UNITED STATES OF AMERICA
NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

**IN THE MATTER OF THE INVESTIGATION OF
EMERY WORLDWIDE AIRLINES, FLIGHT 17,
McDONNELL DOUGLAS DC-8-71F, NS079U
RANCHO CORDOVA, CALIFORNIA, FEBRUARY 16, 2000**

DOCKET NUMBER SA-521

National Transportation Safety Board
Board Room and Conference Center
429 L'Enfant Plaza, S.W.
Washington, D.C. 20024

Thursday, May 9, 2002
8:00 a.m.

National Transportation Safety Board
Board of Inquiry

JOHN GOGLIA, Chairman

JOHN DeLISI, Chief
Aviation Engineering Division
Office of Aviation Safety

DR. ALAN KUSHNER, Deputy Director
Office of Research and Engineering

Technical Panel

FRANK HILLDRUP
Hearing Officer and Investigator-in-Charge

KEN EGGE
Operational Factors Investigator

FRANK McGILL
Maintenance Records Investigator

STEVE CARBONE
Maintenance Records Investigator

KEVIN PUDWILL
Structures Investigator

Federal Aviation Administration

LYLE STREETER, Manager
Accident Coordination Branch
Office of Accident Investigation

Emery Worldwide Airlines

CAPTAIN RICHARD HAGQUIST
Director Flight Operations

BRUCE ROBBINS
Former Director of Operations

The Boeing Company

RICHARD BREUHAUS
Chief Engineer for Air Safety Investigation

Airline Pilots Association

TODD GUNTHER
Chairman of the Accident Investigation Board

Tennessee Technical Services

DAVID HOFFSTETTER, President

SAM PORTER

I N D E X

P R O C E E D I N G S

9:42 a.m.

CHAIRMAN GOGLIA: Good morning, everybody.

Today, we are here to conduct a public hearing in connection with the investigation of an aircraft accident, Emery Worldwide Airlines Flight 17, a Boeing DC-8-71F, the N number, the U.S. registration number is N-8079U, that occurred in Rancho Cordova, California, on February 16th, 2000.

Good morning, ladies and gentlemen, and welcome. I am John Goglia, a member of the National Transportation Safety Board, and Chairman of this Board of Inquiry.

Today, we are opening a public hearing in connection with the accident that I just mentioned. The hearing is being held for the purpose of supplementing the facts, conditions and circumstances discovered during the on-scene and continuing investigation. This process will assist the Safety Board in determining the probable cause of this accident and making any recommendations to prevent similar accidents in the future.

When an accident such as this occurs, it is

the responsibility of the National Transportation Safety Board, with the assistance of the Federal Aviation Administration as well as other designated parties from government, industry and labor, to find out what happened, why it happened, and how we can prevent this unfortunate event from reoccurring.

The purpose of this hearing is twofold. First, the issues that will be discussed at this hearing, while technical in nature, serve to assist the Safety Board in developing additional factual information that will be analyzed for the purposes of determining the probable cause of this accident.

Secondly, this hearing also provides the opportunity not only to the aviation community but to the public as well to see a small portion of the total investigative process and the dedicated efforts being put forward by the investigators from many different organizations to find the cause of this accident.

I want to assure the families of the flight crew that the Safety Board will pursue every lead to find an ultimate solution. The hearing is available on a worldwide webcast through the Safety Board's website at www.ntsb.gov.

Public hearings, such as this, are an

exercise in accountability, accountability on the part of the Safety Board in its conducting a thorough and fair investigation, accountability on the part of the FAA that it is adequately regulating the industry, accountability on the part of the airline that it is operating safely, and accountability on the part of the aviation workforce that they are performing up to the high standards of professionalism expected of them.

As previously stated, these proceedings tend to become highly-technical affairs, but they are essential in seeking to reassure the public that everything is being done to ensure safety of the airline industry.

The purpose of this inquiry is not to determine the rights or liability of private parties and matters dealing with such rights and liabilities will be excluded from these proceedings.

Over the course of this hearing, we will continue to collect information that will assist the Safety Board in its examination of safety issues arising from this accident. Specifically, we will concentrate on the following issues: procedures for training for the DC-8 elevator check and use of the elevator position indicator, maintenance programs,

practices and management training of company and contract personnel, maintenance manual requirements and procedures, installation and inspection procedures of the DC-8 elevator system, associated reference manuals and work cards.

At this point, I would like to introduce members of the Board of Inquiry. To my right is Dr. Alan Kushner, Deputy Director of the Office of Research and Engineering, and to my left, Mr. John Delisi, Chief, Aviation Engineering Division Office of Aviation Safety.

The Board of Inquiry will be assisted by the Technical Panel consisting of the following Safety Board staff: Mr. Frank Hilldrup, the Investigator-in-Charge and Hearing Officer, and he is sitting at -- why don't you identify yourself, Frank? Mr. Ken Egge, Operational Factors Investigator, Mr. Frank McGill, Maintenance Records Investigator, Mr. Steve Carbone, Maintenance Records Investigator, and Mr. Kevin Pudwill, Structures Investigator.

Mr. Paul Shlem and his colleagues from the Safety Board's Public Affairs Office are here to assist members of the news media. Mr. Eric Grossoff from the Office of Family Affairs is here to assist family

members in attendance. Mrs. Carolyn Dargan and Mrs. Eunice Bellinger are present to provide administrative support as needed, and they will be providing copies of the exhibits to witnesses.

Neither I or any other Safety Board personnel will attempt during this hearing to analyze the testimony received nor will any attempt be made at this time to determine the probable cause of the accident. Such analysis and cause determinations will be made by the full Board after consideration of all the evidence gathered during our investigation.

The final report on this accident involving Emery Flight 17, reflecting the Safety Board's analysis and probable cause determinations, will be considered for adoption by the full Board at a public hearing here at the Safety Board's Headquarters at a later date.

The Safety Board Rules provide for the designation of parties to a public hearing. In accordance with those Rules, those persons, governmental agencies and companies and associations whose participation in the hearing is deemed necessary in the public interest and whose special knowledge will contribute to the development of pertinent evidence as designated by the parties. The parties assisting the

Safety Board in this hearing have been designated in accordance with those Rules.

As I call the names of each party, would the designated spokesman give his name, title and affiliation for the record?

The Federal Aviation Administration?

MR. STREETER: My name is Lyle Streeter. I'm the Manager of the Accident Coordination Branch in the FAA's Office of Accident Investigation.

CHAIRMAN GOGLIA: Thank you, Mr. Streeter.

Emery Worldwide Airlines?

MR. HAGQUIST: My name is Richard Hagquist. I'm the Director of Flight Operations at Emery Worldwide Airlines.

CHAIRMAN GOGLIA: Thank you, Mr. Hagquist.

The Boeing Company?

MR. BREUHAUS: Good morning. My name is Richard Breuhaus. I'm Chief Engineer for Air Safety Investigation for Boeing Commercial Airplanes.

CHAIRMAN GOGLIA: Thank you, Mr. Breuhaus.

Airline Pilots Association?

MR. GUNTHER: I'm Captain Todd Gunther. I'm the Chairman of the Accident Investigation Board for the Airline Pilots Association International.

CHAIRMAN GOGLIA: Okay. And finally, Tennessee Technical Services?

MR. HOFFSTETTER: Dave Hoffstetter.

CHAIRMAN GOGLIA: Dave, I don't think your mike was on.

MR. HOFFSTETTER: I'm Dave Hoffstetter, President, Tennessee Technical Services.

CHAIRMAN GOGLIA: Thank you.

I want to publicly thank all of the other private, municipal, county, state and federal agencies that have supported the Safety Board throughout this investigation.

On April 30th, 2002, the Board of Inquiry held a pre-hearing conference in Washington, D.C. It was attended by the Safety Board's Technical Panel and representatives of the parties to this hearing. During that conference, the areas of inquiry and the scope of the issues to be explored at this hearing were delineated in the selection of witnesses to testify on these issues was finalized.

Copies of the Witness Lists developed at the pre-hearing conference are available in the foyer. There are numerous exhibits that will be used in these proceedings. Copies of the exhibits can be ordered

through the Public Inquiries Branch at 202-314-6551.

The witnesses testifying at this hearing have been selected because of their ability to provide the best-available information on the issues being examined at this time. The first witness will be the investigator-in-charge of the accident investigation who will summarize certain facts about the accident and investigative actions that have taken place to date.

The remaining witnesses will be questioned first by the Board's Technical Panel and then by the designated spokesman for each party to the hearing, followed by the Board of Inquiry.

As Chairman of the Board of Inquiry, I will be responsible for the conduct of this hearing. I will make all rulings on the admissibility of evidence and such rulings will be final. The record of the investigation, including the transcript of the hearing and all exhibits entered into the record, will become part of the Safety Board's public docket on this accident and will be available for inspection at the Board's Washington Office. Anybody wanting to purchase the transcript, including parties to the investigation, should contact the court reporter directly.

Now, I would like to acknowledge, before we

move forward with Mr. Hilldrup's statement, the fact that we have in attendance other members of the Board, in fact the entire Board. Mrs. Maryann Blakey, who is the Chairman of the National Transportation Safety Board. Ms. Carol Carmody, who is the Vice Chairman of the National Transportation Safety Board, as well as Members George Black and John Hammerschmidt, and for those of you who are new to this room, this room is fairly new to us as well. It affords some additional opportunities that I don't think that the Board realized when we first moved into this facility.

One is, the ability for Board Members to come down and to view certain witnesses and actually ask some questions of certain witnesses in areas of the proceedings that they have an interest in. As you know, ultimately, this accident and any other proceedings comes before the Board for a vote, and any opportunity we have to, we as Board Members, have to become better informed with the issues that are in front of us can only result in a better product.

So, I consider myself very fortunate to have my fellow Board Members here to help and to help answer any questions that they may have because we often find that if one person has a question and other people also

have similar questions that may not come to mind immediately or they may not want to ask at the time.

So, I thank all of you for your attendance and afford you the opportunity at any time to join us up here, to participate, ask any questions that you feel that you need to have answered from any of the witnesses.

And with that, Mr. Hilldrup, are you ready to summarize the investigation and enter the exhibits into the public docket?

MR. HILLDRUP: Yes, sir, I am.

Good morning, Mr. Chairman, ladies and gentlemen.

On February 16th, 2000, at about 7:51 p.m. Pacific Standard Time, Emery Worldwide Airlines Flight 17, a Douglas DC-871 Freighter, Registration November 8079 Uniform, crashed near Mather Field in Rancho Cordova, California. The flight crew had declared an emergency shortly after take-off from Runway 2-2 Left at Mather Field and was attempting to return for landing when the airplane crashed near the airport, approximately two miles east of the runway. The three flight crew members were fatally injured and the aircraft was destroyed by impact forces and fire.

Emery Flight 17 was a scheduled flight from Reno, Nevada, to Dayton, Ohio, with an intermediate stop at Mather Field. The flight was operating under 14 Code of Federal Regulations Part 121 and visual meteorological conditions prevailed at the time of the accident.

The Safety Board was notified of the accident on the evening of February 16th. Investigators from the Safety Board's Southwest Regional Office initially responded to the accident and secured the site along with local emergency response authorities. Meanwhile, Safety Board Go-Team Members assembled in Washington, D.C., for departure early the next morning. Go-Team Members arrived at Mather Field later that morning. Arrangements were subsequently made to transport the recovered flight recorders back to NTSB Headquarters in Washington. The Board Member on scene was Member George Black.

An organizational meeting was held and investigative groups were formed in the following specialty areas: airworthiness, aircraft operations and human performance, power plants, hazardous materials and maintenance records. Flight data recorder, cockpit voice recorder and aircraft

performance groups were subsequently formed in Washington, D.C. Each group functioned under the leadership of a Safety Board Group Chairman.

The following organizations were given party status during the on-scene phase to provide technical assistance to the Safety Board during the investigation: the Federal Aviation Administration, Emery Worldwide Airlines, the Boeing Company, the Airline Pilots Association, Miami Aircraft Support, now known as Worldwide Flight Services, and General Electric Aircraft Engines. During the course of the investigation, Tennessee Technical Services was also made a party to the investigation.

Now a brief history of Emery Flight 17. The accident airplane arrived in Rancho Cordova from Reno, Nevada, at approximately 6:25 p.m. The captain and flight engineer from the accident flight also flew the airplane on the inbound flight from Reno. The first officer from the accident flight met the inbound flight upon its arrival at Rancho Cordova.

Conversations with the inbound first officer and mechanic stationed at Mather Field as well as a review of maintenance log sheets indicated that no operational problems were encountered on the flight

from Reno. The ramp supervisor stated that it was a normal load and that the loading process went smoothly. The load planner stated that the cargo load that night was about 61,000 pounds and that the typical load for this flight was about 75,000 pounds. He stated that the center of gravity for Flight 17 was within limits. Personnel loading the airplane and moving the pallets and containers into position generally reported that it was a routine operation.

When the load plan was completed, the load planner gave a copy to the pilots. After completing the weight and balance and load manifest forms, the pilots gave the form to the ramp supervisor. The ramp supervisor stated that she was the last one out of the cockpit before the airplane departed.

Now, conversations recorded on the cockpit voice recorder for Flight 17 indicated that the first officer was making the take-off. During the take-off roll, as the airplane reached an airspeed of 80 knots, the cockpit voice recorder recorded the captain stating, "80 knots." The first officer responded with "80 knots", followed immediately by "elevator checks."

Now, during the 80-knot elevator checks, the flight data recorder data indicated that the control

column traveled forward approximately 4 degrees beyond the neutral position within about three seconds, resulting in a change in the elevator from an initial position of about 5.5 degrees up to 2.2 degrees up. The column was then brought aft to the neutral position in just over a second, and the elevator moved to a position around 5 degrees up.

Now, as a general note, except as I note otherwise in my opening statement, all the statements that I refer to the crew are from the CVR transcript.

At time 7:49:02, the captain called V1, then rotate, and then rotate a few seconds later as the airplane accelerated to 149 knots. Cockpit sounds similar to the horizontal stabilizer trim in motion were recorded, and the captain stated, "Watch the tail." Additional sounds similar to the stabilizer trim were recorded, and the captain then stated V2 and positive rate.

At 7:49:17, the captain asked, "You got it?" To which the first officer responded, "Yep." The CVR recorded several sounds of the stabilizer trim in motion within about seven seconds after the airplane began rotating from the runway. Post-accident examination of the horizontal stabilizer jackscrews

indicated a trim position of full nose down.

At time 7:49:20, soon after the flight became airborne, the first officer stated, "We're going back. CG's way out of limits." Seconds later, a sound similar to the stick shaker was recorded, and then the captain stated, "Push forward."

At 7:49:36, the flight crew contacted Sacramento Approach Control to declare an emergency. From around this point until the end of the CVR recording, the CVR transcript contains several references indicating that the pilots were trying to lower the nose and maintain control of the airplane.

At 7:49:40, the first officer stated, "You steer, I'm pushing." The flight engineer then stated, "We're sinking. We're going down." This was followed by the sound of the ground proximity warning system alert, "Whoop, whoop, pull up", which sounded continuously for the next several seconds.

At 7:50:04, the last transmission from the flight crew to Air Traffic Control was "Emery 17, extreme CG problem."

At time 7:50:37, the first officer stated, "What I'm trying to do is make the airplane's position match the elevator. That's why I'm putting it in a

bank." Additional GPWS alerts were recorded on the CVR around 7:51:02, and the end of the recording occurred at 7:51:09. The duration of the flight was approximately two minutes.

The blue trace in this slide shows the track of Emery Flight 17. The flight departed to the southwest and began turning back to the airport but impacted roughly two miles east of Runway 2-2, and it impacted into an automobile salvage yard.

Soon after the flight recorders were turned to the NTSB's laboratory in Washington, D.C., investigative groups were formed to analyze the flight data recorder data and to produce a transcript of the CVR recording. A CVR sound spectrum study was initiated to examine a sound just before rotation that had been identified by the CVR Group as a "ratcheting noise ending with a clunk."

As part of this study, investigators recorded and compared numerous noises in an attempt to identify the ratcheting noise, including such things as the airplane stall warning or stick shaker and the movement of flight control columns, flight crew seats and cargo containers. Although the source of the noise was not determined, the study indicated that the ratcheting

sound was unlikely to have been caused by movement of cargo over the rollers in the cargo compartment. Likewise, information documented by the Safety Board about the weight and loading of cargo on Flight 17 indicates that the cargo was well within limits for weight and center of gravity.

During examination of the flight data recorder data, staff discovered anomalies with the elevator position parameter recorded for Flight 17. This had not been previously detected because the Safety Board had been provided with incorrect conversions for elevator data. Once staff applied the proper offset and corrected the elevator data, it became apparent that the elevator movement in the airplane nose-down direction was restricted on Flight 17. This was despite forward deflection of the control column.

In fact, at no time during the flight, including during the 80-knot elevator checks, did the elevators travel below neutral. In other words, the airplane nose down. As a result of these findings, investigators from the Airworthiness Group reconvened in Sacramento to perform a detailed examination of Flight 17's wreckage to look for components of the

elevator flight control systems.

Now, before continuing, it's appropriate that we take a look at the DC-8 elevator system and the operation and design. The DC-8 employs what's called a tab-driven elevator control system. With a tab-driven elevator, the control columns are linked by cables and linkages to the elevator control tabs. Deflexion of the control tabs causes deflection of the elevators and subsequently changes in the airplane's pitch attitude. In flight with the tabs in the neutral position, aerodynamic forces on the elevator will cause the elevator to trail behind the stabilizer in a nearly fared position.

When the pilot pulls the control column back, the elevator control tabs are moved down, as shown in the plot, in the figure. The aerodynamic effect of this is to cause an opposite movement of the elevators, in this case trailing edge up, this in turn causes the airplane to pitch up. Conversely, pushing the control column forward deflects the control tabs up. The resulting down deflection of the elevators causes an airplane nose-down response.

The DC-8 tail is represented in this slide. The control tabs, you can see in green on the inboard

aft portion of the elevators. The outboard on this are the gear tabs and what they do is they deflect opposite the deflection -- opposite the direction of the elevator deflection to assist in moving the elevator.

During the Airworthiness Group's return visit to examine wreckage of Flight 17, additional components of the elevator control system were identified. The group soon focused on differences in the damage to the left and right elevator control tab push rods and associated attachments.

This slide is a diagram of the elevator control tab push rod and its connection to the elevator and to the control tab. If you'll notice on the forward part of the push rod attaches to the elevator crank fitting. The aft portion of the push rod attaches to the control tab crank fitting.

The push rod for the left elevator control tab had been heavily damaged by impact forces. Both forward and aft rod ends were fractured, and the push rod was bent in the middle. The aft crank fitting where the push rod attaches to the control tab had been consumed by fire. In contrast, the push rod for the right elevator control tab, including both ends, was found intact and relatively undamaged.

In addition, the aft crank fitting remained intact and attached to the control tab inboard hinge fitting. The bushings in the clevis lugs were also present with no visible signs of internal damage or deformation. However, the bolt that attaches the push rod to this fitting was not found nor were the associated nut and cotter pin.

Now, if you'll notice on the same slide, we've got a circle that identifies this aft connection of the aft push rod and the elevator control tab crank fitting. The evidence associated with all these components is consistent with this bolt not installed at the time of impact.

In this photo, these two photos, you'll see a photo of the connection between the aft push rod and the control tab crank fitting. It's just on the inboard portion of the elevators. You'll see a close-up view in the upper left-hand corner there.

Using the corrected FDR elevator data and findings from the Airworthiness Group, Safety Board staff began modeling the effects of an elevator control tab split on Flight 17. This is a bit of a busy plot, but let me walk you through it.

In this slide, you're going to see the

elevator deflection recorded from the FDR is shown in red. Note that the elevator is trailing edge up, in other words, airplane nose up, for the entire flight. Neutral, you can see the zero on the left-hand side would identify neutral, and this is the plot. It remains in the negative area which is airplane nose up for the entire flight. The FDR data, which is not shown on this slide, by the way, but the FDR data for the control column showed a nose-down command.

Now, because the elevator control tab deflections are not recorded on the FDR, it was necessary for staff to extract this data. This was possible because of the available data, FDR data, for control column and elevator positions, and the known relationship between the control tab, the control column and the elevator. This tab deflection is shown in green in the figure and is labeled "the left control tab" just above the elevator plot. The right control tab necessary to balance the elevator and its recorded deflection was calculated using the DC-8 aerodynamic model. This tab deflection is shown in blue at the top of the plot.

Note that the working left control tab is at the trailing edge up stop of 8 degrees for almost the

entire flight; in other words, the maximum airplane nose-down elevator possible. Because the elevators are designed with much greater travel in the airplane nose-up direction, the left control tab would not be able to overcome the greater deflection and authority of the disconnected right control tab. This is compounded by the effects of the gear tabs which would add to the authority of the disconnected right control tab in keeping the elevator trailing edge up.

As a result of the findings involved in the elevator control tabs, an additional Maintenance Investigative Group was formed. This group focused on the history of the elevator assemblies and their associated installation and maintenance. Numerous interviews were also conducted to better understand issues involving maintenance and oversight of Emery's operation.

A D check had been completed on the accident airplane in November of 1999. This D check had been performed by Tennessee Technical Services or TTS. As part of this D check, the right and left elevator assemblies had been removed by TTS and overhauled assemblies provided by Emery were then installed.

On November 25th, 1999, approximately eight

days after the D check sign-off, the flight crew of November 8079 Uniform, the accident airplane, reported that the elevator required more back pressure than normal to flare to the aircraft. After troubleshooting the problem, Emery mechanics discovered that the left and right elevator dampeners were reversed. The dampeners were swapped and an operational check was performed with no defects noted.

A follow-up investigation by TTS and Emery after the dampeners finding revealed that the elevator dampeners had been installed improperly before the elevator assemblies were provided to TTS.

Now, during the course of the investigation of Emery Flight 17, the Safety Board learned of several safety inspections of Emery operations that were conducted by the FAA between 1999 and 2001. The most recent was a focused inspection conducted in May and June of 2001. The purpose of the inspection was to review logbook entries of corrective actions between March 1st, 2001, and May 1st, 2001, to determine if Emery maintained their aircraft in an airworthy condition.

On August 13th, 2001, the FAA and Emery Worldwide Airlines signed an Interim Agreement

stipulating, among other things, that Emery would immediately cease all commercial air carrier operations conducted under Parts 119 and 121 of the Federal Aviation Regulations. The Interim Settlement Agreement cited as its basis FAA inspections dating from February 2000.

The Safety Board's public hearing that we had planned last summer, originally scheduled for August 22nd through 23rd, was postponed to allow Emery to focus its efforts on matters related to this suspension.

A Final Settlement Agreement between the FAA and Emery was signed approximately one month later. In this Agreement, the FAA and Emery agreed to work together to address issues outlined in the Agreement and that Emery would not be allowed to resume operations until meeting standards set by the FAA.

Subsequently, in an Amendment to the Final Settlement Agreement, dated December 4th, 2001, Emery informed the FAA that it did not wish to resume commercial air carrier flight operations.

Mr. Chairman, the record of this investigation to date has been entered into the public docket. All materials now public and available to the

Safety Board's Public Inquiries Branch.

This concludes my opening remarks.

CHAIRMAN GOGLIA: All right. Thank you, Mr. Hilldrup, and would you please call the first witness?

MR. HILLDRUP: Yes, sir. The first witness will be Mr. Nick Gentile for Boeing.

CHAIRMAN GOGLIA: All right. Mr. Gentile, would you please take the stand?

Whereupon,

CAPTAIN NICHOLAS A. GENTILE

having been first duly sworn, was called as a witness herein and was examined and testified as follows:

EXAMINATION

BY MR. HILLDRUP:

Q Mr. Gentile, could you please state your name for the record, your address, your current employer and your title, please?

A I'm Captain Nicholas Gentile. I'm employed by Boeing as Chief Pilot, Flight Crew Training. My current address is [redacted] California, and I work for the Boeing Company.

Q Could you review your experience, please, for your job?

A As a Chief Pilot, Flight Crew Training, at

Boeing, my job entails responsibility for training airline pilots worldwide and those who purchase Boeing equipment. I'm also responsible for achieving type rating for new aircraft, based on -- on the training for -- for first -- first-of-a-type with writing the manuals, developing flight training procedures and obtaining approval for the -- for the training for the courses from the FAA for first-of-a-type aircraft.

Q Thank you, sir.

MR. HILLDRUP: Captain Gentile will be interviewed by Mr. -- excuse me -- Captain Egge.

MR. EGGE: Thank you.

BY MR. EGGE:

Q Good morning, Captain Gentile.

I'd like to thank you very much for your participation at this public hearing today.

A Good morning.

