Aviation Investigation Final Report

Location:	LOS ANGELES, California	**Accident Number:**	LAX99FA218
Date & Time:	June 6, 1999, 23:16 Local	**Registration:**	N751PR
Aircraft:	Boeing 747-4F6B	**Aircraft Damage:**	Minor
Defining Event:		**Injuries:**	425 None
Flight Conducted Under:	Part 129: Foreign		

Analysis

At night, a Boeing 747-4F6B, N751PR, taxied into a Boeing 747 SP-44, F-GTOM. During the collision, N751PR was proceeding westbound on taxilane "C" for its planned departure for Manila. F-GTOM had landed from France and was standing short of its assigned gate 101. F-GTOM was oriented in a northwesterly direction, and its left wing was extending onto taxilane "C". Six ground service personnel were in proximity to F-GTOM, awaiting the connection of a tow tractor to pull it into the gate at the Tom Bradley International Terminal (TBIT). During the collision sequence, N751PR impacted the aft portion of F-GTOM's left wing. N751PR's right wing's winglet was severed off and F-GTOM's left wing was substantially damaged.

ATC had cleared the departing N751PR to taxi past the standing F-GTOM and make a 90-degree turn onto a nearby taxiway. The ground crew's wing walkers for the standing airplane were aware that its left wing was partially blocking taxilane "C." One of the wing walkers issued its company-authorized "engine operating" signal that was observed by N751PR's crew. This nonstandard signal was interpreted by the departing airplane's crew as an "all clear to taxi" signal in accordance with the standard hand signals published in the FAA's Aeronautical Information Manual and by its airline.

The collision occurred as the departing airplane commenced a sharp left turn, from the centerline of taxilane "C" toward a perpendicular taxiway. During the turn the effective length of the airplane's wing increased. The right wing tip was not visible to the captain, and he relied upon his first officer and crewmembers to monitor its proximity to the standing airplane. However, after passing abeam the standing airplane's empennage and observing the wing walker's "all clear signal," the first officer redirected his attention toward their new course and

away from the standing airplane's left wing.

Due to a lack of available ground area, and to accommodate the airport's need for additional airplane movement areas, the FAA had approved a reduction in clearance between the terminal gates and the adjacent taxiway/taxilane. Airport management was aware of the collision hazard related to the proximity between taxilane "C" and adjacent terminal gates. During the previous 5-year-period, three other collisions had occurred between Boeing 747 airplanes on the taxilane.

TBIT airport management personnel were responsible for enforcing published airport rules that required the arriving Boeing 747 SP-44 (F-GTOM) to power into gate 101, which was equipped with an operative docking light guidance system. However, this guidance system had not been used by the contract ground service company for several years. The TBIT management personnel failed to enforce the policy and allowed the ground service personnel to stop the arriving F-GTOM short of gate 101 thus partially blocking taxilane "C." The ground personnel, using their outdated airport rules manual (that directed a tow-in procedure), planned to utilize a tow tractor to pull the airplane the remaining distance to the gate. This was contrary to the revised manual, which required a power-in procedure. Airport management had failed to ensure that all manual holders were using updated versions of the manual.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: Airport management's failure to ensure that its current operating procedure, which required the arriving airplane to power into the terminal gate, was being used. Also causal was (1) the ground service company's utilization of an outdated arrival procedure that directed the arriving airplane to stop short of the gate, thereby obstructing the taxilane; and (2) the ground service company's utilization of a nonstandard marshalling hand signal which was, accordingly, misinterpreted by the departing airplane's crew. A contributing factor was the departing airplane's first officer's misjudged evaluation of wing tip clearance.

Findings

Occurrence #1: COLLISION BETWEEN AIRCRAFT (OTHER THAN MIDAIR)
Phase of Operation: TAXI - TO TAKEOFF

Findings
1. LIGHT CONDITION - BRIGHT NIGHT
2. AIRPORT FACILITIES,TAXIWAY CONDITION - CONGESTED
3. (C) AIRPORT OPERATIONS - IMPROPER - AIRPORT PERSONNEL
4. (C) IMPROPER USE OF PROCEDURE - GROUND PERSONNEL
5. WING,WINGLET - CUT/SEVERED
6. UNSAFE/HAZARDOUS CONDITION - NOT RECOGNIZED - PILOT IN COMMAND
7. (F) INFORMATION UNCLEAR - GROUND PERSONNEL
8. (F) DISTANCE - MISJUDGED - COPILOT/SECOND PILOT
9. VISUAL/AURAL PERCEPTION - COPILOT/SECOND PILOT
10. INTERPRETATION OF INSTRUCTIONS - CONFUSING - COPILOT/SECOND PILOT
11. (C) INFORMATION UNCLEAR - GROUND PERSONNEL

Factual Information

HISTORY OF FLIGHT

On June 6, 1999, about 2316 Pacific daylight time, a Boeing 747-4F6B, N751PR, collided on the ground with a Boeing 747 SP-44, F-GTOM, at the Los Angeles International Airport (LAX), Los Angeles, California. When the collision occurred N751PR, operated by Philippine Airlines as flight 103, was taxiing for takeoff with an intended destination of Manila, Philippines. F-GTOM, operated by Corsair as flight 942, was parking following its arrival from Paris, France. Onboard the Philippine airplane were 4 flight deck crewmembers, 16 cabin attendants, and 405 passengers. None of the 425 occupants were injured. Onboard the Corsair airplane were 4 flight deck crewmembers, 9 cabin attendants, and 261 passengers. None of the 274 occupants were injured. In close proximity to the Corsair airplane were two United Airlines mechanics and four Hudson General LLC ground support personnel. None was injured. Both airplanes were operated as scheduled, international, passenger flights under 14 CFR Part 129. Visual meteorological conditions prevailed during the nighttime collision that occurred as the Philippine airplane taxied for takeoff in a westerly direction on taxilane "C," and collided with the Corsair airplane, which had stopped in a northwesterly direction short of its assigned gate 101, at the Tom Bradley International Terminal (TBIT). The Philippine airplane received minor damage. Its right winglet was severed. The Corsair airplane's left wing was substantially damaged. (All time references in this report are converted to Pacific daylight time, and are based upon the 24-hour clock.)

F-GTOM (Corsair) Arrival and Delayed Parking.

About 1110, F-GTOM departed from Paris, and about 2236, it landed at LAX's runway 25L. The crew advised Federal Aviation Administration (FAA) air traffic control tower personnel (ATC) that its assigned arrival gate was 101. (See the Jeppesen airport diagram and the airport layout charts for a view of the taxiways, taxilanes, and gate locations.) At 2236:41, ATC advised the crew that gate 101 was occupied (by N751PR), and to hold short of the gate. The crew acknowledged the clearance and held its position.

N751PR (Philippine) Delayed Pushback.

N751PR's scheduled 2230 pushback from TBIT gate 101 was delayed because of an onboard passenger medical emergency. About 2301, N751PR's crew advised ATC that their airplane was ready to be pushed back from the gate. ATC issued N751PR instructions to pushback in a tail west direction (onto taxi lane "C") for a runway 25R departure. The crew repeated the pushback instructions to ATC, to which ATC stated, "that's correct."

The captain reported to the National Transportation Safety Board investigator that he repeated

the ATC pushback instructions to the tug driver responsible for the pushback. The captain stated that the driver confirmed receipt of the instructions. Thereafter, the tug driver initiated the pushback in a direction opposite that of the captain's instructions.

ATC observed that N751PR's ground service crew was pushing the airplane in a tail east direction. At 2305:19, ATC amended its clearance and instructed the crew to continue the easterly pushback until the airplane was positioned south of the American satellite, east of "C-10." The pushback process continued, and the ground crew disconnected its tow tractor from N751PR when it was located south of the American satellite.

F-GTOM (Corsair) Taxi to Parking, Procedure, and Captain's Statement.

At 2311, ATC instructed F-GTOM to taxi to gate 101 via a left turn on taxiway "B" and a right turn at "taxiway Charlie ten." The crew repeated the instruction and proceeded toward the gate. En route, F-GTOM taxied in a northerly direction and crossed in front of the west facing N751PR, which was holding on taxi lane "C" to the east of "C-10."

During the subsequent accident investigation, on June 9, 1999, the Corsair captain reported that he followed the lead-in line toward the terminal building as he approached TBIT gate 101. The airplane's taxiing was stopped upon observing a stop signal from his ground marshaller.

Within about 45 minutes after the accident, the captain provided a statement to a Los Angeles City Airport Police Bureau uniformed officer. In pertinent part, the captain reported that a ramp agent (marshaller) had ordered him to stop taxiing the airplane in order to connect the tow bar.

In another statement, the captain wrote, "so we stopped the plane, set the parking brake, shut down all the engines. The ramp agent connected [a communication line] to the aircraft. At this time we felt a shock...." The captain also reported that during this sequence of events the airplane's navigation lights and the beacons remained "on."

The captain also reported that he had observed (on the side of the building at TBIT gate 101) that the guidance system light box (aka the docking light station) was "completely dark" and "no lights were on." (The docking station is designed to provide lateral guidance and closure information to the flight crew when power-in procedures are used to taxi the airplane to the gate.)

