

**SUBMISSION OF AIR MIDWEST, INC. TO THE  
NATIONAL TRANSPORTATION SAFETY BOARD  
AIR MIDWEST FLIGHT 5481  
RAYTHEON BEEHCRAFT 1900D N233YV  
JANUARY 8, 2003**

EXECUTIVE SUMMARY

On January 8, 2003, at 0848 EST, Air Midwest Flight 5481, a Beech 1900D, N233YV, crashed on take off at Charlotte Douglas International Airport. Air Midwest, Inc. sent an accident investigation team to Charlotte to assist the National Transportation Safety Board (NTSB) in the investigation. The team arrived on January 8, 2003, and participated in the initial Organization Meeting. Air Midwest, Inc. designated a Party Coordinator and individual members for each of the NTSB accident investigation groups. Air Midwest, Inc. through its Party Coordinator, accident group members, and senior management, participated fully in every aspect of the accident investigation and the May 20-21, 2003, Public Hearing in Washington, D.C.

Air Midwest, Inc. through its thorough and complete participation in every phase of the accident investigation, has studied and analyzed the facts, conditions, and circumstances related to the accident involving Flight 5481. Based on this analysis of the facts of the accident and the full participation in the NTSB investigation, Air Midwest, Inc., has prepared a Submission which addresses the issues and facts of the accident. The Air Midwest Submission contains a discussion of the facts and circumstances of the accident, the pertinent issues, and the findings.

ISSUES AND FINDINGS

The specific causal factors of the accident are related to the maintenance issues which were addressed in depth at the Public Hearing. Operational issues, including the loading of the airplane, the preparation of the OF11e Beechcraft 1900D Load Manifest, and the performance of the airplane during the take off and accident sequence, were not contributory to the cause of the accident but, nevertheless, involve important safety issues.

The portions of the accident investigation relating to weather, air traffic control and airport issues were not involved as factors in the accident. The investigation by the Powerplants Group and the Structures Group, while important to complete the documentation of the Systems Group investigation, were not specific factors linked to the causal issues of the event. The Powerplants and Structures investigations did prove that other than the work related to the Detail 6 inspection of January 6, 2003, N233YV was properly maintained in accordance with the Air Midwest Maintenance Program and Federal Aviation Regulations (FAR). With the exception of the elevator control system, the power plants, systems and components of N233YV were operating properly until the final impact.

The examination of the structures, engines and the propellers revealed no anomalies. However, the examination of the pitch control system components indicated that the pitch control cable turnbuckles had been adjusted to an abnormal position. The Systems Group investigation documented that the turnbuckles on N233YV had an adjustment which resulted in a difference of 1.76 inches. A survey of the Air Midwest fleet of Beech 1900D airplanes showed that most airplanes had turnbuckles adjusted to nearly the same length which was typical of the expected configuration for the Beech 1900D. The difference between the expected turnbuckle adjustment and the adjustment found on N233YV was the maintenance error which led to the inability of the flight crew to control the airplane after rotation on take off.

Ground testing by the Systems Group on a Raytheon Beech 1900D at Wichita, Kansas, showed that, with the turnbuckle adjusted as found in the accident

airplane, the control column was rigged further forward than normal while the elevators remained at neutral. From this position, the control column could be moved only slightly forward before hitting its stop, thus its range of motion and airplane control was limited severely. Testing on the Beech 1900D at Wichita showed that when the control column was pushed forward to its stop with the mis-rigged turnbuckle, the elevator would travel only about 30 to 40 percent of the normal range of the normal 14 degrees in the down position.

The restriction to the control range of the elevator was also proven by an analysis of the flight data recorder (FDR). An analysis of flights, at a cruise flight speed of 230 knots, was done by the Safety Board for flights immediately before and after the Detail 6 maintenance check of January 6, 2003. The flights before the Detail 6 maintenance check showed a consistent pitch control position of about 4 degrees down. The data for the flights immediately after the maintenance check showed the pitch control position to be about 13 degrees down. This inflight analysis indicated a degradation of about two thirds of the down elevator capability. This data is consistent with the evidence of the misadjusted turnbuckle. The Air Midwest airplane performance analysis is Attachment One.

The loading issues, including weight and center of gravity, for the accident flight are important factors and are addressed in this Submission. However, the aircraft performance analysis clearly established that N233YV could have been controlled by the flight crew had the pitch control system and the elevator been properly adjusted to provide the full, certificated range of travel.

The specific focus on the maintenance issues which underlie the accident is the structure, management, procedures, requirements and the execution of the Air Midwest maintenance program. The factual record of the investigation and testimony at the Public Hearing show that the Air Midwest maintenance program met the full requirements of the FARs and provided complete and specific guidance for every part of the maintenance program, and for the proper completion of the Detail 6 inspection.

The factual record of the investigation, and especially the specific guidance contained in the FARs and the Air Midwest Maintenance Program, establish that the accident was the result of the failure of the foreman, the inspector, and the A&P Mechanic assigned to perform the elevator control portions of the Detail 6 inspection, to accomplish the inspection in accordance with the Air Midwest Maintenance Procedures Manual 210 and the FARs. Specific issues related to maintenance management and maintenance training were important factors and influenced the work done on N233YV on January 6, 2003. However, the investigation established that all other factors notwithstanding, the accident was the result of the failure to follow clearly stated maintenance procedures.

The Air Midwest Submission will address the facts, conditions and circumstances of the accident through a documented analysis of the following findings:

- The Air Midwest Maintenance Program met the requirements of 14CFR121 and all other applicable FARs.
- Senior Air Midwest maintenance managers assigned to the overall management of the maintenance program were qualified, experienced and had supervised the program effectively.
- The mid-level Air Midwest maintenance managers, including the Regional Site Manager at Huntington, WV, were qualified, had long tenure with Air Midwest, and had effectively overseen the maintenance program at the five regional sites in accordance with the FARs and the Air Midwest maintenance manuals.

