	Flight Operations Standards Department **Flight Crew Licensing and Training Section - Flight Synthetic Training Devices (FSTDs)** **Basic Instrument Training Device (BITD) Qualification Checklist**

• **BITD Operator Name**				
• **BITD Qualification Type**	□ Initial Qualification	□ Qualification renewal	□ Variation	□ Re-location
• **BITD Manufacturer Name**				
• **BITD Serial No**				
• **BITD Qualification Number**				
• **BITD Qualification Expiry Date**				

A. Basic Instrument Training Device (BITD) General Technical Requirements.

Qual. Level	General Technical Requirements	Result	
		YES	NO
BITD	A student pilot‘s station that represents a class of airplane sufficiently enclosed to exclude distraction.		
	The switches and all the controls shall be of a representative size, shape, location and shall operate as and represent those as in the simulated class of airplane		
	In addition to the pilot’s seat, suitable viewing arrangements for the instructor shall be provided allowing an adequate view of the pilot’s panels		
	The Control forces, control travel and airplane performance shall be representative of the simulated class of airplane		
	Navigation equipment for flights under IFR with representative tolerances. This shall include communication equipment		
	Complete navigation database for at least 3 airports with corresponding precision and non precision approach procedures including regular updates		
	Engine sound shall be available		
	Instructor controls of atmospheric conditions and to set and reset malfunctions relating to flight instruments, navigation aids, flight controls, engine out operations (for multi engine airplanes only).		
	Stall recognition device corresponding to that of the simulated class of airplane		

Remarks	

Inspector Name	Date	Signature

B. Basic Instrument Training Device (BITD) Certification Requirements.

This checklist describes the minimum 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.

Requirements		Statement of Compliance	YES	
			YES	NO
1	**General**			
a	A cockpit/flight deck sufficiently enclosed to exclude distraction, which will replicate that of the airplane or class of airplane simulated			
b	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 BITDs the switches and controls size and shape and their location in the cockpit shall be representative		
c	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.			
d	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 BITDs instrument indications sufficient for the training events to be accomplished. Reference AC No. 4 to JCAR-FSTD A.030		
e	Lighting environment for panels and instruments shall be sufficient for the operation being conducted.			
f	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).			
g	Navigational data with the corresponding approach facilities. Navigation aids should be usable within range without restriction	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.		

	Requirements	Statement of Compliance	YES	
			YES	NO
h	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 BITDs suitable viewing arrangements for the Instructor should be provided		
i	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		
j	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.	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.		
k	Instructor controls for environmental effects including wind speed and direction shall be provided			
l	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 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. (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.	Tests required For Level 'A' & 'B' FFSs, and applicable systems for FTDs, FNPTs and BITDs the maximum permissible delay is 300 milliseconds.		
m	Daily pre-flight documentation either in the daily log or in a location easily accessible for review is required.			

Requirements	Statement of Compliance	YES	
		YES	NO
2	**Sound System**		
a	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		

Remarks	

Inspector Name	Date	Signature

C. Basic Instrument Training Device (BITD) Functions and Subjective Tests.

No.	Table of Functions and Subjective Tests	BITD	Result YES	Result NO
a	**PREPARATION FOR FLIGHT.**	**Not Applicable**		
b	**SURFACE OPERATIONS (PRE-TAKE-OFF)**			
	(1) Engine Start			
	(a) Normal start	✓		
c	**TAKE-OFF**			
	(1) Normal	✓ (1)		
	(a) Airplane/engine parameter relationships	✓		
	(b) Acceleration characteristics (not associated with motion)	✓		
	(c) Landing gear, wing flap leading edge device operation	✓		
d	**CLIMB**			
	(1) Normal	✓		
	(2) One or more engines inoperative	✓(2)		
e	**CRUISE**			
	(1) Performance characteristics (speed vs. power)	✓		
f	**MANOEUVRES**			
	(1) High angle of attack, approach to stalls, stall warning, buffet, and g-break (take-off, cruise, approach, and landing configuration)	✓		
	(2) Normal and standard rate turns	✓		
	(3) Steep turns	✓		
	(4) Maneuvering with one or more engines inoperative, as appropriate	✓ (2)		
g	**DESCENT**			
	(1) Normal	✓		
h	**INSTRUMENT APPROACHES AND LANDING**			
	Only those instrument approach and landing tests relevant to the simulated airplane 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. (1) Precision			
	(a) PAR	✓		
	(b) CAT I/GBAS (ILS/MLS) published approaches A Manual approach to DH and G/A all engines B Manual one engine out approach to DH and G/A	 ✓ ✓(2)		
	(2) Non-precision			
	(a) NDB	✓		
	(b) VOR, VOR/DME, VOR/TAC	✓		
	(c) ILS LLZ (LOC), LLZ(LOC)/BC	✓		
	NOTE: If Standard Operating Procedures are to use autopilot for non-precision approaches then these should be evaluated			
i	**VISUAL APPROACHES (SEGMENT) AND LANDINGS.**	**Not Applicable**		

