



National Transportation Safety Board Aviation Accident Final Report

Location:	Phoenix, AZ	Accident Number:	LAX02FA266
Date & Time:	08/28/2002, 1844 MST	Registration:	N635AW
Aircraft:	Airbus Industrie A320-231	Aircraft Damage:	Substantial
Defining Event:		Injuries:	1 Serious, 9 Minor, 149 None

Flight Conducted Under: Part 121: Air Carrier - Scheduled

Analysis

After an asymmetrical deployment of the thrust reversers during landing rollout deceleration, the captain failed to maintain directional control of the airplane and it veered off the runway, collapsing the nose gear and damaging the forward fuselage. Several days before the flight the #1 thrust reverser had been rendered inoperative and mechanically locked in the stowed position by maintenance personnel. In accordance with approved minimum equipment list (MEL) procedures, the airplane was allowed to continue in service with a conspicuous placard noting the inoperative status of the #1 reverser placed next to the engine's thrust lever. When this crew picked up the airplane at the departure airport, the inbound crew briefed the captain on the status of the #1 thrust reverser. The captain was the flying pilot for this leg of the flight and the airplane touched down on the centerline of the runway about 1,200 feet beyond its threshold. The captain moved both thrust levers into the reverse position and the airplane began yawing right. In an effort at maintaining directional control, the captain then moved the #1 thrust lever out of reverse and inadvertently moved it to the Take-Off/Go-Around (TOGA) position, while leaving the #2 thrust lever in the full reverse position. The thrust asymmetry created by the left engine at TOGA power with the right engine in full reverse greatly increased the right yaw forces, and they were not adequately compensated for by the crew's application of rudder and brake inputs. Upon veering off the side of the runway onto the dirt infield, the nose gear strut collapsed. The airplane slid to a stop in a nose down pitch attitude, about 7,650 feet from the threshold. There was no fire. Company procedures required the flying pilot (the captain) to give an approach and landing briefing to the nonflying pilot (first officer). The captain did not brief the first officer regarding the thrust reverser's MEL'd status, nor was he specifically required to do so by the company operations manual. Also, the first officer did not remind the captain of its status, nor was there a specific requirement to do so. The operations manual did state that the approach briefing should include, among other things, "the landing flap setting...target airspeed...autobrake level (if desired) consistent with runway length, desired stopping distance, and any special problems." The airline's crew resource management procedures tasked the nonflying pilot to be supportive of the flying pilot and backup his performance if pertinent items were omitted from the approach briefing. The maintenance, repair history, and functionality of various components associated with the airplane's

directional control systems were evaluated, including the brake system, the nose landing gear strut and wheels, the brakes, the antiskid system, the thrust levers and reversers, and the throttle control unit. No discrepancies were found regarding these components.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The captain's failure to maintain directional control and his inadvertent application of asymmetrical engine thrust while attempting to move the #1 thrust lever out of reverse. A factor in the accident was the crew's inadequate coordination and crew resource management.

Findings

Occurrence #1: LOSS OF CONTROL - ON GROUND/WATER

Phase of Operation: LANDING - ROLL

Findings

1. 1 ENGINE
2. THRUST REVERSER - DISABLED
3. (C) THROTTLE/POWER CONTROL - INADVERTENT ACTIVATION - PILOT IN COMMAND
4. (C) DIRECTIONAL CONTROL - NOT MAINTAINED - PILOT IN COMMAND
5. (C) GROUND LOOP/SWERVE - NOT CORRECTED - FLIGHTCREW
6. (F) CREW/GROUP COORDINATION - INADEQUATE - FLIGHTCREW

