WELLINGTON NEW ZEALAND

PURSUANT to Section 28 of the Civil Aviation Act 1990

I, MAURICE WILLIAMSON, Minister of Transport,

HEREBY MAKE the following ordinary rules.

SIGNED AT Wellington

This 15 day of September 1999

by **MAURICE WILLIAMSON**

Minister of Transport

Civil Aviation Rules

Part 125 – Amendment 1

Air Operations — Medium Aeroplanes

Docket 99/CAR/1327

Civil Aviation Rules

Part 125

Air Operations — Medium Aeroplanes

RULE OBJECTIVE, EXTENT OF CONSULTATION AND COMMENCEMENT

The objective of the amendments to Part 125 is to cover the operating requirements for suitably equipped single engine turbine powered aeroplanes carrying passengers for hire or reward under instrument flight rules (IFR) weather conditions. Consequential amendments to Parts 1, 119, and 135 are also part of the SEIFR passenger operations package.

The rules will reduce the effects of adverse weather on turbine single-engine passenger operations and fewer flights will be cancelled because of weather. These aeroplanes will be able to climb through adverse weather and fly at a greater distance from terrain even when cloud or poor visibility exists at low altitudes. In some conditions flight above the weather will be possible.

This will enable the aircraft operators to provide a more regular service that will not be dependent on weather conditions and will provide more comfort for the passengers by flying in the more favourable weather conditions that are experienced above the cloud.

A discussion paper was developed by the CAA to seek submissions from affected persons and organisations and a period of informal consultation followed. This culminated in the issue of Notice of Proposed Rulemaking 98–9 under Docket 99/CAR/1327 on 30 November 1998.

The publication of this notice was advertised in the daily newspapers in the five main provincial centres on Thursday 3 December 1998 and in the *Gazette* on Thursday 3 December 1998. The notice was mailed to interested members of Industry and to other parties, including overseas aviation authorities and organisations, who were considered likely to have an interest in the proposal and the document was made freely available on the CAA Internet site.

A period of 67 days was allowed for comment on the proposed rule. Thirteen written comments were received in response to the notice. Details of the submissions and comments on these are included in the consultation details annexed to the attached amendment to Part 125, in accordance with the requirements of section 32(1)(b) of the Act.

The submissions and verbal comments were considered and where appropriate the proposed rules amended to take account of the comments made.

The rules as amended were then referred to and signed by the Minister of Transport.

Part 125, Amendment 1 comes into force 28 days after notification in the *Gazette*.

List of Rules

Part 125 Amendments

Part 125 Amendments

Rule 125.1 is r evoked and the following new rule inserted:

"125.1 Purpose

(a) Subject to paragraph (b), this Part prescribes rules governing air operations using an aeroplane—

(1) having a seating configuration of 10 to 30 seats, excluding any required flight crew member seat, or a payload capacity of 3410 kg or less and a MCTOW of greater than 5700 kg; or

(2) to perform an SEIFR passenger operation.

(b) If either the seat numbers or payload capacity of the aeroplane falls into the applicability for Part 121, then the operation shall be conducted under Part 121."

125.3 Definitions

In rule 125.3 the definition for Air Operation is revoked and the following new definition inserted:

"Air operation means an air transport or a commercial transport operation using—

(1) an aeroplane having a seating configuration of 10 to 30 seats, excluding any required flight crew member seat, or a payload capacity of 3410 kg or less and a MCTOW of greater than 5700 kg; or

(2) a single-engine aeroplane to perform an SEIFR passenger operation:"

Insert new rules 125.9 and 125.11 after rule 125.7:

"125.9 Exemptions

The Director shall not grant any exemption to the requirements in this Part concerning the HUMS.

125.11 SEIFR passenger operations

Each holder of an air operator certificate shall not conduct an SEIFR passenger operation unless—

(1) the SEIFR passenger operation is specified in the certificate holder's operations specifications under 119.15(b)(5); and

(2) the operation is performed in accordance with the requirements of this Part; and

(3) the aeroplane used has a passenger seating configuration of 14 seats or less, excluding any required crew member's seat, and a payload capacity of 3410 kg or less."

Rule 125.53 is revoked and the following new rule inserted:

"125.53 Aeroplane airworthiness

(a) Each holder of an air operator certificate shall ensure that each aeroplane it uses in conducting an air operation has a current standard category airworthiness certificate.

(b) Each holder of an air operator certificate shall ensure that—

(1) each aeroplane it uses in conducting an SEIFR passenger operation is certificated by an ICAO contracting State—

(i) as a turbine-powered aeroplane; and

(ii) for instrument flight; and

(iii) as complying with airworthiness standards; and

(2) the airworthiness standards referred to in paragraph (b)(1)(iii) are equivalent to at least FAR 23, Amendment 28.

(c) Each holder of an air operator certificate shall ensure that the propeller model, engine model, and those accessories necessary for the continued operation of the propeller and engine, installed in each aeroplane it uses for an SEIFR passenger operation, have a minimum of 100,000 hours time-in-service in the same type and with the same combination of

propeller, engine, and accessories as that aeroplane and demonstrated a mechanical IFSD rate of 1 per 100,000 hours."

Insert rule 125.54 after rule 125.53:

"125.54 SEIFR proving flights

(a) Notwithstanding 119.57(a), each holder of an air operator certificate that intends to conduct an SEIFR passenger operation, where that operation is not already specified in the certificate holder's operations specifications under 119.15(b)(5), shall, upon applying for an amendment to the certificate to enable the certificate holder to conduct an SEIFR passenger operation, ensure proving flights and tests are performed to satisfy the Director that it can meet any relevant requirement prescribed in this or any other Part.

(b) The flights and tests required by paragraph (a) shall be performed in a manner acceptable to the Director."

Rule 125.63 is revoked and the following new rule inserted:

"125.63 Flight check systems

(a) Each holder of an air operator certificate shall, for each air operation, ensure that flight crew members have available for use a cockpit checklist covering the procedures, including emergency procedures, for the operation.

(b) Each person performing an air operation shall use a cockpit checklist covering the procedures, including emergency procedures, for the operation of the aeroplane in accordance with the aeroplane flight manual.

