ICAO Ref. (Doc 100111)	Description	EASA AIR OPS Reference (AMC1 ORO.FC.220&230)		Comments	EASA FQCY	AURTA Ref	ACADEMIC Training Required ICAO	ACADEMIC Training Required EASA	ACADEMIC Training AIB Platform	FSTD Training Required ICAO	FSTD Training Required EASA	FSTD Training Description	FSTD Training Platform	FSTD Training Airbus Reco
A.	**Aerodynamics**	**A**	**Aerodynamics**											
1	General aerodynamic characteristics	1	General aerodynamic characteristics		Every 12 calendar months, such that all the elements are covered over a period not exceeding 3 years	2.5	Yes	Yes	CBT/EL	NO	NO	Refer to Description	FSTD	See below
2	Advanced aerodynamics	This element is included in EASA A.1 General aerodynamic Characteristics					Yes	N/A	CBT/EL	Yes	N/A		FSTD	See below
3	Aeroplane certification and limitations	2	Aeroplane certification and limitations				Yes	Yes	Yes	Yes	N/A*	*covered by another EASA regulatory requirement.	FSTD	See below
4	Aerodynamics (high and low altitudes)	3	Aerodynamics (high and low altitudes)				Yes	Yes	Yes	Yes	Yes		FSTD	See below
5	Aeroplane performance (high and low altitudes)	4	Aeroplane performance (high and low altitudes)				Yes	Yes	Yes	Yes	Yes		FSTD	See below
6	Angle of attack (AOA) and stall awareness	5	Angle of attack (AOA) and stall awareness				Yes	Yes	Yes	Yes	Yes		FSTD	See below
7	Stick Shaker activation	6	Stick shaker or other stall-warning device activation (as applicable)				Yes	Yes	Yes	Yes	Yes		FSTD	See below
7.i	Stick pusher (as applicable)	7	Stick pusher (as applicable)				Yes	Yes	Yes	Yes	Yes		FSTD	See below
7.ii	Mach effects (if applicable to the aeroplane type)	8	Mach effects (if applicable to the aeroplane type)				Yes	Yes	Yes	Yes	Yes		FSTD	See below
8	Aeroplane stability	9	Aeroplane stability				Yes	Yes	Yes	Yes	Yes		FSTD	See below
9	Control surface fundamentals	10	Control surface fundamentals				Yes	Yes	Yes	Yes	Yes		FSTD	See below
9.i	Use of trims	11	Use of trims				Yes	Yes	Yes	Yes	Yes		FSTD	See below
10	Icing and contamination effects	12	Icing and contamination effects					Yes	CBT/EL		Yes		FSTD	See below
11	Propeller slipstream (as applicable)	13	Propeller slipstream (as applicable)			-	Yes	Yes	CBT/EL	Yes	Yes		FSTD	See below
B.	**Causes of and contributing factors to upsets**	**B**	**Causes of and contributing factors to upsets**											
1	Environmental	1	Environmental			2.4	Yes	Yes	EL	Yes	N/A*	Refer to Description	FSTD	See below
2	Pilot-induced	2	Pilot-induced				Yes	Yes	EL	Yes	N/A*	*covered by EASA regulatory SMS requirement	FSTD	See below
3	Mechanical (aeroplane systems)	3	Mechanical (aeroplane systems)				Yes	Yes	EL	Yes	N/A*		FSTD	See below
C.	**Safety review of accidents and incidents relating to aeroplane upsets**	**C**	**Safety review of accidents and incidents relating to aeroplane upsets**				Yes	N/A	EL	Yes	N/A			
		1	Safety review of accidents and incidents relating to aeroplane upsets				N/A	Yes	EL	N/A	N/A	Refer to Description	FSTD	See below
D.	**G-Awareness**	**D**	**g-load awareness and management**											
1	Positive/negative/increasing/decreasing g-loads	1	Positive/negative/increasing/decreasing g-loads			2.5.3 & 2.6.2.2	Yes	Yes	EL	Yes	Yes	Refer to Description	FSTD*	See below
2	Lateral g awareness (sideslip)	2	Lateral g awareness (sideslip)				Yes	Yes	EL	Yes	Yes		FSTD*	See below
3	g-load management	3	g-load management				Yes	Yes	EL	Yes	Yes		FSTD*	See below
E.	**Energy management**	**E.**	**Energy management**											
1	Kinetic energy vs potential energy vs chemical energy (power)	1	Kinetic energy vs potential energy vs chemical energy (power)	Referring to the Pilot Competencies: ICAO E1 is part of SAW ICAO E2 & ICAO E3 are part of FPA or FPM		2.5.2	Yes	Yes	EL	Yes	Yes	Refer to Description	FSTD	See below
2	Relationship between pitch, power and performance	This element is included in EASA F. Flight Path Management					Yes	N/A	EL	Yes	N/A		FSTD	See below
3	Performance and effects of differing power plants	This element is included in EASA F. Flight Path Management					Yes	N/A	EL	Yes	N/A		FSTD	See below
F.	**Flight path management**	**F.**	**Flight path management**											
-	-	1	Relationship between pitch, power and performance	Referring to the Pilot Competencies: EASA F1 & EASA F2 are part of FPA or FPM		-	N/A	Yes	EL	N/A	Yes	Refer to Description	FSTD	See below
-	-	2	Performance and effects of differing power plants (if applicable)			-	N/A	Yes	EL	N/A	Yes		FSTD	See below
1	automation inputs for guidance and control	3	Manual and automation inputs for guidance and control			-	Yes	Yes	EL	Yes	Yes		FSTD	See below
2	Type-specific characteristics	4	Type-specific characteristics			-	Yes	Yes	EL	Yes	Yes		FSTD	See below
-	-	5	Management of go-arounds from various stages during the approach			-	N/A	Yes	EL	N/A	Yes		FSTD	See below
3	Automation management	6	Automation management			-	Yes	Yes	EL	Yes	Yes		FSTD	See below
-	-	7	Proper use of rudder			-	N/A	Yes	EL	N/A	Yes		FSTD	See below
4	Manual handling skills	**I**	**Manual handling skills (no autopilot, no autothrust/autothrottle and, where possible, without flight directors)**			-	Yes	N/A	EL	Yes	N/A		FSTD	See below
-	-	1	Flight at different speeds, including slow flight, and altitudes within the full normal flight envelope			-	N/A	NO	EL	N/A	Yes		FSTD	See below
-	-	2	Procedural instrument flying and manoeuvring including instrument departure and arrival			-	N/A	NO	EL	N/A	Yes		FSTD	See below

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-	-	3	Visual approach			-	N/A	NO	EL	N/A	Yes		FSTD	See below
-	-	4	Go-arounds from various stages during the approach			-	N/A	Yes	EL	N/A	Yes		FSTD	See below
-	-	5	Steep turns			-	N/A	NO	EL	N/A	Yes		FSTD	See below
G.	**Recognition**	**G.**	**Recognition**											
