Annex I to ED Decision 2019/005/R

'AMC and GM to Part-FCL — Issue 1, Amendment 7'

The Annex to ED Decision 2011/016/R of 15 December 2011 is hereby amended as follows:

The text of the amendment is arranged to show deleted text, new or amended text as shown below:

(a) deleted text is ~~struck through~~;

(b) new or amended text is highlighted in blue;

(c) an ellipsis '[…]' indicates that the remaining text is unchanged.

1. GM1 FCL.010 is amended as follows:

'GM1 FCL.010 Definitions

The following abbreviations apply to the Acceptable Means of Compliance and Guidance Material to Part-FCL:

[…]

AIRAC	Aeronautical Information R~~r~~egulation and C~~c~~ontrol

[…]

AoA	Angle of Attack

[…]

AUPRTA	Airplane Upset Prevention and Recovery Training Aid

[…]

CAS	Calibrated Airs~~S~~peed

[…]

CB-IR	Competency-based training course for I~~i~~nstrument R~~r~~ating

[…]

CTKI	Chief Theoretical Knowledge Instructor

[…]

DPATO	Defined Point After Take-O~~o~~ff

[…]

ECQB	European Central Question Bank

[…]

EIR	En route I~~i~~nstrument R~~r~~ating

[…]

FFS	Full-Flight Simulator

[…]

HPA	High-Performance Aeroplane

[…]

IAS	Indicated Airs-Speed
ICAO	International Civil Aviation Organizsation
IGE	In-Ground Effect

[…]

LOC-I	Loss of Control In-flight
LOFT	Line-Orientated Flight Training

[…]

ME	Multi-Eengine

[…]

MEP	Multi-Eengine Piston
MET	Multi-Eengine Turboprop

[…]

MP	Multi-Ppilot
MPA	Multi-Ppilot Aeroplane
MPH	Multi-Ppilot Helicopter
MTOM	Maximum Take-Ooff Mass
NDB	Non-Ddirectional Beacon

[…]

OEM	Original Equipment Manufacturer

[…]

PBN	Performance-based Navigation

[…]

R/T	Radio-telephony

[…]

SATCOM	Satellite Ccommunication
SE	Single-Eengine
SEP	Single-Eengine Piston

SET	Single-Eengine Turboprop
[…]	
SP	Single-P~~p~~ilot
SPA	Single-P~~p~~ilot Aeroplane
SPH	Single-P~~p~~ilot Helicopter
[…]	
TAS	True AirsSpeed
[…]	
TCH	Type Certificate Holder
[…]	
TK	Theoretical K~~k~~nowledge
[…]	
TORA	Take-O~~o~~ff Run Available
TODA	Take-O~~o~~ff Distance Available
[…]	
UPRT	Upset Prevention and Recovery Training
UTC	~~Coordinated~~ Universal Time Coordinated

[…]';

2. The new GM3 FCL.010 and GM4 FCL.010 are inserted as follows:

'GM3 FCL.010 Definitions

UPSET PREVENTION AND RECOVERY TRAINING (UPRT) DEFINITIONS

In the context of UPRT, the following abbreviations apply to the Acceptable Means of Compliance and Guidance Material to Part-FCL:

'Advanced UPRT' refers to the advanced UPRT course in accordance with point FCL.745.A.

'Aeroplane upset' refers to an undesired aircraft state characterised by unintentional divergences from parameters normally experienced during operations. An aeroplane upset may involve pitch and/or bank angle divergences as well as inappropriate airspeeds for the conditions.

'Angle of Attack (AoA)' refers to the angle between the oncoming air, or relative wind, and a defined reference line on the aeroplane or wing.

'Approach-to-stall' refers to flight conditions bordered by the stall warning and stall.

'Basic UPRT' refers to the UPRT elements and exercises integrated into training courses for the issue of a CPL, MPL or Phases 1 to 3 of the integrated ATP course.

'Developed upset' refers to a condition meeting the definition of an aeroplane upset.

‘Developing upset’ refers to any time the aeroplane begins to unintentionally diverge from the intended flight path or airspeed.

‘Energy state’ refers to how much of each kind of energy (kinetic, potential or chemical) the aeroplane has available at any given time.

‘First indication of a stall’ refers to the initial aural, tactile or visual sign of a stall event which can be either naturally or synthetically induced.

‘Flight crew resilience’ refers to the ability of a flight crew member to recognise, absorb and adapt to disruptions.

‘Fidelity level’ refers to the level of realism assigned to each of the defined FSTD features.

‘Flight path’ refers to the trajectory or path of the aeroplane travelling through the air over a given space of time.

‘Flight path management’ refers to active manipulation, using either the aeroplane’s automation or manual handling, to command the aeroplane’s flight controls in order to direct the aeroplane along a desired trajectory.

‘FSTD validation envelope’ refers to the envelope consisting of the following three subdivisions:

(a) Flight test validated region

This is the region of the flight envelope which has been validated with flight test data, typically by comparing the performance of the FSTD against the flight test data through tests incorporated in the qualification test guide (QTG) and other flight test data utilised to further extend the model beyond the minimum requirements. Within this region, there is high confidence that the simulator responds similarly to the aircraft. Note that this region is not strictly limited to what has been tested in the QTG; as long as the aerodynamics mathematical model has been conformed to the flight test results, that portion of the mathematical model can be considered to be within the flight test validated region.

(b) Wind tunnel and/or analytical region

This is the region of the flight envelope for which the FSTD has not been compared to flight test data, but for which there has been wind tunnel testing or the use of other reliable predictive methods (typically by the aircraft manufacturer) to define the aerodynamic model. Any extensions to the aerodynamic model that have been evaluated in accordance with the definition of an exemplar stall model (as described in the stall manoeuvre evaluation section) must be clearly indicated. Within this region, there is moderate confidence that the simulator will respond similarly to the aircraft.

(c) Extrapolated region

This is the region extrapolated beyond the flight test validated and wind tunnel/analytical regions. The extrapolation may be a linear extrapolation, a holding of the last value before the extrapolation began, or some other set of values. Whether this extrapolated data is provided by the aircraft or simulator manufacturer, it is a ‘best guess’ only. Within this region, there is low confidence that the simulator will respond similarly to the aircraft. Brief excursions into this region may still retain a moderate confidence level in FSTD fidelity; however, the instructor should be aware that the FSTD’s response may deviate from that of the actual aircraft.

'Load factor' refers to the ratio of a specified load to the weight of the aeroplane, the former being expressed in terms of aerodynamic forces, propulsive forces or ground reactions.

'Loss of Control In-flight (LOC-I)' refers to a categorisation of an accident or incident resulting from a deviation from the intended flight path.

'Manoeuvre-based training' refers to training that focuses on a single event or manoeuvre in isolation.

'Negative training' refers to training which unintentionally introduces incorrect information or invalid concepts, which could actually decrease rather than increase safety.

'Negative transfer of training' refers to the application (and 'transfer') of what was learned in a training environment (i.e. a classroom, an FSTD) to normal practice, i.e. it describes the degree to which what was learned in training is applied to actual, normal practices. In this context, negative transfer of training refers to the inappropriate generalisation of knowledge and skills to a situation or setting in normal practice that does not equal the training situation or setting.

'Original Equipment Manufacturer (OEM)' refers to the original equipment manufacturer of an aircraft or associated parts or equipment or of parts or equipment installed on the basis of a supplemental type certificate (STC).

'Post-stall regime' refers to flight conditions at an AoA greater than the critical AoA.

'Scenario-based training' refers to training that incorporates manoeuvres into real-world experiences to cultivate practical flying skills in an operational environment.

'Stall' refers to loss of lift caused by exceeding the aeroplane's critical AoA.

Note: A stalled condition can exist at any attitude and airspeed, and may be recognised by continuous stall warning activation accompanied by at least one of the following:

(a) buffeting, which could be heavy at times;

(b) lack of pitch authority and/or roll control; and

(c) inability to arrest the descent rate.

Note: It is possible that in certain conditions the stall warning may not be activated.

'Stall event' refers to an occurrence whereby the aeroplane experiences conditions associated with an approach-to-stall or a stall.

'Stall (event) recovery procedure' refers to the manufacturer-approved aeroplane-specific stall recovery procedures, such as those contained in the flight crew operations manual (FCOM). If an OEM-approved recovery procedure does not exist, the aeroplane-specific stall recovery procedure developed by the ATO, based on the stall recovery template, may be used.

'Stall warning' refers to a natural or synthetic indication provided when approaching a stall that may include one or more of the following indications:

(a) aerodynamic buffeting (some aeroplanes will buffet more than others);

(b) reduced roll stability and aileron effectiveness;

(c) visual or aural cues and warnings;

(d) reduced elevator (pitch) authority;

(e) inability to maintain altitude or arrest rate of descent; and

(f) stick shaker activation (if installed).

Note: A stall warning indicates an immediate need to reduce the AoA.

'Startle' refers to the initial, short-term, involuntary physiological and cognitive reactions to an unexpected event that commence the normal human stress response.

'Stick pusher' refers to any device that automatically applies a nose-down movement and pitch force to an aeroplane's control columns to attempt to decrease the aeroplane's AoA. Device activation may occur before or after aerodynamic stall, depending on the aeroplane type.

Note: A stick pusher is not installed on all aeroplane types.

'Stick shaker' refers to a device that automatically vibrates the control column to warn the pilot of an approaching stall.

Note: A stick shaker is not installed on all aeroplane types.

'Stress (response)' refers to the response to a threatening event that includes physiological, psychological and cognitive effects. These effects may range from positive to negative and can either enhance or decrease performance.

'Surprise' refers to the emotionally based recognition of a difference in what was expected and what is actual.

'Train-to-proficiency' refers to approved training designed to achieve end-state performance objectives, providing sufficient assurances that the trained individual is capable of consistently carrying out specific tasks safely and effectively.

Note: In the context of this definition, 'train-to-proficiency' can be replaced by 'training-to-proficiency'.

