



# National Transportation Safety Board Aviation Accident Final Report

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|--------------------------------|-----------------------------------|-------------------------|-------------------|
| <b>Location:</b>               | Agana, GU                         | <b>Accident Number:</b> | DCA05MA095        |
| <b>Date &amp; Time:</b>        | 08/19/2005, 1418                  | <b>Registration:</b>    | N627US            |
| <b>Aircraft:</b>               | BOEING 747-200                    | <b>Aircraft Damage:</b> | Substantial       |
| <b>Defining Event:</b>         |                                   | <b>Injuries:</b>        | 2 Minor, 338 None |
| <b>Flight Conducted Under:</b> | Part 121: Air Carrier - Scheduled |                         |                   |

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## Analysis

During the initial approach, the red GEAR annunciator light above the gear lever illuminated, and the landing gear warning horn sounded after the gear handle was selected down and the flaps were selected to 25 degrees. During the go-around, the captain asked the second officer (SO), "what do you have for the gear lights?" The SO responded, "four here." When all gear are down and locked on the Boeing 747-200, the landing gear indication module located on the SO's instrument panel has five green lights: one nose gear light above four main landing gear lights. The crew then read through the "Red Gear Light Remains On (After Gear Extension)" emergency/abnormal procedure from the cockpit operations manual to troubleshoot the problem. Although the checklist twice presented in boldface type that five lights must be present for the gear to be considered down and locked, the crew did not verbalize the phrase either time. The captain did not directly request a count, and the SO did not verbally confirm, the number of gear down annunciator lights that were illuminated; instead, the flight crew made only general comments regarding the gear, such as "all gear," "all green," or "got 'em all." Because the crew believed that all of the gear annunciator lights were illuminated, they considered all gear down and locked and decided not to recycle the landing gear or attempt to extend any of the gear via the alternate systems before attempting a second approach. During all communications with air traffic control, the flight crew did not specify the nature of the problem that they were troubleshooting. Although the checklist did not authorize a low flyby, if the flight crewmembers had verbalized that they had a gear warning, the controller most likely would have been able to notify the crew of the nose gear position before the point at which a go-around was no longer safe. Multiple gear cycles were conducted after the accident, and the nose gear extended each time with all nose gear door and downlock indications correctly displayed on the landing gear indication module. Postaccident examination of the nose gear door actuator found that one of the two lock keys was installed 180 degrees backward. Although this improper configuration could prevent proper extension of the nose gear, the actuator had been installed on the accident airplane since 2001 after the actuator was overhauled by the operator. No anomalies were found with the landing gear indication module, the nose gear-operated door sequence valve, and the nose/body landing gear selector valve.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the flight crews' failure to verify that the number of landing gear annunciations on the second officer's panel was consistent with the number specified in the abnormal/emergency procedures checklist, which led to a landing with the nose gear retracted.

### Findings

Occurrence #1: WHEELS UP LANDING  
Phase of Operation: LANDING

#### Findings

1. LANDING GEAR, GEAR INDICATING SYSTEM - ACTIVATED
2. (C) CHECKLIST - NOT FOLLOWED - FLIGHTCREW
3. LANDING GEAR, NOSE GEAR
4. (C) GEAR EXTENSION - NOT VERIFIED - FLIGHTCREW

## Factual Information

### HISTORY OF FLIGHT

On August 19, 2005, about 1419 local time, Northwest Airlines (NWA) flight 74, a Boeing 747-200, N627US, landed on runway 06L with its nose gear retracted at Guam-Antonio B. Won Pat International Airport (GUM) Agana, Guam. An emergency evacuation was initiated several minutes after the airplane came to a stop on the runway. Of the 16 crewmembers and 318 passengers onboard, 2 received minor injuries during the evacuation. The airplane was substantially damaged. The flight was operating under the provisions of 14 Code of Federal Regulations (CFR) Part 121 and was en route from Tokyo-Narita International Airport, Narita, Japan. Visual meteorological conditions prevailed at the time of the accident.

