Progress on Developing Radio Frequency Identification within Commercial Aviation

Kenneth D. Porad

Associate Technical Fellow

The Boeing Company

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Heritage Part Marking Requirements

- Requires a standard format for <u>Automated Identification and Data Capture</u> (SPEC 2000 chapter 9)

  - Developed by industry task force

  - Uses bar code technology to enhance data collection

- Provides a common tracking ID using part number, serial number, and manufacturer code

- Allows the industry to take the next step of sharing the databases that contain product history information (SPEC 2000 chapter 11)

Rockwell Collins Sample
Bar Coded Nameplate

FLIGHT CONTROL COMPUTER
TYPE NO. FCC-702   WT 23.6 LB
BOEING SCD S241T100-___

COLLINS PNR 622-8757-___

Collins Air Transport Division/Rockwell International
Cedar Rapids, Iowa 52498-0001 USA

MFR 4V792

SER 999999   MFR DATE 9501

MODS

Benefits of Automated Identification for Commercial Aviation

Customer and Supplier Benefits

- reduces inventory control and provisioning costs
- accurate configuration control and repair history
- reduces warranty claim processing costs
- regulatory agency compliance monitoring
- part installation and removal time tracking
- accurate and efficient spare parts pooling
- identification of rogue parts
- accurate flight hours tracking by part

Boeing and Airbus Benefits

- reduces parts receiving costs
- eliminates data entry errors
- provides accurate "as delivered" configuration
- improves parts traceability
- reduces risk of unapproved parts
- timely in-service problem resolution
- accurate and efficient spare parts pooling
- improves customer satisfaction

By working together on these non-competitive standards initiatives, both Boeing and Airbus benefit by avoiding conflicting requirements with mutual suppliers and customers and delivering products and services which create best value.

