Namibia Civil Aviation Authority

Aviation Directive (AD)

1/2/4-1 2020

Personnel Licencing Department

December 2020

Procedures for the Approval and Operation of Flight Simulators

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1. LEGAL AUTHORITY

1.1. Pursuant to section 38 (6) of the Civil Aviation Act, "the Executive Director may issue an Aviation Directive ("AD") comprised of a permission, approval or procedure, or the imposition of a condition, restriction or prohibition which the Executive Director believes on reasonable grounds to be –

1.1.1. consistent with the objectives of applicable regulatory requirements, procedures or documents; and

1.1.2. necessary and expedient to better achieve the objects of the Act".

1.2. This AD sets in place requirements for the qualification, approval and operation of Flight Simulation Training Devices (FSTDs) and or Flight and Navigation Procedures Trainers (FNPTs)

2. BACKGROUND

2.1 The current Civil Aviation Regulations (NAMCARs) of 2001 as amended adequately define synthetic flight devices and frequently mention when it is acceptable to use approved simulators. However, the regulations do not define the technical requirements to be met for the Director to approve the simulators neither do the regulations specify the training and testing credits to be accorded to the various categories of simulators approved for use. This Aviation Directive (AD) therefore clarifies the conditions under which the Director may approve simulators for use by Aviation Training Organizations certified under NAMCAR Part 141.

3. PURPOSE

3.1 The purpose of this AD is to provide interim directives for the qualification, approval and operation of Flight Simulation Training Devic es (FSTDs) and or Flight Navigation Procedure Trainers (FNPTs) within Namibian under Approved Training Organizations (ATOs).

4. APPLICABILITY

4.1 This AD shall be applicable to all operators and users of FSTDs and or FNPTs approved for use under NAMCARs 141 for the training and testing of pilots for the issuance of licences and ratings under Parts 61 as specified therein.

4.2 FSTD users must obtain approval to use the FSTD as part of their approved training programmes despite the fact that the FSTD would been previously qualified elsewhere.

5. EFFECTIVE DATE (AND INTERVENING EVENTS)

5.1 This AD will come into force on the date of issue and will be applicable till further notice.

6. CONTACT

6.1 Simulator operators requiring further information should contact:

Senior Manager, Mr Gordon Nanub at nanubg@ncaa.com.na or

Senior PEL Inspector, Humphrey Magwa at magwah@ncaa.com.na

7. ISSUED BY

Gordon Elliot
Interim Executive Director NCAA

NAMIBIA CIVIL AVIATION AUTHORITY NCAA 17 DEC 2020 PRIVATE BAG 13 AUSSPANNPLATZ WINDHOEK OFFICE OF THE EXECUTIVE DIRECTOR

DATE: 17 Dec 2020.

8. SIMULATORS CLASSIFICATION

8.1 The FAA, JAA and Australian legal requirements for FSTDs form the foundation for this NCAA AD. The following categories of devices are applicable under this AD:

8.1.1 BITD i.e., a ground-based training device which represents the student pilot's station found in a specified class of aeroplanes/helicopters. 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.

8.1.2 FNPT I i.e., a static training device which represents the flight deck environment found in a specified class of aeroplanes/helicopters. It must comply with the minimum standards for FNPT I qualification.

8.1.3 FNPT II and FNPT II MCC i.e., a static training device which represents the flight deck environment of a multi-engine aeroplane or a single/multi-engine helicopter type or class to the extent that the systems appear to function as in an aeroplane/helicopter. It incorporates a visual system providing an out of the cockpit view. It must comply with the minimum standards for FNPT II and/or FNPT II MCC qualification.

8.1.4 FTD i.e., a full size replica of a specific type or make, model and series of aeroplane/helicopter flight deck, including the assemblage of equipment and computer software programmes necessary to represent the aeroplane/helicopter in ground and flight operations to the extent of the systems installed in the device and a visual system providing an out of the flight deck view. It does not require a force cueing motion system. It must be in compliance with the minimum standards for FTD qualification.

8.1.5 Flight Simulator (Full Flight Simulator/ Zero Flight Time Simulator) i.e., a full size replica of a specific type or make, model and series of aeroplane flight deck, including the assemblage of equipment and computer software programmes necessary to represent the aeroplane in ground and flight operations, a visual system providing an out of the flight deck view and a force cueing motion system. It must be in compliance with the minimum standards for Flight Simulator qualification.

8.2 ***Note regarding category (e) Flight Simulator (Full Flight Simulator/ Zero Flight Time Simulator)****: This category is not covered by this AD because it is contained in Part 121's established classification and approval system.*

9. SIMULATOR QUALIFICATION LEVELS

9.1 Flight training devices qualified under this AD shall be allocated the following levels of qualification as applicable:

9.1.1 A Basic Instrument Training Device (BITD);
9.1.2 A Flight Training Device – Level 1 (FTD I);
9.1.3 A Flight Training Device – Level 2 (FTD II);
9.1.4 A Flight Navigation Procedures Trainer – Level 1 (FNPT I);
9.1.5 A Flight Navigation Procedures Trainer – Level 2 (FNPT II);
9.1.6 A Flight Navigation Procedures Trainer, Multi Crew – Level 2 (FNPT II MCC); and
9.1.7 A Flight Navigation Procedures Trainer, Multi-Crew – Level 3 (FNPT III MCC).

10. APPLICATION FOR INITIAL FSTD'S QUALIFICATION

10.1 Persons or organizations intending to operate a flight training device for the purpose of training pilots for licensing purposes under an ATO in Namibia must apply to the Executive Director for a Certificate of Qualification for the device, in the form and manner set out in this AD. The application shall be accompanied by a proof of payment of the appropriate fee prescribed in NAMCAR Part 187.

10.2 An application for a Certificate of Qualification for a flight training device must include:

10.2.1 A Qualification Test Guide (QTG) for the device; and
10.2.2 A document describing the quality system that the operator proposes to use to satisfy the technical requirements specified in this AD.

10.3 For the purpose of this AD, the Executive Director may not accept a Certificate of Qualification for a FSTD issued by an appropriate authority in respect of a FSTD located within Namibia unless the Executive Director has granted the FSTD a Qualification Level in terms of this AD.

