Common Factors in Accidents & Incidents

The following information was originally published by the British Gliding Association and has been amended to suit Australian requirements. It summarises the more pertinent factors of gliding accidents and incidents and is presented to improve awareness by learning from the misfortunes and mistakes of others.

Failed (winch or autotow) Launch

Cable break, winch power failure, ground loop

1. You should expect a failure/cable break on every launch. Abandon the take-off if the wing drops during the ground run.
2. Keep your hand near the release especially during initial stages.
3. Remember critical speed loss in recovery from nose high attitude. Typical time to regain safe flying speed is at least 5 seconds. Turning or opening the airbrakes before achieving a safe speed leads to a stall or spin.
4. Pre plan your circuit from various failure heights/positions. If possible always take the safest straight-ahead option rather than pushing your luck and trying to get back to the normal landing area.
5. Climbing too steeply low down increases the risk of a cable break from which there is insufficient height to recover.
6. Soft cushions behind you will compress during acceleration and cause you to pull back on the stick and, maybe, lose rudder control.
7. Failure to correct for drift in a crosswind can result in cable injury to persons on the ground, damage to property and hazards from power cables.

Failed Aerotow Launch

Tug upset, cable break, Pilot Induced Oscillations (PIOs)

1. You should expect a failure/cable break on every launch.
2. Keep your hand near the release. Watch for wing drop; if it does, release!
3. Problems may arise at the start of the launch due to PIO (pilot induced oscillations), especially if the glider is flown onto the ground - relax.
4. Throughout the first few hundred feet of the launch always keep aware of landing options.
5. The main risk is trying to get back to the airfield. It is safer to make a controlled arrival into a field ahead than risk low turns, catching a wing tip, stalling or spinning.
6. The risk for the tug pilot is from the glider rising rapidly upwards, especially if the glider has a centre of gravity hook.
7. The glider must release immediately an uncontrolled upward movement starts or upon losing sight of the tug.

Airbrakes Opened Unnoticed

1. Not a common cause of accidents but most result in substantial damage. Most occur during the take-off phase.
2. On most occasions that the airbrakes open unnoticed they were not locked on the first place. Beware of over-centre locks which need a large force: if there is a detent make sure the lever engages it.
3. Any unusual amount of sink or failure to climb at the expected rate on an aerotow should prompt the pilot to look at the airbrakes
4. Monitor the variometer. Students should be taught to and pilots should do this as a matter of course.
5. On approach beware of using the wrong lever. Look to see and put your hand on the right one and keep it there.

6. If you cannot control the approach this may mean that you are using the wrong lever. Look and check.

Inadvertent Stalling/Spinning

Any flight phase

1. Spin avoidance means maintaining a safe speed, at least 1.5Vs and balanced flight below 1000 ft. Beware: a glider will spin from a turn that looks to be normal.
2. Don't believe anyone who says a particular type will not spin!
3. The main factor is failure to manage the workload in any phase of flight. Continuing to fly the glider is the first priority.
4. Practice Makes Perfect! Practice spin and recovery regularly, both dual and solo (after briefing). If you fly a new type spin that too. If this proves difficult do not assume that it won't. If you lack the ability to make it spin will you be able to make a recovery?
5. Remember: an 'inadvertent spin' means you didn't see it coming.

Poor Soaring Airmanship

Bad judgement and decision making

1. The main causes are poor judgement and/or failure to make the correct or any decision. Sometimes a pilot fails to spot changing weather conditions.
2. Ridge Soaring: failure to assess changing conditions, wind strength, flying into low cloud or caught above it, late decision to leave, etc.
3. Local Soaring: failure to notice a wind change, marginal final glide, 'press-on-itis', crowded circuit pattern, obstructed landing area or undershooting.
4. Cross-country: late field selection, flying over unlandable terrain.
5. Airmanship: failure to connect the controls or lock the canopy, poor lookout leading to mid-air collision.

Flight in Unfavourable Weather

1. Differs from 'Soaring Airmanship in that the weather is marginal before the flight takes place. Err on the side of caution in assessing the weather before starting flying and stop before conditions get too bad.
2. The combined effects of strong wind, turbulence, convection, showers, rain, strong sink and, even, low sun, may give conditions with which you may not cope.
3. Typical situations are - continuing to ridge soar in showery weather, winch launching into low cloud, aerotowing in poor visibility.
4. Be especially aware of flying when the wind strength gradually increases, turbulence which will increase when the convection starts, flying above orographic cloud.

Field Landing

1. Do not choose a field too soon or too late. Do not fly over unlandable terrain. Make every attempt to assess the wind from available clues (including drift). Fly an adequate size of circuit pattern. Do not change your mind at a late stage.
2. Size is relative; get to know and avoid, if possible, areas with small fields.
3. Slopes need to be from seen from different directions if you are to spot them. If landing up hill have extra speed and round out sooner.
4. Surface: be aware of the seasonal changes of colour and texture.
5. Stock: avoid fields with animals, especially cattle and horses. A solitary cow in a field is probably a Bull!
6. SWER: These are Single Wire Earth Return powerlines. Expect them on boundaries, especially near roads. They are very difficult to see. Any powerline on a boundary effectively reduces the field length.

