ATTACHMENTS

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Interview Summaries (Part 1)

**1. Dr. Robert Stein, Passenger Flight 988 of 11/11/01 MIA-SJO**

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Person Interviewed: Dr. Robert Stein
Position: Passenger, Flight 988 SJO-MIA
Represented By:
Location: via Telephone
Date and Time: 11/14/2001, 1500 EST
Present: Operations Group

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Was on flight 988 from San Jose, Costa Rica (SJO) to Miami, FL (MIA) on Sunday, November 11, 2001. His father was a pilot. He flew this route a lot since he had property in Costa Rica. He kept up on aviation. He was seated in last row – row 38 or 39 on the window seat.

After takeoff, pilot said via intercom that they were at 21000 ft following the coast direct to MIA. Shortly thereafter the airplane banked sharply to the right making what he thought was a 180 degree turn. He thought they might be returning to SJO. Told a friend sitting next to him, he thought they were having problems. Later there was a "big power down" and he told his friend that something was not right, he thought they were flying "on one motor".

He was sitting on the right side of the plane. All the way down and part of the way back the inner window pane rattled when they were cruising. He noticed that window stopped rattling during the power down.

At takeoff, they had a full load. They banked right after takeoff. He thought the takeoff was a little "shaky" but only really noticed what he thought was a problem near the end of the climb. They made a sharp bank, 180 degree turn back and thought they might be going back to San Jose. There was no announcement regarding this over the intercom. After the turn, there was a power reduction unlike a normal power reduction and at that time the plane entered a "tilt". He said, "it sounded like both engines powered down." He told his friend "we're on one motor." He thought when this happened they were close to cruise altitude or had just started cruising. He said that the window rattle stopped at this time but came back later.

He thought they were banked about 10 degrees during the time when he perceived that they were operating on just one engine. The bank wasn't very noticeable. He thought that they continued like this for about 5-10 minutes. He thought that they stayed at the same altitude during this time.

Other than the rattle in the window, he heard no other notable noises. He usually rides in first class or closer to the front. This was the first trip he made near the rear of the airplane. The takeoff was “shaky”, but they were heavy and had a full plane.

The airplane returned to full power and the rattle came back and they continued to MIA cruising in straight and level flight. He only told his friend sitting next to him and a man sitting across from them about his concerns. He did not see any other passengers or cabin crew that were concerned about this. He did not notify any of the cabin or flight crew during or after the flight.

Visibility during the flight was good and he judged that they made the sharp bank to the right based on visual contact with the coast. The sharp turn to the right was followed by a slow, long, left bank. He did not notice any yaw of the airplane during this time. They were above a cloud deck.

They made a long right hand turn right after takeoff then went into clouds and couldn’t see the airport as they crossed over it. It was 2-5 minutes before they saw the ground again. He did not recall if they banked left immediately after that. 5-10 minutes later is when he felt the hard right bank. He was watching the shoreline and could see the coast line perfectly fine – it was the Atlantic coast.

## 2. Jay Donald Sullivan, First Officer A-300, American Airlines

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Person Interviewed: Jay Donald Sullivan
Position: First Officer, A-300 American Airlines MIA base
Represented By: J. Bennett Boggess, Allied Pilots Association
Location: American Airlines Admirals Club, JFK
Date and Time: 11/14/2001, 1545 EST
Present: Operations Group

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Date of Hire: 1/1992, Employee number 332994.
Total flight time: 7300 hrs.
A-300 time: 1500 hrs. all as F/O

He has been flying the A-300 for about 4 years. He was an Air Force Academy graduate and flew F-15s for the Air Force. Flew on flight 988 from MIA to JFK on 11/11/01. He was the PNF, it was Capt. Kelly's leg. This was a through flight from San Jose, Costa Rica (SJO) with a crew change in MIA. He did not meet the crew that brought in the flight from SJO.

He glanced at the maintenance log for the last three days but didn't recall anything specific. He remembers there were a few write ups, but nothing remarkable and no open items.

He thought there was a flight attendant crew change in MIA. He thought it was possible that it was the same crew that flew the SJO-MIA leg, but didn't think so.

He was not aware of any maintenance performed on the airplane in MIA. They got to the airplane late due to security and left a little late because of that. No maintenance was being done when they got to the airplane.

During the walk around he noted nothing unusual. The APU was on.

They departed around dusk, 1930 scheduled departure and they left about 14 minutes late.

During taxi nothing was abnormal – all systems worked normally. The captain checked the rudder and he as F/O checked the top control surfaces by looking at the ECAM for full deflection. He had once, in the past, experienced a flight when they did not get full deflection during a control check and returned to the gate for maintenance and got a different airplane to continue the flight.

Nothing unusual occurred prior to takeoff. Flex takeoff was normal. It was a full airplane at medium weight and they were under max gross landing weight at takeoff. There was nothing unusual during the climb. The captain switched on the autopilot at a medium altitude above 10000 feet. He did not notice any problems with the autopilot. The weather was good and they had a smooth ride.

Approach and landing were normal. The captain switched off the autopilot just prior to intercepting the ILS at 3000 feet. The landing was smooth.

He had flown with the accident captain often on the B-727 and considered him to be an extremely good pilot. He described him as very relaxed and competent and couldn't imagine him panicking. He did not know him personally, only professionally.

He did not know the accident F/O.

On landing, there were no maintenance items identified, and he was unaware of any comments from passengers.

He experienced no turbulence nor heard any abnormal noises during the flight. There were no ECAM alerts during the flight.

During landing there was a slight headwind from the left. He did not notice any yawing in the flare. The altimeters were normal throughout the flight. There was a slight fuel imbalance, left side heavy by about 800 pounds, this is not unusual for the A300. The auto-fuel feed corrected this problem.

Wake turbulence training includes simulator training of some extreme unusual attitudes for wake turbulence encounters. For example a nose down roll to an inverted attitude. Actual wake turbulence encounters in the A300 have been much less extreme – typically just some wing rock and you just fly straight through it.

Wake turbulence was addressed in a special program, the advanced maneuvering program given a few years ago. It was reviewed in recurrent training in the simulator, which he went through last month (October). The simulator ride included an unsuspected unusual nose high attitude. Recovery was to add power and feed rudder to the horizon.

Unusual attitude training stresses returning to proper attitude using power, bank. There are no memory items related to unusual attitudes per se. In an extreme situation, there may be a need for max power. Situations where max power is called for include takeoff, windshear, terrain alert.

## 3. Thomas Edward Kelly, Captain A-300, American Airlines

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Person Interviewed: Thomas Edward Kelly
Position: Captain, A-300 American Airlines MIA base (International)
Represented By: J. Bennett Boggess, Allied Pilots Association
Location: American Airlines Admirals Club, JFK
Date and Time: 11/14/2001, 1630 EST
Present: Operations Group

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Date of Hire: 2/4/85, Employee number 93371.
Total flight time: 17000 hrs.
A-300 time: 3000 hrs. 2500 as Captain, 500 as F/O

He has been an A-300 Captain for about 4 years.

He was the captain of AA988 MIA to JFK leg on 11/11/01. This was the beginning of a two day trip that he was paired with the F/O . He was the pilot flying on this leg.

He did not see the incoming flight crew in MIA. He saw no mechanics in the area where the airplane was parked at MIA. He reviewed the airplane's log and there were no open items, no MELs, and no CDLs – it was a clean airplane.

There were no problems during preflight through taxi. He checked the rudder. The F/O checked the control column. All flight controls checked okay. They check the flight controls using the flight control ECAM page, checking flap extension, and flight control position and free and correct travel. He did not notice any resistance and got full extension in both directions on the rudder. There were no ECAM alerts or advisories.

There was no crosswind on takeoff. The winds were fairly light.

He said that this was a pretty trouble free airplane [referring specifically to the accident airplane].

Regarding problems with the A-300, he said that he lost the blue hydraulic system on two occasions due to quantity loss (this was on two different airplanes in the last four years). The blue system powers the spoilers and roll control among other things.

He has not experienced any rudder problems on any airplanes.

Flight 988 was a good ride with no turbulence, no comments about problems in the back, and no ECAM alerts or advisories. He engaged the autopilot about 25000 feet and it was a smooth, normal engagement. One flight attendant commented that one of the galleys was unkempt and asked where the flight came in from, but otherwise had no comments about problems in the cabin.

It was a smooth descent and he disengaged the autopilot around 4000 feet while being vectored to join the ILS. They were then cleared for a visual approach. When he disengaged the autopilot it was smooth, not jerky.

There was no lag in engine response, some slight differential power during cruise but nothing more than normal. He used the autothrottles and they worked normally. He left them on through the landing at JFK.

The landing was good, they turned off on the high speed taxi and taxied at slow speed after that. There was no extreme movement with the tiller.

There were no negative comments or comments about problems from passengers or flight attendants. He did not hear about any comments regarding unusual noises in the back. He had no maintenance items to report (write up) from the flight.

Wake turbulence training is given in the simulator and integrated into unusual attitude recovery. He was given a scenario of following a heavy jet followed by a moderate turbulence encounter resulting in an unusual attitude. Such scenarios are given during every training cycle. He's been to training about one time per year, but now there is a new 9 month program. They get two such scenarios each visit. Usually he sees one nose high attitude and one nose low attitude, both with significant bank. These simulated wake turbulence encounters are unexpected and are given below 10000 feet on approach or departure.

AA has addressed wake turbulence in training since several wake turbulence problems following B-757s being reported several years ago. At that time the B-757 was not considered a heavy airplane, but they changed the B-757 flight separation since then.

An engine failure during climb is dealt with by recognition, the PNF works the ECAM and runs the checklist. There are time critical and non time critical items. Max power is used depending on where the engine failure occurs – it is used if the engine failure takes place during a critical phase of flight. He said he would push it up to max power if he were low to the ground.

The procedure for dealing with a nose high unusual attitude may call for using max power and doing a "slice maneuver" to lower the nose to the horizon.

In the landing flare at JFK he used a little bit of rudder and got normal response from the rudder. There was a slight left crosswind. Rudder application was smooth. He perceived no binding.

He did not observe any altimeter anomalies during the flight nor any instrument, ECAM or CRT flicker.

Landing at JFK the throttles retarded to idle at about 5 feet. He was overriding somewhat to guard the throttles to keep power up a little bit to prevent premature spoiler deployment due to the crosswind. He flew it on to the runway.

He has experienced wake turbulence. Worst encounter he can remember was in a B-727 following a G3 on approach to Fort Myers and resulted in about a 30-40 degree bank. He's had other brief encounters, usually at altitude.

The A-300 wing is stiff, there is not a lot of flex and has a harsh ride in turbulence. In windshear encounters it responds pretty well. It has adequate power for handling windshear.

Regarding possible speculation about the accident, he thought an explosion in the forward cargo hold may cause an unusual yaw. He commented that it is a strong airplane and can't imagine a force that could take the vertical stab off.

## 4. Carlos M. Hernandez, First Officer A-300, American Airlines

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Person Interviewed: Carlos M. Hernandez
Position: First Officer, A-300 American Airlines MIA base
Represented By: Bennett Boggess, Allied Pilots Association
Location: American Airlines Admirals Club, JFK
Date and Time: 11/14/2001, 1710 EST
Present: Operations Group

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First Officer Hernandez's hire date at American Airlines was February 14, 2000. His total flight time was about 8,000 hours of which 290 hours are as an A300 First Officer (FO). There was also a period of time that he was a B-727 Flight Engineer. He has approximately 800 hours total time at AA because of his previous time at a commuter.

First Officer Hernandez flew the 2 legs from Miami (MIA) to San Jose, Costa Rica (SJO) and return to Miami. The scheduled departure time was 10:55 AM; actual time of departure was 11:10 AM. He did a thorough preflight on the aircraft. He did not meet the crew that brought it into Miami. There were no open write-ups in the logbook.

He was the pilot-not-flying (PNF) from Miami to San Jose on AA 989. The flight control check was normal. He set flight controls on the ECAM page and looked for full travel on the control wheel. Checks were normal. The Captain did the rudder check. FO Hernandez was the pilot flying (PF) on the San Jose to Miami leg and also did the rudder check for that leg.

The entire flight was a clear day and smooth flight. There was no turbulence or chop. It was a nice landing. This was the FO's and Captain's first trip together. He did not meet with any maintenance personnel. He did not recall any maintenance write-ups being written in San Jose. At San Jose there is a 1-hour turnaround, so he went to do walk-around. Preflight and taxi out were normal.

Out of San Jose as PF, he used max power takeoff or improved performance takeoff. Autopilot engaged at altitude. He hand flew the airplane to level off (31,000 feet), and then engaged autopilot.

The SJO departure was Runway 07 Right with a tight turn to the VOR.

FO Hernandez normally flies with his feet on the rudder.

He used 25 degrees of bank. The autothrottles were engaged. The right engine overheat light came on at 946 degrees; the left came on at 950 degrees. They did not exceed the limit of 960 degrees but the lights are designed to come on 15 degrees below this limit.

He used auto-throttle during the climb. They had to change headings to avoid buildups on the San Jose 2 departure. He believed they climbed to 31,000 feet and used normal climb power to cruise. Auto-throttle was engaged until 500 feet. Autopilot was disengaged from 10,000 feet to landing.

No anomalies were observed during level off or cruise. A deviation was made during climb around one cell. In cruise a couple of deviations were made around cells.

The aircraft performed flawlessly. It flew wings level except during heading changes. No differential power was observed in climb or cruise.

There were no vibrations or noise changes. The Captain said a flight attendant talked to him (the captain) and indicated a passenger heard noises. He mentioned it to the FO, but was not specific. No other discussion regarding this issue ever took place.

The landing was normal and they had no maintenance write-ups. The Captain took care of the books. They had no passenger, flight attendant, or maintenance comments.

The most deviation around cumulus build-ups was maybe 20 degrees, 30 degrees at most. No ECAM advisory was received other than the lights during max power takeoff.

There were no anomalies anywhere on flight. The turn and slip indicator was perfectly aligned.

Training was given in ground school, simulator, and a video regarding wind shear and unusual attitudes. He thought that the training was very comprehensive. Training is now a 9-month cycle.

The A300 is well built and solid. Wake turbulence encounters are benign. It is a little rough ride in turbulence.

San Jose was clear but with a few buildups on departure.

## 5. Edward C. Monoski, Captain 767/757, American Airlines

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Person Interviewed: Edward C. Monoski
Position: Captain, Boeing 757/767, American Airlines
Represented By: J. Bennett Boggess, Allied Pilots Association
Location: via Telephone (Telephone call to Buenos Aires, Argentina)
Date and Time: 11/15/2001, 0815 EST
Present: Operations Group

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Captain Monoski's hire date at American Airlines was October 1978. He is a B-767/757 Captain. He was Captain of AA Flight 686 from John F. Kennedy Airport to Bermuda. His total flight time was about 20,000 hours.

The accident aircraft, AA 587, took off in front of his flight. He was in the hold short position. When tower cleared AA 587 for takeoff, the aircraft sat there for about 15 seconds. The wind was from the left and 587's takeoff seemed normal. There was a slight yaw to the right.

He was on the hold position 45 degrees to the runway. He saw the JAL flight that seemed to be at a fairly level attitude; but, maybe it was because he was going away. The wind was less than 10 knots. The last time he saw AA 587 was about 200 feet.

Flight 587 seemed to yaw to the right at rotation or at liftoff. He thought that this may have been attributable to parallax from the window or his view angle.

After he took off, departure control was looking for them but they were not answering. In Europe, 1500 feet is used as cleanup. In the States, AA uses 1000 feet. Everyone should clean up at the same time.

Captain Monoski saw fire and black smoke. He was the pilot flying (PF).

He held a small amount of aileron and minor rudder pressure against the wind.

ATC uses either 2 minutes or 5 miles for separation. He believes ATC used 5 miles in this case. Clearance is usually to 5000 feet. There was no turbulence and no wind direction change. It was a Kennedy 9 departure with a Bridge Climb. They were flying the same departure he believed. JAL heading to Bridge seemed more level altitude then climbing, maybe because he was heading away from us. JAL might have been farther to the west. The Airbus lifted off earlier than JAL. He had never thought about the wake turbulence in the crossing paths during cleanup.

He did not know either pilot.

He saw the latter stages of JAL's takeoff roll. He could not be sure.

AA does wind shear recovery as part of recurrent training. In the simulator, they will mention a B-747 is in front of you. The wake turbulence is used to lead to an upset situation.

It will roll you up to 90 degrees bank. AAMP would cover any kinds of upsets. These were pretty much unusual attitude recoveries. He would get one every simulator check. He completed one in October 2001. He got a situation of 90 degrees of bank, nose-high. He also had a wind shear. Instructions are to use all means available to recover. There are no flight control restrictions while operating in the airplane's flight envelope.

He said the First Officer made a couple of radio calls regarding the fire on the ground.

[The telephone line was disconnected at 0835 est, attempts to re-contact Capt. Monoski were unsuccessful].

## 6. Paul Kevin Sulovski, Captain A-300, American Airlines

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Person Interviewed: Paul Kevin Sulovski
Position: Captain, A-300 American Airlines MIA base
Represented By: J. Bennett Boggess, Allied Pilots Association
Location: Marriott Courtyard Hotel, JFK
Date and Time: 11/15/2001, 0930 EST
Present: Operations Group

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Captain Sulovski's hire date at American Airlines was November 6, 1984. His total flight time was about 10,000 hours. Of these, approximately 2,100 hours were as Captain of the A-300; his Captain's checkout was November 1997.

On November 11, 2001, he was the Captain on American Flight 989 from Miami (MIA) to San Jose (SJO) and returning to Miami as a turnaround. Their scheduled departure time was 10:55 AM but pushed back from the gate a little later due to passenger boarding. He did not meet the inbound crew from Newark (EWR). He had flown the same turnaround the day before, November 10.

The log was clear and there were no open items.

Captain Sulovski briefed the flight attendants prior to the flight. The First Officer (FO) did not indicate any preflight problems. The engine start was normal, followed by normal taxi out. The flaps were set for 15/15. They selected the flight controls page and he observed the flight checks for full deflection of flight controls. Everything was totally normal. He was the pilot-flying (PF) on AA 989 to San Jose. The aircraft controlled well and it was a relatively smooth ride. They did not go IFR the whole day. The aircraft performed fine. The approach and landing were good. No passengers made any negative comments about the flight.

On the return flight, (AA 988), they departed at the scheduled time or very close. Captain Sulovski performed the exterior preflight. On the empennage section, the only anomaly was a missing air deflector or dirt flap (descriptive term). (This was in the past, not on flight 988.) This was the only time in 4 years.

The airplane was good on preflight. Engine start and taxi were normal. He has the FO check his rudders when he is the pilot-not-flying (PNF) to ensure he has full-throw, if needed. Both looked at the indicators and it "looked fine."

The takeoff was an improved performance takeoff; normal operation. The right engine overheat light came on at 946 degrees. The left engine light came on about 950 degrees. The right one came on first. This is not a rare occurrence. This is very common at San Jose, Costa Rica.

This was the first flight with the FO. The FO flew well; nothing out of the ordinary. At 4 DME on departure, he initiated a left turn back to the VOR on the field; then cleaned up. They climbed to FL 310. The FO was a smooth pilot. No significant chop was observed – maybe a slight bump.

He hand flew the aircraft to cruise and used climb power to level off. The Captain recalled the climb to be straight and the FO had to avoid buildups in cruise. Deviations were limited to 1 or 2 in cruise with 10-15 degrees of bank and 20 degrees of heading change at most. It was a smooth ride.

No flight attendants made any comments about the ride. They received no ECAM messages and there were no reports by passengers or flight attendants regarding any anomalies of the flight. The only report was an air louver that needed repair and the Captain called maintenance. There were no calls by flight attendants regarding passenger complaints.

Captain Sulovski did not recall anything about an unusual noise. The louver may have been on the previous day. He did not see maintenance on arrival.

He had recurrent training at American Airlines in November 2001 with the new 9-month schedule. The 9-month training program covered all the 1-year recurrent training items and more. It is 4 days in length.

Day 1 – Human factors, Aircraft Safety Action Program (ASAP) reports, radar system usage – ½ day training. He deadheaded in the first half of the day.

Day 2 – Flight manual brief, performance, system review.

Day 3 – Flight simulator with instructor, the warm-up, and debrief.

Day 4 – LOFT for 2 hours plus 2 hours "free play" with check airmen. "Free play" consists of going over "hot items" and any items requested by the pilot. He requested to see if the aircraft would auto-land with a slat system failure with 2 hydraulic systems inoperative. The aircraft did fine. There was then a debrief of the sim.

Day 5 – International recurrent training for international flying only.

Upset training was during the Day 3 warm-up session. The instructor gave a scenario of being in-trail of a B-747 heavy. This was followed by turbulence and a couple of seconds later was upside down and a little nose low. He has had this training every year in recurrent training, along with wind shear and terrain avoidance. His corrective action for the upset situation was "Turn to the sky pointer as you roll towards 90 degrees."

He had 2 nose–high scenarios; one nose high and one extremely nose high. On the extremely nose-high, he used rudder to get down to horizon. Unload the wing, and use max power at pilot's discretion. Use full flight control deflection if needed to keep blue side up; there are no full flight control limits. Mr. Vandenburg developed this program.

In unusual attitudes, there are guidelines for recovery. He believed it is for folks who have never flown aerobatics. They are good and simple guidelines.

He has had unusual attitudes covered in both ground school, simulator, and simulator briefing.

The slats would have been retracted about 220 knots on AA 989. AA 988 would have been about the same speed. No bumps were felt during retraction. AA 989 was about 330,000 pounds; 988 was about 275,000 pounds gross weight.

When asked to clarify about the direction of the departure turn out of San Jose, he stated that the tear drop turn back to the right to get to the airport is normal. At no time did they make a 180 degree turn back towards San Jose. There were no engine problems.

He did not know either the Captain or the First Officer on the accident aircraft.

## 7. Glenn Hoffson, First Officer 767/757, American Airlines

Person Interviewed: Glenn Hoffson
Position: First Officer, Boeing 757/767, American Airlines LGA base
Represented By: J. Bennett Boggess, Allied Pilots Association
Location: Marriott Courtyard Hotel, JFK
Date and Time: 11/15/2001, 1100 EST
Present: Operations Group

First Officer Hoffson was hired at American Airlines on February 15, 1991. His total flight time was about 10,000 hours.

He was the First Officer on American Flight 686 from LaGuardia to Bermuda. AA 686 was immediately behind AA 587, the accident aircraft, and was holding short of runway 31 Left. They were perpendicular (or nearly perpendicular) to the runway. AA 587 was stationary on runway 31L and was waiting for takeoff clearance. The accident aircraft looked totally normal.

First Officer Hoffson saw the Japan Airline (JAL) B-747-400 rolling down the runway, but did not continue to watch long enough to see the aircraft lift-off. He did not hear the JAL takeoff clearance.

He stated that he did hear the clearance for the accident aircraft, AA 587, which was a normal take-off clearance. He heard AA 587's reply that was a standard read-back, strictly normal. When the accident aircraft was cleared for takeoff, he said there was a slight lag of 20 to 30 seconds before rolling. Nothing was said on the radio nor was their any immediate reason observed for their delay.

The takeoff was totally normal according to First Officer Hoffson, who watched the takeoff. He noticed no trailing smoke or anything from the engines. He did not see the rotation or lift-off. He did see them make a left hand turn that appeared to be normal. They also seemed to have a normal rate of climb.

Winds were almost down the runway at approximately 10 knots. There were no wind shears, advisories, or gust factors.

AA 686, his flight, was then cleared into position and hold. He was the pilot-not-flying (PNF) for this leg. Clearance for takeoff is initially to 5000 feet. He thought there might have been a change of altitude at the last minute.

Immediately before takeoff, First Officer Hoffson looks at departing aircraft. When he looked to see the accident aircraft, he could not see them visually. He looked back into the cockpit and saw the accident aircraft on TCAS. AA 587 was not where he normally would expect to see them. He had no visual contact.

During climb to their assigned altitude, the ride was smooth. There was no turbulence and no wake vortices.

As soon as the Captain make a left hand turn, First Officer Hoffson said there was a tremendous plume of smoke and a raging fire on the ground. It looked like a whole block of houses was in flames.

He heard no distress calls or any calls whatsoever to indicate any problem.

First Officer Hoffson knew the First Officer of the accident aircraft, Sten Molin. He spent time with Mr. Molin during contract negotiations. They seemed to have a lot in common and were hired about the same time. He did not know Mr. Molin's interests and they did not socialize outside of the union activities. He never talked to Mr. Molin about his outside interests. This initial time was during 1997.

Since then, he would see Mr. Molin occasionally in operations. He last saw Mr. Molin in the spring of 2001. At this time, Mr. Molin talked about going to Florida and they should get together.

He never heard any communications between AA 587 and the company.

He heard the accident aircraft power go up; they accelerated and started their roll.

He did not notice the TCAS altitude of the accident aircraft when he saw their return on TCAS.

First Officer Hoffson heard the tower calling for AA 587 and a transmission from departure control to give Jet Blue a phone number to call the tower. They were on departure control at this time.

He has experienced wake turbulence 7 to 10 times. It was a hard jolt with 15 to 20 degrees of bank in a B-757. He had experienced a greater deflection in a commuter airplane.

During his last check ride, he was told he was following a B-747 on departure and encountered violent wake turbulence. It was a 45 degree bank with nose low attitude. He recovered successfully. He believed it was also done during the previous year's training.

## 8. Anis Lahlou, Flight Attendant, American Airlines

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Person Interviewed: Anis Lahlou
Position: Flight Attendant, American Airlines
Represented By:
Location: via Telephone
Date and Time: 11/15/2001, 1615 EST
Present: Operations Group

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He was the purser on the trip from MIA to San Jose, Costa Rica (SJO) to MIA on Flight 989 and 988 on 11/11/01. He was originally scheduled as the #3, but then rescheduled as the #1. He then worked a flight to Caracas where he laid over for 30 hours before returning to MIA.

He learned that this was the accident airplane when he was first contacted regarding this interview and was in shock when he learned this.

He did not recall when they departed MIA. He recalled that on the flight the #5 said that the 1L door sounded kind of strange, but wasn't sure which leg this was on. He thought this was described as an unusual sound like a leak.

He hasn't flown the A-300 in a long time. When he flew in the past he recalled there were a lot of mechanical problems on them, but hasn't flown A-300s on a regular basis in a couple years. He has mostly flown the B-757/767 since then.

He remembered encountering some turbulence, but didn't recall which leg that was on.

On one of the flights he thought they may have landed nose wheel first or made a three-point landing, but wasn't sure which leg that was on.

After deplaning, the entire cabin crew walked together to immigration/customs. There was no discussion of problems with the airplane. He recalled that there was a problem with the ceiling panel being down by seats 14 A/B. He also recalled a cabin divider between coach and first class than was down. Another FA pushed it into place and fixed it.

He was unaware of any passenger concerns. He mentioned concern over a passenger who had a daughter with "pimples" that they verified was just a seafood allergy and not contagious, but otherwise was unaware of any problems. He mostly worked in first class but went back to coach for a few minutes on occasion during the flights.

Overall, there was nothing unusual about the trip but the may have been a little bit of turbulence.

## 9. Karen Fulford, Flight Attendant, American Airlines

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Person Interviewed: Karen Fulford
Position: Flight Attendant, American Airlines
Represented By:
Location: via Telephone
Date and Time: 11/15/2001, 1645 EST
Present: Operations Group

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Flight Attendant Karen Fulford was hired at American Airlines in July 1999.

She was Flight Attendant (FA) #6 on AA 989 and AA 988 on November 11, 2001. AA 989 is from Miami to San Jose and AA 988 is from San Jose to Miami.

She had been flying the A300 all month and flies the A300 frequently. She had flown one trip with the purser and with FA #5. She remained on the A300 every other month: July, September, and November. Her usual bid is for position #4, and she usually works in the rear of the airplane.

She talked about the popping sound like a "pop." She always hears it on the Airbus. It seems to come from door 3L or 3R. She usually hears that sound when taking off or in the air.

A little turbulence was felt before landing.

The takeoff sounds were the same during departure.

No unusual sounds were heard in the rear of the aircraft.

She spoke to a doctor in the very last seat. He asked about getting food from first class and was drinking a lot of beverages with his buddies in the back. It was a casual conversation. He had many AA pilots for patients and was a chiropractor. She did not hear anything from him regarding any airplane activity. He did not mention anything about rattling windows or concerns about the airplane to her.

The climb out was normal and the aircraft flew straight and level.

The aircraft was full. The doctor was in the last row by the window, Seat J.

She heard nothing but the usual creaking and popping by the 3L and 3R doors.

## 10. Jamie Gillard, Flight Attendant, American Airlines

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Person Interviewed: Jamie Gillard
Position: Flight Attendant, American Airlines
Represented By: Debbie Roland, Association of Professional Flight Attendants
Location: via Telephone
Date and Time: 11/15/2001, 0845 EST
Present: Operations Group

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Date of Hire: 11/17/95, Employee #:446940

He was the #2 F/A on flights 989 and 988 on 11/11/01 from Miami (MIA) to San Jose, Costa Rica (SJO) and return. He occupied the aft jumpseat near the 4L door which is the aft most door on the left. The #6 F/A, Karen sat across from him.

After the return to MIA, he worked a flight to Caracas (CCS) and returned to MIA Tuesday morning (11/13/01).

On flight 989 MIA-SJO, there was nothing unusual. It was a smooth flight, with no problems and no extreme turbulence.

He flies the A-300 one or two times a month and is familiar with most sounds and noises in the airplane.

There were no maintenance issues with the airplane that he was aware of.

On flight 988 SJO-MIA, during engine start through taxi all was normal. During takeoff near doors 4L and 4R he heard a little bit of cracking sound that he thought was either structural noise or noise associated with pressurization. These sounds are typically more noticeable when the airplane is heavier with more people and cargo. On this particular occasion, the noises seemed louder and longer. He thought they lasted about 30-45 seconds.

He mentioned the noises to the #6 FA, Karen. He asked her if she heard it also and commented that he didn't feel safe on this airplane. When asked to clarify this statement, he said that this was more of a general comment about the A-300 rather than about this specific airplane or flight. She just agreed that she also had heard the sound.

He heard these types of noises before to a certain degree but not this loud. It was very noticeable. It was hard to pinpoint the source. It may have been around the door or the door seal for 4L and 4R. He described it as a loud cracking sound.

He thought the noise started around 5-10 seconds after liftoff and lasted for about 30-45 seconds thereafter.

They experienced a little turbulence during cruise, but nothing more than normal. He did not hear the noise after the incident he mentioned.

He didn't talk to the passenger on the right window seat in the last row except regarding beverage service. Wasn't aware of any concerns of any passengers regarding noises or airplane problems.

The above mentioned noise was the only thing notable on flight 988.

When asked if the sounds were similar to a celery stick breaking, he agreed that the noise was similar to the sound of a celery stick breaking. He described the noise as being similar to ice on a building or a house settling. He said there was no whistling or air leak sounds associated with these noises. He described these as sharp distinct noises that were very noticeable and about twice as loud as they typically are. He said the noises were louder than the sound of an empty coffee pot being dropped in the galley. He didn't consider the noise abnormal, just more (louder and longer) than normal.

Regarding his comment "I don't feel safe on this airplane", he said that those were his exact words and they referred to his general impression of flying the A300. He said he feels this way because turbulence is very noticeable in the back of the airplane and the airplane typically has these cracking noises that he doesn't experience in other airplanes.

He said that in 5-6 years of working as an FA, he has had about 5 emergency situations. Most of them were minor, 2 in the B-757 and one in the B-767 that he could recall. There were a few where he had to pull out the red emergency procedures manual and run through checklists. He had never experienced an emergency in the A-300.

## 11. Nicolas J. Deitz, First Officer A-300, American Airlines

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Person Interviewed: Nicolas J. Deitz
Position: First Officer, A-300 American Airlines LGA base
Represented By: Ray Dukes, Allied Pilots Association
Location: Marriott Courtyard Hotel, JFK
Date and Time: 11/16/2001, 1100 EST
Present: Operations Group

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Date of Hire: 4/1/91
Total flight time: 10000 hrs.
A-300 time: 2500 all as F/O

He has flown the A-300 for about 4-5 years.

He knew Capt. Ed States fairly well. He didn't know F/O Sten Molin, just recognized him.

He flew with Capt. States in the United States Air Force (USAF) at McGuire AFB. He was active duty and Capt. States was in the USAF Reserve. Capt. States was his copilot on C-141s back in 1986. He had met him before that, maybe in 1985.

Capt. States got out of the reserves around the time of the Gulf War in 1991.

He hadn't recently socialized with Capt. States since they do not live in close proximity to each other. He didn't think Capt. States was ever on active duty and commented that this is probably why Capt. States became a Captain while he was just an F/O. Mr. Deitz was serving on full time active duty and therefore had less seniority at AA.

He thought he had flown with Capt. States about 3-4 times in the USAF 15-18 years ago. He thought that maybe 1 or 2 of these occasions were extended trips lasting about 2 weeks. Other occasions were just doing pattern work.

He thought that at that time, Capt. States was flying essentially full time with the USAF reserve, and then about 2 years later got hired by American Airlines.

The last time he flew with Capt. States was a two day trip on Friday 11/9/01 and Saturday 11/10/01. During the trip they discussed personal issues such as Capt. States' children's activities and Capt. States' bathroom remodeling project.

On 11/9/01 he arrived for duty at EWR around 0630 for an 0930 scheduled departure to MIA. They laid over in MIA. On 11/10/01 they had a 1200 call time for a

1400 departure from MIA to San Juan, Puerto Rico. From San Juan they returned to EWR. They arrived in EWR around 2200-2300 Saturday night.

He described Capt. States demeanor during the trip as very normal, happy, upbeat and said that he was very happy at home and indicated that he had a very happy home life.

They discussed family and common interests. Capt. States had 2 boys around the same age as his daughter and their children had similar interests that they discussed. Things discussed included children's activities including scouting, piano lessons and karate. They were also both doing bathroom remodeling projects and discussed these projects during the trip.

Capt. States was close with his wife and he knew that she worked in the USAF reserves. He thought she was a Tech. Sergeant who had an administrative position at McGuire AFB. He did not think Capt. States was having any kind of financial problems.

Capt. States was in good health and they both worked out in the hotel gym on Saturday morning during their layover in MIA. He was aware that Capt. States participated with his sons in a flag run across America and commented that he was in good enough shape to participate in this run.

He was unaware of any personal problems with Capt. States and commented that Capt. States was upbeat and looking forward to future plans.

When he first joined American, he was assigned to be a flight engineer on the B-727. At that time Capt. States was an F/O on the B-727 and they flew together on occasion. Later, he was assigned to be an F/O on the B-727 and Capt. States made captain on the 727 so they again had occasion to fly together.

He was in USAF flight training class 84-04, and knew that Capt. States went through USAF flight training earlier than him, maybe in class 83-06 or 83-08. He did not go through C-141 training with Capt. States.

He described Capt. States flying skills as being as good or better than anyone he knew. He said that he was very smooth in his control and aeronautical judgment was in line with his own. He said that Capt. States crew briefings were thorough, and considered special security measures in light of the events of 9/11/01. He said that Captain States had great rapport with the F/As and solicited their opinions.

Regarding Capt. States' system knowledge of the airplane, he could not recall a specific abnormal or emergency situation while they were flying together, but said that Capt. States generally had outstanding knowledge of the airplane.

He had never done a simulator training session with Capt. States.

He did not think Capt. States had any outside interests in flying outside of AA, but was not certain. He did know that Capt. States had a 16 ft. rowboat that he used recreationally, but didn't think he owned an airplane.

During their most recent trip, Captain States discussed his children, his wife, his remodeling at his house – he was looking forward to the future and did not mention any problems or have any complaints.

He described Capt. States management style as ideal. He said that Capt. States let him fly the airplane, but wouldn't hesitate to make suggestions or offer his opinion. Capt. States dealt with FAs in the same way, soliciting others opinions regarding the operation of the airplane.

When asked how Capt. States might react if wake turbulence was encountered while an F/O was flying he said that in his experience wake turbulence counters are of very short duration. He said that encounters at altitude with the autopilot on are usually over by the time you are ready to react. He expected that Capt. States would assume control if there was a significant departure from controlled flight for a longer duration.

The wake turbulence encounters he has experienced have been nothing more than a bump or two and commented that with the A-300 being itself a heavy jet, wake turbulence has not been much of a factor in his experience.

The worst wake turbulence encounter he could recall was during a landing flare when he got an unexpected rolling movement that surprised him since he was not expecting vortices below 100 feet.

He has never had to use rudder to overcome a wake turbulence encounter.

He has his feet on the rudder pedals when he is hand flying. He typically hand flies to altitude and hand flies the full descent.

Earlier in his flying career with AA, he personally was not keeping his feet on the rudder pedals. A check pilot by the name of Burke Schlott told him to fly with his feet on the pedals. Typically the A-300 doesn't require rudder input due to turn coordination and yaw damper systems.

In simulator training he was exposed to wake turbulence scenarios every year during recurrent training. This involved unusual attitude recoveries that were set up by entering wake turbulence. Roll was at least to a 90 degree back. He was given a nose high unusual attitude on climb out that occurred abruptly. Using rudder to lead the turn can be very useful in turn control for recovery

In simulator training they also typically encounter engine failures anywhere from V1 up to top of climb.

Regarding use of rudder in recovery, he said that procedure was to use whatever is required to recover. His recoveries were acceptable, but thought that the simulator instructor would point it out if recovery techniques were too abrupt or not enough, but this never came up for him.

He also recalled a simulator scenario in which an uncontained engine failure results in a failure of the flaps requiring a single engine no flaps landing.

He thought that it was commonly accepted that the simulator is more sensitive than the actual airplane. He wasn't sure if the airplane would respond the same way during an unusual attitude since he has never experienced one in an airplane, but assumed it would.

When they arrived in MIA on Friday, 11/9/01 they both took a nap when they arrived at the hotel because of the early start. He went to the hotel gym about 1300 where he saw Capt. States who was already there working out. After their workouts, they both went to the hotel pool. Later they had dinner together, then he went to sleep. On Saturday, he thought it was a 1200 pick up for a 1400 flight.

He said that in a nose high unusual attitude, you should apply power as needed.

He commented that he thought it hard to believe that a wake turbulence encounter would cause this type of damage to a structurally sound airplane.

## 12. Jennifer Calderon, Gate Agent, American Airlines JFK

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Person Interviewed: Jennifer Calderon
Position: Gate Agent, American Airlines JFK
Represented By:
Location: via Telephone
Date and Time: 11/16/2001, 1130 EST
Present: Bart Elias, Dick Baker

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She started her shift at 0600 on 11/12/01. Flight 587 was a 0800 scheduled departure. She arrived at Gate 22 about 0645. The cabin crew had already checked in and were on board when she got to the gate. She thought the FAs had gotten to the gate around 0640. Another gate agent was already there and had checked the FA's IDs and allowed them to board. That gate agent was Danielle Floravel.

Jennifer went on board to talk to some of the flight attendants that she knew. She told the captain to let her know when they were done briefing the cabin crew. She helped board all the wheel chair passengers.

The pilots arrived at the gate together at about 0700. The captain was in a good mood, was smiling and he was very pleasant. She just greeted the F/O who had come with the captain, but otherwise didn't interact with him. She said that both the captain and F/O seemed very pleasant.

The other gate agents working the flight were Danielle Floravel and Brenda Licktenburg (ph). She and Brenda both worked to assist disabled passengers to the airplane.

Jennifer checked the captain and F/O's IDs before they boarded. That is when she told the captain to let her know when he was done briefing the cabin crew so they could send an FA to assist with boarding.

She did not see any maintenance personnel at the gate or any maintenance being performed on the airplane.

She said that the scheduled departure was 0800. The actual departure was 0838. It was about 38 minutes late because it took more time to board passengers due to additional security procedures in place after the events of 9/11/01.

## 13. Walter Paul Gershoff, First Officer A-300, American Airlines

Person Interviewed: Walter Paul Gershoff
Position: First Officer, A-300 American Airlines JFK base
Represented By: Ray Dukes, Allied Pilots Association
Location: Marriott Courtyard Hotel, JFK
Date and Time: 11/16/2001, 1300 EST
Present: Operations Group

First Officer Gershoff's American Airlines hire date was in May 1992. His total flight time was about 6,000 hours of which about 1500 hours are as an A300 First Officer (FO). His A300 FO checkout date was November 10, 1999.

He did not know FO Sten Molin; but had flown with the captain 3 times. The dates were November 7, 2001, on the JFK—SJU—JFK turn, October 23, 2001, for the same trip, and about a year ago on a 2-day trip.

FO Gershoff remembered CA Ed States as a very nice guy. He got along with everybody and never had any problems with him. CA States was not a nervous type and did not get upset.

CA States shared tips on soccer with FO Gershoff. They talked about the AA and TWA merger. AA and TWA are still flying as separate carriers. They never discussed personal or financial problems.

CA States seemed to be in perfect health.

FO Gershoff remembered CA States as confident, respected, and able to get a point across in a nice way; he didn't push people around but had a "command presence." At no point during the flight did he ever wonder what the Captain was doing. He had not asked Capt. States any personal questions, but he knew CA States was married and had two boys and that he had flown cargo in the Air Force.

Capt. States let him fly the leg to San Juan. On November 7, San Juan brought us in too high. CA States asked him what he "wanted to do." He said, "I want to go around," and the CA asked the controller to bring us back around. It was rainy and the weather was bad. The CA confirmed he was making the right decision and never pressured him to land.

He has encountered wake turbulence on the A300 before. It was usually a quick jolt that lasted about a second. It bumped your seat. He transitioned from the DC-10 to the Airbus and was told that if it was a little bumpy in the cockpit, the passengers are getting it a little rougher in the back.

He hand flies from takeoff to level off and in descent from 10,000 feet to landing. When flying, he has his feet on the rudder pedals. The only time he uses rudder is on a crosswind landing. He has never noticed yawing while flying the A300.

CA States may have put the autopilot on earlier. Most pilots don't hand fly as much as FO Gershoff does.

At least twice on A300, he has had upset training (initial and recurrent). It was something he had also seen in the Air Force. To recover, he remembered that you unload, control, power up (if going up), and power back, speedbrake (if going down); wingtips on horizon and pull.

Training at AA taught him to be gentler in an airliner. The judgment was left to the pilot as to how much control input was needed to handle the situation. This depended completely on the situation.

There was an initial course on upset training that he attended and subsequently was trained in the simulator. The simulator was placed in a nose-high and a nose-low situation for demonstration purposes. The setup scenario was preceded by a wake turbulence encounter. In the Air Force, the pilot closed his eyes and the backseater (F-4) would give an unusual attitude. The pitch up was so that he could not see the horizon line. He looked at other instruments to determine the direction to roll and push throttles full forward. He then rolled off with bank and he did not use rudder to bring the nose to the horizon and recover. He did not use full control displacement to recover. The training was good. It allowed him to see more of the aircraft envelope.

In recurrent training at AA, he did not recall anything different; it was probably the same.

He has never had a problem in the Airbus.

He had seen the accident FO one time, but did not know him.

The simulator feels like you are in the airplane. The visual is not that good, but the feel of the flight is.

During the upset in the high pitch up, he looked at the VVI to see if he was going up, if the altimeter was climbing, if the airspeed was decreasing, and the pointer in the attitude indicator to see the shortest direction to the horizon.

On takeoff, he used aileron for crosswind takeoff and rudder to stay on centerline.

## 14. David M. Lander III, Captain A-300, American Airlines

Person Interviewed: David M. Lander III
Position: Captain, A-300 American Airlines JFK base, International
Represented By: Ray Dukes, Allied Pilots Association
Location: Marriott Courtyard Hotel, JFK
Date and Time: 11/16/2001, 1400 EST
Present: Operations Group

Captain Lander was hired at American Airlines on January 29, 1987. His total flight time was about 13,000 hours. He has approximately 4,400 hours of time in Air Force C-130's. His total AA time was about 9,300 hours. His A300 Captain's checkout was April 12, 2000 and had approximately 1,000 hours as Captain.

He did not know the accident aircraft's Captain.

He met the accident aircraft F/O Sten Molin on Friday, November 9, 2001. They flew the JFK—SDO—JFK turnaround.

He saw FO Molin as nice, polite, courteous, and very cooperative in every way. They departed about 12:30 PM on that date. There was a 1-hour check-in before the flight.

He said the FO told him he had a civilian flying background. He thought this was as a commuter pilot. The trip was professional. He thought the FO was married, but was not sure.

His health seemed to be superb. He never mentioned any personal or financial problems. The FO was smiles all the way down and all the way back. CA Lander would rate all the FOs, including the accident FO, as near the top. He does not remember any problems. The FO's system knowledge was good. They both left and said, "Let's do it again."

CA Lander felt the A300 training is good or better than any. The training included great instructors and had no deficiencies.

Prior to flying as Captain, he was an FO on the MD-11 for 6 years.

He could not remember when he received wake turbulence training for the first time. Approximately 3-4 years ago, he received AAMP training in DFW. The upset training was completed there. The unusual attitude situations included nose-high and nose-low in a bank. Runaway trim was used to get into the nose-high attitude.

Wake turbulence was given in training right after takeoff. Wake turbulence training was received in the simulator on the DC-10, MD-11, and A300.

The instructions he received included the use of smooth coordination of flight controls in unusual attitude training. An example he used was engine failure after takeoff. He said you can use aileron or rudder to bring the wings level. He went on that at low altitude aileron will lower the high wing to the low wing. Use of the rudder will raise the low wing to the high wing. This difference could be critical at low altitude.

He has not encountered a wake vortex in the A300. Never has he had a rudder load limiter problem.

The simulator seems to be life like although he has never been in high or low attitude and bank angles in AA aircraft.

When flying, he coordinates turns with rudder and ailerons.

His flight with the accident FO had a 12:30PM scheduled departure and an actual time of 12:59PM. They arrived at SDO at 5:36PM. They departed SDO at 6:40PM and arrived at JFK at 9:39PM.

The accident FO told him that he lived in Connecticut.

When asked if he had ever noticed the rudders moving un-commanded, he could not recall ever seeing it happen.

The simulator wake turbulence training usually developed to the point to recognize the situation and allow the recovery techniques to be applied.

On other occasions, it would lead to a nose-high or nose-low attitude.

## 15. Bonnie L. Nathan, Flight Attendant, American Airlines

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Person Interviewed: Bonnie L. Nathan
Position: Flight Attendant, American Airlines
Represented By: Kathy Lord-Jones, Association of Professional Flight Attendants
Location: via Telephone
Date and Time: 11/17/2001, 0830 EST
Present: Operations Group

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Flight Attendant Bonnie Nathan was hired at American Airlines in February 1964.

She had flown a lot of Caribbean flights.

She was Flight Attendant on AA 988 on November 11, 2001, from Miami to JFK Airport.

The FBI visited her and interviewed her prior to the interview with the Operations Group.

She did not see the FAs who brought in the airplane. She was #2 position and was working in the aft galley. The flight was full.

She did not hear any unusual noises during the takeoff roll. She heard no particular noises near the 4L door. There were no abnormal noises during the whole flight. It was smooth as glass.

She is a "nervous Nellie" and would report anything that was serious.

The landing was beautiful. No FAs remarked about anything in the cabin during the flight.

She normally flies in the forward cabin due to her seniority.

In general, flying the A-300, she has heard air leaks around the doors. Sometimes she has heard rattles around the doors. Sometimes it has been a popping noise or "pop gun" sound. When asked if she heard any sounds similar to a cracking celery stick near the rear doors, she said that she did not recall hearing any such sound on the A-300.

## 16. Louis J. Merz, Captain A-300, American Airlines

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Person Interviewed: Louis J. Merz
Position: Captain, A-300 American Airlines JFK base, International
Represented By: Ray Dukes, Allied Pilots Association
Location: Marriott Courtyard Hotel, JFK
Date and Time: 11/17/2001, 0930 EST
Present: Operations Group

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Captain Merz was hired at American Airlines in January 1977. His total flight time was approximately 20,000 hours. He has about 6,000 hours as Captain of the A300. His A300 Captain's checkout was approximately 1994 and has been a captain for 6 or 7 years.

He did know the accident aircraft's Captain, Ed States. He had flown with him years ago when CA States was an FO. They probably flew together 5 or 6 times over the years. He did not know CA States' background. They last flew together over 5 years ago. They had no social contacts outside the airlines. He did not know CA States outside the airlines.

He knew the accident aircraft First Officer (FO) Sten Molin. They met about 2 years ago. He did not socialize with the FO outside the airline. FO Molin seemed very upbeat, always in a good mood, and got along with everybody. He saw him as an overall good guy.

He thought FO Molin was a very competent pilot who flew the airplane well; did a good job. He ranked the FO as an 8.5 out of 10. They had flown 6 or 7 times in the last 2 years. The FO always did what he needed to do.

He flew with FO on November 8 for the last time. It was the same trip as the accident trip. The FO was normal, upbeat. They had some small talk during the trip. The FO talked about buying another condominium. FO Molin was interested in real estate instead of the market and was just seeking his advice since he owned a condo in Florida. He mentioned no financial problems. His health seemed fine.

CA Merz was not aware of any outside flying activities. The FO was not married, but he had a girlfriend.

CA Merz said the Airbus has been a good aircraft. He has never had flight control problems or any rudder load limiter problems.

He has experienced occasional wake turbulence. Most of the encounters are momentary and it is over before you know it. He had never seen the rudder pedals move in an un-commanded fashion. When hand flying, he keeps his feet on the rudder pedals.

He usually hand flies to 18,000 feet and does the same on the descent. He did not believe that he had wake turbulence training during his initial. It has been in place during the last 3 to 5 years.

Every training period he has had wind shear and unusual attitude training. He thought it may have been covered in the briefing phase of the simulator. The instructor goes over the procedures. There are no specific limitations; whatever is necessary. Make it a smooth recovery. There are no limitations discussed on the amount of force required. The training is pretty good.

He does not use an excessive amount of rudder during recovery. He uses whatever it takes. He was not sure if recovery technique was covered in ground school, but did know that it was discussed in the simulator briefings. The scenario was usually introduced as "behind a heavy" as the beginning of unusual attitudes.

He owned an acrobatic airplane (Skybolt) but has never competed. Having been exposed to acrobatics, he did not think that aerobatic training could hurt in unusual attitude. He said that he has not changed his rudder technique flying the A-300 since he started flying his aerobatic airplane. When asked if there is a difference between a large airplane and a small airplane, he commented that an airplane is an airplane.

Most pilots hand fly on both climb out and descents from mid-range attitudes. His last recurrent training was in January 2001. He did not know what the AAMP acronym meant. He had it the last time he was at training. He said training of upsets has never stopped.

He said that FO Molin was a pretty good pilot to hand fly the airplane. He hand flew back into JFK and it was gusty. He did a nice job and CA Merz saw no weaknesses.

CA Merz has had no formal aerobatic training. He did not have any real interest in aerobatics. His training did not involve recovery from unusual attitudes from aerobatics.

He thought the AAMP, the course presentation, was a valuable tool. He said that nothing new was introduced from what he had learned in his flying career, but it served as a refresher and gave him the opportunity to practice recovery maneuvers in the simulator.

He did not know the background of the FO's flight experience. The F/O liked to hand fly the airplane.

CA Merz received his training in Dallas, TX.

To recover from nose-high, roll the airplane toward the horizon. There is no limitation on bank. When at the horizon, bring the wings level.

He has never been over a 90 degree bank during unusual attitude training in the simulator.

He has not flown since last Thursday. CA Merz flew to SDQ and the FO flew back to JFK.

He stated he checks the trapezoid base during his cross check while hand flying. If the trapezoid were displaced, he would adjust the rudder pressure appropriately.

He cannot see the other pilots' feet on the rudders. If there were an uncoordinated turn, he would notice it because he lightly rests his feet on the rudder pedals. He does so after takeoff to be aware of the possibility of an engine failure, if it occurred. He does this when the FO is flying. When he is hand flying, he always keeps his feet on the rudder pedals. He feels "uncomfortable flying an airplane with his feet on the floor." The airplane basically flies a coordinated turn. When hand flying the A-300, he does not know if he is applying a small amount of pressure or if the airplane is making the coordinated turn.

## 17. John Francis LaVelle, Captain B-737, American Airlines

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Person Interviewed: John Francis Lavelle
Position: Captain, B-737, American Airlines
Represented By: Mr. Ray Duke, Attorney Allied Pilots Association
Location: Telephone Interview
Date and Time: July 15, 2002, 0915 EDT
Present: Operations Group members David Ivey, Bart Elias, James Goachee, Delvin Young, John Lauer

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Captain Lavelle stated that his date of birth was May 21, 1960 and that American Airlines hired him on October 28, 1986. He estimated his total flying time to be about 14,000 hours and currently was a captain on the B-737. Positions he had held since being hired by American included flight engineer B-727, first officer MD-80, first officer B-757/767, first officer MD-11, captain B-727 and was current as a captain and check airman on the B-737. Captain Lavelle estimated his flying times to be about 1,700 hours on the B-727 while flying as captain, and about 1,200 hours as captain on the B-737.

He stated he had met Ed States, the captain, and stated that they had met in operations a few times. He only had casual conversations with him.

He knew Sten Molin, the first officer. They had flown together on a number of occasions on the B-727. When they first met, Captain Lavelle was a junior captain and Sten Molin was a junior first officer. Both were on reserve in the New York base.

He described Mr. Molin's personality as that of a perfectionist who worked hard and did everything by the book. He was a real gentleman as well. He said the first met in May 1997, and the last time he saw Molin was sometime in the summer of 2001 in operations. He was just as he always was; a nice person and Captain Lavelle enjoyed his company.

Captain Lavelle said he flew two or three trips with Mr. Molin over a 12 month period. He stated that Mr. Molin's flying skills were excellent. He had excellent flying ability, however, he had one strange tendency: to be very agressive on the rudder pedals. Captain Lavelle stated that during a climb out in a B-727, while the airplane was "dirty of with flaps 5 degrees", Mr. Molin stroked the rudder pedals "1-2-3, about that fast." Captain Lavelle thought they had lost an engine. Captain Lavelle asked him what he was doing, and Mr. Molin said he was leveling wings due to wake turbulence. Captain Lavelle stated that Mr. Molin never leveled the wings, and his actions just created yawing moments on the airplane. After they cleaned up the airplane they discussed it further. Mr. Molin told him he was leveling the wings as per the AAMP. Captain Lavelle told him it was quite aggressive, and that it didn't really level the wings. They talked about the AAMP, Mr. Molin insisted that AAMP (Advanced Aircraft Maneuvering Program) gave him directions to use rudder pedals in that fashion. Captain Lavelle disagreed, and said he thought the use of rudder was, according to AAMP, for use at lower airspeeds. He disputed Mr. Molin and told him to be less aggressive and more coordinated using rudder.

Captain Lavelle said that on two subsequent occasions Mr. Molin modified his wake turbulence manuever to comply with his wishes. Mr. Molin used rudder during these encounters but did not go to the full stop. He was still very quick.

During this first wake turbulence encounter, Captain Lavelle stated that it did not require any more than aileron to level the wings. Occasion (wake encounter) was nothing more than needing a little aileron to level the wings. Captain Lavelle thought that Mr. Molin was more aggressive than he needed to be. He said the B-727 was a very stable airplane. He did not have to be that aggressive.

He recalled the first encounter to be during the "clean up" [after departure] on the B-727. The altitude was between 1,000 and 1,500 feet. It was somewhere around this altitude range that the event occurred. He believed Mr. Molin that the rudder was pushed to full stops. He said the effect on B-727 was that it created an uncomfortable yaw to the "left- right- left". There were heavy side-loads. He said he thought they went to left first, but was not sure. Mr. Molin stopped using the rudder on his own. Captain Lavelle thought they had an engine problem so his attention was drawn to the engine instruments. When asked, he said he did not think Mr. Molin made any aileron inputs during the encounter. The rudder never leveled the wings. He did not recall the wings moving, but experienced, "sideload, sideload, sideload".

His experience has been that you have to hold rudder in to get wing leveling from rudder. Mr. Molin brought up the AAMP program in their conversation after the event. He was adamant that he was complying with AAMP. Captain Lavelle requested that Mr. Molin review the AAMP program when he got home, and to be less aggressive when he flew with him. It never came up in conversation again. This was first time he flew with him. Months later, when they flew together, they encountered wake turbulence on two separate occasions with him again. During the subsequent times they flew together, the subject did not come up again in conversation if Mr. Molin had reviewed the AAMP.

Captain Lavelle knew Mr. Molin had a civilian background and had been a commuter pilot. He was proud that his dad had been an Eastern Airlines pilot. He told Captain Lavelle that his father had taught him to fly when he was very young.

Regarding the AAMP program, Captain Lavelle thought he went through it once in 1995 or 1996. He said he was a first officer on the B-767 at the time. He stated there was AAMP training in the simulator. Once every checkride there is some kind of airplane upset training received in the simulator.

He stated that Mr. Molin's knowledge of procedures, including approaches, flying the airplane, turns, descents, and power, was good and aggressive. In other aspects he had “hands of silk." He could grease the B-727 on landings and had good systems knowledge.

Captain Lavelle when asked had no recollection of what type of airplane they were following during the first wake turbulence encounter.

Captain Lavelle stated that he was a C-130 pilot in the United States Air Force Reserves. On one occasion, he was the last airplane in a 12-ship formation and experienced wake turbulence. He had some very remarkable full aileron deflection with full-scale rudder deflection, yet still rolled in the opposite direction. It was not until the C-130 got out of the vortex that the airplane began to respond to control inputs. He went to about 60 degrees of bank and was at an altitude of 300 feet during low-level operations when the upset occurred. Once or twice while flying the MD-80 did he encounter wake turbulence and he may have hit a control stop with ailerons. He was behind a B-757 on one occasion. He used aileron only and leveled the wings. It was on an approach to a domestic airport.

Captain Lavelle said the first event involving Mr. Molin happened about May 1997. The subsequent two wake turbulence encounters were separated by a few months; perhaps in September 1997 and December 1997. He said that when he is the non-flying pilot, he follows along on the rudder pedals. He felt Mr. Molin’s inputs on the rudder pedals during that first wake turbulence event. He said it is typical for him to fly with his feet on the pedals at critical times when the copilot is flying. He did not know what other captains did with their feet while flying.

When asked why he remembered the event with such clarity five years later, Captain Lavelle stated that it was a very aggressive maneuver and he had never seen any other pilot do this but Mr. Molin. When questioned about the initial direction of the yaw, Captain Lavelle said he thought it was the left rudder input first but it could have been the right. He said the wake vortex encounter with Mr. Molin was not much of anything. Maybe just some choppy air. He thought that Mr. Molin may have been responding to the choppy air. The ailerons were kept level and he used just the rudder pedals.

He stated that he was not a check airman at the time of the encounter. He did not become a check airman until he became a B-737 captain.

He said he did not document or inform anyone at American Airlines, regarding the event.

The two or three events did not seem very significant. Usually he did not encounter wake turbulence very often. Perhaps once every quarter. Captain Lavelle said he flew with Mr. Molin three times. Three separate trips and both of them were on reserve status. He did not recall how many legs they flew together.

During the second and third encounters Mr. Molin applied rudder with coordinated aileron and it was not aggressive.

During the first event, he stated he did not think Mr. Molin applied any aileron. Maybe a little, but it was full or close to full rudder deflection. He did not believe it was the first leg of the first trip together in which the turbulence encounter happened. It was probably the second or third time that Mr. Molin was at the controls. It startled him because Mr. Molin had been so smooth on the controls.

Captain Lavelle stated the wake turbulence encounter could have been due to thermal activities or a preceding airplane. He did not think they were following a heavy airplane. He did not recall aggressive movements or abnormal rudder inputs from Mr. Molin during approaches or during the last two or three times they flew together.

When asked if he had ever made any accidental inputs to the rudder pedals while he feet were on the pedals, Captain Lavelle answered in the negative.

Captain Lavelle's concluding thoughts were that he considered Mr. Molin a friend. He was a great guy. He was a great pilot in all aspects except the one quirk; his use of the rudder pedals. When asked why he had waited until now to disclose this event with the accident first officer, he stated that he believed the NTSB was more interested in interviewing pilots that flew the A300 and had more recent experience flying with the accident crew. He said he had thought about his prior event when he heard that a wake turbulence encounter with the accident airplane might have been a factor in the accident.

## 18. Peter McHale, First Officer American Airlines

Person Interviewed: Peter McHale
Position: First Officer, Boeing 757/767, American Airlines (LGA base)
Represented By: Ray Duke, Attorney, Allied Pilots Association
Location: via Telephone
Date and Time: Wednesday, August 28, 2002, 0900 EDT
Present: Skupeika, Lauer, Young, Elias, Ivey, Brenner

Mr. McHale stated he was a first officer on the B-757/767 and was based in LaGuardia Airport, NY. He had been continuously based there since starting his employment with American Airlines.

He stated his date of birth as February 13, 1960 and his date of hire with American Airlines as October 1992.

He estimated his total pilot time as about 4,000 hours. Of that time, about 2,000 hours was flying the ET3E (P-3) for the U.S. Navy. He stated he had about 2,100 hours as a first officer on the B-757/767 since becoming qualified on the airplane in January 1999. His total time did not reflect flight engineer time and he estimated he had accrued about 2,100 hours as a flight engineer on the B-727 with American Airlines. He stated he had been furloughed from December 1993 until December 1996.

He said he knew Captain States. He was the last pilot he flew with prior to being furloughed at American and the first pilot he met when he came back to work. Captain States welcomed him back from furlough and Mr. McHale was surprised that he remembered that he had been furloughed. He only knew Captain States professionally and did not socialize outside the airline with him. He was as ordinary as everyone else: standardized, and by the book. He was a very nice guy. He had no comments regarding Captain States' flying skills in the B-727.

He stated he knew Sten Molin. They occasionally crossed paths in training. Over a 3-year period he flew with him a lot in the cockpit. He had flown with him on a more regular basis than with Captain States. Occasionally McHale said he would see Molin around the company. McHale characterized Molin's flying abilities as a "good stick". He flew the plane well, and was comfortable in the seat. He did a good job. He felt comfortable at what he was doing. "Good stick" meant he had a good sense of concentration, always on altitude, and never recalled a bounced landing. He put the airplane where he wanted it. McHale said he felt comfortable and relaxed when Molin was flying.

He flew with Molin all those years until January 1999, when he transitioned to the B-757/767. The New York base was small group. There were only about 30 crewmembers in each seat on the B-727.

McHale said that Molin came from Buisness Express that flew out of LGA until American Airlines picked him up as a pilot. He had flown with Sten the last month he was on the B-772. He went on the A300 and McHale went to B-757/767 about the same time. Molin enjoyed sailing. He had no idea if he had participated in acrobatics. He seemed to like flying the heavier commercial transport airplanes. He would not characterize Molin as someone interested in high angles of bank such as done in aerobatics.

McHale said he had flown with Captain Lavelle on as many as 10 sequences over a year. The three of them had flown at least 1 full sequence together. Captain Lavelle was gregarious, a nice person, and very similar to Molin. He was very professional, smart, and an easygoing good guy. He thought that when Lavelle and Molin flew together, that Lavelle had been a brand new captain. He stated that Molin was not one that was criticized by others. He can recall times when he had his eyebrows raised or had concerns while flying with other pilots. Molin flew the airplane smoothly and accurately. He would not characterize Molin as jerking the airplane around, driving the airplane to the ground during a landing, or making excessive bank angles.

He stated that Molin was more senior and had bid a reserve line of flying purposely in order to fill up his month. If Molin had been on reserve at the time, he would have been surprised.

McHale was asked if he remember a yawing event associated with wake turbulence after takeoff when the three of them were flying together and Molin was the flying pilot. He responded that if something had yawed the airplane during their flight together, he would have remembered it. He did not recall a yawing motion. When asked if Captain Lavelle had questioned Molin about what happened or his use of the flight controls after the event, he replied that he did not recall the conversation. He stated that he did not believe Captain Lavelle was making this up, but it was not something he recalled. When asked if during the incident, Captain Lavelle had mentioned he was checking for an engine power loss, he said he did not recall him doing so.

McHale said he did remember that Lavelle definitely had a discussion about a piloting issue and flying the airplane with Molin. He was not privy to their conversation as he was busy with other duties and could not recall where or when the discussion was held. He said he never felt anything uncomfortable in the airplane that would have provoked the discussion. McHale said he thought that since Captain Lavelle was a new captain that he might have been more conservative.

McHale said there was nothing about this incident that he remembered. He said that normally that kind of stuff would get his attention very quickly. He said the Molin did not talk to him about the incident later, although Captain Lavelle did talk to him about Molin. McHale said that he thought Captain Lavelle’s safety envelope might have been narrower since he was new as a captain. He said Captain Lavelle made a passing comment to him about the incident, but he typically did not listen to comments about the flying abilities of other pilots.

He did not recall either one of them discussing the AAMP program. He said he had never heard that type of discussion [AAMP] in his 10 years with American Airlines. He said he did not hear any conversation regarding rudder usage either.

McHale said that he did not think Captain Lavelle and Molin were similar, although their standardization was excellent. That was not an issue. Both of them were confident enough in their own abilities. They did not clash, but they were not best buddies either. He thought Captain Lavelle had to become a captain on the B-727 and came from the B-757/767. He said he did not think Captain Lavelle wanted the B-727. He said Captain Lavelle was a new guy while Molin was an experienced B-727 first officer. Molin never did a thing that shook McHale up.

McHale said he had never heard the words “engine loss,” “engine failure” or “rollback” at anytime when he was flying the B-727.

McHale described most wake turbulence as a very distinctive bump in the road, with some destabilization of the aircraft. He said he knew what it was as opposed to normal turbulence.

Molin never mentioned anything about his father being an air line pilot or about his initial aviation training.

McHale said he would not question Captain Lavelle's integrity. Captain Lavelle had “no axe to grind.” Both Captain Lavelle and Molin worked undistinguishable and professional together; no different from any other American Airlines pilots.

McHale said he went through the AAMP program and it was a course that was about 4-5 hours in length. It was given to the pilots in the New York base. Later, he received training in the simulator for upsets. He personally thought the program was to discuss cases where you either recover or crash – not normal upset recovery such as typical wake encounters.

He said he had never observed anyone using excessive rudder while he was flying as a flight engineer on the B-727. He found the AAMP training interesting and similar to what he had been taught in the military during initial training.

He was furloughed in December 1993, recalled in August 1996 and returned to the line in December 1996. He went through the AAMP program in 1997 after he was recalled from furlough. He said that he did not recall an emphasis on rudder usage in the AAMP.

He said he last saw Sten Molin in Miami about 2 weeks prior to the crash. He did not speak to him. He had not seen Ed States since they flew together on the B-727.

He was not aware of any prior airplane emergencies involving either Sten Molin or John Lavelle. He stated that everyone brings a good natured ness to the cockpit.

He remembered that a discussion about flying skills transpired between Lavelle and Molin but could not recall any details regarding when the discussion occurred or what specifically was said or what it was in reference to.

McHale said he had never flown the B-727 as a captain or a first officer. He stated that he flew the B757/767 with feet on pedals to guard for an engine failure. He liked to hand fly to about 10,000 feet. When asked what to do in an upset recovery, he stated that wings level was number one – use ailerons first. He said that the Navy taught rudder became an aileron at 90 deg of bank. During his 3 ½ to 4 year tenure on the B-727, there were a handful of events that got his attention. The one in question was not one of them. If something had happened he would have remembered it.

McHale stated he had not felt “large” yaw moments but he had felt yaw moments during wake turbulence. Most wake turbulence encounters are pitch and roll, with maybe a little yaw. This was not with Captian Lavelle and Sten Molin.

On another occasion, he remembered another event while flying with Sten Molin. While on final, flying an ILS to runway 4 at LaGuardia in IMC conditions, a landing airplane had not cleared the runway. There was a B-737 in front of them on final and it went around. He stated they got into the wake of the B-737, while Molin was the flying pilot, and he made the decision to go around. He stated that it was a “weird” feeling. The tail pushed down and the nose pitched up. Sten called for power and they went around. As the flight engineer, McHale had a different experience than the two pilots. He said that Molin flew the airplane to do what was necessary to keep the airplane under control. There was a heavy jolt and the nose pitched. There was no discussion or hesitation. “I’m outta here.” Sten made a fast decision to apply max power to climb out and go around. The airplane most likely rolled but he did not think that the bank angle was in excess of 30 degrees. He felt the tail of the airplane go down as the nose of the airplane pitched up. They were in the clouds with no visual cues. He said they were about 3,000 to 5,000 feet about 7 miles from the runway when this happened. He thought the event happen sometime in 1997. Whatever Molin felt inspired him to go around. It was one of the more memorable events in McHale's career. He was not sure but he thought that Captain Rich Solomon was the captain on the flight. He said no other notable events with Sten come to mind.

He thought that Captain Solomon and Molin flew together probably more than anyone else. The captain commented that Sten did a good job on the incident.

He said this was a “good one” regarding wake turbulence. It was a jolt, and Sten made a quick decision to get out. He stated he did not experience wake turbulence very frequently.

He recalled there was an event when a captain went inverted at DFW and recovered after a wake encounter. (Captain Young of the Operations Group indicated it was an American Airlines MD-80)

He stated that the only post accident discussions he had heard about the accident crew were in sympathy for the pilots.

## 19. Richard Eric Salomon, Captain B-757/767, American Airlines

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Person Interviewed: Richard Eric Salomon
Position: Captain, B-757/767, American Airlines
Represented By: Declined representation
Location: Telephone Interview
Date and Time: July 15, 2002, 1015 EDT
Present: Operations Group members David Ivey, Bart Elias, James Goachee, Delvin Young, John Lauer

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Captain Solomon gave his date of birth as August 13, 1952 and said American Airlines hired him on August 8, 1986. He estimated his total flying time to be about 12,000 hours. He stated he had flown for two years as a flight engineer on the B-727, four years as a first officer on the B-727, one and one half years as a first officer on the DC-10, about four and one half years as a captain on the B-727, and the last four years as a captain on the B-757/767.

He did not know Captain States very well. They were about the same seniority and he would see him occasionally in operations. He knew Mr. Molin. They had flown as junior captain and junior first officer together on the B-727 in 1992. They had about the same relative seniority "seat wise" and would coincidentally wind up flying together. Mr. Molin was new when Captain Solomon had checked out as captain on the B-727.

He said that Mr. Molin was a considerate person and perhaps, a tad immature socially. He was pleasant although sometimes talked down to people. He and Mr. Molin came from different sides of the tracks. As a pilot, he was excellent. He was well above the norm. Very professional and worked hard and was very serious about what he was doing.

He said that Mr. Molin had worked for a commuter company named Business Express. He said he had flight instructed a little bit as well. He said Mr. Molin was very young when he came to American Airlines and he told Captain Solomon that he had become a flight instructor to build flying time to enable him to get on with an airline. He said that Mr. Molin told him he wanted to fly from the "gitgo".

The last time he saw Mr. Molin was within one month of the accident. He said they both liked to fly turnarounds. Captain Solomon liked to be home at nights but did not know why Mr. Molin wanted to fly turnarounds. He said that Mr. Molin was getting close in seniority to check out as a captain.

He said he learned a lot more about Mr. Molin after he attended his funeral service. Mr. Molin had lost a brother to leukemia when his younger brother was two years old and he was five. He also found out that his father had been an Eastern Airlines captain and he had never mentioned it to Captain Solomon. He said he did not socialize with Mr. Molin other than on layovers. He did occasionally talk to him on the phone. Captain Solomon was a former plumber and Mr. Molin was renovating a condominium and would ask him questions.

Mr. Molin had a couple of girl friends one of which was a flight attendant. Mr. Molin and she had flown several trips together with him on various occasions. He never saw him ever take a drink. He was not aware of anything unusual in Mr. Molin's life. There had been no major upcoming events in his life of which he was aware.

Mr. Molin was a very serious a pilot. He was professional and thoughtful. Both he and Mr. Molin had come from general aviation backgrounds. Both he and Mr. Molin were always aware of passenger comfort. Molin flew the airplane like he had his family back there. His judgment and handling of the airplane was good. They flew a couple of CAT II approaches together. Molin never did anything in the cockpit that raised Captain Solomon's eyebrows.

Captain Solomon said that as the pilot not flying he did not rest his feet on the rudder pedals when the other pilot is flying. During takeoffs and landings was the exception. You guard everything, but otherwise no. He didn't use rudders much.

He had flown Navajos in general aviation. General aviation airplanes were pretty much coordinated by themselves. He had never flown any aerobatics, and he did not like to push the limits. He said he never saw the need to be on the rudders except for takeoffs, landings, and approaches.

Captain Solomon said the Mr. Molin never indicated to him that he had flown acrobatics and they had never discussed rudder usage.

Captain Solomon said he could only remember one remarkable wake turbulence encounter. He was behind a B-757 while flying a B-727. He got a good roll to about 45 degrees. He never encountered anything that required abrupt or extreme inputs to get out of it. He encountered it a few times in general aviation. He used opposite aileron and then it was over. He never used rudder to correct for wake turbulence.

He recalled one landing in Miami while flying with Mr. Molin. There was a storm on the far end of runway when they landed. Molin touched down on the dry end of the runway with some pretty good winds that started at about 200-300 feet on the approach. Molin did a fine job flying. He got a great landing out of it. The storm just popped up out of nowhere. Captain Solomon said he had his feet on the rudder pedals that time and felt that rudder use was unremarkable. If Molin had used rudder, he said he would have been aware of it. He was smooth. There was no doubt in his mind that there was no aggressive use of rudder. Captain Solomon said he tended to monitor inputs by the first officers because he is aware that there are people in the back of the airplane. Some pilots never seem to think about that. No other trips flown with Molin came to his mind.

Captain Solomon stated that he was on the DC-10 flying as a first officer in 1996 when he received the AAMP training. It was held in a conference room in a New York hotel. He said he had been in the simulator just last week and received his R-18 training (maneuvers validation). He now received training on a nine-month cycle. (R-9, R-18, R-9 etc.) and completed his most recent training on July 13, 2002. Regarding changes to the procedures, he said they had received a pink bulletin dated July 9, 2002 that had a slight change to upset recovery training. He stated that the simulator training regarding upsets in the B-757 included a nose high unusual attitude, a roll to about 100 degrees with the nose falling, and a nose high attitude to about 70 degrees of pitch.

To initiate the upset maneuver, the instructor told you to close your eyes and they place you manually in the unusual attitude. They jostle the simulator some prior to telling you to open your eyes. The maneuvers were briefed and he did not recall any emphasis or discussion about the use of rudder.

When asked about flying with any other first officers that might have used excessive rudder, Captain Solomon said he had not. He had flown with pilots who had used excessive pitch and bank, but not rudder. He also stated that he had not witnessed Mr. Molin use excessive rudder.

He recalled flying with Mr. Molin in 1997. They started training together. They had the same training month and the same training cycle.

He said that Mr. Molin was a little spoiled or a bit immature. He recalled that he was pouting once when they flew together. It was due to a disagreement with his girl friend. Once in a while he would have to correct Mr. Molin about talking down to people. He said that Mr. Molin was from the privileged side and he was from the other side of the tracks. The example he cited involved a cleaner that was servicing the forward lavatory. Molin said to the cleaner, "Hey Mister, how do you like cleaning toilets?" Captain Salomon told him not to talk to people like that. He said that Molin was a good kid with a good heart.

Captain Salomon said he never discussed any training issues as it related to Mr. Molin's flight instruction. It did not effect how Captain Salomon dealt with him.

Recalling the flight into Miami with the weather at the rollout end of the airport, Captain Salomon said he thought the flight may have been in 1997 but it was just a wild guess as to when it occurred. He said the weather popped up rapidly. There was wind and water on the rollout end of the runway. More water than wind. As they descended below 300 feet, they were jostled by the winds. Mr. Molin was smooth on the controls. He did not remember him being jerky or putting in any unusual inputs. He flew the airplane smoothly to touchdown.

He said he never saw Mr. Molin fly the airplane in an aggressive manner. He liked to hand-fly the airplane quite a bit. Both during climbs and descents. He would hand-fly up to what he estimated to 18,000 feet in climbs and turn off the autopilot about there during descents. Most pilots that Captain Salomon flew with would turn on the autopilot early during the climb and leave it on until later in descents. Mr. Molin hand flew the airplane a lot; more than most first officers. He never had to question Mr. Molin's flying ability. He was in the top 10% of the first officers that he had flown with.

Captain Salomon said he never remembered Molin using rudder or not using coordinated rudder when he was hand-flying the airplane during turns.

He did not recall ever discussing the AAMP with him.

He said that Mr. Molin was a good pilot and a good kid. His personality needed a little work.

## 20. Robert Matthew Marinaro, Captain A300, American Airlines

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Person Interviewed: Robert Matthew Marinaro
Position: Captain, A300, American Airlines
Represented By: Mr. Ray Duke, Attorney, Allied Pilots Association
Location: Telephone Interview
Date and Time: July 24, 2002, 1000 EDT
Present: Operations Group members David Ivey, Bart Elias, James Goachee, Delvin Young, John Lauer, Ron Skupeika, and Bernard Boudron (BEA)

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Captain Marinaro stated his date of birth as January 6, 1951 and was hired by American Airlines in February 1985. He estimated his total flying time to be about 15,800 hours and had accrued about 12,000 hours as an American Airlines pilot. He checked out as captain on the A300 in December 1999 and had accumulated about 2,800 hours on the airplane, all while flying as a captain. He said he was based in New York at the LaGuardia base for flying.

He said he knew the accident captain only to say "hello" to him.

He knew the accident first officer, Sten Molin. They first met back in 1994 when they were both on the B-727. He was a captain on the B-727 and Molin had about two years with the company and was a new first officer. He said he flew at least two domestic flights on the B-727 with Molin. Captain Marinaro said he later transferred to the international flying on the B-727. The rest of the time they flew together was on the A300.

Captain Marinaro described Molin's personality as upbeat, happy and he loved life. He loved aviation and was very happy doing what he was doing and felt very lucky being able to fly for American Airlines.

Molin never indicated to Captain Marinaro where he learned to fly. He knew that he did not fly for the military although they never discussed his background. Molin never indicated to him what his prior flying experience was prior to becoming an American Airlines pilot. He thought Molin had been with American Airlines about two years when he met him and had flown as a flight engineer on the B-727 prior to becoming a first officer on the same airplane.

When asked about Molin's flying abilities, Captain Marinaro said they seemed fine. Fairly average. He was a very bright guy, always ahead of the airplane, thorough, and paid attention to detail. He recalled one time that he told the captain where to turn on the taxiway as he was keeping track of where they were during the taxi. He had good situational analysis, was cooperative and made good, normal landings. He was always aware and in the loop. It was fun to work with him. Everything flowed very smoothly.

The next time they flew together was on the A300 in the spring of 1999. The gap from 1994 to 1999 was due to Captain Marinaro's transfer to B-727 international flying while Molin stayed on B-727 domestic flights. When they met on A300 they were both new on the airplane.

There did not seem to be any personality changes since last flying together. Molin seemed upbeat as he remembered him. He was generally happy, liked to fly turn-arounds, and was happy with his schedule. Captain Marinaro did not know why Molin liked flying turn-arounds as opposed to going on flight that had layovers.

He said Molin's piloting skills on the A300 were good. He was happy doing what he was doing, was confident and liked the airplane. His systems knowledge on the A300 was very good. He was up on it. Molin was a very bright guy, and he liked getting into systems issues. Regarding Molin's differences in flying skills on the A300 versus the B-727, Captain Marinaro said he flew as he was trained and flew like everyone else. He was confident. Everyone pretty much flew the airplane the same way. He could not remember anything remarkable or different about Molin's flying.

He said he attended the AAMP road show in 1995 or 1996. It was a special all day class that was given by Captain Vanderburgh, who had developed the program. After the presentation, it was followed up with training at a later date.

Regarding the AAMP presentation, he said it was well done, informative, and educational. Something he needed to think more about (upsets). It was not complicated or different than what he had learned before in aviation. It was basic aerodynamics and was in line with earlier training he had received. To practice on a recurrent basis would lead to better skills. He said he had not received prior training in the area of upsets.

Regarding the use of flight controls, he stated that rudder was to be fed in with the aileron. Nothing different was taught to him about flight controls than he had been previously trained. Recognizing upsets was emphasized during the training. The recovery techniques were consistent with what he had already learned. He was told to use coordinated rudder, and to lead with aileron. He felt like the training given in the AAMP presentation did not put anything additional in the show, but did not leave anything out either.

Captain Marinaro did not recall if he had ever discussed the AAMP training with Mr. Molin.

During the AAMP road shows there were many conversations among pilots and everyone liked the fact that the subject was broached and expanded upon recognition and recovery of upsets.

Captain Marinaro's recalled only one encounter with wake turbulence. It was over the North Atlantic on a flight in an A300. He was flying behind a B-747 with

RVSM and the B-747 was 1000 feet above him and about one mile in front of him. He knew the airplane was there and when they encountered moderate turbulence, he knew why. They encountered light to moderate chop, and the airplane was on autopilot. He did not recall any rolling or yawing of airplane nor did he remember disconnecting the autopilot during the encounter. The B-747 was traveling faster than they were so the spacing was increasing.

Captain Marinaro said he kept his feet on the floor if he was the pilot not flying. He had not felt rudder inputs by other pilots and had not experienced yawing in the A300.

He did not recall Molin being an over or under aggressive pilot. He did not recall ever having flown with Mr. Molin through any wake turbulence.

He stated that the last time they had actually flown together might have been about 9 months prior to the accident. The last time he saw him was about 6 months prior to the accident; in August of 2001. Regarding anything significant in Molin's life he said that he hadn't talked to or seen him in about a year. Molin had a flight attendant girlfriend. He had broken up with his girlfriend, but thought they might get back together. He seemed to be having fun and liked to sail during the summer.

He had received recurrent training and simulator training since the accident. It was in December 2001. He said there had been no change in the simulator maneuvers at that time. Upset training was addressed as always.

Captain Marinaro had never observed any first officer making aggressive inputs on the flight controls that required him to comment or to correct. He had seen Mr. Molin make rudder inputs during crosswind landings. His inputs were smooth, normal, and correct. He never saw him make any inputs or over control beyond what was required for the situation.

He said he thought Molin would hand fly the airplane between 5,000 feet to 10,000 feet before engaging the autopilot. The altitude varied.

He never saw Molin make an abrupt control input that might require his hands to be placed on the controls to correct the situation.

The wake turbulence encounter over the North Atlantic was the only one he could ever recall. He had never experienced wake turbulence with Molin.

He stated that Molin's rudder management and use was normal. He could not recall anything abnormal or that stood out or was unacceptable in its use. He could not remember Molin ever disconnecting the autopilot to hand fly the airplane during any turbulence or abnormal event. He had never seen Molin take over manually to hand fly the airplane due to choppiness.

Molin did not have a "quirk" about the use of rudders.

During transition from cruise to descent, Molin would turn the autopilot off, usually below 10,000 feet for the approach. Somewhere between 20-50 miles out and he did not think any higher than 10,000 feet. He could not be specific about where he would turn the autopilot off to hand fly the airplane.

While hand flying the airplane on short final with the winds gusting and choppy, he never saw him over control the airplane or move the controls in rapid manner to counter roll or pitch. He said, "Sten was smooth."

Captain Marinaro said American Airlines used safety belts that have a 5-point attachment. He did not recall how many attachments Molin would use while flying.

He estimated Mr. Molin to be about 6 feet tall and to weigh about 180 pounds.

He thought that Molin made coordinated turns. All the pilots are trained to keep their feet on the rudders while flying. Captain Marinaro said that as a pilot not flying he kept his feet on floor. He thought Molin's turns were coordinated. He could not see the placement of the first officer's feet on the rudder pedals.

Since the accident only positive feedback had been received. They were both good pilots and that something out of their control must have occurred. Molin was a good pilot, and States was experienced.

He could not think of anything else.

## 21. Ed Keister, Captain A320, Jet Blue flight 41

Name: Ed Keister, Captain Jet Blue flight 41 (JFK-MCO)
Time: 1540 EST, November 12, 2001
Location: via telephone
Present: Evan Byrne

Keister witnessed the AAL587 crash. He was in command of Jet Blue flight 41 from JKF-MCO and has 13,000 hours total time. His A320 was behind a NWA DC-9 during taxi-out to runway 31L. When the DC-9 took the runway his airplane was number 1 on the hold short line. His first officer said "oh my gosh do you see the airplane" and the first thing Keister saw was the A300 was rolling right and left and it looked like they were struggling to keep the wings level. He said it looked like they had elevator control.

Keister saw a small fire coming from the first inboard third of the right wing. He estimated the fire to be about 7-9 feet in diameter based on his observation of the size of the airplane and its distance. He said right after he saw the airplane the flight path angle was about 80 degrees nose down. He said the airplane continued to the ground "almost fluttering" - right wing down, then left wing down, back and forth all the way to the ground. He thought the impact was nose down, left wing down. He said he talked with Airbus personnel and they asked him if it looked like the airplane was stalled. He said after they asked him that he thought that possibly at the very end it was -- and it looked like it made about a 1/4 turn spin right before impact.

Keister said the fire was deep orange -- not bright red but deep orange and it was the same color on the wing as the eventual fireball he saw from the impact.

Keister did not see any debris coming from the airplane. He saw no smoke coming from aircraft either.

Keister said everything as far as the departure and climb out was normal -- he wasn't really watching the departure but the airplane was where it should have been at that point in the procedure.

Keister said that after the crash, he saw birds to the south of 31L over the bay. He said they were large black birds, not seagulls and were flying less than 20 feet above the bay.

Keister couldn't tell whether the engines were on the airframe or not. He was not concentrating on that. He was fixating on the struggle to control the airplane.

Keister said the flame appeared to be coming from the upper surface of the wing.

Keister said he heard no radio communications from the airplane. He said after the crash there were comments on the tower frequency about what people had seen.

Keister said he saw the A300 taxi but didn't look closely.

Keister said that a pilot on Jet Blue flight 79 (Malcolm MacDonald) told him he saw some debris near the airplane and also saw the airplane in a lower nose down attitude than Keister thought it was.

**22. Gabriel Chaves, First Officer A320, Jet Blue flight 41**

| | |
|---|---|
| Name: | Gabriel Chaves, first officer Jet Blue flight 41 (JFK-MCO) |
| Time: | 1640 EST |
| Location: | via telephone |
| Present: | Evan Byrne |

Chaves was the first officer on Jet Blue flight 41. He was in an A320 behind a DC-9 holding in position for runway 31L. He happened to look up and saw the airplane going down. He described the airplane when he saw it as nose-down and out of control. He said the wings were rocking back and forth and the airplane was diving slowly -- like the airplane was stalling but nose down. He could see a fume trail following the airplane and he described it as being light gray, almost white, in color. He said it didn't look like smoke.

Chaves said the whole plane was in complete shape. He said just before the airplane hit the ground he saw an explosion -- an orange light or fire. He said the fire was on the main fuselage by the wing -- right in the middle of the airplane. He could see either the top or the bottom of the airplane at this time and the fire was in the middle. He said the plane then hit the ground and there was a big explosion.

He said the airplane was between 1000 and 2000 feet high when he first saw it about 2 or 3 miles away.

He said the airplane looked normal during taxi. He said there was another AAL airplane in front of the Northwest DC-9, a B-767.

## 23. Jeff Jago, First Officer A320, Jet Blue flight 79

Name: Jeff Jago, first officer Jet Blue flight 79 (JFK-MSY)
Time: 1710 EST, November 12, 2001
Location: via telephone
Present: Evan Byrne

Jago was taxing out on taxiway ALPHA to 31L. He said all other aircraft were heading down taxiway ZULU to 31L. Flight 79 had been asked to take KILO-ALPHA to 31L and they were about the intersection of JULIET - ZULU facing completely south. He glanced out the front window and what caught his eye was an aircraft in what appeared to be a 90 degree bank. He thought it was in a left bank but said that given AAL's silver scheme he couldn't tell whether it was the top or the bottom of the airplane. He said there was a kind of gray to white smoke following the aircraft that was kind of obscured in the sky. He then saw some debris behind the aircraft. His initial thought was it was either the vertical stabilizer or the horizontal stabilizer. He described it as thick at one end and thin at the other. He said it was flickering as it fell like a piece of paper would fall out of the sky -- sometimes a thick profile and the other times a thin profile. He said he felt it was some kind of aerodynamic surface the way it was falling. He said it was falling a few seconds behind the aircraft. He said he generally recalls some other debris but nothing he could identify.

He said the aircraft rolled during its descent and it looked almost like a quarter-turn spin recovery. The aircraft impacted the ground shortly thereafter.

Before impact, he believes he saw a yellowish-whitish flame on the side of the fuselage -- behind the wing root (halfway between the wing root and the tail). It wasn't a huge ball of fire but there was some there. This was visible about 3-5 seconds before ground impact.

He said the airplane was on the downwind leg for the departure -- pretty much abeam JFK going SE bound. He estimated its height as between 3,500 to 5,500 feet.

He said the flickering debris impacted west of the main aircraft impact -- soon afterwards.

He is an A320 first officer and has about 4,000 hours total flight experience.

**24. Malcolm McDonald, Captain A320, Jet Blue flight 79**

Name: Malcolm McDonald, captain Jet Blue flight 79 (JFK-MSY)
Time: 1905 EST, November 12, 2001
Location: via telephone
Present: Evan Byrne

McDonald was the captain of Jet Blue flight 79, an A320 aircraft. He has about 12,500 hours total flight time. He said they were taxing out to runway 31L via taxiway ALPHA and were approximately abeam taxiway HOTEL when his first officer brought the crashing airplane to his attention. He said it looked like it was out of control -- not unlike movies he saw recently on the history channel of a tumbling V2 rocket. He said the airplane appeared at the top of his number 1 windscreen. He estimated his airplane's heading to be about 220 degrees at the time he saw the A300. He estimated the A300 was about 15-20 degrees nose down at that time and it was falling vertically from the sky. He said there appeared to be an object to the right of the airplane (behind it, to the southwest) also falling. He said there was quite a bit of smoke associated with the fuselage area. The smoke was white or grayish. He said the airplane effectively seemed to tumble out of the sky. He said the last bit before impact was a very nose down attitude he estimated at about 80 degrees. He said it looked like the airplane was in a spin or a spiral dive. He said the fuselage appeared to be intact all the way down. He didn't remember seeing the wings but said that may have been because of the angle from his perspective. He said the airplane exploded on impact with a mushroom cloud climbing about 1/3rd the length of the intact fuselage.

He said the object falling with the airplane was too small for him to describe. He said the airplane itself was rotating a bit on the way down. He said there was nothing abnormal about the bird activity at the airport.

Interview Summaries (Part 2)

**25. Volume I**

BEFORE THE

NATIONAL TRANSPORTATION SAFETY BOARD

DFW INTERVIEWS ON
AA 587

VOLUME I

Room F107
American Airlines Flight
Training Academy
4601 Highway 360
Fort Worth, Texas

Tuesday,
January 15, 2002

The interviews commenced at 8:00 a.m.

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P R O C E E D I N G S

**a. Captain Tom Melody**

MR. IVEY: Good morning, everyone.

This group is formed as part of the investigation of American Airlines 587, and we'll be working all week with interviews, and this morning we have Captain Tom Melody from the Boeing Airplane -- Commercial Airplane Division of Boeing.

And the group we have is comprised of Bart Elias, NTSB, Guy Arondel from BEA, Captain Delvin Young from American Airlines, and Captain Jim Goachee from the FAA, and Captain John Lauer from Allied Pilots Association and Captain Ron Skupeika, representing Airbus out of Miami.

And I'm Dave Ivey, and I'm the chairman of the operational factors group concerning this investigation.

And good morning, Tom. Glad to have you here.

CAPT. MELODY: Good morning. Thank you.

EXAMINATION

MR. IVEY: If you would start by just giving us your name, where you work, and some of the background related to your aviation experience.

CAPT. MELODY: My name is Tom Melody. I'm the director of flight operations for the Boeing Commercial Airplane Group in Long Beach. I've been with McDonnell Douglas and Boeing since 1986. Prior to that I spent 24 years in the Air Force, the United States Air Force, and I flew primarily small airplanes but I did have one tour as a Hurricane Hunter in C-130s.

Since I've been at Boeing I have been the project pilot for the MD88 and the project pilot for the MD11. And I've also flown the first flight on the MD11, the MD88, and the 717. I have a bachelor's degree in aeronautical engineering and a master's degree in electrical engineering, and I am a graduate of the Air Force Test Pilot School and I was an Air Force test pilot for about 12 years.

MR. IVEY: Your total flying time and type ratings?

CAPT. MELODY: My total flying time is approximately 8,000 hours, and I am typed in the DC9 and the MD11, which includes the MD80 and the MD10 and the DC10.

MR. IVEY: Are you currently flying?

CAPT. MELODY: Yes.

MR. IVEY: And on which airplane or airplanes?

CAPT. MELODY: I'm flying the MD10, the MD11, and the 717.

MR. IVEY: In August 1997, there was a letter that was written in conjunction with Airbus and the FAA and Boeing that was addressed to American Airlines concerning the AAMP program, which is the Advanced Aircraft Maneuvering Program. Are you familiar with that letter?

CAPT. MELODY: Yes, I am.

MR. IVEY: Were you one of the signatories on that letter?

CAPT. MELODY: Yes, I was.

MR. IVEY: Could you tell me what the basis of that letter was? What was the basis of the letter being written?

CAPT. MELODY: It's my recollection that, and there's a lot of background -- I don't know how much you want me to get into the background -- but the immediate events leading up to that letter was a request, I believe, by Cecil Ewell for certain individuals from Airbus, Boeing, and McDonnell Douglas to come here to Dallas to attend a presentation of the AAMP.

At some point -- I don't recall the exact date, but it was before the letter was written -- American Airlines hosted a presentation of the program at the Hyatt at the airport, and as I recall, there were several hundred attendees from different airlines.

And Captain Ewell had requested certain individuals -- myself, Captain Higgins, Larry Rockliff, and Tom Imrich -- to comment. And I don't recall the exact generation of the request for those comments, but clearly, Captain Higgins led the effort to respond.

And as I recall, the four of us each [had] some individual comments. There was one area in particular that I was focused on in that.

MR. IVEY: You mentioned that this conference was with several hundred people. Were these outside guests as opposed to the pilot cadre at American?

CAPT. MELODY: I believe they were. I don't know the exact percentage of the composition, but there were certainly outside guests because part of the presentation included an offer to provide this program and any related services on request to other airlines.

MR. IVEY: Was this the first type of program like this that was constructed that you were aware of? Is American the first one to develop this?

CAPT. MELODY: I don't know if American was exactly the first. I do know that American and United were simultaneously developing their own programs. And coincident with that, there was an industry effort that had been initiated, I think, by the Flight Safety Foundation and perhaps the ALPA and IATA that I became a part of in

January of 1997. And that group was conducting these same types of reviews about what the appropriate type of recovery activity would be appropriate for certain types of upsets. So there were, I know, numerous efforts going on simultaneously.

The two probably largest independent efforts were at United and American, and then there was an industry wide group which was also trying to compile inputs from different organizations. It was a period when there was a lot of interest and a lot of participation, a lot of questioning about what is right.

And I think it was the beginning of something that each year has gotten to be more refined and more appropriate.

MR. IVEY: In that conference, had American already established this program or was this out there to receive as much input as possible. Was it their presentation, or were they looking for a collection of information to develop something?

CAPT. MELODY: I would say that at that point in time, they were pretty assured that this was a mature program. I had personally been invited to review it on at least two prior occasions when they were more open to some positive feedback.

And so it's my -- would be my belief that even though there would be some evolution that at that point in time they were ready to introduce that program into their fleet training.

MR. IVEY: And do you know who it was that developed this program?

CAPT. MELODY: Yes. It was Captain Warren VanderBurgh.

MR. IVEY: Was he the sole source or was this in concert with other people in American. Do you know?

CAPT. MELODY: I would say he was the primary coordinator. I'm not personally familiar with his other sources of information, but I know that he had numerous contacts with me, asking for my advice and opinion about various parts of the program.

Warren and I had a very similar flying background in the Air Force. We both flew the F-100, the -105, and the F-4, so we had a lot in common.

MR. IVEY: From your perspective attending that conference, did you get any sense that there was a fighter orientation or a military orientation to upset recovery of any -- did that have any sort of a -- give you any sense of a transferal of military to civilian operation?

CAPT. MELODY: At the time -- in fact, I think at the time, the reason Warren first contacted me is American was in the process of incorporating angle of attack indicators into the cockpits of their newer airplanes. Now, historically, angle of attack has not been an instrument used in commercial transport, so there was, I'm sure, a lot of interest about what their benefit would be, how they would best be utilized.

And people with experience using angle of attack are aware of its benefits. So I think Warren wanted to make sure that as part of his program, people understood what angle of attack was. So there was some basic aerodynamics introduced into the course and, you know, the definitions of angle of attack and how angle of attack would be displayed and how it would be used.

Primarily, angle of attack is an instrument or an indicator used in a lot of military fighter aircraft, not so much in the transports, but there was still at that point in time a lot of people that were convinced that angle of attack would be a very useful indicator during an upset recovery. You know, to optimize your energy during a recovery.

MR. IVEY: What did you think of that approach to this Advanced Maneuvering program regarding angle of attack?

CAPT. MELODY: Well, having a lot of experience with angle of attack, I personally think that angle of attack is a very useful instrument if you know how to use it. But I can certainly appreciate that there's a lot of people out there that really don't understand the concept of angle of attack.

And since transport airplanes, for 50 years, really hadn't relied on that, it would involve a mindset, I think, in getting people to understand the benefit of angle of attack. I think at this point in time most people have accommodated to the concept of stick shaker, and in most of the airplanes I'm familiar with, stick shakers is related very, very closely to certain angle of attack points that you want to be aware of.

And I think for the most part my opinion is probably in the minority about angle of attack indicators. I can certainly accept the fact that many people believe a pitch limit indicator or PLI, which is tied directly to angle of attack, in lieu of an angle of attack indicator is probably a more useful piece of information.

MR. IVEY: So after the conference, is it factually correct to say that this letter was generated to address some of the concerns that were witnessed at this conference?

CAPT. MELODY: I think the letter was generated in response to a request for feedback. And the four gentlemen that signed that letter may have slightly different perspectives on the course, based on their personal background, their personal experience.

I know that I had worked with Larry Rockliff throughout the development of the industry program that I mentioned earlier, and it was pretty obvious that the manufacturers all were in pretty much agreement about how we felt about the course.

MR. IVEY: And did Boeing and Airbus get together outside of American to discuss this after the conference and to have, in this case, Larry Rockliff, who represented Airbus, work in concert with Boeing to provide this letter to American Airlines regarding certain issues?

CAPT. MELODY: As far as actually generating the letter, I don't recall that we worked personally. I believe the letter was coordinated in Seattle by Ken [Higgins], and he sent us each a draft of his initial letter that we all made comments. I believe that was the sequence on that -- for that particular letter.

However, in three meetings of the industry group we had opportunities -- Larry and John Cashman and myself -- to talk with Warren about certain issues in his program.

MR. IVEY: Was there any other correspondence besides this particular August 20, 1997, letter regarding this subject that you're aware of?

CAPT. MELODY: I recently became aware of the fact that Ken had sent Captain Ewell a letter previously, prior to this letter, dealing with very, very much the same subject. And then there was a response from Captain Ewell back to Captain Higgins that I have never seen.

I've never seen those two documents. I'm just aware that they exist.

MR. IVEY: I guess Captain Higgins would be more aware of that then.

CAPT. MELODY: Yes.

MR. IVEY: We can talk to him later. Thank you. And as this program was -- as you say, it appeared to be ready to be implemented into their training program at American, the Airbus and Boeing group provided also a training aid, I guess would be the proper term, regarding upsets?

CAPT. MELODY: That's correct.

MR. IVEY: And was this training aid jointly commissioned between Boeing and Airbus?

CAPT. MELODY: I'm not really sure who commissioned it. I actually got involved in their second meeting. I just know that Boeing and Airbus and McDonnell Douglas were invited participants, but it was not a Boeing or Airbus or McDonnell Douglas program. We did not invite other people.

We ourselves were invited to participate. I believe it was a joint program of the Flight Safety Foundation and perhaps IATA, the International Air Transport Association.

MR. IVEY: And is it fair to say that this was more on the manufacturer's side as opposed to the operator's side that this group got together?

CAPT. MELODY: I'm not sure I understand, Dave. The three major manufacturers participated -- Boeing, Airbus and McDonnell Douglas. But there were numerous airlines participating as well.

MR. IVEY: So they actually helped developed the upset training aid that --

CAPT. MELODY: That's correct.

MR. IVEY: When I look at the Airbus and the Boeing training aids, they are very similar in words if not exact duplicates of one another in most if not all areas.

CAPT. MELODY: That's correct.

MR. IVEY: And so this was jointly agreed upon by Boeing and McDonnell Douglas at the time and Airbus, and I presume generally accepted by all airlines?

CAPT. MELODY: That's correct. When the final committee resolution was agreed to, there were certain comprises contained. There was some acceptance of the fact that geometry of airplane models would have some impact on what would be a preferred recovery technique.

There were things like the fact that most of the non-Long Beach airplanes are wing pod-mounted engines, and Long Beach had some unique configurations in the MD80, MD90 family and in the Trijet family, so things that might be a preferred recovery technique from, say, a nose high slow air speed situation might be different in an airplane like an MD10 or an MD11, where the thrust moments are all balanced as opposed to a high bypass pod-mounted engine.

So there were compromises. Depending on airplane type, we had to allow for the fact that there would -- could be some differences in the recovery technique. But in the end, it was a document that everybody could accept.

And in the case of Boeing and McDonnell Douglas -- or Boeing and Airbus, rather -- we basically published the exact same article with a different cover sheet. So the -- Bill Wainwright, who was the Airbus representative at the time, he put this same article that you have now in your presence. It's on that CD.

That same article was published in the Boeing Airliner magazine and in the Airbus magazine, the equivalent magazine, word for word, identical, with a different cover letter. So there was complete agreement.

MR. IVEY: Now, this upset training -- did this apply to all aircraft or was this limited to non-fly-by-wire aircraft? Do you know if there was a difference in the upset training or was it across the spectrum of airplanes?

CAPT. MELODY: It was across the spectrum of transport category airplanes. We didn't differentiate flight control design. We did not want to get entangled in the fact that smaller airplanes might have different characteristics and, you know, it was mainly devoted to the airlines, and so we limited it to commercial transports.

MR. IVEY: Turning to the application of rudder, was there a lot of discussion involved in that particular flight control?

CAPT. MELODY: The use of rudder, I would say, was probably the main area for discussion, although there was a lot of discussion about the characteristics of wing-mounted engines and the effect that they would have during high-powered recoveries.

But the rudder was probably a major -- it was certainly in my mind an area that needed to be very, very well understood.

MR. IVEY: Did you get the sense that it was understood?

CAPT. MELODY: I certainly have the impression that each time I talked to Captain VanderBurgh, from the first time I attended his course through the last time I attended his course, that he was accepting the fact that, you know, based on experience, we knew the impact that the use of the rudder could have in generating side-slip -- large side-slip angles.

So I was aware that he was becoming more and more in agreement with our position, our position being Boeing, Airbus, and McDonnell Douglas. Actually, the final merger between McDonnell Douglas and Boeing took place on August 4 of that year, so by the time the letter was generated, it was really a single organization.

MR. IVEY: August 4, 1997, I guess?

CAPT. MELODY: That's correct.

MR. IVEY: When you mentioned that he -- Captain VanderBurgh -- was coming over to this way of thinking between Airbus and Boeing, I know you can't speak for him, but from your perspective, what was it that changed? What was he going after in the origin of this upset program and how did he change and why, from your perspective?

CAPT. MELODY: Well, I really hate to try to tell you how it changed because I don't want to tell you where I thought it -- you know, where Warren was coming from in the beginning. I do know that there is a commonly held belief that at high angles of attack that the ailerons start to lose their effectivity, so the rolling effect due to ailerons at high angles of attack, depending on the exact shape of the wing and the wing sweep, will start to lose some of their effectivity.

But that is countered by the fact that most of these transport airplanes now use spoilers as well, and the spoilers aren't as affected by that. I think perhaps, based on my experience during this period, shortly before this McDonnell Douglas had opted to demonstrate thrust reverser deployments in flight.

There was the option, based on an NTSB recommendation; the FAA changed the certification criteria for demonstrating thrust reverser deployments. And typically, that had been done at idle power at 10,000 feet, and now we had the option to either redesign the systems for each airplane to demonstrate reliability to a much, much lower number -- higher reliability, lower probability of failure.

McDonnell Douglas at the time decided that we would take a route that allowed us to increase the reliability but also demonstrate controllability. So I personally was the pilot that went up and demonstrated a thrust reverser deployment at cruise mach. It was .84 mach at 33,000 feet.

Naturally, before I did that I wanted a lot of assurance that the airplane would be controllable. So we spent I'd say close to a year building up and developing a simulation model that we had high confidence in, and so I believe at the time, the actual data for the simulator was actual data, out to about 15 degrees of side-slip, and beyond that it was wind tunnel data.

And so we needed to make sure that we could expand that side-slip envelope. And over the course of a year, we just went to larger and larger and larger angles and put that in the simulator and then set up a correlation, so that before we actually did the test, at each point we would increase mach number and altitude and increase the amount of deflection of the reverser and demonstrate correlation with the simulator, and the results were very, very, very good, surprisingly good, to the point where the FAA eventually cut down on the total scope of the demonstration, the in-flight demonstration.

But in the course of doing that, we knew that the FAA would not just accept controllability from the point of a manufacturing pilot that had been working on this for a year, so we needed to, based on their acceptance of our simulation model, we needed to bring in various crew members, both training crew members from McDonnell Douglas and training flight pilots from various airlines.

And in the course of witnessing their recoveries from this, it was very, very clear that the use of the rudder during this recovery could compound the recovery itself. In other words, what we learned in that, is that when you deploy the reverser under those conditions and then you wait the required three seconds, the airplane would have rolled perhaps 60 to 70 degrees.

And you could stop that roll rate immediately with full aggressive aileron, and then you could roll the airplane using some coordinated rudder as the ailerons became more effective. But if you just slammed in the opposite rudder without you being able to observe it, because there are no side-slip indicators in most airplanes, the airplane would build up a very, very large side-slip and then it would do a very rapid roll due to the side-slip in the same direction that you have the aileron already applied.

So I think that when we explained all this to Warren that when you use the rudder, the side-slip that you can generate without being aware of it can generate very, very, very high roll rates. So my personal concern about this was controllability when you use the rudder in a big airplane like this.

We also have experience in our production acceptance of new airplanes. We have some tests where we induce a Dutch roll to validate the effectiveness of the yaw damper. And we also have some tests where we generate high roll rates, and it was clear in doing those types of tests that, you know, in the airplane acceptance, you put the airplane in 30 to 40 degrees of bank and then you rapidly [move] the control wheel in the opposite direction, and you make [sure] that there are no adverse characteristics during that high roll rate.

So we're familiar with the fact that you can generate very high roll rates or stop very high roll rates just with the ailerons alone. But in the Dutch roll test, if you -- in a big airplane like an MD11, if you push the rudder in halfway and leave it there until you see the airplane start to roll, then it will generate a very high roll rate.

So we just wanted to make sure that the industry was aware of this, because generally speaking, most pilots never experience the need to do that, and we wanted to caution them that they shouldn't just take the data that they get from their simulators, because basically, the normal training simulator data error model doesn't have data for those high angles or the high roll rates.

And so it was my belief that over the course of trying to explain all this to Warren in particular that he was in agreement that the position should be that you use the rudder to coordinate the recovery. And in the final version, that's I believe where they had gotten to.

MR. IVEY: You mentioned coordinated rudder, and I see that in the AAMP program those terms used quite often -- coordinated rudder. What does that really imply?

CAPT. MELODY: Well, for me, it implies trying to minimize any side-slip associated with a roll.

MR. IVEY: As you said, though, oftentimes a pilot doesn't realize the side-slip he's encountered, so how does the use of coordinated rudder enter in for a pilot who doesn't know he's in a side-slip?

CAPT. MELODY: Well, I agree that they normally don't know when they're in a side-slip, and the side force accelerometer on most airplanes is not really a side-slip indicator, but it is an indicator that indicates whether there's any acceleration laterally which would indicate a side force.

And for the most part, you can't precisely know whether you're in a side-slip or not because you could have some side force due to the side-slip and balance that with side force due to the rudder. So you don't know precisely, and we take great pains in telling people it's not a side-slip indicator, but it is an indication if there's an unbalanced side force, and that's what we're trying to minimize.

MR. IVEY: So for the use of coordinated rudder, is it still keeping the ball centered?

CAPT. MELODY: That's my definition.

MR. IVEY: As the convention concluded and this letter was then created that was sent to Captain Ewell, there were several issues. I'd like to run down through that. One of them I know was using the term phugoid related to aerodynamic explanations, and I did notice that the term phugoid ultimately was removed from the AAMP program in their booklet or instruction manual, I guess you would call it.

That's more terminology. Those were, I presume, minor issues there?

CAPT. MELODY: Yes.

MR. IVEY: In this letter, would you agree that perhaps the use of rudder was the major issue or were there others?

CAPT. MELODY: I would say from my point of view, the major issues were the use of rudder, the use of simulation outside the boundaries for which there is valid data, and to some extent, there was some differences of opinion about using thrust for recovery from nose high attitudes.

Personally, that was not a major issue for the Long Beach models because of their geometry, so I didn't want to get involved in an area where people would argue that I didn't have any personal experience, which is true. You know, I've never flown a Triple-7 or 767, so I really personally don't know how much pitching moment there is.

In the Long Beach airplanes, there's not very much pitching moment unless you have an engine out. So I didn't want to personally get involved in those areas. I left that to the people with experience in that area.

MR. IVEY: And it's basically the manufacturer's contention that, if I may quote: "to first use full aileron control. If the airplane is not responding, use rudder if necessary to obtain the desired airplane response."

CAPT. MELODY: That's correct.

MR. IVEY: When you came away from the convention and the presentation by Captain VanderBurgh, did you sense that he was trying to suggest that more rudder or rudder only or an added emphasis on rudder was being given?

CAPT. MELODY: My personal recollection, because we really haven't talked about this in all the years since the letter was written, was that Captain VanderBurgh had accepted the manufacturer's recommendations that the rudder should be used to coordinate the recovery.

MR. IVEY: And if I may, in the letter I quote: "Rudder reversals such as those that might be involved in dynamic maneuvers created by using too much rudder in a recovery attempt can lead to structural loads that exceed the design strength of the fin and other associated airframe components."

Do you have any idea how that statement was derived and placed in here? Was there a study done on rudders and strengths of rudders based on this dynamic environment?

CAPT. MELODY: I personally don't know how that concept was put in. I am sure that Captain Higgins will have some comments about that. It's a concept that they, I believe, have more experience with in the Seattle products.

MR. IVEY: All right.

CAPT. MELODY: As far as I know, to meet the certification requirements we have to demonstrate full rudder deflection under cruise mach conditions, but I'm not aware of any of the certification programs I've been involved in where we have done rudder reversals.

But I believe Captain Higgins might have more experience in that up in Seattle. I know they have had some failed fins during -- I know on the B-52 they had a failed fin, so they may be a little more aware of certain aspects to do in that area.

MR. IVEY: Are you involved or have you been involved in certification with some of these airplanes?

CAPT. MELODY: I was involved in the certification of the first American EFIS displayed airplane. Then the MD88, which was primarily an avionics in a new engine airplane, and the MD11, which was complete performance in avionics certification, and I was involved in the 717 certification.

MR. IVEY: Do you understand what the term doublet means?

CAPT. MELODY: Yes.

MR. IVEY: Could you describe for me what a doublet is?

CAPT. MELODY: First let me explain what a singlet is, and then the concept --

MR. IVEY: Singlet?

CAPT. MELODY: -- concept of a doublet might be. It is a technique that is used to make certain types of inputs into the control surface to generate certain types of dynamic response in the airplane.

Normally speaking, pilots make nice smooth inputs. But what we're trying to do to excite high frequency information from the control system is to make very sharp inputs. A what we call a step input -- if you can visualize the position of the controller -- the stick, in this case -- being in a neutral position at some point in time and then suddenly it jumps as rapidly as you can to a displaced position and then stays there. That's called a step input.

So it's not a nice smooth or a sinusoidal input. It's a -- not a ramp input. It's a step input. Suddenly and as quickly as possible, you move the controller from one position to another.

Now, if you do that, if you make a step input and at some period that varies with the type of information we're looking for, you suddenly take that input out just as quickly, and that's called a singlet. So a singlet is a step input and then a step output.

Now, if you do that in succession in two different directions, that's called a doublet. So a doublet is when you rapidly move the controller, then you rapidly take it out and rapidly move it in the opposite direction and then rapidly take it out.

So it would look like a square wave instead of a sinusoidal wave.

MR. IVEY: So in the case of a rudder, could you describe for me what would be a singlet and a doublet on rudder activation?

CAPT. MELODY: For a rudder, a singlet would be a rapid movement of the rudder pedal and then hold it for some period of time, which the engineers would explain whether they want a half a second, one second. Then you would just rapidly take it out and then you would rapidly go in the other direction for the same period of time to try and make it uniform, and then you would rapidly take it out again.

So it's a series of step inputs and step outputs that you attempt to make in each direction and make them so that they are equivalent. You don't want it to be longer in one side than the other. Otherwise, it will drive the dynamics in favor of one side or the other.

MR. IVEY: In terms of the rudder, is this a requirement in certification to do something like this?

CAPT. MELODY: We do this type of maneuver generally to obtain certain types of dynamic data. But it's normally done at not a very big amplitude. In other words, if we want to generate Dutch roll, open loop Dutch roll data, and then damped Dutch roll data, in order to induce the Dutch roll, one of the more common techniques is a rudder doublet.

Not a certification requirement per se, but it's a technique. Like I said earlier, it's a technique to get the airplane into one of its dynamic modes. In this case, in order to get the airplane into the Dutch roll mode, the doublet, rudder doublet, is a fairly common technique.

And the reason is because you want the Dutch roll to be symmetrical in each side. There are other ways to induce a Dutch roll, but they are less controllable. You can induce a Dutch roll by doing an uncoordinated roll, for example, and that will generate side-slip and then that will induce the Dutch roll, but it's more difficult to be consistent and to be symmetrical.

So the rudder doublet is probably the more common. It's certainly the more common in Long Beach.

MR. IVEY: Although you did not fly the Boeing 737, there is in the video that's presented by American to its pilots a recreation of a 737, and there are two different scenarios that the FDR, flight data recorder information, provided for this video.

And one starts, I believe, with a full rudder deflection on the 737 and as the airplane slows, it's taking more aileron control to maintain the wing's level. Are you familiar with that video?

CAPT. MELODY: Yes, I am.

MR. IVEY: What was the purpose of that video?

CAPT. MELODY: I can't recall exactly except the -- where I became aware of that video was in the industry-developed program. I believe the Boeing pilot, John Cashman, entered that video to show a concept that's known as a crossover point in terms of their speed.

That's a point that is basically what we would generally call VMCA. But it basically shows that below a certain speed, the -- you can stop the airplane from turning in one direction. And then you merely increase your air speed and you suddenly see that the airplane starts turning in the other direction.

And so that's a crossover of the yawing moments as a function of deflection of the aileron and the rudder. So I don't recall exactly why John introduced that video, but it was a video that Boeing had prepared and I wasn't involved and I'm not sure exactly what they were trying to demonstrate.

But the concept is very similar to the concept of VMCA. You know, for a given configuration, even with full rudder, if you get too slow the airplane's going to turn, and that's basically what I recall about it. I'm not sure of its exact intent.

MR. IVEY: I know that in the video that was provided to me or to the Board from American that they do show the two scenarios, one where there is an established full rudder input, and then as you say, perhaps it's a crossover speed. It may not be a crossover angle of attack but more of speed-related.

And then the second portion that's incorporated into that video shows starting from a neutral position with a full rudder input and perhaps the differences associated with that. Were those two videos developed after the letter was written to American, or do you know if those were developed before?

CAPT. MELODY: I believe they were developed before, because my memory is that we -- the group that was on the committee -- did see those videos, and the committee was essentially complete by the time this letter was written. They were independent events, but the committee, I believe, was pretty much complete before this letter was written. But it's my memory and it might not be exactly.

MR. IVEY: You mentioned in your experience you have light airplane background?

CAPT. MELODY: Yes.

MR. IVEY: I'm sure you're familiar with the term VA, meaning maneuvering speed?

CAPT. MELODY: Yes.

MR. IVEY: And in air transport category airplanes, VA is not a speed that's normally given to airline pilots. Would you agree?

CAPT. MELODY: I would agree, but there was always an equivalent. And in the newer airplanes, the airplanes with the EFIS tape displays; I think for the most part we all agree that the maneuvering speed for any configuration is the VMIN speed with the appropriate additive.

So that's our definition now of maneuvering speed, so it would be, for practical purposes, we don't recommend and our auto throttle systems won't allow flight below VMIN, which is generally 1.3 VSTALL. There is little, depending on whether you have a 1G stall or a MIN speed definition in the certification.

So -- but whatever the minimum speed is, on all the newer airplanes it's required to be displayed. And then there is a minimum offset -- in our case of five knots -- that we don't -- that's the maneuvering speed, and we don't recommend you fly below it and the auto throttles won't let you fly below it.

MR. IVEY: That speed is not really identified per se in flight manuals as a maneuvering speed. That's not usually a term that you see in flight manuals, is it?

CAPT. MELODY: Well, in the recent airplanes, in the MD11 and in the 717, we do use that term for that by definition.

MR. IVEY: And speaking of definitions, that was my next question. Can you describe for me what maneuvering speed means in a transport category airplane?

CAPT. MELODY: Generally speaking, it is the slowest speed that you can safely maneuver the airplane within the bank limits without getting into stick shaker.

MR. IVEY: Does maneuvering -- and you mentioned bank limits -- does maneuvering speed incorporate rudder in terms of yaw limits within the maneuvering speed?

CAPT. MELODY: Not to my knowledge.

MR. IVEY: So maneuvering speed is more associated with bank and stall as opposed to either pitch or yaw?

CAPT. MELODY: For the minimum maneuvering speed. I'm afraid I thought that was the concept we were talking about. That's minimum maneuvering speed. There's also another speed that varies by name depending on the manufacturer, but it would be the maximum speed at which you could apply a full control surface input without possibly exceeding the limit.

MR. IVEY: That's VA, I guess?

CAPT. MELODY: Yes.

MR. IVEY: V sub A --

CAPT. MELODY: Uh-huh.

MR. IVEY: -- maneuvering speed?

CAPT. MELODY: Maximum maneuvering speed.

MR. IVEY: And by applying a full control input and not hurt the airplane?

CAPT. MELODY: Well, I don't know of hurting the airplane. It would be to make maximum control inputs without exceeding any limits, and they're certainly different there. You can exceed limits without hurting the airplane.

MR. IVEY: So the maximum maneuvering speed, if you were at a speed below that maximum value, can you apply full aileron without exceeding any limits?

CAPT. MELODY: Yes.

MR. IVEY: Full pitch without exceeding any limits?

CAPT. MELODY: Probably without exceeding any structural limits, but you could easily exceed G limits.

MR. IVEY: And full rudder input without exceeding any limits?

CAPT. MELODY: I believe that to be the case that in the certification, we demonstrate full rudder deflection. Some airplane designs rely on rudder limiters and some airplanes rely on the fact that they're hinge-moment limited.

In other words, just the sheer size of the rudder at the normal operating envelope, MMO, that the hydraulic system just can't push the rudder any further into the free stream, so there is a little bit of torque in the vertical fin.

And then there's the rudder moment limit, the – that’s where you just can't move the fin any further out into the air stream.

MR. IVEY: In the case of a rudder --

CAPT. MELODY: Or move the --

MR. IVEY: -- load limiter and its application on the rudder, again, if you're below that maximum maneuvering speed, the airplane with a full rudder input should not exceed any limit?

CAPT. MELODY: That's correct.

MR. IVEY: In the A300 operating manual of American, they've got a turbulence penetration speed. They call that VA, and it's 270 knots or .78 mach, whichever is lower. I realize you're not an A300 pilot or aware of it, but a turbulence penetration speed in general, isn’t it usually that maximum VA speed which is used to help protect that airplane from full control inputs or not?

CAPT. MELODY: I don't believe so. I believe the maximum maneuvering speed is a -- is a number that would be applicable in calm air. And then the reason we have turbulence penetration speeds, which are lower, is to make sure that the combination of control inputs and turbulence wouldn't exceed that number.

MR. IVEY: So if you were in the case of wake turbulence encounter, then perhaps the maneuvering speed could -- or would need to be dropped lower?

CAPT. MELODY: If it was a sustained turbulence. I think generally speaking, the concern about turbulence is more geared toward exceeding acceleration limits vertically, normal G. You know, if you're flying faster and you make longitudinal control inputs, the faster you're going the more G capability you can generate for the same input.

We don't want to combine that with an external gust so that suddenly in an attempt to maintain attitude that between the combination of a vertical gust and a control input, you could exceed the 2G limit so -- for cruise, for clean wind.

So that's primarily the reason we want to do that is to make sure that the combination of any normal acceleration from the turbulence and in normal acceleration from a control input combined don't exceed the G limits.

But as far as I'm concerned, or as far as -- my experience is that it's not a structural issue per se. It's just exceeding the G limit and then requiring an inspection.

MR. IVEY: And in the case of the rudder, I'm sure that there are gust loads that are associated with certification where you've got a displacement that's a normal input by a pilot or an autopilot or whatever, and then an additional gust loading on the tail. Are these issues that are of concern in certification?

CAPT. MELODY: Not that I'm aware of. I'm not aware of any information provided to the pilots about lateral accelerations or rolling accelerations. The only limits that I'm aware of are longitudinal acceleration limits.

MR. IVEY: One last question on this maneuvering. You mentioned that you could make a full control input, and you may or may not know -- I ask the question --

the maximum maneuvering speed -- does that mean a full control input that's put in and held or is it back to your definitions of singlets or doublets? Does that speed offer protection for a singlet and a doublet? I might even go so far as to say a triplet, if there is such a thing.

CAPT. MELODY: It's my belief, my understanding, that it is primarily intended to protect you from abrupt control inputs. Now, depending on which axis we're dealing with, there are structural concerns associated with the abruptness of the input, and if you leave that input in, then there are other concerns that come into account.

For example, in the case of the rudder. If you make an abrupt rudder input, there is some -- obviously, the structures people are concerned that the system can handle that input. It's going to be, you know, a very sudden change in load. It could involve torsion of the vertical fin.

But once that input is made, the issues now become less structural and more aerodynamic, because now that side force is going to generate side-slip, which is going to generate roll. And so I personally have never been aware of any concern about putting the rudder in abruptly.

But if you leave it in for any period of time, the airplane is going to start rolling very, very rapidly and now you have other issues, controllability issues, to be concerned about. Much like if you were to make a rapid longitudinal input, pull the column back into your lap, the only structural issue would be that initial input.

You know, once the control surface stabilizes; now it becomes an aerodynamic. You know, how long can you hold the column full aft. So, you know, in each of these, I believe in the directional axis and in the pitch axis, the initial input, the abruptness of that input is the maneuvering speed concern.

Once that occurs after that time, then it becomes an aerodynamic stability and control issue.

MR. IVEY: Turning back to the letter, you mentioned rudder was one issue and simulation was also an issue. What were the problems that seem to have been agreed upon with Airbus and Boeing Company regarding the simulations?

CAPT. MELODY: Well, I believe we were both aware of the limitations, you know, just from the fact that we, for the most part, have dedicated engineering simulators for doing engineering development work. And we wouldn't be at all comfortable using a training simulator for doing that type of work, because we know the aero models in the training simulators don't have the data to be valid not only beyond certain aerodynamic angles, primarily the data for high side-slip angles and high angles of attack, so the model doesn't have coefficients, aerodynamic stability coefficients, for angles outside that normal envelope.

But they also don't have data for high rates. So the aerodynamic equations of motion that get programmed into the simulator are derived from stability derivatives and coefficients that we obtain in flight tests, and then those coefficients are used in the equations of motion.

So once you get beyond the valid range of those coefficients, then the equations are invalid or not validated or -- so we are aware of that, you know, from an engineering point of view.

And then in some cases equally important is the rate of change of those derivatives. So not only can you put the simulator in a high side-slip angle and may not get the correct response but if the rate of change of side-slip is too high, that's also invalid or not valid data, at least.

And one good example of this is, you know, all of our simulator qualifications have a caveat that they are not valid post-stall, so we only get aircraft data up through the stall. And so anything the simulator does after you stall it is dependent upon the technique that was used in the equations, whether they just kept that value constant or whether they extrapolated in some linear fashion.

So we are just aware that if this simulation wasn't modeled in these areas where there needs to be more data, then outside those envelopes it's not really valid. And we were concerned that you could develop techniques that were inappropriate based on a simulator demonstration.

MR. IVEY: And based on that -- those remarks regarding simulation that you just explained and pretty much summarized in this letter, did the modeling change in the simulators for American?

