

Comment				Comment summary	Suggested resolution	Comment is an observation or is a suggestion	Comment is substantive or is an objection	EASA comment disposition	EASA response
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1	Snecma	2.3		Section 2.3 could be amended to include the notion of time of detection : proposed rewording is "In another approach called "Inspection/Repair Maintenance Approach", no fault indication is displayed in the cockpit <b>or time the fault occurred is not known</b> and thus periodic check of the fault messages from the EECS by maintenance is required (as per Ref. [1] AMC E 1030 (2) Definitions).				Partially accepted	If the fault is displayed to the flight crew, it is their duty to record the message and time of occurrence in the technical log. For other cases the periodic maintenance check can be used.
2	Snecma	3.1		Section 3.1 does not clearly list all the criteria of CS-E 1030 (b) and (e). For example, CS-E 1030 (b)(1)(ii) states " For each dispatchable configuration it must be shown by test or analysis that: (1) The Engine remains capable of meeting all CS-E specifications for:  (ii) Re-light in flight covered by CS-E 910." Inability to re-light is neither a contribution to LOTC nor a Hazardous event, nevertheless failures leading to an inability to re-light in flight shall be classified no per , CS-E 1030 (b)(1)(ii)				Accepted	The wording is modified in a more generic manner to encompass all CS-E 1030 applicable requirements.
3	Snecma	3.2		Section 3.2 stating "Engine system faults other than EECS loss of redundancy (...) should be included in (...) the TLD analysis report (but) not included in the TLD approval" is not clear.				Noted	As the paragraph has been rewritten, it should hopefully be clearer.
4	Airbus	3.2	5	In section 2.2 and in the first para of 3.2 it clearly states that faults other than EECS loss of redundancy faults cannot be included in the TLD approval, ie not only is the TLD approval for these faults not mandatory, it is not allowed.	Delete text as indicated below:  "If MMEL approval is sought for Engine faults other than EECS loss of redundancy faults, <del>an Engine type design approval for time limited dispatch (TLD) is not mandatory. If proposed to be covered by the MMEL,</del> these faults should be evaluated against Ref. [3] CS MMEL criteria as for any other candidate item."		Yes	Partially accepted	Following a rewrite of paragraph 2.2 the CM no longer specify that TLD is limited to loss of redundancies only. Indeed TLD approval against FAA or TCCA requirements and validated by EASA may not be limited to loss of redundancies in EECS.
5	Rolls-Royce plc	1.3 Abbreviations	3	EEC - Electronic Engine Control, traditionally it was referred to the controller, i.e. the main component of the Electronic Engine Control System, if it is meant to that LRU; otherwise if wanted to keep with the nomenclature of the ARP5107, what would be at hardware level the difference between EEC (e.g. the controller) and EECS (i.e. the whole engine control system comprising all LRUs used for engine control and monitoring)?	EEC - Electronic Engine Controller	Yes	No	Accepted	
6	Rolls-Royce plc	3.1 & 3.2	5	There is a inconsistent use of EEC and EECS terms in the title of section 3.1 when section 3.2 refers to the EECS. The body of the Section 3.1 refers to EECS but not EEC. (See also the previous comment). If the suggestion would be adopted, then the EEC abbreviation needs to be deleted as it is not used anywhere else.	3.1 MMEL approach for EECS loss of redundancy faults	Yes	No	Accepted	CM will use EECS as proposed.

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7	Rolls-Royce plc	3.2	5	1st sentence -grammar 3rd person singular	"the Engine manufacturer request <u>s</u> "	Yes	No	Noted	As the text has been revised the (valid) comment is no longer applicable.
8	Rolls-Royce plc	3.2	5	Please use consistently the hazards severity way of writing, i.e. use 1st letter as capital letter (as usually encountered in literature)	"failure conditions classified as <u>H</u> azardous or <u>C</u> atastrophic"	Yes	No	Accepted	Text is revised according to the proposal.
9	Rolls-Royce plc	3.3	5	2nd row has an obsolete "at" in "failure conditions classified as hazardous or catastrophic <u>at</u> as per"	delete "at"	Yes	No	Noted	As the text has been revised the (valid) comment is no longer applicable.
10	Rolls-Royce plc	3.4.	6	A note needs to be in place in this section to clarify the airframe and engine manufacturer roles. The note needs to state that "the multiple engine effect is airframer responsibility, rather than engine manufacturer. However, the engine manufacturer may give support to the airframe manufacturer on this matter, as required"; and also to indicate the relevant items on the workflow presented along Section 3.6 (i.e. 4, 5 and 6)	Note: It is the airframer (i.e. the Aircraft Type Certificate Holder) task to analyse the multiple engines effect when dispatch with known faults on engines. The engine manufacturer (i.e. the Engine Type Certificate Holder) may provide support to the airframer as required. (see Section 3.6 items 4, 5 and 6)	Yes	No	Noted	As the text has been revised the (valid) comment is no longer applicable.
