

70-5

Air Safety Investigation Branch

ACCIDENT INVESTIGATION REPORT

Department of Civil Aviation
Australia

Piper PA-23-250 Aztec Aircraft VH-SPM
near Mount Scratchley, Papua,
on 26th September, 1970



**SOUTH PACIFIC AERO CLUB'S
PIPER PA-23-250 AZTEC AIRCRAFT VH-SPM
NEAR MOUNT SCRATCHLEY, PAPUA,
ON 26th SEPTEMBER 1970**

The investigation of this aircraft accident was authorised by the Director-General of Civil Aviation pursuant to the powers conferred by Air Navigation Regulation 278.

Prepared by:
Air Safety Investigation Branch Melbourne

April, 1971

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THE ACCIDENT

At approximately 1325 hours Eastern Standard Time on 26 September, 1970, a Piper PA23-250 Aztec aircraft, registered VH-SPM, collided with the precipitous face of a ravine, 490 feet below the main line of a ridge, on the eastern slopes of Mt. Scratchley in the Territory of Papua. The aircraft was engaged on a charter flight for the carriage of passengers and baggage from Kokoda to Port Moresby. The aircraft reported its departure from Kokoda but, when it did not arrive at Port Moresby, search and rescue procedures were initiated. The wreckage was sighted on 1 October, 1970 in dense rain forest, 10,100 feet above mean sea level. At first, the efforts of ground rescue parties to reach the wreckage were frustrated by extremely bad weather conditions, the high altitude and the precipitous terrain. Thirteen more days elapsed before a member of a mountain rescue party reached the accident site to find that the aircraft had been destroyed by impact forces and the pilot and the three passengers on board had suffered fatal injuries.

1 - INVESTIGATION

1.1 HISTORY OF THE FLIGHT

At 1050 hours EST on 26 September, 1970 the pilot of the Piper PA23-250 Aztec aircraft, VH-SPM, owned and operated by South Pacific Aero Clubs, submitted to the Port Moresby Operational Control Centre, a flight plan for a charter flight from Port Moresby to Kokoda and return. The plan indicated that the flight would be conducted under the Visual Flight Rules (VFR). The flight stage to Kokoda was to be flown at an altitude of 9,000 feet and the estimated en-route times were shown as 18 minutes to The Gap and 4 minutes to Kokoda. The flight stage from Kokoda to Port Moresby was planned via The Gap at an altitude of 10,000 feet and the estimated en-route times to The Gap and to Port Moresby were 5 minutes and 14 minutes respectively.

Kokoda (1,269 feet a.m.s.l.) is only 40 miles from Port Moresby (125 feet a.m.s.l.) but between the two locations lies the Owen Stanley Range, a chain of rugged jungle covered mountains containing a number of peaks in excess of 11,000 feet in height. The normal route for VFR flights between Port Moresby and Kokoda passes through The Gap which is 39 miles north east of Port Moresby and 10 miles south of Kokoda. The Gap can be negotiated safely in clear weather conditions at an altitude of 7,500 feet. The first 20 miles of the route from Port Moresby to The Gap is within controlled airspace. (see Appendix B).

VH-SPM had been chartered for the purpose of conveying 3 officers of the Commonwealth Department of Works with their baggage and equipment from Kokoda to Port Moresby (see Appendix A). The aircraft was registered for charter operations and the operating organisation was appropriately licensed.

The aircraft departed from Port Moresby at 1218 hours and, at 1236 hours, the pilot reported that his position was over The Gap. Three minutes later he reported in the circuit area at Kokoda. During this flight the aircraft, in order to avoid cloud formations encountered en-route, had climbed above the flight planned altitude of 9,000 feet initially to an altitude of 10,000 feet and later to 11,000 feet.

The pilot did not experience any difficulty in descending in the Kokoda Valley and the aircraft landed at Kokoda at about 1245 hours. The three passengers who met the aircraft on its arrival assisted the pilot to weigh the equipment and baggage and load it into the aircraft.

At 1258 hours the pilot notified the Port Moresby Flight Service Centre by radio that VH-SPM was taxiing at Kokoda for Port Moresby and, at 1302 hours, he reported that the aircraft was climbing in the Kokoda circuit area and that he would advise when setting course. The flight service officer on duty instructed the pilot to report again at 1315 hours or report departure if it was before that time. The flight service officer then notified Port Moresby Tower that VH-SPM was climbing over Kokoda to 10,000 feet (i.e. the aircraft's flight planned altitude to Port Moresby) although the pilot did not specifically state that this was his height objective at that time. At 1315 hours the pilot reported that he was still orbiting in the Kokoda area and that operations were normal. No altitude was given with this report. The flight service officer instructed the pilot to report again at 1330 hours and passed the information to Port Moresby Tower. At 1320 hours the pilot requested a clearance to climb to 11,000 feet. The flight service officer asked if he was still in the Kokoda area and the pilot replied - "SPM departing at this time". The pilot was then told - "Clearance not available, stand by", a message which he acknowledged. The flight service officer then advised Port Moresby Tower that VH-SPM was setting course at this time (i.e. 1320 hours) at 11,000 feet and this information was accepted by the Tower.