(c) Each holder of an air operator certificate shall ensure that when a person performing a pre-flight check for an SEIFR passenger operation removes a flight critical item during the pre-flight check, another person, authorised by the certificate holder, checks that the item has been replaced in accordance with the aeroplane flight manual before the flight commences."

Insert rule 125.72 after rule 125.71:

"125.72 HUMS requirements

(a) Each holder of an air operator certificate conducting an air operation shall ensure that, when a HUMS is required by 125.377 for an aeroplane—

(1) the HUMS is serviceable for each flight; and

(2) the HUMS is operated continuously from the time the propulsive engine start cycle commences until the propulsive engine is shut down; and

(3) the HUMS data is accessed, correlated, and entered into the engine manufacturer's trend monitoring programme—

(i) at least once every ten hours of flight time; and

(ii) before further flight, when the HUMS indicates that an engine parameter has been exceeded or there has been a HUMS failure; and

(4) base line data is established by the HUMS for each engine by operating the aeroplane on VFR operations or SEIFR cargo operations for—

(i) one complete maintenance cycle for that engine; or

(ii) 100 hours time-in-service for that engine.

(b) Each pilot in command performing an air operation using an aeroplane that is required by 125.377 to be equipped with a HUMS shall, as soon as practicable, record in the aeroplane technical log the time and date of each HUMS failure when the failure is indicated in the cockpit."

Rule 125.79 is revoked and the following new rule inserted:

"125.79 SEIFR passenger operations

(a) Each holder of an air operator certificate conducting an SEIFR passenger operation shall—

(1) for each aerodrome to be used for the operation, provide a route guide to the pilot-in-command with details of contingency options available to assist with obstacle clearance in the event of an engine power loss occurring during the instrument departure or approach, including—

(i) any alternative routes available to the intended runway; and

(ii) the minimum height and glide profile necessary to enable the aeroplane to reach the runway; and

(2) ensure that a programme is established to ensure the early identification and prevention of SEIFR related problems that includes—

(i) the recording of any event that is a potential risk to the safety of SEIFR passenger operations; and

(ii) the recording of occasions when an aeroplane was not dispatched on an SEIFR passenger operation due to weather below planning minima at the available alternate aerodromes; and

(iii) for each aeroplane, the maintenance of a database designed to assess the reliability of the aeroplane and its systems; and

(iv) compliance with the engine manufacturer's extended maintenance programme; and

(3) ensure that the database required in paragraph (2)(iii) includes—

(i) the recording of the number of SEIFR passenger flights operated each month; and

(ii) details of any diversion from a planned SEIFR passenger operation; and

(iii) the number of occasions when an aeroplane was not dispatched on an SEIFR passenger operation due to aeroplane unserviceability; and

(4) ensure that the information required by paragraphs (2) and (3) is reviewed each calendar month in accordance with its quality assurance programme and that any corrective or preventive actions are recorded; and

(5) ensure that the information required by paragraphs (2) and (3), and the records required by paragraph (4), are provided to the Director each calendar month except that after six months the

provision of that information may be extended to once every three calendar months if the extension is approved by the Director under paragraph (b); and

(6) ensure that each training syllabus required by Subpart I incorporates additional training—

(i) to integrate any IFR experience gained by a flight crew member in a multi-engine aeroplane and any VFR experience gained by a flight crew member in a single-engine aeroplane into the SEIFR passenger operation; and

(ii) necessary to conduct or avoid, as appropriate, SEIFR passenger operations in icing conditions; and

(iii) if operations are to be conducted at night, necessary to conduct SEIFR passenger operations at night; and

(iv) necessary to enable flight crew members to take appropriate action in the event of any non-normal warning or indication.

(b) The Director may approve an extension to the provision of information and records under paragraph (a)(5) if the Director is satisfied that such an extension will not compromise aviation safety."

Rule 125.81 is revoked and the following new rule inserted:

"125.81 Operations of single-engine aeroplanes – IFR

No person shall perform a commercial transport operation carrying passengers with a single-engine aeroplane under IFR."

Insert rules 125.93 and 125.95 after rule 125.91:

"125.93 SEIFR – immediate actions for non-normal engine indications

(a) Each person intending to performing an SEIFR passenger operation shall ensure that the operation does not commence if a non-normal engine indication occurs prior to take-off.

(b) Each person performing an SEIFR passenger operation shall ensure that, in the event of a non-normal engine indication occuring during flight—

(1) the situation is reported as soon as practicable to the appropriate ATS; and

(2) the flight proceeds to the nearest suitable aerodrome, in point of time, at which a safe landing can be made.

125.95 SEIFR – area navigation system requirements

Each holder of an air operator certificate shall ensure that for each aeroplane it uses in conducting an SEIFR passenger operation, the area navigation system required by 125.361(d)(3)—

(1) is programmed with the position of all aerodromes available for use on routes authorised in the certificate holder's route guide; and

(2) uses the current navigation database, recommended by the navigation system manufacturer, for each SEIFR passenger operation."

Rule 125.155 is revoked and the following new rule inserted:

"125.155 Meteorological conditions – VFR flight

(a) Each person performing an air operation shall ensure a VFR flight is not commenced unless current meteorological reports, or a combination of current reports and forecasts, indicate VFR minima prescribed in Part 91 and in paragraph (b) can be complied with along the route, or that part of the route to be flown under VFR.

(b) A pilot-in-command performing a VFR air operation in an aeroplane outside controlled airspace shall fly in meteorological conditions—

(1) of not less than a ceiling of 1000 feet AGL and a flight visibility of not less than 5 km; and

(2) if the operation is by night, of not less than a ceiling of 3000 feet AGL and a flight visibility of not less than 16 km.

(c) Except as provided in paragraph (d), a pilot-in-command performing a VFR air operation in an aeroplane outside controlled airspace shall fly—

(1) beneath the ceiling, remaining clear of cloud, and in continuous sight of the ground or water; and

(2) above not more than scattered cloud.