'Type-specific UPRT' refers to UPRT elements and exercises integrated into training courses for the issue of a class or type rating pursuant to Part-FCL or during recurrent or refresher training for a specific aeroplane class or type.

'Undesired aircraft state' refers to flight-crew-induced aircraft position or speed deviation, misapplication of controls, or incorrect systems configuration, associated with a reduction in margins of safety.

Note (1): Undesired states can be managed effectively, restoring margins of safety, or flight crew response(s) can induce an additional error, incident or accident.

Note (2): All countermeasures are necessary flight crew actions. However, some countermeasures to threats, errors and undesired aircraft states that flight crew employ are built upon 'hard'/systemic-based resources provided by the aviation system.

'Unsafe situation' refers to a situation which has led to an unacceptable reduction in safety margin.

'Unusual attitude' refers to an aircraft in flight intentionally exceeding the parameters normally experienced in line operations or training, as applicable.

'Incipient spin' refers to a transient flight condition in the post-stall regime where an initial, uncommanded roll in excess of 45° has resulted from yaw asymmetry during a stall and which, if recovery action is not taken, will lead rapidly to a developing spin. Prompt recovery during this

incipient spin stage will normally result in an overall heading change, from pre-stall conditions, of not more than 180°.

'Developing spin' refers to a flight condition in the post-stall regime where the aeroplane exhibits abnormal, but varying, rates of yaw and roll, together with changing pitch attitude, following an incipient spin but before the establishment of a developed spin. A developing spin follows an unrecovered incipient spin and will usually persist, in the absence of any recovery action, until a developed spin ensues.

'Developed spin' refers to a flight condition in the post-stall regime where the aeroplane has achieved approximately constant pitch attitude, yaw rate and roll rate on a descending flight path. In transition from a stall with significant, persistent yaw, with no recovery action, to attaining a developed spin, the aeroplane is likely to have rolled through at least 540°.

'FSTD training envelope' refers to the high and moderate confidence regions of the FSTD validation envelope.'

GM4 FCL.010 Definitions

DEFINITIONS IN GM3 FCL.010 RELATED TO THE POST-STALL REGIME

The definitions for 'incipient spin', developing spin' and 'developed spin' in GM3 FCL.010 relate to the post-stall regime in aeroplanes that might typically be used in the context of the advanced UPRT in accordance with point FCL.745.A. The definitions are not intended for application to commercial air transport operations.'

3. The new AMC1 FCL.745.A and GM1 FCL.745.A are inserted as follows:

'AMC1 FCL.745.A Advanced UPRT course — aeroplanes

COURSE OBJECTIVE AND CONTENT

COURSE OBJECTIVE

(a) The objective of the course is for the pilot under training:

(1) to understand how to cope with the physiological and psychological aspects of dynamic upsets in aeroplanes; and

(2) to develop the necessary competence and resilience to be able to apply appropriate recovery techniques during upsets.

(b) In order to meet the objective as specified in point (a), the course should:

(1) emphasise physiological and psychological effects of an upset and develop strategies to mitigate those effects;

(2) be delivered in a suitable training aircraft in order to expose trainees to conditions that cannot be replicated in an FSTD; and

(3) employ recovery techniques that are suitable for the aircraft used for training in order to support the training objectives. In order to minimise the risk associated with potential negative transfer of training, the recovery techniques used during the course should be compatible with techniques typically used for transport category aeroplanes.

THEORETICAL KNOWLEDGE

(c) Theoretical knowledge instruction supports the objectives of the course and should include the following:

(1) a review of basic aerodynamics typically applicable to aeroplane upsets in transport category aeroplanes, including case studies of incidents involving potential or actual upsets.

(2) aerodynamics relevant to the aeroplane and exercises used in the practical training, including differences to aerodynamics as referred to in point (1);

(3) possible physiological and psychological effects of an upset, including surprise and startle effect;

(4) strategies to develop resilience and mitigate startle effect; and

(5) memorising the appropriate procedures and techniques for upset recovery.

FLIGHT INSTRUCTION

(d) Flight instruction should include:

(1) exercises to demonstrate:

(i) the relationship between speed, attitude and AoA;

(ii) the effect of g-load on aeroplane performance, including stall events at different attitudes and airspeeds;

(iii) aerodynamic indications of a stall including buffeting, loss of control authority and inability to arrest a descent;

(iv) the physiological effects of different g-loads between -1 and 2.5G; and

(v) surprise and the startle effect;

(2) training in techniques to recover from:

(i) nose high at various bank angles;

(ii) nose low at various bank angles;

(iii) spiral dives;

(iv) stall events; and

(v) incipient spin; and

(3) training to develop resilience and to employ strategies to mitigate the startle effect.

COURSE COMPLETION

(e) The course is considered to have been satisfactorily completed if the trainee is able to successfully:

(1) apply strategies to mitigate psychological and physical effects;

(2) recognise upsets;

(3) apply correct recovery techniques from upset scenarios as specified in point (d)(2).

GM1 FCL.745.A Advanced UPRT course — aeroplanes

UPSET RECOVERY TRAINING EXERCISES

GENERAL

(a) The objective of this GM is to provide instructors with further guidance on the conduct of the various upset recovery exercises, which requires instructor performance beyond that experienced in normal operations.

(b) Instructors should:

(1) ensure that the risk mitigation measures determined by the ATO are strictly adhered to;

(2) continuously assess the performance of the student to ensure that the training objectives of the upset recovery exercises are achieved;

(3) understand that all-attitude/on-aeroplane upset recovery exercises serve primarily as resilience-builder. In other words, the training serves mainly human-factor training objectives and not only flying skills training;

(4) understand the differences between all-attitude UPRT and aerobatics training;

(5) have knowledge and understanding of how:

(i) on-aeroplane and FSTD UPRT complement each other; and

(ii) to ensure that negative transfer of training from small aeroplanes to heavier transport category aeroplanes is avoided. This may be achieved by observing UPRT in an FSTD, especially in a type-specific FFS; and

(6) have knowledge and understanding of the upset prevention theoretical knowledge and flight instruction elements taught during the CPL(A) and ATPL(A) training courses to ensure continuity and consistency in delivering UPRT.

Note: Instructors should be aware that the safety and potential human factor implications of poor upset recovery instructional technique or misleading information are *more significant* than in any other areas of pilot training.

(c) In order to increase the applicant's resilience related to the handling of aeroplane upsets, the advanced UPRT course needs to include the development of confidence and competence in recognising and recovering safely from upsets under the presence of the real human factors. Such confidence building is specifically addressed by:

(i) successfully overcoming natural stress response (startle and surprise); and

(ii) performing critically important counter-intuitive actions.

Advanced UPRT therefore considers pitch attitudes, bank angles, AOA/airspeeds, sideslip and g-loads, none of which are normally experienced during routine operations.

(d) Aeroplanes used in this course should be:

(1) appropriately certified and operated by the ATO in a manner that takes into account the effects of repeated training manoeuvres on airframe fatigue life; and

(2) provide sufficient safety margins to cater for student and instructor errors.

(e) This course complements UPRT in FSTDs by providing exposure to psycho-physiological conditions, which cannot be delivered by the motion systems of today's qualified FSTDs. At completion of the course, the student should pilot to be able to:

(1) recognise and confirm the upset-situation;

(2) manage stress response;

(3) apply the correct recovery strategy timely and effectively;

(4) stay within the defined training envelope;

(5) stabilise the flight path after recovery; and

(6) become competent and confident in recovering from upsets.

SPECIFIC EXERCISES

(f) Exercise 1 — Nose HIGH recovery

Exercise 1 Recovery from **Nose HIGH** upsets at various bank angles	
(1) Training objectives	The student pilot should: (i) recognise and confirm the Nose HIGH situation (AOA, attitude, energy, trends); (ii) announce 'Nose High'; and (iii) apply the correct recovery strategy.
(2) Training tasks	The student pilot should: (i) regain situation awareness; (ii) recognise and analyse AOA, pitch, bank, energy state and trends; (iii) note natural and synthetic indications for AOA, attitude, and energy; (iv) manage human factors, stress response (startle and surprise, counter-intuitive actions); (v) take manual control; (vi) identify and apply the Nose HIGH recovery strategy; (vii) correct any out-of-trim condition; (viii) manage nose-down movement; (ix) manage g-load; (x) use the effects of power to assist nose-down movement; (xi) use bank to orient the lift vector as necessary; (xii) stabilise the flight path after recovery using basic pitch/power settings;
(3) Enabling objectives	The student pilot should: (i) decide if Stall Recovery or Nose HIGH recovery is applicable; (ii) perform control inputs deliberately; (iii) use up to full control deflections; (iv) avoid unnecessary low or high loads;

	(v) use secondary flight controls (trim/power) as necessary to support primary flight control inputs (i.e. nose-down movement); (vi) apply control inputs in the correct sequence (see Table 1, Nose-HIGH Recovery Strategy); (vii) apply counter-intuitive actions as necessary: (A) unloading; (B) power-reduction in Nose-HIGH attitude (depending on engine mounting); and (C) using bank to orient the lift vector downwards.

Note: Refer to GM1 to Appendix 9, Table 2: Recommended nose-high recovery strategy template.