11	Rolls-Royce plc	3.6	6	the TCDS abbreviation under item 2 is missing from the Abbreviations list	To include under section 1.3. Abbreviations, <u>TCDS</u>	Yes	No	Accepted	Abbreviation is included.
12	Rolls-Royce plc	3.6	7	the MRB and MPD abbreviations under item 3 are missing from the Abbreviations list	To include under section 1.3. Abbreviations, <u>MRB</u> and <u>MPD</u>	Yes	No	Accepted	Abbreviation is included.
13	Rolls-Royce plc	3.6	7	under item 5 I suggest to add for clarity "engine TLD analysis" rather than just "TLD analysis" as in that context TLD analysis may be related not only to the engine. The airframer may have its own TLD analyses on other systems than engine.	5. The aircraft Type Certificate Holder provides justifications for MMEL, taking into account the results of the <u>engine</u> TLD analysis but also the aircraft level aspects to comply with CS-MMEL.	Yes	No	Accepted	Text is revised according to the proposal.
14	Rolls-Royce plc	3.6	7	the OSD abbreviation under item 6 is missing from the Abbreviations list	To include under section 1.3. Abbreviations, <u>OSD</u>	Yes	No	Accepted	Abbreviation is included.
15	Rolls-Royce plc	3.6	8	I suggest for clarity to put the flow diagram before the explanatory items	Certification process Flowchart to be put before the explanatory points of each item in the flowchart	Yes	No	Accepted	
16	Rolls-Royce plc	3.6	9	under item 3 text box, the term ALS is missing from the Abbreviations list	To include under section 1.3. Abbreviations, <u>ALS</u>	Yes	No	Accepted	Abbreviation is included.
17	Rolls-Royce plc	3.6	9	under item 4 text box the term "maintenance" is misspelled as "mainteance" (i.e. a "n" is missing)	mainten <u>a</u> nance	Yes	No	Accepted	
18	Rolls-Royce plc	2.2	4	The first paragraph does not make grammatical sense "... used to require for the purposes of..."	JAR-E 510 (e)(2) required the Engine Failure Analysis to include "Justification for the inclusion inn the Master Minimum Equipment List of any Engine-associated item permitted to be carried in an unserviceable state for specific periods".	Yes	No	Accepted	
19	Rolls-Royce plc	1.2 References [2]	3	ARP5107 is currently undergoing significant modification as part of its 5 year update	Close liaison with SAE E36 Committee	Yes	No	Noted	Coordination with SAE E36 was ensured prior to release of the final CM.

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20	Rolls-Royce plc	Abbreviations	3	EEC is defined as Electronic Engine Control. This differs from CDS definition of EEC which is 'Engine Electronic Controller', which has 2 subtle difference. Firstly it is the controller that is electronic (not the engine) and also that the EEC is the controller i.e. the LRU, not the system. Is the term 'FADEC' no longer used to describe the system of interconnected items designed to control the engine ?	Suggest modification of definition to Engine Electronic Controller	Yes	No	Accepted	
21	Rolls-Royce plc	3.2	5	Typo: '..the Engine manufacturer request ..."	"...the engine manufacturer requests.."	Yes	No	Accepted	See response to comment no. 7.
22	Rolls-Royce plc	3.3	5	The computational model described in ARP 5107 is subject to change as part of its 5 year update.	Close liaison with SAE E36 Committee	Yes	No	Noted	Coordination with SAE E36 was ensured prior to release of the final CM.
23	Dassault Aviation	3.6 points 8 & 9		<p>Dassault Aviation thank EASA for the opportunity to comment the proposed CM MMEL-001 and would appreciate the following remark about §3.6 points 8 &amp; 9 to be taken into consideration and introduced in a new writing.</p> <p>PM: CM proposed text</p> <p>"8.Following the initial approval, all changes to the TLD operating limitations (change to the times allowed for rectification of Faults, addition or removal of Faults) must also be approved by EASA. If such a change result in a more restrictive operating limitation, operators will be informed by appropriate means.</p> <p>9. The aircraft Type Certificate Holder is responsible for updating the MMEL in accordance with more restrictive changes to the TLD operating limitations."</p> <p>As all modifications of the point 8 are approved by EASA, EASA should endorse the responsibility to inform all aircraft TC Holders that modified TLD data are approved . After the EASA notification, TC Holder will be able to update its MMEL.</p>				Partially accepted	The approval of a change to the TLD is not necessarily done by EASA. The wording has been revised to refer to the engine type certificating authority. "once notified of the change by the Engine manufacturer" is added after as a pre-requisite for the aircraft manufacturer to review the impact on MMEL.
