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ADVISORY CIRCULAR

DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION

SUBJECT: HAZARDS ASSOCIATED WITH SPINS IN AIRPLANES PROHIBITED FROM
INTENTIONAL SPINNING

1. PURPOSE. This advisory circular has been published for the following purposes:

- a. To inform pilots of the airworthiness standards for the type certification of small airplanes prescribed in Section 23.221 of the Federal Aviation Regulations (FARs) concerning spin maneuvers;
- b. To emphasize the importance of observing restrictions which prohibit the intentional spinning of certain airplanes;
- c. To recommend specific flight operations procedures to reduce the probability of entering an inadvertent spin during the performance of stall entries and recoveries; and
- d. To reduce the number of airplane accidents resulting from spins.

2. DISCUSSION.

- a. There has been an alarmingly high number of accidents resulting from failure to recover from either intentional or inadvertent spins in airplanes placarded against intentional spins. Nearly 45 percent of all FATAL accidents in small airplanes have been attributed to stall/spin causes.
 - b. We have determined that some private and commercial pilots as well as some flight instructors are misinformed about the reasons for operating restrictions against spins.
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Initiated by: AFS-444

3. INFORMATION. Operating limitations are imposed for the safety of the pilot and his passengers and operations contrary to these restrictions are a serious compromise of safety. It is, therefore, most important that all pilots, flight and ground instructors, and pilot examiners apply the following information to pilot training and flight operations.

a. Airworthiness Standards - Spinning (FAR 23.221).

- (1) Normal Category. A single-engine normal category airplane must be able to recover from a one-turn spin or a three-second spin, whichever takes longer, in not more than one additional turn with the controls used in the manner normally used for recovery. In addition:
- (a) For both the flaps-retracted and flaps-extended conditions, the applicable airspeed limit and positive limit maneuvering load factor may not be exceeded;
 - (b) There may be no excessive back pressure during the spin recovery; and
 - (c) It must be impossible to obtain uncontrollable spins with any use of the controls.

For the flaps-extended condition, the flaps may be retracted during recovery.

NOTE: Since airplanes certificated under these rules have not been tested for more than a one-turn or three-second spin, their performance characteristics beyond these limits are unknown. THIS IS WHY THEY ARE PLACARDED AGAINST INTENTIONAL SPINS.

- (2) Acrobatic Category. An acrobatic category airplane must meet the following requirements:
- (a) The airplane must recover from any point in a spin in not more than one and one-half additional turns after normal recovery application of the controls. Prior to normal recovery application of the controls, the spin test must proceed for six turns or three seconds, whichever takes longer, with flaps-retracted, and one turn or three seconds, whichever takes longer, with flaps extended. However, beyond three seconds, the spin may be discontinued when spiral characteristics appear with flaps-retracted.

- (b) For both the flaps-retracted and flaps-extended conditions, the applicable airspeed limit and the positive limit maneuvering load factor may not be exceeded. For the flaps-extended condition, the flaps may be retracted during recovery, if a placard is installed prohibiting intentional spins with flaps-extended.
- (c) It must be impossible to obtain uncontrollable spins with any use of the controls.

NOTE: Since airplanes certificated under these rules have not been tested for more than six turns or three seconds, their performance characteristics beyond these limits are unknown.

- (3) Utility Category. A utility category airplane must meet the requirements for either the normal or acrobatic category.
- b. Under FAR 23.1567, all airplanes type certificated under Part 23 must have a flight maneuver placard containing the following information:
- (1) For normal category airplanes, there must be a placard in front of and in clear view of the pilot stating: "No acrobatic maneuvers, including spins, approved."
 - (2) For utility category airplanes, there must be a placard in clear view of the pilot stating: "Acrobatic maneuvers are limited to the following" (list approved maneuvers).
 - (3) For acrobatic category airplanes, there must be a placard in clear view of the pilot listing the approved acrobatic maneuvers and the recommended entry airspeed for each. If inverted flight maneuvers are not approved, the placard must bear a notation to this effect.
- c. THE PILOT OF AN AIRPLANE PLACARDED AGAINST INTENTIONAL SPINS SHOULD ASSUME THAT THE AIRPLANE MAY BECOME UNCONTROLLABLE IN A SPIN.
- d. A spin is an aggravated stall condition involving rotation approximately about the vertical axis with the nose at an angle toward the surface from a horizontal plane. Except for airplanes requiring special recovery techniques which are included in the approved Airplane Flight Manual, placards, or approved manual materials, the recommended recovery procedures from a spin are:
- (1) To positively apply full rudder opposite to the direction of rotation to reduce or stop the rotation;
 - (2) Immediately and positively move the elevator control (stick/wheel) forward to reduce the angle of attack on the wing to break the stall and regain lift;

- (3) Neutralize the controls the instant rotation has stopped; and
- (4) Resume a desired flight attitude using smooth coordination of the controls.

NOTE: An abrupt pull-up during recovery may result in a secondary stall of the wing and possible re-entry, possibly more violent than the original spin. If power was on at spin entry, it should be set at idle immediately and remain in idle until needed to resume normal flight.

- e. Stall demonstrations and practice are a means for a pilot to acquire the skills to recognize when a stall is about to occur and to RECOVER as soon as the first signs of a stall are evident. IF A STALL DOES NOT OCCUR - A SPIN CANNOT OCCUR. It is important to remember, however, that a stall can occur in any flight ATTITUDE at any AIRSPEED, if controls are misused.
 - (1) Power Stalls should be entered with approximately 65 percent power. Stalls in airplanes with relatively low power loadings using maximum climb power result in an excessive angle of attack making the recovery more difficult.
 - (2) Simulated Takeoff and Departure Stalls should be entered at liftoff speed, with the gear extended and flaps in takeoff configuration. In spite of Flight Test Guide instructions to the contrary, many flight test applicants continue to attempt these stalls from cruising speed in clean configuration. The objective of this maneuver is to simulate the flight situation which exists immediately after takeoff.
 - (3) Single-Engine Stalls should not be demonstrated during multi-engine flight tests nor should they be practiced by applicants for multiengine ratings. Such stalls are not required by the regulations for pilot flight tests.
 - (4) Engine-Out Minimum Control Speed demonstrations should be conducted in strict accordance with the warning in the Multiengine Flight Test Guide. The demonstrations should not be attempted when the density altitude and temperature are such that the engine-out minimum control speed is close to the stalling speed, since loss of directional or lateral control could result.
 - (5) Stall Recoveries should be initiated as soon as evidence of a stall is detected. Such evidence may be uncontrollable pitching, buffeting, and a rapid decay of control effectiveness.

- (6) Stall Demonstration and Practice should be conducted at sufficient altitude to enable recovery above 1500 feet A.G.L.
- (7) Stall Warning Devices SHOULD NOT BE DEACTIVATED for pilot certification flight tests in airplanes for which they are required equipment.

4. SUMMARY.

- a. Performance of spins in airplanes placarded against intentional spins is flirting with unknown recovery characteristics;
- b. Certain airplanes placarded against intentional spins have been proven by operational experience to have unsafe characteristics in sustained spins;
- c. Stall demonstrations should be executed in such a manner that recovery is initiated at the FIRST INDICATION of a stall;
- d. Vmc demonstrations in multiengine airplanes must be conducted in accordance with the warning in the Multiengine Flight Test Guide. If the stalling speed and Vmc are close, the demonstration is potentially hazardous.
- e. RECOVERY techniques from spins should be discussed with each student as an integral part of his instruction. Demonstrations of spin recovery techniques should be performed ONLY if the maneuver is approved for the airplane used.



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