Automated Identification and Data Capture In Practice

Boeing Operations/
QA data

Schedule interruptions,
flight hours & landings

Single, user-friendly, electronic resource

Logbook complaint created

Component removal
occurs

Shop repair activity
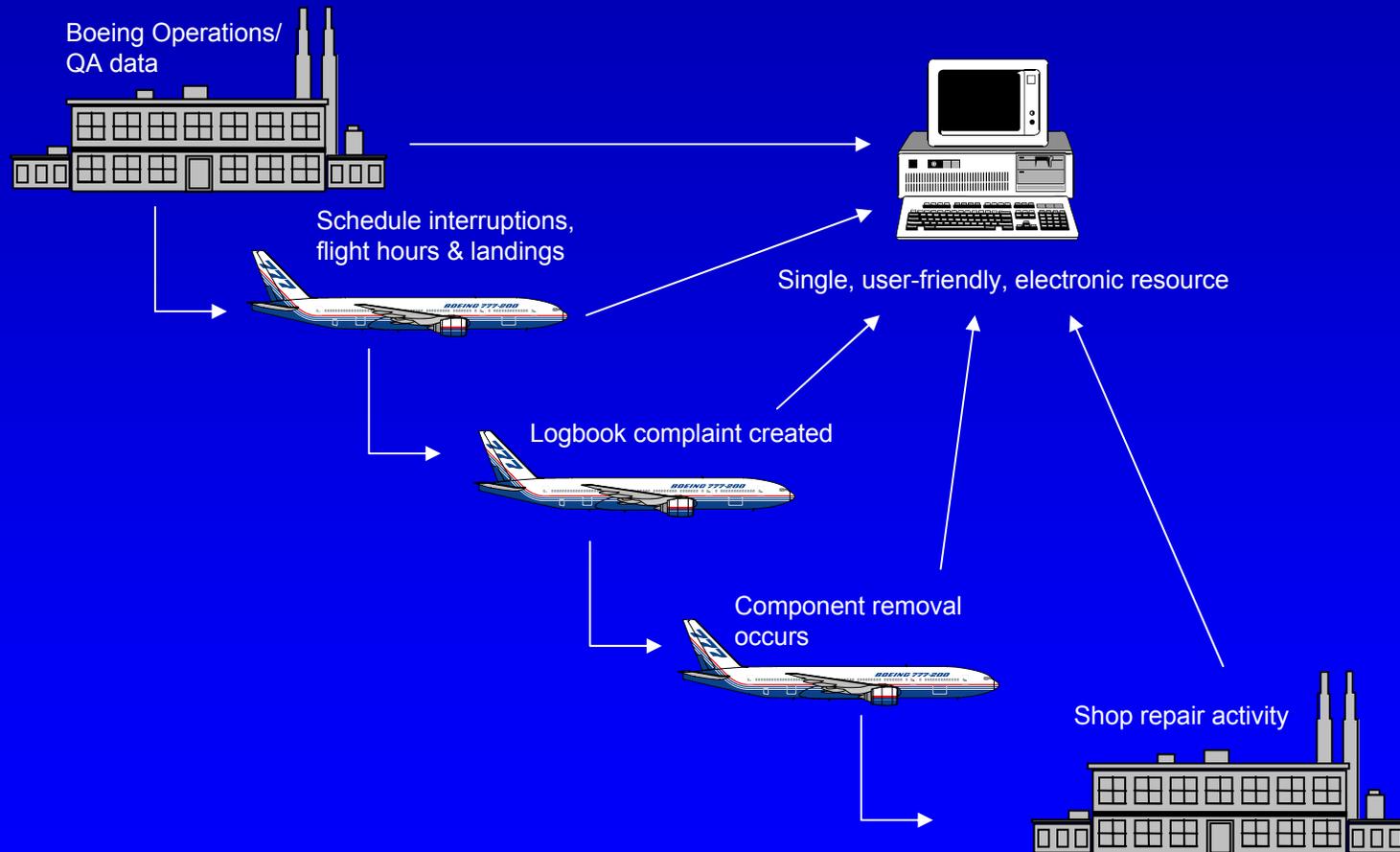
Initial Considerations for Deploying Machine-readable Technology on the 787

- Line replaceable

- Repairable

- Recommended as a spare

- Frequency of removal

- Spares price

- Dispatch criticality

- Life-limited or time-controlled part

- Emergency equipment

We Have Received Broad Airline Interest

Northwest Airlines

Trans World Airlines

FedEx

British Airways

Scandinavian Airlines System

All Nippon Airways

Japan Airlines

United Airlines

Lufthansa

Air France

American Airlines

US Airways

Cathay Pacific Airways

Southwest Airlines

Delta Air Lines

Qantas Airways

Continental Airlines

Boeing Position on Passive RFID

Because passive RFID devices:

(1) Have no on-tag power source and no active transmitter, and

(2) perform a ground operated, non-essential function, and

(3) are not potential sources of interference or susceptibility, and

(4) are FCC-certified for unlicensed use.

The FAA and EASA have agreed that passive RFID devices comply with applicable regulations and do not impact form, fit, or function of installed systems and equipment.

RFID Proof of Concept with FedEx

- RFID tag installation completed October 3, 2003 during freighter conversion by Aeronavali (Venice, Italy).

- Test aircraft, MD-10 (N370FE), returned to revenue service on November 12, 2003.

- Infineon 13.56 MHz passive tags were tested – scope was 40 installations covering all major aircraft zones.

- Duration of RFID test was 90 days in-service.

- FedEx Engineering Authorization 8-1130-67451 indicated minor alteration does not alter form, fit or function of components.

Objectives of the Evaluation

- Identify potential electromagnetic interference and detrimental environmental effects.

- Evaluate the integrity of the data (the ability to read and write data to the smart label during each scheduled inspection).

- Evaluate the integrity of the application (adhesion of the smart label to the part).

- Allow for the assessment of the concept and suitability for widespread use in the FedEx fleet.