The captain was the flying pilot. According to crewmember statements, the takeoff, climb, en route, descent, and initial approach phases of the flight were normal. According to the cockpit voice recorder (CVR), about 1403:28, the local controller (LC) cleared flight 74 for the visual approach to runway 6L and subsequently cleared the flight to land.

About 1405:56, the captain called for "gear down, flaps 20" and the first officer (FO) immediately responded "gear down." About 1406:36, the captain requested, "flaps 25, the landing check." Three seconds later, a sound similar to the landing gear warning horn started. The FO stated, "oh sorry," a crewmember stated, "we didn't get a gear," and then the captain requested, "put it back to 20." About 1406:47, the second officer (SO) stated "red gear light," and the landing gear warning horn sound stopped.

About 1406:54, the captain stated, "uh, tell 'em we're gonna have to go around. Hold out to the left here. Flaps ten." About 1407:02, the FO called the LC and advised, "tower, Northwest 74, we're gonna uh, do a go-around. We'd like to hold out to the west while we work on a problem." The LC then cleared the flight to fly the runway heading and climb and maintain 2,600 feet.

About 1407:27, the captain asked the SO, "what do you have for the gear lights?" The SO responded, "four here." The LC then advised the flight crewmembers to contact Guam departure.

About 1407:57, the controller asked, "your intentions?" to which the FO responded, "uh, we'd just like to uh, go someplace sir we can delay for a few minutes while we work on some light problems." The flight was then cleared to remain VFR.

About 1409:01, the captain instructed the FO, "okay you're gonna take the airplane here. I'm gonna work with him." The SO and the captain then started to complete the "Red Gear Light Remains On (After Gear Extension)" emergency/abnormal procedure in the cockpit operations manual. The SO began reading, "the landing gear lever is seated in the down detent," and the captain responded, "it is." Next, the SO stated, "okay press the landing gear annunciator gear primary switch," and the captain asked, "okay, you got all the gear ... green down, right?" to which the SO responded, "all gear" and then "yeah. Right there. Okay, if uh, gear down not illuminated."

About 1410:02, the SO read out loud the note in the procedure that stated that the gear could be recycled depending on the flight crew's assessment. The captain asked, "I think we'd cycle it one time, don't you?" The SO responded, "yeah," and the captain continued, "you see any reason not to cycle it?" The SO further responded, "no, I don't," and then the FO asked "what

gear are down and what are up?" Both the captain and SO responded, "all of 'em are down."

The captain continued, "you're getting green lights in primary. Hit alternate. You get green lights in alternate, all of 'em left ... on the gear." About 1410:41, the FO asked, "so tell me what the red light's for? Are your gear doors okay?" After a short discussion, the SO stated, "it's all good? It looks good back here."

About 1410:52, the FO stated "this is just technique. This is not airplane, but if I got good gear, I won't put 'em back up.... If I could determine, you know, why I've got a red light but is I've got gears down and green, I probably would take it that way," to which the captain responded, "okay." The SO read, "carrot here says if gear down annunciator light for any gear illuminates in either primary or alternate, that gear can be considered down and locked."

About 1411:26, the captain asked, "so it is down and locked?" to which the SO responded, "down and locked." The three flight crew continued to discuss the situation and then, according to postaccident crew statements, the SO handed the procedure to the captain.

About 1412:20, the captain read, "flybys are considered to be of no value. Okay, insure the landing gear lever is seated down, in the down detent. It is seated. All right, press the landing gear annunciator green primary. It's all green." He then continued reading the last statement in the procedure, "if gear down annunciator light for any one of the five gear is not illuminated, press the alternate. Well we got 'em all. You don't have to do that." The SO states, "we got 'em all. We don't have to do that." The captain reread the last statement and concluded, "we're down and locked," and the SO responded, "good to go."

About 1413:19, the captain called the controller and stated that the flight crewmembers had "sorted out the problem" and "we're ready to return for runway 6L." The flight was then cleared for a visual approach.

While on the visual approach, the captain stated, about 1414:54, "you're gonna have to pull the gear, the horn uh, indicator," and "you see any reason to declare or anything other than just normal here?" The SO responded, "not yet," and the captain agreed. The FO then stated, "you know we still don't know why it's that way, though, right?" and the captain responded, "no."

