CIVIL AERONAUTICS BOARD

ACCIDENT INVESTIGATION REPORT

Adopted: April 12, 1954 Released: June 15, 1954

BRITISH COMMONWEALTH PACIFIC AIRLINES, LTD., NEAR HALF MOON BAY, CALIFORNIA, OCTOBER 29, 1953

The Accident

A Douglas DC-6, VHBPE, owned and operated by British Commonwealth Pacific Airlines, Ltd., crashed near Half Moon Bay, California, at approximately 0844,1/ October 29, 1953. The eight crew members and 11 passengers were killed. The aircraft was destroyed by impact and subsequent fire.

History of the Flight

British Commonwealth Pacific Airlines' Flight 304/44 of October 28, 1953, was scheduled between Sydney, Australia, and San Francisco, California, with intermediate stops at Nadi, Fiji Island, Canton Island, and Honolulu, T. H. The flight to Honolulu was without incident.

A routine crew change was effected at Honolulu and the new crew consisted of Captain B. N. Dickson, First Officer F. A. Campbell, Navigator G. R. Murtagh, Radio Officer V. A. Walker, Flight Engineer C. N. Cattanach, Purser W. Knight and Hostesses J. F. Elder and A. K. Lewis. Following a briefing on expected en route and terminal weather by U. S. Weather Bureau personnel, the crew filed an IFR (Instrument Flight Rules) flight plan with ARTC (Air Route Traffic Control) which indicated a rhumb line course was to be flown to San Francisco with Sacramento, California, the alternate airport. The estimated flying time of the flight was nine hours and 25 minutes and there was 12 hours and 53 minutes of fuel on board. Flight 304/44 departed Honolulu at 2259, October 28, 1953, with 10 adult passengers and one child. According to company records, the gross takeoff weight of the aircraft was 90,166 pounds which was below the allowable gross takeoff weight of 95,200 pounds and the load was properly distributed with respect to the center of gravity of the aircraft.

Following departure from Honolulu, the flight called the tower and requested to leave tower frequency. This request was granted. At 2302, the flight again called the tower and reported that it was over Diamond Head requesting permission to return to the airport. At this time the pilot stated, "We're having a little trouble with one of the props." The IFR flight plan was then cancelled. Three minutes later when over the airport, the flight reported: "The relay is working okay now; desire to continue flight." Upon receipt of this message, ARTC revalidated the original clearance and the flight proceeded on course.

As the flight proceeded toward San Francisco, hourly routine position

1/ All times referred to herein unless otherwise specified are Pacific Standard and are based on the 24-hour clock.

reports were made to OFACS (Overseas Foreign Aeronautical Communication Station). At 0555, the following message was sent by the flight: "VHBPE position 32.39N 134.40W. Time 1350Z (0550). Altitude 11,500. Track 064°. Ground speed 225 knots. Estimating over SFO at 1640Z (0840). Estimating arrival at Blocks 1650Z (0850)." Communications to and from the flight were then changed from CW (code) to voice. In answer to a request from the flight, San Francisco ARTC, at 0807, cleared it to descend in accordance with Visual Flight Rules and to maintain at least 500 feet feet on top of clouds. The flight reported that it was starting descent at 0815 and at that time was given the San Francisco 0800 weather: "Measured ceiling 1,200 feet, broken, visibility nine statute miles, temperature 54, dew point 50, wind west 12 knots and altimeter 30.13." As the aircraft approached the coast, it was identified by Western Air Defense Force Radar and released from corridor assignment at 0821. ARTC shortly thereafter cleared VHBPE as follows: "ATC clears VHBPE to the San Francisco ILS Outer Marker via the Half Moon Bay Fan Marker direct to the San Francisco Outer Marker. Maintain at least 500 feet above all clouds. Contact San Francisco Approach Control after passing Half Moon Bay Fan Marker. Cloud tops reported in the Bay area 1,700 feet." This message was acknowledged and repeated back. The last communication from the flight heard by OFACS was at 0823 when the aircraft reported approximately 60 miles west of the coast.

At 0839, the flight called San Francisco Approach Control on 3105 kc., identified itself as "Air Pacific Echo" and advised that it was over Half Moon Bay, 500 on top and was listening on 278 kc. Approach Control acknowledged and gave the following clearance: "Cleared for an ILS approach to the airport, Runway 28, wind west 15; cross the outer marker initial (ly) at least 500 on top, report when inbound; ceiling 1,200, visibility nine, altimeter 30.14."

