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# The Flying Office

AVIATION GOES TO WORK





# **The Flying Office**

AVIATION GOES TO WORK

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This book is dedicated to our AvKids:

Matthew • Christina • Alexander • Ryan

Peter • Clare • Lauren

Chase • Caden • Alex • Cole • Jack





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# What Is Business Aviation?



Maybe you have flown on a large jet airplane to Disney World or to visit relatives who live far from your home. Or maybe your mom or dad has a job where they buy a ticket on a commercial airline flight so they can get to far away cities to do their work.

While hundreds of airliners fly thousands of people between about 500 airports in the United States every day, thousands of smaller aircraft carry business people to more than 5,000 airports across the country each day. These airplanes and helicopters are called "business aircraft."

As you will see in the chapters of this book, business aircraft are used to do many important things — from flying very sick children to hospitals where they can receive special treatment, to making sure that factories have all the parts they need to make enough toys and games for the holidays. We hope these stories will help you learn how business aviation is an important, essential and quick way for people to travel.

\* The information in this book about business aviation is factual, but the stories are all fiction.



# What Is an FBO?

When business aircraft arrive at airports, they have special terminals to take care of them. These special terminals are called fixed base operations, or FBOs for short.

FBOs are made up of three different primary parts. The first part of an FBO is the hangar. A hangar is like a garage for a car. It is large enough to hold several

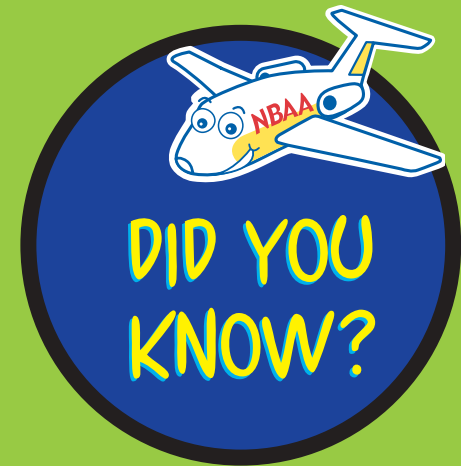
aircraft, either airplanes or helicopters, when they are not flying. The second part of an FBO is the ramp. The ramp is a parking lot for aircraft. The last part of an

FBO is the terminal. The terminal is a building for both passengers and crew members to wait. There are magazines and newspapers to read, TVs to watch and



Internet Web sites to look at, among other things. Also in the terminals, FBOs provide Internet weather systems. Weather is an important part of flying so pilots always want to know what is going on. FBOs also provide a key part of flying a plane - the flight planning room. The flight planning room allows pilots to look at maps and set their plans for the next flight.

Besides helping pilots with their flight planning, FBOs also help pilots take care of their aircraft. FBOs provide fuel and other aircraft services necessary for flight. These other services include providing ground power units, or GPU. A ground power unit is a battery for aircraft. This allows the pilot to turn on the air conditioner and other features in the aircraft to prepare for its passengers. Another aircraft service is cleaning lavatories, aircraft bathrooms. Sometimes aircraft need maintenance to keep them running. FBOs can also provide a mechanic to look at the aircraft engines. Without FBOs, pilots and aircraft would have a difficult time traveling.



**MORE THAN 10,000 AMERICAN COMPANIES FLY OVER 15,000 BUSINESS AIRCRAFT.**

**THERE ARE MORE THAN 22,000 BUSINESS AIRCRAFT FLYING WORLD-WIDE.**

**THE FIRST BUSINESS JET, THE FRENCH-MADE PARIS JET, WAS INTRODUCED IN THE UNITED STATES IN 1955.**

## DID YOU KNOW?

**T**HE LIGHTS ON THE AIRPORT RUNWAY ARE WHITE, AND THE LIGHTS ON A TAXI WAY ARE BLUE TO HELP DIRECT PILOTS.

# Aircraft Helping People

Billy Watson was sad the day he learned that his best friend Sam Johnson was very sick and would have to travel to a far away hospital for special treatments once a month for a whole year. At the dinner table that evening, Billy's parents tried to cheer him up, but the nine-year-old just hung his head and stared at his plate.



But then Billy's dad came up with a great idea: "My company, Excellent Electrical Engineering, uses an airplane to fly me and other people on business trips to Milwaukee, the city where Sam will be going for his treatments. Maybe my company could make Sam's trips simpler, shorter and more comfortable by flying him and his parents to the hospital and back on the company airplane."

Billy's eyes brightened. "Do you really think they would do that?" he asked hopefully. "Sure," said Mr. Watson. "Already this year Excellent Electrical Engineering has flown

physically challenged athletes to the Special Olympics and doctors and emergency blood supplies to help the victims of the big California earthquake. I will call the chief pilot tomorrow and see what he can do to help Sam and his family."

The next morning, Mr. Watson called Mr. Finley, the chief pilot for Excellent Electrical Engineering.

"We would be glad to help," said Mr. Finley. "I will ask our dispatcher Ms. Alexander to see when the next flight to Milwaukee is scheduled. Then we will contact Sam's family and invite them to travel with us if we have space available."



**DID YOU KNOW?**

**YOUR CLASSROOM COULD FIT INSIDE A BOEING 747.**

**DID YOU KNOW?**

**SOME AIRPLANES GET 5 GALLONS TO THE MILE; THE AVERAGE CAR GETS 25 MILES TO THE GALLON.**

Sam needed to start his medical treatments as soon as possible, so it would have been very expensive for his family to buy airline tickets to fly to Milwaukee on short notice. Fortunately, they did not have to because Excellent Electrical Engineering had a Milwaukee trip scheduled the very next day!

After confirming the availability of three empty seats on the planned flight and notifying the business people who were going to Milwaukee that there would be guests aboard, Ms. Alexander called the Johnsons to give them the good news.

Sam, who was understandably discouraged by the prospect of having to stay in an unfamiliar place far away from his friends, was excited to learn what Billy's father had arranged. He had flown on an airliner before, but never in a business jet!

The next morning, rather than drive two hours to the airline terminal, the Johnsons only had to travel a few miles to the local airport where the Excellent Electrical Engineering airplane was based. When the family arrived at the hangar, they were

greeted warmly by the entire flight department, including Mr. Finley, Ms. Alexander, pilots Ms. Chase and Mr. Ryan, as well as Ms. Peters, the aircraft mechanic, who showed Sam around while the pilots prepared for takeoff.