24	Textron Aviation	General		This NPA only mentions CS-25 aircraft. There are numerous CS-23 aircraft that this NPA would apply to. The Cessna 208, 510, 525, 525A, 525B and 525C models are all CS-23 aircraft that have TLD items listed in the MMEL with the same provisos as CS-25 aircraft.	Re-draft the NPA to include CS-23 aircraft or rescind and re-draft after CS-23, 25, 27 and 29 aircraft have been addressed in this NPA.			Accepted	The CM is made to be applicable to all aircraft having a TLD.

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25	TCCA	General		<p>Engines have their own Type Certificate (TC) distinct from aircraft TC. This reflects their relative autonomous operability where each engine, complete with its control system, can operate on a test bench. This autonomous characteristic enables the engine isolation requirement of CS-25.903(b).</p> <p>The Appendix 1 to CS-MMEL Guidance Material GM1 MMEL.145, along with its predecessor JAA Leaflet 26, has no guidance for APU or Propulsion functions (ATA Chapters 49, 70 and subsequent). If there was guidance for dispatch with inoperative engine functions or components, it would be evident that TLD concept was initially designed for Engine Fuel Control System (ATA 73) but CS-E 1030 implementation is not limited to Engine Control System.</p> <p>Reference is made to a SAE Aerospace Recommended Practice (ARP) that was written specifically to Electronic Digital Engine Control System without Hydro-mechanical backup and the proposed Memo attempts to restrict application of TLD approval to redundancy when CS-E 1030 doesn't.</p> <p>Overall, modern Engine Fuel Control System (ATA 73) addresses 2 critical functions, active protection and thrust control, essential functions of engine indicating (ATA 77), and other functions that are not essential for safety but could affect performance such as case cooling (ATA 76) affecting fuel burn and hence range.</p> <p>The proposed memo attempts to describe aircraft ICA and aircraft MMEL as distinct and separate approaches when any detected inoperative function or component has to be addressed by MEL, even those detected by cabin crew or maintenance personnel and not annunciated by EICAS message to the flight crew.</p> <p>The proposed Memo incorrectly links EECS reliability to the number of engines on an aircraft. Considerations for range (irrespective of the number of engines) could replace the proposed section 2.3.</p>			Noted		
26	TCCA	2.1		<p>The Proposed Memo states in <b>"2.1 Identification of the need"</b> that <i>"Currently, dispatch with Engine faults may be assessed on one side by the Engine manufacturer during Engine certification"</i> when the assessment requirement was added to CS-E at amendment 1 in December 2007 as reported in the next section <b>"2.2 Evolutions of the engine certification specifications"</b></p>	<p>TCCA recommends to simplify Section 2.1 as follows:</p> <p><b>2.1 Identification of the need</b></p> <p>Dispatch of aircraft with detected Engine Control System faults requires a Safety assessment by the Engine manufacturer during Engine certification and documented as part of the MMEL of the aircraft. The relationship between Engine certification, Aircraft Certification and MMEL approval needs to be clarified.</p>	suggestion	substantive	Partially Accepted	

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27	TCCA	2.2		<p>The Proposed Memo postulates in “<b>2.2 Evolutions of the engine certification specifications</b>” that the current CS-E 1030 “restricts the TLD approval to EECS degraded conditions with respect to redundancy only. Other systems than the EECS, and EECS faults not related to a loss of redundancy, cannot be included into the TLD approval.” which is not necessarily true. Some system such as turbine case cooling could be inoperational, yet dispatch and flight would still be possible.</p> <p>The next paragraph is also confusing in what is part of engine certification and what is not. “TLD has therefore been recognised as being a separate approval to that of MMEL, that is part of the Engine TC and therefore fully managed at Engine level. MMEL has been recognised as an aircraft activity and references have been removed from CS-E.”</p>	<p>TCCA recommends to delete from section 2.2 any reference to redundancy and to reword the two penultimate paragraphs to end as one paragraph like the following:</p> <p>... The CS-E 1030 was re-written and expanded, including an AMC, at CS-E Amendment 1 dated 12/2007. The first sub-paragraph CS-E 1030 (a) states: “If approval is sought for dispatch with Faults present in 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.” TLD approval has therefore been recognised as part of the Engine TC and fully managed at Engine level. MMEL has been recognised as an aircraft activity and references have been removed from CS-E.</p>			Partially accepted	Although the AMC to CS E.1030 are defined for engine EECS degraded condition with respect to redundancy, EASA accepts not to include specific CS-E requirements directly in the CM and remain generic to ensure applicability of the guidance for product validated with bilateral partners.