(g) Exercise 2 — Nose LOW Recovery

Exercise 2 Recovery from **Nose LOW** upsets at various bank angles	
(1) Training objectives	The student pilot should: (i) recognise and confirm the situation (AOA, attitude, energy, trends); (ii) announce 'Nose LOW'; (iii) apply the correct recovery strategy.
(2) Training tasks	The student pilot should: (i) regain situation awareness; (ii) recognise and analyse AOA, pitch, bank, energy state and trends; (iii) note natural and synthetic indications for AOA, attitude and energy; (iv) manage human factors, stress response (startle and surprise, counter-intuitive actions); (v) take manual control; (vi) identify and apply the Nose LOW recovery strategy; (vii) correct out-of-trim condition; (viii) decide if aircraft is stalled; (ix) manage g-load; (x) identify the correct direction to roll; (xi) roll to wings level to orient the lift vector upwards;

	(xii) manage power and drag; and (xiii) stabilise the flight path after recovery using basic pitch/power settings.
(3) Enabling objectives	The student pilot should: (i) perform control inputs deliberately; (ii) use up to full control deflections; (iii) avoid unnecessary low or high loads; (iv) apply control inputs in the correct sequence (see Table 2, Nose-LOW Recovery Strategy); and (v) apply counter-intuitive actions as necessary: (A) apply Stall Recovery in nose low attitude first if needed; (B) unloading instead of pulling; (C) unloading to increase roll rate; (D) avoid 'rolling-pull'; and (E) accept the priority of rolling to wings level first, before reducing power and before pulling.

Note: Refer to GM1 to Appendix 9, Table 3: Recommended nose-low recovery strategy template.

(h) Exercise 3 — Recovery from spiral dive

Exercise 3 Recovery from **Spiral Dive**	
(1) Training objectives	The student pilot should: (i) recognise the spiral dive as a result of improper nose-up elevator input during a Nose LOW turning situation; and (i) apply the Nose LOW Recovery Strategy.
(2) Training tasks	The student pilot should: (i) maintain/regain situation awareness; (ii) recognise and analyse AOA, pitch, bank, energy state and trends; (iii) manage human factors, stress response (startle and surprise, counter-intuitive actions); (iv) take manual control; (v) identify and apply the Nose LOW recovery strategy; and (vi) stabilise the flight path after recovery using basic pitch/power settings.
(3) Enabling objectives	The student pilot should: (i) perform control inputs deliberately and in the correct sequence; (ii) use up to full control deflections, if required; and (iii) apply counter-intuitive actions as necessary: (A) unloading instead of pulling; (B) unloading to increase roll rate; (C) avoid 'rolling-pull'; and (D) accepting the priority of rolling to wings level first, before reducing power and before pulling.

(i) Exercise 4 — Stall Event Recovery

Exercise 4 Recovery from **Stall event**	
(1) Training objectives	The student pilot should: (i) recognise and confirm the situation (AOA, attitude, energy, trends); (ii) announce 'Stall'; (iii) apply the Stall Event Recovery Strategy.
(2) Training tasks	The student pilot should: (i) regain situation awareness; (ii) recognise and analyse AOA, pitch, bank, energy state and trends; (iii) note natural and synthetic indications for high AOA/stall; (iv) manage human factors, stress response (startle and surprise, counter-intuitive actions); (v) recover from: (A) approach to stall (B) full stall, wings level and during turn (C) slipping stall (D) skidding stall (E) accelerated stall (F) secondary stall (vi) take manual control; (vii) identify and apply the Stall Event Recovery Template or the aircraft manufacturer Stall Recovery SOP; (viii) apply nose-down elevator input to reduce AOA; (ix) manage trim; (x) consider power reduction (if engine mounting induces a nose-up effect); (xi) accept altitude loss; (xii) identify the correct direction to roll to wings level; (xiii) manage power and drag; (xiv) manage g-load and energy to avoid secondary stall; and

	(xv) stabilise the flight path after recovery using basic pitch/power settings.
(3) Enabling objectives	The student pilot should: (i) perform control inputs deliberately; (ii) use up to full control deflections; (iii) apply control inputs in the correct sequence (see Table 3, Stall Event Recovery Strategy Template); and (iv) apply counter-intuitive actions as necessary: (A) unloading to reduce AOA; (B) unloading before rolling; (C) power reduction if necessary; (D) accepting altitude loss; and (E) waiting for airspeed increase before loading again.

Note: Refer to GM1 to Appendix 9, Table 1: Recommended stall event recovery template

(j) Exercise 5 — Recovery from spin

Exercise 5 Recovery from **incipient spin**	
(1) Training objectives	The pilot should: (i) recognise and confirm the spin (AOA, yaw, attitude, energy, roll, trends); (ii) apply the OEM Incipient Spin Recovery procedure.
(2) Training tasks	The pilot should: (i) be aware of the aircraft response to all possible pitch and roll control inputs and to thrust/power changes during (incipient) spin; (ii) maintain/regain situation awareness; (iii) recognise and analyse AOA, attitude, energy, yaw, roll, trends); (iv) note natural and synthetic indications for high AOA, stall, spin; (v) manage human factors, stress response (startle and surprise, counter-intuitive actions); (vi) take manual control;

	(vii) identify and apply the OEM Incipient Spin Recovery Procedure; (viii) manage AOA, g-load and energy to avoid secondary stall; and (ix) stabilise the flight path after recovery using basic pitch/power settings.
(3) Enabling objectives	The pilot should: (i) perform control inputs deliberately and in the correct sequence; (ii) use up to full control deflections as required by the procedure; (iii) apply counter-intuitive actions as necessary; (iv) avoid unreflected control inputs; and (v) allow time for control inputs to show results.

(k) Assessment of student performance

By collecting evidence from observable behaviours, the instructor will continuously assess whether the student meets the required competency standards under the given conditions.

Pilot competencies and behavioural indicators in the context of the Advanced UPRT Course
(1) Application of procedures
(i) Follows the recommended Nose HIGH or Nose LOW recovery strategy or the Stall Event Recovery Template / STALL RECOVERY SOP
(ii) Identifies and follows operating instructions in a timely manner
(iii) Correctly operates aircraft systems and equipment
(iv) Applies relevant procedural knowledge
(2) Communication
(i) Adheres to callouts
(ii) Verbalises the essential steps during the recoveries
(3) Aeroplane flight path management — automation
Disconnects autopilot and autothrust/autothrottle before initiating the recovery (to be simulated if the training aeroplane is not fitted with autothrust/autothrottle)
(4) Aeroplane flight path management — manual control
(i) Detects deviations from the desired aircraft trajectory and takes appropriate action
(ii) Controls the aircraft using appropriate attitude and power settings
(iii) Contains the aircraft within the defined flight envelope
(5) Leadership and teamwork
(i) Understands and agrees with the crew's roles and objectives
(ii) Uses initiative and gives directions when required
(iii) Admits mistakes and takes responsibility
(iv) Communicates relevant concerns and intentions
(v) Gives and receives feedback constructively
(vi) Projects self-control in all situations
(6) Problem-solving and decision-making
(i) Seeks accurate and adequate information from appropriate sources

	(ii)	Identifies and verifies what and why things have gone wrong
	(iii)	Perseveres in working through the event safely
	(iv)	Sets priorities appropriately
(7)	**Situation awareness and information management**	
	(i)	Identifies and assesses accurately the state of the aircraft and its systems
	(ii)	Identifies and assesses accurately the aircraft's vertical and lateral position, and its anticipated flight path
	(iii)	Anticipates accurately what could happen, plans and stays ahead of the situation
	(iv)	Recognises and effectively responds to indications of reduced situation awareness.
(8)	**Workload management**	
	(i)	Maintains self-control in all situations
		Manages and recovers from stress response (startle surprise), interruptions, distractions, variations and errors effectively
	(ii)	Reviews, monitors and cross-checks actions conscientiously
	(iii)	Verifies that tasks are completed to the expected outcome
	(iv)	Offers and accepts assistance, delegates when necessary, and asks for help early
	(v)	Manages and recovers from interruptions, distractions, variations and failures effectively

4. The new AMC1 FCL.915(e), AMC2 FCL.915(e), GM1 FCL.915(e) and AMC1 FCL.915(e)(2) are inserted as follows:

'AMC1 FCL.915(e) General prerequisites and requirements for instructors

ADDITIONAL REQUIREMENTS FOR INSTRUCTING IN A TRAINING COURSE IN ACCORDANCE WITH FCL.745.A — GENERAL

(a) The objective of the course required by point FCL.915(e)(1) is to train instructors to deliver training on the advanced UPRT course according to point FCL.745.A using the train-to-proficiency concept.

(b) Training should be both theoretical and practical. Practical elements should include the development of specific instructor skills, particularly in the area of teaching upset recovery techniques and strategies, whilst exploring the associated physiological and psychological aspects.

(c) Within 6 months preceding the start of the course, the instructor should have completed a pre-course assessment with an instructor holding the privilege in accordance with FCL.915(e)(1) to assess their ability to undertake the course.

(d) The training course should comprise:

(1) theoretical knowledge instruction on the theoretical knowledge elements presented in the advanced UPRT course and the additional elements required for an instructor to deliver effective training;

(2) flight instruction on the exercises used in the advanced UPRT course; and

(3) flight instruction on recovery from upsets that could result from students mis-handling the aircraft during the advanced UPRT course including spin recovery.

(e) The content of the theoretical knowledge and flight instruction should be tailored to the competence of the applicant as demonstrated during both pre-course and continuous assessment.

(f) Successful completion of the course requires that the instructor:

(1) demonstrates the resilience to be able to recover from any feasible upset in the aircraft to be used for training;

(2) demonstrates the ability to provide instruction to achieve the objectives of the advanced UPRT course to a wide range of trainees; and

(3) manages the physiological and psychological well-being of students during training.

(g) The instructor should be issued with a certificate following successful completion of the course.

AMC2 FCL.915(e) General prerequisites and requirements for instructors

ADDITIONAL REQUIREMENTS FOR INSTRUCTING IN A TRAINING COURSE IN ACCORDANCE WITH FCL.745.A — SYLLABUS

The following tables contain theoretical knowledge (Table 1) and practical training exercises (Table 2) that should be taught in the context of the advanced UPRT course as per point FCL.745.A.