At 1322 hours the pilot of VH-SPM called the Port Moresby Flight Service Centre and stated that he was still holding in the Kokoda area waiting for a clearance. He was told that he would not require a clearance until he reached The Gap and the pilot replied "Roger, we want to go to 11,000 feet to get over the build ups". The flight service officer then informed Port Moresby Tower that VH-SPM was waiting for a clearance. The Tower replied that they did not "give clearances up towards The Gap" and issued an instruction for VH-SPM to call the tower in The Gap for a clearance. At 1324 hours the flight service officer instructed VH-SPM to call the tower in The Gap for a clearance. This instruction was accepted by the pilot who then amended his departure time to 1323 hours but no further mention was made of his earlier request for a clearance to climb to 11,000 feet. The flight service officer queried the time of departure, as he had previously noted this as being 1320 hours. The pilot confirmed that VH-SPM's departure time was now 1323 hours; the flight service officer acknowledged this and again told the pilot to call the Tower in The Gap. The pilot's acknowledgement of this message was the last trans-

mission received from the aircraft. At 1324 hours the flight service officer advised Port Moresby Tower of the amended departure time and at 1334 hours the Tower informed the Flight Service Centre that VH-SPM had not yet called the Tower. The flight service operator interrupted a transmission to another aircraft and broadcast "SPM Moresby check 118.1".

At 1337 hours the Port Moresby Tower controller again told the flight service operator that VH-SPM had not called on Tower frequency. Repeated calls to VH-SPM failed to establish communications with the aircraft and at 1344 hours the uncertainty phase of search and rescue procedures was instituted. When VH-SPM did not arrive at Port Moresby and a subsequent check by another aircraft confirmed that it was not on the ground at Kokoda the distress phase of search and rescue procedures was declared at 1359 hours.

Several eyewitnesses on the ground at Kokoda aerodrome observed VH-SPM during its take-off and in the initial stages of its climb in the vicinity of Kokoda. They state that they heard the sound of the aircraft in the area for some time but there is no evidence to indicate that the operation of the aircraft was other than normal during this period. The accident site is located 15 miles on a bearing of 301 degrees (T) from Kokoda and is at 10,100 feet above mean sea level. It is surrounded by an area of virtually inaccessible and totally uninhabited terrain and there are no known surviving eye witnesses who may have seen or heard the accident.

1.2 INJURIES TO PERSONS

Injuries	Crew	Passengers	Others
Fatal	1	3	-
Non-Fatal	-	-	-
None	-	-	-

1.3 DAMAGE TO AIRCRAFT

The aircraft was totally destroyed by impact with trees and with the ground.

1.4 OTHER DAMAGE

There was no damage to other property.

1.5 CREW INFORMATION

The pilot-in-command of the aircraft, was 28 years of age and held a valid commercial pilot licence endorsed for the aircraft type. His total flying experience amounted to 540 hours of which 53 hours had been gained in multi-engined aircraft, including five hours in PA23-

250 aircraft. He held a current "C" flight instructor rating and had completed a total of 160 hours of flight instruction. He did not hold an instrument rating. The Operator's records show that the last assessment of his flying ability was made during his conversion training to PA23-250 type aircraft in September, 1970 and the records indicate that he had reached a safe standard.

Because of Mr. 's flying experience in Papua/New Guinea, the Department of Civil Aviation, in March 1970, granted him a limited dispensation in respect of the requirements of Air Navigation Order 28 - Aircrew Route and Aerodrome Familiarisation. This dispensation applied to operations over the Port Moresby - Kokoda route. Prior to the day of this accident, Mr. had flown between Port Moresby and Kokoda on ten occasions and thus, apart from his general experience, he was quite familiar with the particular features of this route.

1.6 AIRCRAFT INFORMATION

History

Piper PA23-250 Turbo Aztec "D" aircraft, Serial No. 27-3739 was constructed in the U.S.A. by the Piper Aircraft Corporation in 1967 and was imported into the Territory as a new aircraft, in 1968, by South Pacific Aero Clubs. On 8 April, 1968 the aircraft was granted a certificate of registration and a certificate of airworthiness and was allocated the registration letters VH-SPM. Both of these certificates were valid until 7 April, 1971.