11. PROCEDURE FOR QUALIFYING FSTDs

11.1 On receipt of an application for the qualification of a simulation device, the Executive Director shall conduct an evaluation, to be known as an initial evaluation of the device.

11.2 The evaluation will include:

11.2.1 An inspection or trial of the simulator or device; and

11.2.2 A review of the data provided in the Qualification test Guide (QTG).

11.3 If, after the initial evaluation, the Executive Director is satisfied that the device meets the required qualification level, the Executive Director shall approve the Qualification Test Guide (QTG) for the device and issue a Certificate of Qualification for the FSTD in the form he deems appropriate.

12. ISSUANCE OF CERTIFICATE OF QUALIFICATION FOR FSTDs

12.1 The Executive Director shall, in the form determined by him/her, issue an applicant a Certificate of Qualification for a flight training device if he/she determines that the simulator meets the specified technical requirements.

12.2 The Certificate of Qualification will include:

12.2.1 The name of the operator;

12.2.2 Information identifying the device and including a registration number;

12.2.3 Specify the aircraft that is simulated by the device; and

12.2.4 Specify the qualification level for the device.

13. PERIOD OF VALIDITY OF CERTIFICATE OF QUALIFICATION

13.1 A Certificate of Qualification for a flight training device shall be valid for 12 months from the date of issue or depending upon the conditions attached to the certificate, any shorter period as specified on the certificate.

13.2 A Certificate of Qualification for a FSTD will become invalid if:

13.2.1 revoked or suspended in terms of the Act;

13.2.2 if cancelled for reasons specified under paragraph 14 of this AD;

13.2.3 if there is a change of the operator of the device, unless such change has been approved under the terms and conditions of this AD; or

13.2.4 if the device is deactivated or relocated, unless such deactivation or relocation has been approved under the terms and conditions of this AD.

13.3 A Certificate of Qualification for a flight training device is not valid for the period of any suspension imposed under paragraph 15 of this AD.

14. RECURRENT EVALUATION OF QUALIFIED FSTD

14.1 The operator of a Qualified FSTD shall, within 60 days before the expiry of the Certificate of Qualification, request in writing for the Executive Director to conduct an evaluation for the renewal of the device's certificate.

14.2 During a re-current evaluation, a Qualified FSTD shall be assessed against the qualification level at which the device was certified at the initial qualification of the device in Namibia.

14.3 If the Executive Director has changed the qualification level of a Qualified FSTD since the initial evaluation, the qualification level as changed applies in respect of that FSTD.

15. VARIATION, CANCELLATION OR SUSPENSION OF QUALIFIED FSTD

15.1 The Executive Director may by notice in writing to the operator of Qualified FSTD, vary, cancel or suspend the qualification of the FSTD, if:

15.1.1 the FSTD no longer meets the qualification level specified in its qualification certificate; or

15.1.2 the operator has failed to comply with a requirement of this AD in relation to the FSTD.

15.2 If an operator receives a notice of variation or cancellation under this AD, the operator must return the Certificate of Qualification for the FSTD to the Executive Director within 14 days after receiving the notice.

15.3 If the Executive Director varies a qualification for a FSTD in terms of this AD, the Executive Director must reissue the Certificate of Qualification specifying the qualification as varied.

16. QUALITY SYSTEM

16.1 The operator of Qualified FSTD shall establish and maintain a quality system that ensures the correct operation and maintenance of the FSTD.

16.2 The quality system shall cover at least the following matters:

16.2.1 quality policy;
16.2.2 management responsibility;
16.2.3 document control;
16.2.4 resource allocation;
16.2.5 quality procedures; and
16.2.6 internal audit.

17. TECHNICAL REQUIREMENTS, COMPLIANCE AND APPROVAL

17.1 Flight Navigation Procedures Trainer I (FNPT I)

The technical requirements for this entry level category of approvable training devices are as follows:

17.1.1 General regulatory description of device:

A training device without motion system that in its flight deck/cockpit layout generically replicates a specified class of aircraft (for example "all single engine land aircraft up to 2000 kg").

17.1.2 Technical requirements:

17.1.2.1 The system must comprise a cockpit/flight deck sufficiently enclosed to exclude distraction, which replicates that of the aeroplane or class of aeroplane simulated and in which the switches and all the controls operate as, and represent those in, that aeroplane or class of aeroplanes. The use of a computer mouse to actuate simulated aircraft controls and or interfaces in the cockpit is not allowed.

17.1.2.2 The instruments, equipment, panels, systems, primary and secondary flight controls must be sufficient for the training events to be accomplished and must be located in a spatially correct flight deck area.

17.1.2.3 The lighting environment for panels and instruments must be sufficient for the operation being conducted.

17.1.2.4 In addition to the flight crew members' stations, suitable viewing arrangements for the instructor must be provided and which must provide an adequate view of the crew members, panels and station.

17.1.2.5 The system must be capable of simulating the effects of aerodynamic changes for various combinations of drag and thrust normally encountered in flight, including the effect of change in aeroplane attitude, sideslip, altitude, temperature, gross mass, centre of gravity location and configuration. Full 6 degree of freedom simulation model must be employed, recreating aerodynamic effects attributable to combinations of in-flight drag and thrust, to include effects due to changes in aircraft attitude, altitude, environmental temperature, wind, turbulence, weight, loading and aircraft configuration. Conformance must be proven according to the principle of correct trend and magnitude (CT&M) demonstrated in a flight test.

17.1.2.6 There must be a full complement and functionality of navigation equipment with operational tolerances equivalent to reality, including the simulation of air-to-ground communication procedures.

17.1.2.7 Control forces and control travel must broadly correspond to that of the replicated aeroplane or class of aeroplane.

17.1.2.8 The system must include complete navigational data for at least 5 different Namibian airports with corresponding precision and non-precision approach procedures including current updating within a period of 3 months. All navigational aids should be useable, if within range, without restriction and without instructor intervention.

17.1.2.9 Engine sounds must be available.

17.1.2.10 The following must be available:

- variable effects of wind and turbulence
- hard copy of map and approach plot
- provision for position freeze and flight freeze
- instructor controls necessary to perform the training task.

17.1.2.11 The system must include a stall recognition device corresponding to that of the replicated aeroplane or class of aeroplane.