Q I'd like to discuss three general topics with you today. A history of the DC-8 events leading up to the installation of the elevator position indicator or EPI, a review of Boeing or McDonnell publications on elevator checks and the EPI, and elevator-checking procedures.

Let me start by asking you if you would give

us an overview of the DC-8 elevator operation and a history of events leading up to the installation of the EPI on the DC-8?

A I will. Thank you.

We would like to cover the elevator control system overview, the elevator position indicator history, the elevator control check evolution, the current procedures for the elevator control check, what is known and explained, what the 80 knot check during take-off is, and -- and if I can summarize the presentations.

For the elevator control system overview, we'd like to particularly point out what was already pointed out, the location of the control tab, the gear tab, and the relationship of the elevator to the horizontal stabilizer.

These pictures portray that on the actual airplane. The left photo shows the elevator with the gust lock on and shows the position of the gust tab -- of the control tabs and the geared tabs in relationship to the elevator with -- with the gust lock on as being faired.

The picture to the right and upper part of the screen shows the gust locks off. It shows the

elevator trailing edge up. It shows the elevator control tab trailing edge up, and it shows the gear tab trailing edge down.

CHAIRMAN GOGLIA: Mr. Gentile, before you go on, would you just, for the audience, let them know what a gust lock is?

THE WITNESS: A gust lock is a control in the cockpit which allows the controls to be -- the elevator to be locked to the stabilizer, and it allows the rudder to be blocked in a powered-on position to overcome gusts on -- on the ground, and it also blocks the inboard 2 and 3, 3 throttles, so that the aircraft movement with the gust lock on is very difficult. It's for the protection of the controls on the ground in high-wind conditions.

CHAIRMAN GOGLIA: Thank you.

THE WITNESS: Finally, the bottom photo shows the empennage with the gust locks on.

We have a simplified DC-8 control system, some of which has been pointed out to you already. This shows -- this shows the first officer's control column, and in the first officer's control column and the captain's control column are bussed together, but for simplicity, we just show the first officer's

control column, and we particularly would like to note the control stops on the -- on the -- on the first officer's -- on the column as depicted.

We then also show the cable and mechanisms back to the elevator which move the elevator in accordance with the desires of the pilots from the control column, and we also want to point out the control tab stops for the control tab mounted on the elevator.

Later on, when we discuss the control checks, it'll -- it'll be important to understand that we will be moving the controls to where we will contact the elevator control tab stops previous -- prior to the control column stop, so that as we move the control columns for the check on the ground, we will be moving, actually moving the entire elevator. This is a completely manual and -- and these control checks are important in -- in this manual system.

Finally, on the upper part of the screen, we show the gear -- the geared tab and its linkage, and what we'd like to show is the relationship to the horizontal stabilizer since it's -- it's permanently affixed to the horizontal stabilizer. So, as the -- as the elevator moves, the control tab -- the geared tab

will move in relationship to the movement of the -- of the elevator, and it does not have any controls to that geared tab from the cockpit.

Next, we'd like to cover the elevator position indicator history. This depicts the picture of the EPI, elevator position indicator, in the cockpit of the sister ship for the accident airplane taken -- taken in the Emery cockpit in Dayton, Ohio, and it shows especially the location of the -- of the EPI. It is located on the first officer's panel. We will actually show in a video that we have the -- the operation of the control check and the operation of the EPI. This indication of the EPI shows -- is an indication with the gust locks on, which shows it in the neutral faired position.

The elevator position indicator history. We had some occurrences of FOD jamming in the elevator hinge line in 1970. TIA, TransInternational Airways, aircraft had a take-off accident in which a foreign object became logged between the -- the horizontal stabilizer and the elevator in -- in -- in that area. It was determined to be a piece of macadam.

In 1972, a flight engineer during a walk-around discovered some FOD in the hinge line of a DC-8

in which it -- it was an object that appeared to be an axe handle sort of thing. It was about two foot long, and it was wedged directly between -- in that hinge line between the -- the elevator and the stabilizer.

Some other incidents of -- of issues leading up to the EPI was during the '72 and '74 time frame, there were some reports of fractured and cracked control columns, and then in 1974, we had requests and reports from operators, excuse me, and from ALPA reporting the snow and ice might be creating -- might be FOD in this hinge line.

Developmentwise, in 1970, the NTSB recommended consideration of -- of an elevator position indicator. In 1971, Douglas Aircraft and the FAA concluded that the EPI was not necessary. That was also the position of many of our operators at the time.

In 1973, Douglas Aircraft began an engineering study to -- to look again at the requirements for an EPI. In 1974, ALPA again requested the EPI system be installed on the DC-8, and in 1974, we began an in-service evaluation of an EPI system installed on a customer's airplane. I believe it was Flying Tigers. At the end of that time, reports were very positive on the -- on the use of the EPI in

service, and in 1975, Douglas Aircraft released a Service Bulletin for the installation of an EPI.

In 1977, Philippine Airlines had an RTO accident in which they had some geared tab crank-ons failed, which jammed the elevator in the trailing edge up position. The airplane aborted due to the nose coming up early in the take-off run, did run off the runway and -- and had an accident.

After that, 1978, the elevator position indicator was mandated by an AD from the FAA and for the installation, and also at that same time, elevator check procedures were described using the -- when the EPI was not available.

The control check is an integral part of this DC-8 operation, and there's an evolution to the control check, also, for baseline or roll-out. From the very beginning, the directions were for full-aft control column movement followed by a full-forward control column movement, checking for full and free movement with no binding.

In 1970, after the TIA accident, the DAC baseline check was reiterated in a -- in a "Know Your DC-8" Letter, Number 43. In 1973, in an Addendum to that letter in 43-A, it was recommended that to

accomplish the roll-out check into the wind. Since this is a manual system, when you're taxiing normally, you're taxiing downwind, the controls become very heavy with the wind pushing against them, and it was recommended that if the control check could not be satisfactorily concluded, at that point, then it was suggested to wait until the airplane was turned into the wind to accommodate the proper control roll-out check.

In '73, also, an "All-Operators" Letter was released to inspect the areas between the stabilizer and the elevator for FOD after ground engine runs. It was felt like that was probably the time when most of the FOD was -- was being ingested in the -- in the area between the stabilizer and the elevator.

In 1974, on the heels of the control column fatigue cracks and failures, it was recommended that, in an AOL and also an All Operators Letter, that both pilots should simultaneously apply full aft and then full forward pressure to the controls during the roll-out check.

In 1975, along with the installation of the EPI, it was also a "Know Your DC-8" Letter that recommended roll-out check procedures which

incorporated the EPI installation. The letter in Number 53 was to check the EPI needle moves down into the -- into or transitions through the white band with full aircraft nose-down elevator applied to accomplish the elevator roll-out check into the wind if tail wind prevents a valid roll-out check and, finally, if neither of these things happen, to accomplish a positive visual check to verify proper elevator operation, if -- if the -- neither of the first two were accomplished.

In '75, of course, there was the Service Bulletin 27-254 released for the installation of the EPI as an aid to flight crews during elevator checks, and also in '75, the flight crews were informed in an AOL to apply control column pressure slowly during roll-out checks.

The -- the issue with applying control column -- trying -- applying pressure slowly was to overcome the resistance of the yaw dampeners -- I'm sorry -- the -- the gust dampeners in the control system to the movement of the controls. So, the dampeners are such that they're -- they would resist rapid movements from -- from wind gusts and they would also resist rapid movements and the object is a slow, steady, especially

the push part.

CHAIRMAN GOGLIA: Mr. Gentile, again for the -- for those in the audience and maybe elsewhere, the gust lock is a separate system from the dampeners?

THE WITNESS: Yes. Yes, they are. The gust dampeners are -- are built to provide some resistance to rapid movement to keep large controls that are manual controls from slamming and damaging the controls.

In 1977, as part of the elevator control check evolution for airplanes that were not equipped with the EPI, again a letter was released encouraging the use and the installation of the EPI to accomplish the elevator roll-out check into the wind was reiterated and also to introduce an optional 80 knot check during the initial take-off roll.

This was also done at the point in time to allow for inoperative EPI and to give the crew some guidance. We'll talk about -- well, we'll describe the 80 knot check again later, but what we have is to recommended was a small movement forward of the control column during -- during the take-off roll between 60 and 80 knots and also to check for the reaction of the aircraft nose to the slight movement of the controls.

In 1977, all this was again reiterated in a letter, "Know your DC-8", 53-A.

In 1978, after the EPI was mandated by AD for -- for the airplanes not yet equipped with an EPI, the elevator checks were restated and also the 80 knot check was restated, and for airplanes with an EPI to use -- utilize the elevator check procedures, if the EPI was inoperative, and --

CHAIRMAN GOGLIA: Mr. Gentile, I don't think you've made it clear why this check was proposed at 80 knots.

THE WITNESS: The -- this was a check that was proposed at the time, if the EPI was inoperative, to -- that a -- the -- this -- to assure the crew that the elevator and the -- was -- was -- and the airplane was reacting properly to elevator inputs, and they could do this on the runway during take-off roll between 60 and 80 knots.

CHAIRMAN GOGLIA: And that's because there's air flow across the flight controls and that they could feel the response to the control column?

THE WITNESS: Correct, and there should be -- there should be a response by the airplane actually to the nose of the airplane in dipping.

CHAIRMAN GOGLIA: That -- that's the point I wanted you to make.

THE WITNESS: Thank you.

In 2001, Boeing amplified control check procedures in a Flight Operations Bulletin. It was the reiteration of previous recommendations, plus the -- a reiteration of the check for the position of the elevator and tabs during a walk-around, and we will -- we will show the -- all of that in the video when we have a video for the walk-around, and to check the EPI needle to move during this -- during the control roll-out check to a point below the white band with full aircraft nose-down elevator during -- during that check.

If the roll-out check is unsatisfactory, then a positive check must be made with a trained observer prior to take-off, and this was to advise operators that the 80 knot control check was not an adequate substitute for control roll-out check, as it had been in the past. It was now retracted. The 80 knot check is still available to the -- to the operators as a load check, but if the controls do not achieve the desired movement of the EPI needle, then they must return and get a visual control check accomplished.

Okay. Current -- current procedures for the elevator control check. The system is checked during the flight engineer's or second officer's walk-around inspection, normally twice. It's checked prior to starting engines. Some operators check it once, some operators check it twice. The roll-out check is performed after engine start during -- normally during -- during taxi procedures.

The flight engineer' walk-around visually checks the elevator in the tab position and condition. With the gust locks on, the elevators and the tab are faired with the stabilizer as shown in the early picture and as will be shown in the walk-around video.

With the gust locks off and no control inputs, the elevator goes trailing edge up because it's mass balanced in that direction. The control tabs go symmetrically trailing edge up, and the gear tabs go symmetrically trailing edge down.

Okay. If we could have the -- if we could play the walk-around video, please?

CHAIRMAN GOGLIA: Mr. Gentile, while they're getting that up, the flight engineer in doing his walk-around normally would have the gust lock engaged or on?

THE WITNESS: Both. The first -- approaching

the airplane, it would be with the gust locks on, and then the flight engineer would normally go into the cockpit, do his cockpit prep, then release the gust lock.

We wanted to show from the flight engineer walk-around what the gust lock -- what it would look like with the gust locks on. If it's bright enough to see that the elevator, the elevator tabs and the stabilizer are all faired.

(Walk-Around Video)

CHAIRMAN GOGLIA: Now, that view is not a view that we normally have from the ground.

(Walk-Around Video)

THE WITNESS: And stop the video, please.

That last view is also one that the flight engineer would not have since -- since he wouldn't see the motion. He would just know where the controls should be from the -- from the walk-around training.

CHAIRMAN GOGLIA: And also, the view was taken from 10 feet off the ground, and he would be on the ground.

THE WITNESS: Correct. Actually, I wasn't there, but they tell me that they tried to show both on the ground and -- and a head-on view.

Okay. The DC-8, the cockpit check after engine start for the controlled roll-out. The roll-out check checks the elevators, the ailerons and the rudders. For this hearing, we're only going to focus on the elevators.

It's performed after engine start because the ailerons and rudders are hydraulically actuated, so that they need the hydraulic power for those two. The elevator check calls for both pilots to simultaneously apply full aft control column followed by full forward control column.

In checking for freedom of control column movement and appropriate elevator motion on the elevator position indicated, the EPI, it is important for the crew to note the position of the EPI when the gust locks are on prior to releasing it, so that they can ascertain at that point that the elevator does move and is free to move and it does move to trailing edge up position.

Could we do the -- roll the video for the roll-out check, please?

(Roll-Out Check Video)

THE WITNESS: This is a picture of an EPI gauge from another aircraft which is in a different

position on the first officer's panel.

(Roll-Out Check Video)

THE WITNESS: Thank you.

That would be a satisfactory control check by the crew in that it showed the movement of the elevator position and the elevator from the faired position. When it was released, the elevator was free to move, and it moved to its balanced position of trailing edge up, and the tabs were checked by coming back. Since the trailing edge was already up, the tabs just move on that first check and that's the reason that we asked for the check to be made with the trailing -- with the nose up pulling the controls back, and finally then the full control movement for first the tab movement going nose down and then when the tab engages the stop that we talked about on the elevator tab, when that stop is engaged, then the entire elevator is moved by the pilots and the controls to the nose-down position, and the requirement now is that the -- the EPI gauge move below the neutral position, and then finally the EPI gauge needs to be watched the entire time so that as that's released, then the elevator will again return to its normal trailing edge up position.

Okay. The 80 knot check that we discussed

earlier, which is a check performed during a take-off roll, it's optional. Control check during the initial take-off roll, small up and down elevator movements to check weight distribution. The crew observes the pitch of the aircraft in response to that small movement.

The use of the EPI at this stage is not recommended by Douglas, has not -- was not recommended by Douglas when it was installed and is not recommended today by Boeing and that we also noted under the Change 2001 that this 80 knot check is not a substitute for an elevator control roll-out check.

So, in summary, Mr. Egge, the DC-8 elevator control checks have evolved with service experience. The EPI was designed to aid the flight crew during pre-take-off checks, and the 80 knot control check is not a substitute for an elevator control roll-out check.

Thank you.

MR. EGGE: Okay. Thank you for that presentation, Captain Gentile.

BY MR. EGGE:

Q In the presentation, you spoke rather extensively about the EPI or the elevator position indicator.

Could you give us some insight by what was

then Douglas Aircraft in the design and development of that gauge?

A The gauge was designed at the -- at -- at -- at the behest of -- after the studies and the proving grounds, and it was designed to be used on the ground, basically statically, to -- to ascertain that the elevator was -- was free to move and that it moved properly and that's the only purpose for the EPI gauge.

Q There are other airplanes out there that have an elevator control system somewhat similar to the DC-8's elevator control system. The DC-9 and, I believe, the Boeing 707, also, come to mind.

Could you tell us why these airplanes are not required to have an EPI gauge?

A Well, I've never been associated with the 707 and can't -- can't respond to that.

But -- but I have flown the DC-9 as part of my qualifications and my background with Delta Air Lines, and the DC-9 elevator, unlike the DC-8 elevator, is not bussed together. So that, the tabs, that the elevators are free to move in either direction independent of one another, and if one were to create a jammed tab on the other elevator would operate -- the elevator would operate and would be certainly a handful

of airplane but would be flyable.

Q Okay. I'd like to draw your attention to Exhibit 2-Q, which is the Boeing Flight Operations Bulletin, dated June 19, 2001.

First of all, could you tell us something about this document? Basically what it is, what its purpose is, how it came about?

A The document came about to reiterate the -- the proper elevator control roll-out check and also it was to discuss the -- the -- the 80 knot check. In the -- in the evolution of the -- of the operation over the years, we've noticed that the checks are conducted on the elevator control roll-out much more rapidly than they were designed to do, and therefore it seemed to some operators to be more difficult to achieve the proper positioning of the elevator position indicator, and yet what we saw in -- in the -- in the video was what we looked to achieve, and if it's done slowly so that there's less resistance from the gust dampeners, it'll be done properly, and they'll get the reading below the neutral.

We wanted to reiterate that the indication should be below the neutral and the EPI gauge rather than just in the band so that it will take that much

longer to be held in a position and will give the crew a more positive indication that their elevator control system is operating properly.

On the evolution that we found on the -- on the 80 knot check, in fact, some airlines were using that operation and it was done at higher speeds. In the original and all the way through in the letters, we've always recommended that in cases of crosswinds and in cases of slippery runways, that -- that this not -- not -- not be used.

The concern, of course, is destabilizing a take-off and that we've never recommended the use of the EPI gauge at any time during take-off or the 80 knot check. So, we wanted to reiterate what the check should -- how the check should be done and also to remove it from the proper roll-out check, proper control check of the elevator prior to take-off. Prior to the beginning of take-off roll, a proper control check should be -- should be conducted for the manual -- for the manual system, even if it means going back and having a visual check accomplished.

Q And I believe you've touched on this a little bit earlier, but how does this FOB different from previous All Operator Letters, other FOBs or other

publications put out by Boeing or McDonnell on the subject?

A Well, I guess the two -- the two changes in -- that is significant in -- in this letter is that we have also mentioned that the tabs, the tabs in the walk-around, need to be faired which the tabs had not specifically been mentioned in the past. It's just that the elevator needed to be faired to the stabilizer, but here we mention tabs, also, as a proper check and -- and then this -- this FOB removes the -- the 80 knot check as a substitute for a control roll-out check that was not properly performed.

Q Also in Exhibit 2-Q, on Page 1, the last sentence in the second paragraph states that "During the flight control roll-out check, elevator function should be verified by first applying full up elevator and confirming that the needle on the EPI moves in the up direction", and then as you've pointed out before, "followed by full down elevator to the column mechanical stop and verifying that the needle moves through the faired position to a point below the white band."

Here's a case where the full up and full down elevator has been commanded, but the EPI is not

required to show the respective full up or full down indication for a valid test.

How can a pilot looking at this be assured that the elevator is truly functioning properly when this check is accomplished?

A Well, by the -- by the proper control roll-out checks, the elevator was free to move to the up position and then free to move down to the neutral position. If there was a possibility of an elevator obstruction as we had noted in the past between the -- the elevator and the stabilizer, that -- that would -- control roll-out in that manner would not be possible.

In a manual system with -- with the resistance and the weight that this elevator has, there's a lot of cable stretching and there's a lot of resistance from the gust dampeners to the movement to prevent a full -- a full movement without -- without the proper wind over the tail and that's why having the needle move just below the neutral is a satisfactory check, and the crew can be comfortable with the fact that the elevator is free to move.

Q Let's say that the elevator for whatever reason is malfunctioning and the movement is restricted. How would a pilot be able to tell that

based on this roll-out check procedure?

A Well, if the elevator is restricted, when -- the first indication might be when the gust lock is released that the elevator would not move to its normal trailing edge up position and that's why it's important that they check prior to releasing the gust lock and during releasing the gust lock.

Secondly, when the elevator -- if it -- if it were to be in the jammed position, would be -- movement would be difficult since once you get past the control tab stops, then you will be carrying the elevator itself with the controls, and it would be -- it would be difficult to move or it would not move on the indicator, and we're really relying on the indicator to check the proper movement as we saw in the video.

Q And along those same lines, let's say that one of the elevator control tabs was malfunctioning again for whatever reason. How would a pilot know that?

A Probably the best indication would be during the walk-around, when the elevator control tabs and the elevator are in the -- are in known positions. If -- if the control tabs are malfunctioning, that -- that would probably be the best indication. There are no

indications in the cockpit of the control tab, and unless it were some type of jam where it wouldn't -- the controls wouldn't move, the pilot would not know that there was an issue with the control tabs.

Q In the video that you showed, whenever the check was being accomplished, it appeared that there was considerable effort by the operator to move the elevator.

Can you give us some idea of how much force that takes to -- to do that?

A It -- it could take up to a hundred pounds and -- and that's the reason that we ask both pilots to move those controls on the ground together.

Q In the "Know Your DC-8" Letters that you mentioned and in this latest FOB, it states that "When accomplishing the flight control roll-out check, that pilots should first apply full up elevator and then followed by full down elevator to the controlled mechanical stop."

Could you tell us why the procedure's performed in that order?

A Yes. The procedure is performed in that order since, you remember, when we release the gust locks, the elevator goes trailing edge up, and it's

just about on its -- on its stops due to the mass balancing.

At that point then, we are checking the elevator control tab for its movement, but we're really not moving that elevator, and then when we get all of that back first, then when we start forward, we start moving the elevator control tab to the nose-down position, and then when the elevator control tab hits the elevator control tab stops as we showed in the early diagram, then we will begin moving the elevator to the -- to the nose-down position, and we're looking for a movement past neutral there.

Q Also in your presentation, you've explained what an 80 knot control check is, and I believe you've touched on this already, but to properly accomplish this check, would it be necessary for one of the pilots to observe the movement on the EPI?

A No, it would not be necessary for a pilot, and -- and Boeing does not recommend that the pilots divert their attention in the cockpit. We really do think that the attention should be outside the cockpit during -- during the take-off roll as much as possible.

Q Okay. And along the same lines that -- that I asked before on the roll-out check, let's say for

whatever reason, we've got an elevator that's malfunctioning, restricted in movement. On this check, on the 80 knot check, how would a pilot know that?

A If the elevator were restricted in movement, then on the 80 knot check, the -- they may not be able to get any reaction from the nose of the aircraft, if in fact it is not moving.

Q Okay. And again along that same line, say the elevator's free to move but say one of the control tabs is not operating properly, how would a pilot know that then during that 80 knot check?

A I'm not sure that the pilot would know that during the 80 knot check. It depends on a lot of conditions that might be present, but if -- if the other controlled tab is functional and this -- and it may allow for the operation of the -- of the elevator sufficient to -- to in fact give some movement to the nose to convince the pilots that it was a satisfactory check.

Q Okay. And you've already mentioned that Boeing does not recommend that check.

Could you give us some idea, based on your experience, what -- what other tasks are the pilots performing, say the flying pilot, while going down the

runway and then some of the operators do use this 80 knot check? But could you give us an idea of what -- what tasks are being performed by the flying pilot during that time?

A Well, during the time, they have, of course, responsibility for communications. They will have completed the checklist. They will be managing the power on the -- on the aircraft, steering the aircraft down the center of the runway, watching the air speed indicators and -- and -- and looking out, of course, for traffic and any abnormalities that might occur outside the aircraft as well. Pretty busy time.

Q And also along that line, how about the non-flying pilot, the tasks being performed at that time?

A Well, it -- it -- it varies with which of the pilots is the non-flying pilot, but in -- in most cases, the non-flying pilot is assisting with the setting of the -- of the engine powers and is assisting with air speed call-outs which both -- both pilots will acknowledge, like an 80 knot check, which is the first indication of air speed movement since the air speed starts -- indicator starts at 60 knots, 80 knot check to cross-check air speed. They're checking for any -- any other problems that -- or any other indications

that might be abnormal in the cockpit prior to reaching a decision speed or the V1 speed. So, both pilots are involved in calling call-outs. Pilot not flying calls out the air speeds all the way through V1, VR and V2 and checks for positive rate. So, the pilot not flying is inside and outside the cockpit.

Q Because this check's being accomplished on the take-off roll, you've mentioned a number of concerns about that.

Is there any concern with -- in addition to what you've already said, with the location and size of that gauge, of the EPI?

A No. I operated the airplane for about 3,000 hours with that gauge, and it's never been a concern for me. The purpose of the gauge is -- is for ground control checks prior to take-off, and it was never intended for any other purpose, and it was never a concern.

Q Okay. Again, you've stated that your view about this 80 knot check and many operators do indeed use it.

Are there times when -- when this 80 knot check just absolutely should not be done?

A Well, we recommend that it not be done on --

in wet, slippery runway conditions and also in moderate crosswinds, and it is -- it is a check that is still available to all the operators and is a check to, in essence, to check the load of the airplane, the handling characteristics, based on load, rather than a control check at this point.

Q Can you give us a feel for how many carriers out there actually do use this 80 knot check on take-off?

A I think the majority of the -- of the DC-8 operators who -- who were using the DC-8 in freight hauling use that. At Delta Air Lines, where I operated a DC-8 in passenger service, we never used that check, and if we didn't get a good control roll-out, we had to go back to the ramp.

Q Okay. Could you give us any insight as to why you didn't use it in the passenger operation?

A Well, at that point, we did feel it was a bit destabilizing, and it also would be a bit uncomfortable to the passengers because in this check, you're moving the entire 197 feet of aluminum up and down, and if at the same time you start hitting little potholes in the runways or dips, it -- it would exacerbate it. So, we didn't feel it was -- it was an option, and we didn't -

- we didn't choose to use it at Delta Air Lines at the time.

Q If you could, how could you improve this gauge? Any thoughts on that?

