Safety Communique

FEBRUARY 2002

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**

In March 1998, Raytheon Aircraft Company (RAC) issued Safety Communique No. 147 in which it discussed a program evaluating spin avoidance and spin recovery characteristics of the Baron class of airplanes. At that time, RAC had completed a total of 97 spins in a Model B55 Baron. Those tests validated the spin recovery procedures recommended in the pilot's operating handbook.

Subsequently, RAC has performed additional tests on the Baron Model 58 and Baron Model 58P, completing an additional 132 spin maneuvers. The results of these additional tests on additional Baron models have again confirmed the good spin avoidance characteristics of the Baron fleet.

Since it is well known that it is possible for multi-engine airplanes to enter a spin from which the airplane will not recover, RAC believes it is appropriate to reemphasize the spin avoidance information contained in Safety Communique No. 147. 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 Flight Training Handbook (AC61-21A), in the section on V_{MC} advises "…the airspeed should be reduced slowly with the elevators until directional control no longer can be maintained. At this point, recovery should be initiated by simultaneously reducing power on the operative engine and reducing the angle of attack by lowering the nose."

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The spin tests have confirmed the most difficult airplane configuration for spin recovery was with power to the left engine at idle, propeller windmilling, maximum continuous power on the right engine throughout stall, the spin entry and a 270º turn or more. 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 test program confirms:

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 change 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}) is determined at an aft center of gravity, with sea level, standard day engine power. At forward centers of gravity, typical of most training flights, the aircraft will not experience a loss of directional control before a single-engine stall occurs. Unless recovery actions are promptly initiated (which are identical to the V_{MC} demonstration recovery – immediately lower the nose and retard power on the operating engine) a dangerous spin entry is likely to occur. 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 mandatory 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.