CAPT. MELODY: I'm not prepared to answer that. I wouldn't know. I do know that in one particular airplane, the MD11, that the data package for the higher side-slip angles is available, but that wouldn't cover all the possible scenarios for unusual attitudes.

MR. IVEY: You're aware of the response by Captain Ewell back to Airbus and Boeing?

CAPT. MELODY: I'm aware that it exists. I've never seen it. I've heard it summarized, but I've never seen it.

MR. IVEY: Have you had discussions there at Boeing, or even with Airbus, concerning the response by Captain Ewell or have you ever heard anything about whether you felt like American was resistant to these changes or welcomed the changes, incorporated the changes, or if Captain VanderBurgh, who was promoting the program and creating and maintaining that program, accepted all or none of the changes?

CAPT. MELODY: I am not familiar with Captain Ewell's response, but I -- like I said, I had at that point in time discussed with Captain Vanderburgh because we were associates, both on the industry program and on his request for me to monitor his program, that I thought that they had come to the conclusion that in his words, he watered down his emphasis on the use of the rudder; that, you know, he agreed that controllability could be an issue if people, you know, used too much rudder and left it in too long.

MR. IVEY: There was an issue of -- I'll call it primary flight controls versus secondary flight controls, and let's just talk about trim for a moment in these recovery procedures. I think it was suggested in the letter that perhaps stabilizer trim could be used in aircraft recovery from upset.

Did American Airlines agree or disagree with that? Do you recall?

CAPT. MELODY: There was some difference of opinion with several of the airlines on that issue. As I mentioned earlier, I kind of didn't focus on that so much, because I didn't want my background to influence the credibility of the position each side was taking.

The issue had to do with an uncontrolled pitch-up right after takeoff, and there were several pilots in the group that endorsed the concept of immediately rolling the airplane. And there were several pilots in the group that thought the first thing they would do would be to try to trim the nose down.

Maybe it had been set at the wrong position. You know, maybe the calculations for the V speeds were incorrect. So there was some people that favored the idea of at least trying to trim the nose down, and some people that were concerned about trimming the airplane and getting too much nose-down trim. And --

MR. IVEY: The group -- forgive me for interrupting, but when you talk about the group, which group is this?

CAPT. MELODY: The committee. The industry committee. There were several airlines that rejected the idea of trimming. So as a compromise, in the training book what we've done is we've identified certain techniques that could help, not mandating that you do trim or that you can trim, but we've identified certain techniques that could help, depending on the aircraft configuration and so forth.

So that's how we basically reached a compromise on that.

MR. IVEY: Is Boeing, to your knowledge, aware of any other rudder anomalies that has happened in their fleet as a result of abrupt rudder inputs from autopilot, yaw damper, pilots, any other external forces? Do you all maintain a database on rudder anomalies?

CAPT. MELODY: Yes. There would be a database both in Seattle and in Long Beach, and any kind of database search would come up with any anomalies like that. I'm personally not aware of any rudder anomalies in the Long Beach products.

I am aware of there were some vertical fin problems back in the beginning days of the B-52 and there's still, I guess, some investigation as far as the 737, but that would be as far as I'm familiar.

MR. IVEY: Is there any limits -- and I'm speaking on the Boeing side for just a moment -- are there any limitations on rudder usage in any of their airplanes that you're aware of?

CAPT. MELODY: For the Seattle airplanes, I would prefer to have you ask that question of Captain Higgins. For the Long Beach airplanes, I believe we do have some notes advising people about use of coordinated rudder.

Certainly, in the upset recovery section of the manual it talks about using the rudder only as necessary to coordinate the recovery. But there is [no] warning or no caution per se that says, do not use full rudder, or, Do not use abrupt rudder.

You know, it's -- we wouldn't want to limit what could be a necessary control input, depending on some situation that we just haven't envisioned yet. You know, I would assume it's within the design requirement that we not allow the rudder to go to a position where it would be unsafe. I mean, we would have to either artificially limit that or aerodynamically limit that.

I mean, we just couldn't allow a deflection to occur that would be unsafe or go beyond some situation where it could be unsafe. Now, that's the limit of the deflection. Now given that, once you've deflected it, then we go back to the aerodynamic thing.

You have to be aware that we do impose bank limits -- or not limits per se. We define bank limits and pitch limits as saying, This is the normal envelope so you can put the full surface in once you get to this bank limit or pitch limit and then you should go no further.

MR. IVEY: I'd like to ask you this question either based upon knowledge with them -- the manufacturer of the McDonnell Douglas products, now Boeing products, or your background. Do you think it's a fair statement to make that perhaps pitch and roll have been the greatest emphasis in establishing limitations around airplane operations and the use of rudder in the yaw direction has been given a lighter look, if you will, than pitch and roll?

CAPT. MELODY: I would say that's fair. In the letter that we are discussing, that was my input on the section about the side-slip in the simulation, that side-slip is a situation that many, many pilots of big transport airplanes are really not familiar with and they're not really familiar with the considerations given side-slip.

It's normally not a situation that you encounter day-to-day flying. Side-slip is something that the big fins and the yaw dampers and everything pretty much are designed. A lot of modern airplanes now have aileron rudder interconnects or yaw compensators or -- so there's built into the flight control system in a lot of cases designs to help minimize side-slip.

Little airplane pilots -- now we're talking little utility category airplanes -- those pilots are very familiar with side-slip because you can feel it. In the bigger airplanes, you really can't even feel side-slip so much. You can get into a pretty good-sized slip angle and, in the case of our flight testing, and I'm pretty sure Airbus has got an equivalent, in a real flight test airplane we have a side-slip gauge, and even beyond that we have a string that we attach to the center of the wind screen.

And so you can see when you get into a ten or a 15-degree side-slip. But it's when you get into bigger side-slip angles that you can get the airplane to suddenly respond in a way that you have to be very, very alert to control, because a lot of pilots think that they roll the airplane with rudder and that's a fairly common term. Very misunderstood, in my opinion, because people talking about rolling the airplane with rudder.

Well, in the aerodynamic world, the airplane rolls due to rudder in the opposite direction of the rudder you put in. So if you put in right rudder, the roll due to the rudder is to the left. It's the roll due to side-slip that's to the right and, of course, that's the more powerful coefficient.

So when people talk about rolling with the rudder, they're not really aware that the roll they're really talking about is roll to the side-slip, not roll to the rudder. Roll to the rudder is in the other direction. I mean, it's very small compared to roll due to side-slip.

So the roll due to side-slip is very much driven by the sweep in the wing, and so to go from a straight wing airplane to a high-swept so the -- generally speaking, the higher your cruise mach the more wing-sweep you have, the more roll you're going to get due to side-slip.

And I think it's a concept that people need to really understand, because if you were, as I was talking earlier with this thrust reversal deployment, and you were to put in the rudder so if, for example, if you deploy the Number 1 reverser and you roll to the left and it's 60 degrees, you push in full or even more than half right rudder and wait until the airplane rolls the wings level and then you release the rudder, the airplane is not going to stop at wing's level.

You know, just by the rolling inertia due to the side-slip, the airplane could easily roll to a very large bank angle in the opposite direction. Then you get into the habit of kicking the left rudder and pretty soon you get into a Dutch roll.

So that's why I think people should probably be more aware of side-slip and the impact that side-slip has on the rolling of the airplane.

MR. IVEY: Is it your impression that looking at that original video and perhaps the actual presentation by Captain VanderBurgh that there was increased emphasis on rudder only or not?

CAPT. MELODY: I believe in the beginning it was my opinion that there was too much emphasis on the use of rudder. Here again, that was my opinion, and there were lots of opinions out there at the time. We didn't get complete agreement from United Airlines about their training program, and the only thing that I think there was agreement was between the manufacturers of people that had actually been in inverted attitudes about what the impact of using the rudder is, what it could be.

And so I would hate to portray this as a one-on-one, but in my personal opinion I was concerned that people didn't understand the impact of using the rudder and getting into big side-slips. In some airplanes, it's actually possible to get into the situation known as a rudder lock.

The aerodynamic shape of the air foil has what's known as a zero lift line, so if you're familiar with the relationship between lift and angle of attack, for a cambered surface, even at zero angle of attack, there is some lift.

So the point at which the angle of attack -- in this case a negative angle of attack where there's no lift -- is called a zero lift point, and that generates a line through the wing. If you get the airfoil pointed in the direction to the other side of that, then you're actually generating negative lift.

And there are some airplane models where you can put the rudder in and get into such a big side-slip angle that the air load is coming from the negative side of the wing and it actually creates a low-pressure area on the wrong side of the fin and it will suck the tail over.

So if you have a reversible or a tab-driven surface, you can get the airplane into a side-slip that will suck the rudder over. And so that was another concern that, you know, you want to make sure people understand side-slip and what the impact is.

MR. IVEY: And one last question about rudder reversals in these dynamic maneuvers. I think I quoted this earlier regarding using too much rudder in a recovery attempt to lead the structural loads that exceed the design strength of the fin.

That statement obviously, in my view, came from research and study and data that's out there in the manufacturing arena. What tests were done after having looked at the upset recovery program to put that cautionary statement in?

CAPT. MELODY: I don't know if any tests were done. I mentioned earlier that the issue of rudder reversals, in my experience in Long Beach in six 15 years, is that has never been an issue. I think it's more of an issue in Seattle because of some of the earlier B-52 problems.

I know the theory, and the theory of course is that if you were to deflect the rudder, let's say, put the rudder trailing edge right, that generates a load to the left on the combined fin and rudder and then the airplane will stabilize at a side-slip angle to where the force due to side-slip and the force due to the deflected rudder are now balanced.

So now you go to an equilibrium point where there's no unbalanced side force. Now, if you suddenly reverse the rudder, now you have the side force due to the side-slip which had balanced the right rudder deflection, but now you suddenly reverse the rudder, now you have the force due to side-slip and the force due to the deflected rudder in the same direction.

So you've gone from a zero force -- no unbalanced side force -- to a double force, so you've essentially gone from zero to 2X at the size of the force. So depending on how much deflection there was in one direction and how much in the other, there could be a significant delta force.

And that's certainly the concept we understand. Whether it's ever been an issue, I've never heard of any issue or concern with a rudder reversal in the products we work on in Long Beach. Now, I think Captain Higgins might have some more experience in that area.

MR. IVEY: I did think of one more question, then I'll go around the room. You'd mentioned that pilots are not often aware of how much side-slip the airplane may be, and then you even mentioned a number, ten to 15 degrees, which to me sounds quite significant.

Give me a sense of how much side-slip an airplane could be in without a pilot being aware, in your experience, without a pilot being aware of how much, if any, side-slip that they're encountering.

CAPT. MELODY: I would say that typically, once you get beyond five degrees, you should be concerned or aware. Where it's most likely to be an issue, for example, is on an engine-out takeoff. You may recall there was a near-incident involving a 747, San Francisco.

A pilot lost an engine and continued the climb out, was unaware of the fact that he was in a side-slip, and because of that, his performance was degraded to the point where he nearly didn't clear that hill to the west of SFO.

So there was a case where side-slip could have had a critical impact because, you know, in that scenario the pilot might be more concerned to just get the wings level, and if the wings are level he's not thinking about getting the ball centered so he's flying around in a side-slip like that.

And once you get beyond five degrees, that could have an impact on your performance capability with an engine out heavy weight. So I -- you know, I may be just a big advocate of, you know, paying attention to side-slip.

In my opinion, angle of attack can't really hurt, can't really get you in a lot of trouble, you know. If you fly the airplane properly, angle of attack isn't going to get you in a lot of trouble. But too much side-slip, you know, could get you into attitudes that you're not familiar with.

But we had to do some landings in the development of both the MD11 and the 717 where we had to inject malfunctions into the autoland system, and one of the malfunctions was a malfunction in the rudder during an autoland at very low altitude, say, below 100 feet.

And we had to let the airplane stay coupled. Any -- we cannot -- in the certification, we can't take credit for anything changing below 100 feet, so with that rudder input the airplane landed in about a five-degree crab and at that point, five degrees is considerably noticeable to touch down in a five-degree crab.

But when you're flying, it's not that noticeable. You know, generally speaking, with an engine out condition, that's when pilots may not pick up on the fact that they're flying around in a side-slip.

MR. IVEY: Thank you, Captain Melody.

Let's go off the record for a moment.

(Whereupon, a short recess was taken.)

MR. IVEY: Back on the record.

Captain Melody, I'd like to go around the room now and see if anyone has any additional follow-up questions, and I'll start over here on my left with Bart Elias, NTSB.

DR. ELIAS: Thank you for taking the time to be with [us] this morning and talk with us, and [I've] just got a few follow-up questions and some other issues that I'd like to discuss with you.

First off, you mentioned that when you were first asked to review the Double-AMP program and participate in the industry committee that you were specifically focused on one given area. I don't recall if you mentioned what that area was.

CAPT. MELODY: Well, the original contact with Captain VanderBurgh had to do with angle of attack and the usefulness of angle of attack and putting angle of attack indicators in the cockpits of the new airplanes. I think the general consensus is -- was -- that angle of attack could be very useful in recovering from unusual attitudes, especially nose high or nose low.

They could be an indication of an optimal recovery G. There was some difference of opinion about the usefulness of angle of attack for cruise, but I am personally aware that there are airplanes that have angle of attack systems calibrated to show best long-range cruise. And that's an aerodynamic unknown.

So that's how we kind of got started basically was discussing the value of angle of attack, especially in airplanes that don't have a full-time PLI. Some of the new airplanes have full-time PLI and in effect, that's an angle of attack-based information that is useful for one thing, and that would be to get to stick shaker and stay there.

So that was our initial subject of interest and proceeded on, the more we talked to basically reinforce what Captain Ivey is talking about, that people don't understand side-slip and that's the real issue, not angle of attack.

I mean, most airplanes today are designed to stall with -- even stall. Now, beyond stick shaker but even stall with acceptable characteristics, so even if you get an airplane into a stall, as long as you keep it coordinated it's just going to recover.

So it's the whole idea of coordination and so our subsequent discussions started focusing in on side-slip as being really more of an issue that people need to be aware of, especially during an unusual attitude recovery.

DR. ELIAS: So you really got started in looking in terms of the angle of attack. And you mentioned this program that American Airlines had in place in terms of retrofitting airplanes with angle of attack indicators. Have you continued to follow that program?

CAPT. MELODY: I don't know if there's any attempt to retrofit. I think what American has done is part of their new 737 fleet. The new glass cockpits will have an angle of attack display on the PFD. I'm personally not involved in that other than to be aware than on the 737 fleet, it will come with a little angle of attack gauge. Not a separate gauge, but as part of the display, the CRT or LCD display.

DR. ELIAS: Is that something specific that American Airlines has asked for that's not in other airlines' airplanes?

CAPT. MELODY: Delta has also asked for it.

DR. ELIAS: You had mentioned that you first participated in this review of the Double-AMP program early on and then you mentioned that you had attended subsequently and that you had attended one last time. Could you give me sort of a sense of how many times you've attended the courses and rough time frames as to when you've attended?

CAPT. MELODY: I think including the final course, I attended three total. And the time frame, probably starting in 1996. So I had been aware of this American Airline program probably for six or eight months before I got involved in the industry program.

So they -- there was a lot of activity in the industry before the industry program actually got started.

DR. ELIAS: Now, when you say the final course, how recent was that?

CAPT. MELODY: Well, it was the course that led to this August 1997 letter.

DR. ELIAS: Okay. So basically the timeframe was from 1996 to 1997?

CAPT. MELODY: Probably.

DR. ELIAS: And you haven't observed --

CAPT. MELODY: No.

DR. ELIAS: -- any of the training since?

CAPT. MELODY: No.

DR. ELIAS: When you first went to the training -- I guess that would be back in 1996 -- did you feel that the information to be presented about side-slip angle was either inappropriate or lacking in that training program?

CAPT. MELODY: I guess my opinion was that there was not a lot of information about side-slip. There was a lot of information about angle of attack and stalls and, you know, getting into a stall, getting out of a stall. There wasn't a lot of information about side-slip, no.

It wasn't my course to develop, you know. It was -- Warren wanted my opinion about his course, and if that's the course he wants to develop, that's the feedback I gave him. But I personally think that there's probably not enough training about side-slip and the impact of side-slip.

But if his course wasn't designed to teach side-slip, you know, it's not up to me to tell him he needs to teach side-slip.

DR. ELIAS: Now, as you went to the subsequent courses, did you see more information about side-slip being put into the program?

CAPT. MELODY: Perhaps not more information about side-slip but less emphasis on the use of rudder. So it's maybe a roundabout, back door way to address the issue of not getting into big side-slip by not using as much rudder.

DR. ELIAS: On the topic of rudder, are you familiar with the concept of top rudder?

CAPT. MELODY: Yes.

DR. ELIAS: Would you briefly describe what top rudder means.

CAPT. MELODY: Primarily a term that acrobatic or aerobatic pilots would be used to, and basically, if you're approaching 90 degrees at bank, then top rudder is the rudder that would bring the nose up. So the airplane -- when the airplane's on its side, basically top rudder is the rudder in the direction that's on top. Bottom rudder is in the direction that's on the bottom.

DR. ELIAS: And do you think the concept of using top rudder as an unusual attitude recovery technique for line flying and transport category airplanes has any meaningful purpose?

CAPT. MELODY: No. I understand the concept. You could argue the theory, but the roll rates attainable in transport airplanes, especially transport airplanes with spoilers, wouldn't require the use of top rudder to keep the nose up because the roll rate would be so fast.

But what I would be concerned about is if you did use top rudder, especially if you use too much top rudder, that as you roll out, if you don't take that rudder out, you know, in a very coordinated way that you're going to wind up generating side-slip that as you roll wings level, it'll be a very temporary situation and you're just going to flip right over.

So I would -- the problem with top rudder is in theory it works, and if you're an aerobatic pilot, you probably have learned how to do that. But for somebody that's never done it in their career to suddenly do that and not take it out soon enough would probably put you into an equally bad situation.

So personally, I don't recommend it, not a big airplane.

DR. ELIAS: Okay. Given your test pilot record, I think you'd be an excellent person to answer my next question. I'd like to talk a little bit about how rudder system feel -- feel force and travel are evaluated during development and certification flight testing, if you can explain a little bit about the process of assessing that.

CAPT. MELODY: This is an area that really varies from airplane to airplane. There are various ways in some airplanes to limit the rudder. It can be limited by a bellows and pressure. It can be limited merely as a function of their speed

You know, so depending on the sophistication of the flight control computer, there are various ways to limit the rudder. Some rudders need limiting.

They're hinge-moment limited. So even in the fleets out of Long Beach, the twin jet fleets have rudder limiters and the Trijet fleets don't need them.

As far as the feel, the feel has certain certification requirements that enable the fifth percentile pilot to be able to maneuver the rudder to full deflection. The amount of deflection is determined by the balance of yawing moments and the tail volume, the moment arm to the tail.

So there are a lot of aerodynamic concerns. Probably in the case of the rudder, the biggest driver for the size of the rudder and the amount of deflection of the rudder is for an engine-out takeoff. So that drives a lot of other considerations and it drives the control force, because the fifth percentile pilot needs to be able to deflect a rudder fully in that scenario of an engine-out takeoff.

Does that answer your question?

DR. ELIAS: Yes, it does. Just a little bit of follow-up to that. Are there any guidelines available for assessing the proportionality between yoke and rudder forces? So, for example, what we're talking about here is if it takes me a certain effort to move the control wheel to a full deflection, it also -- should there be some sort of correlation between that and the rudder force to move the rudder to full deflection?

CAPT. MELODY: What you're talking about is control harmony, and generally speaking, we do try to get control harmony between lateral forces and longitudinal forces. The reason is you're using the same two arms for both. There are some ergonomic differences between push and pull, but when it comes to the rudder, generally speaking, legs are much stronger than arms, and so the rudder forces in all the airplanes I'm familiar with are much higher.

I mean, I think the upper limit is 175 pounds on the rudder, and that's quite a bit more than people normally could pull or push with. So there is control harmony in the wheel and the yoke in our design, and there is not control harmony between the wheel and the rudder pedals.

DR. ELIAS: Are there any either certification requirements or guidelines for control harmony?

CAPT. MELODY: There are some, but they're pretty qualitative. Pretty qualitative. But, you know, the overall handling qualities probably would be objectionable if there was too much lack of control harmony in the wheel and the yoke. You know, just doing a -- trying to do a coordinated turn. You know, you can't have one pound of force in one axis and five pounds or ten pounds in the other. It would cause the airplane to bobble, so any kind of control force change.

DR. ELIAS: And I just want to follow up. I know we talked at length about rudder doublets. But in terms of doing them for flight test maneuvering, in terms of the rates and amplitudes used, the rates -- you pretty much indicated that you just try to do it as quickly as possible to get as close to a step input as you can. Is that correct?

CAPT. MELODY: That's correct.

DR. ELIAS: Now, how about in terms of the amplitude? Is that something you do buildup on or how do you determine what amplitudes to use to excite the rudder?

CAPT. MELODY: Generally speaking, the engineers are looking for some data that they can use to analyze the dynamics. So one parameter you may be familiar with is known as the roll to side-slip ratio or theta to beta ratio. So if you're doing this with a rudder doublet, you need to have amplitude and a time that's sufficient for them to generate enough side-slip and roll.

So the engineers will give you some guidance and then once you do the first one, they may tell you to leave it in a little longer and make it a little sharper, you know. The rudder input may have been too slow, so they may want the rudder input a little crisper.

They may want you to go a little further, because they're looking to generate roll rate and side-slip, so they will generally ask you to do it several times and then tell you whether you need to leave it in longer or not so long.

If you put in too much rudder and leave it too long, you're liable to get a lot more roll and side-slip than they want, so they'll let you know.

DR. ELIAS: So is it fair to say that the primary reason for doing doublets is more to look at yaw stability rather than looking at or evaluating load limits?

CAPT. MELODY: Yes. In my experience, a doublet is merely a technique to induce high frequency. In other words, you want to get the highest frequency spectrum that you can in the flight control system to make sure that you can identify any deficiencies that could be induced with high frequency inputs.

So as far as I'm concerned, that kind of input is really more of a stability and control technique to get stability and control data and not to get structural data.

DR. ELIAS: And I know we've talked at length about the singlet and doublet. Are there any other flight test requirements or flight test procedures for looking at yaw stability and side-slip load limits?

CAPT. MELODY: Well, we do Dutch roll testing to look at yaw stability. As far as side force load limits, the only test I'm familiar with is when we do the full rudder deflection that we not exceed certain angles.

In other words, in the case of the MD11, the fin-rudder combination is hinge-moment limited, and so the structural engineers predict how much rudder travel we'll get, and then we don't want to exceed that. And then they will analyze the loads and make sure that that's acceptable.

You know, from a limit load function basis, they'll determine whether the load on the tail at the hinge-moment limit is acceptable in terms of not exceeding a limit load percentage.

DR. ELIAS: And that's for a single direction deflection?

CAPT. MELODY: That's correct.

DR. ELIAS: Is that the step input or is it a sinusoidal?

CAPT. MELODY: It's a very, very ramp input. For that particular test we're not trying to induce any dynamic data. We're just trying to make sure that the rudder is hinge-moment limited at the point where the engineer said it would be and that the load on the fin at that point doesn't exceed the structural limit load by more than -- I think the safety factor is 1.5.

So we have to make sure the load on the tail at that point doesn't exceed the limit load by more than that, by -- the design load by more than that. So that test is not very dynamic. It's done fairly slowly.

DR. ELIAS: Thank you. That's all the questions I have.

MR. IVEY: Captain Arondel, BEA.

CAPT. ARONDEL: Yes.

Captain Melody, you told us that the Long Beach produced aircraft you give the recommendations on the use of rudder limits. Will you tell us on which document you give those recommendations?

CAPT. MELODY: In the -- what we call the flight crew operating manual.

CAPT. ARONDEL: You're talking the flight manual. It's on the flight operating manual?

CAPT. MELODY: That's correct. Yes.

CAPT. ARONDEL: And could you give us some more information about those recommendations?

CAPT. MELODY: Basically, the words in our books now are the same as the words in the Boeing Seattle books which are derived from the industry training manual that in the area of rudder application, we recommend using the rudder to coordinate the recovery.

And in our mind, what that means is trying to keep the ball centered. That's the closest thing you have to a display of side-slip. It's actually the side force.

CAPT. ARONDEL: Thank you, Captain.

CAPT. ARONDEL: Thank you.

MR. IVEY: Captain Young, American Airlines.

CAPT. YOUNG: David talked about the letter quite a bit that was generated after the presentation there in '97. Did you have concerns during the presentation or -- because obviously, you were an author to the letter -- or was it generated after the presentation with conversations with some of your colleagues there?

CAPT. MELODY: No. I think it'd be fair to say that the first time I went to Warren's presentation and Warren and I had developed a pretty good personal relationship so, you know, I felt that I could give him my opinion not only about his course but about other things that I thought would be important.

And so over a period of maybe close to a year we, in addition to this other committee, he and I had talked about that and the use of rudder, and my point was one of controllability. You know, I just was concerned that, you know, if somebody in a situation has never been into something that you've never validated that he just needed to be aware from situations that we've been in.

You know, I've personally been upside down in an MD11 and in an MD80 that the use of rudder during the recovery is not something that I would recommend from a controllability point of view.

CAPT. YOUNG: Okay. Do you think the letter would have been generated from that group had Cecil not solicited -- it sounds like Cecil went out of his way to solicit input from the people that were there at the meeting or at least maybe certainly specific folks like yourself and some of the other group.

CAPT. MELODY: I don't recall the exact details of why Cecil did that, but it may be when you talk to Captain  Higgins -- Captain Higgins had written a letter earlier before that letter.

CAPT. YOUNG: Okay.

CAPT. MELODY: And it so it may be that that warranted Captain Ewell to maybe seek more feedback. I'm not really sure how it came about.

CAPT. YOUNG: Okay. You said it was generated in Seattle -- the letter. So was that generated by Captain Higgins then primarily and then you saw a copy of it or --

CAPT. MELODY: That's correct.

CAPT. YOUNG: -- was able to stamp your approval on it?

CAPT. MELODY: That's correct. Captain Higgins wrote it and sent it the three other -- we all -- like I'd pointed out, my primary response to that was the controllability issue and the simulator issue.

CAPT. YOUNG: Right. You mentioned that you never saw the response letter back from Captain Ewell --

CAPT. MELODY: That's correct.

CAPT. YOUNG: -- to that letter?

CAPT. MELODY: That's correct.

CAPT. YOUNG: But any idea of the others? I guess the response letter must have come back to Captain Higgins, I suppose? You said it was discussed or generalized or something, I can't remember exactly how you said it.

CAPT. MELODY: Yes. It went back to Captain Higgins, you know, to be -- it was a vice president to vice president communication at that point.

CAPT. YOUNG: I understand. Did you get the impression that obviously, you had concern over the rudder and this letter indicates that. Did you get the indication that Warren was indifferent to that concept at all or was he kind of agreeable or -- and toned down the presentation, if you will, about rudder usage as time went on or -- from the recommendations from you guys?

CAPT. MELODY: Warren told me that he had changed his view about the use of the rudder and that he would include the word “coordinated rudder” in the recovery program. And I'm not sure that -- in his presentation he didn't even mention that; that it was a fundamental or philosophical change in some of his earlier concepts.

CAPT. YOUNG: Okay. You mentioned earlier that some of your experience with rudder usage in the airplane and things like that and the misconception perhaps about the aileron usage, that ailerons could stop high roll rates but also could generate high roll rates and things like that.

I guess the best way to phrase is how do you advise the user -- the end user, the pilots and the airlines -- about that concept?

CAPT. MELODY: Well, I think the effectiveness of any of control surfaces obviously is affected by air speed, pressure, how much deflection you use. It's fair to say that obviously, if you're real slow, the ailerons aren't going to be nearly as effective as if you're going at .84 mach.

What we recommend is that in any rolling recovery that the primary control surface is the ailerons, the spoilers. So you should use as much aileron as necessary, and I don't know personally in training programs if line pilots are taught that if you need to, you need to use all the aileron you have as quickly as you can.

And then if that is insufficient, because maybe you don't have enough air speed, then you can slowly put in rudder as necessary to finish the recovery. What we didn't want is to have people just pushing in the rudder, because from simulator experience or some other hangar-talk flying, that they know you can roll the airplane if you push harder at it.

But what they may not know is that there's a lag depending on how much wing sweep you have, but then when it finally does kick in, the roll rate due to rudder, due to side-slip, can be pretty eye-watering.

CAPT. YOUNG: It sounds like most of the issues that we're talking about though concerns the airplane in a high alpha or a high angle of attack situation.

CAPT. MELODY: Well, it could be, but one of the things that pilots may not have ever experienced is high alpha inverted. So the issue of that angle of attack is really not in any way related to pitch attitude, and you can be at either a high or a low --

CAPT. YOUNG: I just, I guess, as you kind of -- I don't know if McDonnell Douglas, I guess, at the time, if you guys proceduralized the concept of, Use all the aileron; when you run out of that kind of get into the rudder to help you roll; if it was more of a formal program or kind of an informal?

CAPT. MELODY: No. As far as I know, prior to the industry program when we agreed to these techniques, there was no formal training program at McDonnell Douglas.

CAPT. YOUNG: Have you ever seen an aircraft or heard of an aircraft or been involved with an aircraft, I guess, that was ever, if you will, stuck in wake turbulence or wing tip vortices for any length of time?

CAPT. MELODY: Not for any length of time. I've seen certain FAA videos where they've done wing vortex testing in New Jersey. I've seen some flybys, you know, with true smoke at the end of a runway where they just demonstrate the vortex generating.

One video I've seen where a smaller airplane, Learjet-type airplane, flies intentionally through the wake of a bigger airplane but sustained? No, I've never seen that.

CAPT. YOUNG: Okay. You were talking about and -- excuse me, but you were talking about the force of -- once you get a rudder stabilized over there and then that's equalized forces and then you release it that then you get twice the amount of force?

CAPT. MELODY: If you go in the other direction.

CAPT. YOUNG: If you go in the other direction. I mean, that almost sounds like the certification process; to stabilize it and then neutralize it rapidly. I mean, other than going to the opposite side?

CAPT. MELODY: Yes, as far as I know, we have no requirement to do a rudder reversal in certification.

CAPT. YOUNG: Okay. You talked about with Bart's questions there that the engineers would tell you if you needed to leave it in longer, do a faster input, the rudder faster or whatever. Is that just communication through the radio or as they look at some instruments on the -- as in a ground station or is it engineers in the airplane?

CAPT. MELODY: If it's a stability and control test, trying to get Dutch roll data or trying to get roll rate data, the engineers would probably be on board. During the initial flutter testing, which is one of the very, very first things we do, there are different ways to excite the control surface.

And sometimes we need to do that through a doublet, so in the MD11 and in the 717 we manually induced the attempt to generate flutter. The excitation was manually, and it was done by small doublets. And of course, the first time you've ever gone on out to the design limit of the airplane, your initial doublet is probably usually too small.

So then they -- those would be from the ground. They would work you up a little.

CAPT. YOUNG: All right. When you do those type maneuvers on big airplanes or if you do any type of in particular rudder reversals or whatever, does -- well, I guess at the time it was probably would have been McDonnell Douglas, or do you know -- Boeing now, do they wire the airplane with some strain gauges and some other things that they use to stay within a window?

CAPT. MELODY: Yes. The airplane is really pretty heavily wired, instrumented -- pretty heavily instrumented. So they will -- there are carefully coordinated communications once we get ready to do a maneuver about when to break up, how to break it up.

So they're real time monitoring the loads. You know, they have strain gauges and they're monitoring the angles and they're monitoring whether the surface is damping out. So that's the biggest concern to us. Once we excite the surface, what they're looking to make sure that the surface damped.

And so the guy on the ground who's watching that particular parameter, as soon as we finish the doublet, he immediately start -- in our case, he immediately starts talking, Damping, damping, damping. Fortunately, I've never heard him say, Not damping. But that's what we're listening for is at the surface.

It's not a structural test. It's a damping. We want to make sure that it doesn't go unstable.

CAPT. YOUNG: Okay. And this will be my last question. In the airplanes that you're associated with, the yaw dampers for a feedback system from the rudder, whether it be rudder limiter, yaw damper, or autopilot inputs, the feedback loop, I'm sure, is taken off of some indicator from the rudder itself at some point in time.

I guess my real question is in the airplanes that you're associated with, is that feedback from the rudder in a zero axis of the sensor for the rudder based on the aircraft, longitudinal axis, or vertical stab, or how is that gauge or that sensor zeroed? You know what I'm asking; I may not be asking it very well.

CAPT. MELODY: How is the rudder zero position determined?

CAPT. YOUNG: Not the rudder but the sensor for the zero position, because -- is it off of the airplane or is it off the vertical stab?

CAPT. MELODY: I'm not sure I really understand the question.

CAPT. YOUNG: I'm not asking it very well.

CAPT. MELODY: Are you talking about the signal that determines whether rudder input is needed?

CAPT. YOUNG: Correct.

CAPT. MELODY: Those would all be determined by different functions. In other words, generally speaking, whether the autopilot is engaged or not, the rudder may be in what we call a parallel mode, so the rudder is being commanded to do something.

In the non-parallel mode the rudder is -- even with the autopilot engaged, the rudder is really just a yaw damper. So if there is an indication of side-slip -- so even though there is no display of side-slip in the cockpit, the flight control computers get side-slipped. They calculate it from side force.

So the flight control computer can determine when there's a side-slip, and then it sends a command to the rudder to get rid of that. So that's how yaw, yaw damper works in our airplanes. In other airplanes it could work differently, but in our airplanes --

Now, so in the parallel mode, for example, if you are doing a takeoff and you lose an engine, the rudder gets an input. The rudder pedals will move, and the rudder is being commanded now to enable the airplane to stay wing's level with minimum side-slip. So that's an actual command to do that.

As soon as you come out of takeoff, you come out of parallel rudder. The rudder pedals will zero out, essentially, and now the rudder becomes a yaw damper without any pedal movement. That's in our -- the Long Beach designs. I'm sure the newer fly-by-wire airplanes could do that completely different.

CAPT. YOUNG: Thanks for coming in today.

CAPT. MELODY: Okay. Sure.

MR. IVEY: Captain Jim Goachee, FAA.

MR. GOACHEE: Thank you.

Tom, forgive me now if I'm going to go back and forth, because every time they ask all these great questions I've put it in between. I haven't the August '97 letter, but certainly hearing Dave -- but I have some tapes that were made available to me that were from Captain VanderBurgh's presentation.

My question is that on each one of these, they all seem to be stated videotaped some time in April '97. So was this first meeting that you had with the presentation here? Do you know what timeframe that was?

CAPT. MELODY: I would have to guess that it was some time in 1996.

MR. GOACHEE: Okay. And do you know if at that presentation, did American Airlines video that presentation?

CAPT. MELODY: I can't say for sure. The first presentation I went to, I think, was actually down in Orange County in one of the hotels in Orange County, and they had crew members from Los Angeles and San Diego.

And I can't honestly say whether I know it was videotaped. It was an eight-hour course. Takes all day.

MR. GOACHEE: Do you know if every time Captain VanderBurgh would update the video, would he make you or any of the other individuals from Boeing aware of what he was doing as far as for the Advanced Maneuvering Program?

CAPT. MELODY: No. In fact, I was not aware that the presentation had been put into video programs. I only became aware of that couple of months ago.

MR. GOACHEE: Did you know Captain VanderBurgh in the Air Force?

CAPT. MELODY: No.

MR. GOACHEE: So your first acquaintance with him was during this initial phase of him developing the AAMP program?

CAPT. MELODY: That's correct.

MR. GOACHEE: Have you ever in your work at mostly Long Beach, and I know now your position is director of operations, but have you ever had a chance to instruct or observe instruction to regular line pilots in this Advanced Maneuvering Program?

CAPT. MELODY: No. I've never instructed line pilots in my tenure at -- in Long Beach. I've always been a test pilot and I was the chief test pilot for about eight years. So I've never actually instructed but I have observed during the development of various programs.

When we developed pitch rate damper for the MD11, we had line pilots come in and, you know, I observed. And when we did the thrust reverser deployment, I just observed. I've never instructed.

MR. GOACHEE: Did you ever observe though any instruction giving in Advanced Aircraft Maneuvering Program? I know you did the one on thrust reversal, but did you ever get to observe -- have you ever heard -- I'm sure you're in contact with a lot of the check airmen from, I guess, Boeing flight safety out there at Long Beach?

CAPT. MELODY: Uh-huh.

MR. GOACHEE: And they do instruction out there for many different carriers. And have you ever had discussions with them or have they ever come to you and say, You know, Captain Melody, when we do this Advanced Maneuvering Program, we're finding that the line pilots really don't know what's going on.

It's either because the information in their manuals is not inclusive enough or we're just finding they just lack the basic airmanship to do some of these upset recovery maneuvers. Has anybody ever mentioned to you about any of that training?

CAPT. MELODY: The first I became aware that these AAMP scenarios had been videoed, and I'm still not -- I don't know how many videotapes there are, but probably two months ago I became aware that there was a video on upset recovery from unusual attitudes.

I don't know how old it is. I don't know whether American still uses it or not, but I became aware that there was a video and our FSB people wanted to know if they could use that video in our training course. So the relationship we have is we're the manufacturer. It's our training course. They merely conduct the training.

And we told them no, that we don't want to get into recommending the use of rudder for recovery for controllability concerns. So that's the only exposure I've had. I told them that they could not use any of those training videos in our course.

MR. GOACHEE: But are you referring to American Airlines' AAMP program?

CAPT. MELODY: Yes.

MR. GOACHEE: All right. Does Boeing flight safety, including McDonnell Douglas out in Long Beach, when they're teaching -- I assume that you teach Advanced Maneuvering Program?

CAPT. MELODY: That's correct.

MR. GOACHEE: Okay. In your program, does it differ from American's in any way?

CAPT. MELODY: I really couldn't say because I am, like I said, since this period in 1997, I haven't really been involved with American's training program. I am not familiar with it at all. I was surprised a couple of weeks ago to see that tape, but I have no idea if that tape is currently being used or what that tape was.

MR. GOACHEE: Okay. And I know we're talking different aircraft, but I'm just trying to get a concept of as far as training goes, whether it's -- what other airplane, because it appears when you've put the aerodynamics of jet upsets, it was between Airbus and Boeing you agreed, and you said it was just a cover letter. Is that correct?

CAPT. MELODY: That's correct.

MR. GOACHEE: So if you're teaching, do you know how long -- I mean, in other words, I take it Boeing flight safety does different airline training out there at Long Beach for some -- especially for some of the foreign carriers?

CAPT. MELODY: That's correct.

MR. GOACHEE: Do they do any of the U.S. carriers for initial type rating you're aware of?

CAPT. MELODY: They do some of the initial training, but the initial training is really Boeing's responsibility.

MR. GOACHEE: Okay.

CAPT. MELODY: So for a new carrier, we would make sure that we train the initial cadre, we run the first handful of crews through our program, our instructors, their devices. Then they get involved.

MR. GOACHEE: So let's say that I am -- you know, I have a new company and I come to Long Beach and say, I'd like you to teach my pilots. We don't have a manual but we're going to use your training program. Are you aware of how much time is allotted for ground school only, now, reference the Advanced Aircraft Maneuvering Program as far as instruction?

CAPT. MELODY: No, I'm not.

MR. GOACHEE: Are you aware of how much time or what phase of the simulator training is allocated to the Advanced Aircraft Maneuvering Program?

CAPT. MELODY: I couldn't say for sure because I think the basic concept is train to proficiency. So there may be some crews that can get through the exercise the first time and maybe some crews that might need to do it more than once.

MR. GOACHEE: When a program is submitted to the FAA or when you develop a new program, are you involved in that at all or is it somebody else? Do you have any responsibility of looking at a program?

CAPT. MELODY: Well, the -- I have a training manager whose specific responsibility is to do that. So I don't get involved in the nitty-gritty details. I'm just aware of the fact that a program is being developed. Some customers, as you pointed out, take our training program and our procedures directly.

Some customers will come in, in advance and get a training program tailored to what they want. Then that has to be approved by their POI. So there is a lot that goes on in developing a program for a new operator. I don't personally get involved in the details.

You know, I have -- like I said, I have a training manager and a whole training department that does that.

MR. GOACHEE: Okay. You know -- and I know you did an excellent job explaining the maximum maneuvering speed and putting the input in but then cautioning about leaving it in too long or something to get their response, but -- and let's go back, because you've been around long before this Advanced Maneuvering Program and what was available to the pilot, whether it was from Airbus, whether it was from Boeing, or from Douglas.

As far as I know, my experience, and when I talk to pilots out there, and you ask them, Gee, is there a time when you can give a full deflection in any of the controls, and do you think it will the aircraft? And the response is that I always receive is that it will not damage the airplane. Would you agree with that?

CAPT. MELODY: Yes. I would say that's true.

MR. GOACHEE: Okay. And -- but then you went on to say, because now if somebody happens to leave it in a little too much or now you start to get different parameters coming in, it could cause other problems. Is that a correct statement?

CAPT. MELODY: That's true.

MR. GOACHEE: But prior to this -- these AAMP programs being started, I'd never noticed anything about this in a flight manual that I've looked at, cautioning the pilots. And you say now that the MD11, I think you said, it might be even the 717, that you caution the pilots about that now or amplify on the caution reference the rudder and leaving it in too much. Is that a fair statement?

CAPT. MELODY: That's true.

MR. GOACHEE: But that was only because of the last four or five years?

CAPT. MELODY: That's correct.

MR. GOACHEE: Okay. And Boeing does the same thing for all their aircraft?

CAPT. MELODY: That's correct.

MR. GOACHEE: I know you talked about earlier about when you first had this presentation from Captain VanderBurgh and that there were other airlines involved and, you know, there was 200 or so people there from different airlines or whatever. Do you know if the FAA was ever there?

CAPT. MELODY: In the final presentation, the one that led to the development of this letter, the FAA was there. Captain Imrich was there. In the first and second presentations that I went, I believe it was just American -- American crews and Warren invited me specifically.

So I don't know if there were any other non-American people the first two times I went.

MR. GOACHEE: Okay. Do you know in reference just to the presentation and the letter of '97, we'll say, do you know if there was any discussion from the Boeing side or your side at the time and we'll say Long Beach, even though I think you told me -- I mean, we know it's one now, but was there any discussion from Long Beach side or Boeing side.

Did anybody talk to the aircraft evaluation group out in Seattle or any of the FAA groups up there regarding this training and the Advanced Maneuvering Program?

CAPT. MELODY: From my perspective regarding the American program, I never talked with anybody in Seattle about my experience in that program. However, at the time that that program was going through these three iterations, I was also working with Boeing and with the other airlines on the industry paper, so there was overlap.

But the two developments were a little bit separate. Now, over and above what the industry came up with, which in some cases were compromises to take into account that there could be different airplane configurations, there could be different scenarios, so there is no cookie-cutter, you always do this, you know.

The one thing we did try to stress in that industry program was to analyze the situation and that, you know, it's not always going to be the same response every time. Now, independent of that, Warren at American could take the flexibility from some of those compromises and develop the Advanced Maneuvering Program.

I discussed that program with Warren but not directly with anybody else.

MR. GOACHEE: Okay. I think you talked about when you had that first meeting, you also talked about the Flight Safety Foundation and IATA. Was that fair to say that -- were they involved in Warren's, or they were separately doing their own Advanced Maneuvering Program?

CAPT. MELODY: That's correct.

MR. GOACHEE: Okay. Do you know if Warren had access to that information when he was putting his program together?

CAPT. MELODY: I think for the most part he had put his initial program together before that industry event started. So Warren had already developed his initial program. How much he modified that program, based on the industry effort, I'm not completely sure.

MR. GOACHEE: And I think you'd said that, Tom, is that when you initially expressed your concerns to Captain VanderBurgh about the rudder and the use of coordinated rudder and that finally that he came around and agreed with you and maybe the group that, We have to stress in our training the use of coordinated rudder. Is that --

CAPT. MELODY: That's my understanding. Yes.

MR. GOACHEE: And then -- so but after that, was there any other discussions. Did he ever call you up at any other time and say, Gee, by the way, I'm -- I want to change this program I have and here's what I plan to do. Was there any discussions about changing any of the other part of the initial program in the changes later that you ever got a call from him about?

CAPT. MELODY: I think the last time I talked to Warren about this program is in this time period, August of '97, and it's my understanding that the last time we talked, he had some words to the effect that he was going to change the program to stress or at least include the use of coordinated rudder.

MR. GOACHEE: Okay. Now, this is not an Airbus question. I want to try to use your expertise as either -- on any of the DC9 priorities or maybe the MD11. But, you know, I think that having asked you -- Delvin asked you about the single needed, you know, to the rudder.

But I want to get into the more of a like a rudder limiting. And we know that most airplanes, regardless of what, there's always going to be an airspeed where it starts to restrict, and then there'll be an airspeed that that -- at that airspeed there will be a limit to what it can do. Is that a correct statement?

CAPT. MELODY: Yes.

MR. GOACHEE: Okay.

CAPT. MELODY: If it has a rudder limiter.

MR. GOACHEE: Yes. That's exactly right. But -- so let's just take and range and let's just say hypothetically in 165 range it will start to reduce the limit and then at whatever speed, 260, whatever it is, it will allow only a maximum deflection from that airspeed. Is that correct?

CAPT. MELODY: That's correct.

MR. GOACHEE: Okay. And it uses airspeed to do that. Correct?

CAPT. MELODY: In the Long Beach designs; that's what it is.

MR. GOACHEE: Okay. Can I hit you with a hypothetical reference the airplane now encounters wake turbulence. And it goes through a series of wake turbulence, and you get all the pressure on one side of the fuselage but the other side is blanked out, so to speak. Do you understand what I'm talking about?

CAPT. MELODY: Uh-huh.

MR. GOACHEE: Is there a way that at that time during that very short time that an individual could get more rudder movement under those conditions than would normally be? And we're only talking about the one side having all the pressure but the other side has none, you know.

And I'm sure it would be a very short time, but if at some time a pilot would put in a rudder at that time and say he was restricted to ten degrees, could it have been that at that time, he could get to full 30-degree movement? And we're talking MD11 or DC9.

CAPT. MELODY: Well, the MD11 doesn't have a rudder limiter, so that would just be the hinge moment. Whatever the hinge moment amounted to would determine how much rudder deflection he would get. In the twin jets, the MD80 and MD90, it's merely a function of speed.

The CADC will determine what the indicated speed is, and that's what washes what the MD80s and -90s a rudder limiting hook. And so whether that extends or retracts is a function of speed. The command for using the rudder would be driven by the detected side-slip.

So the system by itself would be basically just a yaw damper at that point. And so it would decide if it needs yaw damping based on the beta delta, the buildup in side-slip. How much rudder it could then use to stop that is driven by the speed and how much rudder limiting.

Generally speaking, in an airplane like a 717 or an MD11, there's a maximum amount of rudder that it can use from the yaw damper function. So the yaw damper function, regardless of how much rudder is available depending on the rudder limiter, the yaw damper function may typically only be able to use four degrees total rudder.

MR. GOACHEE: That's the yaw damper function?

CAPT. MELODY: That's the yaw damper function.

MR. GOACHEE: Yes, and that's going to do it independent?

CAPT. MELODY: Right.

MR. GOACHEE: But now for when that the pilot puts in rudder?

CAPT. MELODY: He'd be able to get as much rudder as the yaw -- the rudder limiter or the hinge moment limiting would allow. The system wouldn't know whether this was side-slipping generated by a vortex or by anything else. It's merely detecting side-slip.

MR. GOACHEE: Thank you, sir.

MR. IVEY: Captain John Lauer, Allied Pilots Association.

CAPT. LAUER: I have a few questions.

Just as Jim kind of skipped around in his notes, I'm going to be doing the same; generate from other questions.

Captain Melody, is there a relationship between -- as an aeronautical engineer and a test pilot, is there a relationship between the angle of attack or the angle of attack gauge on an aircraft that you may be flying and that of rudder management?

CAPT. MELODY: I'm not sure I understand rudder management.

CAPT. LAUER: Well, what I'm trying -- is there a relationship between angle of attack and the use or the management of the rudder or is it totally two different animals?

CAPT. MELODY: The only place that I'm familiar with an interaction -- you see, in aerodynamics, the airplane -- we use a term called coupled. Are you familiar with coupled in relationship to an airplane? The airplane has three axes -- pitch axis, roll axis, and the yaw axis.

We in aerodynamics say that the roll axis and the yaw axis are coupled. If you roll the airplane without any coordination, it's going to develop yaw. If you yaw the airplane without any coordination, it's going to develop roll.

But pitch is uncoupled. You can pitch up and down all day long and that will neither generate roll nor yaw. So we say the longitudinal axis is uncoupled from the lateral directional and the lateral directional axis are coupled.

Now, having said that, that would imply that nothing that you do with angle of attack will impact anything directional. The only place that I know that they can get involved is in a spin or maybe even something close to a spin where we all know that angle of attack is defined as the angle between the longitudinal axis of the airplane and the flight path.

Now, that gets a little confusing as the flight path suddenly becomes 90 degrees. So what would normally have been side-slip is now angle of attack and vice versa. So in a typical spin, and there's lots of different spin characteristics, but one of the things that drives a spin and makes a spin self-generating once you get into it is the interaction between angle of attack and side-slip. It keeps walking.

But in -- the only connection then with rudder is that the rudder could be used to minimize the side-slip. But other than that, I don't know how to answer your question. Typically, angle of attack is not influenced by side-slip itself unless you get into real large angles. Then it's not so clear.

CAPT. LAUER: Is it safe then to surmise that in a nose high, low airspeed scenario -- you had mentioned earlier that there were two schools of thought, one being rolling the aircraft utilizing the ailerons, the other one utilizing rudder to bring the nose down.

Is there a relationship here with regards to angle of attack and utilizing rudder to bring the nose down? Are we referencing the relative angle between the aircraft body and the horizon versus the relative wind?

CAPT. MELODY: There is clearly a response from the rudder to eventually roll the airplane. There's just no denying that you can roll the airplane using the rudder. The rudder was never intended to be used to roll the airplane, and the fact that it can roll the airplane creates a situation where you can develop this difference of opinion about whether you should use the rudder.

The concern that I have about using the rudder to roll the airplane is that it is somewhat unpredictable and that you don't know how much roll you're going to get until you actually start to get it, whereas I think after some experience, pilots by virtue of the control wheel position, have some expectation of how much roll rate they're going to get.

Now, your question is true. If you're going real slow, you're not going to get the same roll rate as you would if you were going faster. But I think the compensation for that is that you keep moving the wheel until you get the roll rate you need.

I'm just concerned if I was the instructor, which I'm not, of just teaching people to use the rudder and wait and see how much roll rate you get. Then that to me, it's just a technique we don't recommend.

You're right -- certainly you can roll the airplane by generating side-slip and letting the side-slip roll the airplane.

CAPT. LAUER: In the discussions that you were part of, and I think this is in relationship to the letter of August '97, Boeing and Airbus expressed a concern with the use of rudder. Was there any discussion with regards to the limits of a rudder?

CAPT. MELODY: I don't believe that was ever an issue. I don't believe that ever came up. I think the agreement between -- there was a little bit different group now. In the letter, it was Ken Higgins and Tom Imrich and Larry Rockliff.

In the industry issue, it was Bill Wainwright from Airbus and John Cashman from Boeing and myself. So there were two slightly different groups. The group that developed that letter actually only communicated on that once.

The group that worked on the training video met four times, so I was there three out of the four meetings. In that group, we discussed the recommended position from Boeing and from Airbus. But when we put together that letter, by the time I received that first draft of that letter and wrote my part about the side-slip and the use of simulators, that had been an opinion that I had formed over the course of a year that, you know, we don't recommend teaching people to control the airplane, roll the airplane using rudder.

And it was just a controllability issue from my point of view.

CAPT. LAUER: So in this particular discussion, the focus of the concern was from, as you just mentioned, a controllability issue versus a structural limit issue?

CAPT. MELODY: From my point of view, from my perspective, it was strictly controllability. I was not aware of the potential of damage to rudder. Now, you might get a different story from Captain Higgins this afternoon.

CAPT. LAUER: You'd indicated earlier that you were involved with tests in airframes of aircraft that you'd been flying that you had collected data. There were two methods of collecting data. One was through mathematical analysis and wind tunnel analysis. The other one was actually taking the aircraft airborne with engineers on board and measuring the parameters.

You'd indicated that on the collection of such data that you had collected side-slip data in the airframe and not from that of wind tunnel or a mathematical analysis.

CAPT. MELODY: What we did in the original certification of the MD11, I believe we validated the wind tunnel data out to about 15 degrees of side-slip, which for a normal training environment, that's sufficient data. Fifteen degrees of side-slip is pretty significant actually.

But they had wind tunnel data going out to as much as 45 degrees. And since a lot of that data is nonlinear, we needed to have more confidence that the wind tunnel data in fact was accurate so that we could proceed with this test, because the test had potential for being hazardous, especially if the wind tunnel data wasn't completely accurate.

So what we did is we validated the wind tunnel test data in this particular model. So on this one airplane that I'm aware of, we do have airplane side-slip data that goes out to 40 degrees or so.

CAPT. LAUER: As a test pilot, did you have any concern with regards to taking an airplane to 40 degrees side-slip?

CAPT. MELODY: I had some concern. I was concerned about engines, inlet distortion. I was -- but we of course do this very slowly, you know. There is the potential for what we call a cliff there, but -- so you don't go incrementally in too large of steps. So we slowly and gradually got out there.

CAPT. LAUER: And with respect to that line of thought, do you recall the maximum speed at which you conducted these tests at?

CAPT. MELODY: .84 mach.

CAPT. LAUER: And the lowest speed? Minimum maneuvering speed -- would that be acceptable.

CAPT. MELODY: For the thrust reversal?

CAPT. LAUER: Well, for the tests that -- for collecting the side-slip data and the max rudder deflection data that you were collecting. Would the speed regime be from that of minimum maneuvering speed up to mach .84?

CAPT. MELODY: I don't recall exactly, but I would say the lowest speed limit that we would probably start from would be VMCA. Wouldn't go below VMCA.

CAPT. LAUER: As a test pilot, you were -- you talked about your concerns with controllability. Did you have or do you have a concern with regards to flying these aircraft and inducing certain maneuvers such as Dutch rolls -- are you concerned about the side load levels on the vertical fin?

CAPT. MELODY: I have not, in my experience, been concerned about that. As I pointed out, though, we do not do rudder reversals in the sense that we would go from a large rudder deflection in one direction to a large rudder deflection in the other.

This afternoon you might hear that Seattle has more experience doing that. We have not done that in Long Beach, so my concern about large side-slip angles has never in my experience been a structural issue as much as a controllability issue, inlet distortion issue on the engines, but not structural.

CAPT. LAUER: If a rudder has a range of 30 degrees and that would be considered a maximum rudder range, deflection, would you consider a deflection of ten degrees large rudder deflection or --

CAPT. MELODY: No.

CAPT. LAUER: -- moderate or a small rudder deflection?

CAPT. MELODY: I would say it's just starting to get into the moderate regime.

CAPT. LAUER: Okay. You'd indicated that through test flying you initiate a rudder doublet to induce a Dutch roll, depending on the data that you want to collect.

CAPT. MELODY: Uh-huh.

CAPT. LAUER: In light of the accident of 587, are you -- as a test pilot -- are you now concerned with regards to taking a tail off an airplane by inducing a rudder doublet?

CAPT. MELODY: I don't think I would be concerned about doing anything that I've done in the past. I mean, I've been doing rudder doublets in airplanes for 26 years, and I have no reason to be unduly concerned that there was a problem.

What I probably wouldn't do is also change the way I do things and do full rudder doublets. That's not the kind of thing we need to do to get the data we need, so I've never done those and I wouldn't be inclined to do those either.

CAPT. LAUER: Is there a difference between in-line thrust aircraft and wing engine pod-mounted aircraft with regards to yaw limits?

CAPT. MELODY: I don't think it necessarily has to do with the location of the engine. I think the yaw limits would be more driven by the inlet distortion testing and the wing sweep.

CAPT. LAUER: Okay. Then the limits that you're describing are focused on pods hanging on the aircraft as opposed to the vertical fin?

CAPT. MELODY: Well, I think we may have mentioned earlier that per se, there are no yaw limits. I mean, from a practical point of view, the maximum side-slip that I would feel comfortable with is driven by those parameters, but from a point of view of having a limitation in a book, there is no yaw limit.

There is no way for the pilot to know what his yaw angle or his yaw rate are.

CAPT. LAUER: We're going to -- I'd like to present a scenario to you. There is obviously on aircraft that have rudder load limiters, there's obviously a concern for the loads that can be induced to a vertical fin; hence, the need for a rudder load limiter.

If the rudder is split -- physically broken, still on its hinges -- would it be reasonable to expect that a full deflection of the rudder would not generate the loads on the vertical fin that a contiguous piece of rudder would generate?

CAPT. MELODY: I'm not sure I understand the scenario. When you --

CAPT. LAUER: The rudder is split. It's broken. It's broken in half, but it's still on the airplane, still on the vertical fin. Can a full deflection of the rudder, that portion of the rudder that is still attached to the hydraulic actuators, can it generate the loads on the vertical fin as if the rudder was one contiguous piece?

CAPT. MELODY: I think the only thing I could say there is that if any part of the rudder deflected, and I'm assuming it has enough integrity to be deflected into the free stream, that that portion of the fin and rudder combination would generate a load.

I mean, it would be just like putting out a flap or putting out an elevator on the wing, you know, in the vertical axis. If the rudder has the energy to stay deflected in the free stream, then it's generating a load because of the difference in camber on each side of the fin.

So it would generate a load. Now, how much load depends on how fast you're going and how much of the rudder actually deflected.

CAPT. LAUER: If you had the scenario of a split rudder, and as a test pilot, would you expect a different stream of feedback data coming to you as the pilot?

CAPT. MELODY: I don't necessarily think you would. At least, if I can relay the case of the MD11 and the DC10 by design have a split rudder. They have an upper and lower rudder. And depending on various types of hydraulic failures, you could lose the upper or the lower rudder.

And so the rudder is still effective if only part of it's moving, but the VMCA is affected. The VMCA is always going to be higher. But whether you can tell that through your feet, I don't know because in that kind of hydraulic failure, the forces are higher to begin with.

So I don't know if you could distinguish or separate, you know, what is causing that, but with a dual hydraulic failure, the forces are going to be different. But the rudder will still move and VMCA will be adjusted higher.

MR. IVEY: Off the record.

(Off the record discussion.)

CAPT. LAUER: I've only got a couple more questions.

CAPT. LAUER: In a single-engine scenario, airborne, if a rudder doublet were induced, possibly due to stepping on the wrong rudder first and then recognizing the need to reverse that, would you be concerned about the vertical fin coming off the aircraft? I mean, because of the rudder doublet.

CAPT. MELODY: I have no personal reason to be concerned. You know, I can't think of too many scenarios in the real world where any kind of maneuver would require a rapid reversal. But clearly, I know there have been training events where people have gotten V-1 cuts and stepped on the wrong rudder and then reversed it.

I don't know what information we can gain from that. I don't know personally if that's ever happened in a real airplane but, you know, I just -- I can't picture any scenario where a rapid rudder reversal, except as you point out, if the initial input was an error.

But I -- if I needed to do that I would do it. We're kind of projecting a scenario that in -- if that ever occurs to me, I may do something differently, but at this point in time, I couldn't say why, if I somehow hit the wrong rudder, why I wouldn't change it.

You know, one mistake doesn't mean you shouldn't, you know, try to correct it.

CAPT. LAUER: Have you heard any feedback or received any feedback from any of the government agencies or entities that was in attendance to Captain

VanderBurgh's presentation in Washington, D.C.? As an example, the FAA and several other government agencies were in attendance, were invited to the -- to his presentation?

CAPT. MELODY: No. No, in fact, I wasn't even aware that he had done that.

CAPT. LAUER: And the last question. In light of the C-141 wing spar that broke during refueling and the Air Force grounded their fleet of aircraft to allow them the opportunity to determine the cause, in light of that, does Boeing feel that if a Boeing aircraft were involved they would recommend the grounding of the fleet to determine the cause of the failure?

CAPT. MELODY: I'm trying to think of any instance where we've ever grounded the whole fleet. I think if we knew, if we knew for sure what the cause was or maybe even within a very high probability of what the cause was, we would probably do that.

But it would require, I think, some confidence that we really knew what the problem was. In trying to think in my recollection, I think the only time that I know we have ever grounded an entire fleet was in the 717. We had an incident of losing critical flight data, and it turned out to be water leaking into one of the electronic power control units and causing that system to fail and then progressively fail the digital flight control computer, and we were losing critical information.

And we knew that was the problem, and we knew that we had to ground the airplanes until they could be modified with a plate to cover that power control unit in case of water getting in there and causing that same problem.

But I don't know of any time we've grounded the entire fleet for flight control problems or an event where the cause was not known to some high probability.

CAPT. LAUER: Thank you, Captain Melody.

MR. IVEY: Captain Ron Skupeika, Airbus.

CAPT. SKUPEIKA: How you doing, Tom. I'll be very brief.

Would you advocate additional training by airlines during initial training by even an extra module concerning rudder reversal at cruise mach?

CAPT. MELODY: Well, I could advocate that, but having said that I've never been a line instructor I don't know how much people would listen to me. I think it's an important subject, and I think it probably could use some more training.

But I -- you know, I know, generally speaking, training programs are so saturated now that if you bring this in, you're going to drive something else out.

CAPT. SKUPEIKA: Right, because I heard earlier in your comments you were very concerned with, you know, enlightening the pilots with side-slip. So that might not be a bad idea.

One last question. Are you familiar with a term called corner speed?

CAPT. MELODY: Yes.

CAPT. SKUPEIKA: Is that a military term or civilian?

CAPT. MELODY: Not to my knowledge. I never heard that particular term until I got involved in this program.

CAPT. SKUPEIKA: Of the AAMP?

CAPT. MELODY: Right.

CAPT. SKUPEIKA: That's where I've heard it too, so -- can you enlighten us on that?

CAPT. MELODY: Well, the concept is pretty straightforward. The concept is based on minimum turn radius. So turn radius in any plane -- vertical, horizontal, or oblique -- the term radius is a function of your speed and your G. Well, obviously, at some speed you're going so fast that the turn radius is increasing.

And at some speed, you're going so slow that you don't have enough G to be able to turn the airplane, so there's some optimized combination of speed and G that allows you to pull the most G but not at a speed that's so high that your ground track or your turn radius is higher.

So the concept of cornering speed is that speed that optimizes to velocity and the G to get you the smallest turn radius possible. In the concept of this program, where that was important is if you were in a nose low, low altitude situation, would you just try to pull as much G as you can and maybe not have enough G to recover the airplane, or would you accelerate some more before you started to recover.

If you've ever stalled the airplane -- actually done a stall -- that concept is meaningful to you because you know as soon as you stall, and if the pusher fires or if you don't have a pusher, as soon as the nose drops, you don't have enough speed to pull it back up yet, so you have to let it accelerate until you can get some speed and then be able to pull it up. And that's what cornering speed was really all about.

It’s -- not a very useful -- I mean, it's a well-understood concept, but it's not very useful in the real world because you don't know what that speed is.

CAPT. LAUER: Is it useful in a large transport air category?

CAPT. MELODY: It is only useful to know that you need to get enough speed to be able to pull the nose up. And don't just sit there with the stick in your lap --

CAPT. LAUER: Right.

CAPT. MELODY: -- fluttering down. So you need to know that you need some energy, and that's why in the newer airplanes that have PLIs, that's -- you know, that's a very good useful piece of information. If you can pull to the PLI, then that's the best you're going to do.

CAPT. LAUER That's it. Thank you.

MR. IVEY: One final question, possibly two.

MR. IVEY: Does it surprise you that this Airbus, at a speed between 230 and 250 knots, that based on whatever encounter it was, whether it was wake turbulence, that the inputs ultimately broke the tail off or that the tail broke off for any reason that we are yet to determine?

CAPT. MELODY: It surprises me that at 250 knots, you couldn't put in full rudder.

MR. IVEY: Continuously back and forth, left and right, and still have the tail remain intact?

CAPT. MELODY: Well, the thing that I wouldn't want to comment on, because it might -- well, it might; it will probably be different from any airplane, and it has to do with bandwidth, okay. So when I was an instructor at the test pilot school, we had to demonstrate bandwidth.

And what you could do in an airplane like a
T-38 is you'd start moving the column forward and back, forward and back, and at that slow rate, the airplane would porpoise; the airplane would follow. Then you would speed up the input and you'd get to a point where you would see the stabilizer back there going like this if the airplane wasn't moving, so you've exceeded the airplane band but the airplane can't respond that quickly.

So now you're pumping the stick like this and you can look in the mirrors and see the stabilizer going like this. Then you can move it so fast that the stabilizer isn't moving. So you've exceeded the bandwidth of the actuator.

So if you have a 20-hertz actuator or whatever, you're going so fast that the actuator can't keep up. Now, the important thing to remember when you're doing this is don't ever stop at one end or the other, you know, because then you're going to get a pretty --

So the point I'm trying to make, Dave, is that I would expect at 250 knots, I could push the rudder all the way in and I could do it fairly quickly. And I would expect that I could do it fairly quickly if I went stop to stop, because I'd probably be exceeding the bandwidth of the actuator.

But if you do it slower, then all bets are off. In other words, what I'm saying is if you do it slow enough so that you kick the rudder in, build up that side load on the fin, build up some side-slip and then reverse it, if you do it at a slower rate, then you're going to get into this rudder reversal issue where you're doubling the force from what you could get just from the rudder alone.

So now you're going plus and minus, you know, 2X, whatever the maximum force you could get, you're doubling it in each direction at whatever rate you're doing it. But if you do it faster so where you don't build up this side-slip or you only build up a little, now you're not doing exactly the same thing.

So whether somewhere between doing it real slow and doing it real fast, you could get into trouble. I think a structures person would have to answer that.

MR. IVEY: One last question. Is there anything that you think that we should look at that might help us solve this accident?

CAPT. MELODY: No. I'm afraid I'd be kind of hard-pressed. You know, I know so little about the accident. I really haven't seen any data or anything. I heard rumors and I've, you know, read a few things in the newspaper, but I really wouldn't know what to recommend except in maybe something that we could all learn a little more about is the real dynamics of doing this rudder reversal at just the proper speed to where you do develop the full loads, you know, in each direction, because I know if you do it real fast, nothing -- you know, the only thing you're going to do is develop the load on the rudder.

If you don't build up any side-slip, you know, then -- and if you do it really fast, although I don't know I've ever flown an airplane where you could do the rudder input so quickly that you get to the bandwidth of the actuator. That -- because the travels are so much bigger, and so physically, you can't move the rudder pedal that fast, you know, like you can with a light-weight control column.

So I think you cannot get to a rudder doublet where you don't induce some side-slip.

MR. IVEY: Well, thank you very much, Captain Melody, and --

DR. ELIAS: I just have one quick question there.

Just a follow-up in terms of the rudder bandwidths. Do you even have a sense for what the bandwidth, the frequency bandwidth, for a rudder on a large transport category airplane would be?

CAPT. MELODY: I'm sure it's pretty slow. I don't think I could -- my feel is that you couldn't do it fast enough to avoid getting some side-slip. You know, I -- off the top of my head, I would say on a big airplane like an MD11, it will probably take

20 pounds of force at least, just to get the pedal fully deflected, and there's a lot of damping in the pedal.

So not only will it take 20 pounds but it might take a second just to get the pedal in, maybe even a little more.  So now you're talking about a minimum of a four-second doublet.  And if you had any air load on, it might even be slower because it could take more force.

So it's a pretty slow maneuver compared to an elevator doublet.  It's pretty slow.  And I -- you know, it would be easy enough to go out and get that data but, you know, as part of a flight test, we don't go to the stop normally before trying to induce Dutch roll or delta theta-beta.  We probably only move the pedals two or three inches.

DR. ELIAS:  Okay.  Thank you.

MR. IVEY:  Thank you very much, Captain Melody.  Appreciate you sharing all this information with us today.

(Whereupon, the witness was excused.)

MR. IVEY:  Off the record.

(Whereupon, a short recess was taken.)

EXAMINATION

**b. Captain Larry Rockliff**

MR. IVEY:  Captain Rockliff, if you will, please state your name and your position and give us an overview of your flight experience.

CAPT. ROCKLIFF:  My name is Larry Rockliff.  I'm vice president of training for Airbus North America customer services division.  Originally trained in the Air Force in Canada and flew for a carrier up in Canada called Ward Air.

And during my stint with them, went on loan to Airbus back at the very beginning of the A320 when it was just coming out. And along that timeframe when I was at Airbus, they made me an offer to come on full-time with them, so I've been with Airbus since -- essentially since 1989.

Came over to the training center as the chief pilot and flight training director in '92, and then changed hallways in the building in '99 in the new complex as responsible for all the training.

Flown fighters, trainers, transports, and heavy equipment for the carriers. For -- just so that everyone's clear, I have flown the 310/300 quite a bit, but it was quite a few years ago. Haven't flown the airplane since, I think -- I'm guessing, but I think '94 was probably about the last time I flew an A310 or A300 because at the training center in Miami, we just do the fly-by-wire variants, 320, '30, '40.

MR. IVEY: Total flying time, type ratings?

CAPT. ROCKLIFF: About 11,000 hours, and I'm typed on every Airbus as well as C-130.

MR. IVEY: I'd like to ask you about the letter that had been written jointly by Boeing and Airbus and the FAA pertaining to the Advanced Aircraft Maneuvering Program that American Airlines initiated, I believe about 1996. Are you aware of that letter?

CAPT. ROCKLIFF: Yes. I was one of the authors.

MR. IVEY: Can you tell me what your participation was in the formation of that letter?

CAPT. ROCKLIFF: During the year of the letter, and if recall correctly it's because I've read the letter in the last few months, but '97, '96, whenever it was written, we all attended a day seminar. I believe it was a day seminar. Might have been a second day that we were here for.

Wasn't specific to those of us who where the others. There were other people in the audience as well and I don't recall who they were. I think other carriers, because there was a lot of interest in the program.

And on completion of the briefing, you know, in the -- I think it was an auditorium; might even have been in this building -- we met with Ceece [Captain Cecil Ewell]. And in fact, that was the first time I had met Kenny -- Kenny Higgins. I'd been introduced to him, and we weren't sitting together. We were sitting in different areas.

And as I recall, we expressed some concerns, some observations, about the program, and I think that Ceece suggested that we collect our thoughts and put them in a note to them and that American Airlines would consider our inputs.

So over a course of, oh, I want to say probably the course of about two months, we exchanged the letter back and forth, you know. I can't remember who wrote the original draft, you know. Each of us wrote a portion of it, you know, be it on simulators, be it on use of angle of attack indicator, on different portions, segments of the letter, and then we all exchanged back and forth between Long Beach, Miami, Seattle, and -- at Seattle.

And then ultimately, sent it out under Kenny's -- we chose Kenny to send it out even though we all signed it, because at that time American had just signed a big contract with Boeing Company, and that was the other rationale behind he being the one who would actually post it.

MR. IVEY: But Airbus and Boeing worked together on the development of the issues that were in that letter?

CAPT. ROCKLIFF: Uh-huh.

MR. IVEY: And is it your belief that this was a pretty much total agreement on the issues that were written to American Airlines regarding angle of attack, simulation, rudder usage?

CAPT. ROCKLIFF: You mean agreement between the manufacturers?

MR. IVEY: Yes, sir.

CAPT. ROCKLIFF: Totally.

MR. IVEY: How did this letter become into existence? Was it because of what you had experienced or witnessed at the presentation of Captain VanderBurgh's upset program or --

CAPT. ROCKLIFF: No --

MR. IVEY: -- had this been going on before or what's the genesis of this letter?

CAPT. ROCKLIFF: The letter -- the genesis of the letter was specifically that presentation. And as I recall, and I'm all but certain, that Ceece offered us the opportunity to, you know, put a letter together expressing our concerns, if we had, you know, observations, suggestions for improvement, anything of the sort from the manufacturers.

However, we had been working for probably a year and a half, two years prior to that on a industry training aid that Boeing and Airbus, as well as a lot of the carriers -- you know, American Airlines, United, Delta, just to name three of many -- became involved in.

And I had first attended the AAMP program at the invitation of Ceece when it was a pretty new program. You know, probably within the first few months of it in existence. And I thought it was a really good program with, you know, a few points I thought needed polishing a couple of points I didn't agree with. But I was there as a guest observer, not as a critique source.

During the time that we were working on the industry training aid, the relationship between -- the relationship insofar as the concept or the notion of upset recoveries became a lot closer between the manufacturers, because what we discovered was that even though our airplanes were assembled on both sides of the Atlantic, the concepts from an aerodynamic point of view and from the flight test groups point of view were identical. There was no difference.

And so I don't recall exactly what drew us, why I had -- why I came back here to Dallas for that particular meeting because I'd already seen the AAMP program. We were already working on the industry training aid.

So what caused me to gravitate back here and meet up with my colleagues from the FAA and newfound colleagues from Boeing, I don't remember. I really don't remember. But from that meeting was the decision, you know, to draft the letter.

MR. IVEY: You mentioned that there was some things that you did not agree with. Can you be specific on some areas?

CAPT. ROCKLIFF: Well, virtually there is right on the letter, you know. I mean, there really was -- there's a lot of really, really good material in the program. There were just some areas that concerned us that -- that concerned me -- that were a detriment to the program.

And, you know, and those were things that we wanted to bring out in the letter.

MR. IVEY: Yes. Regarding simulators, to begin, the fidelity of simulation, I presume, was of concern to Airbus as well as it was to Boeing?

CAPT. ROCKLIFF: Uh-huh.

MR. IVEY: And that was addressed to American and perhaps to the other airlines, at least where we're talking about this letter to American. Do you know whether the simulators received a software package or an upgrade after this letter to improve the quality of the simulation for upset recovery, or do you know if there's been any changes in that area?

CAPT. ROCKLIFF: Well, from Airbus' point of view, we have not produced any software packages or any data packages specific to upset training. The data package that's produced when an airplane's manufactured is based upon the flight envelope that the airplane is tested within, and as it gets out to the extremities, it's a whole lot more gentle than it is when it's closer to the center of the -- you know, the aero package.

From there, it's a combination of wind tunnel data and extrapolation, as you get further out. But to be specific to answer your question, to my knowledge there's been no inputs to the simulator manufacturers from airplane manufacturers to improve fidelity for the sake of upset training.

MR. IVEY: Okay. And in regard to your simulators there in Miami, I don't how many -- you've got quite a few of them. Do you teach upset training in the simulators down there for your customers?

CAPT. ROCKLIFF: Today we don't, because on our fly-by-wire airplanes, we teach the concepts. But by definition, to get into an upset it's an unintentional exceedance of pitch, roll, at inappropriate airspeeds. And with these airplanes, the only way to do [that] is with multiple degradations or to physically, intentionally put you into an upset.

So Airbus policy is that we teach the concepts of upset training for the fly-by-wire fleet but that no specific training is required. Having said that, the most recent PTS [Practical Test Standards] requires us to test it, which is rather questionable, but we are required as a result of that.

So we actually force the airplane into what would be an unusual attitude with the pilot flying not seeing it so they can let go of everything, and it recovers itself.

Now, at the time of the letter we had an A300 simulator, conventional platform, B-4, not 300-600 such as American has. And we used that airplane in the development -- or that simulator in the development of the upset training aid, the industry training aid that the folks from Boeing, the folks from the industry group and ourselves tested, as well as the ones at Boeing -- the 7-5 and the 7-6 at Boeing.

And we discovered some pretty fundamental departures that -- these are simulators that are tested every six months by the inset pass, every six months from the ATG package, both the objectives and the subjective tests, and yet when we put them in departure scenarios, responses of both our simulator in Miami and the 7-5 simulator, 757 simulator, in Seattle were completely diametrically opposed to what you would expect.

As an example, in our A300 we put it in what one would consider to be a deep stall. Just fall back, buffeting, losing altitude, and you simply push the power up and it continues buffeting and climbs away.

In the 757 simulator we put it in a nose low steep turn, hands off, where you would expect, because the airplane's trimmed it would start tightening up in the -- because you're trimmed for reduced speed. It didn't. It diverged the whole time.

So these are simulators, and this was the basis in the letter of concerns for sim fidelity in an area that was inside the envelope on the 7-5 and outside the envelope where it clearly was not accurate data on the A300 sim.

MR. IVEY: Has that been resolved to your knowledge in the case you just cited where the 7-5 diverged, do you know if they changed their program to clean that up?

CAPT. ROCKLIFF: I have no idea. No idea.

MR. IVEY: Now, I know in the training aid that was provided that is a mirror image of Boeing's and Airbus' that it talks in there about, This training aid is not for fly-by-wire airplanes. Is that principally because of the reason that you just stated that in the newer fly-by-wire airplanes, you really have to get the pilot to force into one of these situations for an upset recovery?

CAPT. ROCKLIFF: Yes. That's correct.

MR. IVEY: And so that training aid was basically set up for the non-fly-by-wire, which would certainly include the A300/600 --

CAPT. ROCKLIFF: That's correct.

MR. IVEY: -- involved in the accident.

CAPT. ROCKLIFF: Now, having said that, clearly, in a degraded condition, a fly-by-wire airplane can upset like any other airplane, but since we don't teach multiple degradation, unusual attitudes, or at least philosophically we don't, that's our rationale for not doing it.

MR. IVEY: In American's case, and we have not explored that yet, it seems as though an upset recovery is sometimes preceded by in the simulator being vectored behind a heavy airplane. A Boeing 747, for example. And then the upset is induced through wake turbulence as the scenario.

Do you have any idea in the A300 simulator here whether or not if you had a crackerjack pilot who was very in tune with what was going on and was able to put in a proper control deflection immediately followed by a coordinated rudder if needed, doing everything right at the very quickest time -- he's the ace of the base, if you will -- do you know if that kind of software is degraded so that he doesn't get the roll control so that he can indeed get into the unusual attitude and then get proper control to recovery. Am I -- did you understand what I said?

CAPT. ROCKLIFF: Well, it's a good mouthful. Could you repeat everything after -- I didn't go in the A300 simulator. I suspect it had to be that same trip when Kenny and Tom and Tom and I were here because I recall in a morning -- it might have been the morning of the big presentation or perhaps the following morning -- I went in the MD11 simulator with Tom Melody.

And we had been briefed, and I don't recall whether it was a specific briefing for ourselves or whether it had been at the seminar during the day -- we had been briefed on what the simulator engineering team had done to facilitate the wake vortex model.

And to our understanding or to my understanding at that time was that there was a roll moment that was induced in the sim and that the ailerons roll spoilers were rendered ineffective so that if the airplane was rolling right, intuitively the pilot would try and roll left to counter it, perhaps pushing or pulling whatever would have been appropriate, but it would have been without effect.

So when we went in the sim, in the MD11 sim, we chose not to bother using that because we knew it didn't work. We just used rudder. And -- we popped out, you know. So if that's what your questioning was. But we were -- we knew, or at least we had been briefed on what had been done in the sims.

MR. IVEY: So --

CAPT. ROCKLIFF: And that was an MD11, not a 300.

MR. IVEY: But that's interesting, because I guess that modification perhaps applied to the A300 as well. We don't know but we can find out, but at least in the MD11 simulator, the roll control was rendered ineffective until it got to some particular point, I guess, in the upset where then those controls do indeed take effect?

CAPT. ROCKLIFF: I believe -- yes. I don't remember the numbers. We had been briefed. I think -- I don't recall speaking to the engineering people. I think Warren, you know, Van briefed us on what it was. We seemed quite intriguing and quite, you know, ingenuous what they had put in it.

But Tom's a pretty ingenuous guy as well, and he said, Let's adjust your rudder and see what happens, and then it worked great.

MR. IVEY: So the use -- in the MD11 you actually got into an upset maneuver, never even used aileron, and recovered using rudder only?

CAPT. ROCKLIFF: I don't remember that we spit out of it, but we were able to control the roll. We didn't end up rolling because the rudder was effective against the moment.

MR. IVEY: Oh, I see. So really, the software, I suppose would be the proper term, the software inhibited the ailerons but it really didn't inhibit the rudder at that point?

CAPT. ROCKLIFF: That was our understanding in the box.

MR. IVEY: Do you think that if pilots were to get into a simulator with that foreknowledge, would they have possibly thought, Aha, I can use rudder to recover and make myself look better. Do you think there would have been knowledge transfer here?

CAPT. ROCKLIFF: You know, I don't want to play witness on the stand, and I think that would be speculative because I don't know that -- I don't know that a line pilot would know that. They wouldn't be briefed. Because we were, you know, not part of the group to which the training was intended for, they were looking at more of a technical application for ourselves.

They were giving us information that I think probably a line pilot would have no need of knowing, because what they were trying to do is articulate the simulator in such a position so that the recovery could be taught, not to try and trick the system. So --

MR. IVEY: Understood.

CAPT. ROCKLIFF: -- I can't answer that one to give you anything that I think would be worthwhile.

MR. IVEY: To digress, or maybe it's progress, I'm sorry. In the case of the fly-by-wire airplanes, what type of procedure do you use now outside of, as you say, using multiple degradations to get this pilot in. How are you able to get a pilot into one of these unusual attitudes?

CAPT. ROCKLIFF: Well, by definition that we submitted -- because there really wasn't any definition. Just like this notion of crossover speed is a term that was built, you know, in the last 15 years. In the case of upsets, there is no definition for them.

So as an industry group, we said -- we defined what the limits were, and that's in excess of 25 degrees of pitch, nose up, minus 15, greater than 45 degrees of bank, and at any of those attitudes that's -- or within those attitudes, at speeds inappropriate for flight. The key word being unintentional.

Since with the fly-by-wire airplanes, and again, I'm speaking specifically for the Airbus, you have a neutral stability platform. So the consequence of it is you have to physically put it in. The airplane doesn't just tip. You know, you have to physically move it to a new flight path, somewhat like a very sophisticated control wheel steering. It's always in trim.

So we don't train for it simply because, you know, you have to artificially put the people in these predicaments. But as I mentioned earlier, the PTS requires us to demonstrate a recovery. So what our training center evaluators do is tell a pilot to put his head down or her head down or turn sideways, because there's no G loading in the simulator, of course, so you're not going to disorient them.

We put them with greater than 25 degrees of pitch, more than 45 degrees of roll, with decreasing airspeed, obviously, and we say, Okay, look ahead. You have control. And their recovery is, say, Oh, yes, that's nice. You leave it alone and it stabilizes.

MR. IVEY: Is there a training aid that suggests how much rudder usage there is in some of these attitudes?

CAPT. ROCKLIFF: Well, first of all, the airplanes, as most modern airplanes, have got turn coordinators and yaw dampers in them. For the fly-by-wire airplanes, because they would have to be in a degraded condition, there's no cause or rationale for us to get into discussing use of rudder.

In the training aid in our magazine called Fast, which we put the very same day as Airliner, Boeing's magazine, the purpose of those simultaneous broadcasts, if you will, was very simple, and that was that with the industry training aid, which is a very, very large document with one volume pertaining to training and another one -- sorry -- system knowledge, you know, aerodynamics overview, in initial training and the second one being for recurrent -- you know, repeat training.

In the development of the industry training aid, because we were dealing with a lot of different carriers, a lot of different pilot cultures, we were striving for consensus, and consensus didn't mean you always ended up achieving what you wanted.

And we found as manufacturers that there were a number of cases where the user public, if you will, the pilot groups didn't agree with what we as the manufacturers thought was the proper way to articulate a recovery.

So that's why we put out those particular documents, because it was agreed in the training aid, in the industry training aid, that we would itemize all of these different tools, if you will, that a pilot or a crew could use to try and recover but in no particular order.

We wanted to put it in an order and that's why we put this out. We felt that in taking each step, you would try one thing, for instance, a nose high. We don't arbitrarily start rolling it to the horizon. We're suggesting pitching forward.

We also suggest secondary controls such as trim, if appropriate. And that wasn't well received by a lot of the industry out there, so that's why as manufacturers we put out this document. But --

MR. IVEY: You mentioned second --

CAPT. ROCKLIFF: -- but insofar as rudder, none -- we didn't as manufacturers suggest not using rudder, but the rudder was -- there was a whole lot of emphasis, as you can see from the articles, on the criticality of the use of rudder.

MR. IVEY: In fact, in that area I think there had been a modification in the AAMP program to change wording to reflect coordinated rudder. Does that term mean anything special to you? What does coordinated rudder mean?

CAPT. ROCKLIFF: Well, coordinated rudder is self-explanatory as a term, but with a turn coordination system and a yaw damper, the appropriateness of it -- I don't know. You know, I don't know how to answer that. Coordinated rudder is something where you're not inducing side-slip. You're not -- you'd be countering adverse yaw or something of that nature if there was side-slip that was induced from an aerodynamic source.

Essentially, coordinated rudder would be to take an uncoordinated flight condition and back into a coordinated flight condition.

MR. IVEY: And how would the pilot know that?

CAPT. ROCKLIFF: Good question. Seat of the pants, I suppose. Because there's so many variables in an upset, you know, to say that, Well, this is a specific of where I need a coordinated primary control, I think would be too mechanical.

I think that we have to also appreciate that in the case of upsets, the pilot is trying to get oriented and back in control, and so there's -- you know, there's not a tremendous length of analysis that goes on. There's a lot of recall.

MR. IVEY: The statements made by Captain Melody indicated that oftentimes with side-slip, pilots are not even aware that they're in a side-slip -- his experience as a test pilot, which I thought was interesting.

CAPT. ROCKLIFF: Continued. If you're in it for a period.

MR. IVEY: That I guess large angle side-slip angles could occur and outside of having a yaw string on the front of your airplane or perhaps the ball that they may not know. They may feel lateral accelerations on their body, but that could be from many factors, I'm sure.

And so the use of the ball is a term that when pilots got their basic education as student pilots and hopefully continued on beyond, the ball, particularly in light airplanes, is something that's quite obvious, especially in multi-engine airplanes.

But the emphasis of the ball in large transport category airplanes, in your experience, is that something that's referenced often in air carrier experience?

CAPT. ROCKLIFF: I can't say from -- you know, I'm trying to recall back when I was training on A310s, A300s. And I can't recall that it was an emphasis point. The one thing I would add to that -- and by the way, on 320/30/40s, we're not concerned with it because there's full turn coordination, so essentially for asymmetry and decrabbing for a landing is the only you ever, ever need to touch the rudder in a normal condition on those airplanes.

But the one thing that I have experienced a tremendous amount in conducting initial operating experience with crews throughout the world is that a lot of pilots tend to try and come back to their early days and try and coordinate on final if they're in turbulence on approach by blending in rudder.

And the reason it's noteworthy is that when you're teaching someone and you're at an instructor's station, you can't see their feet, and so you don't pick that up until you're actually in the cockpit on the pedals. And then you happen to notice.

Now, it's not bad. It's just a fact. You know, it's gentle. Pilots tend to do that. But on the more modern airplanes, certainly on our more modern airplanes, all you are doing in trying to coordinate it is causing the yaw damper to dampen out the yaw you're inducing.

MR. IVEY: So would it be fair to say that most air transport pilots really don't use very much rudder because of the aileron rudder interconnector or even more enhanced versions of turn coordination?

CAPT. ROCKLIFF: That's my experience.

MR. IVEY: We're getting more and more away from ruddering, but --

CAPT. ROCKLIFF: That's what I've seen. Yes.

MR. IVEY: When you saw the presentation by Captain VanderBurgh, did you get -- or did you come away from that presentation feeling that there was greater emphasis, about the right amount, or less on rudder as part of a recovery?

CAPT. ROCKLIFF: Yes. Initially, I came away feeling that rudder was significantly overemphasized.

MR. IVEY: Do you recall any specific examples that might help to support that position?

CAPT. ROCKLIFF: Yes. One case study that was reviewed was a -- I believe it was a Northwest accident in Detroit.

MR. IVEY: Off the record for a moment.

(Off the record discussion.)

MR. IVEY: All right. Let's go back on the record.

MR. GOACHEE: You were discussing a Northwest accident.

CAPT. ROCKLIFF: Detroit -- it was a Detroit accident in a DC9 or an MD of some sort-- and I believe it was Northwest, but it involved not having leading edge devices out on the airplane. And there was a fair amount of emphasis. You know, this was in the early briefings. It may have changed throughout the years, but in the early AAMP briefings, very, very good use of training aids and what-not.

But emphasis on the fact that part of the problem that the pilots experienced while they were trying to keep the airplane flying in re-stalling a wing, because they were sitting on the edge of a stall with the ailerons, whereas had they used rudder, everything would have been significantly better for them. And supported in simulators here.

And that scared -- that caused me a great deal of concern, because rudder at high alpha always caused me concern. And that was the very beginning of where I started to get twitchy. I don't remember what year it was, but it was probably a year or so before the letter was written.

MR. IVEY: And once that letter was written, did you get a response back?

CAPT. ROCKLIFF: From Ceece?

MR. IVEY: Yes.

CAPT. ROCKLIFF: It was -- actually, we conversed back and forth -- myself and Kenny and I think Tom Imrich -- called each other on occasion, because we knew that American Airlines was very, very proud of their program, and justifiably proud of their program.

We knew that we were perhaps being a little controversial with some of our inputs, and we also knew where we were in the development of the training aid; that there were -- I won't say departures, but lack of single focus between recommendations that the manufacturer had and recommendations of the users out in industry.

So for that reason, we were most interested in finding out about what Ceece's response would be.  And it was quite awhile in coming.  In fact, Kenny, I think, first got a response.  I never did.  I don't know if Tom did.  And eventually, we got a hold of Ceece's office again, and I think it was somewhere around November that I finally got a response back.

MR. IVEY:  Did you see any modifications in the training program for the upset recovery?

CAPT. ROCKLIFF:  I have not seen the program since.  I do know through discussions with -- not from discussions with Ceece or Van, that things have been changed, because I had no reason to be back here.  But I know that Kud [Captain Kudwa] and Aubrey told me when they knew that Kud was coming in that the program was going to be modified, you know, in that timeframe.

And I'd been led to believe that it had been significantly less emphasis on some of the points in the course, which I assumed to be rudder.  But I haven't been back to see the program whatsoever since.

MR. IVEY:  In the letter, there were comments made regarding rudder reversals, and I'll quote:  Rudder reversals such as those -- referring to large rudder inputs, I suppose -- rudder reversals such as those that might be involved in dynamic maneuvers created by using too much rudder in a rudder -- too much rudder in a recovery attempt can lead to structural loads that exceed the design strength of the fin and other associated airframe complements.

My slaughtered paraphrasing here or quoting, I guess I'm trying to ask you: Was there any studies that came out of Airbus, to your knowledge, that talked about fin failure or structural overloads that could result in fin failure?

CAPT. ROCKLIFF: No. Certainly not originated by me. I didn't write that piece. In fact, I believe Tom did, because Tom had a significant amount of experience with rudder work with the MD11 project and with some of the -80 series. So he was a whole lot more in tune with, you know, those dynamics of side-slip and induced side-slip than were the rest of us.

MR. IVEY: When you say Tom, Tom Imrich?

CAPT. ROCKLIFF: I'm sorry -- no. Tom Melody. I'm sorry.

MR. IVEY: Tom Melody, the Boeing pilot?

CAPT. ROCKLIFF: Yes.

MR. IVEY: Yes. Do you have any test pilot experience yourself?

CAPT. ROCKLIFF: No. Just production test. No development.

MR. IVEY: All right. Regarding secondary flight controls, how -- and I'd like to talk about the Uniteds', the Deltas', first we'll start with American -- how did American feel about the use of stabilizer trim as a secondary flight control as part of recovery?

CAPT. ROCKLIFF: The companies, for all good reasons, want to have as simple as possible the procedures or the education that they impart on their crews. I mean, that's key, if you can do it. I'm not sure whether the use of secondary controls were found to be poor methods for utilization through exposure in the simulator.

But what I can relate to you is that during the building of the training aid, we ended up in some long discussions; probably three days' worth of discussion with the group to try and suggest that use of trim is in often case the effective tool, because if you've got unusual control loads as a result of an abnormal trim, you can be pushing all you want.  You're not getting the effect because the stabs are always bigger than the elevator surface on those types of tail planes.

But the reason that the -- a lot of the industry group would say to us, That may be true, but you guys are test pilots and training pilots and people who are doing this all the time.  You're not the average run-of-the-mill person on the line who's not as acute to that.

And we've seen it -- where people push on the trim in the sim and all of a sudden they go the whole opposite direction, and finally, after many, many hours and days of debating this, we said, Yes, but you have no G load in the sim, and if you're pushing on a -- like, if you've got a control column pushing back on you and you're pushing on the trim to counter it, absolutely in the sim you can go all the way, which would have equivalent of about a minus 2 or minus 3 [Reference to G’s.].

But the split second you go below minus 1 in the airplane, you know it by the seat of your pants, and that again is one of the simulator issues.  Whether that's the basis for various carriers being anti or against secondary controls, don't know.

One other one that we had suggested which was quite controversial and understandably controversial is the notion of reducing thrust on underslung engines, which is completely counterintuitive.  You know, if you're losing energy rapidly, to pull power back is not something that any pilot could feel very comfortable with, particularly if the ground is closely under you.

But in certain conditions, it is the only way you will get the nose down. The only way. With the exception of rolling it over, you know. Exchanging the lift factor.

So their arguments were not incorrect in some of the notions, you know, that primary flight controls are exactly that -- primary flight controls, what a pilot should be using first. But from our standpoint, from the manufacturers' standpoint, we were trying to look at simplicity in recovery awareness to the extent that we don't want to see pilots get themselves in another upset condition as a result of trying to recover from the first one.

And if you've got the stick pushing back at you and you roll up to the horizon where you have very little energy left, at some point you're going to be very susceptible to a nose low with rapidly accelerating. So, you know, there are tiny points between the intended message of the manufacturers and that of what the large cross-section of users was, you know. Wasn't any one company. It was a lot of companies.

MR. IVEY: Do you know whether it has been accepted by Delta or United -- the use of secondary flight controls?

CAPT. ROCKLIFF: I don't know the answer to that.

MR. IVEY: Angle of attack indicators -- is there one in the A300/600?

CAPT. ROCKLIFF: No. There's an option that you have. I hedged on that because I was trying to remember the airspeed indicator, because it's built into the fly-by-wire airplanes as part of the airspeed indicator.

MR. IVEY: An angle of attack?

CAPT. ROCKLIFF: Alpha. Alpha indicator, yes.

MR. IVEY: How was the presentation related to angle of attack? Did you feel comfortable with what was being presented at that time, since angle of attack may not have been in any of them -- American's airplanes at that time, I may be speaking incorrectly here, but I want to say about 1997?

CAPT. ROCKLIFF: Well, the A300s had -- they have a VSTAL tape which is dynamic. So in essence, it's a partial angle of attack indicator except that it's a limiter.

MR. IVEY: Yes.

CAPT. ROCKLIFF: It's the VSW it's called, I think -- the stall strip on your airspeed indicator? Something like that.

MR. IVEY: The crossover angle of attack or the crossover speeds -- what was your feeling about that type of information being presented to the pilots?

CAPT. ROCKLIFF: You're talking about with the 737s -- the notion of rudder versus aileron?

MR. IVEY: Yes.

CAPT. ROCKLIFF: Well, we don't have that on any of the Airbus variants. You always have aileron roll spoiler authority to exceed rudder. So crossover is not a notion on our airplanes.

MR. IVEY: In your experience, I'm sure you've encountered wake turbulence from time to time. Have you ever been in wake turbulence for any length of time?

CAPT. ROCKLIFF: Never.

MR. IVEY: Has it always been --

CAPT. ROCKLIFF: I've been burbled in and out on approach, you know. But not where you're in to the point where, you know, like ten seconds, around that. Personally, I have not.

MR. IVEY: It's been basically a shot or a jolt or some sort of a jarring effect and then it's over?

CAPT. ROCKLIFF: Uh-huh.

MR. IVEY: Are you familiar with the rudder load limiter on the A300?

CAPT. ROCKLIFF: I used to be.

MR. IVEY: The idea --

CAPT. ROCKLIFF: You talking about the deflection from three and a half degrees to 30 degrees from 165 to 300 and something?

MR. IVEY: Correct. Sounds like you been all over --

CAPT. ROCKLIFF: But I don't remember too much more than that.

MR. IVEY: That's pretty good. Sounds like you've been doing your homework.

CAPT. ROCKLIFF: That's travel limiter, not load limiter.

MR. IVEY: Rudder travel limiter. I stand corrected. Thank you. Do you have an understanding as to why their rudder travel limiter is installed on that airplane?

CAPT. ROCKLIFF: Why it's installed?

MR. IVEY: Yes, sir.

CAPT. ROCKLIFF: Well, to restrict the deflection at higher speeds, because you have higher side-slip probability with larger deflection and therefore loads on the fin. It's not unique to that airplane.

MR. IVEY: I think it's also incorporated in some of the manufacturer, some of the Boeing products.

CAPT. ROCKLIFF: Yes.

MR. IVEY: Is that principally because of loads on the tail that could be induced by further deflection at higher airspeeds or is there another reason?

CAPT. ROCKLIFF: I would be making an assumption to answer that, Dave. I would be making an assumption. For sure, it's a load function. But exactly where on the airframe the load is being considered, I don't know.

MR. IVEY: Have you ever heard the term doublet?

CAPT. ROCKLIFF: Yes.

MR. IVEY: Have you heard of it -- were you made aware of it since this accident?

CAPT. ROCKLIFF: Yes.

MR. IVEY: But not before?

CAPT. ROCKLIFF: Correct.

MR. IVEY: Then you're just about in 100 percent of the pilots, exclusive of test pilots, because I think that was a universal reply -- no, I do not know what that was. Seems to be more of a test pilot term. Since the accident, has there been any modifications to your knowledge in training or upsets regarding use of rudder?

CAPT. ROCKLIFF: You're talking about for Airbus training?

MR. IVEY: Yes, sir.

CAPT. ROCKLIFF: I don't train upsets in Miami, and I haven't conversed with my colleagues in Toulouse who do the A300s, so I don't know the answer.

MR. IVEY: Over in Toulouse in those simulators over there, do they teach upset training at all or is it pretty much the same program as here in the United States?

CAPT. ROCKLIFF: Well, if they did, it would only be on the A310/A300/600 variant.

MR. IVEY: But you're just not aware?

CAPT. ROCKLIFF: I'm not aware.

MR. IVEY: Has there been any communications provided to you regarding any restrictions on rudder before this accident? Rudder use that you --

CAPT. ROCKLIFF: Not that I can recall. No. No.

MR. IVEY: Has there ever --

CAPT. ROCKLIFF: There's never been any emphasis on it in order to restrict it in the first place.

MR. IVEY: Has there been --

CAPT. ROCKLIFF: I mean, we were crystal-clear from the day we got into developing a training aid. That was the main reason Airbus got involved, because we were concerned with use of rudder.

MR. IVEY: Because of the fear of overload or overstress or --

CAPT. ROCKLIFF: Departures. Departures. No, we weren't thinking -- I wasn't thinking so much of overstress. I was thinking in terms of the sensitivity and the effectiveness of rudder at high alpha. You know, high alpha and rudder is a great recipe for a spin.

MR. IVEY: Or as you said, you could complete both maneuvers at one time going from a nose high with ineffective flight control usage to recovering from a nose high, and now having the opportunity to recover from a nose low because of incorrect control inputs?

CAPT. ROCKLIFF: Yes. Personally, I had never considered -- never even given any thought to rudder at other than low speeds because, you know, it was a case of not thinking about, you know, a large swath of scenarios.

MR. IVEY: Do you have any idea whether or not in cruise at high speed that there's a limit in the amount of rudder pedal throw in the cockpit?

CAPT. ROCKLIFF: I used to know that and I'm guessing to try and respond to that. I don't know.

MR. IVEY: How about the new airplanes?

CAPT. ROCKLIFF: You know, I don't know on the new airplanes, because I've never pushed the rudders at any speed.

MR. IVEY: And I have had that response also. I think that's --

CAPT. ROCKLIFF: In flight tests --

MR. IVEY: -- fairly safe --

CAPT. ROCKLIFF: -- in production flight, I've done some fairly wild rudder work on the fly-by-wire airplanes, but it's always just one deflection and then stop and let the -- you know, it's for testing the yaw damper; never both ways, so I couldn't answer that.

MR. IVEY: In terms of demonstrating or producing Dutch roll, do you often do that in production test flights; get into the Dutch roll and then --

CAPT. ROCKLIFF: On first flight there is -- it's not really a Dutch roll to get you into Dutch roll. It's simply a case of ensuring that the yaw dampers are functioning so that once you deflect it that you come back and you have no more than half oscillation, you know, back to symmetry.

But you'd have to get rid of a number of computers to induce Dutch roll.

MR. IVEY: To negate the effect of yaw dampers --

CAPT. ROCKLIFF: Yes.

MR. IVEY: -- I would presume would be a major consideration?

CAPT. ROCKLIFF: Uh-huh.

MR. IVEY: Rudder reversal -- what does that term signify or mean to you either as a pilot or as a --

CAPT. ROCKLIFF: Well, as a non-technical term for me it would mean utilizing rudder both directions. You know, putting it on and inducing a side-slip angle and then recovering it and going over to the other side where you end up with a coupling.

MR. IVEY: In view of the accident that occurred at the speed range of 230 to 250 knots, as we know, you're typically limited to 250 knots below 10,000 feet anyway, so that's not a high speed by any means. Does it surprise you that with your knowledge of the accident, based on what you've read or understand, does it surprise you that with the rudder inputs that were made that this tail has broken off?

CAPT. ROCKLIFF: I can tell you that I haven't seen the DFDR traces, so everything would be second-hand to me and then third-hand back to you to speculate that. So I'm going to defer on that one. I just don't know. Plus I'm not a structural engineer.

MR. IVEY: Have you ever felt like as a pilot in an Airbus airplane or any airplane, for that matter, but I guess let's stick to Airbus for a moment -- that you felt like the rudder flight control was something that had to be treated gingerly or in any different fashion than aileron control or elevator control? Did you -- you felt like there needed to be special consideration to that?

CAPT. ROCKLIFF: No. No, I've never felt that way. You know, in other words, if you have asymmetry, you know, you utilize the rudder. If there is -- if you have to decrab and you've got a whole lot of mechanical turbulence close to the ground, you use rudder.

So no, I've never felt on any of our airplanes that I had to be more particular with any control than the other. But I'm in the middle of the envelope and yes, I haven't felt anything of that sort.

MR. IVEY: Have you been made aware of any rudder anomalies on Airbus airplanes before or since the accident?

CAPT. ROCKLIFF: Not that I can recall. Certainly nothing since the airplane that I'm aware of. I know that I've had in the past on fly-by-wire airplanes as well as on 310s, 300s, you know, occasional rudder travel limiter faults where it will either be in high speed mode or low speed mode but, you know, you have an ECAM [Electronic Centralized Aircraft Monitoring] list that heightens your awareness in those cases.

And so those would be cases where I, you know, would suspect that a pilot would be more conscious of the inputs of that particular axis.

MR. IVEY: I believe you were involved in the American incident 903 which involved the blanking of their PFDs [Primary Flight Display] they --

CAPT. ROCKLIFF: SGUs, [Symbol Generator Units] yes. The EFIS [Electronic Flight Information System]. Yes.

MR. IVEY: The EFIS system?

CAPT. ROCKLIFF: Yes.

MR. IVEY: And that was based on roll rates in excess of 45 degrees per second. Is that a --

CAPT. ROCKLIFF: You have a good memory, too.

MR. IVEY: Do you know if that blanking would have anything to do with, say, rudder -- let's call it heading change rate or a side-slip rate -- could that cause the same kind of blanking? Have you anything about that?

CAPT. ROCKLIFF: The blanking -- well, what you'd have to do is go back to the traces. But the SGUs have got computed data up to 45 degrees a second roll rate, and above that in all speed ranges, the effectiveness of the normal roll control elements, you know, the coordinated auto controlling, auto coordination, roll spoilers and aileron, will not give you anywhere close to 45 degrees a second. I don't know what the rate is.

So something -- Mother Nature, something -- would have to induce a rate to get you above 45 degrees a second in order to blank the SGUs.

MR. IVEY: But that is the only parameter that would cause blanking -- roll rate as opposed to --

CAPT. ROCKLIFF: Well, or some kind of an internal failure.

MR. IVEY: Right.

CAPT. ROCKLIFF: But that is a parameter, because it's a continual refresh of the picture that the EFIS is generating. And so in order to have that refresh so that you don't have a segmented picture like this as the roll or the pitch is going, then it has to do it within an envelope, just like any other parameter that a computer can compute.

And if you exceed that rate, then it goes into what's considered a non-computer data mode, which is to give you slant line ambers across the screens until the rate reduces you know, until it's back into that envelope. But how -- you know, how we'd achieve that rate, you know, could be a number of reasons.

MR. IVEY: You were saying obviously pitch would not be 45 degrees per second because that -- you just -- that's not practical --

CAPT. ROCKLIFF: Be slightly more than 2-1/2 G.

MR. IVEY: Yes, that certainly would -- but do you think there's a limitation on the amount of pitch too for the same reason as we just were discussing the 45 degrees roll, because that would have to -- the symbol generators would also have to maintain whatever pitch rate you were using, and I guess I just --

CAPT. ROCKLIFF: It's a rate change function.

MR. IVEY: Yes.

CAPT. ROCKLIFF: So it's a rate change function of 45 degrees a second.

MR. IVEY: In any axis? So if you were capable of -- and I don't know this, I'm -- if you were capable of --

CAPT. ROCKLIFF: That would be vertical in two seconds. You wouldn't be capable physically.

MR. IVEY: And similarly, with the rudder which if you could do 45 degrees a second in rudder, I presume that that would apply there, because this is a symbol generator issue, not --

CAPT. ROCKLIFF: If you flick the airplane you can exceed 45 degrees a second.

MR. IVEY: If you what?

CAPT. ROCKLIFF: If you're at high alpha and there's a yaw induced, you'll exceed 45 degrees a second. Absolutely. Spin entry.

MR. IVEY: I didn't know that. Have there been any limitations or restrictions -- and I may have asked you this question; forgive me if I repeat myself -- have there been any restrictions or limitations placed on rudder usage since the accident?

CAPT. ROCKLIFF: Not to my -- to my knowledge, no. I have received nothing in Miami.

MR. IVEY: And I think we said that -- well, you haven't flown the A300 for quite some time, but there was never any restrictions ever placed on rudder usage in that airplane that you know of?

CAPT. ROCKLIFF: Not that I recall.

MR. IVEY: Captain Melody mentioned that one of the greatest rudder inputs is during an engine failure or V1 -- I suppose V1 cut or just an engine failure, even in flight.

CAPT. ROCKLIFF: Uh-huh.

MR. IVEY: Have you ever seen any communications that talked about pilot inputs identifying in their mind the wrong engine, putting in a full rudder opposite what should have been, followed by a full rudder in the proper direction to offset the side-slip that's developed by --

CAPT. ROCKLIFF: I haven't experienced anyone doing that. You know, I've read about that kind of thing happening, but I haven't experienced it myself with anyone I've ever trained or flown with.

MR. IVEY: Do you all have a wake turbulence encounter devised into your training program for --

CAPT. ROCKLIFF: You mean, like a roll? A roll scenario?

MR. IVEY: Don't teach wake turbulence per se other than to discuss it perhaps in ground school or something?

CAPT. ROCKLIFF: Well, we -- at the Airbus training center, our primary role is transition training and not recurrent or continuation training, so we're trying to qualify people on a new variant versus route training and environment-type training.

So the FAA has got enough for us on our plate to do to, you know, go through the PTS, so areas where we could be and probably should be devoting some attention to our offset in order to do tasks that the FAA require. But in our lofts, you know, certainly these are items that are brought up.

We do not have a model per se that induces a roll type moment as per vortex or something of that nature. Turbulence -- by all means. The instructor can induce a turbulence and they get along the awareness factor by saying, You're following such-and-such so many miles ahead, so that the crews are aware.

But by and large, we don't overemphasize it because we're not dealing with light airplanes. You know, heavy -- behind heavy or even a, you know, 320 behind heavy, you'll get jolted, no doubt. But we haven't emphasized to the point of requiring any sort of specific, you know, recovery type training.

MR. IVEY: Since the accident have you been made aware of any changes that American has made to their training program regarding wind shear, micro bursts, upset training, wake turbulence?

CAPT. ROCKLIFF: Not that I know of.

MR. IVEY: And I might just reverse that question, too. You all haven't made any changes in your training program addressing rudder usage; have you, since the accident?

CAPT. ROCKLIFF: No. Actually, I think that we wouldn't even consider it until the Board comes up with findings, you know, because that would be making assumptions.

MR. IVEY: Have you ever heard of anyone having an uncommanded rudder input on an A300?

CAPT. ROCKLIFF: I have not heard of it. Let me back that up. It seems to me that there have been a couple of instances with autopilots on where there's been yaw damper. In fact, since the event, I have heard of an American, I think out of Lima or some place in South America, where they had some yaw on departure.

MR. IVEY: Have you heard any resolution to that or find out what it was --

CAPT. ROCKLIFF: I think it was a yaw damper, actually, near -- I believe I read -- I just somehow recall that. I didn't study it in depth. And I do recall hearing something about the fact that -- I don't remember if it was indirect or from a pilot report, but what triggered me to yaw damper actuator was that the rudder pedals didn't move. It was yaw experienced, but the pedals weren't moving.

MR. IVEY: Do you get any input from the pedals on a backdrive, if you will? You just mentioned yaw damper doesn't send an input back to the pedals. Does autopilot, if it were trimming a lot of rudder in; you'd start to notice that on your feet in the cockpit?

CAPT. ROCKLIFF: Uh-huh.

MR. IVEY: Has there ever been any uncommanded rudder pedal inputs that you've experienced personally, first, or have you heard about, second?

CAPT. ROCKLIFF: I don't recall myself. I suppose I probably would if there was -- certainly if it was an abrupt. So I can't say that I've experienced any abnormal backdriven from the autopilot. I think American had an incident a few years back into Miami as well with an autopilot on approach where they were getting some excursions, and I don't remember what the parameters were.

I just remember reading a report on it, but I wasn't involved at all in the fix.

MR. IVEY: Is there autopilot and the trim, rudder trim, the only two airplane inputs that would backdrive the rudder pedals?

CAPT. ROCKLIFF: The rudder? The autopilot servos and the rudder trim?

MR. IVEY: Yes.

CAPT. ROCKLIFF: Normally speaking, yes. I think that's correct.

MR. IVEY: I guess if you got a gust load or something on the tail, as in the case of, let's say --

CAPT. ROCKLIFF: No. You wouldn't with a gust.

MR. IVEY: You wouldn't?

CAPT. ROCKLIFF: No.

MR. IVEY: Even if it displaced the rudder it would not come back --

CAPT. ROCKLIFF: Not if you have hydraulic pressure. No. You won't have a gust deflect.

MR. IVEY: So the hydraulic pressure would contain whatever that -- let's call it gust load factor on the rudder, would not -- the pilot would not sense that?

CAPT. ROCKLIFF: Huh-uh.

MR. IVEY: And as you say, the yaw damper -- you don't tell that either through the pedals?

CAPT. ROCKLIFF: That's my recall of the system on that airplane. I feel like this is an oral day.

MR. IVEY: Let me give you a little credit for that so that on your next one, you won't have as many detailed questions on flight controls. In your experience with the Airbus airplanes, has continuity been established from the A300 right on through the latest variance of the airplanes relating to flight control feel?

And I better qualify that, because we've got fly-by-wire and we've got the old basic systems of cables and such. I guess, to clarify my question, when you put aileron control into an airplane, as you get more and more aileron in, does it take more and more force to bring it over to a complete aileron displacement?

Or is it very much like power steering in your automobile where it's the same force and the further you turn the wheel, the more the tires turn on the pavement?

CAPT. ROCKLIFF: Some of your automobiles. To give you an accurate answer I cannot, because I'm just going by recall -- that portion of the flight controls. I remember it as being no loading. It's not a spiral stability in the input or in the reaction, because it's a controlled deflection and there's no restriction at all.

But to be categorically accurate, I would have to review that -- the system again.

MR. IVEY: Yes. For example, to relate to the rudder, if you were trying to put more rudder into a slip stream, do the pedals get harder to try to push it in, based upon how fast you --

CAPT. ROCKLIFF: Yes. I don't remember. I just don't remember. Of course, the other side of it too is adrenaline can be quite an equalizer.

MR. GOACHEE: And, Dave, while you review that, can I just ask a question about --

MR. IVEY: Yes.

MR. GOACHEE: I'd like to know what each response report in this letter so that when it comes time for me, I could ask a couple of questions.

MR. IVEY: Certainly.

MR. GOACHEE: In other words, I understand everybody worked on this separately, but can you tell me what you specifically addressed in this letter?

CAPT. ROCKLIFF: Well, we actually -- we all had inputs to virtually all -- I can recall --

MR. GOACHEE: I mean, you agreed, yes.

CAPT. ROCKLIFF: -- pieces that I've written in each of the topics.

MR. GOACHEE: Yes, but you agreed on everything --

CAPT. ROCKLIFF: Yes.

MR. GOACHEE: -- but individually, you worked on certain segments and then you submitted yours and somebody else submitted theirs or no?

CAPT. ROCKLIFF: You know, I don't remember that, to be honest.

MR. GOACHEE: Okay.

CAPT. ROCKLIFF: I mean, I know for sure I was responsible for the simulator, but I also can recognize my prose in various other components in there as well.

MR. GOACHEE: Okay. But you were responsible for the simulator portion?

CAPT. ROCKLIFF: Yes.

MR. GOACHEE: Okay. That's all. Thanks.

CAPT. ROCKLIFF: Unfortunately, it was -- well, fortunately, it was quite a few years ago, you know, so --

MR. GOACHEE: I know the feeling, believe me.

CAPT. ROCKLIFF: I don't have a memory like my wife where she remembers stuff from 30 years ago like it was yesterday. Selective memory.

MR. IVEY: When Captain Ewell responded to the joint letter, what was your impression of American's take on the joint recommendations?

CAPT. ROCKLIFF: My take was that he wasn't overly impressed with the amount work we'd put in to try to provide him with some profound input.

MR. IVEY: And as a result, do you think most of the suggestions that you made in this letter were accepted or rejected?

CAPT. ROCKLIFF: I don't know the answer to that. All I know is that when the new management came in, they knew that there were going to be changes. You know, I was led to believe that there were going to be some changes in that program.

MR. IVEY: New management meaning when Captain Ewell retired that --

CAPT. ROCKLIFF: Yes. When Aubrey Landry took over the training department and Captain Ewell retired.

MR. IVEY: But you don't know for a fact whether or not it has happened, do you?

CAPT. ROCKLIFF: I don't know for a fact, because I have not come back -- I have not had any exposure to the actual program, the American Airlines program, since the symposium or, you know, whatever the event was that we attended and wrote that letter.

MR. IVEY: Well, thank you.

I'd like to go around the room and see if anyone has any questions, and I'll start by asking Bart Elias, NTSB.

DR. ELIAS: I think you've just answered my first question I had, which was whether you ever attended any subsequent presentations, which apparently you have not. Have you ever received any updates in terms of what changes they've made to the AAMP manual that they distributed?

CAPT. ROCKLIFF: I don't think so. No. I don't recall receiving anything since then.

DR. ELIAS: Pretty much other than your initial input, you really haven't been integrally involved in the program?

CAPT. ROCKLIFF: No. We went -- we, meaning industry and the manufacturers -- worked on the industry program, and so our resolve was to try and get, you know, people looking at an industry, a joint tool versus a specific one at a particular carrier.

DR. ELIAS: That brings me to the next question I was going to ask you which is about the industry training aid. You said that you were working on that for some time before you went to this presentation on the AAMP program. Is that correct?

CAPT. ROCKLIFF: Yes. I believe we started that one in '95. I think that the first meeting we had was actually at ATA headquarters, and at that time there was concern amongst the industry that it was going to be regulated as a result of the NTSB investigations on Pittsburgh, because it had been the second event of a similar sort of nature.

And so we were looking to be proactive to, you know, come up with some guidance and some voluntary work that carriers could do. Some time between that first meeting and not too long after, which I suppose is around the time that the American Airlines program was starting to get off the ground, was when Ceece invited me.

We happened to have a campaign going on at that time to try and sell airplanes, and I got to American Airlines and I had Ceece send some of his flight ops team in Miami for a demonstration. He invited me down to Dallas to experience their program.

And then following that was when we got back together again as an industry unit, still with ATA, looking at it, and Boeing at that time, Dave Carbaugh, had said that Boeing Company would work towards developing a training aid much like the CFIT.

And I said, We will stand beside you and split the costs in half, as a corporation. And that's where we took it from there.

DR. ELIAS: Am I correct in stating that ATA is sort of the organization that started this whole thing on the industry training aid?

CAPT. ROCKLIFF: Well, they were the -- no. I wouldn't say that they started it. I would say probably Boeing did. I think probably Dave Carbaugh would be credited with that. But ATA was a venue where we all met, you know, from the training committees of different carriers.

DR. ELIAS: Then from those meetings and everything, you developed the training aid. You mentioned you had both an initial and a recurrent package that's delivered. What does that consist of?

CAPT. ROCKLIFF: There's a workbook. There are videos. There's CD-ROMs, all of which are the same, you know, essential content. Interestingly, we brought in the chief test pilots from the three companies -- John Cashman from Boeing, Tom Melody from Douglas Boeing at that time, with McDonnell Douglas, and Bill Wainwright from our company.

That was how much concern we were as the training wing of the manufacturers to -- so that the industry would appreciate the message that we were saying. If they wanted to say, to heck with you training people. You don't know what you're talking about. We figured at least if we could get the chief test pilots from the three manufacturers, we might have an elevated credibility in our message.

And they're throughout the film, and throughout the film the two -- the film and, you know, and the workbook -- their messages are in unison. You know, it wasn't for the sake of the training aid. It just so happened that, you know, aerodynamics is aerodynamics, and it doesn't matter who puts the airplanes together, we can't change that.

We can try and change it and we can try and make it as simple as we want so that one size fits all, but it still comes down to Newton in a lot of cases.

DR. ELIAS: This training aid who worked with many of us on all the other components of it -- assume that was distributed then to all carriers that had Airbus equipment in their fleet?

CAPT. ROCKLIFF: Correct. What we did initially is -- and I can't remember the identical specifics -- but we kind of divided the world up. The training aid was meant for large swept-wing transport category aircraft. It wasn't meant for fat little turboprop, you know, fat wings, bellows on the leading edge.

What we determined was that there were certain companies that were exclusive Boeing customers. There were certain companies that were exclusive Airbus customers; i.e., Southwest for total Boeing, Jet Blue, although they didn't exist back then, but you know, somebody who was exclusive Airbus.

The manufacturers would be responsible for those, and Flight Safety Foundation would take care of all of the other ones and the continuing, you know, as it's gone along. In practice, what has occurred -- and by the way, we sent them to Aeroflot people, Aleutian customers throughout the world -- but in practice, I'm sure that Boeing will repeat what I'm going to tell you, is that operators have throughout the years said, Hey, have you got a copy of that training aid? And we'll just send them out CDs.

There's been no update to the program since we put it out.

DR. ELIAS: Next question I have is regarding rudder feel or rudder feel force travel and also throwing in there stuff about yaw dampers and rudder travel limiters, have you had any feedback from customers about the feel characteristics? I'll go across your fleet now and in any plane in particular, do you recall?

CAPT. ROCKLIFF: No, I don't believe so. No, I can't think of it. The only thing I can possibly think of is, you know, in comparing a long body airplane and a short body airplanes -- 320 and the 330, for instance -- that it may feel like you need for an asymmetry, for an engine out, that you need more rudder pedal, more deflection, to actually center the beta index.

But insofar as the actual feel of the rudder, I don't recall at all, you know, any feedback on any specific airframe.

DR. ELIAS: Any feedback you've ever received from trainees in terms of feel characteristics on rudder?

CAPT. ROCKLIFF: No. Not that I've been exposed to. Ron may have some more experience. He deals more with the trainees than I do.

DR. ELIAS: Okay. When you first went and observed the AAMP training course, did you feel that the information at about side-slip and side-slip angle was either lacking or inappropriate?

CAPT. ROCKLIFF: I don't remember. It was too long ago. I mean, it was a very, very full day. You know, I was in -- for the most part; I was suitably impressed with the program. It was just -- you know, a few points that sort of stuck out as being not quite in the direction that I would have favored, but I don't recall any intentional lack of emphasis or anything like that on something like side-slip. It was too long ago.

DR. ELIAS: Are you familiar with the concept of top rudder?

CAPT. ROCKLIFF: Top rudder?

DR. ELIAS: Top rudder.

CAPT. ROCKLIFF: In what sense?

DR. ELIAS: Well, it was introduced in the AAMP course, and I don't know what iteration of the course that it pertained to.

CAPT. ROCKLIFF: I don't remember.

DR. ELIAS: Are you familiar with the term at all?

CAPT. ROCKLIFF: (No response.)

DR. ELIAS: I think we already talked about the idea of crossover -- angle of attack and crossover speeds; I won't repeat that. See if I have anything else for you. No, I don't think so. That's all the questions I have. Thank you.

MR. IVEY: Captain Guy Arondel, BEA.

CAPT. ARONDEL: Thank you.

Regarding the letter sent to American Airlines, were Airbus industry training and Flight Operations Center in Toulouse aware of this program and aware of the content of this letter?

CAPT. ROCKLIFF: Definitely Airbus was aware of the training program that we were doing, the AAMP program. I liaised directly with my counterpart and my boss, Pierre Baud, at that time.

In fact, when I made the bold statement that I was going to commit several six-digit figures into developing this training program without the authority, the first person I called was Pierre Baud, who said, Absolutely, Airbus will, you know, work side by side.

The actual letter I don't recall. Because I was the project manager for the upset training, I worked on a regular basis with flight test, with our aerodynamicists and with the development engineers and the development test pilots.

But I didn't give them, you know, like a weekly update as to what was going on, and so I'm not even sure that I ever sent Pierre a copy of that letter.

CAPT. ARONDEL: Is there a document in which Airbus informed airline pilots of the recommendation concerning the use of the rudder and the risk of improper utilization of the rudder?

CAPT. ROCKLIFF: I'm sorry. Can you repeat that, please?

CAPT. ARONDEL: Yes. Is there an information given to airline pilots regarding the use -- improper use of rudder?

CAPT. ROCKLIFF: Yes. In the Fast article there are several key bullets throughout the article. And I think, in fact, throughout the article the only key bullets are referenced to the use of rudder.

CAPT. ARONDEL: In the flight operating manual, FCOM?

CAPT. ROCKLIFF: I don't recall if there's anything in the FCOM. I don't recall.

CAPT. ARONDEL: That's it. Thank you.

MR. IVEY: Thank you.

Captain Delvin Young, American Airlines.

CAPT. YOUNG: Just to kind of tag onto that, do you remember any type of -- other than the Fast article, any paper or procedure or anything that addresses the use of rudder or restrictions, limitations, anything like that?

CAPT. ROCKLIFF: There was a presentation that was given at the Airbus symposium and repeated in ALPA's magazine, a two-part series written by Bill Wainwright, who's our chief test pilot. And I don't recall specifically the name of the article, but it was along the line of, you know, upset recovery or unusual attitudes as seen from a test pilot.

And it actually was kind of a summary of the three and a half, four years, whatever it was -- maybe that's stretching it -- but the length of time in the development of the building of the training aid.

But actual technical data, I don't recall if we have anything that's specific to use of rudder.

CAPT. YOUNG: Okay. The fly-by-wire aircraft -- they have -- you kind of mentioned it seems like fairly automated dependence, and I have some experience with fly-by-wire aircraft. But it kind of seemed like in an unusual attitude that basically, the programming of the fly-by-wire systems would recover the airplane?

CAPT. ROCKLIFF: If you ended up in an extreme attitude -- if Mother Nature or multiple degradation of the system or a collision -- were to flip you into an extreme attitude, then the pilot would be able to -- would be able to -- would be left to his or her own capability to get it out.

For instance, if you -- if it ends up in a rolling moment. If Mother Nature or something, some kind of a vortex, causes it to roll, without the pilot, with any input whatsoever, as it's rolling right, all of your roll controls will be trying to counteract it to the left.

As you exceed, it varies with each of the fly-by-wire models, but it's in the area of 135 degrees of roll where the pilot may just say, To hell with it. I don't want to continue this way. I'll just continue in the direction that I'm going. You can do that, because what happens is the computers don't just all of a sudden say, There you go. You know, you're in trouble. Fix it yourself.

It's that they've given it everything that they can up to that point, and whatever they've got with full deflection isn't working, so therefore, the pilot's given the option. However, if at 140 degrees of roll Mother Nature decided, Okay, you're on your own, it would not roll you back upright; the pilot would have to do that.

CAPT. YOUNG: It would be -- the pilot would be required to do that.

