



**PURSUANT** to Sections 28, 29 and 30 of the Civil Aviation Act 1990  
**I, HARRY JAMES DUYNHOVEN**, Minister for Transport Safety,  
**HEREBY MAKE** the following ordinary rules.

**SIGNED AT** Wellington

This *7<sup>th</sup>* day of *May* 2008  
by **HARRY JAMES DUYNHOVEN**

Minister for Transport Safety

A handwritten signature in black ink, appearing to read 'Harry James Duynhoven', is written over the printed name. The signature is stylized and includes a large, prominent loop at the end.

**Civil Aviation Rules**

**Part 125, Amendment 13**

**Air Operations—Medium Aeroplanes**

*Docket 4/CAR/7*

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**Rule objective**

The objective of amendment 13 to Part 125 is to update the existing Part 125 rules pertaining to the Engine Health and Usage Monitoring System (HUMS) required to be fitted to aircraft performing single engine instrument flight rules (SEIFR) passenger air operations to improve the current level of safety of those operations.

These amendments to Part 125 will:

- change the terminology of the required monitoring and recording system from HUMS to Automatic Engine Data Recording System (AEDRS).
- enable the Director to approve alternative technical specifications for AEDRS equipment as an equivalent to that specified in Part 125 Appendix B.8.
- enable AEDRS data trend monitoring programmes other than those supplied by the engine manufacturer to be used if acceptable to the Director.
- require AEDRS to be serviceable for every operation of the aircraft's engine.
- require procedures relating to the AEDRS to be documented in the aircraft's maintenance programme.
- allow a reduction in the period over which the baseline engine data must be recorded. This will enable increased operation of aeroplanes under IFR, thereby enhancing safety through reducing exposure to VFR operations.
- require the baseline engine data to be re-established following operation of the aeroplane with AEDRS inoperative or following any maintenance after which the engine manufacturer recommends that the baseline be re-established.
- provide a six month transition period to enable the maintenance programmes for SEIFR passenger aeroplanes to be updated to meet the new requirements.

Amendment 38 to Part 1, which changes the equipment terminology to AEDRS, is associated with this amendment 13 to Part 125.

### **Extent of consultation**

The original HUMS (AEDRS) requirements were developed and introduced into Part 125 in 1999. At that time there were no aircraft in New Zealand suitable for SEIFR operations that incorporated integral HUMS.

The existing rules were developed around proprietary add-on HUMS and, prior to the publication of Part 125 Amendment 9, were in some aspects technically impossible for current proprietary HUMS to be compliant with. The existing requirements are also more stringent than current industry practices with regard to establishing baseline data for monitoring engine performance.

In 2004 a study group was convened within CAA and considerable consultation with manufacturers, operators and aviation industry sources, including overseas aviation authorities was undertaken. The work of this study group, incorporating wide international feedback of the developing working papers, culminated in the preparation by CAA of the final HUMS working paper WP9.

A Notice of Proposed Rulemaking, NPRM 07-06, containing the proposed rule changes was issued for public consultation under Docket 4/CAR/7 on 22 February 2007.

The publication of this NPRM was notified in the *Gazette* on 22 February 2007 and advertised in the daily newspapers in the five main provincial centres on 22 and 24 February 2007. The NPRM was published on the CAA web site and mailed to 20 identified stakeholders who were considered likely to have an interest in the proposal.

This NPRM included the proposal to allow a reduction in the period over which the baseline engine data must be recorded. This will facilitate early SEIFR passenger operations by new aircraft introduced into New Zealand operators' fleets.

A period of 29 days was allowed for comment on the proposed rule.

## **Summary of submissions**

Three written submissions were received on the NPRM. These submissions have been considered and as a result the terminology of the required system has been changed from HUMS to AEDRS and AEDRS data record keeping requirements have been clarified. As a result of the terminology change from HUMS to AEDRS, rule 125.9 is also amended to now refer to AEDRS instead of HUMS.

