Gliding Australia Training Manual

Pilot Guide

GLIDING
AUSTRALIA

Unit 18

Spin / Spiral Dive Avoidance and Recovery

WHAT THIS UNIT IS ABOUT

To:

- Understand what a spin & spiral dive are.
- Understand the circumstances that can lead to spins & spiral dives and how to avoid these.
- Understand the aerodynamics of the spin.
- Recognize the symptoms of, and differences between, a spin and spiral dive.
- Efficiently recover the aircraft from a spin or spiral dive.

WHAT ARE THE PRE-REQUISITES FOR THIS UNIT?

- GPC 12 – Slow Flight, Stalling

COMPLEMENTARY UNITS

Nil

KEY MESSAGES

- Gliders spend a lot of their time at high angle-of-attack and therefore have a high potential for spin entry.
- Pilots must be trained to PREVENT spins, RECOGNISE when a spin is developing or occurring, and be able to RECOVER from any phase of a spin.
    - Pilots should first and foremost fly their aircraft in a manner that prevents spins. Maintain safe speed above ground when low, do not over rudder turns, do not thermal close to the ground.
    - Pilots need to recognize the precursors of a spin and take action to avoid progression into the spin by recovering early.
    - Every pilot needs to recognise & recover from spins & spiral dives.
- Whilst they may appear similar, Spins and Spiral Dives are different and have different recovery procedures. It is vital the pilot can recognise the difference and apply the appropriate recovery technique.
- Some aircraft may progress into a spiral dive from a developed spin.
- Not all aircraft are certified for Spins, refer to the Aircraft Flight Manual (AFM) or Pilot Operating Handbook (POH) before conducting intentional spinning manoeuvres.
- Recovery from spins is the same basic procedure (with some variations) for all aircraft but ALWAYS read the Aircraft Flight Manual (AFM) or Pilot Operating Handbook (POH) for the specific actions to use in spin recovery.
- Spins & spiral dives consume considerable amounts of height and are dangerous below 1000' AGL.
- Spiral Dives can be dangerous at any height if the forces in the manoeuvre build up to a point where they exceed the aircraft's load limits.

PILOT GUIDE FOR THIS UNIT

While spin and spiral dive recovery are very important - because most spinning accidents occur too low for recovery, spin prevention is at least as important as recovery.

Glider Certification for Spins

Most sailplanes on the Australian Register are built to the standards relevant to the time of certification. The former British Civil Airworthiness Requirements (BCAR) Section E was replaced by the Joint Airworthiness Requirements (JAR) 22 in 1980 and is now Certification Specification (CS) 22. The GFA register also includes amateur-built experimental gliders that are not certified.

Gliders certified to the EASA standard CS-22 must be able to be recovered from a spin in less than 1.5 additional turns regardless of configuration. If the aircraft is in a configuration approved for intentional spins, it must recover in one additional turn or less. Thus, all gliders designed to CS-22 must be recoverable.

However, not all CS-22 aircraft are certified for deliberate spins and, as stated earlier, not all gliders are certificated to CS-22. Furthermore, some certified aircraft may not be approved for spinning in certain configurations (e.g., with water ballast, at certain flap settings or cockpit loads, etc.). Therefore it is **essential** that pilots refer to the Aircraft Flight Manual (AFM) or Pilot Operating Handbook (POH) (and applicable supplements) to understand how to operate the aircraft within its stated limitations. It goes without saying that deliberately spinning an aircraft that is not certified for this, (or in one that is certified but outside the approved configurations) is dangerous.

What is a Spin?

When an aircraft spins, a stall occurs together with yaw, and self-perpetuating rotating forces develop. These forces keep the aircraft in the spin until positive and correct control inputs from the pilot stop them.

In a fully developed spin, the aircraft follows a spiral flight path about an axis going straight down, pitching up as well as rolling and yawing towards the spin axis. Descent rates during a stable spin in gliders are typically between 300 to 800 feet per rotation (a rotation could take as little as 2½ seconds), depending on type.

All aircraft will spin, but not all aircraft can be recovered from a spin. Your aircraft's particular spin characteristics are listed in the Aircraft Flight Manual or Pilot Operating Handbook. An aircraft may be approved for spins, but only under certain weight and balance, and centre of gravity restrictions.

A spin will not exist without both stall and yaw.

Pre-aerobatic check

Spinning is an aerobatic manoeuvre and typically significant heigh is lost during the spin and recovery.

It is important that before doing spins that you complete the Pre-aerobatic Check. (HASELL).

