

experience to give the FAA enough data to assess the overall suitability of a two-engine airplane for ETOPS approval.

The AC type design assessment criteria are divided into two parts. The first part defines specific system design capability and safety objectives in order to provide a minimum design standard for airplanes operating in ETOPS. This part of the AC criteria is addressed in proposed section 25.1535(a) and (b), and section I of proposed part 25 appendix L.

The second part of the AC process is a review of in-service problems and identification of appropriate corrective actions to prevent problems that could have an adverse effect on ETOPS safety. Part of this review is to establish that the airplane and propulsion systems have an appropriate level of reliability to meet the safety objectives defined in the AC. Appendix 1 of the AC defines an amount of service experience that would normally be required in order to give a sufficient database to evaluate propulsion system reliability. We are proposing to address this second part of the AC type design assessment process in sub-section II(b) of this notice.

#### II(a)(1) Required Service Experience

This paragraph would require that an applicant who desires to obtain ETOPS type design approval using service experience conduct a reliability review after accumulating 250,000 worldwide fleet engine hours on the airplane and engine combination for which approval is being sought. The number of hours could be reduced if adequate compensating factors are identified which give a reasonable equivalent database. A significant portion of the 250,000 engine hours would have to be obtained on the candidate airplane.

#### Explanation

Proposed paragraph II(a)(1) would codify the service experience eligibility criteria from paragraph a(1) of Appendix 1 of AC 120-42A.

#### II(a)(2) Propulsion System Assessment

Paragraph II(a)(2)(i) would require an applicant to conduct a propulsion system assessment based on data collected from the entire fleet of the specific airplane and engine combination for which approval is sought. Paragraph II(a)(2)(ii) would require an applicant to identify corrective actions to prevent future occurrences of engine in-flight shutdowns or loss of thrust control.

#### Explanation

Paragraph II(a)(2)(i) would codify the reliability data base criteria from

paragraph b. of Appendix 1 of AC 120-42A. ARAC did not include the reliability data base criteria in their proposed rule draft, but did have it in their associated draft advisory material. In paragraph 10(a)(iii) of the draft part 25 advisory circular, ARAC stated "A propulsion system assessment must be based on the following data, collected from the entire fleet of the specific airplane/engine combination type for which approval is sought\* \* \*". Since ARAC clearly stated its intent that an applicant "must" conduct a propulsion system assessment on the specific list that follows, and based on the clear reference to the existing policy from Appendix 1 of AC 120-42A, we have incorporated this section from the ARAC draft advisory circular into proposed paragraph II(a)(2)(i) of this notice.

Paragraph II(a)(2)(ii) would codify the intent of the propulsion system assessment criteria from paragraph 3 of Appendix 1 of AC 120-42A. This is the so-called "fix-all-problems" requirement that has been the practice for all ETOPS type design approvals that the FAA has given using the service experience approval process defined in AC 120-42A.

The corrective actions that the applicant identifies in compliance with proposed paragraph II(a)(2) would be included in the approved configuration, maintenance, and procedures (CMP) document as a condition of the ETOPS approval.

#### II(a)(3) Airplane systems assessment

The applicant would have to show compliance with section 25.1535(a) using available in-service reliability data for ETOPS significant systems. The applicant would have to identify corrective actions to prevent future occurrences of ETOPS significant system failures occurring in service.

#### Explanation

The first part of this paragraph would codify the intent of paragraph 8(c)(1) of AC 120-42A for those ETOPS significant airplane systems addressed in proposed § 25.1535(a). This AC paragraph states that the analysis and demonstration of airframe and propulsion system failure effects and reliability provided by the applicant should be based on in-service experience and the longest diversion time for the airplane.

The second part of proposed paragraph II(a)(3) is an extension of the "fix-all-problems" approach used in the propulsion system assessment that we are proposing in paragraph II(a)(2). For all airplanes approved using the policy

contained in AC 120-42A, the FAA has required an applicant to define effective corrective actions for all in-service problems known to result in, or potentially result in, airplane diversions. The FAA has required this in order to enter ETOPS service with the highest quality airplane. An applicant rarely considers known system failure conditions to be acceptable occurrences in service that they account for in their system failure analyses submitted for compliance with section 25.1309. Therefore, this fix all problems approach is appropriate in reassessing compliance with the applicable airworthiness requirements of proposed section 25.1535(a).

The corrective actions that the applicant identifies in compliance with proposed paragraph II(a)(3) would be included in the approved configuration, maintenance, and procedures (CMP) document as a condition of the ETOPS approval.

#### II(a)(4) In-Flight Shutdown (IFSD) Rates

This proposed paragraph defines propulsion system reliability standards for three levels of ETOPS type design approval.

(i) *For operations up to 120 minutes:* a rate of approximately 0.05 or less per 1,000 fleet engine hours with a CMP intended to bring the rate down to 0.02.

(ii) *For operations up to 180 minutes:* a rate of approximately 0.02 or less per 1,000 engine hours with an existing 120 minute CMP standard, or new or additional CMP requirements that have been demonstrated to achieve this in-flight shutdown rate.

(iii) *For operations greater than 180 minutes:* a rate of approximately 0.01 or less per 1,000 engine hours with an existing 120 minute or 180 minute CMP standard, or new or additional CMP requirements that have been demonstrated to achieve this in-flight shutdown rate.

#### Explanation

This proposed paragraph would codify the propulsion system reliability standards from Appendix 1 of AC 120-42A. In addition, we are proposing to add the reliability standard of 0.01 per 1,000 engine hours for ETOPS greater than 180 minutes that ARAC proposed in their recommended draft ETOPS rule.

The original ARAC recommendation refers to "target threshold" or "target" rate. These terms do not adequately define what would constitute an acceptable or unacceptable in-flight shutdown rate for showing compliance with this proposed requirement. The FAA has similar concerns about the term "approximately" as used in this