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5 SUBJECT NOTEBOOK

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Remote Pilot Manual

Chapter 1. Discovery Aviation - Pilot Training

Summary Checklist

- The Federal Aviation Administration (FAA) is the agency which govern commercial and general aviation.

- The Federal Aviation Regulation (FAR) provide rules which apply to all areas of aviation including flight operation, the construction of aircraft and the training requirement which must be met to obtain certificate and rating.

- Many pilot training school are locate at airport facilities called Fixed based operator (FBO). These facilities provide a variety of service to pilots including aircraft rental, fueling, maintenance parking and the sale of pilot supplies.

- There are 2 type of pilot training school FAA approved school governed by FAR part 141

and school governed by FARGL.

- A syllabus provides structure to pilot training by organizing flight and ground lessons.

- To be eligible for a pilot certificate you must be at least 16 yrs, be able to read & speak and understand English and hold a third class medical certificate.

- There are 3 class of medical certificate
  First class for Airline transport pilot
  Second class for commercial pilot
  Third class for student Recreational and private pilot

- In order to the student pilot required to be eligible for a private pilot certificate you must be at least 17 yrs, complete specified training & flight as described in FAA. pass knowledge test and successfully complete a practical test → read, interpret, performing pilot operations and procedures manoeuvres in the aeroplane.

A private pilot training program can be generally decided into 3 phases, pre-solo, solo & practical test preparation. Each phase include both flight & ground training

- The pilot in command of an aircraft is directly responsible for and is to be certified as to the operation of that aircraft.

- For pilot certification, aircraft are organised in category & class. Your private pilot certificate will state the category, class & type of aircraft you are authorized to fly.

- For aircraft certification category relates to the intended use of an aircraft and set structural limits on its operations.

- To act as a pilot in command you must complete a flight review every twenty four calendar month

- To act as pilot in command of an aircraft carrying passengers, you must perform at least 3 take offs & landing in an aircraft of the same category and class within the preceding 90 days.

Key Terms

- Federal Aviation Administration FAA
- Federal Aviation Regulations (FARs)
- Fixed Base Operator (FBO)
- FAA Certificated Flight Instructor CFI
- Syllabus
- Student Pilot Certificate
- Medical Certificate
- Pilot in Command (PIC)
- Flight Review

Section Chapter 1 Section B Aviation Opportunity

Summary Checklist

- Frequent refresher training to keep flying skills sharp and safe of pilot.

- Maintain flying requires regular training for overall operation, career selection aircraft selection

- Aeronautic instruction increase proficiency FARs do place certain restriction on area take maneuvers. But not flight has training requir

- Aviation AOPA, EAE the Ninety Nine. the CAP sponsor flying increase ability & personal safety & safe to pilot

- The FAA requires that you receive training and a log book endorsement stating competency before you can operate as pilot in command.

- To obtain an instrument rating you ~~need~~ need 40 hrs of instrument flight

time, pass a knowledge and (practical test.

- There are no specific grounds are flight instruction required for the addition of a multi engine rating to your existing certificate, but you will need to pass a practical test.

- To obtain a seaplane rating, your pilot training will focus on the characteristics of water and its effect on the seaplane.

- To pilot aircraft such as helicopter gliders or hot air balloon you will need to obtain an appropriate category and (class) rating.

- To apply for a commercial pilot certificate you must accumulate a 190 to 250 hrs of flight time (according to school) which include a minimum 100 hrs of pilot in command and 50 hrs of cross country time.

- There is no specific number of flight hrs for CFI training, but you have to pass the knowledge exam and a practical test.

- ATP certificate need a 1500 hrs of flight time including 250 hrs of pilot in command, 500 hrs of cross country time, 100 hrs of night flight and 75 hrs of instrument experience

- For regional airline, accumulate as much total time flight, pilot in command and multi engine as possible

- to be airline pilot, depend on market.

