NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division
Washington, D.C. 20594

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Flight Data Recorder - 10

Summary of FDR Group Interviews
By Greg Smith

1. FDR GROUP INTERVIEWS

1.1. FAA Oversight

William T Satterfield	Supervisory PAI	Jan 20, 2011
James Leeder	B757 AVX PPM	Feb 17, 2011

1.2. American Airlines Personnel

Kevin McBride	Lead Avionics Engineer, FOE	Jan 25, 2011
Gerald Shroyer	Engineer, AE	Jan 25, 2011

2. SUMMARIES

2.1. William T. Satterfield

Date: Jan 20, 2011
Location: Via telephone; FDR Lab and various locations
Present: Greg Smith, Pocholo Cruz, Katherine Wilson – NTSB;
Anna Cushman, Nathan Rohrbaugh – FAA;
Brian Predmore – Boeing; Fred Toleman – APA
Represented By: Brad Preamble – FAA Attorney

During the interview Mr. Satterfield stated the following:

His current position was the Supervisory Principal Avionics Inspector (PAI) for the American Airlines certificate. He had been on the certificate for seven years. He supervised a team of 13-14 people who handled the day-to-day inspections on the certificate.

He did not have direct experience working with FDR systems. The experience he did have was from over-the-shoulder observation of mechanics working on them. He had looked at FDR data “long ago” in his career, but even then it was not very often. He had taken a course on FDRs long ago in Oklahoma City and that mainly instructed inspectors about what their duties were when checking FDR systems, but not much about the systems themselves. He felt that the training was adequate at the time he took the course, but the information was out of date. He said additional training from recorder manufacturers would be beneficial.

He said he currently did not do inspections of FDR systems and 2 members of the team he supervised performed those inspections for the American Airlines 757 fleet. Mr. James Leeder was the primary inspector for 757 FDR systems and Mr. Brian Byres had recently been added, within the last 30 days, as a backup for Mr. Leeder. Mr. Satterfield said according to the maintenance program EPI, inspections of the FDR maintenance program occurred every other quarter for every fleet on the American Airlines certificate and that the last inspections of the 757 FDR systems had occurred in the 4th quarter of 2010. He said he felt the frequency of inspections was such that the inspectors would remain proficient with the knowledge they needed to oversee the FDR maintenance program.

His familiarity with the requirements for FDR installations was that the requirements were in Part 121.343 and that they generally required 25 hours of data to be recorded and specified what was to be recorded based on the date the aircraft was manufactured. He said the tools available to aid the inspectors included 8900.1, ATOS guides, and the carrier's program documentation. He did recall AC20-141B once asked about it. He said there might have been a group in D.C. that could provide additional expertise to assist inspectors with evaluation of FDR programs. He said his approach to ensuring American Airlines FDR systems met the requirements, if he had done them, would be to monitor American Airlines inspection program to make sure the FDRs were functional, that American Airlines had a method to read the FDR, had a conversion document, and had correlation data as described in 8900.1 4-1531 A.2. He said the carrier, not the manufacturer, was responsible for ensuring that the FDR system documentation was maintained. He said additional parameters beyond those required must be working if they are installed and that non-functional parameters must be repaired within three days if they are a required parameter and within 10 days if they are not required.

When asked what information got back to him about the inspections, he responded that the inspectors put the information in ATOS. He said he had spent a majority of his time preparing for the interview reviewing the ATOS database and had found nothing with respect to FDRs either in the database or verbally from his inspectors. He said the main problems that had been found with American Airlines were related to compliance with their manuals and that American Airlines was "fairly responsive" to issues raised by inspectors.

