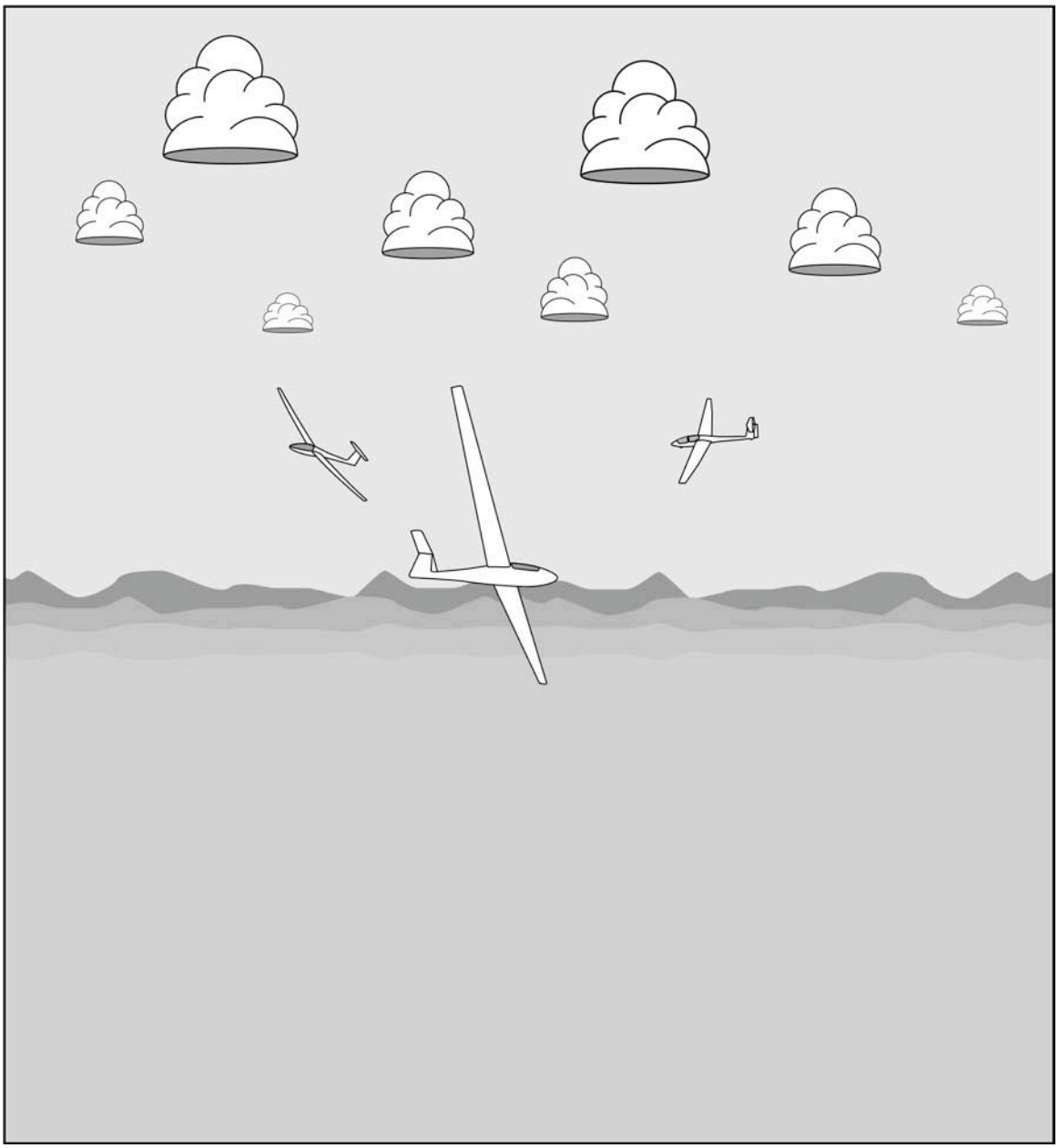
CHAPTER 7: FLYING IN LIFT

Gliding is fun, but soaring is more fun! The ability to climb in rising air—to sustain yourself aloft indefinitely—is what soaring is all about. In this chapter, you will learn how to soar in the four main types of lift used by glider pilots.



