Comment Response Document (CRD)
to Notice of Proposed Amendment (NPA) 03-2005

for amending the Executive Director Decision No. 2003/09/RM
on certification specifications, including airworthiness codes and acceptable means of compliance, for engines (« CS-E »)

Miscellaneous amendments to CS-E

Explanatory Note

I. General

1. The purpose of the Notice of Proposed Amendment (NPA), dated 2 March 2005 was to propose changes to the certifications specifications for engines (CS-E). The reason for this proposal is outlined further below.

II. Consultation

2. The draft Executive Director Decision amending Decision N° 2003/09/RM was published on the website (www.easa.europa.eu) on 2 March 2005.

   By the closing date of 2 June 2005, the Agency had received 87 comments from 8 national authorities, professional organisations and private companies.

III. Publication of the CRD

3. All comments received have been acknowledged and incorporated into a Comment Response Document (CRD). This CRD contains a list of all persons and/or organisations that have provided comments and the answers of the Agency.

4. In responding to comments, a standard terminology has been applied to attest EASA's acceptance of the comment. This terminology is as follows:

   - **Accepted** – The comment is agreed by the Agency and any proposed amendment is wholly transferred to the revised text.
   - **Partially Accepted** – Either the comment is only agreed in part by the Agency, or the comment is agreed by the Agency but any proposed amendment is partially transferred to the revised text.
   - **Noted –** The comment is acknowledged by the Agency but no change to the existing text is considered necessary.
   - **Not Accepted** - The comment is not shared by the Agency.

5. The Agency's Decision will be issued at least two months after the publication of this CRD to allow for any possible reactions of stakeholders regarding possible misunderstandings of the comments received and answers provided.

6. Such reactions should be received by EASA not later than **02 April 2007** and should be sent by the following link: CRD@easa.europa.eu;

Comment #	Comment provider	Para	Comment	Justification	Response	Resulting text
1.	CAA-UK	General	EASA is no doubt aware that the European Airworthiness Code for engines [JAR-E, currently CS-E] is not Harmonised with the equivalent FAR 33 requirements for Engines. For most of the other Certification Specifications, there was a significant amount of work done by JAA and FAA, to get agreement on a set of Harmonised Codes. In the comments below, there are some references to the FAR Code. It would be useful, in future, for EASA to clarify whether Harmonisation with the equivalent FAR remains a goal. It is the CAA's view that, where there is a common intent in the FAR and the CS, the written text should be the same, to avoid giving a false impression that there is a difference.	The comments made under Section V of the NPA go some way to answering these points, but do not entirely clarify whether Harmonisation is still a priority.	**Noted.** EASA aims to retain as much harmonisation with FAR text, unless changes are necessary to met specific safety goals.	N/A
2.	RR, DE	General	Proposals 1, 2, 3, 5, 6, 7, 8, 9, 10, 13 are accepted and should be confirmed.		**Noted**	N/A
3.	RR, UK	General	Proposals 1,2,3,5,6,7,8,9,10,12 & 13 are considered to reflect a sensible approach to each of the subjects covered and are supported by Rolls-Royce.		**Noted**	N/A
4.	FAA	A. IV Paragraph 2	..the fact that there have been no new published rules for a long time has lead to significant co-operation..	Clarification	**Not Accepted** This comment is not related to this NPA. It is a comment against NPA 4/2005 and does not relate specifically to any proposed change.	N/A
5.	RR, UK	A. Explanatory note Several	Assuming the Explanatory Note will be a formal record of the background to the changes to CS-E, there are several editorial, grammatical and factual amendments required. The following lists the		**Partially Accepted** An NPA is only part of the record and is not republished under	N/A (Text does not form part of the amendment).

Comment #	Comment provider	Para	Comment	Justification	Response	Resulting text
		paragraphs	significant issues which need to be addressed; it is proposed that the section is reviewed by the disposition team to improve editorially. (1) - Page 8. Rates and Limits. Para 1. The 10 per million rate is only applicable to turbine engines. The text should be changed accordingly. (2) - Page 9. Approvals and Limitations. Para 4. The paragraph states that the short time interval for entry applications has been established as 125 flight hours and suggests this was prompted by operator request. This may have been the case originally but more recent certifications exercises have justified times in excess of this figure. The text needs to be revised to reflect current practices and dispatch times. (3) - Page 9. Approvals and Methods. Para 5. The original FAA Policy Paper, on which this AMC is based, states a figure of 250,000 hrs to achieve maturity. Reference should be made to this figure and the Explanatory Note should explain why 1,000,000 hrs is now considered a more appropriate figure. (4) - Page 9. Approvals and Methods. Para.7. The terminology for the TLD report is not consistent with the text of the proposed rule and AMC. This should be changed to 'TLD Analysis Report'. (5) - Page 10. Proposal 6. Para 3. The final sentence is not clear and should be amended. (6) - Page 11. Proposal 9. A more detailed explanation should be provided. (7) - Page 12. Proposal 4. Much of the proposal in this NPA is based on a proposed change to the FAA policy. It is not therefore correct to suggest it is based on the FAA's current policy. (8) - Page 14. Impacts and Conclusion of the		normal circumstances unless changes made are so significant that a further consultation is deemed necessary. For a complete record of a rule's development, reference also the CRD and, on final publication, the Executive Director's Decision and any accompanying Explanatory Note and Change Information. (1) - Comment withdrawn by the commenter. (2)**Partially Accepted** It is acknowledged that other figures, for example "300 flight hours" have also been accepted when adequately justified. (3)**Partially Accepted** The AMC to CS-E 1030 (5)(c) has been changed from 1,000,000 flight hours to 250,000 engine flight hours. (4)**Partially Accepted** Text does not form part of the proposed change. (5)**Partially Accepted** Text does not form part of the proposed change.	

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			Regulatory Impact Assessment. This section suggests that there will be a 'slightly positive economic impact'. It is not clear how or by whom this will be achieved. Indeed, the additional restrictions proposed to 'entry level systems' in Proposal 11 would suggest there might be additional maintenance costs associated with this NPA which would result in a negative economic impact. (9) - Page 7. There are references to Proposal II.4 and II.11. These are incorrect references and should quote Proposal 4 and Proposal 11.		(6) - **Noted** Text does not form part of the proposed change. (7)**Partially Accepted** Text does not form part of the proposed change. (8) - **Noted** (9) - **Noted** Text does not form part of the proposed change.	
6.	FAA	A. IV Proposal 4, Rates & limts, Paragraph 2	Move bracket after 'LOTC/LOPC' and place before 'rate'. Also missing space after 'CS-25'.	Typos	**Partially Accepted**	N/A (Text does not form part of the amendment).
7.	FAA	A, IV Proposal 6, Para 3	The statement in parentheses at the end of the paragraph "(here: no maintenance action)" is not clear.	Clarification	**Partially Accepted** Approval of over-speed/over-torque/ over-temp. limits does not influence the approved performance of the aircraft: it is a means to validate the fact that no maintenance action is required in the ICA.	N/A (Text does not form part of the amendment).
8.	Turbo-meca	A, IV Proposal 7	To write the last sentence as follows: "The paragraphs in AMC to CS-E 130 have also been renumbered for clarification.	Paragraphs have been renumbered due to deletion of subparagraph 5(c) but also for clarification of existing text.	**Partially Accepted**	N/A (Text does not form part of the amendment).

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9.	CAA-UK	B Proposal 2 CS-E 135 and Proposal 8 AMC to CS-E 135	- The background information makes it clear that the engine requirement originated solely to facilitate compliance with the aeroplane codes. The engine requirement has gone through a number of iterations and has gradually moved away from the original intention. - The requirement proposal is disagreed, on the basis that the approach is not what is expected by the aircraft Codes (CS-23, 25, 27 and 29). Each of these codes expects 'bonding' or 'electrical interconnections to prevent differences of potential' to be provided, irrespective of whether there is risk of shock, ignition or interference. It should not be acceptable for a significant metal part to be isolated, even if none of the (CS-E) anticipated problems arise. In this respect, the wording of the AMC is considered to be better. - The wording 'the main Engine earth' implies a known required feature. The AMC seems to make it clear that no 'specific feature' is required, just that all carcass elements should be bonded together. It may be better to say 'grounded to the engine'. - FAR 33 appears to have coped sufficiently well, without any 'bonding' requirement. Therefore, another possibility could be to rely entirely on the aircraft requirements and delete CS-E 135 entirely. - Whatever solution is found, it is suggested that the CS-E requirement should not promote a form of compliance that will not be accepted at aircraft level. - If it is decided to retain a CS-E requirement, consider an alternative approach: 'CS-E 135 Electrical Bonding	With these words (or similar), there should no need for an AMC	**Not Accepted** Counter proposal not retained. CS-E 135 comes, in part, from existing CS-E 130 (g). There would be no justification for losing this text. Furthermore, it provides safety objectives; the commenter's proposal does not.	N/A