2.2. James R Leeder

Date: Feb 17, 2011
Location: Via telephone; various locations
Present: Greg Smith, Pocholo Cruz – NTSB;
Anna Cushman, Nathan Rohrbaugh – FAA;
Fred Toleman – APA
Represented By: Joe Gore – FAA

During the interview Mr. Leeder stated the following:

His current position was B757 Avionics Partial Program Manager (PPM) in the American Airlines unit of the AMR CMO. He had been on the American Airlines certificate since 1990 and on the B757 for about 6 years. He started working for the FAA in 1975 as an electrical equipment repairman for the airways facilities equipment group in Oklahoma City. He then became an avionics maintenance technician for the flight inspection group

maintaining their aircraft. He received an electrical engineering degree and became an avionics systems engineer at the aircraft services base, also in Oklahoma City. In 1981, he became an Avionics Systems Engineer in aircraft certification. He held that position in several locations covering Parts 23, 25, 27, and 29 until 1986 when he became an inspector. He was an inspector at the Baltimore and Nashville offices before becoming an inspector in the DFW FSDO in 1989, then moving to the American Airlines certificate in 1990.

He said he had experience maintaining FDRs when he was an avionics maintenance technician early in his career. In 2001, he had attended the training course that resulted from an NTSB recommendation. Other than that, he only dealt with FDRs if there was a problem when he was inspecting American Airlines. He said he had reviewed FDR data from a couple of accidents but that was all the experience he had other than the EPIs. His review of FDR data was not in a primary role, just that he was assigned to the A300 program when the American Airlines flight 587 accident occurred, so he was asked to collect the available FDR data by his Principal Inspector. He reviewed a faxed printout of the FDR data to get an idea of what was going on with the accident aircraft.

He said the training course he had in 2001 was the only FDR course he had taken other than when he was a technician maintaining the FDRs in the 70's. He thought that the 2001 course might have had some information on evaluating the quality of an FDR's performance, validating FDR parameters and evaluating the documentation for FDRs. He said he also went to the accident investigation course quite often (about every 5 years) and that course sometimes had information on FDRs. He said he thought that during one of the investigation courses he had been trained on evaluating foil recorder data. He said "the digital stuff was pretty easy to read though because you weren't reading a tick mark on the foil". He said the last time he went to the accident investigation course was in December 2010 and that evaluation of the FDR data was not discussed at that time. He said he did not recall the last time the FDR information was taught other than basic information about the box. He said in preparation for the interview he had reviewed quite a bit of stuff and found that there had been changes to the FARs since the 2001 training and it was probably time for training to review the new requirements and new FDR equipment.

He said he did inspections of the FDR only when that task was assigned to him and that any inspections assigned during the last 6 years would have been assigned to him. He said ATOS did not raise that inspection frequently because ATOS was a risk based system and the FDR was not a flight safety critical item. He said there was only one question about the FDR in ATOS and that it was buried in the maintenance program EPI. He said all PPMs had to answer those questions and he was not sure how everyone else did surveillance on that item, but, he felt that overall they did "very little" surveillance on the data, the parameters or anything about the FDR on a regular basis. He said that he had EPI 1.3.1 Maintenance Program assigned to him in the 3rd quarter of the last four years and that EPI, 1.3.1, was the only EPI that had a question about the FDR. He said EPI 1.3.1 covers the whole maintenance program and that there was only 1 question out of 38 or 40 that dealt with the FDR. He said their policy on the ATOS questions was that an inspector only had to answer the question one time to complete the EPI, but he usually answered them more than once. He said what he looked at to answer each question depended on what aircraft he was looking at, when and where. He explained that a System Attribute Inspection (SAI) was a look at the element to see if all the attributes

(procedures, controls, interfaces, authority and responsibility) were in place and that an EPI was a performance inspection to see if the operator was following the procedures and that the controls were working, etc. He said he had never done an SAI on American Airlines' 757 FDR program. He also said based on the criticality of the maintenance program, which was the SAI that the FDR question was under, that an SAI was to be done every 5 years. He said the last time the maintenance program SAI was done was in 2009 and it was done by a SEP team from AFS-900, which was the ATOS group, and they answered yes to every question. He said it was difficult to say if the EPI occurred frequently enough to remain proficient with all the information he had to check as part of the maintenance program because he always had to research and prepare for the things he was inspecting. He said the need for preparation was one of the things ATOS helped to highlight and it helped him see what was coming up so that he could prepare accordingly. He said he had been on the working group developing ATOS and while on the working group, he identified to participants from headquarters that ATOS did not evaluate the relationship between certificate management and surveillance nor develop the interface between them. He said there was still no defined interface in ATOS. He said his job entailed both certificate management and surveillance and at times, he was not sure which he should be doing.

