Glide Angle Ranges for Recreational Cross Country

There are a host of situations when your glider cannot achieve best L/D. In order to make our glides safe and comfortable, we recommend derating your glide angle. Find the appropriate performance class and utilize these numbers for your gliding "cones of comfort."

Training- Less than 50 hours XC, or less than 10 XC flights

Novice- Less than 100 hours XC, or experienced pilot with less than 5 XC flights for the season, or unfamiliar with area

Class		Max. Performance		For XC Planning (nm/1000')		
		Ratio	nm/1000'	Training	Novice	Experienced
B	SGS 1-26	21:1	3.5/1000'	2.25	2.5	2.5
C	1-36, 1-34, PW-5, K-6	30:1	5.0/1000'	3	3.5	3.5
D	AC-4a, Junior, K-21, G-103	32:1	5.3/1000'	3	3.5	4
E	Grob 102, 1-35, AC-4c	35:1	5.8/1000'	3.5	4	4
F	ASW-19, Libelle, Pegases	37:1	6.2/1000'	3.5	4	4.5
G	LS-4, DG-300, Discus	40:1	6.7/1000'	4	5	5.5
H	Ventus, ASW-27	44:1	7.3/1000'	4	5	6.0
Suggested Arrival Height (field elevation plus...)				2500'-3000'	2000'-2500'	1500'-2500'
Suggested Cruise Speed				L/D speed + 5-10 kts	L/D speed + 10-15 kts	McCready Settings

Air Sailing vicinity use arr. alt 7000'

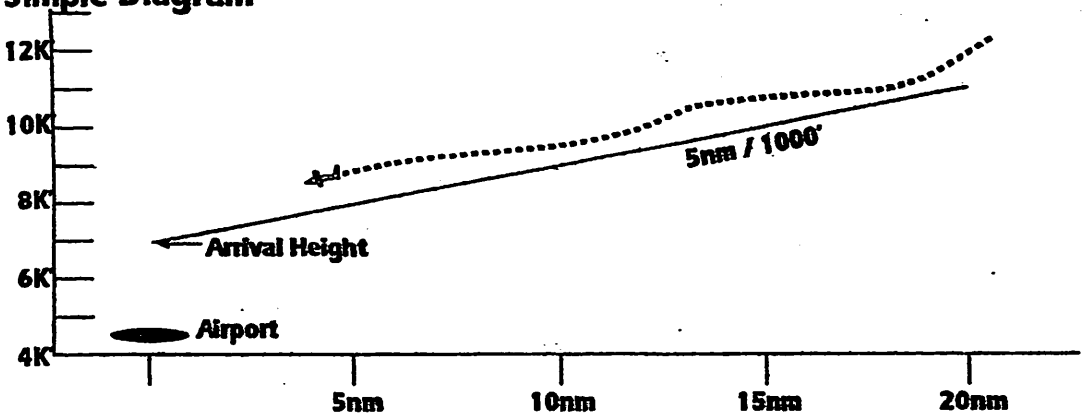
Sink Scenario

One way we can judge if the above numbers are accurate, it to simulate a unfavorable glide using best speeds to fly and MaCready theory. Returning from Pond Peak (about 16nm), how much altitude is needed to arrive at ASI at 7000'? Headwinds: 10kts to 10,000', 12kts above 10,000'. Airmass: 4 miles of 1.5 knot sink, 5 miles of 1/2 knot lift, 1 mile of 6knot sink, and the last 6 miles in 1/2 knot sink.

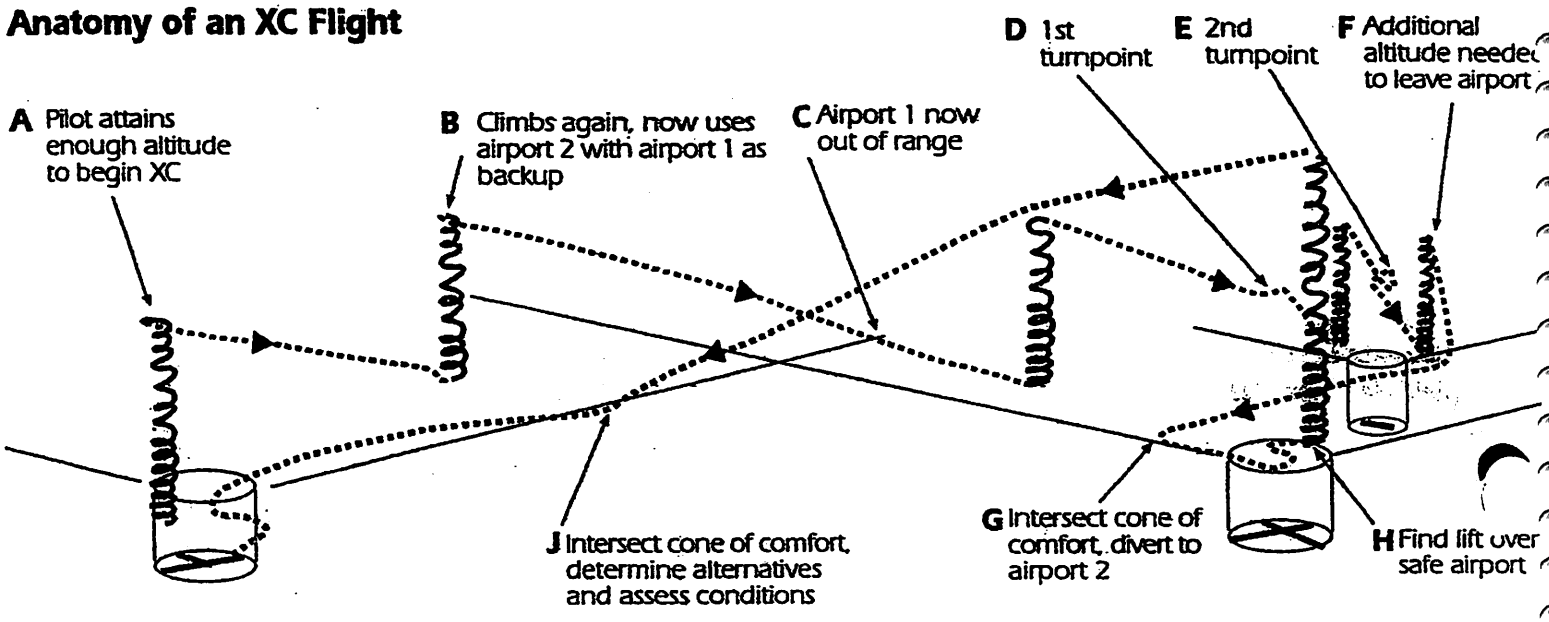
Higher performance gliders actually have a greater erosion of glide than do low performance gliders when sink is encountered. The pilot is also forced to think more quickly in a faster, high performance glider.

	Alt Needed	Alt Lost	Glide	% Max Perf	Time of Glide
B	14,450'	7450'	2.2/1000'	61%	25 min
C	12,400'	5400'	2.9/1000'	60%	26 min
D	12,300'	5300'	3.0/1000'	57%	23 min
E	11,750'	4750'	3.4/1000'	58%	21 min
F	11,625'	4625'	3.5/1000'	56%	21 min
G	11,300'	4300'	3.7/1000'	55%	20 min
H	11,080'	4080'	3.9/1000'	53%	18 min

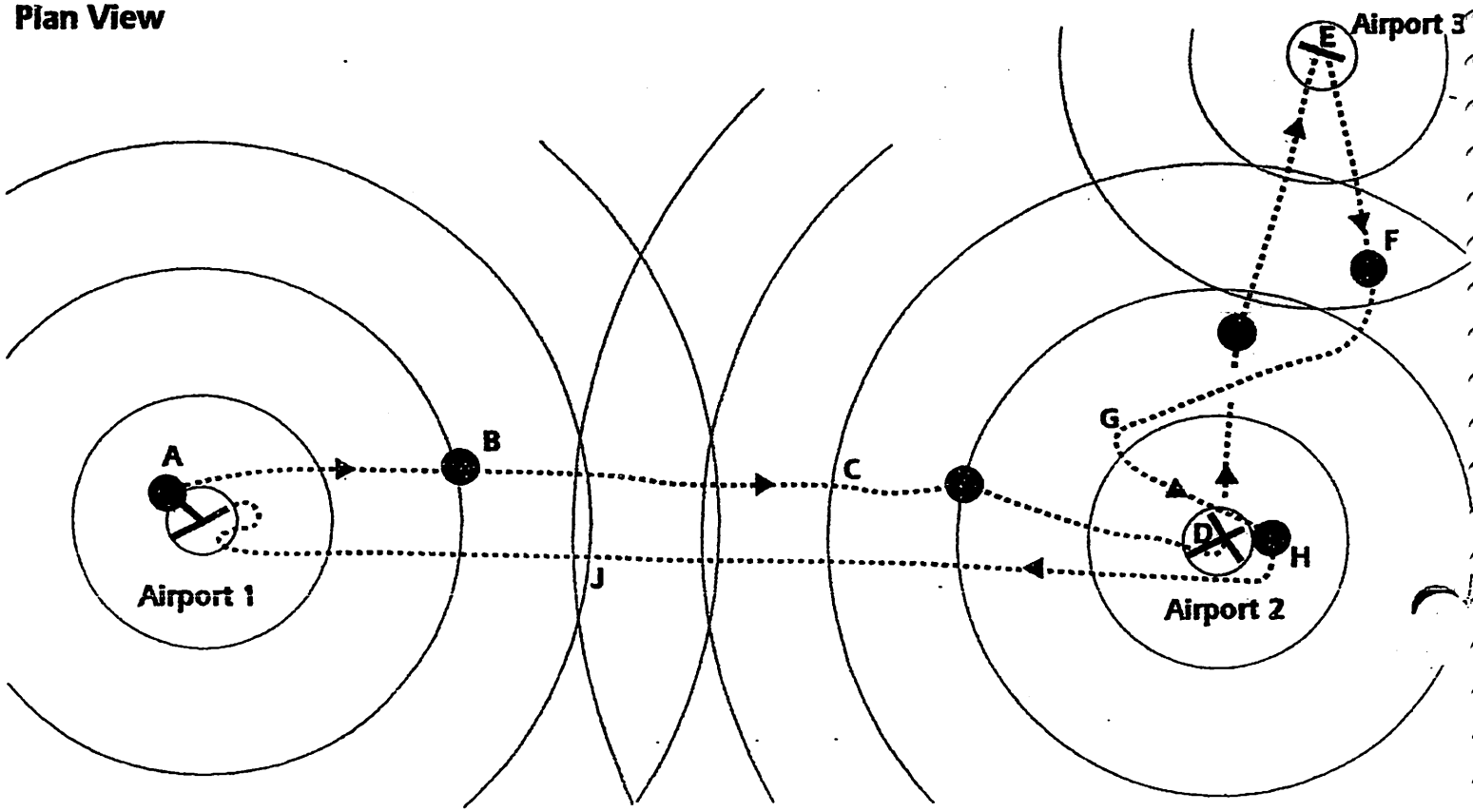
Simple Diagram



Anatomy of an XC Flight



Plan View



JOHN WILLIAMSON

PRESSING ON

In my last article we discovered how to centre quickly in a thermal and how to stay centred. Now it is time to apply this skill to the business of going cross-country . . .

Setting Off. For the inexperienced the decision to turn one's back on the airfield is quite momentous. Whilst developing your thermalling skill you ventured further and further from the site, always maintaining enough height for a quick glide home if necessary. At first you will have been surprised at how little was needed, even when you had been drifted a bit far downwind. As you grew more confident in your judgment you found that two, three or even five miles was not too far. You may have used a calculator to do the sums for you – I hesitate to say "should" in case I'm accused of commercial bias! – and this practice will certainly stand you in good stead later, as we shall see. But the first time you fly deliberately out of gliding range of base is memorable indeed.

It would be foolish to take this first step without being reasonably sure that you will find another thermal. The less experienced can only gain this assurance by indulging in a little local soaring first. It is a good rule to have found at least three separate thermals before deciding to set off and to have climbed to the local cloudbase, which should be at least 4000ft agl. Three thermals within four miles of base should mean an acceptable distribution or pattern of thermals, provided the terrain on course is similar to that at base, and that the visible cloud signs are not unfavourable. The more experienced will be able to make this judgment more quickly by studying the sky – the cloud shapes and patterns – or by reference to previous flights in similar conditions.

Stepping Stones. Your decision to set off will be made easier if the proposed flight – say a Silver distance attempt – is tackled in easy stages. To set off into fifty miles of unknowns can be quite daunting. But an initial goal of, say, ten miles to an area of known good fields, or to a friendly airfield, will be much easier to contemplate. You would need advice about the field situation and need to know what joining procedures might be relevant at the airfield. But with this knowledge it is a simple matter to estimate the height needed to get to the area with a safe margin. Having arrived you can slip back into local soaring mode until you find the next thermal. "Local" soaring is much less stressful than a desperate search for lift in a totally strange area and you should stay within range of the first goal area until it is safe to press on to the next. This second decision to press on is much less traumatic than the first and in no time at all you are happily "local" soaring again and beginning to think that your ultimate goal is not so far away after all! But even taken in easy stages you still have to find the thermals, avoid undue sink, know where you are, and be ready to land out if it goes wrong.

Finding The Thermals – Sky Reading. You must learn to look both up and down in your search for thermals. The sky and the clouds are your best guide above about 2500ft. Intelligent sky reading is very important. You must learn to recognise the cloud which is growing and will still be active when you reach it. You can't usually see a cloud actually getting larger – the changes are too slow for that. But you can get a good impression by observing the clouds ahead each time they come into view as you circle. Each turn should take between 15 and 18 seconds – remember the angle of bank? – and in that time an active cloud will have changed shape noticeably.

Next you must estimate how far away it is, how long it will take you to reach it and what height you will lose getting to it. Find the shadow of your chosen cloud to make the best estimate of distance. It is very difficult to judge the distance to a cloud directly but its shadow four miles away viewed from 4000ft will appear to be about halfway to the horizon. How long to get there? Say five minutes for four miles at the sort of speed at which you would expect to fly your K-6. As for the height loss, this is where your calculator might come in handy. But you can guess about five miles per thousand feet in wood, six miles in glass, seven miles in super-glass. In still air, of course. You *would* need the calculator to make a proper allowance for significant wind.

A vigorous thermal has a life span of about thirty minutes of which probably a third is in the decaying stage

Finally you should realise that a small cumulus marking the top of a vigorous thermal has a total life span of about thirty minutes, of which probably a third is in the decaying stage. Arrival under a decaying cloud has its own peculiar problems, as we shall see in a moment. Now you can see that the decision to go to a specific cloud is subject to quite critical timing and you would be wise to be flexible in your judgment, to choose a route which gives you more than one option.

– And Trigger Spots. Below 2500ft you should turn your attention to the ground for clues to the whereabouts of your next thermal. In all but the most uniform of circumstances the ground heats unevenly, depending on the direction of any slopes, the angle of the sun, surface moisture, vegetation, soil type and the degree of drainage. The thermal derives from the heated layer of air close above the surface which will tend to be released first from the vicinity of the warmest area – the trigger spot. It then draws in all the warmed air from hundreds of yards around. As you look down try to imagine where you would feel warmest if you were down there. A sunny corner, sheltered from a cool breeze by a hillock or large wood, perhaps. Or a warm, dry ploughed field, a built-up area, a village. Look, too, for tell-tale signs in any smoke. Not that a bonfire would add significantly to the energy in your thermal – a good one involves a mass of tens of thousands of tons of air! But the smoke can often give away the presence of a thermal close by. It may look "dead", holding low to the ground, trailing away directly downwind. Or it may be billowing around, or bending suddenly crosswind, both signs that a thermal is not far away. By keeping your eyes open for these signs you stand a much better chance of finding it.

In any significant wind the base of the thermal could well migrate downwind, swinging this way and that to take in further hot spots, resulting in a sustained thermal. To have the best chance of contacting the thermal from a given trigger spot, therefore, you should approach from directly downwind, being ready to turn left or right as required.

Avoiding The Sink. It takes little imagination to realise that cross-country progress would be much more rapid if you always flew in lift. This article isn't about racing techniques so I won't go into the fine detail of street flying and dolphin soaring. Clearly, if you are able to take advantage of adjacent thermals and clouds, you should do so. Even if you can't fly always in lift you might be able to *not* fly in sink with a little foresight and route planning. All thermals have their corresponding downcurrents. These are usually relatively gentle around the thermal itself, since the displacement air which is forced to descend by virtue of the thermal's upward thrust is spread over a much greater area than the fast rising core. Thus a 6kt thermal may induce a 1kt down-current all around itself. We know that it's going to be there when we press on and we deal with it by speeding up for a few moments until we are through the worst of it.

If you cast your mind back to my last article you will realise that the way to minimise the sink surrounding each thermal is to fly directly towards it, straight across the "contours". You can't usually see the next thermal but you should have a clue in the cloud patterns above. If you think a certain cloud is still growing then fly directly beneath it, not just to one side which is where the sink is *bound* to be. If you encounter sink without any visible clue to where the thermal is then use the wing-tilt to guide you towards the lifting wing, away from the sink. And finally, beware the cascade falling from the decaying cumulus.

You will recall that as the thermal reached its condensation level the cumulus cloud formed. Formation of the water droplets released extra heat back into the air. This was the heat originally taken when the water evaporated to form water vapour in the first place and its release into the

thermal gave a boost to the lift at and above cloudbase. When the cumulus has stopped growing the droplets once more start to evaporate, using up heat in the process. When you use up heat something has to cool down. In this case it is the air itself, and cool air will descend! As it descends, it warms at the dry adiabatic rate, which you will recall is 3°C/1000ft.

But there are good thermals around, which implies that the airmass is unstable. The ambient air in an unstable airmass is cooler as you go up by slightly *more* than 3°C/1000ft. And, of course, it is warmer by the same amount as you go down.

It is this down-current that you should watch out for and avoid like the plague!

So the down-current caused by the evaporating cloud will find itself surrounded by an airmass which is becoming progressively warmer than itself. It continues downards – in extreme conditions it may even accelerate – like an un-thermal, possibly forming much the same doughnut shape as did the thermal that spawned it half an hour earlier. It is this down-current that you should watch out for and avoid like the plague! Your clue is the evaporating cloud of ten minutes previously. Be sure to have spotted it and remembered where it was. It won't be there when you fly that way but it's cascade will be!

Navigation. Along with all the problems of finding lift, avoiding sink, keeping a good look-out and generally flying your sailplane, you also have to know where you are going! The airspace in this country is too congested for you to feel free to wander where you will. You have to navigate.

Navigation in gliders is a matter of map reading, which is simple enough so long as you know where you are. The occasions when you might have to do dead-reckoning, work out vectors, estimate time of arrival, and all the things that go with power flying, are so rare as to not be worth worrying you with here. Let's stick to map reading.

The first essential is that you should be able to see where you are going. For your early cross-countries the visibility should be at least ten miles, which means that there should be a reasonable horizon and that you can see clearly most of the way to it. The worse the visibility the harder the task. Next you should, in your flight planning, have noted the significant visual features that occur on your route, such as lakes, rivers, motorways and large towns, and the positional relationship between them. You may need advice with this from someone who is experienced because features which look prominent on your map may not be so when viewed from the air. Ordinary roads all look the same, as do small towns and villages. Railways, clear enough on your map, can be very hard to see unless you are directly above them. Surprisingly, disused railways, printed as a series of insignificant dashes on the air map, are easier to spot than those that are still active because they nearly always have overgrown bushes along the length of them which stand out as bold lines across the otherwise chaotic muddle of hedges, streams and roads. Knowing what to expect, and when, gives you a better chance of spotting it when you get there.

Be sure to fly in the right general direction for your course. Accurate compass flying is rarely necessary in gliders but as you come near the top of each thermal, check and check again the direction in which you should depart. Choose a likely cloud within 30° of that direction and, as you fly, look ahead for your expected landmarks. You need to appreciate how far away things are and what they might look like. In the UK you can rarely see details at more than twenty miles. Ten miles is pretty near your normal horizon and even at that range you can't see the pattern of towns and roads because of the flat perspective. The view changes, of course, with height. A feature may look far away from 2000ft and almost under the nose from 5000ft, ten minutes later.

While you know where you are make a point of checking with your map very frequently. This may not be universal advice but, with many thousands of miles of cross-country behind me, I still find myself referring to the map every few minutes. Practical glider navigation is a matter of moving from one landmark to another, trying to pick up the next before the last is lost to view. Even over familiar country I want to cross-check the relationship of *this* town and *that* landmark, to confirm my impression of orientation with the direction of the sun, to be sure of the optimum direction in which to press on next. Even so there comes a time when one is temporarily uncertain of one's position – which means *lost!* What happens next is down to you.

First, stay calm and try to apply simple logic. Search the area around you for a feature, or combination of features, which would be shown on the map you are using. Then think back to where you were last absolutely sure of your position. Estimate about 25 to 30 miles flown (if a relative novice) for each hour since then, and then scan the map in the appropriate place for the landmark features you have seen outside. Do NOT try to do it the other way round, by "knowing" where you are, and insisting to yourself that the ground is at fault because it doesn't have the features you "know" are there somewhere!

