

SSME EA/CIL
REDUNDANCY SCREEN

Component Group: Igniters and Sensors
 CIL Item: J609-02
 Component: LPOTP Shaft Speed Transducer (O1.1)
 Part Number: RES7005/R0019520
 Failure Mode: Structural failure.

Prepared: M. Oliver
 Approved: T. Nguyen
 Approval Date: 3/30/99
 Change #: 2
 Directive #: CCBD ME3-01-4994
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Phase	Failure / Effect Descriptor	Criticality Hazard Reference
SMC 41	Fire from LOX impact or rubbing if internal to turbopump or overpressurization of aft compartment if external failure Loss of vehicle. Redundancy Screens: SINGLE POINT FAILURE: N/A	1 ME-C2S,A,M,C

**SSME FMEA/CIL
DESIGN**

Component Group: Igniters and Sensors
CIL Item: J509-02
Component: LPOTP Shaft Speed Transducer (01.1)
Part Number: RES7005/R0019520
Failure Mode: Structural failure.

Prepared: M. Oliver
Approved: T. Nguyen
Approval Date: 1/30/98
Change #: 2
Directive #: GCBD ME3-01-4894
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Design / Document Reference

FAILURE CAUSE: A: Parent metal failure.

THE LPOTP SHAFT SPEED TRANSDUCER, FRONT HOUSING, FLANGE, AND REAR HOUSING ARE MADE FROM INCONEL 625 (1). TENSILE STRENGTH, RESISTANCE TO GENERAL CORROSION, WELDABILITY TO 300 SERIES CRES, AND RESISTANCE TO STRESS CORROSION CRACKING ARE PRIMARY REASONS FOR SELECTING THIS MATERIAL (2). THE PROBE HOUSING IS MADE FROM 304L CRES, WHICH WAS SELECTED FOR ITS STRENGTH, WELDABILITY, CORROSION RESISTANCE, AND NONMAGNETIC PROPERTIES (2). THE SENSOR MATERIAL MEETS STANDARD LOX COMPATIBILITY REQUIREMENTS (3). THIS END ITEM UNIT IS A VENDOR SUPPLIED ITEM, DRAWING SPECIFICATIONS AND MANUFACTURING PROCESSES ARE CONTROLLED BY ROCKETDYNE (4). ALL SENSOR DESIGNS ARE SUBJECTED TO A CRITICAL DESIGN REVIEW. ANY DESIGN CHANGES ARE RE-REVIEWED (1). THE RES7005-074 TRANSDUCER DESIGN HAS PASSED DESIGN VERIFICATION TESTING (4), INCLUDING THERMAL CYCLING AND VIBRATION TESTING (5). THE -084 DESIGN IS IDENTICAL TO THE -074 DESIGN WITH THE ADDITION OF A WORKMANSHIP SCREENING REQUIREMENT. THE R0019520-019 DESIGN IS MADE FROM THE RES7005-084 DESIGN. THE RES7005-084 AND R0019520-019 DESIGNS HAVE BEEN QUALIFIED BY SIMILARITY (6) HIGH CYCLE AND LOW CYCLE FATIGUE LIFE, AS WELL AS THE MINIMUM FACTORS OF SAFETY FOR THE TEMPERATURE TRANSDUCER, MEET CEI REQUIREMENTS (7).

(1) RES7005 / R0019520. (2) RSS-8582-6, MSFC-SPEC-522. (3) RL10017; (4) DVS-SSME-203, RSS-8660; (5) RSS-203-11; (6) RSS-8660; (7) RL00532, CP320R0003B, RSS-8648

SSME FM. /CIL
INSPECTION AND TEST

Component Group: Igniters and Sensors
 CIL Item: J605-02
 Component: LPOTP Shaft Speed Transducer (01.1)
 Part Number: RES7005/R0019520
 Failure Mode: Structural failure.

Prepared: M. Oliver
 Approved: T. Nguyen
 Approval Date: 3/30/99
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Failure Causes	Significant Characteristics	Inspection(s) / Test(s)	Document Reference
A	SPEED TRANSDUCER		RES7005 / R0019520
	MATERIAL INTEGRITY	MATERIAL INTEGRITY IS VERIFIED PER SPECIFICATION REQUIREMENTS.	RC7005
	WELD INTEGRITY	ALL WELDS ARE INSPECTED TO DRAWING AND SPECIFICATION REQUIREMENTS PER WELD CLASS. INSPECTIONS INCLUDE: VISUAL, DIMENSIONAL, PENETRANT, RADIOGRAPHIC, ULTRASONIC, AND FILLER MATERIAL, AS APPLICABLE.	
	HOT FIRE ACCEPTANCE TESTING (GREEN RUN)	SENSOR OPERATION IS VERIFIED THROUGH HOT FIRE ACCEPTANCE TESTING.	RL00161
	DATA REVIEW	ALL CONTROLLER DATA FROM THE PREVIOUS FLIGHT OR HOT FIRE IS REVIEWED. ANY ANOMALOUS CONDITION NOTED REQUIRES FURTHER TESTING OR HARDWARE REPLACEMENT PRIOR TO THE NEXT FLIGHT.	MSFC PLN 122B
	PRE-FLIGHT CHECKOUT	SENSOR OPERATION IS VERIFIED EVERY MISSION FLOW BY SUCCESSFUL COMPLETION OF THE CONTROLLER SENSOR ELECTRICAL CHECKOUT. (LAST TEST)	OMRSD V41AQ0.010 OMRSD S00FA0.213

Failure History: Comprehensive failure history data is maintained in the Problem Reporting database (PRAMS/PRACA).
 Reference: NASA letter SA21/88/308 and Rockwell letter 88RQ09761.

Operational Use: Not Applicable