ATA e-Business Program

RFID Update

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ATA e-Business Program

- International standards program for information exchange to support engineering, maintenance, materiel management and flight operations.
- Open membership
  - 120 companies in 33 countries
  - Over 800 active individual participants
- Neutral, consensus-based
- Collaborative web site: [www.ataebiz.org](http://www.ataebiz.org) for documents, balloting, calendars, email
Functional / Lifecycle Scope

- **Design**
  - Configuration Management
  - Maintenance Planning
  - Maintenance Procedures
  - Part Identification, Traceability, RFID
  - Initial Provisioning
  - Delivery Config
  - Reliability Data
  - Industry Performance Metrics
  - Supply Chain Mgmt/e-Procurement/Repair Order Admin/Warranty
  - Electronic Regulatory Documentation
  - Aviation Marketplace
  - Electronic Aircraft Logbook
  - Flight Operations Data/MMEL Data
  - Electronic Aircraft Transfer Records
  - Digital Data Security

- **Production**
- **Operation**
- **Maintenance**

ATA, AIA, ASD Collaboration (S1000D)

Spec 2000
iSpec 2200/S1000D
Spec 42
Spec 2300
In Development
Spec 2000

- Automated Identification (ch. 9)
  - Bar-coded shipping/receiving labels
  - Permanent parts ID (bar-code, data matrix)
  - RFID on parts
  - Part Traceability
Chapter 9-5 Defines:
1. RFID tag data format structure, and
2. Business data content

1. **Tag Data Format** – ensures the readability of data on the tag
   - Flexible design for a variety of tag memory sizes and business needs
     - Data Centric
     - Single-Record, Dual-Record and Multi-Record tag types
     - Could be used for non-part items such as GSE and tools

2. **Business Data Content** – ensures the consistency & of value to the users
   - Covers:
     1. Part identification data (a richer set of data than barcode), and
     2. Part lifecycle/Maintenance data (unlike barcode and nameplate)
RFID Tag Data at a Glance

Aerospace & Defense Identifier (ADI)
- Globally unique license plate number,
- Can co-exist with other UHF RFID tagged items

UHF RFID Tag Memory Organization

- MB 00b: Reserved Memory
- MB 01b: EPC Memory
- MB 10b: TID Memory
- MB 11b: User Memory

Multi-Record Tag
- Part History Record
- Full Birth Record
- Scratchpad Record
- Current Data Record

Dual-Record Tag
- Birth Record
- Lifecycle Record

Single Record Tags
- Birth Record: Non-Rewriteable
- Utility Record: Rewriteable
Business Data Content

• **Part Identification Data**
  - Basic elements
    - Manufacture identifier (or supplier code), Part Number, Serial Number (or UID Construct Number), Lot Number, Manufacture date, ...
  - Extended elements
    - Weight, Hazardous Code, FAA 8130-3/EASA Form-1 Doc #, ...

• **Part Lifecycle/Maintenance Data**
  - Lifecycle elements
    - Part condition, Expiry date, Hydrostatics test date, modification level, current part number, aircraft location, ...
  - Maintenance elements
    - Action: Installed, Removed, Overhauled, Repaired, Modified, ...
    - Action date: YYYYMMDD
    - Action company: Company identifier (CAGE code)
    - Remarks: free text
## EPC header

### Table 9-5.3 EPC Format for Aerospace and Defense

<table>
<thead>
<tr>
<th>EPC Header</th>
<th>Filter Value</th>
<th>Manager number CAGE/DoDAAC</th>
<th>Original Part Number (PNC)</th>
<th>Delimiter</th>
<th>Alphanumeric Serial Number (SEQ or SER)</th>
<th>Terminator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed 8-bit value as assigned by GS1 EPC to prevent collisions with other EPC 0011 1011</td>
<td>See Filter Value sections below</td>
<td>6-character DoDAAC, or space followed by 5-character CAGE</td>
<td>0 to 32 characters</td>
<td>00 0000</td>
<td>Up to 30 characters</td>
<td>00 0000</td>
</tr>
</tbody>
</table>
EPC filter values (v2016)

