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NATIONAL TRANSPORTATION SAFETY COMMITTEE

AIRCRAFT ACCIDENT REPORT

PT. Dirgantara Air Service Flight AW 3130

BN-2B PK-VIY

Datah Dawai, Kalimantan Timur

18 November 2000

NATIONAL TRANSPORTATION SAFETY COMMITTEE
DEPARTMENT OF COMMUNICATIONS REPUBLIC OF INDONESIA
2002

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Readers should note that the information in NTSC reports is provided to promote aviation safety: in no case is it intended to imply blame or liability.

This report has been prepared based upon the investigation carried out by the National Transportation Safety Committee in accordance with Annex 13 to the Convention on International Civil Aviation, UU No.15/1992 and PP No. 3/2001.

This report was produced by the National Transportation Safety Committee (NTSC), Gd. Karsa Lt.2 Departemen Perhubungan dan Telekomunikasi, Jalan Medan Merdeka Barat 8 JKT 10110 Indonesia.

CONTENTS

GLOSSARY OF ABBREVIATIONS

CSN	Cycles Since New
CPL	Comercial Pilot License
DME	Distance Measuring Equipment
F/O	first officer
IR	Instrument Rating
hrs	time (24 hour clock)
IFR	Instrument Flight Rules
IIC	Investigator-In-Charge
ILS	Instrument Landing System
kg	kilogram(s)
mm	millimetre(s)
MTOW	Maximum Take-Off Weight
nm	nautical mile(s)
NTSC	National Transportation Safety Committee
ºC	degrees Celcius
PIC	Pilot-In-Command
QFE	Height above airport elevation based on local station pressure
QNH	Altitude above mean sea level based on local station pressure
RPM	Revolutions Per Minute
TSN	Time Since New
TT/TD	Temperature Dew point
UTC	Universal Time Co-ordinated
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
Perintis	Pioners Flight
PAX	Passanger
LT	Local Time
fpm	Feet per Minute
SOP	Standard Operating Procedure
AOM	Aircraft Operations Manual
CG	Centre of Gravity

SYNOPSIS

On November 18, 2000, 02:51 UTC or 10:51 LT a PT Dirgantara Air Service Norman Islander BN-2B aircraft, registration PK-VIY, and flight number 3130 departed from Datah Dawai Airport for a regular commercial flight with destination airport, Samarinda, East Kalimantan. There were 18 persons on board including the pilot. Minutes after airborne, the aircraft crashed at a location of about two kilometers north of the runway 02 extension. The pilot and 11 passengers were found seriously injured, while six sustained minor injuries or none.

Weather was reported clear at the time of occurrence.

The report consisted of factual information and analysis of the accident involving a BN-2B aircraft with registration name PK-VIY on November 18, 2000. This report is released by the National Transportation Safety Committee. The investigation team consisted of personnel from NTSC, DGAC and an accredited representative from the operator, PT. DAS. The investigation concludes that exceeding MTOW and poor handling qualities of the crew contributed to the accident.

1 FACTUAL INFORMATIONS

1.1 History of Flight

A/C registration : PK-VIY

A/C type : BN-2B

Operator : PT. Dirgantara Air Service

Flight number : AW 3130

Location : Datah Dawai Airport Long Lunuk, East Kalimantan

On November 18, 2000, 02:51 UTC or 10:51 LT a PT Dirgantara Air Service Britten Norman BN-2B aircraft, registration PK-VIY, and flight number AW3130 departed from Datah Dawai Airport for a regular commercial flight with destination airport, Samarinda, East Kalimantan. There were 18 persons on board including the pilot.

The airport radio operator observed the aircraft disappearing around 2 to 3 kilometers distance from Datah Dawai Airport. A search was undertaken and the aircraft was found at about two kilometers north of the runway 02 extension.

The pilot and 11 passengers were found seriously injured, while six sustained minor injuries or none.

Weather was reported clear at the time of occurrence

1.2 Injuries to Persons

Injuries	Crew	Passengers	Others	TOTAL
Fatal	-	-	-	**-**
Serious	1	11	-	**12**
Minor/ None	-	6	-	**6**
TOTAL	**1**	**17**	**-**	18

1.3 Damage to Aircraft

The A/C was totally destroyed. The left and right wing were found detached and bent severely, with the left landing wheel detached. The rudder and upper part of the vertical stabilizer was detached from the A/C and found nearby. The fuselage was crushed and buckled severely.

1.4 Other Damage

Some of the surrounding trees were broken and bent due to the impacting A/C.

