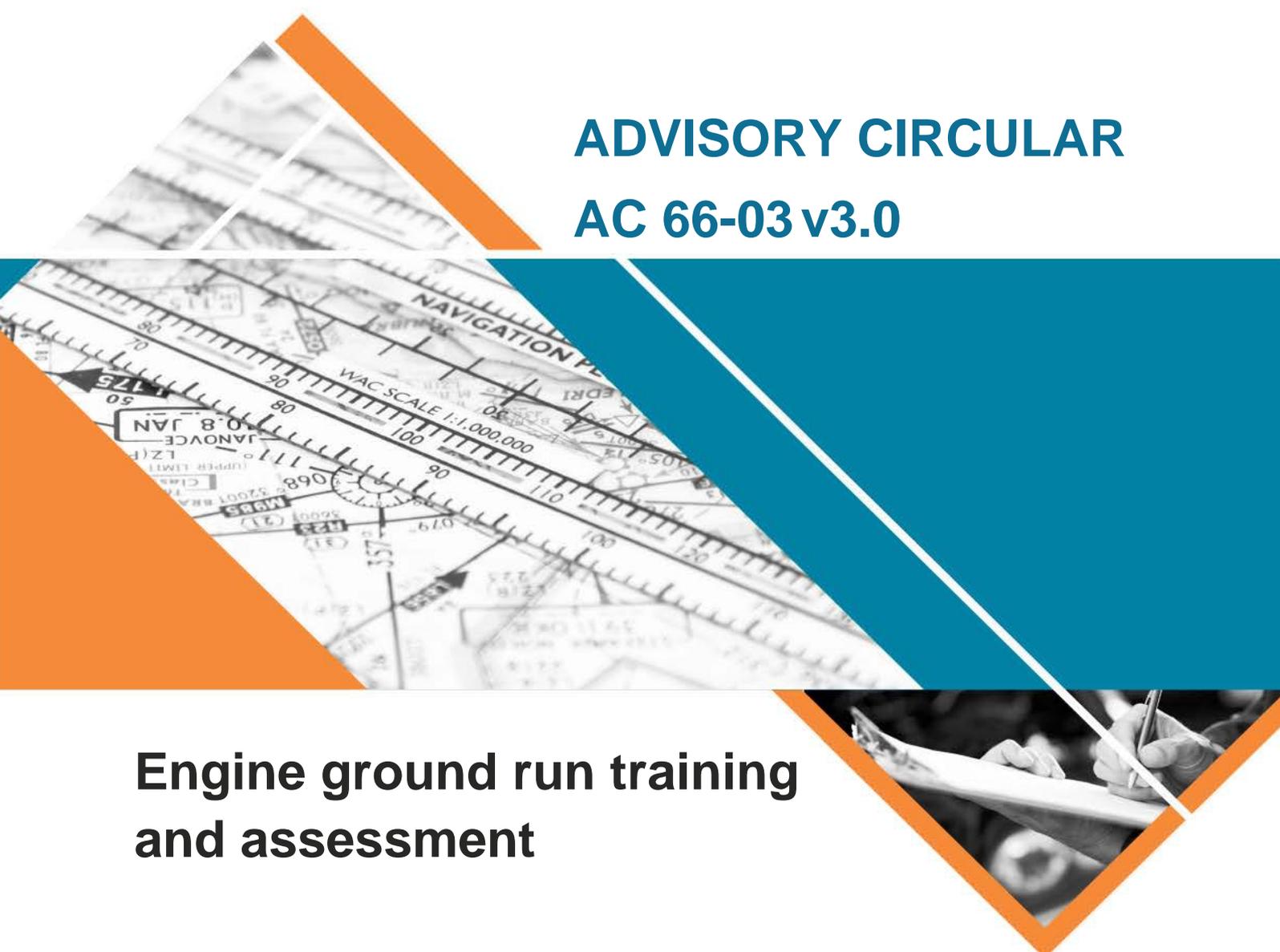




ADVISORY CIRCULAR

AC 66-03 v3.0



Engine ground run training and assessment

Date	June 2020
Project number	MS 16/05
File ref	D20/186413

Advisory Circulars are intended to provide advice 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 informative, interpretative and explanatory material.

Advisory Circulars should always be read in conjunction with the relevant regulations.

