



# TECHNICAL GUIDANCE MATERIAL

for approval of helicopter FNPT II or FNPT II MCC FSTD as Type Specific to obtain training credits towards pilot proficiency checking and Type Rating training.

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## SUBJECT:

Technical Guidance Material (TGM) for approval of a helicopter FNPT II or FNPT II MCC FSTD as Type Specific to obtain training credits towards pilot proficiency checking and Type Rating training.

EFFECTIVE DATE: 09 October 2024

## APPLICABILITY

This Technical Guidance Material applies to helicopter FSTD's seeking device specific FNPT II or FNPT II MCC's qualification to obtain training credits towards Pilot Proficiency Checking (PPC) and Type Rating (TR) training as provided for by the applicable Note 1 in the training credits table contained in SA CATS Part 60.

This Technical Guidance Material should be applied in conjunction with the provisions contained in SACATS Part 60.

## PURPOSE

Helicopter FSTD's seeking device specific FNPT II or FNPT II MCC's qualification to obtain training credits towards Pilot Proficiency Checking (PPC) and Type Rating (TR) training as provided for by the applicable Note 1 in the training credits table contained in credits table in SA CATS Part 60.

## REQUIREMENTS

The following documents are required to assess the FTSD's level of fidelity and determine whether it meets the requirements for the device specific qualification required to obtain credits towards PPC and TR training.

- a. Statement of Compliance (SOC);
- b. Statement of Operational Functionality (SOF);
- c. Qualification Test Guide (QTG); and
- d. Validation Data Roadmap (VDR).

## 1. REFERENCE:

- 1.1 ICAO Doc 9625 volume 2.
- 1.2 South African Civil Aviation Regulations.
- 1.3 SACAR Part 60.
- 1.3 SACATS Part 60.
- 1.4 SACAA-FSTD H

**2. TERMS AND ABBREVIATIONS:**

TERM	DEFINITION
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<b>Fidelity level</b>	The level of realism assigned to each of the defined FSTD features.
<b>Fidelity level — G</b>	Where the fidelity level is G, the initial validation should be based on subjective evaluation against approved data, where available, complemented, if necessary, by approved subjective development, to determine a reference data standard. Recurrent validations should be measured objectively against the reference data standard.
<b>Fidelity level — N</b>	Where the fidelity level is N, the FSTD feature is not required.
<b>Fidelity level — R</b>	Where the fidelity level is R, the initial validation should be based on objective evaluation against approved data, complemented, if necessary, by approved subjective development, to determine a reference data standard. Recurrent validations should be objectively measured against the reference data standard.
<b>Fidelity level — S</b>	Where the fidelity level is S, the initial and recurrent validation should be based on objective evaluation against approved data.
<b>FSTD feature.</b>	Describes the characteristics of an FSTD for each of the thirteen categories that have been used in this Technical Standard to define the general and technical requirements for FSTDs.
<b>Approved data.</b>	Helicopter data collected by application of good engineering practice and accepted for use by the CAA. The preferred data sources are the helicopter manufacturers and/or original equipment manufacturers; however, data supplied by other qualified sources may be considered.

ABBREVIATION	DESCRIPTION
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FSTD	Flight Simulation Training Device
SOC	Statement of compliance
SOF	Statement of Operational Functionality
QTG	Qualification Test Guide
POH	Pilot Operating Handbook
AFM	Aircraft Flight Manual
VDR	Validation Data Roadmap
PPC	Pilot Proficiency Check
TR	Type Rating

### 3. GENERAL

The following documents are required to assess the FSTD's level of fidelity and determine whether it meets the requirements for the device specific qualification required to obtain training credits towards PPC and TR training.

#### 3.1 Statement of Compliance (SOC).

The Statement of compliance shall include:

- i. FSTD Make and Model;
- ii. FSTD Manufacturer;
- iii. FSTD Serial Number;
- iv. Flight Model simulated;
- v. Build Standard Reference Document and qualification level, e.g., SACAA- FSTD H FNPT II MCC;
- vi. Visual System characteristics;
- vii. Data source used to obtain approved data required as reference data for QTG evaluation. From ICAO 9625 volume 2; and FSTD Operator.

**Note: Approved data.** Helicopter data collected by application of good engineering practice and accepted for use by the SACAA. The preferred data sources are the helicopter manufacturers and/or original equipment manufacturers; however, data supplied by other qualified sources may be considered.

