FINAL
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NATIONAL TRANSPORTATION SAFETY COMMITTEE

Aircraft Accident Investigation Report

PT. Intan Angkasa Air Service
PA-31-350; PK-IWH
Mayang Hill, Bontang
East Kalimantan
Republic of Indonesia

24 August 2012

NATIONAL TRANSPORTATION SAFETY COMMITTEE
MINISTRY OF TRANSPORTATION
REPUBLIC OF INDONESIA
2013

This Final Report was produced by the National Transportation Safety Committee (NTSC), 3rd Floor Ministry of Transportation, Jalan Medan Merdeka Timur No. 5 Jakarta 10110, Indonesia.

The report is based upon the investigation carried out by the NTSC in accordance with Annex 13 to the Convention on International Civil Aviation Organization, the Indonesian Aviation Act (UU No. 1/2009) and Government Regulation (PP No. 3/2001).

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ABBREVIATIONS AND DEFINITIONS

AAIP	:	Approved Aircraft Inspection Program
AGL	:	Above Ground Level
AIP	:	Aeronautical Information Publication
ALERFA	:	Alert Phase when there is apprehension about the safety of an aircraft and its occupants where communication is not received or the aircraft fails to arrive within 60 minutes of a prescribed time.
AMSL	:	Above Mean Sea Level
AOC	:	Air Operator Certificate
BKN	:	Broken
BMKG	:	*Badan Meteorologi Klimatologi dan Geofisika* (Meteorological Climatologyl and Geophysical Agency)
C	:	Celsius
CASR	:	Civil Aviation Regulation
CFIT	:	Controlled Flight Into Terrain
COM	:	Company Operation Manual
CPL	:	Commercial Pilot License
CVR	:	Cockpit Voice Recorder
DETRESFA	:	Distress Phase when there is reasonable certainty that the aircraft and its occupants are threatened by grave and imminent danger.
ELBA	:	Emergency Locator Beacon Aircraft
FDR	:	Flight Data Recorder
GPS	:	Global Positioning System
ICAO	:	International Civil Aviation Organization
INCERFA	:	Uncertainty Phase when there is concern about the safety of an aircraft and its occupants where communication is not received or the aircraft fails to arrive within 30 minutes of a prescribed time.
mbs	:	millibars
NM	:	Nautical Mille
NTSC (KNKT)	:	National Transportation Safety Committee (*Komite Nasional Keselamatan Transportasi)*
OPSPEC	:	Operation Specification
PIC	:	Pilot in Command
PPC	:	Pilot Proficiency Check
SCT	:	Scatter
SOP	:	Standard Operating Procedure
UTC	:	Universal Time Coordinate

INTRODUCTION

SYNOPSIS

On 24 August 2012, a Piper Chieftain PA-31-350 aircraft, registered PK-IWH, was being operated by PT. Intan Angkasa Airservice to conduct an aerial survey (aero magnetic) flight at a survey area located north of Bontang, East Kalimantan.

There were 4 persons on board; one pilot, one security officer and two surveyors. The flight was planned with an altitude of 3,000 feet AMSL en-route and 500 feet AGL while surveying the area. The fuel endurance was for 6 hours flight time.

The aircraft departed from Temindung Airport (WALS), Samarinda at 0751 local time (LT - 2351 UTC).

At 0004 UTC, the pilot informed to the Temindung Control Tower controller (Temindung Tower) that the aircraft was abeam Tanjung Santan descending from 3,000 feet and established contact with Bontang Info officer (Bontang Info).

At 0005 UTC, the pilot informed the Bontang Info that their altitude was 300 feet and estimated over Bontang at 0011 UTC. Bontang info acknowledged this transmission and advised the pilot to report when the flight left the Bontang Area.

At 0010 UTC, the SureTrack (flight following system) stopped receiving data from the aircraft. The last recorded information was an aircraft speed of 138 knots, heading 352°, latitude 0°8’33” N and longitude 117°12’54” E.

At 0600 UTC, the engineer of the PK-IWH aircraft asked the Temindung Tower about the flight as the fuel endurance had been exceeded.

The Temindung Tower contacted Bontang Info to get information about the aircraft. After receiving the request, Bontang Info tried to contact the pilot twice and there was no reply. Bontang Info also contacted the Tanjung Bara Airstrip to request information about the aircraft but there was no information.