# FedEx MD-10 N370FE

Annunciator Control Unit

Air Data Inertial Reference Unit

Flap Limit Duplex Actuator Unit
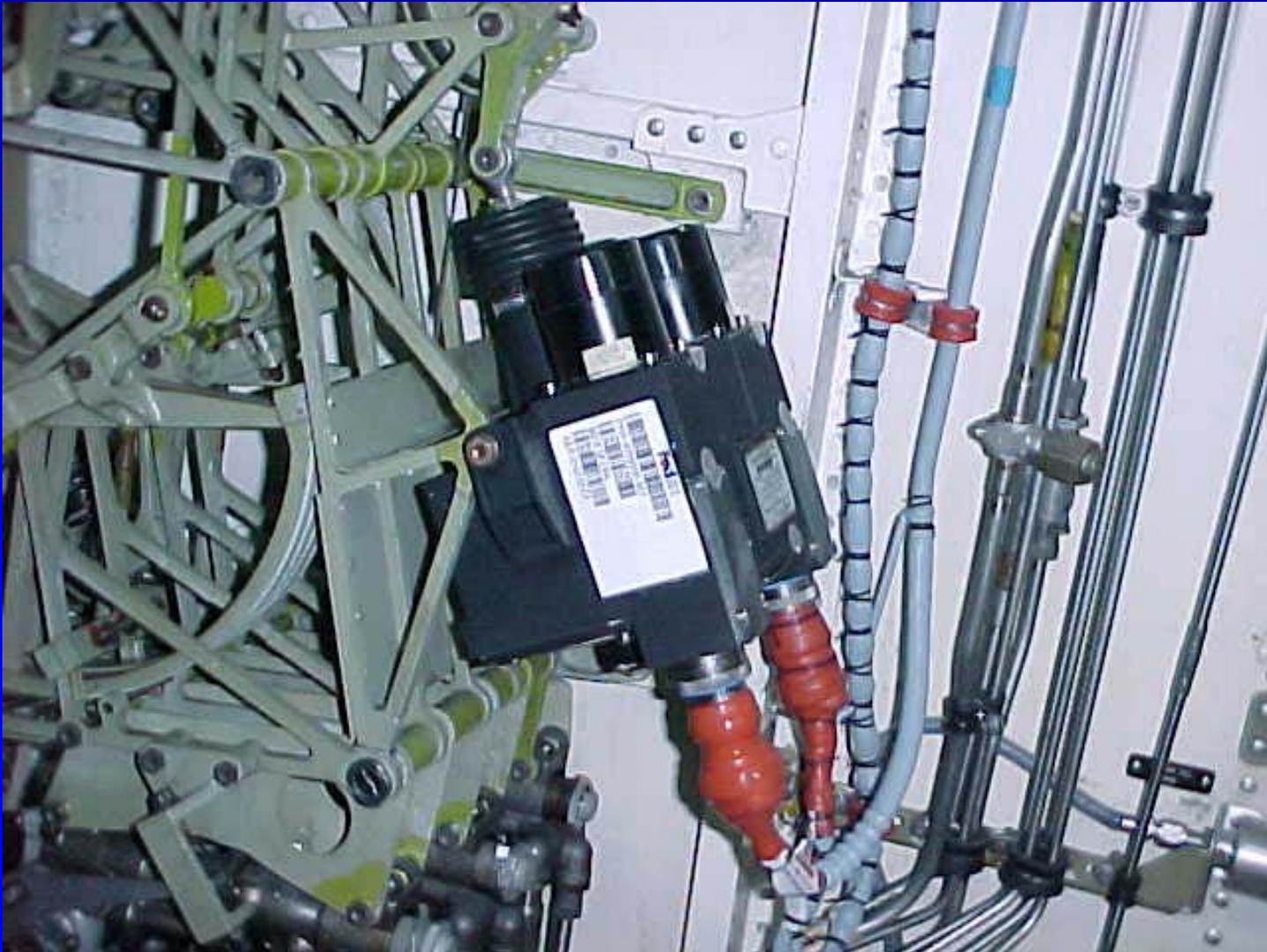
Smoke Detector
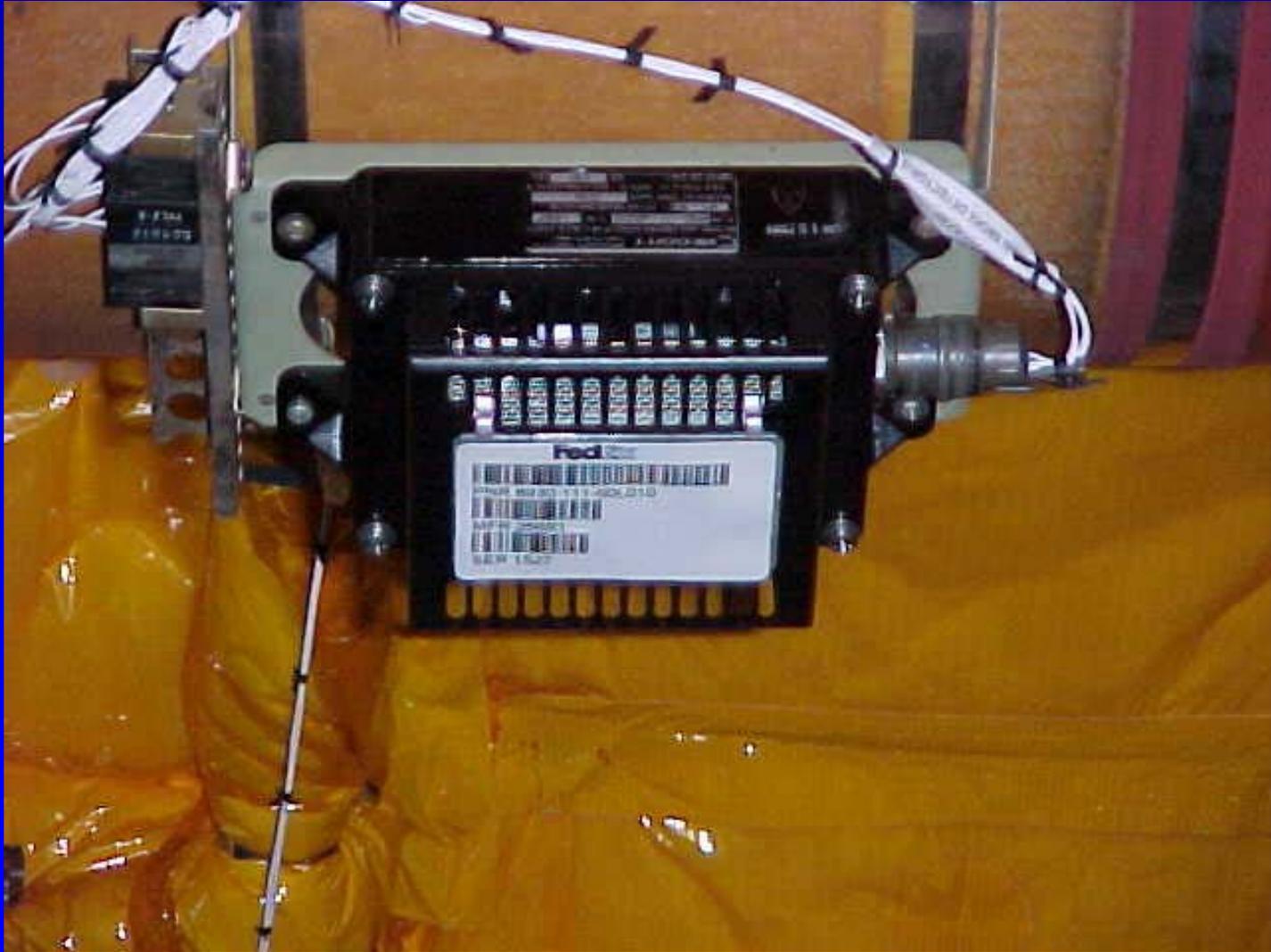
