

No. 31

KLM, Lockheed L-1049E, PH-LKT, crashed into the sea near the
Island of Biak, Netherlands New Guinea, on 16 July 1957.
Report of the Air Accident Investigation Board.

Circumstances

On 16 July at 0332 hours local time (15 July - 1802 hours GMT) the aircraft took off from Mokmer aerodrome on the Island of Biak, on a scheduled transport flight to Manila. It carried nine crew members and fifty-nine passengers. A few minutes after take-off the pilot asked the operator in the control tower to keep the runway lights on. Shortly thereafter he requested permission to make a "low run" over the aerodrome. Both requests were granted. In the meantime, the aircraft had made a turn to the right and a turn to the left and was flying in a westerly direction back towards the aerodrome. During this approach the aircraft lost altitude gradually and at 0336 local time it crashed into the sea one kilometre from the shore. It burst into flames, broke apart and sank immediately. Eleven passengers and one stewardess were rescued. The stewardess and one of the surviving passengers died later in hospital.

Investigation and Evidence

From various observations it appears that the air pressure (QNH), the temperature, the dewpoint, the wind direction, the wind strength and the visibility were constant between 0315 and 0358 hours local time.

The moon rose on 15 July at 2119 hours local time and set on 16 July at 0810 hours local time. At the time of the take-off the moon was shining through a thin layer of cloud. The position of the moon at the time of the accident was:

azimuth 234° and elevation $83^{\circ} 3'$. When the aircraft was flying back towards Mokmer aerodrome, the moon was, therefore, to the left, above and ahead of the aircraft.

There was no mist, not even over the sea. On the basis of general meteorological experience, it is very unlikely that there was any appreciable inversion at the time of the accident. The vertical structure of the atmosphere very probably approached a saturated adiabatic condition.

The sea was calm and the surface must have been slightly rippled.

Mokmer aerodrome possesses a single asphalt concrete runway measuring 2180 metres by 60 metres. This runway bears the numbers 10 and 28.

The threshold height of runway 28 is 9.6 metres (32 feet) and that of runway 10 is 11.1 metres (37 feet), both measured from mean sea level.

The aerodrome has the following lighting:

- a) approach lights along the extended centreline of the runway, for a distance of 510 metres. The lights are separated by intervals of at least 30 metres. Their intensity is variable and their colour white.
- b) Threshold lights; green variable intensity.

- c) white runway lights are provided along the runway, with a minimum interval of 50 metres. They have 5 intensity settings: 1, 3, 10, 30 and 100%.
- d) Taxiway lights: blue, variable intensity.

Traffic using runway 10 must fly a right-hand circuit, while traffic using runway 28 must fly a left-hand circuit.

The aerodrome is provided with several radio aids to navigation, including a VOR, as well as with the customary traffic control and meteorological facilities and facilities for the handling of passengers and loading of aircraft. The control tower has no equipment for automatic recording of messages. Individual messages are entered in the watch log when the message traffic is concluded. The time entered is the time at which the entry commences, which may be several seconds after the actual time of the message. According to the controller's statement, it appears that, after the take-off, he followed the aircraft, but was busy with the watch log book when the aircraft crashed into the sea. He was at that moment busy checking the message concerning the commencement of the "low run" at 1805 GMT.

After the aircraft had become airborne and while still in the first stage of its climb, it made a right turn of approximately 45° from its original path. The climb was normal, although certain witnesses had the impression that the aircraft was climbing faster than usual, perhaps owing to the right turn. The controller cleared the aircraft to make a "low run" over the aerodrome shortly after 0335 hours local time. The aircraft commenced a wide turn to the left at a height of approximately 300 metres and flew over the Island of Owi. Both the right turn mentioned earlier and the left turn must have been steady turns with little deviation as none of the survivors had the impression that turns were being made.

According to the eye witnesses the aircraft began to descend gradually from Owi onwards and the landing lights of the aircraft were switched on. It is assumed that these were switched on while the aircraft was at quite a low level over the water and was flying back in a westerly direction towards the aerodrome.

