

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ACTUATION MECH-HATCHES FMEA NO 02-4A -593205 -2 REV:10/27/87

ASSEMBLY :HATCH, INGRESS/EGRESS
P/N RI :MC252-0002-0001
P/N VENDOR:30226-CADILLAC CONTROLS
QUANTITY :1

VEHICLE	102	103	104
EFFECTIVITY:	X	X	X
PHASE(S):	PL X LO	OO	DO LS

CRIT. FUNC: 1
CRIT. HDW: 1

PREPARED BY:
DES R. H. YEE
REL M. B. MOSKOWITZ
QE J. BARKER

REDUNDANCY SCREEN: A- B- C-
APPROVED BY:
DES *R. H. Yee* SSM
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ITEM:

ATTENUATOR, INGRESS/EGRESS HATCH HINGE

FUNCTION:

THIS COMPONENT CONSISTS OF A FLUID-DAMPED HYDRAULIC-TYPE DASH POT WHICH ASSISTS IN THE CONTROL OF THE HATCH ASSEMBLY WHEN OPENING. THE ATTENUATOR ALLOWS FLOW THROUGH SIZED ORIFICES FROM ONE CHAMBER TO ANOTHER TO REGULATE HATCH MOTION.

FAILURE MODE:

PHYSICAL BINDING/JAMMING

CAUSE(S):

ADVERSE TOLERANCES, CONTAMINATION/FOREIGN OBJECT/DEBRIS, FAILURE/DEPLETION OF INTERNAL PART

EFFECTS ON:

(A)SUBSYSTEM (B)INTERFACES (C)MISSION (D)CREW/VEHICLE

(A) LOSS OF FUNCTION DUE TO INABILITY TO INGRESS OR EGRESS ORBITER THROUGH SIDE HATCH.

(B) NO EFFECT. FAILURE TO OPEN SIDE HATCH DOES NOT AFFECT INTERFACING SYSTEMS.

(C,D) POSSIBLE LOSS OF MISSION OBJECTIVES AND CREW IF FAILURE OCCURS WHEN EMERGENCY EGRESS ON THE PAD IS REQUIRED. NO EFFECT IN FLIGHT. IF FAILURE OCCURS DURING A POST LANDING EMERGENCY, THE OVERHEAD EMERGENCY EGRESS WINDOW OR PYROTECHNIC SIDE HATCH CREW ESCAPE SYSTEM CAN BE UTILIZED.

DISPOSITION & RATIONALE:

(A)DESIGN (B)TEST (C)INSPECTION (D)FAILURE HISTORY (E)OPERATIONAL USE

(A) DESIGN

HIGH MECHANICAL ADVANTAGE OF HATCH OPENING FORCE APPLIED TO ATTENUATOR - 1 LB ON HATCH RESULTS IN APPROXIMATELY 20 LB ON ATTENUATOR, HYDRAULIC FLUID IN CYLINDER, LOW PROBABILITY OF FAILURE IN JAMMED MODE, PISTON LENGTH EXCEEDS DIAMETER, BOOT PROTECTS PISTON ROD FROM CONTAMINATION, BEARINGS HAVE DUAL ROTATING SURFACES.

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(B) TEST

QUALIFICATION TESTS: COMPONENT QUALIFIED (PER CR-28-252-0002-0001B) WHICH INCLUDED: 85% RELATIVE HUMIDITY (PER MIL-STD-810B) FOR 264 HOURS, SALT FOG (PER MIL-STD-810B) FOR 48 HOURS, RANDOM VIBRATION (48 MINUTES, IN EACH OF 3 ORTHOGONAL AXES), ACCELERATION (5 MINUTES IN EACH OF 3 AXES, 5 +/- 0.5 G'S IN BOTH DIRECTIONS OF EACH AXIS), SHOCK (20 +/- 2 G'S FOR 11 MILLISECONDS EACH SHOCK, 132 SECOND TOTAL), THERMAL VACUUM (0.000001 TORR OR LESS, AT -65 DEG F AND 275 DEG F, 5 CYCLES, 10 MINUTE DWELL TIME, 300 DEG F/HOUR RATE), OPERATING LIFE (1,000 CYCLES AT STANDARD TEST CONDITIONS, 1,000 CYCLES AT 275 DEG F AND PRESSURE OF 28.5 INCHES OF MERCURY, LEAKAGE LESS THAN 4 CC/SEAL), LIMIT LOAD (13,400 +/- 1,340 LB STATIC LOAD; 5 TIMES; 5 SECONDS EACH TIME), AND LOAD STROKE (7,000 LB COMPRESSIVE LOAD; FULL STROKE; 5 CYCLES). QUALIFIED AS PART OF SYSTEM QUALIFICATION OF HATCH (PER CR-28-593201-001C) WHICH INCLUDED: CABIN ATMOSPHERE, 85% RELATIVE HUMIDITY AND 2,000 LIFE CYCLE TEST.

ACCEPTANCE TESTS: ATTENUATOR ACCEPTANCE TESTS INCLUDE: X-RAY (FOR NO FOREIGN OBJECTS OR MATERIALS; 2 VIEWS PER MIL-STD-453), LEAKAGE (LESS THAN 0.05 CC AFTER 50 COMPRESSION/EXTENSION CYCLES), LOAD STROKE RATE (5 COMPRESSION AND 5 EXTENSION).

OMRSD: VISUALLY INSPECT OPENING OF CABIN HATCH FROM OUTSIDE-HORIZONTAL, INSIDE-HORIZONTAL, AND INSIDE-VERTICAL. CHECK OF HATCH ATTENUATION: HATCH SHALL ATTENUATE SMOOTHLY AND COME TO A HALT AFTER FULL TRAVEL (WITHIN 3 TO 6 SECONDS).

(C) INSPECTION

RECEIVING INSPECTION

SUPPLIER HARDWARE INSPECTED IN ACCORDANCE WITH QUALITY PLANNING REQUIREMENTS DOCUMENT (QPRD).

CONTAMINATION CONTROL

CORROSION PROTECTION AND FLUID CONTAMINATION MONITORING VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

FASTENER TORQUING TO REQUIREMENTS IS VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

X-RAY FOR FOREIGN OBJECTS IS VERIFIED BY INSPECTION.

(D) FAILURE HISTORY

THERE HAVE BEEN NO ACCEPTANCE TEST, QUALIFICATION TEST, FIELD OR FLIGHT FAILURES ASSOCIATED WITH THIS FAILURE MODE.

(E) OPERATIONAL USE

NONE, ON THE PAD. THE OVERHEAD EMERGENCY EGRESS WINDOW MAY BE USED BY CREWMEMBERS OR GROUND PERSONNEL ONLY AFTER AN EMERGENCY LANDING. THE EMERGENCY (PYROTECHNIC) SIDE HATCH CREW ESCAPE SYSTEM WILL BE INSTALLED FOR STS-26.