SSF Soaring Safety Foundation

P-T-L.
Premature Termination Of the Launch: Partial Power Loss During Aerotow Launches
by Bob Wander, CFI-G.

Premature termination of the aerotow is a lesson that all CFI-G's teach. One of the most common methods employed to teach this lesson is the classic 'rope break' method. Aerotow takeoff and early climb-out occur with the towplane making excellent power at full throttle. At some pre-determined (but safe) altitude during aerotow, the crafty CFI-G in the back seat yanks the tow release handle, the towrope snaps sharply forward, and the front seat candidate reacts as the instantly-unburdened towplane climbs rapidly away. This method is so commonly used that the name of the lesson is usually 'rope break practice' rather than 'premature termination of the aerotow launch.'

As a long-time CFI-G and former founder/owner of a commercial glider flight school, I have had lots of opportunities to experience premature termination of the launch, both as flight-training scenarios (premature terminations engineered by me for the benefit of the candidate in the front seat) and in real life: premature terminations that were not practice simulations but genuine aerotow premature failures. And about the latter, virtually *none of them resembled the classic 'rope break (CFI-G pulls the release knob while the towplane is making full power and climbing well)' lesson*. They looked very different indeed, and so I have concluded that the classic 'rope break under full power' lesson, while useful, is not sufficient to prepare the candidate for real-world flying until it is supplemented by ground and flight training in partial-power-loss aerotow training.

Here are some of the *genuine* premature terminations I have experienced, while instructing from the back seat of the glider, during aerotow operations:
- towplane fuel was contaminated with water, causing misfiring and partial power loss at intermediate altitude
- towplane engine was operating on only one magneto (towpilot error) causing partial power loss
- towplane engine muffler internal baffles disintegrated during aerotow, and internal debris blocked the exhaust outlet, increasing exhaust back pressure and causing partial power loss
- towplane constant-pitch prop was mismanaged, causing partial power loss
- towplane throttle, unattended by the towpilot, crept aft, causing partial power reduction
- towplane engine cylinder exhaust valve stuck open, causing partial power loss
- towplane fuel tank selector was switched to a full tank only after the first tank provided only fumes, causing temporary partial power loss
- towplane flap setting was mismanaged, causing reduced rate of climb
- towplane carburetor heat control was mismanaged, causing partial power loss
- towplane fuel-leaning cockpit control was mistaken for carburetor heat control, causing partial power loss.

I think you see the trend here: The *genuine* premature terminations were *partial power losses*. They were not slam-bang rope breaks, with the towplane's mighty Lycoming thundering in full chat. They were not instantaneous, catastrophic total power failures. They were partial power failures. And they did not in any way resemble the training scenario that the classic 'full power rope break' lesson provides.

What they *did* look like, was this:
- seen from the glider pilot's point of view, the towplane begins to settle
- the once-taut towrope begins to develop a slight bow earthward
- the slight bow in the towrope develops into a very visible sag

- the glider cabin gets quieter as airspeed begins to bleed off
- if the towrope is not released, the towplane may settle below the glider pilot's field of view
- the rate of climb erodes to virtually nothing.

None of these visible signs of a *genuine* partial-power-loss premature termination resemble, in any way, the classic 'rope break' lesson plan. So, if we CFI-Gs intend thoroughly to prepare our candidates for real-world flying hazards, we should incorporate the partial-power-loss training into the training syllabus. It's not hard to do. Here are my suggestions:
Prior to flight, the towpilot, glider candidate, and CFIG confer on the 'why' and the 'how' of the lesson.
- The 'why' is simple: This is real-world training for partial power loss during aerotow operations.
- The 'how' is a bit more complex. At a pre-agreed safe altitude (at least 2,000 feet AGL, and with the gliderport within easy gliding distance for both glider and towplane), the towpilot will smoothly reduce throttle from full throttle to something in the area of 300-400 RPM less than full throttle. (If the towplane has a constant-speed prop, then the power reduction is managed by a reduction in manifold pressure, rather than RPM). The glider candidate is to be on the lookout for the warning signs:
- seen from the glider pilot's point of view, the towplane begins to settle earthward
- the once-taut towrope develops a slight bow earthward
- the slight bow in the towrope develops into a very visible sag
- the glider cabin gets quieter as airspeed begins to bleed off
- if the towrope is not released, the towplane may settle below the glider pilot's field of view
- the rate of climb erodes to virtually nothing.

As the slackening towrope and loss of airspeed symptoms arise, the candidate receiving training identifies and calls them out loud, releases the towrope in time to prevent losing sight of the towplane, stays clear of the towrope, clears to the right, and turns away to the right. The towplane turns left and heads back to the gliderport, and eventually the glider heads for the home airport as well.

In the post-flight briefing, I ask the candidate to review the warning signs of partial power loss during aerotow, and I mention the many reasons that can cause partial power loss. I also emphasize to the candidate that partial power loss may arise as early as the beginning of the takeoff roll! Contaminated fuel, mismanagement of throttle, magnetos, carburetor heat control, mixture control, fuel tank selector, towplane wing flaps, too-low towplane tire pressures, tall grass, wet soil, and even towplane wheel brakes or parking brake can reduce acceleration, lengthen the takeoff roll, and lead to scary low-altitude drama. So, be on watch during takeoff roll that acceleration is what you expected and that things are 'within normal limits' right off the bat. If you suspect that they are not within normal limits, release the towrope and land ahead on remaining runway; if the towplane pilot also decides to land ahead, alter course to the right sufficient to avoid collision with the towplane, and use wheelbrake as needed. Whatever the cause of reduced power or long takeoff roll, both the glider candidate and the towpilot will be better off separated, rather than tied together by the towrope.