Within minutes, the Johnsons were on their way to Milwaukee, seated comfortably in the back of the airplane, while the business people worked together at a table toward the front.

Impressed by the speed and power of the business jet, Sam excitedly peered out the window as the aircraft lifted off the runway and began climbing skyward. Sam's mom, noticing how her boy's spirits had been raised by traveling on the company airplane, turned to Sam's dad and said, "I think he is going to be alright."



Wilbur and Orville Wright

## DID YOU KNOW?

ORVILLE AND WILBUR WRIGHT FLEW THE FIRST POWERED FLIGHT ON DECEMBER 17, 1903, IN KILL DEVIL HILLS (KITTY HAWK), NORTH CAROLINA. IT LASTED 12 SECONDS AND FLEW 37 METERS.



## DID YOU KNOW?

THE WRIGHT BROTHERS OWNED A BIKE SHOP IN DAYTON, OHIO.

# Getting It There Fast

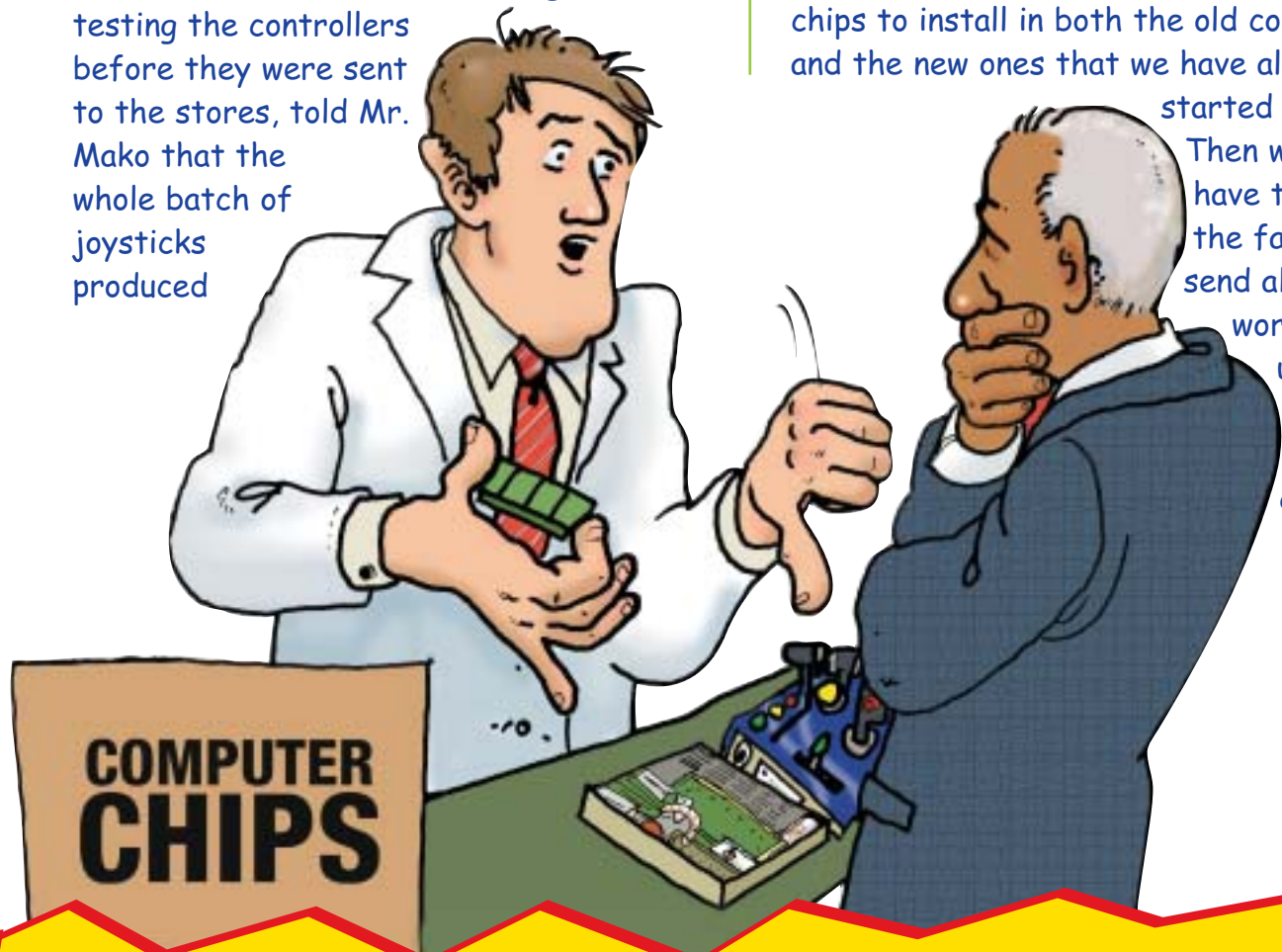
For John Mako, the factory manager at Gargantuan Games, it was the best of times and the worst of times. Toy and electronics stores had ordered more of the company's latest video-game controller than anyone had expected. The Gargantuan Games factory near Phoenix, Arizona, was working around the clock, six days a week, to build enough of the advanced joysticks so that all of the children who expected to receive them as presents during the holidays would be happy.

But then, one Saturday afternoon, Mr. Mako discovered he had a big problem. Freddie Wilson, the man in charge of testing the controllers before they were sent to the stores, told Mr. Mako that the whole batch of joysticks produced

that week did not work properly because of a bad computer chip.

Mr. Wilson immediately called the company that made the chips, Cielo Computer, and asked how fast replacements could be sent to Gargantuan Games. But the chip maker, which already had been building the parts as fast as possible, did not have any chips in stock, and the Cielo Computer plant was not going to be able to build any more until Monday.

Mr. Mako told Mr. Wilson, "We need to find another supplier of computer chips fast! If we don't, we will soon run out of chips to install in both the old controllers and the new ones that we have already started making. Then we will have to close the factory and send all the workers home until we can get some new chips."

