

KNKT/08.26/09.02.39

**NATIONAL
TRANSPORTATION
SAFETY
COMMITTEE**

Aircraft Accident Investigation Report

DORNIER 328-100

PK-TXL; EXPRESS AIR

**FAK-FAK, PAPUA
REPUBLIC OF INDONESIA**

6 NOVEMBER 2008



**NATIONAL TRANSPORTATION SAFETY COMMITTEE
MINISTRY OF TRANSPORTATION
REPUBLIC OF INDONESIA
2009**

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).

Readers are advised that the NTSC investigates for the sole purpose of enhancing aviation safety. Consequently, NTSC reports are confined to matters of safety significance and may be misleading if used for any other purpose.

As NTSC believes that safety information is of greatest value if it is passed on for the use of others, readers are encouraged to copy or reprint for further distribution, acknowledging NTSC as the source.

ISBN:

When the NTSC makes recommendations as a result of its investigations or research, safety is its primary consideration.

However, the NTSC fully recognizes that the implementation of recommendations arising from its investigations will in some cases incur a cost to the industry.

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

TABLE OF CONTENTS

TABLE OF CONTENTS	i
LIST OF APPENDIXES	iv
GLOSSARY OF ABBREVIATIONS	v
SYNOPSIS	1
1. FACTUAL INFORMATION	3
1.1 History of the Flight.....	3
1.2 Injuries to Persons	5
1.3 Damage to aircraft.....	5
1.4 Other damage.....	5
1.5 Personnel information	5
1.5.1 Pilot in command (Pilot monitoring /Instructor)	5
1.5.2 First Officer (FO1)	6
1.5.3 First Officer (FO 2).....	7
1.6 Aircraft Information.....	7
1.6.1 Aircraft Data	7
1.6.2 Engine Data	8
1.6.3 Propeller Data.....	8
1.6.4 Weight and Balance.....	8
1.6.5 Maintenance.....	8
1.7 Meteorological Information.....	9
Date: 6 November 2008 in Fak Fak, Papua area	9
1.8 Aids to Navigation.....	9
1.9 Communications.....	9
1.10 Aerodrome Information	9
1.10.1 General.....	9
1.10.2 2008 Aerodrome general data document.....	9
1.10.3 AIP publication dated 23 December 2004	9
1.10.4 Express Air Visual Approach Guidance chart	10
1.10.5 Runway End Safety Area	10
1.10.6 Airport Facilities.....	10
1.11 Flight Recorders	10
1.11.1 Digital Flight Data Recorder (DFDR)	11
1.11.2 Notable facts from the DFDR	11
1.11.3 Cockpit Voice Recorder (CVR)	11
1.11.4 Notable facts from the CVR.....	11
1.11.5 DFDR Readout	11
1.12 Wreckage and impact information	12
1.13 Medical and Pathological Information.....	13
1.14 Fire	13
1.15 Search and survival aspects	13
1.16 Test and Research.....	13
1.17 Organizational and Management Information.....	13

1.17.1	Operator.....	13
1.17.2	CFIT and ALAR training	13
1.17.3	Express Air safety programs and training	13
1.17.4	Airport Emergency Planning.....	14
2.	ANALYSIS	15
	Runway end safety area (RESA)	15
3.	CONCLUSION	16
3.1	Findings.....	16
3.2	Causes.....	17
3.3	Other Factors	17
4.	SAFETY ACTION.....	18
5.	SAFETY RECOMMENDATIONS.....	19
5.1	Recommendation to Express Air.....	19
5.2	Recommendation to Express Air.....	19
5.3	Recommendation to Express Air	19
5.4	Recommendation to Directorate General of Civil Aviation	19
5.5	Recommendation to the Directorate General of Civil Aviation (DGCA).....	19
5.6	Recommendation to the Directorate General of Civil Aviation (DGCA).....	20
5.7	Recommendation to the Directorate General of Civil Aviation (DGCA)	20
5.8	Recommendation to Torea Airport, Fak-Fak, Papua operator	20
5.9	Recommendation to Torea Airport, Fak-Fak, Papua operator	20
5.10	Recommendation to Torea Airport, Fak-Fak, Papua operator	20
6.	APPENDICES.....	21

TABLE OF FIGURES

Figure 1: PK-TXL, at Torea Airport, Fak-Fak, Papua on 6 November 2008	3
Figure 2: Area of no wheel marks from PK-TXL on the runway	4
Figure 3: Left wheel mark from PK-TXL on the runway approximately 100 meters from the touch-down end of the runway.....	4
Figure 4: Damaged left main landing gear, landing gear bay, and left fuselage structure.....	5
Figure 5: Torea runway diagram	12
Figure 6: Tire mark on stones 30 cm below runway level, 5 meters before the end of runway.....	12
Figure 7: Blue color of fuselage paint on the runway surface.....	12

LIST OF APPENDIXES

FDR Read out

Graph 1	Engine RPM, Prop RPM, and Torque	15
Graph 2	Altitude, Engine RPM, Prop RPM	15

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
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 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
Hrs	Hours
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
IIC	Investigator in Charge

ILS	Instrument Landing System
kg	Kilogram(s)
km	Kilometer(s)
kts	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
°C	Degrees Celsius
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 6 November 2008, an aircraft Dornier 328-100 TP, registration PK-TXL operated by Express Air flight number Express 9000, was being operated on a scheduled passenger flight from Manado to Fak-Fak, Papua via Sorong. The flight departed from Manado at 21:15 UTC (06:15 WIT) with an estimated arrival time at Fak-Fak of 01:33 UTC. There were 36 people on board; consist of three pilots, one cabin crew, and 32 passengers.

