FINAL
KNKT.13.05.13.04

KOMITE NASIONAL KESELAMATAN TRANSPORTASI

Aircraft Accident Investigation Report

PT. Nusantara Buana Air
Casa 212-200; PK - TLG
Sultan Babullah Airport; Ternate
Republic of Indonesia
10 May 2013

KOMITE NASIONAL KESELAMATAN TRANSPORTASI
REPUBLIC OF INDONESIA
2014

This final report was produced by the Komite Nasional Keselamatan Transportasi (KNKT) 3rd Floor Ministry of Transportation, Jalan Medan Merdeka Timur No. 5 Jakarta 10110, INDONESIA.

The report is based upon the investigation carried out by the 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 final report consists of factual information collected until the final report published. This report includes analysis and conclusion.

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However, the KNKT 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 KNKT reports and recommendations is provided to promote aviation safety. In no case is it intended to imply blame or liability.

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ABBREVIATIONS AND DEFINITIONS

AD	:	Airworthiness Directive
AFML	:	Aircraft Flight & Maintenance log
AOC	:	Air Operator Certificate
ATPL	:	Air Transport Pilot License
ATS	:	Air Traffic Service
BMKG	:	*Badan Meterologi Klimatologi dan Geofisika* (Metrological Climatologically and Geophysical Agency)
CAMP	:	Continuous Airworthiness maintenance Program
CPL	:	Commercial Pilot License
CSN	:	Cycles Since New
CVR	:	Cockpit Voice Recorder
DGCA	:	Directorate General of Civil Aviation
EASA		European Aviation Safety Agency
FDR	:	Flight Data Recorder
FL	:	Flight Level
ft	:	Feet
Hrs	:	Hours
ICAO	:	International Civil Aviation Organizationn
IFR	:	Instrument Flight Rules
Kg	:	Kilogram(s)
Km	:	Kilometer(s)
KNKT / NTSC	:	*Komite Nasional Keselamatan Transportasi* (National Transportation Safety Committee)
kts	:	Knots (nm/hours)
L/H	:	Left hand
mbs	:	Millibars
Min	:	Minute (s)
Mm	:	Millimeter(s)
MEL	:	Minimum Equipment List
MTOW	:	Maximum Take-off Weight
NBA	:	Nusantara Buana Air
NDI	:	Non Destructive Inspection

NDT	:	Non Destructive Test
Nm	:	Nautical mile(s)
PM	:	Pilot Monitoring
PF	:	Pilot Flying
PIC	:	Pilot in Command
SB	:	Service Bulletin
SIC	:	Second in Command
UK CAA	:	United Kingdom Civil Aviation Authority

INTRODUCTION

SYNOPSIS

On 10 May 2013, a CASA 212 -200 aircraft was being operated by PT. Nusantara Buana Air (PT. NBA) on a scheduled passenger flight as NBA 868. The aircraft departed from Sultan Babullah Airport, Ternate (TTE / WAMT) at 0455 UTC to Gebe Airport, North Maluku (GEB / WAMJ). The Pilot in Command (PIC) acted as Pilot Flying (PF) and the Second in Command acted as Pilot Monitoring (PM).

This flight was the third flight of the day (TTE-MGL-TTE; TTE-GBE-TTE). The first and the second flights of the aircraft were operated normally.

During climbing when the aircraft passed 6,000 feet, the left propeller detached from rear hub half. The pilots shut down the left engine by closing fuel shut of valve. The aircraft returned to Ternate and landed safely.

No one injured in this accident.

The propeller assembly inspection should be performed 300 hours or 300 cycle interval whichever reached first as stated on the Service Bulletin no, 61-1119.

There was error on transferring data of flight cycle in the aircraft maintenance log up to 114 cycles, and lead to exceeding of the next Non Destructive Inspection of the failure part by 155 cycles, while the next NDI inspection based on flight hour was 30 hours remaining.

The propeller log book did not contain flight cycle column and therefore the flight cycle was not recorded and may lead to the maintenance personnel interpreted that the inspection interval for propeller assembly was based on flight hour only.

The investigation concluded that the factors of this accident were as follows:

- The failure of the hub half was due to fatigue crack which was undetected as the Non Destructive Inspection has exceeded 154 cycles form the next schedule of inspection.
- The exceeding of flight cycles was due to transfer error of data and miss-interpretation of inspection interval.
- The recording column of the Propeller Log Book available in flight hour only, it may miss lead the interpretation of the maintenance personnel of the inspection interval based on flight hour only instead of both flight hour and flight cycle.

During the course of investigation PT. Nusantara Buana Air has taken safety actions by performing the Non Destructive Inspection to all propellers installed on the CASA 212 -200 fleets.

The KNKT issued safety recommendation to address the identified safety deficiencies and to prevent the similar occurrence in the future to the Directorate General of Civil Aviation and PT. Nusantara Buana Air.

1 FACTUAL INFORMATION

1.1 History of the Flight

On 10 May 2013, a CASA 212 -200 aircraft was being operated by PT. Nusantara Buana Air (PT. NBA) on a scheduled passenger flight as NBA 868 from from Sultan Babullah Airport, Ternate (TTE / WAMT) to Gebe Airfield, North Maluku (GEB / WAMJ).

This flight was the third flight of the day (TTE-MGL-TTE; TTE-GBE-TTE). The first and the second flights of the aircraft were operated normally and there was abnormality reported.

The aircraft departed Ternate at 0455 UTC (13.55 LT). The Pilot in Command (PIC) acted as Pilot Flying (PF) and the Second in Command (SIC) acted as Pilot Monitoring (PM).

During climbing while passed 6,000 feet, both pilots saw something like propeller flew forward from the left side of the aircraft. The PIC sensed that the aircraft yaw and countered by pressing rudder pedal. The PIC checked the instruments and saw that the indicated of the left engine torque was zero and the oil temperature rise. The pilots did not hear increasing of engine sound. The PIC then checked visually to the left engine and found that the propeller had lost.

The pilots shut down the left engine by closing fuel shut of valve. The aircraft returned to Ternate and landed safely.

No one injured in this accident.

Map courtesy of Google Earth

Figure 1: Predicted flight track up to the detachment of propeller

Figure 2: The aircraft after incident

1.2 Injuries to Persons

Injuries	Flight crew	Passengers	Total in Aircraft	Others
Fatal	-	-	-	-
Serious	-	-	-	-
Minor/None	2	18	20	Not applicable
TOTAL	2	18	20	-

All flight crew and passengers were Indonesian citizen.

1.3 Damage to Aircraft

There was no other damaged to the aircraft other than the left propeller assembly which detached.

1.4 Other Damage

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

1.5 Personnel Information

1.5.1 Pilot in Command

Gender	:	Male
Age	:	60 years
Nationality	:	Indonesia
Marital status	:	Married
Date of joining company	:	2011
License	:	ATPL
Date of issue	:	22 October 1990
Aircraft type rating	:	CASA 212, Piper PA – 31T
Instrument rating	:	31 April 2014
Medical certificate	:	First Class
Last of medical	:	05 December 2012
Validity	:	05 June 2013
Medical limitation	:	Holder shall wear lenses that correct for distance vision and possess glasses that correct for near vision.
Last line check	:	31 January 2013
Last proficiency check	:	11 April 2013
Flying experience		
Total hours	:	19,049 Hours
Total on type	:	10,016 hours
Last 90 days	:	18 hours 25 minutes
Last 60 days	:	18 hours 25 minutes
Last 24 hours	:	6 hours
This flight	:	36 minutes

1.5.2 Second in Command

Gender	:	Male
Age	:	31 years
Nationality	:	Indonesia
Marital status	:	Married
Date of joining company	:	2011
License	:	CPL
Date of issue	:	21 November 2008

Aircraft type rating	:	CASA-212
Instrument rating	:	18 April 2013
Medical certificate	:	First Class
Last of medical	:	17 April 2013
Validity	:	17 October 2013
Medical limitation	:	Nil
Last line check	:	18 April 2013
Last proficiency check	:	13 March 2013
Flying experience		
Total hours	:	1,868 Hours
Total on type	:	1,438 Hours
Last 90 days	:	18 hours 25 minutes
Last 60 days	:	18 hours 25 minutes
Last 24 hours	:	6 hours
This flight	:	36 minutes

1.6 Aircraft Information

1.6.1 General

Registration Mark	:	**PK - TLG**
Manufacturer	:	Indonesian Aerospace (*PT. Dirgantara Indonesia*) under license from CASA, Spain
Type/ Model	:	CASA-212-200
Serial Number	:	93N/413
Year of manufacture	:	20 September 1993
Certificate of Airworthiness		
Issued	:	31 March 2013
Validity	:	30 March 2014
Category	:	Transport
Limitations	:	Nil
Certificate of Registration		
Number	:	2828
Issued	:	8 November 2012
Validity	:	7 November 2013
Time Since New	:	12,910.50 Hours

Cycles Since New	:	14,523 Cycles
Last Major Check	:	04 October 2012 (C3/1800 Hours)
Last Minor Check	:	08 May 2013 (A3/300 hours)

1.6.2 Engines

Manufacturer	:	Garrett
Type/Model	:	TPE.331-10R-512C
Serial Number-1 engine	:	P-37592C
▪ Time Since New	:	3,579.34 Hours
▪ Cycles Since New	:	3,755 Cycle
Serial Number-2 engine	:	P-37415C
▪ Time Since New	:	9,806.34 Hours
▪ Cycles Since New	:	10,885 Cycles

