

> STALLS, UNUSUAL ATTITUDES AND UPSET RECOVERY



> SCOPE

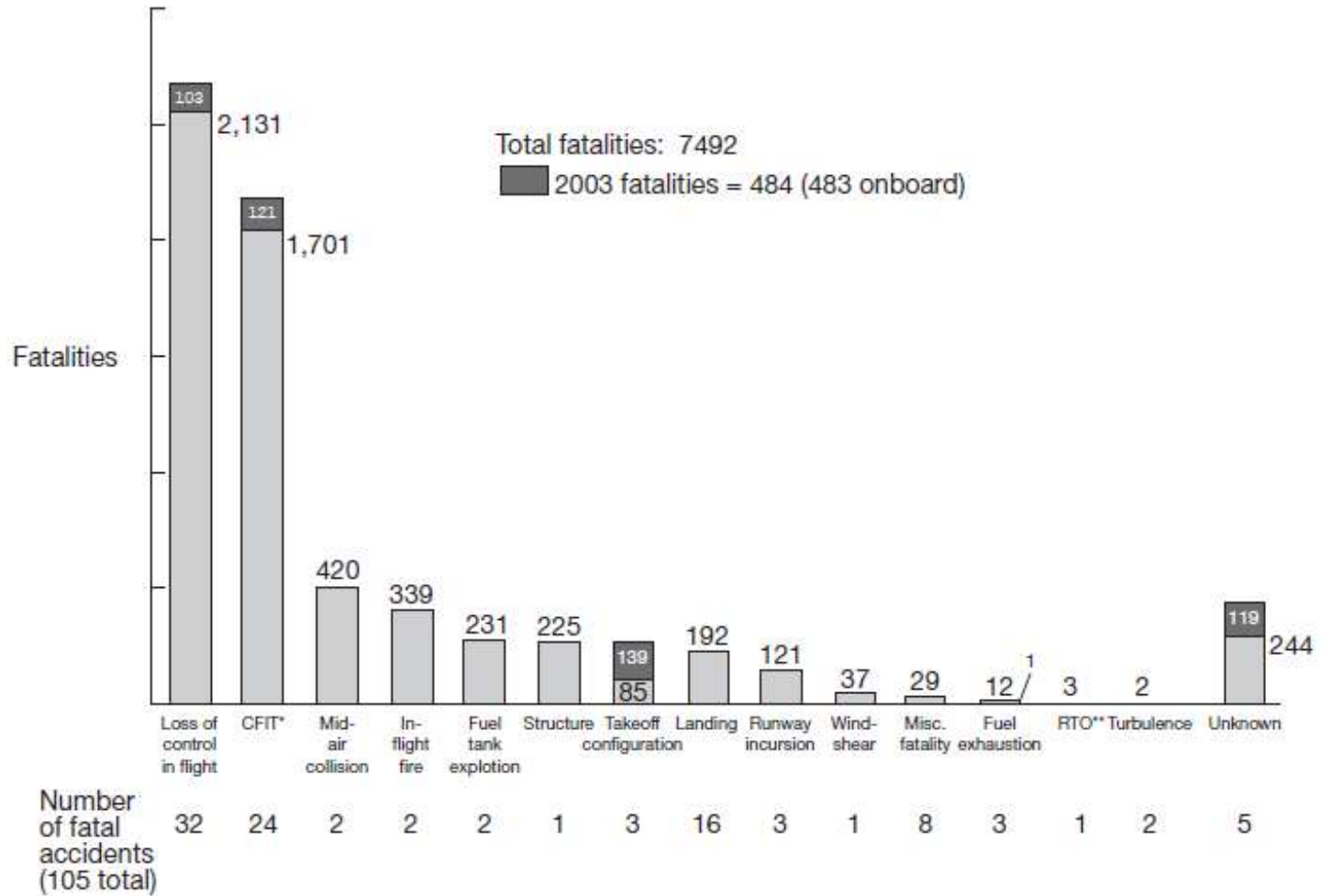
- What may cause an upset situation?
- New stall recovery procedure
- Unusual attitude training
- Upset recovery training
- How safety can be improved?

