



Intermittent Fault Detector (IFD-256™)

[REDACTED] - Pitot Probes

IFD-256 Test Summary



Prepared and Submitted by:

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3 June 2019

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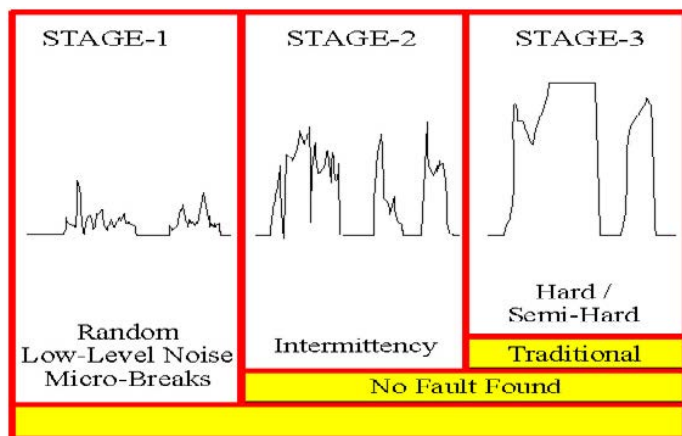
Electrically Heated Pitot Probes (0851HT-1) S/N: 322473 & S/N: 393938

Introduction:

The subject [REDACTED] Pitot Probes were tested at the request of [REDACTED] for the purpose of demonstrating the advanced diagnostic capability of the Intermittent Fault Detector™ (IFD™). Universal Synaptics received the Pitot Probes on 31 May 2019, testing began on 3 June 2019 using the portable Intermittent Fault Detector (IFD-256™). The Interface Test Adaptor (ITA) was designed and manufactured by Universal Synaptics for this test project. The [REDACTED]-supplied banana jack test leads were utilized to connect the ITA to the Pitot Probes / Unit Under Test (UUT).

Test Procedures:

- AutoMap™ – discovered the UUT true as-wired configuration. (no OEM data/schematics required)
 - S/N 322473 utilized to build baseline map as S/N 393938 was received from [REDACTED] with confirmed fail of a continuity test
- 1. Continuity – tests for open circuits
- 2. Shorts – provides shorts indication and shorts tracing
- 3. Intermittence – monitors all circuits to detect and isolate *all three Stages* of intermittent faults (see Graphic 1)

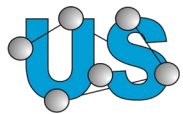


Stage 1 – random low-level nanosecond micro-breaks, likely not operationally evident yet, but on curve of degradation to become Stage 2

Stage 2 – intermittent failure evident to pilot in operation, reported to ground crew, passes ground test and labeled No Trouble Found (NTF) or No Fault Found (NFF). On curve of degradation to become Stage 3

Stage 3 – semi-hard or hard failures, Automatic Test Equipment (ATE) and troubleshooting tools such as DMMs designed to detect hard faults (open circuits or shorted circuits)

