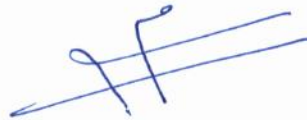


PART- FSTD(A)

Airplane Flight Simulator Training Devices

This new part of the Jordanian Civil Aviation Regulations is hereby adopted under the authority and provisions of the Civil Aviation Law No. (41) 2007, and its amendments.



Capt. Mohammad Amin Al-Quran
Chief Commissioner/CEO
Civil Aviation Regulatory Commission



Revision Control Sheet			
Amendment No.	Effective Date	Subpart	Paragraph
Original	Dec., 2012	ALL	ALL



PART- FSTD(A)

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Flight Simulation Training Device Standards

**Subpart- A
Applicability**

FSTD(A).001 Applicability.

FSTD (A) as amended applies to those persons, organizations or enterprises (Flight Simulation Training Devices (FSTD) operators) or, in the case of BITDs only, manufacturers seeking initial qualification of FSTDs.

The version of JCAR-FSTD (A) agreed by CARC and used for issue of the initial qualification shall be applicable for future re-current qualifications of the FSTD unless re-categorized.

FSTD users shall also gain approval to use the FSTD as part of their approved training programs despite the fact that the FSTD has been previously qualified.

**Subpart- B
General**

FSTD(A).005 Terminology.

[\(See AC to JCAR-FSTD A.005\)](#)

The following principal terms and abbreviations shall be used in order to comply with JCAR–FSTD(A). Further terms and abbreviations are contained in AC to FSTD A.005.

Basic Instrument Training Device (BITD): A ground based training device which represents the student pilot’s station of a class of airplanes. It may use screen based instrument panels and spring loaded flight controls, providing a training platform for at least the procedural aspects of instrument flight.

BITD Manufacturer: That organization or enterprise being directly responsible to CARC for requesting the initial BITD model qualification.

BITD Model: A defined hardware and software combination, which has obtained a qualification. Each BITD will equate to a specific model and be a serial numbered unit.

Flight and Navigation Procedures Trainer (FNPT): A training device which represents the flight deck or cockpit environment including the assemblage of equipment and computer programs necessary to represent an airplane or class of airplane in flight operations to the extent that the systems appear to function as in an airplane. It is in compliance with the minimum standards for a specific FNPT Level of Qualification.

Flight Simulation Training Device (FSTD): A training device which is a Full Flight Simulator (FFS), a Flight Training Device (FTD), a Flight & Navigation Procedures Trainer (FNPT), or a Basic Instrument Training Device (BITD).

Flight Training Device (FTD): A full size replica of a specific airplane type’s instruments, equipment, panels and controls in an open flight deck area or an enclosed airplane flight deck, including the assemblage of equipment and computer software programs necessary to represent the airplane in ground and flight conditions to the extent of the systems installed in the device. It does not require a force cueing motion or visual system. It is in compliance with the minimum standards for a specific FTD Level of Qualification.

Flight Simulation Training Device Operator (FSTD operator): That person, organization or enterprise directly responsible to CARC for requesting and maintaining the qualification of a particular FSTD.

Flight Simulation Training Device Qualification (FSTD Qualification): The level of technical ability of an FSTD as defined in the compliance document.

Flight Simulation Training Device User Approval (FSTD User Approval): The extent to which an FSTD of a specified Qualification Level may be used by persons, organizations or enterprises as approved by CARC. It takes account of airplane to FSTD differences and the operating and training ability of the organization.

Flight Simulation Training Device User (FSTD User): The person, organization or enterprise requesting training, checking and testing credits through the use of an FSTD.

Full Flight Simulator (FFS): A full size replica of a specific type or make, model and series airplane flight deck, including the assemblage of all equipment and computer programs necessary to represent the airplane in ground and flight operations, a visual system providing an out of the flight deck view, and a force cueing motion system. It is in compliance with the minimum standards for FFS Qualification.

Other Training Device (OTD): A training aid other than FFS, FTD, FNPT or BITD which provides for training where a complete flight deck environment is not necessary.

Qualification Test Guide (QTG): A document designed to demonstrate that the performance and handling qualities of an FSTD agree within prescribed limits with those of the airplane and that all applicable regulatory requirements have been met. The QTG includes both the airplane and FSTD data used to support the validation.