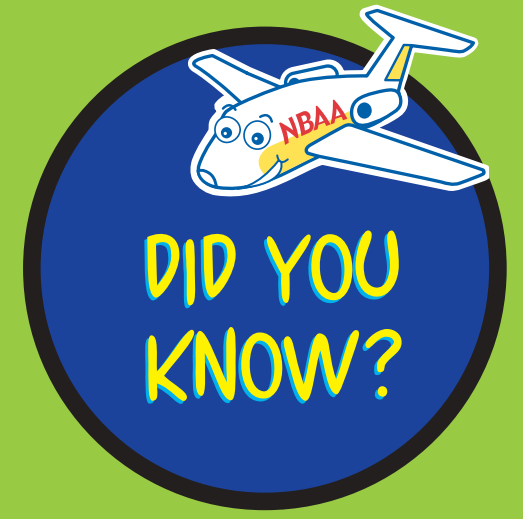


Mr. Wilson rushed back to his desk, sat down at his computer and began to search the Internet for a computer parts maker that could build the kind of chip needed for Gargantuan's controller. He found one — Singapore Super Semiconductors. But the company was in Asia, halfway around the world, and Freddie was not sure that a supplier located so far from Arizona could send the parts quickly enough to prevent the Gargantuan Games factory from shutting down.

Still hopeful that Singapore Super Semiconductors could help, Mr. Wilson quickly sent Mr. Chen, the

manager of the Asian chip making plant, an e-mail explaining Gargantuan's problem. Then both Mr. Wilson and Mr. Mako anxiously waited for a reply.

It took several hours for Mr. Chen of Singapore Super Semiconductors to answer Mr. Wilson's e-mail, but the news was good. His company not only had the exact chip that Gargantuan needed; a large batch of them was stored in a warehouse near Little Rock, Arkansas.



**I**N 1949, A DOUGLAS DC-4 BECAME THE FIRST BUSINESS AIRCRAFT TO FLY AROUND THE WORLD.

**T**HE FIRST AIRPLANE DESIGNED SPECIFICALLY FOR BUSINESS AVIATION WAS THE GULFSTREAM I, WHICH FIRST FLEW IN 1958.



Freddie Wilson immediately told Mr. Chen that he wanted to buy that entire batch of chips. But he realized it was too late in the day on Saturday for the people at the warehouse in Arkansas to ship the chips using an overnight delivery service. Gargantuan Games would have to wait for the chips to be sent on Monday, which meant that they would not arrive in Arizona until Tuesday, which would cost

Gargantuan Games time and money. After thinking a moment, Mr. Mako said, "Wait, I have a better idea. Let's call Don Smith, our flight department manager, and see if he could send the company airplane to pick up the chips. It would only take the plane several hours to fly there and back, and we could have the chips here in time to restart our production line on Monday." It was Saturday afternoon and since the



## DID YOU KNOW?

**B**USINESS AIRCRAFT HAVE ACCESS TO APPROXIMATELY 5,400 AIRPORTS IN THE UNITED STATES, COMPARED TO THE NEARLY 580 SERVED BY THE AIRLINES.

company airplane was not being used, Mr. Smith called Gargantuan's two pilots, Ms. McAllister and Mr. Brown, and told them to prepare to fly to Arkansas. By the end of the day, the chips were delivered to Arizona.

On Monday morning, John Mako looked out at the factory floor and was relieved to see the Gargantuan plant once again building controllers at full speed. He told Mr. Wilson, "Our company airplane really saved the day."



## DID YOU KNOW?

**A**IRPLANES ARE CALLED "FIXED WING" AND HELICOPTERS ARE CALLED "ROTARY WING" BECAUSE THE ROTARY WINGS MOVE.

# The Flying Office Around the World

The jungle cat T-shirts made by the Wildlife Clothing Company of California were so popular that the managers of the company decided to build a second factory so they could produce more of their new T-shirts. The Wildlife Clothing people used their business jet to visit different cities where they thought they might build the factory.

Finally, the Wildlife Clothing Company people hired the Red Clay Construction Company to build a new factory in Texas. The clothing people wanted to make sure that the factory was being built quickly so they could start making T-shirts as soon as possible. So they decided to check on the progress of the construction by visiting the building site twice a week.

The Wildlife Clothing Company's business jet would take off from California every Tuesday and Friday at eight o'clock in the morning and fly two hours, arriving in Texas by 10 o'clock and returning to California after lunch. These "corporate shuttle" flights were almost like flying on an airline, because they would leave and return at the same time each day.



**DID YOU KNOW?**

**OCTOBER 7, 1963 - THE FIRST FLIGHT OF THE MOST WELL-KNOWN BUSINESS JET, THE LEAR JET (MODEL 23).**





The passengers on each of these regularly scheduled corporate shuttle flights between California and Texas were the Wildlife Clothing Company of California president and vice president, the manager of the new plant and a team of engineers from the Red Clay Construction Company. They would spend an hour walking around the construction site watching bulldozers moving earth, trucks carting large loads of dirt away and cement mixers pouring concrete. Then they would talk to the people who were building the new plant to make sure that everything was going according to plan.

After eating lunch, the Wildlife Clothing Company people and the engineers would board the business jet and fly back to California in enough time to stop by their offices and then drive home in time for dinner with their families.



A few months later, when construction of the new factory was almost finished, other passengers

would fly on the Tuesday and Friday shuttle flights.

Wildlife Clothing Company people who were in charge of setting up the T-shirt making machines and hiring workers for the new plant would fly to Texas to get the factory ready to produce the jungle cat T-shirts.

Even after the factory began producing the jungle cat T-shirts, the shuttle flights continued. Twice a month, the president and vice president of the Wildlife Clothing Company would fly to the factory to visit the plant manager and talk to the workers. Sometimes the shuttle flights would bring new fabric samples or replacement parts for the T-shirt-making machines. The Red Clay Construction engineers also flew on the shuttle from time to time so they could show their other customers how well-built the Texas plant was.

## DID YOU KNOW?

DECEMBER 17, 1949 - THE FIRST ROUND-THE-WORLD FLIGHT BY A BUSINESS AIRCRAFT.

# Your Ride to Work



Zachary Paulson had loved roller coasters ever since he first visited an amusement park when he was seven years old, and he dreamed that when he grew up he would be able to design his own thrill ride.

After working a few years as an engineer for a builder of steel railroad bridges, Mr. Paulson decided to follow his dream and start his own company called Wild Rides, which quickly became famous for building some of the biggest and best roller coasters anywhere. So when some people in Japan decided to create a new amusement park there, they asked Zachary Paulson's company to construct the largest roller coaster in the world for them.