A I think the gauge is -- is -- is performing what it was developed for and that is the purpose of checking the fact that the elevator is free to move, and it came as a result of the FOD problems that we had, and I -- I don't -- I don't feel that there's any -- I never considered the gauge for any other purpose when I operated the airplane. That was a lot of years ago, and -- but even today, I don't consider it as any requirement to do anything different. It would have to be for a different purpose and -- and for the purpose that this gauge is used, that's -- that's sufficient and proper.

Q Okay. Other than the gauge itself, how about the procedures? Any thoughts on how the procedures could be improved?

A I -- I think we -- we did that in the 2001 letter that we put out in which we reemphasized some of the procedures that were there in calling for checking with the tabs and any alignment of the elevator and the -- and the -- to the stabilizer with the gust locks and

checking it.

I think we can achieve satisfactory results with the control checks that we have requested without -- without the 80 knot check requirements. So, I -- I don't see that we can do much with a manual system, other than check it.

Q Okay. You've got considerable experience, obviously, with a malfunctioning elevator, one that's restricted in movement in one or both directions.

How could that be misconstrued by a pilot as being a center of gravity or CG problem?

A The reaction of the -- reaction of the airplane would be the same, and it would be if -- if it was a reaction of a nose-up, it would appear to the pilot right at take-off to be a bad load. The same with a nose-down. It would appear to the pilot to be a heavy forward load to -- to where the -- they wouldn't be able to rotate.

So, it could easily be construed by the pilots to be a load since in flight, there's no other indication to the pilots of an elevator problem.

Q And finally, some folks are familiar that Boeing held a DC-8 CG conference in June of last year.

Could you tell us what the purpose of that

conference was and any accomplishments that may have been derived from it?

A The -- the CG conference was held at -- at the request of -- of one of our customers from about nine months probably prior to the -- to the accident that we're sitting here for, and they had had some CG problems on take-off, and they had asked that we develop some procedures which might be termed "escape maneuvers".

At this time, in -- at Boeing, we determined it would probably be proper to study the engineering aspects of their request and then to assemble the -- the DC-8 operators from the industry since they had tremendous expertise and experience that we could use for -- for the -- to answer the questions from our -- from our customer on an escape maneuver.

We did -- we did some engineering studies and are still studying the issue and -- and have determined with the -- with the experience of the customers in attendance at the meeting that there may be an escape maneuver that -- that could be developed in -- in the future, although we're still doing engineering studies on that, which -- which would allow itself to -- to training to where we could maximize the use of the

energy left in an airplane with a bad CG and then -- and then at the proper time go through some procedures and basically a steep turn maneuver to allow the airplane to accelerate in a turn and to where air speeds will be gained and altitudes gained, where the airplane then can be leveled and flown back and -- and -- and in the type of bad CG that they might encounter.

We are still studying the engineering aspects of the possibilities of -- of applying this to -- to a flight control issue, but that is not as clear as it is in applying this to a bad CG. So, we hope that we'll be able to make some suggestions for training in the -- in the future when we finish our engineering studies.

MR. EGGE: Okay. Thank you very much, Captain Gentile, and I have no further questions.

CHAIRMAN GOGLIA: All right. Captain Gentile, I have a clarification I'd like you to make or a little addition.

You talked in great depth about the captain and the first officer, but as we both know, there's a third person in the cockpit, the flight engineer. I wonder if you can explain for the benefit of everybody here what the flight engineer's duties are at this time. Just what is he doing, and what's his role, what

he's required to do?

THE WITNESS: The flight engineer's duties are -- are really company-specific, but in -- in -- in speaking in generalities, he -- he, along with the rest of the crew, is very busy. He has to operate all of the -- all of the systems from -- from the fuel through the pneumatics through -- through the air conditioning and -- and have hydraulics and have everything prepared for take-off.

He also completes the checklists. He's -- he's the person at that point who -- who is also helping with the management of the engines, if that's the company's procedures, some companies use that others do not, and he's also facing forward rather than sideways at that time and helping with the scanning out-- out -- out the window and -- and -- and also watching his own panel for any abnormalities.

CHAIRMAN GOGLIA: Okay. Thank you.

And one other question. In your video, I noticed what appeared to be shaking motions on the part of the person sitting in the first officer's seat when he was pushing the control column forward. Now, that could be construed as -- as really excessive column forces.

Do we know what the column forces were, and is that in fact a -- a considerable amount of force being placed upon the control column?

THE WITNESS: The control column forces at that juncture could be up to a hundred pounds of force on the ground. We don't normally hear that wavering sound in the cockpit, but we did -- we did on the video, and I'm not going to cast any aspersions to the person doing that checking sitting behind there.

CHAIRMAN GOGLIA: Okay. Thank you.

To the parties, Federal Aviation Administration?

BY MR. STREETER:

Q Captain Gentile, if I could, I'd like to clarify a few of the basic items you covered at the beginning because I think for the audience, some of this, we might want to straighten out for -- for later clarification.

In the one video where we showed the static position of the elevator on the ground with the gust lock off, and you said due to mass balance, the elevator was trailing edge up at the point. I believe it also showed the control tab trailing edge up in that video, is that correct?

A That's correct.

Q Okay. Would that be the same situation that we would see if the elevator was commanded trailing edge up in flight?

A No, it would not.

Q Okay. So, the control tab at that point would actually be trailing edge down, is that correct?

A That's correct.

Q Okay.

A That's correct.

Q Would you please explain the purpose of the geared tabs?

A Okay. The -- the geared tabs are, if you would, bussed to the control system and moving the elevator, and -- and they are attached to the -- to the rear of the stabilizer, and -- and as the -- as the elevator moves, the geared tab moves in conjunction with the elevator tab to give it assistance, and it's on both sides, so that as you get inputs from the elevator tabs, as the elevator begins its movement, then it -- it mechanically moves the geared tabs and they also assist in moving the elevator in flight.

Q Okay. Now, when you say they assist, do the geared tabs always move opposite or with the control

tabs?

A They move with the control tabs.

Q The control tabs.

A It is, yes.

Q Okay. And the reason I bring that up is because in the relaxed position shown in the video, it is correct that the geared tabs would oppose the control tabs?

A Correct.

Q Okay. In the Service Bulletin that Boeing issued in 1975, this would be the original service -- I believe it was 27-254. This was the original Service Bulletin calling for the -- the EPI installation, and then we see it's three years before the AD note is issued.

Do you have any background at all as to why the three-year difference there?

A Actually, what -- what I am aware of today is that there was a lack of enthusiasm on the part of the operators at the time for the EPI and -- and only a few were installed between '75 and '77, and then -- and then it was determined that it needed to be done, and it was -- it was -- the AD was issued in '78, after the Philippines accident.

Q Okay. And then, so then, when -- when Boeing issued the second Service Bulletin, I believe it was 27-264, you -- you took that opportunity to also urge the operators to put the EPI in?

A Correct.

Q Okay.

A Correct.

Q Now, regardless of the operators' reactions at that point, is it correct that the EPI was available for installation after 1975?

A Yes, it was.

Q Okay. And -- and they would have had the option of putting it in; they didn't have to wait for the AD note, is that correct?

A Correct.

Q Moving on to the -- the 80 knot check, and we talk about the -- the -- the dip, the visual effect of the dip. Is that a significant dip? Is it a subtle thing? Is it something the crew can easily spot?

A It -- it's -- it's easily spotted by the crew in a normal reaction.

Q Okay. Mr. Hilldrup, in his opening information that he provided, indicated that on the accident flight, the elevator never did go nose down on

take-off.

Can you assess in any way what effect that would have had on the visual dip? Could you have still generated a visual dip, even though the -- the elevator didn't go to a trailing edge down?

A I -- I would have to make an assumption at this time, and the fact that I was on the Cockpit Voice Recording Committee and did hear --

Q Hm-hmm.

A -- that the 80 knot check was satisfactory, which indicated that there was a dip, and there was some movement at that time, maybe not to the nose-down position but there was -- there was some movement of the elevator.

Q Okay. And from your understanding of the basic aerodynamics of the airplane, does that seem feasible?

A It -- it -- it does.

Q Okay. Now, understanding that -- that Douglas or Boeing did not recommend the use of the EPI on the 80 knot check, would this same elevator limitation, the elevator not going to a nose-down position, do you -- do you think that would have had any effect on the EPI indication?

A If -- if they got a -- and they reported a good control roll-out check, then the EPI went below or went to -- to the neutral area at that time, I don't think that -- that anything else was -- was a requirement since they had a good control roll-out check prior to the beginning of this take-off.

Q Okay. Very good, sir. And then, just one last item again of clarification.

During the video showing the walk-around check by the flight engineer, because we had some shots there both -- I think there was at least one from ground level, but some of them appeared to be taken from an apparatus up so that you were actually looking at the trailing position of the elevator, can -- can the flight engineer on the walk-around from the ground, can he readily determine the elevator and tab positions both with the gust lock in and out?

A Yes, I believe so.

Q Okay.

A On the walk-arounds that I've been on, on this and other airplanes, I always step back and -- and take a look at the entire empennage for my own edification and that was part of my walk-around.

Q All right. And you've never experienced

difficulty then determining whether you had trailing edge up or --

A No.

Q -- trailing position?

A No.

Q Okay.

A None at all.

MR. STREETER: That's all I have, sir. Thank you.

CHAIRMAN GOGLIA: Okay. Thank you.

I was remiss in jumping to the parties without finishing the Technical Panel.

So, Mr. Hilldrup, do we have any other comments from the Technical Panel?

MR. HILLDRUP: Yes, sir. Just a couple questions.

BY MR. HILLDRUP:

Q To follow up with Mr. Streeter's question about the walk-around and what you could see, could you characterize what somebody might be able to see at night, which is when we're talking about most of the time? Would it require flashlights or -- or ramp lighting of some kind? Could you characterize what they might see and how difficult that might be?

A The pilots are required to carry flashlights as part of their equipment, and the flashlight is required for walk-around at night, and -- and they should -- the -- the elevator tabs and the elevator and the stabilizer need to be checked at night just the same as in the day time. It may take a little bit more time and a little bit more attention with -- with the view the flashlight it gives you, but it -- it is a requirement that it be accomplished and be accomplished with a flashlight.

Q Just one more question. To follow up on some of the issues about the AD and the Service Bulletin, could you comment at all about what is in the AD for the installation of the EPI? Could you talk about what's in there regarding the operational use of the EPI? Are you familiar with that?

A It -- it -- it described for the operators the use of the EPI, and in that, if I recall correctly, in that first AD, it asks the operators to explain the control roll-out check using the EPI and then further stated that -- which is where we're going back to, that the EPI should go below the neutral zone at that time.

Q And with regard to the 80 knot check, as far as you know, there is no instructional use for -- for

the use of the EPI during the 80 knot check in the AD?

A Correct. It was never recommended by either Douglas or Boeing.

Q Right.

MR. HILLDRUP: Thank you. That's all I have, Mr. Chairman.

CHAIRMAN GOGLIA: All right. Thank you.

Back to the parties now. Well, why don't -- Mr. Streeter from the FAA, anything additional?

MR. STREETER: No.

CHAIRMAN GOGLIA: Okay. And Emery Worldwide, Captain Hagquist.

BY CAPTAIN HAGQUIST:

Q Good morning, Captain Gentile.

A Good morning.

Q I have a few questions for you. The CG conference that you described, the DC-8 CG conference, --

A Yes.

Q -- was Emery present at that?

A Yes, they were.

Q And they participated in that?

A Yes, they were. And I'd like to comment that Emery allowed us the use of their simulator for tests

that we ran previous to the conference, and we thank you.

Q You're welcome, sir.

During the course of the investigation, have you become familiar with Emery's operating procedures as they were contained in the DC-8 Aircraft Operating Manual, Volume 1?

A Somewhat.

Q You mentioned that operators did either one or two walk-around checks of the elevator, one with a gust lock engaged, one with it disengaged.

Can you tell us what -- do you remember what Emery's procedure was?

A Yeah. Emery's was a very thorough walk-around procedure with both the gust lock engaged firs and then with the gust lock disengaged and describing the requirements for the gust lock disengaged and -- and engaged for the flight engineer or second officer to check.

Q The situation of being able to tell whether the tabs are symmetrical or asymmetrical on the walk-around check, in the video, it showed fairly clearly that the two tabs we're talking about being symmetrical are on opposite elevators.

A Correct.

Q So, if I look at the left elevator, I expect to see asymmetric tabs with the flight -- with the gust lock removed and the aircraft static, is that correct, sir?

If I look at the control tab and gear tab on -- on the left elevator, will they be symmetrical?

A With the gust lock removed?

Q Yes, sir.

A On the left elevator, no.

Q They will not?

A No.

Q Thank you.

The tabs that I would be interested in looking at to check for the -- the symmetry are going to be the outboard tabs on the left and the right elevator, the inboard tabs on the left and the right elevator, is that correct, sir?

A Correct.

Q In your -- in your video, you can see that the tail cone and the nav tail light assembly protrudes between the two elevators for what appears to be maybe two feet?

A Correct.

Q If I were trying to do that at night with a flashlight, do you suppose that I could get far enough back to be able to illuminate both of those tabs and -- and still have enough light to see an asymmetric situation with those tabs?

A I -- I really would have difficulty, I think, depending on the power of the flashlight and how big a flashlight the second officer's carrying and what the capabilities are of the equipment he's using.

Q Sure.

A It would -- it would require that.

Q All right. Again, on your video presentation of the walk-around, typically as you testified, you've done walk-arounds on a DC-8. Typically, my experience is that the walk-around on a DC-8 is generally conducted sort of within the shadow of the airplane, not getting very far in front of very far behind the airplane. You mentioned that in your walk-arounds, you typically stood back and -- and did that kind of an overall view.

About how far back would you have to go to do that, sir?

A Oh, probably 10 feet.

Q Okay. Again in the video, I know it's been

said a number of times already, but the video really didn't depict a flight engineer's walk-around because of the elevation of the camera?

A Correct.

Q About how high above the ground is the elevator?

A Oh, I would guess 30 feet.

Q Thank you, sir.

If we look at the current Flight Operations Bulletin, the June 2001 bulletin, in your testimony, you stated a number of times that that's a reinforcement, a reiteration or restatement of guidance that Boeing Douglas had put out earlier.

A Correct.

Q But in your presentation, you pointed out what I -- what I felt were two rather great differences in those two presentations. My recollection is that the Letter 53-A was the letter that was current at the time of the accident.

A I believe that's correct.

Q That would have been the May of 1977 letter.

The two differences that you spoke to and that I'd like to bring to everyone's attention again is that until the 2001 letter, there was never any

guidance to the operator that the needle of the EPI would go below the white band that I'm aware of.

A Okay. In the -- in the original letter, when the EPI was installed in that -- and I think that number is 254 rather than 264, in the original letter, it did in fact talk about the control roll-out going below the -- the neutral. After that, in -- in later letters, it only spoke to going to the neutral zone.

Q All right, sir. Can you tell us what the range of that neutral zone is? What -- what does the white band depict?

A It's about a 5-degree -- it's about a 5-degree range in -- in the neutral area.

Q Hm-hmm. And does it go from zero to minus five or zero to plus five?

A I don't recall.

Q All right, sir. In 2-Q, in the exhibit, there is a graphic of the EPI. It's on Page 1.

A Right. It's zero to five.

Q Five up?

A Yeah.

Q Okay. Thank you.

Is that -- is that graphic indicative of the size of that indicator?

A No. The indicator is one inch.

Q If we -- if we took that one inch and said it's the size of something that we can all relate to relatively quickly, is it -- can I use a quarter?

A Yes.

Q Okay. Thanks.

You had two different airplanes depicted in your presentation. The airplane that was depicted in the still photos, that appeared to be a sister ship of 79 Uniform.

A Correct.

Q And I noticed the EPI in that airplane was located below the flap indicator.

A That's correct.

Q If you were sitting in the first officer's seat on an airplane configured as 79 Uniform was configured, where would that EPI have been in relation to your -- your line of sight?

A It would be off to the left and down.

Q How far down would it be, do you think?

A Well, it's down on the skirt above the panel, just above the skirt of the panel.

Q Basically say knee-level?

A Well, --

Q When you're sitting, it's down about your -- about your left knee?

A Correct.

Q Sure. Okay. In the -- in the design of the -- of the elevator position indicator, which is what the EPI stands for, if I'm not mistaken, --

A Correct.

Q -- does it -- was it ever in the design that this was going to give any indication of where the tabs were?

A No. No, it never was.

Q And when you read the guidance that was developed by Douglas at the time that first recommended and then through an AD, an FAA AD, mandated the installation of the EPI, I always see that the EPI was developed to address the situation of a jammed elevator.

A Correct.

Q And maybe I'm not on track here, but to my mind, a jammed elevator means one that will not move. Is that a fair assessment of what a jammed elevator is?

A I -- I think, you know, the term "jammed" means that, but it also -- there could also be restrictions to the movement of the elevator.

Q All right. That was going to be my point. Was in -- in the case of 79 Uniform, was the elevator jammed or was the elevator restricted from full motion in both directions?

A On the accident aircraft?

Q Yes, sir.

A It -- it -- the elevator was free to move.

Q Okay. A lot of discussion on the 80 knot check. Boeing, when they came out with the check, advised that the check should be done between 60 and 80 knots, if I'm not mistaken.

A Correct.

Q You and I and other people that operate -- have operated the DC-8 always call it an 80 knot check.

Are you aware of operators -- you said you knew that some freight operators, of course, were still using this check. Do you know any operators that are doing it at 60 knots?

A Well, I -- I've never really looked at -- at all the operators, and so I'm not aware at the speeds. We still recommend at the end that it be over at 80 knots.

Q Would -- would Boeing or Douglas have had any technical objection to an operator moving the speed of

that check to a minimum of 80 knots and a maximum of a hundred knots?

A I think had we been requested, we -- we would probably have had a technical objection because it was not something that I think that can go beyond the 80 knots. It -- it gets -- it gets pretty -- it gets pretty quick up in those areas, especially if somebody is questioning whether -- what it feels like, although, you know, we would acknowledge that you get better response between 80 and a hundred than you would between 60 and 80.

Q I certainly would agree with you that those first few seconds of the take-off roll, the crew is tasked with -- with -- heavily tasked.

At what -- at what speed does Boeing still recommend that take-off thrust be set and stabilized on the take-off roll?

A At 80 knots.

Q So, in your description of all the activity that's going on in the cockpit, a lot of which was driven towards management of the engines, at 80 knots, those tasks should go away?

A Correct.

Q All right. I noticed that as far as exhibits

that you were tasked with, and I know this has been a fluid situation in this -- in this hearing, but you were tasked with observing -- with reviewing some of the print-outs from the digital flight data recorder?

A Correct.

Q Can you go to the -- to the data from that and identify both the control roll-out checks and the 80 knot check? Would you be comfortable in doing that?

A I'll need to find that. Could you identify the exhibit, please?

Q I can -- I can steer you to them, if you would like. The first exhibit would be Exhibit 10-F, and it would be Page 2, sir.

A I don't have a 10-F. I have a 10-E. Thank you. What page, please?

Q If you go to Page 2, sir.

A Hm-hmm.

Q And you're familiar with this tabular kind -- this -- this type of tabular read-out?

A Yeah. Actually, I was not tasked with this, but -- but I -- I did have it in -- in a linear read-out, but we'll work through it.

Q The very first column on the left-hand side is Pacific Standard Time.

A Okay.

Q All right. If we come down that column into the time frame of about 19:42:29, --

A Okay.

Q -- and we begin to read left to right, we're going to go through a number of columns, one of which is CCP, and I believe that's control column position.

A Okay.

Q If you'll notice, starting at about 19:42:29, I noticed the control column position in fact goes from a minus 17 to a minus 3.9 and then comes back up.

A Okay.

Q The far right-hand column is the elevator position in degrees. In that same time, the elevator position in fact does show a range there, but it gets into the 2.8 and 3.8 range.

A Correct.

Q Would that be in the white band, sir?

A It could be in the white band because you've got a 5-degree range. Sure.

Q And again going back to Letter 53-A, that would have been an acceptable control roll-out check under the existing guidance?

A Correct.

Q All right. The 80 knot check that most operators do, --

A Hm-hmm.

Q -- that involves pushing the stick forward as one of the checks to see if the nose will in fact go down.

Could you put a quantitative number on how far the nose can go down and the airplane's still solidly on the ground?

A No.

Q Can't go down very far, though, can it?

A No.

Q Okay. If we go to Exhibit 10-J, sir, -- do you have it, sir?

A Hm-hmm.

Q The -- the handwritten page number would be Page 1, the typed page number is II-9.

A Okay.

Q This would be the 80 knot check on the accident flight. If we look again in the far left-hand column at time 19:48:50, and we go three columns to the right, we have pitch attitude in degrees. You'll notice that the pitch in that particular -- from there to the next plot, which is at 19:48:51, the pitch went

from a positive .2 degrees to a negative .6 degrees.

A Correct.

Q That's a nose-down pitch?

A Correct.

Q Is that a pitch that, in your experience on the airplane, that would be noticeable to the crew?

A Yes.

Q Would that be an acceptable 80 knot check if -- if an operator required an 80 knot check?

A Yes.

Q Okay. In the case of the accident flight, sir, where the determination is made that the control tab was disconnected, would the crew have had any indication in this particular take-off, either during the control roll-out check or the 80 knot check, that something was wrong?

A I don't --

Q Simply using the EPI now.

A Using the EPI, I don't believe so. If -- when the controls hit the control tab stops and they moved the elevator, the EPI moved.

Q Thank you, sir.

CAPTAIN HAGQUIST: I have nothing more.

CHAIRMAN GOGLIA: Okay. Thank you, Captain

Hagquist.

Airline Pilots Association?

MR. GUNTHER: Thank you, Member Goglia.

Todd Gunther from the Airline Pilots Association.

BY MR. GUNTHER:

Q Captain Gentile, if your associate, Mr. Steelhammer, could go ahead and bring up that slide show for me again, I would appreciate it.

A Okay. The request is that we go back to the slide show?

Q Yeah. If you could go ahead and bring up Slide Number 8 for me, please?

Okay. Previously, during your testimony, you were talking about the position of the EPI, and I do realize that the video tape that Boeing provided was for demonstration purposes only for -- so that the folks here in the room and the Technical Panel would be able to go ahead and see the exact movements of the EPI and how it worked.

A Correct.

Q The one that you currently are showing is a sister ship to the accident aircraft, is that correct?

A That's correct.

Q Okay. The wheel that we see on the right side in the panel is the first officer's position, is that correct?

A That is the first officer's position.

Q Okay. The captain, of course, would be sitting to the left side of the center quadrant which has the thrust levers, the FMS, etc., over there.

Do you know whether or not that that gauge would be fairly visible from that position where it's located right now?

A Yeah. It would take the captain actually leaning to the right to -- to visualize that gauge from his seat.

Q Okay. And Boeing, which used to be Douglas, the previous recommendations for use of the EPI, you said the EPI was used for control roll-out check only, it's not for the 80 knot check, is that correct?

A That's correct.

MR. GUNTHER: Okay. Could I go ahead and have you go to the next slide, Bill, please?

BY MR. GUNTHER:

Q You'll notice that it's labeled one inch in diameter, and the rub mark that you see just to the left over there is basically a lot of times where

pilots and crews will put their feet. You can go ahead and put your feet up there at that point. So, it's very low down on the panel. As we heard before, it's down near the knee of -- of the first officer.

If you take a look at where that's at, if the first officer sitting, it's very difficult for them to see that gauge if they're manipulating the controls during the take-off roll.

Would you agree with that?

A That's -- that's correct. It was never intended to be used for take-off motion.

Q Okay. And in this instance, Mr. Hilldrup, the investigator-in-charge, stated that during his initial statement, that the first officer was the flying pilot, is that correct?

A That's correct.

Q Okay. If you could go ahead -- and I don't know if you have your exhibits up there, but if you could look at Exhibit 2-I for me? It's handwritten Page Number 17, and do you have it, Captain Gentile?

A Yes, I do.

Q Okay. Could you go ahead and read the last paragraph for me?

A The last paragraph?

Q Yes, please.

A "Between" -- it starts with the word "Between 80 and a hundred knots, the pilot flying shall exert a forward pressure on the elevator to the stop and then release the yoke to slightly forward of neutral. The crew should confirm a nose-down response. Depending on weight and loading, the pilot flying may need to apply the nose-down elevator more than once to get a satisfactory response. Once the check is complete, the flying pilot, the pilot flying, should state elevator checks. The first officer looks for the EPI to respond to yoke movement when the elevator check is made. The captain must know the elevator's working properly early in a take-off. If he is in doubt, he should consider aborting the take-off."

Q Okay. And can you tell me what manual that page you're reading came out of?

A It came out of the DC-8 Aircraft Operating Manual for Emery Worldwide.

Q Okay. Can you go to the next page for me, please? There's a table that's labeled 2-3-1.

A Correct.