Subpart- C
Airplane Flight Simulation Training Devices

FSTD(A).015 Application for FSTD Qualification.

[\(See AC No. 1 to JCAR-FSTD A.015\), \(See AC No. 2 to JCAR-FSTD A.015\)](#)

(a) The FSTD operator requiring evaluation of a FFS, FTD or FNPT shall apply to CARC giving 3 months notice. In exceptional cases this period may be reduced to one month at the discretion of CARC.

(b) An FSTD Qualification Certificate will be issued following satisfactory completion of an evaluation of the FFS, FTD or FNPT by CARC.

(c) For BITDs the manufacturer of a new BITD model which requires evaluation shall apply to CARC giving 3 months notice. In exceptional cases this period may be reduced to one month at the discretion of CARC.

(d) A BITD Qualification Certificate will be issued for the BITD model to the manufacturer following satisfactory completion of an initial evaluation by CARC. This qualification certificate is valid for any devices manufactured to this standard without the need for the device to be subjected to further technical evaluation. The BITD model must clearly be identified by a BITD model number.

(e) The numbering of the BITD model must clearly define the hardware and software configuration of the qualified BITD model. A running serial number shall follow the BITD model identification number.

(f) To add a statement for FSTD approved before implementation of this part.

FSTD(A).020 Validity of FSTD Qualification.

[\(See AC to JCAR-FSTD A.020\)](#)

(a) An FSTD qualification is valid for 12 months unless otherwise specified by CARC.

(b) An FSTD qualification revalidation can take place at any time within the 30 days prior to the expiry of the validity of the qualification

document. The new period of validity shall continue from the expiry date of the previous qualification document.

- (c) CARC shall refuse, revoke, suspend or vary an FSTD qualification, if the provisions of JCAR-FSTD A are not satisfied.
- (d) It is the operator's responsibility to apply for the revalidation of the qualification.

FSTD(A).025 Rules Governing FSTD Operators.

[\(See AC No. 1 to JCAR-FSTD A.025\)](#), [\(See AC No. 2 to JCAR-FSTD A.025\)](#)

[\(See AC No. 3 to JCAR-FSTD A.025\)](#)

The FSTD operator shall demonstrate his capability to maintain the performance, functions and other characteristics specified for the FSTD Qualification Level as follows:

(a) **Quality System.**

(1) A Quality System shall be established and a Quality Manager designated to monitor compliance with and the adequacy of, procedures required to ensure the maintenance of the Qualification Level of FSTDs. Compliance monitoring shall include a feedback system to the Accountable Manager to ensure corrective action as necessary.

(2) The Quality System shall include a Quality Assurance Program that contains procedures designed to verify that the specified performance, functions and characteristics are being conducted in accordance with all applicable requirements, standards and procedures.

(3) The Quality System and the Quality Manager shall be acceptable to CARC.

(4) The Quality System shall be described in relevant documentation.

- (b) **Updating.** A link shall be maintained between the operator's organization, CARC and the relevant manufacturers to incorporate important modifications, especially:

- (1) Airplane modifications that are essential for training and checking shall be introduced into all affected FSTDs whether or not enforced by an airworthiness directive.
 - (2) Modification of FSTDs, including motion and visual systems (where applicable):
 - (i) When essential for training and checking, FSTD operators shall update their FSTDs (for example in the light of data revisions). Modifications of the FSTD hardware and software that affect handling, performance and systems operation or any major modifications of the motion or visual system shall be evaluated to determine the impact on the original qualification criteria. FSTD operators shall prepare amendments for any affected validation tests. The FSTD operator shall test the FSTD to the new criteria.
 - (ii) CARC shall be advised in advance of any major changes to determine if the tests carried out by the FSTD operator are satisfactory. A special evaluation of the FSTD may be necessary prior to returning it to training following the modification.
 - (3) BITD operators shall maintain a link between their own organization, CARC and the BITD manufacturer to incorporate important modifications.
- (c) **Installations.** Ensure that the FSTD is housed in a suitable environment that supports safe and reliable operation.
- (1) The FSTD operator shall ensure that the FSTD and its installation comply with the Jordanian health and safety regulations. However, as a minimum all FSTD occupants and maintenance personnel shall be briefed on FSTD safety to ensure that they are aware of all safety equipment and procedures in the FSTD in case of emergency.
 - (2) The FSTD safety features such as emergency stops and emergency lighting shall be checked at least annually and recorded by the FSTD operator.
- (d) **Additional Equipment.** Where additional equipment has been added to the FSTD, even though not required for qualification, it will be assessed to ensure that it does not adversely affect the quality of training.

