NATIONAL TRANSPORTATION SAFETY BOARD
OFFICE OF AVIATION SAFETY
WASHINGTON, D.C. 20594

October 4, 2011

Maintenance Records Factual Report

A. ACCIDENT: DCA11IA015

LOCATION: Jackson Hole, Wyoming

DATE/TIME: December 29, 2010, 11:38 p.m. MT

AIRCRAFT: Boeing 757-200, N668AA (5CS), S/N 25333

B. GROUP MEMBERS:

Group Chairman: Pocholo Cruz
National Transportation Safety Board
Washington, DC

Member: Pedro Mari
Transport Workers Union
Tulsa, Oklahoma

Member: Shannon Hankins
Airline Pilots Association
Tulsa, Oklahoma

C: SUMMARY

On December 29, 2010, at approximately 11:38 a.m. mountain standard time, American Airlines flight 2253, a Boeing 757-200, registration N668AA, overran runway 19 upon landing at Jackson Hole Airport (KJAC), Jackson Hole, Wyoming. The airplane came to rest approximately 730 feet past the end of the runway in deep snow. There were no injuries to the 179 passengers and 6 crew members on board and the airplane received minor damage. The 14 Code of Federal Regulations Part 121 regularly scheduled passenger flight had originated from Chicago O'Hare International Airport, Chicago, Illinois.

D: DETAILS OF THE INVESTIGATION

1.0 Air Carrier Certificates

American Airlines Incorporated, DFW Airport, Texas, Certificate Number AALA025, was originally issued by the Federal Aviation Administration (FAA) Dallas Flight Standards District Office (FSDO), Southwest Region on December 1, 1988.

See Attachment 1 for further information.

2.0 Operations Specifications (OpSpecs)[1]

American Airlines, Inc. has a Part 121 Certificate, which included the standards, terms, conditions, and limitations contained in the FAA approved Operations Specifications (Parts D and E) were reviewed.

(a) Air carrier was authorized as a 14CFR Part 121 operation.

(b) Per section D072 of the OpSpecs, the Continuous Airworthiness Maintenance Program (CAMP) authorized American Airlines, Inc. to use the manufacturer/American Airlines Inc. maintenance and engine maintenance programs to maintain the airplanes.

(c) Per section D074 of the OpSpecs, the operator is authorized to use a maintenance reliability program.

(d) Per section D076 of the OpSpecs, American Airlines, Inc. was authorized to escalate scheduled maintenance intervals, on a short-term basis, for check packages, check package individual line items, or component time-change/task intervals on their fleet.

[1] Operations Specifications contains the authorizations, limitations, and certain procedures under which each kind of operation, if applicable, is to be conducted by the certificate holder.

(e) Per section D085 of the OpSpecs, American Airlines, Inc. had the following airplanes in its fleet A300-B4605R (10), 737-823 (153), 757-223 (124), 767-323 (73), 777-223 (47), DC-9 (282) and F-28-MK0100 (4).

(f) Per section D090 of the OpSpecs, American Airlines, Inc. was authorized to utilize CASE[2] as a means of qualifying a vendor for services, parts, and materials to satisfy the requirements of 14 CFR Section 121.373.

(g) Per section D091 of the OpSpecs, American Airlines, Inc. was authorized to make arrangements with other organizations to perform substantial maintenance.

(h) Per section D095 of the OpSpecs, American Airlines, Inc. was authorized to use an approved Minimum Equipment List (MEL).

(i) Per section D097 of the OpSpecs, American Airlines, Inc. had an approved repair assessment program incorporated into the continuous airworthiness maintenance program.

(j) Per section D485 of the OpSpecs, American Airlines, Inc. had an Aging Aircraft Inspection and Records Review. N668AA was below the threshold for the record reporting.

(k) Per section E096 of the OpSpecs, American Airlines, Inc. was authorized for a Weight and Balance Program.

3.0 Aircraft Information

The airplane was manufactured by the Boeing Company in June 10, 1992. American Airlines, Inc. put the aircraft onto their certificate on June 10, 1992. The airplane had 58,879 total hours with 20,518 total cycles at the time of the incident.

