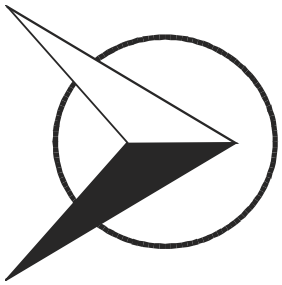

CIVIL AVIATION
SAFETY AUTHORITY
AUSTRALIA

Operational Standards and Requirements—Approved Flight Simulators (FSD-1)

UNCONTROLLED VERSION

Operational Standards and Requirements—Approved Flight Simulators (FSD-1)

This is an internal CASA policy manual. It contains guidance material intended to assist CASA officers and delegates in carrying out their regulatory responsibilities and may be made available to the public for information purposes only.

Since this is an uncontrolled version of the manual which will not be updated by CASA, it should not be relied upon for any regulatory purpose. The current manual can be viewed at any time via CASA's website at "www.casa.gov.au".

You should always refer to the applicable provisions of the Civil Aviation Act, Civil Aviation Regulations and the Civil Aviation Orders, rather than this manual, to ascertain the requirements of, and the obligations imposed by or under, the civil aviation legislation.

Version 6.2: November 2001

Operational Standards and Requirements—Approved Flight Simulators (FSD-1)

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General Provisions

1.1.1 Flight simulators utilised by Australian flight crew licence holders within Australian territory or overseas, must be approved by the Civil Aviation Safety Authority to the operational standards and requirements listed in this publication before training and/or testing conducted in such simulators will be recognised by the Authority. The requirements of this publication must be read in conjunction with applicable CARs and CAOs. See *17. Definitions* for a definition of a flight simulator.

1.1.2 The Authority, may grant approval for flight simulator credits as a result of compliance with this publication and the degree of realism found to exist in the flight simulator. The approval will also be dependent upon the applicant's training and checking organisation being approved to conduct training and checking in flight simulators.

1.1.3 No approved training sequence in a flight simulator can be used as a credit towards a flight crew flight proficiency test until such time as the flight simulator has satisfactorily completed an accreditation check and been assigned a LEVEL of accreditation.

1.1.4 An accreditation check must be performed by the Authority or an approved operator, prior to the Authority assigning the flight simulator a LEVEL of accreditation. It is a requirement that approved simulators maintain the performance, functional and other characteristics that were required for the accreditation. Ongoing approval of the simulator is conditional upon recurrent fidelity checks demonstrating the continued fidelity of the simulator at regular intervals after accreditation.

1.1.5 The policy concerning the accreditation and fidelity checking of overseas flight simulators utilised by Australian check and training organisations is described at *15. Requirements for Use of Foreign Flight Simulators*.

Definitions

1.1.6 View definitions by clicking on the above heading.

Introduction of New Standards

1.1.7 Flight simulators accredited prior to the effective date of an amendment to this publication will continue to maintain their current accreditation as long as they meet the standards under which they were originally approved. Operators having simulator improvement or acquisition projects in progress at the effective date of an amendment to this publication, have 90 days from the effective date to notify the Authority of those projects which the operator wishes to complete under the provisions of this publication prior to the amendment.

1.1.8 Subject to the requirements of paragraph 1.2.6.b, recurrent fidelity checks shall be based on the standards required at the time of the accreditation, notwithstanding that revised standards may have been introduced since that time. This provision shall not prevent an operator from electing to modify a simulator to meet a higher or revised standard if he or she so desires, but there is no compulsion for the operator to do so.

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Overview of LEVELs of Accreditation

1.2.1 Flight simulators may be accredited at LEVELs from 2 to 6. The credits related to the various LEVELs are detailed in Part 13. LEVELs 1-A and 1-B are reserved for approved flight simulators which have temporarily reverted to the level of Synthetic Trainers as a result of system unserviceability.

1.2.2 In assigning a LEVEL of accreditation, the Authority will specify:

a. The operator

b. The model and unique identification of the simulator

c. The location.

1.2.3 A change of any of these three elements will cause the simulator's approval to lapse. Re-accreditation (if desired) will require the simulator to meet the standards applicable at the time of the re-accreditation.

1.2.4 Where an operator has no flight simulator maintenance experience on flight simulators assigned LEVEL 4 or above, the Authority will assign only up to LEVEL 4, notwithstanding that the simulator may have qualified for a higher LEVEL. When the operator has subsequently demonstrated a satisfactory standard of operation over a period of not less than 120 days, the Authority will assign the higher LEVEL for which the simulator has qualified.

Variation of LEVEL

1.2.5 Where the Authority has assessed that an approved flight simulator no longer meets the requirements of this publication, (or, under the provisions of paragraph 1.1.7, the requirements of the publication in force at the tune of accreditation), it may suspend, cancel or vary that approval. The Authority shall determine any temporary or permanent change to the original LEVEL assigned to an approved flight simulator.

1.2.6 Where an operator desires to vary the LEVEL of accreditation of a simulator,

a. If an upgrade to a higher LEVEL is sought, the operator shall apply to the Authority for a complete accreditation at that LEVEL.

b. If the operator wishes to operate the simulator at a lower LEVEL, he or she may do so provided the Authority is notified in writing within 30 days of the change, and all recurrent fidelity checks after the date of notification shall be based on the standards required of the lower LEVEL. Operators are cautioned that a reduction in the LEVEL of accreditation may affect the approved training syllabus.

1.2.7 Once the Authority has been notified that the simulator is to operate at a lower LEVEL, it may not resume its original LEVEL without the Authority's approval. If a simulator has operated at a LEVEL lower than originally approved for a period exceeding 150 days, it will require re-accreditation at the original LEVEL before such approval is given.

Modification of Approved Flight Simulators

1.3.1 Once a simulator has been assigned a LEVEL of accreditation, any subsequent major modification to the flight simulator shall require a re-accreditation of the simulator. This shall be conducted in accordance with the provisions current at the time of the re-accreditation. Changes to hardware items on the flight deck are specifically excluded from this provision provided that such changes are made for the specific purpose of updating the simulator flight deck equipment to reflect the current modification state of the mean of the aircraft fleet.

1.3.2 If the operator desires to modify a flight simulator sub-system to a higher LEVEL, the entire flight simulator must be upgraded to that LEVEL. It is not possible, for example, to have a LEVEL 4 simulator with credit for a LEVEL 5 visual system.

> **Note:** Although a flight deck update in itself does not require a re-evaluation of the simulators' approval, there could be flow-on effects in the program area which may require re-evaluation, depending on the modifications involved.

Responsibility of Operator to Ensure Fidelity

1.3.3 Following the accreditation of a flight simulator, where an operator knows or suspects that the accuracy or realism of simulation has been degraded, the operator shall withdraw any affected sequences from the flight simulator. If as a result, sequences required by the approved training syllabus become unavailable for a period of 30 days or more, the operator shall notify the Authority in writing at the 30 day point.

Contents of Application

2.1.1 Application for approval of a flight simulator at one of the various LEVELs 2 to 6 shall be made to the Authority.

2.1.2 The application shall contain:

a. The identification (by manufacturer, model and unique identifier) of the simulator, the type and model of aircraft being simulated and the location at which operation of the simulator is proposed.

b. A statement by the operator that the flight simulator meets all of the requirements listed in this publication for the proposed LEVEL.

c. A listing of the individual sequences for which credits are sought (submitted as a separate document - see para 2.1.4).

d. The proposed ATG (submitted as a separate document - see para 2.1.4).

e. A record of the measurements taken by the operator during the conduct of the tests contained in the proposed ATG. In addition, a statement indicating the relationship between those measurements and the tolerances:

i. Listed in those Appendices applicable to the LEVEL sought.

ii. If applicable, those nominated in accordance with Part 11.

f. A summary of the source of data contained in the proposed Accreditation Test Guide.

g. A list of all differences existing between the subject flight simulator and the appropriate aircraft together with any proposed modifications.

h. A basic summary of the type of test equipment proposed and the procedures to be used to prove continuing fidelity of the flight simulator in accordance with Part 8.

i. The provisions proposed to meet the maintenance organisation requirements listed in Part 10.

j. Nomination of the person(s) responsible for flight simulator standards in accordance with Part 7, and the engineering officer(s) responsible for flight simulator standards in accordance with Part 10.

k. The numbers of simulator pilot instructors, simulator check pilots, simulator flight engineer instructors and simulator check flight engineers proposed for the appropriate aircraft type.

l. The method proposed to meet the recent experience requirements of simulator check and instructional personnel in accordance with Part 9.

2.1.3 An operator shall give the Authority not less than 90 days written notice of the intention to lodge an application for approval. There is no requirement to nominate a firm date for the accreditation check at this point.

2.1.4 The ATG together with the list of credit sequences, which form part of the application, shall be submitted to the local Airline Office of the Authority, not less than 15 working days prior to the proposed date of commencement of the accreditation check. The application itself, complete except for the ATG and the list of credit sequences, shall be submitted to the local Airline Office of the Authority, not less than one working day prior to the proposed date of commencement of the accreditation check.

Contents of the ATG

3.1.1 The ATG should take account of all applicable requirements contained in this publication, and in the presentation of the performance tests applicable to the LEVEL sought should include descriptions of the test procedures, the test tolerances and the measurements recorded during the operator's tests.

3.1.2 Performance tests contained in the ATG should be such as to permit a reasonable choice of conditions and configurations throughout the accreditation check. A sufficient number of tests must be included in order to prove the fidelity of the flight simulator.

3.1.3 Provided that data exists, or can reasonably be obtained, the Authority may require that additional tests be added to the ATG to ensure the fidelity of the flight simulator's operation.

Provision for Recording Results

3.1.4 Provision should be made at each complete test sequence or on each test page for a signature of certification by the approved person.

3.1.5 A section should be provided in the ATG to log defects observed during the accreditation check together with the date of observation. The same section should allow a record of the rectification action taken and the date of rectification.

High Altitude Tests

3.1.6 Those tests shown as *high altitude* throughout this publication should be conducted at an altitude in excess of 30,000 feet.

Engine Inoperative Climb

3.1.7 Engine inoperative climb tests contained in the ATG need not cover the entire climb from take-off cruise altitude. A reasonable sample across a mid-point altitude will suffice, for example, across a band of 5,000 feet.

Inclusion of Autodrivers

3.1.8 Where an automatic test is submitted to the Authority for approval, it should be included in the ATG together with its identifier.

Recommended Practices

3.1.9 To facilitate use of the ATG testing, the operator should list all tolerances as numerical units applicable to the test concerned. For example, show "IAS 212 kts ± 10% (191 to 233 kts)" or some similar presentation.

3.1.10 To expedite tests relating to take-offs and landings, the operator should consider including in the ATG a table of take-off and landing data relevant to those tests. The table should include navigation information if required.

Assistance from the Authority

3.1.11 Assistance can be made available by the Authority at mutually convenient times to aid in the compilation of the ATG.

4. Accreditation Check
4.1 Checks to be Conducted

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Requirement

4.1.1 An accreditation check must be performed by the Authority or an approved operator prior to the flight simulator being assigned a LEVEL of approval.

Checks

4.1.2 The accreditation check will normally consist of the following segments:

a. A group of performance tests judged to be appropriate by the Authority together with an assessment of the test results made against the tolerances listed in those Appendices applicable to the LEVEL being sought. These tests should include two simulated route flights employing normal procedures, with the first flight as the initial test of the series and the second as the final test of the series.

b. Tests to ensure compliance with the appropriate additional requirements listed in Part 13.

c. All functional tests listed in Part 5 and not carried out in the tests contained in (a) or (b) above.

d. An evaluation of the proper functioning of the instructor station, seating, lighting, radio communications, navigation aids, and intercom facilities.

e. An evaluation of the validity of selected credit sequences for which the operator seeks flight simulator accreditation and which have not been covered elsewhere.

f. A manual validation of selected autodrivers for which the operator seeks recognition.

4.1.3 ***ATG Tests***

4.1.3.1 Unless otherwise directed by the Authority, all tests contained in the ATG which has been given prior approval for the accreditation, are to be completed during the accreditation check.

4.1.3.2 The Authority may require additional tests to be completed where it is satisfied that a deficiency in the ATG schedule has become apparent in the course of testing.

4.1.3.3 The Authority may approve the omission or modification of specified tests where it is satisfied that the original intent of the tests is unnecessary or cannot be achieved. The omission or modification of previously approved tests may in some cases result in a lower LEVEL of accreditation than was originally sought.

4.1.4 *Instructor Station and Supporting Facilities*

4.1.4.1 Evaluation of the instructor station, together with the seating, lighting, radio communications, navigation aids and intercom facilities, will be conducted on an ongoing basis throughout the accreditation.

4.1.5 *Credit Sequences*

4.1.5.1 A selected sample of credit sequences is to be checked as part of the accreditation check. The size of the sample may vary from one simulator to another according to the sophistication of the simulator and the nature of the credit sequences sought. The accreditation team will determine, which sequences are to be sampled when the ATG is presented for acceptance. The following guidelines are to be used in selecting the sample:

a. Where a group of similar credit sequences exists, for example, a group of similar engine failures on different engines, one will be selected from the group.

b. Where there is a credit sequence which can effectively be manually flown in the course of some other subjective sequence, for example, a normal take-off, that test will not be chosen.

c. Credit sequences which represent critical non-normal events (emergencies), or which are specified as recall items by the operator's Operations Manual, for example, engine fire, will be included unless they are already covered as part of some other subjective sequence.

d. The final size of the sample should be not less than 20% and not more than 33% of the total number of credit sequences presented.

4.1.6 *Manual Verification of Autodrivers*

4.1.6.1 A selected sample of autodrivers is to be manually verified as part of the accreditation check. The size of the sample may vary from one simulator to another according to the sophistication of the simulator and the LEVEL of accreditation sought. The accreditation team will determine which autodrivers are to be sampled when the ATG is presented for acceptance, and the operator will be advised of the selected autodrivers prior to the start of the accreditation. The following guidelines are to be used in selecting the sample:

a. Where a group of similar tests exists, for example, a group of stalls in different configurations, one will be selected from the group.

b. Where there is a test which can effectively be manually flown in the course of some other subjective sequence, for example, a take-off, that test will not be chosen.

c. Where there is a test which is critical in terms of learning transfer, for example, distance on rejected take-off or landing distance, that test will be included unless it is already covered as part of some other subjective sequence.

d. Where there is a test which is particularly difficult or time-consuming to fly, that test should not be included unless there are pressing reasons for doing so.

e. The final size of the sample should be not less than 20% and not more than 33% of the total number of autodrivers presented.

4.1.7 *Deficiencies Encountered During the Check*

4.1.7.1 If during the accreditation testing a major deficiency becomes apparent in the visual and/or motion system that would delay the accreditation, the Authority may, upon application by the operator, review the synthetic flight trainer's capabilities compared to the operational standards and requirements listed in the publication FSD-2, to establish whether Category C could be assigned to the synthetic flight trainer until accreditation can be accomplished.

