

# **Off-Airport Landings**

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An inordinate number of accidents occur during off-airport landings, which is regrettable as I am convinced the majority are attributable to pilot error, and could readily be avoided by proper training.

Luck plays a surprisingly small role in successful field landings. Ninety-nine percent is know-how, preparation and skill.

I am reasonably qualified to address this subject, having made, at this point in time, 169 off-airport landings and have probably picked ten times that number of fields. Consequently, most of the following material is based on personal experience including that in the “must-never-do” category. Naturally, it is impossible for anyone to have been exposed to all possible scenarios, even in a lifetime of cross-country flying, so some of the material is derived from other pilots encounters.

Warning: There will be a test sometime after you read this. The time and place will be at your first field landing and failing is not an option.

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## WHY YOU SHOULD BE PREPARED

If you are a glider pilot, cross-country qualified or not, you should know how to safely perform a field landing. Although you may not deliberately set off cross-country, an off-airport landing is always a possibility when flying a sailplane. When flying locally, unless you always fly directly over the airport, there is the potential for misjudging the wind, or encountering excessive sink, thus finding yourself too low and too far away to get back to the airport. Selecting a field and landing safely, while there is still plenty of altitude to do so is much safer than attempting to stretch a glide to the airport with marginal height.

Even if you don't stray very far from home there is the chance of a rain or snow shower engulfing the airport, reducing visibility to below minimum. Selecting a field in the clear, rather than risking a landing in hazardous conditions at the airport is a much better option. Be especially vigilant of snow showers, they can be treacherous, reducing visibility to near zero in less than a minute.

*Many years ago we were selling our Ka-6. A fellow showed up and said he was interested, could he fly it? We didn't see why not and gave him a tow. Just then a snow squall moved in. He disappeared and did not return. This was somewhat disconcerting – this fellow whom we had never seen before had vanished with our glider. An hour or so later we got a phone call. He had taken the proper course of action and landed safely in a field, in the clear 9 miles away.*

### CONTEMPLATING CROSS-COUNTRY?

There are many pilots who deprive themselves of the joys of cross-country soaring because of their anxiety regarding off-airport landings. This is needless and regrettable. Cross-country flying is really what soaring is all about. Of course, it is possible to venture away from home with minimal risk of landing out other than at an airport by using the method of "airport hopping". Nonetheless, serious cross-country flying cannot be done without the occasional visit to a farmer.

Unquestionably, landing in a farmer's field does entail a higher level of risk than landing at an airport, but with proper preparation it can be done with an acceptable level of risk.

### PREPARATION

It's not possible to practice all the situations we may encounter on our field landings, but we can envision a lot of the problems we may be faced with, and in our mind work out how we would deal with them. This is a very useful exercise and I strongly recommend it. Also, read all available material on the subject. Learning from other people's experience is a lot less trouble than learning from your own. Nonetheless, the flying skills and judgment needed for safety in 'outlandings' can be practiced right at your home base. Take full advantage of those opportunities – be prepared and stay safe.

### SPIN PROFICIENCY

When the work load is at an unaccustomed high level, such as during an off-airport landing, that is the time you are most at risk of an inadvertent spin entry. No doubt many of those spin-ins are attributable to insufficient exposure to spins – don't become another statistic. You cannot afford to be ill prepared, recognition and correct control input must be instantaneous. If you have to think about it, you will run out of time, recovery has to be intuitive.

Thorough spin training should be mandatory for all glider pilots, and to make the correct recovery procedure intuitive, spinning should be practiced at regular intervals. To be meaningful it is imperative that the training is done in a sailplane with similar spin characteristics as the sailplane you normally fly. I do not know of any single-seat glider that will not enter a spin inadvertently, given the right conditions.

### THINKING AHEAD

Your mind must always be ahead of the sailplane, eg. "If the present course is maintained and the present conditions (sink rate, ground speed, etc.) persist, where will I be, one, two, and ten minutes

from now?" Unless conditions are 100% reliable, at all times know where there is a place to land.

Always remember that you fly a glider with your head, not your hands. Never let the glider take you somewhere your brain didn't get to five minutes earlier.

## SERIOUS HAZARDS

Now that I have told you how safely this can be done, I'll highlight the hazards. Thought I would cover this while I have your attention. The most dangerous hazards associated with off-airport landings are:

WIRES

SLOPES

Learn to cope with slopes, avoid wires and fences and chances of ever causing serious damage to the glider or yourself are minimal.

FENCES

### WIRES

Wires are by far the greatest hazard, and the most often cause of serious field landing accidents. Every so often, there will be wires on the approach which cannot be seen in time to avoid them wires, the invisible menace.

When we look at wires from the ground they appear quite visible. So, what are we talking about, "The invisible menace?" The problem is that when we are in the process of landing we are not viewing wires with the sky in the background, but against trees, earth, crop, etc. which tends to camouflage wires very nicely. To assure we never make an unpleasant discovery, we must pretend there are wires where they are likely to be, and make the pattern and approach accordingly.

*I have on several occasions skirted imaginary wires, and to my astonishment discovered them to be real – after landing.*

There are likely to be wires:

- Between two poles.
- Between a pole and a group of trees, or a single tree. It is not uncommon to find a telephone pole hidden by one, or a cluster of trees.
- Between a road and a house.
- Above any road.
- Going to any kind of a building.
- A narrow field with trees on one side and wires along a road on the other side, or a field with trees along both sides, may have wires crossing anywhere along it's length. Avoid such fields if at all possible.