- The minimum pilot age certificate to fly as a corporate pilot include a commercial pilot certificate with an instrument rating and a multi-engine rating

- To become employed as an aerial application pilot must hold a commercial pilot certificate and receive training specialized aircraft operation

Key Terms

- Refresher Training
- Maintain Flying
- Aerobatic flight training
- Aircraft Owners and Pilot Association AOPA
- Experimental Aircraft Association (EAA)
- Civil Air Patrol (CAP)
- The Ninety-Nines, Inc
- Aircraft checkout
- High performance Aeroplane
- Complex Aeroplane
- Home Built Aircraft
- Instrument Rating
- Multi-Engine Rating
- Single Engine Sea Rating
- Multi Engine Sea Rating
- Helicopter
- Glider Rating
- Hot air Balloon
- Commercial Pilot Certificate
- Airline Transport Pilot Certificate ATP
- Recreational Pilot Certificate
- Regional Airline
- Major airline
- Corporate Flying
- Aerial application

Chapter 1 Section C: Introduction to Human Factors

When the decision making process is applied to flight operations it is termed aeronautical decision making (ADM).

Your general health, level of stress or fatigue attitude, knowledge, skill level and experience are several factors which affect your performance as pilot in command.

Communication is the exchange of ideas, information or instruction.

Since useful tool and sources of info may not always be readily apparent, learning to recognize and utilize the resources available to you is an essential part of human factors training.

Effective workload management ensures that essential operations are accomplished by planning prioritizing and sequencing task to avoid work overload.

Situational awareness is the accurate perception of the operational and environmental factors

aircraft, pilot, and passengers during a specific period of time.

Ear pain is normally the result of a difference between air pressure in the middle ear and surrounding air pressure.

Slow descent rate can help prevent or reduce the severity of ear problem and to equalize pressure the eustachian tube can sometimes be opened by yawning, swallowing, chewing or employing the Valsalva Maneuver.

The reduction of atmospheric pressure during flight can cause scuba diver to experience a decompression sickness. Recommended waiting period are specified before ascending to 8000 feet MSL or above after scuba diving.

Motion sickness is caused by the brain receiving conflicting message about the state of the body.

Stress can be defined as the body's response to physical and psychological demand placed upon

Some of the effect of fatigue include degradation of attention and concentration impaired coordination and decreased ability to communicate.

Cockpit noise can contribute to excessive fatigue stress and overcharges. as well as severely impaired impede the understanding of the speech.

Pilots who fly frequently may experience excessive hearing loss over a period of time unless ear protection is used.

Depressant are drugs which decrease the body's functioning in many areas. the most common depressant is alcohol.

Intoxication is determined by the amount of alcohol in the bloodstream which is usually measured as a percentage by weight in the blood. The FAR s require that your blood alcohol level be less than 0,04 % and that 8 hrs pass between drinking alcohol and piloting an aircraft.

Stimulant are drug which excite the central nervous system and procedure an increase

in alertness and adverse. Amphetamines, caffeine, and narcolepsy are all forms of stimulant

Your ability to assess your mental and physical fitness for flight and your skill at making effective decisions are essential for flight safety.

Key Terms.

Crew Resource Management (CRM)
Hazardous Attitudes
Risk Management
Pilot in Command Responsibility
Communications
Resource use
Workload
Situational awareness
Stress
Fatigue
Hypoxia
Alcohol
Stimulant.

Chapter 2 - Aeroplane Systems - Section A - Aeroplanes

- The fuselage houses the cabin or cockpit and serves as the attachment point for the other major aeroplane component.

- Wings may be attached to the top, middle or lower portion of the fuselage and are contoured to take maximum advantage of the lifting forces created by the passing aeroplane.

- The Empennage consists of the vertical and horizontal stabilizer which act to steady the aeroplane and maintain a straight path through the air.

- Trim devices are used to help minimize your work load by aerodynamically helping you move a control surface, or maintain the surface in a desired position.

- Landing gear employing a rear mounted wheel is called conventional landing gear

- When the third wheel is located on the nose the design is referred to as tricycle gear.

- Both pressure may be applied equally or to varying degrees by pressing on the top of each rudder pedal

- The engine used to turn the propeller, generate electrical energy, create a vacuum source for some instrument and in most single engine airplanes, provide a source of heat for the pilot and passengers.

- The propeller translates the rotating force of the engine into a forward acting force called thrust that helps to move the airplane through the air.

Info on make and model of airplane including operating limit, can be found in the pilot operating handbook (POH) & FAA airplane flight manual. (AFM).