1.5 Personnel Information

1.5.1 Cockpit Crew

1.5.1.1 Pilot-in-Command

Gender	**:**	Male
Date of birth	**:**	19 March 1963
Nationality	**:**	Indonesia
Marital status	**:**	Married
Date of joining company	**:**	-
License	**:**	CPL+IR
Validity period of license	**:**	06-07-2000 s/d 06-01-2001
Type rating	**:**	BN-2B
Instrument rating	**:**	Available
Medical certificate	**:**	First class
Date of last medical	**:**	06-07-2001
Last line check	**:**	-
Last proficiency check	**:**	26-06-2000
FLIGHT TIME		-
Total time	**:**	7560:15 Hr
This make & model	**:**	3632:15 Hr
Last 90 Days	**:**	126:32 Hr
Last 72 Days	**:**	50:48 Hr
Last 24 Hours	**:**	1:58 Hr
This flight	**:**	Regular Flight

1.6 Aircraft Information

1.6.1 Aircraft Data

Registration Mark	**:**	PK-VIY
Manufacturer	**:**	Britten Norman
Country of Manufacturer		United Kingdom

Type / Model	**:**	BN-2B
Serial Number	**:**	C-2133
Date of manufacture	**:**	1981
Certificate of airworthiness	**:**	1188
Issued	**:**	04 July 2000
Certificate of registration	**:**	1188
Issued	**:**	27 September 2000
Category	**:**	Normal
Crew (Cockpit/Cabin)	**:**	1
Pax seats	**:**	9
Time Since New	**:**	21336:05 hr
Cycles Since New	**:**	20.374 Cycle
Last Major Inspection	**:**	21.000 hr
Next Major Inspection	**:**	22.000 hr
Last Minor Inspection	**:**	21.296:79 Hr (100 HI)
Next Minor Inspection	**:**	21.350 hr (50 HI)
Hours since last inspection	**:**	39:26 hr
Cycles since last inspection	**:**	31 Cycle

1.6.2 Engine Data

Engine Type	**:**	Piston Engine
Manufacturer	**:**	Lycoming
Type / Model	**:**	IO-540-K1B5
Serial Number #1	**:**	L-22150-48A
▪ **TSN**	**:**	8124.04 Hrs
▪ **CSN**	**:**	-
Serial Number #2	**:**	L-24605-48A
▪ **TSN**	**:**	5162.08 Hrs
▪ **CSN**	**:**	-

(Dimension A/C-See Appendix F. BN 2B Dimensions)

The examination on the maintenance log showed that the engine has no history of failure or any other anomaly.

1.6.3 Weight and Balance

The passenger and load manifest found in Datah Dawai read as follows.

No	Payload	Weight (kg)
1	Pax # 1	64
2	Pax # 2	60
3	Pax # 3	54
4	Pax # 4	9
5	Pax # 5	34
6	Pax # 6	8
7	Pax # 11	60
8	Pax # 12	47
9	Pax # 13	20
10	Pax # 14	10
11	Pax # 15	55
12	Pax # 17	70
13	Baggage	0
	TOTAL	491

Interviews with five of the passengers, Wahab Sjahranie Hospital medical staff, and the ground crew participating in the rescue operations reveals the following

PIC (65 kg) (142.35 lbs)		Pax 1 (64 kg) (140.16 lbs)
Pax 2 [55 kg] (120.45 lbs)	Pax 3 [48 kg] & Pax 4 [10.5 kg] (128.11 lbs)	Pax # 5 [48 kg] & Pax #6 [9 kg] (124.83 lbs)
Pax #7 [65 kg] (142.35 lbs)	Pax #8 [62 kg] & Pax #9 [15] (168.63 lbs)	Pax #10 [20 kg] (43.8 lbs)
Pax #11 [62 kg] (135.78 lbs)	Pax #12 [68 kg] & Pax#13 [24 kg] (201.48 lbs)	Pax #14 [34 kg] (74.46 lbs)
Pax #15 [62 kg] (135.78 lbs)	Pax #16 [47 kg] (102.93 lbs)	Pax #17 [70 kg] (153.30 lbs)
Bagage [150 kg] (328.5 lbs)		

The payload weight according to this table is 913.5 kg.

