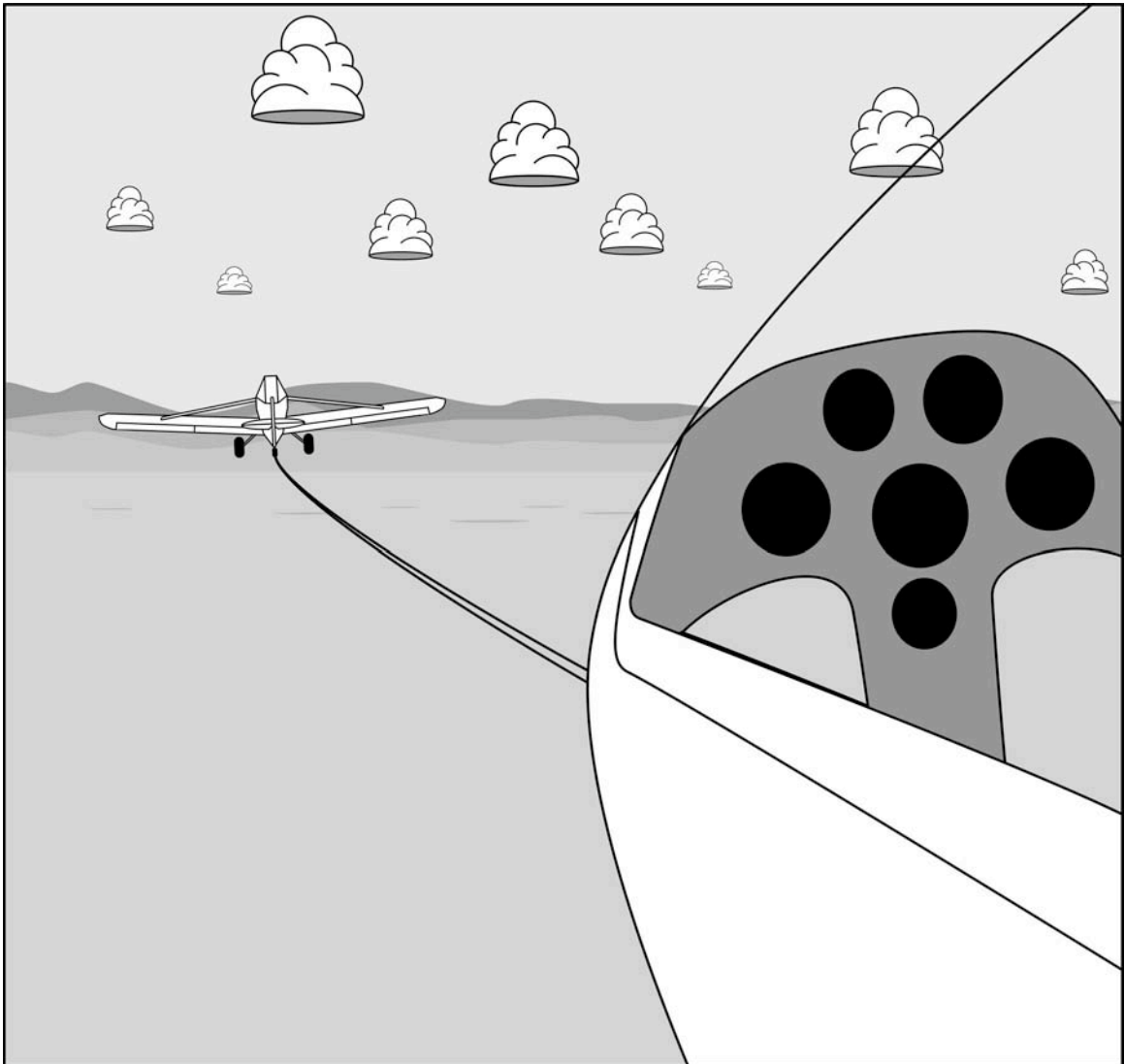


CHAPTER 3: AEROTOW

Before we can soar, we have to be towed up. Aerotowing means towing the glider behind an airplane. The vast majority of gliderports in the United States use aerotowing as the method of getting a glider into the air.

A towrope approximately 200 feet long connects the glider to the tow plane. Both the tow plane and the glider have a mechanism for releasing the rope. However, in normal operations, the glider pilot releases the rope and terminates the tow.

In this chapter, you will learn how to fly the glider on tow, how to communicate with the tow pilot through various signals, and how to safely deal with slack in the rope, both in straight and in turning flight.



3.1 Introduction to Flying the Aerotow

Purpose

In this lesson, you will learn to use the stick (ailerons and elevator) to maintain position behind the tow plane, while your instructor controls the rudder.

Procedure

The Physics of the Aerotow

Before you learn about flying the aerotow, it is helpful to know some of the basic physics involved. First, you need to realize that unless the wings of the glider are kept parallel to the wings of the tow plane, a side force acting on the glider will move it out of position.