Q Okay. And under "Pilot Non-Flying", if you go down to the column that says, "At 80 knots indicated

airspeed", K-I-A-S, in the left-hand column, --

A Right.

Q Okay. Could you read what the first officer is supposed to be doing, which is right next to the PNF? It'll say "F/O" on the top of the column which is first officer.

A Okay. It says, "Watch the EPI during the elevator check."

Q Then I believe the Douglas in the recommendation, did you not say that that EPI is set up for the roll-out check only and is not for checking during the 80 knot check?

A That's correct. It was developed for -- for control roll-out checks to check the freedom of the elevator.

Q Okay. I have sitting on my table, I've got three DC-8 qualified crew members here. Myself, I'm a pilot. Captain Gentile's a pilot who's also flown a DC-8.

I'd like to ask, Captain Gentile, would you find it difficult if you were the flying pilot sitting in the first officer's position to look at that EPI while you're steering the aircraft down the runway for take-off using those procedures?

A That -- that was a procedure never recommended by Boeing because of the distraction to the crew. On this aircraft, it might be more difficult to view that instrument because of the location. On others, the location is in different -- different positions but still not recommended for anything but static-type control roll-out checks.

Q Okay. The other thing I'd like to ask you, also, the non-flying pilot, his call-out is 80 knots.

Where would he be referencing that from in this case, the captain?

A Captain's air speed indicator.

Q And where would that be located on this particular configuration of the aircraft?

A It'd be on the -- on the left side of the -- of the captain's panel and would not be in this picture.

Q Okay. So, that would be off the left side, so the EPI would be located approximately how many feet from the area that he would be looking at at that time?

A Halfway across the cockpit, however long that is.

Q Okay. Where does EPI physically pick up its information? Do you know where it's attached to, where

it's feeding off of?

A No, I really don't have that -- I really don't have that information.

Q Now, you've flown the 8 before, and you'll normally get a nose-dip. If you were to forward CG, would you get as pronounced a dip as you would normally? Do you know if it would be visible if you were forward CG at the 80 knot check?

A At a forward CG, would you get a -- as pronounced as you would with an aft CG?

Q Yes.

A Probably not as pronounced, but there always is room in the nose gear to -- to move.

Q How's the EPI calibrated?

A Other than what the gauge shows, I'm not -- I'm not aware of how the EPI is calibrated.

Q So, you're not aware if there's any follow-on calibration of that after installation?

A No, I'm not.

Q Is the scale on the EPI graduated at all?

A From the -- graduated in -- in what --

Q Are there any other indications, other than up, down and neutral?

A No, not -- not on the -- not on the

indicator.

Q Would it be possible for the EPI, for installations on different aircraft, to give different readings for the same control column movement in normal service?

A I think -- I think it would be, based on the wind conditions and the stretch of the cable and -- and all for the same control column movements, conditions would differ.

Q Okay. One of the other things that you talked about was the walk-around. Some operators do a single walk-around and others do twice walk-arounds.

Could you expand on that a little bit?

A The -- the flight engineer for most of the airlines are tasked to do a walk-around prior to entering the cockpit to check the general condition of the airplane, especially the elevator, and then after their procedures, in preparing the cockpit to release the gust locks and do a second walk-around to specifically check the flight controls but that's generally when a more thorough walk-around is done, also, for the rest of the aircraft.

Q Have you ever known nose gear servicing to affect the indication of the dip during the 80 knot

check? In other words, under-servicing or over-servicing of the nose gear?

A I haven't been involved in maintenance. I do know that different loads and different -- different nose gears react differently as during taxi.

MR. GUNTHER: No further questions, Mr. Chairman.

Thank you, Mr. Gentile.

CHAIRMAN GOGLIA: Thank you, Mr. Gunther, and Tennessee Technical Services, Mr. Hoffstetter?

MR. HOFFSTETTER: Yes.

BY MR. HOFFSTETTER:

Q Could you go through one more time when you talk about pushing forward on the yoke, the -- which position is that? What are we achieving when we do the 80 knot check or the elevator position check? We push forward. That's going to a --

A That's going to a nose-down condition checking the ability of the elevator to be -- to be free.

Q Would there normally be an abort response if you didn't get a positive 80 knot check? Is -- is -- we know what the normal response is from -- from everybody.

Is there a different response if you don't get an acceptable 80 knot check?

A I would assume that most carriers would have it in their instructions to consider aborting as did -- as did Emery on an unsatisfactory 80 knot check.

Q When you -- when the engineer that would first approach the aircraft and look at the tabs with the gust lock on, if the tabs were not in a faired position, he would consider that reason to contact maintenance or -- or write some discrepancy. Is that -- is that your understanding?

A That -- that is my understanding. That would be an unsatisfactory condition.

MR. HOFFSTETTER: That's all I have. Thank you.

CHAIRMAN GOGLIA: Thank you, Mr. Hoffstetter.

And finally, the Boeing Company, Mr. Breuhaus?

MR. BREUHAUS: Thank you.

BY MR. BREUHAUS:

Q Just to go back for a further point of clarification on the point of view, if you will, on the video, two things, and you might check with Bill on this.

Did the video show both point of view from the flight engineer vantage point, i.e. on the ground, as well as the elevated view?

A Yes. The response is yes, both -- both views were --

Q And perhaps --

A It was done in that fashion, just as an education.

Q And perhaps you could go to, I believe it is, Slide 5?

A Is my company supposed to be asking me questions? Is that allowed?

Q Are -- are the upper -- are these all points of view from a person standing on the ground?

A The photographer says yes.

Q Yes. So, -- so, just for clarification, here are -- here are viewpoints from a person stationed on the ground looking up, is that correct?

A That is correct.

MR. BREUHAUS: Thank you. No more questions.

CHAIRMAN GOGLIA: Okay. To the Board of Inquiry and then Mr. DeLisi.

MR. STREETER: Thank you.

BY MR. DeLISI:

Q Good morning. Captain Gentile, the gust lock, can you describe where in the cockpit the control for that device is?

A It is mounted on the co-pilot side of the cockpit, and it is adjacent to his left knee, and it would be close to the center console. When the gust lock is on, it is down, and when it is off and released, it is in the up with a big yellow handle on it.

Q In the DC-8 fleet history, are you aware of any incidents in which an operator attempted to start their take-off roll with the gust lock still engaged?

A I am aware that there was a partial engagement of a gust lock years ago and which created an abort.

Q It became immediately apparent to the flight crew during roll-out perhaps that there was a jam?

A Correct.

Q A couple of questions about the EPI. The gauge itself has a slash mark with the word "up", a slash mark with the word "down".

What do those slashes indicate?

A That the elevator is in the nose-up or the nose-down position.

Q Is that intended to be the limit of nose-up and nose-down travel?

A It is. It is the limit that -- that they could possibly travel.

Q Because during the video of some of the ground tests, it appeared as if the indicator was beyond the extent of the slash marks for up and down, for up, is that possible?

A If -- if it were -- as it was, it looked like it got to the full-up position, but it could be, depending on the rigging of the EPI gauge and the elevator.

Q Is it -- I know there is not a procedure now for the EPI to be an instrument used in flight, but is it possible that the EPI could be referenced by a flight crew in the air?

A I don't know to what extent it would be of value to the flight crew, but I believe it can always look down and be possible.

Q I guess I -- I'd like your opinion if you think that the response of a flight crew may be different if they understand that the problem they're encountering in flight is a restriction in the flight controls versus a shift of their CG.

A If -- if they could understand the difference, I -- and we are studying that at this time, we think that the maneuvers that we are developing for an escape maneuver, that pilots' reaction would probably be close to the same.

Q Okay. One final line of questioning. The Service Bulletin that came out in 1975 for the installation of the EPI, can you again characterize what the operator's response was to that Service Bulletin?

A There was some resistance in 1975 to the incorporation of that Service Bulletin. I believe only a few of the operators made the installations early on.

Q And then, you talked about a 1977 RTO accident that involved a jammed elevator. Do you recall which operator that was?

A I believe that was Philippine Airlines.

Q Do you have any idea whether they had installed an EPI prior to their accident?

A No, I do not.

Q The -- the FAA then in 1978 mandated the installation of the EPI.

Had Douglas previously lobbied the FAA for mandating that installation after the '75 Service

Bulletin?

A I'm not aware of any lobbying efforts back in 1978, but I do know in '77, that we did publish a second AOL, Number 264, in which we were encouraging the operators to in fact install the EPI gauge.

Q And finally, do you believe that the 1977 accident spurred the industry response, including the FAA, in mandating the EPI?

A In -- in the search going back, it would -- based on the dates and times, it would indicate that.

MR. DeLISI: Thank you. No -- no further questions.

CHAIRMAN GOGLIA: Okay. Dr. Kushner?

DR. KUSHNER: Thank you.

BY DR. KUSHNER:

Q Just curious. When a pilot believes he has a CG problem, is there a procedure that he can follow to determine if it's that or something else?

A No, there is not.

Q So, there's no way for him to really --

A There probably isn't time.

DR. KUSHNER: Okay. Everything else has been covered.

CHAIRMAN GOGLIA: Okay. I have no questions.

Mr. Hilldrup, any follow-on questions for this witness? To the parties, does anybody have a clarification or follow-on?

MR. STREETER: Member Goglia, with your permission and with Captain Gentile's permission, I -- I believe he mentioned that he was on the CFR Group. I know the CVR transcript is not one of the exhibits for him, but if it's acceptable, I'd like to ask one question.

Have you read the transcript?

THE WITNESS: I was in the hearing.

MR. STREETER: I can affirm two pages specifically.

CHAIRMAN GOGLIA: Would you like -- Captain Gentile, would you like some time to refresh your memory? Because it's lunch time. Why don't we do that? Why don't we break for lunch and come back at -- at 1:30?

THE WITNESS: I can digest lunch better if we finish now.

MR. STREETER: Well, this will be a simple one, sir.

CHAIRMAN GOGLIA: Okay. Try.

BY MR. STREETER:

Q Okay, sir. Captain Gentile, if you could look, first of all, at Page 9 of the transcript? The question will actually come two pages later, but I believe Page 9, I need to know if it's related. About mid-page there, 19:24:48, --

A I'm sorry, I still don't have it.

Q Still don't have it. I'm sorry, sir. Hold on.

CHAIRMAN GOGLIA: It's not that simple.

THE WITNESS: Okay. Page 9 of 66.

BY MR. STREETER:

Q Page 9 of 66, --

A Correct.

Q -- time 19:24:48, you can see a discussion starts there on the stabilizer trim setting, and what was that stab at 1.9, 1.6, and then you hear the stabilizer in motion.

For the rest of that page, the next page, Page 10, it appears that it's just routine conversation, and then when we reach Page 11, at 19:25:51 or about one minute after the stabilizer trim was set, there's the statement, "Something's not right. It appears -- I swear, must be mistaken, unintelligible, and finally swap positions here."

My question is, whether or not you recall this, and whether or not the CVR Group -- understanding that a transcript is rather dry, was the CVR Group able to determine what the crew was talking about during that period where they said "something's not right"?

A No. We paid a lot of attention in this area and were not able to determine who made the statements and what -- what the discussion was about or even if it was a crew member at that point.

MR. STREETER: Okay. That's all I need. Thank you, sir.

CHAIRMAN GOGLIA: Okay. Does that open up any other thoughts or questions from any of the parties?

(No response)

CHAIRMAN GOGLIA: Okay. Captain Gentile, this concludes this portion of your testimony. I am not releasing you nor will I release any of the other witnesses at this time. So, I request that you stick around and enjoy the proceedings.

THE WITNESS: If I may, I'd like on behalf of Boeing and myself to offer my condolences to the members of the -- family members of the crew who in our estimation did a professional job, and also thank the

Chairman and the NTSB for allowing us to participate in not only this hearing but in other activities that Boeing participates in.

Thank you very much.

(Whereupon, the witness was excused.)

CHAIRMAN GOGLIA: Okay. We also share those feelings, and I would like to acknowledge before we break for lunch that we have two former Board Members present, Dr. John Lauver, and I saw the former Vice Chairman Robert Francis, and I would like to welcome them here today.

With that, we will break for lunch until 1:30, and I get to bang my gavel.

(Whereupon, at 12:07 p.m., the hearing was recessed, to reconvene this same day, Thursday, May 9th, 2002, at 1:30 p.m.)

A F T E R N O O N S E S S I O N

1:39 p.m.

CHAIRMAN GOGLIA: Okay. We can go back on the record now, and Mr. Hilldrup, will you call your next witness, please?

MR. HILLDRUP: Yes, sir. The next witness is Captain Hagquist from Emery Worldwide Airlines.

Whereupon,

CAPTAIN RICHARD HAGQUIST

having been first duly sworn, was called as a witness herein and was examined and testified as follows:

MR. HILLDRUP: Please be seated.

EXAMINATION

BY MR. HILLDRUP:

Q Captain Hagquist, would you give us your full name and address, current employer and title, please?

A I would, sir, but if I could just take a moment before we begin.

I would like to express my personal condolences and those of Emery Worldwide Airlines to the families and our appreciation to the NTSB for the opportunity to participate in the investigation and these proceedings.

My name is Richard Hagquist. I am the Director of Flight Operations for Emery Worldwide Airlines, 1 Emery Plaza, Vandalia, Ohio 45477.

My background. I'm an airline transport-rated pilot. I have -- I'm type rated on 11 different aircraft, including the DC-8, certified flight instructor, ground instructor, flight engineer.

Emery is the fourth airline that I've worked for that operates the DC-8 airplanes. I've got approximately 14,000 hours total time with about 4,000 hours of that in DC-8. Also for a great part of my career in the DC-8, I was also a check airman and instructor, and I do have nearly the same amount of time, 4,000 hours, of simulator time for the DC-8.

Q Thank you very much.

MR. HILLDRUP: Mr. Chairman, Captain Egge will be questioning Captain Hagquist.

BY MR. EGGE:

Q Okay. Good afternoon, Captain Hagquist.

I'd like to thank you very much for your participation in these proceedings.

I'd like to discuss Emery Worldwide Airlines' DC-8 elevator-operating and checking procedures that were in existence up to and at the time of the accident

and also any changes that have been made since that time. Let me start with the elevator-checking procedures on the DC-8 that existed at the time of the accident.

Could you begin with the pre-flight inspection? I know we've -- we've talked about that a bit this morning and from Boeing's perspective, but from Emery's perspective and -- and basically what you're training the pilots and -- and what Emery's procedures are, if we could start with the pre-flight inspection, and if you could describe that for us, please?

A The pre-flight was accomplished by the flight engineer and second officer. It was done in two phases. The first phase was called the initial pre-flight and that involved the flight engineer making certain that the area around the airplane was clear. He did a preliminary cockpit check. The gust lock at this point is engaged. He notes that the elevator and stabilizer and tabs are all faired or in trail. He goes through a few procedures in the airplane and then goes back outside and does a more detailed walk-around inspection.

At this point, the gust lock is released and

our guidance to the -- to the crews was exactly as Captain Gentile described. We gave them the same criteria for the elevator and tabs with the gust lock removed in a balanced position, balanced condition.

Q I'd like to refer to Exhibit 2-I, Page 4. This is an excerpt from Emery Worldwide Airlines Normal Operations, Volume 1, DC-8 Aircraft Operating Manual. At the top of the page is Initial Pilot Station Pre-Flight.

First of all, is the flight engineer the one who is actually doing this -- this pre-flight, this part of the check?

A Yes, sir.

Q Okay. We talked about this a little bit this morning as well, but with -- with the gust lock on, according to Emery's procedures, what -- what indications should there be on the EPI?

A The EPI will be somewhere in the neutral range, in the white band.

Q Okay. And is this a part of Emery's procedures to check that as a part of this pre-flight inspection?

A No, sir, I don't believe so. I believe this part of the inspection, the grading criteria was the

actual position of the tabs and elevator in relation to the stabilizer on his initial walk-around.

Q Okay. On the same page at the bottom, where it states, "Gust lock off", when the flight engineer does the exterior pre-flight, is -- is this statement -- is this something that the -- I believe this is the first officer now or -- or correct me, or is this the flight engineer doing this at this point with the gust lock off?

A The flight engineer does the pre-flight.

Q Okay. So, that's part of this. So, he would be releasing the gust lock at this point?

A Yes.

Q Okay. On Page 7, the same exhibit, 2-I, about two-thirds of the way down the page, after Position B, where it starts, "Left-hand and right-hand elevators tab alignment and condition", hypothetical case, what if both of the control tabs were up, looking at this, but one was up more than the other? Would that be acceptable during the pre-flight?

A In your hypothetical, I would have to tell you that it would be extremely difficult to see any amount of symmetry between those two tabs in my opinion. We do, I believe, in another one of our

documents, and I'd have to do a little research to get back on that one, but I believe we do talk to some -- some symmetry.

Q You talk about symmetry between control tabs, left and right elevator?

A That's right. It would be not in this particular volume but in the volume that's the Systems Description Manual. I believe we had some language that did talk to that.

Q Okay. How about the geared tabs? Is that the same? Is there anything in here on -- about symmetry about that?

A Not in this document, no.

Q Okay. Is there any difference between doing a pre-flight inspection whenever it's -- like an -- we refer to it as an originating flight as opposed to a through flight?

A We did have -- we did have an abbreviated checklist for through flights.

Q Okay. On the accident flight, we had the flight engineer come in from Reno, stayed with the airplane and then departed.

Is that considered a through flight, then?

A Well, actually, if there was a crew change, I

would expect that they did an originating check, but regardless of which one of the checks they did, either the through flight or the originating flight, the requirement for a walk-around exists in both.

Q It's the same? Is it the same?

A It is. Yes, that walk-around's required.

Q Okay. I believe you touched on it a little bit earlier actually in your questioning, but could you describe how easy or difficult it would be for the flight engineer to -- to see the elevator and the tabs and so on during the pre-flight at night?

A Well, you can certainly see them. My point in the questioning was that where you're making a comparison from one tab to the other, that they're not side-by-side. There -- there's -- in the case of the tabs in question, the control tabs, the tail cone of the airplane is between the two. So, you're going to have to make a judgment of symmetry that's very difficult in my opinion to make.

Q Are you familiar with the ramp layout and so on at Mather Field near Sacramento and where the airplane was parked that night?

A Only -- only on diagram, sir. I'm not --

Q Okay.

A -- familiar with the physical layout, no.
Q Okay. That's fine. And I'm not sure if we brought it out earlier, but is it Emery's procedure after the flight engineer does the walk-around to go back into the cockpit and then reengage the gust lock?
A Typically, that's what he would do, yes.
Q Okay. On the after-start checklist, there's a gust lock off, and who actually does that at that point? Who disengages the gust lock?
A The first officer.
Q Okay. And -- and then, whenever it says gust lock off, is -- is the first officer actually disengaging it at that point or is he just verifying that it's off?
A No. The first officer will manually move the gust lock lever.
Q Okay. The next check after doing the initial walk-around and so on as the airplane taxis out, and we've covered some of this before again, but I'd like to know just from Emery's procedures and what you're training the pilots and -- and what the Emery procedures are, of course, in doing the -- what's called the roll-out check or the taxi check of the elevator, if you care to, you can refer to Exhibit 2-I,

Page 11, where it says, "Controls EPI checked".

A Yes, sir, I have it.

Q Okay. Thank you.

The last sentence under that heading states that "the first officer should call out EPI checks".

First of all, what is Emery's procedure for -- for doing this check?

A It's exactly as it was described by Captain Gentile. You need to check the controls around all three axes. The ailerons are checked, the elevator's checked, and the rudders are checked, and the EPI check that we're discussing here today, the guidance that was provided to the crew was exactly what was in the Boeing Letter 53-A.

What he was looking for on the EPI when he -- when he did the elevator check was he was looking for that needle to come down into the white band.

Q Okay. When the -- excuse me. Where it says, "Controls EPI checked", -- I'm sorry. I think we've already covered that.

If I may then turn to Page 15 in that same exhibit?

A Yes, sir, I have it.

Q Okay. The middle paragraph there, the taxi

procedure calls for first pushing the yoke to the forward stop and then followed by the aft stop, and again we've touched on this earlier, but was there any reason for Emery's procedure to be in that sequence?

A No, sir, there wasn't.

Q Okay. And just to be perfectly clear, again we saw in the Boeing presentation the position of the EPI gauge in two different locations.

Again for Emery's DC-8s, the EPI was located where?

A It was below the flap indicator. In a sitting -- in a seated position, it would be just about at knee level, first officer's left knee.

Q Okay. And was this true of all airplanes in the DC-8 fleet at Emery?

A No, sir.

Q There were some variation?

A The AD when it came out, to my recollection, Boeing didn't direct any particular location. There was only a criteria that with the yoke full forward, the indicator would be in view. So, it was -- the operators were given some -- some leeway in where they put it. This particular airplane was being operated by United Airlines at the time, and so this is where

United Airlines chose to put it.

Q Okay. That was going to be my other question. So, on the accident airplane, it was actually located below the flap indicator?

A Yes, sir.

Q Okay. We also heard earlier some information about this, but let me get your take on it as well.

Could you describe the visibility of that EPI gauge from the captain's seat?

A Very limited. It would take -- it would take a conscious effort on the part of a captain to be able to see that indicator.

Q Okay. How about from a first officer's seat? Was it readily visible?

A It is readily visible.

Q Okay. We've gone through the first two checks there, the pre-flight and the roll-out check.

Now, Emery -- Emery's procedure is to do a -- what's commonly known as an 80 knot check or a check done on the take-off roll, correct?

A Yes, sir.

Q On Page 17 of this same exhibit, if I could ask you to look at the last paragraph there on Page 17?

A I have it.

Q Okay. The first sentence of that paragraph states that "The pilot flying shall exert a forward pressure on the elevator to the stop and then release the yoke slightly forward of neutral."

Would the first officer see the EPI needle reach the full down position during that check?

A No, sir, I don't believe he would.

Q Okay. About the middle of that same paragraph, it states that, where it states "Elevator Checks", it then states that "The first officer looks for the EPI to respond to yoke movement when the elevator check is made."

Is -- is there a particular reading that the pilots are trained at Emery to -- to see at that point?

A This -- this check wasn't so much for a value, it was just to ensure movement.

Q Okay. Were the pilots trained to -- this may be a judgment call, but would it be fair to say that the pilots were trained to really just see if there's a change in the attitude of the nose more so than looking at this or --

A That's absolutely true. If you -- if you see the -- the pitch attitude of the airplane change, that's in my mind, that's the indication that you have

pitch control of the airplane.

Q Okay. There are -- and this was brought up earlier as well. There are elevator dampeners installed on the DC-8.

Can you explain the -- I'm not sure if we covered this or not, but the purpose of those elevator dampeners?

A From a pilot's point of view.

Q From the pilot's -- from the pilot's point of view, yes.

A There -- to my mind, I thought of them almost like a shock absorber. You have a manual flight control back there that's fairly large, and its purpose was to keep those elevators from, I think, building up a lot of momentum and getting some almost flutter back there. So, I just -- to my mind, they were shock absorbers.

Q Okay.

A Yeah.

Q Does that have any effect on this 80 knot check?

A It could. As Captain Gentile testified, if you don't do a check very slowly -- these are viscous dampeners. If you don't the check slowly on the roll-

out check, you don't give the elevator time to go through all of the motion it needs to go to.

The 80 knot check, on the other hand, is -- is done relatively quickly. As everyone's pointed out, you know, the aircraft's accelerating. You've got a lot of things going on and so that's done fairly quickly. Some of that elevator motion could be, in my opinion, could be damped out by those elevator dampeners.

Q Okay. I'll ask you basically the same question I asked Captain Gentile.

During this procedure, how could a pilot tell if -- if there was a malfunctioning elevator?

A He would not get a change in pitch.

Q And how about a control tab malfunction?

A I don't think he would have an indication. If he -- if, in your -- in your example there, if the change -- if the pitch changed and the tab didn't move, that would appear to the pilot to be a normal functioning elevator.

Q Anywhere in Emery's procedures, does it say anything about situations when the 80 knot check would not be accomplished?

A We did have some language in the -- in the

discussion about slippery runways and crosswinds and so forth.

Q Okay. Did you ever get any concerns or reports from the pilot group regarding elevator procedures or the EPI gauge?

A I've been flying the airplane since 1987, and it's hard for me to kind of tell you, you know, which -- which ones of these situations came up at which airline. I mean, from time to time, you would have crews that would taxi back because they did not get a good EPI check, and to my recollection, in the vast majority of those cases, the flight controls in fact did check out all right.

Typically, what the problem would be, would be in the strong wind conditions, you can -- you can have a situation that's described as wind lock, where there's so much wind behind the airplane, that that 90 or 100 pounds of force that you're able to exert on the control column isn't enough to move the flight controls.

Q And since the accident, what changes, if any, have been implemented in elevator procedures at Emery?

