CAAT สำนักงานการบินพลเรือนแห่งประเทศไทย The Civil Aviation Authority of Thailand	THE CIVIL AVIATION AUTHORITY OF THAILAND SIMULATOR EVALUATION AND CERTIFICATION CHECKLIST/REPORT		FSTD Certification No.
NAME OF SIMULATOR OPERATOR	TYPE / VARIANT OF AIRCRAFT	TYPE OF FSTD ☐ FFS Level ..... ☐ FTD Level ..... ☐ FNPT Level ..... ☐ BITD	TYPE OF REQUESTED ☐ INITIAL ☐ RENEWAL ☐ MAJOR MODIFICATION For .....
SIMULATOR LOCATION	SERIAL NUMBER		

DOCUMENT for INITIAL and RENEWAL Evaluation

☐ 1) หนังสือรับรองหรือหลักฐานการเป็นนิติบุคคลซึ่งแสดงรายการเกี่ยวกับชื่อ วัตถุประสงค์ที่ตั้งสำนักงาน และรายชื่อผู้เป็นกรรมการ ผู้จัดการ หรือผู้มีอำนาจลงนามผูกพันนิติบุคคลที่เป็นปัจจุบัน
Certificate or official document confirming the entity's legal status, including its name, objectives, registered address, and authorized signatories

☐ 2) หนังสือมอบอำนาจให้ดำเนินการจากนิติบุคคล แสดงการมอบอำนาจให้ผู้ที่ระบุชื่อในหนังสือมอบอำนาจเป็นผู้ยื่นคำขอ
Letter of Attorney and to authorize person to work on FSTD approval

☐ 3) สำเนาเอกสารแสดงกรรมสิทธิ์ หรือสิทธิครอบครองในเครื่องช่วยฝึกบินที่จะขอใบรับรอง
Document evidencing ownership or lawful possession of the flight training device for which the certification is being requested

☐ 4) รายชื่อการแต่งตั้งผู้รับผิดชอบสูงสุด (Accountable Manager) ซึ่งทำหน้าที่ควบคุมการดำเนินงานเครื่องช่วยฝึกบินให้มีคุณภาพและคงมาตรฐานที่ได้รับการรับรอง
Name of Accountable Manager

☐ 5) รายชื่อและคุณสมบัติของบุคลากรซึ่งทำหน้าที่ควบคุมดูแลบำรุงรักษาเครื่องช่วยฝึกบิน
Name list and qualification of responsible persons who control and maintain the flight simulator

☐ 6) แผนผังสถานที่ติดตั้งเครื่องช่วยฝึกบิน (Layout of the flight training device installation site)

☐ 7) เอกสารต้นฉบับคำแนะนำการทดสอบคุณสมบัติเครื่องช่วยฝึกบิน (Master Qualification Test Guide; MQTG)

☐ 8) เอกสารการทดสอบคุณสมบัติเครื่องช่วยฝึกบิน (Qualification Test Guide; QTG)

☐ 9) คู่มือการใช้งานเครื่องช่วยฝึกบินและรายการตรวจสอบ (User guide manual and checklist)

☐ 10) เอกสารหรือหลักฐานอื่นที่พนักงานเจ้าหน้าที่กำหนด (ถ้ามี) (Other documents or evidence as specified by the competent authority, if any)

DOCUMENT for RENEWAL Evaluation (เอกสารเพิ่มเติม)

☐ A) เอกสารรายการตรวจก่อนทำการฝึกบินประจำวัน (Record of Daily function pre-fight check)

☐ B) สมุดปูมข้อขัดข้องและข้อแก้ไข (Record of Daily discrepancy log and corrections)

☐ C) ผลดำเนินการประเมินผลการทดสอบเครื่องช่วยฝึกบิน (QTG) รายปี (Recurrent QTG)

RESULT ☐ SATISFACTORY ☐ UNSATISFACTORY SIGNATURE: INSPECTOR NAME: DATE:	RECOMMENDATION / RESTRICTION / LIMITATION / MEMORANDUM BY INSPECTOR (IF ANY)

For FNPT use in multi-crew cooperation (MCC) training the general technical requirement are expressed in the MCC column with additional systems, instrumentation and indicators as required for MCC training and operation.

For MCC the minimum technical requirements are as for FNPT level II, with the following additions or amendments:

1	**Turbo-jet or turbo-prop engines**
2	**Performance reserves, in the case of an engine failure, to be in accordance with CS-25. These may be simulated by a reduction in the aeroplane gross mass**
3	**Retractable landing gear**
4	**Pressurisation system**
5	**De-icing systems**
6	**Fire detection / suppression system**
7	**Dual controls**
8	**Autopilot with automatic approach mode**
9	**2 VHF transceivers including oxygen masks intercom system**
10	**2 VHF NAV receivers (VOR, ILS, DME)**
11	**1 ADF receiver**
12	**1 Marker receiver**
13	**1 transponder**
The following indicators shall be located in the same positions on the instrument panels of both pilots:	
1	**Airspeed**
2	**Flight attitude with flight director**
3	**Altimeter**
4	**Flight director with ILS (HSI)**
5	**Vertical speed**
6	**ADF**
7	**VOR**
8	**Marker indication (as appropriate)**
9	**Stop watch (as appropriate)**

FLIGHT SIMULATION TRAINING DEVICE STANDARDS		FFS LEVEL				FTD LEVEL		FNPT LEVEL			BITD	COMPLIANCE
		A	B	C	D	1	2	I	II	MCC		
	1. General											
a.1	A fully enclosed flight deck.											
a.2	A cockpit/flight deck sufficiently enclosed to exclude distraction, which will replicate that of the aeroplane or class of aeroplane simulated.											
a.3	Flight deck, a full-scale replica of the aeroplane simulated. Equipment for operation of the cockpit windows shall be included in the FSTD, but the actual windows need not be operable. The flight deck, for FSTD purposes, consists of all that space forward of a cross section of the fuselage at the most extreme aft setting of the pilot seats. Additional required flight crew member duty stations and those required bulkheads aft of the pilot seats are also considered part of the flight deck and shall replicate the aeroplane.											Flight deck observer seats are not considered to be additional flight crew member duty stations and may be omitted. Bulkheads containing items such as switches, circuit breakers, supplementary radio panels, etc., to which the flight crew may require access during any event after preflight cockpit preparation is complete are considered essential and may not be omitted. Bulkheads containing only items such as landing gear pin storage compartments, fire axes or extinguishers, spare light bulbs, aeroplane document pouches, etc., are not considered essential and may be omitted. Such items, or reasonable facsimile, shall still be available in the FSTD but may be relocated to a suitable location as near as practical to the original position. Fire axes and any similar purpose instruments need only be represented in silhouette.
a.4	Direction of movement of controls and switches identical to that in the aeroplane.											
a.5	A full-size panel of replicated system(s) which will have actuation of controls and switches that replicate those of the aeroplane simulated.											The use of electronically displayed images with physical overlay incorporating operable switches, knobs, buttons replicating aeroplane instrument panels may be acceptable to the competent authority.
a.6	Cockpit/flight deck switches, instruments, equipment, panels, systems, primary and secondary flight controls sufficient for the training events to be accomplished shall be located in a spatially correct flight deck area and will operate as, and represent those in, that aeroplane or class of aeroplane.											For Multi-Crew Cooperation (MCC) qualification, additional instrumentation and indicators may be required. See table at start of this Appendix. For BITDs, the switches' and controls' size and shape and their location in the cockpit shall be representative.