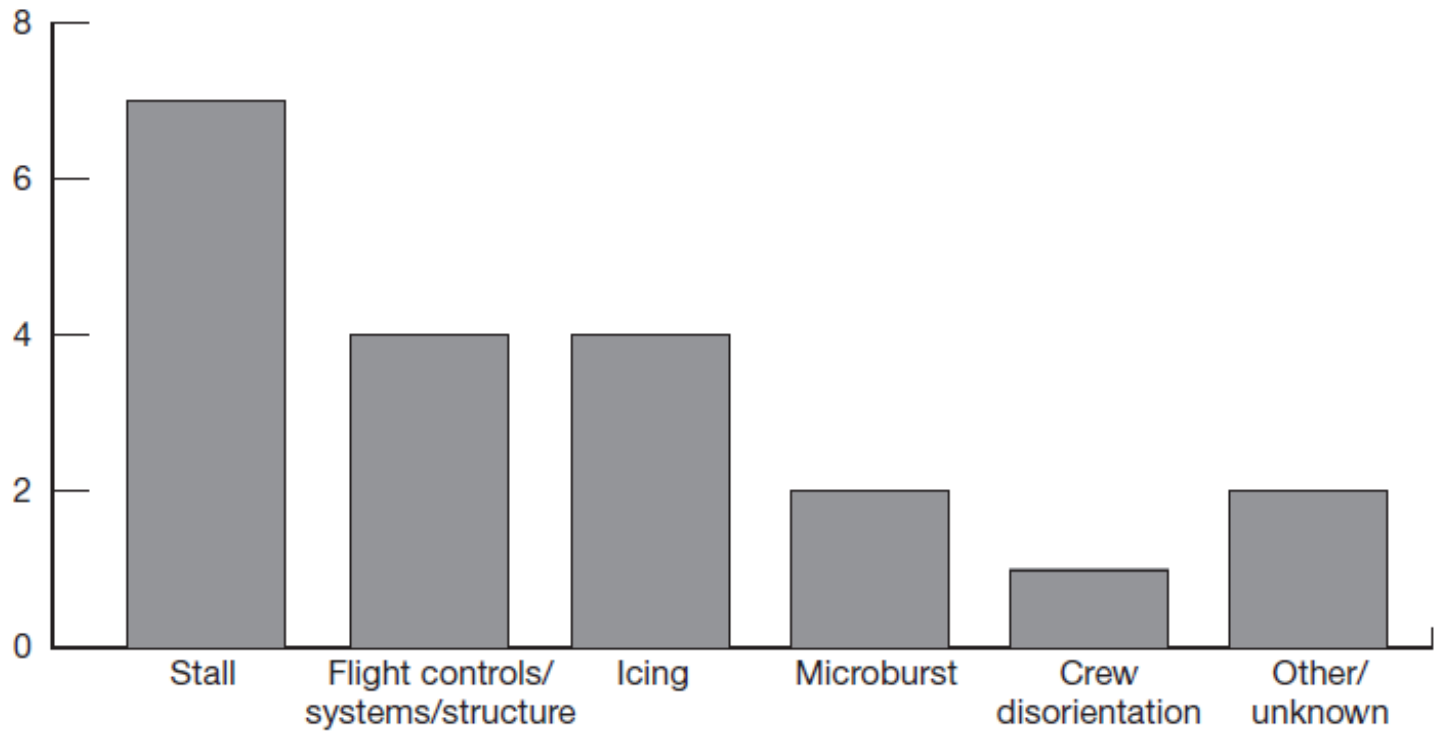


> WHY?