The airplane was equipped with two Rolls Royce turbofan engines and a Honeywell Auxiliary Power Unit. The engines and APU had accumulated the following operating times at the time of the accident:

[2] The Air Carriers section of the Nonprofit Coordinating Agency for Supplier Evaluations (C.A.S.E.) was organized as a means of sharing non-prejudicial supplier quality approval data among the membership airlines. This increases surveillance coverage of suppliers and thereby upgrades their quality programs. It also has an economic impact on each C.A.S.E. member by decreasing the cost of supplier surveillance and making their surveillance programs more effective.

Table 1 – Engine and APU Information

		No.1Engine	No.2 Engine	APU
Manufacturer		Rolls Royce	Rolls Royce	Honeywell
Part Number		RB211-535E4-B-37/21	RB211-535E4-B-37/21	3800298-1-4
Manufacture Date		5/12/95	4/24/94	10/4/90 (new)
Date Installed		8/17/10	4/24/07	3/12/10
Serial Number		31,369	31,252	P-1561
Location of Engine /APU Installation		DFW	MIA	TUL
Total Time (engine/APU hours) at installation		44,227	37,757	48,901
Total Cycles (engine/APU cycles) at installation		15,094	13,019	20,517
Total Time of Airframe during engine/APU installation (hours)		57,902	47,785	56,474
Total Cycles of Airframe during engine/APU installation		20,181	16,674	19,698
Time Since Overhaul (hours)		4,385	17,370	2,405
Hours since last installation (cycles)		978 (337)	6,041 (3,844)	2,405 (1,092)
Total Time in hours and (Cycles) as of 12/29/2010		45,204 (15,431)	48,851 (16,863)	51,307 (21,609)

4.0 Engineering Specification Manual

Fixed Interval Scheduling (FIS) is a scheduling tool that optimizes average maintenance check yield. It does so by allowing up to 10% of loss yield from a previous check to be recaptured at any subsequent check. Individual maintenance tasks packaged within a check will not exceed their threshold limits. Averaged repetitive check intervals will never exceed the check interval limit, nor will any two subsequent checks exceed 110% of the check limit. FIS may not be applied if there is no prior loss of yield.

FIS introduces a 10% window of opportunity before the check limit. Check limits are depicted as waypoints in fixed interval scheduling. For example, a check with a limit of 1200 flight hours has waypoints spaced at 1200 flight hour intervals with a window of opportunity of 120 flight hours (10% of 1200 flight hours) prior to each waypoint. When a maintenance check is accomplished within this window, the next check may be accomplished up to the full interval from the current waypoint, plus up to 10% of the check interval in lost yield. Unredeemed yield (up to the 10% limit) may be rolled to subsequent checks. (Refer to EXAMPLE 1: The 1200 flight hour check was accomplished within the FIS window of opportunity at 100 flight hours prior to the waypoint; therefore, the

subsequent check's waypoint does not move. The subsequent check must be accomplished within 1300 flight hours.)

Checks may never exceed the fixed interval waypoints. If a maintenance check is accomplished before the FIS window (10% of the check interval), the waypoints for subsequent checks are moved to the left (advanced) by any loss of yield that exceeds the 10% limit. This practice ensures that the average number of hours between checks does not exceed the fixed interval check limit. (Refer to EXAMPLE 2: The 1200 flight hour check was accomplished 60 flight hours prior to the FIS window threshold (180 flight hours prior to the waypoint); therefore, up to 120 flight hours (10%) of the loss yield may be recaptured at a subsequent check. Any amount in excess of that (60 flight hours, in this example) becomes a permanent loss in yield, and subsequent waypoints must be recalculated accordingly (i.e., moved to the left).

Airworthiness Directives and Manufacturer Service Bulletin compliance were written into the program when applicable. Additionally, all Zonal and Structural tasks were written into American Airlines, Inc. maintenance program.

Maintenance Frequencies

Periodic Service (PS) – accomplished at a maximum interval of 50 flight hours.

A Check (A) – accomplished at a maximum interval of 85 flight hours. The A Check fulfills the PS interval requirement.

B Check (B) – accomplished at a maximum interval of 500 flight hour plus 50 day FIS intervals. Accomplishment of a B check fulfills the interval requirements of the A check and PS check.

C Check (C) - accomplished at a maximum interval of 6,000 flight hours or 18 Month (plus 54 day FIS) intervals.

Heavy Check (HC) - accomplished at a maximum interval of 24,000 FH plus 219 day FIS or 72 month intervals, whichever occurs first.