No.	Table of Functions and Subjective Tests	BITD	Result	
			YES	NO
j	**MISSED APPROACH**			
	(1) All engines	✓		
	(2) One or more engine(s) out	✓ (2)		
k	**SURFACE OPERATIONS (POST LANDING)**			
	Not applicable			
l	**ANY FLIGHT PHASE**			
	(1) Airplane and power plant systems operation			
	(a) Communications	✓		
	(b) Electrical	✓		
	(c) Fuel and oil, hydraulic and pneumatic	✓		
	(d) Landing gear	✓		
	(e) Power plant	✓		
	(f) Navigation systems	✓		
	(2) Airborne procedures			
	(a) Holding	✓		
	(3) Other as appropriate including effects of wind	✓		
m	**VISUAL SYSTEM.**	**Not Applicable**		
n	**MOTION EFFECTS.**	**Not Applicable**		
o	**SOUND SYSTEM**			
	(1) The following checks should be performed during a normal flight profile with motion			
	(a) significant engine/propeller noise perceptible to pilot during normal operations	✓		
p	**SPECIAL EFFECTS**			

Note: Motion and buffet cues will only be applicable to FSTD equipped with an appropriate motion system:
(1) Takeoff characteristics sufficient to commence the airborne exercises
(2) For FNPT 1
(3) Only trim change required
(4) For FNPT, variable intensity airport lighting not required.

Remarks	

Inspector Name	Date	Signature

D. Basic Instrument Training Device (BITD) Validation Test.

1. PERFORMANCE								
No	Tests	Tolerance	Flight Conditions	BITD Init.	BITD Rec.	COMMENTS	Result YES	Result NO
	TAXI					**Not applicable**		
	TAKE-OFF					**Not applicable**		
	CLIMB							
	(1) Normal Climb All engines operating	± 3 kts airspeed ± 5% or ± 0·5 m/s (100 ft/min) R/C	Clean or specified climb configuration	✓	✓	Flight test data or airplane performance manual data may be used. Record at nominal climb speed and mid initial climb altitude. FSTD performance to be recorded over an interval of at least 300 m (1 000 ft).		
	(2) One Engine Inoperative Second Segment Climb	± 3 kts airspeed ± 5% or ± 0.5 m/s (100 ft/min) R/C but not less than AFM values.	2nd Segment Climb for FNPTs and BITDs Gear up and Take-off Flaps	C T & M	✓	Flight test data or airplane performance manual data may be used. Record at nominal climb speed. Flight simulator performance to be recorded over an interval of at least 300m (1 000 ft). Test at WAT (Weight, Altitude, or Temperature) limiting condition.		
	CRUISE/DESCENT					**Not applicable**		
	STOPPING					**Not applicable**		
	ENGINES							
	(1) Acceleration	± 10% Ti or ± 0·25s ± 10% Tt	Approach or Landing	✓	✓	Ti = Total time from initial throttle movement until a 10% response of a critical engine parameter. Tt = Total time from initial throttle movement to 90% of go around power. Critical engine parameter should be a measure of power (N1, N2, EPR, etc). Plot from flight idle to go around power for a rapid throttle movement. FTD, FNPT and BITD only: CT&M acceptable.		
	(2) Deceleration	± 10% TI or ± 0·25s ± 10% Tt	Ground	✓	✓	Ti = Total time from initial throttle movement Ti = Total time from initial throttle movement until a 10% response of a critical engine parameter. Tt = Total time from initial throttle movement to 90% decay of maximum take-off power. Plot from maximum take-off power to idle for a rapid throttle movement. FTD, FNPT and BITD only: CT&M acceptable.		

