

ACCIDENT REPORT

PIPER PA28R-200; 9M-ARZ

PAPAR, SABAH

17TH FEBRUARY, 1978

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JABATAN PENERBANGAN AWAM
MALAYSIA

(1)

JABATAN PENERBANGAN AWAM

AIRCRAFT TYPE & REGISTRATION : Piper PA28R Arrow 200, 9M-ARZ
ENGINE : Lycoming IO-360-C1C
REGISTERED OWNER : Kelab Penerbangan Sabah, Kota Kinabalu Airport, Sabah
CREW : Aircraft Commander, Fatal
PASSENGERS : One, Fatal
PLACE OF ACCIDENT : 9 miles south-west of Kota Kinabalu Airport at Papar
DATE AND TIME : 17th February, 1978 1035 hours local

SUMMARY

The aircraft was engaged on a social flight from Kota Kinabalu to Keningau and back to Kota Kinabalu on the same day. The aircraft took off at Kota Kinabalu with the Pilot and three passengers on board. The flight to Keningau was uneventful and landed safely at Keningau. Two passengers disembarked at Keningau and the aircraft took off again for Kota Kinabalu. During the flight back the aircraft encountered bad weather. It had to climb to 9500' to avoid clouds. However, even at that height it was not possible for the pilot to maintain VMC.

The report concludes that at a certain stage of the flight in IMC condition, the pilot was probably disorientated and then lost control of the aircraft. The aircraft was apparently overstressed and subjected to speeds far in excess for which it was designed. The aircraft experienced in flight break-up leaving behind a wreckage trail down-track of the point of impact which was on the side of a hill, about 9 miles south-west of Kota Kinabalu Airport.

1. INVESTIGATION

1.1 History of the Flight

9M-ARZ was engaged on a social flight from Kota Kinabalu (K.K.) to Keningau and back to K.K. The aircraft took off from K.K. at

0930 local time (L.T.) with the pilot and three passengers on board.

The aircraft landed at Keningau at about 1000 hours and two passengers disembarked. At about 1010 hrs. it took off for K.K. On the trip inbound for K.K. it was first in contact with K.K. area controller on 126.1 and the pilot gave his estimate for K.K. at time 0422 GH (1042 hrs. L.T.). The aircraft was then flying at 8500'. The pilot later requested to climb to maintain 10500'. The controller then requested his range from the airfield. The captain was unable to make out his distance at that stage and replied "Trying to get through a clearing". His request to climb to 10500' was denied as there was another traffic at the height requested. He was instead cleared to climb and maintain 9500'.

At 1026:32 The aircraft contacted K.K. tower on 118.3 Mhz: Kinabalu Romeo Zulu maintaining 9500'.

At 1026:35 Tower replied Romeo Zulu (RZ) report leaving 9500' runway 20 wind light and variable, QNH 1023, 29.91.

At 1029:28 Tower advised RZ change of runway: Romeo Zulu is recleared 02.

At 1030:58 RZ contacted tower again: Kinabalu Romeo Zulu what is your cloud?

At 1031:08 Tower advised RZ: Romeo Zulu 1 octa 800' and another 6 octas at 6000'.

At 1031:38 Tower asked: Romeo Zulu confirm you are on the direct track.

At 1031:42 Replied; Ah..... we're maintaining 210 radial of Ah..... any opening over the airfield now.

At 1032:33 Tower advised, Romeo Zulu the it seemed overcast with 6000' but as you fly over west of the airfield passing of 5000' should be able to see the runway.

This was acknowledged by RZ.

At 1034:28 Tower requested: Romeo Zulu report level passing.

At 1034:33 Replied: Romeo Zulu still maintaining 95.

At 1037:53 Tower called Romeo Zulu but there was no reply. A further four calls was transmitted and there was no reply from Romeo Zulu.

Shortly before the accident, two ground witnesses located below the slope of the hill saw the aircraft to be at a low attitude. One of them saw the aircraft rolling to the right. He could not however recall any parts of the aircraft falling off before the aircraft crashed into the hill.

A third witness based at Lok Kawi Army Camp saw the aircraft disappeared behind the hills and sensing that there was danger, he contacted the local police and airport authority.