- The Air Midwest maintenance program was effective and had provided a safe, efficient basis for the Air Midwest 14CFR Part 121 maintenance requirements.
- The Air Midwest-Raytheon Aerospace LLC work relationship had been in place for two years and had resulted in a safe, efficient maintenance program for the Air Midwest Beech 1900D fleet.
- Air Midwest Maintenance Manuals 210, 240 and 260 were approved and/or accepted by the Federal Aviation Administration (FAA) and clearly established the maintenance program and procedures that Air Midwest and the FAA required to be followed to fulfill the requirements of the Federal Aviation Regulations.
- The Air Midwest maintenance program was conducted in accordance with the requirements contained in the appropriate manuals; there was no record of maintenance deficiencies related to the Maintenance Procedures Manual 210 or the Maintenance Program Manual 260.
- The Air Midwest maintenance training program had some deficiencies noted by the FAA, which were unrelated to the accident. Air Midwest maintenance managers and the FAA had acted to address each training issue.
- The Huntington WV maintenance facility was staffed properly to perform the Detail 6 inspection on N233YV on January 6, 2003.
- The responsibilities of the foreman, the inspector and the A&P mechanics for the Detail 6 inspection on January 6, 2003, were clearly established in the Air Midwest maintenance manuals.
- The Raytheon Aerospace LLC and SMART employees at the Huntington facility were qualified and had received the Air Midwest indoctrination for the Air Midwest maintenance program. All Raytheon Aerospace LLC and SMART employees at the Huntington facility were aware of the Air Midwest procedures and requirements for the conduct of the Detail 6 inspection on N233YV.
- The Air Midwest Manual 260 and the Beechcraft 1900D Maintenance Manual contained proper and detailed guidance for the elevator rigging procedure which was required to adjust the elevator cable tension.
- The elevator rigging procedure and the adjustment of the elevator cable tension is designated as an RII item which required the inspection of the final work by an inspector who was not associated with the actual adjustment of the cable tension.
- There was a foreman and inspector assigned to the Detail 6 inspection of N233YV.
- The foreman was aware that the A&P mechanic assigned to adjust the cable tension had not been trained on the task and therefore would require supervision and training during the Detail 6 inspection.
- The foreman was responsible to conduct the supervision and training of the A&P mechanic who performed the elevator cable rigging and cable tension adjustment. The inspector was required to perform the RII inspection of the work.
- The inspector was not allowed by FAR or by Air Midwest maintenance manual procedures to conduct the supervision or training of the A&P

mechanic on the elevator control rigging and cable tension adjustment because of his responsibility to inspect the work as an RII item.

- The inspector and the foreman failed to follow the requirements of the FARs and the Air Midwest maintenance manual procedures with respect to the supervision and training of the A&P mechanic assigned to the elevator control rigging and cable tension adjustment of the Detail 6 inspection.
- The inspector who was training the A&P mechanic, and the A&P mechanic, decided on their own not to follow and complete each step required in the Air Midwest maintenance manual and the Beechcraft 1900D Maintenance Manual for elevator control rigging and cable tension adjustment.
- The inspector and the A&P mechanic improperly adjusted the elevator cable on N233YV which restricted the elevator authority available to the flight crew.
- The improperly adjusted elevator was not inspected by an independent "second set of eyes" as required by the RII requirement specified in 14CFR121.371(c) and Air Midwest Manual 210, IV, Required Inspection (RII) Definition and Requirements, Revision T-12, Page 7.3, dated August 23, 2001.
- The improperly rigged elevator made it impossible for the flight crew to control the airplane once N233YV began the initial climb and is the cause of the accident.
- The Air Midwest procedures and training for flight crews for the loading of aircraft, computing weight and balance, and center of gravity, and the use of the OF11E load report were adequate and complied with the FARs.
- Air Midwest, Inc., adhered to the FAA approved average weight program for the weight and balance, center of gravity and aircraft loading requirements.
- At the Charlotte Douglas International Airport, US Airways Express and Piedmont Aviation performed all station related duties including the checking of passengers and baggage, the loading of the Air Midwest airplane, and the completion and accuracy of the OF11E.
- There were two bags loaded onto N233YV which weighed more than 70 pounds but did not have a heavy bag tag attached as required by US Airways Express and Air Midwest procedures.
- The bags loaded on N233YV totaled 31 bags and this number was entered correctly on the OF11E. However, the OF11E did not indicate that two of the 31 bags were "heavy" bags which required an additional weight additive.
- Based on the information on the OF11E provided by the US Airways Express/Piedmont Aviation employee handling Flight 5481, the Captain determined that the flight could be safely operated at 17,028 pounds with a center of gravity index of 81.
- The actual weight and center of gravity condition, unknown to the Captain, was probably over the maximum gross take off weight by 100 to 300 pounds, and at or slightly beyond the aft center of gravity limit of 84.5.

- The Captain, in accordance with Air Midwest procedures, would have taken action to off load either passengers or bags had she been aware of the two heavy bags omitted from the OF11E and the consequence of the additional weight in the aft baggage compartment.
- Despite the actual weight of the airplane and the actual center of gravity condition, N233YV would have been controllable by the flight crew after take off if the elevator controls had been adjusted properly.

#### AIR MIDWEST MAINTENANCE PROGRAM

The Air Midwest maintenance program met the requirements for 14CFR Part 121. The program is essentially contained in the Maintenance Procedures Manual 210, the Training Manual 240, and the Maintenance Program Manual 260. The three manuals are accepted by the Federal Aviation Administration (FAA), except for Chapter 5 of Manual 260 which is approved by the FAA.

Air Midwest, Inc., contracted with Raytheon Aerospace, LLC, for quality assurance and maintenance personnel for the maintenance of the Beech 1900D fleet of airplanes. The accident investigation and the Public Hearing raised several issues related to the Air Midwest management and supervision of the Raytheon Aerospace, LLC, work force, and the routine coordination and communication between the two companies. The testimony and evidence on the issue of contract maintenance in the accident investigation point to several conclusions. First, the FAA was aware of the Air Midwest-Raytheon Aerospace contract and approved of the relationship. The Raytheon Aerospace maintenance work force was integral to the Air Midwest Part 121 maintenance program. Second, the contract between Air Midwest, Inc., and Raytheon Aerospace, LLC, required Raytheon Aerospace to meet the following standard:

"Scope of Maintenance: The scope of the scheduled maintenance and on call maintenance shall be in accordance with Air Midwest's maintenance procedures manual, MPM 210 and MPM 260. Air Midwest shall provide RA LLC with a copy of MPM 210 and MPM 260 prior to the commencement of this agreement. RA LLC shall perform aircraft maintenance under Air Midwest's Air Carrier Certificate (14CFR Part 121)." *Exhibit 11PP, page 2, paragraph 8*

The third conclusion is that Air Midwest, Inc., provided a thorough indoctrination to each Raytheon Aerospace, LLC, mechanic, foreman, and inspector, before the start of employment, on the Air Midwest maintenance program and the maintenance manuals. The A&P mechanic, the foreman and the inspector (Zias, Tucker and States respectively), as well as the four other Raytheon Aerospace, LLC, employees who were interviewed (Coleman, Miracle, Salogub and Sasso) each stated that they had been trained by the Air Midwest Regional Site Manager (Oxley) on the Air Midwest maintenance program and manuals. They knew, and should have known, the correct and legal procedure to accomplish an RII item under the Air Midwest maintenance program and the FARs. The proper accomplishment of the Detail 6 inspection on N233YV had nothing to do with the Air Midwest management relationship with Raytheon Aerospace, LLC.

