Australian Government
Civil Aviation Safety Authority

PRINCIPLE

(OPS.03) Prescribed single-engine aeroplane (PSEA)

December 2023

Acknowledgement of Country

The Civil Aviation Safety Authority (CASA) respectfully acknowledges the Traditional Custodians of the lands on which our offices are located and their continuing connection to land, water and community, and pays respect to Elders past, present and emerging.

Inside front cover artwork: James Baban.

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Table 1. List of acronyms and abbreviations

Acronym/abbreviation	Description
AC	advisory circular
AEB	Airworthiness & Engineering Branch
AFM	aircraft flight manual
AMO	approved maintenance organisation
AMP	approved maintenance program
ASETPA	approved single-engine turbine powered aeroplane
ATC	air traffic control
CAO	Civil Aviation Order
CAR	*Civil Aviation Regulations 1988*
ELA	electrical load analysis
GNSS	Global Navigation Satellite System
IFR	instrument flight rules
IMC	instrument meteorological conditions
MCD	magnetic chip detector
MEL	minimum equipment list
MOS	Manual of Standards
PIC	pilot in command
PICUS	pilot in command under supervision
PSEA	prescribed single-engine aeroplane
SOM	system of maintenance
STC	supplemental type certificate
TAC	type acceptance certificate
TC	type certificate
TSO	Technical Standard Orders
VFR	visual flight rules

Definitions

Table 2. List of definitions

Term	Definition
approved design	The approved design is the original production baseline aircraft plus all repairs and modifications applied throughout the life of the aircraft that defines the current aircraft configuration.
instrument flight rules	The symbol used to designate the instrument flight rules (IFR) prescribed in CAR Part 12. Source: CAR Regulation 2 Interpretation
night	For aviation purposes, night is defined as the period of darkness from the end of evening civil twilight to the beginning of morning civil twilight. Source: CASR Dictionary Part 1 Definitions
scheduled air transport	An air transport operation, other than a medical transport operation, that is conducted: a. in accordance with fixed schedules to and from fixed terminals over specific routes with or without intermediate stopping places between terminals; and b. in circumstances in which the accommodation in the aircraft is available for use by persons generally.

Reference to regulations

Unless specified otherwise, all subregulations, regulations, Divisions, Subparts and Parts referenced in this Principle are references to the *Civil Aviation Safety Regulations 1998* (CASR).

1. Assessment scope

Division 135.D.7 and Chapter 7 of the Part 138 Manual of Standards (MOS) detail the requirements for prescribed single-engine aeroplane (PSEA) operations – formally known as approved single-engine turbine powered aeroplane (ASETPA) operations. PSEA operations no longer require approval. However, CASA may assess the exposition/operations manual as part of an initial issue authorisation or if the application is submitted as a significant change.

A Part 135 air transport operator who conducts a flight under the instrument flight rules (IFR) or at night under the visual flight rules (VFR), in a single -engine aeroplane, must comply with the requirements in regulation 135.240—Prescribed single-engine aeroplanes and Chapter 8 of the Part 135 MOS.

A Part 138 aerial work operator who carries aerial work passengers on a flight under the IFR or at night under the VFR, in a single-engine aeroplane, must comply with the requirements mentioned in Chapter 7 of the Part 138 MOS.

Other components of the assessment also require CASA approval, such as:

- the maintenance program
- the reliability program
- the minimum equipment list (MEL) – if assessed by CASA.

Before inspectors commence their assessment, they must first determine whether the aeroplane is eligible (see section 2.1.2 of this principle) and either:

- held an approval under subparagraph 174B(2)(d)(ii) or subparagraph 175A(1)(d)(ii) of the *Civil Aviation Regulations 1988* (CAR) immediately before the 2nd of December 2021
- has a type certificate (TC), type acceptance certificate (TAC) or supplemental type certificate (STC) stating the aeroplane is eligible for ASETPA or PSEA.

If the inspectors cannot determine whether the aeroplane is eligible, the application must be referred to the Airworthiness & Engineering Branch (AEB) who will conduct a type compliance assessment.

The assessment will be conducted using the following worksheets:

- Worksheet A (OPS.03) PSEA Type Compliance Assessment *(AEB only)*
- Worksheet B (OPS.03) PSEA continuing airworthiness assessment *(AWI)*
- Worksheet C (OPS.03) PSEA flight operations assessment *(FOI)*
- Worksheet D (OPS.03) PSEA Airworthiness – biannual assessment *(AEB only)*
- Work Instruction (OPS.03) PSEA Airworthiness – biannual assessment *(AEB only)*

This principle document relates specifically to the assessment of worksheets B and C. Worksheet A will be assessed in accordance with AEB procedures.

1.1 Approvals

PSEA operations do not require approval under the regulations. However, a change required to be approved by CASA is a significant change under regulation 119.020(c) or 138.012(d). Where a significant change is required, it will be issued by the delegate on worksheet C.

The following approvals may also be required to support PSEA operations:

- system of maintenance (SOM) – under CAR 42(M)
- maintenance program – under CAR 42.J
- reliability program – under CAR 42.L
- MEL (will be conducted using Protocol suite (OPS.01) Minimum equipment list).

1.2 Assessment worksheet user instructions

This principle provides guidance to the inspector when using the associated Worksheet. The worksheet provides inspectors with a regulation-based tool for recording the outcomes of the assessment. It is set out as follows:

- user instructions
- assessment worksheets
- assessment summary
- approval data sheet.