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			It must be shown that all elements of the Engine carcass are electrically bonded together. Additionally, it must be shown that engine components that are mounted externally to the engine are bonded, or provided with an electrical interconnection, to the engine.'			
10.	Turbo-meca	B Proposal 2 CS-E 135	To write the title as follows " CS-E 135 Electrical Bonding (see AMC to CS-E 135)"	It is very useful to specify the relevant AMC in book 1. This was the case in JARE and was very useful for Authorities and manufacturers. AMCs are currently referred in Book 1 of CS-25. It is therefore proposed to incorporate this improvement in CS-E.	**Accepted** References to AMC have been included throughout CS-E.	*(Changes made throughout CS-E).*
11.	Turbo-meca	B. Proposal 4 CS-E 1030	To write the title as follows " CS-E 1030 Time Limited Dispatch (see AMC to CS-E 1030)"	It is very useful to specify the relevant AMC in book 1. This was the case in JARE and was very useful for Authorities and manufacturers. AMCs are currently referred in Book 1 of CS-25. It is therefore proposed to incorporate this improvement in CS-E.	**Accepted** References to AMC have been included throughout CS-E.	*(Result of Comments 11 to 19)* **CS-E 1030** **Time Limited Dispatch** (See AMC E 1030) (a) If approval is sought for dispatch with Faults present in ~~the~~ an Electronic Engine Control System (EECS), a time limited dispatch (TLD) analysis of the EECS must be carried out to determine the dispatch and maintenance intervals. (b) For each dispatchable configuration
12.	FAA	B Proposal 4 CS-E 1030(a)	I would propose section (a) of the proposed CS-E 1030 rule be deleted or revised accordingly.	The optional nature of this is questionable. Since the only identified practical means for EEC's to be credibly shown to comply with the intent of CS-E 25/§33.4 (and it's	**Not Accepted** CS-E 1000 is clear on the optional aspect. It is agreed that TLD criteria would be applied but there is no reason to make this mandatory for	

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				associated airframe counterpart ICA rules, as well as most of the fail-safe rules) is through TLD analysis (which covers both scheduled (MRB) and on condition (MMEL) maintenance periods).	engine certification.	~~the analysis~~ it must be shown by test or analysis that: (1) The Engine remains capable of meeting all CS-E specifications for - (i) The operability aspects covered by CS-E 500 (a), CS-E 750 and CS-E 745 ~~Operability aspects (e.g., acceleration, starting, freedom from surge or stall)~~; (ii) Re-light in flight covered by CS-E 910;
13.	RR, UK	B Proposal 4 CS-E 1030 (a)	If approval is sought for dispatch with Faults present in ~~the~~ **an** Electronic Engine Control System, a time limited dispatch (TLD) analysis of the EECS must be carried out **to determine the dispatch times/maintenance intervals**.	It would be informative to state what the TLD analysis output is.	**Accepted**	
14.	RR, UK	B Proposal 4 CS-E 1030 (b)	For each dispatchable configuration ~~the analysis~~ **it** must **be** show**n** that:	It is not the TLD analysis that shows compliance with the full list of the 8 points listed in 1030 (b). eg. that a further single failure will not produce a Hazardous Engine Effect.	**Accepted**	
15.	CAA-UK	B Proposal 4 CS-E 1030	(1) In this paragraph, compliance with certain CS-E specifications is required in each dispatchable condition e.g. acceleration, starting etc. It is recommended that the relevant CS-E paragraph(s) be referenced, to make sure that each required paragraph is uniformly addressed. (2) What kind of compliance is accepted? Is actual testing - a repeat of the re-lighting tests, say, required? Or can a theoretical exercise be conducted to show that the fault will not impact schedules that determine the operability?	Clarification	**(1) Accepted** **(2) Noted** Text has been clarified.	

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16.	CAA-UK	CS-E 1030 (b)(1)(i).	It is suggested that this be changed to read: 'The Operability aspects covered by CS-E 500, 750 & 745'	It is considered that the rule would be enhanced by explicitly referencing the CS-E specifications that address the specific aspects of engine operability with which compliance must be maintained for TLD. (i.e. delete the list of examples)	**Accepted**	
17.	RR, UK	B Proposal 4 CS-E 1030 (b)(1) (i)	(1) The Engine remains capable of meeting all CS-E specifications for - ~~(i)~~ **The** operability aspects **covered by CS-E 500,750 & 745** (~~e.g., acceleration, starting, freedom from surge or stall~~)	In referring to the operability aspects of CS-E, it should be clear which specifications are intended. The examples should be replaced with a clear reference to a particular paragraph.	**Accepted**	
18.	RR, UK	B Proposal 4 CS-E 1030 (b)(1)(ii)	Relight in flight **- CS-E 910**.	It would be helpful to refer to the particular section.	**Accepted**	
19.	CAA-UK	B Proposal 4 CS-E 1030 (b)(1)(ii)	It is suggested that this be changed to read: "Re-lights in flights – CS-910"	The addition of reference to the CS-E specifications that address the subject of engine re-light is considered to be helpful.	**Accepted**	
20.	CAA-UK	B Proposal 4 CS-E 1030 (b)(3).	It is suggested that this be changed to read: 'Protection is maintained against Hazardous Engine Effects, if provided solely by the EECS and shown to be necessary by the safety analyses required under CS-E 510 and CS-E 50.'	(i) The term 'solely' is introduced in recognition of the fact that for certain systems, the EECS does not provide the only	**Accepted**	*(Result of Comments 20 to 21)* **CS-E 1030 Time Limited Dispatch**

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				means of protection against Hazardous Engine Effects (e.g. certain Turbine Overspeed Systems). (ii) 'Engine Control System' is replaced by 'EECS' for consistency.		… (b) … (3) Protection is maintained against Hazardous Engine Effects, if provided solely by the ~~Engine Control System~~ EECS and shown to be necessary by the safety analyses required under CS-E 510 and CS-E 50
21.	RR, UK	B Proposal 4 CS-E 1030 (b)(3)	(3) Protection is maintained against Hazardous Engine Effects, if provided **solely** by the ~~Engine Control System~~ **EECS** and shown to be necessary by the safety analyses required under CS-E 510 and CS-E 50	It should be recognised that there may be situations where means in addition to those provided by the EECS are used to help protect against Hazardous Engine Effects. These additional means can provide sufficient mitigation to allow dispatch with an EECS fault for a specified period. Some turbine overspeed protection systems have operated successfully in such a manner for many years.	**Accepted**	
22.	CAA-UK	B Proposal 4 CS-E 1030 (b)(4).	It is suggested that this be changed to read: 'Means are maintained to provide signals to identify EECS Faults as necessary.'	There may be more than one means used to provide the necessary signals: the text is therefore changed to reflect this possibility.	**Partially Accepted** Intent of the comment has been agreed. The text has been improved.	*(Result of Comments 22 to 24)* **CS-E 1030 Time Limited Dispatch** …
23.	CAA-UK	B Proposal 4	It is suggested that this be changed to read: ' further single Failure in the EECS will not produce a	' Engine Control System' is replaced by 'EECS' for	**Accepted**	(b) … (4) A means is

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		CS-E 1030 (b)(5).	Hazardous Engine Effect;'	consistency.		maintained to provide necessary signals to identify ~~system~~ EECS Faults; … (5) A further single Failure in the ~~engine control system~~ EECS will not produce a Hazardous Engine Effect; ...
24.	RR, UK	B Proposal 4 CS-E 1030 (b)	(4) ~~A~~ **M**eans ~~is~~ **are** maintained to provide ~~necessary~~ signals to identify ~~system~~ **EECS** Faults **as necessary;** (5) A further single Failure in the ~~Engine Control System~~ **EECS** will not produce a Hazardous Engine Effect;	There may be more than one means used to provide the necessary signals. For consistency, EECS is used in preference to Engine Control System	**Partially Accepted** Intent of the comment has been agreed. The text has been improved.	
25.	CAA-UK	B Proposal 4 CS-E 1030 (b)(6).	It is suggested that this be changed to read: 'The Engine continues to meet its certification specifications for external threats of icing, rain, hail, bird, high intensity radiated fields (HIRF) and lightning;'	The specific external threats are identified (rather than an incomplete list of examples) and the threat from icing is added.	**Partially Accepted** The list has been moved to the AMC to CS-E 1030 as a result of this and other comments and terminology made consistent.	*(Result of Comments 25 to 27)* **CS-E 1030 Time Limited Dispatch** … (b) … (6) The Engine continues to meet its certification specifications for external threats ~~(e.g. rain, hail, bird, high intensity radiated fields (HIRF) and lightning)~~; … AMC to CS-E 1030 Time limited dispatch …
26.	RR, UK	B Proposal 4 CS-E 1030 (b)(6)	(6) The Engine continues to meet its certification specifications for external threats (e.g. of icing, rain, hail, bird, high intensity radiated fields (HIRF) and lightning);	The specific external threats should be identified (rather than an inexhaustive list of examples). Icing is added to the list.	**Noted** (See comment 25)	
27.	RR, UK	Proposal 11 AMC to CS-E 1030(5) para 3	The sub. Para 3 dealing with CS-E 1030 (b)(6) is essentially a repetition of the rule and adds no further guidance. We propose to delete the paragraph. If it is agreed not to delete it, then it should be changed to reflect the earlier proposal to change CS-E 1030(b)(6). (i.e. Provide a full list external threats)		**Accepted** Paragraph (renamed (d)) is retained and expanded to include other threats.	