7.1 Thermaling

Purpose

Thermal lift is by far the most common type of lift used by soaring pilots. The purpose of this lesson is to teach you how to identify and use thermal markers, how to select the best clouds for lift, how to fly in gaggles, and how to maximize your climb rate while thermaling.

Procedure

Thermal Generators and Markers

Before you can climb in a thermal, you have to find one. Thermals are created when a mass of air is warmer than the surrounding air and rises above it. Any surface that heats up faster than the surrounding ground, an outcropping of rocks on a ridge, an over-grazed field, or a parking lot, can be a good thermal generator.

Thermal markers include such things as cumulus clouds, circling birds, and of course, other gliders. The lift will tend to be almost directly under the marker of a free thermal, but will be somewhere between the thermal marker and the thermal generator for an anchored thermal. (See Section 6.9 of the *Glider Pilot's Handbook of Aeronautical Knowledge* for more information about thermal structure.)

Selecting Clouds

The presence of cumulus clouds makes finding thermals relatively easy. However, if you don't read the clouds correctly, they may just tell you where the lift was, not where it is.

Cumulus clouds form when the air at ground level rises high enough to cool to a point where moisture contained in it condenses. Even if a thermal does not reach this level, there can be plenty of workable lift. A cloud just makes the thermal easier to find.

Cumulus clouds have a definite life cycle. During the initial stage, they may be nothing more than a wisp of visible moisture. While thermaling, you should always keep your eyes out for forming wisps. If a wisp starts to grow, perhaps developing into a cumulus cloud, it may be worth exploring. If the wisps are evaporating almost as soon as they form, the thermals may not be ascending quite high enough to produce cumulus clouds. In this case, it may be counterproductive to chase the wisps, since by the time you reach one, it will probably be dissipating, and will have sink instead of lift below it.

Growing cumulus clouds that indicate strong lift tend to have dark bottoms and well defined edges. If the lift is particularly strong, the cloud may develop a concave bottom, where the lift will be strongest.

As the lift decays and turns to sink, the cloud will start to look ragged, fuzzy, or blurry around the edges. It is best to avoid decaying clouds, as they can indicate strong sink.

Flying in a Gaggle

If you fly in the vicinity of other gliders, you will eventually have to share a thermal with them. There are a few basic rules for flying in a "gaggle".

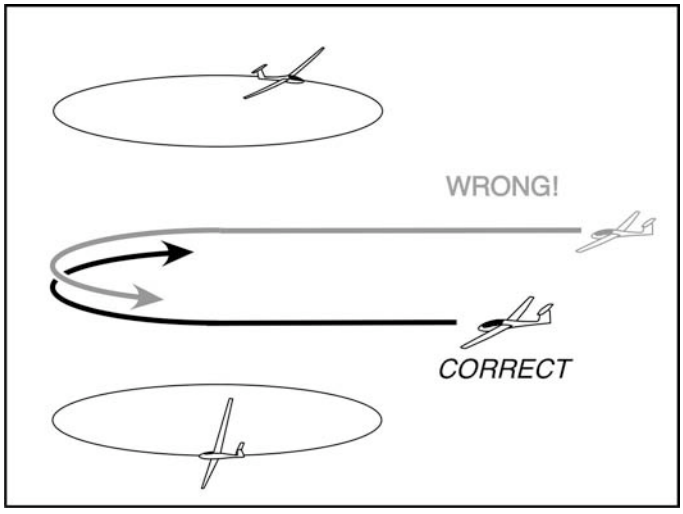


Figure 7.1 – When entering an occupied thermal, always turn in the same direction as the other glider(s).

The first glider to work a thermal establishes the direction to fly in that thermal. Even if you enter the thermal well above or well below the other glider, turn in the same direction so that if more gliders join the thermal, everyone is turning in the same direction.

Gliders already in a thermal should not have to maneuver to avoid you as you enter the thermal. Approach the gaggle carefully, and once in the thermal, match the other glider's bank angle and speed so that you fly the same size circle as they are flying. Slow down to thermaling speed before entering the thermal to avoid climbing though circling gliders as you enter the thermal.

