



Advisory Circular

AC 60-1(0)

APRIL 2003

FLIGHT SIMULATOR EVALUATIONS

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1. REFERENCES

- *Civil Aviation Safety Regulations 1998 (CASR 1998) Part 60 Synthetic Training Devices.*
- *Manual of Standards (MOS) Part 60.*

2. PURPOSE

CASR Part 60 requires that flight simulators undergo initial, recurrent and special evaluations. The purpose of this AC is to provide Evaluation Teams with guidance on the content, process and proformas relevant to these evaluations. It also provides guidance on the application method and information required for Evaluation Team Leader appointment.

3. STATUS OF THIS AC

This is the first AC to be issued on this subject.

Advisory Circulars are intended to provide recommendations and guidance to illustrate a means but not necessarily the only means of complying with the Regulations, or to explain certain regulatory requirements by providing interpretative and explanatory material.

Where an AC is referred to in a 'Note' below the regulation, the AC remains as guidance material.

ACs should always be read in conjunction with the referenced regulations

4. INTRODUCTION

4.1 Flight Simulators may be subject to:

- (a) Operator Testing;
- (b) Initial Evaluation;
- (c) Recurrent Evaluation; and
- (d) Special Evaluation.

4.2 **Operator Testing** is conducted by the Flight Simulator Operator to ensure that the flight simulator complies with their specifications etc. Operator Testing normally involves conducting tests in the Acceptance Test Manual (ATM) and the Qualification Test Guide (QTG). The Flight Simulator Operator conducts this testing to ensure that the flight simulator meets the required standard, specific training requirements, and is ready for evaluation by CASA.

4.3 An **Initial Evaluation** is conducted by CASA to qualify the flight simulator for use. This evaluation consists of a technical review of the QTG and a subsequent on-site evaluation of the flight simulator.

4.4 **Recurrent Evaluations** are conducted periodically to ensure that the flight simulator continues to meet its qualified level.

4.5 **Special Evaluations** are conducted as a result of major modifications, requests for upgrade, or the flight simulator failing to maintain its qualification level. The content of the Special Evaluation depends on the circumstances, and should be determined by CASA.

5. INITIAL EVALUATION

5.1 Qualification Test Guide (QTG)

5.1.1 Flight Simulator Operators are encouraged to submit an advance copy of the QTG to CASA, at the earliest opportunity, to ensure that the proposed tests and validation data are suitable.

5.1.2 The substantially complete QTG should be submitted to CASA not less than 15 working days prior to the proposed date of commencement of the on-site evaluation. All Validation, and Functions and Subjective Test results contained in the QTG should have been conducted on-site within the last 90 days. A letter of application should be submitted before commencement of the on-site evaluation confirming that Operator Testing is complete, listing all outstanding discrepancies and providing QTG updates (as necessary). A template for the letter is enclosed at Appendix A.

5.1.3 CASA should advise the Flight Simulator Operator of the outcome of their technical review of the QTG. Any significant discrepancies should be addressed before commencement of the on-site evaluation.

5.2 Composition of Evaluation Team

5.2.1 CASA should appoint the Evaluation Team Leader. The Evaluation Team Leader should have completed an approved Flight Simulator Evaluation Course.

5.2.2 The Evaluation Team Leader is responsible for the conduct of the on-site evaluation and for certifying the results achieved.

5.2.3 The Evaluation Team may be made up of a combination of both CASA and non-CASA staff. For the duration of the evaluation, any non-CASA Evaluation Team members should be considered as acting on behalf of CASA. It is strongly recommended that individual team members should have completed an approved Flight Simulator Evaluation Course.

5.2.4 The Evaluation Team should consist of at least the following members:

- (a) a flight simulation specialist who is familiar with the scope and content of Qualification Test Guides; and
- (b) a check pilot who is type rated and aircraft current on the aircraft type; and
- (c) a training pilot or suitably qualified person who is familiar with the operation of the flight simulator as a training device, particularly with regard to the Instructor Station.

Note: Non-CASA staff should participate in appropriate team member roles.