Approximately three minutes later, the flight made a report which was acknowledged by the controller as "Air Pacific Easy, Roger, southeast, turning inbound"; the controller then added, "Check passing the ILS outer marker inbound." At 0845, a call to the flight was unanswered as were all subsequent calls. Shortly thereafter, appropriate search and rescue agencies were alerted that the flight was overdue. The wreckage was sighted at 1010, approximately seven and one-half miles southeast of the town of Half Moon Bay.

Investigation

The Civil Aeronautics Board investigated this accident in accordance with ICAO Standards and Recommended Practices of Accident Inquiry, Annex 13. An accredited representative of the Australian Government, the State of Registry, together with representatives of the carrier involved participated in the investigation and public hearing.

The investigation was begun immediately after locating the wreckage in the mountainous area southwest of the San Francisco airport. The aircraft was almost entirely destroyed by impact and ensuing fire. It had initially struck and topped several large redwood trees, continued across a narrow ravine and crashed against the side of a steeply rising slope approximately one-half mile beyond the first tree struck. The elevation of this tree at the point of contact was 2,020 feet MSL. First contact was made by the left wing, at which time 13 feet four inches of the wing, inboard from the tip, was severed. The severed portion of the wing was found 475 feet beyond the tree in a northeasterly direction. The left stabilizer, also sheared in flight, was located about 300

feet farther north. The main wreckage area, at an elevation of about 1,950 feet MSL, was approximately one-fourth mile farther to the north. It was determined the aircraft was flying on an approximate heading of northeast by north when it first struck the trees.

Examination revealed the landing gear was down and locked at impact. From impact impressions in the left flap as well as an extended flap actuator piston, it was determined the flaps were extended between 15 and 20 degrees.

Though severely fire damaged, the major portions of the control surfaces were located with the main wreckage. Many broken and burned control cables were examined and these, together with other components of the control system, failed to reveal any evidence of failure or malfunction prior to impact. As far as could be determined from an examination of the damaged airframe components, there was no evidence to indicate that the aircraft was not airworthy prior to the crash.

Impact forces were of such magnitude that the four engines were widely separated in the wreckage area. Molten masses of aluminum were evidence of the intense fire after impact. All propeller blades were found and from propeller domes, hubs, and blade positions examined, it was determined that they were set at blade angles between 29 degrees and 37 degrees at impact. The propeller governors from Nos. 2 and 3 engines were found and although badly burned, comparative tests were possible which revealed r.p.m. settings of approximately 2400. As far as could be determined from an examination of the damaged engines and components, there was no indication that a malfunction or failure had occurred prior to impact. The aircraft was in an airworthy condition according to the laws of the Australian Government when it departed Sydney.

Two communication receivers were found tuned to 278 kc., the frequency of the San Francisco tower. The marker beacon receiver hi-lo switch was in the "hi" position. The ADF receivers were so badly damaged it was impossible to determine their settings. One altimeter was recovered with a barometric setting of approximately 30.12; the latest setting given the flight was 30.14. This difference amounts to approximately 20 feet of altitude. A clock was impact stopped at approximately 1640 (0840).

CAA navigation and landing facilities in this area were given careful investigation. A thorough flight check was given the facilities by a CAA patrol aircraft as soon as possible after the crash; no discrepancies could be found. Maintenance and daily inspection reports indicated normal operation during the time the approach was being made. The pilot of a scheduled flight from Honolulu who landed a few minutes prior to the accident, stated that during his approach the Half Moon Bay Fan Marker, the Belmont Fan Marker, and the ILS system, gave normal aural and visual indications. Because of information received from a scheduled pilot that an overlap of the aural and visual signals of the Half Moon Bay Fan Marker and the Belmont Fan Marker had been experienced by him four or five years prior, a flight check was made by BCPA using their DC-6 with identical radio equipment to the aircraft involved. A CAB investigator was on board as an observer and the purpose of the flight was to simulate as nearly as possible the flight of VHBPE from the point of starting descent some 71 nautical miles southwest of Half Moon Bay. The radio navigational facilities were checked throughout this flight and neither the alleged overlapping nor any other discrepancies were revealed.