1	Type-specific examples of physiological, visual and instrument clues during developing and developed upsets	**1**	Type-specific examples of physiological, visual and instrument clues during developing and developed upsets			-	**Yes**	Yes	**EL**	**Yes**	Yes	Refer to Description	FSTD	See below
2	Pitch/power/roll/yaw	**2**	Pitch/power/roll/yaw			**2.5.5.5. & 2.5.5.9**	**Yes**	Yes	**EL**	**Yes**	Yes		FSTD	See below
3	Effective scanning (effective monitoring)	**3**	Effective scanning (effective monitoring)			-	**Yes**	Yes	**EL**	**Yes**	Yes		FSTD	See below
4	Stall protection systems and cues	**4**	**Type-specific** stall protection systems and cues			-	**Yes**	Yes	**EL**	**Yes**	Yes		FSTD	See below
5	Criteria for identifying stalls and upsets	**5**	Criteria for identifying stalls and upsets			-	**Yes**	Yes	**EL**	**Yes**	Yes		FSTD	See below
H.	**Upset Prevention and Recovery Techniques**	**A**	**Recovery from developed upsets**	**Recovery Training - A**										
1	Timely and appropriate intervention	**1**	Timely and appropriate intervention	For EASA, refer to Recovery from developed upsets	all the exercises are covered over a period not exceeding 3 years.	**2.6.1**	**Yes**	Yes	**EL**	**Yes**	Yes	Refer to Description	FSTD	See below
-	-	2	Recovery from **stall events**, in the following configurations; — take-off configuration, — clean configuration low altitude, — clean configuration near maximum operating altitude, and — landing configuration during the approach phase.	ICAO addresses this element within chapter J. Specialized elements		-	**N/A**	Yes	**EL**	**N/A**	Yes		FSTD+	See below
-	-	3	Recovery from nose high at various bank angles			-	**N/A**	Yes	**EL**	**N/A**	Yes		FSTD*	See below
-	-	4	Recovery from nose low at various bank angles			-	**N/A**	Yes	**EL**	**N/A**	Yes		FSTD	See below
2	nose high/wings level recovery	**This element is included in EASA 3 (see above)**					**Yes**	**N/A**	**EL**	**Yes**	**N/A**		FSTD*	See below
3	nose low/wings level recovery	**This element is included in EASA 3 (see above)**				**2.6.3.2 to 2.6.3.5**	**Yes**	**N/A**	**EL**	**Yes**	**N/A**		FSTD	See below
4	high bank angle recovery techniques	**This element is included in EASA 3 (see above)**					**Yes**	**N/A**	**EL**	**Yes**	**N/A**		FSTD	See below
5	Consolidated summary of aeroplane recovery techniques	5	Consolidated summary of aeroplane recovery techniques				**Yes**	Yes	**EL**	**Yes**	Yes		FSTD*	See below
I.	**System malfunction (including immediate handling and subsequent operational considerations, as applicable)**	**H**	**System malfunction (including immediate handling and subsequent operational considerations, as applicable)**											
1	Flight control anomalies	**1**	Flight control **defects**		every 12 calendar months, such that all the elements are covered over a period not exceeding 3 years		**Yes**	Yes	**EL**	**Yes**	Yes	Refer to Description	FSTD	See below
2	Power failure (partial or full)	**2**	**Engine** failure (partial or full)				**Yes**	Yes	**EL**	**Yes**	Yes		FSTD	See below
3	Instrument failures	**3**	Instrument failures				**Yes**	Yes	**EL**	**Yes**	Yes		FSTD	See below
		4	Loss of reliable airspeed	EASA Special Emphasis (Part of Instrument failures)		**2.4.2**	**N/A**	Yes	**EL**	**N/A**	Yes		FSTD	See below
4	Automation failures	**5**	Automation failures				**Yes**	Yes	**EL**	**Yes**	Yes		FSTD	See below
5	Fly-by-wire protection degradations	**6**	Fly-by-wire protection degradations				**Yes**	Yes	**EL**	**Yes**	Yes		FSTD	See below
6	Stall protection system failures including icing alerting systems	**7**	Stall protection system failures including icing alerting systems				**Yes**	Yes	**EL**	**Yes**	Yes		FSTD	See below
J.	**Specialized training elements**	**EASA includes this elements in different chapters.**				2.6.3.2 to 2.6.3.5 & 3								
1	Spiral dive (graveyard spiral)	Not Addressed in AIR OPS for CAT				**2.5.5.7**	**Yes**	REFER TO FLIGHT PATH MANAGEMENT OR RECOVERY TRAINING	**EL**	**Yes**	N/A	Refer to Description	FSTD	See below
2	Slow Flight	**This element is included in EASA I.1** (ICAO F. Flight Path Management)				-	NO		N/A	**Yes**	N/A*	* Covered by EASA UPRT I.5	FSTD	See below
3	Steep turns	**This element is included in EASA I.5** (ICAO F. Flight Path Management)				-	NO		N/A	**Yes**	N/A*		FSTD	See below
4	Recovery from approach to stall					-	NO		N/A	**Yes**	Refer to Recovery Training Requirements		FSTD	See below
5	recovery from stall, including uncoordinated stalls (aggravating yaw)					-	NO		N/A	**Yes**			**FSTD+**	See below
6	recovery from stick pusher activation (as applicable)	**This element is included in EASA Recovery Training A. Recovery from developed upset** (ICAO H Upset Prevention and Recovery Techniques)				-	**Yes**		EL	**Yes**			FSTD	See below
7	nose-high/high-speed recovery					-	NO		N/A	**Yes**			FSTD	See below
8	nose-high/low-speed recovery					-	NO		N/A	**Yes**			FSTD	See below
9	nose-low/high-speed recovery					-	NO		N/A	**Yes**			FSTD	See below
10	nose-low/low-speed recovery					-	NO		N/A	**Yes**			FSTD	See below

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11	high bank angle recovery				-	NO		N/A	**Yes**			FSTD	See below
12	line oriented flight training (LOFT) or line operational simulation (LOS)	**This element is required by EASA for LPC/OPC.**			-	NO		N/A	**Yes**			FSTD	See below
K.	**Human Factors**	**EASA includes this elements within the CRM training** (AMC1 ORO.FC.115)			2.5.5. 11.10								