The records indicate that, prior to this accident, the aircraft had flown 1,638 hours since new and its first major inspection was not yet due to be carried out. The engines which were installed were the same two that were fitted at manufacture. Both were overhauled after 979 hours of operation and, at the time of this accident, both had completed 1,638 hours in service since new. There is no record that this aircraft had been involved in any previous accident and an examination of the aircraft log books did not reveal any recurring malfunction which may have contributed to this accident.

The last 100 hourly inspection was carried out on 9 September, 1970 and, on 10 September, 1970, a maintenance release was issued which was valid for 100 hours time in service or until 8 April, 1971, whichever occurred first. At the time of the accident the aircraft had flown 37 hours since the issue of that maintenance release.

Both engines installed in VH-SPM were equipped with AiResearch turbo-chargers which are designed to maintain the power output and efficiency of the aircraft engines by supplying compressed air to their induction systems. This feature, together with an oxygen supply system, for the use of all occupants, enabled the aircraft to operate at altitudes up to at least 25,000 feet.

Loading

The maximum permissible gross weight for this type of aircraft is 5,200 lb. and the gross weight of VH-SPM at the time of the last take-off has been calculated to have been 4,974 lb. The gross weight of the aircraft at the time of the accident was approximately 4,907 lb.

There is no record of the manner in which the baggage and equipment was distributed between the forward and rear lockers and the destruction of the aircraft prevented this from being determined during the wreckage examination. Consequently, it has not been possible to establish the location of the centre of gravity of the aircraft. Nevertheless, with four persons on board and a reasonably even distribution of the baggage between the two lockers, the centre of gravity would fall within the prescribed limits. There is no evidence to suggest that the distribution of the aircraft's load contributed in any way to the accident.

1.7 METEOROLOGICAL INFORMATION

Although the pilot was not required to obtain a weather forecast before commencing this flight, he attended at the Port Moresby Meteorological Office whilst compiling his flight plan and consulted the current area forecast and the terminal forecast for Port Moresby. Because the relevant area forecast covers such a wide area, it is couched in general terms but it did indicate that, by 1400 hours, there would be 2/8 cumulo-nimbus cloud on the mountains between 7,000 and 40,000 feet; 4/8 cumulus cloud on the mountains from 7,000 to 12,000 feet with isolated tops to 20,000 feet and a general visibility of 20 miles. The pilot had planned the return flight from Kokoda at 10,000 feet and, after take-off, remained in the vicinity of Kokoda gaining altitude. It was during this time that he requested a clearance to climb to 11,000 feet because of cloud build-up. The witness evidence indicates that, at this time, although the Kokoda Valley was clear, there was a line of storm clouds on the ranges with bases at 7,000 to 8,000 feet and large cumulo-nimbus clouds were observed over The Gap area. A weather report received from the pilot of another aircraft in the Kokoda area at 1356 hours, stated that The Gap appeared closed with cloud tops at 15,000 feet.

Weather observations made by the Port Moresby Meteorological Office on this day recorded cumulo-nimbus clouds visible in the direction of the Owen Stanley Range from 1300 hours. Nevertheless, the Port Moresby weather remained fine until showers in the area were recorded at 1700 hours. Weather radar observations made by the Port Moresby Meteorological Office at 1445 hours detected numerous areas of scattered moderate echoes with several definite indications of large and medium cumulo-nimbus clouds at distances up to 30 miles from Port Moresby in the general direction of Kokoda and extending along the line of the Owen Stanley Range.

1.8 AIDS TO NAVIGATION

These were not relevant to this accident.

1.9 COMMUNICATIONS

There were satisfactory communications on high frequency radio channels between the Port Moresby Flight Service Centre and the aircraft both on the ground and in the air until the last transmission was received from the aircraft at 1324 hours.

1.10 AERODROME AND GROUND FACILITIES

These were not a factor in this accident.

1.11 FLIGHT RECORDERS

No flight recorders were carried in this aircraft nor was there any requirement for it to be so equipped.

1.12 WRECKAGE

The wreckage was located 10,100 feet above mean sea level on the north-western side of a ridge which runs in a north-easterly direction from the Owen Stanley Range. The top of the ridge immediately above the impact point is 10,590 feet above mean sea level. The main impact occurred at the end of a blind, steep-sided ravine and against a 60 degree slope which extends upwards to the top of the ridge (refer to Appendix E). The area in which the accident occurred is uninhabited, and covered by thick jungle growth. Access to the main wreckage was extremely difficult and was made from the ridge above the accident site. The descent of the last 100 feet was achieved only with the aid of ropes.

The main wreckage, consisting of some 60 per cent of the total structure and including the fuselage, the inner section of the starboard wing and the empennage, was found lying against the face of the ridge ten feet below the principal impact point and resting on a slope which was some 40 degrees from the horizontal. The fuselage wreckage consisted of a compact mass of broken and twisted metal 15 feet long and 10 feet wide. The only relatively intact part of the structure was the empennage and beneath it was the starboard engine with its propeller attached, but with the propeller dome shattered. The damage to the propeller blades indicated that they were rotating at high speed when the engine was dislodged during the main impact.

