

FINAL
KNKT.10.02.04.04

**NATIONAL
TRANSPORTATION
SAFETY
COMMITTEE**

Aircraft Accident Investigation Report

**PT. Trigana Air Service
PK – YRP
Avions de Transport Regional ATR 42-320
Samboja Area, Km 41 Balikpapan
East Kalimantan
Republic of Indonesia**

11 February 2010



**NATIONAL TRANSPORTATION SAFETY COMMITTEE
MINISTRY OF TRANSPORTATION
REPUBLIC OF INDONESIA
2012**

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

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.....	ii
TABLE FIGURES.....	iv
GLOSSARY OF ABBREVIATIONS.....	v
INTRODUCTION.....	1
SYNOPSIS	1
1 FACTUAL INFORMATION.....	2
1.1 History of the Flight.....	2
1.2 Injuries to Persons.....	3
1.3 Damage to Aircraft	3
1.4 Other Damage	3
1.5 Personnel information.....	3
1.6 Aircraft information.....	4
1.7 Meteorological Information.....	6
1.8 Aids to Navigation.....	6
1.9 Communications	6
1.10 Aerodrome Information	7
1.11 Flight Recorders.....	7
1.11.1 Flight Data Recorder	7
1.11.2 Cockpit Voice Recorder	8
1.11.3 Flight Recorder downloads and results	9
1.11.4 Sequence of events on FDR	11
1.11.5 Sequence of events on CVR.....	15
1.11.6 Functional check results of FDR and CVR.....	15
1.12 Wreckage and Impact information	16
1.13 Medical and Pathological Information.....	21
1.14 Fire.....	21
1.15 SURVIVAL ASPECT	21
1.16 Tests and Research	21
1.17 Organizational and Management Information.....	22
1.18 Additional Information	22
1.19 Useful or Effective Investigation Technique	23

2	ANALYSIS	24
2.1	The Fuel System	24
2.2	Engine System	24
3	CONCLUSIONS	26
3.1	Findings	26
3.2	Causes	27
4	SAFETY ACTIONS.....	28
5	SAFETY RECOMMENDATIONS	29
5.1	Recommendation to the PT. Trigana Air Service.....	29
5.2	Recommendation to Directorate General Civil Aviation.....	29

TABLE FIGURES

Figure 1: Flight Data Recorder.....	7
Figure 2: PK-YRP FDR identification plate	8
Figure 3: Cockpit Voice Recorder.....	8
Figure 4: PK YRP CVR identification plate	9
Figure 5: CVR recording head was worn-out and dirty	9
Figure 6: Polling error code during downloading	10
Figure 7: Graphical representation of last flight recorded on the FDR.....	11
Figure 8: The last flight recorded in FDR , Denpasar to Ampenan, Indonesia.....	13
Figure 9: The right main landing gear door was broken	16
Figure 10: The right main landing gear was broken	17
Figure 11: The aircraft at final position.....	17
Figure 12: View of passenger cabin damage.....	18
Figure 13: Nose wheel found inside the cabin	18
Figure 14: After view days of accident the area was flooded	19
Figure 15: The aircraft wing tank.....	19
Figure 16: The inside wing tank a lot of dirt and sealant debris	20
Figure 17: Uncured sealant and deposit	20
Figure 18: Uncured sealant from the wing tank	21

GLOSSARY OF ABBREVIATIONS

AMM	:	Aircraft Maintenance Manuals
AOC	:	Air Operator Certificate
ATPL	:	Air Transport Pilot License
ATR	:	Avion de Transport Regional
°C	:	Degrees Celsius
CG	:	Center of Gravity
CPL	:	Commercial Pilot License
CRM	:	Crew Recourses Management
CSN	:	Cycles Since New
CVR	:	Cockpit Voice Recorder
ECU	:	Engine Control Unit
ETA	:	Estimated Time of Arrival
FAA	:	Federal Aviation Administration
F/O	:	First officer or Copilot
FDR	:	Flight Data Recorder
Hrs	:	Hours
ICAO	:	International Civil Aviation Organization
JAA	:	Joint Aviation Authorities
Kg	:	Kilogram(s)
Km	:	Kilometer(s)
Kts	:	Knots (nm/hours)
KNKT/NTSC	:	<i>Komite Nasional Keselamatan Transportasi</i> / National Transportation Safety Committee
Mbs	:	Millibars
PIC	:	Pilot in Command
P&W	:	Pratt & Whitney
QFE	:	Height above airport elevation (or runway threshold Elevation) based on local station pressure
QNH	:	Altitude above mean sea level based on local station pressure
QRH	:	Quick Reference Handbook
R/W	:	Runway
S/N	:	Serial Number
TSN	:	Time since New
UTC	:	Universal Time Coordinate
VOR	:	VHF Omnidirectional Radio Range
W&B	:	Weight and Balance

INTRODUCTION

SYNOPSIS

On 11 February 2010, an Avions de Transport Regional ATR 42-300 aircraft, registered PK-YRP, was being operated by Trigana Air Service on a scheduled passenger service between Kalimantan Airport Berau (BEJ) and Samarinda (SRI) as flight TGN162. There were 52 persons on board; two pilots, one engineer, two flight attendants, one flight dispatcher and 46 passengers (43 adults, one child, and two infants).

During the final approach for runway 04, the left ECU light illuminated followed by low oil pressure and torque indications. It was reported that during the flight from Tanjung Redep/ Berau-Kalimaru Airport (BEJ), a failure of the left engine occurred while the aircraft was approaching Samarinda (SRI). Samarinda air traffic control advised against an emergency landing since the airport was situated in a residential area and the runway (04/22) length was only 1,160 m (3,800 ft). The pilot decided to divert to Balikpapan - Sepingan Airport (BPN), which was 92 km (50 NM) to the south. This airport had better facilities and a longer runway (07/25, 2,500 meters/ 8,200 ft long). The Pilot in Command (PIC) decided to go around, divert to Balikpapan, and carry out the QRH engine shut-down procedure.

