747-8/8F

CERTIFICATION MAINTENANCE REQUIREMENTS (CMRs)

D011U721-02-03

DECEMBER 2013

COMPILED AND PUBLISHED BY:
MAINTENANCE PROGRAMS ENGINEERING
COMMERCIAL AVIATION SERVICES

BOEING COMMERCIAL AIRPLANE GROUP
SEATTLE, WASHINGTON

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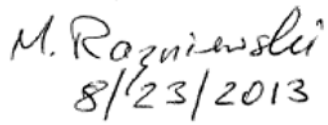
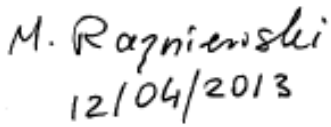
REVISIONS

REVISION AND REVISION DESCRIPTION	APPROVAL	
AUGUST 2011 Original Release.	Submitted by: Kevin Perry (Boeing) 	Approved by: Robert D. Breneman (Seattle FAA ACO) SIGNATURE ON FILE 8/12/2011
AUGUST 2011 R1 Added a new CMR to check for outboard aileron inboard actuator failures (27-CMR-09).	Submitted by: Kevin Perry (Boeing) 	Approved by: Ron Landes for Robert D. Breneman (Seattle FAA ACO) SIGNATURE ON FILE 8/16/2011
SEPTEMBER 2011 Revised the last paragraph in Section C by revising “747-8I” to “747-8” to include all 747-8 passenger model airplanes. Revised Appendix A by revising the systems life limited part applicability from “747-8I” to “747-8” to include all 747-8 passenger model airplanes.	Submitted by: Kevin Perry (Boeing) 	Approved by: Gary Oltman (Seattle FAA ACO) SIGNATURE ON FILE 12/06/2011
DECEMBER 2011 Revised airplane applicability for 27-CMR-09.	Submitted by: Kevin Perry (Boeing) 	Approved by: Angelos Xidias (Seattle FAA ACO) SIGNATURE ON FILE 2/08/2012

REVISIONS

REVISION AND REVISION DESCRIPTION	APPROVAL	
MAY 2012 Revised airplane applicability for 27-CMR-08 from "ALL" to "Applicable to 747-8 airplanes prior to line number 1462 and those airplanes that have not incorporated Service Bulletin 747-27-2501."	Submitted by: Paul Beuter (Boeing) 	Approved by: Doug Tsuji for Angelos Xidias (Seattle FAA BASOO) SIGNATURE ON FILE 6/13/2012
AUGUST 2013 Added two new Certification Maintenance Requirement Tasks: 27-CMR-10 – Lubricate inboard elevator hinge bearings. 27-CMR-11 – Functional check of inboard elevator hinge bearing and power control unit rod end bearing play.	Submitted by: Matthew Razniewski (Boeing) 	SIGNATURE ON FILE FAA BASOO 11/01/2013
DECEMBER 2013 Revised 24-CMR-01 interval from "24 HRS" to "100 FH" and removed Interval Note in accordance with the approved 747-8/-8F Electrical Power System Safety Assessment Document.	Submitted by: Matthew Razniewski (Boeing) 	SIGNATURE ON FILE FAA BASOO 12/20/2013

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A. SCOPE

The 747-8/8F scheduled maintenance requirements described in this document result from airplane certification activities with the U.S. Federal Aviation Administration (FAA), and this FAA approved Certification Maintenance Requirements (CMR) document is cross-referenced in the Model 747 Type Certificate Data Sheet A20WE as an Airworthiness Limitations Section of the Instructions for Continued Airworthiness. These scheduled maintenance requirements may only be revised by the Seattle FAA Aircraft Certification Office (ACO); principal airworthiness inspectors (local regulatory authorities) may not change these requirements or the intervals associated with these requirements without FAA ACO approval.

B. EXCEPTIONAL SHORT-TERM EXTENSIONS

Intervals for these CMRs are based on statistical averages and reliability rates except for 27-CMR-06, 27-CMR-07, and Life-limited Items 2 and 3 in Appendix A. An exceptional short-term extension of 10% for CMRs based on statistical averages and reliability rates may be made without jeopardizing safety. The local regulatory authority must concur with any exceptional short-term extensions before they take place using procedures established with the local regulatory authority in the operators' manuals. The "exceptional short-term extension" process is applicable to CMR intervals. It should not be confused with the operator's "short-term escalation" program for normal maintenance tasks described in the operators' continuous airworthiness maintenance program.