Therefore any subsequent modification, removal or un-serviceability could affect the qualification of the device.

FSTD(A).030 Requirements for FSTD qualification.

[\(See Appendix 1 to JCAR-FSTD A.030\)](#), [\(See AC No. 1 to JCAR-FSTD A.030\)](#)

[\(See AC No. 2 to JCAR-FSTD A.030\)](#),[\(See AC No. 3 to JCAR-FSTD A.030\)](#)

[\(See AC No. 4 to JCAR-FSTD A.030\)](#), [\(See AC No. 1 to JCAR-FSTD A.030\(c\) \(1\)\)](#), [\(See AC No. 2 to JCAR-FSTD A.030\(c\) \(1\)\)](#)

(a) Any FSTD submitted for initial evaluation will be evaluated against applicable JCAR–FSTD (A) criteria for the Qualification Levels applied for. Recurrent evaluations of a FSTD will be based on the same version of FSTD (A). An upgrade will be based on the currently applicable version of JCAR-FSTD (A).

(b) FSTD shall be assessed in those areas that are essential to completing the flight crewmember training and checking process as applicable.

(c) The FSTD shall be subjected to:

(1) Validation tests and

(2) Functions & subjective tests.

(d) Data shall be of a standard that satisfies CARC before the FSTD can gain a Qualification Level.

(e) The FSTD operator shall submit a QTG in a form and manner that is acceptable to CARC.

(f) The QTG will only be approved after completion of an initial or upgrade evaluation, and when all the discrepancies in the QTG have been addressed to the satisfaction of CARC. After inclusion of the results of the tests witnessed by CARC, the approved QTG becomes the Master QTG (MQTG), which is the basis for the FSTD qualification and subsequent recurrent FSTD evaluations. A copy of the MQTG shall be delivered by the BITD manufacturer together with any BITD model delivered to an Operator.

(g) The FSTD operator shall:

- (1) Run the complete set of tests contained within the MQTG progressively between each annual evaluation by CARC. Results shall be dated and retained in order to satisfy both the FSTD operator and CARC that FSTD standards are being maintained; and
- (2) Establish a Configuration Control System to ensure the continued integrity of the hardware and software of the qualified FSTD.

FSTD (A) .031 – Thru FSTD A.034 Reserved.**FSTD(A).035 Requirements for Full Flight Simulators approval.**

[\(See AC to JCAR-FSTD A.035\)](#)

(a) Full Flight simulators approval either will be re-categorized or will continue to maintain their approval or qualification (and be known as FFSs(G)) under the Grandfather Rights provision, in accordance with JCAR-FSTD A.035-(c) and JCAR-FSTD A.035-(d) provided that period of Grandfather Rights shall not exceed 2 years.

(b) Re-categorized of Full Flight simulators will be qualified in accordance with JCAR-FSTD A.030.

(c) Full Flight simulators that are not re-categorized but that have a primary reference document used for their testing may be qualified by CARC to an equivalent JCAR-FSTD (A) Qualification Level. These Qualification Levels refer to similar credits achieved by JCAR-FSTD (A) Levels A, B, C & D. An upgrade requires the re-categorization of the flight simulator.

(1) To gain and maintain an equivalent Qualification Level, these Full Flight simulators shall be assessed in those areas which are essential to completing the flight crew member training and checking process, including:

- (i) Longitudinal, lateral and directional handling qualities.
- (ii) Performance on the ground and in the air.
- (iii) Specific operations where applicable.
- (iv) Flight deck configuration.

- (v) Functioning during normal, abnormal, emergency and, where applicable non-normal operation.
 - (vi) Instructor station function and FSTD control; and
 - (vii) Additional requirements depending on the Qualification or approval Level and the installed equipment.
- (2) The Full Flight simulators shall be subjected to:
- (i) Validation tests; and
 - (ii) Functions and subjective Tests.
- (d) Full Flight simulators devices that are not re-categorized and that do not have a primary reference document used for their testing shall be qualified by special arrangement:
- (1) Such Full flight simulators will be issued with Special Categories.
 - (2) These Full Flight simulators shall be subjected to the same functions and subjective tests referred to in JCAR-FSTD A.035-(c) (2) (ii) above.
 - (3) In addition any previously re-cognized validation test shall be used.