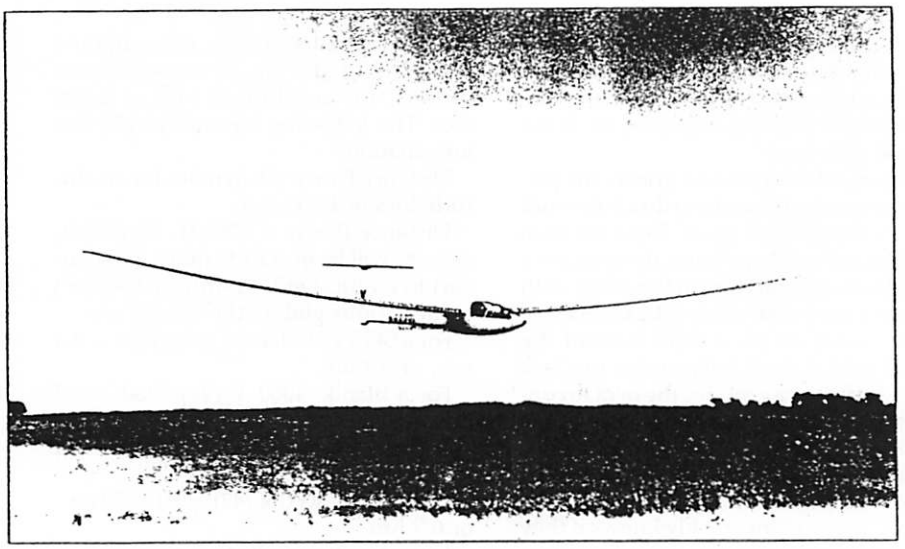
One pilot, from a continent where the landmarks are further apart and perhaps less confusing, set off eastwards to fly to Cambridge. Not wishing to admit to any uncertainty, even to himself, he reported his position confidently every so often. Eventually, having passed "Aylesbury", "Luton", "Baldock" and "Royston", he admitted to some confusion, being unable to identify a large town with a river wiggling through it. His crew, armed with the "facts" of his previous progress, projected his flight forwards and decided it *must* be Cambridge. He followed their advice to "go a bit further in the same direction" and land at the airfield he would "soon come to." Half an hour later he landed at Biggin Hill, having failed to recognise Tower Bridge on the way!

So, by taking it in easy steps, keeping one eye on the clouds and the other on the hot-spots below, and not getting lost in the process, you will have got to your goal. But supposing the day goes "blue", or you have to land out. We will contemplate these eventualities in my next article.

LESSON ONE OF A FIVE PART SERIES — SAFE ALTITUDE CIRCLES

Phil Petmecky is an SSA Director for Region 10 and Chairman of the Flight Training Committee. He has over 10,000 glider flights with over 1,000 hours of dual instruction given in gliders. Phil is an FAA designated examiner for gliders. He completed his Diamond badge in 1987.

In 1988, Phil took a Twin Lark to the Sports Class Nationals with a crew of student and private glider pilots. Each day of the contest a different pilot flew with Phil. In 1989, he and another group of neo-cross country co-pilots flew a Grob 103 II to a first place finish over a field of 19 gliders in the Region 10 Sports Class event in Littlefield, Texas. This was the first time a two-place glider has won an SSA sanctioned event in many years.



The First Solo Cross Country Flight

by Phil Petmecky

I remember back to that day in August, 1979 when I took my first cross country flight in a glider. I didn't decide to go all by myself. In fact, the idea hadn't even crossed my mind. I had recently completed the dreaded five hour flight without ever getting more than three or four miles from home. I had no idea how far the glider I was flying would go.

It was just past noon when the owner of the commercial operation where I was flying walked up to me and said, "It looks like a Silver Distance day. Why don't you jump in the Jantar and fly up to Brenham?" The color drained from my face, but not wanting to appear timid, I glanced up at the sky and said, "Do you think I'm really ready for it?" "Sure," he replied, "piece of cake."

It took me over two hours to get there. I was only lost four or five times. I worked every cloud that had 1/2 knot or better lift, and I only got low once, right after release from tow. I arrived over what I hoped was my goal at 4,000 feet AGL. I won't talk about my first landing on a paved runway in a glider, except to say I missed all the runway lights.

Needless to say, I was not prepared to make this flight. I now have been a glider flight instructor for over eight years. My first few years as an instructor, the students I turned out usually reached my level of ignorance on cross country flight by the time they were rated. One good thing that I can say about myself during this period is that I knew my weaknesses and constantly worked to improve myself. Slowly, over the years, I have developed a cross country training syllabus that I use with my students. Thus, I know that they are much better prepared to break the strings than I was on that August day in 1979.

One of the problems I had in teaching myself to fly cross country was that I read everything I could lay my hands on and tried to use it in flight. I found myself overloaded with information I did not thoroughly understand. Much of what I read was really written for contest pilots and not applicable for beginning cross country pilots.

The approach to a Silver Distance flight is much different than that for a contest task. For example, on a Silver Distance flight, speed should not be nearly as important as altitude. There is no additional reward for finishing the task in less than an hour.

Once we have successfully done our Silver Distance, we will then begin to work on improving our speed on cross country flights. Every local flight should have several goals laid out prior to flight. I like to work my way upwind as far as altitude permits and practice final glides back home. I frequently set a short task and try to fly it as fast as possible.

In the beginning, preflight planning was never adequate and, consequently, my inflight decisions were poor. Even when I made a good decision, the time it took was so long that I frequently lost large amounts of altitude in the process!

One of the first things I tell my students about cross country flight is that the better prepared they are prior to flight, the more likely they are to have a successful outcome. They begin carrying, and using, a sectional chart early in their training. As soon as they develop decent control of the glider, I begin their pilot-in-command training. They must constantly be aware of their location and altitude and be able to get back to the pattern entry point with as little coaching as possible.

This article is the first in a series designed to give beginners the information they need to break the bonds of the

local gliderport. I hope the following information will help those interested, to become more confident when it's time to take that first big step away from the home gliderport.

Before I allow a student to leave the pattern area solo, I have them do a little work on their sectional chart. Even on local flights, my students must always have a marked sectional chart in the glider with them. I have seen many pilots mark five mile circles on their chart around the local field. I don't believe this the best way to do it as it requires the pilot to constantly calculate how much altitude is needed as they move away from the field. I have my students mark their charts with "safe altitude circles." With a glance at the chart, the student quickly knows if they are getting close to a marginal altitude.

Here is how I have them mark their charts:

First, we figure how far our sailplane can glide in still air, or no wind conditions, for an altitude loss of 1,000 feet. The following formula yields this information.

Distance Flown (D) in miles for an altitude loss of 1,000 feet:

Distance flown = 1000 (L/D)/(5280), answer will be in statute miles. (To convert to nautical miles multiply by .869.)

For various gliders the results are:

For a SGS 1-26: 1000 × (23)/5280 = 4.4 mi., or 3.8 nm.

For a Blanik: 1000 × (28)/5280 = 5.3 mi., or 4.6 nm.

For a Twin Lark: 1000 × (34)/5280 = 6.4 mi., or 5.6 nm.

For an LS-3: 1000 × (42)/5280 = 7.9 mi., or 6.9 nm.

For a Nimbus 3: 1000 × (60)/5280 = 11.4 mi., or 9.9 nm.

After we have this figure, we decide on a Safety Factor we want to build into these circles. The *Joy of Soaring* tells us to use 50 percent of best L/D for figuring "go ahead" altitudes on cross country flights and then turns around and tells us to use 100 percent to figure our final glides. I suggest to my students that 75 percent is a good safety factor for local flight around the gliderport. We then compute what I call "safety Distance" by multiplying the figure we got in the first step by .75.

Here are some safety distance (SD) for the same group of gliders:

SD for SGS 1-26 = (D x .75) = 4.4 x .75 = 3.3 mi.

SD for Blanik = (D x .75) = 5.3 x .75 = 3.98 mi.

SD for Lark = (D x .75) = 6.4 x .75 = 4.8 mi.

SD for LS-3 = (D x .75) = 7.9 x .75 = 5.93 mi.

SD for Nimbus 3 = (D x .75) = 11.4 x .75 = 8.55 mi.

My students will be doing most of their early solo flights in Blaniks, so I'll continue the rest of the exercise using the figures for a Blanik. We found our Safety Distance for a Blanik to be 3.98 miles for an altitude loss of 1000 feet. We will round this off to 4.0 miles as we can't read to a 3.98 precision on our charts.

We mark these circles in altitude above sea level (MSL), not altitude above ground level (AGL), thus eliminating another inflight calculation. We do this by finding our gliderport's field elevation from the sectional chart. In the following example, it is 105 feet MSL. Also, we want to add in an amount of altitude for a pattern when we get home. We use 1000 feet for this.

The first circle will be drawn at the first even thousand foot MSL level possible. If the first circle is deemed to be too small, omit it. Radius (R) of the 2000 foot circle for our example is equal to the safety distance multiplied by 2000 feet less field elevation and pattern altitude divided by 1000 feet.

R for a Blanik = (SD)(2000-FE-PA)/(1000) = 3.58 mi.

R = (4.0) x (2000−105−1000) / (1000) = 3.58 mi. (round to 3.6)

For the radius of additional circles, add the Safety Distance to the radius of the previous circle.

Blanik in this example:

2000 foot circle radius (R) = 3.6 mi.
3000 foot circle radius (R) = 7.5 mi.
4000 foot circle radius (R) = 11.5 mi.
5000 foot circle radius (R) = 15.5 mi.
6000 foot circle radius (R) = 19.5 mi.
7000 foot circle radius (R) = 23.5 mi.

Using a compass (not an aircraft compass — the one you used in high school geometry) and a plotter we measure these distances and draw circles around our gliderport. After all circles are

FIGURE 1

drawn, we use a light yellow hi-lighter pen and hi-light everyother circle. Then, in each quadrant we mark the edges of the circles with 1 digit altitudes being careful not to cover useful information on the chart. See figure 1 for my gliderport. You should add additional circles on your chart that go up to altitudes that you are able to reach in your area. Rarely are we able to reach 7000 feet MSL locally, due to our distance from the Gulf.

It may have entered your mind that these circles don't take into account any wind. Here comes another one of my rules for student pilots: Students on solo flights MUST remain in the upwind quadrant from the gliderport until signed off for cross country. Since they will always have a tailwind while coming home, there is always an additional safety factor in their circles.

I then fly dual with the student and have them work their way upwind from the field to a good landmark on the outer edge of the 3000 foot circle, always remaining above 3000 feet MSL. We then gain a little altitude and start a best L/D glide for home. After they make a few of these glides, I allow them to try it solo. Then they may go further out and start back at altitudes right on the marks.

Students who have had this training are easy to transition to actual cross country flight. Next month, we will cover the Silver Distance cross country flight training I use with my students and private pilots.

After the student has become proficient in the use of safe altitude glide circles, we progress to computing speeds-to-fly from higher than minimum altitudes, but that's another story and the subject of a later lesson. ■

Breaking The Apron Strings or The First Solo Cross Country Flight

by Phil Petmecky

Lesson 2 — Constructing a Flight Profile

The purpose of this lesson is to insure that a glider pilot wishing to make his or her first cross country soaring flight is properly prepared. For our sample flight, we are assuming a proposed silver distance flight starting at Purdy-Nielsen Memorial Gliderport in Texas, and ending with a landing at the Hempstead Texas Gliderport. All of our example calculations will be done for a Ka-8 glider. On our worksheet, there will be an extra column that you may use to fill in figures for the type of glider you might use on this flight.

You will be shown how to calculate "Go Ahead" points and altitudes for the entire flight. In order to keep the inflight work load as light as possible, I believe that you should not be switching back and forth between your sectional and a list of notes. I feel that it is best to transfer all important information directly onto the sectional chart. I also suggest that you cut up your chart and discard that portion which is away from your course line. Your sectional chart should be marked with the direct course (orange highlighter) line and a dashed (green highlighter) line between all "Go Ahead" points. The "Go Ahead" points should be indicated as well as other "safe altitude marks" along the course. Mark these "extra" safe altitude marks at good landmarks along the course. We will mark the left side of the course line with "Go Ahead" altitudes (orange highlighter).

We used the following items to complete the sample problem:

1. A current Houston sectional chart.
2. A plotter.
3. A flight computer or calculator.
4. The *Soaring Flight Manual*.
5. The *Glider Flight Manual*.
6. A yellow highlighter pen.
7. A quiet evening at home.

Things to remember about calculating cross country problems:

1. When calculating "Go Ahead" points and altitudes, use 1/2 of the published L/D.

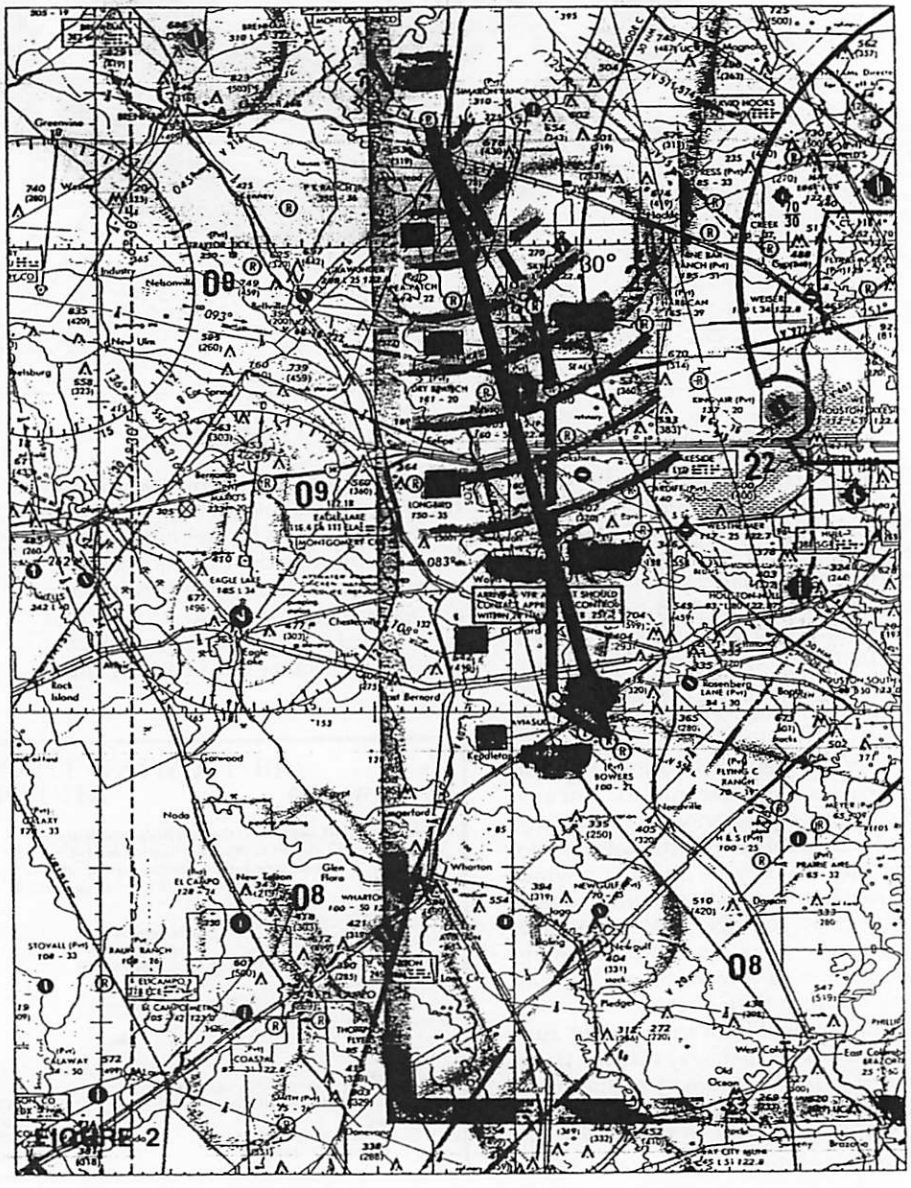
2. All calculations require that you be able to arrive at the next airport at 1000 feet above ground level (AGL) for a safe pattern.

3. Use the field elevation of the higher site in your calculations.

FIGURE 1 Purdy/Nielsen to Hempstead Work Sheet

		(Yours)
Glider:	K8	____
Best L/D:	28/1	____
1/2 L/D:	14/1	____
L/D Speed:	47 mph	____
Mi/1000 feet at 1/2 best L/D:	2.7 mi	____ (1000 X 14 /5280

Airport Name	Elevation	Distance	GA Dist.	K8 GA Alt.	(Yours) GA Alt.	K8 Final Glide	(Yours) Final Glide
Purdy/Nielsen	105	5.0	2.5	2048	____	13831	____
Ward	105	12.0	6.0	3373	____	13203	____
Fendley	110	11.0	5.5	3254	____	12574	____
Sport Flyers	180	6.0	3.0	2341	____	11066	____
Pfeffer	210	16.0	8.0	4277	____	9557	____
Hempstead	260					8174	____
						6791	____
Total Distance:	50. Omi					6037	____
Total Straight Distance:	48. Omi					5283	____
						3271	____
						1260	____



4. "Go Ahead" and final glide altitudes are to be shown as altitudes above sea level (MSL).

The first step is to study your glider flight manual and determine what the manufacturer states is the best L/D and the speed-to-fly for best L/D. Fill this in on the work sheet and make the two calculations requested. We won't use the speed in any calculations, but you need to know this figure when you fly the task!

With this information, we are now ready to complete our "Go Ahead" chart. (Figure 1). First, we will draw a line on the sectional chart (Figure 2) for a direct flight from Purdy/Nielsen to Hempstead. Then, pencil in the magnetic heading (340 degrees) for the course on the highlighted line. Our plotter shows this flight to be 48 statute miles — more than enough for our Silver Distance leg. Next, check the entire course for MOA's, TCA's, restricted areas and other hazards. One hazard is VR151, which is a low-level military training route. Most traffic on VR151 moves from south to north below 1500 feet at 3 to 4 hundred knots. We are used to this in the local area and keep a constant watch. Another area to watch is crossing Interstate 10. There is a lot of airplane VFR traffic that uses I-10 as a VOR radial into and out of the Houston area. We will be extra alert here, especially if we work a thermal close to the highway! We will also cross several airways. Experience has taught me that there is a lot of IFR traffic descending for landing in Houston from 4000 feet upward along these airways. I insist that we be extra alert for the whole flight.

Now we are ready to pick out several possible landing sites along the course and add their field elevations and the distances between them to our work sheet. As you can see from the sectional, there is more than one possible flight path you could use. I picked this particular series of alternates because they are fairly easy to find from the air. Each airport has wide, long runways with few or no obstructions. You should discuss your planned flight path with other pilots who are familiar with your area. If possible, fly the course in a power plane before you try it in your glider.

Since we are doing this planning in advance, there is no way of knowing what the wind conditions will actually be on the day of the flight. I suggest that we assume no wind conditions for the flight. Since we began our calculations using only half of our L/D we should have enough cushion for winds up to 10 knots or so. Once we start the flight and have a good idea of wind conditions, we

can mentally move our "Go Ahead" points slightly up wind. The "Go Ahead" distance will be half the distance between alternate sites. Use the following formula to compute altitude needed at the first "Go Ahead" point:

P/N to Ward: (Dist × 5280 / L/D) + 1000 + FE = Altitude needed (2.5 × 5280/ 14) + 1000 + 105 = 2048 feet MSL

We have, of course, added in our 1000 feet for a safe pattern and our field elevation. Complete the calculations for each additional "Go Ahead" point by changing the distance and field elevation in the basic formula.

Next, we need to mark our sectional chart with these altitudes. You may round your altitudes off to the nearest hundred. On the example chart I have highlighted these in orange. I normally use a red pen to mark these altitudes on my chart. I have also made my marks in open areas so that they will be easier to see.

For this flight, I have not added in any extra safe altitude points, because each leg was short and landmarks are good near each halfway point.

For the final glide altitude circles, I have used 75% of best L/D, or an L/D of 21 for our Ka-8. As you gain more experience you may increase the percent of best L/D, but I don't believe it should ever be higher than 95%. See last month's lesson for details on glide circles. I have only drawn short arcs instead of complete circles. I highlighted them in yellow and marked altitudes in red.

Figure 3 is a graph of "Go Ahead" and final glide altitudes for our flight. Each low point is one of our alternate landing sites.

We will make an attempt during our flight to fly the direct course line if possible. After we have released from tow and notched our barogram, we will climb as high as possible before starting out on course. I would not start unless I was able to climb at least as high as my greatest "Go Ahead" altitude for the entire flight. In this case, 4300 feet MSL would be my minimum start altitude. From 4300 feet I can start directly for Fendley Airport, or a good looking cloud slightly west of course. I will pass only two and a half miles east of Ward. If I can stay above about 2500 feet, I will be okay until I reach the railroad tracks north and east of Ward. To continue, I would have to get back up to a safer altitude. At the second set of railroad tracks, just northeast of the triangle lake, I would like to have at least 3500 feet to proceed toward Fendley. Looking ahead down my course line, I see that I am approaching the Brazos River. I see that the river has a broad stretch of trees along each bank. I suspect that there will be less lift near the river so I will try and get as much altitude as possible before crossing it.

For silver distance flights and all other flights where speed is not a factor, you should basically fly best L/D between thermals. Of course, you should speed up in sink and slow down in lift. Only fly faster if there is a substantial headwind.

In the event there is a crosswind component to the wind, I will try and work toward the upwind side of the course line. I know that when I stop and work a thermal, I will drift toward the course line instead of away from it. If I had aimed directly for a good looking cloud right on the course line, it would have moved downwind before I reached it.