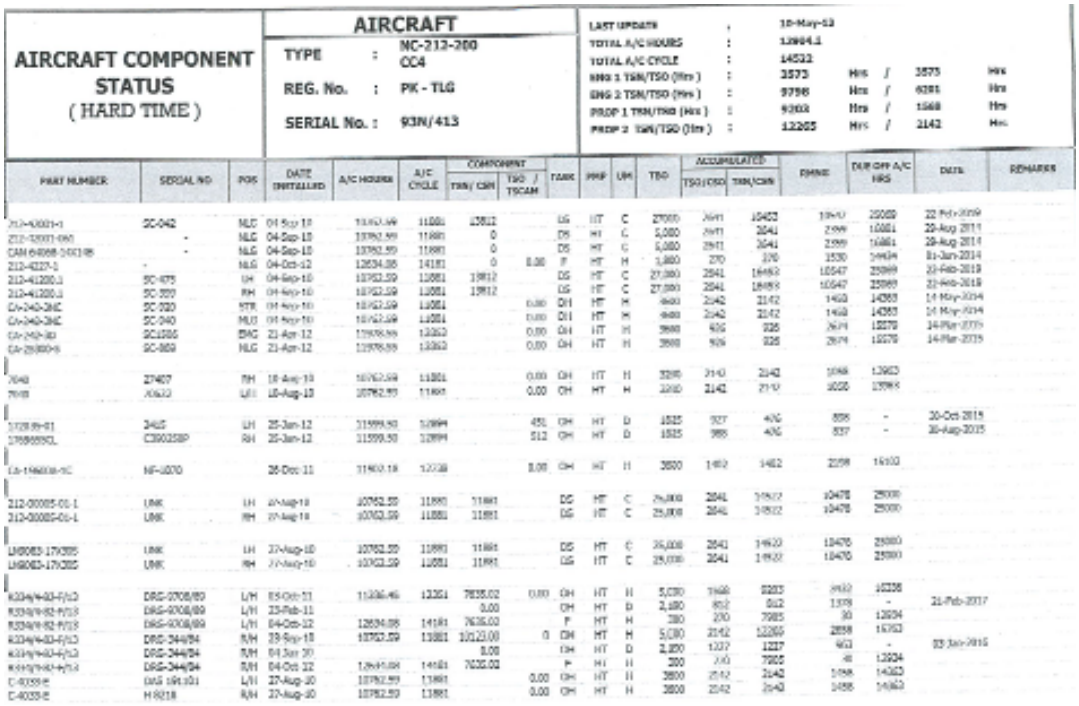
1.6.3 Propellers

Manufacturer	:	Dowty Rotol Limited
Type/Model	:	R.334/4-82F/13
Serial Number-1 propeller	:	DRG-9708/89
▪ Time Since New	:	9,209.34 Hours
▪ Cycles Since New	:	1,574.32 Hours
Serial Number-2 propeller	:	DRG-344/84
▪ Cycles Since New	:	2,148.21 Hours

1.6.4 Maintenance record

The last Non Destructive Inspection (NDI) of the left Propeller was on 04 October 2012 at total aircraft flight hours of 12,634.08 hours, total aircraft flight cycle of 1,418 cycles.

The next Non Destructive Inspection of the left propeller should be performed in the next 30 hours or at aircraft total time of 12,934 hours.



AIRCRAFT COMPONENT STATUS
(HARD TIME)

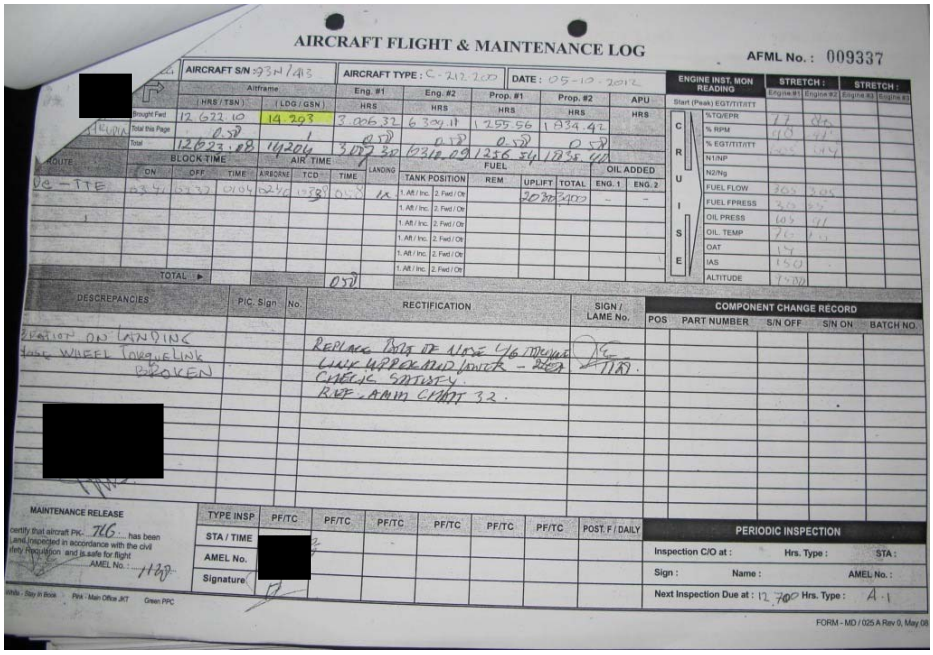
AIRCRAFT
TYPE : MC-212-200 CC4
REG. No. : PK - TLG
SERIAL No. : 93N/413

LAST UPDATE : 10-May-13
TOTAL A/C HOURS : 12984.1
TOTAL A/C CYCLE : 14533
ENG 1 TSN/TSO (Hrs) : 3573 Hrs / 3575 Hrs
ENG 2 TSN/TSO (Hrs) : 9798 Hrs / 6281 Hrs
PROP 1 TSN/TSO (Hrs) : 9203 Hrs / 1568 Hrs
PROP 2 TSN/TSO (Hrs) : 12265 Hrs / 2142 Hrs

PART NUMBER	SERIAL NO	POS	DATE INSTALLED	A/C HOURS	A/C CYCLE	COMPONENT TSN / CSN	COMPONENT TSO / TSCAM	TSMF	RMF	UM	TBO	ACCUMULATED TSO / CSO	ACCUMULATED TSN / CSN	REMAIN	DUE OFF A/C HRS	DATE	REMARKS
212-40001-1	SC-042	NLG	04-Sep-10	10382.59	11681	12812			DS	HT	C	27000	2641	15453	13451	20068	22-Feb-2019
212-33001-001	-	NLG	04-Sep-10	10382.59	11681	0			DS	HT	C	5,000	2641	2641	2359	10681	29-Aug-2011
CAN 6/4068-1001/05	-	NLG	04-Sep-10	10382.59	11681	0			DS	HT	C	5,000	2641	2641	2359	10681	29-Aug-2011
212-4227-1	-	NLG	04-Oct-12	12634.08	14181	0	0.00	F	HT	H	1,800	270	270	1530	14634	01-Jun-2014
212-41200-1	SC-075	LH	04-Sep-10	10382.59	11681	12812			DS	HT	C	27,000	2641	18453	16547	25969	22-Feb-2019
212-41200-1	SC-200	RH	04-Sep-10	10382.59	11681	12812			DS	HT	C	27,000	2641	18453	16547	25969	22-Feb-2019
GA-240-3NC	SC-020	STR	04-Sep-10	10382.59	11681		0.00	DH	HT	H	9400	2142	2142	1458	14365	14-May-2014
GA-240-3NC	SC-040	MLG	04-Sep-10	10382.59	11681		0.00	DH	HT	H	9400	2142	2142	1458	14365	14-May-2014
GA-240-3NC	SC1200	EMG	21-Apr-12	11978.59	13262		0.00	DH	HT	H	9400	405	405	2674	15270	14-Mar-2015
GA-240/80-6	SC-060	NLG	21-Apr-12	11978.59	13262		0.00	DH	HT	H	9400	405	405	2674	15270	14-Mar-2015
7040	27407	RH	18-Aug-10	10762.59	11901		0.00	DH	HT	H	3200	2142	2142	1058	13903		
7040	A0620	LH	18-Aug-10	10762.59	11901		0.00	DH	HT	H	3200	2142	2142	1058	13903		
3708-99-01	3405	LH	25-Jan-12	11999.59	13099		451	DH	HT	D	1825	927	476	898	-	20-Oct-2015	
3708-99-02	C3902SP	RH	25-Jan-12	11999.59	13099		512	DH	HT	D	1825	988	476	837	-	30-Aug-2015	
LA-1980-08-1C	NF-0070		26-Dec-11	11902.18	13238		0.00	DH	HT	H	3800	1482	1482	2358	16103		
212-00005-01-1	LMK	LH	27-Aug-10	10762.59	11881	11881			DS	HT	C	25,000	2641	13522	10478	25000	
212-00005-01-1	LMK	RH	27-Aug-10	10762.59	11881	11881			DS	HT	C	25,000	2641	13522	10478	25000	
LH6063-17/205	LMK	LH	27-Aug-10	10762.59	11881	11881			DS	HT	C	25,000	2641	14522	10478	25000	
LH6063-17/205	LMK	RH	27-Aug-10	10762.59	11881	11881			DS	HT	C	25,000	2641	14522	10478	25000	
K234/4-03-F/L3	DRG-0708/89	L/H	05-Oct-11	11986.46	13261	7835.02	0.00	DH	HT	H	5,000	1668	1223	3777	-	21-Feb-2017	
K234/4-02-F/L3	DRG-0708/89	L/H	23-Feb-11			0.00		DH	HT	D	2,180	852	852	1328	-		
K234/4-02-F/L3	DRG-0708/89	L/H	04-Oct-12	12634.08	14181	7835.02		F	HT	H	280	270	7985	30	12634		
K234/4-02-F/L3	DRG-244/84	R/H	23-Sep-13	13787.59	15081	10123.00	0	DH	HT	H	5,000	2142	12265	2858	16763		
K234/4-03-F/L3	DRG-244/84	R/H	04-Jan-10			0.00		DH	HT	D	2,180	1227	1227	953	-	03-Jan-2015	
K234/4-03-F/L3	DRG-244/84	R/H	04-Oct-12	12634.08	14181	7835.02		F	HT	H	280	270	7985	43	12924		
C-40338-E	DAS 191101	L/H	27-Aug-10	10762.59	11881		0.00	DH	HT	H	3800	2142	2142	1658	14023		
C-40338-E	H 9218	R/H	27-Aug-10	10762.59	11881		0.00	DH	HT	H	3800	2142	2142	1658	14023		

