Getting Started – Getting Better

An introduction to Cross-Country Soaring

1. Introduction

For many (and probably most) glider pilots flying cross-country is viewed as an extension of the sport for an elite group of contest pilots or badge seekers. While competition is certainly an aspect of cross-country flight, it also opens new opportunities for club pilots to extend both their skills and enjoyment of soaring.

I consider cross-country to be any flight that extends beyond a normal glide back to the field at a safe altitude, or where the landing occurs is at a different location than the take off. Even for those who don't want to fly cross country, a basic understanding is necessary in the event of an unplanned event such as a premature release or a weather phenomenon (wind change, storm cell over the field, etc) that necessitates either an outlanding or a deviation.

2. Preparation

A little planning and preparation beforehand is required. This should include:

-*earning the Bronze Badge*. The bronze provides the basic skills for precision landing, rigging the glider, using the trailer, and building confidence.

-*know your glider*. Be familiar with the flight envelope, glide ratio, flight characteristics under different conditions (speed, wind, etc) and equipment such as the barograph, camera, maps, calculators, tie down kit, journey log and so on that are not normally carried for local soaring.

-*Know the weather*. Review basic meteorology, and attempt to understand cloud formations and weather patterns. Keep a journal of weather conditions and flights while flying locally – wind speed and direction, humidity, temp, cloud formation, thermal strength etc. What produces the best soaring conditions for your area? Watch the sky on days you are driving, or stuck on the ground. What would soaring conditions be like if you could be flying instead?

-*Have a crew prepped and ready.* For every planned flight that could include an outlanding, a retrieve crew must be arranged. The retrieve vehicle and trailer should be ready before the flight. Also, be prepared to be a crew member for someone else.

-*Put together a cross-country kit.* This should be stocked and maintained during the season. It includes materials that are required for preparation, as well as items to be carried on the flight. It should include a checklist, and items like:

-camera(s), preferably data back, mount (if needed) and fresh film.
-canopy marking pen (grease pencil). (or logger to replace camera)
-flight declarations.
-landing cards.
-map kit with turnpoint data.
-sunscreen and repellant.
-clothing items – rain jacket, hat, dry socks.
-water bottle.
-pen and pad or cards – telephone numbers, radio frequencies, etc.
-personal relief system .

3. Those First Flights

The first few flights are close to the field, but do have a small potential for a landout. They should always be attempted upwind of the field. After attaining maximum safe height, a quick mental calculation is necessary. From maximum safe altitude, subtract the total of the field elevation plus the circuit height.

Ex. 7000ft – (2000 + 1000) = 4000 ft of working altitude. Divide by 2, and 2000 ft provides the limit to venture upwind. 5000 ft. is the altitude to turn back to the field. This also provides an additional tailwind factor.

Next, based on glide ratio, calculate the glide distance for you height limit.

Ex. from the determined 2000 ft at 30:1 (2000x30)/5280 = about 11 mi. or 18 km. This becomes the "target"distance. For simple calculation, each 1000 ft of height translates into about 9 km of glide. Later, a simple glide calculator can calculate this for any glide ratio and height. In the example, a specific target is selected upwind at about 18 km - a town, road, prominent building, etc.

In early practice exercises, turn back at whichever event occurs first – indicated altitude or reaching the target. Try to read the sky, fly fast through sink, slowly through lift, and don't turn in a thermal. The goal is to build confidence, discipline yourself to fly to a destination, and break the habit of turning in every thermal.

The next step is to revise the target point and extend the flight beyond a glide from the field. Near the target point, use a good thermal to climb back up to height – then select a new target farther upwind, and fly to it. Again, you can turn back at either the target or the minimum determined altitude. Read the sky – unless there is a change of conditions, there will be lift on the way back also. This method can be used to gradually "step" farther away from the field.

The final goal in this type of practice is to work on improving speed and efficiency. Using a kneeboard or notepad, record release time, start time, target or turnpoint time, return time, etc. Use it to calculate average speed, and work on improving it each time. Try for minimum time spent thermalling. Here again, keeping a journal is helpful – note sky conditions, thermal strength, etc. Also, study a barograph trace for the flight and compare time and distance flown between thermals. Aim for a few efficient climbs rather than a lot of slow ones.