CAPT. ROCKLIFF: Right. You have a direct mode, you know, link to the controls.

CAPT. YOUNG: Okay. How does -- in that case, how does the -- prior to the 140 degrees where you can say that the pilot would decide maybe he could go ahead and continue the roll on around?

CAPT. ROCKLIFF: What happens is the normal roll limit -- now I'm going to give you some information which I'll ask in the oral for the 320 -- the normal roll limit is 67 degrees. Sixty-seven degrees equates to 2-1/2 G if you have sufficient energy, so that's why it's 67.

So if Mother Nature's rolling you and you're beyond 67 degrees of bank, even if you roll in the direction you're going, it's going to be trying to counteract you to get you less than 67 degrees of bank, which it's starting right at -- you know, from the level.

But once you exceed that 135, it's now said, Hey, I've done everything I can here. We're rolling at 50 degrees a second. SGUs still showing, and the MCs on that airplane, but at that point you'd be able to continue the roll, and that's -- I forget the actual term. It's unusual --

CAPT. YOUNG: Abnormal law.

CAPT. ROCKLIFF: -- abnormal law. Abnormal law.

CAPT. YOUNG: Okay. And the rudder is interconnected through that entire process or --

CAPT. ROCKLIFF: If there's adverse yaw; only if there's beta that's measured by the accelerometers.

CAPT. YOUNG: Okay. Okay. Great. So the fly by wire on the airplanes, the fly-by-wire have rudder input all the time, just like the ailerons, the spoilers, and all the other roll -- pitch controls?

CAPT. ROCKLIFF: If required.

CAPT. YOUNG: Yes. If required.

CAPT. ROCKLIFF: If there's any, you know, yaw, aerodynamic yaw that's induced.

CAPT. YOUNG: Okay. Do you know of any limitations or restrictions or cautions concerning -- and obviously, we're concerned after this accident, we're certainly about the airplane coming apart and finding out why, which is why we're all here.

But do you know of any limitations or cautions or restrictions that we need to be concerned with below maneuvering speed but below $V_a$?

CAPT. ROCKLIFF: Not that I'm aware of at all.

CAPT. YOUNG: Particularly in relation to the rudder, obviously?

CAPT. ROCKLIFF: Yes. No, not that I'm aware of at all. I think that -- I think it's sufficient to say that given the Board, given the FAA, given the DGAC or the JAA and the BEA but more fundamentally Airbus, if there were anything whatsoever, it would be broadcast wide and loud and clear, because, you know, nobody wants a repeat of what's happened.

CAPT. YOUNG: Right.

CAPT. ROCKLIFF: So it's not a case of anybody being aware of anything. You know, every speck of information that can be extracted daily is being done.

CAPT. YOUNG: Okay. Does the autopilot ever -- does the autopilot continue -- and I know we're doing a little flashback maybe not the right person -- but does the autopilot continue to give input into the rudder specifically, even though it's not engaged?

CAPT. ROCKLIFF: No. Does not.

CAPT. YOUNG: Okay. Do you know any case where there's been a loss of control or something like that with, in particular, the 300 or the 310, by uncommanded rudder inputs? Like, at altitude cruise or something like that?

CAPT. ROCKLIFF: I've never heard of anything like that.

CAPT. YOUNG: Okay. And should we be concerned -- and I don't mean to harp on it a little bit -- but should we be concerned like what Dave had mentioned earlier where like maybe an engine seizure or an engine failure where the pilot inputs the wrong rudder initially, followed by the correct rudder?

CAPT. ROCKLIFF: I don't know the answer to that. I think probably not, because if a pilot puts the wrong rudder in, it's going to be readily apparent. You're going to have a roll as much as a yaw, and putting in the rudder actually is going to help induce the roll in that case, you know. It would actually be a skid into the roll.

But I think that in a -- and I'm just talking as a pilot, not as an Airbus pilot but just as a pilot -- the seat of the pants is going to tell a pilot very, very rapidly if they've put the wrong rudder on, you know. In other words, unlike you may put on too much rudder into the good engine, which is what you want to do, and back it off, you won't, I believe, not get a tenth of the deflection to the bad engine without saying, Whoops, and loud and clear, probably with a few more adjectives attached.

But that's just my own seat of the pants rendition of, you know, how a pilot would respond to it.

CAPT. YOUNG: Okay.

CAPT. ROCKLIFF: But you know, when their planes are flight-tested, you know, we actually go through some pretty extreme moments on the airplane with -- you know, as part of the certification program for FAR and JAR25, and there's some fairly aggressive maneuvers.

You know, the design load limits that are established in the design of a machine are pretty extreme and they do take into account a fairly wide swath of inputs. I'm not the person who could give you what those inputs are, you know.

The design office, as they relate to adjusting for FAR25/JAR25 criteria, could give you a whole lot more than that.

CAPT. YOUNG: Right. You said you'd done some production testing and so I don't know if you've had any dialogue with the test pilots on the initial certification of the airplane --

CAPT. ROCKLIFF: It's always with them, yes.

CAPT. YOUNG: -- or whatever. Yes. Do you know of any limitations or cautions that they have about rudder reversal at all, either amount of movement or rate of movement?

CAPT. ROCKLIFF: It's never come up in conversation with them, so I don't know the answer to that.

CAPT. YOUNG: Okay.

CAPT. ROCKLIFF: I came along after the 310 was certified, so that's the 300/600, but it's certainly never -- it's never anything that is a topic of conversation I've raised or they've raised with me that I remember.

CAPT. YOUNG: Okay. Thank you.

MR. IVEY: Captain Jim Goachee, FAA.

MR. GOACHEE: I tell you, their guys are sharp because they got all my questions answered. I just have --

CAPT. ROCKLIFF: Well, I'm going to just take it to [inaudible]. Yes, no, blue.

MR. GOACHEE: But you know, when -- well, I understood. But when Dave was talking about uncommanded yaw, I think you said that, yes, you remember one at American Lima. And you were saying it was on the autopilot. Are all these --

CAPT. ROCKLIFF: No, I don't think I said that one was on the autopilot. The autopilot was going into Miami. I recall something, but that was a previous incident that was reported. I'm not sure, but I believe the pilots were hand-flying.

MR. GOACHEE: Okay. This was the yaw damper actuator --

CAPT. ROCKLIFF: Right.

MR. GOACHEE: -- I think you talked about? Let me just stick with the ones that the autopilot was on in a heavy uncommanded roll. Were they always -- I mean, were they making an ILS approach at that time or was it straight and level or did it make any difference, do you recall?

CAPT. ROCKLIFF: I don't know because, see, when I see incidents normally, when I see incidents or operational information, Telexes on A300s and A310s, I don't read them unless they're our companies, you know, over here in North America -- FedEX, American.

So when I do go through them, and I'm speaking for the last few years since I haven't been associated with the airplane, so in order to give you a proper answer, I haven't analyzed them to the point to be able to give you the parameters.

Just to be honest, I do recall seeing something and that's as far as I know.

MR. GOACHEE: Now, you said you've been with Airbus since 1989?

CAPT. ROCKLIFF: Uh-huh.

MR. GOACHEE: And you have all the ratings?

CAPT. ROCKLIFF: Uh-huh.

MR. GOACHEE: So at one time you did instruct on the A310. Is that correct?

CAPT. ROCKLIFF: Yes. I've instructed on at one time on all of them.

MR. GOACHEE: So now it's been a long time, but for the A310 and both a simulator and flight?

CAPT. ROCKLIFF: Yes.

MR. GOACHEE: And did you ever give unusual attitudes in the simulator? I mean, prior; before this Advanced Aircraft Maneuvering. Did you do any unusual attitudes or any?

CAPT. ROCKLIFF: No.

MR. GOACHEE: And you didn't --

CAPT. ROCKLIFF: Other than demonstrating an inverted ILS once, but other than that, no.

MR. GOACHEE: Did you -- I mean, so you couldn't equate to that. I think you answered this question before, Larry, but in all your simulator training or in the aircraft, I think you said that you'd never observed anybody putting in the wrong rudder --

CAPT. ROCKLIFF: That's correct.

MR. GOACHEE: -- and so you never -- in all your experiences with crosswinds and approaches and takeoffs and that, you've never seen anybody use too much, not enough, or --

CAPT. ROCKLIFF: Oh, sure. Oh, of course. Oh, absolutely. I mean, if you're coming in to decrab, most of the time people don't put on enough. You know, if you're in a heavy crosswind, as you well know, runways are always made to be out of orientation to prevailing winds.

And so pilots have a lot of practice at decrabbing. And certainly I've seen pilots who've during the course -- I've done it myself-- had insufficient or too much rudder on when you connect with the ground.

MR. GOACHEE: But the answer -- the question I think had to do with probably engine failure, and I think was that the question. You've never see anybody put in the wrong rudder?

CAPT. ROCKLIFF: I've only had one engine failure on a B4, and so -- in the airplane. In the simulator, I don't recall. I don't recall anybody kicking the wrong rudder. I've definitely talked to people. I remember in Air Force days, you know, people saying, Fire on three, shut down two.

MR. GOACHEE: Yes.

CAPT. ROCKLIFF: But I have not personally experienced anyone using the wrong rudder.

MR. GOACHEE: Just two more. The training aid. Now, this training aid consists of this Fast article?

CAPT. ROCKLIFF: No. The Fast article came after the training aid. It virtually word for word bytes out of the training aid, and putting into context the order to which the manufacturers recommended the steps.

MR. GOACHEE: Okay. Then the training aid included two videos?

CAPT. ROCKLIFF: Uh-huh.

MR. GOACHEE: Correct. Then if this came out after the training aid --

CAPT. ROCKLIFF: Yes.

MR. GOACHEE: -- did the -- does this training aid take into account what you covered in the video? I have never seen it. That's why I need to ask.

CAPT. ROCKLIFF: Well, sure. It's all-consistent. The only thing -- the purpose of the Fast and the Airliner article was twofold. One was to expose it to a broad swath of operators throughout the world who may get a chance to see this but didn't have the training aid.

It was kind of like a teaser to let them know that also the training aid was available to them. But more fundamental was the fact that during the training aid and the consensus-building that we were -- we had to achieve in order to put the training aid out, where the carriers were not interested in a particular recommended order of use of the tools that were available to you, we felt that we wanted to put a proper order, and we actually highlight that somewhere up in the beginning of the article. So those are the two reasons for this.

MR. GOACHEE: Well, you know, I'm just getting confused because the new training aid package consists of a document and a two-part video, and it gives me the impression that it was in addition to this article. And that's not the case?

CAPT. ROCKLIFF: No. The training aid came first. This came after the training aid.

MR. GOACHEE: Okay. So the videos aren't covered in the Fast article, if they needed to be?

CAPT. ROCKLIFF: I'm sorry?

MR. GOACHEE: The information in the two videos that you covered in the training aid -- is that information that you presented in the videos, is that information presented in here?

CAPT. ROCKLIFF: It's consistent with that.

MR. GOACHEE: Okay.

CAPT. ROCKLIFF: Yes.

MR. GOACHEE: Okay. Then you made comment about excluding the Fast article about caution on rudder control. Do you ever hear of any cautions? I think everybody's asked you this question. I don't recall any manual that I've been exposed to, and certainly Airbus, prior to this training aid, that there was ever any caution about using rudder.

Are you aware prior to this article, let's say, '98 -- let's say '96 when you first started with industry and you started working on it -- prior to '96 --

CAPT. ROCKLIFF: That was when the --

MR. GOACHEE: -- did you -- were you aware of saying, Gee, I can't use too much rudder, whether you're at high altitude, low altitude, you know?

CAPT. ROCKLIFF: I don't recall prior to the training aid or prior to my exposure to this notion of upset training anything written down, you know, to suggest that you shouldn't use rudder.

MR. GOACHEE: Now, I think in -- I apologize, but then you started talking reference this article or articles presented -- ALPA presented it and a couple other people presented it -- and I think the question was asked reference the cautions of using rudder now, and you say that you have it in your program or your -- do you have it in your manual?

CAPT. ROCKLIFF: No. The Fast article, Airliner, have got various references to be cautious of rudder. The training aid has got various references to be cautious of rudder. The speech or the presentation that Bill Wainwright made to the industry symposium, the Airbus customer-based symposium, talked about rudder, and that speech was put into the ALPA magazine with references to rudder.

MR. GOACHEE: Yes. But my question is, is that if you had all these cautions and all these different organizations were reprinting it, what if the individual didn't see it? I mean, there are a lot of people --

CAPT. ROCKLIFF: Sure.

MR. GOACHEE: -- that don't do it unless they have training. In your training or in your manual, specifically for your flight crew manual, is there anything in there to caution the pilot that under these conditions, you've got to be very careful of putting the rudder in at a certain rate or full rudder?

CAPT. ROCKLIFF: No. No. And the reason why is pretty simple is because as Dave had alluded to in one of his statements prior to a question, we as an industry have got out of using the rudder, so we had to get trained into using it in order to tell people not to use it.

MR. GOACHEE: Okay. Thank you.

MR. IVEY: Captain John Lauer, Allied Pilots Association.

CAPT. LAUER: A lot of my questions have already been asked, so that cuts me down a little bit. I do have a few.

You had mentioned that you still currently fly in addition to sitting in simulators?

CAPT. ROCKLIFF: Yes.

CAPT. LAUER: Okay. So you're in both environments presently? Okay. Are you concerned about using any abrupt rudder inputs on any of the aircraft that you fly in light of what has happened with American 587?

CAPT. ROCKLIFF: Well, you know, again I would have to say, John, that until we discover what happened -- we know the tail came off. The rudder came off on 587. But until we determine what caused the tail to come off, I have no new concerns today flying in the airplane that I had prior to that -- the date in November.

CAPT. LAUER: Okay. But do you have any concerns about inputting -- abrupt rudder input to any plane you're flying?

CAPT. ROCKLIFF: Well, I'm not sure why I would ever want to put in an abrupt rudder input. You know, if you can help me out with that I can --

CAPT. LAUER: Engine failure, high alpha, low speed?

CAPT. ROCKLIFF: Oh, for sure. If you have asymmetry, I would put in whatever rudder is required to --

CAPT. LAUER: You'd step on that rudder?

CAPT. ROCKLIFF: Absolutely.

CAPT. LAUER: Would you be concerned about the rate at which you step on that rudder?

CAPT. ROCKLIFF: No -- no more concern today than I've ever had putting on rudder. I mean, we're not flying in a force. We're flying airliners. And the tail is 209 feet behind me on an A340. When a Number 1 or a Number 4 fails, the airplane's not going sideways immediately. There's a spool-down period.

So -- and even with a seizure, there's still inertia that's going to keep the airplane going. So there is no reason that I would ever want to, with whatever strength I could muster in my leg, kick the rudder at full rate.

I would be prompt, as I always would, you know, in trying to correct any yaw or rolling moment that's induced from an engine failure, but I have no concerns whatsoever about using -- counteracting yaw with rudder. Not creating yaw with rudder.

CAPT. LAUER: A few moments ago you'd answered a question from Jim, I believe, with regards to never having witnessed a pilot in training or flying with you or yourself accidentally stepping on the wrong rudder and then making an immediate correction to stepping on the right rudder for the situation as being presented to them.

Is it safe to assume that though you have never witnessed it, you would feel that a rudder doublet input in any flight regime -- would you be concerned for the vertical fin leaving the airplane?

CAPT. ROCKLIFF: I suppose that, you know, you need to -- there's a fair amount of speculation involved, to answer that question, because having not been exposed to the lateral accelerations on my seat of the pants, to develop a factor, if you will, you know, like an internal factor, if something's aggressive enough, then I suppose there's reason to be concerned.

I've been afraid twice in my life in an airplane, and once was in the middle of a thunderstorm in a C130 where I honest-to-God thought the wings were going to come off. Turned out there wasn't even so much as a single rivet popped, but I was awfully ginger and very, very nervous watching the aircraft commander manipulating this thing through.

The reason I'm telling this, John, is that dependent upon what inputs a pilot was putting in the controls, and yaw -- the two -- roll gives you no sensation. Pitch and yaw give you sensations that your own accelerometers, built in by somebody a whole lot better at computers than any of us, will give you some feedback as to how much input is comfortable or where your personal factor may say, Gosh, I'm really getting up in no-man's land, in the case of G, you know, a positive acceleration, if we go back in studies -- in fact, in demonstrations -- we can sit in the simulator all day long, yank on the side stick and say, Look. Here's this hard limits that we promote in our Airbus airplanes. Look -- the accelerometer there says 2.5 G and the airplane is stopping at 2-1/2 G and you can be very comfortable with that.

You go out in the airplane and to the person, I have never, ever to this day demonstrated the airplane where a person would pull back on the stick and not relax it, and well before they get to 2 G because their own personal accelerometers say, My God, this feels like an F16 pulling 9 G, not an airliner pulling 2 G.

I suspect that massive yaws sensations -- you know, read by your internal accelerometers -- would be much the same. Long-winded answer because, you know, without putting yourself in that predicament, it's kind of difficult to say just -- because we can go in the simulator and kick all you want and say, Well, I don't feel uncomfortable about it, and you don't because your own backside and your vestibular apparatus is still sitting there stationary at 1 G -- in a 1 G function.

CAPT. LAUER: I recognize that you are a production pilot. Is that safe to assume?

CAPT. ROCKLIFF: Uh-huh.

CAPT. LAUER: And not that of an engineer?

CAPT. ROCKLIFF: Correct.

CAPT. LAUER: Given that, I'll ask you an engineering question.

CAPT. ROCKLIFF: I'll give you a production answer.

CAPT. LAUER: Reverse engineer this. It has to deal with the rudder limiter. I have personally and a lot of us have referenced this system utilizing the word load. You had made mention earlier that it's not a load but a travel. It's probably more correct and more descriptive term to use.

Do you know within the system if there is a sensor that monitors, measures, or reacts to, interfaces with or is affected by any of the aerodynamic loads on the rudder whereby the information is then sent to the rudder limiter computer for analysis?

CAPT. ROCKLIFF: My answer to that is I don't know. I just don't know. My assumption would be, probably not, you know, given the generation of equipment.

CAPT. LAUER: If there is no sensor then, then --

CAPT. ROCKLIFF: There's sensors that read it. If the DFDR has it, it's read some place.

CAPT. LAUER: Well, I'm not speaking to the sensor of rudder travel. I'm speaking to, is there a sensor that measures stress or loads on the rudder which backfeeds to the computer for further analysis?

CAPT. ROCKLIFF: Right. I don't know the answer to that.

CAPT. LAUER: I think that's the extent of my questions. Thank you very much.

CAPT. ROCKLIFF: Pleasure.

MR. IVEY: Captain Ron Skupeika, Airbus.

CAPT. SKUPEIKA: Just one question, Larry.

CAPT. SKUPEIKA: Regardless of the Fast. The Fast article that was created by Airbus and obviously the other one by Boeing -- do you think it -- would you have any problem with or would you advocate making it part of Airbus training for initial trainees or a specific module to enhance training?

CAPT. ROCKLIFF: You mean, for fly-by-wire airplanes?

CAPT. SKUPEIKA: Yes.

CAPT. ROCKLIFF: Well, as we said right at the very front page of it, the concepts of understanding unusual attitudes and unusual attitude recovery is appropriate on any airplane but specific training is not appropriate on fly-by-wire airplanes.

So from an awareness point of view, we've got -- to this day we have that article spread all over the training center available to trainees if they feel that their workload is not sufficient during a transition course.

But insofar as introducing it into the training program, I don't think that we would entertain it unless it was regulated upon us.

CAPT. SKUPEIKA: Just like the core program, crew awareness in the Volume 3 on abnormals versus adverse weather -- icing, stuff like that?

CAPT. ROCKLIFF: That would be something that we would, before we would unilaterally insert it in the document, we would discuss it with our three regional training centers -- Toulouse, Beijing, and ourselves -- as well as a cross-section of the operators. We're not going to just unilaterally put it in there.

CAPT. SKUPEIKA: That's all I got.

MR. IVEY: One last question. Captain Young.

CAPT. YOUNG: It was just quick because it reminded me of that. This letter and some of the AAMP and it looked like an article and then the training aid and this, that and the other, but still yet there wasn't ever a procedural message sent to any of the operators. I mean, that seems strange. Do you know why there wasn't --

CAPT. ROCKLIFF: Procedural?

CAPT. YOUNG: Right, to incorporate some unusual attitude or upset into a procedure. You seem to address the article on those points very specifically, and you seem to have a very -- you seem to be very passionate about those procedures that were developed by the industry, but yet we don't have anything in the manual.

CAPT. ROCKLIFF: Well, you actually hit on something really interesting, really focused, because unlike a number of the carriers, we did not want to develop procedures because there are infinite variables in an upset, be it high attitude, high roll, high energy, low energy, high attitude.

There's such a huge variation, and so in the context of the training aid and in the context of the article, we were looking at awareness education for the pilots and to give them a number of tools that are available to them in both the analysis, anticipating or measuring, analyzing, what your energy seed is at the time, and given some of those fundamentals grouped in phases, analyzed and in effect your recovery, we felt, was too wide of a swath to try and proceduralize.

To come up with a very simple boom, boom, boom, you know, we just felt that it was too much to try and put in there. And so that's why it's very difficult to put into words, because when you put something in a document, particularly in a manufacturer's document, it can become -- a technique can become a procedure just like that, depending on who says it or who writes it, when it's not intended as a procedure whatsoever. It's intended as a technique.

Again, a long-winded answer, but it is a fairly extensive proposition to, you know, as to what you're trying to convey to a crew in that predicament.

CAPT. YOUNG: Thank you.

MR. IVEY: Captain Lauer.

CAPT. LAUER: Can I be revisited just for a moment for one question that I missed?

MR. IVEY: Sure.

CAPT. LAUER: Won't take long.

You had mentioned, sir, rudder at high alpha gave you concern, and I wrote down in my notes the word “why”, because you didn't say why. A little bit later you had indicated or alluded to the fact that it was because of the spin, a potential spin concern.

Correct me if I'm wrong or allude to it. Isn't there an alpha protection system, assuming all computers are running properly?

CAPT. ROCKLIFF: In an A300?

CAPT. LAUER: In an A300. Isn't there an alpha protection?

CAPT. ROCKLIFF: You're talking about alpha floor with the auto thrust? You have alpha floor, but that's your only alpha protection on the A300.

CAPT. LAUER: But in any scenario here, would the aircraft purposely lower the nose?

CAPT. ROCKLIFF: Oh, oh, you're talking about alpha trip, I think you're talking about. You'll have a -- what would you call it; I forget the term on that airplane -- but the nose has a tendency to get heavier, like it's an out of trim condition.

But as an environment -- blessed are our regulatory people throughout the world -- when we get into these high alpha conditions, we breathe into an entire industry of aviators the fact that they're measured. The quality of their work is measured on how few feet they lose when they're in this predicament.

And in trying not to lose a foot, a centimeter, a pilot will -- can easily override those forces that are trying to offload. It's not an alpha protection. It's an alpha assistance, I forget the term. But a pilot can easily maintain that altitude, and if they're inducing or not at the same time, it's not too difficult to appreciate that the next step is the airplane's going to flick over in an incipient state.

CAPT. LAUER: So in this particular scenario or case, you would --

CAPT. ROCKLIFF: It's a potential. I'm not talking about, you know, a case but it's a potential --

CAPT. LAUER: -- the automated system --

CAPT. ROCKLIFF: -- at high alpha.

CAPT. LAUER: -- would not prevent the aircraft from going into a spin then?

CAPT. ROCKLIFF: Well, I don't think that an airplane will go into a spin without an input from a pilot -- or I shouldn't say a pilot; an input to a control to get it to go over. But if you induce yaw and you maintain a high alpha, then you can flip yourself over and put yourself into the initiation of a spin state.

In either case, you know, inducing wide variations of side-slip at high alpha is going to call exceptionally rapid roll rates. Even if you don't go into a spin, you're going to end up with very, very high variations potentially.

CAPT. LAUER: High rapid roll rates -- would it equate to large range of roll?

CAPT. ROCKLIFF: You could -- you know, you could end up from a right bank -- you know, you could look to various incidents that are on the public -- you know, they're public dockets -- whereby airplanes have been banked quite a bit one way and with a large input of rudder find themselves at 60 to 90 degrees over the way in a matter of two, three seconds. Just like that, and it's rudder that gets them over there, so it's not aileron.

CAPT. LAUER: Thank you, Dave.

MR. IVEY: Captain Rockliff, is there anything that you would like to suggest that we look at as a group or as the Safety Board in trying to determine might have caused this accident? Do you have any ideas of your own or do you have any ideas that have been reflected by Airbus?

CAPT. ROCKLIFF: No. You know, from the Airbus standpoint, from my colleagues in the safety department and in operations, we have intentionally not tried to come up with scenarios because in doing so, we can come to incorrect conclusions right away.

So I can tell you that we haven't hypothesized what's happened in order to give you, you know, our slant on what the fix would be. I think that your line of questioning -- or questions, I should say -- are interesting. They express a concern that I've had for a number of years with the use of rudder.

But having not read the DFDRs, the DFDR reports, I don't know that that's -- you know, that that's a factor in this particular case. But definitely, rudder is something that's been a concern of mine -- use of rudder.

And not use of rudder industry wide, but in a program that -- the AAMP program, the early days, at least.

MR. IVEY: Well, thank you for coming from Miami today and sharing your expertise with us. This will conclude the interview.

(Whereupon, the witness was excused.)

(Whereupon, a short recess was taken.)

EXAMINATION

**c. Captain J. Kenneth Higgins**

MR. IVEY: Well, Captain Higgins, if you will, give us your name, your position, and your flight experience, including type ratings, total time, a little history of your aviation career.

CAPT. HIGGINS: Okay. I go by initial J. Kenneth Higgins. I'm vice president of flight operations at Boeing. Been at Boeing since 1966. Joined the -- my background in training is in engineering. I joined the flight crew department at Boeing in 1972.

I've flown all models of Boeing airplanes with the exception of the Douglas heritage airplanes. Although I've flown them, I don't have a type rating. I have a type rating in all the currently produced Boeing airplanes -- 737 -- 727, not currently produced, 737, 747, 757, 67 and Triple-7.

I don't have a lot of time. I've got about 7,000 flight hours but a lot of takeoffs and landings because some of our flights are pretty short.

Let me see. I've been a project pilot, which is kind of the engineering pilot, on almost all of the models at one time or another in my career. Flew the first flights on the 747-400, first flight on the 777 airplane, 737-400, -500, -600, and the next generation airplanes.

Like I say, most of my background has been in -- as an engineering test pilot and haven't been doing much of that in the last three or four years. I've been doing an awful lot of flying a desk. So my actual currency -- I got up for the first time in about a year yesterday, so you can see how much time I've been getting to fly.

MR. IVEY: You mentioned engineering test pilot. Does that involve certification?

CAPT. HIGGINS: Yes, it does.

MR. IVEY: So you have been involved --

CAPT. HIGGINS: Yes.

MR. IVEY: -- in certification --

CAPT. HIGGINS: Yes.

MR. IVEY: -- in various airplanes. If I may start from that point --

CAPT. HIGGINS: Sure.

MR. IVEY: -- is there any certification issues that pertain to engineering pilots regarding the rudder?

CAPT. HIGGINS: Well, specifically regard -- there are all kinds of them. You have to prove during the certification work that the rudder is effective throughout the regime and has the capability of doing the things that you need a rudder on an airplane for. Things like side-slips -- those kinds of things, sure. Yes.

MR. IVEY: And you mentioned side-slip. Do you take the airplanes to the limits and beyond in side-slips?

CAPT. HIGGINS: We take the airplane -- we're very careful about that, as a matter of fact. We have a calculated number that we cannot exceed, and we have special instrumentation on the airplane to assure ourselves that before we've done the first side-slips, you don't know how effective the rudder's going to be, so you have to make sure that you don't exceed the limit, the structural limit, on the airplane.

So you have special instrumentation devices on the airplane to let you know when you're -- when you get to or approach that limit, and then you have to show that under all operating flight conditions that you can apply full rudder and not exceed those structural limitations.

MR. IVEY: And I realize that we're assembled here because of an Airbus. I'd like to talk to you just in generalities from your Boeing experience, and I know you can't answer Airbus questions because that's not your airplane.

Regarding certification and the rudder, do you know what a doublet is?

CAPT. HIGGINS: Yes.

MR. IVEY: What is it?

CAPT. HIGGINS: It's usually a maneuver that you do in order to excite Dutch roll. That's push the rudder in one direction, and it's usually not a large input, but a doublet is push the rudder in one direction and then back in the other direction to try to excite Dutch roll.

That's the context under which I'm used to hearing the term doublet.

MR. IVEY: You'd start more or less from a neutral position --

CAPT. HIGGINS: Right.

MR. IVEY: -- and put an input followed by a pass through neutral to --

CAPT. HIGGINS: Right.

MR. IVEY: -- an equal in opposite input?

CAPT. HIGGINS: Right. Right.

MR. IVEY: And I'm talking rudder in this case. It could apply to ailerons or it could apply to an elevator as well?

CAPT. HIGGINS: Yes.

MR. IVEY: In certification, is there a requirement for a doublet or -- and if I'm incorrectly using the term rudder reversal, is there anything of that nature that has to be certificated in the airplane?

CAPT. HIGGINS: I'm not familiar with one that's specifically relates to a doublet. The only specific thing in my recollection about doublet is, is as a means to excite the Dutch roll mode in the yaw axis.

MR. IVEY: With your wonderful history back to 1966, regarding rudder issues, has there been any change in certification that you have recognized or are aware of as it relates to the yaw axis and rudder?

CAPT. HIGGINS: No. You have to understand that my involvement over the last number of years has been somewhat limited. That's a detail area that some of the other folks get into, and I don't know of anything in my own personal history that I can remember that there's been something -- some change in the rudder area.

MR. IVEY: Do you feel like from your experience dating back to 727, which I presume was your first airplane with Boeing --

CAPT. HIGGINS: Uh-huh.

MR. IVEY: -- that emphasis in certification is more on pitch and roll as opposed to rudder?

CAPT. HIGGINS: No. I think that we look at all axes of the airplane. I think that the airplane has to be coordinated in all axes, and the roll axis and the yaw axis have to be coordinated. No, I don't think so. No. I think that we look at all axes in general and the interrelationships among themselves pretty equally.

MR. IVEY: I know in our interviews, it's been consensus, I suppose, that pilots are very used to putting in aileron and elevator pressures. Yet when asked regarding rudder, rudder pedal travel in flight, that really, they don't necessarily know because they don't use rudder very often, and certainly not at full travel during cruise or in certain flight regimes other than perhaps to effect a recovery you might use it in that category.

So it's interesting to see that most pilots in transport category airplanes really don't have good, specific answers about rudder because they don't use it that much, compared to elevators and ailerons.

CAPT. HIGGINS: Right.

MR. IVEY: From an engineering background, had you ever been concerned about full rudder deflection at any speed?

CAPT. HIGGINS: The only times I've ever been worried about it is when we're doing the initial testing and we haven't been there before to make sure -- see, most of the airplanes today have rudder limiters, so with airspeed the rudder limiter limits the amount of rudder than you can put in.

So when you're doing the initial testing, there's a curve, a program, that goes in that says, Here's how much rudder you can get at each airspeed. So the first time you do the test, you have to make sure that that program is correct and that sensing correct, that the pressures are sensing correctly so that you don't get too much rudder.

So yes, in that particular kind of a situation, I've been concerned about rudder, large deflections of rudder. Right. Yes.

MR. IVEY: And is it factually correct to say that rudder load limiters were devised -- I know the 727 actually had one, and in the accident airplane, it too had a rudder limiter. That was probably put in these types of transport category airplanes to protect the tail, to structural loads?

CAPT. HIGGINS: Yes.

MR. IVEY: That was sort of the genesis --

CAPT. HIGGINS: Right.

MR. IVEY: -- of that idea to put that in?

CAPT. HIGGINS: Yes.

MR. IVEY: Have you ever personally been involved in rudder or tail fin calculations of structural loads?

CAPT. HIGGINS: No. Not in the calculation. No.

MR. IVEY: The speed Va -- maneuvering speed -- what is the definition of maneuvering speed?

CAPT. HIGGINS: Well, you know, it varies from airplane to airplane, which type of airplane you're in. And to be quite honest with you, I'm not exactly sure what it is in a transport category airplane. I know what it is in a small airplane, and that's the speed at which you can apply full deflection of the controls without being concerned over the structural integrity of the airplane.

In a transport category airplane, I'm not -- we don't -- we actually from a testing point and actually on the engineering work that I've done, I've never been involved with the Va as a defined parameter.

MR. IVEY: And I think that statement you just made is -- it's been amplified in the past similarly that transport category airplanes usually don't have a Va associated with their operations. There's other speeds that are used to fly the airplane.

CAPT. HIGGINS: Right.

MR. IVEY: Do you believe that there is a Va that's required under FAR25 that's buried in the bowels of certification that doesn't surface to the line pilot operation?

CAPT. HIGGINS: Well, that's why I was very hesitant, because I have a feeling that somehow or another, the same kind of logic is applied, but there may be other things that take care of that for you, like a rudder load limiter. So there isn't a Va. There is a, Go ahead and push on the rudder as much as you want because we're going to take care of it in another way.

So there may be an applicable kind of a thing, but it isn't noted as a Va. So that's right. But I don't know how they do that, to be honest with you, in transport category airplanes.

MR. IVEY: In light aircraft, I understand that concept of Va, most pilots of single and multi-engine light airplanes are very much aware of that speed. I'm sure the FAA are the people that devised the definition of Va, and I wonder if you are below that speed, which is a maximum speed and usually a function of gross weight in light airplanes, that if you take this definition and it's a full control deflection without bending the airplane or damaging the airplane, whether that -- do you know whether that would apply to just one input of a flight control or would it imply that you could go from pillar to post. You could take full right aileron followed by full left aileron, perhaps followed by another full right aileron, and you're still not going to bend that airplane, or do you think it's just one input, or do you know?

CAPT. HIGGINS: I know that in a large airplane that there are those cases where you can generate more side-slip, as an example, by applying full rudder in one direction and then over-yaw in the other direction, because you get airplane dynamics into the equation, which gives -- effectively gives the rudder -- you know, as you swing, you develop momentum in that direction.

So there are those cases where -- yes, I think that there are cases in the rudder axis where you could get yourself in trouble. Yes.

MR. IVEY: I know Captain Melody this morning was discussing the summation of vectors on the tail based on side-slip and side loads and rudder reversal, which can either become additive or can help the situation, depending upon which rudder is being displaced. Since the accident --

CAPT. HIGGINS: But let me interject right there that there are lots of times when you might need full aileron and lots of times when you might -- to the right and there are lots of times when you might need full aileron to the left, but there are very few times when you need aileron in both directions at the same time.

So the fact that I know of a limitation that says you shouldn't do it in both directions -- well, the tiller, the steering tiller -- I know that I shouldn't push on it at 180 knots full over.

So the fact that there are those conditions where -- I mean, you have to apply some logic to the building of an airplane that says you don't do some things, and some of those things come from the fact that you've just flown airplanes before.

It's kind of like driving a car. You don't turn in a -- put in a full steering wheel input at 140 miles an hour, because you learn by driving cars that that's just not something you do. So I guess what I'm trying to say is yes, there are -- I think that there are a lot of those conditions in an airplane that come from intuitive knowledge based on the fact that you fly airplanes for a living.

That's what you do, and you learn that over time, so just kind of a tangential comment
that --

MR. IVEY: Some things are intuitively obvious at the level of flying that you just don't do it.

CAPT. HIGGINS: Right.

MR. IVEY: As the example of turning the steering wheel in a car.

CAPT. HIGGINS: Right.

MR. IVEY: Understood. Are there any limitations that you know of on Boeing products related to the rudder or the frequency of rudder application?

CAPT. HIGGINS: The only limitation that I know of on airplane -- on the Boeing airplanes is under certain failure conditions, you lose the load limiter. And there's a light or a warning of some sort, and it tells you don't use abrupt or hard rudder inputs under those conditions. Those are the only ones that I know of.

MR. IVEY: That's a non-normal that would be referred to by a checklist --

CAPT. HIGGINS: Yes. Yes.

MR. IVEY: -- for corrective action?

CAPT. HIGGINS: Yes.

MR. IVEY: I'd like to turn a moment to a letter that was written by several people. Your name was included on a letter back in August 20, 1997, to Captain Cecil Ewell. And it pertains to the AAMP Conference that represents you attended. And it's signed, I believe, by you?

CAPT. HIGGINS: Yes.

MR. IVEY: And other signatories were Captain Rockliff, Captain Tom Imrich from the FAA, and you -- and Captain Tom Melody, whom we spoke to this morning.

CAPT. HIGGINS: Right.

MR. IVEY: Can you give a little bit of history as to how this letter was developed? What was the genesis for this letter?

CAPT. HIGGINS: It's been quite awhile ago, and a lot of things have happened since, but to the best of my knowledge, I became aware of an industry effort and several different airlines working on concepts which they went by a lot of very different names -- unusual attitude recovery, AAMP -- a whole series of different things, the genesis of which was perhaps several accidents or incidents, and not only that, kind of a general feeling, I believe, within the piloting community that pilots were beginning to rely a great deal on automation and their training.

As a matter of fact, we spent an awful lot of time working only with the automation, and they were feeling like they were becoming less proficient at the stick and rudder work, as opposed to climbing in and spending an awful lot of their time doing automation work.

And even the FAA check rides and so -- I mean, I'm giving you background -- history, background that I was aware of. FAA check flights and so on emphasized automation as opposed to emphasizing flying the airplane.

So there was a general feeling in the industry that we should be changing that. Then the accidents came along, so there were a couple of airlines -- I believe United was one and American -- began doing some looking into training for unusual attitude recovery as part of this thing about getting back to the basics of flying airplanes.

And in addition to that, we had some accidents that perhaps, with some better training, a recovery could have been affected, but if they put a person in an airplane and that's the first time they see it and then have to recover, why, with training, you can always improve.

So I was -- I thought it was a really good idea and -- but I had also been hearing that some of the things that they were proposing in the training involved some things that concerned me. And then, kind of out of the blue, I was invited to come down to American Airlines to witness theirs, which I think at the time was probably the one that was most advanced and most complete at that time, and I do know that they were already applying that training for some of their pilots.

So I came down and listened to the presentation, and Tom Melody and Tom Imrich and Larry Rockliff were already there -- were there also. And we talked during the session and after the session about some concerns we had about the presentation.

And we had -- other people already had discussions with some of the folks from American about some of the concepts. Now, let me stop right there and say that the presentation and the scope and the training I thought to be excellent.

But there were several points that I thought that needed some help from technical people who had perhaps been there, done that. Those areas were the use of rudder in several different flying regimes and the use of the simulator to verify the flight techniques that they were proposing, because in our engineering we are aware that, number one, the simulator data packages as put out to the airlines are put out so that they fly extremely well in the areas that the training people are going to use the data in the normal flight envelope.

But beyond that, their estimates and they -- sometimes we have more full data at Boeing, because we specifically go out and try to obtain that data, but since it's outside of the operating envelope of the airplane, that is not included in the training data package.

In addition to that, there are some areas that we don't have data on, because we don't put the airplane to that kind of a position in order to drive it, especially in dynamic conditions. So we were -- I was concerned about the fact that they were using simulators to verify some of the maneuvering when they had -- when the maneuvering could be in fact outside of the data -- area where the data was valid.

So those were the two main areas that I had of concern. There were some other issues about -- I think that there was some issues about they were -- they explained a couple of accidents that occurred, and I took some issue with the conclusions that were drawn, and I think that -- but that was a minor issue that we took the chance to or the opportunity to point out that there were probably some erroneous conclusions drawn from the accident reports but that they should go back and re-read the accident reports, maybe get a better idea of what the accident report said.

MR. IVEY: Those two actions, I believe, were the 737 in Colorado Springs --

CAPT. HIGGINS: Yes.

MR. IVEY: -- and the Pittsburgh 737?

CAPT. HIGGINS: No. The other that -- at one time or another I think we brought up was the Nagoya --

MR. IVEY: A300?

CAPT. HIGGINS: -- A300. Yes. Right.

MR. IVEY: If I may continue along that line, you mentioned the simulator data and the packages that were out there. After you wrote that particular segment in the letter, have you been made aware of any simulator package changes in any of the simulators, either American, United, Delta, or any other carrier?

CAPT. HIGGINS: I think that, you know, I would have to back off and say I know that we were concerned about that. I believe that we offered some simulator updates as a matter of course. It was -- I can go back another 15 years, ten years before that, with the wind shear data.

We did a wind shear training package, and we found the same thing, that the simulator data was not good into the regimes that we were then flying the -- or training for the wind shears. So we put out a new simulator package for that training package also.

And -- but to be honest with you, I've been too far away from this particular one to know whether or not we have put out additional data. In some of the areas that they're flying it, I'm afraid we just don't have the data, so --

MR. IVEY: Do you know in talking with your friends at Airbus whether they might have afforded a simulator package of some sort?

CAPT. HIGGINS: No, I don't know. I don't know.

MR. IVEY: And regarding the FAA, they signed on this letter, too.

CAPT. HIGGINS: Uh-huh.

MR. IVEY: And I presume that they expressed the same joint concerns that -- of everyone who signed here?

CAPT. HIGGINS: I think that each person in each -- of that group had their own area of expertise, and it was a joint letter that the FAA had, that Tom Imrich had his areas of concern that came from his background. And I of course had my areas of concern, and a fairly significant staff of people who could -- who were also had some concerns.

So I think it was kind of a -- it was in fact a letter that we were all comfortable with signing, and we all had some knowledge of the areas -- each of those areas. But some of us were more expertise -- had more expertise in certain areas than others.

MR. IVEY: Do you know if the FAA, as a follow-up after this letter, ever required anything of the manufacturers or the operators regarding this particular series of suggestions or differences?

CAPT. HIGGINS: No, I don't know. I don't know that.

MR. IVEY: Were there ever any other letters prior to the August 20, 1997, letter?

CAPT. HIGGINS: Prior to? Yes, there was one that was prior to. There was a letter that I wrote immediately after the June meeting to tell Cecil -- to express the concerns that I felt that he should do something about and to verify the fact that Tom, Tom, and Larry and Ken were going to get together to come up with a kind of a manufacturers/FAA consensus on the things that concerned us about the training.

MR. IVEY: So basically, that was sort of a heads up letter --

CAPT. HIGGINS: Yes. Right.

MR. IVEY: -- as opposed to this --

CAPT. HIGGINS: Right.

MR. IVEY: -- that had the core issues in it?

CAPT. HIGGINS: Right. Right.

MR. IVEY: Did you get a reply back to that letter?

CAPT. HIGGINS: No, I didn't.

MR. IVEY: And there was a reply back to your --

CAPT. HIGGINS: Yes. Right.

MR. IVEY: -- August letter from Captain Ewell?

CAPT. HIGGINS: Right.

MR. IVEY: And what was your sense or take on his reply?

CAPT. HIGGINS: I think that he appreciated the fact that we had taken the time and the effort to express our concerns. I think that there were some other areas that he -- I don't want to say disagreed with our concerns or whether it was a question of he thought that they were being handled adequately in the training.

So in general, I think that he appreciated our concern, the time and the effort that we took in order to reply, but that he thought that the issues that we had raised were taken care of adequately by the steps and actions that he'd taken.

MR. IVEY: And regarding that training, when all four of you or perhaps even more had left that training, did each individual, when you met in conference or as a group, have the same feeling that there was an over-emphasis in the use of rudder, or was that kind of --

CAPT. HIGGINS: I can --

MR. IVEY: -- derived in that group?

CAPT. HIGGINS: No. I think that that was kind of almost independent, and I can't say for Tom Imrich because Tom comes from a different background than the other -- well, not Larry, but Tom -- Tom Melody and myself came from an engineering background, so we were -- and we had done stalls, as an example. Had done operations that were close to the kinds of areas that were -- that they were training in, or at least closer to those kinds of areas.

So I think that we had the main concerns about the rudder, and I don't want to put information -- but I think that Larry had contacted his engineering staff, engineering pilot staff, to talk about those concerns.

And somewhere, and I don't remember exactly the timing, but we did get with the Airbus engineering piloting staff to corroborate on the industry training aid basically. And at that time, I know that Airbus engineering pilot staff had the same concerns that we did.

MR. IVEY: Out at Boeing, do you all teach for initial cadre or for small operators that want to use your training as their basis for qualification. Do you teach upset training at Boeing?

CAPT. HIGGINS: No.

MR. IVEY: Do you teach wake turbulence encounters?

CAPT. HIGGINS: Not wake turbulence encounters. We teach wind shear.

MR. IVEY: Wind shear?

CAPT. HIGGINS: Wind shear.

MR. IVEY: Is there any scenarios to your knowledge that involve wake turbulence?

CAPT. HIGGINS: You know, I haven't been through the full type rating work, but I do know in the recurrent training, there is nothing in the recurrent training from Boeing. But I can't -- I honestly cannot say because I haven't been through a type rating -- whole type rating course at Boeing for quite awhile.

MR. IVEY: The upset recovery training aid -- you had a consortium of lots of different people from Airbus and Boeing, I suppose the various airlines, perhaps the unions, and the FAA. Was Tom Imrich the FAA input or were there others out there besides him?

CAPT. HIGGINS: I don't know. I don't know. When it got to the writing of the training aid, I was not as -- I talked frequently with Cashman, who was the guy that in my group that was assigned that task and -- but I did not get into the details.

I did not go to any of the meetings during that time period, so I don't know.

MR. IVEY: Do you know if after this suggestion, did you or anyone out there at Boeing have an opportunity to at a later date see a revised Double-AMP program, say, a video? Did it ever change or did the course work change or did the manuals change?

CAPT. HIGGINS: I didn't, but that -- but I don't know. I know that John Cashman worked really closely in the developing of the training aid and the articles that have appeared, and I do know that he worked with the American Airlines folks.

But whether or not he saw any of the revised training, I don't know.

MR. IVEY: It was stated earlier in testimony that some of the suggested changes in the program was to use the term coordinated rudder?

CAPT. HIGGINS: Uh-huh.

MR. IVEY: What does coordinated rudder mean?

CAPT. HIGGINS: It means -- coordinated rudder means rudder in proportion to the other control inputs. As an example, if you're using a side-slip and you want -- you would use an appropriate amount of rudder that balances the roll. If you are doing -- however, today in most of the Boeing airplanes today, you don't need rudder for turns.

So coordinated rudder for turns is usually feet on the floor, because the yaw damper does that input for you. But it's intended to be the amount appropriate to the flight situation that you're in.

MR. IVEY: As you say, there's the aileron rudder interconnect for turn coordination controllers, if you will, that perhaps work through the yaw damper. But in the case of coordinated rudder, to put in the appropriate amount, how does a pilot know what the appropriate amount would be?

CAPT. HIGGINS: Well, obviously, for engine out work, why, it's -- I think every pilot learns that fairly quickly what the appropriate amount is. So I -- you know, that's a tough question to ask -- or to answer because again, it gets back to the issue that I have at high angles of attack, the rudder -- and the second thing is the rudder is -- takes time to react.

It's a -- with ailerons, the minute you put in a roll input, the airplane reacts. With rudder, you put in rudder. The airplane first yaws, and it may not even be -- I wouldn't even say it's quickly, but it yaws, and then after that it rolls.

So there's a time lag from the time that you input the rudder till the time the airplane reacts. So that's pretty much why we indicated that rudder was a control that you had to be very careful with when you had high angle of attack. Any time, actually, you had to be careful with rudder inputs because they can -- there's a time delay from the time that you input the rudder till the time that the airplane reacts.

MR. IVEY: In your experience as a -- is that the one axis that a pilot perhaps can get himself into more trouble? Or is it that that might not be where he would encounter that much trouble in general, because most of the time pilots don't use the rudder a lot?

CAPT. HIGGINS: The time that the pilot can get -- for the things that we train the pilot for with rudder -- as an example, engine out work -- it's totally appropriate. They get a great deal of training. I mean, what maneuver do you do the most in the simulator? Which one do you remember the most? It's always the engine out stuff that you train in fairly consistently.

And most of the other -- cross wind landings. That's also something that we practice both in every day flying as well as probably in the simulators. The other areas, high angles of attack and so on, we don't train to that, and what's more, the reason that we wrote the letter is that we found that when people try to use rudder under those conditions that you're going to have some very inappropriate results.

MR. IVEY: From an engineering test pilot point of view, I'm sure you have developed high side-slip angles?

CAPT. HIGGINS: Uh-huh.

MR. IVEY: How far have you been left or right in a side-slip?

CAPT. HIGGINS: Well, I've been to full rudder and in all of the Boeing airplanes, throughout the envelope, all the speeds.

MR. IVEY: How far does that actually take you over in a side-slip. Do you have any ideas?

CAPT. HIGGINS: I think that the maximum is at the lower speeds at flaps 40 and -- golly, that's hard to say. Probably -- I'm just guessing -- ten degrees or something like that.

MR. IVEY: Have you ever been, say, clean over 15, 20, 25 degrees, or do you even take those airplanes into that area?

CAPT. HIGGINS: Well, it's all you can get. I mean, I've been to all you can get.

MR. IVEY: Yes. I watched the video, and it's dated 19 December '97 that features Captain VanderBurgh in his presentation. I don't know -- we'll find out if that is the current video. That would have certainly been after your letter of August of -- yes, August 20, '97, so it's quite possible that many of the attributes you have here were incorporated or maybe they weren't. I don't know.

At the end of the video there are caveats, literally caveats that he makes, talking about the use of coordinated rudder, and that's not in the arena with all the people present. This was made after the fact. This could indeed be part of the changes and adaptations that he made as a result of this letter perhaps. I don't know.

Have you ever seen that video?

CAPT. HIGGINS: No, I haven't. No. I've only seen it in person and that's the one time in June.

MR. IVEY: Let's see. The -- I'll revisit that subject. I think I talked about it in terms of certification, the idea of putting in a flight control and in this case rudder to see, obviously, if the rudder works and flight loads associated with yaw.

But in your experience, you've never had to put in a full rudder input followed by another rudder input --

CAPT. HIGGINS: No. The other direction.

MR. IVEY: -- for any certification need?

CAPT. HIGGINS: No. No.

MR. IVEY: When you've put in rudder inputs, can you describe for me the tactile feeling that you get from lateral side loads. Have you ever done a rudder reversal to where you can feel yourself really slinging around left and right inside of this cockpit or had any sensation of G loads?

CAPT. HIGGINS: Sure. As you're -- actually, with a full rudder side-slip at some of the higher flap angles, why, the airplane is at enough of a angle that you're leaning one way or the other in the cockpit. And then during the release from the full rudder side-slips, as an example, why, you can feel G loads but it's not severe. I mean, it's nothing to be alarmed about.

I mean, you just get kind of used to them. It's something that you do. I'm sure that somebody who's doing them for the first time ever would be maybe a little concerned by it, but after you've done them a few times it's just like anything else you do in an airplane.

MR. IVEY: And I think that's what I'm trying to get a flavor for. If you were in, let's say, level flight and controlled the bank to remain level with a full rudder input, that's going to be just a pure lateral load?

CAPT. HIGGINS: Uh-huh.

MR. IVEY: Is that more easily felt -- and I have to rely on your experience, having done this, I presume -- is that a feeling that's pretty obvious as to what's going on as opposed to having the combination of a banked turn and then suddenly having a lateral force, so now you've got not only the complication of the bank but also the inducement of this lateral force due to the rudder.

Is that a confusing feeling? Is that more complex feeling that straight wings level with a full rudder input?

CAPT. HIGGINS: Yes, I think it -- just from the standpoint of when you're doing them from a test standpoint, you know the maneuver that you're trying to do so you can look straight out and make the airplane go straight. Then do whatever you need to do with the controls in order to keep heading -- keep the airplane heading in that direction.

Adding in a turn to that and then getting the same forces, my guess would be it would be a little more confusing. Yes.

MR. IVEY: And I guess I'm just kind of getting into our vestibular senses here. If somebody -- if I pitch up, I get that seat of the pants feeling, and I suppose I can feel it in my ears as well.

CAPT. HIGGINS: Uh-huh.

MR. IVEY: And in one single axis, be it vertical or horizontal or in a rolling tendency, that one input is probably fairly easily defined. I think we all experience that in pitch or -- and roll. But to be in a bank and then suddenly have a large rudder input -- is that -- have you ever experienced that as a source of confusion?

And I know I have to caveat that, because you know you're getting ready to do that, so there's a difference between that and the unsuspected.

CAPT. HIGGINS: The only thing that I might be able to say that I have done and have had happen is an engine failure in a bank, and again, I can understand how there would be vestibular things that might add to the confusion. But the problem still remains to fly the airplane.

And if you apply whatever controls are necessary to fly the airplane and look at the instruments, why, I would not think that it would be that much more difficult to handle an engine failure in a turn than it would be to handle an engine failure, say, straight ahead, except for the extra added problem of the heading is in fact turning for two reasons, one, that the airplane is in a turn, and the second one is you're getting some additional yaw that can create some additional compass change.

MR. IVEY: We've talked about Va and the maneuvering speed. Prior to the accident, has there ever been any concern of yours in placing a full rudder input into a transport category airplane at any speed? And of course that's assuming the normal operation of a rudder load limiter if it happened to have been installed.

Ever any resistance to putting in full rudder?

CAPT. HIGGINS: No.

MR. IVEY: Have you ever considered feeling like there would be an inhibition to put in full rudder followed by an opposite and equal full rudder?

CAPT. HIGGINS: Yes.

MR. IVEY: There has been?

CAPT. HIGGINS: Sure.

MR. IVEY: Why?

CAPT. HIGGINS: Because we're warned during the -- well, there's some things that can happen during the initial checkouts of airplanes, and some of them are things like rudder -- I mean, fin stall. You don't know how effective the fin's going to be.

You don't know whether the fin's going to stall, so when you're doing the first full rudder side-slips, you're aware of these things because if their fin does stall and it begins to correct back and you immediately take out the rudder, why, it will over-yaw in the other direction.

And if you put in -- if you try to help it get back to corrected, that's the same thing as a rudder reversal, and then it can over-yaw in the other direction. So it's something that a test pilot, because of the conditions that he's going to perform, is aware of that in it -- over-yaw -- that you can get it beyond the design conditions in certain parts of the envelope.

Not all parts of the envelope, but in certain parts of the envelope, you can get it to a -- by reversing the rudder, get it to a condition that's too much side-slip for the fin. Yes.

MR. IVEY: Captain Melody testified this morning that oftentimes pilots are not aware of being in a side-slip. Do you agree with that?

CAPT. HIGGINS: I agree with it for small side-slips. But the kind of side-slips that we're talking about here, you’re aware of it.

MR. IVEY: And that would be why?

CAPT. HIGGINS: In many of the conditions, why, the airplane is buffeting because the spoilers are up in order to maintain the bank angle, so the airplane is buffeting. And that's a purposely induced side-slip. Sometimes the airflow separates around the windshield.

There are a lot of -- and then the -- you know, you're leaning sideways in the cockpit one way or the other, so -- and/or the condition where you maintain a wings level side-slip, why, you get a really funny feeling about the nose is translating one way or the other, so you get some G forces in that seat of the pants to let you know that that's happening.

MR. IVEY: You mentioned airflow separating from the windshield. I'm interested in that. Does it create a large noise?

CAPT. HIGGINS: Uh-huh.

MR. IVEY: Is it a rumbling noise?

CAPT. HIGGINS: Yes. It's -- yes.

MR. IVEY: The din in the cockpit actually rises?

CAPT. HIGGINS: Yes. But not -- it depends on the airplane. Each airplane's different, and some airplanes are more prone to do that sooner than others. Some of them you have to get way out in the side-slip and in fact, in some conditions where they don't -- you don't get that burble at all. But in some others, why, it's an obvious cue.

MR. IVEY: Do you think that pilots, line pilots, are familiar with side-slip as a general rule?

CAPT. HIGGINS: Small amounts, yes. I think so. I think that they are. Number one, they do it -- well, most do it. At least, there's some technique involved in the crosswind landing that requires a side-slip, and then during any engine out work, if they've ever had a real one in flight, why, that usually involves some minor amount of side-slip.

In addition to that, trimming the airplane usually involves, or can involve, the removal of certain amount of side-slip. So I think they're -- across the spectrum, they're aware. They may not be for the large side-slip angles.

I mean, you know, take a 35 knot cross wind, 30 -- what are you guys limited to, 32 or 33 knots of direct cross wind? Under those conditions, at some point you can get pretty close to full rudder, and that's a significant side-slip.

So -- but then again, that doesn't happen real often, so in a guy's career, I don't know how many times it does happen, but it's -- you know, you're not used to that all the time, so --

MR. IVEY: Do you think that it's an accurate statement to say that most pilots have associated side-slip with an engine failure, which is typically the thing that's practiced most and is the most yaw-encountering episode in a simulator, as opposed to, as you were talking earlier about, the dynamics of flight controls at either high AOA or even unusual attitudes, and the resultant of increased side-slip --

CAPT. HIGGINS: I don't --

MR. IVEY: -- errors there?

CAPT. HIGGINS: No. I do not think that they -- I don't think that they are aware of the result of side-slip at high angles of attack and what it can cause beyond that. I do not think they do. And I use as evidence the fact that we had some highly-trained, highly-experienced people who developed the original set of training information, and they were not aware of transport category characteristics, side-slip characteristics, as they developed that program.

Most of those -- and there's a difference between airplanes. Fighter airplanes are entirely different in a side-slip regime as opposed to transport category airplanes. And so you -- when you start talking about, Are pilots aware of the effect of side-slip, you first have to say, In what airplane, and then go from there, because the side-slip characteristics and the effect of the use of rudder are different for each kind of an airplane.

Transport category airplanes are significantly different than a smaller, short-coupled fighter type airplanes.

MR. IVEY: Not that you've been involved in training, but do you believe that fighter pilots are more prone to use rudder than pilots who have come up through a general aviation background?

CAPT. HIGGINS: Well, I can only -- I don't know. But I do know that there were certain airplanes in the realm of folklore, F4 and some others, that the pilots claimed to have used an awful lot of rudder in order to fly them. I didn't fly one, so that's folklore to me.

MR. IVEY: How about acrobatic pilots versus non-acrobatic pilots?

CAPT. HIGGINS: I think that anybody who has flown an aerobatic airplane would -- and even a small aerobatic airplane -- would be more prone to use rudder than a pilot who has not had that experience. Yes.

MR. IVEY: Skipping around a few subjects here, critical loads on rudders. I'm sure that in every manufacturer that's important. But as an engineering test pilot, were you ever able -- or were you ever involved in using a rudder reversal to create a critical load in an airplane as opposed to wind tunnel data or calculations?

CAPT. HIGGINS: No. No, I wasn't.

MR. IVEY: So you didn't -- you weren't required to put in a full rudder so that you'd start getting a displacement and then quickly try to rudder-reverse it to make some summation --

CAPT. HIGGINS: No.

MR. IVEY: -- forces on it?

CAPT. HIGGINS: No.

MR. IVEY: That's not part of certification. That certainly not a part of --

CAPT. HIGGINS: No.

MR. IVEY: -- test pilot?

CAPT. HIGGINS: I haven't done it. I haven't done it.

MR. IVEY: Yes. Since the accident, has there been any information provided Boeing or has Airbus provided or shared anything with you regarding limitations on rudder or any critical load activity going on with the FAA and certification? Any changes that are coming about in advance of this accident now?

CAPT. HIGGINS: None that I know of.

MR. IVEY: Everything's still maintained more or less as status quo or --

CAPT. HIGGINS: Yes.

MR. IVEY: -- or wait and see perhaps?

CAPT. HIGGINS: Yes. Wait and see. Yes.

MR. IVEY: In the Boeing fleet, what airplanes have composite tails?

CAPT. HIGGINS: I don't know.

MR. IVEY: Don't know anything about composite?

CAPT. HIGGINS: No. No, I don't. No.

MR. IVEY: All right. Thank you, Captain Higgins. What I'd like to do is go around the room and see if anyone has any questions.

CAPT. HIGGINS: Sure.

MR. IVEY: And I'll start off with Dr. Bart Elias from the NTSB.

DR. ELIAS: Thank you, Captain Higgins, for coming and talking to us today.

CAPT. HIGGINS: You bet.

DR. ELIAS: I apologize I wasn't able to introduce myself earlier. As Dave said, I'm Bart Elias from the NTSB. I've just got a few questions for you. When you were talking about the response that Captain Ewell took to your letter that the group and you wrote to him, you mentioned that he felt that the steps he had taken adequately addressed your concerns.

Do you recall what steps he had taken or that he mentioned he was planning on taking?

CAPT. HIGGINS: No. I think there was a statement in this return letter that he had -- they had taken action to -- I don't remember exactly what it was. I think that if you've got the letter you can read it there. There was one sentence or paragraph that spoke to the fact that they had taken action to alleviate some of those concerns.

DR. ELIAS: Were you satisfied that --

CAPT. HIGGINS: I was concerned even still that, you know -- again, let me get back to the fact that I've been involved in a number of these training program developments before. And the first one that I was involved with was the wind shear training aid.

And that was a several yearlong development of what turned out to be a really excellent training aid for a situation that was with us in industry regarding wind shear. And as we started out at the very beginning of that, there was a lot -- again, a lot of folklore, a lot of pilots who had -- who believed that they had good information, and they did have good information about how they should best fly through a wind shear encounter.

Then as you take real data, the best data that you've got and you subject those theories to trial and error and try to improve your simulation based on the best data that you have, over time you begin to get with science and experience, you begin to blend science and experience together and come up with the very best result.

In this particular case, there was an awful lot of experience that preceded the science. So I was concerned that we get science caught up with experience so that we could come up with the very best training program. And that was difficult even with the wind shear training, as I said, and it took time to muscle those two things together to get something that was acceptable from a scientific standpoint as well as from an experience standpoint. So I was still concerned that we would get there, but I also knew that we were developing the industry consensus on the training aid.

And I thought that by the time all of those things got jammed together with all of the experience and science from throughout the industry that we'd come up with a good product. And second thing is overall, I really agreed -- 100 percent agreed -- with what American was trying to do or what the basic concept of the training program that they were developing, I was 100 percent behind.

So my intent was to try to correct what I saw as minor errors in all this training to get it blended together to come up with a really outstanding product, because I thought they were headed in exactly the right direction.

So that was my -- very long-winded answer to was I still concerned? Yes, but I also recognized that that was the same kind of a point that we were in during the wind shear training aid. I knew that we were going to go on further to develop that training further, and I believed that irrespective of what Cecil Ewell's response was that the industry was going to get it right.

DR. ELIAS: So is it fair to say then that the industry training aid was sort of the culmination of what you were talking about in terms of blending the science --

CAPT. HIGGINS: Right.

DR. ELIAS: -- with the experience?

CAPT. HIGGINS: That's correct. Yes.

DR. ELIAS: And do I understand you correctly? You weren't directly involved in the training aid but you were involved in some of the background information, and then it was Captain Cashman who --

CAPT. HIGGINS: Yes. Right.

DR. ELIAS: -- actually was the Boeing representative?

CAPT. HIGGINS: And I had the pleasure to be able to read it and kibitz as it was going through its -- some of its work.

DR. ELIAS: Would you say that you were more satisfied with what the training aid says as compared to what the aid that he was talking about?

CAPT. HIGGINS: I think that the training aid took care of the major concerns that I had. Right.

DR. ELIAS: What were the major concerns?

CAPT. HIGGINS: The major concerns were the use of rudder at a high angle of attack, the use of simulators to derive the efficacy of the proposed training to make the -- they were using the simulator to prove that their theory was correct when the simulator data -- they were working outside the simulator data range.

And there were the -- there were some other very specifics about using roll angle to get high angles of attack to reduce pitch attitude. I was concerned about that, because rolling an airplane at a high angle of attack is in fact inducing side-slip, and that was a difficult concept to put across.

When you roll an airplane at high angle of attack, you are in fact -- if you rolled about the axis, what you're doing is creating side-slip. Doesn't seem like a -- from my standpoint, doesn't seem like the right thing to do.

I was concerned about the exclusion of the use of thrust as a means to reduce pitch attitude. So those were the main concerns, and I think that the training aid -- I'm not sure I'm using the right word -- the paper that was put out as an accompaniment to the training aid addressed all those areas in a satisfactory manner.

DR. ELIAS: Are you familiar with the concept of top rudder?

CAPT. HIGGINS: Yes.

DR. ELIAS: Do you remember that being discussed in the Double-AMP meeting?

CAPT. HIGGINS: Yes. Yes, I do. Yes.

DR. ELIAS: Do you think this concept has any utility in terms of an unusual attitude recovery technique for line flying in a large transport category aircraft?

CAPT. HIGGINS: You know, flying is such a dynamic thing that you can never give a firm yes or no. When you get upside down in an airplane, what you have to do is use whatever controls you need to use in order to get it back upright and flying in the right direction.

So I would never say that absolutely, do not use rudder. Can't say that, because you have to get to the situation and you have to make the very best judgment that you can when you get there. But were it me, there are very few conditions at high angles of attack where I would use a lot of rudder.

DR. ELIAS: In terms of the videos that I think Dave mentioned before, there was one section where within the presentation Captain VanderBurgh put up some

Boeing test demonstrations done with a 737 where he was demonstrating the crossover angle of attack and effectiveness of rudder and when you run out of rudder to control roll.

Do you recall -- first of all, do you recall these videos that were discussed?

CAPT. HIGGINS: Been a long time. No, I don't. Not specifically, no. No.

DR. ELIAS: Okay. In terms of the concept of crossover angle of attack, what is exactly the relationship between crossover angle of attack and rudder effectiveness?

CAPT. HIGGINS: Well, I think what you're really -- at the -- you're using a term there, crossover angle of attack. What you really mean is where the rudder becomes more effective than the ailerons?

DR. ELIAS: Correct. And that's --

CAPT. HIGGINS: And that is a function of angle of attack. So it varies with angle of attack. Right. Okay? So yes, I'm familiar with the concept.

DR. ELIAS: Are there any implications for this crossover angle of attack, and that's the term that was used in the presentation, so again, it's not exactly the correct term. I apologize.

MR. IVEY: Crossover speed.

CAPT. HIGGINS: Crossover speed. Yes.

DR. ELIAS: Are there any implications for that in terms of upset recovery training or upset recovery technique for a large transport category aircraft?

CAPT. HIGGINS: I think it's just an airplane characteristic. You know, I'm not sure that it has much to do with the airplane AAMP type maneuvering. I don't see that that is a part of the training. I think it's an airplane characteristic that people probably should be aware of, but as an adjunct to the recovery techniques, no, I don't see that it's a real important thing.

DR. ELIAS: I'll ask you to draw on your test pilot experience a little bit for the next couple of questions I have. The first question I'd like to ask you is how is rudder system feel, with feel force and travel characteristics of the rudder system, evaluated during development and the certification flight test?

CAPT. HIGGINS: Well, there are some basic -- and I don't remember the numbers, but, like it can't exceed 80 pounds. I don't remember the numbers, but there is a maximum limit. I don't remember if it's 80, 100 -- because it's different in each axis and I don't remember the numbers.

But there's a maximum number of force that you can -- that you have to be able to apply full rudder with so that you can get a small person who -- or if the person doesn't have strong legs to be able to get to full rudder. So there's a limit there. And what was the rest of the question?

DR. ELIAS: Well, that really regarded the force feel --

CAPT. HIGGINS: The feel? Okay.

DR. ELIAS: -- and the other part of it was the travel limits.

CAPT. HIGGINS: Okay. And I doubt that there are any specific issues involving the travel limit in terms of you can have four inches or you can have six inches or eight inches if you want. I don't know of any specific number.

DR. ELIAS: Now, in terms of the force, you did mention the fact that there's an upper limit --

CAPT. HIGGINS: Yes.

DR. ELIAS: -- to accommodate the --

CAPT. HIGGINS: Right.

DR. ELIAS: -- the lower fifth percentile.

CAPT. HIGGINS: Right.

DR. ELIAS: Are there any lower limits? Like, if control was too light on the feel and too easy to maneuver. Are there are any lower limits?

CAPT. HIGGINS: There's not -- there is no specific lower limit that I know of. However, there's a general rule that says the controls have to be harmonious. And obviously, if you have a rudder that only uses ounces and the wheel forces are pounds, why, then they're not harmonious.

The other thing that you would run into if you made it too soft would be accidental bumping. As an example, when the pilots are maneuvering in their seat, those kinds of things. So I don't think that there's a minimum, but there are other things that approach it from a different way that over time, we've kind of developed what that -- what the proper numbers are for a large transport category airplane.

And so it's just built on itself. That was acceptable before and worked really good. And on the new airplanes, sometimes we try to do things like shorten the throw and make the forces less, and we usually find that for some people that makes them over-control.

So we end up kind of back with four to five inches of travel and a breakout force of four to five pounds, something like that.

DR. ELIAS: You're talking about rudder now?

CAPT. HIGGINS: Uh-huh.

DR. ELIAS: So are there any specific guidelines? I know you talked -- mentioned about accidental bumping or something like that. Are there any specific guidelines for breakout forces based on trying to eliminate [indiscernible]?

CAPT. HIGGINS: There may be, but I don't remember them.

DR. ELIAS: Okay. And the other thing you mentioned was the issue of control harmony. Is there any specific guidelines in terms of what the ratios or portions of control wheel deflection to rudder force should be or something along those lines?

CAPT. HIGGINS: Not that I can remember.

DR. ELIAS: And I think we've talked about this at length already, but I'll just bring out some of that again about in terms of how yaw stability is evaluated during flight test and certification? You mentioned the rudder doublet. Are there any other techniques that are used to assess yaw stability?

CAPT. HIGGINS: Well, there -- you have to do full side-slips at varying degrees -- well, throughout the entire envelope. At all flap settings you have to do side-slips out to full rudder, and so that's another thing. There are some requirements, and I don't remember exactly how to express them that -- let me see.

With full rudder, you still have to be able to bank the angle within certain parts of the envelope. Still be able to turn. Don't remember the exact requirement, but it's in the FARs [Federal Aviation Regulations].

DR. ELIAS: And in terms of these maneuvers such as the rudder doublet, side-slip development, what types of rates, amplitudes, are used? How are those determined? Do you do buildup in terms of going at slow rates and the building up to fast rates?

CAPT. HIGGINS: Actually, the doublets, the only -- again, maybe somebody else has used those doublets for a different purpose, but the only reason that I have ever -- my experience has been to use the doublets was to -- for yaw damper work.

You put the doublet in and then turn the yaw damper on and watch how quickly it damps. Or you want to see what the period of the Dutch roll is, and you'll put in a doublet and just sit and watch it react.

DR. ELIAS: What type of amplitude are you using?

CAPT. HIGGINS: Oh, actually, the amplitude that you're after is to excite the natural frequency of the airplanes, so it doesn't take very much. Some people tend to overdo it and then it doesn't work very well. It doesn't take very much to excite the Dutch roll mode.

And it's more of a -- instead of the amount that you put in, it's the frequency. You have to put it in at the right frequency to get the airplane excited. And it's -- you know, let's take -- if you have four inches of rudder, if I ever put in more than an inch and a half to excite a doublet, I'd be surprised.

And that's -- I don't know whether those numbers are correct, but that's -- I'm trying to give you something that's relative there.

DR. ELIAS: And the final thing, I just wanted to go back to something you were talking about earlier. You were mentioning time delays in terms of the development of a side-slip. What's the magnitude of those time delays or phase lags?

CAPT. HIGGINS: Well, I was -- let me kind of restate that. The time delay is not in the development of the side-slip but it's through reaction to the side-slip that there's a time delay on. If I put in rudder, the roll due to yaw takes a significant --

there's a significant time delay between the roll developing and the yaw input. And it again depends on the airplane.

I'm just going to guess a second. If I put in rudder now, it would take a second for the roll to begin to develop. Maybe it's more than that, but it's in that kind of a general ballpark.

DR. ELIAS: So that's the time delay to excite the Dutch roll?

CAPT. HIGGINS: No. The time delay to -- well, okay, yes, you could look at it that way. Yes.

DR. ELIAS: Okay. That's all the questions I have. Thank you very much.

MR. IVEY: Captain Guy Arondel, BEA.

CAPT. ARONDEL: If you don't mind, Captain Higgins, I guess I would like to come back to the letter. I suppose your concerns about several points of the Aircraft Advancement Maneuver Program developed by American Airlines had to be very serious so as to send such a letter, because it's very unusual after such a presentation that, four institutions of the industry including the authority and three manufacturers send such a letter to one operator.

So your concerns, I think so, were very serious.

CAPT. HIGGINS: Significant, yes.

CAPT. ARONDEL: Yes.

CAPT. HIGGINS: Yes, sir.

CAPT. ARONDEL: And after the answer of American Airlines, you didn't try to make something else?

CAPT. HIGGINS: Again, I got the return answer, and I knew that the return answer -- I may -- to write that sort of a letter, you put somebody in a bad situation. And I was also aware of the industry effort that was going on, and I knew that Airbus, as a matter of fact, agreed with us.

And since Airbus agreed with us, FAA agreed with us, and at that time McDonnell Douglas agreed with what we were saying, or maybe turn it around -- we agreed with them. I don't care who -- I don't want to claim the first or the last or anything.

All I'm saying is we had amongst the people that -- who could effect the change, I believed that we had the consensus that was going to get it changed. So even though I got a letter back that didn't necessarily directly say that the change was going to be made immediately, I knew that VanderBurgh was part of the team that was developing the training aid.

I had been through this before with the wind shear training aid, knowing that it takes time to develop those, and I'm just really confident that in the industry, over time, we get it right. So I was confident that we would get there.

CAPT. ARONDEL: Yes. Another question. Does Boeing recommend to fly the transport category airplanes with the feet on floor except, of course, during takeoff and the landing phase?

CAPT. HIGGINS: I don't think we actually recommend feet on the floor. I think that we use the term feet on the floor to indicate -- and in fact there are -- I have been in training situations where you had to say, Put your feet on the floor because you're making inputs to the rudder and it's not helping you during your turning maneuvers, because they're -- whatever last airplane they flew required didn't have a yaw damper or turn coordinator, and so they were trying to do it and when they did, they were screwing it up.

So in fact, to teach them, you'll say, Put your feet on the floor. And then obviously if you have an engine failure, you don't want your feet on the floor. You want them on the rudders where you can use the rudders. So it's a training thing to say, You'll do better if you keep your feet on the floor.

But that isn't what we intend. What we intend is to tell them; don't put in rudder inputs during turns. Keep your feet on the rudder --

CAPT. ARONDEL: But don't use it?

CAPT. HIGGINS: -- but don't use it unless you have to.

CAPT. ARONDEL: Thank you, Captain.

MR. IVEY: Captain Delvin Young, American.

CAPT. YOUNG: Initially, you said that when you take airplanes or aircraft up to max side-slip that they're heavily instrumented?

CAPT. HIGGINS: Uh-huh.

CAPT. YOUNG: And you obviously shared some concern about that max side-slip and things like that. How do you provide that information about that concern and limitation and caution, whatever, to the line pilot when the product goes to the user?

CAPT. HIGGINS: Well, actually, what we're doing when we do the testing is to prove that the airplane, throughout the envelope -- that's why we do it at all flap settings, all CGs, all speeds -- that you can't get yourself in trouble.

CAPT. YOUNG: Okay. So as long as you stay within the envelope you should be --

CAPT. HIGGINS: Right. Right.

CAPT. YOUNG: -- you should be good to go?

CAPT. HIGGINS: Should be okay. Yes.

CAPT. YOUNG: Okay. Were you invited to United's program? You mentioned that United --

CAPT. HIGGINS: No.

CAPT. YOUNG: -- and American kind of seemed to start at the same time to develop this?

CAPT. HIGGINS: No, I wasn't. No.

CAPT. YOUNG: Okay.

CAPT. HIGGINS: And by the invite, I think that -- you know, when I said invite, I think I -- I know some people in the industry and I arranged for my invite kind of a thing.

CAPT. YOUNG: Sure. Yes, it's --

CAPT. HIGGINS: You know --

CAPT. YOUNG: Sure. Absolutely. And you kind of mentioned that Boeing still doesn't teach or have procedures in their manuals about upset training or -- not that I would expect it, but any reference to wake turbulence?

CAPT. HIGGINS: No.

CAPT. YOUNG: Okay. And just to clarify, just so --

CAPT. HIGGINS: Although, you know, we provide -- we have -- and in fact, I brought them. I think you wanted them and I was supposed to deliver them to you, we -- okay. So you got some different ones, the three? Okay.

So we distribute and we have those, and we give them to those people that we are training. So when I say that -- but I don't -- like I say, I haven't been through the full type rating --

CAPT. YOUNG: Understand.

CAPT. HIGGINS: -- course recently. But the last time I was through one, we did not specifically address anything but wind shear.

CAPT. YOUNG: I understand as a procedure, but these are procedural or just informational?

CAPT. HIGGINS: I think most of those are just informational. There are some procedures embedded in them, but --

MR. IVEY: For the record, what we're referring to are three CD-ROMs that are education and training aids related to turbulence, wake turbulence, and airplane upset recovery.

CAPT. YOUNG: Okay. And just to clarify what Bart was talking about there as I -- as the couple where you said, If you input a rudder input, you would expect a delay. You were primarily concerning the roll effected by the rudder input.

CAPT. HIGGINS: Uh-huh.

CAPT. YOUNG: But you would expect the airplane to yaw --

CAPT. HIGGINS: Yes.

CAPT. YOUNG: -- in relation to that immediately?

CAPT. HIGGINS: Right. Right. It begins to yaw, but -- and it's just like in a roll axis, but I don't think you recognize it so -- when you put in a certain input, why, the airplane begins to roll slowly and then develops a faster roll rate.

And that's intuitive in the roll axis, because you can see that develop more easily. In the yaw axis it's the same way. If you put in an input, it begins slowly and then begins to build.

CAPT. YOUNG: Right. I understand. Sure. You mentioned -- and I think it was Dave that had asked you if you'd had any concern inputting full -- in this case, full rudder input, as long as you're below a $V_a$, and you kind of indicated no, but then when talked about reversing rudder, you said that you do have a concern.

How do you get that information or how is it presented to a line pilot at one of your users out there?

CAPT. HIGGINS: You know, that's a good question. And I guess it's one of those -- it's kind of like the tiller example that I gave you. We don't necessarily say, Don't use the tiller at 100 knots and don't use hardover tiller at 100 knots.

So there are some things that you begin to think are -- if you could think up a scenario that said, I'm going to use -- need -- full rudder in one direction and then full -- I don't have -- because I don't have any problem with small amounts of rudder and, you know, push it this way and then push it that way.

But what I don't -- what I do have concerns about is full rudder in one direction and then followed subsequently by full rudder in the opposite direction. So it's again a question of degree and where is my concern? My concern is with full rudder in one direction and then full rudder in the opposite direction.

And I can't conceive of a situation where -- you know, every time I say I can't conceive of it, it happens. But I can't really conceive of a situation that would create the need to do that. Just the same way, I can't conceive of a need to put in full tiller at 130 knots.

CAPT. YOUNG: Having said that, from an airplane operating below $V_a$, could you ever conceive of a situation that the tail would structurally fail and be ripped off?

CAPT. HIGGINS: No. No, I can't. Comma, we have -- you know, you look at a lot of history and experience, and we have had a B52 fin get knocked off by turbulence, and I think that that's not the first one. I think that happened two times, actually. Two B52s doing low-level stuff, knocked the fin off in turbulence.

CAPT. YOUNG: Would you ever be concerned about a pilot, like an engine failure or an engine seizure perhaps, that fed in the wrong rudder and then corrected it to the opposite side. Would you be concerned about any structural issues if that happened?

CAPT. HIGGINS: I don't -- obviously, you could always draw a scenario that resulted in something that he really got all the way at full rudder in the wrong way and, Oh, by the way, he's really got a hell of a side-slip developing now because he's got the engine helping him and the other.

But certainly, the airplane is good to have the engine fail entirely, seize, control the roll with aileron or -- and then stomp in full rudder in the correct direction. So there's -- you have to understand that the areas that I'm concerned about are those where you're going from full side-slip in one direction to full side-slip in the other direction.

CAPT. YOUNG: Right.

CAPT. HIGGINS: That's pretty difficult to get to.

CAPT. YOUNG: Right. After Cecil responded, it kind of -- I mean, it seems like, if I understand it correctly -- that Warren was still a part of this training aid that was being developed by the industry at the time. So American wasn't completely developing the program in isolation --

CAPT. HIGGINS: No.

CAPT. YOUNG: -- they were soliciting --

CAPT. HIGGINS: Not at all. No.

CAPT. YOUNG: -- and so --

CAPT. HIGGINS: No. Not at all.

CAPT. YOUNG: Okay. But there really wasn't any by the group that authored that letter, there really wasn't any follow-up per se? You just kind of moved on to the industry training aid in those -- that avenue?

CAPT. HIGGINS: Yes. And in fact, I think that there's an expectation that when the industry gets together and publishes that that everybody kind of -- I mean, because it's a joint consensus deal where everybody from -- is invited to participate.

CAPT. YOUNG: Right.

CAPT. HIGGINS: And then we send out all of the developed goods and training aids that -- they go to everybody. So we believe that that's the way the way that that consensus comes about, and we believe that they take the data from there and use it properly.

CAPT. YOUNG: Right. Okay. And this will be my last question. I appreciate your being here today.

CAPT. HIGGINS: Let's hear it. Let's hear it.

CAPT. YOUNG: Because I have never done this with large transport category airplanes so, you know, I rely on your expertise that -- it seems like a lot of what we've talked about is real high alpha maneuvering that concerns rudder and some control inputs and things like that.

If you weren't at high alpha and something excited the yaw axis, would it -- I don't know exactly how to ask it -- I guess would it surprise you if a pilot would react to that with the rudder input to correct the airplane back to neutral or to stable flight?

CAPT. HIGGINS: With no aileron input? I mean, because most of --

CAPT. YOUNG: If it was just excited in the yaw axis. And I'm -- what I'm kind of referring to is I guess that you've had some of that where you had to excite only the yaw axis, and obviously, you probably had some rolling moment after some period of time.

But if a pilot got just a yaw axis excitement --

CAPT. HIGGINS: So this is just my own thought?

CAPT. YOUNG: Yes. This is just your -- because you've been there and we haven't so --

CAPT. HIGGINS: Yes. Okay. Most of the -- when you're on the runway and you have an engine failure, you have a really good yaw string out there and it's called the center line or the sides of the airport or something that gives you really good input as to what you require of the yaw axis.

CAPT. YOUNG: Right.

CAPT. HIGGINS: Once you lift off the ground, it's a dynamic situation and you get some roll into it, and I would find it pretty unusual to have a pilot, in my own experience, use rudder to recover without using the aileron, because the two things go together.

I mean, you get some yaw and then you're going to get some roll, and most of the time the pilot -- once you're up and away and you don't have that yaw string headed out in front of you, the perception of yaw is a little more difficult and the perception of roll is quite easy.

CAPT. YOUNG: Right.

CAPT. HIGGINS: And so I guess I'd find it kind of hard to believe that they react with rudder.

CAPT. YOUNG: Okay. Thank you.

MR. IVEY: Off the record.

(Off the record discussion.)

MR. IVEY: On the record. Captain Jim Goachee from the FAA.

MR. GOACHEE: I only have three quick questions, Captain.

CAPT. HIGGINS: Sure.

MR. GOACHEE: You talked about teaching wind shear but not -- you weren't aware of wake turbulence, and that's -- they could be teaching wake turbulence, just like with this example now of you providing to your customers your wake turbulence --

CAPT. HIGGINS: Uh-huh.

MR. GOACHEE: -- in your training program, you're just not going to be aware?

CAPT. HIGGINS: And I'm just not aware of it. I have not taken a full type-rating course in a long time. That's right.

MR. GOACHEE: All right. Have you ever done any instruction, simulator or flight, with regular line pilots or people going through a training program in any Boeing aircraft?

CAPT. HIGGINS: No. No.

MR. GOACHEE: Okay. So usually for you, being a test pilot and knowing what to do when you have the parameters, the person sitting in the other seat are going to be just as qualified, so the chances of running into somebody that would make a mistake or put a wrong input in a control is probably less than maybe the average pilot with not your knowledge?

CAPT. HIGGINS: Well, actually, that's not quite true. We do a lot of demonstration flights. Also got a lot of -- a fair amount of time in production flight-test where we -- the random pilot comes to Boeing to take their airplane delivery.

We do a lot of -- like I say, a lot of demonstration flights, and we take it -- actually take the airplanes to the kinds of areas that we're talking about to demonstrate the flying characteristics with people who have absolutely no engineering background, no training, and in some cases, since we do it worldwide, they don't understand the language very well. So you end up with --

MR. GOACHEE: But you give them a good briefing --

CAPT. HIGGINS: Well, and --

MR. GOACHEE: -- do you not, prior to --

CAPT. HIGGINS: -- and sometimes they don't understand a word you said.

MR. GOACHEE: This was twice I think you did it, and you talked about seat of the pants flying and intuitive-type, I think Dave brought up. And some things you should know, and then you got into the rudder reversal and you come up with the fin stall, I think you said, and why you wouldn't do it and -- but we're talking your knowledge as a test pilot and you had these concerns about what you would do with a control input.

But what does the poor line pilot have? And we have to cover the weakest link we can set -- you know, I don't know of one that -- you know, I'm not talking about a check airman or a test pilot. I'm talking about the average pilot that, you know, thinks he does his job, but he gets all his information, and we'll just call it flight handbook, you know, I know different carriers have different names, but let's just say it's the flight handbook.

All the information that that pilot is going to use to fly A to B without certain operating procedures that the company has, but system knowledge is going to be in that handbook. And how is that pilot supposed to know about some of the safeguards that you know as a test pilot if they're not put in the handbook?

And are you aware, I mean, prior to this Advanced Maneuvering Program and then afterwards, any of the regards or cautions that you should use on rudder for high angles of attack or for any condition? I mean, as a test pilot you know, but how is the average line pilot supposed to know? Did Boeing have this in their handbooks at the time?

CAPT. HIGGINS: No. No. In fact, I thought that the program, the training AAMP program, was such a good program was because that I -- there are some things that we had been getting away from -- the seat of the pants basic airman knowledge that you -- that I thought that because of the training that we were going through and with where we emphasized automation without getting to some of those areas.

That's why I thought this program was so good, that I think you need to have some of that.

MR. GOACHEE:  Do you have that information in any of the handbooks for Boeing now?

CAPT. HIGGINS:  No.  We have the training aid that we -- yes.

MR. GOACHEE:  But if that pilot has not been aware of that training aid, has never observed it because of whatever company he's talking about, we're not talking major carriers.  I mean, a lot of people fly your airplanes --

CAPT. HIGGINS:  Uh-huh.

MR. GOACHEE:  -- and Airbuses, and they don't have the superb training.  So they use their handbook, and sometimes they use the manufacturer's book.  So if I was not aware of that training aid, how would I know not to use certain inputs at full control, you know, full deflection?

CAPT. HIGGINS:  Well, how do you know not to put in full tiller at 140 knots?

MR. GOACHEE:  Sometimes you learn, and we've had accidents because of that.  I understand that.

CAPT. HIGGINS:  Well, but that's my point.  So where do you stop teaching?  At what point do you stop teaching?  You have to assume that when people climb into a big transport category airplane and become the captain, where there's not somebody that they have gained that experience through the years.

I don't know how you get it. That's called experience, and you have to develop that experience by being there and done that to a certain amount. If we were strapped with assuming that when somebody comes in for a type rating on a transport category airplane and knows nothing, absolutely nothing, and has no experience, the training programs would be years long.

They'd be as long as the experience is to get you to be a captain. That's how long the training program would be. And in fact, that's what experience is. It's a training program.

MR. GOACHEE: But would you agree that, you know, there's different levels of proficiency and different levels of knowledge and different exposure, whether you came up from the military or general aviation?

CAPT. HIGGINS: Sure.

MR. GOACHEE: And that you need to cover the weakest link that -- going through the program?

CAPT. HIGGINS: Well, we've got some awfully weak links. You know, I'll be honest with you. If you -- somewhere or another you hope you weed out the weakest links.

MR. GOACHEE: And I have one last question. In this -- because the other concern you had, and it's an excellent one, is his reference to simulator in giving scenarios in a simulator that may not have the data that you use for test pilot.

My other question would be is that would you agree that, you know, maybe -- you may be a company's aware, and I'm not picking on American -- this is any company -- is that when a pilot goes in and he does the maneuver in a simulator and he pushes the rudder or whatever he does, in essence, it's negative training for him or he thinks that he may be -- or she -- may be able to do this in her real airplane, but it's not realistic and they won't really know, because they don't know that you have a separate data package that you can provide to whoever runs the simulator? And that maybe a pilot could get confused on what they do in a simulator when in actuality, they couldn't do it in the real world?

CAPT. HIGGINS: Well, I tell you. The normal training program that we're aware of throughout industry, prior to that time, we always are improving the data package that we've got. We improved the data package for wind shear, because that was a new phenomenon that nobody knew anything about before, and we were on -- aviation industry is such a wonderful thing because we're always learning.

Every time we go out and fly, we learn something. And we think we know everything about it but we don't, and that's why we still have pilots in airplanes, because if we knew everything there was to know about it, we'd eliminate the pilots from the airplanes. We'd do it all automatically.

But we don't know about it, and that's why pilots are there. So we continue to learn, so in terms of the data package, which we, as we learned about wind shear, we improved the data package. As we learned about AAMP, we improved the data package as we could.

There are cases today where we don't have the data. All we're doing is using derivatives and what the equations of motions say that that will do, because we don't put the airplane there to actually test it. We do the very best we can, but we're always going to -- and tomorrow we're going to find some new area in the simulator that we're going to need to improve.

I can probably guarantee it. We're going to find that place and we're going to improve it. So we do the very best we can within the operational envelope that we know that we are -- that people are training and using the simulation, and we do the very best we can.

MR. GOACHEE: Thank you, Captain.

MR. IVEY: Captain John Lauer, APA.

CAPT. LAUER: Just a couple, two or three questions.

CAPT. HIGGINS: Sure.

CAPT. LAUER: There is no such thing as a steering tiller limiter, is there, because there's no expectation of a pilot to perform in the analogy that you described?

CAPT. HIGGINS: Yes.

CAPT. LAUER: But there is rudder limiters?

CAPT. HIGGINS: Uh-huh.

CAPT. LAUER: Engineers have come up with that to prevent pilots from exceeding the structural limits of the rudder?

CAPT. HIGGINS: Uh-huh.

CAPT. LAUER: Okay. Fin stall. What would cause in a normal airplane that's certified, it's already gone through all of its testing, what would cause a vertical fin to stall?

CAPT. HIGGINS: I can't conceive of it other than some dynamic maneuver that it got into from some unknown cause. I don't know what would cause it. In fact, the reason that we do the full rudder side-slips is to assure that with the rudder that's available you don't get there.

CAPT. LAUER: Okay. So if the design and proper testing has shown that the design is proper, you should never encounter a fin stall?

CAPT. HIGGINS: Within the normal operating envelope that the airplane is expected to operate in, that's correct. But given something outside of that normal operating envelope, I'm sure that you could always get there. I mean, it's just --

CAPT. LAUER: Okay. With that said, if an aircraft encounters turbulence, whatever nature, could the turbulence -- considering that the fin is not going to stall -- could the turbulence be so severe that it could break the rudder?

CAPT. HIGGINS: Yes, well, I think we have --

CAPT. LAUER: Not the fin but the rudder.

CAPT. HIGGINS: I don't know. I don't know about -- I don't know. It would have to be -- because the only loads that can come on the rudder would have to be imparted to the fin also, so I -- you know, it's just a question of how they designed it to which one was the weaker part.

CAPT. LAUER: If the aircraft is in a stall situation, buffeting is being transmitted through the airplane, can buffeting impose the forces possibly to break the rudder?

CAPT. HIGGINS: Not in my experience, no. We've -- no. For a Boeing-designed airplane, we have been in really severe buffet, and all cases, down through and including stall and/or -- and we have loads monitoring data on board the airplane, in the fan and all over the airplane, and we've never experienced those kinds of loads.

CAPT. LAUER: Okay. Are you familiar with the term bandwidth on a rudder?

CAPT. HIGGINS: No. No.

CAPT. LAUER: It was brought to our attention earlier that there's a phenomenon where you could approach, quote, unquote, the bandwidth of rudder where you could in theory exceed the physical capabilities of the rudder actuators in moving the surface because of the frequency that you're applying.

Hence, it was pointed out that you could load up the rudder and not the vertical fin. Have you ever -- do you have any information about this phenomenon?

CAPT. HIGGINS: No, I don't. But that doesn't mean that it's not just something that I haven't been familiar with. Yes.

CAPT. LAUER: Last two questions. Have you ever been involved with an upset or with turbulence in a Boeing airplane?

CAPT. HIGGINS: Well, let me see. Yes, I'm sure I've hit wake turbulence in a Boeing airplane, and I've been involved in upsets in a Boeing airplane.

CAPT. LAUER: Okay. In that wake turbulence upset, did you have -- as the pilot; I'm assuming you were flying?

CAPT. HIGGINS: Uh-huh.

CAPT. LAUER: As the pilot, did you have any inclination to wanting to step on a rudder because the airplane is moving about the axis?

CAPT. HIGGINS: No. I haven't had that personal experience, no, I haven't.

CAPT. LAUER: I don't have any more, Dave. Thank you very much.

MR. IVEY: Thank you, John.

Captain Ron Skupeika, Airbus.

CAPT. SKUPEIKA: Very briefly. This whole interview was -- is that we're dealing with the letter and recommendations, and it was a very serious fact that you guys went off and signed on it. Very briefly in your own words, maybe if you were in the charge of the AAMP program today, hypothetically, how could you make a quick fix?

CAPT. HIGGINS: Well, that -- I'm not familiar with the AAMP program today. But if I went back to when I was familiar to when --

CAPT. SKUPEIKA: Way back -- right.

CAPT. HIGGINS: -- familiar with it, I would change the emphasis that I saw on rudder to be more -- in fact, I would -- in the thing that we wrote, we said, Use aileron first and then if you run out of that, why, then use rudder.

And at the high angle of attack case, I would certainly not use -- propose using roll to reduce pitch attitude. And at the time that I witnessed it, they had a maneuver in the simulator that the wake turbulence encounter rolled the airplane beyond 90 degrees, and they also removed the capability to use the wheel because they zeroed the ailerons.

Couldn't -- you could put in wheel, but the ailerons didn't work, forcing you to use rudder, which I was concerned that that would teach people to use in an inappropriate way.

CAPT. SKUPEIKA: Would you consider that primitive reversion?

CAPT. HIGGINS: Yes -- well, it was teaching them something that wasn't necessarily true, because that isn't what happens to an airplane when it gets upside down. The roll controls still work. So -- but again, let me reemphasize, I thought that the overall program that they had was excellent and it was needed in the industry and it was -- they ought to be applauded for taking the initial steps to get that thing moving in that direction. I thought it was just superb.

CAPT. SKUPEIKA: That's all I got. Thank you.

MR. IVEY: One last question. Airbus does not teach upset recovery and Boeing doesn't teach upset recovery. You can't answer for Airbus, but is one of the reasons that upset recovery training is not taught to an initial cadre or airline using your services -- is it because of one of the statements you made that the lack of simulator data might indeed be giving a bad input.

So is it a simulator limitation that is precluding that from occurring?

CAPT. HIGGINS: No. No, I don't think so. I think that most of the airlines use the period during recurrent training rather than the initial checkout to do that kind of training. That's not Boeing -- let me be really careful -- FSBTI, which is -- that's separate from kind of the things that I do -- our training -- Boeing's training from a commercial standpoint separate from FSBTI, its focus is on initial type ratings and not on recurrent training.

So from a Boeing commercial standpoint, we worry about the initial type rating thing, and I don't believe that any airlines have their AAMP programs embedded in their type rating. I'll ask that as a question: Do they? I don't think they do, and I think that's the real reason is that the footprint is really tight to get a type rating completed in the amount of time that there is available, so that's just something that's beyond the scope of that.

I think the AAMP program takes -- what; an extra couple of days or so, doesn't it? That was what it was when I witnessed the AAMP program a number of years ago.

MR. IVEY: I think it is included in their simulator training program at about simulator period six.

CAPT. HIGGINS: Yes. It is?

VOICE: It is.

CAPT. HIGGINS: All right.

MR. IVEY: Well, Captain Higgins, it's 4:30, and I want to thank you.

CAPT. HIGGINS: You bet.

MR. IVEY: I know you have a plane to catch, and I appreciate all your comments and participation for us today.

CAPT. HIGGINS: You bet. My pleasure.

(Whereupon, the witness was excused.)

(Off the record discussion.)

EXAMINATION

**d. Captain Aubrey A. Landry**

MR. IVEY: Well, we're happy you rejoined us this afternoon, Captain Landry, and I hope by way of introduction you'll tell us your name, your position, your aviation experience, and flight time, ratings -- just a little bit of your aviation history.

CAPT. LANDRY: Okay. Let's see. Been flying for about 30 years, I guess. Went into the Air Force right out of college. Flew the F4 off and on for about ten years. Also flew the F100 Super Saber and my last five years I flew the F15.

Along the way, since most of that was in the Reserves, I got hired by American Airlines. Flew as a 727 flight engineer for seven months. Got laid off and ended up with a corporate flying job where I flew a Cessna 310 and a Merlin as a corporate operator.

Got recalled by American Airlines. Came back and over the years I've flown captain on the DC10, the 757, the 767, the Super 80, F100, and the 727. I was a check airman at one time on the F100 and the 757/767. I've been in management now with American Airlines since -- I believe it was '91 or '92 as first, a fleet supervisor and then a fleet manager of the F100, eventually becoming the manager of flight training and two years ago became the managing director of flight training and standards.

I don't know how many flying hours I've got. Last count, I think, was somewhere around 13,000, but please don't quote me on that. That's real ballpark.

MR. IVEY: You mentioned being the manager of flight training?

CAPT. LANDRY: Yes, sir.

MR. IVEY: And that's over all flight training or is that specific to the A300 or --

CAPT. LANDRY: Yes. It's over all flight training. At the time, the manager of flight training owned the fleet managers. All the various fleets reported to the manager of flight training.

Human Factors or CRM did not at the time, so all of the flight training that was directly related to the airplanes or the fleets, yes, that was my job.

MR. IVEY: I don't think I heard you mention that you had flown the Airbus in --

CAPT. LANDRY: I've not flown the Airbus.

MR. IVEY: So you're not in any seat or --

CAPT. LANDRY: No. Not in any capacity.

MR. IVEY: Have you been involved in the oversight of the A300 ground and simulator training?

CAPT. LANDRY: Yes, sir.

MR. IVEY: And flight training too, I presume --

CAPT. LANDRY: Yes, sir.

MR. IVEY: -- if there is any?

CAPT. LANDRY: There is not now. There was up until several years ago when the regulations changed, allowing us to pretty much do it all in the simulators.

MR. IVEY: Yes. So you also have the opportunity to provide oversight or -- of the AAMP program. Is that part of your purview also?

CAPT. LANDRY: It is now.

MR. IVEY: Was not before?

CAPT. LANDRY: Not directly. No, sir. I was involved quite a bit with things like the scheduling or working the program into other programs or parts of the program, but I did not have direct oversight of the AAMP at that time.

MR. IVEY: You've been around since '91, and that's well before the -- in the management of American, and that's well before Captain Warren VanderBurgh put the AAMP program together. Was that pretty much his independent focus outside of flight training or was there a separate -- I can't even think of the word -- was that just a separate genesis of a program directly under Cecil Ewell, vice president of flight, or where did that fit?

CAPT. LANDRY: I believe, and if my memory serves me well, I believe that Warren had a tremendous interest in this sort of stuff. Warren's always been a very focused instructor. Probably be a good way to put it. And very interested in things along these lines.

And I can't really remember -- I think this started back in '95 not long after we lost our aircraft in Colombia with Warren expressing an interest to do something. Of course, the HBAT had come out in 1995 also, based on some NTSB recommendations that tasked the airlines with getting into the selected event training business.

It's kind of a chicken or an egg thing for me right now in that I can't remember which came first, but I know that all in that same time frame, Warren expressed quite an interest in it and in helping to develop some sort of training along these lines.

And as I say, memory is not serving me well. I'm over 50 now, and I'm starting to -- sometimes the train leaves and I'm not there. But Cecil -- Cecil and Warren were very good friends, and Warren expressed his interest to Cecil and yes, Warren took off with it, and well he should have.

MR. IVEY: And now the AAMP program is under --

CAPT. LANDRY: Yes, sir.

MR. IVEY: -- your direction?

CAPT. LANDRY: It is now.

MR. IVEY: Who heads up the AAMP program now?

CAPT. LANDRY: We don't have anyone -- any one individual named as a head of the AAMP program.

MR. IVEY: It's been pretty much established and not anyone has to oversee it or fine-tune it at this point. If that does occur or needs to occur then that would be handled through your office?

CAPT. LANDRY: Yes, sir. It would.

MR. IVEY: You mentioned the HBAT. Could you describe for me what that HBAT was in reference to?

CAPT. LANDRY: Well, I believe the title of it was Selected Event Training. And it was -- and I don't recall the genesis of that particular HBAT. I do remember that it's based on NTSB recommendations and that the FAA published it and called for training in events that we've, as an industry, had not trained a whole lot before.

Things like various upsets, engine failures during the second segment of climb was one of the items mentioned on it. Now, the list of items on there was not all-inclusive nor was it meant to be mandatory, but the list of items on that HBAT were giving examples of things that would be good things to train in this new Selected Event Training.

MR. IVEY: I have an HBAT 98-10 in front of me that may or may not be applicable. I'll just read the brief cover sheet here. Temporary loss of electronic flight instrument displays during an upset in Airbus Industry A300 airplanes.

That's probably not the one you're really referring to, is it, because that --

CAPT. LANDRY: No, sir.

MR. IVEY: -- that doesn't focus on single event training.

CAPT. LANDRY: And I've got it here, actually, if -- would that -- is that within protocol?

MR. IVEY: Yes. In fact, if you wouldn't mind, if I could have a copy of that later I would appreciate it.

CAPT. LANDRY: You certainly can. I've also got the HBAT. I've got our changes to the approved training manual that we instituted at that time. The HBAT was effective August '95, and it's titled Selected Event Training. I've got along with it the approval sheets and description of what it is we're -- what it was that we put into our training program at the time. You're most welcome to a copy.

MR. IVEY: Thank you. Were you aware of this letter that was sent by Boeing and Airbus and McDonnell Douglas and Tom Imrich signed it with the FAA to Captain Ewell?

CAPT. LANDRY: I am aware of it. Yes, sir.

MR. IVEY: When did you become aware of that?

CAPT. LANDRY: That's a good question. I don't recall. Shortly after that letter was dated, and I'm not sure that I saw it when it first -- when it was first issued. Shortly after that letter was sent, I went to Miami to become the chief pilot down there, and so I was out of the training business and away from here for about two years.

I don't recall if I saw the letter before I went or if I saw the letter after I was gone somewhere. I do know I never had my own copy of it. I have seen it, and I saw it certainly before I took over this department two years ago.

MR. IVEY: And Captain Ewell responded to the people that signed the letter. Did he provide anyone at American a copy of his response to at least alert or allow everyone in training to be aware of what was going on and his reply?

CAPT. LANDRY: I don't know. I don't recall. I want to say yes, that I know I have seen before -- let's see; I'm trying to figure a good way to say this -- before I came, before I took over as managing director. I know I had seen the response. I just -- I can't remember when.

I want to say I saw the letter and the response all at about the same time, but I can't tell you if that was when I was still in training or when I was out at the base.

MR. IVEY: There is a video of Captain VanderBurgh's presentation to a live audience, and I don't know what the current date of the video is, if it's used today for initial or recurrent. Do you happen to know the timeframe of the video or when this video was first recorded?

CAPT. LANDRY: Well, there's a whole bunch of them, and I assume the one you're talking about is the first one that was issued, and I'm trying to think of the title.

MR. IVEY: Actually, the one I'm in receipt of at the Board is dated December --

CAPT. LANDRY: December '97?

MR. IVEY: Yes, sir.

CAPT. LANDRY: That one -- of course, I watched it recently, and the opening credits say that that was a presentation that was filmed in April '97. The tape was issued in December '97 or dated December '97.

MR. IVEY: I noticed in the tape that there are added segments with Captain VanderBurgh there. I'd like to call them caveats for lack of a better word, and he basically says in conclusion that there are certain things that are associated, one of which was with the rudder and talking about the use of coordinated rudder.

Were those caveats, if you'll permit me to use that term, were they added as a result of a letter that might have been sent by the Boeing-Airbus-FAA consortium, the group?

CAPT. LANDRY: Dave, I honestly don't know. I want to say that they were added as a response to some of the verbal comments that had been made before the letter was issued, but I can't honestly say for sure which or what precipitated the addition of that segment.

That segment was added somewhere between April and December '97.

MR. IVEY: And is that the current film that's in use today?

CAPT. LANDRY: It is distributed to new-hire pilots today. In December '97 we issued it to all pilots for their own home reference library, and since then new pilots get a live presentation and the videotape is merely given to the new pilots to take home for their own home library for the -- so they can refresh themselves as they see fit.

MR. IVEY: Does Captain VanderBurgh still make that presentation?

CAPT. LANDRY: No, he doesn't. We have two other individuals who are dedicated to that.

MR. IVEY: And that's given to new-hire pilots?

CAPT. LANDRY: In the last few years, I think that's all we've given it to. Now, Warren has given it to a few other airlines that have asked for it and organizations, but as far as here at American Airlines for the last two years it's been given to the new-hire pilots only by these two other individuals.

MR. IVEY: And that's part of the new-hire --

CAPT. LANDRY: Part of the basic indoctrine --

MR. IVEY: -- approved training program, I guess, that's --

CAPT. LANDRY: Yes, sir.

MR. IVEY: Is it accepted by the FAA or --

CAPT. LANDRY: Yes, sir.

MR. IVEY: -- approved -- no, that's approved by the FAA? It's approved or accepted.

CAPT. LANDRY: I don't know. I'd have to go look at the ATM and see just what it says.

MR. IVEY: Yes. The recurrent training activities -- does that ever revisit the videos at all or is that a one-
time --

CAPT. LANDRY: It doesn't revisit the videos. Parts of the videos are used, I should say, from time to time in recurrent training. But there are snippets and segments that we use.

MR. IVEY: The recurrent training being basically in the ground school?

CAPT. LANDRY: In the classrooms. Yes, sir.

MR. IVEY: Or classroom activity. The recurrent training -- I'm sure each year or cycle you pick certain subjects to cover and that probably changes from year to year. Is upset training something that's revisited every year in recurrent training?

CAPT. LANDRY: Much more often than that. Every nine months. I don't know if you're aware of it. My big home run, the nine-month training initiative that we started September 1, and as a result now every pilot comes in every nine months for this training.

It's revisited in the simulator briefings and in the simulator. I say that portions of it are revisited. The unusual attitudes. The wind shear microburst training, of course, is revisited. Wish I had a worksheet in front of me. Attitudes, wind shear, microburst --

MR. IVEY: Wake turbulence?

CAPT. LANDRY: Wake turbulence is visited somewhat in that one of the methods we use to get into an unusual attitude is an encounter with wake turbulence.

MR. IVEY: But that will be visited every nine months now with this new program?

CAPT. LANDRY: Yes, sir. It was once a year for all pilots. Now it's every nine months.

MR. IVEY: Is that sort of a modification between the AQP [Advanced Qualification Program] and the only conventional six-month check?

CAPT. LANDRY: Yes, and kind of a predecessor to what we know of the N and O rewrite that's due out any day.

MR. IVEY: In the simulator, the upset briefing prior to going into simulator -- is there a set of guidelines for the simulator instructors to provide certain information to the student before he enters the simulator? Is there anything written on that?

CAPT. LANDRY: Well, they use the worksheets, we call them, which lists the items that should be covered in the briefing and in the simulator session. Additionally, something we've been working on -- it's not 100 percent there yet, but we've got a network of computers in all the simulator briefing rooms.

And on these computers, the individual fleets make up the briefing guides for those simulator sessions in PowerPoint so that they can have the information handy, the diagrams, so they don't have to draw on the board, and in an attempt to make things more standardized.

Those are included on most if not all of those. As I say, it's still under development.

MR. IVEY: And so the briefing prior to entering the simulator covers upset issues, I suppose, nose high and nose low. Do they get specific about that?

CAPT. LANDRY: The worksheet, as I recall, just talks about unusual attitudes, but the word that we give our people is we want them to see one of each somewhere along the way during the simulator session.

MR. IVEY: And that's every nine months now?

CAPT. LANDRY: Every nine months now.

MR. IVEY: So they'll get at least two upset scenarios of some sort during a simulator?

CAPT. LANDRY: They should get at least two, yes, sir.

MR. IVEY: Okay. Off the record a second.

(Off the record discussion.)

MR. IVEY: Back on the record.

So typically, every nine months during recurrent training, a pilot will come in and he'll probably get a segment of upset training that might be covered in the ground school portion, but indeed, when he goes into the simulator then he'll get a briefing before entering the simulator and then experience two at least upset events of some sort or another?

CAPT. LANDRY: He'll experience one for sure. Two, hopefully. And these are listed under the AQP variable maneuvers, so he has to get one. Whether he gets two or more -- generally, all the times I go in as a student I get at least two or three.

And to my knowledge, that's pretty typical of what the instructors are doing. That's certainly the guidance we give them.

MR. IVEY: Is the set-up similar in most periods, or is there a variable that each instructor can use to establish this upset maneuver? You mentioned earlier the vector behind an airplane for wake turbulence. Is that usually or is that exclusively the way that these unusual attitudes are developed?

CAPT. LANDRY: I'd say neither. I'd say it's a tool. It's there as an option. The instructor has some leeway as far as how he gets them into these situations. And individual instructors have their own way of doing it. The results is what we're interested in, so we don't get real picky. We give them some ways that they can do it.

MR. IVEY: Can you give me some examples?

CAPT. LANDRY: Well, real similar to what we did when we were in Air Force pilot training. Close your eyes, pull back, turn left, turn right. Okay, open your eyes and recover. That's one way of doing it. Another way of doing it is to distract one pilot, have him down in his kit bag while the instructor has got the other pilot putting the airplane intentionally into an unusual attitude and then telling the heads-down pilot, Okay, recover.

The wake turbulence encounter is a good one or another method. And I suppose probably limited only by the instructor's imaginations, as far as ways to get into it.

MR. IVEY: In the wake turbulence encounter, it's been stated that the aileron control had been inhibited in order for the airplane -- the simulator to actually get into this unusual attitude, and then at some point that roll control was reinstated so that the pilot can recover from the attitude that he's in.

Do you know if that software is still in those simulators --

CAPT. LANDRY: I believe it is.

MR. IVEY: -- to do that?

CAPT. LANDRY: I believe it is. And in -- it's only partially inhibited, and the reason that was done -- and you'll have to talk to my sim -- simulator engineer to get the real specifics on this -- but as I recall, since the HBAT -- we thought the list of items in the HBAT on Selected Event Training was a pretty good place to start.

And the question was how do we get someone into this -- one of the issues it called for was rolls beyond 90 degrees. How do we get them into that in a way that's realistic and quite literally takes a guy by surprise? And we thought, What better way than a wake turbulence encounter.

And what we found was that when we put the software in for the wake turbulence encounter, and I don't pretend to understand all this stuff -- it's all I can do to keep up with my Palm Pilot -- but what we found was that a quick-reacting pilot could stop the roll long before it got anywhere beyond 20 or 30 degrees, even with the tough -- the strongest vortex that we were able to insert into the simulator.

And so, of course, we wanted to, like the HBAT said, get beyond 90 degrees of roll, and the method they came up with was to partially inhibit the ailerons. And the reason I say partially is because, of course, if we inhibit them entirely, it would be a waste of time.

But to partially inhibit them in effect in the software world, all it did was make sure that the vortex was strong enough to get the airplane past 90 degrees. The more aileron a pilot put in, of course, the less effect the vortex had on his aircraft.

And as he rolled further and further towards this 90-degree point, finally, that that partial inhibition was washed completely out so he had full aileron control here. So it was a software fix in our opinion to a problem -- a simulation problem.

MR. IVEY: Earlier testimony indicated that they had been in a simulator and they had realized that they didn't even have to move the aileron; that they could actually recover through use of rudder. I thought that was interesting. Has anyone ever, through your check airmen meetings or simulator instructors, the get-togethers, ever talked about being able to recover from that using rudder only?

CAPT. LANDRY: That's the first time I've heard of that one. I've not seen nor heard anyone talking about -- in a wake vortex encounter? No, sir.

MR. IVEY: The meetings I'm sure you have perhaps monthly or quarterly with simulator instructors and check airmen -- has there ever been -- and you've been in this position, I think you said, about two years -- has there ever been any check airmen meetings or flight standards meetings or simulator instructor meetings that have raised the topic of excess rudder or rudder usage in training pilots?

CAPT. LANDRY: I think I'd have to be honest and say I'd be lying if I said there were or weren't. I couldn't tell you at this point. The manager of flight training would be the guy who is probably up to speed on the intricacies of the individual fleets in as far as the standardization meetings.

MR. IVEY: The individual manager of the particular type of aircraft? In other words --

CAPT. LANDRY: No. The guy who's in between me and the fleets.

MR. IVEY: Instructor, yes. Are there minutes of these meetings kept?

CAPT. LANDRY: Not official minutes. Most of the fleets publish a set of minutes from these meetings. They're not required to. They do it for the check airmen and instructors to reacquaint themselves with things, but they're not required to publish minutes.

MR. IVEY: All right. Since the accident, have there been discussions of any significant nature regarding rudder or rudder inputs or training regarding rudder? Any modifications in your program?

CAPT. LANDRY: No, sir. Been a lot of questions. A lot of people wondering what happened, but there have been no changes. Until we know what caused it, we don't know what to change.

MR. IVEY: Has the FAA in any way made any suggestions or offered any changes or required any changes that are perhaps in the mill at this point?

CAPT. LANDRY: Directly related to this? I'm not aware of any. No, sir.

MR. IVEY: In regards to upset training, have you had feedback of a general nature from your simulator instructors and check airmen regarding the ability of pilots to affect these recoveries?

CAPT. LANDRY: That's a broad question and I'm not sure I know where to go with it. Can you narrow down what it is you're looking for?

MR. IVEY: I'll give you an easy one.

CAPT. LANDRY: Yes.

MR. IVEY: You can answer that by yes or no and then we'll get specific.

CAPT. LANDRY: Okay. Give me the question again?

MR. IVEY: Okay. Has the topic of pilot recovery of unusual attitudes ever been brought up; their effectiveness in recovery?

CAPT. LANDRY: Their effectiveness? Yes.

MR. IVEY: And in those discussions, is it -- I guess I'd like to kind of get a feel for what your instructors and check airmen are -- have seen or experienced, and throughout the spectrum of your pilots here, do they feel comfortable or do you have a high success rate in these unusual attitude recoveries or is there some confusion sometimes?

What are some of the highlights and the pitfalls of the unusual attitude recovery?

CAPT. LANDRY: Highlights -- the feedback I get from the instructors and check airmen are that the pilots, as a group, as a whole, do a much better job these days than they did when we first started this. I guess a lot like the wind shear training when it was first begun, there's a learning curve.

The learning curve appears to have been fairly steep with this program and the feedback I've gotten over the years is that the program was excellent in that it accomplished what we'd set out to do in the first place, and that was to give a pilot the tools he needed to get out of an ugly situation when he may not have had those tools prior to this exposure to this course.

That's universally, I think, been the feedback that I've gotten on the program from the instructors and the check airmen.

MR. IVEY: Have there been any recurring -- and I mentioned pitfalls -- is there anything there that seems to serve as a source of confusion for pilots, or have they had to repeat this on occasions because there's certain things that seem to have come out of this type of training that might have been noticed by the instructors?

CAPT. LANDRY: I'm not aware of any. I've not been made aware of any.

MR. IVEY: I don't know if American has done any overall study since Captain VanderBurgh put that program together and its evolution. Has there been any study regarding your pilots in terms of success maneuvers -- successful accomplishments versus failure of recovering in unusual attitudes and/or --

CAPT. LANDRY: Well, it's not a --

MR. IVEY: -- acrobatic versus non-acrobatic pilots, military versus non-military. Any of that sort of a study done at all?

CAPT. LANDRY: No, sir.

MR. IVEY: All right.

CAPT. LANDRY: No, sir. In the pass/fail issue, it's not a graded maneuver so we have no -- of course, under AQP, and our recurrent training is all under the Advanced Qualification Program now, and we keep enormous amounts of data. But we don't keep a pass/fail criteria on those types of maneuvers.

MR. IVEY: It's more or less train to proficiency?

CAPT. LANDRY: Train to proficiency, just like the wind shear microburst encounters.

MR. IVEY: Do you participate in the ASAP program?

CAPT. LANDRY: I at one time was a member of ASAP, a member of the board. I, in my old job, the number two guy I was talking about. I don't participate directly in ASAP any longer. I receive the information, the feedback, the gist of what goes on in ASAP, the summaries, that sort of stuff, but I don't participate directly in it any more.

MR. IVEY: In that -- how long were you in that program? You say you were the number two?

CAPT. LANDRY: When I was the number two guy, I was the manager of flight training and flight standards from '93 to '97. I forget when ASAP was first conceived, but shortly after its conception I was on the board, the event review team, and then I participated in that continuously until I went to Miami in '97.

MR. IVEY: That's still an ongoing --

CAPT. LANDRY: Yes, sir.

MR. IVEY: -- and effective program?

CAPT. LANDRY: Very effective.

MR. IVEY: Do you recall any information during your time there with pilot reports of rudder anomalies? Did that ever come up often or at all to your recollection?

CAPT. LANDRY: I guess rudder anomalies come up from time to time. We see them occasionally. You know, if I had to venture a guess, I'd say that the rate has been pretty flat over the last umpteen years. I don't know. I honestly don't know.

I don't recall any flags or any spikes in the number of rudder anomaly reports.

MR. IVEY: Is there -- I'm sure you keep a database on your pilot reports through ASAP, even though it's de-identified. Would that be correct?

CAPT. LANDRY: The safety department does. Yes, they do.

MR. IVEY: If we wanted to look through rudder anomalies, to use that as the term, would that be something that could be drawn up just to see if there's anything that had been there before?

CAPT. LANDRY: To my knowledge, you could go back as far as the beginning of ASAP and pull that right out. I know on occasion I've asked them for reports on various issues, and they've been able to go back and research the database and give me the information I'm looking for, so I think that's possible.

MR. IVEY: And then there's the FOQA program. Do you get involved in FOQA at all?

CAPT. LANDRY: What FOQA program?

MR. IVEY: Oh, the quality assurance or the QARs or any of that type of --

CAPT. LANDRY: We don't have one.

MR. IVEY: Oh, you don't? Well, that takes care of that. I was trying to see if there was anything there that might have suggested rudder anomalies. Do you all have the QARs, the quick access recorders -- do you use those --

CAPT. LANDRY: No, sir.

MR. IVEY: -- in tracking any information? All right. It was brought to our attention in the Flight 903, the American Airlines A300 that was involved in the event --

Bart, you were involved in that. How long -- was that last year? You were not?

DR. ELIAS: No. That was Evan.

MR. IVEY: I don't know if it was last year or two years ago.

At any rate -- and again, I know you're not on the A300, but we found out that the screens would go blank, based upon an exceedance of a roll rate and on the PFDs, actually. Are you aware or have you heard any of that occurring during upset training in the simulator here with the A300s?

CAPT. LANDRY: I'm not aware of it occurring in the simulators.

MR. IVEY: Have they ever had the symbol generators go out as a result of rapid flight control response of any kind?

CAPT. LANDRY: Dave, I'd have to go back and look, but I think that since that event, that has been introduced into the A300 training. To get specific about that fleet, I'm not the guy to answer that one.

MR. IVEY: Yes. In other words, there is an event that as a result of that incident we had or that you all had, I should say, you can create the symbol generators to go out or something similar to that?

CAPT. LANDRY: Well, that's what I'm saying. I don't know. I honestly don't know.

MR. IVEY: We've had discussions about coordinated rudder input. Has there been any discussions at all related to the coordination of rudder since perhaps the letter was sent to Captain Ewell? It may not have all been on your watch, but any discussions in training about the use of coordinated rudder for any of the fleets as well as A300?

CAPT. LANDRY: Well, I'm sure there've been thousands of discussions. I'm not sure what it is exactly you're looking for there. There of course are going to be discussions between the instructors and their students. Those go on all the time.

MR. IVEY: I think I'm still trying to get a handle on air transport category airplanes and the concept of coordinated roll -- coordinated rudder, I should say, not coordinated roll. And we've heard the term used coordinated rudder, but we're not -- I'm not clear as to what it is that is taught to pilots about how to use rudder to make something coordinated.

CAPT. LANDRY: I think we're talking about two separate issues here. I think if you're talking about coordinated flight, a coordinated turn, I think that's one issue. And that's, of course, the stuff you learn in your private pilot course, and I don't think we get into that a whole lot.

If you're talking about what -- well, I think Warren said it well in his lectures when he talked about coordinated rudder. I think he gave a great caveat right off the bat and said that when he talks about coordinated rudder, he's talking about rudder in the same direction as the ailerons.

If I remember correctly, this is what is on the tape. Rudder in the direction of the ailerons as opposed to, for instance, cross-controls that you would use on a cross-wind takeoff or landing. So my impression of what Warren has been saying about coordinated rudder has to do with rudder in the direction that you want to roll, i.e., the same direction that the ailerons are going.

MR. IVEY: Yes. And I think that's a very accurate answer. I only follow up with one other question, and that is, is there times when this rudder in the direction of the aileron is too much rudder and sometimes too little rudder? And if so, how does the pilot know?

CAPT. LANDRY: Have we got a couple of days?

MR. IVEY: And I think as it pertains to upset training. That's where we're talking right now.

CAPT. LANDRY: I would have to say that my answer to that would be that you attempt to roll with the ailerons first, of course, because they're one of your primary flight controls for roll, after all. And if the airplane's not doing what you need for it to do, then now you add some rudder.

How much is too much? When you introduce side-slip. The rudder issue for me is maybe a little too simple in that I've flown lots of airplanes that, as you're well aware of, the F4, for instance, that it was rudder only, and other airplanes -- a T38, for example -- you never touched the rudder.

And so for me to give you a really good answer to that, I don't know. I know when I feel like I've got the right amount of rudder and I know when I've got too much and I know when I've got too little. If your question is how do I explain that in an academic environment, I don't know.

I don't know that I could stand here and tell you or anyone else that this is too little and this is too much.

MR. IVEY: I think your point's well made. I guess if you're in an airplane that's dynamic, perhaps you can get that vestibular sensation or whatever's happening as you're sitting in the seat, the seat of the pants, if you will.

CAPT. LANDRY: That's one way.

MR. IVEY: In the simulator, however, how are you able to know it's too much or too little? You don't quite have that luxury of the dynamics of true flight.

CAPT. LANDRY: That's true. That's very true. But once again, it's a simulation. It's what we have to work with. The alternative is to go up and try it in an airplane, and I'm not real big on that one. So I'm not sure what you're looking for.

MR. IVEY: No. I'm just trying to get a sense -- not really trying to put you on the spot either; please understand. You mentioned back in the early days when we learned to fly coordinated flight was turn coordinator or needle involve or --

CAPT. LANDRY: Right.

MR. IVEY: -- keeping the ball centered. And is it an accurate statement or fair to say that perhaps coordinated rudder should involve the ball? If the ball's centered, you're in coordinated flight.

CAPT. LANDRY: If you're talking about coordinated flight, that's --

MR. IVEY: That's a basis --

CAPT. LANDRY: -- normally the case.

MR. IVEY: -- yes. That's a basic thing we learned many years ago where new pilots associate part of their flight training with. But how much -- in reality, how much ball is really taught in air carrier training?

CAPT. LANDRY: Very little. Very little.

MR. IVEY: Precisely. I agree. Let's see. In upset training, has there been any one common theme that seems to have been a problem that instructors have brought up that there's been a modification to that sort of helped the students along in the simulator?

Anything there, or has it been pretty well set in place back in '96, I guess, and as you say, the learning curve has come along to where people are doing fine now, but have there been any tweaking of that to try to help students in their understanding of recovery?

CAPT. LANDRY: I'm sure there was during that time. As I say, we kicked this program off and shortly thereafter I was gone. I'm sure the program evolved during that time when I was gone. Since I've returned we've made minor changes to the program.

Like any program, it undergoes constant revision and review. We take feedback from the instructors and the students and try to make the program better using that feedback.

MR. IVEY: The FAA aircrew program managers, the APMs, have all of the APMs, to your knowledge, taken the ride through upset training?

CAPT. LANDRY: To my knowledge, yes. All the ones who are currently qualified. We've got some new ones that are not yet equipment-qualified, but yes, sir. It's part of all our training program, so they -- as they go through they should. Should have seen it.

MR. IVEY: Any feedback positive or negative from the FAA APMs?

CAPT. LANDRY: Haven't heard anything in awhile. I know that initially, they all thought it was an excellent program. They thought it was very good, that it was good training.

