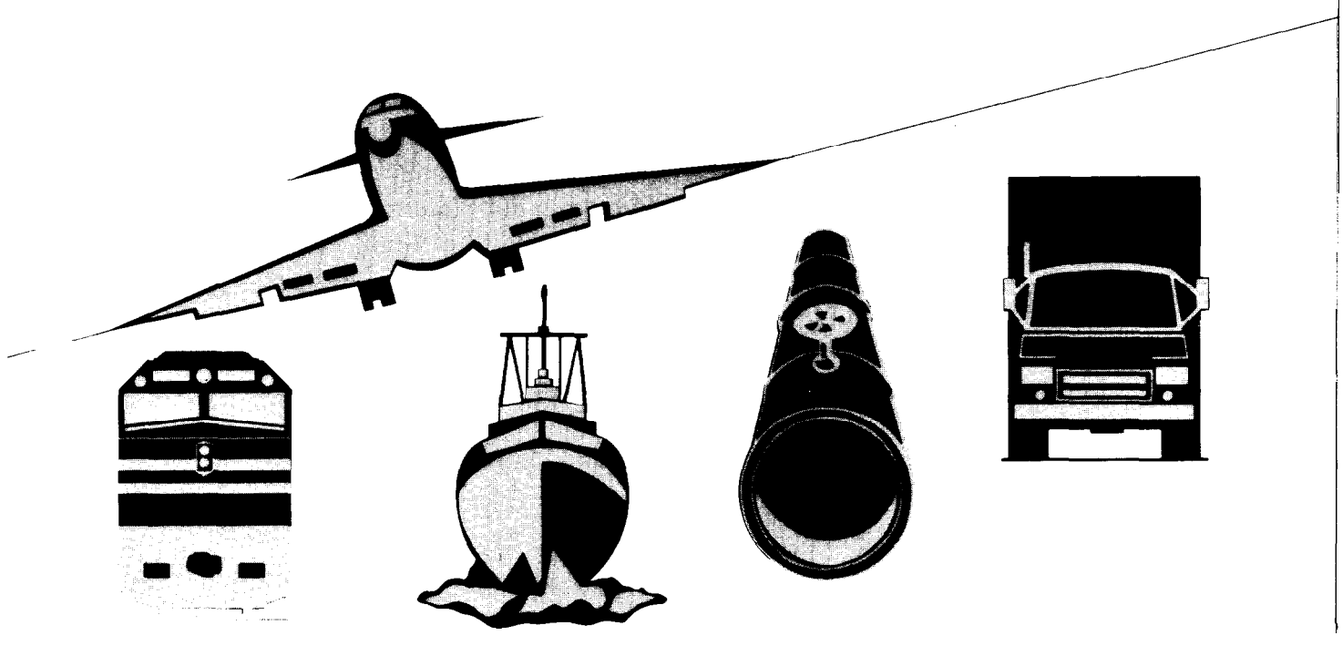
PB90-910405
NTSB/AAR-90/05

NATIONAL TRANSPORTATION SAFETY BOARD

AIRCRAFT ACCIDENT REPORT

ALOHA ISLANDAIR, INC., FLIGHT 1712
DE HAVILLAND TWIN OTTER, DHC-6-300, N707PV
HALAWA POINT, MOLOKAI, HAWAII
OCTOBER 28, 1989



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National Transportation Safety Board
Public Inquiries Section, RE-51
800 Independence Avenue, S.W.
Washington, D.C. 20594
(202)382-6735

EXECUTIVE SUMMARY

On October 28, 1989, Aloha **IslandAir,** *flight 1712, a de Havilland DHC-6-300, Twin Otter,* **N707PV,** *collided with terrain near Halawa Bay, Molokai, Hawaii, while en route on a scheduled passenger flight from the Kahului Airport, Maui, Hawaii, to Kaunakakai Airport, Molokai, Hawaii. The flight was conducted under visual flight rules (VFR) and under the provisions of 14 CFR Part 135. The aircraft was destroyed; the two pilots and all 18 passengers received fatal injuries.*

Official sunset had occurred about 32 minutes before the flight departed Kahului, Maui, and low clouds and precipitation existed over the mountains near Halawa Bay. Radar data revealed that the flight descended from its intended cruising altitude of 1,000 feet msl to an altitude of 500 feet as it approached Halawa Bay. The airplane was in a wings-level attitude on a heading of **260°** *when it struck the rising terrain. This final heading was determined to have been the normal heading routinely used by other Aloha* **IslandAir** *flights as they travelled over water parallel to the north shore of Molokai en route to the Kaunakakai Airport.*

The National Transportation Safety Board determines that the probable cause of this accident was the decision of the captain to continue flight under visual flight rules at night into instrument meteorological conditions (IMC), which obscured rising mountainous terrain.

Contributing to the accident was the inadequate supervision of personnel, training, and operations by Aloha **IslandAir** *management. Also contributing to the accident was insufficient oversight by the Federal Aviation Administration (FAA) of Aloha* **IslandAir** *during a period of rapid operational expansion and corporate growth.*

As result of this investigation, the Safety Board made six recommendations to the FAA pertaining to surveillance of 14 CFR Part 135 operators, 14 CFR Part 135 operating procedures, and flight following in the Hawaiian Islands. It also made one recommendation to the National Weather Service to include the possibility of orographic clouds in weather reports. Three recommendations were made to Aloha **IslandAir** *regarding crew training. In addition, the Safety Board made one recommendation to the Regional Airlines Association and the Aircraft Owners and Pilots Association to inform their members of the circumstances of this accident.*

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15. Supplementary Notes

16. Abstract

This report explains the crash of Aloha IslandAir flight 1712, a de Havilland Twin Otter DHC-6-300 near Halawa Bay, Molokai, Hawaii, on October 28, 1989. The safety issues discussed in the report are surveillance of 14 CFR Part 135 operators by the Federal Aviation Administration, 14 CFR Part 135 operating procedures, flight following in the Hawaiian Islands, weather, and crew training. Safety recommendations addressing these issues were made to the FAA, the National Weather Service, the Regional Airlines Association, and the Aircraft Owners and Pilots Association.

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1. FACTUAL INFORMATION

1.1 History of Flight

On October 28, 1989, about 1837 Hawaiian Standard Time, Aloha IslandAir, flight 1712, a de Havilland DHC-6-300, Twin Otter, N707PV, collided with mountainous terrain while en route on a scheduled passenger flight from the Kahului Airport, Maui, Hawaii, to Kaunakakai Airport, Molokai, Hawaii. The flight was conducted under visual flight rules (VFR) and under the provisions of 14 CFR Part 135.

The flight crewmembers assigned to flight 1712 reported to the Aloha IslandAir facility at Honolulu International Airport about 1310. They flew six uneventful interisland flights in N707PV before the origination of flight 1712 at Hana, Maui. Flight 1712 was scheduled to operate from Hana to Kahului, Maui, to Kaunakakai, Molokai, and to terminate in Honolulu.

At 1815, flight 1712 arrived as scheduled at Kahului. At 1815:44, during the taxi to the ramp area, the flightcrew requested the tower to provide their departure clearance from the Kahului Airport Radar Service Area (ARSA) in preparation for the next leg of its flight to Kaunakakai, Molokai.

Official sunset occurred about 1753, while the aircraft was at Kahului, civil twilight lasted until 1816, and nautical twilight until 1842.[1] No problems or unusual circumstances were reported by the crew or noted by ground personnel during this intermediate stop. The first officer remarked to a ramp agent that he thought the intended route between Maui and Molokai looked quite dark.

At 1825, after about 10 minutes on the ground, flight 1712 departed Kahului on a VFR flight plan and was scheduled to arrive at Kaunakakai at 1850. The departure clearance specified a departure heading of 320° and an altitude of 1,000 feet mean sea level (msl). Company personnel, who listened to the air traffic control tapes, identified the voice making the radio transmissions from the flight as being that of the first officer.

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[1] "Night" is the time between the end of evening civil twilight and the beginning of morning civil twilight; "Civil Twilight" is the period of time between when the upper edge of the sun is on the horizon and when the center of the sun is 6° below the the horizon; "Nautical Twilight" is the period of time when the center of the sun is between 6° and 12° below the horizon.

They stated that this identification implied that the captain was the flying pilot.

At 1826:52, the flight radioed the local controller that it was airborne and climbing through 400 feet for a cruise altitude of 1,000 feet. At 1827:15, departure control advised the flight, "Radar contact resume own navigation." At 1827:27, flight 1712 leveled off at an altitude of 1,000 feet. Radar data indicated that approximately 3 minutes later the flight began to descend out of 1,000 feet at a rate of about 250 feet per minute. The airplane leveled off at 500 feet at 1832:34. At 1833:13, flight 1712 was about 16 miles northwest of the Kahului Airport and clear of the ARSA. Departure control informed flight 1712 that radar contact was lost and instructed it to squawk transponder code "1200," which is the VFR transponder code. The flightcrew acknowledged the transmission. This transmission was the last one known from flight 1712.

The radar data from radar sites on Oahu showed that the flight operated at a ground speed of approximately 140 knots during its climb to 1,000 feet. After reaching 1,000 feet, the flight's ground speed increased to about 165 knots. At 1832:39, after the flight leveled at 500 feet, ground speed decreased to approximately 150 knots. This speed remained nearly constant until contact was lost with the target.

Radar data revealed that flight 1712's track progressed on a heading of about 320° to a point about 2 miles east of the Island of Molokai, where it then turned westerly to a heading of about 260°. The flight remained at 500 feet until contact was lost with the target at 1836:36. Figures 1 and 2 show the reconstruction of radar data on flight 1712's flightpath.

There were no eyewitnesses to the subsequent crash of flight 1712. Flight 1712 was declared missing about 1930, and an immediate search and rescue effort was commenced. The wreckage was found the next morning on the northeastern slopes of the coastal mountains on the island of Molokai at around 600 feet. The accident occurred about 1837, during the hours of darkness, at 21° 10' north latitude and 156° 44' west longitude.

1.2 Injuries to Persons

Injuries	Crew	Passengers	Others	Total
Fatal	2	18	0	20
Serious	0	0	0	0
Minor	0	0	0	0
None	0	0	0	0
Total	2	18	0	20

1.3 Damage to Aircraft

The airplane was destroyed by impact and postcrash fire. The value of the airplane was estimated at $900,000.

Figure 1.
Flight track of Aloha IslandAir flight 1712
departure to impact
1826:56 - 1836:23 HST.