A proposal by 2 of the 3 submitters to allow SEIFR passenger operations to continue for a limited period of time with manual recording of data instead of the automatic recording by the AEDRS was rejected by the CAA because automatic recording of engine data is a critical component for allowing SEIRF passenger operations. Enquiries by the CAA show that failure of the AEDRS is very rare.

After reviewing the submissions the CAA considered that the requirements regarding the establishment of baseline data for the engine trend monitoring system need to be clarified. This required editorial changes to some of the proposed rules and some additional paragraphs to some others. The rules as amended were then referred to Parliament's Regulations Review Committee before being signed by the Minister for Transport Safety.

## **Examination of submissions**

Submissions may be examined by application to the Docket Clerk at the Civil Aviation Authority between 8:30 am and 4:30 pm on weekdays, except statutory holidays.

## **Insertion of Amendments**

The amendments to the rules in this Part are reflected by the revocation of the existing rules and insertion of amended rules.

## **Effective date of rule**

Amendment 13 to Part 125 comes into force on 12 June 2008.

### **Availability of rules**

Civil Aviation Rules are available from—

CAA web site: <http://www.caa.govt.nz/>

Freephone: 0800 GET RULES (0800 438 785)

## Part 125 Amendments

### Subpart A — General

*Rule 125.9 is revoked and replaced by the following new rule:*

#### **125.9 Exemptions**

The Director may not grant any exemption to the requirements in this Part concerning the AEDRS.

### Subpart B — Flight Operations

*Rule 125.53 is revoked and replaced by the following new rule:*

#### **125.53 Aeroplane airworthiness**

- (a) A holder of an air operator certificate must ensure that every aeroplane that is operated on an air operation under the authority of the certificate has a current standard category airworthiness certificate.
- (b) A holder of an air operator certificate must ensure that—
- (1) every aeroplane that is operated on a SEIFR passenger operation under the authority of the certificate is certificated by an ICAO Contracting State—
    - (i) as a turbine-powered aeroplane; and
    - (ii) for IFR flight; and
    - (iii) as complying with airworthiness standards that are equivalent to at least FAR 23, Amendment 28; and
  - (2) the propeller model, engine model, and those accessories necessary for the continued operation of the propeller and engine installed in an aeroplane that is operated under paragraph (b)(1) have—
    - (i) a minimum of 100,000 hours time-in-service in the same type of aeroplane; and

- (ii) with the same combination of propeller, engine, and accessories as that aeroplane, a demonstrated mechanical IFSD rate of not more than 1 per 100,000 hours.

***Rule 125.72 is revoked and replaced by the following new rule:***

### **125.72 AEDRS operating requirements**

A holder of an air operator certificate who operates an aeroplane that is required under rule 125.377 to be equipped with an AEDRS must not operate the aeroplane on a SEIFR passenger operation unless—

- (1) baseline data for the engine has been established by the AEDRS in accordance with the procedure required under rule 125.407(a)(5); and
- (2) for every operation of the engine—
  - (i) the AEDRS is serviceable; and
  - (ii) the AEDRS is operated continuously from the time every start cycle for the engine commences until the time that the engine is shut down.

***Rule 125.93 is revoked and replaced by the following new rule:***

### **125.93 SEIFR – immediate actions for non-normal AEDRS or engine indications**

(a) A holder of an air operator certificate who operates an aeroplane that is required under rule 125.377 to be equipped with an AEDRS must not operate the aeroplane on a SEIFR passenger operation if, prior to take-off,—

- (1) the AEDRS indicates an AEDRS failure; or
- (2) the AEDRS indicates an exceedance in an engine parameter; or
- (3) the engine instruments indicate a non-normal engine condition.



(b) A pilot-in-command of an aeroplane performing a SEIFR passenger operation must, if a non-normal engine indication occurs in flight,—

- (1) report the situation to the appropriate ATS unit as soon as practicable; and
- (2) proceed to the nearest suitable aerodrome, in point of time, at which a safe landing can be made.