HEIGHT – Sufficient for recovery by 1,000ft AGL (2,000ft if within a 2-NM radius of a licenced aerodrome).

AIRFRAME – Flaps, airbrakes, undercarriage set as required. Trim as required. Hatches and vents closed and locked as appropriate.

SECURITY – Harness secure. Loose objects stowed.

ENGINE and PROPELLER (power and propeller set as required, engine off/ propeller feathered, engine retracted for retractable engine configurations).

LOCATION – Clear of built-up areas, cloud, controlled airspace, circuit traffic.

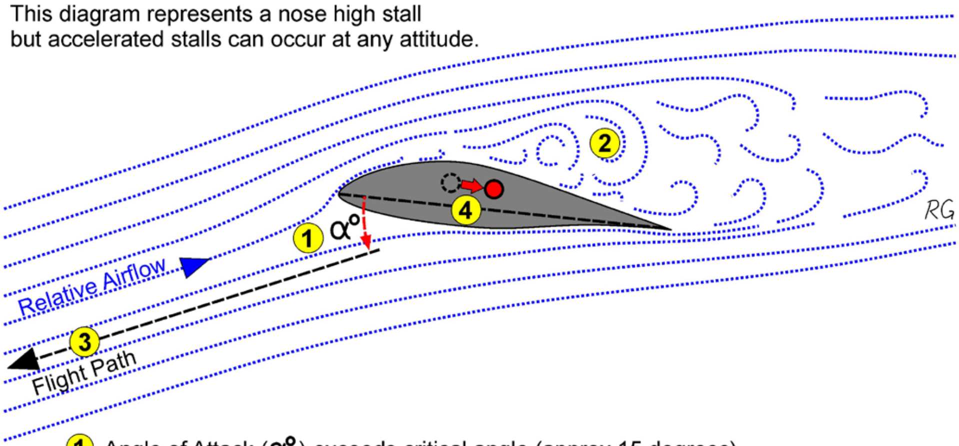
LOOKOUT – 180° turn plus 90° turns in the opposite direction, checking carefully around, above and underneath. Do not do a 360° turn – otherwise other pilots may believe you are thermaling and come over to your location.

How does a Spin Originate?

One requirement for a spin is that the aircraft is in a stalled condition. The stall angle of attack is the critical angle which, when exceeded, will cause the normally streamlined flow of air that follows the curvature of the upper wing surface to separate from the wing and leave as turbulent air flow. At the stall angle of attack, lift reduces rapidly.

Airflow during a stall

This diagram represents a nose high stall
but accelerated stalls can occur at any attitude.



1. Angle of Attack (α°) exceeds critical angle (approx 15 degrees).
2. Turbulent airflow separation causes decreased Lift, increased Drag & airframe buffet.
3. Steep Flight Path = high descent rate (decreased Lift & increased Drag).
4. Rearward movement of Aerodynamic Centre causes uncommanded nose drop.

Pilots use a quoted indicated airspeed (for straight and level flight at a given weight and configuration) to correspond to this stall angle for each aircraft. But in reality, the stalling airspeed varies depending on the weight the wing has to support which is influenced by factors such as the weight distribution in the cockpit and the angle of bank that the aircraft is at. Airspeed is therefore only an indirect measure of an approaching stall.

When evaluating how close an aircraft is to the stall, pilots should think angle of attack rather than airspeed. The elevator position (how far back the stick or control column is held), is actually a better indication of how close to the stall the aircraft is.

In GPC 12 (Slow Flight and Stalling) we saw that a wing-drop could occur at the stall. As the wing drops it generates a very large angle of attack, resulting in loss of lateral damping and a tendency to keep rolling uncontrollably. The large angle of attack also produces a lot of induced drag. The high value of induced drag causes YAW in the same direction as the dropping wing, thus starting the spin autorotation. The term ‘autorotation’ is used as no input from the pilot is required to start the spin rotation, the stall and yaw from the lowered wing is sufficient.

Although wing drop is quite easy to recognise when in a level-flight stall, it will be more difficult if the glider stalls during a turn. This can occur, for example during a thermaling turn, if a pilot tries to fly very slowly in an attempt to reduce the radius of turn and fly into the centre of the thermal.

A stalled condition is a more difficult thing to recognise in this case because it is possible during a turn for a glider to get close to the stall without the nose being noticeably higher than normal. It is also common for the glider to experience buffeting in the rough thermal so pre-stall buffet may not be obvious or it may miss striking the rear fuselage at all.

