

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : SEPARATION MECHANISMS-MECH FMEA NO 02-JA -F4 -1 REV:10/09/87

ASSEMBLY : FORWARD SEPARATION BOLT
P/N RI : V070-562036
P/N VENDOR:
QUANTITY : 1

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

CRIT. FUNC: 1
CRIT. HDW: 1

PREPARED BY:		REDUNDANCY SCREEN:	A-	B-	C-
DES	R. H. YEE	APPROVED BY:			
REL	M. B. MOSKOWITZ	DES	<i>R. H. Yee for A.C. Or...</i>	SSM	APPROVED BY (NASA):
QE	E. M. GUTIERREZ	REL	<i>M.B.M. Moskowicz</i>	REL	<i>[Signature]</i>
		QE	<i>[Signature]</i>	QE	<i>[Signature]</i>

ITEM:

SPHERICAL BEARING, ORBITER/ET FORWARD ATTACH, (MULTIPIECE)

FUNCTION:

RETAINS SHEAR BOLT AT FORWARD ATTACHMENT OF EXTERNAL TANK (ET) TO ORBITER, TRANSFERS LOADS FROM BOLT INTO ORBITER STRUCTURE, PREVENTS BENDING LOADS IN BOLT, AND ACCOMMODATES BOLT ROTATION RESULTING FROM ET CONTRACTION.

FAILURE MODE:

STRUCTURAL FAILURE

CAUSE(S):

EXCESSIVE LOAD, FATIGUE, DEFECTIVE PART/MATERIAL OR MANUFACTURING DEFECT, PHYSICAL BINDING/JAMMING AS A RESULT OF ADVERSE TOLERANCES/WEAR, CONTAMINATION/FOREIGN OBJECT/DEBRIS, DEGRADED OR IMPROPER LUBRICANT, AND/OR TEMPERATURE

EFFECT(S) ON:

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

(A,B,C,D) PROBABLE LOSS OF CREW/VEHICLE DUE TO LOSS OF FORWARD ET TO ORBITER ATTACHMENT.

DISPOSITION & RATIONALE:

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

(A) DESIGN

BALL MATERIAL IS INCONEL 718, BEARING PLATE IS A286 CORROSION-RESISTANT STEEL. BALL IS SECURED IN RACE BY SCREWED-IN LOCKRING TO PERMIT ADJUSTMENT OF FREE PLAY AFTER EACH FLIGHT. LIFE OF BEARING IS LIMITED TO TEN FLIGHTS. ULTIMATE FACTOR OF SAFETY IS 1.4 WITH POSITIVE MARGINS ON ALL COMPONENTS. BALL SURFACES ARE DRY FILM LUBRICATED WITH VITROLUBE 1220. MINIMUM BENDING LOADS INDUCED IN ORBITER STRUCTURE. NO SHEAR OR TORSION LOADS REACTED AT SPHERICAL BEARING. DESIGN STRESS ANALYSIS REPORT SD77-SH-0178. AXIAL PLAY BETWEEN BALL AND RACE IS BETWEEN 0.003 AND 0.008 INCH; BREAKAWAY TORQUE BETWEEN BALL AND RACE IS BETWEEN 1 AND 100 INCH-LB.

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : SEPARATION MECHANISMS-MECH FMEA NO 02-3A -P4 -1 REV:10/09/87

(B) TEST

QUALIFICATION TESTS: LIMIT TENSION AND COMPRESSION LOADS WITH ROTATIONAL MOMENT, ULTIMATE TENSION AND COMPRESSION LOADS WITH ROTATIONAL MOMENT, AND NINE FIRING (SEPARATION) TESTS WITH VARIOUS LOADS.

ACCEPTANCE TESTS: VERIFICATION OF AXIAL FREEPLAY (0.003 TO 0.008 INCH) AND BREAKAWAY TORQUE (1 TO 100 INCH-LB).

OMRSD: TURNAROUND TESTS INCLUDE - BEARING AXIAL FREEPLAY AND BREAKAWAY TORQUE CHECK AFTER EACH FLIGHT, LOCKRING READJUSTMENT AS REQUIRED, EDDY CURRENT TEST, AND VISUAL INSPECTION OF MULTIPIECE BEARING REQUIRED FOR DETECTION OF CRACKS OR OTHER SURFACE DEFECTS.

(C) INSPECTION

RECEIVING INSPECTION

BALL AND BEARING PLATE MATERIAL ARE VERIFIED BY INSPECTION ON MANUFACTURING ORDERS.

ASSEMBLY/INSTALLATION

BEARING ASSEMBLY IS FABRICATED PER DRAWING AND APPLICABLE SPECIFICATIONS AND VERIFIED BY INSPECTION. LOCKRING ADJUSTMENT IS VERIFIED BY INSPECTION. CLEANLINESS AND PARTS PROTECTION ARE VERIFIED BY INSPECTION. INSPECTION VERIFIES DRY FILM LUBE.

(D) FAILURE HISTORY

NONE. BREAKAWAY TORQUE WAS 475 INCH-LB AFTER OV-102 FLIGHT 4. CAUSE OF EXCESSIVE TORQUE WAS NOT DETERMINED. BEARING WAS EARLY CONFIGURATION WITH NO ADJUSTMENT. CHECKOUT OF NEW BEARING DESIGN DURING TURNAROUND WILL DETECT CONDITION, REF. CAR NO. 04F023.

(E) OPERATIONAL USE

NONE.