

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



ERA23FA340

OPERATIONS AND ORGANIZATION

Factual Report

August 9, 2024

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A. ACCIDENT

Location: Ft. Pierce, Florida
Date: August 17, 2023
Time: 1202 local
1602 UTC
Airplane: Piper PA28-161, N9855S

B. OPERATIONS AND ORGANIZATION

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C. SUMMARY

On August 17, 2023, about 1202 eastern daylight time, a Piper PA28-161 airplane, N9855S, was destroyed when it impacted a building near Ft. Pierce, Florida. One flight instructor was fatally injured, and the other flight instructor sustained serious injuries. The airplane was operated by Aviator College under the provisions of Title 14 *Code of Federal Regulations* Part 91 as a training flight.

1.0 Details of the Investigation

The operational and organizational factors were reviewed by the NTSB Investigator-in-Charge. This limited factual report provides an overview of the flight crew, expected flight training plan and maneuvers, and organizational factors for the flight school involved in the accident.

2.0 History of Flight

According to the flight instructor seated in the left seat, the purpose of the flight was to conduct a Title 14 *CFR* Part 141 proficiency check in order for the flight instructor seated in the right seat to begin instructing at the flight school. The flight departed from Treasure Coast International Airport (FPR), Fort Pierce, Florida and proceeded about 10 miles southwest to perform a variety of training maneuvers.

The left seat instructor administering the evaluation reported that the right seat instructor satisfactorily demonstrated maneuvers including chandelles, lazy eights, and slow flight. Subsequently, the right seat instructor asked him, "Can you show me something new?"

The left seat instructor responded that given he was already an instructor, there were no new maneuvers, but added, "I can show you an EASA [European Union

Aviation Safety Agency (EASA)] maneuver.” He described that the maneuver involved a power-off aerodynamic stall and recovery without the use of engine power. The left seat instructor took the flight controls and initiated the demonstration; he pitched up and entered a full aerodynamic stall, with power at idle. After the airplane stalled, he recalled pitching to “Vg” (glide airspeed, 73 knots) to recover from the stall. During the recovery, with power at idle, he stated, “the right wing came off” and there was an “abrupt banking tendency” to the right.

He recalled that he retracted the flaps, and added rudder and aileron application, but his “eyes were getting blurry,” he was starting to see “white,” and the airplane was “losing altitude like crazy.” He also noticed that a lot of wind was entering the cockpit. Subsequently, his next memory was awaking in the hospital. He did not recall observing any other components depart the airplane.

Multiple witnesses located near the accident site reported a similar circumstance in which booms or bangs were heard with variable fast changing low and high power revving engine noises. Subsequently, the witnesses viewed the airplane as it descended in a near vertical spinning descent, with both wings separated from the fuselage and numerous additional pieces of debris falling from the sky. A mobile phone video showed one wing falling to the ground.

The fuselage, with the engine remaining attached to the airframe, impacted an aluminum frame building that housed a recreational vehicle (RV). The airplane came to rest after descending through the building and partially into the RV. Both wings and two horizontal stabilator sections separated from the airplane in-flight and were located about 700-800 ft east of the fuselage. Fragments of the cabin door were also located several hundred feet from the fuselage, along with miscellaneous items from the cockpit such as the tow bar. Figure 1 provides an overview of the ADS-B flight track and wreckage distribution.