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						(5) … (d) CS-E 1030 (b)(6) requires that the applicant shows that … The Engine in each permitted TLD configuration should maintain the capability of operating through the external threats considered during Engine certification e.g. icing, rain, hail, birds, EMI, ~~high intensity radiated fields~~ HIRF and lightning.
28.	CAA-UK	B Proposal 4 CS-E 1030 (b)(7).	It is suggested that this text, which reads; 'The time-weighted-average of the Full-up Configuration and all allowable dispatch configurations with Faults must meet the Loss of Thrust/Power Control (LOTC/LOPC) rate for the intended application(s);' be moved to create a new paragraph CS-E 1030 (d). (Paragraph CS-E 1030 (b)(8) to be renumbered CS-E 1030 (b)(7) accordingly.	This is a requirement in its own right and is not a sub-set of the requirement specified in CS-E 1030 (b).	**Partially Accepted** Intent of the comment has been agreed. The lay-out of CS-E 1030 has been modified to accommodate this and other comments	*(Result of Comments 28 to 29)* **CS-E 1030 Time Limited Dispatch** … (b) … ~~(7)~~ (c) The time-weighted-average of the Full-up Configuration and all allowable dispatch configurations with Faults, must meet the Loss of Thrust Control / Loss of Power Control (LOTC/ LOPC) rate for the intended application(s).
29.	RR, UK	Proposal 4 CS-E 1030 (b)(7)	This is a specification in its own right and is not a sub-set of that specified in CS-E 1030 (b) Propose that a new CS-E 1030 (d) is created using the same words as in the proposed (b)(7)		**Partially Accepted** Intent of the comment has been agreed. The lay-out of CS-E 1030 has been modified to accommodate this and other comments.	
30.	RR, UK	Proposal 4 CS-E 1030	(8) The proposed dispatch intervals are justified.	This paragraph (renumbered as (b)(7) if	**Partially Accepted** Text is simplified and	**CS-E 1030 Time**

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		(b)(8)	The periods of time allowed prior to rectification of Faults must be substantiated as part of the ~~LOTC/LOPC~~ TLD analysis and these times must be documented in the appropriate manual(s).	earlier comment accepted) refers to a LOTC/LOPC analysis. The analysis referred to here is the TLD analysis. (This same comment applies at several other places in the document. Suggest a complete review is carried out to make the appropriate changes.)	documentation made a separate rule.	**Limited Dispatch** … (b) … (7~~8~~) The proposed dispatch interval~~s are~~ is justified. ~~The periods of time allowed prior to rectification of Faults must be substantiated as part of the LOTC/LOPC~~ TLD ~~analysis and these times must be documented in the appropriate manual(s).~~ ... (d) The periods of time allowed prior to rectification of Faults must be documented in the appropriate manual(s). (~~c~~e) Provision must be made for any no-dispatch configuration to be indicated to the flight crew.
31.	Turbo-meca	Proposal 4: CS-E 1030	It is proposed to write CS-E 1030 as follows: **CS-E 1030 Time Limited Dispatch** If approval is sought for dispatch with Faults present in the Electronic Engine ControlSystem (EECS) leading to EECS degraded condition with respect to redundancy: (a) a time limited dispatch (TLD) analysis of the	- The main modification is to clarify that the faults considered under TLD specification of CS-E 1030 are only faults related to redundancy. This is explained in AMC to CS-E 1030 paragraph (1), but it is considered	**Noted** CS-E 1030 has been re-formatted in response to various comments.	N/A

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			EECS must be carried out. (b) For each dispatchable configuration the analysis must show that: (1) The Engine remains capable of meeting all CS-E specifications for - (i) Operability aspects (e.g., acceleration, starting, freedom from surge or stall); (ii) Re-light in flight; (2) The ability to control the Engine within limits is maintained; (3) Protection is maintained against Hazardous Engine Effects, if provided by the Engine Control System and shown to be necessary by the safety analyses required under CS-E 510 and CS-E 50 (4) A means is maintained to provide necessary signals to identify system Faults; (5) A further single Failure in the Engine Control System will not produce a Hazardous Engine Effect; (6) The Engine continues to meet its certification specifications for external threats (e.g. rain, hail, bird, high intensity radiated fields (HIRF) and lightning); (7) The time-weighted-average of the Full-up Configuration and all allowable dispatch configurations with Faults, meets the Loss of Thrust/Power Control (LOTC/LOPC) rate for the intended application(s); (8) The proposed dispatch intervals are justified. The periods of time allowed prior to rectification of Faults must be substantiated as part of the LOTC/LOPC analysis and these times must be documented in the appropriate manual(s).	mandatory to clarify this point in CS-E 1030 itself. In fact, the specifications specified in CS-E 1030(b) are only valid for such faults. Dispatch of other faults in EECS are typically to be addressed through MMEL methodology. See the scheme provided here below for better understanding. - Experience has shown that it is often the source of confusion and it is felt very important to clarify this aspect in CS-E 1030 ** Flowchart **		

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			(c) Provision must be made for any no-dispatch configuration to be indicated to the flight crew.			
32.	Turbo-meca	B Proposal 6: AMC to CS-E 60(d)	No comment - this proposal is fully supported.	This proposal reflect practices used for JAA and EASA certifications.	**Noted.**	N/A
33.	FAA	B Proposal 6 AMC to CS-E 60(d) (5)	We do not agree with the proposal. The proposal would allow the engine to operate in 30-Second/2-Minute OEI (30S/2M) rating power region (power, speed, temperature, or the combination thereof) in AEO without recording the usage and performing mandatory inspection. We believe that the recording and inspection as required by JAR-E 60(h)(2) and JAR-E 25(b)(2) respectively, should be conducted for any engine operation at 30S and 2M OEI power levels in AEO.	1. AMC to CS-E 25(4)(b) states that 30S and 2M OEI ratings are intended to allow brief periods of operation close to the limits of the engine design. This may result in engine hardware deteriorated beyond serviceable limits and not suitable for further use. Therefore the mandatory recording of OEI power usage and the mandatory inspection are required. The potential engine hardware degradations are expected to be identical or similar with the operation at the same OEI power level for either OEI or AEO operation. 2. CS-E 740 (c)(3)(iii) prescribes a 2-hour supplementary endurance test for engines seeking	**Not Accepted** It is considered that the case is adequately explained in the accompanying discussion of the proposals on page 10 of the NPA.	N/A

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				30S and 2M OEI power ratings approval. This requirement includes 20 minutes of testing at these two OEI power levels and up to 80 minutes of testing of other OEI power levels. The test must be run on an engine at deteriorated state which has already completed a 150-hour endurance test in accordance with CS-E 740 (c)(3)(i) or (ii). The engine test required to qualify for Maximum Engine Over-torque, Maximum Engine Overspeed or Maximum Exhaust Gas Temperature is a 15-minute lock-throttle engine test at the respective maximum condition prescribed in CS-E 820, 830 or 870. We presume that the tests may be run with a new engine from reading the rules and AMCs. We believe that there will have cases where the engine degradation based on 152 hours of endurance test runs of CS-E 740 is more reprehensive than that		

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				from CS-E 820, 830 or 870 for the engine operation at an identical condition considering potential engine hardware deterioration in service.		
34.	FAA	AMC to CS-E 60(d)(5)	1. The proposed policy would contradict current FARs 27/29.1305 and 27/29.1521 (See Attached Regulations). These regulations address recording and retrieval of data that documents use of 30 second / 2 minute OEI power events. 2. The use of 30 second / 2 minute power during OEI or AEO events would require an airworthiness assessment IAW the referenced FARs. 3. It is worth noting that many rotorcraft manufacturers offer a Limit Over-Ride feature, for emergency use only, which provides access to power outside the certificated limits. This reinforces the need to record OEI or AEO power usage above certificated engine power limits. Below is the note in the aircraft TCDS for the Bell 427 that addresses the limit override function, for your reference.	The model 427 incorporates an emergency OEI limit override function. When this feature is selected, damage to the engine and transmission is experienced and continued flight is not permitted. Use of this emergency power invalidates the airworthiness of the aircraft and maintenance in accordance with the model 427 Maintenance Manual is required to return the aircraft to an airworthy condition."	**Partially Accepted** Over-ride function is not the subject of this NPA. However, it is agreed that the wording "need not to be recorded" was misleading. The word "recorded" has been changed into "considered" to avoid misinterpretation. Events leading to exceedence of take-off limits are recorded.	*(Result of Comments 34 to 35)* **AMC to CS-E 60 (d)** (5) An Engine can be approved with 30-Second/2-Minute OEI Power Ratings and any combination of Maximum Engine Over-torque, Maximum Engine Over-speed and Maximum Exhaust Gas Over-Temperature in compliance with CS-E 820, 830, and 870. In such a case, Engine operation above the Take-off Rating limits but within the limits established under CS-E 820, 830, and 870 need not be ~~recorded~~ considered as usage of 30-Second/2-Minute OEI Power Ratings if the event was a true over-torque, over-speed or over-temperature event and it can be demonstrated that the recording system is able to distinguish between;
35.	FAA	B Proposal 6 AMC to CS-E 60(d)(5)	The last sentence of the Proposal states that:"It should be shown that an over-speed, over-torque or over-temperature event does not compromise the ability of the Engine to reach its Rated 30-Second/2-Minute OEI Power.". EASA may have realized the shortfall in the proposal in determining the recording and inspection requirements within the regulations and guidance material stated in items 1 and 2 above and added this requirement to remedy the problem.	The AMC is a guidance material, which has no legal enforcement power as we understand, because it lacks regulatory support. EASA may need to address this issue through rulemaking to provide means to support this statement.	**Partially Accepted** Text has been improved for clarity and moved to form new AMCs to CS E-820, 830 and 870.	