Audience

This advisory circular (AC) applies to:

- licensed aircraft maintenance engineers (LAMEs)
- approved maintenance organisations (AMOs) (Part 145 — of the *Civil Aviation Safety Regulations 1998 (CASR)*)
- certificate of approval holders for aircraft maintenance (regulation 30 of the *Civil Aviation Regulations 1988 (CAR)*).

Purpose

The purpose of this AC provides guidance and information to personnel preparing and conducting engine ground run training and assessment of trainee competence. It will assist trainers to:

- achieve a consistent standard of engine ground run training
- achieve a consistent standard of assessment
- ensure persons trained and assessed are competent to perform engine ground running.

For further information

For further information, contact CASA's Airworthiness and Engineering Branch (AEB) (telephone 131 757).

Unless specified otherwise, all subregulations, regulations, divisions, subparts and parts referenced in this AC are references to the *Civil Aviation Safety Regulations 1998 (CASR)*.

Status

This version of the AC is approved by the Manager, Airworthiness and Engineering Branch.

Note: Changes made in the current version are not annotated. The document should be read in full.

Version	Date	Details
v3.0	May 2020	The following changes have been made to the document: <ul style="list-style-type: none"> • Updated list of definitions appropriate to this document. • Include reference to CAO 20.9. • Remove references to rotary wing aircraft. • Change references from aircraft to aeroplane where appropriate.
(1)	May 2013	The following changes have been made to the document: <ul style="list-style-type: none"> • Removal of reference to 145.A.30 (f) of the Part 145 MOS at paragraph 8.3. • This omission is not marked with shading. • Inclusion of additional acronyms and reorganisation of the acronym list into alphabetical order at section 4 of the AC, marked by shading. • Corrections to the referencing protocols, where appropriate, to CAR and CASR throughout the document.
(0)	April 2011	Initial AC.

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1 Reference material

1.1 Acronyms

The acronyms and abbreviations used in this AC are listed in the table below.

Acronym	Description
AC	Advisory Circular
AMC	Acceptable Means of Compliance
AMO	Approved Maintenance Organisation
APU	Auxiliary Power Unit
CAR	<i>Civil Aviation Regulations 1988</i>
CASA	Civil Aviation Safety Authority
CASR	<i>Civil Aviation Safety Regulations 1998</i>
EGT	Exhaust Gas Temperature
GM	Guidance Material
LAME	Licensed Aircraft Maintenance Engineer
MOS	Manual of Standards
NTS	Negative Torque Sensing system

1.2 Definitions

Terms that have specific meaning within this AC are defined in the table below.

Term	Definition
aeroplane	a power-driven heavier-than-air aircraft deriving its lift in flight chiefly from aerodynamic reactions on surfaces remaining fixed under given conditions of flight, but does not include a power-assisted sailplane.
aircraft type	<p>(a) a particular type, or type and model, of large aircraft with a particular type of aircraft engine.</p> <p>or</p> <p>(b) a large aircraft with a particular type of aircraft engine.</p> <p>or</p> <p>(c) a small aircraft with a particular type of aircraft engine.</p> <p>Note: For paragraph (b), aircraft mentioned in this paragraph are known as “non-rated aircraft”.</p> <p>Example 1: For paragraph (a), Airbus A310(GE CF6)</p> <p>Example 2: For paragraph (a), Boeing 747-400 (RR RB211)</p> <p>Example 3: For paragraph (b), non-rated aircraft (PWC PT6)</p> <p>Example 4: For paragraph (b), non-rated aircraft (Honeywell TPE331)</p> <p>Example 5: For paragraph (c), small aircraft (PWC PT6)</p> <p>Example 6: For paragraph (c), small aircraft (Honeywell TPE331)</p>

Term	Definition
AMO	An organisation approved by CASA under Part 145 of CASR as an approved maintenance organisation to carry out maintenance.
CAR 30	An organisation approved by CASA under regulation 30 of CAR to carry out maintenance.
Maintenance certification	A certification performed after completion of maintenance carried out on an aircraft.
Rating	An authorisation granted under regulation 66.080 or 66.095 of Part 66 of CASR, being a permission: <ol style="list-style-type: none"> 1. to perform a maintenance certification, under a category B1 or B2 licence, for maintenance carried out on a particular aircraft type; or 2. to issue a certificate of release to service, under a category B1, B2, or C licence, for an aircraft of a particular aircraft type in relation to maintenance carried out on the aircraft.