The wreckage trail (refer to Appendix D) extended for a distance of about 300 feet back along the flight path from the main impact point. It is apparent that the aircraft initially struck the tops of trees whilst climbing at an angle of about 6 degrees. It commenced to break-up immediately and pieces of skin and structure were found in the trees and on the ground on both sides of the ravine along the length of the wreckage trail. After passing through the tops of small trees for a distance of about 100 feet the aircraft struck and sev-

ered the top of a larger tree and this impact removed the port wing at the wing root. The remainder of the aircraft continued for a further 100 feet where it struck the trunks of two large trees growing close together. The trunks of these trees, which were 15 inches and 22 inches in diameter, were broken off. The violence of this impact showered the sides of the ravine with broken pieces of the aircraft structure and the remainder of the aircraft continued on for a further 100 feet until it struck the face of the ridge and came to rest.

The terrain features made movement around the accident site extremely difficult and precluded removal of any large or heavy items of wreckage. The terrain, the very adverse weather conditions and the disintegration and scatter of the wreckage also prevented a complete examination of it being carried out. The only major components which were not accounted for, however, were the port engine and its propeller. It appears probable that they fell into the bottom of the ravine at the time the port wing was dislodged and this area of the wreckage trail was inaccessible. No evidence was found to indicate that any major malfunction of the aircraft or its systems had occurred prior to impact with the trees.

1.13 FIRE

The aircraft, at the time of impact, contained approximately 30 gallons of 100/130 grade aviation gasoline and 5 gallons of oil. Although it disintegrated on impact and the rubber fuel cells in both wings were ruptured, there was no outbreak of fire.

1.14 SURVIVAL ASPECTS

This was not a survivable accident.

1.15 TESTS AND RESEARCH

Not relevant.

2 - ANALYSIS

The witness evidence, together with information obtained from the communications transcript, indicates that, after a normal take-off, the aircraft continued to gain height in the vicinity of the Kokoda airstrip for a period of about 20 minutes, at the end of which time the aircraft had reached an altitude of 10,000 feet. The aircraft's average rate of climb during this period was less than 500 feet per minute whereas the performance charts indicate that a rate of climb in excess of 1,200 feet per minute could have been achieved in the existing conditions. Since the pilot did not report any aircraft malfunction, the reason for this apparently reduced performance may well have been that he was obliged to spend periods in level flight, while seeking areas clear of cloud in which to continue the climb. A meteorological situation in which there

are numerous layers of stratiform cloud and areas of cumuloform build-ups is normal in this area at this time of day.

The minimum height at which it is possible to negotiate The Gap between Kokoda and Port Moresby, in visual conditions, is about 7,500 feet a.m.s.l. Since the average height of the Kokoda Valley floor is 1,200 feet a.m.s.l. the normal procedure is to gain height by orbiting in the Valley before setting off, almost due south, on the 11 mile flight over steeply rising terrain to The Gap.

The Kokoda Valley extends for a distance of some 20 miles towards the north-west from the Kokoda Aerodrome which is located near the south-eastern extremity of the valley. The valley is flanked on its south-western side by the Owen Stanley Range and on its north-eastern side by the Ajule Kajaale Range. At a height of 5,000 feet the valley is about eight miles wide. On its south-western side the 10,000 feet contour follows the general line of the Owen Stanley Range, except at a point some 15 miles north-west of Kokoda, where a ridge over 10,000 feet in height extends from the Range for a distance of $4\frac{1}{2}$ miles in a north-easterly direction into the valley. The accident site is located on the north-western side of this ridge. (Refer to Appendix C).

The final flight path, from the first contact with trees until the aircraft came to rest, can be represented by a straight line some 300 feet in length on a heading of 108 degrees (T). The aircraft, whilst traversing the first 100 feet of the wreckage trail until it struck the tree which dislodged the port wing, was laterally level and climbing at an angle of about 6 degrees. This climbing flight path continued for another 100 feet until the aircraft struck and severed the trunks of two large trees. Notwithstanding the severity of this impact, however, the aircraft continued on a level flight path over the final 100 feet until it struck the face of the ridge. It would seem, in order to achieve this flight path and absorb the impact forces which occurred, that the aircraft must have been travelling, initially, at something in excess of the normal climb speed. However, the flight path evidence is not compatible with a dive or a steep climb such as in a high speed recovery from a dive. It seems most likely therefore that, immediately prior to the first contact with trees, the aircraft was operating at about the normal cruise speed.

