**Flight Operations Standards Department**
**Training Centers Section - Flight Synthetic Training Devices (FSTDs)**
**Flight Training Devices (FTD) Qualification Test Checklist**
**GACAR PART - 60**

| | | | | |
|---|---|---|---|---|
| **• FTD Operator Name** | | | | |
| **• FTD Qualification Level** | ☐ **FTD Level 1** | | ☐ **FTD Level 2** | |
| **• FTD Qualification Type** | ☐ Initial Qualification | ☐ Qualification renewal | ☐ Modifications | ☐ Re-location |
| **• FTD Manufacturer Name** | | | | |
| **• FTD Serial No** | | | | |
| **• FTD Qualification Number** | | | | |
| **• FTD Qualification Expiry Date** | | | | |

**A. Flight Training Devices (FTD) general technical requirements**.

| Qual. Level | General Technical Requirements | Result YES | Result NO |
|---|---|---|---|
| **FTD Level 1** | Type specific with at least 1 system fully represented. | ☐ | ☐ |
| | Enclosed or open flight deck. | ☐ | ☐ |
| | Choice of systems simulated is the responsibility of the organization seeking approval or re approval for the course. | ☐ | ☐ |
| | The airplane system simulated shall comply with the relevant subjective and objective tests relevant to that system. | ☐ | ☐ |
| **FTD Level 2** | Type specific device with all applicable systems fully represented. | ☐ | ☐ |
| | An enclosed flight deck with an onboard instructor station. | ☐ | ☐ |
| | Type specific or generic flight dynamics (but shall be representative of aircraft performance) | ☐ | ☐ |
| | Primary flight controls which control the flight path and be broadly representative of airplane control characteristics | ☐ | ☐ |
| | Significant sounds | ☐ | ☐ |
| | Control of atmospheric conditions | ☐ | ☐ |
| | Navigation Data Base sufficient to support simulated airplane systems | ☐ | ☐ |

| **Remarks** | |
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| Inspector Name | Date | Signature |
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| Qualified FTD ( ) Assessor Name | Date | Signature |
|---|---|---|
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**B. Flight Training Devices (FTD) Qualification Requirements.**

This checklist describes the minimum Flight Training Devices (FTD) 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 | | FTD Level | | Statement of Compliance | YES | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | | 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 | | **X** | | ☐ | ☐ |
| b | A full-size panel of replicated system(s) which will have actuation of controls and switches that replicate those of the airplane simulated | **X** | **X** | The use of electronically displayed images with physical overlay incorporating operable switches, knobs, buttons replicating airplane instruments panels may be acceptable | ☐ | ☐ |
| c | 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. | | **X** | | ☐ | ☐ |
| d | Circuit breakers that affect procedures and/or result in observable cockpit indications properly located and functionally accurate | **X** | **X** | | ☐ | ☐ |
| e | 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, center of gravity location, and configuration. | **X** | **X** | For FTD Levels 1 and 2 aerodynamic modeling sufficient to permit accurate systems operation and indication is acceptable. | ☐ | ☐ |
| f | 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 | **X** | **X** | | ☐ | ☐ |
| g | Lighting environment for panels and instruments shall be sufficient for the operation being conducted. | **X** | **X** | For FTD Level 2 lighting environment shall be as per airplane | ☐ | ☐ |

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| Requirements | | FTD Level | | Statement of Compliance | YES | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | | YES | NO |
| h | 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 | X | X | For FTD 1 applies where the appropriate systems are replicated | ☐ | ☐ |
| i | Navigational data with the corresponding approach facilities. Navigation aids should be usable within range without restriction. | X | X | For FTD 1 applies where navigation equipment is replicated.<br><br>For all FFSs and FTDs 2 where used for area or airfield competence training or checking, navigation data should be updated within 28 days. | ☐ | ☐ |
| j | In addition to the flight crewmember duty stations, three suitable seats for the instructor, delegated examiner and GACA inspector. GACA 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 | X | X | For FTDs and FNPT's suitable seating arrangements for the Instructor and Examiner or GACA Inspector should be provided. | ☐ | ☐ |
| k | 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 | X | X | For FTD Level 1, applies where system is simulated | ☐ | ☐ |
| l | Instructor controls shall enable the operator to control all required system variables and insert abnormal or emergency conditions into the airplane systems | X | X | Where applicable and as required for training the following shall be available :<br>- Position and flight freeze.<br>- A facility to enable the dynamic plotting of the flight path on approaches, commencing at the final approach fix, including the vertical profile<br>- Hard copy of map and approach plot | ☐ | ☐ |
| m | 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 | | X | 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 | ☐ | ☐ |

