



Presented by:

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Training to Prevent Upset

Training recommendations



Contents

1 Symptoms and Cures

2 Upset Handling

3 Prevention Strategies (Training)

4 Conclusion



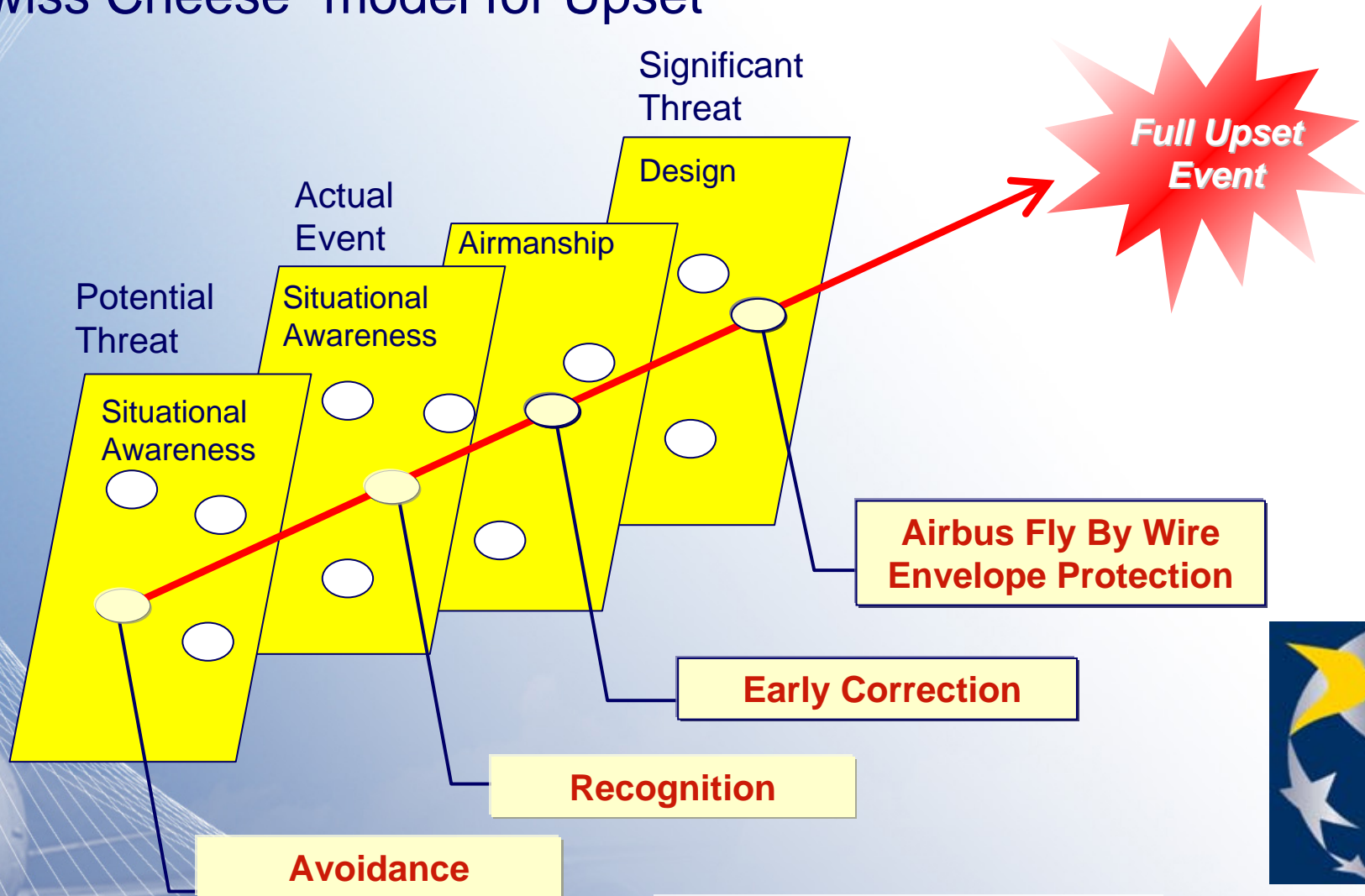
Symptoms – an introduction.

- Lots of talk today regarding Upset
- Loss of control? Loss of Situational Awareness?
- Some say it is the # 1 killer – not for our aircraft!
- We are proud to have developed envelope protection over 30 years ago to address this very issue and counter the threat of Upset.
- You must all agree that prevention is better than cure!



Preventing Upset, the cure?

The “Swiss Cheese” model for Upset

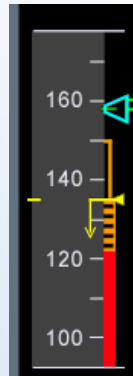


Adapted from Reason, 1990

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Upset Root Cause



Direct?

~~Recognition~~
-Monitoring
- S.A.

~~Prevention~~
-Recovery
- Avoidance

Full
Upset



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The Right Stuff?