The aircraft touched down heavily approximately 5 meters before the touch-down area of runway 10 at Torea Airport, Fak-Fak at 01:33. The investigation found that the left main landing gear touched the ground first (5 meters before the end of the runway), and the right main landing gear touched the ground (4.5 meters from the end of the runway).

It stopped on the runway, approximately 700 meters from the touch-down area. The left main landing gear fractured in two places; at the front pivot point, and the aft pivot point. The left fuselage contacted the runway surface 200 meters from the touch-down point and the aircraft slid with the left fuselage on the ground for a further 500 meters, before it stopped at the right edge of the runway. The wing tip and left propeller blade tips also touched the runway and were damaged.

The passengers and crew disembarked normally; there were no injuries.

Following an inspection of the landing gear and temporary replacement of the damaged left main landing gear, the aircraft was moved to the apron on 8 November 2008 at 04:00. The runway was closed for 5 days.

The Digital Flight Data Recorder data showed evidence that the aircraft descended suddenly and rapidly when it was on short final approach. About 65 seconds before ground impact, the RPM of both propellers commenced to decrease to approximately 70% with the NH increasing to 85%. Propeller RPM then suddenly reduced, followed by an immediate and rapid increase of propeller RPM to 111% left and 97% right, then just as sudden and rapid, the left propeller RPM reduced to 77% and the right to 80%. Given that the propellers are constant speed units, the sudden and rapid changes could not be explained other than the probability that a crew member had made the control inputs.

The PIC (pilot monitoring/flight instructor) did not monitor the operation of the aircraft sufficiently to ensure timely and effective response to the pilot induced excessive sink rate.

The pilots did not communicate appropriately during the approach and landing, resulting in poor crew resource management (CRM). There was no evidence that any of the pilots had completed any form of CRM training for more than 9 years. Other than the handling pilot, there was no evidence that the other pilots had completed ALAR/CFIT training.

The operator did not have a Line Operations Safety Audit Program (LOSA), and the airport did not meet the ICAO Annex 14 Standard with respect to runway end safety areas.

Safety action taken following the accident involved the airport authority raising the level of the undershoot area to the same level as the runway, and the aircraft operator providing the pilots with further flight training.

The NTSC made a number of recommendations covering the following: crew resource management implementation training; the use of the Flight Safety Foundation (FSF) Approach-and-landing Accident Reduction awareness training material; Line Operations Safety Audits; airport emergency planning and response; and the requirement for runway end safety areas at Fak Fak, Papua.

1. FACTUAL INFORMATION

1.1 History of the Flight

On 6 November 2008, a Dornier 328-100 TP aircraft, registration PK-TXL, was being operated by Express Air on a scheduled passenger flight from Manado to Fak-Fak, Papua via Sorong as flight number Express 9000. There were 36 people on board; three pilots, one cabin crew, and 32 passengers.

The aircraft departed from Manado, Sulawesi at 21:15 UTC¹, with an estimated arrival time at Torea Airport, Fak-Fak, Papua of 01:33².

The Pilot in Command (PIC) was the flight instructor and was also pilot monitoring during the flight. The First Officer (FO1) was the handling pilot from the left seat. He was undergoing command training on the aircraft type. Another First Officer (FO2) was located in the observer seat in the cockpit.

The aircraft touched down heavily approximately 5 meters before the touch-down area of runway 10 at Torea Airport, Fak-Fak at 01:33. The investigation found that the left main landing gear touched the ground first (5 meters before the end of the runway), and the right main landing gear touched the ground (4.5 meters from the end of the runway). It stopped on the runway, approximately 500 meters from the touch-down area (figure 1).



Figure 1: PK-TXL, at Torea Airport, Fak-Fak, Papua on 6 November 2008

There were no tire marks on runway after the initial touch-down marks, until approximately 100 meters from the end of runway. There were left wheel marks and body marks on the runway up to the final position of the aircraft. These marks were heavy and provided a continuous track of the aircraft along the runway to its final position.

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 departure airport, Central Indonesia Standard Time (Waktu Indonesia Tengah (WITA)) is UTC +8 hours.

² Local time in the area of the accident, East Indonesia Standard Time (Waktu Indonesia Timur (WIT)) is UTC +9 hours.



Figure 2: Area of no wheel marks from PK-TXL on the runway



Figure 3: Left wheel mark from PK-TXL on the runway approximately 100 meters from the touch-down end of the runway.

The left main landing gear fractured in two places; at the front pivot point, and the aft pivot point. This occurred when the landing gear impacted the end of the runway which is 30 cm higher than the touch-down area (Figure 3). The left fuselage contacted the runway surface 200 meters from the touch-down point and the aircraft slid with the left lower fuselage on the ground for a further 300 meters, before it stopped at the right edge of the runway. The wing tip and left propeller blade tips also touched the runway and were damaged.

