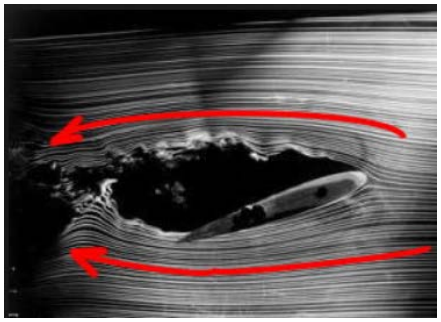
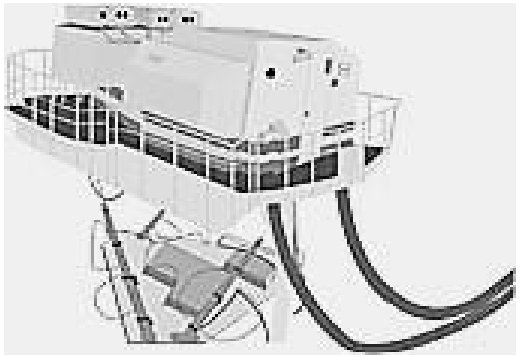
Top 3 take away points

- An ounce of prevention is worth a pound of cure



- Reducing angle-of-attack is THE most important pilot action to an upset



- Pilot upset training in simulators must account for their limitations

Principal conclusions
Introduction

- Although rare, loss-of-control is the #1 cause of fatalities in worldwide jet fleet

Principal conclusions
Background

- Frequent factors in LOC-I are
  - lack of external references
  - lack of effective monitoring
  - lack of effective alerting
  - poor crew resource management

Principal conclusions
Worldwide rules and guidance

- Starting in 2019, all scheduled operators in the United States must train their pilots to prevent and recover from upsets

Principal conclusions
Academic upset training

- Stalls in a commercial transport can be considerably different than those in a general aviation trainer

Principal conclusions
Simulator upset training

- Push
- Roll
- Power
- Stabilize

Principal conclusions

On-aircraft upset training

- Real world training can teach you a lot about surprise and startle

Principal conclusions

Instructor requirements

- Instructors need to understand simulator limitations and help bridge the gap to the real aircraft

Principal conclusions
Training limitations

- Academic, simulator, and on-airplane upset training each has limitations – again, the instructor must convey and account for them

Principal conclusions
Putting it all together

- Academics teaches **why** push, roll, power, stabilize
- Simulator **reinforces** that push, roll, power, stabilize **works**
- On-airplane **confirms that you can apply** push, roll, power, stabilize when surprised or startled

Exam

1. In the U.S., does upset training require using a simulator, and if so, how complex?
   A. Yes, a motion full flight simulator must be used (Level C or Level D)
   B. Yes, a fixed-base device can be used as long as it stalls like the airplane
   C. No, academic and on-airplane training can replace simulator training
   D. No, simulator training is helpful, but not required

Exam

2. Can most of today's simulators teach full stall training?
   A. Yes
   B. Yes, as long as you don't perform accelerated stalls
   C. No, the stall aerodynamics and buffet are typically inadequate
   D. No, simulators will never be used for full stall training. On-aircraft training is necessary for that

Exam

3. Reducing angle of attack is the most important pilot action to recover from a stall because it
   A. Allows the wings to regain lift
   B. Really minimizes the loss of altitude
   C. Disconnects the auto-flight system
   D. Decreases power to the engines

Exam

4. To recover from a stick pusher activation, a pilot must
   A. Compensate by pulling back on the yoke/stick
   B. Release pressure and allow the pusher to reduce angle of attack
   C. Apply nose-up elevator to minimize the altitude loss
   D. Use wheel and rudder to keep wings level and sideslip near zero

Exam

5. To recover from a stall, a pilot should first
   A. Apply full thrust
   B. Level the wings
   C. Engage the autopilot and autothrottle
   D. Reduce angle of attack with forward yoke/stick