TABLE 1: THEORETICAL KNOWLEDGE	
1.	Completion of a flight risk assessment
2.	Resilience-building strategies, managing startle and surprise
3	The limitations and type-specific characteristics of the aeroplane used for training
4	The importance of adhering to the scenarios that have been validated by the training programme developer
5.	Instructor techniques to induce and manage startle and surprise
6.	Upset recognition and recovery strategies
7.	Disorientation
8.	Distraction

9.	Immediate recognition of student pilot errors
10.	Intervention strategies
11.	Delivery of the theoretical knowledge instruction of the advanced UPRT course

TABLE 2: PRACTICAL TRAINING EXERCISES	
SECTION 1 — PRE-FLIGHT PREPARATION	
1.1	Correct completion of a flight risk assessment (such as weather, terrain, traffic density, student's experience level and capabilities)
1.2	Safety briefing
SECTION 2 — FLIGHT	
2.1	Selection of suitable airspace for the conduct of recovery exercises
2.2	Accurate execution of all of the manoeuvres required for the advanced UPRT course
2.3	Recovery from upsets that could result from the student or instructor mishandling the aeroplane including: • timely and appropriate intervention; • accelerated stall; • secondary stall; • incipient spin; • fully developed spin; and • Spiral dive.
2.4	Delivery of all of the training exercises in the advanced UPRT course
2.5	Anticipating and immediately recognising incorrect student inputs which might exceed aeroplane limitations and acting swiftly and appropriately to maintain the necessary margins of safety
2.6	Exercises to surprise the student
2.7	Adapt the training programme to take account of the physiological and psychological state of the student
2.8	Ensure the safety of the operation during training by maintaining awareness of the operating environment
2.9	Assess the competence of the student
SECTION 3 — POST-FLIGHT	
3.1	Provide effective instructor feedback to the student and plan subsequent training details
3.2	Avoid negative transfer of training'

GM1 FCL.915(e) General prerequisites and requirements for instructors

TRAINING ON SPIN AVOIDANCE AND SPIN RECOVERY

(a) While the purpose of advanced UPRT course is to expose students to psychological and physiological effects, students' responses and actions on controls may take any conceivable

variations, including some which can initiate spin entry or, most importantly, can highly aggravate the upset or loss-of-control they are supposed to recover from.

(b) The advanced UPRT course in accordance with point FCL.745.A is not aerobatic training and only requires training for the incipient spin as well as uncoordinated side slipped stalls which are prone to initiating spins. Full spin training or the development of spin recovery proficiency is reserved for the training course in accordance with point FCL.915(e).

(c) Even though most flights will go exactly as planned without an unanticipated departure from controlled flight, the instructor is responsible for the safety of flight despite anomalies or unexpected student inputs.

(d) Even in a case where an aeroplane is not certified for intentional flat or aggravated or inverted spins, it does not mean that mishandled student recovery avoids placing the aeroplane in such a situation. Some student inputs will take the aeroplane uncontrolled far beyond the normal scope of the aerobatic rating as defined in point FCL.800. Those situations might also have the potential to draw the aeroplane outside its certified flight envelope (e.g. overloads, snap-roll departures above limit speed, spin or inverted spin when not certified for, flat spins, etc.). Most importantly, those resulting situations could startle the instructor.

(e) For the reasons specified in point (d), instructors should:

(1) be trained to the extent of proficiency on the specific type of aircraft they use to deliver the course;

(2) have academic understanding of the factors assisting or deterring spin recoveries (upright and inverted spins), altitude requirements for safe recovery margins, and other operational considerations;

(3) demonstrate that they have the ability to early recognise abnormal situations, timely take action, and safely recover from all the conditions that they may encounter in the delivery of training; and

(4) demonstrate their ability to recover from all spin types, not only from spins entered intentionally, but from spins of unannounced direction of autorotation, and from all potential spin variations, including:

(i) normal (non-aggravated) spins;

(ii) flat spins;

(iii) accelerated spins; and

(iv) transition spins (incorrect recovery resulting in reversal of rotation).

(f) In the context of points (d) and (e), it is recommended that candidates either hold an aerobatic rating for aeroplanes or have equivalent experience.

AMC1 FCL.915(e)(2) General prerequisites and requirements for instructors

CONTENT OF THE REFRESHER TRAINING FOR UPRT INSTRUCTIONAL PRIVILEGES

(a) The objective of the refresher training is for the instructor to maintain or to re-obtain, as applicable, the level of competence required for instructing on a training course as per point FCL.745.A.

(b) The content of the refresher training should:

(1) consist of elements from the initial UPRT instructor training course as per point FCL.915(e)(1)(ii); and

(2) be determined by the ATO on a case-by-case basis, considering the needs of the individual instructor and taking into account the following factors:

(i) the experience of the instructor;

(ii) the amount of time elapsed since the instructor provided instruction on a training course as per point FCL.745.A for the last time; and

(iii) the performance of the instructor during a simulated UPRT training session comprising exercises from the advanced UPRT course as per point FCL.745.A. During this simulated training session, another instructor qualified in accordance with point FCL.915(e) should play the role of the student on the advanced UPRT course.

(c) Taking into account the factors listed in (b)(2) above, the ATO may also count the simulated training session as per point (b)(2)(iii) as refresher training without the need for further refresher training sessions, provided that the instructor demonstrates that he or she already possesses the required level of competence.

(d) The completion of the refresher training should be entered in the logbook of the instructor and should be signed by the head of training of the ATO.

5. In AMC1 FCL.920, point (b) is amended as follows:

'(b) The training and assessment of instructors should be made against the following performance standards:

Competence	**Performance**	**Knowledge**
Prepare resources	(a) ensures adequate facilities; (b) prepares briefing material; (c) manages available tools;~~.~~ (d) plans training within the training envelope of the training platform, as determined by the ATO (Note: See GM1 ORA.ATO.125 point (f)).	(a) understands objectives; (b) available tools; (c) competency-based training methods;~~.~~ (d) understands the training envelope of the training platform, as determined by the ATO (Note: See GM1 ORA.ATO.125 point (f)) and avoids training beyond the boundaries of this envelope.
Create a climate conducive to learning	(a) establishes credentials, role models appropriate behaviour; (b) clarifies roles; (c) states objectives; (d) ascertains and supports student	(a) barriers to learning; (b) learning styles.

	pilot's needs.	
Present knowledge	(a) communicates clearly; (b) creates and sustains realism; (c) looks for training opportunities.	teaching methods~~.~~
Integrate TEM ~~or~~and CRM	(a) makes TEM ~~or~~and CRM links with technical training~~.~~; (b) for aeroplanes: makes upset prevention links with technical training.	(a) TEM ~~or~~and CRM~~.~~; (b) Causes and countermeasures against undesired aircraft states
Manage time to achieve training objectives	A~~a~~llocates the appropriate time ~~appropriate~~ to achieve~~ing~~ competency objective.	syllabus time allocation~~.~~
Facilitate learning	(a) encourages student pilot participation; (b) shows motivating, patient, confident and assertive manner; (c) conducts one-to-one coaching; (d) encourages mutual support.	(a) facilitation; (b) how to give constructive feedback; (c) how to encourage student pilots to ask questions and seek advice~~;~~.
Assesses student pilot performance	(a) assesses and encourages student pilot self-assessment of performance against competency standards; (b) makes assessment decision and provides clear feedback; (c) observes CRM behaviour.	(a) observation techniques; (b) methods for recording observations.
Monitor and review progress	(a) compares individual outcomes to defined objectives; (b) identifies individual differences in learning rates; (c) applies appropriate corrective action.	(a) learning styles; (b) strategies for training adaptation to meet individual needs.
Evaluate training sessions	(a) elicits feedback from student pilots; (b) tracks training session processes against competence criteria; (c) keeps appropriate records.	(a) competency unit and associated elements; (b) performance criteria.
Report outcome	R~~r~~eports accurately using only observed actions and events.	(a) phase training objectives; (b) individual versus systemic weaknesses.'

6. The new GM1 FCL.905.TRI(b) is inserted as follows:

'GM1 FCL.905.TRI(b) Privileges and conditions

INSTRUCTORS INSTRUCTING FOR THE ISSUE OF A TRI OR SFI CERTIFICATE

Training in an aeroplane is not a requirement for the issue of an SFI or a TRI certificate. In order to deliver effective UPRT, it is beneficial for the instructor to have first-hand experience of the critical psychological and physiological human factors, which might be present during recoveries from developed upsets. These human factors (effects of unusual acceleration, such as variations from normal 1G flight, the difficulty to perform counter-intuitive actions, and the management of the associated stress response) can only be experienced during training in an aeroplane because FFSs are not capable of reproducing sustained accelerations. Completion of the advanced UPRT course in accordance with FCL.745.A would provide such experience and is therefore useful for instructors providing instruction for the issue of a TRI or an SFI certificate.';

7. In AMC1 FCL.930.TRI, after point (ab), a new point (ac) with a title is inserted follows:

'UPSET PREVENTION AND RECOVERY TRAINING (UPRT)

(ac) It is of paramount importance that instructors have the specific competence to deliver UPRT during the type rating course, including the ability to demonstrate knowledge and understanding of the type-specific upset recovery procedures and recommendations developed by the original equipment manufacturers (OEMs). Therefore, during the TRI training course the student instructor should:

(1) be able to apply the correct upset recovery techniques for the specific aeroplane type;

(2) understand the importance of applying type-specific OEMs procedures for recovery manoeuvres;

(3) be able to distinguish between the applicable SOPs and the OEMs recommendations (if available);

(4) understand the capabilities and limitations of the FSTD used for UPRT;

(5) be able to ensure that the training remains within the FSTD training envelope to avoid the risk of negative transfer of training;

(6) understand and be able to use the (instructor operating station) IOS of the FSTD in the context of effective UPRT delivery;

(7) understand and be able to use the FSTD instructor tools available for providing accurate feedback on pilot performance;

(8) understand the importance of adhering to the FSTD UPRT scenarios that have been validated by the training programme developer; and

(9) understand the missing critical human factor aspects due to the limitations of the FSTD and convey this to the student pilot(s) receiving the training.'

