Getting it Right when things go Wrong - UPRT

Wednesday November 2  3:00 pm - 4:30 pm

PRESENTED BY:
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Did you know?

- Last year, 384 people died in 238 general aviation accidents.

- Loss of control (LOC-I) is the number one cause of these accidents.

- LOC-I happens in all phases of flight. It can happen anywhere and at any time.

- There is one fatal accident involving LOC-I every four days.

LOC-I Accident Statistics

- From 2001-2010 1,841 persons killed in 20 major accidents involving Loss of control
  - Air France Flight 447
  - Colgan Flight 3407

- Corporate loss of control accidents and incidents are increasing

- Stalls are the number one cause of upsets leading to loss of control (LOC-I)
Even Highly Experienced Aviators can find themselves in Unusual Attitudes!
Introduction to UPRT and UAT

- **Aircraft upset** is a dangerous condition in aircraft operations which may result in the **loss of control** of the aircraft, and sometimes the total loss of the aircraft.

- The NASA Aviation Safety Program defines **upset prevention** and **upset recovery** as to prevent loss-of-control accidents due to aircraft upset after inadvertently entering an extreme or abnormal flight attitude.
Definitions

- **UAT**  Unusual Attitude Training
- **UPRT**  Upset Prevention and Recovery Training
- **LOC-I**  Loss of Control  In-flight
- **AM-URT**  Advanced Maneuver Upset Recovery Training
- **G**  Load
- **AOA**  Angle of attack
AOA

- Very Useful for normal flight operations and especially for UA/LOC
- Installed in most corporate aircraft
- Pilots normally not properly trained to use AOA
- Vref taught over AOA
- Most corporate/Airline pilots do not use AOA

- Not a “cure all” but a very useful instrument in the aircraft
Some AOA Indicators
FULL MANEUVERING ENVELOPE

PITCH UP

+90°

+60°

+30°

0°

-30°

-60°

-90°

PITCH DOWN

LEFT ROLL

180°  135°  90°  45°

RIGHT ROLL

180°  135°  90°  45°
FAA DEFINITION OF AN UNUSUAL ATTITUDE

IN EXCESS OF:

• 25 degrees nose up
• 10 degrees nose down
• 45 degree bank angle
Normal Flight Regime

< 5% OF FULL MANEUVERING ENVELOPE
FAA Training Requirements

+/- 30 deg Pitch and 60 deg Bank

Approx 11% of Total Envelope
UAT is about individual envelope expansion
Aircraft Flight Envelopes

- **Normal Flight**
  The “1 G Ride”

- **Design Limits**
  - Normal Category (Light Aircraft)
    -1.5 to +3.8 G’s
  - Aerobatic
    -3 to +6 G’s
  - Military
    -4 to +9 G’s
  - Corporate and Airline Aircraft (FAA Part 23 & 25)
    -1 to +2.5 G’s
V-G DIAGRAM

GWT: 65,000 lbs
PA: 8,000 feet
Gear: Up
Flaps: 0°
Causes of LOC-I / Unusual Attitudes

- Stall
- Pilot Inattention / Distraction
- Autopilot / Automation Malfunction
- Atmospheric
  - Convective Turbulence
  - Mountain Wave
  - Wind Sheer
  - Icing
- Wingtip Vortices
- Horseplay
Viper: In case some of you are wondering who the best is, they are up here on this plaque. Do you think your name will be on that plaque?
Maverick: Yes, sir.
Viper: That's pretty arrogant, considering the company you're in.
Maverick: Yes, sir.
When confronted with a crisis, you will not rise to the occasion; you will sink to the level of your training.
The Value of proper LOC/UPRT

• Enhanced prevention of an Unusual Attitude/LOC-I
• Pilot skill set expanded
• Pilot confidence increased
• Envelope Expansion as part of Upset Prevention and Recovery Training
• Pilots are losing “Stick and Rudder” Skills due to inadequate training / automation
• Unusual attitude recoveries are not necessarily intuitive

• Enhanced SAFETY
Ways to Train

• Ground School
  Theory only
  Low retention
  Difficult to apply theory to actual application

• Simulator
  Most simulators are not currently programmed for full aircraft envelope
  No Feel of “G loads” or Ground Rush
  Reality loss
  Some things in life cannot be simulated!

• Actual In-Flight Training
  As real as it gets
UAT/LOC Training Program - Ground

Ground School

- Aero-Medical
- Aerodynamics of UPRT
- Dynamics of Recovery
- Pre-Flight Briefs
- Video De-Briefs
UAT/LOC Training Program – FLIGHT

• Flight Training (VFR)
  • VFR Flight Segment
    • Pilot G-Cal
    • Zero “G” exercise
    • Stalls (Normal and Accelerated)
    • Pilot Envelope Expansion
    • Baseline Recovery Techniques
    • Actual UAT Recoveries
    • Inadvertent Upset Recoveries
UAT/LOC Training Program – FLIGHT

- Flight Training (IFR)
  - IFR Flight Segment
    - VFR Flight Segment completed under Simulated Instrument Conditions
Q-Factor

- Value of familiarity
- Air conditioned / Pressurized
- G Warm-up
- Applicable maneuvering
- Slow build-up to advanced maneuvering
- Hands-on flying time
Optimum LOC/UPRT

• Not Simulator based
• Like kind aircraft
• VFR and IFR sorties
• UPRT ground training to include:
  • UAT Aeromedical
  • UAT Aerodynamics
  • UAT Recovery dynamics
• Through pre-flight briefs
• Through real time post-flight debriefs
• Re-current UAT/UPRT
What would in-flight raining such as this look like?
Training Mandates

• ICAO
• EASA
• IATA
• NTSB
• FAA
Training Recommendations

• National Transportation Safety Board (NTSB)

  • NTSB issued a series of safety recommendations over a 25 year period, **asking** the FAA to require air carriers to train pilots in recoveries from unusual flight attitudes.

  • In 1996, the NTSB issued a formal Safety Recommendation which **requested** the FAA to require all airlines to provide simulator training for flight crews, which would enable them to recognize and recover from "unusual attitudes and upset maneuvers, including upsets that occur while the aircraft is being controlled by automatic flight control systems, and unusual attitudes that result from flight control malfunctions and un-commanded flight control surface movements."
Corporate Mandates

- Corporate flight departments are recognizing simulator training for UPRT is inadequate for their pilots.

- A large majority of airline and corporate pilots have never been exposed to Advanced Maneuvering of any type.

- Repetitive simulator training does little/if anything to enhance pilot “Stick and Rudder” skills.

- Corporate flight departments are beginning to explore different types of training to enhance pilot skill sets.
Insurance Companies

Federal Aviation Regulations vs. Insurance Requirements

• Insurance companies normally exceed FAA requirements in regards to training

• Aviation Insurance companies can be/are leaders in the promotion of safety

• Better trained pilots = Fewer accidents/incidents = Fewer claims = Better bottom line. A “Win-Win-Win” situation

• Some insurance companies are giving reduced rates for UAT/UPRT
So how do you get it right when things go wrong?

• Receive proper UA/LOC training
• Train in representative aircraft
• Go back to basic “stick and rudder” skill sets
• Receive Aero medical training as it relates to UA/LOC
• Understand the basics of UA/LOC aerodynamics
• Do recurrent UA/LOC training
• Automated cockpits are NOT the solution, they are part of the problem

• You may only have 1 chance to get it right- Train for that moment
QUESTIONS?