Occurrence #2: ON GROUND/WATER ENCOUNTER WITH TERRAIN/WATER

Phase of Operation: LANDING - ROLL

Findings

7. TERRAIN CONDITION - GROUND

Occurrence #3: NOSE GEAR COLLAPSED

Phase of Operation: LANDING - ROLL

Findings

8. LANDING GEAR, NOSE GEAR STRUT - OVERLOAD
9. LANDING GEAR, NOSE GEAR STRUT - FAILURE, TOTAL

Factual Information

1.1 HISTORY OF FLIGHT

On August 28, 2002, at 1844 mountain standard time, an Airbus Industrie A320-231, N635AW, operating as America West Airlines flight number 794, landed on runway 08 at the Phoenix Sky Harbor International Airport, Phoenix, Arizona. While decelerating about midfield, the airplane veered right and exited off the side of the runway. Thereafter, the airplane crossed the apron area east of intersection B8 and experienced the separation of its nose gear strut assembly upon traversing the dirt infield area south of the runway, where it slid to a stop on its nose. The airplane was substantially damaged. On board the airplane there were 2 flight crewmembers, 3 flight attendants, and 154 passengers (including 4 lap children), for a total of 159 occupants. Of the 10 persons injured, 1 of the crewmembers (the captain) sustained a minor injury, 7 passengers and 1 lap child sustained minor injuries, and 1 passenger was seriously injured. The daytime flight was performed under the provisions of 14 CFR Part 121. Visual meteorological conditions prevailed. The 2 hour 41 minute flight departed from Houston, Texas, at 1803 central daylight time.

Days earlier, the airplane's #1 thrust reverser had been rendered inoperative (MEL'd). The #1 thrust reverser system had been mechanically locked out by maintenance personnel thereby precluding its usage.

The captain of the accident airplane reported to National Transportation Safety Board investigators he had been informed by the captain of the preceding flight, following its arrival in Houston, that the #1 thrust reverser was inoperative and had been MEL'd.

At 1840, while approaching Phoenix during the accident flight, a Federal Aviation Administration (FAA) air traffic local controller issued the airplane (call sign Cactus 794) a clearance to land on runway 08. The crew acknowledged the clearance and continued their straight-in visual approach to the runway.

FAA recorded radar data indicates that the airplane descended at an approximate 3-degree descent angle from at least 7 miles west of the airport until arriving in the vicinity of the runway threshold.

The airplane's captain indicated to the Safety Board's Operations Group Chairman that he was the pilot flying (handling the flight controls). The captain indicated that the airplane's touchdown and his derotation on the runway's centerline was normal. The touchdown occurred about 1,200 feet beyond the threshold, and he initially maintained directional control of the airplane.

At 1843:40, the air traffic controller stated to the crew of Cactus 794, "I appreciate the first right turn you can make then a left turn on Bravo and contact ground."

In the captain's written statement he reported, in part, that after retarding both thrust levers to the idle position, he engaged the #2 (right side) thrust reverser. Shortly thereafter, the airplane started slowly diverging to the right. The captain reported that he reached down to ensure that the #1 (left side) thrust lever was in idle, and he reduced thrust on #2 while feeding in left rudder steering. The airplane did not respond to the steering input, so he added more pressure to the left brake, which did not correct the airplane's course. The airplane exited off the right side of the runway, and the nose wheel dropped into a ditch. (See the "Airplane

Information" section of this report and the "Safety Board Operations Group Chairman's Factual Report" for a description of thrust reverser operation and procedures.)

The air traffic controller observed the airplane veer off the runway and traverse the infield. The controller stated to the flight crew, at 1844:35, "there doesn't appear to be any fire coming out of your wings." At 1845:00, the controller said, "ah theres we see no fire or smoke coming out the vehicles are on their way out right now." The crew responded and stated, at 1845:04, "we're going to evacuate the aircraft."

1.2 INJURIES TO PERSONS

Fire department personnel reported having evaluated 150 occupants. Five of the occupants were transported to medical facilities; the others were treated locally, as needed. The injuries generally consisted of head, neck, shoulder, and back trauma.

1.3 DAMAGE TO AIRPLANE

In pertinent part, the external examination of the airplane revealed lateral skin panel buckling on the sides of the airplane from the aft nosecone area near frame #1, through frame #12, located about 9.5 feet aft. The bottom surface of the airplane's nose was crushed upward a maximum of 12 inches.

Regarding interior structure in the vicinity of the nose gear wheel well, the forward pressure bulkhead was found bent and cracked. The rear pressure bulkhead was bent.

1.4 PERSONNEL INFORMATION, FLIGHT CREW

The accident occurred on the second day of the flight crew's scheduled 3-day flight sequence, which began on August 27 with a flight from Phoenix, Arizona, to San Diego, California, to Phoenix, and then to Houston, Texas. On August 28, the flight to Phoenix blocked out of the gate about 1744 central daylight time.

