The Student Pilot's Flight Manual

From First Flight to Pilot Certificate

Based on the original text by
William K. Kershner

11th Edition • Edited by William C. Kershner

PRIVATE AND SPORT PILOTS

William K. Kershner began flying in 1945 at the age of fifteen, washing and propping airplanes to earn flying time. By this method he obtained the private, then the commercial and flight instructor certificates, becoming a flight instructor at nineteen. He spent four years as a naval aviator, most of the time as a pilot in a night fighter squadron, both shore and carrier based. He flew nearly three years as a corporation pilot and for four years worked for Piper Aircraft Corporation, demonstrating airplanes to the military, doing experimental flight-testing, and acting as special assistant to William T. Piper, Sr., president of the company. Bill Kershner held a degree in technical journalism from Iowa State University. While at the university he took courses in aerodynamics, performance, and stability and control. He held the airline transport pilot, commercial, and flight and ground instructor certificates and flew airplanes ranging from 40-hp Cubs to jet fighters. He is the author of *The Student Pilot's Flight Manual, The Instrument Flight Manual, The Advanced Pilot's Flight Manual, The Flight Instructor's Manual,* and *The Basic Aerobatic Manual*. Kershner operated an aerobatics school in Sewanee, Tennessee using a Cessna 152 Aerobat. He received the General Aviation Flight Instructor of the Year Award, 1992, at the state, regional and national levels. The Ninety-Nines awarded him the 1994 Award of Merit. In 1998 he was inducted into the Flight Instructor Hall of Fame, in 2002 was installed in the Tennessee Aviation Hall of Fame, and in 2007 was inducted into the International Aerobatic Club Hall of Fame. William K. Kershner died January 8th, 2007.

Editor William C. Kershner received his early flight training from his father, William K. Kershner. He holds Commercial, Flight Instructor and Airline Transport Pilot certificates and has flown 22 types of airplanes, ranging in size from Cessna 150s to Boeing 777s, in his 15,000+ flight hours. He works as an airline pilot and lives with his wife and two sons near Sewanee, Tennessee.

The Student Pilot's Flight Manual: from first flight to pilot certificate
William K. Kershner
Illustrated by the Author

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Cover photo: William K. Kershner flies his Cessna 152 Aerobat, N7557L, near his home of Sewanee, Tennessee. This photo was taken by Mike Fizer on March 14th, 2000 for the 2001 AOPA calendar. Dad had over 7,000 separate spins of between 3 and 25 turns in his 22 years teaching aerobatics in this airplane. Two months after his death in January 2007, my son, Jim, and I were honored to deliver 57L to Dulles International Airport for display at the National Air and Space Museum's Steven F. Udvar-Hazy Center. —*William C. Kershner*
Photo credits: Front cover, courtesy of AOPA; photo under Dedication, page v, and Chapter 24 cross-country photos, courtesy of Elizabeth Motlow; start of Part 1 "Before the Flight," Adam Korzekwa/istockphoto; start of Part 2 "Presolo," George Jurasek/istockphoto; start of Part 3 "Postsolo Maneuvers" and Part 6 "Syllabus," Ken Babione/istockphoto; start of Part 4 "Cross Country and Night Flying," photo © Smithsonian Institution, used with permission of National Air and Space Museum; start of Part 5 "The Knowledge and Practical (Flight) Tests," skyf/fotolia.

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Dedication

The 11th Edition of the *Student Pilot's Flight Manual* is dedicated to my parents:

Elizabeth Ann Deyo Kershner 1933-2009

William K. Kershner 1929-2007

Acknowledgments for the Eleventh Edition

Thanks go to my wife Donna for her help and encouragement.

My editors at ASA continued to offer great patience and invaluable advice for this new edition. Donna Webster, designated pilot examiner, helped me get a grasp on the new FAA "Airman Certification Standards."

And my special thanks again go to flight instructor Genie Rae O'Kelley for her help with my aviation career and the careers of so many others.

The acknowledgments for the 1st through 10th Editions are found in the back of the book with the Bibliography.

Preface to the Eleventh Edition

This book is written to cover the fundamentals of lightplane flying, and emphasizes flying skills and knowledge that will cover a wide range of airplane types and sizes. For instance, crosswind landing techniques effective in a Cessna 152 can also work well in a Boeing 777 or Bandeirante turbo prop. And although technology has changed dramatically over the years, the basics of flying and good judgment have not.

This manual is not intended to just help the reader "squeak by" the FAA knowledge (written) test and practical test (flight test or checkride), but to lay a foundation of solid knowledge for use in the everyday process of learning to fly airplanes. Even after thousands of hours in the air, most pilots still learn something on every flight.

The flight maneuvers are written in the probable order of introduction to the student. The spin is included to give the student pilot an idea of what the maneuver entails and the dangers involved in an inadvertent low-altitude spin.