- Number 1 accident
- Progress quickly
- Developing upset situation may not be easy to recognize







> DEFINITION OF UPSET

- Generally if aircraft unintentionally exceeds:

- Pitch attitude greater than 25 deg, nose up.
- Pitch attitude greater than 10 deg, nose down.
- Bank angle greater than 45 deg.
- Within the above parameters, but flying at airspeeds inappropriate for the conditions.



> WHAT CAUSES?

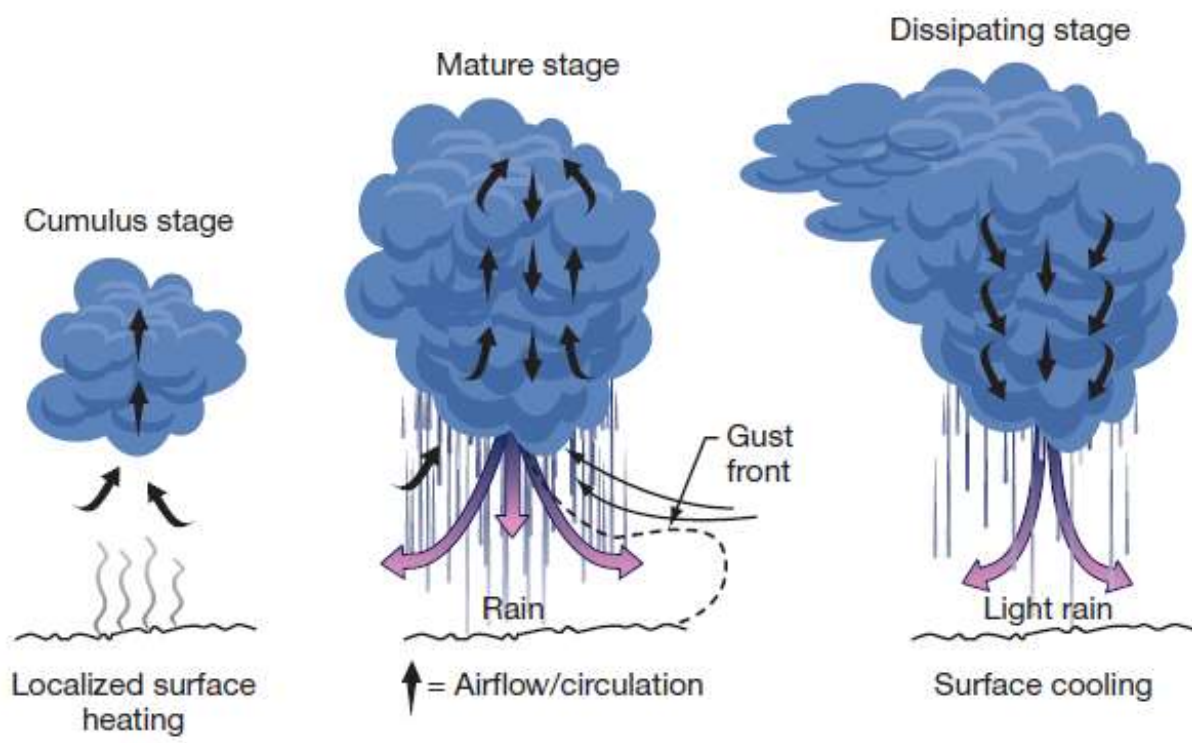
- Environmental
- System malfunction
- Pilot induced
- Or a combination of the three above



The commercial pilot was maneuvering around clouds during a skydiving operation when the airplane abruptly made a steep bank to the left and continued to dive. He made control corrections to recover the airplane and soon after landed uneventfully. The pilot believed that he hit a patch of turbulence that caused the airplane to maneuver in such a manner. A postflight examination revealed wrinkles in the top skin of the airplane's wings, which was later determined to be minor damage.

The National Transportation Safety Board determines the probable cause(s) of this incident to be:

The airplane's encounter with clear air turbulence, which caused a momentary loss of control and minor damage to the airplane.



