

Room To Manoeuvre

by Bryan Quickmire

Of engines and wings, space and time

Pete Piston and Carl Camber both landed their airplanes at the fly-in around mid-afternoon.

Pete was exhausted and complaining.

Carl was relaxed and smiling.

They both flew through the same air.

Why the difference?

The summer sky was full of cumulus clouds, some towering majestically. A somewhat gusty 15 knot wind blew across the airport. Even for the light airplanes this was not exactly severe weather!

Let's look more closely at the flights of these two recreational aviators.

The Piston Flight

Pete took off with the intention of flying at 5,500 ASL direct to the destination. The cloud bases however were below this level, forcing frequent detours. Eventually he descended to 3,500 to stay on the course line pencilled on the map.

Unfortunately the turbulence conspired against Pete. It seemed that just as the airplane settled in on altitude and heading, it would be shoved up or down or a wing would be knocked over. He was forever changing power and pitch to maintain altitude and airspeed; forever jostling stick and rudder to keep going straight.

Pete's preflight calculations had incorporated the winds aloft forecast for 6,000 feet and had assumed a direct routing. He was obviously running behind schedule so the ETA in his flight plan was going to be off. That further frayed his nerves.

At last the airport came into view. Pete descended to pattern altitude where he was ambushed even more frequently by turbulence just lying in wait. He bumped and ground his way around the circuit and had a heck of a time trying to hold airspeed on final.

A few bounces accompanied by squeals from the tires marked the end of a miserable trip. Pete swore he would never again go cross-country on a summer afternoon.

The Camber Flight

Carl took off and once clear of the airport traffic zone flew 5 miles south of the course where he brought the amphib down to follow the shoreline of a very large lake. Meandering along just above the water, Carl waved back at boaters and people sunning on their docks as he passed abeam. After 30 miles of this socializing the airplane was 5 miles north of course and 20 miles closer to the fly-in.

Next there was a long stretch of dry land to traverse so Carl headed over to a nearby thermal and circled up to cloud base at a thousand feet per minute. Pinpointing the next thermal in the general direction of the fly-in, he set cruise power and dove off at high speed through the area of sink between the clouds.

Entering the thermal, a gentle pull on the stick zoomed the plane upwards to take advantage of the lift without circling. Coming out the other side Carl pointed the nose down and towards the next thermal. In this fashion the craft porpoised across the countryside, airspeed averaging 25 to 30% faster than cruise.

Occasionally a thermal not yet capped by cumulus would give away its position by lifting a wing of the passing airplane. Instead of being tilted away, Carl would roll back, banking into the thermal for another free infusion of energy.

Soon the flight was over an area of higher hills interspersed frequently with small and medium sized lakes, some round, others long and narrow. Carl, who must have had one cup of coffee too many, received a call from nature. He landed on a handy lake, upwind of where the waves had built up, and shut the engine down. Standing on the bow of the float, Carl basked in the sun as the airplane sailed backwards in the wind.

Taking note of the terrain and the local winds, Carl turned to the right immediately after liftoff to avoid an area of strong downdrafts from wind pouring over a hill. He aimed instead for a ridge on the opposite side of the lake where there would be lift from that same wind climbing back up. Sure enough, near the slope the air gave him a big boost upward. He cruised back and forth along the ridge for a minute or two, rising well above the crest before heading onward.

Carl zigged the amphib left and zagged it right, descended and climbed, checking out everything from

rustic lodges to beaver dams to a family of loons, splashing down occasionally to taxi up for a closer look.

Inevitably all journeys must come to a pause. Nearing the airport traffic area Carl broadcast his intentions on the radio. Maintaining a constant pitch attitude to average the airspeed fluctuations, he slid the airplane down final in a pronounced crab, transitioned to a wing low attitude coming over the fence then touched down gently on the upwind main, then the downwind main, then the nose wheel.

“Wow!”, said Carl out loud, “What a great trip!”