According to the Papuan witnesses, who were the only ones able to observe the last phase of the flight, there were signs of fire on the aircraft during the descent. This was observed mainly on the right wing and gave one of the witnesses the impression of pieces of burning wood falling downwards. The aircraft continued its gradual descent so that it was flying practically horizontally over the water. One of the Papuans stated that an explosion occurred in the aircraft just before it hit the water. The survivors stated that shortly after the pilot informed the passengers that the aircraft would make a last turn over Biak and then proceed to Amsterdam, the aircraft shuddered. One witness described this as a severe vibration, another as a shock. Several survivors said that at the same time they heard a rattling noise, while the stewardess spoke of an explosion. The aircraft then turned over to the left and entered the water. There was then an enormous burst of flame accompanied by a noise like a bomb explosion. In the cabin, a strong rush of hot air accompanied by a sheet of flame was felt, which caused burns to several of the survivors before they came in contact with the water.

On impact the fuselage broke into several pieces. These pieces remained afloat for a short time in the midst of the wreckage and burning gasoline. Several of the survivors were flung, seat and all, out of the aircraft. Others were able to escape through the openings in the broken fuselage.

In attempting to find the cause of the accident the Board had to rely almost exclusively on the testimony of witnesses and the opinion of experts. Material evidence was lacking. The wreckage sank

in approximately 250 metres of water and efforts to bring it to shore were unsuccessful.

The testimony of the witnesses contains marked discrepancies. For instance, four Papuans stated that they had observed, prior to the crash, an unusual fire effect on the wing of the aircraft, mainly on the upper surface. None of the occupants of the aircraft, several of whom had been looking out, could recall having seen any fire other than the flames from the engine exhaust.

None of the witnesses at the aerodrome or on board the "Kortenaer" noticed any unusual fire effect during the flight, although it would have been perfectly possible for them to see any such abnormality.

It was definitely confirmed that the pilot had informed the passengers at a given moment over the public address system that they would first see the lights of Biak for the last time and that the aircraft would then head for Amsterdam. However, it was not possible to determine the precise period of time that elapsed between the end of this announcement and the first impact with the water. The estimates of the surviving occupants ranged from one second to something less than a minute. It was, therefore, only possible to estimate the point reached by the aircraft at the end of this announcement.

Finally, the statements varied to such an extent that some of the witnesses reported that, before the crash, while the aircraft was still in flight, they had observed an unusual vibration, shaking and noise - the stewardess spoke of an explosion - whereas others stated that they had noticed nothing unusual prior to the crash which caused the aircraft to break up. However, the statements all agree that the above-mentioned phenomenon must have preceded the end of the flight by a few seconds only.

It is also definite that, shortly after the take-off, which took place normally, the pilot asked traffic control for clearance to make a "low run" or "low pass" over the aerodrome. This clearance was granted.

How did the pilot propose to carry out this manoeuvre? He presumably wanted to make this "low pass" at a height of 200 metres, as provided in the Basic Operations Manual, which requires such a manoeuvre to be carried out at a minimum height of 150 metres above the aerodrome level - in this instance, approximately 7 metres above sea level. When over Owi at a height of approximately 300 metres, it is not improbable that he then set the aircraft into a gradual descent, although this appears to be a very early point at which to initiate the descent, since the aircraft was still 10 to 11 kilometres away from the threshold of the runway and was still engaged in the left turn.

When, as assumed above, the aircraft was over Owi at an altitude of approximately 300 metres, the carrying out of a descent by night over a calm stretch of water towards a lighted runway at the distance mentioned could well give rise to pilot error. Experience indicates, indeed, that in such circumstances a pilot, relying mainly on visual observation, can have an impression of the altitude at which he is flying, which differs substantially from the true altitude. Serious consideration must also be given to the possibility that the pilot, unaware of any danger, put the aircraft into a dive which resulted in its crashing into the surface of the sea. This theory is strengthened by the fact that none of the witnesses felt he could state that he had been able to observe that any last efforts were made to interrupt the descent.