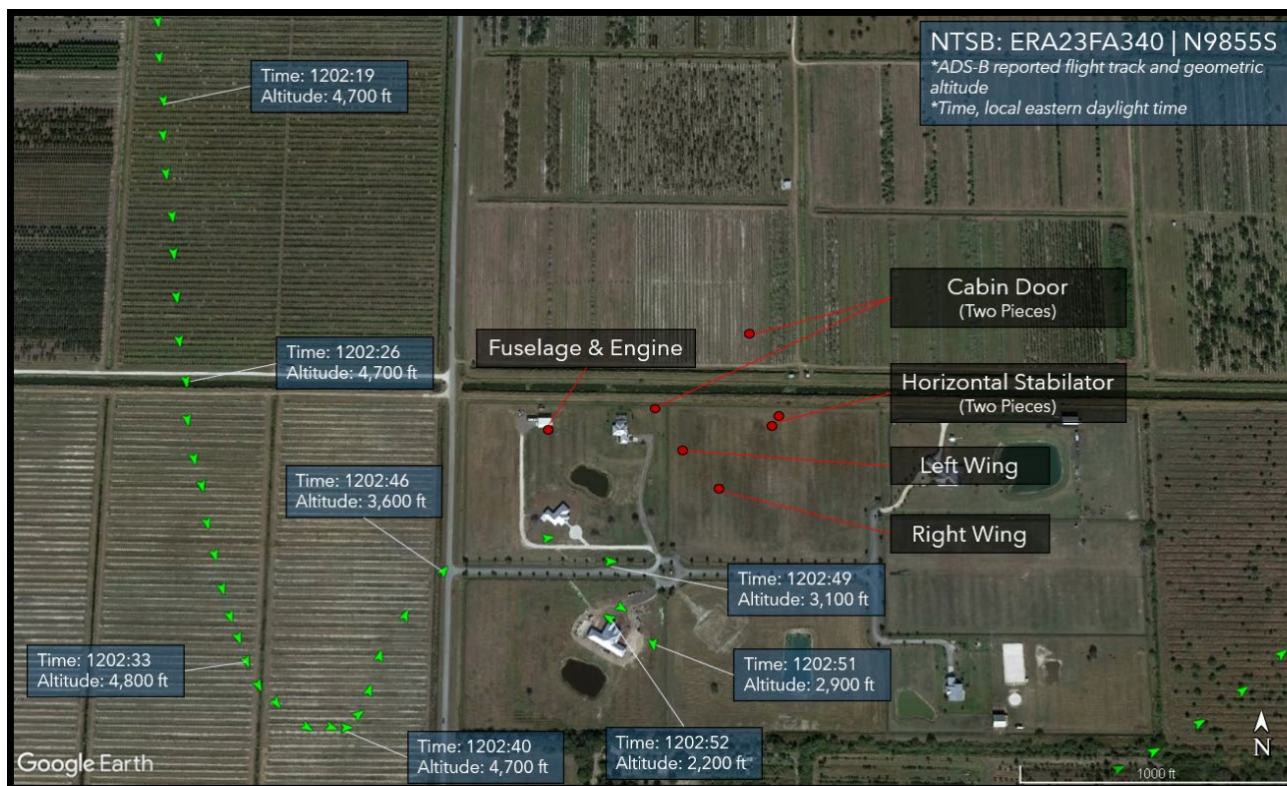


Figure 1: Overview of the final 30 seconds of ADS-B flight track data and wreckage distribution.

Refer to the National Transportation Safety Board Research and Engineering Airplane Performance Study and Materials Factual Reports for additional information pertaining to the flight profile and metallurgical review of the airplane structure.

2.1 Flight Instructor (Left Seat)

The flight instructor seated in the left seat survived the accident with serious injuries. According to the operator, he was an employed flight instructor with Aviator College.

According to FAA airman records, he held a commercial pilot certificate with ratings for airplane single and multi-engine, and instrument airplane. He also possessed a flight instructor certificate with privileges for airplane, instrument airplane, and multi-engine airplane. He was issued a first-class medical on April 13, 2023. According to operator records, his most recent flight review was completed on February 3, 2023.

2.1.1 Flight Hours

The following hours were provided by Aviator College via the NTSB Pilot/Operator Aircraft Accident/Incident Report form.

Flight Time	All Aircraft	This Make and Model
Previous 24 hours	4	2
Previous 30 days	84	32
Previous 90 days	208	61
Time as Instructor	1309	240
Total Flight Experience PIC	1558	361
Total Flight Experience	1681	421

2.2 Flight Instructor (Right Seat)

The flight instructor seated in the right seat was fatally injured. According to an Employee Hiring Form, August 8, 2023, was his official start date with Aviator College as a Certified Flight Instructor.