17.1.3 Compliance

A Statement of compliance document outlining in a qualitative form the manner of meeting the technical requirements must be submitted by the Operator together with the application for approval to the Authority.

Examples of Statements of Compliance:

Technical Requirement: A cockpit/flight deck sufficiently enclosed to exclude distraction, which will replicate that of the aeroplane or class of aeroplane simulated and in which the switches and all the controls will operate as, and represent those in, that aeroplane or class of aeroplane.

Statement of Compliance: *A fully enclosed flight deck for 1 crew member measuring approx.[} mm wide x [ ] mm long x [ ] mm high at the entrance is provided.*

The following features are included to prevent distraction:

The flight deck is laid out and functionally equipped as per the [ ] aeroplane being simulated. No mouse control is used in the cockpit. Access to the flight deck is gained from the rear centre, behind the pilot station. For details please refer to drawing number [ ] on pages [ ] and [ ] these being a plan view and a side view of the simulator room.

Technical Requirement: Instruments, equipment, panels, systems, primary and secondary flight controls sufficient for the training events to be accomplished must be located in a spatially correct flight deck area.

Statement of Compliance: *The flight deck layout and instrument panel is designed to replicate in spatially correct form and function, as required for the intended training events outlined in the operator's FNPT Training Manual, the instruments, equipment, panels, systems, primary and secondary flight controls of the [ ] aeroplane or class of aeroplane being simulated. Please refer drawing number [ ] on page [ ] depicting cockpit control layout.*

Technical Requirement: Lighting environment for panels and instruments must be sufficient for the operation being conducted.

Statement of Compliance: *The flight deck is equipped with the following lamps/lighting:*

- *overhead directionally adjustable map reading lamp in addition to instrument panel mounted and dimmable post lighting.*
- *The instructor's station is equipped with overhead spot-lamps to provide suitable lighting at the instructor's console without distracting the flight crew.*

Technical Requirement: In addition to the flight crew member's stations, suitable viewing arrangements for the instructor must be provided. These must provide an adequate view of the crew members, panels and station.

Statement of Compliance: *The instructor's station is situated behind and to the side of the flight deck with a mobile chair that allows the instructor to also position himself behind and between the flight crew for observation and/or instruction purposes with unobstructed view of the events unfolding in the flight deck. For details please refer to drawing numbers [ ] on pages [ ] and [ ] these being a plan view and a side view of the simulator room.*

Technical Requirement: The system must be capable of simulating the effects of aerodynamic changes for various combinations of drag and thrust normally encountered in flight, including the effect of change in aeroplane attitude, sideslip, altitude, temperature, gross mass, centre of gravity location and configuration. Full 6 degree of freedom simulation model is employed, recreating aerodynamic effects attributable to combinations of in-flight drag and thrust, to include effects due to

changes in aircraft attitude, altitude, environmental temperature, wind, turbulence, weight, loading and aircraft configuration. Conformance is to be proven according to the principle of correct trend and magnitude (CT&M) demonstrated in a flight test.

Statement of Compliance: *The [ ] software package is used as the main simulation engine. The software utilises 6 degree of motion freedom algorithms to recreate all aerodynamic behaviour of the aeroplane or class of aeroplane being simulated. Flight models are:*

- *Pre-programmed by the software developer with no facility for user modification, or*
- *Programmed by the user through the creation of a configuration file read and utilised by the main simulation software engine algorithms. This file contains a number of aircraft parameters defining geometric dimensions, mass & balance, engine and aerodynamic performance and handling as well as aesthetic input data.*

The net result is a highly realistic simulation model that includes, amongst others, the aerodynamic effects attributable to combinations of in-flight drag and thrust, to include effects due to changes in aircraft attitude, altitude, environmental temperature, wind, turbulence, weight, loading and aircraft configuration.

Technical Requirement: There must be a full complement and functionality of navigation equipment with operational tolerances equivalent to reality, including the simulation of air-to-ground communication procedures.

Statement of Compliance: *The flight deck is equipped with a Communications Radio coupled to a 2-3 way intercom system linking the flight crew to each other and via the Push To Talk (PTT) buttons on the respective control wheels to the instructor. Further navigation equipment comprises 2 Navigation Radios with OBI and/or HSI indicators, a Distance Measuring Equipment (DME) receiver, an Automatic Direction Finding (ADF) Radio with RMI indicator and a Mode C Transponder.*

Technical Requirement: Control forces and control travel must broadly correspond to that of the replicated aeroplane or class of aeroplane.

Statement of Compliance: *Control travel corresponds in all three axes to that of the class of aircraft being simulated. Control forces correspond qualitatively to the average control force feel of the aircraft being simulated and are generated through a mechanical system of springs and dampers where required.*

Technical Requirement: The system must include complete navigational data for at least 5 different South African or Namibian airports with corresponding precision and non-precision approach procedures including current updating within a period

of 3 months. All navigational aids must be useable, if within range, without restriction and without instructor intervention.

Statement of Compliance: *Navigation database for South Africa, Namibia and generally the world with all navaids required for navigation, precision and non-precision let-downs is available. All navigation aids exhibit the same transmission and reception characteristics (geographical location, frequency, ICAO designator, Morse code identification) as the real facilities and are useable without the intervention of the instructor being required. Bearing in mind that the navigation database of the FNPT is used solely for training purposes and the fact that relatively few changes take place to the navigation aid equipment in the Southern African region, a regular update of the database is not provided at this time.*

Technical Requirement: Engine sounds must be available.

Statement of Compliance: *Realistic stereo engine, cockpit and navigation sounds are provided through an installed speaker system.*

Technical Requirement: The following must be available:
- variable effects of wind and turbulence
- hard copy of map and approach plot
- provision for position freeze and flight freeze
- Instructor controls necessary to perform the training task.

Statement of Compliance:
– *Meteorological simulation in terms of variable cloud, wind, turbulence, visibility, temperature and atmospheric pressure is provided*
– *Colour or black and white printable output of approach flight path, including navigation aids from the instructor's station printer is provided*
– *Both the flight deck and the instructor's station are equipped with a pause/freeze and unpause/unfreeze button to control this function.*
– *The instructor's station is equipped with a console containing the required controls and switches to perform the training task, e.g. the introduction of aircraft system failures. Additionally, it is equipped with a computer, keyboard, mouse and monitor to manage the training session*

Technical Requirement: The system must include a stall recognition device corresponding to that of the replicated aeroplane or class of aeroplane.