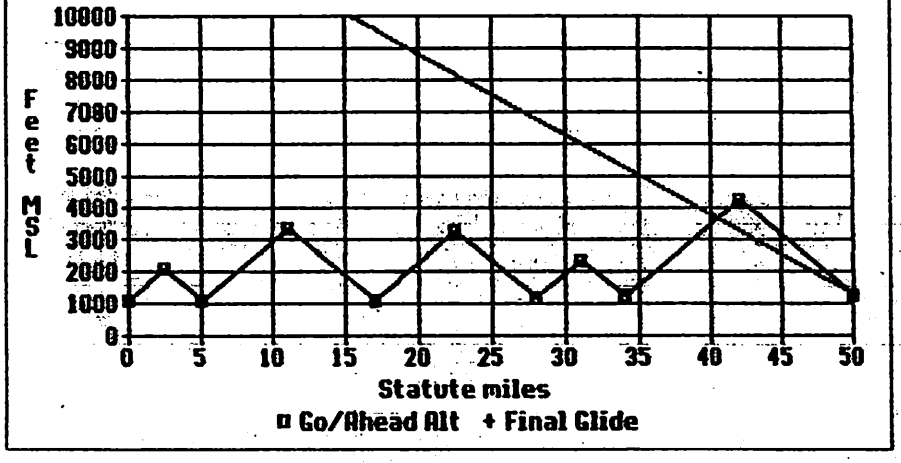
Now that we have completed our sectional chart, we need to review the F.A.I. Sporting Code section in the SSA Membership Handbook to insure that we comply with all the rules so we can earn that Silver Badge!

We will start by finding the maximum altitude (MSL) that we can release without penalty. The chart on page 113 tells us that our release altitude for our flight of 48 statute miles must not exceed 2534 feet above our goal. We will add the goal's field elevation of 260 feet to this figure to obtain our maximum release altitude above sea level. In this case we get 2794 feet MSL.

Checking section 2.2.10, we feel that we must carry a barograph on our flight. On page 109, we find the barograph calibration requirements. They state that the barograph must be calibrated *either* within 12 months prior to the flight *or* within one month after the flight. Our policy with club barographs is that we only have them calibrated after a successfully flown badge leg. It is the responsibility of the official observer for the flight in question to see that this is done.

On page 104 of the SSA Handbook, we find that we could plan a Silver Distance

FIGURE 3



leg using a remote start point that would allow us to complete the flight by landing back at our home base. We would be required to complete a flight declaration form declaring a remote starting point. We would also have to use a camera on this flight. We would also have to fly twice as far. While this is permissible, I advise against it. One of the original goals of the Silver Badge was to require the pilot to land at a spot he had probably never seen before. This was considered part of his training for more advanced cross country flight. No matter how much experience a pilot has, I guarantee that the first out landing, even at another airport, will be a tense moment. We were all (hopefully) taught to fly our patterns at our home gliderport without using the surrounding landmarks as references. Still, we always make that turn to base over the barn at the edge of the next field or use a fixed spot on the ground for an IP.

My first out landing was on my silver distance flight — at an airport with a paved runway. The runway was more than twice as long as my home field. It was also less than half as wide. Of course, my downwind leg was much longer than I was used to. Consequently, I used very little spoiler in the pattern. I should have cut the downwind leg short and turned base sooner than I did. I learned a lot from that one landing. My first out landing in a field was a much better experience. I remembered the lessons learned on my silver distance flight and flew a good 360 degree pattern.

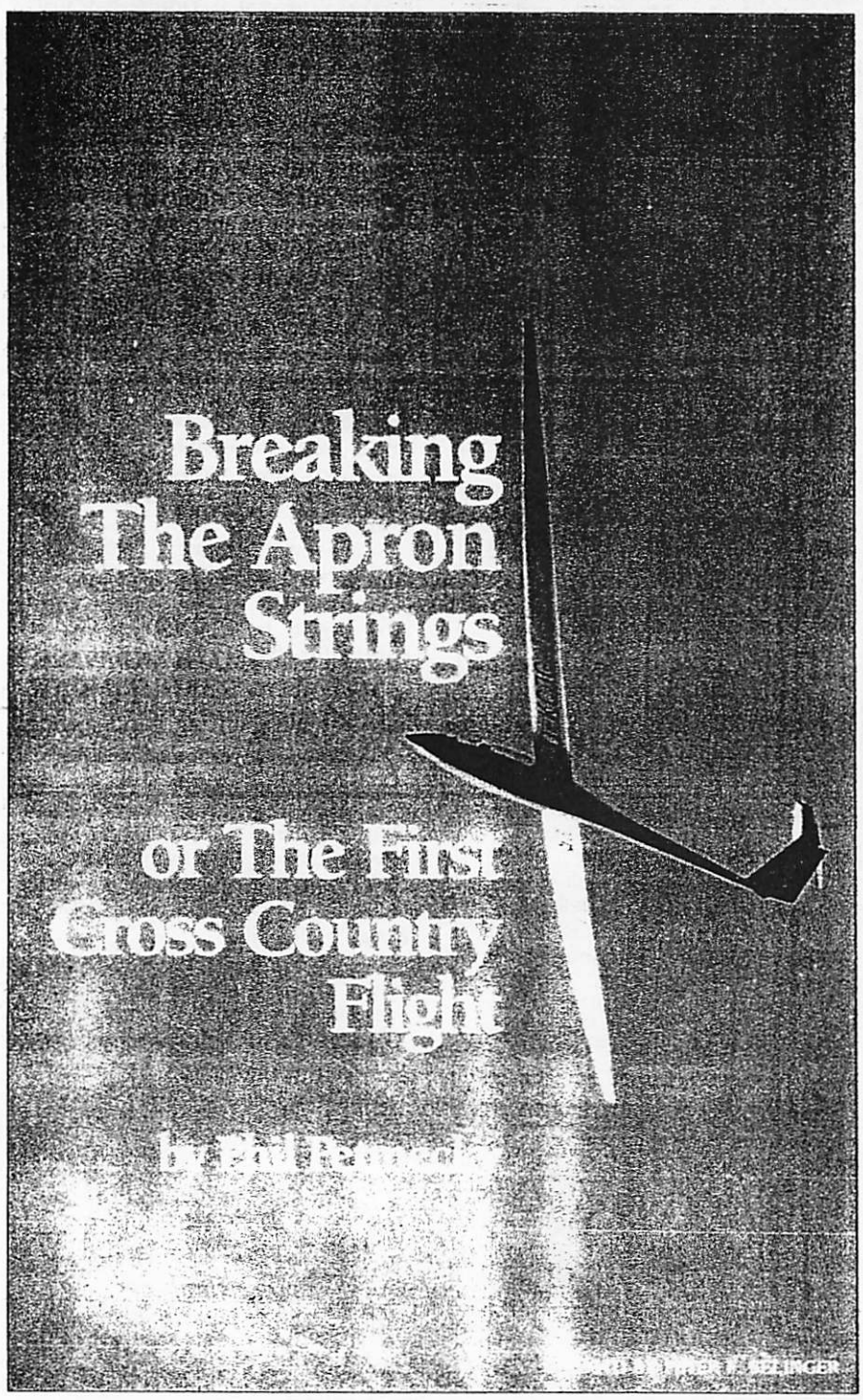
An additional advantage gained by landing at Hempstead is that you will get to visit with a fine bunch of glider pilots. Be sure and have a couple of them sign your application form.

Here are several thoughts you should keep in mind while flying the course. Always know where you are during the flight. Once you are lost, landmarks can get very confusing. Much time and altitude can be lost trying to locate your position. Almost all roads marked on sectional charts are paved roads. Frequently, an unpaved rural road will be much easier to see than a major highway. This can confuse you and lead to your getting lost.

Due to the angles of bank we use when working a thermal, it is impossible to use our wet compass to help us roll out and leave the thermal on course. It is easy to lose our direction while concentrating on milking the most out of a thermal. We should make every effort to know where we are while thermaling. If there is some wind, and the climb is for several thousand feet, we could drift a considerable distance during the time spent in the thermal. Watch the clouds down your course line while thermaling. Pick out the direction you plan to go well before you top out your present thermal. Pick a good ground reference to use for a heading when you leave your present thermal. Remember that as you near cloud base you won't be able to see the clouds down your course. Change that to read "as you near 500 feet below cloud base."

Some final comments on official observers and badge flights is also appropriate. Most of our insurance policies have higher requirements than those required by FAA regulations. Our club has added "additional requirements" for badge flights in club gliders. We require that club members must have earned their Bronze Badge *and* completed their silver duration leg in local flight prior to attempting any cross country flight. We also require that student pilots *must* have a certified glider flight instructor act as their official observer on all badge attempts. I think that this is good advice for all glider pilots.

By next month I'm sure all of you will have completed your Silver Badge, so we will start concentrating on more advanced subjects aimed at Gold Badge and contest flying!■



Lesson 3 — Turnpoint Photos

A successfully flown flight could be ruined by a bad photo of a turnpoint. Rules for turnpoint photos for badge flights are very different from those for contest photos. Know the rules! The SSA offers a Flight Declaration/Rules Procedures set for $.15 each. You should order several sets to keep in your "cross country kit."

Early in my cross country flying, I learned that the closer I flew to the turnpoint the less I could see of it. I would have to drop a wing and take a glance as I neared the turnpoint. This caused me to loose time and altitude at every photo opportunity.

Camera mounting is very important. Cameras should be mounted so that the left wing tip will appear in the upper left of the photograph. Remember that the view through the finder on the ground shows an unloaded wing. The actual location of the tip in flight will vary, depending on the amount of flex in your wings. Photos that are taken when doing a steep pull up will show a different tip location than those taken in a smooth turn. The reason you want the tip high in the photo is to reduce the amount of bank required to center the turnpoint in the photo.

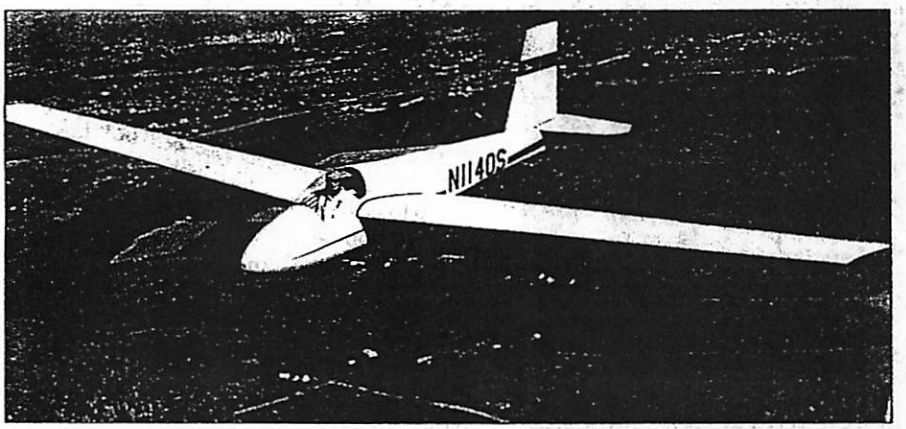
If your cameras have an automatic flash that can't be turned off, be sure and tape over the flash to eliminate reflections from the canopy. Don't tape over the flash sensor! Reflections not only get in the photo they will get to your eyes and may temporarily blind you. Another problem with cameras that have automatic flash is that they won't fire until the flash unit is fully charged. Most of the new cameras are so quiet that you may not be able to hear them as you take your photos. Always start your flight with new batteries in each camera.

You should practice taking turnpoint photos prior to your badge or contest flight. Do this when flying locally by using your home gliderport as an imaginary turnpoint and taking photos of it. For example:

Refer to Figure 1. You have selected Skylake as your first turnpoint and drawn an imaginary inbound and outbound course legs. Place your plotter directly on your inbound leg with the center of the compass over Skylake Airport. Measure the angle between the in and out bound legs (125 degrees here). Find and mark the mid-point of this angle on the chart. I have drawn an arrow pointing toward Skylake Airport at this point. Place the plotter on this point and the center of Skylake Airport. Draw a line on the opposite side of the airport to mark the "ideal photo" line. Next, measure the heading of the line to the airport. It is about 237 degrees in our example. Convert this to a magnetic direction by subtracting the 6.5 degree easterly variation (add west variation). Our example line is about 230 degrees.

According to the Airport Facility Directory, Skylake's runway is 17/35. Runway headings are given as magnetic headings and are rounded to the nearest ten degrees. The "0" digit is dropped. Thus, runway 35 could actually point at any heading between 345 degrees and 355 degrees. Calculate the approximate angle to the runway for your photo. 350–230 is 120 degrees, or 30 degrees past perpendicular to the runway as you make the turn. You now know that the photo should be taken slightly after y have passed the point where the came is pointing perpendicular to the runway.

Breaking The Apron Strings



or The First Solo Cross Country Flight

by Phil Petmecky

Lesson 4 — Flight Bands and/or Speed-to-Fly

I have read and heard a great deal about the proper use of Flight Bands for cross country glider flights. Flight Bands have really worked well for me. They seem to work best when there is a large difference between the ground and cloud base altitudes.

The only time that you should consider using flight bands is when speed or time is a factor, such as during a contest task. They are designed solely to increase your speed. Use of them will almost always result in the pilot getting lower than a pilot not using them.

Okay, what are flight bands, and how are they used? Most flight band users like to divide the available altitude into three more-or-less equal bands. They then alter their strategy as they fly into a different band.

Upper Band — go fast band, fly your speed ring

Middle Band — slow down a little, decrease speed ring 25 to 50%

Lower Band — work almost any lift, set speed ring to 0, fly best L/D

On long flights, the bands move up and down during the day, depending on the current conditions and how you are doing on the flight. If conditions are great, set your MacCready speed to fly at what you feel has been your average rate of climb in the last thermal or two. If conditions are just good I will lower the MacCready setting a little. I will fly the directed speed when I am in my high band. If I don't have MacCready on board, as in my Lark, I will fly 10 to 15 knots over best L/D in the high band under great conditions and 5 to 10 over best L/D in good conditions. I will only stop for thermals nearly equal to or greater than my MacCready setting.

As you lose altitude and enter the center band, turn MacCready down about half of what you have been using. Stop for a weaker thermal and stay with it until you're back into the high band. If the thermal is only a little weaker than you want, stay with it a little longer.

If you reach the lower band, set MacCready to zero and basically fly best L/D. Work almost any lift to get back up, but leave weak lift as soon as possible.

An important factor to keep in mind is "Am I going to be able to finish the task at the present speed?" If you feel that you're a little slow, lower the bands slightly and, maybe even raise MacCready slightly.

When starting final glides try and get a little reserve cushion on your computer above the current MacCready setting. The computer (or speed ring) directs faster flight as the MacCready setting is increased.

There are many other variables that you should consider in setting bands and picking a speed-to-fly, such as:

1. If terrain is poor be conservative.
2. If time is not a factor be conservative.
3. If navigation is difficult be conservative.
4. If lift is dying alter course toward good landing sites.
5. If there are good sign posts (clouds) on course speed up.
6. If the day is blue be very conservative.
7. If there is a strong headwind you may increase the speed ring.

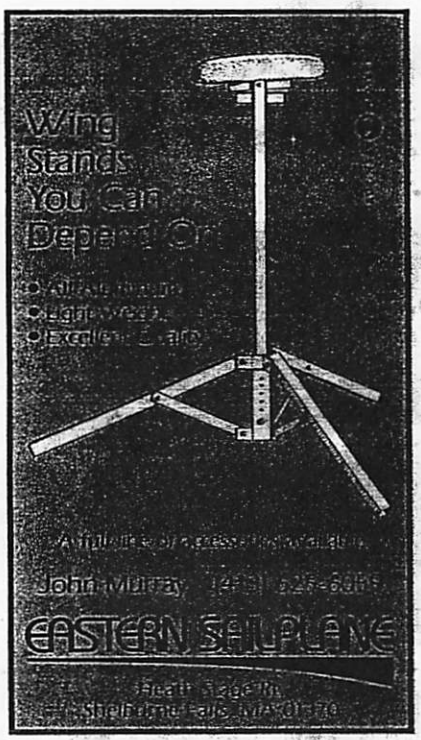
Finally, in setting MacCready you should remember that there is little penalty in a setting a knot or two low. On the other hand, a setting a knot or two high will not only cost you time, it may put you on the ground. At some time

during most flights, I find that my upper band has entirely disappeared.

You will also lose time if you try and keep your speed exactly on the speed directed by the speed ring. Any movement of controls during cruise will create drag and, thus, slow you down. You should remember that your instruments have some lag in them and you may be slowing down for a little lift after you have passed it and are back in the sink (or vice-versa). Make all speed changes during cruise slow. Big pull-ups should be avoided when entering a thermal. They look good, but the loss due to drag and wingloading will cost you time in the long run.

Those of you who have a copy of Dr. Reichmann's "Cross-Country Soaring" stop here and read pages 57 and 58, starting at column 2. For those who don't have a copy stop here and order one from the SSA! In this section, Dr. Reichmann has set up a scenario of a typical cross country flight. He has four different pilots fly the scenario at different speed ring settings. The winner, Pilot (4) flies at a conservative setting of 200 fpm. Not considered in the scenario is the use of flight bands. I would like to continue Dr. Reichmann's scenario a little further and add Pilot (5).

Refer to figure 1. I have omitted pilots (1), (2) and (3) from the task for ease of comparison between pilot (4) and (5). Pilot (4)'s flight path is the same as in Dr. Reichmann's example. Pilot (5) has decided to use flight bands on this task. He has currently set his bands as follows:



High band — 3500 feet upward

Mid band — between 2000 and 3500 feet

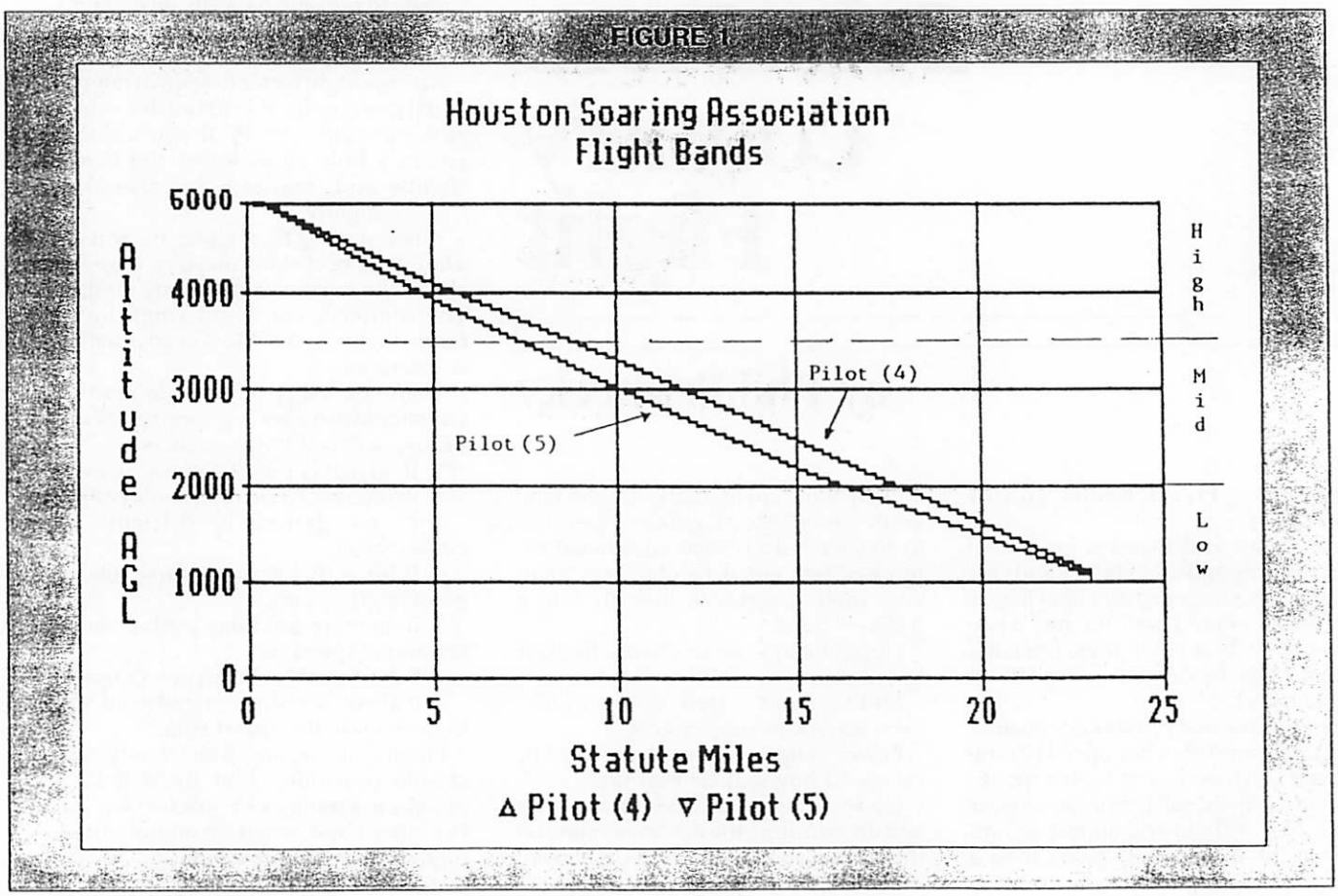
Low band — below 2000 AGL

He leaves the initial cloud with a speed ring setting of 600 fpm as did Pilot (2) and races toward the great cloud down the course. As he reaches 3500 he resets his speed ring to 200 fpm and continues down course. He only slows momentarily going under the first two clouds. Fifteen miles down course he reaches the third 200 fpm thermal. Normally, he would stop here and climb back up near the top of his mid band, but in this case he is sure that he can reach the 600 fpm cloud at a safe altitude if he slows to best L/D speed. He resets his speed ring to "0" and continues down course.