(c) A pilot-in-command of an aeroplane performing a SEIFR passenger operation must, as soon as practicable, record in the technical log the time and date of every AEDRS failure if the failure is indicated in the cockpit.

## **Subpart F — Instruments and Equipment**

*Rule 125.377 is revoked and replaced by the following new rule:*

### **125.377 AEDRS**

A holder of an air operator certificate must ensure that every aeroplane that is used to conduct a SEIFR passenger operation under the authority of the certificate is equipped with an AEDRS.

## **Subpart G — Maintenance**

*Rule 125.407 Reserved is revoked and the following new rule is inserted:*

### **125.407 Maintenance programme — additional requirements for aeroplanes with AEDRS**

(a) A holder of an air operator certificate who operates an aeroplane that is required under rule 125.377 to be equipped with an AEDRS must ensure that the maintenance programme required under rule 119.63 for the aeroplane includes—

- (1) a trend monitoring programme for the engine; and
- (2) a procedure for the AEDRS data to be entered into the trend monitoring programme at the lesser of—

- (i) the interval recommended by the engine manufacturer or other appropriate organisation acceptable to the Director; or
  - (ii) every 10 hours of engine operating time; or
  - (iii) before a further SEIFR passenger operation if the AEDRS indicates that an engine parameter has been exceeded or there has been an AEDRS failure; and
- (3) a procedure for analysing the AEDRS data entered into the trend monitoring programme under paragraph (a)(2) to identify—
- (i) any unacceptable trend in the engine performance; and
  - (ii) any tolerance exceedance in the AEDRS data; and
  - (iii) any failure of the AEDRS; and
- (4) details of the maintenance actions to be taken before the aeroplane is used for a SEIFR passenger operation following—
- (i) the identification of any of the conditions specified under paragraph (a)(3); or
  - (ii) any maintenance on the engine or associated control systems where the engine manufacturer recommends that engine baseline data be established following the maintenance; and
- (5) a procedure for baseline data to be established by the AEDRS for the engine—
- (i) before the aeroplane is used on a SEIFR passenger operation; and
  - (ii) following any operation of the engine without the AEDRS operating; and

- (iii) when the maintenance actions required under paragraph (a)(4)(ii) require the AEDRS baseline data to be re-established.
- (b) The baseline data required under paragraph (a)(5) must be established by operating the aeroplane, engine, and propeller combination on VFR operations or SEIFR cargo only operations for—
- (1) one complete maintenance cycle for the engine; or
  - (2) 100 hours time-in-service for the engine; or
  - (3) a period that is specified for establishing baseline data in the engine trend monitoring programme that is recommended by the engine manufacturer or other appropriate organisation provided that the engine trend monitoring programme is acceptable to the Director.
- (c) For the purpose of paragraphs (a)(2)(i) and (b)(3), an appropriate organisation is an organisation that has design and maintenance knowledge of the engine type concerned.

*The following new rule is inserted after 125.415:*

**125.417 Transition —Maintenance programme — additional requirements for aeroplanes with AEDRS**

Despite the requirements of rule 125.407, the holder of an air operator certificate who on 12 June 2008 was authorised to operate an aeroplane on a SEIFR passenger operation does not need to amend the maintenance programme for the aeroplane to comply with the requirements of rule 125.407 until 15 December 2008 if the certificate holder—

- (1) continues to maintain the aeroplane in accordance with the certificate holder's maintenance programme that was approved under Part 119 and was current on 12 June 2008; and
- (2) complies with the requirements of—

- (i) rule 125.407(a)(2)(i), (ii), and (iii) regarding entry of AEDRS data into the trend monitoring programme; and
- (ii) rule 125.407(b) regarding the establishment of baseline data.

## Subpart L — Manuals, Logs, and Records

*Rule 125.861 is revoked and replaced by the following new rule:*

### **125.861 AEDRS records**

- (a) A holder of an air operator certificate who operates an aeroplane that is required under rule 125.377 to be equipped with an AEDRS must keep a record of the analysis information derived from the AEDRS data as part of the maintenance record for the aeroplane.
- (b) The records that are required to be kept under paragraph (a) must be legible, accurate, permanent, and retrievable.