Voice communications received from the crew prior to the crash were made in a normal manner and at no time did personnel receiving them suspect concern or excitement. The last transmission, "Southeast, turning inbound," was made less than three minutes prior to the crash.

Investigation disclosed that BCPA flights were approved by CAA and by company procedures to make three types of instrument approaches to San Francisco: one radio range approach and two ADF approaches. The standard ADF approach from the southwest is over the southwest leg of the San Francisco low frequency radio range station to the range station at a minimum altitude of 3,000 feet, then outbound on the southeast leg at a minimum altitude of 2,000 feet followed by a left descending turn after passing the Belmont Fan Marker, then crossing the ILS outer marker inbound at 1,660 feet. The compass locators of the outer and middle markers are used in the latter part of the approach. The other ADF approach permitted a direct course from the Half Moon Bay Fan Marker to the ILS outer marker, a distance of 13.8 statute miles and at a minimum altitude of 3,500 feet. BCPA flight crews were not trained to make an ILS approach but when such approach was given they would accept it and use one of the ADF procedures. This latter was approved by CAA.

Company records disclosed during the investigation that both pilots had made more than 100 approaches to the San Francisco Airport, many of which were actual instrument approaches. Their training was adequate and in accordance with company requirements and the standards of the Australian Government.

In the course of the investigation, many ground witnesses were interviewed and written statements taken from seven. These persons not only pointed out significant factors concerning the accident but were generally in agreement on them. All agreed the crash site and surrounding terrain were covered by a dense fog and the aircraft could not be seen in flight. Also the aircraft, when heard, was flying very low with the engines sounding normal. One witness, located one and one-half miles south of Half Moon Bay near the coast, stated that from sound the aircraft seemed south of his position, flying from west to east, and that he heard it crash between one and two minutes after it passed his position. Witnesses who were cognizant of the time and who heard the crash were able to establish the accident as having occurred between 0842 and 0845. Also, witnesses near the crash site substantiated that the course of the aircraft immediately prior to impact was northeast, and that the impact was accompanied by at least one large explosion.

Weather conditions existing at the time of the accident were caused by a weak surface low pressure trough extending from Sacramento and the Bay area south-southeast to Monterey Bay with a high pressure area off the coast. This pressure gradient caused a stratus overcast with its base approximately 1,200 feet and its top about 2,500 feet. This condition also extended westward over the Pacific Ocean for several hundred miles, with varying degrees of cloud coverage. The freezing level was 12,000 feet. The fog and stratus overcast were clearing inland toward the coast and within a short time after the accident, clearing conditions existed at the San Francisco Airport. Good visibility prevailed both above and below the overcast in the instrument approach area and at the airport itself. The mountains to the west and the crash area at an altitude of 1,950 feet were covered by dense fog completely obscuring the terrain

Analysis

The propeller difficulty reported shortly after takeoff from Honolulu probably had no bearing on this accident since the trouble was reported by the flight to have been eliminated and no further reference was made to it in the numerous communications throughout the extensive flight.

The flight was conducted in accordance with an IFR clearance but was above clouds and the pilots apparently were not required to fly actual instruments for any appreciable length of time. The weather in the San Francisco area presented no adverse flight conditions such as turbulence or icing; however, visual reference with the ground was precluded by the overcast as far as is known, and an instrument approach was required.

As the flight neared the coast, it was given its approach clearance which was acknowledged and repeated back. This clearance required the flight to maintain at least 500 feet above all clouds from the Half Moon Bay Fan Marker to the ILS outer marker. The accident site was between these two points. It is obvious the flight did not maintain at least 500 on top and descended in weather conditions which precluded visual reference to the ground.

The flight reported over the Half Moon Bay Fan Marker at 0839 and then reported, "Southeast, turning inbound," at approximately 0842. The crash took place between 0842 and 0845. It seems impossible in this time interval for the flight to have flown from the Half Moon Bay Fan Marker to the ILS outer marker, made the required turn and returned to the crash site, assuming a normal speed. This is especially true considering that a part of the distance was flown with the landing gear down and 15 degrees of flaps extended. Thus it is likely that when the pilot reported "Southeast, turning inbound," his actual position was southwest of the airport. It is therefore probable that the captain after reporting over Half Moon Bay either saw the terrain momentarily through an unreported break in the overcast or because of a radio navigational error became convinced that his position was farther northeast, and started to let down over what he believed was the proper area for this descent.