2. HANDLING QUALITIES

No	Tests	Tolerance	Flight Conditions	BITD Init.	BITD Rec.	COMMENTS	Result YES	Result NO
	STATIC CONTROL CHECKS							
						NOTE: Pitch, roll and yaw controller position vs. force or time shall be measured at the control. An alternative method would be to instrument the FSTD in an equivalent manner to the flight test airplane. The force and position data from this instrumentation can be directly recorded and matched to the airplane data. Such a permanent installation could be used without any time for installation of external devices. CCA: Testing of position versus force is not applicable if forces are generated solely by use of airplane hardware in the FSTD.		
	(1) Pitch Controller Position vs. Force and Surface Position Calibration.	± 0.9 daN (2 lbs) breakout. ± 2.2 daN (5 lbs) or ± 10% force. ± 2º elevator angle	Ground			Uninterrupted control sweep to stops. Should be validated (where possible) with in-flight data from tests such as longitudinal static stability, stalls, etc. Static and dynamic flight control tests should be accomplished at the same feel or impact pressures.		
	Column Position vs. Force only.	± 2.2 daN (5 lbs) or ± 10% Force.	Cruise or Approach	C T & M	✓	FNPT 1 and BITD: Control forces and travel shall broadly correspond to that of the replicated class of airplane		
	(2) Roll Controller Position vs. Force and Surface Position Calibration.	± 0.9 daN (2 lbs) breakout ± 1.3 daN (3 lbs) or ± 10% force ± 2º aileron angle ± 3º spoiler angle	Ground			Uninterrupted control sweep to stops. Should be validated with in-flight data from tests such as engine out trims, steady state sideslips, etc. Static and dynamic flight control tests should be accomplished at the same feel or impact pressures.		
	Wheel Position vs. Force only.	± 1.3 daN (3 lbs) or ± 10% Force	Cruise or Approach	C T & M	✓	FNPT 1 and BITD: Control forces and travel shall broadly correspond to that of the replicated class of airplane		
	(3) Rudder Pedal Position vs. Force and Surface Position Calibration.	± 2.2 daN (5 lbs) breakout ± 2.2 daN (5 lbs) or ± 10% force ± 2º rudder angle	Ground			Uninterrupted control sweep to stops. Should be validated with in flight data from tests such as engine out trims, steady state sideslips, etc. Static and dynamic flight control tests should be accomplished at the same feel or impact pressures		
	Pedal Position vs. Force only	± 2.2 daN (5 lbs) or ± 10% Force.	Cruise or Approach	C T & M	✓	FNPT 1 and BITD: Control forces and travel shall broadly correspond to that of the replicated class of airplane		
	(6) Pitch Trim Indicator vs. Surface Position Calibration	± 0.5º trim angle.	Ground			Purpose of test is to compare flight simulator against design data or equivalent		
		±1° of trim angle	Ground	C T & M	✓	BITD: Only applicable if appropriate trim settings are available, e.g. data from the AFM.		

2. HANDLING QUALITIES								
No	Tests	Tolerance	Flight Conditions	BITD		COMMENTS	Result	
				Init.	Rec.		YES	NO
	(8) Alignment of Cockpit Throttle Lever vs. Selected Engine Parameter.	± 5º of TLA or ± 3% N1 or ± 0·03 EPR or ± 3% torque For propeller-driven airplanes, where the propeller levers do not have angular travel, a tolerance of ± 2 cm (± 0.8 in) applies.	Ground	✓	✓	Simultaneous recording for all engines. The tolerances apply against airplane data and between engines. For airplanes with throttle detents, all detents to be presented. In the case of propeller-driven airplanes, if an additional lever, usually referred to as the propeller lever, is present, it should also be checked. Where these levers do not have angular travel a tolerance of ± 2 cm (± 0.8 inches) applies. May be a series of Snapshot tests		
b	**DYNAMIC CONTROL CHECKS**					**Not applicable**		
c	**LONGITUDINAL**					Power setting may be that required for level flight unless otherwise specified.		
	(1) Power Change Dynamics.	± 3 kts airspeed ± 30 m (100 ft) altitudes. ± 1.5º or ± 20% pitch angle	Approach			Power change from thrust for approach or level flight to maximum continuous or go-around power. Time history of uncontrolled free response for a time increment equal to at least 5 sec before initiation of the power change to completion of the power change + 15 sec. CCA: Test in Normal AND Non-normal Control state.		
	Power Change Force	± 2.2 daN (5 lbs) or ± 10% Force	Approach	C T & M	✓	For an FNPT I and a BITD the power change force test only is acceptable.		
	(2) Flap Change Dynamics.	± 3 kts airspeed ± 30 m (100 ft) altitudes. ± 1.5º or ± 20% pitch angle	Take-off Through initial flap retraction and approach to landing			Time history of uncontrolled free response for a time increment equal to at least 5 sec before initiation of the reconfiguration change to completion of the reconfiguration change + 15 sec. CCA: Test in Normal and Non-normal Control state.		
	Flap Change Force	± 2.2 daN (5 lbs) or ± 10% Force		C T & M	✓	For an FNPT I and a BITD the flap change force test only is acceptable.		