FLIGHT SIMULATION TRAINING DEVICE STANDARDS		FFS LEVEL				FTD LEVEL		FNPT LEVEL			BITD	COMPLIANCE
		A	B	C	D	1	2	I	II	MCC		
a.7	Crew member seats shall be provided with sufficient adjustment to allow the occupant to achieve the design eye reference position appropriate to the aeroplane or class of aeroplane and for the visual system to be installed to align with that eye position.											
b.1	Circuit breakers that affect procedures and/or result in observable cockpit indications properly located and functionally accurate.											
c.1	Flight dynamics model that accounts for various combinations of drag and thrust normally encountered in flight corresponding to actual flight conditions, including the effect of change in aeroplane attitude, sideslip, thrust, drag, altitude, temperature, gross weight, moments of inertia, centre of gravity location, and configuration.											For FTD levels 1 and 2 aerodynamic modelling sufficient to permit accurate systems operation and indication is acceptable. For FNPTs and BITDs, class-specific modelling is acceptable.
d.1	All relevant instrument indications involved in the simulation of the applicable aeroplane shall automatically respond to control movement by a flight crew member or induced disturbance to the simulated aeroplane, e.g. turbulence or wind shear.											For FNPTs, instrument indications sufficient for the training events to be accomplished. Reference: AMC3 FSTD(A).300. For BITDs, instrument indications sufficient for the training events to be accomplished. Reference: AMC4 FSTD(A).300.
d.2	Lighting environment for panels and instruments shall be sufficient for the operation being conducted.											For FTD level 2 lighting environment shall be as per aeroplane.
d.3	Instrument indications respond appropriately to icing effects.											
e.1	Communications, navigation, and caution and warning equipment corresponding to that installed in the applicant's aeroplane with operation within the tolerances prescribed for the applicable airborne equipment.											For FTD level 1 applies where the appropriate systems are replicated.

FLIGHT SIMULATION TRAINING DEVICE STANDARDS		FFS LEVEL				FTD LEVEL		FNPT LEVEL			BITD	COMPLIANCE
		A	B	C	D	1	2	I	II	MCC		
e.2	Navigation equipment corresponding to that of the replicated aeroplane or class of aeroplanes, with operation within the tolerances prescribed for the actual airborne equipment. This shall include communication equipment (interphone and air– ground communications systems).											
e.3	Navigational data with the corresponding approach facilities. Navigation aids should be usable within range without restriction.											For FTD level 1 applies where navigation equipment is replicated. For all FFSs and FTDs level 2 where used for area or airfield competence training or checking, navigation data should be updated within 28 days. For FNPTs and BITDs, complete navigational data for at least five different airports with corresponding precision and non-precision approach procedures including current updating within a period of three months.
f.1	In addition to the flight crew member duty stations, three suitable seats for the instructor, delegated examiner and competent authority inspector. The competent authority shall consider options to this standard based on unique cockpit configurations. These seats shall provide adequate vision to the pilot's panel and forward windows. Observer seats need not represent those found in the aeroplane but in the case of FSTDs fitted with a motion system, the seats shall be adequately secured to the floor of the FSTD, fitted with positive restraint devices and be of sufficient integrity to safely restrain the occupant during any known or predicted motion system excursion.											For FTDs and FNPTs, suitable seating arrangements for the instructor and examiner or competent authority's inspector should be provided. For BITDs, suitable viewing arrangements for the instructor shall be provided.
g.1	FSTD systems shall simulate applicable aeroplane system operation, both on the ground and in flight. Systems shall be operative to the extent that all normal, abnormal, and emergency operating procedures can be accomplished.											For FTD level 1, applies where system is simulated. For FNPTs systems shall be operative to the extent that it shall be possible to perform all normal, abnormal and emergency operations as may be appropriate to the aeroplane or class of aeroplanes being simulated and as required for the training.

FLIGHT SIMULATION TRAINING DEVICE STANDARDS		FFS LEVEL				FTD LEVEL		FNPT LEVEL			BITD	COMPLIANCE
		A	B	C	D	1	2	I	II	MCC		
g.2	For aeroplanes equipped with stick pusher system (e.g. longitudinal control feel system, or equivalent) control forces, displacement, and surface position of the aeroplane correspond to those of the aeroplane being simulated.											A statement of compliance (SOC) is required verifying that the stick pusher system has been modelled, programmed, and validated using the aeroplane manufacturer's design data or other acceptable data source. The SOC must address, at a minimum, the stick pusher activation and cancellation logic as well as system dynamics, control displacement and forces as a result of the stick pusher activation. This requirement applies only to FSTDs that are to be qualified to conduct full stall training tasks. Test required.
h.1	Instructor controls shall enable the operator to control all required system variables and insert abnormal or emergency conditions into the aeroplane systems.											Where applicable, and as required for training, the following shall be available: — position and flight freeze; — a facility to enable the dynamic plotting of the flight path on approaches, commencing at the final approach fix, including the vertical profile; — hard copy of map and approach plot.

FLIGHT SIMULATION TRAINING DEVICE STANDARDS		FFS LEVEL				FTD LEVEL		FNPT LEVEL			BITD	COMPLIANCE
		A	B	C	D	1	2	I	II	MCC		
h.2	The FSTD must have a real-time feedback tool that provides the instructor/evaluator with visibility of whenever the FSTD training envelope or aeroplane operating limits have been exceeded. Additionally, and optionally, a recording mechanism may be utilised.											This feedback tool must include the following: (a) FSTD validation envelope: This must be in form of an alpha/beta envelope (or equivalent method) depicting the 'confidence level' of the aerodynamic model. This 'confidence level' depends on the degree of flight validation or on the source of predictive methods. There must be a minimum of a flaps-up and flaps-down envelope available. (b) Flight control inputs: These must enable the instructor/evaluator to assess the pilot's flight control displacements and forces (including fly-by-wire, as appropriate). (c) Aeroplane operational limits: This must display the aeroplane's operational limits during the manoeuvre as applicable for the configuration of the aeroplane. An SOC is required that defines the source data used to construct the FSTD validation envelope. Please refer to AMC12 FSTD(A).300.

FLIGHT SIMULATION TRAINING DEVICE STANDARDS		FFS LEVEL				FTD LEVEL		FNPT LEVEL			BITD	COMPLIANCE
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h.3	Upset scenarios: When equipped with instructor operating station (IOS) selectable dynamic aeroplane upsets, the IOS is to provide guidance on the method used to drive the FSTD into an upset condition, including any malfunction or degradation of the FSTD's functionality, required to initiate the upset. The unrealistic degradation of simulator functionality (such as degrading flight control effectiveness) to drive an aeroplane upset is generally not acceptable unless used purely as a tool for repositioning the FSTD with the pilot out of the loop.											An SOC is required to confirm that each upset prevention and recovery feature programmed at the IOS and the associated training manoeuvre have been evaluated by a suitably qualified pilot. Please refer to AMC9 FSTD(A).300(a)(1).
i.1	Control forces and control travel shall correspond to that of the replicated aeroplane. Control forces shall react in the same manner as in the aeroplane under the same flight conditions.											For FTD level 2, control forces and control travel should correspond to that of the replicated aeroplane with CT&M. It is not intended that the device should be flown manually other than for short periods when the autopilot is temporarily disengaged. For FNPT level I and BITDs, control forces and control travel shall broadly correspond to that of the replicated aeroplane or class of aeroplane. Control force changes due to an increase/decrease in aeroplane speed are not necessary. In addition, for FNPT level II and MCC, control forces and control travels shall respond in the same manner under the same flight conditions as in the aeroplane or class of aeroplane being simulated.