<table>
<thead>
<tr>
<th>Type</th>
<th>Filter Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Others (see Section 10.1 of [tds])</td>
<td>0</td>
</tr>
<tr>
<td>Item, other than an item to which filter values 8 through 63 apply</td>
<td>1</td>
</tr>
<tr>
<td>Carton (see Section 10.1 of [tds])</td>
<td>2</td>
</tr>
<tr>
<td>Reserved (see Section 10.1 of [tds])</td>
<td>3 thru 5</td>
</tr>
<tr>
<td>Pallet (see Section 10.1 of [tds])</td>
<td>6</td>
</tr>
<tr>
<td>Reserved (see Section 10.1 of [tds])</td>
<td>7</td>
</tr>
<tr>
<td>Seat cushions</td>
<td>8</td>
</tr>
<tr>
<td>Seat covers</td>
<td>9</td>
</tr>
<tr>
<td>Seat belts</td>
<td>10</td>
</tr>
<tr>
<td>Galley, Galley carts and other Galley Service Equipment</td>
<td>11</td>
</tr>
<tr>
<td>Unit Load Devices, cargo containers</td>
<td>12</td>
</tr>
<tr>
<td>Aircraft Security items (life vest boxes, rear lav walls, lav ceiling access hatches)</td>
<td>13</td>
</tr>
<tr>
<td>Life vests</td>
<td>14</td>
</tr>
<tr>
<td>Oxygen generators</td>
<td>15</td>
</tr>
<tr>
<td>Engine components</td>
<td>16</td>
</tr>
<tr>
<td>Avionics</td>
<td>17</td>
</tr>
<tr>
<td>Experimental (“flight test”) equipment</td>
<td>18</td>
</tr>
<tr>
<td>Other emergency equipment</td>
<td>19</td>
</tr>
<tr>
<td>Other rotables; e.g., line or base replaceable</td>
<td>20</td>
</tr>
<tr>
<td>Other repairable</td>
<td>21</td>
</tr>
<tr>
<td>Other cabin interior</td>
<td>22</td>
</tr>
<tr>
<td>Other repair (exclude component); e.g., structure item repair</td>
<td>23</td>
</tr>
<tr>
<td>Passenger Seats (structure)</td>
<td>24</td>
</tr>
<tr>
<td>IFEs (In-Flight Entertainment) Systems</td>
<td>25</td>
</tr>
<tr>
<td>Reserved for future use</td>
<td>26 thru 55</td>
</tr>
<tr>
<td>Location Identifier (1)</td>
<td>56</td>
</tr>
<tr>
<td>Documentation</td>
<td>57</td>
</tr>
<tr>
<td>Tools</td>
<td>58</td>
</tr>
<tr>
<td>Ground Support Equipment</td>
<td>59</td>
</tr>
<tr>
<td>Other Non-flyable equipment</td>
<td>60</td>
</tr>
<tr>
<td>Reserved for internal company use</td>
<td>61 thru 63</td>
</tr>
</tbody>
</table>
Birth Record Multi-record (v2016)

- Manufacturer / Supplier
- Serial Number
- Original Part Number
- Description
- Manufacture Date
- Weight
- ESD Indicator
- Shelf Life
- LLP Indicator
- Lot Number
- Country of MFR
- Export Control
- Software Indicator
- Original ARC
- Mod Level
- NATO Stock Number
- Fabricator
- Commodity Code
Current Data record (v2016)

- Rewriteable, but supported with data in archival part history records
- Current Part Number
- Airline Part Number
- Location on Aircraft
- Current Modification Level
- Expiration Date
- Additional HAZ code
- Owner Code
- Condition Code
- ARC Reference
Scratchpad record

- Open text comments
- Identifies company, date and then allows various “TEIs” (tags) to identify the type of comment
Part History Record

- Meant to archive key events in a component’s lifecycle
- Always identifies date, company and an action code such as:
  - Installed
  - Removed
  - Overhauled
  - Repaired
  - Modified
  - Exchanged
  - Tested
  - Serviced
  - Inspected
  - Shipped
2016 Specification Update

- Added new single record birth tag
- Added new single record utility tag
- Updated EPC filter values
- Clarified and corrects from TOC requirements
- Added tag type to TOC
- Added tag correction and replacement process
- Modified some business rules
- Added Conformance methods and table
Interoperability

- For the OEM parts that are tagged by the OEMs, how does one ensure that these tags are readable by downstream operators?