5.3 Content of On-site Evaluation. The on-site evaluation should consist of an evaluation of the following:

- (a) Validation Tests;
- (b) Functions and Subjective Tests; and
- (c) the proper functioning of the instructor station, seating, lighting, radio communications, navigation aids, and intercom facilities.

5.4. Validation Tests. The on-site evaluation should re-run a representative sample of the Validation Tests in the QTG. This sample size should be approximately 33%. A selection of Validation Tests should also be run manually to verify the integrity of the automatic test procedures.

5.5 Functions and Subjective Tests

5.5.1 The on-site evaluation should evaluate a representative sample of Functions and Subjective Tests.

5.5.2 The Functions and Subjective Testing should be structured into several flights, with the purpose being to evaluate the flight simulator's reliability and usability as a training device. The overall fidelity including the integration of the visual and motion systems should be evaluated. Any user specific training manoeuvres or scenarios should be incorporated into the flight profiles. This evaluation should cover those areas essential for flight crew member training, testing and include:

- (a) flight deck configuration (physical layout, placards, engine, autopilot, flight management system. etc.);
- (b) handling qualities;
- (c) performance; and
- (d) systems functionality during normal and non-normal operations.

5.5.3 During Functions and Subjective Testing, the normal aircraft crew complement should occupy the operating flight crew seats. At least one pilot should be current on the aircraft type and model. That pilot should be competent to assess the flight simulator's performance both as a representation of the particular aircraft and as a training/testing/checking device.

5.6 Instructor Station and Supporting Facilities. Evaluation of the instructor station, together with the seating, lighting, radio communications, navigation aids and intercom facilities, should be conducted on an ongoing basis throughout the on-site evaluation. Additionally, the Instructor Station should be assessed to ensure that its operation does not present an unnecessary distraction from observing the activities of the flight crew whilst providing adequate facilities for the tasks.

5.7 Qualification

5.7.1 At the conclusion of the on-site evaluation, where major discrepancies remain unresolved, the Evaluation Team Leader may at his or her discretion decline to qualify the flight simulator.

5.7.2 Where minor discrepancies remain unresolved, a process and timescale for rectification of all discrepancies outstanding at the conclusion of the on-site evaluation should be agreed to between the Flight Simulator Operator and the Evaluation Team Leader.

5.7.3 The Evaluation Team Leader should certify in the QTG that all tests except those recorded as outstanding have been completed to the standard required for the appropriate Qualification Level. An Evaluation Report detailing the findings of the evaluation should be produced. A template for the Evaluation Report is enclosed at Appendix B.

5.7.4 All outstanding discrepancies arising from the on-site evaluation together with the outstanding discrepancies from operator testing should be entered into the flight simulator's maintenance management system.

5.7.5 Upon satisfactory completion of the on-site evaluation, CASA should issue a Qualification Certificate. A template for the Qualification Certificate is enclosed at Appendix C. CASA should review the flight simulator's reliability in-service and the progress in correcting outstanding discrepancies after the flight simulator has been qualified for 60 days.

5.8 Support Staff. The Flight Simulator Operator should provide sufficient support staff to assist the Evaluation Team with the conduct of the on-site evaluation.

6. RECURRENT EVALUATIONS

6.1 Composition of Evaluation Team

6.1.1 CASA should appoint the Evaluation Team Leader. The Evaluation Team Leader should have completed an approved Flight Simulator Evaluation Course.

6.1.2 The Evaluation Team Leader is responsible for the conduct of the Recurrent Evaluation and for certifying the results achieved.

6.1.3 The Evaluation Team may be made up of a combination of both CASA and non-CASA staff. For the duration of the evaluation, any non-CASA Evaluation Team members should be considered as acting on behalf of CASA. It is strongly recommended that individual team members should have completed an approved Flight Simulator Evaluation Course.

6.1.4 The Evaluation Team should consist of at least the following members:

- (a) a flight simulation specialist who is familiar with the scope and content of Qualification Test Guides;
- (b) a check pilot who is type rated and aircraft current on the aircraft type;

- (c) a training pilot or suitably qualified person who is familiar with the operation of the flight simulator as a training device, particularly with regard to the Instructor Station.