4.1.8 *Recording of Results*

4.1.8.1 Results of tests conducted during an accreditation check (including checks of credit sequences and manual verification of autodrivers) shall be recorded in an appropriate dedicated space made available within the ATG. A copy of the completed ATG containing, the test results shall be retained by the operator for the life of the simulator with that operator, and a second copy shall be provided to the Authority for retention.

4.1.8.2 At the conclusion of the accreditation check, where the outcome is satisfactory, the leader of the accreditation team will certify in the ATG that all tests have been completed to the standard required for the appropriate LEVEL of accreditation. Where the outcome is not satisfactory, the team leader may at his/her discretion certify that specified individual tests have been completed to a particular standard, but no overall certification will be made.

4.1.9 *Protection of Confidentiality*

4.1.9.1 Where an operator provides the Authority with a copy of an ATG under the terms of para 4.1.8.1, the operator may mark that copy "In Confidence", and the information in that ATG shall be regarded by the Authority as having been provided in confidence, and the information so marked shall be accorded all legal protection on that basis.

Duration of the Accreditation Check

4.2.1 Unless the Authority approves otherwise, all tests must be completed within a single continuous period of 120 days. Extensions beyond the 120 day period will be approved only where the Authority is satisfied that exceptional circumstances exist, and where it can be shown that the validity of earlier tests has not been compromised by subsequent adjustments of the simulator sub-systems, including software changes.

Composition of an Authority Accreditation Team

4.2.2 Where the Authority conducts an accreditation check, it will provide a team including two pilots, at least one of whom will be endorsed and current on the type and model of the aircraft being simulated, while at least one is experienced in accreditation checking. In the case of aircraft having a flight engineer position, a flight engineer endorsed and current on type and model must also be a member of the team.

4.2.3 The team must fulfil the following requirements:

a. At least one pilot must have completed a Flight Simulator Evaluation course approved by the Authority.

b. At least one of the pilots, and where applicable the flight engineer, must have completed a base training flight within 35 days of the commencement of the accreditation check. The base training flight must be conducted in the type and model of the aircraft to be simulated, and must include:

- Normal take-offs and landings
- Steep turns
- Low and high-speed handling, at medium and high altitude
- Approach to the stall and recovery, at medium and high altitude.

Approval of an Operator to Conduct Accreditation Checks

4.3.1 The Authority may approve an operator to conduct accreditation checks on behalf of the Authority, provided that the operator:

a. Currently holds approval to conduct recurrent fidelity checks.

b. Has an acceptable record of conducting recurrent fidelity checks.

c. Has demonstrated to the Authority the successful completion of an accreditation check at the LEVEL for which approval is sought.

4.3.2 An operator seeking approval to conduct accreditation checks should apply to the Authority in writing, setting out:

a. The type and model of the aircraft being simulated.

b. The manufacturer, identification and details of the simulator and ancillary equipment.

c. The LEVEL of accreditation being sought.

d. The names of the flight and simulator technical crew being proposed to conduct the check for the type of aircraft being simulated.

4.3.3 Only persons approved by the Authority may conduct and certify to the results of a simulator accreditation check, and those persons may do so only within the limits of their individual approvals.

Procedure Where Operator Conducts Accreditation Check

4.3.4 *Compliance with Requirements*

4.3.4.1 An operator approved to conduct an accreditation check shall comply with all requirements in this publication relevant to the particular accreditation being conducted. Where a requirement contained in this Part conflicts with a requirement elsewhere in this publication, the requirement in this Part shall prevail.

4.3.5 *Approval of ATG*

4.3.5.1 The operator must submit an ATG to the Authority not less than 15 working days prior to the commencement of the accreditation check. The check may not proceed without the Authority's approval of the ATG.

4.3.6 *Certification of Compliance*

4.3.6.1 Prior to the commencement of the check, the operator must provide the Authority with written certification that the simulator is complete and ready for the accreditation check.

4.3.7 *Composition of Operator's Team*

4.3.7.1 The operator must provide a team comprising of at least two pilots, one of whom must be endorsed and current on the type and model of the aircraft being simulated, together with an appropriate number of simulator technical personnel In the case of aircraft having a flight engineer position, a flight engineer endorsed and current on the aircraft type and model must also be a member of the team.

4.3.7.2 The team must fulfil the following requirements:

a. At least one pilot must have completed a Flight Simulator Evaluation course approved by the Authority.

b. At least one pilot must be a check pilot on the type and model of the aircraft be simulated.

c. At least one of the pilots, and where applicable the flight engineer, must have completed a base training flight within 35 days of the commencement of the accreditation check. The base training flight must be conducted in the type and model of the aircraft to be simulated, and must include:

- Normal take-offs and landings
- Steep turns
- Low and high-speed handling, at medium and high altitude
- Approach to the stall and recovery, at medium and high altitude.

4.3.8 *Appointment of Team Leader*

4.3.8.1 The operator must designate one member of the team as the team leader, to be responsible for the conduct of the accreditation and to certify the results achieved. That person must be qualified under para 4.3.7.2 (a).

4.3.9 *Conduct of Subjective Tests*

4.3.9.1 During subjective testing both pilots, and where applicable the flight engineer, must occupy the flight crew control seats. Where only one pilot is qualified under para 4.3.7.2 (c), that pilot must perform all subjective simulator handling tests called up by the ATG.

4.3.9.2 Where the team leader does not personally carry out a subjective test he or she must obtain a statement from the pilot who conducted that test, certifying that the test result or results were satisfactory.

4.3.10 *Notification of Results*

4.3.10.1 The operator is to notify the Authority of the results achieved when the accreditation check is complete, or at the expiry of 120 days from the commencement of the accreditation check whichever occurs first

4.3.11 *Decision by Authority*

4.3.11.1 On completion of the accreditation check where the operator is of the opinion that a satisfactory standard has been achieved, the operator shall provide a set of results for all approved tests, confirm they are all within tolerance and have the Team Leader sign a statement to that effect. The operator shall fax a copy of the Team Leader's certificate to the local Airline Office and the Authority will automatically assign an interim LEVEL as proposed in the application and approved training, may commence immediately.

4.3.11.2 The Authority, having been notified by the operator of the results of the accreditation check, shall announce whether or not the result is acceptable, and in the case of an acceptable result, assign a LEVEL of accreditation, within a period of 14 days from the date of notification by the operator.

4.3.11.3 Where the Authority accepts the results of the accreditation check, the assigned LEVEL of accreditation shall be effective from the date of notification by the operator.

4.3.11.4 If the Authority elects to verify the standard achieved, it must commence any proposed verification action within a time frame such that a decision on acceptability can be reached within the 14 day assessment period.

4.3.11.5 Where the Authority is able to verify that the interim assigned LEVEL is incorrect, and a lower LEVEL or no LEVEL is assigned, then the training conducted during the 14 day assessment period must be re-assessed for its validity.

4.3.12 *Verification of Accreditation Standards*

4.3.12.1 The Authority may direct that an Authority observer attend all or any part of an accreditation check. Prior notice of intention to invoke this provision is not mandatory. The initial accreditation check by an operator of the first flight simulator representing an aircraft type and model new to that operator will be conducted under the observation of the Authority.

4.3.12.2 At the conclusion of the accreditation check, the Authority may elect to verify the standard of simulation certified by the operator by conducting an assessment of the simulator, or by inspecting the hard-copy results, or both.

- Where the Authority elects to invoke the provisions of para 4.3.12.2 by assessment of the simulator, it may require that the flight simulator be made available to the Authority for a period of not less than two hours. The Authority will specify the date on which access to the simulator is required, giving not less than 48 hours notice. The operator may nominate the time on that date when the simulator will be made available.
- When the Authority elects to invoke the provisions of para 4.3.12.2 by inspection of print-outs, it may require that all printed results be made available to the Authority's staff at the simulator's location. The Authority will specify the date and time at which access to the records is required, giving not less than 48 hours notice.

4.3.12.3 Where the Authority has verified the standard of simulation and is satisfied that there is a discrepancy between the operator's assessment of the standard and the Authority's assessment of that standard, it may require that all or part of the accreditation check be repeated under the direct supervision of the Authority.

4.3.13 *Review of Operator's Approval*

4.3.13.1 Where an operator fails to comply with the requirements of this publication, or fails to satisfy the Authority that accreditation checks conducted by that operator are carried out in a manner acceptable to the Authority, the operator's approval to conduct accreditation checks may be reviewed or terminated.

Overview

5.1.1 This Part lists the functional requirements to be met by the systems in an approved flight simulator. Those functions that are relevant to the aircraft type and model represented by the simulator must be demonstrated on the ground and in flight as appropriate to the specific function concerned.

Flight Deck Systems

	Function	Proper Indications and Functions to be Demonstrated
5.1.2	**General**	1. Proper functioning of all switches, indicators and systems including flight management, autothrottle, navigation and communication equipment at all flight crew stations applicable to the credits being sought. Proper functioning of all switches and controls located at the flight simulator instructor stations. 2. For computer-controlled aircraft, flight control and auto thrust operation will be shown in all normal and reversionary modes. 3. This requirement may be achieved by developing a specific test which will drive all the instruments to predetermined positions which can be verified from a maintenance page within the computer software program.
5.1.3	**Engine Start**	1. Normal and non-normal starts. 2. Alternate start.
5.1.4	**Ground Manoeuvring**	1. Thrust response, including breakaway thrust. 2. Normal and non-normal ground manoeuvring. 3. Toe brake displacement/force gradient. 4. Non-normal procedures associated with ground manoeuvring.

	Function	Proper Indications and Functions to be Demonstrated
5.1.5	**Take-off and Climb**	1. Engine parameter indications responses. 2. Engine acceleration characteristics. 3. Nose wheel and rudder steering. 4. Normal take-off. 5. Rejected take-off. 6. Engine failure at V_1. 7. Engine failure at V_r. 8. Crosswind (maximum component approved for the type). 9. Operation of landing gear, flaps and leading edge devices. 10. Area departure. 11. Normal and non-normal procedures associated with climb.
5.1.6	**Cruise**	1. Normal and long range cruise. 2. Normal and steep turns. 3. Turns with and without spoiler operation. 4. High speed buffet, mach tuck, overspeed warning and high speed protection as applicable. 5. Dutch roll. 6. Approach to stall in various configurations including stall warning, stall protection devices, buffet and g-break, as applicable. 7. Unusual attitudes. 8. Non-normal procedures associated with cruise.
5.1.7	**Descent**	1. Normal descent. 2. Emergency descent. 3. Normal and non-normal procedures associated with descent.

	Function	Proper Indications and Functions to be Demonstrated
5.1.8	**Approach and Landing**	1. Manoeuvring with and without flaps and leading edge devices, with all engines operative and with engine(s) inoperative. 2. Speed brake operation. 3. Normal operation of landing gear, flaps and leading edge devices. 4. Non-normal operation of landing gear, flaps and leading edge devices. 5. All engines operative. 6. Engine(s) inoperative. 7. Instrument approach: a. ILS (Cat I, Cat II, Cat III or uncategorised, as applicable). b. Non-precision: i. ADF ii. VOR iii. DME. 8. Circling 9. Minimum non-normal landing flap certificated for the type. 10. Coupled (autoland and/or autothrottle as applicable). 11. Rejected, all engines operative and engine(s) inoperative. 12. Crosswind (maximum component approved for the aircraft). 13. Normal and non-normal procedures associated with approach and landing.
5.1.9	**Landing Roll**	1. Ground spoiler. 2. Reverse thrust. 3. Directional control. 4. Normal and non-normal brake, autobrake and anti-skid. 5. Alternate and emergency brake.
5.1.10	**Engine Shutdown and Parking**	1. Systems. 2. Parking brake.

Motion System

5.1.11 The motion systems shall meet the general specifications listed in Part 11 and additional specifications applicable to the various LEVELs listed in Part 13.

5.1.12 Proper indications and functions in the following effects where appropriate:

a. Buffet due to speedbrake and flap extension.
b. Buffet during approach to stall.
c. Runway rumble and oleo deflection related to speed and runway surface.
d. Buffet due to ground spoiler and reverse thrust during ground roll.
e. Impulses resulting from nose and main landing gear extension and retraction.
f. Impulses resulting from spoiler extension and retraction.
g. Landing gear ground contact impulses.
h. Nose wheel scuffing and breakaway.
i. Pitch effect resulting from brake and thrust application.
j. Roll effect.

Visual System

5.1.13 The visual system shall meet the general specifications listed in Part 11 and additional specifications applicable to the various LEVELs listed in Part 13.

5.1.14 Visibility shall be assessed with the flight deck instrument lighting set at an appropriate level for normal operations.

Sound System

5.1.15 The sound system shall meet the general specifications listed in Part 11 and additional specifications applicable to the various LEVELs listed in Part 13.

Instructors Control Console

5.1.16 Proper functioning of the devices provided to vary the conditions relating to the environment and to control the systems required for operation of the flight simulator (refer para 5.1.2).

Locks and Freezes

5.1.17 The simulator program shall be designed so that after repositioning of the simulator, the onboard navigation equipment and the Flight Management System automatically assume the location and phase of flight to which the flight simulator was repositioned.

Control Loading

5.1.18 Prior to commencing an accreditation check or (subject to para 5.1.19) a recurrent fidelity check, a check of the control loading (that is, actual force compared to computer read-out) will be conducted for the following controls:

- Control column and wheel (side-stick for computer-controlled aircraft)
- Rudder pedals
- Nose wheel steering control.

5.1.19 If the operator has an approved maintenance program which measures control loading on a regular recurrent basis, the control loading check may be omitted from the recurrent fidelity checking schedule provided that the relevant maintenance documents are made available to the recurrent fidelity checking team.

Frequency of Checks

6.1.1 Recurrent fidelity checks at LEVEL 2 shall be scheduled at a frequency of two fidelity checks in each twelve month period, at nominal six monthly intervals from the date of the accreditation, but not conducted earlier than one month before nor one month later than the nominal date. The maximum interval between recurrent fidelity checks shall be seven months.

Tests to be Conducted

6.1.2 The tests to be conducted for the recurrent fidelity checks at LEVEL 2 will be specified by the Authority for each individual case. Test results and certification of successful completion of these checks will be recorded in a Recurrent Fidelity Test Guide by the person conducting the check. The results of the tests completed during recurrent fidelity checks are to be held by the operator until superseded by the next similar recurrent fidelity check.

Persons Approved to Conduct Checks

6.1.3 Recurrent fidelity checks at LEVEL 2 shall be conducted by an Authority pilot or, in the case where an operator is approved to conduct recurrent fidelity checks, an approved person nominated by that operator. In either case, the person selected must be endorsed on the aircraft type and experienced in recurrent fidelity checking. In the case of aircraft having a flight engineer position, a flight engineer endorsed on the aircraft type must be present during the check to assist the person conducting the check.