The following is a listing of the previous inspections accomplished on airplane N668AA.

Table 2 – Maintenance Checks

Maintenance Check	Date	Location	Total Time	Total Cycles
Periodic Service	12/26/10	DFW	58,875	20,516
A Check	12/20/10	DFW	58,847	20,506
Landing Gear Change	11/24/10	TUL	58,735	20,468
B Check	10/17/10	DFW	58,415	20,351
Light C Check	3/13/10	TUL	56,474	19,698
Heavy C Check	8/31/05	TUL	42,774	14,910

5.0 Continuing Analysis and Surveillance System (CASS)[3]

American Airlines, Inc. conducts daily meetings to review the previous day's maintenance discrepancies on the fleet. The CASS is an approved program by the FAA. The program was in place to ensure the adequacy of the maintenance programs and to confirm the programs were properly followed and controlled. The meeting is held quarterly with the FAA but American Airlines, Inc. holds internal CASS meetings every 3rd Wednesday of the month.

In addition, American Airlines, Inc. conducted monthly reliability meetings. The reliability report covered the preceding month's activity. The report was a statistical analysis of maintenance data collected from the following sources: (1) Departure delays; (2) Flight cancellations; (3) Pilot reports. The FAA Principal Maintenance Inspector or representative's attended the meetings scheduled every other month.

6.0 Minimum Equipment List (MEL)[4]

American Airlines, Inc. was authorized to use an approved MEL on its 757-223 airplanes per its OpSpecs. At the time of the incident, there were no open MEL items and two open Non Essential Furnishings (NEF) items in the airplane logbook related to Passenger Cabin Interior Trim.

See Attachment 2 for further information.

[3] As established by 14 CFR Part 121.373, each certificate holder shall establish and maintain a system for the continuing analysis and surveillance of the performance and effectiveness of its inspection program and the program covering other maintenance, preventative maintenance and alterations and for the correction of any deficiency in those programs, regardless of whether those programs are carried out by the certificate holder or by another person.

[4] The FAA approved Minimum Equipment List contains a list of equipment and instruments that may be inoperative on a specific aircraft for continuing flight beyond a terminal point.

7.0 Supplemental Type Certificates (STC)[5]

Supplemental Type Certificates (STC), supplied by the air carrier, were reviewed. A total of 13 STCs were documented by the operator for the airplane.

> STC ST01518SE, dated March 25, 2005, Modification of wing structure, installation of a wing transition plug, blended winglets, and a speed brake load alleviation system per Aviation Partners Boeing Master Drawing List AP57.2-0609, Revision B, dated April 25, 2005 or later FAA approved revision. The modification was installed on N668AA on September 24, 2007 in Kansas City, MO (MCI).

See Attachment 3 for further information.

8.0 Airworthiness Directive (AD)[6] and Service Bulletin (SB) Summary

The air carrier provided an AD summary for review. The AD summary contained the applicable Service Bulletins. A review of Airworthiness Directive status lists for the aircraft and all installed powerplant engines were conducted. No discrepancies were found during the review of the listing.

See Attachment 4 for further information.

9.0 Aircraft Maintenance Logbook

The Airplane Maintenance Logbooks contained daily flight and maintenance information. The logbooks were reviewed from January 2010 through December 2010. The review indicated that the maintenance check records were up to date and complete. No discrepancies were noted.

10.0 Weight and Balance Summary

Per the American Airlines, Inc. OpSpecs, the airplanes were to be weighed every 3 years by either actual weigh or fleet weigh. According to American Airlines Inc. representatives, the last weight and balance on the airplane was accomplished using a fleet weigh calculation (January 18, 2005).

Actual Empty Weight:	135,600 pounds
Arm:	1032.6 inches
Moment:	140020560 lb-inches

See Attachment 5 for further information.

[5] The FAA issues Supplement Type Certificates, which authorize a major change or alteration to an aircraft, engine or component that has been built under an approved Type Certificate.

[6] Airworthiness Directive (AD) is a regulatory notice sent out by the FAA informing the operator of an action that must be taken for the aircraft to maintain its airworthiness status.