2. Airworthiness assessment

2.1 Type compliance assessment

If required, a type compliance assessment will be conducted by AEB. When completed, the TC, TAC or STC will be amended to indicate the aeroplane is eligible for PSEA operations. AEB will utilise to conduct the assessment and complete Worksheet A (OPS.03) PSEA Type Compliance Assessment.

2.1.1 Continuous monitoring of type

To assure aeroplane types eligible for PSEA operations continue to meet the requirements for PSEA, AEB will monitor the global fleet reliability on a periodic basis.

- The procedure for the continuous monitoring of type is detailed in the Work Instruction (OPS.03) PSEA Airworthiness – Biannual assessment (OPS.03) work instruction. AEB will complete Worksheet D (OPS.03) PSEA Airworthiness – biannual assessment

Note: Modifications including STCs must be evaluated to ensure the approved design for the modified aeroplane remains compliant with the PSEA requirements set out in Civil Aviation Order (CAO) 100.5. The operator should ensure that the continuing airworthiness part of the exposition/operations manual has a procedure to ensure evaluation of modification is carried out for any effect on PSEA.

2.1.2 Eligible PSEAs

Table 3. Eligible PSEAs

Aeroplane	Model	TAC	Additional requirements	Engine model
Cessna	208	A320		PT6A-114 PT6A-114A
Cessna	208	A320	STC SVA554	PT6A-42A
Cessna	208B	A320		PT6A-114 PT6A-114A PT6A-140
Cessna	208B	A259		PT6A-114A PT6A-140
Pilatus	PC-12 PC-12/45 PC12/47	A77		PT6A-67B
Pilatus	PC-12/47E	A77		PT6A-67P
Socata	TBM700 C2	A42	SL70042-00	PT6A-64
Socata	TBM700N	A42	SL70042-00	PT6A-66D
Cirrus	SF50	A323	See TaC	FJ33-5A

Note: On a TAC issued by CASA, the term ASETPA will continue to be used until such time the certificate is required to be updated.

Section 10 of CAO 100.5 states that, for an aeroplane to be eligible for PSEA operations, it must be approved in writing by CASA on the STC, TC or TAC. When the aeroplane is eligible for PSEA operations, the STC, TC or TAC will list the eligible aeroplane model and engine models.

2.2 Continuing airworthiness

The operator must ensure that an aeroplane intended to be used in PSEA operations is maintained to conform and comply with the type design. All required equipment, processes and procedures must be put in place and well documented to ensure the integrity of the aeroplane is demonstrated.

The operator should be able to demonstrate that the aeroplane will be maintained in compliance with the type design. For PSEA operations, there are specific continuing airworthiness requirements – such as configuration management.

The key elements of continued airworthiness are:

- aeroplane continuing airworthiness and configuration management systems – including practices, documents and equipment
- aeroplane configuration management
- approved maintenance program (AMP) or SOM
- approved reliability program
- oversight of maintenance organisations – including training
- MEL or dispatch deviation guide.

The inspector must confirm that the operator's continuing airworthiness management procedures and documentation sets out details of all routine maintenance tasks to be carried out on the aeroplane systems. The operator must demonstrate that the aeroplane will be maintained in accordance with its type design and current maintenance data. The inspector must ensure the AMP (for Part 42 aeroplanes) or the SOM (non-Part 42 aeroplanes) covers all PSEA requirements.

Technical Standard Orders (TSOs)

Regulation 21.601(2) recognises foreign Technical Standard Orders (TSOs) for approved equipment. Refer to AC 21-46 – Airworthiness Approval of Avionics Equipment.

Registered operator

If the applicant is not the registered operator of the aeroplane, the inspector will need to ensure that continuing airworthiness arrangements are in place to satisfy PSEA operations. To be suitable, the operator may establish a service level agreement with the registered operator to ensure the continuing airworthiness of the aeroplane. In this instance, the inspector should confirm the registered operator also conducts PSEA operations as part of its authorisation.

2.3 Configuration management

The operator's exposition/operations manual must contain procedures to ensure the configuration of the aeroplane conforms to the TC, TAC or STC prior to conducting PSEA operations. To be suitable, the inspector should verify that the operator has a process for confirming the configuration:

- when a new aeroplane enters the fleet
- after maintenance (for example, a modification may compromise PSEA)
- prior to a flight involving PSEA operations (for example, changing seats may compromise PSEA).

The inspector should confirm that the exposition/operations manual includes a list of aeroplanes eligible for PSEA operations, including a process to remove the aeroplane from the list if a modification affects the aeroplane eligibility.

2.4 Aeroplane systems and equipment

The operator must ensure the aeroplane systems and equipment mentioned in this section are fitted, and serviceable, prior to PSEA operations. Single-engine turbine powered aeroplanes approved to operate at night and/or in instrument meteorological conditions (IMC) must follow the requirements for mandatory systems and equipment intended to not only ensure continued safe flight, but also to assist in achieving a safe forced-landing in the event of an engine failure.

All equipment should either be original equipment manufacturer installation to airframe, or installed in accordance with an approved STC or a Part 21M approval.

2.4.1 Supplementary oxygen (pressurised aeroplanes)

All occupants must be provided with sufficient supplemental oxygen, following an engine failure, to permit a descent to 14 000 ft AMSL from the maximum operating altitude, or elected limiting altitude, at the plane's best gliding speed.