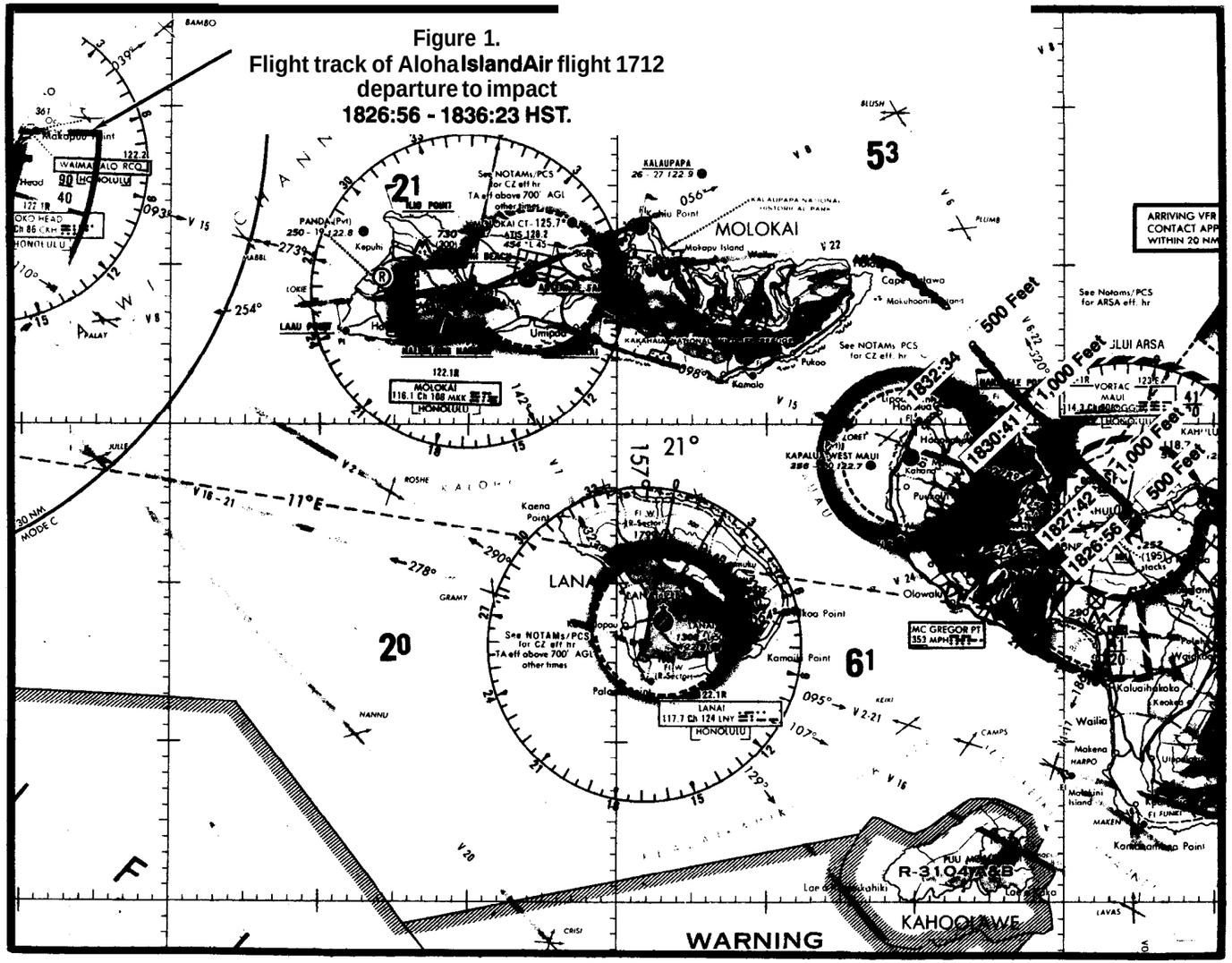
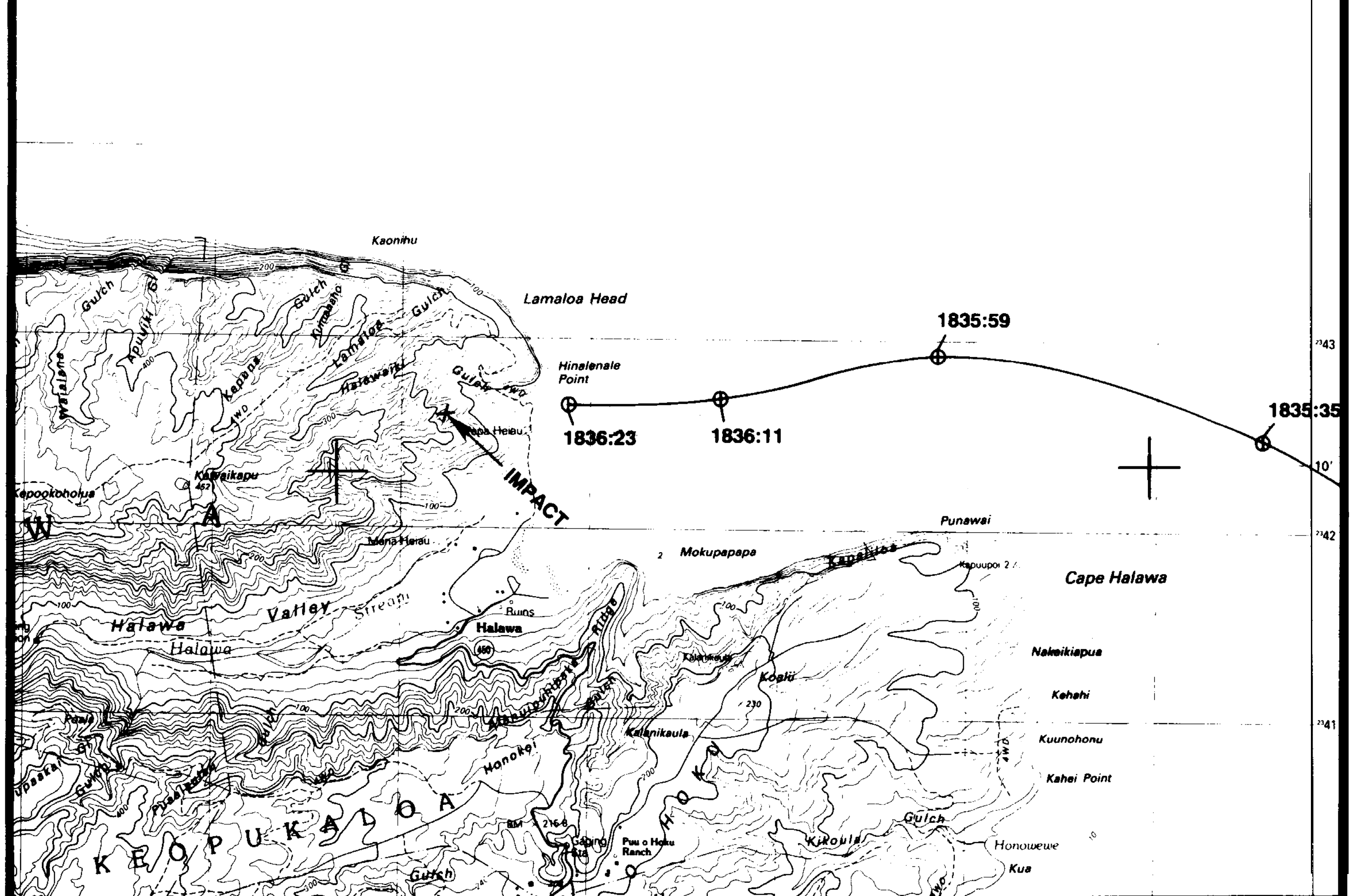


Figure 2.
Flight track of Aloha IslandAir flight 1712
Cape Halawa to impact.



1.4 Other Damage

None.

1.5 Personnel Information

The flightcrew consisted of a captain and first officer, both of whom were properly certificated by the FAA.

The captain, age 30, had been hired by Princeville Airways, the predecessor company of Aloha IslandAir, as a ramp agent in October 1987. In April 1988, he became a first officer for Aloha IslandAir. He was upgraded to captain in August 1989. The captain's aircraft check ride was administered by an Aloha IslandAir check airman and was observed and subsequently approved by the FAA Principal Operations Inspector (POI) from the Honolulu Flight Standards District Office (FSDO-13). The captain held an airline transport pilot certificate. He also held a first class airman medical certificate issued on July 21, 1989 with no limitations.

The captain had accumulated about 3,542 hours total flight time, including about 1,668 hours in the Twin Otter. In the last 30 days, he had logged 67 hours, including 3 hours of night flying and 8 hours of instrument time. In the last 24 hours, he had logged 4 hours total time, including 1 hour of night flying. Much of the captain's recent instrument flight hours was logged in visual meteorological conditions (VMC) and therefore outside references were available.

The captain's FAA records revealed one previous incident and one prior violation. On February 7, 1986, while operating a Piper PA-28 aircraft at Juneau, Alaska, he lost directional control during landing and veered from the runway, ground looping the airplane. The loss of control was attributed to a brake malfunction. The aircraft was not substantially damaged.

On August 1, 1984, the captain was cited for violations of 14 CFR part 135 by not meeting the proficiency and competency requirements and for operating an aircraft in a careless or reckless manner under 14 CFR Part 91. The FAA found that on five occasions the captain had acted as pilot-in-command on air taxi flights when he had not met the flight time requirements or passed the written and oral tests and competency check required under Part 135. As a result of these violations, the captain's commercial pilot certificate was suspended for 180 days.

The first officer, age 27, was hired by Aloha IslandAir in July 1988 as a ramp agent. He became a first officer in August 1989. His initial training with Aloha IslandAir consisted of 24 hours of ground instruction and approximately 4 hours of instruction in the Twin Otter. He held a commercial pilot certificate with ratings in airplane single and multiengine land airplanes and held an instrument rating. On May 17, 1989, he was issued a first class airman medical certificate with a limitation that he must wear corrective lenses for near and distant vision while exercising the privileges of his certificate.

The first officer had accumulated about 425 hours total flight time, including about 189 hours in the Twin Otter. In the last 30 days, he had accumulated 88 hours, all in the Twin Otter, including 3 hours of night flying and 7.7 hours of instrument flight. In the last 24 hours, he had accumulated a total of 4 hours.

The first officer had not accumulated any professional flight experience prior to his employment with Aloha IslandAir and was selected for a first officer position having only 233 hours total flight experience. At the time of the accident, he had completed Aloha IslandAir's training and 3 months of line experience, in which he had accumulated 189 hours of DHC-6 flight time.

The captain had flown the Maui to Molokai segment 12 times as captain; 6 times in September 1989 and 6 times in October. The first officer had flown the same segment 19 times since September, 11 times in October. During the same 2-month period, the captain and first officer were paired as a flightcrew on three occasions. Both crewmembers had previously flown from Maui to Molokai at night.

