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Date: September 20, 2022

Subject: WPR22LA284, Troubleshooting Summary of Accident Airplane

Contacts: Felix Gonzales, Bombardier Technician, Unscheduled Maintenance Team; William Spivey and Aaren Chan, Federal Aviation Administration (FAA), Oakland Flight Standards District Office

Flight Data Recorder (FDR) Download Recap:

- 8/11/2022: FDR data was downloaded by NTSB and data was provided to 24 Bombardier. Original files downloaded onto KITEWORKS Workstation. 25 To note:
- FDR on wing and QAR downloads were unsuccessful.

Cockpit Voice Recorder (CVR) Download Recap:

- Per NTSB review, the pertinent event was not captured; the event occurred mid-flight and the event itself was overwritten. What is left of the recording is a period after the event through to landing.

STEP A Operation Test Recap

- Operational test of Elevator Servo per AMM 22-11-21-710-801 by Bombardier technicians with FAA oversight.
 - o There was no disconnect of the Autopilot during testing which disregarded the next step of interrogating the FGC.
 - o PRIOR TO POWER SHUTDOWN, interrogate the FGC and attain FTC Diagnostic Codes to verify faults. No fault codes annotated.

Added Step A+ Test recap

- Step 1) Have avionics and all associated hydraulics on.
- Step 2) With AP OFF, select VS with a VS reference of 9999 ft and altitude above the current 39 altitude.
- Step 3) Engage the AP and IMMEDIATELY push the column against the servo - try not to slip the clutch. This test will replicate engagement into a large mis trim.
- Step 4) Verify the stab trim system moves as commanded and there is no STAB TRIM FAIL. You will see a MISTRIM eventually.
- Step A+ was completed 6 times. All attempts lead to the expected outcomes except for one 45 attempt. During one of these tests there was unexpected event where the V Bars were coming back down.
 - o UNEXPECTED EVENT: Upon engaging AP and holding the yolk forward fighting the servo, pushing the yolk forward slightly to provide resistance (with VS ref set to 8k), the stab trim moved as commanded to the stop Nose Up. A few seconds after the stop, the trim then proceeded to move in the opposite direction to the Nose Down position. This occurred once out of all attempts.
 - o During this specific attempt all steps were followed per instructions. One item that was not explained in the instructions, is the setting on the Barometric pressure on both Pilot and Co-Pilot side. These settings were not in sync.
 - o Once they restored the airplane to original configuration, they couldn't duplicate the issue they saw yesterday with the reversal of the STAB Trim.
- Based on discussion with Bombardier and Collins, it was determined that unexpected event during STEP A+ test was an anomaly and was not related to our accident event of AP not trimming.

STEP B Recap

- Visual Inspections were performed IAPs, and all cards were confirmed properly installed. No anomalies noted.

- Confirm all cards including IOC, FGC were properly inserted (look for loose cards or not enough pushed...). No anomalies noted
- Check wiring between HSTECU and IOC/FGP. No anomalies noted

STEP C Recap

- Performed and completed on Sept 13-15, 2022, with FAA oversight of Bombardier technicians
- Re-Install IAPS & DCU
- Performed Full functional test of the Pitch Trim System per AMM 27-41-00-720-801. PASSED, no anomalies noted.
- Checked control freedom of movement. PASSED, no anomalies noted.
- Confirm Horizontal Stabilizer Trim Electronic Control Unit (HSTECU) connector clean, pin lock properly, no pin bent. PASSED, no anomalies noted.
- Functional test of Elevator Servo Mount per AMM 22-11-13-720-802 127
Partially completed: performed steps 1 - 7. PASSED, no anomalies noted.
Remaining steps incomplete: did not have the correct tensiometer for measuring tension in the cables of specific.
- Performed Operational test of HST ECU per 27-41-21-710-80. PASSED, no anomalies noted.
- Electrical rigging of rudder travel limiter actuator - PASSED, no anomalies noted.
- Rudder Travel Limiter Actuator check. PASSED, no anomalies noted.
- Electrical rigging of Pitch Trim System. PASSED, no anomalies noted. (lower & upper limits recorded)
- Recorded upper and lower limits to stops. PASSED, no anomalies noted.
- Operational test of Pitch Trim System. PASSED, no anomalies noted.
- Opened Aft-Equipment Compartment Door
- Performed weight-off wheel config with A/C on the ground. PASSED, no anomalies noted.

- Air Data System Test PASSED, no anomalies noted.
- Altitude test of Primary pitot-static system and leak checks at 5,000', 26,000', and 50,000'
- Airspeed test of Primary pitot-static system: 200 kt, 375-385 kts, leak check, no anomalies noted.
- Altitude test of Standby pitot-static system, no anomalies noted.
- Airspeed test of Standby pitot-static system, no anomalies noted.
- Performed control freedom of movement checks of elevator servo and mount per AMM 22- 153 11-13-720-802 with no defects noted. Video taken. PASSED, no anomalies noted.
- Checked servo tach wiring to the Flight Guidance Computer (FGC), no anomalies noted.
- Checked servo and servo clutch for binding with no defects noted.
- Completed air data system checks with no leaks or defects noted.
- Performed successful functional test of the pitch trim system. Witnessed. PASSED, no anomalies noted.
- Confirmed the HSTECU connector was clean, pins good. Performed successful functional test of the HSTECU with no defects noted. Witnessed. PASSED, no anomalies noted.
- Functional test of Elevator Servo Mount per AMM 22-11-13-720-802 COMPLETED after new 186 tensiometer received. PASSED, no anomalies noted.