1	Situation awareness	**General principles** • Human factors in aviation • General instructions on CRM principles and objectives • Human performance and limitations • Threat and error management **Relevant to the individual flight crew member** • Personality awareness, human error and reliability, attitudes and behaviours, self-assessment and self-critique • Stress and stress management • Fatigue and vigilance • Assertiveness, situation awareness, information acquisition and processing **Relevant to the flight crew** • Automation and philosophy on the use of automation • Specific type-related differences Monitoring and intervention **Relevant to the entire aircraft crew** • Shared situation awareness, shared information acquisition and processing; • Workload management; • Effective communication and coordination inside and outside the flight crew compartment; • Leadership, cooperation, synergy, delegation, decision-making, actions; • Resilience development; • Surprise and startle effect; • Cultural differences. **Relevant to the operator and the organisation** • Operator's safety culture and company culture, standard operating procedures (SOPs), organisational factors, factors linked to the type of operations • Effective communication and coordination with other operational personnel and ground services • Case studies	EASA includes those elements into the legacy CRM training.	every 12 calendar months, such that all the elements are covered over a period not exceeding 3 years	-			should be instructional or interactive in style to meet the objectives specified in the CRM training programme or to refresh and strengthen knowledge gained in a previous training			Refer to Description	FSTD	See below
1.i	Human information processing				-	**Yes**	**Yes**		**Yes**	**Yes**		FSTD	See below
1.ii	inattention, fixation, distraction				-	**Yes**	**Yes**		**Yes**	**Yes**		FSTD	See below
1.iii	perceptual illusions (visual or physiological) and spatial disorientation				-	**Yes**	**Yes**		**Yes**	**Yes**		FSTD	See below
1.iv	instrument interpretation				-	**Yes**	**Yes**		**Yes**	**Yes**		FSTD	See below
2	startle and stress response				-							FSTD	See below
2.i	physiological, psychological, and cognitive effects				-	**Yes**	**Yes**		**Yes**	**Yes**		FSTD	See below
2.ii	management strategies				-	**Yes**	**Yes**		**Yes**	**Yes**		FSTD	See below
3	TEM				-		**Yes**					FSTD	See below
3.i	TEM Framework				-							FSTD	See below
3.ii	active monitoring, checking				-	**Yes**	**Yes**		**Yes**	**Yes**		FSTD	See below
3.iii	fatigue management				-	**Yes**	**Yes**		**Yes**	**Yes**		FSTD	See below
3.iv	workload management				-	**Yes**	**Yes**		**Yes**	**Yes**		FSTD	See below
3.v	crew resource management (CRM)				-	**Yes**	**Yes**		**Yes**	**Yes**		FSTD	See below

FSTD*: Use of motion may lead to negative training.
FSTD+: FFS D with extended envelop is required.

ICAO Training element	*Description*	*Example of Airbus scenario elements*
A. *Aerodynamics*	Trainees should be knowledgeable about aerodynamic effects at both high and low altitudes. The FSTD training should be accomplished at both high altitude (within 1 500 m [5 000 ft] of the service ceiling of the aeroplane) and at low altitude (below 3 000 m [10 000 ft] above mean sea level) to reinforce the academic training described in 3.2. High-altitude training should be conducted at normal operational cruise altitudes. Trainees should also be trained with respect to the handling effects of operating at low speeds and high Mach, including: i) demonstration of Mach tuck and Mach buffet (if applicable to the aeroplane type); ii) understanding of the change in aeroplane stability at high altitude; iii) recognition of high speed/Mach buffet (as applicable to the aeroplane type) and low speed buffet; iv) the altitude necessary to effectively recover from a stall event at high altitudes; and v) awareness of control surface effectiveness at low and high speeds. Trainees should apply their aerodynamic knowledge by including the following in FSTD training: i) practice in manoeuvring the simulated aeroplane at high altitude at various speeds and automation levels — the pilot will apply the aerodynamic principles acquired in the academic training to prevent an upset; ii) trainees should be aware of the AOA from available data shown on the flight deck and demonstrate the use of those data to prevent an upset or recover from one; iii) practice of speed controlled by elevator inputs or speed controlled by thrust, and understanding of aeroplane energy state as it pertains to the type being flown — trainees should demonstrate use of that knowledge to avoid or recover from an upset; and iv) trainees should demonstrate knowledge of the type-specific systems that use AOA with emphasis on warning systems and the limitations of those systems; for example, recognizing an indication in the flight deck that “continuous ignition” has turned on without the system being manually selected on. They should understand aeroplane performance across all flight phases, including how to respond as PF and PM. They should apply their basic aerodynamics and flight dynamics knowledge to mentally integrate an understanding of the aeroplane AOA and energy state throughout the part of the flight envelope used in normal operations and should be able to communicate that awareness to the other pilot. (Ref. AURTA — 2.5)	A1: Relation pitch, AOA, flight path. Aircraft flight envelope exploration. A2: PFD limitations reminder (speed, pitch, bank) A3: Aircraft maneuvering capability at same calibrated airspeed at low and hi altitude A4: Acceleration capability at low and high altitude, backside of power curve at recommended max altitude. A5: Angle of Attack awareness at different calibrated airspeed A6: Approach to stall at low and high altitude A7: Not applicable on Airbus types A8: High-speed buffet (Mach effect) at high altitude following a sudden increase of AOA from cruise AOA. A9: Aircraft stability in pitch and roll in normal law. Static stability when out of normal envelope A10: Observation of turn coordination and yaw damping in normal law A11: Use of pitch trim in direct law (direct law demonstration or during a failure leading to direct law) A12: Effect of icing on engines/airframe (limited effect of airframe icing – FSTD effect to be checked) A13: Not applicable. **Theoretical Content: At least the content from AUPRTA (AURTA REV 3) chapter 6.4**
