

**PRELIMINARY**  
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**KOMITE  
NASIONAL  
KESELAMATAN  
TRANSPORTASI**

**Aircraft Accident Investigation Report**

**PT. Cardig - Air  
Boeing 737-300 F; Reg. PK-BBY  
Wamena Airport  
Republic of Indonesia  
28 August 2015**



**KOMITE NASIONAL KESELAMATAN TRANSPORTASI  
MINISTRY OF TRANSPORTATION  
REPUBLIC OF INDONESIA  
2015**

This Preliminary report was produced by the Komite Nasional Keselamatan Transportasi (KNKT), 3<sup>rd</sup> Floor Ministry of Transportation, Jalan Medan Merdeka Timur No. 5 Jakarta 10110, Indonesia.

The report is based upon the investigation carried out by the KNKT 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. 62/2013).

The preliminary report consists of factual information collected until the preliminary report published. This report will not include analysis and conclusion.

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## ABBREVIATIONS AND DEFINITIONS

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|       |   |  |
|-------|---|--|
| AOC   | : | Air Operator Certificate   |
| ATPL  | : | Air Transport Pilot License  |
| ATS   | : | Air Traffic Service  |
| BMKG  | : | <i>Badan Meteorologi Klimatologi dan Geofisika</i> (Metrological Climatology and Geophysical Agency) |
| °C    | : | Degrees Celsius  |
| Cu    | : | Cumulus  |
| CPL   | : | Commercial Pilot License   |
| CVR   | : | Cockpit Voice Recorder   |
| DFDR  | : | Digital Flight Data Recorder   |
| DGCA  | : | Directorate General of Civil Aviation  |
| kg    | : | Kilogram(s)  |
| km    | : | Kilometer(s)   |
| mbs   | : | Millibars  |
| mHz   | : | Mega Hertz   |
| MLG   | : | Main Landing Gear  |
| NDB   | : | Non Directional Beacon   |
| KNKT  | : | <i>Komite Nasional Keselamatan Transportasi</i>  |
| PF    | : | Pilot Flying   |
| PIC   | : | Pilot in Command   |
| PM    | : | Pilot Monitoring   |
| QFE   | : | Height above airport elevation (or runway threshold elevation) based on local station pressure       |
| QNH   | : | Height above mean sea level based on local station pressure  |
| SCT   | : | Scatter  |
| SIC   | : | Second in Command  |
| TBA   | : | To be Advise   |
| TT/TD | : | Ambient Temperature/Dew Point  |
| UTC   | : | Universal Time Coordinate  |
| VASI  | : | Visual Approach Slope Indicator  |

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## **INTRODUCTION**

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### **SYNOPSIS**

The synopsis will be included in the final report.

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# 1 FACTUAL INFORMATION

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## 1.1 History of the Flight

On 28 August 2015 a Boeing 737-300 Freighter, registration PK-BBY operated by PT. Cardig Air was on scheduled cargo flight. At 03:34 UTC the aircraft departed from Sentani Airport (WAJJ) Jayapura to Wamena Airport (WAJW) Papua, Indonesia.

On board this flight were two pilots, and 14,610 kg of cargo. The Pilot in Command (PIC) acted as Pilot Flying (PF) while the Second in Command (SIC) who was under line training acted as Pilot Monitoring (PM). There was no reported or recorded aircraft system abnormality during the flight until the time of occurrence.

At 0637 UTC, when the aircraft approaching PASS VALLEY, the Wamena Tower controller provided information that the runway in use was runway 15 and the wind was 150/18knots, QNH 1003 and temperature 23 °C.

At 0639 UTC, the pilot reported position over PASS VALLEY, descended passing FL 135. The Wamena Tower controller instructed the pilot to report position over JIWIKA.

At 0645 UTC, the pilot reported position over JIWIKA and continued to final runway 15.

At 0646 UTC, the pilot reported position on final runway 15 and Wamena Tower controller provided landing clearance with additional information of wind 150/15 knots and QNH 1003.