Although this explanation of the accident must be given serious consideration, there are several factors which do not fit in with it very well. Apart from

the above-mentioned statement of the four Papuans who, quite understandably in the circumstances, must have recalled less precisely the sequence of what they saw, the following should be noted:

At a certain moment the landing lights of PH-LKT were switched on. The statements of two witnesses on board the "Kortenaer" are very positive on this point, although they differ regarding the exact moment at which the lights were switched on.

According to one of the witnesses the aircraft was then 80 to 100 metres above the sea, while according to the other the height was about 50 metres. It is most probable that the pilot, if he was in fact flying visually, must have observed the appearance of the surface of the sea, which with an 8 knot wind from an easterly direction must have been rippled. Therefore, if he had indeed been mistaken previously about his true altitude, he must have then realized his error. In making his assumed gradual descent, the pilot must, when at a height of about 50 metres, have been in a position, either by moving the elevator controls or by increasing power, or by both means, to arrest the descent in sufficient time to prevent the crash.

It should be noted that the pilot would have lost visual contact with the runway lights when at a height of 50 to 75 metres, owing to the trees and other obstacles to the east of the runway.

A contributory factor may have been that the pilot did not become aware sufficiently early of his error mentioned above.

The danger that a pilot may, in certain circumstances, very easily misjudge his true altitude when he is relying on visual observation was well known to KLM pilots generally, according to an expert witness. There had been reports of occurrences which had caused much concern in professional circles and

accident reports had been published which suggested as a cause of accidents or near accidents the above-mentioned erroneous estimation of actual altitude.

It is scarcely likely that the pilot was so little aware of this danger that he did not check his altitude by looking at the altimeter.

An oil slick was observed on the surface of the sea, several days after the accident, about 4 kilometres east of the point where the wreckage disappeared, approximately on the presumed path of PH-LKT.

If this oil slick actually came from a sunken portion of the aircraft, then some technical failure must have occurred at some distance before the point of the crash. The local currents are such that this oil slick could not have come from the wreckage which sank at the scene of the crash.

It is also improbable that the oil slick could have resulted from loss of oil due to a leak; a leak would have formed a trail of oil on the surface of the water. A concentrated oil slick, if it came from the aircraft, could have resulted only from the loss of some oil-containing component.

Consequently, in seeking the cause of the accident, the Board is unable to exclude the possibility of pilot error. At the same time, it must also consider the possibility of some technical failure having occurred.

It is impossible now to establish what the nature of this failure may have been. No conjectures point to the likelihood of any specific type of failure. When, as mentioned earlier, the pilot spoke to the passengers over the public address system, he must have been unaware that anything was wrong.

This does not mean, however, that some imperceptible failure might not have

occurred earlier without the pilot's knowledge and have been developing.

Assuming that there was some technical failure, it is strange that there was no evidence of any effort being made to arrest the gradual descent, unless the failure was of such a type as to make it impossible to change over from a gradual descent to a climb.

On the basis of the statements of the witnesses, it was possible to establish only that the engines had been operating until the last moment and that the aircraft was flying more or less horizontally when it crashed into the sea.

Had the pilot desired to effect an emergency landing on the water, it is inexplicable why he did not inform the passengers over the public address system that they should follow the safety rules for emergency ditching.

The failure to apply these rules makes it practically certain that - had

any technical failure occurred - the pilot was unaware of its occurrence or became aware of it such a short time before the crash that there was no opportunity to apply these rules owing to the low altitude at which the aircraft was then flying. Assuming that a technical failure may have occurred, the possibility of pilot error must still not be excluded entirely.

Probable Cause

As a result of the foregoing it is concluded that the explanation of the accident lies either in an error on the part of the pilot or in a technical failure. The Board was unable to state whether the accident could have been caused by a combination of both pilot error and technical failure.

The Board was of the opinion that low runs should not be made by aircraft on scheduled services. The magnitude of the danger that is inherent in the proximity of the ground on take-off and landing should not be increased unnecessarily by flying at low altitude.

- - - - -