Rescuers who arrived at the scene found that there were no survivors amongst the aircraft wreckage.

1.2 Injuries to Persons

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

1.3 Damage to Aircraft

The aircraft was completely destroyed by in-flight break-up and subsequent ground impact.

1.4 Other Damage

None

1.5

Crew Information

Pilot : Aged: 31 years
Licence : Private Pilot Licence (PPL)
No. 1804 valid until 23rd
November, 1978
Aircraft Rating : PA28-140; PA28-180; PA28R-200
Instrument Rating : None
Medical Certificate : 8th November, 1979
Last Competency Check : 22nd December, 1977
Initial Flying Conversion : 1975
Flying Experience, approx : 749:55 Hrs.
Total flying hours on type: 40 Hrs. 30 Mins.

The pilot's original flying log book was not available for verification. The new log book was operated as from 26th June, 1977 and the flying hours brought forward from the previous log book was 486.50 hours command and 31:25 hours dual. The transfer of the total hours was not verified by the Club. The monthly summaries since the new log book was opened until the last entry on 30th November, 1977 were only checked by the Club authority on three occasions. The total flying hours are only approximation based on available information in the pilot's new log book and from the Club's flight authorisation book.

The 6 monthly periodical check was carried out by one of the Club's instructor and the report given by the instructor as above average. The pilot joined Sabah Flying Club on 21st December, 1972. He obtained his PPL on 10th November, 1974. After obtaining his PPL he was cleared by the Chief Flying Instructor to carry passengers following a check ride. This was done after completing 5 hours of instrument flying and 5 hours of night flying. In November 1976, he renewed his PPL and continued flying in the Club as social flight pilot.

1.6

Aircraft Information

The Piper PA28R Arrow 200 is a general purpose, single engine, low wing monoplane powered by a Lycoming IO-360-C1C engine

which drives a two bladed constant speed Hartzell propeller. The aircraft was fitted with dual controls, an Autoflite II auto-pilot installation and upper rotating beacon. It was equipped with 4 seats. All aerobatic manoeuvres including spins are prohibited. Inverted manoeuvres are also prohibited.

Piper PA28R Arrow 200 : 9M-ARZ
Manufacturer : Piper Aircraft Corporation (USA)
Date of Manufacture : 25th September, 1972
Certificate of Registration : The aircraft was registered in the name of Sabah Flying Club on 28th January, 1974
Certificate of Airworthiness : Transport Category (Passengers) Valid until 14th November, 1978. The aircraft had been maintained in accordance with approved maintenance schedule ref: SFC/PA28R/Issue 1 approved by the Civil Aviation Department
Total Hours Since Built : 2284:10
Hours Since Last Check : 38:45 since Check 1
Maximum Weight Allowed : 2650 lbs.
Estimated Accident Weight : 2089:2 lbs.
Permitted C of G Range at Accident Weight : 80" aft of datum to 93" aft of datum
Accident C of G : 88:296
Type of Fuel : AVGAS 100L

Examination of the Technical Log and technical documentation showed that the aircraft has been properly maintained, with the exception of a deferred defect relating to the EGT gauge being expired on 25th January, 1978 and awaiting spare before replacement. There was no concession for the life expired EGT gauge. However, this failing did not in any way contribute to the cause of the accident.

Examination of the flight manual carried on board the aircraft revealed that the weight schedule produced on 23rd June, 1976 was outdated. The latest weight schedule prepared on 27th July 1977 should have been incorporated in the flight manual. However, aircraft weight and C of G did not in any way contribute to the cause of the accident.

1.6.1 Aircraft Loading

Empty weight data for the aircraft was derived from the Sabah Air Weight and Balance schedule done at Anduki Airport on 27th July, 1977.

At the time of the accident, the aircraft did not carry any loose baggage. This was confirmed during the examination of the wreckage at the crash site.

1.7 Meteorological Information

Meteorological observations are made at Kota Kinabalu Aerodrome at half hourly intervals, on the hour and half hour. The weather observation made as from 0930 hrs. to 1030 hrs. some 12 minutes prior to the accident was generally:-

Surface Wind	310/05 - 360/05
Visibility	10 km or more
$\frac{1}{2}$ cloud	base at 600 ft.
$\frac{1}{4}$ cloud	base at 350 ft.