Refer to TSO-C64a and TSO-C103.

2.4.2 Landing light

An aeroplane should have a landing light that is independent of the landing gear and is capable of adequately illuminating the touchdown area in a night forced landing.

2.4.3 Engine control system

Section 3 of Appendix 2 to CAO 100.5 sets out the requirements for the engine control system and should be referenced when making an assessment.

2.4.4 Engine ignition

Section 4 of Part 1 of Appendix 2 to CAO 100.5 sets out the requirements for the engine ignition system and should be referenced when making an assessment.

2.4.5 Engine fire warning

For PSEA type approval, an engine fire warning system is required to meet the minimum performance standard of powerplant fire detection instruments – such as the standard set out in TSO-C11E, or included in the type certification of the aeroplane, or as otherwise approved by CASA.

Refer section 5 of Part 1 of Appendix 2 to CAO 100.5.

2.4.6 Engine monitoring system

The aeroplane must be equipped with an approved, automatically activated, electronic engine trend monitoring and recording system. The operator is responsible for ensuring the engine trend monitoring system is operational, the data is analysed and, if an adverse trend is identified, is interpreted, and (if required) timely corrective action taken. The inspector should verify this process is present in the exposition/operations manual, and whether an approved supplier is producing an engine status report with proof of a subscription.

The engine trend monitoring system is to record:

a. engine parameters referenced in the engine manufacturer's published engine trend monitoring procedures; and

b. engine performances parameters exceedances.

Refer to section 6 of Part 1 of Appendix 2 to CAO 100.5.

Engine oil consumption must be monitored in accordance with the engine manufacturer's recommendations. Any anomalies detected during monitoring must be checked against the manufacturer's data to determine appropriate and timely corrective action. The inspector should consider how and where the oil consumption is recorded (maintenance release or technical log), who will analyse it, and when.

2.4.7 Engine electronic magnetic metal contamination detection system

The aeroplane must be equipped with an electronic engine oil metal contamination detection system that monitors the engine, accessories gearbox and reduction gearbox, and provides the pilot with an in-flight visual caution warning. Compliance can be met by either a magnetic chip detector (MCD) or an oil debris monitoring system.

Refer to section 7 of Part 1 of Appendix 2 to CAO 100.5.

> Note: For PT6A engines incorporating MCDs, two chip detectors are required.

2.4.8 Electrical power sources

In addition to the aeroplane's primary electrical generator and the primary electrical storage battery(s), the aeroplane type must be equipped with an alternative source of electrical power. The alternative source must be capable of supplying power to all essential flight instruments, navigation systems, lighting systems, icing protection systems and aeroplane systems required for the endurance of the IFR flight.

Refer to section 8 of Part 1 of Appendix 2 to CAO 100.5.

2.4.9 Electrical load analysis (ELA) and battery capacity

The electrical load analysis (ELA) is required to confirm that the electrical storage capacity of the aeroplane's primary battery(s) is sufficient to supply all probable combinations of continuous in-flight electrical loads for instruments, equipment and systems required at night and/or in IMC.

The aeroplane's primary battery must have sufficient capacity to cover the period required to glide from the maximum operating altitude, or an elected limiting altitude, to sea level and have sufficient capacity remaining to not only conduct two engine-start attempts, but also lower the flaps and the undercarriage.

If items are powered electrically from the aeroplane's electrical system, the aeroplane ELA should be assessed for appropriate changes.

Refer to section 9 of Part 1 of Appendix 2 to CAO 100.5.

If the aeroplane has been modified since it was originally certified for PSEA (ASETPA), the inspector must review the revised ELA and ensure the modification(s) have not compromised PSEA operations.

2.4.10 Electrical load shedding

The aircraft flight manual (AFM), or approved equivalent, is required to provide the pilot with a procedure for shedding non-essential electrical systems during maximum glide range.

Refer to section 10 of Part 1 of Appendix 2 to CAO 100.5.

2.4.11 Flight instrument systems

The aeroplane type must be equipped with flight and navigation instruments, and instrument power sources, complying with Australian regulatory requirements for commercial passenger carrying IFR operations. Refer to Aeronautical Information Publication (AIP) Australia Gen 1.5 and section 11 of Part 1 of Appendix 2 to CAO 100.5.

2.4.12 Autopilot system

For single pilot operations, the aeroplane type must be equipped with an approved automatic pilot complying with Australian regulatory requirements for commercial passenger carrying IFR operations. European Technical Standard Order (ETSO)–C9c provides the minimum performance standards that are required to be met.

Refer to section 12 of Part 1 of Appendix 2 to CAO 100.5.

2.4.13 Global Navigation Satellite System (GNSS)

The aeroplane must be equipped with an IFR approved Global Navigation Satellite System (GNSS) capable of being programmed with the positions of aerodromes and safe forced-landing areas, as well as providing instantly available track and distance information to those locations.

Aeronautical Information Publication (AIP) Australia Gen 1.5 provides the minimum requirements. Also refer to TSO–C145b and TSO–C146b.

The Federal Aviation Administration advisory circular (AC) 20-138D is endorsed by CASA as appropriate guidance material for the design, development and approval of modifications intended for Australian registered aeroplanes involving the installation of GNSS equipment.

Refer to section 13 of Part 1 of Appendix 2 to CAO 100.5.

