SASS 2019

LOC-I: UPRT

6TH MARCH 2019

INTRODUCTION

01 LOC-I: HOW COMMON? PRIMARY DEFENSES

02 UPRT: THE LAST DEFENSE

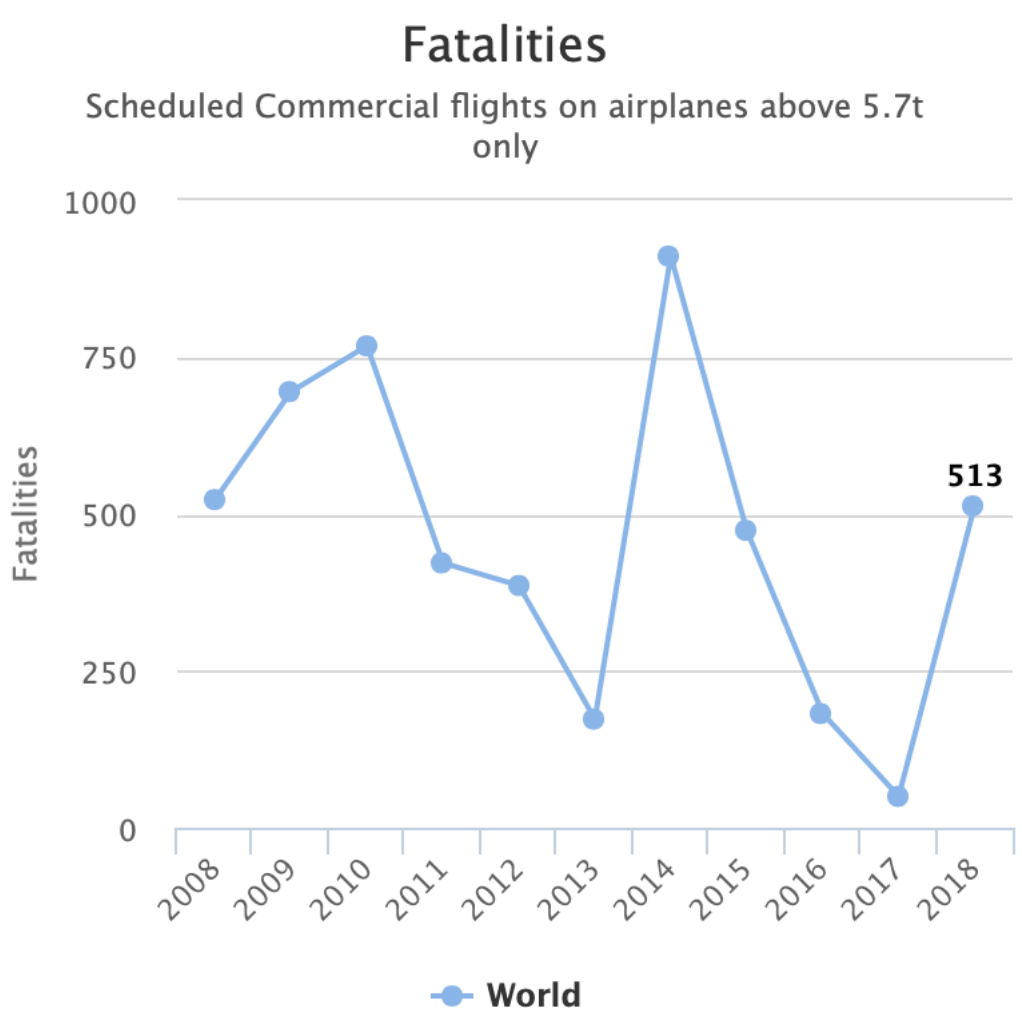
03 KEEPING UPRighT AND ENGAGED MOVING FORWARD