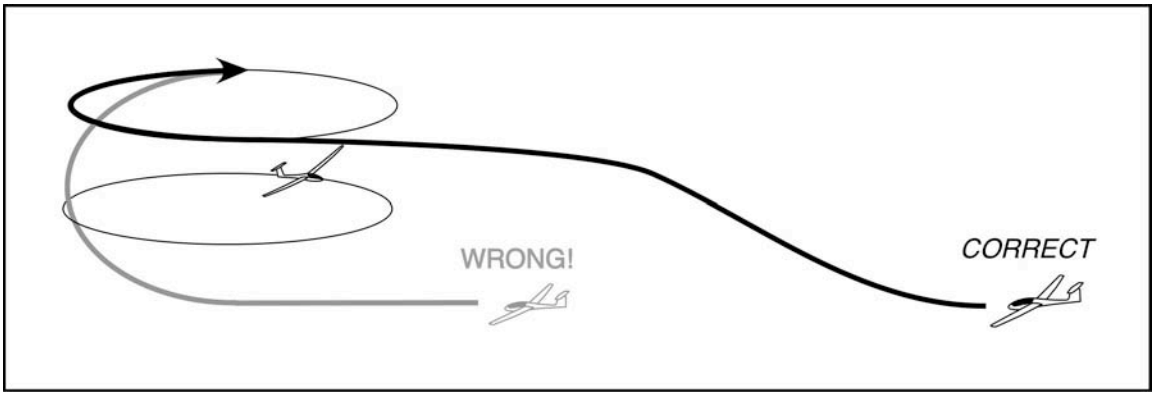


Figure 7.2 – Slow down to thermaling speed before joining another glider in a thermal.

If you are at the same level as another glider, try to maneuver so that you are on opposite sides of the circle. Avoid flying in another glider's blind spot, i.e., directly below or behind it. Many pilots get justifiably nervous when they know that a glider has joined their thermal but can't see it.

A glider climbing faster than others must give way to any slower climbing gliders. This is necessary because a higher glider will not have a good view of any lower gliders.

And finally, look outside. Do not stare at the vario when thermaling, even if you think there are no other gliders around you. A circling glider attracts other gliders like a light attracts moths! You should also look outside to look for power traffic and birds.

Maximizing Climb Rate

There are many variables that affect how fast a glider climbs in a thermal, such as the size of the thermal, the bank angle of the glider (which affects the size of the circle and the sink rate of the glider), the airspeed of the glider, the weight of the glider, and how well the pilot keeps the glider centered in the thermal.

As you can see in Figure 7.3, as the bank angle increases, the turning radius decreases. (The chart was developed for a Grob 103, but the curves are similar for any glider.) There is not much decrease in the turning radius for bank angles greater than 50°. The sink rate is not much greater than in level flight for bank angles up to about 30°. However, past 50°, the sink rate increases dramatically.

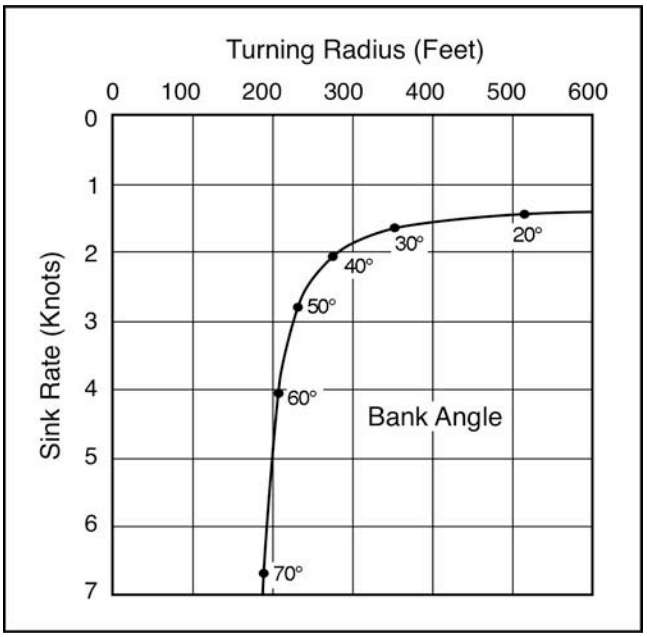


Figure 7.3 – Increasing the bank angle decreases the turn radius but increases the sink rate.