FLIGHT SIMULATION TRAINING DEVICE STANDARDS		FFS LEVEL				FTD LEVEL		FNPT LEVEL			BITD	COMPLIANCE
		A	B	C	D	1	2	I	II	MCC		
j.1	Ground handling and aerodynamic programming shall include: (1) Ground effect. For example: round-out, flare, and touchdown. This requires data on lift, drag, pitching moment, trim, and power ground effect. (2) Ground reaction — reaction of the aeroplane upon contact with the runway during landing to include strut deflections, tyre friction, side forces, and other appropriate data, such as weight and speed, necessary to identify the flight condition and configuration. (3) Ground handling characteristics - steering inputs to include crosswind, braking, thrust reversing, deceleration and turning radius.											Statement of compliance required. Tests required. For level A FFSs, generic ground handling to the extent that allows turns within the confines of the runway, adequate control on flare, touchdown and roll-out (including from a crosswind landing) only is acceptable. For FNPTs, a generic ground handling model need only be provided to enable representative flare and touch down effects.
k.1	Wind shear models shall provide training in the specific skills required for recognition of wind shear phenomena and execution of recovery manoeuvres. Such models shall be representative of measured or accident derived winds, but may include simplifications which ensure repeatable encounters. For example, models may consist of independent variable winds in multiple simultaneous components. Wind models shall be available for the following critical phases of flight: (1) Prior to take-off rotation, (2) At lift-off, (3) During initial climb, (4) Short final approach.											Tests required. Please refer to AMC1 FSTD(A).300, (b)(3) 2.g.
l.1	Instructor controls for environmental effects including wind speed and direction shall be provided.											For FTDs environment modelling sufficient to permit accurate systems operation and indication.

FLIGHT SIMULATION TRAINING DEVICE STANDARDS		FFS LEVEL				FTD LEVEL		FNPT LEVEL			BITD	COMPLIANCE
		A	B	C	D	1	2	I	II	MCC		
m.1	Stopping and directional control forces shall be representative for at least the following runway conditions based on aeroplane related data: (1) Dry (2) Wet (3) Icy (4) Patchy wet (5) Patchy icy (6) Wet on rubber residue in touchdown zone.											Statement of compliance required. Objective tests required for (1), (2), (3); subjective check for (4), (5), (6).
n.1	Brake and tyre failure dynamics (including antiskid) and decreased brake efficiency due to brake temperatures shall be representative and based on aeroplane related data.											Statement of compliance required. Subjective test is required for decreased braking efficiency due to brake temperature, if applicable.
o.1	A means for quickly and effectively conducting daily testing of FSTD programming and hardware shall be available.											Statement of compliance required.
p.1	Computer capacity, accuracy, resolution, and dynamic response shall be sufficient to fully support the overall fidelity, including its evaluation and testing.											Statement of compliance required.

FLIGHT SIMULATION TRAINING DEVICE STANDARDS		FFS LEVEL				FTD LEVEL		FNPT LEVEL			BITD	COMPLIANCE
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q.1	Control feel dynamics shall replicate the aeroplane simulated. Free response of the controls shall match that of the aeroplane within the tolerances specified. Initial and upgrade evaluations will include control free response (pitch, roll and yaw controller) measurements recorded at the controls. The measured responses shall correspond to those of the aeroplane in take-off, cruise, and landing configurations. (1) For aeroplanes with irreversible control systems, measurements may be obtained on the ground if proper pitot static inputs are provided to represent conditions typical of those encountered in flight. Engineering validation or aeroplane manufacturer rationale will be submitted as justification to ground test or omit a configuration. (2) For FSTDs requiring static and dynamic tests at the controls, special test fixtures shall not be required during initial evaluation if the FSTD operator's MQTG shows both text fixture results and alternate test method results such as computer data plots, which were obtained concurrently. Repetition of the alternate method during initial evaluation may then satisfy this requirement.											Tests required.

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r.1	One of the following two methods is acceptable as a means to prove compliance: (1) Transport Delay: A transport delay test may be used to demonstrate that the FSTD system response does not exceed 150 ms. This test shall measure all the delay encountered by a step signal migrating from the pilot's control through the control loading electronics and interfacing through all the simulation software modules in the correct order, using a handshaking protocol, finally through the normal output interfaces to the motion system, to the visual system and instrument displays. (2) Latency: The visual system, flight deck instruments and initial motion system response shall respond to abrupt pitch, roll and yaw inputs from the pilot's position within 150 ms of the time, but not before the time, when the aeroplane would respond under the same conditions.											Tests required. For level 'A' & 'B' FFSs, and applicable systems for FTDs, FNPTs and BITDs the maximum permissible delay is 300 ms.

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s.1	Aerodynamic modelling includes, for aeroplanes issued an original type certificate after June 1980, low altitude level flight ground effect, Mach effect at high altitude, normal and reverse dynamic thrust effect on control surfaces, aeroelastic representations, and representations of non-linearities due to sideslip based on aeroplane flight test data provided by the manufacturer.											Statement of compliance required to include: — Mach effect, aeroelastic representations, ground effect and non-linearities due to sideslip; — separate tests for thrust effects. Please refer to AMC9 FSTD(A).300(a)(2).
s.2	The aerodynamic model has to incorporate data representing the aeroplane's characteristics covering an angle of attack and sideslip range to support the training tasks.											An SOC is required. Please refer to AMC9 FSTD(A).300(a)(3).
s.3	Applicable only for those FSTDs that are to be qualified for full stall training tasks. The aerodynamic modelling has to support stall-recovery training tasks in the following flight conditions: (a) stall entry at wing level (1g); (b) stall entry into turning flight of at least 25° bank angle (accelerated stall); (c) stall entry into a power-on condition (required only for propeller-driven aeroplanes); and (d) aeroplane configurations of second-segment climb, high-altitude cruise ('near performance limited condition'), and approach or landing.											An SOC is required which describes the aerodynamic-modelling methods, validation, as well and check of the stall characteristics of the FSTD. An additional SOC has also to include a verification that the FSTD has been evaluated by a subject- matter expert pilot acceptable to the competent authority. Please refer to AMC10 FSTD(A).300(e) for clarification on the definition of a 'subject-matter expert pilot'. Please refer to AMC9 FSTD(A).300(a)(4) for clarification on the stall modelling. Please refer to AMC1 FSTD(A).200 for clarification of the 'near performance limited condition'.

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t.1	Modelling that includes the effects of icing, where appropriate, on the airframe, aerodynamics and the engine(s). Icing-effects simulation models are only required for aeroplanes authorised for operations in icing conditions.											Icing models simulate the aerodynamic degradation effects of ice accretion on the aeroplane lifting surfaces, including (if present on the simulated aeroplane) loss of lift, decrease in stall angle of attack, change in pitching moment, decrease in control effectiveness, and changes in control forces in addition to any overall increase in drag. Aeroplane systems (such as the stall protection system and auto flight system) must respond properly to ice accretion, consistent with the simulated aeroplane. Aeroplane original equipment manufacturer (OEM) data or other acceptable analytical methods must be used to develop ice accretion models. Acceptable analytical methods may include wind tunnel analysis and/or engineering analysis of the aerodynamic effects of icing on the aeroplane lifting surfaces coupled with tuning and supplemental subjective assessment by a subject-matter expert pilot knowledgeable of the effect of ice accretion on the handling qualities of the simulated aeroplane. An SOC is required describing the effects that provide training in the specific skills for recognition of icing phenomena and execution of recovery. The SOC must describe the source data and any analytical methods used to develop ice accretion models, including a verification that these effects have been tested. Please refer to AMC13 FSTD(A).300.
t.2	Modelling that includes the effects of icing, where appropriate, on the airframe, aerodynamics and the engine(s). Icing-effects simulation models are only required for those aeroplanes authorised for operations in icing conditions.											An SOC is required describing the effects that provide training in the specific skills for recognition of icing phenomena and execution of recovery.