8. AMC1 to Appendix 3 is amended as follows:

(a) In Section 'General', after point (b), a new point (c) is added as follows:

'(c) The UPRT elements and components specified in AMC2 to Appendix 3; AMC1 to Appendix 5 point (a) should be integrated into the flying training phases or modules.'

(b) in Section (A), point (d) is amended as follows:

'FLYING TRAINING

(d) The flying instruction is divided into ~~five~~six phases:

(1) ~~p~~Phase 1:

Exercises up to the first solo flight comprise a total of at least 10 hours dual flight instruction on an SE aeroplane including:

(i) pre-flight operations, mass and balance determination, aeroplane inspection and servicing;

(ii) aerodrome and traffic pattern operations, collision avoidance and precautions;

(iii) control of the aeroplane by external visual references;

(iv) normal take-offs and landings;

(v) ~~flight at critically low air speeds, recognition of and recovery from incipient and full stalls, spin avoidance;~~the basic UPRT exercises as specified in point (b) of AMC2 to Appendix 3; AMC1 to Appendix 5;

(vi) ~~unusual attitudes and~~ simulated engine failure.

(2) ~~p~~Phase 2:

Exercises up to the first solo cross-country flight comprise a total of at least 10 hours of dual flight instruction and at least 10 hours solo flight including:

(i) maximum performance (short field and obstacle clearance) take-offs and short-field landings;

(ii) flight by reference solely to instruments, including the completion of a 180° turn;

(iii) dual cross-country flying using external visual references, DR and radio navigation aids, diversion procedures;

(iv) aerodrome and traffic pattern operations at different aerodromes;

(v) crosswind take-offs and landings;

(vi) abnormal and emergency procedures and manoeuvres, including simulated aeroplane equipment malfunctions;

(vii) operations to, from and transiting controlled aerodromes, compliance with ATS procedures, R/T procedures and phraseology;

(viii) knowledge of meteorological briefing arrangements, evaluation of weather conditions for flight and use of AIS.

(3) ~~p~~Phase 3:

Exercises up to the VFR navigation progress test comprise a total of at least 5 hours of dual instruction and at least 40 hours as PIC.

The dual instruction and testing up to the VFR navigation progress test should comprise:

(i) repetition of exercises of phases 1 and 2;

~~(ii) VFR flight at relatively critical high air speeds, recognition of and recovery from spiral dives;~~

(~~i~~iii) VFR navigation progress test conducted by an FI not connected with the applicant's training;

(i~~v~~ii) night flight time including take-offs and landings as PIC.

(4) ~~p~~Phase 4:

Exercises up to the instrument rating skill test comprise:

(i) at least 55 hours instrument flight, which may contain up to 25 hours of instrument ground time in an FNPT I or up to 40 hours in an FNPT II or FFS which should be conducted by an FI or an authorised SFI;

(ii) 20 hours instrument time flown as SPIC;

(iii) pre-flight procedures for IFR flights, including the use of the flight manual and appropriate ATS documents in the preparation of an IFR flight plan;

(iv) procedures and manoeuvres for IFR operation under normal, abnormal and emergency conditions covering at least:

(A) transition from visual to instrument flight on take-off;

(B) SIDs and arrivals;

(C) en-route IFR procedures;

(D) holding procedures;

(E) instrument approaches to specified minima;

(F) missed approach procedures;

(G) landings from instrument approaches, including circling~~.~~;

(v) in-flight manoeuvres and specific flight characteristics~~.~~ and the basic UPRT exercises as specified in Sections A, B, C and D of Table 2 in point (b) of AMC2 to Appendix 3; AMC1 to Appendix 5;

(vi) operation of an ME aeroplane in the exercises of (iv), including operation of the aeroplane solely by reference to instruments with one engine simulated inoperative, and engine shut-down and restart (the latter training should be conducted at a safe altitude unless carried out in an FSTD).

(5) ~~p~~Phase 5: Advanced UPRT in accordance with point FCL.745.A;

(~~5~~6) ~~p~~Phase ~~5~~6:

(i) instruction and testing in MCC comprise~~i~~ing the relevant training requirements;

(ii) if a type rating for single-pilot aeroplanes in multi-pilot operations, or ~~MP~~ multi-pilot aeroplanes is not required upon completion of this phase ~~part~~, the applicant ~~will~~should be issued~~provided~~ with a certificate of course completion for MCC training.';

(c) In Section C, point (d) is amended as follows:

'FLYING TRAINING

(d) The flying instruction is divided into four phases:

(1) ~~p~~Phase 1:

Exercises up to the first solo flight comprise a total of at least 10 hours dual flight instruction on an SE aeroplane, including:

(i) pre-flight operations, mass and balance determination, aeroplane inspection and servicing;

(ii) aerodrome and traffic pattern operations, collision avoidance and precautions;

(iii) control of the aeroplane by external visual references;

(iv) normal take-offs and landings;

(v) ~~flight at critically low air speeds, recognition of and recovery from incipient and full stalls, spin avoidance;~~the basic UPRT exercises as specified in point (b) of AMC2 to Appendix 3; AMC1 to Appendix 5;

(vi) ~~unusual attitudes and~~ simulated engine failure.

(2) ~~p~~Phase 2:

Exercises up to the first solo cross-country flight comprise a total of at least 10 hours of dual flight instruction and at least 10 hours solo flight including:

(i) maximum performance (short field and obstacle clearance) take-offs and short-field landings;

(ii) flight by reference solely to instruments, including the completion of a 180° turn;

(iii) dual cross-country flying using external visual references, DR and radio navigation aids, diversion procedures;

(iv) aerodrome and traffic pattern operations at different aerodromes;

(v) crosswind take-offs and landings;

(vi) abnormal and emergency operations and manoeuvres, including simulated aeroplane equipment malfunctions;

(vii) operations to, from and transiting controlled aerodromes, compliance with ATS procedures, R/T procedures and phraseology;

(viii) knowledge of meteorological briefing arrangements, evaluation of weather conditions for flight and use of AIS.

(3) ~~p~~Phase 3:

Exercises up to the VFR navigation progress test comprise a total of at least 5 hours of instruction and at least 40 hours as PIC.

The dual instruction and testing up to the VFR navigation progress test and the skill test should contain the following:

(i) repetition of exercises of phases 1 and 2;

~~(ii) VFR flight at relatively critical high air speeds, recognition of and recovery from spiral dives;~~

(~~i~~iii) VFR navigation progress test conducted by an FI not connected with the applicant's training;

(i~~v~~ii) night flight time including take-offs and landings as PIC.

(4) ~~p~~Phase 4:

Exercises up to the instrument rating skill test comprise:

(i) at least 55 hours instrument time, which may contain up to 25 hours of instrument ground time in an FNPT I or up to 40 hours in an FNPT II or FFS which should be conducted by an FI or a~~n authorised~~ SFI;

(ii) 20 hours instrument time flown as SPIC;

(iii) pre-flight procedures for IFR flights, including the use of the flight manual and appropriate ATS documents in the preparation of an IFR flight plan;

(iv) procedures and manoeuvres for IFR operation under normal, abnormal and emergency conditions covering at least:

(A) transition from visual to instrument flight on take-off;

(B) SIDs and arrivals;

(C) en-route IFR procedures;

(D) holding procedures;

(E) instrument approaches to specified minima;

(F) missed approach procedures;

(G) landings from instrument approaches, including circling.

(v) in-flight manoeuvres and specific flight characteristics~~.~~ and the basic UPRT exercises as specified in Sections A, B, C and D of Table 2 in paragraph (b) of AMC2 to Appendix 3; AMC1 to Appendix 5;

(vi) operation of either an SE or an ME aeroplane in the exercises of (iv), including in the case of an ME aeroplane operation of the aeroplane solely by reference to instruments with one engine simulated

inoperative and engine shut-down and restart. The latter exercise is to be conducted at a safe altitude unless carried out in an FSTD.';

(d) In Section D, point (d) is amended as follows:

'FLYING TRAINING

(d) The flying instruction is divided into four phases:

(1) ~~p~~Phase 1:

Exercises up to the first solo flight comprise a total of at least 10 hours dual flight instruction on an SE aeroplane, including:

(i) pre-flight operations, mass and balance determination, aeroplane inspection and servicing;

(ii) aerodrome and traffic pattern operations, collision avoidance and precautions;

(iii) control of the aeroplane by external visual references;

(iv) normal take-offs and landings;

(v) ~~flight at critically low air speeds, recognition of and recovery from incipient and full stalls, spin avoidance;~~the basic UPRT exercises as specified in point (b) of AMC2 to Appendix 3; AMC1 to Appendix 5;

(vi) ~~unusual attitudes and~~ simulated engine failure.

(2) ~~p~~Phase 2:

Exercises up to the first solo cross-country flight comprise a total of at least 10 hours of dual flight instruction and at least 10 hours solo flight including:

(i) maximum performance (short field and obstacle clearance) take-offs and short-field landings;

(ii) flight by reference solely to instruments, including the completion of a 180° turn;

(iii) dual cross-country flying using external visual references, DR and radio navigation aids, diversion procedures;

(iv) aerodrome and traffic pattern operations at different aerodromes;

(v) crosswind take-offs and landings;

(vi) abnormal and emergency procedures and manoeuvres, including simulated aeroplane equipment malfunctions;

(vii) operations to, from and transiting controlled aerodromes, compliance with ATS procedures, R/T procedures and phraseology;

(vii) knowledge of meteorological briefing arrangements, evaluation of weather conditions for flight and use of AIS.

(3) ~~p~~Phase 3:

Exercises up to the VFR navigation progress test comprise a total of at least 30 hours instruction and at least 58 hours as PIC, including:

(~~a~~i) at least 10 hours instrument time, which may contain 5 hours of instrument ground time in an FNPT or an FFS and should be conducted by an FI or an ~~authorised~~ SFI;

(~~b~~ii) repetition of exercises of phases 1 and 2, which should include at least 5 hours in an aeroplane certificated for the carriage of at least four persons and have a variable pitch propeller and retractable landing gear;

~~(c) VFR flight at relatively critical high air speeds, recognition of and recovery from spiral dives;~~

(~~d~~iii) night flight time including take-offs and landings as PIC.