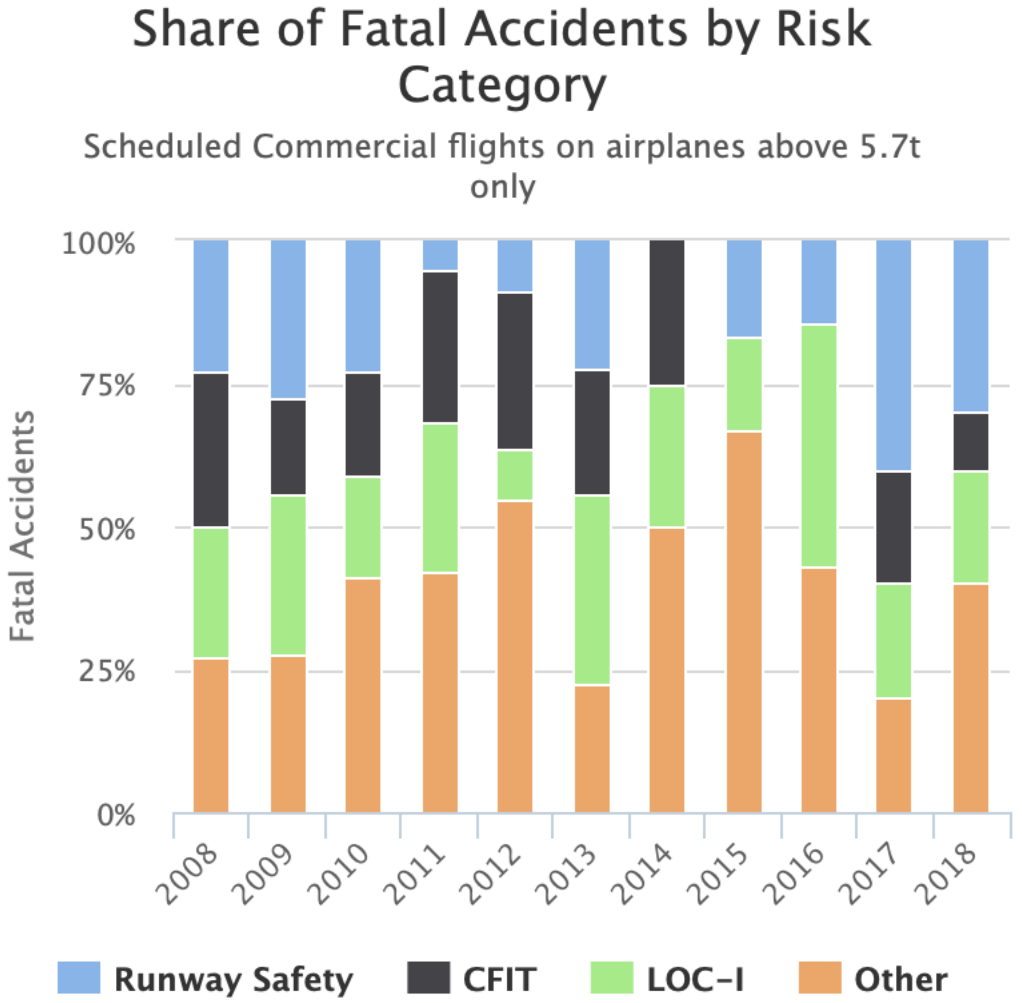
LOC-I

ICAO:

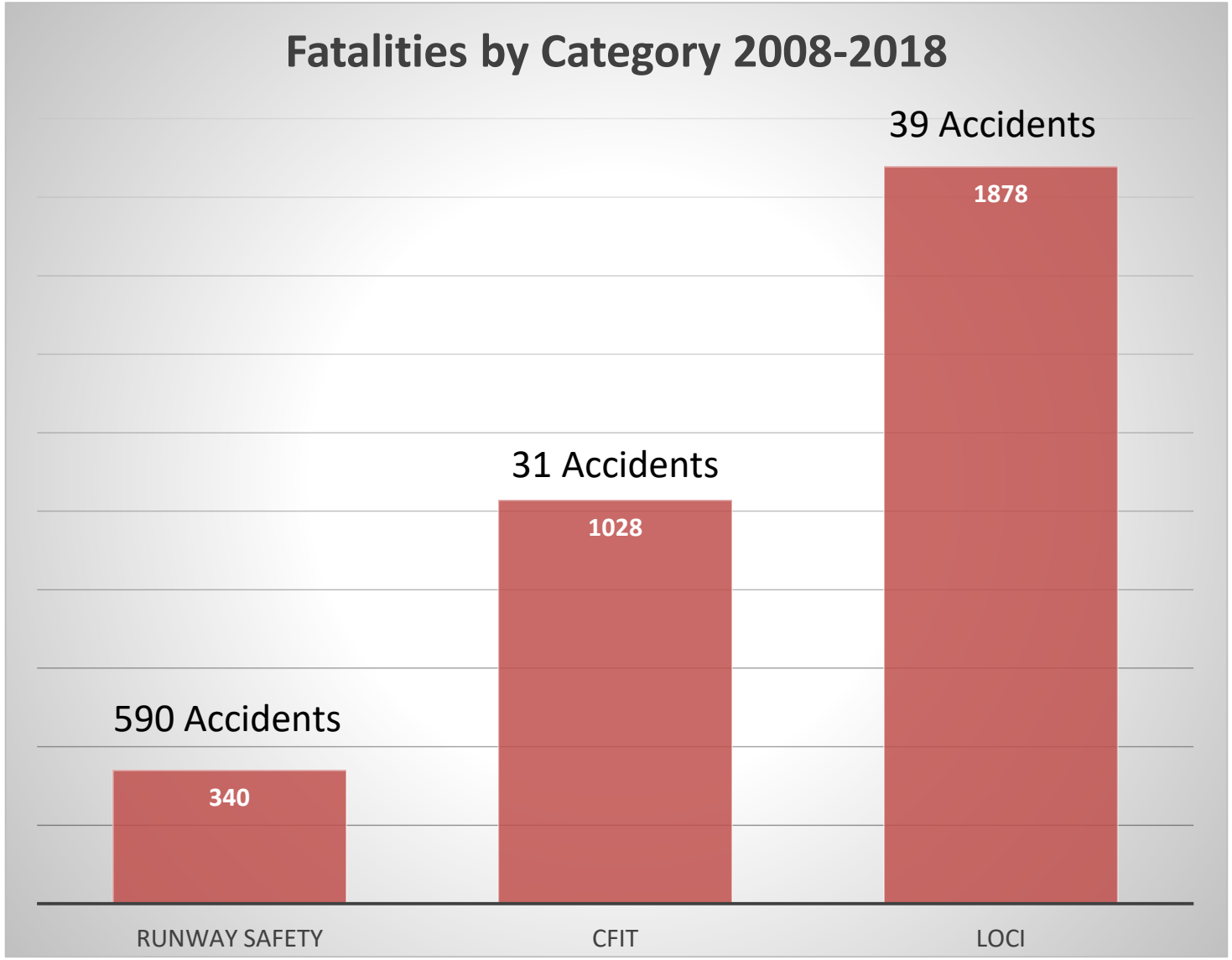
"In an ultra-safe industry, the loss of control in-flight (LOC-I) type of accidents may be rare but **on average it accounts for one quarter of all fatalities** in scheduled commercial air transport. This has made LOC-I one of ICAO's top safety priorities, along with controlled flight into terrain (CFIT) and runway safety."

ICAO Accident Statistics





Break Down


Fatalities by Category 2008-2018
590 Accidents
340
31 Accidents
1028
39 Accidents
1878
RUNWAY SAFETY
CFIT
LOCI

Preventative Mitigation

"An ounce of prevention is worth a pound of cure."
— **Benjamin Franklin**

Manual Flying Skills

Evidence-Based Training

Preventative Measures

FDM Trend Monitoring

Fatigue Risk Management

Collaborative Incident Reporting

- FAA, in its AC 120-111 of April 2015, has indicated that research evidence showed that in many LOC-I incidents and accidents, **the pilot monitoring (PM) may have been more aware of the aeroplane state than the pilot flying (PF)**.

- Debrief and incident reports also confirm this.

- The role of pilot monitoring is more crucial than ever – especially when it comes to preventing LOC-I.

- P.A.C.E model

UPRT: The Last Defense?

To supplement prevention…

- Pilot's must be able to revert to a basic level of flying skill to prevent a LOC-I incident becoming an LOC-I accident.
- So, what are these "basic level flying skills" and when do we learn them?

UPRT: The Last Defense?