Circuit Planning (but not field landings)

1. For a given height the starting point for the circuit depends on the (air)field size, wind strength, crosswind component and glider performance.
2. Monitor the variometer: if flying through sinking/rising air, adjust the circuit accordingly.
3. Most pilots have strong tendency to try and get back to the landing area even when short of height. Training must include landings in different places and, if appropriate, different directions.
4. Always try to have an alternative landing area in case your first choice becomes obstructed. Keep a reserve of height for this option.
5. Avoid landing close to or towards obstructions, particularly 'hangar' flying or in the undershoot area to try and get a quick turn-around.
6. After a soaring flight always check the wind direction and strength.
7. Before the approach look to see your hand is on the right lever.

Airfield Approach Control (not field landing)

1. Wind gradient cause speed loss. Monitor the airspeed! Allow extra speed in moderate to strong winds and known gradient conditions.
2. Avoid making the final turn with the airbrakes open or opening them during the turn. It is difficult to monitor the potential under- or over-shoot during the turn.
3. In general it is better to start the approach with the airbrakes closed and open them progressively, rather than having to close them progressively. The airbrake control is not a 'going-in-to-land' lever.
4. If it is necessary to close the airbrakes completely during the final stage of the approach beware of increasing speed. It is generally better to avoid opening them near the ground.
5. Beware of the different effectiveness of the airbrakes when changing type and the changes in control force at different speeds.
6. Undershoot accidents occur because pilots have not been taught to recognise the situation. Ask for a demonstration!

Failed to Lower Undercarriage

1. In general there are two options: making the whole flight with the undercarriage down and retracting it before landing or forgetting to lower it at all. A well-maintained warning device is the best safeguard.
2. The usual causes are lack of familiarity with the cockpit layout (using the wrong lever!) or a high workload. Always look at the lever!
3. A significant risk arises if a radio call is made to remind a pilot that the u/c is not lowered. Pushing (usually) on the u/c lever results in pulling on the stick. This may lead to a serious accident, even fatal.

Undercarriage Collapsed After 'Normal' Landing

1. Pilots are liable to claim that a landing was normal even when it's not. That said, some of the accidents are 'technical', that is, inherent weakness in the design, either in the locking mechanism or the structure itself.
2. The human factor is failure to ensure that the undercarriage is properly locked down. Usually there are two actions, lowering and locking; the latter may be a combination of over-centre and a detent. Not engaging the detent may be enough to cause the collapse.
3. The further contributory factor may be rough ground. On the airfield this may be due to poor maintenance, e.g. rough edges to runways. In a field it may be just bad luck.

Levelled Off Too High

Early flare, sometimes stalled in

1. The basic cause is generally looking too far ahead. A problem that should be resolved in basic training. Beware of students who have only made successful landings (rare). Instructors should contrive one to be sure the student can cope.
2. This problem also arises on a type conversion flight, especially if the view (aspect) from the cockpit is noticeably different from the previous type(s) flown. Set the glider in the landing attitude before the flight to illustrate this point.
3. The associated risk of stalling in cannot be over-emphasised; close the airbrakes to reduce the rate of descent but then make a brake-less landing.
4. Correct spinal curvature (posture) and energy-absorbing foam can minimise the risk of spinal injury.

Failed to Level Off

No or insufficient round out

1. Causes can be full-brake landings during steep (strong wind) approaches, a marked wind gradient, continuing to sideslip until too low and misjudged crosswind landings.
2. There are a number of variations on the basic theme. Not looking far enough ahead is contributory and, sometimes a teaching problem.
3. If the landing is heavy and results in a bounce then the situation may go wrong when you mishandle the airbrakes or over-control with the elevator. This may result in a PIO'ed 'landing'.
4. Instructors should look out for the tendency of the student to fly the glider onto the ground that is not fully held off, which leads to this problem.
5. Instructors should monitor approach and landing closely and be prepared to retrieve the situation.

Failed to Observe Objects

Failed to observe objects, hidden or otherwise.

1. Obstructions may not be obvious, mobile (animals) or created by the pilot landing too close to obvious obstructions such as other gliders.
2. Obstructions which are not easy to see may be concealed by long grass (in itself a hazard causing ground loops) and may easily be moved, such as tyres.
3. Mobile obstructions such as sheep may be down to poor airfield organisation or landing too close to them. Good airfield management is essential.
4. Landing areas, which are not often used, may have irregularities such as ridges, holes, stones, etc. Typical hazards on a disused airfield with runways are stepped edges from grass to runway.
5. Landing too close to other gliders may be due to over-confidence or failure to move other gliders that have just landed and restricting the landing area. A loss of direction control after landing in a crosswind is sometimes a contributory factor.

Other Landing Faults

Landings not included in the other categories.

1. The main 'other' causes are problems of controlling the ground run; this includes deliberate 'steering'.
2. A change of ground run direction, deliberate or otherwise, may result in running into obstructions, catching the wing tip in long grass, running into parked gliders. Beware: do not steer or land too close to obstructions.