1.3 References

Regulations

Regulations are available on the Federal Register of Legislation website <https://www.legislation.gov.au/>

Document	Title
Part 66 of CASR	Continuing airworthiness - aircraft engineer licences and ratings
Part 66 MOS	Continuing Airworthiness Aircraft Engineer Licences and Ratings
Part 145 MOS	Part 145 Manual of Standards
Regulation 30 of CAR	Certificate of approval
Regulation 214 of CAR	Training of maintenance personnel
Regulation 230 of CAR	Starting and running of engines
Civil Aviation Order 20.9	Air service operations - precautions in refuelling, engine and ground radar operations

International Civil Aviation Organization documents

International Civil Aviation Organization (ICAO) documents are available for purchase from <http://store1.icao.int/>

Document	Title
7192 D-1	Training Manual

Advisory material

CASA's advisory circulars are available at <http://www.casa.gov.au/AC>

CASA's Civil Aviation Advisory Publications are available at <http://www.casa.gov.au/CAAP>

Document	Title
AC 66-08	Part 66 aircraft engineer licences - privileges
AMC/GM CASR Part 66	Continuing airworthiness—Aircraft engineer licences and ratings
AMC/GM CASR Part 145	Approved maintenance organisation requirements
CAAP 30-4	Certificate of Approval - Maintenance Organisation

2 Introduction

- 2.1.1 Paragraph 230 (3) (a) of CAR authorises an appropriately rated Licensed Aircraft Maintenance Engineer (LAME) to ground run the engine(s), of an aeroplane that is having maintenance carried out on it or is being used for the provision of maintenance training. This is provided he or she has sufficient knowledge of the aeroplane's controls and systems to ensure the starting or running does not endanger any person or damage the aeroplane.
- 2.1.2 Paragraph 30 (2C) (d) of CAR includes a condition that the holder of a Certificate of Approval (CoA) must ensure that each person employed by or working under an arrangement with the holder receives adequate training in the work performed by that person and any equipment used in connection with the work.
- 2.1.3 If LAMEs are to provide engine ground running services for the approved maintenance organisation (AMO), Part 145 of CASR requires the AMO's exposition to include procedures for the conduct of engine ground running.
- 2.1.4 Regulation 214 of CAR places responsibility on the holder of a Certificate of Registration of an aircraft used in commercial operations (Registered Operator) to ensure persons performing maintenance are adequately trained.
- 2.1.5 Civil Aviation Order 20.9 includes precautions and safety distances to be observed when starting and ground operating aeroplane engines.
- 2.1.6 Ground running of helicopters involves higher safety risks than aeroplanes. A relevant pilot licence is therefore generally a prerequisite for a permission to ground run helicopters under regulation 230 of CAR.

3 Acceptable means of compliance

- 3.1.1 An Acceptable Means of Compliance (AMC) to demonstrate that a LAME has sufficient knowledge pertaining to starting and running an engine (on fixed wing aeroplanes) would be provided by completion of a course of training or experience such that the regulation 30 of CAR or Part 145 of CASR AMO becomes satisfied the holder now has the requisite qualifications and experience.

4 Basic licence and aircraft type training requirements do not necessarily include training for engine running

- 4.1.1 Aircraft engineer licences and licence ratings are granted by CASA on the basis of an applicant meeting the requirements of Part 66 of CASR. The Part 66 basic licence and aircraft type training requirements do not include training for engine running. It cannot be assumed that the holder of a Part 66 licence rating is adequately trained and qualified to ground run the engines of a particular aircraft, aircraft type or model.
- 4.1.2 Part 145 of CASR and regulations 30, 214 and 230 of CAR, as applicable, must be complied with to engine run an aircraft.

5 Structure of training material and course content

5.1.1 The following subjects, as applicable to the engine/aeroplane combination, should be included in the AMOs internal training package for the purposes of qualifying an appropriately licenced LAME to run the engine/s of the aeroplane:

- Aeroplane system operation as required for engine operation and/or aeroplane and personnel safety
- Aeroplane preparation for engine running
- Emergency procedures
- APU operation
- Engine ground safety precautions, including:
 - o prop/jet blast area
 - o inlet suction area
 - o reverse blast area
 - o fire protection/access
 - o securing aeroplane, chocks and other restraint
 - o safe areas and safety precautions for maintenance personnel during engine operation
 - o Engine operational limits
- Engine performance parameters and corrections for ambient conditions
- Pre-start briefing of persons on the aeroplane, including operating crew
- Preparation for engine start, internal and external pre-start checks
- Wet and dry motoring procedures
- Preparing aeroplane and engine for test as required
- Normal and abnormal start procedures, including monitoring operation
- Post start checks
- Engine tests, including use of reference tables and record sheets
- Normal shutdown procedures
- Emergency shutdown procedures
- Post engine run checks
- Use of built in test and monitoring equipment before, during and after engine running
- Restoring aeroplane to normal shut down configuration, including recording and resetting of exceedance (s)
- Completion of engine run and aeroplane records.