Key Terms

- Fuselage
- Open Truss
- Stressed Skin
- Monocoque
- Semi-Monocoque
- Wings
- Monoplanes
- Biplanes
- Ailerons
- Flaps
- Conventional landgear
- Tailwheel
- Nosewheel
- Tricycle gear
- Fixed gear
- Retractable gear
- Oleo Strut
- Disk brakes
- differential brakes
- Powerplant
- Firewall
- Propeller
- Pilot operating handbook (POH) AKA
- FAA- Approved Aeroplane Flight Manual
- Pilot information Manual

Chapt 2. Aeroplane System Section B. Powerplant & Related systems

Summary checklist

- The continuous energy creating process in almost all reciprocating aeroplane engines is referred to as the four stroke operating cycle. The steps in this cycle are: The intake of fuel/air mixture, the compression by the piston, the ignition and expansion of the gases and the venting of the burned gases.

Engine speed for aircraft equipped with a fixed pitch propeller is displayed on a tachometer in revolutions per minute (rpm).

- A constant-speed propeller is adjustable from the cockpit. A manifold pressure gauge is used on these types of aeroplanes to monitor engine output by displaying the pressure inside the engine in inches of mercury (in. Hg).

- The carburetor mixes incoming air and fuel and delivers it to the combustion chamber.

The operating principal of float-types carburetor is based on the difference in pressure at the venturi throat and the air inlet.

- The fuel air mixture can be adjusted with the mixture control.

- Carburetor ice is more likely to occur when T° are below 21 C (70 F) and relative humidity above 80%.
To combat the effect of carburetor ice engines with float-type carburetor employ a carburetor heat system which is design to eliminate ice by sending air across a heat source before it enter the carburetor.

- The most significant advantages of the fuel injection system is the reduction from the formation of induction icing.

Sea level performance can be obtained even at high altitude using either a supercharger or a turbocharging system.

The ignition system is made up of magnetos, spark plugs, interconnecting wires and

and the ignition switch.

Detonation occurs when fuel in the cylinders explodes instead of burning smoothly.

Preignition is a result of the fuel/air mixture being ignited in advance of the normal timed ignition.

Fuel pump and gravity feed systems are similar, except that gravity system does not include engine driven or electric boost pumps or fuel pressure gauges.

To help prevent moisture build up it is a good practice to ensure that an aeroplane's tanks are replenished following the last flight of the day.

A wet sump system uses an oil pump to draw oil from the sump and route it to the engine. Oil system operation can be monitored by referring to the oil pressure and temp gauges.

Cooling air enters the engine compartment through an inlet behind the propeller hub and flows

it is therefore desirable to use the hottest part of the engine baffles.

Exhaust is normally directed aft below the engine compartment through a muffler and tailpipe. Metal shrouds around the muffler capture heat which is used to defrost the windscreen and heat the cabin

Fixed pitch propellers are a single blade angle which is selected on the basis of what is best for the primary function of the aeroplane

A constant speed propeller control permit you to select a blade angle that is the most appropriate for the flight operation being conducted. The propeller control regulate engine r.p.m as shown in the tachometer, while the throttle controls engine power output as indicated on the manifold pressure gauge.

With a constant speed propeller you should avoid long operating with high manifold pressure.

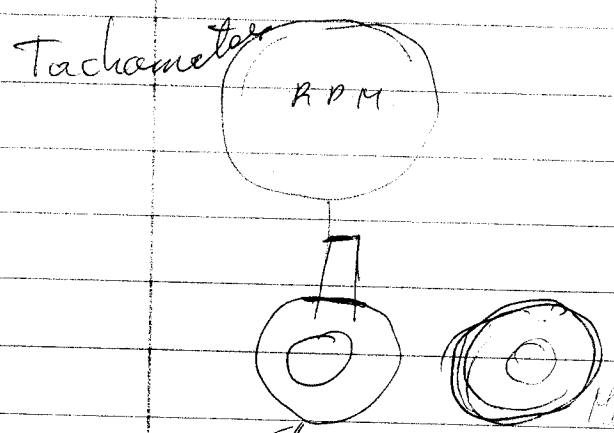
Alternators produce alternating current (AC) first and then convert it to direct (DC) for use in the aeroplanes electrical system.