Auxiliary Hydraulic Pump
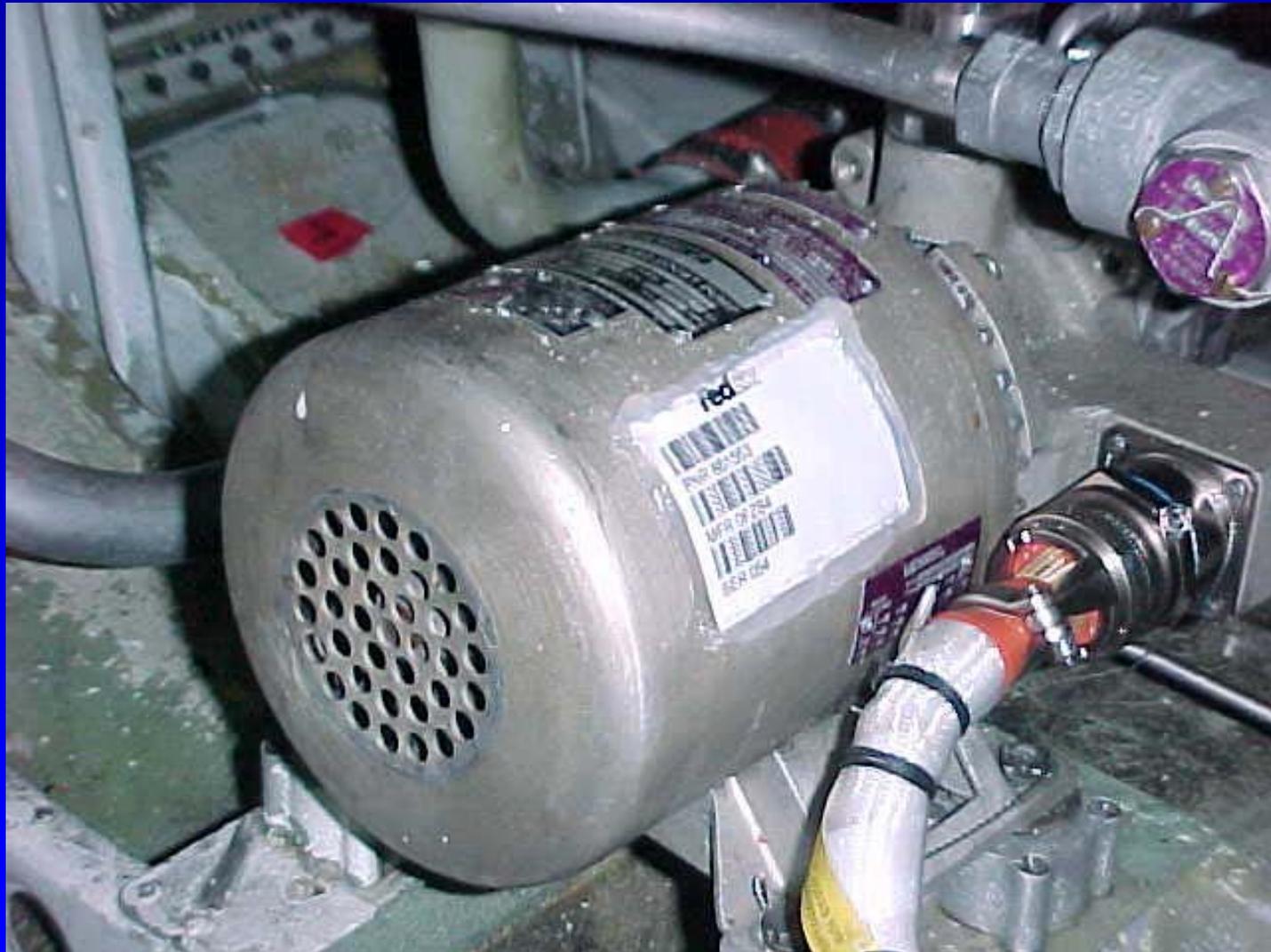
Hand Held Portable Data Terminal

