KNKT

MEDIA RELEASE: LAPORAN AKHIR INVESTIGASI
PT. INDONESIA AIRASIA, AIRBUS A320, PK-AXC

On 28 December 2014, an Airbus A320 aircraft, registered as PK-AXC, operated by Indonesia AirAsia was cruising at 32,000 feet on flight from Juanda Airport, Surabaya, Indonesia departed at 05.35 WIB with intended destination of Changi Airport, Singapore and estimated time of arrival was 08.36 Local Time. Total occupants were 162 persons consisted of two pilots, four flight attendants and 156 passengers including one company engineer. The Pilot in Command (PIC) acted as Pilot Monitoring (PM) and the Second in Command (SIC) acted as Pilot Flying (PF).

Since 06.01 WIB, the Flight Data Recorder (FDR) recorded that 4 master cautions activated following the failure of the Rudder Travel Limiter (RTL) system, which triggered Electronic Centralized Aircraft Monitoring (ECAM) message of AUTO FLT RUD TRV LIM SYS. The crew performed the ECAM procedure on the first three master caution activations. After the 4th master caution, the FDR recorded different signature. The parameters showed similar signature to those on 25 December 2014 when the Flight Augmentation Computer (FAC) CBs were reset on the ground. This pilot action resulted on the 5th ECAM message, which was AUTO FLT FAC 1 FAULT, and 6th master caution activation, which correspond to ECAM message of and AUTO FLT FAC 1+2 FAULT.

Following both FAC faults, the autopilot and auto-thrust disengaged and the fly-by-wire flight control system reverted to Alternate Law in which the aircraft lost several protections available in the Normal Law. The subsequent flight crew action on manual flight led to the aircraft entered an upset condition and the stall warning activated until the end of recording.

Participating in the investigation were Australian ATSB, French BEA, Singapore AAIB and Malaysian MOT as accredited representatives.

Issues such as flight approval was considered not contribute to the accident and was not investigated. The FDR data did not show any indication of the weather condition affecting the aircraft.

The investigation examined aircraft maintenance record and found 23 occurrences of Rudder Travel Limiter (RTL) system problem in the last 12 months. The interval of the occurrence became shorter in the last 3 months. The problem was initiated from the crack soldering on the electronic card of the *Rudder Travel Limiter Unit* (RTLU).

The existing maintenance system did not optimise the Post Flight Reports (PFRs) resulted in unresolved the repetitive occurrence of RTL system problem.

The crew actions following both FAC FAULT and autopilot and auto thrust disengaged. The manual handling resulted in the aircraft entered prolong stall and upset condition, which was beyond the capability of the crew to recover.

The investigation concluded that contributing factors to this accident were:

- The cracking of a solder joint of both channel A and B resulted in loss of electrical continuity and led to RTLU failure.
- The existing maintenance data analysis led to unresolved repetitive faults occurring at shorter intervals. The same fault occurred 4 times during the flight.
- The flight crew action to the first 3 faults was in accordance with the ECAM messages. Following the fourth fault, the FDR recorded different signatures that were similar to the FAC CBs being reset resulting in electrical interruption to the FACs.

- The electrical interruption to the FACs caused the autopilot to disengage and the flight control logic to change from Normal Law to Alternate Law, the rudder deflecting 2° to the left resulting in the aircraft rolling up to 54° angle of bank.
- Subsequent flight crew action resulted in inability to control the aircraft in the Alternate Law causing the aircraft departing from the normal flight envelope and entering prolonged stall condition that was beyond the capability of the flight crew to recover.

Following this accident, the Indonesia AirAsia has performed 51 safety actions in order to improve the existing conditions.

KNKT issued several recommendations to Indonesia AirAsia, Director General of Civil Aviation (DGCA), Airbus, US Federal Aviation Administration (FAA) and European Aviation Safety Administration (EASA).

ABBREVIATIONS AND DEFINITIONS

AAIB	:	Aircraft Accident Investigation Board (Singapore)
Accredited representatives	:	A person designated by a State, on the basis of his or her qualifications, for the purpose of participating in an investigation conducted by another State. Where the State has established and accident investigation authority, the designated accredited representative would normally be from that authority.
Airplane Upset:	:	An airplane in flight unintentionally exceeding the parameters normally experienced in line operations or training: • Pitch attitude greater than 25 degree, nose up. • Pitch attitude greater than 10 degree, nose down. • Bank angle greater than 45 degree. • Within the above parameters, but flying at airspeeds inappropriate for the conditions.
AOA	:	Angle of attack is the angle between the oncoming air or relative wind, and some reference line on the airplane or wing.
A/P	:	Autopilot
A/THR	:	Auto thrust
ATSB	:	Australia Transport Safety Bureau
BEA	:	Bureau d'Enquêtes et d'Analyses
CB	:	Circuit breaker
CVR	:	Cockpit Voice Recorder
EASA	:	European Aviation Safety Agency
ECAM	:	Electronic Centralized Aircraft Monitoring
FAA	:	Federal Aviation Administration (United States of America)
FAC	:	Flight Augmentation Computer
FDR	:	Flight Data Recorder
ICAO	:	International Civil Aviation Organization
KNKT	:	Komite Nasional Keselamatan Transportasi
MC	:	Master Cautions
MOT	:	Ministry of Transportation (Malaysia)
PF	:	Pilot Flying
PFR	:	Post Flight Reportis an automatic reporting system shows on the Centralized Fault Display System (CFDS) consist of ECAM message which contains any ECAM Warning related with system malfunction during the flight and Failure Message which states the failure component. The PFR message can be printed after completion of a flight.
PIC	:	Pilot in Command
PM	:	Pilot Monitoring
PNF	:	Pilot Non flying
RTLU	:	Rudder Travel Limiter Unit
SIC	:	Second in Command
Stall	:	An airplane is stalled when the angle of attack is beyond the stalling angle. A stall is characterized by any of, or a combination of, the following: a. Buffeting, which could be heavy at times, b. A lack of pitch authority, c. A lack of roll control, d. Inability to arrest descent rate.
UTC	:	Universal Time Coordinate