They commenced the climb to 4000 ft with the left engine inoperative. Approximately 16 Nm from Balikpapan Airport, while climbing through 3,800 feet or approximately 1140 local time, the right ECU light illuminated, immediately followed by low oil pressure and low torque indications. The right engine then failed. The crew broadcast a MAYDAY to Balikpapan Approach and decided to conduct a forced landing into a clear field in the Samboja area, about 16 Nm from the Balikpapan Airport.

After the aircraft came to a stop, the PIC initiated an evacuation. One passenger was seriously injured.

The investigation is continuing and includes the engines and its related systems, including the fuel system to determine the reason(s) for the fuel starvation/exhaustion and related engine failures. Fuel samples are also being analyzed. The investigation is also examining operational, maintenance and training documentation.

1 FACTUAL INFORMATION

1.1 HISTORY OF THE FLIGHT

On 11 February 2010, an Avions de Transport Regional ATR 42-300 aircraft, registered PK-YRP, was being operated by Trigana Air Service on a scheduled passenger service between Kalimantan Airport Berau (BEJ) and Samarinda (SRI) as flight TGN162. There were 52 persons on board; two pilots, one engineer, two flight attendants, one flight dispatcher and 46 passengers (43 adults, one child, and two infants).

The aircraft departed from Berau at 0230 UTC¹ and climbed to Flight Level 140. Balikpapan approach cleared the crew to track from en-route Way Point LOLOT direct to Samarinda. After transferring to Temindung Tower, Samarinda, the crew was cleared to track direct to left downwind for runway 04. The controller informed them that the wind was 060/12 knots. The crew did not report any abnormalities and the aircraft operation appeared to be normal.

During the final approach for runway 04, the left ECU light illuminated followed by low oil pressure and torque indications. The Pilot in Command decided to go around, divert to Balikpapan, and carry out the QRH engine shut-down procedure.

They commenced the climb to 4000 ft with the left engine inoperative. Approximately 16 Nm from Balikpapan Airport, while climbing through 3,800 feet, the right ECU light illuminated, immediately followed by low oil pressure and low torque indications. The right engine then failed. The crew broadcast a MAYDAY to Balikpapan Approach and decided to conduct a forced landing into a clear field in the Samboja area, about 16 Nm from the Balikpapan Airport.

The PIC gave instructions to the Flight Attendant to prepare the passengers for an emergency landing. After the aircraft came to a stop the PIC initiated an evacuation.

¹ 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, Western Indonesian Standard Time (WITA) is UTC+ 8 hours.

1.2 INJURIES TO PERSONS

Injuries	Flight crew	Passengers	Total in Aircraft	Others
Fatal	-	-	-	-
Serious	-	1	1	-
Minor	-	1	1	Not applicable
Nil Injuries	6	44	50	Not applicable
TOTAL	6	46	52	-

The occupants were Indonesian citizens.

1.3 DAMAGE TO AIRCRAFT

- Main and Nose Landing gear and surrounding structure were substantially damaged.
- The nose wheel penetrated the fuselage floor and was found in the passenger cabin.
- The cabin overhead lining was damaged and there was mud throughout the passenger cabin.
- The four propeller blades on the right propeller were substantially damaged

1.4 OTHER DAMAGE

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

1.5 PERSONNEL INFORMATION

1.5.1 Pilot in command

Gender : Male
Date of birth : 13 August 1962
Nationality : Indonesia
License : Air Transport Pilot License
Date of issued : 23 May 1991
Valid to : 31 July 2010
Aircraft type rating : Casa 212-200/100, SKA-100, DHC-6, BAe-ATP, F-27, ATR-42 and ATR-72
Medical certificate : Class 1
Date of last medical : 1 February 2010
Valid to : 1 August 2010
Last proficiency check : 15 January 2009
Flying Experience

Total hours : 12,000 hours
Last 90 days : 96 hours 17 minutes
Last 7 days : 13 hours 14 minutes
Last 24 hours : 7 hours 43 minutes
This flight : 3 hours 22 minutes

1.5.2 First Officer

Gender : Male
Date of birth : 15 March 1973
Nationality : Indonesia
License : Commercial Pilot License
Date of issued : 29 December 1999
Valid to : 1 July 2010
Aircraft type rating : DHC-4, F-27, ATR 42 and ATR 72
Medical certificate : Class 1
Date of medical : 18 January 2010
Valid to : 18 July 2010
Last proficiency check : 4 May 2009
Flying Experience
Total hours : 2000 hours
Last 90 days : 133 hours 22 minutes
Last 7 days : 13 hours 14 minutes
Last 24 hours : 3 hours
This flight : 3 hours

1.6 AIRCRAFT INFORMATION

1.6.1 Aircraft Data

Aircraft manufacturer : Avions de Transport Regional (ATR)
Country of manufacturer : France
Aircraft model/type : ATR 42-300
Serial number : 050
Year of manufacture : 1987
Aircraft registration : PK-YRP

Certificate of Registration : 2255
Valid to : 2 July 2010
Certificate of Airworthiness : 2255
Valid to : 1 August 2010
Total time since new : 34,414 hours 10 minutes
Total cycles since new : 42,107 cycles

1.6.2 Engines

Engine type : Turboprop
Manufacturer : Pratt and Whitney
Model : PW 121
Engine number 1 (Left)
Serial Number : PCE – 121040
Total time since new : 495 hours 13 minutes
Total time since overhaul : N/A
Engine number 2 (Right)
Serial Number : PCE – 121201
Total time since new : 25, 200 hours 55 minutes
Total time since overhaul : 1,796 hours 55 minutes

1.6.3 Propellers

Propeller type and model : 14SF-5
Manufacturer : Hamilton Standard
Propeller number 1 (Left)
Serial Number : 1480-5
Total time since new : 11,289 hours 11 minutes
Total time since overhaul : 1,261 hours 1 minute
Propeller number 2 (Right)
Serial Number : 156
Total time since new : Not provided by the operator
Total time since overhaul : 6,675 hours 43 minutes

1.6.4 Weight and Balance (W&B)

The aircraft was within weight and balance CG limitations see appendix

1.7 METEOROLOGICAL INFORMATION

The weather information at Balikpapan Airport² on 11 February 2010 at 0227 was reports as:

Surface wind : 10/13 Knots
 Visibility : 9 Km
 Cloud : Few 2000
 Temperature : 30 °C
 Due Point : 26
 QNH : 1009 Mbs
 QFE : 1008 Mbs

1.8 AIDS TO NAVIGATION

Not relevant to this accident investigation.

