South Carolina AVIATION News Letter

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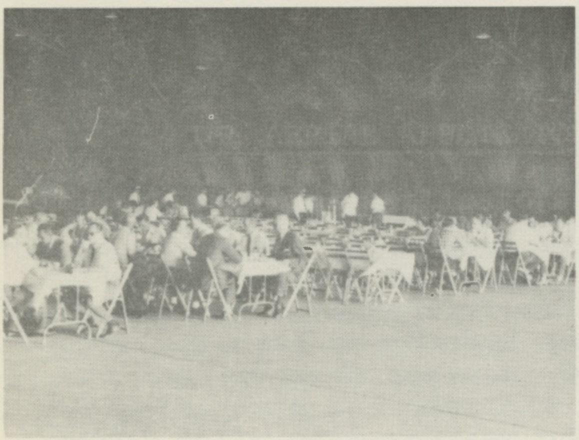


BREAKFAST CLUB NEWS

Pilots from three states met for breakfast at the Columbia Metropolitan Airport on Sunday, May 30th. Representatives from the Georgia Flying Rebels, the North Carolina Aero Club as well as the S. C. Breakfast Club were treated to an excellent breakfast provided by the Richland-Lexington Airport Commission.

A surprise guest and winner of the bouncing ball was Bob Cummings, Movie and TV fame. Bob made an excellent talk to the group and was elected to the position of Honorary Vice President.

President Homer Collum counted 250 private aircraft and most of these remained for the airport dedication program and show featuring Bob Nance and the Blue Angels.

The next meeting will be at the Cheraw Airport which has a new paved and lighted runway.

The N. C. Aero Club will meet at Garland Allen's private strip on the 20th of June. Garland has invited all of the S. C. Breakfast Clubbers to attend. His airport is ten miles out on the 180° radial of the LIBERTY VOR. Come early and spend the day.

NEW WEATHER MANUAL

A new weather manual for pilots, AVIATION WEATHER, was published jointly today by the FAA and the U. S. Weather Bureau, Department of Commerce.

The colorfully-illustrated 300-page book provides weather fundamentals and how to use the aviation services of the Weather Bureau.

The publication is offered pilots with the following word of caution: "Pilots should understand the limitations as well as the capabilities of present-day meteorology; otherwise, the impossible may be requested, while the attainable may be overlooked. It is almost as bad for the pilot to have complete faith in weather forecasts as it is for him to have none at all. Pilots who understand both the information given and limitations of weather observations and forecasts usually are the ones who make the most effective use of the weather service. The weather-wise pilot looks upon a forecast as professional advice rather than the absolute truth..."

Availability of the book is not expected to lessen demand for personalized weather service between pilots and weathermen, which will continue as it has in the past.

The new edition supersedes and replaces the basic weather manual for pilots last issued in 1954 as the "Pilot's Weather Handbook, CAA Technical Manual No. 104." It may be purchased for $2.25 from the U. S. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

The weather manual is divided into 22 chapters including, in addition to standard weather subjects, High Altitude Weather, Arctic Weather, Tropical Weather, and Soaring Weather.

FEDERAL AVIATION AGENCY
VFR EXAM-O-GRAM NO. *28
FACTORS AFFECTING STALL SPEED

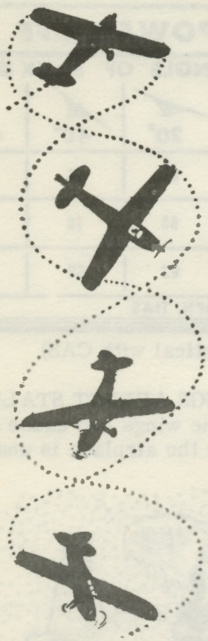


FIG. 1

A recent report indicates that approximately 80% of all accidents are pilot caused. The major cause of fatal accidents is listed as "failed to maintain airspeed (or flying speed) resulting in a stall." Although many of these stalls may have occurred under the stress and duress of other problems such as disorientation during limited visibility or at night, improper division of attention, etc., a review of statistical analyses of written examinations indicates a lack of knowledge and understanding of the various factors that can cause or contribute to a stall. This Exam-O-Gram discusses some of the more important, ever-present factors of which the pilot must have an understanding so that he will instinctively avoid or compensate for situations, conditions, and attitudes which may lead to a stall--even under the stress and duress of additional problems he may encounter in flight.

WHAT CAUSES AN AIRPLANE TO STALL? All stalls are caused by exceeding the critical angle of attack. Knowing this particular fact does not necessarily help the pilot. What is more important to the pilot is to know what factors are likely to contribute to or cause this angle of attack to be exceeded.