1.7 Meteorological Information

Weather was clear at the time of accident. The Samarinda (142 nm from Datah Dawai) meteorology station report is as follows:

Wind	:	Calm
Visibility	:	12 Km
Weather	:	NIL
Cloud	:	Sct/1800 ft
TT/TD	:	30.4 C/25.5 C
QNH	:	1009.1 Mbs / 29.80 Inch
QFE	:	1007. Mbs / 29.76 Inch

1.8 Aids to Navigation

ADF, NAV, Garmin DGPS

1.9 Communications

VHF, HF

1.10 Aerodrome Information

Airport Name	:	Datah Dawai (00° 47 N – 114° 34 E)
Airport Identification	:	WRLJ
Airport Operator	:	Departemen Perhubungan
Certificate Number	:	-
Runway Direction	:	02/20
Runway Length	:	750 meter
Runway Width	:	23 meter
Surface Condition	:	Asphalt

The aerodrome is owned by the local government (Kalimantan Timur Province) and used for "Perintis" flight operations. The coordinates are 00 47 North, 114 34 East. The elevation is not officially published, only measured from the aircraft altimeter, which is about 650 ft above sea level. The runway designation is 02 and 20. The length of the runway is 750 meter with width of 23 meter. A stopway of 30 meter is provided for runway 02. The runway surface is asphalt and its strength can accommodate up to CASA 212 aircraft. It has an apron,

taxiway, but a tower building is not available since the aerodrome is a non controlled aerodrome. The runway is not equipped with landing direction indicators and due to local prevailing surface winds at most of the time, the preferred take off and landing direction is runway 02. A significant obstacle is the hilly forest in the northerly direction of the extension of runway 02. The first obstacle is about 200 feet high above runway elevation located about 533.3 meters from the end of runway 02, and the second obstacle is about 500 feet above runway elevation located 1262.9 meters from the end of runway 02. Runway slope inclination is 3% from direction runway 02. ***(See Appendix C)***

1.11 Wreckage and Impact Information

The A/C was found upside-down with its nose slightly downward. The left and right wing was ripped out of the fuselage. There are signs of heavy impact damage to left wing leading edge, near the engine pylon. The right wing tip was sheared open and all the fuel has drained out by the time the investigators arrived at the site. The right landing wheel was found near the left engine. The rudder and upper part of the vertical stabilizer were found about 7 meters from the fuselage ***(See Appendix A)***. The fuselage was crushed and buckled severely. The right propeller was bent backward.

One of the left propellers was found bent backwards and twisted slightly, while the other was found buried in the ground. To facilitate the evacuation of the crew and passengers, all the seats were taken out from the A/C.

The cockpit windows were found broken on impact. There were indications that the front passenger (next to the pilot) door was open before the right wing bending and before the right engine cowling crushed it.

The cockpit examination showed that the throttle positions for both engines were almost closed, mixture positions were closed, the propeller selections were not feathered, and the flap lever was up ***(See Appendix E)***. The fuel selectors for both tanks were selected to tip tanks. The directional indicator read 320, which is consistent with the heading of the wreckage. The altitude indicator read 800 ft, the vertical speed indicator read -100 fpm, and the manifold pressure read 27 psi. Meanwhile the fuel press, oil press, and oil temp indicators read 0.

1.12 Medical and Pathological Information

Not relevant.

1.13 Fire

The wreckage and the impact site showed no indications of pre- or post impact fires.

1.14 Organizational and Management Information

Aircraft Owner	:	PT. Dirgantara Air Service
Address	:	Halim Perdana Kusuma Airport, Jakarta
Aircraft Operator	:	PT. Dirgantara Air Service
Address	:	Halim Perdana Kusuma Airport, Jakarta
Certificate Number	:	-
Operator Designator	:	-

2 ANALYSIS

2.1 Wreckage analysis

The inspection of the propeller damage indicates that the propellers have very little or no rotation at the time of the impact. This confirms the throttle and mixture setting found in the cockpit, which indicated that most likely that the engines were not running or at very low power at the time of impact. There are three possible causes that may result into engine shut down in flight (***See Appendix E)***. Those are engine fire, engine failure, and emergency landing procedure.

Wreckage analysis found no indication of engine fire. The propellers were found in fine pitch and unfeathered position, which indicating improper in-flight engine shutdown procedure. The wreckage indicated that the propeller levers position was not caused by the impact. All the levers on the pedestal were bent to the left due to impact from the right side ***(See Appendix A)***. It is possible that the pilot may not have time to perform a proper engine shutdown procedure. This and the fact that the settings for both engines were the same indicate that a single engine failure did not occur.

The fuel flow selectors for both tanks were selected to fuel flow from tip tanks. It is known that the fuel in tip tanks was used for extended performance. According to the flight manual, and if the aircraft was fueld up to its maximum capacity at Samarinda airport, the pilot should have used the fuel in the tip tanks at the last 20% of the return trip from Datah Dawai to Samarinda.