Figure 3: Aircraft component status recorded based on flight hours

The aircraft & maintenance log dated 05 October 2012 page 009337, recorded the aircraft total cycle of 14,294 cycles. On 07 October 2012 the data were transferred to page 009339 and was recorded 14,284 cycles. There was mistyping of 10 cycles.



AIRCRAFT FLIGHT & MAINTENANCE LOG

AFML No. : 009337

AIRCRAFT S/N : 93N/413 | AIRCRAFT TYPE : C-212-200 | DATE : 05-10-2012

	Airframe HRS / TSN	Airframe LDG / CSN	Eng. #1 HRS	Eng. #2 HRS	Prop. #1 HRS	Prop. #2 HRS	APU HRS
Brought Fwd	12 622.10	14 203	3 006.32	6 304.11	1 755.56	1 834.42	
Total this Page	0.58	1	0.58	0.58	0.58	0.58	
Total	12623.68	14204	3 007.30	6310.09	1356.14	1835.00	

ENGINE INST. MON READING — STRETCH : — STRETCH :

Start (Peak) EGT/TIT/ITT | %TQ/EPR | % RPM | % EGT/TIT/ITT | N1/NP | N2/Ng | FUEL FLOW | FUEL FPRESS | OIL PRESS | OIL TEMP | OAT | IAS | ALTITUDE

CRUISE

ROUTE	BLOCK TIME ON	BLOCK TIME OFF	AIR TIME AIRBORNE	AIR TIME TCD	LANDING TIME	LANDING	TANK POSITION	REM.	FUEL UPLIFT	FUEL TOTAL	OIL ADDED ENG. 1	OIL ADDED ENG. 2
VC-TTE	0334	0737	0104	0246	0738	0.58	1x 1. Aft / Inc. 2. Fwd / Ctr		2070	2100	-	-
							1. Aft / Inc. 2. Fwd / Ctr					
							1. Aft / Inc. 2. Fwd / Ctr					
							1. Aft / Inc. 2. Fwd / Ctr					
							1. Aft / Inc. 2. Fwd / Ctr					
TOTAL ▶						0.58						

DESCREPANCIES	P/C Sign No.	RECTIFICATION	SIGN / LAME No.
[redacted]			
ELEVATOR ON LANDING GEAR WHEEL LANGUELINK BROKEN		REPLACE BOTH OF NOSE WHEEL LINK UPPER AND LOWER - 2 OFF. CHECK SATISFY. REF. AMM CHAPT 32.	[redacted]

COMPONENT CHANGE RECORD

POS	PART NUMBER	S/N OFF	S/N ON	BATCH NO.

MAINTENANCE RELEASE

I certify that aircraft PK- TLG has been serviced and inspected in accordance with the civil aviation Regulation and is safe for flight

AMEL No. 1120

TYPE INSP	PF/TC	PF/TC	PF/TC	PF/TC	PF/TC	PF/TC	POST F / DAILY
STA / TIME	[redacted]						
AMEL No.							
Signature							

PERIODIC INSPECTION

Inspection C/O at : Hrs. Type : STA :

Sign : Name : AMEL No. :

Next Inspection Due at : 12 700 Hrs. Type : A-1

White - Stay In Book Pink - Main Office JKT Green PPC

FORM - MD / 025 A Rev 0, May 08

Figure 4: Aircraft flight & maintenance log on the 5 October 2012

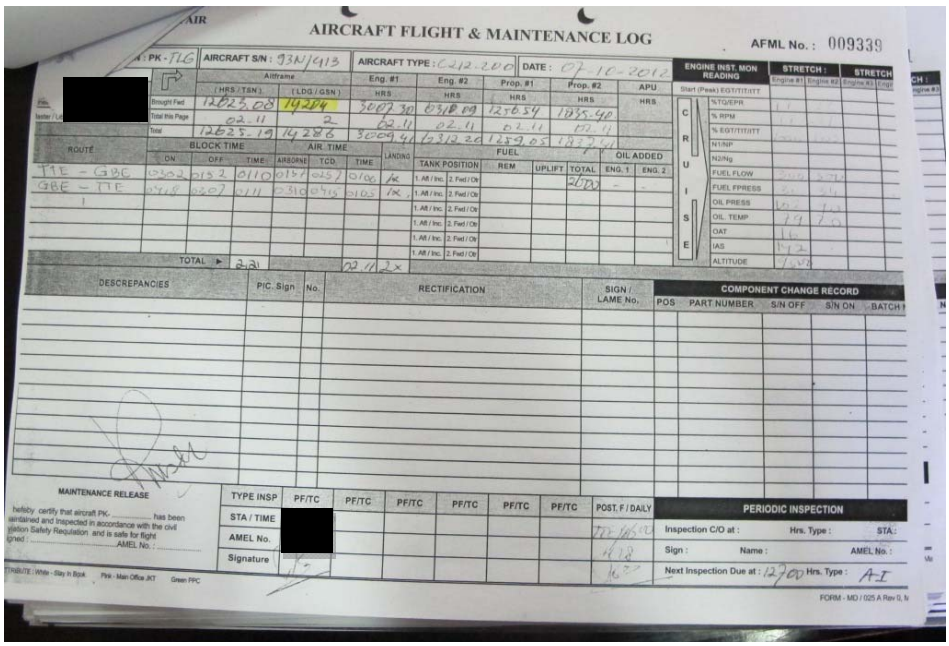
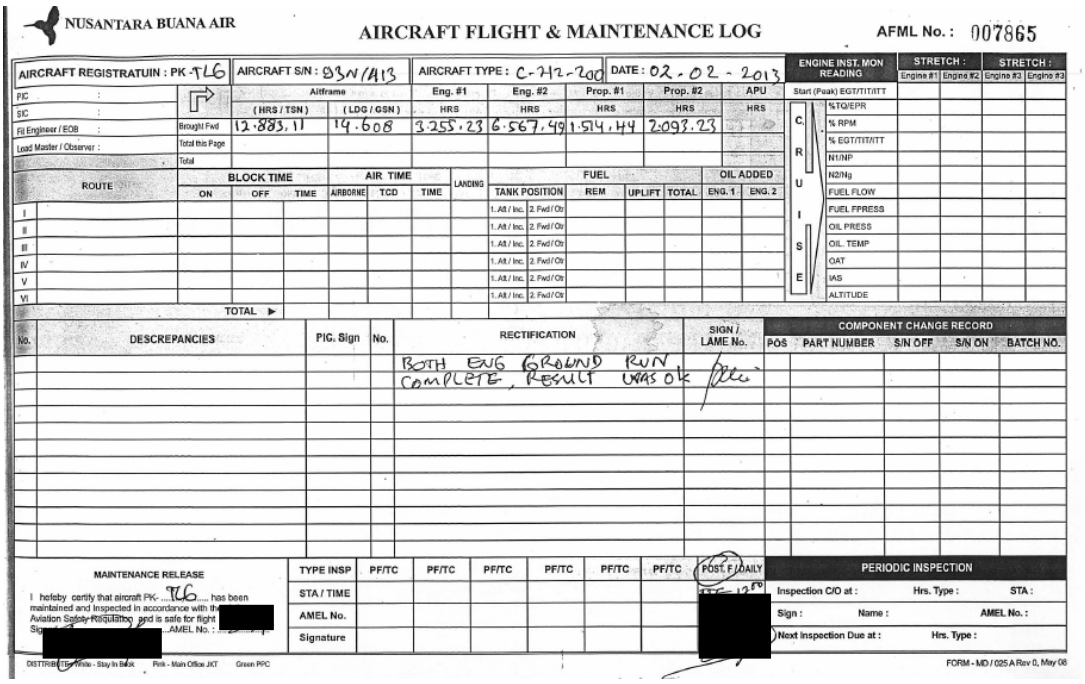


Figure 5: Aircraft flight & maintenance log on the 7 October 2012

On the 02 February 2013 on page number 007865 (See figure 6) recorded the aircraft total cycle of 14,608 cycles. The data were transferred to page 007866 (See figure 6) and was recorded 14,504 cycles. There was 104 cycles mistyping.