B. *Causes and contributing factors of upsets*	Development and training on procedures, including PF and PM roles, for normal operations and deviation recovery should focus on upset prevention. The training should emphasize what to monitor during normal operations and during an upset recovery, how to identify and communicate deviations between pilots and how to recover. Train pilots in what to monitor and when, including cross-checking and verification, during all phases of flight to prevent an upset event. Stress communication behaviour between pilots to share an understanding of the aeroplane state so that both pilots recognize when either of them might be introducing a pilot-induced upset. Trainees should apply their type-specific academic training to prevent, and recover from, environmentally induced, pilot-induced and aeroplane system-induced upsets. (Ref. AURTA — 2.4)	B1: Windshear recovery B2: Pilot incapacitation recovery (with incapacitated crew member interfering with flight control system) B3: Any failure inducing significant impact on flight control system. **Theoretical Content: At least the content from AUPRTA (AURTA REV 3) chapter 5.**
C. *Safety review of accidents and incidents relating to aeroplane upsets*	Demonstration of some of the actual upsets of transport category aeroplanes covered in academic training, with training of the prevention and type-specific recovery techniques.	C1: never implemented by Airbus – Finally removed from ORO 220-230 (to be addressed by academic training only) **Theoretical Content: Case studies of accidents/incidents involving LOC-I (Can be part of CRM Training)**
D. *G-awareness*	It must be emphasized that g-loading in transport category aeroplanes feels significantly more pronounced than in other aeroplanes, due specifically to the cockpit environment. Commercial air transport pilots are normally uncomfortable (for the sake of passenger comfort and safety) reacting appropriately to changing g-forces on a large aeroplane. Pilots should be trained to overcome this inhibition when faced with the necessity to promptly deal with any excess external forces. Most FSTDs cannot replicate sustained g-forces; hence, the limitations of the device to adequately represent the actual g-environment during upset conditions must be well understood by both the instructor and the trainee. If any practical exercise regarding g-awareness is accomplished in an FSTD, careful consideration should be taken to avoid negative training. Because there is a visual and sensory aspect associated with g-loading, the training programme will need to validate whether the g-awareness training in the FSTD will be effective and can be accomplished without negative training.	D1: effect of pitch and bank angle on g-load D2: awareness of lateral g-load in case of asymmetry (engine out) D3: G-load management during unusual attitude recovery (adaptation of bank and pitch rate) **Theoretical Content: At least the content from AUPRTA (AURTA REV 3) chapter 6.4.5**
E. *Energy management*	The training should include integrated CRM training for developing crew knowledge and skills for energy management, as well as techniques for reducing pilot error, including what to monitor during an event and how the PM should coach the PF in the recovery using appropriate callouts and other verbal feedback. To fully understand the concepts discussed in academic training, trainees should be trained in the following: i) acceleration between two speeds of which the aeroplane is capable at low, medium and high altitude (e.g. 200–250 KIAS at low altitude, medium and high altitude with corresponding Mach numbers at high altitude);	E1: Acceleration capability at various altitudes. Reminder regarding the trade of energy, case of REC Max flying with speed decay. **Theoretical Content: At least the content from AUPRTA (AURTA REV 3) chapter 6.1, 6.2 and 6.5**

ICAO Training element	*Description*	*Example of Airbus scenario elements*
	ii) acceleration performance from second regime (back side of power curve) at low altitude and high altitude; iii) the relationship between maximum cruise/climb/continuous thrust and take-off/go-around thrust at low and high altitude; iv) acceleration capabilities through descent versus power/thrust application; v) understanding and managing the type-specific differences between kinetic, potential and chemical energy and the relationship between pitch, power and performance; vi) roll rate performance of the aeroplane at different speeds, altitudes and configurations and with flight spoilers retracted/extended (as applicable) if a difference exists; and vii) pitch rate performance of the aeroplane at different speeds, altitudes and configurations and with flaps retracted/extended; also, demonstration of an aft centre of gravity (CG) versus a forward CG flying qualities, if these are significantly different and the effect of thrust on pitch control in aeroplanes with underslung engines.	
F. *Flight path management*	Flight path management training should be developed with regard to which automated systems are on the type of aeroplane, including type-specific automation challenges.	