1.9 COMMUNICATIONS

Time (UTC)	Contact	Description
0322		Temindung Tower informed Balikpapan Approach TGN 162 experience LEFT ENGINE FAILURE and divert to Sepinggan Airport ETA 03.44 UTC
0324	APP TGN 162 APP TGN 162 APP	TGN162 – BPN APP We now maintain 4000 feet R020 37 Nm BPN VOR ETA.03.44 UTC TGN 162 Identified Position Confirm RWY 07 Cleared direct, confirm maintain 4000 feet Affirm sir..... Maintain 4000 feet Report ready for descend
0325	APP	TGN162 – BPN APP (call 2 times)
0326	APP TGN 162 APP TGN 162 APP	TGN162 – BPN APP Go ahead Confirm engine fail left or right Left sir.... Okay thank you
03.31	TGN 162 APP TGN 162	BPN APP-TGN162 descend leaving 4000 feet passing 3300 feet 19 Nm avoid weather TGN162 descend to 2500 feet traffic chopper ten a 'clock 7 NM climbing to 2000 feet, expect join left downwind 07 Roger

² Balikpapan Airport was the nearest airport to the accident site for weather information.

03.31	TGN 162	Mayday Mayday PK correction TGN 162 both engine failure position 16 Nm Roger mayday, TGN 162 descend to circuit joint left downwind RWY 07 report Runway insight Roger mayday, TGN 162 descend to circuit joint left downwind RWY 07 report Runway insight
03.33	APP	TGN 162 descend to circuit join final RWY 07 report RWY in sight TGN 162-BPN APP TGN 162-BPN APP radio check (2 times)
03.34	APP	TGN 162-BPN APP radio check (3 times)

1.10 AERODROME INFORMATION

Not relevant to this accident investigation.

1.11 FLIGHT RECORDERS

1.11.1 Flight Data Recorder

The aircraft was equipped with a Flight Data Recorder (FDR) and 30 minute Cockpit Voice Recorder (CVR).

FDR Manufacturer : Fairchild
Model : FA 2100
Serial Number : 01299
Part Number : 2100-4043-00



Figure 1: Flight Data Recorder

The aircraft was equipped with a Fairchild/ L3 communications FA2100 flight data recorder. The FDR was a solid state recorder designed to record at least 25 hours of flight data in an ARINC 747 format. The FDR was sent to ATSB (Australia Transport safety Board) on 22 February 2010.



Figure 2: PK-YRP FDR identification plate

1.11.2 Cockpit Voice Recorder

CVR Manufacturer : Fairchild
Model : A100A
Serial Number : 62579
Part Number : 93A100-83



Figure 3: Cockpit Voice Recorder



Figure 4: PK YRP CVR identification plate



Figure 5: CVR recording head was worn-out and dirty

The CVR was sent to ATSB (Australia Transport safety Board) on 22 February 2010

1.11.3 Flight Recorder downloads and results

An attempt at downloading the FDR information was made on 22 February 2010 using the recorder manufacturer's portable interface (PI) equipment. The initial download attempt at the ATSB was performed using the accident FDR chassis. This resulted in a polling error (as reported to have occurred during a previous download attempt at the NTSC's facility) (Figure 6).



Figure 6: Polling error code during downloading

The FDR data download process was then able to be performed normally using the PI. The 25 MB file recovered was named PK-YRP.FDR and contained all the recorded flight data in a compressed format. The data was decompressed and analysed at the ATSB using Flightscape Insight Analysis software. The key FDR parameters examined are shown in Table 1.

The recorder contained about 184 hours of good quality data covering 208 flights, although the data appeared not to include the accident flight.

Table 1: Key parameters recorded.

Parameter Name:	Units:	Recording interval (secs):
Elapsed Time Counter	mm:ss	1
Pressure altitude	feet	1
Indicated airspeed	knots (kts)	1
Magnetic Heading	degrees M	1
Pitch angle	degrees	¼
Roll angle	degrees	1
Fuel Flow – Engine 1	Kg/h	2
Fuel Flow – Engine 2	Kg/h	2
NP – Engine 1	rpm	1
NP – Engine 2	rpm	1
Vertical acceleration	G	1/8
Flight Number	-	4
Day	days	2
Month	months	2
Year	year	2

1.11.4 Sequence of events on FDR

The FDR contained about 184 hours of good quality data covering 208 flights. The FDR data was examined and a sequence of events was developed for the last flight recorded (Figure 6 and Table 2). This flight was not the accident flight.

