SSF Soaring Safety Foundation

Premature Termination of the Launch, or

What Could Possibly Go Wrong?

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It was just over 52 years ago, but I remember it like it was yesterday. On my second flight in a Glider, just after takeoff, I heard a loud BANG, and then silence, all except the constant rush of air around the canopy of the SGU 2-22 that I was learning to fly in at age 14. Sitting in the front seat, I feared nothing. (what me-worry?) Little did I realize the precarious nature of our rope break: we were too low to turn around, or glide forward and clear the trees ahead, and what seemed like way too high to land and stop before hitting the barbed wire ahead. Fortunately, my CFI made the right decision, putting the glider into an aggressive slip with the spoilers fully extended to land and stop just short of the barbed wire fence that defined the airport boundary. That experience made a lasting impression, and I probably anticipate rope breaks to a higher degree than most glider pilots during Aero Tow as a result. (paranoid? maybe just a little!)

In this article, I would like to expand the discussion of Premature Termination of the Tow (PTT) to the analogous, but equally dreaded "Engine Failure on Takeoff" in a Self-Launcher, and a cable break during the early stages of a Winch Launch. Each has its teaching moments. I call it the Premature Termination of the Launch. (PTL)

I like to examine the PTL from an energy management perspective. Let's first consider Aero Tow. We routinely train our students to recognize 200 ft AGL as a significant energy milestone, the point at which a 180 degree turn can be made to return to the runway in case of a rope break. This may or may not really be true, depending on the climb gradient achieved, but let's consider the energy state of the glider should the tow rope break at that point. The airspeed will be the nominal speed of the tow plane-let's call it 65-70 KIAS. The glider's configuration will most likely be that used for takeoff, with gear still down, flaps neutral, and spoilers closed. The glider's angle of attack (AOA) will be relatively low, and should the rope break at that moment, it will be flying well above L/D max or final approach airspeed; consequently there is considerable margin above stall, and maneuvering turns can be made safely. Normal pitch attitudes will dictate the airspeed achieved throughout the resulting abbreviated pattern and landing.

Now, let's consider a retractable engine Self-Launch Sailplane (SLS) in the same realm. Given a catastrophic engine failure at the same altitude, there are drastic differences that dictate aggressive pilot inputs. At 200 ft AGL, the SLS is likely still in takeoff configuration, but this means that in addition to having the gear down, the engine pylon is also extended. The airspeed will likely be at what the POH calls the "blue line," for best powered climb, which for most is at, or very near L/D max. So, at the moment of engine failure, the SLS is slower, at a higher AOA, and in a much higher drag configuration than its Aero-Towed cousin. The needed pilot reaction

is to put the nose down aggressively, in an effort to achieve and maintain final approach airspeed. Given the high drag of an engine pylon extended with the engine not running, the pitch attitude required to maintain this desired speed will be much steeper than normal, and if not trained and practiced, is often not achieved, resulting in getting slow and approaching stall AOA-a bad combination near the ground. Most SLS POH's cite the performance difference in this scenario and the data is shocking. Essentially, a typical 18m SLS with a 50 to 1 L/D turns into that 2-22 I learned to fly in when its engine is extended and not running, and that's without spoilers extended! The decision to land straight ahead, make minimal turns, or consider a return to the runway must be made quickly, and unlike the "200 ft AGL" used as an Aero Tow decision point, the SLS pilot would do well to consider 500-600 ft AGL the same way.

Finally, let's consider the Winch Launch cable break. Trying to recognize and call out "200 ft AGL" will be tough since things happen so fast. At that point in a Winch Launch, the configuration will be as for takeoff, and the glider is probably just achieving its very steep climb profile, with a pitch attitude of 45 degrees nose high or greater. Its airspeed will be relatively low, and its AOA high, in order to maximize the climb gradient. So, should the cable break at 200 ft AGL, the only survivable response is to push the stick forward like your life depended on it, because it probably does. The steep nose high pitch attitude must be translated to a nominal glide picture with the nose below the horizon before stall AOA is achieved, while maintaining directional control for the upcoming landing. Talk about exciting! Although not exactly in line with the cable break discussion, another warning for Winch Launch is appropriate-anytime a wing drops or directional control is suspect during the initiation of a launch, the best solution is to release immediately, and sort out details later.

In summary, getting our gliders into the air, by whatever means you choose, can be dangerous. As always, good preparation and training are the best tools we have to minimize the risk, which is what the Soaring Safety Foundation is all about. Go have fun, and watch out for that "200 ft" point!