Frequency of Checks

6.2.1 Recurrent fidelity checks at LEVEL 3 or above shall be scheduled at a frequency of three fidelity checks in each twelve month period, at nominal 120 day intervals from the date of the accreditation but not conducted earlier than 30 days before nor 30 days later than the nominal date. The maximum interval between recurrent fidelity checks shall be 150 days.

6.2.2 At the request of an operator, the Authority may approve a variation to the start date of the 120-day cycle in order to achieve a more equitable spread of fidelity checking dates throughout the year.

Tests to Be Conducted

6.2.3 Subject to para 6.2.4, each fidelity check at LEVEL 3 or above shall contain:

a. Approximately one third of the subjective and objective tests contained in the ATG, so that the full range of tests in the ATG is covered every twelve months.

b. Approximately one fifteenth of the total number of credit sequences listed in the ATG, so that the total number of credit sequences will be covered over a five year period.

6.2.4 The division of the ATG tests within the recurrent fidelity checking program shall be subject to approval by the Authority. At the request of an operator, the Authority may approve the omission of the following tests from the recurrent fidelity checking program:

a. One or both route flights.

b. The motion acceleration performance test; and/or

c. The control loading check.

6.2.5 Test results and certification of successful completion of each recurrent fidelity check will be recorded in a Recurrent Fidelity Test Guide by the person authorised to conduct the check. The results of the tests completed during recurrent fidelity checks are to be held by the operator until superseded by the next similar recurrent fidelity check.

Composition of Authority's Team

6.3.1 Where the Authority conducts a recurrent fidelity check at LEVEL 3 or above, it will provide a team comprising at least one Authority pilot endorsed and current on the type and model of aircraft being simulated, and who:

a. Has completed an approved flight simulator evaluation course and is experienced in simulator fidelity, checking, or

b. Is accompanied by an Authority pilot who meets that requirement.

In the case of an aircraft having a flight engineer position, a flight engineer inspector endorsed and current on the aircraft type and model must also be a member of the team.

6.3.2 For the purposes of this of this sub-section, currency on type means that the crew member concerned has completed a minimum of three hours personal flying on that aircraft type and model within the previous seven months.

6.3.3 Where the team consists of more than one person, the Authority will designate a person qualified in terms of para 6.3.1(a) to be the team leader. The team leader will be responsible for the conduct of the check and shall certify to the results achieved.

Procedure Where Authority's Team Is Unavailable

Note: The provisions of this sub-section are relevant only where the operator does not hold approval to conduct recurrent fidelity checks.

6.3.4 If an Authority team is not available on the date when a recurrent fidelity check is due, then where the check can be delayed without inconvenience to the operator and without exceeding the 150 day maximum interval between recurrent fidelity checks, the check should be delayed.

6.3.5 Where the procedure at para 6.3.4 is not possible, the operator may conduct the check on behalf of the Authority, provided that:

a. The operator did not conduct the previous fidelity check.

b. A qualified observer from the Authority is in attendance who will certify; the result of the recurrent fidelity check.

6.3.5.1 Where a qualified observer from the Authority is not able to attend, the operator may nevertheless skill conduct the check provided that:

a. The Authority approves in advance the names of the persons proposed to conduct the check, and the operator notifies the Authority of the result of the check within 48 hours and certifies the result.

b. An authorised officer of the Authority inspects the results of the check within 14 days of the successful completion of the check and countersigns the certification.

6.3.5.2 Where an operator conducted a recurrent fidelity check-under the provisions of para 6.3.5.1, the Authority's team on the subsequent recurrent fidelity check shall include a selection of 10% of the items checked by the operator on that previous check.

6.3.5.3 Where an Authority team is not available and where the operator has conducted the previous recurrent fidelity check, the current check may not proceed and all credits for the affected flight simulator shall lapse at the end of 150 days from the previous recurrent fidelity check.

Approval of Operators

6.4.1 The Authority may approve operators to conduct recurrent fidelity checks on behalf of the Authority.

6.4.2 An operator seeking approval to conduct recurrent fidelity checks must have a history of not less than two years operation of simulators at the LEVEL for which approval is sought to conduct fidelity checks. During that time the Authority must be satisfied with the standard achieved by the operator's staff.

6.4.3 Notwithstanding that the operator may be approved to conduct recurrent fidelity checks, if that operator is not also approved to conduct accreditation checks then the first recurrent fidelity check of a newly accredited first-of-type simulator will be conducted by the Authority.

Application for Approval

6.4.4 An operator seeking approval to conduct recurrent fidelity checks shall apply in writing to the Authority, setting out:

a. The type and model of the aircraft being simulated, and the identification of the simulator concerned.

b. The current LEVEL of accreditation.

c. The names of the flight crew and simulator technical personnel proposed to conduct the checks for each type of aircraft being simulated.

6.4.5 Only persons approved by the Authority may conduct and certify to the results of a simulator fidelity check and those persons may do so only within the limits of their individual approvals.

Procedure Where Operator Conducts Recurrent Fidelity Checks

6.4.6 *Composition of Operator's Team*

6.4.6.1 The operator shall provide a team comprising of at least one pilot who is endorsed, holds check pilot approval and is current on the type and model of the aircraft being simulated, together with simulator technical personnel as appropriate. In the case of an aircraft having a flight engineer position, a flight engineer endorsed and current on the aircraft type and model must also be a member of the team.

6.4.6.2 For the purposes of this sub-section, currency on the type and model means that the crew member concerned has flown a minimum of one take-off and one landing on the type being simulated in the last 35 days.

6.4.6.3  At least one pilot must have completed an approved flight simulator evaluation course, must have participated in at least three flight simulator recurrent fidelity checks within the last two years, and have been assessed as competent by the Authority to conduct recurrent fidelity checks.

6.4.6.4 The operator will appoint a pilot who has completed the flight simulator evaluation course to be the team leader, who will be responsible for the conduct of the fidelity check and will certify the results of the check (including results recorded for any autodriver tests conducted prior to the scheduled date of the check under the provisions of para 6.4.7.1).

6.4.7 *Testing of Autodrivers*

6.4.7.1 Autodriver tests may be conducted at the same time as the rest of the fidelity check or at the discretion of the operator, within the 14-day period preceding the check. In any case, the results must be tabled for inspection at the time of the check, by the team conducting the check. Where the 14-day option is exercised, it is conditional upon no maintenance having been conducted in the interval between the autodriver tests and the fidelity check, which would affect the operation of any autodriver. All autodriver tests must be completed with the same computer load.

6.4.8 ***Verification of Fidelity***

6.4.8.1 The simulator must be made available to the Authority on demand, within 14 days of the fidelity check, for a period not exceeding two hours for verification of fidelity. All records and hard-copy results of the check must be available for Authority inspection at that time. The Authority will give not less than 48 hours notice of its intention to invoke this provision, and will specify, the date required. The operator may select the time of day when the simulator can be made available on that date.

6.4.8.2 Where the Authority staff, following the verification and inspection of records described at para 6.4.8.1 above, are of the opinion that the fidelity of the simulator is unsatisfactory or in doubt, the fidelity check is to be repeated in the presence of the Authority and the simulator shall not be used for training until the Authority is satisfied.

6.4.8.3 Where the Authority has required a fidelity check to be repeated on two consecutive occasions, the next scheduled fidelity check shall be conducted in the presence of the Authority. If that check is not satisfactorily completed without intervention by the Authority, the operator's approval to conduct fidelity checks shall be withdrawn.

Operator-conducted Functional Checks

7.1.1 A means shall be provided and approved by the Authority to test the flight simulator programs and hardware by means of operator-conducted functional checks. One such means is defined in Part 8. The operator shall maintain records of such tests. The records shall be retained for a period of at least thirteen months and made available to the Authority on request.

On-going Fidelity

7.1.2 The operator shall ensure that all flight simulators under his/her control, meet the recurrent fidelity check requirements. In addition, the operator shall provide such flight simulator availability as is deemed reasonable and necessary by the Authority for any additional surveillance of fidelity.

7.1.3 The operator shall maintain an on going modification program such as to ensure that the hardware and performance of the flight simulator reasonably match the operator's aircraft fleet.

7.1.4 The operator shall maintain a permissible unserviceability schedule, minimum equipment list or approved assessment procedure for use with an approved flight simulator. The schedule, list or procedure shall be approved by the Authority. The operator shall ensure that during the operation of an approved flight simulator compliance with that schedule, list or procedure is maintained.

7.1.5 The operator shall provide a summary of all significant flight simulator defects which have occurred since the previous recurrent fidelity check. This summary shall be made available for inspection by the team conducting the recurrent fidelity check, at the time of the check.

Changes and Modifications

7.1.6 All changes to an approved flight simulator which have an impact on any accredited sequence shall receive approval by the Authority prior to implementation.

7.1.7 All changes to flight deck presentation, systems or to any part of an approved flight simulator which may affect realism shall be approved by the person nominated (see para 7.1.10). The Authority shall be notified of such changes within 30 days of implementation. The operator shall maintain a written summary of such changes, and this summary shall be made available for inspection by the team conducting the recurrent fidelity check, at the time of the check.

Tests and Recent Experience

7.1.8 The standard employed for a flight crew demonstration of proficiency in a flight simulator shall not be less than the standard established for a flight proficiency test in the appropriate aircraft.

7.1.9 The operator shall ensure that the recent experience requirements listed in Part 9, relating to pilot and flight engineer simulator instructors, are met.

Responsibility for Standards

7.1.10 The operator shall appoint a person or persons responsible for ensuring that the above standards are maintained. Where that person knows or suspects that the accuracy or realism of simulation has been degraded, he or she shall notify the operator at once, to permit the requirements of para 1.3.3 in Part 1 to be met.

8 Operator-conducted Functional Checks

8.1 Checks to Be Conducted

Approved by Assistant Director, Aviation Safety Standards Version 6.0: July 1999

Purpose

8.1.1 Part 7 requires the establishment of operator-conducted functional checks acceptable to the Authority. This Section describes one means of compliance with that requirement.

Check for Flight Simulators Approved at LEVEL 2

8.1.2 A daily functional check including designated fidelity checks performed by a qualified simulator technician to an approved schedule.

Check for Flight Simulators Assigned LEVEL 3 or Higher

8.1.3 A daily functional check including designated fidelity checks performed by a qualified simulator technician to an approved schedule and either:

a. An approved test schedule comprised substantially of automatic test programs and executed by the operator at specified times, or

b. An approved test schedule based on approved test data and performed at specified times by a nominated officer of the operators organisation.

8.1.4 The tests in the approved test schedule shall be recorded on a suitable device capable of recording performance tests at the appropriate LEVEL for comparison with approved test data using the tolerances listed in Part 12, and if applicable, those in accordance with Part 11 para 11.2.5.

8.1.5 The automatic test programs shall be submitted for approval at the time of the accreditation check. Where an automatic test program approval is required at times other than at the accreditation check, the operator shall provide the nominated means for the execution and approval of the automatic test program.

9 Training/Flight Proficiency Tests in an Approved Flight Simulator

9.1 Persons Authorised to Conduct Training/Flight Proficiency Tests

Approved by Assistant Director, Aviation Safety Standards Version 6.0: July 1999

Requirement for Approval and/or Delegation

9.1.1 Endorsement training and competency tests in an approved flight simulator may be conducted only by persons approved by the Authority. Flight crew rating tests may be conducted only by persons who hold a CAR 5.19 delegation.

Check Personnel

9.1.2 Check pilots and check flight engineers may be approved to conduct endorsement training, post endorsement route training and competency tests in an approved flight simulator. This approval may be granted following successful completion of an approved course of training, followed by a demonstration of ability to an appropriate delegate, in a flight simulator representative of the aircraft type for which the approval is sought. Check pilots may be granted a CAR 5.19 delegation to conduct flight crew rating tests in an approved flight simulator.

Instructional Personnel

9.1.3 Flight simulator pilot instructors and flight engineer instructors may be granted approval to conduct endorsement training and recurrent training in an approved flight simulator. This approval may be granted following successful completion of an approved course of training, followed by a demonstration of ability to an appropriate delegate, in a flight simulator representative of the aircraft type for which the approval is sought.

Application for Approval and/or Delegation

9.1.4 An application for approval shall be submitted to the Authority prior to the grant of approval for a person to conduct endorsement training or competency tests in a flight simulator, and an application for a CAR 5.19 delegation shall be submitted to the Authority prior to the issue of the delegation to conduct flight crew rating tests. In each case, the application shall contain a summary of the flying experience of the applicant, including check, training and flight simulator experience. In addition, the application shall contain certification that the applicant has satisfactorily completed an approved flight simulator instructor training course.

Re-approval

9.1.5 Approvals granted under paras 9.1.2 or 9.1.3 shall remain valid for two years unless earlier revoked. A person approved to conduct training or competency tests in an approved flight simulator shall demonstrate proficiency every two years to an appropriate Flying Operations Inspector or delegate, in the flight simulator type for which approval is held, in order to renew that approval.

Maintenance of Proficiency

9.1.6 The operator shall ensure that all persons approved or holding a delegation to conduct training, competency tests and flight crew rating tests in an approved flight simulator maintain a proficient standard.

9.1.7 A person employed on checking or instructional duties in a flight simulator and who does not maintain recency on the aircraft type for which flight simulator approval is held, shall observe at least four sectors of actual aircraft route operations each six months, on the flight deck of that aircraft type.

9.1.8 A person employed on checking or instructional duties in a flight simulator shall receive at least 90 minutes of personal flying practice every 90 days in the flight simulator type for which approval is held. In the case of a person who is currently acting as flight crew on the actual aircraft, this requirement may be partially or fully met in the course of normal recurrent simulator training and/or proficiency testing.

10 Maintenance Organisation for an Approved Flight Simulator

10.1 Requirements

Approved by Assistant Director, Aviation Safety Standards Version 6.0: July 1999

Requirement to Ensure Flight Simulator Fidelity

10.1.1 The operator of an approved flight simulator shall provide a suitable maintenance organisation to ensure flight simulator fidelity. Prior to the granting of a LEVEL of accreditation, the Authority must be satisfied that the proposed maintenance organisation has the capacity to maintain the required on-going level of fidelity.

Provision by the Maintenance Organisation

10.1.2 The maintenance organisation shall provide:

a. An adequate number of properly trained and qualified maintenance personnel.

b. A maintenance schedule designed to ensure fidelity and reliability on a continuing basis.

c. Adequate test equipment to permit the operator to conduct all required fidelity and maintenance checks on the approved flight simulator. In addition, the test equipment shall be sufficient to permit the proper execution of the Authority's accreditation check and recurrent fidelity checks.

d. An approved permissible unserviceability schedule, minimum equipment list or an approved procedure for assessing permissible simulator unserviceability.

e. A defect reporting log.

f. A system which will permit inspection by the Authority of all maintenance and modification records on a continuing basis.