2.4.14 Radar altimeter

The aeroplane must be equipped with a radar (radio) altimeter acceptable to CASA.

Refer to TSO-C87 and TSO-C67, as well as section 14 of Part 1 of Appendix 2 to CAO 100.5.

2.4.15 Weather radar

The aeroplane type must be equipped with a weather radar system acceptable to CASA.

Refer to TSO-C63c and section 15 of Part 1 of Appendix 2 to CAO 100.5.

2.4.16 Passenger seats

The aeroplane type must be equipped with passenger seats and shoulder harnesses, identified by part number, meeting the requirements of:

- Amendment 36 of FAR 23 –parts 23.562 and 23.785; and
- TSO 127A TypeC2.

The seat part numbers must be legible and accessible on the seat to positively identify the correct seat configuration. This is required upon application and also for ongoing assessment, in the event of seat changes after PSEA approval is provided.

Various seats are available for installation, the inspector should validate that the seats meet the above standards.

Part 1 of Appendix 2 to CAO 100.5 provides acceptable seat part numbers for Cessna 208 and 208B aeroplanes that have been verified as meeting the standards.

AEB can assist if there is uncertainty regarding the compliance of a particular part number with the airworthiness standards.

Refer to section 16 of Part 1 of Appendix 2 to CAO 100.5.

> Note: Some corporate seating may not fulfil this requirement. During assessment of Worksheet A, the inspector must ensure the operator has procedures to differentiate between PSEA and non-PSEA, in the event there is a seat installed that is not approved for PSEA operations.

2.5 Maintenance Program

2.5.1 CAR 42(M) System of Maintenance

For an aeroplane to which Part 42 does not apply, the aeroplane must be maintained in accordance with an approved SOM and a reliability program designed in accordance with AC 42-3(0) – as existing on 18 June 2018.

The SOM should be designed to meet the requirements for a Class A aeroplane SOM. This includes the requirement to have regard for the manufacturer's maintenance schedule and any inspection programs or documents issued by the manufacturer (refer to CAR 42M(3)(a.

Refer to section 2 of Part 1 of Appendix 2 to CAO 100.5.

2.5.2 Part 42 Approved maintenance program

For an aeroplane covered by Part 42 , the aeroplane must be maintained in accordance with a maintenance program approved under Subpart 42.J.

For an aeroplane that does not require a reliability program under regulation 42.155, the aeroplane must have a program, that is designed in accordance with AC 42-3(0), that would satisfy the annual assessment of effectiveness of the maintenance program as required by regulation 42.160. However, it should be noted that reliability programs are continuous, and the periodicity of review and normal reporting is more frequent than the annual review. Reliability reports should be provided and reviewed by CASA's Regulatory Oversight Division on a frequent interval that is at least every three months.

2.6 Reliability program

Paragraph 2 of Part 2 of Appendix 2 to CAO 100.5, which applies to PSEA operators, states that the aeroplane must have a reliability program designed in accordance with AC 42-3(0).

AC 42-3(0) provides guidance on the PSEA reliability program requirements, as recommended by ICAO in Annex 6 to the Convention on International Civil Aviation (the Chicago Convention), Operation of Aircraft. A copy of the relevant portions of ICAO Annex 6 can be found in Appendix 1 to AC 42-3(0).

Protocol (MP.02) Approved reliability programs contains the framework for approving a reliability program under Subpart 42.L and may be used as a guide for the assessment of a program designed to support non-Part 42 aeroplanes.

The following subsections describe typical approaches to managing reliability for a small fleet. A PSEA operator should, as a minimum, have an event-based reliability program commensurate with the size and complexity of the fleet.

2.6.1 Event based reliability

Event-based reliability is concerned with the investigation of actual events, such as:

- in-flight shut down (including power loss events)
- scheduled maintenance events
- dispatch delays (unscheduled maintenance events)
- lightning strikes etc.

> Note: Power loss in this context is defined as any loss of power, the cause of which may be traced to faulty engine or engine component design or installation, including design or installation of the fuel ancillary or engine control systems.

Each event should be investigated with a view to prevent or reduce possibility of recurrence. In the case of dispatch delays, it is important to recognise actual equipment failures as opposed to other operational

causes that may be inadvertently charged to the equipment (e.g. unavailability of personnel, replacement of serviceable items through troubleshooting etc.).

2.6.2 Statistical reliability

Statistical reliability is based on the collection and analysis of failure, removal and repair rates of systems and components. Rates are calculated on the basis or normalised events (rates per 1000 FH or 100 FC etc). This requires enough data points to create meaningful data to be statistically significant. For example, it may require at least 30-40 data points to provide a useful program. Rates established from this data set should provide some insight into the effectiveness of the maintenance program, but each scenario is different and good judgement is required as to whether a particular data set and associated metrics provide a useful indication of the effectiveness of the maintenance program.

Care should be taken using data against an aeroplane's frequency of use. For example, if an aeroplane has seasonal use and only used for six months of the year, the data for the period of inactivity should be recorded as 'no data' as opposed to 'no failures', which would not provide accurate reliability figures.

2.6.3 Historical reliability

Historical reliability relies on comparing current events with those of past experiences – typically used when no event rate is available (e.g. new equipment or major modifications). Events and failures are compared to expected outcomes, based on experiences with similar equipment, until enough data has been generated to establish a rate and revert to statistical analysis.