The captain indicated to the Safety Board investigator during the interview that contrary to the printed statement on the Jeppesen airport diagram chart, he did not advise ground control that his airplane was not completely blocked at the terminal gate or that his airplane was partially obstructing taxi lane "C." The captain asserted that, until the collision occurred, he was not aware his airplane needed to be towed to the gate.

United Airlines Mechanics' Statements.

Two United Airlines mechanics, which were under contract with Corsair to provide a walk around inspection of the airplane and related duties upon its arrival, reported that they observed the Corsair airplane approach TBIT gate 101 directly on the lead-in line.

As the Corsair airplane approached the gate, a Hudson ground service employee directed the flight crew to stop taxiing. The airplane came to a stop and all engines were shutdown. A tow tractor was already positioned in front of the gate in anticipation of the Corsair airplane's arrival. One of the mechanics plugged in his headset and began communicating with the Corsair crew.

The mechanic reported that the first communication he made with a flight crewmember was "ground to cockpit." A crewmember replied, "this is cockpit." Then the mechanic reported that he said "set brakes," because he planned to insert the bypass pin into the nose gear to lock out the nose steering.

The collision occurred less than 1 minute after the Corsair airplane had come to a stop. (The FAA participant reported that the mechanic's (head set operator's) "set brakes" instruction should have alerted the captain that the airplane was to be towed. The instruction typically given to a captain when the airplane has reached the gate is "chocks in" to signal to the captain that it is safe to release the brakes.)

N751PR (Philippine) Taxis toward the Departure Runway.

At 2313:17, ATC issued the following clearance to the crew of N751PR, which was holding its position on taxilane "C" at "C-10:" "...when able taxi ahead on charlie to papa turn left at papa onto bravo eastbound taxi to runway two five right." A N751PR crewmember read back the clearance. According to the captain, the airplane then taxied at a slow rate of speed via taxi lane "C's" centerline in a westerly direction toward taxiway "P."

N751PR (Philippine) Taxi procedure and Captain's Statement.

The captain and his crewmembers indicated that they observed the Corsair airplane, and they were aware that a few minutes earlier it had taxied to TBIT gate 101. The captain stated to the Safety Board investigator that he was handling the airplane's controls. He indicated that he and his crew observed a ground service employee (wing walker) with a lighted night wand standing near the Corsair airplane's tail. The wing walker was observed making a signal that the Philippine crew reported interpreting as an "all clear to taxi" sign for their airplane. Accordingly, the Philippine captain continued taxiing past the Corsair airplane. The captain stated that he was certain he was taxiing on the centerline, and then he commenced a left (southbound) turn toward taxiway "P," pursuant to his clearance. The first officer was monitoring the right wing tip's clearance. The collision occurred upon turning about 30 degrees of arc. The estimated speed of the airplane during the turn was between 6 and 8 knots. About 2316, the crew advised ATC that "...we have hit something I mean our right wing tip."

Philippine First Officer's Statement.

The first officer reported that he observed a marshaller behind the Corsair airplane. The marshaller signaled to go ahead. The first officer stated, "I cleared our right wing as we passed behind the parked Corsair 747. Then we started our turn to the left towards taxiway 'P.' I looked towards the direction of our turn. Then we felt a shudder during the turn."

Philippine Captain's Explanation.

The captain indicated that the Corsair's navigation lights were illuminating. However, neither its upper nor lower beacon lights were visible.

According to the captain, he realized that he was close to the Corsair airplane, so he further reduced his taxi speed to give his crew more time to observe the situation. He was aware that he had not received any cautionary statement from ATC regarding the Corsair's position as possibly blocking the taxiway, so he had no doubt that he was in the clear. Additionally, his crew observed a marshaller (also known as a wing walker) positioned near the right-hand tail side of the Corsair airplane. The marshaller was holding a lit wand and was signaling by waving the wand in a manner to indicate that the airplane should continue taxiing forward; it was a motion to alert the crew that it was "clear" to proceed.

The captain reiterated his belief that his path was clear upon stating, "four pairs of trained eyes in the cockpit could not have possibly mistaken a stop from a go signal." The captain stated that the marshaller never issued the "stop" taxi signal. However in retrospect, he wondered whether the marshaller had given him "a wrong signal."

The captain additionally reported that the marshaller was observed with one lit wand. The wand was in the marshaller's left hand, and it was being waved in a counter-clockwise direction.

As an afterthought, the captain reported that it was possible the marshaller, whom he and his crew observed located in proximity to the Corsair airplane's right horizontal stabilizer, may have initially been gauging only the decreasing distance between the approaching Philippine airplane's right wing tip and the Corsair's tail. The marshaller's signal may have only indicated the fact that there was adequate room for the Philippine airliner to pass the Corsair's tail.

None of the Philippine crew indicated that they ever observed a second marshaller positioned near the Corsair airplane's left wing. Also, none stated that they had observed anyone at any location near the Corsair airplane attempt to stop their taxiing by motioning using the customary signalman's stop signal.

INJURIES TO PERSONS

None of the 699 occupants onboard the airplanes were injured during the collision. None of the 6 ground service personnel were injured when airplane wreckage was blown across the tarmac by jet blast from the turning Boeing 747-4F6B.

PERSONNEL INFORMATION

Flight Crew.

The captains from both airplanes reported having previous experience parking at LAX. The Corsair captain stated that he was not familiar with the parking procedure at the TBIT gate 101.

The Corsair captain also reported that his total flying experience was 12,046 hours. His experience flying the Boeing 747-SP was not indicated. During the preceding 90-day period, he had flown the airplane for 182 hours.

The Philippine captain's total flying experience was 19,700 hours. His experience flying the Boeing 747-400 was 650 hours. During the preceding 90-day period, he had flown the airplane for 180 hours.

The Philippine first officer reported that his total flying experience was 6,000 hours. His experience flying the Boeing 747-400 was 885 hours. During the preceding 90-day period, he had flown the airplane for 290 hours.

Ground Support Personnel, and Training.

The two United Airlines mechanics had no marshalling responsibility. The Corsair airplane was marshaled in by employees of Hudson General LLC, the ground service company with whom Corsair management had contracted to render parking and related services.

Hudson's on-scene ground support operation for the Corsair airplane consisted of the following persons being present: one supervisor, one lead marshaller, and two wing walkers. Pertinent background, employment, and training information were reviewed for these persons. No discrepancies were noted.

AIRCRAFT INFORMATION

Visual Angles.

Boeing Company data indicates that from the captain's left seat position in a Boeing 747-400, the right winglet is not visible. It is visible from the first officer's right seat position.

Regarding the visual angle from the cockpit of a Boeing 747 SP, the Boeing Company indicates that in order for the flight crew to observe an object on the ground directly ahead of the

airplane, it must be located about 84 feet 8 inches in front of the pilot's eye position. Or, when measured from the airplane's nose gear location, the object must be 92 feet 4 inches in front of the gear.

Ground Distance, Boeing 747 SP to Gate.

LAX airport management provided measurements of the available distance between the Boeing 747 SP's nose gear stop line that was observed painted on the ground in front of TBIT gate 101, and the location where a signalman could physically stand at a marshalling location in front of the terminal building. The management indicated that the distance was approximately 60 feet.

Wingspan.

According to the Boeing Company, the wingspan of a Boeing 747-400 airplane (with winglets) is 211 feet 5 inches, when empty. When operating at its maximum gross weight and fully loaded with fuel, its wingspan (the maximum distance from wingtip to wingtip) becomes 213 feet 0 inches, as the fueled wings bend downward. The distance between the airplane's longitudinal axis (centerline) and each wingtip is, therefore, 106.5 feet.

Wing Growth.

Due to the Boeing 747-400's swept wing design and its landing gear geometry, when the airplane turns sharply, obstacles (such as a building or another same elevation wingtip) located within 12 feet of the airplane's wingtip can be impacted. Effectively, during a sharp turn a wing "grows" 12 feet because it swings outward, relative to the airplane's point of rotation.

The Boeing Company indicates that when turning, a pilot must therefore assure himself that this "extra" clearance exists. The minimum wing tip clearance required to avoid obstacle contact during a sharp turn is 106.5 feet plus 12 feet, or a total of 118.5 feet.

METEOROLOGICAL INFORMATION

In pertinent part, about the time of the accident LAX reported its weather as follows: Wind from 220 degrees at 4 knots; visibility 7 miles; scattered clouds at 1,000 feet; and temperature/dew point of 61/55 degrees Fahrenheit. No precipitation was reported.

COMMUNICATION

Neither pilot reported experiencing any malfunction of communications capability. No ATC communication impediments were reported.

AIRPORT AND GROUND FACILITIES

Docking Lights.

LAX airport management reported that several years prior to the accident, the airport installed an airplane docking light system on the side of the terminal building for TBIT gate 101. Following its installation, it was calibrated and functionally tested. The docking light system was designed to provide a means for pilots to taxi all the way up to the terminal gate thereby eliminating the previous practice of stopping short of the gate, waiting to be connected to a tow tractor, and then minutes later being towed in. When airplanes stopped short of the gate, at times they partially blocked the adjacent taxi lane "C."

Striping Plan Markings.

Hudson employees and airport management personnel reported that airplanes parking at TBIT gate 101 were to come to a complete stop when the nose wheel reached a "stop line" stripe mark painted on the ground, which corresponded to the respective airplane's size. Airport management reported that its personnel had painted these stop lines for the various sizes of airplanes that were permitted to park at TBIT gate 101.