The fourth conclusion was that Air Midwest and Raytheon Aerospace had a close and effective management relationship. The two companies had worked together effectively for two years and produced a high quality maintenance program at

four facilities. At each of the first four facilities, turnover was low and there were no FAA violations of the maintenance program or its product. The problems with turnover and records at the Huntington facility are, in part, attributed to issues that occur when a new station is opened. However, the two companies clearly have merged the maintenance management decision process. This fact is documented in the record by: (1) the everyday-of-the-year joint conference calls with all Air Midwest and Raytheon Aerospace managers participating; (2) the side by side work relationship between the site managers; (3) the establishment of the common work rules and procedures of the Air Midwest Maintenance Manuals; (4) the daily communication between Air Midwest Maintenance Control and the regional site managers of both companies at the five maintenance facilities; and (5) the establishment of the work schedules through the three-day maintenance forecast that was provided to each facility.

The fifth conclusion is that the Air Midwest Maintenance Program, with the fully integrated participation of Raytheon Aerospace, LLC, was in fact structured, provided proper guidance and supervision for maintenance processes and decisions, and had produced an effective maintenance product. In any case, the management of the Air Midwest maintenance program did not contribute to the decision of the A&P mechanic, the foreman and the inspector to disregard the clearly stated procedures which governed the Detail 6 inspection on N233YV or the FAR requirement for an RII inspection item. Additionally, the actions of the Raytheon Aerospace LLC and SMART employees at Huntington did not represent how maintenance was conducted at the other four Air Midwest facilities.

The Maintenance Procedures Manual 210 established the structure and maintenance management organization to implement the Air Midwest maintenance and airworthiness requirements. Exhibit 11L, Air Midwest Organization Chart, lists the management functions from the President and Vice President, Maintenance, to the individual mechanic level. There is a clear delineation of maintenance functions from quality assurance functions, and accountability is established at every level. The docket of the investigation, along with testimony at the Public Hearing by Air Midwest, FAA and Raytheon Aerospace, LLC, personnel, confirms that the Air Midwest maintenance organization functioned in a coordinated, effective manner. The qualifications of the Air Midwest management and the daily procedures and internal coordination processes, which included both Air Midwest and Raytheon Aerospace, LLC, managers and staff, supported an effective, well documented maintenance program. In fact, with the exception of the Detail 6 inspection performed on N233YV on January 6, 2003, the investigation noted no deficiencies related to maintenance procedures, the aircraft maintenance records, or requirements of Maintenance Procedures Manual 210. There were no FAA findings or discrepancies with respect to any maintenance procedures specified by Manual 210 in any of the FAA correspondence for the past three years. The investigation showed that the Air Midwest maintenance program met FAA requirements, was staffed by qualified personnel and operated in an effective manner. Furthermore, the procedures specified in the Maintenance Procedures Manual 210 established the proper guidance for a safe maintenance program.

The Maintenance Program Manual 260, which contains the requirements for the Continuous Airworthiness Maintenance Program, clearly outlined the procedures for, among other things, the Detail 6 inspection (Exhibit 11Y). Once again, the record of the investigation and the FAA correspondence indicate no deficiencies in the content of the procedures contained in the manual, nor the Air Midwest execution of the manual requirements.

The principal issue in the investigation is not the form, structure, content or capability of the Air Midwest maintenance procedures or management. Rather, the issue central to the cause of the accident was the manner in which a single portion of the Air Midwest maintenance program -- the Detail 6 inspection at Huntington WV -- was conducted on January 6, 2003.

#### THE HUNTINGTON WV MAINTENANCE FACILITY

The Huntington WV maintenance facility was opened by Air Midwest in August, 2002. The staffing was assigned based on a single work shift for no more than one airplane per night. Consequently, one foreman and one inspector were assigned for each shift with the appropriate number of A&P mechanics. The foreman for the night shift was the first level supervisor who was responsible to accomplish the workload for the shift. The second level supervisors were the Air Midwest Regional Site Manager and the Raytheon Aerospace Site Manager. This distinction is important when considering the specific responsibilities for the supervision of work.

The Public Hearing clearly defined the work relationships and the management of the Huntington Maintenance facility. The Air Midwest Regional Site Manager and the Raytheon Aerospace Site Manager would coordinate with Air Midwest senior management, schedule the work for the night shift, ensure parts were available and that the facility was prepared, and that the completed work and training from the previous night was documented. Although both individuals frequently observed the work of the night shift, as second level supervisors their presence was not always required. The testimony of every foreman, inspector and A&P mechanic stated that the Air Midwest Regional Site Manager frequently would appear during the night shift to provide assistance and direction. However, the actual management of the work requirements on the night shift was the responsibility of the foreman of the shift. His procedural guidance was, in every instance, the specific procedures in the Air Midwest maintenance manuals.

The oversight by Air Midwest and the FAA of the Huntington maintenance facility was also evident. The FAA PMI from Wichita, KS, and inspectors from the Charleston, WV, Flight Standards District Office made multiple visits. Air Midwest conducted audits (Exhibit 11K and 14D) of the facility which noted deficiencies at the facility and with the staffing levels at the facility. The corrective action by the Huntington facility was responsive in each case. However, past audit findings notwithstanding, the facilities and the staffing on January 6, 2003, were proper and adequate to accomplish the Detail 6 inspection on N233YV.

On January 6, 2003, the foreman for the shift, while a SMART employee, was fully qualified for all work tasks on the Beech 1900D, and was fully qualified to be the foreman. He had been at the Huntington facility from the first day it was established. The inspector for the shift was a Raytheon Aerospace employee. He had worked on the Beech 1900 since 1999 with Mesa Airlines, Arctic Slope, and then Raytheon Aerospace and was fully qualified for inspector duties. He was an original employee at Huntington WV, starting in July 2002, when the facility was opened. The A&P mechanic who worked on the elevator portion of the Detail 6 inspection had been an A&P mechanic since 1993. He had worked at the Huntington facility since November 2002. Although he was not qualified to perform the elevator rigging procedure and cable tension adjustment on the Beech 1900D, he had flight control rigging experience while at Piedmont and US Airways. He stated that there were no major differences between the Beech 1900D and the other airplanes where he had adjusted the flight control cables (Exhibit 14A, page 7, paragraph 1.2.2).

The point to be made is that with respect to the specific work on the Detail 6 inspection on N233YV, turnover of personnel at Huntington, experience of the personnel involved and the training of the personnel were not factors. The two senior individuals--the foreman and inspector--had been at the facility from the first day it opened. Both individuals had extensive experience on the Beech 1900D and were responsible for much of the OJT training at the facility. The A&P mechanic had 10 years experience, much of it on similar twin engine turbo propeller airplanes. He stated he was familiar with the control cable rigging and adjustment procedures. The conclusion must be that the maintenance error which resulted in the improper rigging and adjustment of

the elevator on N233YV was not the result of high turnover at the facility or the lack of knowledge or qualifications of the individuals who were responsible to manage and inspect the finished work product. Rather, the elevator was improperly adjusted because the foreman, the inspector and the A&P mechanic did not follow the correct procedures in the maintenance manual and failed to ensure the work was inspected properly as an RII task.