11.0 Service Difficulty Reports (SDR)[7]

From January 2010 through December 2010, American Airlines, Inc. reported approximately 10 SDRs to the FAA for aircraft N668AA. The breakdown of the SDRs are as follows: Lights (8), Structural (1), Wing (1).

See Attachment 6 for further information.

12.0 Major Repairs and Alterations

The airplane major repairs and alteration records were reviewed. According to the records, only three major repairs (3/9/2010, 3/12/2010 and 4/16/2010) were reported for 2010. The major repairs were structural in nature.

See Attachment 7 for further information.

13.0 Time Limit Control Components

Time limited component status for the airplane and two installed RB211 powerplant engines and APU were reviewed. The compliance status was satisfactory. No discrepancies were noted.

14.0 Vendors

The Maintenance Records Group reviewed the Approved Vendor List provided by American Airlines, Inc. On the average, American Airlines, Inc. accomplished audits of the approved vendors on a two-year basis. All substantial maintenance vendors are listed in the operator's General Procedures Manual Section 16-15. As previously stated, American Airlines, Inc. was authorized to use CASE.

15.0 Method of Record Keeping

All routine and non-routine work forms, log books, serviceable part tags from components installed, deferred items records, engine records, etc., were entered into the aircraft computer records (DECS) on a daily basis. A computer file history was maintained so that all inspections and checks were monitored for time limitations. The computer files were backed up daily to prevent total loss of history files. All hard copies of the paperwork were also kept and /or scanned by American Airlines, Inc.

American Airlines, Inc. keeps maintenance records for the time specified in 14 Code of Federal Regulations (CFR) Part 121.380. The records to show the requirements of an airworthiness release are kept until the work is repeated or

[7] A Service Difficulty Report (SDR) is a report of the occurrence or detection of each failure, malfunction, or defect as required by 14 CFR 121.703.

superseded by other work, or 1 year after the work is done. Records of the last complete overhaul of each airframe, engine and appliance are kept until the work is superseded by work of equivalent scope and detail (subsequent overhaul). E6 Aircraft Maintenance Logbooks are kept for a minimum of 1 year. Life Limited Parts Records are kept indefinitely unless the part is scrapped, at which point the records are kept for a minimum of 7 years. At the end of the retention period, records are destroyed or disposed of in a manner that will keep any person from unauthorized access.

During the investigation, it was identified that the auto speedbrake actuator (S/N 1543) was replaced more than 2 years prior to the incident through American Airlines, Inc. maintenance computer system. It could not be determined why the auto speedbrake actuator was replaced at that time as the maintenance paperwork was no longer available.

16.0 Manuals

American Airlines, Inc. used the following manual to maintain the airworthiness of its fleet and management of the airline.

General Procedures Manual (GPM) –provides the policies and procedures required to maintain the American Airlines fleet of aircraft. It is the manual that defines the Federal Air Regulation Part 121 required manual system for the conduct of maintenance. The GPM contains administrative information and policies, plus programs and procedures required to perform and record maintenance actions in accordance with FAR and American Airlines requirements.

Engineering Specification Manual (ESM) – The FAA approved document that contains the AAL Maintenance/Inspection requirement for the airframe, powerplants, and systems of the Boeing 757-223. It summarizes those tasks and their frequencies specified by Engineering to adequately maintain this aircraft. The FAA approved Revision EX of the document on December 15, 2010.

Maintenance Check Manual - provide maintenance personnel with readily available information which will be used when accomplishing particular scheduled or unscheduled maintenance tasks or complicated component changes.

Minimum Equipment List (MEL) – list of equipment and instruments that may be inoperative on a specific aircraft.

Weight and Balance Control Manual – Weight and balance procedures to be followed by maintenance and flight operations personnel on all aircraft operated by American Airlines, Inc.

Manufacture Supplied Manuals - Aircraft/Engine Maintenance Manuals, Structural Repair Manuals, Wiring Diagrams, Overhaul Manuals, Illustrated Parts Catalog, Corrosion Program Manual, NDT Manual, Significant Structure Items Manual, Service Bulletins and Engine Manuals.

17.0 E-6 Aircraft Maintenance Logbook Review

A review of the Maintenance Logbooks from December 2009 to December 2010 was conducted. The review primarily focused on the following systems: ATA 27 (Flight Controls), ATA 30 (Ice and Rain Protection), ATA 32 (Landing Gear) and ATA 78 (Thrust Reversers). There were no chronic issues identified in any of the ATA chapters reviewed.