Airport management personnel further reported that the locations for the stop lines were originally surveyed for accuracy following which they were painted on the ground at appropriate locations in front of the gate. The master record for the stripes was recorded on a document entitled "Striping Plan Details, Tom Bradley International Terminal," dated December 18, 1995.

As noted by the location of the stripe marks in this document, the airplane coming closest to the gate is listed as being a "747-400." Marks for progressively smaller airplanes were also listed. The stop mark for DC10 and L1011 size airplanes are located 6 feet farther away from the terminal building. The stop marks for the Boeing 747 SP was located an additional 17 feet farther away, or a total of 23 feet from the Boeing 747-400's stop mark, as indicated in the document.

FLIGHT RECORDERS

The cockpit voice recorder (CVR) was removed from the Philippine airplane and was read out by the National Transportation Safety Board's Vehicle Recorders Division audio laboratory in Washington, D.C. After comparing the 30-minute-long CVR recording with the FAA's ATC transcript, it was determined that the CVR recording started approximately 5 minutes after the ground collision. Since the accident event was overwritten, no CVR transcript was prepared.

WRECKAGE AND IMPACT INFORMATION

According to witnesses, as the westbound Philippine airplane was turning in a southerly direction about 30 degrees left from the centerline of taxilane "C," its right winglet impacted the

outboard trailing edge portion of the Corsair airplane's left wing. The upper 2/3 portion of the Philippine airplane's right winglet was severed off. When the collision occurred, the Corsair was stationary and was heading toward the northwest.

Los Angeles Airport Airfield Operations and ground service personnel noted the location where the Corsair airplane was located at the time of the impact. They reported that the Corsair had stopped an estimated 75 feet short of the gate. At its stopped location, the airplane's left wing partially extended onto taxi lane "C." Airport personnel placed a tape marker on the ground to fix the location of the Corsair airplane's left wingtip for later investigation.

An examination of the Corsair airplane revealed its left wing's outboard aileron was severed. Forward of the aileron, internal wing structure was found substantially damaged. A segment of the wing's rear spar and the Reserve (fuel) Tank #2 were fractured. Fumes of jet fuel were noted in the vicinity of the fractured tank, which was located near the number one engine. There was no evidence of fire.

In relation to the Corsair airplane's wing tip, the damage was located between wing station (WS) 1350 and WS 1410. The aft tip of the wing is at WS 1645. Therefore, the damage was located between approximately 19.5 and 24.5 feet inboard from the wing tip, as measured along the wing's rear spar. (See Boeing's damage report for additional details.)

Neither pilot reported experiencing any malfunction of an airplane system related to ground handling, including steering and braking.

Airport police estimated that the Corsair airplane had stopped short of TBIT gate 101 in such a position that its left wing tip extended approximately 35 feet beyond (south of) the wing tip clearance line associated with airplanes parked at the gate. (The FAA formally refers to this line as the aircraft parking limit line). The line demarks the total usable parking area from the adjacent taxi lane area. There is no safety area between the limit line and the taxilane.

A subsequent tape measurement by FAA personnel of the distance between the Corsair airplane's wingtip, as represented by the temporary mark placed on the pavement following the collision, revealed that the wing tip of the Corsair was 39 feet south of the parking limit line, and 86 feet north of the taxilane centerline.

MEDICAL AND PATHOLOGICAL INFORMATION

No toxicological testing was requested on any of the airline flight crews, FAA controllers, or ground support personnel.

TESTS AND RESEARCH

Marshalling Signal.

Hudson's ground service employee training program for hand signals was observed listed in its "Training and Study Guide." Within this guide, there is a depiction for a signal that principally signifies that it is clear for the airplane's crew to start an engine. The guide also indicates that the signal is used to signify that the airplane's engine is operating. Hudson's employees received training in the appropriate use of this hand signal.

According to the "Training and Study Guide," when giving the "Ready to Start Engine" signal to the flight crew, the signal person should have their right hand and arm raised and pointed vertically upward. The right hand should be rotated in a 12-inch circle at head level. The signal person's left hand should be at the side of their body and pointed downward. (See the study guide for a graphic picture.)

The Hudson employee, who was assigned to the Corsair airplane's right wingtip position, was hired in January 1998. She verbally reported that during the accident sequence she had used the "engines on" hand signal in accordance with the training she had received. Her coworkers also observed the employee's use of the "engine on" signal during the accident sequence.

Standardized Marshalling Signals.

Marshalling signals are listed in the "Aeronautical Information Manual" (AIM). The AIM provides a picture of the "All Clear" signal in which the signalman's right hand is pointing vertically upward, and the left hand is pointing downward.

Philippine Airlines provides guidance to its personnel regarding marshalling signals. In its "Airlines Maintenance & Engineering Manual" it indicates that when the marshaller's right hand is pointing upward and the left hand is pointing downwards, that it is "All Clear to Taxi" and the airplane is "cleared to depart from the ramp." The Philippine Airlines graphic picture for this signal appears consistent with its depiction in the AIM.

Gate 101 Parking Responsibility and Stripe Mark Inspection.

LAX international operations management at the TBIT was responsible for overseeing the parking of airplanes at gate 101. To facilitate the parking process and to ensure that airplanes were parked in such manner as to be clear of the adjacent taxi lane, stripe marks for the various sizes of airplanes authorized to utilize the gate had been painted perpendicular to the tarmac's lead-in line to the gate.

The striping plan for TBIT gate 101, that was on file with the FAA's Western-Pacific Regional Office, Airports Division, was compared by the Safety Board investigator with the corresponding record maintained by airport management. No discrepancies were noted.

The Safety Board investigator also made a comparison between the airport's record and the stripe marks actually visible on the tarmac at the gate. A discrepancy was noted regarding the absence of any stripe line (also known as the nose gear stop line) for the Boeing 747-400

airplane. The nose wheel stop mark for this size airplane, which appeared on the airport's record, was not present on the tarmac. The LAX airport management opined that the painter who was responsible for refreshing the stop lines, and who had performed this task pursuant to a work order issued days earlier, had evidently made a mistake and omitted painting this line.

Observed Parking Procedure.

The Safety Board investigator interviewed ground service personnel who were not associated with the parking of the accident airplane. They reported routinely stopping inbound Boeing 747-400 airplanes short of the gate, and thereafter, towing them in to the stop line marked for the MD-11 size airplane (which has a shorter wingspan).

Subsequently, on several occasions the Safety Board investigator observed this practice was being followed. Whenever a Boeing 747-400 size airplane was parked short of the gate at any point marked for smaller airplanes, its left wing extended beyond the parking limit line and infringed upon taxi lane "C."

LAX Airport Manager Policy Statement.

The LAX airport manager reported that the airport has published procedures for operators to follow when utilizing TBIT gate 101. These procedures are included in a manual entitled "Los Angeles International Airport Rules and Regulations Manual" (Rules Manual). One purpose of the Rules Manual is to enhance the safety of airport operations and to promote the efficient flow of traffic.

The section of the Rules Manual pertinent to the operation at gate 101 indicates that pilots are generally required to power onto the gate, rather than stopping short of the gate and being towed in. The power-in policy was instituted, in part, to reduce the time an arriving airplane would be blocking the adjacent taxilane "C." The power-in policy had been in effect since 1994 according to the airport manager, and it was last reiterated upon publication in the Rules Manual of revision number 7, dated January 1999. (Revision 7 also lists exceptions to the power-in policy. None were found applicable during the subject accident investigation. Also, no deviation from the rules was authorized by the airport's manager.) Revision 1 of the Rules Manual, which was issued in 1993, had specified that a tow-in procedure be used at Gate 101.

The LAX airport manager indicated that his office was responsible for distributing to airport operators the Rules Manual, which was serial numbered to each recipient. To verify that revisions were also being appropriately distributed to all manual holders, the Safety Board investigator requested that the management produce a listing of all manual holders and revision recipients. Management indicated that no current list was available.

Hudson Personnel Statements Regarding Rules Manual.

The general manager of Hudson reported that he had received the January 1999 revision number 7 of the airport's Rules Manual. Staff were provided copies of the manual and expected to keep their manuals current. The manager indicated his belief that Hudson's employees were following the tow-in procedure specified in Revision 1 of the Rules Manual at the time of the accident, instead of the power-in procedure last reiterated in revision number 7.

The Rules Manuals issued to other Hudson employees were examined and none were found updated to include revision number 7. According to Hudson's employee training manager, ramp supervisor, and the marshaller who had directed the Corsair airplane to stop taxiing short of the Boeing 747-SP nose wheel stop mark, it was a customary practice to use tow tractors to bring airplanes into the gate.

The marshaller reported to the Safety Board investigator that, in accordance with company policy, he had stopped the Corsair airplane's taxiing at the customary location for airplanes that, thereafter, are towed the remaining distance to TBIT gate 101. Hudson's first and second line supervisory and training personnel similarly reported that its marshallers use tow tractors to pull airplanes the final distance into the gate. Hudson's mid-level management reported that it is a standard practice to tow airplanes into this gate, and indicated that the 1993 revision 1 to the Rules Manual requires that airplanes be towed onto this gate.