A The guidance material that is now in the Emery manuals, before the accident, it mirrored Boeing

Letter 53-A, and in 2001, when the new Letter came out, Emery's manuals were revised to reflect that language.

We, as a company, are still in discussion about the 80 knot check. As a pilot, I -- I have some reservations about not doing an 80 knot check myself.

Q Could you expand on that just a little bit as to why you feel that way?

A Well, there are a couple of things. In the original Boeing guidance, they suggested that the check be done between 60 and 80 knots. In my time on the airplane, everyone's called it an 80 knot check, and the check's accomplished between 80 and 100 knots.

The 100 knots limit is because that's the beginning of a regime of flight that's the high-speed regime and rejected take-offs above that speed, above a hundred knots, don't always come out well. 60 knots, in most operators' opinion, was too slow to do the check. For one thing, it's the very first indication that you have that the air speed is alive. It's still sitting down there very nearly in the idle position.

The thing you had to be careful about if you did this check between 60 and 80 knots was that the throttles were still being adjusted for take-off thrust. So, you could have some asymmetric thrust on

the airplane. What you don't want to do in that situation is unload the nose wheel. You're going relatively slow. You don't have full rudder authority yet, and if you unload the nose wheel with asymmetric thrust because you put a little back pressure on the yoke, you could have some directional control difficulties.

Our thought -- and -- and we agreed with Boeing, too, that this is a busy time in the cockpit, but pilots are trained to perform in fairly high workload conditions. Our thoughts have always been that at 80 knots, the variable of asymmetric thrust should be gone. You have enough rudder authority to deal with these crosswinds, moderate crosswinds, and it was a safe place to do this test.

Q The changes that you mentioned, how was -- how was this information -- any of the changes that you did after the accident, how was that disseminated to the pilot group?

A It was a revision to the Aircraft Operating Manual.

Q Okay. And when any of these changes -- whenever as a company Emery was evaluating changes and determining changes, did you consult with Boeing at all

to do those?

A Typically not.

Q Okay. Or other operators at all?

A We shared a training facility with another DC-8 operator, and we had a very close relationship with them, and in fact we did talk with that operator.

Q I'll ask you the same question I asked Captain Gentile.

In your opinion, how can the EPI gauge be improved?

A Well, the EPI gauge is -- is what it is. If there were a way to move that flight control so that you could check for full range of motion rather than just full trailing edge up to anything that's below zero, to my mind, that would be a great improvement.

Q Okay. Any changes to procedures that you can see that would be helpful, do you think?

A No, sir.

Q At Emery Worldwide Airlines, was there any pilot training on specific techniques for controlling an airplane with a flight control problem?

A There was.

Q Could you elaborate on that a little bit?

A Airline training is driven by 121, Subpart N,

Appendix E and Appendix F. So, within those regulations, you'll find all of the maneuvers that you need to train to and check to.

As far as flight control anomalies go in the DC-8, you train to jam stabilizer, and the ailerons in this airplane are hydraulically boosted, and so we trained in the simulator for manual reversion of the ailerons.

Q Any training on CG problems or shifting?

A We did.

Q Was that part of the curriculum or --

A No, sir. What happened is over the years, Part 121 and Appendix E and F have remained fairly constant, but in the industry, the requirements for recurrent training and checking have gotten greater and greater and greater. In the last years, we've added wind shear training, control flight into terrain, escape maneuvers, right seat competency and on and on and on.

So, a captain at Emery would get eight hours of simulator time a year. The first officer would get four, and it took almost that amount of time to accomplish all the required training and all the required maneuvers, but on those occasions where you

ended up with some extra time, one of the things that we did train was something that I've been familiar with since 1987 when I was introduced to the airplane and that was the result of the United accident in Detroit, where the airplane stabilizer had been mistrimmed, and on take-off, the airplane pitched up, continued up, stalled, crashed.

The operators that were familiar with the airplane knew that the stabilizer trim worked -- is a fairly slow trim, and in the amount of time it would have taken to trim the airplane, that you were basically out of energy, out of air speed. So, we trained rolling the airplane into a bank which was the only thing that gets the nose down so that you can either maintain air speed or even accelerate in some cases.

You can certainly maintain air speed without losing altitude. If you need to accelerate, you may have to lose a little altitude. So, we trained that maneuver, time permitting, and that was one of the maneuvers that this crew attempted to use in getting this airplane back around to land at Mather Field.

Q Okay. Just so I'm clear on this, is that training, when time allowed, was that in existence

before and/or after the accident?

A Both, sir.

Q Both. Could you talk about -- a little bit about any simulator tests that were accomplished by Emery after the accident?

A I can only tell you third person. I wasn't present for the simulator tests, --

Q Okay.

A -- but I know that we contracted with the owner of our DC-8 simulator to make some modifications to the programming of the simulator to allow some out-of-CG scenarios to be flown.

Q Can you describe any -- what was learned from all of this or did you come to any conclusions as a result of these tests that you're aware of?

A Yes, sir, we did. Basically, a number of different escape maneuvers, if you will, were attempted. There were attempts at seeing what the results were, of raising or lowering the gear, raising or lowering the flaps, jettisoning fuel, transferring fuel, and the maneuver that I just talked about where you just attempt to control the pitch of the airplane by increased bank angle, and the bottom line, to paraphrase the whole situation, was the only thing that

really worked consistently was to roll the airplane into a bank.

Q Okay. Was that incorporated in the training after that then?

A No, sir.

MR. EGGE: Okay. Okay. Thank you very much. I have no further questions.

CHAIRMAN GOGLIA: All right. From the Technical Panel, are there any other questions?

MR. HILLDRUP: No, sir.

CHAIRMAN GOGLIA: Okay. Well, before I go to the parties, I have a question for you.

The flight engineer. You didn't mention the flight engineer, his duties or -- or what he's doing during the take-off roll.

I wonder if you would share what Emery's procedures for the flight engineer are at this point in time in the flight regime?

THE WITNESS: His -- from the time the take-off roll is begun, his seat is swiveled forward. He's forward-facing. He monitors the engines being brought up to take-off thrust, makes whatever adjustments need to be made to get the airplane power set. He then has the best view of anybody in the cockpit for gauges and

indicators on the front panel of the -- of the airplane.

The pilot's primary responsibility at that point is to maintain a watch outside. The flight engineer would announce any anomalies that he saw in the take-off roll, some of which might initiate a rejected take-off, others which are just informational to the crew.

CHAIRMAN GOGLIA: And was there any guidance or instruction to look at this EPI indicator at all?

THE WITNESS: No, sir, there was not.

CHAIRMAN GOGLIA: Okay. And you mentioned that this indicator -- this airplane was originally owned by someone else, United Airlines.

Are you aware or do you have any knowledge yourself of what United Airlines' procedures were for the use of this EPI indicator when they were operating the airplane?

THE WITNESS: No, sir, I don't.

CHAIRMAN GOGLIA: Okay. Thank you.

Federal Aviation Administration?

BY MR. STREETER:

Q Captain Hagquist, I believe you mentioned that it was Emery's procedure to reset the gust lock

after the pre-flight had been completed?

A Yes, sir.

Q Is -- was that a written procedure or just customary?

A Customary.

Q Okay. And would that just be on the assumption that when the flight engineer came back, there was going to be some time before the airplane was moved?

A That's correct.

Q So, if they were going to start up right away, he wouldn't necessarily reset it?

A He wouldn't have to. No, sir.

MR. STREETER: Okay. Thank you. That's all I have.

CHAIRMAN GOGLIA: Okay. Airline Pilots Association?

BY MR. GUNTHER:

Q Captain Hagquist, you were talking before about advisory material that was given to the flight crews in regards to the EPI, and we heard from Captain Gentile about it.

Your company went into existence when? When did you first start operating?

A When was my experience with Emery? 1998.

Q Okay. And when did Emery start operating on their own certificate?

A I believe that was 1989.

Q Okay. Any guidance that you had before that that was -- such as Know Your DC-8 Letters, etc.

How did you deal with that? Was that rolled into some type of memo? Did the crews receive those directly or was it placed it in your manuals?

A While I was at Emery, guidance that came out would be incorporated into the manuals. In the last few years, we also had a bulletin system, and in the case of this 2001 memo from Boeing, I believe that went out to all crew members as part of our bulletin memo system.

Q We've been speaking about the pre-flight checks that happened.

In this instance, the aircraft prior to leaving from Mather, would they have been required to do an initial pre-flight or would they do what's known as a transit or through check?

A No. As I testified earlier, they would have been authorized to do an in-transit check. The walk-around, the outside inspection of the airplane, is

required in both. So.

Q Is that check as detailed as a normal initial?

A No. It eliminates some items.

Q Okay. Where -- what position would the gust lock have been during that check?

A Gust lock would be engaged.

Q You were talking before about the flight engineer's duties when Member Goglia was questioning you about that.

Who makes the final throttle or thrust adjustment on the aircraft during the take-off roll? Would that be the flight engineer?

A It could be, yes.

Q And before we were talking about the tabs, both the control tab and the geared tab, and you said they would normally be flush with the gust lock on?

A That's right.

Q Are they rigged that way?

A I couldn't talk to the rigging of them. I -- from -- from a pilot's point of view, when I look at them, they look faired with -- the elevator's faired -- the tab's faired to the elevator, elevator's faired to the stabilizer.

Q So, if a pilot would come up and look at the -- at the rear end or the trailing edge of the elevator with the gust locks on, if the tabs were out of alignment, is there any type of criteria as to number of inches, etc., as for alignment as to what would trigger them to notice a problem?

A No, there's not.

MR. GUNTHER: Okay. I have no further questions.

CHAIRMAN GOGLIA: All right. Thank you.

Tennessee Technical Services?

MR. HOFFSTETTER: Just one question.

BY MR. HOFFSTETTER:

Q If the tab push rod was disconnected during the pre-flight walk-around, do you feel like that would be a noticeable item during the pre-flight?

A That would depend on where the tab was at that particular time. Part of my reading in preparing for this was to read a study that was commissioned by the NTSB, the Aircraft Performance Study, and in that study, there is a statement that says that the elevator anomaly began to show in the digital flight data about eight and a half minutes before the landing at Mather, and also, as an exhibit is the statement from the first

officer who flew that leg, and he said the captain was flying the airplane, made a normal approach and landing.

So, if in fact this anomaly began to materialize eight and a half minutes before that landing at Mather, it would appear to me that whatever split there may have been between those control tabs may have been fairly small at that point in time and that in this particular walk-around, in this particular incident, not knowing how far out of -- how far out of rig that -- that tab might have ended up, I think it's very possible that they didn't see anything in that walk-around.

Q So, my -- my -- my opinion or what I extracted from that same report was that probably during the approach, the tab would still be in aerodynamic faired position. You would not be getting any input from the other tab, but it probably wasn't jammed, and, you know, at that point, and that after the aircraft had landed, the weight of the tab and the elevator would possibly have made the offset noticeable during a pre-flight.

You would agree or disagree or -- or don't know?

A No, I certainly couldn't agree to that. I don't know where it would have been.

MR. HOFFSTETTER: Okay. That's all. Thank you.

THE WITNESS: Yes, sir.

CHAIRMAN GOGLIA: Okay. The Boeing Company?

MR. BREUHAUS: We have no questions. Thank you.

CHAIRMAN GOGLIA: Okay. And Emery Worldwide?

MR. ROBBINS: Yeah. Captain Hagquist, just a couple questions real quick.

MR. HILLDRUP: Excuse me. Could you identify yourself for the record?

MR. ROBBINS: I'm sorry. Bruce Robbins, Emery Worldwide Airlines.

BY MR. ROBBINS:

Q You testified that you had been experienced with three other airlines that operated DC-8s, correct?

A That's correct.

Q Were the procedures used by Emery the same or different than those other airlines as far as the 80 knot check and the roll-out check?

A No. They were the same.

Q Okay. Are these FAA-approved programs as

they're incorporated in Emery's program?

A Yeah. Everything that's -- everything that's included in an airline's training program has to be FAA approved.

Q Okay. And last question, just for clarification. The EPI, does it -- it does not, excuse me, it does not reflect the position of the control tab, correct?

A It does not.

MR. ROBBINS: That's all. Thanks.

CHAIRMAN GOGLIA: Okay. Thank you.

To the Board of Inquiry. Mr. DeLisi?

MR. DeLISI: Thank you.

BY MR. DeLISI:

Q Captain Hagquist, at the time of the accident, was Mather a facility where Emery had the capability to perform maintenance?

A I'm sure we had through maintenance there. I really can't testify to what the capabilities of the maintenance department was at Mather.

MR. DeLISI: Thank you. No further questions.

CHAIRMAN GOGLIA: Dr. Kushner?

DR. KUSHNER: No. I have no questions.

CHAIRMAN GOGLIA: Okay. And I've asked my questions already.

Back to the Technical Panel. Anything?

MR. HILLDRUP: Just one question.

BY MR. HILLDRUP:

Q I'm not sure if it's been asked or not, but -- and if I need to find the exhibit, I will, but in reference in the Emery AOM about the first officer's duty for identifying the -- the -- looking at the EPI during the 80 knot checks, could you go back over that and what the first officer's role is with the EPI at -- during the 80 knot check?

A Yeah. He's going to glance down and just see that he sees motion, movement of it.

Q As he manipulates the control column?

A If he's the pilot flying, he would be doing both. If he's the pilot not flying, the captain would initiate the forward pressure on the yoke, and the first officer, because he had the unobstructed view of the instrument, would always be doing the -- would always monitor the EPI.

Q And that would be forward and aft movement or up and down movement of the needle?

A There's very limited aft movement because you

can in fact raise the nose wheel off the ground if you do -- if you do this too quickly. The main part of the check was the forward motion part of it.

MR. HILLDRUP: Thank you. Nothing further.

CHAIRMAN GOGLIA: Just triggered an additional question from me.

In the fleet of airplanes that Emery operated, you have some airplanes that this indicator was in different locations?

THE WITNESS: I believe so, yes.

CHAIRMAN GOGLIA: And do you -- do you believe that that may have changed the way that the flight crews actually did this check, if it was visible by the captain, for example? Did you have any airplanes where it was high enough where it was visible from the captain's side?

THE WITNESS: I can't recall any airplane where it was unobstructed from the left seat.

CHAIRMAN GOGLIA: Okay. That's fine. All right. Thank you.

The parties. Do the parties have questioning, any additional questions?

(No response)

CHAIRMAN GOGLIA: Okay. Well, with that, Mr.

Hagquist, thank you for your testimony, and again, I'm not releasing any of the witnesses, and I know that you're going to stay around. So, resume your position as spokesman for Emery Worldwide Airlines.

(Whereupon, the witness was excused.)

CHAIRMAN GOGLIA: And Mr. Hilldrup, will you call the next witness?

We had some discussion about presenting some pictures and other material about the tail. Is this the point where we -- we want to put in prior to the technical discussion?

Okay. In order to do that, then we're going to -- we're going to have Mr. Robbins come up and just give us some Aviation 101 on all the details and all the locations of things that we are going to be discussing for the next round of witnesses, and then at the conclusion of -- of this PowerPoint presentation, we will then resume with our normal sequence, pre-arranged sequence of witnesses.

Mr. Robbins, you are on.

MR. ROBBINS: Thank you.

Okay. The purpose of this slide show, this presentation is to basically give us all an example or a pictorial description of the area in question, the

components that we're going to be discussing through the maintenance aspect of this, and the aircraft that was used, as indicated here, DC-8-81 Series, ex-United aircraft, what would be called a sister ship, meaning that all the components located here would be the same as they are located -- were located on 79 Uniform.

CHAIRMAN GOGLIA: Mr. Robbins, one question before you go on.

Do you know, did this airplane come directly from United to Emery or did it have any stops in between? I mean, operator stops, not necessarily leasing companies but did it -- did it see service with anybody else?

MR. ROBBINS: Which aircraft?

CHAIRMAN GOGLIA: The one that crashed.

MR. ROBBINS: I can't be sure.

CHAIRMAN GOGLIA: Okay. Thank you.

MR. ROBBINS: Okay. Some of the areas we're talking about, and we're going to break this down into three sections of some of the items that were done, maintenance actions that were taken in the back of the aircraft on the elevator, beginning with the D check, and what we're going to discuss or what I'm going to show you here is during the D check, these components -

- I don't know what happened here. Hang on.

These components, being the control tab, the geared tab and the elevator, came as three separate units. These attach points, shown on here as lubrication points, are the attachment points for the elevator. There are attach points for the geared tab, and there's attach points for the control tab, and again it's just a little closer-up picture looking at the lower side of the surface, and you can see the attach points.

This is a close-up of the area where most of the activity is going to be directed, I think. In this area, you're going to see an elevator dampener located here, and this is a cut-out area specifically for the dampener. The control tab lubrication point's marked here, the blue points, but they are attach points. This is the hinge area, and then the area here, which is where the control tab push rod is located underneath of this bearing, and this area located here, which is the elevator hinge area where the pivot of the elevator itself takes place.

Okay. Again, I'd just point out that these are the -- this is a back-up view. What we just looked at was the dampener being in this area, elevator pivot

point or hinge area, control tab, cure tab, and you can barely see the fairing that's got the control tab push rod.

Okay. One of the other items that was accomplished on this aircraft elevator system was that the dampeners were -- were -- were swapped due to a pilot report. In the troubleshooting tips, there's a reference in there to disconnect certain portions, if you're going to troubleshoot this, to disconnect certain portions of the glide control to isolate a possible bearing or something of those -- that nature that may present itself as a -- a stiff control column.

In this case, the manuals direct you to disconnect the cables located here and here and also the torque rod or torque tube located here, and in this case, where I'm looking at is on the inside of the aircraft. The tail of the aircraft, this is the elevator where the arrow is right now. This is the elevator hinge point or the pivot point that I showed you on the others. This is the inside view of the components. Directly outboard from here is that pivot area.

Okay. This is another view, and you can see this is the brush, aerodynamic brush and filler that

covers up that slotted area on the outside that we saw before, the same view, torque rod or torque tube and the elevator connection cables.

To gain access to this area, you go through Panel Number 60, which is located right here. You see it's just -- it's a panel that's you can climb up on the inside of this -- inside of the tail cone of the aircraft. The location of the dampener is here, and again you don't need to be inside of here in order to change the dampener, it's only in the course of troubleshooting that you may need to disconnect some of those control linkages. This is the area where the hinge is.

Down here, on the top of where the arrow is right now, is the fairing that covers the push rod and the crank arm or attach point where the nut, bolt and cotter pin would be. As I said, it's on the other side, and again this is the control tab.

This is another view looking at it. As you can see here, this was -- this is the area of the -- the hinge for the elevator. Once again, there's no way to gain access to the push rod area from inside of here if you're doing any disconnecting of the torque tubes or control cables in the course of troubleshooting.

This view is a representative view looking from basically the shadow of the aircraft or the area that would be walked -- would -- you would see on a walk-around, the course of a walk-around. You see, you have the air gaps here. This is the pivot point we talked about before. This is the dampener area. Once again, the fairing is on the top portion of this. This is the control tab, and to Mr. Hagquist's point, any asymmetry between this control tab and this control tab looking at it from this view or the general walk-around area in the shadow of the aircraft would be a little difficult.

Another maintenance activity took place on here were three separate Emery routine inspections, called B checks. A B-1, B-2 and B-3 inspection were accomplished on this aircraft. In this case, the inspection cards that deal with the tail section of the aircraft on the B-1 is a 007 card. The "I" indicates inspection. The "L" indicates lubrication. Two more cards, 008 and 009, on a B-2. Both of those were general visual inspections, and on a B-3, on the B-3, the B -- excuse me -- the 011 is an inspection and the 018 is a lubrication, and once again, to point out where these lubrications take place on the control tab,

they are right here at these hinge points. Once again, there's the dampener.

Here's a close-up of a lube point on the tab. There is no requirement to remove any panels to gain access to these lubrication points. Elevator lubrication points indicated here, and with the mechanics being in the area and doing a lubrication and/or a general visual inspection, what I'm trying to represent here, what's trying to be shown right here is that this is the view of the control tab fairing which is underneath of here, approximately in this area on the upper side of this fairing, is where the -- the clevis or crank arm push rod, nut, bolt and cotter pin are -- are located.

This is another view, a little different view, same area, basically the same area any maintenance personnel would be in in order to perform a lubrication, and in the course of a general visual inspection, this is what his view would be, and again looking straight down, and if you want to note that there's several rows of screws or several screws holding in the fairing across the top of the fairing and then down across the back side of this as well. All these screws -- none of these screws are removed

during the course of the lubrication. There's no call for getting in here, and a general visual inspection does not call for removal of this panel.

Here's a view showing the elevator in the trailing edge up and the control tab in the trailing edge up configuration, and as you can see here, this area here -- I don't know how well it looks up there. This area has got an aluminum bulkhead basically riveted into place. There's no external viewing capabilities from -- to look inside here and see what this -- see what the tab condition is of the -- excuse me -- the attachment point is.

Here's a close-up of that same view, elevator up, control tab down. As you can see here, this is the riveted aluminum bulkhead. These are the screws that come down through the fairing cover, and again the view from the mechanic's perspective doing a general visual inspection is exactly what's represented here and no way to see what was the condition of the -- of the control arm -- excuse me -- the push rod, the crank arm and the hardware, and that's pretty much it.

CHAIRMAN GOGLIA: Okay. Thank you, Mr. Robbins.

MR. ROBBINS: Thank you.

CHAIRMAN GOGLIA: I think we'll find that to be most helpful.

MR. HILLDRUP: Excuse me, Mr. Chairman. Have we identified that exhibit? And if it is, I believe it's 13. I'm sorry. 17-HH. Could you correct me if I'm wrong?

MR. ROBBINS: I know it's an exhibit. I don't know which number.

MR. HILLDRUP: I'd like to try to get that for the record, if we could.

MR. ROBBINS: Okay. Do we know what the exhibit number is?

CHAIRMAN GOGLIA: It is 17-HH.

MR. ROBBINS: Thank you.

CHAIRMAN GOGLIA: Okay. Mr. Hilldrup, will you proceed?

MR. HILLDRUP: Yes, sir. I believe our next witness is Mr. Kenny Hall from TTS.

Mr. Hall, would you raise your right hand, please?

Whereupon,

KENNETH WAYNE HALL

having been first duly sworn, was called as a witness herein and was examined and testified as follows:

MR. HILLDRUP: Thank you.

EXAMINATION

BY MR. HILLDRUP:

Q Could you provide your full name, current address and employer and current position, please, for the record?

A My name is Kenneth Wayne Hall. I am an A&P -- a licensed A&P mechanic or inspector for Tennessee Technical Services, [redacted] Smyrna, Tennessee.

Q And please review for us your qualifications for -- for that job.

A My background for aviation is 10 years military, former military, USAF Helicopters, 21 years general aviation, large transport aircraft for various 121 operators or 145 operators.

Q Thank you.

MR. HILLDRUP: Mr. Chairman, Captain McGill will be -- will be questioning Mr. Hall.

BY MR. McGILL:

Q Good afternoon, Mr. Hall.

A Yes, sir.

Q I'd like to thank you very much for showing up here today.

We would like to cover several areas here. I'll go through them very quickly. We'll get into some maintenance training, parts and overhaul, receiving, some manuals, task cards, and then, of course, the maintenance inspection of the elevator.

Let's start off with how long have you been working with TTS?

A Twenty years, almost 22 really. I started with Capital Airways in 1981, and I've been on DC-8s off and on ever since.

Q Both as a mechanic and inspector?

A Both as a mechanic and inspector. Yes, sir.

Q What I'm going to start off with and just kind of run us through the general procedures for the installation of the elevator to that particular -- to that particular aircraft.

A With the elevator removed, we do a general pre-installation inspection, which is to look at the hinge points for attachments, the elevator itself, its proper documents, preparation of the front spars for acceptance on to the hinge areas, the torque tubes for their -- as far as their location installations, and then we attach the sling and hoist it into place.

Q On this particular airplane, you were the

inspector on several of the task cards, is that correct?

A Yes, sir.

Q Can you start us through that portion that you were involved with? Other task cards. I think it started with like 3402 and 3404, those, where you were attaching the elevator and control tabs through the elevator for the aircraft.

A Do we have those cards, sir?

Q I don't have them. I thought the elevator tab and hinge is where you had -- you had signed off on it. It was the installation of the right elevator tabs and the installation of the right elevator assembly, and then the last card was a functionality check, I believe, of the right elevator and tabs.

A Do you have the card number, sir?

Q Yeah. I was informed that was in 7-Kilo and that was 3402, 3502, 3504, 3506.

A Do you want to do these one at a time?

Q Yeah. Just generally. I don't -- I just want to get a feel of how this was performed, this D check.

A The Work Card 3502, which installs the elevator tab to the right -- I'm sorry -- the right tab

to the elevator, and it is -- it says it just installs a serviceable tab to the elevator on its hinge.