The Seattle FAA ACO has accepted that these exceptional short-term extensions may be granted without consultation with that office:

1. The term "exceptional short-term extension" is defined as an increase in a CMR interval that may be needed to cover an uncontrollable or unexpected situation. CMRs based on statistical averages and reliability rates have been approved for an exceptional short-term extension of 10%.
2. Repeated use of extensions, either on the same airplane or on similar airplanes in an operator's fleet, should not be used as a substitute for good management practices. Exceptional short-term extensions must not be used for fleet CMR extensions.

After a CMR has experienced an exceptional short-term extension, the CMR interval will revert back to its interval listed in this document. The Seattle FAA ACO must approve, prior to its use, any desired extension not explicitly listed above.

The exceptional short-term extension listed above applies to airlines that fall under the United States FAA jurisdiction only. Operators who are not under U.S. FAA jurisdiction should obtain interval extension approvals from their local regulatory agency.

C. POST-CERTIFICATION CHANGES

Any post-certification changes to CMRs must be approved by the Seattle FAA ACO.

1. Since the purpose of a CMR is to limit the exposure time to a given significant latent failure as part of an engineering analysis of overall system reliability, instances of a CMR task repeatedly finding that no failure has occurred may not be sufficient justification for deleting the task.
2. The introduction of a new CMR should be reviewed by the same process used during initial certification. It is important that operators be afforded the same opportunity to participate that they received during the original certification of the airplane, in order to allow the operators to manage their own maintenance programs.
3. In the event that later data provide sufficient basis for relaxation of a CMR (less restrictive actions to be required), the change may be documented by an FAA ACO approved change to this CMR document.
4. If the requirements of an existing CMR must be decreased (more restrictive actions to be performed), it will be implemented by a change to this CMR document and enforced by an FAA Airworthiness Directive (AD).
5. After initial aircraft certification, the only basis for adding a new CMR is in association with the certification of design changes.
6. A new CMR created as part of a design change should be part of the approved data for that change and added to this CMR document.

In the event that a CMR is revised for all 747-8 and 747-8F airplanes, Boeing will document it by preparing a revision to this document that will be approved by the Seattle FAA ACO. This revision will then be forwarded to all 747-8/8F operators and the Seattle FAA ACO offices.

D. CERTIFICATION MAINTENANCE REQUIREMENTS

SELECTION OF CMRs

In order to grant operators of the 747-8/8F airplane an opportunity to participate in the evaluation and selection of CMRs in an integrated process with MRB tasks and intervals, a Certification Maintenance Coordination Committee (CMCC) was convened to review all of the 747-8/8F CMRs. The CMRs listed in this document are the result of applying the CMCC process as described in AC 25-19.

CMR DEFINITION

As defined by AC 25-19, a CMR is a required periodic task, established during the design certification of the airplane as an operating limitation of the type certificate. CMRs usually result from a formal, numerical analysis conducted to show compliance with catastrophic and hazardous failure conditions. Additional notes concerning the definition of CMRs:

1. A CMR is intended to detect safety-significant latent (hidden) failures that would, in combination with one or more specific failures or events, result in a hazardous or catastrophic failure condition.
2. It is important to note that CMRs are derived from a fundamentally different analysis process than the maintenance tasks and intervals that result from the Maintenance Steering Group (MSG-3) Analysis associated with Maintenance Review Board (MRB) activities. MSG-3 Analysis activity produces maintenance tasks that are performed for safety, operational, or economic reasons, involving both preventative maintenance tasks, which are performed before failure occurs (and are intended to prevent failures), as well as failure-finding tasks. CMRs, on the other hand, are failure-finding tasks only, and exist solely to limit the exposure to otherwise hidden failures. Although CMR tasks are failure-finding tasks, use of potential failure-finding tasks, such as functional checks and inspections, may also be appropriate.
3. CMRs are designed to verify that a certain failure has or has not occurred, and normally do not provide any preventative maintenance function. CMRs "restart the failure clock to zero" for latent failures by verifying that the item has not failed, or cause repair if it has failed. Because the exposure time to a latent failure is a key element in the calculations used in a safety analysis performed to show compliance with 14 CFR 25.1309, limiting the exposure time will have a significant effect on the resultant overall failure probability of the system. The CMR task interval should be designated in terms of flight hours, cycles, or calendar time, as appropriate.

4. The type certification process assumes that the airplane will be maintained in a condition of airworthiness at least equal to its certified or properly altered condition. The process described in AC 25-19 is not intended to establish normal maintenance tasks that should be defined through the MSG-3 analysis process. Also, this process is not intended to establish CMRs for the purpose of providing supplemental margins of safety for concerns arising late in the type design approval process.