Statement of Compliance: *A stall warning system, representative of that found in the class of aircraft being simulated is provided in the form of aural and/or visual stall and over-speed warning.*

17.1.4 Final approval of an installation is subject to:

- Verification of the Statement of compliance through comparison with the hardware and documentation where required.
- Test flying the flight model/s for acceptable realistic behaviour according to the principle of correct trend and magnitude (CT&M) demonstrated.
- Evaluation of an outcomes-based training session conducted by the operator's nominated Chief Simulator Instructor (CSI) according to the operator's MOP and course curriculum outline. Until the appointment and approval by the Authority of a new CSI, the initial CSI remains the operator's accountable person to the Authority in all simulator training related matters. He or she is authorized to appoint further personnel as simulator instructors, these reporting to him or her.

17.2 Flight Navigation Procedures Trainer II (FNPT II)

The technical requirements for this second level category of approvable training devices are as follows:

17.2.1 General regulatory description of Device:

A training device without motion system that in its flight deck/cockpit layout replicates the cockpit of a multiengine class or type of aircraft with the aircraft systems realistically represented. It includes a visual system providing an "out of the cockpit" view.

17.2.2 Technical Requirements:

17.2.2.1 As for the FNPT I with the following additional requirements:

17.2.2.2 The flight deck, including the instructor's station, must be enclosed.

17.2.2.3 Circuit breakers must function accurately when involved in procedures or malfunctions requiring or involving flight crew response.

17.2.2.4 Crew member's seats must be provided with sufficient adjustment to allow the occupant to achieve the design eye reference position appropriate to the aeroplane or class of aeroplane and for the visual system to be installed to align with that eye position.

17.2.2.5 generic ground handling model must be provided to enable representative flare and touchdown effects to be produced by the sound and visual systems.

17.2.2.6 Systems must be operative to the extent that it is possible to perform all normal, abnormal and emergency operations as may be appropriate to the aeroplane or class of aeroplane being simulated and as required for the training. Once activated, proper systems operation must result from system management by the crew member and not require any further input from the instructor's controls.

17.2.2.7 The instructor's station must include the following controls:
- representative crosswinds
- a facility to enable the dynamic plotting of the flight path on approaches, commencing at the final approach fix, including the vertical profile.

17.2.2.8 Control forces and control travels which respond in the same manner under the same flight conditions as in the aeroplane or class of aeroplane being simulated. Conformance is to be proven according to the principle of correct trend and magnitude (CT&M) demonstrated in a flight test.

17.2.2.9 Aerodynamic modelling must reflect:

For aircraft:
- effects of airframe icing
- the rolling moment due to yawing

For helicopters:
- effects of airframe icing
- Vortex ring simulation
- Hover ceiling limitations
- Dead man's curve simulation
- Retreating Blade Stall

17.2.2.10 Significant cockpit/flight deck sounds, responding to pilot actions, corresponding to the aeroplane or class of aeroplane being simulated.

17.2.2.11 A visual system (night/dusk or day) capable of providing a field-of-view of a minimum of 45 degrees horizontally and 30 degrees vertically, unless restricted by the type of aeroplane, simultaneously for each pilot, including adjustable cloud base and visibility. The visual system need not be collimated. The responses of the visual system and the flight deck instruments to control inputs must be closely coupled to provide the integration of the necessary cues.

17.2.3 Compliance

Example of Statement of Compliance:

Technical Requirement: The flight deck, including the instructor's station, must be enclosed.

Statement of Compliance: *A fully enclosed flight deck for [ ] crew members measuring]]mm wide x [ ]mm long x [ ] mm high at the entrance is provided. The flight deck is laid out and functionally equipped as per the [ ] aeroplane/class of aeroplane being simulated. Additionally, it is provided with a suitable front windscreen for viewing of the out of the cockpit scenery and dummy side windows to exclude distraction. Access to the flight deck is gained from the rear centre,*

behind the crew stations, through the instructor's station. For details please refer to drawing number [ ] on pages [ ] and [ ] these being a plan view and a side view of the simulator room.

Technical Requirement: Circuit breakers must function accurately when involved in procedures or malfunctions requiring or involving flight crew response.

Statement of Compliance: Circuit breaker panels accurately replicating the circuit breaker panels found in the [ ] aeroplane being simulated are provided on the flight deck. The circuit breakers are integrated into the functionality of the relevant aircraft systems being simulated in as far as:
– They can be used by the crew to isolate an aircraft system if procedures or malfunctions requiring or involving flight crew response require such action, and/or
– Are additionally able to remotely be tripped from the instructor's station.

Technical Requirement: Crew member's seats must be provided with sufficient adjustment to allow the occupant to achieve the design eye reference position appropriate to the aeroplane or class of aeroplane and for the visual system to be installed to align with that eye position.

Statement of Compliance: *Fully adjustable crew seats, in terms of fore and aft, up and down tilt and seatback with armrests, allow the setting of the eye reference position of the crew members so that the full realistic effect of the visual system is utilised.*

Technical Requirement: A generic ground handling model must be provided to enable representative flare and touch down effects to be produced by the sound and visual systems.

Statement of Compliance: *Referring to requirement 5 for FNPT I above, the 6 degree of motion freedom software simulation model caters for handling simulation on the ground and in ground proximity to replicate the effects during the landing flare and touchdown through the visual and sound system. It also allows start-up and taxiing, including the performance of the relevant checklists, to and from the apron and runway at all the airports included in the navigation database.*

Technical Requirement: Systems must be operative to the extent that it is possible to perform all normal, abnormal and emergency operations as may be appropriate to the aeroplane or class of aeroplane being simulated and as required for the training. Once activated, proper systems operation must result from system management by the crew member and not require any further input from the instructor's controls.

Statement of Compliance: *Simulation of normal, abnormal and emergency situations, from start-up right through to shut down, as required by the [ ] aircraft*

type and the intended training curriculum are provided. Functioning of the respective system is achieved through system control on the part of the flight crew. No inputs from the instructor's station, other than those to introduce abnormalities or emergencies, are required to this end.

