

*The following table provides supporting information from the article: [Why Business Jets for Upset Training Is Not the Best Investment](#)

8 Quantitative LOC-I Mitigation Criteria

Vital UPRT Success Elements ¹	Weight [†]	Best Platform	Order ^{††}
<p>#1 Human Factors²</p> <ul style="list-style-type: none"> Startle and Stress Response (psychophysiological and cognitive effects and management strategies) Situational Awareness (information processing, perceptual illusions, and spatial disorientation) 	10	<p>Best: Aerobatic Piston Adequate: Aerobatic Jet Marginal: Non-Aerobatic Jet Ineffective: Simulator</p>	1
<p>#2 All-Attitude Environment Immersion</p> <ul style="list-style-type: none"> The accomplishment of immersion requires robust, over multiple flights and multiple days, hands-on management of flight attitude, bank angle, angle of attack, energy, load/drag tools, with a full view of the horizon while operating in diverse combinations of all pitch angles up to 90 degrees and all bank angles up to 180 degrees. 	10	<p>Best: Aerobatic Piston and Jet Adequate: Simulator Marginal: Non-Aerobatic Jet</p>	1
<p>#3 Strategy Application Resilience in a Crisis</p> <ul style="list-style-type: none"> UPRT Techniques³ (timely, appropriate intervention, and are maximize while being performed during nose high-wings-level, nose low-wings-level, high bank angles, and consolidated techniques) Specialized Training Elements⁴ (spiral, slow flight, approach to stall, stall, and the value maximized during uncoordinated stalls, nose high/low plus slow/high speed variations, high bank, <i>wake turbulence</i>, line-oriented flight training (LOFT) and/or line-operated simulation (LOS) Flight Path Management 	10	<p>Best: Aerobatic Piston and Jet Adequate: Simulator Marginal: Non-Aerobatic Jet</p>	1
<p>#4 G-Awareness⁵</p> <ul style="list-style-type: none"> Positive, negative, increase=ing, and decreasing g-load, G-load management (<i>application, unload, overload - instantaneous and sustained</i>), and lateral g-awareness (sideslip)) 	8	<p>Best: Aerobatic Jet and Piston Adequate: Non-Aerobatic Jet Ineffective: Simulator</p>	1
<p>#5 Repetition to Proficiency (Amount of Practice) in the Widest Diversity of Airplane Upset Conditions⁶</p> <ul style="list-style-type: none"> This criteria is essential to the habituation and over-learning process and must be strategy/technique focused as applied to a substantial number of unplanned all-attitude upset conditions to include upsets, stalls, simulated wake encounters, and combinations with at least ½ of the events generated from unplanned and/or startling entries. 	8	<p>Best: Aerobatic Piston and Jet Adequate: Simulator and Non-Aerobatic Jet</p>	2
<p>#6 Very Low Altitude and All-Weather Upsets⁷</p> <ul style="list-style-type: none"> Potential airplane upset events where the recovery altitude is below safe and legal recovery altitudes or LODA-approved altitudes from aerobatic maneuvers. Night and IFR airplane upset events that do not meet the ceiling and visibility requirements for aerobatic maneuvering (hood or foggles partially effective). <p>Events conducted in a true CRM environment in transport category or business jet glass cockpits.</p>	7	<p>Best: Simulator Unsafe / Ineffective: Aerobatic and Non-Aerobatic Jet and Aerobatic Piston</p>	3
<p>#7 Crew Resource Management (CRM)⁸</p> <ul style="list-style-type: none"> Implementation on specific or generic aeroplane types to build knowledge and experience at all stages of flight <i>in accordance</i> 	6	<p>Best: Simulator (trainees in both seats)</p>	3

with the operator's established CRM practices.

- Teamwork, managing workload, and vocalizing airplane state, energy, and updated crosscheck.

Marginal: Aerobic
Piston and Jet,
Simulator, and
Non-Aerobic Jet with
Instructor acting as one
crew member.

#8 Representative Control Feel and Response⁹

5

- Simulator will be accurate in flight tested range of the normal envelope.
- Control forces and response rates can vary dramatically between aircraft with powered/boosted vs. manual flight controls

Best: Simulator and
Some Non-Aerobic
Jets

Adequate: Aerobic Jet
Marginal: Aerobic
Piston

3

[†] **Relative Weight:** 10 represents the maximum importance. I.e. 10 is twice as important as 5.

^{††} **Relative Order:** 1 represents the first order of priority in pilot-performance-optimized UPRT

Aerobic Piston = Piston Aerobic Airplane (Roll Rate > 200 deg/sec & Pitch Rate > 20 deg/sec)

Aerobic Jet = Turbofan/jet/prop Aerobic Airplane (Roll Rate > 120 deg/sec & Pitch Rate > 10 deg/sec)

Non-Aerobic Jet = Jet airplane, including transport category, commuter, normal, and many utility category airplanes, not certified for safe operations beyond 30 deg of pitch and/or 60 deg of bank

Simulator = Class-specific advanced multi-engine simulator with glass cockpit, side by side seating, and representative validated aeromodel

Notes

1. The prioritization, weight, platform assessments, and order of the Top 7 Vital UPRT Success Elements in this table are based on the direct, first-hand experience of Aviation Performance Solutions in the delivery of ICAO-compliant UPRT to over 90,000 pilots over a period of 23 years in varying levels of academic, on-aircraft (piston & jet), and simulator (fixed based, full motion, and extended envelope) UPRT. Items in italics were added by APS as known/proven essential items.

2. ICAO UPRT Manual (ICAO Manual on Aeroplane Upset Prevention and Recovery Training), 2014, Table 2-1 UPRT Training Elements, Components, and Platforms [Table 2-1, Section K], and AURTA (Airplane Upset Recovery Training Aid - Revision 2) [Section 2.2.2.11.10]

3. Ibid ICAO UPRT Manual [Table 2-1, Section H], and ibid [Sections 2.6.1, 2.6.3.2-2.6.3.5]

4. Ibid ICAO UPRT Manual [Table 2-1, Section I], and ibid [Sections 2.5.5.7, 2.6.3.2-2.6.3.5, Section 3]

5. Ibid ICAO UPRT Manual [Table 2-1, Section D], and ibid [Sections 2.5.3, 2.6.2.2]

6. Ibid ICAO UPRT Manual [Section 3.3.1.1, Table 3-1 Sections E, F 2), and J 8) and J 9), Section 3.3.2.1.2, Table 3-2 Section F 2), F 3), J 7), J 8), J 9), J 10), and J 11), Table 3-3 Section A, F 7), F 8), F 9), F 10), F 11), F 12), and Appendix A Section 4.

7. Ibid ICAO UPRT Manual [Table 2-1 Section A, Table 3-1 Section F, Sections 3.3.1.5, 3.3.2.1.1, Table 3-2 Section A, F and K, Table 3-3 Section A, E, and F, and Sections 3.4.2.7 and 3.4.2.8

8. Ibid ICAO UPRT Manual [Table 2-1 Section K, Section 2.1.2, Table 3-1 Section K, Table 3-2 Sections E and K]

9. Not specifically mentioned in ICAO Doc 10011, although implied in non-type-specific and type-specific training sections. This element is considered important by APS but not at the exclusion of, or in higher priority than, the seven vital elements preceding it.