1) Manual or automation inputs for guidance and control	The training objective related to the manual or automation inputs for guidance and control addresses correct pilot control inputs to avoid or recover from undesired flight path deviations. This training objective should include the control strategies pilots should use in both developing and developed upset events. Pilots need to know the type-specific conditions under which it is best to allow automated systems to control the aeroplane and those under which manual intervention by the pilot is best. This should include primary/alternate control strategies.	F1: flying with no automation nor flight guidance (pitch/thrust flying) at low and high speed, at low and high altitude. Visual circuit with no automation nor flight guidance. F2: Not applicable **<u>Theoretical Content</u>: At least the content from AUPRTA (AURTA REV 3) chapter 6.3**
2) Type-specific characteristic	Training provided on type-specific characteristics will help avoid inadvertent upset events because of automation surprise. Integrated CRM training should include communication between pilots of their understanding of the current aeroplane state. Pilots should create a mutual mental picture of aeroplane state and keep it updated. In addition, pilots must be able to work as a crew to be aware of, recognize and prevent upsets. This will include instrument interpretation as it applies to recognizing upset events.	F3: Training integrated in all training session: importance of PM role, importance of FMA monitoring and understanding, importance of call-outs in case of flight path/attitude deviations…
3) Automation management	The automation management training objective addresses correct pilot inputs to avoid undesired flight path deviations. Pilots need to know how to use the automation systems during prevention and recovery from an upset event. This training should include the following: i) common errors to avoid and why they occur; ii) specific automation modes to use for specific contexts; iii) the cross-check and verification of mode use and understanding of how the mode used has been directed to command the aeroplane; iv) control strategies pilots should use in both developing and developed upset events. v) advantages and disadvantages of using automated systems for upset prevention and recovery; and vi) the importance of ensuring correct pilot inputs to the automation systems and the consequences of failing to do so. It is imperative that the PF keep the aeroplane in trim while flying with an engine inoperative on a multi-engine aeroplane. At slow speed and high thrust on the remaining engine(s), the A/P on some aeroplanes is generally incapable of holding the correct attitude against an adverse yaw condition, which may result in an upset.	F4/F6: Engagement and disengagement of automation – Take-over procedure – Mode reversions. F5: Management of go-around (with and without automation) at different stages of the approach. Note: automation management is an integrated part of any training session under the competency “Flight Path Management – Automation”. **<u>Theoretical Content</u>: At least the content from AUPRTA (AURTA REV 3) chapter 5.4 and 6.7**
4) Manual handling skills	The manual handling skills objectives are to address correct pilot control inputs to avoid undesired flight path deviations. Refer to the discussion in section G 2) Pitch/power/roll/yaw on how to develop pilot skills for making the correct control inputs to arrest the divergence or to recover from the upset. These manual handling skills should be developed during the specialized training elements in section J below. UPRT should include the practice of manual handling at the edges of the flight envelope. Pilots should know the common errors to avoid, why they occur, the importance of cross-checking and verification of inputs, as well as have a shared understanding among the pilots of why the pilot is flying the aeroplane manually. Pilots should develop an understanding of how the aeroplane responds to inputs across all flight regimes. Manual handling training should include training on the use of full control inputs, if necessary to counter adverse external forces. For instance, flight controls become less effective when the aeroplane is at or near its critical AOA or stalled. The tendency is for pilots not to use full control authority because they rarely are required to do so in normal operations. Pilots need to overcome this habit when recovering from severe upsets. Note 1.— Rudder control is still quite effective at a high AOA, and special care must be taken in the use of rudder during upset prevention and recovery. Note 2.— Excessive use of pitch trim or rudder during the recovery may aggravate the upset condition and/or may result in exceeding aeroplane structural limitations. It is also important to guard against control reversals. To maintain structural integrity rapid full-scale reversal of control deflections should be avoided. In addition, manual handling training should include training on non-intuitive factors. For example, it may be counter-intuitive to use greater unloading control forces when recovering from a high AOA, especially at low altitude. If the aeroplane is stalled while	F7: Use of rudder during cross wind operations and in engine-out conditions F5: Management of go-around (with and without automation) at different stages of the approach. I1: Flying with no automation nor flight guidance (pitch/thrust flying) at low and high speed, at low and high altitude. Visual circuit with no automation nor flight guidance. I2: Departure, arrival and approach performed for training with no AP, no FD and no ATHR. I3: Visual approach performed for training with no AP, no FD and no ATHR. I4: Management of go-around (with and without automation) at different stages of the approach (integrated training). I5: Steep turns (bank angle up to 45 degrees) at low altitude with and without FPV. Refer also to Airbus Flight Crew Training Standards (FCTS) Chapter 7.2.7.1

ICAO Training element	*Description*	*Example of Airbus scenario elements*
	already in a nose-down attitude, the pilot still needs to push the nose down (unload) in order to reduce the AOA. Additionally, for underwing mounted engines it may be necessary to reduce thrust in order to reduce the AOA due to the strong pitch-up forces from added thrust. Altitude cannot be maintained in a stall and should be of secondary importance. The training should highlight when it is appropriate to fly manually versus through automation. Specific aspects of the transition from automated to manual flight, and vice-versa, should also be covered.	
G. *Recognition*	**Trainees should understand that anytime the aeroplane begins to diverge from the intended flight path or speed they need to identify and determine what, if any, action must be taken, and then act accordingly.**	
1) Type-specific examples of instrumentation during developing and developed upset	A key aspect to UPRT is for trainees to recognize developing and developed upset conditions. The emphasis is on using examples of type-specific instrumentation and visual cues to improve awareness, prevention and recognition of a developing upset and recovery from a developed upset in order to train effective aeronautical decision-making to prevent upset events. This training should include visual representations of the outside view and type-specific instrument indications of a variety of developing and developed upset conditions, with a focus on pitch, power and roll, and on what is happening to the airspeed.	This can be addressed by freezing the FSTD in abnormal attitude and ask the trainees to correlate instrumental and visual cues. It can also be addressed during briefings by showing PFD under abnormal attitudes and ask the trainees the actions to be taken for recovery.