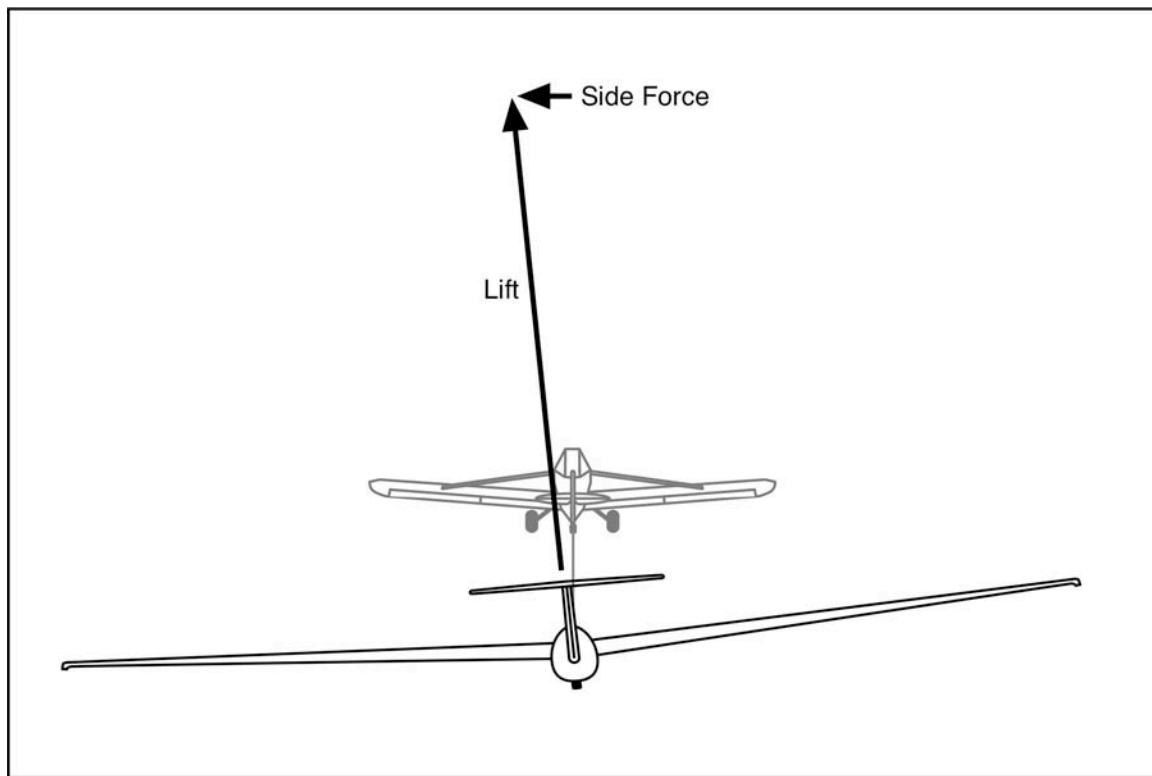


Figure 3.1 – Banking the glider tilts the lift vector, causing a side force that accelerates the glider out of position.

Any bank angle error, no matter how small, will eventually result in the glider's drifting out of position.

When the glider is out of position to the side of the tow plane, the towrope actually provides a restoring force that will bring the glider back into position behind the tow plane. The greater the position error, the greater the restoring force, as shown in Figure 3.2.

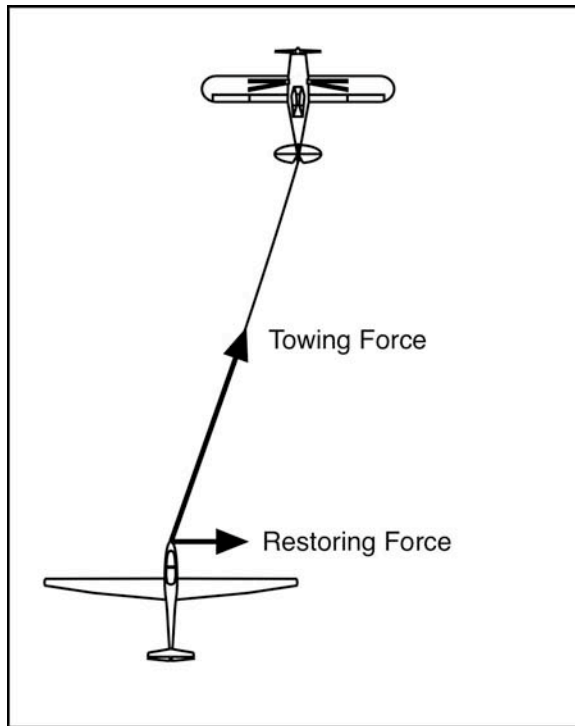


Figure 3.2 – Restoring force resulting from position error on tow

If the wings of the glider are held parallel to the wings of the tow plane, the restoring force generated by the towrope will bring the glider back into position. If no further corrections are made, momentum will cause the glider to overshoot to the opposite side. As the glider regains its position behind the tow plane, it is therefore necessary to apply a small, momentary bank angle to halt the glider's sideways movement.