- One scenario is that the pilot used the tip tanks selection so that the fuel in the tip tanks can automatically be transferred to the main tanks as the main fuel was used.
- Another scenario is that, the pilot used the tip tanks fuel since the remaining fuel in the main tanks were less than 35 US gal each. This may indicate that the fuel tanks were not filled into its maximum capacity at Samarinda. Such things were done to enable the pilot lift additional load, even though this may endanger the flight, as there were not enough fuel for a divert.

Company procedures stated that the A/C should be fuelled to maximum capacity for the Datah Dawai-Samarinda round-trip. The last flight's fuel report from Samarinda indicates that the A/C was fueled with 350 lt (92.3 US gal), which means an additional 46.3 US gal per tanks (68%). However, there is no information on the remaining fuel at the tanks at that time. Therefore, the above scenarios can not be confirmed.

.One sparkplugs form each cylinder was examined. The plugs were dry and clean indicating there were no signs of combustion failure.

2.2 Weight & balance analysis

Analysis was done to find out whether the take-off weight exceeds the limit given by the company, manufacturer, or CAA.

PT. DAS standard operating procedures limit the take-off payload from Datah Dawai to 496 kg. The actual take-off payload was 913.5 kg, exceeding the company standards by 417.5 kg, or by 84% of the allowed payload weight.

The manufacturer's maximum take-off weight (*for Datah Dawai Airport elevation, 650 ft*) is 6,300 lb or 2860 kg. The A/C take-off weight at Datah Dawai is calculated as follows.

Item	Weight (lb)	Moment
A/C empty weight	4302	+1015.3
Pilot	150	- 67.5
Row 1	150	- 67.5
Row 2	375	- 56.25
Row 3	357	+ 53.55
Row 4	414	+ 182.16
Row 5	394	+ 283.68
Baggage	230	+ 242.65
Unused fuel	42	+ 11
Oil	45	-1
Fuel	113	+ 30.4
TOTAL	6572	+ 1626.5

The table showed that the A/C has exceeded manufacturer MTOW by 272 lb or 4.32%. However, PT.DAS argued from the manual that the MTOW is 6600 lbs.

The center of gravity calculated is still inside the moment flight envelope, but close to the aft limit of the envelope. This fact is also indicated by the A/C take-off trim which is set to near -1, meaning that the CG was slightly aft.

2.3 Flight performance analysis

The flight performance was calculated. The result indicates that with a reported 6007 lb A/C weight (allowable for Datah Dawai according to PT.DAS SOP) and two engines operation, the aircraft net gradient climb is 13.8% allowing the aircraft to clear 200 ft height from the runway elevation at 533.3 meter range (first segment climb). The aircraft should be able to reach 500 ft at 1,261 meters range (second segment climb). This performance capability will assure a safe clearance from existing obstacles. The next flight sequence would be the clearing of 1,500 ft altitude at a range of 3,600 meters.

Using a linearized performance model, applying the actual weight of 6,572 lb, the net gradient was calculated to be 12.6%. A correction factor applied to the linearized model resulting in an estimated climb gradient of 11%. With this climb gradient the aircraft can only reach 176ft at 533.3 m range, instead of the required 200 ft. At 176ft above airport ground level, the aircraft height above the top of the trees was 11 ft, which is marginal.

2.4 Operation / Management Analysis

2.4.1 Flight Technique Aspects

The aircraft performed a two engines take-off from runway 02, rotating at 70 kts IAS on a 3% down slope runway.

Information gained from interviews indicated that, watching the obstacles in the direction of the flight path, apparently the flight crew perception was that after rotating and lift-off the aircraft was not gaining height, either due to a downdraft or a loss of engine performance or both. Deciding that the aircraft was unable to climb, the pilot tried to avoid high trees by turning to the left of its original flight path direction. The maneuver was not based on published procedures or visual track charts, as these were not available for departures from runway 02 ***(See Appendix D).*** The investigation also did not find any published information on emergency return to base maneuvers. Realizing that the aircraft continued to lose altitude, the Pilot prepared for an emergency landing. From the interviews, the investigation could not conclude what the Pilot actions were during this maneuver. It is likely, however, that the Pilot did not have the time to initiate proper emergency landing procedures.

Stalling speeds are functions of aircraft weight, the heavier the aircraft, the higher the stall speeds. For the BN-2A aircraft type at 6600 lbs weight and at standard atmosphere, the stall speed for the aircraft (post-mod 386) is 38 kts.

For a Datah Dawai departure, the 1st flight segment covers a 1600 ft range, and the A/C should have gained 200 ft altitude from runway, while for the 2nd segment that covers a 2200 ft range from the end of 1st segment, the A/C should have gained altitude of 500 ft from runway. The flight, however, did only reach an altitude of 150 ft from the runway elevation at a range of 6000 ft.