The meteorological forecast for the route of Kota Kinabalu to Keningau could not be provided by the Met Office, however the forecast for Kota Kinabalu to Tawau which was the closest to the track was:

Wind at 700 ft	100/08
Wind at 10,000 ft	160/08

Weather: Rain shower over the ranges and west of range.

1.7.1 Actual Weather Observation

The actual weather observation on the Kota Kinabalu - Keningau - Kota Kinabalu route was obtained from a MAS BN2 pilot. He was airborne from K.K. at 0845 local time (L.T) landed at Keningau at 0910 L.T. and was airborne again for K.K. 10 mins. later.

Generally the weather was slightly better on the way into Keningau than on his trip back to K.K. From his observation the weather deteriorated quite markedly during the later part of the morning. Turbulence encountered during the flight was slight over the hill ranges and smooth elsewhere. The hill ranges between Keningau - Kota Kinabalu was practically covered with 8/8 of strato - cumulus and cumulus cloud with a base of 1000 - 2000 ft. and top of at least 14000 - 15000 ft. These cloud coverage was over an extensive area throughout the hill ranges. Immediately after the hill ranges and stretching right up to about 1 to 2 nautical miles of Kota Kinabalu air-field, was an extensive area covered with light continuous drizzles. The visibility in these areas was very poor, because coupled with the drizzling rain was an overcast over the whole sky. The whole sky was very dark and hazy. The Captain of the BN2 was on instrument flying most of the time during his flight back to K.K. In his opinion in those environment, visual flying was not at all possible. There was no visual reference and at no time was he in contact with the ground.

The actual route report was not available from the meteorological office as there was no observation done for the purpose.

1.8 Aids to Navigation

The aircraft was fitted with an ADF and VOR.

1.9 Communications

The aircraft was in contact with Kota Kinabalu area controller on 126.1. It established contact with Kota Kinabalu tower 118.3 at 1026 hrs. local.

1.10 Aerodrome and Ground Facilities

Normal and not a factor to the accident.

1.11 Flight Recorder

There was no requirement for this aircraft to be equipped with a flight recorder and none was installed.

Wreckage

The main impact wreckage was located on a wooden hill at a height of approximately 700 feet. Examination of this wreckage showed that the aircraft had struck 3 branches off a tree and one branch off another tree and the branches were of 2½ inches maximum diameter. The aircraft then struck the slope of the hill at a high speed in a steep nose down attitude. It then tipped over and slipped down the slope by 5 feet towards slightly level ground and was lying upside-down.

Towards the point of impact, the wreckage trail extended for 1.25 miles across the padi fields in a heading of 25° (M).

The wreckage trail consisted mainly of sections of both wings, stabilator, part of the fin, port aileron, port flap and bits off the tail cone. However, the starboard aileron and the rudder together with its rear fin spar attachment could not be found. The wreckage trail was typical of aircraft break-up in flight.

Examination of the wreckage at the impact area revealed that both port and starboard wings separated just outboard of the fuel tanks at Wing Station 86.2. The complete tail and fin assembly was severed from Fuselage Station 225. The fuselage assembly broke into two sections, at Fuselage Station 70.

The forward section of the fuselage was badly crushed, twisted and almost flattened, due to impact. Both front seats were facing downwards and detached from the seat rails. The rear fuselage section was also crushed and flattened due to impact.

The pilot's control wheel assembly was broken at the universal joint and the left-hand grip was also broken off. The co-pilot's control wheel assembly was intact except for the broken left-hand grip. However, the control column tee bar joining both control wheel assemblies was broken. These were consistent with the impact damage sustained. The flying controls on the ailerons and stabilator were examined and did not show evidence of malfunction prior to in-flight break-up of the aircraft and prior to crash. The rudder control pedals and cables were

similarly examined and did not show evidence of malfunction or failure prior to in-flight break-up of the aircraft and prior to crash.

The landing gear were found in the up position. Flaps were selected to 10° down.