## Appendix B — Instruments and Equipment Airworthiness Design Standards

*Appendix B.8 is revoked and replaced by the following new Appendix:*

### **B.8 AEDRS**

- (a) An AEDRS must electronically record—
  - (1) the period of time that the engine is running at operating RPM; and
  - (2) engine parameter data for those engine parameters that are critical to engine performance and condition, as recommended by the engine manufacturer or another organisation acceptable to the Director that has design and maintenance knowledge of the engine type; and
  - (3) the engine running time during any AEDRS sensing device failure; and

- (4) every exceedance of the operating limit associated with each of the parameters recorded under paragraph (a)(2); and
  - (5) as far as practicable, any occurrence of tampering with any component of the AEDRS.
- (b) An AEDRS must—
- (1) have sufficient electronic memory to record, between maintenance checks, all the data and occurrences required under paragraph (a); and
  - (2) store data in a manner that enables trends over time to be electronically established for the engine parameters recorded under paragraph (a)(2); and
  - (3) include a cockpit caution indication of—
    - (i) any exceedance of the tolerances on the parameters recorded under paragraph (a)(2); and
    - (ii) as far as practicable, an AEDRS failure including tampering; and
  - (4) automatically activate the data recording at the commencement of a start cycle for the engine; and
  - (5) comply with the environmental conditions specified in RTCA Inc. document number RTCA/DO-160C; and
  - (6) comply with the software conditions specified in RTCA Inc. document number RTCA/DO-178B; and
  - (7) identify, as recommended by the AEDRS manufacturer, any components of the propulsion and airframe system it is monitoring; and
  - (8) 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.)*

A Notice of Proposed Rulemaking, NPRM 07-06, containing the proposed rules was issued for public consultation under Docket 4/CAR/7 on 22 February 2007.

A copy of the NPRM was sent to:

- Air New Zealand Ltd
- Airwork NZ Ltd
- Altair Avionics Corporation
- Aviation Quality Systems
- The Australian Civil Aviation Safety Authority (CASA)
- Cessna Textron Ltd
- Danish Engine Trend Analyzing (DETA)
- The United States Federal Aviation Administration (FAA)
- Flight Technology Ltd
- Gippsland Aeronautics Ltd
- Glenorchy Air Services & Tourist Co. Ltd
- Helicopters NZ Ltd
- Pacific Aerospace Corporation Ltd
- Rangiora Aircraft Engineering
- Sounds Air Travel and Tourism
- Mr Ronald Ashford
- Mr Karl Trautmann

The NPRM was also published on the CAA website.

A total of three submissions were received from Aviation Quality Systems (AQS), air2there.com and Sounds Air.

**General comments**

One submission was received from AQS to the effect that the proposed changes do not reflect current industry practice and technology trends.

**CAA Response**

*The CAA disagrees with this submission.*

*Industry practice in relation to HUMS is, or should be, set by the existing rules and the proposed rules do not fundamentally change the SEIFR HUMS requirements. The majority of the proposed changes only require documentation of HUMS procedures in the aircraft's maintenance programme. Technology trends such as automatic trend monitoring and pictorial navigation displays that appeared in the late 1990s enabled SEIFR to be approved but have not altered the basic requirement of achieving and maintaining an acceptable level of engine reliability and using all practical and effective means to avoid an in-flight engine failure.*

**Approach taken by other States**

Two submissions were received regarding the approach taken by other states. AQS submitted that the proposed rules are inconsistent with other regulatory authorities and inconsistent in some respects to those of the International Civil Aviation Organisation (ICAO).

Sounds Air submitted that ICAO and the FAA do not require HUMS except for aircraft built after 1 January 2005.