Graphic 1 – Three Stages of an Intermittent Fault

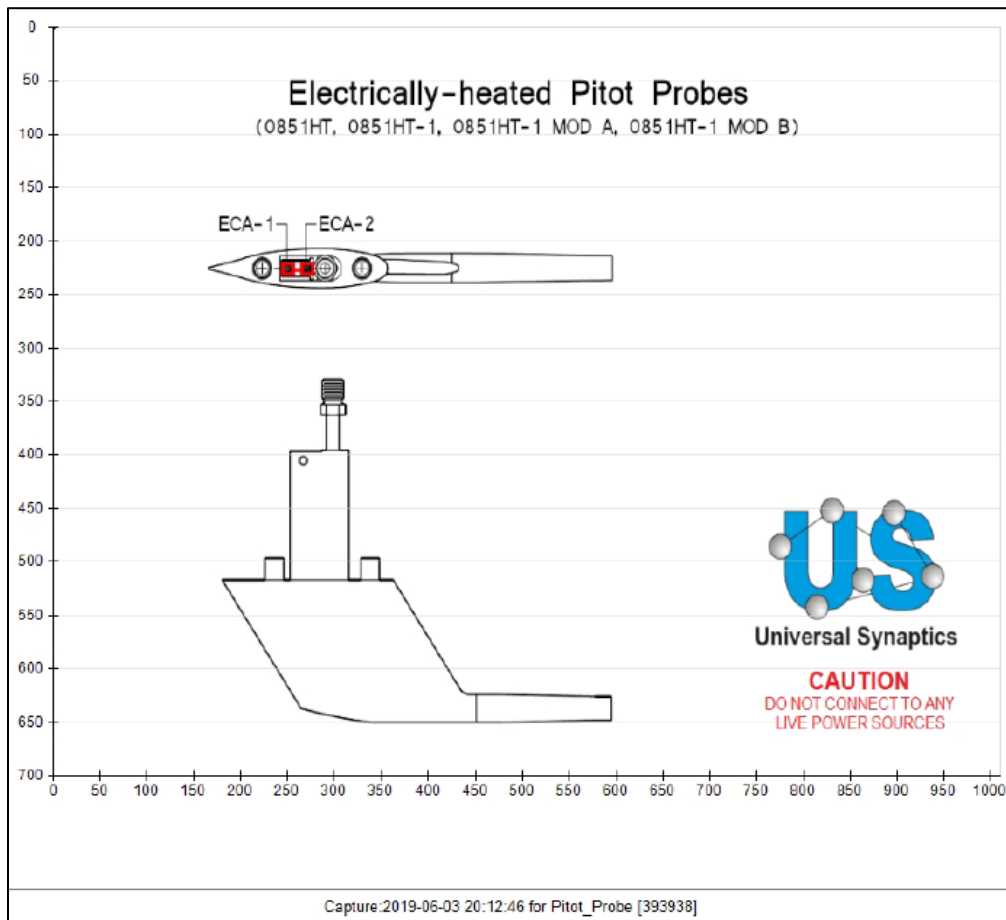


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Results:

S/N 393938

1. IFD-256 Continuity testing conducted – confirmed known open circuit in the Electrical Connection Assembly - ECA-1 to ECA-2 (see Graphics 2, 3, and 4)
2. IFD-256 Shorts testing conducted – no shorted circuits were detected in the UUT
3. IFD-256 Intermittence testing conducted – no intermittence detected



Graphic 2 - Continuity Graphic - S/N: 393938

From	To	Gold	Meas	Diff	Diagnostic	Status
ECA1	ECA2	63.67	>100	OVLD	CON-Default POC-FAIL @ECA2	Fail

Graphic 3 - Continuity Report - S/N: 393938

NOTE: Gold value above at 63.67 ohms includes 16 ohms resistance through the internal IFD circuitry switches plus the specified ohmic resistance value of 40 – 56 ohms +/- 4 ohms



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Results Report Header for - Continuity Test					
Test Information:					
Unit being tested		Pitot_Probe			
Unit serial number		393938			
Date tested (yyyy-mm-dd)		2019-06-03			
Time tested		19:12:44			
Operator		User Administrator			
393938 SUMMARY OF NODAL CONTINUITY TEST RESULTS FOR: Pitot_Probe					
TP#	NOMEN	NODE	GOLD	MEAS(DIFF)	DIAGNOSTIC
15	ECA1	1	63.67	POC (>100)	CON-Default POC-FAIL @ECA2
Continuity Test Completed in 0:00:02					