This fact confirmed that the aircraft is overloaded. An interview with the PIC revealed that he had a habit of taking-off from Datah Dawai at 70 kts, faster than the A/C recommended take-off speed 55-60 kts. He mentioned that doing so would improve his obstacle clearance performance ***(See Appendix C)***.

This perception was not correct, since if the A/C takes off with a speed of 70 kts instead of 60 kts, the A/C would have a smaller horizontal distance from the obstacle (in this case high ground and trees). Therefore, the A/C should climb with a higher rate of climb. Climbing with a higher rate of climb will slow down the aircraft significantly, and there is a possibility that after clearing the obstacle, the aircraft has lost so much speed that it is unable to get enough lift to increase its altitude further.

It is concluded that a combination of overload and improper flight technique had made the A/C to stall.

2.4.2 Flight Operations

Examination of the load manifest and passenger tickets, and the interview with the passengers showed that only 12 of the 18 passengers have valid tickets.

Examination of the RS. Wahab Sjahranie patient records showed that the weights of the passengers were not measured correctly at Datah Dawai. The fact that the pilot or the ground crew did not object with the possible overloading indicates that apparently there was a common practice or understanding on making extra-illegal profits from this practice. Most probably, such practice has been done before.

The investigation found that the crew of PT.DAS has never filled out a Flight Clearance for all its operation from Samarinda. This is a violation of CASR 135 (Part 135.601). The airport briefing office should sign the flight clearance, and therefore supervise the process.

In Pioneer Flight operations, the local government requires the operator to recruit / hire local businesses/human resources in the operation, such as for the ticket agents, suppliers/pasasi, load master, etc. PT.DAS Area Manager in Samarinda mentioned that in many cases, the local personnel are not qualified or do not have the right qualification ratings to work in airline operation, but have to be hired anyway. This might influence the safety level of the operation.

The Investigation found that there were two different load manifests. The original manifests are obtained by the police at Tenggarong district, East Kalimantan. The first manifest, numbered 012904 was suspected to be from Datah Dawai. It stated that the passenger composition are 07/01/01 (seven adult, one child, one infant) and there area some baggage in the A/C. The second manifest, numbered 012905, is suspected made in Samarinda. The number on the top right of the document is pasted over, obviously to cover the document's real number. The manifest stated that there are 8 adults, 2 children, and 2 infant aboard the A/C and there are no baggages.

This is a gross violation of aviation safety procedures that can be classified as willful misconduct if not considered as a criminal act.

2.4.3. Company Structure

PT.DAS is a company owned by the Indonesian Air Force Foundation. The majority of the commissioners and executives are Air Force personnel both retired and active. This kind of organization may cause many factors adversely influence operation and management, such as on Human Resources Management, that is on recruitment and training.

PT.DAS has improved the skill training for their employees (for pilots and ground crews), to meet the requirement on CASR 135. At the time of accident, the company did not have a clear safety program. However, currently, the company established Company Aviation Safety Officer, which is the requirement of CASR 135, to ensure the enforcement of SOP related to safety.

Since the pioneer flight operation is subsidized by the government (local government), there are some issues related to the funding. Due to the limitations of local government funding, the operator has to compensate by selling the ticket at very low price so that common people can afford to fly. This made the passenger demand very high. However, the airline can not make the decision to add the number of flights. The local government, as the sponsor, is the one that

has the authority to decide. The high demand and low supply raise the potency of bribery. Without strong supervision, the airline employee or authority may take bribe from passengers who do not want to wait in line.

2.5 Operational Practices analysis

The passengers reported that the PIC made a deal for the sale of seats to the last two passengers for Rp. 600,000 and Rp. 1 million (the actual ticket price is Rp. 68,000). The passengers agreed to pay the prices so that they can be included in the flight. The PIC confirmed that such deals are common and that he has done this before how ever he did mention the price.

The PIC and his Chief Pilot interviews reveal that such practices are often carried out in conjunction with other personnel to get extra money to compensate their 'lower' salary compared to the skill and service time they have to provide to the company assignment.

Although the Company did issue notices to all personnel about consequences of such in-disciplinary action, there were no such control ever been implemented by the management. This lack of control suggested that the personnel who are involved in such practices have built a belief that this unauthorized practice were actually rewarding and at any opportunity would repeat again.

The practice mention above become a safety hazard when the crews, lured by the amount of money they will get and knowing that there will be no adverse consequences on them, started to neglect the operating limits of the aircraft.

