CAMiGUiN AViATiON

On - Airplane UPRT

INTRODUCTION

The Camiguin Aviation On-Airplane Upset Prevention and Recovery Training program (CamAv OA UPRT) emulates established training scenarios presented in the following industry publications while at the same time introducing physiological (G-forces) and psychological (startle) elements:

- ICAO (2008). *Manual on Aeroplane Upset Prevention and Recovery Training (Doc 10011)*.
- Upset Recovery Industry Team (2008). *Aeroplane Upset Recovery Training Aid Rev. 2 (AURTA).*
- ICAO, Airbus, ATR, Boeing, Bombardier, Embraer (2017). *Aeroplane Upset Prevention and Recovery Training Aid, Rev. 3 (AUPRTA).*
- CAA Philippines (2018). *Philippine Civil Aviation Regulations, Parts 2, 3 and 8.*

FLIGHT TRAINING PROGRAM

CamAv OA UPRT follows a *Training-to-Proficiency* approach (ICAO Doc 10011, Sec. 1.3.6, 2.1.3) in lieu of the traditional 'checkbox-done-that' testing approach (ICAO Doc 10011, Sec. 2.2.3). The goal is to produce pilots that can deal with upset scenarios under the potentially incapacitating effects of startle and G-forces.

Training Aircraft

CamAv OA UPRT utilizes the aerobatic-certified American Champion Super Decathlon 8KCAB. Utilization of an aerobatic aircraft opens up a greater range of training manoeuvres (ICAO Doc 10011, Sec. 3.3.1.2).

Startle and G-Forces

Startle is minimized by teaching students to engage and be aware of the airplane's energy state and flightpath (AUPRTA, Rev. 3, Sec. 7.2.1). Startle can further be minimized by removing *fear-of-the-unknown*. For that purpose, students will be exposed to specific flight-envelope extremities that build confidence and trust in an airplane's aerodynamic capabilities. In addition to +G forces, pilots will experience the uncomforting sense of 'being negative' and the physiological/psychological aspects that come with it.

Minimizing Negative Transfer of Training

Emphasis is placed on training within the extended flight envelope of commercial airliners. However, this flight envelope might, at the discretion of the OA UPRT instructor, be exceeded to emphasize specific training elements. To minimize negative transfer of training at such times (CAAP, PCAR 2, Sec. IS 2.3.3.3, App. C) the OA UPRT instructor will discuss with students relevant points, for example:

- Most aerobatic airplanes initiate stall recovery by simply 'unloading' the controls; commercial jet airliners, however, require an additional 'forward nudge' on the stick (nose-down input) to recover.
- Aerobatic airplanes withstand G-loads such as (+6G to -5G) or higher, while commercial airliners operate within (+2.5G to -1G).
- Aerobatic airplanes are flown with more aggressive rudder inputs than commercial airliners.
- The initial procedure during upset recovery in a commercial airliner is to turn OFF the auto-throttle and auto-pilot, both of which aerobatic airplanes do not have.
- In aerobatic airplanes pilots use their index finger to 'fly or feel' the angle of attack (AoA). In airliners, pilots utilize the digital AoA meter in conjunction with the index finger.

FLIGHT TRAINING SYLLABUS

Aircraft Handling Characteristics *(Objective: to introduce the aircraft and the concept of 'flying by feel')*

	Trainee Mistakes	*Instructor Notes*
Exercise 1: **Rolling to 60° using aileron**	Control inputs not decisive enough or too abrupt. No UP rudder causing nose to drop and an increase in airspeed.	Trainee is nervous. Promote looking right, left, up, down at all times to start practicing **spatial awareness**.
Exercise 2: **Rolling to 15° using rudder**	No nose-up nudge prior to roll. Abrupt application of rudder.	Mention commercial airliners must use **gentle rudder inputs**.
Exercise 3: **Changing pitch with elevator trim**	If surprised, trainee **startles** and forgets to push nose down.	Discuss startle if it happens and runaway elevator trim scenario.
Exercise 4: **Changing pitch with thrust**		Discuss thrust as powerful tool on underwing-engined airliners.
Exercise 5: **Aileron Roll**	No pitch-up prior to rolling causing diving roll. Looks only ahead. **Indecisive** control inputs. Difficulty finding wings level after 360° roll.	Aileron rolls **build confidence** and **spatial awareness** and should be flown prior to stalls. Trainee should look out all sides throughout the roll.
Exercise 6: **Stall/Incipient Spin**	Due to prior training, student is tense before/during recovery, focuses too much on **altitude loss**, possibly startles. Does not UNLOAD, LEVEL, NUDGE, PULL. Exit speed too low, entering a **secondary stall**. Does not recognize spin onset.	Emphasize following **OEM stall recovery**. Discuss approach to stall and buffet. Teach to **feel the AoA** in the fingertips and not worry about **altitude loss**. **** Throughout every lesson, emphasize **gaining control** by: UNLOAD, LEVEL, NUDGE, PULL*