Note: CASA staff may participate in any arranged Recurrent Evaluation in an appropriate team member role.

6.1.5 The check pilot (referred to at 6.1.4 (b)) should be selected from not more than two or three suitably qualified pilots who are identified in the Flight Simulator Operator's Quality System.

6.2 Content of Recurrent Evaluation. The Recurrent Evaluation should consist of an evaluation of the following:

- (a) Flight Simulator Operator's Quality System;
- (b) overall flight simulator reliability and serviceability;
- (c) current unserviceabilities and defects;
- (d) modification status;
- (e) Validation Tests;
- (f) Functions and Subjective Tests;
- (g) the proper functioning of the instructor station, seating, lighting, radio communications, navigation aids, and intercom facilities.

6.3 Quality System

6.3.1 The Evaluation Team should review the effectiveness of the Flight Simulator Operator's Quality System, with regard to the specific flight simulator, including:

- (a) reports, findings and follow up actions; and
- (b) corrective and preventative measures.

Note: The Operator's Quality System should be subject to an annual audit by CASA. This audit should normally be conducted independently from any Recurrent Evaluation.

6.4 Overall flight simulator reliability and serviceability.

6.4.1 The Flight Simulator Operator should provide metrics describing the flight simulator's performance since the previous Recurrent Evaluation. Further guidance may be found in Aeronautical Radio Inc (ARINC) Report 433 Standard Measurements for Flight Simulator Quality.

6.4.2 The Flight Simulator Operator should provide a summary of all significant flight simulator defects that have occurred since the previous Recurrent Evaluation.

6.4.3 The Evaluation Team should review the defect history, the reported overall performance and consider their effects on the future Qualification Level.

6.5 Current Unserviceabilities and Defects

6.5.1 The Evaluation Team should assess whether any current unserviceability or defect affects the Qualification Level of the flight simulator.

6.6 Modifications

6.6.1 The Flight Simulator Operator should provide a summary of all flight simulator modifications which have occurred since the previous Recurrent Evaluation.

6.6.2 The Evaluation Team should confirm that the Master QTG Validation Tests, if applicable, have been updated to reflect the incorporation of the flight simulator modifications.

6.6.3 The Evaluation Team should assess whether any modifications affect the Qualification Level of the flight simulator.

6.7 Validation Tests. The Recurrent Evaluation should re-run a representative sample of the Validation Tests in the QTG. This sample size should be approximately 10 - 15%.

6.8 Functions and Subjective Tests.

6.8.1 The Recurrent Evaluation should assess a representative sample of Functions and Subjective Tests. The Functions and Subjective Testing should be structured into one or more flights, with the purpose being to evaluate the flight simulator's reliability and usability as a training device. The continuing overall fidelity including the integration of the visual and motion systems should be evaluated. A sample of specific training manoeuvres or scenarios should be incorporated into the flight profiles. This evaluation should include a selection of those areas essential for flight crew member training, testing and checking including:

- (a) flight deck configuration;
- (b) handling qualities;
- (c) performance; and
- (d) systems functionality during normal and non-normal operations.

6.8.2 During Functions and Subjective Testing, the normal aircraft crew complement should occupy the operating flight crew seats. At least one pilot should be current on the aircraft type and model. That pilot should be competent to assess the flight simulator's performance both as a representation of the particular aircraft and as a training/testing/checking device.

6.9 Instructor Station and Supporting Facilities. Evaluation of the Instructor Station, together with the seating, lighting, radio communications, navigation aids and intercom facilities, should be conducted on an ongoing basis throughout the Recurrent Evaluation.

6.10 Continuing Qualification

6.10.1 At the completion of the Recurrent Evaluation, where major discrepancies remain unresolved that are likely to have a significant impact on the continuing use of the flight simulator, the Evaluation Team Leader may at his or her discretion decline to requalify the flight simulator.

6.10.2 A process and timescale for rectification of all discrepancies outstanding at the conclusion of the Recurrent Evaluation should be agreed to by the Flight Simulator Operator and the Evaluation Team Leader.