The safest assumption is to pretend there are wires around the entire perimeter of every field. When crossing the boundary of a field pretend there is a wire there, then fly the approach high enough to provide plenty of clearance. It is not advisable to fly under a wire or wires as there could be a wire half way up the utility poles.

If you must make your final approach over high tension power lines, be sure to allow for the thin ground wire above the power cables, which may not be visible. This thin wire can be as much as 15 feet. above the power cables. Beware, the heavy-duty power cables will tend to focus your attention. The safest tactic is to make the approach above the height of the adjacent pylons.

The best way to minimize the potential for having an unpleasant encounter with wires, is to pick a field out in open country, away from roads, trees and buildings.

## **SLOPES**

Obviously, the best way to deal with slopes is to avoid them. In our part of the country (the Finger Lakes region in New York State) the terrain on the high ground tend to be hilly. Fields in the valleys, for the most part, are reasonably flat and level, they also tend to be bigger. Furthermore, when selecting a field in a valley you will have more altitude available in which to find a thermal.

As much as we try to avoid landing on a slope, there may come a time when there is no other choice. When flying directly above a field, slopes are undetectable. Fields should be viewed at an angle of 30° from the horizontal. When viewed from 30°, terrain features are considerably more evident. Flying directly above a field which you are contemplating landing in is a complete waste of time and altitude. In spite of viewing a field at an angle of 30°, any detectible slope will be steeper than you think, and too steep for a downhill landing. You must land uphill, regardless of wind direction.

Landing uphill is tricky business, and as with so many other skills we talk about, one that we don't have much opportunity to practice. Yet it is imperative that we get it right, and the only hope to get it right is to be well acquainted with the proper technique and the pitfalls.

Here are the fundamentals of an uphill landing:

- During an uphill landing it is crucial to pick up extra speed on final so as to be able to fly uphill parallel to the ground, prior to flaring. The main objective is to avoid flaring into the hill, people have sustained serious injuries from during this.
- The final should be started at the same place in the pattern as you normally do and at the same height (providing your normal height for starting the final leg is 300 feet,) then get the nose down to build up extra speed. What makes this maneuver even more challenging is that a strong illusion comes into play. When looking at an uphill slope on final, you will get a distinct impression that the glider is more nose-down than it is. Be sure to monitor the airspeed indicator.
- Go easy on the spoilers, chances are you may not need them at all. The speed will dissipate in a hurry once you start going uphill.
- Do not use landing flaps, doing so will make the pull-up somewhat mushy which is precisely what you do not need.
- Landing uphill, into a stiff breeze is especially demanding. In addition to all the rest, you also have to deal with: heavy sink, due to curl-over; wind gradient and turbulence.

Landing across a slope is not advisable. However; if you must land at ninety degrees to a slope, keep in mind that the glider simply will not fly straight with one wing down. Landing from a conventional, straight-in approach will most certainly result in a vigorous ground loop and a broken glider. The only hope is to make the final in a turn to match the slope – easier said than done. The touch down must be on the upward portion of the slope so as to avoid rolling down hill.

## **FENCES**

We are not so much concerned with wooden fences or fences with wooden posts, not that we want to run into them, but because they are quite obvious and should be readily avoidable. The type of fences we are concerned with are the single strand electric fences with thin steel posts, they can literally be invisible and deadly. Not that I want to over dramatize the subject, but some unfortunates have been decapitated. To avoid ever encountering this hazard:

- Never land or roll across two different crops.
- Never land or roll across the border of dissimilar textured or coloured surfaces. A slightly different textured surface in one section of a field may indicate the presence of a fence. In many cases, such difference in texture is a result of grazing cattle having been confined to one section of a field by an electric fence – never cross such a boundary.

If you are approaching a fence or other obstacle on the roll-out, and you realize that you are not going to be able to stop in time, the best course of action will be to ground loop the glider. Remember to push the stick forward to lift the tail off the ground at the same time as you put one wing down, this will prevent the fuselage from breaking.

## **WIND DIRECTION**

Check wind direction periodically during any flight. Knowing in which direction you will want to land will be one less thing you need to sort out if or when you get to the level where you need to look for fields. Here are some means of checking the wind direction:

- Drift when thermalling is a good indication of wind direction and strength.
- Smoke is the best indicator, but there are not as many smoke stacks as there used to be.
- Pond or lake surface. A wind shadow (calm area) will be next to the upwind shore.
- Drift of cloud shadows across the terrain. Keep in mind that there often is a difference between the wind direction at the surface and at altitude.
- When hunting on a ridge, hawks tend to hover directly into the wind, making an excellent weather vane.
- Waves in high crops, or grass.
- The wind in a narrow valley between two ridges will be parallel with the valley in spite of the wind direction being at 90° to the ridge at the crest.

## **FIELD SELECTION**

- Do not rely on small private airports.

The width of a mowed runway of a small private strip is often only wide enough for a tricycle landing gear, and too narrow for a glider with a 50 foot wing span. If there is fully grown corn or fences on both sides, you will be in big trouble.

There is a certain amount of risk in relying on a landable waypoint in your flight recorder, unless you are familiar with it. Supposing you are at about 150 feet, and it looks like you will be needing a place to land. You call up landable waypoints. Sure enough, there is one a mere 6 miles away. "You arrive with 50 feet in hand. Oh shucks! Too narrow. Now what?" A cut hay field is the optimum choice.