5.1.2 The pre-start briefing should be completed by the trainer and include the functions and actions of each crew member in relation to normal operations and emergencies, including evacuation procedures and emergency assembly point. Procedures should include any of the following which are applicable to the engine/airframe combination:

- Start with external power/air
- Start with APU
- Cross bleed start
- Battery power start
- Start without N1, N2, Ng, Np, Fuel Flow or EGT indication

- Start without automatic control and monitoring;
- Start without oil pressure
- Start with tailpipe fire
- Hung start
- Surge/stall
- Auto thrust recovery
- Thrust reverser tests
- Propeller tests, including beta operation, governing operation, auto feather, manual feather, NTS, pitch lock, reverse operation, auto power recovery
- Emergency shut down procedure, including extended motoring, if applicable.

5.1.3 **Training in a simulator.** Where a simulator is used all normal pre-start, start, shutdown post run and emergency procedures which are simulated should be performed under the control of each student. Functional checks may be performed in teams of two (or three if flight engineer station is fitted) provided each student is a participant.

5.1.4 **Training in an aeroplane.** Where an aeroplane is used all normal pre-start, start, shutdown and post run procedures should be performed under the control of each student. Functional checks may be performed in teams of two (or three if flight engineer station is fitted) provided each student is a participant. Emergency procedures should be covered by a thorough briefing in the aeroplane cockpit, with questions to confirm each student understands the procedures.

5.1.5 Post run debriefs should include completion of all records related to the operation of the simulator/aeroplane and completion of all documentation related to each task performed during the training session. If a vibration analysis was conducted during the training session all documentation related to a vibration analysis should be completed as though they were to be incorporated into the actual aircraft records. Where appropriate, the trainees should complete and sign duplicate documentation as a demonstration of competence in satisfactorily completing the documentation and making the certifications related to the tasks undertaken during the training/assessment session.

6 Conduct of engine ground running training

- 6.1.1 Training should be conducted by a person with instructional and assessment training, such as Certificate IV in Workplace Training and Assessment, and who is competent and authorised to carry out engine ground running for the engine/airframe combination.
- 6.1.2 The authorisation, by the AMO, to carry out engine ground running training may be limited to simulator training in which case the trainer need not hold a Part 66 licence rating for the engine. If the training is conducted in an aeroplane, the trainer will need to hold an appropriately rated Part 66 licence or other authorisation (e.g. pilot endorsed on the aeroplane) to run the engines.
- 6.1.3 Engine ground run training will usually involve a period of classroom training, briefing and debriefing. It may be conducted in an aeroplane, in an aeroplane simulator or a combination of both.
- 6.1.4 All engine ground run training should be conducted using the appropriate procedures used in the course of normal maintenance. Additional documents may be used to assist student learning and to provide consistency of training and assessment.
- 6.1.5 Since this training usually involves both training and assessment, it is important that the trainer clearly differentiates between training and assessment. For example, it would be unreasonable to subject a student to assessment of his/her handling of an emergency procedure without first being trained in the procedure.

7 Student assessment

- 7.1.1 Satisfactory completion of engine ground run training would be demonstrated by each student satisfactorily completing each procedure assigned to him/her and answering questions related to the procedures and operation of the engine in the particular airframe.
- 7.1.2 The questions may be asked at any appropriate time during the pre-run briefing, the run session or the post run debriefing. Questions asked during the engine run session should be in context with the current operations to avoid distraction and confusion of the student(s) operating the aeroplane/simulator.
- 7.1.3 During the assessment, the trainer should make notes about the actions of the student when carrying out or demonstrating engine ground running procedures and the student's responses to questions asked during the assessment. These notes and records will be used during the post run de-brief to provide feedback to the student about their performance and competence.

8 Recordkeeping requirements

- 8.1.1 An acceptable means of recording satisfactory completion of engine ground run training and assessment is through the use of a permanent record within the training records or personal file of the student.
- 8.1.2 This entry must be verified by the Trainer/Assessor and show the date(s) the training/assessment was conducted.