2) Pitch/power/ roll/yaw	A key aspect of UPRT is for trainees to recognize developing and developed upset conditions so they can make control inputs based on desired aeroplane reaction. Control deflections at one point in the flight envelope might not be appropriate in another part of the flight envelope. Pilots should have a fundamental understanding of instrumentation and flight dynamics in pitch/power/roll/yaw in order to recognize the current state of the aeroplane and make the correct control inputs to arrest the divergence or recover from the upset. The ADI is the primary control instrument for recovery from an upset as, due to varying visibility conditions in operations, one cannot depend on having adequate outside visual references. (Ref. AURTA — 2.5.5.5 to 2.5.5.9)	For practical exercises, refer to FCTS chapter 7.2.7.3 **<u>Theoretical Content</u>: At least the content from AUPRTA (AURTA REV 3) chapter 6.4.2 and 7.1**
3) Effective scanning (effective monitoring)	Effective instrument scanning techniques should be trained as appropriate to recognize normal states and divergence from normal flight parameters. Pilots should be trained on what to monitor and when, including cross-checking and verification, during all phases of flight, to identify the precursors and the initial development of an upset and then use that recognition to make timely and appropriate responses to bring the aeroplane back to the desired path. Specifically, to reduce delays in detecting a deviation and mitigate surprise events, pilots should be trained on a type-specific description of what instrumentation to monitor during developing and developed upsets, and during the recovery phase. Pilots should also be aware of the effects of fatigue on their ability to monitor effectively. Training should also be provided on communicating the current aeroplane state between pilots, including callouts to improve situation awareness. Pilots should be able to create a mental picture of the aeroplane state and keep it updated and cross-checked with the other pilot throughout the flight. The PM should know how to effectively assist the PF to return the aeroplane to a stable state. To improve the detection and interpretation of deviations, pilots should know the aeroplane normal states (particularly in pitch and power levels), detect deviations, interpret the meaning of the deviation, communicate effectively as a crew, decide on a response, and take action.	Effective monitoring is an important part of Undesired Aircraft States Prevention. For practical exercises, refer to FCTS chapter 7.5 **<u>Theoretical Content</u>: At least the content from AUPRTA (AURTA REV 3) chapter 5.3**
4) Stall protection systems	Accurate and early recognition of all available aural, visual and tactile alerts to both an approaching stall and an aerodynamic stall. Particular attention must be given to aeroplane stall characteristics in the absence of a stall warning indication. (Ref. AURTA — 2.5.5.1)	For practical exercises, refer to FCTS chapter 7.2.7.4 (stall) and 7.2.7.4 (full stall) **<u>Theoretical Content</u>: At least the content from AUPRTA (AURTA REV 3) chapter 6.4.1 and 7.3.1**
H. *Upset prevention and recovery techniques*	Upset prevention and recovery techniques should be accomplished in the highest fidelity FSTD qualified for the training, using the operator's upset prevention and recovery procedures published in the operations manual. These procedures should follow the OEM recommendations for upset prevention and recovery (see 3.5).	**<u>Theoretical Content</u>: At least the content from AUPRTA (AURTA REV 3) chapter 7**
1) Timely and appropriate intervention	Training should emphasize the need for the PF or PM to recognize a divergence as early as possible and immediately ensure corrective action is taken to return the aeroplane to a stabilized flight path, including appropriate crew interaction. The corrective action should include managing the energy, arresting the flight path divergence and recovering to a stabilized flight path. If the aeroplane is stalled during the divergence from the intended flight path, then the training should also stress the importance of first applying and maintaining nose-down elevator until recovery from the stall is complete. The amount and rate of control input to counter a developing upset should be proportional to the amount and rate of pitch, roll and/or yaw experienced. If pilots' inputs do not arrest the divergence, then pilots should follow the aeroplane's flight manual recommended guidance. The ADI is the primary control instrument for recovery from an upset, as adequate outside visual references may not be available or may be misleading.	**<u>Theoretical Content</u>: At least the content from AUPRTA (AURTA REV 3) chapter 7.1**
2) Nose-high/ wings-level recovery	See 3.5 for OEM recommended recovery techniques.	Refer to Airbus Flight Crew Training Standards (FCTS) Chapter 7.2.7.3 **<u>Theoretical Content</u>: At least the content from AUPRTA (AURTA REV 3) chapter 7.3.3**
3) Nose-low/ wings-level recovery	See 3.5 for OEM recommended recovery techniques.	Refer to Airbus Flight Crew Training Standards (FCTS) Chapter 7.2.7.3 **<u>Theoretical Content</u>: At least the content from AUPRTA (AURTA REV 3) chapter 7.3.4**

ICAO Training element	Description	Example of Airbus scenario elements
4) High bank angle recovery techniques	Ref. AURTA — 2.6.3.4.	Refer to Airbus Flight Crew Training Standards (FCTS) Chapter 7.2.7.3 **<u>Theoretical Content</u>: At least the content from AUPRTA (AURTA REV 3) chapter 7.3.3**
5) Consolidated summary of aeroplane recovery techniques	Ref. AURTA — 2.6.3.5	Refer to Airbus Flight Crew Training Standards (FCTS) Chapter 7.2.7.3
6) Stall event	Awareness of the distinction between aircraft attitude and AOA. Energy management trading altitude for speed. Awareness of the correlation between stall speed and g-load and the capability to reduce stall speed by unloading. Stall recovery technique.	Refer to Airbus Flight Crew Training Standards (FCTS) Chapter 7.2.7.4 and 7.2.7.5
I. *System malfunction*	Trainees should understand the systems of their aeroplane and how these systems can cause or contribute to an upset. FSTDs allow instructors to induce malfunctions that cannot be safely trained for in the aeroplane. Operators should refer to OEM checklists and procedures, which cover system and component failures. Upset-inducing failures/malfunctions related to systems, instruments, power, and automation should be incorporated into training, whenever applicable. Trainees should be made particularly aware of the insidious nature of inaccurate information (e.g. unreliable airspeed, failures of stall and icing alerting devices, degradation of envelope protection systems), so that trainees are trained to recognize the error, prevent an upset and maintain control of the aeroplane.	This section may be addressed through various exercise that are already part of recurrent training: engine failure, instrumental failures, unreliable airspeed, fly-by-wire degradation, partial or full loss of automation… **<u>Theoretical Content</u>: At least the content from AUPRTA (AURTA REV 3) chapter 5.2**
J. *Specialized training elements*	These are several specific elements to be incorporated into the training that teach a specific skill set to help trainees prevent, and if needed, recover from an upset. *Note.— Communicating the current aeroplane state between pilots, including callouts to improve situation awareness, is essential. The PM should know how to effectively assist the PF to return the aeroplane to a stable state.*	
1) Spiral dive	In this manoeuvre, sometimes called a graveyard spiral, the aeroplane is at a high bank angle and descending. Trainees will learn in this situation that applying up-elevator in an attempt to arrest both the increasing speed and sink rate causes the spiral to tighten. The skill learned is that it is imperative to get the wings close to level before beginning any pitching-up manoeuvre. Trainees must decrease the bank angle and then apply up-elevator to recover. If g-loading is large, the pilot will need to offload some g to regain adequate roll control.	Self-explanatory. Spiral dive is an example of abnormal attitude “nose-low” recovery
2) Slow flight	Slow flight exposes the trainee to flight right above the stall speed of the aeroplane and to manoeuvring the aeroplane at this speed without stalling. The purpose is to reinforce the basic stall characteristics learned in academics and allow the pilot to obtain handling experience and motion sensations when operating the aeroplane at slow speeds during the entire approach-to-stall regime in various aeroplane attitudes, configurations and bank angles.	Self-explanatory.