MR. IVEY: Have you had any information from other air carriers? You'd mentioned that Captain VanderBurgh had kind of taken his show on the road.

CAPT. LANDRY: Right.

MR. IVEY: And I think there's been acceptance of that perhaps around the world. I'm not familiar, but have you, as the manager of training, had any feedback from other carriers or had calls related to that?

CAPT. LANDRY: Oh, talk at industry gatherings. We -- the ones I can remember talking to thought it was a good program. They liked it. They thought we'd gotten out in front of the industry on it. Nothing formal.

MR. IVEY: Do you know whether anyone besides United had developed their own program?

CAPT. LANDRY: I don't know. I don't know.

MR. IVEY: Had you ever -- we'd heard in earlier testimony that it seemed like United and you all were taking the lead on this in its development. And --

CAPT. LANDRY: Yes. United was one of the carriers that asked Warren to give the presentation to them.

MR. IVEY: Oh. Oh, so perhaps you all were ahead of United in that development?

CAPT. LANDRY: We're always ahead of United. No. I want to -- I always --

VOICE: Well put.

CAPT. LANDRY: Well, I want to say we were, but I'm basing that strictly on the fact that I know that some time after we had this program in place was when United asked Warren to go back and give the program to several of their people. I don't know who all was in attendance, but quite a few people, I guess.

MR. IVEY: Yes. I know that Captain VanderBurgh, I believe, presented or invited them to watch. This was FedEx pilots and UPS pilots, and I think FedEx established a program and UPS did not. But I don't guess you were privileged to why various airlines around the country accepted or rejected the programs, were you? Do you have any --

CAPT. LANDRY: No, I don't.

MR. IVEY: -- general ideas there?

CAPT. LANDRY: I don't. I know that the industry initiative was starting up about the same time and once again, that's the two-year gap in my corporate memory that -- where I was playing chief pilot at Miami. During that time was when all of that was really developing.

MR. IVEY: Have there -- is the unusual attitude program generic or is it specific?

CAPT. LANDRY: Both. We start with a generic program and then, of course, you have to talk about the individual aircraft differences when you get to that level to the individual fleets.

MR. IVEY: In the simulator instructor or ground instructor manuals, is there specific guidance to teach the -- let's use ground, ground school instructor. I think you have perhaps one or two people teach --

CAPT. LANDRY: We have two currently.

MR. IVEY: Thank you. Is there a specific guideline for these ground school instructors to follow as it relates to what they need to teach regarding upset training?

CAPT. LANDRY: There is, and -- well, first of all, I have to talk about ground school instructors. These are check airmen, and a ground school instructor is a different cat at American Airlines. I don't know if that's significant, but these are check airmen that actually teach this course now -- the ground portion of it, the lectures that Warren VanderBurgh used to do. And the train left again. What was the question?

MR. IVEY: Just the ground school instructor manual --

CAPT. LANDRY: Oh.

MR. IVEY: -- and specific guidelines to ensure that they cover all the pertinent aspects of upset training.

CAPT. LANDRY: They have basically -- I think it's a glorified PowerPoint briefing with notes. And of course you've seen the PowerPoint slides or the handout, which is the PowerPoint presentation. And they use that with the notes that go with it to teach the course.

MR. IVEY: And in the simulator instructor manual, is there any specific bullet points that the simulator instructor should cover in his manual for sim instructors to say, Okay, regarding upset maneuvers, you need to cover this, you need to cover that. The point by point bullets, if you will, to ensure that it's an adequate briefing before simulation?

CAPT. LANDRY: Other than what we're putting on the computer network in the briefing rooms and the AAMP handouts themselves and the individual fleet worksheets. I think that pretty much covers it.

MR. IVEY: Is there any specific information in, say, the simulator instructor's handbook -- and I'm using that term. Is there a simulator instructor handbook or instructor guide?

CAPT. LANDRY: Not an official one per se. There is a addendum to the flight department administrative guide that covers a lot of this stuff for the individual fleets. Some more elaborate than others.

MR. IVEY: I guess what I was looking for was if a student is put through an unusual attitude, are there specific guidelines that say, Well, he didn't do that properly. He exceeded this. He went the wrong direction. Are there specific guidelines for that instructor to evaluate a pass/fail -- not pass/fail, because I know it's not -- it's train to proficiency, but are there specific guidelines for this instructor to look to say, Well, he went the wrong direction, or, He entered into a secondary upset maneuver. Or is that left strictly to the judgment of the check airmen?

CAPT. LANDRY: That is mostly left to the judgment of the check airmen. Those issues are discussed from time to time at standardization meetings. Our standardization program focuses on these things.

Our standardization coordinators, as well as our managers, watch the individual instructors and other check airmen at least once a year to see what they're teaching, how, and if there are any discrepancies that they pick up -- not teaching it the same way or someone not teaching what it is we've instructed them to teach, then we get the feedback on that and we take proactive action to make sure that that's done properly.

As far as do we publish something that says, Don't continue the roll, for instance, I don't know. I've seen it written. I've heard it a hundred times. We all have. It's basically -- it's almost travel knowledge, if you will.

Whether it's written or not, I couldn't tell you. I'd have to -- I'd honestly have to go and look at their manuals and see what they've got.

MR. IVEY: I guess I'm thinking somewhat in terms of giving a check ride if a pilot exceeds his altitude by 200 feet and his airspeed's off by 25 knots --

CAPT. LANDRY: Well, those are published --

MR. IVEY: -- and those kinds of things, of course, are flight standards requirements and --

CAPT. LANDRY: They're published in the qualification standards under Advanced -- AQP, now that we have that. And all our recurrent training, of course, is under AQP. So those sorts of things are published in the qualifications standards.

I haven't looked recently at what's published on those individual maneuvers. I'd have to go back and look. Not being an instructor any longer, I don't read those very often. Of course, there would not be pass/fail parameters, but there should be something listed in there.

MR. IVEY: That would say, Well, I need to re-demonstrate this for this student because it just didn't pan out right obviously, but what it is, they really need to be teaching in order to re-teach or to demonstrate, if that's the case?

CAPT. LANDRY: Yes. I believe that's the case. Once again, I'd have to go look.

MR. IVEY: That would be in what document?

CAPT. LANDRY: That would be in the qualification standards which are published as a part of the AQP.

MR. IVEY: And I know there's a lot in the simulator period and you go into the debriefing aspects. Is there anything that's specifically itemized for a sim instructor to debrief regarding just unusual attitudes?

CAPT. LANDRY: I don't think that's specifically mentioned in the debriefing outlines. I may be wrong.

MR. IVEY: Thank you, Captain Landry.

What I think I'll do is I'll go around the room, and because Captain Skupeika has always been the last one to speak, I think I'm going to let him go first this time.

So Captain Skupeika with Airbus.

CAPT. SKUPEIKA: Hi. How are you?

CAPT. LANDRY: Good.

CAPT. SKUPEIKA: I just have one question. When you get the pilots on these excursions and wake turbulence upset, and I might be asking the wrong person here, but what do you base your data on when you reach those over 60-degree bank or 90-degree bank or 130-degree bank?

When you're outside the realm of normal parameters, what does your simulator programming base that on? Since I know Airbus does not produce any of that at all, what do you guys use?

CAPT. LANDRY: It's extrapolated data, I would assume. Well, yes, you apparently are asking the wrong guy here, Ron, because I don't know once -- I do know that the flight test data is only valid to certain ranges of pitch bank, and once you get past those, I don't know what data we're operating on, to be honest with you.

CAPT. SKUPEIKA: Then if the guy recovers from that and he assumes the airplane is going to be responsive the same way, how can you say he's trained to proficiency when you don't have data?

CAPT. LANDRY: I don't think that we've ever said that the airplane is going to respond the same way. I think you have to go back to the genesis of this program and realize where it came from.

This started, at least in my mind, with the Roselawn crash where we had some pilots who got into this upside down situation --

CAPT. SKUPEIKA: Right.

CAPT. LANDRY: -- and didn't have -- it appears, at least -- that they did not have the basic knowledge they needed to know that what they needed to do was roll that airplane right side up. They did what was instinctive to them, and that was -- and of course I'm not the expert on this, but it appears that they did the instinctive thing and pulled themselves right into the ground.

CAPT. SKUPEIKA: Yes.

CAPT. LANDRY: And so based on that and the fact that we might have pilots who couldn't -- who, given this situation, would end up the same way, I don't care where the data came from because the goal there is to teach that guy that what he needed to do was this.

And whether the simulator responds exactly the way the airplane did or not is a moot point, because we have no other way to teach him that.

CAPT. SKUPEIKA: Would you say you'd disable the aileron inputs for a while?

CAPT. LANDRY: No. I'd say we partially inhibit them.

CAPT. SKUPEIKA: Partially inhibit them, yes, so he's got roll spoilers. The only reason I'm bringing that up is because we've heard testimony from your pilots earlier the first week in November that stated that they were inverted, and they expected the airplane to respond exactly the way the simulator was, and we have that documented. So that's why I just bring it up to your attention.

CAPT. LANDRY: I'm sorry. We -- statement -- we had pilots that were inverted?

CAPT. SKUPEIKA: That's what they told us. Well, some of the comments were that they got into an upset and were on their back and they recovered from it.

CAPT. LANDRY: In a real airplane?

CAPT. SKUPEIKA: No, no, no. This is a simulator. Strictly simulation. All simulations. That's why I just brought up the subject. And then they thought --

CAPT. LANDRY: Well, I don't think pilots --

CAPT. SKUPEIKA: -- we asked them that question. Did you think that the airplane would respond that way, and they answered, Well, yes, I guess so. An airplane's an airplane. That's all I'm bringing up at this point.

CAPT. LANDRY: Yes. Yes.

CAPT. SKUPEIKA: And it's just going -- you know.

CAPT. LANDRY: I don't think your average pilot has any idea how a simulator works --

CAPT. SKUPEIKA: Right.

CAPT. LANDRY: -- or what the limitations on a simulator are. And so that's probably valid.

CAPT. SKUPEIKA: That's all I have. Didn't mean to put you on the spot there.

CAPT. LANDRY: That's okay.

MR. IVEY: Captain John Lauer, Allied Pilots Association.

CAPT. LAUER: Captain Landry, just got a couple, three or four things. Has your department or has American Airlines received any information in any form from Airbus at any time in the past that you're aware of referencing the use of or the limitations to the use of the rudders in the A300?

CAPT. LANDRY: Well, that's a lot of anys, John. Let's see if I can give you a fair answer. Other than the letter that we've already discussed here, I'm not aware of anything else regarding that subject.

CAPT. LAUER: Okay. So from the manufacturer, as best as you can remember or know, nothing in a training form or any information that can be used in a training scenario to help with the training of rudder management or to alert pilots to rudder limitations have ever been received or conveyed to the company?

CAPT. LANDRY: Not that I'm aware of. Once again, with the exception of the letter.

CAPT. LAUER: In your opinion, and you were an instructor pilot at one time, I'm assuming an instructor pilot in the simulator as well as --

CAPT. LANDRY: Yes, I was --

CAPT. LAUER: -- out on the line?

CAPT. LANDRY: -- doing both. I was an "X" type.

CAPT. LAUER: Because of this unique condition that is programmed into the simulator where the ailerons are partially inhibited to help get the aircraft up to a bank angle to effect the training, is there any possibility or chance that because of this software as it is designed, would it lead the pilot to utilize or to rely on the utilization of rudders to get out of this scenario?

CAPT. LANDRY: I believe -- first of all, something you said about the inhibitions. I'm not really sure -- I think I need to clarify that -- I'm not really sure how they did that -- how they effected that. Once again, you'd have to talk to my chief engineer on that, and he'll go on for days on what they really did.

It's my layman's terms, if you will, that we partially inhibit the ailerons. That's my understanding of the way it works, so I want to make sure that's very clear. The engineers are going to have a whole different explanation for how they did it.

Did that -- and the rest of your question was did that in any way give a guy the impression that he needed to --

CAPT. LAUER: Use the rudders.

CAPT. LANDRY: -- use the rudders.

CAPT. LAUER: Would that lead him to use the rudders because the ailerons had been partially inhibited?

CAPT. LANDRY: I think in a lot of cases it would lead them to use at least some measure of rudder.

CAPT. LAUER: Is it -- is the pilot left, upon leaving the session, is the pilot left with the perception that in the real world, real airplane, if he were to find his airplane in that same scenario where, let's say, he's up at 80, 90 degrees bank, that he would have to use his rudders instead of rolling it with just aileron only?

CAPT. LANDRY: I think the message that we try to get across and I think it's very clear in Warren's lectures is that you do everything you can with the ailerons and then you use rudder as necessary if the airplane's not doing what it is you want it to do.

And particularly in a case where the airplane's gone beyond 90 degrees of bank and the nose is going to be following quickly now. Ailerons are not getting you where you need to be, then some measure of rudder is called for, certainly.

CAPT. LAUER: Okay. For those of us that are flying blind, we were hired -- in this case, this company with regards to myself and for others, other companies -- there are some basic tenets to being hired at a major air carrier; whether it's American, United, or any of the other major carriers of the world.

Building upon that, a pilot when trained from scratch is supposedly taught some basic fundamentals of flight, of which one is the needle ball concept, as Dave alluded to earlier. Is it fair to say that when an applicant comes to American Airlines that it is assumed that he has a solid understanding of the concept of the needle ball principle of basic flight?

CAPT. LANDRY: I think it's -- I think we make that assumption.

CAPT. LAUER: Okay. What is the average flight time of a typical applicant?

CAPT. LANDRY: I don't know what the typical applicant is, and as far as the last few years, the hiring we've done, I saw some statistics about a year and a half into that hiring phase that said that the average pilot had -- oh, boy. We could get those numbers for you if they're important, but I want to say it's 3,900 hours or 3,600 hours.

That was the average person we hired in the first year and a half of this last hiring binge. That's ballpark.

CAPT. LAUER: Okay, Captain. So is it fairly safe to assume that American Airlines in hiring these pilots, before they put them into the training program here at American, that it's understood that these pilots, because of the level of experience that they have acquired over 36-, 3,900 hours that the concept of needle ball management is second nature?

CAPT. LANDRY: I would hope so.

CAPT. LAUER: Okay. I don't have any more questions.

MR. IVEY: Thank you, Captain Lauer.

Captain Jim Goachee, FAA.

MR. GOACHEE: I'm going to follow up on John's. When he makes the suggestion that you assume, do you assume just because I write down 3,600 hours I have 3,600 hours, or is there a way in your screening process to -- does the applicant get a simulator ride for you to evaluate?

CAPT. LANDRY: They do.

MR. GOACHEE: So you evaluate more on the observation than the assumption. Is that a fair statement?

CAPT. LANDRY: Yes. What's the word -- trust but verify.

(Whereupon, at 6:00 p.m., the interviews continued in evening session.)

## E V E N I N G   S E S S I O N

6:00 p.m.

MR. GOACHEE: Yes. Okay.

CAPT. LANDRY: Okay.

MR. GOACHEE: All right, sir. Thanks. I want to go back to earlier in the question about training manuals and whether it's approved or accepted. Is it your responsibility -- and I really don't know from American's standpoint; you're going to have to help me -- but can you lead me through the process that all of a sudden someone will come to you and say, You know, we got to change this training manual. I mean, it's all wrong, or we need to add something.

And let's say it comes from the fleet manager and then work up or he works through the manager, then you. What's the process that you use here at American once you want to change the training manual. What process do you go through, and we'll start with you, Captain Aubrey. Forget everybody else.

What do you do once you want to change the -- or request to change the manual. How do you go about it?

CAPT. LANDRY: Well, first of all, I've got a guy who does that for me so he takes care of the dirty work as far as the paperwork and the process itself. But if you were my 767 fleet manager and you came to me and said, I need to add this into the training program.

My response typically has been, Okay. Do you feel like you need to add it. Do you feel -- what's it going to do? Okay, let's talk about it. Good. Put it in. From there, we turn it over to my -- we refer to him as the FAA liaison, and he takes care of the paperwork and petitioning the FAA.

And of course right now, it's kind of -- it's fleet specific because about half of our airplanes are under AQ -- we're all under AQP for recurrent training. But for initial transition and upgrade training, we're halfway there. Half of our fleets are AQP and the other half, the training is approved through the ATM process, so it depends on which one of those it's coming from.

The 767 is not yet on AQP. It will be later this year. So we go through the ATM approval process to add things like that.

MR. GOACHEE: Okay. So there are ways to go through the FAA to get approval for your training?

CAPT. LANDRY: Yes. A good example is earlier this year I wanted to get a day of flight management system training put into all the airplanes. It's something that I felt we needed for some time. I was fighting the war with the bean counters, and I was finally able to prove that it actually resulted in a cost avoidance.

Of course, you have to learn to play their game in order to make those things work out, but -- and so I said, Okay. So I wanted one day of training added to all the fleets, because now every airplane we've got has got either an FMS [Flight Management System] or a GFMS [Global Flight Management System] in it, one day of ground school added to every fleet across the board.

My FAA liaison got going on the paperwork and then we, through the APM and also the AQP approval process, which as you know has to go up to Washington for final approval, we got it approved for all these fleets. We added the day of training.

MR. GOACHEE: Do you personally have any contact with the POI [Principal Operations Inspector] or the APM on a weekly, daily, biweekly basis?

CAPT. LANDRY: It's irregular. Sometimes five times a week, sometimes once a month.

MR. GOACHEE: Yes. Is it usually the POI or the APM?

CAPT. LANDRY: POI.

MR. GOACHEE: Do you --

CAPT. LANDRY: The APMs -- I know them all and I see them in the hall and I stop to talk to them. I mean, that -- very informal with the APMs.

MR. GOACHEE: Yes. And since the APMs, and you rightly said it, that they go through all the training up to and including your check airmen training. Right? And during that period, let's just use for the initial, let's just say that you happen to have an APM and you said you're having some now that are in the process of going through your training.

But -- and I don't know the turnover rate you have for them, but let's say since you've been in this position two years, have you ever had an APM come to you and talk about any of your training being negative or needed to be amplified in any way as far as --

CAPT. LANDRY: Sure.

MR. GOACHEE: -- training?

CAPT. LANDRY: Of course.

MR. GOACHEE: Okay.

CAPT. LANDRY: Well, I can't say that about the APMs. The assistant POI came to me yesterday and expressed a concern he had over a remark that was made in the human factors class. So I would write to the human factors' acting manager and we fixed it.

I don't hear too much directly from the APMs. We get into large meetings sometimes. For instance, when we were building this nine-months training course, which incorporates some things that to our knowledge haven't really been done a whole lot in the industry so far, yes. Some of the APMs were involved in there and we talked a lot in those meetings.

They had a lot of input and we had a lot of discussions over the content.

MR. GOACHEE: But I'll be more specific in --

CAPT. LANDRY: Okay.

MR. GOACHEE: -- here it --

CAPT. LANDRY: I'm missing it?

MR. GOACHEE: Yes.

CAPT. LANDRY: Sorry.

MR. GOACHEE: No. No. You answered it very well, but I want to be specific now. Let's just say for -- because they're exposed to the AAMP program like every other pilot, we're talking the initial, have they ever in the last two years that you've been in your position, has anyone -- any of the APMs, after going through that training, come to you with any negative comments?

CAPT. LANDRY: I don't recall any. I don't recall any.

MR. GOACHEE: Okay. And I think part of the APM requirements, so to speak, and you're going to have to help me out here because it's American, but it's a requirement or they usually attend check airmen meetings. Is that correct, on a regular basis when you have your check airmen --

CAPT. LANDRY: Quite frequently.

MR. GOACHEE: -- meetings.

CAPT. LANDRY: Oh, yes.

MR. GOACHEE: Right.

CAPT. LANDRY: Well, they're invited, all of them.

MR. GOACHEE: Yes. Yes. And they do attend?

CAPT. LANDRY: Oh, yes.

MR. GOACHEE: Yes. And --

CAPT. LANDRY: Not every one, but as much as their duties allow, yes.

MR. GOACHEE: Now, you in your position -- do you ever attend those meetings or do you usually let your manager take care of that?

CAPT. LANDRY: For the most part, the issues that you would be interested in are dealt with by the individual fleet managers and the manager of flight training, my number two guy. Generally, when I walk into a standardization meeting, they want to talk about pay and other issues. That's -- I've been relegated to that level.

MR. GOACHEE: I'd just like to follow up on a little bit what Dave said about, you know, instructor manuals and procedures and all that. And I think that you covered that when you talked about ground school instructors, that whether it was from the beginning or changed afterwards, but you decided to take a check airman pilot wise and instruct the ground school portion of the AAMP program. Is that correct?

CAPT. LANDRY: Right. And it's always been taught by a check airman --

MR. GOACHEE: So it's never been taught by a ground school instructor?

CAPT. LANDRY: Not the course we're talking about. The basically full-day course or almost a full day.

MR. GOACHEE: Okay. So that's all from the beginning?

CAPT. LANDRY: It's never been -- it's always been a check airman to my knowledge. At least I have to say this. Once again, I got my two-year gap in there. I'm not aware of any time that anyone else might have taught that course.

MR. GOACHEE: Okay. Now, since I haven't looked at your FOTM and I haven't seen your syllabus for any of your subjects, but let's just stick with the AAMP. And does the instructor or the check airman -- is he using a syllabus, a lesson plan? How does that individual know --

CAPT. LANDRY: I think --

MR. GOACHEE: -- that they're teaching all the required subject material that American Airlines wants them to teach?

CAPT. LANDRY: I think you'd have to characterize it as a lesson plan that they use. And of course, these people -- now, these two guys I'm talking about were trained quite a bit by Warren VanderBurgh. They attended several of his lectures and in turn, he attended several of theirs to make sure that they were teaching the things that -- and we make changes from time to time.

We tell them, you know, Let's get into this or let's leave that alone. Get out of that area. Minor changes to the curriculum from time to time.

MR. GOACHEE: Okay. But because you have more than one instructor --

CAPT. LANDRY: Uh-huh.

MR. GOACHEE: -- you have several instructors, and then we'll get into the check airmen and the different one, but let's just stick to -- you have two instructors doing the AAMP program.

CAPT. LANDRY: Right.

MR. GOACHEE: But to make sure that both of them instruct or give the same information, they need to follow something because one day somebody will be thinking of something and if they're not following a lesson plan, would you not agree that they could miss something, something important?

CAPT. LANDRY: They could, but as I say, they've got the lesson plan and of course outline. I think --

MR. GOACHEE: So each one of them has one of those lesson plans?

CAPT. LANDRY: They better.

MR. GOACHEE: Do you -- does the -- and I'm sure American does, but do you have a quality assurance program that, you know, forget the FAA side coming and checking, do you internally have somebody from your department or some other department come in to observe your instructors and your check airmen?

CAPT. LANDRY: That's a continuing process. All instructors and all check airmen are monitored on a regular basis.

MR. GOACHEE: Okay. Good.

CAPT. LANDRY: We even have -- we have the standard coordinators doing that, but we also have instructors monitoring each other.

MR. GOACHEE: Well, if you bear with me two more questions it will be over with.

CAPT. LANDRY: Okay.

MR. GOACHEE: On the AQP program, I mean, help me out reference -- I think you talked that you do have the check airmen do on the ground portion, and then you talked about simulator time. How much time do you allow for the pre-briefing and the debriefing?

CAPT. LANDRY: Two and a half hours total.

MR. GOACHEE: Total? So is it broken up into where it's --

CAPT. LANDRY: Two-hour briefing, 30-minute debriefing.

MR. GOACHEE: Thirty-minute debriefing? Then it's -- is it --

CAPT. LANDRY: All of our simulator sessions are now two-hour briefings.

MR. GOACHEE: And how is a simulator period?

CAPT. LANDRY: We schedule it for four hours and 15 minutes.

MR. GOACHEE: Thanks.

MR. IVEY: Captain Landry --

CAPT. LANDRY: Yes, sir.

MR. IVEY: -- I have the American Airlines flight training A300 simulator outlines. Would that be perhaps the documents that a simulator instructor would follow to talk about what's going to be covered in a particular simulator five, for example --

CAPT. LANDRY: Should be.

MR. IVEY: -- and simulator six?

CAPT. LANDRY: Yes, sir. Should be.

MR. IVEY: Would that be the lesson plan, so to speak? And -- yes. In fact, there's a briefing outline. It's a split column in that particular document, but it starts talking about the briefing outline and there's certain references and notes over on this side.

But at least, the title of this is the A300 simulator outlines. Would that be the simulator instructor's guide or briefing and -- informing the student as to what's going to be held during that period?

CAPT. LANDRY: Both.

MR. IVEY: There's not another supplementary document as he was talking about --

CAPT. LANDRY: They are --

MR. IVEY: -- points to hit under each one of these little categories, for example?

CAPT. LANDRY: There are not official ones in all the fleets. Some fleets, as I say, are more detailed than others. Some fleets publish that official guide that you have in your hands and then in addition to it, we give the instructors the excerpts from, say, the operating manual or whatever other manual may contain the detailed guidance for those particular things.

And I think the reason they do that is because, as you well know, if you publish the same information in two different places, one of them is always going to be wrong. So it's better to work from one that refers you to the operating manual for specific procedures and such.

MR. IVEY: In fact, this is just an excerpt from that A300 simulator outline, and it may fall under simulator five or simulator six. I think it's probably -- well, it's under one of those two.

CAPT. LANDRY: Uh-huh.

MR. IVEY: For example, under unusual attitude recovery, the briefing outline basically says -- and then at A, locate sky pointer, B, determine pitch attitude, C, locate horizon line, and several other enumerations underneath that.

Moving over to the right under references and notes, it talks about OM -- that's the Operations Manual, I presume, Volume 1, and the reference is Flight-I 3, I believe is probably what this is, if I'm reading it correctly. But at least, there's references to --

CAPT. LANDRY: Oh. Flight Instruments, page 3.

MR. IVEY: Flight instruments? Thank you.

CAPT. LANDRY: Flight instruments tab, page 3.

MR. IVEY: All right. Flight instruments.

CAPT. LANDRY: Took me a second.

MR. IVEY: My apologies.

CAPT. LANDRY: That's okay.

MR. IVEY: But there's references, as you were talking about, and actually specific items related to unusual attitude that's in this briefing outline.

CAPT. LANDRY: Right, because that's --

MR. IVEY: And that's probably the major document that the simulator instructors use?

CAPT. LANDRY: It should be, and the outlines that we're building into the networks follow that.

MR. IVEY: Yes.

MR. GOACHEE: Can I just ask one more question because of what you did now, not because of something I thought, because it's going along your line. Just take one second.

MR. IVEY: All right.

MR. GOACHEE: I'm just confused on -- you say some manuals are going out official and some aren't official.

CAPT. LANDRY: Well --

MR. GOACHEE: Will you help me out with that official --

CAPT. LANDRY: And I realized after I said it that that was really poor terminology. They will take what he's got there, for instance, where it says, Okay, this is how we're going to do this particular maneuver, and it just gives quick bullet points.

And then over here it refers you to the operating manual. Lot of guys will take copies of the operating manual and slip that into that position so that they've got the information there without having to flip through the manual.

MR. GOACHEE: And then you -- and the only other comment, Captain Aubrey, is that I think, or I believe you have said, that some are more elaborate than others. Why would that be? Why would you have one fleet that had more elaborate manuals for teaching than the others? Did I misunderstand that?

CAPT. LANDRY: No. And perhaps it needs some clarification. The -- you're always going to have individual differences between instructors, and you're going to have individual differences between fleets, no matter how much you try to make them all the same.

There are -- there's equipment on some airplanes that's not contained on other airplanes. To talk about the pressurization system on one airplane is a no-brainer in that you turn it on and forget about it. On another airplane, the pressurization system takes a little bit more understanding, a little bit more effort, to operate and to keep up with.

So if we had an item where we're going to be talking about pressurization system or pressurization system malfunctions, those differences, coupled with the history, if you will, our knowledge of the history of how well these systems work, of course are going to dictate how much information or how much time we're going to spend talking about that pressurization system.

That is going to drive a lot more information in one fleet on that particular system than it is on another. On the F100, for instance -- well, I've been off that one for years, but as I recall it's real simple. You turn it on and you go away and forget about it. If the light doesn't come on, you're okay. It's of course oversimplification, but --

MR. GOACHEE: Well, so I just want to make sure. When you say elaborate, you're really talking about --

CAPT. LANDRY: Pretty.

MR. GOACHEE: -- well, because of the systems on the airplane or --

CAPT. LANDRY: Well, the differences in the airplanes.

MR. GOACHEE: -- the additional information.

CAPT. LANDRY: The differences in the airplanes, certainly.

MR. GOACHEE: Yes. What's generated by aircraft and not by an individual making up that manual is all I'm trying to make the point.

CAPT. LANDRY: No, because -- no.

MR. GOACHEE: Okay. That's all I wanted to make sure. Thanks.

Thank you, sir.

MR. IVEY: Captain Delvin Young, American.

CAPT. YOUNG: Yes, sir.

Lot of talk about the AAMP program. Did American Airlines take input from the industry as well as other organizations as they developed this to your knowledge?

CAPT. LANDRY: To my knowledge, yes, quite a bit.

CAPT. YOUNG: Some of the other testimony indicates -- you mentioned that you were an instructor and a check airman in the past on some different airplanes, and ever see a student put in a wrong rudder with an engine failure or seizure?

CAPT. LANDRY: Yes.

CAPT. YOUNG: Initially?

CAPT. LANDRY: I'm trying to remember if I've seen it or heard about it. These things are so far back now that I don't remember if I've seen it or just heard about it. I want to say I've seen it once with a young copilot on an F100. I've heard about it several times.

CAPT. YOUNG: With -- after the 587 accident, any concern in particular -- I know you haven't flown the Airbus -- of a maneuver like that where a student would put in or a pilot would put in the wrong rudder following by a correction to the correct rudder?

CAPT. LANDRY: Any concern that -- you need to be more specific. What do you mean by concern? Or concern directly related to 587. Are you asking me if I was concerned that that would cause --

CAPT. YOUNG: Structural failure or some --

CAPT. LANDRY: -- structural failure?

CAPT. YOUNG: Right.

CAPT. LANDRY: No. I've not seen anything that caused me any concern along those lines.

CAPT. YOUNG: Okay. You've flown a lot of different types of airplanes. Has there -- of the airplanes that you've flown in reference to the $V_a$, have you ever been concerned about control movements bending or breaking the airplane if you were operating below that maneuvering speed?

CAPT. LANDRY: It's never been a concern to me personally. No.

CAPT. YOUNG: I guess the last thing I have -- well, we're talking -- there were some questions on the other side there about the simulator software issues and how it was programmed and this, that and the other. Was the sim designed to teach procedures or exact replication of the airplane primarily? I mean, now, is that how we use it?

CAPT. LANDRY: Are those the only two choices?

CAPT. YOUNG: Well, I understand there's some techniques and things thrown in there, but primarily as it relates to unusual attitudes.

CAPT. LANDRY: As it relates to unusual attitudes? Call it procedures, knowledge, whatever you want to call it. I'd go that way as opposed to -- what was the other thing you said -- you asked --

CAPT. YOUNG: An exact replication of the airplane.

CAPT. LANDRY: No. No, we know it's not. We know that a simulation is a simulation. I mean, it's never going to be an exact replication in any regime. It's good, getting better all the time.

CAPT. YOUNG: Right. That's all I have.

MR. IVEY: Thank you.

Captain Arondel from BEA.

CAPT. ARONDEL: Captain Landry, what is the American Airlines procedure regarding the use of the autopilot; for example, specific recommendation to connect or disconnect the autopilot. Is there some policy regarding that?

CAPT. LANDRY: On connecting the -- we don't have a policy on connecting the autopilot -- well, that's a very broad question. If you mean on a category 3 approach, we put it on autopilot downwind but --

CAPT. ARONDEL: For example, after takeoff, do you have an altitude at which you recommend to use the autopilot?

CAPT. LANDRY: No. We have a minimum altitude for engaging the autopilot.

CAPT. ARONDEL: Yes. But not --

CAPT. LANDRY: Not a recommended altitude. No.

CAPT. ARONDEL: Normally, the pilots fly the aircraft manually till what altitude?

CAPT. LANDRY: There is no --

CAPT. ARONDEL: No --

CAPT. LANDRY: I don't get to fly much, so I fly all the way up to 35,000 feet, and then I turn on the autopilot. Some people turn it on at 5,000 feet. And of course, it depends on the workload, too, and what's happening. But that's strictly a pilot -- it's up to the individual pilot as to when it turns it on, so long as he doesn't exceed the limitations of the autopilot published in the manual, minimum altitude for engagement.

CAPT. ARONDEL: For example, when I flew with Air France, at 10,000 feet we engage autopilot.

CAPT. LANDRY: On climb out?

CAPT. ARONDEL: Yes.

CAPT. LANDRY: I'd be more inclined to go the other way. Personal difference. Above 10,000 you don't have to look for airplanes as much as you do below 10-.

CAPT. ARONDEL: Do you have a policy regarding the position of the pilot's feet on the floor or on the rudder pedal except for takeoff and landing phase or a single-engine or one engine out phase?

CAPT. LANDRY: If you mean do we have it written somewhere, I don't think so. But other than when we talk about guarding the flight controls when the other pilot is flying -- for instance, on takeoff and landing -- the non-flying pilot is expected to have his hands and feet near the flight controls. That's written.

But as far as -- it is understood, I think, by -- I think it's safe to say, without exception, that if you are hand flying the airplane at American Airlines, your hands at the controls also means your feet on the rudder pedals.

CAPT. ARONDEL: If the captain is the pilot not flying, what is the instructed action given to him if the first officer seems to have difficulties to fly the plane?

CAPT. LANDRY: Once again, I believe that's the captain's initiative. If his difficulty is severe enough to cause serious concern, I would expect the captain to take control of the airplane. And I guess it depends on what do you mean by difficulty.

Is the guy just sloppy? Probably going to let him go ahead and fly the airplane. Do I have guidance written somewhere on when the captain should take the airplane away from the copilot? No. I don't believe we have any such guidance written anywhere.

CAPT. ARONDEL: Okay. Thank you.

MR. IVEY: Bart Elias, NTSB.

DR. ELIAS: I just really have one quick question. Forgive me if this has been asked already. In the simulator, is there any type of exercise or demonstration that demonstrates to the pilot the effectiveness of using rudder or coordinated rudder or otherwise?

CAPT. LANDRY: When we were teaching the instructors, of course, the instructors got a lot more background in the simulator than was required for the line pilot. Typical with any teaching job, I guess you'd say. There was a maneuver that was used to demonstrate that to the instructors.

I don't believe anyone's using that with the line pilots. Certainly, we're not calling for that. But there was a maneuver designed to do that -- demonstrate the effectiveness of the rudder at high -- at very high angles of attack approaching the stall.

DR. ELIAS: Do you recall how that was done?

CAPT. LANDRY: I can give you the ballpark version if that's good enough. Basically, you get the airplane very slow and try to roll back and forth some number, 20 or 30 degrees' worth of bank, I believe. Of course, power's set.

Roll back and forth with the ailerons only and watch the performance of the airplane, whether it would climb or descend, whatever. And then try the same thing using the rudder only, and it -- that's the only demonstration I can remember that talked about that.

The performance in the case of the simulator, at least, we know, was somewhat better when the rudder was used.

DR. ELIAS: You're saying that that is not used in any --

CAPT. LANDRY: I don't think so.

DR. ELIAS: -- modifying demonstration where you're bringing them in their nine-month rotation?

CAPT. LANDRY: It's not called for. Now, does that mean I ever -- you know, there's always the 1 percent. It's not called for, and we don't want them doing that demonstration.

DR. ELIAS: And in doing those demonstrations, I'm assuming you did this fleetwise, so you did this across all your airplanes. Is that --

CAPT. LANDRY: I think so.

DR. ELIAS: Were there any specific aircraft types where you really needed rudder or rudder was more effective than others?

CAPT. LANDRY: You're -- I don't think I can give you an honest answer to that. I had it demonstrated to me on the airplane I was flying at the time, which I think was the 757/6 series. This was -- Warren did most of the instructing of the instructors until he had a cadre of check airmen built up, and then they in turn instructed the remainder of the instructors.

I don't know. As I say, a lot of that, I believe, was done while I was elsewhere -- Miami.

DR. ELIAS: And although it's not necessarily talked about or demonstrated in the simulator, is this discussed at all in ground training for the line pilots as they come through recurrent?

CAPT. LANDRY: It's probably touched upon by a lot of the instructors -- the fact that the rudder can be an effective tool at very high angles of attack.

DR. ELIAS: That's all I have.

CAPT. LANDRY: It's certainly in the AAMP handout and is part of the AAMP program. Yes. The ground school.

DR. ELIAS: Okay. Thank you.

MR. IVEY: Well, is there anything you'd like to add or suggest that we as an operational group or the NTSB should look at that might help us solve this accident?

CAPT. LANDRY: Well, Captain Ivey, if I knew that I'd be sitting in your job instead of down here at this end of the table.

I don't envy you guys. This is a baffling one. I hope you find the true answer.

MR. IVEY: Well, thank you, Captain Landry.

This will end today's interview session.

(Whereupon, at 6:25 p.m., the interviews were recessed.)

**26. Volume II**

BEFORE THE

NATIONAL TRANSPORTATION SAFETY BOARD

DFW INTERVIEWS ON
AA 587

VOLUME II

Room F107
American Airlines Flight
Training Academy
4601 Highway 360
Fort Worth, Texas

Wednesday,
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The interviews resumed at 12:30 p.m.

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<u>P R O C E E D I N G S</u>

EXAMINATION

**e. Captain Bruce D. Ott**

MR. IVEY: Good afternoon, Capt. Ott. I've made the introductions around the table, and I would like to begin by having you give us your full name, your aviation qualifications, a little bit of your history in terms of flying and total flight time, type ratings and your present position.

CAPT. OTT: Okay. It's Captain Bruce Ott, D. for middle initial if you want that, too. I'm a check airman in training now for the triple-seven at American.

I had previously been -- I've been a check airman for about 11-1/2 years, originally in a 727 for about eight years, back to the MD-11 and then to -- bounced back and forth between both of them for a couple of years and just went to the triple-seven in June. So I'm just starting my check airman training on that.

Prior to that, I was in the air force. I flew T-38s in the air force as an instructor for four years. I also flew in the reserves in the A-10 and the A-37 to get my 20 years in. I also flew the T-29 -- if we go back to ancestor worship, you know, the old Convair in the military -- for a couple of years.

So prior to that, I just did a little civilian flying. I still carry a -- I still keep my CFI and double I current. So I still use those occasionally, but not very often.

So total flight time? Since I've been in the simulator so many years -- 727, I think, captain time was around 2,600 hours and co-pilot time was probably about 900 to a thousand. MD-11 time was around a thousand hours. I was on the DC-10 as a co-pilot for probably around 600 hours. 727 engineer time: 4,154. But I wasn't counting. And military time is about 3,500 hours. So --

VOICE: And what does that add up to?

(Pause.)

MR. IVEY: The type ratings you've got are 727, triple-seven, MD-11 and --

CAPT. OTT: Convair.

MR. IVEY: Convair, yes. Thank you.

CAPT. OTT: Yes, grandfathered, you know, from the commercial days when they moved up. So --

MR. IVEY: And do you have -- your position presently is check airman, or do you have any additional duties?

CAPT. OTT: No. I-- check airman. And when we had the new-hires going, we were teaching the AAMP program, you know, two to three times a month. So I was -- myself and another instructor were teaching it to the new-hires. So other than that, since I'm just in training now and the new guy, I kind of have a little vacation going until I get going full speed. So --

MR. IVEY: So you -- when American was hiring, you basically were teaching AAMP probably three times a month. Would that be --

CAPT. OTT: Yes. It would be --

MR. IVEY: -- accurate?

CAPT. OTT: -- two to three times a month depending on the class schedule. So --

MR. IVEY: And -- but did the other pilot also teach two or three times a month?

CAPT. OTT: Well, we had two or three total, and he would take one or two and I'd take one or two. Or sometimes, one guy would be on vacation and you'd take all of that month. So --

MR. IVEY: I see.

CAPT. OTT: -- we shared it depending on what our schedules were.

MR. IVEY: How long have you taught the Advanced Aircraft Maneuvering Program?

CAPT. OTT: About two years. I mean --

MR. IVEY: That would be '99?

CAPT. OTT: '99 is when I started -- probably the spring of '99.

MR. IVEY: And the other gentleman was the same way?

CAPT. OTT: He taught it longer. He actually worked with Captain VanderBurgh some -- who created the program. So Fred Freland is the other instructor. And Fred taught it for probably a couple of years before because -- they also taught all the Eagle guys, you know, they -- when the Eagle pilots came over or -- they went over to Eagle and they taught the classes to the Eagle. So he probably taught it four or five years, I would say. And then he drafted me over there; he told me it would be a good deal.

MR. IVEY: Was he telling the truth?

CAPT. OTT: Well, he's on vacation this month. So --

MR. IVEY: Oh.

CAPT. OTT: No. It was enjoyable.

MR. IVEY: Have you ever taught the course to visiting guests or other airlines, foreign or national?

CAPT. OTT: I --

MR. IVEY: If you have --

CAPT. OTT: I never did. I think Fred Freland or -- I know VanderBurgh did for sure teach it. And I think Fred did, also. But the most foreign -- I've taught it to the FAA. I taught it in October to the FAA. There were three APMs going through, and I taught it then. And I just recently gave it to Talmadge, you know, last week. So --

MR. IVEY: And --

CAPT. OTT: But other than that, if there were visitors in the class -- the classes were fairly large, probably 60 to 80 people sometimes. And so there could have been other people in there -- there were other FAA individuals that would identify themselves to me. But I wouldn't have known completely.

CAPT. GOACHEE: Yes. In fact, Mr. Talmadge is the POI.

CAPT. OTT: The POI, right.

CAPT. GOACHEE: Was that a special course last week that --

CAPT. OTT: Yes.

CAPT. GOACHEE: Just for him, or for FAA in general? Or --

CAPT. OTT: Him and --

CAPT. GOACHEE: The APM?

CAPT. OTT: Yes, the A-300 Garrett, A-300 APM.

CAPT. GOACHEE: So the two of them -- they were -- attended the class?

CAPT. OTT: Right.

MR. IVEY: Do you know if that was the first time that they had ever attended the class?

CAPT. OTT: I don't know for sure. I don't -- I think, in Talmadge's, it may have been. But I wasn't sure. I know, for Garrett, it was -- he said it was just a refresher. But I don't know for sure if for Talmadge it was his first time or not.

MR. IVEY: When you started teaching AAMP, you had already at that point in time received the -- that basic course back in about 1966? Is that accurate? Or -- when Capt. VanderBurgh started teaching it to all the pilots individually?

CAPT. OTT: Yes. I think he gave it in '95 and '96. And he -- what they did is they gave it to all the check airmen first.

And he said '66, didn't he?

VOICE: Yes.

CAPT. OTT: Yes, I thought so.

MR. IVEY: Did I say '66?

CAPT. OTT: I -- you did say sixty- --

MR. IVEY: I apologize.

CAPT. OTT: I was going to say, I was just getting out of high school that day or -- I think I was.

MR. IVEY: All right. Yes, 1996. I stand corrected.

CAPT. OTT: So --

MR. IVEY: Thank you.

CAPT. OTT: So he -- they originally gave it to the check airmen. And then they expanded it to give it to all the pilots.

MR. IVEY: So you received it as a check airman?

CAPT. OTT: 727 check airman, correct.

MR. IVEY: And now that you teach the course, and having received that course in that time frame as a check airman, is there any differences in the way the course is taught to check airmen, as opposed to the ordinary line pilot, any other special considerations or differences?

CAPT. OTT: Not that I can see at all. I think that it is the same -- well, the part of the differences it that we use Capt. VanderBurgh's videos when we teach it whereas VanderBurgh would do this stand-up the whole time when he taught it to the check airman with some, you know, excerpts from some investigations and other accidents that we -- that he has data from. But he taught it as a stand-up whereas we will use some of his videos when we teach the class.

MR. IVEY: But there was never an specialized training in terms of upset given to instructors that was not passed along to the line pilot, as well?

CAPT. OTT: No, not that I'm aware of.

MR. IVEY: You mentioned the FAA. Have they appeared from time to time, not only perhaps the FAA from this carrier but from other carriers, to just get the experience? Or has it been pretty much limited to --

CAPT. OTT: If they had -- the only time I knew I had an FAA individual in the class was with Harold Johnson. And he came up and introduced himself because we had done A-37 flying together in another life. So other than that, I did not know if I had an FAA guy present in the class or not.

So when we presented it to them -- we have the class list, but you focus primarily on the new-hires more so. And they were the ones that -- you know, they --

usually, they would be sitting in the middle, and then the other supporting cast would be sitting off to the side. So --

MR. IVEY: During the time that you've been teaching, have there been any revisions to the AAMP manual?

CAPT. OTT: The manual was revised, I think, in '99. And I don't know exactly why it was revised, but it -- the text material was never significantly changed at all. And in the Power Point presentation, they added some angle ofattack slides in there, and I think that was really the extent of it; there may have been a couple of other minor changes in there. But it did change in '99.

MR. IVEY: And, basically, that's the main thrust that's there today from that last change in about 1999?

CAPT. OTT: Right.

MR. IVEY: Were there -- in your experience when you started in '99, there -- it had probably been developed -- that first booklet was around --

CAPT. OTT: Was it in '96 or '97?

MR. IVEY: I believe it was like the first of October of '96.

CAPT. OTT: Okay.

MR. IVEY: I know members of the safety board in Washington actually sat in on Capt. VanderBurgh's presentation up there in Washington when he was giving it to some of the pilots, and we received, I believe, the first iteration of the book. I know there have been several since.

Was Capt. VanderBurgh more or less instructing you all to take over in his stead?

CAPT. OTT: He instructed Capt. Freland. He and Capt. Freland did it together for awhile and when Capt. VanderBurgh was no longer a check airman -- is what I understand. I don't know exactly why he ceased teaching the class, but he ceased teaching the class.

So they needed another check airman. And Fred and I were friends, so he just kind of drafted me to do it. But I never received any instruction from Capt. VanderBurgh other than the initial check airman class and, also, watching his videos numerous times.

MR. IVEY: Yes. Was there ever any input received from the FAA regarding the program, pro or con --

CAPT. OTT: The --

MR. IVEY: -- that you remember?

CAPT. OTT: The remarks I've received from the FAA has always been outstanding. Okay? When I taught it to the three APMs in October -- I think it was October 4 -- all of them just said, This is a great course. They were really impressed with it. Mr. Talmadge was also very favorably impressed with it. Harold Johnson came up and said it was a great course afterwards when I taught it to him.

So everybody that I've known has been with the FAA has said that it's a great course, that they enjoyed the presentation.

MR. IVEY: The -- gain, just pertaining to the ground school aspect, on recurrent training, are there segments allotted in recurrent training for the AAMP program?

CAPT. OTT: Yes.

MR. IVEY: How much time on it? Is it by an hourly kind of time, or --

CAPT. OTT: The last time I went to recurrent training, I think they had just a -- 20 minutes or so of video that was micro-burst and wind-shear related. I don't think they had anything on unusual attitudes. But then, in the recurrent training itself, in the simulator phase -- time is also dedicated to practicing unusual attitudes and the AAMP program itself during the simulator phase. So --

MR. IVEY: But each recurrent training has a certain segment, I guess, that's excerpted from the program -- it could be wake turbulence or wind shear or micro-burst or upset training perhaps --

CAPT. OTT: Correct.

MR. IVEY: -- from the ground school --

CAPT. OTT: Right.

MR. IVEY: -- yet, the --

CAPT. OTT: They had a video they showed the last time I went to recurrent training, and the video had the micro-burst segment in it.

MR. IVEY: Is that their --

CAPT. OTT: They did -- it did the Delta -- I think it was the Delta 191, which is one we've used a lot to talk about.

MR. IVEY: In the simulator training, you still -- well, you're obviously checking out in the triple-seven right now as the check airman. So you have probably used in the past in check airman positions upset training or placing students into part of that training for recovery.

CAPT. OTT: Right.

MR. IVEY: Are there a various number of scenarios that you can use to effect that training, or is it pretty much the same canned approach to it each recurrent?

CAPT. OTT: No. There's -- a lot of it's focused on the micro-burst and wind shear recovery, and there's different scenarios you can give. There's different levels of intensity, and particularly on the 727. I can't remember on the MD-11 because I was only an X-type for a couple of months. We had different intensities on the 727 we could give people.

The unusual attitude training actually progressed with time; at first, the simulators were kind of getting knocked off their jacks a little bit, and then they were able to enhance it so that the scenario was more realistic. And you would give it different scenarios. Sometimes it would -- you would, you know, pursue with a wake turbulence event in front of you. Other times it would just be with some type of an upset that would occur.

MR. IVEY: You didn't have to use the, Close your eyes and turn left --

CAPT. OTT: No.

MR. IVEY: -- turn right?

CAPT. OTT: No. The, "Close your eyes," I mean, in the old days in the air force when we used to do unusual attitude, as an instrument recovery procedure was pretty much -- that was not really the way American focused on it.

MR. IVEY: Do most of the pilots that take that recovery training have a positive, neutral or negative outlook about it? Any feedback from most of the pilots regarding the upset training?

CAPT. OTT: It -- well, a lot of times, it varies depending on a pilot's background. Some of them could really handle it very well. Others had a -- you know, they would have to repeat the maneuver sometimes. They couldn't really grasp the whole extent of trying to recover from it.

So -- depending on the background. But most pilots were -- you know, they're always appreciative of the upset training, as well as -- and the micro-burst and wind-shear training, as well. I mean they were areas that they -- because they were training events and not checking events, too. So they really were non-jeopardy events to the pilots.

MR. IVEY: Right. We were in the simulator earlier today, and some of us probably weren't quite as good as others; so I understand the repeat performances.

CAPT. OTT: Did you get to do it?

MR. IVEY: Yes.

CAPT. OTT: Okay. And you were --

MR. IVEY: Several times.

The -- in your experience, when you observe the pilots in their upset training recoveries, is there any one particular control that you see used more than any other? Or tell me how they recover.

CAPT. OTT: Well, I think the -- a lot of times, it varies. Some guys were reluctant to use rudder. And I think that would make a difference in the recovery. They didn't -- and if you repeat a maneuver, a lot of times, it was just to show someone how recovery at a higher angle of attack could enhance the recovery with a coordinated rudder type of movement, maneuver.

Other people who have never been -- you know, I mean we've got pilots that are all the way from F-15 pilots to guys that have, you know, probably never been above 12,000 feet before we hired them.

So the ones that have never been upside down or anything like that -- for them, the recovery was more of an eye-opener, I think. And they would learn it, and they would get it down. And they would learn how to do a coordinated a rudder maneuver to come out of it if they needed rudder. So --

MR. IVEY: Now, you've worked this program on the seven-two, MD-11?

CAPT. OTT: Uh-huh.

MR. IVEY: And have you had an opportunity through the training on the triple-seven now to --

CAPT. OTT: I haven't given it to anybody. I've just had my own.

MR. IVEY: You've had your own?

CAPT. OTT: Right.

MR. IVEY: Working across those three airplanes in that training, have you noticed any varied -- differences between the responses of those three airplanes, for example, in that training? Does the training seem to fit each one of those airplanes equally well?

CAPT. OTT: Yes. I think that, you know, some of the simulation's a little bit better -- you know, we've got, obviously, next generations. The 727 simulators are a little old. And I think that perhaps the -- you know, the triple-seven -- I observed it last night, as a matter of fact. And in observing the sim. -- the triple-seven simulation, it's much better than the 727 simulation.

But the recovery procedures -- they just changed the triple-seven recovery procedures. November 1, I believe, was the date.

MR. IVEY: Really? Any -- as a result -- I mean, in other words, a variation from the AAMP program, or just their --

CAPT. OTT: Yes.

MR. IVEY: -- recovery?

CAPT. OTT: Yes. It would -- if we were to re-present that program, we would have to edit some changes, I mean. And when I gave it to Mr. Talmadge, I did tell him that I -- you know, I gave him the changes out of the triple-seven operating manual. I don't know if the other fleets had changed yet or not or if they were going to change, but I noticed the high-recovery technique had changed a little bit -- changed substantially.

Instead of -- you know, Boeing, I guess, was recommending pushing the nose over and even trimming the stabilizer and reducing the thrust. So American incorporated that in their operating manual.

MR. IVEY: So now they're going to be -- this is a new change?

CAPT. OTT: Uh-huh.

MR. IVEY: Effective when, 1 November?

CAPT. OTT: I think it was November 1, on the triple-seven. And I don't know what other fleets have or have not made that change one way or the other.

When the program was first taught, we had, you know, a lot of 727s and a lot of Super 80s, which -- we still have a lot of Super 80s -- where, you know, the thrust vector effect is probably not as pronounced on the 727. As a matter of fact, we're always begging for thrust on the 727, you know. So I think that's what probably made some of the changes on the triple-seven.

MR. IVEY: Because of the under-mounted wings --

CAPT. OTT: Right.

MR. IVEY: -- and all the --

CAPT. OTT: 90,000 pounds of thrust is a whole lot more than we had on the 727s, so -- per engine. So --

MR. IVEY: This change -- has it been -- is this brand-new, or has this been evolving for a period of time?

CAPT. OTT: I am sure -- again, a lot of this is a lot above my level. But I'm sure that -- you know, I think this has been in Boeing's procedures for awhile, which was just the background that I heard from Gene Richardson. He said that this was in Boeing's and they're just trying to incorporate more of what Boeing's information is. And that's just hearsay; there would be better sources as to how it evolved. So --

MR. IVEY: Yes. Because Boeing and Airbus both put out an upset recovery joint-letter. In fact, they -- there's one under Airbus's title, under the Fast Magazine. And then the Boeing Aero Magazine has virtually the same training aid that was sent out, I think, to all operators of their respective airplanes.

But with this latest November change, it sounds like at least the triple-seven, but you don't necessarily know about, say, the Airbus --

CAPT. OTT: No.

MR. IVEY: -- or any of the other airplanes --

CAPT. OTT: No. Just --

MR. IVEY: -- or whether they --

CAPT. OTT: -- casual conversation. Some people say that they may all be evolving to it -- all the, you know, wing-mounted engines aircraft. So --

MR. IVEY: Yes. And, also, to incorporate the use of trim?

CAPT. OTT: Stab trim --

MR. IVEY: To --

CAPT. OTT: -- in case you were to -- you know, which -- to use as much stab trim -- nose-down stab trim as you -- possible. So --

MR. IVEY: On a nose-high only?

CAPT. OTT: Nose-high only, yes.

MR. IVEY: Was this since -- you don't know when this actually got started. Was this change provided by the FAA? Were they the ones that more or less mandated it, or --

CAPT. OTT: I don't know.

MR. IVEY: Okay.

CAPT. OTT: I mean it just comes down from -- you know, I mean we get the revision, and we put it in. And we discuss it at a standardization meeting. And, of course, you know, pilots are reluctant to change no matter what it is, usually. So after we talked about it, you know, everybody kind of had a grasp of why it was incorporated. So --

MR. IVEY: Yes. The first you heard about it was sometime in the first part of November?

CAPT. OTT: Right. Probably the middle of November, when you finally get the revision distributed to you and you look at it. So --

MR. IVEY: After the crash --

CAPT. OTT: And then we had the stan meeting and discussed it. And they're almost -- they're very close to each other -- the stan meeting and the revision date.

MR. IVEY: It was after the crash, however?

CAPT. OTT: No. I think it was before November -- when was the crash?

MR. IVEY: November 12.

CAPT. OTT: Yes. So the revision was actually before the crash.

MR. IVEY: Has there been any discussions related to the use of rudder and the training aids that were provided by Boeing and Airbus to your knowledge? The whole rudder issue -- has that been anything that has --

CAPT. OTT: Well, one of the --

MR. IVEY: -- manifested itself over the last couple of years?

CAPT. OTT: That has what over?

MR. IVEY: Just manifested itself, the rudder issue.

CAPT. OTT: I mean I'm aware of the letter that came out in '97, but I wasn't aware of that letter until just recently. I mean Mr. Talmadge showed it to me first, and then I saw it again and had a chance to read it.

I don't -- having taken the course in the '95 and '96 time frame and then not having taken the course again until '99, you know, when I started teaching it all the time, I don't know what evolution may have happened then. Okay? I do know that as a result of that, we probably put some segments that are on unusual attitude, you know, they -- I mean they may have emphasized -- I mean Boeing and, I think, Airbus wanted to, you know, de-emphasize the use of extreme rudder at certain points. And we did put a little -- and you have the training aid there, too, that shows that little blurb in there that says excessive use of the rudder can cause departure. But I don't remember from the time I took it as a check airman that rudder was ever emphasized other than in a coordinated fashion. Okay?

And so I don't think there has been that much change to the program. Obviously, there has been some, but, in those couple of years there, I don't remember that there would be anything. And I know that the whole time I taught it as a 727 check airman, the rudder was taught as a coordinated thing, and only if you're not getting the roll response necessary out of the yoke.

MR. IVEY: When you talk about coordinated rudder, what is it that you brief the student going into the simulator -- how do you brief or -- what is coordinated rudder?

CAPT. OTT: Well, it -- you know, that -- we use the coordinated -- we use the term "coordinated" probably in the classroom more than we actually do in the briefing room. And "coordinated" is more that you're not getting -- you know, the jet aircraft don't use turn and slip. I mean that's unreliable. So the days of your Cessna flying when the coordinated turn was one where you led it with rudder and all that -- that's not really what we're referring to.

More of the fact that you don't really want to rely just on ailerons to try to effect your recovery if you're not getting the roll response out of them. Because of the high angle of attach, you will lose roll control from your ailerons. So at that point, you're going to start to turn with your ailerons. And if you're not getting the response, then you're going to be coming in with some rudder to enhance the roll capabilities.

MR. IVEY: So it's never briefed about a particular amount or a particular instrument to look at; it's more to suggest that if you're not getting the roll response, then apply rudder?

CAPT. OTT: It's a -- yes. It's a feel type of thing. It's never an instrument to look. I mean, you know, the newer generation ones don't even have the old turn-and-slip, you know, ball thing. So --

MR. IVEY: Right.

CAPT. OTT: The 727 has still got a ball sitting down there, but -- you know.

MR. IVEY: The video I looked at before coming to Dallas was dated 19 December, '97. I don't know if that was an original video or not. In fact, if I may --

Jim, you looked at the video, also.

CAPT. GOACHEE: Yes.

MR. IVEY: And didn't you say that the video was dated in April of '97?

CAPT. GOACHEE: Well, I looked at all these tapes. And for whatever reason, I mean, it came -- it would come on the video tape at the flight academy in April of '97.

MR. IVEY: Okay.

CAPT. GOACHEE: So --

MR. IVEY: April of '97.

At least the annotation on my video said 19 December, '97, but I think it's perhaps the same video that was produced here in your auditorium.

CAPT. OTT: Right.

MR. IVEY: Is that -- do you think that's the current video, or has it been --

CAPT. OTT: That's the current one we show, the 19 December one, yes.

MR. IVEY: All right. Great. That hasn't changed at all; it's still being used.

CAPT. OTT: No. That's still -- that's the one we still show.

MR. IVEY: When you read the letter -- let me back up just a moment. That video -- was that -- when you were having new-hire pilots, was that video given to every new-hire pilot?

CAPT. OTT: Yes, the second hour of the presentation.

MR. IVEY: All right. And let's see. (Perusing document.)

Oh. Regarding the letter that you did see, after you read that letter for the first time -- and I guess you've read it in the last week or two for the first time -- what was your impression when you read the letter from Boeing, Airbus, FAA?

CAPT. OTT: Well, the first thing was that it says, "Excellent," in the first paragraph and it says, "Excellent," in the last paragraph. So I guess they thought the program overall was pretty good.

I think some of the stuff in the middle you could argue back and forth on one way or the other. I can understand the position of wanting to not make sure that rudder is overemphasized as a control mechanism.

And I think that they probably heeded some of those. And I think there may have been a change in the video that occurred because, you know, if you watch the video, at the end of it, there's three little bullets at the end that VanderBurgh does say, you know, don't over-use this -- you know, excessive use of the rudder.

So I think those were probably generated from the letter. What other changes may have been generated from the letter I don't know. But I can understand some of the things that Airbus and Boeing were saying.

But I also read Captain Ewell's response to the whole thing. And, you know, his -- the two of them together -- again, it's well above my pay grade, but I think, you know -- I mean if Airbus was concerned -- if Airbus or Boeing or FAA look at the class and they think there may have been an over-use of rudder, then perhaps those little clips at the end were valid.

I don't think from my standpoint -- and, again, I wasn't teaching it in '97, but -- from when I took the class to when I performed as a check airman that we over-emphasized the rudder to the point of excessive rudder. That was on the 727, and then when I was on the MD-11, as well. We really talked about rudder as a roll aid at a high angle of attack when you've lost some of your aileron control.

MR. IVEY: I think those caveats, as I say, appear to be added to the video because the video basically features him in the auditorium and, at the end, then it looks as though he's basically standing in front of a blank wall --

CAPT. OTT: Right.

MR. IVEY: -- which certainly suggests that the caveat's added or, at least, his bulleted items, as you say, were added specifically to address. And one I do remember is rudder control and rudder authority or --

CAPT. OTT: Right.

MR. IVEY: -- rudder usage, I should say.

CAPT. OTT: And they -- actually, I think they added two little -- there's a little flag on the Power Point presentation that says, Excessive use of rudder at a high-angle attack can result from -- departure from control flight.

MR. IVEY: And the Power Point presentation is what the two of you teach from to --

CAPT. OTT: It's basically the same as the handbook you have there.

MR. IVEY: When you first took the program, did you -- did they give you a video, also, back in '95/'96?

CAPT. OTT: They gave the videos later than that, because the videos weren't produced until '97. So we -- they handed all the videos out to the pilots about that time frame. They ceased handing out the videos for some reason or another, although I don't know why, about a year or so ago.

MR. IVEY: Do you know if this Advanced Aircraft Maneuvering Program, the manual itself -- is that called a training aid, or is it an FAA-accepted or approved --

CAPT. OTT: No. I think it's just a training aid. I mean it's something we give the students so they can follow along with the Power Point presentation and make any notes or annotations that they may want to.

MR. IVEY: But to your knowledge, the FAA doesn't accept or approve that training aid --

CAPT. OTT: No. As a matter of fact --

MR. IVEY: -- or booklet?

CAPT. OTT: -- there was a period there where we -- when they went from the one manual to the new manual, we didn't pass them out to a couple of classes because we just didn't have any. So I don't think it was endorsed at all by the FAA --

MR. IVEY: Yes.

CAPT. OTT: -- or sanctioned one way or the other by the FAA.

MR. IVEY: In your instruction as a check airman, have you ever seen the students use an excessive amount of rudder in some of these types of controls? I know we have students that go from one end to the other.

CAPT. OTT: Well, sure. I mean I'd say you have. I'd say that on the 727, you saw excessive use of rudder more on an engine failure than -- you know, when someone would go from, you know, an A-300 or a 767 to the 727, obviously, the amount of rudder required for an engine failure is substantially different.

You would see rudder used excessively then, more so than in the unusual attitude recovery. If anything, a rudder may have been under-used in some of the unusual attitude recoveries, you know, depending on somebody's experience level.

MR. IVEY: Yes. What I think I'll do is go around the room and see if anyone else has any other questions, Bruce.

And we'll start with Bart Elias of the NTSB.

DR. ELIAS: Okay. Thank you.

In terms of the AAMP training, there's the booklet that's handed out to the students. In addition to that, is there any type of an instructor's booklet with more detailed notes in terms of things to present to the class?

CAPT. OTT: No. All I have is -- I have my enlarged pages of the Power Point presentation with my own notes. I mean I -- the class takes almost six-and-a-half hours, so you could read through that book in a few minutes. But --

DR. ELIAS: Right.

CAPT. OTT: So I have notes that I amplify things with.

DR. ELIAS: So you have more detailed notes of your own that you've taken in terms of things --

CAPT. OTT: And watching --

DR. ELIAS: -- you want to present?

CAPT. OTT: -- Capt. Freland teach the course and stuff, yes.

DR. ELIAS: Now, have you ever sat down with Capt. Freland and sort of compared notes and made sure that you were consistent in the way --

CAPT. OTT: We -- actually, before the program ended, we started -- I monitored him one time. And then he was going to monitor me. And we were trying to figure out how we could march this program out together. And then, you know, as of September 11, the new-hires quit. So the emphasis on the program died. So --

DR. ELIAS: So then, in your opinion, would you say that there's good consistency between what he's teaching and what you're teaching?

CAPT. OTT: Yes.

DR. ELIAS: In the video that Dave talked about earlier, there's a segment there where there's some discussion of top rudder. Is this still presented --

CAPT. OTT: That's still in the video --

DR. ELIAS: -- in the video?

CAPT. OTT: -- and that's still presented: The one section where he talks about unusual attitude, yes.

DR. ELIAS: Yes. Is there any other section of the course where you teach directly to the audience where you invoke the concept of top rudder?

CAPT. OTT: No. That's the only time top rudder's mentioned in the whole program.

DR. ELIAS: Okay. And --

CAPT. OTT: He does mention -- I mean when he -- when you go on and look at caution, he does mention it one other time, when he's talking about the MD-11 rudder and how powerful it is. So he does mention in another section that, you know, to be careful with some of the rudder controls, that they are powerful.

DR. ELIAS: Okay. Also in the video, there's a section where a Boeing test demonstration is done looking at -- I think, actually, when he presents the video, he's using the term, "Cross-over angle of attack," although we heard yesterday that, "Cross-over speed," might be the more effective or more correct term to describe that. Is that still presented?

CAPT. OTT: The concept of cross-over angle of attack?

DR. ELIAS: Cross-over angle of attack.

CAPT. OTT: Yes. That's presented in the first hour.

DR. ELIAS: And is that presented in terms of demonstrating rudder effectiveness at low air speed/high-angle of attack?

CAPT. OTT: At high angle of attack maneuvering. There's a point there where the rudder becomes a better -- you're going to get more roll response out of the rudder than you will out of your ailerons because of the higher angle of attack maneuvering.

And usually, it's discussed at a point between, you know, approach angle of attack and the onset of stick-shaker; so between 1.1 and 1.3 of stall is when you're going to get the most beneficial use out of it. So --

DR. ELIAS: So then am I safe to assume that that is then somehow tied back to nose-high unusual attitude recovery and use of rudder in that situation?

CAPT. OTT: The rudder use is described more as a nose-high. And the nose-high is if you're in a low-energy state with a low -- I mean with a high angle of attack -- you know, that it would aid in rolling the aircraft off --

DR. ELIAS: Okay.

CAPT. OTT: -- so as to reduce the pitch to take it down to the horizon, versus a push-over maneuver which is now what Boeing wants out of the triple-seven. So --

DR. ELIAS: And do you recall -- I know you weren't teaching when the video was first put together, but -- why those Boeing demonstration videos were created in the first place?

CAPT. OTT: Are you talking about the ones when -- they did with the rudder?

DR. ELIAS: Yes. Basically, he -- yes. He's --

CAPT. OTT: The United -- I mean the --

DR. ELIAS: -- using --

CAPT. OTT: -- Colorado Springs and the rudder?

DR. ELIAS: Exactly.

CAPT. OTT: No, I don't. They're excellent videos, and so I think they were incorporated in there. But I don't know where they came about or what their -- you know, where they came about.

DR. ELIAS: And, again, we talked already about those -- we called them caveats, but -- sort of additions to the videos where Capt. VanderBurgh is talking without the audience present. What -- do you know when they were put in?

CAPT. OTT: I can only assume they were done -- with that 19 December date on the video, that they were done -- I mean the date on the letter is -- I've forgotten when it -- I mean I think --

VOICE: October 6.

CAPT. OTT: Yes.

And I think that video occurred right afterwards. So I assume those changes were made after the letter. Capt. Ewell and Capt. VanderBurgh could probably tell you better if there was -- if those changes were as a direct result of it. I can only assume they were, but I don't know for a fact.

DR. ELIAS: But in terms of since the time you've been teaching, that video has been the one you've used, and it has always had those --

CAPT. OTT: Yes.

DR. ELIAS: -- included in the videos?

CAPT. OTT: Yes.

DR. ELIAS: Okay. Let's see. I think that's all the questions I have, but let me just double-check.

(Pause.)

DR. ELIAS: Yes. Thank you.

CAPT. YOUNG: I have a couple questions.

MR. IVEY: Okay.

Thank you, Captain.

Capt. Delvin Young, American.

CAPT. YOUNG: Just real quick, just to clarify a couple things.

So the instructors or you guys -- as instructors, you and Capt. Freland didn't receive anything additional as far as specialized training or any of that?

CAPT. OTT: No.

CAPT. YOUNG: Okay.

CAPT. OTT: Just watching the material and presenting it.

CAPT. YOUNG: Do you know if initially the instructors during that initial group that went through received any additional training besides just the normal presentation --

CAPT. OTT: Well, I think that when --

CAPT. YOUNG: -- by Capt. VanderBurgh?

CAPT. OTT: Just when VanderBurgh presented it. And there was another individual that I met one time that said he presented it. And I think all of them just -- you know, just followed the presentation and watched the presentation of Capt. VanderBurgh.

CAPT. YOUNG: Okay.

CAPT. OTT: So --

CAPT. YOUNG: Okay. Sure. Usually, from all your experience as a check airman instructor, when you see an airplane -- if you put a student into some type of upset, or whatever, what's the first control that you see him use usually?

CAPT. OTT: Usually, the yoke, either rolling it or with a pitch. If it's a real nose-high, they'll try to basically pitch over.

CAPT. YOUNG: Okay.

CAPT. OTT: They're more prone to try to pitch over, I think, than they are to try to roll off a little bit.

CAPT. YOUNG: Yes. Did you ever see them in any of those situations really use rudder first --

CAPT. OTT: No.

CAPT. YOUNG: -- or kind of lead with excessive rudder --

CAPT. OTT: No.

CAPT. YOUNG: -- in comparison to the roll?

CAPT. OTT: No.

CAPT. YOUNG: Okay. That's all I have. Thank you.

CAPT. OTT: Okay.

MR. IVEY: Thank you.

Captain Jim Goachee, FAA?

CAPT. GOACHEE: You said you did a special course. The other day, I think you said it was in -- what was it, in October, the 4th or something like that?

CAPT. OTT: Right.

CAPT. GOACHEE: Now, when -- you say, Special course. Was it specifically for the FAA?

CAPT. OTT: Well, the only students here were FAA.

CAPT. GOACHEE: Okay. So --

CAPT. OTT: There were three APMs and there the triple-seven, Nickerson. And I can't remember -- you know, one guy was going to the Super 80, and I met him the other day outside the classroom. And the other guy was going to the 727. So I don't know where he's going now. But they -- as part of American's initial training, they go through this week of --

CAPT. GOACHEE: And we're going to talk about that. But I mean --

CAPT. OTT: Yes.

CAPT. GOACHEE: -- for here, is -- I mean, specifically, you had the three APMs, and you had Talmadge, the POI?

CAPT. OTT: And he was afterwards. Talmadge was last week.

CAPT. GOACHEE: Oh. Okay.

CAPT. OTT: Okay.

CAPT. GOACHEE: You did Talmadge by himself? Or was --

CAPT. OTT: Talmadge and the --

Garrett's his name.  Right, Delvin?

CAPT. YOUNG:  Yes.

CAPT. OTT:  Garrett.

CAPT. GOACHEE:  The APM --

CAPT. OTT:  The APM.

CAPT. GOACHEE:   -- for the API?

CAPT. OTT:   -- for the A-300.

CAPT. GOACHEE:  And --

CAPT. OTT:  And they just wanted to see the program, so I just presented the program as I had always presented it.

CAPT. GOACHEE:  Do you know if they -- did they call you directly, or did they work through the director of training to set up that course?  Do you know?

CAPT. OTT:  Delvin called me.  So --

CAPT. GOACHEE:  Okay.

CAPT. OTT:   -- I don't know who gave him the -- where it came from. But --

CAPT. GOACHEE:  Well, we can find out.  I mean I can find out that later.  But, in essence, you were told to teach a course to the APM --

CAPT. OTT:  Well, he asked me.  He was not --

CAPT. GOACHEE:  Well, I understand.  Okay, yes.  But you were -- he requested --

CAPT. OTT:  And I'm senior to him, anyway.  So it doesn't --

CAPT. GOACHEE:  So -- but you did the APM on the A-300, and you did Talmadge separately or --

CAPT. OTT: Together.

CAPT. GOACHEE: Together?

CAPT. OTT: Together. Those two took it together -- the class.

CAPT. GOACHEE: And then, a week later, in the normal course of being an APM at American, you did the other three APMs?

CAPT. OTT: No. The other -- the three APMs was done October 4.

CAPT. GOACHEE: Yes. But --

CAPT. OTT: Okay.

CAPT. GOACHEE: Okay.

CAPT. OTT: And so those three were done --

CAPT. GOACHEE: Oh. October 4? Okay.

CAPT. OTT: Yes.

CAPT. GOACHEE: I'm sorry.

CAPT. OTT: Nickerson --

CAPT. GOACHEE: Yes.

CAPT. OTT: -- and the -- I can't remember --

CAPT. GOACHEE: Okay.

CAPT. OTT: -- the Super 80 guy. I should, but --

CAPT. GOACHEE: Okay.

CAPT. OTT: And then there was a seven-two. And there was also one other FAA guy in there, but I don't think it was an APM. I didn't -- I don't remember his name. That was done on October 4.

And then I basically didn't think I'd be teaching the material again for a long time. They said we might give it to the TWA guys when they go through something, but I kind of put the books up. And then Delvin called me on Monday and asked me if I would give it to Talmadge and Garrett. So --

CAPT. GOACHEE: Okay. You taught the regular course; you didn't amplify it in any way?

CAPT. OTT: Huh-huh.

CAPT. GOACHEE: And could you --

CAPT. OTT: The only change at all was the fact that I did copy the pages from the triple-seven operating manual that showed the changes in the nose-high unusual attitude recovery -- okay -- because that change occurred -- I mean October 4 is when I taught it to the APMs.

And then November 1 came in, and I think that was the date of the change in the triple-seven manual. And then I mentioned that change to them and said that if we taught this class en masse, we would obviously be making changes to the material right now that's there.

CAPT. GOACHEE: But are you teaching -- the course that Talmadge and the APM -- that you would teach is a general course for everyone. Correct?

CAPT. OTT: Yes. It was kind of reshuffled a little bit because Mr. Garrett didn't see -- he had to leave for part of it.

CAPT. GOACHEE: Okay.

CAPT. OTT: So Mr. Talmadge wanted the whole thing. So I gave him the whole program.

CAPT. GOACHEE: Okay.

CAPT. OTT: And you also go a little bit quicker because they have a -- their basis is higher, you know.

CAPT. GOACHEE: Yes.

CAPT. OTT: So they don't ask as many questions.

CAPT. GOACHEE: And I think you stated that Mr. Talmadge showed you the letter from --

CAPT. OTT: Right.

CAPT. GOACHEE: -- '97?

CAPT. OTT: That was the first time I saw the letter.

CAPT. GOACHEE: Did he say why he was showing it to you or anything?

CAPT. OTT: No. He just -- well, he mentioned that -- I think we were talking about the clips at the end of the unusual attitude, although I'm not quite sure. But he just said -- you know, I think this was discussed -- we -- yes. You were -- it was discussed then. And so that was the first time I really saw that letter.

CAPT. GOACHEE: Did he make the comments to you, or -- I mean during that course that at the end of Tape 1, when VanderBurgh wants to -- makes his conclusion and review -- is that what you're talking about, those three items that he covers?

CAPT. OTT: Uh-huh.

CAPT. GOACHEE: But Talmadge is the one --

CAPT. OTT: He makes those three --

CAPT. GOACHEE: Yes. And --

CAPT. OTT: -- you know, the ones that were done separately from the classroom.

CAPT. GOACHEE: Yes. And Talmadge is the one that was talking to you about how he thinks that it was added later?

CAPT. OTT: Right.

CAPT. GOACHEE: Okay.

CAPT. OTT: Because he was going by what the date -- he asked me the date of the video. I think that was what it was. He said, What's the date on the video? And that's why I knew it was in December of '97. And he said it was subsequent to the letter, and he mentioned that the clips were probably made as a result of the letter.

CAPT. GOACHEE: Are you an examiner for American on any airplanes, or have you --

CAPT. OTT: I was --

CAPT. GOACHEE: -- ever been an examiner?

CAPT. OTT: -- on the seven-two.

CAPT. GOACHEE: You were an examiner on the seven-two? Okay.

CAPT. OTT: Yes, for many years.

CAPT. GOACHEE: Okay. There was a question -- I mean an answer -- a question and an answer, but I -- you know, I got it down here. And it -- you're talking about unusual attitudes and how pilots get different runs. And I got kind of confused on who decides --

CAPT. OTT: Well, they --

CAPT. GOACHEE: -- who gets what.

CAPT. OTT: On the unusual attitude on the 727 -- okay -- or -- and, I think, also, on the triple-seven -- watching it, it's just a one-parameter-type thing that --

it's, you know, about 40 to 50 to 60 degrees nose-high thing. And you hit a button for nose-high unusual attitude.

When we first were developing the program, as a check airman, you would take the yoke and maneuver it into an unusual attitude position, and then they would recover from it. But then they eventually put it in the simulator, where you hit a button. And this button puts them in a nose-high or nose-low -- actually, not so much a nose-low as -- we call it a roll.

So it tends to buffet a little bit and then roll off, and then they recover it from there. So they -- really, the unusual attitude scenario is the same. The speed of the aircraft may differ, you know, and the flight -- you know, the altitude may differ. So the recovery may differ slightly because of that.

CAPT. GOACHEE: And I think that you were talking -- replying to Dave when you talked about the November 1 changes. And you had made a comment that there could have been a change maybe -- you referenced the wing-mounted engines, and the other thing was the nose-high trim. Are those the two things that you thought were changed in that November 1 --

CAPT. OTT: Right. What they changed was -- the recovery consisted of lowering the -- pushing the elevator forward -- okay -- as much as you can, trimming it, stab trim if required -- there's a little asterisk with stab trim, and as well as reducing the thrust.

CAPT. GOACHEE: Okay. And up to that change, up to November 1 or when you received it and started teaching it, what was the use of or -- how did you teach nose-high trim or high-angle attack?

CAPT. OTT: We didn't. On the 727, the trim was never -- we never really worked with the trim at all on the recovery. It was more of, Roll the aircraft over to allow the nose to come to the horizon. As it approached the horizon, we'd want them to roll out.

CAPT. GOACHEE: What about the MD-11?

CAPT. OTT: The MD-11? I only taught that a couple of times on X-Type. And, really, the change did not -- it was about the same change.

CAPT. GOACHEE: Okay. And --

CAPT. OTT: It was about the same technique to recover from it.

CAPT. GOACHEE: And you're still going through training on the triple-seven now --

CAPT. OTT: Right.

CAPT. GOACHEE: -- or have you completed your training?

CAPT. OTT: No. I'm going through -- I've been blessed as a L-Type line-qualified check airman. And now I'm going through my X-Type training.

CAPT. GOACHEE: Do you know what the procedure was for the triple-seven prior to the November 1 --

CAPT. OTT: It was --

CAPT. GOACHEE: -- reference?

CAPT. OTT: -- the same. It was, Roll the aircraft off.

CAPT. GOACHEE: And then nothing about nose trim?

CAPT. OTT: No.

CAPT. GOACHEE: So it was just changed --

CAPT. OTT: Right.

CAPT. GOACHEE: -- in this November?

CAPT. OTT: That's correct.

CAPT. GOACHEE: And I think that you said that you had seen the letter from Ewell -- Cecil Ewell and a response --

CAPT. OTT: I saw Cecil's response this week, yes.

CAPT. GOACHEE: In a reference to the nose trim?

CAPT. OTT: Right.

CAPT. GOACHEE: Okay. I think we made the comments about the review. So we don't have to do that. I -- with the Power Point presentation, you also said there was a little change. In reference to what they see now in the course, you teach the same video, but '97?

CAPT. OTT: Right.

CAPT. GOACHEE: And now you have a Power Point presentation. But was there a little change you said that you've seen now in the Power Point presentation that wasn't there before?

CAPT. OTT: Well, I -- when I first started teaching it, it was the old work book. Okay? And then the new work book came out, and then the Power Point presentation kind of changed at the same time. And one thing that was obviously added was that they showed a graphic of the angle of attack indicator on the 737 and the triple-seven -- you know, its display and its different functionalities.

They -- also, I think there was a little flag added, that excessive use of rudder, but it may not have been added then, too. I don't know when that came about.

CAPT. GOACHEE: Now --

CAPT. OTT: Because I don't have any of the old work books we kind of --

CAPT. GOACHEE: Yes.

CAPT. OTT: You know, the new ones came in. And the old ones go.

CAPT. GOACHEE: Yes. Okay. But when you use the Power Point, it would only be you and the other gentleman --

CAPT. OTT: Capt. Freland.

CAPT. GOACHEE: -- Capt. Freland, doing the Power Point presentation?

CAPT. OTT: Correct.

CAPT. GOACHEE: So is -- let's say you've been on vacation for a month or you've been away and you come back. And let's say January 1, now, you show up, and you've been away a month and you're going to teach an AAMP course and you're going to use your Power Point presentation.

Is there anything in that Power Point presentation that is going to alert you that there might be a change in that program or -- you're not going to discover that there's a change in it until you go through it?

CAPT. OTT: No other than if Captain Brasher or Capt. Freland were to have told me of the change. I knew when we changed the book, we made some minor changes to the Power Point presentation --

CAPT. GOACHEE: But --

CAPT. OTT: -- is what I was told.

CAPT. GOACHEE: -- do you know whose responsibility that -- it is to change the program?

CAPT. OTT: It's -- I think it's -- either Capt. Brasher or Capt. Landry are the ones who make it. I mean it tends to fall into their -- there's no actual department head, if that's what you're trying to -- just for the AAMP. Capt. Freland and myself teach it, but they tend to --

CAPT. GOACHEE: Well, you teach it, but then --

CAPT. OTT: And they've had other check airmen review it and edit it and want to make changes from it. I mean they were going through an edit period on the course.

CAPT. GOACHEE: But I'm trying to think of, though, Captain, how this -- when you go in physically and change the slide presentation and the Power Point presentation --

CAPT. OTT: Correct.

CAPT. GOACHEE: -- whose responsibility is that to do? Is it yours, or --

CAPT. OTT: No.

CAPT. GOACHEE: -- it -- but it's somebody else in the training department?

CAPT. OTT: Right.

CAPT. GOACHEE: Would you happen to know who that person is?

CAPT. OTT: When the changes were made, Capt. Brasher told me that some of the changes had been made.

CAPT. GOACHEE: But they told you?

CAPT. OTT: Yes.

CAPT. GOACHEE: Before you used the Power Point presentation?

CAPT. OTT: Yes.

CAPT. GOACHEE: And they --

CAPT. OTT: He told me that there had been some changes.

CAPT. GOACHEE: But when you say they --

CAPT. OTT: Because he also -- it coincided with the little work book change, too.

CAPT. GOACHEE: Yes.

CAPT. OTT: The little work book change was -- the last time any changes were made, they coincided with each other. And he told me that there were some changes to the Power Point.

CAPT. GOACHEE: So by looking at your book, you would be able to tell what changes were made? What I'm trying to get at is: For you to be presenting a course with a Power Point presentation and know there's changes but you don't know what the changes are, I mean, is --

CAPT. OTT: Well, I review it -- I review the Power Point before I teach it.

CAPT. GOACHEE: Yes.

CAPT. OTT: Okay? I mean before I teach this class, I spend about two to three hours reviewing my notes because, obviously, I don't want to look like a dufus in front of 80 people. So I will review all my notes. And then I will got to the -- because it's in all the computers at American, I mean it --

CAPT. GOACHEE: Okay.

CAPT. OTT: The Power Point presentation's loaded up there.

CAPT. GOACHEE: Yes.

CAPT. OTT: So I'll go to another classroom, have a cup of coffee and go through it all to see what changes have been made. And I just know that in the last, you know, couple of years since that -- I mean the changes were made when I was about three months into the program or so -- or four months. And there haven't been any changes since then.

CAPT. GOACHEE: Okay. But you won't -- someone won't send you a letter or a notification of changes --

CAPT. OTT: No.

CAPT. GOACHEE: -- in reference to that program?

CAPT. OTT: No. They just -- Capt. Brasher called me on the phone.

CAPT. GOACHEE: Okay.

CAPT. OTT: And I think I was in his office and he told me, Incidentally, there have been some changes made to it.

CAPT. GOACHEE: Okay. I just have two more.

CAPT. OTT: Okay.

CAPT. GOACHEE: Thank you. The -- now, you and Capt. Freland teach the course.

CAPT. OTT: Right.

CAPT. GOACHEE: And I think that what I'm concerned with or -- not concerned with but would like to know, because I don't know American's procedures --

CAPT. OTT: Right.

CAPT. GOACHEE: -- is that -- I take it that the syllabus that is in the AQP program has been approved.

CAPT. OTT: Yes.

CAPT. GOACHEE: Right. And in there, for that AAMP program, there will be highlights of subject materials that need to be taught?

CAPT. OTT: Uh-huh.

CAPT. GOACHEE: And then, from that, do you have a lesson plan to teach this course outside of the Power Point presentation?

CAPT. OTT: No.

CAPT. GOACHEE: Does Capt. Freland? Do you know if he has --

CAPT. OTT: No.

CAPT. GOACHEE: -- a lesson plan?

CAPT. OTT: We just have our -- the Power Point and our notes from the different bullet items that we expound upon.

CAPT. GOACHEE: I'm only going to ask this because I think that you have said --

CAPT. OTT: Right.

CAPT. GOACHEE: -- and I have --

CAPT. OTT: And then the course is also taught -- it's only taught to the pilots once. Okay? This course -- the academic course that I teach is only taught to the pilots once. And it's taught to the new-hires during the first week of indoctrination.

CAPT. GOACHEE: Yes, sir.

CAPT. OTT: Okay? So they get it on that first week of indoctrination. So they -- the follow-on training is the recurrent training or the transition training, when they get more focused on AAMP for their particular aircraft or their recurrent training.

So that's the follow-on. And that's where the syllabus and the AQP stuff would probably fall more in line.

CAPT. GOACHEE: Okay.

CAPT. OTT: But it's -- I would presume, since this is, you know, part of our training, it has been put into the syllabus.

CAPT. GOACHEE: Okay. What I'm just trying to get at is that the -- because you sat in on Capt. Freland to observe him teaching the course. And you probably at the end of the session may critique Capt. Freland. And, vice-versa, he'll sit in on yours and --

CAPT. OTT: And critique me.

CAPT. GOACHEE: -- critique you at the end.

CAPT. OTT: Yes. We -- I probably spent three months watching the program and training with Capt. Freland before I --

CAPT. GOACHEE: Okay.

CAPT. OTT: -- taught it by myself. I mean I would go in and teach one section of it, and he would critique me. And then we would go on back and forth. And even afterwards, I would call him on the phone at home, or whatever, and say, you know, "What about when this item comes up," you know.

And sometimes there would be questions that I would -- some of the guys were a lot smarter than I am. And they could ask questions that were way out.

CAPT. GOACHEE: Have you done this more than one time during the two years that you've been doing this?

CAPT. OTT: Teach the program?

CAPT. GOACHEE: Yes. I mean when -- you've been teaching the program for two years now. And have you sat in on Capt. Freland's --

CAPT. OTT: I think I've sat in on -- since I started teaching by myself, I've sat in on him twice --

CAPT. GOACHEE: Okay. And --

CAPT. OTT: -- I believe.

CAPT. GOACHEE: And --

CAPT. OTT: And we actually -- and what generated some of that is that we have these peer observation days, and I was assigned a peer observation day on the 727. And I said, you know, One of my duties is to teach this course; Because I've been doing it on the 727 for ten years, I'd rather go watch Capt. Freland. And then he in turn did the same thing, and then I did -- later on --

CAPT. GOACHEE: Okay.

CAPT. OTT: -- watched him, too.

CAPT. GOACHEE: Okay. And during those times that he has observed you or you observed him, have you noticed either one of you teaching something or excluding something that should have been taught in the course?

CAPT. OTT: No. That's -- I mean the material is -- it's extremely standardized material.

CAPT. GOACHEE: And that's because of the Power Point presentation; it covers everything?

CAPT. OTT: Right.

CAPT. GOACHEE: Okay. All right. Good.

CAPT. OTT: As well as being trained by the guy --

CAPT. GOACHEE: Yes.

CAPT. OTT: He tends to -- you tend to follow your mentor.

CAPT. GOACHEE: This is the last question, Dave.

But I want to include this because we had this comment about the -- that you're using the original tape from Capt. VanderBurgh that Dave was -- talked about, December of '97. And you were talking about use of rudder. And I just -- I want to read this to you and see if you agree with it.

CAPT. OTT: Okay.

CAPT. GOACHEE: And in essence, he's talking about coordinated rudder, and he underlined the word, "Coordinated," in his discussion.

CAPT. OTT: Correct.

CAPT. GOACHEE: And he says, "They have a lot of different meanings out there, but" -- he says, "What I mean about coordinated rudder is you apply rudder in the direction you're trying to roll the airplane -- left rudder, left roll; right rudder, right roll -- and just the amount of rudder it takes to get the desired roll response.

"These are very powerful rudders; we only take smooth, small applications we only need to use to get to the desired results." Does that sound like --

CAPT. OTT: Correct.

CAPT. GOACHEE: -- what you're doing and what you're teaching?

CAPT. OTT: Yes.

CAPT. GOACHEE: And you taught that from the beginning --

CAPT. OTT: Yes. The only --

CAPT. GOACHEE: -- about the rudder?

CAPT. OTT: The only exception to that maybe at all is that when the triple-seven went to the --

CAPT. GOACHEE: I don't want to go into any --

CAPT. OTT: Okay.

CAPT. GOACHEE: What -- I wanted to try to stay here -- I'm sorry, captain --

CAPT. OTT: Okay.

CAPT. GOACHEE: -- is that --

CAPT. OTT: Stay pre-triple-seven --

CAPT. GOACHEE: -- this --

CAPT. OTT: -- change? Yes.

CAPT. GOACHEE: This is pre-, and this was December of '97. And from the first tape that was used for this presentation, this comment was in there from the beginning --

CAPT. OTT: Correct.

CAPT. GOACHEE: -- because it's during his presentation.

CAPT. OTT: Correct.

CAPT. GOACHEE: Now, when he gets back to his conclusion and he wants to review things on the rudder, then he makes it. But then he starts to get into high slip and high angles of attack. But the bottom line was: He has re-emphasized this use of rudder, but he used that same statement from the beginning about, We don't want you using a lot of rudder; We want you to coordinate it and use smaller amounts --

CAPT. OTT: Correct.

CAPT. GOACHEE: -- to whatever roll rate it takes. Is that a correct statement?

CAPT. OTT: Correct.

CAPT. GOACHEE: Okay. Thank you.

That's it, Dave.

MR. IVEY: Thank you.

Captain John Lauer, APA?

CAPT. LAUER: I only have two questions.

CAPT. OTT: Okay.

CAPT. LAUER: Outside of your teaching the AAMP, you have also taught in the simulator?

CAPT. OTT: Correct.

CAPT. LAUER: Okay. And I'm assuming that you have taught in the high-angle attack scenarios.

CAPT. OTT: Yes.

CAPT. LAUER: What is your definition of an aircraft departure in a high -- nose-high scenario?

CAPT. OTT: Well, that would be -- I guess well into the stick-shaker with a large amount of rudder would constitute departure. We don't really train departures, but we do a high angle of attack maneuvering, not a full stall-type scenario where you're -- you show that -- the first scenario, I think, is aileron only and the sluggishness and the tendency of the aircraft to want to descend because of the spoilers coming up.

And then, the second thing, they teach rudder only. And then they teach coordinated aileron and rudder at the last thing to show that that's the optimum way to respond to the thing. So we don't really go into a departure. I've never taught a full departure on the aircraft. It's just high angle attack maneuvering.

CAPT. LAUER: Okay. You had indicated that the pilots are taught or attend -- they take this AAMP course once.

CAPT. OTT: Correct.

CAPT. LAUER: After the pilots that you have worked with -- after the pilots have taken the course that you have worked with, have you witnessed or seen any of these pilots attempt to apply flight corrections based on small-jet or turbo-prop aircraft procedures, versus large commercial aircraft?

CAPT. OTT: No. But I wouldn't say I'm completely familiar about what smaller jet procedures would be. You know, I tend to see them -- and you talk mostly -- I mean I taught it to new-hires. And I would occasionally see them in the 727 simulator.

So that's a very small sampling that I could have observed in the simulator for who are taught at the ground school course, too. And I don't think I've ever seen anybody not try to implement the recovery procedures --

CAPT. LAUER: Okay.

CAPT. OTT: -- correctly. I mean I've never seen anybody try to take a small jet recovery and put it to American's procedures.

CAPT. LAUER: Okay. Good. Thank you.

That's it.

CAPT. OTT: Okay.

MR. IVEY: Captain Ron Skupeika?

CAPT. SKUPEIKA: Hello. I'm going to follow up on John's questioning. In your experience with initials or recurrents or transitions, did you ever see improper recoveries from this nose-high attitude?

CAPT. OTT: Oh, sure. I mean you have seen improper recoveries, and that gives you an opportunity to -- you know, to de-brief it. And they go on and do it correctly.

CAPT. SKUPEIKA: What percentage of the -- you know, ball park would you say that, you know, backgrounds and all that --

CAPT. OTT: Well, bear in mind again that unusual attitude recovery is a training maneuver. Okay? So it wasn't really -- it was something we trained with, and so you would see it. But I'd say probably you would see 10 to 15 percent of the people that would not really do it -- they would do it poorly enough that you'd want to repeat it so they'd have a better understanding of it.

CAPT. SKUPEIKA: Okay.

CAPT. OTT: With some people, it was just a de-brief item that -- Hey, you could have, you know, done this a little bit better, or that. I mean the mistakes -- you know, there's a gamut of mistakes that they could make on the recovery. So --

CAPT. SKUPEIKA: Okay. Have you ever seen rudder reversal in those improper recoveries?

CAPT. OTT: The only time I've ever -- I think I've ever seen rudder reversals at all was in engine failures, when people would put in the wrong rudder. I don't really see -- now, we had parameter read-outs on things on the 727 that you could go back and you could actually show people how many G's they actually pulled in the event recovery -- you know, how many negative G's or positive G's.

But I don't think that rudder was anything that we could actually see -- I never saw a rudder reversal in an unusual attitude recovery. I've seen it probably in an engine failure on a 727, you know, when he's got the yoke one way and he's got the rudder the other way, and then he goes back and forth trying to straighten one out --

CAPT. SKUPEIKA: Sure.

CAPT. OTT: -- over the other.

CAPT. SKUPEIKA: Sure. In that percentage that you mentioned earlier that were improper recoveries, did you ever have to have extra sessions with these gentlemen?

CAPT. OTT: No.

CAPT. SKUPEIKA: It was either a de-brief item or --

CAPT. OTT: Yes -- well, that was -- those -- that 10 to 15 was probably the only percentage that you would -- we would actually say, Hey, let's try that maneuver again.

CAPT. SKUPEIKA: Okay.

CAPT. OTT: The majority of the time, you'd just de-brief somebody. And they --

CAPT. SKUPEIKA: Right.

CAPT. OTT: The recoveries were fairly adequate. Even though they wouldn't have been as picture-perfect as you like, they really achieved the desired objective. So --

CAPT. SKUPEIKA: Okay.

That's all I have.

MR. IVEY: Thank you.

Anything else you'd like to share with us, Bruce?

CAPT. OTT: Well, I can tell you after, you know, teaching this course for awhile that, you know, you always get applause at the end of the class. The response from the pilots is always -- I've had guys come up and tell me it's the best class they've ever had. I've had people ask for the tapes, you know, to take to the reserve or guard units -- and particularly the mountain wave tape, I think, because we -- that's something we forget about a lot.

But they've wanted to get copies of the tapes. And we had quit giving the tapes out for awhile. So I've had nothing but positive responses from this course, you know, since I've been teaching it and working with it.

MR. IVEY: Well, thank you, very much. I appreciate you coming in today and talking with us and sharing all this information. And we'll conclude the interview.

CAPT. OTT: Okay. Thank you.

MR. IVEY: Thank you.

(Whereupon, the witness was excused.)

MR. IVEY: Let's take a break.

(Whereupon, a short recess was taken.)

MR. IVEY: We're back on the record.

EXAMINATION

**f. Mr. John Cook**

MR. IVEY: And good afternoon. I appreciate you joining us today in the operations group in the investigation of American 587.

And if you will, please give us your full name, your present occupation with American Airlines and a little bit of history on your aviation background, to include type ratings, experience and total time and that sort of thing.

MR. COOK: My name is John Michael Cook. I'm an A-300 simulator pilot at American Airlines. And my aviation background began as a civilian pilot. When I graduated from high school, I got my private and commercial license. I went to Parks College, which is an aviation school, got a bachelor's degree in aeronautics.

I then went to air force pilot training at Webb Air Force Base in 1969, graduated from there and became a KC-135 pilot, aircraft commander and instructor in that. And when I left the air force five years later, I went to work for the FAA as an air traffic control specialist. In 1981, I -- shortly thereafter, I went to work for Lear Siegler in their -- was the products support manager for the corporate-type aircraft, general aviation.

And then I came to American in 1987. Originally, I taught for approximately two years in the international section. I then became a simulator pilot on the Boeing 75/76 program. And approximately five years ago, I transferred to the Airbus. I'm sorry. I also taught in the A-300 ground school for about a year.

MR. IVEY: And type ratings?

MR. COOK: I have a type rating on the 707, 727, 75/76 and A-300.

MR. IVEY: Total flying time, just your best guess?

MR. COOK: Not counting simulator time, approximately 2,000 hours.

MR. IVEY: And with the simulator, I'm sure, after all those years, it's --

MR. COOK: I would guess --

MR. IVEY: -- quite a few?

MR. COOK: -- in excess of 10,000.

MR. IVEY: Well, I appreciate you joining us this afternoon. You currently are a simulator pilot for the A-300?

MR. COOK: A-300, that's correct.

MR. IVEY: And that's the only one that you're working on at this time?

MR. COOK: That's correct.

MR. IVEY: Okay. Did you know either the accident captain or first officer?

MR. COOK: I worked with First Officer Molin, yes, sir.

CAPT. GOACHEE: And in what capacity?

MR. COOK: I wish I could help you more. I had him as a student, I believe, last summer. And I remember distinctly, when I walked in the room, he called me by name as though we had worked together before; I recognized him visually, but I could not place where I had worked with him before. And it's a little embarrassing at times because sometimes it has been a year, and sometimes it has been ten years.

But he was a very open personality, a young man who exuded confidence. And I do remember him from that. I do not remember, however, what type of training it was. In other words, it could have been recurrent or he could have been there for take-off and landing currency; I do not remember.

MR. IVEY: So often times, you can have someone that becomes non-current, so they have to come back for take-offs and landings?

MR. COOK: If they become non-current, then they have to come back and do that with a check airman. But if they're -- have been on extended leave and they're not non-current yet, then I can requalify them with take-offs and landings.

MR. IVEY: I see. Had -- he seemed to have remembered working with you earlier. And I do know that you probably have quite a few students on a year's basis, from initials to recurrents. That's, I imagine, most of your bread and butter right there. Is it not?

MR. COOK: Most of it is recurrent, with probably one transition per month.

MR. IVEY: Sure. Understanding the numbers of people involved, was there anything that comes to mind regarding his flying in the simulator? Can you remember anything about him as a student or participant in the simulator?

MR. COOK: I remember that he had a very open personality and he seemed very confident in himself, which is a little unusual for someone that young in a simulator environment. And I remember when we were done with the session, I thought to myself, That man has a right to be that confident. And I remember -- I don't remember any specifics, but I remember his -- I felt that way at the end of the session.

MR. IVEY: I'm sure --

MR. COOK: He came down --

MR. IVEY: -- you get to see the entire spectrum of pilots. In new-hires that are brought in as first officers -- and I realize they're still flight engineers in some cases that may be transitioning into a co-pilot status, but, I think, as you're getting more into the two-man airplanes, there's new-hires coming off the street going into the right seat. Or has that happened prior to nine -- September 11 and the furloughs?

MR. COOK: I don't know for sure that they're new-hires off the street. I know we've had a couple right from Eagle, which is a different environment, and I know I've had some that had minimum time as a flight engineer.

MR. IVEY: Yes.

MR. COOK: But other people could answer that a little bit better than I.

MR. IVEY: Yes. But in your experience, looking at the gamut of pilots, do you ever see pilots that are just literally rough on the controls?

MR. COOK: Yes.

MR. IVEY: Could you characterize for me -- not to indict anybody, but can you characterize the kinds of backgrounds that those pilots might come from?

MR. COOK: Well, I think that the reason I said yes was this was a simulator rather than an airplane. And so many people are -- well, of course, they're all used to flying airplanes, so they're used to feeling things they don't feel in the simulator.

So many people in the very beginning of a simulator session tend to over-control the aircraft because they're making movements and expecting to feel things that they're not feeling right away. So --

MR. IVEY: So that roughness is pretty much -- do they tend to mellow out in one period, or, sometimes, do you see pilots that are just plain rough? I don't care if they came back tomorrow and the next day --

MR. COOK: Do you mean --

MR. IVEY: -- but they seemed to be just rougher?

MR. COOK: Do you mean by, "Rough," abrupt --

MR. IVEY: Yes.

MR. COOK: -- on the controls?

MR. IVEY: Yes.

MR. COOK: No. I don't believe that's the case. Once they settle down and I have them relax a little bit, a little less pressure on the yoke -- I encourage them to fly with their fingertips for awhile. And then they tend to quit over-controlling the simulator. I'm talking a simulator. 727 people are a little -- when I get them for transition, they're used to a little bit more muscle, also, than the newer airplanes require.

MR. IVEY: And it -- that was pretty much addressing the first-time pilots coming into the right seat. On recurrent training events, not that you may or not remember a guy being more -- I'll use the term -- rough and then come back the next year -- do you find a settling down in those pilots who might be somewhat rough on controls?

Do -- is there more of a mellowing effect in terms of flight manipulation later as they gain more experience, or do some people just kind of keep the way they fly airplanes intact?

MR. COOK: Well, you know, I think if you're talking actual abruptness on the controls, they get over that very easily in the -- during the initial sim. sessions. I don't find them overly aggressive normally on the flight controls.

MR. IVEY: You --

MR. COOK: I may have given the wrong impression earlier.

MR. IVEY: No, not at all. I'm just throwing these ideas out as I think about them. You're a simulator pilot. So you take the Simulator 1 period through how many?

MR. COOK: On transition, it's One through Five.

MR. IVEY: And on initial, also, One through Five?

MR. COOK: Well, that would be their initial type rating possibly.

MR. IVEY: Yes. All right. And on type ratings, One through Five. Is the unusual attitude program in the fifth simulator period on the A-300?

MR. COOK: Yes.

MR. IVEY: Do you teach that?

MR. COOK: Yes.

MR. IVEY: And after Simulator Period 5, they move from Period 5 through --

MR. COOK: Period 9 --

MR. IVEY: Nine?

MR. COOK: With a check airman.

MR. IVEY: Okay. On -- is the first introduction of upset maneuver training or unusual attitude training in Period 5 on the A-300?

MR. COOK: That's when it's scheduled. Occasionally, when -- due to something, I will put it in if I have additional time on an earlier day. So there's some flexibility there, which gives me more time on Day 5 for review. But normally, it would be Day 5.

MR. IVEY: It -- you've perhaps moved it up as early as the Day 4, or not --

MR. COOK: Right, yes.

MR. IVEY: There's a lot to cover, I realize.

MR. COOK: Yes, sir.

MR. IVEY: And in that period, if it were a normally scheduled activity in Period 5, when you brief the student prior to the simulator, is that one of the subject areas that you cover -- unusual attitudes or upset maneuvers? Or --

MR. COOK: Yes.

MR. IVEY: What is it called? Could you --

MR. COOK: Well, on --

MR. IVEY: Do you know?

MR. COOK: Unusual attitudes I do on Day 5. Wind shear I do on probably Day 4, typically. So I mean they're kind of related, I believe.

MR. IVEY: On the unusual attitudes, is there any specific guidance given to the simulator instructors as to what to brief prior to going into the box to counter, say, unusual attitudes?

MR. COOK: Well, we're -- we have a pictorial display there in the briefing room, and I discuss it with the students. I ask if they have any military background, and I talk about some of the differences on military and general aviation and air carrier.

MR. IVEY: What are some of those differences? Help me out on that.

MR. COOK: Well, on the roll maneuver, there's not a whole lot of difference. In the nose-high unusual attitude, I feel there is some difference, and I talk to them about that.

When I first started flying general aviation back in the '60s -- and remember, we're talking Cessna 150 -- I was taught to recover from a nose-high unusual attitude by rolling the wings level, getting power and pushing forward on the yoke. And that works fine in a small aircraft, but it doesn't work well in a large aircraft.

So then I got in the air force, and they told us, No, you don't do that; You roll to 90 degrees of bank; That way, you have a zero lift vector; The nose will fall to the horizon, and, when it does, you roll the wings level. Well, that's not such a good environment for an air carrier, either. So what I tell them is it's really a combination of the two

On nose-high low speed unusual attitude, of course, the first thing you have to do is recognize where you are -- it's always auto-pilot; auto-throttle's off -- and release a little bit of back pressure, still trying to maintain positive G forces. It's difficult to do in the simulator because you don't feel all those G's, and I explain that to them.

But you're trying to always maintain some positive G force. Okay? However, when you release back pressure, that's decreasing the angle of attack.

Then using coordinated aileron and rudder, start a -- lowering a wing -- the low wing until the nose naturally starts to fall. Once it naturally starts to fall and you're still holding that little bit of back pressure, you have what you're trying to attain. As the nose starts to fall, add power. When you hit the nose on the horizon, again, using coordinated aileron and rudder, roll the wings level.

I tell them to wait adding the power until the nose naturally starts to fall because these are pod-mounted engines and when you add power, it actually gives you a pitch-up tendency. So that's the way I teach it.

MR. IVEY: And the question about asking of their backgrounds sort of gives you a feeling about the probability of the learning that you just explained about civilian versus military and translating into air carrier --

MR. COOK: Yes, sir.

MR. IVEY: -- type of operations? Okay. First Officer Molin -- as you say, you worked together. Was there any personal information that he shared with you that you can recall, any anecdotal information, either positive or negative?

MR. COOK: I'm sorry. I enjoyed working with him.

MR. IVEY: Yes. Sure. And you're based here, still working in the simulators here, or are you in a different location now?

MR. COOK:  No.  I'm right here.

MR. IVEY:  Right here?  Okay.

Mr. Cook:  I know some students can be harder than others because -- I had five periods with him.  So I'm surprised he doesn't have a few more gray hairs.

Mr. Ivey:  Did you know the accident captain?

MR. COOK:  I don't recognize the name.  If I saw him, I possibly could. One thing about the Airbus is that it's a small group of -- I started it back in '90 in the ground school.  And then I've been teaching it in the sim. for about five years.  So I see a lot of faces.  They recognize me; occasionally, it's from the 75/76.  So I don't know.

MR. IVEY:  So you've been on the Airbus for about five years, teaching?

MR. COOK:  In the simulator --

MR. IVEY:  Yes.

MR. COOK:   -- that's correct, yes.

MR. IVEY:  That's about the time that the upset maneuvering program came about, so I guess it's not a fair question to say that -- during the 75/76, did you have the opportunity to teach it in that aircraft, as well?

MR. COOK:  It was just beginning, I believe, as I -- at the end of that.

MR. IVEY:  The modeling of the two simulators -- is there anything that you can compare to?  Do you feel like the Airbus is a good representative simulator for recoveries even compared to, say, the 75/76?  Any comparison in those two devices?

MR. COOK:  The 75 simulator is a newer generation simulator than the 76 or the Airbus.  So they have a different feel and different visual.  I think most of the people would tell you that there's considerable difference in actually flying it.

MR. IVEY:  In other words, it seemed to be better?

MR. COOK: Yes, better flight control loading and better visual.

MR. IVEY: Than the 76 and, say, the A-300?

MR. COOK: The -- that's correct.

MR. IVEY: Have you ever had any particular problems with the A-300 simulator as it relates to fidelity or loss of symbol generators with recovery procedures?

MR. COOK: Loss of symbol generators is quite common. So when that happens, I definitely point that out to them -- not that they need it. But we talk about why. The simulator does tend to drop off motion fairly often during a recovery because -- the technicians explain to me that it's safety limits on the actuators. And so it's not unusual then to have to call them and to have them reset the sim. I think it happened with you.

MR. IVEY: Yes, it did.

MR. COOK: And that -- it's too bad because a lot of the pilots feel that they did something wrong, and I just have to explain to them, No, not at all; It's a safety feature on the simulator.

MR. IVEY: Does it tend to manifest itself during the recovery, or just --

MR. COOK: During the recovery.

MR. IVEY: So you'd have to either reset it and do it again or re-attempt -- is it more because of a pilot input or their technique of recovery that might be causing that, or is it just --

MR. COOK: No. I don't --

MR. IVEY: -- a simulator glitch?

MR. COOK: No. I don't believe so.

MR. IVEY: More of a simulator glitch than --

MR. COOK: Yes.

MR. IVEY: All right. Has there been any modifications to the upset training procedures that you've been required to undertake since you started teaching it, say, five years ago? Have there been any changes in it?

MR. COOK: The way I teach it?

MR. IVEY: Or even the way the requirement is to teach it or to add any new information or subtract or -- any changes.

MR. COOK: Well, when we first started doing it in the 75/76, they didn't even have the upset programmed. So we actually, you know, did like in the olden days, "Close your eyes," and gave them some type of upset.

MR. IVEY: Now it's programmed into all the -- at least the 75/76 and A-300?

MR. COOK: Yes, it is.

MR. IVEY: Yes. Is the upset training normally given to a pilot when he is not expecting it, or is it usually, when you're in the training cycle, presented to him as, All right; Now what I want to give you or to show you or to demonstrate to you is going to be an upset followed by the event?

MR. COOK: Remember, I have these people for training. So I tell them in the beginning of a session that I'm not going to surprise them with anything. And my intent is that they do it correctly each time, so I try to surprise them with nothing. I tell them ahead of time.

I brief them on what we're going to do, and then I try to tell them before the event what they're going to do. And I tell them to think about it: If you know how to do it, we'll commence the problem; If not, stop me right there, and we'll talk about it so when you do it, you'll know what you're at least trying to accomplish.

MR. IVEY: And I think that we've had an earlier testimony that it's not a graded event; it's something to learn, and if you need to repeat the item, then do so, so that you get the proper learning transfer.

MR. COOK: That's correct.

MR. IVEY: In your experience, which is extensive, do most of the students seem to catch on, on the first go-round, or does it sometimes take a second event? Or on average, is there two or three during a period, or three or four, or four or five? I -- give me a sense of --

MR. COOK: You're talking what type of maneuver?

MR. IVEY: Oh, just the upset maneuver training.

MR. COOK: It's almost always done properly. The nose-high unusual attitude in the simulator -- the A-300 simulator is a little bit unique in that it's programmed such that when I put in the event, it will then -- it rolls in an up -- nose-up trim, and it lifts the nose of the aircraft regardless of what inputs the pilot puts in.

It gets them to a certain deck angle -- and I can't tell you what that is -- and then it releases the aircraft, at which point -- then he has control over it. I think that's probably not the best. I tell them that happens.

And then, of course, as I told you, I teach, Use coordinated aileron and rudder and start a bank angle until the nose naturally starts to fall; In other words, decrease the lift vector. That simulator doesn't -- you can increase the bank angle to an extreme amount, and the nose won't fall until you put in more rudder than would probably be required on the aircraft.

MR. IVEY: And that tends to get the nose --

MR. COOK: Yes, sir.

MR. IVEY: -- coming down then? Okay. And is nose-high, versus nose-low, a little more difficult to comprehend, or do you really see any differences in recovery --

MR. COOK: Well, the other one's --

MR. IVEY: -- success?

MR. COOK: -- not really nose-low. It's just a roll maneuver. Okay? I think the roll maneuver is done more successfully than the nose-high.

And I think what I see is most pilots put in the correct amount of bank angle and rudder that I think the airplane would require, and then I have to -- I'm sitting in the instructor seat, which is right behind the captain, and I just in a very calm voice tell them, More rudder; More rudder. And then I go through again that I don't believe that the aircraft without some type of structural problem would require that much rudder.

MR. IVEY: Sitting in the instructor's seat, is there some indicator or tool that you use to determine whether there is enough or not enough rudder being used?

MR. COOK: No, sir. It's a feeling I have.

MR. IVEY: Do they --

MR. COOK: Now --

MR. IVEY: Do they use or -- not do they. Is the trapezoid talked much about in unusual attitude recovery?

MR. COOK: No, sir. Not by me.

MR. IVEY: Do you know of anyone who really uses that as a teaching tool for that kind of recovery, either?

MR. COOK: No.

MR. IVEY: In --

MR. COOK: It's a pretty small trapezoid during that period.

MR. IVEY: The --

MR. COOK: There --

MR. IVEY: I'm sorry.

MR. COOK: There's another time we get into a nose-high attitude often times, and that's on recovery to GPWS, Ground Proximity Warning. And one of the tools we show them is that on the Airbus, you have the stick-shaker indicator, the SS 1.12 stall, and that you really have all the energy between your current air speed if you need it all the way down to the stick-shaker. And you know exactly where the stick-shaker's going to be.

So we show them that that amount of energy -- speed energy can be traded for altitude. When they do that, they end up with a nose-high low speed situation. And then by doing exactly what we said, the nose falls naturally. And invariably, they do that properly.

MR. IVEY: And that's the learning.

MR. COOK: That --

MR. IVEY: Do you find --

MR. COOK: And in fact, that's the one I prefer.

MR. IVEY: Do you find that most of the students use aileron as the principal flight control, or do you find aileron and rudder, or is it aileron or pure rudder only? Have you ever seen anyone do a recovery with just rudder only?

MR. COOK: No. I can't imagine anybody doing that.

MR. IVEY: It -- typically, the pilot will lead with what?

MR. COOK: Aileron.

MR. IVEY: And then followed by rudder?

MR. COOK: Followed by rudder. That's what I find. That's also true on the single engine, I find.

MR. IVEY: But they'll lead with the aileron, and then --

MR. COOK: Yes.

MR. IVEY: Have you ever experienced a student applying a rudder reversal? That's to suggest that they put the wrong rudder in followed by the correct rudder, one of these rapid swings?

MR. COOK: On single engine?

MR. IVEY: No, sir. Just -- well, that could probably happen on a single engine --

MR. COOK: Occasionally, on --

MR. IVEY: -- and you may have seen it.

MR. COOK: Occasionally, on a single engine, yes.

MR. IVEY: How about in upset maneuver training? Have you ever seen anyone put in the wrong rudder followed by the correct rudder and seen how the simulator performed?

MR. COOK: I don't believe I've ever seen that. I've seen them not put in enough rudder possibly.

MR. IVEY: And the lack of enough rudder does what on, say, the nose-high?

MR. COOK: It will not bring the nose down.

MR. IVEY: And the term "top rudder" -- does that -- is that a term that you use or are familiar with?

MR. COOK: No, I don't use it.

MR. IVEY: And one last term and one last question. The term "coordinated rudder." When that term is used, explain for me what that means. Or how can a pilot ascertain what is enough coordinated rudder?

MR. COOK: In the simulator, it's difficult, I believe. In the airplane, it -- I think it's easy to determine the amount of rudder necessary to keep the turn coordinated. We all learned it when we first started flying.

I think that one of the points is that when you're using small aileron deflections that you're using in normal flight conditions -- you have a yaw damper, and you have a turn coordinator. And I think pilots get possibly a little complacent with the rudders at times. When you get extreme aileron deflections, then your yaw damper and turn coordinator aren't really designed for that, and you have to follow up with appropriate rudder put-on.

But I never teach, you know, "Put on all the rudder," or anything like that. I always teach coordinated flights. That's the way I learned.

MR. IVEY: Well, thank you, very much, for my questions. What I'd like to do is go around the room and see if anyone else has some questions and follow-up, and I'll start with Dr. Bart Elias from the NTSB.

MR. COOK: Yes, sir.

MR. IVEY: Bart?

DR. ELIAS: Yes.

Thank you for being here today. Just a couple of questions. First, since you've flown both the 75/76 and, also, the A-300, I'd like you, if you could, to give us a sense of a comparison between those two airplane types in terms of rudder effectiveness in those unusual attitude recoveries.

MR. COOK: In the simulator?

DR. ELIAS: Uh-huh.

MR. COOK: The -- it has been a long time, but in the 75/76, if you use less rudder, what I believe would be coordinated aileron and rudder, the nose will fall appropriately whereas, in the Airbus, it would not.

DR. ELIAS: I'm sorry. In --

MR. COOK: The Airbus requires more rudder -- the simulator. Now, that's only during that pitch-up maneuver the way it's programmed. If they get the nose-high in another situation, then it reacts more like I believe the aircraft would.

DR. ELIAS: Do you think that's a function of the way that maneuver or unusual attitude entry was set up in the programming of it? Or is it --

MR. COOK: I would guess so, but other people could probably tell you more definitively.

DR. ELIAS: Okay. But in other situations, are you saying that the A-300 sim. seems to have equal rudder command authority or --

MR. COOK: Yes.

DR. ELIAS: -- rudder requirements --

MR. COOK: Yes.

DR. ELIAS: -- comparatively? Okay. Are you familiar with the concept of cross-over angle of attack or cross-over air speed?

MR. COOK: By, "Cross-over air speed," you mean maneuvering speed?

DR. ELIAS: Not exactly. This would be either the air speed or angle of attack where rudder effectiveness becomes more effective for roll control than aileron.

MR. COOK: No.

DR. ELIAS: And so that's not something that you teach --

MR. COOK: No.

DR. ELIAS: -- in the simulator? Okay. That's all the questions I have. Thank you.

MR. COOK: All right.

MR. IVEY: Captain Guy Arondel from BEA?

CAPT. ARONDEL: Thank you.

MR. COOK: Hello.

CAPT. ARONDEL: Could you tell me, prior to the simulator sessions, don't the students know the ultimate content of the session, or is there some exercises they discover during the session?

MR. COOK: I think they know what they're -- what's going to be involved in the sessions. There's nothing --

CAPT. ARONDEL: And --

MR. COOK: -- covert.

CAPT. ARONDEL: -- you don't have any new exercise they just discover during the session?

MR. COOK: If there's something that they need to -- some element of what we're doing, if they need to repeat that --

CAPT. ARONDEL: Yes.

MR. COOK: -- they would certainly repeat it --

CAPT. ARONDEL: Yes?

MR. COOK: -- if that's what you're asking.

CAPT. ARONDEL: Yes.

MR. COOK: Yes, sir.

CAPT. ARONDEL: Thank you.

MR. IVEY: Thank you.

Captain Delvin Young, American?

CAPT. YOUNG: The -- earlier, you had talked about when -- Dave had asked you about the rough control movement. I just want to clarify that a little bit. In the -- by, "Rough control," do you mean kind of over-controlling --

MR. COOK: Over-controlling of the simulator.

CAPT. YOUNG: -- or abruptness of the control and the amount of control?

MR. COOK: It's over-controlling of the simulator, in my opinion, because of lack of feel of the G forces.

CAPT. YOUNG: Okay.

MR. COOK: And a little bit of the visual, also.

CAPT. YOUNG: Right.

MR. COOK: So it's not abruptness as much as over-controlling.

CAPT. YOUNG: Right. Okay.

MR. COOK: But that settles down.

CAPT. YOUNG: Okay. He had asked you a little bit, also, about new-hires off the street to the right seat. Have you ever had a new-hire -- a brand-new hire that -- you mentioned there was Eagle guys and there was a -- people that had been on the panel not very long on the 727.

MR. COOK: I've certainly had people that have not been on the panel very long, but I don't know if I've ever had any that are right off the street.

CAPT. YOUNG: Okay.

MR. COOK: If --

CAPT. YOUNG: That's all I have.

MR. IVEY: Jim, you're on the deck.

CAPT. GOACHEE: I'm on the deck?

MR. IVEY: Yes.

CAPT. GOACHEE: I was waiting for the official notification.

MR. IVEY: Oh.

This is Captain Jim Goachee from the FAA.

And I'm sorry. My mind sort of wandered.

CAPT. GOACHEE: Can you explain the difference between an instructor at American Airlines and a check airman -- the job function difference?

MR. COOK: Well, my job is to -- for recurrent training, what I do is I get the students, and I brief them. And I give them a four-hour simulator session reviewing maneuvers that they don't typically get to do in the aircraft. And I believe my job at the end of that period is to, One, build confidence. And Two is to make sure that they can do those maneuvers to my satisfaction.

Then a check airman has standards that the FAA sets to follow. And he grades them on some of those maneuvers.

CAPT. GOACHEE: Would it be fair to say that at American Airlines -- and this is where you've got to help me. It would be that an instructor at American Airlines does all the same type of training in the simulator that a check airman may do except maybe for proficiency checks? Is that a true statement, or not?

MR. COOK: Well, the check airman is not really there training. He's evaluating, not training.

CAPT. GOACHEE: But a check airman could do training if requested by the training department? Or do you know?

MR. COOK: We get into some union rules here.

CAPT. GOACHEE: Okay. That's -- okay. Thank you. You know what? When Dave first started asking you about being rough on the controls, I mean, initially, for the people in the simulator, I heard, 727. Did you teach in the 727 simulator?

MR. COOK: No.

CAPT. GOACHEE: So it wasn't the 727? Maybe I misheard, and it was the 757?

MR. COOK: No, sir. I -- what I'm saying is that people coming off the 727 --

CAPT. GOACHEE: Coming off the 727? Okay.

MR. COOK: -- tend to be a little bit heavier on the controls.

CAPT. GOACHEE: Okay. And then you talked about that when you're teaching for high angle, you teach ailerons and coordinated rudder. Is that a true statement?

MR. COOK: That is a true statement.

CAPT. GOACHEE: Okay. Do you teach it where that if you're in a high angle, you automatically -- at the same time you're throwing in aileron, you put the rudder in at the same time? Or is there a delay in putting in the aileron to see the response and then put in rudder?

MR. COOK: What I've found is that the natural tendency for people is to lead with aileron, yes

CAPT. GOACHEE: But now I'm just trying to understand what -- when you said you teach -- you referenced you teach aileron and coordinated rudder. Do you --

MR. COOK: That's correct.

CAPT. GOACHEE: And do you explain to them, I mean, that or -- tell me you explain that coordinated rudder with the aileron in high angles of attack.

MR. COOK: I guess I don't. I don't know how to answer your question other than --

CAPT. GOACHEE: Well --

MR. COOK: I don't go into a big discussion on how to --

CAPT. GOACHEE: Well, okay.

MR. COOK: -- how you can sense coordinated flight.

CAPT. GOACHEE: Could -- then could we talk about the -- you teach the AAMP initial course in Sim. 5, you said, correct, as far as unusual attitudes?

MR. COOK: I did teach unusual attitudes in the 75/76.

CAPT. GOACHEE: Okay. Would you explain to me how you would -- when you teach it in the first or the fifth sim. period, have you gotten them into high angles of attack for the maneuver?

MR. COOK: We've got -- get them into high deck angles.

CAPT. GOACHEE: Okay. But prior to going into that, do you do a pre-briefing --

MR. COOK: Yes.

CAPT. GOACHEE: -- because you --

MR. COOK: Yes.

CAPT. GOACHEE: Okay.

MR. COOK: Yes.

CAPT. GOACHEE: What do you explain to them when they're going to be in a nose-high attitude on how to recover, or do you tell them?

MR. COOK: We have a model airplane on a stick.

CAPT. GOACHEE: Okay.

MR. COOK: And I hold that up.

CAPT. GOACHEE: Okay.

MR. COOK: And then, as I told you, I tell them to release a little bit of back pressure. Okay? That's done on angle of attack. And then I tell them, Using coordinated aileron and rudder, lower the low wing until the nose naturally starts to fall.

CAPT. GOACHEE: But --

MR. COOK: What happens -- I'm sorry.

CAPT. GOACHEE: No. Where I'm getting confused and it's -- believe me, it's because of my lack of knowledge. And you're the expert. But if I was doing the maneuver and I'm in a high angle of attack, once I start that aileron, whether it's left or to the right, am I also at the same time -- while I'm applying the aileron, am I applying the rudder in the same direction?

MR. COOK: I think, theoretically, yes. But most pilots don't do that. Most pilots start, I feel, mainly with aileron --

CAPT. GOACHEE: Okay.

MR. COOK: -- and then follow up with rudder.

CAPT. GOACHEE: Oh. Then they follow up with it, waiting to see the response they get from the aileron?

MR. COOK: That's what happens.

CAPT. GOACHEE: And then they put in the rudder after they see the response?

MR. COOK: That's -- yes.