- Use visual judgment – not the altimeter.
- Be conscious of the terrain at all times.
- Look for a group of fields when down to 2000 feet. Never rely on a single field in the midst of hostile terrain, always have some options.
- Retrieve convenience should never be considered when selecting a field. Always select the best and biggest field within reach regardless of convenience of roads, gates, restaurants, bars, etc.
  1. There are enough prerequisites to be met when selecting a field, no need to add any more.
  2. If the farmer can get his equipment into the field to cultivate it, you can get the sailplane out.
  3. Never compromise your choice of field for the sake of an easy retrieve. Even a ten hour retrieve is insignificant compared with a damaged sailplane.
- If spotting a high-tension wire pylon, look for the others. You want to be sure you know where they are.

- At 1500 feet, turn the radio off.

The radio will not help you to land or stay up, and those are the only two things that matter. Even listening to the radio is distracting. Getting low away from home is the most stressful situation you are likely to encounter in your soaring career, and the tasks at hand will require your undivided attention. People have crashed because of being preoccupied with the radio.

- A field must be selected by 1200 feet, then don't change your mind.
- Once a field has been selected, stick with it. This is not the time for indecision. On closer scrutiny you may discover some obstacles or troublesome features you did not notice earlier, but your best course of action is to make the best of it. Do what needs to be done to accommodate whatever difficulties you may be faced with. Trying to find an alternate field at this stage would be inviting disaster – this is not the time to change your mind. From 1000 feet you only have about one minute until it is time to start the pattern.
- Once a field has been selected, you can consider it your base of operation and look for lift, but be sure you can reach the IP with comfortable altitude.
- On your first few off-field landings do not attempt to prolong the flight below 800 feet. Once you reach that level consider the flight over and concentrate on the field and making a safe landing. Thermalling low over unfamiliar territory, with minimal experience is definitely not advisable.

## **CROP & SURFACE**

- A freshly mowed hay field (without haystacks) should be your first choice.
- Low crops may be okay. Land parallel with the furrows between the plants. If you cannot see any ground between the plants, or you can see wind waving the crop, it is too high.
- High crops should be avoided, especially fully grown corn.
- If you must land in high crop, pretend the top of the crop to be ground level, and flare accordingly.
- Cultivated fields (harrowed) or freshly seeded fields will be soft, but the advantage is that all rocks and holes are readily visible.
- Plowed fields with deep furrows should be one of your last, desperate choices.

However, should you get yourself in a bind and wound up in an area where all the fields within reach are too small, a plowed field may save the day, as the roll-out will be extremely short. The question about whether to extend the gear or not is debatable. One claim is that an extended gear offers more protection for the pilot. On the other hand, an extended gear may cause damage to it and will bring you to a stop very fast exposing the glider to high "G" loads.

- Use pastures only as a last resort.

Ask yourself – if the farmer hasn't put a plough on that field, why would you put your glider in it? Pastures are a poor choice, not only because they are probably not cultivated, but animals can be a real problem. Horses are unpredictable and may get excited. Cows are curious, difficult to keep away from the sailplane and they like to eat it. If you must leave the glider surrounded by cows, leave the radio on with the squelch turned down and the volume up, they don't like noise.

If there is a single cow in a field, it's probably a bull.

## FIELD SIZE

As a rough idea, if there are no obstructions on the approach, 500 feet may be adequate, but if you need to clear 70 feet high trees, you will need about 1000 feet and if your speed control is less than perfect you may need more. But adequate size depends on a number of factors, such as:

1. Slope.
  2. Wind direction and strength.
  3. Obstructions.
  4. Type of surface.
  5. Type of sailplane.
  6. Level of skill and experience.
- Another glider in a field may not necessarily mean that it's suitable for you. Your best bet is to pick the biggest, flattest field within reach.

*It was a national contest and a lot of us were coming back to earth in the same area. A fellow competitor had landed ahead of me and invited me to join him, but I declined. The field had been more than adequate for his ASW-20 but there was no chance of me squeezing in there with my heavy Schueman Libelle, with its ineffective dive brakes.*

- Visual illusions:
  1. A narrow field will appear to be longer than it is.
  2. A wide field will appear to be shorter than it is.
  3. A long field will appear to be narrower than it is.
  4. A short field will appear to be wider than it is.
  5. If you have been low for a while, all fields will appear to be bigger than they are.
- A longer field is needed if there is a lot of wind and turbulence. When the wind is at 20 kts or more, you need plenty of speed throughout the pattern, right down to the round-out and hold-off. Consequently, you will need a little longer field than you normally would.

## PATTERN AND APPROACH

A standard pattern during any field landing is paramount. Just because you are away from home and the critical gaze of your fellow club members, don't get the idea that you don't need to worry about a pattern. A proper pattern is more important during a field landing than at the home base. If you ever make a straight-in approach to a field and it doesn't scare you half to death, you don't understand the problem.

This is not the time for the type of pattern we see from time to time, where the downwind leg is much too close and too low such that the base leg is replaced by a 180 degree turn from the downwind leg onto final, and the final leg is virtually obliterated as that final turn is completed at a mere 50 feet. This is known as a 'button-hook' pattern.

Get in the habit of making proper, well-defined patterns with the downwind leg adequately spaced to allow for a proper base leg and high enough to enable you to start the final leg at about 300 feet, positively no less than 200 feet. The pattern can be either right-hand or left-hand whatever is optimum, pending wind direction and terrain. If there is a crosswind component, make the base leg into the wind, if there are tall obstructions on one side fly the downwind leg on the other.