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u.1	Aerodynamic and ground reaction modelling for the effects of reverse thrust on directional control shall be provided.											Statement of compliance required.
v.1	Realistic aeroplane mass properties, including mass, centre of gravity and moments of inertia as a function of payload and fuel loading shall be implemented.											Statement of compliance required at initial evaluation. SOC shall include a range of tabulated target values to enable a demonstration of the mass properties model to be conducted from the instructor's station.
w.1	Self-testing for FSTD hardware and programming to determine compliance with the FSTD performance tests shall be provided. Evidence of testing shall include FSTD number, date, time, conditions, tolerances, and the appropriate dependent variables portrayed in comparison with the aeroplane standard.											Statement of compliance required. Tests required.
x.1	Timely and permanent update of hardware and programming subsequent to aeroplane modification sufficient for the qualification level sought.											
y.1	Daily preflight documentation either in the daily log or in a location easily accessible for review is required.											
	2. Motion system											
a.1	Motion cues as perceived by the pilot shall be representative of the aeroplane, e.g. touchdown cues shall be a function of the simulated rate of descent.											For FSTDs where motion systems are not specifically required, but have been added, they will be assessed to ensure that they do not adversely affect the qualification of the FSTD. For level C or level D devices, special consideration is given to the motion system response during upset prevention and recovery manoeuvres. Notwithstanding the limitations of simulator motion, the operator should place specific emphasis on tuning out objectionable motion system responses, where possible.

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b.1	A motion system shall: (1) provide sufficient cueing, which may be of a generic nature to accomplish the required tasks;											Statement of compliance required. Tests required.
	(2) have a minimum of 3 degrees of freedom (pitch, roll & heave); and											
	(3) produce cues at least equivalent to those of a six-degrees-of-freedom synergistic platform motion system.											
c.1	A means of recording the motion response time as required.											

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d.1	Motion effects programming shall include: (1) effects of runway rumble, oleo deflections, groundspeed, uneven runway, centreline lights and taxiway characteristics; (2) buffets on the ground due to spoiler/speedbrake extension and thrust reversal; (3) bumps associated with the landing gear; (4) buffet during extension and retraction of landing gear; (5) buffet in the air due to flap and spoiler/speedbrake extension; (6) approach-to-stall buffet and stall buffet (where applicable); (7) touchdown cues for main and nose gear; (8) nose-wheel scuffing; (9) thrust effect with brakes set; (10) Mach and manoeuvre buffet; (11) tyre failure dynamics; (12) engine malfunction and engine damage; and (13) tail and pod strike.											For level A FFSs: effects may be of a generic nature sufficient to accomplish the required tasks. For level B, C and D FFSs: if there are known flight conditions where buffet is the first indication of the stall, or where no stall buffet occurs, this characteristic should be included in the model.

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e.1	Motion vibrations: tests with recorded results that allow the comparison of relative amplitudes versus frequency are required. Characteristic motion vibrations that result from operation of the aeroplane in so far as vibration marks an event or aeroplane state that can be sensed at the flight deck shall be present. The FSTD shall be programmed and instrumented in such a manner that the characteristic vibration modes can be measured and compared with aeroplane data.											Statement of compliance required. Tests required.
	3. Visual System											
a.1	The visual system shall meet all the standards enumerated as applicable to the level of qualification requested by the applicant.											For FTDs, FNPT 1s and BITDs, when visual systems have been added by the FSTD operator even though not attracting specific credits, they will be assessed to ensure that they do not adversely affect the qualification of the FSTD. For FTDs if the visual system is to be used for the training of manoeuvring by visual reference (such as route and airfield competence) then the visual system should at least comply with that required for level A FFS.
b.1	Continuous minimum collimated visual field-of-view of 45 degrees horizontal and 30 degrees vertical field of view simultaneously for each pilot.											SOC is acceptable in place of this test.
b.2	Continuous, cross-cockpit, minimum collimated visual field of view providing each pilot with 180 degrees horizontal and 40 degrees vertical field of view. Application of tolerances require the field of view to be not less than a total of 176 measured degrees horizontal field of view (including not less than ±88 measured degrees either side of the centre of the design eye point) and not less than a total of 36 measured degrees vertical field of view from the pilot's and co-pilot's eye points.											Consideration shall be given to optimising the vertical field of view for the respective aeroplane cut-off angle.

FLIGHT SIMULATION TRAINING DEVICE STANDARDS		FFS LEVEL				FTD LEVEL		FNPT LEVEL			BITD	COMPLIANCE
		A	B	C	D	1	2	I	II	MCC		
b.3	A visual system (night/dusk or day) capable of providing a field-of-view of a minimum of 45 degrees horizontally and 30 degrees vertically, unless restricted by the type of aeroplane, simultaneously for each pilot, including adjustable cloud base and visibility.											The visual system need not be collimated but shall be capable of meeting the standards laid down in Parts (b) and (c) (Validation, Functions and Subjective Tests - See AMC1 FSTD(A).300). SOC is acceptable in place of this test.
c.1	A means of recording the visual response time for visual systems.											
d.1	System geometry. The system fitted shall be free from optical discontinuities and artefacts that create non-realistic cues.											Test required. A statement of compliance is acceptable in place of this test.
e.1	Visual textural cues to assess sink rate and depth perception during take-off and landing shall be provided.											For level A FFS visual cueing shall be sufficient to support changes in approach path by using runway perspective.
f.1	Horizon and attitude shall correlate to the simulated attitude indicator.											Statement of compliance required.
g.1	Occulting - a minimum of ten levels shall be available.											Occulting shall be demonstrated. Statement of compliance required.
h.1	Surface (Vernier) resolution shall occupy a visual angle of not greater than 2 arc minutes in the visual display used on a scene from the pilot's eyepoint.											Test and statement of compliance required containing calculations confirming resolution.
i.1	Surface contrast ratio shall be demonstrated by a raster drawn test pattern showing a contrast ratio of not less than 5:1.											Test and statement of compliance required.
j.1	Highlight brightness shall be demonstrated using a raster drawn test pattern. The highlight brightness shall not be less than 20 cd/m^2 (6ft-lamberts).											Test and statement of compliance required. Use of calligraphic lights to enhance raster brightness is acceptable.
k.1	Light point size – not greater than 5 arc minutes.											Test and statement of compliance required. This is equivalent to a light point resolution of 2.5 arc minutes.

FLIGHT SIMULATION TRAINING DEVICE STANDARDS		FFS LEVEL				FTD LEVEL		FNPT LEVEL			BITD	COMPLIANCE
		A	B	C	D	1	2	I	II	MCC		
l.1	Light point contrast ratio – not less than 10:1.											Test and statement of compliance required.
l.2	Light point contrast ratio – not less than 25:1.											Test and statement of compliance required.
m.1	Daylight, twilight and night visual capability as applicable for level of qualification sought.											Statement of compliance required for system capability. System objective and scene content tests are required.
m.2	The visual system shall be capable of meeting, as a minimum, the system brightness and contrast ratio criteria as applicable for level of qualification sought.											
m.3	Total scene content shall be comparable in detail to that produced by 10 000 visible textured surfaces and (in day) 6 000 visible lights or (in twilight or night) 15 000 visible lights, and sufficient system capacity to display 16 simultaneously moving objects.											
m.4	The system, when used in training, shall provide in daylight, full colour presentations and sufficient surfaces with appropriate textural cues to conduct a visual approach, landing and airport movement (taxi). Surface shading effects shall be consistent with simulated (static) sun position.											

FLIGHT SIMULATION TRAINING DEVICE STANDARDS		FFS LEVEL				FTD LEVEL		FNPT LEVEL			BITD	COMPLIANCE
		A	B	C	D	1	2	I	II	MCC		
m.5	The system, when used in training, shall provide at twilight, as a minimum, full colour presentations of reduced ambient intensity, sufficient surfaces with appropriate textural cues that include self-illuminated objects such as road networks, ramp lighting and airport signage, to conduct a visual approach, landing and airport movement (taxi). Scenes shall include a definable horizon and typical terrain characteristics such as fields, roads and bodies of water and surfaces illuminated by representative ownship lighting (e.g. landing lights). If provided, directional horizon lighting shall have correct orientation and be consistent with surface shading effects.											
m.6	The system, when used in training, shall provide at night, as a minimum, all features applicable to the twilight scene, as defined above, with the exception of the need to portray reduced ambient intensity that removes ground cues that are not self-illuminating or illuminated by ownship lights (e.g. landing lights).											
	4. Sound System											
a.1	Significant flight deck sounds which result from pilot actions corresponding to those of the aeroplane or class of aeroplane.											For FNPTs level I and BITDs, engine sounds only need to be available.
b.1	Sound of precipitation, rain removal equipment and other significant aeroplane noises perceptible to the pilot during normal and abnormal operations and the sound of a crash when the FSTD is landed in excess of limitations.											A statement of compliance is required. Sounds have to be directionally representative. For FSTDs that are to be qualified for full stall training tasks, sounds associated with stall buffet have to be replicated, if significant in the aeroplane.