28	TCCA	2.3		<p>The Proposed Memo Section <b>2.3. TLD “MEL maintenance approach” vs. “Inspection/Repair maintenance approach”</b> gives the appearance of limiting the MMEL general philosophy to those annunciated to the flight crew, when any inoperative items has to be in MEL and hence MMEL for the aircraft to be airworthy at dispatch. The interpretation of AMC E 1030 (and of ARP 5757) is to provide choices to the aircraft and engine designers on how to design discovery of Engine Control System faults but not how to handle their disposition once discovered. Therefore even if discovered through scheduled interrogation of the ECS by maintenance, dispatch with faults not yet rectified would require an MMEL entry.</p>	<p>TCCA recommends to clarify disposition of ECS faults discovered by scheduled maintenance that have no cockpit indication by rewording section 2.3 and its title as follows:</p> <p><b>2.3. TLD “Inspection/Repair maintenance approach”</b></p> <p>The general philosophy of the MMEL is that every failure/fault or inoperative equipment, once discovered and reported, requires a MMEL item to allow the aircraft dispatch until the condition is rectified.</p> <p>Through an “Inspection/Repair Maintenance Approach” (as per Ref. [1] AMC E 1030 (2) Definitions) an engine system fault or functional failure that is not displayed to the flight crew can be detected (found) through a periodic check of the Engine Control System. The applicable rectification time limit is set by TLD analysis and recorded in the Airworthiness Limitations for the Engine Type Certification.</p>			Accepted	Text is revised in accordance with the proposal. “or equivalent” added after the reference to ALS as it is not always the case (Engine Installation Manual may be used).
29	TCCA	3.1		<p>The proposed Memo Section <b>3.1 MMEL approach for EEC loss of redundancy faults</b> title and first line refers to “loss of redundancy”. For the reasons explained previously, loss of any function that is not necessary for safe flight due to malfunction of sensor, effectors feedback or their connector and not redundant would not cause a LOTC event or loss of a critical protection. The title and the first line should not include the words “loss of redundancy”.</p>	<p>TCCA recommends to reword section 3.1 and its title as follows:</p> <p><b>3.1. Dispatch with EECS faults</b></p> <p>If MMEL approval is sought for dispatch of an aircraft with known and not rectified fault (or faults combination) in an Electronic Engine Control System (EECS), a time limited dispatch (TLD) analysis of the EECS should be carried out as per Ref. [1] CS-E 1030 to determine dispatch intervals and demonstrate that the prescribed fleet-wide average LOTC/LOPC rates and Hazardous Engine Effects rates are not compromised.</p>			Partially accepted	



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30	TCCA	3.2		<p>The proposed Memo Section <b>3.2. MMEL approach for Engine system faults other than EECS loss of redundancy faults</b> implies that any other engine malfunction should be addressed by this memo in lieu of separate entry in the appendix to GM1. As an example, an inoperative automatic air starter valve that should be an ATA 80 item with a (M) procedure for operating the starter air valve on the ground and relying on windmilling restart in flight would not be monitored and causing a TLD message. If not causing a TLD message, it should not be included here.</p>	<p>TCCA recommends to reword section 3.2 and its title as follows:</p> <p><b>3.2. Dispatch with Engine system detected faults not causing LOTC</b></p> <p>If MMEL approval is sought for dispatch of an aircraft with Engine system fault or inoperative equipment other than EECS degraded protection or redundancy against Loss of Thrust Control (LOTC), it would not be included in the TLD analysis as shown in Fig.2 of Ref. [1] AMC E 1030. These faults and inoperative equipment would be separate MMEL item and should be evaluated against Ref. [3] CS MMEL criteria as for any other candidate item.</p>			Not accepted	The intent of the CM paragraph is to propose a way to handle the cases when TLD report are including faults not affecting the LOTC/LOPC rates because they are monitored through the same TLD messages. As no TLD (e.g. Markov) analysis is performed for these faults, they should be clearly identified in the report so that if the manufacturer MMELs is proposing.
31	TCCA	3.3		<p>The proposed Memo Section <b>3.3. Evaluation of aircraft level consequences for MMEL evaluation</b> contains a misleading “(e.g. dual IFSD)” because it implies a different severity for a quad engine aircraft. No explanation should be needed about Catastrophic event. Note 2 is confusing, CS 25.1322 would not allow any TLD message to be a Warning or a Caution in flight. On the other hand a red warning or an Amber caution caused by an ECS fault or failures has to be rectified with no deferral allowed i.e. No Dispatch.</p>				Accepted	Text is revised to remove the issues highlighted in the comment.