Although this book was originally written for the individual working toward the private pilot certificate, ASEL (airplane, single-engine, land), it includes all the information necessary for the slightly more restrictive sport or recreational pilot certificates. For example, the sport pilot applicant will not require training in emergency instrument flight (Chapter 15) or night flying (Chapter 26). The already certificated pilot can use this book in preparing for the Flight Review (14 CFR 61.56—required every 24 months). Referencing Chapters 27 and 28, along with a review of 14 CFR Parts 61 and 91, will bring the pilot back up to speed on subjects perhaps not touched on in awhile.

You'll notice that technology is not front-and-center in this manual. Although you'll be responsible for basic knowledge of any installed navigation systems, the practical test continues to focus on the basic skills of flying: controlling the airplane, using good judgment in choosing a course of action, and basic navigation using landmarks and a chart. The FAA's "Airman Certification Standards" (FAA-S-AC-8) is the detailed guide for the "checkride," containing a welcome emphasis on risk management, identifying the hazards to a particular flight, and minimizing them.

This manual is, of necessity, written in general terms, as seen in the (often changing) areas of information and weather services. Because airplanes vary from type to type in the use of flaps, carburetor heat, spin recovery and other procedures, the *Pilot's Operating Handbook* or equivalent source is the final guide for operation of your specific trainer. Of course, all of the performance and navigation charts in this text are for reference and example only.

Pilots should have ready access to a few other important resources. I have found the bare minimum to be the *Aeronautical Information Manual* (AIM), Federal Aviation Regulations (Title 14 of the Code of Federal Regulations), *Aviation Weather Services* (FAA Advisory Circular 00-45), and *Aviation Weather* (AC 00-6A). The *Advanced Pilot's Flight Manual* (Kershner) is a good source for more detail on aerodynamics and for transition to more complex airplane types.

I will welcome any feedback offered on the 11th Edition of *The Student Pilot's Flight Manual*. Please contact me through ASA (email: feedback@asa2fly.com).

Flying is one of mankind's most rewarding and challenging endeavors. Every flight is different and most experienced pilots can tell of wonders they've seen that no ground-bound person will ever know.

William C. Kershner
Sewanee, Tennessee

1

Starting to Fly

There are many reasons why people want to start flying. Maybe you are a younger person who wants to make it a lifetime career or maybe you are a slightly more senior citizen who always wanted to fly but until now haven't had the money. Whether a man or woman, young or old, you still may have a few butterflies in your stomach while worrying about how you will like it or whether you can do it. That's a natural reaction.

What can you expect as you go through the private pilot training course? You can expect to work hard on most flights and to come down from some flights very tired and wet with perspiration, but with a feeling of having done something worthwhile. After others, you may consider forgetting the whole idea.

Okay, so there will be flights that don't go so well, no matter how well you get along with your instructor. The airplane will seem to have decided that it doesn't want to do what you want it to. The situation gets worse as the flight progresses and you end the session with a feeling that maybe you just aren't cut out to be a pilot. If you have a couple of these in a row, you should consider changing your schedule to early morning instead of later afternoon flights, or vice versa. You may have the idea that everybody but you is going through the course with no strain at all, but every person who's gone through a pilot training course has suffered some "learning plateaus" or has setbacks that can be discouraging.

After you start flying, you may at some point decide that it would be better for your learning process if you changed instructors. This happens with some people and is usually a no-fault situation, so don't worry about a change or two.

It's best if you get your FAA (Federal Aviation Administration) medical examination out of the way very shortly after you begin to fly or, if you think that you might have a problem, get it done before you start the lessons. The local flight instructors can give you names of nearby FAA aviation medical examiners.

How do you choose a flight school? You might visit a few in your area and see which one suits you best. Watch the instructors and students come and go to the airplanes. Are the instructors friendly, showing real interest in the students? There should be pre- and postflight briefings of students. You may not hear any of the details, but you can see that such briefings are happening. Talk to students currently flying at the various schools and get their opinions of the learning situation. One good hint about the quality of maintenance of the training airplanes is how clean they are. Usually an airplane that is clean externally is maintained well internally, though certainly there are exceptions to this.

What about the cost? It's a good idea to have money ahead so that you don't have to lay off and require a lot of reviewing from time to time. Some flight schools give a discount if you pay for several hours ahead of time.

You are about to set out on a very rewarding experience; for an overall look at flight training and future flying you might read the following.

The Big Three

As you go through any flight program, particularly in a military flight program, you will hear three terms used many times: *headwork, air discipline,* and *attitude toward flying*. You may be the smoothest pilot since airplanes were invented, but without having a good grip on these requirements, you won't last long.