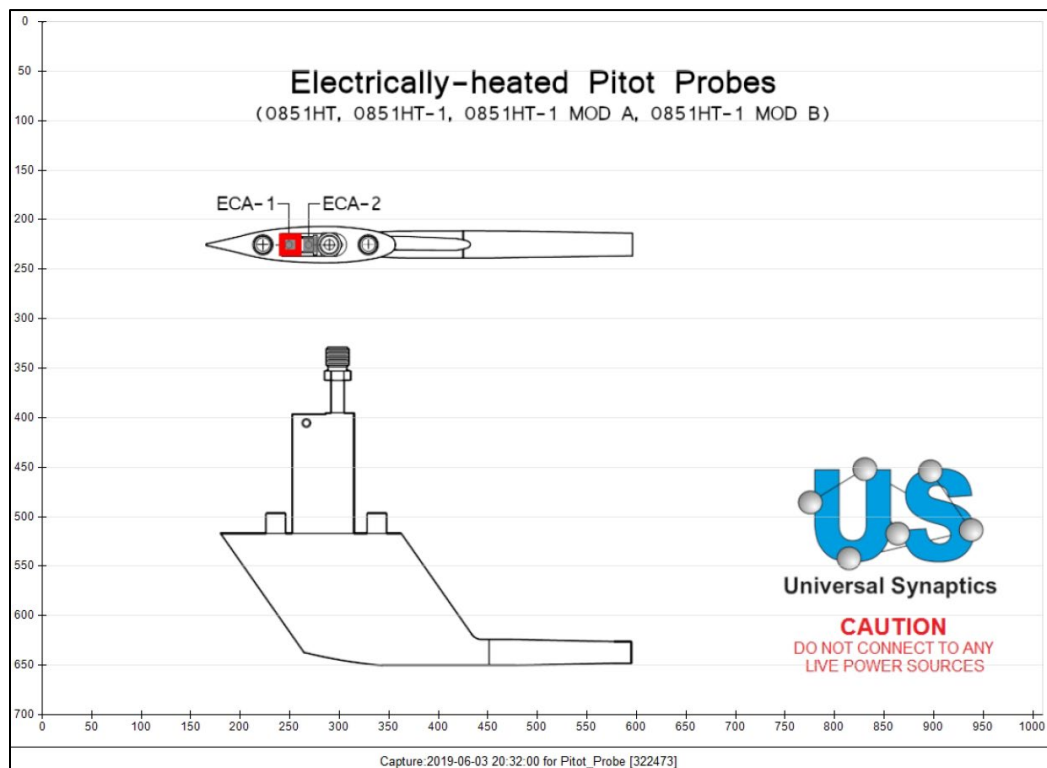
Graphic 4 - Continuity Results - S/N: 393938 – ECA-1 Open

S/N 322473

1. IFD-256 Continuity testing conducted – passed continuity / no findings (see Graphic 5)
2. IFD-256 Shorts testing conducted – no shorted circuits were detected in the UUT
3. IFD-256 Intermittence testing conducted – multiple intermittent events detected and isolated on ECA-1 (see Graphics 6 and 7)

Results Report Header for - Continuity Test				
Test Information:				
Unit being tested	Pitot_Probe			
Unit serial number	322473			
Date tested (yyyy-mm-dd)	2019-06-03			
Time tested	16:47:58			
Operator	User Administrator			
322473 SUMMARY OF NODAL CONTINUITY TEST RESULTS FOR: Pitot_Probe				
TP#	NOMEN	NODE	GOLD	MEAS (DIFF) DIAGNOSTIC
Continuity Test Completed in 0:00:02				

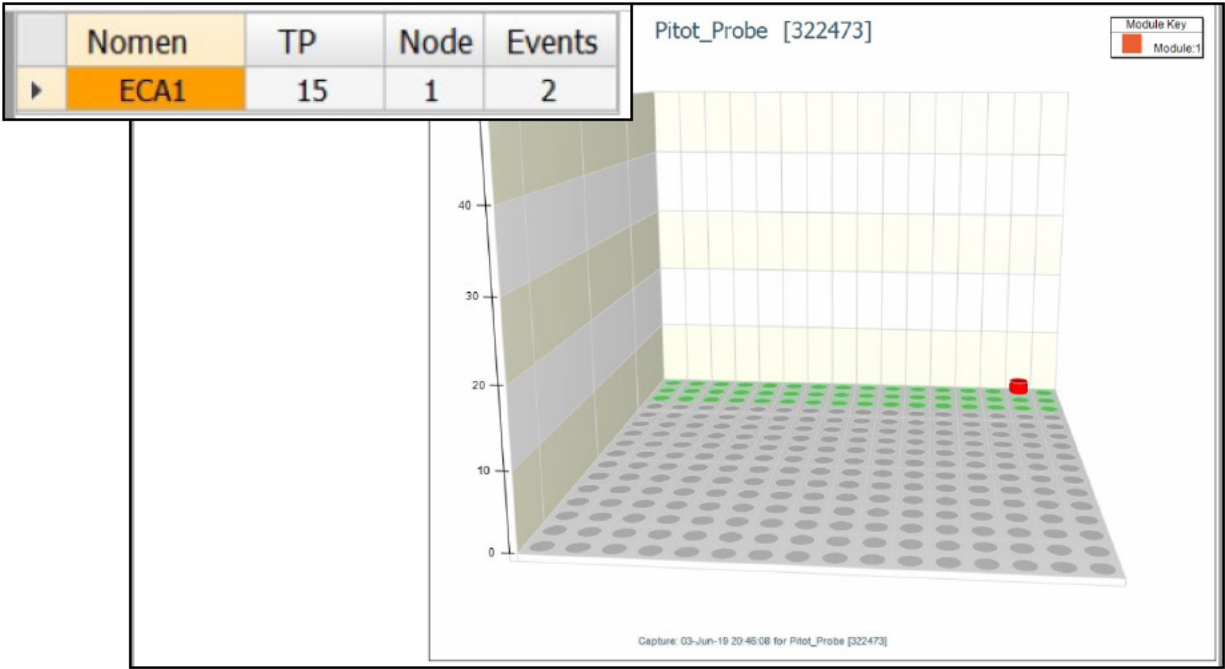
Graphic 5 - Continuity Results - S/N: 322473 – No Findings