Up to now, he has been out in front of Pilot (4), but as he slows down Pilot (4) starts to overtake him. In fact, both pilots arrive at the 600 fpm cloud at nearly the same time and altitude. Both climb to cloudbase and continue their flight. In this scenario, we have a tie between Pilots (4) and (5). So, what's the use of flight bands? Read on!

Now let us change the scenario slightly and find out who would win the day. If any of the 200 fpm clouds Pilot (5)

FIGURE 1

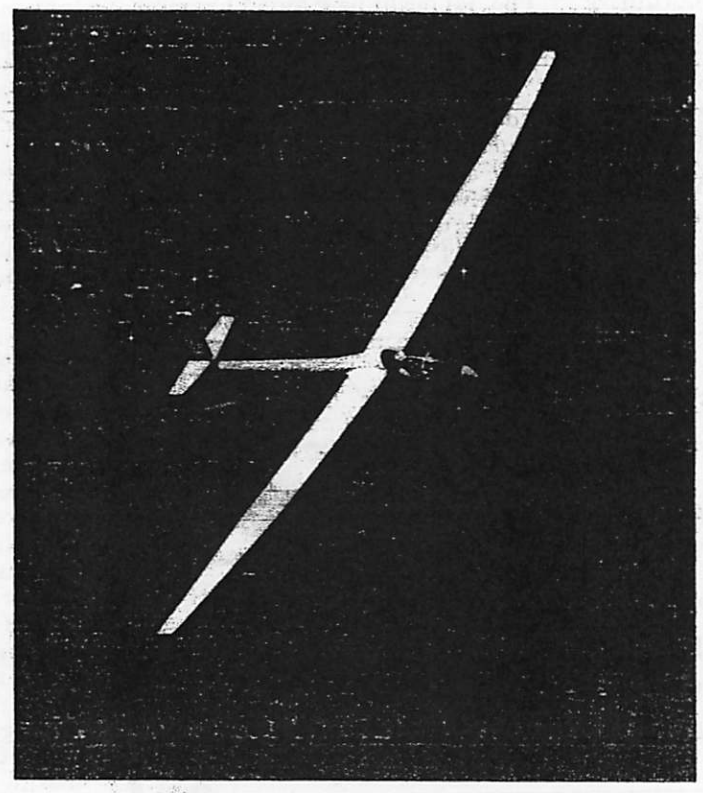


originally passed had turned out to have grown to the 600 fpm "super cloud," Pilots (4) and (5) would have stopped to climb. Our hero, Pilot (5), would have moved well ahead of Pilot (4). In this scenario, Pilot (2) would move ahead of both Pilots (4) and (5) if the 600 fpm cloud had been at either the 10 or 15 mile position. If the 600 fpm cloud had been a little further down course than in Dr. Reichmann's scenario, say 2 or 3 miles further, Pilot (4) might have found himself on the ground watching Pilot (5) climb to cloudbase.

If we know exactly what will happen down the course we can compute a speed ring setting for the fastest possible average speed. Unfortunately, this rarely occurs. The use of flight bands allows us to expand our options as we get lower. They allow us to fly fast when conditions warrant without reducing our options beyond a minimum level. As with any tool we use we must constantly review our decisions and abandon or modify their usage as conditions dictate. By changing the scenario further, we could end up having any one of the five pilots win the task. The main point is that we can't set fixed rules and follow them religiously. We should have a flexible set of guidelines that we can modify as conditions change. I think that flight band usage should be part of every glider pilot's tool kit.

It might be said that use of flight bands is a form of risk management. Every decision made in flight, or prior to flight can have positive and/or negative effects on a successful outcome of the flight. It has also been said that we learn from our mistakes. It is up to each pilot to learn something from every flight he makes. He must avoid making decisions that put him or his ship in jeopardy. I always debrief myself after each flight by asking myself what were the good and bad decisions I made during the flight. As I have grown in experience I have found myself making fewer serious (dangerous/stupid) errors. Occasionally, now, I find that I am making almost as many good decisions as bad.

Next month we will work on selecting good cross country tasks for gold and diamond distances. ■



Breaking The Apron Strings *or* The First Solo Cross Country Flight

by Phil Petmecky

Lesson 5 — Selecting a Cross-Country Task

This month we will discuss task selection. Figure 1 is a list of 47 possible 300 km triangles that could be flown from Purdy/Nielsen Gliderport. Any of these flights would qualify for both Gold Distance and Diamond Goal. Most pilots who fly Gold distance flights plan them so that they will also qualify as Diamond Goal flights. We will concentrate on flights that meet both requirements.

Before we start to plan the flight, I want to explain where I got my list of possible flights. I entered every airport listed in the *Airport Facility Directory* in the states of Texas and New Mexico into an Appleworks spreadsheet file on my Apple IIe. I wrote a program that computed every possible out and return, triangle and quadrilateral that could be flown from any airport I selected (Purdy/Nielsen Gliderport for our flights) and stored the results in a data base file. I was then abl . to sort the file by distance and see the results.

You will notice from the sample list that

FIGURE 1

TO	TP1	LAT	LON	TO	TP2	LAT	LON	TO P/N	TOTAL	NAV	LAND	AIR	RATE
40.08	Andrau A/P	29 43	95 35	146.11	Flatonia	29 42	97 5	119.78	305.97	-----	-----	-----	-----
57.54	Brazoria	29 6	95 27	151.55	Brenham	30 13	96 22	95.46	304.55	-----	-----	-----	-----
57.54	Brazoria	29 6	95 27	138.35	Montgomery	30 21	95 24	108.09	303.98	-----	-----	-----	-----
95.46	Brenham	30 13	96 22	82.69	Cherry	29 50	97 6	124.92	303.07	-----	-----	-----	-----
95.46	Brenham	30 13	96 22	90.84	Flatonia	29 42	97 5	119.78	305.28	-----	-----	-----	-----
95.46	Brenham	30 13	96 22	108.06	Hallettsvill	29 23	96 57	104.14	307.66	-----	-----	-----	-----
73.31	Calaway	29 5	96 30	101.85	Cherry	29 50	97 6	124.92	300.08	-----	-----	-----	-----
140.91	Caldwell	30 31	96 42	33.46	Easterwood	30 35	96 21	132.77	307.14	-----	-----	-----	-----
140.91	Caldwell	30 31	96 42	59.05	Navasota	30 22	96 6	102.69	302.65	-----	-----	-----	-----
140.91	Caldwell	30 31	96 42	99.55	Robert Level	29 38	96 30	63.78	304.24	-----	-----	-----	-----
140.91	Caldwell	30 31	96 42	25.20	Texas A&M	30 38	96 29	142.47	308.58	-----	-----	-----	-----
140.91	Caldwell	30 31	96 42	97.53	Two G Rch	29 39	96 35	70.33	308.77	-----	-----	-----	-----
140.91	Caldwell	30 31	96 42	22.01	Varisco	30 39	96 32	146.09	309.01	-----	-----	-----	-----
140.91	Caldwell	30 31	96 42	100.36	Wells	29 38	96 31	63.71	304.98	-----	-----	-----	-----
124.92	Cherry	29 50	97 6	103.65	Hempstead	30 7	96 5	74.96	303.53	-----	-----	-----	-----
124.92	Cherry	29 50	97 6	138.70	Lakeside	29 49	95 40	43.82	307.44	-----	-----	-----	-----
124.92	Cherry	29 50	97 6	57.89	Yoakum	29 18	97 8	122.70	305.51	-----	-----	-----	-----
144.87	Coulter	30 42	96 19	118.23	Lakeside	29 49	95 40	43.82	306.92	-----	-----	-----	-----
144.87	Coulter	30 42	96 19	16.35	Texas A&M	30 38	96 29	142.47	303.69	-----	-----	-----	-----
140.81	Cuero	29 5	97 16	107.83	Glasscock	29 43	96 25	58.86	307.50	-----	-----	-----	-----
140.81	Cuero	29 5	97 16	95.69	Robert Level	29 38	96 30	63.78	300.28	-----	-----	-----	-----
140.81	Cuero	29 5	97 16	91.46	Two G Rch	29 39	96 35	70.33	302.60	-----	-----	-----	-----
139.23	Double D	29 42	97 18	111.70	El Campo Met	29 10	96 19	53.88	304.81	-----	-----	-----	-----
139.23	Double D	29 42	97 18	105.33	Gravunder	29 56	96 14	62.90	307.46	-----	-----	-----	-----
139.23	Double D	29 42	97 18	134.66	Jordan Farms	29 45	95 54	31.17	305.06	-----	-----	-----	-----
139.23	Double D	29 42	97 18	143.35	New Gulf	29 17	95 54	20.77	303.35	-----	-----	-----	-----
139.23	Double D	29 42	97 18	45.79	Yoakum	29 18	97 8	122.70	307.72	-----	-----	-----	-----
44.77	Eagle Lake	29 36	96 19	110.40	Gonzales	29 31	97 27	152.71	307.88	-----	-----	-----	-----
44.77	Eagle Lake	29 36	96 19	116.99	Texas A&M	30 38	96 29	142.47	304.23	-----	-----	-----	-----
132.77	Easterwood	30 35	96 21	152.13	New Gulf	29 17	95 54	20.77	305.67	-----	-----	-----	-----
132.77	Easterwood	30 35	96 21	106.61	Robert Level	29 38	96 30	63.78	303.16	-----	-----	-----	-----
132.77	Easterwood	30 35	96 21	106.66	Two G Rch	29 39	96 35	70.33	309.76	-----	-----	-----	-----
132.77	Easterwood	30 35	96 21	107.45	Wells	29 38	96 31	63.71	303.93	-----	-----	-----	-----
48.73	El Campo	29 16	96 20	116.77	Smithville	30 1	97 10	138.56	304.06	-----	-----	-----	-----
137.14	Ernster	29 3	97 12	106.56	Glasscock	29 43	96 25	58.86	302.56	-----	-----	-----	-----
119.78	Flatonia	29 42	97 5	53.11	Giddings-Lee	30 10	96 58	131.25	304.14	-----	-----	-----	-----
119.78	Flatonia	29 42	97 5	107.87	Hempstead	30 7	96 5	74.96	302.61	-----	-----	-----	-----
119.78	Flatonia	29 42	97 5	138.04	Lakeside	29 49	95 40	43.82	301.64	-----	-----	-----	-----
105.34	Flying C	30 20	96 18	67.81	Giddings-Lee	30 10	96 58	131.25	304.40	-----	-----	-----	-----
131.25	Giddings-Le	30 10	96 58	141.22	Hull	29 37	95 39	28.11	300.58	-----	-----	-----	-----
131.25	Giddings-Le	30 10	96 58	132.10	Lakeside	29 49	95 40	43.82	307.17	-----	-----	-----	-----
58.87	Glasscock	29 43	96 25	103.12	Texas A&M	30 38	96 29	142.47	304.46	-----	-----	-----	-----
152.71	Gonzales	29 31	97 27	51.38	Hallettsvill	29 23	96 57	104.14	308.23	-----	-----	-----	-----
152.71	Gonzales	29 31	97 27	92.38	Robert Level	29 38	96 30	63.78	308.87	-----	-----	-----	-----
152.71	Gonzales	29 31	97 27	86.02	Two G Rch	29 39	96 35	70.33	309.06	-----	-----	-----	-----
152.71	Gonzales	29 31	97 27	147.85	Ward	29 30	95 56	5.94	306.50	-----	-----	-----	-----
152.71	Gonzales	29 31	97 27	92.19	Wells	29 38	96 31	63.71	308.61	-----	-----	-----	-----

there are several tasks that have home base and one turnpoint in common. This really helps you pick out good tasks that are just over the minimum distance required for a badge leg. By the time I was ready to try my 500 km flight, I had several good possibilities already laid out. On the day I flew the task I was able to check the weather and pick a task. My task was a 500.42 km quadrilateral. For our problem I have deleted O&R and quadrilateral tasks.

Your job (should you elect to accept it) is to examine each task and pick out what you feel are the five best possibilities. I have used a portion of two World Aeronautical Charts (WAC) for this "class" exercise to conserve space in the magazine, but you should use sectional charts for planning real flights. Unfortunately, several of our airports are not shown on the WAC chart. You only have their latitudes and longitudes to work with in this exercise.

Use a separate paper to make notes to aid in the job. For example: you might note that one leg of a task runs right down a river for a long time and should be down rated. You might find that one turnpoint has no good landmarks along your approach path and could easily be missed. Nothing is more infuriating than having to search for a turnpoint.

My program listed the turnpoints alphabetically, but you may fly each task in either direction. When you consider which way to fly a triangle, remember that your cameras are on the left, so left turns are shorter and easier. It can be very difficult to finish a long task into the sun. It is tiring and very hard to pick out details when you fly to the west at the end of the day. You might fly right past home base!

I have included three ratings areas and a final "overall" rating column. Rate each of the first three categories from 1 to 5, where 1 is excellent and 5 is unacceptable. They are marked:

NAV. . .This stands for navigation. You should look for ease of navigation along all legs of the task. For example, a task that runs right down a major highway would rate high. A task running over a large area where there were no good landmarks would rate low.

LAND. . .This stands for off-field landing sites. Of course, a task with a lot of airports along the task would rate high. Tasks that run over forested or river areas would offer less good landing sites and would rate lower.

AIR. . .This stands for Air Space considerations. A task running through a TCA would be unacceptable. An ARSA would rate only slightly better. MOA's are acceptable, but tasks without them would rate better.

RATE. . .A final overall rating for the task. Again, use a scale of 1 to 5. A 5 rating in any of the other areas should cause the overall rating to also be a 5.

I will help start you off with a few ideas. Notice that we have ten tasks that first go to Caldwell or Brenham. This leg runs straight down a major highway for the majority of the course and has several airports close at hand. It would rate high for both NAV and LAND. Two tasks go to Brazoria which is nearer the Gulf coast (not shown here). This is not a good direction to go — lift is weaker and cloud base lower. They get a low AIR rating.

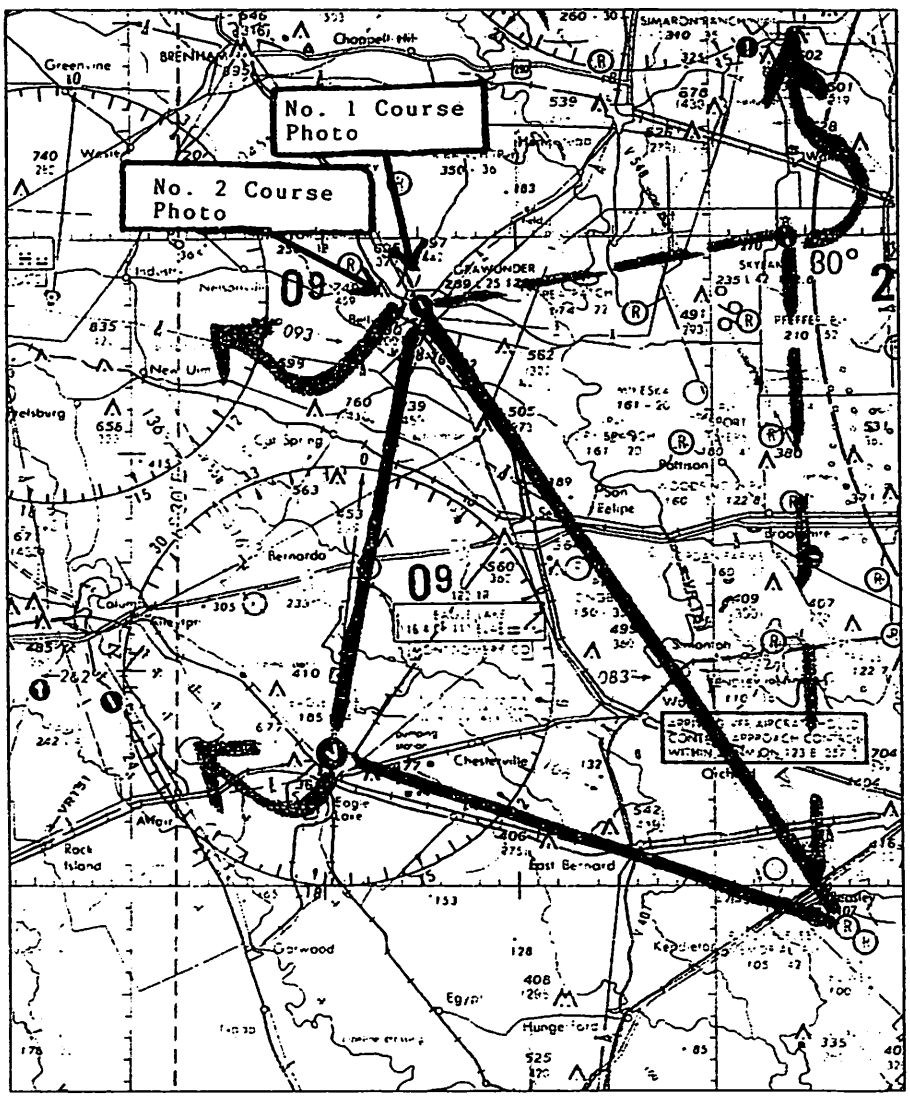
You might think that Easterwood would be unacceptable because of the control tower and control zone. It is actually a low volume airport and I have always found the personnel very interested and helpful when I have talked to them on the radio. On one flight I had planned to go from Navasota to Hearn, but had been forced west after leaving Navasota. I contacted the tower and asked permission to fly through their airspace. When they learned I was in a glider and actually trying to go somewhere they passed me straight over the airport. One of our club members was forced to land there one day because of weather. They held a power plane while he landed and sent a crew out to help move his glider into a hanger before the storm hit the field.

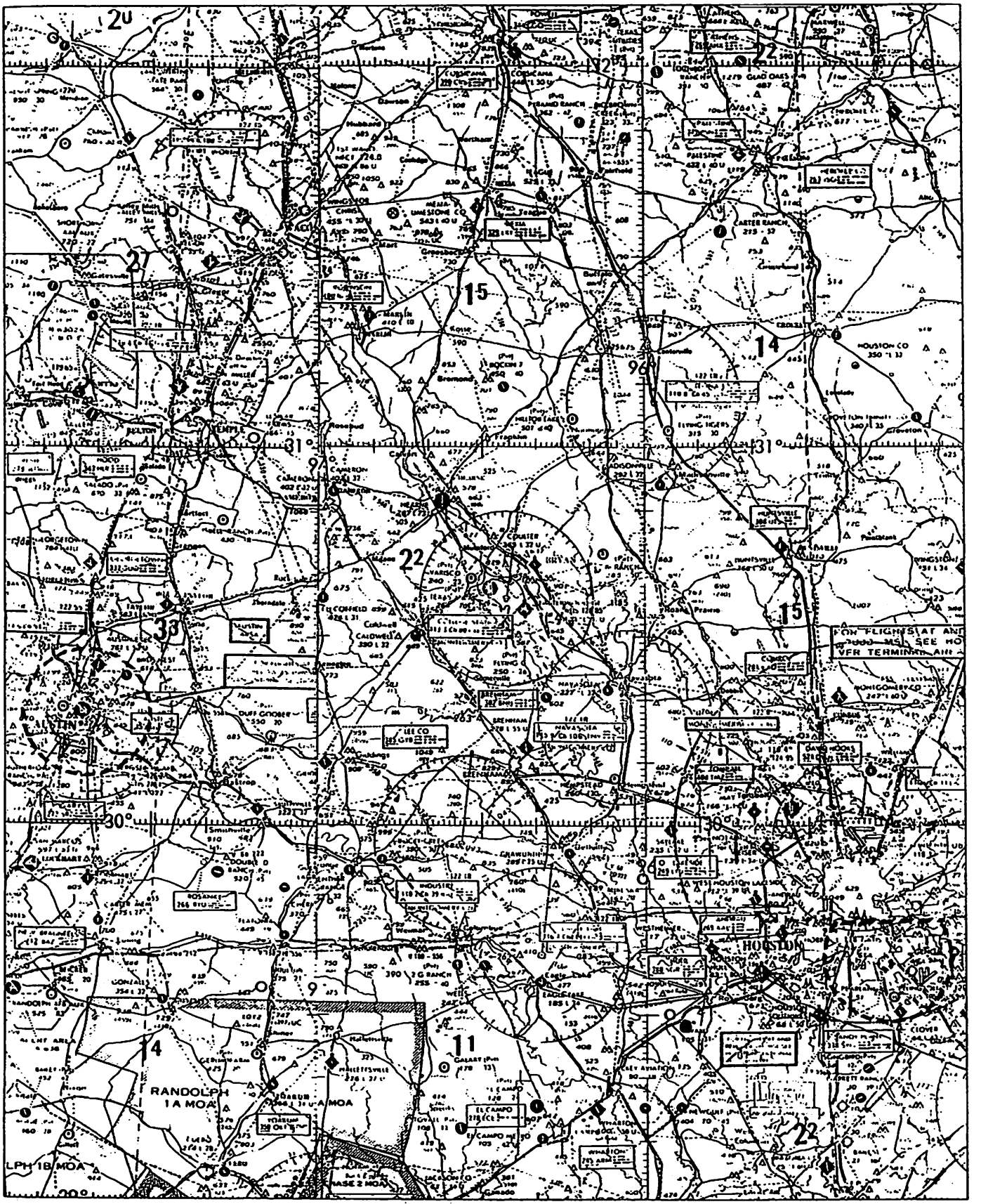
The point of this story is that you can't rely only on your charts. You need to discuss possible tasks with more experienced pilots in your area. For example, you might find that a good looking airport has very high runway lights that are close together.