- When an airline received a new airplane with many tagged parts installed, can the airline read the tag data from all the tags? What about updating data to these tags?

- These will require the tag and the data are compliant to the following two standards:

  1. **GS1 EPC Class 1 Gen 2, or ISO/IEC 18000-6C**, for interface between tags and readers for retrieving data from the tag or writing to it, and

  2. **Spec 2000 Chapter 9-5**, for encoding and decoding of the data on the tag to obtain the part identification and other user data, e.g. MFR, PNR, SER in an ATA Birth Record.
Conformance

- Ensure tag data is compliant to Spec 2000 – data is readable by downstream users/operators
- Provides standard list of tests that can help confirm that tags conform to the specification
- Address one aspect of interoperability
- ATA doesn’t provide compliance certification testing, but will partner with 3rd party, e.g. Auburn University RFID lab.
<table>
<thead>
<tr>
<th>Item</th>
<th>Subclause</th>
<th>Focus Area</th>
<th>Requirement</th>
<th>Validation process</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.5.3.1</td>
<td>ATA Record</td>
<td>In the case of the Single-Record Tag, the Null terminator must be included, unless the end of the record coincides with the end of ATA Memory.</td>
<td>If the ATA record ends with space for at least one character remaining before word boundary, 1) Check the last character of ATA record 2) If the last character is a single Null character and the field delimiter is not present at the location - Verified, otherwise - Not verified</td>
</tr>
<tr>
<td>21</td>
<td>2.5.3.1</td>
<td></td>
<td>ATA records shall be encoded in their entirety, including the delimiters and terminator, using either 6-bit or 8-bit ASCII encoding as defined in Appendix A13.</td>
<td>1) Decode all characters of the record using definitions in Appendix A13 2) All characters can be decoded - Verified, otherwise - Not verified</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>SRT</th>
<th>DRT</th>
<th>MRT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BR</td>
<td>UR</td>
<td>BR</td>
</tr>
<tr>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

**Conformance Sample**
## Conformance Sample

### Table A24-2

<table>
<thead>
<tr>
<th>Area</th>
<th>Requirement</th>
<th>Validation process</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICR</td>
<td>Therefore, at the time tags are commissioned or when the birth record is</td>
<td>1) Read or Change the kill password</td>
</tr>
<tr>
<td></td>
<td>written, the kill password must be permanently write-locked. A zero-valued</td>
<td>2) If the commands failed - Verified, otherwise - Not verified</td>
</tr>
<tr>
<td></td>
<td>kill password when locked will result in a tag that can never be killed.</td>
<td></td>
</tr>
<tr>
<td>Access control</td>
<td>Since the tags described in this specification are meant for exchange of</td>
<td>1) Read or Change the access password</td>
</tr>
<tr>
<td></td>
<td>information between companies throughout the industry, Access passwords</td>
<td>2) If the commands failed - Verified, otherwise - Not verified</td>
</tr>
<tr>
<td></td>
<td>should not be used. If a tag does support the access password, at the time</td>
<td></td>
</tr>
<tr>
<td></td>
<td>tags are commissioned or when the birth record is written, the access</td>
<td></td>
</tr>
<tr>
<td></td>
<td>password will result in a tag that can never be killed.</td>
<td></td>
</tr>
<tr>
<td>AIT tag</td>
<td>An AIT tag used for Aerospace or Defense purposes and in accordance with</td>
<td>1) Parse the EPC memory contents per [Tdsl] for the ADI FPC.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>SRT</th>
<th>DRT</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BR</td>
<td>UR</td>
<td>BR</td>
<td>LCR</td>
<td>BR</td>
<td>CD</td>
</tr>
<tr>
<td>-------</td>
<td>-----</td>
<td>-----</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
Next Steps

- ATA e-Business, IATA, Boeing, Airbus meeting to plan not for profit Interoperability testing facilitated by Auburn University RFID Lab

- Update Specification for some carry over items
  - Improved instruction on tag replacement
  - Any reported issues, clean up

- Possibly extend conformance to interoperability testing
Questions

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