(d) A pilot-in-command shall not carry out an air operation under VFR in an aeroplane above more than scattered cloud unless—

(1) the aeroplane meets the requirements for IFR flight and the required minimum flight crew for IFR operation, holding current instrument rating qualifications, is at the controls; and

(2) the instruments and equipment, including radio navigation equipment, required for IFR flight are operative; and

(3) the aeroplane, if it is multi-engine, is capable, with one engine inoperative, of maintaining a net flight path that has a positive slope at 1000 feet above the cloud; and

(4) the aeroplane, if it is single-engine and is carrying passengers, is authorised to perform SEIFR passenger operations in accordance with this Part; and

(5) the aeroplane carries radio navigation equipment enabling it to be navigated by IFR to an aerodrome where an instrument approach procedure may be carried out for landing; and

(6) the aeroplane carries sufficient fuel and fuel reserves to proceed by IFR to an aerodrome where an instrument approach procedure may be carried out for landing."

Rule 125.161 is revoked and the following new rule inserted:

"125.161 IFR departure limitations

Each person performing an air transport operation shall ensure an IFR flight from an aerodrome is not commenced when weather conditions are at or above take-off minima requirements prescribed under 91.413 and are below authorised IFR landing minima requirements prescribed under 91.413,

unless the aeroplane is a multi-engine aeroplane and there is an appropriate aerodrome—

(1) for a two-engine aeroplane, within a maximum of one hour flying time, in still air at one engine inoperative cruising speed, of the aerodrome of departure; or

(2) for an aeroplane having three or more engines, within a maximum of two hours flying time, in still air at one engine inoperative cruising speed, of the aerodrome of departure."

Rule 125.163 is revoked and the following new rule inserted:

"125.163 Reduced take-off minima

(a) Each holder of an air operator certificate may operate a multi-engine aeroplane at lower take-off minima than that prescribed in 91.413(g) provided the holder of an air operator certificate ensures that the operation is conducted in accordance with the reduced minima take-off procedure specified in the certificate holder's exposition.

(b) The reduced take-off minima procedure shall ensure that—

(1) each flight crew member is qualified for reduced minima take-offs; and

(2) the runway to be used has centre-line marking or centre-line lighting; and

(3) Part 95 authorises reduced take-off minima on the runway to be used; and

(4) if the aeroplane is a two-engine propeller-driven aeroplane, the aeroplane is equipped with an operative auto-feather or auto-course system; and

(5) the runway visibility is established using RVR; and

(6) the method for observing and confirming that the required visibility exists for that take-off is acceptable to the Director."

Rule 125.165 is revoked and the following new rule inserted:

"125.165 IFR procedures

(a) Each pilot-in-command shall perform an IFR air operation on a route prescribed under Part 95 except when—

(1) it is necessary to avoid potentially hazardous conditions; or

(2) operating under radar control from an ATS; or

(3) operating under an off-route clearance obtained from an ATC unit; or

(4) otherwise specified in the exposition of the holder of the air operator certificate that authorises the operation.

(b) Unless a clearance has been obtained from the appropriate ATC unit, in controlled airspace, each pilot-in-command shall comply with any IFR departure and approach procedures prescribed under Part 95 for the appropriate aerodrome.

(c) In uncontrolled airspace each pilot-in-command shall comply with any IFR departure and approach procedures prescribed under Part 95 for the appropriate aerodrome.

(d) Each holder of an air operator certificate shall ensure that no aeroplane it uses in conducting an SEIFR passenger operation operates further than a maximum of forty five minutes flying time, in still air at normal cruising speed, from a suitable aerodrome.

(e) For the purpose of paragraph (d), a suitable aerodrome means an aerodrome that—

(1) will, at the possible time of use, be at or above the approved weather minima specified for that aerodrome when used as an alternate; and

(2) has suitable facilities and services available for the aeroplane type concerned that include—

(i) a meteorological reporting service; and

(ii) at least one prescribed instrument approach procedure."

Rule 125.355 is revoked and the following new rule inserted:

"125.355 Seating and restraints

(a) Each holder of an air operator certificate shall ensure that each of its aeroplanes is equipped with a shoulder harness for each crew seat.

(b) Each holder of an air operator certificate shall ensure that each aeroplane it uses in conducting an SEIFR passenger operation is equipped with seats, for all passengers, that—

(1) are fitted with an approved shoulder harness or a safety belt with a diagonal shoulder strap; and

(2) have been dynamically tested for that aeroplane, by the manufacturer; and

(3) certificated by an ICAO contracting State; and

(4) comply with standards equivalent to at least FAR 23, Amendment 36."

Rule 125.361 is revoked and the following new rule inserted:

"125.361 Instrument flight rules

(a) Each holder of an air operator certificate shall ensure that each of its aeroplanes operated under IFR is equipped with—

(1) additional, and independent, means of indicating—

(i) airspeed, calibrated in knots, with a means of preventing malfunctioning due to either condensation or icing; and

(ii) sensitive pressure altitude, calibrated in feet; and

(iii) spare bulbs for cockpit instrument illumination; and

(2) spare fuses.

(b) Notwithstanding paragraph (a)(1)(i), the holder of an air operator certificate may fit an additional attitude indicator powered by a separate power source.

(c) Each holder of an air operator certificate shall ensure that each aeroplane it uses in conducting an SEIFR passenger operation is equipped with an emergency electrical supply system with sufficient capacity for, following the failure of all engine-powered electrical generating systems—

(1) the extension of landing gear, where appropriate; and

(2) the extension of flaps; and

(3) those aeroplane systems essential for continued safe IFR flight and landing, including those required by paragraph (d)(3), paragraph (d)(4), and paragraph (d)(5); and

(4) either—

(i) descent from maximum operating altitude to sea level, assuming the aeroplane is configured in the optimum gliding configuration and operated at the optimum still air range gliding speed for the descent, plus one attempt at engine restart; or

(ii) continuation of flight for a minimum of one hour—

whichever requires the higher electrical load.

