

April 19, 1996

CRITICAL ITEMS LIST

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1) CIL ITEM : F200-8Y-01
2) FMEA CODE : F200-8Y
3) COMPONENT : VIBRATION ISOLATORS
4) PART NUMBER : RE1493
5) SYSTEM/SUBSYSTEM : CONTROLLER/F200-XX
6) FAILURE MODE : FAILURE OF ONE OR MORE OF THE FOUR VIBRATION ISOLATORS

7) PREPARED : SSME RELIABILITY
8) APPROVED :
9) DATE : 04-19-96
10) REVISION/CHANGE : -001/0
11) EFFECTIVITY : -05
12) HAZARD REFERENCE: : SEE LISTINGS BELOW
13) CCBD #

ME3-01-3285

PHASE	FAILURE DESCRIPTION/EFFECT	CRITICALITY
M	FAILURE WILL EXPOSE CONTROLLER TO HIGH VIBRATION ENERGY AND CAUSE BOTH CHANNELS TO FAIL. CONTROLLER INITIATED PNEUMATIC SHUTDOWN. MISSION ABORT. (SEE OPERATIONAL USE.) REDUNDANCY SCREENS: SINGLE POINT FAILURE: N/A.	1R HAZARD REF: ME-04M

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CIL ITEM: F200-BY-01	DESIGN	DOCUMENT REF.
ALL CAUSES: DEGRADATION OF ELASTOMER INSERT	<p>TO REDUCE VIBRATIONAL LOADING ON THE CONTROLLER ASSEMBLY, A FOUR POINT VIBRATION ISOLATION MOUNTING SYSTEM IS USED (1). TWO ELASTOMER ISOLATORS (2), TWO EXTERNAL CUPS (3), AND TWO INTERNAL SLEEVES (4) ARE EMPLOYED AT EACH MOUNTING POINT. THE CUP AND SLEEVE DESIGN PRECLUDES COMPRESSIVE LOADING ON THE ELASTOMER. THE ELASTOMER MATERIAL WAS SELECTED FOR SATISFACTORY DAMPING CHARACTERISTICS OVER THE ENGINE OPERATIONAL TEMPERATURE RANGE (2). RADIUS CORNERS ON THE ELASTOMER REDUCE POINT LOADING DURING OPERATION (2). THE CUP AND SLEEVE MATERIAL (A-286 BAR) WAS SELECTED FOR ITS STRENGTH IN THIS APPLICATION (3, 4). THE LOWER (AFT) INBOARD AND OUTBOARD, MOUNTS ARE EACH COMPRISED OF AN ELASTOMER/CLIP/SLEEVE SET INSTALLED ON EACH SIDE OF A CLEVIS (5, 6). TWO ELASTOMER/CLIP/SLEEVE SETS ARE USED AT EACH OF THE TWO ATTACH POINTS OF THE FORWARD (UPPER) MOUNT (7) AND PLATE (B) ASSEMBLY. PROPER TORQUE HAS BEEN SPECIFIED FOR INSTALLATION OF EACH VIBRATION ISOLATION MOUNTING ASSEMBLY (1).</p>	<p>(1) DSHG8977A1 (2) RES1226 (3) RSD10412 (4) RSD10413 (5) RSD07364 (6) RSD10409 (7) RSD10410 (8) RSD07379</p>
<p>THE VIBRATION ISOLATORS MEET CEI REQUIREMENTS FOR HIGH AND LOW CYCLE FATIGUE LIFE (1, 2), AND MINIMUM FACTOR OF SAFETY (1, 3). THE VIBRATION ISOLATORS ARE CLEARED FOR FRACTURE MECHANICS/IDE FLAW GROWTH (4). RAMP CLAMPS SECURE THE CARDS INSIDE THE CONTROLLER TO PRECLUDE VIBRATION INDUCED CARD FAILURES (5). EACH UNIT (PRODUCTION AND RECYCLED) IS REQUIRED TO PASS A FUNCTIONAL ACCEPTANCE TEST UNDER VIBRATIONAL CONDITIONS BEYOND THOSE SEEN DURING NORMAL FIELD OPERATION WITHOUT DEGRADATION OF HARDWARE LIFE EXPECTANCY (5).</p>	<p>(1) CPJ20R00038 (2) RL00532 (3) RSS-8546 (4) NASA TASK 117 (5) DSHG8977A1</p>	
<p>DESIGN QUALIFICATIONS TESTING OF THE CONTROLLER ASSEMBLY HAS BEEN PERFORMED INCLUDING: CASE AND ASSEMBLY VIBRATION TESTING (1), AND ASSEMBLY BREAK OPEN INSPECTION (2).</p>	<p>(1) TR34080204, TR34080205, TR34080206, TR34087499, (2) TR34085022</p>	