Comment #	Comment provider	Para	Comment	Justification	Response	Resulting text
						- an Engine over-speed, over-torque or over-temperature with all Engines operating, and - use of the 30 Second/2 Minute OEI Power Ratings with one Engine inoperative. ~~It should be shown that an over-speed, over-torque, or over-temperature event does not compromise the ability of the Engine to reach its Rated 30-Second/2-Minute OEI Power.~~ **AMC E 820 (a)(2) Over-torque Test** In order to comply with CS-E 820 (a)(2), it should be shown that an over-torque event does not compromise the ability of the Engine to reach its Rated 30-Second/2-Minute OEI Power. **AMC E 830 (c) Maximum Engine Over-speed** In order to comply with CS-E 830 (c), it should be shown that an over-speed event does not compromise

Comment #	Comment provider	Para	Comment	Justification	Response	Resulting text
						the ability of the Engine to reach its Rated 30-Second/2-Minute OEI Power. **AMC E 870 (a)(3) Exhaust Gas Over-temperature Test** In order to comply with CS-E 870 (a)(3), it should be shown that an over-temperature event does not compromise the ability of the Engine to reach its Rated 30-Second/2-Minute OEI Power.
36.	Pratt& Whitney	B Proposal 8. AMC to CS-E 135	Change 2nd paragraph to read, " the applicant should show that the modules, assemblies, components and accessories installed on the engine are adequately bonded to the main engine earth as to not result in the conditions identified in CS-E 135.	As written the paragraph implies a component having any electrical potential with respect to ground requires electrical bonding to main Engine earth regardless of level. In addition, the paragraph does not provide a means to define adequate bond resistance whereas the proposed text provides a means to calculate required bond impedance as it relates to the defined	**Not Accepted** The counter proposal from the commenter does not facilitate the interpretation because it simply paraphrases CS-E 135. The current text of the NPA is considered as being adequate.	N/A

Comment #	Comment provider	Para	Comment	Justification	Response	Resulting text
				effects.		
37.	CAA-UK	B Proposal 10. AMC to CS-E 510	- CS-E 510(a)(1)(i) already requires consideration of Aircraft components. It is not clear that the list in CS-E 510(f) is meant to apply to aircraft components; there is only one specific mention. All of the other items could be engine or propeller components. So it seems as though the opening sentence of the new AMC may be overstating the case. - Consider a small revision to this AMC as follows: 'AMC to CS-E 510 CS-E 510(a)(1)(i) requires the applicant to take account of 'typical aircraft-level devices' in the Engine safety analysis. For example, under CS-E 510(f)(3) the effects on the engine of failure of aircraft air ducts should be considered.' - It is not clear whether there has been any particular reason for the introduction of this new AMC. It appears that it introduces a single example of the general case.	Clarification	**Partially Accepted** Intent of the comment has been agreed. The text has been improved. The reasons for adding this AMC can be found in the explanation of proposal 3. This is retained as a reminder of the need to address these items.	**AMC to CS-E 510** … (c) Typical installation … CS-E 510 ~~(f)~~ (a)(1)(i) requires the applicant to ~~include~~ take account of aircraft-level devices in the Engine safety analysis ~~consideration of some Aircraft components~~. For example, ~~under CS-E 510 (f)(3)~~ the effects on the Engine of Failure of Aircraft air ducts might be considered.
38.	RR, UK	B Proposal 11 AMC to CS-E 1030	There are a number of references throughout the NPA to 'LOTC/LOPC analysis', 'reliability analysis' and 'analysis'. In most cases it would be more appropriate to refer to 'TLD analysis' and in other cases be quite clear which analysis is intended.		**Accepted** Clarification has been provided.	(*Various editorial changes made*).
39.	Turbo-meca	B. Proposal 11: AMC to CS-E 1030 (1)	- It is proposed to modify the third sub paragraph as follows: "TLD methodology is one way of managing dispatch	- Deletion of reference to paragraph 7: It is not understood what is the intent of this cross-	**Accepted** Figure 2 is adopted. (See Appendix).	*(Result of Comments 39 to 45)* **AMC to CS-E 1030** **Time limited dispatch**

Comment #	Comment provider	Para	Comment	Justification	Response	Resulting text
			with EECS Faults. Faults in systems or equipment other than EECS or, Faults other than loss of redundancy are typically addressed through the Master Minimum Equipment List (MMEL).See also ~~paragraph (7) below~~ figure 2." - and to add a figure 2 (after the figure1) as shown on the attached sheet.	reference. Paragraph 7 provides explanation related to the two maintenance approaches associated to TLD methodology of CS-E 1030. Whereas this third paragraph explains that dispatch of faults not covered by TLD methodology of CS-E 1030 (ie faults other than loss of redundancy in EECS) should use other methodology. Therefore deletion of reference to paragraph 7 is proposed - Addition of figure 2: it is proposed to add this figure 2 in order to clarify what is covered by the TLD methodology of CS-E 1030 and to clarify that other methodology should be used for the other cases ((ie for faults other than loss of redundancy in EECS). Experience has shown that it is often the source of confusion and it is felt very important to clarify this aspect in this AMC. ** Flowchart **		(1) Guidance … The objective of TLD is to allow dispatch with certain EECS faults present but without them compromising the prescribed fleet-wide average LOTC/LOPC rates and Hazardous Engine Effects rates. TLD methodology is one way of managing dispatch with EECS Faults. Faults in systems or equipment other than EECS~~,~~ or EECS Faults other than loss of redundancy are typically addressed through the Master Minimum Equipment List (MMEL). Figure 2 illustrates the various ways of managing dispatch with engine faults. ~~See also paragraph (7) below.~~ TLD operations have been applied … availability requirements for single engine Aircraft applies to both ~~reciprocating~~ piston and turbine engines. ~~The Engine Control System reliability and availability~~

Comment #	Comment provider	Para	Comment	Justification	Response	Resulting text
40.	Turbo-meca	Proposal 11: AMC to CS-E 1030 (1)	To replace (twice) in the last subparagraph "reciprocating" by "piston".	To be consistent with CS-E.	**Accepted** Second occurrence has been deleted by another comment.	~~requirements should be the same for both turbine and reciprocating engines when those engines are targeted for the same type of Aircraft application.~~
41.	CAA-UK	B Proposal 11 AMC to CS-E 1030 (1) 2nd sub-para.	It is suggested that this be changed to read: 'The objective of TLD is to allow dispatch with certain EECS faults present but without them compromising the prescribed fleet-wide average LOTC/LOPC rates <u>and Hazardous Failure rates</u>.'	It is considered that it would be helpful here to emphasise that the Hazardous Failure rate must not be compromised by TLD.	**Partially Accepted** Terminology changed to retain consistency.	
42.	RR, UK	B Proposal 11 AMC to CS-E 1030(1) 2nd para	The objective of TLD is to allow dispatch with certain EECS faults present but without them compromising the prescribed fleet-wide average LOTC/LOPC rates and Hazardous Failure rates.	It is considered helpful to emphasise that the Hazardous Failure rates must not be compromised by TLD.	**Partially Accepted** Terminology changed to retain consistency.	
43.	FAA	B. Proposal 11 AMC to CS-E 1030 (1) Paragraph 3	Delete the comma after "...EECS or..". Also add brackets around "See also paragraph (7) below."	Format and consistency	**Partially Accepted** The text has been changed in response to various comments.	
44.	RR, UK	B Proposal 11 AMC to CS-E 1030(1) 3rd para	TLD methodology is one way of managing dispatch with EECS Faults. Faults in systems or equipment other than EECS or, **EECS** Faults other than loss of redundancy are typically addressed through the Master Minimum Equipment List (MMEL). See also paragraph (7) below.	To clarify the intent of the paragraph.	**Accepted**	
45.	FAA	B Proposal 11 AMC to CS E-1030 (1)	The last statement may need to be reconsidered. Using the low expectations for a reciprocating engine reliability could be inappropriate for a single turbine engined aircraft. There may be a compromise value for turbines on Part 23 aircraft	Technical justification	**Partially Accepted** Intent of the comment has been agreed. The sentence has been deleted.	

Comment #	Comment provider	Para	Comment	Justification	Response	Resulting text
		Guidance paragraph 4				
46.	CAA-UK	B Proposal 11 AMC to CS-E 1030 (2) Definitions	It is suggested that the definition for Average Fault Exposure Time be amended to read; 'means the average period of time between the fault occurring and that fault being repaired. It applies when the periodic inspection/repair maintenance approach is used. In this case the time of occurrence of the Fault may not be known. One-half of the periodic inspection interval will be used in the analysis since the Fault could have occurred at any time during the interval.'	The proposed text is considered to improve the clarity of the definition. The technical meaning of the definition is not changed.	**Partially Accepted** Intent of the comment has been agreed. In relation to other comments, the text has been further improved.	*(Result of Comments 46 to 49)* AMC to CS-E 1030 … (2) Definitions Definitions may be found in CS-Definitions, CS-E 15 and AMC 20-3. For the purpose of this AMC to CS-E 1030 the following additional definitions apply. … "Average ~~F~~fault ~~E~~exposure ~~T~~time" means the ~~duration~~ average period of time between the Fault occurring and that Fault being repaired.~~that the average system is exposed to a Fault before periodic inspection/ repair is performed.~~ It applies when the periodic inspection/repair maintenance approach is used. In this case the time of occurrence of the Fault may not be known. One-half of the periodic inspection interval will be
47.	SNECMA	B Proposal 11 AMC to CS-E 1030 (2) Definitions, Paragraph 2	Proposal is to change the definitions of 'Average Fault Exposure Time' "Average Fault Exposure Time" means the duration of time that the average<delete> faulty<add> system is exposed to a Fault before periodic inspection/ repair is performed. It applies when…	an average system (=EECS) would be a concept difficult to define.	**Partially Accepted** Intent of the comment has been noted. Definition has been amended in relation to this and other comments.	
48.	RR, UK	B. Proposal 11 AMC to CS-E 1030 (2)	Average Fault Exposure Time means the ~~duration~~ average period of time between the fault occurring and that fault being repaired ~~that the average system is exposed to a Fault before periodic inspection/ repair is performed.~~ It applies when the periodic inspection/repair maintenance approach is used. In this case the time of occurrence of the Fault may not be known.. One-half of the periodic inspection interval will be used in the TLD analysis since the Fault could have occurred at any time during the interval. This assumes that the Fault rate of occurrence is constant throughout the interval. If the Fault rate is not constant throughout the interval, the average exposure time should be adjusted	To help clarify the definition	**Accepted**	