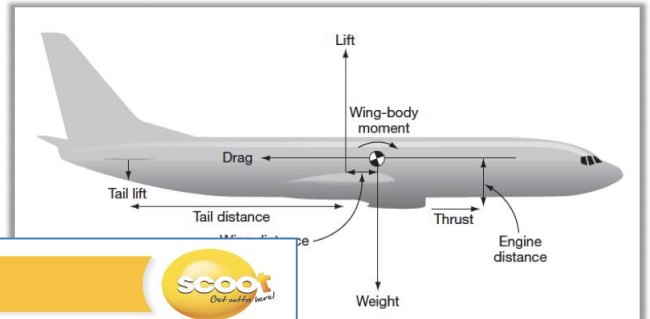
- Scoot's UPRT training program consists of **initial** and recurrent **exercises**

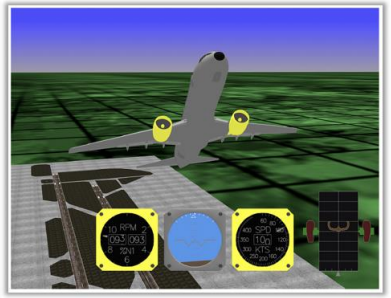
- Training Objectives:
  - **Recognise** an upset.
  - **Avoid** an upset.
  - **Recover** from an upset.

- Computer-based training… all 156 slides!

Advanced aerodynamics (Extremely low airspeed)

- Flight at extremely low airspeeds becomes **more complicated** when **thrust** is considered

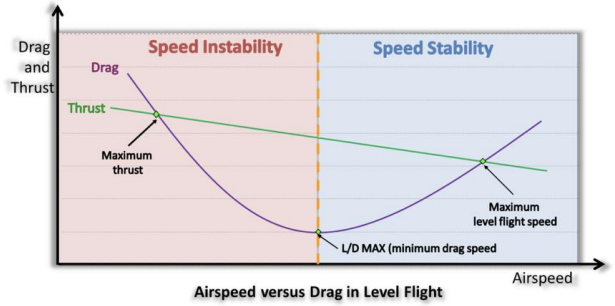




As speed decreases, thrust increases – Nose up moment
Higher nose up attitude – lower airspeed

Advanced aerodynamics (High Altitude / LD Max)

- The lowest point on the total drag curve (as indicated in figure below) is known as L/D_{MAX} (or V_{md} - minimum drag speed)
- The speed range **slower than L/D_{MAX}** is known as slow flight, which is sometimes referred to as the **"back side of the power-drag curve"**
- **Speed faster than L/D_{MAX}** is considered normal flight, or the **"front side of the power-drag curve"**
- **Normal flight = Stable flight**
  Airspeed disturbances (i.e. turbulence) airspeed will return to the original airspeed when thrust has not changed



Airspeed versus Drag in Level Flight

Advanced aerodynamics (High and low altitude)

As **altitude increases** – **High speed** buffet **decrease**
As **altitude increases** – **Indicated airspeed** (IAS) for **low speed** buffet **increases**
sulting in a narrow margin between High speed and Low Speed buffet decreases

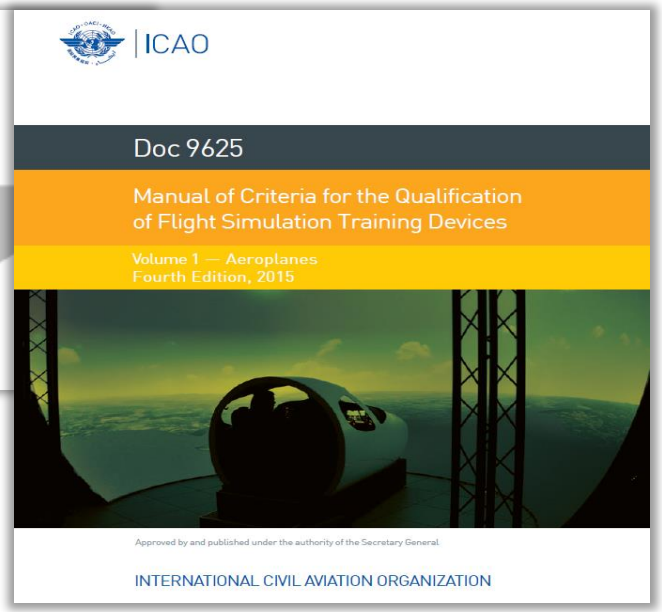
High Speed Buffet
Low Speed Buffet

Respect buffet margins - Proper use of buffet boundary charts or maneuver capability charts and FMC calculations allows the crew to determine the maximum altitude.