The inner wing in a turn operates at a higher angle of attack than the outer wing and is therefore likely to reach the stalling angle while the outer wing is still below that critical angle. This means that the first thing a pilot might know about the onset of an incipient spin from turning flight is an "uncommanded" roll in the direction of the turn - the glider increases its bank or rate of roll without any aileron input from the pilot.

This is the first sign of a stalled inner wing in a turn, and it is caused once again by the loss of lateral damping as the wing stalls. It is important to realise that, of all the conventional symptoms listed as being present in a level-flight stall, the only one which may be present during turning flight is the continuous backward movement of the stick.

The yawed and stalled aircraft then starts to rotate. However, it not only rolls about the longitudinal axis due to the differences in lift from each wing, but also simultaneously rotates (yaws) about the vertical axis due to the differences in drag. The combination of these two movements gives us a new axis, the spin axis. The aircraft will continue in a self-perpetuating spin, or autorotation, about this axis until opposing forces come into play.

Common Spin Scenarios

Accidental spins tend to occur in the following scenarios, in each of these there is an element of stall and yaw leading to the spin:

Mishandled rudder

- Normal nose attitude with small angle of bank.
- Rudder used to assist the turn - i.e., into-turn or 'bottom' rudder - encourages loss of stability and hence an uncommanded wing drop.
- Natural nose drop opposed by elevator, increasing angle of attack.
- If allowed to persist, the rudder against the elevator drags energy out of the glider and the inside wing stalls.
- Pre-stall turbulence misses the tail plane – so no buffet is felt.
- The induced drag makes the glider appear to commence to turn and the uncommanded wing drop may be not detected.
- This can occur in a turn started with safe speed near the ground - but the aircraft then turns more than 360°.

Attempt to stretch the glide to a landing

- Pilot running out of height attempting to stretch the glide to a landable area.
- The pilot is tense and overloaded.
- There is a need to turn the glider (possibly to avoid obstacles).
- Pilot allows the speed to decay but does not let the nose get low and does not use much bank.
- Stress causes pilot to use excessive unconscious application of into-turn rudder.
- Glider appears to begin to turn - but this is due to an uncommanded wing drop and is it is entering a spin which will require a full spin recovery which will generally require 300 ft to complete.

Attempt to turn a stalled glider (such as after a winch launch failure or other situation)

- Glider already slow (below straight flight stall speed) or stalled but this not detected by pilot.
- Attempt to turn can result in a wing drop which may not be detected as uncommanded – i.e. the aircraft appears to enter turn as commanded.
- Glider enters a spin which will require a full spin recovery.

Thermaling too low

Many accidental spins have occurred when the pilot is trying to thermal too close to the ground. This situation catches even experienced pilots.

This is complicated by:

- Broken, variable lift at low altitudes.
- Variable wind strengths and mechanical turbulence.
- The turn increasing the wing's angle of attack.
- Initial turn down wind causes transient increase in the wing's angle of attack.
- Entering a tight core causes a further transient increase in the wing's angle of attack.

Overall Considerations

- Warning signs for a spin are not always present - often there is no pre-stall buffet.
- Into-turn rudder i.e., rudder used to assist a turn is dangerous.

By far the most common cause of entry to an unintentional spin is the first of these – yaw at the stall caused by out-of-balance flight.