At 0730 UTC, the search and rescue team assembled, the team consisted of the Temindung Airport Authority, National Search and Rescue, Indonesian Police, Army and Airforce. The search operation was conducted via ground and air using three helicopters.

On 26 August 2012 at 0850 UTC, the aircraft wreckage was located by a ground search team on a ridge of Mayang Hill, Bontang at approximately 1,200 feet AMSL at coordinates 00°12’34.3”N, 117°16’57.3”E, 12 NM from Bontang Aerodrome on bearing of 294°. The accident site was within the planned aircraft survey area.

All occupants were fatally injured and the aircraft was destroyed by impact force and post impact fire.

The investigation found several findings and concluded that this accident is typical of a Controlled Flight Into Terrain (CFIT). Low altitude flying in a low visibility environment limited the pilot’s sight and increases the probability impact to the terrain.

Following this investigation PT. Intan Angkasa Airservice have performed several safety actions. The NTSC issued several safety recommendations to the Indonesia Directorate General of Civil Aviation (DGCA) and PT. Intan Angkasa Airservice.

1 FACTUAL INFORMATION

1.1 History of the Flight

On 24 August 2012, a Piper Chieftain PA-31-350 aircraft, registered PK-IWH, was being operated by PT. Intan Angkasa Airservice to conduct an aerial survey (aero magnetic) flight at a survey area located north of Bontang, East Kalimantan.

There were 4 persons on board; one pilot, one security officer[3] and two surveyors.

Based on the flight plan submitted by the Pilot in Command (PIC) to the Briefing Office, the flight was planned with an altitude of 3,000 feet AMSL en-route and 500 feet AGL while surveying the area. The fuel endurance was for 6 hours flight time and the aircraft equipped with an Emergency Locator Transmitter (ELT).

The aircraft departed from Temindung Airport (WALS), Samarinda[4] at 0751 local time (LT - 2351 UTC)[5].

At 0004 UTC, the pilot informed to the Temindung Control Tower controller (Temindung Tower) that the aircraft was abeam Tanjung Santan[6] descending from 3,000 feet and established contact with Bontang Info officer (Bontang Info).

At 0005 UTC, the pilot informed the Bontang Info that the aircraft altitude was 300 feet and estimated over Bontang at 0011 UTC. Bontang info acknowledged this transmission and advised the pilot to report when the flight left the Bontang Area.

At 0010 UTC, the SureTrack[7] (flight following system) stopped receiving data from the aircraft. The last recorded information was an aircraft speed of 138 knots, heading 352°, latitude 0°8’33” N and longitude 117°12’54” E.

At 0600 UTC, the engineer of the PK-IWH aircraft asked the Temindung Tower about the flight as the fuel endurance had been exceeded.

The Temindung Tower contacted Bontang Info to get information about the aircraft. After receiving the request, Bontang Info tried to contact the pilot twice and there was no reply. Bontang Info also contacted the Tanjung Bara Airstrip to request information about the aircraft but there was no information.

The Temindung Tower reported that:

- at 0610 UTC declared INCERFA (Uncertainty phase);
- at 0630 UTC declared ALERFA (Alert phase);
- at 0700 UTC declared DETRESFA (Distress phase).

3 Security officer is the person from Ministry of the Defence supervising the survey activity.

4 Temindung Airport will be named as Temindung for the purpose of this report.

5 The 24-hour clock used in this report to describe the time of day as specific events occurred is in Coordinated Universal Time (UTC). Local time, Indonesian Central Time Zone (WITA) was UTC + 8 hours.

6 Tanjung Santan is the airstrip located between Temindung Airport and Bontang.

7 SureTrack flight following system is described in Chapter 1.17.1 of this report.

At 0730 UTC, the search and rescue team was assembled; the team consisted of the Temindung Airport Authority, National Search and Rescue, Indonesian Police, Army and Airforce. The search operation was conducted via ground and air using three helicopters.

On 26 August 2012 at 0850 UTC, the aircraft wreckage was located by a ground search team on a ridge of Mayang Hill, Bontang at approximately 1,200 feet AMSL at coordinates 00°12'34.3"N, 117°16'57.3"E, 12 NM from Bontang Aerodrome on bearing of 294°. The accident site was within the planned aircraft survey area.