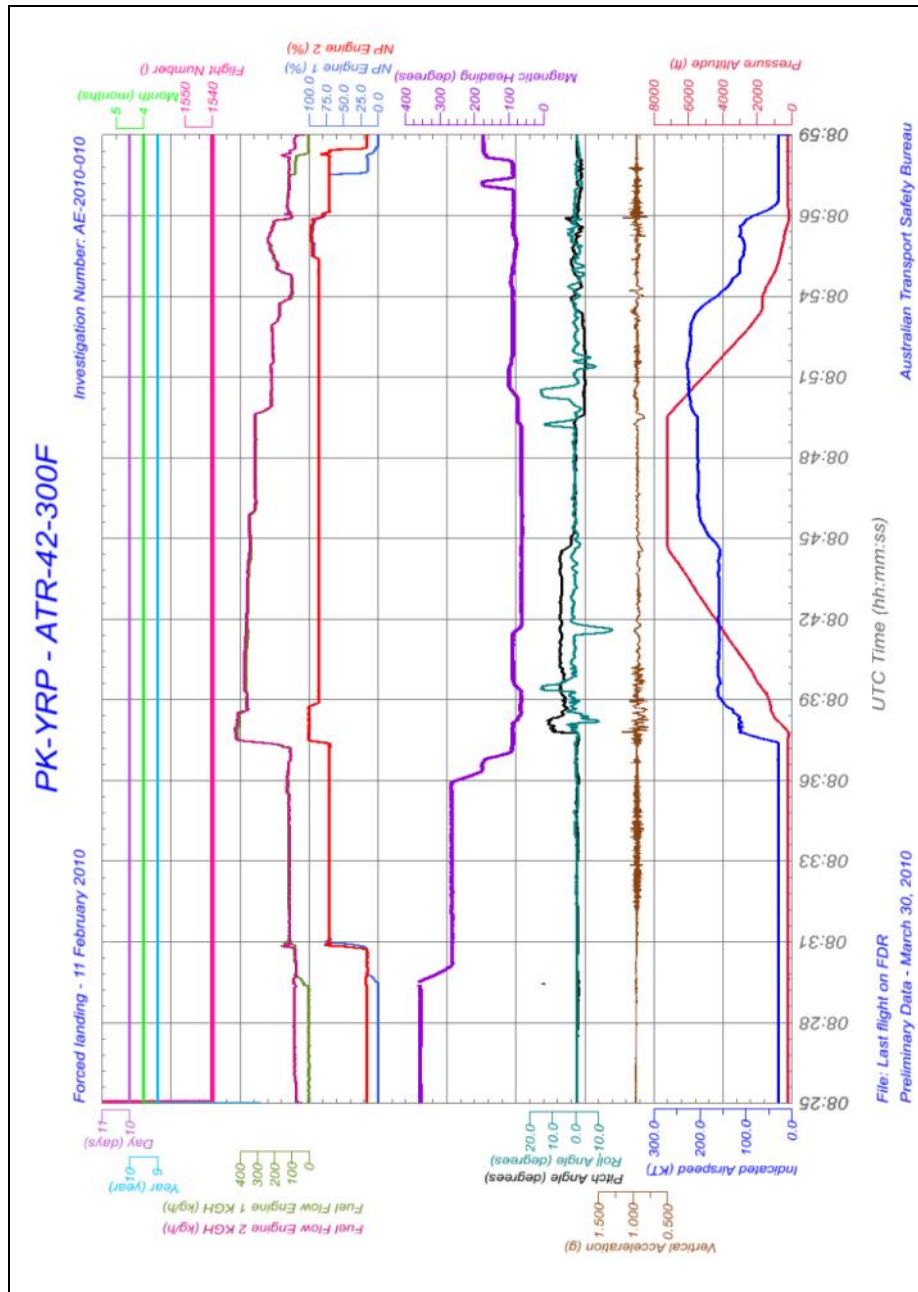


Figure 7: Graphical representation of last flight recorded on the FDR

Table 2: Sequence of events developed from FDR data

Recorded Elapsed Time UTC (mm:ss)	Event	Parameter Source
08:25	Power applied, Flight Number 1540 on Day 10, Month 4, and year 9.	Flight Number, Day, Month, Year.
08:29	Aircraft commenced taxi to takeoff position.	Magnetic Heading, Fuel Flow Engine, NP Engine.
08:38	Aircraft take-off from airport, using runway 09 (magnetic heading 90 degree).	Indicated airspeed, pressure altitude, pitch angle, magnetic heading.
08:45 – 08:49	Aircraft cruise at pressure altitude of 7,200 ft. Indicated airspeed = 156 to 211 knots.	Pressure altitude, indicated airspeed
08:56	Aircraft touchdown at airport on runway 27 at IAS = 92 knots. Pressure altitude recorded as 181 ft, heading is 90 degree (runway 09).	Indicated airspeed, pitch angle, magnetic heading, and pressure altitude.
08:59	End of data.	

The flight time was 18 minutes, or 30 minutes including ground taxi.

The flight number was a four digit parameter recorded on the FDR. On the last flight, the flight number was recorded as 1540 (**Error! Reference source not found.**). That flight was likely to have been Trigana Air Services flight TGN540 from Denpasar to Ampenan. The magnetic heading parameter also suggested that the flight was TGN540. Denpasar - Bali International Airport runways are 09/27 and Ampenan - Selaparang Airport runways are also 09/27. These headings agreed with the aircraft heading during takeoff and landing. The direction of the last flight was recorded as between 060 and 100 degrees (east and northeast), which correlated with a flight from Denpasar to Ampenan as shown in Figure 16.