Headwork

For any pilot, private or professional, the most important thing is good headwork. Nobody cares if you slip or skid a little or maybe every once in a while land a mite harder than usual, but if you don't use your head—if you fly into bad weather or forget to check the fuel and have to land in a plowed field—you'll find

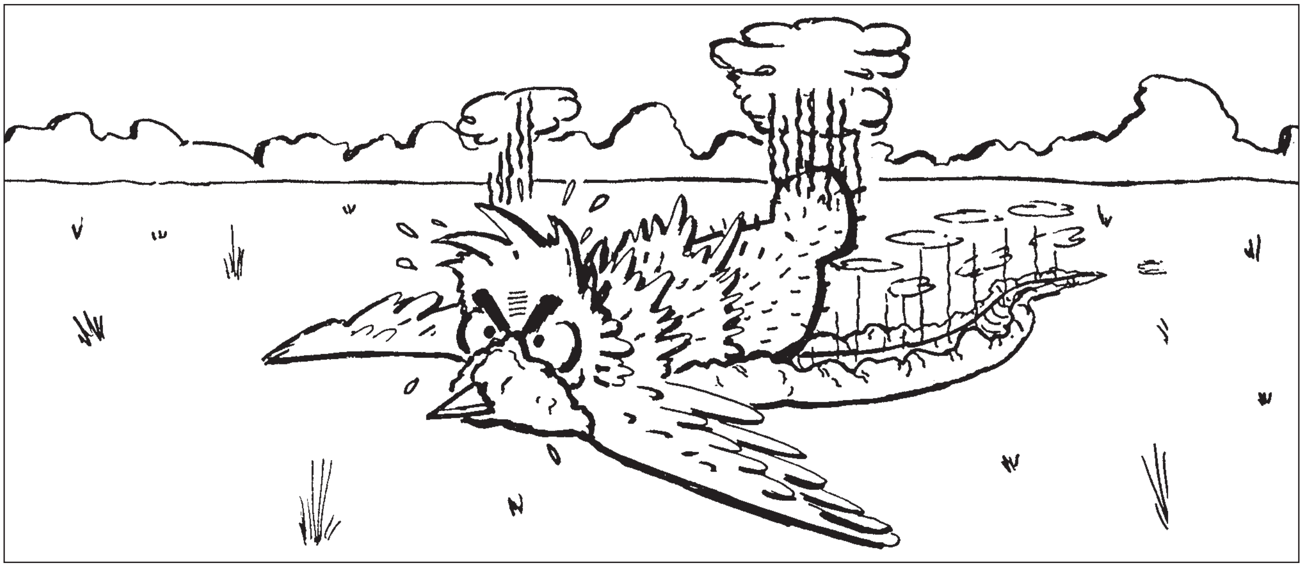

Figure 1-1. Headwork is remembering to put the landing gear down.

people avoiding you. Later, as you progress in aviation and lead flights or fly passengers, it's a lot more comfortable for all concerned if they know you are a person who uses your head in flying. So as the sign says—THILK, er, think.

Air Discipline

This is a broad term, but generally it means having control of the aircraft and yourself at all times. Are you a precise pilot or do you wander around during maneuvers? Do you see a sports car and decide to buzz it? Air discipline is difficult at times. It's mighty tough not to fly over that good-looking member of the opposite sex who happens to be sunbathing right where you are doing S-turns across the road—but be strong!

More seriously, air discipline is knowing, and flying by, your own limitations. This means, for instance, canceling for bad weather and not risking your life and your passengers' lives. It also means honestly analyzing your flying faults and doing something about them. In short, air discipline means a mature approach to flying.

Attitude

A good attitude toward flying is important. Most instructors will go all out to help someone who's really trying. Many an instructor's favorite story is about ol' Joe Blow who was pretty terrible at first, but who kept at it until he got the word, and is now flying rockets for Trans-Galaxy Airlines. With a good attitude you will get plenty of help from everybody. More students have failed in flying because of poor headwork and attitude than for any other reason. This doesn't imply "apple polishing." It does mean that you are interested in flying and study more about it than is required by law.

2

The Airplane and How It Flies

The Four Forces

Four forces act on an airplane in flight: *lift, thrust, drag,* and *weight* (Figure 2-1).

Lift

Lift is a force exerted by the wings. (Lift may also be exerted by the fuselage or other components, but at this point it would be best just to discuss the major source of the airplane's lift, the wings.) It is a force created by the "airfoil," the cross-sectional shape of the wing being moved through the air or, as in a wind tunnel, the air being moved past the wing. The result is the same in both cases. The "relative wind" (wind moving in relation to the wing and airplane) is a big factor in producing lift, although not the only one (Figure 2-2).

Lift is always considered to be acting perpendicularly both to the wingspan and to the relative wind (Figure 2-3). The reason for this consideration will be shown later as you are introduced to the various maneuvers.

As the wing moves through the air, either in gliding or powered flight, lift is produced. How lift is produced can probably be explained most simply by Bernoulli's theorem, which briefly puts it this way: "The faster a fluid moves past an object, the less sidewise pressure is exerted on the body by the fluid." The fluid in this case is air; the body is an airfoil. Take a look at Figure 2-4, which shows the relative wind approaching an airfoil, all neatly lined up in position 1. As it moves past the airfoil (or as the airfoil moves past it—take your choice), things begin to happen, as shown by the subsequent numbers.