**CAA Response**

*The CAA's research indicates there is a wide variation in the approach taken by overseas authorities in relation to HUMS requirements for SEIFR operations. The FAA takes a liberal approach and does not require the use of HUMS. CASA requires the use of HUMS for all single engine air transport operations (whether IFR or VFR) but does allow operation for short period when the equipment is inoperative provided engine data is manually recorded by the pilot. The European Joint Airworthiness Authority (JAA) does not permit SEIFR operation at all although this is under review.*

*ICAO Annex 6 contains a standard that requires single turbine powered aeroplanes operated at night or in IMC to have an engine trend monitoring system and this trend monitoring system must be an automatic system for those aeroplanes for which the first individual certificate of airworthiness was issued on or after 1 January 2005.*

*The requirements for HUMS to be fitted to New Zealand aircraft operating SEIFR has been in place since SEIFR operations were first permitted in 1999 and was a fundamental basis for the acceptance of such operations by the CAA.*

*The CAA does not consider its requirements to be inconsistent with overseas authorities as both CASA and (in the case of aircraft first issued with an airworthiness certificate after 1 Jan 2005) ICAO, require automatic engine data recording systems to be fitted to SEIFR aircraft. The remaining authorities which New Zealand takes cognisance of in developing aviation rules are divided on the requirement for this equipment, or on the acceptability of SEIFR air operations at all.*

### ***Safety case***

Two submissions questioned the safety case for HUMS. AQS submitted that HUMS will not improve the outcome of an engine failure and will not detect certain types of failure such as turbine blade failure. Sounds Air also submitted that HUMS does not provide short term predictability or prevention of an engine failure.

Sounds Air further submitted that the proposed rule changes will impede the safety benefits of SEIFR by resulting in more VFR operations being undertaken. Sounds Air believes VFR operation is inherently less safe than IFR operation. Sounds Air also submitted that there should be a statistical analysis of the value of HUMS in detecting sudden engine failures, that engine failures are not a significant cause of accidents involving single engined aircraft compared to accidents occurring under VFR operation and that other airborne systems make stringent requirements for HUMS unnecessary.

### ***CAA response***

*The CAA does not agree with these submissions. The prime purpose of HUMS is to ensure engine health is continuously monitored,*



*particularly any exceedance events, so appropriate maintenance action to protect engine reliability can be taken. Exceedance events can cause damage which will affect future engine reliability and could result in an engine shutdown in-flight.*

*While the CAA accepts that conducting air transport operations under IFR is generally safer and more reliable than under VFR it is fundamental to the CAA's approach to SEIFR approval that engine health is continuously and automatically monitored. The CAA believes this is an essential element in achieving the required engine reliability levels for SEIFR passenger operations.*

*The CAA also accepts that other airborne systems such as moving map displays improve the safety of SEIFR operations in the event of an engine failure. However these systems do not substitute for utilising best practice monitoring and maintenance techniques to ensure power plant reliability is maintained to the highest practicable level.*

### **Scope of HUMS**

AQS submitted that HUMS should be part of an engine monitoring programme that includes regular inspections and analysis of oil samples and that there should be less emphasis on HUMS as a device.

### **CAA response**

*The CAA agrees that HUMS should be part of a wider engine reliability programme based on manufacturer's recommendations. Existing rule 125.79(2)(iv) requires compliance with the engine manufacturer's extended maintenance programme. In the case of the Pratt and Whitney Canada PT6A engine, the manufacturer does not require engine oil soap analysis as part of the trend monitoring. However some engine overhaul interval escalation programmes covered by supplemental type certificates do require oil sample analysis.*

### **Terminology**

AQS submitted that the terminology "automatic engine trend monitoring" should be used instead of "HUMS".