Person Responsible

10.1.3 The operator shall appoint a person responsible for ensuring that the requirements of para 10.1.2 are maintained.

Flight Deck

11.1.1 Part 5 specifies the functional requirements necessary for the various systems of an approved flight simulator.

11.1.2 The flight deck layout of an approved flight simulator shall be a full scale and detailed replica of the typical fleet aircraft. The total number of flight crew stations provided shall equal the total number of flight crew stations normally required on the aircraft for execution of a particular sequence for which a credit is sought. In addition to the flight crew stations, seating accommodation shall be provided to permit adequate flight deck observation to be accomplished. This accommodation is for the use of check pilots, check flight engineers and officers of the Authority.

11.1.3 All of the aircraft systems related to flight deck operation and required for a particular approved LEVEL shall be simulated and shall be fully operational. Such systems shall operate on the ground and in flight as appropriate. These systems shall enable normal operating procedures, emergency, abnormal and alternate procedures to be properly accomplished in all sequences for which the operator seeks credits.

11.1.4 Where movement of a flight control, ancillary control or switch is required in any phase of operation, the direction and extent of movement shall correspond to that which exists in the aircraft. When such a movement is made the resulting indications and effects shall be automatic, shall correspond to those associated with the actual aircraft in the same condition and shall meet the requirements listed in Part 5.

11.1.5 Flight deck circuit breaker panels shall have locations and layouts which reflect those of the appropriate aircraft. Circuit breakers that affect procedures and whose operation will result in observable flight deck indications shall be functionally accurate and shall produce the same indications in the flight simulator as those in the aircraft.

11.1.6 All navigation equipment which is available in the aircraft at those flight crew stations applicable to the credits being sought shall be faithfully reproduced in the flight simulator, with the exception of INS and similar area navigation systems, which are required only for LEVEL 5. The functions, switching and range of the radio navigation aids shall match those installed in the aircraft and they must operate within the tolerances prescribed for the equipment installed in that aircraft.

11.1.7 The communications equipment installed in the flight simulator shall be representative of that installed in the aircraft and the switching and tuning facilities shall be identical. The performance in normal and non-normal modes shall, within the limits of design capability, simulate that of the equipment installed in the aircraft.

Instructor Station

11.1.8 A means shall be provided to readily vary within the operating envelope of the aircraft, the values and rates of change of the environmental conditions and system parameters.

11.1.9 Facilities shall be provided which enable a satisfactory level of air traffic control simulation to be presented to the flight crew. Such air traffic simulation may be provided from the instructor's console, an isolated operations station or a synthetic device. The means of providing simulated air traffic control shall be approved by the Authority.

11.1.10 Provision shall be made to enable the check pilot, check flight engineer and officers of the Authority to aurally monitor all radio navigation aids and communications. Where the operator does not require the use of aircraft interphone for all flight crew intercommunications, an adequate area microphone system shall be provided to permit the monitoring of flight crew intercommunication. Where the instructor provides ATC facilities for the crew, his or her station must additionally be provided with means to transmit on the simulated radio frequencies, and to identify the radio set and frequency selected by the crew.

Performance to be Matched to Aircraft

11.2.1 The performance of the flight simulator as reflected by the flight deck instruments, the flight controls and by the motion, visual and sound systems shall reproduce the aircraft and engine performance and behaviour in all ground, transitional and flight modes of operation required by Part 5 and Part 12 as applicable to the particular LEVEL of accreditation, and in any additional tests the Authority may require to be included.

11.2.2 The flight characteristics of the appropriate aircraft shall be adequately simulated in all configurations and thrust/drag combinations encountered in the flight envelope appropriate to the credits being sought. Account shall be taken of the various attitudes, altitudes, airspeeds, temperatures, gross weights and centre of gravity locations.

11.2.3 Control forces, control travel and control effects shall correspond to those of the appropriate aircraft whilst in the same flight condition.

Tolerances

11.2.4 Unless the Authority approves otherwise, the tolerances called up in this publication specify the maximum deviation from the relevant approved test data, permitted for an approved flight simulator. The Authority may at its discretion approve the application of an expansion factor to the tolerance listed in the ATG. These approved deviations must be placed on record and held by the operator for the life of the simulator with that operator.

11.2.5 Where the Authority requires the inclusion of a performance test not listed in the parts relevant to the LEVEL of accreditation sought, the tolerances applicable to that test shall be approved by the Authority.

11.2.6 Where small values are involved, the application of the tolerances must be such that the simulator response is in the correct sense.

11.2.7 The tolerances applied during the accreditation check of a simulator (including any deviations or expansions approved by the Authority) shall be applied during subsequent recurrent fidelity checks of that simulator.

Use of Approved Test Data

11.2.8 Unless the Authority approves otherwise, all objective ATG tests shall be based on approved test data.

11.2.9 The Authority may approve limited deviations from test data when it is convinced that such deviations are warranted in pursuit of proper feel and realism for the particular flight simulator. These approved deviations must be placed on record and held by the operator for the life of the simulator with that operator.

11.2.10 The Authority may approve data contained in the operator's performance manual or in the appropriate aircraft flight manual for use in take-off and landing distance checks and enroute climb and descent checks. These take-off and landing distances must be unfactored distances.

11.2.11 Where a performance test is fully dynamic and precise data is shown not to be available, the Authority may approve the use of overlay plots.

11.2.12 Control surface angular deflections may be used in lieu of control forces where a proper relationship can be demonstrated.

Subjective Tests in Lieu of Approved Test Data

11.2.13 Where a particular test requires objective data and that data can be shown to be restricted or unavailable, the Authority may at its discretion approve a subjective assessment of that manoeuvre by an approved person. Such an assessment shall be based on an actual observation of the aircraft behaviour in the same flight conditions and the relative value inherent in the particular sequence for check and training purposes.

11.2.14 The provisions of para 11.2.13 will be limited to cases where flight test data is restricted or unavailable solely because of special difficulties involved in recording such data; for example, an emergency descent.

Identification of Autodrivers

11.2.15 Where an automatic test is submitted to the Authority for approval the operator shall provide with it an unambiguous identifier such that the test will always be clearly recognisable against other automatic tests.

Motion System

11.3.1 The system provided shall be automatic in operation and shall reasonably portray in at least three degrees of freedom of movement the various accelerations appropriate to the aircraft in all simulated manoeuvres.

Visual System

11.3.2 ***Aspects to be Included***

11.3.2.1 The visual system shall reasonably portray individual scenes normally viewed from each pilot station of the aircraft and shall include the aerodrome surrounding areas, runways and taxiways. Buildings, aprons and other outstanding features shall be suitably detailed and the overall visual scene shall be realistic.

11.3.2.2 Realistic approach, runway and taxiway lighting where appropriate shall be provided.

11.3.2.3 Approach lighting, runway lighting and VASI intensities shall be independently variable.

11.3.2.4 Visual systems approved for instrument take-off end instrument approach shall provide a realistic simulation of the appropriate weather conditions.

11.3.2.5 A means shall be provided at the flight simulator instructor station to permit control of cloud base, runway visual range and visibility.

11.3.3 ***Stability of Scene***

11.3.3.1 The visual scene displayed shall be reasonably stable in static and dynamic states, both on the ground and in the air. In a multi-channel system the visual scene shall have no obvious mismatch between channels.

11.3.4 ***Latency***

11.3.4.1 Visual scene changes from steady state disturbance shall not occur before the resultant motion onset, but be within the system dynamic response tolerance.

11.3.5 *Field of View*

11.3.5.1 **Minimum Requirement:** The forward display of the visual system shall provide a minimum of 38° horizontal and 25° vertical continuous field of view at each pilot station , and the lower visual display cut-off shall be reasonably coincident with that which exists in the appropriate aircraft.

11.3.5.2 **Bad Weather Circuit Approval Requirement:** In order for a visual system to be approved for visual bad weather circuits, the system shall provide:

a. in the case of continuous-field-of-view systems, either:

   i. A single panoramic display of not less than 200° of continuous horizontal field of view with at least 40° of continuous vertical field of view, or

   ii. A single panoramic display of not less than 150° of continuous horizontal field of view with at least 40° of continuous vertical field of view, provided that the primary navigational display is serviceable and capable of displaying the aircraft's position relative to the runway.

b. In the case of other systems, a horizontal field of view of not less than 100° from the pilot's straight ahead position. The lateral visual display should be such that the pilot can assess the abeam position relative to the downwind end of the runway with a 10° adverse cross wind drift angle. Vertical positioning of the aft screen may be adjusted to enhance runway acquisition.

11.3.6 *Recommended Practice*

11.3.6.1 To facilitate the visual system checks in the ATG, a diagram of the aircraft's geometry (in the final landing configuration) indicating slant range, pilot eye height, radio altitude, barometric altitude and glide slope antenna position should be included.

Sound System

11.4.1 A sound system, automatic in operation, shall be provided to reasonably simulate the various engine, system and aerodynamic sounds at the various noise levels associated with flight deck operation of the appropriate aircraft.

11.4.2 The flight simulator instructor station shall be fitted with a sound control switch.

11.4.3 External sounds which are not recognised as being associated with the aircraft in a particular mode of operation shall not be noticeable within the crew compartment of the flight simulator.

General Provisions

12.1.1 *12.2 Performance Tests for Flight Simulators Assigned LEVELs 2 or 3* lists the minimum performance tests required for flight simulators assigned LEVEL 3 or below. *12.3 Performance Tests for Flight Simulators Assigned LEVEL 4 or Higher* lists the minimum performance tests required for flight simulators assigned LEVEL 4 or higher. Certain tests and requirements apply only to computer-controlled aircraft simulators, and these are annotated "*CCA*".

12.1.2 Sufficient tests must be available to prove the fidelity of the flight simulator. The Authority may require additional tests as deemed necessary.

12.1.3 Configurations chosen for performance tests should be appropriate for the aircraft type. Where a performance test is inappropriate, or where performance is measured elsewhere, the item may be excluded.

12.1.4 Where two tolerances are listed against a performance test item the greater tolerance will apply. An asterisk against a test or item number indicates that the test or item is to be subjectively assessed. The tolerance in such cases is shown as "S".

12.1.5 All tests except those nominated for subjective assessment shall be evaluated against appropriate approved test data. Where a subjective test is required and approved test data is available, the data may be utilised in conjunction with the subjective assessment.

12.1.6 Where a proper relationship has been established over the operating speed range of the aircraft control surface angular deflections may be utilised in lieu of control forces in all areas of performance, using the following tolerances:

a. Elevator ± 2° or ± 10%
b. Aileron ± 1° or ± 10%
c. Spoiler ± 2° or ± 10%
d. Rudder ± 2° or ± 10%.

Required Recording Devices

12.1.7 Where flight simulators are assigned LEVEL 4 or higher a suitable high speed permanent recording device shall be used for the following tests:

- Take-off
- Approach and landing
- Longitudinal stability, and control
- Lateral and directional stability
- Motion system
- Visual system
- Latency.

12.1.8 The high speed permanent recording device shall be capable of recording, where required, at least the following parameters:

a. Control forces or control surface angular deflections:
   i. Pitch control or elevator surface
   ii. Roll control or aileron surface
   iii. Yaw control or rudder surface.
b. Pitch attitude.
c. Roll angle.
d. Yaw angle.
e. Airspeed.
f. Altitude.
g. Time.

Note: For roll control, where a proper relationship exists between aileron and spoiler, either parameter is acceptable.

Additional Requirements for Computer-controlled Aircraft (CCA)

12.1.9 When testing CCA simulators, flight test data is required for both the normal and non-normal control states, unless indicated otherwise in an annotation to the specific test concerned.

12.1.10 Tests in the non-normal state will always include the least augmented state. Tests for other levels of control state degradation may be required as specified by the Authority at the time of definition of a set of specific aircraft tests for simulator data. These may be described in the credit sequences sought by the operator.

12.1.11 Where applicable, flight test data must record:

a. Pilot controller deflection or electronically generated inputs including the location of input.
b. Flight control surface positions, unless test results are independent of, or not affected by, surface positions.

The recording requirements of (a) and (b) above apply to both normal and non-normal states.

12.1.12 All tests called up in 12.2 and 12.3 require test results in the normal control state unless specifically noted otherwise in a comment designated “CCA”.

12.1.13 For A320 flight simulators, the following additional conditions must be satisfied:

a. The side stick controllers and associated force spring and damper systems used in the flight simulator, must be aircraft parts which meet the appropriate aircraft quality control specifications.
b. Control surfaces position must be recorded and available as part of all aircraft (natural and computer controlled) data acquired for simulator validation.
c. Controller deflections or electronically generated inputs and the system location of application of the input, must be available for tests based on aircraft (natural and computer controlled) data.
d. The engineering simulator software model used for validation and proof of compliance must be frozen in the configuration used for reference and strict configuration control enforced.
e. Where engineering simulator data is used for a flight simulator validation reference, the tolerances in this publication, as revised, will not be applicable when comparing the flight simulator to the engineering simulator. Instead, reduced tolerances will be applied which will require an essential match between two sets of data; and
f. Degraded modes of handling qualities, both longitudinal and lateral-directional, resulting from double or greater systems failures must be included in the ATG. This condition is based on the assumption that the aircraft will be dispatched with one flight control channel failed.

Parameters to be Measured

Note: The test numbers in this Part reflect a system previously agreed with operators and **must not** be changed without consultation.

An asterisk against the test or item number indicates that the test or item is to be subjectively assessed. The tolerance in such cases is shown as "S".

