

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE

NUMBER: 60-RC-200000-00-021-X

SUBSYSTEM NAME: RCRS CHECKOUT UNIT

REVISION : 1 07/02/91

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
□ LRU :	RCRS PNEUMATIC C/O UNIT	G070-622550
□ SRU :	GAS CYLINDER	8HS2250
□	HOKE, INC.	

PART DATA

- EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:  
CO2 STORAGE AND SUPPLY CYLINDER
- REFERENCE DESIGNATORS: C1550TK1  
                              : C1550TK2  
                              : C1550TK3
- QUANTITY OF LIKE ITEMS: 3  
THREE, TK1-TK3 IN THE RCRS PNEUMATIC CHECKOUT PANEL
- FUNCTION:  
PROVIDE SOURCE OF CO2 FOR USE IN RCRS TEST AND CHECKOUT.

FAILURE MODES EFFECTS ANALYSIS (FMEA) — CRITICAL FAILURE MODE

NUMBER: GC-RC-200000-00-021-02

REVISION# 1 07/02/91 R

SUBSYSTEM: RCRS CHECKOUT UNIT  
LRU :RCRS PNEUMATIC C/O UNIT  
ITEM NAME: GAS CYLINDER

CRITICALITY OF THIS  
FAILURE MODE:1

FAILURE MODE:  
STRUCTURAL FAILURE, RUPTURE

MISSION PHASE:  
GT GROUND TURNAROUND

VEHICLE/PAYLOAD/KIT EFFECTIVITY: F00 MISSION ONLY  
: 102 COLUMBIA  
: 105 ENDEAVOUR

CAUSE:  
MATERIAL FLAW, MECHANICAL STRESS (MECHANICAL SHOCK, VIBRATION), EXCESS  
INTERNAL PRESSURE, PROCESSING ANOMALY

CRITICALITY 1/1 DURING INTACT ABORT ONLY? N/A

REDUNDANCY SCREEN A) N/A  
B) N/A  
C) N/A

PASS/FAIL RATIONALE:

- A)
- B)
- C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:  
LOSS OF THE CO2 IN THE AFFECTED TANK. POSSIBLE DAMAGE TO PANEL AND  
PARTS AND COMPONENTS.

(B) INTERFACING SUBSYSTEM(S):  
POSSIBLE DAMAGE TO NEARBY SYSTEMS FROM SHRAPNEL IMPACT AND/OR  
IMPINGEMENT OF HIGH-VELOCITY GAS STREAM.

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■ (C) MISSION:  
N/A

■ (D) CREW, VEHICLE, AND ELEMENT(S):  
POSSIBLE DAMAGE TO VEHICLE AND INJURY TO OR LOSS OF PERSONNEL FROM SHRAPNEL IMPACT AND/OR IMPINGEMENT OF HIGH-VELOCITY GAS STREAM.

■ (E) FUNCTIONAL CRITICALITY EFFECTS:  
N/A

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- DISPOSITION: RATIONALE -  
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■ (A) DESIGN:  
THE CYLINDER IS DESIGNED AND MANUFACTURED TO STRINGENT DEPARTMENT OF TRANSPORTATION SPECIFICATIONS (DOT RATING 3A1800) TO PROVIDE LONG PERFORMANCE LIFE AND MAXIMUM SAFETY. THE CYLINDER IS FABRICATED FROM SEAMLESS DRAWN 304SS STAINLESS STEEL, WITH INCREASED WALL THICKNESS IN THE THREADED AREA TO PREVENT EXPANSION WHEN THE VALVE IS INSTALLED. COMPLETELY FORMED ENDS MAXIMIZE STRENGTH AND ELIMINATE POTENTIAL LEAK PATHS. PRECISION SPINNING OPERATION ELIMINATES INTERNAL POCKETS IN THE CYLINDER WALLS. INTERNAL SANDBLASTING SMOOTHS SURFACE IMPERFECTIONS AND REMOVES FOREIGN PARTICLES.

■ (B) TEST:  
ALL CYLINDERS ARE PROOF TESTED TO TWICE THEIR RATED INTERNAL PRESSURE.

■ (C) INSPECTION:  
ALL CYLINDERS ARE INSPECTED FOR WEIGHT, WORKMANSHIP, FINISH, DIMENSIONS, CONSTRUCTION, CLEANLINESS, IDENTIFICATION MARKING AND CERTIFIED MATERIALS AND PROCESSES. MATERIAL AND PROCESS CERTIFICATION ARE VERIFIED BY INSPECTION. ACCEPTANCE TEST PROCEDURES ARE APPROVED BY QUALITY ASSURANCE AND VERIFIED BY INSPECTION.

■ (D) FAILURE HISTORY:  
NONE. THERE ARE NO IDENTIFIED GENERIC FAILURE MODES.

■ (E) OPERATIONAL USE:  
N/A

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- APPROVALS -  
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RELIABILITY MANAGER	:	M. P. RAGUSA	:	<u>M.P. Ragusa</u>
RELIABILITY ENGINEERING	:	H. R. HILDRETH	:	<u>H.R. Hildreth</u>
DESIGN ENGINEERING	:	G. R. GUM	:	<u>G.R. Gum</u>
DESIGN MANAGER	:	R. F. MADRID	:	<u>R.F. Madrid</u>
QUALITY MANAGER	:	O. J. BUTTNER	:	<u>O.J. Buttner 7/9/91</u>

NASA RELIABILITY	:		:	<u>JRB: 7/29/91</u>
NASA SUBSYSTEM MANAGER	:		:	<u>Michael W. Hill 8-26-91</u>
NASA QUALITY ASSURANCE	:		:	<u>HPB: 7/10/91</u>