Examination of the wreckage recovered from the wreckage trail revealed that the fin was struck twice at its leading edge. The lower impact mark had a tell-tale sign of black and blue paint, and this was found consistent with the impact mark on the port wing. The upper strike mark suggested that it could have been struck by a wing section. The stabilator was broken into two sections, the break propagating from the left-hand stiffener. The leading edge of the left-hand stabilator also revealed an impact mark and that it was twisted around the front spar prior to in-flight break-up. The remaining right-hand stabilator section revealed that its front spar was twisted backwards, suggesting that the aircraft had been subjected to excessive airspeeds.

The autoflite system was completely destroyed, the on/off switch was missing. Examination of remains could not establish whether it was in use or not.

The propeller blades were found bent backwards and the engine experienced substantial crash damage. The propeller was underpower at the time of impact. There was no evidence to suggest any engine malfunction other than damage consistent with the crash impact.

The fuel selector valve was found selected to starboard. No fuel could be obtained from the crash, however, a fuel sample was taken from the vehicle used for the last refuelling of the aircraft.

1.13 Medical and Pathological Information

Postmortem examination showed that the cause of death of the pilot and the passenger were due to extensive internal haemorrhages, crush injuries damaging the brain, following multiple fractures of bones and multiple lacerated wounds. There was no evidence that the pilot was suffering from the effect of alcohol or drugs.

1.14 Fire

There was no evidence of fire either in the air or after the subsequent impact at the crash site.

1.15 Survival aspects

Considering the nature of the impact, the accident is considered non-survivable.

1.16 Test and Research

There was no requirement for any tests or research to be carried out.

2. ANALYSIS & CONCLUSIONS

2.1 Analysis

The post accident examination of those parts of the aircraft, its engine, flight controls and systems revealed no evidence to suggest any pre-crash defects. There is also no evidence of technical failure or malfunction sufficient to have degraded the aircraft handling or performance capabilities. It is necessary, therefore to examine the manner in which the pilot operated the aircraft in the prevailing weather conditions.

Prior to the day of the accident, the pilot, who was also an Air Traffic Controller, was on duty at the Control Tower from 0800 hrs. to 1230 hrs. Local Time (L.T.). He was again on duty from 1900 hrs. (16th Feb. '78) to 0730 hrs. (17th Feb. '78)

Local Time. However, as there were two air traffic controllers on watch duty, the pilot was the watch controller from 1900 hrs. to 2230 hrs. (L.T.), thereafter he had his rest until relieved the following morning at 0730 hrs. (L.T.), some 2 hrs. before his flight. After take-off from Kota Kinabalu at 0930 hrs. (L.T.) for Keningau the pilot flew in a southerly direction for Keningau. It was established from a passenger's statement that the weather was clear during the flight to Keningau except when crossing over the Crocker Ranges, when the pilot had flown into cloud for approximately four minutes, and in so doing he had not complied with his VFR flight plan.

On the return flight from Keningau to K.K., the actual weather had deteriorated significantly. It was established from statements made by the MAS BN2 pilot that the hill ranges between Keningau - Kota Kinabalu was practically covered with clouds with a base of 1,000 - 2,000 ft. and top of at least 14,000 - 15,000 ft. It was not possible to fly the aircraft under VFR conditions. The pilot on his return flight from Keningau was flying at 8,500 ft. and further requested to climb to 10,500 ft. However, he was only cleared to climb and maintain 9,500 ft. From the ATC transcript, the pilot appeared to be very concerned with the prevailing weather conditions.

Whatever the reasons, the evidence suggest that the pilot decided to continue the flight in that weather condition. It is extremely probable that during the flight in clouds, the pilot was disorientated hence resulting in loss of control of the aircraft. The aircraft was overstressed and subjected to airspeeds far in excess of those for which it was designed. The wreckage trail indicated that the aircraft was probably in a spiral dive during its break-up.

Examination of the wreckage tend to suggest a probable right wing separation with the wing striking the upper portion of the fin and left section of the stabilator. The left wing

also broke up and struck the lower section of the fin. The left stabilator was separated due to impact and torsional deflection and the remaining stabilator was separated from its mounting at the rear fuselage bulkhead. Fin and rudder disintegration were probably initiated from impact. The in-flight separation of the primary structure happened in a matter of seconds and a great deal of noise was generated as a result of this energy release. This was consistent with witnesses' statements of hearing the noise as an explosion.