- Do not start the downwind leg too high. Some people have the idea that starting a little higher is better, but it isn't. If the correct altitude is 700 feet, then 1000 feet is simply wrong. A correctly spaced, downwind leg is a critical element for a safe field landing. This is the only chance to scrutinize the field for rocks, holes,



etc. so as to select a touchdown and roll-out area, and you'll be surprised how much detail you are going to miss from just a few hundred feet further away. Starting too high will also get you out of position for the rest of the pattern. Maintain proper distance during the downwind leg so as to better evaluate the field and to leave plenty of room for that well defined base leg.

- Don't rush the pattern. Your first landouts are likely to be a stressful experience and you may feel an urge to get it over with. Don't worry, the glider will come down in due time.
- Plan to land well into the field.
- If possible, avoid making the approach over tall obstructions.
- If landing on a hill when the wind is 15 kts or more, expect plenty of turbulence. If approaching a hill from the downwind side, expect strong sink at the brow, and keep the base leg close in and the final short.
- Good speed control is imperative.

Do not confuse a low energy landing with a pattern flown at minimum airspeed. While it is true that modern gliders are slippery and we need to be extra careful concerning speed control, it is not advisable to fly the pattern at minimum speed. Always increase the speed in the pattern. You may be at the proper position and altitude, but if your airspeed is marginal the situation can deteriorate in a hurry should you encounter some heavy sink. With a little extra speed you are better prepared to cope with the unexpected.

The accidents which are caused by excessive speed are attributable to loss of speed control. To my knowledge no one has ever crashed because of approaching at an extra 5 or 10 kts. Be sure your speed is adequate to cope with the prevailing conditions, such as wind, turbulence and wind gradient. Select a speed that will make you feel comfortable and in full control, then stick to it.

- If too high on base leg use the "Reverse Pattern Technique". If you should find yourself hopelessly too high as you are about to turn onto final, implementation of the Reverse Pattern Technique will save the day. Accidents due to overshoots are rare. Nevertheless, they do occur from time to time, which is a shame as they can easily be avoided. "Ah! This will never happen to me," you may say. It's not as unlikely as you think. Supposing, on one of your first cross-countries you are committed to a rather smallish field, you are surrounded by unfamiliar terrain and perhaps you have not been practicing landing without reference to the altimeter as often as you should have. Also, there is a tendency to be conservative and fly the pattern a little higher than normal during your first field landings and there you are much too high. What to do?

The worse action you can take is to make a 360° turn, as it is difficult to predict the loss of altitude, and there is a real danger of becoming disoriented, especially in strange surroundings. Never lose sight of the field when in the pattern.

With the Reverse Pattern Technique you can salvage the situation without stress or strain. You simply continue the base leg to the other side of the pattern while edging slightly further back so as to make room for a '180' which will lead you on to a perfectly normal base leg from the other side. During this entire maneuver you can apply spoilers as required while constantly keeping the landing site in full view. If you are not familiar with this technique, talk to an instructor, it may come in real handy some day.

- Landing diagonally across a field to increase the length of the landing area.

Providing the surface is suitable, if the field is short but wide, landing diagonally across the field will add considerable distance to the landing area. In a field 300 feet wide and 500 feet long a diagonal approach and landing will add approxi-

mately 100 feet. Be sure to “clock” the pattern around to match the direction of the approach.

- Be flexible.

Although a standard pattern is important we must also be flexible. Supposing, while on the downwind leg you notice the field has an undulating surface with 10ft high crests, 50 to 100 feet apart, diagonally aligned with the field. The prudent thing to do, irregardless of wind direction, will be to clock the pattern around such that you will be landing in line with, and on top of one of the crests.

- Lower the gear.

If the sailplane is equipped with a retractable wheel, don't forget to lower it. This should be done at the same place in the pattern as you normally do, eg. when entering the downwind leg. Then check it when on base.

### **WHEN TO OPT FOR A DOWNWIND LANDING**

When the wind is light it may be advantageous to land downwind.

- As stated previously, if landing on a slope you must land uphill no matter what the wind direction is, whether the wind is minimal or otherwise.
- It may be better to land downwind with no obstructions on the approach than into the wind over tall obstructions.
- It may be a better choice to land downwind in a quality field than into the wind in a marginal one.
- If you are landing close to sunset do not land into the sun, regardless of wind direction, you will not see much of anything if you do. Fortunately, by that time there is seldom much wind.

There will be a significant increase in ground speed versus an into-wind approach, even in light winds. Prepare for a longer final by placing the base leg further back, so as not to get cramped.

### **LANDING**

- Direction of landing. The decision should be yours and yours alone. Another glider may have landed shortly before you got there, but don't let the direction in which that glider is pointed influence your decision making.

*Years ago I made a field landing during a contest. The field wasn't the greatest and the landing resulted in a 180° ground loop. Another pilot arrived and did the same thing, so we were both sitting there facing in the opposite direction from which we had come. A third pilot prepared to join us. He assumed we had landed in the direction in which we were aimed and approached accordingly, going through some wires at the other end, ripping off the undercarriage. Of course, he blamed us for leading him astray.*

- Be sure to stick with the touchdown and roll-out area you selected while on the downwind leg.

Good speed control is imperative. Be sure to maintain whatever airspeed you have determined to be optimum for the conditions, all the way to the round-out and flare.

- Always do a complete flare on every landing.