Q Do you remember any of these tasks at the time when you did this on this aircraft?

A No, sir.

Q Do you remember the people that actually performed the maintenance?

A I recognize the names. Yes, sir.

Q Do you know the lead mechanic that -- that did this work?

A Yes, sir, I do.

Q What kind of experience did he have?

A He has quite a bit more experience than I do. He was already working at Capital when I started there in '81, and I'm not real sure how many years he's been there.

Q I was noticing when we pick up these task cards, like the -- like we have right here, the first one I had looked at was 3402, which is -- was the one that you're Inspector 19, is that correct?

A That's correct, sir.

Q That you had signed off on, which was the right elevator tab hinge eyebolt bearing replacement, and I notice at the top, it says Kit Number 6003401.

Can you tell me about that kit?

A There is no kit.

Q Please explain that, please.

A For some reason or another, that kit number appeared on the card, and if I went to the stockroom and pulled out that kit, there would be no kit listed in the Emery supply for that -- under that number to install that elevator tab.

Q Is that typical of -- of inspection cards or would you have some sort of designation for contents of that kit?

A As far as the content of the kit, when the kit is made up and it'd be under several different part numbers of either hardware, would be incorporated into a bag per se, and under that bag, it would be listed as a kit number and that kit number would be matched to a particular task card for the aircraft to be used during the accomplishment of that card.

The task card would call out to use this kit, but in this particular case, there is no kit.

Q So, you're saying that this is not a kit. Are there contents that should have been in with part numbers and replacement parts and so forth?

A There is no kit. There's not one made up to

be sent to us to install on the airplane. We have to go piece-by-piece.

Q On 3502, the installation of the right elevator tab, I noticed that most of these cards state, "applicable DC-8 maintenance manual".

What does that mean to you?

A To use the DC-8 -- applicable DC-8 maintenance manual chapter to effectively install these components.

Q And which manual was that?

A The DC-8 Maintenance Manual, Chapter 27, in this particular area.

Q Is that a Douglas manual, SAS manual? What --

A For this aircraft, for the effectivity, it is United. So, we would use the United portion of the manual, yes.

Q And how do you get the effectivity?

A We look up the serial number in the front portion of the maintenance manual and cross-reference back through the individuals that had the aircraft built, and then it will give us a subcode for maintenance practices. You go into the subportion for maintenance practices, and it gives you a full index of

description, maintenance and troubleshooting and etc. for that air -- that particular coded aircraft.

Q And all this occurred on this particular airplane?

A Code 1.

Q Which is?

A A United aircraft.

Q I remember Code 6. That was Braniff.

But do you feel comfortable that everything that you're going to need to know to do -- perform any maintenance would be in that particular manual?

A With support from other manuals, yes.

Q How do you know if there are other manuals?

A I've been doing this for 20 years or longer.

Q Say I was going to work for you out there. Would I know that there other manuals involved, supplemental manuals?

A You're the lead mechanic. I would tell you that there are other manuals available.

Q So, it would be from an experience level?

A Yes, sir.

Q I notice there's no dates, other than the check date, on these cards. There's a maintenance task with a sign-off, and like Card 3404, I believe it was,

I know that like an A&P mechanic worked on that particular card over a period of nearly a month.

How do you know or how would you know what was being done every day and you're going to be signing the end result as the inspector?

A As far as what was being done every day, it would be a judgment call. You could look up the time cards and see who charged time and ask them what they did as far as the dates are concerned. We don't require any paperwork at the time.

Q Well, that's exactly what I'm going to do. To get that information that you just told me, I had to pull out that information out of accounting to determine that a good many people worked on that airplane over a good period of time, and I was trying to better understand what exactly each mechanic did in that area.

A The elevator has several hinge points, and those hinge points must be aligned at the exact same time to connect the elevator to the rear spar of the horizontal stabilizer. We position a man at each one of the elevator hinge points on the top for guidance to keep the eyebolt aligned. We position a man at the lower side of the elevator as it's being positioned to

guide the elevator itself on to the hinge bolts and that takes more than several people to do that. It also has to be aligned with the elevator torque tube at the same time. So, there's more than four or five involved in this.

Q When you sign off in one place as an inspector, is that at some critical point or some complete point or how would you -- how would you continue that inspection when it's done over many days? Are you looking every day at the --

A What we do with this particular work card is we pull up the applicable maintenance manual reference required for accomplishing the task. In the maintenance manual, there are step-for-step guides to go by, and they would be specific to install, give you specific torques or sequence to go by, and we use that guide as we're accomplishing the work attached to the back of the work card, and as it's being accomplished, the mechanic will initial that area and the mechanic or the inspector will stamp that area to keep progress shown and that the task card is being accomplished.

Q So, these flight controls, for instance, they are line replacement units, is that correct?

A That's correct, sir.

Q And if you did perform this same function on a line, you would go to a United maintenance manual, is that correct?

A On that particular aircraft, yes, sir.

Q On that particular aircraft. So, you would follow that HEA chapter to perform the same role like you're doing off of these tasks cards on this D check, is that correct?

A That's correct.

Q But on a task card itself, it doesn't tell you this. You're -- you're working off of a maintenance manual other than the task card, is that correct?

A Yes, sir.

Q And that's the only way you would know what critical areas that you need to be checking, and is that how you're following the progress over three days on a particular task?

A Yes. The work card also describes the individual tasks that the lead -- that a mechanic will sign off, but there's no inspection requirement for it, up until you get to the end.

Q Is that good or bad?

A In critical areas, it's bad. In general

areas, it's not so bad.

Q We've been concerned a lot at the Board with how some of the maintenance tasks are -- how they're applied from the different certificate holders.

Is this particular task card any different than others that you see from other operators of DC-8 equipment?

A We've had some that were better.

Q Better in what manner?

A In the -- in the critical area, where it calls for a specific torque or safety and verification of torque and verification of safety, there would be two signatures by the block instead of one, one for the mechanic accomplishing the block and one for another person to witness as my case being an inspector, with a sign-off. It's directly in line with that particular one task.

Q Do those other cards have more information, such as dates or anything on there, rather than just the final check date?

A They would be dated at the time that the maintenance actions is accomplished for that item.

Q Does Emery have a task card that performs a functional check after the installation?

A Yes.

Q Can you very quickly go through that functional check?

A It's -- the general card that they do, it's done at the end of the inspection. It's not done outside on the line. It's a visual verification that when you do move a flight control in a particular direction, that the flight control itself does correspond to the direction as demanded, and it's a one-, two- or three-man operation. It's one in the cockpit and one or two individuals witnessing movement of controls, especially during the operations or the tail operations, where you've got such a vast area to oversee, one guy can't see it all, because when you do the ailerons, one comes up, one comes down, you've got to stand way back to watch that.

Q I noticed that the task card of the installation of the right elevator. I know it said that this would be in conjunction with the 3506 card which is the functional test. When I was trying to track these -- these times, the sign-off of the 3504 was actually before the 35 -- I mean, 3506 was before 3504, but I guess the -- that date is not as important as tieing the two together.

So, when you're doing that inspection, you're actually working in conjunction with the other card, also, is that correct?

A That's correct.

Q You have any feelings that this could cause some -- any type of problems or is this normal procedure?

A For these particular cards, it's normal procedure.

The additional work card is the -- it calls for a functional check, but you're also doing some testing, and the dimension here is -- that's taken care of during the installation process, also, and that's the reason it referenced back to the installation card, and it doesn't reference all the cards but you've got a clearance that you've got to check on the geared tab and the control tab and the elevator and the torque tube at the same time, and you can do that in steps.

Q We've kind of talked about the -- the -- the area of the push rod and the tab crank fitting, where the bolt and the cotter pin -- those items were missing in our investigation.

Is there any kind of a possibility that they could have been missing when this airplane came out of

check?

A Very unlikely.

Q Why is that?

A This work card installs the elevator. It also rigs the elevator, and during the installation process, this rod is connected and safetied. During the initial portion of the rig procedure, this rod is also exposed and checked, set to a particular dimension, and then the fairing is temporarily installed, go through the rig process, the fairing is removed, and the area's also inspected with an okay to close and the fairings are put on. So, there's three, at least three, inspections for stamp-offs for that area. It's a high-exposed area.

Q Talk just a minute because it was brought up earlier about the dampener that was installed in the reversed position.

Could you elaborate on that very briefly?

A As far as I know, I was told that the elevators were installed -- the dampeners were installed in opposite positions.

Q Do you do receiving inspections?

A Yes.

Q Have you done receiving inspections of -- of

elevators?

A Yes, sir.

Q What is the procedure that Emery has that -- for receiving inspections on the --

A The general visual for shipping damage and appropriate documents accompanying the component.

Q You have not checked part numbers on the dampeners?

A No, sir.

Q Do you do it now?

A Yes, sir.

Q Because of the -- what was found out?

A Yes, sir.

Q It was not done prior, though, is that correct?

A No, sir.

Q As an inspector on a D check, the flight controls are overhauled, is that correct?

A That's correct.

Q Where do these flight controls come from?

A Emery supplies them.

Q Do you ever take off the flight controls that are on the airplane, overhaul those and put them back on to the airplane?

A We have not.
Q Is it normal for the control tabs to be separated from the elevators?
A In a disassembly condition?
Q Yes, sir.
A No.
Q On this particular aircraft, however, the control tabs came from one location and the elevators from another location, is that correct?
A I believe so, sir.
Q From your experience of just receiving flight controls, could you very quickly go through what your -- what you're finding out there as different types of flight controls coming in to your facility for inspection?
A We have had some of the flight controls that have come in. We've had problems with questioning various repairs that had been done, effectivity for the airplane, the wrong part being ordered or being supplied to fit the aircraft that they were designed to go on, balance problems. That's just to name a few.
Q These components are all overhauled and tagged with an 8133?
A Yes, sir.

Q If they're coming from an overhaul facility, and they're all with the correct FAA form, why would they not all be the same?

A Different parts fit different airplanes. It's not effective for the aircraft it was ordered for.

Q Whose responsibility is that?

A Emery's.

Q So, in your -- on this particular airplane, at the time the elevator was assembled on to the aircraft, you receive it from Inspection, and then it is your role with the task card to put it on the airplane?

A Well, when we have task card in hand, the assembly process has already been completed. The lead mechanic signs for the elevator to go on to the aircraft through the stock room, and we install it.

Q Do you have both jobs sometimes, where you're doing the receiving?

A Yes.

Q And if a set of elevators are -- tabs come through you.

Well, could you real quickly go through that procedure?

A It's a general visual inspection of the tab

or elevator for its shipping condition. We have to open a box up or a crate, research all the documents to make sure that the appropriate documents as Emery requires are with the unit, and if it's supposed to be an overhaul unit, you look at the condition or continued time or -- or as removed or something like that and log it in on a receiving inspection.

Q Was the hardware with this particular set of flight controls?

A Is it or was it?

Q Was it.

A I don't know.

Q Do you normally see the hardware come with the flight controls?

A Sometimes we do.

Q When you said -- when you take off the flight controls of an airplane, do you send the hardware with the flight controls to be overhauled?

A It really depends on which -- which hardware you're addressing.

Q Let's just take these right here. If you were told to pull the tabs, somebody pulled the tabs somewhere, and then someone else pulled the elevator, would they have sent the hardware, the bolts, the nuts

and so forth, with that unit to be overhauled or would they have bagged it and kept it with the airplane?

A They would have bagged it, and it would probably stay with the airplane and the unit go out for overhaul. The tab comes off and there's very little hardware there. The elevator itself, we keep the matched parts for that elevator because of the control -- the torque tubes, they're drilled for that particular torque tube on that position on that particular airplane. So, we would not intermix those parts.

Q Would you have gone to the parts room and got a new bolt and washer and nut and cotter pin?

A If it was not supplied with the unit when we received it back from overhaul, yes, we would.

Q Are these considered expendable units? Would they be wanted anywhere?

A They are expendable, yes. Bought in bulk probably.

Q So, it's not necessarily we could track in fact these hardware pieces were in fact pulled and installed on this particular airplane?

A If they had been ordered specifically for that individual task card, you probably could trace it

to a receiving report; otherwise, if it's generally expendable hardware, either Emery supplied it or we would have it in our supply.

Q You don't have -- on a non-routine elevator pan eyebolt that was reringed, do you just generally have non-routines that are created from an overhauled part?

A Yes.

Q Can you explain that?

A We have encountered a time when the overhauler replaces different bearings and bushings. Out of the overhaul manual, the bushings are replaced and then they're final ringed to accept the diameter of the hinge bolt. Sometimes that process gets skipped, and we don't find out until we get the elevator swinging in the air and it won't fit in there. So, we have to bring it back down and go back and research data to find out why it doesn't fit and if we've finalized it, the bushing has not been ringed, and we write a non-routine card and accomplish the task.

Q So, that means somebody that overhauled some component did not follow all of the stamps that was in the overhaul manual?

A That's correct.

Q Do you receive components like this occasionally --

A That's correct.

Q -- that are not the same?

When you find a component that is overhauled with an 8130-3 type of sign-off, do you report that to anybody?

A Emery reps.

Q If it's an Emery aircraft, but if someone else, you always report it to the certificate holder, in other words?

A Yes.

Q Do you report it to your own FAA principal over you all's repair facility?

A It's reported to my boss, and the information is passed on to other personnel, but I'm not sure who all is informed.

Q Do you remember any -- is there any history with components coming -- parts sent to you all's facility ordered by Emery?

A Yes.

Q Any parts?

A Emery ordered a lot of parts that were sent to us.

Q Have you found problems in some of these parts?

A Yes, we have.

Q So, what's the next stage after you find a problem like that?

A We generate a non-routine to address the problem, and then everybody gets informed as to what the disposition would be to satisfy the requirement to be able to use the component. The rep knows. Who he notifies, I don't know. Our management knows, and our scheduling knows. So, we can get the work card accomplished so we can go ahead and continue on with the maintenance or notify Emery that we need another component. It could take any number of different routes as to how serious the problem is.

Q Do you find normally the certificate holder rectifies this problem and that particular vendor that sent you that -- that is replaced and another vendor is put in place?

A I have been told that they had quit dealing with one or two of their vendors because of problems encountered with their -- their overhaul or the condition of the parts that they were sending out.

Q Can you take me through very quickly the --

we've had discussion on the installation, the direction of the bolt that we could not find for the control tab.

Can you tell me what you know about that?

A The maintenance manual says install the bolt, put the nut on there and cotter key it.

Q Was there ever any consideration about which direction, whether it's inside or outside?

A No, sir. It's not specific in the maintenance manual.

Q Is it in the IPC?

A Yes, it is.

Q Have you looked at the IPC lately to verify that?

A The picture of the bolt is in the IPC, yes.

Q With the direction that is now used?

A As far as we don't use the IPC for assembly, it's just a part reference.

Q What about overhaul?

A The overhaul manual shows the bolt and a temporary revision now has come out in the overhaul manual that gives guidance as to which direction to install the bolt.

Q But at the time that you did the overhaul, there was no guidance, is that correct?

A That's correct.
Q As a mechanic and inspector with all of those years, did it matter to you?
A No.
Q Do you think anyone really worried about one way or the other which direction that bolt went in?
A No. The general deal would be to install that bolt with the bolt head either in a direction of flight or flow of water, flow of water meaning that Mother Nature would have to take care of that. If the nut wasn't there, Mother Nature would help keep that bolt in place.
Q If the bolt and nut had been bagged and where the old one but a new cotter pin had been placed on that nut?
A On installation, yes.
Q Always?
A Always.
Q You never use the old cotter pin?
A No, sir.
Q As an inspector, what kind of training did you receive from -- from Emery?
A Their GNM requirements for general familiarization, their receiving policy, their RII or

required inspection items, and their corrosion control and prevention program.

Q Did you feel that training was adequate?

A Yes, I did.

Q Do you all do contract work sometimes other than at your location in TTS?

A Yes, we do.

Q Have you gone up to work at Dayton?

A Yes, we have.

Q And other locations, also?

A Yes, we have.

Q Have you ever performed any flight control maintenance?

A Yes, we have.

Q Rigging?

A Yes, sir.

Q Why would you do that, other than to have the -- why would Emery want you to come up and do that rather than their own mechanics?

A If they call and ask for us to provide support, we go.

Q Have you ever seen anything -- any problems specific to the flight controls?

A I'm not sure I understand the question, sir.

Q Have you ever gone out to perform contract maintenance involving elevators?

A Not elevators, no.

Q Rigging?

A Rigging, yes.

Q What was the problem with the rigging?

A The ailerons were having trim problems.

Q What did you do to correct it?

A We rerigged it, checked for discrepancies in the system and rerigged it.

Q What kind of discrepancies?

A If you got a hung-up aileron cable that's broke, a bypassing valve, a freight cable, something that would cause the trim system to be off enough where the flight crew would mark a discrepancy on it.

Q Do you remember if you've done any recent work on this particular airplane?

A I can't remember.

Q Do you recall a fleet campaign directive that was issued by Emery involving the direction of this bolt and nut and washer, so forth?

A Yes, sir, I do.

CHAIRMAN GOGLIA: Mr. McGill, do you have an exhibit number for that?

MR. McGILL: Let's see. That's all under 17-A, 17, Attachment -- List of Attachments, 17-D and E. There's two of these, and we also have, since they're in several locations here, the other is 7-Mike and 17-D and E.

BY MR. McGILL:

Q I was just really -- I didn't want to get into it too much. It's a normal campaign directive. They wanted to clarify how they want the bolt and attachment.

From your perspective, I wanted to know did anyone at Emery get back with you or someone at TTS to talk about this particular fleet campaign directive?

A It was issued for one of the aircraft we had in the hangar to accomplish.

Q Has TTS themselves issued any kind of direction for future use of the installation of the hardware?

A We have a -- a procedure now to inspect all DC-8s before they leave the facility for the direction of that bolt and safety.

Q Mr. Hall, I think I'll ask the rest of these questions for Mr. Hoffstetter. However, I want to thank you very much.

MR. McGILL: I have no further questions at this time. Thank you.

CHAIRMAN GOGLIA: To the Technical Panel, any other questions?

MR. HILLDRUP: Yes, just one question. Actually two questions, please, for Mr. Hall.

BY MR. HILLDRUP:

Q You mentioned the revision to the overhaul manual for -- for the information about the direction of this bolt, is that correct?

A Yes.

Q Okay. Do you know the date that that was issued?

A No, sir, I can't remember right off the top of my head, no.

Q Do you know if it's identified in any of the exhibits?

A It's in the temporary revision. I don't know.

MR. HILLDRUP: Okay. I might ask for that information from Boeing at some point, but I'll follow up later with that.

BY MR. HILLDRUP:

Q Also, Mr. Hall, do you know which direction

-- I don't know if we've specified which direction the revision has specified?

A Yes, I do.

Q Could you tell us what that is?

A The aft and the bolt head would be inboard to out.

MR. HILLDRUP: That's all I have. Mr. Chairman, thank you.

CHAIRMAN GOGLIA: Okay. To the parties. Federal Aviation Administration?

BY MR. STREETER:

Q Mr. Hall, when you're working on Emery's airplanes at the repair station that you're employed at Tennessee Tech, is that work done under Emery's Maintenance Program?

A Yes.

Q When you mentioned earlier then that, for example, this was a former United airplane and there were some United manuals being used, you're speaking of the marking on the manual, is that correct?

A As far as the effectivity of the manual and Emery supplied us with the -- with the tapes for that aircraft, yes.

Q So, that manual you're using is part of

Emery's Maintenance Program, is that correct?

A Yes, sir.

Q Okay. If you would, sir, please go look at Exhibit 7-K and specifically Work Card 3504-D, which is the fourth -- fourth page in that exhibit.

Now, did you state earlier that you are Inspector 19?

A Yes. Yes, I am.

Q Okay. So, is -- that is your stamp then on the Step Number 11 there at the top of the page, is that correct?

A I haven't got the exhibit in front of me, but if that's the installation paperwork, yes, it is.

Q Yeah. That's the installation. That -- that specific step, "The inspector checks elevator assembly for proper installation and security."

A Yes.

Q Okay. And do you -- do you -- well, I want to make sure you've got that there, so we --

A I have it in front of me.

Q Okay. So -- and so, that is your stamp on there, correct?

A Yes, sir.

Q All right. Now, you mentioned earlier that

you didn't recall that -- some of the work on this airplane.

I want to ask you specifically, do you recall that inspection and that -- that stamp-off?

A No.

Q Okay. Then what I would like to do is ask you a few questions about this based on your general experience in doing this type of inspection on DC-8s.

The first thing I'd want to know is, when you do this inspection, is the -- is the fairing already off or does it have to be removed first?

A The fairing would have to be removed.

Q Okay. So, it had been put back on, and you would have to take it off to complete this step, is that correct?

A That's correct.

Q Okay. Now, when you have that fairing off, do you do a -- I'm speaking specifically now of inspecting the elevator control rod, the push rod and the crank assembly.

A Yes, sir.

Q Do you do that inspection visually or does it also include a hands-on?

A Visually and by touch.

Q Okay. And by touch, what are you looking for?

A Safety.

Q Okay. So, you actually feel for a cotter pin?

A Yes, sir. Visually -- you visually put it in your mind that you have it --

Q Right.

A -- and then physically touch it to know that it is there, and it's two ways of knowing and it satisfies in your conscience that you won't wake up in the middle of the night wondering whether you did actually see or touch that cotter pin in place.

Q Okay. Now, would your Inspector Stamp 19 have been put on this paper before you actually did that?

A No, sir.

Q All right. So, when this stamp goes on here, according to your work routine, that means that you have actually looked and laid hands on that component, is that correct?

A That's correct.

Q And if the cotter pin was not there, it would not have been stamped by you?

A It would not have been signed or stamped.

MR. STREETER: I have no further questions. Thank you, sir.

CHAIRMAN GOGLIA: All right. Thank you.

Emery Worldwide?

BY CAPTAIN HAGQUIST:

Q Good afternoon, Mr. Hall.

A Hi.

Q You mentioned there was no kit available for the -- that was spoken to on one of the work cards. There was no Emery kit, hardware kit?

A That's correct.

Q The hardware that was required, TTS had all the hardware in stock that was required to make that installation?

A I'm not sure where the hardware -- TTS had it or Emery supplied it to us.

Q All right. But there's no question that the proper hardware is what was used to assemble the component?

A Not a question.

Q All right, sir. And did you actually personally do the receiving inspection of the elevator and tabs when they came to TTS?

A I had received some of the flight controls shipped to TTS by Emery. Whether it's this particular set, I don't know. I work second shift. We have a permanent receiving inspector assigned to the day shift who does primarily most of that receiving.

Q All right, sir. In your earlier testimony, you said that you had received flight controls that were not applicable to subject airplanes and that you had received some damaged flight controls, that some had balance problems. You rattled off a litany.

The specific flight controls that came to Aircraft 79 Uniform, were they the correct flight controls?

A I don't remember a problem with those flight controls.

Q Do you remember any significant damage to those flight controls?

A No, sir.

Q You went back to 1981, I think, in your experience on maintaining the DC-8, and in that experience, had you ever seen any B check task cards that are similar to Emery's task cards?

A I can't remember. That's going back a long time. There are similar cards, yes, that I have worked

off of.

Q All right.

A But it's not necessarily all strictly Emery's.

Q Certainly. So, some -- this -- Emery's isn't the only set of task cards that you've seen with just a single signature or stamp location?

A That's correct.

Q Okay. Just so that I'm clear on this, the task cards. Are they part of an approved maintenance program, are they not?

A That's correct.

Q And the approval is from the FAA?

A That's correct.

Q All right, sir.

CHAIRMAN GOGLIA: David, you know, I have to ask you a question, because there's -- there's much interest in the words "approved" and "accepted" in the maintenance community, and at the inspector level, and particularly in a repair station, that's not a fair question to ask.

I think that question and that line of questioning needs to go to the management of Tennessee Tech, and it's going to come back to you from me if it

doesn't come from the panel, not to you but to Emery, to your people that you're going to put on because that does go to the heart of some of the issues that are here today.

CAPTAIN HAGQUIST: All right, sir. It's understood.

CHAIRMAN GOGLIA: Okay.

BY CAPTAIN HAGQUIST:

Q TTS is a 145 repair station?

A Yes, sir, we are.

Q All right, sir. And TTS is a repair station that is authorized to work on DC-8 aircraft?

A Yes, sir.

Q All right. All 145 repair stations are not, are they? Are all 145 repair stations authorized to work on DC-8s?

A Not that I know of.

CAPTAIN HAGQUIST: Okay. And perhaps again, Mr. Chairman, this might go to Mr. Hoffstetter.

BY CAPTAIN HAGQUIST:

Q I just wonder what the process is for a repair station to become authorized to work on a particular kind of airplane.

A You have to go to Mr. Hoffstetter on that.