All these can be classified as willful misconduct of flight safety procedures, and a disregard for safety.

3 CONCLUSIONS

3.1 Findings

- There are no signs of engines failure prior to the impact.
- The A/C exceeded its manufacturer's MTOW on the flight from Datah Dawai to Samarinda.
- The A/C center of gravity is near the aft limit of the CG flight envelope.
- The PIC apparently has a wrong perception on take-off procedure. He thought that the optimum take off performance could be achieved by taking-off with a higher velocity. Meanwhile, in achieving high velocity one has to roll closer to the obstacle, which forced the aircraft to maintain a higher rate of climb.
- The PIC and Datah Dawai ground crews have endangered his passengers by letting more passengers loaded into the A/C than the number of seats available.
- The PIC and Datah Dawai ground crews have endangered their passengers by improperly calculating the weight of A/C payload.
- PT.DAS did not have proper supervision system that may prevent such practice to happen.

- PT.DAS has never filled out Flight Clearance, for its Samarinda-Datah Dawai operation.
- There are a lot more passengers or demand than the capacity of the Pioneer Flight Samarinda-Datah Dawai.
- There are not enough flight operation documents published (such as visual track and single engine emergency return guidance) to fly safely in and out of Datah Dawai.
- The exceeding MTOW, small stability margin, PIC take-off habit, and lack of published safety documents for the area are the contributing factors to the accident.

There were found indications of practices that fit into the category of negligence, willful misconduct and violations of existing flight safety rules and regulations.