According to FAA airman records, he held a commercial pilot certificate with ratings for airplane single and multi-engine, and instrument airplane. He also possessed a flight instructor certificate. He was issued a first-class medical on October 12, 2021. His most equivalent flight review was completed on August 7, 2023.

2.2.1 Flight Hours

The following hours were provided by Aviator College via the NTSB Pilot/Operator Aircraft Accident/Incident Report form.

Flight Time	All Aircraft	This Make and Model
Previous 24 hours	1	1
Previous 30 days	9	1
Previous 90 days	21	1
Time as Instructor	0	0
Total Flight Experience PIC	200	16
Total Flight Experience	287	92

3.0 Airplane Information

The Airplane

According to FAA airworthiness records, the airplane was a Piper PA28-160, serial number 2842151, manufactured in 2002. The airplane was certificated in the normal and utility category.

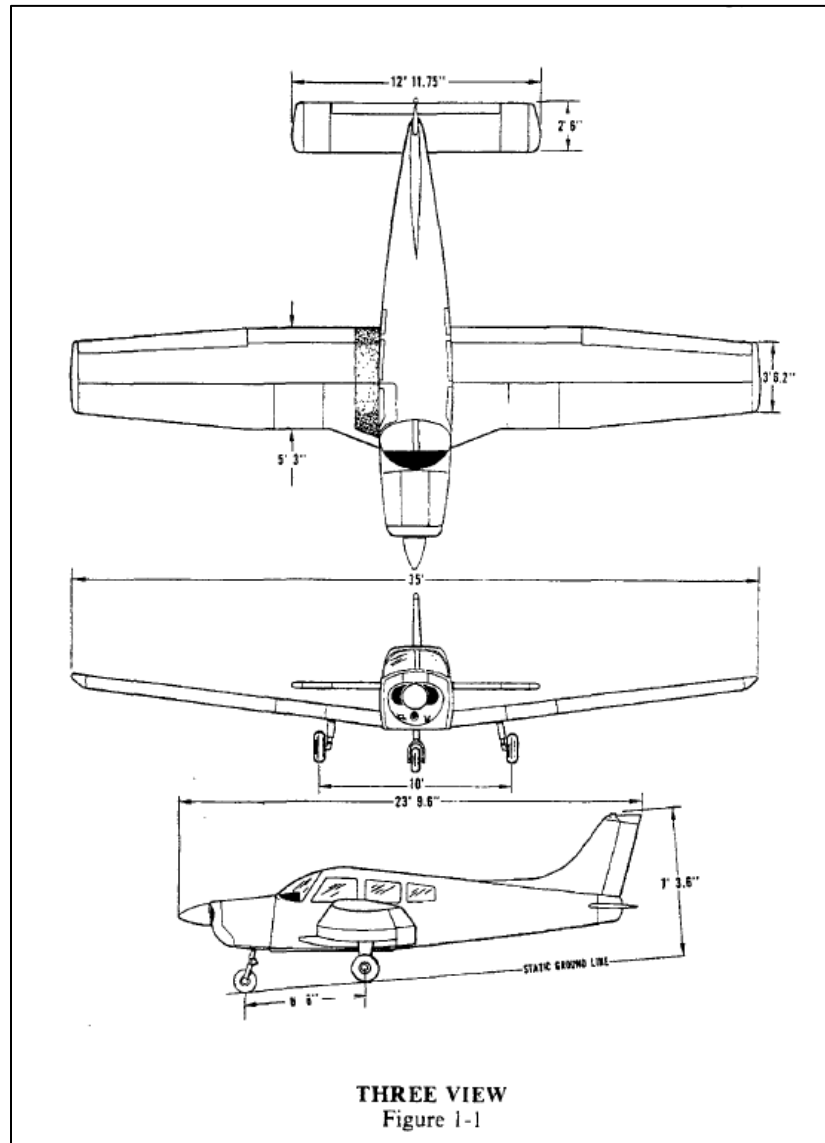


Figure 2: Three view airplane drawing.