FSTD(A).036 Requirements for Flight Training Devices approval.

[\(See AC to JCAR-FSTD A.036\)](#)

(a) Flight Training Devices approved or qualified will be re-categorized or will continue to maintain their approval or qualification (and be known as FTDs(G)) under the Grandfather Rights provision, in accordance with JCAR-FSTD A.036 (c) and JCAR-FSTD A.036(d), provided that period of Grandfather Rights shall not exceed 2 years.

(b) Recategorized of FTDs will be qualified in accordance with FSTD(A) .030.

(c) FTDs that are not re-categorized but that have a primary reference document used for their testing may be qualified by CARC to an equivalent JCAR-FSTD A Qualification Level. These Qualification Levels refer to similar credits achieved by JCAR-STD A Level 1 and 2.

(1) To gain and maintain an equivalent Qualification Level, these FTDs shall be assessed in those areas which are essential to completing the flight crew member training and checking process, including:

- (i) Longitudinal, lateral and directional handling qualities (where applicable);
- (ii) Performance on the ground and in the air;
- (iii) Specific operations where applicable;
- (iv) Flight deck configuration;
- (v) Functioning during normal, abnormal, emergency and, where applicable non normal operation;
- (vi) Instructor station function and FSTD control, and
- (vii) Certain additional requirements depending on the Qualification or approval Level and the installed equipment.

(2) The FTDs shall be subjected to:

- (i) Validation Tests, and

- (ii) Functions and Subjective tests.

- (d) FTDS devices that are not re-categorized and that do not have a primary reference document used for their testing shall be qualified by special arrangement.
 - (1) Such FTDs will be issued with Special Categories.
 - (2) These FTDs shall be subjected to the same Functions and Subjective Tests referred to in JCAR-FSTD A.O36(c) (2) (ii).
 - (3) In addition any previously recognized Validation Test shall be used.

FSTD(A).037 Requirements for Flight Navigation and Procedures Trainers approval.
[\(See AC to JCAR-FSTD A.037\)](#)

- (a) FNPTs approved or qualified will continue to maintain their approval or qualification (and be known as FNPT(G)) under the Grandfather Rights provision, in accordance with JCAR-FSTD A.O37-(c) and JCAR-FSTD A.O37-(d) provided that period of Grandfather Rights shall not exceed 2 years.
- (b) Re-categorized FNPTs will be qualified in accordance with JCAR-FSTD A.030.
- (c) FNPTs devices that are not re-categorized but that have a primary reference document used for their testing may continue under previous authorization, provided that they continue to comply with the primary reference document.
 - (1) To maintain their qualification/ approval, these FNPTs devices shall be assessed in those areas which are essential to completing the flight crew member training, testing and checking process, including:
 - (i) Longitudinal, lateral and directional handling qualities.
 - (ii) Performance on the surface and in the air.
 - (iii) Specific operations where applicable.

- (iv) Cockpit / flight deck configuration.
 - (v) Functioning during normal, abnormal and emergency operation.
 - (vi) Instructor station function and FSTD control;
and
 - (vii) Certain additional requirements depending on the qualification or approval and the installed equipment.
- (2) The FNPTs shall be subjected to:
- (i) Validation Tests (if applicable); and Tests.
 - (ii) Functions and Subjective.
- (d) FNPTs devices that do not have a primary reference document used for their testing may continue by special arrangement:
- (1) Such FNPTs will be issued with Special Categories.
 - (2) These FNPTs shall be subjected to the same Functions and Subjective Tests referred to in JCAR-STD A.037-(c) (2) (ii).
 - (3) In addition any previously recognized Validation Test shall be used.

FSTD(A).038 Requirements for BITDs approval.

- (a) FNPT (G) s and STDs under special category may be re-categorized as BITDs. The FSTD operator shall apply for the evaluation. Following satisfactory completion of the evaluation the FSTD operator will be issued a Qualification Certificate.
- (b) Re-categorized BITD's will be qualified in accordance with JCAR-FSTD A.030.

