RTCA Background on Standards for Lithium Batteries

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RTCA: A Unique Public-Private Partnership

- Revenue Source:
  - Membership Dues
  - Document Sales
  - Training

- Over 400 Members
  - Academia
  - Airports
  - Aviation service providers, repair facilities
  - Government organizations (FAA, DOD, TSA, NASA)
  - Manufacturers (OEMs and after-market)
  - Operators – airlines, general aviation, cargo, DOD
  - Suppliers of automation, infrastructure & avionics
  - Labor – Pilots, Controllers, Dispatchers
  - R&D organizations

Founded in 1935
Incorporated in 1991
RTCA Operates U.S. Federal Advisory Committees

- Chartered by the FAA
- Deliver consensus-based, objective & independent recommendations to FAA
- Membership balanced representation
- Promote transparency, accountability
- Minimum Performance Standards
  - Expands marketplace of solutions
  - Provides anti-trust protection
Special Committees
17 Active: 13 in Partnership with Europe

- Automatic Dependent Surveillance-B
- Aeronautical Information Systems
- Aeronautical System Security
- Air Traffic Data Communications
- Airport Security Access Control
- Airport Surface Wireless Comm
- Audio Systems Equip
- Enhanced Flight Vision Systems
- Environmental Testing
- GPS
- Inmarsat
- Lithium Batteries
- Mode-S Transponders
- Performance-Based Navigation
- Traffic Collision Avoidance Sys
- Aeronautical Databases
- Unmanned Aerial Systems

All are Federal Advisory Committees

Oversight, Guidance, Integration Provided by Program Management Committee (PMC)
Minimum Aviation System Performance Standard (MASPS)

“… specifies characteristics that should be useful to designers, installers, manufacturers, service providers and users of systems intended for operational use within a defined airspace.”

Compliance with a MASPS is recommended as one means of assuring that the system and each subsystem will perform its intended function(s) satisfactorily under conditions normally encountered in routine aeronautical operations for the environments intended.

Example: Automatic Dependent Surveillance-B (ADS-B) Architecture for new satellite technology to replace radar
Minimum Operational Performance Standard (MOPS)

“… provides standards for specific equipment useful to designers, manufacturers, installers and users of the equipment…”

Compliance with MOPS is recommended as one means of assuring the equipment will perform its intended function(s) satisfactorily under all conditions normally encountered in routine aeronautical operations.

Example: Specific requirements for ADS-B aircraft avionics
Documents are recommendations

FAA can implement with reference:

- Regulation
- Advisory Circular
- Technical Standard Order

RTCA DO-260B – FAA TSO-C166b

Adherence to RTCA Standard is one means of compliance
STANDARDS FOR LITHIUM BATTERIES
History of Standards for Batteries

- Standards for nickel-cadmium, nickel-metal hydride & lead acid batteries 07/04
- Issues and questions arose during testing of batteries
  - Storage life, altitude testing, rapid discharge, etc.
- Lithium technology considered mature enough to establish standards in 2006
- Request from FAA to establish SC-211, scope:
  - Update nickel-cadmium lead acid standards
  - Develop standards for rechargeable lithium batteries
- First meeting of SC-211 - 8/06, completed standard 3/08
- Committee referenced other standards organizations
  - ANSI/ASQC, IEC, ISO, UL, EUROCAE
Proper integration of rechargeable lithium battery systems into aviation-related equipment requires cooperation among the battery supplier, aircraft designer, the avionics equipment designer, and the FAA.

Outcome → DO-311, Minimum Operational Performance Standards for Rechargeable Lithium Battery Systems
Broad Stakeholder Participation

Co-Chair William Johnson, Naval Air Systems Command
Co-Chair Hector Silberman, The Boeing Company

1. A123Systems, Inc.
2. ACME Aerospace
3. Aero Quality Sales
4. Aeroflex
5. American Airlines, Inc.
6. Appareo Systems, LLC
7. Astronics AES
8. Aviation Application Engineer
9. Aviation Management Associates
10. Bitrode Corporation
11. Cessna Aircraft Company
12. Concorde Battery Corporation
13. Continental Airlines, Inc.
14. Crane Aerospace & Electronics
15. Davidson Engineering Resources, Inc.
16. EaglePicher Technologies
17. EaglePicher Technologies LLC
18. EaglePicher Technologies, LLC
19. East Penn Manufacturing Co., Inc.
20. EIC Laboratories
22. EnerSys
23. Energy/Hawker GmbH Ltd.
24. Federal Aviation Administration
25. Federal Express Corporation
26. George Mason University
27. GS Yuasa Corporation
28. Gulfstream Aerospace Corporation
29. Honda Aircraft Company, Inc.
30. Lithium Technology Corporation
31. Lux Aviation Engineering
32. Marathon/Norco Aerospace Inc.
33. Modular Ener Devices
34. Quallion
35. RTCA, Inc.
36. Saft America, Inc.
37. Securaplane Technologies
38. Sparrow-Tech Inc.
40. The Boeing Company
41. U. S. Air Force
42. U. S. Army
43. UK – Civil Aviation Authority
44. United Lithium Systems
45. Wiley Rein LLP
DO-311 MOPS in Regulatory Material