All occupants were fatally injured and the aircraft was destroyed by impact force and post impact fire.

1.2 Injuries to Persons

Injuries	Flight crew	Passengers	Total in Aircraft	Others
Fatal	1	3	4	-
Serious	-	-	-	-
Minor/None	-	-	-	Not applicable
TOTAL	1	3	4	-

One of the passengers was an Australian citizen and the others were Indonesian citizens.

1.3 Damage to Aircraft

The aircraft destroyed by impact forces and a post-impact fire.

1.4 Other Damage

There was no other damage to property and/or the environment.

1.5 Personnel Information

1.5.1 Pilot in Command

Gender	:	Male
Age	:	64 years old
Nationality	:	Indonesia
Date of joining company	:	1997
License	:	CPL
Date of issue	:	1 October 1970
Aircraft type rating	:	DHC-6 , PA-31-350
Medical certificate	:	First Class
Last of medical examination	:	26 April 2012
Validity of medical certificate	:	26 October 2012

Last proficiency check	:	26 August 2010
Next proficiency check due	:	31 August 2011
Last instrument rating	:	26 August 2010
Next instrument rating due	:	31 August 2011
Flying experience		
Total hours	:	17,547 hours
Total on type	:	4,250 hours
Last 90 days	:	11 hours
Last 60 days	:	7 hours
Last 24 hours	:	6 hours
This flight	:	About 20 minutes
Medical limitation	:	The pilot shall wear lenses that correct for distant vision and possess glasses that correct for near vision.

1.6 Aircraft Information

1.6.1 General

The aircraft was certified, equipped and maintained in accordance with existing regulations and Approved Aircraft Inspection Program (AAIP) for aircraft type certificated for nine or less seats amendment 05 with effective date 18 June 2012.

Registration Mark	:	PK-IWH
Manufacturer	:	Piper Aircraft Company
Country of Manufacturer	:	USA
Type/ Model	:	PA-31-350
Serial Number	:	31-7862065
Date of manufacture	:	1978
Special Certificate of Airworthiness		
Issued	:	4 May 2012
Validity	:	3 May 2013
Category	:	Restricted
Purpose	:	Photo Flight and Aerial Surveying
Certificate of Registration		
Number	:	1693
Issued	:	14 February 2011
Validity	:	13 February 2014

Time Since New	:	16743.9 hours
Cycles Since New	:	14830 cycles
Last Major Check	:	information not available
Last Minor Check	:	information not available

1.6.2 Engines

Manufacturer	:	Lycoming
Serial Number-1 engine	:	L-4166-61A
Type/Model	:	T10 540J2BD
▪ Time Since New	:	2,964 hours 3 minutes (16/08/2012)
▪ Time Since Overhaul	:	1,134 hours 3 minutes (16/08/2012)
Serial Number-2 engine	:	L-2543-68A
Type/Model	:	LT10 540J2BD
▪ Time Since New	:	3,747 hours 6 minutes (16/08/2012)
▪ Time Since Overhaul	:	1,792 hours 5 minutes (16/08/2012)
▪ Time Between Overhaul	:	2,000 hours

1.6.3 Propellers

Manufacturer	:	Hartzell Propeller Inc
Type/Model	:	HC-E3YR-2ATF
Serial Number-1 propeller	:	DJ 8905 A
▪ Time Since New	:	3,012 hours 16 minutes
▪ Time Since Overhaul	:	Information not available
Serial Number-2 propeller	:	DJ 8924 A
▪ Time Since New	:	3,012 hours 16 minutes
▪ Time Since Overhaul	:	Information not available

1.6.4 Weight and Balance

Based on the total occupants, fuel and equipment carried in this flight, the aircraft was calculated to be within the allowable weight and balance envelope at the beginning of the flight and at the time of the accident.

1.7 Meteorological Information

1.7.1 Temindung Meteorological Report

Meteorological information was issued by the BMKG observation office at Temindung airport and updated every hour.

	2300 UTC	0000 UTC	0100 UTC
Wind	200° / 05 knots	100° / 05 knots	230° / 08 knots
Visibility (m)	8 km	10 km	10 km
Weather	NIL	NIL	NIL
Cloud	BKN 1,300 feet	SCT 1,400 feet	BKN 1,300 feet
Temperature / Dew point	25°C / 23°C	26°C / 23°C	26°C / 23°C
QNH (mbs)	1011 mbs	1012 mbs	1013 mbs

1.7.2 Satellite Image

A satellite image was provided by BMKG after the accident for the purpose of the investigation.

