Summary of Download and Analysis of Two N1 Digital Electronic Engine Controls from Wheeling, IL IAI 1125 Westwind Astra Accident Aircraft Registration N39TT

1 INTRODUCTION AND SUMMARY

1.1 PURPOSE

This report presents the findings of the investigation of two N1 Digital Electronic Engine Controls (N1 DEECs) at the Honeywell Aerospace facility in Tucson, Arizona on September 26, 2023.

The investigation was conducted at the request of and under the supervision of the National Transportation Safety Board (NTSB).

1.2 BACKGROUND

The N1 DEECs, serial numbers 49-AF0023 (associated with the left engine) and 69-AM0057 (associated with the right engine), were installed on two TFE731-3C-200G engines, serial numbers P96192C (LH) and P96193C (RH)[1], of an Israel Aircraft Industries 1125 Westwind Astra aircraft, Registration Number N39TT, Serial Number 053. The aircraft experienced a runway excursion during landing at Chicago Executive Airport in Wheeling, IL, on August 21, 2023 at 13:15 central daylight time. The aircraft sustained substantial damage and the two occupants were not injured. The aircraft had departed Chicago Midway International Airport bound for Chicago Executive Airport.

1.3 ANALYSIS

1.3.1 LEFT ENGINE (P96192C) DEEC (49-AF0023) ANALYSIS

The data shows the following for the left engine:

- Throughout the accident flight, the engine appears to be operating and correctly responding to Power Lever (PLA) movements.
- For this version of the N1 DEEC, WOW is a calculated parameter that is a function of Static Pressure (PS) and calculated MACH, which is a function of PT2 and PS. TR deployment is a calculated parameter that is a function of WOW, MACH, and PLA commanded N1, and is not based on actual TR condition.
    - At time stamp 164 seconds, WOW is set to On Ground because PS and MACH met pre-determined logic requirements.
    - No TR deployment is indicated in the N1 DEEC data. A TR deployment indication requires that WOW indicate On Ground, MACH be below a threshold and decreasing, and commanded N1 be greater than a threshold.
    - For the Chicago Executive Airport field elevation (647 ft), the PLA position would have to exceed approximately 37-40 degrees in

[1] For the purpose of this background information, the identification and assignment of N1 DEECs to the appropriate left and right engine is based on labels fixed to the DEECs.

order for the commanded N1 to meet the logic in the N1 DEEC software to indicate a TR deployment.
    - The incident recorder data shows that the PLA remained less than 26 degrees throughout the landing roll.
- Analysis of the accident data indicate that the left engine was rotating, operating, and responding to power lever inputs throughout the landing accident.

1.3.2 RIGHT ENGINE (P96193C) DEEC (69-AM0057) ANALYSIS

The data shows the following for the right engine:

- Throughout the accident flight, the engine appears to be operating and correctly responding to Power Lever (PLA) movements.
- For this version of the N1 DEEC, WOW is a calculated parameter that is a function of Static Pressure (PS) and calculated MACH, which is a function of PT2 and PS. TR deployment is a calculated parameter that is a function of WOW, MACH, and PLA commanded N1, and is not based on actual TR condition.
    - At time stamp 164 seconds, WOW is set to On Ground because PS and MACH met pre-determined logic requirements.
    - No TR deployment is indicated in the N1 DEEC data. A TR deployment indication requires that WOW indicate On Ground, MACH be below a threshold and decreasing, and commanded N1 be greater than a threshold.
    - For the Chicago Executive Airport field elevation (647 ft), the PLA position would have to exceed approximately 37-40 degrees in order for the commanded N1 to meet the logic in the N1 DEEC software to indicate a TR deployment.
    - The incident recorder data shows that the PLA remained less than 26 degrees throughout the landing roll.
- The ECTM data buffers filled fault was an indication that the buffers were full and the N1 DEEC needed to be downloaded. The remaining three faults appear to be associated with the download process and are not germane to the accident analysis.
- Analysis of the accident data indicate that the right engine was rotating, operating, and responding to power lever inputs throughout the landing accident.

1.4 CONCLUSIONS

The download of the incident recorder data and fault history data from both N1 DEECs was completed successfully. Analysis of the data indicated that both engines were rotating, operating, and responding to power lever inputs throughout the flight and accident sequence. The data does not indicate a TR deployment. It should be noted that TR deployment indication is not a discrete input, rather a calculation based on WOW, MACH, and commanded N1.