Soaring Safety Foundation

Three strikes and your out!
By Richard Carlson – SSF Chairman

According to the NTSB aviation database, a stall/spin at a low altitude is the leading cause of fatal glider accidents in the United States. Last month we talked about the accelerated stall/spin accident where the pilot attempted to make a steep turn at a low initial airspeed. The result was the glider's wing stalling as the wing exceeded the critical angle of attack during the turn. The remedy was to establish a pitch attitude that would keep the glider flying during the turn and to monitor the airspeed during the turn to ensure that it stays at the value the pilot selected.

This month we talk about the stall/spin out of the skidding turn. The classic scenario is that the pilot stalls the glider while skidding the base to final turn, resulting is a crash just off the end of the runway. The crash is usually fatal.

Picture yourself making a landing at your home gliderport. You fly the downwind leg monitoring your pitch attitude (with periodic glances at the ASI), position, and descent rate and make a normal turn onto base leg. For some reason you have gotten yourself a little low on base so you reduce the amount of spoilers you are using and decide to make a shallow turn to final to avoid the possibility of catching a wing-tip in the trees. In reality you are far above the tree tops and even with a 45 deg bank the inside wind will not come close to them. But it's hard to judge this accurately so you decide to error on the safe side and use a shallower bank for this turn.

You start the turn where you normally do, but it soon becomes apparent that something is wrong. The glider isn't turning fast enough and you are going to overshoot the extended runway centerline.

Sitting on the ground reading this article it is quite easy to recall that the gliders turn rate is a function of the airspeed and bank angle. The higher the speed or the steeper the bank angle: the faster the turn rate. In the cockpit it may be harder to recall this fact, so it is something of a surprise to see that the glider isn't turning as fast as you want/need it to.

Strike 1: the inside rudder
As the glider begins to pass the extended runway centerline you mistakenly start stepping on the inside rudder. Unfortunately this seems to help. Even through we know that the rudder does not turn the glider, the lift produced by the wings does, the rudder does control the motion about the vertical axis. When you press on the inside rudder, the glider begins to yaw in that direction. This yawing motion appears to point the nose to the inside of the turn, making it look like the turn rate is increasing. It isn't! It just an optical illusion.

Strike 2: the opposite aileron
As the glider beings to yaw, the speed of the outside wingtip increases resulting in an increase in the amount of lift that wingtip is producing. This increased lift causes the bank angle to increase. That isn't what you wanted so you apply a little opposite aileron to keep the bank from getting steeper.

Sitting on the ground reading this article it is also easy to recall that the sink rate of the glider is lowest when you are in coordinated flight. In uncoordinated flight, slipping or skidding, the sink rate is higher.

Strike 3: the increased back pressure.
The glider is now in uncoordinated flight, that is in a skidding turn and the sink rate is starting to increase. Since your attention is focused on the runway and your intended landing spot, what you see is the aim point beginning to rise up on the canopy. You now add a little back pressure to bring the aim point back to the normal spot on the canopy, which results in a decrease in airspeed.

Slowing down also results in a decreased turn rate, so it now appears that the glider is still going to overshoot. Since you just saw that adding a little rudder appeared to help you push a little harder on the inside rudder to speed up the turn rate again. However, this causes the bank to begin to increase again causing you to add a little more opposite aileron and a little more back pressure to keep the aim point at the proper point on the canopy.

This viscous cycle repeats until the wing exceeds the critical angle of attack and a stall occurs. Since the glider is yawing when the stall occurs, it begins to spin. Being close to the ground the obvious result is a crashed glider just off the end of the runway. In most cases the pilot receives fatal injuries during this crash.

The solution is to continuously monitor the glider speed and coordination while operating close to the ground. Pick up your instrument scan and look at the ASI every few seconds to ensure that your chosen airspeed is not changing. Make an immediate correction with the stick if a change is detected. Also learn to monitor the airspeed by sound. Listen to the sound of the wind as the glider fly's in the pattern, open the vent window if it has been closed to a better sense of the noise. If the sound changes, glance at the ASI and make a positive control input to correct the situation.

Most gliders, even those with benign stall characteristics will spin out of the skidding turn. Take some flights with an experienced instructor and practice the entry and recovery techniques at altitude. Practice this maneuver until you are proficient in recognizing when the glider is starting to skid the turn and the recovery happens without conscious thought.

Only by keeping the glider from stalling can we prevent this fatal accident from occurring. Who knows, the life you save may be your own.