(4) ~~p~~Phase 4:

The dual instruction and testing up to the CPL(A) skill test contain the following:

(i) up to 30 hours instruction which may be allocated to specialised aerial work training;

(ii) repetition of exercises in ~~p~~Phase 3, as required;

(iii) in-flight manoeuvres and particular flight characteristics including the basic UPRT exercises as specified in point (b) of AMC2 to Appendix 3; AMC1 to Appendix 5;

(iv) ME training.

If required, operation of an ME aeroplane including operation of the aeroplane with one engine simulated inoperative, and engine shutdown and restart (the latter exercise at a safe altitude unless carried out in an FSTD).'

(e) in Section E, paragraph (d) is amended as follows:

'FLYING TRAINING

(d) The following flight time is suggested for the flying training:

(1)	visual flight training:	suggested flight time
	(i) Exercise 1: pre-flight operations: mass and balance determination, aeroplane inspection and servicing.	
	(ii) Exercise 2: take-off, traffic pattern, approach and landing, use of	0:45 hours

	checklist, collision avoidance and checking procedures.	
(iii)	Exercise 3:	
	traffic patterns: simulated engine failure during and after take-off.	0:45 hours
(iv)	Exercise 4:	
	maximum performance (short field and obstacle clearance) take-offs and short-field landings.	1:00 hours
(v)	Exercise 5:	
	crosswind take-offs, landings and go-arounds.	1:00 hours
(vi)	Exercise 6:	
	~~flight at relatively critical high air speeds; recognition of and recovery from spiral dives~~ Arresting divergence of the aeroplane from intended flight path, Preventing flight at airspeeds inappropriate for the (intended flight) conditions, High airspeed (including flight at relatively high airspeed), Steep turns Nose-low attitudes at various bank angles (including spiral dive).	0:45 hours
(vii)	Exercise 7:	
	~~flight at critically slow air speeds, spin avoidance, recognition of and recovery from incipient and full stalls~~ Arresting divergence of the aeroplane from intended flight path, Preventing flight at airspeeds inappropriate for the (intended flight) conditions, slow flight, nose-high attitudes at various bank angles, spin avoidance,	0:45 hours

stall events in the following configurations:

— take-off configuration,

— clean configuration, and

— landing configuration.

(viii) Exercise 8:

cross-country flying using DR and radio navigation aids; flight planning by the applicant; filing of ATC flight plan; evaluation of weather briefing documentation, NOTAM, etc.; R/T procedures and phraseology; positioning by radio navigation aids; operation to, from and transiting controlled aerodromes, compliance with ATS procedures for VFR flights, simulated radio communication failure, weather deterioration, diversion procedures; simulated engine failure during cruise flight; selection of an emergency landing strip.	10:00 hours

(2) instrument flight training:

(i) This module's content is identical to that of the 10-hour~~s~~ basic instrument flight module as set out in AMC2 to Appendix 6. This module is focussed on the basics of flying by sole reference to instruments, including limited panel and ~~unusual attitudes~~ basic UPRT exercises as specified in Sections A, B and C of Table 2 in point (b) of AMC2 Appendix 3; AMC1 Appendix 5.

(ii) All exercises may be performed in an FNPT I or II or an FFS. If instrument flight training is in VMC, a suitable means of simulating IMC for the student should be used.

(iii) A BITD may be used for the following exercises: (9), (10), (11) and (14).

(iv) The use of the BITD is subject to the following:

(A) the training is complemented by exercises ~~i~~on an aeroplane;

(B) the record of the parameters of the flight is available;

(C) an FI(A) or IRI(A) conducts the instruction.

(v) Exercise 9:

Basic instrument flying without external visual cues; horizontal flight; power changes for acceleration or deceleration, maintaining straight and level flight; turns in level flight with 15° and 25° bank, left and right; roll-out onto predetermined headings.	0:30 hours

(vi) Exercise 10:

Repetition of exercise 9; additionally climbing and descending, maintaining heading and speed, transition to horizontal flight; climbing and descending turns.	0:45 hours

(vii) Exercise 11:

Instrument pattern: (1) start exercise, decelerate to approach speed, flaps into approach configuration; (2) initiate standard turn (left or right); (3) roll out on opposite heading,	0:45 hours

maintain new heading for
1 minute;

(4) standard turn, gear down,
descend 500 ft/min;

(5) roll out on initial heading,
maintain descent (500 ft/min)
and new heading for 1 minute;

(6) transition to horizontal
flight, 1.000 ft below
initial flight level;

(7) initiate go-around;

(8) climb at best rate
of climb speed.

(viii) Exercise 12:

Repetition of exercise 9 and steep turns with 45° bank; recovery from undesired aircraft states. 0:45 hours

(ix) Exercise 13:

Repetition of exercise 12 0:45 hours

(x) Exercise 14:

Radio navigation using VOR, NDB or, if available, VDF; interception of predetermined QDM and QDR. 0:45 hours

(xi) Exercise 15:

Repetition of exercise 9 and ~~recovery from unusual attitudes~~ recovery from nose-high attitudes at various bank angles, recovery from nose-low attitudes at various bank angles 0:45 hours

(xii) Exercise 16:

Repetition of exercise 9, turns and level change and ~~recovery from~~ recovery from nose-high attitudes at various bank angles, recovery from nose-low attitudes at various bank angles with simulated failure of the artificial 0:45 hours

horizon or directional gyro.

(xiii) Exercise 17:

Basic UPRT exercises as specified in point (b) of AMC2 to Appendix 3; AMC1 to Appendix 5, excluding those manoeuvres which have already been completed during exercises 15 and 16 ~~Recognition of, and recovery from incipient and full stalls~~. 0:45 hours

(xiv) Exercise 18:

Repetition of exercises (14), (16) and (17). 3:~~3~~0 hours

(3) ME training

If required, operation of an ME aeroplane in the exercises 1 through 1~~8~~7, including operation of the aeroplane with one engine simulated inoperative, and engine shutdown and restart. Before commencing training, the applicant should have complied with the type and class ratings requirements as appropriate to the aeroplane used for the test.';

9. The new AMC2 to Appendix 3; AMC1 to Appendix 5, GM1 Appendix 3; Appendix 5 and GM1 to Appendix 3 are inserted as follows:

'AMC2 to Appendix 3; AMC1 to Appendix 5

BASIC UPRT FOR AEROPLANE ATP INTEGRATED, CPL/IR INTEGRATED, CPL INTEGRATED AND CPL MODULAR COURSES AS WELL AS MPL COURSE PHASES 1 TO 3

(a) BASIC UPRT ELEMENTS AND COMPONENTS

In order for student pilots to develop the competencies to prevent and recover from aeroplane upsets, the basic UPRT elements and respective components in the following Table 1 should be integrated into the flying training modules and phases, such that all the elements are covered.

Table 1: Basic UPRT elements and components		**Pre-flight briefing**	**Flying training**
A.	**Aerodynamics**		
1.	General aerodynamic characteristics	•	•
2.	Aeroplane certification and limitations	•	•
4.	Aerodynamics (high and low altitude)	•	
5.	Aeroplane performance (high and low altitude)	•	
6.	AoA and stall awareness	•	•
7.	Aeroplane stability	•	•
8.	Control surface fundamentals	•	•

9.	Use of trim	•	•
10.	Icing and contamination effects	•	•
11.	Propeller slipstream (as applicable)	•	•
B.	**Causes of and contributing factors to upsets**		
1.	Environmental	•	
2.	Pilot-induced	•	
3.	Mechanical (aeroplane systems)	•	
C.	**Safety review of accidents and incidents relating to aeroplane upsets**		
1.	Safety review of accidents and incidents relating to aeroplane upsets	•	
D.	**G-load awareness and management**		
1.	Positive/negative/increasing/decreasing G-loads	•	•
2.	Lateral G awareness (sideslip)	•	•
3.	G-load management	•	•
E.	**Energy management**		
1.	Kinetic energy vs potential energy vs chemical energy (power)	•	•
F.	**Flight path management**		
1.	Relationship between pitch, power and performance	•	•
2.	Performance and effects of differing power plants	•	•
3.	Manual and automation inputs for guidance and control (if applicable)	•	•
4.	Class-specific characteristics of flight path management	•	•
5.	Management of go-arounds from various stages during the approach	•	•
6.	Automation management (if applicable)	•	•
7.	Proper use of rudder	•	•
G.	**Recognition**		
1.	Class-specific examples of physiological, visual and instrument clues during developing and developed upset	•	•
2.	Pitch/power/roll/yaw	•	•
3.	Effective scanning (effective monitoring)	•	•
4.	Stall protection systems and cues	•	•
5.	Criteria for identifying stalls and upsets	•	•
H.	**System malfunction**		

	(including immediate handling and subsequent operational considerations, as applicable)		
1.	Flight control defects	•	•
2.	Engine failure (partial or full)	•	•
3.	Instrument failures	•	•
4.	Loss of reliable airspeed (training elements as per point (lb) of AMC2 ORA.ATO.125[1]).	•	•
5.	Automation failures	•	•
6.	Stall protection system failures, including icing alerting systems	•	•

(b) MANOEUVRE-BASED UPRT EXERCISES

The following Table 2 contains manoeuvre-based basic UPRT exercises.

Table 2: Manoeuvre-based basic UPRT exercises		**Pre-flight briefing**	**Flying training**
A.	**Timely and appropriate intervention**		
1.	Arresting divergence of the aeroplane from intended flight path	•	•
2.	Preventing flight at airspeeds inappropriate for the (intended flight) condition	•	•
3.	Avoiding spins	•	•
B.	**Flight path management**		
1.	Steep turns	•	•
2.	Slow flight (including flight at critically low airspeed)	•	•
3.	High airspeed (including flight at relatively high airspeed)	•	•
C.	**Application of OEM recommendations (if applicable) during developing upsets**		
1.	Nose-high attitudes at various bank angles	•	•
2.	Nose-low attitudes at various bank angles (including spiral dive)	•	•
D.	**Stall events in the following configurations**		

[1] Please refer to ED Decision 2012/007/R.