CIL ITEM: F200-BY-01		INSPECTION AND TEST	
POSSIBLE CAUSES	SIGNIFICANT CHARACTERISTICS	INSPECTION(S)/TEST(S)	DOCUMENT REF.
ALL CAUSES:	RE1493 - CONTROLLER		RE1493
	ASSEMBLY INTEGRITY	CLEANLINESS REQUIREMENTS ARE VERIFIED PER SPECIFICATION DURING MANUFACTURING OF THE CONTROLLER ASSEMBLY.	RC1493
		ENVIRONMENT CONTROLS (TEMPERATURE, HUMIDITY) ARE ENFORCED DURING ASSEMBLY AND TESTING PER SPECIFICATION REQUIREMENTS.	DSNG8977A1
		TO PREVENT COMPONENT DAMAGE, STATIC ELECTRICAL DISCHARGE POTENTIAL IS CONTROLLED DURING MANUFACTURING PER SPECIFICATION REQUIREMENTS.	DSNG8977A1
	MATERIAL INTEGRITY	MATERIAL INTEGRITY IS VERIFIED PER SPECIFICATION REQUIREMENTS.	RC1493
		PROTECTIVE FINISHES AND MATERIAL SELECTION TO PREVENT DETRIMENTAL EFFECTS FROM ENVIRONMENTAL EXPOSURE, STRESS CORROSION, AND ELECTROLYTIC CORROSION ARE VERIFIED PER SPECIFICATION REQUIREMENTS.	RC1493 MSFC-SPEC-250
		FLAMMABILITY REQUIREMENTS ARE VERIFIED PER SPECIFICATION REQUIREMENTS.	RC1493
	INTEGRITY OF ELECTRONICS	THE FOLLOWING PROCESSES ARE VERIFIED PER SPECIFICATION DURING MANUFACTURING OF THE CARD ASSEMBLIES:	
		- CONSTRUCTION OF PRINTED CIRCUIT BOARDS.	RL10005
		- INSTALLATION OF TERMINALS.	RL10007
- PLASTICS AND ELASTOMERS FOR ELECTRONIC ENCAPSULATION.		RL10008	
- SOLDERED ELECTRICAL CONNECTIONS.		RL10009	
- POST-SOLDERING INSPECTION FREE OF SPLATTER AND CONTAMINATION.		RL10009	
- ELECTRICAL BONDING.		RC1493	
- COMPONENT LEAD AND INTERCONNECTION MATERIAL SELECTION.	BSHO3928		
- FREE OF CONTAMINATION AFTER CONFORMAL COATING.	RC1493		