Finally, to the right of the RATE column make a final choice between all of the top rated tasks. Grade the top five tasks from one to five.

Since the computer gave us such a large list to pick from, we have not added a column that could have been labeled DISTance — our longest task is just 309 km. If you have a smaller list with greater

FIGURE 2




RANDOLPH
1A MOA
LPH 1B MOA
HOUSTON

variances of distances you could add this column.

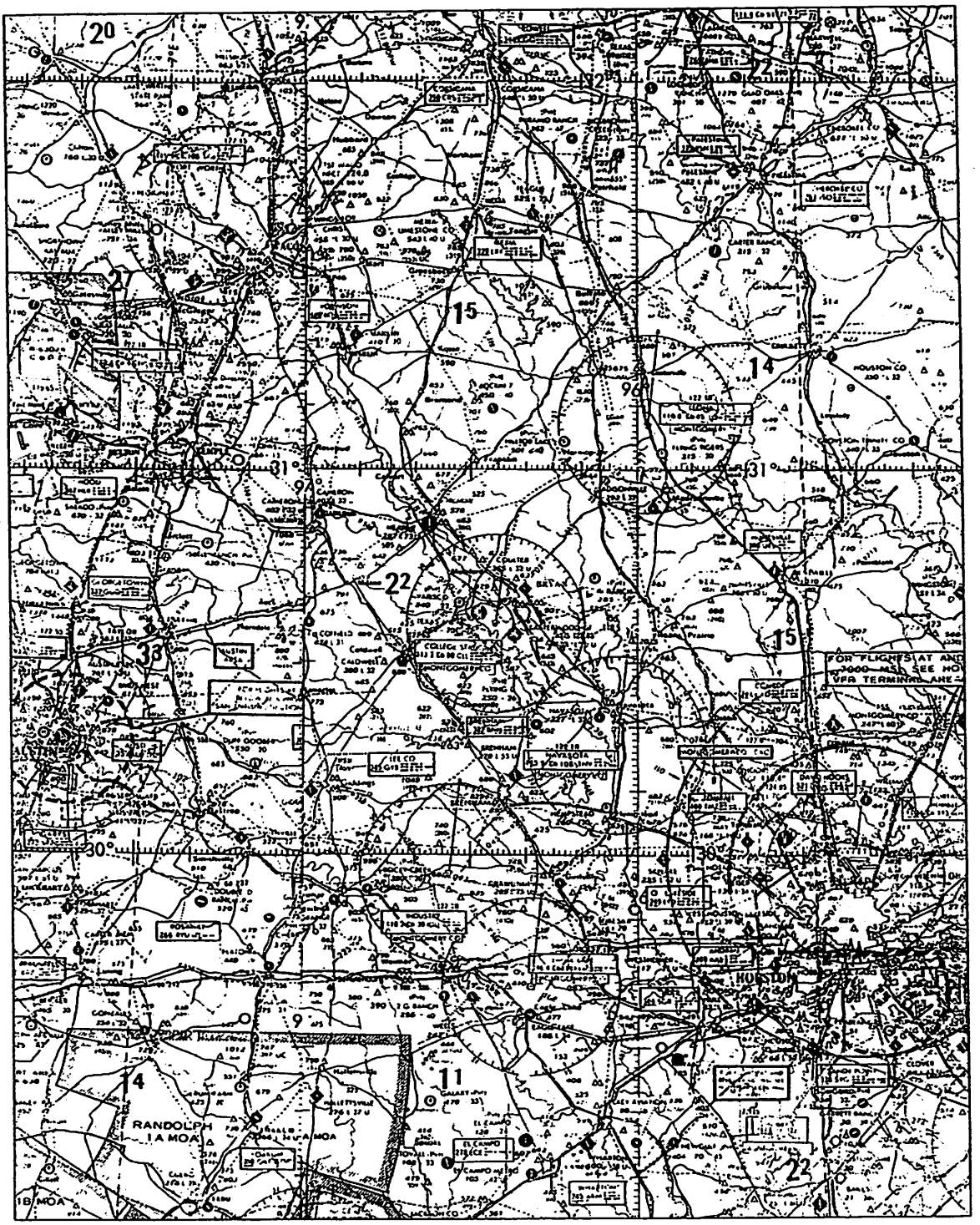
This should not take as long as you might first think because you might eliminate a whole group of tasks that go to the same first turnpoint.

After you get your 300k Goal flight in the bag, you can then start planning that 500k flight. Rules for the 500k task are considerably different than those for the 300k Goal flight. You are not required to return to your starting point. You may go straight out (dirty downwind dash) without declaring any turnpoints and land anywhere that is beyond 500k from your starting point. You may declare up to three turnpoints, but are not required to use any of them. This can give you great flexibility when conditions change after you are well on your way. Here are several possible scenarios:

You originally planned to fly a 500k triangle, but shrewdly added an extra turnpoint on your declaration (see Figure 2 — to save space the flights shown are not actually 500k in length). Your "number one" plan was to fly from Purdy/Nielsen to Grawunder to Eagle Lake and back home — the solid line course. Your second triangle would go from Grawunder to Skylake and home — the dashed line. Either course would complete a 500k task. Both tasks are covered by the same declaration! Now, as you approach Grawunder you should make up your mind which course you plan to fly before you take your picture. Remember that the photo quadrant is different for each course. If you haven't made up your mind which way you will go when you leave a turnpoint, take two or more photos that will cover all possibilities. We're not finished yet, we have other options.

Now assume that you turned Grawunder and are nearing Eagle Lake. Conditions back toward home are not looking very promising and will be into the prevailing southeast winds. You may "tack" on Eagle Lake and go any direction to a landing (normally downwind, or toward good weather) as long as the

WORLD AERONAUTICAL CHART NO. 2



total distance of your three "legs" exceeds 500k. This "tack" option would apply at any of your turnpoints.

A few years ago one of our club members, Steve Nichols, added another wrinkle to the list of possibilities. Our field is near the Gulf and conditions frequently start to die earlier in the evening than farther inland. Knowing this, Steve flew an out and return course to the northwest that would be nearly 600k if completed. He would complete 500k at Brenham on his return, but if conditions permitted, he could continue toward home base. He actually made it all the way home, setting a state out and return record in the process!

As you can see from these few examples, there are many ways to fly 500k without tying yourself down to a fixed course. Start your flight early with a good set of alternates available. Don't try and set any speed records; fly only fast enough to complete the course before the day quits. Carry plenty of water and drink it, and something to snack on. Carry change for the phone in case you have to land out. If conditions aren't up to a 500k day, it's quite all right to abandon the course and head for home at any time. ■

Breaking The Apron Strings *or*

The First Solo Cross Country Flight

by Phil Petmecky

Lesson 6 — Polar Adjustments and Speed to Fly in Sink

What speed should you fly for the flattest glide in still air? We all know (or should know) that the answer is, "best L/D speed." The $64 dollar question is, "What is the best L/D for our glider in still air?" Most of us would say that the answer for a Blanik is 46 knots, or maybe 44 knots. You see both numbers on the placards and in the manual.

Refer to Figure 1, the copy of the performance chart for the Blanik which I took from page 22 of the *Pilot's Notes for the L-13 Sailplane.* According to this chart, the answer is 46 knots. Unfortunately, there is a very significant piece of information missing from the chart, and that is the weight of the Blanik from which these measurements were taken. I have examined the entire manual very carefully and can only find one clue. On page 15, several measurements listed are for a gross weight of 1040 pounds. For the following discussion, I assumed that this was the weight used for the performance curve on page 22.

Every glider pilot and contest or badge pilot, in particular, should know that a glider's polar moves when the weight of the glider is changed. This means that all calculations for speed-to-fly, including best L/D are valid only for one particular weight of a glider. The good news is that there is a formula for calculating a new polar, or a particular point on a polar when the weight of a glider is changed. The formula used is taken from Dr. Helmut Reichmann's *Cross-County Soaring,* page 96. The formula is:

P(N) = P(O) × the square root of [W(N)/W(O)]
Where:
P(N) is the new point on the polar
P(O) is the old point on the polar
W(N) is the weight of the glider for P(N)
W(O) is the weight of the glider for P(O)

Let us assume that the weight of the Blanik in the performance chart was 1040 pounds. We can now compute the best L/D (and other points on the polar) for different gross weights using this formula and numbers from the manual.

Empty weight of the Blanik is: 644 lbs. (page 17)
Weight of pilot and cushions is: 170 lbs.
New gross weight is: 814 lbs. (644 + 170)
Old gross weight is: 1040 lbs.

Best L/D speed at old weight is 45.48 knots, which I calculated from the polar data on my Apple computer.

Best L/D at 814 lbs. = 45.48 × sq. rt. of [814/1040] = 40.24 knots

This is considerably slower than you might have thought. It looks like I have been flying the Blaniks a little too fast when I was flying solo.

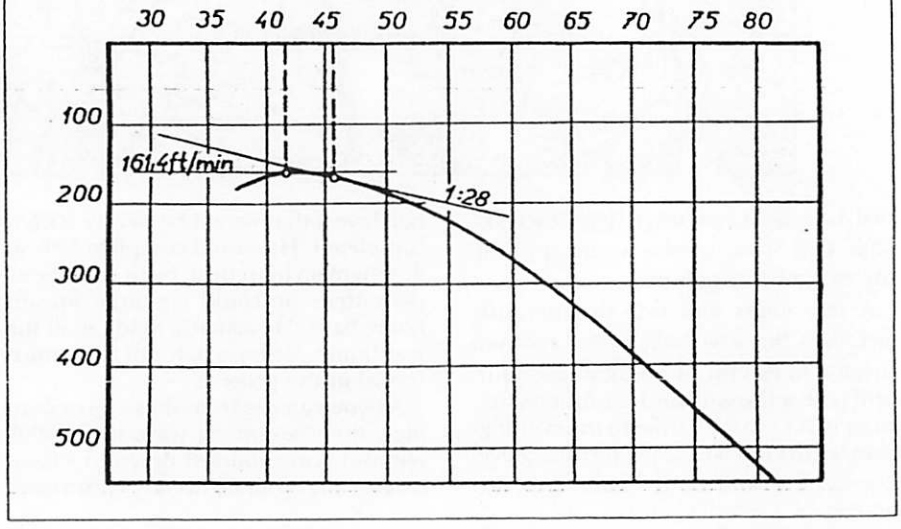
Here are a few more calculations at different weights:

Gross Weight	L/D speed	Stall flaps up
984 (two 170 lb. pilots)	44.24 knots	31.13 knots
1102 (max. gross weight)	46.82 knots	32.94 knots
800 (min. gross weight)	39.89 knots	28.07 knots

This movement of the polar for different weights is even more dramatic for fiberglass gliders that can carry a lot of water ballast. For example, my LS-3's best L/D occurs at just under 60 knots when I am flying dry at a wing loading of 6.85 lbs. per square foot. If I add water ballast to bring my wing loading up to 9.00 lbs. per square foot, my best L/D occurs at 68.8 knots, an increase of 9 knots. Of course, equally effected are the speeds at which I need to change flap settings for maximum performance.

I am planning on flying a new Grob 103III at the Sports Class Nationals this

FIGURE 1



File: GLIDE.COMP.1

FIGURE 2

SPEED TO FLY IN A SINKING AIRMASS
H201 STANDARD LIBELLE

A/S MPH	SINK RATE OF GLIDER	SINK RATE OF AIRMASS	VARIO SHOULD SHOW	ALT. LOST 1 MI	L/D	BEST L/D
55	153	0	153	167	31.6	•
60	172	0	172	172	30.7	
70	221	0	221	189	27.9	
55	153	50	203	221	23.8	
60	172	50	222	222	23.8	•
70	221	50	271	232	22.7	
55	153	100	253	276	19.1	
60	172	100	272	272	19.4	•
70	221	100	321	275	19.2	
55	153	200	353	385	13.7	
60	172	200	372	372	14.2	
70	221	200	421	361	14.6	•
80	285	200	485	364	14.5	
55	153	300	453	494	10.7	
60	172	300	472	472	11.2	
70	221	300	521	447	11.8	
80	285	300	585	439	12.0	•
90	363	300	663	442	11.9	
55	153	400	553	603	8.8	
60	172	400	572	572	9.2	
70	221	400	621	532	9.9	
80	285	400	685	514	10.3	
90	363	400	763	509	10.4	•
100	455	400	855	513	10.3	
55	153	500	653	712	7.4	
60	172	500	672	672	7.9	
70	221	500	721	618	8.5	
80	285	500	785	589	9.0	
90	363	500	863	575	9.2	
100	455	500	955	573	9.2	•
110	562	500	1062	579	9.1	

year, courtesy of Mike Shade at Grob Systems. I guess that I need to compute several different polar equations for my PC-6 Final Glide Computer, before we go to Littlefield this year. I will have to take into consideration the weights of my co-pilots, parachutes and other gear. (Please don't let Al Heath or Rokki Roberts and, especially, Ned Wilson see this article until after Littlefield).

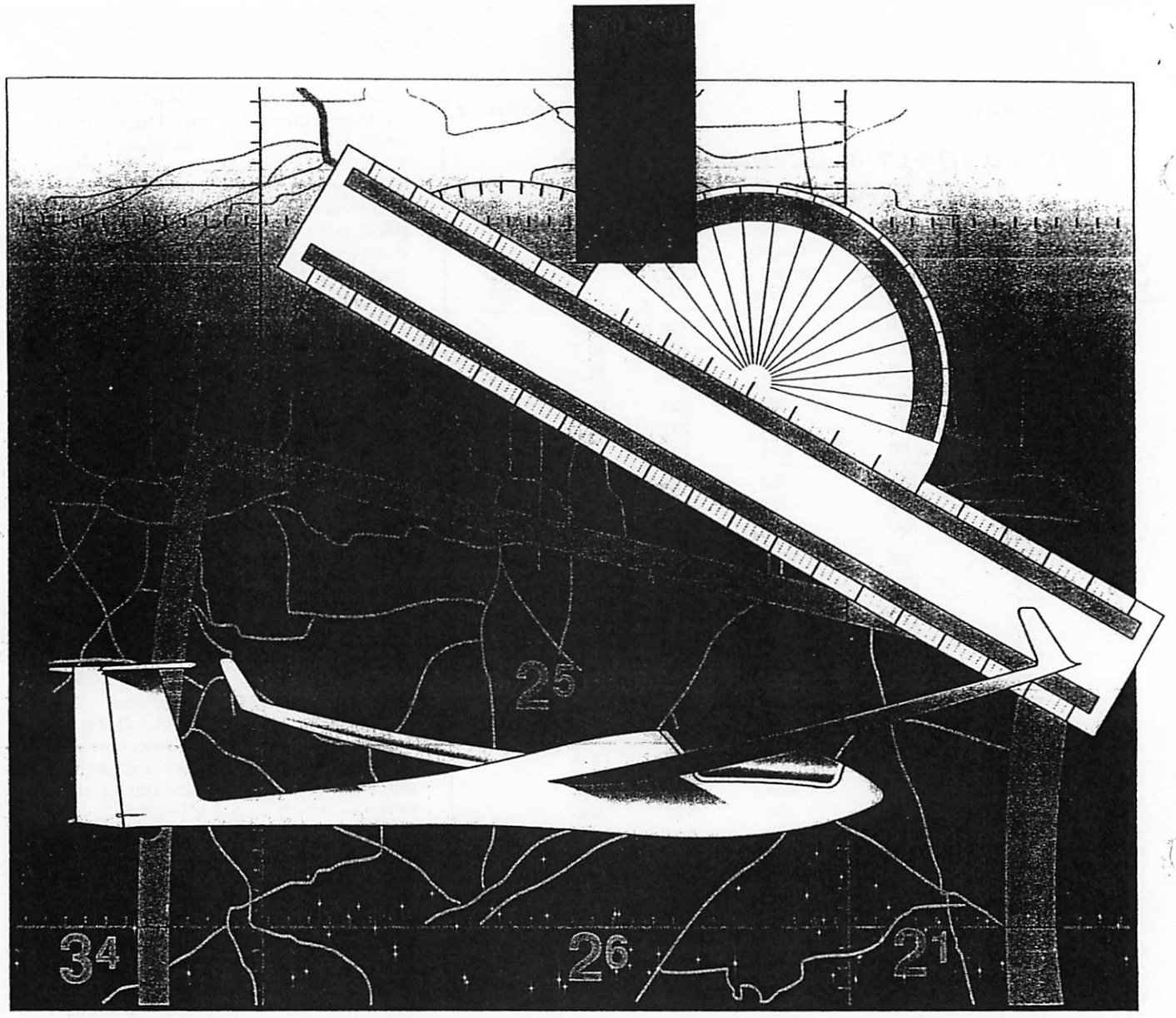
Another set of calculations that are affected by gross weight are those for your McCready Speed Ring. Your speed ring is only accurate at one specific gross weight. Many pilots mark their speed rings with two sets of numbers, one for wet and one for dry. They mark both sets on the same ring.

Speed to Fly in a Sinking Airmass

We now know that to fly the flattest glide in still air we should compute the best L/D for our glider's actual flying weight. We have been told to speed up in sink and slow down in lift. But, the next $64 question is, "How much?" Refer to Figure 2. This spreadsheet contains the answer for a Standard Libelle H-201B. Each box in the spreadsheet contains data for a different airmass sink rate. I deleted airspeeds that are out of the range in which we are interested.

Notice that if we are in a 50 foot per minute sinking airmass and speed up from our best L/D speed of 55 mph to 60 mph our vario will move from an indicated 203 fpm sink to 222 fpm, but we will only lose 1 additional foot after flying one mile! Now look at the 400 fpm sinking airmass data. We must speed up to 90 mph for our flattest glide. Most low time pilots find this very difficult to do (me too). They know that they are in sink and want to speed up, but as they increase speed the vario goes down even further. They tend to fly slower than the correct speed in order to decrease the sink rate reading. It looks good on the vario, but after flying out of the sink they are actually lower than they would have been if they had flown the correct speed. The secret is that the faster you fly in sink, the faster you will get out of it. If we flew our Libelle at 55 mph in 400 fpm sink for 1 mile we would actually lose almost 100 feet or more than if we flew at 90 mph (603 versus 509).

If you examine all the data in each block, you will find that there is little additional loss of altitude if you fly 10 mph or so faster than the "best glide speed" in a sinking airmass. For example, in the 400 fpm sinking airmass data, you will see that a speed of 100 mph will only cost you 4 additional feet over the 90 mph figure. In contest flying, the additional speed gained would more than likely offset the loss of altitude. ■



SOME TIPS OFF THE COUNTER FOR BEGINNING CROSS-COUNTRY FLIGHT

by Jean-Renaud Faliu

This is in no way an exhaustive survey of all the topics important for early cross-country flight. Rather, it is only intended to be a reminder of the most important aspects related to this very special form of soaring, cross-country flight. Aspiring cross-country pilots should, by all means, read and digest as many as possible of the articles and books written on the subject. In-depth study is an excellent pastime for the winter season, the "slow soaring" time of the year, and this advice will hopefully provide the added emphasis to make your early cross-country flights safe and successful.

MENTAL PREPARATION AND TRAINING

If you decide to fly cross-country (preferably under the "gentle" supervision of an instructor for the first few tries) you must be mentally prepared to sever yourself from the home nest. The disappearance of the home field is a major step for the beginning cross-country pilot and the possibility of an outlanding must be recognized. Hopefully, there has been a great deal of thought about the potential outlanding fields along the course.

Before the flight is the time to become proficient in the use of the oxygen system and any other tasks you will need to perform in the air. Take a couple of hours to sit in your plane on the ground finding the best locations to stow equipment and

supplies. It does no good to have the best oxygen system in the world if you find you can't reach connectors or put on the mask with one hand, if necessary. Oxygen can have a strong drying effect. Is your water bottle within easy reach? It's best to know all these things before you are 12,000 feet up and 50 miles from home.

Use each of your landings at home as a practice for outlandings. Try high and low approaches, very precise touch downs, while consistently watching airspeed and wind gradients. However, I strongly advise against over stressing the wheel brake in practice. . .you may need it at peak performance level for a real outlanding.

Regardless of previous experience, you should occasionally fly with an instructor. After the flight, write down what you learned new, and don't hesitate to talk about your difficulties and concerns. Don't invent convenient excuses or gloss over problems as this fools no one, not even yourself. If you have a good relationship with your instructor they will help you solve your problems. And the better you become, the prouder they are.

THE FLIGHT

Thermals

We are now concerned with the search for thermals, nailing them, and staying in them. There is no more appropriate time for clean, academic flying, and the glider in thermals is always best in the middle, just like the yaw string. Always remember that the glider's best rate of climb is when it is horizontal, the attitude in which its sustaining surface is at its greatest value. But, there are times when you will have to turn to stay in the core of a thermal and a compromise must be made between efficiency and expediency.

An important fact to keep in mind is that every time you activate a control surface you are activating an airbrake; consequently, your flying should be as "quiet" as possible.

With a building cumulus cloud, thermals may be found on the windward side, on the sunny side, on the bisection of these two, or under the darkest part of the cloud. On any given day, it is up to you to analyze your lift and determine which type is at work. When looking for a thermal, let the glider "speak" to you. Be very light on the controls, and veer toward the wing lifted by the current. Once you think you have found a thermal, draw a picture of it in your mind, thinking of how it fits into the scenery, and how you fit in it. Your picture might be wrong, and in the beginning it often will be. However, you will never be too far off when you "commit yourself to a thermal" as I say.