He said his general understanding of the Part 121 requirements was that they set the requirements for how many parameters were to be recorded (based on manufacture date of the aircraft), that they required the operator to keep at least 25 hours of recorded history, and that if the data was removed from the recorder, it had to be held for at least 60 days. He said he was not specifically aware of any requirements in Part 121 with regard to documentation of the recorder or parameter conversions. He did remember discussing it pretty thoroughly in the training in 2001 but he had not been involved in correlation evaluation.

He said when he did an inspection of the program, he would look for the things that the question was asking about, the things already discussed as required in 121. He said they did not do any evaluation of the parameters to see if they were working or recorded properly. He had never gotten into any inspection in that depth, and that an EPI is only checking to see if the operator is following their program. He said the information in FAA handbook 8900.1 was the detailed stuff that was required to set up the program. Once the operator had set up a managed program, inspectors only looked to see if the operator was following their program. The maintenance program itself was checked as part of the SAI. When asked specifically about steps b-d of 8900.1 volume 4, chapter 14, section 4-1531.A.2, he said the ATOS question did not send them to do the steps in the handbook. He said that was a problem with the interface between the handbook and the controls that were in ATOS. He said it ended up being subjective as to what they would do because there was so much in the handbook and the limited amount of time they had to do the inspection. He said inspectors were supposed to review the handbook but what they were directed to do as part of an EPI was based on the ATOS question and most of the items in the handbook were related to an SAI not an EPI.

He said during his last EPI he looked at 2 airplanes that were in for heavy check in Tulsa, but he had never done an EPI on the incident aircraft. He was there to answer all the other questions in the EPI at the same time. On this particular question, he went to the program and saw they had a work card to download the recorder every 4,000 hours and

sent the data to the evaluation group to evaluate the reasonableness of all the parameters required. He looked at the list of work being done on the airplane to see if that work card (2907) was being done. If it was not, he would have had nothing to look at because there was no maintenance being done on the airplane. He then would have gone to the aircraft records to look to see if there had been any FDR maintenance, a write up, in the last 31 days (because 31 days was all he could see). If there had been a write up, he would have check to see if the FDR was removed, what they did with the data and whether they were following their program. He said he was sure there was no FDR maintenance for the two airplanes he looked at during his December 2010 inspection because FDRs very seldom fail. He said if he had found one of the 2907 cards being completed in that timeframe on the airplanes he was checking, he would have followed the download and reviewed the reasonableness audit. But, he had never seen a reasonableness audit being conducted because of the small window of opportunity he had to find a 2907 card being accomplished and the scheduled interval at which they are done.

He said ATOS was designed to have the two components, SAIs and EPIs, be separate and focused on different things. The SAI was designed to see if a program exists and if it had all the appropriate attributes. The EPI was designed to see if the program worked and was being followed. He said most people think the evaluation of whether the procedures work was not appropriate for an SAI. However, his belief was that some procedures should be evaluated as part of the SAI and he had raised that issue when he was part of the ATOS working group. He believed the FDR procedures were some of those that should have been evaluated as part of the SAI.

He said ATOS was designed to have the lists of references for the inspector to review in preparation for his visit to spot-check the operator's processes. He explained that prior to ATOS, they would randomly look at whatever was going on when they visited but that ATOS was designed to take a more systematic approach. This approach was intended to ensure that the operator's processes would be a closed-loop system to ensure that safety was maintained.

He said there was nothing that would have the inspector review an operator's documentation or procedures to ensure they were kept up to date with best practices and current guidance. He said the only things an inspector would check for was what was listed in the SAI and EPI, or if there was a change to the FDR system such as changing to a different recorder model.