1.4.1 The Captain.

The captain, age 59, held an airline transport pilot certificate, with an airplane single and multiengine land and rotorcraft helicopter ratings. He held type ratings in the Airbus A320 and the DHC-8. He possessed a first-class aviation medical certificate with the limitation that he must have available glasses for near vision.

A review of the captain's FAA records indicated that he had no history of prior accidents, incidents, or enforcement actions. The captain's total flight time was reported at 19,500 hours, of which 7,000 hours were as captain flying an A320. During the preceding 24 hours, 30, and 90 days the captain had flown for 4, 76, and 232 hours, respectively. The captain's last A320 proficiency check was accomplished in July 2002.

The captain reported that following his arrival in Houston on August 27, he had a 15-hour layover. He stated that he had sufficient sleep in Houston. On August 28, he had lunch with his first officer prior to reporting for duty.

1.4.2 The First Officer.

The first officer, age 40, held an airline transport pilot certificate, with airplane single and multiengine land ratings. He held type ratings in the B-737, BA3100, and SF-340. He possessed a first-class aviation medical certificate with the limitation that he must wear corrective lenses.

A review of the first officer's FAA records indicated that he had no history of prior accidents, incidents, or enforcement actions. His total flight time was reported at over 11,000 hours, of which 800 hours were acquired flying an A320. During the preceding 24 hours, 30, and 90 days the first officer had flown for 4, 53, and 173 hours, respectively. The first officer's last A320 proficiency check was accomplished in February 2002.

The first officer reported that following his arrival in Houston on August 27, he likewise had a 15-hour layover. He stated that he had sufficient sleep in Houston. He stated that his rest the night before was adequate, sleep was sufficient and normal, and his fatigue level was insignificant.

1.5 AIRPLANE INFORMATION

1.5.1 Maintenance, General.

The airplane, serial number 092, was manufactured in 1990. America West Airlines maintained the airplane on a continuous airworthiness basis following the Airbus maintenance inspection program. The program was reviewed for accomplishment of the prescribed Through-Flight Checks, 4- and 8-Day Checks, A & C Checks, and for compliance with airworthiness directives. According to the FAA participant, the program audit revealed that America West Airlines had followed the approved maintenance program. The last "C" check and "A" checks were accomplished as scheduled on September 27, 2001, and on July 22, 2002, respectively. By the accident date, the airplane had 40,084 total hours and 18,530 cycles.

1.5.2 Landing Gear.

The airplane's nose and main landing gear overhaul records indicated that all three gears were last overhauled in October 1999. All three gears were installed on the accident airplane in November 1999. All three gears have 18,262 cycles since new and 3,863 cycles since the last overhaul. No sub-components of the nose landing gear assembly have been replaced since installation.

1.5.3 Thrust Reverser Operation and Service History.

The "Landing" section of the America West Airlines "Flight Crew Operations Manual" (FCOM) states the following: "After main gear touchdown, immediately raise the reverse thrust levers to the full reverse position and adjust reverse thrust as necessary. The "Powerplant Controls and Indicators" section of the FCOM provides a description of the airplane's reverser latching levers and thrust levers. In part, the manual indicates that a thrust lever is placed into the reverse position by first pulling up the reverser latching lever that is located on the front of the thrust lever. Thereafter, the thrust lever may be retarded in an aft direction thereby placing it into the reverse thrust position. (See the Safety Board Operations Group Chairman's Factual Report, Attachment 9, for drawings and additional information.)

The thrust reverser systems for the two engines function independently of each other. Pursuant to America West Airlines procedures, N635AW could be dispatched with an inoperative (MEL'd) thrust reverser.

On August 17, 2002, the #1 thrust reverser failed to deploy on landing in Phoenix. The system was repaired, operationally checked, and was found serviceable. Later on August 17, the #1 thrust reverser failed to deploy again. Maintenance personnel deactivated the reverser and deferred maintenance pursuant to MEL 78-30-01. On August 18, the #1 thrust reverser underwent maintenance. It was satisfactorily operationally checked, and the MEL placard was

removed.

On August 20, the #1 thrust reverser did not deploy. It was deactivated, and its status was placarded pursuant to the aforementioned MEL. The airplane's operation continued with the MEL'd thrust reverser. On August 27, repair parts were ordered; however, they had not been installed by the time that the flight crew was dispatched on August 28. At dispatch, the #1 thrust reverser continued to be listed as inoperative pursuant to the MEL.