When entering a thermal, a little excess speed is handy and necessary for brisk changes in direction and attitude; however, before you initiate a turn, check for other gliders. Do this frequently and consistently in every thermal, no matter how alone or far out you may feel you are. Use all your senses, fly by ear and don't let your eyes be hypnotized by the vario needle. The sky is immense, but each thermal is coveted and sailplanes do appear from nowhere. Instruments steal your attention from the sky, and that's where things are happening.

When climbing under a cloud street, don't stop and try to reach cloud base with the first good lift as doing this will obstruct your view of what lies ahead on your course. Assuming that you are far enough from the cloud base, fly straight, pulling up in lift and speeding up in sink. You should aim at the last cloud where you may circle to the base. If lift there is not strong enough or is dissipating, you might wish to backtrack to stronger conditions. Remember, it often pays off to divert up to 30 degrees from your intended route to find promising lift, and the best diversions will be upwind from your intended goal. An upwind diversion will leave you back on track after drifting while thermaling. At this stage, it is better to fly toward a line of five small cumulus clouds rather than toward one big one. If you miss the big one, there are no alternatives, whereas with the five "cuties" there are five chances of hitting a good thermal.

Occasionally lift might be so strong as to draw you into the cloud itself where it is critical you do not speed up. Before you become totally disorientated, you should open the airbrakes fully, set the trim, then release the controls allowing the glider to spiral itself down out of the cloud. Being aware of the correct trim setting for hands off spirals is one of those little things to be practiced in clear air before the skill is needed. Best of all, you should anticipate and avoid this dangerous situation. This is known as a "Benign Spiral Mode." It doesn't work with all gliders and should have been tested in clear air in order to check how the glider responds to that mode.

CROSS-COUNTRY FLIGHT

For a start, let's forget the MacCready technique, and about computers too. Here is my suggested rule of thumb for the best speeds-to-fly:

In most of today's glider types, when you encounter lift while going straight, you should reduce your speed to the glider's minimum sink speed. If you are not sure of that (shame on you), then try 50 knots. If you are not sure of your plane's best thermaling speed, you should enter a thermal at 55 knots then slow to 45 knots after the first turn. In sink while going straight, you should maintain 60 knots in 0 to 4 down, 70 knots in 4 to 7 down, and 80 knots in 7 to 10 down. Speeds greater than 80 knots may result in your sinking like a stone. If you plan on circling in sink, any speed will do. It always pays to fly straight and up, even at a slow speed rather than to circle in good lift, because circling gives you a cross-country speed of zero. Just as important as the attitude of the glider is the attitude of the pilot. A pilot with a good attitude will anticipate changes before they begin to show up on the instruments...this pilot will be at the correct speed before the variometer tells him to slow up or speed up.

TURNPOINTS AND PHOTOS

I mentioned earlier the preparation of the camera which really means, of course, two cameras for backup. It goes without mentioning that you have already "wasted" a few rolls of film in the vicinity of your home field to verify the operation of your cameras and the correct way to "aim" them with your glider. When taking turnpoint photos it is always a good idea to take a second photo three seconds after the first just in case there is a reflection off the canopy or other like problems. To be valid, turnpoint photos should be taken on the far side of the turnpoint within an arc covering no more than 45 degrees on each side of a bisection line between approach and departure legs. That sounds like a mouthful, but the diagram on Page 41 should explain all.

To keep things neat, you should mark on your map not only the turnpoints but also distances, altitudes, outlanding sites, and five- and ten-mile circles around airfields. Don't draw lines over the turnpoints - stop a little short, leaving them clear. Draw a little silhouette of your glider where it should be when you take your turnpoint photos, but otherwise

don't clutter up the map with too many details. A piece of transparent plastic or contact paper over the map will also help to preserve your marks from smudging.

RADIO USE

The less you use your radio the better, and keep its volume low to avoid being distracted by the chatter. A small card with a list of nearby field frequencies and their altitudes is more convenient than trying to find them on the map, and this too can be plastic coated. Radio is a useful tool, and you should get used to giving short, precise messages so that others may use that tool. A lot of information can be given with a short message like, "SF, this is 13 Golf. I'm 10 miles southeast of Mt. Patterson at 15,500 heading south. Over." If you recognize the development of a tricky situation which may get beyond your ability, don't wait for the last minute to radio for advice. Some pilots turn their radios off as soon as they have spoken to their ground crews, but that is not such a good idea for the novice cross-country pilot.

TERRAIN AND LANDING OUT

One should have a sectional with all the fields clearly marked plus outstanding features underlined with their altitudes. Airfields should have ten-mile circles around them, and at no time should you be out of reach of a potential landing area. Put it in your mind that the nearest landing area is your local airport, and this should put your mind at ease enabling you to work the next thermal in a relaxed state of mind. Remember, play it safe by getting high and staying high. Altitude is money in the bank, so don't leave your potential landing site until you have reached a good safe altitude.

Don't panic over the consequences of an outlanding! If it upsets you too much, then you shouldn't have left the home field in the first place. Never stretch your luck, for when you are done, you're done, and it's time to set up a landing pattern.

BADGES

Badges require a lot of paperwork, so make sure you know in advance what you will have to do when the day comes. It is a good idea to always carry a copy of the landing witness form in your glider.

CONCLUSION

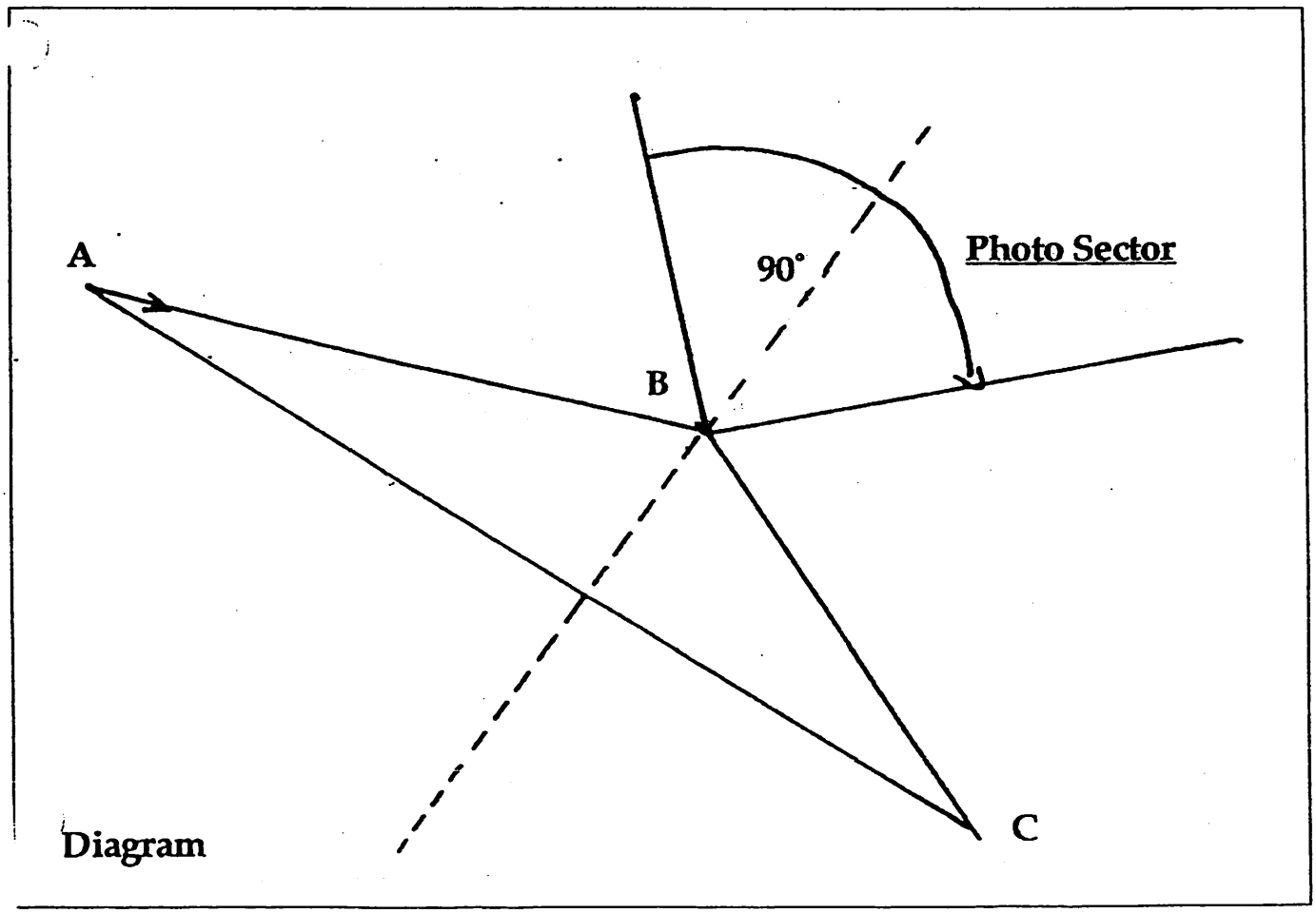
Remember, after having completed a cross-country or badge leg, there will be a steep drop in tension and elation will set in. Just before entering the landing pattern, change your seating position and forget about your success. Don't make a low pass to announce your victory, as at this stage it might (read "will") be dangerous and is unnecessary. You will probably have been in the air longer than normal and will be more tired than you think, so it is best to fly a normal pattern being alert and over-conservative. Do your best to make a perfect landing.

Remain in this higher state of alertness until the glider is not only on the ground but also tied down. Too many accidents or incidents have occurred because the pilot simply forgot he was still in the air and things still needed to be done. When you are down and safe, let the joy fill your heart, take your friends to the bar and let them listen to your first-hand account of the memorable day.

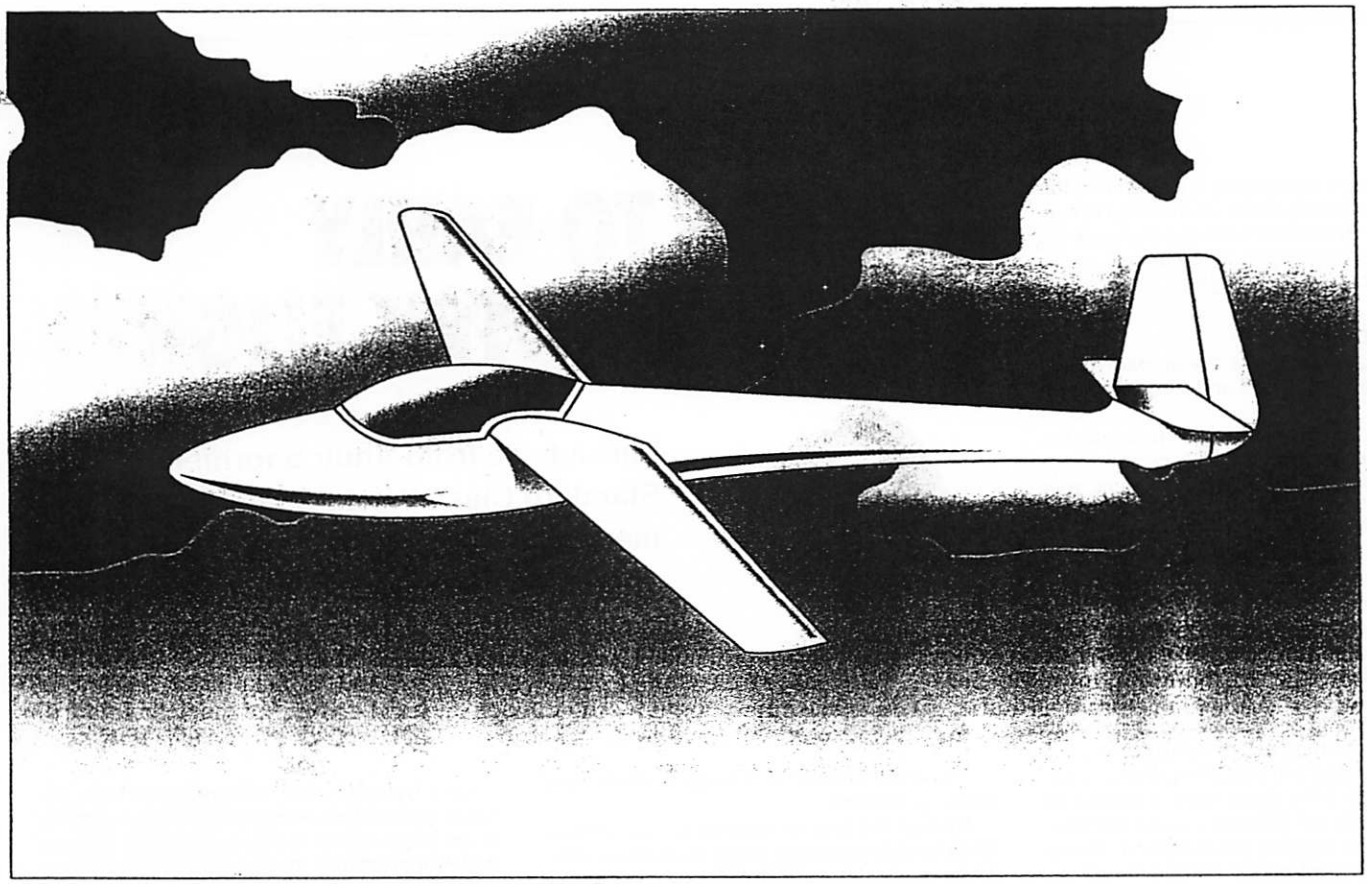
PHYSICAL PREPARATION

The following check list includes the absolute basics for cross-country flying:

1. A full-brim soaring hat, not a cap.



Diagram



2. Good quality sun glasses. Glare from the sun causes painless but serious damage to the eyes.

3. A sun screen appropriate for your skin. Indirect glare from the canopy at high altitudes can cause serious skin damage leading to cancer.

4. Cushions, especially the new NASA foams are a must. Even with a parachute, good cushions add to your comfort and safety.

5. Fluids in a practical container are critical. Water, "Athlon," and/or "Gatorade" consumed during the flight are essential for health, as dehydration, especially on desert flights, has been proven to be responsible for some fatal accidents. Avoid carbonated beverages or those which increase thirst.

6. Foods of a high-energy variety. Fruit bars, almonds, apples, and dried goods are best, and avoid easily spilled or sticky products, like chocolate.

7. Unless you have a football-size bladder, plan on bringing a suitable device for relief. The configuration of your plane will determine what you need.

8. Clothing appropriate for the season and for the possibility of outlandings. The light shoes which give a good feel on the rudder pedals may not feel so good on a long "forced march" following an isolated outlanding. Walking shoes added to the emergency bag are a good idea.

9. Identification, documents (both yours and the glider's), and money are obvious, but often forgotten. Small change is always handy.

10. Phone numbers. . .that's what the small change is for. Make sure you have the club's, your crew's, and others you might need.

11. Maps appropriate for your intended flight. While still on the ground, fold them so the flight track is easy to read. Don't go places for which you don't have a map!

12. A tie-down kit including screw-in pegs, plenty of cordage, space blanket, first aid kit, signal mirror, walking shoes, and the like.

13. Oxygen system which has been "PRICE" checked, turned on, and with the mask at hand.

14. Batteries fully charged with a radio check completed BEFORE the flight begins.

15. Barograph loaded, sealed, and turned on before the flight.

16. A camera, which must now be "fixed" in place, should be turned on, tested, and the declaration photo completed. Will the wing tip and/or the random line on the canopy be on the film?

Yes, it's a lot when you do it for the first time, but it quickly becomes a habit and most items can be kept in a bag you can stuff in the glider before each flight.

About the Author

Jean-Renaud Faliu teaches English in a private school in Paris. He is a glider flight instructor in both France and the United States and has over 5000 hours in sailplanes and 400 in power. He has flown numerous contests, regionals, nationals, and European championships.

A three Diamond holder, he is a promoter of the sport everywhere he goes. He has been the equivalent of an SSA governor for the Parisian area, has been the president of French soaring clubs including the French Association of Mountain Pilots. In July and August of 1990, he set four French records in an ASH 25 over the 300 and 500 O&R and triangles.

He originally wrote this material while instructing for Soar Minden several years ago and several revisions have been made to the original work.

Martin Gundlach, who flies a Schreder HP-14 out of Minden, assisted with the revised English translation. Martin is a relative newcomer to soaring and has flown with Jean-Renaud at Minden, Nevada.

ANDY DAVIS

A GUIDE TO EARLY CROSS-COUNTRY FLIGHTS

This advice from Andy, a former Standard Class World Champion and a member of the British team squad, should help to give you confidence to strike out from the comforting area around your site

The new soaring season is just around the corner. The following notes are intended to help pilots with many hours of local soaring break the invisible string tying them to the airfield and to start regular cross-country flights.

Preparation

Advance preparation is a vital part of any cross-country flight. It falls under several headings.

1. Airspace. Familiarise yourself **now** with the airspace regulations in your likely cross-country area - a minimum of 100km radius around your home site. If you have a R/T licence learn the procedure for crossing Class D airspace.

There have been a lot of changes recently to controlled airspace. Buy the latest edition half million map and study the layout of the controlled airspace bases and level changes. **You must not fly in an airway** or any controlled airspace (other than Class D with a clearance).

The airway base is defined as an altitude or Flight Level (FL). If it is defined as an altitude, then you can climb up to that indicated on your altimeter as long as you set QNH (airfield elevation) for take-off. If the airway base is defined as a FL, you should set 1013mb on your altimeter subscale as you cross or climb under it. This is particularly important whenever the atmospheric pressure is lower than standard.

Don't forget to make a note of the QNH setting, so that you can reset your altimeter when leaving the airway base. (See also Gliding and UK Airspace on p70.)

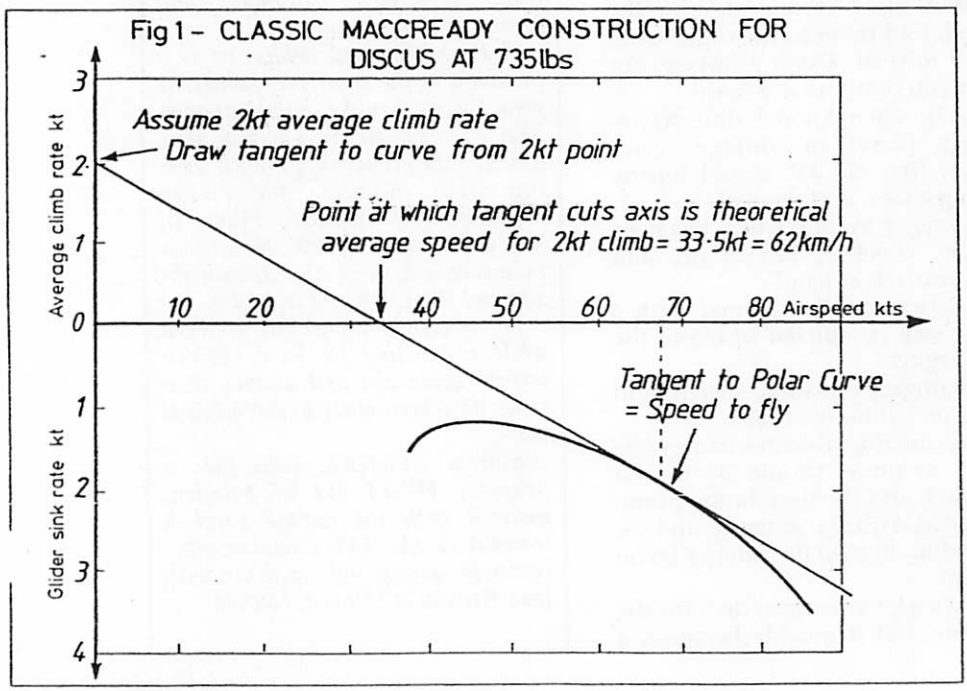
2. Speed/distance. It is useful to know how far you can expect to go in any given time. To do this you need to estimate your likely cross-country speed.

Obtain a polar curve for your sailplane and draw this on a large sheet of graphpaper extending the axes back to zero. Use the classic MacCready construction to find the theoretical cross-country speed for a range of climb rates (see Fig 1 below).

Reduce the speeds obtained by, say, 20% to allow for detours, buggy wings, wind effects, mistakes etc, to get the likely average cross-country speed for any given day. Make up a table of average climb rate versus likely average cross-country speed (Fig 2). Refer to this throughout the season when pre flight planning.

Fig 2.
Average climb rate vs average likely cross-country speed. Discus at 735lbs (unballasted)

Av climb rate (kt)	Theoretical av xc speed (km/h)	Likely av xc speed (km/h)
	44	35
1	62	50
2	77	62
3	87	70
4	94	75
5		



On a typical UK day, achieved climb rates average about 2.5kts throughout the day. From Fig 2, we might expect to average 56km/h. A good day with 4kt climbs might enable us to average 70km/h.

By combining the available soaring day (or length of time your syndicate or club allows you) with forecast climb rate, you can estimate how far to reasonably plan on any given day.