#### AIR MIDWEST MAINTENANCE TRAINING PROGRAM

The Air Midwest Maintenance Training Program was contained in Manual 240. The training requirements applied to any person working in the Air Midwest maintenance program without regard for employment status with Air Midwest, Raytheon Aerospace, or SMART. The training program complied with 14CFR121.375. The Director of Maintenance and the Director of Quality Assurance had joint responsibility for assuring that required training and qualifications were accomplished. The Maintenance Training Coordinator maintained detailed records of the on the job training (OJT) records of each mechanic working for Air Midwest. The Maintenance Training Coordinator also developed and scheduled appropriate training programs. The three managers responsible for the overall Air Midwest maintenance training were qualified, experienced maintenance managers who had long tenure with the airline.

The Regional Site Manager conducted the initial indoctrination training at each site and oversaw the OJT program for each mechanic (Exhibit 11EE, page 2.29, paragraph P4j). The Regional Site Manager would forward the training records to the Maintenance Training Coordinator. The actual administration of the OJT program was provided by the foremen at each site who were responsible to arrange and supervise OJT (Exhibit 11BB, page 2.2, paragraph 5, Exhibit 11CC, page 1, 3, paragraph E, Exhibit 11GG, page 2.19, paragraph I4d,e,f). While an inspector could (and did) administer OJT, this duty was not contained in the Quality Assurance Inspector job description. In no case could an inspector give OJT on an RII item and then sign off the work as an inspector.

The record documented several inquiries by the FAA concerning the Air Midwest maintenance training program. In each case, the airline promptly took corrective action to respond to the concerns of the FAA inspectors. The FAA PMI stated in his interview (Exhibit 11I, page 3) when asked if the training issues had been eliminated, "Yes, we have been able to get this turned around somewhat". He also stated (Exhibit 11I, page 8) that Air Midwest had not received any FAA violations for problems with the training program.

The concerns of the FAA notwithstanding, it is clear that the Air Midwest maintenance training program did not have a part in the events which led to the accident. On January 6, the A&P mechanic assigned to do the elevator portions of the Detail 6 inspection on N233YV had not been trained to do this task (no OJT record sign off). This fact was known to the foreman and the inspector on duty for the maintenance shift. The responsibility to conduct the training of the A&P mechanic belonged solely to the foreman. The work would involve an RII item which had to be inspected by a Quality Assurance Inspector. The FARs and the Air Midwest Maintenance program required this separation of maintenance and inspection functions. However, the inspector elected to do the supervision and training of the A&P mechanic on the elevator rigging procedure and the cable tension adjustment, and the foreman agreed to the arrangement. The inspector then proceeded to sign off the RII inspection, although technically and legally he was responsible as the person who had done the work. The redundancy of the RII process was thus defeated, and the error of an improperly rigged elevator was not discovered. This error was not a training error and was not related in any way to any previous or existing deficiencies in Air Midwest maintenance training. Instead, the error which lead to the misadjustment of the elevator on N233YV was caused by the failure of the foreman and the inspector to follow established and clear maintenance procedures.

#### CONDUCT OF THE DETAIL 6 INSPECTION ON N233YV

The primary issue which must be addressed involves the decisions that were made on January 6, 2003, about how the Detail 6 inspection on N233YV would be accomplished. Questions related to the Air Midwest oversight of contract maintenance, specific concerns about the management of the Huntington, WV, facility, the effectiveness of Air Midwest maintenance management, and the maintenance training program were important issues in the investigation. Air Midwest has made many program changes to address the issues identified during the investigation and these changes have been provided to the Safety Board. However, the regulations, procedures, manuals and good common sense maintenance practices which governed the events and decisions of the Detail 6 inspection on N233YV were so clear and so basic that they stand apart from other issues.

There are five questions which constitute the foundation of the decisions which led to the improper maintenance on N233YV.

- Was the night shift properly staffed and qualified for the task;
- Were the manuals and procedures clear with respect to the Detail 6 inspection and the RII policy;
- Did the work done on the elevator constitute the rigging of the elevator;
- Were the maintenance personnel required to complete the specific tasks in the Detail 6 procedures;
- Was the inspector authorized to conduct the OJT training on the elevator rigging and cable adjustment and still inspect the RII task.

#### Was the Night Shift Properly Staffed and Qualified for the Task?

This subject has been discussed previously. Yes, there were sufficient numbers of qualified individuals on the work shift on January 6, 2003. The foreman and the inspector were the two most senior and most qualified individuals at the Huntington facility. The A&P mechanic had 10 years experience and was familiar with control cable adjustments although he was not specifically qualified on the Beech 1900D. All of the maintenance personnel were trained on the Air Midwest maintenance manuals and procedures. The foreman and the inspector had years of experience with the aviation maintenance inspection procedures and requirements. They both knew the purpose of the requirement for a "second set of eyes" on RII items.

#### Were the Manual and Procedures Clear for the Detail 6 Inspection and the RII Policy?

The answer to both of these questions is yes. The specific guidance in the Maintenance Program Manual 260 for the Detail 6 inspection (Exhibit 11Y) was adequate to properly and safely complete the inspection. The same procedure had been used by Air Midwest for many years, by organic Air Midwest maintenance personnel and by Arctic Slope and Raytheon Aerospace, LLC, contract maintenance personnel. The procedure, if followed step by step, and properly inspected, had always resulted in the correct result.

It is correct that after the accident Raytheon-Beech revised the elevator rigging procedure in the Beechcraft 1900D Maintenance Manual in response to suggestions from Air Midwest. The revision constituted a more effective way to complete the maintenance procedure. The fact remained, however, that the Detail 6 procedure in effect for the inspection of N233YV was adequate if the maintenance personnel followed the procedures as specified.

The second clarity issue was the RII policy. This rule is one of the most basic tenets of aviation maintenance--a mechanic cannot inspect his own work for certain designated critical work tasks, or RII tasks.

14CFR121.371(c) expressly prohibits any person from performing a Required Inspection if that person also performed the work requiring inspection. 14CFR65.81 General Privileges and Limitations (Exhibit 11KK) states that a

mechanic may not "...approve and return to service, any aircraft or appliance, or part thereof, for which he is rated unless he has satisfactorily performed that work at an earlier date." The A&P mechanic working the elevator rigging portion of the Detail 6 inspection had not satisfactorily performed that work at an earlier date. He required supervision and training. Therefore the person conducting the supervision and training --the inspector on the shift (States)--was responsible for the work. The inspector was required to stamp the work as completed--not the A&P. At this point, 14CFR121.371(c), the RII rule, expressly prohibited the inspector (States) from conducting the RII inspection. These requirements were clear in the FARs, the Air Midwest manuals, and universally understood by all licensed maintenance personnel. The requirement is also clearly stated in Exhibit 11VV, the Air Midwest Maintenance Procedures Manual.