The last aircraft flight & maintenance log book dated 10 May 2013 recorded the total flight hour prior departure was 12,901.08 hours and total aircraft landing 14,519 cycles. On this page the data recorded the total flight hours were 3.36 hours and 3 cycles.



NUSANTARA BUANA AIR

AIRCRAFT FLIGHT & MAINTENANCE LOG

AFML No. : 007865

AIRCRAFT REGISTRATUIN : PK-TLG | AIRCRAFT S/N : 83N/A13 | AIRCRAFT TYPE : C-212-200 | DATE : 02 - 02 - 2013

	Airframe (HRS / TSN)	Airframe (LDG / GSN)	Eng. #1 HRS	Eng. #2 HRS	Prop. #1 HRS	Prop. #2 HRS	APU HRS
Brought Fwd	12.883,11	19.608	3.255,23	6.567,49	1.514,44	2.093,23	
Total this Page							
Total							

ENGINE INST. MON READING — STRETCH : — STRETCH : — Start (Peak) EGT/TIT/ITT — %TQ/EPR — % RPM — % EGT/TIT/ITT — N1/NP — N2/Ng — FUEL FLOW — FUEL FPRESS — OIL PRESS — OIL TEMP — OAT — IAS — ALTITUDE

CRUISE

ROUTE	BLOCK TIME ON	BLOCK TIME OFF	BLOCK TIME TIME	AIR TIME AIRBORNE	AIR TIME TCD	AIR TIME TIME	LANDING	FUEL TANK POSITION	FUEL REM	FUEL UPLIFT	FUEL TOTAL	OIL ADDED ENG. 1	OIL ADDED ENG. 2
I								1. Alt / Inc. 2. Fwd / Otr					
II								1. Alt / Inc. 2. Fwd / Otr					
III								1. Alt / Inc. 2. Fwd / Otr					
IV								1. Alt / Inc. 2. Fwd / Otr					
V								1. Alt / Inc. 2. Fwd / Otr					
VI								1. Alt / Inc. 2. Fwd / Otr					
TOTAL ►													

No.	DESCREPANCIES	PIC. Sign	No.	RECTIFICATION	SIGN / LAME No.
				BOTH ENG GROUND RUN COMPLETE, RESULT WAS OK	

COMPONENT CHANGE RECORD

POS	PART NUMBER	S/N OFF	S/N ON	BATCH NO.

MAINTENANCE RELEASE

I hefeby certify that aircraft PK- TLG has been maintained and Inspected in accordance with the Aviation Safety Regulation and is safe for flight

Signed : [redacted] ...AMEL No. : [redacted]

TYPE INSP	PF/TC	PF/TC	PF/TC	PF/TC	PF/TC	PF/TC	POST. F.DAILY
STA / TIME							[redacted]
AMEL No.							
Signature							

PERIODIC INSPECTION

Inspection C/O at : Hrs. Type : STA :

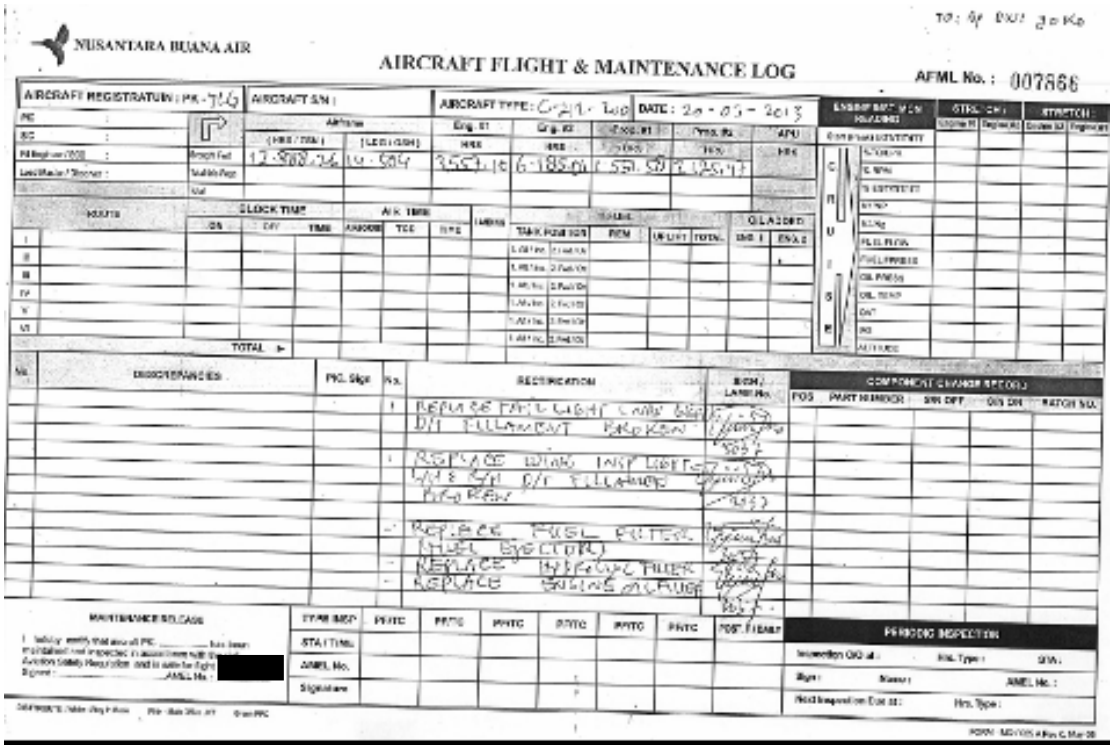
Sign : Name : AMEL No. :

Next Inspection Due at : Hrs. Type :

DISTRIBUTION : White - Stay In Book Pink - Main Office JKT Green PPC

FORM - MD / 025 A Rev 0, May 08

Figure 6: Aircraft flight & maintenance log on the 2 February 2013



NUSANTARA BUANA AIR

AIRCRAFT FLIGHT & MAINTENANCE LOG

AFML No. : 007866

AIRCRAFT REGISTRATUIN : PK-TLG | AIRCRAFT S/N : | AIRCRAFT TYPE : C-212-200 | DATE : 20 - 03 - 2013

	Airframe (HRS / TSN)	Airframe (LDG / GSN)	Eng. #1 HRS	Eng. #2 HRS	Prop. #1 HRS	Prop. #2 HRS	APU HRS
Brought Fwd	12.908,26	19.634	3.255,18	6.585,01	1.521,50	2.125,17	
Total this Page							
Total							

ENGINE INST. MON READING — STRETCH : — STRETCH : — Start (Peak) EGT/TIT/ITT — %TQ/EPR — % RPM — % EGT/TIT/ITT — N1/NP — N2/Ng — FUEL FLOW — FUEL FPRESS — OIL PRESS — OIL TEMP — OAT — IAS — ALTITUDE

CRUISE

ROUTE	BLOCK TIME ON	BLOCK TIME OFF	BLOCK TIME TIME	AIR TIME AIRBORNE	AIR TIME TCD	AIR TIME TIME	LANDING	FUEL TANK POSITION	FUEL REM	FUEL UPLIFT	FUEL TOTAL	OIL ADDED ENG. 1	OIL ADDED ENG. 2
I								1. Alt / Inc. 2. Fwd / Otr					
II								1. Alt / Inc. 2. Fwd / Otr					
III								1. Alt / Inc. 2. Fwd / Otr					
IV								1. Alt / Inc. 2. Fwd / Otr					
V								1. Alt / Inc. 2. Fwd / Otr					
VI								1. Alt / Inc. 2. Fwd / Otr					
TOTAL ►													

No.	DESCREPANCIES	PIC. Sign	No.	RECTIFICATION	SIGN / LAME No.
1			1	REPLACE TAIL LIGHT LAMP BOTH O/I FILLAMENT BROKEN	
2			2	REPLACE WING INSP LIGHT L/H & R/H O/I FILLAMENT BOTH BROKEN	
3			3	REPLACE FUEL FILTER (FUEL EXCLUDE)	
4			4	REPLACE HYDRAULIC FILTER	
5			5	REPLACE ENGINE OIL FILTER	

COMPONENT CHANGE RECORD

POS	PART NUMBER	S/N OFF	S/N ON	BATCH NO.