Small triangles also work well for practice. Plan for specific turnpoint targets and practice getting good turnpoint pictures from the correct sector. With practice, a lot of time and altitude can be saved at a turnpoint. One technique that works well is a climbing, well coordinated turn with a sequence of pictures near the top of the turn as the wing is pointing down at the photo target.

4. Decision making and Safety

Although a cross-country flight has an "ideal" ground path, the actual flight path may deviate considerably depending on sky and ground conditions. A continual application of SOAR techniques for decision making is essential to both success and safety.

Scanning and lookout techniques are important to practice. Considerable time can be spent between thermals, with a tendency to focus on the target ahead or on maps and instruments inside the cockpit. It can take a few seconds for the eye to adjust to different focal lengths. A good technique is to constantly scan to one side, ahead, to the other side,

etc with an occasional glance at the instruments on the way by to confirm what you should already know.

Keep cockpit distractions to a minimum while practicing and learning. While invaluable later on, with a GPS, flight computer, etc. there is a tendency to focus on them rather than concentrating on specific learning goals for safety and efficiency.

Know and watch the weather, especially for changes and overdevelopment

Keep hydrated. There is a tendency to not drink enough water. It is a good idea to drink water on final glide, a few minutes before reaching circuit height. Dehydration is hard to recognize before it is too late, and can result in severe headache, poor muscle coordination and poor decision making.

On any flight, be prepared to land out. As a general rule, at 1000 ft above circuit height, select three suitable fields. A stubble field is usually excellent. Summerfallow is suitable but may be soft and furrowed. Pastures can be uneven with rocks or obstructions. Avoid cropped fields if possible. As you over fly one, select a new one ahead to replace it. Apply OWLS checklist (Obstructions, Wind, Length. Surface). Watch for powerlines, fences, and obstructions. Note up or down slope. Be aware of wind speed and direction. At 500 ft above circuit height, select the best field. As you continue, always have three potential fields, but have one selected for landing. At 1000 ft AGL commit to a field and prepare to land. Regardless of field size, picture an *airstrip* in the field with a specific aiming point. If possible, select to land near an approach to a road. If a telephone is necessary, try to land near an occupied farmhouse or near a town. However, always put safety first, convenience second. Plan and set up the circuit to land as you normally would. Hold off the touchdown as long as possible (minimum speed) to allow for soft or rough terrain.

5. <u>And finally, those badges!</u>

The silver distance is often the first step, requiring a straight line flight of at least 50 km. Depending on the glider and the day, a downwind task is often selected. Review the rules and work with your O.O. to make sure you satisfy all the requirements. Make the towpilot aware of your intentions and familiar with the release procedures and declaration. Remember, there is a penalty of 50:1 for any release greater than 500m AGL, or about 1650 ft. A good barograph "notch" varifies the start altitude. The same penalty applies to a difference in elevation if the landing site is lower than the launch site.

Ex. (a real one) – release altitude 2000 ft. Landing site 150 ft. lower than takeoff location. Declared distance 57 km. Penalties, 350 ft (high release) + 150 ft (elevation difference) = 500 ft or about 150 m. Penalty = 150 x 50 = 7500 m or 7.5 km. Total recognized distance 49.5 km. No silver!

Consider some alternatives. Declare an out and return to beyond the 50 km distance required. The turn point can become a remote start point. Fly to it, take a proper turnpoint photo, and fly back to the field. Whether you land beyond the turnpoint, or back at the field, you will have completed the requirements for silver distance. For the more ambitious, declare a 300 km (gold) distance task or a 2 or 3 turnpoint diamond goal task. Any successful leg of more than 50 km will meet the requirements for silver distance. The longer attempts are the time to work in the 5 hr duration requirement.

Every attempt is a learning situation. Plan and practice for success. Badges will result. Most of all, enjoy the experience and fly safely.