The FAA Principal Maintenance Inspector (PMI) stated, in his interview (Exhibit 11I), that it was inappropriate to sign off a maintenance task when performing it for the first time during training. He said "That was against company rules". He also stated that he "had never seen that before" and if he had he "would have told them it was against their manual". (Page 4-5)

With respect to the RII requirement the FAA PMI said the following (Exhibit 11I, page 5):

- If the person who signed off the maintenance trainee were the inspector, he would not have been able to inspect the trainee and sign off the work. That would not have met the intent of the rule.
- He had never seen this practice before and it was not acceptable.
- An inspector should not be inspecting a maintenance item and overseeing for that item. If the inspector were assigned to the work, he would not be able to do his RII.
- Exhibit 11I, page 9 -- "When asked if the mechanic and inspector at Huntington had violated FAR 65.81 by signing off the elevator rig the way they did, the PMI responded that they violated the AMI P&P manual."

It is clear that the FARs and the Air Midwest manuals were very specific about the RII requirements. The FAA PMI confirmed the regulatory intent of the rule and the application of the rule as reflected in the Air Midwest manuals. The foreman, the inspector and, to a lesser extent, the A&P mechanic were wrong in how they performed the work on N233YV. The rigging of the elevator was done incorrectly and the inspector who was conducting the training did not detect the error. A second independent inspection, as required by the FARs and Air Midwest, could have detected the improperly rigged elevator and prevented the accident.

The RII regulatory requirement is clear. The question is why did the foreman, the inspector and the Raytheon Aerospace site manager, all experienced, licensed A&P mechanics, state during the investigation and at the Public Hearing, that they had interpreted the RII rule correctly, when in fact they had not. Air Midwest, Inc., believes that the three individuals clearly knew and understood the RII requirement. However, since they had not complied with either the FAR or the Air Midwest manual requirement, they choose to offer a different interpretation to explain their actions. Each of the three individuals evaded answering direct questions about the RII rule and the OJT sign off requirement--they never directly answered any of the pertinent questions posed by the Safety Board staff or any of the Parties. Instead, the record indicates that they responded to questions on the RII issue and the OJT sign off/qualification issue with the statement that they had done it this way since 1999 at MESA, Arctic Slope, Raytheon Aerospace LLC and Air Midwest. The FARs and the maintenance manuals are clear on these subjects yet the three individuals would have the Safety Board believe that for four years, at

different companies, these blatant violations of the regulations were commonplace. They maintained this position despite being told that the FARs and Air Midwest manuals have established the requirement.

The "that's the way we always did it" statement is further discredited by Member Goglia's repetitive questions of the witnesses that they worked under the Air Midwest program and manuals, not the manuals and programs of any other airlines. This point was very clear when Member Goglia asked Richard Tucker the following question (Tr page 300): "So, you are saying to me that when we have a set of norms, even though they run counter to what the manual says, the norms are okay?" Mr. Tucker responded "That's the way it was when I was up in DuBois. Actually, that's the way it has been throughout my whole aviation career."

The same lack of credibility was seen in the testimony of the inspector, Mr. States, in response to the spokesman for the International Association of Machinists (IAM). The IAM spokesman asked (Tr page 212): "In our January 30th testimony, excuse me, you stated that a standard industry practice to skip steps you felt were unnecessary in the manual. Can you explain what you mean by standard industry practice to skip steps?" The follow up question by the IAM spokesman was: "Okay, so essentially you took the maintenance manual area that you felt was pertinent to tension in the cables and you performed that section only?" The answer was "Right, I done the tension sets the way we'd always done it from MESA." The next question was "Okay, did the Air Midwest procedures allow you to do that?" Mr. States did not answer the question but said, "That's the way we had done it when I started with MESA in July of '99." In every case the witnesses failed to answer the direct question of why they did not follow the FARs and the Air Midwest manuals with respect to the required procedure for RII tasks.

Two additional points must be made in this area which proved that the foreman and inspector knew the correct interpretation of the regulations despite their interview and hearing testimony. On January 30, 2003, the foreman was interviewed. Mr. Carbone asked the following question (Exhibit 11H, page 38).

Q: "I just want to clarify, when Joseph asked you how the OJT, the person performing the task, if they haven't done the job before, you don't have a concern about them signing the block as completing the job, if they haven't done it before, on the records?"

A: Especially if its a (RII?) -- if an inspector has to take a look at it. So, you're training them how to do it. He signs off. You're what's called a side stamp. You actually sign off."

This is the correct procedure for signing an RII task when OJT is conducted. However, the side stamp procedure was not done by the inspector on January 6, 2003. If it had been done, the inspector then could not have also signed off the RII inspection as he did. In fact, this point was made by Member Goglia, the IAM spokesman, Mr. Carbone and the Air Midwest spokesman in the questioning of the three witnesses at the hearing. In all cases, the three witnesses provided the stock answer of "that's the way we did it at three different companies for four years." These statements were not believable. The Air Midwest maintenance program did not operate in a manner characterized by the three witnesses. As previously discussed, specific statements in the Air Midwest Maintenance Procedures Manual (Exhibit 11VV) and the FARs provide exact guidance as to how an RII inspection is performed and these regulations and procedures governed the actual manner in which the Air Midwest maintenance program was conducted. Apparently for reasons of their own, the three witnesses made incorrect statements regarding the Air Midwest maintenance program.

The last point addresses what the three witnesses were told about the Air Midwest maintenance program. First, each was required by the Raytheon Aerospace, LLC, contract to do all work in accordance with the Air Midwest

maintenance manual. The inspector, the foreman, and the site supervisor each stated they were given indoctrination by the Air Midwest Regional Site Manager. The quality of the indoctrination can be summed up in the following questions of the inspector at the Public Hearing (Tr page 209):

Q: Okay, you--you received required inspection for RII--or you received training for RII in November of '02, is that correct?

A: Yes sir.

Q: Can you tell us who gave you that training?

A: Mr. Oxley. He is the site manager.

Q: Okay. How detailed was that training?

A: It was--it was rather detailed.

The record of interviews and the testimony at the Public Hearing were clear that the procedures in the Detail 6 inspection and the RII requirements were specifically contained in the Air Midwest manuals. The inspector, the foreman and the site supervisor had a legal obligation to know and observe the required procedures. They each admitted that they did not follow the procedures, and in some cases, had not complied with the FARs for as much as four years.

**Did the Work on the Elevator Constitute the Rigging of the Elevator?**

The answer to this question is yes. The three witnesses each stated that they were not doing the elevator rig--they were doing cable tension only. Despite the testimony of the three witnesses, it is clear that the procedure was the rigging of the elevator and had to be followed in its entirety. In fact the Elevator Control Rigging--Maintenance Practices is the only guidance on how to do cable tensioning (Exhibit 11NN). The inspector, when asked this question by the Air Line Pilots Association spokesman, replied (Tr page 232).