Tow Tractor Positioning at TBIT Gate 101.

Hudson management reported to the Safety Board investigator that one reason they had stopped the Corsair airplane short of the gate was that it was difficult to position their tow tractor at the gate once the airplane was parked in front of it. The difficulty was principally related to aspects of the terminal building's geometry and its proximity to the tow tractor's tow bar hookup location on the airplane's nose gear. Management stated that if the airplane had come to a stop closer to the terminal than indicated by the striping plan's stop line, it would have been difficult to connect a tow bar and push back the airplane. Although the tow tractor's tow bar could be connected if the tractor was not prepositioned in front of the terminal before the airplane's arrival, due to the size of the airplane, there was virtually no room to spare and it could be difficult to accomplish the hookup with the equipment they were using.

Hudson management acknowledged to the Safety Board investigator that smaller tow tractors and tow bars existed. A smaller tow tractor could be used to push back Boeing 747 size airplanes.

Docking Light Usage and Test Results.

The Safety Board investigator conducted brief interviews with several ground service personnel from various companies, including Hudson. Interviews were also conducted with airport operations management personnel. None of the personnel having marshalling responsibility at TBIT gate 101 reported having used the docking light system during the past few years. Without exception, all reported the docking light system was out of service.

Similarly, airport operations management personnel having direct oversight responsibility of the TBIT initially reported to the Safety Board investigator that the docking light system was inoperative. Therefore, airplanes were directed to stop short of the gate whereupon they would be hooked up to a tow tractor and towed in.

Within days following the accident the functionality of the docking light system was examined. The LAX airport management verbally reported finding the lights functional. The management indicated that the docking lights were usable under a manually programmed control system if properly operated by ground service personnel. The docking lights had not undergone maintenance between the accident date and the date of their subsequent examination.

Taxiway and Taxi lane Inspection Results, Approvals and Criteria.

The Standards Section supervisor of the Airports Division, FAA Western-Pacific Region, performed a field examination of the taxi lane/terminal ramp pavement markings near the TBIT gate 101. In summary, the supervisor reported that the markings he observed in the area were clear, in good condition, and consistent with FAA standards and approvals.

The supervisor noted that FAA design standards (not operational standards) call for a 138-foot separation between the taxilane centerline and the nearest object, which is more than the 125-foot separation that exists next to TBIT gate 101. According to the supervisor, it is recognized that present runways/taxiways/terminals configurations at LAX do not permit meeting a number of design separation standards due to the lack of adequate land area. The existing operational separation distances have been accepted or approved by the FAA through such actions as construction project design approvals and certification manual approvals. The FAA last approved the reduced distance of 125 feet on May 16, 1996.

The FAA's current design standard generally provides for a wingtip to object minimum clearance distance of 160 feet, for a Boeing 747-400 airplane on a taxiway. Airport management indicated that because of operational needs, the FAA was requested to approve the reduction of the wing tip to object clearance to 125 feet in the area south of TBIT gate 101.

In the FAA's Advisory Circular number 150/5300-13, effective September 29, 1989, it is reported that the reduced wing tip clearances on a taxilane are acceptable because taxi speed is very slow outside the movement area, taxiing is precise, and special operator guidance techniques and devices are normally present.

Taxiway and Taxilane Definition and Design Rationale.

According to the Advisory Circular, a taxiway is a "defined path established for the taxiing of aircraft from one part of an airport to another." A taxilane is "the portion of the aircraft parking area used for access between taxiways and aircraft parking positions."

At times, both air traffic control (ATC) and airport management personnel refer to the taxilane

in various publications as being a taxiway. ATC management reported to the Safety Board investigator that airplane movement over this taxilane is considered to be heavy, and it is frequently used for routing airplanes to/from neighboring taxiways.

Boeing 747 Airplane Ground Collision History.

Three collisions during the 5-year period preceding the current investigation date were noted during a partial review of LAX management records. Assessments of the reported damage in all cases were minor. In pertinent part, the incidents are as follows:

In July 1994, at 1250 hours, the wing of a Boeing 747-400 taxiing eastbound on "K" (subsequently renamed "C") struck a Boeing 747's winglet. The "parked" airplane was in the process of being towed to gate 77.

In January 1997, at 2050 hours, a Boeing 747-400 taxiing eastbound on "C" struck a "parked" Boeing 747-100 that had stopped short of gate 69A, awaiting to be towed in. The "parked" airplane's wingtip was noted as having extended beyond the wing clearance line.

In May 1999, at 1110 hours, a Boeing 777 taxiing eastbound on "C" struck a Boeing 747-400 that had stopped short of gate 69A, awaiting tow tractor hookup. The investigating officer noted that the Boeing 747 was encroaching onto "C."

Airline Operating Regulations and Responsibilities.

Title 14 CFR Part 129.11 requires foreign air carriers to conduct operations within the United States in accordance with operations specifications issued by the FAA. Part 129.11(a)(3) requires carriers to have "such operations rules and practices as are necessary to prevent collisions between foreign aircraft and other aircraft."

Oversight of the International Terminal's Operations.

Based upon the lines of authority existing on the accident date, the airport's international operations management had responsibility for ensuring that safe and efficient operations were conducted at the Tom Bradley International Terminal, gate 101. In part, this responsibility related to the following: (1) monitoring that power-in parking procedures were appropriately followed in accordance with the airport's published regulations; (2) stop lines were appropriately located to provide ground crews guidance regarding where airplanes were to be parked; (3) monitoring the placement of stopped and parked international flights to ensure that they were located within the confines of the international terminal's designated areas, and not overlapping onto an active taxilane; (4) overseeing that the docking lights were operational and available for use by ground service personnel; and (5) identifying deficiencies associated with the orderly flow of traffic to/from the gate including taxi routes which may be hazardous to international operations in the vicinity of gate 101.

ADDITIONAL INFORMATION

Safety Board Supplemental Data and Party Representative.

Pertinent statistical data for the Safety Board's "Supplement E" form has been included in the Aircraft Accident Report Form No. 6120.1/2. Flight and ground crewmembers provided identification data that is included in their respective witness statements. No pertinent data was applicable to "Supplements C and D," and accordingly they were not included in this docket.

The Bureau Enquetes-Accidents (BEA) was appointed as the accredited representative to the investigation. The BEA designated Corsair Airline's quality assurance manager, as their technical representative under ICAO Annex 13.

Wreckage Release.

The airplanes were released to both operators on June 7, 1999.

Pilot Information

Certificate:	Airline transport; Foreign	**Age:**	51,Male
Airplane Rating(s):	Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 1 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	January 19, 1999
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	February 18, 1999
Flight Time:	19700 hours (Total, all aircraft), 650 hours (Total, this make and model), 9100 hours (Pilot In Command, all aircraft), 180 hours (Last 90 days, all aircraft), 100 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Co-pilot Information

Certificate:	Airline transport; Foreign	**Age:**	44,Male
Airplane Rating(s):	Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 1 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	January 21, 1999
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	February 16, 1999
Flight Time:	6000 hours (Total, all aircraft), 885 hours (Total, this make and model), 2150 hours (Pilot In Command, all aircraft), 290 hours (Last 90 days, all aircraft), 195 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Boeing	**Registration:**	N751PR
Model/Series:	747-4F6B 747-400	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Transport	**Serial Number:**	27261
Landing Gear Type:	Retractable - Tricycle	**Seats:**	461
Date/Type of Last Inspection:	June 1, 1999 Continuous airworthiness	**Certified Max Gross Wt.:**	875000 lbs
Time Since Last Inspection:	69 Hrs	**Engines:**	4 Turbo fan
Airframe Total Time:	24267 Hrs at time of accident	**Engine Manufacturer:**	General Electric
ELT:		**Engine Model/Series:**	CF6-8C2B1F
Registered Owner:	Wilmington Trust Co. Trustee	**Rated Power:**	56900 Lbs thrust
Operator:	PHILIPPINE AIRLINES, INC.	**Operating Certificate(s) Held:**	
Operator Does Business As:		**Operator Designator Code:**	SCOF

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Night/bright
Observation Facility, Elevation:	LAX,126 ft msl	**Distance from Accident Site:**	
Observation Time:	23:16 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Scattered / 1000 ft AGL	**Visibility**	7 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	220°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.97 inches Hg	**Temperature/Dew Point:**	16°C / 13°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	LOS ANGELES, CA (LAX)	**Type of Flight Plan Filed:**	IFR
Destination:	MANILA (MNL)	**Type of Clearance:**	IFR
Departure Time:	23:12 Local	**Type of Airspace:**	Class B

Airport Information

Airport:	Los Angeles International LAX	**Runway Surface Type:**	Concrete
Airport Elevation:	126 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	25R	**IFR Approach:**	Unknown
Runway Length/Width:	12091 ft / 150 ft	**VFR Approach/Landing:**	Unknown

Wreckage and Impact Information

Crew Injuries:	20 None	**Aircraft Damage:**	Minor
Passenger Injuries:	405 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	425 None	**Latitude, Longitude:**	33.93861,-118.408889

Administrative Information

Investigator In Charge (IIC):	Pollack, Wayne
Additional Participating Persons:	Joseph B Allee; FAA Western-Pacific Flight Standards District Ofc.; Los Angeles, CA Raymond Jack; Los Angeles Department of Airports; Los Angeles, CA Herve Auter; Corsair Airlines; Rungis Cedex, France Reuben Sternberg; Philippine Airlines; PasayCityPhilippines
Original Publish Date:	November 25, 2003
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=46628

Aviation Investigation Final Report

Location:	LOS ANGELES, California	**Accident Number:**	LAX99FA218
Date & Time:	June 6, 1999, 23:16 Local	**Registration:**	F-GTOM
Aircraft:	Boeing 747-SP	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	274 None
Flight Conducted Under:	Part 129: Foreign		

Analysis

At night, a Boeing 747-4F6B, N751PR, taxied into a Boeing 747 SP-44, F-GTOM. During the collision, N751PR was proceeding westbound on taxilane "C" for its planned departure for Manila. F-GTOM had landed from France and was standing short of its assigned gate 101. F-GTOM was oriented in a northwesterly direction, and its left wing was extending onto taxilane "C". Six ground service personnel were in proximity to F-GTOM, awaiting the connection of a tow tractor to pull it into the gate at the Tom Bradley International Terminal (TBIT). During the collision sequence, N751PR impacted the aft portion of F-GTOM's left wing. N751PR's right wing's winglet was severed off and F-GTOM's left wing was substantially damaged.