FSTD(A).040 Changes to qualified FSTD.

(a) **Requirement to notify major changes to a FSTD.** The operator of a qualified FSTD shall inform CARC of proposed major changes such as:

- (1) Airplane modifications, which could affect FSTD qualification.
- (2) FSTD hardware and or software modifications that could affect the handling qualities, performances or system representations.
- (3) Re-location of the FSTD; and
- (4) Any de-activation of the FSTD.

CARC may complete a special evaluation following major changes or when a FSTD appears not to be performing at its initial Qualification Level.

(b) **Upgrade of a FSTD.** A FSTD may be upgraded to a higher Qualification Level. Special evaluation is required before the award of a higher Level of Qualification:

- (1) If an upgrade is proposed the FSTD operator shall seek the advice of CARC and give full details of the modifications. If the upgrade evaluation does not fall upon the anniversary of the original qualification date, a special evaluation is required to permit the FSTD to continue to qualify even at the previous Qualification Level.
- (2) In the case of a FSTD upgrade, an FSTD operator shall run all validation tests for the requested Qualification Level. Results from previous evaluations shall not be used to validate FSTD performance for the current upgrade.

(c) Relocation of a FSTD.

(1) In instances where a FSTD is moved to a new location, CARC shall be advised before the planned activity along with a schedule of related events.

(2) Prior to returning the FSTD to service at the new location, the FSTD operator shall perform at least one third of the validation tests and, functions and subjective tests to ensure that the FSTD performance meets its original qualification standard. A copy of the test documentation shall be retained together with the FSTD records for review by CARC.

(d) Deactivation of a currently qualified FSTD.

(1) If a FSTD operator plans to remove a FSTD from active status for prolonged periods, CARC shall be notified and suitable controls established for the period during which the FSTD is inactive.

(2) The FSTD operator shall agree a procedure with CARC to ensure that the FSTD can be restored to active status at its original Qualification Level.

FSTD(A).045 Interim FSTD Qualification.

[\(See AC to JCAR-FSTD A.045\).](#)

(a) In case of new airplane programs, special arrangements shall be made to enable an interim Qualification Level to be achieved.

(b) For Full Flight Simulators, an Interim Qualification Level will only be granted at levels A, B or C.

(c) Requirements, details relating to the issue, and the period of validity of an interim Qualification Level will be decided by CARC.

FSTD(A).050 Transferability of FSTD Qualification.

When there is a change of FSTD operator:

(a) The new FSTD operator shall advise CARC in advance in order to agree upon a plan of transfer of the FSTD.

(b) At the discretion of CARC, the FSTD shall be subject to an evaluation in accordance with JCAR-FSTD A.

(c) Provided that the FSTD performs to its original standard, its original Qualification Level shall be restored. Revised user approval(s) may also be required.

**Appendix- 1 to FSTD (A) .030
Flight Simulation Training Device Standards**

This appendix describes the minimum Full Flight Simulator (FFS), Flight Training Device (FTD), Flight and Navigation Procedures Trainer (FNPT) and Basic Instrument Training Devices (BITD) requirements for qualifying devices to the required Qualification Levels. Certain requirements included in this section shall be supported with a statement of compliance (SOC) and, in some designated cases, an objective test. The SOC will describe how the requirement was met. The test results shall show that the requirement has been attained. In the following tabular listing of FSTD standards, statements of compliance are indicated in the compliance column.

For FNPT use in Multi-Crew Co-operation (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 (Multi Crew Co-operation) minimum technical requirements are as for Level II, with the following additions or amendments:

1	Turbo-jet or turbo-prop engines.
2	Performance reserves, in case of an engine failure, to be in accordance with JCAR-25. These may be simulated by a reduction in the airplane gross mass.
3	Retractable landing gear.
4	Pressurization 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

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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)