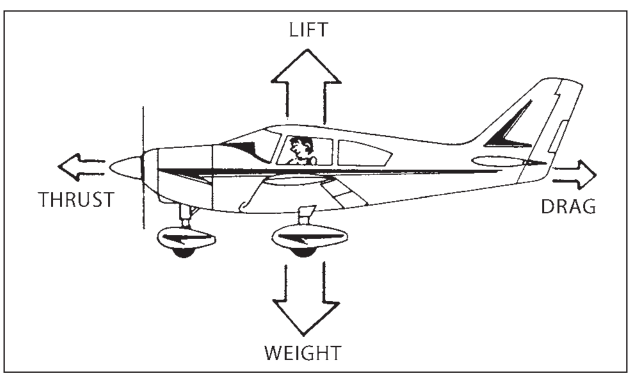

Figure 2-1. The four forces. When the airplane is in equilibrium in straight and level cruising flight, the forces acting fore and aft (thrust and drag) are equal, as are those acting at 90° to the flight path (lift and weight, or its components).

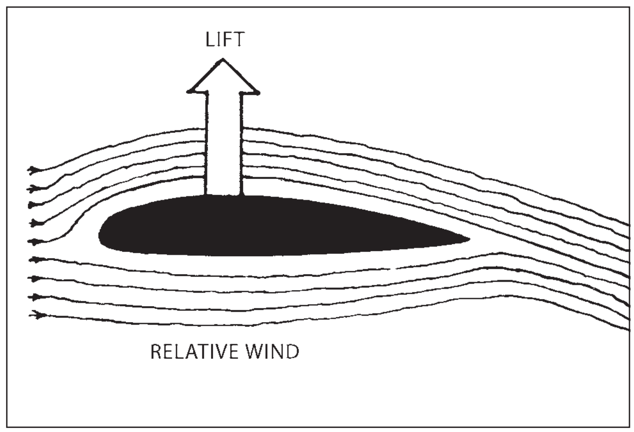

Figure 2-2. The airfoil.

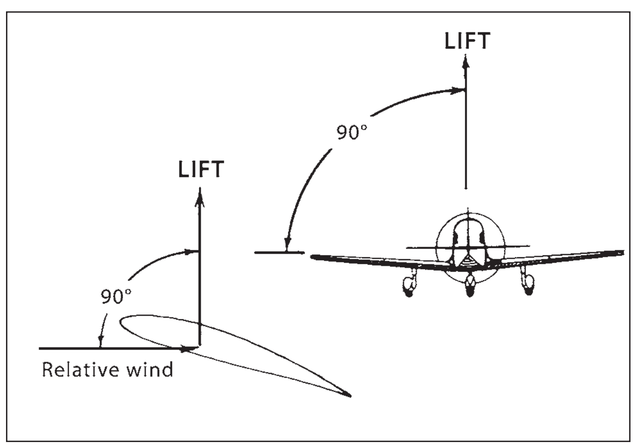

Figure 2-3. Lift acts perpendicular to the relative wind and wingspan.

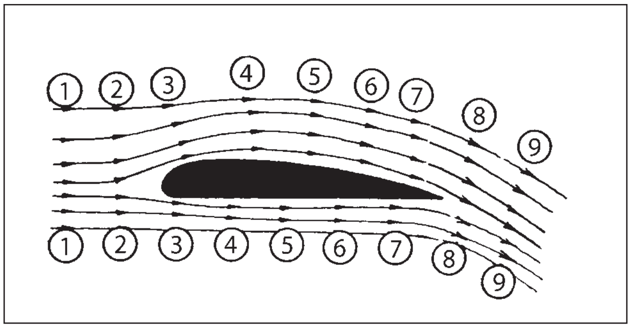

Figure 2-4. Airflow past the airfoil.

The distance that the air must travel over the top is greater than that under the bottom. As the air moves over this greater distance, it speeds up in an apparent attempt to reestablish equilibrium at the rear (trailing edge) of the airfoil. (Don't worry, equilibrium *won't* be reestablished.) Because of this extra speed, the air exerts less sidewise pressure on the top surface of the airfoil than on the bottom, and lift is produced. The pressure on the bottom of the airfoil is normally increased also and you can think that, as an average, this contributes about 25 percent of the lift; this percentage varies with "angle of attack" (Figure 2-5).

Some people say, "Sure, I understand what makes a plane fly. There's a vacuum on top of the wing that holds the airplane up." Let's see about that statement.

The standard sea level air pressure is 14.7 pounds per square inch (psi), or 2,116 pounds per square foot (psf). As an example, suppose an airplane weighs 2,000 pounds, has a wing area of 200 square feet, and is in level flight at sea level. (The wing area is that area you would see by looking directly down on the wing.) This means that for it to fly level (lift = weight) each square foot of wing must support 10 pounds of weight, or the wing loading is 10 pounds psf (2,000 divided by 200). Better expressed: There would have to be a difference in pressure of 10 pounds psf between the upper surface and the lower surface. This 10 psf figure is an average; on some portions of the wing the difference will be greater, on others, less. Both surfaces of the wing can have a reduced sidewise pressure under certain conditions. However, the pressure on top still must average 10 psf less than that on the bottom to meet our requirements of level flight for the airplane mentioned. The sea level pressure is 2,116 pounds psf, and all that is needed is an average difference of 10 psf for the airplane to fly.