Flying the Aerotow

Your instructor will not have you attempt to fly the aerotow until you have mastered the basic flight controls and can hold a pitch attitude and heading while in free flight.

Flying the aerotow is a form of formation flying. As such, it requires keen observation and precise flying. Don't be discouraged if your first several attempts to fly the aerotow result in your instructor saying "I have it" after only a few seconds.

After climbing to a safe altitude, your instructor will tell you to take the stick. The instructor will continue to control the rudder. The goal when flying aerotow is to maintain position directly behind and at the same level as the tow plane. You know you are on the same level as the tow plane when it is on the horizon, and you know you are directly behind the tow plane when the tow plane's rudder appears centered on its fuselage. If mountains or haze obscure the horizon, you will have to rely on visual cues from the tow plane to determine if you are in the proper vertical position with respect to the tow plane. Notice in

Figure 3.3 the horizontal stabilizer is lined up with the wing of the tow plane (a Pawnee in this case). If you were too high, the stabilizer would appear below the wing, and if you were too low, the stabilizer would appear above the wing. You will have to determine the visual cues for the type of tow plane(s) used at your gliderport.

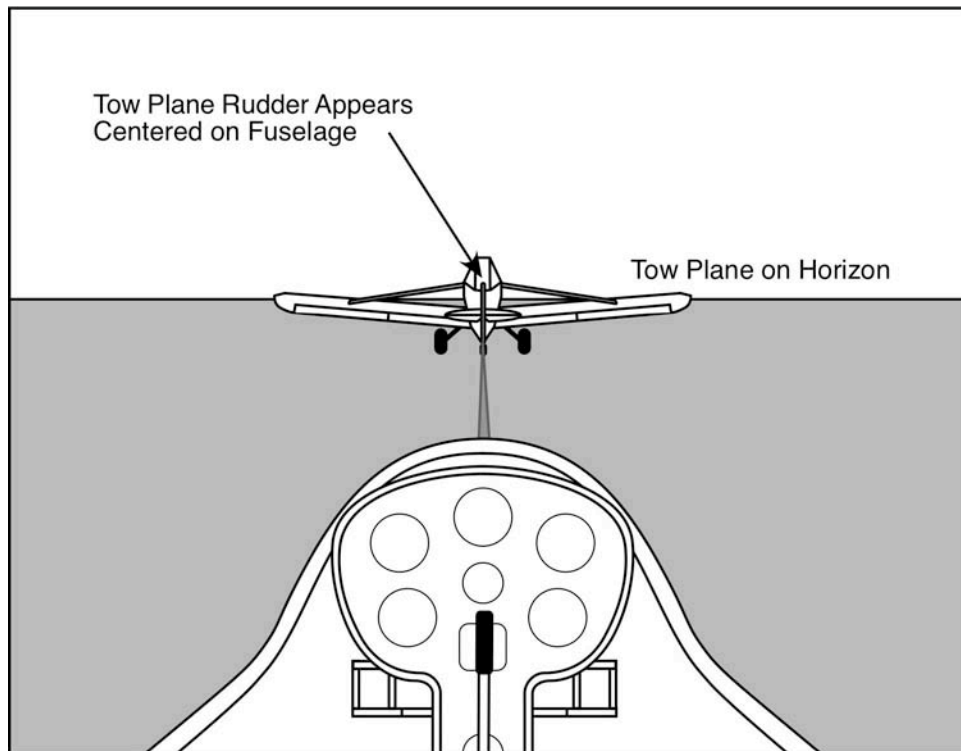


Figure 3.3 – Correct tow position. If you are directly behind the tow plane, its rudder will appear centered on the fuselage. If you are level with the tow plane, the horizon will intersect it.

The key to staying in position on tow is to recognize when you are just starting to move out of position and to immediately take the proper corrective action. Look for relative motion between the tow plane and the glider. As soon as you notice the tow plane drifting, apply very small control corrections. You should first try to stop the relative motion between the glider and the tow plane, and then slowly move the glider back into position.

If you find yourself off to one side of the tow plane, it is usually only necessary to match the tow plane's bank angle, or to briefly establish a bank angle towards the tow plane. Once the glider starts to move back in the desired direction, you should remove the bank angle and let momentum carry the glider back into position. If you hold the bank angle too long, the glider will accelerate and probably overshoot to the other side of the tow plane.

Use very small bank angles when on tow. Large bank angles will cause the glider to accelerate rapidly to the side, making it difficult to control and perhaps inducing slack in the line.

If a gust starts to cause the glider to pitch or roll, you must use the controls to keep the glider at the desired pitch and bank angles. If you allow the bank angle to change, you will eventually end up to the side of the tow plane. If you allow the pitch angle to change, you will end up above or below the tow plane.

Common Errors

- Failing to notice when the glider is getting out of position
- Using too much bank angle/control movement
- Not removing bank angle correction early enough
- Failure to maintain a constant pitch and bank angle when in the proper position on tow

Completion Standard

This lesson is complete when you can consistently maintain position on tow using the stick, while the instructor controls the rudder.