AT 0647 UTC, the aircraft touched down about 35 meter before the beginning runway 15 with vertical acceleration of 3.68 G and stopped at about 1500 meters from runway threshold. The left main landing gear collapsed and the left engine scratched the runway surface.

No one was injured on this occurrence.



**Figure 1: The aircraft last position**

## 1.2 Injuries to Persons

| Injuries     | Flight crew | Passengers | Total in Aircraft | Others   |
|--------------|-------------|------------|-------------------|----------|
| Fatal        | -           | -          | -                 | -        |
| Serious      | -           | -          | -                 | -        |
| Minor/None   | 2           | -          | -                 | -        |
| <b>TOTAL</b> | <b>2</b>    | <b>-</b>   | <b>-</b>          | <b>-</b> |

## 1.3 Damage to Aircraft

The aircraft was substantially damaged, with the following condition:

The trunnion link of the left MLG assembly was broken, the left MLG collapsed, the Left landing gear access panel lower fairing damaged, and the shock strut of the right MLG leaked and deflated.



**Figure 2: The collapse left MLG and broken trunnion link**



**Figure 3: The left engine**

The detail damages on the left Engine are as follow:

- Lower Fan cowling outer damage;
- Lower Fan cowling inner damage;
- Lower Gearbox Casing scratch
- Lower C-Duck thrust reverser inner damage
- Lower C-Duct thrust reverser outer damage

The detail damages on the left wing are as follow:

- lower inboard trailing edge flap, aft flap and mid flap dented,

- Upper outboard flap track fairing dented,
- Inboard flap track fairing dented,
- Flap transmission assembly (ball screw) number 2 broken.

## 1.4 Other damage

There was no other damage reported.

## 1.5 Personnel information

### 1.5.1 Pilot in Command

|                          |  |
|--------------------------|--|
| Gender                   | : Male   |
| Age                      | : 48 Years   |
| Nationality              | : Indonesian   |
| Marital status           | : Married  |
| Date of joining company  | : 15 September 2008  |
| License                  | : ATPL   |
| Date of issue            | : 17 October 2002  |
| Aircraft type rating     | : B737 CL  |
| Instrument rating        | : 31 October 2014  |
| Medical certificate      | : First Class  |
| Last of medical          | : 01 April 2015  |
| Validity                 | : 31 October 2015  |
| Medical limitation       | : Holder shall wear lenses that correct for distant vision and posses glasses that correct for near vision |
| Last line check          | : 13 November 2014   |
| Last proficiency check   | : 20 April 2015  |
| <b>Flying experience</b> |  |
| Total hours              | : 13,880.8 Hours   |
| Total on type            | : 4,877.2 Hours  |
| Last 90 days             | : 73.6 Hours   |
| Last 60 days             | : 57.1 Hours   |
| Last 24 hours            | : 5.1 Hours  |
| This flight              | : 30 Minutes   |

### 1.5.2 Second in Command

Gender : Male  
Age : 35 years  
Nationality : Korean  
Marital status : Single  
Date of joining company : 15 January 2015  
License : CPL  
    Date of issue : 18 December 2012  
    Aircraft type rating : B 737CL  
Instrument rating : 30 June 2016  
Medical certificate : First Class  
    Last of medical : 15 May 2015  
    Validity : 15 November 2015  
    Medical limitation : Holder Shall wear corrective Lens  
Last line check : TBA  
Last proficiency check : 24 June 2015  
**Flying experience**  
Total hours : 608.9 Hours  
Total on type : 342.7 Hours  
Last 90 days : 77.2 Hours  
Last 60 days : 77.2 Hours  
Last 24 hours : 5.1 Hours  
This flight : 30 Minutes

## 1.6 Aircraft Information

### 1.6.1 General

Registration Mark : PK-BBY  
Manufacturer : Boeing  
Country of Manufacturer : USA  
Type/ Model : 737-300F  
Serial Number : 23535  
Year of manufacture : 1986  
Certificate of Airworthiness  
    Issued : 15 May 2015