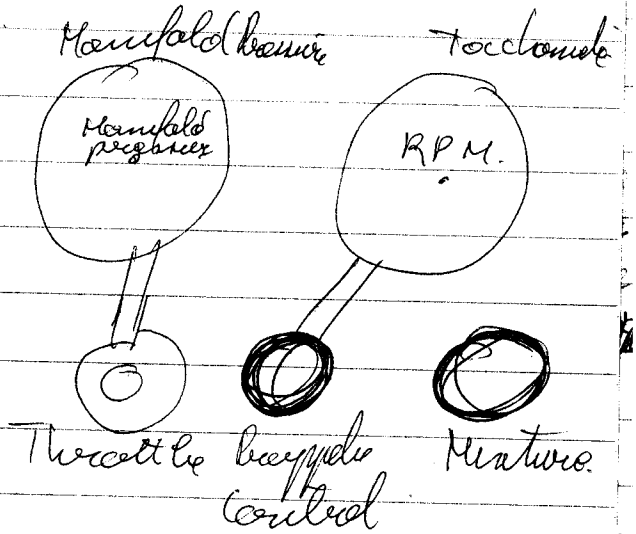
- On type of ammeter reflect current flowing to or from the battery like the type called loadmeter, simply displays the load placed on the alternator.

Key Terms

Turbine Engine
Four-Stroke Operating Cycle
Reciprocating Engine
Throttle
Mixture
intake Port
Carburetor
Carburetor Ice
Fuel injection
Supercharger
Turbocharger
Magneto
Ignition switch
Detonation
Pre-ignition
Fuel Pump System
Fuel Pressure Gauge
Vapor Lock
Gravity Feed System
Fuel Tank
Fuel Quantity Gauge
Fuel Selector Valve
Fuel Strainer
Dry Sump System
Wet Sump System
Oil pressure Gauge
Oil T° Gauge

Cowl Flaps — Propeller Control
Cylinder Head T° Gauge — Altimeter
Climb propeller — Alternating Current (AC)
Cruise propeller — Rated Crescent (ROC)
Fixed Pitch Propeller — Ammeter
Constant Speed propeller — Master Switch





Chapter 2 Flight Instrument Section C

- The airspeed indicator, altimeter and vertical speed indicator all are static pressure. The airspeed indicator is the only instrument which uses pitot pressure.

- At sea level, the standard atmosphere consist of a barometric pressure of 29.92 in Hg (1013.2 millibars) and a temperature of 15° (59°F)

- In the lower atmosphere (below 36000 feet) the standard pressure lapse rate for each 1000 feet of altitude is 1.00 in Hg and 2° lapse rate is 2°C (3.5°F).

-- The airspeed indicator is denoted into color-coded arc which define speed ranges for different phases of flight. The upper and lower limit of the arcs correspond to specific airspeed limitation called V-speed

- V_A or maneuvering speed is the maximum speed at which you may apply full and abrupt control deflection without causing structural damage. Since GA

with the correct weight, it is not depicted in the airspeed indicator.

Regardless of altitude, the indicated airspeed at which a particular airplane stalls in a specific configuration remains the same.

Indicated altitude is the altitude measured and displayed by your altimeter. Pressure altitude is ~~the altitude measured~~ and the vertical distance above the standard datum plane, while density altitude corrects pressure for nonstandard temperature. True altitude is the actual height of an object above mean sea level. Absolute altitude is the actual height of the airplane above the earth's surface over which it is flying.

If you fly from an area of high pressure to an area of lower pressure without resetting your altimeter, the altimeter will indicate higher than the true altitude. True altitude will be higher than indicated altitude. If you do not reset your altimeter when flying from a low pressure area to

an area of high pressure

A one inch change in the altimeter setting equals 1000 feet of indicated altitude change in the same direction.

If atmospheric temperature is higher than standard true altitude will be higher than your indicated altitude. In colder than ~~standard~~ T° true altitude will be lower than indicated altitude.

Trend info shows an increase or decrease in the aeroplane's rate of climb or descent, while rate info shows you a stabilized rate of change

Blockage of the pitot line only affect the airspeed indicator, but a clogged static system affect all 3 pilot static instrument

Rigidity in space refers to the principle that a wheel with a heavily weighted rim spun rapidly will remain in a fixed position in the plane in which it is spinning.

precession cause slaved drifting and minor erroneous indications in the gyroscopic instrument

The turn coordinator typically uses electrical power while a engine driven vacuum pump is used to power the attitude and heading indicators.