Q All right. I understand.

The -- the issue of 19 mechanics having documented some time against the installation of the elevators, was that the minimum number that was required to get that job done or is that just how it happened to work out?

A It's just how it happened to work out. We could have been doing a training for one or two new people to show them how we do the procedures. We could have encountered small problems, any number of -- that card is spread out over three or four days. It's a nightmare card to handle because it has to accomplish so much work with very little sign-off.

Q All right, sir. I just have one last question, and that is, that the temporary revision that you spoke to that deals with the orientation of the bolt, you described a general rule of thumb for the installation of hardware, direction of flight or flow of water.

A That's correct.

Q That temporary revision, is it contrary to that general rule?

A Yes, sir.

CAPTAIN HAGQUIST: I have nothing more.

THE WITNESS: But for that particular bolt in that position.

CHAIRMAN GOGLIA: Okay. The Boeing Company?

MR. BREUHAUS: Boeing has no additional questions.

CHAIRMAN GOGLIA: ALPA?

BY MR. GUNTHER:

Q Mr. Hall, I met you once before when we came up to Tennessee Technical Services, and I do thank you for coming once again.

One of the things that I'd like to ask you, you had mentioned that that particular procedure, the work card, you called that a nightmare card. Why is that?

A The process that you go through on it, the very first -- at the top of the card, it tells you to follow the appropriate maintenance manual for installation. Then it goes along in line, and it quotes some of the steps out of the maintenance manual for a lead mechanic to sign off, but it lacks sufficient data. Unless we did have a maintenance manual, we couldn't do what the card is asking for, and it's -- it's minimal at best. It could be improved.

Q Now, you're dealing with a lot of different

customers that come to Tennessee Technical Services, and they provide cards for you for different build-ups for their -- for the customer aircraft.

How does this card -- these cards compare with others you would receive?

A Probably on the lower side of functional. There are better cards.

Q One of the other questions that I had was, and I'm just a layman at this, I'm a pilot, I'm not a mechanic. So, one of the things that I do is ALPA has an engineering staff, and a lot of our guys are A&P mechanics, and one of the things that I ended up doing was showing the cards to them because I had trouble understanding it. I'm used to doing checklists which are item-by-item, and they start at one point, they go to another in a logical flow.

I noticed that on these cards, that it says it must be done in conjunction with another card. Is that pretty normal for you to go one step, go through sequential number to the end of a card and then have to go back to another card to complete the procedure?

A Somewhere Emery saw fit to group these two cards together during the installation process of the elevator. Some of this stuff is -- some of the items

that are covered on both cards are done in one step per the maintenance manual. How they derived at issuing both cards, I don't know.

Q You as a mechanic and inspector with 20 years' experience, if you, you know, had the chance to become, you know, the FAA administrator or had the ability to effect how you'd go ahead and do a task card or a work card like this, in your experience, what you as a line mechanic want to see, if you were doing this type of thing using a card?

A The work card would not repeat the installation process, pretending to put the elevator on in accordance with the maintenance manual and leave it at that and reference through a required inspection item for certification of the part once the card is completed. Put the maintenance manual on the card and also tell me to go by the work card, it's kind of redundancy, plus it's lacking proper information.

Q You also talked about kitting before. I picture a kit, I picture the hardware in it along with the parts list, etc., that could either be pulled from a stock room, etc.

Is that the only time you've had problems with kitting? I'm not used to looking at kitting as

just being something that you would go to look for on either a task or a work card and then not find either you have it in stock or have to build the kit up yourself. Is that a normal practice?

A We would not build the kit for TTS. That kit would have to come from Emery. In order to find out what's in the kit, we would have to call Emery Stores to find out what's included in the kit, so we would know what their requirement is to assemble the kit, to put the kit together, before we used it. Otherwise we would just order the parts that we need and Emery would either supply them or we would get them ourselves.

Q Is that the first time you've run into that?

A No.

Q And have you complained to anybody about that?

A We tell our reps.

Q Can you tell me what type of -- for instance, you did a D check on this aircraft type.

Are there any differences that you've noted in customer support from Emery in this case with their aircraft for your personnel when you're doing the D check versus anybody else you've done it for?

A The supplies are a little slower than that.

It's about the same support.

Q Do they have any maintenance rep on site while you're doing this build-up?

A Yes, they do.

Q You talked before about the elevators that you received and the paperwork that comes with it, which is our Form 8133, and so you get these parts that come in. They're tagged.

Would you have expected that you would have had to go ahead and inspect the dampener installation when it came from an approved vendor?

A No.

Q And you said that you do that now?

A Yes, we do.

Q Do you know who the vendor was that supplied those?

A No, sir, I don't.

CHAIRMAN GOGLIA: Mr. McGill, was that in the docket at all? Who supplied the -- the elevator?

MR. McGILL: I was going to ask those questions to Mr. Hoffstetter.

CHAIRMAN GOGLIA: Okay. Thank you.

BY MR. GUNTHER:

Q Are those maintenance reps from Emery on all

shifts when they're there?

A Yes, they are.

MR. GUNTHER: I don't have any further questions.

CHAIRMAN GOGLIA: Okay. Tennessee Tech?

MR. PORTER: Yes. My name is Sam Porter with Tennessee Tech. I had a couple questions for Kenny Hall, if I may?

CHAIRMAN GOGLIA: Why are we switching party spokesman?

MR. PORTER: No specific reason. I just had a couple about -- a couple of detailed questions about the B check work card itself. I could easily explain it to Mr. Hoffstetter and have him ask.

CHAIRMAN GOGLIA: Please do.

MR. PORTER: Okay.

MR. HOFFSTETTER: Dave Hoffstetter, Tennessee Tech Services.

BY MR. HOFFSTETTER:

Q Kenny, when we first started working, doing work for Emery, do you remember us working B checks for them?

A Yes, I do.

Q Were you involved with those B checks?

A Yes, I was.

Q Are you familiar with the -- with the card that now covers the B-2 inspection, the card that -- when we were doing the Emery B checks, we did a full-blown B check, and later Emery segmented those cards so they did a portion of the B check. They did a B-1, 2, 3 and 4.

A Yes.

Q Are you familiar with the B-2 inspection?

A Yes.

CHAIRMAN GOGLIA: Mr. McGill, do we have an example of the B-2 card in an exhibit?

MR. McGILL: Exhibit 17-U.

CHAIRMAN GOGLIA: Okay. Can staff provide the witness with a copy, please?

BY MR. HOFFSTETTER:

Q The last page in the B check, B-009.

A Yes.

Q Item 1. Would you explain how you would accomplish that inspection?

A The test calls for a visual inspection of the elevators and tabs for general condition, corrosion, leakage and security of the attachments, inspect the static dischargers for general condition and security.

To accomplish this task, we would remove the fairings on the elevator itself for its attachments and the control tab and its attachments and the geared tab and its attachments to accomplish all of that card.

Q There is no reference on the card to indicate that panels need to be removed.

Is it typical for the B check to ask you to do work that requires panel removal without specifically telling you to remove the panel?

A Yes.

Q Do you have any examples of that?

A It would be in the -- in the lubrication for spars, lubrication for slots, lubrication for the flaps. You -- it doesn't tell you to take the panel off to lube them. Doors.

Q Could -- could the attach points be inspected without removing the panel?

A You cannot check security of attachments with the panel installed. It's covering the area. You cannot see it.

MR. HOFFSTETTER: Thank you. That's all I have.

CHAIRMAN GOGLIA: To the Board of Inquiry.

MR. DeLISI: Thank you.

CHAIRMAN GOGLIA: Mr. DeLisi?

BY MR. DeLISI:

Q Mr. Hall, I'd like to start with a few more questions on work cards, Exhibit 7-K, in particular, the third page. It's got a 526 in the lower right-hand corner.

A Yes.

Q I'd like for you to help me really understand what's on that card. For instance, Step Number 2, which starts with the word "hoist the overhauled elevator", just to the left of that Number 2, it appears to be a signature and appears to be some kind of a number underneath that.

Can you explain what those are?

A That's the individual that's signing for accomplishing that task.

Q So, that's the individual's name on -- as a signature and his employee number underneath it?

A It would be his A&P number.

Q His A&P number. Okay.

Now, would you expect that to have been the person that did that job or is that someone who oversaw the job being done?

A One of them. It could be either one.

Q It looks like that individual signed off on all the subsequent steps on that card.

Would you have expected him to sign each step as it was completed?

A He or another authorized A&P mechanic, yes.

Q But -- but you would expect that to be done as each step is completed as opposed to stepping over to the card at some point after all the work is done and signing it all off?

A One or the same. As you do it, you can sign it or you can do it at the end and go back and verify that you have accomplished everything that this card is calling for, but the primary document would be the maintenance manual which would coincide with this document or should coincide with this document, with the lack of information on the document to complete the task.

Q Okay. On that same card, on the first step in the -- in the upper left-hand corner, there's an inspection stamp.

What is that stamp indicating?

A That inspector had inspected the area and gave the okay to install the elevator.

Q So, why on that card would the inspector have

only stamped off that first step as opposed to also stamping the completion of each subsequent step?

A It's not a requirement.

Q And is there a way to look at this card and determine if it's required for an inspector to verify each step?

A Yes. There would be an additional block beside the signature block for the mechanic and would have an "I" in front of it. An I inspector would have to stamp it.

Q Okay. If we could flip back to the previous page on that attachment, Page Number 2, 523 in the lower right-hand corner, Steps 3, 4 and 5 on this card, it looks like I'm seeing a bunch of stuff.

Can you help sort out what -- what we're seeing there? I'm sort of expecting now to see the inspector's stamp be on the far left-hand side but I'm not. I'm seeing what looks like a signature there.

Can you help me understand what -- how that card was signed and stamped?

A It would be an error in this part because the inspector stamped over the mechanic block rather than being the opposite.

Q And then, to the far right of the circle, it

looks like something else, maybe a second signature, something that ends with three or four numbers.

Do you see what I'm referring to there? It looks like there's a signature with a number underneath it on the left, then a circled stamp, but then some other writing, and I can't really decipher what that is. Do you have any idea?

A No, I don't recognize it, no.

Q Okay. Earlier with Mr. McGill, we were -- you were talking about a card that referred to a kit, and you had mentioned that that kit doesn't really exist.

Would that be something that you would have brought to someone's attention, say hey, we're working a card here that refers to a kit, but we don't have that kit? Is that something that would have been brought to your management's attention?

A Yes, and Emery's.

Q And Emery's. Did you ever find that there was a modification to that card now to have it more accurately reflect the fact that that kit didn't exist?

A As far as a change to the card, I don't know.

Q So, as far as you knew, you continued to work to a card that referred to a kit but that kit didn't

really come into play?

A That's correct.

Q I'd like for you to help me be sure I understood this correctly.

On a card like the one on Page 3 where you're installing the right-hand elevator assembly, did you previously say that typically the entry point for that was an elevator with the control tabs assembled as one piece?

A Yes.

Q But on some occasions, what you received from Emery was an elevator and the control tabs separate?

A Yes.

Q So, prior to commencing this work card, you would have had to go through another procedure which was install the control tab to the elevator?

A Yes.

Q Is that a card that we've looked at today?

A Yes. It's -- it's in the same exhibit, Card Number 3502-D, Card 523 in the right-hand corner.

Q 3502-D. Okay.

A Yes. That puts the tabs on the elevator.

Q Got it. Okay. Good. Thank you.

On Page 4 of that same exhibit, we -- we

talked earlier about your Stamp Number 19 on Step 1, which said, "Inspector check elevator assembly for proper installation and security."

A Yes.

Q You had mentioned earlier that the fairing for that elevator tab push rod and crank assembly was off at that time.

A Yes.

Q Is there a subsequent step in a work card for installing that fairing?

A You reinstall it back on this card after the inspection is completed or we have a set of closing cards issued with the Emery program --

Q Okay.

A -- that would direct us back to that area to verify that that area's okay to close and close that panel.

Q When -- when you say reinstall it on this card, is there a step previously on this card that -- that talks about installing that fairing?

A Previously, no.

Q So, there's not a specific line item to install that -- that fairing?

A No.

Q Okay.
A Not on the card.
Q And if it's not on this card, you mentioned that it might be on a subsequent close-up card?
A That's correct.
MR. DeLISI: Okay. Thank you very much. No further questions.
CHAIRMAN GOGLIA: Okay. Dr. Kushner?
DR. KUSHNER: Yes, I was just curious now.
BY DR. KUSHNER:
Q It's Exhibit 7-R, which is a Chapter 27 from the Maintenance Manual, Troubleshooting Manual. That is a combination of United and Douglas documents.
How much variability, if I were to get the similar chapter that was an American and Douglas document, you know, in general, how much variability is there among them?
A I really wouldn't know. I mean, you'd have to look at both documents to see the variation.
Q Do you have any experience where you've done similar or the same jobs on planes that had different lineages and therefore you were, you know, using a different set of manuals for the same job?
A Different ATA -- different effectivity codes,

yes.

Q Have you ever noticed anything that was markedly different among them?

A Some -- in some of the rig procedures, the dimensions do change, but that's because of the difference between the short airplanes and the longer airplanes, and there's a small variation and that's because of the difference in the short and the longer airplanes.

Q But it's never anything where somebody who is doing the same job, let's say, twice in a row on two planes would do it once and then maybe would do it the same way the next time when he should have been doing it, you know, differently where you would get into a habit or something?

A It's possible. If -- if you don't read the paperwork, you know, you could -- you could make that error, yes.

DR. KUSHNER: Okay. Thank you. That's all.

CHAIRMAN GOGLIA: Okay. Mr. Hall, I have a couple questions for you.

You mentioned you had Emery reps on all your shifts, and you also mentioned that you had occasion to raise some issues with both your management and the

Emery reps.

In referencing the Emery on-site personnel, the reps, how responsive were they in your experience to problems that you raised? Not just did they acknowledge they heard you, did they do anything?

THE WITNESS: The problems that we had at the time were satisfied, yes.

CHAIRMAN GOGLIA: You were satisfied with whatever you raised to them, that they had addressed it properly?

THE WITNESS: When they ordered a set of flaps that were the wrong flaps for an airplane, yes, we did have to replace those flaps.

CHAIRMAN GOGLIA: Well, let's talk about parts ordering for a second.

I assume at least in a portion of your career working on Emery airplanes, you were a mechanic?

THE WITNESS: Yes, sir.

CHAIRMAN GOGLIA: When -- from time to time, when the need came not for hardware and not necessarily for units that were already provisioned as part of the check, because when you -- when you -- when you decided to do a check, there are a certain number of items that you know you're going to consume, so normally most

airlines will supply those -- those bits and pieces, if you will, to the repair station because they know they're going to be used.

THE WITNESS: Yes.

CHAIRMAN GOGLIA: And then, from time to time, you will also find something that hasn't been provided to -- to the repair station --

THE WITNESS: Yes.

CHAIRMAN GOGLIA: -- that needs to be replaced.

Can you walk me through the process that you would use as a mechanic to -- to get those parts, especially if they were not pieces that were in stock?

THE WITNESS: We would research the IPC for the part required, fill out a requisition and turn it into the Stores people for them to order. They would go through Emery Stores first to see if they had the part in supply to send it down to us or go to an outside source vendor.

CHAIRMAN GOGLIA: You would go to the outside -- not you yourself, but to your knowledge, was it your employer, Tennessee Technical Services, that -- that went to the outside supply agency to generate these -- these bits and pieces or was it Emery who ordered the

bits and pieces and had them sent to you directly?

THE WITNESS: It would depend on Emery. Their decision whether they would order the part or they would ask us to order the part. Most of the time, it comes through Emery.

CHAIRMAN GOGLIA: Okay. Now, you also mentioned that -- that you did some receiving inspection.

THE WITNESS: Yes.

CHAIRMAN GOGLIA: But -- but the majority of the receiving inspection was done on day shift?

THE WITNESS: Yes, sir.

CHAIRMAN GOGLIA: Okay. On the periods of time that you actually performed receiving inspections, did you find any units that were damaged in shipment, for example?

THE WITNESS: Yes, sir, we did.

CHAIRMAN GOGLIA: And how did you handle that?

THE WITNESS: We quarantined the unit and then notified the Emery rep that we had a problem with a unit, a screw had been hanging out, and when they laid the aileron inside of it, the screw had actually gouged the skin and rolled it up, and we generated

paperwork to get those items taken care of.

CHAIRMAN GOGLIA: And did they replace them or was the repair performed by Tennessee Technical Services?

THE WITNESS: We did a repair.

CHAIRMAN GOGLIA: And firsthand experience again, what you have seen, did you ever have any receiving inspections performed by you in which there were pieces missing from the unit that arrived? Hardware, brackets, etc.

THE WITNESS: No.

CHAIRMAN GOGLIA: Okay. Now, when I visited the facility in Tennessee, we also visited a location that was off the airport where there was a lot of work done on flight controls.

Have you done any work in that facility?

THE WITNESS: Not in that building, no.

CHAIRMAN GOGLIA: Okay. Was that type of work done in the -- in the hangar, in the hangar area, prior to that building -- I have no idea when that building came on. Do you know when it came on?

THE WITNESS: I can't remember when it came on.

CHAIRMAN GOGLIA: I will defer those

questions to another witness.

THE WITNESS: Mr. Hoffstetter could probably answer that for you.

CHAIRMAN GOGLIA: I think that's all I have for you.

Back to the Technical Panel. Does anybody on the Technical Panel have any follow-up questions?

MR. McGILL: We have one question.

BY MR. McGILL:

Q First of all, the changes that are mandated to TTS related to the receipt or anything about the inspection of the elevators was prompted by Emery?

A We had one alert that was put out as to -- for dampeners, as to the orientations of the arms. That's about all.

MR. McGILL: Thank you.

CHAIRMAN GOGLIA: To the parties. FAA? ALPA? Emery?

CAPTAIN HAGQUIST: Yes, sir, I do have one follow-up question.

BY CAPTAIN HAGQUIST:

Q Mr. Hall, you testified that sometimes the wrong part was provided by Emery?

A Yes.

Q In any of these instances, did TTS perform a repair without having received the correct part? Did you ever use the wrong part, sir?

A No.

CAPTAIN HAGQUIST: Thank you.

CHAIRMAN GOGLIA: Boeing? Tennessee Tech?

I have one additional question. You mentioned that you did some field service, for lack of a better word.

Do you understand what I'm saying? You left your home base to do some work?

THE WITNESS: Yes.

CHAIRMAN GOGLIA: And some of it involved rigging?

THE WITNESS: Yes.

CHAIRMAN GOGLIA: Was this rigging on airplanes that had recently left Tennessee Tech? Were these -- these assignments, this rigging that was performed, did you do that on airplanes that had been out for awhile?

THE WITNESS: They had been out for awhile.

CHAIRMAN GOGLIA: Okay. And that's okay. All right, Mr. Hall.

Did that trigger any need for a response from

any parties to my questions?

(No response)

CHAIRMAN GOGLIA: Okay. Then, I -- we -- I don't want to say finished, but you're released for the time being, but again I'm keeping all the witnesses here to be recalled in the event that we need them.

THE WITNESS: Okay.

CHAIRMAN GOGLIA: So, I'd appreciate it if you would just sit back and relax for a little while.

(Whereupon, the witness was excused.)

CHAIRMAN GOGLIA: And I'm going to have a revolt if I don't take a 10-minute facilities break. I see people dancing in their chairs and people have been leaving like crazy from the audience. So, I think that's a good indicator that we need to take 10 minutes and get our next witness ready and do what we have to do.

(Whereupon, a recess was taken.)

CHAIRMAN GOGLIA: Mr. Hilldrup, can we go back on the record?

MR. HILLDRUP: I'd like to call Mr. David Hoffstetter to the stand, please.

CHAIRMAN GOGLIA: While Mr. Hoffstetter's coming to the stand, I want all the parties to -- to --

I want to inform all the parties that we will be breaking at 5:00 roughly, and we will be getting together with the parties briefly immediately thereafter. So, this witness probably will not be concluded today, unless you all talk fast.

MR. HILLDRUP: Mr. Hoffstetter, please raise your right hand.

Whereupon,

DAVID HOFFSTETTER

having been first duly sworn, was called as a witness herein and was examined and testified as follows:

MR. HILLDRUP: Thank you.

EXAMINATION

BY MR. HILLDRUP:

Q For the record, please state your name, current address, employer and title.

A My name is David Hoffstetter. I'm President of Tennessee Technical Services. The address is 634 Fitzhugh Boulevard, Smyrna, Tennessee.

I'd like to take the opportunity to express my condolences to the families and also thank the Board for the opportunity to be here.

Q And if you could tell us, please, the qualifications for your -- for your position.

A I've been in aviation since 1967. I've worked for several major carriers, Eastern Airlines, PanAm and National. I've worked for repair stations and also for smaller carriers. I worked for Capital in Smyrna, Tennessee. That's why I moved to Smyrna, and I've worked for airlines that were as small as one airplane and major carriers and several repair stations.

Q Thank you.

MR. HILLDRUP: Mr. Chairman, Captain McGill will be doing the questioning of Mr. Hoffstetter.

BY MR. McGILL:

Q Good afternoon, Mr. Hoffstetter. It's a pleasure to have you with us today.

We've had some discussion about your facility as a Part 145-certificated repair station. So, why don't you very quickly take us through what it takes to be a Part 145 and specifically to perform maintenance of the DC-8 airplane?

A Okay. When we started our certification process, it was in early 1998. In order to have the repair station certificated, we had to show the operator we had qualified people, facilities capable of housing the aircraft, human factors equipment that

would allow us access to the aircraft and lighting in order to accomplish all the tasks outlined in the OMM for the DC-8, and we had to support the organization to be able to inspect and coordinate activities on aircraft of that size.

Q Do you have an FAA inspector assigned to your facility?

A Yes, we do. We have three right now. We have a PMI and we have an assistant and we have an avionics inspector, PAI.

Q Were any of these people involved in any of the Emery investigation areas?

A The PMI that was with the company at the time of the accident was Mr. Schuler. He's been replaced by David Miller, and Mr. Miller was in the local office at the time of the accident. He's been involved with any of the reports that -- of problems that we've had with supplier's suspected unapproved parts, requests for additions to our certificate, those type of things. So.

Q But they're specifically assigned to you and to your certificate, and he doesn't really reflect upon the certificated holder that you're working on the airplane, is that correct?

A That's correct.

Q Since we've got this far, technically, what is the role of a 145?

A 145 provides maintenance services to air carriers or aircraft owners. We generally provide services to carriers that aren't large enough to have their own maintenance facility or don't have the right people to support their own maintenance facility or major carriers that have more maintenance to accomplish than they have capacity for in their own -- in their own facilities. We do work for leasing companies, aircraft owners, to prepare their aircraft for the next operator or for sale or for lease.

Q Okay. We had a very short question a little while ago about the approved program or the maintenance that is performed on the specific airplane.

Can you go through that for us?

A We are charged as a repair station to comply with the operator's maintenance program. So, we do not generate our own task cards for work on an Emery aircraft nor do we create our own task cards for work on leasing company aircraft. For leasing companies, we use the maintenance program. For an operator, we use the operator's program, and generally the operator will

come in and train our people to the peculiarities of their system, their parts tagging requirements, their receiving inspections, their RII programs, and give us some general training on their -- their maintenance manual.

Q In this particular case, did Emery come in and do this with you all?

A Yes, they did.

Q Was it adequate?

A I would say it was adequate.

Q How is the relationship established with a certificate holder for you to start doing the -- doing maintenance for them? In this case, let's just use Emery as the example.

A Tennessee Technical Services approached Emery about accomplishing maintenance for them. We had had some conversations with their maintenance people. They decided they would let us do some B checks on their aircraft. They were getting ready for their peak rush in the November-December time frame. They had some maintenance requirements to prepare their aircraft for that time frame.

I think on the first group of aircraft we did, they did some preventive work or -- on replacing

main landing gear seals, special checks on EPR systems, EGT systems, plus a full B check. They were -- for B checks, they were fairly extensive.

Q How many B checks have you all done roughly?

A On -- for Emery in that time frame, I think we did seven or eight.

Q What kind of man hours goes along with the B check, Emery's B check?

A In our facility, we were running 600 man hours plus on the aircraft, but that included the special requirements that they had to prepare the aircraft for their -- for their rush. So, we had main landing gear changes, engine work that were not a part of a normal B check.

Q So, whenever extra work content was added to the B check, you all performed it?

A Yes, sir.

Q Roughly how long does it take to perform a B check without the extra routine work that's given?

A It -- it depends on how -- how many man hours you're willing to dedicate to the program. Typically, the Emery work was in the three-day time frame. We had some aircraft that had corrosion problems that took significantly longer, but just the support and the

parts that we would run into for the aircraft would dictate that it would be at least a two-day project and generally three. That was our target, was three days, for the B check.