A: Are you saying--if you're asking me, is the elevator--the section on elevator rigging is the only place you can find out how to do the tensioning, the answer is yes.

Q: Would it make more sense to you to follow the entire procedure rather than just picking sections out?

A: It would for me because I think as a mechanic you know rigging and tensioning are--as I said before, part of rigging is cable tensioning but part of cable tensioning is not cable rigging.

Member Goglia raised very valid points (Tr page 255) when he pointed out that he saw no direct reference in the 27-30-02 procedure (Exhibit 11NN)"...to just rigging the cables or adjusting of the cables for cable tension. There is not separate section here for adjusting the cables."

Member Goglia then asked (Tr page 256):

Q: So, based upon your previous experience, you felt that you could take out just the sections that applied to cable tension adjustment and use them, is that correct?

A: From--from my training and experience, that's the way we'd always done it.

However, the final sign off of the cable tension adjustment (Exhibit 11JJ) stated: "Adjusted elevator cable tension per BMM 27-30-02 ops check normal." This sign off indicated that all the procedures in BMM 27-30-02 were completed "per BMM 27-30-02". Finally, the statement "ops check normal" was incorrect because the inspection of N233YV after the accident proved that the elevator system was improperly adjusted--the ops check could not have been "normal".

The FAA PMI was asked whether the full rigging procedure should be followed when doing a cable tension (Exhibit 11I page 8). He stated "...that the re-rig is necessary when cable tensions are adjusted." He also stated that a mechanic cannot deviate from the manual procedures. The PMI also stated, in response to Member Goglia's (Tr page 612) question, that the sign off of the RII item in Exhibit 11JJ which said "adjusted elevator cable tension per" and the manual reference of 27-30-02 meant "...that he had accomplished it in accordance with the whole thing".

**Were the Maintenance Personnel Required to Complete the Specific Tasks in the Detail 6 Inspection Including Beech Maintenance Manual Section 27-30-02?**

The answer to this question is yes. The Air Midwest manuals and the FAA PMI make it clear that the mechanics had to follow each step in the elevator rigging procedure. There was no "industry standard" which allowed a mechanic to pick and choose. Finally, the mechanic and the inspector stamped that they had accomplished the work in accordance with the 27-30-02 portion of the manual, the entire 27-30-02 section of the manual. There is no question about the legal requirement to adhere to the entire procedures.

One interesting point on this issue concerns who made the decision not to follow the entire procedure. The A&P mechanic, who was not trained or qualified on the task, made the decision, accomplished the work, and then told the inspector what he did. This fact was recorded in an early NTSB interview. On January 30, 2003, the inspector was interviewed by the Safety Board (Exhibit 11G page 29) and this exchange was recorded:

Q: Did you suggest to Brian to bypass steps in that procedure or was that Brian's decision?

A: Well, he bypassed them and I agreed with him that we didn't have to do all that.

This raises a real question of how much the inspector actually supervised the A&P mechanic. It would appear not very much if the A&P mechanic made the decisions on how to do the work. This point also raises the question of how thorough an inspection was done on the final work product. It would appear that the inspector provided very little guidance to an untrained mechanic on a critical safety of flight maintenance procedure. The documented mis-rig of the elevator system also proves that the RII inspection by the inspector was not conducted properly.

**Was the Inspector Authorized to Conduct OJT Training on the Elevator Rigging and Cable Tension Adjustment and Still Inspect the RII Item?**

The answer to this issue is clearly NO. It was against the regulations and Air Midwest manuals and procedures, and resulted in the failure to ensure that the critical, safety of flight maintenance task was properly completed.

The inspector, foreman and the site supervisor for Raytheon Aerospace, LLC, were all asked about the difference from the FAR on this subject and the actual practice on January 6. How could you train a mechanic and then do a required RII inspection on the same work you supervised and for which you were responsible?

The three Raytheon witnesses did not answer this question. Their responses fell into two areas: (1) he did the work so he could sign it off and (2) this

was the way we had always done it at MESA, Arctic Slope, Raytheon and Air Midwest.

The three witnesses were asked pointed questions on how they could justify their positions despite the clear provisions of the FARs and the Air Midwest maintenance manuals. Questions from the Board technical staff, Board Members and spokespersons for the IAM, ALPA and Air Midwest were all evaded with the non-answers. The most direct answer, which subsequently negated the statements of the three witnesses, came from Mr. Tucker in his interview by the NTSB on January 30, 2003, when he stated that the correct procedure would have been for the inspector to side stamp the work. The only conclusion was that a second inspector would have had to do the RII inspection since an inspector cannot inspect his own work. Mr. States was the only inspector at Huntington on January 6 so there was no one else to do the RII inspection.

A question by the IAM spokesperson on this subject very clearly illustrates the facts of the issue and the evasiveness of the inspector (Tr page 219).

Q: Are you aware the Air Midwest--that's Exhibit 11VV if--if you want to show it--specifically references FAR 121.371 on--definitions and requirements which expressly prohibits any person from inspecting a required inspection item if that person also performed the work needing inspection? Were you aware of that?

A: I was aware of that but I wasn't performing--performing the work.

Q: Okay, was that covered under the in-job-training, do you think? Do you recall?

A: I don't recall.

Q: How about any of the inspection training?

A: I don't recall that either.

A series of questions to the foreman also demonstrates the errors and misstatements made by the inspector by signing off the RII item after he had supervised the training (Tr page 301). This exchange clearly established who was responsible for the work done by the A&P mechanic on the elevator:

Q: Okay. And when you saw on January 6 that the inspector was conducting training on the job, did you believe he was going to be responsible for the work?

A: Yes.

Q: And since in order to hold your position you also have to understand what items are RII, or required inspection items, you were aware that this task was a required inspection item?

A: Yes.

Q: And it didn't bother you at all that the person who now is responsible for the work was also going to be the person signing off for the satisfactory completion of the work?

A: The mechanic's the one that signed off the work. I didn't see no problem.

The facts on this issue are that the mechanic, the inspector and the foreman failed to observe the FARs and the Air Midwest maintenance procedures for the conduct of the elevator rigging and cable tension adjustment. The work was improperly done and the RII inspection failed to detect the mis-rigged elevator.

#### AIRPLANE PERFORMANCE

N233YV could have been controlled and flown safely by the flight crew under any of the likely weight and center of gravity scenarios of Flight 5481 if the elevator had been properly adjusted to certification standards.

The Aircraft Performance Group Study (Exhibit 13A) identified the following four different weight and center of gravity scenarios which may have existed with respect to Flight 5481:

- Air Midwest average weight method used to compute the load manifest for Flight 5481;
- Actual passenger and baggage weight determined from various sources during the investigation;
- FAA Notice 8400.40 Survey Average Weights;
- Air Midwest new average weights.