CMR TASK TYPES

CMR Tasks are divided into two categories: One Star (*) CMRs and Two Star (**) CMRs. They are defined as follows:

1. One Star (*) CMRs - The tasks and intervals specified are mandatory and cannot be changed, escalated, or deleted without the concurrence of the Seattle FAA ACO.
2. Two Star (**) CMRs - Task intervals may be adjusted in accordance with each operator's approved escalation program or an approved reliability program in a like manner for any MRB Report task, but may not be deleted without prior Seattle FAA ACO approval.

ESCALATION OF TWO STAR (**) CMRs

All Two Star (**) CMRs can be managed and controlled the same as any MRB Report task; however, they can not be deleted from an operator's program without prior Seattle FAA ACO approval. For operators with approved escalation practices or an approved reliability program, data collection and analytical techniques are used to make adjustments to an operator's maintenance program. It has been demonstrated that the management of a maintenance program does not give rise to undue escalations; consequently, the escalation of Two Star (**) CMR intervals within an operator's maintenance program will be properly managed by the operator subject to local regulatory authority approval

E. CERTIFICATION MAINTENANCE REQUIREMENTS REQUIRED BY AIRWORTHINESS DIRECTIVES

CMRs 27-CMR-06, 27-CMR-07, and Life-limited Items 2 and 3 in Appendix A are required by existing Airworthiness Directives (ADs) required under 14 CFR 39 and do not come from system safety analysis required under 14 CFR 25.1309. CMR 27-CMR-06 is required by AD 2006-10-02. CMR 27-CMR-07 is an FAA ACO approved Alternate Method of Compliance (AMOC) for AD 2003-11-01. Life-limited Items 2 and 3 in Appendix A are required by AD 2009-22-08.

Since CMRs 27-CMR-06, 27-CMR-07, and Life-limited Items 2 and 3 in Appendix A are required by existing ADs required under 14 CFR 39, requests for an AMOC or a change in the compliance times for these items should be in accordance with 14 CFR 39.

F. CERTIFICATION MAINTENANCE REQUIREMENTS REQUIRED BY OTHER SAFETY ANALYSIS USED FOR CERTIFCATION

Life-limited Item 1 in Appendix A is required by safety analysis used to certify the flight deck door. The flight deck door strike assembly life limit assures minimum system performance requirements in the event of a cabin decompression event (Reference FAA memorandum 01-115-11 dated Nov. 6, 2001 revised Dec. 3, 2002).

G. CMR TASKS

CMR ITEM NUMBER	TYPE	RELATED MRB REPORT ITEM NUMBER	CMR INTERVAL	APPLICABILITY		TASK DESCRIPTION
				APL	ENG	
21-CMR-01	*	21-058-15	12,000 FH	ALL	ALL	Operational test of E&E cooling system override mode function.
21-CMR-02	*	21-058-03 (MPD Number)	2,000 FH	ALL	ALL	System test – E30 rack pressure at E&E cooling system E30-2 Shelf (equipment cooling system).
24-CMR-01	*	24-029-03 (MPD Number)	100 FH	ALL	ALL	Operational (short) test – 115 volt AC standby power generation system.
24-CMR-02	*	24-023-00 (MPD Number)	500 FH	ALL	ALL	Operational test – generator control units and bus control units (power-up test).
26-CMR-01	*	26-011-00	24 HRS NOTE	ALL	ALL	Operational test for engine and APU fire/overheat detection system (if not checked by crew). INTERVAL NOTE: Under exceptional operational circumstances the interval may be extended beyond 24 hours (elapsed clock hours) but not exceed 48 hours (elapsed clock hours).
27-CMR-01	*	27-051-20	1,200 FH	ALL	ALL	Operational check of the primary electrical leading and trailing edge flap system.
27-CMR-02	*	27-051-10	10,000 FH	ALL	ALL	Operational check of the alternate electrical leading and trailing edge flap system control switch.
27-CMR-03	*	27-051-12 (MPD Number)	1,200 FH	ALL	ALL	Operational check of the alternate electrical leading and trailing edge flap system arm switch.