The FO continued, "okay, but we ran through it and it said gear's down and everybody's happy." The captain responded, "yeah, now if you want to read the thing, read it. We've got plenty of time. We've got 37 thousand pounds of gas. We're indicating green on both primary and alternate on the gear."

About 1415:27, the FO radioed the LC, and the flight was subsequently cleared to land on runway 6L. As the flight continued the approach, the captain asked, about 1416:07, "did you find that horn?" and the SO responded, "yep." The captain then stated, "okay, you can pull it." The flight crew continued the approach and completed all of the before landing checklist items.

About 1418:17, the CVR recorded a sound similar to touchdown, and, about 1418:22, the SO stated, "reversers normal." Three seconds later, the LC radioed "Northwest 74, go around. Uh, negative, uh, nosewheel." About 1418:26, the CVR recorded a sound similar to increasing engine RPM and the SO stating, "seventy percent," and then the FO and SO both stated "go around" multiple times. About 1418:37 the LC queried "Northwest 74, tower," but the FO radioed "we're unable."

About 1418:51, the CVR recorded the sound of impact, and then the captain stated "standby with the evacuation checklist." The FO then radioed the LC, asking if he could see any fire, and

the LC responded, "negative." About 1419:56, the captain informed the passengers via the public address system that the nose gear had collapsed and that they were to remain seated. The CVR stopped recording about 1420:35.

According to postaccident interviews, a flight attendant notified the captain of smoke in the forward cabin area. The captain advised the FO and SO to secure the cockpit, and he went downstairs to assess the situation. The captain stated that he "saw smoke coming from an access hatch and told the flight attendants to move the passengers aft of door two." He also directed the upper deck flight attendant to move the passengers from the upper deck down to the main cabin deck and aft of door two. When he noticed that the smoke was getting worse, he ordered the flight attendants to "open the doors, inflate the slides, and evacuate the airplane." All passengers and crew evacuated the airplane on the runway. Two passengers received minor injuries during the evacuation.

#### DAMAGE TO THE AIRCRAFT

The airplane was substantially damaged. The nose gear was retracted, and the nose gear doors were closed.

The following structure was worn and abraded as a result of contact with the runway: skin panels and stringers from station (Sta) 400 to 700 and stringers (Str) 44L to 44R, frame assemblies from Sta 400 to 500 and Str 44L to 44R, and the nose landing gear doors (left forward, left aft, right forward, right aft). The equipment cooling duct was completely destroyed from contact with the runway. The line replaceable units common to the E-1, E-2, and E-3 racks sustained heat and soot damage. The E-2 inertial navigation system shelf sustained severe fire damage. Wire bundles running vertically between the E2 and E3 equipment centers sustained heat and fire damage.

#### PERSONNEL INFORMATION

The captain, age 51, held an airline transport pilot certificate with airplane multiengine land, B747, and DC9 ratings and a commercial pilot certificate with an airplane single-engine land rating. At the time of the accident, the captain held a first-class medical certificate dated February 1, 2005, with no restrictions.

According to NWA employment and flight records, the captain was hired on April 13, 1984, and had accumulated a total of 7,850 hours at NWA, of which 2,350 hours were as pilot-in-command. In the 24 hours, 30 days, and 12 months before the accident, the captain had accrued a total of 9, 86, and 450 hours, respectively. He received his most recent recurrent training on April 21, 2005, and his most recent proficiency check on June 25, 2005. On the day of the accident, the captain had been on duty for 5 hours 2 minutes and had accumulated a total duty time of 24 hours 36 minutes in the 3 days before the accident.

The first officer, age 46, held a commercial pilot certificate with airplane multiengine land, airplane single-engine land, and instrument airplane ratings and held a flight engineer certificate (turbojet). At the time of the accident, the FO held a first-class medical certificate dated December 8, 2004, with no restrictions.