An emergency evacuation was not required, and all of the aircraft's occupants disembarked normally through the aircraft's main entrance door and right service door. There were no injuries.

Following an inspection of the landing gear and temporary replacement of the damaged left main landing gear, the aircraft was moved to the apron on 8 November 2008 at 04:00. The runway was closed for 5 days.

1.2 Injuries to Persons

Injuries	Crew	Passengers	Others	TOTAL
Missing/ Fatal	0	0	0	0
Serious	0	0	0	0
None	4	32	0	36
TOTAL	4	32	0	36

1.3 Damage to aircraft

The left main landing gear, the structure around left main landing gear bay, and the left lower fuselage skin, were substantially damaged. Wheel³ & tire number 1, tire number 2, and tire number 3 were also damaged. The left propeller tips and the left wing-tip were damaged due to ground contact.



Figure 4: Damaged left main landing gear, landing gear bay, and left fuselage structure

1.4 Other damage

There was a 213 meter long scrape on the runway surface, 5 cm deep, starting 284 meters from the touch-down end of the runway.

1.5 Personnel information

1.5.1 Pilot in command (Pilot monitoring /Instructor)

Gender : Male
Date of birth : 25 July 1971
Nationality : Philippines
Marital status : Married

³ Main landing gear wheels/tires are numbered from left outer number 1, to the right outer number 4.

Date of joining company : 1 May 2008
License : ATPL (Philippine)
Certificate of Validation from DGCA
Indonesia
No.VL-17/1070/KAOPS/LIC/VIII
Valid to : 31 January 2009
Type rating : Dornier 328-100
Medical certificate : Valid
Date of last medical : 05 August 2008
Last proficiency check : 12 July 2008
FLIGHT TIME
Total time : 10,190 hrs.
On type : 2,365 hrs
Last 90 days : 15 hrs
Last 30 days : 15 hrs
Last 24 Hours : 3 hrs

1.5.2 First Officer (FO1)

Gender : Male
Date of birth : 6 June 1969
Nationality : Indonesian
Marital status : Married
License : ATPL 4544
Date of issue : 01 June 2007
Valid to : 30 April 2009
Type rating : Dornier 328 -100
Medical certificate : Valid
Date of last medical : 23 June 2008
Last line check : 7 October 2008
Last proficiency check : 7 October 2008, Dornier 328
FLIGHT TIME
Total time : 4,673 hrs.
On type : 15 hrs.
Last 90 days : 15 hrs.
Last 30 days : 15 hrs
Last 24 Hours : 3 hrs

1.5.3 First Officer (FO 2)

Gender : Male
Date of birth : 24 March 1972
Nationality : Indonesian
Marital status : Married
Date of joining company : 10 October 2007
License : ATPL 4486
Valid to : 31 December 2008
Type rating : Dornier
Medical certificate : Valid
Date of last medical : 23 June 2008
Last line check : 7 October 2008
Last proficiency check : 7 October 2008

FLIGHT TIME

Total time : 3,777 hrs.
On type : 15 hrs
Last 90 days : 15 hrs.
Last 30 days : 15 hrs
Last 24 Hours : 3 hrs

1.6 Aircraft Information

1.6.1 Aircraft Data

Registration Mark : PK-TXL
Manufacturer : Dornier
Country of Manufacturer : Germany
Type/ Model : Dornier 328-100 TP
Operator : Express Air
Serial Number : 3037
Date of manufacture : 28 March 1995
Certificate of Airworthiness valid up to : 6 October 2009
Date of Issue : 28 October 2008
Certificate of Registration valid to : 25 September 2009
Certificate of Registration date issued : 26 September 2008
Category : Transport

Passengers seats : 32
Time Since New : 24,404 hours 50 minutes
Cycles Since New : 21,916 cycles
Last Major Check C4 (C1 + C2) : July 2008 /at 24,370 hours
14 minutes
Next Major Check : At 28,370 hrs.

1.6.2 Engine Data

Manufacturer : Pratt & Whitney
Type : PW 119B
Type/Model : Propeller turbine
Serial Number left engine : PCE116062
▪ Time Since New : 22,787 hours 30 minutes
▪ Cycles Since New : 21,919 cycles
Serial Number right engine : PCE116099
▪ Time Since New : 22,949 hours 31 minutes.
▪ Cycles Since New : 20,411 cycles

1.6.3 Propeller Data

Type : HD-E6C-3D
Manufacturer : Hartzell
Left propeller serial number : HL327
▪ Time Since New : 3,289 hours 25 minutes.
Right propeller serial number : HL270
▪ Time Since New : 2,637 hours 59 minutes.

1.6.4 Weight and Balance

Load and centre of gravity were within the allowable limits for the landing.

1.6.5 Maintenance

Maintenance had been carried out in accordance with the operators approved maintenance schedule. There was no evidence that maintenance contributed to this accident.

1.7 Meteorological Information

Date: 6 November 2008 in Fak Fak, Papua area

	01:00 UTC	01:30 UTC
Wind	200 ⁰ / 05	180 ⁰ /5-7
Visibility	17 km	15 km
QNH	1010.1 mbs	1010.1 mbs
QFE	994.3 mbs	994.3 mbs

1.8 Aids to Navigation

Not related to this accident.