2.6.4 Performance standards

Performance standards are the acceptable levels of reliability set for the different equipment monitored by a basic reliability program. Typically, they are produced from an event based on a statistical reliability program of the operator or manufacturer and normalised against hours or flights.

Performance standards require engineering judgement for their application and typically apply to aeroplane equipment and systems. A reliability performance standard (also referred to as alert level, control level, reliability index, upper limit, lower limit) is purely an indicator, which, when intersected, indicates that there has been an apparent deterioration in the normal behaviour pattern of the item with which it is associated.

The term event or failure rate typically refers to the actual performance of the item; hence, the prime objective of the program is to manage the event rate below the set performance standard.

Performance standards should be up-dated periodically to reflect operating experience, product improvement or changes in procedures. Consideration needs to be given to items under investigation at the time of a review, as they may not be eligible to have their performance standard recalculated.

Operators with very small fleets, or a section of the program with limited data, may choose to set the performance standard to zero, requiring review of all reports to determine whether an alert is to be raised and investigation conducted. This is, in effect, an event-based reliability program.

2.6.5 Reliability program requirements

A reliability program should be established covering the engine and associated systems, and include the following:

- basic information, including the name and address of the registered operator, and the type, model, serial number and registration mark of aeroplane controlled by the program
- a general description and layout of the program in writing, and should include definitions of terms, acronyms and abbreviations
- an organisation structure that contains a statement describing lines of authority and responsibility; the program should identify the positions responsible for managing the overall reliability functions
- performance standards for engine hours flown in the period, and the in-flight shutdown rate for all causes, and the unscheduled engine removal rate – both on a 12-month moving average basis

- the event reporting process, covering all items relevant to the ability to operate safely at night and/or in IMC – the data should be available for use by the operator, the TC Holder and CASA to establish that the intended reliability levels are being achieved
- clearly defined and identified aeroplane parts and systems controlled by the program
- those items identified in CAO 100.5 as required for PSEA operations
- a description of the data collection system as it relates to the aeroplane – the description should include the sources of data, as well as procedures for transmission and receiving of data from each source
- a description of the methods for reviewing performance standards

Any sustained adverse trend should result in an immediate evaluation by the operator, in consultation with CASA and TC holder, to determine actions to restore the intended safety level.

The reliability program must provide for a format of display that allows easy identification of trends, events and when performance standards are exceeded. This display should be in a format that is available for CASA and the TC holder to review upon request, and meet the reporting requirement to CASA (at least quarterly or as agreed as per paragraph 9 of AC42-3(0))

A summary report of reliability performance should be provided to CASA on a periodic basis (e.g. a monthly or quarterly report)

The operator should develop a parts control program, with support from the manufacturer, that ensures that the proper parts and configuration are maintained for single-engine turbine-powered aeroplanes approved to conduct PSEA operations. The program includes verification that parts placed on an approved single-engine turbine-powered aeroplane, during parts borrowing or pooling arrangements, as well as those parts used after repair or overhaul, maintain the necessary configuration of that aeroplane for operations approved for PSEA.

2.6.6 Pooling of data

For a reliability program for a small fleet of aeroplanes, it is permitted to ‘pool’ data. That is, to collate data from several operators of the same type of aeroplane.

For context, a small fleet can be considered to be a fleet of less than six aeroplanes although the number is not a hard number.

Variations in utilisation between two operators may fundamentally corrupt the analysis. For the analysis to be valid, the following things for the aeroplane, from which data is pooled, must be substantially the same:

- aeroplane configuration
- aeroplane age and utilisation rate
- a type of operation and operating environment
- maintenance program and maintenance procedures.

Although not exhaustive, the following list provides guidance on the primary factors that may be considered:

1. Certification factors – such as aeroplane type certificate data sheet compliance (variant) / modification status, including SB compliance.
2. Operational factors – such as operational environment/utilisation (e.g. low, high, seasonal) / respective fleet size operating rules applicable (e.g. Reduced Vertical Separation Minima (RVSM), all Weather operations) / operating procedures / MEL and MEL utilisation.
3. Maintenance factors – such as aeroplane age, maintenance procedures, maintenance standards, applicable lubrication/servicing procedures, MPD revision or escalation applied, or maintenance program applicable.

2.7 Maintenance training

It is the operator’s responsibility to ensure that the approved maintenance organisation (AMO) that maintains the operator’s aeroplanes has the appropriately trained personnel to ensure the fleet are compliant with PSEA requirements. The inspectors may request confirmation from the operator in writing that this has been assured, and that the AMO’s training is in line with Part 145 of CASR and/or Part 30 of CAR. For AMO’s that

only have a CAR 30 certificate, the operator must submit a description of the training programs for engineering personnel. Documentation should also include evidence of initial, upgrade and recurrent training.

The person responsible for continuing airworthiness management may have to undertake additional training relevant to PSEA.

2.8 Minimum equipment list (MEL) requirements

Systems and equipment are required to be operational for PSEA operations. The MEL may provide relief for certain systems and equipment to be inoperative, but also may invalidate PSEA operations while the MEL is applied. The MEL should be assessed by both an airworthiness inspector and flying operations inspector.

If required, the inspectors will conduct the assessment of the MEL using Protocol suite (OPS.01) Minimum equipment list.