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| Requirements | | FTD Level | | Statement of Compliance | YES | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | | YES | NO |
| n | Instructor controls for environmental effects including wind speed and direction shall be provided | X | X | For FTDs environment modeling sufficient to permit accurate systems operation and indication | ☐ | ☐ |
| o | Computer capacity, accuracy, resolution, and dynamic response shall be sufficient to fully support the overall fidelity, including its evaluation and testing | X | X | Statement of Compliance required. | ☐ | ☐ |
| p | One of the following two methods is acceptable as a means to prove compliance:<br><br>(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.<br><br>(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 | X | X | Tests required.<br><br>For Level 'A' & 'B' FFSs, and applicable systems for FTDs, FNPTs and BITDs the maximum permissible delay is 300 milliseconds | ☐ | ☐ |
| q | Timely and permanent update of hardware and programming subsequent to airplane modification sufficient for the Qualification Level sought | X | X | | ☐ | ☐ |
| r | Daily pre-flight documentation either in the daily log or in a location easily accessible for review is required | | | | ☐ | ☐ |
| **2** | **Sound System** | | | | | |
| a | Significant flight deck sounds which result from pilot actions corresponding to those of the airplane or class of airplane | | X | | ☐ | ☐ |

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| **Remarks** | |
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| **Inspector Name** | **Signature** | **Date** |
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| **Qualified FTD ( ) Assessor Name** | **Signature** | **Date** |
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**C. Flight Training Devices (FTD) Functions and Subjective Tests.**

| No. | Table of Functions and Subjective Tests | FTD | | Result | |
|---|---|---|---|---|---|
| | | 1 | 2 | YES | NO |
| a | **PREPARATION FOR FLIGHT** | | | | |
| | (1) Preflight. Accomplish functions check of all switches, indicators, systems, and equipment at all crewmembers' and instructors' stations and determine that; | | | | |
| | (a) the flight deck design and functions are identical to that of the airplane or class of airplane simulated | ✓ | ✓ | ☐ | ☐ |
| b | **SURFACE OPERATIONS (PRE-TAKE-OFF)** | | | ☐ | ☐ |
| | (1) Engine Start | | | ☐ | ☐ |
| | (a) Normal start | ✓ | ✓ | ☐ | ☐ |
| | (b) Alternate start procedures | ✓ | ✓ | ☐ | ☐ |
| | (c) Abnormal starts and shutdowns (hot start, hung start, tail pipe fire, etc.) | ✓ | ✓ | ☐ | ☐ |
| c | **TAKE-OFF** | | | | |
| | (1) Normal | | | | |
| | (a) Airplane/engine parameter relationships | ✓ | ✓ | ☐ | ☐ |
| | (b) Acceleration characteristics (not associated with motion) | ✓ | ✓ | ☐ | ☐ |
| | (c) Nose wheel and rudder steering | ✓ | ✓ | ☐ | ☐ |
| d | **CLIMB** | | | | |
| | (1) Normal | ✓ | ✓ | ☐ | ☐ |
| | (2) One or more engines inoperative | ✓ | ✓ | ☐ | ☐ |
| | (3) Other | ✓ | ✓ | ☐ | ☐ |
| e | **CRUISE** | | | | |
| | (1) Performance characteristics (speed vs. power) | ✓ | ✓ | ☐ | ☐ |
| | (2) High altitude handling | ✓ | ✓ | ☐ | ☐ |
| | (3) High Mach number handling (Mach tuck, Mach buffet) and recovery (trim change) | ✓ | ✓ | ☐ | ☐ |
| | (4) High IAS handling | ✓ | ✓ | ☐ | ☐ |
| f | **MANOEUVRES** | | | | |
| | (1) High angle of attack, approach to stalls, stall warning, buffet, and g-break (take-off, cruise, approach, and landing configuration) | ✓ | ✓ | ☐ | ☐ |
| | (2) Flight envelope protection (high angle of attack, bank limit, over speed, etc) | ✓ | ✓ | ☐ | ☐ |
| | (3) Turns with/without speed brake/spoilers deployed | ✓ | ✓ | ☐ | ☐ |
| | (4) In flight engine shutdown and restart (assisted and windmill) | ✓ | ✓ | ☐ | ☐ |
| | (5) Maneuvering with one or more engines inoperative, as appropriate | ✓ | ✓ | ☐ | ☐ |
| | (6) Specific flight characteristics (e.g. direct lift control) | ✓ | ✓ | ☐ | ☐ |
| | (7) Flight control system failures, reconfiguration modes, manual reversion and associated handling | ✓ | ✓ | ☐ | ☐ |
| | (8) Other | ✓ | ✓ | ☐ | ☐ |