Since energy is proportional to velocity squared, even a small difference in speed at touchdown makes a significant difference in kinetic energy. Assuming a glider with a stalling speed of 40 knots, landing at 45 knots. The extra 5 knots of speed would result in 26% additional energy to be dissipated upon contact with the ground. This number would go up to 56% if the glider was forced on the ground at 50 knots.

If landing in high crop, be sure to flare completely above the top of the crop as if the top of the crop was the ground. If you are flying a sailplane with spoilers on the undersurface of the wing (fortunately, there are not too many of those left,) close the spoilers just as the glider is about to settle. If you do not retract them, inevitably the spoiler on one wing will contact the crop before the other, causing a vigorous ground loop. If you are flying a glider equipped with landing flaps, try to land without them.

- Once on the ground, apply full wheel brake.

Immediately after touchdown, apply the wheel brake to shorten the roll-out as much as possible. The longer distance you roll, the greater are the chances of encountering rocks and holes. Don't be clever and roll up to the gate for convenience, it won't look very clever if you roll into a hole and wreck the landing gear.

- Forgot to lower the gear? If you realize you forgot to lower the gear, as you are about to flare – leave it alone. Attempting to extend the gear at that point in time can easily lead to pilot induced oscillations and a broken glider. Worse, if you didn't succeed in getting the gear down and locked you will be susceptible to injury. It is next to impossible to cycle the gear with one hand and remain totally steady with the other, and any slight twitching of your "stick-hand" will result in PIOs. On the other hand, a smooth and gentle landing on soft ground, with the gear up is likely to cause very little damage, if any.

## QUALIFICATIONS

So when will you be ready to tackle off-airport landings? Aside from being thoroughly familiar with the content of this booklet you need to be comfortable with the glider you are flying. There are no set minimum hours, it is the number of flights that counts. If you recently have moved up to a new type of glider a good rule is, ten flights before going cross-country. Another factor to take into consideration is the difference in flying characteristics between types. Once you get into the higher performance gliders, the handling between types is very similar. The bottom line is, don't go cross-country until the task of flying the glider is intuitive.

## AFTER LANDING

- If you land at a private strip, quickly move the glider out of the way so as not to block the runway.

*During a Region III contest a competitor landed at a small private strip, abandoned his glider in the middle of the runway and left to make a phone call. The owner came back from a trip, was not able to land at his own airport and had to land someplace else. We are very fortunate in having such places with friendly owners to resort to when the need arises, but let's not test their tolerance. We must be courteous and considered to the owners, or these oasis may not be available to us in the future. Be sure to move the glider off the runway.*

If you are flying in a contest and have landed in a farmers field, there is a good possibility that if you can't stay up, there may be others with the same problem and you may get company. Before doing anything else, move the glider off to the side.

- Keep in mind that you are trespassing.
- If landing in a field with crop, next to a busy road, try to keep spectators out of the field as they can cause considerably more damage to the crop than your landing.
- Always contact the owner of the field if possible.
- If there may be a question of crop damage, take pictures of the landing path to defend any potential insurance claim.
- Be courteous, and respect the farmers property. Ask the farmer for the best way

of getting the sailplane out, and to get his permission before driving the car and trailer into the field. If you cannot locate the owner and there is crop in the field, do not drive in there, use some other means of getting the glider out.

*I landed once on an Amish farm in Pennsylvania and I was puzzled over the cold reception I was getting from the otherwise friendly appearing farmer. It turned out that a glider pilot had landed on his property some ten years before. This pilot had driven his trailer through a crop without bothering to ask permission. The memory of this pilot's crude behavior was quite vivid even after ten years. I did finally manage to convince my host that all glider pilots do not necessarily behave in the same manner.*

- Prior to making the phone call, write down the directions to be sure they are complete and clear. It is crucial to include the phone number of the people you are with – enabling the crew to contact you in case they have any problems.

At first the farmer may very well view you as a rich city playboy who has landed his expensive toy (true) on his humble plot of land with complete disregard for other people's property (hopefully, not true.) Here are some suggestion as to how you may conduct yourself to win him over:

- Be polite and courteous. Be sure to show appreciation for all his help including the use of his phone and don't forget to pay for the call.
- Impress upon him how fortunate you were that his field was there, enabling you to avoid a crash, and how happy you are not to have caused any damage.
- Emphasize how, in these rare emergencies, we always strive to avoid landing in any kind of crop.
- Show an interest in his farm. Ask questions and talk less about yourself.
- Take pictures of him, his family and kids next to, or in the glider.
- Don't forget to get his address so you can mail him copies of the pictures and perhaps a soaring calendar at Christmas to show your gratitude.
- Remember – you are an ambassador for the soaring movement.

The manner in which you conduct yourself will be a reflection on all glider pilots. A discourteous pilot will make a lasting impression on the locals, and future visiting glider pilots will be treated accordingly. You may have had a bad day but don't take it out on the farmer.

#### **ELEMENTS OF A SUCCESSFUL FIELD LANDING**

- RADIO OFF
- EARLY DECISION TO LAND
- VIEW FIELDS AT ABOUT A THIRTY DEGREE ANGLE
- PICK THE BIGGEST AND FLATTEST FIELD
- DISREGARD CONVENIENCE OF THE RETRIEVE
- BE SURE SLOPE IS TOLERABLE AND LAND UP HILL
- SUITABLE SURFACE, LOW OR NO CROP
- TALL CROP, LAND ON TOP
- ALLOW FOR WIRES AND FENCES
- BE HEEDFUL OF THE AIRSPEED
- WELL DEFINED PATTERN, RIGHT OR LEFT HAND
- BE DISCIPLINED, YET FLEXIBLE
- SELECT A SPECIFIC TOUCH-DOWN AND ROLL-OUT AREA
- LAND WELL INTO THE FIELD
- FULL FLARE, SHORT ROLL-OUT

## **PRACTICE**

Off-airport landings require many skills. Skills are acquired through practice. Fortunately, some of the skills essential to successful off-airport landings can be practiced without going cross-country. The more we practice, the better chance we have in getting it right when the time comes.

