

The Mystery behind 200 ft?

By Richard Carlson – SSF Chairman's

Last month this column discussed the many reasons why your aerotow may not have gone the way you initially planned. The main point was that the traditional 'Rope Break' training at 200 ft AGL does not prepare your students or pilots for an actual aerotow launch failure. Instead, a more realistic failure mode is a partial power loss on the part of the tow plane. That guidance also applies to self launches and to some extent ground (winch) launches. Launch failures, both practice and actual require thought and pre-planning to achieve a successful outcome.

This month we explore in more detail why using an altitude, e.g., 200 ft AGL, as the only decision criteria is not a viable planning tool.

To begin, let's consider why the U.S. soaring community has chosen 200 ft AGL as a safe altitude to execute a return to the runway in the first place. Imagine you are in your club's SGS 2-33 being towed by a Pawnee. You expect a nominal climb rate of 600 fpm behind this towplane. That means after 20 seconds you are at 200 ft AGL and you have traveled forward 1907 ft (assuming a tow speed of 65 mph). Once you release you maintain this speed and complete a 180° turn at 45° angle of bank. Rolling out you are now about 500 ft to the side of the runway centerline and have spent about 10 seconds of time. Assuming a sink rate of 250 fpm, you have lost about 40 ft. You must now fly 1971 ft back to the runway which will take about 24 seconds costing you about 100 ft so you arrive over the runway about 60 ft AGL.

In summary, since you are climbing much faster than your sink rate, you will have enough altitude to get back. Note that this simple analysis does not take into account lift/sink, a slower initial climb rate, density altitude effects, nor the impact of wind speed and direction. Also you need to make a turn at this low altitude to align your glider with the runway centerline. In addition, if you mistakenly launched with the spoilers open or that Pawnee didn't have full power, you can forget about getting back.

Why not simply move the release altitude from 200 ft to 300 ft AGL? Clearly that is just another 10 seconds or so on tow. You have only traveled another 950 ft forward so you get back about 100 ft AGL.

The problem is, you never really accounted for those other factors that were mentioned in the previous paragraph. Consider this real accident summary report.

"Two glider pilots were conducting a simulated rope break from 200ft above ground level (AGL). The glider pilot had requested the tow pilot sidestep right on upwind further than normal to allow for enough distance between the upwind leg and the runway. After a normal takeoff, the tow pilot sidestepped further right than the previous flights. After the tow rope was released, the glider pilot made a steep turn back toward the runway and realized that the runway was beyond glide distance. The pilot elected to land the glider in a clear area beside a dirt road, but during the landing, the left wing impacted a tree, resulting in substantial damage to the wing. The pilot reported that there were no mechanical malfunctions or anomalies that would have precluded normal operation."

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The check pilot's failure to account for the extended departure distance from the airport during a simulated tow rope break and recovery.

In the above accident, both pilots were flight instructors! The detailed pilot reports noted that the front seat, flying pilot, called '200 ft' and the rear seat check pilot immediately pulled the release. While it

should have been obvious to both that the glider was not in a position to safely return from this altitude and position, the 200 ft decision point had been reached so a release was pulled.

In most of the country, the pre-launch checklist ends with the letter 'E – Emergency' plans. The intent is to have the student or pilot verbally brief themselves, and their instructor, on what their plan is to handle a failed launch. Typically that involves something like this:

“If we are still on the runway I will release and land straight ahead, maneuvering to the right to avoid the towplane, if we are below 50 ft I will land straight ahead, if between 50 ft and 100 ft, I will make a turn to the left (or right as appropriate) and land in the field. If between 100 ft and 200 ft I will land in a field (unique to your local gliderport) and above 200 ft I will turn around and land back on the runway.”

Read that carefully, and realize that everything is simply based on altitude. That is exactly what our accident pilots (instructors) did. The check pilot pulled the release as soon as the flying pilot called 200 ft.

What do you think would change when taking off into a 10 mph headwind? If you turned around at 200 ft, would you have enough room to stop before you ran off the far end of the runway? What about taking off on a hot high density altitude day? Would you be within glide range of the runway at 200 ft? Both of those factors would change your horizontal position in relation to the runway at this 200 ft call out.

Taking that horizontal position (distance from the runway) into account may have been implied by that hypothetical briefing. But, it is not explicitly discussed, and that is the problem we need to address. Your pre-launch emergency plan, which should be made before you get into the glider, needs to explicitly include discuss both the horizontal and vertical position of the glider at multiple points in this launch.

Consider this alternate briefing:

“Looking at today’s conditions, and noticing how other launches have proceeded, I expect that the glider will become airborne about 1/3rd of the way down the runway. The towplane will become airborne about mid field. If we miss either of those points I will pull the release and land straight ahead, moving to the right to avoid the towplane if necessary. I expect to cross the airport boundary about 150 ft AGL. If it looks like that will not happen, I would release and land in the field just to the left (or right as appropriate). If we are at or above 300 ft AGL and beyond the tree line (a well know local landmark) Once I release, I will pitch to a flight attitude that will keep the speed near today’s approach speed and evaluate my options. If a return is the best option, I will maneuver to create some turning room and make the final turn into the wind to roll out on the extended runway centerline”

This briefing brings both the gliders horizontal/vertical position and the pilots expectations into account. How the pilot obtained and validated those expectations is another skill the instructor needs to teach. If this is the 1st launch of the day, then you need to think about some previous days that had similar conditions. If this is the 12th launch of the day for this glider, then you should have some recent data to deal with. That assumes you were paying attention to some of those previous launches. That is something you do, right? It is important to note that each launch may be different if conditions are changing rapidly so cookie cutter answers are not appropriate.

It is also important to recognize that the alternate fields, and landmarks used are unique to your home field. You should use tools like Google Earth, Condor, and local expertise to determine what alternate

fields and landmarks are available. You also need to take into consideration how those might change during the flying season.

Regardless of the briefing type, it should also occur BEFORE you climb into the glider. Do this when there is plenty of time to think through your options and plans. Doing this while seated in the cockpit with the wing runner bugging you to hook up is not conducive to a good pre-launch brief. Then when you get to the E-Emergency item on the checklist you can simply say 'As briefed'.

This type of briefing also works for self launching gliders. The pilot uses the climb data from the flight manual, updated for today's conditions to determine the take-off point and climb rate. An engine failure below a pre-determined position, both horizontal and vertical, could result in an off-airport landing.

Our U.K. colleagues also use something similar when winch launching. In addition, after reviewing multiple accidents during the initial ground roll, they determined that it is nearly impossible to pick up a dropped wing on a winch launch. They require pilots to release if a wing starts to drop during the initial ground roll. Other failure points are in the initial acceleration phase, where a landing straight ahead is reasonable and during the rapid climb phase, where getting the nose low pitch attitude established to prevent a stall is essential. The pilot can then evaluate their options and make a safe landing.

As noted in the previous articles, launch failures result in fatal injuries to the pilot almost 40% of the time. A major problem is that pilots are trained to use a fixed number, 200 ft AGL, as the only decision point when handling this event. They also tend to make an immediate and impulsive turn to head back to the runway regardless of the actual altitude. While that may not be what your instructor intended, the accident reports indicate that is what students and pilots learned. Developing and using a better briefing method for preparing to deal with a Premature Termination of the Launch (PTL) event can help reduce this fatality rate.

Next month we will discuss the additional tools and methods you can use to better prepare yourself to deal with a PTL event.