Findings

On the basis of all available evidence, the Board finds that:

1. The carrier, the aircraft, and the crew were properly certificated according to appropriate regulations of the Australian Government.

2. The aircraft was loaded to a weight less than its maximum allowable and its center of gravity was located within prescribed limits.

3. Propeller relay difficulty was eliminated shortly after takeoff and the flight from Honolulu to the Half Moon Bay Fan Marker was otherwise uneventful.

4. The clearance given the flight for its instrument approach to San Francisco Airport was proper, was acknowledged, and was read back correctly.

5. The radio navigational and landing facilities for this area were functioning normally at the time the approach was being made.

6. The accident location was in a mountainous area seven and one-half miles southeast of Half Moon Bay at an elevation of 1,950 feet MSL.

7. The weather conditions in the area precluded an approach by means of visual reference to the ground.

8. The time element involved would not have permitted the aircraft to have flown from Half Moon Bay Fan Marker to the ILS outer marker and then execute the CAA approved instrument approach procedure.

9. The undestroyed wreckage yielded no evidence of mechanical or structural failure of the aircraft prior to impact.

Probable Cause

The Board determines the probable cause of this accident was the failure of the crew to follow prescribed procedures for an instrument approach.

BY THE CIVIL AERONAUTICS BOARD:

/s/ CHAN GURNEY

/s/ HARMAR D. DENNY

/s/ OSWALD RYAN

/s/ JOSH LEE

/s/ JOSEPH P. ADAMS

SUPPLEMENTAL DATA

Investigation and Hearing

The Civil Aeronautics Board was notified of this accident through its Oakland, California, office at 1000, October 29, 1953, and immediately initiated investigation pursuant to the provisions of Section 702 (a)(2) of the Civil Aeronautics Act of 1938, as amended. A public hearing was ordered by the Board and was held at Alameda, California, on November 17 and 18, 1953.

Air Carrier

The carrier is an Australian corporation incorporated in the state of New South Wales. Prior to April 25, 1948, the operations of this corporation were conducted under contract by another operator, Australian National Airways Pty. Limited. Service to the United States was inaugurated September 1946, and conducted under United States Permit to Foreign Carriers issued by CAB Docket Nos. 2688 and 2777. The carrier conducted scheduled service three times weekly to the San Francisco Airport. The subject flight for this service was BP 304/44.

Flight Personnel

Captain B. M. Dickson, age 34, was employed by the British Commonwealth Pacific Airlines, March 30, 1948. He currently held a first-class air transport pilot license with first instrument rating issued by Department of Civil Aviation, Commonwealth of Australia. The captain's total time was 10,696 hours of which 4,136 hours were in type equipment involved and 3,624 were instrument hours. Last physical was given Captain Dickson August 27, 1953.

First Officer F. A. Campbell, age 28, was employed April 26, 1949, by this carrier and he currently held a third-class air transport pilot license with a second instrument rating and second-class telephone license. These were issued by the Department of Civil Aviation, Commonwealth of Australia. This pilot's total time was 4,782 hours of which 3,896 hours were in DC-6's and 1,462 hours were instrument. This officer completed his last physical October 13, 1953.

Navigation Officer G. R. Murtagh, age 28, was employed January 22, 1951, and currently held an Australian Flight Navigators License. This officer had an aggregate of 2,917 hours, 2,482 hours were in the type equipment involved.

Radio Officer V. A. Walker, age 32, held a current Australian first-class Telegraph License and P. M. G. first class. This officer was employed October 15, 1950, and his total flying time as a Flight Radio Officer was 5,645 hours of which 2,645 were in the type equipment involved.

Flight Engineer Officer C. N. Cattanach, age 31, employed since April 12, 1948, by British Commonwealth Pacific Airlines, currently held a Department of Civil Aviation Aircraft Maintenance Engineers License. He held licenses in Divisions A, C. and D. Total time for this officer was 3,118 hours, all in DC-6 type aircraft.