The turn ~~indicator~~ coordinator provides an indication of turn direction and quality as well as a backup source back information in the event of attitude indicator failure

Due to precession, the heading indicator must be aligned periodically with the magnetic compass. When aligning the heading indicator, be certain you are in straight and level, unaccelerated flight with the magnetic compass steering or steady indication.

Turning error causes the magnetic compass to lead or lag the actual magnetic heading of the aircraft during turns

Key Terms

International Standard Atmosphere (ISA)
Standard Lapse Rates
Pitot Tubes
Static Port
V-Speeds
Indicated Altitude
Density Altitude
Calibrated altitude
True altitude
Absolute Altitude

Trend information
Rigidity in Space
Precession
Vacuum (Suction) System
Stand Rate
Slip
Skid
Variation
Deviation
Magnetic Dip

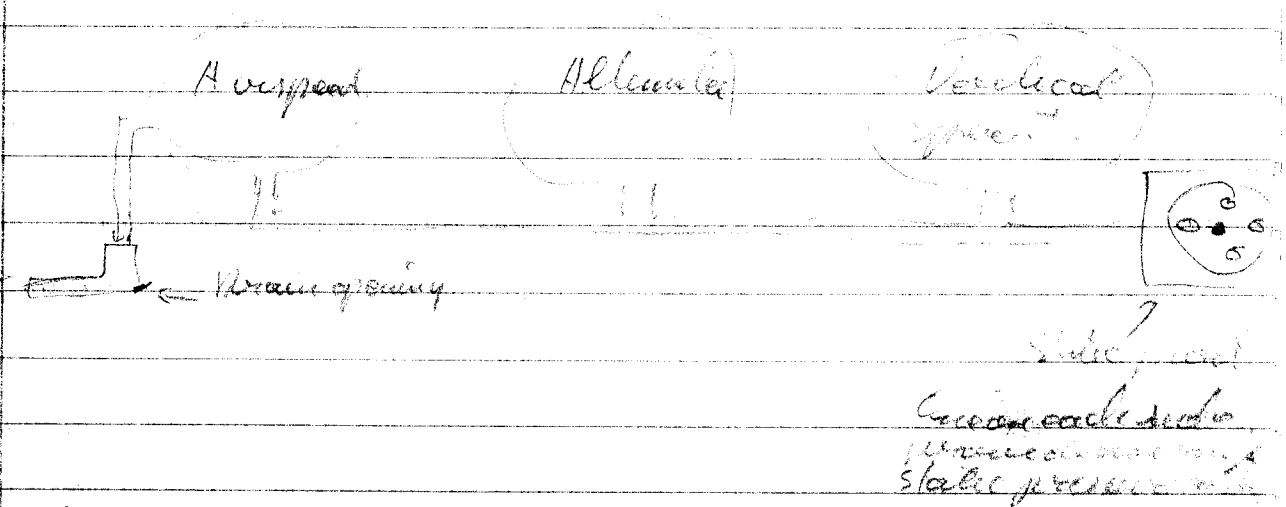
Altimeter.

The longest pointer of the altimeter shows hundred of feet. the middle sized pointer indicate thousand and the shortest pointer shows tens of thousands of feet

[Q] The pitot static system provides impact or ram air pressure to the airspeed indicator.

The pitot tube is mounted so the opening is expose to the relative wind ; increase in speed → increase ram

Static pressure enters the pitot static system through a static port, on the side of aeroplane in a area of undisturbed air



Blockage of the pitot tube affects only the airspeed indicator, but a clogged static system affects ASI, altimeter & Vertical speed ind.

The pitot system can become blocked completely or partially if the pitot tube drain hole remain open.

If the pitot tube become clogged and its associated drain remain clear, ram air will not enter the system. Air in the system will travel through the drain hole and ~~so~~ pressure will drop. Airspeed indicator senses no difference between ram and static pressure, like if the plane is stationary. The apparent loss of airspeed is gradually, slowly to zero.

If the pitot tube, drain hole, and static system all become clogged in flight changes in airspeed will not be indicated due to the trapped pressure.

If the static system remain clear and total pressure holes are clogged, airspeed will change with altitude. An apparent increase in the rams air pressure relative to the static pressure will occur as the altitude increase above the level where the pitot tube, holes become clogged so increase in altitude show an increase in speed and decrease in altitude show a decrease in speed.