The pilot's operating handbook (POH) provided several limitations, with excerpts noted below.

<u>Airspeed Limitations</u>	<u>KIAS¹</u>	<u>KCAS²</u>
Never Exceed Speed (Vne)	160	153
Maximum Structural Cruising Speed (Vno)	126	122
Design Maneuvering Speed (Va)		
2440 lbs Gross Weight	111	108
1531 lbs Gross Weight	88	89

Maneuver Limits

Normal Category - All acrobatic maneuvers including spins prohibited.

Utility Category - Approved Maneuvers for bank angles exceeding 60°

<u>Maneuver</u>	<u>Entry Speed</u>
Steep Turns	111 KIAS
Lazy Eights	111 KIAS
Chandelles	111 KIAS

Flight Load Factors

	<u>Normal</u>	<u>Utility</u>
Positive Load Factor (Maximum)	3.8g	4.4g
Negative Load Factor (Maximum)	No inverted maneuvers approved	

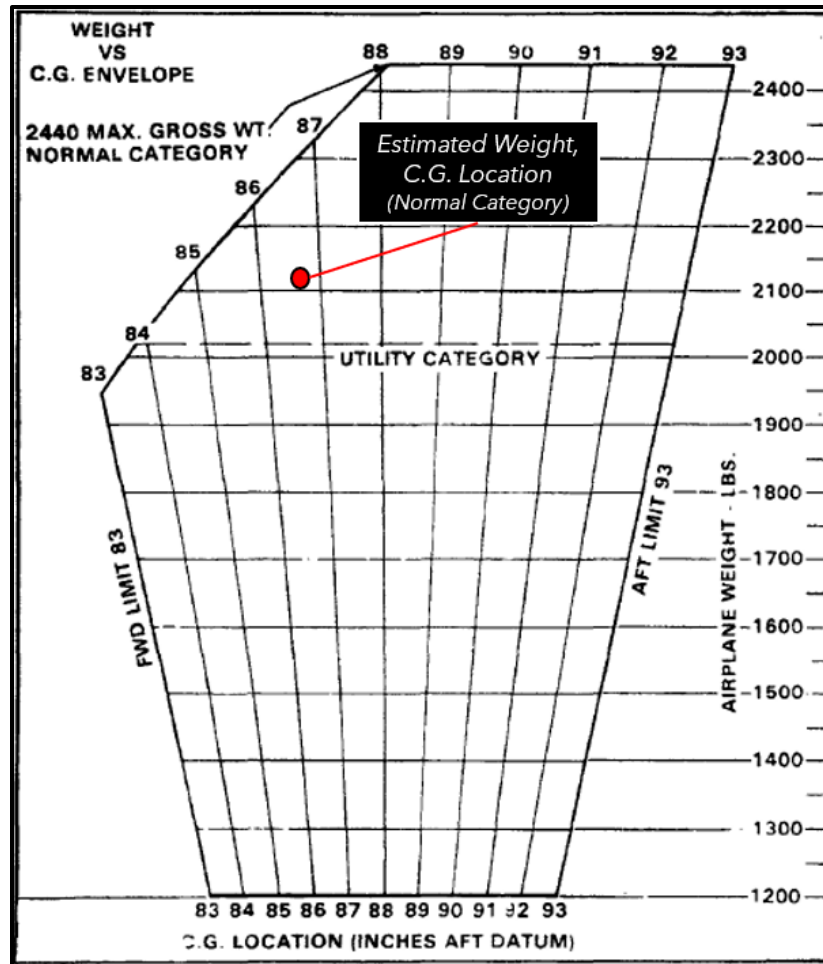
Weight and Balance

According to the POH, the airplane's weight and balance limits in the normal category was 2,440 lbs takeoff weight. The utility category was limited to 1950 lbs with the most forward center of gravity (C.G.) and 2,020 lbs with the most rearward C.G.