### **PRECISION PATTERNS**

Get in a habit of making well defined patterns. Be sure to start the pattern at the correct altitude, there is never a reason to start too high. Unless you get back to the airport too low, there is never a reason not to make a standard pattern.

### **PATTERNS WITHOUT REFERENCE TO THE ALTIMETER**

As frequently as possible, enter and fly your patterns without reference to the altimeter. When the time comes to make an approach into a strange field there will be many other things requiring your attention. To practice, when it's time to come down and while still at 2000 feet or higher, tape a piece of cardboard over the altimeter. This is a worthwhile exercise – when the time comes for the real thing, the altimeter will be useless.

### **PRECISION LANDINGS**

Do not be satisfied with anything less than precision landings on every flight. Strive for perfection in speed control and spot landings.

### **FLARE COMPLETELY ON EVERY FLIGHT**

Complete flare with minimum touch down speed must be practiced on every landing. In a normal landing at the home airport, unless you are about to run into something or someone gets in the way, there is no urgency to bring the glider to a stop, no great harm done by rolling another hundred feet or so. Habits are hard to break and can resurface without warning. This habit could sneak up on you during a stressful field landing in a high performance glider, which very likely would have dire consequences.

### **PATTERNS WITHOUT REFERENCE TO GROUND FEATURES**

Do not rely on terrain features such as barns, houses, etc. for establishing the pattern. Use only the landing area for reference.

Whenever the traffic allows, land at some other location on the airport. Doing a few of these before setting off into the unknown is well worth it. It gives you the opportunity to experience a pattern over terrain with different ground features than you are accustomed to. Remember, when landing out the only reference you will have is the spot where you plan to land. Another helpful experience is to fly at another site.

### **EVALUATING FIELDS**

Don't let the drive to the airport go to waste. Although the vantage point is not quite right, it is still worth while to contemplate potential scenarios, eg. which field would be better, how would you handle obstructions, consider various wind conditions, what would be the best approach, etc.

Practicing field selection can also be done while flying local. When down to 1500 feet near the airport, pick a field. After landing, go over to the field and check it out. You will be surprised what it looks like up close. Such exercises are well worth the trouble.

The soaring site I operated at for many years has an eight hundred foot ridge next to the airport, a perfect set-up for honing the skills for evaluating fields. You can pick a field on top of the ridge, in some cases fly part of the pattern, land at the airport, drive to the field and have a closer look. As you might have guessed, no one else bothered too much trouble.

By practicing as many of the skills as possible and simulating as many of the various hurdles which

may be encountered when landing out as possible, we can significantly reduce the stress and work load when faced with the real thing. The objective is to have as few new challenges to cope with as possible on those first off-airport landings.

## **FLYING IN ANOTHER PART OF THE COUNTRY**

When driving to another site you are not familiar with make it a point to look for features in the terrain which may be different from your home area, such as, crops, slopes, fences, wires, etc. On the way to a Region 6 North contest in Ionia, Michigan, known for its exceptionally friendly terrain, I made an interesting discovery. Whereas in other parts of the country wires along roads are spaced at about 20 feet from the road, on many roads in the Ionia vicinity, the poles are located several hundred feet into the fields. This is useful information to have before hand. In case you are about to set-up for a landing with the approach over a road, better plan for the field being considerably shorter than it looks.

## **EMERGENCY PROCEDURES**

### **LANDING IN LAKES**

If there are no fields in sight, a lake may be preferable. Land parallel with the shore. Providing the canopy is hinged at the front, unlatch it before landing. This prevents the canopy from jamming shut due to compression loads, possibly making exit from the cockpit difficult. Flaps should be set in the neutral position and the spoilers should be closed at touchdown. Flaps and spoilers were not designed for water loads. Contrary to what seem to be intuitive, the landing gear should be lowered. It has been proven through tests that there is less tendency for the glider to tuck under if the gear is down.

If a water landing is done correctly, the glider may well be flyable the next day. In Sweden, water landings are done more or less on a regular basis, as in many parts of that country lakes are the only option other than trees.

### **LANDING IN WOODS**

If landing in woods are unavoidable never pick a clearing with stumps, that's deadly. Select a large tree with a full crown. Set up a normal pattern, approach the tree into wind, then stall nose high into the crown. Your biggest problem is likely to be getting down from the tree, the lines from your parachute may come in handy for that purpose. I have partaken in several retrieves from tree landings where the pilots were unscathed. If you lose control and spin in, that's another story.

### **IF YOU NEED TO STOP IN A HURRY**

If, with the sailplane on the ground and rolling, it becomes obvious that it cannot be stopped in time to avoid an encounter with a fence, rocks, ditch or other obstacle, an intentional ground loop may be a better alternative. Be sure to move the stick forward, lifting the tail of the ground to avoid breaking the fuselage as you put the one wing down. If possible, turn into the wind.