1.9 Communications

Not related to this accident

1.10 Aerodrome Information

1.10.1 General

Airport Name : Torea
Airport Identification : WASF
Elevation : See paragraphs 1.10.2 to 1.10.3
Airport Operator : Directorate General of Civil Aviation
Class : IV
Runway Direction : 10/28
Runway Length : See paragraphs 1.10.2 to 1.10.3
Runway Width : 23 meters
Surface : Asphalt

1.10.2 2008 Aerodrome general data document

The 2008 aerodrome general data document supplied to the NTSC investigation by the Torea Airport operator listed the aerodrome coordinates as 08°30'16"S 140°26'01"E and the elevation as 440 feet. The runway dimensions were listed as 1,200 meters by 23 meters.

1.10.3 AIP publication dated 23 December 2004

The AIP publication dated 23 December 2004, current at 23 March 2009, listed the aerodrome coordinates as 02°56'00"S 132°13'00"E and the elevation as 136 meters [446 feet]. The runway dimensions were listed as 630 meters by 23 meters.

1.10.4 Express Air Visual Approach Guidance chart

The aircraft operators Visual Approach Guidance chart provided to the NTSC investigation on 17 December 2008 listed the aerodrome coordinates as 02°55'27"S 132°15'79"E and the elevation as 400 feet [122 meters]. The runway length was listed reported to be 1,200 meters.

1.10.5 Runway End Safety Area

The Toera Airport runways did not conform to the International Civil Aviation Organization (ICAO) Annex 14 Standard.⁴ There was no prepared stopway or runway end safety area (RESA) at each end of the runway.

ICAO Annex 14 Paragraph 3.5.2 specified that a RESA shall extend from the end of a runway strip to a distance of at least 90 meters.

ICAO definition of runway strip:

A defined area including the runway and stop-way, if provided, intended:

- a) to reduce the risk of damage to aircraft running off a runway; and
- b) to protect aircraft flying over it during take-off or landing operations.

1.10.6 Airport Facilities

There was only one fire fighting officer available at Fak Fak. The airport establishment list indicated that there were four fire fighting officers, but the investigation was unable to determine the identity of three of the persons listed and it appeared that they were not active fire fighting officers.

The fire fighting vehicle was unserviceable and had been unserviceable since 1995.

The Command vehicle used for directing the fire fighting operation was not available.

The Rescue vehicle was unserviceable and there was no ambulance and no rescue boat available.

1.11 Flight Recorders

The flight recorders were recovered from the aircraft on 6 November 2008 under the supervision of NTSC investigators. The data was downloaded by experts of the maintenance facility of Aero Nusantara at Curug, Tangerang, West Java. The data download was supervised by the NTSC investigators who subsequently conducted the data analysis.

⁴ The requirement for RESA at Indonesian airports was extensively covered in the report published 22 October 2007 by the National Transportation Safety Committee into the Boeing 737 accident on 7 March 2007 at Yogyakarta. Recommendations were made in that report to the Directorate General of Civil Aviation and Indonesian airport operators. www.dephub.go.id/knkt

1.11.1 Digital Flight Data Recorder (DFDR)

Manufacturer : L3 Communications Fairchild
Type/Model : FA2100
Part Number : 2100-4043-00
Serial Number : 000118832
Installation date : 26 August 2004

1.11.2 Notable facts from the DFDR

During short final approach, about 65 seconds before ground impact, the RPM of both propellers commenced to decrease to 70% left and 66% right, with the NH increasing to 85%. The propeller RPM reduction lasted approximately 60 seconds. The left propeller RPM then suddenly reduced to 60% and the right increased to 77%, with NH increasing to 92%, followed by an immediate and rapid increase of propeller RPM to 111% left and 97% right, with NH changing to 90% left and 93% right. Just as sudden and rapid, the left propeller RPM reduced to 77% and the right to 80%, with the NH at 84% left and 88% right.

The flight profile was constant on the glideslope until just after the propeller RPM reduced through 70% to 60%, when the aircraft was about 50 feet above the ground. It entered a sudden and rapid rate of sink, which the DFDR shows coincides with the times of the rapid increase and decrease of propeller RPM and ground contact. (See DFDR graph 1 at Part 6, Appendices).

1.11.3 Cockpit Voice Recorder (CVR)

Manufacturer : Fairchild
Type/Model : A100
Part Number : 93-A100-80
Serial Number : 62440
Installation date : 26 August 2004

1.11.4 Notable facts from the CVR

During the final approach the PIC (pilot monitoring) called “100”, then he shouted “*too short*”, “*too short*”, “*I have it*”. Shortly after he called “*evacuate*”, “*evacuate*”.

The handling pilot (FO1) did not make any comment during the final approach or touchdown.

The pilots did not exercise appropriate and effective crew resource management to ensure the safety of the aircraft and its occupants during the approach and landing phase of the flight.

1.11.5 DFDR Readout

There was no evidence on the DFDR of any adverse wind effect or weather activity that might have contributed to the undershoot.

1.12 Wreckage and impact information

There were tire marks on the stones 5 meters before the end of the runway, and wheel and fuselage scrape marks on the runway.