FLIGHT SIMULATION TRAINING DEVICE STANDARDS		FFS LEVEL				FTD LEVEL		FNPT LEVEL			BITD	COMPLIANCE
		A	B	C	D	1	2	I	II	MCC		
c.1	Comparable amplitude and frequency of flight deck noises, including engine and airframe sounds. The sounds shall be coordinated with the required weather.											Tests required.
d.1	The volume control shall have an indication of sound level setting which meets all qualification requirements.											

TABLE OF FUNCTIONS AND SUBJECTIVE TESTS	FFS				FTD		FNPT			BITD	REMARKS
	A	B	C	D	1	2	I	II	MCC		
1. PREPARATION FOR FLIGHT											
1.1 Preflight. Accomplish a functions check of all switches, indicators, systems, and equipment at all crew members' and instructors' stations and determine that:											
(1.1A) the flight deck design and functions are identical to that of the aeroplane or class of aeroplane simulated											
(1.1B) design and functions represent those of the simulated class of aeroplane											
2. SURFACE OPERATIONS (PRE-TAKE-OFF)											
2.1 Engine start											
(2.1A) Normal start											
(2.1B) Alternate start procedures											
(2.1C) Abnormal starts and shutdowns (hot start, hung start, tail pipe fire, etc.)											
(2.1D) Pushback / Powerback											
2.2 Taxi											
(2.2A) Thrust response											
(2.2B) Power lever friction											
(2.2C) Ground handling											
(2.2D) Nosewheel scuffing											
(2.2E) Brake operation (normal and alternate/emergency)											
(2.2E(a)) Brake fade (if applicable)											
(2.2E(b)) Other											
3. TAKE - OFF											
3.1 Normal											
(3.1A) Aeroplane / engine parameter relationships											
(3.1B) Acceleration characteristics (motion)											
(3.1C) Acceleration characteristics (not associated with motion)											
(3.1D) Nosewheel and rudder steering											

TABLE OF FUNCTIONS AND SUBJECTIVE TESTS	FFS				FTD		FNPT			BITD	REMARKS
	A	B	C	D	1	2	I	II	MCC		
3. TAKE – OFF (Continue)											
(3.1E) Crosswind (maximum demonstrated)											
(3.1F) Special performance (e.g. reduced V1, max de-rate, short field operations)											
(3.1G) Low visibility take-off											
(3.1H) Landing gear, wing flap leading edge device operation											
(3.1I) Contaminated runway operation											
(3.1J) Other											
3.2 Abnormal/emergency											
(3.2A) Rejected											
(3.2B) Rejected special performance (e.g. reduced V1, max de-rate, short field operations)											
(3.2C) With failure of most critical engine at most critical point, continued take-off											
(3.2D) With wind shear											
(3.2E) Flight control system failures, reconfiguration modes, manual reversion and associated handling											
(3.2F) Rejected, brake fade											
(3.2G) Rejected, contaminated runway											
(3.2H) Other											
4. CLIMB											
(4.1) Normal											
(4.2) One or more engines inoperative											
(4.3) Other											
5. CRUISE											
(5.1) Performance characteristics (speed vs. power)											
(5.2) High altitude handling											
(5.3) High Mach number handling (Mach tuck, Mach buffet) and recovery (trim change)											

TABLE OF FUNCTIONS AND SUBJECTIVE TESTS	FFS				FTD		FNPT			BITD	REMARKS
	A	B	C	D	1	2	I	II	MCC		
5. CRUISE (Continue)											
(5.4) Overspeed warning (in excess of V mo or M mo)											
(5.5) High IAS handling											
6. MANOEUVRES											
(6.1A) High angle of attack, approach to stalls, stall warning and stall buffet (take-off, cruise, approach, and landing configuration) Including reaction of the autoflight system and stall protection system.											
(6.1B) High angle of attack, approach to stalls, stall warning, stall buffet and stall (and g-break, if applicable) (take-off, cruise, approach, and landing configuration) Including reaction of the autoflight system and stall protection system.											
(6.1C) Upset prevention and recovery manoeuvre within the FSTD validation envelope.											
(6.2) Flight envelope protection (high angle of attack, bank limit, overspeed, etc.)											
(6.3) Turns with/without speedbrake/spoilers deployed											
(6.4) Normal and standard rate turns											
(6.5) Steep turns											
(6.6) Performance turn											
(6.7) In-flight engine shutdown and restart (assisted and windmill)											
(6.8) Manoeuvring with one or more engines inoperative, as appropriate											
(6.9) Specific flight characteristics (e.g. direct lift control)											
(6.10) Flight control system failures, reconfiguration modes, manual reversion and associated handling											
(6.11) Other											

TABLE OF FUNCTIONS AND SUBJECTIVE TESTS	FFS				FTD		FNPT			BITD	REMARKS
	A	B	C	D	1	2	I	II	MCC		
7. DESCENT											
(7.1) Normal											
(7.2) Maximum rate (clean and with speedbrake, etc.)											
(7.3) With autopilot											
(7.4) Flight control system failures, reconfiguration modes, manual reversion and associated handling											
(7.5) Other											
8. INSTRUMENT APPROACHES AND LANDING											
Note: Only those instrument approach and landing tests relevant to the simulated aeroplane type or class should be selected from the following list, where tests should be made with limiting wind velocities, wind shear and with relevant system failures, including the use of flight director.											
8.1 Precision											
(8.1A) PAR											
(8.1B) CAT I/GBAS (ILS/MLS) published approaches											
(8.1B(i)) Manual approach with/without flight director including landing											
(8.1B(ii)) Autopilot/auto throttle coupled approach and manual landing											
(8.1B(iii)) Manual approach to DH and G/A all engines											
(8.1B(iv)) Manual one engine out approach to DH and G/A											
(8.1B(v)) Manual approach controlled with and without flight director to 30 m (100 ft) below CAT I minima											
(8.1B(v)a) with crosswind (maximum demonstrated)											
(8.1B(v)b) with wind shear											
(8.1B(vi)) Autopilot/auto throttle coupled approach, one engine out to DH and G/A											
(8.1B(vii)) Approach and landing with minimum/standby electrical power											
(8.1C) CAT II/GBAS (ILS/MLS) published approaches											
(8.1C(i)) Autopilot/auto throttle coupled approach to DH and landing											
(8.1C(ii)) Autopilot/auto throttle coupled approach to DH and G/A											
(8.1C(iii)) Auto coupled approach to DH and manual G/A											
(8.1C(iv)) Auto coupled/auto throttle Category II published approach											