3) Steep turns	Steep turns provide the trainee with practical experience of manoeuvring the aeroplane at higher than normal bank angles.	Self-explanatory.
4) Recovery from approach-to-stall	Particular emphasis should be placed on the early recognition of those symptoms associated with approaching a stall as well as on the recognition of stall warning system activation. Trainees should be made to understand that recovery action involving a deliberate and smooth application of nose down pressure should be performed immediately upon recognition of the presence of stall-related symptoms or the activation of a stall alerting device.	For practical exercises, refer to FCTS chapter 7.2.7.4
5) Recovery from stall	With due regard to fidelity limitations of the FSTD in use, this portion of the training would normally be performed as a **demonstration exercise only,** highlighting the following: i) recovery training from an aerodynamic stall should focus on developing the awareness of stall related cues such as buffet, degradation of control responsiveness in the pitch and roll axis, as well as the inability to arrest descent; and ii) the recovery portion of the training should constantly stress the primary importance of a smooth and deliberate reduction in the angle of attack sufficient to break the stalled condition and completing the recovery in compliance with aeroplane-specific recommended techniques. The effect of thrust/power application on pitch control capability should be covered for aeroplanes with underslung engines. The maintenance of a wings level condition during the recovery is secondary to the reduction in the angle of attack.	For practical exercises, refer to FCTS chapter 7.2.7.5

ICAO Training element	*Description*	*Example of Airbus scenario elements*
6) Recovery following stick pusher activation (if equipped)	Stick pusher activation is a sudden event that often startles the crew and is usually followed by an almost overpowering urge to pull back on the controls in an attempt to overcome the sharp nose down movement of the elevator. Training in the FSTD should focus on developing a proper pilot response to such an occurrence recognizing that the stick pusher is a valued aid in the recovery from an aerodynamic stall.	Not applicable on Airbus fly-by-wire types.
7) Nose high/ high speed 8) Nose high/ low speed 9) Nose low/ high speed 10) Nose low/ low speed 11) High bank angle recovery	The FSTD training should include a variety of developing and developed upset conditions with focus on pitch, power, roll and yaw. It should include demonstrations and practice recovery techniques for various upset scenarios, to include nose-high and nose-low scenarios with various bank angles and speeds, including bank angles greater than 90° (AIRBUS ATO: limited to 60 degrees). Trainees should practice high bank angle recovery exercises in both nose-high and nose-low situations. FSTD manoeuvres training should be done in both visual and instrument conditions to allow trainees to practice recognition and recovery under both conditions and to train them to recognize some of the physiological factors. Upset training in an FSTD, which exceeds the VTE of the aeroplane flight envelope data provided by the OEM and used for the FSTD qualification, could increase the risk of negative training. See 3.5 for OEM-recommended recovery techniques.	For practical exercises, refer to FCTS 7.2.7.3 **<u>Theoretical Content</u>: At least the content from AUPRTA (AURTA REV 3) chapter 7.3.3 and 7.3.4**
12) Line-oriented flight training (LOFT) or line-operational simulation (LOS)	Training should expose trainees, through LOFT or LOS scenarios, to situations or malfunctions, which could cause an upset if not properly managed. The focus of each scenario should be awareness and prevention of the upset. The operator should integrate the various LOFT/LOS scenarios into the LOFT/LOS training and rotate them to ensure a wide exposure to a wide variety of possible upset scenarios.	
K. *Human Factors*	Human Factors are an overarching, integral part of UPRT. The Human Factors in UPRT address the physiological and crew responses in the event of a flight path divergence or a sudden upset. Integrating Human Factors into UPRT is also important to help develop airmanship, which requires perceptual, cognitive, and psychomotor knowledge and skills. Human Factors include, but are not limited to, CRM, the cognitive process, the learning process and the ability of the trainees to recall and apply appropriate knowledge and skills in operations.	
1) Threat and error Management (TEM)	TEM as it relates to upset prevention and recovery should be integrated in the UPRT. The flight crew should identify and manage any threat that may contribute to an upset. TEM training should include: communication/interaction techniques between pilots and between pilots and the aeroplane, the aeroplane normal states, identification and management of environmental threats that might induce an upset, detection of deviations, interpretation of the meaning of the deviation, decision on how to respond, and response. TEM is a crucial means of addressing Human Factors training elements. The flight crew's capacity to think effectively in flight conditions to which they have not previously been exposed may be challenged during an upset event and should be developed through UPRT. Training should define which control inputs are appropriate and how to prioritize the tasks to avoid overloading. TEM requires effective monitoring and for that, methods and training should be provided and include appropriate assessment techniques (i.e. what to monitor and when, what to cross-check, ensuring proper verification) during all phases of flight to prevent an upset event and during recovery efforts.	This is normally addressed in CRM course that is part of the recurrent training cycle.
2) Human information processing	For pilots to understand how to respond appropriately and why they sometimes fail to do the correct action, they must understand how they process information. These are the "building blocks" of knowledge that allow a better understanding of how to maintain or improve such areas as communication, decision-making, situation awareness, and team dynamics. Those areas involved in all human information processing include: i) attention — the sensing and retrieval of relevant information from the environment; ii) perception — understanding that information which has been retrieved; iii) interpretation — associating the information which is relevant and the knowledge required for the task at hand; iv) judgement — aligning the requirement for action with the correct response; v) decision-making — assessing the correct response needed for the outcome required or an alternative; vi) action — implementing the response chosen; and vii) feedback — checking that the response action meets the correct requirements of the task.	This is normally addressed in CRM course that is part of the recurrent training cycle.