Test No.	Parameter to be measured	Tolerance
2.3.0	**Calibration Tests**	
2.3.0.1	**Timing** Check timing devices against flight simulator clock. (Minimum period 300 seconds)	± 1 sec
2.3.1	**Engine Start**	
2.3.1.1	**Engine Parameters (Idle Thrust)** 1. Engine spool speeds 2. EPR 3. EGT 4. Fuel flow for a given EPR or engine spool speed	 ± 2% ± .01 EPR ± 5% or ±10° ± 10%
2.3.2	**Ground Manoeuvring**	
2.3.2.1	Hand operated nosewheel steering force	± 25% or ± 2 lbs
2.3.2.2	*Rate of turn versus nosewheel steering angle	S
2.3.2.3	Rudder pedal steering force	± 25% or ± 2 lbs
2.3.2.4	Toe brakes 1. Maximum displacement 2. Force gradient	 ± 5% ± 10% or ± 5 lbs

Test No.	Parameter to be measured	Tolerance
2.3.3	**Take Off**	
2.3.3.1	**Normal Take Off** 1. Ground acceleration time 2. Ground acceleration distance *3. Directional controllability *4. Nosewheel steering effectiveness *5. Control forces	 ± 5 % or ± 1.5 secs ± 7.5% or ± 250 ft S S S
2.3.3.2	**Rejected Take Off** 1. Ground deceleration time 2. Ground deceleration distance *3. Directional controllability *4. Nosewheel steering effectiveness	 ± 5% or ± 1.5 secs ± 7.5% or ± 250 ft S S
2.3.3.3	**Engine Failure at V1** 1. Ground acceleration time 2. Ground acceleration distance 3. Minimum control speed (ground) or rudder power on ground *4. Column and wheel forces *5. Rudder pedal force *6. Directional controllability *7. Nosewheel steering effectiveness *CCA: Test in normal and non-normal control states*	 ± 5% or ± 1.5 secs ± 7.5% or ± 250 ft ± 5 kts ± 3 kts S S S S
2.3.3.4	**Crosswind** (Maximum crosswind component approved for the aircraft) *1. Directional controllability *2. Roll controllability *3. Column and wheel forces *4. Rudder pedal force *5. Nosewheel steering effectiveness *6. Ground to air transition	 S S S S S S

Test No.	Parameter to be measured	Tolerance
2.3.4	**Climb**	
2.3.4.1	**Second Segment (Engine Inoperative)** *1. Column and wheel forces *2. Rudder pedal force 3. Rate of climb	 S S ± 10% or ± 50 fpm
2.3.4.2	**En-route Climb** 1. Elapsed time to specified altitude 2. Ground distance traversed to specified altitude 3. Fuel used to specified altitude	 ± 15% ± 15% ± 15%
2.3.4.3	**Engine Inoperative Climb** 1. Elapsed time to specified altitude 2. Ground distance traversed to specified altitude 3. Fuel used to specified altitude	 ± 15% ± 15% ± 15%
2.3.4.4	**Approach Climb (Engine Inoperative)** 1. Rate of climb *2. Column and wheel forces *3. Rudder pedal force *CCA Test in normal and non-normal control states*	 ± 10% or ± 50 fpm S S
2.3.4.5	**Landing Climb (All Engines Operative)** 1. Rate of climb *2. Column force (untrimmed) *CCA: Test in normal and non-normal control states*	 ± 10% or ± 50 fpm S
2.3.5	**Cruise**	
2.3.5.1	1. Speed versus thrust 2. Fuel flow versus thrust	±.02M or ± 3 kts ± 5%

Test No.	Parameter to be measured	Tolerance
2.3.6	**Descent**	
2.3.6.1	1. Elapsed time to 5000ft or specified lower altitude 2. Ground distance traversed to 5000 ft or specified lower altitude 3. Fuel used to 5000ft or specified lower altitude	± 15% ± 15% ± 20%
2.3.7	**Approach and Landing**	
2.3.7.1	**Normal** 1. Ground deceleration time 2. Ground deceleration distance *3. Column and wheel forces *4. Rudder pedal force *CCA: Test in normal and non-normal control states*	 ± 5% or ± 1.5 secs ± 7.5% or ± 250 ft S S
2.3.7.2	**Heavy Weight (Maximum Landing Weight)** 1. Ground deceleration time 2. Ground deceleration distance *3. Column and wheel forces *4. Rudder pedal force *CCA: Test in normal and non-normal control states*	 ± 5% or ± 1.5 secs ± 7.5% or ± 250 ft S S
2.3.7.3	**Light Weight** 1. Ground deceleration time 2. Ground deceleration distance *3. Column and wheel forces *4. Rudder pedal force *CCA: Test in normal and non-normal control states*	 ± 5% or ± 1.5 secs ± 7.5% or ± 250 ft S S
2.3.7.4	**Minimum Flap** (Minimum non-normal landing flap certified for the type) 1. Ground deceleration time 2. Ground deceleration distance *3. Column and wheel forces *4. Rudder pedal force	 ± 5% or ± 1.5 secs ± 7.5% or ± 250 S S

Test No.	Parameter to be measured	Tolerance
2.3.7.5	**Engine(s) Inoperative**	
	1. Ground deceleration time	± 5% or ± 1.5 secs
	2. Ground deceleration distance	± 7.5% or ± 250 ft
	*3. Column and wheel forces	S
	*4. Rudder pedal force	S
	*5. Directional controllability	S
	*6. Roll controllability	S
2.3.7.6	**Crosswind Landing**	
	(Maximum crosswind component approved for the aircraft)	
	*1. Directional controllability	S
	*2. Roll controllability	S
	*3. Column and wheel forces	S
	*4. Rudder pedal force	S
	*5. Air to ground transition	S
	*6. Nosewheel steering effectiveness	S
2.3.8	**Stalls**	
2.3.8.1	Configurations: (I) Clean	
	(ii) Take-off flap - gear optional	
	(iii) Landing flap - gear down	
	1. Stickshaker speed	± 4 kts
	2. Airframe buffet speed	± 4 kts
	3. Stall speed	± 4 kts
	*4. G-break	S
	*5. Airframe buffet	S
	CCA: Test in normal and non-normal control states	
2.3.9	**Minimum Control Speed (Air)**	
2.3.9.1	Airspeed	± 5 kts
	Note: This test should be $Vmca_3$ and $Vmca_2$ where appropriate.	
	CCA: Test in normal and non-normal control states	

Test No.	Parameter to be measured	Tolerance
2.3.10	**Longitudinal Controllability** *CCA: Test in normal and non-normal control states*	
2.3.10.1	**Effects of Configuration or Thrust Change** Configurations: (I) Take-off (ii) Approach (iii) Clean	
2.3.10.1.1	**Landing Gear** 1. Pitch angle 2. Rate of climb 3. Column force	 ± 0.5° ± 10% or ± 50 fpm ± 10% or ± 5 lbs
2.3.10.1.2	**Flaps** 1. Pitch angle 2. Rate of climb 3. Column force	 ± 0.5° ± 10% or ± 50 fpm ± 10% or ± 5 lbs
2.3.10.1.3	**Speedbrake** 1. Pitch angle 2. Rate of climb 3. Column force	 ± 0.5° ± 10% or ± 50 fpm ± 10% or ± 5 lbs
2.3.10.1.4	**Thrust** 1. Pitch angle 2. Rate of climb 3. Column force	 ± 0.5° ± 10% or ± 50 fpm ± 10% or ± 5 lbs

Test No.	Parameter to be measured	Tolerance
2.3.11	**Longitudinal Static Stability**	
2.3.11.1	Configurations: (i) Clean (ii) Take-off flap (iii) Landing flap 1. Pitch angle 2. Rate of climb 3. Column force 4. Airspeed 5. EPR or engine spool speeds 6. Stabiliser *CCA: Test in normal and non-normal control states*	 ± 0.5° ± 10% or ±50 fpm ±10% or ± 5 lbs ± 7.5 kts ±.01 EPR or ±2% rpm ± 1.0 units
2.3.12	**Longitudinal Dynamic Stability**	
	Configurations: (i) Clean, high altitude (ii) Take-off flap, low altitude (iii) Landing flap, low altitude **Note:** Of the three tests, at least one is to be conducted at forward CG, and at least one at aft CG. *CCA: Test in normal and non-normal control states*	
2.3.12.1	*Short period	S
2.3.12.2	Phugoid 1. Time to half (or double) amplitude 2. Period	 ± 25% ± 25%
2.3.13	**Longitudinal Manoeuvring Stability**	
2.3.13.1	Column forces during turns (high and low altitude) *CCA: Test in normal and non-normal control states*	± 10% or ± 5 lbs

Test No.	Parameter to be measured	Tolerance
2.3.14	**Lateral Control**	
	Configurations: (i) Clean - high or low altitude (ii) Take-off flap - low altitude (iii) Landing flap - low altitude	
2.3.14.1	Rates of roll (average both directions)	± 10%
2.3.14.2	*Roll overshoot *CCA: Test in normal and non-normal control states*	S
2.3.14.3	*Engine inoperative turn (required in clean configuration only)	S
2.3.15	**Lateral Stability** *CCA: Test in normal and non-normal control states*	
2.3.15.1	**Spiral Stability**	
	Configurations: (I) Take-off flap (ii) Landing flap	
	1. Time to half (or double) angle 2. Control wheel angle	± 15% ± 10% or ± 2°
2.3.15.2	**Dutch Roll** Configurations: (i) Clean - high altitude (ii) Landing flap - low altitude	
	1. Time to half (or double) amplitude 2. Period	± 20% ± 10%
2.3.16	**Flight Attitude and Stabiliser Trim**	
2.3.16.1	Configurations: (i) Clean (ii) Take-off flap (iii) Landing flap	
	1. Pitch angle 2. Stabiliser	± 0.5° ± 1.0 units

Test No.	Parameter to be measured	Tolerance
2.3.17	**In-Flight Acceleration And Deceleration**	
2.3.17.1	Time	± 5%
2.3.17.2	Distance	± 5%
2.3.18	**Flight Control Checks** *CCA: Position versus force is not applicable if an aircraft cockpit controller is used and there is no external position or force modifier required.*	
2.3.18.1	Pitch control force	± 10% or ± 2 lbs
2.3.18.2	Roll control force	± 10% or ± 2 lbs
2.3.18.3	Yaw control force	± 10% or ± 2 lbs
2.3.19	**System Operating Times**	
2.3.19.1	Landing gear operating time (Normal and alternate operation.) 1. Up 2. Down	 ± 3 secs or ± 20% ± 3 secs or ± 20%
2.3.19.2	Flap operating time Normal and alternate operation. Incremental flap selections specified by the operator are to be timed. 1. Up 2. Down	 ± 3 secs or ± 20% ± 3 secs or ± 20%
2.3.20	**Motion System**	
2.3.20.1	*System latency	S
2.3.20.2	*Platform lateral and longitudinal response	S
2.3.20.3	*Motion response to various landing impacts	S

Test No.	Parameter to be measured	Tolerance
2.3.21	**Visual System**	
2.3.21.1	*System latency	S
2.3.21.2	*Horizon alignment with flight deck instrumentation (ground and air).	S
2.3.21.3	Visibility, cloud base, distance-to-threshold correlation. Conditions: Visibility setting, cloud base setting and distance-to-threshold correlation with altitudes of 1000, 500, 300, 200 and 100 ft, or such other altitudes approved by the Authority. At these various altitudes all appropriate strobe, approach, VASIS, runway threshold, runway edge, centreline and touchdown zone lighting shall be visible. 1. Cloud base 2. Visibility 3. Distance to threshold *4. Airfield lighting **Note:** These measurements may be effected in either a static or dynamic state.	 ± 10% or ± 20 ft ± 10% ± 10% S
2.3.21.4	*Correlation of runway edge lighting and centreline lighting at various visibility settings, with the flight simulator located at the take-off position.	S

Parameters to be Measured

Note: An asterisk against the test or item number indicates that the test or item is to be subjectively assessed. The tolerance in such cases is shown as "S".

Test No.	Parameters to be Measured	Tolerance
2.4.0	**Calibration Tests**	
2.4.0.1	**Timing** Check timing devices against flight simulator clock (Minimum period 300 seconds)	± 1 sec
2.4.1	**Engine Start**	
2.4.1.1	**Engine Parameters (Idle Thrust)** 1. Engine spool speeds 2. EPR 3. EGT 4. Fuel flow for a given EPR or engine spool speed	 ± 2% ± 0.01 EPR ± 5% or ±10° ± 10%
2.4.2	**Ground Manoeuvring**	
2.4.2.1	Hand-operated nosewheel steering force	± 25% or ± 2 lbs
2.4.2.2	*Rate of turn versus nosewheel steering angle	S
2.4.2.3	Rudder pedal steering force	± 25% or ± 2 lbs
2.4.2.4	Minimum reversal turn (entry with nosewheel straight)	± 15% or ± 5 ft
2.4.2.5	Symmetrical radius turn (both directions - entry with nosewheel full deflection)	± 5% or ± 2 ft
2.4.2.6	*Nosewheel scuffing	S
2.4.2.7	*Response to nosewheel steering release from a turn	S
2.4.2.8	Toebrakes 1. Maximum displacement 2. Force gradient	 ± 5% ± 10% or ± 5 lbs
2.4.3	**Take Off**	

Test No.	Parameters to be Measured	Tolerance
2.4.3.1	**Normal Take-Off**	
	1. Ground acceleration time	± 5% or ± 1.5 secs
	2. Ground acceleration distance	± 7.5% or ± 250 ft
	3. Column force	± 10% or ± 5 lbs
	or elevator position	± 10% or ± 2°
	4. Rudder pedal force	± 10% or ± 5 lbs
	or rudder position	± 10% or ± 2°
	*5. Directional controllability	S
	*6. Nosewheel steering effectiveness	S
2.4.3.2	**Rejected Take-Off**	
	1. Ground deceleration time	± 5% or ± 1.5 secs
	2. Ground deceleration distance	± 7.5% or ± 250 ft
	*3. Directional controllability	S
	*4. Nosewheel steering effectiveness	S
2.4.3.3	**Engine Failure at V1**	
	1. Ground acceleration time	± 5% or ± 1.5 secs
	2. Ground acceleration distance	± 7.5% or ± 250 ft
	3. Minimum control speed (ground) or	± 5 kts
	rudder power on ground	± 3 kts
	4. (a) Column force	±10% or ± 5 lbs
	or elevator position	± 10% or ± 2°
	(b) Wheel force	± 10% or ± 3 lbs
	or aileron position	± 10% or ± 1°
	5. Rudder pedal force	± 10% or ± 5 lbs
	or rudder position	± 10% or ± 2°
	*6. Directional controllability	S
	*7 Nosewheel steering effectiveness	S
	CCA: Test in normal and non-normal control state	

Test No.	Parameters to be Measured	Tolerance
2.4.3.4	**Crosswind** (Maximum crosswind component approved for the aircraft. If flight test data is not available for the full crosswind component, objective measurement is to be carried out for that crosswind component for which data is available and the full crosswind component is to be assessed subjectively.)	
	*1. Directional controllability	S
	*2. Roll controllability	S
	3. (a) Column force	± 10% or ± 5 lbs
	or elevator position	± 10% or ± 2°
	(b) Wheel force	± 10% or ± 3 lbs
	or aileron position	± 10% or ± 1°
	4. Rudder pedal force	± 10% or ± 5 lbs
	or rudder position	± 10% or ± 2°
	*5. Nosewheel steering effectiveness	S
	*6. Ground to air transition	S
2.4.4 **Climb**		
2.4.4.1	**Second Segment (Engine Inoperative)**	
	1. (a) column force	± 10% or ± 5 lbs
	or elevator position	± 10% or ± 2°
	(b) Wheel force	± 10% or ± 3 lbs
	or aileron position	± 10% or ± 1°
	2. Rudder pedal force	± 10% or ± 5 lbs
	or rudder position	± 10% or ± 2°
	3. Rate of climb	± 10% or ± 50 fpm
2.4.4.2	**En-Route Climb**	
	1. Elapsed time to specified altitude	± 10%
	2. Ground distance traversed to specified altitude	± 10%
	3. Fuel used to specified altitude	± 10%
2.4.4.3	**Engine Inoperative Climb**	
	1. Elapsed time to specified altitude	± 10%
	2. Ground distance traversed to specified altitude	± 10%
	3. Fuel used to specified altitude	± 10%
	*4. Column and wheel forces	S
	*5. Rudder pedal force	S
2.4.4.4	**Approach Climb (Engine Inoperative)**	