#### 3.2 Statement of Operational Functionality (SOF).

##### 3.2.1

The Statement of Operational Functionality serves the purpose of detailing the feature fidelity level of the simulator to allow the authority to determine whether the FSTD meets the required fidelity to qualify for training credits towards PPC and TR. The use of photographs and/or Video footage as a tool for illustration is recommended as well as the use of the feature fidelity level definitions and guidance from ICAO 9625 volume 2. Some definitions are given below for informative purposes.

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|------|------------------|--|
| i.   | Fidelity level   | the level of realism assigned to each of the defined FSTD features.  |
| ii.  | Fidelity level G | Where the fidelity level is G, the initial validation should be based on subjective evaluation against approved data, where available, complemented, if necessary, by approved subjective development, to determine a reference data standard. Recurrent validations should be measured objectively against the reference data standard. |
| iii. | Fidelity level N | Where the fidelity level is N, the FSTD feature is not required.   |
| iv.  | Fidelity level R | Where the fidelity level is R, the initial validation should be based on objective evaluation against approved data, complemented, if necessary, by approved subjective development, to determine a reference data standard. Recurrent validations should be objectively measured against the reference data standard.                   |
| v.   | Fidelity level S | Where the fidelity level is S, the initial and recurrent validation should be based on objective evaluation against approved data.   |
| vi.  | FSTD feature.    | Describes the characteristics of an FSTD for each of the thirteen categories that have been used in this Technical Standard to define the general and technical requirements for FSTDs.  |

### 3.2.2

The fidelity level of individual devices may vary within a single qualification level, and thus affect the suitability of a device to conduct specific training tasks. User Approvals within a qualification level depend upon the combination of features required to achieve the training or training to proficiency task. To identify the fidelity level of a device and award User Approval objectively, four fidelity levels, (None, Generic, Representative and Specific) are defined in Table 1 below describing the minimum level of fidelity required for each simulation feature.

I. Table 1 – Fidelity Levels for each feature category

Level	Aircraft Simulation	Cueing Simulation	Environment Simulation
None (N)	Not Required	Not Required	Not Required
Generic (G)	Not specific to helicopter model, type, or variant	Generic to a helicopter of its class. Simple modelling of key basic cueing features. For visual cueing only: generic visual environment with perspective sufficient to support basic instrument flying and transition to visual from straight-in instrument approaches.	Simple modelling of key basic environment features.
Representative (R)	Representative of a class of helicopter, e.g., piston engine helicopter, single turbine helicopter, multi turbine helicopter etc. It does not have to be type specific.	For sound and motion cueing only: replicates the specific helicopter to the maximum extent possible. However, physical limitations currently only provide representative, not specific, cues. For visual cueing only: representative of the real-world visual environment and perspective.	Representative of the real-world environment.
Specific (S)	Replicates the specific helicopter.	Applicable to visual cueing only: replicates the real-world visual environment and (infinity) perspective.	Replicates the real-world environment, as far as required to meet the training objectives, for any specific training or checking task at a specific location.

### 3.2.3

The thirteen categories mentioned in the FSTD feature definition above can be grouped into three main categories with their sub-categories:

- 1.) Helicopter simulation comprising the following simulation features:
  - i) flight deck layout and structure;
  - ii) flight model (aerodynamics and engine);
  - iii) ground handling / Hover and ground effect handling;
  - iv) helicopter systems (e.g., Hydraulics, electric, fuel system, instrumentation etc.); and flight controls and control force feedback / control loading.
  
- 2.) Cueing simulation comprising the following simulation features:
  - i) sound cues;
  - ii) visual cues;
  - iii) instrument cues; and
  - iv) motion cues.
  
- 3.) Environment simulation comprising the following simulation features:
  - i) environment — ATC;
  - ii) environment — navigation;
  - iii) environment — atmosphere and weather; and
  - iv) environment — aerodromes and terrain.
  - v) environment --- scenery / obstacles resulting in a crash.

### 3.2.4 Qualification Test Guide (QTG)

- 1.) The QTG format and content should be in accordance with the requirements of SACAA-FSTD H as applicable to the level of qualification, i.e., FNPT II, FNPT II MCC or FTD with the addition of the following tests if they do not already form part of the QTG test requirement for the respective qualification level.
  - vi) Test 1.b.1 – Ground Operations Minimum Radius Turn
  - vii) Test 1.b.3 – Ground Operations Taxi
  - viii) Test 1.b.4 – Ground Operations Brake Effectiveness
  - ix) Test 1.j.4 – Auto-rotational landing with touchdown
  - x) Test 2.b.1 – Low Airspeed Handling Qualities: Trimmed Flight Control Positions
  - xi) Test 2.b.3 (i-iv) – Low Airspeed Handling Qualities: Control Response
  
- 2.) The reference data used for the initial evaluation should be approved data as defined in ICAO doc 9625 volume 2, the definition being included in this TGM under this section 3 General for ease of reference.
  