CAPT. GOACHEE: Okay. And then the other is -- I just want to talk a little bit about the -- this -- you're teaching the simulator. And do you teach from an approved American Airlines syllabus for training for the A-300?

MR. COOK: We have a syllabus.

CAPT. GOACHEE: And you follow that syllabus?

MR. COOK: As best I can. What happens is that occasionally, you get two first officers or you have a sim. problem or you have to repeat maneuvers. And so sometimes you get a little bit of movement, you know: I wanted to do it yesterday, but we'll do it today. I -- what I try to do, however, is only move the abnormals.

The -- and by that system, abnormals, I might want to do, for example, a cargo fire on one day, and I can't do it until the next day.

CAPT. GOACHEE: Okay. Capt. Cook, does -- do you have a --

MR. COOK: I'm not a --

CAPT. GOACHEE: -- lesson plan.

MR. COOK: I'm not a captain.

CAPT. GOACHEE: Okay. But do you have --

MR. COOK: Yes.

CAPT. GOACHEE: -- a lesson plan?

MR. COOK: Yes.

CAPT. GOACHEE: Is it a lesson plan that you developed for your instruction for transition, or is it a lesson plan provided to you by American Airlines?

MR. COOK: We have one provided by American Airlines.

CAPT. GOACHEE: And as far as you know -- and we'll stick to only sim. instructors -- does each instructor teaching a particular, whether it was recurrent or whether it was transition -- because I think you used the word, "Transition" --

MR. COOK: Right.

CAPT. GOACHEE: -- or, "Initial" -- do you all use the same lesson plan?

MR. COOK: On the Airbus?

CAPT. GOACHEE: Yes.

MR. COOK: Yes.

CAPT. GOACHEE: That's fine. That's all. Thank you.

MR. IVEY: Captain John Lauer, APA?

CAPT. LAUER: It's a pleasure meeting you again.

MR. COOK: It's good to see you, sir.

CAPT. LAUER: I'd like to visit just briefly the word that was used previously, of, Rough. And Capt. Young mentioned it, and I believe Dave mentioned it, also. I'd like to revisit it because I want to make sure that for whoever has access to and reads the transcripts of this session, there's no mistake in our definition. So with that said, I'll lead in with a couple of questions.

In your opinion, are the control feedbacks and inputs in the simulator as we would probably refer to as loading -- are they different in the simulator than that of the aircraft?

MR. COOK: That's a very difficult question for me because I don't fly the aircraft. Okay?

CAPT. LAUER: Okay.

MR. COOK: However, I don't believe they're identical. And the feedback from the line crews says they're not identical. And, certainly, the -- what you feel on your body is not identical.

CAPT. LAUER: Okay. For simplicity's sake, you work with two different groups of pilots that come through. One group of pilot could be safely categorized as a pilot who has previously experienced training in the A-300 simulator. And the second group of pilots is a group where they have never been in the A-300 simulator before; it's their first time.

MR. COOK: That's correct.

CAPT. LAUER: So we basically are working with two groups?

MR. COOK: That's correct.

CAPT. LAUER: Would it be safe to say that the pilots from the group that have had previous training in the A-300 simulator -- when they visit for recurrent training, the, quote/unquote, term, "Rough," is not nearly as pronounced in that group of pilot, as opposed to the group of pilots that have never been in the simulator before?

MR. COOK: Yes, I believe so.

CAPT. LAUER: Okay. What do you -- as a simulator instructor, what do you allow and/or provide to both groups within the first few minutes of getting into the simulator to help them acquire, quote/unquote, "The feel of the simulator"?

MR. COOK: Well, I probably did this with both of you or I hope I did, anyway. That -- I explain to you why you tend to be over-controlling and that you're not feeling everything that you're used to feeling on the airplane. And I try to get you to put less pressure on the yoke, fly with your fingertips for a moment. Okay?

And maybe I gave you the wrong impression. I attribute all this to flying the simulator. Okay? The lack of feel and the difference in -- you used the term, Control loading. The simulator -- each simulator feels a little bit different. If you went in the 75/76 simulator -- I'm sorry -- the 75 simulator, I think that you would agree that it feels a little bit more like an airplane than the older simulators.

CAPT. LAUER: After this initial period of getting the feel for the simulator -- which takes just a few minutes?

MR. COOK: Yes.

CAPT. LAUER: If we were to draw a line between that short period of time -- five or ten minutes, or whatever you've allowed -- and that of the regular session that is scheduled, if you were to then say or -- be asked, "Have you had any pilots or have you witnessed any pilots that are really rough on the controls," how would you or -- have you seen pilots that have once gotten the feel and still showed a roughness --

MR. COOK: Oh, no.

CAPT. LAUER: -- an abrupt, forceful --

MR. COOK: No. They just to over-control, especially with elevator -- well, and aileron, initially because, I believe -- my theory is that they are expecting to feel things in their seat that they're not feeling.

CAPT. LAUER: Okay.

MR. COOK: So flying the simulator is more visual, I believe, than flying the airplane; flying the airplane is certainly visual, but it's also tactile. A simulator will give you an initial feeling of movement, but it can't give you sustained G forces.

CAPT. LAUER: After this three- or four- or five-minute or ten-minute period of getting the feel, would it be safe to say that, generally speaking, the pilots are about the same in the way the approach and handle the simulator?

MR. COOK: Yes.

CAPT. LAUER: Okay.

MR. COOK: Yes.

CAPT. LAUER: That's it. That's all.

MR. COOK: Yes.

MR. IVEY: Just one follow-up question to what Capt. Lauer was asking. In your experience, have you ever seen anyone overly-aggressive on rudder, just rudder?

MR. COOK: I don't believe so. On unusual attitudes? Or --

MR. IVEY: Just as a general nature of a particular student. And perhaps unusual attitudes would be a better arena to be using rudder. But just in your experience, you haven't seen that?

MR. COOK: I don't believe that's the case, no.

MR. IVEY: Yes? Okay.

CAPT. LAUER: Could I ask one more question? Well, actually, it's two questions.

The first question is: Are you familiar with the term, "Killing snakes," in a cockpit?

MR. COOK: No.

CAPT. LAUER: Okay. It is generally referred to in some circles as a pilot just taking the controls of the aircraft and going to the stops in all attitudes. It's an old military term, but you're killing snakes. In that regard, have you ever witnessed a pilot in an upset maneuver, no matter what it is, abruptly move the controls to the stops in both directions, trying to feel for or getting the feel for the airplane?

MR. COOK: Well, I've seen them use a great deal of aileron in the roll maneuver. I don't know that it has ever hit the stops.

CAPT. LAUER: Okay.

MR. COOK: I -- that would be difficult to judge, but it does take a fairly good input to stop that roll.

CAPT. LAUER: Okay.

MR. COOK: But I've never seen it -- you know, your analogy of this type of thing, no.

CAPT. LAUER: Okay.

MR. COOK: No.

CAPT. LAUER: That's it.

MR. IVEY: Captain Ron Skupeika, Airbus?

CAPT. SKUPEIKA: Thank you.

Hello, Mike.

MR. COOK: Hello.

CAPT. SKUPEIKA: You made an excellent presentation on upset recovery with the high-nose pitch attitude. Could you enlighten us on what you basically teach the crew members on where to focus during that, or the scan process? I know you do it step by step, one, two, three. But where do you have one of them look? Inside reference, say, the PFD, or the outside reference, horizon, visually?

MR. COOK: They're on the Primary Flight Display --

CAPT. SKUPEIKA: Okay.

MR. COOK: -- the PFD.

CAPT. SKUPEIKA: And what do you have them look at or where do you look -- what are they looking at on the PFD, specifically?

MR. COOK: Well, the sky pointer.

CAPT. SKUPEIKA: Okay.

MR. COOK: And, of course, they have to determine if it's nose high, nose low or on the horizon.

CAPT. SKUPEIKA: Okay. And --

MR. COOK: And I -- I'm sorry.

CAPT. SKUPEIKA: You mentioned that in that procedure, you would teach them a coordinated recovery. Would you not agree that by looking at possibly the -- what we used to call the beta target, or trapezoidal index, they would get an indication if they were coordinated or not? Do you amplify on that, or --

MR. COOK: No, I don't.

CAPT. SKUPEIKA: Okay. So you just --

MR. COOK: I don't argue with you, but --

CAPT. SKUPEIKA: Yes.

MR. COOK: -- no, I don't --

CAPT. SKUPEIKA: Okay.

MR. COOK: -- to answer your question.

CAPT. SKUPEIKA: No problem. One other question. Now, how would you know -- since you taught the student how to recover coordinated, how would you know that he is doing a coordinated maneuver during that particular upset? How do you know since you can't see his rudder pedals?

MR. COOK: Well, I can see his legs move. I -- it's a feeling I have.

CAPT. SKUPEIKA: You just have a feeling?

MR. COOK: Yes.

CAPT. SKUPEIKA: Okay. And, last but not least, are you aware that in a 300 simulator, during that upset entry, the flight controls, especially the ailerons, are degraded? Were you aware of that?

MR. COOK: Well, as I told -- I don't know how to answer that. I am aware of what the simulator does during that maneuver.

CAPT. SKUPEIKA: Have you ever been told that this is what we have done to create this upset, by degrading the ailerons so the pilots --

MR. COOK: I don't know what's --

CAPT. SKUPEIKA: -- don't have control --

MR. COOK: I don't know what's done.

CAPT. SKUPEIKA: Okay.

That's all.

MR. IVEY: Well, is there anything you think -- in discussions around here in the academy that might help us try to determine what might have caused this accident or any thoughts that you might have regarding this accident that we might explore?

MR. COOK: I wish I could help you. No, sir.

MR. IVEY: Well, I want to thank you for coming in this afternoon and sharing all your experience. And I've certainly enjoyed working with you in the past. So --

MR. COOK: I've enjoyed you.

MR. IVEY: -- we'll conclude the interview. Thank you, very much.

(Whereupon, the witness was excused.)

MR. IVEY: Let's take a break.

(Whereupon, a short recess was taken.)

MR. IVEY: We're on the record.

EXAMINATION

**g. Captain Robert Fogel**

MR. IVEY: And if you would, please give us your full name, your position here with American and a brief history of your flying experience, total time, type ratings and your -- just the history of your aviation experience.

CAPT. FOGEL: Robert Fogel. I started flying with American Airlines in 1986, to be precise, October of '86. A civilian background -- all civilian. And I've been rated in the Beech 1900, 727 and the Airbus A-310 official rating, and have been an Airbus check airman since April of 1997.

Total time I don't recall at this point. I would be guessing, so I won't say. I do not know --

MR. IVEY: This is --

CAPT. FOGEL: -- my total at this point.

MR. IVEY: This is one of the easiest times to make as much flying time as you care to.

CAPT. FOGEL: Right. Well, I'm not going to give you a number without knowing for sure; I'd rather give you a factual number.

MR. IVEY: All right. And type ratings?

CAPT. FOGEL: Beech 1900, which is also a Super King Air 300. It's a dual, A-310,727.

MR. IVEY: And your current position with American?

CAPT. FOGEL: A-300 X-Type check airman.

MR. IVEY: And if you will, explain for me the difference between the X-Type and L-Type.

CAPT. FOGEL: The X-Type check airman works in the simulator and helps train and check transitioning pilots and already qualified line pilots. Also, X-Type does L-Type work, which involves airplane check-rides in the physical airplane and initial operating experience. L-Types basically just stick to the airplane type work, initial operating experience and check-rides.

MR. IVEY: And were you a check airman on the 727, as well?

CAPT. FOGEL: No.

MR. IVEY: And a line pilot?

CAPT. FOGEL: Line pilot?

MR. IVEY: Yes.

CAPT. FOGEL: To what?

MR. IVEY: Up until 1997.

CAPT. FOGEL: Yes, a line pilot --

MR. IVEY: Okay.

CAPT. FOGEL: -- on the 727, captain.

MR. IVEY: Yes. Did you know either the captain or the first officer that were involved in the accident?

CAPT. FOGEL: Well, do you want to -- I'm not sure -- when you say, "Know," in what regard?

MR. IVEY: Just either as a -- in a professional -- let's take the captain first. Did you ever meet the captain or were you ever aware of him --

CAPT. FOGEL: No.

MR. IVEY: -- either socially or professionally?

CAPT. FOGEL: No.

MR. IVEY: And how about the first officer?

CAPT. FOGEL: I believe I had the first officer in some sort of training capacity; I'm not sure when or what type.

MR. IVEY: A time frame? Last year, or this year?

CAPT. FOGEL: I really don't remember when it was. I -- when I saw his picture, I did put the face -- I'm sorry -- the name to the face. And I knew of him, yes. I had worked with him, but I don't remember exactly what it was.

MR. IVEY: Even whether it was in a simulator or in an actual airplane?

CAPT. FOGEL: Simulator, yes.

MR. IVEY: Oh. In the simulator?

CAPT. FOGEL: Yes.

MR. IVEY: Have you, just trying to reflect -- and I realize you have many students that come through that are pilots that you're working with in the simulator. Nothing that you're able to recollect about him in any way, shape or form when you all crossed paths -- personality or even as a pilot?

CAPT. FOGEL: No.

MR. IVEY: All right. Typically, as an X check airman, do you pick up on Simulator Period 6 and carry them through Nine as part of the training curriculum on the A-300?

CAPT. FOGEL: Yes.

MR. IVEY: And then Period 10 would be the check-ride, or is that an L -- a loft?

CAPT. FOGEL: Maneuvers validation.

MR. IVEY: Maneuvers validation is Number 10. Is there a Number 11?

CAPT. FOGEL: No. I'm sorry. Check-ride is on Ten. I'll qualify that. Line orientation evaluation is Day 10. Day 9 is maneuvers validation.

MR. IVEY: All right.

CAPT. FOGEL: Yes, sir.

MR. IVEY: And then is there an 11, where you do those loft, at all?

CAPT. FOGEL: That's on the Day 10.

MR. IVEY: All right. Thank you. We talked to one of the simulator pilots, Mr. Cook, who just preceded you. And he testified that on -- generally on Simulator Period 5, he does teach upset training according to the simulator outline and sometimes that may move a little bit, but that may be associated with either wind shear training or GPWS escape maneuver.

The next day when you -- the next day -- I'm sorry. Simulator Period 6, is there a requirement to teach unusual attitude training or advanced maneuvers of any kind in that second period?

CAPT. FOGEL: It's in our curriculum, yes.

MR. IVEY: Is that typically when you introduce the student or the pilot to that?

CAPT. FOGEL: Yes.

MR. IVEY: And in that period, what do you usually present?

CAPT. FOGEL: Well, we present what's available to us. As far as in the briefing room, we let them know what we are going to cover. And there's only two ways to introduce this type of procedure, which is a roll maneuver and/or a pitch-up maneuver.

MR. IVEY: And I think you worked with us in the simulator this morning, demonstrating some of those maneuvers. Could you just for the record explain to me what the choices are that can be introduced in the simulator?

CAPT. FOGEL: You can introduce either a pitch-up moment or a roll maneuver. Those are the two choices.

MR. IVEY: And the pitch-up maneuver does what for the pilot? How is it really introduced when you're in flight?

CAPT. FOGEL: Basically, it takes the simulator and causes the simulator or -- I should say -- the aircraft simulator to pitch up. And it is introduced -- looks to be initially by a stabilizer that's running away towards a nose-up position.

MR. IVEY: And in your experience, the initial reaction of a pilot is to do what when this maneuver's starting to occur?

CAPT. FOGEL: The initial reaction is to usually push forward on the yoke.

MR. IVEY: And then the pitch-up continues. And then what typically is the next reaction of the pilot in that maneuver?

CAPT. FOGEL: Based on what we had briefed in our briefing and as training, we encourage them to start a roll-over to help arrest the pitch so it stops becoming so aggravated.

MR. IVEY: And the roll -- how much roll is normally recommended or briefed prior?

CAPT. FOGEL: Sixty degrees is our technical target.

MR. IVEY: Target value?

CAPT. FOGEL: Yes.

MR. IVEY: And when you -- in your experience working in the simulator with -- I started to say, Real pilots. After working with us this morning, I don't want to use that as a yard-stick. But in your experience as the first countering effort with the yoke forward to stop the pitch-up, it's then followed by a roll-over.

How do you see most pilots employ the roll? Do they use rudder first? Do they use aileron first? Do they use aileron only? Or do they use rudder only?

CAPT. FOGEL: Well, they -- natural tendency for the majority is to roll with the ailerons and coordinate rudder as appropriate.

MR. IVEY: Have you seen most pilots that are in the A-300 with turn coordination and yaw dampers perform this maneuver with just ailerons only to a successful conclusion?

CAPT. FOGEL: I have on occasion. To be honest, yes, I have.

MR. IVEY: Does it seem to work better with a coordinated rudder input?

CAPT. FOGEL: Yes.

MR. IVEY: And why?

CAPT. FOGEL: I believe it to be a software issue for the simulator. I do not know why, but that's the way it seems to work better.

MR. IVEY: And then, once they achieve that bank angle, the nose then starts down through the horizon. And any other considerations while they're in this nose-high?

CAPT. FOGEL: What do you mean?

MR. IVEY: Power, for example.

CAPT. FOGEL: The tendency is to power up because of the loss of air speed, and that tends to pitch up the aircraft just a little bit more. So that may delay the -- not -- I'm not going to say delay the recovery, but add to the recovery effort. So --

MR. IVEY: Because of the pitching up moment?

CAPT. FOGEL: Correct.

MR. IVEY: Then as the nose approaches the horizon, what is the subsequent recovery procedure?

CAPT. FOGEL: As the nose starts falling through the horizon, the speed will start gaining. And then they're to slightly unload and roll wing low.

MR. IVEY: In your experience, this has already been covered, not necessarily in the very same maneuver -- I'm asking in, say, Simulator Period 5 with the simulator pilot. Are -- in your Simulator 6 period, are people pretty good at this after having had the training period the day before or the session before? Do they seem to have a pretty good recognition or cognitive skills about how to do one of these recoveries?

CAPT. FOGEL: It depends on the pilot. It -- that's a variable. It really is. It -- that's all I'll say. It depends on the pilot.

MR. IVEY: So sometimes you might have to repeat it to just -- because it's not a graded maneuver, this is something for a learning environment and, if need be, can be done over again so that the pilot or student can employ the proper recovery technique?

CAPT. FOGEL: Yes.

MR. IVEY: Have you ever had any feedback from the pilots in a de-briefing session talking about either their lack of understanding or success or failure -- any feedback that comes to mind just in the pilot group?

CAPT. FOGEL: No.

MR. IVEY: You --

CAPT. FOGEL: Not that I can recall, no.

MR. IVEY: Did they --

CAPT. FOGEL: Not for that.

MR. IVEY: -- like the training?

CAPT. FOGEL: Excuse me?

MR. IVEY: Did they like the training?

CAPT. FOGEL: Oh, yes, sir.

MR. IVEY: Any negative input you've ever received?

CAPT. FOGEL: Negative to the effect that this is a simulator. That's a very standard comment: It's not the airplane. I don't know what the airplane would ever do, nor do, you know, I hope to ever find out. However, it is a tool, and that's what the simulator's based on.

MR. IVEY: Were you aware of the software insertion to reduce roll control and/or, if it is a rudder, reduction just to enable the airplane to get into one of these attitudes?

CAPT. FOGEL: No.

MR. IVEY: Are you aware now that there may be that type of software just to enable a cracker-jack pilot to negate the effects of unusual attitude or wake turbulence encountered so that you can get into it so that he can learn?

CAPT. FOGEL: I'm aware of it now.

MR. IVEY: The -- we talked about the nose-high pitch attitude. That was one of the -- using the trim to start the maneuver. What other choices are there?

CAPT. FOGEL: Roll.

MR. IVEY: And that is set up by what manner? How does the student get into that?

CAPT. FOGEL: The instructor pushes a button on the panel that says, "Roll maneuver."

MR. IVEY: And what does that basically do?

CAPT. FOGEL: Basically, we have the student -- again, having been briefed -- and it is training -- we set them up with ATC in-trail of a role-playing scenario behind another heavy aircraft. And we ask them to start a turn and increase the separation. And we push the button, and it starts a roll.

MR. IVEY: As many times as you've employed this technique, is the intercept angle -- it's not necessarily predictable; when you press that button, you don't necessarily know what they're going to get, do you?

CAPT. FOGEL: No.

MR. IVEY: So, obviously, they don't. And is that a function of intercept angle or speed, or have you ever pushed that button where they might have had an intercept angle of 90 degrees and failed to really get an upset?

CAPT. FOGEL: I'm not following the question.

MR. IVEY: Well, I guess, really, as you say, you're trying to create an intercept angle. And this is for a learning purpose.

CAPT. FOGEL: I --

MR. IVEY: I was thinking, early on in your check airman days perhaps, when you -- when they first put this in -- there's sometimes a learning curve to say, "Well, if I had a 90-degree intercept angle to that wake turbulence," the software package may say, Well, that's not going to work too well. So --

CAPT. FOGEL: Well, you're mixing apples and oranges here. By telling me an intercept angle to a wake turbulence, you're applying a real world and an artificial world; that's not what we're doing. We're just pushing a button, and it aggravates into a roll maneuver. I can't tell you what's in the program as far as software in intercept angles; I would not know.

MR. IVEY: Sure. And I -- but I guess what I was trying to ascertain was if in fact from a simulation standpoint of trying to vector behind the airplane at a smaller than 90-degree angle -- whether that software that you've ever experienced in your own scenarios -- that I pushed it and, all of a sudden, it did not work -- it didn't work as I have seen it in the past.

CAPT. FOGEL: No.

MR. IVEY: It has always worked?

CAPT. FOGEL: Yes.

MR. IVEY: Okay. Have you ever used the enhanced GPWS maneuver, the -- I think it was called at one time, The moving mountain. Is that a correct term? Do the -- is that still employed?

CAPT. FOGEL: I can't speak for others. So I don't know.

MR. IVEY: You don't know --

CAPT. FOGEL: I only can tell you what I do.

MR. IVEY: Have you ever used the -- do you use the moving mountain? Is that a term that's used in the training department at all?

CAPT. FOGEL: That's not a term that I'm familiar with.

MR. IVEY: On the GPWS escape maneuver --

CAPT. FOGEL: Yes?

MR. IVEY: Do you ever teach that?

CAPT. FOGEL: Enhanced GPWS escape maneuver, yes.

MR. IVEY: Tell me how that operates in the simulator.

CAPT. FOGEL: Well, the -- again, this would be covered with our transition on Day 6 coupled with the unusual attitudes. Normally, we introduce it at higher elevation airports, demonstration only. And our current curriculum calls for the use at Bogota, which is a very high terrain, South America.

And, basically, what we have the students do is -- it's database predicated. So we have to make sure the airplane and FMCs are all in agreement as far as physical location on the earth. And we have them take off out of Bogota basically on a runway heading maintaining a lower altitude than the terrain. And we let them experience the warnings, the different levels -- training only.

MR. IVEY: Yes. And when that activates, what does the student have to do?

CAPT. FOGEL: Basically, the student escapes out of this maneuver. And if there's any automation on, he goes TO/GA, which advances all throttles to the maximum power setting, and disconnects the automation and pitches up to a 20-degree or greater climb attitude to escape the terrain.

MR. IVEY: We've had earlier testimony that was rather interesting in that, quite possibly, you could have the nose-high high angle of attack after one of the enhanced GPWS maneuvers. I thought that was interesting. Have you ever used that unusual attitude at the conclusion of an enhanced GPWS or escape maneuver like that?

CAPT. FOGEL: No.

MR. IVEY: In other words, you teach that -- your way of doing it is to just demonstrate that as an enhanced GPWS maneuver?

CAPT. FOGEL: One at a time.

MR. IVEY: On Day 6 in the simulator, how many unusual attitudes do you normally demonstrate for the student to participate in or set up for him to participate in?

CAPT. FOGEL: It depends on the student.

MR. IVEY: In other words, if he gets it right on the first, say, nose-high, then you don't have to worry about a nose-low or a roll maneuver or rudder hard over or anything of that nature?

CAPT. FOGEL: They'll experience one of each.

MR. IVEY: So they'll get a nose-high and a nose-low or nose-high and rudder hard over or --

CAPT. FOGEL: He'll experience the pitch-up maneuver. Then he'll experience the roll maneuver.

MR. IVEY: All right.

CAPT. FOGEL: Or she.

MR. IVEY: In your experience seeing the pilots come through, frequently, infrequently, never or always does the symbol generator sometimes disappear in one of these recoveries?

CAPT. FOGEL: One of the recoveries? Are you specifically relating to the roll?

MR. IVEY: Roll would be a good one. That probably is more significant, yes.

CAPT. FOGEL: I would say, average, frequently.

MR. IVEY: And what does the pilot do to overcome that situation?

CAPT. FOGEL: Well, there's two things he could do. One is -- if he doesn't gain it back by his excessive roll rate, he can look at the stand-by attitude indicator, which is always available, or decrease the roll.

MR. IVEY: In your training, say, in the briefing before the simulator, in discussions of unusual attitude recovery, do you teach or brief, I should say, to look outside, or do you teach to look at a particular instrument or set of instruments to help in the recovery?

CAPT. FOGEL: Instruments.

MR. IVEY: Instruments? Which ones?

CAPT. FOGEL: Which one are you talking about?

MR. IVEY: Well, I guess, if it was unknown to me that it was going to happen, I would certainly need to -- I need to know what to look at -- whether it was going to be nose-high or a roll environment, I would think he would have to use the same thing in each case. Wouldn't he?

CAPT. FOGEL: Yes, he would. It just depends because of the blanking out. We would have pre-briefed on the stand-by attitude. That's why I asked.

MR. IVEY: I see.

CAPT. FOGEL: But our pilots would primarily focus on the Primary Flight Display.

MR. IVEY: Have -- in your experience -- and this is kind of an opinion I'm asking for. If someone looks out the horizon and they've got a good day and they can see out the horizon, do you think a pilot would use outside references first?

And let's use this in terms of our accident. Here we are, at 2,800 feet. It's day time. It's VFR. There seems to be a discernible horizon. Would you expect the pilot if he got into an unusual attitude to perhaps go outside for recovery, or do you think he would use the PFD?

CAPT. FOGEL: I have no idea.

MR. IVEY: What would you do?

CAPT. FOGEL: Both.

MR. IVEY: Which do you think you would go for first?

CAPT. FOGEL: I would cross-check in and out, like I always do. So if I keep to the way I fly, that's probably what I would do just to verify my senses. But that's me.

MR. IVEY: Well, we're --

CAPT. FOGEL: And that's what you asked me.

MR. IVEY: That's right. That's why I asked for an opinion. Have you ever had the opportunity to observe someone in the simulator using the outside reference in the sim., as opposed to -- purely as a recovery method, using outside, as opposed to using either both the PFD and outside or totally PFD? Have you ever tried that with somebody to say, Let's see what the difference looks like?

CAPT. FOGEL: No, I have not.

MR. IVEY: Because I think, often times, in my experience in the past, check airmen are always trying to learn from students. And I think you -- the more you teach, the more you learn and the more you'll see interactions and differences in people. That's why I asked the question.

CAPT. FOGEL: It's hard on the visual in that simulator based on some of the environments we put it in to get a good, distinct visual.

MR. IVEY: Yes.

CAPT. FOGEL: It -- that's probably why most of us don't have that opportunity.

MR. IVEY: Have you heard any discussions about either the captain or the first officer since the accident regarding any information you think would be valuable to us to determine their abilities --

CAPT. FOGEL: No.

MR. IVEY: -- or some of their successes and failures in flying in the past?

CAPT. FOGEL: No. I have not heard.

MR. IVEY: Well, what I'd like to do -- thank you for answering my questions. I'd like to run around the room here, and I'll start with Dr. Bart Elias from the NTSB.

DR. ELIAS: Okay. Just a few quick questions. And the -- one goes back, I think, a few questions to what Dave was asking about: Outside reference, versus inside reference. When you execute these unusual attitudes in the simulator, what are the visual conditions that you do them under?

CAPT. FOGEL: Normally, IMC.

DR. ELIAS: So it's normally IMC; you don't typically do it under VMC conditions?

CAPT. FOGEL: Normally, IMC.

DR. ELIAS: Let me change gears then, and I'll ask you another question here. Do you get much opportunity to fly the actual airplane?

CAPT. FOGEL: Periodically, yes.

DR. ELIAS: Okay. And understanding that when you're in the actual airplane, you're not bringing in the regimes of unusual attitudes as you do in the simulator, but in terms of roll control and aileron effectiveness, how would you compare the simulator to the actual airplane?

CAPT. FOGEL: Again, the simulator is a tool that gets a pilot prepared to fly the aircraft. Between the two, the airplane is much more responsive in my opinion.

DR. ELIAS: Okay. And then the same question regarding rudder effectiveness and rudder control in the airplane versus simulator?

CAPT. FOGEL: Well, I normally don't -- well, I wouldn't -- that one's hard to compare because, you know, we're not stomping on the rudder.

DR. ELIAS: Right.

CAPT. FOGEL: So that is -- you know, unless it's a -- and I'm not going to say stomp, but -- I shouldn't use that phrase. We're not using it unless it's a coordinated issue on most approaches, i. e. -- for cross-wind landings and things like that is really where we're doing it. Otherwise, their feet are resting for lightly coordinated turns.

DR. ELIAS: What about using the rudder in terms of ground handling? Is -- can you make the comparison there?

CAPT. FOGEL: Yes, I can. It's pretty close. There's more feel in the airplane. There's more feel as far as taxiing. Is that what you're asking?

DR. ELIAS: Yes.

CAPT. FOGEL: Taxiing the airplane?

DR. ELIAS: Yes, exactly.

CAPT. FOGEL: Yes. It's -- because we have some interlinks, yes, there's a little bit more sensitivity and feel --

DR. ELIAS: So --

CAPT. FOGEL: -- in the aircraft.

DR. ELIAS: -- would you say it would be better feel in the actual airplane --

CAPT. FOGEL: Absolutely.

DR. ELIAS: -- as compared to the simulator?

CAPT. FOGEL: Yes.

DR. ELIAS: Okay. Let me just double-check, but I think that's all the questions I have.

(Pause.)

DR. ELIAS: I have just one more question. Are you familiar with the concept of cross-over angle attack or cross-over air speed?

CAPT. FOGEL: No.

DR. ELIAS: No? So that's not a concept that you introduce --

CAPT. FOGEL: Oh, no.

DR. ELIAS: -- in the simulator?

CAPT. FOGEL: I have no idea.

DR. ELIAS: Okay. Thank you.

MR. IVEY: Captain Guy Arondel, BEA?

CAPT. ARONDEL: Yes. Thank you.

I understood you flew an A-310.

CAPT. FOGEL: No.

CAPT. ARONDEL: No?

CAPT. FOGEL: I'm sorry. The rating is issued as an A-310 --

CAPT. ARONDEL: I --

CAPT. FOGEL: -- on our license.

CAPT. ARONDEL: On my -- I remember that in the A-310 series, pitch moment is very important with a variation of thrust. And is it the same on the A-300, and, if so, what is the impact with the upset recover maneuver there?

CAPT. FOGEL: I have no idea.

CAPT. ARONDEL: No?

CAPT. FOGEL: I've never flown the A-310.

CAPT. ARONDEL: And is it -- is there a pitch moment important in the A-300 that's accepted?

CAPT. FOGEL: I'm sorry? I don't understand the question.

CAPT. ARONDEL: On -- is there a very important pitch moment with a thrust variation?

CAPT. FOGEL: Yes. Power is pitch, if that's what you're asking me. You add power, your pitch will rise.

CAPT. ARONDEL: Yes.

CAPT. FOGEL: You decrease power, your pitch will fall. Is that what you're asking?

CAPT. ARONDEL: Yes, sir.

CAPT. FOGEL: Yes, it's important.

CAPT. ARONDEL: And what is the impact on the upset recovery maneuver?

CAPT. FOGEL: I have never been in the airplane with a pitch-up moment, so I don't know what the impact would be. I can only tell you what it does, as you know.

CAPT. ARONDEL: Thank you.

MR. IVEY: Captain Delvin Young, American Airlines?

CAPT. YOUNG: You mentioned that you were a check airman and all of that. Are you an FAA-designated evaluator?

CAPT. FOGEL: Yes.

CAPT. YOUNG: On the A-300?

CAPT. FOGEL: Yes.

CAPT. YOUNG: Okay. Have you ever seen a pilot use a rudder without using any other flight controls, i. e., aileron or anything, on a maneuver in, in particular, upset training, either a nose-high or a nose-low?

CAPT. FOGEL: No.

CAPT. YOUNG: In general, what would be the control that you think most pilots use first for recoveries from these that you've seen?

CAPT. FOGEL: They would roll first with the ailerons.

CAPT. YOUNG: Okay. That's all.

That's all I have.

MR. IVEY: Captain Jim Goachee, FAA?

CAPT. GOACHEE: So you're a designee in the A-300. How long have you been a designee?

CAPT. FOGEL: (No response.)

CAPT. GOACHEE: Approximately --

CAPT. FOGEL: Well, hang on.

CAPT. GOACHEE: -- you know?

CAPT. FOGEL: Give me a second. I have a good memory, but it's short. December '98.

CAPT. GOACHEE: Okay. So have you ever worked with the APM for the A-300?

CAPT. FOGEL: Can you qualify that?

CAPT. GOACHEE: Well, I mean has he ever observed you giving check-rides?

CAPT. FOGEL: Yes.

CAPT. GOACHEE: And could you -- do you remember the last time you were observed by the APM giving a check-ride?

CAPT. FOGEL: Yes.

CAPT. GOACHEE: Could you tell me what that was and when that was?

CAPT. FOGEL: It was within the last month.

CAPT. GOACHEE: Okay.

CAPT. FOGEL: I don't have the exact date, though.

CAPT. GOACHEE: Oh. Well, we don't need that.

CAPT. FOGEL: Okay.

CAPT. GOACHEE: Okay. What about the POI? Have you ever had any contact with the POI?

CAPT. FOGEL: No.

CAPT. GOACHEE: Okay. I'm sure it -- and I may not know American procedures. So -- but the question usually is that the APM will work through the carrier. The carrier will provide all the training and the checking. Have you ever given the APM any type of training -- initial training, you know, transition training, AAMP training -- that you can recall?

CAPT. FOGEL: I've given the APM that's currently on the Airbus re-qualification training.

CAPT. GOACHEE: Okay. And would -- could you amplify for me re-qualification training?

CAPT. FOGEL: It would be very similar to transition training.

CAPT. GOACHEE: Okay. And what was -- did it include the AAMP program?

CAPT. FOGEL: I believe it did --

CAPT. GOACHEE: Okay.

CAPT. FOGEL: -- yes.

CAPT. GOACHEE: And, Rob, did he -- after being exposed to that for the re-qualification, did he ever make any remarks to you about that portion of the training --

CAPT. FOGEL: I --

CAPT. GOACHEE: -- that you can recall?

CAPT. FOGEL: I do not recall.

CAPT. GOACHEE: Okay. Has the -- how often do you on the A-300, anyway, as check airman, do you have flight standards meetings? Is it once a month, or is it every quarter?

CAPT. FOGEL: Flight standards duties? Is that what you said?

CAPT. GOACHEE: Well, for check airman.

CAPT. FOGEL: Right. Once every couple of months.

CAPT. GOACHEE: Okay. Does the APM come to those meetings quite frequently?

CAPT. FOGEL: Oh, I'm sorry. Did you say, Meetings?

CAPT. GOACHEE: Yes. In other words, don't you have check airman --

CAPT. FOGEL: Flight standards meetings, once a quarter.

CAPT. GOACHEE: Okay. Once a quarter?

CAPT. FOGEL: Yes. I --

CAPT. GOACHEE: Okay.

CAPT. FOGEL: I thought you said something else. I'm sorry.

CAPT. GOACHEE: And during those meetings, does the APM attend most of the time?

CAPT. FOGEL: Normally --

CAPT. GOACHEE: Okay.

CAPT. FOGEL: -- yes.

CAPT. GOACHEE: Good. Have you ever seen the POI there at that meeting?

CAPT. FOGEL: I do not recall.

CAPT. GOACHEE: Okay. Help me out a little bit on -- and the nomenclature may be a little different because of the airline. But do you have on the A-300 a simulator instructor's manual or something like that?

CAPT. FOGEL: Well, you need to be more definitive on that question.

CAPT. GOACHEE: Well --

CAPT. FOGEL: Are you talking about to operate the simulator, or are you talking about --

CAPT. GOACHEE: No.

CAPT. FOGEL: -- instructor check airman guide?

CAPT. GOACHEE: A guide, a procedure. A guide.

CAPT. FOGEL: Yes.

CAPT. GOACHEE: And is it just -- is that manual or procedure guide the same for all the check airmen on the A-300?

CAPT. FOGEL: I believe so, yes.

CAPT. GOACHEE: Okay. And then, when you -- I think you said that you work through Day 6 to Day 10 or Sim. 6 to Sim. 10, or whatever it is. Is -- that's correct?

CAPT. FOGEL: Well, I don't do -- me personally? Are you asking me --

CAPT. GOACHEE: Yes.

CAPT. FOGEL: -- personally?

CAPT. GOACHEE: Yes.

CAPT. FOGEL: I don't do those as much any more. Those are called --

CAPT. GOACHEE: Because you're --

CAPT. FOGEL: -- transition keys. Because of being a designee --

CAPT. GOACHEE: -- a designee?

CAPT. FOGEL: That's correct.

CAPT. GOACHEE: Then let's --

CAPT. FOGEL: But I used to do them.

CAPT. GOACHEE: Okay. Then let's go back --

CAPT. FOGEL: Yes.

CAPT. GOACHEE: But you've been -- I think you told me, since '98 or something, you've been a designee. So it has been awhile?

CAPT. FOGEL: Yes.

CAPT. GOACHEE: So let's see if you can remember a little bit.

CAPT. FOGEL: Okay.

CAPT. GOACHEE: Is that -- when you did the training -- and because I'm really not familiar with the AQP program of American, you may have to help me. But when I come in for Period, say, 6, you know, you'll probably have several pages of what is going to be taught during that period. Correct?

CAPT. FOGEL: Yes.

CAPT. GOACHEE: And then there -- are there other guidelines that -- do you pretty much have to follow the guidelines in Sim. 6, or can you change any of the required maneuvers that are scheduled for that day?

CAPT. FOGEL: Well, I'm sorry. What do you mean by, Change?

CAPT. GOACHEE: In other words, let's say that you were going to be -- you were -- it's the first day and you're just going to be doing approaches and air work and the next day was scheduled maybe Category 2 or 3 approaches. Can you interchange and, say, for Sim. 6, pick some, I mean, areas of airmanship that you would like to see, versus what's in your lesson manual?

CAPT. FOGEL: Well, I don't change anything. I stick to the profile of what's published. And what's published is Day 6 maneuvers as far as the curriculum goes --

CAPT. GOACHEE: Okay. You follow --

CAPT. FOGEL: -- and Day 7 and Day 8. Yes, I --

CAPT. GOACHEE: Okay. You follow the curriculum?

CAPT. FOGEL: -- follow the course guidelines.

CAPT. GOACHEE: Okay. Good. And in that procedure guide, is there hints for you to be able to discover if someone's having a problem with any type of maneuver?

And the problem -- I don't want to narrow it down because, you know, there's so many different things that you do. But is the lesson plan helpful for you to pick out that a pilot had maybe problems with a certain maneuver and you can point out the weaknesses and show him how to do it correctly?

CAPT. FOGEL: Yes.

CAPT. GOACHEE: Okay. Good. That's all.

Personally for you, because I know it has been five years that you've been -- I think you said five years as a --

CAPT. FOGEL: This April, yes --

CAPT. GOACHEE: Okay.

CAPT. FOGEL: -- five years.

CAPT. GOACHEE: So -- but you went through the check airman AAMP program. Correct?

CAPT. FOGEL: Well, I went through an AAMP, but, yes, it was through that check airman training, sure.

CAPT. GOACHEE: Okay. But it was strictly for check airmen?

CAPT. FOGEL: I don't recall having it strictly for check airmen. What we had was an AST, which is Advanced Simulation Training, but I don't recall that. I mean it's --

CAPT. GOACHEE: Okay.

CAPT. FOGEL: -- again, five years almost. So --

CAPT. GOACHEE: Yes. But then help me out with this advanced simulator training. Was that --

CAPT. FOGEL: That's for check airman.

CAPT. GOACHEE: Okay. So it is a check airman function?

CAPT. FOGEL: Correct.

CAPT. GOACHEE: And that's when you probably would have had it, five years ago. Was anything covered in that training, if you can remember, versus what is being taught to the student today? I mean, were you given additional information to help you teach that course, or was it pretty much the way it's laid out or being taught today?

CAPT. FOGEL: Consistent to today.

CAPT. GOACHEE: Okay. So you weren't given anything additional that --

CAPT. FOGEL: I do not recall.

CAPT. GOACHEE: Okay. Good. And that's all. Thank you.

MR. IVEY: Captain John Lauer?

CAPT. LAUER: Yes, just to follow up on this, only because I'm aware of it.

Do the check -- was the AST a one-time sim. when you went through your check airman training, or do you get it other times, too?

CAPT. FOGEL: No. It's a recurrent for check airman. It's a -- on a recurrent cycle.

CAPT. LAUER: Okay. So the AST sim. is something above and beyond the normal recurrent training, but the check airmen get it at the recurrent training cycle?

CAPT. FOGEL: The check airmen get it every current training cycle. It's only check airmen.

CAPT. LAUER: Okay.

CAPT. GOACHEE: Could I just ask one question because of this? It will be short.

MR. IVEY: Go ahead, Jim.

CAPT. GOACHEE: Is the -- but then I have to go back. If you can remember, Rob, is that -- it was my understanding that when the program started, the AAMP program was initially taught to only check airmen. So that's the reason why I asked you. Did you receive that type training, or was it prior to you becoming a check airman? Because you were right in the range of '96 that you probably were a check airman?

CAPT. FOGEL: '97 --

CAPT. GOACHEE: '97?

CAPT. FOGEL: -- April.

CAPT. GOACHEE: Okay.

CAPT. FOGEL: I recall, as a first officer on the Airbus, having received this training as a line pilot.

CAPT. GOACHEE: Okay. But when you -- does American only use a -- captains as check airmen --

CAPT. FOGEL: Yes.

CAPT. GOACHEE: -- or can you be a first officer at American?

CAPT. FOGEL: No -- well, yes. Captains --

CAPT. GOACHEE: Okay.

CAPT. FOGEL: -- as check airmen, yes.

CAPT. GOACHEE: Okay. So, yet, you had the AAMP program as a first officer?

CAPT. FOGEL: I remember that, yes.

CAPT. GOACHEE: Okay. But did you also have an additional training period as a check airman for AAMP, if you can remember?

CAPT. FOGEL: I don't remember. But it -- again, it was for the check airman. It was probably, if I remember right, conducted during the AST portion of the check airman --

CAPT. GOACHEE: Okay. Good enough.

CAPT. FOGEL: -- in transition.

CAPT. GOACHEE: Thank you.

MR. IVEY: All right. Now we'll turn to Captain John Lauer.

CAPT. LAUER: Thank you, Rob. I've just got a couple of questions. And focus on the fidelity of the simulator. Over the years, as you have conducted your sessions, and of the numerous approaches that you have witnessed, whether it has been in VMC conditions that you have set up or in IMC conditions, either on a Cat. 1 or a Cat. 2 or 3 scenario, as a pilot approaches the airport, have you witnessed or noted a difference in the sensitivity of the rudder given -- when you may have set up, let's say, a cross-wind condition, have you noticed a sensitivity to the rudder compared to the real aircraft?

CAPT. FOGEL: I really don't know. I mean I -- that's not in my sensory to compare. I mean I don't fly it that often, as far as either simulator or aircraft, enough to where there's a sensory to answer your question.

CAPT. LAUER: Have you had to comment to a pilot flying or brief the pilot flying that he or she should be careful with rudder management in a cross-wind environment approaching the runway because of the fidelity of the simulator as compared to a real aircraft?

CAPT. FOGEL: That comment would be if it was made under certain conditions in cross-wind on visual VMC on a Day 6-type thing, where we institute some cross-wind landings, to help the pilots, yes, if they need it. But I can't say every pilot needs that because most of them that come through the program understand it and the wide-body concept and the kicking out of the crab technique, per se, on a cross-wind. So it's on a pilot-by-pilot basis.

CAPT. LAUER: Have you ever witnessed a pilot inadvertently or accidentally or deliberately, for that matter, inputting an excessive amount of rudder to de-crab?

CAPT. FOGEL: Not that I ever recall, no. If anything, a little bit more might have been needed to help blow from the center line. But no, not excessive. No.

CAPT. LAUER: Would it be fair to say that -- of all the pilots that you can remember, would it be fair to say that as a general rule, pilots would tend to not use enough rudder than what a condition may call for to be used?

CAPT. FOGEL: Well, that's kind of -- again, that's a pilot-by-pilot basis. And I can't recall saying, you know, that that would be the standard, no. I would have to say that there are some that would put in the correct amount and maybe some might need a little bit more.  So that -- again, I cannot recall.

CAPT. LAUER:  Okay.  Would it be fair then to say the majority are either attaining the desired results or not meeting the needed rudder required more so than, let's say, the number of pilots that would inadvertently apply too much and then have to back off?

CAPT. FOGEL:  I would say the majority meet the required results overall.  And then whatever instructional is needed as far as inputs are minimal.

CAPT. LAUER:  Thank you, Rob.  I appreciate it.

MR. IVEY:  Captain Ron Skupeika from Airbus?

CAPT. SKUPEIKA:  Thank you.

Captain Bob, I notice that in your Simulator A-300, your tiller wheel was missing on the FO side.  Is that standard in the aircraft, also?

CAPT. FOGEL:  Yes.

CAPT. SKUPEIKA:  Why is that?

CAPT. FOGEL:  Ask management.

CAPT. SKUPEIKA:  Okay.  Is there any procedures that you guys have in case of a captain incapacitation on taxiing in or out?

CAPT. FOGEL:  Not that I'm aware of.

CAPT. SKUPEIKA:  Okay.  That's all I've got.  Thank you.

MR. IVEY:  One last question, and then we'll conclude.  Has the FAA been in the simulator in the last few weeks with you or any of the check airmen, to your knowledge, concerning this accident?

CAPT. FOGEL: Oh, I have no idea. Not with me. Only for my re-qual. for APD, but not -- nothing concerning this. I would not know.

MR. IVEY: All right. So you haven't heard of either the POI or the APM associated with either of --

CAPT. FOGEL: Nobody has told me.

MR. IVEY: All right. Okay. And based on, obviously, your limited knowledge of this accident, is there anything you think we should be looking at or you would offer as a suggestion to us to explore that might help solve this accident?

CAPT. FOGEL: I'm not an engineer; I'm a pilot. And I can only tell you what I feel. Flight control surfaces don't fall off airplanes. That's my opinion.

MR. IVEY: Thank you for that. Has there been any feeling among the pilots in the academy that are moving in and out of here -- any discussions that they had concerns about -- regarding this airplane and this accident?

CAPT. FOGEL: Yes.

MR. IVEY: How about enumerating some of that for me?

CAPT. FOGEL: I can't. I'm not speaking for people. They can speak for themselves. I'm not privy to their insight. But you hear others, other fleets -- other pilots from other fleets talking. So -- and it is evident. So to answer your question, yes, but I wouldn't know what they're saying.

MR. IVEY: All right. Well, thank you, very much.

This will conclude the interview.

(Whereupon, at 4:00 p.m., these interviews were concluded.)

## 27. Volume III

BEFORE THE

NATIONAL TRANSPORTATION SAFETY BOARD

DFW INTERVIEWS ON
AA 587

VOLUME III Room F107

American Airlines Flight
Training Academy
4601 Highway 360
Fort Worth, Texas

Thursday,
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The interviews resumed at 7:30 a.m.

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P R O C E E D I N G S

**h. Captain Robert W. Reid**

EXAMINATION

MR. IVEY: If you wouldn't mind, please state your name and your aviation experience, a little history about that; flying experience, type ratings, position with American Airlines.

CAPT. REID: Okay. My name is Robert W. Reid. I started flying in the Marine Corps; flew F4s and A4s primarily.

Came on American in '85. Was a flight engineer on a 727; moved to the right seat for two or three years, and went to the 76 International right seat; flew Europe out of Kennedy; upgraded to the F100 left seat around '91 for about eight years.

Somewhere around '95 or '96, I became an L-type check airman on that airplane. And about 2-1/2 years ago, I came to the Airbus as a X-type check airman.

So I have a flight engineer's rating. I'm rated on the 767, the F100, and the Airbus.

MR. IVEY: And total flying time?

CAPT. REID: I have 3,000 military hours. I don't know what I have with American.

MR. IVEY: This is the easiest time in the world to make time. We're just curious for estimates.

CAPT. REID: Yes. Yes. Probably 10- or 12,000 hours.

MR. IVEY: That's fine. Could you estimate how much Airbus-time you might have?

CAPT. REID: It's in the hundreds. I'm not sure.

MR. IVEY: And you checked out as -- it's all captain time on the Airbus?

CAPT. REID: Well, sometimes as a check airman I sit in the right seat.

MR. IVEY: And you've been flying the Airbus- -- you may have said that. I'm sorry. I didn't catch when you checked out in the Airbus.

CAPT. REID: Two years ago October.

MR. IVEY: All right. And your current position is check airman here working in the training academy or -- CAPT. REID: That's correct.

MR. IVEY: Did you know the accident Captain?

CAPT. REID: Evidently I did, but I don't recall.

MR. IVEY: Apparently, looking through records, you may have administered a check ride or some sort of training. Have you been able to determine at least when your paths did cross?

CAPT. REID: I was told that I did his last recurrent training, but I don't remember the event.

MR. IVEY: Or him either?

CAPT. REID: That's correct.

MR. IVEY: Is that typically a situation where if someone is average or above average that they're usually not a notable individual as opposed to someone that might be remembered for either totally outstanding performance or totally substandard performance?

CAPT. REID: I think the ones that you remember the most are the ones that are below average, because you have to do some extra work and you have to do a little more paperwork.

MR. IVEY: Sure. So you really don't even recall having seen his face, perhaps in pictures or something like that?

CAPT. REID: No.

MR. IVEY: All right. Did you know the accident first officer?

CAPT. REID: No.

MR. IVEY: Did not? And how long have you been doing check airman activities on the Airbus, about the same amount of time?

CAPT. REID: It'll be two years ago this March that I finished my check-out as a check airman.

MR. IVEY: Uh-huh. And the total amount of check airman time, has it been continuous, once you entered the check airman program, as you changed airplanes?

CAPT. REID: Yes.

MR. IVEY: When did you first become a check airman?

CAPT. REID: It was probably 1996 plus or minus a year. I'm not sure exactly.

MR. IVEY: That's fine. And that started on the 767?

CAPT. REID: That started on the F100.

MR. IVEY: F100? So you've really been a check airman on the F100 and the Airbus?

CAPT. REID: That's correct.

MR. IVEY: And as a check airman you received specialized training in order to become a check airman?

CAPT. REID: Yes.

MR. IVEY: Did you receive specialized training in the simulator and how to operate the simulator?

CAPT. REID: Yes.

MR. IVEY: In that training do you also receive a check airman or an instructor handbook that provides you guidance, outlines, on how to teach students? Is there such a document?

CAPT. REID: There is an instructor handbook. Yes. And I did receive it.

MR. IVEY: And the instructor handbook, is it generic in nature about teaching, how to teach, or is it more specific in nature? And let's use the Airbus as an example, that it says, This is what you should be teaching on Day 1, Day 2, Day 3, this sort of thing?

CAPT. REID: It's a syllabus more than a technique book.

MR. IVEY: So the syllabus basically spells out the course outline on each day?

CAPT. REID: Yes.

MR. IVEY: And that's what the check airman uses? Was there ever a generalized teaching handbook for check airmen to learn how to teach students, in other words, the whole theory of teaching as a check airman as opposed to the specifics of various airplanes?

CAPT. REID: Not that I'm aware of.

MR. IVEY: All right. Did you receive any specialized training on the upset maneuvers training, the AAMP program?

CAPT. REID: Yes.

MR. IVEY: Was that dedicated to check airmen, or was that dedicated to all the pilots, in which you fell, in that training?

CAPT. REID: All the pilots get the training. The check airmen get just a little bit more time on it, maybe go into a little bit more, you know, a little more difficulty. But it's all the same.

MR. IVEY: Uh-huh. But when you took this, and I want to use the term specialized training, because you went through it more as a check airman as opposed to sitting in the audience with all the pilots?

CAPT. REID: No. My initial training was as one of the pilots.

MR. IVEY: Uh-huh. And then, there was additional training in that upset maneuvering program?

CAPT. REID: When you become part of the check airmen ranks, and when you go for your recurrent training, you get an extra period, in which case at which time you can explore the envelope a little further, not only in the upset maneuvers, but also in wind shear and, you know, whatever.

MR. IVEY: We've heard in earlier testimony that there are various scenarios that you are able to employ to use as entries for upset maneuvering. When you're working with a student, what procedure do you use to enable a student to get into, say, a nose-high recovery?

CAPT. REID: Are you asking about the scenario I set up or the buttons that I push?

MR. IVEY: Well, that's a good point. I guess the scenario would be nice to see, because I think for the student and for us, too, to learn how it might be set up from your technique. I think that would be interesting.

CAPT. REID: What I'd do is, we were taking off from Mexico City. We had done a ground escape maneuver using the terrain they run to the southwest of Mexico City. When they recover from that, they're around 15,000 feet, about 220 knots.

I keep them slow. We do a little maneuvering, explore how the airplane maneuvers at that speed using the ailerons, and then, if you tried to do a coordinated turn to show that the rudder will help you.

And then, following that, I vector them in behind a Lufthansa 747 for a return for landing. And then I give them the unusual attitudes. You know, in our simulator we select AAMP, which brings up a page, and you have the roll maneuver and the pitch maneuver.

And I'll give them one, and when they recover from that and get back to 15,000 feet, about 240 knots, I'll give them the other one.

MR. IVEY: The other one, is that a button, also?

CAPT. REID: Yes. Yes.

MR. IVEY: The first button is for wake turbulence, and then, the second button does --

CAPT. REID: Well, they're both supposedly from wake turbulence, you know, just to give them mind-set that, you know, you can maybe expect a little something. What actually -- well, what is it that you're looking for?

MR. IVEY: I was curious. You said that you used, 220, 230 knots, and that wake turbulence behind the Lufthansa, then, once they recovered from that, then you would give them the other --

CAPT. REID: Yes. They're still behind the Lufthansa.

MR. IVEY: Does one produce a nose-low and the other produce a nose-high?

CAPT. REID: Yes.

MR. IVEY: I see.

CAPT. REID: Yes.

MR. IVEY: In other words, it's two different buttons?

CAPT. REID: Right.

MR. IVEY: That's a tough day coming out of Mexico City, isn't it?

CAPT. REID: Yes, it is. Yes. We get a lot of X's filled there.

MR. IVEY: Yes. The demonstration that you show there at 220 knots, help me understand what you go through there and what the student will observe and learn.

CAPT. REID: Well, at that speed -- and we're very heavy, because we're doing max weights out of Mexico City, it's a max weight, runway limited demonstration.

So they're very heavy, they're at about 15,000 feet, somewhere around 220, because they're right above the barber pole at that point, so it's a relatively slow, high angle attack situation.

And typically in these big airplanes you don't use the rudders very much when you're flying it, because the yaw dampers and/or the autopilot will do it for you.

So now I have him hand flying, and I just have him roll into a 30-degree angle turn, using the ailerons only, and then reverse it back the other way, and then do the same thing with just a little bit of rudder, to consciously make a coordinated turn just to show the difference.

And it is subtle, but the airplane does roll a little more crisply when you use a little bit of rudder.

MR. IVEY: When you use just the ailerons, what's noticeable? This is interesting.

CAPT. REID: Well, the airplane being slow and heavy, it's just a little bit of wallow to it, you know. It's back towards the barber pole, it's not the heart of the envelope.

MR. IVEY: And just for our understanding, barber pole is the --

CAPT. REID: Stick shaker.

MR. IVEY: Stick shaker?

CAPT. REID: Yes.

MR. IVEY: Thank you. And when you then start using aileron -- I mean rudder as a supplement, or coordinated rudder, I think was what you said --

CAPT. REID: Yes. Right.

MR. IVEY: -- that it's a more crisp turn?

CAPT. REID: Right. Right. Right. But it's not obvious? I mean, I have to point it out to them and make them try and really notice the difference. And there is a subtle difference.

MR. IVEY: Uh-huh. When you use the term, coordinated rudder, how is that -- what does that mean on the Airbus? How do you do that? Just the term, coordinated rudder.

CAPT. REID: Well, the displays, we have a little index on our PFD, on our attitude indicator; it's a slip index. And if you don't use it, then it will show that you're in a little bit of a slip. So a coordinated rudder would be just to keep the index lined up and not generate any slip.

MR. IVEY: In your first demonstration you're able to look at that tetrahedron? Is that --

CAPT. REID: Well, the triangle. Yes.

MR. IVEY: The triangle? And if you're just using aileron only, then do you point that out to the student, that there's the slip index? Does that show noticeably just in aileron only?

CAPT. REID: I don't point that out to the student. I'm mostly telling them to feel it.

MR. IVEY: Yes. So that basically is the coordination of rudder right there, by using that slip index?

CAPT. REID: Yes.

MR. IVEY: When you're at those high weights at around 220, I think you it was, you said 220, 230 --

CAPT. REID: Right.

MR. IVEY: -- when you get into that wake turbulence encounter --

CAPT. REID: On weight turbulence I speed them up to about 250.

MR. IVEY: Does the syllabus have anything for you to -- I'm bouncing back for a moment to prior to entering the simulator now. Forgive me.

In the briefing aspect of preparation for simulator, is there anything specific that you cover with the students related to upset maneuvers, use of flight controls during recovery?

CAPT. REID: We do brief the maneuvers. Yes.

MR. IVEY: And the maneuvers are not specifically what they're going to enter, but the maneuvers of nose-high recovery, nose-low recovery --

CAPT. REID: Yes.

MR. IVEY: -- or do you say, Well, it's going to be a wake turbulence that's going to roll you over and --

CAPT. REID: Well, we'll talk about unusual attitudes, nose-high and nose-low.

MR. IVEY: Are these -- the guidelines that you have for teaching the student those recoveries, is there anything spelled out in that syllabus or lesson plan telling you what you're supposed to teach the students, or is that pretty much left up to you and what you have experienced or learned?

CAPT. REID: It tells us that we need to do the unusual attitudes. And the briefing that we give, you know, we've researched with our flight manuals.

MR. IVEY: Uh-huh. You've been doing this, as I say, two years on the Airbus and since about '96. Just to compare for a moment the F100 to the Airbus, any differences in recovery on an F100? I'm talking about transport category airplane, not the real F100.

CAPT. REID: Right.

MR. IVEY: Any differences in those recoveries or even simulation modeling?

CAPT. REID: Well, I've got a lot more experience in the simulator with the Airbus, because I'm an X-type. On the F100 I was an L-type, so I only went in the simulator for my own recurring.

But I don't -- I mean, we do everything exactly the same company-wide on all the fleets. I don't know of any -- there aren't any differences in procedure between the F100 and the Airbus. The Airbus is just a bigger hunk of metal with a lot more inertia in it.

MR. IVEY: Yes. The modality of simulation -- granted, you came back every six months or, if you were under AQP, perhaps every year. Any -- just looking back across what you've done, any modality differences between the two airplanes, one better than the other or --

CAPT. REID: I don't -- can't think of any difference. Of course, you never actually do them in the airplane, so whether the simulator is exactly like the airplane in either case, I don't know.

MR. IVEY: All right. In terms of the airplane itself when you go out and fly the airplane and then you work in the simulator -- I presume you principally fly the airplane in line operations, you don't get involved in any of the Tulsa activities or --

CAPT. REID: That's correct.

MR. IVEY: -- get out there with empty airplanes -- does the airplane resemble pretty much the simulation?

CAPT. REID: Yes, it does.

MR. IVEY: Even the inertias you use, do you get the same inertial sense in the simulator that you do in the real airplane?

CAPT. REID: I think so. Yes. There's always a discussion about whether the ailerons are as sensitive or not as sensitive, but it's just a tweaking. I think basically it's pretty good.

MR. IVEY: Uh-huh. But that's been the age-old comment between paychecks and simulators.

CAPT. REID: Yes.

MR. IVEY: I don't know which one is talked more. But --

Has there been any changes to the upset maneuvering program handed down to you by upper management, your bosses?

CAPT. REID: No.

MR. IVEY: It's been pretty much consistent from Day 1?

CAPT. REID: Yes.

MR. IVEY: What feedback do you get from the pilots regarding that maneuvers training?

CAPT. REID: Most of the time, none, because we've done it for a number of years now, and they've learned it. So we do it. It's another chance for them to see an airplane upside down, you know, which is certainly not something they're going to see in line operations.

But they usually don't comment on it because it's something they've gotten used to on the simulator.

MR. IVEY: Is there ever enough time at the end of a simulator period to where -- or a training cycle where a pilot is offered the opportunity to choose what he would like to do in the simulator, with time permitting?

CAPT. REID: Now there is. Under our new program, there is. And that's been very well received.

MR. IVEY: Really? What is the new program?

CAPT. REID: What do we call the new program. 9 and 18 we call it. Right? Now we come back every nine months. And when we're done with all the training, we still have two hours of sim time. And with that two hours of sim time we can do whatever we want. And that's been the best thing that the guys have ever seen.

MR. IVEY: They can get another look at something that they'd like to either practice or see or just --

CAPT. REID: Yes.

MR. IVEY: -- a little more proficiency?

CAPT. REID: Yes. And it's relaxed, it's not jeopardy time. They can see something, they can screw it up, they can do it a second time. If they don't have anything that they want to see, then we usually have a few items that we'll be more than willing to show them. It's been great.

MR. IVEY: When did this start?

CAPT. REID: September, I think.

MR. IVEY: September?

CAPT. REID: Is that right, Delvin?

MR. IVEY: Did it add an additional simulator period in this training cycle, or what freed up that extra two hours or created the two hours?

CAPT. REID: Well, I didn't design it. I really don't know. But it does give them I think 33 percent more simulator time or --

MR. IVEY: Thirty-three percent more simulator?

CAPT. REID: Something like that. Delvin knows. I don't know. They get more simulator time, and we have a free period. That's the bottom line, and the guys love it.

MR. IVEY: Has there ever been any requests -- granted, it's only been in place now three months or thereabouts -- any requests so far for upset maneuver repeats?

CAPT. REID: No.

MR. IVEY: What typically are some of the things that they like to repeat, just as an insight?

CAPT. REID: They like to see things like jammed stabilizers, runaway trims. We've been doing pressurization problems because of the incident we had in Miami. We might do an engine fire routine because of the loop design on this airplane.

MR. IVEY: You mentioned jam stabilizer and said runaway trim. Those don't -- is it more just to become a little more familiar with the procedure or just to get the feeling of this airplane?

CAPT. REID: Just the feeling of it.

MR. IVEY: Those don't ever end up -- of course, you never know. You know, as a check airman you can see it all. But have you had any in the short duration that's ended up becoming an upset maneuver recovery?

CAPT. REID: I haven't, but I've heard of other check airmen who have had some wild rides.

MR. IVEY: Uh-huh. It's interesting. Just as you described, here's an opportunity to really -- if it developed into that sort of a wild ride, to use that term, in discussions with check airmen, did the training kick in for those fellows if they needed to --

And I'm not suggesting that it turned into an upset; maybe it did, maybe it didn't. But if it did, did that training kick in to effectively recover that airplane? Did you ever have those discussions?

CAPT. REID: I don't have firsthand knowledge of it, because that hasn't happened in my simulator. What I understand is if they give the right scenario on short final, the airplane goes nose down. So they show that, show what happens, and then they back them out and show them what they can do about.

MR. IVEY: Yes. That was a little different.

Every now and then, I presume, check airmen have the opportunity to be in the simulator just to practice on their own and perhaps develop other ideas or see something that they've had in discussions just to learn more. As an instructor and as a teacher you learn far more than the student as you teach, and I think your depth of knowledge certainly increases.

Have you ever gotten into the simulator to try unusual attitude recoveries using just rudder or just aileron or some of the other techniques of recovery?

CAPT. REID: We would always just follow the procedures in our manual.

MR. IVEY: Have you seen a student use a wrong recovery technique to amplify the situation as opposed to saving it?

CAPT. REID: No.

MR. IVEY: Outside of engine failures, is there any other area or maneuvers that require use of large inputs of rudder?

CAPT. REID: No.

MR. IVEY: Captain Reid, I'm going to run around the table here. Thank you for your comments.

CAPT. REID: Okay.

MR. IVEY: Let's see if anyone has any other questions they would like to ask. And I'll start with Dr. Bart Elias.

DR. ELIAS: Okay. Just a few quick questions. You've flown a few different airplane types, including the F100 and the 767, in addition to the A300. And I just wanted to get your sense of if there's any unique handling characteristics of the A300 in comparison to those other airplanes.

CAPT. REID: Well, the biggest thing about the A300 is, you know, it has a hard wing and it's susceptible to a rough ride. Other than that, it's a good, honest airplane.

DR. ELIAS: Just going back for a second, you mentioned that you had, according to the records, given the accident captain his last recurrent check. Had you ever crossed paths with the accident first officer?

CAPT. REID: No.

DR. ELIAS: And another question: In terms of your observations as a check airman, have you ever seen students that, in terms of either the air work you were talking about earlier in terms of low air speed maneuvering or in the upset recoveries, use too much rudder?

CAPT. REID: No. I don't think so. Maybe on the maneuver one they might kick in just a little too much but bring it out. But not really. No.

DR. ELIAS: Are you familiar with the term, crossover angle of attack crossover air speed?

CAPT. REID: Maybe as another -- I don't know.

DR. ELIAS: As it relates to rudder effectiveness for controlling roll, that control?

CAPT. REID: I think we -- back in the fighter community, but we might have had another term for it, not on the ~~Airbus~~.

DR. ELIAS: But it's safe to say, then, that that's not something you use an explanation or term that you introduce --

CAPT. REID: No.

DR. ELIAS: -- in training when you're talking about the use of rudder at high angle of attack?

CAPT. REID: No.

DR. ELIAS: Okay. Those are all the questions I have. Thanks.

MR. IVEY: Thank you. Captain Guy Arondel from BEA.

CAPT. ARONDEL: No questions.

MR. IVEY: Thank you. Captain Delvin Young, American.

CAPT. YOUNG: I guess I'll just roll through this. In your time in the Airbus have you ever been in wake turbulence?

CAPT. REID: Yes.

CAPT. YOUNG: But was it ever any length of time?

CAPT. REID: No. It's usually just a second or two.

CAPT. YOUNG: Yes. When you were in that, did you ever have the need for a lot of rudder?

CAPT. REID: No. Usually you just ride it out.

CAPT. YOUNG: Yes. Okay. Have you ever been in any kind of airplane, really, kind of I guess since you've been here at American, not in the sim -- I mean we know you use rudder in the sim sometimes.

CAPT. REID: Right.

CAPT. YOUNG: But have you ever been in a situation where you needed a lot of rudder, i.e., take the rudder to the stops or whatever in the airplane?

CAPT. REID: No.

CAPT. YOUNG: That's all I have. Thanks.

MR. IVEY: Captain Jim Goachee, FAA.

CAPT. GOACHEE: Two years as a check-type on the A300. Correct?

CAPT. REID: Right.

CAPT. GOACHEE: Do you remember who observed you for your initial check airman observation?

CAPT. REID: FAA.

CAPT. GOACHEE: Would you happen to know if it was just an FAA inspector that was qualified on the A300, or was it your APM for the A300?

CAPT. REID: It was my APM for the A300, Ed Garrett.

CAPT. GOACHEE: Ed Garrett?

CAPT. REID: Yes.

CAPT. GOACHEE: And he is still the APM?

CAPT. REID: Yes, he is.

CAPT. GOACHEE: Have you had dealings with Ed on occasions?

CAPT. REID: On occasions. Yes. He comes into the sim.

CAPT. GOACHEE: Does he come in to observe you in training?

CAPT. REID: Yes. He has come -- he has observed me while I've undergone my training. Yes. And then -- but I don't know if he has observed me doing the training since that time.

CAPT. GOACHEE: So two years ago he observed you?

CAPT. REID: Right.

CAPT. GOACHEE: But does he give you an annual check, or have you had -- when was your last annual check as a check airman? Do you recall?

CAPT. REID: Well, Bob Fogel was in with me just a couple months -- just last December.

CAPT. GOACHEE: Okay. Have you ever worked with the APM as far as observing him fly the aircraft?

CAPT. REID: No.

CAPT. GOACHEE: Have you ever done any training to the APM as far as the AAMP program or initial training, transition training, recurrent training?

CAPT. REID: No.

CAPT. GOACHEE: And I understand that you occasionally, whether it's monthly or quarterly, you have check airman meetings. Is that correct?

CAPT. REID: That's correct.

CAPT. GOACHEE: And at those meetings does anyone from the FAA participate?

CAPT. REID: Yes. Ed Garrett participates in some of those when he's available.

CAPT. GOACHEE: So if he's available he comes? Since your experience for two years, is it a pretty regular basis except when he's not available for other duties, or do you happen to know that?

CAPT. REID: I don't know. I really haven't kept track of that. I know I've seen him at the meetings.

CAPT. GOACHEE: Okay. That's fine. That's fine. I'd like to go back to the -- Dave asked you about this training and the AAMP training, was it the same for pilots as it was for check airmen? And I think I wrote down here that you get a little extra, and I thought I might have written down details or something.

Could you explain to me, if you could, and if you can remember, when you initially went through the AAMP program, and then, when you went through the AAMP program as a check airman, what did you mean about you got a little extra?

CAPT. REID: Well, when we go through as a check airman, we do the same training periods that regular pilots do, and then we get one additional period.

During that one additional period, we might explore or we might do wind shear cranked up to a higher degree, or we might do approaches to lower minimums. You know, whatever we do, we'll probably do it, you know to a little tighter constraints.

CAPT. GOACHEE: But --

CAPT. REID: It might not be the AAMP, or it might be the AAMP. You know, it's just whatever the guy running the sim period chooses.

CAPT. GOACHEE: Okay. Good. So I have written down that you get an extra period and you explore the envelope. So it may or may not be the AAMP program, it may be something that the check airman that gives you the training --

CAPT. REID: Right.

CAPT. GOACHEE: -- decides, or probably asks you, What would you like to explore?

As we get into that, and especially with the terminology, explore the envelope, if you get into these nose-high and nose-low maneuvers for your unusual attitude, do you know what type of G loads that the aircraft or the simulators experience when you get into those maneuvers?

CAPT. REID: No.

CAPT. GOACHEE: Have you ever been told, or do you have any way of knowing?

CAPT. REID: No.

CAPT. GOACHEE: Have -- and you have to help me out here in reference to the AQP, because I'm really not familiar with American's. But I understand there's really no failures, it's training to proficiency, so to speak. Is that a fair statement?

CAPT. REID: Right.

CAPT. GOACHEE: And you get -- is it -- when they come back every nine months now, I think you told me you have to do the maneuvers, and then at the end, if everything goes good, they've got like two hours of free time to explore?

CAPT. REID: That's correct.

CAPT. GOACHEE: But is it one or two periods that they come back for during that every nine months? Is it they come in for one period and you do everything, or is it over a two or three-day period and they get two or three simulator periods?

CAPT. REID: It's a two-day period. They get a four-hour period in the simulator with a simulator pilot who is not a line pilot with American. And then they get a four-hour period with a check airman. And the first two hours is their evaluation, and the second two hours is a free period.

CAPT. GOACHEE: Okay. So it would be fair to say that the instructor pilot -- and you're not an instructor pilot -- would give them like a warm-up and get them in tune to the simulator in preparation for your evaluation the next day?

CAPT. REID: Yes.

CAPT. GOACHEE: Okay. Since you have been doing this in the last several years, I take it that you -- at the same time you're checking the captain, does the first officer also have to demonstrate to you during that period his proficiency?

CAPT. REID: Yes.

CAPT. GOACHEE: So that four-hour period is divided between the captain and the first officer?

CAPT. REID: That's correct.

CAPT. GOACHEE: In this two-year period have you yourself had, I don't want to call them failures, but requested additional simulator time because you were unable to get the pilot up to the standards of American Airlines?

CAPT. REID: Yes.

CAPT. GOACHEE: Is that -- can you tell me if -- I mean, how often that happens?

CAPT. REID: I haven't really kept track. You know, most of the guys are fine and come prepared. And occasionally you get someone who just needs a little more training.

CAPT. GOACHEE: Okay. And I wrote down -- I mean, so -- and I'm sorry, Bob, if I'm going back. But this personal time without the student, explain to me what that is. Is that the one we were talking about previously about the extra time?

CAPT. REID: Personal time without the student?

CAPT. GOACHEE: Yes. I have written down like you -- oh. No. I'm sorry. You know, some times that you'll be scheduled, you know, say for, you're going to check John, say today at two o'clock, and he heard he was going to have you, and he called in sick or something. So at the last minute somebody calls in sick.

But at that time it's too late to schedule another pilot, so really there are good chances that that simulator would be free, and you are already here, say at the building for the training.

Do you ever go in yourself in the simulator and fly it around, just yourself because the period is free?

CAPT. REID: It occasionally happens.

CAPT. GOACHEE: Yes. And if you did that, or if you have done it -- and I know it's not on a regular basis, and I know all this stuff is tight, but -- and there again, you usually may not have a first officer in there or someone acting as a first officer.

But if you go in there, is it just regular -- do you just make regular approaches and steep turns or stalls? And I know it's kind of hard.

I don't know if you have -- do you have boxes next to the captain or the first officer when you're a check airman to push buttons or do you just, when you are a check airman you just stand back and program the computer screen?

CAPT. REID: So you're saying if I'm in there practicing?

CAPT. GOACHEE: Yes.

CAPT. REID: If I'm in there practicing?

CAPT. GOACHEE: Yes.

CAPT. REID: The only time I'm ever doing it, there's another check airman. We only had had one student, so the period ended early, and so the student left. And he and I went back in, and we each did an engine out.

CAPT. GOACHEE: Okay. All right. And my last question -- sorry, Bob --

CAPT. REID: That's all right.

CAPT. GOACHEE: -- is that, you know, we've been having discussion with a lot of the check airmen. And I would like for you to be able to tell me, reference the feel in the simulator or the response that you get in the simulator versus your experience on the aircraft and how it relates.

And we're talking the normal envelope. We're not talking outside of the envelope where it's just a recovery.

But could you explain to me, do you think in the normal envelope, in the normal maneuvers that you teach for initial training and recurrent training, does the simulator respond fairly closely to the aircraft?

CAPT. REID: I think it responds fairly closely, but the ailerons are more sensitive on the simulator than they are in the aircraft, is my feeling.

CAPT. GOACHEE: Have you -- I want to skip ahead, and then I'm going to come back. Do you -- said your next type you do initial IOE?

CAPT. REID: Yes.

CAPT. GOACHEE: And that's just initial operating experience for the reporter. But so when they get their type ready, and now they come out on the line, and it's going to be their first time flying the aircraft. Is that correct?

CAPT. REID: That's correct.

CAPT. GOACHEE: And most likely there are going to be passengers in the back?

CAPT. REID: That's correct.

CAPT. GOACHEE: So I know you go through a briefing and everything. We're not going to talk about that.

But once you've done your, say your normal briefing, especially for someone it's going to be their first takeoff and first landing, give me a feel of -- I mean, pilots, I mean after you've talked to them, they've come from the simulator, do you see any problem from that pilot transitioning from the simulator to the aircraft in reference to the response of the aircraft?

CAPT. REID: No.

CAPT. GOACHEE: Okay. So even though you're saying there might be just a little bit in the ailerons as far as it may be lighter in the simulator --

CAPT. REID: Well, if it was the other way around they might have trouble.

CAPT. GOACHEE: Yes. But you don't have that there?

CAPT. REID: No.

CAPT. GOACHEE: And once again, so as far as you're concerned, I mean, you have no problem that when you observe -- you're not a designee, are you?

CAPT. REID: No.

CAPT. GOACHEE: Okay. But let's give you a hypothetical, and let's say you were a designee, because there's not much difference between a designee and a check airman anyway. Correct? Except one will put his signature on a certificate.

But you judge the pilot on the same standards that designee would if they were giving a rating. Right?

CAPT. REID: Right.

CAPT. GOACHEE: Would that be a correct statement? Would you -- do you feel that if you were a designee that you would have no problem signing a certificate, knowing full well that the pilot, the first time he leaves that simulator and goes in the aircraft, he's going to have passengers back there?

CAPT. REID: I would not have a problem signing it. No.

CAPT. GOACHEE: You would not have a problem? Okay. That's it.

MR. IVEY: Thank you. Captain John Lauer, APA.

CAPT. LAUER: Bob, earlier -- I can't remember which of the gentlemen here may have asked or generated the question -- but you had responded and made a statement saying, After demonstrating the difference between an aileron turn versus a rudder turn and indicating that the turn is more crisp with a rudder coordinated turn.

Have you witnessed or noticed any pilots utilizing and/or augmenting their control inputs with additional rudder after this demonstration?

CAPT. REID: No.

CAPT. LAUER: Is that because they did not believe the demonstration was credible, or was it just that they don't feel that the additional use of the rudder is required?

CAPT. REID: Well, it's because they don't normally fly the airplane at 220 knots at 15,000 feet at 320,000 pounds. You know, it's an unusual situation that we put them in, right above the barber pole, to show that at high angle of attack, slow speeds, the rudder will help you turn.

CAPT. LAUER: Okay. A little bit later you had made comment that the Airbus, out of design, gives you a rough ride. Is, quote, unquote, the term "rough ride" as you mention it, is this due to the dynamic forces applied on the wings of this aircraft or is it due to pilot input?

CAPT. REID: Well, it's not due to pilot input. But I'm not an engineer or anything, so I don't know otherwise.

CAPT. LAUER: So it has nothing to do with the pilot manipulating the controls --

CAPT. REID: No.

CAPT. LAUER: -- in a manner that would give you this, quote, unquote, "rough ride"?

CAPT. REID: No.

CAPT. LAUER: Okay. You had indicated that you had had an encounter with wake turbulence in this aircraft. Have you had more than one encounter?

CAPT. REID: An encounter with wake turbulence isn't all that unusual. And I probably have. You know, it's not something you keep track of or score of.

CAPT. LAUER: Do you recall a wake turbulence event, do you recall the dynamics, the response of what the aircraft did or how it behaved from the beginning of the event and as it was spit out?

CAPT. REID: I know don't if I can describe it, but I know when I'm in it. You can tell the difference between wake turbulence and other turbulence. Wake turbulence just has a different feel to it.

CAPT. LAUER: There is a distinct difference between that of clear air turbulence versus wake turbulence?

CAPT. REID: Yes.

CAPT. LAUER: If -- I'd like to center on wake turbulence. In your opinion, does the aircraft, though it may transmit different sensations to you between the two, does the aircraft behave differently? Is there more of a roll moment or a pitch moment between the two events?

CAPT. REID: In the wake turbulence it tends to be more roll.

CAPT. LAUER: Do you recall, in your experience, do you recall about how much the aircraft would have rolled?

CAPT. REID: Not a large amount. I wouldn't put a number on it, but it would not be 30 degrees, I mean, it would be five, ten degrees. I don't know.

CAPT. LAUER: Do you recall any kind of a yaw moment being induced?

CAPT. REID: I don't recall.

CAPT. LAUER: In this event -- or earlier you described that generally you just ride it out to go from the beginning to the end of the event.

In this event, do you remember if you ever had an inclination or a desire to want to control the aircraft, either through aileron and/or through rudder because the aircraft abruptly started to change either pitch or roll moments?

CAPT. REID: You certainly have an inclination to, but it's primarily aileron. If the autopilot is on, you know, guys just grab the yoke in case the autopilot clicks off. I don't think I see anybody stick a bunch of rudder in there.

CAPT. LAUER: So you've never stepped on a rudder anticipating or trying to straighten out a yaw moment in the aircraft --

CAPT. REID: No. Usually it's --

CAPT. LAUER: -- in a wake turbulence event?

CAPT. REID: No. Usually if you do respond, it's with aileron, usually.

CAPT. LAUER: Have you ever -- as a captain, obviously you have first officers sitting to your right. Have you ever witnessed a first officer manipulating or inputting aileron or rudder in response to these events?

CAPT. REID: Definitely aileron. I don't recall any rudder inputs.

CAPT. LAUER: In your opinion, with the first officers that you have flown with, if you were to generally categorize the use of the rudder by these pilots, would you say that the majority of the use of the rudder is such that they are applying the measured amount of rudder required for the event or they are falling short of utilizing the rudder enough versus over-utilizing the rudder?

CAPT. REID: The tendency is to under-utilize the rudder.

CAPT. LAUER: Okay. I think that's all I have to say. Thank you very much.

CAPT. REID: Yes.

CAPT. LAUER: Appreciate it.

MR. IVEY: Captain Ron Skupeika, Airbus.

CAPT. SKUPEIKA: Hi, Captain Reid.

CAPT. REID: Hi.

CAPT. SKUPEIKA: Referencing the Airbus, in an everyday scenario, normal conditions, does the aircraft coordinate its turns automatically?

CAPT. REID: When you're hand-flying, it does coordinate them. When the autopilot is flying, it does not utilize the rudder --

CAPT. SKUPEIKA: Okay.

CAPT. REID: -- it's my understanding.

CAPT. SKUPEIKA: Is there something called rudder limiting?

CAPT. REID: Oh, yes.

CAPT. SKUPEIKA: What does that do for us?

CAPT. REID: Restricts the amount of rudder authority as the air speed increases.

CAPT. SKUPEIKA: Okay. Is there something called yaw dampening?

CAPT. REID: Yes.

CAPT. SKUPEIKA: What does that do for us?

CAPT. REID: That just is an automatic flight augmentation system that helps dampen out yaw oscillations.

CAPT. SKUPEIKA: Would it be safe to say that this is a manufacturer's maybe protection or automation to help the pilot or to be used as a tool?

CAPT. REID: Which one, the yaw damper or the --

CAPT. SKUPEIKA: Say all three: turn coordination, rudder limiting, yaw dampening. And if so, is it transparent to the pilot?

CAPT. REID: I think it's transparent to the pilot. I mean, don't know the engineers' reasons for doing it. I think the rudder limiter is probably the most obvious.

CAPT. SKUPEIKA: Okay. If the airplane coordinates its turns, and in the scenario you were talking about earlier with the high pitch attitude in Mexico, why do you really want to fight or go against the automation, you might say, if I might use that term? Why do you want to train that? What's the purpose of it?

CAPT. REID: Just to show them that sometimes you need a little bit more. You know, we tend to fly without using the rudder because of the augmentation, and there are sometimes when you need a little bit more. And that's just an unusual situation that we put them in just to demonstrate it.

CAPT. SKUPEIKA: Okay. Do you know of any manufacturer that trains that way other than the airlines' training?

CAPT. REID: I don't know anything about anybody's training.

CAPT. SKUPEIKA: Okay. That's all I have.

MR. IVEY: Thank you.

I've got one question. On taxi out, when you're doing control checks in the airplane, have you ever had the opportunity to take the ailerons and do a rapid reversal to feel the resistance in control wheel compared to doing a normal control wheel right, full left, at a slower rate of speed?

Have you ever noticed any -- have you ever tried that? And if you have, have you ever noticed any difference in the way the control wheel feels?

CAPT. REID: I don't think we've ever thought about trying it at different speeds, just hit the edges of the authority.

MR. IVEY: Uh-huh. And in relationship to the rudder, typically a captain does a rudder check taxiing out. Sometimes or other you may have done it quicker than at another time -- and I'm just talking about frequency here, is what I'm trying to get to.

If you do it slowly, of course, the hydraulic pressures are sitting there, and they're kind of working with you. But if you were to put in a sudden rudder check real fast, have you ever noticed any differences in what the rudder pedals are giving you as tactile information?

CAPT. REID: I've never tried to do it very quickly.

MR. IVEY: All right. Delvin, I think you had one last question?

CAPT. YOUNG: I did, just to follow up on Ron's question kind of. You had said that sometimes you need a little rudder. How do you know that? If the automation works and stuff, how do you know you need a little more or a little rudder, as you said?

CAPT. REID: The only time you know it probably is by looking at the slip index, because we never fly the airplane in the part of the envelope where we do our demonstrations.

CAPT. YOUNG: Right. I understand. Okay.

CAPT. REID: So other than that, the only time we'd ever know is the slip index.

CAPT. YOUNG: Okay.

MR. IVEY: Thank you, Captain Reid, for being in this morning. And this will conclude the interview. (The hearing was concluded.

(Whereupon, the witness was excused.)

EXAMINATION

**i. Walter Marvin Goff**

MR. IVEY: Good morning. I want to thank you for joining us today, Walt. And if you would, just by way of introduction, please give us your full name and your present position and a little history on aviation background to include flight time, type ratings, that sort of thing.

MR. GOFF: I'm Walter Marvin Goff. I've been with American Airlines about 13-1/2 years, been on the bus about 11-1/2 years.

Prior to coming with American, I was in the Air Force 24 years. I flew one, two, and four engines, jets, props, turboprops, and helicopter gun ships.

MR. IVEY: Any type ratings?

MR. GOFF: C47 and A320.

MR. IVEY: And total flying time?

MR. GOFF: Probably about 7,500 hours.

MR. IVEY: In the Airbus, any actual flying time?

MR. GOFF: No.

MR. IVEY: And your present position with American Airlines?

MR. GOFF: Simulator pilot instructor, or pilot simulator instructor.

MR. IVEY: And you've done that for 11-1/2 years with American?

MR. GOFF: Yes.

MR. IVEY: Okay. Did you know the accident captain?

MR. GOFF: I realized I knew him when I saw his picture in the paper. And I had him for a student, but I don't know when, or for what session I don't know.

MR. IVEY: If he had been your student he would have been going through the simulator program, I guess, or it could have been in warm-up for an annual check ride, too --

MR. GOFF: Right. Either --

MR. IVEY: -- either/or?

MR. GOFF: -- a recurrent or a transition program. I have no idea which one it was.

MR. IVEY: Just do not remember him at all?

MR. GOFF: No.

MR. IVEY: Did you know the accident first officer?

MR. GOFF: He looked a little familiar, but I'm not sure about him.

MR. IVEY: In the same way, just --

MR. GOFF: Right.

MR. IVEY: Have there been any comments regarding either the captain or first officer since the accident down here at the training academy relating to anything personal about either of these individuals that you've been made aware of?

MR. GOFF: None that I know of.

MR. IVEY: You mentioned an A320 rating.

MR. GOFF: I'm sorry. 310.

MR. IVEY: A310?

MR. GOFF: Sorry.

MR. IVEY: All right. Thank you. Did you receive that training here?

MR. GOFF: Yes.

MR. IVEY: And did you receive it through an FAA representative or --

MR. GOFF: Yes.

MR. IVEY: FAA?

MR. GOFF: Well, I guess it was a designee. I think it was a designee.

MR. IVEY: And that entire 11-1/2 years has been on the A300?

MR. GOFF: Yes.

MR. IVEY: Are you the most senior A300 sim pilot here?

MR. GOFF: I've been on it the longest, but I'm not the most senior in our union.

MR. IVEY: From 11-1/2 years ago, to look back, you've got pretty significant history in terms of watching the evolution of training from the sim pilot perspective. Give me an overview as to some of the significant changes that have come through in the simulator training in that 11-1/2 years.

MR. GOFF: Probably the AAMP program; we didn't have that to start with. We started doing that I don't know how many years ago. The -- I can't think of anything really significant other than that.

MR. IVEY: Has it been the same simulator the whole time?

MR. GOFF: Yes.

MR. IVEY: Do you ever get informed or made aware of simulator software package changes? Is that anything that you deal with?

MR. GOFF: No.

MR. IVEY: Regarding the AAMP program, when did you receive that kind of training, at the onset of when it first was developed, or was it at a later date?

MR. GOFF: Yes. When they first started it, we attended two classes on it.

MR. IVEY: Did you ever receive any simulator training yourself to show how to demonstrate or perform or to even recover from some of these maneuvers?

MR. GOFF: Yes. I believe we did.

MR. IVEY: Do you know who gave you that training?

MR. GOFF: No. I don't remember.

MR. IVEY: I know you're looking back quite a few years.

With that in place since perhaps about 1995 or 1996, you've had the opportunity in the A300 to demonstrate upset maneuvers training?

MR. GOFF: Yes.

MR. IVEY: Is that typically in Period 5?

MR. GOFF: In the transition course it is. Yes.

MR. IVEY: Is there usually just one segment allotted to that, or is there more than two periods? In other words, you mentioned transition. I suppose in initial it may fit in a different location or --

MR. GOFF: Yes. Someone initially coming on to the Airbus, initial transition into the Airbus will get it. Yes. It's generally on Day 5. And that's the only day that we do it. And of course we do it when they come back for recurrent training.

MR. IVEY: What is -- we've covered the nose-high and nose-low aspects of that kind of training. Do you ever use a technique to demonstrate flight control usage prior to upset maneuver training, in other words, the effectiveness of aileron versus the effectiveness of rudder or the combination thereof?

MR. GOFF: Usually I believe it's Day 1 of the transition program, we go -- while we're on our way to altitude we'll let the people see how it flies at a slow flight opposed to stall type of thing and how it reacts at altitude with the ailerons and rudders and the inputs on it.

MR. IVEY: In your experience, which is significant, this slow flight, what are you able to demonstrate? Do you demonstrate aileron control only, coordinated, rudder only, just to show the differences, or is there anything there that you use as a teaching tool or teaching guide to show the students the differences?

MR. GOFF: Yes. Usually it's, you know, you let them turn it with the ailerons, and then they add some rudder and see how the coordinated flight is much easier, better, and smoother and everything. It's, you know, just a simple thing, not to go back to basic flying, but just to show them how the thing feels and how it reacts.

MR. IVEY: You mentioned the term, coordinated flight. How -- if you're using just ailerons is there some indication that shows it's uncoordinated?

MR. GOFF: Well, on most airplanes there's a needle and ball, and on this one there's a trapezoid, and it slides out to one way or the other if you're not in coordinated flight. So the simple way is to step on the trapezoid and push it back under the little triangle above it for coordinated flight.

MR. IVEY: Does -- rudder usage, is that a noticeable thing among students in the Airbus? Do you see a lot of rudder usage or excessive rudder usage or average rudder usage, or do you find that most pilots use less rudder than perhaps they would ever typically need?

MR. GOFF: I'd say it's just normal rudder usage. Of course, the first time they have an engine failure, you have to remind them that they've got to come in with quite a bit more rudder because of the underslung engine and the power in the running engine. So that's probably the biggest time, the biggest change of rudder.

MR. IVEY: Have you ever seen in upset maneuver training excessive use of rudder by a student?

MR. GOFF: No. I -- well, no, I haven't.

MR. IVEY: Would you say it would -- is it fair to say that they'd probably use less rudder than they would more rudder as a general rule?

MR. GOFF: I'd say as a general rule they probably usually need a little more rudder. They start in with the aileron, and the rudder catches up a little bit later generally.

MR. IVEY: In the simulator, when you're doing a on-the-ground during taxi and you're doing the control checks, aileron and rudder, elevator, too, for that matter --

I realize you don't fly the airplane, but if you're doing a slow aileron check, flight controls feel smooth, the pressure that's built into the simulator gives a certain input -- I'm sure you're totally familiar with all three of these inputs.

And what I'm trying to understand is, if you were to increase this frequency, do a rapid reversal of aileron or an exaggerated control column sweep or rapid rudder reversal, have you ever felt any of the inputs that are in the pedals or in the aileron -- let's use those two as opposed to the control column -- is there a different feel?

MR. GOFF: I don't recall. I don't know.

MR. IVEY: And that's on the ground. When you're airborne in the simulator, I don't know if you -- have you ever had a sensation that the control system is giving you feedback, basically saying, All right, slow down a little bit, or air loads, it could be software? And of course we're talking simulator, we're not talking real airplane here.

I'm just trying to get a sense if you've ever experienced any different kind of control feedback through more rapid control response than through normal, slow, coordinated typical airline kind of flying. Have you noticed that in the simulator at all?

MR. GOFF: I haven't noticed.

MR. IVEY: Okay. Thank you. Since the events of September 11 last year, have any of the students come in and talked to you about -- during training about how they would like to handle the situation as it relates to a hijacker or an intruder, about getting them off their feet or trying to produce some sort of a maneuver that would disable someone that was trying to come in through the cockpit door, any discussions of that nature --

MR. GOFF: No.

MR. IVEY: -- people with their own individual scenarios?

MR. GOFF: No.

MR. IVEY: Has there been any discussion by management to get a common strategy, if you will, to ensure that all pilots have the same proper approach to flying that airplane and to not have these individual ideas out there? Have you been in contact with anything of that nature?

MR. GOFF: No, I haven't.

MR. IVEY: Regarding upset maneuver training, nose-high and/or nose-low, have you ever had an opportunity to see a student over-correct through use of rudder in an attempt to do a recovery?

MR. GOFF: No. When I've seen a problem, it's been not enough rudder, just trying to do it all with ailerons. I've not seen anybody use excessive rudder.

MR. IVEY: I started to say, after eleven years of training, you've seen it all. It's bound to go from one end to the other.

MR. GOFF: A few.

MR. IVEY: Have there been any comments or questions posed to you by the students that have come in or the pilots that have come in regarding questions related to this accident, that they thought you might be able to help them understand about certain systems or procedures or flight characteristics, any discussions that you've had in light of the accident?

MR. GOFF: No.

MR. IVEY: Do you ever, when you're flying the simulator for demonstration purposes, do you ever get any sensation or feedback through rudder pedals from any inputs that may be derived through software or any other reason, autopilot or anything you feel in rudder pedals?

MR. GOFF: No.

MR. IVEY: In that approach to -- and I'm trying to understand, too -- if you get into the buffeting for approach to stall practice, does that have a sensation in the rudder at all?

MR. GOFF: Sensation, a kicking, a fluttering --

MR. IVEY: Yes.

MR. GOFF: -- or something like that? Not that I recall.

MR. IVEY: Has the AAMP program changed in its development or its presentation since its initial development in any significant or even minor ways?

MR. GOFF: No.

MR. IVEY: The procedures have remained intact ever since about '95 or '96, when its been in there?

MR. GOFF: Yes.

MR. IVEY: There have been no major changes?

In terms of upset maneuver training, what would you say is the biggest problem that students encounter if they're -- out of all the things that are done by them, what's the biggest problem that they have in upset maneuver training?

MR. GOFF: The only problem I've seen is people try to turn the wrong way, they misinterpret once in a great while. And it's not a big problem. It's just maybe two or three times a year I see a guy try to turn the wrong way to make his recovery.

MR. IVEY: Is that usually because they're in that inverted attitude?

MR. GOFF: Right.

MR. IVEY: And that's the one that becomes more the source of confusion?

MR. GOFF: Right.

MR. IVEY: Uh-huh. That's not typically a problem if you're in the blue-side up regime somewhere?

MR. GOFF: Not usually. No.

MR. IVEY: In the training is it taught to look to outside references, or what guidelines do you give students, Look outside the windshield, look at your PFD, look at what?

MR. GOFF: Well, usually the visual is going to be probably close to dark anyway, and they're not going to get much out of that, because usually we're going to have the weather set so they won't have any visual cues out there. So usually it's done on the instruments.

And if they're upset and they go upside down and the airplane rolls to the right, usually it's not going to take them exactly 180 degrees worth of turn there, so they're going to have one wing not as low as the other one, of course.

And its just if it rolled to the right, top aileron and top rudder to get the thing righted again, if that was the case of their upset.

MR. IVEY: The top aileron, that's a term -- in other words, top aileron meaning counter to the roll?

MR. GOFF: Yes.

MR. IVEY: And top rudder, that term, what does that mean?

MR. GOFF: Well, if it rolls you to the right, probably the closest direction to the sky pointer is going to be back to the left. So in that case it would be the top or left rudder and aileron to make your recovery on.

MR. IVEY: Uh-huh. And those are terms, top aileron and top rudder, is that part of your teaching style and --

MR. GOFF: If they can recognize that that's what happened to them. Yes.

MR. IVEY: The term, coordinated rudder, what does that mean?

MR. GOFF: That means try to use as much aileron and rudder in conjunction with each other so it's a smooth flight, smooth roll-out, and the trapezoid stays lined up with the triangle on top of it.

MR. IVEY: Is that trapezoid something that's pointed out in the airplane but not really a reference to flight, is it? Isn't it more the attitude reference, but that's available there --

MR. GOFF: Yes.

MR. IVEY: -- for them, too?

MR. GOFF: It's available to them. Yes. It's not something that, you know, if it was going --

MR. IVEY: You teach them to fly by --

MR. GOFF: Right.

MR. IVEY: -- like an ILS needle, if you will?

MR. GOFF: Right. It's there to use.

MR. IVEY: Yes. Well, thank you, Mr. Goff. I'd like to go around the room here. And Bart Elias, Bart, do you have any questions?

DR. ELIAS: Just a couple. First, you talked a little bit about the scenarios in terms of setting up those two upsets, the nose-high upset and, then, the roll, too, nose-low.

Are you aware if the effectiveness of either the ailerons or rudders or both are either disabled or degraded as that maneuver is entered?

MR. GOFF: I'm not aware of it.

DR. ELIAS: So if I was really aware or had good situation awareness, I might not get into as large of an unusual attitude as compared to maybe if there was a delay in recognition. Is that correct?

MR. GOFF: Right. You'd probably recognize it earlier, you'd probably react earlier, and you'd probably recover earlier.

DR. ELIAS: Okay. Are you familiar with the term at all of crossover angle of attack or crossover air speed as it relates to rudder effectiveness for controlling roll?

MR. GOFF: Not in relation to the rudder effectiveness. No, I'm not.

DR. ELIAS: How are you familiar with it?

MR. GOFF: Well, just the, I guess the definition of the corner speed. It's the lowest speed at which you can get the maximum G Forces without -- when you still honor the stick shaker. And if you're not right at that speed your turn radius is going to be greater. If you're faster or slower it will be greater, your turn radius will be greater. That's about all I know about it.

DR. ELIAS: That's corner speed, so not necessarily crossover speed.

MR. GOFF: Not so. That's corner speed I was talking about, that's it.

DR. ELIAS: Okay. So it's sort of a different term that you're talking about?

MR. GOFF: Yes. That's right. And that's -- yes. Right.

DR. ELIAS: Okay. But crossover speed is not a concept --

MR. GOFF: No. We don't get into that. No.

DR. ELIAS: -- and crossover angle of attack is not a concept you talk to students about?

MR. GOFF: No.

DR. ELIAS: Okay. That's all the questions I have.

MR. GOFF: Okay.

MR. IVEY: Captain Arondel, BEA.

CAPT. ARONDEL: Yes, sir. You told us that you received special training to teach aircraft advanced maneuvering program. And do you have recurrent training also on this program?

MR. GOFF: Do we have what training?

CAPT. ARONDEL: Recurrent training each year, or you just have it once?

MR. GOFF: Well, several of us went through it twice. I don't know if we were slow learners or not, but several of us went through it twice. And since then we haven't gone through any training, except when we do our own recurrent training each year we go through the training.

CAPT. ARONDEL: Okay. And during this recurrent training, do you have special training on the advanced maneuver program?

MR. GOFF: In the simulator. Yes.

CAPT. ARONDEL: Yes?

MR. GOFF: Uh-huh.

CAPT. ARONDEL: Okay. Is there specific instruction for the students for getting coordination between the use of rudder and the use of aileron during initial training or during preparation training?

MR. GOFF: Yes. They get training on that.

CAPT. ARONDEL: Okay. Thank you.

MR. GOFF: Yes.

MR. IVEY: Captain Young, American.

CAPT. YOUNG: I'll rely on your experience in the sim a little bit here, then, and you do observations in the plane during the year sometimes. How does the airplane, from your observation there, operate in comparison to the sim in your opinion, I mean, from what you see the line crews doing?

MR. GOFF: A lot smoother, a lot --

CAPT. YOUNG: Which is?

MR. GOFF: Which is --

CAPT. YOUNG: Which is a lot smoother, which one, the airplane or the sim?

MR. GOFF: The airplane. I'm sorry.

CAPT. YOUNG: Oh. Okay.

MR. GOFF: The cruise in the airplane, the airplane is much smoother than the sim. It appears to fly heavier as opposed to the sim, which evidently is getting signals to keep everything moving here, and it seems like it's in constant motion as far as, you know, zipping back and forth there. And you have to really lighten your grip in the sim as opposed to the airplane.

CAPT. YOUNG: Okay. Have you ever seen crews use the rudder on the line when you're out there observing or ever notice it?

MR. GOFF: I've never noticed --

CAPT. YOUNG: You've never noticed it?

MR. GOFF: No.

CAPT. YOUNG: As you're out on the line in the airplane, have you ever been with a crew that encountered wake turbulence?

MR. GOFF: No.

CAPT. YOUNG: Not that you're aware of? Okay. And just so I can clear up -- because I thought that maybe Dave asked you or whatever that after the accident here the students haven't discussed the accident at all with you?

MR. GOFF: Just to say that, you know, they miss the people and they're sorry it happened and things like that. But as far as, you know, what causes it, everybody I guess has got a million thoughts on it. But as far as discussing it with me, no.

CAPT. YOUNG: Okay. Thank you.

MR. IVEY: Captain Jim Goachee, FAA.

CAPT. GOACHEE: In regards to Delvin's reference to observing I guess on an annual basis the crews --

MR. GOFF: Yes.

CAPT. GOACHEE: I think you said before you've never flown the airplane before. Correct?

MR. GOFF: Yes. That's true.

CAPT. GOACHEE: Did you, prior -- I mean, you became an instructor, what, 11-1/2 years ago. Prior to instructing in the simulator, did you get any airplane time at all? Did they ever take you up just to see how it would feel?

MR. GOFF: No.

CAPT. GOACHEE: So with that question in mind is, how can you tell the response of an aircraft from a simulator to an airplane if you haven't flown it by observing? Tell me how you relate to that.

MR. GOFF: Well, I can see the inputs that the pilots are making, and they're a little bit different in the sim in that the thing has a little tendency to wander around a little bit where in the airplane it doesn't, and just from talking to people about the heavy feeling of the aircraft as opposed to the sim.

CAPT. GOACHEE: Okay. But most of the time do you do recurrent training -- or for one day I think you have -- when the pilots come back, you have them for one day, then the next day check airman gets them for a proficiency type check for their maneuvers. Is that correct?

MR. GOFF: Yes.

CAPT. GOACHEE: So you really see the pilots for the first five periods, and then they get an additional five or six periods in the simulator that is after your five periods with them. Correct?

MR. GOFF: On the transition program. Yes.

CAPT. GOACHEE: So on a normal progression, it would not appear that -- you have them for five periods, but they can smooth out the control inputs that you see in the simulator in that additional six periods so that by the end of the ten, eleven days that there would be a much smoother pilot than what you would have observed in your five-day period with them? Is that a correct statement?

MR. GOFF: That's a correct statement. Yes.

CAPT. GOACHEE: With -- you're tasked, I think, Mr. Goff, with the five periods for -- and we're going to talk just about the transition training.

You've done it for 11-1/2 years, and I know it's going to be hard to go back 11-1/2 years, so just go back the amount of time that you can remember.

But when you get students, does it ever take more than five periods for you to recommend them to go with the check airman for Sim 6?

MR. GOFF: If someone is not ready, we fill out an additional training report, or an Additional training required, and there's a sheet that we fill out on that. And then they get whatever is decided that they need for additional training.

CAPT. GOACHEE: Have you done that in prior --

MR. GOFF: Have I filled out additional training reports? Yes, I have.

CAPT. GOACHEE: Is it unusual to do something like that?

MR. GOFF: Probably maybe one out of 15 classes or something like that. It's not very often.

CAPT. GOACHEE: Could you tell me, if you can recall, initially when you got hired as a sim instructor for American Airlines, you went through -- we'll assume you went through all the required training.

Were you observed by -- after that were you observed by the company prior to going by yourself in the simulator with students?

MR. GOFF: Yes.

CAPT. GOACHEE: And was that done by someone in Flight Standards for the A300?

MR. GOFF: I think at the time it was the fleet manager for the A300, I think.

CAPT. GOACHEE: Okay. I know it's been a long time. But are you observed on an annual basis, biannual, or twice a year, I mean, reference being observed by someone from the training department, Flight Standards, for the A300?

MR. GOFF: Observed at least once a year by a check airman, the standardization check airman, at least once a year.

CAPT. GOACHEE: Okay. Have you ever been observed, say in the last several years, by the FAA, either by an inspector that is qualified on the A300 or by an air crew program manager for the A300?

MR. GOFF: I don't remember.

CAPT. GOACHEE: Talking about upset training, what I'd like to do is just to give you one, not as how you teach it as referenced nose-high or nose-low, but one that -- because some of these can be into extreme bank angles upset. Is that correct?

MR. GOFF: Yes.

CAPT. GOACHEE: And consequently some of them could be at a high speed, a high bank angle, or could be at a low speed, high bank angle?

MR. GOFF: They could be.

CAPT. GOACHEE: Okay. Would there be any difference between a recovery technique -- and we're just talking -- we're not talking so much nose-high or nose-low -- but extreme bank angle, but at a low speed versus a high speed as to how you would recover? I mean in one scenario would you use ailerons, and the other one would require ailerons and coordinated rudder?

MR. GOFF: I would say we always teach it coordinated rudder and ailerons, and the only difference would be the power that might be required.

CAPT. GOACHEE: Okay.

MR. GOFF: That's the way I look at it.

CAPT. GOACHEE: So for you, in a high bank angle, low speed, there would be no difference in technique as far as ailerons or ailerons, coordinated rudder?

MR. GOFF: I would use coordinated rudder and ailerons.

CAPT. GOACHEE: Just several questions on instructor manual for your five periods, I think. Does that instructor manual, does that include -- is it a syllabus?

Does it expand on that and talk about procedures or problem areas that you may want to look at or why the pilot is having problems under a certain maneuver to help you understand or help the student understand how he got into a problem?

For example --

MR. GOFF: It's not in the syllabus. It doesn't outline how to do that in the syllabus.

CAPT. GOACHEE: So American leaves it up to each individual instructor to be able to find the problem areas with your experience?

MR. GOFF: Yes.

CAPT. GOACHEE: I have no more questions.

MR. IVEY: Thank you. Captain John Lauer, APA.

CAPT. LAUER: Good morning. I'd like to go back and revisit the term, top aileron and top rudder.

Are these terms derived -- they're relative to the horizon, the artificial horizon, the real horizon, or some other reference point?

MR. GOFF: The aircraft horizon, is the way I look at it. If you're upside down, if it rolled you to the right, you're going to use top aileron, in this case left aileron, left rudder, and return. And you're using the horizon. Is that what you're asking?

CAPT. LAUER: Yes. Utilizing your scenario, the aircraft right, hence the left rudder is considered the top rudder?

MR. GOFF: Yes.

CAPT. LAUER: Is that because the left rudder is higher than the right rudder relative to the real horizon or relative to the artificial horizon displayed to the pilots or relative to some other reference source?

MR. GOFF: Whatever reference they have to use at the time, whether it be the real one or the PFD horizon, whatever they're going to use for a reference.

CAPT. LAUER: So the term, top aileron, top rudder, is that a military term or is it something that --

MR. GOFF: I have no idea.

CAPT. LAUER: Is it a term that you and other simulator pilots or check airmen use in discussion on a daily basis or occasionally?

MR. GOFF: Probably not on a daily basis, but maybe occasionally.

CAPT. LAUER: When that term is used, the people who are using it obviously have a pretty good concept of what it means?

MR. GOFF: I think so.

CAPT. LAUER: Okay. In light of the accident of 587, have there been or have you heard of or have you been a part of any discussion in breaks or before your workday begins or afterward or in social gatherings with your peers, your working peers, have there been any discussions about possible or plausible theories as to why 587 went down?

MR. GOFF: No. Other than just what we read in the papers.

CAPT. LAUER: And nothing -- based on what the news media has reported, there hasn't been any discussion as to, well, it might be this or it might be that, as a theory?

MR. GOFF: No.

CAPT. LAUER: Okay. In light of 587's accident and given the amount of experience that you have in the A300 and here at American -- and this is just strictly your opinion -- do you believe that a warning should be published to training departments -- not necessarily here at American, but any training department engaged with the Airbus -- should there be a warning issued with respect to the use of the rudder?

MR. GOFF: I don't think so personally. I don't know of the ins and outs of it, and I don't know what's been found out and all that, so it would be pure speculation on my part.

CAPT. LAUER: In all the years of your training, recurrent training and of course your initial training, have you ever heard of or been privy to any kind of information with regards to a limitation on the use of a rudder in the Airbus?

MR. GOFF: No.

CAPT. LAUER: I think that's it. I don't have any more.

MR. IVEY: Thank you. Captain Ron Skupeika, Airbus.

CAPT. SKUPEIKA: Good morning. I know you have a number of simulator sessions that you offer the pilots in the course of training. Are the average weights -- we used to call them training weights -- do you -- about what training weight do you normally do on an average simulator session that you do?

I know you probably have one that has a max gross weight takeoff, and --

MR. GOFF: Yes.

CAPT. SKUPEIKA: -- maybe the rest of them were all at --

MR. GOFF: Usually I'd say commonly we do our training just under the max landing weight, which is 308. So we usually do it around 300,000 pounds.

CAPT. SKUPEIKA: Right. Because that's a lot easier for maneuvering in --

MR. GOFF: Yes.

CAPT. SKUPEIKA: -- avoiding the over-max weight procedures and all that. I understand.

MR. GOFF: Right. And then, there is one day that we do a heavy weight --

CAPT. SKUPEIKA: Heavy weight takeoff and landing?

MR. GOFF: -- takeoff and landings, and engine failure just to see what that's like.

CAPT. SKUPEIKA: Do you think the training weights would have a difference in feel versus the actual airplane when generally you're flying pretty much to heavy loads on the aircraft? Do you think that might be a reason why there's a difference in the sensitivity between the simulator and aircraft?

MR. GOFF: I don't know how they tweak the sim, so I don't know what the difference would be.

CAPT. SKUPEIKA: Okay. In AAMP training, what weights do you use when you do those upset maneuvers? What average weights do you use, training weights or heavy weights?

MR. GOFF: Usually just under the max landing weight.

CAPT. SKUPEIKA: Okay. So that --

MR. GOFF: About 300,000 usually.

CAPT. SKUPEIKA: So none of those maneuvers that you demonstrate the upset, nose-high and nose-low, would be done at max gross weight?

MR. GOFF: Generally not.

CAPT. SKUPEIKA: Okay. So there probably would be a different feeling, I would assume, at heavy weights versus light weights?

MR. GOFF: I would imagine so.

CAPT. SKUPEIKA: So there might be some consideration as to how a pilot recovers from heavy weight versus light weight?

MR. GOFF: There could be.

CAPT. SKUPEIKA: Okay. How would you teach a coordinated recovery from an upset maneuver, how much like rudder input, aileron input? What do you give a general sense for the pilot coming in first time around? What do you tell him?

MR. GOFF: Put some aileron in, try to follow it with some rudder that feels about right. And then, if you have the trapezoid up there, check the trapezoid.

CAPT. SKUPEIKA: When you say, Feels about right, what is that, half rudder?

MR. GOFF: You've got to feel it. You know, you've just got to do it to feel it, that's it.

CAPT. SKUPEIKA: Does the simulator offer any side loads, any motion side loads or any G Force?

MR. GOFF: Well, it depends on how rough or smooth the pilot is.

CAPT. SKUPEIKA: Would you feel that the G loading and the senses he gets in the simulator are the same as the aircraft?

MR. GOFF: I have no idea.

CAPT. SKUPEIKA: Okay. So therefore, maybe the procedures that you're teaching may not be correct, because we don't have good data?

MR. GOFF: I --

CAPT. SKUPEIKA: Because we're teaching by feel. We don't have a feel on the simulator, as far as I know.

MR. GOFF: I can't answer that for sure.

CAPT. SKUPEIKA: Okay. Going back to AAMP training, are you happy with this training American has set aside as special training? Are you happy with it personally?

MR. GOFF: It's fine.

CAPT. SKUPEIKA: Okay. If I gave you the latitude right now today of making changes or developing a better program or changes to the current one, what could you offer me as suggestions?

MR. GOFF: As far as the training itself goes, I probably wouldn't change anything.

CAPT. SKUPEIKA: Not change anything?

MR. GOFF: There may be something to be done about the simulator and the way it -- probably the feel of the sim when it goes into a pitch-up.

CAPT. SKUPEIKA: Okay.

MR. GOFF: But other than that, I wouldn't change anything.

CAPT. SKUPEIKA: Can you enlighten us on what you feel would be a little bit better, going back to what you were saying about the pitch feel?

MR. GOFF: Just so it doesn't -- it just feels like it's -- once you push the button to insert a pitch up, it holds it in there a little bit too long. It takes a little bit of time and a little bit of effort to get it out of that nose-up attitude. And what causes that I don't know. Somehow they do it, enter it in the sim.

CAPT. SKUPEIKA: Okay. So through simulator magic and software --

MR. GOFF: Right. I guess.

CAPT. SKUPEIKA: -- they induce something that, as far as you know, you don't know how it gets there, but we have a recovery to it.

MR. GOFF: Right.

CAPT. SKUPEIKA: We induce a recovery or teach a recovery from a scenario that, as far as I know, the manufacturer has never been into or demonstrated, nor does have validated information on. So how do you feel about that? And here you are running this program now.

MR. GOFF: I just do what they ask me to do as far as the instructing on the procedures.

CAPT. SKUPEIKA: Okay. Very good. Thank you very much.

CAPT. GOACHEE: Dave, just one quick -- well, I have one quick question after you're done.

MR. IVEY: Go ahead. That's all right.

CAPT. GOACHEE: You have, on Sim 5, the day that the pilots are exposed to the AAMP program. Is that a correct statement?

MR. GOFF: Yes.

CAPT. GOACHEE: Okay.

MR. GOFF: On the transition.

CAPT. GOACHEE: Yes, sir.

MR. GOFF: Yes. That's the first time.

CAPT. GOACHEE: And then, the next day they leave you and go with the check airman. Is that a correct statement?

MR. GOFF: Well, yes. It would be considered their next sim period. It may not be the next day.

CAPT. GOACHEE: Okay. Let's say you were training me, and if this happened it probably would happen the way I'm going to talk to you about, is that I'm not performing that day very well with the AAMP upset maneuvers, and you do not have sufficient time to give me additional training. Would I advance to the next stage, into Day 6, under that scenario?

MR. GOFF: In the transition program? Yes.

CAPT. GOACHEE: Without showing proficiency in that particular --

MR. GOFF: Right. And we would write it up that the student wasn't proficient in this particular thing.

CAPT. GOACHEE: Okay. Thank you. That's all.

CAPT. YOUNG: I might add one other thing, because Ron brought up a little something.

You said you teach them to feel the rudder input for the recovery from the unusual attitude, whatever it is, in the sim. How do you know, or how do they know and how do you know if they put too little or too much rudder in that in relation to the rudder there?

MR. GOFF: Usually it's the smoothness of the recovery or the lack thereof. If they don't put enough, it's very rough or it's very sloppy on this recovery.

CAPT. YOUNG: Okay. Can you feel side loads in the sim when that happens?

MR. GOFF: Up to a very small point. It moves a little bit, but not a whole lot.

CAPT. YOUNG: Okay.

MR. GOFF: You just get the indication that there are side loads there.

CAPT. YOUNG: Okay.

MR. GOFF: But it's not, you know, it's not a full feeling of it.

CAPT. YOUNG: Right. Okay.

MR. IVEY: Well, thank you very much. I appreciate you coming in this morning and sharing your insight and providing answers to some of these questions. This will conclude the interview.

MR. GOFF: Thank you.

(Whereupon, the witness was excused.)

(Whereupon, a short recess was taken.)

MR. IVEY: Good morning, Captain VanderBurgh. This is an interview that's based on the accident of American 587.

EXAMINATION

**j. Captain Warren M. VanderBurgh**

MR. IVEY: And if you would, by way of introduction, please give me your full name, your present title and status with American Airlines, and an overview of your history, including aviation and type ratings, total flying time, just a general nature.

CAPT. VANDERBURGH: Okay. I'm Captain Warren M. VanderBurgh. I'm a Boeing 777 international captain with American Airlines.

In the way of an experience overview, I have fairly extensive experience in general aviation. I have 25 years mission-ready in one of four different jet fighter aircraft in the U.S. Air Force, to include the F100, the F105, the A10, and the F4.

Seven years on active duty, the rest of the time in the Air Force Reserves or Air National Guard system, while concurrently flying as a pilot for American Airlines.

For American Airlines I have served as a captain on the Boeing 757, on the DC10, captain on the 727, 767, 757, and 777.

I have been an instructor pilot, check airman on the Boeing 757, 767, and 777. I have also done some acceptance test flying work on the 777 aircraft.

My tenure as a check airman lasted about 14 years with the company. And with three years remaining, at a point about two years ago in history, I returned to the line to enjoy my last three years as a senior 777 international captain, which I am currently enjoying very much.

MR. IVEY: Total flying time, just in general numbers?

CAPT. VANDERBURGH: Let's see, general numbers, 4,600 hours of jet fighter time; about 1,400 hours of general aviation time, various types; and about 12,000 hours of airline transport time.

MR. IVEY: Are you currently an FAA designee?

CAPT. VANDERBURGH: No, I am not. I left the schoolhouse two years ago to return to line flying.

MR. IVEY: Just in general aviation, do you maintain currency in general aviation now or not?

CAPT. VANDERBURGH: Yes. I have a partnership in a Mooney 231, and also in a RV8 airplane for flight aerobatics.

MR. IVEY: You're an aerobatic pilot and maintain proficiency?

CAPT. VANDERBURGH: Well, some would say I'm proficient, and some would not.

MR. IVEY: Okay. I'd like to have you tell us about the derivation of the AAMP program and give us a history of how this came into being.

CAPT. VANDERBURGH: Well, frankly, one day Cecil Ewell, Captain Cecil Ewell, the Vice President of Flight at American Airlines, called me into his office and said, Van, would you do something for me? And being the boss, what you say is, Well, sure, boss.

And he said, I would like you to develop a program for American Airlines that deals with the behavior of our aircraft all around the edges of the flight envelope, the extraction of maximum performance from the airplane whenever that is required, and recovery of the airplane from critical flight attitudes.

That request was made of me in I guess April of -- April-ish time frame of 1995.

MR. IVEY: And so that began your endeavor to establish the program that's now in existence?

CAPT. VANDERBURGH: Yes. From --

MR. IVEY: How did you approach that request? Did you have industry, or was it an in-house development --

CAPT. VANDERBURGH: Well --

MR. IVEY: -- participation?

CAPT. VANDERBURGH: No. It was a combination of a lot of things. It took a huge amount of -- as you might imagine -- study on my part and research.

Although I have a lot of experience as an instructor and a lot of experience flying, I am not an aeronautical engineer. And if I was going to give this program, then, I was going to have to put a foundation under it.

And so I had to do quite a bit of research, quite a bit of reading. I talked to friends that are aeronautical engineers in the initial development of the program, and they in turn, of course, led me to the proper resource documents to use as a basis for the aerodynamic portion, if you will, of the program.

So there was quite a bit of extensive time and research invested in the initial development of the program.

I don't know if you want me to go on from there. But this became an ongoing process.

After the program was initially formulated and developed, it went through several initial revisions, because as I gave it I certainly encouraged very knowledgeable people to come and take the course.

The course was initially given to check airmen only. And of course, we have a lot of check airmen that are very, very knowledgeable in this arena, and they would make good input. But additionally, we encouraged the manufacturers to take the course.

And McDonnell Douglas at the time was an independent corporation, and so we asked the chief test pilot from McDonnell Douglas, Mr. Tom Melody, to come and take the course, which he did, not only once while the check airmen were taking the course, but also he took it again in Los Angeles when I was out there teaching our pilots.

He was very helpful. He had a lot of input. In fact, I have the greatest respect, of course, for all these gentlemen. And Tom Melody in particular is not only a very knowledgeable engineer in my opinion, but he is also uniquely able to communicate at a pilot's level and in a very understandable way.

So he was very helpful to me. In fact, he pretty much wrote for me and showed me how-to to give the high altitude flight characteristics, flight handling characteristics segment of the program.

Let's see. And to further ensure that we had things correct, in addition to McDonnell Douglas we wanted to be sure Boeing looked at this, so Mr. Lee Schumacher [phonetic], Captain Lee Schumacher, who at the time was the manager and director of training, and I, with the program, took the program to Boeing and asked --

You know, we went to Seattle in this case and asked that they have as many test pilots and aeronautical engineers as they might wish to bring that would be able to help us to make the program better and to ensure the accuracy of the program. So we presented the entire program in Seattle to that group.

And then, at the end of that -- we encouraged them prior to the presentation to stay afterwards and sit down with us and go through the program and give us their ideas of how we might be able to do it better in any areas that it might not be correct so that the program -- so we could be sure that what we were saying to our pilots was accurate.

MR. IVEY: Did Airbus give you the same participation?

CAPT. VANDERBURGH: No. We encouraged Airbus, all the manufacturers. Now, at this time frame, the early-on time frame, as I recall no test pilot or engineering representative from Airbus came and attended the course. They did later, subsequently, but I think we're talking now about the formative stages, if I have this correctly, of the program.

MR. IVEY: Yes. Do you have any idea or reason -- did they offer you a reason why they didn't want to be in on the formative stages?

CAPT. VANDERBURGH: Oh, I didn't get the impression they didn't want to be. It's just they were encouraged and invited, but no one, for whatever reason, did or was able to attend.

MR. IVEY: Uh-huh. Just staying along that theme, do you have an idea of when they first started to participate in either the development or the changes or just the familiarization of the program?

CAPT. VANDERBURGH: The first participation by an official Airbus representative that I can recall was at the industry -- we had an industry conference which was at the -- basically we had completed most of our line pilots by this point.

And because the program had been so well received and there was so much demand coming from other airlines to access this information so they might develop a similar program that we decided to have an industry conference and share with all of the airlines as well as the military a program we felt was very successful.

And so we had an industry conference which was in I believe May of '97. And that's the first time I recall a official representative, if you will of the Airbus company in attendance.

Now, certainly a lot of Airbus pilots took this course along the way, not only from our airline, but from others as well.

MR. IVEY: Uh-huh. Regarding the FAA, were they involved in the initial development of this program?

CAPT. VANDERBURGH: Yes. In the sense that when we were -- the developmental stage as we view it was while we were giving this course to our check airmen and constantly improving it and revising it in that phase.

The FAA -- many FAA representatives attended the course here at DFW, not only all of the APMs or all of the FAA representatives for each of our fleets, but also FAA management attended.

I'm not sure I can name them all, but I know Ron McGarry [phonetic] attended; Wayne Williams, who luckily is PLI now; Tom Stuckey, who was the Chief of Flight Standards in Washington at that time, or at least the interim chief; Corky [phonetic] Valentine, who was a FAA manager -- and I'm not sure if that's his current title.

But, yes. Many members of the FAA attended in the formative stages of the program, and all of their responses were very positive.

MR. IVEY: Tom Imrich, were you familiar with him?

CAPT. VANDERBURGH: Yes. Tom Imrich, who at the time I believe was a -- I'm not sure of his title. He's a very, very smart man. I have great respect for Tom.

And Tom took -- was at the time working for the FAA. I'm not sure where he first took the course, but it was prior to the industry conference. And, yes. He did take the course. And, yes. And he made some significant input to the program, too, some helpful input.

MR. IVEY: Does the FAA accept or approve the advance maneuvering program? Was that part of their oversight, to watch the development and then ultimately give a thumbs-up or thumbs-down on the course work and simulator work? Do you know?

CAPT. VANDERBURGH: Well, I'm not sure I'm qualified to speak for the FAA. And I guess you would have to ask them that question.

MR. IVEY: All right. And this has been offered, as you said, not only to the military and to other airlines in this country, but overseas as well?

CAPT. VANDERBURGH: Yes. Mr. Baker, our Vice President of Operations -- since this is -- his opinion was that because this was a safety oriented program it benefited the entire industry and that we would share it with anyone who was interested in using this type of training.

So as a consequence of that, many airlines worldwide, as well as domestically, took advantage of this program.

I worked with -- after working with our pilots, I worked with the training departments of Delta Airlines. Basically we trained all of Delta's instructors, as well as most all of their senior management took the course, flight management. And they went on to develop a similar program.

Likewise I worked with United, who had a program going of their own but decided they wanted to look at what we were doing and see if they could possibly improve their program.

Also worked with Northwest Airlines' training department; all of Alaska Airlines' training department; all of UPS, that's in attendance at their training facilities. UPS had me work with all of their instructors.

And gosh, Avianca, down in Bogota, I worked with them. I worked with KLM extensively, two week-long trips to Amsterdam to train all of their check airmen and sim pilots. SAS likewise, I spent a fair amount of time there with them; gave the briefing to Lufthansa.