### **MAINTAIN CONTROL**

The important thing is to maintain control no matter how bad the situation you may be faced with. You may not be able to save the glider, but chances of serious personal injury will be highly unlikely. Bob Hoover said: *"If you're faced with a forced landing, fly the thing as far into the crash as possible."*

### **BE PREPARED**

Obviously we cannot practice any of these emergencies, but we can be mentally prepared. By envisioning any predicament we can think of and planning how to deal with them, we can increase our chances of keeping our skin intact, in the event we should ever be faced with such emergencies.

## **LOW SAVES**

### **HOW LOW IS TOO LOW**

Many flights have come to a bad end because the pilot attempted to climb away from an impossible low altitude. Consequently, an in-depth discussion on the subject is prudent.

At contests, we are often enthralled by spell-binding accounts of heroic saves from 97 feet. However, it should be mentioned that some glider pilots have been known, on rare occasions, to stray ever so slightly from the perpendicular truth when relaying their aeronautical adventures. Also, there is an amazing illusion which mysteriously comes into play in these situations, which is this, 400 feet actually looks exactly like 97 feet.

In discussions on the subject of off-airport landings we often neglect to mention that the optimum course of action when faced with a field landing is, not to land. Naturally, there will come a time when all efforts to continue the flight must be abandoned so as not to compromise a safe landing, and that's the big question, when must we commit to land?

Pundits are often asked, "How low is it safe to thermal?" This question hardly ever brings forth a definite response. Most often the question will be evaded entirely. The reason this question fails to bring forth a nice firm, quantitative answer which you can neatly tuck away and have handy when needed, is that there isn't one. The altitude at which the decision should be made to discontinue a flight depends on several factors such as experience, level of skill, currency, familiarity with the sailplane, and weather conditions.

### **EXTRA AIRSPEED AND WELL BANKED TURNS**

Low level thermalling should always be performed using well banked turns with an additional 5 to 10 kts of airspeed. One of the most often causes of stall and spin accidents are circling close to the ground in gently banked turns near stalling speed.

In a sailplane, it is far easier to stall and spin from a gentle turn than from a well banked one. In turns of more than 35 degrees of bank, due to the higher stalling speed, the control response remains firm and crisp until the last moment before the stall, and recovery can be made instantaneously without any loss of altitude by simply relaxing the backward pressure on the stick. In straight flight or a shallow banked turn, the stalling speed is lower and control response get sluggish when approaching the stall. Should a stall occur, greater control input is required and recovery cannot be made without a significant loss of altitude.

The good news is that using well banked turns is no disadvantage as thermals at lower levels tend to be small, and steep turns are necessary in order to climb. Extra airspeed, also improves the climb as it enhances maneuverability which helps in dealing with low level, disorganized thermals. What's more, when making that first turn in what you think is a thermal and you are concerned about losing too much altitude if it doesn't work out, a 45° bank will get you around with minimal loss of height.

### **EXPERIENCE AND INSTRUMENTATION**

One prerequisite which has to be met before attempting to thermal at low levels is that you must be capable of flying the sailplane with only occasional glances at the instrument panel as 99% of your attention has to be directed elsewhere. Consequently, any attempt to thermal will be severely impaired if your glider is not equipped with an audio variometer.

Although you may have acquired the level of proficiency outlined above, if you get down to 800 feet on any of your first few cross countries by all means abandon the flight and concentrate on the pattern and landing. Those first off-airport landings will tax your capabilities without further challenges. Do not attempt to thermal below 800 feet until you have a handful of field landings under your belt and begin to feel a little more comfortable in those situations. That is, shear terror has been replaced by just a normal state of panic.

## **CURRENCY**

You made good progress last year and reached new levels of performance. Now it is spring and you are all primed to continue where you left off, but it has been six months since you flew last. Not being current is somewhat like being slightly intoxicated. You won't notice the effect till you get in a tight situation, as for example when scratching around low down, out over the boonies. So watch out, do not get too aggressive right away.

Regardless of the level of experience you may have, if you are flying a type of glider which is unfamiliar to you it is a good idea to fly more conservatively, until you get thoroughly acquainted with the glider.

## **SPIN PROFICIENCY**

Inasmuch as we spend a lot of time flying near the stalling speed, proficiency in spin recognition, prevention and recovery should be a prerequisite for flying a glider under any circumstances. But definitely do not expose yourself to the additional stress and workload of low level thermalling over unfamiliar terrain until you have reached the level of spin training and practice where spin entry recognition and the correct control input for recovery is intuitive. When the work load is high, as it is when trying to latch on to a feeble scrap of a thermal at pattern altitude, while scrutinizing your selected field for obstacles at the same time, is when you are most likely to experience an inadvertent spin entry – better be ready.

To be fully effective, spin practice should be done in the glider to be flown, as spinning characteristics will vary from one glider to another.

If you have never spun a glider, be sure you get spin training in a two-seater with a qualified instructor prior to practicing on your own. In order for this spin training to be of any value, it needs to be done in a glider that truly spins. I do not know of any single-seat glider that will not spin, given the right conditions. If you fly a glider long enough, sooner or later you will experience a spin entry when you least expect it.

## **WEATHER CONDITIONS**

In windy and turbulent conditions you need to raise the minimum altitude for attempting a save. There are days when it is not safe to thermal below 1000 feet regardless of your experience level.

## **RADIO USE**

Needless to say, the radio should have been off long before you get to this stage, if it isn't, by all means turn it off. Scratching around close to the ground, checking your selected field for slope, wires, fences and scrutinizing the intended touchdown area for stones, holes etc. while frantically attempting to center this scrap of a thermal you stumbled into at the last possible moment and, by the way, flying the glider at the same time, is most certainly the most demanding flying you will ever be faced with. Trust me, this will keep your mind fully occupied. The radio will not help you stay up, it will not help you land, and nothing else is of any consequence.