6.10.3 An Evaluation Report detailing the findings of the evaluation should be produced. A template for the Evaluation Report is enclosed at Appendix B.

6.10.4 All outstanding discrepancies arising from the Recurrent Evaluation should be entered into the flight simulator's maintenance management system.

6.11 Support Staff The Flight Simulator Operator should provide sufficient support staff to assist the Evaluation Team with the conduct of the tests and operation of the Instructors' Station.

7. EVALUATION TEAM LEADER APPROVAL

7.1 An Evaluation Team Leader seeking to be appointed to conduct Recurrent Evaluations, on behalf of CASA, should apply to the General Manager Airline Operations stating the following:

- (a) Flight Simulator Operator;
- (b) Flight Simulator Identification Details;
- (c) Flight Simulator Qualification Level;
- (d) Proposed Quality System procedures.

7.2 The Evaluation Team Leader should have:

- (a) completed an approved Flight Simulator Evaluation Course,
- (b) previously participated in several Recurrent Evaluations;
- (c) an acceptable record of performance in Recurrent Evaluations; and
- (d) have demonstrated to CASA within the last twelve months, the successful completion of a Flight Simulator Recurrent Evaluation under supervision.

7.3 An Evaluation Team Leader appointment will be valid for a maximum period of three years. The renewal of an Evaluation Team Leader appointment will be conditional upon the applicant having:

- (a) performed the duties of an Evaluation Team Leader on at least two occasions within the last three year period; and
 - (b) demonstrated to CASA the successful completion of a Flight Simulator Recurrent Evaluation within the last 12 months.
-

Bill McIntyre
Executive Manager
Aviation Safety Standards Division

Appendix A

APPLICATION FOR INITIAL QUALIFICATION

(Date).....

(Name)
General Manager Airline Operations
Civil Aviation Safety Authority
GPO Box 2005
Canberra, ACT 2601

Dear

.....(Name of Applicant)..... requests the evaluation of its
.....(type)..... Flight Simulator for Level ... (A, B, C, D) qualification. The flight
simulator is fully defined on page of the Qualification Test Guide (QTG) which
was completed on(date)..... at(place)..... We have completed testing
of the flight simulator and declare that it meets all applicable requirements of Civil
Aviation Safety Regulation 1998 Part 60 and Manual of Standards 60 except as noted
below. We have also established a suitable Quality System and this is available for your
review.

The flight simulator has been assessed by the following personnel:

- (name) Qualification/Title
- (name) Qualification/Title
- (name) Pilot's Licence No

who attest(s) that it conforms to the aircraft cockpit configuration of(type of
aircraft) and that the simulated systems and subsystems function equivalently to those in
that aircraft. This pilot has also assessed the performance and the flying qualities of the
flight simulator and finds that it represents the designated aircraft.

(additional comments as required)

The following tests/discrepancies are outstanding:

Sincerely,

Print Name
Position/Appointment held.



CIVIL AVIATION
SAFETY AUTHORITY
AUSTRALIA

Appendix B

GPO Box 2005
Canberra, ACT 2601
Australia

Phone: +61 6217 1553

Date:

**CIVIL AVIATION SAFETY AUTHORITY AUSTRALIA
FLIGHT SIMULATOR EVALUATION REPORT**

Authority Code :

Aircraft Type and Variant :

Engine Version(s) Simulated :

- 1 Flight simulator characteristics**
- 2 Evaluation details**
- 3 Supplementary information**
- 4 Training, testing and checking considerations**
- 5 Classification of items**
- 6 Results**
- 7 Evaluation team**

This report is provisional. The conclusions presented are those of the team and CASA Airline Operations reserves the right to change these after internal review. The qualification certificate finalises the evaluation report unless a modified report has been issued.