The flight from Kokoda to Port Moresby was planned at a cruising altitude of 10,000 feet but, before setting course, the pilot of VH-SPM made three requests for a clearance to climb to 11,000 feet. Since there is no requirement to obtain clearances for altitude changes outside controlled airspace, it is difficult, having regard to the pilot's experience of operating procedures in the Territory, to understand what prompted him to seek a clearance for this action whilst he was still climbing outside controlled airspace on the northern side of The Gap in the Kokoda area. The flight service officer's reply to the first of these requests "Clearance not available - standby" may have conditioned the pilot to believe that he should and could obtain a clearance despite the

fact that he was outside controlled airspace and had not yet reached the point (i.e. The Gap) where the transfer from the flight service frequency to the air traffic control frequency is normally effected and where a clearance to enter controlled airspace is normally obtained. It is apparent that the flight service officer interpreted the pilot's requests for a clearance as referring to a clearance to enter controlled airspace and, although his replies to the pilot's second and third requests were obviously based on this premise, their wording should have removed any misunderstanding which may have arisen in the pilot's mind as a result of the reply to his initial request.

Although The Gap is 11 miles almost due south of Kokoda the accident occurred 15 miles to the north-west of Kokoda and after the aircraft had initially reported leaving Kokoda for The Gap at 1320 hours. (see Appendix B). This initial departure time was amended by the pilot to 1323 hours in a transmission received at 1324 hours and this was the last message received from the aircraft. The altitude at which the aircraft struck the ridge, 10,100 feet, and its position relative to The Gap suggest that the accident probably occurred very shortly after the transmission of the second departure message. The uncertainty evident in the reporting of the departure time together with the evidence that the aircraft's heading, at the time of impact, was some 80 degrees east of that required to reach The Gap from Kokoda, suggest also that the pilot was unsure of his precise position. This situation on its own is not necessarily unsafe and it usually occurs when the aircraft is on top of, or between cloud layers. In such conditions, however, at a height of 10,000 feet above sea level the pilot is required under the Visual Flight Rules to fly not closer than 1 mile horizontally and 1,000 feet vertically from all cloud and to have a flight visibility of at least 5 miles. If these requirements can be met and normal pilot vigilance is exercised, there is no possibility of a collision with terrain such as occurred in this accident.

From the evidence it seems that, whilst climbing between layers and around areas of cloud, the pilot lost visual reference to the ground, to a substantial degree. His subsequent manoeuvring to retain the 10,000 feet of altitude he had gained in conditions where there were serious impediments to continued visual flight, resulted in the aircraft being flown inadvertently to a position close to the Owen Stanley Range and between it and the ridge on which the accident occurred. In this area the meteorological conditions had deteriorated such that they were considerably less than the minimum prescribed for safe flight under the Visual Flight Rules and the aircraft's operating altitude was below the highest terrain in the area. By continuing the flight under these conditions the pilot deprived himself of the means of obtaining a timely warning to avoid a collision with terrain.

3 - CONCLUSIONS

1. The pilot was properly licensed for the duties he undertook and his experience on the route was sufficient to enable him to complete the flight with safety. There is no evidence of any pilot incapacitation which may have contributed to the accident.

2. The aircraft had a current certificate of airworthiness and there is no evidence that it was other than airworthy.

3. The weather in the area was substantially as forecast and it should not have presented any unavoidable hazard to the aircraft.

4. The pilot did not comply with the Visual Flight Rules as prescribed in the Air Navigation Regulations.

CAUSE: The cause of the accident was that the pilot, whilst operating without adequate terrain clearance, proceeded into conditions in which visual flight could not be maintained.