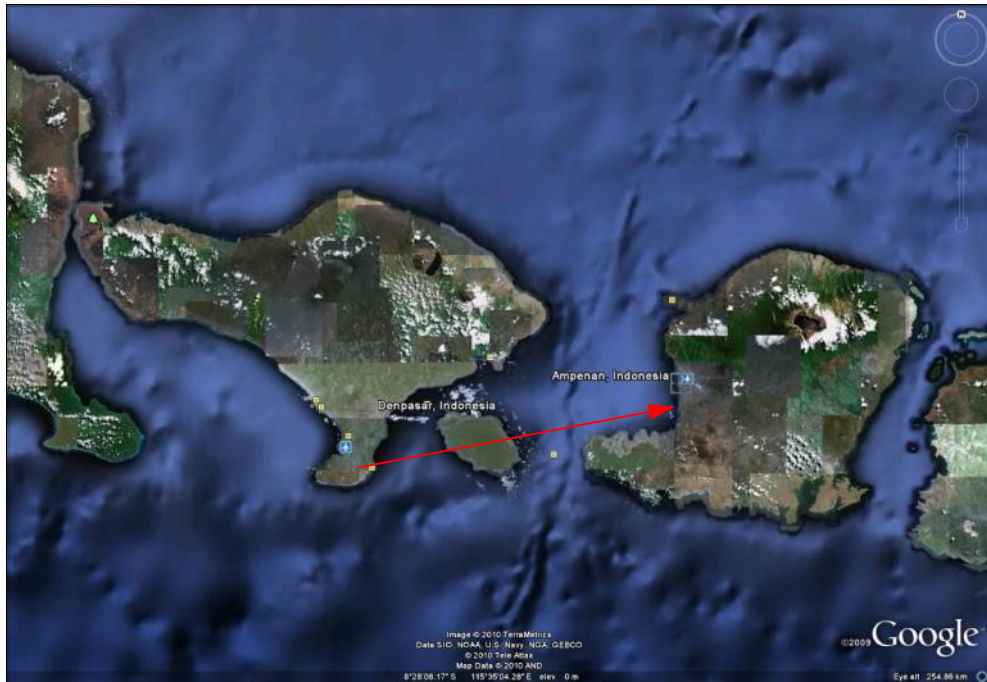


Figure 8: The last flight recorded in FDR , Denpasar to Ampenan, Indonesia

The date on the FDR was recorded as day 10, month 4, and year 9, which indicated a flight on Friday 10 April 2009. The operator’s timetable indicated a scheduled flight TGN540 on a Friday (Table 3).

The time of the flight recorded on the FDR was 0825 to 0859 UTC or 1625 to 1659 Local Time. TGN540 was scheduled for 1600 to 1625 (Table 3), the difference being possibly due to flight delays.

Table 3: Operator Flight Schedule information

Flight	Origin City	Destination City	Frequency	Depart	Arrive
TGN 502	Alor	Kupang	SAT	07:30:00	08:15:00
TGN 504	Alor	Kupang	THU	14:00:00	14:45:00
TGN 510	Alor	Kupang	WED	07:35:00	08:20:00
TGN 504	Alor	Kupang	FRI	16:50:00	17:35:00
TGN 502	Alor	Kupang	SAT	09:00:00	09:45:00
TGN 504	Alor	Kupang	SUN	16:50:00	17:35:00
TGN 415	Ambon	Sanana	MON, WED, FRI	08:00:00	08:50:00
TGN 405	Ambon	Saumlaki	TUE, THU, SAT	07:00:00	08:45:00
TGN 406	Ambon	Langgur	SUN, TUE, THU, SAT	15:00:00	16:35:00
TGN 563	Ampenan	Bima	MON, WED, SAT	09:45:00	10:35:00

TGN 543	Ampenan	Denpasar	EVERYDAY	08:00:00	08:25:00
TGN 545	Ampenan	Denpasar	EVERYDAY	12:00:00	12:25:00
TGN 541	Ampenan	Denpasar	SUN, MON, TUE, WED, FRI, SAT	15:00:00	15:25:00
TGN 561	Ampenan	Sumbawa Besar	SUN, TUE, THU	09:45:00	10:20:00
TGN 541	Ampenan	Bima	THU	13:55:00	14:45:00
TGN 508	Bajawa	Kupang	TUE, SAT	15:10:00	16:05:00
TGN 508	Bajawa	Kupang	THU	10:35:00	11:30:00
TGN 508	Bajawa	Kupang	SUN	10:35:00	11:30:00
TGN 169	Balikpapan	Berau	MON, TUE, WED, THU, FRI, SAT	11:25:00	12:30:00
TGN 168	Berau	Samarinda	MON, TUE, WED, THU, FRI, SAT	09:20:00	10:10:00
TGN 162	Berau	Samarinda	MON, TUE, WED, THU, FRI, SAT	12:45:00	13:35:00
TGN 163	Berau	Tarakan	MON, TUE, WED, THU, FRI, SAT	15:05:00	15:20:00
TGN 564	Bima	Ampenan	MON, WED, SAT	10:55:00	11:45:00
TGN 540	Bima	Ampenan	THU	15:15:00	16:05:00
TGN 452	Buli	Ternate	SUN	11:50:00	12:20:00
TGN 452	Buli	Ternate	MON, WED, FRI	11:15:00	11:45:00
TGN 542	Denpasar	Ampenan	EVERYDAY	09:00:00	09:25:00
TGN 544	Denpasar	Ampenan	EVERYDAY	13:00:00	13:25:00
TGN 540	Denpasar	Ampenan	SUN, MON, TUE, WED, FRI, SAT	16:00:00	16:25:00
TGN 594	Ende	Kupang	SUN, MON, TUE, WED, FRI	12:40:00	13:30:00

The aircraft performed a normal takeoff and landing. No indications of engine shutdown were found during this flight. The last flight recorded on the FDR was uneventful and therefore it was concluded that it was not the accident flight. It should be identified during C of A renewal by inspector, where the FDR down load is a mandatory to be supplied as the requirement.

1.11.5 Sequence of events on CVR

A sequence of events was developed from replay of the CVR data.

Table 4: Sequence of events from CVR data.

Recorded Elapsed Time (mins:secs)	Event
03:19	TGN 542 contact to Selaparang tower, climb to 7000 ft.
10:06	TGN 542 request for landing. Tower approved to runway 09.
16:07	TGN 542 final approach.
17:59	Tower welcomes TGN 542 to Selaparang.
23:13	TGN 561 request for taxi. Selaparang tower confirm takeoff to runway 27.
27:23	TGN 561 airborne to 46, climbs to 9000.
32:59	End of data.

The recorded audio on the CVR indicated a flight TGN 542 from Bali to Ampenan, followed by TGN 561 from Ampenan to Sumbawa. It should be identified during C of A renewal by inspector, where the CVR readout is a mandatory to be supplied as the requirement.

1.11.6 Functional check results of FDR and CVR

Functional tests on the FDR and CVR were carried out by the maintenance facility in Melbourne on 17 March 2010 to report on any faults found and not to repair or return the units into service.

The findings from the assessment were:

- The FDR was in a latched state when the maintenance facility powered up the unit. They indicated that a fail light on the aircraft would likely have been on to indicate the FDR was not operating correctly.
- The FDR was unable to function due to a faulty acquisition processor circuit board. The fault was confirmed by temporarily changing the acquisition processor board and re-testing the unit.
- Initial investigation revealed that CVR thermal insulation assembly had expired in 2005.
- The CVR read, write and erase heads were extremely worn and had a brown residue covering them.
- The motor that drives the CVR tape did not function at all, due to an open circuit in the motor assembly. The recorder would be unable to operate correctly.
- Investigation of the CVR unit internal condition indicated that the CVR would not have been operating for quite some time.