1.6 Aircraft Information

The airplane was a de Havilland DHC-6-300, Twin Otter, serial number 400, registration N707PV, manufactured in 1973. The airplane had accumulated about 19,875 total hours of flight time and 30,139 cycles. Its last inspection was completed on October 22, 1989, and its last phase inspection was completed on October 10, 1989, at 19,818.6 hours and 29,985 cycles. It was equipped with two Pratt & Whitney of Canada PT6A-27 engines. The airplane was equipped for instrument flight rules (IFR) operations. A check of the very high frequency omnidirectional radio range (VOR) receiver was completed on October 23, 1989, and no deviations exceeding ± 2 degrees were noted.

The flight log aboard the airplane was not recovered. Crews that had flown the airplane earlier in the day stated that there were no problems with the airplane and that everything was working properly. The company maintenance logs indicated that there were only three deferred maintenance items on the airplane. Two involved inoperative panel lights on the flap indicator and the engine fire indicator panel. The remaining open item was for the forward fuel tank low-level light.

1.7 Meteorological Information

At 1854, the weather at the Kahului Airport was reported as 900 feet scattered, 2,000 feet scattered, ceiling estimated 5,000 feet broken, visibility 15 miles, temperature 75° F, dew point 72° F, wind 030° at 10 knots, and the altimeter 29.96 inches of mercury.

Infrared satellite photographs revealed that at 1831 there was a north-south band of low clouds along the eastern side of Oahu and a north-south band of low clouds through western Maui and along the eastern coast of Molokai. Radar observations taken at Hickam Air Force Base at 1830

reported no echoes. The observation at 1935 indicated an area of 10 percent coverage of moderate rain showers to the west of Molokai. The accident site was 37 miles northwest of the closest observed rain showers.

The pilots automatic telephone weather answering service (PATWAS), valid at the time of the accident, stated, in part;

> "Honolulu to Upolu Point via north shores Molokai and Maui: Clouds 4,500 feet scattered variable broken. Briefly 2,000 feet broken in showers. Honolulu to Upolu Point via south shores Molokai and Maui, also along Kona Coast: scattered clouds. Briefly 4,500 feet broken."

The PATWAS added that a flight precaution was recommended because of occasional moderate turbulence below 4,000 feet both above and in the area south and west of the mountains on all islands. An airman's meteorological information (AIRMET) indicated that moderate turbulence had been reported at 1410, south of Molokai airport at 2,000 feet.

About 1745, a private pilot departed from a private airstrip on the west end of Molokai to fly around the island. He initially headed eastward along the north shore. He said that about 1800, he encountered scattered clouds and climbed above them to 5,500 feet. He described the clouds near the accident site as "just a lump" over the point with very localized rain showers. He noted that the showers were hugging the shore, not more than .25 mile offshore to the east and extending about .5 mile north of the island. The cloud tops were about 4,500 feet, and he described them as "puffy," sloping down toward the east. He estimated the visibility at less than .5 mile under the clouds. He stated that "everywhere else the weather was nice" and that he could see the islands of Maui and Lanai and that the south shore of Molokai was clear.

About 1815, another private pilot departed Kahului Airport on Maui and flew to the northeastern end of Molokai near Halawa Point. He then flew clockwise around the mountainous region of Molokai and returned to Maui. The pilot stated that he noted a large formation of clouds with a base about 500 to 700 feet surrounding the mountains around Molokai. He also said that as he approached Molokai he had to descend to approximately 500 feet to avoid instrument meteorological conditions (IMC). A video tape of most of the flight taken by one of the passengers confirmed the pilot's report and showed that clouds were obscuring the mountain over the eastern end of Molokai.

Residents that live in the Halawa Valley reported that about the time of the accident a strong rain shower had moved through the valley. The showers were described as a "big ball of gray cloud with rain coming out." The cloud base was described as "down to the ocean." A resident of the valley, who is also a private pilot, reported that showers came across in lines and that around the time of the accident the ceiling dropped to below 500 feet.

1.8 Aids to Navigation

There were no known difficulties with navigational aids,

1.9 **Communications**

There were no known communications difficulties.

1.10 Aerodrome Information

Not applicable.

1.11 Flight Recorders

N707PV was not equipped, nor was it required to be equipped, with either a cockpit voice recorder or a flight data recorder. It is noted that commencing in October 1991, cockpit voice recorders will be required on turbine-powered airplanes with 10 or more passenger seats.

1.12 Wreckage and Impact Information

The airplane was on a heading of approximately 260° magnetic when it struck a 27° rocky slope. The airplane was in a wings-level attitude with a nearly level flightpath. Propeller slash marks spaced 32 inches apart for each engine were found at the point of initial impact.

The impact with the terrain severely fragmented the airplane and a postcrash fire consumed most of the fuselage. All the airplane wreckage was confined to the impact area. The cockpit was so fragmented that no meaningful documentation of the instruments or controls could be obtained. The weather radar unit was found along the wreckage path. However, it was extensively damaged, and no useful information could be obtained about its ability to function before impact. It was not possible to establish preimpact continuity of the control system, but an inspection of the rudder and elevator control components in the tail cone of the airplane revealed no preimpact failures.

Both engines and propellers revealed evidence of rotation and power at impact.

1.13 Medical and Pathological Information

The cause of death for the 18 passengers and the two flight crewmembers was determined to have been blunt impact trauma.

The results of toxicological examinations of the two crewmembers indicated no evidence of drugs. The toxicology examinations indicated the presence of ethanol in both crewmembers, but that was attributed to post-mortem decomposition of the specimens because the victim's bodies were not recovered for several hours after death.

1.14 Fire

There was no evidence of in-flight fire. The fuselage was largely consumed by the postcrash fire.

1.15 Survival Aspects

The accident was nonsurvivable due to high longitudinal impact forces. The wreckage was discovered the morning after the accident by a commercial helicopter pilot who was involved in the search.

1.16 Tests and Research

Calculations using measurement of the propeller slash marks found at the accident scene, assuming a cruise power setting, indicate that the airplane had a ground speed of about 132 knots at impact. At the maximum power setting normally used for takeoff, the corresponding ground speed would have been 166 knots.

1.17 Additional Information

1.17.1 Human Factors Investigation

The following information concerning the activities of the flightcrew was reconstructed from information provided by persons interviewed during the course of the investigation.

1.17.1.1 The Captain

The captain had recently been accepted by Aloha Airlines to become a first officer on the company's Boeing 737s. During the 2 weeks prior to the accident, the captain had attended Aloha Airlines B-737 ground school. Aloha **IslandAir** *had given the captain time off to attend the ground school during the week, but he assumed his normal flight duties on the weekends. The captain altered his routine while attending the ground school, typically spending his evenings at home studying until 0209, and retiring until about 0700.*

On Wednesday, October 25, 1989, the captain reportedly did not study during the evening, but retired about 2230 after going out to dinner. On Thursday, October 26, 1989, he studied at the beach all day and attended an evening ground school session, returning home about 2230. Since the captain was off duty from both flight duties and attending ground school classes for more then 24 hours, he was in compliance with the crew rest requirements contained in 14 CFR Part 135. He studied late that night for the final examination the next day. He arose at 0700 on Friday, October 27, 1989 and attended ground school classes.

The night before the accident, he retired about midnight and slept until 0830. He ate breakfast, relaxed at home, and took a 'short nap before leaving for work. He had been on duty for about 5 hours at the time of the accident.

The investigation disclosed that the captain had recently experienced two significant events in his life. One was his engagement to be, married, and the other was professional advancement to a flight officer position with Aloha Airlines. No recent adverse life events were discovered during the investigation.

Two previous employers of the captain reported that he was intelligent and possessed good to excellent piloting skills. One employer believed that because flying was so easy for the captain, he became too comfortable and had developed a careless attitude toward his duties. The other employer reported that he believed the captain was careless and took unnecessary operating risks. That employer had decided to terminate him about the time he resigned to join Aloha IslandAir as a ramp agent. Both of these previous employers reported that they had not been contacted by either Aloha Airlines or-Princeville/Aloha IslandAir for a pre-employment reference. They did report being contacted by other airlines to which the captain had submitted applications for employment. They both stated that they gave unfavorable references to those airlines.

An Aloha IslandAir training captain stated that he had flown with the captain when the captain was a first officer and had conducted most of the captain's upgrade flight training. He described the captain as a very skilled pilot but believed that he was "cocky and irresponsible." He further believed that the captain's off-duty activities interfered with his flying skills. He remarked that as a first officer the captain would occasionally report for work in a fatigued condition. In one instance, while the captain was flying a scheduled operation, the other pilot observed him to "nod off" and fall asleep. On this occasion, he counseled the captain about his professional responsibilities.

The instructor stated that on two occasions during upgrade training, the captain's performance of maneuvers and instrument procedures was unsatisfactory. He said that the captain attributed his substandard performance to fatigue and admitted that he had received little rest and that his diet had been relatively poor. About 2 weeks later, the captain returned for additional training. The instructor described the session as a "great flight" in which all maneuvers and procedures were completed in a satisfactorymanner. However, the instructor recommended that the company have the captain undergo his upgrade check ride with an FAA inspector present "to be sure" that he was proficient. The check ride was satisfactory and described as a "good ride."

Aloha IslandAir management personnel stated during the investigation that they were never made aware of the instructor's concerns regarding the captain's abilities. They added that the FAA inspector was present only because the Aloha IslandAir check airman needed a third observation by the FAA in order to qualify as an FAA-designated check airman.

The ground school instructor for Aloha Airlines observed the captain during his 2 weeks of Boeing 737 training. The instructor stated that the captain was an average or above average student and made normal progress in training. The captain successfully completed the ground school

phase of training, passing the final examination on the day before the accident. The instructor reported that the captain had periodic attention lapses during training and on several occasions fell asleep briefly in class. He said that the captain had trouble keeping his eyes open and nodded off. He stated that these problems usually occurred during early morning hours or following lunch breaks.

Another Aloha IslandAir captain flew numerous times with the captain while the captain was a first officer. He said that he believed the captain of flight 1712 was intelligent and anxious to become a captain. However, at times he found him to be impulsive, and he occasionally reprimanded him for poor judgment. He thought that as a first officer the captain was knowledgeable about the aircraft and seemed conscientious but that his judgment was sometimes flawed and inconsistent. He believed that the captain's active personal life distracted from his professional duties and that he was somewhat immature.

1.17.1.2 The First Officer

The first officer flew morning flight sequences on Wednesday, October 25, 1989, and Thursday, October 26, 1989, between 0530 and 1100, and 0530 and 1325, respectively. On Friday, October 27, 1989, he was scheduled to be off duty and met a cousin, an Aloha IslandAir ramp agent, for lunch. No other details of the first officer's off-duty activities could be obtained until he returned to his home about 2000 and retired for the night.