IS IT NECESSARY FOR THE AIRPLANE TO HAVE A RELATIVELY LOW AIRSPEED IN ORDER FOR IT TO STALL? No! An airplane can be stalled at any airspeed. All that is necessary is to exceed the critical angle of attack. This can be done at any airspeed if the pilot applies abrupt or excessive back pressure on the elevator control. A stall that occurs at a relatively high speed is referred to as an accelerated or high speed stall.

IS IT NECESSARY FOR THE AIRPLANE TO HAVE A RELATIVELY HIGH PITCH ATTITUDE IN ORDER FOR IT TO STALL? No! An airplane can be stalled in any attitude. Repeating again the statement made above - all that is necessary is to exceed the critical angle of attack. This can occur in any attitude by application of abrupt or excessive back pressure on the elevator control.

DOES WEIGHT AFFECT THE STALLING SPEED? Yes! As the weight of the airplane is increased, the stall speed increases. Due to the greater weight, a higher angle of attack must be maintained to produce the additional lift to support the additional weight in flight. Therefore, the critical angle of attack will be reached at a higher airspeed when loaded to maximum gross weight than when flying solo with no baggage. (See Exam-O-Gram No. 13.)

DOES THE CENTER-OF-GRAVITY LOCATION (WEIGHT DISTRIBUTION) AFFECT STALL SPEED? Yes! The farther forward the center of gravity, the higher the stalling speed. The farther aft the center of gravity, the lower the stalling speed. (See Exam-O-Gram No. 13.)

DOES THIS MEAN THAT THE WEIGHT SHOULD BE DISTRIBUTED IN THE AIRPLANE SO THAT THE CG IS AS FAR TO THE REAR AS POSSIBLE? No! This may present problems with stability that will far outweigh any advantages obtained by the decrease in stall speed. (See Exam-O-Gram No. 13.)

*Exam-O-Grams are non-directive in nature and are issued solely as an information service to individuals interested in Airman Written Examinations.

DO FLAPS AFFECT STALLING SPEED? Yes! The use of flaps reduces stalling speed. The Stall Speed Chart (Figure 2) excerpted from an airplane flight manual illustrates this fact. This also can be readily verified by checking the color coding on any airspeed indicator. The lower airspeed limit of the white arc (power-off stalling speed with gear and flaps in the landing configuration) is less than the lower airspeed limit of the green arc (power-off stalling speed in the clean configuration). (See EXAM-O-GRAM No. 8.) This fact is important to the pilot in that when making no-flap landings, a higher indicated airspeed should be maintained than when landing with flaps. The manufacturers' recommendations should be adhered to as to approach speeds with various configurations.

STALL SPEED, POWER OFF

Gross Weight 3000 lbs. / CONFIGURATION	ANGLE OF BANK 0°	20°	40°	60°
GEAR & FLAPS UP	65	67	74	92
GEAR DOWN, FLAPS 20°	61	63	70	86
GEAR DOWN, FLAPS 40°	60	62	69	85

SPEEDS ARE MPH, TIAS

FIG. 2. (Note: TIAS identical with CAS)

DOES AN ACCUMULATION OF FROST, SNOW, OR ICE ON THE WINGS AFFECT STALLING SPEED? Yes! Even a light accumulation of frost, snow, or ice on the wings can cause a significant increase in stalling speed. It can increase it so much that the airplane is unable to take off. The accumulation disrupts the smooth flow of air over the wing thus decreasing the lift it produces. To make up for the lost lift, a higher angle of attack must be used or a higher speed must be attained on the takeoff roll. The runway may not be long enough to attain the necessary speed and even though the airplane may become airborne, it could be so close to the stall speed that it would not be possible to maintain flight once the airplane climbs above the comparatively shallow zone where ground effect prevails. DO NOT TAKE OFF UNTIL ALL FROST, SNOW, OR ICE HAS MELTED OR BEEN REMOVED FROM THE AIRPLANE.

FIG. 3

DOES AN INCREASE IN ALTITUDE AFFECT THE INDICATED AIRSPEED AT WHICH AN AIRPLANE STALLS? An increase in altitude has no effect on the indicated airspeed at which an airplane stalls at altitudes normally used by general aviation aircraft. That is, for all practical purposes, the indicated stalling speed remains the same regardless of altitude in this range. This fact is important to the pilot in that the same indicated airspeed should be maintained during the landing approach regardless of the elevation or the density altitude at the airport of landing. (Follow the manufacturer's recommendations in this regard.) If higher than normal approach airspeed is used, a longer landing distance will be required.

DOES AN INCREASE IN ALTITUDE AFFECT THE TRUE AIRSPEED AT WHICH AN AIRPLANE STALLS? Since true airspeed normally increases as altitude increases (for a given indicated airspeed), then true airspeed at which an airplane stalls generally increases with an increase in altitude. Under non-standard conditions (temperature warmer than standard) there is an additional increase in true airspeed above the indicated airspeed.