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Flight Simulator Training Device Standards 1.1 General		FFS Level				FTD Level		FNPT Level			BITD	Compliance
		A	B	C	D	1	2	I	II	MCC		
a.1	A fully enclosed flight deck	✓	✓	✓	✓							
a.2	A cockpit/flight deck sufficiently enclosed to exclude distraction, which will replicate that of the airplane or class of airplane simulated						✓	✓	✓	✓	✓	
a.3	<p>Flight deck, a full scale replica of the airplane simulated.</p> <p>Equipment for operation of the cockpit windows shall be included in the FSTD, but the actual windows need not be operable.</p> <p>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 pilots' seats. Additional required flight crewmember duty stations and those required bulkheads aft of the pilot seats are also considered part of the flight deck and shall Replicate the airplane.</p>	✓	✓	✓	✓							<p>Flight deck observer seats are not considered to be additional flight crewmember duty stations and may be omitted.</p> <p>Bulkheads containing items such as switches, circuit breakers, supplementary radio panels, etc. to which the flight crew may require access during any event after pre-flight cockpit preparation is complete are considered essential and may not be omitted.</p> <p>Bulkheads containing only items such as landing gear pin storage compartments, fire axes or extinguishers, spare light bulbs, aircraft 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.</p>
a.4	Direction of movement of controls and switches identical to that in the airplane.	✓	✓	✓	✓							
a.5	A full size panel of replicated system(s) which will have actuation of controls and switches that replicate those of the airplane simulated.					✓	✓					<p>The use of electronically displayed images with physical overlay incorporating operable switches, knobs, buttons replicating airplane instruments panels may be acceptable.</p>

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Flight Simulator Training Device Standards 1.1 General		FFS Level				FTD Level		FNPT Level			BITD	Compliance
		A	B	C	D	1	2	I	II	MCC		
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 airplane or class of airplane.							✓	✓	✓	✓	For Multi-Crew Co-operation (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.
a.7	Crewmembers seats shall be provided with sufficient adjustment to allow the occupant to achieve the design eye reference position appropriate to the airplane or class of airplane 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 airplane attitude, sideslip, thrust, drag, altitude, temperature, gross weight, moments of inertia, centre of gravity location, and configuration.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	For FTD Levels 1 and 2 aerodynamic modeling sufficient to permit accurate systems operation and indication is acceptable. For FNPTs and BITDs class specific modeling is acceptable.
d.1	All relevant instrument indications involved in the simulation of the applicable airplane shall automatically respond to control movement by a flight crewmember or induced disturbance to the simulated airplane; e.g., turbulence or wind shear.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	For FNPTs instrument indications sufficient for the training events to be accomplished. Reference AC No. 3 to JCAR-FSTD A.030. For BITDs instrument indications sufficient for the training events to be accomplished. Reference AC No. 4 to JCAR-FSTD A.030.

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Flight Simulator Training Device Standards 1.1 General		FFS Level				FTD Level		FNPT Level			BITD	Compliance
		A	B	C	D	1	2	I	II	MCC		
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 airplane.
e.1	Communications, navigation, and caution and warning equipment corresponding to that installed in the applicant's airplane with operation within the tolerances prescribed for the applicable airborne equipment.	✓	✓	✓	✓	✓	✓					For FTD 1 applies where the appropriate systems are replicated.
e.2	Navigation equipment corresponding to that of the replicated airplane or class of airplanes, 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.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	<p>For FTD 1 applies where navigation equipment is replicated.</p> <p>For all FFSs and FTDs 2 where used for area or airfield competence training or checking, navigation data should be updated within 28 days.</p> <p>For FNPTs and BITDs complete navigational data for at least 5 different airports with corresponding precision and non-precision approach procedures including current updating within a period of 6 months.</p>

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Flight Simulator Training Device Standards 1.1 General		FFS Level				FTD Level		FNPT Level			BITD	Compliance
		A	B	C	D	1	2	I	II	MCC		
f.1	In addition to the flight crewmember duty stations, three suitable seats for the instructor, delegated examiner and CARC inspector. CARC will 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 airplane 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 FNPT's suitable seating arrangements for the Instructor and Examiner or CARC Inspector should be provided. For BITDs suitable viewing arrangements for the Instructor should be provided.
g.1	FSTD systems shall simulate applicable airplane 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 airplane or class of airplanes being simulated and as required for the training.
h.1	Instructor controls shall enable the operator to control all required system variables and insert abnormal or emergency conditions into the airplane 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

