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**NATIONAL
TRANSPORTATION
SAFETY
COMMITTEE**

Aircraft Investigation Report

**PT. Aviastar Mandiri
PK – BRS
Twin Otter DHC6-400
Ewer Airstrip, West Papua, Papua
Republic of Indonesia**

12 December 2008



**NATIONAL TRANSPORTATION SAFETY COMMITTEE
MINISTRY OF TRANSPORTATION
REPUBLIC OF INDONESIA
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This Report was produced by the National Transportation Safety Committee (NTSC), Karya Building 7th Floor Ministry of Transportation, Jalan Medan Merdeka Barat No. 8 JKT 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, Aviation Act (UU No.1/2009), and Government Regulation (PP No. 3/2001).

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GLOSSARY OF ABBREVIATIONS

AD	Airworthiness Directive
AFM	Airplane Flight Manual
AGL	Above Ground Level
ALAR	Approach-and-landing Accident Reduction
AMSL	Above Mean Sea Level
AOC	Air Operator Certificate
ATC	Air Traffic Control
ATPL	Air Transport Pilot License
ATS	Air Traffic Service
ATSB	Australian Transport Safety Bureau
Avsec	Aviation Security
BMG	Badan Meterologi dan Geofisika
BOM	Basic Operation Manual
°C	Degrees Celsius
CAMP	Continuous Airworthiness Maintenance Program
CASO	Civil Aviation Safety Officer
CASR	Civil Aviation Safety Regulation
CPL	Commercial Pilot License
COM	Company Operation Manual
CRM	Cockpit Recourses Management
CSN	Cycles Since New
CVR	Cockpit Voice Recorder
DFDAU	Digital Flight Data Acquisition Unit
DGCA	Directorate General of Civil Aviation
DME	Distance Measuring Equipment
EEPROM	Electrically Erasable Programmable Read Only Memory
EFIS	Electronic Flight Instrument System
EGT	Exhaust Gas Temperature
EIS	Engine Indicating System
FL	Flight Level
F/O	First officer or Copilot
FDR	Flight Data Recorder
FOQA	Flight Operation Quality Assurance
GPWS	Ground Proximity Warning System
hPa	Hectopascals
ICAO	International Civil Aviation Organization

IFR	Instrument Flight Rules
IIC	Investigator in Charge
ILS	Instrument Landing System
Kg	Kilogram(s)
Km	Kilometer(s)
Kt	Knots (NM/hour)
Mm	Millimeter(s)
MTOW	Maximum Take-off Weight
NM	Nautical mile(s)
KNKT / NTSC	Komite Nasional Keselamatan Transportasi / National Transportation Safety Committee
PIC	Pilot in Command
QFE	Height above aerodrome elevation (or runway threshold elevation) based on local station pressure
QNH	Altitude above mean sea level based on local station pressure
RESA	Runway End Safety Area
RPM	Revolution Per Minute
SCT	Scattered
S/N	Serial Number
SSCVR	Solid State Cockpit Voice Recorder
SSFDR	Solid State Flight Data Recorder
TS/RA	Thunderstorm and rain
TAF	Terminal Aerodrome Forecast
TSN	Time Since New
TT/TD	Ambient Temperature/Dew Point
TTIS	Total Time in Service
UTC	Coordinated Universal Time
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions

SYNOPSIS

On 12 December 2008, a de Havilland DHC 6-300 Twin Otter aircraft, registered PK-BRS, was being operated by PT. Aviastar Mandiri on a series of scheduled flights from Timika, Papua.

The last flight of the day was a return flight from Timika to Ewer, about 36 minutes each way. The copilot was the handling pilot for the flight sector from Ewer to Timika, and the PIC was the support/monitoring pilot.

The PIC reported that the aircraft commenced sliding before brakes release, and shortly after commencing the take-off roll the aircraft veered to the right, so he took over control from the copilot. However, he was unable to prevent the aircraft from swinging to the left and it rolled through the centreline to the left side of the runway. The PIC aborted the take off and attempted to regain the runway centreline from the left using nose-wheel steering. That attempt was unsuccessful, and the aircraft veered further left and slid off the runway into wet soft ground on the edge of the marsden matting runway. It came to a stop 360 meters from the departure end of the runway on a heading of 190 degrees.