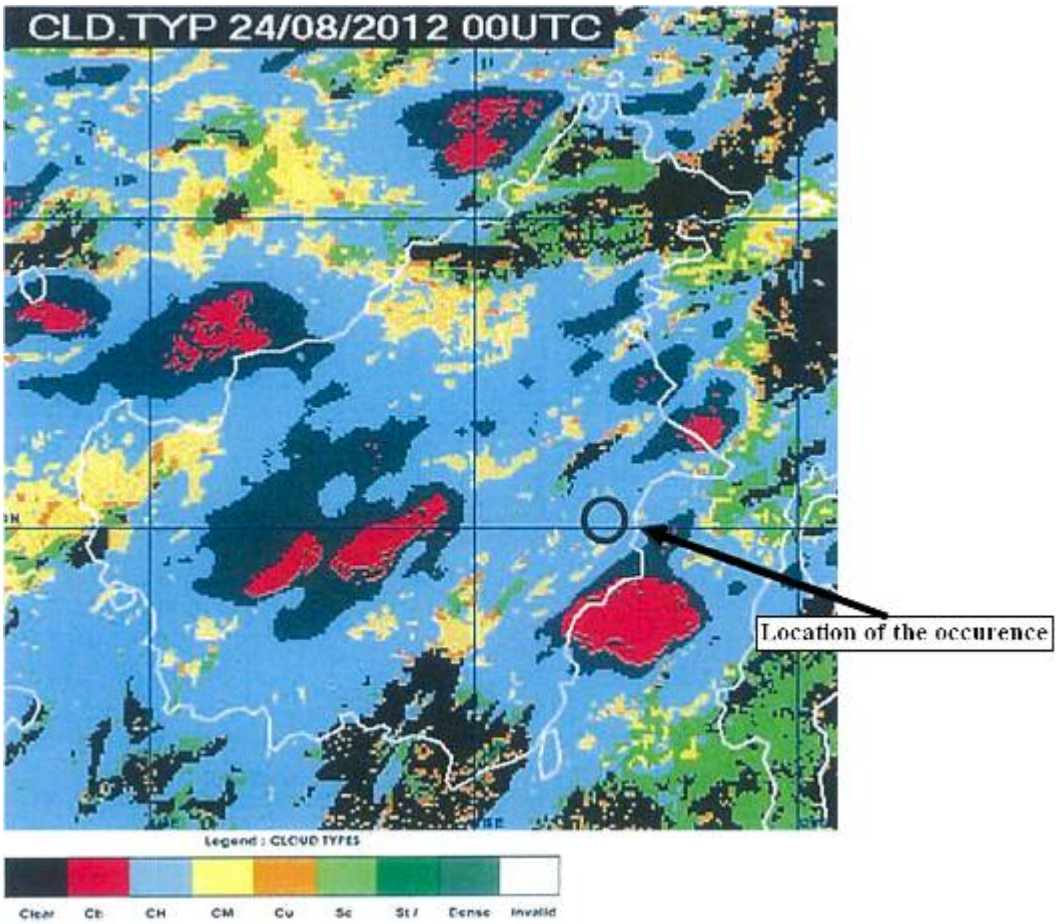

Figure 1: Satellite image at 0000 UTC

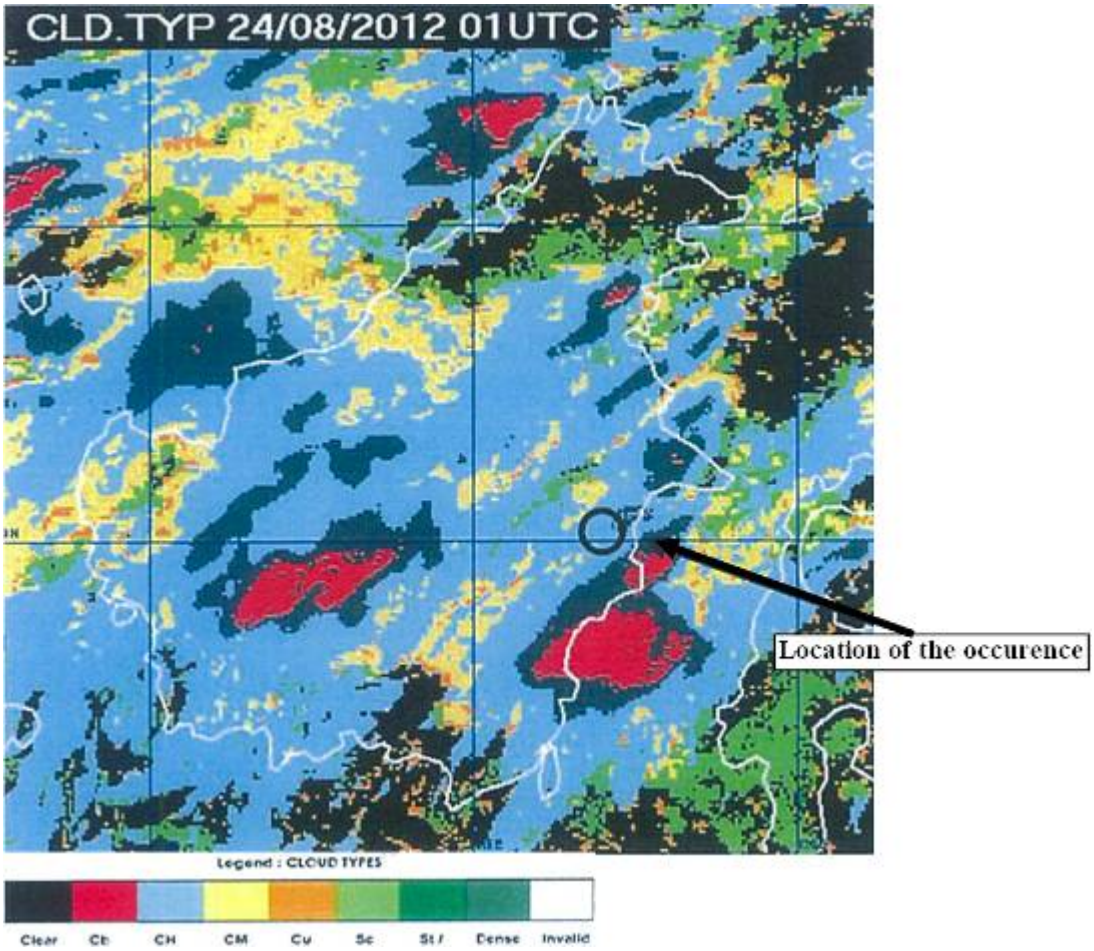

Figure 2: Satellite image at 0100 UTC

The analysis of the BMKG based from the satellite images, the weather surrounding the accident site was partially cloudy with towering cumulus type clouds.

1.7.3 Weather Observation

The Bontang Info officer observed dark cloud and rain on the west of Bontang Aerodrome.

Figure 3: Bontang Aerodrome relative to the accident site

1.8 Aids to Navigation

Not relevant to this accident.

1.9 Communications

Communication between PIC and Air Traffic Services (Temindung Control Tower and Bontang Info) was recorded. Temindung Control Tower had an automatic recording ground based facility. The quality of the recording on Temindung during the day of the accident was good.

At 0300 UTC, the Bontang Aerodrome was close as stated in the Aeronautical Information Publication (AIP) and re-opened at 0500 UTC. There was no person standby on the radio communication during this break and Bontang Info did not have a ground-based recording facility.

1.10 Aerodrome Information

1.10.1 Temindung Airport

Airport Authority	:	Directorate General of Civil Aviation
Airport Identification	:	WALS
Coordinates	:	00°28’55” S 117°09’24”E
Elevation	:	33 feet

Runway Direction	:	04 – 22
Runway Length	:	940 meters
Runway Width	:	23 meters
Surface	:	Asphalt

1.10.2 Bontang Aerodrome

Airport Authority	:	PT. Badak NGL CO
Airport Identification	:	WALC
Coordinates	:	00°07’ N 117°28’ E
Elevation	:	16 meters
Runway Direction	:	04 – 22
Runway Length	:	900 meters
Runway Width	:	23 meters
Surface	:	Asphalt
Operating hour	:	Monday; 2300 – 0300 UTC and 0415 – 0900 UTC
		Friday; 2300 – 0300 UTC and 0500 – 0900 UTC
		Saturday; 2300 – 0300 UTC and 0415 – 0700 UTC
		Sunday; 0800 – 0930 UTC

1.11 Flight Recorders

The aircraft was not equipped with a Flight Data Recorder (FDR) or Cockpit Voice Recorder (CVR). Neither recorder was required by current Indonesian Civil Aviation Safety Regulations.