2. HANDLING QUALITIES								
No	Tests	Tolerance	Flight Conditions	BITD		COMMENTS	Result	
				Init.	Rec.		YES	NO
	(4) Gear Change Dynamics.	± 3 kts airspeed ± 30 m (100 ft) altitude. ± 1.5º or ± 20% pitch angle For FNPTs and BITDs, ± 2º or ± 20% pitch angle	Takeoff (retraction) and Approach (extension)			Time history of uncontrolled free response for a time increment equal to at least 5 sec before initiation of the configuration change to completion of the reconfiguration change + 15 sec. CCA: Test in Normal AND Non-normal Control state.		
	Gear Change Force	± 2.2 daN (5 lbs) or ± 20% Force.	Take-off and Approach	C T & M	✓	For an FNPT I and a BITD the gear change force test only is acceptable.		
	(5) Longitudinal Trim	± 1º elevator ± 0·5º stabilizer ± 1º pitch angle ± 5% net thrust or equivalent	Cruise, Approach and Landing			Steady-state wings level trim with thrust for level flight. May be a series of snapshot tests. CCA: Test in Normal OR Non-normal Control state.		
		± 2 deg Pitch Control (Elevator & Stabilizer) ± 2 deg Pitch ± 5% Power or Equivalent	Cruise, Approach	C T & M	✓	May be a series of Snapshot tests. FNPT I and BITD may use equivalent stick and trim controllers.		
	(6) Longitudinal Maneuvering Stability (Stick Force /g).	± 2.2 daN (5 lbs) or ± 10% pitch controller Force Alternative method: ± 1º or ± 10% change of elevator	Cruise, Approach and Landing	C T & M	✓	Continuous time history data or a series of snapshot tests may be used. Test up to approximately 30º of bank for approach and landing configurations. Test up to approximately 45º of bank for the cruise configuration. Force tolerance not applicable if forces are generated solely by the use of airplane hardware in the FSTD. Alternative method applies to airplanes which do not exhibit stick-force-per-g characteristics. CCA: Test in Normal AND Non-normal Control state as applicable.		
	(7) Longitudinal Static Stability.	± 2.2 daN (5 lbs) or ± 10% pitch controller force. Alternative method: ± 1° or ± 10% change of elevator	Approach	C T & M	✓	Data for at least two speeds above and two speeds below trim speed. May be a series of snapshot tests. Force tolerance not applicable if forces are generated solely by the use of airplane hardware in the FSTD. Alternative method applies to airplanes which do not exhibit speed stability characteristics. CCA: Test in Normal OR Non-normal Control state as applicable		