ATC had cleared the departing N751PR to taxi past the standing F-GTOM and make a 90-degree turn onto a nearby taxiway. The ground crew's wing walkers for the standing airplane were aware that its left wing was partially blocking taxilane "C." One of the wing walkers issued its company-authorized "engine operating" signal that was observed by N751PR's crew. This nonstandard signal was interpreted by the departing airplane's crew as an "all clear to taxi" signal in accordance with the standard hand signals published in the FAA's Aeronautical Information Manual and by its airline.

The collision occurred as the departing airplane commenced a sharp left turn, from the centerline of taxilane "C" toward a perpendicular taxiway. During the turn the effective length of the airplane's wing increased. The right wing tip was not visible to the captain, and he relied upon his first officer and crewmembers to monitor its proximity to the standing airplane. However, after passing abeam the standing airplane's empennage and observing the wing walker's "all clear signal," the first officer redirected his attention toward their new course and

away from the standing airplane's left wing.

Due to a lack of available ground area, and to accommodate the airport's need for additional airplane movement areas, the FAA had approved a reduction in clearance between the terminal gates and the adjacent taxiway/taxilane. Airport management was aware of the collision hazard related to the proximity between taxilane "C" and adjacent terminal gates. During the previous 5-year-period, three other collisions had occurred between Boeing 747 airplanes on the taxilane.

TBIT airport management personnel were responsible for enforcing published airport rules that required the arriving Boeing 747 SP-44 (F-GTOM) to power into gate 101, which was equipped with an operative docking light guidance system. However, this guidance system had not been used by the contract ground service company for several years. The TBIT management personnel failed to enforce the policy and allowed the ground service personnel to stop the arriving F-GTOM short of gate 101 thus partially blocking taxilane "C." The ground personnel, using their outdated airport rules manual (that directed a tow-in procedure), planned to utilize a tow tractor to pull the airplane the remaining distance to the gate. This was contrary to the revised manual, which required a power-in procedure. Airport management had failed to ensure that all manual holders were using updated versions of the manual.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: Airport management's failure to ensure that its current operating procedure, which required the arriving airplane to power into the terminal gate, was being used. Also causal was (1) the ground service company's utilization of an outdated arrival procedure that directed the arriving airplane to stop short of the gate, thereby obstructing the taxilane; and (2) the ground service company's utilization of a nonstandard marshalling hand signal which was, accordingly, misinterpreted by the departing airplane's crew. A contributing factor was the departing airplane's first officer's misjudged evaluation of wing tip clearance.

Findings

Occurrence #1: COLLISION BETWEEN AIRCRAFT (OTHER THAN MIDAIR)
Phase of Operation: STANDING - ENGINE(S) NOT OPERATING

Findings
1. LIGHT CONDITION - BRIGHT NIGHT

2. AIRPORT FACILITIES,TAXIWAY CONDITION - CONGESTED
3. (C) AIRPORT OPERATIONS - IMPROPER - AIRPORT PERSONNEL
4. (C) IMPROPER USE OF PROCEDURE - GROUND PERSONNEL
5. FLIGHT CONTROL,AILERON - CUT/SEVERED
6. UNSAFE/HAZARDOUS CONDITION - NOT RECOGNIZED - PILOT OF OTHER AIRCRAFT
7. (F) INFORMATION UNCLEAR - GROUND PERSONNEL
8. (F) DISTANCE - MISJUDGED - PILOT OF OTHER AIRCRAFT
9. VISUAL/AURAL PERCEPTION - PILOT OF OTHER AIRCRAFT
10. INTERPRETATION OF INSTRUCTIONS - CONFUSING - PILOT OF OTHER AIRCRAFT
11. (C) INFORMATION UNCLEAR - GROUND PERSONNEL

Factual Information

HISTORY OF FLIGHT

On June 6, 1999, about 2316 Pacific daylight time, a Boeing 747-4F6B, N751PR, collided on the ground with a Boeing 747 SP-44, F-GTOM, at the Los Angeles International Airport (LAX), Los Angeles, California. When the collision occurred N751PR, operated by Philippine Airlines as flight 103, was taxiing for takeoff with an intended destination of Manila, Philippines. F-GTOM, operated by Corsair as flight 942, was parking following its arrival from Paris, France. Onboard the Philippine airplane were 4 flight deck crewmembers, 16 cabin attendants, and 405 passengers. None of the 425 occupants were injured. Onboard the Corsair airplane were 4 flight deck crewmembers, 9 cabin attendants, and 261 passengers. None of the 274 occupants were injured. In close proximity to the Corsair airplane were two United Airlines mechanics and four Hudson General LLC ground support personnel. None was injured. Both airplanes were operated as scheduled, international, passenger flights under 14 CFR Part 129. Visual meteorological conditions prevailed during the nighttime collision that occurred as the Philippine airplane taxied for takeoff in a westerly direction on taxilane "C," and collided with the Corsair airplane, which had stopped in a northwesterly direction short of its assigned gate 101, at the Tom Bradley International Terminal (TBIT). The Philippine airplane received minor damage. Its right winglet was severed. The Corsair airplane's left wing was substantially damaged. (All time references in this report are converted to Pacific daylight time, and are based upon the 24-hour clock.)

F-GTOM (Corsair) Arrival and Delayed Parking.

About 1110, F-GTOM departed from Paris, and about 2236, it landed at LAX's runway 25L. The crew advised Federal Aviation Administration (FAA) air traffic control tower personnel (ATC) that its assigned arrival gate was 101. (See the Jeppesen airport diagram and the airport layout charts for a view of the taxiways, taxilanes, and gate locations.) At 2236:41, ATC advised the crew that gate 101 was occupied (by N751PR), and to hold short of the gate. The crew acknowledged the clearance and held its position.

N751PR (Philippine) Delayed Pushback.

N751PR's scheduled 2230 pushback from TBIT gate 101 was delayed because of an onboard passenger medical emergency. About 2301, N751PR's crew advised ATC that their airplane was ready to be pushed back from the gate. ATC issued N751PR instructions to pushback in a tail west direction (onto taxi lane "C") for a runway 25R departure. The crew repeated the pushback instructions to ATC, to which ATC stated, "that's correct."

The captain reported to the National Transportation Safety Board investigator that he repeated

the ATC pushback instructions to the tug driver responsible for the pushback. The captain stated that the driver confirmed receipt of the instructions. Thereafter, the tug driver initiated the pushback in a direction opposite that of the captain's instructions.

ATC observed that N751PR's ground service crew was pushing the airplane in a tail east direction. At 2305:19, ATC amended its clearance and instructed the crew to continue the easterly pushback until the airplane was positioned south of the American satellite, east of "C-10." The pushback process continued, and the ground crew disconnected its tow tractor from N751PR when it was located south of the American satellite.

F-GTOM (Corsair) Taxi to Parking, Procedure, and Captain's Statement.

At 2311, ATC instructed F-GTOM to taxi to gate 101 via a left turn on taxiway "B" and a right turn at "taxiway Charlie ten." The crew repeated the instruction and proceeded toward the gate. En route, F-GTOM taxied in a northerly direction and crossed in front of the west facing N751PR, which was holding on taxi lane "C" to the east of "C-10."

During the subsequent accident investigation, on June 9, 1999, the Corsair captain reported that he followed the lead-in line toward the terminal building as he approached TBIT gate 101. The airplane's taxiing was stopped upon observing a stop signal from his ground marshaller.

Within about 45 minutes after the accident, the captain provided a statement to a Los Angeles City Airport Police Bureau uniformed officer. In pertinent part, the captain reported that a ramp agent (marshaller) had ordered him to stop taxiing the airplane in order to connect the tow bar.

In another statement, the captain wrote, "so we stopped the plane, set the parking brake, shut down all the engines. The ramp agent connected [a communication line] to the aircraft. At this time we felt a shock...." The captain also reported that during this sequence of events the airplane's navigation lights and the beacons remained "on."