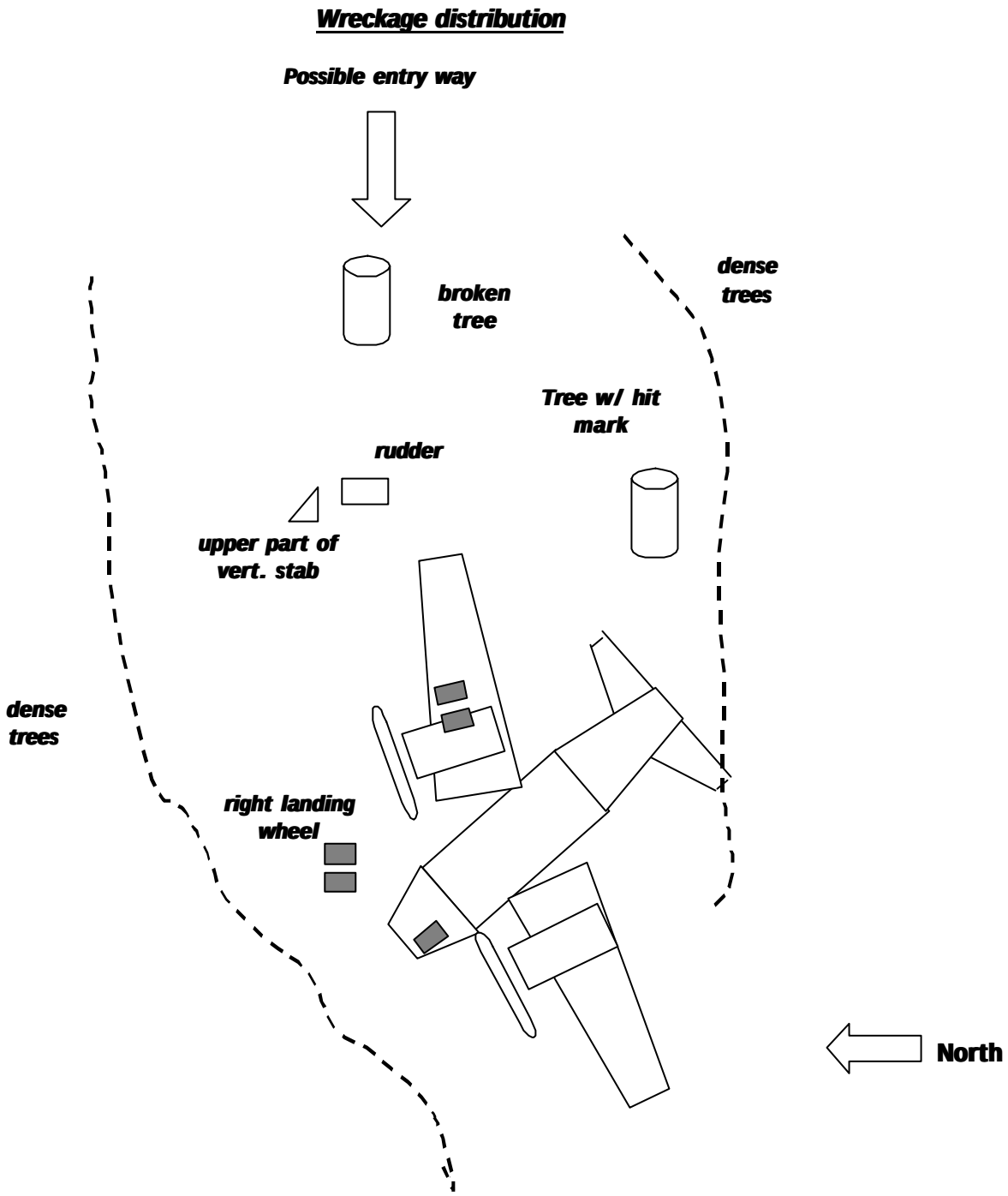
4. RECOMMENDATIONS

- PT.DAS should always enforce its SOP more strictly, and the proper authority should improve its oversight on the enforcement.
- PT.DAS should enforce all its flightcrews to fill out Flight Clearance documents according to the regulation of CASR 135. The Samarinda airport personnel should support the enforcement of the regulation.
- The local government should clarify its regulation on hiring/recruiting local businesses/human resources, so that only qualified personnel may support the Pioneer Flight operation. More supervision/training should be given to the current local recruits so that the air safety is not jeopardized.
- Further studies need to be done on whether there is a need to increase the number of flights in the Datah Dawai - Samarinda operation to accommodate the passenger demand.
- The authority shall publish visual tracks to take-off from Datah Dawai and guidance guidelines for single engine emergency return procedures to Datah Dawai and all other pioneer airports in the region.
- The authority shall enforce the proper use of existing flight safety rules and regulations.

The authority shall monitor closely the possibility of gross negligence and or willful misconduct in pioneer (perintis) flight operations.

Appendix

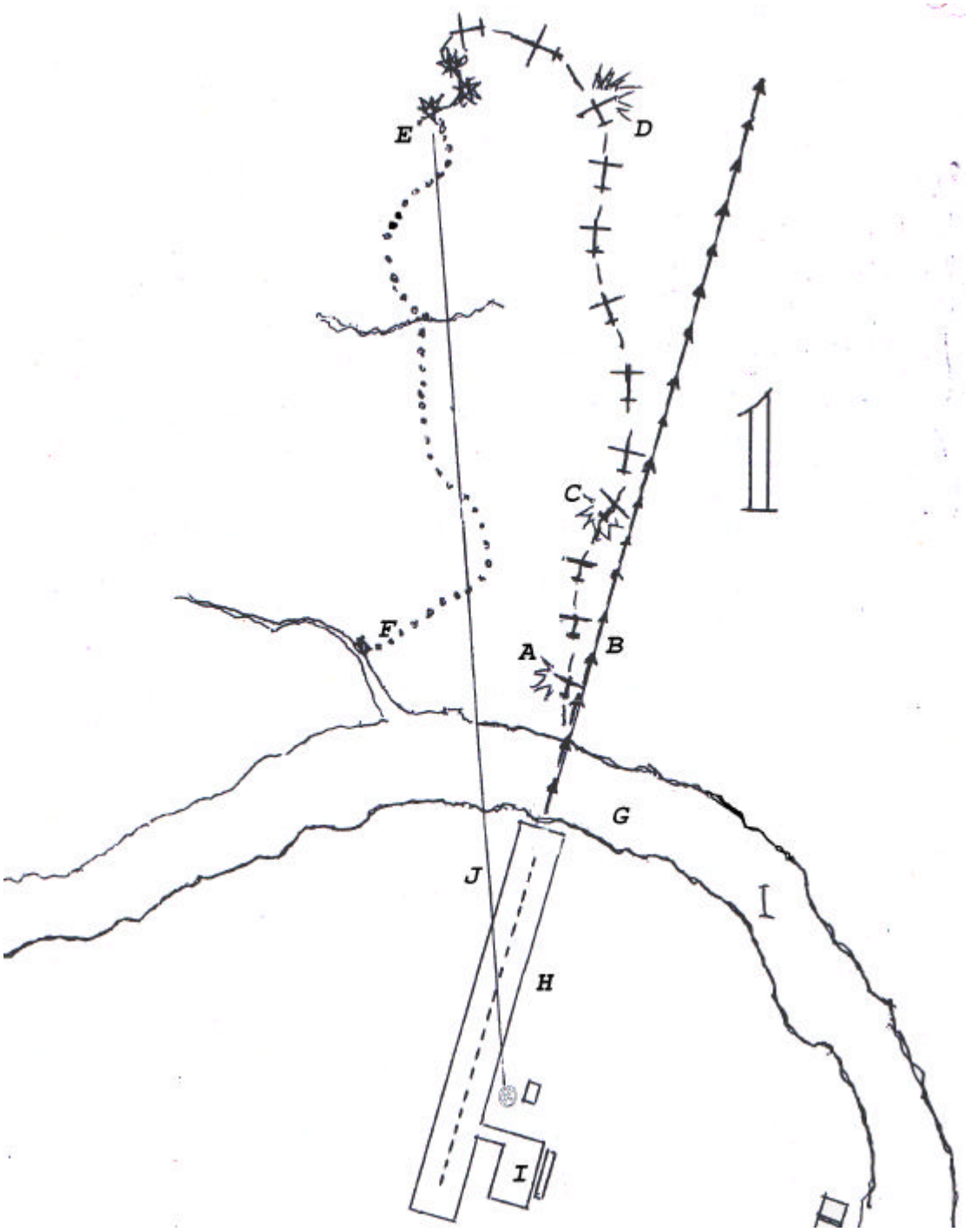
Appendix A. Wreckage and Impact Distribution