OF WHAT SIGNIFICANCE IS THIS TO THE PILOT? It is significant in that when landing at higher elevations or under higher density altitudes, he is operating at higher true airspeeds (and therefore higher groundspeeds) throughout the approach, touchdown, and landing roll. This results in a greater distance to clear obstacles during the approach, a longer ground roll, and consequently, the need for a longer runway. If, in addition, the pilot is operating under the misconception that a higher than normal indicated airspeed should be used under these conditions, the situation is further compounded due to the additional increase in groundspeed. (See EXAM-O-GRAM No. 26.)

DOES TURBULENCE AFFECT STALLING SPEED? Yes! Turbulence can cause a large increase in stalling speed. Encountering an upward vertical gust causes an abrupt change in relative wind. This results in an equally abrupt increase in angle of attack which could result in a stall. This fact is important to the pilot in that when making an approach under turbulent conditions, a higher than normal approach speed should be maintained. Also, in moderate or greater turbulence, an airplane should not be flown above maneuvering speed. (See EXAM-O-GRAM No. 8.) At the same time, it should not be flown too far below maneuvering speed since a sudden severe vertical gust may cause the airplane to stall due to the higher angle of attack at which it will already be flying.

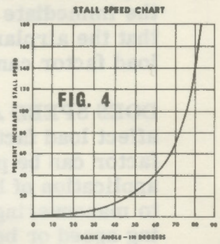


FIG. 4

DOES ANGLE OF BANK AFFECT STALLING SPEED? Yes! As the angle of bank increases in a constant altitude turn, the stalling speed increases. This is easily seen from the STALL SPEED CHARTS (Figs. 2 and 4) which show the increase in stall speed as the angle of bank increases--Fig. 4 in terms of percent, Fig. 2 the actual values for one airplane. At a 60° bank stalling speed is 40% greater than in straight-and-level flight (25-27 mph for the specific example.) At angles of bank above 60°, stall speed increases very rapidly, and at approximately 75° it is doubled with respect to straight-and-level stall speed (Fig. 4).

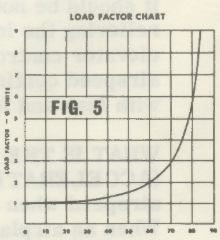
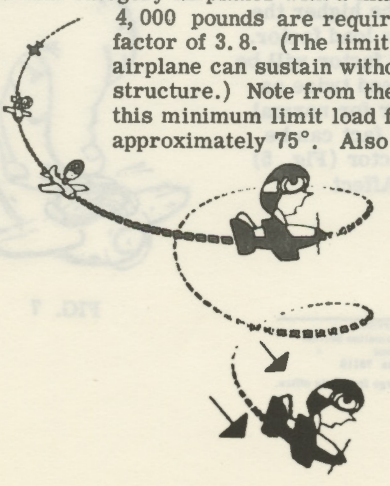


FIG. 5

DOES LOAD FACTOR AFFECT STALLING SPEED? Yes! As the load factor increases, stalling speed increases. When the load factor is high, stalling speed is high. A comparison of the two charts (Figs. 4 and 5) should easily show this relationship. Load factor is the ratio of the effective weight of an airplane and its contents to its actual weight. At a load factor of 2, the airplane weighs twice its normal weight; at a load factor of 4, it weighs 4 times its normal weight. Normal category airplanes with a maximum gross weight of less than 4,000 pounds are required to have a minimum limit load factor of 3.8. (The limit load factor is that load factor an airplane can sustain without taking a permanent set in the structure.) Note from the load factor chart (Fig. 5) that this minimum limit load factor is attained in a constant altitude turn at a bank of approximately 75°. Also note from the Stall Speed Chart (Fig. 4) that at this angle of bank, the stall speed is twice as great as in straight-and-level flight. There are two reasons then why excessively steep banks should be avoided--an airplane will stall at a much higher airspeed and the limit load factor can be exceeded. The danger is compounded when the nose gets down in a steep turn if the pilot attempts to raise it to the level flight attitude without shallowing the bank since the load factor will be increased even more. This is the situation as it generally exists when, due to disorientation, the pilot enters a diving spiral (often referred to as the "graveyard spiral") and attempts to recover with elevator pressure alone.



WHAT FACTORS CAUSE AN INCREASE IN LOAD FACTOR? Any maneuvering of the airplane that produces an increase in centrifugal force will cause an increase in load factor. Turning the airplane or pulling out of a dive are examples of maneuvering that will increase the centrifugal force and thus produce an increase in load factor. When you have a combination of turning and pulling out of a dive, such as recovering from a diving spiral, you are, in effect, placing yourself in double jeopardy. This is why you must avoid highspeed diving spirals or if you accidentally get into one--be careful how you recover. Turbulence can also produce large load factors. This is why an airplane should be slowed to maneuvering speed or below when encountering moderate or greater turbulence.

