

Lessons Learned in Upset Prevention and Recovery Training

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Control in-Flight and UPRT
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Federal Aviation
Administration



Questions I imagined you having

- Do we know if UPRT is working?
- Any consensus UPRT pros/cons?
- Any unintended consequences?
- Any UPRT differences between operators?
- What are my UPRT anxieties?

Main points

- **UPRT saved at least one commercial flight last year**
- **In sim, want understanding, not muscle memory**
- **UPRT quality control is incredibly important**

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 - Both pilots said, without a doubt, UPRT they recently received saved their lives

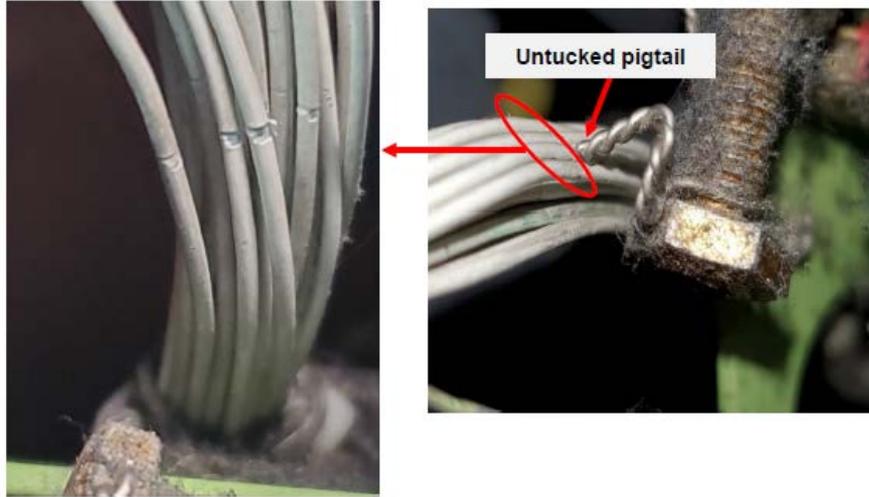
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- **Need additional industry-wide metrics**

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- **Untucked pigtail causing trim electrical short**
- **Nine other airplanes also had chafing**
- **Memory item differences between airline and OEM**
- **Used UPRT skill of banking to lower nose**

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- **Pros**
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 - Many pilots have said “why didn’t I know this before now?”
 - Some pilots saying “yes” when asked if there is anything else they would like to see during their simulator session

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- **Cons**
 - Hear that we are destroying their simulators (yet, others in the same company are saying that is not true)
 - Some frustration on expectations and implementation of some of the requirements like differences training, slow flight, bounced landing, and gusting crosswinds

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- **NTSB wishes we would mandate high-altitude full-stall training (even though most everyone does it)**
- **A few forest versus trees problems**
 - instructor station details
 - overfocus on procedure at the expense of understanding

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 - Some are meeting the letter of the law and shoehorning requirements into existing footprint
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- **My 2020 plan was travel and compare programs**
 - Then, COVID-19

My Anxieties

- **Don't want to take muscle memory from the sim to the airplane**
 - We do maneuvers and scenarios in the sim
 - Load factor is fed back to the trainee
 - Maybe that feedback suggests a do-over
 - Hopefully the do-over is better

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- **The learning points should NOT be**
 - “this is the right amount and rate of control input” as the flight condition affects that

Main point #2



My Anxieties

- **Simulator load factor limitations**

- Some recoveries feel great in the simulator – but they won't in the aircraft
 - Pulling 2.5g's in a commercial transport is unnerving, and may cause you to change your input
 - While I think aerobatic training has some benefits, it is not a fix
 - Instructors have to help bridge this big gap

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- Seeing excessive control in the simulator getting overlooked
- Seeing confusion among concepts of lift, load factor, and AOA
 - Since sim provides so little load factor, the sim is not clearing that confusion
 - Particularly seeing error of saying some display movements are from load factor, when they are from AOA (like the red zipper)
 - Load factor = L/W ; Lift = $f(\text{CAS}, \text{AOA}, \text{configuration})$; AOA = well, you know

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 - Recovery steps are the same
 - The amounts in each step are different
 - The allowed time delay between each step can be different
 - Breaking the stall is easy...it's the ensuing recovery that's hard
 - At high altitude, lack of pitch damping wreaks recovery havoc
 - At low altitude, pitch-up from too much thrust wreaks recovery havoc

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 - Knowing why it is the way it is can help prevent an upset
 - For instance:
 - Top and bottom amber bands
 - Top and bottom barber poles
 - Which ones move during maneuvering? Why?
 - Can use speed trend vector to in recoveries for proper amount and timing of pitch inputs

My Anxieties

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- **“This-is-so-unlikely-to-happen-itis”**
 - If the pilot is the lifesaver after a particular failure, then the less likely the failure happens, perhaps the more that failure needs to be trained
 - If you hardly ever train for it, you may hardly ever respond correctly

My Anxieties

- **Incomplete understanding, awareness, and use of trim**

My Anxieties

- **A LOT of people are teaching UPRT**
 - Most are quite good, and I continue to learn from others
 - Potential slippery slope with instructor turnover
 - Quality control is incredibly important



Main point #3

Conclusions

- **UPRT saved at least one commercial flight last year**
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