The captain also reported that he had observed (on the side of the building at TBIT gate 101) that the guidance system light box (aka the docking light station) was "completely dark" and "no lights were on." (The docking station is designed to provide lateral guidance and closure information to the flight crew when power-in procedures are used to taxi the airplane to the gate.)

The captain indicated to the Safety Board investigator during the interview that contrary to the printed statement on the Jeppesen airport diagram chart, he did not advise ground control that his airplane was not completely blocked at the terminal gate or that his airplane was partially obstructing taxi lane "C." The captain asserted that, until the collision occurred, he was not aware his airplane needed to be towed to the gate.

United Airlines Mechanics' Statements.

Two United Airlines mechanics, which were under contract with Corsair to provide a walk around inspection of the airplane and related duties upon its arrival, reported that they observed the Corsair airplane approach TBIT gate 101 directly on the lead-in line.

As the Corsair airplane approached the gate, a Hudson ground service employee directed the flight crew to stop taxiing. The airplane came to a stop and all engines were shutdown. A tow tractor was already positioned in front of the gate in anticipation of the Corsair airplane's arrival. One of the mechanics plugged in his headset and began communicating with the Corsair crew.

The mechanic reported that the first communication he made with a flight crewmember was "ground to cockpit." A crewmember replied, "this is cockpit." Then the mechanic reported that he said "set brakes," because he planned to insert the bypass pin into the nose gear to lock out the nose steering.

The collision occurred less than 1 minute after the Corsair airplane had come to a stop. (The FAA participant reported that the mechanic's (head set operator's) "set brakes" instruction should have alerted the captain that the airplane was to be towed. The instruction typically given to a captain when the airplane has reached the gate is "chocks in" to signal to the captain that it is safe to release the brakes.)

N751PR (Philippine) Taxis toward the Departure Runway.

At 2313:17, ATC issued the following clearance to the crew of N751PR, which was holding its position on taxilane "C" at "C-10:" "...when able taxi ahead on charlie to papa turn left at papa onto bravo eastbound taxi to runway two five right." A N751PR crewmember read back the clearance. According to the captain, the airplane then taxied at a slow rate of speed via taxi lane "C's" centerline in a westerly direction toward taxiway "P."

N751PR (Philippine) Taxi procedure and Captain's Statement.

The captain and his crewmembers indicated that they observed the Corsair airplane, and they were aware that a few minutes earlier it had taxied to TBIT gate 101. The captain stated to the Safety Board investigator that he was handling the airplane's controls. He indicated that he and his crew observed a ground service employee (wing walker) with a lighted night wand standing near the Corsair airplane's tail. The wing walker was observed making a signal that the Philippine crew reported interpreting as an "all clear to taxi" sign for their airplane. Accordingly, the Philippine captain continued taxiing past the Corsair airplane. The captain stated that he was certain he was taxiing on the centerline, and then he commenced a left (southbound) turn toward taxiway "P," pursuant to his clearance. The first officer was monitoring the right wing tip's clearance. The collision occurred upon turning about 30 degrees of arc. The estimated speed of the airplane during the turn was between 6 and 8 knots. About 2316, the crew advised ATC that "...we have hit something I mean our right wing tip."

Philippine First Officer's Statement.

The first officer reported that he observed a marshaller behind the Corsair airplane. The marshaller signaled to go ahead. The first officer stated, "I cleared our right wing as we passed behind the parked Corsair 747. Then we started our turn to the left towards taxiway 'P.' I looked towards the direction of our turn. Then we felt a shudder during the turn."

Philippine Captain's Explanation.

The captain indicated that the Corsair's navigation lights were illuminating. However, neither its upper nor lower beacon lights were visible.

According to the captain, he realized that he was close to the Corsair airplane, so he further reduced his taxi speed to give his crew more time to observe the situation. He was aware that he had not received any cautionary statement from ATC regarding the Corsair's position as possibly blocking the taxiway, so he had no doubt that he was in the clear. Additionally, his crew observed a marshaller (also known as a wing walker) positioned near the right-hand tail side of the Corsair airplane. The marshaller was holding a lit wand and was signaling by waving the wand in a manner to indicate that the airplane should continue taxiing forward; it was a motion to alert the crew that it was "clear" to proceed.

The captain reiterated his belief that his path was clear upon stating, "four pairs of trained eyes in the cockpit could not have possibly mistaken a stop from a go signal." The captain stated that the marshaller never issued the "stop" taxi signal. However in retrospect, he wondered whether the marshaller had given him "a wrong signal."

The captain additionally reported that the marshaller was observed with one lit wand. The wand was in the marshaller's left hand, and it was being waved in a counter-clockwise direction.

As an afterthought, the captain reported that it was possible the marshaller, whom he and his crew observed located in proximity to the Corsair airplane's right horizontal stabilizer, may have initially been gauging only the decreasing distance between the approaching Philippine airplane's right wing tip and the Corsair's tail. The marshaller's signal may have only indicated the fact that there was adequate room for the Philippine airliner to pass the Corsair's tail.

None of the Philippine crew indicated that they ever observed a second marshaller positioned near the Corsair airplane's left wing. Also, none stated that they had observed anyone at any location near the Corsair airplane attempt to stop their taxiing by motioning using the customary signalman's stop signal.

INJURIES TO PERSONS

None of the 699 occupants onboard the airplanes were injured during the collision. None of the 6 ground service personnel were injured when airplane wreckage was blown across the tarmac by jet blast from the turning Boeing 747-4F6B.

PERSONNEL INFORMATION

Flight Crew.

The captains from both airplanes reported having previous experience parking at LAX. The Corsair captain stated that he was not familiar with the parking procedure at the TBIT gate 101.

The Corsair captain also reported that his total flying experience was 12,046 hours. His experience flying the Boeing 747-SP was not indicated. During the preceding 90-day period, he had flown the airplane for 182 hours.

The Philippine captain's total flying experience was 19,700 hours. His experience flying the Boeing 747-400 was 650 hours. During the preceding 90-day period, he had flown the airplane for 180 hours.

The Philippine first officer reported that his total flying experience was 6,000 hours. His experience flying the Boeing 747-400 was 885 hours. During the preceding 90-day period, he had flown the airplane for 290 hours.

Ground Support Personnel, and Training.

The two United Airlines mechanics had no marshalling responsibility. The Corsair airplane was marshaled in by employees of Hudson General LLC, the ground service company with whom Corsair management had contracted to render parking and related services.

Hudson's on-scene ground support operation for the Corsair airplane consisted of the following persons being present: one supervisor, one lead marshaller, and two wing walkers. Pertinent background, employment, and training information were reviewed for these persons. No discrepancies were noted.

AIRCRAFT INFORMATION

Visual Angles.

Boeing Company data indicates that from the captain's left seat position in a Boeing 747-400, the right winglet is not visible. It is visible from the first officer's right seat position.

Regarding the visual angle from the cockpit of a Boeing 747 SP, the Boeing Company indicates that in order for the flight crew to observe an object on the ground directly ahead of the

airplane, it must be located about 84 feet 8 inches in front of the pilot's eye position. Or, when measured from the airplane's nose gear location, the object must be 92 feet 4 inches in front of the gear.

Ground Distance, Boeing 747 SP to Gate.

LAX airport management provided measurements of the available distance between the Boeing 747 SP's nose gear stop line that was observed painted on the ground in front of TBIT gate 101, and the location where a signalman could physically stand at a marshalling location in front of the terminal building. The management indicated that the distance was approximately 60 feet.

Wingspan.

According to the Boeing Company, the wingspan of a Boeing 747-400 airplane (with winglets) is 211 feet 5 inches, when empty. When operating at its maximum gross weight and fully loaded with fuel, its wingspan (the maximum distance from wingtip to wingtip) becomes 213 feet 0 inches, as the fueled wings bend downward. The distance between the airplane's longitudinal axis (centerline) and each wingtip is, therefore, 106.5 feet.

Wing Growth.

Due to the Boeing 747-400's swept wing design and its landing gear geometry, when the airplane turns sharply, obstacles (such as a building or another same elevation wingtip) located within 12 feet of the airplane's wingtip can be impacted. Effectively, during a sharp turn a wing "grows" 12 feet because it swings outward, relative to the airplane's point of rotation.

The Boeing Company indicates that when turning, a pilot must therefore assure himself that this "extra" clearance exists. The minimum wing tip clearance required to avoid obstacle contact during a sharp turn is 106.5 feet plus 12 feet, or a total of 118.5 feet.

METEOROLOGICAL INFORMATION

In pertinent part, about the time of the accident LAX reported its weather as follows: Wind from 220 degrees at 4 knots; visibility 7 miles; scattered clouds at 1,000 feet; and temperature/dew point of 61/55 degrees Fahrenheit. No precipitation was reported.

COMMUNICATION

Neither pilot reported experiencing any malfunction of communications capability. No ATC communication impediments were reported.

AIRPORT AND GROUND FACILITIES

Docking Lights.

LAX airport management reported that several years prior to the accident, the airport installed an airplane docking light system on the side of the terminal building for TBIT gate 101. Following its installation, it was calibrated and functionally tested. The docking light system was designed to provide a means for pilots to taxi all the way up to the terminal gate thereby eliminating the previous practice of stopping short of the gate, waiting to be connected to a tow tractor, and then minutes later being towed in. When airplanes stopped short of the gate, at times they partially blocked the adjacent taxi lane "C."