2.2

Conclusions

a) Findings

- i) The aircraft had been maintained in accordance with an approved maintenance schedule.
- ii) Its documentation was in order except for a minor irregularity when a life expired EGT gauge on 25th January, 1978 was annotated as a deferred defect.
- iii) The latest copy of the weight schedule was not incorporated in the aircraft flight manual.
- iv) The centre of gravity of the aircraft was within the prescribed limits during the flight.
- v) There was no evidence that any pre-crash defect or malfunction of the aircraft, its engine, or services was a causal factor.
- vi) The aircraft was overstressed and experienced in-flight separation of both wings and the complete tail and fin assembly.
- vii) The aircraft struck the slope of a hill at a high speed in a steep nose down attitude.
- viii) The pilot was properly licensed on the type however he was not rated for IMC and instrument.
- ix) The pilot's insufficient rest prior to the flight may be a causal factor.
- x) The pilot was not sufficiently briefed for the flight.
- xi) The pilot continued the flight in clouds and had not complied with the VFR flight plan.

b) Probable Cause

It appears extremely probable that the pilot was disorientated in clouds and control of the aircraft was lost allowing the aircraft to reach terminal velocity and subsequently disintegrate in the air prior to final impact on the ground.

3. RECOMMENDATIONS

3.1 It is recommended that prior to authorizing of a flight, the Flying Club Instructor, should adequately brief the pilot especially in respect of weather conditions.

3.2 The Flying Club should emphasize to their pilots on the importance of rest periods prior to executing a flight.

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ENGINE : Lycoming IO-360-C1C
REGISTERED OWNER : Kelab Penerbangan Sabah, Kota Kinabalu Airport, Sabah
CREW : Aircraft Commander, Fatal
PASSENGERS : One, Fatal
PLACE OF ACCIDENT : 9 miles south-west of Kota Kinabalu Airport at Papar
DATE AND TIME : 17th February, 1978 1035 hours local

SUMMARY

The aircraft was engaged on a social flight from Kota Kinabalu to Keningau and back to Kota Kinabalu on the same day. The aircraft took off at Kota Kinabalu with the Pilot and three passengers on board. The flight to Keningau was uneventful and landed safely at Keningau. Two passengers disembarked at Keningau and the aircraft took off again for Kota Kinabalu. During the flight back the aircraft encountered bad weather. It had to climb to 9500' to avoid clouds. However, even at that height it was not possible for the pilot to maintain VMC.

The report concludes that at a certain stage of the flight in IMC condition, the pilot was probably disorientated and then lost control of the aircraft. The aircraft was apparently overstressed and subjected to speeds far in excess for which it was designed. The aircraft experienced in flight break-up leaving behind a wreckage trail down-track of the point of impact which was on the side of a hill, about 9 miles south-west of Kota Kinabalu Airport.

1. INVESTIGATION

1.1 History of the Flight

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Rescuers who arrived at the scene found that there were no survivors amongst the aircraft wreckage.

1.2 Injuries to Persons

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

1.3 Damage to Aircraft

The aircraft was completely destroyed by in-flight break-up and subsequent ground impact.

1.4 Other Damage

None

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Crew Information

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At the time of the accident, the aircraft did not carry any loose baggage. This was confirmed during the examination of the wreckage at the crash site.

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Wind at 700 ft	100/08
Wind at 10,000 ft	160/08
Weather: Rain shower over the ranges and west of range.	

1.7.1 Actual Weather Observation

The actual weather observation on the Kota Kinabalu - Keningau - Kota Kinabalu route was obtained from a MAS BN2 pilot. He was airborne from K.K. at 0845 local time (L.T) landed at Keningau at 0910 L.T. and was airborne again for K.K. 10 mins. later.