The MEL placard was required to be affixed to the throttle quadrant. Following the accident the quadrant area was photographed, and the placard was noted (see photograph).

1.5.4 Flight Operation Procedures, Thrust Reverser, and Callouts.

According to the MEL, when a thrust reverser is deactivated "it is recommended not to select reverse thrust on affected engine at landing."

The airline's procedures, as indicated by information in its simulator lesson guide for thrust reverser operation and related airspeed callouts (pursuant to the FCOM), is as follows:

"Reverse thrust is most effective at high speeds and will always reduce the 'brake only' stopping distance. Reverse thrust is effective down to as low as 60 knots."

"After main gear touchdown and with the thrust levers at idle, immediately raise the reverse thrust levers to the full reverse position. The FADEC [Full Authority Digital Engine Control] limits N1 during MAX REVERSE."

"Although the FADEC will control the maximum thrust, the PNF should monitor engine operating limits, and call out any engine operational limits being approached, exceeded or any other abnormalities."

"Maintain up to the maximum reverse thrust until the airspeed decreases to 80 knots. At 80 knots, the PNF announces '80 KNOTS.'"

"After 80 knots, start reducing reverse thrust toward idle reverse to be at idle reverse by 60 knots. At 60 knots, the PNF announces '60 KNOTS.'"

1.5.5 Approach and Landing Briefings.

America West Airlines had procedures in effect for the conduct of approach and landing briefings. In pertinent part, the airline's policy indicated that the pilot flying (PF) should initiate the approach and landing briefing. The FCOM specified "the pilot flying will make any callout the non-flying pilot does not make."

The airline had guidelines for the role of the pilot not flying (PNF) during the time when the PF briefs the approach. In pertinent part, the crew resource management approach encouraged the PNF to be supportive of the PF, and backup his conduct/performance if he omitted items pertinent to the approach briefing. The FCOM stated that "All approaches have certain basics in common. These are good descent planning, careful review of the approach procedures, accurate flying and good crew coordination."

In part, in the FCOM's "Approach Briefing and Planning" section, it stated the following:

"The PNF will obtain the airport information as soon as possible and inform the PF of the landing runway currently in use. The PF will brief these items as soon as specific airport conditions are known prior to top of descent: ...The landing flap setting, ...target

airspeed...autobrake level (if desired) consistent with runway length, desired stopping distance, and any special problems."

(The FCOM was changed following the accident. The following specific briefing item was added: "Crews must also brief any en route failure or MELs that may affect the landing and rollout.")

1.6 METEOROLOGICAL INFORMATION

At 1840:11, the local Phoenix Sky Harbor Airport controller reported to Cactus 794 that the wind direction was from 060 degrees, and its speed was 12 knots. About 1843, the wind speed had increased to 16 knots.

At 1856, the Phoenix Airport weather was, in part, wind from 090 degrees at 14 knots, with 10 miles visibility.

On the accident day in Phoenix, sunset occurred at 1859. The end of civil twilight was at 1924.

The ambient light condition inside and outside the airplane was evaluated on September 5. On this date sunset occurred at 1848, about 11 minutes earlier than on the day of the accident. The end of civil twilight occurred at 1914. The America West Airlines Operations Safety Director and the Cabin Safety Manager reported that during their September 5 inspection, which was performed about the time of the accident, there was sufficient light to clearly see.

1.7 AIRPORT AND GROUND FACILITIES

Runway 08 is oriented on a magnetic bearing of 078 degrees. In the vicinity of the runway threshold, the elevation is 1,109 feet mean sea level. The runway is 11,490 feet long and 150 feet wide. The runway has a concrete grooved surface, and it was dry at the time of the accident.

Design engineering terrain elevation and slope data was received from airport administration personnel. A comparison was made between the provided data and the Safety Board investigation team's observations of the actual terrain. No discrepancies were noted. The terrain has its maximum elevation at the runway crown, and it gradually slopes downward toward the runway edge. Thereafter, the terrain elevation continues to decrease on the taxiway apron and reaches its lowest point in the infield area where the airplane came to rest. No drainage culverts or berms existed along the accident airplane's rollout path.

1.8 FLIGHT RECORDERS

The cockpit voice and digital flight data recorders were examined by the Safety Board's Vehicle Recorder Laboratory in Washington, D. C.