The first time that Mr. Paulson and his team of engineers and construction experts traveled to Japan from their hometown of Salem, Oregon, they flew on an airliner from Salem to Los Angeles, California and then had to change planes in Los Angeles for the long flight over the Pacific Ocean to Japan. It took more than a day to get there, and by the time the people from Wild Rides arrived, they had to rest overnight before going to work.

Zachary Paulson knew that he and his people would have to make many trips between Oregon and Japan during the two

years it would take to plan and build the giant roller coaster, so he promised that he would find an easier way to make the long international trip. Mr. Paulson decided that chartering a long-range business aircraft was the best answer.

Every time that the people from Wild Rides needed to travel to Japan to meet with the amusement park people

and check on the progress of the roller coaster project, Mr. Paulson made arrangements to have a private aircraft pick them up right in Salem at exactly the time the passengers wanted to go. Because the long-range business jet could fly 14 hours without stopping, the Wild Rides people did not have to change planes, so the trip was several hours shorter than if they had traveled by airline. Also, when the Wild Rides people were ready to go home, the business jet was standing by ready to fly back to Oregon.

## DID YOU KNOW?

SOME JETS CAN FLY AT 51,000 FEET ABOVE SEA LEVEL; THAT'S OVER 6 MILES HIGH.



More importantly, because the engineers and construction people had the business aircraft all to themselves, they could use the time in the air to work on their own or talk with the other passengers about the Japanese roller coaster project without being interrupted. If the Wild Rides people needed to ask the Japanese amusement park people a question while they were flying, the passengers could communicate directly with them because the airplane had a fax machine, phone and computer with Internet and e-mail connections right in the aircraft cabin.

The Wild Rides people also were able to eat what they wanted, when they wanted

because the airplane had been stocked with their favorite foods, and a flight attendant was on board to prepare meals and snacks for them. Because the large business jet had a separate sleeping area, some of the passengers could sleep while others worked in the main cabin. That meant they were rested and ready to work once they arrived in Japan.

After taking just one trip on the business jet between Oregon and Japan, Mr. Paulson realized how efficient business aviation could be and how it helped his people be most productive.



## DID YOU KNOW? .....

**MAY 21, 1927 - CHARLES LINDBERGH FLEW NONSTOP FROM NEW YORK TO PARIS. THE TRIP WAS ABOUT 1,000 MILES AND TOOK HIM 33 AND ONE HALF HOURS TO COMPLETE.**

# AvKids Aviation Careers

## Flight Department Manager

— The leader of the group of people who fly, maintain, schedule and service the company aircraft. This person is someone who has a college or advanced degree and a lot of experience working in the flight department as either a pilot or maintenance technician or has managed another group of people within the company.



**Business Pilot** — The person who actually flies the aircraft. After being taught how to handle a small airplane, they receive a license and then must spend many more hours learning to fly larger and larger airplanes until they are qualified to fly the kind of airplane operated by the company. After they get a

job flying for a company, pilots must continue to take training one or more times a year to keep their skills sharp.

## Mechanic/Maintenance Technician

— The person who makes sure that all parts of the airplane are working correctly and fixes the aircraft when something on it is broken. These people usually go to a college or other school that specializes in aviation training. After they finish school, they receive a license showing that they are qualified to care for aircraft. Even after they get a job maintaining a company aircraft, mechanics must continue to take training one or more times a year to keep their skills sharp and learn new and improved ways of caring for aircraft.

## Scheduler/Dispatcher

— The person who makes sure that the airplane is available for passengers when they need to travel. A scheduler/dispatcher must check with the mechanics to see that all parts of the

airplane are working, tell the pilots when they need to come to the airport to fly the airplane, then notify the passengers that their flight is confirmed. Dispatchers must earn a license, while schedulers do not have to.

## Flight Attendant

— The person who flies on the airplane along with the passengers and is in charge of preparing their meals and keeping them safe in case of emergencies.

**Line Service** — These people put gas in the airplane, wash it and perform other tasks to help the mechanics make sure the aircraft is ready to fly.



# The 4 Forces of Flight

An aircraft in straight and level flight is acted upon by **four forces: drag, gravity, lift, and thrust.** The opposing forces balance each other; lift equals gravity and thrust equals drag.

Any inequality between thrust and drag, while maintaining straight and level flight, will result in acceleration or deceleration until the two forces again become balanced.

## **DRAG:**

The air resistance that tends to slow the forward movement of an airplane.

