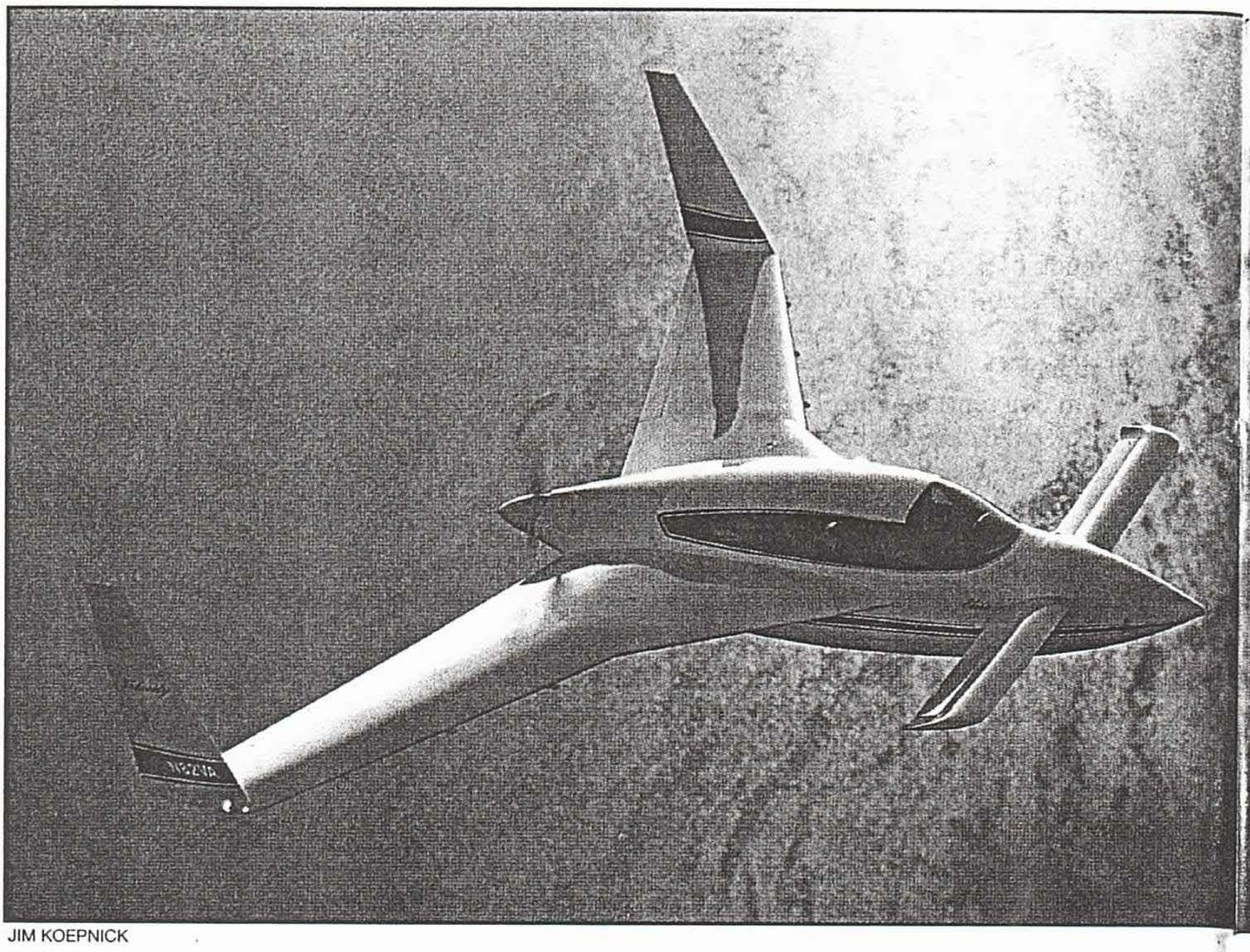

JIM KOEPNICK

STALLING THE LITTLE WING FIRST

The Velocity has probably had, if not the most, then certainly the most interesting aviation press coverage about its stall characteristics. Referring of course to a deep stall phenomenon, the manufacturer reports preventive redesign has been incorporated into all models. The two models flown for this evaluation were "stalled" in a controlled fashion, and exhibited very nice manners. That stiff elevator centering spring alone is almost sure to preclude an inadvertent stall because of the very high pull force required to slow from cruise speed to stall speed. The same applies to accelerated stalls — the pilot just has to pull too hard to get there by accident.

