KOMITE NASIONAL KESELAMATAN TRANSPORTASI
REPUBLIC OF INDONESIA

FINAL

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Aircraft Serious Incident Investigation Report

PT. Wings Abadi Airlines
ATR 72-212A; PK-WHS

and

Balai Pendidikan dan Pelatihan Penerbangan Banyuwangi
Cessna 172S; PK-BYK

Near NAMP ISLAND, West Nusa Tenggara
Republic of Indonesia

21 November 2017

2019

This Final Investigation Report is published by the Komite Nasional Keselamatan Transportasi (KNKT), Transportation Building, 3rd Floor, 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).

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Jakarta, April 2019

KOMITE NASIONAL
KESELAMATAN TRANSPORTASI

Chairman

SOERJANTO TJAHJONO

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ABBREVIATIONS AND DEFINITIONS

AIP	:	Aeronautical Information Publication
AOC	:	Airline Operator Certificate
ATC	:	Air Traffic Control
ATS	:	Air Traffic Services
ATZ	:	Aerodrome Traffic Zone
BMKG	:	*Badan Meteorologi Klimatologi Geofisika* / Meteorological Climatological and Geophysics Agency
BP3B	:	Balai Pendidikan dan Pelatihan Penerbangan Banyuwangi
C of A	:	Certificate of Airworthiness
C of R	:	Certificate of Registration
CASR	:	Civil Aviation Safety Regulation
CTR	:	Control Zone
CVR	:	Cockpit Voice Recorder
FDR	:	Flight Data Recorder
FL	:	Flight Level
GPS	:	Global Positioning System
KNKT	:	Komite Nasional Keselamatan Transportasi
LT	:	Local Time
NOTAM	:	Notice to Airmen
PF	:	Pilot Flying
PIC	:	Pilot in Command
PM	:	Pilot Monitoring
PPL	:	Private Pilot License
PSC	:	Pilot School Certificate
QAR	:	Quick Access Recorder
SIC	:	Second in Command
SOP	:	Standard Operation Procedures
SP	:	Student Pilot
STAR	:	Standard Arrival
T^2CAS	:	Terrain and Traffic Collision Avoidance System
TAWS	:	Terrain Awareness Warning System
TCAS	:	Traffic Collision Avoidance System
TCAS RA	:	Traffic Collision Avoidance System Resolution Alert
TMA	:	Terminal Control Area
UTC	:	Universal Coordinated Time
VHF	:	Very High Frequency

VOR : VHF Omnidirectional Range

SYNOPSIS

On 21 November 2017, a Cessna 172S aircraft registered PK-BYK was being operated by Balai Pendidikan dan Pelatihan Penerbangan Banyuwangi (BP3B) on a cross country training flight from Blimbingsari airport (WADY), Banyuwangi to Sultan Muhammad Kaharuddin airport (WADS), Sumbawa Besar.

On board the PK-BYK were two student pilots. The Student Pilot 1 (SP1) acted as Pilot Flying (PF) and the Student Pilot 2 (SP2) acted as Pilot Monitoring (PM). Prior to departure there was no report or record of aircraft system malfunction.

The PK-BYK departed from Banyuwangi with intention to cruise at altitude of 7,000 feet and when approached point KUBU TAMBAHAN, the PK-BYK pilot requested to Bali approach controller to climb to altitude of 9,000 feet and was approved.

At the same day, an ATR72-600 aircraft registered PK-WHS was being operated by PT. Wings Abadi Airlines (Wings Air) as a scheduled passenger flight from Sumbawa to Lombok International Airport (WADL), Nusa Tenggara Barat with flight number WON1861. Prior to departure there was no report or record of aircraft system malfunction.

The WON1861 departed from Sumbawa with cruising altitude of 8,000 feet. On board the aircraft were two pilots, two flight attendants and 62 passengers, the Pilot in Command (PIC) acted as PM and the Second in Command (SIC) acted as PF.

When the PK-BYK aircraft approaching point NAMP ISLAND, the PK-BYK PF saw an ATR72-600 aircraft flew through clouds from the opposite direction with aircraft nose slightly up. The PK-BYK PF assumed that the ATR72-600 aircraft was on climbing and then the PF decided to descend with intention to avoid the ATR72-600 aircraft.

The separation of both aircraft reduced to below minima when the PK-BYK pilot left altitude 9,000 feet at 01:31:40 UTC, the distance of both aircraft was 4.7 Nm and continued reducing.

Both flights continued their flight to the destination safely. The aircraft was undamaged and no one injured in this occurrence.

The investigation determined that the aircraft and radio communication serviceability were not issues in this occurrence and the investigation concluded the contributing factor was the assumption of ATR72-600 on climbing and not aware of the right of way rules resulted in the PK-BYK pilot decided to descend aircraft for traffic avoidance.

The KNKT had been informed corrective action taken by the AirNav Indonesia and BP3B responding to the KNKT safety recommendation in the preliminary report. The KNKT acknowledged the corrective actions and considered relevant to address the safety issue described in this report. Therefore, KNKT did not issue safety recommendation in this report.

1 FACTUAL INFORMATION

1.1 History of the Flight

On 21 November 2017, a Cessna 172S aircraft registered PK-BYK was being operated by Balai Pendidikan dan Pelatihan Penerbangan Banyuwangi (BP3B) on a cross country training flight from Blimbingsari airport (WADY), Banyuwangi[1] to Sultan Muhammad Kaharuddin airport (WADS), Sumbawa Besar[2]. The flight plan route followed the Visual Flight Rules (VFR) route as follows: Banyuwangi – GILIMANUK – GEROKGAK – SERIRIT – KUBU TAMBAHAN – TEJAKULA – TANJUNG BATUTIGA – LABUHAN PON – LEMBAR – LMB VOR[3] – LABUHAN HAJI – NAMP ISLAND – SAROKAYA – Sumbawa (figure 1).

On that day, PK-BYQ, another Cessna 172S aircraft operated by BP3B conducted cross country training flight on the same route.