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Flight Simulator Training Device Standards 1.1 General		FFS Level				FTD Level		FNPT Level			BITD	Compliance
		A	B	C	D	1	2	I	II	MCC		
i.1	Control forces and control travel shall correspond to that of the replicated airplane. Control forces shall react in the same manner as in the airplane under the same flight conditions.	✓	✓	✓	✓		✓	✓	✓	✓	✓	<p>For FTD Level 2 Control forces and control travel should correspond to that of the replicated airplane 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.</p> <p>For FNPT Level I and BITDs control forces and control travel shall broadly correspond to that of the replicated airplane or class of airplane. Control force changes due to an increase/decrease in aircraft speed are not necessary.</p> <p>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 airplane or class of airplane being simulated.</p>
j.1	<p>Ground handling and aerodynamic programming shall include:</p> <p>(1) Ground Effect. For example: round-out, flare, and touchdown. This requires data on lift, drag, pitching moment, trim, and power ground effect.</p> <p>(2) Ground reaction – reaction of the airplane upon contact with the runway during landing to include strut deflections, tire friction, side forces, and other appropriate data, such as weight and speed, necessary to identify the flight condition and configuration.</p> <p>(3) Ground handling characteristics – steering inputs to include crosswind, braking, thrust reversing, deceleration and turning radius.</p>	✓	✓	✓	✓			✓	✓		<p>Statement of Compliance required. Tests required.</p> <p>For Level ‘A’ FFS, 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 cross -wind landing) only is acceptable.</p> <p>For FNPTs a generic ground handling model need only be provided to enable representative flare and touchdown effects.</p>	

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Flight Simulator Training Device Standards 1.1 General		FFS Level				FTD Level		FNPT Level			BITD	Compliance
		A	B	C	D	1	2	I	II	MCC		
k.1	<p>Wind shear models shall provide training in the specific skills required for recognition of wind shear phenomena and execution of recovery maneuvers.</p> <p>Such models shall be representative of measured or accident derived winds, but may include simplifications which ensure repeatable encounters.</p> <p>For example, models may consist of independent variable winds in multiple simultaneous components.</p> <p>Wind models shall be available for the following critical phases of flight:</p> <p>(1) Prior to take-off rotation (2) At lift-off (3) During initial climb (4) Short final approach</p>			✓	✓							<p>Tests required.</p> <p>See AC No 1 to JCAR-FSTD A.030, Para 2.3, g.</p>
l.1	1.1 Instructor controls for environmental effects including wind speed and direction shall be provided	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	For FTDs environment modeling sufficient to permit accurate systems operation and indication.
m.1	<p>Stopping and directional control forces shall be representative for at least the following runway conditions based on airplane related data:</p> <p>(1) Dry (2) Wet (3) Icy (4) Patchy wet (5) Patchy icy (6) Wet on rubber residue in touchdown zone.</p>			✓	✓							<p>Statement of Compliance required.</p> <p>Objective Tests required for (1), (2), (3), Subjective check for (4), (5), (6).</p>
n.1	Brake and tire failure dynamics (including anti skid) and decreased brake efficiency due to brake temperatures shall be representative and based on airplane related data.			✓	✓							<p>Statement of Compliance required.</p> <p>Subjective test is required for decreased braking efficiency due to brake temperature, if applicable.</p>

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Flight Simulator Training Device Standards 1.1 General		FFS Level				FTD Level		FNPT Level			BITD	Compliance
		A	B	C	D	1	2	I	II	MCC		
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.
q.1	Control feel dynamics shall replicate the airplane simulated. Free response of the controls shall match that of the airplane 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 airplane in take-off, cruise, and landing configurations. (1) For airplanes 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 airplane 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 will 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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Flight Simulator Training Device Standards 1.1 General		FFS Level				FTD Level		FNPT Level			BITD	Compliance
		A	B	C	D	1	2	I	II	MCC		
r.1	<p>One of the following two methods is acceptable as a means to prove compliance:</p> <p>(1) Transport Delay: A transport delay test may be used to demonstrate that the FSTD system response does not exceed 150 milliseconds. 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.</p> <p>(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 milliseconds of the time, but not before the time, when the airplane would respond under the same conditions.</p>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	<p>Tests required.</p> <p>For Level 'A' & 'B' FFSs, and applicable systems for FTDs, FNPTs and BITDs the maximum permissible delay is 300 milliseconds.</p>
s.1	<p>Aerodynamic modeling shall be provided. This shall include, for airplanes 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, aero elastic representations, and representations of non-linearity's due to sideslip based on airplane flight test data provided by the manufacturer.</p>			✓	✓							<p>Statement of Compliance required. Mach effect, aero elastic representations, and non-linearity's due to sideslip are normally included in the FSTD aerodynamic model. The Statement of Compliance shall address each of these items. Separate tests for thrust effects and a Statement of Compliance are required.</p>

