Australian Government

Civil Aviation Safety Authority

I, MARK ALAN SKIDMORE, Director of Aviation Safety, on behalf of CASA, make this instrument under regulation 61.045 of the *Civil Aviation Safety Regulations 1998*.

[Signed M. Skidmore]
Mark Skidmore AM
Director of Aviation Safety

8 September 2015

Prescribed qualification standards for FSTD (MCC training – aeroplane) Instrument 2015 (Edition 1)

1 Name

This instrument is the *Prescribed qualification standards for FSTD (MCC training – aeroplane) Instrument 2015 (Edition 1).*

2 Commencement

This instrument commences on the day after registration.

3 Definitions etc.

(1) Subject to the specific definitions set out in subsection (2), in this instrument words and phrases have the same meaning as in Part 61 of the *Civil Aviation Safety Regulations 1998* (***CASR 1998***).

(2) In this instrument:

device has the same meaning as FSTD.

FCM means flight crew member.

FSTD, or ***device***, means a flight simulation training device.

IFR means the instrument flight rules prescribed in Part 12 of the *Civil Aviation Regulations 1988*.

MCC means multi-crew cooperation.

MCC training means an approved course of training in multi-crew cooperation.

model, in relation to an FSTD, means a particular simulation functionality of the device.

Note For example, the flight dynamics model of an FSTD is the functionality of the device to simulate the flight dynamics of a multi-crew aeroplane in a particular environment.

multi-crew aeroplane means a turbine-powered multi-engine aeroplane, that is:

(a) fitted with:

(i) a pressurisation and oxygen system; and

(ii) a retractable undercarriage; and

(iii) an engine fire detection and extinguishment system; and

(iv) a weather radar; and

(b) equipped for multi-crew operations under the IFR.

Note The standards in this instrument are those which a device must meet to be suitable as a flight simulation training device for a multi-crew aeroplane with the systems and equipment mentioned in this definition.

no discernible latency means that any observable delay in a simulated system responding to a simulated control input is no greater than the observable delay (if any) in a multi-crew aeroplane responding to the same actual control input.

simulate means to reproduce, at least in all essential respects, the actions and reactions of a multi-crew aeroplane, and its systems and equipment, when on the ground or in flight, including associated noise, attitude, motion, and external environmental effects.

transport delay means the total computer processing time required for a simulated system to respond to a simulated control input.

4 Application

The requirements set out in Schedule 1 are prescribed as qualification standards for an FSTD, to be used for MCC training for a multi-crew aeroplane.

Note See paragraph (d) of the definition of ***flight simulation training device*** in regulation 61.010 of CASR 1998.

Schedule 1 Qualification standards for an FSTD used for MCC training for a multi-crew aeroplane

1 Flight deck or cockpit layout and structure

1.1 The flight deck or cockpit layout and structure (as the case may be) of the device must:

(a) represent that of a multi-crew aeroplane; and

(b) be enclosed, or perceived by a user to be enclosed, to exclude distractions; and

(c) include, where applicable, the following structural elements:

(i) primary and secondary flight controls;

(ii) engine and propeller controls;

(iii) aeroplane systems (for example, for fuel management, electronics and hydraulics) and their controls;

(iv) circuit breakers and panels;

(v) flight instruments and instrument panels;

(vi) navigation and communication equipment;

(vii) caution and warning systems.

1.2 Each applicable structural element mentioned in a subparagraph of paragraph 1.1 (c):

(a) must be located in a spatially correct cockpit area; and

(b) must be such that the technique, effort, travel and direction required to manipulate the element simulates that of a multi-crew aeroplane.

Note Circuit breaker panels that are not required to be operated by an FCM in simulation training, may, as far as practicable, be scale, photographic representations.

1.3 Flight deck or cockpit instruments or instrument panels represented by electronically displayed images with physical overlay or masking which incorporate operable controls, must be free of quantization.

Note ***Quantization***, sometimes called stepping, means restraint, limitation or reduction from the scope or range of values, readings or other data that would normally be found in the relevant instrument or panel of a multi-crew aeroplane.

1.4 If an angle of attack indicator is displayed, it must operate in correct sense.

Note To operate in "correct sense" is an aviation expression meaning that the angle of attack increases as the aircraft approaches aerodynamic stall.

1.5 The flight deck or cockpit seating for each FCM in the device must enable the FCM to have the optimal eye-point position.

1.6 The flight deck or cockpit seating in the device for the instructor must enable the instructor to:

(a) provide training to each of the FCMs; and

(b) operate the device.