1.8.1 Cockpit Voice Recorder.

The airplane was equipped with a Fairchild Model A-100A cockpit voice recorder (CVR), serial number 26340, which showed no evidence of structural damage. The interior of the recorder and the tape sustained no apparent heat or impact damage. A Dukane underwater locator beacon (ULB) was installed on the recorder. It was found to be inoperative when tested in the Safety Board's laboratory.

A transcript was prepared of the cockpit communications during the latter portion of the flight and accident sequence. The transcript starts at 1813:40 mountain standard time and ends at 1824:58. Thereafter, about 13 minutes of nonpertinent conversation between the pilots was

not transcribed. The transcript resumes at 1838:15, as the flight was vectored for landing on runway 08. The transcript covers the captain (pilot flying) and the first officer's (pilot not flying) preparation for approach, the descent, and vectoring for approach and landing. The transcript ends at 1844:03.

As evidenced by the recorded communications, the PF did not mention to the PNF that the #1 (or any) thrust reverser was inoperative (MEL'd). The PNF did not state to the PF, or otherwise discuss with the PF, that the #1 thrust reverser was inoperative (MEL'd). During the landing rollout, the required airspeed callouts were not made.

1.8.2 Digital Flight Data Recorder.

Safety Board laboratory personnel reported that the Allied Signal Model 980-4700-003 DFDR was found in good condition. About 1 minute 40 seconds of data pertinent to the accident was extracted and plotted. Also included, for comparison purposes, were selected parameters from the prior three landings.

The accident airplane's DFDR data indicated that about 4 seconds before the nose landing gear touched down, both thrust levers were brought to the idle position (0 degrees thrust lever angle (TLA)). As the nose gear touched down, both engine's thrust levers were brought to the full reverse position (-25 degrees TLA). During the next 8 seconds, the #1 thrust lever moved from the full reverse position to idle, then to the cruise position (+25 degrees TLA), and ultimately to the Take-Off/Go Around (TOGA) position, where it remained for 11 seconds before returning to the idle position. During this same period, the #2 thrust reverser remained at full reverse for 18 seconds, was moved to near the cruise position for about 2 seconds, and then returned to the idle position, concurrently with the #1 thrust lever. During the 11 seconds when the #1 engine was at TOGA thrust and the #2 engine was at full reverse, a right yawing motion occurred.

The DFDR indicated that the antiskid system was in the "on" position.

1.9 WRECKAGE AND IMPACT INFORMATION

The airplane's initial point of touchdown on runway 08 was not located. The site was not conspicuous among the array of observed tire tread marks near the touchdown zone.

Airport operations personnel inspected the runway during the evening of August 28. A set of light tire tracks was first discernable beginning about 2,000 feet beyond runway 08's threshold. These tire tracks, near the center of the runway, led to progressively darker tracks, consistent with heavy braking as the airplane drifted toward the south edge of the runway. The tracks were directionally oriented toward the accident airplane.

The Safety Board investigator's subsequent examination of the accident site revealed tracks consistent with the airplane's left and right main landing gear tires. In several locations the transfer marks/tracks made by these tires appeared symmetrical. With the exception of one nose gear tire that was found deflated after the accident, all tires had retained air pressure.

The tracks were prominent on the runway's right side and along the adjacent apron where an alternating dark and light pattern became visible. The pattern appeared consistent with anti-skid brake operation.

The magnetic bearing of the tire tracks at the pavement's edge was 082 degrees. Adjacent to this location an estimated 6-inch-deep (maximum depth) ground scar (swath) was found in the

hard-packed dirt infield. In the dirt, fragments from the airplane's nose landing gear strut assembly were found.

The airplane was found with its nose at ground level in the infield between the B-9 and B-10 intersections, on a magnetic bearing of 095 degrees. This location was approximately 7,650 feet east of the threshold. The airplane's nose was at the following approximate global positioning satellite coordinates: 33 degrees 26.414 minutes north latitude by 112 degrees 00.132 minutes west longitude. The lateral distance between the right side of the runway and the airplane's centerline was about 130 feet. There was no fire.

1.10 MEDICAL AND PATHOLOGICAL INFORMATION

The captain and first officer submitted breath alcohol and urine specimens for toxicological tests to an America West Airlines contract laboratory on August 28, 2002. The specimens tested negative for alcohol and screened drugs of abuse.

