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Corrigendum No. 1
(English and Russian only)
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MANUAL OF CRITERIA FOR THE QUALIFICATION OF FLIGHT SIMULATION TRAINING DEVICES

CORRIGENDUM No. 1

1. Please replace existing pages II-1-3, II-2-12, II-App B-75, II-App C-15, II-App D-1, III-2-11 and III-App C-17 by the attached new pages bearing the notation “Corr. 1”, dated 28/10/16.
 2. Record the entry of this corrigendum on page (iii) of the manual.
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Closed loop testing. A test method for which the flight control stimuli are generated by controllers which drive the FSTD to follow a pre-defined target response.

Computer controlled aeroplane (CCA). An aeroplane in which pilot inputs to the control surfaces are transferred and augmented via computers.

Control sweep. Movement of the appropriate pilot controller from neutral to an extreme limit in one direction (forward, aft, right or left), a continuous movement back through neutral to the opposite extreme position and then a return to the initial position.

Convertible FSTD. An FSTD in which significant hardware or software, or a combination of both, are changed so that the device replicates a different model, type or variant, usually of the same aeroplane. The same FSTD platform, motion system, visual system, computers and necessary peripheral equipment can thus be used in more than one simulation.

Note.— The significance of the difference, as adjudged by the CAA, will dictate whether a complete separate QTG would be necessary. Otherwise, a supplemental section added to the original QTG may suffice.

Correct trend and magnitude (CT&M). A tolerance representing the appropriate general direction of movement of the aeroplane, or part thereof, with appropriate corresponding scale of forces, rates, accelerations, etc.

Critical engine parameter. The engine parameter that is the most appropriate measure of propulsive force for that engine.

Damping.

- a) **Critical damping.** That minimum damping of a second order system such that no overshoot occurs in reaching a steady state value after being displaced from a position of equilibrium and released. This corresponds to a relative damping ratio of 1.0.
- b) **Overdamped.** That damping of a second order system such that it has more damping than is required for critical damping as described above. This corresponds to a relative damping ratio of more than 1.0.
- c) **Underdamped.** That damping of a second order system such that a displacement from the equilibrium position and free release results in one or more overshoots or oscillations before reaching a steady state value. This corresponds to a relative damping ratio of less than 1.0.

Daylight visual. A visual system capable of meeting, as a minimum, the system brightness and contrast ratio requirements as identified in Appendix B.

Deadband. The amount of movement of the input for a system for which there is no reaction in the output or state of the system observed.

Device qualified as T only. Training on this FSTD type may be credited towards the issuance of the associated licence, rating or qualification.

Device qualified as TP. Training on this FSTD type may be credited towards the issuance of the associated licence, rating or qualification and should include all tasks to the level of proficiency required. Testing and checking can additionally be conducted provided that training-to-proficiency has also been completed on a device qualified to the same level.

Driven. A test method where the input stimulus or variable is driven or deposited by automatic means, generally a computer input.

Engineering simulator validation data. Validation data generated by an engineering simulation or engineering simulator that is acceptable to the CAA.

Evaluation (FSTD). The careful appraisal of an FSTD by the CAA to ascertain whether or not the criteria required for a specified qualification level are met.

Fidelity level. The level of realism assigned to each of the defined FSTD features.

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.

Fidelity level — N. Where the fidelity level is N, the FSTD feature is not required.

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.

Note.— Fidelity level R1 is defined in Chapter 2, 2.2.6.3.

Fidelity level — S. Where the fidelity level is S, the initial and recurrent validation should be based on objective evaluation against approved data.

Flight simulation training device (FSTD). A synthetic training device that is in compliance with the minimum requirements for FSTD qualification as described in this manual.

Flight test data. Actual aeroplane data obtained by the aeroplane manufacturer (or other approved supplier of data) during an aeroplane flight test programme.

Footprint test. A test conducted and recorded on the same FSTD, during its initial evaluation, to be used as the reference data standard for recurrent evaluations. In the event of an approved change to the FSTD to the flight model, or flight control system that may alter its characteristic, the CAA may require that the footprint test result be re-generated under the new conditions to form a new reference data standard.

Note.— See also definition of “master qualification test guide (MQTG)”.

Free response. The hands-off response of the aeroplane after completion of a control input or disturbance.

Frozen/locked. A test condition where a variable is held constant over time.

FSTD approval. Declaration of the extent to which an FSTD of a specified qualification type may be used by an FSTD operator or training organization as agreed by the CAA. It takes account of differences between aeroplanes and FSTDs and of the operating and training ability of the organization.

FSTD data. The various types of data used by the FSTD manufacturer and the applicant to design, manufacture and test the FSTD.

FSTD feature. Describes the characteristics of an FSTD for each of the thirteen categories that have been used in this manual to define the general and technical requirements for FSTDs.

- b) aeroplane data documents included in the QTG may be photographically reduced only if such reduction will not cause distortions or difficulties in scale interpretation or resolution; and
 - c) validation data variables should be defined in a nomenclature list along with sign convention. This list should be included at some appropriate location in the QTG;
- 14) *Comparison of results.* The accepted means of comparing FSTD test results to the validation data is overplotting;
- j) a copy of the applicable regulatory qualification standards, or appropriate sections as applicable, used in the initial evaluation; and
 - k) a copy of the validation data roadmap (VDR) to clearly identify (in matrix format only) sources of data for all required tests including sound and vibration data documents.

2.6.3 The QTG will provide the documented proof of compliance with the FSTD validation tests in Appendix B. FSTD test results should be labelled using terminology common to aeroplane parameters as opposed to computer software identifications. These results should be easily compared with the supporting data by employing overplotting or other acceptable means. For tests involving time histories, the overplotting of the FSTD data to aeroplane data is essential to verify FSTD performance in each test. The evaluation serves to validate the FSTD test results given in the QTG.

2.7 MASTER QUALIFICATION TEST GUIDE (MQTG)

2.7.1 During the initial evaluation of an FSTD, the MQTG is created. This is the master document, as amended in agreement with the CAA, to which FSTD recurrent evaluation test results are compared.

2.7.2 After the initial evaluation, the MQTG is available as the document to use for recurrent or special evaluations and is also the document that any CAA can use as proof of an evaluation and current qualifications of an FSTD when approval for the use of the particular FSTD is requested for a specific training task.

2.8 ELECTRONIC QUALIFICATION TEST GUIDE (eQTG)

Use of an eQTG may reduce costs, save time and improve timely communication, and is becoming a common practice. ARINC Report 436 provides guidelines for an eQTG (see 2.3.3 above).

2.9 QUALITY MANAGEMENT SYSTEM AND CONFIGURATION MANAGEMENT

2.9.1 A quality management system which is acceptable to the CAA should be established and maintained by the FSTD operator to ensure the correct maintenance and performance of the FSTD. The quality management system may be based upon established industry standards, such as ARINC Report 433 (see 2.3.3 above).

2.9.2 A configuration management system should be established and maintained to ensure the continued integrity of the hardware and software as from the original qualification standard, or as amended or modified through the same system.