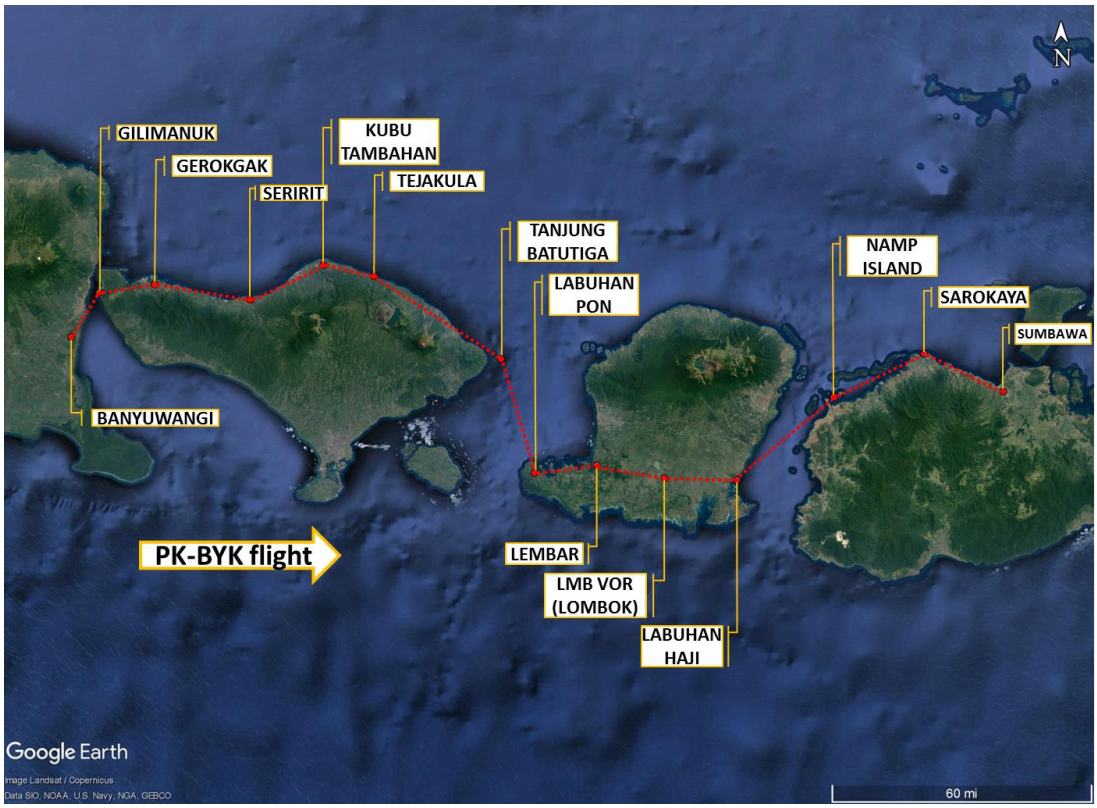

Figure 1: The flight plan route of PK-BYK

On board the aircraft were two student pilots. The Student Pilot 1 acted as Pilot Flying (PF) and the Student Pilot 2 acted as Pilot Monitoring (PM). Prior to departure there was no report or record of aircraft system malfunction.

1 Blimbingsari airport (WADY), Banyuwangi will be named as Banyuwangi for the purpose of this report.

2 Sultan Muhammad Kaharuddin airport (WADS), Sumbawa Besar will be named as Sumbawa for the purpose of this report.

3 The LMB is the name of the VOR in Lombok. The VHF Omnidirectional Range (VOR) is a type of short-range radio navigation system for aircraft, enabling aircraft with a receiving unit to determine their position and stay on course by receiving radio signals transmitted by a network of fixed ground radio beacons.

At 0701 LT (0001 UTC[4]), on daylight condition, the PK-BYK aircraft departed from Banyuwangi and intended to cruise at altitude of 7,000 feet. After departure the control was transferred from Banyuwangi tower controller to Bali approach controller. The provision of air traffic services conducted by Bali approach controller was utilizing surveillance system (radar service).

At 0009 UTC, the PK-BYK PM contacted the Bali approach controller and was instructed to continue climb to altitude 7,000 feet. At 0012 UTC, the Bali approach controller advised the Lombok tower controller of PK-BYQ which has departed earlier than the PK-BYK aircraft with cruising altitude of 7,000 feet, the estimate over LMB VOR was 0111 UTC and arrival Sumbawa was 0148 UTC.

At 0013 UTC, the Bali approach requested to the PK-BYK of the estimate time over LMB VOR and arrival Sumbawa. The PK-BYK PM advised that the estimate time over LMB VOR was 0139 UTC and estimate time arrival Sumbawa was 0230 UTC. The Bali approach controller acknowledged and instructed the PK-BYK to maintain cruising altitude of 7,000 feet. Afterwards, the Bali approach controller advised the Lombok tower controller of PK-BYK aircraft from Banyuwangi to Sumbawa including the estimate time of the PK-BYK with cruising altitude of 7,000 feet. The Lombok tower controller then wrote the altitude of 7,000 feet on the PK-BYK flight progress strip.

At 0032 UTC, when approached point KUBU TAMBAHAN, the PK-BYK PM requested to the Bali approach controller to climb to altitude of 9,000 feet due to weather condition and was approved. A few second later, the Bali approach controller provided instruction to other aircraft. At this time the controller handled more than 10 aircraft which several aircraft requested weather diversion.

At 0057 UTC, the Bali approach controller instructed the PK-BYK to contact Lombok tower controller and to report when the contact has been established. The PK-BYK PM then requested to Bali approach controller to fly heading 125° for avoiding clouds and was approved. Afterwards, the PK-BYK PM contacted the Lombok tower controller and advised their estimate time over LMB VOR would be 0119 UTC and estimate time arrival Sumbawa would be 0158 UTC. The Lombok tower controller then asked the aircraft position and the PK-BYK pilot advised that the aircraft was on radial 300 at 41 Nm from LMB VOR.

At 0058 UTC, the PK-BYK PM requested to the Lombok tower controller to make direct flight to point LEMBAR for avoiding weather and it was approved.

At the same day, an ATR72-600 aircraft registered PK-WHS was being operated by PT. Wings Abadi Airlines (Wings Air) as a scheduled passenger flight from Sumbawa to Lombok International Airport (WADL), Nusa Tenggara Barat with flight number WON1861. Prior to departure there was no report or record of aircraft system malfunction.

At 0104 UTC, the Sumbawa tower controller requested to the Lombok tower controller the altitude clearance of WON1861 flight to cruise at altitude of 8,000 feet and was approved.

4 The 24-hours clock in Universal Time Coordinated (UTC) is used in this report to describe the local time as specific events occured. Local time in Banyuwangi is UTC+7 hours.

At 0107 UTC, the PK-BYK PM advised the Lombok tower controller that the aircraft position was over point LEMBAR and maintaining altitude of 9,000 feet. The Lombok tower controller instructed the PK-BYK to report when over LMB VOR. Afterwards, the Lombok tower controller advised the Sumbawa tower controller that there was PK-BYQ aircraft from Banyuwangi to Sumbawa with altitude of 7,500 feet and the estimate time arrival Sumbawa would be 0153 UTC.

At 0114 UTC, the PK-BYK PM advised the Lombok tower controller that the aircraft was over LMB VOR and was instructed to report when over point LABUAN HAJI. The pilot then requested to direct the aircraft to point NAMP ISLAND due to weather condition and was approved.