### **CAA response**

*The CAA agrees that the term “HUMS” is not appropriate in describing this type of airborne equipment which automatically records and stores engine and ambient flight condition data and compares recorded engine parameters with limiting values established by the engine manufacturer. The CAA’s research indicated the terminology “HUMS” was originally used in the United Kingdom to describe helicopter transmission vibration monitoring systems developed to improve reliability of helicopters operating in offshore oil exploration work.*

*However the CAA does not agree that the terminology “automatic engine trend monitoring” is appropriate to describe the airborne equipment required under this rule because the trending of engine parameters over time to determine engine health and deterioration is done in a ground based computerised analysis system using the recorded data downloaded from the airborne equipment, not in the airborne equipment.*

*For this reason CAA proposes replacing the terminology “HUMS” where it appears in rule parts 1 and 125 with the terminology “automatic engine data recording system” (AEDRS).*

#### ***Requirement for automatic data capture***

Sounds Air submitted that manual capture of engine data rather than automatic capture via HUMS should suffice on the basis that manual data capture is accepted by the FAA and under ICAO Annex 6 SARPS for SEIFR operations.

#### ***CAA response***

*The CAA does not accept that manual capture of engine data is adequate for SEIFR operations. In particular manual data capture does not provide continuous monitoring of engine parameters from engine start to engine shut down. Manual data capture is reliant on the pilot recording data during flight, typically when the aircraft is stabilized in cruise. The ability to do this depends on pilot workload and flight conditions and the data captured is not generally recorded as accurately as is possible with an automated system.*

*The CAA considers it is essential that any exceedance of engine limitations such as inter-turbine temperature, torque and rpm*

*limitations is automatically detected and accurately recorded so appropriate maintenance action can be taken to ensure any potential damage to the power plant is detected and rectified before further flight.*

### ***Additional engine parameters to be analysed***

AQS submitted that paragraph 3.1.2 of the NPRM is too broad in that it states that the requirement to analyse additional parameters was to be extended to any parameters relevant to HUMS rather than to engine parameters only. AQS submitted that the parameters to be measured should be relevant to the engine and as determined by the engine manufacturer.

### ***CAA response***

*The CAA accepts that the wording used in paragraph 3.1.2 was unduly sweeping in suggesting non-engine parameters were being included in the proposed requirements. The parameters required to be electronically recorded are specified in Part 125 appendix B.8 at (a)(2). This requirement is unchanged from the existing rule and only requires engine parameter data for those parameters critical to the engine performance and condition, as recommended by the engine manufacturer or trend analysis service provider to be electronically recorded. It should be noted that data relating to ambient flight conditions such as altitude, temperature and airspeed is essential to the analysis of HUMS data and in this context is regarded as “engine data”.*

### ***HUMS requirements (125.72)***

One submission was received regarding proposed rule 125.72. AQS submitted that:

- The layout of the requirements is not logical because the requirement to fit HUMS appears in the rules after the applicable airworthiness requirements.
- The requirement for HUMS to be operative for dispatch is inappropriate on the basis that the FAA Master Minimum Equipment List (MMEL) for the Cessna 208 (the aircraft type predominantly in use for SEIFR operations in New Zealand) allows

the aircraft to be operated with the engine trend monitoring system inoperative for up to 120 days. AQS submitted that HUMS should be a Category B MEL item for New Zealand SEIFR operations, which allows aircraft operation with HUMS inoperative for up to 3 days, with possible extension of this time limit if manual recording of engine data was performed.

- Proposed rule 125.72(1) should be revoked.
- Proposed rule 125.72(2) is too stringent and manual recording of engine data should be acceptable for engine ground runs.

### **CAA Response**

*The existing layout of the CAA rules relating to aircraft operations (such as Parts 91, 121, 125 and 135) places the aircraft equipment requirements in sub-part F and the same layout applies to HUMS requirements in Part 125. The proposed rule is no different from the existing HUMS rule in this regard.*

*The FAA MMEL is used by the CAA as the base document for approving MEL for New Zealand aircraft. However it is quite normal and appropriate for additional requirements and/or conditions to be added to the CAA approved MEL to reflect New Zealand CAA Rule requirements.*