Comment #	Comment provider	Para	Comment	Justification	Response	Resulting text
			accordingly.			used in the TLD analysis since the Fault could have occurred at any time during the interval. This assumes that the Fault rate of occurrence is constant throughout the interval. If the Fault rate is not constant throughout the interval, the average exposure time should be adjusted accordingly. "Dispatch ~~I~~interval" means the maximum time interval approved for dispatch with Faults present in the system before corrective maintenance is required. …
49.	Turbo-meca	B Proposal 11: AMC to CS-E 1030 (2).	To modify definition of "Average fault exposure time" as follows: " Average Fault Exposure Time' means the duration of time that the average system is exposed to a Fault before periodic inspection/ repair is performed. It applies when the periodic inspection/repair maintenance approach is used. In this case the time of occurrence of the Fault may not be known. The 'Average Fault Exposure Time' will be considered equal to One-half of the periodic inspection interval ~~will be used~~ since the Fault could have occurred at any time during the interval. This assumes that the Fault rate of occurrence is constant throughout the interval. If the Fault rate is not constant throughout the interval, the average exposure time should be adjusted accordingly."	Proposed for clarification.	**Noted** Superseded by changes made in response to other comments.	
50.	CAA-UK	B Proposal 11 AMC to CS-E 1030 (3)	A date is required (currently 'TBD') for the referenced ARP 5107 document.	Self Explanatory.	**Partially Accepted** Revision B dated November 2006 is now available and is referenced.	*(Result of Comments 50 to 53)* AMC to CS-E 1030 **Time limited dispatch** … (3) Referenced Documents ARP 5107 revB, Time-Limited-Dispatch (TLD) Analysis for Electronic Engine Control Systems, dated November 2006.
51.	RR, UK	B Proposal 11 AMC to CS-E 1030 (3)	A date is required for the referenced SAE document (ARP 5107)		**Partially Accepted** Revision B dated November 2006 is now available and is referenced.	
52.	FAA	B Proposal 11 AMC to CS	Update to latest revision level. ARP 5107, Rev A, Guidelines for Time-Limited-	Clarification	**Partially Accepted** Revision B dated November 2006 is now	

Comment #	Comment provider	Para	Comment	Justification	Response	Resulting text
		E-1030 (3)	Dispatch (TLD) Analysis for Electronic Engine Control Systems, January, 2005.		available.	
53.	Turbo-meca	B Proposal 11: AMC to CS-E 1030 (3)	To specify the issue number of ARP 5107 as follows: "ARP 5107, issue dated 1997-06, Time…."	This document is not under EASA control. The issue considered by the drafting group was the issue dated 1997-06. Any subsequent issue has never been considered by the drafting group. Therefore the date of issue is to be specified.	**Partially Accepted** Revision B is now referenced.	
54.	CAA-UK	B Proposal 11 AMC to CS-E 1030 (4)	The third sub-paragraph describes how the graph of Figure 1 is established and introduces a 'factor of two' to 'cover uncertainties in the analysis itself'. This is but one of a number of different factors prescribed by this AMC, each of which is intended to address or cover various uncertainties in the analysis. Furthermore, having taken such uncertainties into account and applied the relevant factors, the AMC then defines the despatch intervals for short and long term despatch for both entry level and mature systems (Ref Tables 2 and 3). In this proposed form, the AMC is considered to be too prescriptive and overly conservative. It is therefore suggested that the text be revised to clarify that these are examples intended to show how factors may be applied where uncertainties in the analyses exist, and how the limitations applied to the periods allowed for short and long-term despatch should be justified.	It is considered that the applicant should be free to establish appropriate limits for despatch based upon their own data and experience, provided that the limits proposed can be fully justified in all respects (e.g. previous service experience, use of new components, potential for maintenance errors, uncertainties in the analysis, new system design or system supplier etc.), as well as being shown to meet the LOTC/LOPC rate and Hazardous Engine Effects criteria. In the absence of any	**Partially Accepted** Additional text added at the beginning of the sub-paragraph.	*(Result of Comments 54 to 62)* AMC to CS-E 1030 **Time limited dispatch** … (4) Time Limited Dispatch Analysis The factors and limitations used throughout this AMC, and in Tables 2 and 3 in particular, are examples and are used for illustrative purposes only. However, where supporting data and analysis are not available, the values quoted may be used as default values. The TLD analysis should

Comment #	Comment provider	Para	Comment	Justification	Response	Resulting text
				factors that can be justified to the Agency's satisfaction, the applicant should use the factors and limitations prescribed in the proposed AM		~~define~~ establish the dispatchable configurations. ~~in terms of the Faults and their associated dispatch intervals.~~ The TLD report should define the dispatchable configurations in terms of the Faults and their associated dispatch intervals. ~~To substantiate that the reliability goal for the EECS under TLD operations can be achieved, the applicant should show by a suitable analysis,~~ The TLD analysis, typically a Markov analysis or Fault tree analysis, should show that the fleet-wide average reliability ~~criteria~~ or average LOTC/LOPC rate, which includes full-up as well as degraded system dispatches (including those resulting from ~~and~~ Uncovered Faults), meets the required LOTC/LOPC rate for the assumed installation (see also AMC 20-3). The TLD analysis that ~~to~~ substantiates compliance with ~~a given~~ the required LOTC/LOPC ~~target~~ rate should be … EECS Faults.
55.	Turbo-meca	B. Proposal 11 AMC to CS-E 1030 (4).	To modify the first subparagraph as follows:" The TLD analysis should define the dispatchable configurations in terms of the Faults and their associated dispatch intervals. To substantiate that the reliability goal for the EECS under TLD operations can be achieved, the applicant should show by a suitable analysis, typically a Markov analysis or Fault tree analysis, that the fleet-wide average reliability criteria or "average LOTC/LOPC rate," which includes full-up as well as degraded system dispatches ~~and Uncovered Faults~~, meets the LOTC/LOPC rate for the assumed installation (see also AMC 20-3)."	It is proposed to delete "uncovered faults" as this is not directly linked with TLD subject. AMC 20-3 already defines in "paragraph (7)(e) last subparagraph" which faults are to be considered in the LOTC/LOPC analysis. Therefore AMC to CS-E 1030 has only to address what is specific to TLD. In addition, the wording used in proposal 11 is not identical to AMC 20-3 and therefore may lead to confusion even to non-consistency. In addition, reference to AMC 20-3 is already included at the end of the sentence and is considered sufficient.	**Not Accepted** Duplication of information is not considered detrimental, but helps interpret the certification specifications.	
56.	RR, UK	B Proposal 11 AMC to CS-E 1030 (4)	~~The TLD analysis should define the dispatchable configurations in terms of the Faults and their associated dispatch intervals. To substantiate that the reliability goal for the EECS under TLD operations can be achieved, the applicant should show by a~~	The 1st sentence suggests that the TLD analysis defines the dispatchable configurations. It would be more appropriate to	**Partially Accepted** Intent of the comment has been agreed. The text has been improved.	

Comment #	Comment provider	Para	Comment	Justification	Response	Resulting text
			~~suitable~~ **The TLD** analysis, typically a Markov analysis or Fault tree analysis **should show** that the fleet-wide average reliability criteria or "average LOTC/LOPC rate," which includes full-up as well as degraded system dispatches and Uncovered Faults, meets the **required** LOTC/LOPC rate for the assumed installation (see also AMC 20-3).	state *that* ***'A TLD analysis report should describe the dispatchable configuration in terms of the Faults and their associated dispatch intervals'***. The revised sentence would be better placed at the end of Section 4. The 2nd sentence speaks of substantiating the 'reliability goal' for the EECS. This same concept/intent is contained in the final sentence of the paragraph. The 2nd sentence is therefore redundant and should be removed. The final sentence of the paragraph discusses 'the LOTC/LOPC rate'. For clarity, it would be prudent to refer here to 'the required LOTC/LOPC rate' since it is the acceptable rates in AMC 20-3 that are being referred to.		If dispatchable EECS Faults have been grouped into two categories, a short-time dispatch (or repair) category and a long time dispatch (or repair) category (see paragraph (6) below), the ordinate of the graph should show a long time dispatch ~~time~~ interval of at least twice the length of time of the ~~repair~~ dispatch interval being requested. When calculating the LOTC/LOPC rate as a function of the long time dispatch interval, the assumed short-time dispatch interval should be twice the requested short-time dispatch interval. This factor of two is used to cover uncertainties in the analysis itself. In the TLD analysis, all Uncovered Faults should be assumed to lead to LOTC/LOPC unless it can be shown that they do not directly result in an LOTC/LOPC. The TLD analysis should provide the rationale and substantiation for the Failure rates used for
57.	RR, UK	B. Proposal 11	The TLD analysis ~~to~~ that substantiates compliance with the ~~a given~~ required LOTC/LOPC rate ~~target~~	The analysis referred to is the 'TLD analysis' and	**Accepted**	

Comment #	Comment provider	Para	Comment	Justification	Response	Resulting text
		AMC to CS-E 1030 (4)	should be summarised in a graph. An example of such a graph is shown in Figure 1. The ordinates of the graph should be the estimate of fleet-wide average LOTC/LOPC rate of the EECS versus the dispatch interval(s) (in hours) for the EECS Faults	should say so. Minor grammatical changes proposed. The terminology to describe the required LOTC/LOPC rate should be consistent within the Section. Hence propose to use the term 'required LOTC/LOPC rate'.		Uncovered Faults~~ in the analysis~~.
58.	Turbo-meca	B. Proposal 11 AMC to CS-E 1030 (4)	To modify the 2nd and 3rd subparagraphs as follows: " The analysis to substantiate compliance with a given LOTC/LOPC target should be summarised in a graph. An example of such a graph is shown in Figure 1. The ordinates of the graph should be the estimate of fleet-wide average LOTC/LOPC rate of the EECS versus the ~~d~~**D**ispatch ~~i~~**I**nterval(s) (in hours) for the EECS Faults If dispatchable EECS Faults have been grouped into two categories, a short-time dispatch (or repair) category and a long time dispatch (or repair) category (see paragraph (6) below), the ordinate of the graph should show a long time dispatch ~~time~~ interval of at least twice the length of time of the ~~repair~~ **Dispatch ~~i~~I**nterval being requested. When calculating the LOTC/LOPC rate as a function of the long time Dispatch iInterval, the assumed short-time **Dispatch ~~i~~I**nterval should be twice the requested short-time **Dispatch ~~i~~I**nterval. This factor of two is used to cover uncertainties in the analysis itself."	- "Dispatch Interval" when used according to the definition of AMC to CS-E 1030(2) should be with capital letters. - Other modifications proposed are self-explanatory.	**Partially Accepted** The policy with regard to use of capital letters is limited to definitions in CS-E 15 and CS-Definitions (see CS-E 15). Other proposed changes are accepted.	