The airplane's weight and balance were calculated based upon an operator supplied Basic Empty Weight, and FAA medical obtained crew weights. The fuel load and burn were estimated based upon information submitted by the operator and ADS-B flight track data. The airplane was found to be in the normal category and within maximum weight and balance limitations. Refer to Figure 3 for weight and balance calculations.

¹ Knots Indicated Airspeed

² Knots Calibrated Airspeed



Weight and Balance	Weight (lbs)	Arm	Mom.
Basic Empty Weight	1541.25	85.9	132393
2 Front Seat Occupants	325	80.5	26162.5
Fuel 40g (Est. 8g Fuel Burn)	240	95	22800
Baggage	20	142.8	2856
<i>Aproximate Weight at Accident Time</i>	2126.25		184212
		C.G.	86.637

Figure 3: Approximate Weight and Balance at time of accident.

4.0 The Operator

The operator was Aviator College of Aeronautical Science and Technology³, based in Fort Pierce, Florida. The flight school held a Part 141 certificate. The operator's website provided information pertaining to multiple pilot career oriented training programs marketed to domestic and international customers.

According to the operator's College Catalog, 'Aviator College of Aeronautical Science & Technology is an accredited, co-educational, degree-granting institution of

³ [Aviation Degree | United States | Aviator College](#)

higher learning. It is dedicated to providing individuals with quality flight training that will prepare students with entry-level skills necessary for employment in the field of aviation.'

The operator further reported, *'more than 45,000 FAA licenses have been earned by students at Aviator College. Most of the College's graduate pilots fly professionally in the United States and internationally. The College's fleet has increased to more than 40 aircraft, flying more than 35,000 hours yearly.'*

4.1 The Operator's Safety Programs

According to the operator's Chief Flight Instructor, they did not have a Safety Management System (SMS) or a Flight Data Monitoring (FDM) program. The operator did have an Aviation Safety Action Program (ASAP).

The College Catalog described the ASAP program:

The FAA has joined with Aviator College to establish a program to foster a voluntary, cooperative, non-punitive environment for reporting safety concerns. For complete information on the ASAP, please consult the memorandum of understanding (MOU) available from the Aviation Safety Department. Covered individuals include Students, Flight Instructors, and Airplane Mechanics, but only while conducting flights or operations at Aviator College. The goal of the Aviation Safety Action Program (ASAP) is to enhance aviation safety through the prevention of accidents and incidents. Its focus is to encourage voluntary reporting of safety issues and events that come to the attention of employees of certain certificate holders.

Enforcement-related incentives have been designed into the program to encourage employees to voluntarily report safety issues even though they may involve an alleged violation of Title 14 of the Code of Federal Regulations (14 CFR). An ASAP is based on a safety partnership that will include the Federal Aviation Administration (FAA) and the certificate holder and may include any third party, such as the employee's labor organization. Events must be reported through Aviator College's accident/incident reporting program. Reports may be filed through the WBAT portal or by phone. Events should be reported as soon as possible. Non-sole source reports should be completed within 24 hours of the end of training activities for the day it occurred or within 24 hours of becoming aware of possible non-compliance with the regulations.

The operator was requested to provide any ASAP reports that involved the accident airplane or flight crew. Three reports were discovered, and all were found to be related to compliance with air traffic control instructions.

5.0 Part 141 Flight Instructor Proficiency Check

According to an operator document, Instructor Briefing Sheet Test, CFI Proficiency Check – 141 Rev.2, several items were to be evaluated by the left seat flight instructor during the 141 checkout being conducted. The check was required in order for the right seat flight instructor to begin training Aviator College students. The actual form for the accident flight had yet to be completed.

The lesson objective was stated as: *'Part 141 requires all flight instructors to be qualified to teach each course of training to which they are assigned, and prescribes certain knowledge and proficiency tests to be accomplished prior to being assigned to an approved training course.'*

The lesson completion standard was stated as: *'The instructor must satisfactorily accomplish a one-time proficiency test in each M/M [make and model] of aircraft (Piper PA28-161) before giving any flight instruction in the particular aircraft. The flight instructor shall meet or exceed the Commercial Pilot Airplane ACS [Airman Certification Standards].'*

The proficiency check required multiple maneuvers to be completed. The below table provides a listing of the maneuvers to be completed and notes pertaining to how the examiner may choose one maneuver from each category.