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Flight Simulator Training Device Standards 2. Motion system		FFS Level				FTD Level		FNPT Level			BITD	Compliance
		A	B	C	D	1	2	I	II	MCC		
a.1	Motion cues as perceived by the pilot shall be representative of the airplane, 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.
b.2	A motion system shall:											Statement of Compliance required. Tests required.
	(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).		✓									
	(3) Produce cues at least equivalent to those of a six-degrees-of-freedom synergistic platform motion system.			✓	✓							
c.3	A means of recording the motion response time as required.	✓	✓	✓	✓							
d.1	Motion effects programming shall include: (1) Effects of runway rumble oleo deflections, groundspeed, uneven runway, centerline lights and taxiway characteristics. (2) Buffets on the ground due to spoiler/ speed brake 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/ speed brake extension. (6) Approach to stall buffet. (7) Touchdown cues for main and nose gear. (8) Nose wheel scuffing. (9) Thrust effect with brakes set (10) Mach and maneuver buffet. (See next page)	✓	✓	✓	✓							For Level 'A'FFS: Effects may be of a generic nature sufficient to accomplish the required tasks.

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Flight Simulator Training Device Standards 2. Motion system		FFS Level				FTD Level		FNPT Level			BITD	Compliance
		A	B	C	D	1	2	I	II	MCC		
d.1	Continued (11) Tire failure dynamics. (12) Engine malfunction and engine damage. (13) Tail and pod strike	✓	✓	✓	✓							
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 airplane in so far as vibration marks an event or airplane 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 airplane data.				✓							Statement of Compliance required. Tests required.

Flight Simulator Training Device Standards 3 Visual System		FFS Level				FTD Level		FNPT Level			BITD	Compliance
		A	B	C	D	1	2	I	II	MCC		
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 maneuvering by visual reference (such as route and airfield competence) then the visual system should at least comply with that required for level A FFS.

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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 optimizing the vertical field of view for the respective airplane cut-off angle. SOC is acceptable in place of this test.
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 airplane, 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 Part 3 and 4 (Validation, Functions and Subjective Tests - See AC No.1 to JCAR-FSTD A.030). SOC is acceptable in place of this test.

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Flight Simulator Training Device Standards 3 Visual System		FFS Level				FTD Level		FNPT Level			BITD	Compliance
		A	B	C	D	1	2	I	II	MCC		
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 artifacts 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 eye point.			✓	✓							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 high light 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.
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.

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Flight Simulator Training Device Standards 3 Visual System		FFS Level				FTD Level		FNPT Level			BITD	Compliance
		A	B	C	D	1	2	I	II	MCC		
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 10000 visible textured surfaces and (in day) 6000 visible lights or (in twilight or night) 15000 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 color 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.			✓	✓							
m.5	The system, when used in training, shall provide at twilight, as a minimum, full color 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 own ship lighting (e.g. landing lights). If provided, directional horizon lighting shall have correct orientation and be consistent with surface shading effects.			✓	✓							

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Flight Simulator Training Device Standards 3 Visual System		FFS Level				FTD Level		FNPT Level			BITD	Compliance
		A	B	C	D	1	2	I	II	MCC		
m.6	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 own ship lights (e.g. landing lights).	✓	✓	✓	✓							

Flight Simulator Training Device Standards 4 Sound System		FFS Level				FTD Level		FNPT Level			BITD	Compliance
		A	B	C	D	1	2	I	II	MCC		
a.1	Significant flight deck sounds which result from pilot actions corresponding to those of the airplane or class of airplane.	✓	✓	✓	✓		✓	✓	✓	✓	✓	For FNPT Level I and BITD engine sounds only need be available
b.1	Sound of precipitation, rain removal equipment and other significant airplane 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.			✓	✓							Statement of Compliance required.
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.	✓	✓	✓	✓							