(d) Each holder of an air operator certificate shall ensure that each aeroplane it uses in conducting an SEIFR passenger operation is equipped with—

(1) an additional independent engine-powered electrical generating system capable of supplying adequate power for all components; and

(2) an additional attitude indicator, powered by an independent source; and

(3) an area navigation system capable of being programmed with the positions of aerodromes and emergency landing sites en-route that is—

(i) certified for IFR by the navigation system manufacturer; and

(ii) permanently installed in the aeroplane; and

(iii) powered by the aeroplane's emergency electrical supply system; and

(4) a radar altimeter or radio altimeter that is powered by the aeroplane's emergency electrical supply system; and

(5) a landing light that is powered by the aeroplane's emergency electrical supply system; and

(6) for a pressurised aeroplane, sufficient additional oxygen for all occupants that will enable the aeroplane to descend safely from its cruising level to a cabin altitude of 14,000 feet following engine failure assuming—

(i) the maximum cabin leak rate; and

(ii) the best range gliding speed for the aeroplane; and

(iii) the best gliding configuration for the aeroplane; and

(7) a powerplant installation that has been certificated by an ICAO contracting State to FAR 33, Amendment 28, or equivalent airworthiness standards, and is equipped with—

(i) an ignition system that activates automatically, or is capable of being operated manually for take-off and landing and during flight in visible moisture and is designed to be capable of operation for the full duration of any flight; and

(ii) a magnetic particle detector system that monitors the engine and reduction gearbox lubrication systems, and includes a flight deck caution indicator; and

(iii) an engine control system that permits continued operation of the engine through a power range sufficient to allow diversion to a suitable aerodrome and landing in the event the fuel control unit fails or malfunctions; and

(iv) an engine fire warning system.

(e) Each holder of an air operator certificate shall, when the magnetic particle detector system required by paragraph (d)(7)(ii) incorporates a method to remove detected particles without the removal of the particle detector from the engine or without examining the particles, record each detection occurrence as soon as practicable in the technical log for that aeroplane."

Insert rule 125.377 after rule 125.375:

"125.377 HUMS

Each holder of an air operator certificate shall ensure that each aeroplane it uses in conducting an SEIFR passenger operation is equipped with a HUMS that meets the requirements of Appendix B8."

Rule 125.511 is revoked and the following new rule inserted:

"125.511 Minimum flight crew – IFR

(a) Except as provided in paragraph (b), each holder of an air operator certificate shall ensure that an aeroplane operated under IFR is operated with two pilots.

(b) The holder of an air operator certificate may operate an aeroplane with a seating configuration, excluding pilot seats, of 14 seats or less under IFR with one pilot if—

(1) the aeroplane flight manual permits the aeroplane to be operated by one pilot; and

(2) the aeroplane is equipped with an operative autopilot or stabilisation system capable of operating the aeroplane controls to maintain flight and manoeuvre the aeroplane about the roll and pitch axes with an automatic heading and altitude hold; and

(3) the aeroplane is fitted with a headset that includes a boom microphone and facility for control column transmit-receive switching at the pilot-in-command station; and

(4) the pilot-in-command has met the other applicable requirements of this Part; and

(5) where the aeroplane is used in conducting an SEIFR passenger operation, the autopilot or stabilisation system required by paragraph (2) is capable of remaining fully functional after an engine failure."

Insert rule 125.861 after rule 125.859:

"125.861 HUMS records

Each holder of an air operator certificate that uses a HUMS shall—

(1) control and coordinate the information output from its HUMS; and

(2) keep an accurate record of all information collected from its HUMS as part of the appropriate aeroplane maintenance record; and

(3) ensure that the information is incorporated into its aeroplane maintenance programme."

Insert Appendix B.8 after Appendix B.7:

"B.8 HUMS

(a) A HUMS shall electronically record—

(1) the period of time that each engine is running at operating RPM; and

(2) the following parameters by time, duration, and value:

(i) engine torque:

(ii) engine temperatures:

(iii) engine pressures:

(iv) engine RPM; and

(3) the engine running time during device failure; and

(4) each exceedance of the operating limit associated with each of the parameters recorded in paragraph (a)(2); and

(5) tampering with any component of the HUMS.

(b) A HUMS shall—

(1) have sufficient electronic memory to record all parameters between maintenance checks; and

(2) store data in such a manner as to enable trends over time to be electronically established for each of the parameters specified in paragraph (a)(2); and

(3) include an immediate cockpit warning of—

(i) any exceedance of the parameters specified in paragraph (a)(2); and

(ii) a HUMS failure including tampering; and

(4) comply with the environmental conditions specified in RTCA Inc. document number RTCA/DO-160C; and

(5) comply with the software conditions specified in RTCA Inc. document number RTCA/DO-178B; and

(6) be capable of downloading its data to a separate ground based data storage unit."

CONSULTATION DETAILS

(This statement does not form part of the rules contained in Part 125.
It provides details of the consultation undertaken in making the rules.)

Background to the Rules

The new rules are structured in a manner similar to the Federal Aviation Regulations (FAR) of the FAA, and aim to achieve maximum harmonisation whilst allowing for national variations. Close co-operation is also being maintained with the Civil Aviation Safety Authority of Australia to ensure maximum harmonisation with their regulatory code. NZ legislation is being generated where necessary for the areas not presently covered.

New Zealand's revised legislation is published as Civil Aviation Rules (CAR) which is divided into Parts. Each Part contains a series of individual rules which relate to a particular aviation activity.

Accompanying most Parts will be at least one associated Advisory Circular (AC) which will expand, in an informative way, specific requirements of the Part and acceptable means of compliance. For instance an AC may contain examples of acceptable practices or procedures which would meet the requirements of a particular rule.

The objective of the new rules system is to strike a balance of responsibility between the State authority and those who provide services and exercise privileges in the civil aviation system. This balance must enable the State authority to set standards for, and monitor performance of, aviation participants whilst providing the maximum flexibility for the participants to develop their own means of compliance.

Section 12 of the Civil Aviation Act 1990 requires participants in the aviation system to carry out their activities safely and in accordance with the relevant prescribed safety standards and practices. Section 28 of the Act empowers the Minister to make ordinary rules; in this case, rules including but not limited to—

- the conditions and requirements for air operator certification; and

- the conditions and limitations under which aeroplanes may be used or operated for air operations.

Notice of Proposed Rule Making

To provide public notice of, and opportunity for comment on the proposed new rules, the Authority issued Notice of Proposed Rule Making 98–9 under Docket 99/CAR/1327 on 27 November 1998. This Notice proposed the amendment of Civil Aviation Rules Part 125 to provide a regulatory safety boundary for Single-engine IFR Passenger Operations.