1.7 Flight deck or cockpit lighting must represent that of a multi-crew aeroplane.

2 Flight dynamics model (aircraft and engines)

The flight dynamics model of the device must be able to simulate the various combinations of drag and thrust that are normally encountered in the flight of a multi-crew aeroplane, and that give rise to changes in the following:

(a) aeroplane attitude;

(b) thrust;

(c) drag;

(d) altitude;

(e) aeroplane configuration.

3 Ground reaction and handling

3.1 The ground reaction and ground handling models of the device (the ***models***) must enable sound and visual systems to simulate the touchdown effects of a multi-crew aeroplane.

3.2 The stopping and directional control forces of the models must enable simulation of dry runway conditions.

4 Aeroplane systems

4.1 Aeroplane systems of the device, as used in training, must simulate those of a multi-crew aeroplane.

4.2 The systems must be functionally correct to simulate specified normal, non-normal and emergency operating procedures to be carried out by FCMs during training.

4.3 The systems must simulate system operations, including interdependencies, both on the ground and in flight.

4.4 Circuit breakers operated in the conduct of MCC training must be functionally accurate and simulate the functions of circuit breakers in an aeroplane.

4.5 Instrument indications must automatically respond:

(a) to simulated flight control movements by an FCM; and

(b) to simulated atmospheric disturbance;

as they would in a multi-crew aeroplane.

4.6 For subclause 4.5, numerical values displayed or otherwise conveyed by the instruments must be presented in units relevant to a multi-crew aeroplane.

4.7 The device must simulate the following multi-crew aeroplane systems:

(a) the communication system;

(b) the navigation system;

(c) the caution and warning system.

4.8 The simulated systems mentioned in subclause 4.7 must include the following:

(a) a headset-capable communications system that is integrated with the crew oxygen system for each FCM;

(b) a method of identifying selected navigation aids;

(c) push-to-transmit switches for each FCM, installed on the flight controls;

(d) a system which enables each FCM to select the radio frequency that he or she intends to use;

(e) a system which enables the instructor to know if each FCM is transmitting on the correct frequency.

4.9 Approach to a simulated aerodynamic stall must be indicated in the same way as it is indicated in a multi-crew aeroplane.

4.10 Activation of the traffic collision avoidance system (TCAS), and the terrain awareness warning system (TAWS) must be simulated in the same way as in an aeroplane.

4.11 Activation of the anti-icing system must be simulated in the same way as in a multi-crew aeroplane.

5 Flight control forces and control travel

5.1 Flight control forces on the device to simulate those of a multi-crew aeroplane, may be produced by active or passive arrangement.

Note Passive arrangement does not modify control forces with changes in aircraft flight conditions. Active arrangement modifies control forces with changes in aircraft flight conditions.

5.2 Flight control travel must simulate that of a multi-crew aeroplane.

5.3 Reactions to the operation of the flight controls must simulate the reactions of a multi-crew aeroplane to its flight controls.

6 Sound cues

6.1 Flight deck sounds in the device resulting from pilot actions or aeroplane system malfunctions must simulate those of a multi-crew aeroplane.

6.2 Engine sound cues must correspond to engine locations.

7 Visual display cues

7.1 The visual display of the device must produce at least a generic textured representation of ambient conditions, and be free of optical discontinuities that may create non-realistic visual cues.

7.2 For each FCM, the visual display field of view (***FOV***) must be not less than: 45° horizontally and 30° vertically.

7.3 For each FCM, distance from the FCM's eye position to the surface of a direct view display must not be less than the distance from the FCM's eye position to the instrument panel.

7.4 The visual display must be capable of producing the same changes to runway perspective as arise in a multi-crew aeroplane from changes to its approach path.

7.5 The visual display contrast ratio must be capable of the following:

(a) displaying variations in ground terrain;

(b) distinguishing landing sites, or runway or taxiway surfaces, at aerodromes;

as they would appear to the FCMs of a multi-crew aeroplane.

7.6 The visual display brightness must be sufficient to support daylight, twilight and night environment conditions.

8 Motion cues — Reserved

Note There is no requirement for motion cues.

9 Air traffic control environment simulation

The device must be capable of generating at least 1 simulated automated airport weather reporting message of an Automated Terminal Information Service (ATIS) broadcast.

10 Navigation environment — replication of real-world operations

10.1 The navigation data and corresponding landing approach facilities programmed into a device must be capable of supporting scenario-based training designed to simulate operations in the environment of specific, real-world, locations.

10.2 The navigation database, and its supporting maps and charts for relevant geographical areas, must be accurate and designed for simulated operations in the environment of specific, real-world, locations.