32	TCCA	3.4		<p>The proposed Memo Section <b>3.4. Dispatch with EECS faults on more than one Engine on twin-engine aircraft</b> should be revisited because it undermines the autonomous isolated engine concept that was the basis for TLD approach in the first place.</p> <p>The concept is to consider engine capability on per engine basis rather than looking at the aircraft level for all-or-nothing EECS channels. On a twin-engine aircraft with 2 channel EECS, only one channel not full-up can be considered. Whereas TLD allows every channel with varying level of degradation but each engine has the required reliability against LOTC and loss of active protection.</p> <p>By design and compliance with engine isolation dual engine LOTC is avoided. Further, as per section 3.1, MMEL item is required for dispatch with known faults even if classified LT and discoverable only by periodic scheduled maintenance.</p> <p>On the other hand, aircraft range consideration for 2, 3 or 4 engines that are not analysed should be addressed.</p>	<p>TCCA recommends to reword section 3.4 and its title as follows:</p> <p><b>3.4. Dispatch with EECS faults with performance effects</b></p> <p>Particular attention should be paid to range sensitive operations, including LROPS and ETOPS, when Engine system faults, including some included in TLD analysis, could have an effect on fuel consumption, hence range. Normally, degraded performance is not analysed by the engine manufacturer for LOTC but should be assessed by the aircraft manufacturer. Flight duration and thrust variation in case of an IFSD should be considered in performance / range assessment. If necessary, operational limitations should be specified in the MMEL for combination of MMEL items.</p>			Accepted	The proposed text is taken in place of the initially proposed text.
33	TCCA	3.6		<p>The raison d’être of the proposed Memo is Section <b>3.6. Certification workflow for TLD and MMEL</b>. Based on the discussion about the misinterpretations of “approaches” in AMC E 1030, and the need to</p>	<p>The following rewrite is recommended and the flowchart figure could be omitted or redrawn to reflect the following:</p>			Partially accepted	Most of the proposed updates to the workflow have been retained.

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				<p>include in MMEL items for dispatch with known faults detected by scheduled maintenance, some aspects should be revised. There is also the need to identify the different authorities having complementary authority. Step 3 should be divided. While aircraft MPD could refer to engine Airworthiness limitations, they should not be duplicated. Engine Type Certificate Holder are required to provide directly to each operator the airworthiness Limitations, not through the aircraft but directly.</p>	<p><b>3.6. Certification workflow for TLD and MMEL</b></p> <p>In the case when an MMEL approval is requested for aircraft dispatch with EECS faults present, the following workflow is proposed to enable proper coordination of certification activities:</p> <ol style="list-style-type: none"> <li>1. Application for TLD approval according to CS-E 1030 should be made by the Engine Type Certificate holder to the type certification authority in the state of design. Justification requires TLD analysis.</li> <li>2. TLD design approval is recorded in the Engine TCDS (See CS-E 40(d)) (Validated Engine Type Certificate by EASA as required) with references to Installation and interface Design requirements (for the aircraft design) and TLD operating time limitations for the aircraft operations.</li> <li>3. The TLD time limitations in the Engine Airworthiness Limitation (CS-E 25 (a) ) and Maintenance Instructions (CS-E 20(d) ) as applicable, are provided directly by the engine manufacturer to operators (Part 21.A.61 requirement).</li> <li>4. The aircraft Type Certificate holder is to design the human interfaces, assess the reliability and performance effects for compliance with CS-23, 25, 27 or 29 as applicable to the authority in the state of design, to be validated by EASA as required.</li> <li>5. The aircraft Type Certificate Holder is to justify all the MMEL items as required by CS-MMEL, be provided to EASA as part of aircraft Type Certification OSD requirements (Part 21.A.17B) and to all known EU operators of the aircraft in accordance with Part 21.A.62.</li> <li>6. Actual usage of the TLD and in-service LOTC rate are monitored by the Engine Type Certificate Holder and its authority in the state of design. Should operators fail to report TLD usage and LOTC rate to the engine Type Certificate Holder, the authority in the state of design could rescind or restrict the TLD operating time limitations.</li> <li>7. Should change be made to the TLD time limitations by the engine Type certification authority, and validated by EASA as required, the aircraft Type Certificate holder shall assess the effect to CS-MMEL justifications. Operators will be informed by appropriate means of changes to TLD.</li> </ol>				