TABLE OF FUNCTIONS AND SUBJECTIVE TESTS	FFS				FTD		FNPT			BITD	REMARKS
	A	B	C	D	1	2	I	II	MCC		
(8.1D) CAT III/GBAS (ILS/MLS) published approaches											
(8.1D(i)) Autopilot/auto throttle coupled approach to land and rollout											
(8.1D(ii)) Autopilot/auto throttle coupled approach to DH/Alert Height and G/A											
(8.1D(iii)) Autopilot/auto throttle coupled approach to land and rollout with one engine out											
(8.1D(iv)) Autopilot/auto throttle coupled approach to DH/Alert Height and G/A with one engine out											
(8.1E). Autopilot/auto throttle coupled approach (to land or to go around)											
(8.1E(i)) with generator failure											
(8.1E(ii)) with 10 kts tail wind											
(8.1E(iii)) with 10 kts crosswind											
8.2 Non – precision											
(8.2A) NDB											
(8.2B) VOR, VOR/DME, VOR/TAC											
(8.2C) RNAV (GNSS)											
(8.2D) ILS LLZ (LOC), LLZ(LOC)/BC											
(8.2E) ILS offset localizer											
(8.2F) direction finding facility											
(8.2G) surveillance radar											
NOTE: If Standard operating procedures are to use autopilot for non-precision approaches then these should be evaluated.											
9. VISUAL APPROACHES (SEGMENT) AND LANDINGS											
(9.1) Maneuvering, normal approach and landing all engines operating with and without visual approach aid guidance											
(9.2) Approach and landing with one or more engines inoperative											
(9.3) Operation of landing gear, flap/slats and speed brakes (normal and abnormal)											
(9.4) Approach and landing with crosswind (max. demonstrated for FFS)											

TABLE OF FUNCTIONS AND SUBJECTIVE TESTS	FFS				FTD		FNPT			BITD	REMARKS
	A	B	C	D	1	2	I	II	MCC		
9. VISUAL APPROACHES (SEGMENT) AND LANDINGS (Continue)											
(9.5) Approach to land with wind shear on approach											
(9.6) Approach and landing with flight control system failures,(for FFS – reconfiguration modes, manual reversion and associated handling (most significant degradation which is probable)											
(9.7) Approach and landing with trim malfunctions											
(9.7A) longitudinal trim malfunction											
(9.7B) lateral-directional trim malfunction											
(9.8) Approach and landing with standby (minimum) electrical/hydraulic power											
(9.9) Approach and landing from circling conditions (circling approach)											
(9.10) Approach and landing from visual traffic pattern											
(9.11) Approach and landing from non-precision approach											
(9.12) Approach and landing from precision approach											
(9.13) Approach procedures with vertical guidance (APV), e.g., SBAS											
(9.14) Other											
10. MISSED APPROACH											
(10.1) All engines											
(10.2) One or more engine(s) out											
(10.3) With flight control system failures, reconfiguration modes, manual reversion and for FFS - associated handling											
11. SURFACE OPERATIONS (POST LANDING)											
11.1 Landing roll and taxi											
(11.1A) Spoiler operation											
(11.1B) Reverse thrust operation											
(11.1C) Directional control and ground handling, both with and without reverse thrust											
(11.1D) Reduction of rudder effectiveness with increased reverse thrust											

TABLE OF FUNCTIONS AND SUBJECTIVE TESTS	FFS				FTD		FNPT			BITD	REMARKS
	A	B	C	D	1	2	I	II	MCC		
(rear pod-mounted engines)											
(11.1E) Brake and anti-skid operation with dry, wet, and icy condition											
(11.1F) Brake operation, to include auto-braking system where applicable											
(11.1G) Other											
12. ANY FLIGHT PHASE											
12.1 Aeroplane and powerplant systems operation											
(12.1A) Air conditioning and pressurisation (ECS)											
(12.1B) De-icing/anti-icing											
(12.1C) Auxiliary powerplant/auxiliary power unit (APU)											
(12.1D) Communications											
(12.1E) Electrical											
(12.1F) Fire and smoke detection and suppression											
(12.1G) Flight controls (primary and secondary)											
(12.1H) Fuel and oil, hydraulic and pneumatic											
(12.1I) Landing gear											
(12.1J) Oxygen											
(12.1K) Powerplant											
(12.1L) Airborne radar											
(12.1M) Autopilot and flight director											
(12.1N) Collision avoidance systems (e.g. GPWS, TCAS)											
(12.1O) Flight control computers including stability and control augmentation											
(12.1P) Flight display systems											
(12.1Q) Flight management computers											
(12.1R) Head-up guidance, head-up displays											
12.1 Aeroplane and powerplant systems operation (Continue)											

TABLE OF FUNCTIONS AND SUBJECTIVE TESTS	FFS				FTD		FNPT			BITD	REMARKS
	A	B	C	D	1	2	I	II	MCC		
(12.1S) Navigation systems											
(12.1T) Stall warning/avoidance											
(12.1U) Wind shear avoidance equipment											
(12.1V) Automatic landing aids											
12.2 Airborne procedures											
(12.2A) Holding											
(12.2B) Air hazard avoidance. (traffic, weather)											
(12.2C) Wind shear											
12.3 Engine shutdown and parking											
(12.3A) Engine and systems operation											
(12.3B) Parking brake operation											
(12.3C) Other as appropriate including effects of wind											
13. VISUAL SYSTEM											
13.1 Functional test content requirements **(levels C and D)**											
NOTE: The following is the minimum airport model content requirement to satisfy visual capability tests, and provides suitable visual cues to allow completion of all functions and subjective tests described in this appendix. FSTD operators are encouraged to use the model content described below for the functions and subjective tests. If all of the elements cannot be found at a single real world airport, then additional real world airports may be used. The intent of this visual scene content requirement description is to identify that content required to aid the pilot in making appropriate, timely decisions.											
(13.1A) two parallel runways and one crossing runway displayed simultaneously; at least two runways should be lit simultaneously											
(13.1B) runway threshold elevations and locations should be modelled to provide sufficient correlation with aeroplane systems (e.g., HGS,GPS, altimeter); slopes in runways, taxiways, and ramp areas should not cause distracting or unrealistic effects, including pilot eye-point height variation											
(13.1C) representative airport buildings, structures and lighting											

TABLE OF FUNCTIONS AND SUBJECTIVE TESTS	FFS				FTD		FNPT			BITD	REMARKS
	A	B	C	D	1	2	I	II	MCC		
13.1 Functional test content requirements **(levels C and D) (Continue)**											
(13.1D) one useable gate, set at the appropriate height, for those aeroplanes that typically operate from terminal gates											
(13.1E) representative moving and static gate clutter (e.g., other aeroplanes, power carts, tugs, fuel trucks, additional gates)											
(13.1F) representative gate/apron markings (e.g., hazard markings, lead-in lines, gate numbering) and lighting											
(13.1G) representative runway markings, lighting, and signage, including a wind sock that gives appropriate wind cues											
(13.1H) representative taxiway markings, lighting, and signage necessary for position identification, and to taxi from parking to a designated runway and return to parking; representative, visible taxi route signage should be provided; a low visibility taxi route (e.g. surface movement guidance control system, follow-me truck, daylight taxi lights) should also be demonstrated											
(13.1I) representative moving and static ground traffic (e.g., vehicular and aeroplane)											
(13.1J) representative depiction of terrain and obstacles within 25 NM of the reference airport											
(13.1K) representative depiction of significant and identifiable natural and cultural features within 25 NM of the reference airport **NOTE:** This refers to natural and cultural features that are typically used for pilot orientation in flight. Outlying airports not intended for landing need only provide a reasonable facsimile of runway orientation.											
(13.1L) representative moving airborne traffic											
(13.1M) appropriate approach lighting systems and airfield lighting for a VFR circuit and landing, non-precision approaches and landings, and Category I, II and III precision approaches and landings											
(13.1N) representative gate docking aids or a marshaller											