10.3 Ground-based navigation aids programmed into a device must be useable for simulated operations within their range or line-of-sight without any restrictions.

10.4 The navigation database mentioned in subclause 10.2 must include instrument approach procedures for simulated operations at no fewer than 5 different, specific, real-world, aerodromes that support 2D and 3D instrument approach operations.

11 Atmosphere and weather environment

11.1 The device must be able to simulate the following as they would affect a multi-crew aeroplane:

(a) the international standard atmosphere;

(b) instrument meteorological conditions (IMC);

(c) icing conditions;

(d) surface wind speed, including direction;

(e) turbulence.

11.2 The visual display must be capable of adjustment to produce changes to cloud base and visibility during a simulated operation.

12 Airports and terrain

12.1 The navigation database of a device must contain correct terrain modelling and runway orientation for simulated operations at aerodromes.

12.2 Each terrain model must reflect correct Ground Proximity Warning System (GPWS) activation for each training scenario in which a warning is designed to be activated.

12.3 During simulated take-off and landing, the visual system must have cues to enable the trainee to assess the following:

(a) sink rate;

(b) depth perception;

(c) rate of acceleration or deceleration.

12.4 For subclause 12.3, the cues must include cues for the following:

(a) the surface on runways, taxiways and ramps;

(b) terrain features;

(c) surface depiction of terrain within an area of 400 m around a runway used for a take-off, approach or landing.

12.5 The simulated visual environment attitude must provide an accurate portrayal of the horizon as it would be displayed on a multi-crew aeroplane's attitude indicator.

12.6 The visual system must include representative scenery for at least 3 different, specific, real-world, aerodromes as they each appear in daylight, twilight and night illumination.

12.7 With daylight illumination:

(a) each of the 3 aerodromes must be visible for a simulated straight-in approach from a distance of at least 10 nautical miles (***NMs***); and

(b) the associated runway or runways must be visible from a distance of at least 5 NM.

12.8 The visual system must provide full colour presentations and surfaces with textural cues to simulate:

(a) a visual approach and landing; and

(b) taxi operations on the ground.

12.9 The visual system must have sufficient capacity to display simultaneously moving objects.

12.10 The visual system must simulate the twilight visual scene, with full colour presentations of reduced ambient intensity and typical terrain that would be illuminated by a multi-crew aeroplane's lights in:

(a) ground taxiing; and

(b) take-off; and

(c) visual approach and landing.

12.11 For a simulated ground taxi operation and visual approach and landing, scenes in the visual system must include self-illuminated objects such as roads, ramp lighting and airport signage.

12.12 The visual system must have a definable horizon that is synchronised with the artificial horizon displayed on the instrumentation of the device, with no discernible latency.

12.13 The visual system must provide night visual scenes without ground cues that are:

(a) self-illuminating; or

(b) illuminated by the simulated lights of the aeroplane or other aeroplanes.

12.14 Aerodrome models must include static and dynamic clutter associated with aerodromes, for example, gates, aircraft, and ground handling equipment and vehicles.

13 Miscellaneous

13.1 The instructor station in a device must be so located that the instructor can:

(a) observe the simulated external image through the forward windows; and

(b) assess the performance of the FCM receiving training.

13.2 When an instructor is conducting training in the device, the instructor station must have within reach controls for the following:

(a) aeroplane system variables used in training;

(b) time freezes;

(c) environmental conditions, including wind direction and speed adjustments.

13.3 Instrument and visual system transport delay (***TD***) must not exceed 300 milliseconds (the ***TD standard***) as verified by:

(a) the manufacturer's systems test for the device; or

(b) if there is no systems test available to verify compliance with the TD standard — the manufacturer's statement, supported by relevant technical data, that the device complies with the TD standard.

Note This statement is known as the statement of compliance.

13.4 The device must have sufficient computer capacity to support its overall fidelity at all times when used to conduct MCC training.

13.5 The device must be supported by:

(a) maintenance and inspections in accordance with the manufacturer's instructions and recommendations; and

(b) any other maintenance and inspections necessary to ensure the device complies with the standards in this Schedule; and

(c) relevant documents demonstrating satisfactory completion of the maintenance and inspections mentioned in paragraphs (a) and (b).

13.6 The device must have an operations manual that describes the following:

(a) the emergency procedures;

(b) the tests or checks used to determine the serviceability of the device and compliance with these standards;

(c) the operating procedures for an FCM receiving training;

(d) the operating procedures for an instructor conducting training.