Supplementary Information

The comments made on the Notice of Proposed Rule Making are available in the rules docket for examination by interested persons. A report summarising each substantive contact with the Civil Aviation Authority contact person concerning this rule making has been filed in the docket.

Availability of the Document

Any person may view a copy of these rules at Aviation House, 1 Market Grove, Lower Hutt or on the CAA Internet page at **http://www.caa.govt.nz**

Summary of Comments on NPRM 98-9 (Docket 99/CAR/1327)

General summary

The NPRM was sent by mail to all persons who submitted comments on the discussion paper, and all certificated air transport operators. Approximately 250 parties are known to have directly received a printed copy of the NPRM. The CAA's automatic list server emailed notification to 242 e-mail addresses to notify the recipients that the NPRM was available on the CAA web site to read online or download.

The CAA concludes that SEIFR passenger operations using turbine powered aeroplanes is accepted by many of the NPRM recipients on the basis that only 13 comments were received. From these 13 submissions, seven had concerns about SEIFR passenger operations, five approved, while the Airways Corporation of New Zealand were concerned about the cost

impact of low or restricted performance IFR aircraft on the IFR airways system but they did not express direct opposition to the NPRM.

Opposition Group

From the seven who opposed SEIFR passenger operations, two were totally opposed because they believed that the risk of engine failure was unacceptably high and would result in fatalities, one opposed in principle, and three submitters had reservations about the concept. All but two of the submitters included in this grouping offered alternative suggestions to improve the rule, should the CAA not accept their advice to disallow SEIFR passenger operations.

Supporters Group

From the five who supported SEIFR passenger operations, three were totally in support and two agreed with the concept. One submitter from this grouping wanted SEIFR to be permitted without the additional requirements proposed in the NPRM. This submitter thought the proposed rule was narrow minded, and restrictive and therefore declined to comment on specific rules in the NPRM. In particular, this supporter stated that the rule was defective because it did not include piston engine aeroplanes and helicopters.

General comments

Many of the more general comments stressed the importance of maintaining high operating standards. A number of submitters raised specific concerns about the need for vigilance by both operators and the CAA to ensure the risk to the travelling public remains acceptable. The CAA acknowledges these concerns. A number of changes have been made to the rule to ensure the necessary standard of operational safety is maintained by operators. The same principles used to maintain safety in ETOPS have been introduced into the rule. These changes are discussed in the Summary of Comments under the most appropriate NPRM rule number in the section, *Specific comments on the NPRM*.

Although the requirement to operate SEIFR passenger operations under Part 125 was clearly established in several rules in Part 125 and Part 135, the requirement to operate under the standards of Part 125 were missing from Rule 119.153 *Flight operation requirements*. This rule has been amended to ensure consistency and to avoid misunderstanding.

General comments on the NPRM with CAA responses

One commenter believed that the concept of accepting the light multi-engine piston aeroplane as the bench mark to judge an equivalent level of safety for the turbine-powered single-engine aeroplane was not acceptable because, in his observation, the majority of accidents were caused by, "*either poor pilot technique/training standards or poor maintenance standards. Also, most multi engine piston aircraft are flown by inexperienced, low-hour pilots, whom have a higher accident rate".*

CAA response: The various Authorities who have changed their rules to allow SEIFR passenger operations were careful to take into account other accident causes, such as those cited in this submission, when they evaluated accident statistics effecting the safety of SEIFR passenger operations. The FedEx SEIFR freight operation provided a controlled trial for SEIFR and proved that allowing SEIFR, at night, in turbine engine aeroplanes was an acceptable risk. The higher standards required by Part 125 will ensure that a professional standard will be maintained by certificate holders conducting SEIFR.

Two commenters raised the issue of single engine performance and the inequity caused by the lesser standards required for the single-engine aeroplane as opposed to the two-engine aeroplane. Performance standards require the two-engine aeroplane to be capable of continued flight above the terrain after one engine has failed. This requires a reduction in payload on some routes. One of the commenters suggested that a double standard was being introduced into the aviation system and that SEIFR rules could set a precedent for removing the engine-out performance requirements for multi-engine aircraft.

CAA response: The CAA accepts that a different standard will exist. These performance differences have always existed and the CAA believes that the public understands the difference between the capabilities of the single and twin engine aeroplane when an engine fails.

Different standards also exist for aircraft certificated under the various certification rules (Part 23 and Part 25), and even under the existing Part 125 (pre-SEIFR) there are different performance standards within the various classes of multi-engine aircraft.

One commenter suggested that a 4th factor should be added to the three mentioned in the NPRM under the heading, *Main factors affecting SEIFR*

safety. The submitters suggested the following wording:
(4) procedures for pre-flight planning, and inflight operation, that ensures the aircraft can reach a suitable landing site in the event of an engine failure.

CAA response: The CAA disagrees. The CAA first introduced this type of requirement in Rule 135.81 but were requested by the Industry during consultation to remove the provision. The same reasoning remains valid for declining this suggestion.

One commenter thought the NPRM should be withdrawn entirely as the proposal does not achieve the objective of an equivalent level of safety between single-engine and multi-engine air transport passenger operations. The commenter believes that the Civil Aviation Authority should focus on improving the light multi-engine aeroplane safety record rather than allowing the replacement of these aeroplanes by single engine aeroplanes.

CAA response: The CAA disagrees that the NPRM should be withdrawn. However the CAA agrees that safety is important, and will continue to act proactively to improve the safety performance of the entire Aviation Industry.

One commenter would like to know if an investigation has been made into the number, and causes, of in-flight engine shutdowns experienced by air transport operators using twin turbo-prop aeroplanes powered by the Pratt and Whitney PT6 engine. The commenter suggested that the significantly greater number of cycles flown by these operators may bring to light engineering support problems not yet considered.

[Note: Currently the PT6 engine is chosen by most manufactures of turbine single-engine aeroplanes.]