The PIC shut down the engines and instructed the copilot to disembark the passengers. None of the aircraft's occupants were injured.

The investigation was unable to determine why the pilots were unable to maintain directional control during the take-off roll. It is likely that in taking control from the copilot, and using nose-wheel steering, the PIC may have over corrected, resulting in a loss of directional control.

The National Transportation Safety Committee (NTSC) made recommendations to the Directorate General of Civil Aviation (DGCA) to require aircraft operators to ensure that airstrips in remote locations have an effective means of communicating with regional authorities in the event of an accident or serious incident.

The NTSC also recommended that the DGCA require Indonesian airport operators to inspect the marsden matting runway and ensure that there are no exposed locating pins or other objects that could present a hazard to aircraft, and that traction can be assured in wet conditions.

1 FACTUAL DATA

1.1 HISTORY OF THE FLIGHT

On 12 December 2008, a de Havilland DHC 6-300 Twin Otter aircraft, registered PK-BRS, was being operated by PT. Aviastar Mandiri on a series of scheduled flights from Timika, Papua.



Figure 1: Twin Otter Aircraft DHC 6-300 PK-BRS

The last flight of the day was a return flight from Timika to Ewer, about 36 minutes each way. On arrival at Ewer, the pilot in command (PIC) shut down only the left engine, and the flight engineer disembarked the passengers and unloaded the baggage from Timika. He subsequently boarded 18 new passengers for the return flight to Timika.

The copilot was the handling pilot for the flight sector to Timika, and the PIC was the support/monitoring pilot. The take-off roll was commenced from runway 24 at 0505 Coordinated Universal Time¹ (UTC).

The PIC reported that the aircraft commenced sliding before brakes release, and shortly after commencing the take-off roll the aircraft veered to the right, so he took over control from the copilot.

¹ The 24-hour clock in Coordinated Universal Time (UTC) is used in this report to describe the local time as specific events occurred. Local time in the area of the accident, Eastern Indonesia Standard Time (Waktu Indonesia Timur (WIT)) is UTC+ 9 hours.

However, he was unable to prevent the aircraft from swinging to the left and it rolled through the centreline to the left side of the runway. The PIC aborted the take off and attempted to regain the runway centreline from the left using nose-wheel steering. That attempt was unsuccessful, and the aircraft veered further left and slid off the runway into wet soft ground on the edge of the marsden matting² runway. It came to a stop 360 meters from the departure end of the runway on a heading of 190 degrees.

The PIC shut down the engines and instructed the copilot to disembark the passengers.

None of the aircraft's occupants were injured.

1.2 INJURIES TO PERSONS

Table 1: Injuries to persons

Injuries	Flight crew	Passengers	Total in Aircraft	Others
Fatal	-	-	-	-
Serious	-	-	-	-
Minor	-	-	-	Not applicable
Nil Injuries	3	18	21	Not applicable
TOTAL	3	18	21	-

The occupants were Indonesian citizens.

1.3 DAMAGE TO AIRCRAFT

- The nose, nose-baggage compartment and associated structure, and nose-wheel landing light were substantially damaged.
- The leading edges of the left propeller blades were gouged.
- The ADF antenna was fractured and the rudder cable tension had slackened due to the airframe distortion.

1.4 OTHER DAMAGE

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

² Marsden matting is standardized, perforated steel matting material originally developed by the United States at the Waterways Experiment Station shortly before World War II, primarily for the rapid construction of temporary runways and landing strips.

1.5 PERSONNEL INFORMATION

1.5.1 Pilot in Command

Age : 43 years
Gender : Male
Type of licence : Airline Transport Pilot License
Valid to : 30 May 2009
Rating : Bell 47 G, Hughes 500, SA330
Puma, BO 105, AS 202, C-172,
Casa 212-200, DHC6-300

Total flying time : 7,790 hours 29 minutes
Total on type : 2,906 hours 39 minutes
Total last 90 days : 180 hours
Total on type last 90 days : 120 hours
Total on type last 7 days : 21 hours 25 minutes
Total on the type last 24 hours : 5 hours 29 minutes
Last proficiency check : 21 May 2008
Medical class : Class one
Last medical examination : 11 November 2008
Valid to : 11 May 2009
Medical limitation : no limitation