At 0117 UTC, the Sumbawa tower controller confirmed to the Lombok tower controller that the altitude of the PK-BYK and PK-BYQ was 7,000 feet and it was confirmed. The Sumbawa tower controller also informed that there was WON1861 would depart to Lombok with altitude 8,000 feet, the Lombok tower controller acknowledged the information and advised that the PK-BYK aircraft position was about over LMB VOR and the estimated time arrival Sumbawa would be 0206 UTC.

At 0119 UTC, the WON1861 departed from Sumbawa. On board the aircraft were two pilots, two flight attendants and 62 passengers, the Pilot in Command (PIC) acted as PM and the Second in Command (SIC) acted as PF.

At 0121 UTC, the Sumbawa tower controller informed to Lombok tower controller that the WON1861 departed Sumbawa at 0119 UTC, intended altitude of 8,000 feet and estimate arrival Lombok 0146 UTC, thereafter transferred the control of WON1861 to Lombok tower controller.

The Lombok tower controller then advised the Bali approach controller regarding the WON1861 flight.

At 0126 UTC, the PK-BYK PM relayed a message from the PK-BYQ pilot to the Lombok tower controller that their aircraft was over point NAMP ISLAND. The Lombok tower controller then instructed the PK-BYK pilot to advise the PK-BYQ pilot to contact the Sumbawa tower controller.

At 0127 UTC, the WON1861 PM made initial contact to the Lombok tower controller and advised that the aircraft was maintaining 8,000 feet and position on 52 Nm from LMB VOR crossing radial 066. The Lombok tower controller instructed to direct to point PUSUK for runway 13 and to report when clear descend by the Bali approach controller. The PK-BYK pilots did not recall hearing altitude information of WON1861 on the Lombok frequency.

The Lombok tower controller did not provide traffic information of WON1861 to the PK-BYK as the PK-BYK was maintained at altitude below the WON1861 and both aircraft had been separated 1,000 feet vertically.

At 0128 UTC, the WON1861 PM made initial contact to the Bali approach controller then received traffic information that there was an aircraft at about 19 Nm on opposite direction maintaining 9,000 feet.

At 01:30:05 UTC, the Bali Air Situational Display (Bali radar display) recorded that the WON1861 at altitude of 8,000 feet passed PK-BYQ on opposite direction which was maintained altitude of 7,000 feet. The WON1861 was on the left side of PK-BYQ.

The PK-BYQ pilot advised to the PK-BYK pilot that there was an ATR72-600 aircraft just passed above the PK-BYQ aircraft however they could not determine the ATR72-600 altitude. The pilots communicated using secondary Very High Frequency (VHF) radio (COM2) on BP3B company frequency while their primary VHF radio (COM1) maintained on the air traffic controller frequency.

The PK-BYK pilots then attempted to search the ATR72-600 visually and the PK-BYK PF pitched down the aircraft nose to get a better view.

The PK-BYK PM switched the COM1 to the Sumbawa tower controller frequency with intention to get the altitude information of the ATR72-600. At 01:30:34 UTC, PK-BYK PM made initial contact to the Sumbawa tower controller and reported that the flight was from Banyuwangi to Sumbawa. The communication was unclear and the Sumbawa tower controller requested to repeat the message. The PK-BYK PM then performed radio check to the Sumbawa tower controller and responded that the communication was improved.

At 01:31:15 UTC, the PK-BYK PM reported to the Sumbawa tower controller that the aircraft was approaching point NAMP ISLAND and maintaining 9,000 feet. The Sumbawa tower controller requested the estimate time arrival Sumbawa and responded that the estimate was 0155 UTC.

The Sumbawa tower controller then advised the surface wind on Sumbawa was calm, visibility 10, present weather NIL, cloud FEW CB 1,700 feet, SCT 1,700 feet, temperature 29°, dew point 25°, QNH 1,008 mbs and QFE 1,007 mbs. In addition, the Sumbawa tower controller instructed the PK-BYK pilot to report when ready for descend.

While the Sumbawa tower controller transmitting the message, the PK-BYK PM then changed the COM1 to the Lombok tower controller frequency again to ask the altitude of the ATR72-600 aircraft. At this time the Lombok tower controller was communicating with other traffic then the PK-BYK PM changed the COM1 to the Sumbawa frequency.

When the PK-BYK aircraft approaching point NAMP ISLAND, the PK-BYK PF saw an ATR72-600 aircraft flew through clouds from the opposite direction with aircraft nose slightly up. The PK-BYK PF assumed that the ATR72-600 aircraft was on climbing and then the PF decided to descend with intention to avoid the ATR72-600 aircraft.

At 01:31:40 UTC, the PK-BYK aircraft target on Bali radar display was starting to descend from 9,000 feet, while from the opposite direction the WON1861 was maintaining 8,000 feet. At this time the lateral distance between both aircraft was 4.7 Nm and continued reducing. At this time the Bali approach controller was controlling traffic over Bali Island.

At 01:31:46 UTC, the PK-BYK PM requested descend clearance due to traffic to the Sumbawa tower controller who then responded to standby. Afterwards, the PK-BYK PM advised the Sumbawa tower controller that they had traffic ahead and responded that the traffic was WON1861 which was maintaining 8,000 feet. The PK-BYK pilot did not respond the traffic information.

At 01:32:00 UTC, the WON1861 pilot started to turn the aircraft to the right.

At 01:32:06 UTC, the Bali radar screen recorded that the PK-BYK aircraft altitude was passing 8,000 feet and the horizontal distance with WON1861 was 2 Nm. One second later the WON1861 descended.

At 01:32:17 UTC, the WON1861 started to climb from altitude of 7,800 feet. The Sumbawa tower controller called the PK-BYK pilot with no respond.

At 01:32:24 UTC, the Sumbawa tower controller was able to communicate with the PK-BYK pilot and confirmed whether the traffic information of the WON1861 has been acknowledged. The PK-BYK pilot responded that the traffic had just passed at the same altitude.

The Sumbawa tower controller confirmed the PK-BYK pilot whether the traffic had passed and was responded that the traffic just passed on their left side then the Sumbawa tower controller instructed to standby for the descent. The PK-BYK pilot advised that the aircraft had been descent to 7,000 feet to avoid traffic. The Sumbawa tower controller then advised that there was PK-BYQ aircraft was maintaining 7,000 feet ahead of the PK-BYK aircraft with estimate point SAROKAYA would be 0140.

At 01:32:27 UTC, the WON1861 pilot turned the aircraft heading to the left and then advised the Bali approach controller that there was Traffic Collision Avoidance System Resolution Alert (TCAS RA) activation with the intruder traffic was descending from 9,000 feet. The Bali approach controller acknowledged the information and instructed to maintain 8,000 feet after clear of traffic.