Assume for the sake of argument that, in this case, the 10 psf is obtained by an *increase* of 2.5 psf on the bottom surface and a *decrease* of 7.5 psf on the top (which gives a total difference of 10 psf). The top surface pressure varies from sea level pressure by 7.5 psf. Compared to the 2,116 psf of the air around it, this is certainly a long way from a vacuum, but it produces flight!

Note in Figures 2-2 and 2-4 that the airflow is deflected downward as it passes the wing. Newton's law, "For every action there is an equal and opposite reaction," also applies here. The wing deflects the airflow downward with a reaction of the airplane being sustained in flight. This can be easily seen by examining how a helicopter flies. Some engineers prefer Newton's law over Bernoulli's theorem. But the air *does* increase its velocity over the top of the wing (lowering the pressure), and the downwash also occurs. The downwash idea and how it affects the forces on the horizontal tail will be covered in Chapters 17 and 23.

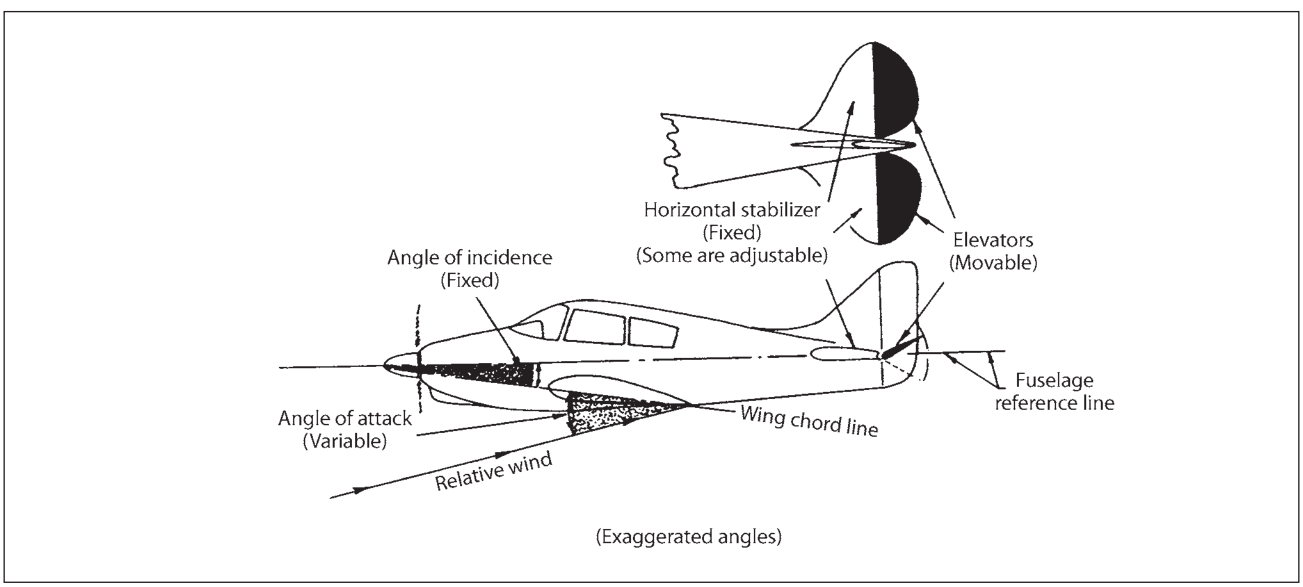

Figure 2-5. Nomenclature.

Angle of Attack

The angle of attack is the angle between the relative wind and the chord line of the airfoil. Don't confuse the angle of attack with the angle of *incidence*. The angle of *incidence* is the fixed angle between the wing chord line and the reference line of the fuselage. You'd better take a look at Figure 2-5 before this gets too confusing.

The pilot controls angle of attack with the elevators (Figure 2-5). By easing back on the control wheel (or stick) the elevator is moved "up" (assuming the airplane is right side up). The force of the relative wind moves the tail down, and because the wings are rigidly attached to the fuselage (you hope), they are rotated to a new angle with respect to the relative wind, or new *angle of attack*. At this new angle of attack the apparent curvature of the airfoil is greater, and for a very short period, lift is increased. But because of the higher angle of attack more drag is produced, the airplane slows, and equilibrium exists again. (More about drag later.)

If you get too eager to climb and *mistakenly* believe that the reason an airplane climbs is because of an "excess" of lift (and so keep increasing the angle of attack), you could find that you have made a mistake. As you increase the angle of attack, the airplane slows and attempts to reestablish equilibrium, so you continue to increase it in hopes of getting an "excess" of lift for more climb. You may make the angle of attack so great that the air can no longer flow smoothly over the wing, and the airplane "stalls" (Figure 2-6).