1.5.2 Copilot

Age : 23 years
Gender : Male
Type of licence : CPL
Valid to : 9 March 2009
Rating : C172, DHC6-300

Total flying time : 311 hours 9 minutes
Total on this type : 157 hours 4 minutes
Total last 90 days : 157 hours 4 minutes
Total on type last 90 days : 157 hours 4 minutes
Total on type last 7 days : 21 hours 25 minutes
Total on the type last 24 hours : 5 hours 5 minutes
Last proficiency check : 1 September 2008
Medical class : Class one
Last medical examination : 9 September 2008
Valid to : 9 March 2009
Medical limitation : no limitation

The co-pilot was familiar with operations from Ewer, having previously operated from Ewer eight times.

1.5.3 Flight Engineer

Age : 35 years
Gender : Male
Licence : FE
Valid to : 25 September 2009
Rating : AF Cat. DHC6 Twin Otter series,
Eng. Cat PWT PT6- Series. Instr.
Cat. Boeing 737-300/400/500. Elect.
Cat. Boeing 737-300/400/500.

1.6 AIRCRAFT INFORMATION

1.6.1 General

Aircraft manufacturer : de Havilland Canada
Model : DHC6-300 Twin Otter
Serial number : 299
Year of manufacture : 1971
Nationality and registration mark : Indonesia, PK-BRS
Name of the owner : PT. Aviastar Mandiri
Name of the operator : PT. Aviastar Mandiri
Certificate of Airworthiness Issued : 24 September 2009
Valid to : 29 March 2009
Certificate of Registration Issued : 24 March 2008
Valid to : 23 March 2009
Total flying hours since manufacture : 41,368 hours 54 minutes

Engine details are not relevant in this occurrence.

1.6.2 Data Engine

Engine Type : Turbo propeller
Manufacturer : Pratt & Whitney Canada
Type : PWT PT6A-27
Engine number one (Left)
Serial Number : PCE-PG0200 (TBO 5100)
Total Time Since New : 4,850 hours 48 minutes
Total Time Since Overhaul : 4,773 hours 17 minutes
Engine number two (Right)
Serial Number : PCE-PG0346
Total Time Since New : 889 hours 17 minutes
Total Time Since Overhaul : 0 hours

1.6.3 Propeller Data

Propeller Type	: Variable Pitch Propeller
Manufacturer	: Hartzel Manufacturer USA
Type	: HCB 3TN3DY (TBO 3000)
Propeller number one (Left)	
Serial Number	: BUA 21173
Total Time Since New	: 41,303 hours 3 minutes
Total Time Since Overhaul	: 677 hours 1 minutes
Propeller number two (Right)	
Serial Number	: BUA 29037
Total Time Since New	: 40,484 Hours 8 minutes
Total Time Since Overhaul	: 912 hours 8 minutes

1.6.4 Data Weight and Balance

The aircraft was loaded within the permissible weight and balance limitations.

1.7 METEOROLOGICAL INFORMATION

Ewer weather condition at 0230:

Wind	: 7 knots / west
Visibility	: 5 to 6 km
Cloud	: Broken, base 1,300 feet

1.8 AIDS TO NAVIGATION

Not relevant to this accident.

1.9 COMMUNICATIONS

The Ewer high frequency (HF) radio equipment was unserviceable. The pilot was also unable to establish HF radio communications with Jayapura and attempted to contact Timika by satellite telephone at 0530 and 0550, to inform authorities of the accident. He established telephone communications with Timika at 0550.

1.10 AERODROME INFORMATION

Airport	: Ewer
Runway	: 24 / 06
Coordinates	: 05° 29' 54.2" S, 138° 05' 15.6" E
Elevation	: 10 feet
Surface	: Marsden matting, steel plate

The Ewer runway was constructed on swampy ground, using the marsden matting to give a solid surface.



Figure 2: The marsden matting steel plate runway surface



Figure 3: Ewer airstrip runway 24

1.11 FLIGHT RECORDERS

The aircraft was not fitted with a flight data recorder or cockpit voice recorder. At the time of the accident neither recorder was required by Indonesian regulations.