MAINTENANCE RELEASE

I hefeby certify that aircraft PK- ..... has been maintained and Inspected in accordance with the Aviation Safety Regulation and is safe for flight

Signed : [redacted] ...AMEL No. : [redacted]

TYPE INSP	PF/TC	PF/TC	PF/TC	PF/TC	PF/TC	PF/TC	POST. F.DAILY
STA / TIME							
AMEL No.							
Signature							

PERIODIC INSPECTION

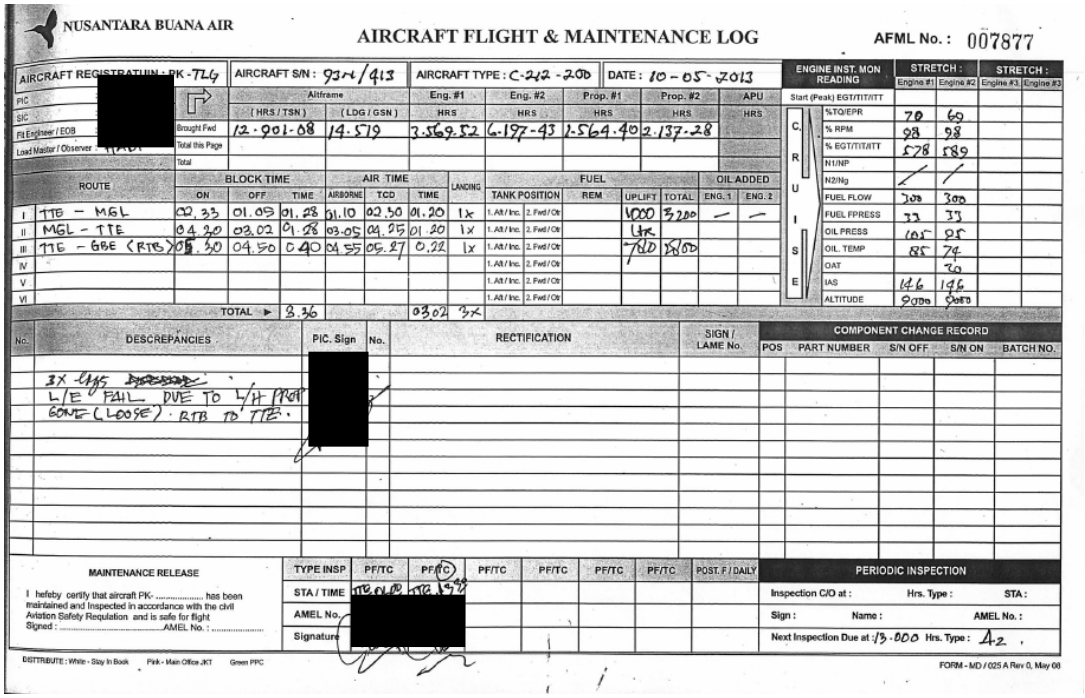
Inspection C/O at : Hrs. Type : STA :

Sign : Name : AMEL No. :

Next Inspection Due at : Hrs. Type :

Figure 7: Aircraft flight & maintenance log on the 20 March 2013

The investigation did not find any correction on the above transferring errors.



NUSANTARA BUANA AIR

AIRCRAFT FLIGHT & MAINTENANCE LOG

AFML No. : 007877

AIRCRAFT REGISTRATION : PK-TLG | AIRCRAFT S/N : 9314/413 | AIRCRAFT TYPE : C-212-200 | DATE : 10-05-2013

PIC [redacted]
SIC
Fit Engineer / EOB
Load Master / Observer

	Airframe (HRS / TSN)	Airframe (LDG / GSN)	Eng. #1 HRS	Eng. #2 HRS	Prop. #1 HRS	Prop. #2 HRS	APU HRS
Brought Fwd	12.901.08	14.579	3.569.52	6.197-43	1.564.40	2.137.28	
Total this Page							
Total							

ROUTE	BLOCK TIME ON	BLOCK TIME OFF	BLOCK TIME TIME	AIR TIME AIRBORNE	AIR TIME TCD	AIR TIME TIME	LANDING	FUEL TANK POSITION	FUEL REM	FUEL UPLIFT	FUEL TOTAL	OIL ADDED ENG. 1	OIL ADDED ENG. 2
I TTE – MGL	02.33	01.05	01.28	01.10	02.50	01.20	1x	1. Alt / Inc. 2. Fwd / Otr		4000	3200	—	—
II MGL – TTE	04.20	03.02	01.28	03.05	04.25	01.20	1x	1. Alt / Inc. 2. Fwd / Otr		Ltr			
III TTE – GBE (RTB)	05.30	04.50	0.40	04.55	05.27	0.22	1x	1. Alt / Inc. 2. Fwd / Otr		TKD	1800		
IV								1. Alt / Inc. 2. Fwd / Otr					
V								1. Alt / Inc. 2. Fwd / Otr					
VI								1. Alt / Inc. 2. Fwd / Otr					
TOTAL ►	3.36					03.02	3x						

ENGINE INST. MON READING — STRETCH : Engine #1 / Engine #2 — STRETCH : Engine #3 / Engine #4

CRUISE	Start (Peak) EGT/TIT/ITT		
	%TQ/EPR	70	69
	% RPM	98	98
	% EGT/TIT/ITT	578	589
	N1/NP	/	/
	N2/Ng	/	/
	FUEL FLOW	308	300
	FUEL FPRESS	33	33
	OIL PRESS	105	95
	OIL TEMP	85	74
	OAT		20
	IAS	146	146
	ALTITUDE	9000	9000

No.	DESCREPANCIES	PIC. Sign	No.	RECTIFICATION	SIGN / LAME No.
	3X ~~LHS~~ ~~RHS~~ L/E FAIL DUE TO L/H PROP GONE (LOOSE). RTB TO TTE.	[redacted]			

COMPONENT CHANGE RECORD

POS	PART NUMBER	S/N OFF	S/N ON	BATCH NO.

MAINTENANCE RELEASE

I hefeby certify that aircraft PK- ..... has been maintained and Inspected in accordance with the civil Aviation Safety Regulation and is safe for flight
Signed : ..... AMEL No. : .....

TYPE INSP	PF/TC	PF/TC	PF/TC	PF/TC	PF/TC	PF/TC	POST. F / DAILY
STA / TIME	TTE 01.05	TTE 14.43					
AMEL No.	[redacted]						
Signature							

PERIODIC INSPECTION

Inspection C/O at : Hrs. Type : STA :
Sign : Name : AMEL No. :
Next Inspection Due at : 13.000 Hrs. Type : A2

DISTRIBUTE : White - Stay In Book Pink - Main Office JKT Green PPC

FORM - MD / 025 A Rev 0, May 08

Figure 8: Aircraft flight & maintenance log on the 10 May 2013

1.7 Meteorological Information

Not relevant to this accident.

1.8 Aids to Navigation

Not relevant to this accident.

1.9 Communications

Not relevant to this accident.

1.10 Aerodrome Information

Not relevant to this accident.

1.11 Flight Recorders

The aircraft was not equipped with a Flight Data Recorder it was not required by current Indonesian aviation regulations.

1.11.1 Cockpit Voice Recorder

Details of the CVR were:

Manufacturer : Fairchild

Type/Model : SSCVR

Part Number : 93-A100-80

Serial Number : 61252

The CVR was downloaded at KNKT facility on 13 May 2013 and contained 32 minutes of good quality recording. The audio files were examined found to contain the accident flight.

1.12 Wreckage and Impact Information

There was no other damaged to the aircraft other than the left propeller assembly which detached.

Parts of rear hub half was still intake to the propeller flange of the left engine while the detach parts of the hub half and the propeller were not recover.

1.12.1 The Left Propeller Hub

Further examination of the left rear propeller hub half was found crack about 70%.

The investigation could not find the detail report of any graph or quantitative data of the Ultrasonic Inspection result of inspection other than the statement of no crack.

The left propeller hub was send to metallurgy laboratory of the Institute Technology of Bandung (ITB) for further observation.

Figure 9: Remaining left propeller hub half attached at the propeller flange

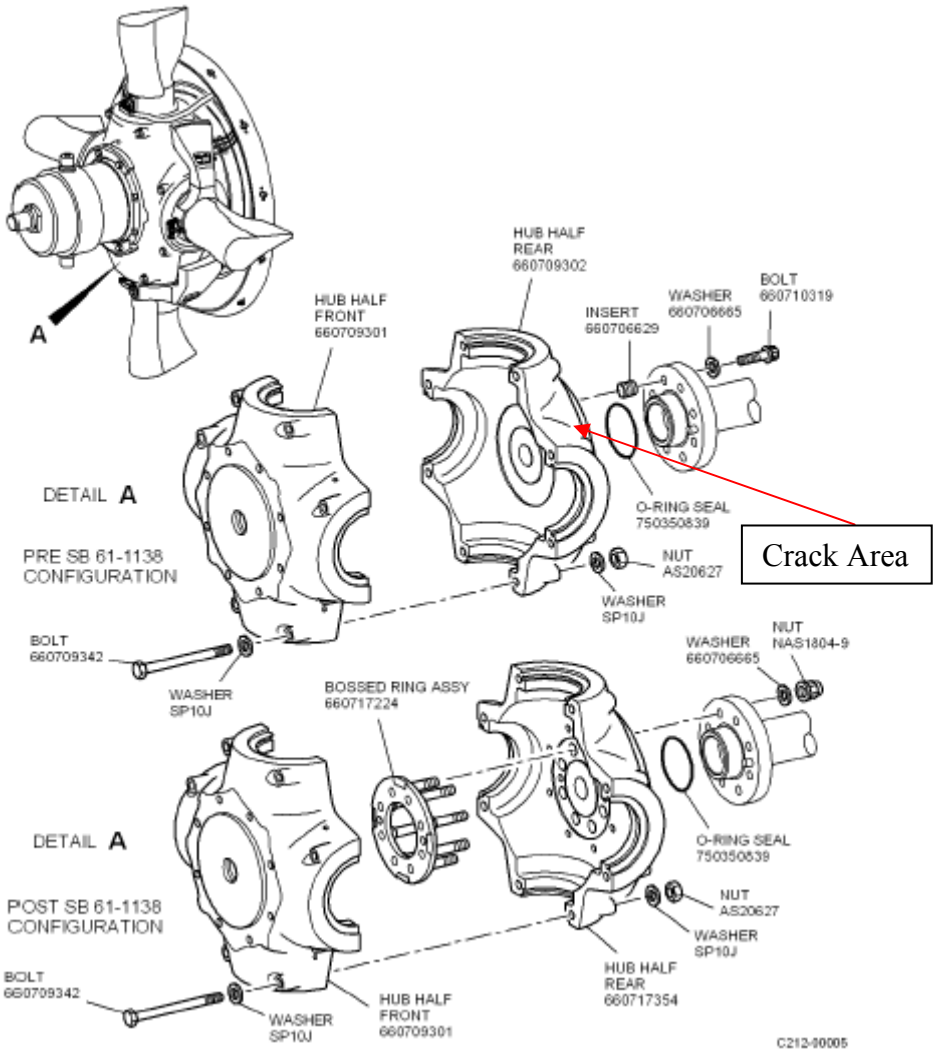


Figure 10: Detail of propeller assembly

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.