According to NWA employment and flight records, the FO was hired on August 21, 1987, and had accumulated a total of 8,695 hours at NWA with a total of 875 hours as second-in-command in Boeing 747 airplanes. In the 24 hours, 30 days, and 12 months before the accident, the FO had accrued a total of 9, 75, and 501 hours, respectively. He received his most

recent recurrent training on December 2, 2004, and his most recent line check on March 23, 2005. On the day of the accident, the FO had been on duty for 5 hours 2 minutes and had accumulated a total duty time of 24 hours 36 minutes in the 3 days before the accident.

The SO, age 61, held an airline transport pilot certificate with airplane multiengine land, A320, CE500, DC9, DC10, and N265 ratings; a commercial pilot certificate with an airplane single-engine land rating; and a flight engineer certificate (turbojet). At the time of the accident, the SO held a first-class medical certificate dated April 28, 2005, with the following restriction: "Holder must wear corrective lenses."

According to NWA employment and flight records, the SO was hired on July 18, 2004, and was previously an NWA captain but was retrained as an SO after he reached the mandatory pilot retirement age of 60. The SO had accumulated a total of 8,720 hours at NWA with 3,500 hours as an SO. He had accumulated 345 hours as an SO in B747 airplanes. In the 24 hours, 30 days, and 12 months before the accident, the SO had accrued a total of 9, 100, and 490 hours, respectively. He received his most recent training on November 23, 2004, and his most recent line check on January 10, 2005. On the day of the accident, the captain had been on duty for 5 hours 2 minutes and had accumulated a total duty time of 24 hours 5 minutes in the 3 days before the accident.

Flight, duty, and rest times for each of the accident pilots were documented for the 2-week period before the accident flight. All three pilots began their trips from Anchorage International Airport (ANC), Anchorage, Alaska, where they were based, although none of the pilots maintained a residence in Alaska. The captain and FO had the same flight schedule during this 2-week period.

#### METEOROLOGICAL INFORMATION

Visual meteorological conditions prevailed at the time of the accident. The GUM surface weather observation was wind from 350° at 4 knots, visibility 10 miles, broken clouds at 2,500 feet, and altimeter 29.83 inches of Mercury.

#### FLIGHT RECORDERS

The airplane was equipped with a Honeywell model 6022 SSCVR 120, 2-hour solid-state CVR. A transcript was prepared of the final 20 minutes 38 seconds of the 2-hour recording.

#### MEDICAL INFORMATION

In accordance with 14 CFR Part 121, Appendixes I-J, the captain, FO, and SO submitted to postaccident testing by the company for alcohol and five major drugs of abuse. All tests were negative.

#### TESTS AND RESEARCH

##### ON-SCENE GEAR OPERATION

The nose landing gear door actuator, the nose gear-operated door sequence valve, and the nose/body landing gear selector valve were removed from the airplane for further testing. After these components were removed, 25 "normal" (hydraulic) retraction/extension cycles were completed, and two extensions were completed using the alternate extension system (electrical motor). The nose gear extended each time, and all nose gear door and downlock indications were correct. After all of the landing gear cycle tests were completed, the landing gear indication module assembly was removed for evaluation.

## COMPONENT EXAMINATION

The nose gear-operated door sequence valve and the landing gear selector valve were examined at their respective manufactures. No significant discrepancies were found.

The landing gear indication module assembly was examined at Boeing's Equipment Quality Analysis (EQA) facility in Seattle, Washington. All of the indicator lamps illuminated sequentially and properly in response to selected switch input/positions. Electrical continuity testing found no anomalies, and insulation resistance tests confirmed proper circuit isolation and no unintended electrical paths.

The nose landing gear door actuator was examined at its manufacturer. The actuator was last overhauled in 2001 by NWA. Testing of the actuator in accordance with Functional Test Procedure 1U1198-5T found that the actuator was operating smoothly and that internal leakage was below the maximum allowable amount. The actuator retracted length measured 21.578 inches, but the nominal length was 21.630 to 21.650 inches. The actuator failed the actuator lock test and manual unlock test.

Disassembly of the actuator revealed the following: one of the two lock keys was installed 180° backward, several strands of metallic material was found in different areas of the actuator, the manual override crank gland was found lightly torqued with safety wire installed, the lock ram and lock ring were found damaged, and the piston rod seal was installed with nonstandard backup rings.