- **EASA Conference on pilot training for a safe aviation today and tomorrow: "Are pilots trained to meet the challenge?"**
- **Pilots must be given the Knowledge, Skills and Attitudes to avoid full upset events.**
- Airbus believes that early recognition of the situation and correct decision making prevents upset.
- Better to avoid and/or recover early rather than utilize exceptional flying skills later.



The Wrong Stuff....

- Airbus does not support the use of full flight simulators to conduct upset recovery training.
- Potential for negative training once outside the established envelope.
- Accelerations and rotations felt by pilots become totally unrealistic compared to real flight.
- In certain cases, the validity of the aerodynamic model is questionable; it comes from extrapolations of the real measurements.
- ***Risk of producing significant negative training.***



Total Loss of Situational Awareness?

- We must also address the many Loss of Control incidents where pilots were unaware of their loss of Situational Awareness – upset recovery training will never help in such situations.



- And the opposite – thinking the Aircraft is upset when it is not – WAKE ENCOUNTERS.

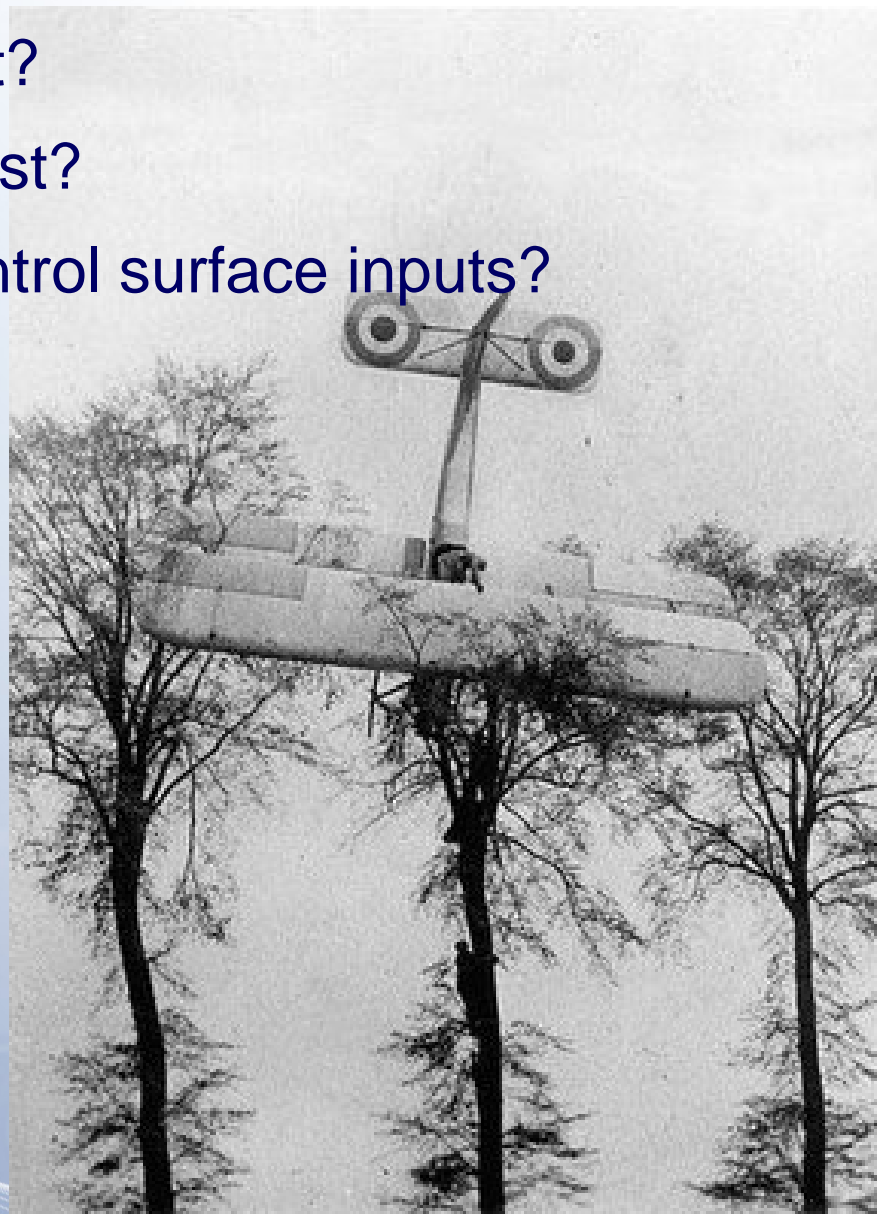


Industry Recommendations.

- Disengage the Autopilot?
- Disengage the Autothrust?
- Use Rudder and full control surface inputs?

Often the wrong thing to do!

- Smooth inputs.
- Avoid rudder.



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- Academic Training

- Simulator Training



Airbus policy

- Train an understanding of the principles of aircraft upsets and how to avoid such situations.
- Upset recovery training is encouraged in the context of awareness training but absolutely not in the context of procedural recovery training from full upset.
- High altitude exercises aimed at recognizing a developing situation rather than recovering from a subsequent event.
- The use of simulators for such training is appropriate.