Findings of Evaluation

- There were no reported detrimental environmental effects and no suspected electromagnetic interference from the installed smart labels.

NEWS RELEASE: Boeing Introduces Radio Frequency Identification on 787 Dreamliner

SEATTLE, Oct. 3, 2005 -- Boeing [NYSE: BA] announced plans to introduce radio frequency identification (RFID) "smart labels" on maintenance-significant parts of the 787 Dreamliner. RFID technology will improve configuration control and help airlines reduce costs by managing part maintenance and repair histories.

"Boeing customers are eager to take advantage of automated identification technology, especially the capabilities and benefits of RFID," said Mike Bair, 787 vice president and general manager. "Introducing this advancement on our newest airplane makes good sense."

RFID is an automated identification technology that uses radio frequency waves to transfer data between a reader and items that have RFID devices affixed. The "smart labels" contain a microchip and antenna and operate at internationally recognized standard frequencies. Similar to a bar code, the RFID tag stores data but offers enhanced data collection and significant advantages such as being able to read without a direct view of the RFID label and a dynamic read/write capability.

"Information stored on the RFID tag will enhance parts traceability and reduce cycle time to solve in-service problems by improving the accuracy of information exchanged between customers and suppliers," said Lou Mancini, vice president and general manager of Boeing Commercial Aviation Services.

Boeing plans for the tags to contain unique identification as well as maintenance and inspection data in accordance with industry standards developed for commercial aviation by the Air Transport Association. Typical Dreamliner parts to incorporate RFID smart labels will be serialized end items such as line replaceable units (LRUs) and life-limited parts as well as on-board emergency equipment. Smart labels will be applied during the manufacturing process by the responsible systems and equipment supplier prior to delivering the airplane to airlines.

The FAA published RFID policy in May 2005 which states that passive RFIDs -- transponders that do not have a dedicated power supply and derive their operating power from the reader -- pose no safety risk and are acceptable for use on civil aircraft under specified conditions.

Boeing has successfully completed two in-service evaluations of passive RFID smart labels on a FedEx MD-10 Freighter. The tests showed that passive RFID devices do not adversely affect the simultaneous operation of any aircraft systems or interfere with continued safety of flight.

BCA RFID Focus Areas

- Shipping labels and packing slips to support commercial airplane production and spares delivery.

- Permanent airplane parts identification utilizing smart labels.

- Totally integrated automation of our airplane final assembly process.

- New after-market products and services.

UHF Smart Label Key Requirements for On-airplane Parts Marking

- Passive, reader talk first protocol

- 860 - 960 MHz frequency range

- Read/write secure memory

- Complies with ATA SPEC 2000 Chapter 9

- Environmental tests per DO 160E requirements

- Air Interface in accordance with ISO 18000-6C

- Metal mount, surface insensitive packaging

- 10 year service life

- Complies with FAA policy dated May 13, 2005

Examples of Data Elements for On-airplane RFID

- Part number

- Serial number

- Manufacturer

- Date of manufacture

- Country of origin

- Modification level

- Weight

- Part description/nomenclature

- Lot number

- Hazard material code

- Electrostatic sensitive device indication…

Accomplishments to Date

- Passive RFID in-service evaluations with FedEx completed

- Global Aviation RFID Forums (four events completed)

- FAA Policy authorizing passive RFID usage issued May 13, 2005

- UHF smart label requirements defined for on-airplane use

- Airplane Level Study 781 completed (weight, cost, etc.)

- 787 Planning Directive released

- Began EPC Global standards activities

- Cambridge University Aero – ID Research Program member

Planned Next Steps

- Data synchronization effort with Cambridge University

- Supplier education forums

- Complete RFID smart label development

- Airline education forums

- Service ready plan for RFID on 787

- Finalize certification plan for RFID on 787

- Finalize ATA SPEC 2000 data content

- Active tag in-service evaluation