Striping Plan Markings.

Hudson employees and airport management personnel reported that airplanes parking at TBIT gate 101 were to come to a complete stop when the nose wheel reached a "stop line" stripe mark painted on the ground, which corresponded to the respective airplane's size. Airport management reported that its personnel had painted these stop lines for the various sizes of airplanes that were permitted to park at TBIT gate 101.

Airport management personnel further reported that the locations for the stop lines were originally surveyed for accuracy following which they were painted on the ground at appropriate locations in front of the gate. The master record for the stripes was recorded on a document entitled "Striping Plan Details, Tom Bradley International Terminal," dated December 18, 1995.

As noted by the location of the stripe marks in this document, the airplane coming closest to the gate is listed as being a "747-400." Marks for progressively smaller airplanes were also listed. The stop mark for DC10 and L1011 size airplanes are located 6 feet farther away from the terminal building. The stop marks for the Boeing 747 SP was located an additional 17 feet farther away, or a total of 23 feet from the Boeing 747-400's stop mark, as indicated in the document.

FLIGHT RECORDERS

The cockpit voice recorder (CVR) was removed from the Philippine airplane and was read out by the National Transportation Safety Board's Vehicle Recorders Division audio laboratory in Washington, D.C. After comparing the 30-minute-long CVR recording with the FAA's ATC transcript, it was determined that the CVR recording started approximately 5 minutes after the ground collision. Since the accident event was overwritten, no CVR transcript was prepared.

WRECKAGE AND IMPACT INFORMATION

According to witnesses, as the westbound Philippine airplane was turning in a southerly direction about 30 degrees left from the centerline of taxilane "C," its right winglet impacted the

outboard trailing edge portion of the Corsair airplane's left wing. The upper 2/3 portion of the Philippine airplane's right winglet was severed off. When the collision occurred, the Corsair was stationary and was heading toward the northwest.

Los Angeles Airport Airfield Operations and ground service personnel noted the location where the Corsair airplane was located at the time of the impact. They reported that the Corsair had stopped an estimated 75 feet short of the gate. At its stopped location, the airplane's left wing partially extended onto taxi lane "C." Airport personnel placed a tape marker on the ground to fix the location of the Corsair airplane's left wingtip for later investigation.

An examination of the Corsair airplane revealed its left wing's outboard aileron was severed. Forward of the aileron, internal wing structure was found substantially damaged. A segment of the wing's rear spar and the Reserve (fuel) Tank #2 were fractured. Fumes of jet fuel were noted in the vicinity of the fractured tank, which was located near the number one engine. There was no evidence of fire.

In relation to the Corsair airplane's wing tip, the damage was located between wing station (WS) 1350 and WS 1410. The aft tip of the wing is at WS 1645. Therefore, the damage was located between approximately 19.5 and 24.5 feet inboard from the wing tip, as measured along the wing's rear spar. (See Boeing's damage report for additional details.)

Neither pilot reported experiencing any malfunction of an airplane system related to ground handling, including steering and braking.

Airport police estimated that the Corsair airplane had stopped short of TBIT gate 101 in such a position that its left wing tip extended approximately 35 feet beyond (south of) the wing tip clearance line associated with airplanes parked at the gate. (The FAA formally refers to this line as the aircraft parking limit line). The line demarks the total usable parking area from the adjacent taxi lane area. There is no safety area between the limit line and the taxilane.

A subsequent tape measurement by FAA personnel of the distance between the Corsair airplane's wingtip, as represented by the temporary mark placed on the pavement following the collision, revealed that the wing tip of the Corsair was 39 feet south of the parking limit line, and 86 feet north of the taxilane centerline.

MEDICAL AND PATHOLOGICAL INFORMATION

No toxicological testing was requested on any of the airline flight crews, FAA controllers, or ground support personnel.

TESTS AND RESEARCH

Marshalling Signal.

Hudson's ground service employee training program for hand signals was observed listed in its "Training and Study Guide." Within this guide, there is a depiction for a signal that principally signifies that it is clear for the airplane's crew to start an engine. The guide also indicates that the signal is used to signify that the airplane's engine is operating. Hudson's employees received training in the appropriate use of this hand signal.

According to the "Training and Study Guide," when giving the "Ready to Start Engine" signal to the flight crew, the signal person should have their right hand and arm raised and pointed vertically upward. The right hand should be rotated in a 12-inch circle at head level. The signal person's left hand should be at the side of their body and pointed downward. (See the study guide for a graphic picture.)

The Hudson employee, who was assigned to the Corsair airplane's right wingtip position, was hired in January 1998. She verbally reported that during the accident sequence she had used the "engines on" hand signal in accordance with the training she had received. Her coworkers also observed the employee's use of the "engine on" signal during the accident sequence.

Standardized Marshalling Signals.

Marshalling signals are listed in the "Aeronautical Information Manual" (AIM). The AIM provides a picture of the "All Clear" signal in which the signalman's right hand is pointing vertically upward, and the left hand is pointing downward.

Philippine Airlines provides guidance to its personnel regarding marshalling signals. In its "Airlines Maintenance & Engineering Manual" it indicates that when the marshaller's right hand is pointing upward and the left hand is pointing downwards, that it is "All Clear to Taxi" and the airplane is "cleared to depart from the ramp." The Philippine Airlines graphic picture for this signal appears consistent with its depiction in the AIM.

Gate 101 Parking Responsibility and Stripe Mark Inspection.

LAX international operations management at the TBIT was responsible for overseeing the parking of airplanes at gate 101. To facilitate the parking process and to ensure that airplanes were parked in such manner as to be clear of the adjacent taxi lane, stripe marks for the various sizes of airplanes authorized to utilize the gate had been painted perpendicular to the tarmac's lead-in line to the gate.

The striping plan for TBIT gate 101, that was on file with the FAA's Western-Pacific Regional Office, Airports Division, was compared by the Safety Board investigator with the corresponding record maintained by airport management. No discrepancies were noted.

The Safety Board investigator also made a comparison between the airport's record and the stripe marks actually visible on the tarmac at the gate. A discrepancy was noted regarding the absence of any stripe line (also known as the nose gear stop line) for the Boeing 747-400

airplane. The nose wheel stop mark for this size airplane, which appeared on the airport's record, was not present on the tarmac. The LAX airport management opined that the painter who was responsible for refreshing the stop lines, and who had performed this task pursuant to a work order issued days earlier, had evidently made a mistake and omitted painting this line.

Observed Parking Procedure.

The Safety Board investigator interviewed ground service personnel who were not associated with the parking of the accident airplane. They reported routinely stopping inbound Boeing 747-400 airplanes short of the gate, and thereafter, towing them in to the stop line marked for the MD-11 size airplane (which has a shorter wingspan).

Subsequently, on several occasions the Safety Board investigator observed this practice was being followed. Whenever a Boeing 747-400 size airplane was parked short of the gate at any point marked for smaller airplanes, its left wing extended beyond the parking limit line and infringed upon taxi lane "C."

LAX Airport Manager Policy Statement.

The LAX airport manager reported that the airport has published procedures for operators to follow when utilizing TBIT gate 101. These procedures are included in a manual entitled "Los Angeles International Airport Rules and Regulations Manual" (Rules Manual). One purpose of the Rules Manual is to enhance the safety of airport operations and to promote the efficient flow of traffic.

The section of the Rules Manual pertinent to the operation at gate 101 indicates that pilots are generally required to power onto the gate, rather than stopping short of the gate and being towed in. The power-in policy was instituted, in part, to reduce the time an arriving airplane would be blocking the adjacent taxilane "C." The power-in policy had been in effect since 1994 according to the airport manager, and it was last reiterated upon publication in the Rules Manual of revision number 7, dated January 1999. (Revision 7 also lists exceptions to the power-in policy. None were found applicable during the subject accident investigation. Also, no deviation from the rules was authorized by the airport's manager.) Revision 1 of the Rules Manual, which was issued in 1993, had specified that a tow-in procedure be used at Gate 101.

The LAX airport manager indicated that his office was responsible for distributing to airport operators the Rules Manual, which was serial numbered to each recipient. To verify that revisions were also being appropriately distributed to all manual holders, the Safety Board investigator requested that the management produce a listing of all manual holders and revision recipients. Management indicated that no current list was available.

Hudson Personnel Statements Regarding Rules Manual.

The general manager of Hudson reported that he had received the January 1999 revision number 7 of the airport's Rules Manual. Staff were provided copies of the manual and expected to keep their manuals current. The manager indicated his belief that Hudson's employees were following the tow-in procedure specified in Revision 1 of the Rules Manual at the time of the accident, instead of the power-in procedure last reiterated in revision number 7.

The Rules Manuals issued to other Hudson employees were examined and none were found updated to include revision number 7. According to Hudson's employee training manager, ramp supervisor, and the marshaller who had directed the Corsair airplane to stop taxiing short of the Boeing 747-SP nose wheel stop mark, it was a customary practice to use tow tractors to bring airplanes into the gate.