I think KLM has adopted the program in its entirety and implemented it, much as we did at American Airlines, and perhaps have gone beyond where we have gone, as I understand it, with the program.

I've worked in Asia, as well, with Chinese, with the Free Chinese, EBA, China Airlines.

MR. IVEY: How about the military?

CAPT. VANDERBURGH: Yes. The military, we received numerous requests from various military organizations to use our video programs in their safety briefings.

I mean, they had a number of requests for me to come and work with them, but, you know, I'm just one guy, and so I wasn't able to be in all these places.

However, we did share it with the military at their request. And numerous military transport units were pleased to have the program and be able to use it in their safety training programs.

MR. IVEY: Uh-huh. Did the military more or less have an upset training program -- and I'd like to think more in terms of the fighter type aircraft -- in place? Maybe it's not as formalized as the current AAMP, but did the military have that kind of training for their pilots?

CAPT. VANDERBURGH: Well, actually, all of these requests were coming from military transport units. We weren't getting any from fighter units, you know.

I guess, you know, the fighter pilots -- I'd better not digress here. I think all the requests were coming from transport units, and we weren't getting requests from fighter units.

And in fact, it was -- the standout one was the squadron in Washington that flies the President and the senators and so on and so forth were very interested in getting -- they wanted me to go up and work with them. Again I was not able to. But they wanted to use our video training aids.

MR. IVEY: Do you know whether or not they adopted any of that or not?

CAPT. VANDERBURGH: I do not know in that case. No.

MR. IVEY: You mentioned various airlines. Did some of them, when they expressed interest and did not accept the program, did you ever get any feedback from various airlines as to why they would opt out as opposed to opt in?

CAPT. VANDERBURGH: I'm not sure I ever heard of an airline that wanted to opt in that subsequently decided not to. I mean, those that we heard from were those that wanted part of the program.

In answer to your question, there might have been some that wanted to do more, but due to possibly time or financial constraints were not able to do as much as they would like to.

MR. IVEY: I know you don't -- and you didn't state that you had flown the A300 at all. In this country we have Fed Ex and UPS, as well as American being the principal operators of that type airplane. Did you have meetings with Fed Ex?

CAPT. VANDERBURGH: Yes. Actually, Fed Ex was sending their instructors here to take the course while I was delivering it to our line pilots. The way we did it was, we did 150 or 200 pilots at a time, and we did it at the pilot bases.

So when I was here in Dallas giving it to Dallas pilots, the Fed Ex people would come -- instructors would come and take the course. And they were putting as many instructors through the course as they could.

UPS, on the other hand, actually invited me to come to their facility and address all of their check airmen and instructors as a group.

MR. IVEY: Did UPS accept your program or use it in its entirety, or did they modify it -- or do they have one, I should say, I suppose, is the first question?

CAPT. VANDERBURGH: I don't have the answer as far as how -- I do not know how far they went with the program. I do have letters from their managing director of training praising the program and thanking us for all the information we provided to them.

The extent to which they have adopted the program, you would have to speak with Tom Keen [phonetic] or whoever the current manager directing the training over there is now.

MR. IVEY: Yes. And I'm thinking -- we're going down the line of the A300 investigation again, and I realize that still this is a generic training.

Fed Ex didn't accept your program, I suppose, or at least did not adopt it, is probably a more appropriate word. Did you ever get any feedback from them as to why they didn't? Or maybe they were here just as an interest. I don't know. Can you enlighten me as to Fed Ex's approach to upset training?

CAPT. VANDERBURGH: I honestly do not know what their approach to it is. I have not worked closely with Fed Ex. As I said, the only thing I am aware of is that they sent a lot of their instructors to our course. Now, whether they pursued our course or not I don't know, because we had no follow-on requests that I'm aware of from them for additional information.

MR. IVEY: Yes. And the kickoff for AAMP was early '96 or late '95 for American? Do you recall the time line?

CAPT. VANDERBURGH: I don't have an exact date for you. We started developing the program in the late spring of '95. I would say the kickoff was probably early '96-ish. I mean, I could find those dates. I do not recall them.

MR. IVEY: I know members of the NTSB, including myself, were in attendance for your presentation. I believe it was in late '96, when you were in Washington up there, briefing your flight crews there --

CAPT. VANDERBURGH: Uh-huh.

MR. IVEY: -- in Springfield, Virginia, or near there.

You mentioned a video. I presume that was probably -- as you say, you're only one person, so through the use of video and media you're able to get the word out more to pilots and to other organizations that might have interest in your program.

The video that was created, has there been a single video of your presentation, or has it been modified from year to year?

CAPT. VANDERBURGH: I'm not sure I understand the question. On the beginning part of that, many NTSB investigators, and in fact some members, as you're aware -- I know that, as you stated, you were there one day.

But at a number of my Washington presentations to our Washington pilot groups, not only the one that you attended, but at a number of the others, NTSB either investigators or members attended the program.

And they were very helpful, too, in the sense that they provided me with more relative accident data to address the issues that I was trying to -- we were trying to highlight. And I appreciate that.

In regard to the second part of that question, I guess you're going to have to rephrase it, because I'm not sure what you're asking me.

MR. IVEY: I know there was a video made. And my question is, was that video, once it was made, is that still the source of video information for pilots that are now coming through the program to view and to have in their possession?

CAPT. VANDERBURGH: What we did -- the way the videos evolved was, there were so many requests after -- it was not a part of our initial plan to do it the way we did do it eventually.

There were so many requests from our pilots that had taken the program for a review of the essence of the material, because they wanted to be able to study it and review it periodically, and we could not give this course, of course, every year to all the pilots.

So because of the demands and desires of the pilots, expressed by the pilots, we decided what we would do is segment the program, put it on palatable videos -- by that I mean a video that is not too lengthy. We cannot put eight hours of video information and expect anyone to do anything with that except put it in their library.

So we decided to sequentially make videos of about 45 minutes of length that would take each part of the program and copy it and make a video and then send that to every single pilot in the company so that they would have it for their home library.

And we began that process, I believe, in late '97. After we had finished all of our line pilot training, we began that process.

The concept was that every four or five months we would produce another video that would refresh a segment of the Advanced Maneuvers Program, and we would send it to all of our pilots.

I think we got through about five, we produced about five of those. And that is not the program in its entirety, but rather it is segments from the program that we think would be very helpful for the pilot to review and refresh his memory in the Advanced Maneuvers Program subjects.

MR. IVEY: I know that first, I'll call it Video 1, which is the basic introduction, I think it runs about 45 minutes in duration. And I have actually seen it. And I think that is the one that's of 1997.

CAPT. VANDERBURGH: The one you're referring to is Unusual Attitude Recovery Procedures.

MR. IVEY: Yes. Thank you for the title.

CAPT. VANDERBURGH: Okay.

MR. IVEY: And I think Video 2 would be -- that was also a segment. It was perhaps a little shorter in nature. You'll have to help me with the title. Perhaps --

CAPT. VANDERBURGH: I think Video 2 was probably -- we were trying to, what we felt, prioritize this in our minds as to order of importance. And I think the next one we made probably was related to automation dependency. That was probably the --

MR. IVEY: And then, Video 3 was the mountainous --

CAPT. VANDERBURGH: It was the control flight in terrain and mountain wave.

MR. IVEY: Yes. And last -- at least the fourth video that I was aware of --

CAPT. VANDERBURGH: That we sent out was Control Malfunctions and Flight Instrument Anomalies.

MR. IVEY: Yes. Was there a fifth video? Do you know?

CAPT. VANDERBURGH: The fifth video was really on microbursts. And we didn't send that one out to the pilots because it's not a fifth video. It's being used in our recurrent training.

MR. IVEY: Yes.

CAPT. VANDERBURGH: It's a -- the subject is microbursts and how do deal with microbursts. And that is being shown -- has been being shown in recurrent training to cover the microburst training requirement that you have to fulfill in recurrents.

MR. IVEY: Were the first four videos sent out to all the pilots, not all necessarily at one time, as they were being developed, obviously, but do most pilots now that come through initially for that training receive those videos? Is that still an ongoing process and distribution?

CAPT. VANDERBURGH: Yes. Those first four that we talked about. Right. The video on microbursts is being used in recurrent training.

MR. IVEY: Yes.

CAPT. VANDERBURGH: So there's only four. But those four were, after they were made, mailed to every pilot in the company.

And now new hires are issued those videos after they take -- there is a new hire Advanced Maneuvers Program, a day-long program that's given to all the new hires. After they receive that from one of the people that do that now, one of our instructors, then they are issued these four videos to put in their home library.

MR. IVEY: We interviewed Captain Ott, who I think is one of the ground school instructors, yesterday.

CAPT. VANDERBURGH: Uh-huh.

MR. IVEY: And I presume that in the past you were the one that really made this presentation, and now it's taking two people to take your position, maybe even more.

CAPT. VANDERBURGH: Uh-huh. There are three trained to do it now.

MR. IVEY: Did you more or less pass the torch to them and give them the training needed to basically present the course?

CAPT. VANDERBURGH: I trained Dave Garell [phonetic] and Fred Freeland to do the program. Fred has been doing it for the new hires for some time.

And I did not train Bruce Ott. I'm sure he's very capable. But I have been back on the line now for two years, so it lives on without me. But I am sure that he is very capable. I have not heard his presentation, but I'm sure he is very capable and was properly prepared to do the job.

MR. IVEY: You mentioned in your civilian background that you participated with an RV8 in acrobatics. Has that been an ongoing process for a number of years? Have you -- and has acrobatics been something that's been of interest to you for a long period of time?

CAPT. VANDERBURGH: No. I just recently, along with two partners, completed that project, and we just got that plane flying six months ago.

MR. IVEY: I see.

CAPT. VANDERBURGH: And so the answer to that question is no.

MR. IVEY: So acrobatics is really something new for you in terms of general aviation?

CAPT. VANDERBURGH: In terms of general aviation, it is. In terms of military aviation, obviously, I spent a lot of time in fighter airplanes, 25 years, 4,500 hours.

MR. IVEY: Uh-huh. With, as you said, going out to industry for experts to help build this program, what was the attitude of the Boeing people towards the idea of this plan development? Were they encouraging?

CAPT. VANDERBURGH: The Boeing people -- we sought the Boeing people's help and advice in development of this program, and we wanted all the input that we could get from their test pilot group especially, because certainly they are the ones that may have had these airplanes in these particular arenas. Most of us have not.

And we were hopeful to get as much help from them as we could to ensure that we were presenting the program accurately.

MR. IVEY: And I use the term Boeing now because I realize that McDonnell Douglas is now part of that. So I'm using that as an all-encompassing. You've already made mention of Captain Melody and his help with you.

CAPT. VANDERBURGH: Uh-huh.

MR. IVEY: And that was McDonnell Douglas at the time.

CAPT. VANDERBURGH: Uh-huh.

MR. IVEY: Was there ever, during the evolution, development, and presentation over the years prior to your leaving two years ago, was there ever any comments made by the FAA individuals charged with oversight of the airline that they liked what they saw, they felt like there needed to be changes? Just give me a feeling for FAA interaction.

CAPT. VANDERBURGH: The FAA response to the program was very, very positive. Every FAA individual that I worked with, including Tom Imrich, who had some criticism of the program. However, it was all positive criticism, and it was all incorporated.

But all of the other FAA individuals were very, very encouraging. They were very positive about the program.

In fact, Tom Stuckey, I believe is the right name, who was the Flight Standards Chief in Washington, asked me to attend the tri-national FAA of Canada and Mexico and U.S. annual seminar and address that seminar with the Advanced Maneuvers Program. And subsequently he said it was very well received by all of their FAA representatives, as well.

So I never received or the company never received anything but very positive response from everyone in the FAA. And I considered Tom Imrich's response to be very positive, too. He just was being sure I got everything technically correct.

MR. IVEY: Uh-huh. Once you began the program -- I'm in receipt of various date changes with the changes in the AAMP program -- there were several changes, as you would expect any manual to have as things are compiled and changes are needed to be incorporated.

From the development in 1995 until your leaving in 2000 back to the line, or 1999 --

CAPT. VANDERBURGH: March of 2000.

MR. IVEY: -- March of 2000, what would you say was the significant change or evolution of the AAMP program during that tenure?

CAPT. VANDERBURGH: Well, now, the program evolved constantly. And most of it was a matter of finding ways to better communicate the issue. I don't really recall a significant change. Essentially the basics and the essence of the program remained the same pretty much from its inception.

The changes were just a matter of massaging the program in ways to make it clearer to the pilots that we were trying to communicate the message to.

So almost every revision was just a nuance or hopefully painting a clearer picture, being absolutely sure that we were painting the picture that we were trying to paint right from the beginning.

MR. IVEY: I know there's been an addition of an angle of attack to two of the airplanes in the American fleet. I believe that's the 777, which you fly, and also the 737. Is that correct?

CAPT. VANDERBURGH: Yes. The 737 and the 777 both now are produced and delivered with angle of attack instrumentation. The 737 has it both on the PFD and on the HUD, and the 777 has it on both of the PFDs. All new airplanes from Boeing will have angle of attack on their displays.

MR. IVEY: What do you think about angle of attack?

CAPT. VANDERBURGH: Well, I'm a proponent of angle of attack and have been for a long time. And there are thousands of our pilots that have been asking for angle of attack information to be presented in the cockpit for many, many years.

I think that the angle of attack indicator is a clear, unambiguous presentation of the wing state that's easily interpreted by any pilot. And it's extremely useful in determining whether the airplane is in a stalled -- wings in a stalled conditioned or whether it's in a flyable condition in its most basic form.

Probably the strongest reason for my advocacy is that, as we see in very highly automated airplanes, if you have a pitot-static anomaly, it becomes extremely confusing in the cockpit.

Not only is the air speed and the altimetry affected, but numerous other automated presentations, either on the PFD or in the area of flight envelope protection, start to give inputs to the pilot that will task-saturate him.

As you are well aware, there's been two recent losses, 757s which were perfectly viable airplanes, but the pilots had difficulty assimilating what was happening to them and maintaining aircraft control.

We've had several in highly automated airplanes like the MD80, where so many bells and whistles were ringing, when really the only thing that was wrong was the air speed was inaccurate.

So angle of attack is just going back to basics. It's a clear, unambiguous indicator of what the wing is actually doing.

And for future safety of our airline operations, I am a strong advocate of the installation of the indicator.

MR. IVEY: Pilots that came from military backgrounds, especially fighters, I should say fighter airplanes as opposed to the transport in military, has it been your experience in training to see that they have an advantage over unusual attitude recognition and recovery as opposed to the general aviation pilot that might not have had fighter experience?

CAPT. VANDERBURGH: I'm sorry, Dave. Would you ask that question one more time?

MR. IVEY: I was thinking that the military pilot who has flown fighter airplanes -- and of course fighters are in all corners of the envelope -- do they have a better recognition of unusual attitudes and better capability of recovery than those who have not flown those types of airplanes?

CAPT. VANDERBURGH: I think the best way to answer your question is to say that, when I developed this program, I was surprised about how much I learned. I had a great deal of experience in fighters, and I was -- as I studied and learned more about the behavior of large transport airplanes, I came to realize that what I might expect of those airplanes would not occur.

And so the answer to your question is, I learned a great deal, and I had a great deal of experience in fighter airplanes. And what I learned was that a lot of the things I would expect to happen with certain control inputs in the fighter would not necessarily occur in the same way in the transport airplane.

And so the consequence of that was I think our program put as much emphasis on teaching the fighter pilots how to manage this transport airplane as it would be to teaching the pilots that came from the general aviation background.

Yes. Perhaps the fighter pilot might be more aware of the attitude that he's in, his situation awareness might be a little bit better. But as far as proper control application and what might be required to recover the airplane, he is not necessarily any better prepared than the general aviation pilot.

MR. IVEY: Let me follow on with that question to compare an acrobatic pilot. Do you think an acrobatic pilot had any greater skills or recognition than either the fighter pilot or the general aviation pilot in this program? Did that give him an edge?

CAPT. VANDERBURGH: My personal feeling had always been that an aerobatic pilot would probably have an edge only in the sense that he had been there, he was aware of what the G Forces were going to be as a consequence of what was happening to him and what he might have to do to recover. So I was hoping that an aerobatic pilot might have better situation awareness.

However, now I'm not sure I believe that anymore, either, to answer your question truthfully.

MR. IVEY: Thank you. I'd like to go to a letter that you may be familiar with that was written to Captain Ewell, and it was signed by various people, Tom Melody, Larry Rockliff, Tom Imrich, and Ken Higgins, to Captain Ewell regarding the AAMP program. Are you familiar with that letter?

CAPT. VANDERBURGH: Yes, I am.

MR. IVEY: When were you first made aware of that letter?

CAPT. VANDERBURGH: I'm not sure of the date that I was first made aware of that letter. When it was received by Captain Ewell, whatever that date was, I'm sure he distributed a copy to me as well as some others.

MR. IVEY: When you first read it, what was your impression of the various subjects that were covered in that letter? And we can certainly step down it, if you wouldn't mind my doing so. But just the first impression of the overview of the letter, and then we'll get into specific content.

CAPT. VANDERBURGH: Well, and this letter evolved out of the industry conference that we discussed earlier, in May of 1997. And in that conference Captain Ewell encouraged the conferees to provide us feedback.

And I might add that in every presentation we ever gave in this company or worldwide I encouraged all of the recipients to give feedback to us on ways that we might be able to improve this program.

So as a consequence of that encouragement and I think and specifically -- you would have to ask Captain Ewell -- but I think specifically probably asked Mr. Higgins and some others to provide that feedback.

So we expected to receive -- I guess the answer is, we expected to receive a letter.

MR. IVEY: Did it seem unusual or surprising that two competitors, Boeing, McDonnell Douglas -- three competitors, actually, McDonnell Douglas and Boeing and Airbus, were all on the same page with signatures in this letter?

Do you have any idea how the manufacturers happened to get together, along with the FAA, Tom Imrich representing them as one of the signers? Did that come as a surprise that three competitors would all get together and sign a joint letter to American?

CAPT. VANDERBURGH: Well, I think some of the things in the letter were surprising, and I think -- and some of them were not. I mean, some of it was anticipated, because some of it was known.

You know, I think the things that were surprising are the things that we were in agreement on all the way and the things that were not surprising were things that we knew we didn't agree on.

I think that they were encouraged to work together on this. And Boeing, of course, at this time, as you're aware, Boeing and McDonnell Douglas are the same company now. They were not when we initiated the program. McDonnell Douglas and Tom Melody --

Tom Melody was an independent chief of flight tests for McDonnell Douglas, and he was very, very helpful early on in the program.

Subsequently, prior to this industry conference, as you know, McDonnell Douglas and Boeing merged into one company, and then Tom Melody now worked for Ken Higgins. So actually, you know, they were not independent in that sense.

MR. IVEY: We have interviewed Tom Melody and Ken Higgins and Larry Rockliff, and this afternoon Tom Imrich will be coming into town. So we'll have everyone onboard.

I'd like to just move down the letter, if I may --

CAPT. VANDERBURGH: Sure.

MR. IVEY: -- and just get your feelings on this. They talked about aerodynamic explanations and, the use of the term, phugoid. And I know, looking through the changes in the AAMP program, that that term was ultimately removed.

CAPT. VANDERBURGH: Uh-huh.

MR. IVEY: But I don't think that the essence -- that may have been just a term that was changed.

Did you agree with what they were saying here in reference to phugoid and --

CAPT. VANDERBURGH: Well, I think that this part is actually after the fact in a lot of respects. And by that I mean Tom Imrich and I, Tom and I worked on the program prior to this industry meeting, and Tom at that time did express his concerns about a few things in there that were not engineering technically accurate.

And Tom knew that I in fact developed this program, the basis for the program, the Bible for the program was Airplane Performance, Stability and Control by Perkins and Hage. I used that to write the program in 1995.

I had -- I did understand that the use of the term, phugoid, was not perfectly technically correct. It is a static stability issue. However, I was using it as an instructor because it was a great word, and pilots can latch onto a word and associate the behavior with the word. It's an instructor technique.

However, the engineering background that Mr. Imrich and others have made them uncomfortable with the word being used in not a pure sense. And so I understood that, I did agree with that, and I removed the word from the program.

Tom also expressed concerns that I was not using the Greek lettering that is displayed in Perkins and Hage for the various axes and flight path angles.

I did explain to Tom that the problem with that was that, you start talking Greek letters to pilots, and the pilots are going to fall asleep.

So we have to have something the pilot can relate to comfortably and hold his attention that he can remember, so I was using the English alphabet.

However, we did agree, and he was very comfortable with the idea, that I would change some of the letters in English so they would better relate to the Greek lettering.

This all occurred well prior to this letter being written. And this meeting -- in fact, I went to Seattle. I was in Seattle on 777 business, I think. But I had a separate meeting with Tom in Seattle for a couple of hours, and he and I went over these issues that we are discussing at this table now, resolved them, and then I incorporated them.

So this particular paragraph coming in the letter was like, Well, we already did this.

MR. IVEY: You beat them to the punch?

CAPT. VANDERBURGH: Well, yes. And Tom was aware that we had agreed on exactly how to handle this.

And so phugoid was removed, and the lettering was changed, and Tom Imrich, as far as I know, was satisfied with those changes.

MR. IVEY: Regarding the word, corner speed, give me an idea of how that term was developed and its use for the presentation. Did that come from your military background or how was that developed?

CAPT. VANDERBURGH: Well, yes. That did come from my military background. But the incentive to put that in the program was the study of the accident histories that we were concerned with. In other words, the accidents we were looking at were the loss of control accidents from 1987 through 1995.

And when you study those accidents, you will find accidents in there where pilots are attempting to pull out of a dive in well in excess of 360 or -70 knots with the throttles full forward. This is clearly not conducive to longevity.

Likewise, you will see pilots at very low air speeds, near approach speeds, trying to recover from a dive prior to ground impact with the power in idle.

Well, when you look at those accident statistics, you're motivated to try to find a way to communicate to the pilots that there is a way to shorten this turn radius and thereby avoid ground contact in attempting to recover from the dive.

So the consequence of that, it became -- it appeared to us that it would be important to educate the pilots in the concept of corner speed, not to the degree that they had to fly it like a fighter pilot would fly it.

In fact, we tried to simplify it greatly, to the point that it was only necessary to have an approximate idea of where corner speed might reside in your airplane, because, of course, it's weight dependent.

But you can certainly have a ballpark idea of where corner speed is when you're on approach or where corner speed is when your wing is clean, i.e., when your wing is dirty or clean. And knowing that, you can react appropriately.

To take this one step farther, we actually have testimony from an Avianca captain who believes his airplane, his life, and his passengers were saved by the knowledge I imparted to him on corner speed.

MR. IVEY: Did he have a target value in mind but either -- was he clean or configured? Do you recall?

CAPT. VANDERBURGH: He was in a holding pattern at Quito, Ecuador when the airplane departed due to a stall. And prior to the course, his instinct, he said, would have been to pull the power off. But instead, in the ensuing dive recovery, he pushed the power in and just made it out prior to ground impact. You know, in Quito the terrain elevation is quite high there.

He had taken my course three months earlier. The only thing I can say is, he seemed to understand the concept, but he had not prior to that course.

MR. IVEY: Turning to the use of rudder, there is discussion in the letter that pertains to rudder and high angle of attack use.

And one comment that basically was made, and I quote, talking about rudder reversals, that, "Rudder reversals such as those might be involved in dynamic maneuvers created by using too much rudder in a recovery attempt can lead to structural loads that exceed the design strength of the fin and other associated airframe components.

The hazard of inappropriate rudder use during wind sheer encounters, wake turbulence recovery, and low air speed at high angle of attack, for example, stick shaker, should also be included in the discussion."

Do you have any idea why people were concerned and wrote about the use of rudder in this letter regarding your program?

CAPT. VANDERBURGH: I think the truthful answer is no, in the sense that we are in agreement throughout, as far as I know, the industry on the proper use of rudder.

We have been teaching all along that coordinated rudder needed to be used at high angles of attack and that in the normal flight envelope that we fly on a daily -- on a normal profile, that you didn't need any rudder.

I mean, the normal alpha ranges you would expect to be in on a regular profile, modern airplanes coordinate the yaw damper and spoiler, and there's no need for rudder.

But as the alpha increases in an event such as microbursts beyond the normal range to a very high alpha range, well, then coordinated rudder becomes necessary, and in some airplanes, such as an MD-80 aircraft, it becomes essential.

And so we have 360 of those in our airline, and so we have to train the pilots to use coordinated rudder at very high alpha.

But everyone I think is -- I was surprised by this because certainly that's -- we're all in agreement it needs to be used there. And the way that we use it I think is also in sync with what the manufacturers would expect. So in that regard I was surprised. Yes.

MR. IVEY: Do you have any idea why they expressed these concerns based on your program?

CAPT. VANDERBURGH: No.

MR. IVEY: In the -- forgive me -- I'm not sure if it was Tape Number 4, at the conclusion there is some added, and I'll use the term caveats where you actually address issues such as the amount of rudder and the use of rudder and coordinated rudder. Were those caveats added to the end of the presentation as a result of this letter?

CAPT. VANDERBURGH: Yes. They were as a result of this letter, because this was the first time that we had seen or heard the statement that you just read, i.e., that there was some structural concern. This was the first time I had heard this from anybody. And so I was surprised at that one sentence, you know.

But of course Captain Ewell and the others involved in all this rightfully, and myself included, said, Well, if that's a concern, then we'd better be absolutely sure -- absolutely sure -- that every pilot clearly understood what we had been saying.

And so to reinforce our message about the proper use of coordinated rudder, we decided that I would add, we would tag -- because that was not part of our plan -- we would tag this six or seven or eight-minute segment to the unusual attitude recovery procedure and mail it to all 11,000 pilots to be absolutely sure that they understand the proper use of coordinated rudder, i.e., small, smooth amounts.

MR. IVEY: The coordinated rudder, in a generic sense across all fleets, how is a pilot to know with automated airplanes and the supplements that are in there with automation, how is a pilot to know how much is coordinated rudder versus too much or too little?

CAPT. VANDERBURGH: Well, that's a very good question. And the emphasis that we put on the program is that you're going to use roll controls to control the roll axis all the time. At low alpha you won't need any rudder, because it will respond as it should.

At higher alphas, then you're still going to lead with roll control. But when the airplane is not responding to the roll controls, then you're going to have to start to smoothly apply rudder until you get the desired response.

Now, we do not teach pilots to look at the ball. Now, certainly what you're trying to do here is overcome adverse yaw, as everyone understands. The airplane is yawing the wrong way and is trying to roll against the direction that you're attempting to roll in. So you're applying rudder now to true the airplane out in order to enable the roll response you're looking for.

Well, we don't teach pilots to look at the ball. The reality of it is you're trying to center the ball.

But the AAMP program doesn't teach the pilot to watch the ball during a microburst recovery or some other critical flight attitude recover, CFIT, you know, GPWS response, those kinds of things. It would be very difficult and certainly impossible for me personally to watch the ball and still recover the airplane.

So we teach it by feel. We teach that you'll just smoothly apply rudder until the airplane exhibits the desired response to the roll controls that you have applied.

MR. IVEY: Having worked in the simulator, I realize we don't have the dynamic forces that are available in true flight in an airplane.

What is your impression of pilot recognition of side slip? Do you think most pilots know when they're in a side slip condition?

And I guess let me even narrow it further. Let's just talk about the airplane for a second, because you're going to have better indications in an airplane than the simulator. We all understand that.

CAPT. VANDERBURGH: Uh-huh.

MR. IVEY: But in an actual airplane, large transport category airplane, do you think pilots are able to recognize when they are in side slips?

CAPT. VANDERBURGH: You know, I think one of the problems here is it's hard to -- it's hard to answer that question, because we do all our training in simulators, I mean, we have to do all our training in simulators. And so we have a lot of experience watching professional pilots respond in simulators to any combination of anomalies.

Whether or not they would better sense the yawing motion in a real airplane than they do on a simulator I'm not qualified to say.

What we see, though, in simulation is that most of the time, you know, if the airplane is starting to roll, well, you know, it could be rolling due to an air mass anomaly, it could be rolling due to an engine failure, it could be rolling due to hard-over rudder, it could be rolling because one flap went down and the other didn't during configuration or didn't come up during reconfiguration.

There's a lot of reasons the plane could be rolling.

What we see in the simulator is that pilots react with a roll control to all of those things initially. Engine failure in flight, the initial reaction is normally with the roll controls.

So does that mean they're not sensing the yaw immediately? I don't know in simulation, you know.

But the generic training regardless teaches that the first thing you do to stop a roll is you come in with the roll controls. And then subsequently, if the roll controls aren't exhibiting the desired response, you come in with rudder.

Well, that deals with engine failure, and it deals with configuration anomalies, and it deals with hard-over rudder.

And subsequently what you see in simulation is, the pilots fly the plane using primary flight controls, regain and maintain control, and then will usually look around and figure out what went wrong. Oh. The left engine failed.

But it wasn't that they reacted to the failure. They reacted to the airplane's behavior and then regained control, then identified the problem, then treated it.

Would it happen exactly that way in flight? Would they sense the yaw first, you know, on an engine failure and come in with rudder without -- I don't know. I'm not qualified to say.

MR. IVEY: We certainly have in transport category airplanes during takeoff a yaw string. We have a runway in front of us. And if we lose an engine, it's real easy to use that runway as a yaw string, if you will.

CAPT. VANDERBURGH: Uh-huh.

MR. IVEY: But once that nose rises up beyond that point, from there until you perhaps have a runway in front of you for landing, the idea of a yaw string is not there other than if you, as you say, have a ball or have some sort of a lateral acceleration indicator, as on the Airbus you've got what they call a trapezoid.

Do you think having a yaw -- let's be simple -- a yaw string on a transport category airplane is a good thing? Would it be useful?

CAPT. VANDERBURGH: I never thought about a yaw string. I mean, I understand the yaw string, and I think any -- to answer the question in the simplest form, I haven't given that a lot of thought, but any information you give the pilot is helpful.

However, you know -- what you say is absolutely true. An engine failure on the runway, which is a regular part of training, you will never see the pilot get to the wrong rudder, because it's patently obvious to the most casual observer what the correct rudder is because of the way the airplane is diverging from the runway alignment.

However, in flight it is not at all uncommon -- and I'm talking about in simulator training. In flight, let's say right after cleanup, turning out of the pattern you fail the engine on the inside of the turn for a training exercise. It is not at all uncommon to see a professional pilot initially get to the wrong rudder.

He will quickly recognize that. But by now such a huge side slip has developed because of the engine already pushing the airplane into the side slip, and then the added improper rudder amount puts it in a pretty good -- he recognizes that and now takes essentially all the rudder in the airplane to retrue the airplane back.

That's not uncommon to see that in training. Professional pilots recover from that. But as you point out, the situation awareness once you're in flight and especially in weather, it is more difficult to deal with that correctly on your first move.

And that is one of the reasons that we train to roll control first and then to always coordinated rudder coordinated rudder in the sense that coordinated rudder always goes in the direction you're trying to roll.

That would preclude you from getting the wrong rudder, i.e., if the pilot is trying to do this by some other sense, you know, step on the ball, step on the down-hand, or some rule he might have, he's less likely to make a mistake and get the wrong rudder.

However, it does happen in training, and it results in some very large yawing moments on the airplane.

MR. IVEY: I'm certainly not trying to suggest that a string be on the outside of the airplane, but at least some device to recognize the yaw.

We've talked to simulator instructors, and I've asked about, do pilots typically look outside for recovery as opposed to looking on instruments? And testimony has been given that basically you're in a low light condition, or you could be at IFR conditions, so the horizon is not readily available, which is certainly understandable.

I guess I'm going to ask you for your opinion in terms of being in an airplane, an actual airplane, do you -- and on a VFR day -- and I'm not trying to suggest the conditions of Flight 587.

But do you think a pilot would, if he encountered an upset condition, do you think he would have a greater tendency to go outside to see what's going on, or would he tend to focus more on his primary instruments, the PFD in the case of the A300? What do you think?

CAPT. VANDERBURGH: I'm not sure I'm qualified to answer that. My opinion is that airline pilots would probably look inside, even on a visual day. The airline pilots are more prone to look toward their instruments for information than to pick up their situation awareness by looking outside at the horizon.

MR. IVEY: The concept of crossover speed or crossover angle of attack --

CAPT. VANDERBURGH: Could we stop for one minute while I get another glass of water?

MR. IVEY: Absolutely.

(Whereupon, a short recess was taken.)

MR. IVEY: In the crossover speeds, they mention the term -- regarding crossover speeds, is that something that's used a lot in the upset maneuver program, or is it more for demonstration purposes, or was it just a term that was made available to the pilots?

CAPT. VANDERBURGH: Yes. Now, the manufacturers in the industry training they produced use crossover speed. Now, at American Airlines we use crossover angle of attack, just to clarify that.

I mean, the crossover -- and the discussion of crossover angle of attack really revolves around two things.

First it is to emphasize the effectiveness of the rudder at high angles of attack. As you are aware, when you are at an angle of attack above crossover angle of attack, i.e., a higher angle of attack, a fully displaced rudder by definition will overpower fully displaced roll controls against it.

So the discussion of crossover angle of attack does two things. It is first to show the pilot how effective or powerful the rudder can be at the higher alphas, i.e., that he has to be careful and judicious in the smooth application of this rudder at high alpha because it is so effective.

It also teaches the pilot that the rudder in fact can overpower his roll controls. And his understanding of that and its relationship to angle of attack is what will enable him to recover the airplane if that should happen to him.

As accident history has indicated, this can happen. It is listed as the most probably cause in two hull losses on the 737.

And so we wanted to be sure that we could train the pilots to recover from that type of an incident, hard-over rudder, on any airplane, not just the 737.

And so we felt the understanding of the issue was important both for recovery from control malfunction, and also for proper aircraft handling when the controls were functioning normally.

MR. IVEY: One of the subjects discussed regarding the airplane recovery from upsets was the use of secondary controls as opposed to primary flight controls, specifically trim.

CAPT. VANDERBURGH: Uh-huh.

MR. IVEY: At the time of the letter, how did you feel about the use of trim as part of a recovery?

CAPT. VANDERBURGH: Well, the way that we teach in the Advanced Maneuvers Program is that you use the primary flight controls, the ailerons, the elevator, and the rudder of the airplane, to affect the recovery, applying the proper procedure or technique.

You can use stabilizer trim or thrust vectoring effects to trim off pressures. However, we do not teach that you would use those as a primary control force to affect the recovery.

We feel that the running stabilizer trim in a number of critical flight attitude recovery scenarios can lead to serious secondary problems in affecting the recovery.

Likewise an early selection of thrust vectoring effects can also result in problems, whether it's a loss of energy or in fact, in the case of yawing moments, a selection of the wrong thrust vector.

MR. IVEY: It was brought to our attention that in November of last year and I believe prior to the accident on November 12 that in the 777 that now there may be an additional emphasis or usage of trim during recovery. Could you enlighten me on that?

CAPT. VANDERBURGH: I am a 777 captain, and I am not in training anymore. I saw the change enter my manual to the nose-high recovery procedure. Is that what you're referring to?

MR. IVEY: Yes, sir.

CAPT. VANDERBURGH: And I am not sure that I am in a position to know why that change was affected or what caused it to be affected. You would have to ask someone in American Airlines management why that was changed.

If you're -- are you asking me my opinion on that procedure?

MR. IVEY: That was my very next question, sure enough, your opinion. And what do you think about that change?

CAPT. VANDERBURGH: I am not at all comfortable with that change. Clearly that goes against our original covenants, which was that you would use primary flight controls to recover the airplane from a critical flight attitude and use secondary flight controls to trim off pressures.

In that particular recovery, that is a recovery for a nose-high unusual attitude. If that event occurs at low altitude and low energy -- and most of them do -- either on takeoff or missed approach, our procedure, using primary flight controls was to push the elevator forward toward a zero G Force if that was achievable and as much forward elevator as it might take to achieve that.

And then, second move was to roll the lift vector off if the nose pitch rate was not adequate, i.e., the nose-down pitch rate was not adequate to recover immediately, we would roll the lift vector off in order to generate a nose-down pitch rate regardless of what was wrong with the airplane; i.e., whether the stabilizer had gone full nose-up, if it was jammed, whatever it might be, that would bring the nose pitch rate down.

The procedure that is currently being implemented on the Boeing 777 is I believe the Boeing 777 procedure, which states that you will push the yoke full forward, does not relate in any way to the G Force that might be created. It just says you'll push the yoke full forward.

And then, the next step it says is to start trimming the stabilizer toward nose-down, and, then, the next step is to pull the power off.

I do not agree with that process. I think that the resulting consequence could be catastrophic.

The stab may or may not trim toward nose-down, dependent on whether it's jammed. If it does trim toward nose-down, how much are you going to trim it down?

As you continue to trim it down and then remove the power, if in fact you succeed in pushing the airplane over the top, she is going to pitch down, but now there's a possibility you will not have the pitch authority with elevator alone because you have trimmed the stab down to pull the airplane out of the ensuing dive.

More importantly, though, in reducing thrust, although we all agree that with under-wing engines there is certainly a thrust vectoring effect on the pitch axis, if you reduce thrust rather than roll the lift vector off, there is no scenario that I can envision that you will not end up with less energy after the airplane recovers to level flight than if you had not left the thrust on or increased it and rolled the lift vector off.

So net-net you're going to end up at a higher energy level by leaving the thrust vector in, and you are guaranteed of getting the nose back to the horizon by rolling the lift vector off.

So I believe that the procedure that had been in there previously has a much higher probability of success in every scenario that you can envision than does the procedure that Boeing keeps in their manual, which involves the elevator full forward, trimming the stabilizer toward nose-down, and retarding the power.

MR. IVEY: I'd like to turn to the use of simulators. There was concern expressed in the letter about the fidelity and the ability to detect lateral and linear forces in the simulator.

We all know a simulator is not an airplane. Do you think that the simulator -- not any particular simulator, but a simulator in general -- is capable of giving pilot reasonable expectations for recovery compared to the real airplane absent these lateral and linear feelings or inputs?

CAPT. VANDERBURGH: I think to start with the simulator is the only tool that we have to train pilots, and especially in this environment. We certainly cannot do these kinds of maneuvers in the actual transport airplane.

So starting with the only tool that we have, we have to ensure as best we can that the fidelity of the simulator is replicating the performance of the airplane.

We did I felt due diligence in the sense that we were careful to monitor during the initial modeling of our upsets, and also during the recoveries we monitored the alpha and beta ranges that were being experienced during both the onset and the recovery to ensure that alpha for known flight data and beta for known side slip for known flight data were not being exceeded.

It is our belief that as long as you don't exceed alpha and beta for known flight data that the simulator will behave essentially the way the airplane does regardless of attitude, because the simulator, just like the airplane, does not know where the world is, it only knows what the alpha and the beta are. So that's one part of the equation.

And I think the other part of the equation you were asking me about -- and tell me if this is correct -- was the sense that the pilot gets or the feel or the lack of G Force.

MR. IVEY: Right. The lateral acceleration.

CAPT. VANDERBURGH: Okay.

MR. IVEY: Or linear, too, for that matter.

CAPT. VANDERBURGH: Okay. So maybe I got off track there.

The simulator cannot recreate G Force in a realistic way. There are sensations in the simulator, but those sensations do not replicate the G Forces, whether they're in the lateral or the vertical axis. So we don't have a fix for that. We can't put these things in a centrifuge or anything, so that's always gong to be a problem.

But I think nonetheless to not do the training because the physical senses are not there, the sensation of G Force, would be irresponsible.

Because I think the training has clearly showed us at American Airlines that there was a need for it, that it does evoke the proper control inputs and responses, and that prior to the training or early on in the training there were numerous procedural mistakes on control inputs being made by the pilots; i.e., at or past 90 degrees of bank it would not be unusual to see back pressure applied to the yoke.

We feel the training has trained much of that out of the pilots, and that's a desired learning objective, and it's achieved with or without the appropriate G Force being felt in the airplane.

Now, certainly the kit bag did not fly up to the ceiling when he pushed forward on that yoke, and it would in reality. But nonetheless, he applied the correct control input, and he learned to do that through that training.

MR. IVEY: In your discussions with pilots around the world -- you even mentioned the Avianca down there in Quito -- was there ever any feedback from pilots -- perhaps him -- regarding lateral forces or linear forces during his recovery, or have you heard from other pilots around the world on other incidents of that nature regarding lateral and linear forces?

CAPT. VANDERBURGH: No. You know, as I recall he did not comment on the G Force. And from the letter that I received it sounded like that he must have experienced a pretty significant G Force in the recovery to succeed. However, he did not comment on that in the letter.

I have not heard from pilots with real life experiences any particular comments or concerns about the forces that they experienced. There certainly is a discussion about the simulation that we were talking about or the lack of those senses. But from real world events I have not gotten feedback from pilots of anything that was particularly surprising or abnormal.

Does that answer your -- was that the question?

MR. IVEY: Yes. Yes. In your presentation in the videos you actually use two of the NTSB recreations, one that was associated with the Colorado Springs 737, and, then, the other was with the Pittsburgh 737 accident.

However, you also were provided from Boeing, I presume, two recreations that were in a 737, one of which began by having a full rudder application in, and the second scenario starting point was with neutral rudder and then a full rudder application.

Would you take me through those two scenarios and why these were, number one, developed by Boeing, and number two, provided to you for training? And what was it that was imparted to the students that observed this?

CAPT. VANDERBURGH: Well, first, Boeing was very kind to share those videos with us. And I think they made those videos -- and I can't speak for them.

I think they made those videos in the right vein in the sense that even though there had not been any finding -- in those two accidents which you referred to, at the time that they made those videos, there had been no finding by the NTSB.

But I think Boeing, in a very proper way, was saying, Well, if this is -- could be what's happening, you know, how do we develop an understanding of it?

So basically your question is, well, how did we use that, and what did those videos tell us?

Well, the first one is a pilot, a Boeing flight test engineer, I suppose, holding the rudder fully in -- I believe the right rudder -- holding it fully in as he slows the airplane down in flight, a Boeing 737.

I believe his configuration is slats or Flaps 1, just slats out only. And he is slowing toward 190, which monitored 190 knots, which is the configured speed for that configuration.

As he slows, starting at around 215 or -20 knots, as he slows toward 190, what's happening is, of course, at 1 G flight the angle of attack is increasing.

And as the angle of attack continues increasing to the slowing air speed, you'll see that, although he is holding full right rudder, he is having to continually increase the amount of left yoke in order to keep the airplane from rolling over.

It's an excellent demonstration for all of our pilots to watch.

So as he holds the rudder fully in, he has to put more and more yoke in as the angle of attack continues to increase.

Now, on these videos Boeing is going to be talking and does talk about crossover speed, so we have to take that off, and we talk about crossover angle of attack. Because the reason is, it doesn't relate to a speed, it relates to angle of attack.

It's only a speed if you keep the airplane at 1 G all the time, because then we can relate speed to alpha, because this is really an alpha issue.

And the problem is in these accidents is obviously the pilot is not going to stay at 1 G all the time. Especially if his airplane is going into a big bank, he's going to pull back on the yoke in order to keep the nose from falling. That's just what airline pilots do.

And so as he pulls back on the yoke, the alpha is going to go up, and speed ceases to be an issue. You can be going 240 knots even though your, quote, crossover speed is 200, and if you pull back on the stick and increase alpha at 240, you're going over due to the full-over rudder because it's an angle of attack issue.

So at American we don't use the speed part of that -- we don't emphasize the speed, we emphasize the alpha, because we want the pilot to understand it's really whether he's pushing or pulling that's going to make the difference here on this roll axis.

So as he continues to slow down, we see that the pilot will run out of yoke. In 1 G flight with full right rudder, he finally hits crossover angle of attack at the time that the yoke hits its stop. At that point we're at crossover alpha.

Now, as he continues to slow past that point the airplane will now roll against the roll controls due to dihedral effect, which is the consequence of the rudder being fully right. Although the yoke is fully left, the rudder is now the most effective and most powerful roll control in the airplane.

We're still well within the airplane's flight envelope, but we have reached crossover angle of attack. So that demonstration is in there.

And then it continues. As it continues, he has full left yoke. And as long as he keeps pulling that yoke back in an attempt to -- on the diagram it shows him pulling the yoke back. And as long as he keeps pulling the yoke back in an attempt to maintain altitude or stay at 1 G, the airplane will continue to roll until it rolls inverted.

It shows as the airplane approaches 70 degrees of bank or so that at that point the engineering test pilot pushes forward on the yoke, thereby lowering angle of attack and reempowering the roll controls, or more appropriately, disempowering dihedral effect being caused by the rudder, which then allows him to roll out.

With the extra speed that is gained in the loss of altitude or the slight dive, he is then able to pull out at slightly more than 1 G without exceeding crossover angle of attack.

What the pilots learn from watching this is that you can recover from this by reducing alpha. You can regain control of your roll axis by reducing the angle of attack.

Further, if you pick up your speed you can get back to 1 G flight even though the rudder is still fully displaced. You'll have enough roll control to fly the airplane.

And when we get into our recoveries, then, it makes sense to them what's happening and why our recovery procedure actually works even though they don't know what's wrong, because again, our basic philosophy is the pilot probably won't know what's happening to him, he's just going to react to the way the airplane is behaving.

So we'll regain and maintain control, and then we'll treat the problem with differential thrust and things like that later.

In the second video that you asked me to review, the second segment of this, what the engineering test pilot does is, he's flying along with everything neutral, the airplane is trimmed up, it's at the proper speed for its configuration, which I again believe was Flaps 1, the slats are out, and he's at 200 knots or 195 or something.

And at that point what the engineering test pilot does, with everything symmetric, everything flying perfectly, he slams, I believe, the left rudder all the way to the floor, fully displaced instantaneously all the way to the stop.

And of course what happens now is the airplane immediately goes into a severe yaw and then, of course, rolls to dihedral rather rapidly to the left.

The pilot takes a human factors delay, appropriate human factors delay, of three seconds and then goes against that roll with full aileron deflection, aileron spoiler deflection, in an attempt to stop the roll.

But then in that demonstration what he does is he tries to keep the nose -- as the plane is rolling, he does what airline pilots will probably do, which is he'll start to pull back on the stick and attempt to keep that nose from dropping.

As he pulls back on the stick, of course, the roll rate simply increases, because the angle of attack is going up and the rudder is full in. So the dihedral effect becomes even more powerful, and the roll rate actually increases, and he starts to basically roll over.

Again, to recover what he does is he pushes the yoke forward, lowering alpha, keeping the roll controls fully against the roll, and then, disempowering the rudder, the airplane will start to roll to the roll controls and roll out.

Now, on the next one -- in that one there -- I'm sorry. In that one there I think what he does is he holds it in. I take that back. In the second one what he actually does is he keeps holding it in, and the airplane basically just goes into a rolling spiral to the left and keeps going, doesn't stop.

On the third demonstration he does the same. He starts with everything neutral. The Boeing engineering test pilot starts with everything neutral and trimmed up at appropriate speed for the configuration.

He again jams full rudder all the way to the floor, holds it, same thing happens, a yaw, a roll, a dihedral roll to the left. But this -- he takes a three-second human factors delay, then he goes full against it with yoke.

But this time instead of pulling back, he intentionally pushes forward, and the airplane immediately rolls right back out again, because he has lowered angle of attack.

And so those videos I think were very helpful in showing the pilots the airplane's reaction to the rapid application of the rudder.

And so it helps them to understand, more importantly, the association of alpha and dihedral effect and how they relate directly one to the other.

And again, a demonstration of just how effective that rudder is and how powerful it can be at the higher angles of attack, how the knowledge of that can help you if you use it carefully and smoothly, and also the knowledge of that -- or the understanding of that can help you when the controls malfunction and you need to recover from that malfunction.

MR. IVEY: Do you feel like the AAMP program overemphasized the use of rudder?

CAPT. VANDERBURGH: No. I think that there might be an impression that it was overemphasized, only in the sense that in a training technique -- let me start that again.

I think it might have been felt because some may have been looking at the workbook. I mean, my feeling has been those that might have gotten that idea were getting it by looking at the workbook.

And the workbook is exactly that. It is not a stand-alone document. It was never intended that anyone should pick up that workbook that had not taken the program and infer anything whatsoever from the workbook.

It is simply a workbook that was supposed to be used by a person that was in attendance at a 6-1/2-hour program on which he would take notes, placing them below each of the slides. And the slides are simply briefing bullets. They will not stand alone. Many of those slides I would brief as much as 15 minutes.

So I think that anyone in attendance in the course would not come away with a feeling that the rudder was overemphasized.

Basically you would see it in the workbook fairly often simply because even the basic aerodynamic issue and the proper use of coordinated rudder was covered in the first two hours of the program, along with a lot of other aerodynamic issues. It would be used later in the program.

And then, later in the program what we do is take accident examples and use them, using this aerodynamic foundation show how you can recover from each of these accidents by applying this knowledge.

And a common instructional technique is to reinforce those things that you learned, and you're reinforcing by example.

So even though that rudder may show up very often, it was not -- it's just a small part of the program. The Advanced Maneuvers Program is about a lot more than proper use of the rudder. And I think those that have taken the course are well aware of that.

Those who might have just used the workbook as a reference could possibly have gotten the wrong impression. That's the only explanation I have for that.

MR. IVEY: Do you think that might have been the case for the response that was in that letter to Captain Ewell, that they may have indeed looked at that course work as opposed to have seen the entire presentation along with the supplemental workbook and gotten that impression?

CAPT. VANDERBURGH: I think it's entirely possible that they or others perhaps who had not taken the course in its entirety had made some assumptions that were incorrect perhaps.

Because I have trouble imagining anyone who took that course making some of the comments that are made in here on use of rudder in this letter that was sent to Captain Ewell.

MR. IVEY: One of the revisions that I have looked at -- and I know there were many changes made to the workbook -- that on the one that was changed back in about September of 1997 there are terms in there that talk about coordinated rudder. And the term, coordinated rudder, is in there.

And as you -- we discussed earlier and you answered about the caveats, as I called them, at the end of the video even suggests the amount of rudder to be used. So those apparently were changes at least -- and correct me if I'm wrong -- at least in consideration for what they said.

CAPT. VANDERBURGH: Oh, it's absolutely in consideration of it. Even though we felt that we were presenting the issue clearly and correctly and were in absolute agreement on the proper use of coordinated rudder, since it was still being questioned by some apparently or was being questioned by some, then we felt like, Well, what else can we do?

So we wanted to be sure we just, you know, put the word in there. It's coordinated we're talking about. We wanted to be absolutely sure.

That, along with, as you say, the addendum to the initial video, that's all an attempt to be -- to ensure that there was no one out there that had the wrong impression about what we were saying.

MR. IVEY: Yes. You mentioned that you returned to line flying a couple of years ago. Did you leave the leadership and continued development of this AAMP program voluntarily? Was it a personal decision that you made to go back to line flying?

Was there anything associated with this AAMP program that had taken a turn in a direction that you were not in approval of that prompted you to return to line flying and to step down from the helm of the AAMP program?

CAPT. VANDERBURGH: Oh, no. I wouldn't say that. You know, I had instructed for many years and been a check airman; an FAA designee; I had worked very hard on the Advanced Maneuvers Program.

I had been very fortunate to have Captain Ewell and others give me some very interesting assignments while I was a check airman and a designee. I enjoyed all of that.

I had three years left to go with the airline, and there was a significant change occurring in management, both at the top and the Vice President of Flight, as well as the manager and director of training, Lee Schumacher, was retiring. There was a lot of changes happening.

And I thought, you know, this is a good time for me to exit and get back out and enjoy the world's best job, which is a senior 777 captain at American Airlines.

So it was time for me to go back and get some flying in before my career was over, and that's the reason I returned to the line.

MR. IVEY: Not as a result of management acceptance or rejection, it just seemed like a good time to make that change?

CAPT. VANDERBURGH: Well, there was a big management change at the time. Every management has a -- every group that comes in and a different group of managers has a different way of doing business.

However, it was not my sense that the Advanced Maneuvers Program or anything else like that was being rejected. No.

MR. IVEY: All right. Thank you for your questions. Let's go off the record for a moment.

(Discussion held off the record.)

MR. IVEY: Thank you for your comments, Captain VanderBurgh.

And I'll go around the room and see if anyone else has any additional questions they would like to ask. And I'll start with Dr. Bart Elias.

DR. ELIAS: Yes. Thank you, Dave.

Thank you, Captain VanderBurgh, for being here today. Dave was pretty thorough, so I really don't have too many questions.

One thing I want to get straight, though, is, we've been talking about the AAMP program primarily in terms of the initial ground school program that you had developed. Were you also involved in the development of the simulator scenarios that were developed for the unusual attitude recoveries?

CAPT. VANDERBURGH: That's a very -- developing those scenarios is very sophisticated business. I was only involved to the extent that I, you know, suggested what types of scenarios we might need to evoke the desired responses from our pilots, what would be appropriate to achieve the desired learning result. Okay?

The actual development of the various profiles in the simulator that would lead to upsets, that would require the pilot to have to recover from either a nose-high upset or a nose-low upset was affected really within each fleet through the program development section there.

A gentleman named Ashak Goshal [phonetic] kind of heads up our simulation division, a very, very smart guy. And I wouldn't have the slightest idea how to program any of that software, you see.

But one of the covenants that I requested was that any of the upsets would be accomplished within the control laws of that particular fleet aircraft, because you can -- I mean some aircraft cannot be upset in the same way as others because, as an example, their stabilizers behave in different ways.

You can't necessarily upset some Boeing airplanes with runway stabilizers. If a pilot goes against it, it's going to lock. And so you couldn't deny that.

What I'm saying is that my request was that all of these models would be accomplished within the control laws of that particular fleet aircraft. So each fleet might be -- you know, the upset might be developed and affected in a little different way.

But the actual development really was under, you know, the supervision of the fleet manager and simulation engineering. Does that answer your question?

DR. ELIAS: Yes. I'd like to just follow up a little bit on that. But in terms of just saying that you wanted a nose-high and a nose-low or a roll or unusual attitude, was that part of your initial planning?

CAPT. VANDERBURGH: Yes. Absolutely. In other words, if you mean conceptually, the program, if I understand your question, the program cannot possibly stand-alone in the ground school, it cannot. I mean, there's no way. It has to be reinforced with some sort of flight training. Obviously that would have to occur in simulation.

And so there had to be a simulator portion to the program that would reinforce the behaviors that we were trying to encourage in the ground school portion of the program.

As with any flight training program, it cannot stand-alone. Without the simulation portion you could not, a) reinforce it on a regular basis, the behavior you would like for a one-time life threatening event.

And secondly, you cannot ensure that the concepts are understood, which, as an example, the high AOA maneuvering demonstration that we would do in the simulator would be to teach the pilot the behavior of his aircraft as it relates to the roll controls and subsequently the required coordinated rudder at high angles of attack.

It would teach them, in fact, that they have to put very small, smooth amounts of rudder in at high alpha, but that small, smooth amount is very effective.

The simulator would show you that during our high angle of attack maneuvering demonstration, which would hopefully not only enable the pilot to better control his airplane at high alpha, but it also showed him the consequences of over-controlling the yaw axis.

DR. ELIAS: In terms of when those were developed and the software was written to create those scenarios, was it ever brought to your attention that in order to invoke these unusual attitudes that flight controls were either inhibited or degraded during the entry into the unusual attitude?

CAPT. VANDERBURGH: It was my understanding that we would not do that if it was at all possible. If any of that was necessary to get the desired result out of the airplane, I'm not aware of it being done to any significant degree.

I think, as an example, and the ones that I looked at because they were my fleet was the 75, 76. You would have to ask the other fleet managers, you know, about each of their fleets. But I think the attempt was made to ensure that the pilot would not get any false sense of lack of response or anything.

So in my fleet, as an example, on what we have labeled the roll maneuver, which perhaps would simulate something like a wake vortex, if you went aggressively against it with the roll controls, you slowed things down.

In other words, if you didn't do anything with the roll controls it would roll over really quickly. And if you went aggressively against it with the roll controls, it would slow down, perhaps even stop by the time you got to 90 degrees.

So the roll controls were not eliminated. I'm not sure I can tell if they were inhibited at all or not. You would have to ask, you know, one of the simulation engineers.

But my point here is, if you went aggressively against that roll with roll controls, you had an effect. You may not be able to stop completely, but you had an effect. Does that make sense?

DR. ELIAS: Yes. Certainly. And once these scenarios were developed, I assume that you might have had the opportunity to look at some of the different simulators, different fleets, and also get some sense of maybe some of the differences.

CAPT. VANDERBURGH: Uh-huh.

DR. ELIAS: Particularly in terms of the nose-high unusual attitude, were there any particular airplanes -- I know the recommended procedure is to use a little bit of rudder to help you in bringing that nose down.

CAPT. VANDERBURGH: Can I correct that?

DR. ELIAS: Yes. Sure.

CAPT. VANDERBURGH: That is not -- that was not ever a recommended procedure. Our procedure is to hold -- go forward on the yoke towards 0 G, and then to use the roll controls -- the roll controls -- to roll the vector off.

Because if you've achieved near 0 G, you've achieved it, then your angle of attack is very low. And you don't want any -- well, not that it would hurt you, but you don't want any rudder in here, it's counter-productive.

The airplane will roll very nicely to the roll controls, because you are at a very low alpha, regardless of speed. Even though you've let up a lot of speed here, because you have achieved this lower angle of attack by unloading, roll controls is all you want here.

We never suggested any pilots using any rudder in this maneuver. Okay?

Now, if you've got all the roll controls in in some strange scenario where she simply wouldn't respond to the roll controls, which means perhaps your stabilizer is full up and your elevator is not helping and you are still at a high alpha, well, maybe, maybe now you need some. Okay? You're out of this, maybe you need some rudder.

But normally in that recovery no rudder should be applied, because you're at a very low alpha. So you should respond to the roll controls, and the lift vector should come off.

And on these airplanes, even in the worst scenarios that we've worked in the simulator, you don't get very far with this. I mean, you know, by the time you're at 40 degrees of bank or so, you've got the nose coming down if you're holding the yoke forward.

DR. ELIAS: Okay. Thank you for correcting me on that. And with regards to that, then, are you aware of any simulators across fleets that might require some use of rudder or more use of rudder in that maneuver than others?

CAPT. VANDERBURGH: I am not. I am not. The ones that I flew would recover very nicely -- and I mean the ones in addition to the 75, 76, which I flew at the time. Now, I have not, you know, flown all those simulators for those upsets for two or three years.

But during the recent times after development and all, the ones that I looked at and the fleets that I flew, even though the nose-high upset was fairly aggressive, all of them could be recovered very nicely by forward yoke pressure and use of roll controls only to roll a lift vector off.

DR. ELIAS: Thank you. I got the opportunity to review some of the videos that we were discussing earlier last week. And there were a few topics that were introduced that I'd like to ask you a few questions about.

The first is, you introduced the term, top rudder. Could you please explain what that term means and how it is to be applied in terms of unusual attitude recoveries in transport category aircraft?

CAPT. VANDERBURGH: The term is used and it is explained in some detail in the Advanced Maneuvers Program. It relates to trying to recover the airplane from a nose-low, beyond-90-degrees-of-bank attitude. That's the only time that it would be used.

So in the attempt to recover the airplane from nose-low, beyond-90-degrees-of-bank, the first thing of course the pilot is going to be doing is pushing forward on the yoke. He's beyond 90 degrees of bank, so he's not going to -- if he pulls back he's going to pull the nose into the ground.

So he would need to be pushing forward on the yoke in order to lower the alpha and reduce the lift, because the lift vector is pointed at the ground.

And so he pushes forward on the yoke. Well, when he pushes forward on the yoke he's going to dramatically reduce angle of attack down toward a very low alpha.

Next thing we teach him is he's going to roll the airplane with roll controls, because we're at a very low alpha. We won't want any rudder in here, we just want roll controls. We don't need any rudder to help. She'll respond quickly to the roll controls.

But quickly in an airliner is not real fast. And so even though the yoke is full over, you're trying to get this lift vector pointed up. The airplane is going to be rolling fairly slowly back towards right-side-up, i.e., getting the vector pointed toward the sky.

So as he rolls through this portion where he's going to 90 degrees of bank, there's nothing lifting, and the airplane is going to want to try to slice out. The nose is going to want to drop in this portion, because there is nothing to keep it from doing so.

So top rudder in this case is the application of rudder in the coordinated direction. In the sense that you are rolling right in this example, we teach always you push the rudder in in the direction you're trying to roll, always. There's no use, we teach, for opposite rudder except possibly cross-wind landings. Okay?

So coordinated rudder in this, in a sense it is in the direction you're trying to roll, but because you're unloaded it's not affecting the roll. But what it is going to do is, if you put the rudder in, it will act as the elevator of the airplane during this time that the airplane is near 90 degrees of bank.

It will help reduce the rate at which the nose is falling. It won't stop it on these airliners, the best we can tell, but it will dramatically reduce the rate, which could be very important depending on how close you are to the ground, i.e., how much altitude will be lost in the ensuing dive recovery.

So the top rudder relates to the application of rudder in the coordinated direction -- in the coordinated direction -- during a recovery from a very nose-low maneuver that is beyond 90 degrees of bank. It's the only time that we use it.

We use it to effectively hold the nose up while we get through that portion of the roll that is critical.

Once the lift vector comes up beyond, let's say less than 60 degrees of bank, then we want to be coming off of that rudder and coming on with back pressure and start pulling the airplane out of the ensuing dive. Does that make sense?

DR. ELIAS: Okay. Yes. Thank you for that explanation.

I think you also talked a little bit about maneuver speed. I don't think you spent a lot of time talking about it. But in terms of maneuver speed, can you convey to me your understanding of what protection maneuver speed gives you with regard to rudder input?

CAPT. VANDERBURGH: Are you talking about maneuver speed as in VA, are you talking about crossover speed, or are you talking about --

DR. ELIAS: I'm talking about VA type of maneuver speed.

CAPT. VANDERBURGH: Okay. And what protection that gives you?

DR. ELIAS: In terms of control inputs, and particularly with control inputs with regard to rudder pedal inputs.

CAPT. VANDERBURGH: In regard to rudder pedal inputs? Well, at maneuver speed, by definition you should be able to put in full control inputs on any control surface up to maneuver speed. Is that your question?

DR. ELIAS: Yes, it is. What's your understanding of what a full input is? Does that mean continued full inputs, or is it a single input?

CAPT. VANDERBURGH: I'm sorry. I'm really trying, but I'm still not sure I understand your question.

DR. ELIAS: Okay. If you were below maneuver speed VA, is it your understanding that you can continually apply full rudder, perhaps even if you perhaps stepped on the wrong rudder and then decided to go full to the opposite direction, that that would be -- you would have protection to do that when below VA or maneuver speed?

CAPT. VANDERBURGH: Yes. It is my understanding that you would have protection to do that.

And it would be difficult to operate without that protection. I mean, pilots are not perfect.

In an example of engine failure, as we discussed earlier, an example of engine failure it's not uncommon in flight, in a failure in flight, to see the pilot initially use the incorrect rudder and have a fairly large side slip develop and subsequently put in aggressively the correct rudder, and aggressively is required in that scenario.

And I would certainly expect that that would be within the structural capability of the airplane. Does that answer your question?

DR. ELIAS: Yes, it does. Thank you.

CAPT. VANDERBURGH: And if it were not -- I mean, I guess maybe I shouldn't go there. But if it were not, I would certainly hope that some manufacturer would give us the limitation clearly stated in our limitations section so that we would know the consequences of doing something that I think every aviator would expect his flight controls should be able to do.

DR. ELIAS: Okay. And you're sort of in a unique position, because not only did you develop some of this AAMP program and some of the scenarios, but now as a line pilot flying you get to go and get trained on that during your recurrent training.

CAPT. VANDERBURGH: Uh-huh.

DR. ELIAS: Do you know, in that recurrent training do you get a demonstration where -- a high alpha demonstration where roll control is demonstrated using aileron only and then rudder only and then a combination of the two? Is that done?

CAPT. VANDERBURGH: That is not normally done during recurrent training.

The concept of the program was that initially everyone, in the fleet that they were flying at the time the program was presented, when everyone came to their first recurrent in that fleet, they would get the high AOA maneuvering demonstration that you are referring to.

Subsequently the intent and the structure of the program at the time we developed it was that when a pilot transitioned to a different fleet type that he would get that in his transition training one more time just to see the little nuances and differences between fleet types in this arena.

Because they are very dramatic between the MD-80, as an example, and some of your newer airplanes, the MD-80 demonstrating some very dramatic adverse yaw characteristics and requiring better and more management of the rudder. So that was the intent of the training.

So, no. You wouldn't get it on every recurrent training. But the --

DR. ELIAS: But you do get it on --

CAPT. VANDERBURGH: Huh?

DR. ELIAS: Like you said, it's for transition training primarily and --

CAPT. VANDERBURGH: Yes.

DR. ELIAS: -- initial?

CAPT. VANDERBURGH: Initial training, and then transition training was the concept at the time the program was developed.

DR. ELIAS: Okay. And what was the purpose to demonstrate to the pilots in terms of exposing them to that?

CAPT. VANDERBURGH: The purpose of the high AOA maneuvering demonstration is to show the pilot in that particular fleet type airplane exactly how it responds at high alpha, now, high alpha being alpha above that which we normally fly day in and day out.

Because if you are in the normal alpha ranges, you don't need any rudder for most of these airplanes. They fly just fine with the yaw damper and the spoiler coordinating. You don't need the rudder.

But high alpha meaning the alpha between approach alpha, let's say, and onset of stick shaker, we never take our pilots past onset of stick shaker angle of attack. So they're working just below the onset of stick shaker.

And the idea is to demonstrate to the pilot, a) as an example, in the MD-80, just below onset of stick shaker let's say trying to work through a microburst with the ground below you where you cannot lower alpha, you've got to stay there, and show you in the MD-80 that with the roll controls it basically won't respond.

You can get it over to 30 degrees and try to get out, and it won't come out. You'll have the yoke full left, and you'll just be stuck there. And that's because adverse yaw is pulling it, making it wanting to roll right even though you have the controls in to the left.

That shows the pilot that he's got something to deal with here.

And then we would also have him do it next with just rudder, showing him, Look, it will respond fairly nicely with just rudder back and forth. It's not the right thing to do, but it shows them that it does respond to rudder.

And then, thirdly we would say, Now you've got to coordinate. You're going to use the two together. You're going to use your roll controls and your rudder, and you're going to coordinate this roll back and forth between 30 degrees on either side at this high alpha.

And it teaches them, and they learn to do that. And it teaches them several things: a) the airplane responds a whole lot better at high angle of attack if you coordinate the rudder. It also teaches them that you have to do it smoothly. If you over-control it, it will start to wallow around a bit on you.

And so it's an excellent exercise, a) to teach them the need for it at high alpha and how effective it is, and, b) to ensure that they won't over-control, that they'll understand the effect, how effective this rudder really is at the high alpha.

And then, you know, within each fleet, as I say, there's little differences. So it's good for the pilot to experience it once on a new fleet type aircraft.

DR. ELIAS: Okay. Thank you.

CAPT. VANDERBURGH: Uh-huh.

MR. IVEY: Captain Guy Arondel, BEA.

CAPT. ARONDEL: Yes. I have just one question to make.

To your opinion and regarding your experience, do you think that airline pilots are fully aware that the excessive use of rudder associated with a large size slip can lead to the loss of structural parts of transport category aircraft, or in other words, do you think that they are fully aware that they can break the plane by acting on the controls?

CAPT. VANDERBURGH: I think pilots are aware it is very possible to break an airplane. And in fact, there's considerable discussion in the Advanced Maneuvers Program in two phases where we're talking about structural limitations and how you have to be very careful.

In the case of dive recoveries, we talk about rolling G. You cannot -- just because you have a G limit on the airplane, clean wing of 2-1/2 G's, and because you have 150 percent, that means you have, what, 3-3/4 G's, that's just the straight-ahead symmetric pull.

We put a great, great deal of emphasis on the fact that you cannot put rolling G on these transport airplanes and expect the engines and perhaps other parts of the structure to stay on -- the pylons and other components in the tail structure. There's emphasis placed on that.

So, yes. I think that the pilots are aware there are structural limits on these transports and if they get into these demanding arenas of critical flight attitude recoveries, they're still going to have to be conscious of the fact that they cannot exceed the structural limitations of the airplane.

CAPT. ARONDEL: And after the receipt of this letter where this concern was fully expressed, did you revise this instruction or --

CAPT. VANDERBURGH: We did not revise what we teach, because we were teaching it correctly. As best we can tell we're in agreement with what's being recommended.

What we did, though, is make every attempt to reinforce, as we discussed a little while ago, the specific issue that they're referring to here, i.e., the vertical stabilizer. We made every attempt to reinforce and ensure that the pilots understood that it took just small, smooth amounts of coordinated rudder to accomplish the desired result.

That's what had been taught. But we wanted to be sure that it was understood by everybody, which is the reason we made the addendum to that video we sent out to all of our pilots and also the reason we simply changed the verbiage on the workbook, too, to be sure that there was just no question in any pilot's mind what we're teaching and what we expect them to be doing.

CAPT. ARONDEL: Thank you.

CAPT. VANDERBURGH: You're welcome.

MR. IVEY: Captain Ron Skupeika, Airbus.

CAPT. SKUPEIKA: Yes. Captain, I just have one question. I'm going to revisit the top rudder situation --

CAPT. VANDERBURGH: Sure.

CAPT. SKUPEIKA: -- scenario that you very nicely described. Do you have any flight test data from the various manufacturers to back up your sim training scenarios that express G load side loads of the fin and the empennage of your aircraft?

CAPT. VANDERBURGH: What we do -- and if I don't answer your question, ask it again.

What we do is -- what we did, I should say, in the development of the simulation training was, we tried to -- we did -- we were very cognizant of the alpha and the beta readings during the entry to and the recovery from any of the maneuvers, including the nose-low, past-90-degrees recovery, which is the one in which we use top rudder.

The beta readouts on that were within flight data information. So we didn't have any reason to believe that we'd be exceeding at that point or be giving the pilot some invalid information or belief that that airplane would do something that it hasn't been demonstrated to do before. Does that --

CAPT. SKUPEIKA: Possibly until this letter came about?

CAPT. VANDERBURGH: Possibly until this letter came about.

CAPT. SKUPEIKA: Yes.

CAPT. VANDERBURGH: Now, this letter -- and we've talked through this. I mean, this was --

CAPT. SKUPEIKA: Right. I just wanted -- okay. That's all I have. Thank you.

CAPT. VANDERBURGH: You're welcome.

MR. IVEY: Captain Delvin Young, American.

CAPT. YOUNG: Thank you for coming in.

It sounds like as you read this letter, I gather from today that you were somewhat surprised at some of the issues that were brought up in there.

Do you think the authors of the letter -- and I'm not quite sure who authored what part of it -- when you read that, did you think they had formed an opinion before they came to your conference in May or whatever?

CAPT. VANDERBURGH: Yes. I think that in the case of the use of rudder paragraph, it appeared to me that whomever was the author of this paragraph --

And my personal feeling is that you can associate some segments of this report to various individuals, not that the group felt this way about every section, but rather various individuals in the group are responsible for various paragraphs.

Whoever wrote the paragraph on the use of rudder it seemed to me was predisposed to this opinion, because if he had clearly listened to what was being taught, it was hard for me or others, thousands of other pilots who have taken this course, to see how he would come out of it with this position.

CAPT. YOUNG: Okay. After the letter was written, obviously you and Captain Ewell responded to their concerns. Was there ever any correspondence or any concern expressed to you after that, or was it kind of just dropped and pressed on?

CAPT. VANDERBURGH: We did not receive any response to the reply that Captain Ewell sent to Captain Higgins and his team.

CAPT. YOUNG: Okay. That's all I have. Thank you.

MR. IVEY: Captain Jim Goachee, FAA.

CAPT. GOACHEE: I just want to confirm. I think in your tapes you've always said the only time you would ever use opposite rudder is cross-wind landings, engine failure. Correct?

CAPT. VANDERBURGH: Yes. That's -- actually, no. That's not exactly correct.

Cross-wind landings with the opposite rudder. Engine failure is not opposite rudder. It's not opposite, it's really coordinated. In other words, when we teach engine failure, again, in flight we're not even necessarily teaching to engine failure. We're teaching the aircraft control.

So what happens in flight is the plane, when you have an engine failure, it yaws and it rolls to dihedral effect, the pilot initially will put in roll controls and attempt to stop the roll.

And when the roll continues, i.e., his roll effectiveness is not what he would expect of it, he would then come in with rudder, and he continues to come in with rudder until he stops the roll.

Well, when he recognizes it's engine failure, what he's going to do now is continue to push in more rudder until he gets his yoke level, because that's the proper way to fly a plane.

But that is not opposite rudder. That is eliminating the yaw which is causing the roll which enables him now to fly coordinated again.

CAPT. GOACHEE: Okay. Good. Thanks.

CAPT. VANDERBURGH: You're welcome.

CAPT. GOACHEE: I'd like to discuss the change in the 777 trim usage, and only to the -- have you addressed with American's management your opinion on the change that they were --

CAPT. VANDERBURGH: Yes, I have.

CAPT. GOACHEE: Okay. Thanks.

CAPT. VANDERBURGH: You'll have to go to high management to ask why this change is occurring.

CAPT. GOACHEE: Okay. I'm too a little confused with the use of rudder.

I'd like to talk first, prior to that, with -- I think you worked with Tom Melody quite a bit, even after the initial presentation that he observed here or out in Seattle or somewhere?

CAPT. VANDERBURGH: Yes, I have.

CAPT. GOACHEE: And I think that it's fair to say that Tom did have some concerns with the presentation, either with your presentation or the videos that he saw or the handbook that he saw, that he was concerned in some respects about maybe in the high angle of attack the rudder usage. Was that a fair statement?

CAPT. VANDERBURGH: Yes. I think that Tom, very rightfully so -- I have the greatest respect for Tom Melody, and he was a huge help to me in the development of this program.

And Tom, rightfully so, did put emphasis on the fact that he wanted to be sure the pilots understood that if you use rudder excessively at high angles of attack it can lead to the departure from controlled flight. And I certainly, I wholeheartedly agree with that.

And so we wanted to be sure that in the presentation of the program the pilots understood that you can't over-control the rudder. This time the whole issue was loss of control, that is, we don't want to cause the airplane to depart controlled flight with excessive use of rudder at high alpha.

And in fact even in places, you know, in the program we talk about, you know, you do that, I mean, that is the spin entry procedure. So, you know, yes.

And he wanted to -- he justifiably wanted me to be sure I was clearly communicating that.

CAPT. GOACHEE: But before the letter did you meet with Captain Melody at any other time after the presentation with a discussion on the use of rudder, or did you come to any agreement at that time?

CAPT. VANDERBURGH: Tom Melody and I met numerous times on this -- on the program itself. And --

CAPT. GOACHEE: Well, just strictly the use of rudder. In other words, when you met prior to when you first got the letter with the concerns of all five individuals, and prior to the response, did you meet with him to try to address some of his concerns?

And if you had, when you left one or several meetings, did you come away with the understanding that you and Tom were, so to speak, on the same wavelength about the use of rudder?

CAPT. VANDERBURGH: I don't believe I met with Tom subsequent to receiving this letter on the subject of proper use of rudder.

I did meet with Tom prior to the receipt of this letter. And it's my feeling -- and you certainly need to ask Tom if it wasn't his feeling -- that we were both in agreement on the proper use of coordinated rudder.

CAPT. GOACHEE: Okay. Good. What I'd like to do, Captain, is, I would assume up through '99 you were a check airman on the 75 with all your other duties reference to AAMP program, or did that devote all of your time and you weren't able to do any of your check airman work in the simulator?

CAPT. VANDERBURGH: I was a check airman on the 75 and 76 airplane, as well as an FAA designee from I believe 1987 up through maybe 1998 or whenever we started the 777 program.

But when I started this program, when Captain Ewell had me develop this program and then begin to present it, I was not able to keep up with my 75, 76 check airman duties. This demanded my full-time attention.

And so while I was still being carried by American Airlines as a 75, 76 check airman, I was not performing those duties during the time I was affecting this program.

CAPT. GOACHEE: Okay. Let me ask that another different way, then. After you had given the presentations to all your American Airlines pilots, was there ever a time that you -- between doing your presentations, was there ever a time that you were in the simulator doing any work with pilots, whether it's the AQP, reference AAMP?

CAPT. VANDERBURGH: I'm sure there was. Yes.

CAPT. GOACHEE: Okay. And then, I mean, do you recall -- I mean, during this time -- I'm trying to get back. Initially you said you met with different people in the FAA, they attended your presentations both here and in Washington --

CAPT. VANDERBURGH: Yes.

CAPT. GOACHEE: -- and they, you know, said that they were very happy with it.

CAPT. VANDERBURGH: Yes.

CAPT. GOACHEE: My question is, did you ever have an FAA individual, meaning probably most likely the APM of the 75 program -- were you ever in the simulator with an FAA inspector giving this AAMP program to that individual or any inspector from the FAA here in the Dallas office?

CAPT. VANDERBURGH: You know, I want to answer that question yes, but, you know, you're -- I'm not sure my memory can tell you when or who.

What I'd really be saying is I'm confident that the FAA have been in that simulator more than once when we were doing these maneuvers, and perhaps Glen Holmbeck, who was APM on the 75, 76 at the time, or one of the other FAA. But I can't give you a specific date and time, and I can't answer with absolute assurance who it was or what day it occurred on.

But I know that they did and had to have seen these maneuvers being performed in the simulator.

CAPT. GOACHEE: Could I, then, ask you this additional question about it? Is that -- because you can't recall, and I know it's been a long time and things happen.

But if someone would have made a negative comment -- and when I say, some person, I mean FAA and specifically the APM or somebody that's typed on the Airbus and has knowledge or has flown the Airbus. So we'll stick to those individuals from the FAA.

CAPT. VANDERBURGH: Okay.

CAPT. GOACHEE: If you would have been observed giving AAMP maneuvers or being checked yourself by observation of the APM for your annual check or giving an initial check to an APM, if you had done that during this period of time, and there would have been negative comments, it certainly would have been brought, you know, brought to your attention, and you would remember that?

CAPT. VANDERBURGH: Yes.

CAPT. GOACHEE: And you don't recall having any negative comments if that did happen?

CAPT. VANDERBURGH: I do not recall any negative comments. And I would remember those, because they would be the exception.

CAPT. GOACHEE: Okay. And the only other one is, I know that you were asked the question about software to get into some of these maneuvers. And I think your answer was they were trying to get it as truly as -- or close as possible so you could do the maneuver. But you're not aware if there was any major software changes to accomplish that?

CAPT. VANDERBURGH: The simulation engineering section had to develop a lot of software to create the upsets required so that the pilots could recover from a nose-high or nose-low attitude and affect the procedure.

So there was actually software written, you know, to create those models for the roll maneuver and the pitch maneuver. It was to be created within the control laws of the airplane. And it didn't modify the control laws of the airplane to my knowledge. Does that answer your question?

CAPT. GOACHEE: Well, it does. But I just want to --

CAPT. VANDERBURGH: You can keep trying. I mean, I'll try to get the answer.

CAPT. GOACHEE: No. It was good. But if in fact you were aware that the software was revised to complete the -- or to allow the maneuver that you were trying to teach in the AAMP, and if it was out of the limits, would that be a concern to you, number one?

And should it have been explained to a pilot prior to taking this so that they would actually know that, We're trying to teach a procedure here. Hopefully you will never get into this, but it may save your life. But I have to tell you that how we have to accomplish this is that, you know, you could be putting stress on an airplane that could cause catastrophic consequences.

CAPT. VANDERBURGH: I think, a) we tried to do this all within the control laws of the airplane; and, b) if there were any of the scenarios in any of the fleets where the instructors felt that a situation might exist as you described it, then they certainly should be briefing the pilots and making them clearly aware that this was just a procedures trainer and in fact did not relate, as in the example you're giving, to a realistic expectation from the airplane.

CAPT. GOACHEE: And my last question, I assure you, I've reviewed all your four tapes. And I wrote down reference to corner speed. And I think you talk about it -- in fact, I want to refer --

CAPT. VANDERBURGH: Sure.

CAPT. GOACHEE: -- to my notes, if I can. And maybe you picked the 75, 76 that you used the example of Flaps 5, plus-40 on speed, 1 G, I think. Is that in your first video for the unusual attitude recoveries reference crossover angle of attack?

CAPT. VANDERBURGH: (No audible response.)

CAPT. GOACHEE: And you talk about there's a point in angle of attack at which the rudder more powerful, and with our fleet that becomes the mean angle of attack. And in the example you give a 75, 76 at Flaps 5, plus-40 on speed, you would be at that crossover angle of attack?

CAPT. VANDERBURGH: Correct.

CAPT. GOACHEE: Do you think that was an important thing when you were using -- or were you using the example of the 75 just as an example?

But do you think if I was flying the A300 or I was flying the DC10 or the 72 or whatever airplane that maybe the example that you use should have been taught at a briefing in the simulator for that pilot to know this crossover angle of attack that you were talking about, or were you just using an example for crossover angle of attack?

CAPT. VANDERBURGH: It's just a generic example.

CAPT. GOACHEE: Okay.

CAPT. VANDERBURGH: You know, I had to hold a model in my hand when I'm talking, and the model I had in my hand was the 75, and so I'm relating to that airplane.

You know, we've already talked about the 737 airplane in another part of the program. And in another part of the program we point out that it could happen on any fleet airplane, hard-over rudder could happen on any fleet airplane, and the consequences on that airplane if it's beyond, i.e., above crossover angle of attack will be the same.

Specifically where crossover angle of attack resides in any particular fleet would be a fleet-specific issue. In other words, there are a lot of things in the

Advanced Maneuvers Program that are fleet specific. We don't teach that in the generic ground school.

If the fleet manager feels like it's important enough in that particular fleet to put extra emphasis on a particular aspect of the Advanced Maneuvers Program because his fleet has a sensitivity or a particular concern, and then that would be briefed in a fleet-specific briefing by the check airman or sim pilot.

CAPT. GOACHEE: But my question now is that, do you think that the example that you used for the crossover angle of attack with the specific configuration of the 75, do you think that a fleet manager teaching it in the A300 should give the crossover angle of attack that you used in the presentation?

CAPT. VANDERBURGH: No. I don't think it's necessary. I think what we're trying to teach in the Advanced Maneuvers Program is just the concept that the rudder, once you go beyond this angle of attack, actually will overpower the roll control.

Exactly where it occurs on any particular fleet aircraft is not necessarily relevant, nor should he need to try to remember that, because at each configuration it might be a little different, and also, it's G dependent, so it would only be true -- knowing the speed is only important if you're constantly at 1 G.

Again I reemphasize, at American Airlines we don't talk about crossover speed. We just want to think of it as an angle of attack.

The important thing in this issue is the pilot understands that angle of attack is the thing that is causing the rudder to be able to overpower the roll controls and that if he can lower his angle of attack he can regain roll control on any airplane.

CAPT. GOACHEE: Yes. And I think I used crossover angle of attack versus the crossover speed.

CAPT. VANDERBURGH: Sure. So you know, the example is a generic example simply to teach the point. But I don't think it's necessary that each fleet understand any of the speeds. I think it's necessary they understand that it's caused by angle of attack.

CAPT. GOACHEE: And by going through your videos, unfortunately, I mean, I missed the most crucial one. I was never able to attend your presentation. So --

CAPT. VANDERBURGH: I'm sorry. I wish you could have.

CAPT. GOACHEE: But the question would be is, with the aileron and coordinated rudder and the high angles of attack.

Let me explain to you what I got from reading, and hopefully it will help me ask the question --

CAPT. VANDERBURGH: Okay.

CAPT. GOACHEE: -- is that the high angle of attack, we will push over with the control column. Correct?

CAPT. VANDERBURGH: Anytime altitude permits the lowering of angle of attack, that should be the pilot's first move.

CAPT. GOACHEE: Okay. And then, the next would be, is to do a roll. Is that a correct statement?

CAPT. VANDERBURGH: Oh. I'm sorry. Now, you're talking about a nose-high recovery?

CAPT. GOACHEE: Nose-high recovery.

CAPT. VANDERBURGH: All right.

CAPT. GOACHEE: Okay.

CAPT. VANDERBURGH: Would you rephrase the question, please?

CAPT. GOACHEE: If I was in a nose-high recovery for American Airlines, the first response for me should be to push the control column forward around low. Is that a correct statement?

CAPT. VANDERBURGH: That is a correct statement.

CAPT. GOACHEE: And then, the next would be, is to initiate roll the lift vector to --

CAPT. VANDERBURGH: To --

CAPT. GOACHEE: -- reduce --

CAPT. VANDERBURGH: That's right. To roll the lift vector off of the vertical as necessary if you're not generating the desired pitch rate by the first move. If the first move is generating the desired nose-down pitch rate, you may not have to roll it off.

But if the first move is not generating the desired nose-down pitch rate, i.e., you're running out of energy before you're getting your nose down, then your next move is going to be to roll the lift vector off of the vertical to ensure that we will get a nose-down pitch rate to enable us to maintain control.

CAPT. GOACHEE: When you initiated the program or started teaching the pilots, did you ever envision that a pilot would use roll and rudder at the same time, even if it was coordinated? Meaning that if I had a cause to roll the airplane, say left, at the same time I would be initiating a rudder even though it was coordinated?

CAPT. VANDERBURGH: No. I don't envision that. I envision a pilot almost always leading with his roll controls. He's going to respond to an uncommanded roll with roll controls against that uncommanded roll.

CAPT. GOACHEE: Okay. And then I think you said that if you didn't get the response at that time is the only time that you would use coordinated rudder. Is that a true statement?

CAPT. VANDERBURGH: That is correct. If she is not responding to the roll controls, then you're going to start coming in with rudder in an attempt to regain control, because you're losing control.

CAPT. GOACHEE: Yes. Thank you very much. I'm finished.

MR. IVEY: Captain John Lauer, APA.

CAPT. LAUER: Thank you. Go back to 1997. May of 1997 is when the industry conference was held. Is that correct?

CAPT. VANDERBURGH: Yes.

CAPT. LAUER: Do you recall who sponsored that or initiated that conference?

CAPT. VANDERBURGH: American Airlines sponsored that conference. Actually, I guess Corporate Safety was the true sponsor of the conference, American Airlines Corporate Safety.

CAPT. LAUER: And the conference was called for the purpose of promoting and/or debuting the AAMP program to the industry?

CAPT. VANDERBURGH: The conference was really called to share the program with the industry.

There was so much industry interest developing and so many requests from various members of the industry, particularly airlines, but also corporate operators and also the military, that the Corporate Safety Department, and in particular senior management I think at American Airlines, felt that the appropriate thing to do was to share what appeared to be a very successful safety initiative on the part of our company.

And it was felt by senior management, as I understand it, that we should share this with the entire industry because safety benefits all of us.

CAPT. LAUER: Once the program had gotten off the ground and you were receiving a great deal of interest throughout the industry, was there any one area of the program that you were receiving advice on to affect changes or incorporate changes to the program? Was there any one particular area of the program that seemed to be the, quote, unquote, sore thumb?

CAPT. VANDERBURGH: I think the discussion of AOA probably generated the most consternation outside of the pilot group. In other words, I think AOA seemed to be controversial among manufacturers.

The display of AOA in the cockpit, or the discussion of the AOA, or just the idea that we were emphasizing AOA throughout the program probably got the most attention.

But the reality of it was, we felt -- and we did not respond to that criticism, if you will -- is that we felt there was no way to educate a pilot to the factors involved in loss of control and the recovery therefrom without a clear understanding of angle of attack.

And we just -- we wouldn't back -- that was one controversial issue that we couldn't say, No, you don't need to talk about AOA, because frankly we couldn't conceive of a way of teaching a pilot to deal with loss of control or recover from it without clearly understanding the angle of attack on the airplane.

And the accident history shows fairly professional, experienced pilots holding airplanes in full stalls from fairly high altitudes all the way to the ground just because their nose is below the horizon.

And there was this huge problem that we felt we had to deal with, i.e., there are pilots out there, professional pilots, who, through no fault of their own associate pitch attitude with angle of attack.

And until you straighten that particular issue out and make them realize that there is no relationship whatsoever between pitch attitude and angle of attack, that you really can't get through the rest of this program.

CAPT. LAUER: In the course of your flying career, have you ever been in an aircraft in a wake turbulence event?

CAPT. VANDERBURGH: No. I -- well, you know, I've bumped through -- I guess the answer is yes. I have bumped through -- I have not had serious wake turbulence events at very low altitude. I have encountered wake turbulence in cruise flight a couple of times. And so the answer is yes. I've encountered wake turbulence.

CAPT. LAUER: With that being said, have you ever witnessed your copilot, or if and when you were a first officer, have you ever witnessed a captain ever using rudder in a wake turbulence event?

CAPT. VANDERBURGH: Oh, no. Because -- no. I mean, I have not -- no. I have not witnessed it, nor can I imagine it in that type of an event, because there is no -- I mean, the events that I encountered were just we just got into wake turbulence, we knew we were pretty sure we were in wake turbulence because of the aircraft ahead and just above us.

But the airplane, it was like being in moderate chop. I mean, we were bouncing around, bank angles were minimal, pitch attitude was well within the norm, and the alpha was at cruise alpha.

So there would be no incentive to do anything with the rudders whatsoever. I mean, the only incentive was to keep the wings level using the ailerons and spoilers only.

You know, I can't imagine being incentivized to use the rudders when you're not threatened in any way by bank angle, pitch attitude, or high alpha.

CAPT. LAUER: Have you ever witnessed a pilot apply the wrong rudder?

CAPT. VANDERBURGH: As I mentioned earlier today, the times -- we see that in training in the simulator, where I've done an awful lot of work with a lot of very professional pilots. The time that I see that sometimes is when you have an engine failure in flight, not on the runway, but in flight.

And when you see that sometimes in flight, you will sometimes see the crew initially get the wrong rudder. And you know, and then they'll quickly recognize what they've done and respond very aggressively with the correct rudder in order to get the airplane flying true again.

CAPT. LAUER: All right. Speaking of that response -- or speaking to that response, the ensuing correction of applying the proper rudder, can you speak to the effects of the speed or rate of the application of the rudder?

CAPT. VANDERBURGH: Well, I think, you know, the initial in that scenario, where the pilot initially selects the wrong -- incorrect rudder, and his problem has been caused by an engine failure. And so he initially gets the wrong rudder.

Well, the problem he immediately recognizes he has is two things: one, that the -- first, the yaw induced by the failure of the engine, i.e., the good engine creating a significant yaw; and then he adds to that yawing moment by selecting the incorrect rudder, and now the airplane is in a very severe side slip.

He recognizes subsequently what he's done by the aircraft's behavior and immediately comes on -- he is going to come on very, very aggressively on the correct rudder, because the airplane has gone now into a fairly high side -- very significant side slip.

And he is going to be incentivized to come on very aggressively on the correct rudder in order to retrue the airplane.

And, yes. It's going to be very aggressive. It's going to be very fast and it's going to be very aggressive.

CAPT. LAUER: Should there be --

CAPT. VANDERBURGH: And it will probably go all the way to the floor.

CAPT. LAUER: Should there be any concern at this point in time for a pilot to think of any restrictions or cautions or concerns to the structural essence of the aircraft?

CAPT. VANDERBURGH: At that point in time the pilot is totally focused on regaining aircraft control, and I don't think that his -- that is his priority, is to regain aircraft control at that point.

And I don't think the first thing in his mind at that point will be the structure of the airplane. I think the first thing in his mind at that point is to regain and maintain control of the airplane.

CAPT. LAUER: I think you've touched upon this before in a previous question, but I'd like to just visit it one more time to ensure clarity.

Would you expect a pilot in an aircraft at a low to medium alpha encountering wake turbulence -- or encountering a wake turbulence event to have a need to use rudder as a result of the turbulence that he or she may encounter --

CAPT. VANDERBURGH: Well, the --

CAPT. LAUER: And if I may continue.

CAPT. VANDERBURGH: Sure.

CAPT. LAUER: -- emphasizing low to medium alpha versus in high alpha?

CAPT. VANDERBURGH: All right. No. I think that the Advanced Maneuvers Program teaches that a low angle of attack -- which any normal profile angle of attack is low angle of attack. Anything we fly on a normal day-to-day profile is low alpha by our definition.

So at low angle of attack, they are taught not to use rudder. Rudder is counter-productive. It's not going to help. It's just going to add some side slip that wouldn't otherwise be there.

And so the airplane responds very nicely to the roll controls within its normal, everyday alpha range.

And so I can't imagine -- to answer your question, if I understand it -- a pilot leading with rudder to any roll input. Okay? Any roll input, I can't imagine him leading with rudder rather than leading with roll controls at low alpha.

I can't imagine him even using the rudder at all at low alpha unless he simply couldn't correct the roll by applying the full roll controls. Then he might be coming in with some rudder.

So the answer to your question is, I can't imagine an incentive in that scenario to use the rudder, you know, unless you can give me some information that would make him believe he had some sense of significant yaw in the airplane.

CAPT. LAUER: I'd like to visit angle of attack just for a moment. Would an angle of attack indicator benefit a pilot in a wake turbulence event?

CAPT. VANDERBURGH: I don't think so, at least not in the onset of the event. I mean, subsequently it might. You know, if he gets himself into some severe upset, you know, in which he has to get maximum performance out of the wing or actually just determine the wing state relative to the stall, that might be an effect, it might be useful.

But at the onset of the event, the airplane is in the heart of its envelope at low alpha, and the angle of attack indicator isn't -- he doesn't need the angle of attack indicator there to tell him that he's in low alpha.

He's going at a speed that's well within his normal envelope for that airplane, and he's at 1 G, so he intuitively realizes he's at low angle of attack. I mean, everything here is basically normal, heart of the envelope stuff.

He wouldn't need an angle of attack indicator sitting there, you know, right at whatever, 4 degrees or something, saying, Yes, you're fine.  I think he would intuitively know that at this point.

CAPT. LAUER:  But it's safe to say that as a result of a possible event, a wake turbulence event, if the aircraft were to find itself in an unusual attitude, the AOA indicator would definitely benefit the pilot in possibly escaping --

CAPT. VANDERBURGH:  In numerous scenarios I think it would help the pilot to clearly identify his position relative to the stall angle of attack, i.e., Am I stalled or am I not?  And if I am not stalled, what is my margin to stall?  How much G is available?  How much lift can I get out of this wing?

I think it's a clear, unambiguous indicator of the wing state, and you can use that information to help you in a recovery from various upsets.

CAPT. LAUER:  And the last question.  In your opinion, should there be some kind of a warning given to the industry training departments concerning the use of the rudder in light of the Flight 587 accident?

CAPT. VANDERBURGH:  I think that what you're getting into there is a manufacturer's issue.

I mean, I think if in fact there is something that we don't know out there as operators about the limitations structurally on these airplanes, then the manufacturers I think should be letting all of the airlines know right away in the limitations section that they cannot be using the flight controls that are available to them in whatever scenarios they feel like need to be limited.

Because I think most pilots believe that inside the envelope, in the heart of the envelope, you can use the flight controls you've been provided with as you feel is necessary to maintain control of the airplane. And if we can't, then, I think that's probably something the manufacturers need to help us with.

CAPT. LAUER: Thank you very much, Captain. That concludes my questions.

MR. IVEY: Thank you.

I think that was Tom Imrich right outside the doorway there, perhaps.

Is there anything you would like to add that might help us try to solve this accident just in your judgement, your opinion, your thoughts? I realize you don't have all the information.

CAPT. VANDERBURGH: Well, I think that's -- and that's my answer. You know, I am not privy to the detailed readouts of the DFDR or the CVR. And without being able to see those in detail, accurately synced to a precise time line, I would not even consider speculating on what has occurred here.

MR. IVEY: Totally understood.

Well, I certainly thank you for the three hours that you've spent talking and sharing with us this morning and afternoon. And again, thank you for coming. It's been very beneficial.

CAPT. VANDERBURGH: Thank you, Dave.

(Whereupon, the witness was excused.)

(Whereupon, at 12:45 p.m., the hearing was recessed, to reconvene this same day, Tuesday, January 17, 2002, at 1:40 p.m.)

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

1:40 p.m.

**k. Captain Thomas Imrich**

MR. IVEY: Good afternoon, Tom. I appreciate you joining us from Seattle today. And I've introduced the operations group to you.

EXAMINATION

MR. IVEY: So by way of your own introduction, I'd like for you to start by giving us your full name, your present occupation, and a history of your flying experiences, to include total flying time, types of airplanes -- type ratings, I should say, a little aviation history about yourself.

CAPT. IMRICH: Okay. My name is Thomas Imrich. I'm Chief Research Pilot for the Boeing Commercial Airplane Company since last March -- actually, since last April.

Before that I spent most of my career with the FAA in various positions in research, flight standards, managing the Flight Standards Division, and then, for about the last 13 years before I retired, as FAA's National Resource Specialist for Air Carrier Operations.

My undergraduate and graduate training is in international aeronautics, both at MIT. And after that I spent two years in the Air Force, active duty. I worked in flight test in the Air Force.

At the FAA, when I transitioned to FAA, I was fortunate to become involved with most of the new airplane programs and technology programs over the years, starting with really the -- one of the first programs, anyway, was the A300-B2K, and B4 at Eastern, putting that on-line.

I, in my career at the FAA, had the opportunity to be involved with writing and preparing a lot of the criteria that the FAA used for a wide variety of issues, including Category III, low visibility operations.

I was the principal author for much of the FAA's criteria for low visibility landing and takeoff and landing operations, Advisory Circulars 120-28, 120-29.

I did TCAS, Category III, wind sheer, FAMS, RNP, a wide variety of -- Com-Nef [phonetic], Data Link, a wide variety of programs.

And then for certification in 1980 I left Washington, where I ran what is now the Flight Technical Programs Division. Back then it was the staff and a branch of the Air Carrier Division.

And after leaving the Flight Technical Programs Branch at that time I went to Seattle, and I was in the Flight Standards Division till 1987, and then I took the NRS job. In that capacity I was chief of FAA's aircraft evaluation groups.

And then I was involved with the original certification of the MD-80; 67; 57; the 37 mid-series, 3, 4, 5; 747; 400; MD-11; A340; A330. I did a lot of work with the A320, particularly in the area of Category III and the fly by wire flight control. And then we did the 777.

And I issued or was issued or was in the first group of people issuing the first type ratings in virtually all those types. I have type ratings in the Cessna 500; the Boeing 707; Boeing 720; DC9; DC10; MD-11; Boeing 737; 747; 747-400; 757; 767; 777; and the A300.

I have lots of flying time, but much of it is in flight test. I did serve as an air carrier operations inspector for that career with the FAA, and in that capacity flew worldwide, did a lot of the original navigation approvals, for example, all the original FAMS approvals on the Pacific with Data Link with United and so forth.

And then, of recent years, I've worked mostly in the navigation area, doing all the original HUD, did all the original HUD quals with Alaska, did all the original RNP quals in Southeast Alaska with Alaska Airlines.  And so that probably is a summary.

In the Air Force I did some interesting programs that are coming back into vogue again, Pathfinder landing radar, which is the old independent landing monitor radar, which is known as now EVS and SVS, Enhanced Vision and Synthetic Vision, auto land programs, back in the early days, when I was starting out.

And that's probably an overall summary, as best as I can think.

MR. IVEY:  Any free time left in all of this?

CAPT. IMRICH: I've been married for 32 years, and I'm very fortunate, and I have a very understanding and patient wife.

(General laughter.)

CAPT. IMRICH:  Actually, my family flies.  My father was one of the original captains with U.S. Air; my son is a F-16 fighter squadron; my baby brother flies Eagles at Kay Falls [phonetic]; my wife was a flight attendant.  So we have -- family started flying in 1932, and we have many, many people in the family that fly.

MR. IVEY:  Thank you for that.  That's an awful lot of experience.  I'm sure that it dwarfs many of us.

CAPT. IMRICH:  I've been very fortunate.

MR. IVEY:  I'd like for just a moment to turn to a letter that I'm sure you're familiar with.

It was a letter that was signed by four parties: Captain Higgins; yourself representing the FAA as the National Resource Specialist; Tom Melody, working with Boeing Products Division, Douglas Branch; and Larry Rockliff with Airbus. And it was dated August 20, 1997. Are you familiar with that letter?

CAPT. IMRICH: Yes, sir, I am.

MR. IVEY: Can you help me understand the genesis of that letter?

CAPT. IMRICH: The industry was in a very formative and evolving time and state as a result of events that had taken place over the preceding years and was trying to find collectively, I believe, the right approach to deal with the knowledge and the experience of airmen to cope with the unusual situations that were occurring in the way of service events.

And so a number of airlines -- and I think American was clearly one of the airlines in the lead in this area -- were trying to find a better way to educate flight crews to be able to more robustly handle the events that occurred in line operations.

And so many airlines were struggling with what the right things are to do, what the right things are to teach.

And being in the lead in this area, American was proposing moving in certain directions for educating flight crews. And there were a number of meetings, conferences, discussions, telephone calls about how to address this.

I was involved at the FAA in sort of advising the FAA about what to do in the way of criteria and qualification programs and training and certification requirements for airmen and so forth, and so I became involved in that. And there were a series of meetings that took place where these issues were discussed.

And this letter, in summary, was the result of discussions that took place at one of those meetings where it was believed that providing feedback, not just to American, but to a number of entities who were trying to improve the quality of this airman or pilot education would be useful.

And this was one of a number of steps that I think were taken. But this was the most visible one, because in this particular case it was put in letter form. And then I think probably it was, I wouldn't say widely circulated, but relatively widely known that this was one of the major issues of that whole subject of, what should we do as an industry to help best prepare pilots?

And so it was in that spirit that we wrote the letter providing feedback, I think as a result of American's initiative to host this meeting and to try to provide a forum for an exchange of views on what at the time was a very important subject.

MR. IVEY: Just for clarification in the record, events and issues really were pertaining to upsets. Is that a fair word?

CAPT. IMRICH: Yes. But it wasn't -- I mean, that was certainly an important issue. But the whole issue of unusual -- I mean, remember, we had come back off of a decade or even two decades of wind shear and of a variety of circumstances that we were dealing with. And then, certainly upsets were high on the list.

But it wasn't just upset. It was the whole issue of -- if you remember back to that era, it was the issue of automation. How are our flight crews prepared to deal with automation, and human factors interface with modern technology aircraft.

There were a variety of issues of which upsets were certainly one. And it was an important one, nonetheless. But it was one of a number of issues. Basic airmanship --

MR. IVEY: Wind shear, microbursts?

CAPT. IMRICH: Sure. I mean, there was -- we were on the tail end of the wind sheer learning experience. I think by then we pretty much had wind sheer, figured out is probably too strong of a word, but you know, the general sense. We thought we had it pretty much well understood by that point.

But there were other things that were occurring with icing in certain fleets, again with basic airmanship skills as the industry changed and grew. And unusual attitude recovery was certainly one of those important issues.

MR. IVEY: Uh-huh. This letter -- you mentioned it was industry-wide. Obviously this letter was sent straight to Captain Ewell --

CAPT. IMRICH: Right.

MR. IVEY: -- at American. Were there similar letters sent to United, who were developing programs --

CAPT. IMRICH: No.

MR. IVEY: -- and to Delta, perhaps?

CAPT. IMRICH: No, there were not. But at this point in time American was really, if not the leader, certainly at the top of the list of trying to suggest and develop new and better and improved ways to do this.

So in our industry different airlines, so to speak, have taken leadership roles at different times on different issues. It happened with Category III, it happened with wind shear, whatever. And sometimes it was a result of events or incidents; at other times it was because of, well, just a variety of reasons.

And so in this particular situation American was in the lead, so they were really sort of the pioneers that were leading trying to bring this together at the industry level.

There were certainly discussions with other airlines. But I think a lot of that was sort of following the direction and the road that American was taking at the time. And so that's why the correspondence was to Captain Ewell, because of American's leadership role at that time in this issue.

MR. IVEY: And in the letter it talks about the conference. Did you participate in that conference --

CAPT. IMRICH: Yes, I did.

MR. IVEY: -- as an attendee --

CAPT. IMRICH: Yes.

MR. IVEY: -- as well as all the other --

CAPT. IMRICH: Yes.

MR. IVEY: -- individuals that signed the letter?

CAPT. IMRICH: Yes. That's correct.

MR. IVEY: Was that conference to bring all interested parties, I presume on a national basis, or an international basis? Do you know?

CAPT. IMRICH: Again, this is to the best of my recollection. This is some time ago, and I haven't gone back to try to study, to review.

But my recollection was that it was international. I mean, I believe that there were people there beyond North America.

But my recollection was it was a very broad conference. There were many organizations and disciplines and skills that were represented at that meeting.

MR. IVEY: Yes. And as you move through the body of the letter -- we discussed with many of your predecessors that have been interviewed the various issues that are in the letter.

But is it general consensus of those that signed the letter they're in agreement with most of the issues that are in here, or were there certain people that had greater feelings about one issue as opposed to all issues?

CAPT. IMRICH: I think it was clear at the time that this was being drafted and formulated that among the four, Ken, Tom, Larry, and me, that we each had -- sure, there were differences of view during that time that we tried to reconcile and get a more uniform view, and there were also differences in the strength of feeling of particular individual small issues.

But I think that there was broad agreement from the beginning. There wasn't significant disagreement at all about the letter. It was a very tight group, so to speak, of thought about it.

I think that there were probably discussions about individual wording of sentences and the struggle about, what should we say, what's the right thing to say, what's the right level to say it or what emphasis for it?

But I think there was very broad agreement, even though there were differences in terms of the strength of feeling about certain points.

MR. IVEY: Yes. Is this unusual to have three manufacturers at that time -- as McDonnell Douglas was still a separate entity -- to have three manufacturers to get together and sign a letter and also have the FAA participate? Is that unusual?

CAPT. IMRICH: It's unusual in the specific form that was taken. But it wasn't unusual to reflect the nature of the dialogue that was taking place.

Because American was clearly a leader at this time, and what American did -- and not just American, there were some other pioneering airlines that were not quite in that same league, but close -- we all knew that it would have a very substantial effect on how the industry responded and what the industry did.

And so it was important to try to get this right, shape it right, because the consequence of this was much, much, much broader than American. Anytime you have a major airline like Lufthansa, British Airways, United, or American move in a direction, then the industry takes note of that.

And so this just happened to be the vehicle at the time that we thought was convenient, appropriate, and best to not only provide feedback, but provide a springboard to help the industry dialogue get convergence on this issue.

MR. IVEY: Yes.

CAPT. IMRICH: It could have been done on some other issue, wind sheer years earlier or something, but it just, it didn't turn out that anyone either thought of it or decided to do it. There wasn't anything peculiar about the fact that it was a letter that the four of us signed. It just happened.

It seemed to me at the time to be the best vehicle to provide something that was written that could be widely discussed and people could be aware of as to a recommendation for a direction to take for feedback.

MR. IVEY: Why was the FAA invited to participate in this?

CAPT. IMRICH: The whole issue of crew qualification and airman certification and training, recency of experience, is certainly an issue that the FAA and any regulatory authority has a central role in.

But as this was an evolving situation, it wasn't one where answers were very clear and definitive as to what should be done or needed to be done or could be done, even.

And so the FAA was at that point just one more party trying to find ways to do the right thing for the right reason.

And so it seemed to be the right thing to do to participate in finding sort of the centroid of industry view of this.

And that's why at that point, because of my job responsibility, I had taken the initiative to try to pull together an FAA consensus to the extent that I could -- and that's always difficult, as you can imagine, in any big organization -- but to try to provide an anchor point to help move this forward so it would be a joint operator-airline-regulatory authority move forward in a constructive direction.

And so that's how I became involved and participated.

MR. IVEY: Was this directed from a national level?

CAPT. IMRICH: Directed, no. It was sort of, I would say supported, condoned, accepted. But the state of the FAA at that time was very -- well, the FAA goes through cycles, over its history, of effectiveness, and this probably was not one of the times that FAA's effectiveness was perhaps at its peak or equivalent to other times.

And so let's just say that the level of direction on almost any subject in the FAA at that time was perhaps less than some in the industry and even within Government would perhaps have hoped.

So there were a lot of things happening at the FAA that just simply required initiative to make any progress.

And so the initiative was taken with the industry, but with the full support and awareness of this happening with -- but it was certainly not at the direction of the FAA as such.

But that's -- I have to add, though, that that's the nature of the job of the NRS, National Resource Specialist, in the FAA. The purpose of that position and the nature of that job is to provide that senior technical leadership.

So that would be common for any issues that any of the NRS's, whether it would have been George Ledane [phonetic] or Jim Tracy [phonetic] or the other co-NRSs with me for their respective fields. Their job charter and job responsibility was to provide that leadership in some respects. So that's to just put it in context of the FAA.

MR. IVEY: Well, once this letter was written, there was a reply back to the four of you by Captain Ewell.

CAPT. IMRICH: Yes.

MR. IVEY: And when you -- you are familiar with that letter?

CAPT. IMRICH: Yes.

MR. IVEY: When you read that letter, what was your initial reaction to his reply?

CAPT. IMRICH: Well, I guess my first reaction was appreciative to have the reply from a major worldwide aviation leading organization to at least close the loop on the dialogue. I mean, that was the first thing.

I appreciated the fact that Captain Ewell believed it appropriate and responded back so we could more or less get this dialogue formally established and so forth. That would probably be the first reaction.

The second reaction was, personally -- and this was just personal, and again, this is in the context of the evolving situation at the time -- I was very glad that some of the changes had been made and were being made that we had recommended, because I felt as though that we had had some positive effect to help the general program move in a more constructive direction.

And there were some areas where I had hoped that perhaps the movement perhaps would have been more or faster in that direction.

But I do recognize and recognized at the time that in aviation there are a lot of differences of views on a lot of issues, and it takes time. And only history is the judge of what the truth really is.

And so we did the best we could with the information that we all had at hand to try to help move that in the direction we thought.

So I guess in general I was pleased that it was moving in the right direction, but I perhaps had a twinge of, as I often do, hoping that it could have moved farther faster, which --

MR. IVEY: Was there a major sticking point that you personally had in his reply?

CAPT. IMRICH: No. I wouldn't say a major sticking point. I think that it's always difficult in this complex industry to get convergence on major issues.

I mean, goodness knows, on TCAS, on Cat III, on HUD, on FLIR, on almost any subject, winter operations, deicing, name it, it's extremely difficult to get consensus quickly on major issues of our time, because they are complex.

And so my life has been one of frequent disappointment, of being frustrated at not being able to move issues farther faster. And this was probably in the middle of the group of that level of frustration.

MR. IVEY: Yes. Now, this was training that was being given to the American pilots, and then the conference was held. And this feedback in both directions had been given and received, or the correspondence had been given and feedback received.

In terms of the FAA and the certificate management organization here, the POI and the FAA in Dallas is charged with the oversight of the carrier.

CAPT. IMRICH: Yes.

MR. IVEY: Is part of the AAMP flight training program approved or accepted by the CMO?

CAPT. IMRICH: Well, certainly the CMO has the regulatory oversight responsibility for the airline, and as such there are different levels. There are things that are just directly approved; there are things that are accepted; there are things for which there is awareness.

And certainly you have training programs, you have ops specs, you have check lists, you have simulator programs.

And so there were probably a full range of issues that ranged from ops specs on the one end of the scale to simply correspondence that's routine correspondence exchanged with the CMO that would fall under the category of awareness, and probably everything in between that would relate to a program that was as important to American as the Advanced Maneuver Training Program.

And so I'm sure that there were all those levels, including the regulatory compliance of airman certification that would have folded that back into programs that were their approved qualification program.

MR. IVEY: But is -- do you -- well, let's start the sentence over again.

In the case of the AAMP flight training, which one of those categories, approved, accepted, observed, informed, how was that program surveiled from the CMO's standpoint?

CAPT. IMRICH: Well, surveiled would be different -- may be different necessarily than the approval level.

I think because of the iterative steps that the FAA has taken on the way that they have, for example, done ops specs and what the standard ops specs were, my recommendation would be really to talk to the APMs or the POI or the CMO manager at the time to know exactly which vehicle was used for which part of that.

But typically the training programs would be approved.

MR. IVEY: Sure.

CAPT. IMRICH: But I would work at the technical level, not at the administrative detail level of signature as to the exact form that was taken and what was covered by an ops spec, what was covered by an approved training program, what would be covered by an approved manual, for example, or an accepted for an individual airplane type.

You'd have to talk with Frank Breeden or Corky or one of the inspectors that was directly involved with that. And I don't remember. I know Wayne Williams at the time there, and I believe Frank Breeden. But I don't know exactly which inspectors did what at which periods during that time. You would have to just go back to the historic record.

And perhaps after talking to them I could reconstruct that, but I just flat don't remember what the exact approval mechanism was for this within the CMO.

MR. IVEY: One of the questions that I'm sure begs to be asked and answered is that, once the return letter was received and the FAA saw that there was some disagreement, either philosophically or in the practical application of the training, these differences, what did the FAA do as a follow-up regarding these differences?

CAPT. IMRICH: I don't know definitively the answer to that question. And the reason why is because my role was to provide recommendation, guidance, background information, and suggestions as to the bigger picture in my role. But the CMO would have known the answer to that detail.

But I think it's very important to note that within the FAA there are wide ranges of differences of view and levels of familiarity and, I don't want to use the word competence, but education and experience with respect to these issues.

And it's not uncommon for differences of views to exist between Washington, the regions, regions and CMOs, CMOs and individual inspectors that are charged with that.

And I don't know definitively exactly what the CMO's response was to this evolving information.

MR. IVEY: So it's fair to say that, although this letter may have been received by you, it's quite possible -- and not to suggest -- but that Washington may have agreed with Captain Ewell's approach, or perhaps Washington could have agreed with you, and, as you say, in the region someone had felt differently --

CAPT. IMRICH: That's very possible.

MR. IVEY: -- or the CMO might have felt differently. And so the way it was approached --

CAPT. IMRICH: I think that that's --

MR. IVEY: -- would have been influenced by that opinion?

CAPT. IMRICH: It's probably more than possible. It's probably likely.

MR. IVEY: I'd like to ask you your assessment of the Advanced Maneuvering Program of American from its beginning until -- your familiarization with it up until last year, when you left the FAA.

CAPT. IMRICH: Sure.

MR. IVEY: Tell me what you think about the program and how it has evolved.

CAPT. IMRICH: I'll try to use some adjectives. Pioneering; movement in the right direction; pleased that an operator recognized the need that needed to be filled in a broader way; but, as with most things in aviation, areas where I thought that continued evolution or improvement could be beneficial.

MR. IVEY: What are some of the shortcomings of the program as it stands today?

CAPT. IMRICH: I can't answer that today, because I don't have current knowledge of exactly where it stands.

The last direct contact I would have had with the program would have been probably about a year or so before I felt FAA. The last year that I left FAA I didn't have the opportunity to work directly to see what American was doing, the last six months or so.

So I truly couldn't say for today. I just -- I would have only secondhand or third-hand information.

MR. IVEY: So that would be about --

CAPT. IMRICH: Probably --

MR. IVEY: -- the time frame of 1999?

CAPT. IMRICH: A year ago, year-and-a-half ago, roughly.

After this was done, changes were being introduced that I was aware that changes were being introduced, but I don't know and I didn't know the extent to which those changes were being made.

Because at that point it would have been the CMO and the FS-200 Division in Washington and Tom Longrige and AQP and the other parts of the FAA that would typically have been monitoring that evolution in a direct way.

At that point I was -- I had shifted focus to work on many other issues. And I had done what I could. And so it was then in the hands of the line part of the organization to deal with this and to provide that follow-up. So I just don't know.

MR. IVEY: Was there any overriding concern about simulation? Did you have that concern?

CAPT. IMRICH: I wouldn't use the term, overriding. Was there concern about simulation? Yes. Is there still concern about simulation? Yes. And this isn't in the context of American. This is in the context of the entire industry.

There are a number of areas where simulation still has ample room to be improved, in my view, in my personal view. And I think it's a continuing, and it probably will be a continuing journey to get our simulation capability to where we in the industry want to eventually take it.

MR. IVEY: Can you give me some point specifics about improvement in simulation?

CAPT. IMRICH: Sure. Low, near the ground operations, winter slippery runway operations. Our best Level D simulators yet in many respects do not perform or behave exactly the way an airplane would behave on an icy runway, for example, or in touchdown dynamics, or in the landing maneuver and the landing flare.

Even though we have landing approved simulators, there are still aspects of simulation that remain to be improved.

MR. IVEY: And forgive me. I know there's lots of issues. I'm going to try to just focus a little bit over in the maneuvering --

CAPT. IMRICH: Sure.

MR. IVEY: -- aspect as it relates to this accident.

CAPT. IMRICH: Absolutely. The flight envelope. The flight envelope.

If you look at simulation, there are areas that are assessed in flight with aircraft in flight test programs where you get data and provide that to simulator manufacturers typically to program the simulation characteristics, the stability derivatives, the performance parameters, the feel and response of the airplane.

And that's a continuing work in progress, to make simulation as closely match the characteristics of the airplane as you can.

And so there are areas where you have flight tests, there are areas where you have good data that's based on good extrapolation.

And then, there are areas that are based on extrapolation where you don't have the same level of completeness or confidence in the data as you get further and further and further away from the normal part of the flight envelope.

And that can be particularly true when you get to unusual configurations of an aircraft, because you can imagine if you change the aerodynamic configuration or say have a flap come off or something like that, or say a thrust reverser came open, getting data on some of those characteristics is very difficult.

So the farther that you get away from the middle of the normal part of the flight envelope, the more opportunity you have -- we have as an industry in simulation in general to improve the quality of simulation.

And when you're dealing with unusual attitude recovery or unusual attitudes or the fringes of the flight envelope, particularly with large amounts of alpha, beta, or velocity extremes or configuration extremes, simulations aren't as good as they are in the normal training part of the flight envelope -- or the normal operating part of the flight envelope, say.

MR. IVEY: Well, we have engineering simulators that the manufacturers usually have in their possession. And of course for flight training pilots, the idea is to keep them in the center of this envelope so that they don't --

CAPT. IMRICH: Sure.

MR. IVEY: -- approach those extremes.

CAPT. IMRICH: Sure.

MR. IVEY: But given the fact that we don't take real airplanes out to train pilots at these extremes, and the simulator is the only available tool, is it better to have degraded simulation at the extremes in hopes of still training proper techniques, or would it be better not to do that? And if one is better than the other, why?

CAPT. IMRICH: That's a Hobson's choice. I'm not sure that it's either/or. I believe the real situation is, you take the best tools that you have, and you try to use them as appropriately as you can within the limitations of those tools to try to come to the right or to the best training objective.

And as you get farther and farther away from the part of the flight envelope where you have high confidence in the result, then you have to be more and more and more careful about qualifying and limiting the applicability of the simulations so that the message that remains with the flight crew member is the right message or the message that's intended to be delivered.

I don't think it's a matter of either/or. I think clearly Appendix H and the whole movement towards simulation has been good for the industry. And in general I think that we do much now that we couldn't possibly have hoped to have done had we done all this in airplanes only. But on the other hand, we still have more opportunity for improvement.

So what you do is you do the best that you can within the level of your ability to simulate.

But as you get farther and farther and farther toward these edges, I personally believe you have to be more and more and more careful about the message, how it's conveyed, and what the conclusions are that are drawn by operating in those areas.

MR. IVEY: Do you think that -- in the simulators we've heard that perhaps roll control and rudder control for that effect has been degraded in the software in order to get a pilot into an unusual attitude, and then they are restored so that, once entered, they have the opportunity to recover. Is that a good idea? Does that teach negative learning?

CAPT. IMRICH: It's, again, too narrowly focused of a question, in my view, in the sense that airlines have been exceedingly creative in finding ways to use this device to good advantage to get certain training messages across, because you just can't go into the simulation and get to the -Euler equations or get to the stability derivatives or get to an atmospheric disturbance model that has the sections of the wing properly sectioned to model, for example, the vortex encounter.

So you have to do what you can do within the budgetary resources and the simulator design limitations that you have to try to model the effect.

And in some cases I think it's been done very creatively with a good training outcome of the crew getting the correct picture even though it's been done by a very primitive method.

But in other cases it's possible that the conclusion could be disturbed or contaminated by the method that's used because it's such a troubling method that's used to simulate.

That's a sort of a roundabout answer. But I think that in the industry overall there have been really good examples, there have been okay ones, and there have probably been some that are not so good, that in retrospect we've maybe decided, Well, gee, that's really not that great of a way to introduce this idea.

MR. IVEY: Have you participated in the upset maneuver training?

CAPT. IMRICH: Yes.

MR. IVEY: Both ground school and simulator?

CAPT. IMRICH: Yes. And flight, with Veridian flying a Lear, doing in-flight work, too.

MR. IVEY: Regarding the simulation, when you went through it did you go through it here at American Airlines?

CAPT. IMRICH: A number of places, including here at American.

MR. IVEY: Having the experience of several airlines, do you see differences in their approach to upset recovery or unusual attitudes?

CAPT. IMRICH: Yes. But I think that that's usual in many, many, many areas.

And I wouldn't say differences to highlight the differences. There are subtle shades of nuance that are best aligned with the individual airline's route system, aircraft fleet types, culture, experience levels.

And I think that that's common to see that between airlines or among airlines because of the characteristics of the individual airline.

But, yes. I have seen differences and subtle shades of variation in how these issues are approached.

MR. IVEY: When you came out of the simulator or were placed -- I should say while you were in the simulator, what was your impression of the way that they introduce unusual attitudes and the recovery process at American?

CAPT. IMRICH: At the time I was exceedingly pleased that they were addressing it at all, because if you look at the very large number of airlines that have FAR 121 certificates, or even the larger number of airlines worldwide that weren't doing anything at that point, I and I know many of my colleagues were exceedingly pleased that it was being addressed, period.

We had questions about basic airmanship. Is it -- are we risking deterioration of basic airmanship skills?

I mean, we all know of other events that involve takeoff and landing where we have concerns about basic airmanship skills and so forth.

So the general reaction was a very, very, very positive one.

In terms of the specific, about how the upsets were being introduced, it's tough -- for example, if you have a big budget and a lot of time, there are ways to get into the basic simulation to change it to introduce those upsets other ways.

But it's a tradeoff. Can you even get that done? Can you get it introduced? And if you can't, then, there are more primitive ways to do it.

This wasn't the best way to do it; it might not have been the way that I might have elected to do it. But it did initiate the event and elicit a response from the flight crew that was within the plausible range of a way to help expose flight crews to the situation. It was certainly within the range of plausibility for a way to address this.

MR. IVEY: In the case of the A300, we learned in the simulator that there are two select buttons, one that uses a wake vortex behind a heavy aircraft to induce an unusual attitudes for recovery, and the other was to use a trim situation that --

CAPT. IMRICH: Right.

MR. IVEY: -- creates a pitching up moment for a recovery later.

Whether these are primitive or not, I don't know. I'm not asking that question. But what I am asking you is, is that, in your participation with other airlines, give me some other good ideas about how the approach to unusual attitude could be better served, or have you seen better ways?

CAPT. IMRICH: Better is a very difficult word under this context. Better often can only be judged historically.

But there were other methods to do it. And let me just describe an example of another method. And that is where an instructor or someone would physically fly the airplane into the attitude and say the airplane is in the attitude, and then you recover from that attitude; or to simply move the airplane to an attitude with a simulation initial condition and then release it.

I mean, there just are other ways. There are other ways to where disturbance could be introduced, but at least the control input could be allowed to function during the disturbance's introduction.

MR. IVEY: Can you give me an example of a disturbance introduction?

CAPT. IMRICH: Well, I mean, a pitch perturbation, a roll perturbation, an engine failure. I mean, there are a lot of ways that one could presumably initiate an upset.

There are operational scenarios that can fly an airplane into a situation where you have an autopilot failure, for example. And you say, Well, the scenario is that the autopilot has had this failure, it's a slow-over, and it's night, and you're doing whatever your normal enroute cockpit duties are, and you look up, and here's the attitude the airplane is in. And now respond.

I mean, so there are a number of scenario-based ways that one can get an airplane into an undesirable situation, whether it be prestall or high speed or unusual attitude; failure of an instrument indication, where you fly and follow a failed instrument in some case and then discover later from comparison that that instrument was failed.

So I'm not suggesting that any of these ways are better or superior to what --

MR. IVEY: They're just different?

CAPT. IMRICH: They're just different. They're just different. They all have their strengths, their weaknesses, their pros, cons.

And they all have to be viewed against time, budget, the generation of simulator, what's even possible to put into the simulator, because even within an operator there are many generations of simulator at times, and some you can do it, some you can't.

MR. IVEY: I'd like to turn for a moment to the use of rudder, which was one of the points made in the letter to Captain Ewell.

And there's a statement regarding rudder reversals -- and I'll read it -- such as those that might be involved in dynamic maneuvers created by using too much rudder in a recovery attempt can lead to structural loads that exceed the design strength of a fin and other associated air frame components.

CAPT. IMRICH: Yes.