3. Flight operations assessment

3.1 Prescribed kinds of single-engine aeroplanes

Operators who wish to conduct PSEA operations must publish a list of the prescribed kinds of single-engine aeroplanes in their exposition/operations manual. To be suitable, the list should detail the aeroplane type/kind, registration and serial number. The exposition/operations manual should include procedures to inform the pilot in command (PIC) when, due to unserviceability or configuration changes etc., an aeroplane is no longer eligible for PSEA operations.

3.2 PSEA operations

The exposition/operations manual must provide instruction to the PIC as to when an operation requires a PSEA.

For Part 135 air transport operators, all flights conducted under the IFR or at night under the VFR, in a single -engine aeroplane, must comply with the requirements in the regulation 135.240—Prescribed single-engine aeroplanes and the Chapter 8 of the Part 135 MOS.

For Part 138 aerial work operators, who are authorised to carry aerial work passengers, if the operator carries more than 4 aerial work passengers on a flight conducted under the IFR, or at night under the VFR, in a single -engine aeroplane, the operations manual must include procedures for PSEA operations that comply with the requirements in the subregulation 135.240(2) and the Chapter 8 of the Part 135 MOS.

For certain other aerial work activities, the aeroplane utilised must be an eligible PSEA. To be suitable, the exposition/operations manual must list the kinds of PSEA and the activities that require their use. The inspector should confirm the exposition/operations manual provides instructions for:

- flights over water under the IFR or at night, below 1 500 ft ASL in a single-engine aeroplane, for the purposes of conducting an aerial work function
- flights over a public gathering, below 1 000 ft AGL, for the purposes of conducting an aerial work function.

> Note: For the definition of kind of aeroplane, refer to the CASR dictionary.

3.3 Prescribed matters for PSEA operations

3.3.1 Engine malfunction or failure

The exposition/operations manual must include procedures for the PIC to manage an engine malfunction or failure during take-off or initial climb.

If the decision is to abort the take-off, procedures are to be followed by the PIC. To be suitable, the procedures should include the following:

- actions to be followed by the PIC to abort the take-off (type/kind specific)
- indications, cautions or warnings that should initiate an aborted take-off
- actions where the aeroplane may not be stopped before the end of the runway.

> Note: For long runways, the abort decision may be after lift-off, but in a position where a safe landing can be made on the remaining runway.

Once the aeroplane is airborne, and aborting the take-off on runway or aerodrome are no longer an option, if suitable forced landing areas exist, the exposition/operations manual should include instructions to the PIC, about:

- maintaining control of the aeroplane
- airspeeds, altitudes or angle of attack indications for safe operation
- carrying out of AFM emergency procedures or checklists
- limitations on turning the aeroplane to achieve any forced landing areas
- planning and, if necessary, use of suitable forced landing areas around the departure end of the runway for use immediately after take-off
- weather minimums or wind conditions that make the areas available or limit their use
- the use of undercarriage, flaps or other high lift devices
- self-briefing for flight crew on the conditions and aspects of each take-off or a series of take-offs.

Where suitable forced landing areas do not exist, instructions to the pilot on conducting a forced landing, that are in addition to the above, should include:

- identification of the most suitable place to land the aeroplane, considering occupant safety and survivability
- procedures to prepare for impact
- declaration of emergency
- use of undercarriage, flap or other high lift devices to achieve the lowest possible speed and sink rate at touchdown
- where the aeroplane performance, speed, altitude and configuration allow, a turnback manoeuvre to re-land on the aerodrome.

Where turnback procedures are detailed in the exposition/operations manual, they should clearly identify:

- AFM emergency procedures and limitations
- altitudes at which turning back becomes an option, and may be variable dependant on the environment and location
- airspeeds for safe operation and configuration
- angle of bank limits
- configuration, including undercarriage, flap and other high lift device usage
- pre-take-off briefing requirements
- environmental limits, such as downwind components
- airspace and traffic considerations
- declaration of emergency
- after take-off climb performance to achieve initial height gain
- pilot competency and recency at conducting turnback manoeuvres, including:
  - initial training under the training and checking system approved in the exposition/operations manual
  - line checking
  - regular proficiency checking with competent training and checking pilots.

Note: Turn-back procedures from minimum safe height, or otherwise, are not mandatory for PSEA operations; they are simply one option for a safe landing outcome and may not always be suitable for or chosen by operators.

3.3.2 Decision point

For each aeroplane kind, the operator will need to determine the point during take-off at which the PIC can abort the take-off and reasonably expect to stop the aeroplane on the runway. The exposition/operations manual will need to include instruction on how the PIC will calculate the decision point. In practice, the decision point will relate to the speed of the aeroplane at the time of the abort decision. To be suitable, the decision point should include the following pre-take-off considerations:

- runway length
- take-off weight
- terrain
- environmental conditions, including wind, temperature and density
- braking efficiency or factors effecting brake efficiency, such as ice, snow or standing water.

3.3.3 Forced landing

The exposition/operations manual must include procedures and instructions to flight crew in the conduct of a forced landing from above 1 000 ft AGL in the after take-off, climb, enroute and approach stages of a flight. Each aeroplane has different considerations depending on cruise heights, glide performance, icing conditions etc. The operator's procedures must be suitable for each aeroplane type/kind operated and include considerations for:

- effect of wind
- flight in icing conditions
- normal, standby or alternate electrical power limitations
- loadshedding
- standby or primary instrumentation limitations
- procedures or patterns to fly to achieve a stabilised glide to arrive in the circuit of an aerodrome, or a selected forced landing area, at 1 000 ft AGL.