## **GRAVITY:**

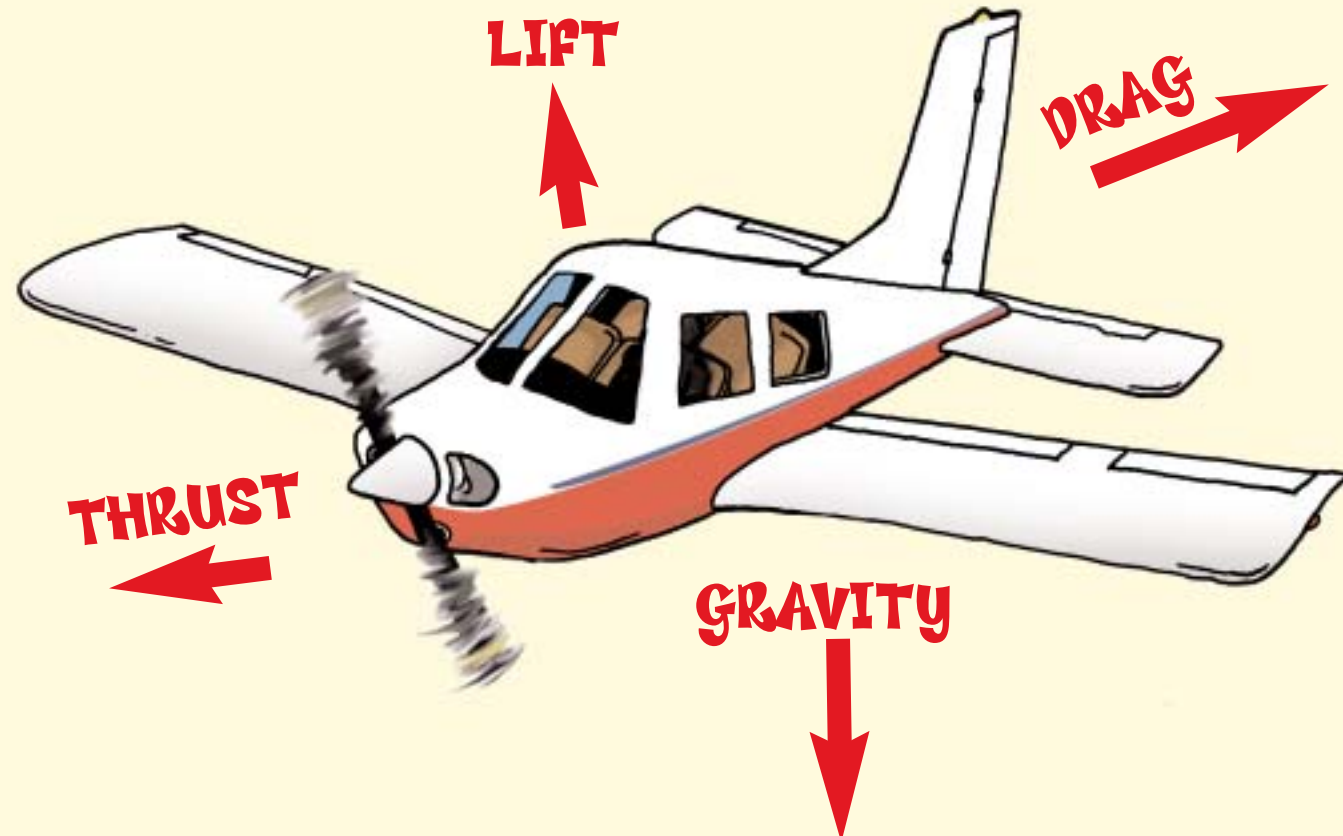
The force that pulls all objects towards the earth.

## **LIFT:**

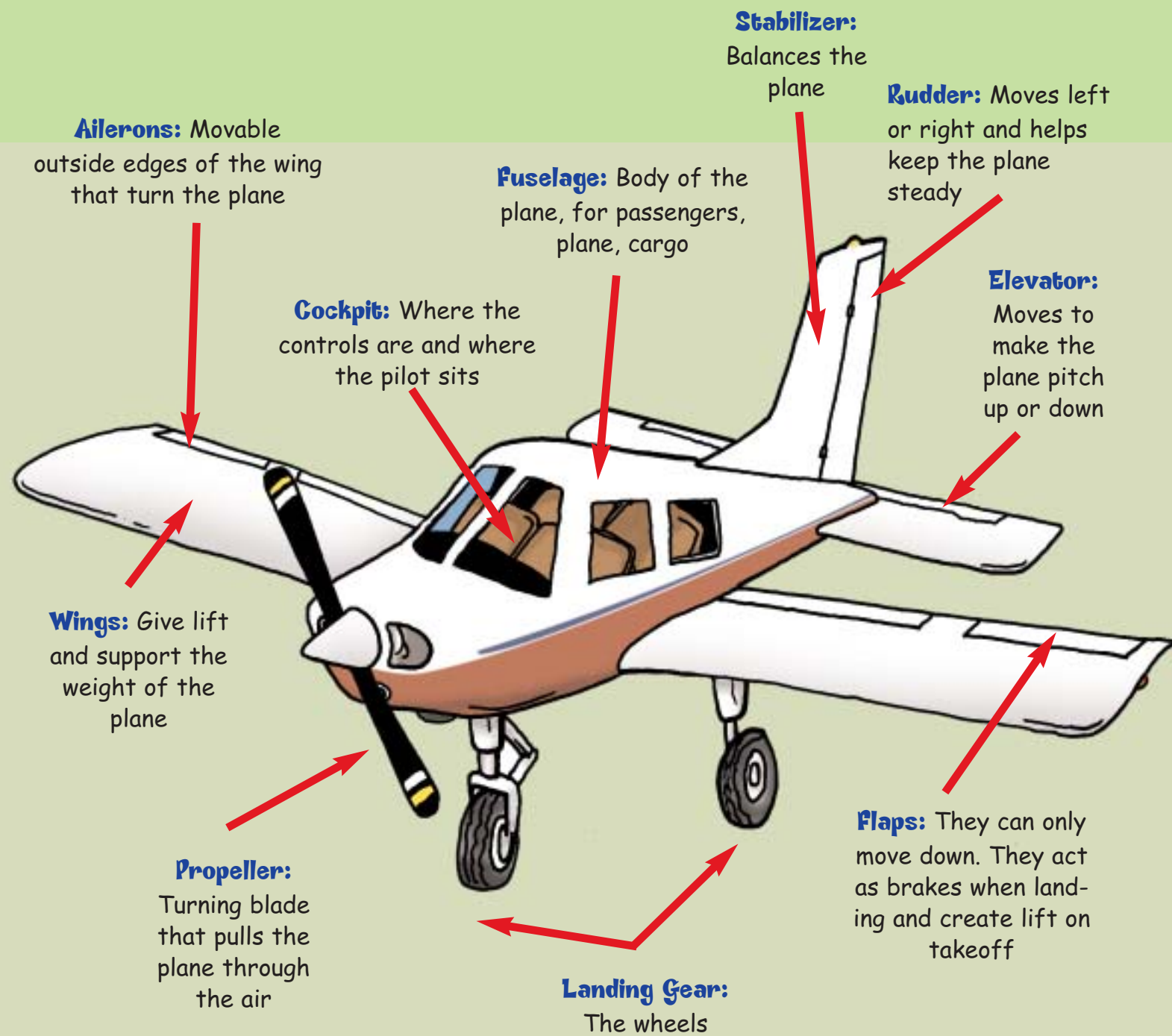
The upward force that is created by the movement of air above and below a wing. Air flows faster above the wing and slower below the wing, creating a difference in pressure that tends to keep an airplane flying.

## **THRUST:**

The force that moves a plane forward through the air. Thrust is created by a propeller or a jet engine.



# 10 Main Parts of a Plane





# AvKids Aviation Terms

**aerobatics** — spectacular stunts, such as rolls and loops, performed in general aviation aircraft specially designed to withstand the stresses of such maneuvers.