Q Did TTS perform other work outside your facility in Tennessee?

A Yes, we did. We performed work for several carriers. We provided rigging crews, avionics support, mechanical support for Emery and several other air carriers.

Q In the area of flight controls, can you recall any problems that might have existed with Emery-type flight controls?

A We -- we had significant problems with the flight controls that came in from -- from other vendors. The -- because of the labor, the amount of labor involved with the D check, the decision was -- was reached with Emery, a joint decision, that the flight controls would go out to an outside vendor. Emery procured a spare set of flight controls and positioned them at Tennessee Technical so -- to -- to help expedite the workflow and the overhaul or the D check on the aircraft.

We had problems with -- with balance,

significant problems with balance on the -- on one of the elevators. We had problems with balance on -- on our rudder. It was not uncommon for bushings to not be brought up to size. On occasions, we've had surfaces that were originally designed for a 61 that needed modification to be able to be used on a 71 that Emery was -- 71 series aircraft that -- that Emery was operating.

There was -- whenever you do modifications like the engine program, there's always some confusion with the manuals and -- and ensuring that you get the right effectivity. I don't think Emery did a particularly bad job, but there was certainly problems with the -- with the surfaces in the beginning, and those problems continued through to the last set of surfaces that we had. They had their vendor come up and we had to send, I think, one of the outboard ailerons back to the facility to have one of the major fittings in the aileron replaced. Emery took care of that. That was their supplier.

Whenever we'd find problems with them, we would write -- record the discrepancies, talk with the on-site maintenance reps, whether they wanted us to correct it or go back to their vendors, and basically

whether we corrected the problems or it went back to the vendor was an economic issue with Emery, not with -- not with us.

Q Why should there be a difference, if everybody's using the same overhaul manual, to overhaul these components?

A There's more than just the overhaul manual involved with -- with flight controls. The overhaul process is covered in the overhaul manual. Balance is covered in the SRM. Bushings and bearings sometimes are not covered in overhaul, they're covered in the maintenance manual. So, you have several manuals, plus you have Service Bulletin and AD compliance to verify.

Some companies are real good with that, some are not. Some companies conscientiously do corrosion preventive programs on surfaces when they're sent up for overhaul, not all of them do. We ran into that problem with some of the surfaces. Emery had us do the CPC program on those surfaces. So, they were aware of the problems. They tried to work with us and work with their other suppliers to help resolve those issues.

Q All right, sir. An operator would request whatever they were doing in their flight controls?

A Yes, sir.

Q On this particular set of flight controls on this aircraft here, do you recall anything about that set of flight controls?

A If you had asked me when I first started the business, I probably would have said no, but having reviewed -- reviewed records and being more aware of what was happening with the -- with this particular set, the fact that they came in without tabs installed was significant to me. The -- I don't remember a -- a real large amount of problem with the -- with the surfaces, other than the fact that -- that they came in in pieces rather than as a complete unit, and the -- the only problem that -- there is not a real problem from that standpoint because the tabs are individually replaceable. They don't have to be replaced in conjunction with -- with the elevator, but it -- it certainly creates some balance issues when the surface comes in balanced with no tabs installed.

When we installed the tabs, we have to watch the weights and make sure that we get the right -- right pieces and the right weights to make sure that the surface is in balance.

Q As the repair facility, can you remember if you've had other -- had any other problems with this

particular repair facility?

A The gentleman who was the director of quality assurance at the time this happened had written a letter to Emery stating that we had, in addition to the elevators that we put on 74 U, we had another set of elevators that was received from the same company with the dampeners in the incorrect location. I don't remember that, but I'm aware of the memo.

Q The fact that the repair facility went through a broker first, is that anything significant with the parts in the repair facilities?

A From my standpoint, there -- there probably is not. I don't like to purchase parts for Emery or other companies. That's an economic issue with me. Buying parts is -- is probably the worst situation to be in in the world for a repair station.

Everybody wants the best price. I can spend three days looking for a part that started off at $20,000 and end up purchasing it for 5 and for my three days' work, I get 14 percent of $5,000 instead of 14 percent of 20. So, I personally don't like to -- to go out and buy parts. I prefer to go to Boeing or Douglas. That's pretty straightforward. We know exactly what we're getting, and we don't have any

quality issues with it or usually don't. But I recommend that the operators generally provide their own parts, and in the agreement that we had with Emery, they provided everything that was above $2,500 in cost and many of the parts that were below that were provided by Emery.

I would prefer to let them go -- going where they want to -- any broker to find the parts, somebody that they're comfortable with, because I -- I can't stand the argument that you didn't work hard enough to not make any money. It's a difficult position to be in.

Q When you're counting on the customer who has the broker to give you the set of parts at the repair facility, all of these other things that you mentioned awhile ago, extra -- extras, if that reflected in the price of -- of a component whether you bought it from one place or another place, is that correct?

A Yes, it should. There are -- there are some repair facilities and brokers that have very good reputations. There's some that seem to make the news on a regular basis for suspected unapproved parts or -- or removed -- components removed from foreign aircraft, those type of issues.

Q (Inaudible question)

A Just an 8130-3 does not make a part serviceable. The information on the 8130-3 is very critical. If it's not signed by a repair station, we've seen 8130-3s signed by brokers, signed by people with A&P licenses, signed by all kinds of different groups that really don't have the authority to make the component airworthy. So, we reject those kind of -- those parts and have notified the FAA on occasion to what our situation was when we felt it was a critical component.

Q There was a question, too, when you have some sort of a check report for different components.

A If it's not provided by the operator, if it comes direct to us from the repair station, there will be a tear-down report with it. If it's provided by an operator, and it has an operator's tag on it, then we never see the tear-down report. We would -- we would be looking at the final fit on the aircraft or maybe not be aware of a problem until we went to install it on the aircraft.

Emery was pretty -- better than most about providing us tear-down reports for the material when it came in, especially as it related to flight controls.

We generally received the flight controls direct from their vendor and had all the documentation with them.

Q Other than flight controls, without a tear-down, that changes the reliability or liability-type of program and would not have that information to adjust whatever needed to be adjusted to maintain that --

A Just because I didn't have the tear-down report doesn't mean that Emery shouldn't have had it. If I get a part and it came out of Dayton, I may or may not get the tear-down report with the component, but my assumption would be that Emery's inspectors looked at that part, they put an Emery tag on it, and somebody has already verified that the documentation is acceptable to meet Emery's requirements.

Q When you found components that did not meet the standards that you needed, who did you talk to about that? Did you get back with the certificate holder?

A It would depend on -- on what the program was. There were times when we went only to Emery. There were times when we went to Emery and also notified the FAA, and there were times, if I was buying the part, that it was quarantined and went to my FAA without Emery ever being aware. As long as it was not

used on their aircraft, it was something that I purchased for my stock to be issued at a later date, we would quarantine it, quarantine that component.

We had significant problems with -- maybe not significant problems. We had some problems with material coming from foreign carriers and that's a problem. We don't -- we don't want anything with the foreign cert on it. It has to be a U.S.-certificated entity that creates the -- the tag, the document, for the -- for the certification.

Q If you would go to your principal, does that particular FAA guy then pass it forward to the principal of this other certificated --

A Oh, yes, and then I get called and screamed at for not letting them know first. So, --

Q So, things happen?

A Oh, yes. Guaranteed. If Emery's -- that's fair. If Emery's providing the part, even if they never see it, if it comes into our facility and there's a problem with it, the first time that they see the part is -- is their reps at the Tennessee Tech hangar, they need to -- to be aware and to be able to handle those problems, and I would say 99 percent of the time, they did.

There -- there was a couple instances where the -- my local FAA was advised before they were, and I think that really was generated more because the FAA was on site there than -- than because there was an effort to notify them first.

Q And there's some representation on site, was that -- did you have a good relationship there?

A Generally, we did. There were some people that I had problems with, and I'm sure there were some people that had problems with me, but they had their jobs to do. I think they did a pretty good job. They -- they had a unique rotation. They actually had three reps assigned to Tennessee Tech Services. They would have two reps there at any specific time. One would be on day shift and one on second shift, and then the second shift rep would move to days and the day shift rep would take a week off and the new man would come in on second.

So they had kind of a rotation where we saw the same people over and over. You get used to them, they get used to the operation. That works -- that works fairly well. There was occasional problems with coverage on weekends and third shift, but they had cell phones and they were generally available if there was a

problem on the weekend for us to contact.

Q Let's go back to the performing maintenance, other than at Tennessee Tech, specifically Dayton.

Do you recall any times when you sent people to Dayton and why they would be there?

A Yes. In May of last year, we had a significant crew at Dayton to assist Emery during their -- the -- an FAA inspection where there was quite a bit of ramp activity. We were requested to send a crew up, and we provided a crew to -- to support their activities.

Generally, our crew would be assigned an aircraft that -- that had problems. We would work through whatever problems there were with the airplane, and when we finished, it would go out and we'd get -- get the next most critical airplane from -- from Emery's standpoint. It was their decision what we worked. We had -- I think it was pretty -- pretty interesting for -- for both of us. We found problems, conflicts with the overhaul program and the -- the maintenance manuals.

We had one instance where I was called by one of our mechanics who had opened -- said he was approached by one of the Emery mechanics, said that

they rerigged everything that leaves Tennessee because we don't know how to rig airplanes, and I talked to the maintenance controller, and he advised me that we were rigging all the United specs and I told him that was correct, we were. We have an Emery D check job card that -- that says our fleet standard is to use the United manual for aileron rigging. That particular situation, I faxed the card up to the maintenance controller. The airplane was rerigged to the Douglas spec anyway, and it was turned over to our crew the next day. It still had trim problems. I'm not sure what the exact problems were.

It became an issue for -- for us because we opened the panels and on the ailerons, most of the safeties were loose, cotter keys were missing, safety wire was cut and jam nuts were loose. One of Emery's inspectors was there at the time and one of my mechanics or several of our mechanics were there.

Q What would it cost to repair something like that?

A The airplane was worked the day before. The aileron rigging was worked the day before by Emery mechanics.

Q So, they were rerigging from the manual?

A They sent the aircraft to us and we changed it back to the United manual. I found out something new this morning on rigging. Our captains are telling me that they would recheck an aircraft if the tabs aren't level with the gust lock on it. I didn't rig airplanes to level with the gust lock on. I rig by the manuals and the manuals tell me that the tab with the gust lock on is half an inch up. It's half an inch plus or minus a quarter inch, and that's where we rig to. We rig with the rig pins installed, which fixes the control column in a neutral position, and we set zero. When you remove the rig pin, the tab comes up a half inch plus or minus the quarter, and if it doesn't do that, I'll guarantee you, Emery's flight engineer that's doing their test flights won't accept the airplane.

Q With the gust lock on and you approach an airplane, that would be in a faired position. I haven't flown an 8 in 15 years.

A I don't know, but it does tell you in the Emery pre-flight that the surfaces are faired, and to me, that's another example of the mechanic at Emery that's telling me we rig everything wrong. If he's setting things to neutral because the flight crews

think that's where it's supposed to be, then we have a problem. But I was not aware of that until this morning.

Q Was a task card ever changed back to only rig United airplanes with a rigging procedure or --

A No, sir. We still have -- up the last aircraft we worked, it said to rig all airplanes to United manual.

Q Was there any problem with that?

A From my standpoint, there isn't. There is when the airplane gets left at Emery on the road because they've got a section in their -- in their maintenance manual that says rig to appropriate -- and in their policy and procedures manual that says rig to the appropriate manual that's applicable to that aircraft. So, if -- if I have an aircraft that's anything other than ex-United airplane and somebody on the road working for Emery sees that airplane, it's out of rig as far as they're concerned by the maintenance manual.

When it comes back to me, I put it right back to the United per the job card that I have.

Q Let's change subjects real quickly. Let's go through the manuals. We've had concern in the past

about all of these different manuals and the work cards that specifically identify which manual, whether it's the supplemental manual or manufacturer's manual, whatever.

Do you think that's a problem or do you have the experience level to adapt to that?

A Could I direct you to Exhibit 7-R? It was provided this morning. It says Emery-Douglas Aircraft on it.

Q 7-R. I don't have that. Just a second.

(Pause)

BY MR. McGILL:

Q Okay.

A As you look at that exhibit, you open up Page 1 is out of United manual which is applicable to the accident airplane. Page 3, we go back to a Douglas manual, and if you look at the bottom right-hand corner on Page 3, that is a Code 1 procedure that is applicable to the United aircraft under the Douglas Maintenance Program.

If you turn back to Page 6, you'll see that we now have a Code 2 in the bottom right-hand corner. That page is not applicable to that airplane.

Q And the Code 2 is what?

A I don't know what it is, but I know it's not 8079 U.

Q Okay.

A Now, if -- if the people here in this room can have that problem creating this exhibit, you can imagine what it's like for the mechanic to deal with.

There's one other -- one other item. Since I got to looking at that, if you look at -- oh, let me see where it is. If you look at Page 7 in the exhibit, Step Number 2, right at the very top of the page, it says, "Move gust lock control lever located on the pilot's control pedestal to the unlock position."

Q Yes.

A That's a typo. Since 1971, that's a typo. If you look at the correct maintenance manual for that aircraft, the same step, I have a copy of it here if you'd like to -- like to look at it, it says, "move the gust lock control lever located on the pilot's control pedestal to the locked position." That's the correct procedure.

Q And when was that revision?

A Same date. Both pages, different codes, same revision, same date.

Q I was going to ask about the accuracy for the

different maintenance manuals on the older-type airplanes. Some of them go back into the '60s or '70s, and how many of them are current revisions?

A Mr. Boeing is quite agreeable to telling me that your manuals are not revised in selling the new equipment. They have no problem at all doing that. So, it's only a phone call away. We do have revisions service to our manuals, and generally, with the DC-8 manual, you don't get complete revisions anymore, you get temporary revisions, and the temporary revision book, what we do is if there is a temporary revision, we put a dot on our microfilm that indicates in that ATA code there have been revisions to the film, and the books with the revisions are right next to the reader printers. So, most or all of our people are aware of that.

I don't know how you do that if you're out in the field and all you have is the tapes to work from because it -- it's possible at that point, if you don't have the temporary revisions, that you're not working off current data.

Q And current data, how do you know that the manufacturer is changing revisions from information that they received? What if they don't receive

information? Say something an authorized repair facility does not have to -- they can create their own major revisions. What if they don't report those?

A Then the maintenance manuals are never revised to reflect those changes. There's some really unique items in the manual. There's an item that I was looking at in the United manual that is specific to one elevator and one rod. It's an only. It was manufactured and it was a problem with the hinge location. They manufactured a special rod to actually -- the geared tab on that one elevator, and if you don't look in the right manual, you'll never find that. You order a typical replacement rod, and it won't work.

Q Let me go back to the task cards that are created by an operator under an FAA-approved program. Obviously they are all different.

Do you see some that are better than others that will include applicable manual to define specifically which manual they're talking about and perhaps even give the revision date of that particular manual?

A There are some -- some companies that have gone to a great deal of expense to include pictures,

detailed data. They do fleet standardizations, so that they know exactly what they expect of each mechanic on each job cards, like the elevator installation, are difficult to deal with. Some of the corrosion task cards that Douglas generated before Boeing took over are even worse.

There are cards that take 2 or 300 man hours to complete the inspection portion of that task, and there's one space for one person to sign. The -- the -- from a maintenance standpoint, what we like to do is break work down into manageable increments. No card should have more than eight hours worth of work to assign to a mechanic. That way, you're sure that at the end of each shift, every mechanic gets all of his paperwork up to date and it's all turned back in. That's not going to happen on these aircraft. I think it is happening more on newer aircraft. There's much better detail and much better breakdowns, but there are some -- some huge problems and huge opportunities with the CPCP programs and with some of the job cards that are -- that are issued to some of the older aircraft.

My feeling is the cards match generally the manufacturer's program or the OAMP. The OAMP is put together to cover every DC-8 that Douglas built. So,

they keep them vague and they reference the appropriate maintenance manual, and -- and that -- what that does is encourage operators to use the same program. They use the Douglas program and put their numbering system on it and that becomes very easy for the FAA to approve because now you've got a card that exactly matches the manufacturer's. So, you know you're doing exactly what the manufacturer wants.

Q But does --

A It helps the mechanic get the job done.

Q Those were created years ago. Do they need to be updated any or are they originally going back to the --

A I'm not sure what the last revision date on the DC-8 was. It has to be 15 years ago, I would imagine.

Q Well, I noticed that Emery was actually going to -- what we're talking about is the maintenance guidance, and Emery was going through a MSG-3 to significantly make these job cards better.

Were you aware of that process?

A Yes, I was, and -- and I support that activity 100 percent. I think that was -- that's the only way to go with the -- with the aircraft, is to

completely rewrite the program. The problem with it is that in the interim, for the three years that you're working on rewriting that program, you don't do changes to the program that you're using, and you ignore the problems with the -- by convincing yourself that all of them are going to be fixed when we issue our new job cards, and I don't know. I haven't seen the MSG-3 program. I don't know whether that's true or not, but, you know, maybe all of the problems that I perceive with the -- with the job cards are cleaned up with the -- with the new MSG-3 program. I don't know.

Q Did you see any problems in how they were handwriting the work tasks or CPCP or the inspection programs, anything with the total package, total work package?

A Some of the cards are integrated, some are not. Emery had some cards integrated. Some were basically the -- the Douglas card, and you would have two cards that did similar functions. You may have the interior of the airplane removed on a CPCP card and the interior of the airplane removed on a D check card, and both cards reinstall them, and it becomes a planning opportunity to make sure everything's matched.

Q When you encounter any kind of problems,

especially in the CPCP areas, do you generally fill out MRRs to the FAA or do you report those --

A We have filled out MRRs and turned them in to the FAA. Generally that process works through the operator, and most of our findings went to -- went to Emery.

Q Do you remember any findings where you classified the issue as Level 2 or --

A I feel sure that we did, but I -- I don't personally get involved with the filling out of the -- the -- the classification on corrosion. I would get involved with the repair, you know, when it gets -- gets expensive and time-consuming or starts to delay the airplane, but the classification of the repair is done by Quality Control and that's coordinated with Emery's Quality Control. They did do specific training on a classification of corrosion under the CPCP Program.

Q Just very quickly on the training, since you brought that up.

What type of training for A&P mechanics are even non-certificated mechanics working at your facility? Can you talk very quickly about that?

A We -- we used to have a full-time instructor.

We don't at the current -- current time, but we -- we did have courses on the aircraft that we were rated for. We also sponsored some A&P classes, had people from trade schools come out and we subsidized that -- that class for the mechanics that we had working with us.

We have a 30-foot section of a 727 fuselage that we use for training structures people. Most of the A&Ps that we have went through the structures class because I find that the A&P certificate does not necessarily prepare them for doing structures work. So, we found that as a problem and worked most of our A&Ps through that class.

We've -- we do management training, right-to-know training, OSHA and EPA standards. We have a safety officer and had at that time a safety officer and still do. I think we did more training than most companies I've worked for, with the exception of maybe Eastern Airlines, where they ran a full-blown apprentice mechanic course.

Q We visited your facility. We were shown a flight control overhaul area.

Do -- in fact, do you overhaul flight controls?

A We have the capability of overhauling the flight controls. We leased a 30,000 square foot building that's set up to do flight controls primarily because of the amount of problems we were having with the surfaces that were coming back from other vendors for the Emery aircraft.

What we really used the facility for was all the panels, cargo systems, gear line, everything that was removed from the aircraft was tagged, went down to our facility where they had an EPA-approved watch area, so we could get everything good and cleaned. It was all inspected and retagged to be reinstalled on the -- on the aircraft when -- when it was ready. It cleaned the hangar up. It made a big difference in the -- in the hangar and in our ability to work on the basic airframe, to get all the removed parts completely out of the hangar bay where the airplane was -- was being worked.

Q Did you ever overhaul any flight controls for Emery?

A No, sir.

Q Why not?

A The flight control was considered components at Emery. It was controlled by someone outside of the

heavy maintenance organization. They had selected vendors through a different process and -- and tried to resolve the issues that they had with those vendors. I don't know all the internal political problems that may have been associated with that at Emery, but we had several other components that were chronic problems in our hangar. Elevator load fields were -- were a real chronic problem.

We had those from several different repair stations. We had two different repair stations up to look at the problems with the elevator load field units. They were -- they were being assembled incorrectly. The rivets that retained the springs were not being installed correctly, and what would happen is when you'd install the unit in the -- in the aircraft, you would feel the ratcheting in the control column where that rivet was hitting the springs.

I bet we repaired 10 of them. We never did get -- those were repaired only while they were under the control of heavy maintenance. We never did get to a point where we could get those sent in from the material people at Emery. We had manual reversion mechanisms on the ailerons were fairly critical and fairly difficult to overhaul. They're expensive, and I

would say that -- and for the first four airplanes that we did, we didn't receive good units from Emery. We would have to repair them, replace the shafts. They'd have to be pre-loaded when they're drilled, and there's some special fixtures and tools to do that. We have all of that equipment.

Emery ended up going to Fortner Engineering for that, and Fortner -- I'm not supposed to -- you know, don't really like to advertise for somebody else. They do real quality work, and there was no problems with them after they started going to Fortner.

Q Take the flight controls off of the airplane that you're overhauling during the heavy check, overhaul those same flight controls, and then put them back on the same airplane.

Would that not negate the problems between 61 and a 71 and a heavy and a light and a short and long haul of these different models?

A In theory, there should be a significant amount of interchangeability, and you shouldn't have problems moving the flight controls from one 63 to another 63. From a practical standpoint, we saw issues where we were told ailerons came off of an aircraft. They were installed and we couldn't make them fit the

airplane that they were sent to. We had to -- the repair facility come up and they replaced the fitting that nobody had ever worked, but it -- there's no way in the world that aileron ever came off of an airplane unless the aircraft itself had been modified to fit that aileron.

The repair facility got the blueprints out, went back and changed it, changed things, but nothing in their records reflected that fitting ever being replaced. I don't know where the surface came from before it was sent to them. So, I have no way of knowing when that -- when that activity happened. But I do know they fixed the problem, and it was right when it -- when the airplane left.

Q And there was discussion about major repairs that were -- that TTS had to verify that were on Emery airplanes. I recall a fairly large number of those, as I remember.

Do you remember a repair --

Q One of the -- one of the aircraft that came to us after we had -- Emery had moved to D. Howard for their primary heavy maintenance provider was a lease return aircraft, and to meet the lease return conditions, they had to provide documentation for all

of the repairs on the aircraft, and we had 80 repairs that we either x-rayed or removed and -- and re-engineered or had an engineer -- I think Emery provided the engineer to come up and -- and recertify those repairs, but it was probably a two-month quarter-million dollar problem by the time it was -- it was finished and apparently there were no -- no documentation in the records, in the aircraft records, for those repairs.

Q Is there anything else unusual that you know of?

A We've had other companies that have come in and provided engineers and go through and -- and document all the -- the repairs on their aircraft, and we had one DC-8 operator that -- that had an engineer come up and start a file on each one of their aircraft. They went through every repair on the aircraft and -- and either recertified it or provided the documentation to their own engineer who was working on the -- on site at the time.

I think there was a big push about the time damage tolerance became an issue to document every repair on -- on different aircraft. The -- probably the most significant thing that I see with what

everybody's doing is they're only documenting the ones that you can see from the outside. Nobody has any idea how many floor beams or circumferentials or stringers are repaired. All they're worried about is the scab doublers on the outside of the airplane are flush.

I don't know if they're accomplishing the intent of what the regulations is.

Q Now, those are the ADs, is that correct?

A I don't believe it's an AD, but it was driven by the -- the Hawaiian Airlines crash.

Q Coming from the CPCP to verify a lot of these things and that was a result of any requests that you did perform that on the particular airplane.

A Emery's not unique in that particular area. There's many customers that come in and -- or several. I don't have many customers anymore.

MR. McGILL: Mr. Hoffstetter, I have no further questions. It's been a pleasure to have you here today. I know that Member Goglia has set 5:00, and I just noticed that I've exceeded his time.

So, I thank you very much.

CHAIRMAN GOGLIA: And I want you to know that you will pay.

Why don't we just take a break right here?

We'll stop it right here, and we can pick it up in the morning.

I would like to propose to the parties that we start at 8 a.m. Anybody have an objection to that? It's Friday. I know many of you out-of-towners would like to try to get the afternoon bank of flights out of here, and we'll try to accomplish that tomorrow.

Okay. So, we will -- we will recess until tomorrow at 8:00.

Mr. Hoffstetter, you will return to the stand tomorrow morning.

THE WITNESS: Yes, sir.

CHAIRMAN GOGLIA: It's not over.

(Whereupon, at 5:14 p.m., the hearing was adjourned, to reconvene tomorrow morning, Friday, May 10th, 2002, at 8:00 a.m.)