At 01:32:57 UTC, the Bali approach controller asked the Lombok tower controller whether the PK-BYK aircraft was descended to 7,000 feet and responded that the PK-BYK aircraft was maintaining 7,000. The Bali approach controller advised that the PK-BYK aircraft had climb to 9,000 feet.

At 01:33:27 UTC, the Sumbawa tower controller asked the Lombok tower controller whether the PK-BYK aircraft was descended to 7,000 feet and responded that the PK-BYK aircraft was maintaining 7,000 since the first contact.

At 0135 UTC, the Sumbawa tower controller asked the PK-BYK pilot regarding the clearance to climb to 9,000 feet and responded that they had been approved to climb by the Bali approach controller. The Sumbawa tower controller then asked whether the PK-BYK pilot communicated with the Lombok tower controller, since the Lombok tower controller did not realize that the altitude was 9,000 feet and the PK-BYK pilot responded it might be misinterpretation to the PK-BYQ that was maintaining 7,000 feet.

At 0136 UTC, the Lombok tower controller asked the Sumbawa tower controller regarding the altitude of the PK-BYK and informed that the PK-BYK climbed to 9,000 feet for avoiding weather condition when was controlled by the Bali approach controller.

At 0147 UTC, the WON1861 landed safely in Lombok and at 0158 UTC, the PK-BYK aircraft landed safely in Sumbawa.

Both aircraft was undamaged and no one injured in this occurrence.

1.2 Personnel Information

1.2.1 WON1861 Pilots

The Pilot in Command (PIC) had valid Airline Transport Pilot License (ATPL) while the Second in Command (SIC) had valid Commercial Pilot License (CPL). Both pilots qualified as ATR72-600 aircraft pilot and had valid first class medical certificate without limitation. The flight experience of the pilots was as follows:

		PIC	SIC
Total hours	:	approximately 12,600 hours	approximately 1,920 hours
Total on type	:	approximately 10,000 hours	approximately 1,920 hours
Last 90 days	:	152 hours 25 minutes	274 hours
Last 60 days	:	115 hours 5 minutes	167 hours
Last 24 hours	:	2 hours 5 minutes	2 hours 5 minutes
This flight	:	35 minutes	35 minutes

1.2.2 PK-BYK Pilots

		Pilot Flying (PF)	Pilot Monitoring (PM)
Age	:	20 years old	20 years old
Nationality	:	Indonesia	Indonesia
Marital status	:	Single	Single
License	:	PPL	PPL
PPL check ride	:	30 August 2017	30 August 2017
Date of issue	:	3 November 2017	3 November 2017
Aircraft type rating	:	Cessna 172	Cessna 172
Instrument rating validity	:	-	-
Medical certificate	:	First Class	First Class
Last of medical	:	25 October 2017	24 October 2017
Validity	:	25 April 2018	24 April 2018
Medical limitation	:	None	None
Flying experience			
Total hours	:	132.45 hours	129.30 hours
Total on type	:	132.45 hours	129.30 hours
Last 90 days	:	92.45 hours	83 hours
Last 60 days	:	63.45 hours	51.30 hours
Last 24 hours	:	5.45 hours	3.45 hours
This flight	:	2.45 hours	2.45 hours

Both PK-BYK pilots did not have experience of flying passed another aircraft from opposite direction prior the occurrence.

1.3 Aircraft Information

1.3.1 WON1861

The aircraft was manufactured by Avions de Transport Regional (ATR) in France on 1 March 2017 with type/model ATR 72-212A, and the serial number 1307. The aircraft registered PK-WHS and had valid Certificate of Airworthiness (C of A) and Certificate of Registration (C of R).

The total hour of the aircraft was 3,111 hours 24 minutes with total cycle of 3,556 cycles.

The engine was manufactured by Pratt & Whitney Canada in Canada with type/model of 127 M. The serial engine number 1 PCE-ED 1179 and the serial engine number 2 PCE-ED 1180. The both engines had total hour of 3,111 hours and 24 minutes.

The aircraft was equipped with Terrain and Traffic Collision Avoidance System (T^2CAS) manufactured by Aviation Communication and Surveillance Systems (ACSS) with part number 9000000-10309 and serial number 22002615. The T^2CAS combines actual aircraft climb performance-based Terrain Awareness Warning System (TAWS) into the Traffic Collision Avoidance System (TCAS).

1.3.2 PK-BYK

The aircraft was manufactured by Cessna aircraft company in United States of America in 2016 with type/model Cessna 172S, and the serial number 172S11697. The aircraft registered PK-BYK and had valid C of A and C of R.

The total hour of the aircraft was 376 hours with total cycle of 369 cycles.

The aircraft was not equipped with flight recorders and nor it was required by current Indonesia regulation for this type of aircraft.

The engine was manufactured by Lycoming Engines Company in United States of America. The engine type/model IO-360-L2A with serial number of L-36841-51E. The total hour of the engine was 376 hours.

The aircraft was equipped with transponder Garmin GTX 33 model with part number 011-00978-00 and serial number 89131136. The transponder was serviceable during the occurrence flight.

The aircraft was equipped with two Very High Frequency (VHF) radio communication systems (COM1 and COM2). In the occurrence flight, the COM1 was used as primary radio communication to communicate with the air traffic controller while the COM2 was used as secondary radio communication which also used to maintain company frequency. All VHF radios were serviceable.

Garmin G1000

The aircraft equipped with Global Positioning System (GPS) manufactured by Garmin with type/model G1000 which has capability of flight data logging. According to the Garmin G1000 Integrated Flight Deck Pilot's Guide, the data logging capability would automatically store critical flight and engine data on a

Secure Digital (SD) data card inserted into the top card slot of the Multi-Function Display (MFD). The data logging is written to the SD data card once each second while the MFD is powered ON. If no SD card has been inserted, “NO CARD” is displayed. When data is being written to the SD card, “LOGGING DATA” is displayed.

The logging data capable to record 51 parameters including time, aircraft coordinate, GPS altitude, indicated airspeed, vertical speed, ground speed, pitch attitude angle and roll attitude angle. All of recorded parameters could be downloaded.

During the occurrence, the SD data card for the flight data logging was not inserted to the Garmin G1000 and the investigation unable to retrieve the logging data.

1.4 Communications

The coordination between air traffic controller units and communications between the air traffic controller and the pilot were recorded by ground based automatic voice recording equipment at Bali, Lombok and Sumbawa for the duration of the flights. The quality of the recording transmissions was good. The excerpt of communication record was used to develop the history of the flight.

1.5 Flight Recorders

The PK-BYK aircraft was not fitted with a Flight Data Recorder (FDR) or Cockpit Voice Recorder (CVR). Neither recorder was required by current Indonesian aviation regulations.