He spent the morning of Saturday, October 28, 1989, the day of the accident, at home with his family, ate breakfast, and reported for work at 1300. He had been on duty for about 5 hours at the time of the accident.

The investigation found no recent significant events in the life of the first officer. However, a few days before the accident, he had expressed to his family and co-workers misgivings about unsafe and perceived illegal practices he had observed conducted by Aloha IslandAir captains with whom he had been paired. His concern focused on the practice of attempting to maintain visual reference to the ground when encountering IMC during VFR flight by descending to low altitudes to remain below clouds.

The day before the accident, the first officer had lunch with his cousin, who is an employee of Aloha IslandAir. During lunch, the first officer expressed his concerns regarding flying with a few of the Aloha IslandAir captains. The cousin stated that the first officer had indicated his alarm over a practice the first officer called "scud running," wherein Aloha IslandAir captains he had flown with maintained visual contact with the ground during VFR flights by flying below clouds at low altitudes. He gave an example of following the phosphorescent line made by breaking surf to "stay VFR" during night operations or periods of reduced visibility.

He reported that the first officer stated “I’m scared for my life," describing how some captains used their own private "flight plans" for specific headings, distances, times, and turns when they encountered instrument conditions while operating under VFR. The cousin added that the

first officer was planning to compile for the cousin a list of captains who used such practices. His cousin, who hoped to be hired as an Aloha IslandAir first officer in the near future, was to use this list to avoid being scheduled with these captains.

The parents of the first officer related that their son enjoyed his work but had recently expressed concern about an unsafe practice they thought he had called "scudding."

1.17.2 Company History

Aloha IslandAir, Inc. was originally founded in 1980 as Princeville Airways by Consolidated Oil and Gas. The primary purpose of the airline was to serve tourist resorts under development by Consolidated Oil and Gas. Initially, two Twin-Otter airplanes were purchased, and service was started between Honolulu and Princeville, Kauai, with occasional stops at Lihue.

In 1984, the airline began service from Honolulu to Molokai and Waikoloa/Kamuela. Service was discontinued in 1985 but reinstated in 1986. A third airplane was purchased in 1985. When another commuter airline ceased operations in 1986, the company planned to fill the void and expand its fleet. In March 1987, a fourth Twin Otter was purchased to support the continued growth of the airline.

In May 1987, Aloha AirGroup purchased Princeville Airways. In early 1988, two additional Twin Otters were purchased. In May 1988, the airline was renamed Aloha IslandAir to reflect its new ownership and affiliation with its sister company, Aloha Airlines. In July and August 1988, three additional Twin Otters were purchased in order to begin a new business for the airline--all-day air/ground tours of most of the populated Hawaiian Islands.

At the time of the accident, Aloha IslandAir employed 24 captains and 21 copilots, including 4 authorized check pilots. All flight crewmembers are domiciled in Honolulu, and all daily flights are scheduled to depart and terminate at Honolulu International Airport. The airline operated nine aircraft, flying about 120 sorties (a sortie is one takeoff and landing) each day, and carried approximately 30,000 passengers per month.

1.17.3 Aloha IslandAir Training and Policies

Aloha IslandAir's training program and flight training manual were accepted by the FAA. According to the training manual, the syllabus called for approximately 44 hours of initial ground school. Recurrent training required 16 hours of ground school. Neither ground school contained specific cockpit resource management (CRM) training. The investigation noted that the airline had reduced its initial ground training program to 24 hours during August 1989. The FAA POI stated that he was not aware of this reduction, which required his approval.

With one exception, all the airplanes in the company's fleet were equipped with weather radar units, including the accident airplane. The unit in the accident airplane had a ground-mapping feature. Weather radar was not specifically addressed in the company's operations manual or in its training program. However, company officials stated that the use of weather radar was addressed verbally during initial training and 'upgrade training. Several Aloha IslandAir captains reported that they had received little or no instruction on the use of the weather radar. One captain reported that during training he was told "not to use the radar unless absolutely necessary, as it was expensive to get repaired."

Aloha IslandAir operational policies are published in the company's operations manual. The purpose of the manual was to provide guidelines for Aloha IslandAir personnel to carry out their assigned duties and responsibilities in accordance with company policies and Federal Aviation regulations (FARs). The manual was accepted by the FAA in that it was provided to the FAA for review to verify that it contained no deviations from the FARs.

The company operations manual and 14 CFR Section 135.203 state that "VFR operations at night may not operate at an altitude less than 1,000 feet above the highest obstacle within a horizontal distance of 5 miles from the course intended to be flown or, in designated mountainous terrain, less than 2,000 feet above the highest obstacle within a horizontal distance of 5 miles from the course intended to be flown." The flight track indicates that flight 1712 was operated within 5 miles of the designated mountainous areas of Maui and Molokai.

The VFR visibility requirements (14 CFR Section 135.205) are "not to operate an airplane under VFR in uncontrolled airspace when the ceiling is less than 1,000 feet unless flight visibility is at least 2 miles."

Aloha IslandAir's Director of Operations and the Chief Pilot/Director of Training at the time of the accident stated that all the airline's operations were conducted in accordance with the company operations manual and the FAR's and that any deviations were unauthorized. Both officials flew the line regularly. Concerning first officer employment and training practices, they stated that highly qualified pilots were difficult to find and that first officers with limited flight time and experience were more easily hired and retained by the company. The chief pilot stated that each first officer received 5 to 6 hours of flight training by the chief pilot and/or check airman. The Director of Operations stated that being.a ramp agent was not a requirement to be hired as a first officer. However, Aloha IslandAir employees were given a preference in applying for positions in the company.

1.17.4 Flight Scheduling and Operations

At the time of the accident, Aloha IslandAir's flight schedule was predicated on operation in visual meteorological conditions, using a set of designated company VFR flight plans that were prefiled with the Honolulu

Flight Service Station for all scheduled flights. All VFR flights were monitored by the Aloha IslandAir flight dispatch flight-following system.

Flight under instrument flight rules (IFR) was optional, at the discretion of the captain of the flight, and designated company IFR flight plans were available for his use. The company had prefiled IFR flight plans at the Honolulu Flight Service Station to expedite receiving an IFR clearance. The company operations manual stated 'Captains anticipating a flight under IFR should file the plan at [least] 30 minutes before proposed departure time." The company reported that 95 percent of its flights were conducted under VFR using designated and prefiled company VFR flight plans in accordance with the published flight schedule. However, Aloha IslandAir's procedures were that if a flight encountered deteriorating weather conditions en route, the flightcrew was to open one of the prefiled IFR flight plans by contacting the flight service station by radio.

Aloha IslandAir required its crewmembers to report for duty 30 to 45 minutes prior to initial departure on a scheduled flight sequence. The flight schedule provided for 10- to 20-minute turnarounds between flights, during which the aircraft would be serviced by ramp personnel and the crew would prepare for the subsequent leg in the flight sequence.

Observations of Aloha IslandAir ground operations following the accident revealed that typical aircraft turnarounds were completed in approximately 10 minutes. The captain typically would remain in the aircraft with the right engine at idle and the left engine shut down. The first officer opened the cabin door, disembarked passengers, supervised cargo loading, embarked passengers, closed the cabin door, and inspected the cabin and verified passenger restraint use while returning to the cockpit. The nonflying pilot gave the passengers a safety briefing while the airplane was taxied to the active runway.

Fueling, obtaining weather information, IFR operations, flightcrew physiological breaks, completing required forms and logs, minor maintenance, and unpredictable delays could lengthen the turnaround and have an adverse effect on the schedule and on-time performance of subsequent flights. Company officials stated that pressure was never placed on pilots to make the scheduled arrival and departure times. The investigation did not disclose any overt pressure on pilots to meet the scheduled times. The investigation found that prior to the accident the airline had a promotional campaign involving a nationally known pizza franchise. If the airplane was late, passengers received a free pizza. This promotional campaign was terminated approximately 1 month prior to the accident. The investigation could not determine if this promotional campaign in any way influenced Aloha IslandAir pilots to meet the scheduled arrival times.

Aloha IslandAir pilots normally navigated using direct point to point routes. However, "minor diversions from this routing to show scenic points, which would be of interest to the passengers' were allowed on VFR flights, weather permitting, according to the company operations manual.

Pilots with the airline stated that the normal route of flight from Maui to Molokai was along the north shore of Molokai. They stated that this route was preferred because passengers enjoyed the view of the tall cliffs and that there was less turbulence due to the trade winds than on the leeward side of the island. However, company officials reported that most Aloha IslandAir pilots chose to fly Molokai's south shore at night because more visual references were available.

Several regular passengers interviewed during the investigation, including a private pilot, reported that scheduled Aloha IslandAir flights had diverted from normal flight routes for sightseeing purposes. Some of the passengers reported that they had taken excursions, narrated by flightcrew members, into Halawa Valley near the accident site. Such excursions required the flightcrew to climb the airplane out of the valley and to fly over Halawa Point at low altitude.

The private pilot, who routinely flew as a passenger on Aloha IslandAir, noted several occasions when the airplane would be in IFR conditions while the transponder was set at 1200 VFR code. On separate occasions during the investigation, with different crews at the controls, a Safety Board investigator and an FAA accident investigator assigned to the investigation noted that Aloha IslandAir aircraft passed through clouds while on VFR flight plans. The FAA inspector was monitoring crew communications by being "plugged into" the intercom system. He stated that the crew was not communicating with or monitoring air traffic control while in the clouds. Following the flight, he counseled the flightcrew on flying through clouds during VFR operations.

1.17.5 Changes to Aloha IslandAir's Procedures

Immediately after the accident, Aloha IslandAir cancelled all night VFR operations. Shortly thereafter, with minor exceptions, this procedure was changed, requiring all flights, day or night, to be conducted under IFR. The exceptions are for short flights between airports that do not have instrument facilities. Additionally, the airline adopted the policy of conducting VFR flying at altitudes in excess of the FAA minimums.

The airline changed the experience requirements for hiring captains and upgrading first officers to captains. The new requirements reestablish the airline's policy of a minimum of 3,000 hours flight time to upgrade from first officer to captain. Previously, at the option of the airline, the total time requirement could be waived for pilots with 1,200 hours in the Twin Otter.

Aloha IslandAir's training program was modified to place additional emphasis on instrument procedures and the operation of on-board radar equipment. Additionally, the airline began sending pilots to the same CRM workshop used by Aloha Airlines. To improve IFR operations, Aloha IslandAir employees have been trained as weather observers at Molokai and Lanai, and the airline has convinced the Molokai Tower to extend its operating hours to service evening arrivals and departures.