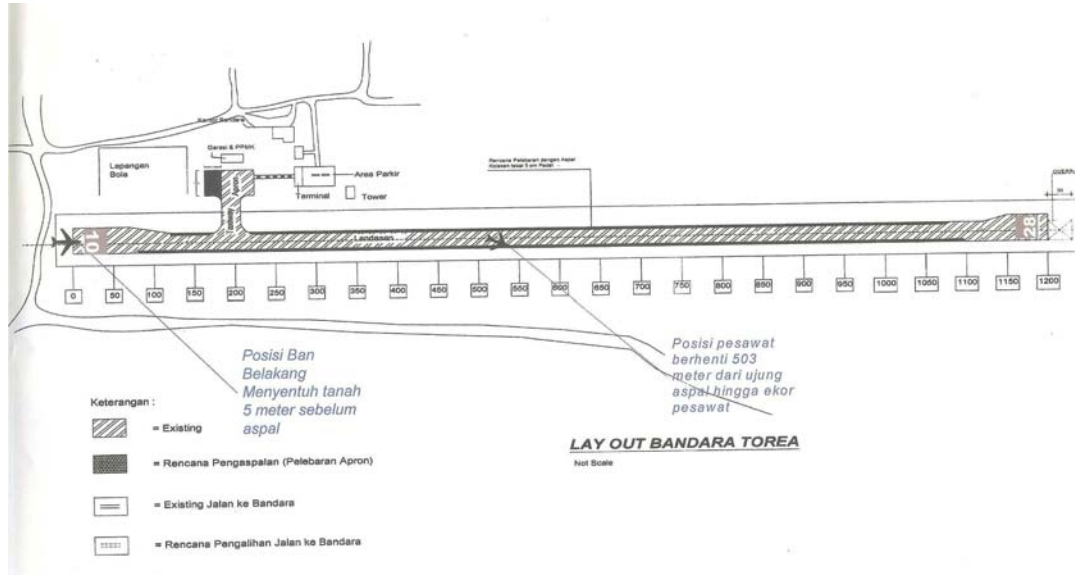


Figure 5: Torea runway diagram



Figure 6: Tire mark on stones 30 cm below runway level, 5 meters before the end of runway



Figure 7: Blue color of fuselage paint on the runway surface

1.13 Medical and Pathological Information

Not related to this accident.

1.14 Fire

There was no fire.

1.15 Search and survival aspects

Not relevant to this accident.

1.16 Test and Research

Not relevant to this accident.

1.17 Organizational and Management Information

1.17.1 Operator

Aircraft Operator : Express Air

Operator Certificate : AOC 121-038

1.17.2 CFIT and ALAR training⁵

The DGCA introduced the CFIT ALAR training program using the United States Flight Safety Foundation' CFIT and ALAR material (Appendices G and H), to all Indonesian operators between 18 and 21 July 2005. The training for operators' training instructors and some line pilots was jointly conducted by the DGCA and International Civil Aviation Organization.

The FO(1), handling pilot involved in this occurrence had successfully completed the DGCA/PT. Aurora Perdana Mandiri CFIT and ALAR Implementation Flight Safety Training course number 28, conducted between 13 and 15 August 2008.

Despite a number of requests, no evidence was provided to demonstrate that the FO(2), and the PIC (Monitoring/instructor pilot) had completed CFIT and ALAR training.

1.17.3 Express Air safety programs and training

At the time of the accident Express Air had not implemented Flight Operations' Quality Assurance (FOQA) or Line Operations Safety Audit (LOSA) programs.

⁵ Copies of the ALAR education and training programs, including video programs, are available in CD-ROM format and can be obtained directly from the FSF (www.flightsafety.org). This subject was extensively covered in the report published 22 October 2007 by the National Transportation Safety Committee into the Boeing 737 accident on 7 March 2007 at Yogyakarta. Recommendations were made in that report to the Director General of Civil Aviation and Indonesian airlines. www.dephub.go.id/knkt

The Crew Resource Management (CRM) training was not adequately and effectively implemented during post-ground school training. The operator did not have a robust CRM program. No evidence was provided to demonstrate that the pilots involved in this accident had received CRM training.

1.17.4 Airport Emergency Planning

Based on the lack of emergency personnel and equipment at Torea Airport, Fak Fak, Papua, to respond to an aircraft accident, it was clear that emergency planning and exercising did not meet the ICAO Annex 14 Standards.⁶

ICAO Annex 14 contains Standards and Recommended Practices with respect to Airport Emergency Planning.

Paragraph 9.1.12;

The plan shall contain procedures for periodic testing of the adequacy of the plan and for reviewing the results in order to improve its effectiveness.

Note.— The plan includes all participating agencies and associated equipment.

Paragraph 9.1.13

The plan shall be tested by conducting:

- a) a full-scale aerodrome emergency exercise at intervals not exceeding two years; and
- b) partial emergency exercises in the intervening year to ensure that any deficiencies found during the full-scale aerodrome emergency exercise have been corrected; and reviewed thereafter, or after an actual emergency, so as to correct any deficiency found during such exercises or actual emergency.