- Accepted and invoked by FAA TSO-C-179a

  - “Permanently Installed Rechargeable Lithium Cells, Batteries and Battery Systems.”
    - TSO-179 issued 12/2/2009
    - TSO-C179a, issued 04/19/2011
    - Last Updated 11/20/2012

  “Requirements. New models of permanently installed rechargeable lithium cells, batteries and battery systems manufactured on or after the effective date of this TSO must meet the minimum operating performance standards (MPS) tests based on the intended application defined in the TSO installation manual, in Sections 2 and 3 of RTCA/DO-311, MOPS for Rechargeable Lithium Battery Systems dated March 13, 2008. Refer to Table 4-1 of DI-311 for test schedule.” 04/19/2011
DO-311 Scope

- General
- Safety
- Quality Control
- Storage, Shipping, Disposal
- Design Requirements
- Test Considerations
- Electrical Qualification Requirements & Test Procedures
- Environmental Qualification Requirements & Test Procedures
- Quality Assurance Requirements
DO-311 Content

- Provides guidance on...
  - Design
  - Certification
  - Production
  - Use

- Applications as power sources for:
  - Equipment devices
  - Emergency lighting
  - Engine or APU starting when required

- Applies to:
  - Chemical composition
  - Cell size
  - Cell construction
  - Cell interconnection methods within batteries
  - Venting provisions
  - Ops & storage environments
  - Packaging, handling, test, storage and disposal

...installed separately or in avionics equipment
Copies of RTCA standard DO-311 may be obtained from RTCA, Inc. at http://rtca.membershipsoftware.org/store_product.asp?prodid=1097 or by contacting RTCA at 202-833-9339.
BACKUP
Rechargeable Lithium Batteries – Small & Medium

- SC-225
  - Chair: Boeing
  - 56 Companies participating

- Committee established March 2011

- Certification guidance for small to medium size rechargeable lithium batteries and battery systems that are permanently installed on aircraft

- Anticipated completion in October 2013
Rationale for SC-225

- Standards for non-rechargeable large exist
- Certification guidance for small & medium does not exist.
- The aviation industry is seeing increased use of these small and medium sized rechargeable Lithium batteries in Avionics and Cabin Systems equipment.
- Certification guidance will enable a more efficient and standardized certification approach across the industry.
RTCA Standards re: Batteries

- **DO-311**, MOPS for Rechargeable Lithium Battery Systems
- **DO-293A**, MOPS for Nickel-Cadmium, Nickel Metal-Hydride, and Lead Acid Batteries
- **DO-227**, MOPS for Lithium Batteries
- **DO-188**, Emergency Locator Transmitter (ELT) Batteries Guidance and Recommendations
- **DO-160G**, Environmental Conditions and Test Procedures for Airborne Equipment
SC-225 Member Companies

- A123Systems Inc.
- ACME Aerospace
- Aeroflex Plainview
- Air Line Pilots Association
- Airbus Americas, Inc.
- Airbus Industries
- American Airlines, Inc.
- ANAC-Brazil
- Association of Flight Attendants
- Astronics AES
- BAE Systems Controls
- Bell Helicopter Textron Canada
- Beyond the Edge
- Bitrode Corporation
- CARERI
- Cessna Aircraft Company
- Concorde Battery Corporation
- Crane Aerospace & Electronics
- Day-Ray Products, Inc.
- DME Corporation
- EaglePicher Technologies LLC
- EIC Laboratories
- EMBRAER
- EnerSys
- European Aviation Safety Agency
- Federal Aviation Administration
- FedEx Express
- Gogo LLC

- GS Yuasa Corporation
- Gulfstream Aerospace Corporation
- Honda Aircraft Company, Inc.
- International Communications Group
- Intertek Testing Services NA
- JSR Micro Inc.
- L-3 Communications
- Marathon/Norco Aerospace Inc.
- Mid-Continental Instruments
- Mobile Power Solutions
- NASA
- National Fire Protection Association
- NSWG Carderock
- Overlook Consulting, Inc.
- Panacis
- Panasonic Avionics Corporation
- PRBA - The Rechargeable Battery Association
- RTCA, Inc.
- Saft America, Inc.
- Securaplane Technologies
- Teledyne Controls Division
- TES Electronic Solutions
- The Boeing Company
- Thompson Aerospace
- Transport Canada
- U.S. Army
- Universal Avionics Systems Corp.
Updating Standards, Creating New Standards

Requests from FAA or industry

Drivers:
- Experience using standard or operating equipment
- Forecasted change in airspace environment (NextGen)
- New, improved technology
- International activity

Threshold to start activity
- Minimum of 3 companies
- FAA intention to reference
- Critical mass of participants