1.17.6 FM Oversight

FAA FSDO-13 had primary responsibility for oversight of Aloha **IslandAir.** *FSDO-13 has an air carrier unit (Part 121) and a general aviation unit, which oversees Part 135 operators as part of its responsibilities.*

FSDO-13 was assigned five general aviation **POIs.** *During the year preceding the accident, one position was vacant. Turnover in the other four positions resulted in only one position being filled continuously for the entire year.*

The general aviation unit of FSDO-13 was responsible for about 52 certificate holders. There were 35 Part 135 certificated holders, 5 of which were commuter air carriers and the remainder were on-demand air taxis, and 16 helicopter external-load operators, 1 of which was held by a Part 141 training school. Five of the Part 135 certificate holders were on Guam and American Samoa.

The FAA's **POI** *for Aloha* **IslandAir** *had served in that capacity since 1988 and had conducted one en route inspection with the captain of the accident aircraft. This inspection occurred in May 1989, while the captain was the first officer of a flight from Honolulu to Kapalua. There were no discrepancies noted during the inspection. On August 8, 1989, the* **POI** *observed a company check airman administer the captain's final flight check before his upgrade to captain. There were no discrepancies noted during the check flight.*

On April 26, 1989, FSDO-13 conducted a base inspection of Aloha **IslandAir.** *Three discrepancies were noted: not keeping duty records of nonflying days, not including all the items on the manufacturers recommended checklist in the checklists used by the airline, and using outdated standards in training programs.*

According to the manager of FSDO-13, it takes about 1 year for an employee to become fully trained as a POI. The manager estimated that a **POI** *has only 55 percent of the work year to perform his duties. The remaining 45 percent is consumed by training, annual leave, and in some instances military leave, and compensatory time for work or travel after duty hours. In addition, he noted that the large geographical area of FSDO-13's region (the Pacific basin) requires that a significant portion of an inspector's available man hours be used for travel. The travel hours that took place in part after normal duty hours were remunerated by employee compensatory time.*

The FAA's National Work Program Activity, as outlined in FAA Order 1800.56, provided general guidance to **FSDOs** *for the development and execution of annual work programs. Accordingly, FSDO-13 was required to accomplish one base inspection and six ramp inspections of Aloha* **IslandAir** *each year. The number of en route inspections was predicated on the number of different airplane models and the number of pilots in command at the airline. For Aloha* **IslandAir,** *six en route inspection per year were 'required. FAA records indicate that from January to October 1989, FAA inspectors performed seven en route inspections and one base inspection.*

During the public hearing for an accident that occurred on April 28, 1988, involving Aloha Airlines flight 243,[2] Aloha's principal maintenance inspector (PMI) testified that his heavy workload made frequent visits to observe maintenance programs impossible. The PMI was responsible for nine air carriers and seven repair stations that were located throughout the Pacific basin and in the People's Republic of China, Taiwan, Hong Kong, Singapore, the Philippines, and Hawaii. He stated that travel distances reduced the time available to inspect each operator. One of the Safety Board's findings in that investigation was that the PMI's workload and geographic assignments were too extensive for him to be effective.

Shortly after the accident involving flight 1712, a special safety inspection of Aloha IslandAir was conducted by a team from the FAA's Western Pacific Region. It was conducted to determine Aloha IslandAir's compliance with the FARs and with the company's written policies and procedures. The team filed its report on November 28, 1989.

The team found that Aloha IslandAir had reduced its ground school from 44 hours to 24 hours without notifying the POI. A total of 19 Aloha IslandAir pilots had not received the ground training that was required under the approved training program. Among this group was the first officer of flight 1712. Additionally, the team found that the flight and ground training records of two of the airline's check airmen did not contain evidence that they had received the appropriate training that is required by 14 CFR Part 135.339. One of these check airmen was the chief pilot for the airline. Aloha IslandAir located the two check airmen's training records after the team departed, and FSDO-13 did not process a violation.

The team's report noted the flight times logged in the crewmember's training records and monthly flight reports contained dates and flight times that were inconsistent with the corresponding aircraft maintenance logs.

Some of the training records were silent as to specific types of training. For instance, specific IFR training was not entered in several records. One record revealed that a pilot had not received instrument training in the aircraft and that instrument procedures were not checked during the flight. A statement in a pilot's file indicated that he had passed an instrument competency check in a simulator. However, no authorization for the use of a simulator or instrument training device was contained in the airline's approved flight training program.

The team report noted that Aloha IslandAir's FAA-accepted operations manual stated under Flight and Duty Time: "In completing the "Monthly report," each pilot will log as instrument time all time under actual instrument conditions; however, only the pilot who is the sole manipulator of the aircraft controls will log a takeoff or a landing." These instructions contrast with 14 CFR Section 61.51 that state "...a pilot may

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[2] Aircraft Accident Report--"Aloha Airlines, Flight 243, Boeing 737-200, N73711, Near Maui, Hawaii. April 28, 1988" (NTSB/ARR-89/03)

log as instrument flight time only that time during which he operates the aircraft solely by reference to the instruments, under actual or simulated instrument flight conditions."

In reviewing the airlines's operations records, the team found that load manifests were inaccurate for the number of passengers and the total weight of the aircraft for 17 of the flights conducted on October 1, 1989. Additionally, it was found that the load manifest passenger counts did not agree with the dispatch passenger list. The team reported that flightcrew personnel were not entering the aircraft's actual takeoff, landing, and block times into the weight and balance flight log in accordance with the operations manual- of the airline. Instead, they were entering the scheduled flight times.

Finally, in a review of flight and duty times, the team found that during May 1989, two flight crewmembers had exceeded 34 hours of flight time in 7 consecutive days, indicating noncompliance with the requirements of 14 CFR Section 135.265(a) (3). Aloha IslandAir responded that the two crewmembers had recorded their flight times incorrectly and that they had not exceeded the maximum authorized flight time.

On January 1, 1990, the FAA removed FSDO-13's Part 129 and Part 145 surveillance/inspection responsibilities. Currently, FSDO-13's geographic surveillance area is confined to Hawaii, Guam, the Marshall Islands, the Caroline Islands, and American Samoa.

1.17.7 Flight Path Reconstruction

The Safety Board reviewed radar data from both the FAA and US military sources, and these data were used to reconstruct the flight path of flight 1712. The data included a Search and Rescue (SAR) Printout for transponder code 1763 and 1200 returns. Data in the SAR printout was considered accurate to within 1/8 nautical mile.

The Fleet Area Control Surveillance Facility (FACSFAC), at the Pearl Harbor Naval Base, is operated by the U.S. Navy and provides radar coverage throughout the Hawaiian Islands. At the request of the Safety Board, FACSFAC personnel provided a printout of primary and secondary radar returns in the area of the accident from 1835:00 to 1850:01. A review of the FACSFAC data revealed nine possible returns associated with the flight. Three of the returns were based on mode "C" transponder data between 1835:37 and 1836:01 which recorded an altitude of 500 feet. The remaining six returns were based upon primary radar data only. Two returns were indicative of transponder data presented in available FAA data sets. The other four returns were recorded between 1836:25 and 1837:47, after the loss of transponder data. These returns were indicative of a nearly stationary target and varied in target strength.

An examination of the possible nature of these returns indicated three probable sources: reflected energy from an area of precipitation; reflected energy from terrain; or reflected energy from the residue or smoke from a fossil-fuel fire. The relatively short duration and the stationary

position of the last four primary radar returns were determined to be the returns from the smoke plume of the accident.

1.17.8 Ground Proximity Warning Systems

Examination of the topography along the route of flight shows that the terrain rises about 1,050 feet vertically in 3,200 feet horizontal distance. The data indicate that assuming a constant heading and speed, ground impact probably occurred 7 seconds after flight 1712 crossed the coastline.

The investigation noted that N707PU was not equipped, nor was it required to be equipped, with a ground proximity warning system (GPWS). However, the possible benefit of a GPWS aboard flight 1712 was considered. Calculations show that a GPWS designed for commuter aircraft, such as the Twin-Otter would have given the warning "TOO LOW - TERRAIN" about 0.7 seconds after the airplane crossed the coastline or about 7 seconds prior to impact. Assuming a 3-second pilot recognition and response time to this warning, a wings-level pull up with a 1.5 G load factor would have allowed the flight to clear the terrain vertically.

As a result of the Safety Board's investigation of three commuter accidents[3] in 1985 and 1986, Safety Recommendation A-86-109 was issued to the FAA on October 9, 1986. This recommendation stated:

> Amend 14 CFR 135.153 to require after a specified date the installation and use of ground proximity warning devices in all multiengined, turbine-powered fixed wing airplanes, certificated to carry 10 or more passengers.

On April 24, 1990, the FAA issued a Notice of Proposed Rulemaking (Notice No. 90-14) to require the installation of GPWS in turbine-powered airplanes having 10 or more passenger seats. The comment period ended on July 23, 1990. The Safety Board had previously classified Safety Recommendation A-86-109 as "Open--Acceptable Action," pending the adoption of the final rule. Nevertheless, the Safety Board now reiterates this recommendation and encourages the FAA to expedite its rulemaking action.

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[3] Bar Harbor Airlines flight 1808, Beechcraft B-99. N30WP, Auburn-Lewiston Airport, Aurbourn, Main, August 25, 1985 (NTSB/AAR-86-06); Henson Airlines flight 1517, Beechcraft B-99, N339HA, Shenandoah Valley Airport, Grottoes, Virginia, September 23, 1985 (NTSB/AAR-86-07); Simmons Airlines flight 1746, Embraer EMB-110p1, Phelps Collins Airport, Alpena, Michigan, March 13, 1986 (NTSB/AAR-87-02)

2. ANALYSIS

2.1 General

The investigation determined that the airplane had been maintained in accordance with applicable FARs and company operation specifications. There was no evidence of any preexisting discrepancies or of any preimpact structural, flight control, electrical system, or engine failures that would have been causal to the accident.

The captain was properly certificated and qualified in accordance with applicable FARs and company requirements. The first officer's ground-school training, provided by Aloha IslandAir, did not meet the required 44 hours as stated in the airline's FAA-approved training program. Consequently, he was not qualified as a first officer.

The investigation revealed that both members of the flightcrew were in good general health and had proper FAA medical certification at the time of the accident. There was no evidence of adverse medical conditions that affected the flightcrew. The examination of toxicological specimens obtained from the flightcrew following the accident indicated that neither the captain nor the first officer was under the influence of, or impaired by, drugs or alcohol at the time of the accident.

2.2 Weather

The investigation determined that the accident occurred about 6 minutes before the end of nautical twilight. During this time, only a very dim horizon and the brightest stars are visible. There were very few lights on the ground and no navigational lights on the eastern end of Molokai. Therefore, the island of Molokai and the clouds over Molokai might only have been detectable to the pilot as an occlusion on a dim horizon.

The investigation determined that there was an orographic cloud[4] over the northeastern end of Molokai, created by the northeast trade winds. Based on witness observations and analysis of meteorological conditions, the base of the cloud was about 500 feet above sea level and the top was about 4,500 feet. Precipitation was observed under the cloud, probably in the form of drizzle or very light rain because of the shallow depth of the cloud.