Nose-High Recovery Exercises *(Objective: to teach recovery from upsets that cause the aircraft to pitch up)*

	Trainee Mistakes	*Instructor Notes*
Exercise 1: **Lowering nose using PITCH**	Does not announce 'Nose High' or 'Auto-Pilot/Throttle OFF'. Weak, delayed control inputs. Does not realize nose is pitching up until airplane is pitched 90°.	Discuss if it is really necessary to turn auto-functions OFF. Discuss view turning to sky, in airliners ground will disappear except if you look sideways.
Exercise 2: **Lowering nose using ROLL**	Too much roll, too little roll. Rolls out at too high a pitch attitude, stalling the airplane.	Ensure proper entry speed. Discuss Spiral Dive. Explain secondary stall during pull-up.
Exercise 3: **Lowering nose using YAW**	Too much yaw, too little yaw. Steps on rudder too abruptly, stressing the airplane. Looses airspeed, stalls the airplane.	Ensure proper entry speed. Discuss Spiral Dive. Discuss potential of **rudder damage** on commercial airliners.
Exercise 4: **Lowering nose using THRUST**	Abrupt throttle application.	Emphasize this works better on underwing-engined airplanes.
Exercise 5: **Combining PITCH, ROLL & THRUST**	Any combination of mistakes mentioned before.	Encourage 'playing around', freely combining all techniques.

Nose-Low Recovery Exercises *(Objective: to teach recovery from upsets that cause the aircraft to pitch down)*

	Trainee Mistakes	*Instructor Notes*
Exercise 1: **Nose-low recovery**	Does not announce 'Nose Low' or 'Auto-Pilot/Throttle OFF'. Control inputs not decisive or too abrupt. Wings not level prior to pull-out. Slow recovery and airspeed approaching V_{ne}.	Discuss if it is really necessary to turn auto-functions OFF. Explain V_{ne} and G-Force. Discuss view turning to ground, in airliners the sky will likely have disappeared.
Exercise 2: **Spiral Dive**	Trainee does not **unload**, does not reduce power, pulls prior to reaching wings level.	Remind students to act swiftly, but smoothly. Discuss altitude loss, airspeed increase, V_{ne} and increase in G-load if pulling before wings are level.
Exercise 3: **Banking past 60°**	Startle. Wings not rolled to level before pulling nose up. Failure to roll back the shortest route. Student 'pulls through' into a Split-S approaching V_{ne}.	Discuss causes: wake vortices, rotor clouds, system malfunctions. **CAUTION:** If near inverted, student might 'pull through' and inadvertently execute a high-speed Split-S.

Specialized Flight Maneuvers *(Objective: to teach 'unloading' and build confidence without negative transfer)*

	Trainee Mistakes	*Instructor Notes*
Exercise 1: **Wing-Over**	Pilot does not trust airplane's aerodynamic capabilities and heavily controls it at the top, without completely **unloading**.	This exercise builds trust in the airplane. Pilots should **unload** at the top, feeling the airplane fly itself around into a 180° heading change.
Exercise 2: **Inverted Flight**	Nose drops while trying to maintain inverted horizontal level flight approaching V_{ne}. Reduced cognitive ability while flying upside down.	Point out the difficulty of cognitive processes while upside down. Discuss the effect that -1 G can have on aircraft systems and the potential for malfunctions. C**AUTION:** Student might 'pull through' and inadvertently execute a high-speed Split-S.
Exercise 3: **Half-loop, unloading at the top**	Student not looking sideways and not **unloading** at the inverted top. Does not roll wings to level-upright prior to pulling nose up and allows the airspeed to rapidly approach V_{ne}.	Emphasize the importance of **unloading** when spatially disoriented; commercial airliners have positive static control and will 'wind cock', if you let them. Discuss the importance of rolling wings to level-upright prior to pulling the nose up.

- End -

LIST OF REFERENCES

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Donoghue, J. A. (2011). *Stop Stalling*. Flight Safety Foundation, AeroSafety World Magazine, P. 46-49.

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