It's not like a car stalling, in which case the engine stops; the airplane stall is a situation where the lift has broken down and the wing, in effect, is no longer doing its job of supporting the airplane in the usual manner. (The engine may be humming like a top throughout the stall.) There is still some lift, but not enough to support the airplane. You have forced the airplane away from the balanced situation you (and the airplane) want to maintain. For the airplane to recover from a stall, you must decrease the angle of attack so that smooth flow again occurs. In other words, point the plane where it's going! This is done with the elevators, the angle of attack, (and speed) control (Figure 2-5). For most lightplane airfoils, the stalling angle of attack is in the neighborhood of 15°. Stalls will be covered more thoroughly in Chapters 12 and 14.

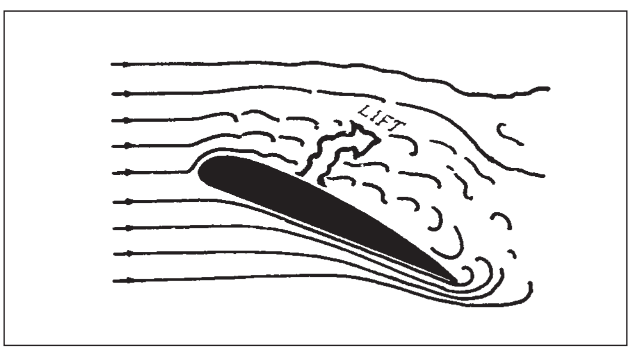

Figure 2-6. The stall.

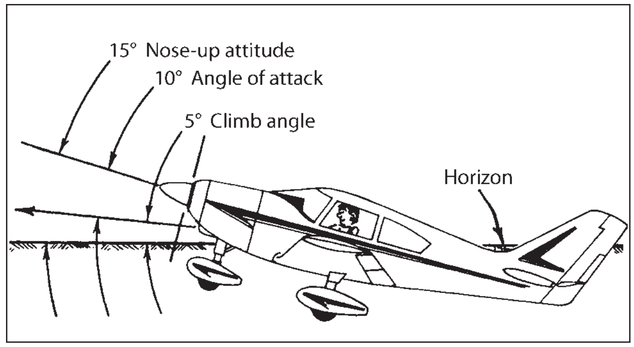

Figure 2-7. Pitch attitude, climb angle (flight path), and angle of attack.

At first, the student is also confused concerning the *angle of attack* and airplane *attitude*. The attitude is how the plane looks in relation to the horizon. In Figure 2-7 the plane's attitude is 15° nose up, but it's climbing at an angle of 5°, so the angle of attack is only 10°.

In a slow glide the nose attitude may be approximately level and the angle of attack close to that of the stall. Later in your flying, you'll be introduced to the attitude of the wings (wing-down attitude, etc.), but for now only nose attitudes are of interest.

The coefficient of lift is a term used to denote the relative amounts of lift at various angles of attack for an airfoil. The plot of the coefficient of lift versus the angle of attack is a straight line, increasing with an increase in the angle of attack until the stalling angle is reached (Figure 2-8).

Lift depends on a combination of several factors. The equation for lift is:

$$L = C_L S \frac{\rho}{2} V^2, \text{ or } L = C_L \times S \times \frac{\rho}{2} \times V^2$$

where L = lift, in pounds

C_L = coefficient of lift (varies with the type of airfoil used and the angle of attack). The coefficient of lift, C_L, is a dimensionless product and gives a *relative* look at the wings' action. The statement may be made in groundschool that, "At this angle of attack, the coefficient of lift is point five (0.5)." Point five what? "Just point five, and it's one-half of the C_L at one point zero (1.0)." Just take it as the relative effectiveness of the airfoils at a given angle of attack. Later, the coefficient of *drag* will be discussed.

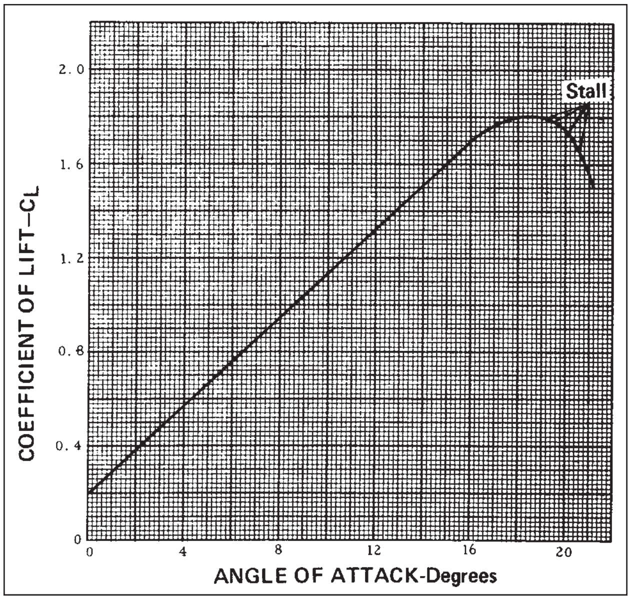

Figure 2-8. Relative lift increases with angle of attack until the stall angle is reached.