Spin Direction References

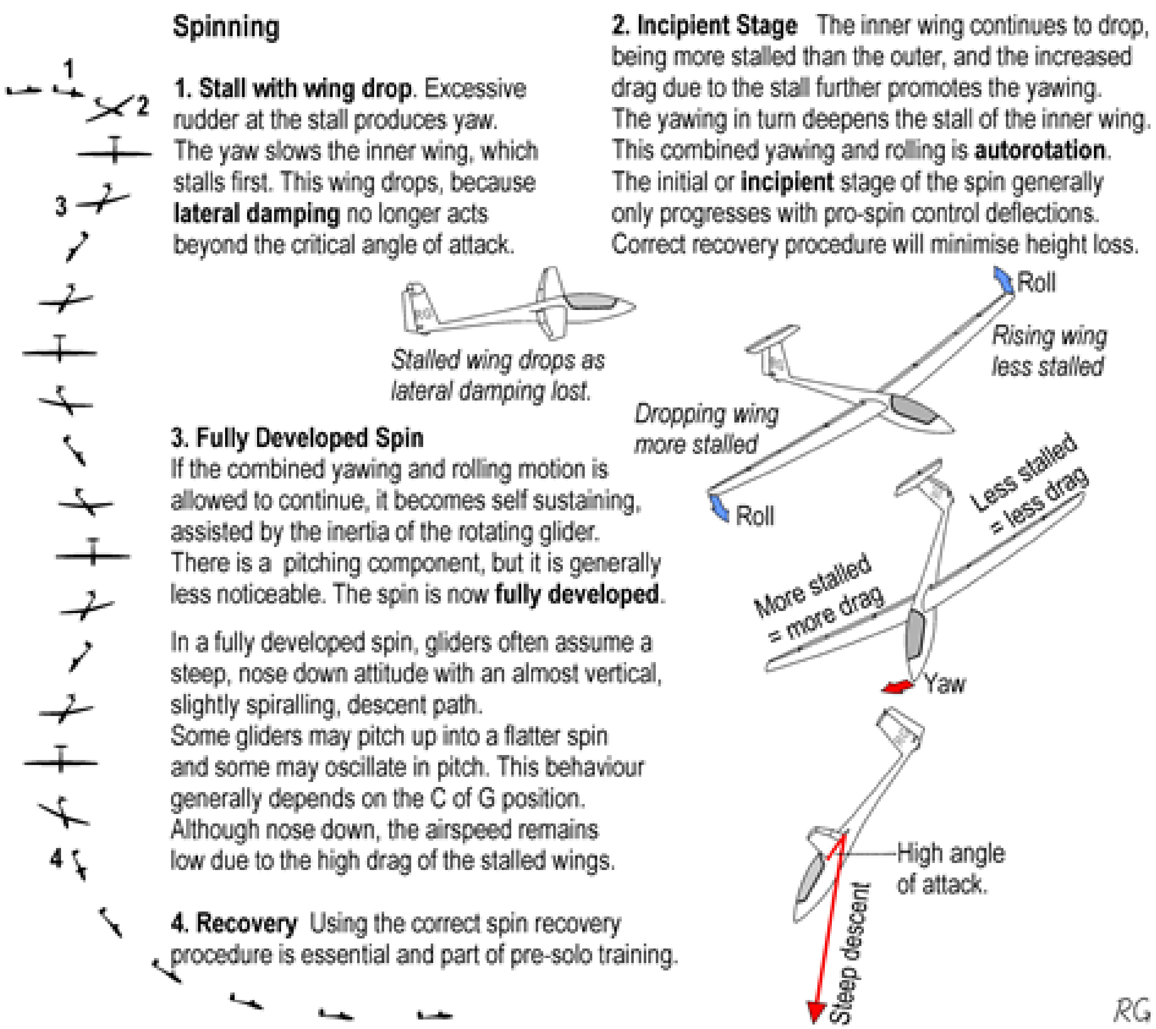
Pilots in a spinning aircraft may be confused as to which way the aircraft is actually spinning. It is essential that the spin direction is identified so that the correct recovery procedure is applied.

The pilot has access to internal and external references to assist in identifying the spin direction:

- External: look forward at the ground or horizon, which way does the earth appear to rotate, which wing is lower?
- Yaw string indicates YAW which caused the spin. It points towards the rudder required for recovery
- Internal: the compass will move as the aircraft rotates, which way does it spin?

Phases of the Spin

The following diagram shows an aircraft in the phases of a spin.



Entry Phase

The 'entry' or 'transition' phase is the short period between departure from controlled flight at the stall and the incipient phase. For a spin to develop it is necessary to have a wing lowered at this point and yaw introduced to the aircraft. The entry phase is the commencement of autorotation as the down going wing increases its angle of attack beyond the stall and generates drag – creating the rotation.

The entry phase is the easiest point to recover from the developing spin.

RECOVERY AT THIS POINT IS STRAIGHTFORWARD:

- Move the stick smoothly and progressively forward to unstall the wing.
- At the same time use rudder to counteract any yaw.

Incipient Phase

The incipient phase of the spin is the period of stalled flight between the commencement of rotation and the developed, stable or steady phase of autorotation. The final balancing of aerodynamic and inertial forces has yet to occur.

This progression may be very rapid and is sometimes described as a flick. It may last only one turn, or it may persist for up to four rotations until pitch, roll and yaw oscillations develop into relatively steady and predictable periods, during which time the rotation tends to accelerate towards the rate found in the fully developed phase.

From this point the full spin recovery procedure must be used to recover from the spin.

If the spin is not recovered by this point one of two things occurs:

- either equilibrium is achieved, and the aircraft is now in the fully developed phase of the spin (typically this takes anywhere from ½ to 4 turns), or
- following the initial roll and yaw the tilted lift vector allows the nose to drop and if longitudinal and/or directional stability sufficiently oppose the pro-spin moments the angle of attack decreases back below the stalling angle and the aircraft transitions to a spiral dive.

