. Amphibians are: 1) Shaped like frogs; 2) Able to go on land and water; 3) Able to fly without any wings.

Special purpose planes are planes that have special purposes such as performing tricks in shows or spraying chemicals on crops. Some amphibians also have a special purpose. They are used for putting out forest fires. They fly just above the lakes and ponds and suck up water so they can later spray it on forest fires.

So, there are a lot of different types of airplanes, and as we have learned, it's because there are a lot of different jobs for airplanes to do.

Words and phrases:

commercial *adj.* 商业的

general aviation 通用航空

galley *n.* 机上厨房

gallon *n.* 加仑(容量单位)

liter *n.* 公升(容量单位)

twin-engined *adj.* 双发的

soil erosion 水土流失;土壤侵蚀

livestock *n.* 牲畜

float *v.* 使漂浮; *n.* 浮舟,浮筒

amphibian *n.* 两栖动物;水陆两用飞机

spray *v.* 喷洒

Lesson Two

Aircraft Structure

Although airplanes are designed for a variety of purposes, most of them have the same major components. The overall characteristics are largely determined by the original design objectives. Most airplane structures include a fuselage, wings, an empennage, landing gear, and a power plant.

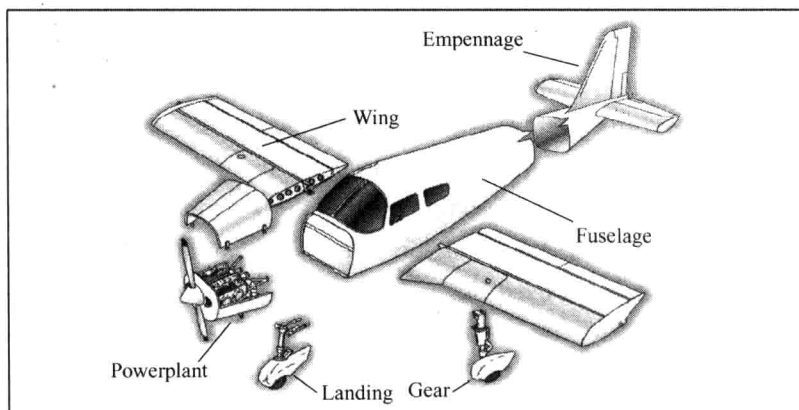


Fig. 2 - 1 Airplane components

The fuselage includes the cabin and/or cockpit, which contains seats for the occupants and the controls for the airplane. It is the central body of an airplane and is designed to accommodate the crew, passengers, and cargo. It also provides the structural connection for the wings and tail assembly. Older types of aircraft design utilized an open truss structure constructed of wood, steel, or aluminum tubing. The most popular types of fuselage structures used in today's aircraft are the monocoque (French for "single shell") and semi-monocoque. The monocoque design uses stressed skin to support almost all imposed loads. This structure can be very strong but cannot tolerate dents or deformation of the surface. The semi-monocoque system



uses a substructure to which the airplane's skin is attached. The substructure, which consists of bulkheads and/or formers of various sizes and stringers, reinforces the stressed skin by taking some of the bending stress from the fuselage.

The wings are airfoils attached to each side of the fuselage and are the main lifting surfaces that support the airplane in flight. There are numerous wing designs, sizes, and shapes used by the various manufacturers. Each fulfills a certain need with respect to the expected performance for the particular airplane. Wings may be attached at the top, middle, or lower portion of the fuselage. These designs are referred to as high-, mid-, and low-wing, respectively. The number of wings can also vary. Airplanes with a single set of wings are referred to as monoplanes, while those with two sets are called biplanes.

Many high-wing airplanes have external braces, or wing struts, which transmit the flight and landing loads through the struts to the main fuselage structure. Since the wing struts are usually attached approximately halfway out on the wing, this type of wing structure is called semi-cantilever. A few high-wing and most low-wing airplanes have a full cantilever wing designed to carry the loads without external struts. The principal structural parts of the wing are spars, ribs, and stringers.