UTC Time Derived (hh:mm:ss)	Pressure Altitude (ft)	Indicated Airspeed (KT)	Magnetic Heading (degrees)	Pitch Angle (degrees)	Roll Angle (degrees)	Fuel Flow Engine 1 KGH (kg/h)	Fuel Flow Engine 2 KGH (kg/h)	NP Engine 1 (%)	NP Engine 2 (%)	Vertical Acceleration (g)	Flight Number (I)	Day (days)	Month (months)	Year (year)											
08:45:20	7207	169.7	63	1.8	1.8	1.8	1.8	0		86.4	86.3	0.929	0.938	0.929	0.929	0.947	0.929	0.938	0.938		10				
08:45:21	7200	170.9	63	1.8	1.8	1.8	1.8	0	338	344	86.4	86.3	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.929	0.938	1540	4	9
08:45:22	7207	171.8	63	1.8	1.8	1.8	1.8	0.4			86.4	86.3	0.938	0.938	0.938	0.947	0.938	0.947	0.938	0.929		10			
08:49:32	7207	204.9	72	0.7	0.7	0.7	0.7	10.9			86.1	85.9	0.965	0.965	0.965	0.965	0.975	0.975	0.965	0.965		10			
08:49:33	7221	204.7	73	0.7	0.7	0.7	0.4	9.5	308	314	86	85.9	0.965	0.956	0.956	0.956	0.956	0.956	0.956	0.956	1540		4	9	
08:49:34	7221	204.6	73	0.4	0.4	0.4	0.4	7.4			86.1	85.9	0.956	0.947	0.947	0.947	0.947	0.947	0.938	0.938		10			
08:49:35	7221	204.5	74	0.4	0.4	0.4	0.4	5.6	309	314	86	85.9	0.938	0.938	0.938	0.938	0.929	0.929	0.929				4	9	
08:49:36	7221	204.6	75	0.4	0.4	0.4	0.4	4.2			86	85.9	0.938	0.929	0.929	0.929	0.938	0.929	0.929			10			
08:49:37	7221	204.5	75	0.4	0.4	0.4	0.4	2.8	309	315	86	85.9	0.929	0.938	0.938	0.929	0.929	0.929	0.92	0.92	1540		4	9	
08:49:38	7221	204.4	75	0.4	0	0	0	1.8			86	85.9	0.92	0.92	0.92	0.929	0.929	0.929	0.938	0.938		10			
08:49:39	7214	204.3	75	0	0	0	0	0.7	309	314	86	85.9	0.938	0.938	0.938	0.929	0.938	0.929	0.938	0.929			4	9	
08:49:40	7221	204.5	75	0	0	0	0	0			86	85.9	0.92	0.92	0.91	0.91	0.91	0.91	0.892	0.892		10			
08:49:41	7221	204.5	75	-0.4	-0.4	-0.4	-0.4	-0.7	309	313	86.1	85.9	0.883	0.883	0.883	0.883	0.883	0.874	0.874	0.865	1540		4	9	
08:49:42	7221	204.5	75	-0.7	-0.7	-0.7	-0.7	-1.1			86.1	85.9	0.865	0.865	0.856	0.856	0.856	0.846	0.837	0.837		10			
08:49:43	7221	204.7	75	-1.1	-1.1	-1.4	-1.4	-1.1	308	313	86.1	85.9	0.837	0.828	0.828	0.828	0.837	0.837	0.837	0.837			4	9	
08:49:44	7221	205.4	75	-1.4	-1.4	-1.8	-1.8	-0.7			86.1	86	0.846	0.846	0.846	0.846	0.856	0.846	0.856	0.846		10			
08:49:45	7221	205.9	75	-1.8	-2.1	-2.1	-2.1	-0.4	308	314	86.2	86.1	0.846	0.846	0.846	0.856	0.856	0.846	0.846	0.846	1540		4	9	
08:49:46	7214	206.4	75	-2.1	-2.5	-2.5	-2.5	-0.4			86.3	86.2	0.837	0.846	0.846	0.846	0.856	0.856	0.856	0.856		10			
08:49:47	7186	207	75	-2.8	-2.8	-3.2	-3.2	0	307	315	86.4	86.3	0.846	0.856	0.846	0.846	0.846	0.846	0.856	0.846			4	9	
08:55:45	588	103	80	1.4	1.4	1.4	1.4	-1.8	220	230	92.5	95.1	0.956	0.956	0.956	0.947	0.947	0.947	0.947	0.938	1540		4	9	
08:55:46	588	102.3	80	1.4	1.4	1.4	1.4	-1.1			92.6	95.1	0.929	0.938	0.938	0.938	0.929	0.938	0.947	0.947		10			
08:55:47	574	102.4	79	1.4	1.1	1.1	1.1	-0.7	220	228	92.4	95.1	0.92	0.92	0.92	0.92	0.92	0.929	0.92	0.92			4	9	
08:55:48	581	102.4	79	1.1	1.1	1.1	1.1	-1.4			92.2	94.9	0.92	0.929	0.938	0.929	0.938	0.938	0.938	0.938		10			
08:55:49	567	102.1	79	1.1	1.1	1.1	1.1	-2.5	219	230	92.3	95	0.938	0.929	0.92	0.91	0.91	0.901	0.901	0.91	1540		4	9	