The CVR installed on the WON1861 aircraft was L3 Communication CVR model with part number 2100-1020-02 and serial number 001069443. The recorded voice during the occurrence was overwritten.

The WON1861 aircraft was fitted with L-3 Communication Digital FDR model with part number 2100-4245-00 and serial number 001077429.

The Wings Air provided the KNKT of Quick Access Recorder (QAR) raw data taken from the FDR for analysis. The significant recorded parameters of the FDR were as follows:

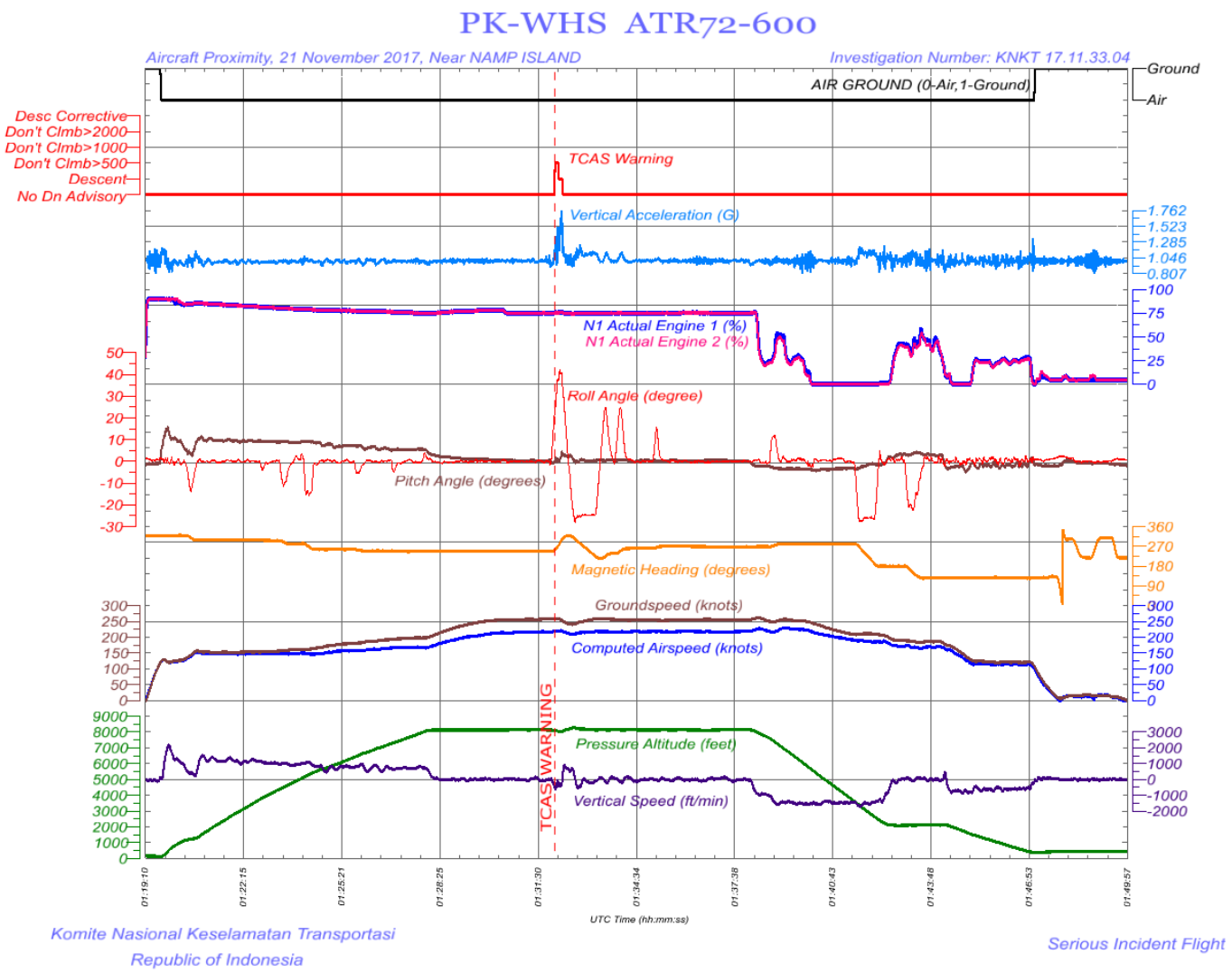

Figure 2: The significant recorded parameters

1.6 Organizational and Management Information

1.6.1 AirNav Indonesia

The *Perum Lembaga Penyelenggara Pelayanan Navigasi Penerbangan Indonesia* (AirNav Indonesia) is the Air Traffic Services (ATS) provider within Indonesia airspace including Bali, Lombok and Sumbawa airspace.

Approach Control Service in Bali Airspace

The approach control service in the Bali airspace is provided by AirNav Indonesia branch office Denpasar utilizing surveillance system (radar service). The Bali approach control unit divided the jurisdiction into three sectors – Bali Control Zone (CTR), Bali East Terminal Control Area (TMA East) and Bali West Terminal Control Area (TMA West). The air traffic service on Bali CTR was provided by Bali Director, TMA East by Bali East Radar and TMA West by Bali West Radar.

The approach control service on Bali CTR was provided by Bali Director on altitude below 10,000 feet, while in the Bali CTR boundary at altitude above 10,000 feet up to FL245 the approach control service was provided by Bali Radar.

Considering human resources and equipment issues, the AirNav Indonesia branch office Denpasar combined the approach control service on CTR and TMA depending on the number of air traffic. The Notice to Airmen (NOTAM) number A3121/17, effective since 11 September 2017 at 0325 UTC to 10 December 2017 at 2330 UTC, described as follows:

- Between 2330 until 1130 UTC, the approach control service on TMA East and TMA West combined on frequency 119.3 MHz with call sign Bali Radar; and
- Between 1130 until 2330 UTC, the approach control service on TMA East and TMA West combined on frequency 119.7 MHz with call sign Bali Director.

During the occurrence, the approach control service for PK-BYK aircraft and WON1861 was provided by Bali Radar which covered TMA East and TMA West airspace jurisdiction without assistant

The AirNav Indonesia branch office Denpasar had ATS Operations Standard Operating Procedure (SOP) as guidance while performing duty as ATS operator. The SOP subchapter requires 11.8.4.2, the Bali ATS unit as transferring unit to advised information regarding air traffic to the accepting unit as follows:

- Estimate (direction of flight);
- Aircraft call sign;
- Squawking (transponder code);
- Estimate (significant point) and time;
- Level (altitude);
- Speed and other information.

Approach Control Service in Lombok

The approach service in Lombok CTR is provided by AirNav Indonesia branch office Lombok utilizing procedural control (non-radar service). The service was provided by Lombok control tower unit which combined the aerodrome control service and approach control service. The service was responsible for air traffic up to 6,000 feet.