3. Mistakes in the pitching sense include landing too fast and PIO'ing. Complication arise through misuse of airbrakes, opening them just before landing, landing with brakes closed or closing after touchdown if the speed is too high. Always try to make a fully-held-off landing.
4. Do not adjust the airbrakes after roundout. Open them after touchdown by all means. Make sure you can handle a brakeless landing.

Instructor Slow to Take Over

Failure to prompt a decision or take control

1. It is easy to be lulled into a false sense of security, both in terms of judgement and handling.
2. The judgement aspect is tricky; prompting too soon denies the student the chance to make the decision - prompting too late results in undershoots, out- landings, etc.
3. Handling faults include failure to take control as appropriate, kicking off drift, rounding out, misuse of airbrakes, etc.
4. In the launch failure case (real or simulated) there may be limited time for the student's attempts (ie, to make a mistake) and points of no- return - running out of height, speed, options and ideas at same time.
5. Try and stay alert, especially in critical phases of flight - take-off, launch, circuit, approach & landing, 'scratching' (on ridges or in thermals). Do not allow your student to fly into a situation that may be beyond your personal limits.
6. If you have to take control explain why.

Solo Supervision

Failures to supervise, check or brief properly.

1. There are two broad categories, failure to check or to brief and soaring or weather-related accidents.
2. Up to 'off-checks', even after, inexperienced pilots need check flights (which should aim to develop their skill, judgement and confidence). Briefings should lead to supervised self-briefing, except for type con- versions.
3. Soaring- or weather-related accidents may occur due to a lack of soaring performance knowledge (leading to stretched final glides) or weather conditions which deteriorate (or were too difficult in the first place).
4. Difficult or limiting 'weather' includes strong or cross winds, showers, squalls, rain, reduced visibility, low cloud, turbulence, etc. Brief short flights if changes are expected or (in this modern age!) use radio - "Number 13, your time is up!"
5. Conservatively assess the conditions for each solo pilot's ability; restrict individuals if conditions necessitate.

Airfield Supervision

Signalling, operating procedures, long grass, cable conflicts, ground handling.

- There are a number of potential hazards due to poor airfield management. These include vehicles, taxying aircraft, falling cables, poor launch- point control, blow-overs and risks to third parties.
- Cable conflicts are potentially very serious; aircraft may fly into them or they may fall on people or gliders with a risk of serious injury or death. Good organisational control is the safeguard. Winches should be located to minimise the risks to gliders on the ground and third parties from falling cables.
- Launch-point location should allow an undershoot area.
- Sloppy signalling causes accidents. Have a Duty Pilot/Instructor who is responsible for launch-point control.

- Blow-overs are needless accidents. Put gliders in the hangar if the number of handlers is getting near to the minimum for safe ground hand- ling. Watch the weather; you can put gliders away too soon, but not too late!

Technical Causes

Control system failure, control jam, design faults.

1. Some accidents in this category may disputed. Did the canopy come off because of a design fault? Probably not! More likely that the pilot failed to lock it properly.
2. Technical failures, as such, may not have been noticed on the Daily Inspection (DI) or, even at the Form 2 Inspection. The DI is your last line of defence. Do not assume that because the glider flew yesterday that everything is okay.
3. Cumulative effects may be critical. Damage from one heavy landing or ground loop may not become apparent until the next incident. Always report an incident to an instructor or inspector; it is an Operational Regulation to do so.
4. Control cable ferrules a common cause with potentially serious results. Check that the crimping tools are the right size and proof load the cables.

Other Causes

Cause unknown or miscellaneous

Don't be misled; this is not like 'et cetera'. Causes unknown include fatal accidents, write-offs or substantial damage accidents. Some of the fatalities that have occurred have as their possible cause the confusion between the symptoms of negative 'g' and the stall. These always resulted in the glider diving steeply into the ground. It is important to establish your own susceptibility to negative 'g'.

Motor Gliders

Motor gliders, self-launching and self-sustaining sailplanes.

1. The problem with 'motor gliders' is that they are a hybrid. Airmanship is a meld derived from aeroplane and glider flying, the categories need to be treated differently in the EFTO (engine failure on take off) case. Retractable-engine types have poor performance with the engine out and stopped.
2. Engine re-starts are potentially fraught with danger. Never assume that it will, and plan accordingly. Better to land in field than crash re-starting. (It's happened, with fatal results!).
3. Instructors beware: with engine running there is an extra lever to take control of; unless you are careful you need three hands for stick, throttle and brakes!

Incidents

Incidents without injury or damage, mis-rigging, blow-overs, 3rd parties.

1. This category includes incidents in flight but without damage, incidents or accidents on the ground, accidents involving cables or towropes and ineptitude in the ground handling of gliders.
2. Blow-overs and accidents when moving gliders behind a vehicle are generally preventable. A frequent cause is the wind blowing a canopy closed and even fuselages during de-rigging.
3. Mismanagement of winch cables causes accidents, falling on third parties and causing injuries at the launch point. Aerotow ropes trail and hit cars and third parties in the undershoot.
4. Cattle often damage gliders left in fields.