- 3.) Where manufacturer's flight test data is not available the following tests are recommended to use POH/AFM data as reference data with application of the tolerances given on the POH/AFM data and within the tolerances stipulated in SACAA-FSTD H for QTG's. Some helicopter POH/AFM's do not publish the required data. In such cases data supplied by other qualified sources is to be considered with consideration of the requirements of SACAA-FSTD H.

i) Test 1.b.1 – Ground Operations Minimum Radius Turn

Objective

To demonstrate that the turn radius for wheel equipped helicopter flight models conforms to that of the actual helicopter.

Tolerances

Turn radius:  $\pm 3\text{ft}$  (0.9m) or 20%

ii) Test 1.b.3 – Ground Operations Taxi

Objective

To demonstrate that the taxi characteristics for wheel equipped helicopter flight models conform to that of the actual helicopter.

Tolerances

CT&M

iii) Test 1.b.4 – Ground Operations Brake Effectiveness

Objective

To demonstrate that the brake effectiveness for wheel equipped helicopter flight models conforms to that of the actual helicopter.

Tolerances

CT&M

iv) Test 1.j.4 – Auto-rotational landing with touchdown

Objective

To demonstrate that the autorotational landing to touchdown conforms to that of the actual helicopter.

Tolerances

CT&M

v) Test 2.b.1 – Low Airspeed Handling Qualities: Trimmed Flight Control Positions

Objective

To demonstrate that the low airspeed handling qualities in translational flight (sideways, rearward and forward) IGE conform to that of the actual helicopter.

Tolerances

Torque:  $\pm 3\%$   
Pitch Attitude:  $\pm 1.5^\circ$   
Bank Attitude:  $\pm 2^\circ$   
Longitudinal Control Position:  $\pm 5\%$   
Lateral Control Position:  $\pm 5\%$   
Directional Control Position:  $\pm 5\%$   
Collective Control Position:  $\pm 5\%$

vi) Test 2.b.3 (i-iv) – Low Airspeed Handling Qualities: Control Response

Objective

To demonstrate that the low airspeed step control input response qualities conform to that of the actual helicopter.

Tolerances

CT&M

4.) Where neither manufacturer's flight test data nor POH/AFM data is available for the balance of the objective QTG tests, it is recommended to enlist the services of an experienced type rated test pilot to subjectively evaluate the characteristics of the FSTD and assist with flight model fine tuning until satisfactory correlation to the real aircraft is obtained. QTG Baseline data for the initial evaluation can then be generated by the FSTD for consideration of the SACAA.

### 3.2.5 VALIDATION DATA ROADMAP (VDR)

1.) Refer to SACAA FSTD-H for the requirements for the Validation Data Roadmap. The VDR can form part of the QTG document. At a minimum the VDR should tabulate for each objective QTG test:

- i) SACAA FSTD-A test number
- ii) Test name/description
- iii) Validation data source/reference document
- iv) Comments, e.g., pointer to the section, page and/or graph in the reference document where the reference data is obtained.

Example:

VALIDATION DATA ROADMAP TABLE FOR FSTD. FSTD LEVEL: FNPT II / II MCC (Type Specific) HELICOPTER TYPE:			
TEST	TEST DESCRIPTION	VALIDATION SOURCE	COMMENTS
1.a.2	Power Turbine Speed Trim	POH/Video	Video xxxx, dated 20xx/xx/xx BHT-222U-FM-1 Section 2 page 2-10B Engine Runup
1.j.4	Auto-rotational landing with touchdown .	Video/ Baseline Data	A satisfactory qualitative FSTD evaluation was done supported by the results of the actual vs. simulator video recorded flights. Thereafter objective baseline data was created by running sample QTG

NOTE: If the services of a type rated test pilot are used, a detailed test pilot report should be included with the name, surname, License number, signature with date and a summary of flight hours of the test pilot on the specific helicopter type.

4. FSTD FEATURE CATEGORY VERSUS FIDELITY LEVEL REQUIREMENT FOR DEVICE SPECIFIC APPROVAL TO OBTAIN TRAINING CREDITS TOWARDS PPC AND TR TRAINING.