## ADDITIONAL INFORMATION

### BOEING 747 LANDING GEAR SYSTEM

During normal operation, landing gear extension and retraction are accomplished by using two separate hydraulic sources: system 1 for the nose and body gear, and system 4 for the wing gear. The gear is retracted (up) and extended (down) by a three-position landing gear lever located on the pilots' forward instrument panel. The landing gear lever also has an OFF position that depressurizes the landing gear hydraulic system and is selected following gear retraction after takeoff.

The three annunciator lights above the landing gear lever are as follows:

- Gear door open light (red) – illuminates when one or more landing gear doors are open.
- Gear down light (green) – illuminates when the landing gear is DN and locked.
- Gear light (red) – illuminates for the following conditions:
  - Landing gear not DN and locked and any thrust lever retarded to IDLE.
  - Landing gear in transit or not in agreement with the landing gear lever.
  - Landing gear UP with flaps selected to 25° or 30°.

Two separate systems consisting of primary and alternate sensors are used for landing gear position indications and warnings. The primary (PRIM) system has sensors to determine if the gear is down and locked, up and locked, tilted, and gear doors closed. The alternate system (ALT GEAR) has sensors to determine if the gear is down and locked, nose gear up, gear tilted, and gear doors closed. (There are no sensors to determine if the main gear is up and locked.)

The SO's landing gear indication module, located on the SO's upper right instrument panel,

contains the annunciator lights used to display the indications from the primary or the alternate system. The nose gear light and nose door open light are located above the block of lights for the four main gear (four each of gear, door, and tilt lights). If any of the sensors fail to agree with the position of the landing gear lever, the red gear light above the landing gear lever will remain illuminated.

The PRIM and ALT GEAR switches are located on the SO's landing gear indication panel. When these switches are pressed and held, the PRIM or ALT GEAR, TILT, and DOOR proximity switches are connected to the respective annunciator lights. Five gear DOWN lights will illuminate when the PRIM or ALT GEAR switch is pressed and held and the respective proximity switch senses that the landing gear is down and locked.

#### RED GEAR LIGHT AFTER GEAR EXTENSION

The NWA B747 Cockpit Operations Manual, Emergency / Abnormal Procedures checklist, pages 2.32.21 and 2.32.22 stated the following about the red gear light remaining ON after gear extension:

Condition: Red gear light on indicating that the landing gear is not in agreement with the landing gear lever.

Note: Fly-bys are considered to be of no value in confirming locked/unlocked condition of landing gear and are not authorized.

Insure that the landing gear handle is in the down position.

Press the LANDING GEAR annunciator GEAR PRIM switch. If gear down annunciator light for any one of the five (5) gear is not illuminated, press the GEAR ALT annunciator switch. If the same gear DOWN annunciator is not illuminated, that gear must be considered NOT down and locked.

Caution: If a gear down annunciator light (less than five (5) gear light indications) fails to illuminate during both PRIM and ALT checks, that gear must be considered NOT down and locked.

Note: Depending on the flight crew's assessment of the situation, the landing gear may be recycled using the normal system prior to initiating the "Alternate Landing Gear Operation" procedure.

Use "Alternate Landing Gear Operation" procedure, if required.

If gear DOWN annunciator light for any gear illuminates in either PRIM or ALT, that gear can be

considered down and locked.

#### LANDING GEAR AURAL WARNING SYSTEM

The NWA B747 cockpit operations manual stated that an aural warning horn will sound when the landing gear is not down and locked under the following conditions:

With the flaps in a maneuvering detent (1 thru 20 degrees), any time a thrust lever is

retarded

to IDLE. The pilot can override the warning horn with the Warning Horn Cutout Switch located

on the pilot's rear pedestal.

With flaps 25 or 30 degrees and the thrust levers in any position. The pilot cannot override the

warning horn under these circumstances.

#### LANDING GEAR WARNING HORN CIRCUIT BREAKER

An aural warning circuit breaker is located on the P6 circuit breaker panel. When this circuit breaker is pulled, all warning bells, horns chimes, and wailers are inoperative.