Technical Requirement: The instructor's station must include the following controls:
– Representative crosswinds
– A facility to enable the dynamic plotting of the flight path on approaches, commencing at the final approach fix, including the vertical profile.

Statement of Compliance:
– *Through the meteorological simulation model of [ ] software, representative winds in any direction and of different strengths can be introduced to the training session from the instructor's station.*
– *The instructor's station monitor screen can be configured to display the colour dynamic plotting of the flight path including the vertical profile, also on approaches commencing at the final approach fix. These plots can then be output to a hardcopy format through the colour printer provided at the instructor's station.*

Technical Requirement: Control forces and control travels which respond in the same manner under the same flight conditions as in the aeroplane or class of aeroplane being simulated. Conformance is to be proven according to the principle of correct trend and magnitude (CT&M) demonstrated in a flight test.

Statement of Compliance: *Control travel corresponds to that of the [ ] aircraft being simulated in all three axes. Control forces correspond qualitatively to the average control force feel of the aircraft being simulated and are generated through a mechanical system of springs and dampers where required. Control response and sensitivity is fine-tuned in software through the flight model configuration file to respond in the same manner as the aeroplane being simulated.*

Technical Requirement: Aerodynamic modelling must reflect:
– effects of airframe icing
– the rolling moment due to yawing

Statement of Compliance:
– *Through the meteorological simulation model of [ ] software, icing conditions with their respective effects can be introduced to the training session from the instructor's station.*
– *The 6 degree of freedom software simulation model of [ ] software caters for the simulation of rolling moment due to yawing.*

Technical Requirement: A visual system (night/dusk or day) capable of providing a field-of-view of a minimum of 45 degrees horizontally and 30 degrees vertically,

unless restricted by the type of aeroplane, simultaneously for each pilot, including adjustable cloud base and visibility. The visual system need not be collimated. The responses of the visual system and the flight deck instruments to control inputs must be closely coupled to provide the integration of the necessary cues.

Statement of Compliance: *Projected visual system with the following characteristics is provided:*

– *Day, dusk and night visuals.*

– *Simultaneous field-of-view in excess of 45° horizontal and 30° vertical field of view to each crew member – For details please refer to drawing number [ ] on pages [ ] and [ ] these being a plan view and a side view of the simulator room.*

– *Through the meteorological simulation model of [ ] software, adjustable cloud base and visibility can be controlled and adjusted from the instructor's station.*

– *The visual model presented by the projection system in front of the flight deck, and viewed by the crew through the front windscreen, is driven by the same computing power and simulation model software, namely [ ] software, as the flight deck instrument indications. This means that the closest possible level of coupling between the visual system and flight deck instruments and indications is assured to be able to provide the required integration of the necessary cues.*

Technical Requirement: Significant cockpit/flight deck sounds, responding to pilot actions, corresponding to the aeroplane or class of aeroplane being simulated.

Statement of Compliance: *Realistic stereo engine, cockpit and navigation sounds as well as appropriate flight deck sounds are provided through a suitable speaker system installed on the flight deck.*

17.2.4 Final approval of an installation is subject to:

- Verification of the Statement of compliance through comparison with the hardware and documentation where required.
- Test flying the flight model/s for acceptable realistic behaviour according to the principle of correct trend and magnitude (CT&M) demonstrated.
- Evaluation of an outcomes-based training session conducted by the operator's nominated Chief Simulator Instructor (CSI) according to the operator's MOP and course curriculum outline.
- Until the appointment and Authority approval of a new CSI, the initial CSI remains the operator's accountable person to the Authority in all simulator training related matters. He is authorized to appoint further personnel as simulator instructors, these reporting to him/her.

17.3 Flight Navigation Procedures Trainer II MCC (FNPT II MCC)

The technical requirements for this category, being the second level of approvable training devices are the following:

17.3.1 General regulatory description of Device:

A training device without motion system that in its flight deck/cockpit layout replicates the cockpit of a multi-engine class or type of aircraft with the aircraft systems realistically represented. It includes a visual system providing an "out of the cockpit" view.

17.3.2 Technical Requirements:

17.3.2.1 For use in Multi-Crew Co-operation (CC) training – as for the FNPT II with the following additional requirements:

17.3.2.2 Turbojet or turbo-prop engines.

17.3.2.3 Performance and handling to be representative of the aircraft type or class being simulated. Performance reserves in the case of an engine failure may be simulated by a reduction in the aeroplane gross mass. Conformance is to be proven according to the requirements contained in the table "Flight Training Device Validation Tests".

17.3.2.4 Retractable landing gear (for aircraft)

17.3.2.5 Pressurization system (for aircraft)

17.3.2.6 De-icing systems (for aircraft)

17.3.2.7 Fire detection/suppression system

17.3.2.8 Dual Controls

17.3.2.9 Autopilot with automatic approach mode (for aircraft)

17.3.2.10 1 x VHF Transceivers including oxygen masks intercom system

17.3.2.11 2 x VHF NAV receivers (VOR, ILS, DME)

17.3.2.12 1 x ADF receiver

17.3.2.13 1 x Marker receiver

17.3.2.14 1 x Transponder

17.3.2.15 The following instrument indications must be located in the same positions on the instrument panels of both pilots:

– Airspeed
– Flight Attitude with Flight Director

- Altimeter DCA
- Flight Director (for aircraft) with ILS (HSI)
- Vertical Speed
- ADF
- VOR
- Marker Indication (as appropriate)
- Stopwatch (as appropriate)

17.3.3 Compliance

A Statement of compliance document outlining in a qualitative form the manner of meeting the technical requirements which must be submitted by the Operator together with the application for approval to the Authority.

Example of Statement of Compliance:

Technical Requirement: Turbojet or turbo-prop engines.

Statement of Compliance: *According to the replicated [ ] aeroplane, jet engines are simulated.*

Technical Requirement: Performance and handling to be representative of the aircraft type or class being simulated. Performance reserves in the case of an engine failure may be simulated by a reduction in the aeroplane gross mass. Conformance is to be proven according to the requirements contained in the table "Flight Training Device Validation Tests".