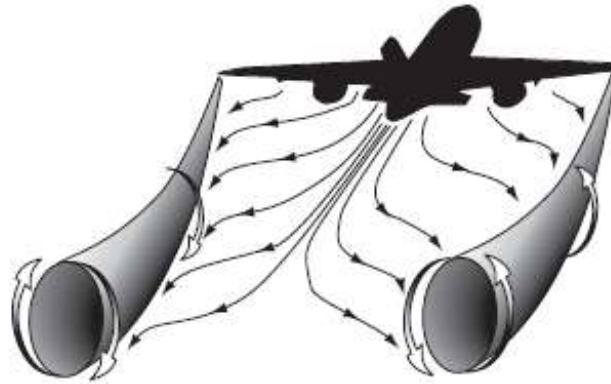


Figure 7
Wake Turbulence
Formation

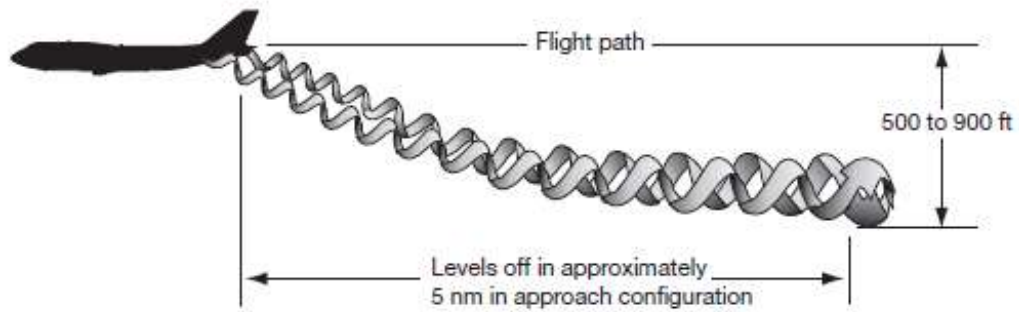
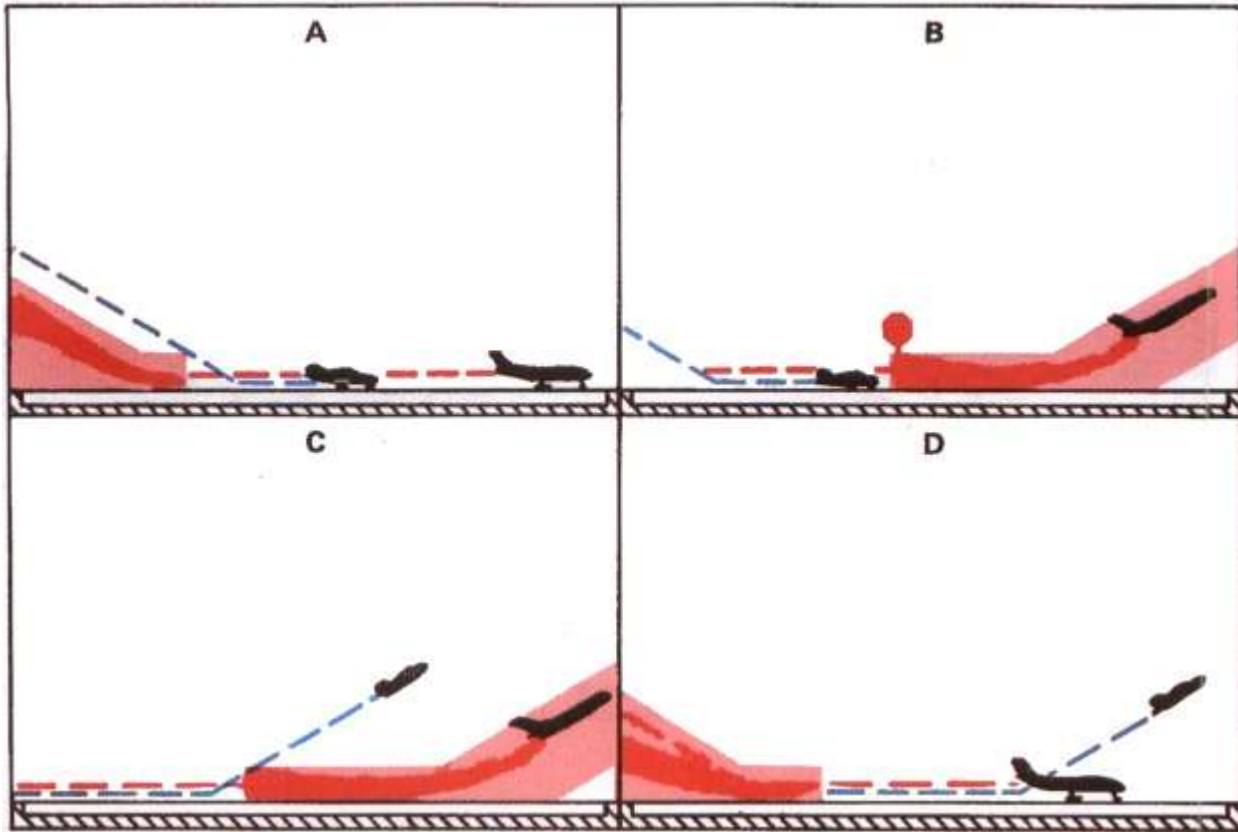