He said for those parameters that are installed that are beyond the minimum mandatory requirements, the FAR says that if it is connected, it must be doing its intended function. He did not know what American was doing because he had never looked at their program in that detail. He said that if a non-mandatory parameter is connected, he would expect it to be checked during the reasonableness and functional system checks.

He said the window for repairing a non-functioning parameter would have been defined by the aircraft manufacturer and the operator would be required to follow those manufacturer guidelines.

He said he was not assigned to the 757 fleet at the time the updates to the FDR system were made. He said since he had been assigned to the 757 program, American Airlines

had made no changes to the recorder system and he had never found a problem with the recorder system that required follow-up work. He said documentation of his inspections and findings were documented in the ATOS system.

He said he did not have concerns with violations at American Airlines, but he frequently found minor cases of them not following their procedures. He said one of his biggest concerns with American Airlines maintenance was that a big part of their maintenance was tightly interfaced with and affected by Engineering. He said the maintenance FARs didn't mention engineering except if they made a design change that would have to have been documented. He said that the only FARs that dealt with engineering were the Part 25 FARs because they flew those types of airplanes. He said there were not FAR requirements on an engineer doing his job properly. But, it was a large part of American Airline's organization and engineering touched all parts of maintenance, yet inspectors had no FAR standards to check engineering. He said his biggest problem was engineering giving instructions to a certificated mechanic that the mechanic could not follow because engineering did not provide good instructions.

He said the logistics of being on-site when a particular maintenance activity was occurring was a significant problem because he was located in DFW and the FDR maintenance activity all occurred in Tulsa. He said when he was assigned the maintenance EPI he would spend a week in Tulsa to answer all the questions in the EPI. He said if his office was located in Tulsa, he would have been able to drive over to the maintenance facility daily to observe the maintenance activities.

He said in order for him to review a reasonableness audit, the EPI would have needed a question directing him to review one. He said the only way he would have reviewed one under the current EPI question was if he had found a 2907 card being completed. He had not found one on any of the 2 airplanes he inspected in 2010 or 4 airplanes he inspected in 2009.

He said while he was preparing for the interview, he came to the realization that they should be looking at the reasonableness audits and the functional checks and he did not think anyone had ever observed a functional check. But, under the current ATOS questions, they were not directed to do so. He again emphasized the problems with doing those checks because of the problems they had in getting on-site when those maintenance checks were occurring.

2.3. Kevin McBride

Date: Jan 25, 2011
Location: American Airlines Maintenance Facility, Tulsa, OK
Present: Greg Smith, Pocholo Cruz – NTSB;
Nathan Rohrbaugh – FAA;
Fred Toleman – APA
Represented By: Doug Cotton – AA Attorney

During the interview Mr. McBride stated the following:

His current position was Lead Engineer, Fleet Operations Engineering (FOE) – Avionics for American Airlines and he had been in that position for 2 years. He had been employed

by American Airlines for 12 years. His previous positions at American Airlines were in Avionics Engineering (AE) as a systems integration engineer providing hangar support and before that as an engineer in FOE. He held a private pilot certificate and was an Organizational Delegation Authorization (ODA) unit member. He described his current duties as mostly overseeing engineering support for day-to-day operations, out of service aircraft, lower minimums program, and flight recorder analysis and audits although he would occasionally get involved in the details.

He described the relationship between FOE and AE as FOE providing support for day-to-day operations, in-service engineering, while AE was responsible for the maintenance programs and hangar support. He said FOE's role, with regard to FDRs, was to perform reasonableness audits and to provide FDR analysis support for in-service events and AE's role was to set up the maintenance program for the flight recorders and maintain the documentation. He said AE would drive any changes to the maintenance process, checklists or documentation.

He said his experience with FDRs was primarily providing FDR analysis support for in-service events and doing reasonableness audits during his first pass through FOE. He did not recall ever working on the FDR programs during his time in AE. He said he had done a lot of audits during his time in FOE, but there was not any particular event that stood out in his mind other than periodically finding broken parameters. He said his training for doing reasonableness audits was doing several with one of the other engineers who had been doing them before he had the position, on-the-job training but nothing formal.

