Safety Communique

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TO: **ALL OWNERS AND OPERATORS, RAYTHEON AVIATION CENTERS, CHIEF PILOTS, DIRECTORS OF OPERATIONS, DIRECTORS OF MAINTENANCE AND ALL RAYTHEON AIRCRAFT AUTHORIZED SERVICE CENTERS, AND INTERNATIONAL DISTRIBUTORS AND DEALERS.**

MODELS: **ALL BEECH BARON AIRPLANES**

SUBJECT: **SPIN AVOIDANCE AND SPIN RECOVERY CHARACTERISTICS**

Since it is well known that it is possible for multi-engine airplanes to enter a spin from which the airplane will not recover, Raytheon Aircraft Company (RAC) believes it is appropriate to reemphasize the spin avoidance information contained in Safety Communiqués No. 147 and 192. Spin maneuvers are prohibited by the FAA for normal category airplanes – including the Baron. A spin can occur whenever an airplane is stalled and is subject to yaw input. Yaw input can be provided by rudder, asymmetric power, aileron, p-factor, or any combination of these forces. Unless an airplane is stalled, a spin is not possible. One of the special dangers of low speed asymmetric flight in multi-engine airplanes is that the asymmetric power provides yaw input sufficient for spin entry if the airplane is allowed to stall.

It is for this reason that FAA regulations do not require pilots to perform single-engine stalls for training or pilot certification; and, in fact, describe specific procedures to avoid spin entry stalls as noted in the following:

1. The FAA Practical Test Standards for Airplane Multi-Engine Land specifically notes that "[N]o stall shall be performed with one engine throttled or inoperative and the other engine(s) developing effective power."

2. The V_{MC} demonstration required by FAA Practical Test Standards suggests artificially limiting rudder travel (blocking the rudder pedals) to "…avoid the hazards of stalling one wing with maximum allowable power applied to the engine on the other wing." The FAA Airplane Flying Handbook (FAA-H-8083-3A), in the section on V_{MC} Demonstration (page 12-30) advises "…the pitch attitude is slowly increased to decelerate at a rate of 1 knot per second (no faster). As the airplane slows and control effectivity decays, the increasing yawing tendency should be counteracted with additional rudder pressure. Aileron displacement will also increase in order to maintain 5° of bank. An airspeed is soon reached where full right rudder travel and a 5° right bank can no longer counteract the asymmetrical thrust, and the airplane will begin to yaw uncontrollably to the left.

   The moment the pilot first recognizes the uncontrollable yaw, or experiences **any** [emphasis in original] symptom associated with a stall, the operating engine throttle should be sufficiently retarded to stop the yaw as the pitch attitude is decreased. Recovery is made with a minimum loss of altitude to straight flight on the entry heading at V_{SSE} or V_{YSE}, before setting symmetrical power. The recovery should not be attempted by increasing power on the windmilling engine alone."

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RAC performed tests confirming that, in the Baron, the most difficult airplane configuration for spin recovery was with power to the left engine idle, propeller windmilling, maximum continuous power on the right engine throughout stall, and then permitting a 270° degree turn or more after entering the spin.

Any time asymmetric power is allowed to continue through spin entry and into a developed spin, a dangerous and possible unrecoverable spin could be encountered. RAC believes this is true any time asymmetric power is allowed to continue into a developed spin to the right or to the left.

The tests confirm:

1. Recovery from a developed spin in a multi-engine airplane is, for a variety of reasons, unpredictable; it is possible, especially when the airplane is stalled under asymmetric power, to encounter a spin from which recovery cannot be effected. The greater the asymmetric thrust and the longer it is allowed to continue, the greater the chance that an unrecoverable spin could be encountered.

2. Failure to lower the nose and retard power immediately when a stall is encountered – and especially, allowing power to remain on during spin entry or in a developed spin – tends to raise the nose (increase the angle of attack) and result in a spin from which recovery is far more difficult and sometimes impossible.

3. Asymmetric power stalls must always be avoided. The V_{SSE} airspeed published in the manual must carefully be observed any time power to one engine is suddenly retarded. V_{SSE} is, by definition, an airspeed above which the airplane can safely be operated under asymmetric power and should faithfully be observed as a minimum speed during single engine flight.

4. All Baron Models tested have good spin avoidance characteristics. At the point of stall – even with asymmetric power – if the control column is immediately and briskly moved forward, lowering the nose to regain flying speed, and the power is simultaneously retarded, the airplane will recover immediately, reliably and smoothly. There is sufficient time to execute this control input even at the point of stall. A multi-engine pilot of ordinary skill can easily avoid an unintended spin.

5. Minimum Control Speed (V_{MCA} or V_{MC}) is determined at an aft center of gravity, with sea level, standard day engine power. Once a single engine stall occurs, a dangerous spin entry is also likely to occur, unless recovery actions are properly initiated (which are identical to the V_{MC} demonstration recovery – immediately lower the nose and retard power on the operating engine). For more specific instruction, refer to the STALLS, SLOW FLIGHT, AND TRAINING advice provided in Section X of the manual. If operators follow the instructions in the manual, an unintended spin will be avoided.

6. During single-engine operation (actual or simulated), at the first indication of approach to a stall (the stall warning horn, buffeting, or both) stall recovery must be initiated immediately – that is, simultaneously lower the nose and retard power. If this instruction is not followed, a stall will occur and a dangerous spin is likely to occur.

7. It is absolutely essential that the stall warning system be kept operational and in proper adjustment at all times. The stall warning horn must not be deactivated by interruption of circuits, circuit breakers or fuses.