The NWA B747 cockpit operations manual, Emergency/Abnormal Procedures, page 2.1.4, stated, in part, "the flight crew must also use good judgment before pulling and resetting a circuit breaker, or resetting a tripped circuit breaker, if done outside the guidelines of a specific procedure."

#### PREVIOUS GEAR MALFUNCTION

Another flight crew experienced a landing gear malfunction on the accident airplane on August 9, 2005. During that event, the flight crewmembers indicated that they saw a red gear warning light on the forward instrument panel when the gear was extended. When either the PRIM or ALT GEAR switches was pushed on the SO's landing gear indication module, the nose GEAR DOWN green light did not illuminate, but the four main GEAR DOWN green lights illuminated. The crew elected to recycle the gear, after which all five gear extended normally with normal indications (five green gear lights), and the airplane landed without incident. The FO stated that she did not think that she had seated the landing gear lever firmly enough in the DOWN position, and, as a result, the captain did not enter this event in the airplane's maintenance logbook.

#### RELATED ACCIDENTS

On March 5, 1999, an Air France Boeing 747-200 freighter landed with its nose gear retracted at Chennai Airport, Chennai, India. The crew was not injured, but the airplane was destroyed by postcrash fire. According to the accident report, the flight crew had concluded that all gear were down and locked despite a red GEAR light on the forward instrument panel. The crew had failed to recognize that the green GEAR DOWN light for the nose gear was not illuminated and assumed that the red GEAR light on the forward instrument panel was a false indication. The gear was recycled, but an alternate extension was not attempted.

On October 19, 1994, Ansett Australia Airlines flight 881, a Boeing 747-300, landed with its nose gear retracted at Sydney-Kingsford Smith International Airport, Sydney, Australia.

None of the 274 passengers and crew aboard was injured, but the airplane was substantially damaged. According to the report on this accident, the airplane returned to Sydney after having shut down the number 1 engine because of an oil leak. When the landing gear and flaps were extended for landing, the landing gear warning horn began to sound. Although the SO's panel indicated that the nose gear was not down and locked, the SO did not recognize this

error, and subsequent communication and coordination among the flight crew did not detect the error. The failure of the gear to extend resulted from a hydraulic pressure failure, although the gear would likely have extended with more time. The crew did not attempt to extend the gear via the alternate extension system.

On November 1, 1972, a Japan Air Lines Boeing 747-200 landed with its nose gear retracted at Anchorage International Airport. None of the 281 passengers and crew aboard was injured, but the airplane was substantially damaged. According to the report, the flight deck indications reflected that the nose gear was not down, but the crew did not cycle the gear or attempt to use the alternate gear extension procedures. The airplane landed with the nose gear retracted (for undetermined reasons) but with the nose gear doors open.

**BOEING OPERATIONS MANUAL BULLETIN**

On January 21, 2000, the Boeing Company issued an operations manual bulletin that revised the procedures for the Emergency/Abnormal checklist as follows: "Red Gear Light Remains ON After Gear Extension."

The emergency/abnormal procedures checklist used by NWA flight crews at the time of the accident for "Red Gear Light Remains ON After Gear Extension" incorporated the changes recommended in the Boeing bulletin and emphasized "five (5) gear light indications," in bold print, twice in the checklist.

**POSTACCIDENT CHANGES**

Subsequent to the accident, NWA issued a flight operations general bulletin, "Landing Gear Indications," to all NWA B747-200 pilots. That bulletin reviewed the logic, operation, and cockpit indications of the landing gear system. NWA also modified the cockpit operations manual emergency/abnormal procedures checklist to include a color graphic of the SO's landing gear annunciator panel. In the graphic, each of the five landing gear annunciators is numbered, starting with the nose gear, and the text associated with each illuminated annunciator appears in green rather than gray.