Test No.	Parameters to be Measured	Tolerance
	1. Rate of climb 2. (a) Column force or elevator position (b) Wheel force or aileron position 3. Rudder pedal force or rudder position **Note:** Control force or control surface deflection may be measured either in a trimmed or untrimmed condition according to the availability of data. Where the trimmed option is used, trim position must be noted. 4. Stabiliser (if applicable) *CCA: Test in normal and non-normal states*	± 10% or ± 50 fpm ± 10% or ± 5 lbs ± 10% or ± 2° ± 10% or ± 3 lbs ± 10% or ± 1° ± 10% or ± 5 lbs ± 10% or ± 2° ± 1.0 units
2.4.4.5	**Landing Climb (All Engines Operative)** 1. Rate of climb 2. Column force(untrimmed) or elevator position *CCA: Test in normal and non-normal control states*	 ± 10% or ± 50 fpm ± 10% or ± 5 lbs ± 10% or ± 2°
2.4.5 **Cruise**		
2.4.5.1	1. Speed versus thrust 2. Fuel flow versus thrust	± .02M or ± 3 kts ± 2%
2.4.6 **Descent**		
2.4.6.1	1. Elapsed time to 5000 ft or specified lower altitude 2. Ground distance traversed to 5000 ft or specified lower altitude 3. Fuel used to 5000 ft or specified lower altitude	± 10% ± 10% ± 20%

Test No.	Parameters to be Measured	Tolerance
2.4.7	**Approach and Landing**	
2.4.7.1	**Normal** 1. Ground deceleration time 2. Ground deceleration distance 3. Column force or elevator position *4. Rudder pedal force *5. Ground effect **Note:** Both dry and wet runway surfaces required for LEVEL 5. *CCA: Test in normal and non-normal control states*	 ± 5% or ± 1.5 secs ± 7.5% or ± 250 ft ± 10% or ± 5 lbs ± 10% or ± 2° S S
2.4.7.2	**Heavy Weight (Maximum Landing Weight)** 1. Ground deceleration time 2. Ground deceleration distance 3. Column force or elevator position *4. Rudder pedal force *5. Ground effect *CCA: Test in normal and non-normal control states*	 ± 5% or ± 1.5 secs ± 7.5% or ± 250 ft ± 10% or ± 5 lbs ± 10% or ± 2° S S
2.4.7.3	**Light Weight** 1. Ground deceleration time 2. Ground deceleration distance 3. Column force or elevator position *4. Rudder pedal force *5. Ground effect *CCA: Test in normal and non-normal control states*	 ± 5% or ± 1.5 secs ± 7.5% or ± 250 ft ± 10% or ± 5 lbs ± 10% or ± 2° S S
2.4.7.4	**Minimum Certified Flap** 1. Ground deceleration tune 2. Ground deceleration distance 3. Column force or elevator position *4. Rudder pedal force *5. Ground effect	 ± 5% or ± 1.5 secs ± 7.5% or ± 250 ft ± 10% or ± 5 lbs ± 10% or ± 2° S S
2.4.7.5	**Hands Off Landing or Low Level Fly-by**	

Test No.	Parameters to be Measured	Tolerance
	*Ground effect - Including pitch angle, airspeed and vertical speed changes.	S
2.4.7.6	**Engine(s) Inoperative** 1. Ground deceleration time 2. Ground deceleration distance 3. Column force or elevator position 4. Rudder pedal force or rudder position *5. Ground effect **Note:** Where the simulator represents a three or four engined aircraft, a test with two engines inoperative should be included. Where data does not exist, a subjective test must be included to gain a credit sequence.	 ± 5% or ± 1.5 secs ± 7.5% or ± 250 ft ± 10% or ± 5 lbs ± 10% or ± 2° ± 10% or ± 5 lbs ± 10% or ± 2° S
2.4.7.7	**Crosswind Landing** (Maximum crosswind component approved for the aircraft. If flight test data is not available for the full crosswind component, objective measurement is to be carried out for that crosswind component for which data is available, and the full crosswind component is to be assessed subjectively.) *1. Yaw controllability *2. Roll controllability 3. (a) Column force or elevator position (b) Wheel force or aileron position 4. Rudder pedal force or rudder position *5. Air to ground transition *6. Ground effect *7. Nosewheel steering effectiveness	 S S ± 10% or ± 5 lbs ± 10% or ± 2° ± 10% or ± 3 lbs ± 10% or ± 1° ± 10% or ± 5 lbs ± 10% or ± 2° S S S

Test No.	Parameters to be Measured	Tolerance
2.4.8	**Stalls**	
2.4.8.1	Configurations: (i) Clean (ii) Take-off flap (gear optional) (iii) Landing flap (gear down) 1. Stickshaker speed 2. Airframe buffet speed 3. Stall speed *4. G-break *5. Airframe buffet *CCA: Test in normal and non-normal control states*	 ± 2 kts ± 2 kts ± 2 kts S S
2.4.9	**Minimum Control Speed (Air)**	
2.4.9.1	Airspeed **Note:** This test should be $Vmca_3$ and $Vmca_2$ where appropriate. *CCA: Test in normal and non-normal control states*	± 5 kts
2.4.10	**Longitudinal Controllability**	
2.4.10.1	**Effects Of Configuration or Thrust Change** Configurations: (i) Take-off (ii) Approach (iii) Clean *CCA: Test in normal and non-normal control states*	
2.4.10.1.1	**Landing Gear** 1. Pitch angle 2. Rate of climb 3. Column force or elevator position	 ± 0.5° ± 10% or ± 50 fpm ± 10% or ± 5 lbs ± 10% or ± 2°

Test No.	Parameters to be Measured	Tolerance
2.4.10.1.2	**Flaps** 1. Pitch angle 2. Rate of climb 3. Column force or elevator position	 ± 0.5° ± 10% or ± 50 fpm ± 10% or ± 5 lbs ± 10% or ± 2°
2.4.10.1.3	**Speedbrake** 1. Pitch angle 2. Rate of climb 3. Column force or elevator position	 ± 0.5° ± 10% or ± 50 fpm ± 10% or ± 5 lbs ± 10% or ± 2°
2.4.10.1.4	**Thrust** 1. Pitch angle 2. Rate of climb 3. Column force or elevator position	 ± 0.5° ± 10% or ± 50 fpm ± 10% or ± 5 lbs ± 10% or ± 2°
2.4.11 **Longitudinal Static Stability**		
2.4.11.1	Configurations: (i) Clean (ii) Take-off flap (iii) Landing flap 1. Pitch angle 2. Rate of climb 3. Column force or elevator position 4. Airspeed 5. EPR or engine spool speeds 6. Stabiliser *CCA: Test in normal and non-normal control states*	 ± 0.5° ± 10% or ± 50 fpm ± 10% or ± 5 lbs ± 10% or ± 2° ± 5 kts ±.01 EPR or ±2% rpm ± 0.5 units

2.4.12 **Longitudinal Dynamic Stability**

Test No.	Parameters to be Measured	Tolerance
	Configurations: (i) Clean, high altitude (ii) Take-off flap, low altitude (iii) Landing flap, low altitude **Note:** Of the three tests, at least one is to be conducted at forward CG, and at least one at aft CG. *CCA: Test in normal and non-normal control states*	
2.4.12.1	Short period	± 10% or ± 1.0 secs
2.4.12.2	Phugoid 1. Time to half (or double) amplitude or damping ratio 2. Period	 ± 20% ± .02 ± 10%
2.4.13 **Longitudinal Manoeuvring Stability**		
2.4.13.1	Column forces during turns (high and low altitude) *CCA: Test in normal and non-normal control states*	± 10% or ± 5 lbs
2.4.14 **Lateral Control**		
	Configurations (i) Clean - high or low altitude (ii) Take-off flap - low altitude (iii) Landing flap - low altitude	
2.4.14.1	Rates of roll (average both directions	± 10%
2.4.14.2	Roll overshoot *CCA: Test in normal and non-normal control states*	± 5°
2.4.14.3	*Engine inoperative turn (clean configuration)	S

Test No.	Parameters to be Measured	Tolerance
2.4.15	**Lateral Stability**	
2.4.15.1	**Spiral Stability** Configurations: (i) Take-off flap (ii) Landing flap 1. Time to half (or double) angle 2. Control wheel angle *CCA: Test in normal and non-normal control states*	 ± 7.5% ± 7.5% or ± 1.5°
2.4.15.2	**Dutch Roll** Configurations: (i) Clean - high altitude with aft CG (ii) Landing flap -low altitude 1. Time to half (or double) amplitude or damping ratio 2. Period *CCA: Test in normal and non-normal control states*	 ± 20% ± .02 ± 10%
2.4.16	**Flight Attitude and Stabiliser Trim**	
2.4.16.1	Configurations: (i) Clean (ii) Take off flap (iii) Landing flap 1. Pitch angle 2. Stabiliser	 ± 0.5° ± 0.5 Units
2.4.17	**In-Flight Acceleration and Deceleration**	
	Note: The airspeed change must be such that an adequate time frame is possible, with a minimum variation of 50 kts.	
2.4.17.1	Time	± 5%
2.4.17.2	Distance	± 5%

Test No.	Parameters to be Measured	Tolerance
2.4.18	**Flight Control Checks**	
	CCA: Position versus force is not applicable if an aircraft cockpit controller is used and there is no external position or force modifier required	
2.4.18.1	Pitch control forces	± 10% or ± 2 lbs
2.4.18.2	Roll control forces	± 10% or ± 2 lbs
2.4.18.3	Yaw control forces	± 10% or ± 2 lbs
2.4.19	**System Operating Times**	
2.4.19.1	Landing gear operating time (normal and alternate operation) 1. Up 2. Down	 ± 3 secs or ± 20% ± 3 secs or ± 20%
2.4.19.2	2.4.19.3 2.4.19.4 2.4.19.5	 ± 3 secs or ± 20% ± 3 secs or ± 20%
2.4.20	**Motion System**	
2.4.20.1	System latency	see Part 13
2.4.20.2	Quietness	see Part 13
2.4.20.3	Positional performance - linearity	see Part 13
2.4.20.4	Acceleration performance	see Part 13
2.4.20.5	*Motion response to various landing impacts	S

Test No.	Parameters to be Measured	Tolerance
2.4.21 **Visual System**		
2.4.21.2	System latency	see Part 13
2.4.21.3	*Horizon alignment with flight deck instrumentation (ground and air)	S
2.4.21.4	Visibility, cloud base, distance-to-threshold correlation. Visibility setting, cloud base setting, and distance to threshold are to be correlated with altitudes of 1000, 500, 300, 200 and 100 ft, or such other altitudes approved by the Authority. At each specified altitude all appropriate strobe, approach, VASIS, runway threshold, runway edge, centreline and touchdown zone lighting shall be visible when cloudbase and visibility would permit. 1. Cloud base 2. Visibility 3. Distance to threshold *4. Airfield lighting **Note:** These measurements may be effected in either a static or dynamic state.	 ± 10% or ± 20 ft ± 10% ± 10% S
2.4.21.5	*Correlation of runway edge lighting and centreline lighting with various visibility settings, with the flight simulator located at the take-off position.	S
2.4.21.6	Visual scene static and dynamic stability (ground and air)	see Part 13

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LEVEL 1-A Credits (Visual System Inoperative)

13.1.1 The credits available to an approved LEVEL 1-A synthetic trainer are:

CAO 40.2.1 Appendix II Section 2, CAR 5.60, 5.76, 5.187(2)

a. All the credits applicable to an Approved Synthetic Trainer in accordance with CAO 40.2.1 Appendix II Section 2, CAR 5.60, CAR 5.76 and CAR 5.187(2).

b. Endorsement training in air work sequences including instrument approaches to minima.

LEVEL 1-B Credits (Motion System Inoperative)

13.1.2 The credits available to an approved LEVEL 1-B synthetic trainer are:

a. All the credits available to LEVEL 1-A synthetic trainers.

b. Endorsement training in all sequences, but excluding take-offs, landings, ground manoeuvring, manoeuvres involving buffet, and the endorsement flight simulator proficiency test (if called up by an approved training syllabus).

LEVEL 2 Credits

13.1.3 The credits available to an approved LEVEL 2 flight simulator are:

a. All the credits available for LEVELs 1-A and 1-B.

b. LEVEL 2 additional credits which are:

CAO 40.1.5, 43.1, 43

CAR 5.81, 5.108, 5.116, 5.173, 5.192, 5.85, 5.112, 5.169, 5.191, 5.193, 217

i. The endorsement flight simulator proficiency test (if called up by an approved training syllabus), one of the two annual competency tests required by CAR 217, and those sequences of the Flight Proficiency Test approved by the Authority in accordance with CAO 40.1.5 Appendix II.

ii. The flight engineer flight proficiency test in accordance with CAO 43.1 Appendix 1.

iii. The aeronautical experience simulator credits and recent experience simulator credits as granted in CAO 43.1.

iv. Proficiency test for the initial issue or renewal of an instrument rating, including initial endorsement of all radio aids. Where the visual system meets the requirements listed at Part 11 para 11.3.5.2 the bad weather circuit may be demonstrated in the simulator; where it does not, the bad weather circuit must be demonstrated in an aircraft.

v. All credits applicable to an approved synthetic trainer in accordance with CARs 5.81 5.108 5.116 5.173 5.192 5.85 5.112 5.169 5.191 5.193

LEVEL 3 Credits

13.2.1 In order for an approved flight simulator to be eligible for LEVEL 3 credits the flight simulator must meet the requirements stipulated in Part 11 and the additional requirements nominated in this section.