Fully Developed Phase

In this phase, a state of equilibrium is reached, characterised by a low and constant airspeed. Rates of descent in unballasted gliders can be as high as 800’ per rotation.

If the aircraft proceeds to the fully developed phase, aerodynamic forces created by the aircraft are balanced by gyroscopic forces due to the distributed mass of the rotating aircraft, causing a steady autorotational state. By this time the corkscrew flight path is vertical and oscillations in pitch, roll and yaw steadily repeat with each turn.

In this spin phase the spin will be self-perpetuating. If the pilot does nothing about it, the spin is likely to continue until the aircraft hits the ground. Positive anti-spin control inputs will be required to recover from the fully developed spin.

The aircraft will lose altitude rapidly and descend along a vertical path about the spin axis.

Whilst pitch attitude, wing tilt, rate of rotation and rate of descent will all be somewhat stable it is likely that these may oscillate during the spin. It is also possible for some aircraft to exhibit different rates of movement in the aircraft axes during the spin depending on the manner of spin entry

The recovery procedure for the incipient and fully developed spin phases

The universal spin recovery technique in gliding is guaranteed to work for all gliders certified to EASA Standards CS-22.

1. For powered sailplanes, close the throttle.
2. Full rudder opposite to the direction of spin applied and held.
3. Check ailerons neutral.
4. Ease the control column forward until rotation ceases.
5. Hold these positions of controls until recovery is completed (rotation stops and aircraft is no longer stalled).
6. After spin rotation stops, centralise rudder and ease out of the ensuing dive.

Some aircraft manufacturers specify variations on this sequence such as a pause between application of rudder and movement of elevator. Consult the AFM/POH for specific guidance on the aircraft you are operating.

Recovery Phase

Spinning ceases only if and when opposing forces and moments overcome the aircraft's autorotation. Recovery phase is where the pilot has initiated the spin recovery actions and the aircraft is no longer in autorotation. The aircraft can then be recovered from the ensuing dive.

Recovery action is clear-cut and universal however some points need to be considered:

1. It is easy for a pilot to become disorientated in the spin and become confused as to which way the glider is spinning. Referring to the correct internal and external references and practice removes most of this confusion.
2. The nose-down attitude in the spin may be very steep in some spins. It is by no means an instinctive reaction to move the stick forward under these circumstances.
3. During the recovery phase, the nose attitude typically steepens, and the rate of rotation may momentarily accelerate as well, giving the impression that the spin is actually getting worse. It is not, and the anti-spin control inputs must be maintained until the spin stops.
4. Spin recovery is not instantaneous. It may take up to several turns for the anti-spin control inputs to finally overcome pro-spin forces. The longer an aircraft is in a spin, the more turns it may take to recover. Spins are recoverable only when the cumulative effects of the interacting variables favour recovery and there is enough altitude.

It is therefore necessary to practice spinning to the extent that confusion is eliminated and the recovery action, like that from a stall, becomes a CONDITIONED RESPONSE.

Variations in the Spin

The development and characteristics of a spin vary between glider types, but a glider will usually rotate a few times before it settles down into a state of spinning steadily. The spin stabilises once a complicated balance is reached between the various aerodynamic and inertial forces acting on the aircraft.

Variation in spin entry has a significant impact on the ensuing motion of the aircraft. A couple of basic cases are the nose high and nose low attitude entries:

- The nose high attitude entry to the spin usually results in a rapid nose down pitch change during the autorotation phase that transitions immediately into a spiral dive as the high angle of attack is lost due to high pitch inertia.
- The nose low attitude entry to the spin may cancel the autorotation phase just as it is trying to build by preventing the wing's angle of attack from increasing to spin-sustainable levels. Here longitudinal and directional stability win out and if pro-spin controls are held an uncomfortable nose low sideslip is experienced.

The Spiral Dive

The Spiral Dive is significantly different from the spin. In a spiral dive the aircraft is still in controlled flight and the wings are not stalled. However, from the viewpoint of the pilot the spin and spiral dive can look somewhat similar.

- Effectively a spiral dive is the aircraft flying in a (generally) steep angle of bank with a nose down attitude, gathering speed as it goes. From what we saw in GPC 8 (Sustained Turns) this applies an increasing load on the aircraft as the airspeed increases.