| No. | Table of Functions and Subjective Tests | FTD | | Result | |
|---|---|---|---|---|---|
| | | 1 | 2 | YES | NO |
| **g** | **DESCENT** | | | | |
| | (1) Normal | ✓ | ✓ | | |
| | (2) Maximum rate (clean and with speed brake, etc.) | ✓ | ✓ | | |
| | (3) Flight control system failures, reconfiguration modes, manual reversion and associated handling | ✓ | ✓ | | |
| | (4) Other | ✓ | ✓ | | |
| **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) CAT I/GBAS (ILS/MLS) published approaches | | | | |
| | A. Manual approach with/without flight director including landing | ✓ | ✓ | | |
| | B. Autopilot/auto throttle coupled approach and manual landing | ✓ | ✓ | | |
| | C. Manual approach to DH and G/A all engines | ✓ | ✓ | | |
| | D. Manual one engine out approach to DH and G/A | ✓ | ✓ | | |
| | E. Autopilot/auto throttle coupled approach, one engine out to DH and G/A | ✓ | ✓ | | |
| | F. Approach and landing with minimum/standby electrical power | ✓ | ✓ | | |
| | (b) CAT II/GBAS (ILS/MLS) published approaches | | | | |
| | A. Autopilot/auto throttle coupled approach to DH and landing | ✓ | ✓ | | |
| | B. Autopilot/auto throttle coupled approach to DH and G/A | ✓ | ✓ | | |
| | C. C Auto coupled approach to DH and manual G/A | ✓ | ✓ | | |
| | (c) CAT III/GBAS (ILS/MLS) published approaches | | | | |
| | A. Autopilot/auto throttle coupled approach to land and rollout | ✓ | ✓ | | |
| | B. Autopilot/auto throttle coupled approach to DH/Alert Height and G/A | ✓ | ✓ | | |
| | C. Autopilot/auto throttle coupled approach to land and rollout with one engine out | ✓ | ✓ | | |
| | D. Autopilot/auto throttle coupled approach to DH/Alert Height and G/A with one engine out | ✓ | ✓ | | |
| | (2) Non-precision | | | | |
| | (a) NDB | ✓ | ✓ | | |
| | (b) VOR, VOR/DME, VOR/TAC | ✓ | ✓ | | |
| | (c) RNAV (GNSS) | ✓ | ✓ | | |
| | (d) 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** | | | |
| **j** | **MISSED APPROACH** | | | | |
| | (1) All engines | ✓ | ✓ | | |
| | (2) One or more engine(s) out | ✓ | ✓ | | |
| | (3) With flight control system failures, reconfiguration modes, manual reversion and for flight simulator - associated handling | ✓ | ✓ | | |