Basic Maneuvers

Score this
Flight

Straight-and-Level Flight	Review
Turns at different Bank Angles	Review
Climbs and Descents	Review
Climbing and Descending Turns	Review

Ground Reference Maneuvers

(The check instructor shall select at least one ground reference maneuver to be performed)

Rectangular Course	Review
S-Turns	Review
Turns Around a Point	Review
Eights on Pylons	Review

Performance Maneuver

(The check instructor shall select at least two maneuver to be performed)

Steep Turns	Review
Steep Spiral	Review
Chandelles	Review
Lazy Eights	Review

Slow Flight and Stalls

(The check instructor shall select at least two maneuver to be performed)

Maneuvering During Slow Flight	Review
Power-Off Stall	Review

Power-On Stall
Accelerated Stalls
Spin Awareness

Review
Review
Review

The flight instructor administering the evaluation reported that the other flight instructor had demonstrated chandelles, lazy eights, slow flight, and aerodynamic stalls satisfactorily. The flight instructor administering the evaluation described that at the time of the accident, he was demonstrating an “EASA” maneuver, as described in the history of flight section above.

This maneuver was not a part of the Instructor Briefing Sheet Test, CFI Proficiency Check – 141 Rev.2.

5.1 The Operator’s Flight Operations Manual

The operator’s PA28-161, Flight Operations Manual (FOM), provided a maneuvers and procedures section. A review of this section found no reference to an “EASA maneuver” as described by the flight instructor administering the evaluation.

The operator’s PA28-161, FOM, provided a “Pre-Maneuver Checklist Flow, to be completed prior to any maneuver. The manual further stated, *‘this checklist shall be complete prior to starting any maneuver. If multiple maneuvers are conducted in sequence, this checklist needs only be verified as complete during all subsequent maneuvers.’*

PRE-MANEUVER (SOP)	
Fuel Selector	FULLEST TANK
Mixture	ENRICH AS REQUIRED
Carburetor Heat	OFF
Lights	(as required) ON
Magnetos	BOTH
Engine Instruments	CHECK
Seats / Seatbelts / Harnesses	ON / CHECK
► Clearing Turns	COMPLETED
Area / Altitude / Airspeed	SELECTED / ACCEPTED
Trim	SET

Figure 4: The operator’s pre-maneuver checklist.

5.2 The Operator’s Flight Operations Manual, Performance Maneuvers

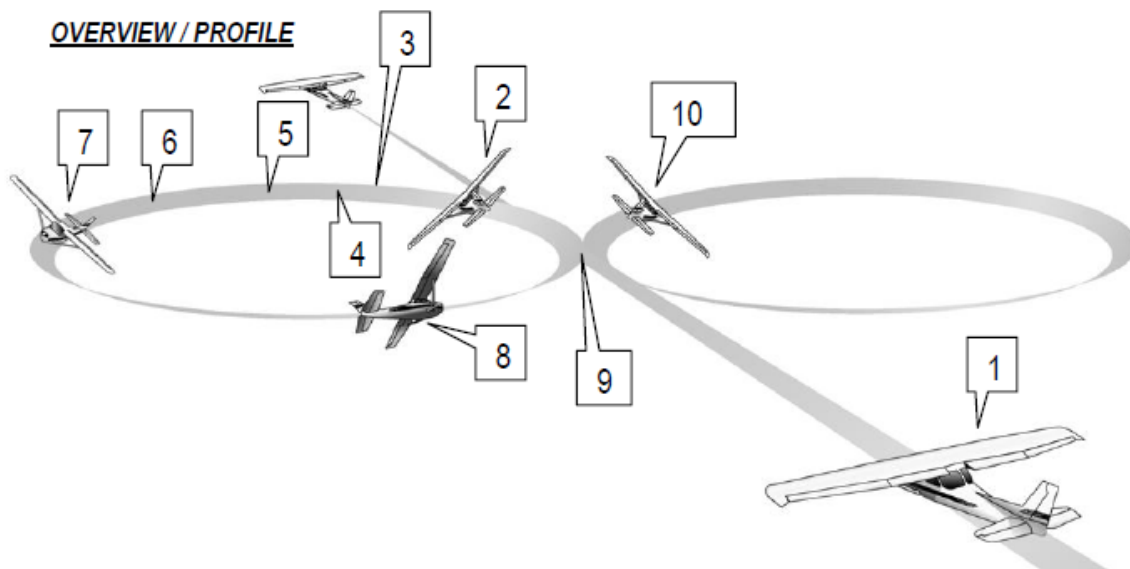
The operator’s PA28-161, FOM, provided detailed guidance on the performance of Steep Turns. The manual stated in part:

DEFINITION(S)

The steep turn maneuver consists of two consecutive 360° turns in either direction (usually first to the left and then to the right), using a bank angle between 45 to 60° (45° bank angle at the Private Pilot level and 50° at the Commercial Pilot level). This will cause an overbanking tendency during which maximum turning performance is attained and relatively high load factors are imposed.

PURPOSE(S) OF THE MANEUVER

The objective of the maneuver is to develop the smoothness, coordination, orientation, division of attention between inside and outside references, and control techniques necessary for the execution of maximum performance turns when the airplane is near its performance limits. Smoothness of control use, coordination, and accuracy of execution are the important features of this maneuver.



STEP-BY-STEP PROCEDURES

1. Establish A/C at 2,500ft MSL on a selected heading (use cardinal headings for general orientation, prominent landmark such as a road, canal or railroad). Power should be set to cruise power setting 2300 RPM. A/C trimmed for level flight.
2. Initiate the first turn to the left through a smooth and coordinated use of ailerons and rudder deflection.

3. As the bank angle increases, apply necessary back elevator pressure to maintain altitude.
4. As the bank angle reaches about 30°, increase the power to 2350 to 2400 RPM to maintain the selected A/S (≈90 KIAS).
5. As the airplane reaches the desired bank angle (45° bank angle at the Private Pilot level and 50° at the Commercial Pilot level), apply slight aileron pressure in the opposite direction of the turn to compensate for the airplane's overbanking tendency. This will allow the airplane to maintain the desired bank angle.
6. Maintain constant awareness by referring to outside and inside references for any gain or loss of altitude, changes in attitude, changes in airspeed and general spatial orientation during the turn.
7. If the altitude begins to increase, or decrease, relaxing or increasing the back-elevator pressure will be required as appropriate. A small increase or decrease of 1 to 3° of bank angle may be used to control small altitude deviations. Small power adjustments may be required to maintain A/S.
8. As the airplane approaches the rollout heading (anticipate by half of the bank angle), smoothly roll the airplane back to wings level so that the wings reach level flight when the airplane is exactly on the heading from which the maneuver was started.
9. As the airplane rolls out, back-elevator pressure is gradually released and power reduced, as necessary, to maintain the altitude and airspeed.
10. Proceed to initiate a steep turn in the other direction using the same techniques described here above.
11. Once A/C has completed the second consecutive turn, exit the maneuver on the original heading and resume back to normal cruise configuration.

COMMON MISTAKES

- ☐ Failure to adequately clear the area.
- ☐ Excessive pitch change during entry or recovery.
- ☐ Attempts to start recovery prematurely.
- ☐ Failure to stop the turn on a precise heading.
- ☐ Excessive rudder during recovery, resulting in skidding.
- ☐ Inadequate power management.

- ❑ Inadequate airspeed control.
- ❑ Poor coordination.
- ❑ Gaining altitude in right turns and/or losing altitude in left turns.
- ❑ Failure to maintain constant bank angle.
- ❑ Disorientation.
- ❑ Attempting to perform the maneuver by instrument reference rather than visual reference.
- ❑ Failure to scan for other traffic during the maneuver.