S = wing area in square feet

$\frac{\rho}{2}$ = air density (ρ) divided by 2. Rho (ρ) is air density, which for standard sea level conditions is 0.002378 slugs per cubic foot. If you want to know the mass of an object in slugs, divide the weight by the acceleration of gravity, or 32.2. (The acceleration caused by gravity is 32.2 feet per second per second at the earth's surface.)

V^2 = velocity in feet per second squared

When you fly an airplane, you'll be working with a combination of C_L and velocity; but let's talk in pilot terms and say that you'll be working with a combination of angle of attack and airspeed. So lift depends on angle of attack, airspeed, wing area, and air density. For straight and level flight, lift equals weight. Assuming that your airplane weighs 2,000 pounds, 2,000 pounds of lift is required to maintain level flight. This means that the combination of the above factors must equal that value. The wing area (S) is fixed, and the air density (ρ) is fixed for any one time and altitude. Then C_L (angle of attack) and velocity (airspeed) can be worked in various combinations to maintain the 2,000 pounds of lift required. Flying at a low airspeed requires a high angle of attack, and vice versa. As the pilot you will control angle of attack and, by doing so, control the airspeed. You'll use power (or lack of power) with your chosen airspeed to obtain the desired performance.

While the factors of lift are being discussed, it might be well to say a little more about air density (ρ). The air density decreases with increased altitude and/or temperature increase. Because of the decreased air density, airplanes require more runway for takeoff at airports of high elevation or on hot days. You can see in the lift equation that if the air is less dense, the airplane will have to move faster through the air in order to get the required value of lift for flight—and this takes more runway. (The airspeed mentioned is called "true airspeed" and will be discussed in more detail in Chapter 3.) Not only is the lift of the wing affected, but the less dense air results in less power developed within the engine. Since the propeller is nothing more than a rotating airfoil, it also loses "lift" (or, more properly, "thrust"). Taking off at high elevations or high temperatures can be a losing proposition, as some pilots have discovered after ignoring these factors and running out of runway.

Interestingly enough, you will find that lift tends to remain at an almost constant value during climbs, glides, or straight and level flight. *Don't* start off by thinking that the airplane glides because of decreased lift or climbs because of excess lift. *It just isn't so.*

Thrust

Thrust is the second of the four forces and is furnished by a propeller or jet. The propeller is of principal interest to you at this point, however.

The theory of propellers is quite complicated, but Newton's "equal and opposite reaction" idea can be stated here. *The propeller takes a large mass of air and accelerates it rearward, resulting in the equal and opposite reaction of the plane moving forward.*

Maybe it's time a few terms such as "force" and "power" should be cleared up. Thrust is a *force* and, like the other three forces, is measured in pounds. A *force* can be defined as a tension, pressure, or weight. You don't necessarily have to move anything; you can exert force against a very heavy object and nothing moves. Or you can exert a force against a smaller object and it moves. When an object having force exerted upon it moves, *work* has been done.

Work, from an engineering point of view, is simply a measure of *force* times *distance*. And while at the end of a day of pushing against a brick wall or trying to lift a safe that won't budge, you feel tired, actually you've done no *work* at all. If you lift a 550-pound safe 1 foot off the floor, you'll have done 550 foot-pounds of *work* (and no doubt strained yourself in the bargain). If you lift a 50-pound weight to a height of 11 feet, you'll have done the same *work* whether you take all day or 1 second to do it—but you won't be developing as much *power* by taking all day. So the *power* used in lifting that 50 pounds up 11 feet, or 550 pounds up 1 foot, in 1 second would be expressed as:

Power = 550 foot-pounds per second

Part Six

Syllabus 6

Introduction

This syllabus is written to meet the requirements of 14 CFR Parts 61, 141, and 142, and is intended to be used primarily as a checklist, reference, guide, and record for the flight instructor and the student from the first flight through the private pilot (ASEL) Knowledge and Practical Tests and Certification.

By design this is a summary, in order, of the steps the aspiring private pilot must take to successfully complete the course of ground and flight instruction and is to be used by the flight instructor as a checklist. For each subject reference is made to the more detailed information in *The Student Pilot's Flight Manual (SPFM)* or *The Flight Instructor's Manual (FIM)* so that both the student and instructor may read more details about a particular subject or flight maneuver. *However, this is intended to be more than a bare-bones syllabus with reminders, so memory joggers (cryptic comments) are included to help the flight instructor review what was learned from SPFM, FIM, and the other references cited here.*

This syllabus is broken down into Units rather than flights or hours because of the variations in student progress, which may be a function of schedule. For instance, bad weather, illness, or other factors may cause a large time gap between flights, requiring extra flight or ground school review. The instructor using this syllabus will in some cases divide the Units into several sessions for easier handling; some suggested "break" points have been included (Stage 3, Unit 4 is one example).