1. Flight simulator characteristics				
(a) STD OPERATOR		(b) LOCATION		
(c) STD IDENTIFICATION		(d) SIMULATOR MANUFACTURER AND STD IDENTIFICATION SERIAL NO.		
(e) FIRST ENTRY INTO SERVICE (MONTH / YEAR)				
(f) VISUAL SYSTEM MANUFACTURER AND TYPE		(g) MOTION SYSTEM		
(h) AIRCRAFT TYPE AND VARIANT				
(i)	ENGINE TYPE(S)	ENGINE INSTRUMENTATION	FLIGHT INSTRUMENTATION	

2. Evaluation details					
(a) DATE OF EVALUATION			(b) DATE OF PREVIOUS EVALUATION		
(c) TYPE OF EVALUATION		<input type="checkbox"/> initial <input type="checkbox"/> recurrent <input type="checkbox"/> special			
(d) STD QUALIFICATION LEVEL RECOMMENDED:					
MOS 60	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	
Grandfather (FSD-1)		<input type="checkbox"/> BG (3)		<input type="checkbox"/> DG (5)	
technical criteria primary reference document:					

3. Supplementary Information	
Company Representative(s) (Main STD user, STD operator)	
Simulator Seats Available	
Visual Databases Used	
Specific Airfield	
Other	

4. Training, testing and checking considerations	
CAT I RVR m DH ft	
CAT II RVR m DH ft	
CAT III (lowest minimum) RVR m DH ft	
LVTO RVR	
Recency	
IFR Training/Checks	/
Type Rating	
Proficiency Checks	
Recurrent Training/Checks	
Autocoupled Approach	
Autoland / Roll Out Guidance	/
ACAS I / II	/
Windshear Warning System / Predictive Windshear	/
WX-Radar	
HUD / HUGS	/
GPWS / EGPWS	
ETOPS Capability	/
GPS	

5. Classification of Items

UNACCEPTABLE

An item which fails to comply with the required standard and therefore affects the level of qualification or the qualification itself.

If these items will not be corrected or clarified within 30 days, CASA may have to suspend, vary, restrict or revoke the STD qualification.

RESERVATION

An item where compliance with the required standard is not clearly proven and the issue will be reserved for later decision. Resolution of these items will require either:

1. A CASA policy ruling or
2. Additional substantiation

UNSERVICEABILITY

A device which is temporarily inoperative or performing below its nominal level.

RESTRICTION

An item which prevents the full usage of the STD according to the training, testing and checking considerations due to unusable devices, systems or parts thereof.

RECOMMENDATION FOR IMPROVEMENT

An item which meets the required standard but where considerable improvement is strongly recommended.

COMMENT

Self explanatory

6. Findings

6.1 Subjective

A Unacceptable

1	
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B Reservation

1	
---	--

C Unserviceability

1	
---	--

D Restriction

1	
---	--

E Recommendation for improvement

1	
---	--

F Comment

1	
---	--

6.2 Objective

A Unacceptable

1	
---	--

B Reservation

1	
---	--

E Recommendation for improvement

1	
---	--

F Comment

1	
---	--

7. Evaluation Team

Name	Position	Organisation	Signature

.....
For CASA



CIVIL AVIATION
SAFETY AUTHORITY
AUSTRALIA

Appendix C

**FLIGHT SIMULATOR
QUALIFICATION CERTIFICATE**

No. AUS/Device No (XX)/Sequence No (XX)

It is hereby certified that

(Operator's)

(Type) Flight Simulator

Located at (location)

has satisfied the Qualification Level X requirements prescribed in the Manual of Standards 60 Version XX subject to the conditions of the attached Specification.

This Certificate is not transferable, and unless revoked, suspended or varied shall continue in effect until (date).

General Manager
Airline Operations
(Date)

Civil Aviation Safety Authority

Flight Simulator Specification

No. AUS/Device No (XX)/Sequence No (XX)

- a) **Type/Variant of Aircraft**
- b) **Flight Simulator Qualification Level**
- c) **Visual System**
- d) **Motion System**
- e) **Engine Fit**
- f) **Flight Management System Fit**
- g) **TCAS Fit**
- h) **Training, testing and checking considerations**
(List qualified items from Section 4 of Evaluation Report)
- i) **Restrictions / Limitations**