3) Crew resource management (CRM)	Pilots should focus on stabilizing the aeroplane as a team, with clearly defined PF and PM roles, especially if one pilot becomes fixated. Training should include: i) development and application of appropriate communication patterns between pilots for a shared understanding of the current aeroplane state; ii) how to identify and communicate deviations and guide recovery in both PF and PM roles; and iii) type-specific description of assessment techniques for the aeroplane state during developing and developed upset. Training should define how to distribute the tasks between the PF and the PM to avoid overloading either pilot.	This is normally addressed in CRM course that is part of the recurrent training cycle.

ICAO Training element	*Description*	*Example of Airbus scenario elements*
	Pilots should be able to create a mental picture of the aeroplane and its energy state and keep it updated and cross-checked with the other pilot throughout the flight. The training should also include appropriate communication techniques between the PF and PM for deviation avoidance and recovery. Crew callouts according to SOPs will assist in communication, leading the flight crew to implement a recovery strategy as necessary.	
4) Situation awareness	Pilots need to maintain situation awareness at all times through effective monitoring (see the training element "Recognition" in this table). Pilots do this by maintaining a mental model while creating mental pictures of developing situations. A breakdown of a pilot's mental model or picture, which can be caused by several factors, such as spatial disorientation from in-flight perceptual illusions, being startled, inattention and complacency, can lead to a loss of situation awareness. Training should include how to maintain situation awareness and what to monitor to prevent, and recover from, upsets. Trainees should learn how the PM should assist/coach the PF in the recovery using appropriate callouts and other verbal feedback. After a deviation, it is important that the first actions be correct to prevent the recovery effort from developing into an even more serious situation. In order to accomplish that objective, the accurate and timely determination of the actual flight condition and energy state during the upset is of paramount importance. Troubleshooting the cause of the upset is secondary and can wait. Pilots should use the primary flight instruments because darkness, weather conditions, and the limited view from the cockpit may make it difficult/impossible to effectively use the outside horizon. The ADI is the primary reference. The situation analysis process includes: i) communicating with other flight crew members; ii) locating the bank indicator on the ADI and determining the bank angle; iii) determining the pitch attitude (from the ADI primarily); iv) confirming the attitude by reference to other indicators; and v) assessing the energy state.	This is normally addressed in CRM course that is part of the recurrent training cycle. This topic is now a pilot competency that has to be continuously assessed during each training session by reference to specific observable behaviors (refer to ICAO pilot competency framework)
5) Decision-making	Training should stress the importance of the pilots effectively communicating verbally and nonverbally. Another important subject is the criteria for a PM to decide whether to take control of the aeroplane if the PF is overwhelmed and is unresponsive. This should include the case of a co-pilot (pilot monitoring) taking over from an overwhelmed pilot-in-command (pilot flying). These criteria should be outlined and documented in the SOPs used by the ATO or the operator. The pilots should use a shared decision-making process where both are engaged in the outcome. Pilots should focus on stabilizing the aeroplane. They should understand the role of the PM in coaching the PF to a stable state. They should know the appropriate pitch and power targets for stabilization and take the appropriate action. To do so, trainees should be aware of what information they need to make the optimum decision for action, as well as of those factors, such as cognitive biases, that affect decision-making.	This is normally addressed in CRM course that is part of the recurrent training cycle. This topic is now a pilot competency that has to be continuously assessed during each training session by reference to specific observable behaviors (refer to ICAO pilot competency framework)
6) Problem-solving	Training should improve the problem-solving competency, and recognize those factors that can impede a trainee's ability to solve a problem, such as fatigue, fear and work overload. In particular, UPRT should emphasize the importance of evaluating whether a solution is working and of not rushing into an action that may be detrimental. Pilots should be able to communicate verbally or nonverbally to the other pilot if stress overwhelms them. Training should include how to self-assess impending incapacitation because of stress. This includes detecting and avoiding fixation on a particular item.	This is normally addressed in CRM course that is part of the recurrent training cycle. This topic is now a pilot competency that has to be continuously assessed during each training session by reference to specific observable behaviors (refer to ICAO pilot competency framework)
7) Startle and stress response	Training should include strategies to deal with the range of physiological, psychological and cognitive effects associated with the human stress response to unexpected threatening events with the pilots applying their competencies to maintain safe flight and crew coordination. Pilots may be startled when an unexpected event during flight contradicts their expectations. If an unexpected event is sufficiently serious and/or arises during a critical phase of flight, the correct response to that uncertainty becomes vital for survival. Upset training should strive to include the element of "unexpectedness" that pilots will experience in a real world application.	This is normally addressed in CRM course that is part of the recurrent training cycle.
8) Physiological factors	Recognizing the effects of visual and vestibular (angular and linear) illusions and responding appropriately is a key aspect of UPRT. Areas to be addressed during on-aeroplane training include: i) conditions which can lead to spatial disorientation and the use of instrument interpretation to manage spatial disorientation; ii) avoiding errors in adjusting attitude/power; iii) avoiding and recovering from PIOs; and iv) recognizing and managing sensory illusions in flight. All of these items should be covered in academic training, but training in an FSTD can target some of them. Spatial disorientation has been a significant factor in many aeroplane upset accidents. The definition of spatial disorientation is the inability to correctly orient oneself with respect to the earth's surface. Pilots who are unable to resolve a perceived conflict between bodily senses and flight instruments are spatially disoriented. Allowed to continue, spatial disorientation may lead to aeroplane upset. Attention to flight instruments and a good cross-check are the keys to remaining spatially oriented. A review of aeroplane upsets reveals that inattention or neglecting to monitor the aeroplane's performance can lead to upsets. Neglecting to monitor the appropriate instruments or fixating on a certain instrument can lead to performance deviations.	This is normally addressed in CRM course that is part of the recurrent training cycle.

ICAO Training element	*Description*	*Example of Airbus scenario elements*
	Distractions can be very subtle, such as warning or caution lights illuminating during critical phases of flight. Many aeroplane upsets occur while the pilot is engaged in some task that takes attention away from monitoring the aeroplane state.	