COMPLETION STANDARDS

Private Pilot ASEL PTS, AREA OF OPERATION V, TASK A: Steep Turns

Commercial Pilot ASEL PTS, AREA OF OPERATION V, TASK A: Steep Turns

CFI ASE PTS, AREA OF OPERATION IX, TASK A: Steep Turns

Airline Transport Pilot ASEL PTS, AREA OF OPERATION IV, TASK A: Steep Turns

5.3 The FAA Airplane Flying Handbook, Steep Turns

The Federal Aviation Administration (FAA) Airplane Flying Handbook provided guidance on the execution of several performance maneuvers, including steep turns. The handbook stated in part:

Steep Turns

Steep turns consist of single to multiple 360° and 720° turns, in either or both directions, using a bank angle between 45° and 60°. The objective of the steep turn is to develop a pilot's skill in flight control smoothness and coordination, an awareness of the airplane's orientation to outside references, division of attention between flight control applications, and the constant need to scan for hazards and other traffic in the area.

While the fundamental concepts of all turns are the same, when steep turns are first demonstrated and performed, the pilot will be exposed to:

1. Higher G-forces
2. The airplane's inherent overbanking tendency
3. Significant loss of the vertical component of lift when the wings are steeply banked
4. Substantial pitch control pressures
5. The need for increased additional power to maintain altitude at a constant airspeed during the turn

As discussed in previous chapters, when banking an airplane for a level turn, the total lift divides into vertical and horizontal components of lift. In order to maintain altitude at a constant airspeed, the pilot increases the angle of attack (AOA) to ensure that the vertical component of lift is sufficient to maintain altitude. The pilot adds power as needed to maintain airspeed. For a steep turn, as in any level turn, the horizontal component of lift provides the necessary force to turn the airplane. Regardless of the airspeed or airplane, for a given bank angle in a level altitude turn, the same load factor will always be produced. The load factor is the vector addition of gravity and centrifugal force. When the bank becomes steep as in a level altitude 45° banked turn, the resulting load factor is 1.41. In a level altitude 60° banked turn, the resulting load factor is 2.0. To put this in perspective, with a load factor of 2.0, the effective weight of the aircraft (and its occupants) doubles. Pilots may have difficulty with orientation and movement when first experiencing these forces. Pilots should also understand that load factors increase dramatically during a level turn beyond 60° of bank. Note that the design of a standard category general aviation airplane accommodates a load factor up to 3.8. A level turn using 75° of bank exceeds that limit.

Because of higher load factors, steep turns should be performed at an airspeed that does not exceed the airplane's design maneuvering speed (VA) or operating maneuvering speed (VO). Maximum turning performance for a given speed is accomplished when an airplane has a high angle of bank. Each airplane's level turning performance is limited by structural and aerodynamic design, as well as available power. The airplane's limiting load factor determines the maximum bank angle that can be maintained in level flight without exceeding the airplane's structural limitations or stalling. As the load factor increases, so does the stalling speed. For example, if an airplane stalls in level flight at 50 knots, it will stall at 60 knots in a 45° steep turn while maintaining altitude. It will stall at 70 knots if the bank is increased to 60°. Stalling speed increases at the square root of the load factor. As the bank angle increases in level flight, the margin between stalling speed and maneuvering speed decreases. At speeds at or below VA or VO, the airplane will stall before exceeding the design load limit.

In addition to the increased load factors, the airplane will exhibit what is called "overbanking tendency" as previously discussed in Chapter 3, Basic Flight Maneuvers. In most flight maneuvers, bank angles are shallow enough that the airplane exhibits positive or neutral stability about the longitudinal axis. However, as bank angles steepen, the airplane will continue rolling in the direction of the bank unless deliberate and opposite aileron pressure is held. Pilots should also be mindful of the various left-turning tendencies, such as P-factor, which require effective rudder/aileron coordination. While performing a steep turn, a significant component of yaw is experienced as motion away from and toward the earth's surface, which may seem confusing when first experienced.

D. LIST OF ATTACHMENTS

Attachment 1 - Operations Related Document Excerpts

Submitted by:

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