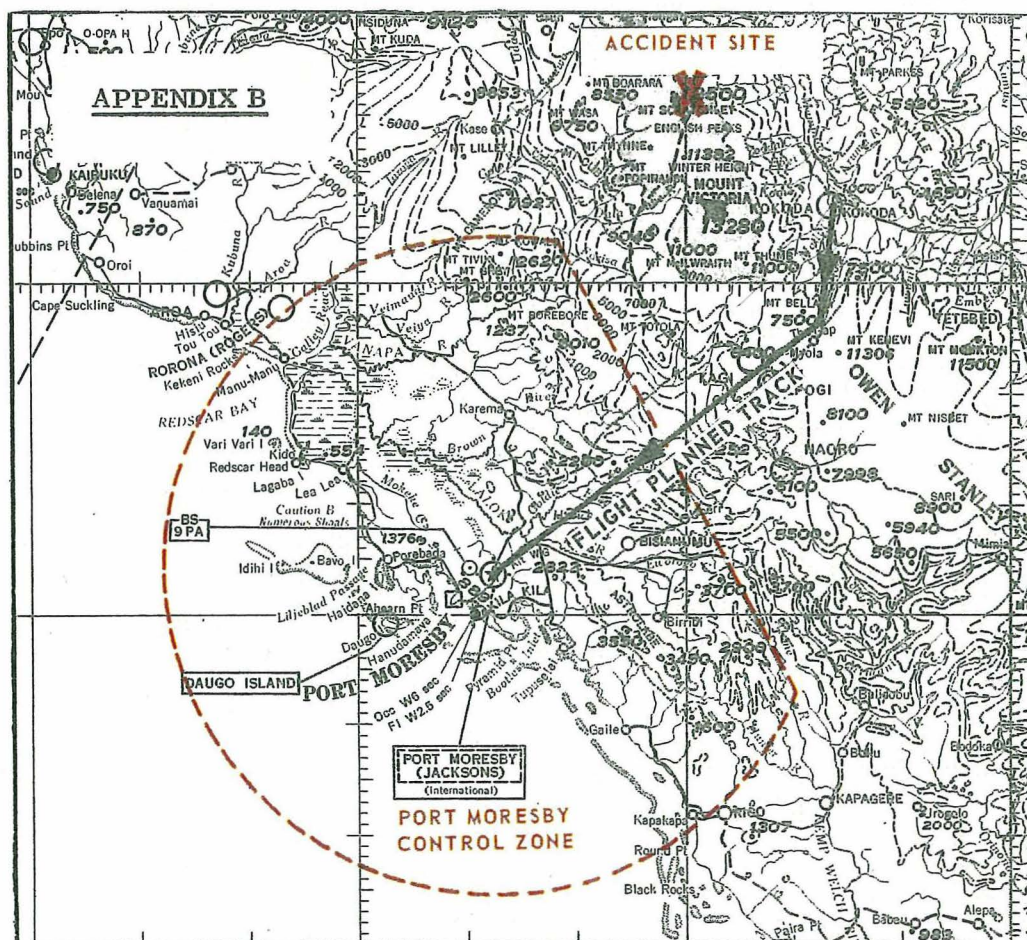
APPENDICES

Details of Persons on Board	Appendix A
Map Showing Flight Planned Route and Accident Site	B
Map Showing Accident Site and Kokoda Valley	C
Wreckage Distribution and Final Flight Path	D
Section Along Final Flight Path	E

