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## 1 INTRODUCTION

a) Although some pilots consider stalling and spinning belong to the days of training and skill tests, the reality is that loss of control at or near the stall is too common and can have fatal consequence. Instructors will introduce exercises in both PPL(A) and CPL(A) courses (Exercises 10 and 11) which give the student pilot sound skills in recognition of and recovery from these manoeuvres. Sadly the reality of flying is that departure from controlled flight does not always happen at safe altitudes, level flight and in clear weather.

## 2 SIGNS AND SYMPTOMS

a) At least one of the symptoms of the fully developed stall **MUST** happen before the aeroplane can spin.

b) To revise, these symptoms are:

- wing drop (undemanded roll);
- nose drop;
- inability to maintain level flight; and
- buffet.

It is clearly inappropriate to wait for this confirmation before recovery.

c) What signs will be evident to help us avoid a full stall and possible spin? To help us, we can draw on the classic list of signs of the *approaching* stall:

- increasingly high nose attitude (in level flight);
- reducing control effectiveness;
- low and decreasing airspeed; and
- the onset of buffet –

these may be augmented by a mechanical stall warning device.

Note that all these signs relate most clearly to controlled level flight. What if you are climbing, descending, turning, manoeuvring hard or merely holding large out-of-trim forces?



d) Stalling recognition requires an understanding of angle of attack (AoA). **The stalling angle can be achieved in any attitude, at any speed and in conditions of high control force.** Remember that the stall speed will increase with wing loading ( $g$ ) by  $\sqrt{\text{load factor}}$  – e.g. multiply your basic stall speed by 1.4 in a level turn at  $60^\circ$  angle of bank (load factor of 2).

e) One of the most critical phases of flight is just after take-off or when going around from an approach to land. At low level, at relatively low speed and with a high nose attitude, an engine failure will lead to a rapid deceleration and increasing angle of attack. To avoid any possibility of stalling and spinning, the pilot must promptly and positively select a lower nose attitude, to achieve and maintain a safe gliding speed. If the aircraft has already decelerated below the recommended gliding speed, this may initially require an attitude lower than normal.

### **3 STALL AVOIDANCE**

How then to safely avoid the stall and spin?

- Be alert and be prepared.
- Practise regularly at safe altitudes to keep your handling skills current.
- Read and understand the contents of the Flight Manual/POH for your aeroplane.
- Seek advice from a Flight Instructor if you are unsure of any techniques.
- Be ready to apply **immediate** recovery action whenever you feel that the aeroplane is not responding correctly:
  - Move the control yoke (column) centrally forward to unstall the wings.
  - **Simultaneously** apply full power (if available), keeping the aircraft in balance.
  - Level the wings.
  - Retract Flaps/Gear as per POH – remember on some aircraft Full Flap must be removed as soon as possible to achieve any climb performance.

Now you have time to regain a safe flight path and analyse what happened.

If prompt action is taken during the approaching stall, the attitude change required is small and height loss (if any) should be minimal.