1.15 Survival Aspects

The passenger and the flight crew disembarked normally at the apron.

1.16 Tests and Research

1.16.1 Observation on the Fail Part

Observation on the fracture surface revealed that fatigue cracks (area with beach-marks) had propagated / progressed to a large area, so that the remaining area of the final failure (area with-out beach-marks) is approximately 30% of the original area. The dark colored surface indicates that fatigue cracks developed much earlier that the cracks shown at the bright fracture surface. Dark color was due to exposure to exhaust gas during propeller reverse operation.

The fatigue cracks originated from the edges of the fastening holes. (See figure 11 and figure 12).

Figure 11: Fatigue cracks: darker surface shows earlier crack development while the lighter surface shows cracks developed somewhat later

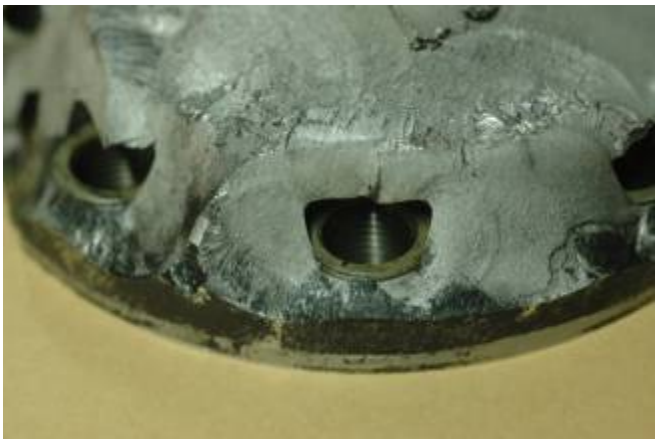


Figure 12: Fatigue cracks started from edges of fastening hole

Further SEM (Scanning Electron Microscope) observation was performed on two nearby points close to the fastening hole, which were identified as the initiation of the fatigue crack propagation.

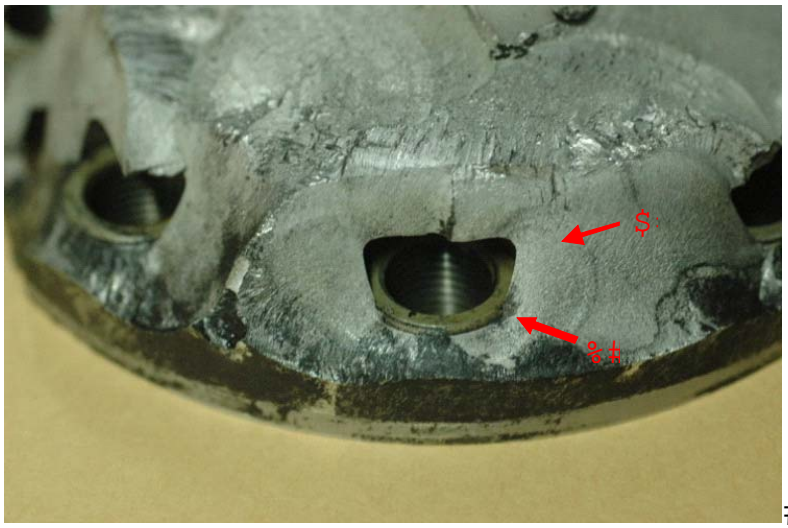


Figure 13: Two points of observations, which were identified as the initiation of the fatigue crack propagation

Striations which were front lines indicated propagation of fatigue crack per load cycle shown on the following figures:

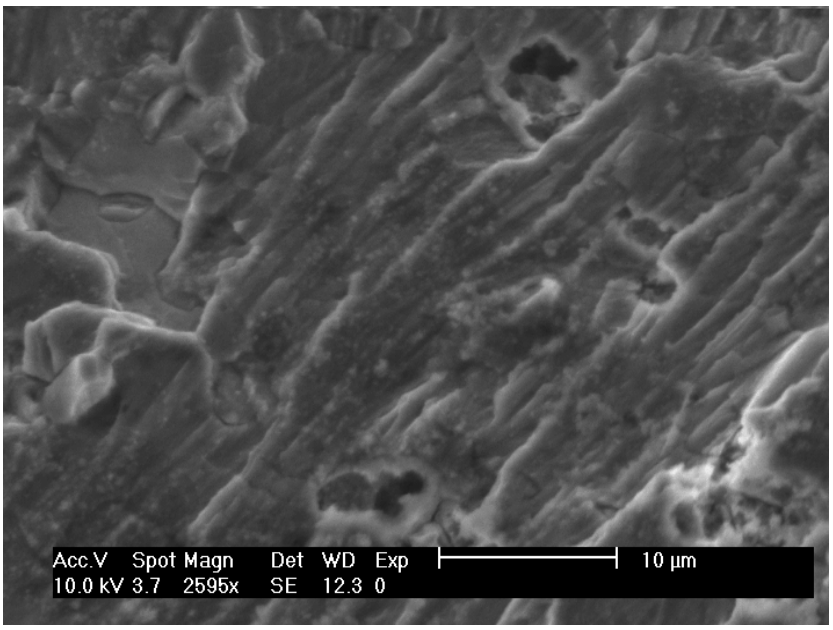


Figure 14: Striations found on the point B with the gap between lines Approximately 5 µm

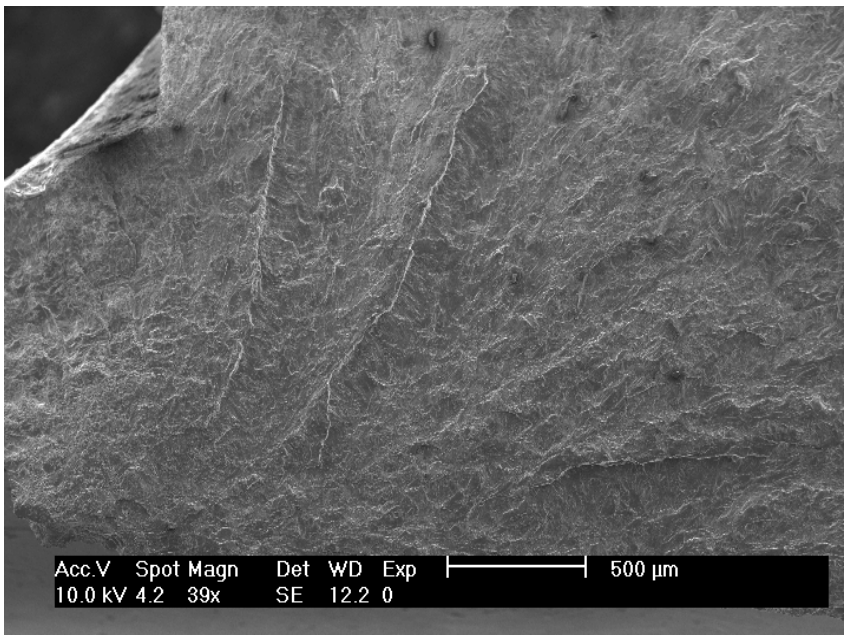


Figure 15: Striation on point A with gap between lines approximately 500 µm

Refer to the gaps between striations, it can be predicted that the rate of fatigue crack propagation approximately 100 – 200 µm /load cycle.

Assuming that the fastening hole was the initial point of the fatigue crack and the distance of the fastening hole to the middle of the propeller hub was 8 cm. The rate of propagation was 100-200 µm /load cycle. The fatigue crack would reach to the middle of the propeller hub after 400-800 load cycles. 400 – 800 load cycles has exceeded the inspection interval.

1.17 Organizational and Management Information

Aircraft Operator : PT. Nusantara Buana Air
Jalan DR Saharjo No. 123EF
Jakarta 12860, Indonesia.

1.17.1 Continues Airworthiness Maintenance Program

The Aircraft maintained under Continues Airworthiness Maintenance Program (CAMP) for CASA 212-200 of PT. Nusantara Buana Air, approval Number DKUPPU/0768/APP/2008

The inspection program contained:

a. Applicability

The continuous airworthiness maintenance program applicable to the following:

- Aircraft type : NC 212-200
- Engine Type : Garret TPE 331-10-512C
- Propeller type : Dowty Rotol R334/4-82/13

b. Aircraft Schedule Inspection.

The schedule Inspection contain of preflight, transit, post flight check. Periodic inspections based on flight time interval are: A check every 100 hours (A1 up to A3), C check every 600 hours (C1 up to C6). Periodic inspection base on calendar yearly interval divided into Y1 up to Y8.

c. Component inspection and Airworthiness Limitation.