TABLE OF FUNCTIONS AND SUBJECTIVE TESTS	FFS				FTD		FNPT			BITD	REMARKS
	A	B	C	D	1	2	I	II	MCC		
13.2 Functional test content requirements **(levels A and B)** **NOTE:** The following is the minimum airport model content requirement to satisfy visual capability tests, and provides suitable visual cues to allow completion of all functions and subjective tests described in this appendix. FSTD operators are encouraged to use the model content described below for the functions and subjective tests.											
(13.2A) representative airport runways and taxiways											
(13.2B) runway definition											
(13.2C) runway surface and markings											
(13.2D) lighting for the runway in use including runway edge and centerline lighting, visual approach aids and approach lighting of appropriate colours											
(13.2E) representative taxiway lights											
13.3 Visual scene management											
(13.3A) Runway and approach lighting intensity for any approach should be set at an intensity representative of that used in training for the visibility set; all visual scene light points should fade into view appropriately											
(13.3B) The directionality of strobe lights, approach lights, runway edge lights, visual landing aids, runway centre line lights, threshold lights, and touchdown zone lights on the runway of intended landing should be realistically replicated											
13.4 Visual feature recognition **NOTE:** Tests 4(a) through 4(g) below contain the minimum distances at which runway features should be visible. Distances are measured from runway threshold to an aeroplane aligned with the runway on an extended 3-degree glide slope in suitable simulated meteorological conditions. For circling approaches, all tests below apply both to the runway used for the initial approach and to the runway of intended landing											
(13.4A) Runway definition, strobe lights, approach lights, and runway edge white lights from 8 km (5 sm) of the runway threshold											
(13.4B) Visual approach aids lights from 8 km (5 sm) of the runway threshold											
(13.4C) Visual approach aids lights from 5 km (3 sm) of the runway threshold											
(13.4D) Runway centreline lights and taxiway definition from 5 km (3sm)											

TABLE OF FUNCTIONS AND SUBJECTIVE TESTS	FFS				FTD		FNPT			BITD	REMARKS
	A	B	C	D	1	2	I	II	MCC		
13.4 Visual feature recognition (Continue)											
(13.4E) Threshold lights and touchdown zone lights from 3 km (2 sm)											
(13.4F) Runway markings within range of landing lights for night scenes as required by the surface resolution test on day scenes											
(13.4G) For circling approaches, the runway of intended landing and associated lighting should fade into view in a non-distracting manner											
13.5 Airport model content Minimum of three specific airport scenes as defined below;											
(13.5A) terminal approach area											
(13.5A(i)) accurate portrayal of airport features is to be consistent with published data used for aeroplane operations											
(13.5A(ii)) all depicted lights should be checked for appropriate colours, directionality, behaviour and spacing (e.g.,obstruction lights, edge lights, centre line, touchdown zone, VASI, PAPI, REIL and strobes)											
(13.5A(iii)) depicted airport lighting should be selectable via controls at the instructor station as required for aeroplane operation											
(13.5A(iv)) selectable airport visual scene capability at each model demonstrated for : (i) night (ii) twilight (iii) day											
(13.5A(v)) ramps and terminal buildings which correspond to an operator's LOFT and LOS scenarios											
(13.5A(vi)) terrain- appropriate terrain, geographic and cultural features											
(13.5(vii)) dynamic effects - the capability to present multiple ground and air hazards such as another aeroplane crossing the active runway or converging airborne traffic; hazards should be selectable via controls at the instructor station											
(13.5(viii)) illusions - operational visual scenes which portray representative physical relationships known to cause landing illusions, for example short runways, landing approaches over water, uphill or downhill runways, rising terrain on the approach path and unique topographic features											
NOTE: Illusions may be demonstrated at a generic airport or specific aerodrome.											

TABLE OF FUNCTIONS AND SUBJECTIVE TESTS	FFS				FTD		FNPT			BITD	REMARKS
	A	B	C	D	1	2	I	II	MCC		
13.6 Correlation with aeroplane and associated equipment											
(13.6A) visual system compatibility with aerodynamic programming											
(13.6B) visual cues to assess sink rate and depth perception during landings. Visual cueing sufficient to support changes in approach path by using runway perspective. Changes in visual cues during take-off and approach should not distract the pilot											
(13.6C) accurate portrayal of environment relating to FSTD attitudes											
(13.6D) the visual scene should correlate with integrated aeroplane systems, where fitted (e.g. terrain, traffic and weather avoidance systems and head-up guidance system (HGS))											
(13.6E) representative visual effects for each visible, ownship, aeroplane external light											
(13.6F) the effect of rain removal devices should be provided											
13.7 Scene quality											
(13.7A) surfaces and textural cues should be free from apparent quantisation (aliasing)											
(13.7B) system capable of portraying full colour realistic textural cues											
(13.7C) the system light points should be free from distracting jitter, smearing or streaking											
(13.7D) demonstration of occulting through each channel of the system in an operational scene											
(13.7E) demonstration of a minimum of 10 levels of occulting through each channel the system in an operational scene											
(13.7F) system capable of providing focus effects that simulate rain and light point perspective growth											
(13.7G) system capable of six discrete light step controls (0-5)											
13.8 Environmental effects											
(13.8A) the displayed scene should correspond to the appropriate surface contaminants and include runway lighting reflections for wet, partially obscured lights for snow, or suitable alternative effects											
(13.8B) Special weather representations which include the sound, motion and visual effects of light, medium and heavy precipitation near a thunderstorm on take-off, approach and landings at and below an altitude of 600 m (2000 ft) above the aerodrome surface and within a radius of 16 km (10 sm) from the aerodrome											

TABLE OF FUNCTIONS AND SUBJECTIVE TESTS	FFS				FTD		FNPT			BITD	REMARKS
	A	B	C	D	1	2	I	II	MCC		
13.8 Environmental effects (Continue)											
(13.8C) in-cloud effects such as variable cloud density, speed cues and ambient changes should be provided											
(13.8D) the effect of multiple cloud layers representing few, scattered, broken and overcast conditions giving partial or complete obstruction of the ground scene											
(13.8E) gradual break-out to ambient visibility/RVR, defined as up to 10% of the respective cloud base or top, 20 ft ≤ transition layer ≤200 ft; effects should be checked at and below a height of 600 m (2000 ft) above the aerodrome and within a radius of 16 km (10 sm) from the airport											
(13.8F) visibility and RVR measured in terms of distance. Visibility/RVR should be checked at and below a height of 600 m (2 000 ft) above the aerodrome and within a radius of 16 km (10 sm) from the airport											
(13.8G) patchy fog giving the effect of variable RVR. Note – Patchy fog is sometimes referred to as patchy RVR.											
(13.8H) effects of fog on aerodrome lighting such as halos and defocus											
(13.8I) effect of ownship lighting in reduced visibility, such as reflected glare, to include landing lights, strobes, and beacons											
(13.8J) wind cues to provide the effect of blowing snow or sand across a dry runway or taxiway should be selectable from the instructor station											
13.9 Instructor controls of:											
(13.9A) Environmental effects, e.g. cloud base, cloud effects, cloud density, visibility in kilometres/statute miles and RVR in metres or feet											
(13.9B) Airport/aerodrome selection											
(13.9C) Airport/aerodrome lighting including variable intensity where appropriate											
(13.9D) Dynamic effects including ground and flight traffic											

TABLE OF FUNCTIONS AND SUBJECTIVE TESTS	FFS				FTD		FNPT			BITD	REMARKS
	A	B	C	D	1	2	I	II	MCC		
13.9 Instructor controls of:											
(13.10) Night visual scene capability											
(13.11) Twilight visual scene capability											
(13.12) Daylight visual scene capability											
14. MOTION EFFECTS											
The following specific motion effects are required to indicate the threshold at which a flight crew member should recognise an event or situation. Where applicable below, FFS pitch, side loading and directional control characteristics should be representative of the aeroplane as a function ofaeroplane type:											
14.1 Effects of runway rumble, oleo deflections, ground speed, uneven runway, runway centreline lights and taxiway characteristics (14.1A) After the aeroplane has been pre-set to the take-off position and then released, taxi at various speeds, first with a smooth runway, and note the general characteristics of the simulated runway rumble effects of oleo deflections. Next repeat the manoeuvre with a runway roughness of 50%, then finally with maximum roughness. The associated motion vibrations should be affected by ground speed and runway roughness. If time permits, different gross weights can also be selected as this may also affect the associated vibrations depending on aeroplane type. The associated motion effects for the above tests should also include an assessment of the effects of centreline lights, surface discontinuities of uneven runways, and various taxiway characteristics.											
14.2 Buffets on the ground due to spoiler/speedbrake extension and thrust (14.2A) Perform a normal landing and use ground spoilers and reverse thrust – either individually or in combination with each other – to decelerate the simulated aeroplane. Do not use wheel braking so that only the buffet due to the ground spoilers and thrust reversers is felt.											
14.3 Bumps associated with the landing gear (14.3A) Perform a normal take-off paying special attention to the bumps that could be perceptible due to maximum oleo extension after lift-off. When the landing gear is extended or retracted, motion bumps could be felt when the gear locks into position											