- As described earlier some aircraft may be able to transition from a spin to a spiral dive after a number of turns due to the aircraft's nose-down attitude. A glider which is spun with the C of G in a forward position may show a tendency for the spin to transition into a spiral dive. Some gliders will not spin at all in this C of G configuration, others may proceed through the spin entry phase but show a tendency to enter a spiral dive after less than one turn of a spin.
- The danger inherent in a spiral dive (that is not present in a spin) is that the forces on an aircraft build up quite quickly and if not checked may build to the point that can affect the structural integrity of the aircraft. This is compared to an aircraft in a spin where the aircraft is not flying and the forces on the aircraft are reasonably light.
- The recovery from a spiral dive is different from that of a spin. This is because the aircraft in a spiral dive is still flying so its controls can be used in their usual sense. However, the high aerodynamic forces that build up on the aircraft mean that extreme care is required to avoid over-stressing the aircraft during the recovery.

Spiral Dive Recovery

The general recovery sequence from a spiral dive is:

1. UNLOAD – Release (unload) the forces on the aircraft by applying forward stick.
2. ROLL – Gently apply stick and rudder to roll the aircraft to a wings level configuration.
3. PULL (ease) BACK – Gently ease back on the stick to raise the nose attitude back to level flight.

These are separate actions. DO NOT combine them as pulling back on the stick whilst still banked in the spiral dive will further increase the aerodynamic forces on the airframe.

Do not apply the airbrake during a spiral dive. Doing so changes the lift forces on the wing and may cause damage to the aircraft structure.

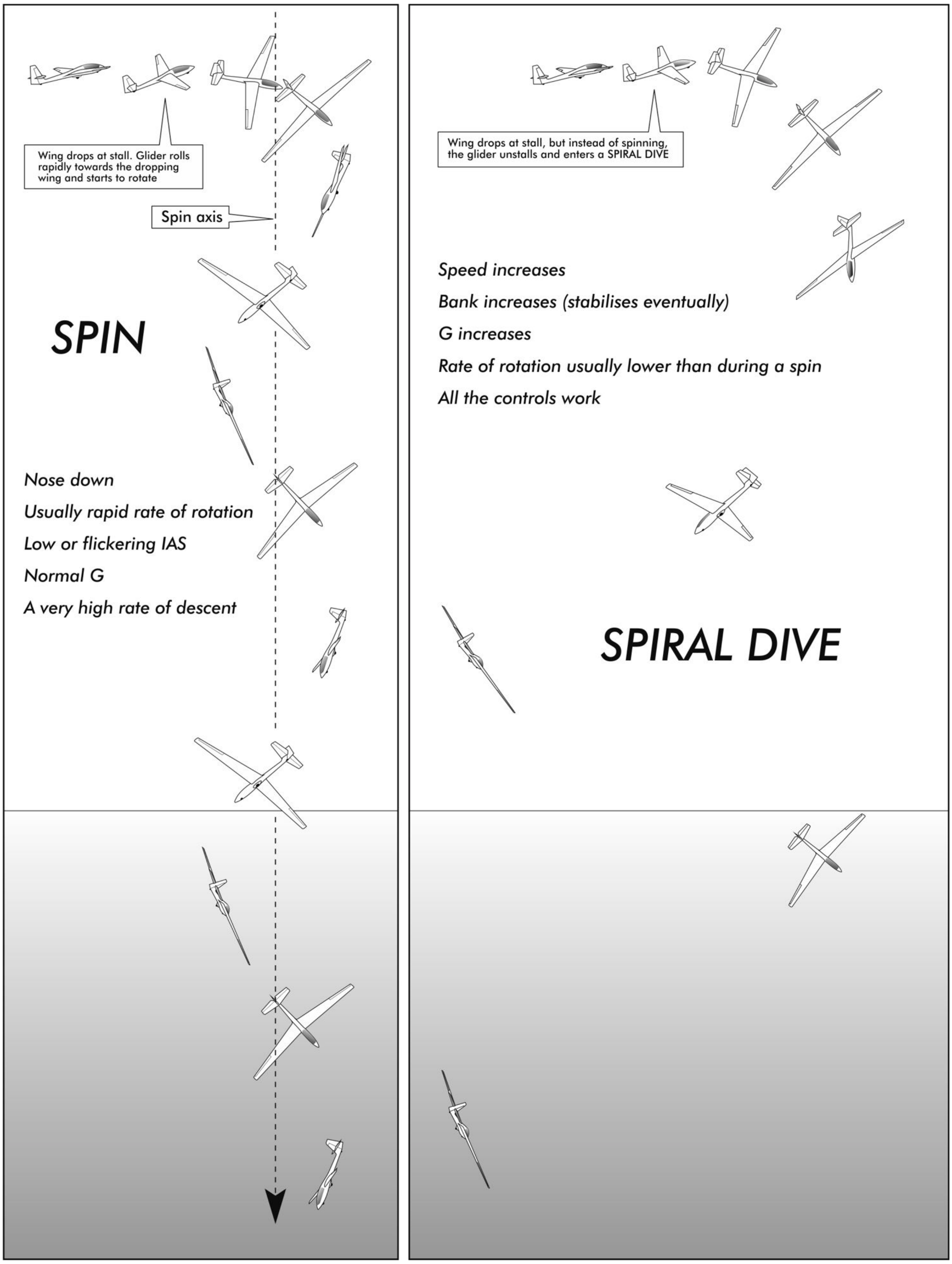
Differences between Spins and Spiral Dives