1.12 WRECKAGE AND IMPACT INFORMATION

1.12.1 Airframe



Figure 4: Forward fuselage and nose landing gear buried in soft ground

The nose cone and nose-baggage compartment and taxi light were broken when the nose landing gear sank into swampy ground outside the runway hard surface. The nose landing gear was not damaged.



Figure 5: Nose landing gear assembly and nose structure



Figure 6: Broken ADF antenna



Figure 7: Rudder cable tension slackened from structural damage at impact



Figure 8: One damaged left propeller blade

1.13 MEDICAL AND PATHOLOGICAL INFORMATION

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

There was no evidence that physiological factors or incapacitation of the pilots affected their performance.

1.14 FIRE

There was no evidence of pre-or post-impact fire.

1.15 SURVIVAL ASPECTS

The aircraft occupants were not injured and vacated the aircraft unaided.

1.16 TESTS AND RESEARCH

Not relevant to this accident.

1.17 ORGANIZATIONAL AND MANAGEMENT INFORMATION

1.17.1 P.T Aviastar Mandiri Airlines

Aircraft Owner : Ashe Aircraft Enterprises Ltd

Aircraft Operator : P.T Aviastar Mandiri Airlines
Puri Sentra Niaga Blok B no.29, Kalimalang,
Jakarta 13620, Indonesia

AOC Number : AOC/135-029

Operator Designator: ASM

1.18 ADDITIONAL INFORMATION

1.18.1 Take-off procedure

The PIC reported that he instructed the copilot to conduct a static take off requiring power to be increased to rated take-off power before brakes release. The pilots reported that as the power reached rated take-off power the aircraft started to slide and veer slightly to the right. As they were no longer able to hold the aircraft on the brakes, the PIC released the brakes and they commenced the take-off roll.