Avoiding Negative Training

- Simulator Fidelity
  - FSTD modification
  - IOS capability
  - Training envelope clarified

> Unless the UPRT FSTD's simulation model satisfactorily represents the aeroplane's behaviour and performance during an aerodynamic stall, training demonstrating conditions beyond the critical angle of attack can create harmful misperceptions about such an event and the recovery experience. For this reason, CAAs should consider requiring ATOs and, if applicable, operators to implement the recommendations for FSTD improvements contained in Paragraphs 4.2 and 4.4 without undue delay. This is covered in more detail in Doc 9625, Volume I and the RAeS *Research and Technology Report*.



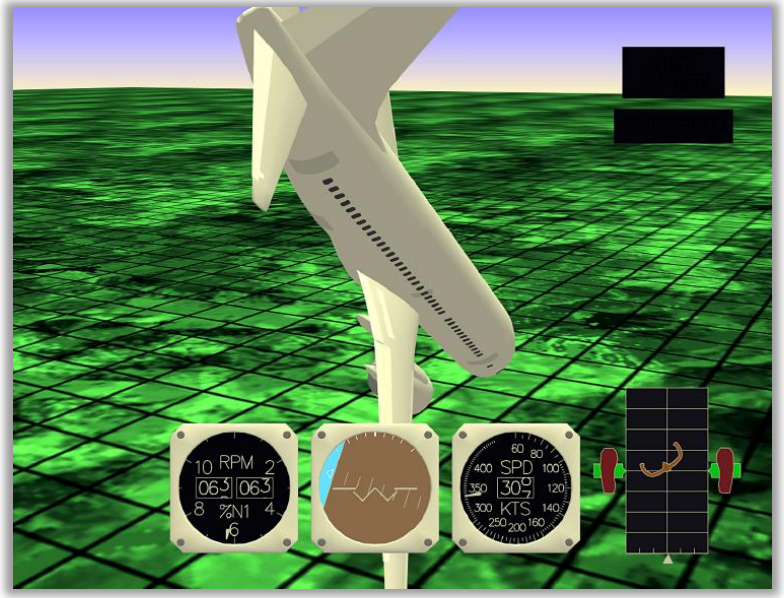
- Instructor Training
  - Recognition of inappropriate input
  - Understand FSTD limits

- Student Demonstration
  - Maneuver based Training
  - Maintained within FSTD training envelope

- *Realistic* Application (within normal envelope)
  - Scenario based Training

Stages of UPRT Training

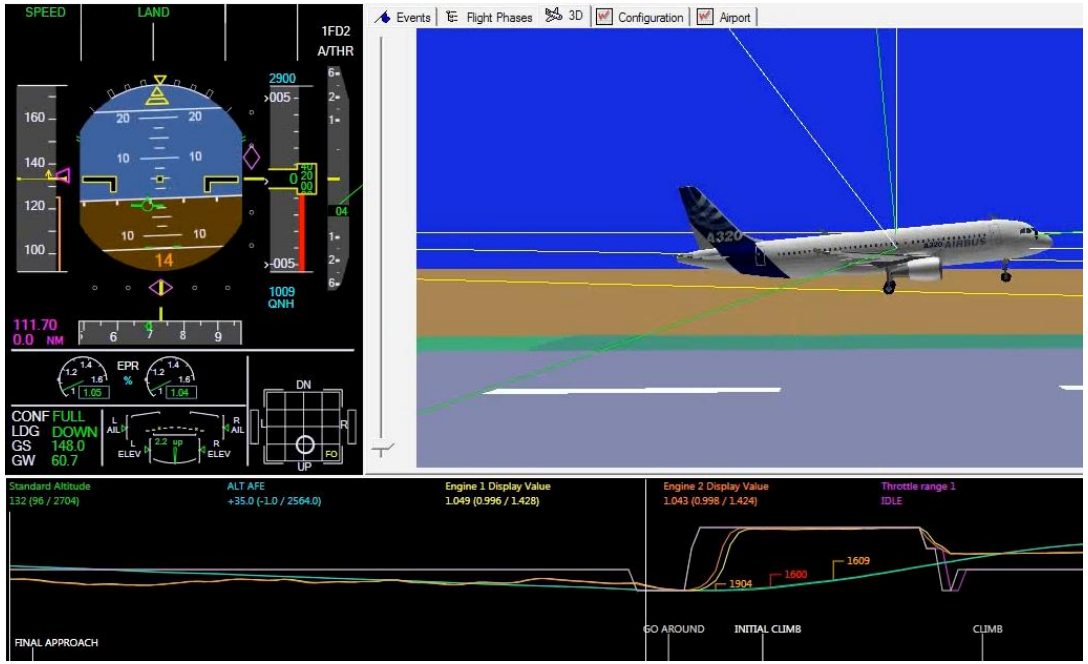
- Identifying situations when/where an undesired aircraft state may develop.
- Identifying deficiencies in KSA markers that can result in LOC-I e.g. “**SITUATIONAL AWARENESS**”.
- Reinforcing the role of Pilot Monitoring.
- Scenarios:
  - High attitude
  - Loss of Reliable Airspeed
  - Sub-Threshold Roll
  - Manually-Controlled Slow Flight