APPENDIX A

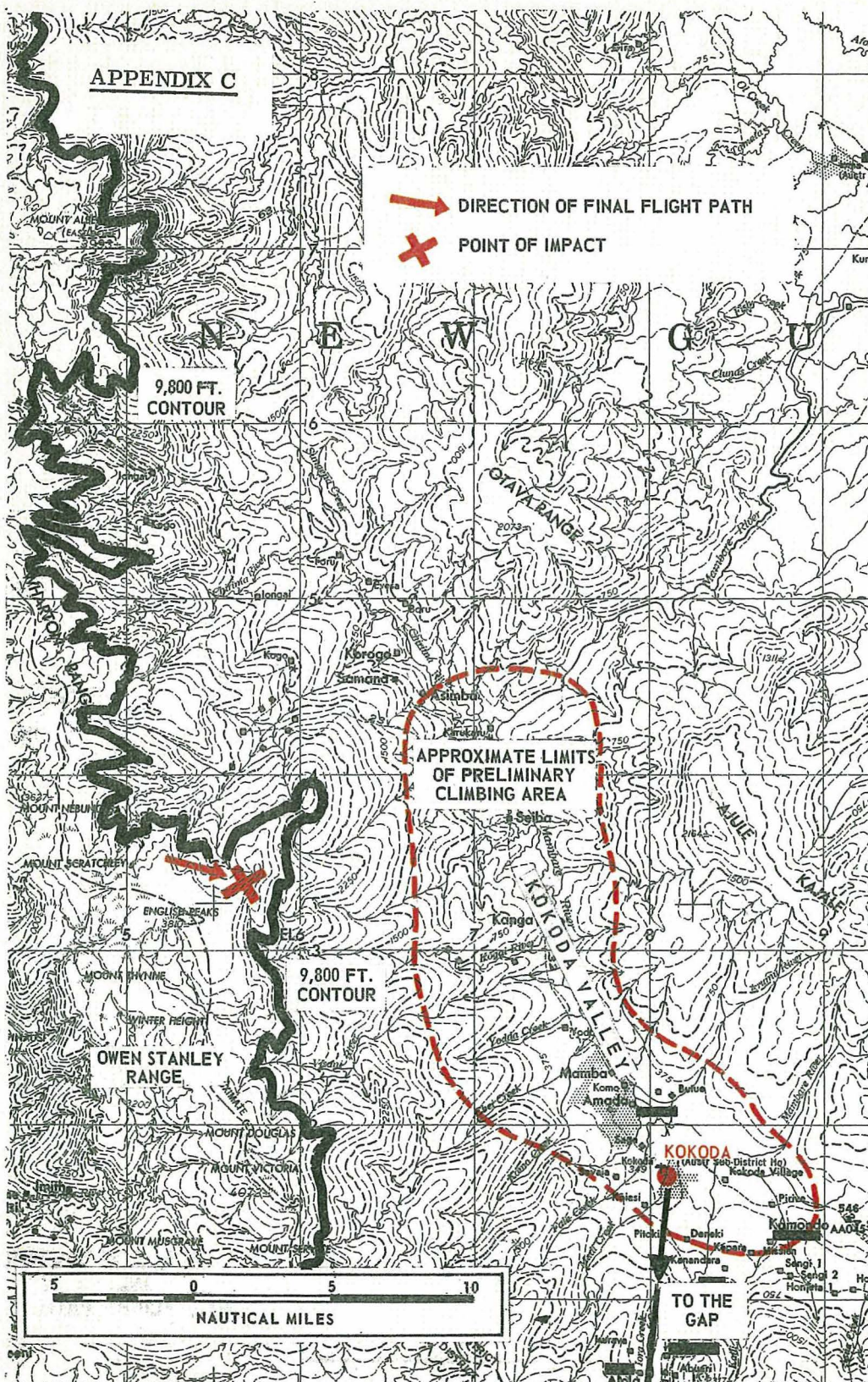
DETAILS OF PERSONS ON BOARD

NAME	AGE	ADDRESS
	28 years	Port Moresby, Papua.
	23 years	Port Moresby, Papua.
	about 30 years	Port Moresby, Papua.
	about 30 years	Port Moresby, Papua.

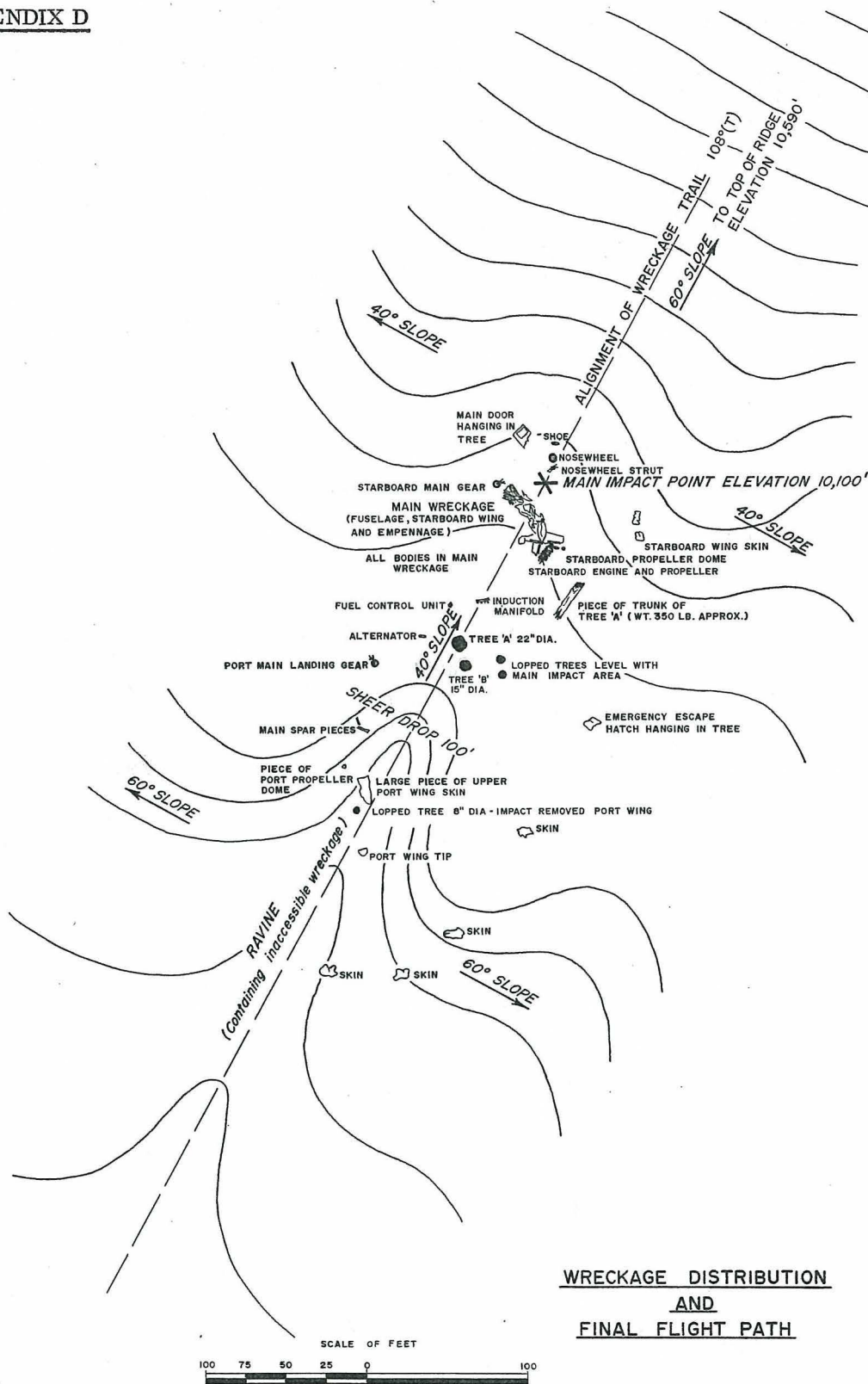


Map showing accident site and relationship of flight planned route to controlled airspace.