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| No. | Table of Functions and Subjective Tests | FTD | | Result | |
|---|---|---|---|---|---|
| | | 1 | 2 | YES | NO |
| **k** | **SURFACE OPERATIONS (POST LANDING)** | | | | |
| | (1) Landing roll and taxi | | | | |
| | (a) Spoiler operation | ✓ | ✓ | | |
| | (b) Reverse thrust operation | ✓ | ✓ | | |
| | (c) Directional control and ground handling, both with and without reverse thrust | ✓ | ✓ | | |
| | (d) Brake operation, to include auto-braking system where applicable | ✓ | ✓ | | |
| | (e) Other | ✓ | ✓ | | |
| **l** | **ANY FLIGHT PHASE** | | | | |
| | (1) Airplane and power plant systems operation | | | | |
| | (a) Air conditioning and pressurization (ECS) | ✓ | ✓ | | |
| | (b) De-icing/anti-icing | ✓ | ✓ | | |
| | (c) Auxiliary power plant/auxiliary power unit (APU) | ✓ | ✓ | | |
| | (d) Communications | ✓ | ✓ | | |
| | (e) Electrical | ✓ | ✓ | | |
| | (f) Fire and smoke detection and suppression | ✓ | ✓ | | |
| | (g) Flight controls (primary and secondary) | ✓ | ✓ | | |
| | (h) Fuel and oil, hydraulic and pneumatic | ✓ | ✓ | | |
| | (i) Landing gear | ✓ | ✓ | | |
| | (j) Oxygen | ✓ | ✓ | | |
| | (k) Power plant | ✓ | ✓ | | |
| | (l) Airborne radar | ✓ | ✓ | | |
| | (m) Autopilot and Flight Director | ✓ | ✓ | | |
| | (n) Collision avoidance systems. (e.g., GPWS, TCAS) | ✓ | ✓ | | |
| | (o) Flight control computers including stability and control augmentation | ✓ | ✓ | | |
| | (p) Flight display systems | ✓ | ✓ | | |
| | (q) Flight management computers | ✓ | ✓ | | |
| | (r) Head-up guidance, head-up displays | ✓ | ✓ | | |
| | (2) Airborne procedures | | | | |
| | (a) Holding | ✓ | ✓ | | |
| | (b) Air hazard avoidance. (Traffic, weather) | ✓ | ✓ | | |
| | (c) Wind shear | ✓ | ✓ | | |
| | (3) Engine shutdown and parking | | | | |
| | (a) Engine and systems operation | ✓ | ✓ | | |
| | (b) Parking brake operation | ✓ | ✓ | | |
| | (4) Other as appropriate including effects of wind | ✓ | ✓ | | |
| **m** | **VISUAL SYSTEM.** | **Not applicable** | | | |
| **n** | **MOTION EFFECTS.** | **Not applicable** | | | |
| **o** | **SOUND SYSTEM.** | **Not applicable** | | | |
| **p** | **SPECIAL EFFECTS.** | **Not applicable** | | | |

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**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 shall be at least controllable to permit the conduct of the flight.

| **Remarks** | |
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| Inspector Name | Date | Signature |
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| Qualified FTD ( ) Assessor Name | Date | Signature |
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**D. Flight Training Devices (FTD) Validation Test.**

| **1. PERFORMANCE** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **No** | **Tests** | **Tolerance** | **Flight Conditions** | **FTD** | | **COMMENTS** | **Result** | |
| | | | | **1** | **2** | | **YES** | **NO** |
| **a** | | | | | | It is accepted that tests and associated tolerances will only apply to a Level 1 FTD if that system or flight condition is simulated. | ☐ | ☐ |
| | **TAXI** | | | | | **Not applicable** | | |

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| **1. PERFORMANCE** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **No** | **Tests** | **Tolerance** | **Flight Conditions** | **FTD** | | **COMMENTS** | **Result** | |
| | | | | **1** | **2** | | **YES** | **NO** |
| | **TAKE-OFF** | | | | | | | |
| **b** | | | | | | Note-All commonly used take-off flap settings should be demonstrated at least once either in minimum un-stick speed (1b3), normal take-off (1b4), and critical engine failure on take-off (1b5) or cross wind take-off (1b6). | ☐ | ☐ |
| | (1) Ground Acceleration Time and Distance. | ± 5% or ±1.5 s time and ± 5% or<br><br>± 61 m (200 ft) distance | Take-off | CT & M | ✓ | Acceleration time and distance should be recorded for a minimum of 80% of the total time from brake release to VR.<br><br>May be combined with normal takeoff (1b4) or rejected takeoff (1b7). Plotted data should be shown using appropriate scales for each portion of the maneuver.<br><br>For FTD's test limited to time only | ☐ | ☐ |
| | **CLIMB** | | | | | | | |
| **c** | (1) Normal Climb All engines operating | ± 3 kts airspeed<br>± 5% or<br>± 0·5 m/s<br>(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.<br><br>FSTD performance to be recorded over an interval of at least 300 m (1 000 ft).<br><br>For FTD's may be a Snapshot test | ☐ | ☐ |
| | (2) One Engine Inoperative Second Segment Climb | ± 3 kts airspeed<br>± 5% or ± 0.5 m/s<br>(100 ft/min) R/C but not less than AFM values. | 2nd Segment Climb<br><br>for FNPTs and BITDs Gear up and Take-off Flaps | CT & 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).<br><br>Test at WAT (Weight, Altitude, or Temperature) limiting condition.<br><br>For FTD's may be a Snapshot test | ☐ | ☐ |
| | (3) One Engine Inoperative En route Climb. | ± 10% time<br>± 10% distance<br>± 10% fuel used | Clean | CT & M | ✓ | Flight test data or airplane performance manual data may be used.<br><br>Test for at least a 1 550 m (5 000 ft) segment. | ☐ | ☐ |