Calculating Glide Ratio, Distance and Time:

The Glide Ratio (L/D) with respect to the air (GRa) remains constant at a given airspeed. The Glide Ratio with respect to the ground (GRg) is influenced by the wind

GRg = (GRa (airspeed +or- windspeed) / airspeed)

With no wind: GRg = GRa

Problems: If your altimeter is set correctly to sea level pressure, how high must it read at point H to reach the airport *A* in still air if you are a distance *D* from *A*. Assume the glider has a glide ratio of 30/1 at 50 MPH (45 KTS), that the airport height (h) is 1530 ft. ASL, that *D* is 20 statute miles and that you want to be at the airport *A* at a height of 1000 ft. AGL for a safe circuit.

With no Wind:

Height needed = ((D x 5280) / (GRg)) + 1000 + h
= 3520 + 1000 + 1530
= 6050 ASL.

As you reach an altitude of 6050 ft. ASL you note that the time is 14:40 hr and you set off for the airport *A*. What is your ETA?

time = 20 miles/50 mph. = 0.4 hrs = 24 minutes. ETA = 14:40 + 0:24 = 15:04 EST.

With a 15 mph Headwind:

GRg = 30((45-l5)/45) = 20
Hh = ((20 x 5280)/20) + 1000 + 1530 = 7810 ft. ASL
time = (20/(50-15)) = .57 hrs = 34 minutes.
ETA = 14:40 + 0:34 = 15:14 hr

With a 15 mph Tailwind:

GRg = 30((45 +15)/45) = 40
Ht = ((20 x 5280)/40) + 1000 + 1530 = 5170 ASL.
time = (20/(50+15)) = 0.31hrs = 19 minutes
ETA = 14:40 + 0:19 = 14:59 EST.

Feet Lost Per Mile: - Glide Ratio 30/1 at 50 mph (45 Kts).
No wind = 5280/30 = 176 ft.
Head wind (15 mph) = 5280/20 = 264 ft.
Tail wind (15 mph) = 5280/40 = 132 ft.

Distance covered per 1000 ft. Height Loss
30/1 = 30 x 1000 ft./5280 = 5.7 miles
20/1 = 20 x 1000 ft./5280 = 3.8 miles
40/1 = 40 x 1000 ft./5280 = 7.6 mile

Cross Country Checklist

Personal cross country kit – regular contents

_____ Maps – aeronautical charts, highway, grid, site maps
_____ GPS – preloaded turnpoints, fresh battery, instructions
_____ Turnpoint camera(s), fresh film, spare batteries, camera mount
_____ clothing – nylon jacket, sweatsuit, spare socks, rainsuit pack, hat
_____ water bottle
_____ notepad, filecards, pen(s)
_____ insect repellant
_____ landing cards
_____ add daily contents:
  _____ lunch, snacks, electrolyte beverage
  _____ cell phone
_____ personal relief system
_____ sunscreen
_____ flight declarations
_____ canopy marking grease pencil
_____ water
_____ sunglasses

Preflight Preparation

_____ weather – TAF(s), GAF(upper winds, pressure systems)
_____ route for task(s), headings, leg distances
_____ O.O. arrangements
_____ towpilot arrangements
_____ flight declaration(s) prepared
_____ glider arrangements
_____ retrieve crew arrangements

Flight Preparation

_____ retrieve trailer loaded (wing stands, fuselage stand, fittings, de-rig kit)
_____ trailer attached, check lights, tires, plates, car keys, trailer keys
_____ O.O. - review and sign declaration, load & seal camera, load & seal barograph
_____ file card – radio frequencies, phone numbers, etc as required
_____ crew instructions – contact, retrieve

Glider Preparations

_____ D.I. including clean, gap tapes as required
_____ install camera, mark canopy, install GPS, wind and install barograph
_____ load tiedown kit, water bottle, lunch, map kit, pen, file card, jacket, repellant, etc.

Prelaunch

_____ barograph on
_____ tow instructions
_____ appropriate clothing, hat, sunscreen
_____ declaration photo
_____ correct weak link
_____ remove wallet

Post landing

_____ landing photo
_____ landing card completed, witnessed, signed
_____ barograph off
_____ glider secured