

**NINTH MEETING OF THE ASIA PACIFIC ACCIDENT INVESTIGATION GROUP (APAC-AIG/9)***(27-28 October 2021 on Virtual Platform at 11.00 hrs. Bangkok Time UTC+7)***Agenda Item 4: Enhancing Accident Investigation Capabilities****SHARING EXPERIENCE ON THE RECENT MAJOR INVESTIGATION***(Presented by Indonesia)***SUMMARY**

This paper highlights the recent experience of Komite Nasional Keselamatan Transportasi (KNKT) of the Republic of Indonesia on the investigation process of the accident of B737-500, on flight number SJY182, that was occurred on 9 January 2021.

The complexity of the investigation related to the aircraft system, large data management, and the activities hampered by the pandemic.

Cooperation with other States investigation authority was found beneficial to improve the investigation process by the support on facility and expertise.

<i>Strategic Objectives:</i>	This working paper relates to Strategic Objectives to share the investigation process of Sriwijaya SJ182.
<i>Financial implications:</i>	
<i>References:</i>	

**1. INTRODUCTION**

1.1 This information paper shares the Komite Nasional Keselamatan Transportasi (KNKT) of the Republic of Indonesia experienced in regard with the SJY182 accident investigation.

1.2 The accident aircraft was a Boeing 737-500 that was manufactured in 1994, which some States had fairly adequate understanding to the aircraft system however, there were still some aircraft systems that need to be thoroughly understand. The autothrottle system which suspected to be the main problem had been through many evolutions since it was developed by Boeing.

1.3 The investigation activities, large amount of data collected and the Corona (Covid-19) pandemic had increased the investigation complexity. The investigation is still ongoing.

## 2. DISCUSSION

### 2.1 Investigation Process

2.1.1 After the recovery of the Flight Data Recorder (FDR), the investigation process, the investigation found a problem on the aircraft autothrottle system and the investigation team required to review the maintenance history and the Boeing autothrottle system. The autothrottle system evolution was traced to provide better understanding to the system. Boeing had provided detail information of the autothrottle system.

2.1.2 The amount of data and the pandemic condition increased the complexity of the investigation process. The investigation had collected data, (up to September 2021) was about 79 Gigabyte. Dealing with the amount of data, the investigation team divided in several groups, consisting of operation, human factor, engineering and sea search. The Investigator In-charge (IIC) plays an important role in coordinating each team to work directly with the relevant parties.

2.1.3 The number the parameters recorded in the FDR and the CVR that did not record Captain channel, increased the difficulties of the investigation to get a thorough understanding of the situation and the aircraft system. The autothrottle system has a feature of automatic disengagement on a certain condition which one of them can be found by the deployment of the spoiler. However, the spoiler angle deployment was not recorded on the FDR. The aircraft manufacturer calculated the spoiler angle deployment by calculating another parameter. The calculation was intended to find whether the accident flight met the criteria of the autothrottle disengagement.

### 2.2 The Operation and Human Factor Team

2.2.1 The operation group examined the operation procedures during the problem combined with the human factors involving in the situation including utilized the flight recorder data.

2.2.2 The operation group also examining the Upset Prevention and Recovery procedures, training and regulation in relation to the ability of the pilots to recover the upset condition.

2.2.3 The operation group will conduct flight simulation in Henderson, Nevada, USA. The simulation intended to provide the investigation to the understanding of aircraft system behaviour, the cues of the abnormality available to the pilots and the pilot actions.

### 2.3 The Engineering Team

2.3.1 The autothrottle system evolution had been examined and revealed that the autothrottle system installed in the accident aircraft was the latest model. However, the hardware linked from the computer to the mechanical system required to be examined thoroughly because the mechanical system of the Boeing 737-500 carried over from the beginning of the system introduced to the aircraft.

2.3.2 In conjunction to the autothrottle evolution, the operator required to be aware that the system had been changes including the maintenance method. The first maintenance method introduced to the aircraft was referred to Maintenance Steering Group (MSG) 2. In 2012 the aircraft had been re-analysed to introduce the MSG 3 maintenance method involving the Enhance Zonal Analysis Procedure (EZAP) and Electrical Wiring Interconnect System (EWIS). The EZAP dealing with the combining of several task cards of zonal maintenance inspection which previously implemented to the aircraft. The combining of several task cards into single task card might lead to inspection overlooked by the engineer. The engineering team is still conducting the examination to the EZAP and EWIS implementation to the operator including the engineering training.

2.3.3 The condition of the debris and the accident location hampered the recovery of related component. The investigation also considered the location of the components that were on the nose section combined with the impact attitude, presumably that the component had severe damage. Therefore, the examination could not be performed to the installed components.

2.3.4 The engineering group had performed several tests to the components related to the autothrottle system that were removed during the rectification. The tests involving several States including United States (US) and United Kingdom (UK) as the component manufacturer. Amid the pandemic situation, several tests were observed by KNKT investigators virtually, which restrict the communication, coupled with the time difference. The component test included the autothrottle computer, autothrottle servos, flight control computer and enhance ground proximity warning system (EGPWS). The examination intended to provide the evidence to the investigation about the behavior of the system related to the system design.

2.3.5 To provide the better understanding of the autothrottle system behaviours, the investigation had conducted examination to observe the spoiler behaviour in conjunction with autothrottle disengage mechanism, using a Boeing 737-400 aircraft that was performed in United Kingdom (UK). The aircraft selection was based on the similarity of the autothrottle system.

#### 2.4 The Investigation Team

2.4.1 Participate in the investigation are several States investigation authority including National Transportation Safety Board (NTSB) of the United States of America as the State of manufacture and state of design, Transportation Safety Investigation Board (TSIB) of Singapore as State providing assistance and expert, Aircraft Accident Investigation Branch (AAIB) of the United Kingdom as the State providing facility.

2.4.1 The KNKT found that coordination with other State investigation authority was beneficial to improve the investigation process by the support on facility and expertise.

### **3. ACTION REQUIRED BY THE MEETING**

3.1 Based on these experiences, the KNKT encourage investigation authority to utilise the coordination other State investigation authority and any other institution to assist the complex investigation.

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