Attached to the rear, or trailing, edges of the wings are two types of control surfaces referred to as ailerons and flaps. Ailerons extend from about the midpoint of each wing outward toward the tip and move in opposite directions to create aerodynamic forces that cause the airplane to roll. Flaps extend outward from the fuselage to near the midpoint of each wing. The flaps are normally flush with the wing's surface during cruising flight. When extended, the flaps move simultaneously downward to increase the lifting force of the wing for takeoffs and landings.

The correct name for the tail section of an airplane is empennage. The empennage includes the entire tail group, consisting of fixed surfaces such as the vertical stabilizer and the horizontal stabilizer. The movable surfaces include the rudder, the elevator, and one or more trim tabs. The rudder is attached to the back of the vertical stabilizer. During flight, it is used to move the airplane's nose left and right. The rudder is used in combination with the ailerons for turns during flight. The elevator, which is attached to the back of the horizontal stabilizer, is used to move the nose of the airplane up and down during flight. Trim tabs are small, movable portions of the trailing edge of the control surface. These movable trim tabs, which are controlled from the cockpit, reduce control pressures. Trim tabs may be installed on the ailerons, the rudder, and/or the elevator.

The landing gear is the principal support of the airplane when parked, taxiing, taking off, or when landing. The most common type of landing gear consists of wheels, but airplanes can also be equipped with floats for water operations, or skis for landing on snow. Airplanes with conventional landing gear are sometimes referred to as tailwheel airplanes. When the third wheel is located on the nose, it is called a nose wheel, and the design is referred to as a tricycle gear. A steerable nose wheel or tailwheel permits the airplane to be controlled throughout all opera-

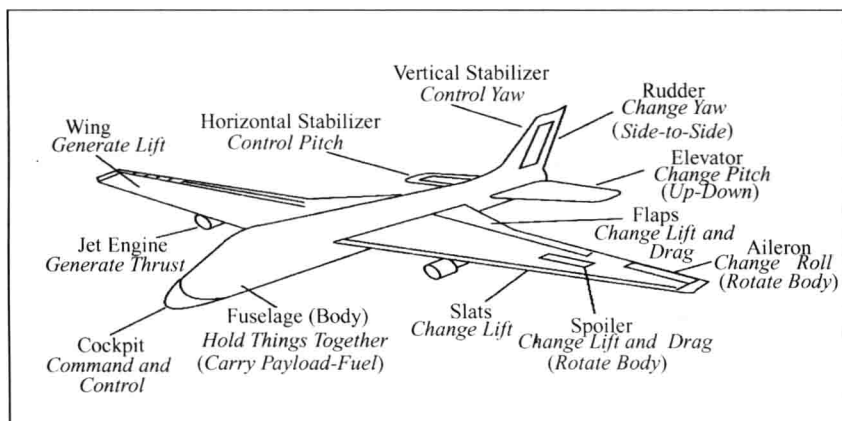


Fig. 2 -2 Airplane parts with functions

tions while on the ground.

The power plant usually includes both the engine and the propeller. The primary function of the engine is to provide the power to turn the propeller. It also generates electrical power, provides a vacuum source for some flight instruments, and in most single-engine airplanes, provides a source of heat for the pilot and passengers. The engine is covered by a cowling, or in the case of some airplanes, surrounded by a nacelle. The purpose of the cowling or nacelle is to streamline the flow of air around the engine and to help cool the engine by ducting air around the cylinders. The propeller, mounted on the front of the engine, translates the rotating force of the engine into a forward-acting force called thrust that helps move the airplane through the air.