Orographic clouds are common in Hawaii and other mountainous tropical islands in the trade wind belt. Orographic clouds would be quite familiar to pilots flying regularly in the area and to local meteorologists. Additionally, because of conditions required to create an orographic cloud, clouds on the windward side of an island would often obscure or partially obscure mountainous terrain.

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[4] An orographic cloud is developed by air forced aloft by rising terrain and cooled adiabatically to saturation. The cloud is constantly being generated on the upuind slope of the terrain and dissipated on the downwind slope of the terrain, making it appear stationary.

The Safety Board concludes that at the time of the accident it was too dark to avoid the clouds by visual reference and therefore it was unsafe to continue VFR flight near Halawa Point. The Safety Board further concludes that the flight entered clouds and continued into high terrain that was obscured by the clouds. The captain might have been able to see the phosphorescence of the surf braking on the shore of Molokai. However, the forward visibility would have been severely limited by precipitation, clouds, and darkness.

The 500-foot ceiling over the eastern (windward) end of Molokai was considerably lower than the 2,000-foot ceiling predicted by the Area Forecast, and IMC conditions existed in this region below 4,500 feet. Consequently, the Safety Board concludes that the weather forecast valid at the time of the accident was incomplete, because it did not include the possibility of low cloud conditions along the intended route of the accident flight.

The captain's previous experience in the Hawaiian Islands should have made him familiar with and aware of the possibility of orographic clouds in this mountainous area. However, if the forecast had been accurate, the captain could have been informed of the likelihood of orographic clouds and he might have filed an IFR flight plan or altered his course to avoid the eastern end of the island. Therefore, the Safety Board concludes that National Weather Service reports should include the possibility of orographic clouds whenever conditions exist that would create such clouds.

2.3 The Flight

Shortly after leaving the Kahului ARSA, flight 1712 descended to 500 feet, an altitude that did not comply with 14 CFR Part 135 or with Aloha IslandAir's operating procedures for night operations. The flight progressed on a heading of about 320° to a point about 2 miles east of Molokai, where it turned to a heading of approximately 260°, a heading consistent with paralleling the north shore of Molokai.

Based on the flight track, the Safety Board concludes that in the reduced visibility conditions of darkness, low clouds, precipitation, and with the lack of lighted visual reference points on the ground, the captain of flight 1712 visually mistook the surf breaking, on Cape Halawa for the portion of land known as Lamaloa Head. Believing that the flight had passed north and east of Lamaloa Head, the captain commenced a turn to a westerly heading to parallel the north shore of Molokai. This error of misidentification caused the flight to enter into' the north side of the Halawa Valley at an altitude substantially lower than the height of the terrain.

The Safety Board believes that rather than trying to continue the VFR flight at 500 feet above the water, the prudent action would have been for the captain to have filed IFR enroute. The Safety Board notes that the flight could have flown air route "Victor 6" to Plumb intersection and then air route "Victor 22" to Kaunakakai Airport. This IFR flight path would have added only a few minutes to the total flight time, but it would have ensured

that the flight was at a safe altitude and distance from the mountainous terrain on the eastern end of Molokai.

The flight path of flight 1712 did not comply with the requirements of 14 CFR Section 135.203 in that it was operating at less than 1,000 feet above the highest obstacle within a horizontal distance of 5 miles. Flight 1712 did not comply with this regulation when it let down from 1,000 feet after clearing the Maui ARSA. As the flight approached to within 5 miles of Molokai, it was again not complying with this regulation.

During most of the flight, flight 1712 was in compliance with the visibility requirements of 14 CFR Section 135.205 since the visibility was greater than 2 miles. However, when the flight encountered clouds and precipitation, which most likely reduced the visibility to less than 2 miles as it neared Molokai, it was no longer in compliance with the regulation.

As a result of the Safety Board's investigation of an accident involving a Beechcraft B-99A,[5] Safety Recommendation A-89-91 was issued to the FAA on August 11, 1989:

> Restrict 14 CFR Part 135 air carrier (fixed-wing) passenger flights from operating in uncontrolled airspace under visual flight rules (VFR) in less than the basic VFR weather minimums of a l,OOO-foot ceiling and 3 miles visibility.

In its response dated October 23, 1989, the FAA stated that it believes that the current requirements of 14 CFR Section 135.205 are adequate. The FAA further stated that it did not plan to take any further action regarding this recommendation. The Safety Board believes that scheduled 14 CFR operations should be required to be conducted under instrument flight rules when low ceilings (less than 1,000 feet) or low visibilities (less than 3 miles) are forecast, reported, or encountered enroute. Therefore, the Safety Board classifies Safety Recommendation A-89-91 as "Closed-Unacceptable Action/Superseded."

The Safety Board maintains that passengers on board scheduled 14 CFR Part 135 flights are entitled to the additional safety margin provided by IFR requirements. Currently, 14 CFR Part 135 requires that the airplanes used in these operations are to be equipped for IFR flight and the pilots to be IFR rated. Therefore, there is no reason that scheduled 14 CFR Part 135 flights could not be operated IFR.

2.4 Crew Performance

The Safety Board's examination of the captain's background established that a pattern of unprofessional behavior had existed and that similar behavior continued following the captain's employment by Aloha IslandAir. The first documented event occurred 5 years before the accident,

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[5] San Juan Air Lines, Inc. flight 204, Beechcraft B-99A, N803BA, October 4, 1988.

resulting in a 180-day suspension of his commercial certificate for conducting a commercial flight in violation of the competency requirements of the FARs and for reckless or negligent operation of an aircraft.

Two previous employers reported that the captain had developed careless and unsafe practices as a result of his attitude and off-duty activities. Both of them gave unfavorable references to a major air carrier with whom the captain had filed an employment application. These previous employers were not contacted by Princeville Airways prior to the captain's employment as a ramp agent or his selection as a first officer.

The captain, while a first officer, had been reprimanded by a senior Aloha IslandAir captain for falling asleep in flight, after reporting for duty in a fatigued condition, and by another Aloha IslandAir captain for exercising poor judgment. During upgrade flight training 3 months before the accident, the captain performed so poorly, because of a lack of proper rest, that he was given unsatisfactory grades and admonished by his instructor. Later, when rested, the captain performed well in training and during an FAA-monitored proficiency check, and he was upgraded to captain. Unfortunately, these events, reported by Aloha IslandAir's Director of Operations, Chief Pilot/Director of Training, a training captain, line captains, and other coworkers, were not recognized collectively as symptoms of a problem that could adversely affect the safety of the captain's flight operations.

The evidence indicates that the captain's behavioral traits adversely influenced the captain's professional judgment on the day of the accident and were factors that contributed to his decision to continue the planned VFR flight into IMC.

During the 2 weeks prior to the accident, the captain, having been selected by Aloha Airlines as a first officer for a B-737, attended Aloha's initial B-737 ground school. He studied in the evening hours and altered his sleep-wake cycle to accommodate his studies. He frequently studied late into the night, sleeping only 4 or 5 hours. Thus, he had difficulty staying awake at various times in class. On the day before the accident, the captain completed the training and passed the final examination.

The captain continued to work at Aloha IslandAir on the weekends during the period he attended ground school, conducting flight operations on the day of the accident and on the 2 previous weekends. The captain's schedule for the 18 days prior to the accident had been filled with intensive classroom training, home study, and Aloha IslandAir flight operations, leaving little time for rest. Furthermore, he had been either an Aloha IslandAir captain or an Aloha Airlines ground-school student for 25 of the previous 28 days. As a result, the captain may have accumulated a sleep deficit that led to a condition of chronic fatigue.

The Safety Board cannot conclude with certainty that chronic fatigue adversely affected the captain's conduct of the accident flight. However, activities of the captain in the days and weeks prior to the

accident probably were detrimental to his performance, and probably were a factor that affected his judgment and ability to make appropriate decisions.

Although the first officer's attitude toward his new duties was positive, his lack of operational experience would have given him little influence over or credibility with the captain of flight 1712, who was older, more experienced, more qualified, and highly confident in his own abilities. Statements made by the first officer prior to the accident indicated that he was uncomfortable with VFR operations at night and sometimes with "scud running." Under the circumstances, the first officer may have been unable to assert his feelings to the captain or object to the captain's management of the flight, given his inexperience as a pilot and in commuter operations.

Therefore, the Safety Board believes that the actions of the first officer were not a factor in the accident and that his lack of experience and training prevented him from influencing the captain's actions.

2.5 Flight Scheduling

The Aloha IslandAir flight schedules were designed to provide for optimum aircraft and flightcrew utilization through the use of direct point-to-point routing on VFR flight plans in visual meteorological conditions, allowing minimum time for aircraft turn around between flight legs. Any delay could adversely affect on-time performance on subsequent legs of the flight sequence and could result in overtime for the crew. The Safety Board believes that this method of operation, when weather conditions were marginal or nonconducive to VFR, may have placed subtle pressure on pilots to avoid IFR operations. However, the investigation found no evidence that Aloha IslandAir had intentionally pressured pilots to maintain flight schedules. Moreover, there was no evidence that the company or any management personnel condoned VFR flying in marginal VFR conditions or otherwise authorized "scud running."

The Safety Board believes that there were subtle factors that may have contributed to the captain's decision to continue the flight under the clouds at 500 feet, contrary to company and FAA requirements. The flight could have followed the south coast of Molokai, which offered more visual references; but turbulence on the route would have been greater. The captain may have been trying to maintain the flight schedule by remaining VFR and following the northern Molokai coastline, to provide the passengers with a relatively smooth ride. He may have been fatigued and may have wanted to end the trip as quickly and easily as possible. Another possible explanation for his action is that the captain did not want to complicate or otherwise increase his workload by filing an IFR flight plan en route.

After reporting for duty on the day of the accident, the captain completed his monthly flight report and logged the flight and duty hours that had been pre-established by Aloha IslandAir. The accident occurred near the end of the day's flight sequence, less than 1 hour before the scheduled completion of the captain's duty day. The Safety Board believes that these events collectively adversely influenced the captain's judgment and led to the flawed decision to continue VFR flight into instrument conditions.

2.6 Pilot Training

The investigation disclosed that because VFR weather conditions are predominant in the Hawaiian Islands, 14 CFR Part 135 IFR operations are relatively uncommon. Thus, some pilots, although qualified, rarely file IFR and are therefore unpracticed and may be reluctant to operate under IFR. The Safety Board believes that the combination of typically favorable weather conditions and Aloha IslandAir's VFR-oriented operation provided insufficient opportunity for pilots to maintain instrument flying skills.