Attachment One to the Air Midwest Submission is an airplane performance analysis. The analysis documents that, with a properly adjusted (to type certification standards) elevator control system, the flight crew of Flight 5481 could have safely controlled the airplane at weights and center of gravity conditions between those reflected on the load manifest to the most extreme condition of any of the four possible loading scenarios. In any case, each of the four load scenarios was less severe than existed on the Beechcraft 1900C at Homer, Alaska, in 1987.

The following discussion of the effects of the maintenance that was performed on N233YV and the conclusions of the airplane performance analysis has been excerpted from Attachment One:

"To show the effects of the maintenance that was performed, the position to which the pitch control was moved to maintain the proper takeoff and climb attitude was plotted as shown in Figure 10. There is clearly a significant change in the pitch control values from before to after maintenance. Before the maintenance, the pitch control required to maintain a constant climb pitch attitude for a heavy airplane with a relatively aft CG location was approximately -5.5 degrees. The full forward position of the pitch control is approximately -17 degrees. Before maintenance, the most aft CG takeoff still had approximately 11.5 degrees of elevator movement available for pitch adjustments after takeoff. The maintenance that was performed removed all of that margin in trailing edge down elevator movement. When the accident aircraft took off, the crew pushed the control column forward after the initial rotation, but the column hit the forward stop before the crew could achieve the necessary trailing edge down elevator position.

On all of the flights described above except the accident flight, the airplane flew quite safely. In particular, flight 59 had loading conditions almost identical to the accident airplane, and the DFDR data suggests that the flight was normal in every respect. As discussed above, when an airplane exceeds the aft CG limit, it does not become uncontrollable. When an airplane's CG is at the aft CG limit, the airplane is more sensitive to pitch commands. At some CG location well aft of the manufacturer's CG limit, the airplane becomes uncontrollable. If the elevator movement is limited to some movement less than what the manufacturer designed into the airplane, the CG location at which the airplane becomes uncontrollable is farther forward than the airplane designers specified.

Worst case assumptions of the CG location showed that the CG could be as much as an inch aft of the calculated location; however, normal design procedures and FAA design requirements insure that a certified airplane will be controllable at CG locations aft of the specified CG limit. Flight tests have

shown that the Beech 1900 is controllable at CG locations well aft of the limit in the flight manual. A Beech 1900 crashed in Alaska in 1987. The accident reconstruction that followed this accident showed that the airplane was flying with a CG location several inches aft of the specified limit. Subsequent flight testing on a Beech 1900 showed that the airplane behaves as the theory predicts. If the elevator movement is not restricted, the Beech 1900 is controllable at the most extreme loading scenarios possible for the accident flight.

#### CONCLUSIONS

1. The maintenance performed on the elevator control system significantly reduced the maximum possible trailing edge down position.
2. The limitation in the movement of the elevator was not detected by any of the crews that flew the airplane in the nine flights before the accident because the CG locations did not require a significant trailing edge down elevator position any time during those flights.
3. On the accident flight, the CG location was far enough aft to require an elevator position that was more trailing edge down than could be achieved by the flight crew.
4. If the elevator motion had not been restricted by the maintenance that was performed, the airplane would have been easily controllable, even under the most extreme loading conditions possible for the payload carried on the accident flight, as illustrated by the pre-maintenance flight history."

#### FLIGHT CREW TRAINING AND PROCEDURES

Air Midwest trains pilots on the loading and weight and balance procedures during initial and recurrent training. The Air Midwest Flight Operations Procedures Manual 410 contains the appropriate procedures (Operations Group Factual Report, Attachment 14). The Air Midwest Crew Member and Dispatcher Training Manual 710 (Operations Group Factual Report, Attachment 20) provides outlines of the weight and balance training curriculum for Air Midwest personnel who are responsible for supervision of the aircraft loading, and the computation of weight and balance and performance.

These programs, as reflected in the various Air Midwest manuals, provided clear guidance to the flight crew of Flight 5481. With respect to Flight 5481, the maximum allowable gross take off weight was 17,120 pounds and the aft center of gravity limit was 84.5 on the index on the Air Midwest Beechcraft 1900D Load Manifest. The Captain was given the OFllE for Flight 5481 that was prepared by one of the US Airways Express/Piedmont Aviation ramp agents assigned to the flight. In accordance with US Airways Express procedures, the ramp agents "do not account for weight on the OFllE. All they do on the worksheet is count the number of bags". (Operations Group Factual Report, page 12, quote by Tina Weaver, Director, US Airways Express Training). The Captain of Flight 5481 noted the passenger count and number of bags written on the OFllE and determined that the Flight could operate safely at a take off gross weight of 17,028 and an index scale of 81. (Operations Group Factual Report, Page 10). Her decisions with respect to Flight 5481 were correct and complied with all Air Midwest and FAR requirements.

The information that would have affected her decision to fly Flight 5481 with the existing loading conditions was available if the OFllE had been prepared correctly in accordance with US Airways Express and Air Midwest requirements. This was not done by the US Airways Express/Piedmont Aviation ramp agent.

The factor which would have changed the finalization of the OFllE was the knowledge that the 31 bags in the aft bin one included two heavy or overweight bags. (These bags will be referred to as heavy in this Submission.) The US

Airway Express requirements for the identification and loading of heavy bags are clear. The US Airways Express Ground Operations Manual (EGOM) Section 5-Baggage & Cargo Loading (Operations Group Factual Attachment 19) states "Any overweight, oversized bags must be noted in the Remarks section (of the OF11E)". There was no notation of heavy bags in the Remarks section of the OF11E given to the Captain of Flight 5481. Her computation of the baggage weight could only be based on the 31 bags on the OF11E. However, had the OF11E been properly filled in to reflect the two heavy bags that were on board N233YV, the Captain would have been able to more accurately evaluate the take off performance of the airplane.

The knowledge of the two heavy bags would have required her to add additional weight to the total weight (775 pounds for 31 bags). Testimony was clear from the Air Midwest pilots interviewed by the Operations Group during the investigation--each pilot stated that he/she would add weight for a heavy bag. Most indicated that they would use the military duffel bag guideline and count each bag as two bags. This would have added at least 50 additional pounds. Other pilots stated that they would ask for the actual weights or count the heavy bag as three bags. In the case of Flight 5481, ramp agents stated it took two persons to load the heavy bags, one of which contained body armor. They stated that the bags weighed more than 70 pounds each. In any event, with a properly prepared OF11E, the Captain would have added at least 50 pounds and this additional weight put the airplane at or just beyond the aft center of gravity limit. The improperly prepared OF11E clearly influenced her take-off decision and precluded her from making a different decision with respect to off loading passengers or bags.

#### US AIRWAYS EXPRESS REQUIREMENTS

There are two procedural issues that are important when considering the loading of Flight 5481 and the preparation of the OF11E. The first has to do with the proper tags on heavy bags. The second involves the identification of heavy bags and the preparation of the OF11E, and in particular the Remarks section of the OF11E. Each of these issues had the potential to provide the Captain with additional information about the take off performance of the airplane.