Words and phrases:

component *n.* 组成部分

fuselage *n.* 机身

empennage *n.* 尾翼

cabin *n.* 客舱

cockpit *n.* 驾驶舱

occupant *n.* 乘员

crew *n.* 空勤组, 机组

cargo *n.* 货物

assembly *n.* 组件

truss *n.* 构架; 桁架

monocoque *n.* (飞机的) 硬壳机身

dent *n.* 凹痕

deformation *n.* 变形

consist of 由……构成

bulkhead *n.* 隔板; 隔框



stringer *n.* 桁条
reinforce *v.* 加强
airfoil *n.* 机翼,翼面
strut *n.* 支柱
cantilever *n.* 悬臂
spar *n.* 翼梁
rib *n.* 翼肋
trailing *adj.* 后面的,后缘的
aileron *n.* 副翼
flap *n.* 襟翼
cruising *adj.* 巡航的
stabilizer *n.* 安定面
rudder *n.* 方向舵
elevator *n.* 升降舵
taxi *v.* 滑行
float *n.* 浮筒
skis *n.* 滑橇
conventional *adj.* 常规的
steerable *adj.* 可操纵的
cowling *n.* 整流罩
nacelle *n.* 发动机短舱
cylinder *n.* 圆筒,气缸
mount *v.* 安装
rotate *v.* 旋转
thrust *n.* 推力

Exercises:

I. Answer the following questions:

1. What are the major components of an airplane?
2. Which part of an airplane is used to adjust its flight attitude?
3. What's the difference between ailerons and flaps?
4. What's the main function of the landing gear?
5. How could the engine be cooled?

II. Decide whether the following sentences are true or false:

1. The cockpit is designed to accommodate the crew, passengers and cargo.
2. Wings can be attached at different portion of the fuselage.
3. Flaps can be extended and moved to increase lifting force.
4. Trim tabs are the fixed part of the trailing edge of the control surface to reduce control



pressure.

5. The propeller is turned by the power provided by the engine.

III. Translate the following phrases:

- | | |
|--------------------|------------------------|
| 1. landing gear | 2. vertical stabilizer |
| 3. rotating force | 4. trim tab |
| 5. lifting surface | 6. 巡航飞行 |
| 7. 前三点式起落架 | 8. 产生电能 |
| 9. 单发飞机 | 10. 空气流动 |

IV. Translate the following sentences:

1. 尽管飞机的设计目的各不相同,大多数还是有相同的主要结构,包含机身、机翼、尾翼、起落架和发动机。
2. 飞机的硬壳机身结构是目前很流行的结构之一,这种结构使用受力蒙皮承受几乎所有的外加载荷。
3. 机翼是连接到机身两侧的翼面,也是支持飞机飞行的主要升力面。
4. 方向舵安装在垂直安定面的后部。飞行时,它用来使机头向左或者向右运动。
5. 安装在发动机前面的螺旋桨把发动机的转动力转化为称为推力的前向作用力,帮助飞机在空气中移动。

Supplementary Reading

Control Surface

Aircraft flight control surfaces allow a pilot to adjust and control the aircraft's flight attitude. The main control surfaces of a fixed-wing aircraft are attached to the airframe on hinges or tracks so they may move and thus deflect the air stream passing over them. This redirection of the air stream generates an unbalanced force to rotate the plane about the associated axis.

Ailerons are mounted on the trailing edge of each wing near the wing tips and move in opposite directions. When the pilot moves the stick left, or turns the wheel counter-clockwise, the left aileron goes up and the right aileron goes down. A raised aileron reduces lift on that wing and a lowered one increases lift, so moving the stick left causes the left wing to drop and the right wing to rise. This causes the aircraft to roll to the left and begin to turn to the left. Centering the stick returns the ailerons to neutral, maintaining the bank angle. The aircraft will continue to turn until opposite aileron motion returns the bank angle to zero to fly straight.

An elevator is mounted on the trailing edge of the horizontal stabilizer on each side of the fin in the tail. They move up and down together. When the pilot pulls the stick backward, the elevators go up. Pushing the stick forward causes the elevators to go down. Raised elevators push down on the tail and cause the nose to pitch up. This makes the wings fly at a higher angle of attack, which generates more lift and more drag. Centering the stick returns the elevators to neutral and stops the change of pitch. Many aircraft use a stabilator — a moveable horizontal