CMR ITEM NUMBER	TYPE	RELATED MRB REPORT ITEM NUMBER	CMR INTERVAL	APPLICABILITY		TASK DESCRIPTION
				APL	ENG	
27-CMR-04	*	27-021-45	6,250 FH	ALL	ALL	Test upper rudder hinge bearing and rudder power control package bearing play.
27-CMR-05	*	27-021-40	6,250 FH	ALL	ALL	Test lower rudder tab hinge bearing and rudder control rod bearing play.
27-CMR-06	*	27-041-10	21,000 FH	ALL	ALL	Test horizontal stabilizer trim system ballnut-to-ballscrew freeplay.
		12-027-34	I-15,000 FH / 18 MO R- 2,000 FH / 12 MO			Lubricate horizontal stabilizer trim system ballnut and ballscrew.
		27-041-05	I-15,000 FH / 18 MO R- 4,000 FH / 24 MO			Inspect horizontal stabilizer trim system ballnut and ballscrew.
27-CMR-07	*	51-041-01 (MPD Number)	2 YR	ALL	ALL	Operational check of the canted pressure deck exterior drain lines in the main landing gear wheel wells by purging the drain lines with compressed air to ensure there are no blockages.
		51-041-02 (MPD Number)	2 YR			Inspect and restore (clean) the interior of the wing center section canted pressure deck by removing all debris that could contaminate and obstruct water drain paths, water drain inlets, water scavenge tube inlets, or water drain catch basins.
		51-041-03 (MPD Number)	3 YR			Inspect the canted pressure deck exterior surface from inside the main landing gear wheel wells to detect unintended water leakage paths.
		51-041-04 (MPD Number)	6 YR			Inspect the canted pressure deck exterior surface from inside the main landing gear wheel wells with the fuselage pressurized to detect air leakage paths.
27-CMR-08	*	27-011-05 (MPD Number)	11,000 FH	NOTE	ALL	Functional check of the inboard aileron power control unit compensator. AIRPLANE NOTE: Applicable to 747-8 airplanes prior to line number 1462 and those airplanes that have not incorporated Service Bulletin 747-27-2501.

CMR ITEM NUMBER	TYPE	RELATED MRB REPORT ITEM NUMBER	CMR INTERVAL	APPLICABILITY		TASK DESCRIPTION
				APL	ENG	
27-CMR-09	*	27-011-07 (MPD Number)	24 HRS NOTE	NOTE	ALL	Visually check the Flight Controls Maintenance Page on EICAS for the presence of an "x" adjacent to the outboard aileron inboard actuator position indication, and follow the fault isolation procedure for the "L/R AIL ACTUATOR" status message if an "x" is present. INTERVAL NOTE: Under exceptional operational circumstances the interval may be extended beyond 24 hours (elapsed clock hours) but not exceed 48 hours (elapsed clock hours). AIRPLANE NOTE: 747-8F airplanes prior to line number 1450 that have not incorporated Service Bulletin 747-31-2455 R00.
27-CMR-10	*	12-027-33 (MPD Number)	5,000 FH / 18 MO NOTE	ALL	ALL	Lubricate inboard elevator hinge bearings. INTERVAL NOTE: Whichever occurs first.
27-CMR-11	*	27-031-10 (MPD Number)	6,250 FH / 18 MO NOTE	ALL	ALL	Functional check of inboard elevator hinge bearing and power control unit rod end bearing free play. INTERVAL NOTE: Whichever occurs first.
29-CMR-01	*	29-021-00	11,000 FH / 30 MO	ALL	ALL	Functional check of the ram air turbine system, including gross internal leakage check of the ram air turbine hydraulic system.

APPENDIX A. SYSTEMS COMPONENTS LIFE-LIMITED ITEMS

The replacement times established for life-limited parts in this appendix result from Model 747-8/8F airplane certification activities with the U.S. FAA and are part of the Airworthiness Limitations Section of the Instructions for Continued Airworthiness. These maintenance actions are mandatory. These life limits may only be revised with the approval of the Seattle FAA ACO.

ITEM NUMBER	LIFE-LIMITED ITEM	PART NUMBER	PART DESCRIPTION	APPLICABILITY SPECIFICATIONS	LIFE LIMIT	QUANTITY PER AIRPLANE
1	Double Roller E Strike	AR4704-6	Flight Deck Door Strike Assembly	Applicable to 747-8 Flight Deck Security Door	9 Years	1
2	Switch	284U7410-1	Fwd and Aft Cargo Door Control Switch	Applicable to 747-8 and 747-8F in the following installation positions: Aft Cargo Door Forward Cargo Door	6 Years	2
3	Switch	284U7410-1	Nose Cargo Door Control Switch	Applicable to 747-8F in the following installation positions: Nose Cargo Door	6 Years	1

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