Generally the weather was slightly better on the way into Keningau than on his trip back to K.K. From his observation the weather deteriorated quite markedly during the later part of the morning. Turbulence encountered during the flight was slight over the hill ranges and smooth elsewhere. The hill ranges between Keningau - Kota Kinabalu was practically covered with 8/8 of strato - cumulus and cumulus cloud with a base of 1000 - 2000 ft. and top of at least 14000 - 15000 ft. These cloud coverage was over an extensive area throughout the hill ranges. Immediately after the hill ranges and stretching right up to about 1 to 2 nautical miles of Kota Kinabalu airfield, was an extensive area covered with light continuous drizzles. The visibility in these areas was very poor, because coupled with the drizzling rain was an overcast over the whole sky. The whole sky was very dark and hazy. The Captain of the BN2 was on instrument flying most of the time during his flight back to K.K. In his opinion in those environment, visual flying was not at all possible. There was no visual reference and at no time was he in contact with the ground.

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Wreckage

The main impact wreckage was located on a wooden hill at a height of approximately 700 feet. Examination of this wreckage showed that the aircraft had struck 3 branches off a tree and one branch off another tree and the branches were of 2½ inches maximum diameter. The aircraft then struck the slope of the hill at a high speed in a steep nose down attitude. It then tipped over and slipped down the slope by 5 feet towards slightly level ground and was lying upside-down.

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The wreckage trail consisted mainly of sections of both wings, stabilator, part of the fin, port aileron, port flap and bits off the tail cone. However, the starboard aileron and the rudder together with its rear fin spar attachment could not be found. The wreckage trail was typical of aircraft break-up in flight.

Examination of the wreckage at the impact area revealed that both port and starboard wings separated just outboard of the fuel tanks at Wing Station 86.2. The complete tail and fin assembly was severed from Fuselage Station 225. The fuselage assembly broke into two sections, at Fuselage Station 70.

The forward section of the fuselage was badly crushed, twisted and almost flattened, due to impact. Both front seats were facing downwards and detached from the seat rails. The rear fuselage section was also crushed and flattened due to impact.

The pilot's control wheel assembly was broken at the universal joint and the left-hand grip was also broken off. The co-pilot's control wheel assembly was intact except for the broken left-hand grip. However, the control column tee bar joining both control wheel assemblies was broken. These were consistent with the impact damage sustained. The flying controls on the ailerons and stabilator were examined and did not show evidence of malfunction prior to in-flight break-up of the aircraft and prior to crash. The rudder control pedals and cables were

similarly examined and did not show evidence of malfunction or failure prior to in-flight break-up of the aircraft and prior to crash.

The landing gear were found in the up position. Flaps were selected to 10° down.

Examination of the wreckage recovered from the wreckage trail revealed that the fin was struck twice at its leading edge. The lower impact mark had a tell-tale sign of black and blue paint, and this was found consistent with the impact mark on the port wing. The upper strike mark suggested that it could have been struck by a wing section. The stabilator was broken into two sections, the break propagating from the left-hand stiffener. The leading edge of the left-hand stabilator also revealed an impact mark and that it was twisted around the front spar prior to in-flight break-up. The remaining right-hand stabilator section revealed that its front spar was twisted backwards, suggesting that the aircraft had been subjected to excessive airspeeds.

The autoflite system was completely destroyed, the on/off switch was missing. Examination of remains could not establish whether it was in use or not.

The propeller blades were found bent backwards and the engine experienced substantial crash damage. The propeller was under-power at the time of impact. There was no evidence to suggest any engine malfunction other than damage consistent with the crash impact.

The fuel selector valve was found selected to starboard. No fuel could be obtained from the crash, however, a fuel sample was taken from the vehicle used for the last refuelling of the aircraft.

1.13 Medical and Pathological Information

Postmortem examination showed that the cause of death of the pilot and the passenger were due to extensive internal haemorrhages, crush injuries damaging the brain, following multiple fractures of bones and multiple lacerated wounds. There was no evidence that the pilot was suffering from the effect of alcohol or drugs.

1.14 Fire

There was no evidence of fire either in the air or after the subsequent impact at the crash site.

1.15 Survival aspects

Considering the nature of the impact, the accident is considered non-survivable.

1.16 Test and Research

There was no requirement for any tests or research to be carried out.