MR. IVEY: While you were in the FAA, do you have any idea how this sentence came to be placed into that paragraph and into this letter?

CAPT. IMRICH: I believe that there were a number of people who have had or at that time had contact with design, development, flight testing, or certification of airplanes that were sensitive to the issue of these unusual forces and moments on a big transport airplane.

It didn't limit itself to the use of rudder. It also included differences in basic design philosophy of different manufacturers about characteristics of airplanes that covered a wide range of subjects, of which the rudder and the fin were one.

And because of that concern of how airplanes are designed, in my mind for many years I had been concerned about what the strength of these airplanes would be under certain wind -- not wind -- but certain atmospheric conditions of turbulence or dynamic maneuvering.

And from what I knew about airplane design, it seemed to me that this was an area that required great care and sensitivity in addressing.

And so it turned out that my view of that matched the view of others at other manufacturers and out of the manufacturing community in the operations community, and we believed it important to make this statement.

MR. IVEY: Do you think that American Airlines was advocating excessive use of rudder in their program?

CAPT. IMRICH: There are many, many people at American Airlines. It's like any big organization. I think there were probably many views within American, as there were within FAA, as there are within any large organization.

I believe that there were some within American that probably very clearly understood the significance of these issues. There were some that perhaps didn't have quite as much familiarity with aircraft design that may or may not have had that same level of familiarity.

I don't know what the centroid of that view necessarily would be with American. I know that --

MR. IVEY: I was -- pardon me. I just -- I do know that Captain VanderBurgh made -- he was the guru, if you will --

CAPT. IMRICH: Yes. Yes.

MR. IVEY: -- for American, and certainly was the point person --

CAPT. IMRICH: Yes.

MR. IVEY: -- as well as the delivery --

CAPT. IMRICH: Yes.

MR. IVEY: -- person of the initial training, to be followed up even by videos.

CAPT. IMRICH: Right.

MR. IVEY: So from a ground school standpoint, he was sort of the all-encompassing teacher.

CAPT. IMRICH: That was my perception.

MR. IVEY: And of course in the simulator, he's not teaching each individual in the simulator.

CAPT. IMRICH: Right.

MR. IVEY: But from his ground school perspective, did you feel like there was an -- did he advocate excessive use of rudder?

CAPT. IMRICH: I would have preferred and I did recommend to Van that this subject be very carefully addressed. And I believe at the time that I did suggest alternate forms of wording and alternate forms of description that I believed more closely aligned with what I believed to be a better way to present the issue.

But I must say at the time that to me it wasn't always fully clear as to what best was. I mean, this was -- you have to understand that this was a very formative involving period for all of the industry.

And so that was my view, but it was a view with recognition at the time of a fair margin for, perhaps others had a better view than I had.

MR. IVEY: I do know that the term, phugoid, had been --

CAPT. IMRICH: Yes.

MR. IVEY: -- mentioned, and then, in subsequent revisions to their maneuvering program --

CAPT. IMRICH: Yes.

MR. IVEY: -- that it was removed.

CAPT. IMRICH: Yes. That's near and dear to my heart, because I -- there were a number of areas where I had clear feelings about those kinds of issues.

And I did suggest that in this industry it's important for us to use common terminology that's clearly understood and to not apply terminology that doesn't fit to situations that could cause confusion.

And so I specifically remember discussions about that. And I believe it was later adjusted.

MR. IVEY: Yes. It was removed.

CAPT. IMRICH: Yes.

MR. IVEY: In fact, at the end of the video tape presentations there are caveats that were actually added segments that were not in the filming of his earlier presentation. And I'll use the term caveat at the end where he was talking about the use of rudder and using coordinated rudder and all that.

In testimony it was stated it was added as a result of the suggestions that were made in this letter. Have you seen that revised video tape that came out about the end of December of '97?

CAPT. IMRICH: Dave, I can't say conclusively that I have or have not, because I've seen so much over the years that, I mean, there wouldn't be a prayer that I could remember the date of a particular video.

I've seen videos, I've seen video clips. Which date, which version they were, I just have no -- from so many airlines and so many situations, I just would have no idea of remembering for sure.

If I saw the video I could probably say, I saw that, or, I didn't see that.

MR. IVEY: Sure.

CAPT. IMRICH: But at this point I just couldn't remember that.

MR. IVEY: All right. The significance of the statement about structural loads that exceed the design strength of the fin, did you pass along to Headquarters in Washington or to the CMO or to any other interested FAA parties the significance of structural loading with rudder reversals?

CAPT. IMRICH: I tried to do that to nearly everyone that I spoke to on this issue.

MR. IVEY: FAA people?

CAPT. IMRICH: Anybody. Because it was an issue that was of concern to me and had been of concern to me.

I spoke to many people at Headquarters, not so much the CMO, a little bit probably to the CMO in passing. But my principal responsibility was to Washington, and then Washington to the CMO, because I wasn't directly in the chain to the CMO.

So anything I would have done with the CMO was in the area of advisory advance information, suggestions, just to keep them informed along the way, because their real chain was a Washington-regional CMO chain.

So I tried to do that. But my principal contact was -- attempted to be with Washington in that area.

MR. IVEY: And how was their response to your information?

CAPT. IMRICH: The FAA has -- had at that time significant opportunity for improving its communication process.

I can't say what effect, if any, it had in those discussions. I just, I can't say for certainty what effect it would have had. I know that --

MR. IVEY: You feel like you passed the information out but it was never acted on?

CAPT. IMRICH: That wasn't peculiar to this issue.

MR. IVEY: Just many issues in general?

CAPT. IMRICH: Yes.

MR. IVEY: This would have been in the 1997 time frame. How many years did you say you were in the FAA?

CAPT. IMRICH: I started with the FAA in 1975, 1976, in that transition when I left the Air Force.

MR. IVEY: So 30 years or slightly better than 30 years?

CAPT. IMRICH: Roughly. Approximately 29 and some years.

MR. IVEY: So you've seen a lot of changes in the FAA --

CAPT. IMRICH: Yes, I have.

MR. IVEY: -- in that career. Before I get over into that area, I'd like to back up one moment and ask you, from your technical background, do you know what the maneuvering speed VA means?

CAPT. IMRICH: In general. Yes.

MR. IVEY: Give me a definition, if you will.

CAPT. IMRICH: Well, in sort of in just general terms, the speed at which you can apply a control application within the structural limit of the airplane.

MR. IVEY: Full control?

CAPT. IMRICH: Yes. I mean, within the bounds of the rule. You have to look at how the rule applies to FAR 23, FAR 25, and so forth. But in broad terms. Yes.

MR. IVEY: Do you know whether or not that would mean going from a neutral -- let's use rudder as the example --

CAPT. IMRICH: Okay.

MR. IVEY: -- from a neutral rudder pedal position to a full-throw rudder below the maneuvering speed based on the gross weight of the airplane, should you be able to apply a full rudder without damaging the airplane?

CAPT. IMRICH: VA typically focused historically on the pitch axis of the airplane as opposed to on the lateral axis of the airplane.

There are significant questions about the use of rudder and rudder movement at various speeds. Obviously rudders are designed against design conditions of engine failure, cross-wind landing, other characteristics. And airplanes are designed so that rudder movement is often limited as a function of speed or Q and so forth to protect the rudder.

But there are certain things that one can do with a rudder and a fin that are clearly intended and within the design goal of the airplane, for example, coping with a major engine failure during takeoff.

And there are other things that one could do with a rudder of an airplane that we've learned historically, since the early dutch roll experiences, for example, dating back to the 707 or C135, that that can be very, very troubling.

And so it's not just a matter of applying full rudder throw. It's a matter of the excitation of dynamic modes of the airplane, for example, dutch roll. And it's a matter of what the airplane is doing in terms of yaw rate at the time that rudder application is made.

So really that's actually quite a sophisticated and complex question that, you know, I wouldn't want to go back and tie VA to that particular issue of rudder use.

MR. IVEY: And you made an interesting statement, that VA is about full control deflection and that it seems to have been primarily emphasized in pitch. How about in roll, aileron full control, or spoiler --

CAPT. IMRICH: Yes. This gets back to basic certification requirements. And really, I would urge you to talk to both the industry and the FAA certification people in that area in terms of the particular testing characteristics, certification characteristics, and design characteristics that relate to those features of an airplane.

I have my own personal views about that. But I think that you're getting into territory about the design characteristics of an airplane that probably would be best addressed by manufacturing people and by certification people as far as what, if any, connections might be made for concepts like VA, VD, VC, and the other speed points in the certification requirements of FAR 25 to the design characteristics of the airplane.

MR. IVEY: Yes. In general aviation, and even light airplane pilots familiar with their airplanes, VA is a maneuvering speed that they generally are familiar with.

CAPT. IMRICH: Right.

MR. IVEY: And I think it's below that speed they always feel like a --

CAPT. IMRICH: Full control deflection.

MR. IVEY: -- full control deflection is not going to --

CAPT. IMRICH: Right. Harm the airplane.

MR. IVEY: -- harm the airplane. I have never seen where it said, Pitch only, or, Roll only, or, Rudder only, or --

CAPT. IMRICH: Right. But there's a reason for that, and that's because of the blending of controls and the control force, the control authority, and what the characteristics of the airplane are in terms of what its design strength conditions are that set that.

Often, for example, if you take an airplane and introduce full aileron on a small airplane, the design condition for wing strength isn't sized by aileron deflection.

But on large, flexible airplanes, you can introduce dynamic characteristics to the airplane that don't in any way relate to even full deflection.

For example, if you excite an airplane with the right frequency with aileron, spoiler, or rudder, you can introduce dynamic response of the airplane, dutch roll, as an example, that could have secondary effects, not only for aerodynamic surfaces of the airplane, but also for the engines.

I mean, there have been airplane types, large airplane types, that have had engines come off, for example, because of --

MR. IVEY: And our current accident is a case.

CAPT. IMRICH: I didn't mean to go there. But I was referring to particularly the earlier Boeing 707, C135 experience.

And so when you talk about applying full control, I think it's important to look at the dynamic conditions that are involved, the speed range, the mach range. And I mean, that's deep into design territory, that I would urge you to take those kinds of questions to design people and certification people.

MR. IVEY: I appreciate what you're saying. And I guess we as pilots, when we all started out, not everyone started out in the Cessna 152 or a J-3 Cub, but for the greatest community out there, they started their flying in small airplanes.

And so they learned this VA for light airplane certification and their development in flying to respect that speed for what it would protect them from.

And so when we move into large transport category airplanes, we don't have a VA. That's not normally given to pilots --

CAPT. IMRICH: That's correct.

MR. IVEY: -- and operators don't put those speeds out there for pilots.

CAPT. IMRICH: That's correct.

MR. IVEY: They use a different means to --

CAPT. IMRICH: Sure.

MR. IVEY: -- protect the pilots, if you will, in terms of speeds reference to, let's call it the approach speed and to back up from there.

But that pilot who learned in a small airplane the protection of VA carries that with him when he becomes a captain on an air transport pilot.

And I must confess that what I learned back then I presume to still be applicable in a big airplane, although I'm not given that number.

And you've certainly told me something that I'm aware of, but what brought me to the dance was back there when I learned about VA.

And if I'm a pilot today in a transport category airplane, and I felt like I couldn't put in -- to use the rudder as an example -- a full deflection rudder because of other complications -- do you believe it's necessary for the manufacturer to enlighten pilots about these kinds of limitations for full control inputs?

CAPT. IMRICH: Oh, I think that typically the manufacturers do provide that information already in the form of -- for example, in our early training programs for years we've talked about upsets that involve stabilizers, dutch roll recovery, yaw damper.

So I think that the manufacturers typically do provide that information and currently provide that information.

The information that's provided is key to the operating characteristic of the airplane.

For example, we don't typically provide engine-out glide speeds that are provided in small airplanes, because the idea of a large transport airplane or a multi-engine airplane is that from brake release on takeoff until the time that you pull into the gate that you have protection from the engine failure, including extraction for go-around at mountainous airports, for example.

So there are many differences between small airplanes and large airplanes. And it's incumbent upon operators and training organizations, be they military or civil, to bridge that gap.

And so I think that the information that's provided in general by manufacturers does cover the flight envelope of the airplane, covers it exceedingly well, as attested by our accident record.

Now, could it be improved? Of course. I mean, I've spent my career trying to find ways to improve that information. And does it still have room to improve? Of course, in general, for all manufacturers. I try in my current job to do that.

MR. IVEY: The idea of -- again just focusing on the rudder, because certainly the interest in loads on the rudder, as explained in the letter to Captain Ewell, certainly was of concern to someone, if not the entire group.

And I guess I, as a pilot I'm interested in finding out whether or not under the VA if you made one input from a neutral -- the term, doublet -- I don't know if you're familiar -- well, in your engineering tests I'm certainly sure you are. And we have covered that.

But to a pilot, every time I have asked a question, with the exception of an engineering test pilot, no one had ever heard the term, doublet. And I also fall into that category until recently.

CAPT. IMRICH: I'm sure there are many other terms that fall in that category, too.

MR. IVEY: I'm sure that's true.

And I guess my concern is, is that, if for some reason I were to put in a rudder input followed by a reversal -- and I would use the example of full throw in both directions.

That if I were below a maneuvering speed, just in my way of thinking -- and taking in full consideration the differences between air transport category airplanes and small airplanes -- I get the feeling that the general pilot population would feel protected.

Now, that's not to say that we're going to sit here and try to tear a tail off or break a wing off by making such rapid control inputs, because that's not the way we're taught to learn how to fly.

But I think the idea of putting in an input followed by another input, most pilots would feel like they would be protected at fairly slow speeds, or even at a moderate speed. Do you agree with that?

CAPT. IMRICH: I'm not sure that I do. And the reason why is because it's not a matter of full deflection. It's a matter of the circumstance of the deflection and the dynamic response of the airplane and the frequency that you make the input.

And that's a very sophisticated issue and question. And typically we don't do, test, make, or have those kinds of excitations on an airplane.

And that's not only true with rudder. This is true with, there are things you can do laterally with aileron with large flexible wings; there are things you can do with elevator that involve APC, the whole issue of aircraft pilot coupling.

You know, that there's a whole Duane McRuer, and National Academy of Engineering study on aircraft pilot coupling that addresses similarly sophisticated and complex issues that range from basic large aircraft to modern fly by wire aircraft.

But there are all kinds of characteristics of airplanes that require understanding and being addressed.

And so I wouldn't at all in any way single out this rudder issue, from that perspective. I mean, I can cite many, many, many circumstances with engines or with air frames like this that requires correct design, certification, manual construction, training program, recency of experience, and exposure to in simulation.

I don't think that this rudder issue is a particularly unique one in any way, shape, or form.

MR. IVEY: Do you believe that principally the concerns are more over pitch and roll than they have been in the past, prior to this accident, in the direction of yaw?

CAPT. IMRICH: Are you talking about --

MR. IVEY: Have airplane protections been built more into pitch and roll with less thought about yaw, or no?

CAPT. IMRICH: Not historically, because, for example, the whole issue of the yaw damper, remember back to the dutch roll era, the early 707 again, I take you back to the 707, DC8 series airplanes and airplanes that have NEL provisions for yaw damper out limitations.

I think that -- and also if you look at the entire turbo prop class of airplane with feathering and feathering engines and lateral directional characteristics during takeoff and landing.

Vehicles have characteristics that relate to their fundamental design, and you always have to respect those characteristics regardless of the class of airplane you're dealing with.

If you're dealing with a glider, it's very different than if you're dealing with a space shuttle or 777 or an A340. They just, they have differences, and those differences have to be respected.

You can get into trouble with any airplane if you don't treat the airplane within the bounds that it was designed and intended to be flown.

And incidentally, manuals and airplane flight manuals can't possibly address all the combinations and variations of things that could occur. Otherwise it would take a lifetime to read the manual.

MR. IVEY: Sure. I'd like to turn now for just a moment to the FAA system and structure.

You were talking about the seemingly lack of response from FAA Headquarters to the comments that you were making regarding unusual attitude training and other subjects. So perhaps it would be better to talk in generality rather than specifics for just a moment.

The old way of -- well, it's still current. Let me retract my statement.

The way the FAA provided surveillance of carriers used to be through the Program Tracking and Reporting Subsystem --

CAPT. IMRICH: PTRS.

MR. IVEY: -- or PTRS. And just a few years ago this system has made a change, and it has incorporated the top ten carriers of the country into the ATOS, Air Transportation Oversight System.

In your 30 years of working with the FAA, tell me what you think about this new system. Is this going to be more effective for oversight of carriers?

CAPT. IMRICH: Well, I'd like to start back with the PTRS for a minute. That wasn't the old way. That was actually the middle way.

MR. IVEY: Yes.

CAPT. IMRICH: I go back long before the PTRS.

The issue of surveillance, the relationship of the FAA with airlines is a very difficult issue, and it has been. I mean, through various levels of new airline maturity, new entrant airlines, deregulation, it's an exceedingly complex subject.

The whole issue of the role of surveillance in management of the relationship between the FAA and the airlines is a tough one.

And any of these systems have had their strengths and weaknesses. Old wasn't always better. We have made improvements, we speaking of the industry, over time in the way that that relationship is managed.

I have had aspects of the system in 1975 that were good, aspects that weren't so good; same was true in 1980.

In '84 through the '87 time frame we tried to more systematically address this. I think Congress was very interested for many, many years in improving the effectiveness of the FAA's surveillance in this area.

That continued through the period with ATOS and CSET, into this certification evaluation team for initial certification of airlines.

I've had areas where I believe that there were effective aspects of those programs and areas of concern all through that period.

But at the time that ATOS occurred, I had particular concerns about that change, about its effectiveness, about the direction that was being taken that remain to this day.

MR. IVEY: What are some of those concerns?

CAPT. IMRICH: Any system that you have depends heavily on the qualification and the familiarity and the knowledge of the people who put it into place and on the level of exposure that those people have to real operations as opposed to paper.

And I believe that in the years, the few years before I left the FAA, I saw directions being taken in the FAA that I felt weren't perhaps the best directions to take in these areas.

It involved areas of emphasis; it involved methods of working with the operators; it involved the kinds of people that were assigned to responsibility in this area; it involved the type and the nature of management review and oversight and the ability and capability of management to do that oversight to the point where I am not sure it was as effective as it could have been.

MR. IVEY: Do you think that it's the qualification of the inspectors and managers or the lack thereof that is a big part of the problem?

CAPT. IMRICH: I think that was certainly a factor. I think that's an important factor.

There were inspectors in the FAA that were exceedingly well qualified and had very good experience. In my view, that number was very small as compared to what it needed to be.

In the management area, I believe that there were significant opportunities to improve that, also.

MR. IVEY: When you speak in terms of management are you thinking about on the local level, regional level, or national level?

CAPT. IMRICH: Principally at the office level and above; certainly at the region level, and certainly at the Washington level.

MR. IVEY: Will the ATOS system that's being developed and is currently being used by the ten carriers, will that help in any way solve that problem?

CAPT. IMRICH: I can't definitively answer that. And the reason why is because I can only really talk to the program that I knew in the '96 through '98 period as it was evolving.

And I actually drifted away from the entire ATOS issue, probably by '98, certainly into the area of 1999, because I and others in FAA, some of whom have left and others who are still there who had voiced concerns about this, were troubled about what was happening in the FAA in general, in the leadership in the FAA in general and this program in particular.

And so as our ability to help affect constructive change diminished, I just tried to find other more productive things to work with.

So I really cannot speak to where it currently stands, because I just don't know.

MR. IVEY: And you left the FAA at the end of --

CAPT. IMRICH: Let's say effectively April of 2000. Yes. But for the period of the year before that, I really wasn't working directly with issues that would have related to ATOS or CSET. I was working other technical issues. And so I just didn't have much contact with it except through secondary or tertiary means.

And so I really -- I mean, I would comment, but I would prefer not to comment on it, because I just wasn't that close to what was happening.

I had basically given up on ATOS at that point. I didn't see that there was anything that I could do that would help it, salvage it, fix it, or help the people that were doing change the view about it. So I just simply wasn't involved with it.

MR. IVEY: With your moving away from ATOS, can you provide me some insight from inspectors that were in the system and shared their concerns with you? What were some of the major concerns, if you can recall their comments?

CAPT. IMRICH: Training was exceeding difficult, to --

MR. IVEY: For ATOS?

CAPT. IMRICH: -- to get the necessary training, to know the airlines that you were going to be working with.

The paper was far out of proportion to its value. The analysis was less than useful. The qualifications of the people that were assigned to do the programs were less than desired.

The ability of management to glean useful information from the program was very low. The frustration in even understanding what was intended was high.

The ability to have hands-on contact, to see, feel, touch, do, to get a feeling for an airline, for what was happening on a day-to-day basis was significantly diminished.

Resources were allocated in areas where the potential yield to help, work with an airline to achieve a useful outcome, those opportunities were reduced.

It went on and on and on. And any -- and it was exceedingly frustrating to hear the pleas of line inspectors expressing their frustration and concern about it to the point where I just -- I couldn't do anything about it, I could no longer influence senior managers to take a different view of it, and so I just didn't deal with it.

MR. IVEY: What about geographic inspectors for the carriers?

CAPT. IMRICH: It was exceedingly frustrating for everyone, from PLIs to APMs to geographic inspectors to FSDO managers, the few FSDO managers who had any contact with the air carrier industry, I might add, because there was a huge change in the FAA over the decade since --

There was one particular Executive Director who just shifted the qualifications of inspectors in a way that it got to the point where there were fewer and fewer and fewer air carrier -- fewer inspectors who really had serious contact with air carrier aviation.

And so the level of frustration was just very high during that era.

MR. IVEY: Do you think ATOS is just a rehash of the previous PTRS system?

CAPT. IMRICH: It would be fortunate if it was that. In my view it -- some ideas in it may have been sound, of using statistics and trying to get the key statistical measures.

But in my view, at least at the time that I was associated with it -- and I cannot speak for it now. I just can't speak for it now, because hopefully the industry itself would have helped shape its evolution to a better form. But at the time it seemed to me to be in great need of attention.

MR. IVEY: Earlier in the development of ATOS the General Accounting Office, the GAO, came out with a report talking about ATOS. And one of the things that was cited was that it was an insufficient amount of time to train the inspectors, just inspector guidance was insufficient. Do you think that's been improved at all, up until when you --

CAPT. IMRICH: I can't speak for the current --

MR. IVEY: -- up until --

CAPT. IMRICH: I can only speak up to the time that I was familiar with it.

There were two types of training. There's training in the administrative aspects of making the program administratively work, and there's training in the inspectors' level of knowledge about the technical activities of the air carrier industry.

On both counts I would say that the FAA had major opportunities for improvement.

MR. IVEY: One of the justifications for ATOS was that it was supposed to lower the number of inspectors that were necessary. Do you think that's actually happened?

CAPT. IMRICH: That's a very important question, and it's a difficult question, because people often think, perhaps the more general public, the more inspectors the better. I personally don't believe that's necessarily true.

You have to ask the question, if you doubled the number of inspectors, what would the effect be, and if you halve the number of inspectors what the effect would be.

The number of inspectors that are effective is very importantly related to the knowledge and the skills and the abilities of the inspectors that you have.

In some cases you could double the effectiveness of the FAA by halving the number of inspectors if you have the right inspectors.

It's the knowledge that they have that has an incredibly important effect on the effectiveness of the FAA.

You could quadruple the number of inspectors and reduce the effectiveness of the FAA if you have the wrong skills, qualifications, knowledge, or coordination among them or between them.

And so I think that there is a major disconnect in the understanding of the role of having knowledgeable inspectors versus the number of inspectors.

I've never believed that the number of inspectors is the crucial issue. It's the quality and the knowledge of the inspectors that you have.

Well trained people that really know what they're looking for and know what they're doing can have major effects if they work effectively with the airlines that they're working with. This isn't a numbers issue.

And I think that within the FAA for the last 15 years at least, at least since there were some particular changes at the level of Executive Directors of the FAA who made these decisions, there have been profound and fundamental mistakes made in the way that they have treated the entire inspector workforce and what was important to safety.

MR. IVEY: With that, let's go off the record.

(Whereupon, a short recess was taken.)

MR. IVEY: We're back on record.

You were talking about the quality and number of inspectors for the surveillance of the FAA.

I'd like to turn just a moment to the new way of doing business and recording it. You mentioned about the paperwork not perhaps matching the task.

CAPT. IMRICH: Right.

MR. IVEY: Can you give me some feel about that?

CAPT. IMRICH: I would be happy to tell you what I remember. But again, this is a number of years ago now. And I really don't want to give any impression about what the current situation is, because I don't deal with the current situation, and I can't say how it may have changed in the past, certainly in the past year.

But at the time, roughly from the early '90s on, this situation within the FAA by many inspectors was viewed as a deteriorating situation. And it probably started in the early 1990s. And it got continuously worse.

And I don't know what to say other than the fact that it was a very -- there were a very complex set of reasons why that possibly occurred, or at least why that perception existed.

MR. IVEY: Just give me a little insight, if you will, into why it was deteriorating, just so I can understand.

CAPT. IMRICH: Management directions; management leadership and choices for where the particular group of managers were trying to take the FAA during that period, certain particular senior managers.

MR. IVEY: You mentioned a shift in direction.

CAPT. IMRICH: And this is principally within Flight Standards.

MR. IVEY: What do you think the proper direction should be -- should have been for the FAA? And when it was in the proper direction, what was it?

CAPT. IMRICH: That -- proper in that sense would involve many, many, many elements of leadership; people; qualification; organization; relationship with the industry; feedback with the regulatory standards; modernization of the regulatory standards; modernization of the guidance material that was available to inspectors and the industry.

There are a hundred dimensions to that question, Dave, and I think that there were opportunities for significant improvement in many, if not most, of those areas.

MR. IVEY: And do you believe up until a year or two ago that they have moved away from that?

CAPT. IMRICH: It was continuing to deteriorate at the point that I left the FAA, in my view. In fact, it was one of the reasons why I left the FAA.

MR. IVEY: The FAA has been charged with advocacy of aviation and regulation of aviation. Do you think that those two areas have been significantly altered?

CAPT. IMRICH: No. Not at all. In fact, I don't think the advocacy issue ever was really an issue, in my view.

The goal was the pursuit of safety. And I don't -- I have a different view of that advocacy issue than some others have about the role that it played. I don't think that advocacy was the issue.

The issue, in my view, always was getting the major safety change that really has helped lead the industry to substantially improve our safety record. And I think it's widely misunderstood where safety comes from, at the micro level versus at the macro level.

And the FAA often focused on trying to achieve safety at what I call the micro level and missed opportunities for massive improvements to safety at the macro level because of the completely wrong emphasis on what was done.

And many examples I think could be cited of how that works. And that's a philosophical difference. And so --

MR. IVEY: Could you just cite two examples?

CAPT. IMRICH: Sure. I mean, look at the simple issue of takeoff and landing weather minimums, of providing credit for -- say a small amount of minimums credit in return for improving the quality of flight directors and autopilots on the airplane.

Where the micro view of that is, Don't do it, it's unsafe, you're going too low, it's lowering your decision height, it's lowering your RVR, and it's going to make things unsafe, and so don't approve it.

The macro version of that is, by that tiny little bit of credit that you allow you draw entire new systems into the airplane, radar altimeters, autopilots, fail operational autopilots, fail passive autopilots, flight directors, FMS's.

And you change the entire way that the airplane is operated that you benefit from even in cruise flight having good autopilots or high quality autopilots.

So by giving up the original, back in 1963, Cat II, Cat III credit, we have an entire industry now that has airplanes that have capability that might never, ever have occurred had we not provided that credit to lead the introduction of the modern autopilot, flight director, flight management kinds of systems that we have, which have been -- and map displays, same way -- that have been of phenomenal help in improving the safety of our industry.

And so if you say, Don't approve that extra 50-foot decision height, or, No, you can't have that extra 100 feet of RVR for this or the other thing --

I mean, my goodness, look at what's happened with some airlines with head-up display; a tiny bit of credit, but it's brought a whole new dimension to the --

And so the issue is, the FAA has been, in my view -- this is my personal view; I want to underscore that personal view -- has been very good at stepping on the ants while the elephant's walking by, and in many cases being a major inhibitor to safety improvement.

So this has nothing whatsoever to do with advocacy or foster and promote.  It's the issue of safety perspective.

TCAS was another good example, where everyone said, The sky will fall, don't do TCAS, it's going to cause accordion springs in the sky, it's going to cause the collapse of the air traffic control system.  None of that proved true.

In fact, TCAS has warts. Does it have to be fixed? Absolutely. Do we need to get better systems so we don't have target drop? Absolutely. But I think most people would believe that TCAS has made a positive, constructive improvement in the industry.

There were elements of the FAA that were dead set against TCAS at the early days, before we called it TCAS.

Again, it was a classic case of, the certification people were saying, You can't certify TCAS. It's going to cause an accident, doesn't meet 10 to the minus 7th, 10 to the minus 9th, missing the fact that there's a much bigger safety picture that needed to be addressed.

And so those are the two examples that I would cite of where missing the forest for the trees.

And I think that that philosophy, there are many people who had the view of the FAA, that the FAA was no longer effectively performing its safety function and leadership role.

MR. IVEY: Did the FAA, when they began to implement ATOS, did they go out to industry to have them give input to this new system?

CAPT. IMRICH: Nominally. Yes. Practically, and again, in my personal view, not effectively, or much less than probably was required.

And this isn't just with ATOS. This is with most major changes that the FAA has dealt with in the past five years or so. In my personal view, that there hasn't been anywhere near enough international and national coordination with important technical organizations that have that role.

In fact, there have been major reports to that effect. RTCA Task Force IV essentially said that, a major RTCA effort that was essentially summarily ignored by the FAA.

And so it's not just me. I think there are -- there have been -- in fact, there is a study going on right now, a major certification study that's involved, about that aspect of the FAA that I think is a very significant one.

And so I believe many people held that view, as evidenced by these studies that were done that noted that very narrow perspective of the FAA as opposed to the broader perspective.

I would like to note, though, that these are strictly my personal views.

MR. IVEY: You mentioned the analysis of information within the ATOS system. And there are supposed to be data analysts at each of the carriers.

CAPT. IMRICH: Right.

MR. IVEY: Was this lacking for a period of time?

CAPT. IMRICH: That gets back to the earlier comment about, it's one thing to have data analysts, it's another thing to have data analysts who know what they're looking at, and it's even a third thing to have data analysts that know what they're looking at when they've asked the correct questions in the first place or looked in the correct place as to what they're looking at.

And so you can have stacks and stacks and stacks of data and not have an effective system if you don't have it structured the right way, have it looking at the right kinds of things, and having the right kinds of people with the right kinds of skills looking at that information.

And in my view there were at the time opportunities for improvement in all those areas.

MR. IVEY: Was it your sense prior to leaving the FAA that perhaps the data analysts that were in place were not necessarily familiar with aviation or even qualified to analyze aviation issues and were not given the training prior to being placed in those positions?

CAPT. IMRICH: There may have been a small number who were. But many who were in a variety of positions in my view could have benefited greatly from much, much more aviation awareness, experience, and knowledge for the work that they were doing and for the responsibilities that they were being given. That was my observation at the time.

MR. IVEY: Do you happen to have an idea of when the analyst or analysts were put in place --

CAPT. IMRICH: Eastern Region --

MR. IVEY: -- on the American certificate?

CAPT. IMRICH: There was a particular division manager in Eastern Region who pioneered that. And there were several senior managers in the FAA who thought that was a good idea and tried to promote that idea, and then that idea grew and spread, was my recollection of the origin of that program.

MR. IVEY: Do you have any idea when those analysts were installed on the American certificate?

CAPT. IMRICH: Oh. No. I'm not -- this was well before this occurred at American. This would have been evolution that had taken place within Flight Standards before this 1997-'98 time frame, well before that.

This would have been -- this is a progressive thing that was happening. Because different regions were doing different programs within Flight Standards. There was actually quite wide variation in the way that Flight Standards was administering its responsibilities in those days.

And some of these programs and some of these ideas originated within particular regions of the FAA, and then they grew to be national programs as those managers moved to Washington and assumed responsibility for the Flight Standards organization.

MR. IVEY: And to help me understand it, I know that there are within the CMO -- I believe there are data analysts --

CAPT. IMRICH: Yes.

MR. IVEY: -- down on the CMO level. Are there analysts also collecting similar or same data at a regional level and then on up to Headquarters, Washington, out near Dulles?

CAPT. IMRICH: I would prefer to not speak for the situation currently.

MR. IVEY: Yes.

CAPT. IMRICH: Because, again, my last contact was in the late 1990s. At that time there were people who were charged with the responsibility of analyzing this information. And their ability to bring knowledge to bear on those tasks was limited at best in my view and the view of other of my colleagues.

MR. IVEY: Now, were those the regional or Headquarters people that you would be referring to? And I'm just trying to --

CAPT. IMRICH: Yes. Yes. But there were also people even at the -- even within the FSDO level or within the CMO level. And so that characteristic existed across the board in the FAA. It wasn't just limited to Washington, but I think it was particularly acute in Washington during that period.

MR. IVEY: Uh-huh. Do you feel like that the inspectors that are -- that were being brought in at your time in the FAA, were they being given an adequate amount of training to be effective air carrier inspectors, and were their qualifications to get the job still being held at high standards?

CAPT. IMRICH: The qualification level of inspectors that were hired in the late 1970s, since the major group of World War II level inspectors were hired, on the average I think were substantially different than the qualifications of inspectors that were hired and assigned to positions in later years.

There were considerably better -- considerably higher requirements, not just for the simple things like flying experience, but also at the broad level of exposure and experience to aviation at the broader level in air carrier aviation. And I believe that was true, certainly in military aviation.

That clearly changed over the years. It's never been good. It was less bad then than it was in recent years.

And I think it steadily deteriorated over the years, but there were plateaus, and then it would go down, and plateaus.

And in fact, I can remember specific discussions in the early '80s about this with one particular administrator where the administrator was even -- expressed concern about that.

Because it was noted even back then that the FAA was one of the few organizations where the inspectors no longer were able to maintain active contact with flying, unlike other authorities all around the world where the inspectors have active contact with flying. FAA is one of the few in all the world where that wasn't true, in fact is no longer true. It's very rare now.

And then this deteriorated further at the time that the APD program was put into place, because the APMs and the APDs -- the APMs were supposed to be -- the idea was to get back to that model where we had a small number of people who were very well qualified and had that contact. And then the rules of the game were changed when that happened.

And then it went through plateaus, and it steadily deteriorated to the point where at one period of time there specific inspectors that I recall that were being assigned as principal operations inspector for carriers that were flying turbo jet carrier operations that didn't even have their inspector's credentials issued yet. And those assignments were being directed.

And those were the kinds of things that I remember specifically that took a very heavy toll on the organization.

And so, yes. I believe that there were significant opportunities for improving quality and the education of inspectors once they were brought into the system.

MR. IVEY: I'd like to turn for a moment to the Airbus airplane. You said that you were involved from the very beginning when Eastern Airlines was the first operator of the Airbus?

CAPT. IMRICH: It was the A300 B2 and B4, not the later version. I did relatively little with the A300-600 and the A310, but it was the earlier version. Then I did the later Airbuses, the A330 and the A340.

MR. IVEY: So you really haven't had any direct association with the airplane that American Airlines operates now?

CAPT. IMRICH: Only indirectly. I helped support the Flight Standardization Board when that program was happening.

Dave Potter and Jerry Davis were the two FAA inspectors who were most closely associated with the A310 and the A300-600, in my recollection.

And then, we had Seattle Aircraft Evaluation Group inspectors, like Gary Larson, who were the A300-600, A310 specialists.

My connection with the A300 series really dropped significantly after the early Eastern work, because I had gone on to other airplanes by that point.

MR. IVEY: Have you ever been made aware of any rudder anomalies associated with the A300 since the beginning or any rudder events, either here in this United States or worldwide, pertaining to rudders on A300s?

CAPT. IMRICH: I was aware of typical service events that took place through that period. There were events that involved the A300 that I was aware of and had supported indirectly through the Seattle Aircraft Evaluation Group.

There were particular events that involved large angles of bank in Florida and so forth that I was aware of. Yes.

MR. IVEY: Have you ever had any encounters or knowledge of wake turbulence events with A300s of any variety?

CAPT. IMRICH: I can't say definitively yes or no, because I have been involved with wake turbulence events on virtually every type of airplane that I've worked with over the years.

I don't recall particular serious events with the A300 that were wake turbulence related. I remember graphically other airplane types that were involved with wake turbulence events.

But I think this late one is the first one that I would, in my immediate recollection, associate with wake vortex. The others all involved other types of aircraft that stuck in my mind as serious wake vortex encounters.

MR. IVEY: Having said that, first, have you ever flown through a wake vortex?

CAPT. IMRICH: Many, many, many, many times.

MR. IVEY: And what type of encounter do you typically experience?

CAPT. IMRICH: It depends. I've done it from flying the box and sail planes under tow as a glider instructor for many years through doing it in big airplanes during flight testing and TCAS testing and other close formation flying things.

So I've had -- plus in normal operational flying you encounter wake vortices, hopefully from a very great distance.

And so, I mean, it -- be more specific about the nature of your question, because --

MR. IVEY: I'd like to relate to large airplanes.

CAPT. IMRICH: Okay.

MR. IVEY: And just the type -- the worst roll -- I shouldn't have said roll -- but the worst response that you've ever had in a large airplane when flying into a wake vortex or encountering one unexpectedly.

I don't know. In some of your flying you may have deliberately been flying in them to see the results, or you may have just inadvertently encountered one.

But I'd like to get a sense of what kind of experience you have had with wake vortex encounters in a large airplane.

CAPT. IMRICH: Sure. Personally, with wake vortex encounters in large airplanes, it's been limited. In small airplanes I've had some very interesting events.

But in large airplanes it's been relatively modest as compared to other FAA inspectors who did the deliberate flight testing of assessing the wake vortex at various distances and so forth.

In my experience, I've had several significant encounters, but the angle of bank and the response of the airplane was relatively modest, probably on the order of 5 to 10 degrees of roll response, and what would be considered a significant jolt, but not anything that was particularly troubling or concerning.

And most of the -- probably the larger number of encounters I've had have been in circumstances where the response was simply to say, Well, it's clear what's happening. Let's move the flight path to a different flight path, for example, in RVSM kinds of situations in flying the Atlantic or something like that.

So I've had relatively, by design, little exposure to significant major events in close in big airplanes because my objective has always been to avoid the wake as opposed to examine it or research it in that context.

MR. IVEY: Were you the flying pilot when you've encountered some of this in large airplanes?

CAPT. IMRICH: It's been all -- it's been flying pilot; the PNF, flying, for example, during TCAS testing where we were doing close encounter geometry, flying through the wakes in perpendicular with crossings.

And also as an inspector, where I've encountered wakes with closed separation longitudinally and we hit a vortex that we would have preferred to not hit, but we hit it, and so forth.

MR. IVEY: And in those encounters, either when you were flying or happened to see the other individual flying, what type of response was made in the case that you talked about up to perhaps 5 degrees of roll difference?

CAPT. IMRICH: Right.

MR. IVEY: What input was made by either you or by the other person?

CAPT. IMRICH: Typically to introduce roll control to counter the vortex encounter. And then, very quickly the event was over, you popped out of the vortex and kind of made a CRM comment about the event of some form, and then worked very hard to not have the event repeated. I mean, that's the typical profile over a flying career of the event.

MR. IVEY: You never really saw any input of rudder for one of those kinds of events, did you?

CAPT. IMRICH: I have never -- I personally have never seen rudder used at all in a large airplane encounter event, in a large airplane encounter event.

MR. IVEY: What would be your impression of airline pilots and the use of rudder in general?

CAPT. IMRICH: I think it varies widely. It depends on the pilot's background. I've seen, for example, military trained Navy pilots that have principally flown in tactical aviation on an aircraft carrier that perhaps have less familiarity with rudder use in strong cross-winds as a new, say, first officer.

Then, other kinds of pilots, I've seen some that have used rudder exceedingly effectively in very difficult bad-weather cross-wind landings.

And so I see a range of skill in that area of use of the rudder.

MR. IVEY: Back to the A300 again. There's never been any reports that you have been made aware of pertaining to upset events with wake turbulence or large side slip angles with wake vortex or anything of that type of air mass anomaly?

CAPT. IMRICH: Well, one was apparently attributed to wind shear which, at least as best as I know, probably was not due to wind sheer. So I --

MR. IVEY: Was that American 903?

CAPT. IMRICH: Yes.

MR. IVEY: Was that an Airbus?

CAPT. IMRICH: To the best of my recollection.

MR. IVEY: Is that about the only one that you're familiar with?

CAPT. IMRICH: It's certainly the one that sticks near the top of my memory of Airbus events. When I think of Airbus events as collective with 67 and 777 and DC8 and so forth, certain events stick in one's memory of the major events of our industry in the last 30 years.

Quite honestly, I can't say that I remember A300 events related to wake vortex. I just don't remember them. I remember them related to other events, stabilizer issues, et cetera, but not due to --

MR. IVEY: I'm trying to get a sense, too, and I'd like to move to other large airplanes.

CAPT. IMRICH: Sure.

MR. IVEY: Have you had any reports given to you or that you became aware of relating to upsets or unusual attitudes with air mass anomalies in 747s or MD-11s or DC10s or just any other gamut outside of Airbus?

CAPT. IMRICH: Yes. But it covers a broad spectrum. I mean, in the early part of the jet age we had the whole jet upset issue of the large altitude loss issues, of jack-knifes -- well, it wasn't jack-knifes -- but it was just stalled stabilizers and so forth that were some early properties of the early jet age. So there was that issue.

There have been cases where various air mass anomalies have been associated with in-flight turbulence events of injured passengers or flight attendants. So I mean, in that sense. Yes.

MR. IVEY: Well, I've asked quite a few questions, Mr. Imrich. I'm going to go around the table here and --

CAPT. IMRICH: Okay.

MR. IVEY: -- see if anyone else has anything they'd like to ask you.

Bart Elias, NTSB.

DR. ELIAS: Thanks, Dave. You've talked about a broad variety of topics. I just want to revisit a few.

First of all, in terms of the correspondence between yourself and some of the other industry experts and Captain Ewell, what particular areas of that letter were you assigned to work on or did you -- were you responsible for writing?

CAPT. IMRICH: My recollection is that we all had an involvement through all the areas.

I know that I had particular concerns about the standardization of terminology and the way things were explained in a way that was at variance with what the industry conventions were for both terminology and symbology. I mean, I think that I probably played a leading role in that aspect of the letter.

But I believe we were basically all involved with all aspects of the letter to varying degrees.

DR. ELIAS: When you got the response back from Captain Ewell, did you still have some lingering concerns then about particular areas in terms of how they were addressed?

CAPT. IMRICH: Sure. I wouldn't say lingering concerns. I think that continued opportunity to help evolve the issue -- the issue evolve and where I thought the issue needed to end up.

But that's not unusual. I mean, in both the role that I had and in all the issues that I've worked, that's a pretty common phenomenon with me, to always want to move things farther and faster and so forth.

So I don't want to give you the impression that this was unusual or atypical. It was certainly within the realm of what I would consider reasoned response where there was movement. The question was, how much and how quick, and how much more movement was needed?

And you know, would I have preferred more in certain directions? Of course. But then again, that's not unusual for where the industry is dealing with a hugely complex subject over a long period of time. And it takes time to have these ideas gel to the point where they really become the standard of the industry.

DR. ELIAS: And you also mentioned that you had some concerns and some recommendations that were addressed in the letter regarding use of rudder.

And as you continued to watch the AAMP program evolve, did you see those concerns and recommendations addressed and reflected in the program?

CAPT. IMRICH: I saw continuous change in the program from the time the issues were first raised until I became less involved with the program. It was a continuously evolving program from my perspective.

And so, I mean, I think most major programs like this are in a continuous state of evolvement. They go through periods of plateau, but very little in our industry is static for all time. And so it was continuously being improved throughout that period, in my view.

DR. ELIAS: Okay. And it sounded like you had some opportunity to participate in some of the simulator --

CAPT. IMRICH: Yes.

DR. ELIAS: -- events that they had created --

CAPT. IMRICH: Yes.

DR. ELIAS: -- to induce upsets?

CAPT. IMRICH: Yes.

DR. ELIAS: And you mentioned that maybe they weren't ideal, but you thought given the technology that they were acceptable.

CAPT. IMRICH: It's a tradeoff of resource, ability, simulation, doing it now versus doing it better a year from now, and those are tough tradeoffs, they're tough choices.

And I thought at the time, again, while I personally would have done it differently, would have recommended doing it differently, they were certainly in a direction that was constructive, and they were within the range of reasonableness, give or take what any of us knew about what needed to be done during that period.

Would I have done it differently? Probably. But, you know, during these evolving programs one never knows exactly for sure what the answer is or what the answers are. It takes time to really be sure of that.

DR. ELIAS: Focusing on particularly the simulator and the two upset scenarios, you mentioned you might do things a little bit differently, and of course, maybe perhaps if the technology were more advanced there might be more capabilities to do things differently.

CAPT. IMRICH: Right.

DR. ELIAS: But given the current state of the art or the state of the art where it was back in '96 or '97, is there anything in particular that you can point to as to how you would design a simulator-based upset program?

CAPT. IMRICH: The program or the simulator programming?

DR. ELIAS: Well, just the two -- the simulations in general or the scenarios.

CAPT. IMRICH: I personally probably would have worked harder to introduce the vortex into the equations of motion so that you can get the aerodynamic phenomenon. I don't have any fear whatsoever of going into the stability derivatives and working with those directly.

And I probably would have gone back to the simulator manufacturer and found some ways to introduce a vortex threat that more closely modeled the vortex threat so if the crew had the correct response, they popped out of the vortex, and if they didn't have the correct response it was more apparent.

But that's because, you know, I was very comfortable with simulators and simulator design.

I mean, from the engineering point of view, personally that would have been easier for me than using an artificial mechanism to generate that effect. I just would have done it the other way.

But then again, that's, you know, that all gets back to one's familiarity with how simulators are built, designed; and what the capability of the simulator is; and how well you can write FORTRAN 4 or FORTRAN 77, get into the code, know the code. I mean, there are some really complex issues.

You know, and some at some airlines they had simulator technicians that had great confidence in doing that.

In other cases, if you do that, you have to be exceedingly careful, because you can make changes to the simulator that not only make the simulator worse in other areas -- because when you start changing those things, you can easily destroy the validity of the simulation.

And the other thing is that you put at risk the certification of the simulator for Level A, B, C, D, Phase 1, Phase 2, whatever it is.

So that is a very complex trade for an airplane to deal with that. And it also could be exceedingly expensive, too. It depends on what the relationship is with the simulator vendor, what level of technology is involved.

But that's just a personal bias on my part to try to do it a more technically accurate way.

DR. ELIAS: You also mentioned in passing, very briefly, in-flight upset training in the Lear. And I assume you were talking about the Veridian, or I guess --

CAPT. IMRICH: It's not training. It's testing. It's the assessment, not at all training. I'm not talking about in-flight training. I'm talking -- I was strictly referring to testing that was done to look at this whole issue at Veridian in the last few years. It's a NASA contract.

DR. ELIAS: Could you describe that program a little bit, just very briefly?

CAPT. IMRICH: Just it was a -- I think you should go directly to Veridian at NASA, because it's a NASA Veridian program.

But it was a program to try to assess the effect of some of these events, training skills, basic skill sets that are brought into that, to effectively understand what can or should or might be done in this area.

DR. ELIAS: And you got to participate in that?

CAPT. IMRICH: I did.

DR. ELIAS: Do you have any particular observations or insights from that participation that might be relevant to our investigation?

CAPT. IMRICH: Sure. But that ranges from the whole gamut of views of individual events that have been reshaped, revolved after having seen it, felt it in the simulation to thoughts just about, you know, in general the industry and the training that we do and use of that to help in simulator design and program design and what-not.

So, sure. I mean, there are a lot of complex thoughts that one can have after having gone through a program like that.

DR. ELIAS: How about in terms of maybe the appropriateness of both the AAMP program and also the industry training aid that's been developed? Has there been any work done that you saw or observed with regards to the appropriateness of that and its effectiveness in actual flight upset training?

CAPT. IMRICH: I think that the training aid is very good. It's important that it be widely implemented and endorsed and supported.

I think that the AAMP program, the letter and in many, many fora (forums?) since, I think there's been broad recognition that those kinds of programs are very good. I think they're important for the industry. It's important that we continue to evolve them to make them better as we get better and more useful information.

DR. ELIAS: Thank you.

MR. IVEY: Captain Guy Arondel, BEA.

CAPT. ARONDEL: Yes. I want to ask you, did the FAA check that the airline pilot were correctly teached that excessive use of rudder can cause large size slip and that can lead to structural destruction?

CAPT. IMRICH: I don't know the answer to that question, because that's something that would have occurred with the CMO, the principal operations inspector, and the air crew program managers for the particular airplane types.

That would be a question that I would recommend that you ask directly to those people who are involved with the management of the American Airlines certificate.

CAPT. ARONDEL: Thank you.

CAPT. IMRICH: I wish that I could answer more, but I just can't say for sure.

CAPT. ARONDEL: Thank you.

MR. IVEY: Captain Delvin Young, American.

CAPT. YOUNG: The August '97 letter that you and the other three gentlemen drafted there, how was that initiated? Was it solicited, or did you four get together and discuss it at the conference?

CAPT. IMRICH: It was interactive. My recollection was -- and this is a fuzzy recollection because these things sort of just evolve.

CAPT. YOUNG: Sure.

CAPT. IMRICH: My recollection, we were at the conference, everyone was truly struggling to find the right thing to do, the right way to approach this. And there was discussion.

And out of the discussion somehow came an idea, Well, we want to formalize this, not just say it. How do we get this so it's a little bit more formal on both American's part and our part?

And somehow -- and I don't even honestly remember who had the idea to do it in a letter form, said, Well, if we put it in a letter, let's cosign it, we'll get it to Cecil, and Cecil will have our input. And then we'll have all the ability to help, at least have it in writing.

And when you write stuff down there's a sense of discipline that's enforced that forces you to think about the language that you use.

And it was believed to be a good idea, a way to maybe help force convergence here of the ideas so that it wasn't just discussion, but it was something that would be lasting and usable.

And then, if there really was this convergence of idea, that Cecil would have something that would be clear to him and written down.

And so, I mean, that's my recollection of how it evolved.

CAPT. YOUNG: Okay. I gather from your conversation that you were less than impressed with the ability to simulate some of these envelopes that we were broaching, or at least the industry was trying to broach --

CAPT. IMRICH: It's still true.

CAPT. YOUNG: And it's still true.

CAPT. IMRICH: It's still true. I mean, as one of the original fathers of Appendix H, with Charlie Hutner and Ed Fell [phonetic], back when we wrote FAR 121, Appendix H, I mean, I've been trying my entire career to improve the quality of simulation.

CAPT. YOUNG: Right.

CAPT. IMRICH: And I think it's played an enormously important role, and I personally think that there's still a long way we have to go yet.

We wouldn't be taking airplanes off the sides and ends of runways in the winter if we had better ways to let pilots see, feel, touch, and experience what it's like to go off the end of LaGuardia 4 on a winter takeoff on an RTO.

I think there's a lot of room for improvement we can have in our industry. And I will do my very best to try to help continue that effort that we started when we wrote Appendix H back in the late '70s.

CAPT. YOUNG: Right. I understand.

CAPT. IMRICH: I'm saying that, we, from the perspective of when I was formerly with the FAA.

CAPT. YOUNG: Right. And that's the context of the question.

CAPT. IMRICH: Those are the global kind of safety perspectives that I think can fundamentally and profoundly change safety effects as opposed to the stepping on the ants of counting widgets on papers with an analyst that -- probably shouldn't go there.

CAPT. YOUNG: Well, let me ask you this, and specifically as it pertains to unusual attitude or upset training. Do you think the training conducted in a simulator that is less than perfect for an aerodynamic model is better than not training at all --

CAPT. IMRICH: It can be.

CAPT. YOUNG: -- and discussing it in a classroom?

CAPT. IMRICH: It can be. Any training that you do, any training that you do can be good or bad depending on how -- the context in which they use it.

For example, Don't reset a circuit breaker. I could give you 50 contexts for, Don't reset a circuit breaker, that will be all over the map in terms of their goodness and their badness.

And so I am very reluctant to give binary yes/no answers to a question like that that could have such powerful global consequence.

But can you use primitive simulation devices to train effectively? Absolutely.

Is it always necessarily done in an effective way? No.

Are there some ways that it's done that probably introduce more uncertainty or difficulty than the benefit that's gained? Probably.

CAPT. YOUNG: Okay. Fair enough. You've obviously been involved with a certification. You've talked about the B2, B4 with Eastern in particular.

CAPT. IMRICH: Yes.

CAPT. YOUNG: And a varied and wide range of experience --

CAPT. IMRICH: Yes.

CAPT. YOUNG: -- especially with the FAA. And I'll certainly accept that if you choose not to answer this question. That's fine.

But do you think certification of large aircraft, and in particular the rudder certification issues in FAR 25 are adequate?

CAPT. IMRICH: I think that the FAA rules could very much benefit from improvement in many, many, many areas.

CAPT. YOUNG: Fair enough.

David asked you some questions, and I think it brought some new light to $V_a$, in particular to large aircraft, to this group as well as, I'm certain, many others in the aviation industry.

And I'm not for sure this is probably for this forum. But any idea why the definition hasn't been reworded to reflect more accurately some of the explanation that you gave -- to clarify, should I say?

CAPT. IMRICH: Writing wise rules and wise policies that go with those rules in the forms of advisory circulars and FAA orders for internal administration -- this is true for the JAA, also -- requires insight, wisdom, and experience.

There are many, many, many, many areas in the current FARs, advisory circulars, and handbooks that need attention, and they need outside -- and at this point it's my view that they need much outside attention to help those be reshaped in wise directions, because that expertise no longer exists within the FAA.

CAPT. YOUNG: Any idea -- and this may -- you may have already answered just in the last two questions. But any idea why the FAA does not -- or the

JAA, for that matter -- doesn't require any type of a doublet maneuver with control surfaces on large aircraft in particular for certification?

CAPT. IMRICH: Manufacturers go well beyond what the FAA requires in design and testing of their aircraft. They do that for very important reasons. Some of those are commercial, some of those are safety.

In my view, the FAR and the JAR both could benefit, and the advisory materials and policies that go with the JAR and the FAR could benefit from continued modernization and improvement in many, many areas.

CAPT. YOUNG: Thank you. One last question.

CAPT. IMRICH: And I say some of the most critical choices that are made of all are made by the manufacturers in the testing and the design that the manufacturers do that aren't even addressed by the FAR.

CAPT. YOUNG: I understand.

One last question. And when -- I think it was Dave that had asked you about the general use of rudder by airline pilots. And part of what you had talked about was there is certainly a wide range of skill based on a lot of experience, et cetera, from previous experience.

In general would you say that the use of the rudder in particular with airline pilots by the time they get to this level is overused or under-used when it's necessary to be used, in particular, i.e., engine failures or as such?

CAPT. IMRICH: I'm not sure that the two are correlated with when one gets to this level.

Things that are done familiar -- as an inspector, after 30 years I was pretty confident that if the pilot had been flying for many years in this seat or this seat, that that pilot could probably reasonably competently do an ILS.

If that pilot had to demonstrate skill flying with, say standby instruments on standby power with loss of all the glass or all the primary instruments, there would probably be a wide variation in the response level, and it wouldn't necessarily correlate with flying hours. It might correlate with other experience that that pilot had had.

And so I think that in the pilot population you might see flight crews who would have a tendency to use rudder aggressively atypically because it was a new situation; you may have pilots that will use rudder less than aggressively because it's an atypical situation. And so there might be great variability in the response of flight crews.

I wouldn't at all characterize over- or under-use. It just might be different.

CAPT. YOUNG: Okay. Thank you very much.

MR. IVEY: Captain Jim Goachee, FAA.

CAPT. GOACHEE: I'm almost afraid to ask the question, Tom. But I'm going to get you to -- I'm going to stick with the AAMP program for a second, though.

CAPT. IMRICH: I hope that I'm not doing that poorly.

CAPT. GOACHEE: No. You haven't done that. I'm just kidding.

Did you have a chance to review American's Advanced Maneuvering Program prior to coming here for this interview?

CAPT. IMRICH: Review is a strong word. I was familiar with it at the time that I was working with it in the late '90s. I didn't even review it then. I was familiar with it. But it's the responsibility of the CMO and the POI to review it as such.

I was aware of it, I had seen it, I read it. And so I didn't even review it as such then, because when I hear the term, review, that has a very specific FAA meaning to me.

CAPT. GOACHEE: Well, then, let me rephrase it, then.

CAPT. IMRICH: Yes. Okay.

CAPT. GOACHEE: When I guess Dave contacted you to come here -- I don't know if he did or not.

CAPT. IMRICH: Sure. Yes.

CAPT. GOACHEE: Did he advise you of the content of the interview?

CAPT. IMRICH: I mean, in broad terms. I knew that it was the American Airlines accident in New York, and we had a broad framework within which I was being called that was associated with the letter, because obviously, why would I, a person at Boeing, be called to come to talk about an accident involving an Airbus aircraft?

So it was clear to me that it was related to the letter that I had signed with the FAA.

CAPT. GOACHEE: Okay. And I understand in the position you were during this period of time that you didn't have the responsibility reference either Washington approving through the CMO --

CAPT. IMRICH: Right. I was truly advising Washington. And to the extent that the CMO requested my input, then I would provide that to them.

CAPT. GOACHEE: After the letter that was sent originally to Cecil, and after the response back from Cecil to the group --

CAPT. IMRICH: Right.

CAPT. GOACHEE: -- did anyone from Washington or the CMO contact you and ask for further advice as far as how they should go into approving, accepting, or trying to change that program at that time?

CAPT. IMRICH: I believe there were a small number of discussions with the CMO, and I believe that there were a number of discussions with people in Washington, but they don't stick out in my mind. They were more like just information exchange discussions with the CMO.

And with Washington I have a very different view. This was a period of evolving difficulty in Washington to where I -- this was one of almost a limitless set of issues that just got nothing coming out of Washington in terms of response during that period. I mean, this was the least of the issues that we didn't get response on out of Washington.

I probably should prefer to rephrase that a different way. But --

CAPT. GOACHEE: But you know, sometimes, as you know, especially with your career with the FAA, that sometimes when you would contact Washington for guidance that sometimes you may have to go to a different source. And there's no one in that position better than you at the time as a Resource Specialist, especially having attended these, to, you know, ask a question directly.

CAPT. IMRICH: Sure.

CAPT. GOACHEE: And do you know if there was any -- was this all phone conversations? Were there written --

CAPT. IMRICH: Typically, yes. Because much of the important work of that coordination is done by phone or by email or something like that.

And for example, the whole issue of the entire AQP program and Tom Longrige and that whole part of the FAA and its relationship with the Dulles organization, and what did the different divisions at Dulles do, what did Downtown do, and the role of the region and the AEGs with Washington.

It was a very, very difficult subject at that point.  And it was very difficult on many, many, many fronts to get substantive, meaningful, technical communication with almost any of those organizations.

CAPT. GOACHEE:  You know, I'm sorry --

CAPT. IMRICH:  There were very good people during that period, like Dan Bodet [phonetic] was absolutely wonderful in the CSET --

CAPT. GOACHEE:  CSET.

CAPT. IMRICH:  Yes.   -- and so forth; were responsive, tried to glue things together and so forth.

Then, there were other parts of the organization that just, they had different goals, different objectives, different agendas.  And these kinds of issues just, for whatever reason, never seemed to make it onto the radar scope.

CAPT. GOACHEE:  I have to apologize, too, Tom.  Your qualifications with the FAA are so wide that I couldn't copy it fast enough.  So will you tell me when you went to Boeing?  Was it a year-and-a-half ago?

CAPT. IMRICH:  Roughly last April.

CAPT. GOACHEE:  Okay.  So not quite a year?

CAPT. IMRICH:  That's correct.

CAPT. GOACHEE:  Okay.  So let's just say within the last year. Because of your friendships that you had in the FAA during your career --

CAPT. IMRICH: Sure. Sure.

CAPT. GOACHEE: -- and I'm sure you still maintain, do you keep up to date with what's going on, or do your friends tell you what's going on?

CAPT. IMRICH: In some areas, yes; in other areas, no. For example, in areas that I have maintained a continuing direct involvement and an interest with, in all-weather operations, in new aircraft design or certification, or areas like that, I stay pretty familiar.

CAPT. GOACHEE: Would ATOS be included in that?

CAPT. IMRICH: No. ATOS is not even on my radar scope, and I hope it never is again for the rest of my life.

CAPT. GOACHEE: Okay.

(General laughter.)

CAPT. GOACHEE: Let's talk about the --

CAPT. IMRICH: And I don't even want to know about ATOS anymore.

CAPT. GOACHEE: Okay. We'll talk about the experience level that you observed in your career with the FAA. And you seemed to think or thought or felt that you had the plateaus going up --

CAPT. IMRICH: Yes. They were going down.

CAPT. GOACHEE: Yes.

CAPT. IMRICH: And I know that there's probably a phenomenon that just occurs with age that may relate to things like this. And I know that there is a tendency to say, Well, the old times were always better. That's not what this is. This is not the phenomenon that I am describing.

I truly am concerned about the FAA having progressively lost its compass over the years. I am deeply concerned about the FAA, its role in the country and in the world and its aviation leadership role.

And I've seen what I believe to be a significant deterioration in the last five to seven years, certainly in the Flight Standards part of the organization. I won't talk about the other parts of the FAA.

CAPT. GOACHEE: What I'd like to address specifically is Flight Standards and Air Carrier --

CAPT. IMRICH: Okay.

CAPT. GOACHEE: -- because, I mean, that's why we're here, for an air carrier accident.

Are you aware of the experience level or educational level of inspectors that are coming in --

CAPT. IMRICH: Yes.

CAPT. GOACHEE: -- to Air Carrier?

CAPT. IMRICH: I was clearly up until the time that I left the FAA. I have not had any contact with that issue at all since I've left the FAA.

CAPT. GOACHEE: Okay.

CAPT. IMRICH: But up -- and certainly till I left the FAA I was aware of who specific inspectors were that even were being assigned to particular positions and certain organizations with the FAA. But there are concerns I know from friends that are still there that are of concern to this very day.

CAPT. GOACHEE: Okay. And it's the Flight Standard offices throughout that have responsibility for air carriers? Are you familiar --

CAPT. IMRICH: I don't know about throughout. I know about particular offices, but I do not know about throughout.

CAPT. GOACHEE: In those offices, I mean, do they have responsibility for major carriers? Are you aware of that?

CAPT. IMRICH: In some cases they do.

CAPT. GOACHEE: Okay. I'd like to try to rephrase Guy's question --

CAPT. IMRICH: Okay.

CAPT. GOACHEE: -- because I think specifically you asked him that you would like him to go to the CMO here or to the APM.

CAPT. IMRICH: Right.

CAPT. GOACHEE: I'd like to make it more general, because I think this is a wider scope than just his direction that he was taking or you interpreted it being for this accident.

And that is that the experience I've had in talking throughout pilots -- and I'm talking air carrier pilots from -- I don't care if they flew with Charles Lindburgh or they've got 30,000 hours and they've got 20 type ratings, you ask the same question, you'll get the same answer 95 percent of the time.

And that is that, Are you aware that in the normal envelope of flying that if you would input a flight control to its maximum that you could structurally damage the airplane?

So it's not specifically for this one, but it's on a whole general level. And I really think that it's been my experience in my 40 years that pilots do think that, is that there does not seem to be enough information in the flight manual that would give cautions.

Now, I know that earlier you had talked, Tom, that there's only so much information that we can put in a flight manual, and if we continue to keep adding that it would take us forever just to read a manual.

But are you aware of this concern? Are you aware of the pilots thinking that they can be flying and do a full deflection with the control, maybe several times, and feel that they cannot damage the airplane?

And then, the second part of the question would be, can you point me to any manufacturer with any flight manual for the series aircraft that you've been aware of, from your 707 days up through the 777, that give caution to the pilot of the proper use of flight controls under certain conditions?

CAPT. IMRICH: Okay. Well, let me try to separate the answers to those questions.

The first one on the full control deflection, I think that that's very much contextually related in that you expect pilots and you train pilots to use full control deflection when it's appropriate.

And the example that I cite would be a V-1 cut where you need to aggressively, with appropriate control response and time reaction, input an amount of rudder that's necessary to maintain the directional control of the airplane.

I mean, and that's clearly a case where you expect the pilot to make full control deflections in a timely way.

In fact, if you don't, that probably would be grounds for remedial instruction or training or repetition during a training program.

Other cases might be cases, for example, a VMCA-VMCG application of full control where with non-normal conditions you may have to apply full control.

With situations like cross-wind takeoffs, you may initially start out with a control at a limit position or with -- during the speed prior to V-1, where you may need a lot of control to make the airplane respond in the way you need to make it respond.

There are other cases where full control may be required, for example, when you use maximum deflection of spoilers immediately or you use the tiller full over.

I think that you have to relate control usage to the maneuvers that are trained and to the conditions that are trained.

There are cases in certain airplane types where when the stabilizer is in a certain condition you may have to use up to full control until such time as other conditions are met.

And so, yes. Flight crew members should be familiar with those cases to the extent that those cases relate to the particular type of airplane which they're flying.

Now --

CAPT. GOACHEE: Could I just stop there one second? I mean, I know -- I'm sorry -- it was a two-parter. But I tend to forget if I don't get --

CAPT. IMRICH: Okay.

CAPT. GOACHEE: Now we're talking -- I'll give you a specific. We're in flight, but we're not taking off, we're not landing. We're in flight, we'll say light turbulence.

CAPT. IMRICH: Sure.

CAPT. GOACHEE: We're in a range of a clean configuration. We could be anywhere from -- let's say that we're below 10,000 feet. And usually most turbulent penetrations, if you're under max landing weight, you would agree that it could be around the 250 range?

CAPT. IMRICH: Sure.

CAPT. GOACHEE: Okay. So if we're in a range of 230 knots to 250 knots under those conditions, could I do the double reversal with the rudder, could I do that and not damage the airplane?

CAPT. IMRICH: Why would you want to?

CAPT. GOACHEE: Well --

CAPT. IMRICH: I mean, let's say you were in a turbulent situation. It turns out that you have a lot of control authority typically at that range of flight.

And in turbulence it would be my experience it would be unusual for a pilot to be using full controlled movement. There may be times where you're using a lot of aileron control or aileron spoiler control, but even there it would be, in my view, unusual to be using full control.

And it's simply because it's not required, because the amount of control authority you have exceeds that which you would often need to cope with even, you know, imagine inadvertent thunderstorm penetration.

Typically you would be doing things like managing attitude and setting thrust at a value where you didn't have the engines put at risk. You wouldn't be doing full applications at all.

And I can't even imagine why one would be using full rudder under those circumstances unless you had other non-normal conditions that you were trying to cope with; you know, you had lost a chunk of wing because of a mid-air collision, for example, and you needed that for rolling authority or something. I mean, I can't even imagine the scenario.

CAPT. GOACHEE: Well, let me try to give you a scenario, provide you with a scenario.

CAPT. IMRICH: Okay.

CAPT. GOACHEE: We got into what you haven't experienced, I haven't experienced to a level of non-controllabity above 45 degrees with wake turbulence, but I know there's cases out there that that has happened.

Now, could you couple a condition under those conditions with wake turbulence and for some reason having a loss that would cause a big change in yaw where the individual comes in.

He knows he's moved ten degrees or so with the yaw. He puts in the rudder, but he's also fighting the aileron for the roll. And let's say it was a fairly substantial roll, meaning above 30 degrees out of standard.

Could there be a case where if that individual now wanted to get the yaw back to a normal straight-ahead, use rudder at the same time he, you know, instinctively fighting with the ailerons to get it level, and for whatever reason he put too much into the rudder, and consequently he fought several times. I mean, that would seem to me that it's an unusual position to be in.

But under those conditions, could an individual or a pilot cause structural damage to the airplane?

CAPT. IMRICH: Well, the short answer is, if you use rudder inappropriately, it certainly could be possible to cause -- if you use any control inappropriately -- if you use the tiller inappropriately in taxiing, you can damage the airplane tires. I mean, you'll scuff tires you do that with the tiller.

You get on an icy runway, and you start doing the right thing, and the thrust is the wrong level, and you start snow plowing with the tire, you're going to damage the airplane.

So there are many, many, many ways to damage tires, engines, wings, rudders, fins, elevators. I think, yes. It's always possible to damage an airplane if you use inappropriate control application.

Now, the question is, you know, what are those bounds, what are those limits? You know, when will you blow a tire? If you have the nose gear like this and you're going forward snow plowing, when will the tire blow? I don't know when the tire will blow. It depends on how slippery -- whether you're going on or off a paint stripe.

You know, I don't know how to answer your question about, would a pilot do that? I can't conceive of a -- in my personal experience, I can't conceive of a wake vortex circumstance where that would be a factor.

Because my experience with wake vortex and what I understand from the FAA people and the manufacturing people who flew those vortex encounters, unless you were in an airplane like a Metro following in the wake of a 747 or something, which could be different, typically you're popping out of that vortex relatively soon so that the reaction is typically a roll reaction, not a yaw reaction in any way.

And I just, I personally can't conceive of a circumstance where -- and I have not observed crews react in that way.

So I mean, I just have no experience on which to recommend to you an answer on crews responding that way, because I've not seen that response.

CAPT. GOACHEE: Okay. I'm going to try it one more time.

CAPT. IMRICH: Okay.

MR. IVEY: Jim, what I'd like to do is to -- I feel like we're getting awfully long-winded in scenarios and ideas that are moving away from our accident. And I feel like what I've listened to has pretty well encompassed control deflection pretty much.

And if you can more or less either generalize as opposed to using incidents --

CAPT. GOACHEE: Well, I'd like to use an abnormal that he would be familiar with, now, with the Boeing airplane, and that is rudder ratio.

CAPT. IMRICH: Okay.

MR. IVEY: Well, what I'd like to do is to stay away from Boeing products, because part of what we had discussed, really, he is with Boeing, and he is here to represent the FAA.

Let's go off record for a second.

(Discussion held off the record.)

CAPT. GOACHEE: Are you aware of any limitation for Airbus 300-600 or also known as the A310, any limitation of rudder usage that could cause structural damage to the aircraft?

CAPT. IMRICH: No. But that's not unusual that I wouldn't be, because I didn't work with the A310 or the A300-600. And so the work that I did with those airplanes would be in the area of Category II, Category III, landing, all-weather operations, in those areas.

And so I've never noted that they were principal airplanes of mine. I never even qualified on the airplanes. So really I would recommend that you go to those people in the FAA who have that technical knowledge of the A300-600 -- that's Jerry Potter, the other is the FSB Chairman -- because they could answer that question.

I mean, I don't know of that. But then again, it wouldn't be unusual that I don't know of it, because they weren't my airplanes.

CAPT. GOACHEE: Okay.

CAPT. IMRICH: I'll talk to you about MD-80s.

CAPT. GOACHEE: No. My last question: Are you aware of any airplanes that you are qualified in the Airbus that has limitations for usage --

CAPT. IMRICH: Sure.

CAPT. GOACHEE: -- for structural damage?

CAPT. IMRICH: Sure. I mean, for effectiveness, I just flippantly mentioned the MD-80. I mean, we have rudder throw limiters in the MD-80.

And there is a body of knowledge out there that was supported by Douglas before they were Boeing South that says that under certain circumstances you have to make sure that you release the rudder throw limiter to get full rudder authority.

I mean, there are airplane design-specific things like that for varieties of kinds of airplanes when they apply if they need to be cited. And I think that that's true probably across the fleet, from the regional jets through the big jets.

~~Airbus~~Airbus AA340, I remember VMCL minus 1, VMCL minus 2, because there are specific rudder issues that have to be addressed.

When the manufacturer believes that that's appropriate, they specify that information, and then crews are aware of it and they're trained for it.

I mean, that's my perception of the issue, as best as I can try to answer that question.

CAPT. GOACHEE: I'm sorry, Tom. I thought you had an A330 or A340 rating.

CAPT. IMRICH: Yes, I do. No. I do. In fact, I do. I am rated in the A330 and A340. But as I said, there you asked me A310, A300-600.

CAPT. GOACHEE: Yes. But now my last question --

CAPT. IMRICH: Oh. Okay.

CAPT. GOACHEE: -- when you came up with the -- now I want to know, because of your experience in the A340, A330, is there anything noted in the flight manual reference usage of the rudder that could cause structural damage?

CAPT. IMRICH: I can't say in the flight manual, because I don't have the flight manual memorized.

But the flight crew operating manual, I believe that there are specific provisions that Airbus has that address in their view the appropriate way the airplane is to be operated that are in the manual.

And again, it's been four years or five years since I've been in the A340, so bear with me here on my memory of that airplane.

But I mean, I remember VMCL minus 1, VMCL minus 2, rudder -- yes -- and all that stuff.

And so, yes. My recollection is that there are things there when those things needed to be there. I mean, that's my recollection of the airplane.

CAPT. GOACHEE: Okay. Thank you. I'm finished.

MR. IVEY: Off the record.

(Discussion held off the record.)

MR. IVEY: Captain John Lauer, APA.

CAPT. LAUER: I'd like to go back to the letter.

CAPT. IMRICH: Sure.

CAPT. LAUER: And I have to assume that you had already -- and I think you had mentioned this -- you had already attended one of the presentations by Captain VanderBurgh prior to --

CAPT. IMRICH: It was probably more than one.

CAPT. LAUER: But you had been -- you had sat through the presentation --

CAPT. IMRICH: Yes. Yes. Yes.

CAPT. LAUER: -- and viewed it?

CAPT. IMRICH: Yes.

CAPT. LAUER: Is it possible that your interpretation of the presentation of information concerning the use of the rudder as he defined the use could possibly be incorrect due to Captain VanderBurgh's method of delivery of the information?

CAPT. IMRICH: Sure. I mean, communication is always a difficult issue, and human interaction.

And you know, one tries to understand clearly, but it's certainly always possible.

I mean, and you also speak in figures of speech and analogies, and Van is very graphic in some of his descriptions and exuberant and enthusiastic. And certainly it's possible that there's a misunderstanding. Yes.

CAPT. LAUER: Prior to your involvement with the letter, did you ever have any verbal communication with Captain VanderBurgh in asking for a further clarification of those issues before you committed yourself to the letter?

CAPT. IMRICH: I don't specifically remember particular instances, but I know that there were -- we had a number of discussions over a period of time.

And I just don't remember in context whether they were before or after, because in my mind this is years ago, and it was all a blur of when it occurred.

But, sure. Van and I talked about it both one-on-one and in groups of people. And I know that Van had very strong views about what he believed and why he believed it. And we talked about it, and we had very, very good discussions, very good exchange of information.

I would only hope that I understood clearly what he said, but there's always the possibility that I didn't understand fully or completely, of course.

CAPT. LAUER: For clarity purposes, or to clarify, was your concern focused -- and this is referencing the letter.

Was your concern focused on the high alpha scenarios concern for the airport departures or for structural considerations?

CAPT. IMRICH: Oh, my concerns -- the areas of interest that I had were much broader than that. I mean, those are two specifically.

I had a broad range of areas that I thought that there was an opportunity that improvement could be brought to the description.

It wasn't just high alpha, it wasn't just a particular control axis. It was across a broad range of issues that I thought that it was important for the industry to understand clearly and articulate clearly so that the pilots would get the right message.

CAPT. LAUER: Okay. And my last question: You had mentioned earlier -- and I can't remember to what question -- but you had -- and I'm going to paraphrase here just briefly.

If you can't cover all of the aspects of the airplane and the concerns -- or, You can't cover all the aspects of aerodynamic concerns because the manuals would be too large.

With that said, how do you impart the limitations to the pilots who operate the aircraft, and who would be responsible to do that?

CAPT. IMRICH: Those are powerfully important questions, penetrating questions.

Aviation requires a lot of broad knowledge to do safely. It is widely misunderstood what the purpose and nature of AFM limitations are as such.

For example, there is no AFM limitation about taking the control and doing this at 200 feet on final approach, but I can assure you that's a career limiting maneuver.

So the idea is --

MR. IVEY: Just for the record, he gave a punching --

CAPT. IMRICH: Pushed full nose down elevator at 200 feet above the runway.

MR. IVEY: Thank you.

CAPT. IMRICH: And so there has to be a balance of the information that one conveys. Some of that is dependent on basic airmanship; some you get training as a pilot; some you get as training from an operator; some you get as training for a route of flight.

Don't divert into Nesarserak [phonetic] if you have an ETOPS engine out. That's not a good place to go to. It's way better to Kefflebaker [phonetic] or to Gander. Okay. That's not an FM limitation.

Don't stay up for 32 hours on an air mobility command reserve trip, commute to New York, and then fly a trip after being up for 32 hours. That's not an FM limitation, but it also is probably not a very good idea.

And so the idea is, what do you put in the FM limitations? What do you put in training material? What do you put in advisory circulars? What do you put in basic pilot training? That is a very tough choice for the entire industry.

And right now we're trying to find the right balance of information to go in those various place.

And I can assure you, from the AFM limitation point of view, limitations like some of the ones that we've come up with with Data Link that are totally incomprehensible things to memorize, that pilots don't want to have to answer on an oral examination because they don't even understand it in the first place, are much better off placed elsewhere than in the ADM limitations section. That's the kind of struggle that we're facing.

Now, could we improve on what we do as limitation, what as training, what as bold-face item, what as memory, what is check list? Absolutely. And we desperately want to do that as an industry.

But right now I think for the most part we have it pretty close. Can we improve it? Absolutely. Would I support those improvements? Absolutely.

CAPT. LAUER: Thank you, Tom. Appreciate that. I'm done.

MR. IVEY: Captain Ron Skupeika.

CAPT. SKUPEIKA: Just a quickie. Would you happen to know, during that time or period you were at the AAMP program, certification or validation of simulators, would that have to have a specific certification for the AAMP simulator, upset --

CAPT. IMRICH: No. Because my recollection is this, that -- I can't remember if it was Ed Booth or Paul Ray [phonetic] that had the sim team at the time.

But basically the criteria that we're using, that relates back to Appendix H and the whole -- and all that stuff all related to other factors. We didn't yet have that built. In fact, I'm not even sure that it's really there today to the way that it needs to be.

So I doubt seriously -- and this is just an opinion. I doubt seriously there was anything that drove that from the point of view of simulator certification.

That, it's one of the many areas -- someone asked me before about opportunities for regulatory improvement. There are major areas of opportunities for regulatory improvement in the whole simulator training place area.

CAPT. SKUPEIKA: So in your opinion you think that there should be?

CAPT. IMRICH: Not necessarily a rule. But industry criteria? Of course. I mean, I think that there are many, many opportunities we could have to improve the criteria in that area.

CAPT. SKUPEIKA: Great. Thank you.

MR. IVEY: Well, thank you for joining us, Captain Imrich. And we appreciate you coming to Seattle today, or Long Beach.

CAPT. IMRICH: Sure.

MR. IVEY: And this will conclude the interview.

CAPT. IMRICH: Thank you.

(Whereupon, the witness was excused.)

(Whereupon, a short recess was taken.)

EXAMINATION

**I. Captain Cecil Ewell (Retired)**

MR. IVEY: Captain Ewell, if you will, please, sir, give me your name and your current status and a little bit of the history of your flight experience, including your aviation background, type ratings, total flying time.

CAPT. EWELL: Well, my name is Cecil Ewell. I'm a retired captain with American Airlines.

I flew in the Navy five years as an F4 pilot from 1963 to 1968. From 1968 to January 1, 2000, I flew for American Airlines.

I was type rated in the -- I'll try to remember all these -- the 727, the MD-80, the A300, the 757, 767, and the MD-11.

Total flight time, somewhere around 20,000 hours. And I guess that's -- is that all the questions you asked?

MR. IVEY: That sounds good.

The A300, approximately how much flying time did you happen to accrue in that airplane?

CAPT. EWELL: I honestly don't know. Several hundred hours. I was one of the initial check airmen, instructor pilots, that went to Toulouse, France, and went through the aero formation, the French ground school and -- well, school. We went through the simulator there. And then FAA guys came over from New York and gave us our type ratings in the Airbus.

And then, I was an instructor both in the simulator and on the line on the Airbus.

MR. IVEY: How many years did you fly it?

CAPT. EWELL: Oh, just a couple of years.

MR. IVEY: The purpose of our bringing you in is to get a little bit of background on the AAMP program, its evolution, and get your insights to changes that were made and the relationship between manufacturers and suggested changes that they made. Were you part of the genesis of AAMP?

CAPT. EWELL: Yes.

MR. IVEY: Was it your idea to start this program?

CAPT. EWELL: Well, I'm not that smart. It was my idea in conjunction with a number of different people.

I think you have to put this in the context of the world the way it was back in 1996-'97. We had several airplanes roll over on their backs and go straight in, which I don't have to reiterate all of those.

And I'm not talking about American Airlines now. I'm talking about U.S. Air, United, American Eagle. There was a China Airlines 74 out in the middle of the Pacific that got into some real dramatic trouble.

And the industry as a whole and American Airlines particularly were very concerned about the capability of pilots in general to not so much handle -- well, I suppose that's part of it -- but to -- what they would do in the event that they got put in this situation.

And from that I started talking to a lot of different people, one of which I'm sure you're going to talk to, or if you already haven't, Captain Warren VanderBurgh, all of our training people.

We had some very long and involved discussions about these types of things, and that's where -- we proceeded from there.

MR. IVEY: And so you tasked him with developing a program here at American?

CAPT. EWELL: Well, I tasked him with starting it. Yes. Starting the development. I mean, Warren is an outstanding individual aeronautically. And he developed the basic outline and also helped us fill in all the spots after the outline was done. But I did task him initially to at least give us an outline of where he thought we should go. And then we talked about it a lot.

MR. IVEY: And once that outline was pretty much formulated, did you bring in outside industry or consultants or experts to help develop this program, or was it pretty much in-house?

CAPT. EWELL: It was in-house.

MR. IVEY: Uh-huh. Once it was developed, did you invite industry, manufacturers or perhaps other airlines, for that matter -- I don't know -- to evaluate or to participate in the ongoing efforts of the new program?

CAPT. EWELL: Well, we didn't invite people to come in and help us write the program.

When we got it to the place where we thought it was reasonably developed, we had a seminar -- I guess that's a good word -- and we invited all the manufacturers, we invited the FAA, the NTSB, and we invited all airlines in the United States.

And I believe -- my memory is very good, but it's short. I believe we had it over here across the street, at the Hyatt at DFW.

Had a very large turnout of people. And that's when we -- and we introduced it to the industry and all the people that I've mentioned. And then of course we explained to them fully that comments, questions, anything they had to say, we wanted to hear it.

And I also explained to them that in my opinion safety is not something you sell and that anything they wanted with regard to this program would be given to them and that Captain VanderBurgh or some other captain involved in it would be happy to come to their place of business and help them with it, give it for them once, and let their instructor pilots see it.

So it was a wide open thing. There was -- it was offered to everyone to say what they wanted to, do what they wanted to.

MR. IVEY: Was it well received?

CAPT. EWELL: Oh, I never had one negative comment, not one.

MR. IVEY: Did Captain VanderBurgh ever receive any negative comments, either?

CAPT. EWELL: Well, I don't think so. But you know, I really couldn't say that. I don't know.

MR. IVEY: Sure.

CAPT. EWELL: He, in the meantime, over the years, has traveled all over the world. Many international carriers from Europe have called me and asked that he come to Europe at various airlines and give this program, and he did. That was fine. I let him go and do it. Very expensive, but again, I don't think when you have something like this you ought to be out selling it.

MR. IVEY: Did any of the manufacturers, in particular, Airbus, McDonnell Douglas then, which was separate, or Boeing incorporate any of that type of program into their training at the manufacturer's level?

CAPT. EWELL: I have no idea. I really have no idea what they did.

MR. IVEY: And this conference or seminar, I guess, that you had there by invitation for everyone, that must have been prior to your receipt of a letter that was signed by three of the manufacturers and the FAA. Is that correct?

CAPT. EWELL: Yes.

MR. IVEY: You did receive a letter, I think it was August 20, 1997. Are you familiar with that letter?

CAPT. EWELL: Yes.

MR. IVEY: It was signed by Captain Tom Melody, Captain Kenneth Higgins, Captain Tom Imrich, and Captain Larry Rockliff.

When you got that letter, what was your overall impression of the letter and why it was sent?

CAPT. EWELL: Well, I think my first impression was I was a little surprised, because no verbal communication ever happened with any of these people.

None of them ever came up to me after this thing, after the conference, or subsequent to that, on the telephone or any other time and made any comment about it.

As a matter of fact, their only comments to me were how wonderful all this was, which was pleasant. But there was I guess a little -- I was a little surprised to see it.

MR. IVEY: Upon reading through it and all the various issues that were brought up, what did you think about those?

CAPT. EWELL: Well, I wrote them an answer, and that's what I thought about it. And I have reread the letter. You know, obviously I haven't seen the letter for five years. I reread the letter, and I'm perfectly satisfied with it today.

MR. IVEY: Your responses to --

CAPT. EWELL: Yes, sir.

MR. IVEY: -- their issues?

I believe you said you retired on 1 January a year ago, so you've had --

CAPT. EWELL: Two years ago.

MR. IVEY: Two years. That's right. Thank you.

Would it be an accurate statement that, based on what Captain VanderBurgh and American Airlines had put together, that their take on some of these issues were not necessarily in agreement with the American Training Program?

CAPT. EWELL: You're going to have to say that one again.

MR. IVEY: It's, based on these issues here that you all remained in disagreement with some of these issues --

CAPT. EWELL: Right.

MR. IVEY: -- they cited.

And as your letter stated, you went through point specific --

CAPT. EWELL: Yes, sir.

MR. IVEY: -- addressing each one of those. Was the training program changed in some fashion to accommodate some of their requests or suggestions?

CAPT. EWELL: Well, I think that -- I think we were responsive.

Now, I think we need -- Mr. Ivey, I think everybody here needs to understand that this wasn't some cat fight. We have and will remain friendly. It was all done in a very gentlemanly manner.

And I would say to you that everything I said in my letter was exactly how I felt about their notes as to what they kind of disagreed with.

On the other hand -- and I have not changed those ideas whatsoever.

On the other hand, if you read the letter -- and I have it here. I figured I might ought to look at a copy of it after five years.

But you know, in the first paragraph, when they write me, they -- the four of them agreed to provide a coordinated package of recommendations for improving your already excellent program.

Now, to me that didn't sound like something was dramatically wrong. And we did say to ourselves, Okay. What do we need to do?

We spent more time and money; we put out another video -- which I'm sure you've seen all this material --

MR. IVEY: Yes.

CAPT. EWELL: -- and listened to it and all that stuff -- put out another video with a tag on the end of it about their concern about rudders; and we did it in a timely fashion. And from that point on, I never heard another word from them.

So one would make the assumption that anyone that would choose to write a four-page letter of suggestions -- we responded as we felt we should, and we never heard from them again. One would assume that you had satisfied their questions or the things that they thought might be improved.

But the idea that there was something grossly wrong with what we were doing, it's not reflected in this letter.

MR. IVEY: And that's, quite frankly, why I wanted you to be here, because I wanted to hear your side of this as well as --

CAPT. EWELL: Sure.

MR. IVEY: -- theirs. One of the things that we have talked to each of the individuals that signed the letter about was this issue in there on page 2, down at the bottom -- and I'll quote the statement again.

The bottom paragraph, it states, "Rudder reversals such as those that might be involved in dynamic maneuvers created by using too much rudder in a recovery attempt can lead to structural loads that exceed the design strength of the fin and other associated air frame components."

CAPT. EWELL: Let me see where you are. Large --

MR. IVEY: The next sentence after that one.

CAPT. EWELL: Yes. I see what that says there. I guess my question would be, what are these -- well, I've got two questions, if you don't mind. And it's in the form of an answer.

But the first thing is, is I don't understand -- and I know nothing about the accident in New York which we're here for.

On the other hand, I don't understand what this has to do with the accident in New York. My understanding from the news was that they were at somewhere around 250 knots, 240 knots, at some altitude, 1,500 or 2,000 feet. I'm not sure --

Their concern in this letter was a nose-high, low air speed reversal or rudder usage, and of course we told them we didn't do that, we didn't teach that, never had, never will, and invited them to reread the information. And the part that they didn't like, we added other words.

But I guess that if -- I look at this statement, and it says, Large rudder use at a high angle of attack -- which I don't think this accident was at high angle of attack -- can create rapidly -- lead to rapid loss of controlled flight.

And rudder reversals such as those that might be involved in dynamic maneuvers -- whatever that is -- created by using too much rudder -- what is too much rudder? Where is that stated anywhere in any manual that either Airbus publishes or Boeing publishes or anybody else?

I really don't get this, because in none of their manuals that we could find at the time was there any mention of too much rudder usage. That's why we had a rudder limiter, for one thing. And I assume that it worked on this aircraft in question.

But I guess my answer to that question was -- I read the first thing, and it says, Side slip angle is a crucial parameter that should be discussed in your program. It is probably not well understood by many line pilots.

I totally disagree with that. These guys are at the highest level of professionalism in aviation. If they don't understand it, we're in deep trouble, the whole industry.

So -- and then they go down here and talk about too much rudder usage, and I don't know what too much rudder usage is. That's where I failed to understand what they were talking about. And especially in this case, it wasn't involved. As far as I know, they were not in a nose-high recovery.

Anyway, long answer. Sorry.

MR. IVEY: No. No. That's fine. I am very interested in your viewpoints. And I think during the course of the last two days we have certainly hit at this issue even as it relates to how this could have been incorporated in the letter because someone was aware of structural loads on a tail for any type of rudder input.

And having said that, what we have tried to do is to understand where the genesis of this idea came from. Was it from your program or was it from some engineer at one of the manufacturers, and to try to get an understanding of rudder.

CAPT. EWELL: Oh. Yes. And you know, I think every aviator understands the dynamics of taking a big barn door and sticking it up in the air back there and then putting a piece on the end of it and wiggling it around. There are some really big dynamic forces at work there.

But if in fact this is such a crucial item, why is it never mentioned anywhere in any operating manual?

For as long as I've been flying airplanes, I can't remember anybody saying, You can't push too hard this way or that way, you can't go backwards and forwards, left foot, right foot, left foot, right foot. I have never seen a restriction.

Now, I flew the F4, I told you. We used to have a restriction in the F4 where they said, No full deflection rudder rolls -- or -- sorry -- no full deflection aileron rolls.

Well, it wasn't exactly structural, but it went so fast that people had a tendency to black out. And so there was -- but as far as this rudder business, I hadn't heard it.

Let me tell you an interesting story. And this occurred after this letter.

When we were looking for long-range airplanes, we looked at both the A340, Airbus's product, and we looked at Boeing's product, the 777, and we ultimately bought the 777.

Now, the next sentence in this thing says -- in this letter says, The hazard of inappropriate rudder use -- whatever that is -- during wind shear encounters, wake turbulence recovery, and low air speeds at high angle of attack, for example, stick shaker, should also be included in -- and now, this is called inappropriate rudder use.

When I went out to fly the 777, you know what one of the maneuvers was? I flew a Cathay Pacific 777, never been in the airplane before.

I went out in the left seat, cranked it up, made a rolling takeoff, went out to whatever that place is, that lake --

MR. IVEY: Moses Lake?

CAPT. EWELL: -- Moses Lake. And they had me take that thing -- they took off all the gee-whiz stuff, and they had me pull that thing up into stick shaker.

And one of the great things they wanted to show me was how you could fly around in stick shaker in that airplane and make turns with the rudder. Now, is that inappropriate?

When you read this letter, and then you go out there and do those kind of things under the auspices of the Boeing Corporation, I wonder what the definition of inappropriate rudder usage is.

MR. IVEY: When you were part of that initial cadre over there at Airbus, did they even provide you that same type of demonstration?

CAPT. EWELL: No, sir.

MR. IVEY: Just to digress for a moment, the term, maneuvering speed, is generally associated with light airplanes or general aviation, I should say. And in air carrier operations, we don't get a maneuver speed.

But the term, maneuver speed -- we've asked several people -- what does maneuver speed mean to you?

CAPT. EWELL: Nothing today.

(General laughter.)

CAPT. EWELL: It means getting home in the rush hour.

Well, maneuvering speed always meant to me the speed, I guess the speed at which you -- if you needed to slow down in an airport environment, your maneuvering speed, you had a clean maneuvering speed which I always considered 215 knots, 220 knots; most airplanes are around that. And so that's what I thought was maneuvering speed.

Now, I mean, I'm sure you could -- it depends on what you're doing.

MR. IVEY: But I was thinking more in terms of control deflections. If you're below a maximum maneuvering speed, has it been your impression that you could put a full control deflection in without bending an airplane?

CAPT. EWELL: Well, I don't know that I can remember anything ever in an operating manual that -- I could be wrong about this. But I don't know that I can remember something that said, Don't put a full control deflection in if you're in a certain configuration or -- and I told you about the F4. There was one there.

But I mean, at the slower speeds obviously the outboard aileron would unlock to give you more control deflection. So I wouldn't assume it was a problem there.

MR. IVEY: Well, as you say, they built in, in the case of the Airbus airplane and Boeing products, as well, on the rudder, for example, there is a rudder limiter that --

CAPT. EWELL: Right.

MR. IVEY: -- precludes big excursions or deflections of the rudder at higher speeds.

CAPT. EWELL: Right.

MR. IVEY: And as you say, in other aircraft, the outboard ailerons start to become effective once the airplane has slowed down and various flap conditions are made or extended. So there's protections built in there.

And we have certainly addressed that issue of limitations. There are none that we're aware of as it relates to the rudder on the A300.

And quite frankly, I can't think of any rudder limitations in the limitations sections of most air transport manuals that --

CAPT. EWELL: No. I can't. I think that, you know, I can remember reading, when going through ground school on -- I don't even remember what kind of airplane -- but they would say, If you got a light and the rudder limiter was inoperative, be very careful.

Now, I don't know what kind of limitation you'd call that, but it said be very careful.

I think that anybody who is at this level of aviation would know that you could probably do some damage or certainly scare yourself if you jammed in a lot of rudder at 300 knots and the rudder limiter wasn't working. I think we all understood that part.

But nothing in the manual ever really was specific. It just said, Be careful.

MR. IVEY: Did the FAA ever -- they were one of the individuals that signed -- in fact, Captain Imrich, who we just interviewed, we discussed with him, as the

FAA signer of the letter, if there had ever been any follow-up on this from his perspective, and he answered in the negative. Did you ever hear from the FAA regarding this at all?

CAPT. EWELL: No, sir.

MR. IVEY: And --

CAPT. EWELL: The only thing we ever got was thanks for designing or developing a program that would do the things that this one did. And I really mean that. I never had one negative thing, whether it be industry or otherwise. I just never had anything negative.

MR. IVEY: You testified earlier that one of their concerns and yours is the aerodynamic explanations. I do know that we have had the term, phugoid, removed in one of the changes.

As you said, the caveats that were added at the end of, it was the December '97 video, that were added on to the end seemed to address the coordinated rudder usage.

CAPT. EWELL: Well, the thing is, we have never taught anything but coordinated control, you know. We can talk about that, the nose-high recovery, if you wish.

But my letter was so -- I felt like -- and when I sent it, I sent a copy to Mr. Baker, who was my boss and, you know, other people. And they got a little nervous because I had been so what some people would call straightforward or to the point.

But I just feel like in aviation this gray area business is wrong. And if in fact after this letter was sent and my response was sent there was some other comment, one would surely think that it would have been made, and it wasn't, no other negative comments.

MR. IVEY: In your letter back I know you respond to Captain Higgins. In fact, you made the comment about airplane recovery from upsets that, We clearly disagree totally with your position.

CAPT. EWELL: Yes, sir.

MR. IVEY: And could you highlight that for me as to what the disagreement was that they were talking about? And I think it was really referencing secondary flight controls as opposed to primary, and that probably really is concerned with trim, using trim --

CAPT. EWELL: Which section was this?

MR. IVEY: Let's see. That's under Airplane Recovery From Upset, which would be page 3 of their letter.

CAPT. EWELL: Page 3 of their -- oh. Okay.

MR. IVEY: I think --

CAPT. EWELL: Well, what did you want me to do?

MR. IVEY: Weren't they suggesting the use of trim? Was that part of their suggestion?

CAPT. EWELL: They told me -- and I can't remember whether it was Mr. Higgins or Mr. Melody. I suspect it was Mr. Melody.

They told me in a nose-high upset that their procedure was to push forward on the yoke. Now, we're sitting up here nose-high like this, 60, 70 degrees nose-up -- which can happen; China Airlines proved that -- 60, 70 degrees nose-up. And their procedure was to push over up to and including full forward yoke, at the same time rolling in full nose-down trim and reducing the power.

To say that I thought that was absurd is an understatement. It's just -- I just can't imagine.

And it doesn't matter what kind of airplane you're in -- energy conservation is a terribly important thing. And reducing the power to idle when you're 60 or 70 degrees nose-up is beyond me. So that was basically my argument.

And then they said, Rolls should be introduced only after exhausting the use of pitch axis controls and after considering the reduction of thrust.

They had said in some other place about coordinated control usage. That isn't coordinated control usage. That's a manual push-over and running full nose down trim at the same time, and then reducing the power.

And of course my response was maybe a little harsh. But I explained to them that we clearly disagreed with their position and that -- I gave them our -- I don't need to read all this. But I understand what they said, and I still have not changed my opinion how I feel about it.

MR. IVEY: Do you think they've changed their approach to accommodate your thoughts on that as manufacturers, or --

CAPT. EWELL: Oh, I really, I don't have a clue. I don't have a clue.

MR. IVEY: In your experience with the A300 and being the Vice President of Flight, had there been any rudder anomalies that had surfaced regarding the Airbus aircraft during your tenure here?

CAPT. EWELL: Well, we had some -- and I can't give you the fine points of all of this.

We had two things that happened that were of concern to me, and they were certainly of concern to the guys who were flying the airplanes at the time.

We had an airplane that got into a pitch axis flop at one time where they got into some fairly violent nose excursions just flying along. And I don't, quite frankly, remember what the outcome of that one was.

We also got into a thing where the -- as I remember, and you can't hold me to this. But I remember that we had a yaw damper problem which -- and you'll have to excuse me -- but which Airbus claimed was pilot input, it was his fault.

Ultimately we found out that what was happening was, as the yaw damper corrected, did what it was supposed to do, where as the yaw turned, the yaw damper hit it back the opposite way with ten times the force that it should have done. And they ultimately corrected that with a software change.

And you'd have to dig back in to find out about that. But there were, as I remember, several or a number of incidents where this occurred, and nobody could figure out what it was.

But ultimately, after a lot of talk back and forth, it was discovered that it was not the pilots, it was the yaw damper kicking back at ten times or some multiple of force more than it should have.

MR. IVEY: One airplane, or was it occurring across the fleet?

CAPT. EWELL: No. I think it -- and honestly, I can't say this for a fact. It was on several different airplanes, and that's why they changed the software.

MR. IVEY: Uh-huh.

CAPT. EWELL: And I believe it was in the FMC. They changed the software somewhere in the FMC or something. I don't know. But you could find out. Maintenance would have that.

MR. IVEY: In the ASAP program, of which I guess you participated or at least provided oversight for, were there ever any pilot reports to your knowledge that came out of that regarding Airbus airplanes with rudder anomalies or any types of excursions that would be of value to us?

CAPT. EWELL: I honestly can't tell you. I really honestly don't remember. I just remember those two incidents, especially the yaw damper one.

MR. IVEY: Yes. And the simulators, I know they wrote an -- or one of the paragraphs dealt with their simulation and going outside of valid data.

Could you comment on your reply about simulators? That's the -- we obviously don't do training in airplanes or unusual attitudes and upset.

CAPT. EWELL: That's right.

MR. IVEY: And the second best thing that's available out there today is the simulator, I suppose. You mentioned about the modeling. When the simulator evaluation team came in, did they ever make any comments about poor quality or improper quality of the simulator?

CAPT. EWELL: Never. Never.

MR. IVEY: Did the simulator ever fail to meet standards for training purposes?

CAPT. EWELL: Not that I know of. And I mean, it wasn't just the Airbus simulator. We did this in all of our simulators. And now, we did it in the newer simulators, you know, not the 20-year-old models. We did it in the newer simulators.

And you know, it's like I said here. One of our covenants has always been to abide by the control laws in each of our eight fleet type aircraft, and we did that in the simulator. I mean, all of our training was focused on staying inside the airplane envelope.

Well, I don't know how else you do it. The idea that you're going to take a pilot, a very competent individual, and not expose him to some things because Boeing says, You may be getting outside of the limits.

We weren't outside of the limits. We never felt we were outside of the limits of the engineering data that we had in the simulators and proved it to ourselves that we weren't. And my whole thought on the thing was, I would be remiss if I didn't train these guys in the way that I thought they should go.

To just let him fly around straight and level because some engineer tells me that I may be approaching the limits of the envelope -- we always tried to stay and focused on the envelope of the airplane.

So my opinion was just -- and again, I hate to keep saying this -- but it's the same as it was in here.

I think it's some of the most dramatic training that we ever had when I -- you know, for 30 years that I was there, 30-plus years.

MR. IVEY: It's been my understanding -- and of course our focus is not on the 777. But we found out in the last day, I believe, if not this morning, that prior to the accident in November, at the beginning of November, that there is a change now to 777 -- correct me if I'm wrong, gentlemen -- but the upset training to include now using trim.

CAPT. EWELL: May be.

MR. IVEY: Of course, you've been retired, so --

CAPT. EWELL: Well, and I think, Look, it's kind of like we all agreed to this when we were developing this program. You can't develop a training program and set it in concrete and refuse to listen to anybody's ideas or industry changes or airplane changes. You can't do that.

Now, if they feel today like trim is required, fine. I don't have a problem with that.

But it's kind of like the part in automation here, about, We didn't like automation.

The FAA's attitude with airplanes like the Airbus and the 757, 767 was that you had to demonstrate, which meant to them you flew the whole rating ride on the automation. I disagree with that.

Now, I think you ought to use the level of automation that's appropriate for the time and place. That doesn't mean that on an engine out -- they tried to force us at one time on engine outs to -- it was mandatory to put the autopilot on, coming downwind at 2,000 feet on one engine. It was mandatory. That's wrong.

So the idea that change is bad is not correct. I think that if they think trim needs to be done in the 777 or in any other airplane, fine. But I think that that's just, maybe we listened. So --

MR. IVEY: I did notice that in the evolutionary change of the AAMP there was different videos and presentations now showing angle of attack indicators in two of the airplanes, the 737 and the 777.

CAPT. EWELL: Sure.

MR. IVEY: I think that was a --

CAPT. EWELL: Well, Boeing got very upset with me on the angle of attack thing because they -- we started talking about angle of attack initially.

Now, most all of us have flown angle of attack, and we realize the value, even in what I call an electric airplane.

The problem with getting a stuffed pitot tube on an electric airplane or the CADC goes out or something else, is you get a lot of peripheral warnings of different things going on. It's not the air speed indicator. And the angle of attack is --

But Boeing was trying to design one. They were afraid we were going to buy some rinky-dink angle of attack, which we had no intention of doing, and stuffing it up there on the glare shield in the cockpit of one of our airplanes. We never had any intention of doing that.

And ultimately we worked with them and designed the angle of attack, and we now have it on the 737. It's a wonderful instrument.

MR. IVEY: Did you get a lot of Airbus feedback at all, or was primarily your contact in the context of the letter that was sent with Boeing and McDonnell --

CAPT. EWELL: Totally with Boeing.

MR. IVEY: -- or was it just --

CAPT. EWELL: Totally with Boeing.

MR. IVEY: With Boeing?

CAPT. EWELL: McDonnell Douglas was -- I never even heard from them. They -- Douglas really said -- it was strictly Boeing.

MR. IVEY: Uh-huh. That's all the questions I have, Captain Ewell.

And I'd like to go off record for just a moment.

(Discussion held off the record.)

MR. IVEY: Thank you for your questions. And I'd like to go around the room, with Dr. Bart Elias from the NTSB.

CAPT. EWELL: Okay.

MR. IVEY: Bart.

DR. ELIAS: Thanks. Just a few quick questions.

You previously testified that you knew of no limitations specified in any airplane manual regarding limitations on the use of rudder. Is that correct?

CAPT. EWELL: Well, as far as how to operate the rudder, what you -- how you could -- how you were to push your feed, or at the speed at which you pushed your feed, anything. No.

DR. ELIAS: No. So you're not aware of any?

CAPT. EWELL: No.

DR. ELIAS: Now, you did attend the -- this is going back a few years -- but you did attend the initial ground and simulator training when, I guess when you acquired the A300s and went over to Toulouse for that training?

CAPT. EWELL: Yes, I did.

DR. ELIAS: Was there anything in the training program that mentioned anything that you recall about limitations on use of rudder or what the appropriate use of rudder should be?

CAPT. EWELL: No. Absolutely not.

DR. ELIAS: Have you ever attended any other manufacturer training for any other aircraft type?

CAPT. EWELL: Well, when I went through the MD-80 training, it was initial MD-80 training -- I forget what year it was, early '80s, I guess -- I went to

McDonnell Douglas for part of that, because our school wasn't set up here yet and we had no simulators.

So you went up to Northwest and did some of it, then you went out to Long Beach and did some of it with McDonnell -- or with Douglas, and then you went to Atlanta and flew Delta's simulator.

So I did -- I mean, I guess that was -- I don't -- we did the ground school here, but I -- most of the instructors were hired by Douglas the rest of the time in the simulator training. But that's the only other one I've been to.

DR. ELIAS: And in that training was there any information imparted in terms of limitations on rudder use or, being more general, limitations on use of any flight controls?

CAPT. EWELL: No.

DR. ELIAS: So in your experience you haven't experienced any training where you've been told about limitations at any flight regime regarding flight control use?

CAPT. EWELL: Well, I mean, it's like I said a while ago, if the rudder limiter is inoperative, there are -- they did say really specific things like, Be careful, whatever that means. But we all knew what it meant.

But as far as limitations on the operation of the rudders? Absolutely not. Never.

DR. ELIAS: And something like a rudder limiter failure or something like that, that would refer you to maybe a non-normal procedure or something where then it does say, Be careful, or, Avoid excessive rudder use, or something like that? Is that what you're referring to?

CAPT. EWELL: Well, excessive inputs would be the ticket, I mean, because you really wouldn't want to frighten yourself with full rudder at 300 knots with no rudder limiter. So --

But there were never any restrictions or numbers or anything like that.

DR. ELIAS: Now, you also spent some time as a check airman.

CAPT. EWELL: Yes.

DR. ELIAS: Did you ever observe any students using excessive rudder, or what you consider to be excessive rudder?

CAPT. EWELL: Well, no. I would say that if you went to any simulator in the world, and on a dark night at about 1,000 feet with 15 to 20 degrees nose-up, you gave a guy an engine failure at full power, max power, I think you're going to see some real rudder usage.

Now, is that excessive? Not by any book I've read. Is it a little scary? Yes.

But pilots who know how to fly airplanes have the ability to ultimately dampen that down, and it works fine.

But I wouldn't call that excessive. I would call it exciting rudder usage.

But other than that, I've never seen anything like that, whether it be in the simulator or the airplane.

DR. ELIAS: And you had mentioned you had gone through some manufacturer training, and I don't know what other training you've been exposed to.

But prior to the AAMP program being put in place here at American, had you ever gone through any unusual attitude or upset recovery training in a simulator?

CAPT. EWELL: No.

DR. ELIAS: Were you aware of any other airlines or the military having a similar program where they were using simulators?

CAPT. EWELL: Well, I don' know. I'm sure the military does, because they're at a stage in the military now where in the fighter business they go out and have what we would call dog fights in a simulator. So I mean, there's a lot of unusual attitudes there.

And that was part of the reason for designing the AAMP program, because we had four or five different airplanes in unusual attitudes that went straight into the ground. And that was of great concern, of great concern to the industry, not just American Airlines.

But I think it's just one of those things that the time came. And it was something that woke us all up to the fact that these things can happen to us all. And to stick your head in the sand and ignore it would be criminal.

DR. ELIAS: That's all the questions I have. Thank you.

MR. IVEY: Captain Guy Arondel from BEA?

CAPT. ARONDEL: No questions.

MR. IVEY: Captain Delvin Young, American?

CAPT. YOUNG: No questions. Thank you.

MR. IVEY: Captain Jim Goachee, FAA?

CAPT. GOACHEE: No questions.

MR. IVEY: Captain John Lauer, APA?

CAPT. LAUER: I only have one question. I'd like to just briefly revisit the issue that Dave touched upon when you were asking questions with regards to the piece of information that this committee was exposed to either yesterday or today -- I can't remember myself -- regarding a change that has now been incorporated or placed in the operating manual of the 777.

And there was testimony -- and the members of this committee, please correct me if I'm wrong on paraphrasing this.

But there was testimony from Captain VanderBurgh stating that he had indeed made his displeasure known to American management with regards to this change to 777 to the extent that he believes -- and he is in concert with you -- that it is wrong.

As a former pilot, but more importantly, as a former officer of American Airlines representing -- or being part of management, do you have any idea, sir, why American management would concede to Boeing instead of supporting Captain VanderBurgh's position?

CAPT. EWELL: Well, no. That's a tough question, and I really honestly don't know. I think that that -- you're going to get into personalities, the politics, Boeing, American, management, management, both sides, the whole thing. I really couldn't tell you.

My opinion is, if you're going to talk about airplanes, then you take the brightest minds that you've got, and whether you're just a pilot or you're just a manager, you should listen to the brightest minds that you have. And that's the way policy should be set. Politics should not enter into this; money should not enter into it.

So I don't know. I really couldn't answer your question.

CAPT. LAUER: Captain Ewell, I thank you for your candor on that.

I don't have any other questions. Thank you. It's most appreciated.

MR. IVEY: Captain Ron Skupeika, Airbus?

CAPT. SKUPEIKA: No questions. Thank you.

DR. ELIAS: I have one follow-up question.

MR. IVEY: Go ahead, Bart.

DR. ELIAS: Okay. I don't recall if this was in the letter originally sent to you from the industry participants or if it was brought to American Airlines' attention by other means.

But was it ever brought to your attention about a concern on the part of some industry experts who had come and seen the simulator upsets that some of the flight controls, perhaps the ailerons and perhaps both the ailerons and rudders, were being disabled in order to put the simulator into those upset conditions?

CAPT. EWELL: Well, I think -- and I can't give you a really factual answer there.

I think initially, in 1997, say, when we first started it, there was some of that went on, and then they got rid of it.

DR. ELIAS: Okay.

CAPT. EWELL: It was only initially. Because I've got to tell you, the most important thing to us was making it as realistic as we could.

And I said many times to all of these people, whether it be in training or wherever, We have to stick with realism. The minute you go outside the envelope of the airplane, it is not real anymore, and we do a disservice. So we didn't.

Anytime anything got close to the edge of the envelope or the technical data, we didn't go any further than that. And so we weren't in there jimmying with the simulators.

And I think I answered that, if you've -- you've got a copy of the letter. But I think I answered that. I think that it's -- oh. It's right here: The modeling in training focuses on maintaining the airplane inside of its flight envelope regardless of attitude.

And we felt like -- and that was backed up by a lot of simulator companies, the people that we bought our simulators from, and also our technical people, that as long as you stayed inside the envelope of the airplane, that it was perfectly valid.

But the point is, we're not talking about splitting hairs here. What we're talking about is a guy who ends up nose-high and maybe inverted in the middle of the night in the driving rain. What's he going to do?

And we saw four or five examples of what some people do, or did, and that's why we developed this thing. It was just basic understanding that we were trying to help our guys with, and the industry.

DR. ELIAS: Thank you.

MR. IVEY: I realize you're on the outside looking at this accident. And we've had a vertical fin failure that -- because it separated from the airplane. And is there anything that you think in your experience you can suggest to us as a group or as the NTSB to look at to help solve this accident? Got any ideas?

CAPT. EWELL: Oh, you know, I'm not that smart, Dave. I really am not that smart.

I think that unfortunately -- and I don't mean this in the wrong way, I really don't. But unfortunately, it always seems like that we -- and I include myself -- we always look to the pilots, that we always start with the assumption they might have or they could have done something wrong.

And you know, I think this was -- these guys, I guess their flight was about a minute-and-a-half long, and they never got above a reasonable air speed. And apparently -- and I've seen nothing other than NBC News, which is, you know, I believe about 5 percent of that. But it didn't appear that anything was dramatically wrong.

And I think that the important thing is -- and I think you guys are going to do it. I really have trust and belief in that. I think the important thing is to get to the bottom of it as best you can, and then -- are we still on the tape?

MR. IVEY: Yes.

CAPT. EWELL: Oh. And then, if we see something that -- we know for sure the vertical fin evidently departed the airplane. Is that what you just said to me?

MR. IVEY: Yes.

CAPT. EWELL: We just need to get whatever happened fixed.

And we all -- and I've been involved in too many depositions, as you're well aware. But we all worry about the Plaintiff's attorneys and the Defense attorneys and all the other attorneys.

And it would be my fervent hope that we can just find out what happened and admit it and stand up and go on down the road, because the people of this country trust us.

This sounds like I'm on a soapbox. But the people of this country, they trust the NTSB, they trust Boeing, they trust Airbus, they trust American, United, Delta, any other airline, and we can't afford to lose that trust because of politics or money or anything like that.

And I just, you know, I've been involved in some hearings with you all, and sometimes it's gotten a little ugly, but it has always worked out that the truth was found, and I have a firm belief that it will be found this time.

And I hope, whatever the cause is -- and it may be spread out. But whatever the cause is, we just need to sit up and admit and go on and fix it, whatever it is, and move on and protect the people in this country that fly around on these airplanes with this trust that they have.

MR. IVEY: Thank you very much.

CAPT. EWELL: That's my speech for today.

MR. IVEY: Well, thank you very much for your candid comments and participating in our interview.

And this will conclude the interview.

(Whereupon, the witness was excused.)

(Whereupon, at 5:45 p.m., the interviews were recessed, to resume on Friday, January 18, 2002.)

**28. Volume IV**

BEFORE THE

NATIONAL TRANSPORTATION SAFETY BOARD

DFW INTERVIEWS ON
AA 587

VOLUME IV

Room F107
American Airlines Flight
Training Academy
4601 Highway 360
Fort Worth, Texas

Friday,
January 18, 2002

The interviews resumed at 8:00 a.m.

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P R O C E E D I N G S

EXAMINATION

**m. Captain Paul Wayland Railsback**

MR. IVEY: Good morning and thank you for joining us. Just by way of introduction, if you would just give me your complete full name, your title and position at American Airlines, and a brief overview of your background in aviation, flight hours, type ratings, experience.

CAPT. RAILSBACK: My name is Paul Wayland Railsback; I'm managing director of Flight Operations Technical. My background in aviation was originally I was a Marine Corps pilot flying A-4s; I've been with American since 1967; I was a line pilot for about 19 years; I became a check airman on the MD-80 for five or six years; was a check airman on the DC-10 subsequent to that; then became the fleet manager for the DC-10 and the 747; then was the manager of flight training for a short period of time; and since 1993 I've been the managing director of Flight Operations Technical.

I've got flight ratings on DC-3, DC-9, DC-10, MD-11, A-300, F-100, 757, 767 and 747.

MR. IVEY: And just an estimate of your total flying time?

CAPT. RAILSBACK: 7- or 8,000 hours.

MR. IVEY: And if you can just give me, again, an estimate of, say, A-300 flight time?

CAPT. RAILSBACK: I never flew the A-300; I went through the program and got type-rated on it to get familiar with the airplane, but I never actually completed my IOE or did any line flying on it because it was down in Miami.

MR. IVEY: What time frame was that type rating?

CAPT. RAILSBACK: '93-94.

MR. IVEY: And as the director of Flight Operations Technical, explain for me what your duties are there.

CAPT. RAILSBACK: Flight Operations Technical handles basically everything that's flight training or people management -- that is, the chief pilots. We supervise or oversee all publications, flight publications; we have a group of technical pilots who do maintenance flying for us, STC type flying; they represent us and we represent ourselves out in the industry in various industry forums, regulatory forums in an effort to advance the state of the art, for example, Data Link communications is something we're very interested in and leading in; RNAV type approach procedures, anything we can do to move the state of the industry forward. We handle the MELS, performance manuals.

MR. IVEY: Was Captain VanderBurgh ever part of Flight Operations Technical?

CAPT. RAILSBACK: No. He was always in training.

MR. IVEY: In training. In terms of you mentioned manuals, is it primarily flight manuals or all types of manuals, to include training manuals?

CAPT. RAILSBACK: We don't do training manuals; we do all flight operations manuals, Flight Manual Part 1 which is our policy, our flight operations manual, MELS, that sort of thing.

MR. IVEY: So really over in Flight Operations Technical you wouldn't have been associated with the AAMP program, that workbook that's published, would you?

CAPT. RAILSBACK: No, I was not.

MR. IVEY: Do you all ever come in contact with -- well, that's not a good term. Did you ever get involved with the development, initial production development of the maneuvering program?

CAPT. RAILSBACK: The only program that I attended was the initial presentation that VanderBurgh put on for managers while it was in the developmental stage.

MR. IVEY: And as a technical pilot, I presume you're able to get out on occasion and fly airplanes without passengers in there to either see effects of something or to verify that maintenance had properly fixed an airplane, so you're be able to be out there and fly with just pilots on board airplanes?

CAPT. RAILSBACK: Occasionally. I don't do too much of that; I've got an excellent of maintenance pilots; I occasionally fly with them but I don't do very much of it myself.

MR. IVEY: But they would at least have the opportunity to do that type of flying.

CAPT. RAILSBACK: Yes.

MR. IVEY: After having gone through the Advanced Maneuvering Program, give me your thoughts about it, what did you think?

CAPT. RAILSBACK: Well, I thought the concept was very good. Many of our pilots don't have any particular background in high-performance aerodynamics. I thought that an introduction to aerodynamics was good, and relating it to specific types of safety or accident situations, like microburst, was a very good concept.

MR. IVEY: Did you ever have the opportunity to go through the upset training in the simulator?

CAPT. RAILSBACK: Yes, I have on numerous occasions.

MR. IVEY: Is that part of your recurrent training?

CAPT. RAILSBACK: Yes, it is.

MR. IVEY: So even the technical pilots, when they have their annual check ride, so to speak, or under AQP -- and I understand there's a new program now, the Eight Month, I believe it's called.

CAPT. RAILSBACK: Nine Month, 9 and 18; same program, it's just shortened time frames -- well, it's a different program.

MR. IVEY: That you experience this on an annual basis or on a recurring basis?

CAPT. RAILSBACK: Yes.

MR. IVEY: Did you ever have any comments with your technical pilots in the past, since the formation of AAMP, about any issues that they felt like might need to be changed or need to be positively promoted? Any discussion about pluses and minuses in that program that might have transmitted to Captain VanderBurgh?

CAPT. RAILSBACK: Do you mean discussions with Captain VanderBurgh or discussions with the technical pilots?

MR. IVEY: Well, I was thinking more or less the attitude of the tech pilots who attended the course over that first initial introduction to come back over into your shop and to say: Hey, this is pretty good; or hangar flying saying: Here's some things that I think maybe Warren ought to be --

CAPT. RAILSBACK: I think my technical felt it was a little elementary for them, and they didn't particularly get much out of it, but on the other hand, for a large group of line pilots it had value.

MR. IVEY: And did Captain VanderBurgh consult with you all during this development of that program?

CAPT. RAILSBACK: No. I just saw the one presentation.

MR. IVEY: You mentioned that your tech pilots seemed as though it was very elementary for them. Did they have an opportunity to go out and fly and get into further reaches of the envelope than the typical line pilot?

CAPT. RAILSBACK: Not really, we don't encourage that kind of flying. One of the things that they do is we do an extensive check on airplanes when we buy the airplanes from the factor and we do the same check when we pick them up when they go through heavy maintenance, and that includes not any radical flying maneuvers, however, they do, for example, slow the airplane up to the onset of a stick shaker to check the calibration of the airspeed and make sure the stick shaker is coming on at the proper point. They also shut down each engine at different times and restart the engines to make sure they start up in flight. So they do not fly the airplanes at the edge of the envelope.

Now, let me also add that my test pilots, some of them have very sophisticated backgrounds, including experimental flight tests. One of my pilots was a Boeing flight test pilot for 14 years, so they have had plenty of opportunities to fly airplanes in unusual situations.

MR. IVEY: I'd like to turn for a moment to a change that I saw in the Flight Manual Part 1. Any changes that are in that Part 1 manual, that's the general operations manual?

CAPT. RAILSBACK: Flight operations manual, yes. It's general policies and FARs that we think it's important to have.

MR. IVEY: The change I'm referring to is back in Section 19 that was abnormal emergency but specifically there was a change in hijacking. Are you familiar with that change?

CAPT. RAILSBACK: Yes, I am.

MR. IVEY: Give me your view of how this change happened to occur and the evolution of it.

CAPT. RAILSBACK: After September 11, when we started flying again, we heard a number of reports from flight attendants and pilots that some of our captains were briefing that at the suspicion of a hijacking they were going to take radical aircraft --

MR. IVEY: Off the record.

(Off the record.)

MR. IVEY: On the record. You mentioned you were aware of the Part 1 change that dealt with hijacking.

CAPT. RAILSBACK: Yes.

MR. IVEY: I'd like to know how that hijacking change occurred in the manual, what was the development and the emphasis behind that.

CAPT. RAILSBACK: Afer September 11, a number of pilots suggested that they could use the airplane as a defensive weapon by maneuvering the airplane. We felt it was very important that they understood the limitations of the airplane in terms of G-forces and maneuvers that could be done safely, and so we transmitted that to the pilots via a number of methods

MR. IVEY: Did any of your technical pilots, having seen what happened in light of September 11, go out and perform any maneuvers to get an idea about limitations?

CAPT. RAILSBACK: No. The limitations are published, G limitations, et cetera.

MR. IVEY: But there was never any technical flying done to go out to establish parameters or guidelines?

CAPT. RAILSBACK: Not at American Airlines.

MR. IVEY: And so you mentioned that in light of September 11, I'd like to get a sense of the corporate culture, if you will, of the pilots, their attitudes and perhaps even their discussions. Was this part of the reason for that change because there were so many ideas out there that pilots had about what they would like to do in the event, and was this change made to collect all these various ideas and to put it into one formal company policy?

CAPT. RAILSBACK: I wouldn't say that it was a culture of our company, it was actually throughout the industry, this idea of using the airplane as a defensive weapon, and there were a number of newspaper articles published about this -- I think USA Today published one where they interviewed a number of pilots from other airlines -- and so all of us in the industry felt there was some risks associated with that type of maneuvering and wanted to make sure that the pilots understood that the transport category airplanes have got very specific vulnerabilities or limitations.

MR. IVEY: Did training managers here at the academy, or even line pilots, for that matter, make any calls to your department that all these various ideas were going on? And I guess what I'm trying to say is were there calls coming in that: Hey, we're getting different ideas out here?

CAPT. RAILSBACK: Yes, that's correct.

MR. IVEY: And perhaps not only from American, but as you say, it was from across all airlines.

CAPT. RAILSBACK: Yes.

MR. IVEY: Many pilots out there, in light of September 11, perhaps coming up with their own scenarios in discussions about what they think they'd like to do or attempt to do.

CAPT. RAILSBACK: Yes.

MR. IVEY: Do you know if other airlines have attempted to mirror what you've done here in changes in the event of a hijacking?

CAPT. RAILSBACK: I think most of the airlines have dealt with it in some way or another. We've had discussions with other airlines. Delta was very interested in this; I've shared the information that we put out with the other airlines, and each has taken their own approach to it. I really don't know exactly what the other airlines have done.

MR. IVEY: In light of September 11, I think you perhaps used the term "defensive maneuvering" or is there a term that's associated with last-ditch?

CAPT. RAILSBACK: "Defensive maneuvering" seems to be the term that has kind of taken hold in the industry for those that talk about it.

MR. IVEY: But again, the whole idea was to get everybody on the same page -- no pun intended because there are two pages associated with this -- have you had any feedback from the line pilots after the issuance of the revision on hijacking?

CAPT. RAILSBACK: Not much. I had, I think, one e-mail that disagreed with me, and I corresponded with him and we convinced him of the correctness of the revision. Given that we have 12,000 pilots, there was not much response.

MR. IVEY: Has there been any discussion between the director of training over here who runs the AAMP program and you regarding these changes?

CAPT. RAILSBACK: All the changes in Part 1 are coordinated with all the other managers and managing directors. They all saw this change and they all made comment on it and we created it as a group effort.

MR. IVEY: I know one of the statements involved excessive control forces, and presume that that was based on limitations of the airplane, again.

CAPT. RAILSBACK: Yes.

MR. IVEY: Is that where it was derived, that statement?

CAPT. RAILSBACK: Yes.

MR. IVEY: To stay within limitations of the airplane?

CAPT. RAILSBACK: It was on limitations, just general good airmanship.