1.12 Wreckage and Impact Information

The aircraft wreckage was located on a ridge of Mayang Hill, Bontang at coordinates 00°12’34.3” N, 117°16’57.3” E at approximately 1,200 feet AMSL and about 50 feet from the top of the hill.

At approximately 100 meters elevation below the main wreckage were found dry leaves on the top of trees that indicated the flight path of the aircraft

Figure 4: The final path of the flight

The aircraft impacted a significant sized tree before impacting terrain with the direction from the trees to last impact was approximately on a heading of 114°M. The distance from the tree to the last impact was 18 meters.

Figure 5: The impacted tree relative to the main wreckage

The engines were found close to each other with the right engine in front of the left engine toward the direction of flight. The propellers were detached from the engines.

Figure 6: The main wreckage

1.12.1 Components Examination

Several component of the aircraft were taken to Balikpapan for further examination, those were the engines, propellers and airspeed indicator.

The component examinations were conducted on 29 September 2012 by NTSC investigators at PT. Intan Angkasa Air service hangar in Balikpapan.

Engines and propellers

Both engines sustained extensive impact damage. Both propellers were detached from each crank shaft. One blade of the left propeller assembly was detached from the hub. All blades of both propellers bent rearward and in rotational direction. The damage to the propellers was consistent with both engines operating at impact (Figure 7).

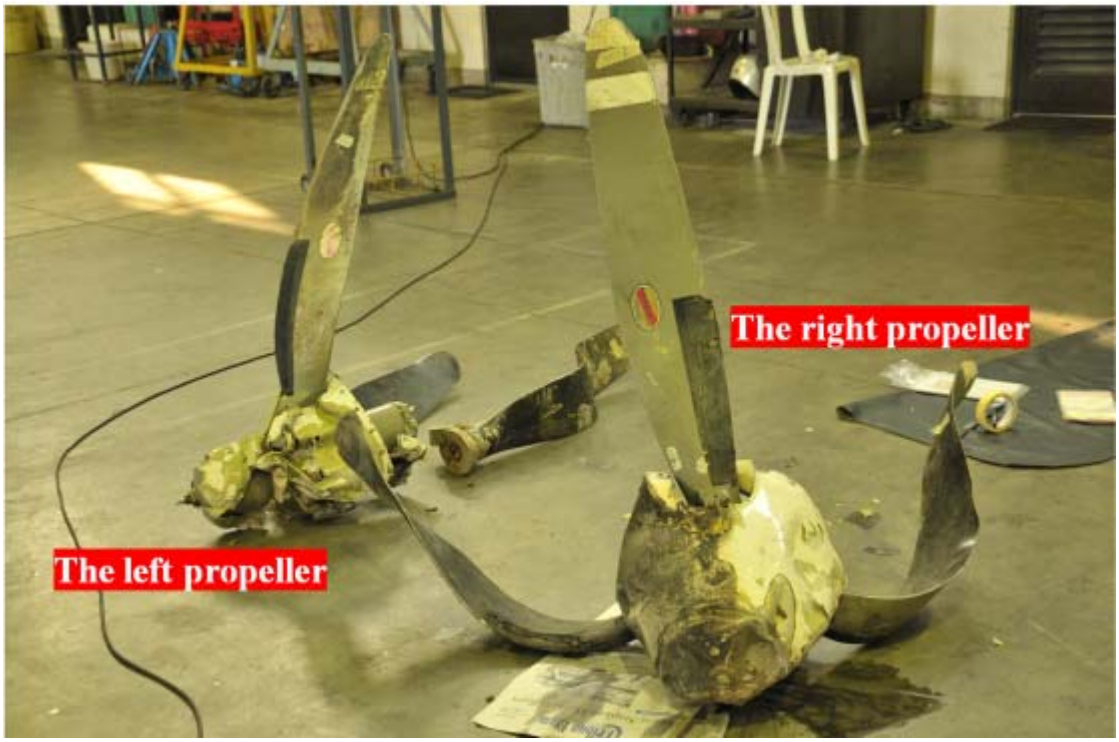

Figure 7: The propellers

Airspeed indicator

A circle impact mark was found on the face of the airspeed indicator. The mark matched to the diameter of a “knot” on underside of the indicator needle. The distance between needle base to the mark is identical to the “knot” distance on the needle.