Figure 8
Vertical Motion Out
of Ground Effect





> STALL / SPIN

- In any upset if aircraft is stalled condition or in a spin it must be recovered from it
- After Colgan and Air France accidents stall recovery has been changed
- The reasoning before was that fatal accidents were happening because aircraft is stalled close to the ground
- Requirement for recovery from stall with minimum or zero loss of altitude
- Sometimes without reduction of AoA
- TRTO level (Oxford, Flight Safety)





EASA Safety Information Bulletin

Based on accident review, a concern has arisen within the Aviation Community regarding loss of control (LoC) accidents. In this type of accident, quite often the pilot's inappropriate reaction to the first indication of a stall or stick pusher event is a key factor.

It is widely recognised that sometimes pilots are failing to avoid conditions that may lead to a stall, or failing to recognise the onset of an approach-to-stall during routine operations in both manual and automatic flight. Sometimes pilots may not have the necessary skills or competencies to appropriately respond to an unexpected stall or stick pusher event.

Stall and approach to stall training should always emphasise reduction of the Angle of Attack (AOA) as the most important response when confronted with any stall event.

> NEW STALL RECOVERY

- FAA, EASA, UK CAA
- Stall recovery should always start with reduction of AoA



> VISUAL UNUSUAL ATTITUDES

- Two scenarios
- Nose high
- Nose low
- May include bank or various throttle setting
- Student closes his eyes and lowers his head and instructor maneuvers



> INSTRUMENT RECOVERIES

- Same as visual unusual attitudes except by reference to flight instruments
- Cross check to confirm no failed instrument
- Full and partial panel





Gaining altitude

Climbing right turn

Airspeed decreasing





Losing altitude

Diving left turn

Airspeed increasing





> UPSET RECOVERY TRAINING

- Recently become popular for commercial air crews
- Aim to learn to recognize an upset situation and how to recover
- At minimum spins, rolls and rolling upset scenarios (control failures can be simulated)



> SAFETY IN TRAINING

- Unusual attitude must always be recoverable by the instructor
- Aircraft suitable and loading suitable
- No loose objects





> HASELL

- Height
- Airframe
- Security
- Engine
- Location (A,B,C)
- Lookout (2x90 or 180)

H
E
L
L



> HOW CAN WE BE SAFE?

- Use positive transfer of flight controls
- Practise at altitude
- Use designated practise areas
- Keep high safety factors
- TEM







> QUESTIONS?