Table 2: Manoeuvre-based basic UPRT exercises		Pre-flight briefing	Flying training
1.	Take-off configuration	•	•
2.	Clean configuration	•	•
3.	Landing configuration	•	•

(c) INTEGRATION OF TEM, PILOT CORE COMPETENCIES, AND HUMAN FACTORS

Threat and Error Management (TEM), pilot competencies and human factors, as shown in the following Table 3 below, should be integrated into the flying training modules and phases as appropriate.

Table 3: Core elements and components of TEM, pilot competencies and human factors		Pre-flight briefing	Flying training
A.	**TEM**		
1.	TEM framework	•	•
2.	Recognition of threats and errors	•	•
3.	Management of threats and errors	•	•
4.	Countermeasures against threats and errors to prevent undesired aircraft states, including early intervention and, when necessary to prevent upsets, timely application of countermeasures to manage undesired aircraft states	•	•
B.	**Pilot Competencies, including CRM**		
1.	All elements listed in Table 1 of GM2 FCL.735.A	•	•
C.	**Human factors**		
1.	Instrument interpretation, active monitoring, checking	•	•
2.	Distraction, inattention, fixation, fatigue	•	•
3.	Human information processing, cognitive effects	•	•
4.	Perceptual illusions (visual or physiological) and spatial disorientation, effects of G-loads	•	•
5.	Stress, startle and surprise effect	•	•

6.	Intuitive and counter-intuitive behaviour	•	•

GM1 to Appendix 3; Appendix 5
BASIC UPRT EXERCISES

(a) GENERAL

The training objective of the basic UPRT exercises is for the student to achieve competence in applying prevention and recovery techniques. In order to meet the training objectives, some UPRT exercises will involve operation at altitudes, speeds and g-loadings that are not required for other parts of the training course. When designing training courses, ATOs should ensure that the aircraft used for these exercises will allow the training objectives to be achieved while maintaining a margin of safety to aircraft limitations in accordance with the training envelope, as determined by the ATO (see GM1 ORA.ATO.125 point (f)).

(b) UPRT WITH REFERENCE TO INSTRUMENTS

Basic UPRT exercises completed by reference to instruments (i.e. in simulated instrument meteorological conditions (IMC)) should involve only moderate excursions from the speeds and attitudes used in normal instrument flight. Exercises conducted in IMC should not be planned to involve 'unusual attitudes'.

(c) INSTRUCTORS DELIVERING BASIC UPRT

Instructors conducting basic UPRT training during the CPL or ATP course do not require any additional qualifications. It is the responsibility of the ATO to ensure that instructors are competent to deliver effective training on all parts of the course and also that they are competent to recover the aircraft in the event that a student erroneously conducts any UPRT exercise.

(d) APPLICATION OF OEM RECOMMENDATIONS DURING DEVELOPING UPSETS

Stall recovery training exercises as well as nose-high and nose-low prevention training exercises use the recovery strategies recommended by the OEMs contained in Tables 1, 2 and 3 below.

Note: As OEM procedures always take precedence over the general strategies as recommended by the OEMs, ATOs should consult the OEM on whether any approved specific procedures are available prior to using the templates.

Refer to revision 3 of the Airplane Upset Prevention and Recovery Training Aid (AUPRTA) for a detailed explanation and rationale of nose-high and nose-low recovery strategies as recommended by the OEMs.

Table 1: Stall event recovery template	
Pilot Flying (PF) Immediately do the following at first indication of a stall (aerodynamic buffeting, reduced roll stability and aileron effectiveness, visual or aural cues and warnings, reduced elevator (pitch) authority, inability to maintain altitude or arrest	

rate of descent, stick shaker activation (if installed)) during any flight phases *except at lift-off*.		
1.	**AUTOPILOT — DISCONNECT (IF APPLICABLE)** (A large out-of-trim condition could be encountered when the autopilot is disconnected)	
2.	**AUTOTHROTTLE — OFF (IF APPLICABLE)**	
3.	**(a) NOSE-DOWN PITCH CONTROL** apply until stall warning is eliminated **(b) NOSE-DOWN PITCH TRIM** (as needed) (Reduce the AoA whilst accepting the resulting altitude loss.)	
4.	**BANK — WINGS LEVEL**	
5.	**POWER — ADJUST** (as needed) (Thrust reduction for aeroplanes with underwing-mounted engines may be needed)	
6.	**SPEEDBRAKES/SPOILERS — RETRACT**	
7.	When airspeed is sufficiently increasing — **RECOVER** to level flight (Avoid the secondary stall due to premature recovery or excessive G-loading)	

Table 2: Nose-high recovery strategy template		
Recognise and confirm the developing situation by announcing **'nose high'**		
Pilot Flying (PF)		
1.	**AUTOPILOT — DISCONNECT (if applicable)** (A large out-of-trim condition could be encountered when the autopilot is disconnected)	
2.	**AUTOTHROTTLE — OFF** (if applicable)	
3.	**APPLY** as much nose-down control input as required to obtain a nose-down pitch rate	
4.	**POWER — ADJUST** (if required)	

5.	**ROLL — ADJUST** (if required) (Avoid exceeding 60-degree bank)	
6.	When airspeed is sufficiently increasing — **RECOVER** to level flight (Avoid the secondary stall due to premature recovery or excessive G-loading)	

NOTE:

(1) Recovery to level flight may require use of pitch trim.

(2) **WARNING:** Excessive use of pitch trim or rudder may aggravate the upset situation or may result in high structural loads.

Table 3: Nose-low recovery strategy template		
Recognise and confirm the developing situation by announcing **'nose low'** (If the autopilot or autothrottle is responding correctly, it may not be appropriate to decrease the level of automation while assessing if the divergence is being stopped)		
Pilot Flying (PF)		
1.	**AUTOPILOT — DISCONNECT (if applicable)** (A large out-of-trim condition could be encountered when the autopilot is disconnected)	
2.	**AUTOTHROTTLE — OFF** (if applicable)	
3.	**RECOVERY** from stall (if required)	
4.	**ROLL** in the shortest direction to wings level (It may be necessary to reduce the G-loading by applying forward control pressure to improve roll effectiveness)	
5.	**POWER** and **DRAG — ADJUST** (if required)	
6.	**RECOVER** to level flight (Avoid the secondary stall due to premature recovery or excessive G-loading)	

NOTE:

(1) Recovery to level flight may require use of pitch trim.

(2) **WARNING:** Excessive use of pitch trim or rudder may aggravate the upset situation or may result in high structural loads.

ADDITIONAL GUIDANCE

(e) Specific guidance on UPRT is available in the latest revision of ICAO Doc 10011 'Manual on Aeroplane Upset Prevention and Recovery Training'.

GM1 to Appendix 3 Example of a grading system for practical flight training during ATP, CPL and MPL courses grading system

An ATPL/CPL/MPL grading system may be developed by using the grading system in GM3 FCL.735.A.

10. In GM1 to Appendix 5, the table in point (d) is amended as follows:

MPL Training Scheme

Phases of training	Training items	Flight and simulated flight training media - Minimum level requirement -		Ground training media
Adapted competency model				
Phase 4 — advanced Type rating training covering the training content of Appendix 9 to Part-FCL within an airline-oriented environment	• TEM and CRM • Landing training • All weather • LOFT • Abnormal procedures • Normal procedures • Type-specific UPRT	Aeroplane: ME Multi-crew certified FSTD FS level D or C + ATC simulation	6 to 12 take-offs and landings as PF (in accordance with point 11 of Appendix 5) One go-around with all engines operating (refer to GM1 to Appendix 9 (d). PF / ~~PNF~~M	• ~~CBT~~ • E-learning • Part-task trainer • Class-room
Phase 3 — intermediate Application of multi-crew operations in a high-performance ME turbine aeroplane	• TEM and CRM • LOFT • Abnormal procedures • Normal procedures • Multi-crew • Instrument flight • Non-type-specific UPRT	FSTD: *representing an ME turbine-powered aeroplane to be operated with a co-pilot and qualified to an equivalent standard to level B + ATC simulation*	PF / ~~PNF~~M	
Phase 2 — basic Introduction of multi-crew operations and instrument flight	• TEM and CRM • PF / ~~PNF~~PM complement • IFR cross-country • Instrument flight • Night flight	Aeroplane: SE or ME FSTD: FNPT II + MCC	PF / ~~PNF~~M	
Phase 1 — core flying skills Specific basic SP training	• TEM and CRM • VFR c~~C~~ross-country • Solo flight • Basic ~~I~~instrument flight • Principles of flight • Cockpit procedures • ~~On aeroplane~~ U~~u~~pset recovery in an aeroplane • Night flight	Aeroplane: SE or ME FSTD: FNPT I / BITD	PF	

11. The new GM1 to Appendix 9 is inserted as follows:

'GM1 to Appendix 9 Training, skill test and proficiency check for MPL, ATPL, type and class ratings, and proficiency check for IRs

TYPE SPECIFIC UPRT AND GO-AROUND TRAINING IN FSTD

(a) General

(1) The upset recovery training exercises should be mainly manoeuvre-based but may include some scenario-based training elements. The manoeuvre-based training enables type rating applicants to apply their handling skills and recovery strategy whilst leveraging CRM principles to return the aeroplane from an upset condition to a stabilised flight path.

(2) If training is conducted in an FSTD, it is important that applicants understand the limitations of the FSTD in replicating the physiological and psychological aspects of upset recovery exercises.

Note: In order to avoid negative training and negative transfer of training, the ATO should ensure that the selected upset recovery exercises take into consideration the limitations of the FFS.