Based on the impact mark from the “knot” on the needle on the instrument face, the needle was indicating approximately 130 knots at the time of impact (Figures 8 and 9).

Figure 8: Impact mark found on the Airspeed Indicator

Figure 9: The Airspeed Indicator

1.13 Medical and Pathological Information

No medical or pathological investigations were conducted as a result of this occurrence, nor were they required.

1.14 Fire

There was no evidence of in-flight fire and the main wreckage was destroyed by a post impact fire (Figure 10).

Figure 10: The main wreckage

1.15 Survival Aspects

The ELT did not transmit a distress signal due to the extensive wreckage disruption. The accident was not survivable due to the magnitude of the deceleration forces and the severity of the post-impact fire.

1.16 Tests and Research

No test and research were conducted as a result of this occurrence, nor were they required.

1.17 Organizational and Management Information

Aircraft owner and operator	:	PT. Intan Angkasa Air service Komplek KIMU Jalan Pintu Gerbang Tol Cibitung Bekasi 17520
Air operator certificate	:	AOC 135-019

As stated in the Operation Specification (OPSPEC), PT. Intan Angkasa Airservice is authorized to conduct On Demand Airplane Operation, carriage of passengers or cargo in unscheduled operations within Indonesia, including:

1. Aerial Work Operations which provide one or more of the following special purpose air transportation services as described in appendix A-A of CASR 135;
   (a) helicopters carrying external,
   (b) towing of objects,
   (c) dispersal of products,
   (d) aerial survey and photography, except recreational photography,
   (e) air ambulance, and
   (f) Other service would include such specialties as parachute dropping.
2. Sight-seeing flight.

The investigation could not find any evidence of specific standard operation procedure of aero-magnetic operations prior to the accident.

1.17.1 Flight Following System

The operator established a flight-following system for the purpose of monitoring aircraft using a SureTrack Global Positioning System (GPS) Tracking Device. The device transmitted data from a flight to the Sure Track server every 5 minutes. The data transmitted to the server are as follows;

- Aircraft identification;
- Location (coordinate);
- Speed;
- Heading.

The last transmission of the accident flight to the server was at 0010 UTC and contained information of coordinate 00°8’33” N 117°12’54”E with aircraft speed 138 knots and heading of 152°.

The distance from the last transmission location to the accident site was approximately 6.4 NM in the straight line. With assumption of aircraft speed 138 knots, the distance would be travelled in 2 minutes 46 seconds (Figure 11).

Figure 11:The flight path based on Sure Track

1.18 Additional Information

There was a picture of the aircraft prior to the accident (Figure 12) taken from coordinate 00°9’35.93”N, 117°14’5.76”E. This position was between the last Sure Track transmission and the accident site (Figure 11).

The witness was interested to see an aircraft that was flying at low altitude and decided to take a picture. The witness also stated that the weather on that time was haze.

Figure 12: The picture of PK-IWH prior to the accident

1.19 Useful or Effective Investigation Techniques

The investigation was conducted in accordance with the NTSC approved policies and procedures, and in accordance with the standards and recommended practices of the ICAO Annex 13 to the Chicago Convention.

2 ANALYSIS

The accident flight was an aero magnetic survey operation. This type of operation is conducted at low level altitude and with fully visual reference to the ground

The last pilot report to Bontang Info at 0005 UTC indicated that the aircraft was flying at 300 feet AGL while the flight plan was 500 feet. The picture on figure 12 showed that the aircraft was conducting low flying.

At approximately 100 meters elevation below the main wreckage were found dry leaves on the top of trees that indicated the flight path of the aircraft. The last impact was approximately 1,200 feet AMSL. The flight path track on the tree tops indicated that the aircraft was climbing prior to impact.