**Pilot Information**

|                                  |   |  |                            |
|----------------------------------|---|--|----------------------------|
| <b>Certificate:</b>              | Airline Transport; Commercial   | <b>Age:</b>                              | 50, Male                   |
| <b>Airplane Rating(s):</b>       | Multi-engine Land; Single-engine Land   | <b>Seat Occupied:</b>                    | Left                       |
| <b>Other Aircraft Rating(s):</b> | None  | <b>Restraint Used:</b>                   | Seatbelt, Shoulder harness |
| <b>Instrument Rating(s):</b>     | Airplane  | <b>Second Pilot Present:</b>             | Yes                        |
| <b>Instructor Rating(s):</b>     | None  | <b>Toxicology Performed:</b>             | No                         |
| <b>Medical Certification:</b>    | Class 1 Without Waivers/Limitations   | <b>Last Medical Exam:</b>                | 02/01/2005                 |
| <b>Occupational Pilot:</b>       | Yes   | <b>Last Flight Review or Equivalent:</b> | 04/20/2004                 |
| <b>Flight Time:</b>              | 7850 hours (Total, all aircraft), 7850 hours (Total, this make and model), 2350 hours (Pilot In Command, all aircraft), 184 hours (Last 90 days, all aircraft), 86 hours (Last 30 days, all aircraft), 12 hours (Last 24 hours, all aircraft) |  |                            |

## Co-Pilot Information

|                                  |  |  |                            |
|----------------------------------|--|--|----------------------------|
| <b>Certificate:</b>              | Commercial; Flight Engineer  | <b>Age:</b>                              | 46, Male                   |
| <b>Airplane Rating(s):</b>       | Multi-engine Land; Single-engine Land  | <b>Seat Occupied:</b>                    | Right                      |
| <b>Other Aircraft Rating(s):</b> | None   | <b>Restraint Used:</b>                   | Seatbelt, Shoulder harness |
| <b>Instrument Rating(s):</b>     | Airplane   | <b>Second Pilot Present:</b>             | Yes                        |
| <b>Instructor Rating(s):</b>     | None   | <b>Toxicology Performed:</b>             | No                         |
| <b>Medical Certification:</b>    | Class 1 Without Waivers/Limitations  | <b>Last Medical Exam:</b>                | 12/08/2004                 |
| <b>Occupational Pilot:</b>       | Yes  | <b>Last Flight Review or Equivalent:</b> | 03/23/2005                 |
| <b>Flight Time:</b>              | 9100 hours (Total, all aircraft), 8695 hours (Total, this make and model), 208 hours (Last 90 days, all aircraft), 75 hours (Last 30 days, all aircraft), 12 hours (Last 24 hours, all aircraft) |  |                            |

## Flight Engineer Information

|                                  |  |  |                            |
|----------------------------------|--|--|----------------------------|
| <b>Certificate:</b>              | Airline Transport; Commercial; Flight Engineer   | <b>Age:</b>                              | 61                         |
| <b>Airplane Rating(s):</b>       | Multi-engine Land; Single-engine Land  | <b>Seat Occupied:</b>                    | Rear                       |
| <b>Other Aircraft Rating(s):</b> | None   | <b>Restraint Used:</b>                   | Seatbelt, Shoulder harness |
| <b>Instrument Rating(s):</b>     | Airplane   | <b>Second Pilot Present:</b>             | Yes                        |
| <b>Instructor Rating(s):</b>     | None   | <b>Toxicology Performed:</b>             | No                         |
| <b>Medical Certification:</b>    | Class 1 With Waivers/Limitations   | <b>Last Medical Exam:</b>                | 04/28/2005                 |
| <b>Occupational Pilot:</b>       | Yes  | <b>Last Flight Review or Equivalent:</b> |                            |
| <b>Flight Time:</b>              | 8720 hours (Total, all aircraft), 345 hours (Total, this make and model), 4110 hours (Pilot In Command, all aircraft), 163 hours (Last 90 days, all aircraft), 100 hours (Last 30 days, all aircraft), 9 hours (Last 24 hours, all aircraft) |  |                            |