Comment #	Comment provider	Para	Comment	Justification	Response	Resulting text
59.	RR, UK	B. Proposal 11 AMC to CS-E 1030 (4)	If dispatchable EECS Faults have been grouped into two categories, a short-time dispatch (or repair) category and a long time dispatch (or repair) category (see paragraph (6) below), the ordinate of the graph should show a long time dispatch time interval of at least twice the length of time of the repair interval being requested. When calculating the LOTC/LOPC rate as a function of the long time interval, the assumed short-time interval should be twice the requested short-time interval. This factor of two **(which is used for both short time and long time dispatch intervals)** is used to cover uncertainties in the analysis itself **but may be reduced as the system matures**.	To clarify that the factor of 2 is applicable to short and long time dispatch intervals and that the factor can be reduced if the LOTC/LOPC rate is shown to reduce with time/experience.	**Partially Accepted** Intent of the comment has been agreed. The text has been improved.	
60.	RR, UK	B Proposal 11 AMC to CS-E 1030 (4) para 4	~~In the analysis, all Uncovered Faults should be assumed to lead to LOTC/LOPC unless it can be shown that they do not directly result in an LOTC/LOPC.~~ The analysis should provide the rationale and substantiation for the Failure rates used for Uncovered Faults **unless they can be shown to not directly result in an LOTC/LOPC.** ~~in the analysis.~~	To simplify the text	**Noted** Text has been amended as a result of other comments.	
61.	RR, UK	B. Proposal 11 AMC to CS-E 1030 (4)	The point is clearly made in the proposed AMC (Section 4) that the factor of 2 used to reduce the repair time interval is to cover uncertainties in the TLD analysis and to ensure that sufficient margin exists to ensure that the required LOTC/LOPC rate is achieved at entry into service. Experience will demonstrate when/if this factor can be reduced. The limitations of 125 hours and 250 hours quoted in Tables 2 & 3 add in additional conservatism that cover the same uncertainties addressed by the factor of 2 embedded in the analysis.		**Accepted**	

Comment #	Comment provider	Para	Comment	Justification	Response	Resulting text
			Since the applicant will already have justified the limitations in his analysis, it is considered that the limitations of Tables 2 & 3 are overly prescriptive and unnecessarily conservative. The applicant should be free to justify the limits for dispatch based upon his own data and experience. Only where an applicant does not have sufficient data to justify his own limitations should the values prescribed in Tables 2 & 3 be used. The text and Tables 2 & 3 should be amended accordingly to reflect the above.			
62.	Turbo-meca	B Proposal 11: AMC to CS-E 1030 (4).	To delete the 4th subparagraph as follows: . "~~In the analysis, all Uncovered Faults should be assumed to lead to LOTC/LOPC unless it can be shown that they do not directly result in an LOTC/LOPC. The analysis should provide the rationale and substantiation for the Failure rates used for Uncovered Faults in the analysis~~."	This subparagraph is out of subject. It defines manner to conduct an LOTC/LOPC analysis in different wording than used in AMC 20-3. This is not the subject of AMC to CS-E 1030. The LOTC/LOPC analysis is covered in details by AMC 20-3. AMC to CS-E 1030 has only to address what is specific to TLD. This subparagraph leads to confusion.	**Not Accepted** This paragraph is considered as being important. Changes have been made to provide clarification.	
63.	CAA-UK	B Proposal 11 AMC to CS-E 1030 (5)	The first line should be amended to read, 'CS-E 1030 (b)(1) to (b)(7) prescribe the requirements for all dispatchable configurations.' If comment to Section B, Proposal 4, CS-E 1030 (b)(7) is adopted.	Editorial	**Partially Accepted** Now named as sub-paragraph (a).	*(Result of Comments 63 to 77)* AMC to CS-E 1030 Time limited dispatch

Comment #	Comment provider	Para	Comment	Justification	Response	Resulting text
64.	RR, UK	B Proposal 11 AMC to CS-E 1030 (5) para 1 and 5	Assuming the earlier comment on renumbering CS-E (b) is accepted, the references to (b)(8) should be changed to (b)(7).		**Noted** Cross references have been corrected	… (5) Certification specifications for all dispatchable configurations. (a) CS-E 1030 (b) ~~(1) through (b)(8)~~ prescribes the requirements for all dispatchable configurations. (b) CS-E 1030 (b)(3) is directed at protection systems within the EECS that provides the sole means of mitigation from Hazardous Engine Effects. There may be some cases that have a degree of protection from other sources. Such cases may best be addressed through the MMEL rather than the TLD. (c) CS-E 1030 (b)(5) stipulates that … … (d) CS-E 1030 (b)(6) requires that … external threats considered during Engine certification e.g. icing, rain, hail, birds, EMI, ~~high intensity radiated fields~~ HIRF and lightning. Relative to HIRF and lightning …
65.	RR, UK	B. Proposal 11 AMC to CS-E 1030 (5)	A new paragraph 2 is proposed to explain the acceptability of having mitigation against Hazardous Engine Effects provided by means in addition to that provided via the EECS. Propose new para 2 to read: 'CS-E 1030 (b)(3) is directed at protection systems within the EECS that provide the sole means of mitigation from Hazardous Engine Effects. There may be some cases that have a degree of protection from other sources, eg. the use of Critical Parts may provide such mitigation. Such cases may best be addressed through the MMEL rather than TLD.'		**Partially Accepted** Text has been modified. (The example is not included)	
66.	CAA-UK	B Proposal 11 AMC to CS-E 1030 (5)	It is suggested that a new second sub-paragraph be introduced to read, 'CS-E 1030 (b)(3) is directed at protection systems within the EECS that provide the sole means of mitigation from Hazardous Engine Effects. There may be some cases that have a degree of protection from other sources, e.g. the use of Critical Parts may provide such mitigation. Such cases may best be addressed through the MMEL rather than TLD' in support of the comment made on Section B, Proposal 4, CS-E 1030 (b)(3) above.	This new AMC text would help to clarify the text proposed, in the comment to Section B, Proposal 4, CS-E 1030 (b)(3), on the subject of mitigation of Hazardous Engine Effects.	**Accepted**	
67.	CAA-UK	B Proposal 11 AMC to CS-	It is suggested that the current third sub-paragraph's second sentence be amended to read, 'The Engine in each permitted TLD configuration should maintain	This proposed text for the AMC would support the changed text proposed in	**Partially Accepted** Terminology is changed slightly for consistency.	

Comment #	Comment provider	Para	Comment	Justification	Response	Resulting text
		E 1030 (5)	the capability of operating through the threats considered during Engine certification: icing, rain, hail, birds, high intensity radiated fields (HIRF) and lightning.'	the comment to Section B, Proposal 4, CS-E 1030 (b)(6).		(e) In showing compliance with CS-E 1030 (b)(~~8~~7), justification of the proposed dispatch intervals should be based on a ~~statistical~~ reliability analysis. The reliability analysis is typically the result of a model of the EECS, like a Markov Model or a Fault Tree Analysis, and is based largely on electronic component databases for failure rates. ~~The approved TLD operating limitations should be declared in the manuals specified in CS-E 20 (d) and CS-E 25 (a), whichever is appropriate, and provided to operators as required by Part 21A.61. The approved TLD operating limitations are the times allowed for rectification of Faults. An example of the typical operating limitations for TLD is provided in Table 1. The fact that the Engine has been approved for TLD operations should be recorded in the Engine TCDS (See CS-E 40(d)).~~ … ~~The collecting system~~
68.	Turbo-meca	B Proposal 11: AMC to CS-E 1030 (5) 2nd sub-paragraph	This subparagraph says that HIRF/lightning tests are often carried out in single channel operation. Whereas in AMC 20-3, paragraph (6)((f)(iii), it is said that "transfer to alternate channel/modes" is considered as an adverse effect. Is it consistent? If test is carried out in single channel operation configuration, is it still possible to detect a potential channel/mode change? This should be clarified.	See comment 73.	**Not Accepted** CS-E 50 determines what should be documented. In single channel testing, attempt to revert to the missing channel should be monitored. An alternative could be 2 tests (dual channel and single channel configurations).	
69.	CAA-UK	B Proposal 11 AMC to CS-E 1030 (5)	The current fifth sub-paragraph should now refer to CS-E 1030 (b)(7) in line with a previous comment made above.	Editorial (but only required if comment to II.4, CS-E 1030 (b)(7) is accepted)	**Accepted**	
70.	SNECMA	B Proposal 11 AMC to CS-E 1030 (5) Para. 5	Proposal is to add some explanations about the statistical analysis : In showing compliance with CS-E 1030 (b)(8), justification of the proposed dispatch intervals should be based on a statistical analysis. The statistical analysis is typically the result of a model of the EECS, like a Markov Model, to predict EECS failure modes, effects, rates and exposure times. The statistical analysis is based largely on electronic component databases for failure rates.	The “statistical analysis” required to satisfy CS-E 1030(b)(8) is a vague concept in the NPA. Without further explanation, a “statistical analysis” could be understood as an analysis of the fault rate of all the EECS that are already in service. But it is not the present sense in the	**Partially Accepted** Intent of the comment has been agreed. The text has been further improved.	