2. ANALYSIS & CONCLUSIONS

2.1 Analysis

The post accident examination of those parts of the aircraft, its engine, flight controls and systems revealed no evidence to suggest any pre-crash defects. There is also no evidence of technical failure or malfunction sufficient to have degraded the aircraft handling or performance capabilities. It is necessary, therefore to examine the manner in which the pilot operated the aircraft in the prevailing weather conditions.

Prior to the day of the accident, the pilot, who was also an Air Traffic Controller, was on duty at the Control Tower from 0800 hrs. to 1230 hrs. Local Time (L.T.). He was again on duty from 1900 hrs. (16th Feb. '78) to 0730 hrs. (17th Feb. '78)

Local Time. However, as there were two air traffic controllers on watch duty, the pilot was the watch controller from 1900 hrs. to 2230 hrs. (L.T.), thereafter he had his rest until relieved the following morning at 0730 hrs. (L.T.), some 2 hrs. before his flight. After take-off from Kota Kinabalu at 0930 hrs. (L.T.) for Keningau the pilot flew in a southerly direction for Keningau. It was established from a passenger's statement that the weather was clear during the flight to Keningau except when crossing over the Crocker Ranges, when the pilot had flown into cloud for approximately four minutes, and in so doing he had not complied with his VFR flight plan.

On the return flight from Keningau to K.K., the actual weather had deteriorated significantly. It was established from statements made by the MAS BN2 pilot that the hill ranges between Keningau - Kota Kinabalu was practically covered with clouds with a base of 1,000 - 2,000 ft. and top of at least 14,000 - 15,000 ft. It was not possible to fly the aircraft under VFR conditions. The pilot on his return flight from Keningau was flying at 8,500 ft. and further requested to climb to 10,500 ft. However, he was only cleared to climb and maintain 9,500 ft. From the ATC transcript, the pilot appeared to be very concerned with the prevailing weather conditions.

Whatever the reasons, the evidence suggest that the pilot decided to continue the flight in that weather condition. It is extremely probable that during the flight in clouds, the pilot was disorientated hence resulting in loss of control of the aircraft. The aircraft was overstressed and subjected to airspeeds far in excess of those for which it was designed. The wreckage trail indicated that the aircraft was probably in a spiral dive during its break-up.

Examination of the wreckage tend to suggest a probable right wing separation with the wing striking the upper portion of the fin and left section of the stabilator. The left wing

also broke up and struck the lower section of the fin. The left stabilator was separated due to impact and torsional deflection and the remaining stabilator was separated from its mounting at the rear fuselage bulkhead. Fin and rudder disintegration were probably initiated from impact. The in-flight separation of the primary structure happened in a matter of seconds and a great deal of noise was generated as a result of this energy release. This was consistent with witnesses' statements of hearing the noise as an explosion.

2.2

Conclusions

a) Findings

- i) The aircraft had been maintained in accordance with an approved maintenance schedule.
- ii) Its documentation was in order except for a minor irregularity when a life expired EGT gauge on 25th January, 1978 was annotated as a deferred defect.
- iii) The latest copy of the weight schedule was not incorporated in the aircraft flight manual.
- iv) The centre of gravity of the aircraft was within the prescribed limits during the flight.
- v) There was no evidence that any pre-crash defect or malfunction of the aircraft, its engine, or services was a causal factor.
- vi) The aircraft was overstressed and experienced in-flight separation of both wings and the complete tail and fin assembly.
- vii) The aircraft struck the slope of a hill at a high speed in a steep nose down attitude.
- viii) The pilot was properly licensed on the type however he was not rated for IMC and instrument.
- ix) The pilot's insufficient rest prior to the flight may be a causal factor.
- x) The pilot was not sufficiently briefed for the flight.
- xi) The pilot continued the flight in clouds and had not complied with the VFR flight plan.

b) Probable Cause

It appears extremely probable that the pilot was disorientated in clouds and control of the aircraft was lost allowing the aircraft to reach terminal velocity and subsequently disintegrate in the air prior to final impact on the ground.

3. RECOMMENDATIONS

3.1 It is recommended that prior to authorizing of a flight, the Flying Club Instructor, should adequately brief the pilot especially in respect of weather conditions.

3.2 The Flying Club should emphasize to their pilots on the importance of rest periods prior to executing a flight.