RESPONSES RECEIVED ON DRAFT REPORT "LOSS OF FLAP PART, BOEING 747-400"

Number	Party	Chapter/section	Text to be corrected (first … last word)	Argumentation	Corrected	Dutch Safety Board response
1	Owner aircraft	Summary, page 4, paragraph 2	(…) flap system encountered (…).	Add the word "design" in the sentence.	Yes	The word "design" added.
2	Owner aircraft	Ch. 1, page 8, paragraph 2	(…) flap system encountered (…).	Add the word "design" in the sentence.	Yes	The word "design" added.
3	Owner aircraft	Ch. 1, page 8, paragraph 2	Aircraft may encounter controllability problems (…)	The impact of a missing (partly) missing fore flap has a neglected effect on controllability. It requires a minor steering input. The controllability of the aircraft is a big word requiring more than a steering input. The potential of additional damage caused by PDA to the aircraft or on ground is a higher risk.	Yes	Text changed.
4	Owner aircraft	Ch. 1, page 11, paragraph 2	(…) beyond repair.	Change to: "(…) beyond economical repair." A repair was possible although the choice was made not the repair due to economic reasons.	Yes	Text changed.
5	Owner aircraft	Ch. 2, page 15, paragraph 2	(…) the service life of the fore flap fitting was 16 years.	Change to: "(…) service life at the moment of failure of the fore flap fitting was 16 years." At the moment of failure there was no life limit requirement for the fitting. The fitting operated 16 years in the CKA before failure.	Yes	Text changed.
6	Owner aircraft	Ch. 3, page 21, paragraph 2	The play, loosening and migration (…) skewed operation of poor lubrication (…).	This SB does not have the new insights as currently covered in SB 747-57A2367 where pitting corrosion is the main cause of the failure mode. No traces of skewed operation or poor lubrications of the fitting were discovered by the CKA.	Partly	Paragraph rewritten.
7	Owner aircraft	Ch. 3, page 22, paragraph 1		KLM follows the Boeing MPD. The inspection interval in the SB is recommended and not obliged as the MPD inspection time. The failure mode that caused the CKA PDA could not have been prevented by the task stipulated in SB 747-27-2366 rev 3. The SB has never reached the level of an AD. The SB includes an external examination however it does not require inspection of the inner bore were the corrosion starts where the failure mode starts and progresses. This inspection can only be performed when the bearing is removed. Boeing opted not to introduce this additional inspection but issued alert SB 747-57A-2367 for a preventive replacement of the complete fitting at a fixed interval (SB now mandated per AD). This hard time was issued after the CKA event in this report, and the other, similar failures shortly before this event.	Yes	Paragraph added to explain the relation between the service bulletin and the detection of corrosion.

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8	Owner aircraft	Ch. 3, page 22, paragraph 1	The failure mode that caused the CKA PDA could not have been prevented by the tasks stipulated in the SB 747-27-2366 rev 3, because the SB does not require inspections of the inner fitting bore were the corrosion is present and progresses. This can only be performed when the bearing is removed. Boeing opted not to introduce this additional inspection but to mandate the preventive replacement of the complete fitting at a fixed interval per SB 747-57A-2367. This hard time was issued after the CKA event in this report.	Add text	Yes	Paragraph added to explain the relation between the service bulletin and the detection of corrosion.
9	Owner aircraft	Ch. 3, page 22, paragraph 4	The maintenance worksheet (…).	The non-routine maintenance worksheet raised by the MRO had the SOPM (…).	Yes	Text changed.
10	Owner aircraft	Ch. 3, page 22, paragraph 4	The worksheet provided did not make reference to the CMM 57-52-31.	The non-route maintenance worksheet raised by the MRO did not make (…).	No	MRO is mentioned in first sentence.
11	Owner aircraft	Ch. 4, page 24, paragraph 2		Add text to paragraph: "Analysis indicate that the failure mode that caused the CKA PDA could not have been prevented by the tasks stipulated in the SB 747-27-2366 rev 3."	No	The paragraph is about the planning of maintenance to reveal anomalies of foreflap fittings and bearings.