All this information is presented to convince you to use a 45° bank angle when entering a thermal. (You learned in Lesson 4.6 how to determine a 45° bank

angle.) If necessary, you can adjust the bank angle once you are established in the thermal.

One of the hardest things about thermaling is centering the thermal. There are almost as many ways to work a thermal as there are glider pilots, but what follows is a good starting point for developing your own thermaling technique.

As you encounter lift, you should keep flying straight until you reach the point of maximum lift. You will have to identify this point mostly by the "seat of your pants", since the vario will lag behind too much to be very useful.

As you reach the point of maximum lift, you should enter a turn. If after a 90° turn, the lift has stayed constant, stay in the turn. If the lift has increased, level out until it peaks again, then turn again in the same direction. If the lift has decreased after your first 90° turn, stay in the turn for another 180°, then level out and wait for another peak in the lift, then start another turn in the same direction. A flowchart illustrating this strategy is shown in Figure 7.4.

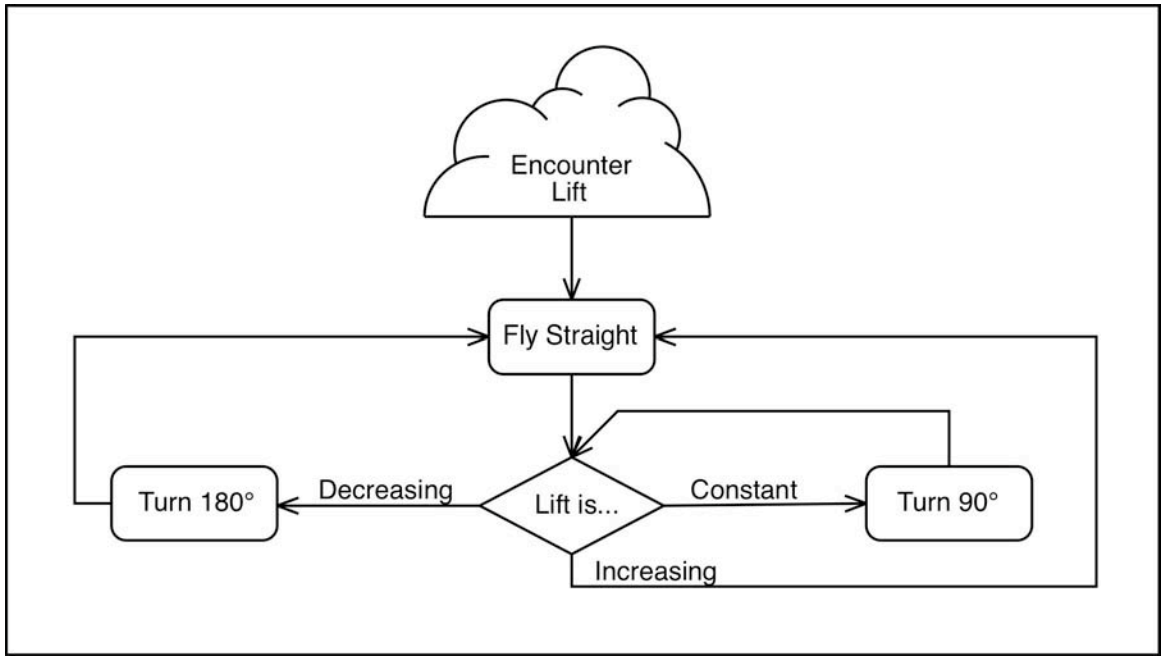


Figure 7.4 – Thermaling algorithm

Let's see how this applies to an "ideal" thermal. In Figure 7.5, the pilot encounters lift at ①, so continues to fly straight. The lift peaks at ②. The pilot senses at this point that the glider is no longer accelerating upward. In other words, the lift is constant.