Instructor's Remarks and Certification
PRO
COMM
AFPM AUTO
AFPM MAN
LTW
PSD
SAW
WLM

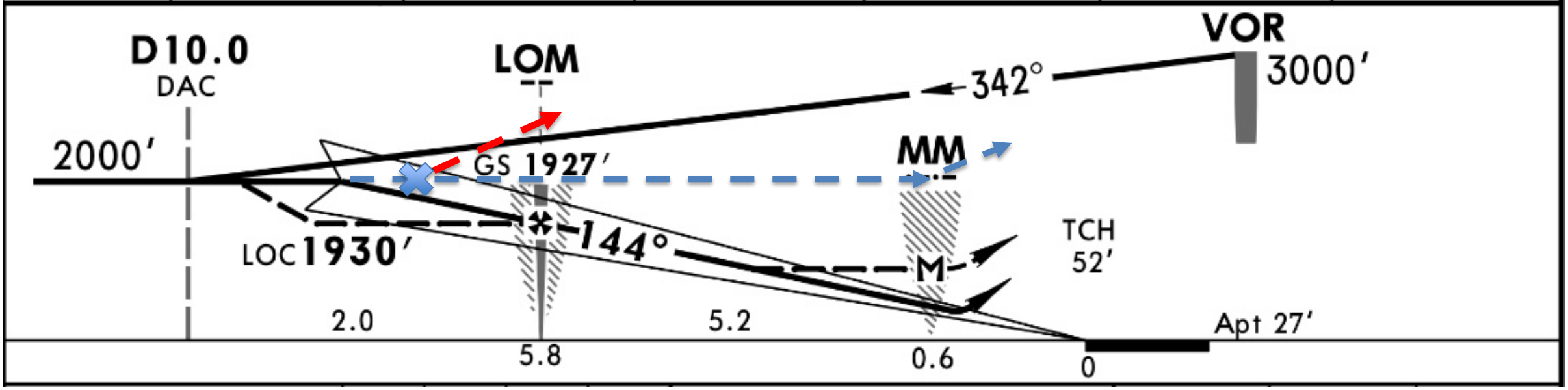
KEEPING UPRighT AND ENGAGED MOVING FORWARD

- UPRT in Recurrent Training
- All previously mentioned exercises plus:
- Evidence-Based Training Scenarios of events we have experienced within the industry
- “Startle” Element
- At least once every 3 years.
- Emphasis of **KSAs** and **TEM**



Example Flight Profile

LOC (GS out)	DAC DME	8.0	7.0	6.0	5.0	4.0
	ALTITUDE	1930′	1610′	1290′	970′	650′



Platform height capture – 2000ft

A/P Disconnected. PF meant to continue. PM mean to Go-Around

KSA errors? SAW / AFPM AUTO

Who flew the aircraft?

How to re-engage the crew?

THANK YOU

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