**aerodynamics** — forces, such as resistance, pressure and velocity, that affect the movement of air around moving objects, such as aircraft.

**aeronautical charts** — maps of the airspace designed to help pilots navigate.

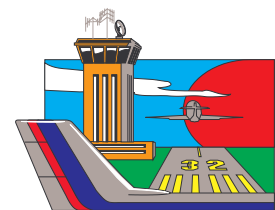
**ailerons** — moveable aircraft control surfaces located near the end of the wing which are used to make an aircraft bank or roll.

**aircraft** — any man-made object that flies, including airplanes, blimps and helicopters.

**airfoil** — any surface designed to provide lift from the air through which it moves, including wings, control surfaces and propeller blades.

**airframe** — the structure of the aircraft, not including the powerplant or engine.

**airline** — a company that is in the business of providing scheduled transportation.



**airport** — a field from which aircraft land and take off.

**airspace** — the part of the atmosphere above a particular land area.

**airspeed** — the speed of an aircraft relative to the air.

**air taxi** — a company that provides on-demand (instead of scheduled) commercial air transportation.



**air traffic control (ATC)** — the system of ground-based facilities that coordinates the movement of aircraft by tracking their progress using radar and communicating with pilots via radio.

**air traffic controller** — a person who communicates with a pilot, usually by radio, directing the movement of aircraft, especially close to an airport.

**airways** — highways in the sky.

**altimeter** — a device that measures changes in air pressure to calculate how high an aircraft is flying.

**altitude** — the height that an aircraft is flying above the ground, usually expressed in the number of feet above sea level.

**anti-icing** — a substance applied to the exterior of an aircraft before flight to prevent the formation of ice, which can impair the ability of an aircraft to fly. Also, a system that is used on board an aircraft to prevent the formation of ice on the wings, propellers, engine inlets and control surfaces.

**approach** — the phase of flight in which an aircraft has started its descent toward its destination airport.

**attitude** — the position of an aircraft in relation to the earth's horizon.

**autopilot** — short for "automatic pilot," this is a control system that keeps an aircraft on a set course or speed so that the pilot does not have to steer or add power to the aircraft. Autopilots are most often used during the level, cruising portion of a flight.

**aviator** — a person trained and qualified to fly an aircraft; a pilot.

**avionics** — short for "aviation electronics," any electronic system used on an aircraft, primarily for navigation and communication.

**bank** — to tilt an aircraft laterally and inwardly during forward flight.

**business aircraft** — a general aviation aircraft used to support a business.

**business aviation** — the use of general aviation aircraft to support a business. These activities can range from individuals who fly rented, single-engine, piston-powered airplanes to companies that have flight departments that operate fleets of jet airplanes and helicopters.

**business jet** — a jet-powered general aviation aircraft that is used to support a company's business.

**captain** — the pilot in command or aviator in charge of the flight, who usually sits in the left seat of the cockpit.

**ceiling** — The highest altitude from which the ground is still visible in a particular weather condition.

**checklist** — a written list of procedures used by pilots to ensure that all the items that need to be accomplished during a flight are actually performed.

**clearance** — permission granted by an air traffic controller that allows a pilot to taxi, land or take off an aircraft.

**certification** — official approval granted by a government agency qualifying a pilot or aircraft to fly.



**cockpit** — the forward compartment of an aircraft where the pilots sit.

**cockpit voice recorder** — an audio system that records all the sounds made in the cockpit. Enclosed in a crash-proof container, this "black box" is used by accident investigators to help determine why an aircraft crashed.

**collision avoidance system** — a device that can detect when one aircraft might be flying too close to another and tells a pilot which direction to turn in order to avoid a collision.

**compass** — a magnetic device that helps determine the direction an aircraft is flying.

**control surfaces** — moveable parts of the aircraft's wing and tail (or empennage) that are used to make an aircraft climb, descend or turn.



**control tower** — the building from which air traffic controllers direct the movement of aircraft on and around an airport.

**copilot** — a second pilot, who usually sits in the right seat of the cockpit assisting the captain (or pilot in command), who usually sits in the left seat of the cockpit.



**corporate aircraft** — a general aviation aircraft used to support a corporation's business activities.

**corporate aviation** — often used interchangeably with the term "business aviation," this refers to the use of general aviation aircraft to support corporate business. Most corporations have flight departments that operate just one airplane, but some large corporations fly and maintain fleets of airplanes and helicopters.

**cowling** — a removable cover or housing placed around a section of the aircraft, usually an engine.

**crosswind** — any wind that blows across the intended course of an aircraft, causing it to drift off course.

**cruising speed** — a steady, moderate speed considered optimum for long-range flight.

**deicing** — a system or substance that removes ice that has formed on an airborne aircraft.

**downwind** — moving in the same direction as the wind is blowing.

**drag** — the air resistance encountered as an aircraft tries to move forward.

**elevator** — the control surface located on the horizontal tail of an aircraft that, when moved by the pilot, makes the airplane climb or descend.

**empennage** — the rear portion or tail of the aircraft.

**empty weight** — the weight of the aircraft alone, not including fuel, passengers or baggage.

**enroute** — on or along the way.

**Federal Aviation Administration (FAA)** — The U.S. government agency that establishes and enforces rules for aviation.

**fixed base operator (FBO)** — an airport-based fueling and service center for aircraft, similar to a gas station for cars.

**flaps** — devices located on the trailing or rearward portion of the wing that can be extended to increase lift and drag, especially during takeoff or landing.



**Flight attendant** —

a person whose job is to help ensure the safety and comfort of aircraft passengers by providing meals, beverages and instructions on what to do in case of an emergency.

**flight data recorder** — a system that records the airspeed, altitude, heading and other operating characteristics of an aircraft in flight. Enclosed in a crash-proof container, this "black box" is used by accident investigators to help determine why an aircraft crashed.

**flight department** — the organization within a company that is responsible for flying and maintaining aircraft. People who work in a flight department can include pilots, maintenance technicians, schedulers/dispatchers and flight attendants.

**flight manual** — a guide issued by an aircraft manufacturer that contains official information regarding the speed, operating limits and other essential guidelines for safely operating an aircraft.

**flight plan** — a formal document that describes the intended course of a planned flight.

**flight service station (FSS)** — an official aviation information center that pilots use to obtain up-to-date information on weather and airport conditions before beginning a flight.