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CIL ITEM: F200-8Y-01		INSPECTION AND TEST	
POSSIBLE CAUSES	SIGNIFICANT CHARACTERISTICS	INSPECTION(S)/TEST(S)	DOCUMENT REF.
	WELD INTEGRITY	ALL WELDS ARE VERIFIED TO DRAWING AND SPECIFICATION REQUIREMENTS.	RL10011
	PRE-CLOSEOUT TESTING AND INSPECTION	<p>THE FOLLOWING TESTS ARE PERFORMED AT THE CARD/COMPONENT LEVEL DURING MANUFACTURING:</p> <ul style="list-style-type: none"> - PARTIAL IMPACT NOISE DETECTION (PIND) TEST ON HYBRID MICROCIRCUITS AND CAVITY TYPE DEVICES. - ULTRASONIC SCAN TEST FOR DELAMINATION CERAMIC ON CAPACITORS (CKR05 AND CKR06). - BURN-IN PERIOD FOR ELECTRICAL PARTS. - INSULATION RESISTANCE AND CONTINUITY TEST. - DIELECTRIC WITHSTANDING VOLTAGE. - FUNCTIONAL TEST. - X-RAY OF CONTROLLER INTERNAL CABLES AND WIRES. <p>THE FOLLOWING INSPECTIONS ARE PERFORMED ON THE COMPLETED ASSEMBLY PRIOR TO FINAL CLOSURE:</p> <ul style="list-style-type: none"> - INTERNAL AND EXTERNAL CLEANLINESS. - CARD DIMENSIONS ARE VERIFIED AT CARD ASSEMBLY. - CHASSIS CAVITY INSPECTION FOR CONTAMINATION. - ELECTRICAL INTERFACE CONNECTORS. - CARD INSTALLATION AND CONFIGURATION AUDIT. - CONFORMAL COATING OF EEE PARTS. 	<p>DSHG8977A1</p> <p>DSHG8977A1 BSMD3928</p> <p>DSHG8977A1</p> <p>DSHG8977A1</p> <p>DSHG8977A1</p> <p>RC1493</p> <p>DSHG8977A1</p> <p>RC1493</p> <p>RC1493</p> <p>DSHG8977A1</p> <p>BSMD3928</p>
	ACCEPTANCE TESTS	<p>THE FOLLOWING TESTS ARE PERFORMED BY HONEYWELL DURING ACCEPTANCE TESTING:</p> <ul style="list-style-type: none"> - HERMETIC SEAL AND PRESSURIZATION PORT LEAK TEST. - FUNCTIONAL TEST INCLUDING: <ul style="list-style-type: none"> - OUTPUT INTERFACE, - CHECKOUT, - OPERATION, - CONTROLLER CHECKOUT. - HIGH TEMPERATURE OPERATION. - LOW TEMPERATURE OPERATION. - VIBRATION TESTING. - FINAL FUNCTIONAL TEST. 	<p>RC1493</p> <p>RC1493</p> <p>RC1493</p> <p>RC1493</p> <p>RC1493</p> <p>RC1493</p> <p>RC1493</p> <p>RC1493</p> <p>RC1493</p> <p>RC1493</p> <p>RC1493</p>

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CIL ITEM: F200-BY-01		INSPECTION AND TEST	
POSSIBLE CAUSES	SIGNIFICANT CHARACTERISTICS	INSPECTION(S)/TEST(S)	DOCUMENT REF.
	HOT FIRE ACCEPTANCE TESTING (GREEN RUN)	CONTROLLER OPERATION IS VERIFIED THROUGH ENGINE NO1 FIRE ACCEPTANCE TESTING.	RL00461
	FLIGHT FLOW TESTING	ALL CONTROLLER DATA FROM THE PREVIOUS FLIGHT IS REVIEWED.	MSFC PLN 122B
		DURING EXTERNAL INSPECTION, THE ISOLATORS ARE INSPECTED FOR ANY EVIDENCE OF DAMAGE PER SPECIFICATION REQUIREMENTS.	OMRSD Y4200.050
<p>FAILURE HISTORY: COMPREHENSIVE FAILURE HISTORY DATA IS MAINTAINED IN THE PROBLEM REPORTING DATABASE (PRMS/PRACA). REFERENCE: NASA LETTER SA21/88/308 AND ROCKETDYNE LETTER 88RC09761.</p>			

OPERATIONAL USE: FAILURE MODE CAN BE DETECTED IN REALTIME BY THE FLIGHT CONTROL TEAM WHO WILL EVALUATE EFFECTS UPON VEHICLE PERFORMANCE AND ABORT CAPABILITY. BASED ON THIS EVALUATION THE APPROPRIATE ABORT MODE OR SYSTEM CONFIGURATION WILL BE SELECTED. FAILURE DETECTION CUES AND ASSOCIATED SOME PERFORMANCE DATA HAVE BEEN COORDINATED BETWEEN THE ENGINEERING AND FLIGHT OPERATIONS ORGANIZATIONS WITH THE RESPONSES DOCUMENTED IN MISSION FLIGHT RULES.