Comment #	Comment provider	Para	Comment	Justification	Response	Resulting text
				context, as it is acceptable to present a analysis to support CS-E 1030 (b)(8) for an entry level EECS, without service experience.		~~required by Part 21A.3 (a) should include a~~ A means to monitor the in-service LOTC/LOPC rate should be established. This ~~system~~ should compare service experience of component Failures with the modes, effects, rates, and exposure times predicted in the TLD analysis. The data collected by this ~~system~~ means may be used to support applications for changing dispatch ~~time~~ intervals and may be incorporated into the system required by Part 21 A.3. … A mature level system is an EECS that has achieved a stable in-service LOTC/LOPC rate that meets the ~~Loss of Thrust/Power control~~ required LOTC/LOPC rate for the intended application and is consistent with the analysis on which TLD approval is based. For engines installed in large transport aeroplanes this might not be achieved until ~~1,000,000~~ 250,000 Engine flight hours in-service
71.	RR, UK	B Proposal 11 AMC to CS-E 1030 (5) para 8	As written, the paragraph is effectively providing advisory material to Part 21. This is not appropriate. We propose a change to the text which would make the use of the collecting system required by Part 21 A.3 an acceptable means of monitoring LOTC/LOPC rate. Proposal: ~~The collecting system required by Part 21A.3 (a) should include a~~ A means to monitor the in-service LOTC/LOPC rate should be established. This system should compare service experience of component Failures with the modes, effects, rates, and exposure times predicted in the TLD analysis. The data collected by this ~~system~~ means may be used to support applications for changing dispatch time intervals and may be incorporated into the system required by Part 21 A.3.		**Accepted**	
72.	CAA-UK	B Proposal 11 AMC to CS-E 1030 (5)	The eighth sub-paragraph should be amended to read, 'A means to monitor the in-service LOTC/LOPC rate should be established. This should compare service experience of component Failures with the modes, effects, rates, and exposure times predicted in the TLD analysis. The data collected by this means may be used to support applications for changing dispatch time intervals and may be incorporated into the system required by Part 21A.3 (a).'	The changed text also has the benefit of enhancing the fact that such a means of monitoring the LOTC/LOPC rate is key to the successful management of entry level systems and their development through to mature level.	**Accepted**	

Comment #	Comment provider	Para	Comment	Justification	Response	Resulting text
			It is inappropriate for this AMC to CS-E to prescribe an AMC to Part 21A.3 (a); it may however suggest that it is would acceptable under CS-E for such data to be extracted from the system developed to show compliance with Part 21.			operation have been accumulated. … Since such failures due to design, … are applied compared to mature level systems, even though the ~~statistical~~ reliability analysis may support dispatch for a longer dispatch interval for entry-level systems. … The report should tabulate the chosen category described in paragraph (6) for each Fault covered in the analysis. The report should also ~~and~~ show that the exposure time chosen for the short and long time Fault categories allows the EECS to continue to meet its reliability requirements.
73.	Turbo-meca	B. Proposal 11 AMC to CS-E 1030 (5).	To modify this paragraph as follows: (*Formatting and editorial changes follow)*	- Modification of format proposed for clarification: for a better identification of the four paragraphs of CS-E 1030 that are addressed here. - Other modifications are editorial and self-explanatory.	**Partially Accepted** Text modified, except for capital letters (see response to comment 58).	
74.	DGAC-F	B Proposal 11 AMC to CS-E 1030 (5)	The approved TLD operating limitations should be declared in the manuals specified in CS-E 20 (d) and CS-E 25 (a), whichever is appropriate, and provided to operators as required by Part 21A.61. The approved TLD operating limitations should be declared in the section titled airworthiness limitations, specified in CS-E 25 (b), of the instructions for continued airworthiness, and provided to operators as required by Part 21A.61.	The TLD limitations are EASA approved, and can not be changed without EASA approval (see Table 1). Putting these limitations into the airworthiness limitations section clearly shows that they can not be considered like the rest of the instructions for continued airworthiness, and can not be changed without EASA approval.	**Noted** The "mandatory" aspect of TLD limits will be considered by EASA for future rulemaking. However, this subject involves "design related" activities, which are under the agency's responsibility, and "operational" aspects, which are not yet under the agency's responsibility. Furthermore, aircraft level TLD criteria may be more restrictive than engine level TLD criteria	

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					and in such cases, having less restrictive criteria in the ALS, would inevitably cause unnecessary confusion.	
75.	FAA	B Proposal 11 AMC to CS E-1030 (5), para 6	Add period after Table 1, "...limitations for TLD is provided in Table 1."	Typo	**Accepted**	
76.	SNECMA	B Proposal 11 AMC to CS-E 1030 (5) Para. 5, Para. 9, Para.13, Para 14.	Proposal is to harmonise the use of 'statistical analysis' and 'reliability analysis' in the above paragraphs, by keeping only one name, if the analysis are equivalent. Extract from the paragraphs : Para. 5. 'In showing compliance with CS-E 1030 (b)(8), justification of the proposed dispatch intervals should be based on a statistical analysis.' Para. 9 'Entry level and mature level EECSs are differentiated to consider factors not included in a reliability analysis.' Para. 13 " A reliability analysis is typically based on electronic component databases. Para. 14 " Since such failures due to design, manufacturing, quality and operating environment of the EECS, as well as maintenance errors, are not covered by the reliability analysis,.. Thus, more conservative criteria for dispatch intervals for entry-level systems are applied compared to mature level systems, even though the statistical analysis may support dispatch for a longer dispatch interval for	If the analysis are equivalent, there is no need to have two different names for the same thing.	**Accepted** Text now refers to “reliability analysis” throughout.	

Comment #	Comment provider	Para	Comment	Justification	Response	Resulting text
			entry-level systems."			
77.	Pratt& Whitney	B Proposal 11, AMC to CS-E 1030 (5)	Replace "For engines installed in large transport aeroplanes this might not be achieved until 1,000,000 Engine flight hours in-service operation have been accumulated" with "For engines installed in large transport aeroplanes this might not be achieved until 250, 000 Engine flight hours in-service operation have been accumulated".	SAE ARP 5107 states that "after a FADEC system has accumulated 250,000 flight hours in-service operation, an applicant may request a change in FADEC system status from entry level to mature. This level has proven to be appropriate for distinguishing system maturity.	**Accepted**	
78.	RR, UK	B Proposal 11 AMC to CS-E 1030 (7)	This paragraph, Table 1 and Table 3 use the term 'MEL Maintenance Approach' to describe the approach to be taken when the time of the TLD fault is known. This term does not convey the real meaning of the approach and it is therefore proposed to change this term. One alternative could be the 'on-condition approach'.		**Partially Accepted.** Definitions have been added.	AMC to CS-E 1030 Time limited dispatch … (2) Definitions … "MEL maintenance approach" means that the presence of a detected TLD approved fault in the EECS will be annunciated in the cockpit and that in the presence of the fault indication dispatch will be allowed by including the indication in the MMEL. The operator can then keep the indication listed within their approved MEL and

Comment #	Comment provider	Para	Comment	Justification	Response	Resulting text
						disposition the indication as they do any other MEL items. "Inspection/Repair maintenance approach" means that a periodic inspection and repair strategy has been approved to manage FADEC system faults. Within this approach, the presence of a detected TLD approved fault in the EECS need not be annunciated to the flight crew. The FADEC system must be interrogated by maintenance for the presence of faults during periodic inspections, and the faults found must be repaired within a specified time period or interval, so that the average exposure time of a fault in a particular category does not exceed the maximum average allowed exposure time for that category.
79.	Mr Banal EASA (S.D)	B Proposal 11 AMC to CS-E 1030 (7)	It is said that: 'Where a 'MEL' approach is used, and hence the time of initial occurrence of the Fault is known, the dispatch interval starts from the moment the Fault occurs. In the subsequent Table 1, it is said in both cases for Short and Long TLD: If an MEL Maintenance		**Partially Accepted** Clarification has been provided in the revised text of AMC to CS-E 1030 para.7. The intent is not to start a clock in	**AMC to CS-E 1030** … (7) TLD Operations Associated with the "MEL

Comment #	Comment provider	Para	Comment	Justification	Response	Resulting text
			Approach is used for this Fault category, there should be an appropriate generic flight deck display of the presence of a short (long) time Fault condition(s). Moreover, in tables 2 and 3 the Maximum Operating Times are defined in engine flight hours. For all the above, I may interpret that, in the MEL (or MMEL), the time limit should be defined in term of engine flying hours starting from the moment the fault is detected on the display in the middle of a flight. If my interpretation is correct, I can say this seems against the practical way the MEL is organised. I mean that any starting point for a hourly driven MEL item is the next flight were the failure has been detected. It would be highly impractical for maintenance or flight crew to take into account the exact point where the failure occurs. My proposal is that, in defining the MOT in the MEL approach, you should assume the fault occurs in the middle of the flight (the average length of the sector is a parameter that you can take into account in a operator MEL), then you publish in the MEL the practical number of hours that the flight crew or maintenance crew should consider for the rectification of the defect. This will also avoid the need to have a device that calculates onboard the hours from the moment of the fault till the landing time.		the middle of a flight.	Maintenance Approach" and with the "Inspection/ Repair Maintenance Approach." The dispatch intervals … used in the maintenance programme. Where a "MEL Maintenance Approach" is used, and hence the time of initial occurrence of the Fault is known, the dispatch interval starts from the point in time when the MEL procedures identify the presence of the fault ~~moment the Fault occurs~~. In the "Inspection/ Repair maintenance approach", the Fault is assumed to have occurred half-way through the inspection interval and the dispatch interval is therefore assumed to have started accordingly from this mid-point. In each case, the analysis should support the dispatch interval(s). Table 3 shows ~~a comparison of~~ an example of ~~the maximum~~ operating times for TLD operations associated with the "MEL Maintenance Approach" and with the "Inspection/Repair