Exam

6. Why is minimizing loss of altitude no longer part of stall recovery?
   A. Stalls are now occurring primarily at high altitude, so plenty of altitude is available for recovery
   B. Stalls arise from too high an angle of attack, and minimizing altitude loss is not related to the prime objective of reducing the angle of attack
   C. Because the auto-flight system will maintain the altitude during the recovery
   D. Because if you follow the stall recovery template properly, you will minimize the loss of altitude

Exam

7. True or false: An activation of a stick pusher is considered a fully stalled condition

Exam

8. How long should a pilot apply nose-down pitch control in a stall recovery?
   A. Until the stick shaker activates
   B. Until the stall warning is eliminated
   C. Until thrust is applied
   D. Until the wings are leveled

Exam

9. An upset is defined as
   A. Nose up pitch less than 25 degrees
   B. Pitch attitude below the horizon
   C. Bank more than 60 degrees
   D. Airspeed inappropriate for the flight condition

Exam

10. A technique to recover from a nose-high stall is to roll into a steady bank. What is the bank angle guidance?

A. Less than 30 degrees
B. Between 30 and 60 degrees
C. Between 60 and 90 degrees
D. Greater than 90 degrees

Exam

11. True or false: To reduce the risk of negative transfer of training, instructors must understand the limitations of flight simulators

Exam

12. A stall in a commercial transport aircraft may be recognized by
    A. A pitch, or g, break along with a possible roll-off
    B. A deterrent amount of buffeting
    C. Reaching an aft control stop for 2 secs with no more increase in pitch, leading to a high descent rate
    D. All of the above

Exam

13. The stall speed at 0g is
    A. 0 kts
    B. Approximately one half of the 1g stall speed
    C. Stall speed does not depend on g
    D. Approximately twice the 1g stall speed

Exam

14. Using the rudder in an upset recovery can be problematic because

A. An airplane is not certified to be able to withstand full pedal deflection
B. An airplane is not certified to withstand the loads arising from back-and-forth pedal inputs
C. Applying rudder makes the yaw damper ineffective
D. Rudder becomes ineffective in an upset

Exam

15. Which of the following is false
    A. If your pitch and thrust are not limited, you can control to any flightpath and speed in the operational flight envelope
    B. If your thrust is fixed or limited, you can control flightpath with pitch without stalling only if you fly faster than the maximum L/D speed
    C. If your thrust is fixed or limited, you can control flightpath with pitch without stalling only if you fly slower than the maximum L/D speed
    D. If your thrust is fixed or limited, you can control your speed with pitch when flying slower than the maximum L/D speed

Exam

16. Technology in modern airplanes reduces workload. Therefore, in an upset the pilot should:
    A. Verify that the autopilot and autothrottles are still engaged
    B. Engage the autopilot and autothrottles if disengaged
    C. Reduce the level of automation by disengaging the autopilot and autothrottle
    D. Ask the other pilot “What is it doing now?”

Exam

17. Which of the following is true

A. In the typical inverted upset, angle of attack is negative
B. When inverted, a split-S maneuver is preferred only if you have sufficient altitude to complete it
C. When inverted, after disengaging the autoflight systems, unloading is the next proper action
D. When inverted, using rudder is acceptable, since the ailerons are obviously ineffective when upside down

Exam

18. The stall is fundamentally defined by
    A. Angle of attack, load factor, and speed
    B. Angle of attack, Mach number, and configuration
    C. Bank angle, speed, and load factor
    D. Gross weight, altitude, and load factor

Exam

19. True or false: The stall recovery technique is altitude dependent, as reducing angle of attack when low could result in an accident

Exam

20. When should an upset recovery be initiated

A. Only when pitch or bank reaches its limit values
B. Only when the airspeed is rapidly increasing or decreasing
C. Whenever an unintentional excessive divergence from the intended flightpath or airspeed occurs
D. After an uncommanded autopilot or autothrottle disconnect