CAN THE PILOT RECOGNIZE WHEN THERE IS AN INCREASE IN LOAD FACTOR? Yes! He can recognize it by the feeling of increased body weight or the feeling that he is being forced down into the seat--the greater the load factor the greater this feeling of increased weight or of being forced down in the seat (Figs. 6 and 7). It is the same feeling one has when riding the roller coaster at the bottom of a dip or going around a banked curve. This feeling of increased body weight is important to the pilot because it should, if it becomes excessive, have the immediate effect of a red flag being waved in his face to warn him that the airplane will now stall at a higher airspeed or that the limit load factor can be exceeded, resulting in structural failure.

FIG. 6

DOES SPEED AFFECT LOAD FACTOR? Speed does not, in itself, affect load factor. However, it has a pronounced effect on how much of an increase in load factor can be produced by strong vertical gusts, or by the pilot through abrupt or excessive application of back pressure on the elevator control. This is why airspeed should be reduced to maneuvering speed or below if moderate or greater turbulence is encountered. At maneuvering speed or below, the airplane is stressed to handle any vertical gust that normally will be encountered. Also, below this speed, the pilot can make abrupt full deflection of the elevator control and not exceed the maximum load factor for which the airplane is stressed. However, it should be noted that the reason this is possible is because <u>the airplane will stall</u>, thus relieving the load factor. At airspeeds above maneuvering speed, abrupt full deflection of the elevator control or strong vertical gusts can cause the limit load factor to be exceeded. As airspeed continues to increase above maneuvering speed, the limit load factor can be exceeded with less and less turbulence or abrupt use or deflection of the controls.

WHAT IS THE RELATIONSHIP BETWEEN A HIGH SPEED (ACCELERATED) STALL AND LOAD FACTOR? The higher the airspeed when an airplane is stalled, the greater the load factor. When an airplane stalls at a slow airspeed, the load factor will be very little more than one. When stalled at an airspeed twice as great as the normal stall speed, the limit load factor for normal category airplanes probably will be exceeded. This fact can be determined from the stall speed (Fig. 4) and load factor (Fig. 5) charts. See also discussion of "Does Load Factor Affect Stalling Speed" (page 3).

FIG. 7

Prepared by FAA Flight Standards Service
Operations Airman Examination Section
5300 South Portland Avenue
Oklahoma City, Oklahoma 73119

Exam-O-Grams available free of charge from this office.

Bill Orr & C. A. Walker

OPERATOR OF THE MONTH

The new fixed base operation is Spartan Aviation, Inc.

C. A. Walker is President and Billy Orr is Vice President; Vic Fulop, Chief Pilot; Dick Morrison, Flight Instructor and Mrs. Orr is Secretary of the Company.

The new company is located at the Spartanburg Downtown Memorial Airport. Spartan Aviation is the Cessna Dealer for the Spartanburg area, and will also operate a flight school and charter service. They have 80-100 octane fuel available, unicom service and ground transportation. The offices are located in the terminal building.

Also located in the terminal building is the airport restaurant operated by John Ginn. John has short orders and plate lunches throughout the day.

In addition to Spartan Aviation, Billy Orr operates Orr's Aero Mechanix which does major and minor air-frame and power plant maintenance.

Billy is an authorized inspector and Bill Edwards is a mechanic.

CAROLINA'S 99'S

The Carolina's Chapter of the 99's has planned an all day airlift program for Saturday, June 19th at the Spartanburg Downtown Memorial Airport. Members will fly their own aircraft to carry passengers for the benefit of their scholarship fund. Rates will be ninety-nine (.99¢) cents for children and one ($1.99) dollar and ninety-nine cents for adults. Be sure and urge your friends to take advantage of this chance to fly and serve a worthy cause.

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THE AERIAL APPLICATORS ASSOCIATION

The S. C. Aerial Applicators Association met on May 17, 1965, to elect new officers for the coming year. Mr. George Gedra of the Gedra Flying Service of Darlington was elected Chairman of the Association and Mr. R. M. Weatherly was elected Vice-Chairman.

Members elected to the Advisory Committee are Les Hembel of Saluda, Henry Padgett, Fairfax; James Price, Dillon; Billy Lynam, Sumter and Bob Merck of Bishopville. Dan Fraley of the Aeronautics Commission will serve as Secretary to the Association.

The Aerial Applicators Association is organized for the purpose of cooperation, coordination and standardization in the field of aerial application and to continue development of the use of aircraft in agriculture, in close cooperation with Clemson University and the U. S. Department of Agriculture.

It is the belief of this association that this movement will result in a much better understanding and relationship between farmer and the aerial applicator and between the aerial applicator and other interested persons and agencies.