Whilst a pin and a spiral dive might look similar, the recovery actions needed for them are different. As noted before, in a spiral dive the aircraft is in controlled flight and the wings are not stalled. The table below provides additional aids on differentiating between spins and spiral dives.

AID TO DEVELOPED SPIN/SPIRAL DIVE IDENTIFICATION

Attribute	In Developed Spin	In Spiral Dive
Aircraft stalled	YES	NO
G Loading	Normal	Increasing
Load on controls	Light (unresponsive)	Effective and increasing control loads
Yaw string	Large deflection, pointing towards rudder for recovery	Generally normal flight position
ASI	Low or unreliable	Steady and increasing*
Air sounds	Stable (but may vary on rotation)	Increasing
* If a pilot enters the spiral dive from a spin and is continuing to apply pro-spin control settings the ASI may still indicate low airspeed due to pitot/static errors.		

These differences are shown in the following figure:



(Image courtesy of the BGA)

Recovery Technique Summary

This table is a guide only – the Aircraft Flight Manual must be consulted for specific actions for any given aircraft.

From Spin (Entry Phase)	***From Spin (Incipient & Fully Developed Phases)***	***From Spiral Dive***
Stick forward.	Full opposite rudder to spin rotation.	Unload wings, control column forward.
Rudder to correct yaw.	Aileron neutral.	Roll wings level gently using aileron & rudder.
	Ease control column forward until rotation ceases.	Ease out of dive with elevator.
	Rudders neutral and ease out of dive with elevator.	
Adopt gliding position, re-orientate yourself, regain situational awareness with FULL SCAN.		

Note: Yaw string pointing towards Left Rudder for recovery. ASI on zero. High rate of descent

Spin Avoidance

The easiest way to recover from an unintentional spin is to avoid it in the first place.

- Safe speed near the ground is essential – but on its own is not sufficient so ensure all turns are coordinated – especially near the ground. Never over-rudder a turn.
- Near the ground – don't turn through more 90°.
- Never stretch the glide to land.
- Under no circumstances should you be tempted to thermal too close to terrain.
- If you are in doubt about whether the aircraft may be entering a spin, move the stick forward.
- Practice your spin entry and recovery regularly so that it becomes instinctive.

Human Factors

Disorientation

Pilots understand which way is up via three sensory mechanisms – proprioceptive (seat of the pants), visual (eyes) and vestibular (inner ears).

Proprioceptive inputs provide information about joint position and muscle tension, but generally play only a small part in the total picture. Visual sensation is the most reliable, whereas vestibular inputs are very powerful but frequently misrepresent the rotational motion of flight. Therefore the eyes, through the interpretation of instruments and outside references are important to orientation. Disorientation occurs when there is a conflict between the visual and vestibular sensations – your eyes tell you one thing, but your inner ear says something else.

Within the ear, three semicircular canals are structured perpendicular to each other, so that a canal lies in each of the three planes of the human body. Information from these semicircular canals affects visual tracking.

During the initial phases of a spin, the eye is able to remain oriented. However, in a spin that continues beyond about two turns, disorientation often occurs, and it will be very difficult for the pilot to make the correct recovery inputs, unless properly trained and experienced in spinning.

After about five turns, the eye becomes out of synch with the aircraft's rotation. Vision will blur and the speed of rotation appears to increase. Now the pilot has difficulty in determining the number of turns in the spin, its direction, and the effectiveness of any actions taken to exit the spin.

Upon stopping a spin, the fluid within the semi-circular canals continues to move in the same direction as the spin rotation.

The brain must contend with a conflict between this indication of turning one way and a visual indication of turning in the opposite direction, when there may be no actual rotation at all.