The marshaller reported to the Safety Board investigator that, in accordance with company policy, he had stopped the Corsair airplane's taxiing at the customary location for airplanes that, thereafter, are towed the remaining distance to TBIT gate 101. Hudson's first and second line supervisory and training personnel similarly reported that its marshallers use tow tractors to pull airplanes the final distance into the gate. Hudson's mid-level management reported that it is a standard practice to tow airplanes into this gate, and indicated that the 1993 revision 1 to the Rules Manual requires that airplanes be towed onto this gate.

Tow Tractor Positioning at TBIT Gate 101.

Hudson management reported to the Safety Board investigator that one reason they had stopped the Corsair airplane short of the gate was that it was difficult to position their tow tractor at the gate once the airplane was parked in front of it. The difficulty was principally related to aspects of the terminal building's geometry and its proximity to the tow tractor's tow bar hookup location on the airplane's nose gear. Management stated that if the airplane had come to a stop closer to the terminal than indicated by the striping plan's stop line, it would have been difficult to connect a tow bar and push back the airplane. Although the tow tractor's tow bar could be connected if the tractor was not prepositioned in front of the terminal before the airplane's arrival, due to the size of the airplane, there was virtually no room to spare and it could be difficult to accomplish the hookup with the equipment they were using.

Hudson management acknowledged to the Safety Board investigator that smaller tow tractors and tow bars existed. A smaller tow tractor could be used to push back Boeing 747 size airplanes.

Docking Light Usage and Test Results.

The Safety Board investigator conducted brief interviews with several ground service personnel from various companies, including Hudson. Interviews were also conducted with airport operations management personnel. None of the personnel having marshalling responsibility at TBIT gate 101 reported having used the docking light system during the past few years. Without exception, all reported the docking light system was out of service.

Similarly, airport operations management personnel having direct oversight responsibility of the TBIT initially reported to the Safety Board investigator that the docking light system was inoperative. Therefore, airplanes were directed to stop short of the gate whereupon they would be hooked up to a tow tractor and towed in.

Within days following the accident the functionality of the docking light system was examined. The LAX airport management verbally reported finding the lights functional. The management indicated that the docking lights were usable under a manually programmed control system if properly operated by ground service personnel. The docking lights had not undergone maintenance between the accident date and the date of their subsequent examination.

Taxiway and Taxi lane Inspection Results, Approvals and Criteria.

The Standards Section supervisor of the Airports Division, FAA Western-Pacific Region, performed a field examination of the taxi lane/terminal ramp pavement markings near the TBIT gate 101. In summary, the supervisor reported that the markings he observed in the area were clear, in good condition, and consistent with FAA standards and approvals.

The supervisor noted that FAA design standards (not operational standards) call for a 138-foot separation between the taxilane centerline and the nearest object, which is more than the 125-foot separation that exists next to TBIT gate 101. According to the supervisor, it is recognized that present runways/taxiways/terminals configurations at LAX do not permit meeting a number of design separation standards due to the lack of adequate land area. The existing operational separation distances have been accepted or approved by the FAA through such actions as construction project design approvals and certification manual approvals. The FAA last approved the reduced distance of 125 feet on May 16, 1996.

The FAA's current design standard generally provides for a wingtip to object minimum clearance distance of 160 feet, for a Boeing 747-400 airplane on a taxiway. Airport management indicated that because of operational needs, the FAA was requested to approve the reduction of the wing tip to object clearance to 125 feet in the area south of TBIT gate 101.

In the FAA's Advisory Circular number 150/5300-13, effective September 29, 1989, it is reported that the reduced wing tip clearances on a taxilane are acceptable because taxi speed is very slow outside the movement area, taxiing is precise, and special operator guidance techniques and devices are normally present.

Taxiway and Taxilane Definition and Design Rationale.

According to the Advisory Circular, a taxiway is a "defined path established for the taxiing of aircraft from one part of an airport to another." A taxilane is "the portion of the aircraft parking area used for access between taxiways and aircraft parking positions."

At times, both air traffic control (ATC) and airport management personnel refer to the taxilane

in various publications as being a taxiway. ATC management reported to the Safety Board investigator that airplane movement over this taxilane is considered to be heavy, and it is frequently used for routing airplanes to/from neighboring taxiways.

Boeing 747 Airplane Ground Collision History.

Three collisions during the 5-year period preceding the current investigation date were noted during a partial review of LAX management records. Assessments of the reported damage in all cases were minor. In pertinent part, the incidents are as follows:

In July 1994, at 1250 hours, the wing of a Boeing 747-400 taxiing eastbound on "K" (subsequently renamed "C") struck a Boeing 747's winglet. The "parked" airplane was in the process of being towed to gate 77.

In January 1997, at 2050 hours, a Boeing 747-400 taxiing eastbound on "C" struck a "parked" Boeing 747-100 that had stopped short of gate 69A, awaiting to be towed in. The "parked" airplane's wingtip was noted as having extended beyond the wing clearance line.

In May 1999, at 1110 hours, a Boeing 777 taxiing eastbound on "C" struck a Boeing 747-400 that had stopped short of gate 69A, awaiting tow tractor hookup. The investigating officer noted that the Boeing 747 was encroaching onto "C."

Airline Operating Regulations and Responsibilities.

Title 14 CFR Part 129.11 requires foreign air carriers to conduct operations within the United States in accordance with operations specifications issued by the FAA. Part 129.11(a)(3) requires carriers to have "such operations rules and practices as are necessary to prevent collisions between foreign aircraft and other aircraft."

Oversight of the International Terminal's Operations.

Based upon the lines of authority existing on the accident date, the airport's international operations management had responsibility for ensuring that safe and efficient operations were conducted at the Tom Bradley International Terminal, gate 101. In part, this responsibility related to the following: (1) monitoring that power-in parking procedures were appropriately followed in accordance with the airport's published regulations; (2) stop lines were appropriately located to provide ground crews guidance regarding where airplanes were to be parked; (3) monitoring the placement of stopped and parked international flights to ensure that they were located within the confines of the international terminal's designated areas, and not overlapping onto an active taxilane; (4) overseeing that the docking lights were operational and available for use by ground service personnel; and (5) identifying deficiencies associated with the orderly flow of traffic to/from the gate including taxi routes which may be hazardous to international operations in the vicinity of gate 101.

ADDITIONAL INFORMATION

Safety Board Supplemental Data and Party Representative.

Pertinent statistical data for the Safety Board's "Supplement E" form has been included in the Aircraft Accident Report Form No. 6120.1/2. Flight and ground crewmembers provided identification data that is included in their respective witness statements. No pertinent data was applicable to "Supplements C and D," and accordingly they were not included in this docket.

The Bureau Enquetes-Accidents (BEA) was appointed as the accredited representative to the investigation. The BEA designated Corsair Airline's quality assurance manager, as their technical representative under ICAO Annex 13.

Wreckage Release.

The airplanes were released to both operators on June 7, 1999.

Pilot Information

Certificate:	Airline transport; Foreign	**Age:**	52,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	January 25, 1999
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	March 5, 1999
Flight Time:	12046 hours (Total, all aircraft), 10427 hours (Pilot In Command, all aircraft), 182 hours (Last 90 days, all aircraft), 47 hours (Last 30 days, all aircraft), 12 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Boeing	**Registration:**	F-GTOM
Model/Series:	747-SP 747-SP	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Transport	**Serial Number:**	21253
Landing Gear Type:	Retractable - Tricycle	**Seats:**	362
Date/Type of Last Inspection:	April 29, 1999 Continuous airworthiness	**Certified Max Gross Wt.:**	701000 lbs
Time Since Last Inspection:	489 Hrs	**Engines:**	4 Turbo fan
Airframe Total Time:	66851 Hrs at time of accident	**Engine Manufacturer:**	Pratt & Whitney
ELT:	Installed, not activated	**Engine Model/Series:**	JT9D-7J
Registered Owner:	CORSAIR	**Rated Power:**	48650 Lbs thrust
Operator:		**Operating Certificate(s) Held:**	Foreign air carrier (129)
Operator Does Business As:		**Operator Designator Code:**	CQOF

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Night/bright
Observation Facility, Elevation:	LAX,126 ft msl	**Distance from Accident Site:**	
Observation Time:	23:16 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Scattered / 1000 ft AGL	**Visibility**	7 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	220°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.97 inches Hg	**Temperature/Dew Point:**	16°C / 13°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	PARIS (FPO)	**Type of Flight Plan Filed:**	IFR
Destination:	(LAX)	**Type of Clearance:**	IFR
Departure Time:	11:10 Local	**Type of Airspace:**	Class B

Airport Information

Airport:	Los Angeles International LAX	**Runway Surface Type:**	Concrete
Airport Elevation:	126 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	25R	**IFR Approach:**	Unknown
Runway Length/Width:	12091 ft / 150 ft	**VFR Approach/Landing:**	Unknown

Wreckage and Impact Information

Crew Injuries:	13 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	261 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	274 None	**Latitude, Longitude:**	33.93861,-118.408889

Administrative Information

Investigator In Charge (IIC):	Pollack, Wayne
Additional Participating Persons:	Joseph B Allee; FAA Western-Pacific Flight Standards District Ofc.; Los Angeles, CA Raymond Jack; Los Angeles Department of Airports; Los Angeles, CA Herve Auter; Corsair Airlines; Rungis Cedex, France Reuben Sternberg; Philippine Airlines; PasayCityPhilippines
Original Publish Date:	November 25, 2003
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=46628