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| 1. PERFORMANCE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **No** | **Tests** | **Tolerance** | **Flight Conditions** | **FTD** | | **COMMENTS** | **Result** | |
| | | | | **1** | **2** | | **YES** | **NO** |
| **d** | **CRUISE/DESCENT** | | | | | | | |
| | (1) Level Flight Acceleration | ± 5% time | Cruise | ✓ | ✓ | Minimum of 50 kts. Increase using maximum continuous thrust rating or equivalent.<br><br>For very small airplanes, speed change may be reduced to 80% of operational speed range | ☐ | ☐ |
| | (2) Level Flight Deceleration | ± 5% time | Cruise | ✓ | ✓ | Minimum of 50 kts. decrease using idle power.<br><br>For very small airplanes, speed change may be reduced to 80% of operational speed range | ☐ | ☐ |
| | (3) Cruise Performance | ± 0.05 EPR or ± 5% N1 or ± 5% torque<br>± 5% fuel flow | Cruise | ✓ | ✓ | May be a single snapshot showing instantaneous fuel flow or a minimum of two consecutive snapshots with a spread of at least 3 minutes in steady flight. | ☐ | ☐ |
| | (4) Idle Descent | ± 3 kts airspeed<br>± 5% or ± 1·0 m/s (200 ft/min) R/D | Clean | | | Idle power stabilized descent at normal descent speed at mid altitude. Flight simulator performance to be recorded over an interval of at least 300 m (1 000 ft). | ☐ | ☐ |
| | (5) Emergency Descent | ± 5 kts airspeed<br><br>± 5% or ± 1·5 m/s (300 ft/min) R/D | As per AFM | | | Stabilized descent to be conducted with speed brakes extended if applicable, at mid altitude and near VMO or according to emergency descent procedure. Flight simulator performance to be recorded over an interval of at least 900 m (3 000 ft). | ☐ | ☐ |
| **e** | **STOPPING** | | | | | **Not applicable** | | |
| **f** | **ENGINES** | | | | | | | |
| | (1) Acceleration | ± 10% Ti or<br><br>± 0·25s<br>± 10% Tt | Approach or Landing | ✓ | ✓ | Ti = Total time from initial throttle movement until a 10% response of a critical engine parameter.<br><br>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.<br><br>FTD, FNPT and BITD only: CT&M acceptable. | ☐ | ☐ |

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| 1. PERFORMANCE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **No** | **Tests** | **Tolerance** | **Flight Conditions** | **FTD** | | **COMMENTS** | **Result** | |
| | | | | **1** | **2** | | **YES** | **NO** |
| | (2) Deceleration | ± 10% TI or<br><br>± 0·25s<br>± 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.<br><br>Tt = Total time from initial throttle movement to 90% decay of maximum take-off power.<br><br>Plot from maximum take-off power to idle for a rapid throttle movement.<br><br>FTD, FNPT and BITD only: CT&M acceptable. | ☐ | ☐ |

| 2. HANDLING QUALITIES | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **a** | **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.<br><br>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.<br>± 2.2 daN (5 lbs) or<br>± 10% force.<br>± 2º elevator angle | Ground | CT & M | ✓ | 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. | ☐ | ☐ |
| | (2) Roll Controller Position vs. Force and Surface Position Calibration. | ± 0.9 daN (2 lbs) breakout<br>± 1.3 daN (3 lbs) or ± 10% force ± 2º aileron angle<br>± 3º spoiler angle | Ground | CT & M | ✓ | 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. | ☐ | ☐ |

