



CASE STUDY

Boeing 757-200 TE FLAP DISAGREE: Troubleshooting high friction in rotary components using the UL101 Aviation Troubleshooter (p/n B00033; Boeing Tool Tag SPL-1473)

Scenario

The trailing edge flaps of an operator's Boeing 757-200 were locking out, displaying the "TE FLAP DISAGREE" message. Several parts were replaced, but the lockout issue persisted. QAR data seemed to indicate the possibility of binding in the trailing edge flap system. A member of Boeing's Charlie Works division helped the operator's maintenance team to develop a test plan to isolate which component(s) were causing the error.

Overview of Work

1. The team established a baseline of the current draw on a good 757-200's alternate flap motor when the TE flaps were electrically lowered. To "warm up" the aircraft before testing, the flaps were cycled hydraulically twice before performing the current draw test. Following the warm-up, the alternate flaps were cycled electrically three times. The team recorded Nominal and Inrush current draw at each flap setting (1, 5, 15, 20, 25, 30).
2. Once the baseline was established, the team tested the current draw on the AOG 757-200. The same process from Step 1 was repeated on the questionable aircraft. The current draw test indicated excessive draw (c. +10 amps) on flap positions 20, 25, and 30 during the Inrush test, indicating high friction in one or more of the TE flap transmissions.
3. After removing the canoe fairings from the flap track to gain access to the flap transmissions, a member of the team used the UL101 Aviation Troubleshooter to listen to the friction from each transmission, angle drive, and ball nut. The #8 transmission had recently been changed, so it was used to null the UL101's gain settings before listening to the other seven transmissions. Comparison testing of all eight transmissions revealed high amounts of ultrasound at the #4 and medium/high amounts of ultrasound at the #5 transmission, indicating excessive friction in both transmissions.
4. Finally, the team tested flap control tension per AMM Task 20-00-02-211-801 and flap control lever force per AMM task 27-51-00-735-063. No defects were found in either test.

Conclusion

QAR data indicated a high friction issue within the flap system. The flap control cable and friction tests did not identify any defects. Current draw testing against a good baseline showed a high inrush current between flap positions 20 and 30, which was in line with the QAR data which showed the flaps locking out at 23 degrees.

Testing with the UL101 Aviation Troubleshooter revealed high amplitude ultrasound at the #4 flap transmission, which indicates excessive friction. While the ultrasonic amplitude on the #5 transmission was not as loud as #4, it was still significantly higher than the sound from the other six transmissions. The end user replaced both transmissions, and the aircraft was returned to revenue service with no further defects or error messages.

The information in this case use was supplied by Matthew Couture of Boeing's "Charlie Works" team. CTRL Systems thanks Matthew and Boeing for partnering with us to promote the benefit of acoustic ultrasound detection to the aircraft maintenance community.



INDUSTRY

Commercial
Aviation



CTRL EQUIPMENT

UL101 Aviation
Troubleshooter
(p/n B00033)



PART NUMBER

CTRL Part No.
B00033 / Boeing
Tool Tag SPL-1473



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