Statement of Compliance: *The flight performance model is fine-tuned in software through the aircraft configuration file to also provide power reserves representative of the replicated [ ] aeroplane in case of an engine failure. Please refer to the validated results of the conformance flight tests attached as part of the MQTG.*

Technical Requirement: Retractable landing gear.

Statement of Compliance: *Retractable undercarriage with emergency extension system is provided.*

Technical Requirement: pressurization system.

Statement of Compliance: *Procedural simulation of the pressurization system is included.*

Technical Requirement: De-icing systems.

Statement of Compliance: *As per the aircraft replicated, the following de-icing system simulation is installed:*

- *Pitot Heat*
- *Surface De-ice*
- *Fuel Control Heaters.*

Technical Requirement: Fire detection / suppression system.

Statement of Compliance: *As per the aircraft replicated, fire detection/suppression simulation is provided.*

Technical Requirement: Dual Controls

Statement of Compliance: *Dual Controls for pitch, roll and yaw with toe brakes are provided.*

Technical Requirement: Autopilot with automatic approach mode.

Statement of Compliance: *Autopilot simulation is provided. Specifically, the following modes according to the replicated aircraft are installed as part of the autopilot/flight director:*

- *Alt Hold Mode*
- *V/S Hold Mode*
- *Heading Hold Mode*
- *NAV1 Hold Mode*
- *Approach Hold Mode*
- *Flight Director*
- *Flight Director Pitch Sync*
- *Go Around Mode*
- *Yaw damper*

Technical Requirement: 1 x VHF Transceivers including oxygen masks intercom system.

Statement of Compliance: *1 x VHF Transceiver interfaced to the intercom system is installed at present. Where the replicated aeroplane or class of aeroplane is equipped with a supplemental oxygen supply system, this is taken into consideration.*

Technical Requirement: 2 x VHF NAV receivers (VOR, ILS, DME).

Statement of Compliance: *2 x VHF NAV receivers with station ID and radial facility coupled to VOR, ILS and DME indications are provided.*

Technical Requirement: 1 ADF receiver.

Statement of Compliance: *1 x ADF receiver with station ID facility coupled to RMI indication is provided.*

Technical Requirement: 1 x Marker receiver.

Statement of Compliance: *1 x Marker receiver with OMI indication is provided.*

Technical Requirement: 1 x Transponder.

Statement of Compliance: *1 x Mode-C Transponder with flight level indication is provided.*

Technical Requirement: The following instrument indications must be located in the same positions on the instrument panels of both pilots:

- Airspeed
- Flight Attitude with Flight Director
- Altimeter
- Flight Director with ILS (I)
- Vertical Speed
- ADF
- VOR
- Marker Indication (as appropriate)
- Stopwatch (as appropriate).

Statement of Compliance: *Instrument Panel layout is according to the replicated aeroplane and is equipped with the following instrument indications located in the same positions:*

- *Airspeed*
- *Flight Attitude with Flight Director*
- *Altimeter*
- *Flight Director with ILS (I)*
- *Vertical Speed*
- *ADF*
- *VOR*
- *Marker Indication*
- *Stopwatch is not included as the crew normally use their own.*

17.3.4 Final approval of an installation is subject to:

- Verification of the Statement of compliance through comparison with the hardware and documentation where required.

- Test flying the flight model/s to quantitatively verify the correlation with POH data and the correctness and acceptability of the simulator data submitted in the "Flight Training Device Validation Tests" table of the MQTG.

- Evaluation of an outcomes-based training session conducted by the operator's nominated Chief Simulator Instructor (CSI) according to the operator's MOP and course curriculum outline. Until the appointment and Authority approval of a new CSI, the initial CSI remains the operator's accountable person to the Authority in all simulator training related matters. He is authorized to appoint further personnel as simulator instructors, these reporting to him/her.

17.4 (Type Specific) Flight Training Device (FTD)

17.4.1 Technical Requirements:

For use in type specific initial, recurrent and refresher training – as for the FNPT II MCC with the following additions or amendments:

17.4.1.1 Type specific cockpit layout in terms of form, feel and function. Use of original aircraft parts is not a requirement.

17.4.1.2 For aircraft systems and CPT training accreditation according to the submitted training curriculum, integrated simulation of the respective aircraft systems and subsystems according to the type of aircraft being simulated. This includes the provision of functional circuit breakers as required by the training curriculum to be implemented.

17.4.2 Compliance

Example of Statement of Compliance:

Technical Requirement: Type specific cockpit layout in terms of form, feel and function. Use of original aircraft parts is not a requirement.

Statement of Compliance: *The cockpit layout is type specific in terms of form, feel and function according to the ….. aircraft being simulated.*

Technical Requirement: For aircraft systems and CPT training accreditation according to the submitted training curriculum, simulation of the respective aircraft systems and subsystems according to the type of aircraft being simulated. This includes the provision of functional circuit breakers as required by the training curriculum to be implemented.

***Statement of Compliance**: The simulator is equipped with systems simulation according to the POH for detail numbers ??? – ??? dated ???, as outlined in the table below:*

Aircraft System	Circuit Breakers (remotely tripped)	Failures provided
Hydraulic	N/A	Pump failures Overpressure Low pressure
Electrical	Main Bus (y) Emergency Bus (n) Bus tie (y) LH Bus 3x (y) RH Bus 3x (y)	 LH bus RH bus Crossover Bus
Avionics	L Avionics (y) R Avionics (n) Com 1 (n) Nav 1 (y) Nav 2 (y) ADF (y) Transponder (y) DME 1 (y) DME 2 (n)	 L Avionics Bus Com 1 Nav 1 Nav 2 ADF Transponder DME1

17.4.3 Final approval of an installation is subject to:

- Verification of the Statement of compliance through comparison with the hardware and documentation where required.
- Test flying the flight model/s to quantitatively verify the correlation with POH data and the correctness and acceptability of the simulator data submitted in the "Flight Training Device Validation Tests" table of the MQTG.
- Evaluation of an outcomes-based training session conducted by the operator's nominated Chief Simulator Instructor (CSI) according to the operator's MOP and course curriculum outline. Until the appointment and DCA approval of a new CSI, the initial CSI remains the operator's accountable person to the Authority in all simulator training related matters. He is authorized to appoint further personnel as simulator instructors, these reporting to him/her.