TABLE OF FUNCTIONS AND SUBJECTIVE TESTS	FFS				FTD		FNPT			BITD	REMARKS
	A	B	C	D	1	2	I	II	MCC		
14. MOTION EFFECTS (Continue)											
14.4 Buffet during extension and retraction of landing gear (14.4A) Operate the landing gear. Check that the motion cues of the buffet experienced are reasonably representative of the actual aeroplane											
14.5 Buffet in the air due to flap and spoiler/speed brake extension and approach to stall buffet (14.5A) First perform an approach and extend the flaps and slats, especially with airspeeds deliberately in excess of the normal approach speeds. In cruise configuration verify the buffets associated with the spoiler/speedbrake extension. The above effects could also be verified with different combinations of speedbrake/flap/gear settings to assess the interaction effects											
14.6 Approach to stall buffet and stall buffet (Where applicable) (14.6A) Conduct an approach-to-stall with engines at idle and a deceleration of 1 kt/s. Check that the motion cues of the buffet, including the level of buffet increase with decreasing speed, are reasonably representative of the actual aeroplane **Note**: For FSTDs that are to be qualified for full stall training tasks (Level C or Level D), modelling that accounts for any increase in buffet amplitude from the initial buffet threshold of perception to the critical angle of attack or deterrent buffet as a function of the angle of attack; the stall buffet modelling should include effects of Nz, as well as Nx and Ny, if relevant.											
14.7 Touchdown cues for main and nose gear (14.7A) Fly several normal approaches with various rates of descent. Check that the motion cues of the touchdown bump for each descent rate are reasonably representative of the actual aeroplane											
14.8 Nose wheel scuffing (14.8A) Taxi the simulated aeroplane at various ground speeds and manipulate the nose wheel steering to cause yaw rates to develop which cause the nose wheel to vibrate against the ground (“scuffing”). Evaluate the speed/nose wheel combination needed to produce scuffing and check that the resultant vibrations are reasonably representative of the actual aeroplane											

TABLE OF FUNCTIONS AND SUBJECTIVE TESTS	FFS				FTD		FNPT			BITD	REMARKS
	A	B	C	D	1	2	I	II	MCC		
14. MOTION EFFECTS (Continue)											
14.9 Thrust effect with brakes set (14.9A) With the simulated aeroplane set with the brakes on at the take- off point, increase the engine power until buffet is experienced and evaluate its characteristics. This effect is most discernible with wing mounted engines. Confirm that the buffet increases appropriately with increasing engine thrust											
14.10 Mach and maneuver buffet (14.10A) With the simulated aeroplane trimmed in 1 g flight while at high altitude, increase the engine power such that the Mach number exceeds the documented value at which Mach buffet is experienced. Check that the buffet begins at the same Mach number as it does in the aeroplane (for the same configuration) and that buffet levels are a reasonable representation of the actual aeroplane. In the case of some aeroplanes, manoeuvre buffet could also be verified for the same effects. Manoeuvre buffet can occur during turning flight at conditions greater than 1 g, particularly at higher altitudes											
14.11 Tyre failure dynamics (14.11A) Dependent on aeroplane type, a single tyre failure may not necessarily be noticed by the pilot and therefore there should not be any special motion effect. There may possibly be some sound and/or vibration associated with the actual tyre losing pressure. With a multiple tyre failure selected on the same side the pilot may notice some yawing which should require the use of the rudder to maintain control of the aeroplane											
14.12 Engine malfunction and engine damage (14.12A) The characteristics of an engine malfunction as stipulated in the malfunction definition document for the particular FSTD should describe the special motion effects felt by the pilot. The associated engine instruments should also vary according to the nature of the malfunction											
14. MOTION EFFECTS (Continue)											

TABLE OF FUNCTIONS AND SUBJECTIVE TESTS	FFS				FTD		FNPT			BITD	REMARKS
	A	B	C	D	1	2	I	II	MCC		
14.13 Tail strikes and pod strikes (14.13A) Tail-strikes can be checked by over rotation of the aeroplane at a speed below Vr whilst performing a take-off. The effects can also be verified during a landing. The motion effect should be felt as a noticeable bump. If the tail strike affects the aeroplane's angular rates, the cueing provided by the motion system should have an associated effect.											
(14.13B) Excessive banking of the aeroplane during its take-off/landing roll can cause a pod strike. The motion effect should be felt as a noticeable bump. If the pod strike affects the aeroplane's angular rates, the cueing provided by the motion system should have an associated effect.											
15. SOUND SYSTEM											
15.1 The following checks should be performed during a normal flight profile with motion											
(15.1A) precipitation											
(15.1B) rain removal equipment											
(15.1C) significant aeroplane noises perceptible to the pilot during normal operations, such As engine, flaps, gear, spoiler extension/retraction, thrust reverser to a comparable level of that found in the aeroplane											
(15.1D) abnormal operations for which there are associated sound cues including, but not limited to, engine malfunctions, landing gear/tire malfunctions, tail and engine pod strike and pressurization malfunction											
(15.1E) sound of a crash when the FFS is landed in excess of limitations											
(15.1F) significant engine/propeller noise perceptible to pilot during normal operations											
16. SPECIAL EFFECTS											
16.1 Braking Dynamics											

TABLE OF FUNCTIONS AND SUBJECTIVE TESTS	FFS				FTD		FNPT			BITD	REMARKS
	A	B	C	D	1	2	I	II	MCC		
(16.1A) representative brake failure dynamics (including antiskid) and decreased brake Efficiency due to high brake temperatures based on aeroplane related data. These representations should be realistic enough to cause pilot identification of the problem and implementation of appropriate procedures. FSTD pitch, side - loading and directional control characteristics should be representative of the aeroplane											
16.2 Effects of Airframe and Engine Icing											
(16.2A) See Appendix 1 to GM FSTD(A).300 1.t.1.											
17. OTHERS											
(17.1) GPS											
(17.2) ETOPS / EDTO Capabilities											
(17.3) Upset and Prevention Recovery Training											
(17.3A) Upset prevention and recovery manoeuvre within the FSTD validation envelope.											
(17.3B) Instructor operating station control and briefing											
(17.3C) Icing indicators (engine and airframe)											

NOTE: For level 'A', an asterisk (*****) denotes that the appropriate effect is required to be present.

NOTE: It is accepted that tests will only apply to FTD level 1 if that system and flight condition is simulated. It is intended that the tests listed below should be conducted in automatic flight. Where automatic flight is not possible and pilot manual handling is required, the FTD should be at least controllable to permit the conduct of the flight.

NOTES:

S = Satisfactory; U = Unsatisfactory; N = Not Observed; N / A = Not Applicable

General: motion and buffet cues will only be applicable to FSTD equipped with an appropriate motion system

1. take-off characteristics sufficient to commence the airborne exercises;
2. for FNPT 1 and BITD only if multi-engine;
3. only trim change is required; and
4. for FNPT, variable intensity airport lighting is not required.