12	Owner aircraft	Ch. 4, page 24, paragraph 3	(…) observing standard engineering practices is vital to ensure system safety.	Replace "engineering" by "maintenance"	Yes	Text changed.
13	Operator	Summary, page 4, paragraph 2	In the past (...) of the flap system In the past the Boeing 747 trailing edge flap system encountered various technical 13 abnormalities such as separating parts of the fore flap and a skewed operation of the flap 14 system.	Suggest to rephrase into 'In the past the Boeing model 747 series trailing edge flap (…) of the flap system.' With current sentence it remains unclear if the text refers to the technical abnormalities of the 747 trailing edge flap system in general, or to the incident aircraft (PH-CKA). In line with chapter 2.5 line 7-14.	Yes	Text changed.
14	Operator	Summary, page 5, paragraph 5	The operator had incorporated (…) of 7 to 8 months ensued.	Add the word 'voluntary' in the sentence. The operator voluntary incorporated Service Bulletin 747-27-2366 (Rev 3) in order to improve reliability (…) 7 to 8 months ensued. Incorporation of this SB is not mandatory and is a result of the embodiment policy of non-mandatory modifications. The SB was issued to improve reliability i.s.o. safety in case of an AD.	No	The paragraph states that regulation allows for an adaptable incorporation.
15	Operator	Ch. 1, page 8, paragraph 2	The loss (…) following risk	Change loss of broken aircraft parts into 'Separation of parts from the aircraft causes the following risk. Or 'Parts departing aircraft causes the following risk.'	Yes	Paragraph rewritten.

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16	Operator	Ch. 1, page 8 paragraph 2	Aircraft may encounter (…) on the ground.	Suggest to add (consequential). Change sentence in 'Aircraft may encounter (consequential) controllability problems (…).' To clarify that controllability problems may be caused by the loss of a flight control (as in our case) but also as result of collateral damage caused by PDA. (e.g. If the PDA damages the horizontal stabilizer for example.)	Yes	Paragraph rewritten.
17	Operator	Ch. 2, page 14, paragraph 1	The operator's engineering and (…) flap fitting parts.	Suggest to change operator's engineering and maintenance into contracted maintenance organization. Since the aircraft was operated under the interchange lease agreement, it is vague who is the operator in this case. See also comment on page 15 line 5.	Yes	Text changed.
18	Operator	Ch. 2, page 15, paragraph 2	The operator's report (…) of the bearing.	Suggest to change operator's report into maintenance organization report. Since the aircraft was operated under the interchange lease agreement it is vague who is the operator in this case. The metallurgic failure analyses was conducted by the contracted maintenance originations laboratory.	Yes	Text changed.
19	Operator	Ch. 3.1, page 21, paragraph 1	The operator's (…) fitting failure.	Suggest to change operator's into maintenance organization (…) Since the aircraft was operated under the interchange lease agreement, it is vague who is the operator in this case. The metallurgic failure analyses was conducted by the contracted maintenance originations laboratory.	Yes	Text changed.
20	Operator	Ch. 4, page 24, paragraph 3	At that time, it (…) of the fitting lug. This corrosion (…) the replacement.	Maybe relevant to add if there was an inspection requirement for this part?	No	Paragraph addresses the fact that it is likely that corrosion was present and that it was not detected.
21	Operator	Appendix A, Page 25, paragraph 2		Add Martinair Holland	Yes	Company name added.
22	ILT	Ch. 1, page 8, paragraph 1	While selecting the required position of the trailing edge flap system (..) the aircraft.	We assume that the 747-4 trailing edge flaps during normal operations are not selected separately from the leading edge flaps (slats).	Yes	Text changed.
23	ILT	Ch. 3.2, page 22, paragraph 4	Yet instructions (…) the CMM 57.52.31	From the narrative it is not clear if the operator was required to perform the maintenance according CMM 57-52-31; however, the remark made in the conclusion (investigating according to maintenance manuals and by observing standard engineering practices) is clear.	Yes	Text added.
24	Boeing	Ch. 2.1, page 11, paragraph 1	The left hand side of the fore flap was deformed, but still attached to toggle assembly 5, (…).	The left hand side of the fore flap was deformed, but still attached to sequence carriage assembly 5,	Yes	Text changed.