3. Routes. Aim to compile a file of routes from short to long so that on each soaring day you can tailor your flights to the conditions and time available. Your route selection should take into account the following:-

- The most efficient way is to arrange your cross-country downwind on the first leg while conditions are developing, into wind during the peak of the day and downwind on the last leg as conditions weaken. Most good soaring in the UK is associated with winds from west clockwise round to north-east. Try to plan a selection of routes at each distance to cater for different wind directions.
- Keep away from areas of poor soaring. Low lying areas are always bad early in the day - keep to higher and drier ground. In particular avoid coastal areas as sea air can penetrate far inland by late afternoon. The prevailing wind can by late afternoon drive sea air through the Cheshire Gap as far as Birmingham, from The Wash to Daventry and from the Bristol Channel to Salisbury, Devizes and Swindon.
- A small dogleg to avoid airspace causes few problems, but planning to operate under a low airway ceiling can bring difficulties, especially when the cloudbase is high.
- Select TPs for ease of navigation and identification. Two crossing line features are ideal for this purpose, *eg* road/rail or rail/river. If you use GPS, make sure that the most likely co-ordinates are loaded accurately into its memory using WGS84 data. Perform a gross error check by selecting Go To The TP from your club site. The indicated distance should be sensible.

4. Equipment. It is important that your sailplane and its equipment are well maintained and reliable. Inspect everything with a critical eye. ➡

Does the wheelbrake close? It is suicidal to fly cross-country without it being serviceable - you will need it in the event of a field landing.

Is there stowage for drinking water? Many inexperienced cross-country pilots suffer from a dramatic and visible (except to themselves - that's the danger) fall in performance and concentration after about 2hrs' flying on a hot day. This is almost always due to dehydration. The lesson is - **always carry** 1.5 litres of water and drink it.

Does the total energy variometer really work? Check the systems for leaks using a DIY kit. Pay particular attention to all plumbing between the vario and the total energy probe. Try sealing the probe/fin joint with a soft silicone tube - it is far more effective and convenient than using tape.

A complex vario/nav computer is really not necessary. It focuses too much attention inside the cockpit. A good total energy variometer with speed director and audio output is all that we require. Some kind of final glide computer is useful, but the John Willy calculator is more than adequate.

Is the cockpit draughty? Cold draughts can become very unpleasant on a long flight and are easily solved using modern draught proofing materials.

Is the trailer serviceable? Even the very best pilots get it wrong occasionally. You will need a viceable trailer for the inevitable retrieve. ually an afternoon spent with the grease gun, foot pump and spare bulbs is enough to fix it up for another year.

Weather

Try to watch a daily TV forecast. With practice and experience you will learn to recognise good weather patterns developing. It should be possible to spot a really good soaring day about three days in advance.

The evening before the TV forecast should give a fairly accurate picture of the coming day. Make a note of the forecast wind direction, cloud amount and maximum and overnight minimum temperatures. The "Bradbury rule" estimates that afternoon cumulus cloudbase will be 400ft for every 1°C difference between max and min temperatures. In general terms, UK average climb rates in knots are equivalent to cloudbase (or thermal tops in blue weather) in thousands of feet minus 1.

For example 4000ft cloudbase
->4-1 = 3kt thermals

From the previous evening's forecast it should be possible to make a provisional task selection for the following day.

On the day watch another TV forecast and use this together with any available specialist gliding forecast to revise and refine your picture of the day's weather. You should now have a good idea of the length of the soaring day, wind direction and lift strength. Compare your assessment of the day with an experienced cross-country pilot.

Pre flight planning

Check the temporary nav warnings for any activity that might affect your task area. Note that all times are quoted in UTC, one hour behind British Summer Time.

Estimate your likely take-off time, allow half an hour to climb up and settle down. Plan to be back on the airfield by 5pm or one hour before the end of usable thermals, whichever is earlier. This is to give you a safety margin in the event of a hold up *en route*. Use the resultant soaring time multiplied by likely cross-country speed from Fig 2 to set your task distance for the day. For example:

Take-off at 1230, finish at 1700, 2kt thermals.
-> 4hrs cross-country soaring time.
From Fig 2:
2kt thermals -> 50km/h average speed.
->Task distance = 4hrs x 50km/h = 200km.

Now select a task at the appropriate distance from your pre prepared file to match the day's wind direction. Draw the track lines on your map and note down approximate latest times to arrive at each TP to complete the task on schedule. Load and check the TP co-ordinates in the GPS.

Watch how the day develops. If the start of convection is delayed, adjust your task length accordingly. However, be alert to significant changes in the weather which might require drastic changes to your plans. Danger signs are rapidly thickening cirrus, strengthening wind or very early development of towering cumulus.

After take-off

Don't feel obliged to rush off on track straight away. Fly around locally to get the feel of the day. Sample several clouds and try to work out which part of the cloud works best. The lift tends to lie under the same part of the cloud throughout the day.

Don't start until you feel relaxed and the sky is reliable. Wait for good clouds to appear along the first leg before setting off.

Cloud selection

Be aware that the appearance of clouds from the side can be very misleading. The same cumulus can look completely different when viewed up or down sun. The top of a cumulus cloud is not a good indicator of thermal activity underneath. The appearance of the base is a much better indicator of potential lift than the cloud top.

Fig 3.

Fig 3 shows a side view of four cumulus clouds. All four have identical classic cauliflower tops, yet only clouds 1 and 2 are likely to produce good lift. Cloud 3 is starting to decay. Cloud 4 is in an advanced state of decay and likely to have sink underneath.

Generally a firm dark base is a good indicator of lift. If the base of the cumulus is "stepped" (Fig 4) this is a good sign of strong lift. The lift lies close to the step on the high side.

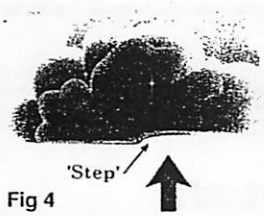


Fig 4

<u>The key learning point is that the base of the cloud is the best indicator of likely lift.</u>

The more clouds you sample the greater your chances of finding good lift. A common mistake amongst early cross-country pilots is to stick too rigidly to the track line. Weave from side to side of track to pass under as many likely looking clouds as possible. Your first priority is always to soar.

A deviation from track of 30° adds very little to the total distance flown. A 45° derivation can be justified if it takes you to exceptionally good looking clouds. In *extremis* fly at 90° to track or even backtrack if necessary to stay airborne.

En route

Take it easy at first, climb frequently and stay high. Navigate using major features, don't waste time trying to identify every small town or village. Remember that even large towns can disappear in a cloud shadow, especially in hazy weather.

As your confidence grows and conditions develop be more selective about your climbs. Do not be tempted to set a high MacCready. High average cross-country speeds are achieved by using strong thermals and not by flying fast. I tend to use only two MacCready settings in the UK - 2kts when conditions are good and 0 when poor or weak. Set a threshold at which you will discard thermals and leave any climb that falls below that threshold. Continually vary your threshold according to the situation. For example you may wish to lower the threshold if running into a poor patch of sky or getting too low.

It is always a mistake to remain with a dying thermal when not climbing. Keep a constant lookout for growing parts of your cloud or newly forming wisps a short way into wind and be prepared to move to this new activity. Very often a newly developing thermal core can be found just a few hundred yards from a dying thermal.

If spread out is cutting off the sun ahead, be prepared to deviate from track to soarable areas sooner rather than later. You are better off 20 miles from track at cloudbase than struggling on track at low level in weak lift.

Avoid the temptation to fly from airfield to airfield or to select outlanding fields from considerable altitude. I do not recommend selection of outlanding fields too early. For a start you are probably too high to spot obstructions and assess the slope. Secondly by concentrating too early on fields you are likely to increase the chances of outlanding by ignoring soaring possibilities. The first priority is always to concentrate on the clouds. Fly to good cumulus and soar.

I am often asked at what height I choose my outlanding fields. It all depends on the situation. If the sky is obviously completely unsoarable I have usually chosen a safe outlanding **area**, if not perhaps the individual field, by 1000ft. On the other hand if running at low level into an area of good active clouds I don't pay much attention to fields until well below 1000ft. To put it into perspective, most reasonable pilots could expect to climb away from a 1000ft winch launch on a normal soaring day.

Every so often compare your progress with the scheduled times of the various TPs. If you are falling behind schedule or there is a major weather deterioration, abandon your task and fly straight home. There is no point continuing to an unnecessary field landing.

If all goes well you will eventually realise with some pleasure that you are high enough to final glide to your goal. For your first few final glides carry a good safety margin; it is always better to spend an extra minute climbing a few hundred feet extra than to land half a mile short of the airfield!

Approaching your goal airfield, start planning your circuit well in advance. What are your options once you arrive over the airfield boundary? If fast? If slow?

Racing finishes are great fun, but you are likely to be tired, especially if at the end of a long flight. A lot of accidents happen at the end of a cross-country and avoid arriving at low level with no speed and no ideas.

Review

After landing spend some time reviewing the flight. What did you do well? What did you do badly? What would you do differently next time in the same situation. How could you go fast and further? Revise your likely average cross-country speed in Fig 2 to more accurately reflect what you are actually achieving.

Learn and above all enjoy your cross-country flying. I look forward to seeing you over the UK somewhere this summer.

Potpourri On: "Tactics for Budding Cross Country Pilots"

What Glider Should You Purchase ??

You should buy the best glider you can afford. Remember, you are HOW you fly not WHAT you fly.....Flying a 1-26 well counts for a lot more than blundering about dangerously in an expensive glass ship. Flying well means flying with good skill in a situationally aware manner. Do not purchase cheap instruments. Get a quality total energy variometer and audio system, and a good radio. A fancy flight computer is not needed during your budding XC phase. Spend the money on more tows and building your experience and wisdom.

A current Sectional, a handheld GPS and a Williamson Glide Calculator are very helpful additions to a budding XC pilot..... Learning: 1.) To read a chart, 2.) To estimate distances, and 3.) Learn to make the continuing trade offs between speed to fly, distance to go and, altitude margins.

Your trailer need not be the latest model but should be functional and reliable. You must have reliable wiring, brakes, lights, and excellent tires, even the spare tire.

Developing Soaring Skills

Graceful, considerate, safe thermal entry; treat someone else's thermal like shared community property. As a glider pilot, you do not have the same rights in a thermal with others as you do alone. If you want to thermal efficiently, get your own thermal. Pull-ups and pushovers in a thermal are very dangerous on entering and leaving. Once in the thermal, how many gliders are in your blind spot, or versa visa?? Avoid thermals with erratic and low time glider pilots who do not telegraph their intentions to maneuver.

Avoid trying to do dolphin flying, most of the pull-ups you make will be in turbulence or wind shear. At the beginning, you will dolphin into no lift most of the time. You are just wasting energy.

Practice locally on weak thermal days, on windy days, ridge days, wave days and low saves near the airport to build up your confidence in your ability to stay up in all conditions and to know that if there is lift, you can find it and use it effectively. Be able to stay up all day. Try to local soar avoiding the local hot spots. Fully explore local conditions until your core flying skills become 'sub-conscious'. Fly locally at more than one site; this develops confidence in dealing with new airports, new lift hot spots, and situations you will meet on early XC flights. During this period, become familiar with surrounding safe places to land. Visit and inspect these airports and fields by car.

Prior to making your own XC flights, it is a good idea to crew for others who have some experience. This is a good introduction to XC learning.

Glide Performance Judgment

Think distance as miles per thousand ft while selecting one of 3 key cruising speeds of plus 5 to 10 knots, 10 to 20 knots, or 20 to 30 knots above maximum L/D speed. Reduce cockpit load and mental arithmetic. A chart showing the polar suggests the minimum sink performance and the slow themalling speed range. A chart showing glide ratio more dramatically shows the cruising speed and increasing rate of sink impact on your range. Both curves make different points. One suggests thermalling and L/D speeds. The later shows the range impact of the gliders speed. In addition, flying faster than L/D reduces your chance of loosing control of the glider at the wrong time in entering a rough thermal, soaring against the mountains, etc. New XC pilots tend to thermal too fast, loose the lift, and fly too fast in sink, especially if they are trying to follow a speed to fly indicator. Until you gain experience, these instruments are not very accurate or smooth, and tend to over-state the speed to fly command. Set your MacCready to 1/3 of your best rate of climb. With high experience, you can raise it to no higher than 2/3 rds.

Off field Landing Practice

If you get low and have to land, pick Bronze Badge training sites and known walked fields at first. Early XC pilots should have off airport landing training, (ideally in a motor glider; with e.g. Rolf Peterson) but should not plan on landing off-airport unless it has been briefed and visited on the ground. This activity should come after a string of successful experiences (if ever). The pilot in command is responsible to make sure he navigates such that his low spots are his selection, not the un-luck from nature. This is a part of risk management. That is, risk to continuing the flight.

Early XC flights should be airport hopping with pattern margins from wide airports with windsocks. Narrower airports should not be planned until you have at least 10 XC flights. If you only fly a few XC flights a year on your own and don't have a lot of off field practice, you will never be current to use this, except in an emergency, which you should avoid at all times! It is nice to be lucky, but do not plan on it.

Touching down at the spot with too much or too little energy is bad, and not stopping a given distance beyond the spot is bad. Field length should be double or triple your required length. Glider pilots seldom allow for high approaches, weak spoilers, maybe a down wind landing. No adequate margin results in accidents. When landing KEEP FLYING the glider as long as it is moving.

A big error to learn in off field landings is that grass fields more subject to wind gradient near the ground. A paved runway wind gradient is much less on a rough or grassy surface. This is serous stuff, in the high desert where the winds can be stronger and more turbulent near the ground, the wind gradient is more severe, and you will hit the ground much sooner. Minimum sink speeds and shallow final approaches is a way to land hard well short of your intended touchdown in off airport landings. This is serious stuff. Many years ago, we experienced more landings short of the runway at Lee Vining and at Truckee due to lack of understanding this problem.

Know your safe margins. Make sure you get low near a safe place to land and with sufficient to check out the area, find the wind sock, make a good pattern and land. Do not try to save the flight once you enter the pattern. This is a high risk to have an unnecessary budding XC pilot incident.

First X-C Flight Tactics

Mother Nature never cooperates totally. She has not read Helmut Reichmann's book on Cross County soaring. You can and should pick the most benign soaring days (Cumulous Clouds, good lift rates, and medium winds aloft) for first attempts by the budding pilot. Ask your CFIG, or your mentor. You should expect to face challenges to get around a short course even on the easiest days. Center those challenges around a known strip or airfield at first. As the Pilot in Command (PIC), you must be constantly managing your risk level until the glider is safely landed and stopped.

Target Budding pilot XC days are characterized by cumulous clouds, high bases, long days, and moderate winds. To plan the day, check the soaring index, expected lift. Estimate the length of the useful soaring day based on heating and sunlight, and then use theoretical achieved x-c speed from MacCready theory (you can read this off your John Williamson style prayer wheel). Initially, plan 1/3rd MacCready achieved x-c speed for the day and plan your task distance from the time and expected average speed. Initially, you should follow the adage 'Get High, Stay High.' Why? It gives you more time and range between thermals, more time to make decisions and evaluate conditions. The aim is to COMPLETE the task without racing or rushing the process on early x-c flights. This reduces pilot stress. Make low (flight) risk decisions on first flights and fly the weather you see and experience; do not fly the forecast. Forecasting local micrometeorology is very difficult.

Few pilots know how to use their instruments, especially all the knobs and whistles on glider computers and moving map displays. There are a lot of pilots with their heads in the cockpit too often trying to learn while in flight. Further, not many pilots are using Sectionals any more. It would be good to focus on learning contact flying with your sectional so you learn all the important information on the chart. Computers and bells and whistles can come later, after you have learned the basics.

Know and practice emergency egress, and under supervision, pull the ripcord on your chute every time you are getting a repack. A key item is a Take-off/Landing checklist. In addition, read the list out loud, complacency is a killer. This is true for budding pilots ranging all the way to very senior pilots as well.

For the budding XC pilot, study and know the area of your planned flight. Note and plan ahead to avoid critical passes, altitudes, river crossings, lake crossings, and other likely soaring potholes to be encountered on this flight day.

Do not make decisions on the basis of historical data! A Hot Spot is validated when you have experienced it. The visual clues are not guarantees for a budding XC pilot. There are indicators, which indicate the hot spot is working, but the budding XC needs to know more about where hot spots are less likely. Avoiding poor lift areas is more important than knowing where hot spots are supposed to be. Historically Hot Spots in the mind of a budding XC pilot are a very dangerous mind set. In the real world, be careful of simplistic rules to make tactical decisions. Simplistic rules can be a bad approach for learning the hard way. Clearly, learn to avoid the poor lift producing areas.

The budding XC pilot should arrive at a pattern altitude for landing with at least another 1,000 feet to spare if it is an airport. If the site is in the boonies and a long glide away, you should add another 1000 to 2000 feet for pattern margins as a budding pilot. The budding pilot should not suck himself into a tunnel brain (overload) situation on his early XC flights. He has little idea of his decision-making skills under the duress of making anxious in flight decisions in unrelenting succession. A good final glide for the budding XC pilot is to reach his destination with a comfortable margin of altitude to spare. Below pattern altitude high speed finishes with steep pull ups by budding XC pilots are verboten!!!!

Getting to the landing site high, allows the budding XC pilot to get emotionally settled down from any anxiety and plan his pattern, check the winds, and decide his pattern, while the tension is lowering. In this manner, he will not stray from his training, due to stress.

Depart for XC flight when you are confident there is an adequate height band for XC soaring. Some days and areas the XC soaring height operating band is only 1,000 feet, other days it is 10,000 feet. If the mountains are 9,000 feet above the valleys along the path, it might still be a marginal height band. The low end of the height band is where your point of no return margins begin to diminish. They should be at least 1,000 foot above...pattern altitudes and maybe more if you are more than 10 or 15 miles away, even in a glass STD Class glider (for the budding XC pilot). In the mountains assume thermal spacing is a myth. You need to learn to read winds and clouds, and realize that lift areas under clouds can be very deceiving to the novice (for example in the desert mountains the lift plume can be sloped at 30 to 45 degrees).

There are experienced pilots who like blue days as thermal locations are likely more predictable. Early in your flight look for the rules of the day: where is the lift likely to be under a Cumulous, what is the duration of the lift under a Cu, what are today's indicators for clouds which produce above average lift..... Learn to avoid Alto-Cu.....Exploit or avoid lines or areas of lift or sink.....When in flight, look for visual indications of Hot Spots, not depend on a computer generated history map. Learn when to be patient, especially when you get to an area where the day is starting more slowly. In desert flying or around lakes and shallow valleys, the soaring climate can be subject to wide range of changes, know when you are in a different air mass where you must change you tactical gear thought processes.

Learning Plateau's

There will be soaring plateaus, where you feel you are not making progress. They will happen during your XC soaring career. Human beings are not linear creatures and they do not learn in a linear fashion, despite the delusions of our education system.

Do not let these plateaus get you down. You are not doing everything wrong. There needs to be some tuning on your basic skill set. More skill, patience, and learning and talking with mentors will you move beyond this temporary plateau. Get High and Stay high is a good sound mantra for the budding and the experienced glider pilot. Know where you need to locate yourself so when you need to find lift you have several options left open to you by your tactical decisions. You need to get low where there is a safe place to land, multiple opportunities to explore before you are a pattern altitude. Having time to explore and learn the nearby air and birds, and dust, water ripples and such are not for the budding pilot to solve. With growing experience, he can begin to build these tools in later flights. The naive and budding XC pilot should have good experiences.

With experience in XC soaring, your margins can be diminished without increasing the risk to the flight, the glider, or the pilot and passenger. The desire is to have plenty of margins so the experiences on the first couple of dozen XC flights will provide a more mature base for your risk margin decisions.

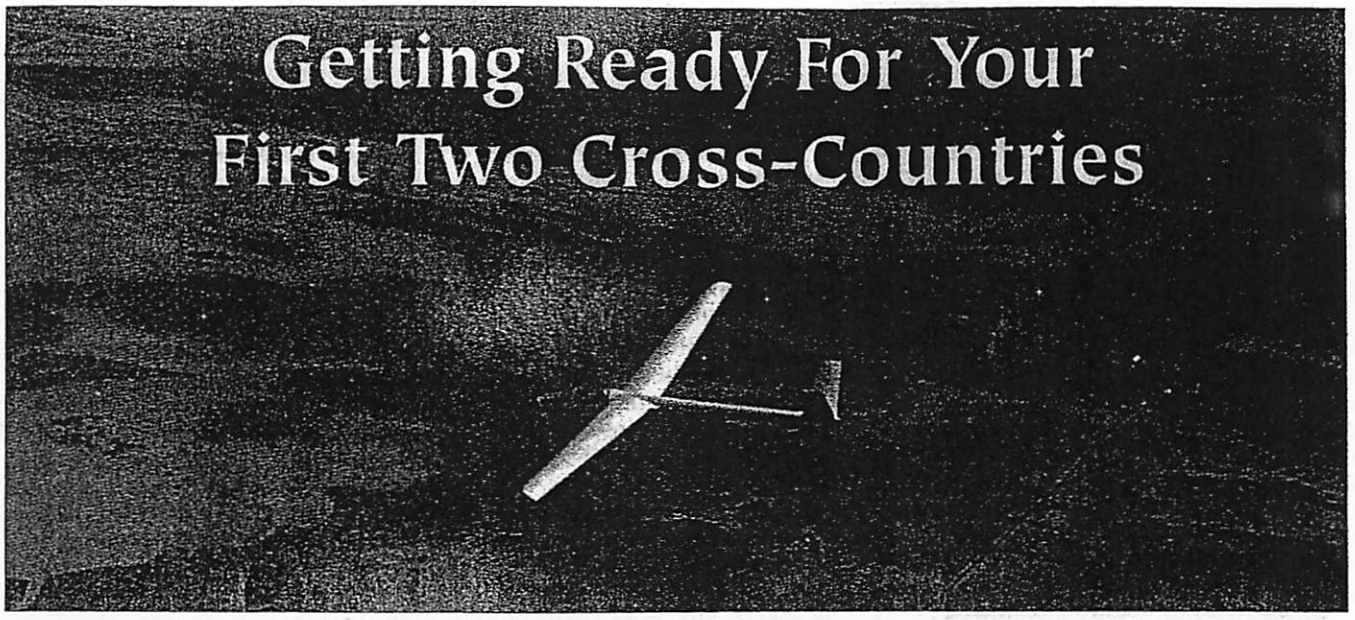
Lift cycles, lift strength, soaring potholes, and meteorological potholes are different for every soaring site and for each and every day, and in some cases dramatically different. Learning at one soaring site, is just the beginning. The real learning is doing it, not talking it, or reading it. These later are important but not training or wisdom generating in the ab initio stages of learning a new set of soaring tools.