1.12 WRECKAGE AND IMPACT INFORMATION



Figure 9: The right main landing gear door was broken



Figure 10: The right main landing gear was broken



Figure 11: The aircraft at final position



Figure 12: View of passenger cabin damage



Figure 13: Nose wheel found inside the cabin



Figure 14: After view days of accident the area was flooded



Figure 15: The aircraft wing tank

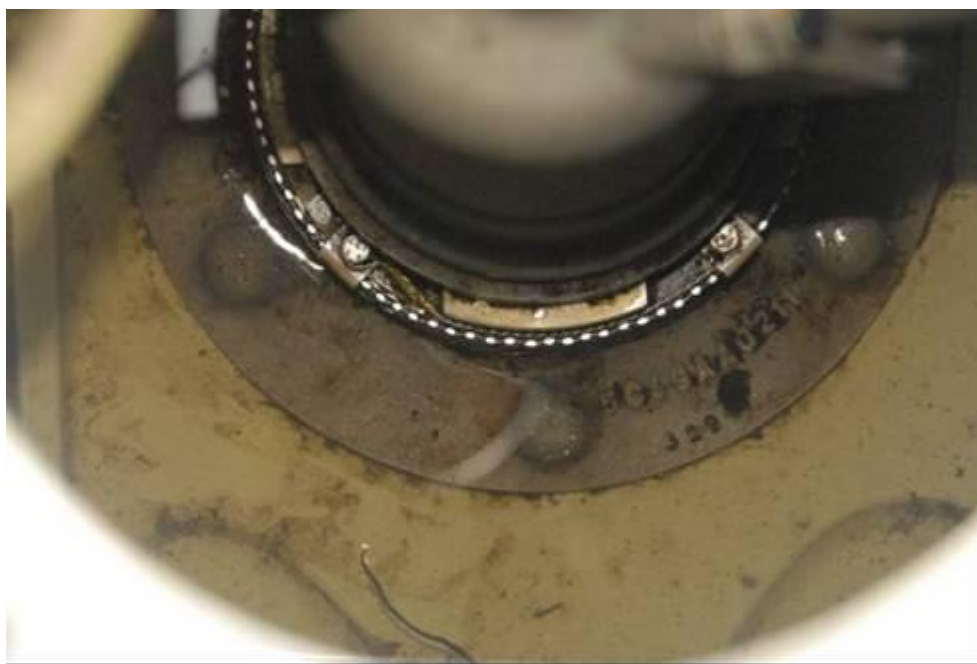


Figure 16: The inside wing tank a lot of dirt and sealant debris



Figure 17: Uncured sealant and deposit



Figure 18: Uncured sealant from the wing tank

1.13 MEDICAL AND PATHOLOGICAL INFORMATION

One passenger was seriously injured (left leg fracture) and one passenger received minor injuries. Both were taken to a hospital for treatment. No medical or pathological investigations were conducted on the flight crew.

1.14 FIRE

There was no pre- or post- impact fire.

1.15 SURVIVAL ASPECT

All of the occupants survived the accident. One passenger was seriously injured, and one passenger received minor injuries.

1.16 TESTS AND RESEARCH

1.16.1 Deposits test

The deposits from the bottom wing tank were sent to laboratory to determine the type of the material. The contain of the deposits material are as follows:

1. Silica
2. Sodium chlorite
3. Ferro oxide,

1.16.2 Wing Tanks drained

Both wing tanks had been drained after the accident to check the remaining fuel on each tank, the result of the drained were as follows:

- Left wing tank, fuel was about 2 liters
- Right wing tank, fuel was only 400 liters

At the accident area has been observed that no indication of fuel leak from the aircraft, so the fuel remaining in the both wing tanks showed at the condition of the accident.

1.17 ORGANIZATIONAL AND MANAGEMENT INFORMATION

Aircraft Owner : PT. Trigana Air Services
Aircraft Operator : PT. Trigana Air Services
Kompleks Puri Sentra Niaga
Jl. Wiraloka Blok D 68-69-70, Kalimalang
Jakarta 13620, Republic of Indonesia.
AOC : 121-006

1.18 ADDITIONAL INFORMATION

1.18.1 The investigation of Fuel system

- Left fuel drip stick indicate zero and drained fuel contain of two liters.
- Right fuel sticks indicate ten, and drained fuel contained 400 liters.
- Fuel quantity system bite test was normal.
- Left and right cross feed valve operation check both of them working normal as the order for each function.
- The Flapper valves of left and right wing were in its position and their surfaces were clean.
- Left and right fuel jet pump ware clean.
- All fuel filters were clean.
- The fuel in the left engine fuel filter contain more than in the right one.
- The fuel quantity probes & indicators removed and functional check within acceptable limit.
- Fuel investigation from aircraft fuel and engine filters at Cepu center laboratory indicated that all the specification were in acceptable specific condition.
- Modification of fuel system referred to service bulletin No ATR42-28-039 and technical instruction No: 006/ENG-07/2008 to match new FAA/JAA Regulations was embodied on 23 August 2009, at aircraft 40,634 landing and 33,677:14 flight hours.

- The test of modification of fuel system was only by fuel quantity monitoring data, the correct procedure should be a functional test of fuel quantity indicator as per AMM (JIC) 28-42-00 FUT 10000.

1.18.2 The Investigation of the Engines & Propellers

At the accident site, both engines were intact with all rotors free to turn. A slight noise could be heard while rotating the low pressure compressor from the No. 2 engine which was caused by ingestion of local vegetation. No evidence of structural damage was observed on either engine; the right propeller blades were bent and broken.

The engines external components showed no damage. All air, oil and fuel lines were found secured and intact. Oil levels in the tanks were normal and all of the chips detectors were clean.

Visual examination of the low pressure impeller and 2nd stage power turbine blades revealed no damage.

The engine were removed and forwarded to Pratt & Whitney Canada (P&WC) (S.E.A.) where testing was conducted. Both engines test results were satisfactory. Vibration levels were also acceptable.

The engine accessories were then removed and forwarded to P&WC in Canada for testing and further investigation.

There were no anomalies or damage evident which could have prevented the engines from operating normally prior to impact.

1.19 USEFUL OR EFFECTIVE INVESTIGATION TECHNIQUE

The investigation is being 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

The aircraft was airworthy prior departure, the left engine was flame out on final Temindung Samarinda Airport and diverted to Balikpapan. About 16 Nautical miles from Balikpapan the right engine flame out.