Aloha IslandAir management apparently recognized that some of its pilots were weak on IFR skills and therefore had issued an operational requirement for pilots to log six instrument approaches per month. The Safety Board believes that this requirement was of little value because most of these approaches were flown in visual meteorological conditions, during revenue operations. Since significant visual cues are provided to pilots by peripheral vision, they cannot fully develop instrument flying skills in this manner. Additionally, this requirement did not give pilots the experience of filing an IFR flight plan while in flight or the knowledge gained by operating in the IFR system.

The Safety Board previously addressed the issue of vision-restricting devices in its investigation of three commuter accidents.[6] Safety Recommendation A-86-102, issued to the FAA on October 9, 1986, recommended that the FAA:

> Issue an Air Carrier Operations Bulletin Part 135, to verify that commuter air carrier operators use appropriate vision-restricting devices for their pilots during initial and recurrent flight instrument training.

In its response of September 15, 1987, the FAA stated that it had issued ACOB No. 87-4 which addressed the use of view-limiting devices during initial and recurrent training. The Safety Board found that the FAA's reply complied with the intent of the recommendation and classified Safety Recommendation A-86-102 as "Closed--Acceptable Action," on November 27, 1987.

'The Safety Board believes that the accident involving flight 1712 dramatically indicates how quickly instrument flying skills and procedures can deteriorate when not used regularly.

The Safety Board finds that these considerations influenced the daily operational decisionmaking processes of Aloha IslandAir pilots, including those of this captain, to the detriment of flight safety. The Safety Board believes that 14 CFR Part 135 should require appropriate IFR recurrent training, using vision-restricting devices.

The reduction of Aloha IslandAir's ground-school training program by 40 percent several months before the accident was made without the

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[6] Op. cit.

knowledge or approval of the FAA. Such action reduced the opportunity for new, inexperienced pilots, including the first officer of the accident flight who attended the shortened course, to receive adequate initial training.

The investigation disclosed that the company placed little emphasis on crew coordination or CRM in its training. Although Aloha IslandAir believed that it addressed some elements of CRM in training, only the procedural mechanisms of crew interaction were addressed. The behavioral aspects of crew interaction were not discussed, and the investigation disclosed little awareness or understanding of the principles of CRM at Aloha IslandAir. The Safety Board notes that Aloha IslandAir has recognized this deficiency and has adopted the formal CFR program used by Aloha Airlines.

In summary, the Safety Board concludes that Aloha IslandAir management provided inadequate supervision of its personnel, training, and flight operations. The numerous deficiencies evident during the investigation relative to the IFR training of the pilots, the reduced ground school training, the lack of CRM training, the captain's known behavioral traits, and the policy of not using the weather radar systems installed on the airplanes, were the responsibility of the airline's management to correct. The failure of the management personnel to correct these deficiencies contributed to the events that led to this accident.

2.7 Radar Equipment and GPWS

The Safety Board believes that this accident could have been prevented by the use of on-board weather radar equipment or by existing ground-based radar systems.

Flight 1712 was equipped with weather radar that contained a ground-mapping feature. The investigation could not determine whether the unit was functioning during the flight or if it was even used by the flightcrew. The investigation did determine that minimal training was provided to Aloha IslandAir pilots on the use of weather radar. Although the Aloha IslandAir checklist requires the unit to be turned to the STANDBY position before takeoff, there were no standard operating procedures on the actual use of weather radar.

The Safety Board believes that if the weather radar had been used by the pilots of flight 1712, the clouds and precipitation in front of them would also have been apparent. If the flight crew had selected the terrain-mapping feature, the shoreline of Molokai would also have been apparent. Additionally, the pilots could have used the weather radar to cross-check their position with indications from other electronic navigation aids.

Regarding ground-based radar systems, the Safety Board believes that if the flightcrew had elected to remain on its assigned ATC frequency and had continued the VFR radar traffic advisory service; the controller would have been alerted by the Minimum Safe Altitude Warning (MSAW) system that the flight was approaching an unsafe terrain situation. A controller's

observance of such a situation would have required the issuance of a safety alert to the flight regarding its situation.

A review of the FAA radar data indicated that except for a brief period near midpoint in the flight, radar contact with the flight was maintained until just before the airplane struck the terrain. This finding is supported by the fact that the airplane collided with terrain approximately 8 seconds after the last recorded return or about 4 seconds before the next sweep of the antenna would have illuminated the target. Therefore, even at the low altitude of flight 1712, ground-based radar controllers would have been able to warn the crew of its position relative to the coastline of Molokai if the crew had been in radio communication with ATC facilities.

The Safety Board investigated two other fatal accidents that have occurred involving Part 135 operators in the area of the Hawaiian Islands[7] in which radar services could have prevented such accidents or could have expedited search and rescue (SAR) efforts. The pilots of all of the airplanes, including flight 1712; had requested and had received VFR radar traffic advisory service for the initial portion of their intended flights.

One case was similar to flight 1712 because the airplane was tracked to within several hundred feet of impact. In the other case, the crash site was located about 2.5 nautical miles from the flight's last known radar position.

In all three accidents, SAR efforts were hampered and/or delayed because the exact location of the accident and the time the accident occurred were unknown. Additionally, in all three cases, the operator's flight-following system was unable to locate when or where their respective airplanes crashed.

The Safety Board believes that if pilots of the accident aircraft had utilized radar flight-following services or filed IFR, the accidents involving collision with rising terrain could have been averted. In the accident involving the aircraft lost at sea, the availability of such a service would have provided instantaneous notification of the situation, either by the simultaneous loss of radio and radar contact or by a distress call from the pilot. In either situation, the ATC system would have provided the means to activate SAR assets immediately and could have led to the recovery of survivors.

The Safety Board believes that the establishment of such radar flight-following services in the Hawaiian Islands should incorporate the use of FAA and US military ground-based radar facilities currently available in the Hawaiian Islands. Incorporation of these facilities would provide the maximum level of terrain-warning protection for the user. In the event of an in-flight emergency, SAR assistance could be activated immediately and a

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[7] Panorama Air Tours, Piper PA-31-350, December 23, 1987; Scenic Air Tours Beechcraft BE-18, June 11, 1989.

response could be made at a level not currently available to aircraft operating without benefit of contact with an ATC facility.

As previously stated, the investigation revealed that the collision with terrain might have been avoided if the airplane had been equipped with GPWS. The Safety Board supports the FAA's NPRM, Notice No. 90-14, which would require the installation of GPWS in all turbine-powered airplanes that have 10 or more passenger seats.

2.8 Pre-employment Screening

The investigation revealed that Aloha **IslandAir** *was unaware that its experience with the captain's behavior was similar to that observed by the captain's two previous employers. The captain was originally hired as a ramp agent by Princeville Airways. Copies of his application for employment and background check could not be found in the company's files. Aloha* **IslandAir** *had not conducted a pre-employment background check on the captain before employing him as a first officer because he had previously worked for the company as a ramp agent for Princeville. Moreover, Aloha* **IslandAir** *had not examined the captain's safety record by using the FAA's accident/incident files and enforcement history records. If Aloha* **IslandAir** *had done so, it might have been able to identify and correct a pattern of inappropriate behavior before upgrading him to captain or it might have decided against upgrading him to captain.*

The Safety Board believes that Aloha **IslandAir** *should have conducted a background investigation of the captain's flying experience and FAA records prior to hiring him as a first officer.*

The Safety Board addressed pre-employment screening of pilots following the investigation of the crash of Continental Airlines Flight 1713 at Denver, Colorado, on November 11, 1987.[8] *As a result of that investigation, the Safety Board recommended that the FAA:*

> *Require commercial operators to conduct substantive background checks of pilot applicants, which include verification of personal flight records, and examination of training, performance, and disciplinary records of previous employers and Federal Aviation Administration safety and enforcement records. (Class II, Priority Action)(A-88-141)*

The FAA agreed with the intent of the recommendation but did not believe that the benefits derived from such a regulatory change would outweigh the costs of promulgating and enforcing it. Therefore, the FAA placed the scope and standards for such screening entirely upon voluntary efforts of the operators. The Safety Board believes that the FAA's response to the recommendation is unacceptable and that the circumstances of the

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[8] Aircraft Accident Report--"Continental Air Lines, Inc., Flight 1713, McDonnell Douglas DC9-14, N626TX, Stapleton International Airport, Denver, Colorado. November 15, 1987 (NTSB/AAR-88-09)

accident involving flight 1712 clearly emphasize the need for such a requirement. Therefore, the Safety Board now classifies Safety Recommendation A-88-141 as "Closed--Unacceptable Action/Superceded."

2.9 FM Surveillance

The Safety Board is concerned that its investigation and the FAA's special inspection of Aloha IslandAir found discrepancies that the POI did not detect during the base inspection or during other surveillance activities. Most of the discrepancies involved errors in training records, load manifests, and flight time logs. In other investigations, the Safety Board has noted that special inspections have revealed similar paperwork errors that were not detected through routine surveillance. The Safety Board recognizes that a special inspection involves many inspectors conducting comprehensive review of specific activities of an airline. Therefore, it is possible to discover problems that could have been overlooked by the POI during a base inspection.

However, three of the discrepancies found by the special inspection team indicate that the surveillance of Aloha IslandAir was seriously deficient. These discrepancies are: (1) initial ground-school training hours were reduced without the POI's knowledge, (2) records for two of the airline's check airmen, one of which was the chief pilot, did not contain evidence that they received check-airman training required by 14 CFR Section 135.339, and (3) scheduled flight times rather than actual flight times were being recorded by both the airline and the pilots. The Safety Board is concerned that the POI did not monitor how Aloha IslandAir pilots maintained their instrument proficiency or how instrument training was accomplished.

The Safety Board realizes that the abbreviation of the ground school syllabus occurred after the base inspection and that it would be incumbent upon the operator to request from the POI such a change to its operationsspecifications. However, the POI did not monitor the training times for first officers and discover this reduction in their training, indicating an unacceptable level of surveillance.

The Safety Board believes that the inadequate surveillance is a result of the POI's heavy workload and insufficient qualitative guidance from FAA headquarters. Interviews with the POI and the FSDO manager indicate that turnover of personnel and the lack of experienced personnel resulted in only two POIs having responsibility for all the general aviation and Part 135 surveillance activities for FSDO-13 from June until August 1989. In August, one of the two POIs was reassigned to surveil 14 CFR Part 121 operators.

The Safety Board believes that it was possible for 52 operators to be surveilled by only one or two persons because the requirements of the FAA's National Program are too low. One yearly base inspection, six ramp inspections, and six en route inspections do not provide a reasonable level of surveillance of a rapidly growing airline that has considerable turnover in pilots, of which many have less than 400 hours total flight time. The unauthorized reduction in first officer ground training hours and the lack of instrument proficiency by some Aloha IslandAir pilots was allowed to

continue because of insufficient staffing at FSDO-13 and inadequate inspection requirements.