The three cabin attendants were also tested for alcohol and screened drugs of abuse. All tests were negative.

1.11 SURVIVAL FACTORS

The City of Phoenix Fire Department performed an internal review of its response to the accident. In summary, the Aviation Division's deputy chief reported that about 1845, fire station 19 received a "ring down" on the crash phone line from the control tower. The information received was "very sketchy at best." Some firemen reported hearing that "this was a drill" and some heard "this is not a drill." No other information was given over the crash phone as the tower hung up. Thereafter, fire equipment was dispatched. One unit pulled forward to the aircraft movement area line in front of the station and requested clearance to the drill. This unit did not know which ground frequency would handle the request as no information was given on the "ring down." At this time, the airport's ground controller advised the unit that it was not a drill and to proceed onto a taxiway where they would see the airplane. As the unit approached the airplane, occupants were observed evacuating via slides.

Fire department personnel secured the scene, treated injured persons, consulted with crewmembers, and verified that all occupants had deplaned. A fire line tape was placed around the entire airplane, and the fire command denied entry to the airplane without its permission.

The fire department's deputy chief reported that America West maintenance personnel started to remove slides and board the aircraft without permission from the fire department command. The command requested that the police department personnel assist with prevention of unauthorized entry. An FAA representative arrived on scene about 1950 and assumed on-scene control responsibilities.

1.11.1 Evacuation Slides and Usage.

Seconds after the airplane came to a stop the captain ordered an evacuation. The evacuation was accomplished using the four overwing emergency exits and the two forward door exits, 1L and 1R. Although all of the slides deployed during the evacuation, the two aft slides, 2L and 2R, were not used. No evidence was found indicating that any slide deployment malfunctions occurred.

Flight attendants indicated that the downward angle to which an exiting passenger would have been subjected upon using the rear slides was steep in the airplane's nose down pitch attitude.

It therefore was more prudent to evacuate using the forward slides.

The Safety Board investigator reviewed a videotape made by the City of Phoenix, Sky Harbor International Airport, of the fire department's accident scene response, and also reviewed still photographs showing the deployed evacuation slides. In pertinent part, the images show the relative angle between the airplane's longitudinal axis and the ground onto which the slides deployed. The photographs document that the aft slides touched the ground on one corner at the bottom of the slides.

1.11.2 Emergency Exit Light System, Cockpit.

A three-position toggle type switch labeled "EMER EXIT LT" is located in the cockpit's overhead panel. The switch partially controls activation of the airplane's emergency lights for the escape path and exit markers, overhead emergency lights, overwing escape route lights, and escape slide lights. When the switch is in the ARM position, emergency lights activate under specified conditions, such as when the airplane's normal aircraft electrical power system fails or when there is an interruption of electric power from specified sources.

The America West Airlines "Normal Procedures" checklist for "Preflight" requires that the cockpit crew position the emergency exit light switch in the "ARM" position before flight.

America West Airline mechanics, who had entered the cockpit during the nighttime recovery operation to start the APU and energize the brake system, reported observing the position of the overhead Emergency Light Switch in the cockpit. The switch was found in the "OFF" position.

During an interview conducted with the captain on September 4, 2002, he reported that when he exited the cockpit he observed that all of the emergency lights were on. He recalled seeing the Floor Lighting, Emergency Exit Signs in the cabin ceiling, and the Exit signs over the doors illuminated. After checking for remaining passengers, he returned to the cockpit and turned off the battery switches and the Emergency Exit Lights. The captain stated that he turned off the lights because he wanted the cabin to be dark so that any fire flaring up would be obvious.

1.11.3 Cabin Emergency Lights.

A guarded push button type switch labeled "LIGHT EMER" is located on the forward flight attendant's (purser's) panel in the forward cabin. Depressing this button performs the same function as positioning the cockpit's "EMER EXIT LT" switch to the "ON" position. According to America West operating procedures, it is the responsibility of the #1 flight attendant to "turn on emergency exit lights after releasing seat belt."

The first flight attendant located in the forward outboard jump seat reported that the entire light panel above the jump seat was "dead." He did not activate the emergency light switch because "it was too dark" to see it." The second flight attendant, located in the forward inboard jump seat, reported that she never saw the emergency lights turn on. She did see the exit sign lights over the exits. She reported that there was no aisle lighting.

