

# 全日本空輸株式会社所属ボーイング式787-8型JA804A航空重大インシデントに係る安全勧告に基づき講じた措置について(通知)

## 【重大インシデントの概要】

全日本空輸株式会社所属ボーイング式787-8型JA804Aは、平成25年1月16日(水)、東京国際空港に向けて山口宇部空港を離陸し、四国上空を上昇中、メインバッテリーの不具合を示す計器表示とともに、操縦室内で異臭が発生したため、目的地を高松空港に変更し、高松空港に着陸した。

同機のメインバッテリーが損傷したが、火災は発生しなかった。



## 【 FAAに対する安全勧告内容 】

米国連邦航空局が、講ずべき措置

- (1)航空機装備品の試験が実運用を適切に模擬した環境で行われるよう指導すること
- (2)LIB(リチウムイオンバッテリー)の技術基準を見直し、必要があれば改正すること

- (3)バッテリーの故障率の想定の見直し
- (4)セル間の熱伝播リスクが適切に評価されているか見直し
- (5)意図せぬコンタクター動作の運航に与える影響を検討し、必要な措置を講じること

米国連邦航空局がボーイング社に指導すべき措置

- ①内部短絡の発生機序の調査を継続すること、LIBの品質と信頼性の向上を図ること、温度等のLIBの運用条件を見直すこと
- ②BCU(バッテリーチャージユニット)の動作及びコンタクターの動作確認を改善すること

## 【 FAAからの回答】

(1)(2) LIBの新たな基準を策定し、実運用を模擬して航空機装備品の試験を行うこととした。

(3)(4)(5) バッテリーシステムは再設計され、新しいLIB安全評価に基づいて承認されており、また、熱伝播リスクにも明確に対応した。

①②バッテリーセル設計を継続的に見直す過程において、ボーイング社は内部短絡の発生メカニズムの研究を継続し、LIBの製造過程も調査している。これにはBCUとコンタクターの動作の改善も含まれている。



U.S. Department  
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**Federal Aviation  
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**MAY 20 2015**

Norihiro Goto  
Chairman  
Japan Transport Safety Board  
2-1-2, Kasumigaseki  
Chiyoda-ku, Tokyo, 100-8918  
Japan

Dear Mr. Goto:

This is our initial and final response to Safety Recommendations 15.013 through 15.019 issued by the Japan Transport Safety Board (JTSB) on September 25, 2014. The Federal Aviation Administration (FAA) Office of Accident Investigation and Prevention received these recommendations through the National Transportation Safety Board on January 15, 2015. The JTSB issued these recommendations as a result of a serious incident that occurred on January 16, 2013. A Boeing 787-800 (B-787), operated by All Nippon Airways Co., LTD., registered JA804A, took off from Yamaguchi Ube Airport for Tokyo International Airport as its scheduled flight 692. When it was climbing through 32,000 feet over Shikoku Island, an Engine Indicating and Crew Alert System message of battery failure came on accompanied by an unusual smell in the cockpit. The airplane diverted and landed at Takamatsu Airport. An emergency evacuation was executed using slides on the taxiway. Four passengers of the 137 occupants (which included the Captain, seven crewmembers, and 129 passengers) suffered minor injuries during the evacuation. Although the main battery was damaged, it did not lead to a fire.

Incidentally, a similar incident occurred in the United States, on January 7, 2013, at Logan International Airport (BOS), Boston, Massachusetts. Additionally, about one year after the incident at BOS, a similar main battery incident occurred at Japan's Narita International Airport on January 14, 2014.

15.013. Provide instruction to airplane manufacturers and equipment manufacturers to perform equipment tests simulating actual flight operations.

15.014. Review the technical standards for lithium ion battery to ensure that the electric environment is appropriately simulated, and if necessary, amend the standards.

FAA Comment. The FAA worked with industry experts to develop new Lithium battery and battery system standards that require applicants to perform equipment tests simulating actual flight operations, including a simulation of the worst-case failure condition. On

December 18, 2013, these revised standards were released in Radio Technical Commission for Aeronautics (RTCA) DO-347, Certification Test Guidance for Small and Medium Sized Rechargeable Lithium Battery and Battery System. These standards are being applied to large batteries through the issue paper process pending final release of RTCA DO-311a by September 2015. RTCA DO-347 can be found at the following Web site:

[http://www.rtca.org/store\\_product.asp?prodid=1124](http://www.rtca.org/store_product.asp?prodid=1124).

These standards were developed to ensure that the electric environment is appropriately simulated, and include testing based on in-service lessons learned that simulate actual aircraft installation and flight operation. The standards have been revised to include design review and testing processes intended to verify that the battery system meets all design and performance requirements for aircraft application.

15.015. Review lithium ion battery failure rate estimated during the 787 type certification, and if necessary, based on its result, review the lithium ion battery safety assessment.

15.016. Review the type certificate for its appropriateness on heat propagation risk.

15.017. Assess the impact of contactor opening after the cell vent on the flight operation and take appropriate actions, if necessary.

15.018. Supervise Boeing to continue the study of internal short circuit mechanism considering the effects of non-uniform winding formation and other factors deriving from the manufacturing process; and continue efforts to improve lithium ion battery quality and its reliability, reviewing the lithium ion battery operational conditions, such as temperature.

15.019. Supervise Boeing to improve Battery Charger Unit (BCU) and contactor operations which are outside the design envelope.

FAA Comment. The B-787 Main and Auxiliary Power Unit (APU) batteries, their associated systems, and enclosure were redesigned and are significantly different than what was certified during the initial B-787 type certification. Accordingly, approval of the redesigned system was based on a new lithium ion battery safety assessment.

Certification of the redesigned system and enclosure specifically addressed heat propagation risk. Two in-service battery cell thermal events on airplanes with the new battery and enclosures have not propagated beyond the battery enclosure, per design.

Certification of the redesigned system and enclosure specifically addressed cell venting events and subsequent isolation of the battery. The enclosure with overboard venting is designed to mitigate and contain a cell venting event. Loss of a Main or APU battery as a power source will not preclude continued safe flight and landing. Two in-service battery cell thermal events on airplanes with the new battery and enclosures have not had airplane level effects outside of the enclosure and have not had system level effects beyond loss of the associated battery as a power source, per design.

In an effort to continually improve the battery cell design, Boeing is continuing to study the internal short circuit mechanism and examining the build procedure for the lithium ion battery.

This included improvements to the Battery Charger Unit (BCU) and contactor operations. Two in-service battery cell thermal events on airplanes with the new battery and enclosures have not had airplane level effects outside of the enclosure and have not had system level effects beyond loss of the associated battery as a power source, per design. The BCU and contactor functioned per design.

Based on the actions noted above, the FAA does not intend to conduct any further review of the original lithium ion battery safety assessment.

I believe that the FAA has effectively addressed safety recommendations 15.013 through 15.019 and consider our actions complete.

The FAA would like to thank the JTSC for submitting FAA Safety Recommendations 15.013 through 15.019 and its continued interest in aviation safety. If you have any questions, or need additional information regarding these safety recommendations, please contact

(Name and Phone Number)

Sincerely,

(Original signed)

Director, Office of Accident Investigation  
And Prevention