13.2.2 The credits available to an approved LEVEL 3 flight simulator are:

a. All the credits available for LEVELs 1-A and 1-B, which are:

CAO 40.2.1 Appendix II Section 2

CAR 5.6O, 5.76, 5.187(2)

i. All the credits applicable to an Approved Synthetic Trainer in accordance with CAO 40.2.1 Appendix II Section 2, CAR 5.60, CAR 5.76 and CAR 5.187(2).

ii. Endorsement training in air work sequences including instrument approaches to minima.

iii. Endorsement training in all sequences, but excluding take-offs, landings, ground manoeuvring, manoeuvres involving buffet, and the endorsement flight simulator proficiency test (if called up by an approved training syllabus).

b. LEVEL 2 additional credits which are:

CAO 40.1.5 Appendix II, 43.1

CAR 5.81, 5.108, 5.116, 5.173, 5.192, 5.85, 5.112, 5.169, 5.191, 5.193, 217

i. The endorsement flight simulator proficiency test (if called up by an approved training syllabus), one of the two annual competency tests required by CAR 217, and those sequences of the Flight Proficiency Test approved by the Authority in accordance with CAO 40.1.5 Appendix II.

ii. The flight engineer flight proficiency test in accordance with CAO 43.1 Appendix 1.

iii. The aeronautical experience simulator credits and recent experience simulator credits as granted in CAO 43.1.

iv. Proficiency test for the initial issue or renewal of an instrument rating, including initial endorsement of all radio aids. Where the visual system meets the requirements listed at Part 11 para 11.3.5.2, the bad weather circuit may be demonstrated in the simulator; where it does not, the bad weather circuit must be demonstrated in an aircraft.

v. All credits applicable to an approved synthetic trainer in accordance with CARs:

5.81	5.108	5.116	5.173	5.192
5.85	5.112	5.169	5.191	5.193

c. LEVEL 3 additional credits, which are:

CAR 5.169.2(b), 5.173, 217

i. The aircraft flight review test in accordance with CAR 5.169.2(b).

ii. The aeronautical experience simulator credits granted in CAR 5.173.

iii. The competency checks required by CAR 217.

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LEVEL 3 Additional Requirements

13.2.3 *Visual System*

13.2.3.1 The visual scene shall have a quality at least equal to that of a computer generated image visual system which provides a realistic representation of airports required by the training credits, and which is projected by an optical system which has a focussed image greater than 30 feet from the pilot's viewing position.

13.2.3.2 The effect of the aircraft landing lights shall be portrayed and shall be selectable.

LEVEL 4 Credits

13.3.1 In order for an approved flight simulator to be eligible for LEVEL 4 credits, the flight simulator must meet the requirements stipulated in Part 11, para 13.2 and the additional requirements nominated in this section.

13.3.2 The credits available to an approved LEVEL 4 flight simulator are:

a. All the credits available for LEVELs 1-A and 1-B, which are:

CAO 40.2.1 Appendix II Section 2, CAR 5 60, 5.76, 5.187(2)

i. All the credits applicable to an Approved Synthetic Trainer in accordance with CAO 40.2.1 Appendix II Section 2, CAR 5.60, CAR 5.76 and CAR 5.187(2);

ii. Endorsement training in airwork sequences including instrument approaches to minima; and

iii. Endorsement training in all sequences, excluding take-offs, landings, ground manoeuvring, manoeuvres involving buffet, and the endorsement flight simulator proficiency test (if called up by an approved training syllabus).

b. LEVEL 2 additional credits which are:

CAO 40 1.5 Appendix 1, 43.1, Appendix II, 43.1,

i. The endorsement flight simulator proficiency test (if called up by an approved training syllabus), one of the two annual competency tests required by CAR 217, and those sequences of the Flight Proficiency Test approved by the Authority in accordance with CAO 40 1.5 Appendix II;

CAR 5.81, 5.108, 5.116, 5.173, 5.192, 5.85, 5.112, 5.169, 5.191, 5.193, 217

ii. The flight engineer flight proficiency test in accordance with CAO 43.1 Appendix 1,

iii. The aeronautical experience simulator credits and recent experience simulator credits as granted in CAO 43.1

iv. Proficiency test for the initial issue or renewal of an instrument rating, including initial endorsement of all radio aids. Where the visual system meets the requirements listed at Part 11 para 11.3.5.2 the bad weather circuit may be demonstrated in the simulator; where it does not, the bad weather circuit must be demonstrated in an aircraft; and

v. All credits applicable to an approved synthetic trainer in accordance with CARs 5.81 5.108 5.116 5.173 5.192 5.85 5.112 5.169 5.191 5.193.

c. LEVEL 3 additional credits, which are:

CAR 2.169.2(b), 5.173, 217

i. The aircraft flight review test in accordance with CAR 5.169.2(b); and

ii. The aeronautical experience simulator credits granted in CAR 5.173; and

iii. The competency checks required by CAR 217.

d. LEVEL 4 additional credits which are recent experience requirements for take-off and landing (day and night) in accordance with:

CAO 40.1.5 para 11.3, 40.1.5 para 11.4(b), 40.1.5 para 11.7, 40.1.5 Appendix II para 5

CAO 40.1.5 para 11.3 CAR 5.82,
CAO 40.1.5 para 11.4(b) CAR 5.109,
CAO 40.1.5 para 11.7 CAR 5.170
CAO 40.1.5 Appendix II para 5.

CAR 5.82, 5.109, 5.170

LEVEL 4 Additional Requirements

13.3.3 *Performance*

13.3.3.1 The aerodynamic programming shall include:

a. Proper flare and touchdown characteristics. These shall include data on lift, drag and the pitching moments in ground effect.

b. Ground reaction of the aircraft on contact with the runway during landing including landing gear deflections, tyre friction and side forces.

c. Ground handling characteristics and proper ground air transition. These effects shall include crosswind, brakes, thrust reverse, acceleration, deceleration and steering, including turn manoeuvres.

13.3.4 *Latency*

13.3.4.1 The individual responses of the motion, the visual and the flight deck instrument systems to sharp pitch, roll and yaw inputs applied to the control column and rudder pedals shall be such that they provide proper sensory cue integration and respond within 225 ms of the time but not before the time when the aircraft would respond under the same conditions.

Note: The visual system response time shall be deemed to terminate at the completion of the visual display scan of the first video field giving different information as the result of a control input.

13.3.5 *Motion System*

13.3.5.1 The system shall provide motion cues representative of all aircraft manoeuvres and systems operations. The quality of the cues developed must be equal to those developed by a motion system possessing six degrees of freedom of movement.

13.3.5.2 To demonstrate quietness the motion system shall remain within 0.025% of full leg extension while the input signal is held static (eg. 15/1000" for a 60" system).

13.3.5.3 The system shall possess a linear frequency response to a sine wave input with a tolerance of ±1 dB up to a comer frequency of 1 Hz, where it may be no more than 3 dB down.

13.3.5.4 The system shall be capable of producing an acceleration of 1 g (+0.5 g to -0.5 g amplitude change) up to 3 Hz and better than .02 g (+0.01 to -0.01 g amplitude change) at 10 Hz. The acceleration performance, once established, will not be required to be demonstrated on a recurrent basis because of the possibility of damage at the higher frequencies.

13.3.5.5 The system shall reasonably portray the effect of ground surface roughness.

13.3.6 *Visual System*

13.3.6.1 The visual system shall be fully compatible with the aerodynamic program of the flight simulator.

13.3.6.2 The visual cues provided shall be such as to permit the assessment of sink rate and depth perception during landings.

13.3.6.3 The visual scene when compared to flight instrument readouts shall show no perceptible lag.

13.3.6.4 The effect of the aircraft landing and taxi lights shall be adequately portrayed and shall be selectable.

13.3.7 *Sound System*

13.3.7.1 The sound system provided shall be directional and shall be automatic in operation. It shall provide engine sounds varied by operating conditions and representative aerodynamic sounds varied as a function of airspeed. In addition, the effects of runway rumble shall be represented.

13.3.7.2 Representative sounds of system operation shall be provided, particularly relating to the operation of flaps, slats, spoilers and landing gear.

13.3.8 *Miscellaneous*

13.3.8.1 A suitable high speed permanent recording device capable of recording LEVEL 4 performance tests shall be provided.

LEVEL 5 Credits

13.4.1 In order for an approved flight simulator to be eligible for LEVEL 5 credits, the flight simulator must meet the requirements stipulated in Part 11, paras 13.2 and 13.3, and the additional requirements nominated in this section.

13.4.2 The credits available to an approved LEVEL 5 flight simulator are:

a. All the credits available for LEVELs 1-A and 1-B, which are:

CAO 40.2.1 Appendix II Section 2, CAR 5.60, 5.76, 5.187(2)

i. All the credits applicable to an Approved Synthetic Trainer in accordance with CAO 40.2.1 Appendix II Section 2, CAR 5.60, CAR 5.76 and CAR 5.187(2).

ii. Endorsement training in air work sequences including instrument approaches to minima.

iii. Endorsement training in all sequences, but excluding take-offs, landings, ground manoeuvring, manoeuvres involving buffet, and the endorsement flight simulator proficiency test (if called up by an approved training syllabus).

b. LEVEL 2 additional credits which are:

CAO 40.1.5 Appendix II, CAO 43.1 Appendix I, 43.1

i. The endorsement flight simulator proficiency test (if called up by an approved training syllabus), one of the two annual competency tests required by CAR 217, and those sequences of the Flight Proficiency Test approved by the Authority in accordance with CAO 40.1.5 Appendix II.

CAR 5.81, 5.108, 5.116, 5.173, 5.192, 5.85, 5.112, 5.169, 5.191, 5.193, 217

ii. The flight engineer flight proficiency test in accordance with CAO 43.1 Appendix 1.

iii. The aeronautical experience simulator credits and recent experience simulator credits as granted in CAO 43.1.

iv. Proficiency test for the initial issue or renewal of an instrument rating, including initial endorsement of all radio aids. Where the visual system meets the requirements listed at Part 11 para 11.3.5.2, the bad weather circuit may be demonstrated in the simulator; where it does not, the bad weather circuit must be demonstrated in an aircraft.

v. All credits applicable to an approved synthetic trainer in accordance with

CARs	5.81	5.108	5.116	5.173	5.192
	5.85	5.112	5.169	5.191	5.193

c. LEVEL 3 additional credits, which are:

CAR 5.169.2(b), 5. 173, 217

i. The aircraft flight review test in accordance with CAR 5.169.2(b).

ii. The aeronautical experience simulator credits granted in CAR 5.173.

iii. The competency checks required by CAR 217.

d. LEVEL 4 additional credits which are recent experience requirements for take off and landing (day and night) in accordance with:

CAO 40.1.5 para 11.3, 40.1.5 para 11.4(b), 40.1.5 para 11.7, 40.1.5 Appendix II para 5
CAR 5.82, 5.109, 5.170

CAO 40.1.5 para 11.3	CAR 5.82
CAO 40.1.5 para 11.4(b)	CAR 5.109
CAO 40.1.5 para 11.7	CAR 5.170
CAO 40.1.5 Appendix II para 5.	

e. LEVEL 5 additional credits, which are all endorsement training sequences in accordance with CAO 40.1.0 Appendix 3 and Appendix 5, including the endorsement flight proficiency test, but excluding the aircraft post-endorsement route training and the flight proficiency test on an air route.

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LEVEL 5 Additional Requirements

13.4.3 ***Performance***

13.4.3.1 The flight simulator shall provide:

a. Representative stopping and directional control forces for wet and dry runway conditions based on flight test data or other appropriate data approved by the Authority.

b. Representative crosswind and three dimensional windshear dynamics based on flight test data or other appropriate data approved by the Authority; and

c. Representative brake failure dynamics, tyre failure dynamics and decreased brake efficiency due to high brake temperatures based on the manufacturer's data or other data approved by the Authority.

13.4.3.2 Operational flight management systems shall be provided including systems such as inertial and area navigation, auto-throttle and performance data computation.

13.4.3.3 The flight simulator shall have sufficient computer capacity, accuracy and resolution to meet the computer program requirements of LEVEL 5. Computer resolution equivalent to that of at least a 32 bit word length computer is required for critical areas of the aerodynamic program.

13.4.3.4 In order to permit the flight dynamics to properly integrate with the visual simulation all critical dynamic equations shall employ at least a 30 Hz iteration rate in the digital computer.

13.4.3.5 The individual responses of the motion, the visual and the flight deck instrument systems to sharp pitch, roll and yaw inputs applied to the control column and rudder pedals shall be such that they provide proper sensory cue integration and respond within 150 ms of the tune but not before the time when the aircraft would respond under the same conditions.

> **Note:** The visual system response tune shall be deemed to terminate at the completion of the visual display scan of the first video field giving different information as the result of a control input.

13.4.4 *Motion System*

13.4.4.1 The system shall provide motion cues representative of all aircraft manoeuvres and systems operations. The quality of the cues developed must be equal to or better than those developed by a synergistic low friction motion system possessing six degrees of freedom of movement.

13.4.4.2 To demonstrate quietness, the motion system shall remain within 0.025% of full leg extension while the input signal is held static (eg within 15/1000" for a 60" system).

13.4.4.3 The system shall possess a linear frequency response to a sine wave input with a tolerance of ±1 dB amplitude performance up to a corner frequency of 3 Hz where it may be no more than 3 dB down.

13.4.4.4 The system shall be capable of producing an acceleration of 1 g (+0.5 to - 0.5 g amplitude change) up to 10 Hz and better than .02 g (+0.01 to -0.01 g amplitude change) at 30 Hz. The acceleration performance, once established, will not be required to be demonstrated on a repetitive basis because of the possibility of damage at the higher frequencies.

13.4.5 *Visual System*

13.4.5.1 The visual system shall provide dusk or daylight in addition to night visual scenes of specific airport models, including general terrain characteristics, significant landmarks, taxiway holding points, significant terrain hazard beacons and those lights normally seen while conducting a visual circuit. The system shall have a minimum capability of producing 10 layers of occulting.

13.4.5.2 The visual scene displayed shall be stable in all static and dynamic states, both on the ground and in the air.

13.4.5.3 The visual system shall realistically portray runway surface.

13.4.5.4 All radio navigation aids shall be correctly orientated in relation to the airport runway layout.

13.4.5.5 Test procedures and equipment shall be provided to confirm the visual system colours, runway visual range, focus and intensity of the visual scene as viewed from the flight deck crew positions. In addition, equipment shall be provided to measure the horizon position in pitch and roll, as compared with that shown on the flight simulator attitude indicators.

13.4.5.6 The optical system shall:

a. **In the case of continuous-field-of-view systems,** be a single panoramic display of not less than 150° of continuous horizontal field of view. It shall provide a continuous vertical field of view of not less than 40°; or

b. **In the case of other systems**, simultaneously provide two continuous fields of view each of which has a horizontal span of not less than 75° and an inboard extremity located at the centreline of the flight simulator. It shall provide a continuous vertical field of view of not less than 30°. These fields of view shall be measured from the approved eye position at each pilot seat. Visual gaps shall be held to a minimum where they do not occur in positions appropriate to the aircraft type represented.

13.4.6 ***Sound System***

13.4.6.1 The sound system provided shall be capable of representing precipitation noises varied as a function of airspeed.