| 2. HANDLING QUALITIES | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **No** | **Tests** | **Tolerance** | **Flight Conditions** | **FTD** | | **COMMENTS** | **Result** | |
| | | | | **1** | **2** | | **YES** | **NO** |
| | (3) Rudder Pedal Position vs. Force and Surface Position Calibration. | ± 2.2 daN (5 lbs) breakout<br>± 2.2 daN (5 lbs) or ± 10% force<br>± 2º rudder angle | Ground | CT & M | ✓ | 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 | ☐ | ☐ |
| | (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 | ✓ | ✓ | BITD: Only applicable if appropriate trim settings are available, e.g. data from the AFM. | ☐ | ☐ |
| | (7) Pitch Trim Rate | ± 10% or ± 0.5 deg/s trim rate (°/s) | Ground and approach | ✓ | ✓ | Trim rate to be checked at pilot primary induced trim rate (ground) and autopilot or pilot primary trim rate in flight at goaround flight conditions. | ☐ | ☐ |
| | (8) Alignment of Cockpit Throttle Lever vs. Selected Engine Parameter. | ± 5º of TLA or ± 3% N1 or ± 0·03 EPR or ± 3% torque<br><br>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.<br><br>For airplanes with throttle detents, all detents to be presented.<br><br>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.<br><br>Where these levers do not have angular travel a tolerance of ± 2 cm (± 0.8 inches) applies.<br><br>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<br>± 30 m (100 ft) altitudes.<br>± 1.5º or ± 20% pitch angle | Approach | CT & M | ✓ | Power change from thrust for approach or level flight to maximum continuous or go-<br>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.<br><br>CCA: Test in Normal AND Non-normal Control state. | ☐ | ☐ |

**Flight Operations Standards Department**
**Training Centers Section - Flight Synthetic Training Devices (FSTDs)**
**Flight Training Devices (FTD) Qualification Test Checklist**
**GACAR PART - 60**

| 2. HANDLING QUALITIES | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **No** | **Tests** | **Tolerance** | **Flight Conditions** | **FTD** | | **COMMENTS** | **Result** | |
| | | | | **1** | **2** | | **YES** | **NO** |
| | (2) Flap Change Dynamics. | ± 3 kts airspeed<br>± 30 m (100 ft) altitudes.<br>± 1.5º or ± 20% pitch angle | Take-off Through initial flap retraction and approach to landing | CT & M | ✓ | 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.<br><br>CCA: Test in Normal and Non-normal Control state. | ☐ | ☐ |
| | (3) Spoiler / Speed brake Change Dynamics. | ± 3 kts airspeed<br>± 30 m (100 ft) altitude.<br>± 1.5 º or ± 20% pitch angle | Cruise | CT & M | ✓ | 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.<br><br>Results required for both extension and retraction.<br><br>CCA: Test in Normal AND Non-normal Control state. | ☐ | ☐ |
| | (4) Gear Change Dynamics. | ± 3 kts airspeed<br>± 30 m (100 ft) altitude.<br>± 1.5º or ± 20% pitch angle<br><br>For FNPTs and BITDs, ± 2º or ± 20% pitch angle | Takeoff (retraction) and Approach (extension) | CT & M | ✓ | 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.<br><br>CCA: Test in Normal AND Non-normal Control state. | ☐ | ☐ |
| | (5) Longitudinal Trim | ± 1º elevator<br>± 0·5º stabilizer ± 1º pitch angle ± 5% net thrust or equivalent | Cruise, Approach and Landing | CT & M | ✓ | Steady-state wings level trim with thrust for level flight. May be a series of snapshot tests.<br><br>CCA: Test in Normal OR Non-normal Control state. | ☐ | ☐ |
| | (6) Stall Characteristics. | ± 3 kts airspeed for initial buffet, stall warning, and stall speeds.<br><br>For airplanes with reversible flight control systems (for FS only):<br><br>± 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.<br><br>CCA: Test in Normal and Non-normal Control state. | ☐ | ☐ |