The Airworthiness Limitation Item and component maintenance/inspection interval were varied in hourly, cycle, and calendar (yearly) basis.

The propeller assembly inspection should be performed 300 hours or 300 cycle interval whichever reached first as stated on the Service Bulletin no, 61-1119.

1.18 Additional Information

1.18.1 Airworthiness Directive

The DGCA issued AD No. 13-06-001 dated 05 June 2013 Relating to the propeller rear half hub failure, referred to the UK CAA issued AD No.2005- 0027; EASA issued AD No. 2010-0196R1;

Subject/Description

Fatigue failure has occurred around the threaded in the rear hub half leading to separation of the R334 propeller on CASA 212-200 aero plane.

This condition if not detected and corrected result in further events of propeller separation, possibly resulting in danger to the aero plane and or injury to person on the ground.

For the reason describe above, this AD retain the repetitive inspection requirement of EASA AD 2009-0147 and CAA UK Ads 009-05-2002, 010-05-2001 and 011-05-2002, which are superseded reduces the inspection intervals for the NDT inspection and procedure an optional terminating action to the inspection requirement of all propeller fitted with hub part number 660709201

This AD has been review for reasons of standardization and clarification, to confirm that two other CAA UK Ads have been suspended.

Compliance

This AD is required to be performed within the compliance as specified reference AD.

Accomplishment

This AD shall be accomplished in accordance with the reference AD.

EFFECTIVE DATE: 26 October 2010.

1.18.2 Propeller Log Book

The NBA used the propeller log book issued by the Directorate General Civil Aviation; Sub Directorate Maintenance Control; Directorate Airworthiness Certification; Number KU 066, revision V 1092. The recording column available was flight hour only and no column for flight cycle. (See appendices 6.3).

The availability of column in the propeller log book had made the maintenance key personnel interpretation that the inspection interval for propeller was based on flight hour only. The Continuous Airworthiness Maintenance Program stated that the propeller inspection interval may be based on flight hour, cycle, and calendar /yearly basis.

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.

2 ANALYSIS

2.1 Cause of Failure

The examination on the remaining left propeller hub fracture surface revealed that the failure was due to fatigue. The fatigue cracks (area with beach-marks) had propagated / progressed to a large area, so that the remaining area of the final failure (area with-out beach-marks) was approximately 30% of the original area. Fatigue cracks initiated at the edge of the fastening hole. The dark colored surface indicates that fatigue cracks developed much earlier than the cracks shown at the bright fracture surface.

The dark color was due to exposure to exhaust gas during propeller reverse operation.

2.2 Aircraft Maintenance Records

The aircraft & maintenance log dated 05 October 2012 page 009337 recorded the aircraft total cycles was 14,294 cycle, while on 07 October 2012 on page 009339 the total cycle was transferred as 14,284 cycles. There was a transfer error of recorded aircraft total cycle by 10 cycles.

The aircraft & maintenance log dated 02 February 2013 on page number 007865 the aircraft total cycle recorded 14,608 and transferred to page 007866 became 14,504 cycles. There was a transfer error by 104 cycles less. The total transfer error on page 009339 and page 007866 was 114 cycles.

The last Non Destructive Inspection (NDI) of the left propeller was performed on 04 October 2012 at total aircraft flight hours of 12,634.08 hours and total aircraft flight cycle of 14,181 cycles. The interval of NDI was 300 flight hours or 300 cycles whichever reached first, as stated on the Service Bulletin no, 61-1119. The next schedule for NDI was at 12,934 flight hours or 14,481 cycles.

The aircraft component status recorded on the day of the accident (10 May 2013) stated that total aircraft flight hour was 12,904.1 hours and total flight cycle was 14,522 cycles. The total aircraft cycle on 10 May 2013 with addition of the transfer error was 14,636 cycles.

The next scheduled inspection base on flight cycle should be performed on 14,481cycles. The accident flight has been exceeded 155 cycles of the schedule inspection.

This exceed of flight cycle interval for the next NDI might due to miss-interpretation of maintenance personnel that the interval was based on flight hour only.

2.3 Miss-interpretation of maintenance interval

The propeller Log Book issued by Sub Directorate of Maintenance Control; Directorate of Airworthiness; Number KU 066, revision V 1092, the recording column available was in flight hour only. There was no column for flight cycle.

According to service Bulletin No, 61-1119 stated that the hub assemblies Part No. 660709201, included in propellers installed on Casa 212 aircraft, the periodic inspection should be carry out at an interval of 300 flying hours or 300 flight cycles, whichever reached first.

In-availability of flight cycle column on the propeller log book may lead to maintenance

personnel interpret that the interval inspection of the propeller was based on flight hour only.

3 CONCLUSIONS

3.1 Findings

a. The operator has an approved Continuous Airworthiness Maintenance Program.

b. Both pilots have valid licenses and medical certificates.

c. The left propeller assembly detached from the rear hub half in flight.

d. The aircraft landed safely.

e. The rear hub half has failed due to fatigue crack which was undetected.

f. The propeller assembly inspection should be performed 300 hours or 300 cycle interval whichever reached first as stated on the Service Bulletin no, 61-1119.

g. There was error on transferring data of flight cycle in the aircraft maintenance log up to 114 cycles.

h. The Non Destructive Inspection of the failure part has exceeded 155 cycles from the next schedule 300 cycles inspection interval.

i. The next NDI inspection of the left propeller hub based on flight hour was 30 hours.

j. The propeller log book did not contain flight cycle column and therefore the flight cycle was not recorded.

k. The maintenance personnel interpreted that the inspection interval for propeller assembly was based on flight hour only.

3.2 Contributing Factors[1]

- The failure of the hub half was due to fatigue crack which was undetected as the Non Destructive Inspection has exceeded 154 cycles form the next schedule of inspection.
- The exceeding of flight cycles was due to transfer error of data and miss-interpretation of inspection interval.
- The recording column of the Propeller Log Book available in flight hour only, it may miss lead the interpretation of the maintenance personnel of the inspection interval based on flight hour only instead of both flight hour and flight cycle.

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

4 SAFETY ACTION

At the time of issuing this final investigation report, the Komite Nasional Keselamatan Transportasi (KNKT) had been informed of safety actions resulting from this occurrence.

4.1 The Nusantara Buana Air

- On 16 May 2013 PT. Nusantara Buana Air informed the Komite Nasional Keselamatan Transportasi that it had taken the following safety action to address the Propeller Half Hub NDI safety deficiency to all Casa 212-200 in their fleet by performing Airworthiness Directive No. 2005-25 /the SB No. 61-1119 R5. The result of the inspection was reported of no evident of crack of each inspected propeller.
- Issued Engineering information No CA212-EI-61-001 subject: Control of the propeller interval inspection in Flight hour and Cycle.

4.2 Directorate airworthy and Aircraft Operation

Issued AD No. 13-06-001 dated 05 June 2013 relating to the propeller rear half hub failure.

5 SAFETY RECOMMENDATIONS

As a result of this investigation, the Komite Nasional Keselamatan Transportasi issued safety recommendations to address safety issues identified in this report.

5.1 PT. Nusantara Buana Air

a. Shall improve the knowledge of the maintenance personnel related to the aircraft inspection, maintenance record and controlling the aircraft airworthiness.

b. Shall review the current Aircraft Component Status of Casa 212 -200 to meet to the requirement of the Approve CAMP, Service Bulletin and related Civil Aviation Safety regulation.

5.2 Directorate General of Civil Aviation; c.q. Directorate of Airworthiness and Aircraft Operation

a. To review and emphasize the implementation of the standard of safety over sight.

b. Should review the implementation of the standard qualification of the maintenance personnel related to the duty and responsibility

c. Review the using of the Propeller log book and other log book produced by the Sub Directorate of Maintenance Control; Directorate Airworthiness to meet to the maintenance recording in accordance with the current Civil Aviation Regulation.

d. To emphasize the NDI approved facility to implement the inspection requirement for the required a quantitative limitation, to have a quantitative result.