Aerodrome Control Tower Service in Sumbawa

The aerodrome control tower service in Sumbawa Aerodrome Traffic Zone (ATZ) is provided by AirNav Indonesia branch office Sumbawa utilizing procedural control (non-radar service). The service was responsible for air traffic up to 4,000 feet.

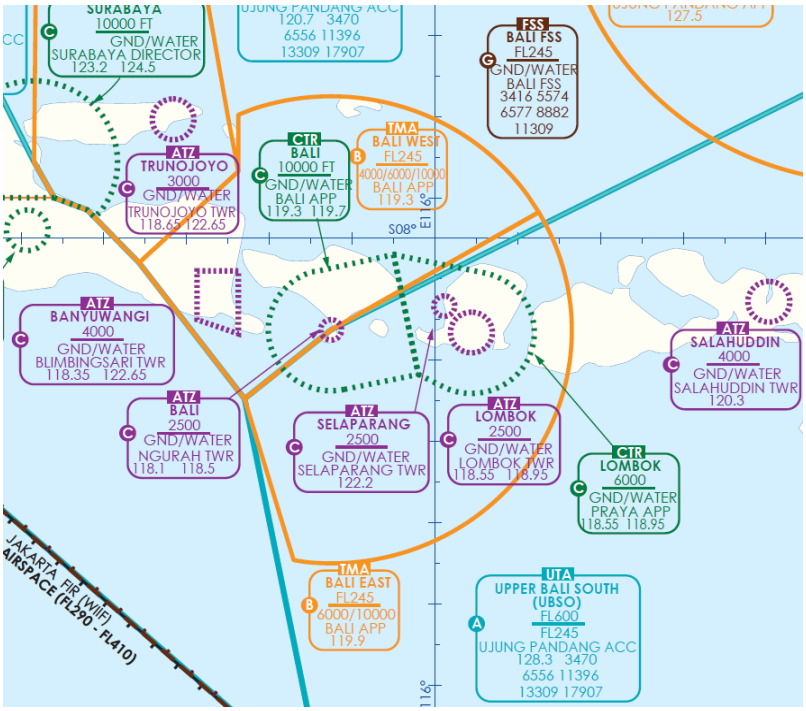

Figure 3: The ATS airspace in Bali, Lombok and Sumbawa (excerpt from AIP Volume 1)

Operational Coordination Agreement

The Bali approach control unit and Lombok control tower unit had letter of operational coordination agreement which covered details of coordination procedures. The agreement described that the Bali approach unit shall pass information to the Lombok control tower unit regarding air traffic that will enter the Lombok airspace as follows:

- Aircraft call sign and type;
- Point of departure;
- Route of flight or standard arrival (STAR);
- Estimate time of arrival;
- Transferring unit shall pass any changes of estimate that varies three minutes or more.
- Other pertinent information, if any.

1.6.2 PT. Wings Abadi Airlines

PT. Wings Abadi Airlines (Wings Air) which has address on Jalan A.M. Sangaji No. 17 Jakarta Pusat, Indonesia. The aircraft operator has valid Air Operator Certificate (AOC) number 121-012. The Wings Air was operating 20 ATR 72-500 aircraft and 32 ATR 72-600 aircraft.

1.6.3 Balai Pendidikan dan Pelatihan Penerbangan Banyuwangi

Balai Pendidikan dan Pelatihan Penerbang Banyuwangi (BP3B) is a flying school owned by Ministry of Transportation which has address on Jalan Agung Wilis, Rogojampi, Banyuwangi, Jawa Timur, Indonesia.

The BP3B has valid Pilot School Certificate (PSC) number 141D-014 which was operating two TB-10 aircraft and 25 Cessna 172 SP aircraft.

The BP3B Training Procedure Manual subchapter 5.6.1 described right of way rules to be followed by pilot which referred to CASR Part 91 subchapter 91.113.

1.7 Additional Information

1.7.1 Compliance with Air Traffic Control Clearance and Separation Minima

According to the Indonesia Civil Aviation Safety Regulations (CASR) part 91 – General Operating and Flight Rules, subchapter 91.123, when an Air Traffic Control (ATC) clearance has been obtained, a pilot in command may not deviate from that clearance, except in an emergency, unless that pilot obtains an amended clearance. In addition, when a pilot is uncertain of an ATC clearance, that pilot must immediately request clarification from air traffic controller.

The ICAO Doc. 4444, Procedures for Air Navigation Services – Air Traffic Management subchapter 5.3 mentioned that the vertical separation minimum shall be:

a) a nominal 1,000 feet below Flight Level (FL) 290 and 2,000 feet at or above this level, except as provided for in b) below; and

b) within designated airspace, subject to a regional air navigation agreement: a nominal 1,000 feet below FL 410 or a higher level where so prescribed for use under specified conditions, and a nominal 2,000 feet at or above this level.

1.7.2 Right of Way Rules

According to the Indonesia CASR part 91 – General Operating and Flight Rules, subchapter 91.113, when weather conditions permit, regardless of whether an operation is conducted under instrument flight rules or visual flight rules, vigilance shall be maintained by each person operating an aircraft so as to see and avoid other aircraft. When a rule of this section gives another aircraft the right of way, the pilot shall give way to that aircraft and may not pass over, under, or ahead of it unless well clear. Under the circumstances of approaching head-on or nearly so, each pilot of each aircraft shall alter course to the right.

1.8 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

Based on the available information, there was no record or report of aircraft system and radio communication system malfunction. The investigation determined that the aircraft and radio communication serviceability were not issues in this occurrence.

The intended altitude of PK-BYK based on the flight plan was 7,000 feet and this altitude had been informed to the Lombok tower controller by Bali approach controller. When approached point KUBU TAMBAHAN, the Bali approach controller approved PK-BYK pilot request to climb to altitude of 9,000 feet and few second later the controller changed his attention providing instruction to other aircraft. The change of Bali approach controller attention made the altitude change of PK-BYK was not advised to the Lombok tower controller.

At initial contact the PK-BYK pilot did not mention the cruising altitude of 9,000 feet to the Lombok tower controller. Over point LEMBAR, the PK-BYK pilot advised the Lombok tower controller that the aircraft was maintaining 9,000 feet. The Lombok tower controller did not pay attention of the altitude mentioned by the PK-BYK pilot and assumed the altitude was 7,000 feet as written in the flight progress strip.

At 01:27:02 UTC, the PK-BYK relayed message from Lombok tower controller to the PK-BYQ and eight seconds later, the WON1861 pilot made initial contact with Lombok tower controller, advising their aircraft position and also informed that the aircraft altitude was maintained at 8,000 feet. The PK-BYK pilots did not recall hearing altitude information of WON1861 on the Lombok frequency.