CAA response: Pilots generally carry out in-flight shutdowns (IFSD) to avoid engine damage – they are not therefore a measurement of engine failures. The suggestion has however been actioned by searching the CAA database. From the seven occurrences describing PT6 IFSD events compiled and analysed, six involved an engine shutdown because of indicator malfunctions, and one was caused by physical damage to the fuel control unit. In all cases the damage was not terminal and it could be assumed the engine would have continued to operate for the remainder of the flight had the pilot elected to leave the engine running.

One commenter was concerned that there were no guarantees or procedures that would preclude engine shutdowns caused by ancillary engine equipment or human failure such as leaving oil filler caps undone. The commenter stated that these problems caused the largest number of in-flight-shutdowns experienced by their twin-engine aeroplanes and that these events would lead to a forced landing with a single-engine aeroplane. The commenter was convinced records would show that these failures tended to occur in the critical flight phases such as shortly after take-off. The commenter stated, "*In each case our aircraft have been able to return or continue a safe and uneventful landing*". This commenter was however concerned that the final result for a single-engine aeroplane of a forced landing may show that there was inadequate protection for the fare paying passenger.

CAA response: The CAA had recognised these problems and the NPRM proposed that certificate holders conducting SEIFR passenger operations comply with the higher engineering and training standards required by Part 125. The CAA agrees with the commenters who consider that the Part 125 standards proposed in the NPRM were not sufficient. The rule has been amended to provide additional protection although this type of *human factor failure* should be a rare occurrence.

Engineers already have procedures that require *dual checks* to be accomplished when critical systems have been assembled. These procedures are designed to ensure that actions critical to flight safety, are accomplished by having a second person check that the work has been completed correctly. The SEIFR rule has been amended by adding a new rule, 125.63(c), which requires the development of similar procedures in the certificate holder's exposition. These procedures should include a *dual check* of the oil cap each time it is removed to check oil levels or replenish oil during a pre-flight inspection.

It is of interest that no incident involving oil caps and subsequent oil starvation or incipient starvation has been reported to the CAA. However inquiries in response to the above comments confirmed at least four incidents where oil caps have been left off prior to flight. One of these incidents is purported to have been a Cessna Caravan 208 aeroplane and the rest Bandierante aeroplanes. These incidents also illustrate the difference between single-engine and multi-engine aeroplanes in respect to the IFSD issue. The single-engine Cessna returned to a landing under engine power while the pilots of the multi-engine aeroplanes are reported to have shut

down and feathered the affected engine. The failure to report all these reportable incidents, in accordance with Part 12, is of concern to the CAA.

Two commenters would prefer to see the introduction of a rule that allows certification of SEIFR operations on a case by case basis, rather than a general rule as proposed. There was concern that commercial pressure would gradually erode the safety standard achieved by new or small SEIFR operators.

The commenters expressed the view, verbally, that they were concerned that nothing in the rule provided the CAA with a mechanism to control the marginal operator whose actions were not yet endangering their *air operator certificate*.

CAA response: All certification under Part 119 is on a case by case basis. However, it is clear that industry has a concern about the entry and exit of unsatisfactory SEIFR passenger operators. The CAA also agrees that new SEIFR operators, particularly those new to turbine engines, may need extra surveillance and assistance. It is also important that the standards for SEIFR passenger operations, required by Part 125, be permanently maintained.

Several amendments have been made to the rule in order to ensure these standards are satisfactorily maintained. Rule 125.81(c)(2) in the NPRM contained requirements for operators to record any detrimental event in a database and to proactively review the data and their operation to ensure safety was maintained. This rule has been moved to 125.79(a) and modified.

The information collected must now be provided to the Director on a monthly basis for the first six months. The Director may extend the provision of this information to three monthly reports, if the Director is satisfied with the standard of the certificate holder's own internal monthly reviews and its overall operating performance.

In addition 119.15(c) has been developed to allow the Director to specify a probation period for the new operator and require satisfactory monthly reliability reviews for continued authorisation. This brings SEIFR passenger operations in-line with the proven principles established for extended range twin engine operations (ETOPS) operations. This also clearly separates the authorisation to conduct SEIFR passenger operations from the issue of an air operator certificate. The period required for probation will be specified in the 119 Advisory Circular.

One commenter stated, "*We believe the rules as proposed in NPRM 98-9 will ably meet the requirements of New Zealand operators.*"

CAA response: The CAA agrees that, with the changes made in response to the submissions, this rule will achieve an acceptable level of safety.

One commenter cited the two recent ditching accidents that resulted in fatalities and submitted that the CAA should take note and carefully consider the impact of those ditching accidents before disregarding the requirements for over-water operations of countries such as Australia and USA, especially given the sea conditions associated with New Zealand coastal waters. The commenter stated that life-rafts and other safety equipment need to be carried.

CAA response: The CAA carefully considered this issue. This SEIFR amendment imposes a limit of 45 minutes flight from an alternate aerodrome. This will also restrict over-water operations. Life jackets are required by Rule 91.525(a)(1).

One commenter believes that the increased risk of passenger operations at night has not been adequately considered because the chances of completing a successful forced landing are reduced considerably, especially if over water. The commenter suggested that it would make much more sense to introduce this at a later date, once the concept has been given time to prove itself, here and through overseas experience.

CAA response: In New Zealand existing freight operations in single-engine turbine aeroplanes are operating at night without serious incident.

One commenter strongly supports the concept of permitting SEIFR operations by both aeroplanes and helicopters stating that the approval of such operations would provide an immediate and significant benefit to aviation. SEIFR provides an assurance of terrain clearance, in contrast to flying VFR where weather conditions could be marginal and change rapidly. This submitter was very disappointed with the NPRM which, in this commenters view, imposed grossly excessive airframe, powerplant, equipment, route, operating, and certification requirements for SEIFR operations. The submitter felt that the entire concept of SEIFR would be regulated out of existence before getting to the end of the runway. The submitter stated; "*We do not propose to comment in detail on any of the*

specific rules proposed as they are so far removed from a reasonable, cost effective, and workable solution that they do not deserve further attention."