6 APPENDICES

6.1 A sample of Propeller half rear hub inspection result

NDT TEST REPORT
Laporan Hasil Uji

DGCA-AMO 145-14700

LAB. NON DESTRUCTIVE TESTING QUALITY CONTROL
PT. REKATAMA PUTRA GEGANA AVIATION
Jalan Bima No. 90 Bandung 40172 Telp. (022) 6046497 Fax. (022) 6044495
http : //www.rpgrekatama.co.id e-mail : contact@rpgrekatama.co.id

DGCA DAAO

Customer Name & RW/WO *Nama Customer & RO/WO*	: PT. Nusantara Buana Air NBA-009/05/13	**Report Number** *Nomor Laporan*	: 104/NDT-RPG/05/2013
Part To Be Tested *Barang Yang Diperiksa*	: Propeller Hub (Rear Half) LH P/N 660709201	**Type/Model** *Type/Model*	: R334/4-82-F/13 DRG/343/84
Inspection Method *Metoda Pemeriksaan*	: Ultrasonic Testing	**Receive Date** *Tanggal Terima*	: May 15, 2013
Quantity *Jumlah*	: 1 ea	**Finish Date** *Tanggal Selesai*	: May 16, 2013
Program/Reference *Program/Reference*	: 300 Flight Cycle Cassa PK-TLE	**Ref. Manual** *Dokumen Ref.*	: AD 2005-25-10 SB No. 61-1119 Rev. 5

DESCRIPTION OF TEST
Uraian Hasil Pemeriksaan

INSPECTED BY ULTRASONIC TESTING MERK KRAUTKRAMER TYPE USK7 S/N 27274/2190
PROBE 5 MHz DIA 0,125 INCH, CALIBRATION DUE DATE : JANUARY 12, 2014
RESULT : NO CRACK INDICATION (SATISFACTORY)

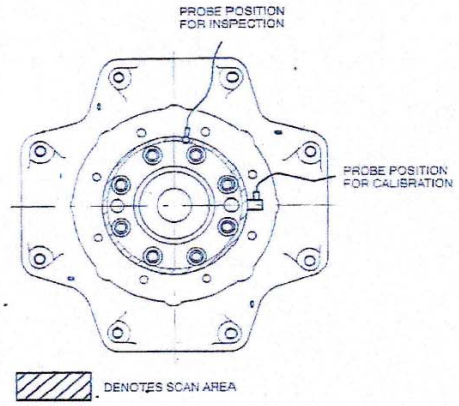


Figure 2

Left Side

Inspected by : [redacted]
Diperiksa oleh

Approved by : [redacted]
Disetujui oleh

Note :
Catatan
1. Claim after 3 (three) month from date of issued will not be accepted.
   Pengaduan atas hasil uji setelah tiga bulan dari tanggal laporan, tidak diterima.
2. This certificate may not be reproduced, without permission from the head of quality control
   Tidak dibenarkan memperbanyak laporan hasil uji, tanpa seijin kepala quality control.

Form RPG 20-02/13 (1) Asli untuk customer. (2) Salinan untuk arsip.

Merpati
MerpatiMaintenance Facility
Juanda International Airport
Surabaya Indonesia

NDT Report

JO No : 1136993

Phone No. 62-31-8686 382, Fax No. 62-31-8686489 Email : mmf_marketing@merpati.co.id

Description	: AIRCRAFT	Customer	: PT NBA
A/C Type/Part No.	: CA-212	W O Number	: QN/213/MZ Approved
A/C Reg/Serial No.	: PK-TLH	Vendor	: DOWTY ROTOL
Complaint	: NDT PROP HUB		
Job Request	: NON DESTRUCTIVE INSPECTION		

NDT Report Number	: NDI / RPT / 40-01 / V / 2013
Reason/Job Ref.	: AD G-2005-0027
Reference	: SB 61-1119 R5
Method	: ULTRASONIC TESTING
Description of Inspection	: INSPECT FOR CRACK THE PROPELLER HUB REAR HALF REAR WALL (RH PROPELLER ASSY S/N: DRG/335/84)
Discrepancy Found	: NO Defect Card : N/A
Inspection Result	: NO CRACK INDICATION

Detail Illustrated : N/A

Material Used

No.	Description	Part Number	Serial No./Qty	Remarks
	N/A			

Tool/Equipment Used

No.	Description	Part Number	Serial Number	Expired Date
1	ULTRASONIC FLAW DETECTOR	USM35X	5287A	2013-07-20

This inspection specified above has been carried out in accordance with the current requirements and/or related approved maintenance specification.

Manhour : 2.00	Performed by : [redacted]	Certified by (sign & stamp) : [redacted]
Date : MAY 14 2013		

Form : F02-0407R2

6.2 Airworthiness Directive

Republic of Indonesia - Ministry of Transportation
Directorate General of Civil Aviation

Airworthiness Directive

This Airworthniess Directive (AD) is issued by DGCA in accordance with the requirements of CASR Part 39. ADs affect aviation safety and are regulations which require immediate attention. Part 39 of CASR is amended by adding the following new AD. No Person may operate a product to which an AD applies except in accordance with the requirements of that AD.
NOTE : A ferry flight permit to fly the aircraft to a location where the requirements of this directive can be acomplished, may be granted by application to DGCA. Report and inquiring concerning this AD should be addressed to the DGCA. Alternative means of compliance with this directive may be used only if approved by the Director General.

DAAO FORM 39-02

NUMBER: 13-06-001 **DATE OF ISSUE:** 05 June 2013

APPLICABILITY:

GE Aviation Systems Ltd, trading as Dowty Propellers, R334/4-82-F/13 propellers, if fitted with Part Number (P/N) 660709201 hub assemblies. These propellers are known to be installed on, but not limited to, CASA C-212 airplanes.

REFERENCE:

EASA AD 2010-0196R1

SUBJECT/DESCRIPTION:

-Fatigue failure has occurred around the threaded inserts in the rear hub half, leading to separation of the R334 propeller on CASA C-212 aeroplanes.
This condition, if not detected and corrected, could result in further events of propeller separation, possibly resulting in damage to the aeroplane and/or injury to person on the ground.
-For the reasons described above, this AD retains the repetitive inspection requirements of EASA AD 2009-0147 and CAA UK ADs 009-05-2002, 010-05-2002 and 011-05-2002, which are superseded, reduces the inspection intervals for NDT inspection and introduces an optional terminating action to the inspection requirements of all propellers fitted with hub P/N 660709201.
-This AD has been revised for reasons of standardisation and clarification, to confirm that two other CAA UK ADs have been superseded.

COMPLIANCE:

This AD is required to be performed within the compliance as specified reference AD .

ACCOMPLISHMENT:

This AD shall be accomplished in accordance with the reference AD.

EFFECTIVE DATE: 26 October 2010

NOTE: This AD revises EASA AD 2010-0196 dated 29 September 2010, which superseded EASA AD 2009-0147 dated 07 July 2009 and CAA-UK AD 009-05-2002, 010-05-2002 and 011-05-2002.

On behalf of Director General of Civil Aviation

MURSYIDIN
Acting Director of Airworthiness and Aircraft Operation

6.3 Propeller Log Book

A/C	POS	INST. DATE	REMOVE. DATE
TLH	LH	28-10-08	27/6-09
TLP	P/H	27/6-09	23/10-09
TL6	P/H	23/9-2010	

Form. : K.U. 066

MINISTRY OF TRANSPORTATION
DIRECTORATE GENERAL OF AIR COMMUNICATIONS
DIRECTORATE OF AIRWORTHINESS CERTIFICATION

VARIABLE - PITCH

PROPELLER : V
LOG BOOK

SERIAL NUMBER : DRG - 344 / 84
BOOK NUMBER

Dikeluarkan Oleh :
Issued By

Sub Direktorat Pengendalian Perawatan
Direktorat Sertifikasi Kelaikan Udara
Gedung Karya Lantai 22
Jln. Medan Merdeka Barat No. 8
Jakarta 10110 - Indonesia

REV. : V 1092

PROPELLER DIPASANG PADA
Propeller Fitted to

ENGINE TYPE : TPE. 331-10U-512C
ENGINE S/N : P-37411C
FITTED AT ENGINE HRS :

AIRCRAFT TYPE : CASA-212-200 37
AIRCRAFT REG. MARK : PK-TLG
POSITION : R.H.

JAM DARI HALAMAN DEPAN
Hours brought forward

Waktu sejak baru - jam / Time Since New - Hours : Menit / Mins
Waktu sejak pembongkaran terakhir - jam / Time Since Last Complete Overhaul - Hours : Menit / Mins

Tanggal Date	Waktu di Udara Time in Air		Jam Sejak Pembongkaran terakhir Accumulated Hours S.L.O				*) Rincian tentang pemeriksaan rutin/kecil, perbaikan kecil. Enter full details of inspection, minor repairs, dan surat tanda pengesahan perawatan dibelakang buku ini and Maintenance Release Certificates issued hereunder
	Jam Hours	Menit Mins	Jam Hours		Menit Mins		
brought forward			12086	0	1962	40	
31-Oct-2012	3	41	12089	41	1966	21	
1-Nov-2012	2	58	12092	39	1969	19	
2-Nov-2012	4	47	12097	26	1974	6	
3-Nov-2012	5	38	12103	4	1979	44	
5-Nov-2012	5	38	12108	42	1985	22	
6-Nov-2012	3	51	12112	33	1989	13	
7-Nov-2012	4	50	12117	23	1994	3	
8-Nov-2012	4	4	12121	27	1998	7	
9-Nov-2012	4	46	12126	13	2002	53	
10-Nov-2012	6	0	12132	13	2008	53	
12-Nov-2012	5	48	12138	1	2014	41	
13-Nov-2012	4	20	12142	21	2019	1	
14-Nov-2012	4	0	12146	21	2023	1	
15-Nov-2012	4	16	12150	37	2027	17	
16-Nov-2012	5	0	12155	37	2032	17	
17-Nov-2012	6	0	12161	37	2038	17	
19-Nov-2012	6	0	12167	37	2044	17	
20-Nov-2012	4	15	12171	52	2048	32	
21-Nov-2012	3	52	12175	44	2052	24	
22-Nov-2012	4	20	12180	4	2056	44	
23-Nov-2012	5	52	12185	56	2062	36	
Jumlah jam dipindahkan ke halaman berikutnya Hours Carried Forward TOTAL			12185	56	2062	36	

Tiap Pesanda tangnaan pada halaman ini akan dianggap sebagai pernyataan bahwa pada propeller telah dikerjakan hal yang sesuai dengan catatan yang bersangkutan
A signature under or in line with the entry in this page will be taken as a certification that the entry is correct.