## Aircraft and Owner/Operator Information

|                               |                          |                                    |                    |
|-------------------------------|--------------------------|------------------------------------|--------------------|
| Aircraft Manufacturer:        | BOEING                   | Registration:                      | N627US             |
| Model/Series:                 | 747-200                  | Aircraft Category:                 | Airplane           |
| Year of Manufacture:          |                          | Amateur Built:                     | No                 |
| Airworthiness Certificate:    | Normal; Transport        | Serial Number:                     | 21709              |
| Landing Gear Type:            | Retractable - Tricycle   | Seats:                             |                    |
| Date/Type of Last Inspection: | AAIP                     | Certified Max Gross Wt.:           | 816000 lbs         |
| Time Since Last Inspection:   |                          | Engines:                           | 4 Turbo Fan        |
| Airframe Total Time:          | 95270 Hours              | Engine Manufacturer:               | Pratt & Whitney    |
| ELT:                          | Installed, not activated | Engine Model/Series:               | JT9D-7Q            |
| Registered Owner:             | NORTHWEST AIRLINES INC   | Rated Power:                       | 53000 lbs          |
| Operator:                     | NORTHWEST AIRLINES INC   | Air Carrier Operating Certificate: | Flag carrier (121) |
| Operator Does Business As:    |                          | Operator Designator Code:          | NWAA               |

## Meteorological Information and Flight Plan

|                                  |                      |                               |               |
|----------------------------------|----------------------|-------------------------------|---------------|
| Conditions at Accident Site:     | Visual Conditions    | Condition of Light:           | Day           |
| Observation Facility, Elevation: |                      | Observation Time:             |               |
| Distance from Accident Site:     |                      | Direction from Accident Site: |               |
| Lowest Cloud Condition:          |                      | Temperature/Dew Point:        | 29° C / 25° C |
| Lowest Ceiling:                  | Broken / 2500 ft agl | Visibility                    | 10 Miles      |
| Wind Speed/Gusts, Direction:     | 4 knots, 350°        | Visibility (RVR):             |               |
| Altimeter Setting:               | 29.83 inches Hg      | Visibility (RVV):             |               |
| Precipitation and Obscuration:   |                      |                               |               |
| Departure Point:                 | TOKYO (RJAA)         | Type of Flight Plan Filed:    | IFR           |
| Destination:                     | AGANA, GU (PGUM)     | Type of Clearance:            | IFR           |
| Departure Time:                  |                      | Type of Airspace:             |               |

## Airport Information

|                      |                               |                           |           |
|----------------------|-------------------------------|---------------------------|-----------|
| Airport:             | Guam-Antonio B. Won Pat (GUM) | Runway Surface Type:      | Concrete  |
| Airport Elevation:   |                               | Runway Surface Condition: | Dry       |
| Runway Used:         | 06L                           | IFR Approach:             | Visual    |
| Runway Length/Width: | 10015 ft / 150 ft             | VFR Approach/Landing:     | Full Stop |

## Wreckage and Impact Information

|                            |                   |                             |             |
|----------------------------|-------------------|-----------------------------|-------------|
| <b>Crew Injuries:</b>      | 1 Minor, 15 None  | <b>Aircraft Damage:</b>     | Substantial |
| <b>Passenger Injuries:</b> | 1 Minor, 323 None | <b>Aircraft Fire:</b>       | None        |
| <b>Ground Injuries:</b>    | N/A               | <b>Aircraft Explosion:</b>  | None        |
| <b>Total Injuries:</b>     | 2 Minor, 338 None | <b>Latitude, Longitude:</b> |             |

## Administrative Information

|  |  |                      |            |
|--|--|----------------------|------------|
| <b>Investigator In Charge (IIC):</b>     | Joseph M Sedor   | <b>Adopted Date:</b> | 12/30/2008 |
| <b>Additional Participating Persons:</b> | Vikki Anderson; FAA; Washington, DC<br>Brit Etzold; ALPA - NWA; Bloomington, MN<br>Ross Hunter; AMFA; MN<br>Todd Tilbury; NWA; Eagan, MN<br>Richard Anderson; Boeing; Renton, WA   |                      |            |
| <b>Publish Date:</b>                     | 12/30/2008   |                      |            |
| <b>Investigation Docket:</b>             | 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 <a href="mailto:pubinq@ntsb.gov">pubinq@ntsb.gov</a> , or at 800-877-6799. Dockets released after this date are available at <a href="http://dms.nts.gov/pubdms/">http://dms.nts.gov/pubdms/</a> . |                      |            |

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