Graphic 6 – Intermittence Fault Isolation Graphic - S/N: 322473



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Graphic 7 – Intermittence Test Column View - S/N: 322473

Summary:

Universal Synaptics' patented Intermittent Fault Detection technology has proven to increase aircraft component reliability. As proven by this demonstration, the IFD-256 will increase the reliability of the aircraft by ensuring that quality Pitot Probes are installed on [REDACTED] aircraft, subsequently preventing Operational Difficulty Index (ODI) events and customer dissatisfaction.

S/N 393938

- Functional test complete: FT 04/19 – stamped APR 30 2019 (see Image 1)
- Passed traditional continuity test and marked Ready for Install (RFI)
- Removed at 8.21 hours after operational failure
- Failed Continuity Test @ 47.41 megaohms outside of 40-56 ohms range
- Based on Time-on-Wing (TOW), an operational failure occurred soon after conventional testing certified the asset as RFI
 - Indicative of a pre-flight intermittent condition that would have been detected and isolated by the IFD-256
 - IFD-256 would have prevented an Operational Difficulty Index (ODI) event

S/N 322473

- Functional test complete: FT 03/15 – (see Image 1)
- Removed at 12,596 hours
- Passed Continuity Test @ 46.3 ohms within 40-56 ohms range
- Multiple Intermittent events detected

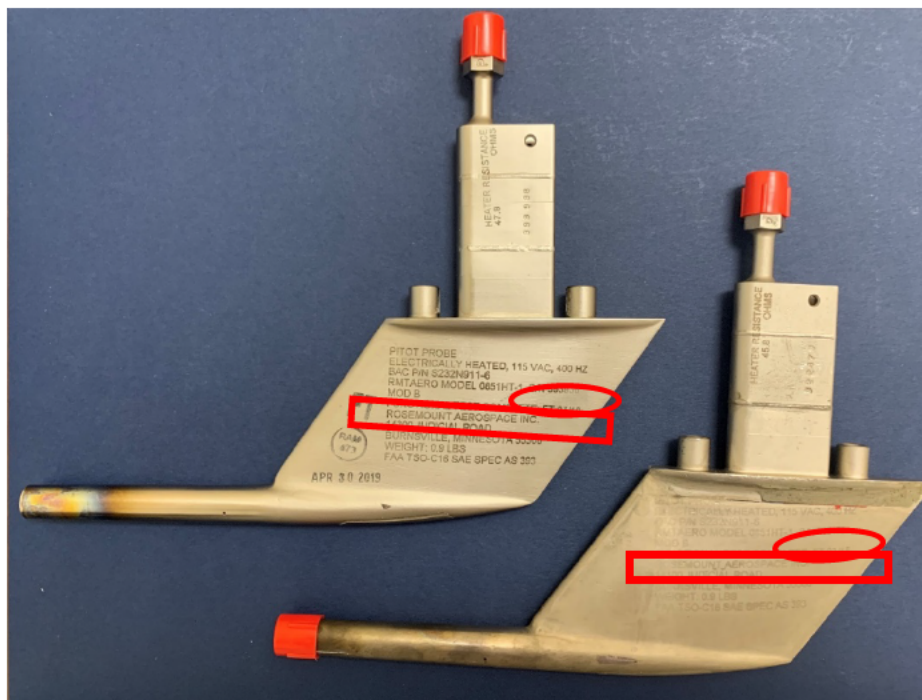


Image 1 – Pitot Probes – S/N: 393938 and S/N: 322473