> Note: Refer to section 3.5 of AC 135-13.

Additionally, these procedures should include consideration for the inflight conditions, including:

- normal visual meteorological conditions (VMC) glide circuit procedures, in line with AFM instructions
- glide in IMC to becoming visual with the landing environment, with time to adjust for the touchdown
- glide in IMC to touchdown
- glide at night to touchdown, without runway or ground lighting
- instructions on the best speed, configuration and procedures to achieve minimum impact at touchdown and enhance safety and survivability aspects.

The exposition/operations manual must include procedures for glide to a suitable aerodrome or forced landing area from not more than 1 000 ft AGL to touchdown. This case needs to consider the natural flow-on of procedures following a failure at altitude, or an unprepared failure when operating below 1 000 ft AGL. The procedures need to be relevant to each type/kind of aeroplane and take into consideration the differences in glide performance, or use of high lift or drag devices during the glide approach phase.

3.3.4 Engine ignition and performance

Activation of a chip detector warning

The operator should establish procedures for the immediate actions, and considerations, for continued flight following an activation of a chip detector warning. The AFM procedures and instructions should be the basis of these instructions.

Some manufacturers' AFM instructions are generic and do not consider the activation of the chip detector warning in the PSEA context. The operator should develop procedures, in addition to the manufacturer's instruction, that would be the safest option following a chip detector warning.

Uncommanded engine shutdown

This includes a roll back or uncommanded reduction to idle power with no normal power lever function. For an aeroplane fitted with a secondary means of engine fuel control which bypasses the governing section of the fuel control unit, the exposition/operations manual must provide the PIC with abnormal procedures to manage the event. The inspector should confirm the operator's procedures comply with the AFM.

The exceedance of an engine parameter

All exceedances should be recorded and reported. The operator's instructions to flight crew, and the continuing airworthiness systems or procedures, must include detailed procedures to be followed in the event of an exceedance.

Activation of an (engine) fire warning

The operator's procedures for an engine fire warning must comply with the AFM. To be suitable, the operator's procedures should detail the actions post the AFM procedures, and include any decisions to leave the engine running, restart the engine or shut the engine down.

Engine failure

The operator's procedures for an engine failure must comply with the AFM. The ongoing actions, including restart options and battery power considerations, should be included in the exposition/operations manual. If the engine failure involves a roll-back to idle with no power lever response, the use of alternate/emergency/standby power lever systems should be included in the exposition/operations manual. This should include the limitations or considerations for further or continued flight under PSEA using the alternate system.

3.3.5 Suitable route and forced landing areas

Actions after an engine shutdown

The time to glide from a high cruising altitude may be significant in some high performance PSEAs. Following a powerplant failure and the subsequent loss of electrical power generation, battery condition and time to discharge become critical, particularly if IMC exist, to a low altitude. The operator's exposition/operations manual should include instructions to the pilot on what systems they may turn off or isolate manually to reduce battery draw and the expected time that electrical power will be available using battery only. Some PSEAs include automatic load shedding and standby electrical power systems. The exposition/operations manual should include instructions to the pilot on monitoring these systems both pre-flight, during flight and in the event of an activation following a failure.

In both cases, the exposition/operations manual should include instructions on the implication of critical systems that may be lost during load shedding, such as:

- ice protection or anti ice systems
- navigation or instrumentation systems
- pressurisation control and/or oxygen systems
- weather radar

- aeroplane internal and external lighting.

Where the PSEAs operate at higher altitudes, the exposition/operations manual should include instructions to flight crew on any limitation on the duration of the emergency oxygen system while gliding at altitudes above 10 000 ft pressure altitude. The information should include:

- minimum PSEA dispatch oxygen capacity/pressures/contents
- time of availability for various passenger/crew numbers
- consideration of the effect on glide range if an emergency descent is required due to depressurisation or loss of oxygen system.

3.3.5.1 Route planning

The operator's exposition/operations manual must include instruction to flight crew on planning a suitable route for a PSEA operation. The procedures should be developed to consider:

- routes that are flown regularly, or as part of scheduled air transport operations, may have standing instructions for the routes to be flown, considering known forced landing areas and operational restrictions such as minimum planning heights
- routes that are not flown regularly as part of a non-scheduled air transport operation will require additional procedures to assist the PIC with the selection of the most suitable route.

The procedures should take into consideration not only the route to be flown, but any potential alternate routes and suitable aerodromes or forced landing areas.

The exposition/operations manual should include procedures for inflight replanning, which takes into consideration the circumstances managed by the PIC.

The exposition/operations manual should include any restrictions, limitations and considerations for flight along the route, and include:

- considerations for the terrain to be overflown, or company instructions on avoiding overflying certain types of terrain of bodies of water
- the effect of weather phenomena that may require a diversion around the weather, or a change in the normal or planned operating altitude which reduces glide range. When considering weather effects, the exposition/operations manual should include guidance on:
  - known regular weather events or wind patterns
  - seasonal variation or diurnal variation of weather
  - rare or occasional events (cyclones or tropical revolving storms)
  - widespread areas of icing conducive weather or cloud formations
  - extremes of temperature
  - areas of known or forecast turbulence.
- any other event that may take the aeroplane outside of gliding distance of a suitable landing area, or any factors that may affect that range
- air traffic control (ATC) requirements – established required navigation performance, routes or airspace must be considered when planning PSEA routes. The exposition/operations manual should include instructions to flight crew on:
  - planning routes clear of special use airspace (danger, restricted or prohibited airspace) where possible
  - advising ATC of PSEA requirements if control measures cause tracking or descent, which will limit the glide capability or place the aeroplane over water, unsuitable terrain or into conditions that will affect safe PSEA operations.