CAA response: The CAA discussed this fully in the NPRM and does not propose to comment in detail. The power-train failure for helicopters is greater than 1 failure in 100,000 hours and does not fit the reliability requirements of Rule 125.53 [Final rule]. Advances in technology may allow the CAA to permit piston-engine aeroplanes or helicopters, or both, to perform SEIFR in the future as their reliability and safety record improves.

It is important to remember that the reason underpinning the decision to allow SEIFR is not because the existing operating standards for the older technology single-engine were considered to be overly conservative. It is a recognition that more reliable aeroplanes are now available that can safely enter the IFR environment.

One commenter was concerned about potential effects on Air Traffic Management procedures. The commenter stated that, *"Poor performing, usually light, twin engine aircraft have restricted improvements in system safety and efficiency in the past. Improvements in traffic capacity have been made as these aircraft have been progressively replaced by higher performance aircraft. Achievement of maximum traffic capacity at airports would be compromised by the introduction of low or restricted performance IFR aircraft."* The commenter was also concerned about disruptions caused by routeing restrictions and the need for non-standard flight profiles after engine failure.

CAA response: The CAA accepts that aircraft of differing performance characteristics will affect the efficiency of airspace management. SEIFR passenger operations are required to use turbine powered aeroplanes. Depending on an operator's procedures, the Cessna 208 can have a similar operating profile to the Banderiante while the Pilatus PC 12 is a higher performance aeroplane that can approach the performance profile of the Metro. In addition, ATS have always had the ability to prioritise clearances based on airspace requirements and other factors. In terms of airspace control, the engine failure requirements of the single-engine aeroplane are perhaps no more immediate than the pressurisation-failure requirement of any high altitude aeroplane.

Specific comments on the NPRM

Specific comments received from the 13 submissions are discussed as follows:

Part 1 General definitions

One commenter suggested that the 160kg of oil in the definition of *payload capacity* should be amended to say 15-20 kg of oil as this is the capacity of the small turbine engines, in the calculation of the zero fuel weight for establishing a payload capacity.

CAA response: The CAA agrees and the rule has been amended to take into account this difference.

In addition, the FAR definitions for *empty weight*, *justifiable aircraft equipment*, and *maximum zero fuel weight* have been added to Part 1 to make the definition of *payload capacity* legally acceptable. These definitions are already established in the FAR that are incorporated into the New Zealand certification rules and therefore the CAA considers their addition to Part 1 is acceptable without further consultation.

125.11 Exemptions [Final rule 125.9]

One commenter submitted that the Director should always be able to grant exemptions to a rule where an equivalent level of safety can be shown.

CAA response: The CAA disagrees. Other existing rules follow this principle and restrict the granting of exemptions.

125.53 Aircraft airworthiness

One commenter submitted that, "*the IFSD rate* [*required by the rule*] *is too high given the condition of flight at night or in IMC where there is a very high likelihood that an engine failure will result in fatalities. IFR procedures are produced* [designed] *to a safety rate of a failure at the rate of 1 in 10,000,000. If IFR procedures were produced to such a low* value [1: 100,000] *we could have much lower minimas but we would crash more aircraft. I recommend an IFSD rate closer to the IFR safety requirement as there can be no justification for a lesser rate given that there is no alternative means of propulsion envisaged*".

CAA response: Actual IFSD rates achieved by the Cessna 208 turbine-engine aeroplane in the FedEx SEIFR trial were three times that required by most Authorities for the SEIFR rule. The CAA accepts that the IFSD rates implemented in the Australian and Canadian rules establishes an acceptable minimum standard.

125.81(b)(4) SEIFR Passenger operations [Final rule 125.11]

Three commenters submitted that 14 passengers seats represented an unacceptable risk for SEIFR and that the maximum should conform with the maximum of ten passenger seats permitted by other Authorities.

One of these commenters would like to know what investigation was done to determine the maximum passenger numbers and weight-break for SEIFR operations. The submitter was concerned that the proposed levels would introduce an unfair commercial advantage for SEIFR operators over operators using small twin-engine aircraft. The submitter stated that operators using twin-engine aircraft should not be disadvantaged due to the engine-out performance criteria for multi-engine aircraft. If this rule is not changed, commercial pressure may force operators to use single-engine, rather than multi-engine aircraft. This result would be undesirable.

Another commenter was concerned that the carriage of 14 passengers would increase the pilot workload and submitted that two pilot crews should be required for the seat break 11 to 14 seats.

CAA response: When the Cessna 208 was first certificated in New Zealand, the CAA followed the example of a number of other Authorities by accepting the FAA certification of the aeroplane with 14 seats. This allowed the operation of single-engine aeroplanes with more than 10 seats for air transport operations. The requirements for two-crew operations are already established in the rules and the problems presented to a flight crew member by the number of passengers carried are not changed by the number of engines installed on the aircraft. One issue that is changed for the single engine aeroplane is the functionality of the autopilot after an engine failure. In addition to the existing requirements, the rule has been altered to require an aeroplane to have either two pilots, or an autopilot that is capable of functioning after an engine failure. This requirement means that any instruments required to drive the autopilot must be powered by the reserve power, and the autopilot itself is included in the list of essential services requiring power specified under 125.511(b)(5) [Final rule].

125.81(b)(5) SEIFR Passenger operations

One commenter asked, "*Will the requirements alluded to in this statement incorporate planning and in-flight considerations tailored to SEIFR operations. For example, is a minimum height of 2000ft above mountainous terrain still considered acceptable for SEIFR.*"

CAA response: All certificate holders are required to incorporate planning and in-flight considerations tailored to the type of operation.

One commenter submitted that the rule should be more forcefully stated if it was not to be meaningless. Another commenter also requested the rule make provision for en-route requirements such as minimum cloud ceiling and maximum time/distance from an emergency landing site.

CAA response: The CAA agrees that the rule achieves little and that the general principle of sound airmanship alluded to in the statement is required by the Act and other rules. The imposition of en-route restrictions was discussed in the NPRM and considered impractical. The rule has therefore been deleted.

125.81(c)(1)(ii) SEIFR Passenger operations [Final rule 125.79]

Two commenters queried this rule. One stated that the rule was sound in principle but impractical to comply with in the real world. One recommended that the rule be amended to require a flight to remain in VMC until at a height that a glide to a runway could be achieved. A similar rule would be required for the approach manoeuvre.