A heart pounding land out or a scary series of in-flight situations can be put into motion long before pilot awareness comes to light. We all like to keep the stress occurrence rate and heart pounding situations to a minimum. Make continuing small decisions to maintain clear-headed thinking. Don't be bashful to recognize you have a better picture than you did, and now realize that there are a couple of better decisions to make now. Minimize the number of decisions you make a minute and only consider a few parameters in the process. Efficient flying results from decisive decision making. It is better to avoid the low payoff decisions than to wait to make complex perfect decisions. Avoid the "I cudda done this or I shudda done that" approach to learning.

By: Peter Deane, Kempton Izuno, and Carl Herold

9 March 2002

Getting Ready For Your First Two Cross-Countries



by Mark Montague

Lead Page Photo: Lennart Edvinson sets off in his beautiful HP-18, near Ephrata, Washington.

Were you just about ready to go cross-country last summer, but ran out of season before you ran out of obstacles? Congratulations! You are, believe it or not, in an enviable position – poised on the very brink of one of the most significant and satisfying milestones of your soaring career. What glider pilot wouldn't want to relive the wonder and sheer joy of his first truly free flight? With a little planning, you can just about guarantee having a safe, rewarding introduction to the world outside of the pattern – and learning a lot in a hurry, too. I have a few suggestions that will help make those first flights successful. None of these are rocket-scientist material, but they are the sort of things I wish had been pointed out to me before I first wound that barograph.

I happen to be almost perfectly qualified to write an article aimed at beginning cross-country pilots, because I am one – twice over. My first cross-countries took place over a decade ago, but shortly thereafter, the usual career, marriage, and child-rearing considerations took center stage. When I got back into cross-country flying, it was fascinating to be a rank beginner again, yet to have the perspective of someone who had "been there" before. All I can promise you is this – nothing is more fun than learning, and at no time will you be learning faster than when you are just starting out. Here are a few ideas that will help you enjoy those first two flights – one to an outlanding, the other, back to your home field – as much as you should.

Long before the weather becomes flyable, you can start working toward your goal. You are going to want to really know and trust your ship and its equipment, particularly the vario. It is a fact of life that we all tend to tinker in our cockpits, adding and removing instruments without documenting very well what we're doing. The result is that the pilots who are to follow us often aren't really sure of what all those switches do, or even if they are working correctly. If this is your situation, fix it! If you have to, take your panel to an instrument technician who is qualified and equipped to tell you what the various modes and controls mean – including netto, cruise, speed director, even damping and scaling – and whether they are properly calibrated. I realize that instruments alone cannot improve the performance of your glider, but at the same time they will do a lot to improve your performance. Summoning the confidence to set out away from the field will be hard enough, even without wondering whether to believe in the information you're getting. Extremely high performance is not required of the ship – but you are going to have to fly it with confidence!

When the weather becomes flyable, perhaps even good enough for local soaring, you will want to practice spot landings until you know, really know, that you can pick an area just large enough to land in safely, then fly a proper pattern and land (and stop) within that area. Practice sizing up little areas on your home field and flying successful approaches to the smallest areas your ship will safely fit into. (I don't mean you should actually land in confined spaces – but you might try placing some orange traffic cones on the field, to simulate tiny fields. If you don't know where to buy these cones, try calling the local public works office.) Remember, though, that when the day finally comes, you will actually choose fields much larger than the minimum – but you will still want to cultivate the habit of landing and stopping in as short a distance as is possible. Read Tom Knauff's sobering little booklet on off-field landings, and take it to heart.

Your first cross-country should be long enough to win you a Silver Badge, but by all means, don't be tempted to fly just the minimum distance. Also, don't be tempted to fly off your five hours on this flight. Fatigue leads to poor decisions, and I can't think of anything more conducive to fatigue than watching the clock, just trying to stay airborne for some arbitrary length of time! (You will almost certainly get five hours when you fly your first 300 km flight, or when you make the attempt, which probably will come much sooner than you think.)

You want to fly far enough to really get somewhere, and 50 kilometers

In this example, 8000 feet over the Wilson Creek airport will put you over the airport at Ephrata with 2500 feet (1200 AGL) in hand – plenty for a safe pattern. You can also see, at a glance, how high you should be at any point along the way.

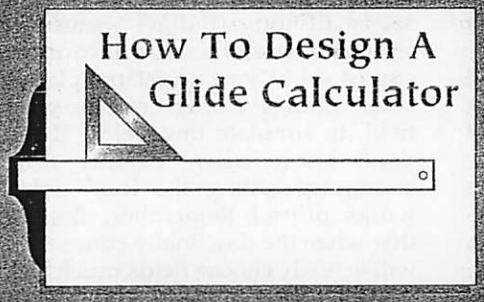
might only be a couple of thermals away. Performance we take for granted today, even on the used sailplane market, makes everything less of a challenge than when the badge requirements were first set forth, and the purpose of the Silver Badge is to recognize your demonstrated ability to go the distance and to handle everything that goes along with it. This includes navigating, reading a map while flying, evaluating changing weather conditions, and landing where you've never landed before. Please don't cheat yourself out of these things, for they will be important building blocks for all that will follow in the years to come, and they will contribute to your sense of accomplishment, which is the original motivation, isn't it?

So, pick yourself out a nice airport, not too busy, 50 or 60 miles away – far enough to feel like a real adventure, but easily accomplished on any reasonably good day. As a matter of fact, a 60-mile Silver flight is generally easier than one which just barely exceeds the minimum distance because it allows a higher tow, which in turn eliminates the need for that first painstaking climb (let's not kid ourselves, it's really a low save) right at the outset of your voyage. What you want is to prepare yourself beforehand to actually "do it," then to make a smooth, relaxed climb to the top of the lift and set off on the adventure before second thoughts crop up. Before you know it, you'll have clicked off the distance and will be looking down at your destination. You will remember that first glimpse of the airport as long as you live – I guarantee it.

While planning your route and poring over your sectional, try to find and mark good landing sites spaced comfortably along the way. How far apart? That depends on the altitudes you expect to reach and the nature of the terrain – play with your glide calculator and you'll soon figure it out. Seek out the experienced cross-country pilots at your field and ask them where the good fields are. You'll be surprised at what they can tell you. Make sure you have your sectional with you when you do this, and encourage them to actually draw the fields on it. Don't forget to also ask about fields which look good, but are unsuitable. (As an aside to those of you out there who are in a position to help out, please be generous with your time and wisdom. Not only is this simple courtesy, it may well affect the long-term survival of your sport, it's time well spent.)

Naturally, you will have already visited the destination field, on the ground, and checked it over for obstacles, local practices, condition of the runways and taxiways, availability of tiedowns, and so on. You will have taken your crew with you, and agreed on a place to meet after your flight, as well as figured out how to get from the highway to that part of the airfield – something that's not always obvious at the outset. Being well prepared will allow you and your crew to safely accomplish all that will need doing, and will eliminate a lot of the unnecessary stress that often accompanies the first time you (and your crew) do anything new. Remember, a good crew can make a lot of difference to your enjoyment of your soaring. The way to acquire a good crew is to make crewing easy and enjoyable at the outset – you'll want your crew to stick around long enough to become experienced!

How To Design A Glide Calculator

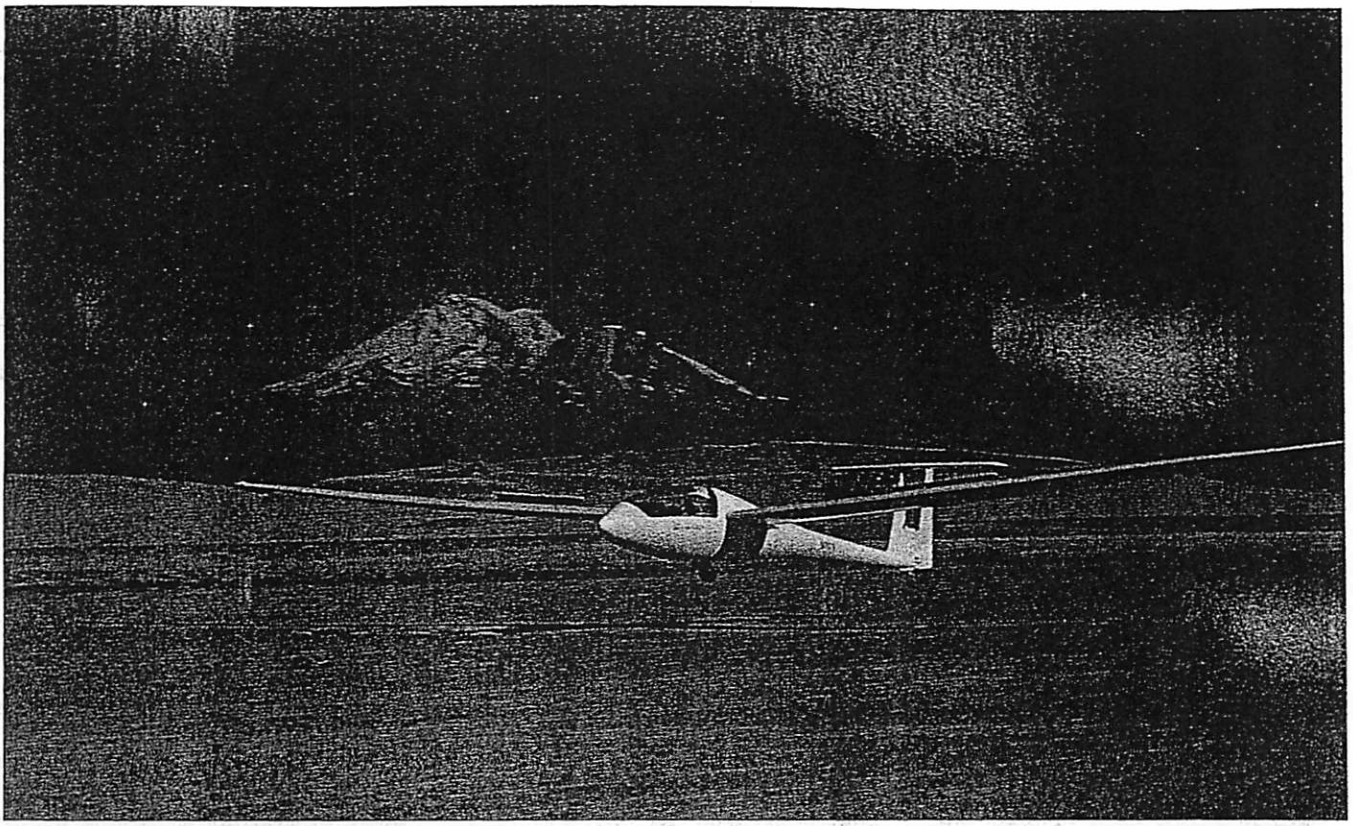


Whether you're on the ground planning a flight, or in the air trying to make decisions quickly, yet correctly, you'll need to have some easy way to figure out how much altitude you'll need to do what you want, or conversely what you can do with the altitude you do have! Drawing circles on the sectional around every conceivable landing spot just won't work – you'll never be able to read them when you need to.

With thanks to Derek Rumsby, who first presented this calculator in this form to me, here's an easy and quick way to make the figuring automatic. There are 6080 feet per nautical mile. Suppose the ship you're flying has a published best glide of 36:1. Allowing for a little sink, a generous headwind, and some optimism on the part of the designer, let's cut that in half; now you're flying a ship with a glide ratio of 18. Dividing 18 into 6080 feet per nautical mile gives us our altitude lost per mile – in this case, 338 feet. If you flew along at that rate until you'd lost 10,000 feet, you would expect to cover (let's see...10,000 feet divided by 338 feet per mile gives...) 29.6 nautical miles.

Measure 29 and a half miles on your sectional (the missing tenth of a mile is only about a dozen wingspans, so just eyeball something between 29 and 30 miles) and divide that distance into ten equal lengths. If you don't know how to divide a line segment into equal lengths, see your nearest high school geometry teacher. He'll be delighted to do it for you, and if you let him know your purpose, he'll be grateful for an example of the use of mathematics to solve a problem the kids can grasp – and one that will interest them as well. (Why not use the opportunity to "sell" soaring to impressionable young minds?)

At any rate, put the scale, labeled in thousands of feet, on the edge of a card (laminate it if you want) so that you can quickly measure the altitude lost in flying from where you are to where you want to be by simply holding it against the sectional. If you put the altitude MSL at which you'd like to arrive over the next field (remember to include enough height for a pattern) you can read the altitude MSL required at any point along the way. More uses will undoubtedly occur to you. While you're at it, you might find room on the card for checklists, weight and balance info, critical speeds, and the number for the clubhouse or retrieve phone.



Ray Gimmey demonstrates perfect off-field landing technique.

Nobody really enjoys not knowing what to do, so make sure all of the little concerns (like getting lost, or feeling stupid, or...) are addressed right away. On the way to and from the departure and destination fields, be certain to stop every so often, get out of the car, and actually evaluate as many fields as you can. (I am not telling you to trespass! Just look over the fence, thank you.) Try to spot all of the obstructions, gauge the extent of any rolling terrain (it is amazing how flat a rolling field can appear, right up until short final) and try to relate the color of each field to the height of the crops or weeds in it.

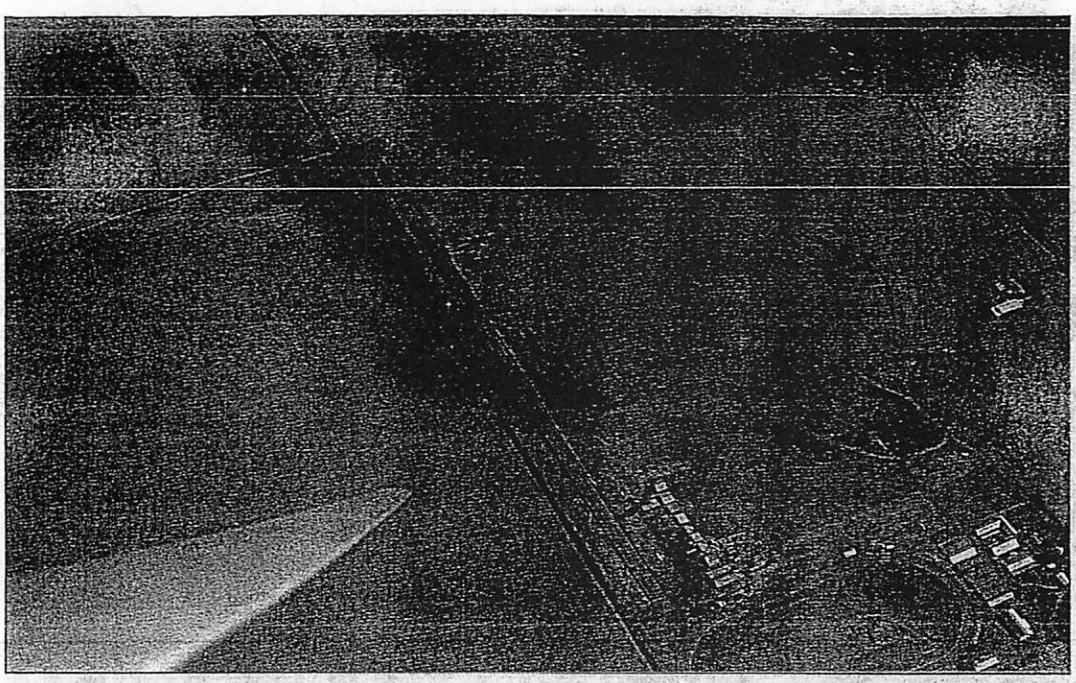
There will usually be a pattern evident in your part of the country, and it will gradually change as the seasons progress. Your job is to discover it – and to keep track of it as the season continues. For the remainder of your soaring career, remember that a day ill-suited for flying is by no means worthless – just get in your car and visit some of those fields that look good from the air. "The more you know, the faster you'll go." While you're at it, take the time to investigate those areas off the end of the runway where you always tell yourself you'll land when the rope breaks. The peace of mind alone will be more than worth it, and if that rope break ever does come, you'll amaze your flying buddies with your cool professionalism – and you'll help keep my insurance rates down!

What should you take with you? Well, to begin with, don't even think about going cross-country without water and food. You will be making real demands on your body, and when the time comes, hours after takeoff, for the approach and landing, you will want to have at your disposal all of the flying skills and decision-making abilities that you have acquired at great cost in time and money. Don't begrudge your body the supplies it will need to do what you ask of it. Depending on the sort of country you fly over, survival gear might be a good idea. Unfortunately, that's probably about all it will be, since so few ships have the baggage capacity for much of anything. Find some safe place to securely mount your tiedown kit. It should stay there even during "local" flights. You should get used to carrying a barograph. Not only will it prove to be a useful tool for evaluating your performance (see "Barogram Analysis," by Val Brain, *Soaring*, February, 1992), but you will want to make preparing the barograph just part of your routine.

Once the day arrives, make certain the trailer is properly hitched to the crew car, the radios both work, and your crew has the proper keys for car and trailer. Don't forget to check NOTAMS for your route; the FAR's specifically require you to familiarize yourself with all available information regarding any flight "not in the vicinity of an airport," and that means you!

Yes, I realize that the regulation is meant more as a way for the FAA to protect itself, rather than as protection for you, but it is the reg. So call the Flight Service Station, give the briefer your N-number, and get yourself on the tape – these calls are recorded – requesting a "complete briefing" for the proposed flight. Who knows, you might just find out something critical to your plans. Perhaps the airport you've picked out is closed today for work on the pavement! It's happened to me.

For a short cross-country there is no reason to launch very early. Instead, let the experts get established first so they can mark the first few thermals for you! About the time you top the second or third good thermal, a little light bulb will light up in your head, and you will realize that there's no reason not to head out so that you're in range of the next field out along the course – but no longer in range of the airport you took off from. Congratulations! How



Looking down on the runway – yesterday's destination, today's turnpoint. Airports make especially good turnpoints because they're easy to spot and always available for landing.

do you feel to be on your first cross-country? Exhilarated? I was, too.

Now give your crew another call, both to confirm contact (good for your peace-of-mind) and to report that you're heading out. The rest of the flight will, in all likelihood, go very smoothly, and probably more quickly than you expected. Before you know it, you will catch your first glimpse of your destination airport. Before much longer, you will be looking down on the field. Call your crew once again, while you're still up high, to report the fact that you've got the field made. They will respond with an estimate as to how long it will take them to arrive. (Human nature practically guarantees this, so don't even bother briefing it.)

Find the spot you've agreed to meet, plan your approach, enter the pattern and land. As I've already mentioned, don't even think about flying off your five hours! You will have spent more of yourself than you think you have, so just land (use your checklist) and relax in the sudden silence. . . don't be surprised to find yourself experiencing emotions of great depth, and feeling that the glider is the best friend you've ever had. Perhaps it is.

Tie the ship down, drink some water, relieve yourself. Eat something. Relax and enjoy the loud silence. (Don't touch that barograph!) Your crew will eventually show up – you know this because you took the time to visit the field together. When your crew does show up, consider having them take the heavy end of the wing – assuming a sturdy-enough physique, a properly trained crew ought to be able to take charge of directing a routine de-rigging. In any event, I recommend that you let your crew drive the crew car back to the home field, or at least until you stop for dinner. Like everything else, cross-country flying will eventually become routine – a fact which is, in some ways, unfortunate – but at first you will find that you will have spent yourself. Please don't push it.

If your crew is also your partner, in all likelihood the next day will be your turn to crew! You will have a much better idea of what a pilot wants and needs from their crew; make sure your pilot gets it.

The next time you get to go cross-country, plan an out-and-return (perhaps even turning at your previous destination – after all, you've already done your homework for that route) or an easy triangle. More experienced pilots at your field can probably suggest a good route. As opposed to the first flight, where the real goal was simply to get out of town, this next flight will have the goal of getting home.

You will find that the flying, per se, is the same as before, but the tactical decision-making will be different. You will have to pay more attention to the time, to achieving the best groundspeed you can, and to the effects of wind.

You will want to get an earlier start than before. If all these considerations sound to you like the things you hear around the clubhouse when the aces talk to each other, you've broken the code! They are the common coin of cross-country flying, and they are things you'll think about for the rest of your career.

There are only two things I will tell you about this next flight, your first cross-country back to your own field. They are, first, plan on making this flight as soon as possible after your first cross-country; and second, when you round that turnpoint and look back toward home, it will seem like an impossibly long way! You will probably be pretty discouraged.

You'll have a lot going for you, though, so get going. Concentrate on your flying and on the landable fields around you. Keep your eye on the task at hand and don't fixate on the goal. When you touch down at the home field, you will be a cross-country pilot, one of soaring's elite.

And quite probably, you will be elated. You will certainly be deeply satisfied.

Until next weekend.