

# ALAMEDA-CONTRA COSTA TRANSIT DISTRICT



## STAFF REPORT

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**MEETING DATE:** 4/14/2021

**Staff Report No.** 21-202

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**TO:** AC Transit Board of Directors  
**FROM:** Michael A. Hursh, General Manager  
**SUBJECT:** Report on New Flyer Fuel Cell Bus A123 Battery Failures

### BRIEFING ITEM

#### **RECOMMENDED ACTION(S):**

Consider receiving a report on the New Flyer fuel cell bus A123 battery failures, investigation, and conclusion.

#### **STRATEGIC IMPORTANCE:**

Goal - Convenient and Reliable Service  
Initiative - Zero Emission Programs

This report provides a summary of the results from the high voltage battery system diagnostics performed by the manufacturer on three New Flyer fuel cell buses and corrective actions implemented.

#### **BUDGETARY/FISCAL IMPACT:**

There are no budgetary or fiscal impacts directly related to this report.

#### **BACKGROUND/RATIONALE:**

Since January 2020, the District has been operating ten 2018 New Flyer 40-foot fuel cell buses. These buses were purchased as part the Fuel Cell Electric Bus Commercialization Consortium Deployment (FCEBCCP) project administered by the Center for Transportation and the Environment (CTE) and funded by the California Air Resources Board (CARB). Three of the ten buses experienced repetitive isolation faults in the high voltage battery system which would cause malfunction of the bus and render it out of service. Staff collaborated with New Flyer to report the issues experienced as part of the warranty process. During initial diagnostic attempts the buses were kept out of service for several months, which created a condition causing the high voltage batteries to become unbalanced (a condition when the voltage difference between battery packs is too high).

New Flyer's engineering team worked with the high voltage battery manufacturer A123 to diagnose the battery modules and identify the root cause; however, this became a challenging task leading to long delays. To expedite returning the buses back to revenue service, New Flyer replaced six new battery modules across the three impacted buses. Once the new battery modules were installed, the isolation faults were cleared and did not reoccur, and the buses remained in use for revenue service.

Staff requested an in-depth analysis of the six battery modules experiencing failures and service protocols to

prevent a re-occurrence. In response, New Flyer sent the six battery modules to A123 for root cause analysis. One module was found to have a faulty monitor balance board (MBB) and the other five modules were found to be functional with no signs of isolation issues. The root cause analysis also found evidence of moisture intrusion to the exterior housing of the battery modules.

As a result of the root cause analysis, New Flyer is implementing the following additional solutions:

- Improved communication with additional dedicated technical and engineering support staff assigned to AC Transit.
- Complete secondary sweep for water intrusion or loose electrical connections on the battery electric and fuel cell electric fleet.
- Provide controller area network (CAN) logger and advanced diagnostics training to expedite troubleshooting.
- Maintain stock of battery modules at the Motor Coach Industries (MCI) service center in Hayward, California to improve turnaround time if batteries are needed.
- Improved documentation on A123 battery diagnostics, storage, and operation.

In summary, the overall engineering and design of the A123 high voltage battery system was not found to be faulty, rather a few individual modules experienced issues. As with any new advanced technology deployment, unexpected conditions may arise when buses are placed in service. What makes a tremendous difference, is the level of support and response from the bus manufacturer. New Flyer certainly has been a valuable partner and advocate for AC Transit during this process and continues to provide expeditious support to our team.

**ADVANTAGES/DISADVANTAGES:**

There are no advantages or disadvantages to this report.

**ALTERNATIVES ANALYSIS:**

There is no alternative analysis to this report.

**PRIOR RELEVANT BOARD ACTION/POLICIES:**

Staff Report 17-025 Funding Agreement with Center for Transportation and the Environment for the Fuel Cell Electric Bus Commercialization Consortium Project.

**ATTACHMENTS:**

None

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**Approved/Reviewed by:**

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