2.1 THE FUEL SYSTEM

- Left fuel drip stick indicate zero and drained fuel contain of two liters
- Right fuel stick indicate ten, and drained fuel contained 400 liters
- Fuel quantity system bite test was normal
- Left and right cross feed valve operation check both of them working normal as the order for each function.
- The Flapper valves of left and right wing were in its position and their surfaces were clean.
- Left and right fuel jet pump ware clean
- All fuel filters were clean
- The fuel in the left engine fuel filter contain more than in the right one.
- Fuel quantity probe & indicator removed and check normal.
- Fuel investigation from aircraft fuel and engine filters at Cepu center laboratory indicated that all the specification were in acceptable specific condition.

2.2 ENGINE SYSTEM

- Both propellers were rotate freely by hand.
- The power turbine of the both engine were no evident of damage nor indication if overheating.
- Oil quantity of the both engine were normal.
- All Line Replacement Unit of the engine were normal no indication of damage.
- Both engines functional check at Pratt & Whitney Singapore found normal.
- The both engines were tested in the facility of Pratt & Whitney Canada (P&WC) (S.E.A.). The results were satisfactory and the vibration levels were also acceptable.
- Electrical Control Unit of both engine reported that the warning light were illuminated before the flame out of each engine.
- During divert to Balikpapan the both engine were fed from the left fuel tank used the cross feed that indicated by the fuel remaining at the left engine fuel filters was less the on the right one.

He tear down at engine repair station showed that there was no indication of mechanical failure or any abnormal condition which caused the engines to stop

operation. The cause of the flame out could not be determined properly due to the malfunction of the FDR, the lack of flight data.

The drained fuel from the both wing tanks showed that fuel remaining was very minimum, therefore the most probable cause of the both engine flame out was fuel starvation.

3 CONCLUSIONS

3.1 FINDINGS

The aircraft was airworthy prior departure, the left engine was flame out on final Temindung Samarinda Airport and diverted to Balikpapan. About 16 Nautical miles from Balikpapan the right engine flame out.

The Fuel System:

- Left fuel drip stick indicate zero and drained fuel contain of two liters.
- Right fuel stick indicates ten, and drained fuel contained 400 liters.
- Fuel quantity system bite test was normal.
- Left and right cross feed valve operation check both of them working normal as the order for each function.
- The Flapper valves of left and right wing were in its position and their surfaces were clean.
- Left and right fuel jet pump ware clean.
- All fuel filters were clean.
- The fuel in the left engine fuel filter contain more than in the right one.
- Fuel quantity probe & indicator removed and check at the other ATR42-300 aircraft were normal.
- Fuel investigation from aircraft fuel and engine filters at Cepu center laboratory indicated that all the specification were in acceptable specific condition.
- Modification of fuel system referred to service bulletin No ATR42-28-039 and technical instruction No: 006/ENG-07/2008, was tested only by fuel quantity monitoring data, the correct procedure should be a functional test of fuel quantity indicator as per AMM (JIC) 28-42-00 FUT 10000.
- Both wing tanks were a lot of deposits and dirt.
- The uncured sealant found in the both wing tanks.

Engine System:

- Both propellers were rotate freely by hand.
- The power turbine of the both engine were no evident of damage or indication if overheating.
- Oil quantity of the both engine were normal.
- All Line Replacement Unit of the engine were normal no indication of damage.
- The both engines were tested in the facility of Pratt & Whitney Canada (P&WC) (S.E.A.). The results were satisfactory and the vibration levels were also acceptable.

- Electrical Control Unit of both engine reported that the warning light were illuminated before the flame out of each engine.

Flight Data Recorder and Cockpit Voice Recorder

- The FDR was unserviceable and not operating at the time of the accident on 11 Feb 2010. The last flight recorded on the FDR was likely to have been TGN540 from Denpasar to Ampenan on 10 April 2009 and not the accident flight.
- A functional test at a maintenance facility found that a faulty acquisition processor circuit board would have prevented operation of the FDR on the aircraft.
- The CVR was unserviceable and not operating at the time of the accident on 11 Feb 2010.
- The CVR was likely to have not been functioning for quite some time.
- The last flight recorded in the CVR was likely TGN542 from Denpasar to Ampenan followed by TGN561 from Ampenan to Sumbawa at an unknown time.
- A functional test at a maintenance facility found that the CVR read, write and erase heads were extremely worn and had a brown residue covering them. The motor that drove the CVR tape did not function at all, due to an open circuit in the motor assembly. As such, the recorder was unable to operate correctly.
- The read out of the FDR and CVR should be identified during the renewal of the C of A.

3.2 CAUSES

The both engine were lack of fuel before flame out, it was indicated the fuel management was out of control during flight that might be a misleading of fuel quantity indication. The proper analysis could not be carried out due to both FDR and CVR were un-operated.

4 SAFETY ACTIONS

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

5 SAFETY RECOMMENDATIONS

5.1 RECOMMENDATION TO THE PT. TRIGANA AIR SERVICE

The National Transportation Safety Committee recommends to the Trigana Air Service should:

- Review and improve the Implementation of CRM and technical knowledge.
- Ensure the actual of fuel quantity on both fuel tanks was equal and balance prior departure.
- Ensure that the modification of fuel system referred to service bulletin No ATR42-28-039 and technical instruction No: 006/ENG-07/2008, was tested referred to the correct procedure as per AMM (JIC) 28-42-00 FUT 10000.
- Ensure the FDR and CVR read out and calibration in accordance to the manufacture standard and should be done by approved repair station
- Ensure that the wing tank is clean and free from debris
- Ensure that the correct sealant type for the wing tank application and correct procedure to be followed to avoid uncured process of it.

5.2 RECOMMENDATION TO DIRECTORATE GENERAL CIVIL AVIATION

The National Transportation Safety Committee recommends to Directorate General Civil Aviation should:

- Ensure that FDR and CVR read out are correct from the actual last flight data, during C of A renewal.
- Ensure the quality system of the operator was function as required by the regulation, in order to avoid such wing tank sealant uncured and dirt.