The cabin emergency light system was examined. The location of the forward flight attendants' panel was observable in the ambient light condition with the cabin doors closed. When the switch guard was lifted and the emergency exit lights button was depressed, the emergency light system (ELS) illuminated the seat-mounted floor proximity escape path lights, the exit row lights, and the overhead exit signs. Due to the ambient light level, these lights were not needed to move about the cabin during the September 5, 2002, test that terminated at 1850.

In summary, the ELS was found functional when activated during the tests in all circuit configurations. The light bulbs from the "EMER EXIT LT" selector were found to be functional. Also, the cockpit control switch for that system was found functional in all configurations.

1.12 TESTS AND RESEARCH

Components from the airplane's nose landing gear strut, the brake control unit, the left and right thrust control units, the CVR and the DFDR, were removed from the airplane and examined. Additional examinations were performed regarding the thrust lever friction and thrust reverser system.

1.12.1 Nose Landing Gear Strut and Wheels.

The nose landing gear (NLG) strut assembly was found fractured into three pieces. Examination of the fractured surfaces revealed features consistent with bending overstress breakage, according to the Safety Board's Materials Laboratory.

The left tire bead was broken, and the tire was deflated. The right tire remained inflated. Both the inboard and outboard surfaces of the left tire had scoring marks around the entire circumference. The score marks were angled approximately 45 degrees from the direction of normal rotation. The right tire showed no damage.

A review of maintenance log entries for non-routine maintenance associated with the NLG strut, torque link, strut axle leakage or strut extension was undertaken for about the 5-month period preceding the accident. No evidence of non-routine maintenance was found. Also, a review of maintenance records for the A-checks completed in June and July 2002 indicated no non-routine maintenance related to NLG damage.

1.12.2 Brake and Anti-skid Components.

The Brake Steering Control Unit was removed from the airplane and examined. Two automated tests were conducted to check the function, integrity, and operation of the unit. No discrepancies were found, and the unit was found completely operational.

1.12.3 Throttle Control Unit.

The throttle control unit proportionally changes the mechanical movement from the thrust levers into an electrical signal that is sent to the FADEC. Both throttle control units were removed and functionally tested, with no discrepancies noted.

1.12.4 Thrust Lever Friction.

Both thrust levers were manipulated to evaluate friction in their manual movement. The friction forces of both levers in the accident airplane were observed to be similar to forces required to move levers in another similar airplane. Movement of the left thrust lever in a forward direction (from the maximum reverse position) showed that movement past the idle detent position required a nominal force; the lever did not easily slip over the detent.

1.12.5 Thrust Reverser System.

The #1 thrust reverser was found stowed and its deactivated status was noted on the airplane's Minimum Equipment List (MEL). A MEL placard (sticker) was observed on the forward

portion of the left-hand side of the thrust lever quadrant, directly forward of the thrust lever's TOGA position. All pertinent thrust reverser components were secured from usage by the specified insertion of lockout pins in a manner consistent with the America West Airlines maintenance procedures.

The #2 thrust reverser was found unlocked. It appeared to have functional capability.

1.13 ADDITIONAL INFORMATION

1.13.1 First Officer Statements.

Regarding the prelanding approach briefing, the first officer stated that the captain had given the briefing at the normal time during the descent, but that the inoperative thrust reverser was not discussed at that time. Additionally, there was no discussion about specific procedures to be followed during landing or rollout.

The first officer reported that, following touchdown, he noticed an increase in engine sound as the captain selected reverse thrust. He stated that a Master Caution Light was illuminated and a single chime was heard for a #1 thrust reverser fault. He did not consider this significant because the #1 thrust reverser had been deactivated per the MEL. He indicated that the airplane began to veer right, and the captain brought the engines out of reverse thrust. The first officer additionally reported that during this time his attention was focused outside the airplane, and that at this point he thought that they would stay on the runway, with drift being stopped or possibly a correction to the left already begun. Instead the airplane veered farther right, and he could see the airplane was going to depart the runway. The first officer stated he instinctively applied maximum brakes with both feet without a request from the captain. The first officer stated that he received no instructions from the captain during the accident sequence.

1.13.2 FAA Participant Statements.

The FAA participant, an aircrew program manager, A-320, verbally reported to the Safety Board investigator-in-charge, that while the #1 thrust reverser's inoperative status was not a defined approach briefing item, its inoperative (MEL'd) status should have been briefed during the approach because the airplane's deceleration performance during rollout would be impacted by an inoperative thrust reverser.