Appendix B. Wreckage and Impact Picture

Appendix C. Take off slope Runway 02 Direction

Appendix D. Trajectory Plot



Remarks :

A. The A/C undercarriage first contact with treetop

B. Normal flight path

C. The A/C undercarriage second contact with tree

D. The A/C undercarriage third contact with tree

E. The aircraft L/H landing gear final impact with tree

F. Trail to the crash side

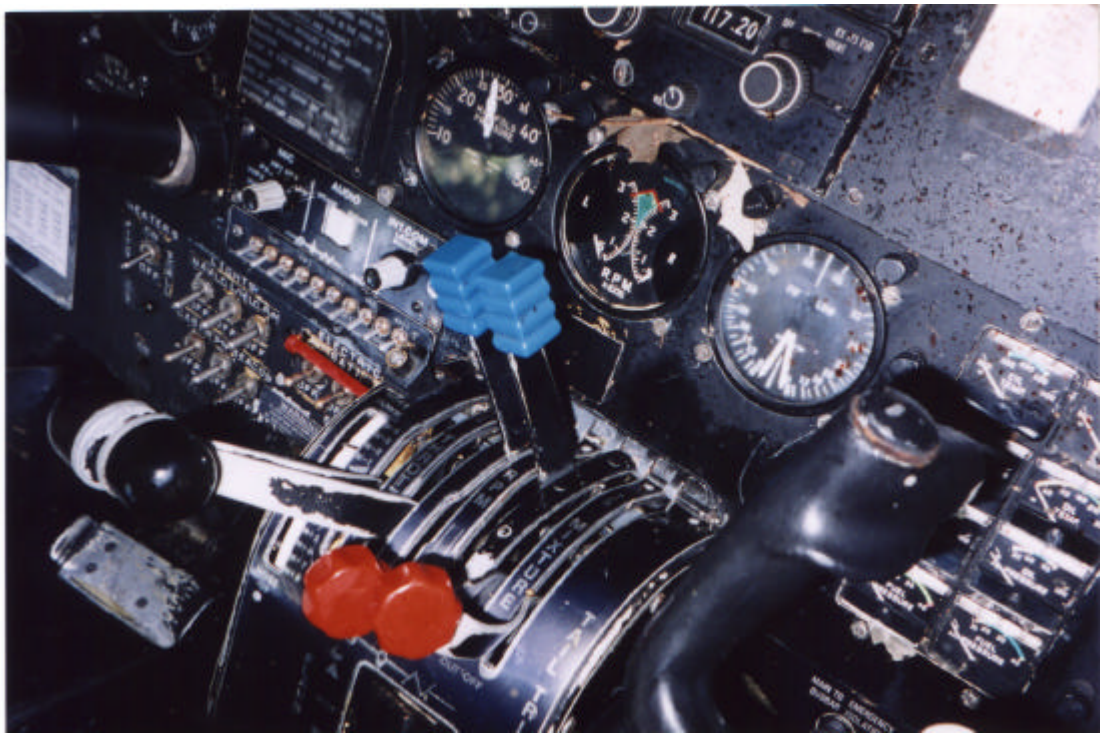
G. Kapuas River

H. Datah Dawai Airstrip

I. Aerodrome / Appron Datah Dawai

J. Distance from Aerodrome to the crash side (2 km)

Appendix E. Throttle, mixture, propeller setting after crash



Appendix F. Britten Norman 2 B Dimensions