He said his recollection of the Part 121 requirements was that Part 121.344 described the parameters required to be recorded based on manufacture date of the aircraft and Appendix M specified the range, rate and accuracy requirements for the parameters. He did not have any recollection of requirements for documentation or maintenance of FDRs. He said FOE had a master checklist of parameters developed by AE that denoted what was required to be checked as part of the audit and FOE only checked those parameters. He said he did not know if anyone did any maintenance or review of the parameters not included in the list of 34 mandatory categories covered by the AE checklist. He said FOE would only look at those parameters if supporting an event and if the parameters were found to not be working, FOE would put in a request to tech services to get them fixed. He said mandatory parameters were required to be fixed in 20 days but was not sure what the MEL window was for fixing a non-mandatory parameter.

He said an FAA person had visited within the last 2 years and he thought the FAA person was looking into a parameter repair order. He did not recall ever going through a reasonableness audit with an FAA inspector. He did not recall any cases when FOE had to follow up on any questions raised by an FAA inspector during an inspection.

He said he was responsible for FOE – Avionics and that covered all of the various airplanes in American Airlines' fleet. He said he currently had 3 positions for people who would perform reasonableness audits, 2 were filled and 1 was open at the time of the interview. The 2 remaining people had 2-3 years experience and about 10 years experience. He said each individual was assigned to the audits on a specific fleet(s) of aircraft. He said the person who had done the last reasonableness check on the incident aircraft had about 10 years experience and had recently left the department creating the

open position. He said they still utilized on-the-job training for the reasonableness audits and since his time as an engineer in FOE, about 7 years ago, the reasonableness check process had changed from being paper-based to computer-based. He said they used their software to pull up the parameters on the checklist and reviewed the plots in groups on the screen. The method of determining if a parameter was good or not was left up to the individual doing the check based on his previous experience looking at data, essentially each engineer had his own process. He said prior to the incident he did not check the audits but since then he had looked at some.

He said each individual assigned would do multiple audits a week. He said when he was doing audits, when he previously worked in FOE, it would take less than half a day to do a 757 audit but he did not track how long engineers he was supervising would take to get one done.

He said other than the audits and data reviews already discussed, FOE would only get involved with FDR maintenance if there was an in-service issue with the recorder system itself. He said he did not know what processes were in place at American Airlines to ensure that their FDR maintenance processes and documentation were kept up to date with industry best practices and current FAA guidance or if a change to that guidance would be cause to initiate a change to American Airlines programs.

He said his office routinely found issues with parameters during reasonableness audits, but he could not quantify how frequently those issues were found. He said it was up to each individual engineer to determine what follow-up steps would need to be taken to ensure a bad parameter was repaired.

He said he was not involved with the FDR retrofit to the 757 fleet and he did not recall any changes to his procedures as an FOE engineer as a result of the retrofit. He did not know if the FDR maintenance process, checklist or documentation had been changed since the retrofit of the 757 fleet.

He said he would consider a parameter that was always recorded from a backup source as a fault if he was aware of all the details of how the primary and alternate sources were reflected in the FDR.

He said the engineers had the Boeing documentation available to them as a reference when doing reasonableness audits, but there was no emphasis placed on it during the on-the-job training provided to new auditors.

2.4. Gerald Shroyer

Date/Time: Jan 25, 2011
Location: American Airlines Maintenance Facility, Tulsa, OK
Present: Greg Smith, Pocholo Cruz – NTSB;
Nathan Rohrbaugh – FAA;
Fred Toleman – APA
Represented By: Doug Cotton – AA Attorney

During the interview Mr. Shroyer stated the following:

His current position was in American Airlines Avionics Engineering as the engineer responsible for recorders. He had been in that position for about 3 months although he previously had worked for TWA, which was acquired by American Airlines, in Kansas City, MO for many years. He was still in the process of getting up to speed on his new responsibilities and did not have any detailed knowledge of the design or development of American Airline's 757 recorder supplemental type certificate, reasonableness audit or functional check procedures.