4.1 Helicopter simulation comprising the following simulation features:

4.1.1 Flight deck layout and structure, Minimum Fidelity – R.

- i) It is preferable to use the flight deck section of an actual airframe into which the simulator is built to obtain the highest level of fidelity.
- ii) The flight deck can be recreated without using an airframe.
- iii) Attention to detail needs to be paid to the correct spatial form, feel and function of the flight deck and its instrumentation, switches, and equipment.
- iv) Fleetwide standardisation of flight deck layouts in commercial general aviation helicopters used under Part 127 is not a given. This may be due to vastly different equipment fit and or modifications across the type fleet along the years as illustrated by comparing Bell 222 cockpits. Consequently, replication of a specific helicopter cockpit can be done to obtain fidelity level - S but is not a necessity.
- v) If the flight deck is replicated to fidelity level – R, the flight deck replication must be type specific without needing to be helicopter specific.
- vi) Attention should be focused on the correct arrangement of critical man- machine interfaces.
- vii) A flight deck that is helicopter class representative only, is not acceptable.
- viii) The Statement of Operational Functionality can be used to describe the flight deck level of fidelity.

4.1.2 Flight model (aerodynamics and engine); Minimum Fidelity – R

- 1.) For an FNPT II or FNPT II MCC, as applicable to the helicopter type, the Qualification Test Guide (QTG) required is as outlined in FSTD-H expanded with the additional tests listed below.
  - i) Test 1.b.1 – Ground Operations Minimum Radius Turn
  - ii) Test 1.b.3 – Ground Operations Taxi
  - iii) Test 1.b.4– Ground Operations Brake Effectiveness
  - iv) Test 1.j.4 – Auto-rotational landing with touchdown
  - v) Test 2.b.1 – Low Airspeed Handling Qualities: Trimmed Flight Control Positions
  - vi) Test 2.b.3 (i-iv) – Low Airspeed Handling Qualities: Control Response

4.1.3 Ground handling, Minimum Fidelity – R

- 1.) Ground handling to be as required for the respective qualification level, i.e. FNPT II, FNPT II MCC or FTD. In all cases brake systems as per helicopter type simulated need to be provided.



#### 4.1.4 Helicopter systems, Minimum Fidelity – S

- i) The Statement of Operational Functionality (SOF) should contain the detail description of the flight deck equipment, helicopter system simulation as well as the functionality of the flight deck man-machine interfaces as “procedural” or “functional as in the helicopter”. Non-critical systems, systems not used within the intended training/checking program or systems used for procedural training only may be installed as “procedural only” on the flight deck.
- ii) Fidelity level – S is required for functional systems.
- iii) An outline of the Instructor’s Station helicopter systems failure modes should be included in the SOF

#### 4.1.5 Flight controls and forces, Minimum Fidelity – R

- i) Flight Controls and forces to be as required for the respective qualification level, i.e. FNPT II, FNPT II MCC or FTD. Flight Control harmonization to be representative of the aircraft type simulated.

### 4.2 CUEING SIMULATION

#### 4.2.1 Sound cues, Minimum Fidelity – R

- i) Sound cues to be as required for the respective qualification level, i.e. FNPT II, FNPT II MCC or FTD.

#### 4.2.2 Visual cues, Minimum Fidelity – R

- ii) Visual cues to be as required for FNPT II and FNPT II MCC .
- iii) Horizontal field of view to be a minimum of 220° to better facilitate peripheral vision cues.

#### 4.2.3 Motion cues. Minimum Fidelity – N

Not Required

### 4.3 ENVIRONMENT SIMULATION

#### 4.3.1 Environment — ATC. Minimum Fidelity – G

- i) As required for the respective qualification level, i.e. FNPT II, FNPT II MCC or FTD.

#### 4.3.2 Environment — navigation. Minimum Fidelity – S




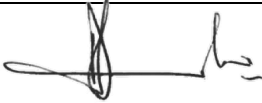
- ii) As required for the respective qualification level, i.e. FNPT II, FNPT II MCC or FTD.

#### 4.3.3 Environment — atmosphere and weather. Minimum Fidelity – R

- iii) As required for the respective qualification level, i.e. FNPT II, FNPT II MCC or FTD

#### 4.3.4 Environment — aerodromes and terrain, Minimum Fidelity – R

- iv) As required for the respective qualification level, i.e. FNPT II, FNPT II MCC or FTD

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