MR. IVEY: In terms of a defensive maneuver, if in fact you were using coordinated control with an airplane throughout any kind of maneuver that a pilot might attempt to employ on his airplane, what would be your opinion if you maintained 1G on this airplane in a defensive maneuver, how do you think that might affect what was going on, let's say, in the cabin?

CAPT. RAILSBACK: If you maintained 1G, I don't think it would have any effect at all on what was going on in the cabin.

MR. IVEY: One of the issues that was brought up in this October 23 revision made the statement that excessive side loads can cause pylon-mounted engines to break off the airplane.

CAPT. RAILSBACK: Yes.

MR. IVEY: Where was the derivation of that statement?

CAPT. RAILSBACK: We were just trying to put out the cautions and the things that could happen and the fact that pylon-mounted engines are vulnerable to side loads.

MR. IVEY: Did that come out of technical or were you in conference with Airbus and Boeing and other manufacturers?

CAPT. RAILSBACK: No. Basically that was put in at the suggestion of my technical pilots who had quite a bit of experience in this area.

MR. IVEY: During the production of this change to the hijacking part of the manual, was Boeing or Airbus ever consulted in any way as a manufacturer?

CAPT. RAILSBACK: Yes. The Rapid Response team asked the question about defensive maneuvering and there was a group put together that was led by Delta, a captain named Michael Huelo [phonetic] at Delta, and we had a number of conference calls with Boeing and Airbus regarding these types of maneuvers.

MR. IVEY: What kind of concerns were expressed by the manufacturers, if you can enumerate some for me.

CAPT. RAILSBACK: Well, they were concerned that excessive defensive maneuvering was dangerous in terms of loss of control of the airplane, a danger to the passengers, and potentially structural failure.

MR. IVEY: Was there ever any discussion to your knowledge that related to rudder -- did the term "rudder" ever specifically get mentioned?

CAPT. RAILSBACK: I believe that when Boeing preferred to use the negative Gs and I believe they specifically recommended against the use of rudder for defensive maneuvering.

MR. IVEY: During a negative G or just using rudder at any time?

CAPT. RAILSBACK: Any time. I think they just didn't think it was effective.

MR. IVEY: Did Airbus ever mention anything regarding rudder?

CAPT. RAILSBACK: I don't recall. It was a conference call and there were quite a few people on the call.

MR. IVEY: Do you believe that in light of this revision that there is more consensus now among the pilot group? Have you had any feedback about how everyone has gotten on the same page?

CAPT. RAILSBACK: My opinion is yes, I think they've got everybody's attention.

MR. IVEY: One of the issues mentioned involved an inverted maneuver that most likely will result in a nose-low attitude from which recovery may be impossible before ground contact. That inverted maneuver, was that discussed in conference, as you said prior to this change? Were there any discussions associated with that inverted maneuver?

CAPT. RAILSBACK: We absolutely did not believe that any type of inverted maneuver is appropriate, and I think the genesis of that was a newspaper article -- I believe it was USA Today -- in which a number of pilots expressed the intent to be inverted. It is totally inappropriate for a transport category airplane.

MR. IVEY: I'm not familiar with those articles. Were they interviewing just pilots out there in the aviation community and they were talking about rolling inverted as a particular maneuver possibly to thwart a hijack?

CAPT. RAILSBACK: That's my recollection. It was just a part of the general newspaper coverage after September 11 when they interviewed pilots and there were a number of articles that came out on this subject which got us concerned.

MR. IVEY: So they were kind of going out on their own just giving ideas about how I'm going to take care of it in my case, or something along that line? They weren't speaking specifically for airline operators?

CAPT. RAILSBACK: Oh, absolutely not, no. They were speaking for themselves, and it was a reaction to the very serious nature of what took place on September 11 and what the pilots could do about it. It was certainly well-intentioned.

MR. IVEY: You mentioned that Rapid Response Team. What is that? Is that an American Airlines RRT?

CAPT. RAILSBACK: No. The Secretary of Transportation, Secretary Mineta formed a Rapid Response Team immediately after September 11. I know that Mr. Baker was a member of it, as well as several other very high airline executives, and they came up with a series of recommendations to prevent a recurrence of September 11, and I think there were 17 areas that they wanted examined or looked at, including things like cockpit doors and whatnot, and this was one of the questions that they raised. They had no specific recommendation, they just raised the question.

MR. IVEY: As you say, you never flew the A-300 but did go through the entire process outside of flying the airplane.

CAPT. RAILSBACK: Yes.

MR. IVEY: And that was in 1993 so that's quite some time ago.

CAPT. RAILSBACK: Yes.

MR. IVEY: In light of this accident, have your technical people, and more importantly, those that are on the A-300, had any discussions with you about what might have caused this accident?

CAPT. RAILSBACK: Well, there's been rampant speculation everywhere, of course.

MR. IVEY: Is there anything that you could share with me or with us this morning that might help us to look down various avenues, roads, paths to try to solve this accident?

CAPT. RAILSBACK: Well, I haven't been a party to the investigation, but I certainly don't feel like the structural failure that occurred should have happened.

MR. IVEY: The term "maneuvering speed" it normally does not show up in flight manuals for line pilots and air transport category airplanes, but the term "maneuvering speed" what does that mean to you?

CAPT. RAILSBACK: It's the speed at below which you can put full input without any structural damage to the airplane.

MR. IVEY: And typically every large transport category airplane is limited to 250 knots on a climb out to 10,000 feet.

CAPT. RAILSBACK: Yes.

MR. IVEY: Would it be your view that that would be below a maneuvering speed, that limit?

CAPT. RAILSBACK: Well, maneuvering speed is a function of weight and a lot of factors, but by and large, yes.

MR. IVEY: So would it be your view that a 230-knot to 250-knot speed regime is not low but it's not high either.

CAPT. RAILSBACK: That's correct.

MR. IVEY: Would you expect that the maneuvering speed would be, for any particular gross weight, above that?

CAPT. RAILSBACK: Yes.

MR. IVEY: And in terms of a maneuvering speed and of control deflection, we've had many people talk about that speed, and my question to you is if you put in a full control deflection, is it your belief that it's ailerons and elevator as well as rudder full control?

CAPT. RAILSBACK: I've never seen any limitation to the contrary or any caution published to the contrary.

MR. IVEY: And no caution has ever been provided you by Airbus regarding any flight control limitation for any speed?

CAPT. RAILSBACK: No.

MR. IVEY: I'm sure your technical pilots are aware of the rudder load limiter that's on the A-300 and perhaps on other American Airlines airplanes.

CAPT. RAILSBACK: I believe it's on all airplanes.

MR. IVEY: All of them, so they're aware of the reason for that type of limiting device.

CAPT. RAILSBACK: Yes. The rudder limiter is supposed to protect you from having excess rudder control authority.

MR. IVEY: But would it be your opinion that if the rudder load limiter were working properly that if you were still below the VA speed that you should be able to fully, in the rudder's case, displace it the limited amount and still stay within structural limits?

CAPT. RAILSBACK: Yes.

MR. IVEY: Do you know what the term "doublet" means?

CAPT. RAILSBACK: Yes, I do.

MR. IVEY: And I must ask you did you know it before the accident or after the accident?

CAPT. RAILSBACK: After the accident.

MR. IVEY: Welcome to the group. Almost exclusively, pilots had never heard that term either. Would it be your thought that if you were to take a -- and let's just talk rudder for a moment -- if you were to have neutral rudder pedals, you were below a VA speed, and you put in a full deflection of the rudder, followed by an opposite full deflection of the rudder, that that might also apply below the maneuvering speed to protect the airplane?

CAPT. RAILSBACK: I would expect it to.

MR. IVEY: Let's go one step further. If we were to put in -- and I realize there can be a frequency involved in this so there's a time element -- that if we were gently going full right rudder and then full left rudder and then full right rudder with everything working in an airplane -- you've got a yaw-damper back there that helps you -- the airplane is gently reacting to your input, that below a VA speed the airplane should be protected?

CAPT. RAILSBACK: I am of that belief, yes.

MR. IVEY: Most of your pilots feel the same way?

CAPT. RAILSBACK: As far as I know. I've never heard of any caution or any statement to the contrary.

MR. IVEY: And if we were to put in a full right rudder, let's say, followed immediately by a full left rudder, and did maybe two or three or four series of these things, with the system still working, what do you think about that?

CAPT. RAILSBACK: I'm really not qualified to say what the results of that are; it's beyond the scope of my qualifications.

MR. IVEY: I understand.

CAPT. RAILSBACK: Although, again, I've never seen any limitation or suggestion that you shouldn't do that.

MR. IVEY: In light of this accident, knowing what you know -- and I understand you don't have complete knowledge -- do you believe that a rewrite of the definition of "maneuvering speed" might be in order?

CAPT. RAILSBACK: Possibly. Again, we have asked and need some guidance from the manufacturers on what the limitations are.

MR. IVEY: I still am not clear as to whether it means just one full control input followed by a neutral, or if in fact you can sit there, alternate back and forth, and of course the frequency would make a significant difference. If you're doing a rapid response, then perhaps there is a problem.

Did any of your technical pilots ever become involved in the development or the changes that came along associated with the AAMP program?

CAPT. RAILSBACK: No. That was strictly training.

MR. IVEY: Yes.

In the A-300 operating manual, under limitations they do have maximum airspeed limitations as one category in their limitations, and I realize you don't fly the airplane, but one of the boxes they have there talks about turbulence penetration speed VA (AFM ) -- airplane flight manual, I presume.

CAPT. RAILSBACK: Yes.

MR. IVEY: In most large transport category airplanes, if you start encountering turbulence, you find yourself in a thunderstorm or something like that, the turbulence penetration speed, is that normally a speed that's attempted to either get below a VA in terms of mach and/or indicated airspeed, again to afford that protection?

CAPT. RAILSBACK: Both. It is there to maintain an adequate stall margin and yet to reduce the structural loads on the airplane.

MR. IVEY: So it's sort of a combination to stay above stall and below buffeting or high-speed buffet, and yet at the same time to stay within that flight control range of being able to fully deflect flight controls, I suppose.

CAPT. RAILSBACK: Well, those speeds are provided by the manufacturer and you'd have to ask the manufacturer exactly how they're derived.

MR. IVEY: In terms of the upset maneuvering program, have you ever had an opportunity to discuss with other carriers or manufacturers the idea of the use of rudder control for roll-off as opposed to just using full elevator control to push the nose over, and to use the wings level recovery in a nose-high attitude as opposed to using wings level and rudder roll-off to nose-high recover?

CAPT. RAILSBACK: Have I had any discussions with them? I have discussions with some of the pilots with the manufacturers.

MR. IVEY: Is it generally the consensus that the use of rudder to roll off on a nose-high recovery is the best way to go as opposed to just pushing the airplane over?

CAPT. RAILSBACK: I don't think our procedure calls for the use of rudder, it's the aileron.

MR. IVEY: And if the aileron doesn't affect a roll, then do you use the rudder to follow?

CAPT. RAILSBACK: Every time I've done that procedure in a simulator, I've only used ailerons; ailerons are very effective on transport category airplanes under very slow speeds.

MR. IVEY: Have you ever -- and I know you mentioned going to approach the stall -- or into the buffet area when you're picking up new aircraft from manufacturers. I assume that was probably also done with the 1800, although I don't think you've had any new airplanes in a few years.

CAPT. RAILSBACK: I presume it was. We have a standard acceptance checklist that we use.

MR. IVEY: Do your pilots ever get the opportunity to go out and fly at a low airspeed high angle of attack and either have demonstrated to them by the manufacturers roll control through use of aileron only and then roll control through use of rudder only? Do they ever get involved in that?

CAPT. RAILSBACK:  You mean my maintenance pilots?

MR. IVEY:  Yes, sir.

CAPT. RAILSBACK:  Or FOT pilots?  No.  Well, let me correct that. As I said, I've got one pilot that was a Boeing test pilot for 14 years, so I feel certain that he had the opportunity.

MR. IVEY:  I'm certain he has.

I know you stated this, I'll just ask it one more time.  On any of your airplanes, be it Boeing or Airbus, there has never been any limitations, to your knowledge, about deflections, rates or restrictions on the use of any of the three flight controls.

CAPT. RAILSBACK:  Not that I know of.

MR. IVEY:  Well, thank you, sir.  What I'd like to do is go around the room and see if anyone else has any questions, and I'll start with Dr. Bart Elias, NTSB.

DR. ELIAS:  Just one quick question.  You mentioned in terms of during the time period when this change regarding defensive maneuvering was being developed, you either solicited the input of manufacturers or had some discussions with them, and you mentioned that Boeing had some either recommendations or concerns about use of rudder.  Can you elaborate on that?

CAPT. RAILSBACK:  They did not recommend the use of rudder for defensive maneuvering, they specifically stated that, mainly because I don't think they thought it was effective.

DR. ELIAS:  Did they express any concerns over aircraft loss of control or structural loads that would be imposed by use of rudder?

CAPT. RAILSBACK:  That was not brought up specifically, no.

DR. ELIAS: Thank you.

MR. IVEY: Captain Guy Arondel, BEA.

CAPT. ARONDEL: Do you think that the new posture concerning hijacking will not produce in the pilot's mind the idea that they can use full deflection of rudder without any damage of the aircraft?

CAPT. RAILSBACK: I think that the procedure specifically says don't use rudder.

CAPT. ARONDEL: Don't use rudder.

CAPT. RAILSBACK: I don't have it in front of me but I believe it says that.

MR. IVEY: Oh, regarding the -- and I think specifically excludes the use of rudder?

CAPT. RAILSBACK: I believe that there's a bullet there that says don't use the rudder.

MR. IVEY: I was just reading: "Excessive rudder input can cause a departure or spin." Would that be what you're referring to?

CAPT. RAILSBACK: Yes. We certainly did not encourage the use of rudder in defensive maneuvering.

MR. IVEY: Captain Delvin Young, American.

CAPT. YOUNG: Just to clarify a little bit a question that David asked you about the defensive maneuvering, this change that got put into Part 1, was it something that a pilot would use right away or if they suspected some type of hijacking that clarification was put in there?

CAPT. RAILSBACK: We very clearly said that in case of a known hijacking as a last-ditch maneuver.

CAPT. YOUNG: As a last-ditch you would end up going to that.

CAPT. RAILSBACK: Yes.

CAPT. YOUNG: During this time that talked about this particular change to the Part 1, you had mentioned that the manufacturers were involved and you think Airbus was a part of that conversation or the conference call?

CAPT. RAILSBACK: There were a lot of people on the call, and I know Boeing was and I have to believe that Airbus was but I'm not 100 percent sure.

CAPT. YOUNG: Right, okay. You mentioned at the very end there you were talking about the nose-high recovery and things using the ailerons. Earlier this week we had testimony that possibly the Triple-7 was maybe changing or making some modification to their nose-high recovery as it pertains to AAMP. Do you know anything on that?

CAPT. RAILSBACK: Yes, I do. Originally when AAMP was created, we put in the unusual attitude recovery procedures in our flight operations manual in the maneuvers section and it was a consistent or standard nose-high recovery which was unload the airplane, roll no more than 60 degrees -- there was no discussion of rudders in the operating manual -- and maximum power which is a normal nose-high recovery. However, Boeing expressed some concern that on wing-mounted engines that the engines provided an upward thrust vector and so they put a procedure in their flight operations manual dated June 18 -- so just a few months ago -- which they specifically put an upset recovery procedure in there which was different from our procedure, particularly in terms of handling the power.

We changed our Tripe-7 procedure to exactly match the Boeing procedure because we felt that it was prudent, they had flown the airplane in these attitudes, and even though there's some disagreement in the pilot community about reducing the thrust to get rid of that upward vector, Boeing felt very strongly about it, we're matching their procedure. We're going to do the same thing on the 737. Any time the manufacturer has a procedure specifically published in their operations manual, we'll put it in our operations manual the same way.

CAPT. YOUNG: Are those the only two airplanes that you've seen it so far?

CAPT. RAILSBACK: Now, the tail-mounted engines have a different procedure, that is, they don't have the upward thrust vector from the wing-mounted engines so it's a little simpler. Boeing has come in their operations manual with a procedure for each of their airplanes; we're matching that word for word. We're querying Airbus as to if they would like us to change or whether they're satisfied with what we already have.

CAPT. YOUNG: Have you seen a procedure from Airbus in their operating manual at all concerning this?

CAPT. RAILSBACK: There's no procedure in their operating manual.

CAPT. YOUNG: That's all I have.

MR. IVEY: Thank you. Captain Jim Goachee, FAA.

CAPT. GOACHEE: I just have one question. We've been talking about VA and maneuvering speed and the idea of most pilots out in the community being able to put in a full deflection, and in this particular case rudder, without damaging if you're in the flight envelope.

CAPT. RAILSBACK: Yes.

CAPT. GOACHEE: Now, we've discussed this quite a bit with different people here that we've interviewed during this previous week. Did anybody make you aware of this as far as talking about moving the rudder or the structural damage that could or could not be put into an aircraft by moving the rudder once or twice in unison?

CAPT. RAILSBACK: I'm sorry, I don't entirely understand the question.

CAPT. GOACHEE: Have you heard of this? Dave asked you the question about VA and the maneuvering speed.

CAPT. RAILSBACK: Yes.

CAPT. GOACHEE: And about moving the rudder, a full deflection, at a speed of around 230-250 knots could or could not cause structural damage, and I believe you said you believed it wouldn't.

CAPT. RAILSBACK: I believe it wouldn't, yes.

CAPT. GOACHEE: Have you had a discussion in the previous week about this particular question or have you heard about it at all?

CAPT. RAILSBACK: Yes, it came up immediately after the accident, so I think we've queried the manufacturers as to whether there are some limitations that we're unaware of.

CAPT. GOACHEE: Is anyone at American Airlines reviewing all your flight manuals, including the AFM from the manufacturer, to review to make sure that someone hasn't overlooked that there is a limitation on moving the flight controls?

CAPT. RAILSBACK: We have reviewed the Airbus manual; I don't think we've conducted a formal review on all the other manuals, but again, I'm just not aware of any -- in fact, I think we made our queries to the manufacturers through this group here.

CAPT. GOACHEE: Okay, thank you.

MR. IVEY: Captain John Lauer, APA.

CAPT. LAUER: Captain Railsback, can you think of any situation where the application of rudder is any more important with respect to the rate of the input than that of countering an engine failure?

CAPT. RAILSBACK: I'm sorry, I don't really get the question.

CAPT. LAUER: Is there any situation as a pilot, is there any situation that you can think of where the rate at which you input rudder would be greater than the need for you to do that in an engine failure scenario?

CAPT. RAILSBACK: I can't necessarily think of any unless you had some particular aerodynamic force on the airplane where you needed to counteract with rapid rudder.

CAPT. LAUER: Could you give an example of a perceived aerodynamic force?

CAPT. RAILSBACK: You know, perhaps a wake of turbulence.

CAPT. LAUER: As a pilot given the authority to fly and operate the aircraft and using the flight controls to their full stops capability under V(a), and noting the speed that you would react in an engine failure scenario requiring you to respond with a rudder input, would you expect any concern toward a rudder reversal because of possibly a wrong rudder input?

CAPT. RAILSBACK: Because of a wrong rudder input?

CAPT. LAUER: Yes, sir.

CAPT. RAILSBACK: I wouldn't be qualified to answer that.

CAPT. LAUER: Well, let me rephrase the question then. You as a pilot in command flying, would you have a personal concern if executing a rudder input, as an example, to an engine failure scenario, recognizing that after you've made this initial input it's the wrong input, you immediately reversed, essentially executing a rudder reversal --

CAPT. RAILSBACK: A doublet.

CAPT. LAUER: A doublet -- would you have any concern with regards to that maneuver or procedure?

CAPT. RAILSBACK: Well, I would prefer to put in the correct rudder to begin with, but obviously if you put in the incorrect rudder, you should be able to expect to remedy it by putting in the correct rudder which would in effect be, I suppose, a rudder doublet.

CAPT. LAUER: With regards to the Triple-7 change, in your opinion as a pilot, doesn't rolling the lift vector towards the horizon negate the pitch-up that is generally associated with under-wing engine pod aircraft?

CAPT. RAILSBACK: You mean put it in a roll maneuver? You said roll towards the horizon. You mean leveling the wings?

CAPT. LAUER: Yes, and more specifically, I think that Boeing's concern is that with power on the aircraft or power increased to a max power setting would hence tend to increase the pitch-up of the aircraft, so rolling the lift vector towards the horizon, would that not counter or negate the pitch-up?

CAPT. RAILSBACK: Yes, and there seems to be a misunderstanding, Boeing did not recommend not rolling the airplane, the procedure says roll the airplane. Boeing does not say keep the wings level, they say roll the airplane, it's in the procedure.

CAPT. LAUER: In a nose-high attitude they are recommending to bring the power off the aircraft.

CAPT. RAILSBACK: Would you like me to read the procedure or would you like me to give it to you?

MR. IVEY: I'd certainly like to have a copy of the procedure at the conclusion of the interview.

CAPT. RAILSBACK: It says reduce thrust and roll the airplane and reduce the pitch on the airplane as well.

CAPT. LAUER: As a pilot, could you see a scenario or a situation develop in a nose-high attitude where by removing the power you could, in theory, cause a more severe situation to develop because you're now bringing the aircraft into a slower air --

CAPT. RAILSBACK: As a pilot, reducing the thrust seems to be counter-intuitive, it's not what I would expect to do on a nose-high attitude. However, I am aware that there are significant upward thrust vectors, but this is the procedure that Boeing was quite insistent upon on wing-mounted engines.

CAPT. LAUER: In a nose-high attitude in a large commercial aircraft, and for whatever reason why that aircraft found its way to that attitude, would you, as a captain in command, consider that an emergency situation?

CAPT. RAILSBACK: Well, yes.

CAPT. LAUER: Hence, the authority given to the captains to execute or to escape the maneuver and the procedures to be executed at his discretion?

CAPT. RAILSBACK: No, I don't agree with that. I mean, we have a recommended procedure here and I have to trust Boeing to have given us proper procedure, and I do.

CAPT. LAUER: Okay, I don't have any further questions.

MR. IVEY: Thank you. Captain Ron Skupeika, Airbus.

CAPT. SKUPEIKA: Yes, good morning. Just one question. We noticed in the simulator that the co-pilot had no tiller wheel, and the question was posed to one of our sim pilots, and he said to forward that question to management and why it was removed, because it's the same way on the airplane, so I'm posing it to you.

CAPT. RAILSBACK: I'm sorry. You're telling me that the standard A-300 has two nose-wheel tillers?

CAPT. SKUPEIKA: Right, and you had it removed.

CAPT. RAILSBACK: Those airplanes were bought before I was in management, so I can't answer that.

CAPT. SKUPEIKA: Okay. Just thought I'd throw it out there.

CAPT. RAILSBACK: And I don't know.

CAPT. SKUPEIKA: That's all I have.

MR. IVEY: One last question from me. As a pilot, going back as far as you do, have you ever encountered wake turbulence in a large transport category airplane?

CAPT. RAILSBACK: Yes.

MR. IVEY: What has been the greatest influence on the airplane that you remember?

CAPT. RAILSBACK: Turbulence, rolling motion.

MR. IVEY: Do you remember about the maximum amount of bank that you ever encountered in a wake turbulence encounter?

CAPT. RAILSBACK: I've never been in a severe wake turbulence; basically every wake turbulence I've ever been in has been pretty much in and out within a couple of seconds, not requiring any particular control input other than just some ailerons to keep it straight.

MR. IVEY: And in light of the accident and what you might have heard about a wake turbulence encounter, in discussions with your pilots has anyone discussed a wake turbulence encounter that was of a greater significance than what you just described?

CAPT. RAILSBACK: No.

MR. IVEY: And my last closing question is is there anything -- and we made mention of this earlier -- is there anything that you think that the Safety Board should look at to try to help solve this accident, any ideas?

CAPT. RAILSBACK: Other than what you've already got or looking at, I have no further questions to add.

MR. IVEY: Well, thank you very much for coming in this morning, Captain Railsback, appreciate your comments and participating in the interview process.

CAPT. RAILSBACK: Thank you.

MR. IVEY: This completes the interview.

(Whereupon, a recess was taken.)

EXAMINATION

**n. Walter Edward Garrard, Jr.**

MR. IVEY: Good morning, and by way of introduction, if you would just give us your name, current position, and a bit of history related to your aviation experience, including type of aircraft, type ratings, and perhaps total time.

MR. GARRARD: I'll try to remember all that. Forgive me if I get this out of order. I'm currently assigned temporarily to the American Airlines-TWA transition team in our office at the AMR CMO, and that was just -- excuse me. Walter Edward Garrard, Jr., I commonly go by Ed Garrard, aviation safety inspector, have been fulfilling jobs APM on the A-300 until just recently was temporarily assigned to this transition team to help move that along in conjunction with TWA and American Airlines, but because of various issues in the office, I'm also still filling in as the APM, administratively and whatnot, on the Airbus.

Background, I've been with the FAA since 1984 in several positions; I was supervisor for a while for an international field office unit here at DFW, and I initially went through Airbus training at Toulouse in '87 and was the APM for about a year after that, and then went on to that international work. Someone else assumed that duty and then I came back to the AMR CMO in the fall of '97, worked with dispatch and other issues, and finally got back to being the APM about a year and a half ago.

Did I answer all your questions?

MR. IVEY: Yes.

MR. GARRARD: You didn't say much about flying time. My flying experience was Air Force, primarily, active duty and then reserve; I've flown training airplanes, C-130, C-5, was activated for ten months during Desert Storm/Desert Shield and the Gulf War, and retired out of the reserves the following year after that. With the FAA I've been type rated on half a dozen airplanes or so, the last being the Airbus in '87.

MR. IVEY: Any other large air transport category airplanes?

MR. GARRARD: 757, 6, DC-9, and I'm typed in the L-32, C-130 from my Air Force training, YS-11 and CE-500 -- that was a long time ago, that was '79 and I hardly remember it.

MR. IVEY: Just in general numbers, total flying time?

MR. GARRARD: Probably 5- to 6,000, I can't tell you off the top of my head.

MR. IVEY: Does that include military?

MR. GARRARD: Most of that is military. I've got some light airplane time too, about 5- or 600 hours of light airplane.

MR. IVEY: Regarding the A-300, any estimate as to flying time in the A-300?

MR. GARRARD: No. When they initially got the airplane, I flew for a dozen or so of the training flights because that counted for part of the proving test, and I was able to get a few landings out of that, most of the course is in the simulator and my initial check ride was in an Airbus A-310 in France, the 15 percent portion of that, but that's the extent of it. I haven't flown it on line as a captain or anything with an airline.

MR. IVEY: And your first assignment with the AMR CMO has been as the APM?

MR. GARRARD: No. My first assignment with the American certificate was when it was a part of the DFW FSDO in '87 when my initial training was with the Airbus. Subsequently, the AMR CMO was created out of that unit in the DFW

FSDO and I left the American certificate and rejoined it in '97, but that was not as the APM on the Airbus, that was to work with dispatchers and other projects as assigned by the POI. I can't recall the exact date that I was officially made the APM the second time; it's about a year and a half ago, though, roughly.

MR. IVEY: You don't have any assistants working for you, you're the APM on the airplane?

MR. GARRARD: Correct.

MR. IVEY: Did you go through the A-300 training of American Airlines at all?

MR. GARRARD: Yes, sir.

MR. IVEY: Completely from beginning to end as though you were going to get a type rating or as a transition?

MR. GARRARD: Well, because my training was broken up -- my initial training on the Airbus was with Aero Formacion in Toulouse, and that was prior to American getting the airplanes, in conjunction with their check airmen, et cetera. When I came back on to the fleet about a year and a half ago, two years ago, time frame, I went through a transition course which basically was a re-qualification course for me, so I didn't have that initial training with American, I got it at that time, if that makes sense to you.

MR. IVEY: Yes.

MR. GARRARD: So I went through all of that as if I was a transitioning captain at that time.

MR. IVEY: Did you attend the advance maneuvering program as part of that training?

MR. GARRARD: Yes, I did.

MR. IVEY: Describe for me the training that you received.

MR. GARRARD: There's classroom, about a day's worth of classroom, and that was followed up with simulator training which was a part of the regular training, as I recall. I don't recall specifics on when and where we got the various maneuvers but it was part of the flow of the training for wind shear, unusual attitudes, and et cetera.

MR. IVEY: What did you think of the training, ground training?

MR. GARRARD: I thought it was very good and for this reason: it reacquainted me with a lot of the basics of unusual attitude training that I had gotten in the Air Force years and years ago which is out of sight, out of mind in a lot of respects because I'd been so far removed from it, even from instructing it; it pointed out the aerodynamic factors that play into various situations you could get into and the things you need to be -- you don't want to forget about, if you will, the way I thought about it, to recover from those maneuvers without losing control of the airplane. And I thought that was a good general review in that respect.

MR. IVEY: And then when you received the simulator training in one of the periods, was pretty much what you had learned in the ground school able to apply and work well?

MR. GARRARD: I thought so, yes. It was very valuable and it went hand in glove. I got a lot out of the classroom and then we got to apply it directly, and they seemed to fit together very well, from my point of view at least.

MR. IVEY: What did you think about the way in which you received the unusual attitude training -- that is, the setup to get into it. Do you recall how that occurred?

MR. GARRARD: I'm trying to recall specifically. I really don't recall specifically because I've been through recurrent a couple of times since then too. To the best of my recollection, we did some of the maneuvers as kind of a surprise, if you will; we weren't told by the instructor all right, we're going to do this now, we just got it; and in other cases we did do that. But I can't tell you exactly when we did that, I don't recall.

MR. IVEY: You mentioned recurrent training and you get that ever year, and really in the last year and a half you might have only had it one time since that transition training initially. You've had one recurrent training since then?

MR. GARRARD: Well, I guess I've had so that means I've been two years now; I'm pretty sure I've been through recurrent twice since I had my transition training so that's been like two years then more than a year and a half. I'll correct that.

MR. IVEY: And during those recurrent trainings, did you also get upset maneuver during the simulator period?

MR. GARRARD: Yes.

MR. IVEY: Both times?

MR. GARRARD: As I recall, we did, yes.

MR. IVEY: With that training do you recall whether you got just one event, or was it a nose-high and a nose-low, two events?

MR. GARRARD: I don't recall specifically.

MR. IVEY: Regarding the simulator, when a simulator inspection team comes through and evaluates simulators -- and in this case the A-300 -- do you ever get feedback regarding the simulation or the quality of the simulator?

MR. GARRARD: Yes, sir, I do.

MR. IVEY: Has a simulator eval. team been though during your tenure as APM to look at the American simulators?

MR. GARRARD: I know they've been through there, I can't tell you how many times exactly.

MR. IVEY: Have there ever been any comments as to the quality of the simulator?

MR. GARRARD: Yes -- that's a short answer, I don't know exactly what to tell you. My experience with the sim team has been they like for -- at least the ones that I've been associated with is they like for the APMs and the principal to get some feedback on how the sims are operating, especially if there are items that are broken or on the borderline, so to speak. And this is just my recollection of verbal exchanges, so I guess yes is the answer.

MR. IVEY: Do you know if it's a Level C or D simulator?

MR. GARRARD: My recollection it's a Level C with a caveat; it's a fairly old simulator and it's got some -- I think the word is "exemptions" to make it a Level C, but I can't swear to the exact legalities of that, but it is an early generation Level C simulator to my knowledge.

MR. IVEY: When you mention exemptions and they may not be right in your field of knowledge right now, but do you have any idea if any of those exemptions pertain to flight envelopes or the range in which the simulator could be operated?

MR. GARRARD: It's my understanding they have to do with the capabilities of the visual and that's all I know about that because we've had some discussions about that.

MR. IVEY: Have you had any other simulator discussions with American pertaining to the quality of simulation in the box?

MR. GARRARD: I've spoken to -- I'm not sure of his title. There's a guy at American who oversees the evaluations and whatnot, and we've had some discussions about can we make the visual a little better here and there, or what are the limitations. And he's educated me a bit as well as the sim team on the parameters under which that simulator is certified -- over my head, technically speaking, but they were in answer to my questions about what I observed when I was in the simulator, the quality or lack thereof, as the case may be. And that was all in an effort for me to do my job to keep everything going on a level that I thought it should be in the normal course of doing business, so to speak.

MR. IVEY: Do you get in the simulator frequently or infrequently?

MR. GARRARD: I don't know what the definition of frequently or infrequently is. I can tell you that we do our ECC (below its EVC – which is correct?) program, if you're familiar with that.

MR. IVEY: No.

MR. GARRARD: Now I don't even know what the EVC stands for, I can't tell you exactly. Every quarter we get a number of hours in the simulator, do a number of approaches and landings and whatnot for our proficiency, and if we're going to do certification, the FAA requires us to maintain a level of proficiency, just like they require us to go through recurrent training and/or a check ride every year, so that's what that's all about.

So the definition of frequently or infrequently depends on every person's point of view, what have I got to do this week and can I fit it into my schedule and how much do I need for my personal proficiency, so that's a hard question to answer. I can tell you this, I'm able to get as much simulator time as I feel I need and can fit into my schedule, that's not a problem.

MR. IVEY: Just sticking with the simulator quality issue for a moment, when you have flown the simulator, in particular in these upset maneuvers, if you can remember, did you get the sense that the controls, the ailerons, the elevator, the rudder controls in that Airbus simulator worked as you might expect the actual airplane to?

MR. GARRARD: Well, I would say this, up to the point where the airplane -- my perception of what the airplane is doing is within the envelope of controlled flight, it does quite well, but if you push the simulator to quote-unquote the edge of the envelope, then it falls of the motion -- if that's the correct way to say that. Basically you lose control of the simulator because it is an older simulator and it's not designed, for example, to do barrel rolls, so I can't define that exactly for you but if I'm flying the simulator and I don't let it get too far out of bounds, it does quite well.

MR. IVEY: In the event of an unusual attitude that would take beyond 90 degrees perhaps to 135-degree point in the simulator, is the simulation quality still within bounds?

MR. GARRARD: My experience has been no, that if you get over 90 degrees of bank, the simulator really just can't handle that, for whatever reason and what I've been told is it really wasn't designed to do that -- I mean, it could be, I guess, but there's no real data available. They have to do the best they can to extrapolate the data to get it to that point. But I'm not expert on it, I can only tell you what my perception is.

MR. IVEY: Has the simulator team suggested to American to either restrict certain activities in the simulator due to lack of quality?

MR. GARRARD: I have no knowledge of that one or another, I really don't know.

MR. IVEY: In terms of the program, the workbook, I think it's called the AAMP workbook and the videotapes, have you looked at the videotapes that is perhaps part of the ground school that is provided to pilots? Have you seen those?

MR. GARRARD: I don't know the answer to that, yes or no. I can tell you I saw the videotapes that were presented in class; what's been given to the pilots may equate to that or be equal to that, I don't know. I assume yes but I don't know for sure.

MR. IVEY: More than likely you saw the videotapes of the maneuvering program and it featured Captain Warren VanderBurgh on there.

MR. GARRARD: Right. If that's what you're talking about, yes, I saw that in class.

MR. IVEY: In lieu of him being present making the presentation.

MR. GARRARD: Exactly, right.

MR. IVEY: Is that program, the upset maneuvering ground school program approved or accepted by the FAA?

MR. GARRARD: I honestly don't know the exact answer to that; I think it's only accepted. It's not required by the FARs, but I can't tell you exactly, I'd have to go check on that.

MR. IVEY: But it is one of the time allotted training segments in their training program, so training is normally approved or accepted, which?

MR. GARRARD: Normally it's approved.

MR. IVEY: And if the upset maneuvering was in that training, then it's probably been reviewed and has been accepted -- approved. I'm sorry. Or am I making a leap here?

MR. GARRARD: Well, I don't know if you're making a leap or not, I can't tell you exactly because I don't know how that was done because I wasn't in place at the time, so I just went along with what's been done exactly, I haven't specifically looked at the technicality of whether it's approved or accepted.

MR. IVEY: I don't know since the accident if you've heard about a letter that had been written to now-retired Captain Cecil Ewell, who used to be the vice president of flight. Are you aware of that August 20, 1997 letter in which the FAA was one of the people who signed the letter?

MR. GARRARD: I was made aware of that letter after the 587 crash.

MR. IVEY: And you read that. From the FAA perspective -- and I realize this was before your tenure here as an APM -- what was your take on that letter?

MR. GARRARD: My opinion?

MR. IVEY: Yes, sir.

MR. GARRARD: Let me get the letter straight, this is the letter from the industry to Captain Ewell?

MR. IVEY: Captain Ewell, American Airlines.

MR. GARRARD: I thought it brought out some interesting discussion points. My general impression was, too, of what are these guys talking about there, it seems like they don't have confidence in their airplane for some reason. It didn't track with my understanding of how airplanes are built that you could easily get these airplanes into a position that you'd have to apply some of these techniques to recover and have it break, I just couldn't imagine that that's what they were saying, but that's what it sounded like to me that they were saying.

MR. IVEY: Did you read the response from Captain Ewell back to industry, the FAA, I suppose?

MR. GARRARD: I read it once.

MR. IVEY: What did you think about his return letter?

MR. GARRARD: I thought it was very forthright. He said what he agreed with and what he disagreed with and was very definitive about what he intended to do. I don't think he minced any words, in other words, and I said, Well, that sounds like a pretty strong leader to me on knowing what he thinks he ought to do.

(Off the record.)

MR. IVEY: You're the first person we've talked to since Captain Ewell's interview last night, so it's fresh in our minds. In light of the exchange of letters, perhaps since you've been APM, have you seen anything that has had further correspondence from the FAA regarding those issues, since the FAA signed that letter, to either attempt to modify or suggest or re-emphasize some of those points that were made in the first letter to American Airlines?

MR. GARRARD: I haven't seen any; to my knowledge, I don't know if there were any or not. It's not been a big issue, though, I can tell you that -- it hasn't been a big issue in my presence and I haven't been made aware that it's a big issue.

MR. IVEY: I know one of the issues was use of rudder as well as the quality of the simulator, and that's why earlier in our discussion we were just talking about the simulator and its quality too.

MR. GARRARD: Oh, okay.

MR. IVEY: And is it fair to say that basically the simulator evaluation team has given a passing score on the simulator and there have been few comments made but there's nothing of a great nature that is wrong with the A-300 simulator other than it being an old one?

MR. GARRARD: To my knowledge, that's correct, that statement is correct.

MR. IVEY: The videos you saw with Captain VanderBurgh making the presentation regarding the advanced maneuvering program, I don't know if you've seen the videos again recently or not, however, at the end of the current video there are certain caveats that talk about the use of coordinated rudder. Do you remember those?

MR. GARRARD: Yes, I do, and it's quite apparent that that's a change that was made after the initial tape; the quality of the tape is different a little bit, and obviously this has been an issue that we're kind of aware of since the crash of 587, so I have to put that in context and say well, what's the deal. And it seems to me that those additional comments were made to emphasize the fact that what all this is about is coordinated rudder and not over-controlling the rudder, so that's the way I took it.

MR. IVEY: Looking at those caveats at the end of the video, as you say, you think having read that August 20 letter now that perhaps those caveats might have been added as a result of the suggestions that industry had written?

MR. GARRARD: Oh, it's apparent they probably were, and that's fine, I think that's appropriate. It addressed that issue, I thought.

MR. IVEY: I'm asking your opinion as a pilot, when you sat through the training of the advanced maneuvering program, did you get a feeling perhaps prior to those caveats -- I know I'm breaking that in the middle, but did you ever get a sense that there was an advocacy of excess rudder usage during that recovery process?

MR. GARRARD: No, I honestly didn't.

MR. IVEY: Then after seeing the caveats?

MR. GARRARD: No, I don't think so. I think the little caveat deal was emphasizing the fact that you don't arbitrarily do this stuff, you coordinate it, you use what you need to use to keep from making a smoking hole in the ground, and that's the reason for the whole training is to avoid that.

MR. IVEY: Since the accident have there been any FAA-mandated changes in American Airlines A-300 procedures of any kind?

MR. GARRARD: There's been so much going on, I don't know if I can give you a definitive answer on that. There's things that are changing in procedures almost weekly that we have to review. Right now, for example, I'm in the middle of reviewing a complete rewrite on the minimum equipment list, and that's very much procedural. There's been a couple of bulletins but I don't remember the exact dates that that stuff came out, and of course, some of it's in response to 9/11 too. I'd have to say yes, there have been some changes, but definitively, I'd have to go back and look at the records to see what they are.

MR. IVEY: I was thinking more in light of our accident from the standpoint of A-300 flight control limitations, the A-300 procedures relating to upset training, A-300 procedures related to wake vortex encounter.

MR. GARRARD: I don't recall any.

MR. IVEY: Maximum performance issues?

MR. GARRARD: I don't recall anything. My memory would be really slipping if I'd forgotten that; I don't think so, no.

MR. IVEY: All right. Have there been any AAMP manual changes since you've been the air crew program manager?

MR. GARRARD: I'm trying to remember the date of the last manual. I don't think so but I can't remember the exact date of that manual. If I remember correctly, the last changes may have been made about the time they made the little caveat on the videotape, but that would have been '97.

MR. IVEY: '97.

MR. GARRARD: Is that right?

MR. IVEY: Correct.

MR. GARRARD: I don't think there have been any since then.

MR. IVEY: Do you participate in the ASAP program?

MR. GARRARD: Yes, sir, I do.

MR. IVEY: And just for the record, what does A-S-A-P stand for?

MR. GARRARD: Aviation Safety Action Program.

MR. IVEY: And who normally participates in that?

MR. GARRARD: General participants? American Airlines management, the Airline Pilots Association and the FAA; we're the three major players, if you will.

MR. IVEY: Regarding the ASAP program, do you recall any reports within there that have pertained to A-300 operations, and within A-300 operations anything to do with flight control anomalies?

MR. GARRARD: I've been doing ASAP since about '98, on and off. I seem to recall there are several -- I don't know how many, two or three maybe, of different things had to do with that, reports that we worked to do with that.

MR. IVEY: Does anything come to mind?

MR. GARRARD: The biggest one I remember -- and this was also an event that occurred outside of ASAP, happened in Miami with an autopilot problem and a servo and a cross-channel connected part of the autopilot wherein they got excessive rudder input from the autopilot when the autopilot was thought to be off, and that was on departure out of Miami, it was a big deal, and I think there were some mechanical problems that basically were the problem there, as I recall.

MR. IVEY: Any other pilot-reported flight control anomalies?

MR. GARRARD: I'd have to go check records and stuff to see about that; I don't recall exactly. I generally recall there may have been a few reports dealing with a couple of little bumps here and there with rudder which I seem to recall may have been related to CADC problems, if you will, and/or flight control computer, but I don't recall the specifics on that.

MR. IVEY: When you were experiencing recurrent training and perhaps even in that transition again initially, in the receipt of upset training did you ever lose symbol generators during any of those recoveries?

MR. GARRARD: During initial I don't recall. My most recent experience going through we did momentarily lose some, yes.

MR. IVEY: During upset recoveries?

MR. GARRARD: Yes.

MR. IVEY: Have you ever heard feedback from pilots regarding symbol generator loss as being a problem in the simulator, or the airplane, for that matter?

MR. GARRARD: I haven't heard anything out of the training, no. I think there was an event -- I don't remember the exact time frame -- where some pilots got into a situation where the airplane the airplane rolled quick enough that they lost some display; that's been several years ago, I think.

MR. IVEY: I think that might have been associated with the American Airlines 903. Does that ring a bell?

MR. GARRARD: The flight number doesn't ring a bell, no. I just remember a situation happened down in Florida several years ago that some guys got into something, the airplane rolled rather rapidly and they lost flight display, I think, as I recall.

MR. IVEY: You were mentioning that during your unusual attitude recovery you might have lost a symbol generator on one.

MR. GARRARD: Yes.

MR. IVEY: What did you do?

MR. GARRARD: Well, there's not much -- well, you look at the standby indicator is what you do, but I don't know what else you can say, either there or you look out the window if you can see that, that's the best place to look.

MR. IVEY: During your training did they suggest looking out the window or suggest to look at the standby, or did that kind of come as a surprise to you and the instructor as well?

MR. GARRARD: What?

MR. IVEY: The loss of symbol generator.

MR. GARRARD: It wasn't a surprise to me in my recent training because we knew from the Florida event that that could occur. But usually when that happens, it's not a pilot-induced roll rate that occurs there, it's the airplane is out of control, it's a snap or something, and usually it's not recoverable anyway.

MR. IVEY: Talking about recoveries just for a moment, do you recall how you made recoveries, did you use aileron, did you use rudder, or did you use a combination of both?

MR. GARRARD: Well, you use all your flight controls available to you, it depends on your pitch attitude and bank attitude and airspeed -- really not airspeed but angle of attack what you have to use to recover. And as I recall, that's what was taught in class and that's what was taught in the simulator.

MR. IVEY: Have you encountered the wake turbulence or wake vortex training aid that's in the simulator?

MR. GARRARD: Training aid?

MR. IVEY: I say training aid, the wake vortex encounter is probably a better word.

MR. GARRARD: As input by the instructor?

MR. IVEY: Yes, sir.

MR. GARRARD: Yes, sir, I have.

MR. IVEY: Does that typically put you in one of these unusual attitudes, is that perhaps a lead-in for that type of unusual attitude?

MR. GARRARD: Well, it can end up that way. The way I understand that they've modeled the training in the simulator is the wake turbulence events are exactly that, they're not meant to give an unusual attitude, and if the responses are appropriate by the guy being trained, then it won't end up in unusual attitude, he's just got to fly his airplane. Those seem, in my opinion, to be pretty realistic. Now, I don't think there's much extrapolation of data that they've gone into to make that happen.

MR. IVEY: It's been brought to our attention that there may be in the modeling software of the simulators that earlier testimony has shown that the wake vortex encounter is used to induce an upset and then the pilot is allowed to recover, but the modeling, to software inhibits perhaps the aileron and rudder so that the pilot can in fact get placed into one of these unusual attitudes and then the controls are given back to him. Are you aware of that at all?

MR. GARRARD: Well, I'm not aware of the details of how they do that and how they model it, no, I'm not. You know, what can I say, I just don't know exactly.

MR. IVEY: Do you know if in the nose-high attitude, for example, one of the buttons I believe that's in the simulator -- of which there are two, the one I just talked about I'll call Button 1 -- Button 2 basically allows the trim to start running in a nose-up condition when the pilot will then place forward control and the trim runs until a certain pitch attitude is achieved, and again places the student into a position to effect recovery. Are you aware of that particular button or model?

MR. GARRARD: I don't know which button it is; I am familiar with that model, it's one that I had a little bit of trouble with, and we have talked about that a little bit, me and some of the guys at American, about that methodology for inducing that. As a matter of discussion, I questioned maybe there might be a better way to get the nose to that attitude instead of running the trim in because that seems a little bit artificial to me and may affect a little bit of the aircraft flight characteristics, but I don't know if that's possible or not, to use a different model, I don't know.

MR. IVEY: And I'd like to ask your opinion, in either case, whether it's Button 1 or Button 2, do you believe it is more important to have the event occur so that there can be training received in recovery as opposed to how they set it up to get to it?

MR. GARRARD: Absolutely. The training outcome is the whole point, in my opinion; how they get there is irrelevant. My take on it is, though, when you get to the point of putting in the flight controls to recover, it should be as real as you can make it, and then you have to use some judgment. If we don't have data and we're extrapolating data, then we have to say is this close enough to reality to be valid or is this negative training, and that's a judgment call.

MR. IVEY: And in your judgment, do you think there is any negative training in either one of those two buttons that's going to detract from the pilot learning what needs to be learned for upset recovery?

MR. GARRARD: My personal opinion is that trimming the nose up, if it stays in there, could possibly be negative, and we've talked about that a little bit and we're going to talk a little bit more. We don't want to have any negative training, and right now my opinion is that the training is positive and if we can make it more positive, that's where I want to go, and my impression is American is the same way -- my understanding is that's why they created this whole program in the first place.

MR. IVEY: From your perspective -- change gears -- what is the relationship between the CMO and American Airlines?

MR. GARRARD: What is the relationship? I think it's pretty positive, I think it's a partnership, quite honestly, for safety, and my experience in the last year it's gotten better than it was before. There's been some changes at American and the way they look at safety and audit their safety program, and I've been told they've added personnel and whatnot, and they're working pretty much hand in glove with the CMO -- from an APM point of view. Now, I don't get to see a lot of stuff so that's just my impression as an APM.

MR. IVEY: so when you ask for changes, there's a good give-and-take back and forth, there's not a resistance over on the side of American Airlines resistant to changes that the FAA is trying to suggest?

MR. GARRARD: As in all relationships, there is generally discussion always. Most of it is positive, from my perspective. Everybody likes pride of authorship, I guess, and American likes to think of it before we do, being the FAA, and a lot of times they do, but I think we work together quite well.

MR. IVEY: What's the morale in the CMO, and of course on the American side?

MR. GARRARD: From my point of view, morale is as good as I've seen it since I've worked in the FAA.

MR. IVEY: Why?

MR. GARRARD: Why? I think it has to do with the people that are there. I think most of the people really are working hard to do their job the best they can for aviation safety, and I don't know exactly why, there is not a lot of negative back-biting like you sometimes find, and I've seen in some offices in the FAA and other places -- I mean, it's everywhere no matter where you go -- but maybe it's just luck. I also think that, however, we've got some good supervision that promote that, and that's all I know. It's above my pay grade.

MR. IVEY: The qualifications of the inspectors that are on the certificate for American, are their qualifications good? Do you think they're well-trained people that are knowledgeable in their respective fields, or is there a weakness there?

MR. GARRARD: I think they're all well-trained, yes, and well-qualified before they were hired in the first place.

MR. IVEY: In earlier testimony we broached the subject of ATOS. You have been in the FAA since 1984.

MR. GARRARD: Yes, sir.

MR. IVEY: And you've perhaps gone through two or three different iterations of programs that the FAA has developed and implemented. Give me your view of ATOS today.

MR. GARRARD: ATOS today. I believe the concept of systems safety management, risk analysis, and whatnot is really a good way to go; it provides a bit of objective way to look at hazards and risks and try to deal with those in the best way possible, but ATOS is not panacea by any means, it's just a tool, and it's still in a state of change and growth; I don't think we've perfected it yet. I'm a little bit out of it because I've been concentrating on other issues, ASAP and APM program a lot more than I have ATOS, so I don't have a lot of great detailed knowledge about it, that's just my general impressions about it.

MR. IVEY: Is it fully up to speed and running at American Airlines?

MR. GARRARD: ATOS at American? Well, ATOS is an FAA program.

MR. IVEY: Yes.

MR. GARRARD: Is that what you mean?

MR. IVEY: Yes, within the CMO as it relates to American Airlines.

MR. GARRARD: To my knowledge, it is.

MR. IVEY: Your feedback with other inspectors, whether they're geographic or local, what's the general feeling of inspectors and the inputs that they have to make in order to satisfy the elemental performance inspections or the safety attribute inspections, the EPIs and SAIs?

MR. GARRARD: Rumors, talk and whatnot that I hear is it's still somewhat a user-unfriendly computer program, if you will -- and that's just the computer program, not the concept -- that's being improved all the time. Pilots can be complainers sometimes, as we may all know, and they're usually not one to not express their opinions, so sometimes you hear stuff that's just BS a lot of times. They'll be happy when it's improved and a little faster, obviously.

MR. IVEY: When you say pilots, you're talking about the FAA pilots?

MR. GARRARD: FAA pilots, yes, the APMs and whatnot. It's a system that's still growing and improving, so until it gets there, if you will, there's going to be some whining about it, that's natural.

MR. IVEY: It's been a little over three years since it was implemented, and of course, American is one of the ten carriers in which ATOS has been implemented, and if I'm correct, I think you and Mr. Talmadge just returned from an ATOS meeting this week. Is that correct?

MR. GARRARD: Yes, we had our office meeting here in the local area. We got out of the office away from the office to have our annual meeting, yes.

MR. IVEY: And it was a meeting as it related to ATOS?

MR. GARRARD: It related to ATOS and other issues that fit into that; also safety was brought into that and an update from all the fleets. It was as much an operations for us, being operations, where we brought in all our geographic inspectors, kind of an annual reacquainted with what we're going, what we're doing, as it was ATOS because it all interrelates.

MR. IVEY: What were some of the major sticking points, if I may look into that meeting a little?

MR. GARRARD: Sticking points?

MR. IVEY: Yes, sir. What were some of the complaints coming from out in the field? And field could be just down the hall, too, of course.

MR. GARRARD: Complaints? Well, there weren't a whole lot of complaints because we didn't really talk a whole lot about the mechanics of the computer system. That's where any and all the complaints are is getting the data in and speed, or lack thereof, of the computer and things like that. I think most of the inspectors, if not all the inspectors, agree that the concept of the system is very, very good, and they've long since decided this is the way we're going and let's use it to the best of our ability. Most of the discussion about ATOS itself had to do with putting in the new DORs.

MR. IVEY: That's D-O-R-S?

MR. GARRARD: Yes, D-O-R-little s. Dynamic Observation Report -- I was trying to think of what that stood for -- and that was basically it, and how to make comments on observations.

MR. IVEY: If someone were to say or to ask you -- well, I'll ask you, I don't need to be someone, I'll just be me -- is ATOS a complete rehash of the old PTRS system.

MR. GARRARD: No. This is me talking now. PTRS is nothing more than a file cabinet, if you will. The way ATOS is supposed to be designed, with a formulation in the background that's above us and we don't really worry about, is to take data and crunch it and use the formulas to assess risk and put our assets where we think they should be, and that's a lot bigger improvement, in my opinion, over just something that's a file cabinet.

MR. IVEY: For the record, PTRS is Program Tracking and Reporting Subsystem. And what you just said, in my opinion, I guess, is the theory behind it and is it in actuality working just as you described the ATOS system is supposed to work, or is it still evolving?

MR. GARRARD: I think the formulation part of it is working; what we're having -- and this is just an impression, I don't know if this is fact or not -- the growing pains are still in getting the data into the machine properly to make that all happen.

MR. IVEY: Earlier testimony suggested that analysts, either in headquarters or perhaps in the field, are not really qualified in the aviation aspects of good analysis. Do you agree or disagree?

MR. GARRARD: I don't know, I can't agree or disagree, I really don't know their qualifications.

MR. IVEY: Is there a local -- is it operational analysts or are they called systems analysts or data analysts?

MR. GARRARD: I don't know the exact term; I call them data analysts, that's generally how we refer to them.

MR. IVEY: How long has that data analyst been in place here at the CMO?

MR. GARRARD: Less than a year, I think, but I can't tell you exactly.

MR. IVEY: What was being done prior to that analyst? Was all this data being figuratively piled in a corner somewhere?

MR. GARRARD: I honestly don't know. I couldn't tell you if it was being analyzed outside the office by somebody else or not, I really don't know.

MR. IVEY: Regarding geographic inspectors, do they have the capability and resources to effectively surveil the carrier out in geographic locations, in your opinion?

MR. GARRARD: Who do you mean by they?

MR. IVEY: The ATOS geographic inspectors.

MR. GARRARD: I don't know. I mean, I don't supervise those guys so I may not be the guy to ask, so I really don't know about resources for them.

MR. IVEY: Are there any recurring themes between you and the other APMs on American Airlines that you seem to share a similar concern that may or may not be addressed, either by the FAA or by the airline?

MR. GARRARD: I don't think so. We all have our own fleet-specific things that we like to emphasize. My experience has been the fleet managers and training guys have been very open to our conversation and suggestions, and a lot of the common hot items, if you will, across the fleets have come out of ASAP and other things that have been kind of a joint effort. Most everything we have concerns about are covered, in my opinion.

MR. IVEY: Regarding the ATOS system, has he region or headquarters provided good training and good information for you and other inspectors to do an effective job under ATOS?

MR. GARRARD: I think they've done about as best as they can, yes.

MR. IVEY: I think early on in ATOS, the General Accounting Office made a statement that basically they felt there was an insufficient amount of time to train inspectors and give them guidance. Do you feel like that has been changed, or there is proper amount of time being given to inspectors and guidance now?

MR. GARRARD: I honestly don't know. I know there's a course now they teach at Oklahoma City, and how much time they cover and what they cover, I don't know, because I had the initial training back in the inception of the program, and I can't make a judgement on that.

MR. IVEY: Apparently ATOS, once it was fully implemented, was supposed to reduce the number of inspectors. Number one, do you think the number have been reduced, and if they have, is that a good idea?

MR. GARRARD: I don't have the data on that, and I had not heard that ATOS was supposed to reduce the number of inspectors. It's been my impression, ever since I've been with the FAA and Flight Standards, that we've never had enough people to do what really needs to be done, and that's really a true impression from me. I would have been surprised if that was used as a justification for the program, quite honestly. Our office number of inspectors has gone up and with the workload that we've got with this carrier, with the size that it is, even with the geographic help that we've got -- which every day I hear about we don't have time to do all that needs to be done, so we're always prioritizing. And I expect that will always be the case as long as we're able to do the really important priority items, I guess that's okay, but when we start dropping the things that really have to be done, then that's not good.

MR. IVEY: In comparison of the ATOS system to the old PTRS system, from your job standpoint, give me an example of one strength that ATOS has provided you directly over the old PTRS system.

MR. GARRARD: I'm pushing back a little bit; I haven't done that much with ATOS; I've been tied up with other things, so I don't know anything that I would tell you that would really be a valid thing. Well, general terms, I'd have to say that -- I can't think of a real specific thing, it's really a general thing -- the way ATOS is structured to get inspectors to think in a more systematic approach to organization of carriers and how a systems approach to initial organization and a systems approach to surveiling what they're doing will give a truer picture of root causes is the biggest thing that I think ATOS is good for.

I don't know how to describe that exactly, but instead of just going to do an inspection, for example -- and you name it, a station inspection for an Ops person or some kind of spot inspection for a maintenance inspector -- instead of just focusing on that one little thing, makes them think about this is going on here but why is this going on here the way it's going on here, and is someone else in the company watching what's going on here like I am, and if there's a problem are they going to be able to fix it if I'm not here. And that's the way we would like to see it and I think that ATOS tends to make inspectors think along those lines more than what they used to do under PTRS, and that's the only way I can tell you.

MR. IVEY: And similarly, I'd just like one comment about an advantage that was under the PTRS system that you don't seem to see under the ATOS system.

MR. GARRARD: Advantage?

MR. IVEY: Anything that's been lost in the new system or something that's working against you from the old to the new?

MR. GARRARD: The new system is still just a bit cumbersome to get the data in, that's the drawback, I think, to satisfy the system, if you will. Other than that, no.

MR. IVEY: Do you get involved with the inspections that the FAA performs on the carrier, whether it's a NASIP or RASIP? And I know those are normally outside people. Do you recall when the last NASIP inspection was of the carrier?

MR. GARRARD: I don't recall.

MR. IVEY: RASIP? Do you know what might have been the last inspection that's been given to American, on the operations side, of course?

MR. GARRARD: Well, we've done some -- in the last six months I think we've done some inspections, ATOS SAI inspections of focused areas. I can't tell you specifically what they were, and I believe AFS-40 came and did some kind of an audit last year or the year before, I don't recall exactly when that was.

MR. IVEY: Do you know what the audit was about?

MR. GARRARD: No, not specifically.

MR. IVEY: Any of those SAIs that you just mentioned, did any of it pertain to the simulator or training or to the A-300 in particular?

MR. GARRARD: I don't think any of it had to do with simulation specifically or the A-300 specifically; I believe that they were working on one on the training programs in general, and that was all of them which is a monumental task.

MR. IVEY: Any major findings?

MR. GARRARD: To this point, to my knowledge, no.

MR. IVEY: Well, thank you, Mr. Garrard. What I'd like to do is go around the room here for just a moment and see if anyone has any other questions.

MR. GARRARD: Sorry I'm being a little verbose; I'll try to shorten my answers a little bit.

MR. IVEY: You're doing fine. Do you need any more water or anything?

MR. GARRARD: This is fine.

MR. IVEY: I'll turn to Captain Guy Arondel from BEA.

CAPT. ARONDEL: Yes, just one question.

MR. GARRARD: Yes.

CAPT. ARONDEL: I think you know that the Aircraft Advance Maneuver Program raised several concerns among industry, in particular concerning the use of rudder in upset recovery. My question is did the FAA check the airline pilots were currently taught that excessive use of rudder can cause large size slip which can lead to structural destruction?

MR. GARRARD: I was not involved in any approval process that might have occurred, so I don't know specifically if the FAA did that or not.

CAPT. ARONDEL: Thank you.

MR. GARRARD: Sure.

MR. IVEY: Captain Delvin Young, American.

CAPT. YOUNG: Way back at the very beginning of the interview we were talking about some visual problems there which assumed some of the isolated, that we were talking maybe some exceptions to that set. Have you flown any other A-300 or A-310 since, I don't know, in the last year or two?

MR. GARRARD: Well, in the last year or two, the only one I've been in was in Miami which is Boeing Flight Safety.

CAPT. YOUNG: How as the visual in comparison to American's up there?

MR. GARRARD: About the same, as I recall, but I didn't really look at it that closely.

CAPT. YOUNG: Well, I just kind of clarified that. The visual problem doesn't seem to be isolated.

MR. GARRARD: Oh, no, I don't think so, no, and back in '87 -- no, '88 I flew, of course, a simulator in Toulouse and I flew one of Swissair's simulators in Zurich, and they were all about the same.

MR. IVEY: Regarding the visual you're talking about, are you talking about the visual outside or the visual PFD inside the simulator?

CAPT. YOUNG: From your line of questioning, I thought you were talking about visual outside.

MR. GARRARD: And that's what I was talking to, too, the visual system, yes.

MR. IVEY: Captain Jim Goachee, FAA.

CAPT. GOACHEE: I think that you talked that you've been an APM for a year and a half or just a little bit more than that.

MR. GARRARD: This go-round, yes.

CAPT. GOACHEE: When you took over as APM, was there any contact between you and the previous APM for the A-300 prior to taking over?

MR. GARRARD: Yes.

MR. IVEY: So that you had sufficient time to get acclimated back into American's APM, and especially the A-300 program?

MR. GARRARD: Yes.

CAPT. GOACHEE: You told us about your transition training. Can you tell me the last time you had specific recurrent training or AAMP training at American?

MR. GARRARD: I can't recall the exact date of my recurrent; it was last of April, first of May of 2001, as I recall. And because of the interest in this program, we went back and we asked American to run me back through that AAMP program last week or the week before, in the last two weeks.

CAPT. GOACHEE: When you say we, who is we?

MR. GARRARD: Well, my boss the POI went through the ground school also because he hadn't seen it; he's only been the POI for a little over a year and he was interested in seeing that also.

CAPT. GOACHEE: In reference to this last time because it's been a while, especially for the POI, and I know you were asked this but because it was so recent, did you still think it was as good when you saw it last week as you initially remember it back in '97 or '98?

MR. GARRARD: Actually, going through it a second time, I got a lot out of it that either I had forgotten or I missed the first time. There's a lot of information that VanderBurgh covers there in a relatively short period of time and some light bulbs came on in my head, if you will, that may not have come on in the previous class that I went through, so I thought it was beneficial.

CAPT. GOACHEE: I guess one of the functions of -- and help me out here because of AQP and APM for American, but I think one of the functions is to observe check airmen, both for simulator and line checking. Is that correct?

MR. GARRARD: Yes.

CAPT. GOACHEE: Can you tell me, let's just use the last year, can you recall how many times you might have observed training in the simulator and also did you observe line training in the A-300 for observations of check airmen only?

MR. GARRARD: I can't give you specific numbers. We've had a couple or three new line check airmen that I've had to go observe, so we did that, most of them out of Miami down into the Caribbean. Time runs so fast, I'm not sure if I'm recalling just the last year or not. And I've been in the simulator, of course, observing new simulator check airmen and designated examiners.

CAPT. GOACHEE: In regards to both of those during those times that you were doing observations or required checks to make a new check airman, whatever, after the observation was there any negative comments made to you by a check airman in regards to the training program or how they felt about anything as far as line checking?

MR. GARRARD: No, not specifically. I know we had some discussions in the last year about we need to tweak this here or tweak that there, we need to talk about this in the standardization meetings because of the recent conversion to 9 and 18 on recurrent, and of course the Airbus went to AQP just a few years ago and that's been an ongoing improvement process. Other than that, no.

CAPT. GOACHEE: And so I take it that American has check airmen meetings on some type of time basis, whether it's every month or twice a month or quarterly. Is that true?

MR. GARRARD: Yes.

CAPT. GOACHEE: And do you attend those meetings?

MR. GARRARD: As much as I can; I'm not always able to do that.

CAPT. GOACHEE: Do you know if the POI has ever attended those meetings?

MR. GARRARD: Not on the Airbus, to my knowledge.

CAPT. GOACHEE: Now, one of the questions that I think was asked referenced approved/accepted training manuals, but from the process that you receive a request, how do you receive a request from -- say American wants to initiate a change in their training manual, does it come to you or does it come to the POI?

MR. GARRARD: Well, it depends on what it is. I think that if a specific fleet -- this is my impression -- if a specific fleet wants to make a change for something, the fleet management guys will usually talk to the APM and they'll have some informal discussions about it to see if it's even feasible to start with. If they're going to go forward with some kind of request, that is a formal thing that has to be done through the POI, and it usually comes out of the -- I forget Aubrey's exact title, Aubrey Landry's office and goes to one of the assistant POIs or whoever is handling that, the training manual in the office, and then that is given to me if it's my fleet for my information and comment before it's approved. We get internal evaluation within our office. If we have to come and do an evaluation in a simulator or otherwise, or sit through a class over here at American before we can give our opinion, then that's what's done.

CAPT. GOACHEE: Do you recall, say in the last year, whether a fleet manager or someone on the A-300 management team from American has requested a change in their training manual at all?

MR. GARRARD: No, I don't recall; I don't think so and I don't really recall.

CAPT. GOACHEE: I think David asked you a question and I think it was in reference to the wake turbulence and leading up to the unusual attitude, and you had a comment that how they get there doesn't matter because maybe the training is really necessary. Do you remember that?

MR. GARRARD: Kind of.

CAPT. GOACHEE: Where he wanted to know whether it was going to be negative training or not, if you had software or something or a trim leading into an unusual attitude, and I think that you had made a comment that more importantly is that we are going to talk about it or we are talking about that particular questioning about software or about how they enter unusual attitude. Do you recall that?

MR. GARRARD: Yes, I do recall it.

CAPT. GOACHEE: My only question there, Ed, is who are you talking about "we're going to talk about it"? Are you talking to American management, are you talking to the POI, or is it a combination of the POI and American that you're going to be talking to or are talking to?

MR. GARRARD: Well, out of the AAMP review that I went through a couple of weeks ago, I had a little bit of concern about running the trim to get the nose up to input the nose-high attitude because not specifically running the trim in the get there, but if it stays there, that may not be realistic, and we're going to talk about how -- I was going to talk to the fleet people and the American Airlines simulator guy about that methodology and if there's a better way to maybe do that.

CAPT. GOACHEE: When you say -- so you haven't done it yet or you're in the process of doing it?

MR. GARRARD: We're still talking about that, yes.

CAPT. GOACHEE: I think another requirement for the APM under AQP or anything is that you attend all check airmen training. When you go through transition training, you also get the training that they give their check airmen. Is that correct?

MR. GARRARD: Uh-huh.

CAPT. GOACHEE: And you've done all that?

MR. GARRARD: Yes, sir.

CAPT. GOACHEE: And during that time when you're maybe with other check airmen going through training, any negative comments or any comments made to you about flight operations meaning in the training center or line flying from a check airman's point of view, anything negative?

MR. GARRARD: Negative about the training that they're getting?

CAPT. GOACHEE: Yes.

MR. GARRARD: No, I don't think so.

CAPT. GOACHEE: Hopefully it's just two or three more but it's very simple.

MR. GARRARD: Okay.

CAPT. GOACHEE: Dave asked you about ATOS and referenced geographic inspectors and how it relates to the old PTRS versus ATOS. Could you enlighten us on the training that's required for an inspector to be assigned to the ATOS geographic as far as what type of schools they need to go through, both with the FAA and the CMO as far as before they can even start doing ATOS work, if you can recall?

MR. GARRARD: I can't recall all the stuff, I know some of the things they're required to go through. Normally the geographic inspectors are highly qualified at their various locations around the country and they have to go through the course of the bidding process and get selected for the job, but before they can do work on American Airlines and in ATOS, it's my understanding they've got to go through ATOS training -- and now that's being done in Oklahoma City -- and they also have to get carrier-specific training which is done here, conducted by our office by one of the inspectors, assistant POIs or partial program managers in our office, and usually it takes three or four days. They spend basically a week here going through all of American's stuff.

CAPT. GOACHEE: So in relation to the old PTRS where any inspector could do functions reference American versus now under the system of ATOS reference having to have specific training which could be several weeks long before they're allowed to do training would probably certainly be better than the old system with PTRS?

MR. GARRARD: That would be my assumption, yes.

CAPT. GOACHEE: And I know that this isn't your function as an APM but, you know, sometimes being in the CMO and the relationship you have with the with POI and maybe even the individuals involved in the ATOS, have you ever heard that a geographic inspector out in any of the regions -- and we'll take all three specialties reference the Avionics, Maintenance and Ops -- have you ever heard a geographic inspector assigned to ATOS calling the CMO and complaining that they do not have sufficient job to do their job reference ATOS for American, or they do not have the resources to do their job in regards to oversight of American?

MR. GARRARD: Specifically I can't tell you that I've heard that except in general terms. The geographic guys are assigned to the particular office that they're in and the POI that's here doesn't have direct control, if you will, over their activities; he has to negotiate that through their supervisor at that location. Funding-wise, I don't know how they work that exactly, if they transfer funds or they get funds out of our office, I'm not sure how that works.

CAPT. GOACHEE: And I understand that's not your responsibility. That's all the questions I have.

MR. IVEY: Captain John Lauer, APA.

CAPT. LAUER: Do you or your office have any concerns about the fidelity of the simulator here at American?

MR. GARRARD: Fidelity -- define fidelity. I don't want to tell you something wrong.

CAPT. LAUER: I believe we've agreed that the simulator currently, I believe, is kind of Level C.

MR. GARRARD: Yes.

CAPT. LAUER: Do you have any concerns with regards to that level?

MR. GARRARD: Okay. I don't think so. It meets the requirements for the Level C the way it was certified at the time, and that's the way it is, that's the way the rules are. You know, it's what it is. As long as you don't exceed the parameters for the way it's being used right now, I don't see any problem with it as long as it's well maintained, and normally it is. What I would take issue with is when things start working and the motion doesn't work right or the visual gets fuzzy or bad or out of alignment and stuff, and American usually jumps right on that when it's written up by the check airmen and the inspector or the instructors. And of course, if they don't, whenever I come in -- and that's the other advantage to coming over periodically to get a little bit of sim time is we can keep a little bit of an eye on how that's being done. So from that perspective, I don't have any problem with it.

CAPT. LAUER: That's it.

MR. IVEY: Captain Ron Skupeika, Airbus.

CAPT. SKUPEIKA: Just a quicky here. In upset recovery in AMPand the program itselfAAMP, in your actual recurrent training and they put you in the wake turbulence upset and they stress a lot of this coordinated recovery, how do you know when you're executing a coordinated recovery, what are you focusing on in the simulator?

MR. GARRARD: Well, that's a hard call. You can't really focus on an instrument to give you that, it's kind of a feel sort of thing, from a pilot's point of view. If you're trying to roll the airplane to the right, for example, you need to have some right rudder to make it do that.

CAPT. SKUPEIKA: How do you know how much?

MR. GARRARD: Well, I think you know how much by how the airplane is responding. If you have some right rudder in and the airplane is still rolling to the left, then the only reason that it would be doing that is if it's still uncoordinated to the left and you need some more right rudder and right aileron too. If you've gone to the maximum with your aileron, then that's the only thing you can do is add a little more right rudder.

What I got out of the simulator training is really how powerful and effective the rudder is on the Airbus and that judicious coordinated use of the rudder is very effective in maintaining control of the airplane and you certainly do not want to arbitrarily jam rudder in one way or the other because that can exacerbate the problem, and that's good training -- it was for me.

CAPT. SKUPEIKA: But then you're going from what you consider a feel issue to a visual issue because if the aileron is not stopping your roll apparently, how do you know what your roll is? You're looking at something.

MR. GARRARD: Well, yes, you look at your attitude indicator or out the window, and that's what you're looking at.

CAPT. SKUPEIKA: So the feel issue is really not --

MR. GARRARD: Well, when I say feel, I don't mean really tactile feel, I mean gut feel, it's the impression that you have as an aviator.

CAPT. SKUPEIKA: Interpreting the instruments.

MR. GARRARD: Exactly. All the cues that are coming in to you.

CAPT. SKUPEIKA: That's it. Thank you.

MR. GARRARD: Sure.

MR. IVEY: One housekeeping chore that I failed to mention prior to the beginning of the interview, Dr. Bart Elias is not present as part of our operations group here, and I failed to mention Mr. Lyle Streeter over here who sat in as a representative for Mr. Garrard and he is from the FAA IIA-100 in Washington.

Is there anything else you'd like to add before we conclude?

MR. GARRARD: Well, just as a general statement to this group, I hope this is not taken wrong, I feel a little bit left out in this whole issue on 587. All that we have gotten, for the most part, has been through the news media on what's going on with this accident, and I have real concerns about the remainder of the aircraft that are out there flying. There are 34 airplanes, and there was a structural failure, for whatever reason, structural failure, and my uneducated Ops point of view is a visual inspection is not sufficient to ensure the integrity of the vertical stabilizer on this airplane, and I feel a little uncomfortable now in the position we're in still operating those airplanes. I'm not assured that we know for sure that what we're doing is the right thing, and this is not the way -- fingers crossed is not the way to be operating, we need to know for sure that we're doing the right thing by operating those airplanes, and that's any information that you NTSB people can give us or the manufacturer would be greatly appreciated.

MR. IVEY: Thank you very much, Mr. Garrard. This concludes the interview.

(Whereupon, a brief recess was taken.)

EXAMINATION

**o. Robert E. Talmadge**

MR. IVEY: We've introduced the operations group to you prior to the beginning of the interview, and by way of introduction to the remainder of the group here, please give us your name, your present position and a little history of your aviation background.

MR. TALMADGE: My name is Robert E. Talmadge. I'm assigned to supervisory principal operations inspector on the American Airlines certificate, the AMR CMO DFW Airport, Texas. I started flying in '67; went through ROTC; went through flight school; went to Southeast Asia; came back, taught as an instructor. Got out of the military; went to the university to continue my education; taught as a civilian instructor;

stayed in the reserve system; flew offshore helicopters for a period of about five years, continued that as a part owner of a company. Became a Department of the Army civilian flight instructor and maintenance officer; from there into anther private enterprise; from there into the FAA.

MR. IVEY: Total flying time estimate?

MR. TALMADGE: In excess of 10,000 hours.

MR. IVEY: And any particular type ratings?

MR. TALMADGE: Yes, sir. HB-212, SK-76, EMB-110, DC-8, B-300, B-1900, B-727.

MR. IVEY: And you have been the POI here for the American certificate how long?

MR. TALMADGE: Let's see, I guess on orders it would be October of 2000. I was reassigned in September from Continental Airlines where I was principal inspector.

MR. IVEY: Was that here in the Dallas area as well, or was that down in Houston?

MR. TALMADGE: No, sir. That certificate is held at the Continental CMO in Clear Lake City, Houston.

MR. IVEY: All right, thank you. And forgive me, I did not catch the date that you joined the FAA.

MR. TALMADGE: February 2, 1985.

MR. IVEY: Did you have any other prior assignments to the American certificate since 1985 other than coming here as the POI?

MR. TALMADGE: Yes, sir.

MR. IVEY: And in what capacity?

MR. TALMADGE: Well, I was assigned here from Continental, and before Continental I was assigned to Mesa after some problems, and before Mesa I was assigned to Air Transport International after some problems that they had; before that I was a principal in air logistics, and before that system principal on Gulf Air and before that the system principal of L'Express and the system principal of Royal Air; before that I was a geographic inspector in Miami on Pan American.

MR. IVEY: So you've had good experience as a principal or as an assistant principal on several carriers, both large and small.

MR. TALMADGE: Yes, sir.

MR. IVEY: And if I may just stick with that for a moment, that experience certainly brings to bear a lot of ability to compare various airline operations, large and small, and I'd like for you to give me an overview of what you think the American certificate is like compared to the Continental certificate, if that's a fair comparison, and if you choose to use another one, please do so.

MR. TALMADGE: Well, I'll be glad to compare them to Continental. The MD-80 fleet at American is just large as just about Continental's airline. There's not much difference in the technical issues; the main difference is the workload, the volume because of the size of the carrier and the dynamics of the carrier. Their business plan creates a lot of work, a lot of research, they are on the leading edge of a lot of projects; American does a lot of work with ATA and cooperative work with a lot of other carriers, so they generate a lot of research on our part. A lot of times we're out on the front of the Ops specs trail; a lot of the programs that we're working through, RNP program CPTLC programs, the GPWS programs, new Ops specs that are driven by technological advances that American embraces, and then we try to manage those appropriations as best we can.

The only difference between American and Continental I think is probably, besides size, is that American's disciplines are a little bit more separated, some of it because of difference in Tulsa and here and others, but the corporations appear to be organized differently in that respect only because of, I guess, leadership philosophies, but the same kind of people employed in both places in the critical skill positions, very good, reputable, well experienced, safety conscious people.

MR. IVEY: How is your working relationship with American compared to some of these other carriers, and perhaps Continental is another good example to compare to?

MR. TALMADGE: Well, I would say that they're a responsive carrier; I feel like we have a good working relationship. It's a business, I recognize that, but from a safety standpoint, I see a very strong commitment in both carriers, and American's safety department is certainly enviable in its assets budgeting and access to senior management.

MR. IVEY: Are they adaptive to changes and suggestions that you as a POI offer?

MR. TALMADGE: Yes, sir, generally so.

MR. IVEY: And if they're not, why?

MR. TALMADGE: Well, if not -- let me just say when we can't get consensus in a very short period of time, it's normally because, in my perspective, it's because of magnitude of change that had to occur because of the size of the organization, and in some cases cultural issues.

MR. IVEY: The operations unit manpower was provided to me. I don't know if that was part of something that you sent up for my benefit, but your organization on the operations side, how many people do you have working for you?

MR. TALMADGE: Well, I have 23, counting myself, in the office, and then five geographic inspectors assigned, and then of course the full force of the FAA for some issues that all inspectors can help us with due to recent change of the ATOS programs.

MR. IVEY: And to help us understand, are some of the people that are assigned underneath you dedicated t the ATOS program as opposed to being inspectors?

MR. TALMADGE: If I digress, just say Bob, that's not which way I want you to answer. If I'm understanding the question, here's how I'm going to answer what I think you're asking. Each inspector has an ATOS responsibility. You asked how many people are on my group, in my team. I have two ASAs, one a dispatch inspector, one a cabin safety inspector; and the remainder are 1825s, aviation safety inspectors operations discipline.

MR. IVEY: If I may, just for the record, ASA?

MR. TALMADGE: Aviation Safety Assistant.

MR. IVEY: Thank you.

MR. TALMADGE: Clerical personnel -- well, that's their title, they do a lot more than that.

And so ATOS replaced a Program Tracking Reporting System method of surveillance, and it's a systems approach to safety, closed loop, so really everybody except the ASAs are involved in it. Now, you don't get to participate until you've had air-carrier specific training and you've been to the ATOS school, once you're a journeyman inspector -- that's the only two requirements.

Well, under that system we take data from several sources, self-disclosures, enforcement, accidents/ incidents/occurrences, industry norms, complaints, American Airlines, from our quarterly risk management group that we have instituted since I've been here, and we take that with the help of an operational research analyst -- which are assigned to us because of ATOS which is basically a really good information systems management person, and the FSAIC database and we take data, cleanse data and we enter it into a computer program called the Air Carrier Assessment Tool, and that tool takes factors under consideration, weighs it against the air carrier dynamics, and gives you a reasonable risk approximation.

The basic premise of ATOS is you work on the highest perceived risk first and other issues as you can. All the items must be completed in three years, so it rotates, and basically as soon as you find out you have a problem, you document that, you take the appropriate action, sometimes that's to start a system analysis team which involves the carrier and manufacturer and anybody else and you go to the root of the problem, but if you don't find a problem, you stop that pretty quickly and go to the next highest perceived risk. So it gives you a little bit more flexibility than an annual work program where you had this many things to do and that many things to do and it was hardly any way around except do those mark-on-the-bark items.

Well, each person then is a member of a group and this group is divided up depending on what our highest perceived risk is, and then we take these risks and we identify them and study them in two areas: number one is a safety attribute inspection which is a group effort, and then they're supported by element performance inspections which is basically a work task. SAI, do they have the system; EPI, does the system work.

So each inspector is a team member on these groups; each team has what they call a team coordinator; the coordinator is responsible for breaking down the overall inspection into a manageable size, assigning individuals and submitting a budget to me to get it done and making sure they go where I ask them to go when we plan these activities for the areas of concern, if we have them based on a risk assessment. So that's how each individual is involved in it.

The complete the inspections, as many activities as they think it takes to make up their mind one way or the other -- and we don't tell them how many, we ask them to do at least five, we'd like ten or more, but the idea behind system safety is look till they get satisfied and put the information in a repository. The repository is a computer program; it's cleaned up by what we call a data program entry manager; he makes sure the words are spelled right and we don't get embarrassed because it is a national database -- with the limitations of PTRS, we didn't have that attribute -- and then that information goes as a matter of record, and then once we complete these inspections, they come to me, and each time we have a discrepancy area, then the inspector enters that and it comes to me and then I have to ascertain if it's a data point or a trend and we take action on a comment on it making the matter of record by completing the program.

Then based on what we learn -- and it may not always be what we're studying -- then we're supposed to go in the new direction if we have increased perceived risk in a different area, or we drive harder on what we think we have a problem on. And the individuals, the team members, they have a responsible portion of this, and that's in addition to their regular jobs, if it's certification as an APM or all the duties that are assigned to them in the normal CMO realm which is very similar to a flight standards office anywhere: you have to have enforcement, you've got to handle complaints, you have to have this, that, and the next thing, so it's a basic load.

I hope that's where you were going.

MR. IVEY: Yes. In fact, we are under the impression that this week you have had an ATOS get-together or you brought in your people from geographic as well as local and have spent two or three days -- correct me if I'm wrong -- either discussing the system, rehashing the system, taking compliments, complaints, just talking as a group within ATOS, as a retreat, perhaps. I don't know if that's a good word or not

MR. TALMADGE: Yes, I like that word because it gives me connotations of a very favorable explanation for it. You know, when we produced our work program, it was before 9/11, and our CSP, the meeting that you're talking about that we just held, it was scheduled for the week following 9/11 and we were not able to get our arms around it, so we rescheduled it. Well, as a result, the work programs went to the individuals. the purpose of the meeting that we just held was we take our risk indicators, we put it in this air carrier assessment tool, we explain it to everybody, let everybody tell us what also we should be considering, we make modification to it, then the automation provides a direction for this iteration of the surveillance program. We send it out to the field, people have a chance to comment, they send it back, then we save it to final, their work program goes to them, and that all happened before this meeting because of the time that it occurred. That's the only reason it's this late.

Normally it is a time where everybody gets together and we look very frankly at all the problems that we have and everybody gets a chance to make input to it, and then we pretty much hammer out that risk assessment tool and automation does the rest.

MR. IVEY: Let me ask you, you mentioned the input and then the data derives where perhaps there's greater potentials that need to be looked at later. In other words, you've got a risk assessment and they go from high to low and within this system I think you said basically it's supposed to take a look as though you were going to certificate a carrier every three years. Is that correct?

MR. TALMADGE: Dave, that's a very good explanation of it. You know, when we certificate a carrier, we use tools now, the CSET team uses tools now that are very similar to the letter of compliance that I'm sure you're familiar with based on your background. Well, we don't have a living letter of compliance, but what ATOS does is all the elements that are considered are actually all the elements of the rule which are covered in the original certification and now it's on a continuing basis. Therefore, after the advent of 1-1(9), the attempt is to make sure the dynamics of a carrier -- in the case of American, very dynamic -- as they change we are able to keep up with the method of compliance that the carrier is employing.

The principal inspectors on these carriers have limited life expectancy and basically it's good for the carrier to have a medium, a given, this is the way we do business -- written handshake we call them -- when the next guy comes in, this is the way we do business, you know, and we evaluate that on a recurrent basis. For the certificate management office, that's also good because a fellow comes in, like myself, from outside with a good idea of how a CMO is run, new to the carrier, and so it provides a continuum, it kind of smoothes the water while the changes take place. And this cycle is intended to evaluate each of those integral factors in turn with emphasis on the most -- the perceived highest risk first.

MR. IVEY: Having said that, my question is based on the data entry and the analysts look at this data, they compile the data, and as it flows into the system, then it will perhaps regenerate a higher risk assessment for one particular category than another, and that's a living document so that could change day to day, week to week, month to month. My question is let's talk about simulator check rides and en route checks, cockpit en routes, the data is processed and during the course of data entry it's found that carry-on baggage is just getting hit over and over and over again and now that's a big problem.

My question is what precludes in this cycle, this training cycle for let's call it Year One, highest priority we've got is checked baggage, so boy, let's just get out there and check every airplane and make sure that doesn't happen again. Oh, and way down here, yes, we've got type ratings and en route checks and simulator checks next year. Checked baggage, boy, we've hit it hard and it just hadn't gotten turned around the corner yet; highest priority and here we are. Do you get my drift of where I'm coming from?

MR. TALMADGE: I sure do, Dave.

MR. IVEY: The priority and the importance of that priority, is there a waiting factor to say hey, we can't for three years running have checked baggage as our main priority when the elephants are running out the doggone zoo door. We've got check rides, we've got sim checks, we've got en routes, how do we know what these pilots are doing? Well, I don't know but when I get through checking that baggage, I'll go find out. What precludes that from happening?

MR. TALMADGE: The point is very well taken. Here's how that works. Each of the factors which are considered, 1-1 through 7-12, have a criticality weight and that criticality is also modified by the size carrier. We're 4 because we're the biggest. So you have an event, it has a criticality weight that is multiplied by the air carrier's dynamics and then anything the PI wants to add.

So let's say that we could use weight and balance, that would be a good example -- I think you've been looking at my ATOS sheets -- let's say that weight and balance did come up. Now, this is a good example because it just happened in the air worthiness crew, the last iteration of their work plan. Well, they got into it, they were answering the questions, they said, Yes, there's a problem here, we've got work to do.

Well, at that point you close that portion of it and you go into what's called a system analysis team and it includes the manufacturer in some cases, in this case it included American, several departments in American because at American everybody is tied together through a central database and mutual concerns, and that event was closed, and then a smaller work group went to work specifically on those items. Now, when that inspection group was closed and saved to the repository, it did two things: number one, it cleared them to re-target which now they're going to the next highest perceived risk; number two, it goes to us -- I say us, on the outside of the house, we've got a carry-on baggage program. That's why I was smiling a while ago because I figured he knows exactly how this works.

So now we've got a carry-on baggage program, everybody knows that's tied to weight and balance, so we've got to go look. And oh, by the way, they just changed the overhead bins so I wonder how that fits in, so here's Ops off and running.

How do we keep from not seeing something? You know what, you have a basic load during each re-target you have to do. In the case of training and in the case of simulator evaluations, there's a couple of things we do. American does every other eval now because the national sim team just can't keep up with the activities; we're there when they do every other one, every time they do an original. And Delvin knows this, usually when we do the record ones with the national sim team, our people are there as well.

Cockpit en routes, well, sometimes we do cockpit en routes. Most of the time they fall under a category 3-1(1), 3-1(2), 3-1(3) which is flight crew flight deck duties. Training programs is 4-2(1) through 4-2 like (16) or (17), it has all the stuff down in there, and we always get a basic load of those and the lion's share go to the APMs. Why? They're there all the time, they see it every day. Even if it isn't part of their ATOS assignment, that's the nature of their job, so when those two instances they see that because they're making L-type check airmen, they're making APDs, or they're evaluating the sims.

Did that help?

MR. IVEY: Yes, it did.

Just continuing with ATOS in general again, in your retreat again -- if I may use that term -- of the last three days, was that an opportunity for all the people that are working on the certificate -- and I presume this was a certificate group meeting.

MR. TALMADGE: Yes.

MR. IVEY: Was this an opportunity for the members of the certificate to voice their pleasure or displeasure with various aspects of ATOS?

MR. TALMADGE: Yes, sir.

MR. IVEY: Give me a couple of the positive things.

MR. TALMADGE: The automation bas been improved, they're having less difficulty putting in their reports. And DEPMs made presentations; those are the English teachers that are kicking the stuff back, making sure the data is processed to go in the repository. There's less animosity there. We had him up front, right up front, we got a lot of the discussions out of the way.

By the way the AFS-900 sends a team; we're Wayne Stewart's client on Ops and Mike Ingalls on air worthiness, and they sent a team to assist us, and they have a four-hour presentation and they go through the automation enhancements and the latest changes in ATOS; and the next morning we had our folks kind of doing a parallel thing inside the office, common problems, this, that, and the other; and then we had a how-you-do-it session for those, watch out for this, the automation hasn't fixed that, this, that, and the other. That was one of them.

Of course, another positive is from the team environment, the geographic guys who have a lot of skill don't always get to rub shoulders with the APM when the fleet's there doing IOE forum. We try to get them down here for exposure in the sim with their APM on a respective fleet. They're qualified in a respective fleet. I ask for a qualification depending upon the geographic of the demographics of the area that they're assigned from.

Now, Dave, you know that I don't get to choose where or whom is assigned to me, but we take who we have, where they are, demographics of what we need and that basically becomes his operating base. It's like he's a commuter for the purpose of the high density areas, and of course we have Chicago, New York, Boston, Miami, L.A. and we have one inspector in Des Moines and he works through Chicago. So they get a chance and they attend our Ops meetings, so they get a chance to come rub shoulders.

Detrimental or other side issues, I think you probably wanted met o follow on with. They're frustrated because they would really prefer -- let me just answer from my crew, all I can tell you is the guys assigned to American -- they would really rather be assigned, lock, stock and barrel, to the certificate management unit and not have to wear two hats in the areas where they're working.

MR. IVEY: You're speaking in terms of the geographic inspectors there?

MR. TALMADGE: Yes, sir, geographic inspectors. And also sometimes where they work, the demographics of our fleet where they work is not the airplane they want to fly, or are already rated, familiar with this, this, that, and the other. But those are problems that we work through pretty well. The guys in New York have a heavy 80 load and those are not fun, glamorous trips, and it's no fun to go do the surveillance where they are, but we get good work out of them.

But I would say those are the two areas and you get a really good guy, and I haven't had anyone I would complain about, I'm going to put that right out. I'll play them any Saturday night, anybody that I have, but you have a guy and when you have good people they have a tendency of being identified as good folks and they get different jobs and then you're back in that mode again which, of course, we are in some areas right now. I would say that's the two detriments to them: they would prefer to be assigned strictly to the certificate and to also have a little bit more choice about what airplane they're flying.

If that answers your question, I think those are two good examples on both sides.

MR. IVEY: You came on October 2000 as the POI, I believe you said. Correct?

MR. TALMADGE: Yes, sir.

MR. IVEY: When was the analyst for the CMO brought on board, do you know about that time frame?

MR. TALMADGE: Dave, I think it was after that.

MR. IVEY: And that analyst is charged with taking the reports that all the inspectors are filling out and analyzing that data. Is all the analysis kept locally or is it also sent back to Washington over to the Dulles area out there for Tom Longridge and company, or help me out on that.

MR. TALMADGE: Tom has resources we don't have but we're very proud of our ROA. He does the number crunching on our certificate, and of course, because of his access to the database itself, he can also look at other carriers and it gives him a fair comparison. He basically is a research assistant for the principal inspectors and the office manager, and he functions very well at it. We're lucky, the guy we have is very, very well qualified out of the military, that was his forte in the military.

But as far as sending it forward to someplace else, he's always has that capability but normally Tom's group has the ability to use FSAIC and they use that medium, and then Joe many times, our ORA, he's given that information and he processes it for me. Normally he has a workload of stuff that he does and then I may go in and say, Joe, how many this, that, or the others do we have in PTRS or in the ATOS repository on this thing between this time and this time, so he gets that, he retrieves that data for us and processes it. He also looks at SPAS and has complete capability to look at the PTRS system as well. So with the database that he has access to -- and it's pretty much everything except some of the stuff that only Tom and them need access to and AQP, he has the ability to pull that down and do for us.

MR. IVEY: Your analyst, as you mentioned, he had come out of the military and filled your position.

MR. TALMADGE: Yes, sir.

MR. IVEY: Does he have an aviation background?

MR. TALMADGE: No, sir.

MR. IVEY: He does not. Do you think from your perspective that an analyst that's analyzing inspector comments that are qualified individuals with an aviation background and qualified to surveil the carrier is providing this to an analyst who has no aviation experience, can you get the right kind of weighted needs and targeted information for moving the SAIs around accurately?

MR. TALMADGE: That's not his job.

MR. IVEY: That's not his. Good, I'm glad you cleared that.

MR. TALMADGE: That's my job. His job is to take the questions and requests for research that I ask him to perform and present them to me, and he usually does it two or three different ways -- which is very helpful -- and then it's my job to make the decision on which way we're supposed to go, and all principal inspectors, Avionics, Maintenance and Operations, Cabin Safety inspectors also involved in that. Probably our Dispatch resource will also be involved in that at some point when they make that because they're just coming on board.

The direction is my responsibility.

MR. IVEY: If that person -- well, let me back up to you for a moment. Do you look at his data to make those determinations, and if so, could he be the bottleneck if he were giving you bad information just as an analyst as opposed to an aviation-experienced researcher? Could that lead you in a wrong direction, is that a potential bottleneck?

MR. TALMADGE: I would say potentially, yes. I think the way the system works, he could make you a pie chart or a bar graph but it's going to be the same numbers you ask him for -- him or her. You know, I'd certainly like to have somebody with a very rich aviation background, only because it speeds their learning process when it comes to the job, but when they turn the machine on and you say I want you to do this and this and this, these MIS folks know exactly what to do, and they'll say you want soup with that, and basically if you don't get what you ask for, you just need to ask them a different way because they'll keep punching until they can find it if it's in the database.

Now, the database, they can only give you what the database says; if there's something there, they can slice and dice it any way you want to but it all goes back to defensible data; if the data is good, the validity of what you're looking at is good. Where it would help having an aviation background if they knew the data was good by looking at it. How much help, I don't know.

MR. IVEY: That just gets back to my being concerned that if it was carry-on baggage and he's sitting here thinking: Yes, I know, I've had the person sitting next to me hit me in the head twice, that's important to me. But to you as the POI, en route checks, type ratings, line checks and simulator type rating check rides. Yes, it's important, it's very important and it's continuously important.

MR. TALMADGE: Yes, that's why you have a basic load of all that stuff, and in fact, the principal inspector can change the basic load -- and we do anyway for a variety of reasons -- but the ORA's job in that is to say here's the data that you requested on this, this and this, and here's the data out of a different database that presents this information. And since we have the association with American with our quarterly risk management group, we have access to general data directions that they have. Lord knows, we're working hard to be if not the first, one of the first carriers to be able to cleanse that data and merge it.

The way it works now, it's sort of manual. Their safety group takes their quarterly risk management data, they cleanse it, they present general areas; we take ours, we cleanse it, we present general areas. Where they overlap, the group makes a decision, you know, what do you think we can do about this. We identify, we quantify; if they can mitigate, they mitigate; if not, they accept and they try to make the safety controls better. But the long and the short of it, if we both see the same thing through independent audits, then they're able to go to management -- which they have access to management -- with defensible data, not an opinion -- even a gut feeling is good -- but defensible data in American's climate is very attractive because of the accounting background of a lot of the senior leaders, and then the leaders are better able to look at something based on what they're used to looking at and making a good, well-informed decision on it.

We don't keep score on that side of it. What we do is that information goes back into the ACAD itself. Joe, our ORA, processes everything we know and he presents it. It still comes back to a program with everybody in the CMT considering it with the ability to make the change, and then that special tailorization plus the basic loads you get on each iteration based on the air carrier's size and complexity and dynamics, that becomes the new program. And then as soon as you complete that or have an area of greater concern, you change it.

MR. IVEY: You mentioned twice in the interview the quarterly risk management group.

MR. TALMADGE: Yes, sir.

MR. IVEY: Tell me who that is comprised of and who developed it.

MR. TALMADGE: It's a joint project between American and my group and Scott Griffiths and I primarily developed it; and on his side it's made up of ASAP information, audit information that they have from IE&A; on our side it's made up of everything that we can bring to the table from PTRS, SPAS, ATOS, enforcements, complaints, et cetera. It's all de-identified, sort of double blind; it's pie charts and bar graphs, but we look for common goals, we have common categories, and the convention is just to work together to get it done and to try to identify from two different perspectives where we may have a risk, try to mitigate it with plausible action.

And it's informal, it's not charted. Matter of fact, the second meeting scheduled for the 2nd of February, we're getting down to the business of the MOU. My group also has a MEL MOU with Captain Railsback's group; it's the first one I know of, a similar convention where we took action to try to be more responsive to the carrier and at the same time the carrier understands some of the constraints we have, and it's worked out well -- not without problems, but it's worked out well. We're confident that this endeavor is going to also produce a desired result of safety.

MR. IVEY: Turning now to some of the -- you had mentioned this was a joint participative effort, there's the ASAP program that's also an effort between APA, the FAA, and American Airlines. Do you directly participate in that?

MR. TALMADGE: No, sir. The event review committee is an autonomous group by design by MOU, and both the carrier -- well, the carrier, the union and I all trust the folks that are on there, and they work within the MOU to accomplish a desired task which eclipses, in many cases, the best we could do from a strict enforcement standpoint with the advantage that we get more data and we know more about the risks that we're encountering and we can plow them back into safety action programs.

MR. IVEY: Turning to a different issue, in the news recently there has been statements regarding pilots' concern for A-300 airplanes. Has your office received any information regarding this issue?

MR. TALMADGE: Yes, sir, but not officially. Everyone in my unit saw the news last night and this morning, I'm sure, and we have one issue that's been forwarded that we know of through the company where there was a concern, and I assume they're the flight crew members that are flying the bus and that's New York and Miami primarily where she's based, and so we are aware that there's a concern in that area. I had seen a list of questions, and I don't know where they came from but I think it was developed from base visits that management went out and engaged the flight crews, and my assumption is -- and I don't know this but my assumption is that it was an attempt for both sides to try to have some dialogue.

MR. IVEY: Have there been any hotline complaints regarding this activity?

MR. TALMADGE: I'd have to check, Dave; I don't remember one. If there is one, it's being worked.

MR. IVEY: Do you get many hotline complaints, just in general, from pilots regarding American Airlines?

MR. TALMADGE: We certainly get them, but they're rare; we get more from disgruntled passengers, we get a lot from flight attendants.

MR. IVEY: Not so many from pilots?

MR. TALMADGE: No, sir. We do have some and there are individuals who have submitted more than one.

MR. IVEY: Have you had any complaints at all regarding the A-300, to your knowledge?

MR. TALMADGE: I don't know, Dave. I think if we have one currently, it does involve the A-300, but I have an administrative assistant who handles the complaints and if you like, I can check.

MR. IVEY: We'll take a look at it, that would be helpful.

MR. TALMADGE: Hotline. Right?

MR. IVEY: Yes, sir.

Have there been any regional or headquarters issues that have come down to your level requiring any adaptations or changes to A-300 operations since the accident?

MR. TALMADGE: No, Dave. The only thing I remember there was a flurry of activity in the aftermath of the accident on November 12 where we did a bunch of inspections on the aircraft themselves, but as far as flying the airplane differently, not to my knowledge. I think there's a routine manual review that Ed is working on right now, but I'm not sure that that's as a result of the November 12 accident. In fact, I think that's an MEL, if I remember correctly.

MR. IVEY: Do you get involved with the simulator inspection teams at all and their reports.

MR. TALMADGE: I do but here's the way it is, though. Just like at Continental, just like at ATI, just like at Mesa, they call and say we're going to be there on such-and-such a day, we're doing certain inspections, we'd like for somebody to accompany us if you could provide an APM; otherwise, somebody from the company usually does it with them. And I set that up, and occasionally I get to go myself, not often enough.

MR. IVEY: Typically it's the APM associated with that simulator?

MR. TALMADGE: Absolutely. If they let me go, I'm usually observing, sometimes I get a bounce or two on a 727.

MR. IVEY: And they still have those fine airplanes, I guess.

MR. TALMADGE: Yes, sir. Unfortunately, I saw the last flight of the 7-2 at Continental, I guess I'll see it here as well; neither one very pleasurable.

MR. IVEY: I realize you're type rated on the 727 in terms of large aircraft, that was your -- well --

MR. TALMADGE: The 8 is a pretty good size.

MR. IVEY: Yes, you did say DC-8, my apologies.

Have you had the opportunity to talk with any of the members or management or line pilots with American regarding A-300 issues?

MR. TALMADGE: Well, I talked to the folks that accompanied Ed in the simulator last week, sure did, but it was more the performance of the aircraft than any of the events that I was going to observe but Ed was going to participate in.

MR. IVEY: And that's my understanding that both of you attended the AAMP program.

MR. TALMADGE: Yes, sir.

MR. IVEY: And did you have the opportunity to go into the simulator as well?

MR. TALMADGE: Yes, sir.

MR. IVEY: And what was demonstrated to you or did you participate in?

MR. TALMADGE: The ground school goes through -- it's a pretty long ground school and I think that Bruce Ott was the teacher, and then without comment we went into the simulator because having observed issues like this before, I wanted to see what the sim instructor was going to do without saying anything, and they taught exactly what was taught in the ground school, exactly what was in the videotape of Warren VanderBurgh, and they did scenarios where we had -- let's see, what did we do? We did wake turbulence, roll left, roll right, wake turbulence upset with the nose real high by using a trim, wind shear recovery, terrain avoidance, pretty much one of everything that's in the program, micro-burst.

MR. IVEY: Was that your first time in an A-300 simulator?

MR. TALMADGE: No, sir, but I'm not an experienced A-300 principal operations inspector, I want to make sure you don't get the wrong idea.

MR. IVEY: Understood. Do you have the opportunity during the course of the year you've been here to get into different simulators?

MR. TALMADGE: Yes, sir.

MR. IVEY: And I realize you're not type rated in that airplane, notice any differences in flight control response in the simulator of the A-300 you were in last week compared to the 727 simulator or the MD-80, if you happen to get into that?

MR. TALMADGE: I did both. I didn't get a chance to fly it so I just observed Ed the APM and the check airman flying the airplane.

MR. IVEY: Any comments about the fidelity of the simulator, either by Ed or by the check airman?

MR. TALMADGE: Well, you know, Dave, there were but I'm not sure I could qualify -- I'd like to qualify my response because I'm not in a position to evaluate what they were saying, but I think they were just flying the profiles; I'm not sure either one of them had ever flown the airplane into those profiles, so I guess they were -- I would say within the flight envelope that we have data for, you know, I watched them do what they were doing and it seemed to be successful outside of some parameters. I guess they encountered some difficulties, but neither one of them offered to me an explanation of, you know, that's not the way the airplane flies, and this, that, and the next thing. I was mostly looking for the procedural approach to it and were they following the instructions that had been given in the ground school and were they effective.

MR. IVEY: Since your return to the AAMP ground school and then followed up with that simulator training, that is part of their training in initial and recurrent and transitional.

MR. TALMADGE: Upgrade, transition, yes, sir.

MR. IVEY: Upgrade, and that's part of their training program which is approved.

MR. TALMADGE: Yes, sir. Now, some fleets are approved under classic 121 subpart(h); almost all will be under AQP by this fall.

MR. IVEY: And this A-300 is under the AQP training program?

MR. TALMADGE: Yes, sir.

MR. IVEY: The workbook or the little accompanying manual that's with the ground school, is that an approved -- I'll use the term workbook as opposed to a training manual? I don't think it's a training manual per se, is it?

MR. TALMADGE: Dave, I would classify that under 8400-19 as courseware, and the training program is approved and courseware has to be acceptable. And I wondered that myself. When I looked at the book, I thought well, it's courseware, it's just like a slide show or any other book that you would use. It's not the program itself, it's the courseware that's utilized.

MR. IVEY: I'm glad to hear that because we finally, I think, have reached closure on that, or at least an understanding.

MR. TALMADGE: At least that's my opinion, and I think that's solid based in 8400.

MR. IVEY: Along with the videotapes?

MR. TALMADGE: Yes, sir, that's courseware as well, and the models and the blackboard.

MR. IVEY: Good.

Your manpower within the American certificate, do you have enough people to effectively administer the certificate? Are you short?

MR. TALMADGE: The first question, I think we are effectively administering the certificate management responsibilities; the second question, yes, I am short.

MR. IVEY: Short by how many? You never have enough, I realize.

MR. TALMADGE: Dave, on the books I'm short two inspectors in the office and one in geographic. Now, would I draw more blocks? Yes, sir.

MR. GARRARD: Like to have more. All right.

MR. TALMADGE: Especially in view of the TWA transition is coming, nobody has had an aircraft fleet the size American's will be -- is now, really -- and so we've not been there before, so I think it's a real challenge to our group, and the certificate manager is on work groups with division management teams from our region and Central Region to try to identify what that should look like. And OPM has some ideas I'm not sure are the best way to structure it, so I'm just not confident that we look exactly like we should look right now, but that's above my pay rate.

MR. IVEY: You made a statement earlier in your description of the ATOS system -- if I may revisit that one more time -- that it's a closed loop system.

MR. TALMADGE: Yes, sir.

MR. IVEY: I'm familiar with that. Do you believe that the closed loop system is operating effectively now even from the headquarters down to your level?

MR. TALMADGE: Let me answer it this way and then I'll answer it a different way if it's not what you are asking. When I referred to closed loop, I'm talking about the system safety approach to a high consequence operation where we try to identify, see if we have a system is the system working, is it written down, is it well known, is it trained, do they document it, do we keep records on how well it's working, and then do we try to implement an improvement and start back to square one. That's what I meant by closed loop.

Would you restate the second part, please?

MR. IVEY: I think that was very well stated. When I've seen the overview of the ATOS, the global system, I think there's perhaps seven or eight steps that complete the entire -- that's a closed loop also, in my way of thinking.

MR. TALMADGE: Yes, sir.

MR. IVEY: And within the organizational structure of ATOS proceeding all the way through the data collection through the analysts to continue the cycle around in each of these seven or eight steps -- and forgive me, I can't think of the titles of them all -- is that effectively working now from the headquarters level right on down to your level as POI?

MR. TALMADGE: Headquarters has enhanced their support tremendously in the last six months. As I mentioned, we're dedicated clients to a group at the headquarters group. Dave Hanley's report took at look at some of the problems inside of ATOS, they made a lot of changes, I'm beginning to see the changes. I do know that the automation works better, you have the opportunity to tell them almost anything through the automation itself on a help line with a dedicated problem button with researchers all the time that do it, and they do get back to you. As far as the headquarters staff, the CMO staff, I can't imagine they have enough because just the ten carriers that they're working with and the rapid changes that take place and the automation challenges in the field inspector level, it requires a lot of work on their part, but I think the direction is certainly positive and it's working well enough to get the job done if we really apply the guidelines.

MR. IVEY: And you're getting the support from headquarters and the region that you need?

MR. TALMADGE: Yes, sir. The manpower, that's kind of over-the-top/down-to-the-bottom, but other than that, if you have a problem, they'll call you back and try to work it through. Now, some of it's in the works as a continuous development group, CAD group for ATOS and Module 7 and 8 which is the risk identification/risk management module which our work group, the quarterly risk management group would love to be part of and try to emulate what we think is going to come down the road and try to get there first.

We're waiting with bated breath for that to roll out because we see the real benefit in that, probably the most benefit because our opinion is it will take defensible data, double-blind, de-identified, provide it in a way that can be sliced and diced like SPAS, drive you through the system safety training that they're giving all the inspectors now, into the ability to identify risks and document the risks, try to mitigate it. Identify it, you know, get rid of it if you can; if you can't, how do you live with it.

From there to develop an action plan which allows you to chronicle what you want to do, what your real perceived risks are, whether it's a hazard over risk, what probability that it will occur, what's the magnitude, what's the consequence. And then from there, see, that falls right into the group we're trying to really get rolling, so we're looking forward to that and I think it works fine.

Dedication, if everyone is absolutely trying to do what they're set up for, it will work. The program works; it's been proven in the Nuclear Regulatory Agency and several other high consequence arenas, and I guarantee, we can do it.

MR. IVEY: Thank you. I'd like to go around the room and see if anyone has any questions. Captain Guy Arondel from BEA.

CAPT. ARONDEL: Yes, thank you, Dave. As the American Airlines POI, were you informed that after Captain VanderBurgh's of the Aircraft Advanced Maneuver Program, three major manufacturers and the FAA sent a letter in which they raised several concerns regarding this program, and more precisely, the risk of excessive use of rudder in upset recovery maneuver?

MR. TALMADGE: Yes, sir.

CAPT. ARONDEL: What was the action of the FAA after being informed of this letter?

MR. TALMADGE: I learned of the letter November 13; I also saw American's response on their October 6 letter to the August 20 letter. I don't know what the FAA's response is to the letter of August 20 -- is that what you're referring to -- 1997?

CAPT. ARONDEL: In fact, in this letter certain number of concerns were expressed, and of course, as a POI of American Airlines, did you have an action against American Airlines?

MR. TALMADGE: I think I understand. Let me restate the question. Did I consider the input of the August 20, 1997 letter and did I take action with American?

CAPT. ARONDEL: Yes.

MR. TALMADGE: No, sir. I wasn't here.

CAPT. ARONDEL: Thank you, sir. That's it.

MR. TALMADGE: Yes, sir.

MR. IVEY: Captain Delvin Young, American.

CAPT. YOUNG: I have no questions. Thank you.

MR. IVEY: Captain Jim Goachee, FAA.

CAPT. GOACHEE: I just want to clear up this thing on sim evaluation because now, I mean, you've told Dave that not only does the sim team come, but they share responsibility with the evaluation team at American to evaluate the simulators, but one of the issues from the FAA side from the sim team is that if the national sim team comes to American to evaluate -- and let's talk A-300, and usually I think you said you would try to send the APM to assist the sim team in any manner that they would like them to assist them in. Correct?

But in my example, we'll say that the APM or the workload that you had that no one from the certificate could come and help but usually the sim team will get assistance from somebody, and then after that report, if there's something negative, they certainly make American aware of the problem and you, and do they not send you an official document that they did a sim evaluation and their findings for each time they come to American?

MR. TALMADGE: Yes, sir. Also, we get it if American does the event and the national sim team does not come.

CAPT. GOACHEE: And I would like just to go back through the period of time that you were the POI. Do you recall for the A-300 -- and I understand that you have an APM, but do you recall any negative reports on the A-300 sim evaluations, either from the national sim team or from American?

MR. TALMADGE: You know what, Jim, I don't. There are almost always squawks on the field inspector's report and that's what I remember seeing. If they're serious problems, we usually get a letter from the national sim team that says you need to do this, this, and this --

CAPT. GOACHEE: And that's what I'm talking about.

MR. TALMADGE: -- and they have this much time to do this, that, and the other. But I don't remember; that doesn't mean that there weren't any, I've got several fleets and I just don't remember any.

CAPT. GOACHEE: Well, I'll rephrase it then because I do understand it. If there was any major findings that would cause the simulator to be --

MR. TALMADGE: Degraded.

CAPT. GOACHEE: -- degraded, you certainly would know and American would not be able to use that sim until they brought it up to that standard. Correct?

MR. TALMADGE: Well, they could use it but they could only use it at the level it was allowed to be utilized by the national sim team.

CAPT. GOACHEE: Yes, exactly. And so if it was downgraded from Level C, you would certainly know about it and you'd know about it probably with a phone call before you got the filing documents.

MR. TALMADGE: That's correct, and American has a process that it goes through Aubrey's department and their process is that they start modifying their training at that point.

CAPT. GOACHEE: And as you recall, you haven't heard anything of that nature?

MR. TALMADGE: No, sir, I don't remember anything of that nature.

CAPT. GOACHEE: Have you personally received any type of comments from American management or check airmen or the APM in regards to the A-300 training since you've been here on the American certificate?

MR. TALMADGE: Well, you mean like detrimental?

CAPT. GOACHEE: Yes, sir.

MR. TALMADGE: No, I don't remember any.

CAPT. GOACHEE: And I just want to ask a question about -- and I know that the AQP program is a little bit different than the average POI working with a certificate is not AQP, but help me out here. If American would like to change -- and we'll talk specifically A-300 -- if they wanted to change their manual or change their procedure, could you explain to us how that is worked, and like I said before, it's American requesting the change, not you requesting it. Could you tell me how it filters from American to you?

MR. TALMADGE: There's no rule change, this isn't based on a rule change. Right?

CAPT. GOACHEE: Okay, that's right.

MR. TALMADGE: I'm saying that I'm assuming it's not based on a rule change.

CAPT. GOACHEE: No. In fact, I'll even say it's an enhancement they think that they want to do in their training.

MR. TALMADGE: Okay, the AQP program -- can I just digress just a second to answer this?

CAPT. GOACHEE: Sure.

MR. TALMADGE: Not to talk too much; I know you folks are probably meeting'd out. The AQP is managed by FS-230, we are the clown of Chris Mike War -- I think we're the luckiest carrier because I worked with Chris on two carriers now and he's great, and a lot of attention to detail. AQP allows modification to a training program, unlike the old Appendix H training where you know you're going to get one of these, two of these, one of these, one of those. AQP allows you to modify based on what you see within the carrier's dynamics that you probably need a change on your training program and maybe the operating dynamics of the whole industry.

Well, they present that, and the difference in AQP is data is kept on every event, so you get defensible data, again. It's like actuary tables in the insurance business. And that data is processed and it comes with the annual report. Now, FS-230's job is to look at the data in perspective with all the other carriers and with the individual carrier and that fleet's basic dynamics, and they say what do they want to do next year that looks reasonable because they've shown a spike here, they've shown a spike here, they're doing fine here, they'll change these two, they'll upgrade the training, they'll go from there.

So FS-230 crunches these numbers with FSAIC and they send us back down a huge report and in the report we get kind of a how-goes-it on the training program. Now, if American wants to change -- and they do after annual report, they want to change their program -- we open up this big long report and say yes, they want to change that, that's reasonable, that's what they should be doing. And then that process goes as a change to AQP through me to FS-230, signed by Tom, comes back down, I countersign it, and it goes to them and they implement that.

CAPT. GOACHEE: Thank you, sir. And one last question that has to do with approved/accepted reference. We talked about the workbook for the AAMP.

MR. TALMADGE: Yes, sir.

CAPT. GOACHEE: Help me out how American would do this -- and we used the handbook example. Even though that you weren't here when this was original as far as starting out for the AAMP, but if they wanted to change something in the workbook -- and you said earlier that you accept it, you don't approve it -- but does American give you an advance copy of the workbook -- we say the workbook as an example -- and do you review it and then make comments and send it back to American, and then you discuss if you had any issues with that workbook?

MR. TALMADGE: Okay. I'm going to address -- Jim, I'm going to try to answer the question in a general mode and then I'm going to come back exactly to the book.

Courseware varies between whether it's individually accepted or not, and it's seldom individually accepted, unless it's a simulator or a flight training device which is all equipment but it's also courseware because it's a learning tool, it has information on it, so we don't list it that way but that's what it is.

All right. When a change to let's say the AAMP specifically now, American wants to make a change, the first change will go through the fleet managers, it will go through the training department, the APMs will pick up on the change from the fleet managers. Whether or not the book is sent to me, they already know about it; by the time the book gets to me, they've already told them yes/no, or the boss is going to say. Most of the times when American has a reason for changing a procedure, I'll either get a call from Aubrey, more than likely a letter or an e-mail -- Aubrey Landry is the director of training -- and he'll say we want to change this because of X. Sometimes it's a swimming pool, it was last summer; and sometimes it's courseware because it's been upgraded; we've got CDs now, we're not using a manual anymore, we're in the learning center with a manual. So that's a media change but it hasn't changed the stuff very much.

When content changes, it's been my experience that American staff said very well. I think for two reasons: number one, their culture is pretty good, the APM-fleet manager is strong like it was at Continental; secondly, American desires a second look probably for a lot of reasons and they want us to do the second look.

So whether or not an individual page was changed, would I see an individual page, maybe not always but anything of significance. To date, I'm not aware of anything I've missed that they didn't share with us and we looked at.

CAPT. GOACHEE: And I think that was a good example, but if before they send this book or whatever off to the line pilot for training, they ask your concurrence with it and have you look at it, and if there's a problem -- when I say you, the APM, let's use the APM.

MR. TALMADGE: If it's contained in the approved training program.

CAPT. GOACHEE: Exactly, and so you'd review it; if there were comments made, it would go back to American; you'd come to agreement whether they should or should not include what you would like; and then the final say, you would give the blessing that they could just now submit whatever manual or whatever workbook to the line pilot. Is that correct?

MR. TALMADGE: Yes, sir, and that's reflected in the approval document of the AAMP in particular.

CAPT. GOACHEE: Thank you. No questions.

MR. IVEY: I noticed you made a note when he mentioned the accepted versus the approved. Did you get that straightened out? Was that correct terminology he was talking about?

MR. TALMADGE: Yes, sir. The courseware is generally accepted, the training program is approved.

MR. IVEY: All right, thank you for clearing that up.

Captain John Lauer, APA.

CAPT. LAUER: Bob, my intent is not to put you on the spot.

MR. TALMADGE: Understood.

CAPT. LAUER: Just to ask some tough questions.

MR. TALMADGE: Okay.

CAPT. LAUER: Have you or your office had discussions with AA management concerning the potential to ceasing A-300 operations as a result of 587?

MR. TALMADGE: No. That's the company's business.

CAPT. LAUER: Is there any trigger or threshold that could be crossed that would have you or your office take a more firm stand on that issue?

MR. TALMADGE: Well, John, I guess if we became aware of any conclusive evidence that it would be in the interest of safety to do that, that's what our charter is.

CAPT. LAUER: Okay. Given consideration on the effectiveness or the lack of effectiveness to the current inspection techniques already performed on the 34 aircraft remaining in the fleet, do you have any concerns or your office have any concerns about the air carrier's approach to these inspections?

MR. TALMADGE: Now, are we talking about the visual inspections of the vertical pin that occurred the first week after the accident?

CAPT. LAUER: That's correct.

MR. TALMADGE: First of all, I have a maintenance background but I'm not the principal maintenance inspector, so it would be inappropriate for me to comment on that, and as far as the office's view on that, I think probably the office manager ought to speak to it, but I think the general rule would be I don't think we've gotten there; if we were concerned about it, we would be taking action.

And I forgot the last part of your question. Would you ask me again?

CAPT. LAUER: Do you have any concerns about the air carrier's approach to these inspections?

MR. TALMADGE: To the visual inspections?

CAPT. LAUER: Or any inspection to date.

MR. TALMADGE: Oh, the visual inspections I don't because I think Airbus told them what to look for, and I think everybody did sort of the same thing. And again, the maintenance inspections to date, I'm not the best qualified person to ask those questions to. I know that there are inspections ongoing but I'm not sure of the depth or how they're being done, whether it's proper/improper/whatever, I just don't know what they are.

CAPT. LAUER: That would not fall under the purview of your office?

MR. TALMADGE: I'm sorry, the office?

CAPT. LAUER: You or your office.

MR. TALMADGE: No, I think it would fall under the purview of the office, not me, for a maintenance inspection; I only handle operational issues. In the

CMO we have a principal maintenance inspector, principal avionics inspector and principal operations inspector, and those three disciplines -- I mean, we all coordinate with each other, cooperate with each other, but those are three disciplines normally own the subject matter that follows in those general areas.

CAPT. LAUER: Have you seen or do you believe that there is a cultural issue or potentially cultural issue difference between you and/or your office and AA management concerning the inspections?

MR. TALMADGE: Do you mean do we think they should do more than they have done, they being American?

CAPT. LAUER: Well, you had alluded earlier, I think to a question presented by David, with regards to the fact that there were some differences in your office -- between your office and AA in the area of cultural issues.

MR. TALMADGE: Okay, you might want to play that back to me, but I think what I was answering was the question, if I remember right, comparing Continental and American, and what I said there were some cultural differences. That's what I attempted to answer. Now, if I answered that and misled you, I'm sorry.

CAPT. LAUER: Maybe I misunderstood. You were alluding to the cultural differences between AA and Continental versus your office and AA. Is that correct?

MR. TALMADGE: When I answered that question, I was referring to the differences between American and Continental.

CAPT. LAUER: Okay, well, I'm glad we got that cleared up. Then is it safe to say that you do not perceive any cultural issues -- or cultural differences or issues in differences between your office and American management?

MR. TALMADGE: In safety, John?

CAPT. LAUER: That's pretty broad.

MR. TALMADGE: Because that's our job; I mean, our job is safety.

CAPT. LAUER: I was trying to focus in on the 587 accident.

MR. TALMADGE: Okay, can you help me a little bit? Could you clarify? I'd like to answer your question.

CAPT. LAUER: Have there been any issues between your office and AA management that are a result of cultural differences?

MR. TALMADGE: As a result of the accident?

CAPT. LAUER: Well, no, not as a result of the accident but because -- maybe I'm not phrasing this quite right.

MR. IVEY: Better back up and try again.

CAPT. LAUER: I'm going to have to take a running leap at this one. I'd like to focus in on the A-300 fleet and as a result of the event of 587, in the last 60 days since the accident, have you perceived or have you noted any problems between you or your office and American's management as a result of possible cultural differences or concepts? And I think where I'm trying to take you here for an answer is I'm assuming that your office and American management are in agreement with everything that has occurred to date in the last 60 days.

MR. TALMADGE: Meaning operations-wise or maintenance-wise?

CAPT. LAUER: Well, that's pretty broad, sounds good.

MR. TALMADGE: Both?

CAPT. LAUER: If you can speak to it.

MR. TALMADGE: I can't answer for the maintenance. As far as since the accident, have we had any parting of philosophical ways about safety since the accident?

CAPT. LAUER: I should have phrased it just like that, sir. I apologize.

MR. TALMADGE: I'd have to tell you no. What I've seen with the management personnel I work with, I thought they were doing what I would have expected them to do to try to mitigate the risks. Our frustration -- Dave, I'm not throwing any barbs here -- the frustration at the CMO is we're in a vacuum for the most part, we know what we read in the paper, see in the news and what they share with us, but like you, I'm concerned about the 34 airplanes flying every day and I'd love nothing better than to say, hey, you know, this is a problem or this might be the problem, what do you think?

And I think American would be the same way. Having been in corporate management before, I know you sure want to mitigate the risks for a lot of reasons. I can't remember since it happened where I was disappointed in action or lack of action. I'm not privy to what the company does on the long scale. We meet every morning, we have a telecon -- you know, this -- every morning at 7:45 with the safety department, and they're the focal point of our contact with the company for most matters.

Captain (indiscernible) and I talk all the time, Mr. Ahern and I talk all the time, Kaiser and I talk all too often because he tells me when we have events, and Captain Landry, Captain Lewis, so I have routine contact with those folks. They normally apprize me of a situation that we would have an interest in, and I have to say, in answer to your question, I haven't seen a big splitting of the philosophical ways about their pursuit -- their being the management's pursuit on the Ops side that I'm aware and what they've tried to accomplish here to try to figure out what happened and how to mitigate the risks. I think they're pretty much frustrated by the lack of arrows in the quiver at the present time, as we are.

CAPT. LAUER: Well, I want to thank you for helping me rephrase that question.

MR. TALMADGE: I wish I could have been faster on the uptake.

CAPT. LAUER: I don't have any more.

MR. IVEY: Thank you. Captain Ron Skupeika, Airbus?

CAPT. SKUPEIKA: No questions, thank you.

MR. IVEY: Is there anything that you'd like to add at all to conclude the interview, anything you can help us with relating to this accident?

MR. TALMADGE: Just to restate that our purpose is the same as yours; we'd love nothing better than to find out what we can do, if we need to do anything in the operations realm, to mitigate whatever risks may be involved. And this is a safety issue, it's not who's right, it's what's right; we just want to get our shirt sleeves out and go to work on it. And I have questions but they're questions because I'm not as informed as the members of your group are, and frustrations because we're all prone to want to take action under stress, and certainly a lot of stress involved in this.

And again, the absolute the devastation, even from the CMO standpoint, Jim, I was talking about, and so do you, you feel when you're involved in a loss, and we just want to help the NTSB any way we can and we want to get the information as fast as we can get it so we can apply it to mitigate whatever risks we have, that's all.

MR. IVEY: Well, thank you very much for participating and sharing your views.

MR. TALMADGE: Yes, sir.

MR. IVEY: Dr. Bart Elias -- thank you -- is our human performance investigator and part of the operations group and he was not part of this particular interview. And that will conclude the interview for now.

(Whereupon, at 1:25 p.m., the interviews were concluded.)