Validity : 14 May 2016  
 Category : Transport  
 Limitations : None  
 Certificate of Registration  
 Number : 3070  
 Issued : 14 April 2015  
 Validity : 13 April 2016  
 Time Since New : 54254 Hours  
 Cycles Since New : 38422 Hours  
 Last Major Check : C01 Check  
 Last Minor Check : A03 Check

### 1.6.2 Engines

Manufacturer : CFM  
 Type/Model : CFM56-3B2  
 Serial Number-1 engine : 721550
 

- Time Since New : 60055:46 Hours
- Cycles Since New : 42997 Cycles

 Serial Number-2 engine : 860256
 

- Time Since New : 17765:46 Hours
- Cycles Since New : 12369 Cycles

## 1.7 Meteorological Information

The weather data for Wamena Airport was issued by the Badan Meteorologi Klimatologi dan Geofisika (BMKG), and the weather observation performed 10 minutes prior to the issuance. The weather reports on 28 August 2015, at 0600-0700 UTC were as follows:

|            | 0600 UTC        | 0700 UTC        |
|------------|-----------------|-----------------|
| Wind       | 150/14-19 knots | 150/15-23 knots |
| Visibility | 10 km           | 10 km           |

|           |                           |              |
|-----------|---------------------------|--------------|
| Weather   | NIL                       | NIL          |
| Cloud     | SCT <sup>1</sup> Cu 480 m | SCT Cu 480 m |
| TT/TD     | 24 / 15 °C                | 23 / 14°C    |
| QNH (mbs) | 1003                      | 1004         |
| QFE (mbs) | 834                       | 833          |

## 1.8 Aids to Navigation

Wamena Airport equipped with a Non-Directional Beacon (NDB) identify as ZW on frequency 222 MHz. There was no instrument approach procedure published for this airport.

The Wamena Airport equipped with a Visual Approach Slope Indicator (VASI). After the runway extension this VASI was not operated.

## 1.9 Communications

All communications between Air Traffic Services (ATS) and the crew were recorded by ground based automatic voice recording equipment and Cockpit Voice Recorder (CVR) for the duration of the flight. The quality of the recorded transmissions was good.

## 1.10 Aerodrome Information

Airport Name : Wamena Airport  
 Airport Identification : WAJW/WMX  
 Airport Operator : DGCA  
 Coordinate : 04°31'53"S 136°33'18"E  
 Elevation : 5084 feet  
 Runway Direction : 15 - 33  
 Runway Length : 2,175 meters  
 Runway Width : 30 meters  
 Surface : Asphalt

The Airport Operation Manual was still under process after last audit by the DGCA.

The investigation found several touchdown marks on the pavement before the runway 15.

The surface of runway 15 found excessive rubber deposit at about 600 meter started from the runway threshold. The investigation did not found specific aerodrome

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<sup>1</sup> Cloud amount is assessed in total which is the estimated total apparent area of the sky covered with cloud. The international unit for reporting cloud amount for Scatter (SCT) is when the clouds cover more than half (3/8 up to 4/8) area of the sky.

maintenance program and the inspection system applicable to the runway and other facilities of Wamena Airport.



**Figure 4: Rubber deposit on runway 15**



**Figure 5: Touchdown marks found on the pavement before the runway 15**

### **1.11 Flight Recorders**

The aircraft was equipped with a Honeywell solid state flight data recorder. The DFDR and CVR were received at the KNKT recorder laboratory on 31 August 2015 received in a good condition.

The details of the DFDR were:

Manufacturer : Allied Signal  
Part Number : 980-4700-042  
Serial Number : 2466

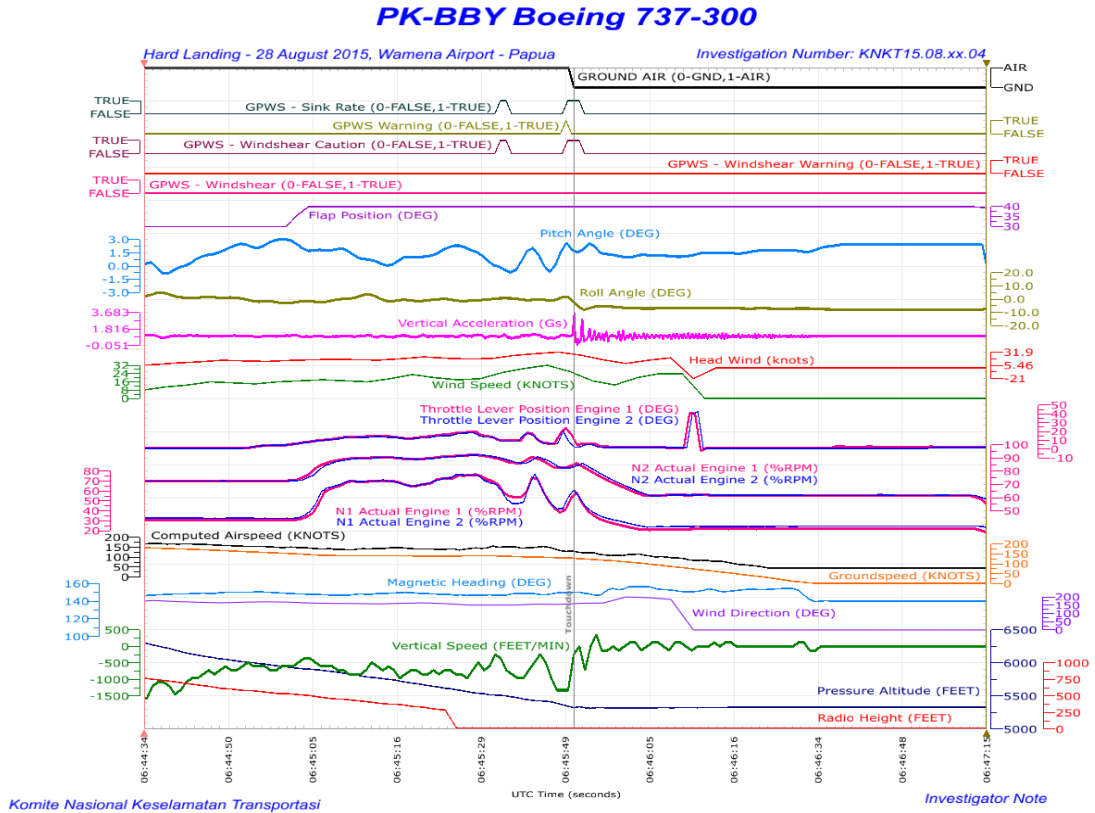
The details of the CVR were:

Manufacturer : L3 Communication

Part Number : 2100-1020-00

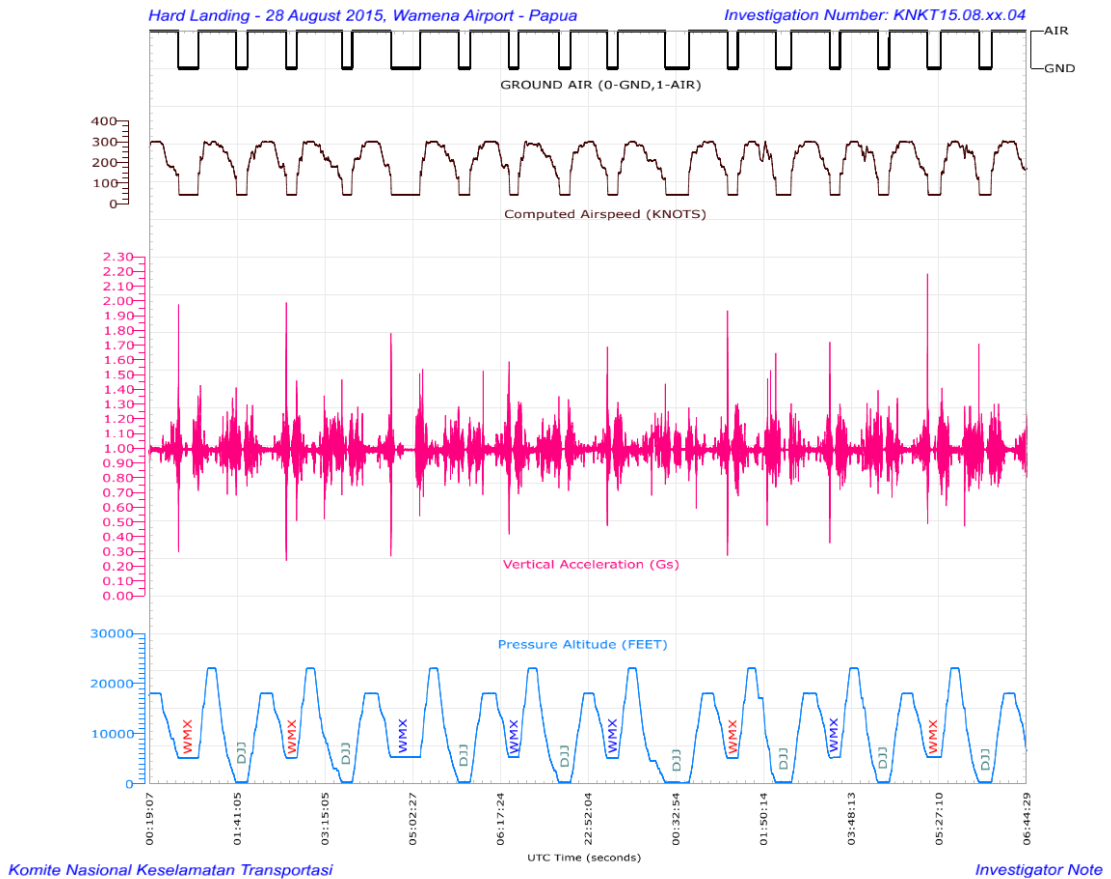
Serial Number : 0333000320801

The record of CVR was in a good quality voice recorded.



The vertical acceleration recorded on the DFDR when the aircraft touched down was 3.68 G.

## PK-BBY Boeing 737-300



**Figure 6: DFDR vertical acceleration previous flights recorded**

The DFDR data contained of 107 flight hours which recorded three times of the vertical acceleration of 2.1 G and event more during landing at Wamena.

### 1.12 Wreckage and Impact Information

The aircraft touched down about 35 meter before the beginning runway 15 with vertical acceleration of 3.68 G and stopped at about 1500 meters from runway threshold. The left main landing gear collapsed and the left engine scratched the runway surface.



**Figure 7: Touchdown point**

### **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 fire prior and post impact

### **1.15 Survival Aspects**

The flight crew safely evacuated from the aircraft.

### **1.16 Tests and Research**

Test and research will be included in the final report.

### **1.17 Organizational and Management Information**

|                             |   |   |
|-----------------------------|---|---|
| Aircraft Owner              | : | Celestial Trading 51 Limited  |
| Address                     | : | Aviation House Shannon County Clare,<br>Ireland                               |
| Aircraft Operator           | : | PT. Cardig Air  |
| Address                     | : | Alia Building 4 <sup>th</sup> floor, Jl. M.I Ridwan<br>Rais No. 10-18 Jakarta |
| Operator Certificate Number | : | AOC/121-013   |

There was no established flight crews performance monitor/control.

### **1.18 Additional Information**

The investigation is continuing and will include the information of the CVR, DFDR, operational regulations and procedures, and any other relevant information.

### **1.19 Useful or Effective Investigation Techniques**

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

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## 2 FINDINGS

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According to factual information during the investigation, the Komite Nasional Keselamatan Transportasi determines that the findings of the investigation are listed as follows:

1. The aircraft was airworthy prior to the occurrence and was operated within the weight and balance envelope.
2. All crew has valid licenses and medical certificates.
3. The aircraft touched down about 35 meters before runway 15 with the vertical acceleration recorded of 3.68 G.
4. The DFDR data contained of 107 flight hours which recorded three times of the vertical acceleration more than 2.1 G during landing at Wamena.
5. There was no established flight crews performance monitor/control.
6. The trunion link of the left MLG assembly was found broken and the left MLG collapsed.
7. The VASI of runway 15 was not operated after the runway extension.
8. The investigation found several touchdown marks on the pavement before the runway 15.
9. Excessive rubber deposit was found on the surface of runway 15 at about 600 meter started from the runway threshold.