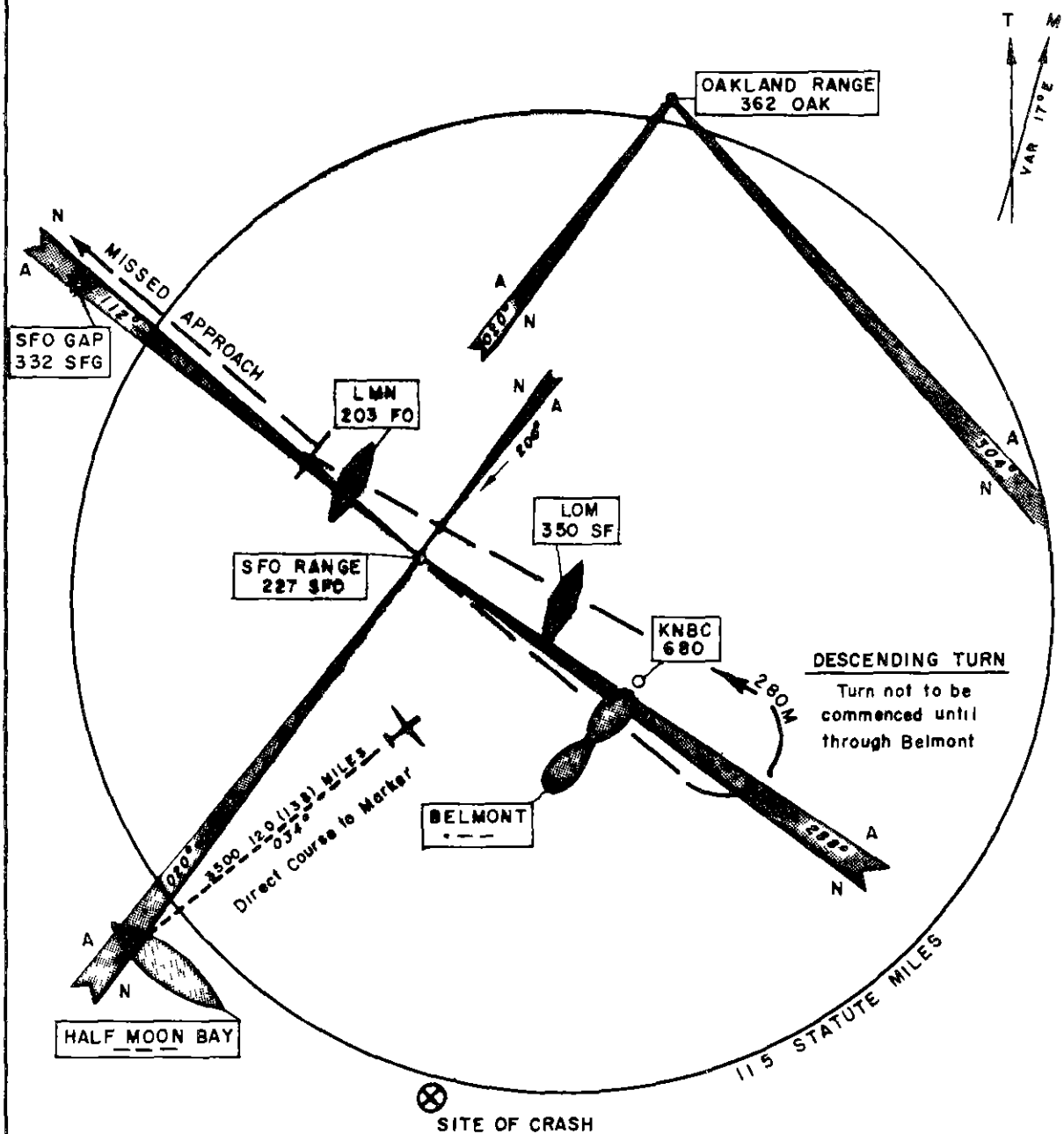
Purser W. Knight, age 34, had a total time as purser of 1,008 hours and had worked for this carrier since January 9, 1951.

Hotesses A. K. Lewis, age 32 and J. F. Elder, age 26, had been employed since May 16, 1949, and June 28, 1951, respectively.

The Aircraft

The aircraft was a Douglas DC-6, serial No. 43125, manufactured in 1948. The airframe had accumulated 5,904 hours since overhaul. The engines were Pratt and Whitney R-2800-CA15 with Hamilton Standard 43E60/6895A-8 propellers.

INSTRUMENT APPROACH PROCEDURE AND CRASH SITE



SAN FRANCISCO ADF APPROACH

ROUTE INSTRUCTIONS

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