(b) Stall event recovery in FSTD (Appendix 9, Section B(5) exercise 7.2.1; Section B(6) exercise 3.7.1)

(1) It is of utmost importance that stall event recovery training takes into account the capabilities of the FFS used. To deliver stall event recovery training, the FFS should be qualified against the relevant UPRT elements of CS-FSTD Issue 2. Stall event recovery training should include training up to the stall (approach-to-stall). Post-stall training may be delivered provided the device has been qualified against the relevant optional elements of CS-FSTD Issue 2 and the operator demonstrates that negative training or negative transfer of training is avoided. A 'stall event' is defined as an occurrence whereby the aeroplane experiences one or more conditions associated with an approach-to-stall or a post stall.

(2) Stall event recovery training should emphasise the requirement to reduce the AoA whilst accepting the resulting altitude loss. High-altitude stall event training should be included so that flight crew experience the aeroplane control response, the significant altitude loss during the recovery, and the increased time required to recover. The training should also emphasise the risk of triggering a secondary stall event during the recovery.

(3) Recovery from a stall event should always be conducted in accordance with the stall event recovery procedures of the OEMs.

Note: If an OEM-approved recovery procedure does not exist, ATOs should develop and train the aeroplane-specific stall recovery procedure based on the template in Table 1 below. Refer to Revision 3 of the Airplane Upset Prevention and Recovery Training Aid (AUPRTA) for a detailed explanation and rationale of the stall event recovery template as recommended by the OEMs.

Table 1: Recommended stall event recovery template

Stall event recovery template

	Pilot Flying (PF) Immediately do the following at first indication of a stall (aerodynamic buffeting, reduced roll stability and aileron effectiveness, visual or aural cues and warnings, reduced elevator (pitch) authority, inability to maintain altitude or arrest rate of descent, stick shaker activation (if installed)) during any flight phases *except at lift-off*.	**Pilot Monitoring (PM)**
1.	**AUTOPILOT — DISCONNECT** (A large out-of-trim condition could be encountered when the autopilot is disconnected)	**MONITOR** airspeed and attitude throughout the recovery and **ANNOUNCE** any continued divergence
2.	**AUTOTHRUST/AUTOTHROTTLE — OFF**	
3.	**(a) NOSE-DOWN PITCH CONTROL** apply until stall warning is eliminated **(b) NOSE-DOWN PITCH TRIM** (as needed) (Reduce the AoA whilst accepting the resulting altitude loss.)	
4.	**BANK — WINGS LEVEL**	
5.	**THRUST — ADJUST** (as needed) (Thrust reduction for aeroplanes with underwing-mounted engines may be needed)	
6.	**SPEEDBRAKES/SPOILERS — RETRACT**	
7.	When airspeed is sufficiently increasing — **RECOVER** to level flight (Avoid the secondary stall due to premature recovery or excessive G-loading)	

(c) Nose-high and nose-low recovery exercises (Appendix 9, Section B(5) exercise 7.2.2; B(6) exercise 3.7.2)

Nose-high and nose-low recovery exercises should be conducted in accordance with the strategies recommended by the OEMs contained in Tables 2 and 3 below.

Note: As the OEM procedures always take precedence over the recommendations, ATOs should consult the OEM on whether any approved type-specific recovery procedures are available prior to using the templates.

Refer to Revision 3 of the Airplane Upset Prevention and Recovery Training Aid (AUPRTA) for a detailed explanation and rationale of nose-high and nose-low recovery strategies as recommended by the OEMs.

Table 2: Recommended nose-high recovery strategy template

Nose-high recovery strategy template		
Either pilot — Recognise and confirm the developing situation by announcing **'nose high'**		
PF		**PM**
1.	**AUTOPILOT — DISCONNECT** (A large out-of-trim condition could be encountered when the autopilot is disconnected)	**MONITOR** airspeed and attitude throughout the recovery and **ANNOUNCE** any continued divergence
2.	**AUTOTHRUST/AUTOTHROTTLE — OFF**	
3.	**APPLY** as much nose-down control input as required to obtain a nose-down pitch rate	
4.	**THRUST — ADJUST** (if required) (Thrust reduction for aeroplanes with underwing-mounted engines may be needed)	
5.	**ROLL — ADJUST** (if required) (Avoid exceeding 60-degree bank)	
6.	When airspeed is sufficiently increasing — **RECOVER** to level flight (Avoid the secondary stall due to premature recovery or excessive G-loading)	
NOTE: (1) Recovery to level flight may require use of pitch trim. (2) If necessary, consider reducing thrust in aeroplanes with underwing-mounted engines to aid in achieving nose-down pitch rate. (3) **WARNING:** Excessive use of pitch trim or rudder may aggravate the upset situation or may result in high structural loads.		

Table 3: Recommended nose-low recovery strategy template

Nose-low recovery strategy template	
Either pilot — Recognise and confirm the developing situation by announcing **'nose low'** (If the autopilot or autothrust/autothrottle is responding correctly, it may not be appropriate to decrease the level of automation while assessing if the divergence is being stopped)	
PF	**PM**

1.	**AUTOPILOT — DISCONNECT** (A large out-of-trim condition could be encountered when the autopilot is disconnected)	**MONITOR** airspeed and attitude throughout the recovery and **ANNOUNCE** any continued divergence
2.	**AUTOTHRUST/AUTOTHROTTLE — OFF**	
3.	**RECOVERY** from stall if required	
4.	**ROLL** in the shortest direction to wings level (It may be necessary to reduce the G-loading by applying forward control pressure to improve roll effectiveness)	
5.	**THRUST** and **DRAG — ADJUST** (if required)	
6.	**RECOVER** to level flight (Avoid the secondary stall due to premature recovery or excessive G-loading.)	
NOTE: (1) Recovery to level flight may require use of pitch trim. (2) **WARNING:** Excessive use of pitch trim or rudder may aggravate the upset situation or may result in high structural loads.		

(d) Go-around with all engines operating from various stages during an instrument approach (Appendix 9, Section B(5) exercise 7.3; B(6) exercise 4.1.)

(1) The objective of the go-around exercises is to expose the student pilot to the physiological effects caused by a go-around. The instructor should ensure that student pilots understand the objective of the exercises and provide students with appropriate coping strategies, including TEM. Due consideration should be given to environmental conditions when evaluating the demonstration of task proficiency and related criteria.

(2) A go-around may be commenced at any time during an approach, including before the aeroplane is in the landing configuration. Historically, most go-around training has been conducted when the aeroplane is in the landing configuration prior to commencing the go-around. Students must be prepared to adapt the go-around manoeuvre if the go-around is commenced prior to the point where the aeroplane is fully configured for landing. Situation awareness in relation to flap and gear configuration, aeroplane speed and missed approach altitude is important.

(3) Unanticipated go-arounds may startle the students (e.g. unexpected ATC constraints, automation malfunction, adverse weather, etc.). Students may find themselves faced with a situation where they have to perform a large number of critical actions under a high workload (e.g. setting thrust, landing gear retraction, flight path management). The instructor should explain that there is also a possibility of disorientation during a go-around because of the somatogravic effect produced by

large longitudinal acceleration felt by the inner-ear as the aeroplane speed increases. This effect cannot be reproduced in an FSTD.

(4) It is vital that the correct pitch attitude is selected and maintained, while the aeroplane is kept in trim as it accelerates (depending on the aeroplane type). On some aeroplane types with under-slung engines the pitch response with all engines functioning may be amplified due to the relatively low gross weight towards the end of a flight and the high thrust available from modern aeroplane engines. It is particularly important that trim changes are anticipated on such aeroplanes.

(5) ATOs should develop scenarios for go-around training containing different take-off and approach stall situations that also involve surprise and startle effects and include:

(i) a go-around from the non-landing configuration;

(ii) a go-around at low gross weight using maximum go-around thrust;

(iii) a go-around from the outer marker or equivalent point;

(iv) a go-around below 500 ft using, as applicable/permitted, reduced go-around thrust;

(v) a go-around initiated above the published missed approach altitude; and

(vi) a normal go-around from the landing configuration using reduced go-around thrust (if available / type-specific).

(6) Training should also incorporate topics such as flight path management (manual and automatic), application of procedures, startle factors, communication, workload management and situation awareness. The objective of this training is to highlight:

(i) differences to procedures when the aircraft is in the non-landing configuration;

(ii) differences in handling characteristics at low gross weights and high thrust settings;

(iii) the threat associated with go-arounds close to the published missed approach altitudes;

(iv) startle and surprise associated with an unplanned go-around (ATC, blocked runway, etc.);

(v) the importance of effective communication between flight crew;

(vi) the requirement to be aware of the aircraft energy state during a go-around; and

(vii) the importance of engaging the autopilot or flight director in the correct modes during a go-around.

(7) Go-around training should not be limited to addressing the somatogravic effects caused by a go-around. Training should also cover topics such as flight path management (manual and automatic), application of procedures, startle factor, communication, workload management and situation awareness. Flight path management training should address:

(i) the handling differences of a lighter than normal aircraft which may differ to handling experienced during take-off when the aircraft is much heavier;

(ii) the different reaction of the aeroplane (pitch and vertical speed) comparing a go-around performed with reduced G/A thrust (if the function is available) and a go-around performed with full G/A thrust (a different weight).

(8) The importance of correct selection of TO/GA modes by the PF should also be emphasised (pushing TO/GA, selected the correct thrust lever detent, etc.)

(9) The importance of the PM role in the go-around manoeuvre should also be highlighted. The PM usually has higher workload as they need to reconfigure the aircraft, engage FMA modes, communicate with ATC and monitor the actions of the PF. This excessive workload for the PM may lead him or her to prioritise actions to the detriment of monitoring activities. The phenomenon of attentional tunnelling may also need to be addressed. This happens when one pilot, or both, focus exclusively on a problem at the expense of general monitoring of the flight parameters.'