ICAO Annex 14, paragraph 9.1.14 states that:

The airport rescue and fire fighting services shall have a plan that shall include ready availability of coordination with appropriate specialist rescue services to be able to respond to emergencies where an aerodrome is located close to water/or swampy areas and where a significant portion of approach or departure operations takes place over these areas.

Paragraph 9.2.2 states that:

Where an aerodrome is located close to water/or swampy areas and where a significant portion of approach or departure operations takes place over these areas, specialist rescue services and fire fighting equipment appropriate to the hazards and risks shall be available.

⁶ The requirement for Airport emergency planning and exercising at Indonesian airports was extensively covered in the report published 22 October 2007 by the National Transportation Safety Committee into the Boeing 737 accident on 7 March 2007 at Yogyakarta. Recommendations were made in that report to the Directorate General of Civil Aviation and Indonesian airport operators. www.dephub.go.id/knkt

2. ANALYSIS

The Cockpit Voice Recorder revealed that the handling pilot (FO1) did not make any comment during the final approach or touchdown.

During the final approach the PIC (pilot monitoring) called “100”, then he shouted “*too short*”, “*too short*”, “*I have it*”. Shortly after he called “*evacuate*”, “*evacuate*”.

The Digital Flight Data Recorder data showed evidence that the aircraft descended suddenly and rapidly when it was on short final approach. About 65 seconds before ground impact, the RPM of both propellers commenced to decrease to approximately 70% with the NH increasing to 85%. Propeller RPM then suddenly reduced, followed by an immediate and rapid increase of propeller RPM to 111% left and 97% right, then just as sudden and rapid, the left propeller RPM reduced to 77% and the right to 80%. Given that the propellers are constant speed units, the sudden and rapid changes could not be explained other than the probability that a crew member had made the control inputs.

Furthermore, from the statement by the PIC “I have it”, it is likely that an attempted corrective action was made by the PIC. However, it was too late to prevent the aircraft from touching down before the end of the runway.

The PIC was not adequately monitoring the flight in order to take timely remedial action when the aircraft rapidly descended on short final approach.

Runway end safety area (RESA)

The runway at Torea Airport, Fak-Fak did not meet the ICAO Annex 14 Standard requiring a 90 meter RESA. It is likely that the aircraft would have landed safely and not been damaged if there had been a RESA.

ICAO requires a difference to be filed by signatory States that are unable to comply with Standards. The DGCA had not filed a difference with ICAO with respect to the Torea Airport not meeting the Annex 14 Standard, in that it did not a RESA at each end of the runway.

Airport data

The NTSC investigation found that the actual runway length was approximately 1,120 meters. Due to the differences in data between the AIP, Airport operator and aircraft operator, the investigation determined that it was appropriate to recommend a survey of the airport and publication of accurate data in AIP and inform Jeppesson.

3. CONCLUSION

3.1 Findings

- 3.1.1 At the time of occurrence the aircraft was airworthy.
- 3.1.2 The aircraft was maintained in accordance with the approved maintenance schedule.
- 3.1.3 The pilot flying (FO1) was licensed as pilot in command of Dornier 328-100 TP aircraft approximately 12 weeks before the accident. At the time of the accident he had completed 15 flight hours on the aircraft type within the preceding 3 months, and 3 hours in the preceding 24 hours.
- 3.1.4 The PIC (pilot monitoring/flight instructor), had completed 2,365 hours on the Dornier 328-100 aircraft type, with more than 15 flight hours within the 3 months preceding the accident.
- 3.1.5 The pilot flying (FO1) reduced the power lever to a power setting that created propeller diskings, resulting in an excessive rate of sink, before the aircraft was above the touch-down area.
- 3.1.6 The pilot flying (FO1) was a former Twin Otter aircraft PIC who was familiar with the environment in Papua, but he had only completed three take offs and landings at Fak Fak before the accident.
- 3.1.7 The aircraft operator did have a robust crew resource management (CRM) implementation training program and did not have a Line Operations Safety Audit (LOSA) program.
- 3.1.8 There was no evidence that any of the pilots had completed any form of CRM training for more than 9 years.
- 3.1.9 Other than the handling pilot, there was no evidence that the pilots had completed ALAR/CFIT training.
- 3.1.10 The airport did not meet the ICAO Annex 14 Standard with respect to the requirement to have runway end safety areas.
- 3.1.11 The DGCA had not filed a difference with ICAO with respect to its inability to comply with the Annex 14 Standard for runway end safety areas at Torea Airport, Fak-Fak, Papua.
- 3.1.12 The airport did not meet the ICAO Annex 14 Standard with respect to the airport emergency personnel, equipment and exercising of an airport emergency plan.

3.2 Causes

- 3.2.1 The Digital Flight Data Recorder data showed evidence that the aircraft descended suddenly and rapidly when it was on short final approach before the aircraft was above the touch-down area. Propeller RPM was reduced suddenly and rapidly to 70% less than 10 seconds before ground contact. Given that the propellers are constant speed units, the sudden and rapid changes could not be explained other than the probability that a crew member had made the control inputs.
- 3.2.2 The PIC (pilot monitoring/flight instructor) did not monitor the operation of the aircraft sufficiently to ensure timely and effective response to the pilot induced excessive sink rate.

3.3 Other Factors

- 3.3.1 The airport did not meet the ICAO Annex 14 Standard with respect to the requirement to have runway end safety areas.