The following information is of note:

On 3/18/10 with a spoiler EICAS message and overhead panel discrete annunciation. Item was BITE checked with "No Faults Found" and signed off "OK for service".

On 9/8/10 with "Auto Speed brake", "Spoilers" and "Air/Gnd Disagree" EICAS and/or panel discrete annunciation. The "Spoilers" EICAS message was BITE tested in accordance with the FIM (Fault Isolation Manual) with no faults noted. "Auto Speed brake" was addressed by MPM 27-12C and placarded INOP per the MEL. The "Air/Gnd Disagree" message corrective action included removing and replacing relays K10384 and K10387 in the air ground system followed by a BITE check on the PSEU. The corrective action in the signoff indicated that the reason for the relay replacement was attributed to the faults on the spoiler control module and not as a result of the PSEU BITE.

Tulsa Technical Services issued the following ATBT on 9/9/10 09 SEP/TUL ACCOMPLISH THE FOLLOWING…1. ACCOMP APPROPRIATE AUTO SPEED BRAKE FAULT ISOLATION REF FIM 27-62-00 FIG 104 AND SUBS. 2. ACCOMP AUTO SPEEDBRAKE ADJ/TEST REF MM 27-62-00-5 P501 AND SUBS. 3. ACCOMP TEST OF FWD THRUST POSITION SWI REF MM 27-62-07-5 P501. 4. ACCOMP TEST OF REV THRUST POSITION SWI REF MM 27-62-08-2 P206. AFTER REPAIRS ARE MADE, ENSURE THAT THE ELECTRICAL CONNECTOR IS RE-INSTALLED ON THE SPEEDBRAKE AUTOSTOW CONTROLLER AND THAT BOTH BREAKERS ARE RE-INSTATED REF MPM 27-12B. REPAIR REPLACE AS FINDINGS DICTATE.

On 9/9/10, station maintenance in MIA placed an entry in the E-6 (9999 entry) placarding the Load Alleviation System (L.A.S) in accordance with MPM 27-17D due to deferral of the Auto Speed brakes the previous day. Aircraft was later

flown on AA flight #1688 and on touchdown in DFW had a “Probe Heat” EICAS message momentarily annunciating and then extinguishing approximately five seconds later. The discrepancy was entered into the E-6 logbook and signed off with “info noted”. There was no maintenance troubleshooting or corrective action annotated in the maintenance logbook.

On 9/10/10 in SJU, the aircraft experienced a Repeat of item #60 with a “Spoilers” EICAS message and overhead discrete annunciation on touchdown and rollout. SJU maintenance replaced the #1 AIR/GND relay K10384 per the MM. The aircraft then flew the same day and the following EICAS messages annunciated upon takeoff “Probe Heat”, “TAT”, “Anti-ice” and the “Spoilers” EICAS message annunciated on landing. MCO maintenance accomplished probe heat tests per the FIM and MM with all indications normal. Spoiler ground checks and SCM (spoiler control module) checks documented as normal.

9/11/10 at DFW items #60 and #67 repeated with “Spoilers” EICAS message and overhead discrete annunciation. DFW maintenance replaced the left hand tilt actuator, TAT probe, and probe test relay K10264 and left hand speed card 5159. Maintenance reports ground checks good.

Between 9/11/10 and 12/27/10, no relevant systems discrepancies are known to exist or documented.

On 12/27/10 in DFW, Right and left probe heat, Nose A/G Disagree and LDG Gear Monitor status messages are displayed on the EICAS during preflight. DFW maintenance accomplished the EICAS erase procedure for the probe heat messages and the messages “did not return”. The Nose A/G Disagree and LDG Gear Monitor discrepancies are addressed in detail on E58D-3 S/N 9532560. In addition a terminal block pin in terminal TB25 CC5 was found to have been pushed back and secured. No messages returned and were checked per the FIM. Maintenance also in reference to Items #64 and #65, replaced #2 system nose sensor as a result of PSEU BITE check which indicated sensor S10068 was faulting. PSEU was also replaced. Further trouble-shooting revealed the terminal block TB25 pin issue above provided positive corrective action which resulted in a good PSEU BITE check and no status messages per the FIM.

See Attachment 8 for further information.
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