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Academic Training

- Airbus Jet-ELT basic flying techniques
 - Jet Aerodynamics Briefing
 - Jet Handling Briefing
 - Pitch/Thrust
 - High Altitude Aerodynamics
- APT2 Unreliable Speed Indication exercise
- Turbulence
- E-briefing / FCOM/FCTM
- FOBN
- Upset Recovery Training Aids Issue 2



Academic Training

• Airbus JET Entry Level Training:

- High Altitude Operations
- Maneuvering Stability
- Optimum/Maximum Altitudes
- Thrust Limit Conditions
- High Alt Threats
- Buffet Limited Max Altitude
- Mach Buffet and Tuck
- High / Low Speed Stalls



AIRBUS Training & Flight Operations Support and Services A320		ELT - JET FAM COURSE		02.03 Page 1 EF2M A7	
INIT FL 350					
5 - CLIMB TO OPT FL - ECON SPEED					
■ 6 - AIRCRAFT BEHAVIOR AT HIGH ALTITUDE - FLIGHT ENVELOPE Vis - MMO - BUFFETS - TURN RADIUS				V	V
[Airline ID] 103 LAT 4338.1 N LONG 00122.1 E ALTN DIST - COST INDEX 30 FL TO ALTN - CRZ FL TEMP TRSQ FL 350 / -51° 38 090 INIT NEXT PAGE GW 80 t 132 200 lb CG 31.6 % FOB 8 t 13 200 lb ZFW 54 t 119 000 lb ZFWCG 32.8 % NOTES RWY COND DRY FPLN : LFBO 14R AIR COND ON ... FPLN DISC ... LFBO ILS 14R					
2 - CLIMB TO FL 70 ■ 3 - NORMAL LAW DEMONSTRATION ■ 4 - DEMONSTRATION OF RELATIONSHIP THRUST / SPEED : USE OF SPEED TREND				V	V
INIT FL 350					
■ 6 - AIRCRAFT BEHAVIOR AT HIGH ALTITUDE - FLIGHT ENVELOPE Vis - MMO - BUFFETS - TURN RADIUS				V	V
■ 7 - DESCENT AT 4000 FT ■ 8 - TURN RADIUS AT 250 KTS ■ 9 - AIRCRAFT DECELERATION 250 KTS TO VAPP ■ 10 - TURN RADIUS AT VAPP ■ 11 - AIRCRAFT ACCELERATION - ENGINE SPOOL UP 12 - RADAR VECTORS ■ 13 - VISUAL APPROACH - ILS SUPPORTED STABILIZED ■ 14 - LANDING				V	V

03 - SESSION GUIDE

During the entire session the instructor will provide the trainee with pitch attitude and power setting using the unreliable speed indication tables.



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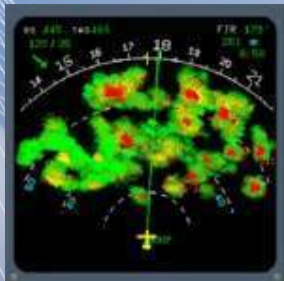
- Academic Training

- Simulator Training



Simulator Training

- Unreliable Speed Indication Simulator (Low Altitude / High Altitude)
- High Altitude Flying Techniques
- Early recognition of potential upset and early correction
- Optimum Use of Weather Radar



Recurrent Training

Handling of A318/A319/A320/A321 and A330/A340 aircraft in Alternate Law at high altitude and unreliable airspeed issues

- ▶ Airbus recommends to **Reinforce Flight Crew Training** during Recurrent Training for aircraft handling at high altitude, for example.
 - ▶ The aim is to **Consolidate Pilots Confidence in Aircraft Handling in Alternate Law** including Stall Warning response.



CLEAN				
FL	Speed	Pitch (°)/Thrust (% N1)		
Below FL 250	240 kts	5.0 / 66.6	3.5 / 62.0	2.5 / 59.7
FL 250 – FL 360	260 kts	3.5 / 79.1	2.5 / 75.4	2.0 / 73.1

Above FL 360	M 0.78	3.5 / 84.3	3.0 / 81.6	2.5 / 78.4
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We believe in more practice of manual aircraft handling skills in simulators.



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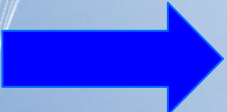
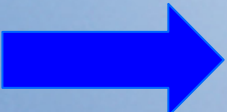
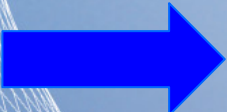


Conclusion

- Avoidance, Correct Recognition and early prevention are essential.
- Contain the Startle Factor - Do Not Overreact - Act Smoothly on the Control Inputs.
- Fly Pitch/Thrust.
- Do not disengage automation unless clearly necessary



Conclusion; best use of simulators?

	Theory of Upset	no
	Recognition and early prevention	yes
	Prevention up to normal maneuver limits	yes
	Full Upset Recovery techniques	no!

Today's Full Flight Simulators?

Create an avoidance culture rather than recovery attitude.



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