The Lombok tower controller considered traffic information of WON1861 to the PK-BYK was not necessary as the Lombok tower controller assumed that the PK-BYK was maintained at altitude below the WON1861 and both aircraft had been separated 1,000 feet vertically.

At 01:30:05 UTC, the PK-BYQ passed the WON1861, and afterward the PK-BYQ pilot advised to the PK-BYK pilot that there was an ATR72-600 aircraft just passed above the PK-BYQ aircraft however they could not determine the ATR72-600 altitude.

The PK-BYK PM changed the COM1 to the Sumbawa tower frequency attempting to get altitude information of the ATR72-600 aircraft without success while the COM2 was maintained at company radio frequency. The changed frequency without advising Lombok tower controller who handled the PK-BYK might become hazard as the pilot unable to monitor controller instruction and other pilot communications.

The information of an aircraft in opposite direction without altitude information and unsuccessful attempt to get the altitude information from Sumbawa tower controller made the PK-BYK pilots attempting to search the ATR72-600 visually and pitched down the aircraft nose to get a better view.

When the PK-BYK aircraft approaching point NAMP ISLAND, the PK-BYK PF saw an ATR72-600 aircraft flew through clouds from the opposite direction with aircraft nose slightly up. The PK-BYK pilots assumed that the aircraft was climbing and decided to descend the aircraft without air traffic control (ATC) clearance to avoid ATR72-600.

The pitch altitude of ATR72-600 on cruising was about 0°. The pitching down of PK-BYK attitude might resulted in visual illusion to the PK-BYK pilots that the ATR72-600 was climbing. In addition, both PK-BYK pilots did not have experience of flying passed another aircraft from opposite direction which then made the decreasing of altitude differential assumed as ATR72-600 was on climbing.

The decision to descend aircraft without ATC clearance for traffic avoidance might be an indication that the PK-BYK pilot was not aware of the right of way rules.

The separation of both aircraft reduced to below minima when the PK-BYK pilot left altitude 9,000 feet at 01:31:40 UTC, the distance of both aircraft was 4.7 Nm and continued reducing.

The assumption of ATR72-600 on climbing and not aware of the right of way rules resulted in the PK-BYK pilot decided to descend aircraft for traffic avoidance.

3 CONCLUSION

3.1 Findings[5]

1. The pilots of WON1861 and PK-BYK held valid licenses and medical certificates.
2. The air traffic controllers of Bali, Lombok and Sumbawa held valid licenses, rating, medical certificates and ICAO language proficiency level 4.
3. The WON1861 and PK-BYK aircraft had valid Certificate of Airworthiness (C of A) and Certificate of Registration (C of R).
4. There was no report or record of aircraft system malfunction on WON1861 and PK-BYK prior to the occurrence.
5. The PK-BYK cruised at altitude of 7,000 feet according to the flight plan. Prior point KUBU TAMBAHAN, the PK-BYK PM requested to the Bali approach controller to climb to altitude of 9,000 feet due to weather condition and was approved.
6. The Bali approach controller advised the Lombok tower controller regarding the PK-BYK flight including the cruising altitude of 7,000 feet. The Lombok tower controller then wrote the altitude of 7,000 feet on the PK-BYK flight progress strip.
7. The change of Bali approach controller attention made the altitude change of PK-BYK was not advised to the Lombok tower controller.
8. On the initial contact to Lombok tower controller, the PK-BYK pilot did not mention the cruising altitude. The PK-BYK pilot advised the Lombok tower controller that the aircraft was maintaining 9,000 feet when over point LEMBAR.
9. The Lombok tower controller did not pay attention of the altitude mentioned by the PK-BYK pilot and assumed the altitude was 7,000 feet as written in the flight progress strip.
10. The WON1861 departed from Sumbawa with cruising altitude of 8,000 feet. The departure including the altitude information had been informed to the Lombok tower controller by the Sumbawa tower controller.
11. After the PK-BYK relayed message from Lombok tower controller to the PK-BYQ, the WON1861 pilot made initial contact with Lombok tower controller, advising their aircraft position and also informed that the aircraft altitude was maintained at 8,000 feet. The PK-BYK pilots did not recall hearing altitude information of WON1861 on the Lombok frequency.

5 Findings are statements of all significant conditions, events or circumstances in the accident sequence. The findings are significant steps in the accident sequence, but they are not always causal, or indicate deficiencies. Some findings point out the conditions that pre-existed the accident sequence, but they are usually essential to the understanding of the occurrence, usually in chronological order.

12. The Lombok tower controller considered traffic information of WON1861 to the PK-BYK was not necessary as the Lombok tower controller assumed that the PK-BYK was maintained at altitude below the WON1861 and both aircraft had been separated 1,000 feet vertically.
13. The PK-BYK and PK-BYQ pilot communicated using secondary Very High Frequency (VHF) radio (COM2) on BP3B company frequency, while the primary VHF radio (COM1) maintained to the air traffic controller frequency.
14. At 01:30:05 UTC, the Bali Air Situational Display (Bali radar display) recorded that the WON1861 at altitude of 8,000 feet passed PK-BYQ on opposite direction which was maintained altitude of 7,000 feet. The WON1861 was on the left side of PK-BYQ.
15. The PK-BYQ pilot advised the PK-BYK pilot that there was an ATR72-600 aircraft just passed above the PK-BYQ aircraft with undetermined altitude.
16. The information of an aircraft in opposite direction without altitude information and unsuccessful attempt to get the altitude information from Sumbawa tower controller made the PK-BYK pilots attempting to search the ATR72-600 visually and pitched down the aircraft nose to get a better view.
17. When the PK-BYK aircraft approaching point NAMP ISLAND, the PK-BYK PF saw an ATR72-600 aircraft flew through clouds from about the opposite direction with aircraft nose slightly up. The PK-BYK PF assumed that the ATR72-600 aircraft was on climbing and then the PF decided to descend with intention to avoid the ATR72-600 aircraft.
18. While descending, the PK-BYK PM requested descend clearance to the Sumbawa tower controller who then provided traffic information of WON1861 which was maintaining 8,000 feet. The PK-BYK pilot did not respond the traffic information.
19. The WON1861 pilot performed avoid manoeuvre to the right.
20. The pitch altitude of ATR72-600 on cruising was about 0°. The pitching down of PK-BYK attitude might resulted in visual illusion to the PK-BYK pilots that the ATR72-600 was climbing.
21. Both PK-BYK pilots did not have experience of flying passed another aircraft from opposite direction which then made the decreasing of altitude differential assumed as ATR72-600 was on climbing.
22. The decision to descend aircraft without ATC clearance for traffic avoidance might be an indication that the PK-BYK pilot was not aware of the right of way rules.
23. The separation of both aircraft reduced to below minima when the PK-BYK pilot left altitude 9,000 feet at 01:31:40 UTC, the distance of both aircraft was 4.7 Nm and continued reducing.
24. The Bali radar screen recorded PK-BYK was passing 8,000 feet when the horizontal distance between PK-BYK and WON1861 was 2 Nm.