18. FSTD CREDIT TABLE

18.1 Below is a table to be used to extract the level of FSTD to be used for the training/checking credit being sought. It is allowable to carry credit towards the right within the table (using a higher level of FSTD for the credit). If a credit is allowed at a certain level in the table, it is allowed in any device tabled in the columns to the right.

18.2 Where simulation is available within the Republic of Namibia as required by NAMCAR Part 135 and Part 121 operations, such simulation must be used. For the purpose of this table, "*single pilot aeroplanes"* refers to those aircraft that were originally certified to be flown with one pilot. When considering aircraft types, the type grouping as per NAMCATS-FCL 61 must be applied. Where differences training is required between variants, only such variants shall be considered to be the same type.

LICENSES/ RATINGS	APPLICABILITY	BITD	FNPT I	FNPT II	FNPT II MCC	FTD	FFS LEVEL C	FFS LEVEL D	REMARKS
PPL (A&H&P)	Basic training	5 hrs	5 hrs	5 hrs	5 hrs	5 hrs	5 hrs	5 hrs	**None**
NIGHT RATING	Appreciation to flight instruments	5 hrs	5 hrs	5 hrs	5 hrs	5 hrs	5 hrs	5 hrs	
	Skill test	---------	---------	Yes	Yes	Yes	Yes	Yes	
INSTRUMENT RATING	Instrument training towards initial rating	--------	20 hrs	20 hrs	20 hrs	20 hrs	20 hrs	20 hrs	
	Instrument training towards initial rating through an in integrated course (ground instrument time)	-------	--------	25 hrs	25 hrs	25 hrs	25 hrs	25 hrs	The FSTD must provide an accurate representation of the flight deck of a particular aircraft type to the extent that the mechanical, electrical, electronic, etc. aircraft systems control functions, the normal environment of flight crew members, and the performance and flight characteristics of that type of aircraft are realistically simulated.
	Instrument training in another category	--------	3 hrs	3 hrs	3 hrs	3 hrs	3 hrs	3 hrs	FSTD must represent an aircraft in the specific category
	Instrument training in the MEP aircraft class	--------	--------	3 hrs	3 hrs	3 hrs	3 hrs	3 hrs	FSTD must represent a multi-engine-piston aeroplane

LICENSES/ RATINGS	APPLICABILITY	BITD	FNPT I	FNPT II	FNPT II MCC	FTD	FFS LEVEL C	FFS LEVEL D	REMARKS
INSTRUMENT RATING (CONT.)	Skills test	--------	--------	Yes	Yes	Yes	Yes	Yes	None
	Revalidation check	--------	--------	Yes	Yes	Yes	Yes	Yes	
	5 instrument approach procedures and a missed approach for the revalidation of a lapsed IR	--------	--------	Yes	Yes	Yes	Yes	Yes	None
CPL (A)	Instrument training	--------	10 hrs	10 hrs	10 hrs	10 hrs	10 hrs	10 hrs	None
	Training towards initial CPL	---------	---------	20 hrs	20 hrs	20 hrs	20 hrs	20 hrs	None
CPL (H)	Instrument training	--------	5 hrs	5 hrs	5 hrs	5 hrs	5 hrs	5 hrs	None
	Training towards initial CPL	---------	---------	30 hrs	30 hrs	30 hrs	30 hrs	30 hrs	None
ATPL (A)	Instrument time	--------	25/10 hrs	30/40 hrs	30/40 hrs	30/40 hrs	30/40 hrs	30/40 hrs	If an integrated course is followed, 40 hours instrument time is allowed and 10 may be on an FNPT I.
	Skills test	--------	--------	--------	Yes	Yes	Yes	Yes	The FSTD must represent a multi-engine, multi-crew aeroplane with variable pitch propellers or turbine engines, adjustable flaps and retractable undercarriage and fully functioning dual controls.
	Revalidation check for the maintenance of competency (done by means of the instrument rating revalidation check)	--------	--------	--------	Yes	Yes	Yes	Yes	

LICENSES/ RATINGS	APPLICABILITY	BITD	FNPT I	FNPT II	FNPT II MCC	FTD	FFS LEVEL C	FFS LEVEL D	REMARKS
ATPL (A) (cont.)	Training for the revalidation of a lapsed maintenance of competency	------	--------	--------	Yes	Yes	Yes	Yes	The FSTD must represent a multi-engine, multi-crew aeroplane with variable pitch propellers or turbine engines, adjustable flaps and retractable undercarriage and fully functioning dual controls.
ATPL (H)	Instrument training	--------	10 hrs	10 hrs	10 hrs	10 hrs	10 hrs	10 hrs	None
	Skills test	--------	--------	--------	Yes	Yes	Yes	Yes	The FSTD must represent a multi-crew helicopter with fully functioning dual controls.
	Revalidation of the Maintenance of competency	--------	--------	--------	Yes	Yes	Yes	Yes	
	Training for the revalidation of a lapsed maintenance of competency.	--------	--------	--------	Yes	Yes	Yes	Yes	None
FLIGHT INSTRUCTOR RATING GRADE III	Instructor training	--------	--------	5 hrs	5 hrs	5 hrs	5 hrs	5 hrs	FSTD must be equipped with dual flight controls.
	Skills test	--------	--------	Yes	Yes	Yes	Yes	Yes	
	Revalidation check	--------	--------	Yes	Yes	Yes	Yes	Yes	
	Instructor training for the revalidation of a lapsed rating	--------	--------	Yes	Yes	Yes	Yes	Yes	

LICENSES/ RATINGS	APPLICABILITY	BITD	FNPT I	FNPT II	FNPT II MCC	FTD	FFS LEVEL C	FFS LEVEL D	REMARKS
FLIGHT INSTRUCTOR RATING GRADE II	Instructor training	--------	--------	Yes	Yes	Yes	Yes	Yes	None
	Skills test	--------	--------	Yes	Yes	Yes	Yes	Yes	
	Revalidation check	--------	--------	Yes	Yes	Yes	Yes	Yes	
	Instructor training for the revalidation of a lapsed rating	--------	--------	Yes	Yes	Yes	Yes	Yes	
FLIGHT INSTRUCTOR RATING GRADE I	Instructor training	--------	--------	Yes	Yes	Yes	Yes	Yes	FSTD must be equipped with dual flight controls
	Skills test	--------	--------	-------	--------	-------	--------	Yes	
	Revalidation check	--------	--------	Yes	Yes	Yes	Yes	Yes	
	Instructor training for the revalidation of a lapsed rating	--------	--------	Yes	Yes	Yes	Yes	Yes	
FLIGHT INSTRUCTOR ENDORSEMENTS	Demonstration of competency for the night rating instructor Instrument flying part	--------	--------	Yes	Yes	Yes	Yes	Yes	
	Demonstration of competency for the instrument rating instructor	--------	--------	Yes	Yes	Yes	Yes	Yes	
	Demonstration of competency for the turbo-propeller and turbojet instructor	--------	--------	Yes	Yes	Yes	Yes	Yes	