2. HANDLING QUALITIES								
No	**Tests**	**Tolerance**	**Flight Conditions**	**BITD**		**COMMENTS**	**Result**	
				Init.	**Rec.**		**YES**	**NO**
	(8) Stall Characteristics.	± 3 kts airspeed for initial buffet, stall warning, and stall speeds. For airplanes with reversible flight control systems (for FS only): ± 10% or ± 2·2 daN (5 lb) column force (prior to g-break only)	2nd Segment Climb and Approach or Landing	✓	✓	Wings-level (1 g) stall entry with thrust at or near idle power. Time history data should be shown to include full stall and initiation of recovery. Stall warning signal should be recorded and should occur in the proper relation to stall. FSTDs for airplanes exhibiting a sudden pitch attitude change or 'g break' should demonstrate this characteristic. CCA: Test in Normal and Non-normal Control state. FNPT and BITD: Test need only determine the actuation of the stall warning device only		
	(9) Phugoid Dynamics.	± 10% period. ± 10% time to ½ or double amplitude or ± 0.02 of damping ratio.	Cruise			Test should include 3 full cycles or that necessary to determine time to ½ or double amplitude, whichever is less. CCA: Test in Non-normal Control state.		
		± 10% Period with representative damping	Cruise	C T & M	✓	Test should include at least 3 full cycles. Time history recommended.		
d	**LATERAL DIRECTIONAL**					Power setting may be that required for level flight unless otherwise specified.		
	(1) Minimum Control Speed, Air (V_{MCA} or V_{MCL}), per Applicable Airworthiness Standard or Low Speed Engine Inoperative Handling Characteristics in the Air.	± 3 kts airspeed	Take-off or Landing (whichever is most critical in The airplane)	C T & M	C T & M	Minimum speed may be defined by a performance or control limit which prevents demonstration of V_{MC} or V_{MCL} in the conventional manner. Take-off thrust should be set on the operating engine(s). Time history or snapshot data may be used CCA: Test in Normal OR Non-normal Control state. FNPT and BITD: It is important that there exists a realistic speed relationship between Vmca and Vs for all configurations and in particular the most critical full-power engine-out take-off configurations.		
	(2) Roll Response (Rate).	± 10% or ± 2º/sec roll rate FS only: For airplanes with reversible flight control systems: ± 10% or ± 1·3 daN (3 lb) roll controller force.	Cruise and Approach or Landing	C T & M	✓	Test with normal roll control displacement (about 30% of maximum control wheel). May be combined with step input of flight deck roll controller test (2d3).		

2. HANDLING QUALITIES								
No	Tests	Tolerance	Flight Conditions	BITD Init.	BITD Rec.	COMMENTS	Result YES	Result NO
	(4) Spiral Stability.	Correct trend and ± 2º or ± 10% bank angle in 20 seconds If alternate test is used: correct trend and ± 2° aileron.	Cruise and Approach or Landing	C T & M	✓	Airplane data averaged from multiple tests may be used. Test for both directions. As an alternative test, show lateral control required to maintain a steady turn with a bank angle of approximately 30°. CCA: Test in Non-normal Control state.		
	(6) Rudder Response.	± 2º/s or ± 10% yaw rate	Approach or Landing			Test with stability augmentation ON and OFF.		
		± 2 deg/sec or ± 10% yaw rate or heading change		C T & M	✓	Test with a step input at approximately 25% of full rudder pedal throw. CCA: Test in Normal AND Non-normal Control state.		
	(8) Steady State Side slip.	For a given rudder position: ± 2º bank angle ± 1º sideslip angle ± 10% or ± 2º aileron ± 10% or ± 5º spoiler or equivalent roll controller position or force For FFSs representing aircraft with reversible flight control systems: ±10% or ±1·3 daN (3 lb) wheel force ±10% or ±2·2 daN (5 lb) rudder pedal force.	Approach or Landing	C T & M	✓	May be a series of snapshot tests using at least two rudder positions (in each direction for propeller driven airplanes) one of which should be near maximum allowable rudder. For FNPT and BITD a roll controller position tolerance of ± 10% or ± 5º applies instead of the aileron tolerance. For a BITD the force tolerance shall be CT&M.		
e	**LANDINGS**					**Not applicable**		
f	**GROUND EFFECT**					**Not applicable**		
h	**Flight And Maneuver Envelope Protection Functions**					**Not applicable**		
3. MOTION SYSTEM.						**Not applicable**		

4. VISUAL SYSTEM								
No	Tests	Tolerance	Flight Conditions	BITD Init.	BITD Rec.	COMMENTS	Result YES	Result NO
a	**SYSTEM RESPONSE TIME**							
	(1) Transport Delay	150 milliseconds or less after controller movement. 300 milliseconds or less after controller movement.	Pitch, roll and yaw	✓	✓	One separate test is required in each axis. See Appendix 5 to AC FSTD A.030 FNPT I and BITD only the instrument response time apply.		
	or							
	(2) Latency	- 150 milliseconds or less after controller movement. - 300 milliseconds or less after controller movement	Take-off, Cruise, and Approach or Landing	✓	✓	One test is required in each axis (pitch, roll, yaw) for each of the 3 conditions compared with airplane data for a similar input. The visual scene or test pattern used during the response testing shall be representative of the required system capacities to meet the daylight, twilight (dusk/dawn) and night visual capability as applicable. FS only: Response tests should be confirmed in daylight, twilight and night settings as applicable. FNPT I and BITD only the instrument response time applies		
b	**DISPLAY SYSTEM TESTS**							
5. SOUND SYSTEMS						**Not applicable**		

Remarks	

Inspector Name	Date	Signature