The Safety Board notes that in 1989 the US General Accounting Office (GAO) evaluated the internal controls and management practices of the FAA to determine if its national work program guidance on inspection requirements was followed by staff at FAA district offices, which conduct the inspections.[9] *That report concluded:*

> *"FAA has developed both a safety inspection program to help ensure that flying is safe and the computer-based WPMS [Work Program Management Subsystem] to assist it in keeping that safety inspection on track. As required by internal control standards, FAA management should provide adequate supervision of the implementation of these policies to ensure that specific management directives are followed and objectives are achieved. However, these national FAA policies are always being followed by local FAA staff who implement the inspection program to the extent that a material discrepancy exists between what management required and what staff accomplished."*

The GAO report recommended that:

> *". . .the Secretary of Transportation direct the FAA Administrator to provide adequate supervision, as required by internal control standards, to ensure that national FAA inspection policies are followed by the local FAA staff who are responsible for implementing the required national work program. To aid in this supervision, we further recommend that the Secretary direct the Administrator to establish adequate checks of data entered into WPMS to ensure that the information on inspection is complete and accurate."*

The Safety Board believes that at least three accidents in the Hawaiian Islands might have been prevented if FSDO-13 had personnel and guidance to maintain adequate surveillance of its assigned 14 CFR PART 135 operators. Although the geographic area under the jurisdiction of FSDO-13 was reduced on January 1, 1990, the Safety Board is concerned that it may still have insufficient numbers of experienced personnel to accomplish its mission. Additionally, the Safety Board is concerned that a similar situation may exist at other **FSDOs.** *Therefore, the Safety Board believes that the FAA should perform a special study of the adequacy of staffing of* **POIs** *relative to their workloads, available time, size, and complexity of the operators under their supervision, and the geographical area of surveillance responsibility.*

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[9] **GAO/RCED-90-36 FAA's Inspection Management System, November 1989.**

3. CONCLUSIONS

3.1 Findings

1. The airplane was certificated, equipped, and maintained in accordance with Federal regulations and approved procedures.

2. There was no preexisting damage to the airplane, its systems, or powerplants that could have contributed to the accident.

3. The captain was certificated, experienced, and qualified for his duties. However, the first officer's ground school training did not comply with FAA-approved curriculum, thereby disqualifying him to serve as first officer of the flight.

4. Instrument meteorological conditions existed near Halawa Bay, Molokai, at the time of the accident.

5. The weather forecast, in effect for the time of the accident, did not include the likelihood of low clouds and precipitation over the northeastern end of Molokai.

6. The airplane descended to 500 feet during the flight into uncontrolled airspace and entered instrument meteorological conditions. This altitude did not comply with the minimum altitude allowed by 14 CFR Part 135 for night operations within 5 miles of land.

7. The captain continued the VFR flight in instrument meteorological conditions while attempting to maintain visual reference with the ground.

8. As a result of navigational error, the captain mistakenly believed that he was circumnavigating the northern portion of Molokai Island, and he continued flying at an altitude substantially lower than the height of the terrain.

9. The captain had a record of performance difficulties before joining Aloha IslandAir and continued to have such difficulties at Aloha IslandAir.

10. Princeville Airways/Aloha IslandAir's procedure for screening the captain's background was inadequate because FAA enforcement and accident records were not examined and previous employers were not contacted.

11. The captain was probably fatigued because of a full-time training schedule with Aloha Airlines, late night habits, and a part-time flight schedule with Aloha IslandAir.

12. *Aloha* **IslandAir's** *VFR-oriented operation and VMC environment fostered the erosion of pilot instrument skills and discouraged pilots from undertaking IFR operations.*

13. *The first officer's initial ground training was shortened from the FAA-approved 44-hour syllabus to 24 hours by Aloha* **IslandAir's** *chief pilot after the FAA had conducted a base inspection of the airline and was accomplished without the knowledge or approval of the FAA.*

14. *The surveillance of Aloha* **IslandAir** *by FSDO-13 complied with the requirements of the FAA's National Work Program; however, the standards are set too low.*

15. *The FAA did not provide sufficient surveillance of Aloha* **IslandAir** *during its rapid expansion, hiring, and training of new pilots.*

16. *FSDO-13 had insufficient staff, relative to the number of 14 CFR Part 135 operators and the large geographical area, to fulfill its responsibilities adequately.*

17. *A ground proximity warning system would have provided sufficient warning for the crew to have pulled up and overflown the terrain.*

3.2 Probable Cause

The National Transportation Safety Board determines that the probable cause of this accident was the airplane's controlled flight into terrain as a result of the decision of the captain to continue flight under visual flight rules at night into instrument meteorological conditions, which obscured rising mountainous terrain.

Contributing to the accident was the inadequate supervision of personnel, training, and operations by Aloha **IslandAir** *management and insufficient oversight of Aloha* **IslandAir** *by the Federal Aviation Administration particularly during a period of rapid operational expansion.*

4. RECOMMENDATIONS

As a result of its investigation of this accident, the National Transportation Safety Board makes the following recommendations:

--to the Federal Aviation Administration:

Require that scheduled 14 CFR Part 135 operators develop and use Cockpit Resource Management programs in their training methodology by a specified date. (Class II, Priority Action) (A-90-135)

Perform a special study of the adequacy of Flight Standards District Office staffing considering the availability of work hours, the geographic area of responsibility, and the size and complexity of the assigned operations. (Class II, Priority Action) (A-90-136)

Require that scheduled 14 CFR Part 135 operations of turbine-powered or multiengine airplanes be conducted under Instrument Flight Rules during hours of darkness or whenever visibilities less than 3 miles or ceilings less than 1,000 feet are forecast, reported, or encountered. (Class II, Priority Action) (A-90-137)

Establish procedures whereby existing FAA and US military ground-based radar facilities are incorporated into the Hawaiian Islands Reporting Service area. (Class II, Priority Action) (A-90-138)

Require the Honolulu Flight Standards District Office (FSDO-13) to distribute a bulletin to general aviation operators (14 CFR Part 91) of the facts and circumstances of this accident and encourage those operators to use IFR services or radar flight following during periods of darkness and marginal VFR weather. (Class II, Priority Action) (A-90-139)

Require that scheduled 14 CFR Part 135 operators provide comprehensive instrument proficiency training to all company flight crewmembers, using a view-limiting device when VFR conditions exist. (Class II, Priority Action) (A-90-140)

Require commercial operators to conduct substantive background checks of pilot applicants, which include verification of personal flight records and examination of training, performance, and disciplinary and other records of previous employers, the Federal Aviation Administration safety and enforcement records, and the National Drivers Register. (Class II, Priority Action) (A-90-141)

--to the National Weather Service:

Require that weather forecasts note the possible formation of orographic clouds and precipitation when conditions exist that would create such clouds. (Class II, *Priority Action)* (A-90-142)

--to Aloha IslandAir:

Modify flight schedules, operations, and flightcrew duties to accommodate operations under instrument flight rules. (Class II,*Priority Action) (A-90-143)*

Implement procedures to conduct background checks of pilot applicants to include the verification of personal flight records, the examination of training performance, disciplinary and other records of previous employers, and Federal Aviation Administration safety and enforcement records. (Class II, *Priority Action) (A-90-144)*

--to the Regional Airline Association (RAA) and the Aircraft Owners and Pilots Association (AOPA):

Advise your members of the circumstances of the Aloha IslandAir *accident and the safety recommendations issued as a consequence thereof. (Class* II,*Priority Action) (A-90-145)*

Also as a result of its investigation of this accident, the National Transportation Safety Board reiterates Safety Recommendation A-86109 to the Federal Aviation Administration:

A-86- 109

Amend 14 CFR 135.153 to require after a specified date the installation and use of ground proximity warning devices in all multiengined, turbine-powered fixed-wing airplanes, certificated to carry 10 *or more passengers.*

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ James L. Kolstad
Chairman

/s/ Susan Couohlin
Vice Chairman

/s/ Jim Burnett
Member

/s/ John K. Lauber
Member

/s/ Christopher A. Hart
Member

Jim Burnett, Member, filed the following dissenting statement on the Probable Cause:

I would add to the statement of probable cause the following additional language: Also contributing to the accident was the failure of the Federal Aviation Administration to require a Ground Proximity Warning System for Part 135 aircraft.

September 25, 1990

APPENDIXES

APPENDIX A

PERSONNEL INFORMATION

Captain Bruce Antonio Pollard

The captain, age 30, was employed by Princeville Airways on October 8, 1987, as a ramp agent. At the time he was hired, the captain held a commercial pilot certificate and had accumulated about 1,300 hours of flight experience.

On April 2, 1988, the captain was assigned as a first officer in the de Havilland DHC-6. On April 19, 1988, he completed first officer training, receiving a total of 3.4 hours in the de Havilland DHC-6.

On July 24, 1989, he began upgrade training to his position as captain. On August 30, 1989, a company check airman administered an aircraft check ride to the captain in the de Havilland DHC-6. The check was observed and subsequently approved by the company's FAA principal operations inspector. He was then assigned to line duties as a captain in the de Havilland DHC-6 aircraft.

At the time of the accident, the captain had accumulated about 3,542 hours of flight time, of which 1,668 were in the de Havilland DHC-6, including 140 hours as captain in the DHC-6.

A review of the captain's airman records maintained by the FAA in Oklahoma revealed one previous incident and a violation. On February 7, 1986, he was involved in an accident while operating a single-engine aircraft in Juneau, Alaska. On August 1, 1984, he was cited for several violations of 14 CFR Part 135. As a result of these violations, the captain's commercial pilot certificate was suspended for 180 days.

First Officer Philip Edwin Helfrich

The first officer, age 27, was employed by Aloha IslandAir in July 1988 as a ramp agent. He started flight lessons in August 1987, and on November 11, 1987, he was issued a private pilot certificate with a single-engine land rating. He had accrued about 62 hours of flight experience.

While he was a ramp agent, the first officer continued flight training until May 1989. At that time, he held a commercial pilot certificate with single and multiengine land and instrument ratings. His total flight experience was about 233 flight hours.

APPENDIX A

In August 1989, he was hired by Aloha IslandAir as a first officer. He completed 24 hours of initial ground instruction on August 8, 1989. On August 18, 1989, he completed a 14 CFR Part 135.297 flight check administered by a company check airman and began flight duties on August 21, 1989.

According to the first officer's airman records maintained by the FAA in Oklahoma City and by Aloha IslandAir records, his total aeronautical experience consisted of about 425 hours, of which 189 were accrued in the de Havilland DHC-6. In the 90 days before the accident, the records indicate a total of 13 hours of night and 16.5 hours of instrument flight experience.

* U.S. G.P.O:1990-281-626:20026