If the static system become clogged and the pitot tube remain clear the airspeed indicator will continue to operate, but inaccurately. Airspeed will be slower than the real airspeed at operating altitude where the static port become clogged because the trapped static air is higher than normal for that altitude, so at lower altitude a faster airspeed is shown.

Blockage of static system also affects the altimeter and VSI.
→ Trapped static pressure will cause the altimeter to freeze at the altitude at which the blockage occurred.
→ The VSI will show a continuous zero of pitot static line

Some aircraft have alternate static source

Chapter 3 Aerodynamic principle & force of flight 5/1

- During flight, the four forces acting on the airplane are lift, weight, thrust and drag.

- The 4 forces are in equilibrium during unaccelerate flight.

- Lift is the upward force created by the effect of the airflow as it passes over and under the wing

The airplane wing's shape is designed to take advantage of Newton's law and Bernoulli's principle.

- According to Bernoulli principle, the increase in speed over the top of air foil produce a drop in pressure and this lowered pressure is a component of total lift

The deflection to downwash from the top surface of the wing and the airstream striking the wing's lower surface causes an upward deflection in positive lift according to Newton's third law motion.

Planform, camber, aspect ratio and wing area are some of the design factors which affect a wing's lifting capability

- A stall is caused by the separation of airflow from the wing's upper surface. For a given airplane a stall always occurs at the critical angle of attack regardless of airspeed, flight attitude, or weight

Total lift depends on the combined effect of airspeed and angle of attack. When speed decreases, you must increase the angle of attack to maintain the same amount of lift.

Flaps increase lift (and drag) by increasing the wing's effective camber and changing the chord line which increases the angle of attack. Flap types includes plain, split, slotted, fowler

- Weight is the force of gravity which acts vertically through the center of the airplane toward the center of the earth.

- Thrust is the forward acting force which opposes drag and propels aeroplane

Drag acts in opposition to the direction of flight opposes the forward motion of the aeroplane and limits the forward speed of the aeroplane.

Parasite drag is caused by any aircraft surface which deflects or interferes with the smooth airflow around the aeroplane.
Parasite drag → form drag, interference drag and skin friction drag.
If airspeed is doubled parasite drag increases fourfold.

Induced drag is generated by the airfoil circulation around the wing and creates lift. Induced drag increases with the flight at slow airspeed as the angle of attack increases.

The phenomenon of ground effect occurs close to the ground where the earth's surface restricts the downward deflection of the airstream from the wing, decreasing induced drag.

Key Terms

Lift
Weight
Thrust
Drag
Vectors
Newton's 3 laws of motion
Bernoulli principle
Venturi
Airfoil
Leading edge
Trailing edge
Upwash
Downwash
Relative wind
Camber
Chord line
Angle of Attack
Coefficient of Lift
Stall

Critical Angle of Attack
Aspect Ratio
Wing Area
Planform
Angle of Incidence
Stall strips
Flaps
Configuration
Plain flap
Split "
Slotted "
Fowler "
Parasite drag
Form drag
Interference drag
Skin friction drag
Induced drag
Wingtip Vortices
Ground effect

Chapter 3 Aerodynamic Principle Stability Section B

Most training aircraft are designed to display positive static and positive dynamic stability.

All aircraft movement take place around the 3 longitudinal, lateral and vertical axes, all of which pass through the center of gravity

Longitudinal stability relate to movement about the aeroplanes lateral axes. Longitudinal stability is influenced by the relationship between the center of pressure and the center of gravity as well as the effects of power changes and the design of the horizontal stabilizer.

Stability around the aircraft's longitudinal axis is referred to as lateral stability. Wing dihedral, sweepback, keel effect and weight distribution are design features that affect an aeroplanes lateral stability.

Directional stability or stability about the vertical axis, of most aircraft is maintain by the vertical tail.

Dutch Roll is most likely to occur on an aircraft with weak directional stability and strong lateral stability.

Aircraft with strong directional stability and weak lateral stability are susceptible to spiral instability.

A stall will occur when the critical angle of attack or $C_{l_{max}}$ is exceeded. This can occur at any airspeed and in any configuration or attitude.

A spin will not develop unless both wings are stalled. Normal, erect spin results in the airplane entering an accelerated nose low descent with one wing stalled more than the other.