*The existing CAA C208 MEL for SEIFR approved aircraft permits dispatch with HUMS inoperative for a period of up to 10 days **provided** the aircraft is not used for SEIFR passenger operations. The MEL requires HUMS to be operative for all SEIFR passenger operations. The CAA has reviewed this requirement in response to the submission and confirms that it does not agree that the MEL relief sought by the submitter is appropriate for HUMS equipment on aircraft approved for SEIFR operation. The requirement to monitor engine parameters continuously and automatically was fundamental to the CAA's approval of SEIFR operations in 1999 and is entirely consistent with existing Rule 125.72(a)(1) and proposed rule 125.72(2).*

*Investigations by the CAA revealed that HUMS equipment is extremely reliable, the major SEIFR operator reportedly never having had a HUMS failure. In addition the adoption of proposed rule 125.407(b)(3) by emergency rule 7/EMY/1 effective 3 May 2007 allows a much shorter period of operation than previously required, typically 3 days, to re-*

*establish the engine data baseline to re-qualify the aircraft for passenger SEIFR operations.*

*For these reasons the CAA does not consider the requirements of 125.72 to be onerous and remains of the view that this rule is essential to the integrity of SEIFR operations.*

*As previously indicated the CAA does not consider that the manual recording of engine parameters is adequate to ensure any exceedance event is captured.*

*Accordingly the CAA does not agree to the MEL relief sought by the submitter.*

***SEIFR – immediate actions for non-normal engine indications (125.93)***

AQS submitted that proposed rule 125.93(a)(1) should be deleted but concurred that 125.93(b) and (c) are acceptable. AQS also submitted that proposed rule 125.93(c) is not necessary as there is already a general requirement to record the failure of any required equipment in the aircraft's technical log.

***CAA Response***

*The CAA disagrees with the submitter's request to delete the proposed rule 125.93(a)(1) because this rule will make it clear that HUMS must be operating for a SEIFR passenger flight to be conducted. This is consistent with the existing rule 125.72(a)(1) and is fundamental to the CAA's requirement that the parameters of an engine fitted to an aircraft approved for SEIFR must be continuously monitored during SEIFR passenger operations.*

*Proposed rule 125.93(c) requiring logging of the time and date of any HUMS failure already exists as rule 125.72(b); the requirement has only been renumbered.*

***HUMS (125.377)***

AQS submitted that single engine helicopters operating IFR should also be included in HUMS requirements. The use of the term "aeroplane" in proposed rule 125.377 excludes helicopters. AQS also submitted that

125.377 should clearly state that the requirement is for an automatic engine trend recording device.

**CAA response**

*Helicopters are already precluded from single engine IFR air transport operations under Rule 135.81. Rule Part 125 is not applicable to helicopters so the reference to “aeroplane” in 125.377 is appropriate.*

*The requirement for an automatic recording device is already specified in the technical requirements for HUMS contained in Part 125 appendix B.8.*

**HUMS maintenance requirements (125.407)**

AQS submitted that:

- The title of this rule should be changed as the rule does not relate to the maintenance of the HUMS device as the title suggests.
- The proposed rule 125.407(a)(1) should require the engine manufacturer’s trend monitoring programme to be used.
- The proposed requirement under 125.407(a)(2)(iii) to enter HUMS data into the trend monitoring programme before further flight in the event of a HUMS failure should be deleted.
- The proposed requirement under 125.407(a)(3)(iii) to analyse HUMS data entered into the trend monitoring programme to detect possible HUMS failure should be deleted.
- Operation of an aeroplane on a SEIFR passenger operation following failure of the HUMS unit should be permitted under the MEL using manual recording of engine data.

Air2there.com questioned whether the HUMS data needed to be trended more frequently than every 10 hours of engine operating time as would be required under the proposed 125.407(a)(2)(i) if the engine manufacturer or other appropriate organisation recommended such.

Air2there.com considers that 10 hours is an acceptable interval on the basis that the HUMS system advises the pilot if there has been a failure.