CAA response: The CAA disagrees that the rule is impractical. This rule requires the production of a route guide as part of the exposition. It must detail all the requirements for each route used by the operator. Each flight must be planned to only operate on routes or to aerodromes contained in the route guide. The principles are well established and similar to those used to calculate en-route drift-down for multi-engine aircraft. This does not preclude the flight crew taking alternative action in the event of a failure. The suggestion that a flight remain in VMC until at a height that a glide to a runway could be achieved will unnecessarily restrict SEIFR operations. This comment has also been taken into consideration when amending rule 125.161(a)(1).

125.81(c)(3)(iii) SEIFR Passenger operations

One commenter stated SEIFR operations at night are particularly dangerous should a failure occur. If [SEIFR passenger] operations at night are to be permitted at all, approval must be particularly strict.

CAA response: The requirements established for SEIFR passenger operations are strict. The certificate holder is required by 125.79(a)(6)(iii) to detail its training programme in a syllabus under Part 125 Subpart I including night training if operations are to be conducted at night.

125.161(a)(1) IFR departure limitations

Three commenters used this rule to discuss the principle of requiring VFR weather conditions as a safety net for an SEIFR passenger operation. They submitted that all take-offs should be conducted in conditions of ceiling and visibility that the operator determines are required to effect a safe landing on an available runway or suitable area of land. One also wanted VFR en-route conditions to ensure a safe forced landing.

One of the commenters said the wording of 125.161 was unclear and in the wrong sense.

CAA response: The CAA has agreed to permit an SEIFR passenger operation because of the proven level of reliability achieved by the new technology engine and airframe combinations. To require this type of operation to comply with a mixture of both the VFR and IFR limitations is to deny the effectiveness of the turbine aeroplane reliability record. The decision to allow SEIFR is not because of the need to establish less conservative operating standards. It is a recognition of the better aeroplane designs now available that take advantage of new technology and the ability to comply with higher certification standards. The CAA does however acknowledge the submissions that suggest the option for a rapid re-land is necessary. This rule has been amended to remove the ability of the single engine aeroplane to depart from an aerodrome when the weather is below that aerodromes landing minima. The rule is written in the correct sense when related to Part 91.

125.165 IFR procedures

One commenter submitted that the 45 minute requirement fulfils no real purpose in the event of an engine failure. The rule should be re-written to reflect that the aeroplane must at all times be able to glide to a place where an instrument approach can be completed to a safe landing or the ceiling must be forecast to be no lower than MSA [the prescribed minimum safe altitude] for the IFR route.

CAA response: The CAA disagrees. The word *suitable* has been substituted for the word *adequate* used in the NPRM to conform with the word usage in other rules. The requirement however remains the same. It is to be 45 minutes from a suitable aerodrome. In many cases there will be adequate aerodromes with an instrument approach that are closer and the pilot may elect to land at these aerodromes in an emergency. Inherently, turbine engines give some warning of a failure. They will continue for some time after these warnings are visible to the flight crew. The warnings may be in the form of a change in engine indications from the normal established readings, or in abnormalities plotted from the output of the health and usage monitoring system. The health and usage monitoring system alone is estimated to provide a 20 to 30% increase in reported engine reliability. The submissions have highlighted the need for a specific rule to require a pilot to take appropriate action when non-normal indications are observed. Rule 125.93 has therefore been added to the rule to ensure this requirement is clear.

125.361(c)(2)(ii) Instrument flight rules [Final Rule 125.361(c)]

One commenter submitted that the requirements used to calculate the emergency electrical supply system should be re-evaluated to more reasonably reflect the reason the emergency electrical supply is needed. The reason is either an engine failure; requiring glide time, engine restart attempt, extension of landing gear and flaps, and lights; or a generation failure that would require a maximum flight time of 45 minutes to an alternate aerodrome and extension of landing gear and flaps, and lights.

CAA response: The CAA has re-worded this rule to simplify understanding of the requirement and added the autopilot as part of the required equipment as discussed in this discussion document under 125.81(b)(4).

125.361(c)(3) Instrument flight rules

One commenter submitted that the extra instruments must be in full view of the pilot. The commenter cited the example of the Cessna 208 which has co-pilot's instruments that are not in reasonable view of the pilot in the left hand seat.

CAA response: This is already a requirement in 91.503 which states that any instruments and equipment operated or used by one pilot must be readily seen and operated from that pilot's normally seated position. It may be that, because of the width of the Cessna 208 instrument panel, an emergency attitude indicator would be necessary on the pilot's side if the aeroplane is to be operated by one pilot.

125.361(c)(4) Instrument flight rules

One commenter submitted that the words *capable of being* should be deleted. The requirement for the required area navigation system should be that it is programmed with the positions of aerodromes and emergency landing sites.

Another commenter wanted all aerodromes and emergency sites to be programmed into the navigation system.

CAA response: As suggested by these commenters, an operating rule to complete the requirement is necessary. A new rule [125.95 SEIFR – area navigation system requirements] has been developed to ensure the operator has procedures in place to programme the area navigation system.

One commenter wanted the Director to be permitted to approve non-certificated-IFR navigation systems that have large format displays for navigation.

CAA response: The CAA disagrees, SEIFR flight requires an IFR approved GPS.

Transitional arrangements

SEIFR passenger operations are not mandatory therefore transitional arrangements are not required.

Implementation

Existing certificate holders seeking approval to conduct an SEIFR passenger operation should amend their expositions to meet all of the requirements specified for SEIFR passenger operations and submit the amendments to the Director requesting that their *operations specifications* be amended to permit SEIFR passenger operations.

Conclusion

The Authority concludes from this consultation that the majority of the aviation industry participants favour the direction of the new and amended rules relating to the operation of single-engine aeroplanes in IFR. Specific issues that were identified in the comments received from the consultative group have been addressed. The rules also meet New Zealand's international obligations under the Chicago Convention.

The comments and all the background material used in developing the rules are held on the docket file and are available for public scrutiny.

Persons wishing to view the docket file should call at:

Aviation House, 1 Market Grove, Lower Hutt and ask for docket file 99/CAR/1327.