Startle / Surprise Response

Startle is an uncontrollable, automatic muscle reflex, raised heart rate, blood pressure, etc., elicited by exposure to a sudden, intense event that violates a pilot's expectations.

Surprise is an unexpected event that violates a pilot's expectations and can affect the mental processes used to respond to the event.

This human response to unexpected events has traditionally been underestimated or even ignored during flight training. The reality is that untrained pilots often experience a state of surprise or a startle response to an aircraft upset event. Startle may or may not lead to surprise.

Pilots can protect themselves against a debilitating surprise reaction or startle response through scenario-based training, and in such training, instructors can incorporate realistic distractions to help provoke startle or surprise.

Pilots need to understand that their primary training cannot cover all possible contingencies that an aircraft or pilot may encounter, and therefore they should seek recurrent/additional training for their normal areas of operation, as well as to seek appropriate training that develops the aeronautical skill set beyond the requirements for initial certification. GFA Flight Reviews provides this recurrent training.

FLIGHT EXERCISES FOR THIS UNIT

- You must complete the pre-aerobatic check.

- Entry Phase Spin Symptoms & Recovery – Your trainer will demonstrate the spin entry and incipient phase of a spin with the actions necessary to recover and return to stable level flight. This will include how to recognise the spin entry and the direction of rotation.
- Incipient & Fully Developed Spin Symptoms & Recovery – Your trainer will demonstrate the spin entry and show how the spin develops through the incipient to the fully developed phase, with the actions necessary to recover and return to stable level flight. This will include how to recognise the direction of spin rotation.
- Spiral Dive Symptoms & Recovery – Your trainer will demonstrate a spiral dive and the necessary actions to recover to stable level flight. The spiral entry may be from a spin.
- Student practice – you will be provided the opportunity to practice recovery from the various spin phases working from the initial entry and incipient phases first. As you become competent with recovery from the incipient phase your trainer will allow you the opportunity to recover from the fully developed phase of the spin and following that recover from a spiral dive.

THINGS YOU MIGHT HAVE DIFFICULTY WITH

COMMON PROBLEMS	
Problem	**Probable Cause**
• Failure to conduct adequate pre-aerobatic check.	Forgetting that spins are an aerobatic manoeuvre and require the pre-aerobatic check to be completed. Practice using the pre-aerobatic checklist.
• Failure to identify the spin entry phase.	Not sensing the stall/yaw/nose drop symptoms. Multiple exposure or even simulator demonstration will assist. Unlike in a wings-level stall, buffet symptoms may not be present.
• Failure to identify the direction of rotation:	Multiple exposure or even simulator demonstration will assist.
• Failure to use adequate (i.e., full) rudder during recovery from the fully developed phase of the spin and allowing aircraft to recover itself (or not).	Too impatient. Use full recovery techniques. If your training glider recovers quickly from the spin this makes it difficult, so focus on following the full procedure.
• Inability to differentiate between spin and spiral dive and subsequent incorrect use of controls.	Focus on G loads, ASI reading, increasing noise level. These are signs of a spiral dive.
• Excessive use of controls during recovery.	Discomfort with nose down attitude. Feel the G force you are applying to the glider and keep this limited.
• Continuing to hold rudder in after cessation of rotation or failing to centre ailerons during spin recovery.	Once the glider is unstalled, you need to apply coordinated stick and rudder.

HOW DO YOU DEMONSTRATE COMPETENCE?

- Describe the characteristics of spins & spiral dives.
- Demonstrates recovery from a spin at the entry, incipient and full phases of a spin.
- Identify indicators of a spiral dive and take recovery action.

RESOURCES & REFERENCES

- CASA AC61-16 v1.0
- GPC Theory Lesson 6.
- Video – Spin & Spiral Dive Avoidance & Recovery.

SELF-CHECK QUESTIONS

Use these questions to test your knowledge of the unit.

- Why is it important to understand if the aircraft is certified for spinning?
- What is the most common way that an unintended sin occurs?
- What are the ways to avoid accidently entering a spin?
- What are the symptoms of a spin?
- What are the symptoms of a spiral dive?
- Why are unintended spins so dangerous?
- What are the recovery actions for an aircraft at the entry phase of a spin?
- What are the recovery actions for an aircraft in the incipient and fully developed phase of a spin?
- What are 3 characteristics that are different between a spin and a spiral dive?
- What are the recovery actions for an aircraft in a spiral dive?
- What is a threat to an aircraft in a spiral dive that does not apply in a spin?
- Does a spin only develop when the aircraft has a high nose attitude?
- What does the term ‘autorotation’ mean?