**fuselage** — the body of an airplane to which the wing, tail and landing gear are attached.

**general aviation** — all flying activities other than commercial (airline) and military aviation. General aviation aircraft, which include everything from two-seat training airplanes to intercontinental business jets, can fly to about 10 times the number of airports that airliners can.

**General Aviation Manufacturers Association (GAMA)** — a Washington, D.C.-based national trade association that represents U.S. manufacturers of general aviation aircraft and parts.

**glide slope** — the part of an instrument landing system that provides a radio beam so that the pilot can follow a standard descent path to land at an airport.

**gross weight** — the maximum weight than an aircraft is designed to carry when taking off.

**hangar** — an airport building specially designed to house an aircraft.

**heading** — the course or direction in which an aircraft is moving, generally expressed in degrees of a circle (from zero to 360).

**headwind** — a wind blowing directly against the course of an aircraft.

**helicopter** — a type of aircraft that uses a rotor or propeller mounted on top of the fuselage to take off and land vertically, which allows it to operate without using a runway or airport.



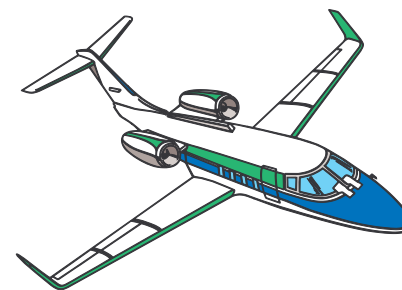
**helipad or heliport** — a small structure or paved area that is used by helicopters to take off and land vertically.

**holding pattern** — to fly in a circle until an air traffic controller clears a pilot to proceed toward his destination.

**instrument flight rules (IFR)** — the regulations for flying an aircraft when clouds, fog or other weather conditions make it difficult or impossible to fly by sight alone.

**instrument landing system (ILS)** — electronic navigation equipment that uses a radio beam to guide pilots of descending aircraft along a standard path so they can land on a runway.

**instrument panel** — the section of the cockpit located in front of the pilot that houses all the instruments, gauges and indicators that tell the pilot important information, such as airspeed, altitude and heading. The instrument panel is similar to an automobile dashboard.



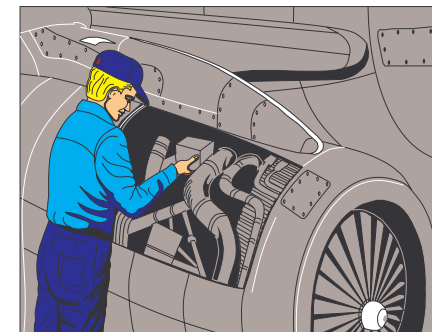
**jet** — a type of aircraft powerplant that uses a turbine, which increases the flow of air through an engine, for power.

**knot** — a unit of aviation speed that equals one nautical mile per hour, which is equivalent to 1.151 miles per hour.

**landing gear** — a system of wheels, floats or skis that are used to support an aircraft when it is on the ground or in the water. Landing gears either are "fixed" (permanently extended) or "retractable" (which means that they are pulled back inside the fuselage or wings of the aircraft once it becomes airborne).

**lift** — the aerodynamic force that tends to keep an aircraft in the air.

**logbook** — a book that contains a record of flights made by a pilot or maintenance procedures performed on an aircraft during its lifetime.



**maintenance technician** — a person who is trained and certified to maintain or repair an aircraft.

**multiengine** — an aircraft that has more than one engine.

**nacelle** — the streamlined housing that encloses the engine.

**N number or tail number** — the "license plate" of an aircraft that contains a series of numbers and/or letters that are painted on the fuselage near the tail of an aircraft. All aircraft registered in the United States have registration numbers that begin with the letter "N."

**National Business Aviation Association (NBAA)** — a Washington, D.C.-based national trade association that is dedicated to enhancing the safety, efficiency and acceptance of business aviation. NBAA's membership includes more than 7,500 companies that are involved in flying general aviation aircraft for business purposes.

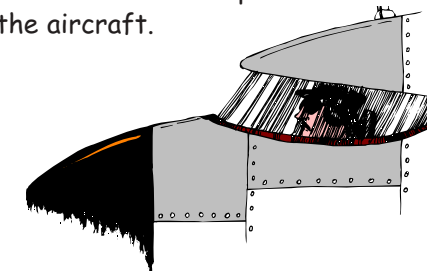
**National Transportation Safety Board (NTSB)** — the agency of the U.S. government that is responsible for investigating aircraft accidents.

**nautical mile** — the standard unit of distance used in aviation. It equals 6,080 feet or 1.151 miles.

**navaids** — a shortened form of the words "navigational aids." It refers to any system or device used to help guide a pilot while flying an aircraft.

**navcom** — a shortened form of the words "navigation-communication." It refers to any piece of aircraft equipment used by the pilot for navigation or communication purposes.

**nose** — the front portion of the aircraft.



**notice to airmen (NOTAM)** — special announcement used to alert pilots of unusual conditions around an airport.

**oxygen mask** — a small face mask that is connected to a canister of oxygen. This system is used by each person on board an aircraft in case there is a malfunction in the aircraft's pressurization system, which normally supplies air to breathe at high altitudes.

**payload** — the total weight of passengers and cargo that an aircraft carries or can carry.



**pilot** — a person trained and certified to fly an aircraft; an aviator.

**pilot in command** —

the captain or aviator in charge of the flight, who usually sits in the left seat of the cockpit.

**pitch, roll and yaw** — terms used to describe the three-dimensional movement of an aircraft. Pitch is the rotation of an airplane around its lateral axis. Roll is the motion of an aircraft around its longitudinal axis. Yaw is the movement of an airplane around its vertical axis.

**powerplant** — an engine used to power an aircraft. There are four basic types of powerplants: a piston engine, which is similar to the engine used in a car, turns a propeller, which propels an aircraft by pulling the air over the wings. A jet engine uses a turbine to accelerate the flow of air without using a propeller. A turboprop uses a jet engine combined with a propeller. A turboshaft engine uses a jet engine and a rotor (or horizontally mounted propeller) to lift a helicopter and allow it to take off and land vertically.

**preflight** — the testing procedure a pilot uses before flying to ensure that an aircraft's equipment and systems are working properly.