4. SAFETY ACTION

- 4.1. The undershoot area before the end of the runway was 30 cm lower than the surface of the runway. Following the accident the Fak Fak airport authority raised the level of the undershoot area to the same level as the runway.
- 4.2. Express Air has given the PIC (pilot monitoring/flight instructor) recurrency training, and the pilot flying FO1 has received further training including “base flight training”.

5. SAFETY RECOMMENDATIONS

As result of investigation into the Express Air Dornier 328-100, accident that occurred on 6 November 2008 at Fak-Fak, Papua, Indonesia, the National Transportation Safety Committee (NTSC) issues the following recommendations to address the safety deficiencies identified in this report.

5.1 Recommendation to Express Air

The National Transportation Safety Committee recommends that Express Air ensure that all company pilots are given Crew Resource Management (CRM) training, including the implementation of specific CRM aspects relating to the operation of aircraft being flown by the crew. For example the pilots in the Fak Fak occurrence should be given CRM implementation training specifically relating to the Dornier 328-100 aircraft.

5.2 Recommendation to Express Air

The National Transportation Safety Committee encourages the use of the Flight Safety Foundation (FSF) Approach-and-landing Accident Reduction (ALAR) and Controlled Flight Into Terrain (CFIT) awareness material and recommends that Express Air include ALAR and CFIT awareness modules in their recurrency training programs, and conduct initial ALAR and CFIT training for flight crew members who have not yet completed such training.

5.3 Recommendation to Express Air

The National Transportation Safety Committee recommends that Express Air implement a Line Operations Safety Audit (LOSA) program.

5.4 Recommendation to Directorate General of Civil Aviation

The National Transportation Safety Committee recommends that the Directorate General of Civil Aviation, as part of its safety audit/surveillance oversight of Express Air, assess the adequacy of Express Air's CRM training program, in particular CRM implementation.

5.5 Recommendation to the Directorate General of Civil Aviation (DGCA)

The National Transportation Safety Committee recommends that the Directorate General of Civil Aviation (DGCA) review the Torea Airport, Fak-Fak, Papua runway complex to ensure that runway end safety areas (RESA) are established that meet the dimension Standards prescribed in the International Civil Aviation Organization (ICAO) Annex 14.

Particular attention should be given to:

- ICAO Annex 14 Paragraph 3.5.2 (Standard) that a runway end safety area (RESA) shall extend from the end of a runway strip to a distance of at least 90 meters.

If the DGCA is unable to meet the RESA Standard in accordance with ICAO Annex 14, it should file a difference with ICAO as soon as possible.

5.6 Recommendation to the Directorate General of Civil Aviation (DGCA)

The National Transportation Safety Committee recommends that the Directorate General of Civil Aviation (DGCA) ensure that the operator of Torea Airport, Fak-Fak, Papua surveys the Torea Airport runway complex and ensure that the runway dimensions promulgated on aerodrome charts are accurate.

5.7 Recommendation to the Directorate General of Civil Aviation (DGCA)

The National Transportation Safety Committee recommends that the Directorate General of Civil Aviation (DGCA) review the procedures and equipment used by the Toera Airport, Fak Fak, Papua, Rescue and Fire Fighting Services to ensure that they:

- meet the minimum requirements specified in the International Civil Aviation Organization's Annex 14.

5.8 Recommendation to Torea Airport, Fak-Fak, Papua operator

The National Transportation Safety Committee recommends that the operator of Torea Airport, Fak-Fak, Papua survey the runway complex and ensure that the runway dimensions promulgated on aerodrome charts are accurate.

5.9 Recommendation to Torea Airport, Fak-Fak, Papua operator

The National Transportation Safety Committee recommends that the operator of Torea Airport, Fak-Fak, Papua review the runway complex to ensure that runway end safety areas (RESA) are established that meet the dimension Standards prescribed in the International Civil Aviation Organization (ICAO) Annex 14.

Particular attention should be given to:

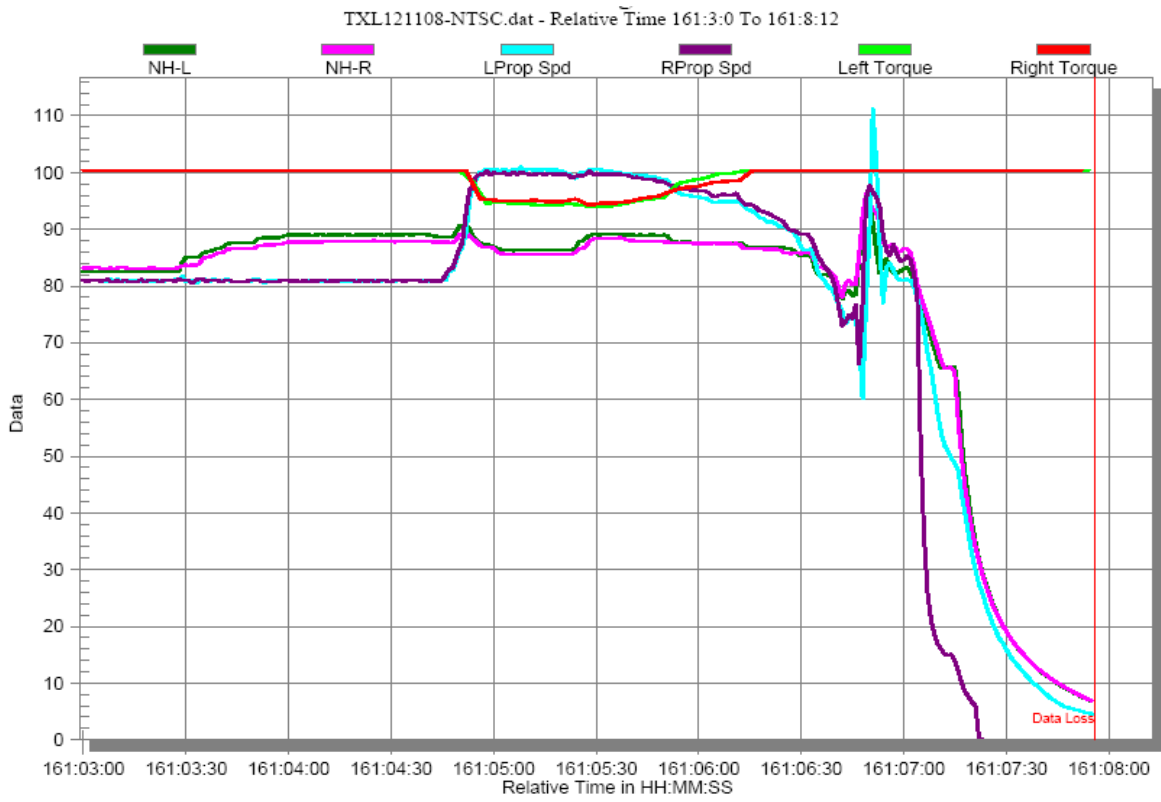
- ICAO Annex 14 Paragraph 3.5.2 (Standard) that a runway end safety area (RESA) shall extend from the end of a runway strip to a distance of at least 90 meters.

5.10 Recommendation to Torea Airport, Fak-Fak, Papua operator

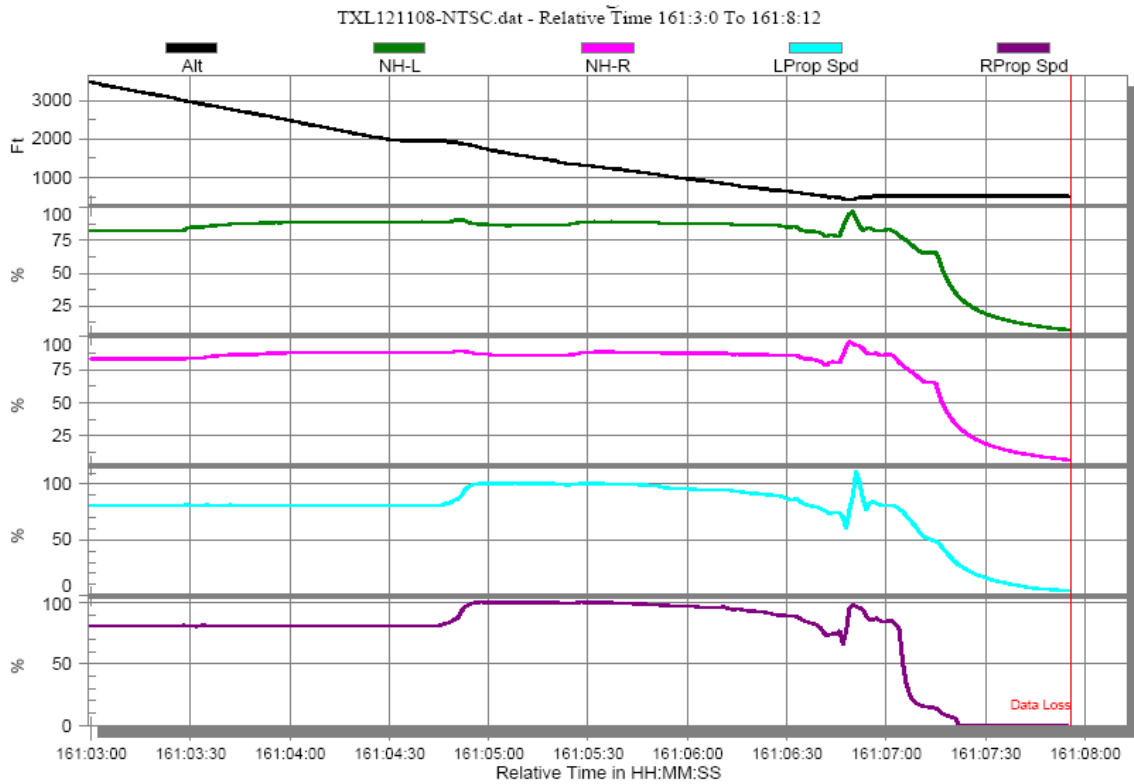
The National Transportation Safety Committee recommends that the Torea Airport operator review the procedures and equipment for the airport Rescue and Fire Fighting Services to ensure that they:

- meet the minimum requirements specified in the International Civil Aviation Organization's Annex 14.

6. APPENDICES



Graph 1



Graph 2