1.13.3 Parties.

Parties to the investigation include the FAA, America West Airlines, and the Air Line Pilots Association. Pursuant to the provisions of ICAO Annex 13, the French Bureau Enquetes-Accidents (BEA), through its technical advisor from the airplane's manufacturer, Airbus Industrie, provided additional technical assistance.

1.14 WRECKAGE RELEASE

The airplane wreckage was released in person to the America West Airlines Director of Safety on September 6, 2003.

Pilot Information

Certificate:	Airline Transport; Flight Instructor	Age:	59, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	Helicopter	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	Airplane Single-engine	Toxicology Performed:	Yes
Medical Certification:	Class 1 With Waivers/Limitations	Last FAA Medical Exam:	03/01/2002
Occupational Pilot:		Last Flight Review or Equivalent:	06/01/2002
Flight Time:	19500 hours (Total, all aircraft), 7000 hours (Total, this make and model), 227 hours (Last 90 days, all aircraft), 72 hours (Last 30 days, all aircraft), 6 hours (Last 24 hours, all aircraft)		

Co-Pilot Information

Certificate:	Airline Transport	Age:	40, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Right
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 1 With Waivers/Limitations	Last FAA Medical Exam:	08/01/2002
Occupational Pilot:		Last Flight Review or Equivalent:	02/01/2002
Flight Time:	11000 hours (Total, all aircraft), 800 hours (Total, this make and model), 169 hours (Last 90 days, all aircraft), 49 hours (Last 30 days, all aircraft), 6 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Airbus Industrie	Registration:	N635AW
Model/Series:	A320-231	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Transport	Serial Number:	092
Landing Gear Type:	Retractable - Tricycle	Seats:	156
Date/Type of Last Inspection:	07/01/2000, Continuous Airworthiness	Certified Max Gross Wt.:	156700 lbs
Time Since Last Inspection:	5658 Hours	Engines:	2 Turbo Fan
Airframe Total Time:	40084 Hours at time of accident	Engine Manufacturer:	International Aero Engines
ELT:		Engine Model/Series:	V2500-A1
Registered Owner:	Wilmington Trust Company, Trustee	Rated Power:	25000 lbs
Operator:	AMERICA WEST AIRLINES	Operating Certificate(s) Held:	Flag carrier (121)
Operator Does Business As:	America West Airlines	Operator Designator Code:	AWXA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	PHX, 1135 ft msl	Distance from Accident Site:	0 Nautical Miles
Observation Time:	1856 MST	Direction from Accident Site:	
Lowest Cloud Condition:	Scattered / 9000 ft agl	Visibility	10 Miles
Lowest Ceiling:	Broken / 13000 ft agl	Visibility (RVR):	
Wind Speed/Gusts:	14 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	90°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.78 inches Hg	Temperature/Dew Point:	32° C / 17° C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	HOUSTON, TX (IAH)	Type of Flight Plan Filed:	IFR
Destination:	Phoenix, AZ (PHX)	Type of Clearance:	IFR; VFR
Departure Time:	1803 CDT	Type of Airspace:	

Airport Information

Airport:	Phoenix Sky Harbor Intl. (PHX)	Runway Surface Type:	Concrete
Airport Elevation:	1135 ft	Runway Surface Condition:	Dry
Runway Used:	08	IFR Approach:	Visual
Runway Length/Width:	11490 ft / 150 ft	VFR Approach/Landing:	Full Stop; Straight-in

Wreckage and Impact Information

Crew Injuries:	1 Minor, 4 None	Aircraft Damage:	Substantial
Passenger Injuries:	1 Serious, 8 Minor, 145 None	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Serious, 9 Minor, 149 None	Latitude, Longitude:	33.440278, -112.002222

Administrative Information

Investigator In Charge (IIC):	WAYNE POLLACK	Report Date:	09/13/2005
Additional Participating Persons:	Robert M Warth; Federal Aviation Administration, CMO; Phoenix, AZ Jack Drake; America West Airlines, Inc.; Phoenix, AZ Mark A Solper; Air Line Pilots Association, Int'l; Goodyear, AZ		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov , or at 800-877-6799. Dockets released after this date are available at http://dms.nts.gov/pubdms/ .		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).