# The Possible Turn

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At a recently completed Flight Instructor Refresher Course (FIRC) we had a short discussion on planning and executing the dreaded 'Premature Termination of the Tow' (PT3) event, commonly called a rope break. The discussion started with the question, what factor or factors are important in determining if you turn back and land at the airport or not.

As expected, the initial responses focused on altitude. Is the glider high enough to safely turn around. The common rule of 200 ft AGL applies here. After some prompting form the FIRC instructor, the group also noted that the distance that the glider has traveled forward is also an essential element is making this determination. Being 200 ft AGL over the departure end of the runway due to a crisp cool fall day would not be the place to begin this turn.

There was agreement that the 1st action the pilot needs to take is to lower the nose and establish a pitch attitude that will keep the glider flying at the previously discussed approach speed. Failure to do this will typically result in a rapid decrease in airspeed, leading to a stall/spin entry half way through the steep turn you just started.

The next step is to stop and think (wind your watch) and evaluate the situation to determine exactly where you are and what you planned to do at this point if the rope broke. How long can you wait?

Lets consider that you are in a SGS 2-33 at 200 ft AGL sinking at 300 ft/minute. How much altitude will you lose if you delay your decision to turn for 4 seconds? To figure that out divide 300 by 60 (300 ft/min / 60 sec/min = 5 ft/sec). So in 4 seconds you will loose 20 ft or 10% of your current altitude. A more realistic time to think would be 2 seconds or 10 ft of altitude. If you can't afford to lose 10-20 ft of altitude, then the decision is already made, you are going straight ahead!

Putting this in perspective, a $360^{O}$ thermalling turn takes about 20 seconds so half of that, or 10 seconds, is the time required to complete the initial turn. This would take about 50 ft of altitude[1]. So even delaying the start of the turn by 4 seconds means you are still over 100 ft AGL when you are pointed back at the airport.

Obviously, if you are in a glider with a lower sink rate, you will lose less altitude, so there is very few occasions where entering an immediate turn is the appropriate response.

The next question is, what to do next? Most pilots will start a steep turn into the wind with the goal of rolling out on the extended runway centerline. Unfortunately, the chances of you rolling out on the centerline are slim. It takes time and distance to make a $180^{O}$ turn so chances are you will be offset from the centerline and you will need to maneuver the glider to establish yourself on the centerline. This may consists of maneuvering close to the ground as you continue the turn another $45^{O}$-$90^{O}$ before making a $45^{O}$-$90^{O}$ turn in the opposite direction to line up with the runway.

A better idea is to start by making a $45^{O}$ turn downwind to give you the turning room you need to roll out on the extended runway centerline. Figures 1 and 2 demonstrate this and show that this method keeps you from making steep alignment turns close to the ground.

1 Yes, the altitude lost in this turn will be higher due to the increased sink rate in turning flight. However, this just reinforces this method by minimizing the maneuvering needed to line up with the runway after completing this turn.

Now lets consider how to return if the rope break occurs at a higher altitude, say 500 ft AGL.

At one of the clubs I fly at, I observed a flight instructor putting a student in this type of situation. The glider (an ASK 21) had departed runway 9 with a left turn out (heading North) about 1 mile from the field around 500 ft AGL I noticed that the glider was in a steep right turn. Given that the winds were from the South, I realized that this was going to be close. The pilot did make a modified pattern, flying directly back to intercept the pattern near the downwind/base turn. The turn to final was below 200 ft AGL and a successful landing was made.

The problem I had with this was that there is an emergency N/S runway at the west edge of the airport. A much safer approach could have been made as a straight in to this emergency runway. When I asked the instructor if that option was ever considered, the answer was no, we planned to come back and make a normal landing. Even though the altitude was marginal. The instructor wanted to demonstrate that you could eliminate some of all of the pattern and still make a successful landing.

While that is a worthwhile lesson all students should learn, how much more effective would that lesson have been if the instructor had demonstrated that a landing on the emergency runway was a better option?

Dealing with launch emergencies is a part of all student training. I have yet to meet an instructor who does not practice low altitude PT3 events with students before solo. Yet, we still see fatal and non-fatal accidents in both training and real emergencies. Perhaps we instructors are failing to ensure that the proper lesson is being learned. The object is to make a good decision and land safely on or off the airport. Our training demonstrated that the glider can safely return to the airport, mostly because the instructor initiates the PT3 event at an altitude and position that pretty much ensures that a return to the airport is the correct response.

Does this train our pilots to always think that every PT3 will result in a return to the airport? Is this why pilots immediately begin a steep right turn when a real rope break occurs?

The use of a simulator like Condor can help instructors train students and pilots to become better at handling these PT3 events where you can’t return to the runway. Learning how to fight that urge to immediately turn back to the runway and instead land in a field may save your life one day. Think about it.

Figure 1

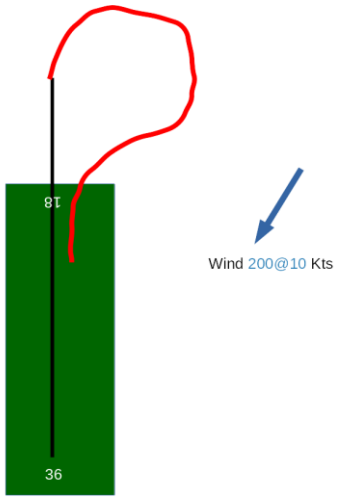


Figure 2