LICENSES/ RATINGS	APPLICABILITY	BITD	FNPT I	FNPT II	FNPT II MCC	FTD	FFS LEVEL C	FFS LEVEL D	REMARKS
FLIGHT INSTRUCTOR ENDORSEMENTS	Training and skills test for the flight simulator instructor endorsement	--------	--------	Yes	Yes	Yes	Yes	Yes	
SINGLE-PILOT MULTI-ENGINE CLASS RATING	Flight training	--------	--------	3 hrs	3 hrs	3 hrs	3 hrs	3 hrs	FSTD must represent a multi-engine-piston aeroplane
INITIAL SINGLE-PILOT MULTI-ENGINE TYPE RATING	Flight training	--------	--------	3 hrs	3 hrs	3 hrs	3 hrs	3 hrs	The FSTD must accurately be representative of the aircraft type.
	Skills test	--------	--------	Yes	Yes	Yes	Yes	Yes	
CLASS AND TYPE RATING	Training, skills test and proficiency training / checking on single-engine and multi-engine single-pilot aeroplanes	As per Appendix 9.2: FS = Flight Simulator (meaning FSTD FFS Level C or higher) FTD = Flight Training Device (including FNPT II for ME class rating) (meaning FSTD level FNPT II, FTD or higher)							The FSTD must accurately be representative of the aircraft type
	Training, skills test and proficiency training/checking on multi-pilot aeroplanes	As per Appendix 9.1: FS = Flight Simulator (meaning FSTD FFS Level C or higher) FTD = Flight Training Device (meaning FSTD level FNPT II FTD or higher)							
GNSS/RNAV APPROACH PILOT CERTIFICATION	GNSS/RNAV approach training	--------	--------	Yes	Yes	Yes	Yes	Yes	The FSTD must be suitably equipped

LICENSES/ RATINGS	APPLICABILITY	BITD	FNPT I	FNPT II	FNPT II MCC	FTD	FFS LEVEL C	FFS LEVEL D	REMARKS
VALIDATION / CONVERSION	Skills test for the validation/conversion of an instrument rating	--------	--------	Yes	Yes	Yes	Yes	Yes	None
	Skills test for the validation/conversion of an ATPL (A)	--------	--------	--------	Yes	Yes	Yes	Yes	The FSTD must represent a multi-engine aeroplane with fully functioning dual controls.
	Skills test for the validation/conversion of an ATPL (H)	--------	--------	--------	Yes	Yes	Yes	Yes	The FSTD must represent a multi-crew helicopter with fully functioning dual controls.
RECENCY	3 take-offs and three landings by day and night	-------	--------	--------	--------	Yes	Yes	Yes	None
	2 instrument approaches	------	-------	Yes	Yes	Yes	Yes	Yes	
MCC	Multi-crew cooperation training	-------	--------	--------	Yes	Yes	Yes	Yes	FSTD must represent a multi-pilot aircraft or be suitably equipped. The ATO/MCC instructor must use applicable training syllabus, procedures (SOPs) and checklists.

19. APPROVAL OF AEROPLANE ZERO FLIGHT TIME TYPE (ZFTT) RATING COURSES

19.1 GENERAL

19.1.1 Approval for ZFTT will only be given to a Training Organisation of a NAMCAR Part 121 operator or a Training Organisation having a specific approved arrangement with a NAMCAR Part 121 operator.

19.1.2 The training organisation must ensure that the student pre-requisites are met before starting the Type Rating Course.

19.1.3 The Type Rating will be restricted to that Operator until flying under supervision has been accomplished.

19.2 APPROVAL OF TYPE RATING COURSE USING ZFTT

19.2.1 The flight simulator to be used must be qualified in accordance with NAM-FSTD and user approved for ZFTT by the Authority. User approval will only be given if the flight simulator is representative of the aeroplane flown by the operator.

19.2.2 The flight simulator approved for ZFTT must be serviceable according to the quality system criteria of the FSTD operator. Some equipment may be unserviceable provided that it is not required during the simulator lesson. The motion and the visual must be fully serviceable.

19.2.3 Unless specified otherwise, a specific simulator session including a minimum of six additional take-offs and landings included in the type rating course must be conducted.

19.2.4 For an initial approval to conduct ZFTT the operator must have held a Namibian Air Operator's Certificate for at least one year. This period may be reduced at the discretion of the Authority where the operator and the ATO have experience of type rating training.

19.2.5 Approval for ZFTT may only be given if the operator has at least 90 days operational experience of the aeroplane type. In the case of ZFTT provided by a training organization having a specific approved arrangement with a NAMCAR Part 121 operator, the 90 days operational experience requirements will not apply if the type rating instructor involved in the additional take-offs and landings requirement in paragraph (c) above, has operational experience acceptable to the Authority on the aeroplane type.

19.2.6 The check required may be combined with the type rating skill test. When this is not the case, a conversion course must be conducted, and a check completed before the specific simulator session.

19.3 REQUIRED PILOT EXPERIENCE

19.3.1 A pilot undertaking ZFTT course must have completed, on a multi-pilot turbo-jet transport category aeroplane or on a multi-pilot turbo-prop aeroplane having a MTOM of not less than 10 tons or an approved passenger seating configuration of more than 19 passengers, at least 500 hours flight time or 100 route sectors if a flight simulator qualified to Level D is used during the course.

19.3.2 When a pilot is changing from a turboprop to a turbo-jet aeroplane or from a turbojet to a turbo-prop aeroplane, additional simulator training approved by the Authority must be undertaken.