| 2. HANDLING QUALITIES | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **No** | **Tests** | **Tolerance** | **Flight Conditions** | **FTD** | | **COMMENTS** | **Result** | |
| | | | | **1** | **2** | | **YES** | **NO** |
| **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) | CT & 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<br><br>CCA: Test in Normal OR Non-normal Control state. | ☐ | ☐ |
| | (2) Roll Response (Rate). | ± 10% or<br>± 2º/sec roll rate<br><br>FS only: For airplanes with reversible flight control systems: ± 10% or ± 1·3 daN (3 lb) roll controller force. | Cruise and Approach or Landing | CT & 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). | ☐ | ☐ |
| | (4) Spiral Stability. | Correct trend and<br>± 2º or<br>± 10% bank angle in 20 seconds<br><br>If alternate test is used: correct trend and ± 2° aileron. | Cruise and Approach or Landing | CT & 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°.<br><br>CCA: Test in Non-normal Control state. | ☐ | ☐ |
| | (5) Engine Inoperative Trim. | ± 1º rudder angle or<br><br>± 1º tab angle or equivalent pedal.<br>± 2º sideslip angle. | 2nd Segment Climb and Approach or Landing | CT & M | ✓ | Test should be performed in a manner similar to that for which a pilot is trained to trim an engine failure condition. 2nd segment climb test should be at take-off thrust. Approach or landing test should be at thrust for level flight.<br>May be snapshot tests. | ☐ | ☐ |
| **e** | **LANDINGS** | | | | | **Not applicable** | | |
| **f** | **GROUND EFFECT** | | | | | **Not applicable** | | |
| **g** | **WIND SHEAR** | | | | | **Not applicable** | | |

**Flight Operations Standards Department**
**Training Centers Section - Flight Synthetic Training Devices (FSTDs)**
**Flight Training Devices (FTD) Qualification Test Checklist**
**GACAR PART - 60**

| 2. HANDLING QUALITIES | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **No** | **Tests** | **Tolerance** | **Flight Conditions** | **FTD** | | **COMMENTS** | **Result** | |
| | | | | **1** | **2** | | **YES** | **NO** |
| **h** | **Flight And Maneuver Envelope Protection Functions** | | | | | | | |
| | | | | | | This paragraph is only applicable to Computer-controlled airplanes. Time history results of response to control inputs during entry into each envelope protection function (i.e., with normal and degraded control states if function is different) are required. Set thrusts as required to reach the envelope protection function | ☐ | ☐ |
| | (1) Over speed | ± 5 kts airspeed | Cruise | ✓ | ✓ | | ☐ | ☐ |
| | (2) Load Factor | ± 0.1 g | Take-off, Cruise | ✓ | ✓ | | ☐ | ☐ |
| | (3) Pitch Angle | ± 1.5º pitch angle | Cruise, Approach | ✓ | ✓ | | ☐ | ☐ |
| | (4) Bank Angle | ± 2º or<br>± 10% bank angle | Approach | ✓ | ✓ | | ☐ | ☐ |
| | (5) Angle of Attack | ± 1.5º AOA | Second Segment Climb and Approach or Landing | ✓ | ✓ | | ☐ | ☐ |
| **3. MOTION SYSTEM** | | | | | | **Not applicable** | | |
| **4. VISUAL SYSTEM** | | | | | | | | |
| **a** | **SYSTEM RESPONSE TIME** | | | | | | | |
| | (1) Transport Delay | 150 milliseconds or less after controller movement.<br><br>300 milliseconds or less after controller movement. | Pitch, roll and yaw | ✓ | ✓ | One separate test is required in each axis. See GACAR PART 60-FSTD | ☐ | ☐ |
| | **or** | | | | | | | |
| | (2) Latency | - 150 milliseconds or less after controller movement.<br><br>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. | ☐ | ☐ |

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| **4. VISUAL SYSTEM** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **No** | **Tests** | **Tolerance** | **Flight Conditions** | **FTD** | | **COMMENTS** | **Result** | |
| | | | | **1** | **2** | | **YES** | **NO** |
| | (3) Light point Contrast Ratio | Not less than 10:1<br><br>Not less than 25:1 | Not Applicable | ✓ | | Light point contrast ratio should be measured using a test pattern demonstrating a 1° area filled with light points (i.e. light point modulation just discernible) and should be compared to the adjacent background.<br><br>Note. During contrast ratio testing, simulator aft-cab and flight deck ambient light levels should be zero. | ☐ | ☐ |

| **5. SOUND SYSTEMS** | | | **Not applicable** | | |
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| **Remarks** | |
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| **Inspector Name** | **Date** | **Signature** |
|---|---|---|
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| **Qualified FTD ( ) Assessor Name** | **Date** | **Signature** |
|---|---|---|
| | | |