The last Sure Track data recorded the aircraft speed of 138 knots. The examination of airspeed indicator concluded that the impact speed was at approximately 130 knots. The reducing speed might due to that the aircraft was climbing.

The propeller examinations showed that the engines were running at the time of impact.

The evidence that the engines were operating and the aircraft was climbing are typical of the Controlled Flight into Terrain (CFIT) accident.

Climbing the aircraft could be as a result of pilot action to avoid terrain ahead. The reason that the maneuver was unsuccessful was likely due to reduced visibility in the area at the time. Dark cloud and rain was observed to the west of Bontang which was close to the flight track of the aircraft. The cloud situation was confirmed by satellite image from the BMKG. These indicated that the weather in the area surrounding the accident site was cloudy.

It is reasonable to conclude that the cloud cover prevented the pilot from being able to observe the terrain ahead of the aircraft.

3 CONCLUSIONS

3.1 Findings

Based on factual information collected during the investigation, the National Transportation Safety Committee found findings as follows:

a. The aircraft was certified, equipped and maintained in accordance with existing regulations and Approved Aircraft Inspection Program (AAIP).

b. The aircraft had a valid Special Certificate of Airworthiness and had been maintained in compliance with the regulations.

c. The aircraft was airworthy when dispatched for the flight.

d. The mass and the centre of gravity of the aircraft were within the prescribed limits.

e. There was no evidence of any defect or malfunction in the aircraft reported prior to impact.

f. The aircraft was not equipped with a flight data recorder (FDR) or a cockpit voice recorder (CVR); neither was required by regulation.

g. The last Pilot Proficiency Check (PPC) for the pilot was 26 August 2010 and the next PPC was due on 31 August 2011.

h. The aero magnetic survey flight plan was 500 feet AGL.

i. The last aircraft altitude reported on the communication was 300 feet AGL.

j. The operator did not have a specific standard operation procedure of aero-magnetic operations.

k. All blades of both propellers bent rearward and in rotational direction. It showed that the engines were operating at impact.

l. The flight path on the tree tops indicated that the aircraft was on climbing prior to impact.

m. The last aircraft speed recorded on the SureTrack was 138 knots and the impact speed predicted at 130 knots as result of airspeed indicator examination.

n. The weather on area surrounding the accident site was cloudy.

o. The location of the aircraft was found by land search team at a ridge of Mayang Hill, Bontang on coordinate 00°12’34.3”N 117°16’57.3”E at approximately 1,200 feet AMSL.

p. The accident was not survivable due to the magnitude of the deceleration forces and the severity of the post-impact fire.

q. The aircraft destroyed by impact forces and a post-impact fire.

3.2 Factors[8]

The accident was typical of a Controlled Flight into Terrain (CFIT). Low altitude VFR flying in a low visibility environment limited the pilot's visibility and increased the probability of impact with terrain.

8 "Factors" is defined as events that might cause the occurrence. In the case that the event did not occur then the accident might not happen or result in a less severe occurrence.

4 SAFETY ACTION

At the time of issuing this draft final investigation report, the National Transportation Safety Committee had been informed of safety actions resulting from this occurrence. The PT. Intan Angkasa Airservice have developed the aerial survey procedures to be included in the Company Operation Manual (COM) revision 03 dated December 2012 and Standard Operating Procedures (SOP) revision 00 dated December 2012.

5 SAFETY RECOMMENDATIONS

As a result of this investigation, the National Transportation Safety Committee issued safety recommendations to address safety issues identified in this report.

5.1 PT. Intan Angkasa Air Services

The National Transportation Safety Committee recommends that PT. Intan Angkasa Air Service to:

a. Include particular training requirement in the SOP for special operations including aerial survey procedures ;

b. Review the Controlled Flight Into Terrain (CFIT) training;

c. Ensure all pilots are current with the proficiency check.

5.2 Directorate General of Civil Aviation

The National Transportation Safety Committee recommends that Directorate General of Civil Aviation should review the Operator Operation Specification as specially the AOC 135 holder that have a special operation such as Survey Flight, Aerial Manuring to have an approved specific SOP for conducting such flights, especially Survey/Manuring preparation and individual site risk analysis, as previously NTSC recommendation on KNKT.12.04.08.04 investigation report.