**propeller** — a rotating airfoil with two, three or four blades that is used to move an airplane forward.

**pressurization** — a system designed to maintain normal air pressure in an aircraft at higher altitudes, where the air is too thin to allow proper breathing.



**radar** — a shortened form of the words "radio detection and ranging." Radar is a system that uses electronic pulses to measure how far away an object is. The distance is measured by timing how long it takes for the pulses to be transmitted from an airplane or ground facility and reflect or bounce off an object and return to their source. Airborne radar is used by pilots to detect thunderstorms and other severe weather, while ground-based radar is used by air traffic controllers to track the direction and speed of aircraft.

**ramp** — the paved area, usually located next to a hangar, where aircraft can be loaded, unloaded or parked.

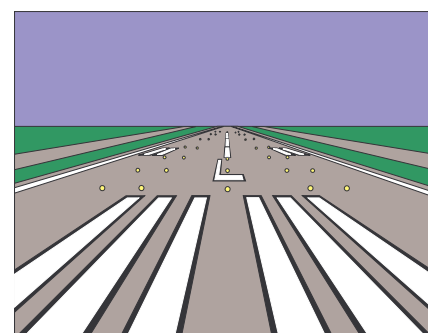
**range** — the maximum distance an aircraft can fly without being refueled.

**rivet** — a small metal pin that is used to attach the various sheet metal parts of an aircraft.

**rotorcraft** — an aircraft that uses rotors; a helicopter.

**rudder** — the movable vertical portion of the tail (or empennage) that is used to control the yawing movement of an aircraft.

**run-up** — the process of increasing the power of an aircraft engine before takeoff to check and see that the powerplant and propeller are operating properly.



**runway** — a strip of level, usually paved ground on which aircraft take off and land.

**scheduler/dispatcher** — a member of the flight department who is responsible for making all the non-mechanical arrangements — such as obtaining permits — to prepare an aircraft for a flight. They also make and maintain lists of the times that an aircraft is supposed to depart, arrive and be serviced.

**simulator** — a mechanical device that resembles a cockpit and is used by pilots to learn and practice flight maneuvers while on the ground.

**skin** — the outer covering of an aircraft, usually made of sheet metal, but also can be fabric or wood, especially on older airplanes.

**spin** — a maneuver in which the aircraft, after experiencing an aerodynamic stall, descends with its nose pointing toward the ground while turning rapidly around its vertical axis.

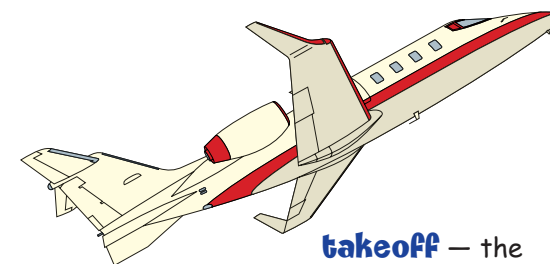
**stabilizer** — a fixed (non-movable) horizontal or vertical part of the tail that keeps the aircraft stable as it flies.

**stall** — an aerodynamic condition in which the smooth flow of air over a wing or other airfoil is disrupted, thus decreasing the amount of lift produced and causing the aircraft to cease flying.

**stick** — the control and steering wheel of an airplane, sometimes called the "yoke."

**tail** — the rear-most part of an aircraft fuselage.

**tailwind** — a wind that is blowing from behind an aircraft, helping it fly faster.



**takeoff** — the point in a flight when the aircraft leaves the ground or runway and becomes airborne.

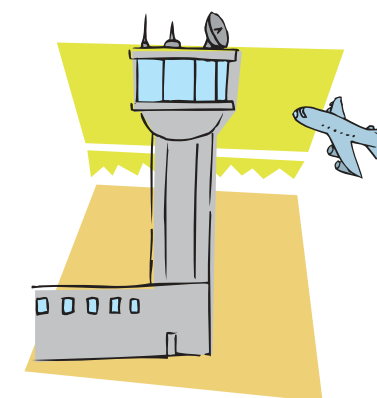
**taxi** — to move an aircraft slowly on the ground or on the surface of the water before takeoff or after landing.

**taxiway** — a paved strip on the airport that leads from the ramp to the runway.

**throttle** — the cockpit lever that increases engine power, allowing an aircraft to take off or accelerate if it is already airborne.

**thrust** — the forward force developed in a jet engine as a reaction to the high-velocity rearward ejection of exhaust gases.

**touchdown** — the moment when the wheels of a landing aircraft touch the surface of a runway.



**traffic pattern** — a low-altitude course, usually an oval, around an airport that airplanes must follow in order to ensure the safe flow of aircraft to the runway.

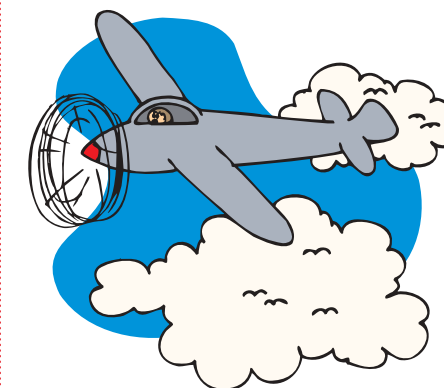
**transponder** — a transmitter-receiver that sends a unique, coded signal to ground radars, thus allowing air traffic controllers to identify and track individual aircraft.

**trim** — a device that allows the pilot to adjust the attitude of the aircraft without having to constantly move the elevators.

**turbulence** — a disturbance or uneven flow of air that causes an aircraft to bounce in flight.

**upwind** — flying an aircraft in the opposite direction the wind is blowing.

**vector** — a heading given to a pilot by an air traffic controller via a radio communication.



**visibility** — the distance that one can see clearly in the air.

**visual flight rules** — the regulations for flying an aircraft in clear weather by sight alone.

**waypoint** — a reference point in the airspace used for navigational purposes.

**weather briefing** — the official forecast information that a pilot gets from a flight service station before departing on a flight.

**weight and balance** — the mathematical calculations done to determine if the cargo and/or passengers aboard an aircraft are loaded properly.

**wing** — the large airfoils that extend out from either side of the middle of an airplane's fuselage to provide the lift needed to fly.

**yoke** — the control and steering wheel of an airplane, sometimes called the "stick."



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