3.3.5.2 Over water flights

The exposition/operations manual must detail ditching procedures and instructions to crew on the following:

- the aeroplane design – must be suitable for a ditching or a landing on the area water
- the areas of water selected as forced landing areas – must themselves be suitable for the ditching as described above, including not placing other persons in or on the water at risk
- equipment required and the location on board – ensures quick and unrestricted access and launching from inside the aeroplane (not from a cargo pod)
- aeroplane configuration and methods of achieving the best ditching in various sea and weather states
- any special aeroplane procedures or use of emergency exits to be used in a ditching (e.g. use only the rear cargo door upper half)
- passenger briefing instructions detailing the above.

The exposition must describe suitable water forced landing areas, including the following:

- that the area of water is adjacent to land and it is reasonable that persons would be able to either transition easily from the water onto the land (beach) or there is an immediate rescue capability at that site
- if an offshore platform is used, that the platform has an immediately available capability to rescue persons from the water – this should take into consideration the number of persons to be rescued and the sea conditions, including drift or swell, which may cause persons in the water to be swept away
- be in an area of water where pre-positioned search and rescue capability is available that can immediately rescue persons from the water.

The exposition should provide instructions on the overwater distance that is allowed for PSEA operations. This distance must take into consideration all the overwater requirements of Parts 135, 119 and 91. The inspector should ensure that the exposition/operations manual limits the overwater PSEA operation to either:

- a maximum of 25 nautical miles from a suitable forced landing area; or
- where the operator elects to use a distance greater than 25 nautical miles as the limit, clear instructions and process in the exposition/operations manual on what that limit is and the additional equipment, planning or considerations that must be taken when applying that limit.

3.3.5.3 Route time limitations

The exposition/operations manual must include planning and inflight procedures to ensure that the aeroplane remains within the maximum time limit of 15 minutes outside the glide range of a suitable forced landing area. To be suitable, the exposition/operations manual should publish the 15-minute time limit as a distance for each PSEA. The exposition/operations manual should also provide instructions as to when the aeroplane can be flown more than the 15-minute time limit, and what the additional time limit is. This should also be expressed as a distance.

3.3.5.4 Aerodromes and suitable forced landing areas

The aerodromes and suitable forced landing areas that are used by the operator in planning PSEA routes must be readily available to the PIC for pre-flight planning and inflight. To be suitable, the inspector should consider the following:

- the method by which suitable forced landing areas are identified
- whether the flight planning system used (if any) has the capability to include suitable forced landing areas and aerodromes, and be capable of calculating glide distances based on cruise speed and altitude
- whether the aeroplane navigation system includes all areas to be used, relevant to that flight, and can be easily recalled or selected in an emergency.

For the exposition/operations manual to be considered suitable, the inspector should confirm there is a process for:

  – recording aerodromes and suitable forced landing areas

- assessing and adding new areas
- identifying who has the responsibility to maintain the records and regular checking that the areas remain suitable
- how new areas will be added to the aeroplane navigation system, and the naming conventions for ease of use inflight.

3.4 Flight crew training and checking

For a Part 135 air transport operator, the training and checking system must include the competencies required by flight crew to safely conduct PSEA operations.

For a Part 138 aerial work operator, the operations manual must include the competencies required by flight crew to safely conduct PSEA operations. Aerial work operators who require a training and checking system, under regulation 138.125, must include the competencies required by flight crew to safely conduct PSEA operations. Aerial work operators who are not required to have a training and checking system must still meet their obligations under Chapter 23 of the Part 138 MOS. The type of assessment will depend on whether the operator is required to document PSEA operations in accordance with Chapter 8 of the Part 138 MOS.

Independent of the requirement to have a training and checking system, aeroplanes eligible for PSEA operations are prescribed under regulation 61.062 and required to meet the flight training and flight review requirements mention in regulation 61.747. To be suitable, the exposition/operations manual must include procedures to ensure flight crew successfully complete a flight review in an aircraft of the type, conducted by a person who is qualified under Part 61.

Item 4 in the table in regulation 135.395(1) requires the PIC of a PSEA to have a minimum of 20 hours as PIC or pilot in command under supervision (PICUS) of the kind of aeroplane used in PSEA operations. To be suitable, the exposition/operations manual must ensure the PIC completes the 20 hours PIC or PICUS flight time after they have completed flight training and a flight review on the aeroplane.

> Note: The 20 hours as PIC or PICUS is in addition to the training for the flight review and the flight review.

4. Revision history

Amendments/revisions for this principle are recorded below in order of the most recent first.

Table 4. Revision history table

Version No.	Date	Parts / Sections	Details
2.1	December 2023	Various	Removed duplicate sections that are now contained in the Operations protocol framework. Content moved to new template. Minor editorial changes throughout.
2.0	June 2022	Entire document	Full review IAW Part 135 of the CASR Adding flight operations assessment components from section 2.13 onwards Changing term ASETPA to PSEA Changing term aircraft to aeroplane Changing term RPT to scheduled air transport
1.0	June 2020	All sections	Initial Issue