Visualizing the invisible

One major difference between these two flights is that Pete was fighting the air whereas Carl was working with it. At the risk of spouting platitudes, one could say that Pete flies the engine, driving the plane through the air by brute force, a veritable bull in a china shop.

Carl on the other hand flies the wing, seeing opportunity where Pete sees adversity. Carl visualizes the air as he journeys through it. He anticipates what happens when wind and sun and terrain interact. Carl doesn't get ambushed!

How do we visualize the air, isn't it invisible? Actually we can visualize the air just as plainly as we can tell how long ago the wagon train passed by examining the horse apples on the trail!

Sailplane pilots are very highly motivated to visualize air currents. Their objective is to spend as much time as possible in air that is going up and as little time as possible in air that is going down. If they don't succeed, they end up back on the ground!

The most common form of soaring uses thermals. Think of a thermal as a hot air balloon, but without the balloon. The sun heats the ground which in turn heats the air and, voila, we have an updraft! Often the thermal will be marked by a cumulus cloud - a dark, flat base indicates strong lift.

Sailplane pilots refer to blue thermals when the relative humidity is too low for cumulus to form. Then it is necessary to look for surfaces which will get hotter than their environs. For example, an area of exposed rock is more likely to trigger a thermal than a stand of trees.

Other popular sources of lift are derived from the flow of air over ridges or mountains. When the wind encounters a ridge, it of necessity goes up the upwind side and down the downwind side. Guess which side sailplane pilots frequent!

A strong wind going over a mountain in specific atmospheric conditions will form a standing wave, much like water in a stream flowing over a partially submerged rock. Such waves can literally go up into the stratosphere, lofting sailplanes above airliners. Sometimes clouds called lenticulars reveal the presence of waves, other times you have to use your imagination.

Sailplane pilots have refined visualization to the point where the world distance record is 2,049 km and the world altitude record is 14,938 metres. That's 1,300 miles and 49,000 feet - on a fuel consumption of zero gallons per hour!

Visualizing the air is also an integral part of flying floatplanes. Landable bodies of water are often sited in locations which no sane planner would ever consider for an airport. The terrain channels and funnels air so the direction and strength of the surface wind may bear little resemblance to the winds aloft.

The air speaks to the listening float pilot through the surface of the water. Bands of glassy water, wind streaks, gust ruffles, waves and whitecaps tell the story even more clearly than would a windsock.

Floatplanes and sailplanes are flown by aviators whose success depends on visualizing the air. Aviators in more conventional aircraft can learn from their brethren how to avoid unpleasant surprises and how to reap the benefit of no-cost height and speed.

Freedom in four dimensions

The four-striper at the helm of an Airbus is obligated to move people from A to B on a schedule fixed long in advance. Heading and altitude cannot be altered without approval from the ground. Even airspeed is governed. Thermalling is verboten!

The businessperson trucking along in a Cessna 210 at nine point five on a 500 mile leg is probably not going to be checking out beaver dams enroute to an important meeting. Or making pit stops on lakes!

There is a great deal of personal satisfaction to be garnered in mastering the complexity of these highly structured environments. However, this is not the dream of flight most recreational flyers were trying to realize when they signed up for flying lessons.

From ab initio training right through to the flight test the aspiring aviator, whether airline bound or not, follows straight lines on maps and computes time enroute to the nearest minute. The very act of filing a flight plan entrenches a rigid mindset. This eases our task as instructors at the expense of stifling our students.

Yes, we must be cognizant of our place on the globe. Yes, we must husband our fuel lest we make an unscheduled arrival at an unfriendly place. But there is no law that requires all cross-country flyers to get to the destination in the least possible time. And where does it say in the CARS that a day VFR flight must not vary altitude or airspeed?

Flight has the potential to offer freedom in all four dimensions of space and time. Pete Piston has come to view the purpose of flight as transportation to a destination. Carl Camber lives the view that the point of flight is the journey itself. Carl is one with the air while Pete has become an interloper. Which would you rather be?