Retrimming both airplanes for 100 kts. (55-60 kts. below normal cruise speeds), the pilot must still apply more than a 30 pound pull on the stick (25-30 pounds in the 173 RG) to stall the canard. That's a lot of tactile warning for the pilot. There's also the buffeting canard to cue the pilot to the approaching stall. If he ignores these two blatant warnings, the stall is simply a 3°-5° pitch break as the canard loses lift — no roll off, no nose wander in yaw. Relaxing the stick recovers the airplane. Holding that 30 or so pounds of pull results in a pitch oscillation of about 5°, once per second. These values reflect a 1 kt./sec. deceleration into the stall. Faster decelerations result in more dramatic pitch oscillations, but hardly threatening. Of course, beginning a stall with a 45° nose high attitude may be an entirely different experience — one which is not recommended.

Accelerated stalls have the same character. The pitch breaks are smaller, but the stick force needed is even higher.

Lowering the landing gear in the 173 RG with the airplane trimmed for 100 kts. can be a hands-off event. There is virtually no pitching moment generated. The airplane maintains its 100 kts. after the gear comes down, but it develops a rate of descent as a result of the extra drag.

Establishing a landing pattern speed of 80 kts. indicated, both models remain well behaved in pitch although longitudinal stick forces continue to be substantial. Roll forces lessen to around 10 pounds for a full stick deflection, but control stick harmony seems okay.

A WHOLE NEW (BALANCE) BALL GAME

Those light aileron forces come in handy, because the roll rates at 80 kts. are quite low. A full-stick effort yields an average roll rate of 40°/sec. in the standard model if augmenting rudder

(rudder in excess of what's required for coordination) is used. In the 173 RG the same technique yields only 20°/sec. At this lower speed/higher angle of attack, both models exhibit a strong dihedral effect, permitting the planes to be rolled quite effectively with rudder inputs. In fact, leading the roll with a substantial rudder input seems to produce the fastest roll rates.

With the necessarily large aileron deflections come a good deal of adverse yaw, making rudder use mandatory in the landing pattern. While this is true for many airplanes, the roll-yaw coupling of the Velocitys presents a coordination challenge. Since aileron deflection causes both roll and (adverse) yaw, and rudder deflection causes both (proverse) yaw and roll, getting it all sorted out and settled down requires practice. When the airplane yaws a dutch roll is initiated which takes several oscillations and several seconds to subside. Most pilots won't or can't afford to be that patient on final approach, so they must possess the skill to actively suppress it. Five hundred flight hours are not required, but a couple of hours in the pattern with the factory pilots is a good idea.

Much has been written about having to "fly the Velocity onto the runway." This seems to be more of an admonition than a conscious effort. Clearly, the prospect of stalling the canard close to the ground is not appealing. Using a normal landing flare technique works just fine as long as the pilot realizes there's a limit on the nose-up attitude he should achieve. Once there, the airplane settles nicely onto the runway on a landing gear that can take quite a beating should the settle be a little firmer than expected. The distortion of the earlier windshields complicates the height above the runway estimation; with the newer windshield, there is no problem.

Rollout is uneventful. "Feeling" for the brakes may result in an initial asymmetric application, but once the pilot is sure he's "on" both brakes, precise directional control is regained.

Although it may look like a starfighter, the Velocity is a cruiser. Quiet, comfortable, fast and room for four, the airplane is meant to go someplace. Sure, sightseeing is okay, and so is flying it for the fun of flying. Its forte, however, might just be found in its name — Velocity: a vector, identified by both speed and direction.

CONCLUSION

Most of this discussion concerned primary consequences of rudder location and deflection. Other, equally significant effects such as dihedral, dutch roll frequency, roll and yaw damping, etc., haven't been mentioned but are all players in the rudder placement game.

Conclusion? There is no conclusion except possibly to re-state the obvious. Namely, there's a lot of stuff going on around that (those) rudder(s). ◆