Incidentally, people have crashed because they were preoccupied with the radio. If you should fail to stay up, any message to your crew can much better be transmitted at your leisure when you are safely on the ground, and in case you are unable to contact anyone to relay your message, it is of no consequence as you can always get to a phone. Besides, there is plenty of time, you won't be doing anything else that afternoon.

Even listening to a transmission is distracting. *"KI, this is 1G, I am about 2 miles SW of Loon Lake at 8000 feet, climbing at 7 knots."* This may be interesting information for somebody, but for you, when struggling at 600 feet, it is totally useless. Worse than useless, because it can't help but divert some of your attention from the task at hand at a time when you can least afford it.

Hence, your best bet is to turn the radio off. My policy is to turn the radio off when I get down to 1500 feet. I suggest you do likewise.



## **CRITERIA**

The criteria I have used for many years is simply this, "If I can afford to lose 200 feet, I give it a try. If I can't afford to lose 200 feet, I proceed with the pattern." Why 200 feet, you may ask. Well, on the average soaring day it is reasonable to expect areas of sink in the magnitude of 600 ft/min. It is also reasonable to expect that you will turn in the wrong direction, which could place you very nicely in 600 ft/min down. The rate of turn will probably be about 20 sec/360°. Consequently, you may be 200 feet lower by the time you complete the circle. If you expected this, and planned for it, you won't get in trouble.

Let's assume you meet all the prerequisites. You have the experience outlined above, you are current and thoroughly familiar with the glider. You are on another cross-country flight. Things didn't go as expected, you are in the pattern to an apparent inevitable landing in an alfalfa field. You are half way along the downwind leg, and you feel a surge. Should you try a circle?

If there will be enough height left to complete the pattern if you lose 200 feet, albeit a little on the low side, but not uncomfortably so, you can give it a try. If it feels solid roll into a 45° bank. With a little bit of luck, you may find yourself going up half way around so that you haven't lost or gained any height at the completion of the circle. Incidentally, this is about the best you can hope for on the first circle as the thermals tend to be small at that level. It is highly unlikely you will gain much during the first few circles. If you didn't lose any altitude, try another circle and if you can keep the variometer on zero, stay with it. The combination of your presence, helping to break the thermal free, and your centering efforts will eventually (most of the time) improve the climb rate.

However, if you continue to merely hold your own, you must be prepared to abandon the effort before you drift too far from the field. In case you eventually are forced to give it up, your effort will not have been completely futile as you gained some extra time to further scrutinize the field.

## **POSITION**

Your position with respect to your chosen field is as much a consideration as your altitude. Crowding the pattern must be avoided. You should be in a comfortable position, off to the side. The distance to your selected field is all as important as your altitude, you may be high enough to circle, but if a 200 foot loss will prevent you from reaching the entrée point of the pattern at the appropriate altitude, don't try it.

If you do find yourself too low for a full, standard pattern, don't insist on it. The prime objective is to prevent the turn to final from being below 200 feet.

## **THE CLIMB**

When starting to climb, you need to make a real effort to keep concentrating. There is a natural tendency to heave a sigh of relief and relax just a little when reaching a thousand feet, promptly losing concentration and the thermal.

A climb that stops at a 1000 feet is not always caused by inattention. It is rare, but there are times when a thermal does not go any higher. Sometimes a thermal draws in excessive amounts of cold air and loses its buoyancy. A thermal may fade away when drifting in to the shade. At times like this, keep in mind that on any specific day, the thermals tend to sprout from the same source. Consequently, if you lose the lift before you get high enough to continue on course your best bet is to go back to the spot where you found it. Chances are there will be another bubble coming along which may have enough temperature differential to continue all the way up to the inversion.

## **ACCIDENTS**

Most accidents occurring during attempts at low saves are attributable to:

- Forgetting to fly the glider.
- Not knowing when to quit.
- Inadequate spin training.
- Work overload.

## **FUNDAMENTALS OF LOW SAVES**

- BE SURE THE RADIO IS OFF.
- WHEN LOW, USE EXTRA AIRSPEED AND WELL BANKED TURNS.
- AN AUDIO VARIOMETER IS A MUST.
- WHEN FACED WITH YOUR FIRST FIELD LANDINGS DO NOT ATTEMPT TO THERMAL BELOW 800 FEET.
- STAY WITHIN YOUR CAPABILITIES.
- DON'T DO ANYTHING YOU ARE UNCOMFORTABLE WITH.
- NEVER THERMAL AT LOW LEVELS UNLESS YOU ARE EXPERIENCED AND CURRENT.
- YOU NEED TO BE FAMILIAR WITH THE GLIDER.
- THE TASK OF FLYING THE GLIDER MUST BE INTUITIVE.
- MUST BE PROFICIENT AND CURRENT IN SPINS.
- RAISE YOUR MARGIN OF SAFETY ON WINDY AND TURBULENT DAYS.
- NEVER TRY A CIRCLE UNLESS YOU CAN AFFORD TO LOSE 200 FEET.
- YOUR POSITION WITH RESPECT TO THE CHOSEN FIELD IS AS RELEVANT AS ALTITUDE.
- DON'T FORGET TO FLY THE GLIDER.
- DON'T LOSE CONCENTRATION AFTER GAINING A FEW HUNDRED FEET.