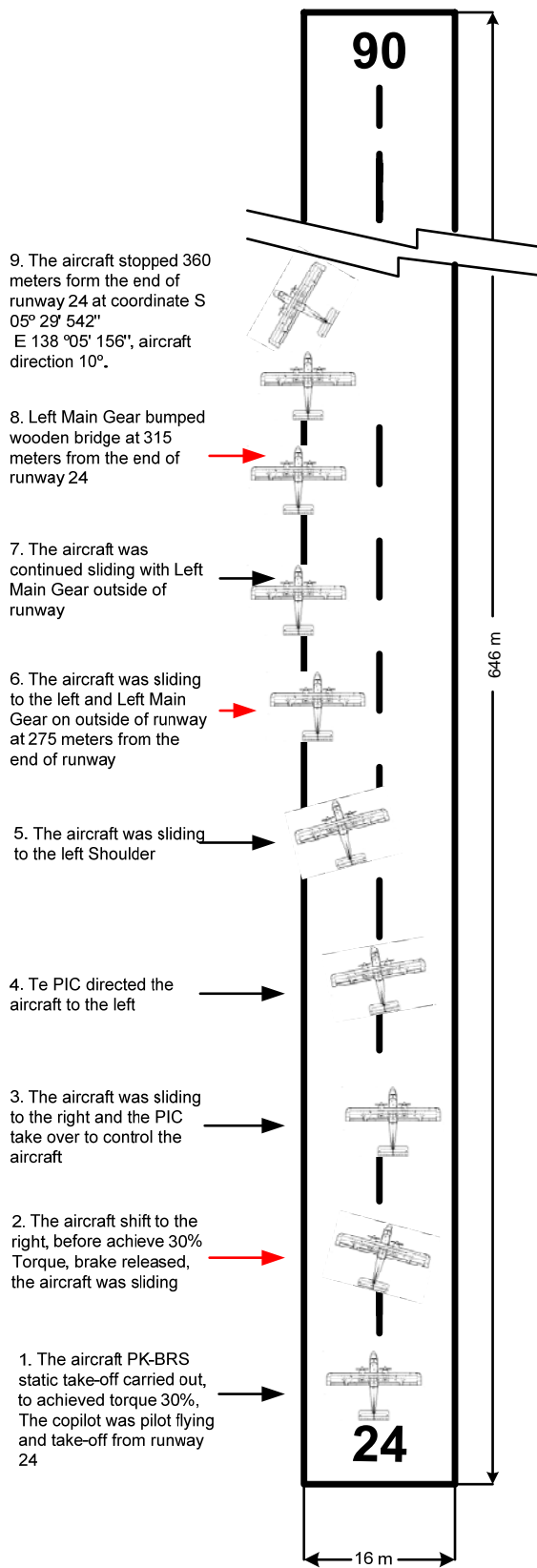


Figure 9: The aircraft PK-BRS accident sketch

1.18.2 Runway hazard

During the on-site investigation, the investigators found that a number of marsden matting fixing pins had worked loose and were sitting high above the steel matting. This had the potential to cause damage to aircraft tires. However, in the case of this accident, no tire damage was found. The marsden matting surface had worn smooth over many years in service and traction could not be assured.



Figure 10: Marsden matting fixing pin sitting high above steel plate

1.19 USEFUL OR EFFECTIVE INVESTIGATION TECHNIQUES

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

2 ANALYSIS

Early in the take-off roll the aircraft veered to the right. The pilot in command (PIC) took control of the aircraft from the copilot (the handling pilot) and attempted to correct the right veer, but the aircraft then swung to the left. The PIC was unable to regain directional control and bring the aircraft back onto the centreline using nose-wheel steering.

There was no evidence that the pilots attempted to arrest the swing using asymmetric power. The PIC's attempts to regain directional control were unsuccessful and the aircraft left the runway surface and the nose wheel sank into the soft wet ground, swinging left onto a heading of 190 degrees; 50 degrees from the runway 24 heading.

The rudder cable tension had slackened, however the investigation determined that this was caused by the damage to the forward fuselage structure during the impact.

The reason for the pilot's inability to maintain directional control during the take off could not be determined. It is likely that in taking control from the co-pilot, and using nose-wheel steering, the PIC may have over corrected, resulting in a loss of directional control.

3 CONCLUSIONS

3.1 FINDINGS

- The aircraft was certified, equipped and maintained in accordance with existing regulations and approved procedures.
- The aircraft was certified as being airworthy when dispatched for the flight.
- There was no evidence of any defect or malfunction in the aircraft that could have contributed to the accident.
- The aircraft was loaded within the prescribed weight and balance limitations.
- The pilots were licensed and qualified for the flight in accordance with existing regulations.
- The pilots used nose wheel steering to arrest the swing during the take-off roll and did not attempt to use asymmetric power.
- The high frequency radio at Ewer was unserviceable.

3.2 CAUSE

The investigation was unable to determine why the pilots were unable to maintain directional control during the take-off roll. It is likely that in taking control from the co-pilot, and using nose-wheel steering, the PIC may have over corrected, resulting in a loss of directional control.

4 SAFETY ACTIONS AND RECOMMENDATIONS

4.1 SAFETY ACTIONS

At the time of writing the Draft Report, the National Transportation Safety Committee had not been informed of any safety actions resulting from this accident.

4.2 SAFETY RECOMMENDATIONS

As a result of the investigation into this accident, the National Transportation Safety Committee made the following recommendations.

4.2.1 Directorate general of civil aviation

The National Transportation Safety Committee recommends that the Directorate General of Civil Aviation require Indonesian aircraft operators to ensure that airstrips in remote locations have an effective means of communicating with regional authorities in the event of an accident or serious incident.

4.2.2 Runway serviceability; Ewer Airport, Papua

The National Transportation Safety Committee recommends that the Directorate General of Civil Aviation require the Ewer Airport operator to inspect the marsden matting airstrip and ensure that there are no exposed locating pins or other objects that could present a hazard to aircraft.

4.2.3 Runway serviceability; airports with marsden matting airstrips throughout Indonesia

The National Transportation Safety Committee recommends that the Directorate General of Civil Aviation require Indonesian airport operators, with marsden matting airstrips, to inspect the marsden matting and ensure that there are no exposed locating pins or other objects that could present a hazard to aircraft.

4.2.4 Traction on marsden matting airstrips in wet conditions

The National Transportation Safety Committee recommends that the Directorate General of Civil Aviation require Indonesian airport operators with marsden matting airstrips, to inspect the marsden matting and ensure that traction can be assured when the marsden matting is wet.