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### **3 SAFETY ACTION**

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At the time of issuing this preliminary report, the National Transportation Safety Committee had not been informed of any safety actions following this accident.

The operator safety department issued a safety action based on the download and analysis of the DFDR of other Boeing 737 registered PK-BBC to review the operation performance, they found several vertical acceleration having excessive vertical acceleration (G force) during landing at Wamena Airport and some stabilized approach criteria were exceeded prior to land.

Detail of the action to operation department dated 16 September 16, 2015 are as follow:

- To review the ALART/CFIT training effectiveness and emphasizes the implementation for Papua operation.
- Make a Notice to pilot that when unstabilize approach happen on short final a Go Around shall be conducted.
- To review the SOP related to DDJ – WMX operation.

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## **4 SAFETY RECOMMENDATIONS**

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According to factual information and findings, the Komite Nasional Keselamatan Transportasi issued safety recommendations to address safety issues identified in this report.

### **4.1 Aircraft Operators (PT. Cardig Air)**

- a. To monitor the flight crew performance.
- b. To review the maintenance interval related to the operating condition such as having frequent high vertical acceleration during landing.

### **4.2 Wamena Airport**

- a. To develop an aerodrome maintenance programme.
- b. To review and improve the runway inspection system.
- c. To install VASI on the runway 15.

### **4.3 Directorate General of Civil Aviation**

- a. To ensure that the recommendations addressed to the air operator are well implemented, as well as the other cargo operator operate in the same operation region.
- b. To ensure that the airport have an adequate aerodrome maintenance program and properly implemented.

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## 5 APPENDICES

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### 5.1 Safety Reminder PT. Cardig Air



#### **SAFETY REMINDER**

No : 026/SQS/SR/2015  
Date : 16 September 2015  
To : ALL CARDIG PILOTS  
Subject : **APPROACH & LANDING PRECAUTION**

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*Latar Belakang :*

*Pada tanggal 28 Agustus 2015, PK-BBY dengan no. penerbangan 8F199 mengalami "hard landing" pada saat mendarat di runway 15 bandara Wamena sehingga L/H MLG collapsed dan pesawat menutup (blocked) runway Wamena. Tidak ada korban luka dan korban jiwa.*

Dari hasil investigasi internal atas kejadian tersebut diatas, kami juga melakukan download FDR pesawat PK-BBC untuk mendapatkan data performance operation khususnya penerbangan DJJ-WMX sebagai langkah awal pemantauan Operation Performance monitoring sebelum melakukan Flight Data Analysis secara terus menerus dengan vendor yang akan dilakukan kerjasamanya dalam waktu dekat.

Adapun hasil analisis data pada FDR PK-BBC menunjukkan kemiripan operation performance dengan PK-BBY hingga terjadinya incident, khususnya pada phase approach dan landing di Wamena, dengan hasil sebagai berikut :

1. Beberapa kali terdapat landing dengan vertical acceleration lebih besar dari 1.8G bahkan sampai 2.1G
2. Masih terdapat kriteria stabilized approach yang belum terpenuhi pada saat approach/ landing di RWY 15 Wamena

Dari temuan tersebut dengan ini kami menerbitkan Safety Notice/Reminder kepada Direktorat Operasi, intinya untuk melakukan perbaikan pada proses :

1. Melakukan review terhadap pilot proficiency check / flight technique khususnya untuk approach landing di Wamena yang tidak dilengkapi dengan VASI agar stabilized approach terpenuhi sampai dengan landing.
2. Menerbitkan instruksi kepada Pilot agar apabila pada short final, approach menjadi unstabilized maka tanpa keraguan melakukan Go Around.
3. Melakukan kajian/review terhadap SOP yang diterapkan untuk operasi penerbangan DJJ-WMX.

Demikian disampaikan. Terima kasih atas perhatian dan kerjasamanya.