Comment #	Comment provider	Para	Comment	Justification	Response	Resulting text
						Maintenance Approach.”
80.	Turbo-meca	B Proposal 11 AMC to CS-E 1030 (8)	To add a paragraph (8) in AMC to CS-E 1030 as follows: " (8) CS-E 1030(c) requires indication to the flight crew for no-dispatchable configuration. This does not mean that indication during flight is required. Indication on ground only is an acceptable means of compliance."	This is to clarify that the intent is not to require indication during flight.	**Partially Accepted** Intent accepted. Minor changes made to the text.	AMC to CS-E 1030 Time limited dispatch … (8) Flight Crew Indication CS-E 1030 (e) requires provisions for indication to the flight crew for no-dispatch configurations. This does not mean that indication during flight is required. Indication on the ground only is an acceptable means of compliance.
81.	Turbo-meca	B Proposal 11 AMC to CS-E 1030 Table 1.	a) to modify table 1 "short time "item as follows: "If a Periodic Inspection/Repair Maintenance Approach is used, the system should be inspected for short time Faults at an interval, such that if Faults are found, they can be repaired so that the average length of time that a Fault is present in the system (~~a~~**A**verage **Fault** ~~e~~**E**xposure ~~t~~**T**ime) does not exceed the specified (*insert XXX*) hour limitation. ~~Reference SAE ARP5107 for a more complete understanding of these maintenance approaches.~~" .b) to modify "average exposure time" in a similar manner in "long time" item.	a) - First modification: to be consistent with definition. - Deletion of sentence proposed, as it is felt difficult to ask a reader (operator?) to refer to an SAE ARP document. b) See a).	**Partially Accepted** Addition of the word “fault” has been agreed. Deletion of reference to SAE document is not accepted: it might be useful for those using the form.	**Table 1. Typical Operating Limitations for TLD** SHORT TIME … • If a Periodic … the average length of time that a Fault is present in the system (average fault exposure time) does not exceed the specified *(insert XXX)* hour limitation. Reference SAE ARP5107 rev B for a more complete

Comment #	Comment provider	Para	Comment	Justification	Response	Resulting text
						understanding of these maintenance approaches. LONG TIME … • If a Periodic … the average length of time that a Fault is present in the system (average fault exposure time) does not exceed the specified *(insert YYY)* hour limitation.
82.	Turbo-meca	B Proposal 11: AMC to CS-E 1030 Table 2.	a) to modify the heading of table 2 as follows: "Limitations on Electronic Engine Control System Operations with Faults Present (for TLD operation associated with the MEL/MMEL maintenance approach)."	The times specified in this table are only valid for MEL maintenance approach (see table 3). Therefore heading modified for clarification.	**Partially Accepted** Intent of the comment has been agreed. Title changed.	Table 2. ~~Maximum~~ An Example of Operating Times for TLD Operations associated with the MEL maintenance approach.
83.	Turbo-meca	B. Proposal 11: AMC to CS-E 1030 Table 3.	a) To modify the table 3 as follows: "Limitations on Electronic Engine Control System Short Time and Long Time Operations with Faults Present **table**	The times intervals applicable to the inspection maintenance approach are equal to two times the intervals associated to MEL maintenance approach as the Average Fault Exposure Time in case of inspection maintenance approach is assumed to start at mid interval (see paragraphs (2) and (7) and figure 1 of AMC to CS-E 1030. To allocate the same	**Partially Accepted** Intent of the comment has been agreed. Changes have been made to provide clarification.	(See Appendix)

Comment #	Comment provider	Para	Comment	Justification	Response	Resulting text
				note number to each column could lead to confusion (intervals identical).		
84.	Turbo-meca	B Proposal 11 AMC to CS-E 1030 Figure 1.	Modify Figure 1 and associated footnotes as follows: **figure**	- Modification of heading of ordinates of figure 1: according to paragraph (4) of this AMC, this is the dispatch intervals not the repair intervals (only associated to repair maintenance approach). - Modifications of notes are for clarification or completeness.	**Partially Accepted** Text has been modified, except for capital letters (see response to Comment 58).	(See Appendix).
85.	RR, DE	B Proposal 12 AMC-20	(NPA AMC1/2004)" in title of proposal 12. (NPA-4-2005)	Correction of NPA reference	**Accepted**	N/A
86.	RR, UK	B. Proposal 12 AMC -20	Para. 1 The reference to NPA AMC1/2004 should be to NPA No. 04/2005		**Accepted**	

APPENDIX

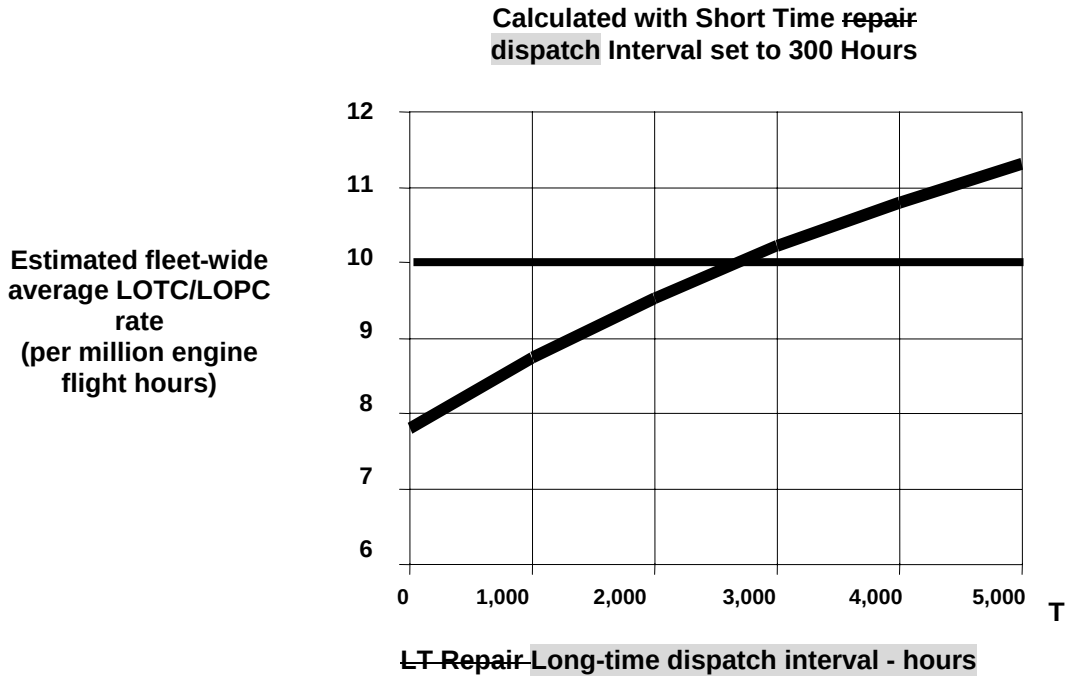
Table 3. Maximum Operating Times for TLD Operations Associated with the "MEL maintenance approach" and "Inspection/Repair maintenance approach."

Limitations on Electronic Engine Control System Short Time and Long Time Operations with Faults Present

	Short Time Faults		Long Time Faults	
Experience Level	Time of Fault occurrence known and MEL maintenance approach used – max operating time with Fault(s) present	Time of Fault occurrence unknown and Periodic Inspection/ Repair maintenance approach used – max periodic inspection/repair interval	Time of Fault occurrence known and MEL maintenance approach used – max operating time with Fault(s) present	Time of Fault occurrence unknown and Periodic Inspection/ Repair maintenance approach used – max periodic inspection/repair interval
Entry Level	125 engine flight hours.	250 engine flight hours.	250 engine flight hours.	500 engine flight hours.
Mature Level	(1)	(~~1~~2)	(1)	(~~1~~2)

Notes:
(1) Times vary depending upon the results of the TLD Analysis.
(2) Should be equal to two times the value of note (1)

Figure 1. Example of the analysis results for a system with both Short Time Dispatch and Long Time Dispatch



In this example,

- The analysis was conducted with the Short Time ~~repair~~ dispatch interval set to 300 hours based on the assumption that the desired Short Time approval was 150 hours. This ratio is in accordance with paragraph (4)
- The target average LOTC / LOPC rate is 10 per million engine flight hours
- The analysis shows that the target rate is not exceeded with a declared Short Time dispatch interval set to 150 (= 300/2) hours and the Long Time less than 2700 hours. However, the long-time interval would be limited to an operational time of 1,350 hours. Again this ratio is in accordance with paragraph (4).
- In the case of an entry level system the short-time Fault category would be limited to an operational time period of 125 hours, and Faults in the long-time interval would be limited to an operational time of 250 hours. This is in accordance with Table 2.
- If the long-time Faults were to be addressed using the periodic inspection/repair maintenance approach, the inspection/repair interval could not be longer than 500 hours for entry level system and 2,700 hours for a mature level system. This in accordance with Table 3.
- If the short-time Faults were to be addressed using the periodic inspection/repair maintenance approach, the inspection/repair interval could not be longer than 250 hours for entry level system and 300hours for a mature level system. This in accordance with Table 3.

Figure 2: Possible ways of managing Dispatch with Engine Faults