25. The assumption of ATR72-600 on climbing and not aware of the right of way rules resulted in the PK-BYK pilot decided to descend aircraft for traffic avoidance.
26. During the occurrence, PK-BYK aircraft was controlled by Lombok tower controller and WON1861 was controlled by Bali approach controller.
27. The Lombok tower controller realized that the PK-BYK aircraft was maintaining 9,000 feet when advised by Sumbawa tower controller after the occurrence.

3.2 Contributing Factors[6]

The assumption of ATR72-600 on climbing and not aware of the right of way rules resulted in the PK-BYK pilot decided to descend aircraft for traffic avoidance.

6 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 report, the KNKT had been informed corrective action taken by the AirNav Indonesia and BP3B responding to the KNKT safety recommendation in the Preliminary Report.

4.1 AirNav Indonesia

Responding the safety recommendation number:

- ***04.A-2017-33.04***

  After provided approval for climb to the PK-BYK, the Bali approach controller did not notify the Lombok tower controller of the altitude change.

  The KNKT recommend to AirNav Indonesia to ensure air traffic controller provides all necessary information to the accepting unit as stated in the SOP.

The AirNav Indonesia included the coordination procedure stated in the SOP to the briefing material during performance check in AirNav Indonesia branch office Bali.

Responding to the safety recommendation number:

- ***04.A-2017-33.05***

  On the initial contact to Lombok tower controller, the PK-BYK pilot did not mention the cruising altitude. The PK-BYK pilot advised the Lombok tower controller that the aircraft was maintaining 9,000 feet when over point LEMBAR. The Lombok tower controller realized that the PK-BYK aircraft was maintaining 9,000 feet when advised by Sumbawa tower controller after the occurrence.

  The KNKT recommend to AirNav Indonesia to ensure air traffic controller maintain listening watch to all communication.

The AirNav Indonesia published notice to remind all air traffic controllers in Lombok to maintain listening watch in when providing air traffic control services.

4.2 Balai Pendidikan dan Pelatihan Penerbangan Banyuwangi (BP3B)

Responding to the safety investigation number:

- ***04.O-2017-33.01***

  After received traffic information, the PK-BYK pilots attempted to search the traffic visually by pitching down the aircraft nose and the aircraft descended without ATC clearance.

  The KNKT recommends the BP3B to ensure all student pilots to comply with ATC clearance including assigned altitude and aware of the right of way.

- ***04.O-2017-33.02***

  The PK-BYK pilots used one radio communication to communicate with the air traffic controller by switching to different frequencies while the other radio communication was maintained on company frequency.

  The KNKT recommends the BP3B to ensure all student pilots maintain listening watch to air traffic controller communication.

The BP3B issued notice number 06/QC/XII/2017 and 01/QC/III/2019 which contained reminder to flight instructor and student pilots as follows:

- to maintain listening watch on the designated ATC frequencies;
- to comply with ATC clearance including assigned altitude, heading or sequence of traffic; and
- to follow right of way rules as stated on the Training Procedure Manual.

The details of the notice can be found in the appendix of this report.

Responding to the safety investigation number:

- ***04.O-2017-33.03***

  The PK-BYK aircraft was equipped with Global Positioning System (GPS) manufactured by Garmin with type/model G1000 which has capability of flight data logging that can be used as Flight Data Analysis for the safety management system and support the investigation process to enhance safety. During the occurrence, the SD data card for the flight data logging was not inserted.

  The KNKT recommends the BP3B to ensure SD data card for data logging is inserted in all aircraft that installed with Garmin G1000 for the purpose of enhancing safety.

On 4 December 2017, the BP3B inserted SD card for data logging to all Cessna 172 aircraft that was equipped with Garmin G1000.

5 SAFETY RECOMMENDATIONS

The KNKT acknowledged the safety actions taken by the involved parties described in the chapter 4 and considered relevant to address the safety issue described in this report. Therefore, KNKT did not issue safety recommendation in this report.

6 APPENDIX

6.1 Notice Number 06/QC/XII/2017 published by BP3B

KEMENTERIAN PERHUBUNGAN
BADAN PENGEMBANGAN SUMBER DAYA MANUSIA PERHUBUNGAN
LOKA PENDIDIKAN DAN PELATIHAN PENERBANG BANYUWANGI

NOTAM
No : 06 / QC / XII /2017

1. Based on the occurrence of near-miss incident between PK-BYK and Wings Air WON1861 during VFR cross-country training stage from WADY to WADS.

2. For all pilots, Flight Instructors or cadets should maintain listening watch to the designated ATC frequencies during each stage of the flight training. Do not split the attention to the other frequency if was not ordered by the ATC.

3. Should comply with the latest instruction from the ATC clearance; consist of the assigned altitude, heading or sequence of the traffic. Please request to ATC in advance to change the altitude or heading of the flight.

4. In every phase of the flight, the safety pilot should keep the awareness of listening and looking out the traffic. If any information of traffic is received, please be advice to the Pilot in Command for further action.

5. If there any traffic information for other aircraft, please relay it with the complete information of the traffic. Do not confuse the other aircraft by giving a mislead information.

6. This announcement should be executed properly in order to avoid unwanted events.

Banyuwangi, November 30th 2017
QUALITY CONTROL

6.2 Safety Notice Number 01/QC/III/2019 published by BP3B

SAFETY NOTICE

NO: 01/QC/III/2019

1. No person may conduct any activity on the manoeuvring area (both BP3B taxiway) that could interrupt aircraft movements unless it has been authorised by ATC/Airport Authorities or Head of BP3B.
2. All the airmen should be concern about the aircraft movement, therefore any disciplinary action is prohibited to be execute at the manoeuvring area.
3. All the airmen should follow the Right of Way Rules and comply with ATC clearence during training exercise, including the assigned altitude and heading/vector as stated on Training Procedure Manual.
4. All the airmen should be conduct pre-flight and post-flight procedures throughly on the aircraft, please inspect carefully if any foreign object attached on the aircraft, and make sure the aircraft in good condition before and after flight. If there is any malfunction or damage on the aircraft, plaese report immediately the engineer.
5. During refueling process, the engineer is expected to supervise refueling activities to avoid any mistakes. The cadets are encouraged to deliver fuel drum to the aircraft.
6. For aircraft positioning on the ground, the aircraft should be towed lead by engineer, the cadets may only assist the process.
7. Please the notice should be executed properly in order to avoid unwanted events.

Banyuwangi, March 4th 2019

QUALITY CONTROL

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