US Airways Express required that any bag that weighs between 70 and 100 pounds be identified with a heavy bag tag by the ticket agent (Operations Group Factual Report, page 12; Operations Group Factual Report Attachment 1-94; interview of Tina Weaver). This is a very straight forward requirement yet apparently not done for two of the bags loaded on Flight 5481. The Piedmont Airlines ramp agent stated (Operations Group Factual Report Attachment 1-8) that "...some of the bags are heavy; not marked heavy, but they are heavy". He also stated that two of the bags required two agents to load them into the bin. "He estimated their weight to be at least over 70-80 pounds." This failure of US Airways Express to properly tag two obviously heavy bags with tags identifying them as heavy led to the OF11E being improperly completed. As a result, the Captain was not properly advised of the actual take off condition of Flight 5481.

One ramp agent stated that he told the Captain that some of the bags were heavy even though they were not marked with a heavy bag tag-- and were not on the OF11E. This statement raises two questions--why did he not put them on the OF11E and, second, how should the Captain treat this information. The first question is addressed in this section of the submission--he was required by the EGOM to list all overweight bags in the Remarks section.

With respect to the Captain, the issue is less clear. According to the ramp agent he told her "some of the bags were heavy" (Operations Group Factual Attachment 1-8). There was already a procedure for heavy bags--they must be entered on the OF11E--so how should the Captain treat the casual statement that "some heavy" bags were loaded? An Air Midwest pilot operates into several stations a day and works with many different ramp agents. Non-specific evaluations of the baggage are against US Airways Express procedures

(Operations Group Factual Report Attachment 1-97) and provide the Captain no useful information that can be specifically incorporated into aircraft weight decisions. Finally, the conversation with the Captain was not recorded on the cockpit voice recorder so the clarity of the discussion and the other concurrent preflight activities could not be evaluated.

The second issue concerns how the OFllE Remarks Section was regarded by the ramp agent who counted the checked bags. The US Airways Express Director of Training, Tina Weaver, stated (Operations Group Factual Report Attachment 1-97) that ramp personnel were trained to identify heavy bags only through "heavy bag" tags, starting at 70 pounds. The agent was only required to note in the Remarks section a heavy bag that had a heavy bag tag. If the bag was heavy but did not have a heavy bag tag, there was no requirement to list it in the Remarks section.

According to Ms. Weaver, the ramp agents handling Flight 5481 followed the EGOM procedures correctly. The two bags which required two agents to load into the bin and were estimated to weigh more than 70 or 80 pounds were not noted in the Remarks section. As a result, an error made by a ticket agent when he/she failed to properly identify a heavy bag was not corrected by the ramp agents who apparently recognized the error. The unanswered question must be why, if two of the bags were clearly identified as heavy, was the Remarks section not properly annotated? Did not common sense and safety dictate that this step be taken?

The statement by Ms. Weaver on the subject of unmarked heavy bags appears to be contradicted by sound safety guidance and common sense in the rest of the EGOM. For example, the EGOM Section 5, Baggage and Cargo Loading (Operations Group Factual Attachment 19-11) states:

**\*\*WARNING\*\***

It is imperative that all employees responsible for the completion of the OFllE are fully aware of how important accuracy is and how costly it can be when this form is not completed correctly.

Attachment 19-5, EGOM Section 5 states:

"Any overweight, oversize bags must be noted in the Remarks section."

There is no mention in this paragraph of only heavy bags with heavy bag tags. This section says "any overweight" bag must be reflected in the Remarks section.

Air Midwest Flight 5481 was handled completely by US Airways Express and Piedmont Aviation at Charlotte Douglas International Airport. US Airways Express and Piedmont Aviation were responsible to place heavy bag tags on at least two of the pieces of baggage so that the additional weight could be identified to the flight crew. The ramp agents had a responsibility to note that two of the bags were oversized, or heavy, and make the proper entry in the Remarks section of the OFllE. The statement of the US Airways Express Director of Training that the bag was not heavy unless it had the proper tag was contradicted by the EGOM which stated that overweight bags "must be noted" in the Remarks section.

As a result, the US Airways Express procedures failed in two areas with respect to Flight 5481. First, at least two heavy, overweight bags were not properly identified. Second, ramp agents failed to properly fill out the OFllE Remarks section with respect to the two heavy bags. These omissions denied the Captain the opportunity to account for the extra weight on Flight 5481 and the possibility that she would have made different decisions with respect to the take off performance of the airplane.

SUMMARY

The crash of Flight 5481 on January 8, 2003, was the only accident Air Midwest has experienced in nearly 37 years of operation. The people of Air Midwest learned a lot about themselves and their airline during the course of the Safety Board's investigation, and many constructive changes were made to the way Air Midwest conducts its operations. The accident investigation activities and record made clear the strengths of Air Midwest as well as the areas where changes were indicated. The accident investigation also pointed to several conclusions that have been discussed in this Submission.

The first conclusion is that the Air Midwest maintenance program complied fully with all 14CFR121 requirements, that the maintenance managers at each level were qualified, and the maintenance program had been managed safely and effectively. The second conclusion is that the Air Midwest Maintenance Program Manual 260 and the Maintenance Procedures Manual 210 established clear and effective requirements for the Air Midwest, Raytheon Aerospace and SMART employees who implemented the Air Midwest maintenance program. The third conclusion is that the Huntington WV facility was staffed properly with qualified individuals to perform the Detail 6 inspection on N233YV. The fourth conclusion is that the on the job training of the A&P mechanic performing the elevator system inspection of the Detail 6 inspection was done improperly. The foreman was required to do the training because he knew the work involved an RII inspection and there was just one inspector available that night. The inspector violated Air Midwest manual requirements and the FARs when he supervised the OJT and then signed off the RII item as a Quality Assurance inspector. The fifth conclusion is that the inspector and the A&P mechanic disregarded the requirements of the Air Midwest maintenance manuals when they did not complete all the required procedures for the elevator rigging procedure. The contract between Air Midwest and Raytheon Aerospace LLC and good, common sense maintenance practices required that all the steps in the procedure be completed. The sixth conclusion is that the A&P mechanic failed to rig the elevator and adjust the cable tension properly, and the inspector failed to inspect the work properly. The misadjustment of the turnbuckles that was documented in the wreckage of N233YV proves that the work was not done properly. The FDR records of the nine flights after the Detail 6 inspection also document the impaired functions of the elevator. The seventh and final conclusion is that the mis-rigged elevator resulted in the inability of the flight crew to control the airplane after Flight 5481 began its initial climb. The absence of proper elevator authority, not the weight or the center of gravity index, triggered the events that led to the accident. The content and management of the Air Midwest maintenance program and the maintenance training program were primary issues in the investigation but did not, in the final analysis, contribute to the failure of licensed maintenance personnel to perform their required duties in accordance with the prescribed Air Midwest maintenance procedures and the FARs.