As the elements of each Unit are completed to the satisfaction of both the student and instructor, the next Unit should be introduced. In some cases the instructor may have the student go on to a following Unit in the same Stage because of weather problems and, for instance, do pattern work rather than fly to the practice area. The incomplete Unit then should be completed as soon as possible.

Certain maneuvers are referred to in several Units and the user may think, "This was mentioned earlier." Yes, it was; but as a memory jogger and review, those items are repeated.

The time noted for each Unit, ground instruction or flight, is an estimate since one flight school may be at a non-tower airport and have its practice area very close, while another school may be located at a busy airport with a tower, thus, much more time is needed to complete the Unit. Suggested ground instruction time for each Unit includes pre- and postflight briefings.

By checking off the items covered, the instructor and student each can review the syllabus to confirm the areas completed (or those that need to be reviewed). The student should initial each Unit to confirm its completion.

There will not be a repeat of "completion standards" with each Unit. The standards for the various Units will be complete when the student has performed the requirements for that Unit to the satisfaction of the flight or ground instructor, as applicable.

At the end of each Unit the Assigned Reading is in preparation for the next Unit.

The minimum requirements for a Part 141 school are 35 hours of ground instruction and 35 hours of flight training, with 20 hours of flight training from a CFI. The minimum requirements for Part 61 operations are 40 hours flight time, including at least 20 hours of flight instruction from a certified flight instructor and 10 hours of solo flight with the breakdowns as listed in §61.109.

Note that the minimum of 20 hours dual and 10 hours solo do not add up to the total minimum of 40 hours. The flight instructor may, for instance, use the extra 10 hours of total time for dual as required for a student, or have a combination of dual and solo for that time.

The average flight time for the certification of a private pilot (Airplane SEL) in the United States is approaching 75 hours, and this syllabus is intended to cover more than the bare minimums as cited by either Part 61 or 141. This syllabus requires a *minimum* of 12 hours of dual before solo (the average student will need more time than this); with the five Stages included, the course is set up for a total of 71 hours of ground instruction or oral exams, 39 hours of dual flight (including check flights), and 25 hours of solo flight, for a combined total of 135 hours. These times can be modified to fit a particular airplane or local condition but still must meet the minimum number of hours of ground instruction, dual or solo. The goal of the program is not to just provide a minimum number of hours of instruction but to train a safe and competent pilot, and it is up to the instructor(s) to assure that flight times and more-than-minimum performance standards are met.

The cross-country requirements cited in Stage 3 are a case in point. *This writer believes there is not enough solo cross-country, both in times and distances, required by Part 61 and so has expanded the requirements in this area of instruction. The instructor/user, of course, may limit the experience to that currently required by Part 61.*

Note that up to 2.5 hours of instruction may be given in a flight simulator or flight training device representing an airplane from an authorized instructor and credited toward the total hours required by §61.109. A maximum of 5 hours of instruction in a simulator or flight training device representing an airplane may be credited toward the total hours required by §61.109 if the instruction is accomplished in a course conducted under Part 142. The instruction flights that may use a flight simulator are so indicated in this syllabus.

The various tasks and maneuvers are aimed for the flight instructor's action or are general suggestions unless the student is specifically cited. For instance, such items as "Discuss the power-off stall" or "Demonstrate a forward slip" are for the flight instructor's use. "Student practices forward slips" is obviously for the student's actions. This syllabus, as indicated earlier, serves as a checklist for both parties to confirm that various requirements have been completed.

Much thanks is owed to Paul A. Craig, author of several aviation textbooks and chief instructor of a major flight school, for his keen eye and ability to find gaps in the material required. His comments and suggestions were most valuable. I also want to thank Ellen Roberts, a flight instructor whose techniques and methods should be copied by more of us. James E. Perkins, Aviation Safety Inspector at the Nashville FSDO, was most helpful with his review of the manuscript and comments and suggestions. My son, Bill, who flies for American Airlines and is a flight instructor, reviewed the manuscript and made valuable suggestions also. Thanks to editor Lynne Bishop, whose humor and always good help is much appreciated. And, as with my other books, my wife Betty gave most invaluable typing and editing help.

I would appreciate comments and suggestions to make this syllabus more useful to the flight instructor and to the student.

William K. Kershner

Private Certificate Syllabus

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*If an approved flight simulator or other approved flight training device and authorized instructor are available, 14 CFR §§61.4 and 61.109 permit them to be used for these units.

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— Patty Wagstaff, 2004 Inductee National Aviation Hall of Fame

With over six decades of experience as pilot-in-command in more than 100 types and models of airplanes, Bill Kershner was FAA/General Aviation Flight Instructor of the Year in 1992, and named Elder Statesman of Aviation in 1997. He was inducted into the Flight Instructor Hall of Fame in 1998. His son, William C. Kershner, was soloed by his father, and holds Flight Instructor and Airline Transport Pilot certificates. He has flown 22 types of airplanes in his over 15,000 hours of flight time, ranging from Cessna 150s to Boeing 777s.

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