### **CAA response**

*The CAA agrees that the title of 125.407 should be changed for clarity and the final rule will use the title “Maintenance programme – additional requirements for aeroplanes with AEDRS”.*

*The CAA does not agree that only the engine manufacturer’s trend programme should be used to analyse HUMS data. Pratt and Whitney Canada supports the use of third party trend analysis organisations such as Danish Engine Trending Analyzing (DETA). These organisations provide specialist expertise in analysing engine parameters to better enable adverse trends to be identified and to accurately identify appropriate maintenance actions to ensure the continued airworthiness of the aeroplane on SEIFR operations. The existing rule 125.72(a)(3) specifically requires the use of the engine manufacturer’s trend monitoring programme and the prohibition on the Director’s power to issue exemptions to HUMS rules under 125.9 results in the current rule denying operators the ability to use a superior third party programme. This is not conducive to achieving best practice in the analysis of HUMS data and was a deliberate change in the proposed rule 125.407(a)(1).*

*The CAA does not agree that the proposed requirement under 125.407(a)(2)(iii) to enter HUMS data into the trend monitoring programme before further flight in the event of a HUMS failure should be deleted. The CAA believes this requirement, which already exists under 125.72(a)(3)(ii), is necessary to ensure the most up-to-date engine data has been analysed prior to resuming SEIFR passenger operation of the aircraft.*

*Similarly the CAA does not accept deleting the requirement to monitor trend data for signs of possible failure of the HUMS unit itself. The correct functioning of HUMS is essential to the integrity of SEIFR operations and any reasonable means of verifying the status of the HUMS unit should be included in the maintenance requirements.*

*As stated in its response under rule 125.72 the CAA does not consider it appropriate to provide MEL relief to enable continued SEIFR passenger operation while the HUMS unit is inoperative*

*With regard to air2there.com's submission that engine data should not need to be analysed more frequently than every 10 engine operating hours, the CAA believes it is appropriate to align with the engine manufacturer or trend analysis service provider's recommendations. This is consistent with the recent changes to the Part 91 general maintenance requirements to align with manufacturer's maintenance recommendations. The engine manufacturers and service providers have considerable expertise in the science of trend monitoring and may have good reason to specify shorter trending intervals, for example placing an engine "on watch" if parameters indicate the start of an adverse trend.*

#### ***Transitional HUMS maintenance requirements (125.417)***

AQS submitted that this rule is not required if all SEIFR aircraft already comply and the proposed changes are an improvement.

#### ***CAA response***

*Rule 125.417 provides a six month period for operators to comply with the proposed rule 125.407 which introduces new requirements for HUMS procedures to be included in the maintenance programme of an aircraft conducting SEIFR passenger operations. This is a necessary transition provision to enable operators to update their aircrafts' maintenance programmes after the rule becomes effective.*

*However the requirements to enter data HUMS data into the trend monitoring programme and to establish baseline data must be complied with at all times and in the final rule these requirements are excluded from the transition provisions of 125.417.*

#### ***HUMS records (125.861)***

Air2there.com questioned whether its current procedure of downloading HUMS data to the trend analysis service provider's website would meet the proposed requirement of 125.861 for HUMS information to be kept



by the aircraft operator as part of the maintenance record in a form that is legible, accurate, permanent and retrievable.

AQS submitted along similar lines, pointing out that operators do not necessarily keep the “raw” HUMS data, but trend reports subsequently generated from the data may be kept.

***CAA response***

*The CAA accepts that it may be very difficult for the operator to extract and retain the raw HUMS data when using download methods such as direct connection from a laptop PC to the HUMS unit to extract and send data to the service provider.*

*However the retention by the operator of the trended reports received from the service provider is essential and a process must be included in the operator’s maintenance procedures to ensure this. This could involve printing and retaining reports accessed via the Internet from the service provider’s website or storing these reports in electronic form that meets the permanent and retrievable requirements of 125.861(b).*

*For this reason the CAA proposes changing rule 125.861(a) to reflect a requirement for the operator to keep a record of the **analysis information** collected from the HUMS, rather than **all information collected**.*

*Reliance cannot be placed on the service provider to store these reports as, for example, data may be permanently lost if the service provider ceases business.*