APPENDIX C

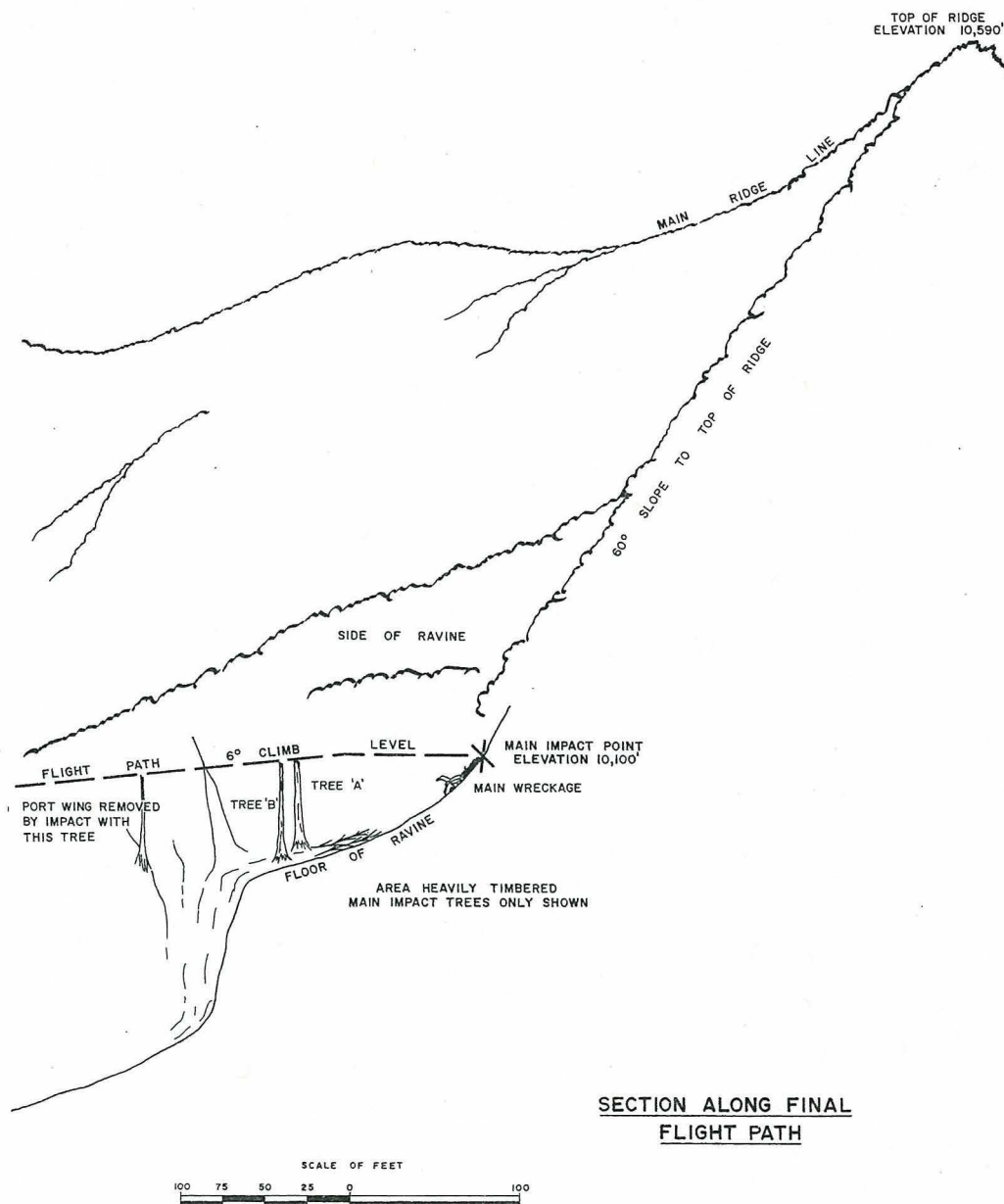


APPENDIX D



WRECKAGE DISTRIBUTION
AND
FINAL FLIGHT PATH

APPENDIX E



SECTION ALONG FINAL
FLIGHT PATH