25	Boeing	Ch. 2.1, page 11, figure 1	sequence carriage mechanisms	Items noted as sequence carriage mechanisms should be noted as main carriage assemblies.	Yes	Text changed.
26	Boeing	Ch. 2.1, page 11, figure 1	toggle assemblies	Items noted as toggle assemblies should be noted as sequence carriages.	Yes	Text changed.

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27	Boeing	Ch. 2.1, page 13, paragraph 2	(…) is connected with an inboard link assembly onto toggle assembly No 5 and with an outboard foreflap fitting onto toggle assembly's No 6, that are part of the sequence carriages mechanism (see Figure 1). The flap fittings are joined with the toggle assemblies by means of a bearing with bearing ball and bolt (see Figure 6). Besides being connected to the toggle assembly's, the foreflap is also connected to the mid flap via three attachment levers and (…)	(…) is connected with an inboard link assembly onto sequence carriage No 5 and with an outboard foreflap fitting onto sequence carriage No 6 (see Figure 1). The flap fittings are joined with the sequence carriage assemblies by means of a bearing with bearing ball and bolt (see Figure 6). Besides being connected to the sequence carriage assemblies, the foreflap is also connected to the mid flap via three attachment levers and (…)	Yes	Text changed.
28	Boeing	Ch. 2.4, page 16, paragraph 1	The outer fore flap fitting bearing was still attached to toggle assembly number 6 (see Figure (…)	The outer foreflap fitting bearing was still attached to sequence carriage assembly number 6 (see Figure (…)	Yes	Text changed.
29	Boeing	Ch. 2.4, page 16, figure 6	Figure 6: Toggle assembly 6 with outboard fore flap fitting bearing (a) and close up of the bearing surface (…)	Figure 6: Sequence carriage assembly 6 with outboard fore flap fitting bearing (a) and close up of the bearing surface (…)	Yes	Text changed.
30	Boeing	Ch. 2.5, page 17, paragraph 4	(…) the periodically replacement of critical parts of the fore flaps and the flap carriage system (…)	(…) the periodically replacement of critical parts of the fore flaps and the flap sequence carriage assemblies (…) To more accurately state the nomenclature of the parts.	Yes	Text changed.
31	Boeing	Ch. 2.5, page 17, paragraph 4	(…) issued AD 2021-02-15. This AD is applicable to all operators of Boeing Model 747 Series, (…)	(…) issued AD 2021-02-15. This AD is applicable to all operators of Boeing Model 747 Series, except the 747SP and 747-8 models (…) To more accurately state the 747 models effected by the Airworthiness Directive.	Yes	Text changed.
32	CAAC	Ch. 3.1, page 21, Paragraph 1	"The failure of the outboard fitting caused the fore flap to come lose, move upwards and backwards into the airstream, then break in half and separate from the aircraft."	As described in Line 6-8 of Paragraph 3.1 on Page 21, could be one of the causes resulted in the occurrence but should not be the only one. As stated in Paragraph 2.6 on Page 19, similar occurrences have happened before, although the causes could be various, the aircraft manufacturer Boeing has made a reasonable conclusion in 747-FTD-57-10002 and SL-747-57-097.	Yes	Text added to paragraph 3.1.1.
33	CAAC	Ch. 3.1, page 24, paragraph 4	"At that time, it was likely that a progressed form of pitting corrosion was present on the inside of the fitting lug. This corrosion was not discovered during the replacement."	As described in Line 21-23 of Paragraph 4 on Page 24, could be one of the scenarios, while the other possibilities should not be ignored. Such as the fact might be, no Pitting Corrosion existed or Pitting Corrosion did not progress to a visible and detectable condition, at the time of replacing Bearing/Bushing one year ago. The Pitting Corrosion would be initiated slowly, but if the electrochemical reaction started, the development of pitting could be incredibly fast. Furthermore, the material or metallurgy used on Fitting should be considered as one of the valid factors contributing to Corrosion.	No	It is likely that a progressed form of pitting corrosion was present due to the fact that primer, which is used during replacement of the bearing, was present in the corrosion pits.