13.4.6.2 The system shall generate taxi, take-off and landing noises for various degrees of runway surface roughness.

13.4.6.3 The system shall provide representative aerodynamic sounds varied as a function of aircraft altitude.

13.4.6.4 The system shall provide sounds representative of those occurring in the event of a rapid depressurisation.

13.4.7 ***Miscellaneous***

A suitable high speed permanent recording device capable of recording LEVEL 5 performance tests shall be provided.

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LEVEL 6 Credits and Additional Requirements

13.5.1 RESERVED

14. The Qualification of Airplane Flight Simulators

14.1 Acceptance of International Standards

Approved by Assistant Director, Aviation Safety Standards Version 6.0: July 1999

General Provisions

14.1.1 The Authority approves the use of the International Standards for the Qualification of Airplane Flight Simulators, published by ICAO as document number DOC 9625-AN/938 first edition, dated 1995 as a standard which may be used for defining an international Qualifications Test Guide (IQTG) in lieu of the ATG required by Part 2 and subsequent Parts. The IQTG so defined may be used to accredit a flight simulator in accordance with Part 4, or to conduct recurrent fidelity checks in accordance with Part 6, and reference in this publication to an ATG may be deemed to include reference to an IQTG.

Equivalent Standards

14.1.2 The LEVEL II standard defined in the international Standards for the Qualification of Airplane Flight Simulators meets the FSD-1 LEVEL 5 standard defined in Part 13, and a simulator verified to LEVEL II standard is approved by the Authority for all credits listed in Part 13, para 13.4.2.

14.1.3 The LEVEL I standard defined in the International Standards for the Qualification of Airplane Flight Simulators meets the FSD-1 LEVEL 4 standard defined in Part 13, and a simulator verified to LEVEL I standard is approved by the Authority for all credits listed in Part 13 para 13.3.2.

Ratification of Revisions to ICAO Document

14.1.4 Revisions to the ICAO document, including subsequent editions of the document, will require ratification by the Authority before being accepted. Revisions will not automatically supersede the provisions currently being accepted by the Authority.

15. Requirements for the Use of Foreign Flight Simulators

15.1 Introduction

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Purpose and Scope of this Part

15.1.1 For the purpose of this section "foreign" means a person or device (according to context) not licensed by or subject to the jurisdiction of the Authority.

15.1.2 This part lists the requirements to be met by an Australian training and checking organisation wishing to utilise a foreign flight simulator, which has not been accredited by the Authority.

Application for Approval of Use

15.2.1 Where an operator proposes to make use of a foreign flight simulator that has not been approved to the international standards, he or she shall apply in writing for approval from the Authority, not less than 20 working days prior to the first intended use. The application shall include the following details:

a. The type of training to be undertaken, and either:

i. The LEVEL to which accreditation is sought, or

ii. The sequences for which credit is sought, as applicable

b. The length of time or the total amount of training envisaged

c. The Australian equivalent standard of the simulator and the level of approval assigned by the supervising foreign regulatory authority.

d. An Accreditation Test Guide suitable for the LEVEL or credit sequences sought.

Accreditation

15.2.2 Where the operator seeks LEVEL 2 or specific credits only, then:

a. The Authority (or, if the operator is approved to conduct accreditation checks, the operator) will specify the nature and extent of the accreditation tests required.

b. The Authority, (or, if the operator is approved to conduct accreditation checks, the operator) will provide an accreditation team consisting of at least one pilot endorsed and current on the appropriate aircraft type, and for those aircraft which include a flight engineer position, a flight engineer endorsed and current on the appropriate aircraft type. Where the team consists of more than one person, the accrediting authority shall appoint one of the persons to be the team leader.

15.2.3 Where accreditation is sought at LEVEL 3 or higher, the requirements of Part 4 will apply.

Recurrent Fidelity Checks

15.2.4 Where the operator is using the simulator for specific credits only, the need for recurrent fidelity checks should not arise. Approval to use a foreign simulator for specific credits will normally be given only for specified short periods.

15.2.5 Where the operator is using the simulator at LEVEL 2 or higher, recurrent fidelity checks shall be as required by Part 6, relevant to the LEVEL of use.

Application for Approval of Use

15.2.6 Where an operator proposes to make use of a foreign flight simulator which has been approved to the international standards, he or she shall apply in writing for approval from the Authority, not less than 20 working days prior to the first intended use. The application shall include the following details:

a. The type of training to be undertaken, and either:

i. The LEVEL to which accreditation is sought, or

ii. The sequences for which credit is sought as applicable.

b. The length of time or the total amount of training envisaged.

c. The Australian equivalent standard of the simulator and the level of approval assigned by the supervising foreign regulatory authority.

Validation Check

15.2.7 On receipt of the application the Authority will satisfy itself of the validity of the foreign simulator's status.

a. Where a Memorandum of Understanding does not exist with the foreign State concerned, the Authority may obtain a certified summary of the results of the IQTG tests for the foreign simulator and conduct a validation check of all or pan of the sequences for which the operator seeks credit.

b. Where a Memorandum of Understanding exists, it may be sufficient for the Authority to obtain statement of compliance from the foreign Regulatory Authority having jurisdiction over the simulator.

Recurrent Fidelity Checks

15.2.8 Where continued use of the simulator dictates the need, the operator shall obtain written certification at appropriate intervals, that a recurrent fidelity check has been satisfactorily completed by the Regulatory Authority having jurisdiction over the simulator. The intervals between recurrent fidelity checks shall be as specified by the Regulatory Authority having jurisdiction. The operator shall not use the foreign simulator after the applicable interval has expired unless the operator holds a certificate of fidelity issued by the foreign Regulatory Authority for the current period.

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Foreign Personnel Authorised to Conduct Training

15.3.1 Endorsement or recurrent training may be conducted by foreign personnel provided they are approved by the Authority.

15.3.2 Foreign flight simulator pilot instructors and flight engineer instructors may be granted approval following successful completion of a demonstration of ability to an Authority Flying Operations Inspector, in a flight simulator representative of the aircraft type for which the approval is sought.

15.3.3 Unless earlier cancelled, an approval granted to a foreign person to conduct training in an approved flight simulator shall be valid for twelve months, and may be renewed following a further demonstration of ability to an Authority Flying Operations Inspector, in a flight simulator representative of the aircraft type for which the approval is sought.

15.3.4 Foreign personnel will not be approved to conduct tests on behalf of the Authority.

16 Rotary-wing Flight Simulators

16.1 Acceptance of FAA Tests for Accreditation

Approved by Assistant Director, Aviation Safety Standards Version 6.0: July 1999

General Provisions

16.1.1 Subject to the requirements of paras 16.1.7 to 16.1.15, the Authority approves the use of the tests prescribed in Appendices 1, 2 and 3 of FAA document AC 120-63 dated 11 Oct 94 for the purpose of accrediting rotary-wing flight simulators, in lieu of the tests prescribed at Parts 5 and 12 of this publication. A reference in this Part to "FAA tests" shall be understood to refer to the tests in Appendices 1, 2 and 3 of FAA document AC 120-63 dated 11 Oct 94.

16.1.2 An ATG constructed on the basis of the FAA tests may be used to accredit a flight simulator in accordance with Part 4, or to conduct recurrent fidelity checks in accordance with Part 6, and reference in this publication to an ATG may be deemed to include reference to an ATG containing the FAA tests. A simulator accredited using an ATG based on the FAA tests must satisfy the requirements of all parts of this publication in all other respects.

Equivalent Standards

16.1.3 A simulator accredited in compliance with the General Provisions described above, and which satisfies the FAA tests prescribed for LEVEL D meets the FSD-1 LEVEL 5 standard defined in Part 13 and is approved by the Authority for all credits listed in Part 13 para 13.4.2.

16.1.4 A simulator accredited in compliance with the General Provisions described above, and which satisfies the FAA tests prescribed for LEVEL C meets the FSD-1 LEVEL 4 standard defined in Part 13 and is approved by the Authority for all credits listed in Part 13 para 13.3.2.

16.1.5 A simulator accredited in compliance with the General Provisions described above, and which satisfies the FAA tests prescribed for LEVEL B meets the FSD-1 LEVEL 3 standard defined in Part 13 and is approved by the Authority for all credits listed in Part 13 para 13.2.2.

Required Variations to FAA Tests

16.1.6 In order to satisfy the requirements of the Authority, the FAA tests in an ATG constructed under the provisions stated in paras 16.1.1 to 16.1.2, shall be varied as set out in the following paragraphs.

16.1.7 ***Reference to FAA***

16.1.7.1 References to the FAA, NSPM and FARs shall be deemed to refer to CASA, designated CASA officers and CARs respectively, according to context, and a reference to a QTG shall be deemed to be a reference to an ATG.

16.1.8 ***Numerical Values***

16.1.8.1 Numerical values shall be presented in units acceptable to CASA..

16.1.9 ***Communication and Navigation Equipment***

16.1.9.1 The communication and navigation equipment specified at FAA App 1 para 2e shall be deemed to include caution and warning equipment.

16.1.10 ***Simulator Systems***

16.1.10.1 The words
"Three systems …" at FAA App 1 para 2g shall be deemed to read “The systems …”.

16.1.11 ***Crash Simulation***

16.1.11.1 The words “landing gear” in the final sentence of FAA App 1 para 2k shall be deemed to be deleted.

16.1.12 ***Wind Speed and Direction***

16.1.12.1 The requirements of FAA App 1 para 2n shall be deemed to include the requirement for wind shear prescribed by the ICAO Manual of Criteria for the Qualification of Flight Simulators App A para 1n.

16.1.13 ***Motion System***

16.1.13.1 The words of FAA App 1 para 3c shall be deemed to read “A motion system which produces cues equivalent to a 6-DOF synergistic motion system.”

16.1.14 ***Visual System Additional Requirements***

16.1.14.1 The requirements set out in the ICAO Manual of Criteria for the Qualification of Flight Simulators App B paras 4e (visual scene content), 4f (weather effects) and 4g (flight compatibility) shall be deemed to be inserted following FAA App 2 para 4f.

16.1.15 ***Sound System Additional Requirements***

16.1.15.1 The requirements set out in the ICAO Manual of Criteria for the Qualification of Flight Simulators App B paras 5a, 5b and 5c shall be deemed to replace the requirements of FAA App 2 para 5b.

Revision of FAA Tests

Revisions to the FAA tests issued by the US regulatory authority, including subsequent editions of the FAA document, will not automatically supersede the requirements of this part unless such revisions are ratified by the Authority.

17 Definitions

Approved by Assistant Director, Aviation Safety Standards Version 6.0: July 1999

Accreditation	Accreditation is the process by which the Authority formally approves a flight simulator, in order to recognise or assign credit for training and/or testing conducted in that simulator. The complete process of accreditation includes: ▫ Acceptance of the **Accreditation Test Guide** ▫ Conduct of the **accreditation check** ▫ Assignment of a **LEVEL** of accreditation ▫ The necessary associated administrative procedures.
Accreditation Check	An accreditation check is the process of verification of a simulator's fidelity and compliance with the required standards, using a set of tests accepted by the Authority as adequate for that purpose. The Authority may delegate the conduct of an accreditation check to an approved operator.
Accreditation Test Guide (ATG)	An ATG is a document which contains a set of flight simulator tests based on **approved test data**, compiled by the operator and approved by the Authority. The ATG encompasses all tests deemed necessary by the Authority to prove the fidelity of the flight simulator's performance and systems characteristics, in the accreditation check and subsequent recurrent fidelity checks.
Approved Flight Simulator	An approved flight simulator is one accredited under the provisions of this publication for use by Australian Flight Crew Licence holders.
Approved Test Data	Approved test data is data approved by the Authority as a basis for the tests contained in an ATG. It will normally consist of data provided by an aircraft manufacturer from the results of aircraft measurements, or obtained from flight tests conducted by the operator and observed by an authorised representative of the Authority, or from other sources approved by the Authority. Where such data is not available, for example, because the aircraft type is still undergoing development tests, the Authority may approve the use of predicted data for an agreed limited period. It is a requirement that, where possible, flight test data should represent the **mean of aircraft performance**, and not reflect the possible idiosyncratic behaviour of one particular test vehicle. This requirement can normally only be met by the aircraft manufacturer, and operators are advised, when entering into arrangements for the provision of test data for use in an ATG, to ensure that the supplier is aware of the requirement.
Authority	The Civil Aviation Safety Authority

17 Definitions

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Authority's pilots	The term "Authority's pilots" used in this publication, means the Authority's pilot-qualified Flying Operations Inspectors.
Automatic Test Program (Autodriver)	An autodriver is a subsidiary computer program designed to automatically execute a performance test on a flight simulator. The program is normally constructed so as to set and maintain the various parameters required for the test, and to make the initial inputs required for the conduct of the test.
Credit Sequences	Credit sequences are training sequences including normal and non-normal procedures, for which the operator seeks credit in the simulator.
Flight Simulator	As used in this publication, means a device suitable for the training and for testing of flight crew, which incorporates a full-size replica of a specific type or make, model and series aircraft flight deck including the assemblage of equipment and computer programs necessary to represent the aircraft in ground and flight operations, a visual system providing an out-of-the-cockpit view, and a force cueing system which provides cues at least equivalent to that of a three-degrees-of-freedom motion system, and is in compliance with the minimum standards for a LEVEL 2 simulator.
Functional	Functional means that the control or device in the simulator, when operated, produces or simulates the same effect, including flow-on effects, as does the same control or device on the actual aircraft under the conditions being simulated.
LEVEL	LEVEL (in capital letters) refers to a level of accreditation granted by the Authority to permit flight crew training conducted in a flight simulator to be recognised by the Authority in lieu of similar training in the actual aircraft.
Mean of Aircraft Performance	The mean of aircraft performance is the point in a spread of data where 50% ± 10% of the aircraft type perform above that point and the remainder of the aircraft type perform below that point.
Operational	Operational means that the control or device must be capable of being operated by crew members. It does not necessarily require that the item be functional.
Properly Accomplish	In relation to crew actions, properly accomplish means that the crew can observe the proper indications and/or behaviour associated with normal and non-normal procedures, as well as being able to make the proper selections or movements with system controls.
Tolerances	All tolerances listed in this publication concern the measurement of flight simulator performance with respect to approved test data.

Operational Standards and Requirements—Approved Flight Simulators (FSD-1) - Revision History

Revision History

Approved by Assistant Director, Aviation Safety Standards Version 6.2: November 2001

Version	Date	Part	Details
5.0	November 1993	All	Paper document
6.0	July 1999	All	Online document
6.1	August 1999	12	Adjustment of test numbers in the performance test tables to reflect the CASA/operator agreed numbers.
6.2	November 2001	6.4.6.3	Amendment to paragraph.