

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE

NUMBER: MO-AB1-301000-00-000-X

SUBSYSTEM NAME: GAMMA RAY OBSERVATORY

REVISION : 1 01/23/91

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ATTACHMENT
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	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
■ SRU	: RETRACT/RETENTION ARM	V757-714012-007
■ SRU	: RETRACT/RETENTION ARM	V757-714013-007

 PART DATA

- EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
RETRACTION/RETENTION ARM, MECHANICAL; V757-714012-007 IS THE POWER UMBILICAL DISCONNECT ARM, V757-714013-007 IS THE COMMAND AND DATA UMBILICAL DISCONNECT ARM.
- QUANTITY OF LIKE ITEMS: 2
TWO: ONE FOR COMMAND/DATA, PORT SIDE; ONE FOR POWER, STARBOARD SIDE
- FUNCTION:
ATTACHES TO THE ORBITER LONGERON BRIDGE FITTING AND SUPPORTS UMBILICAL CABLE AND DISCONNECT PLUG FOR THE PAYLOAD RECEPTACLE. WHEN DISCONNECT IS SEPARATED, ARM RETRACTS PLUG AND UMBILICAL CLEAR OF THE PAYLOAD TO ALLOW DEPLOYMENT OF THE PAYLOAD, AND LOCKS IN THE STOWED POSITION.

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FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE

NUMBER: MO-AB1-301000-00-000-01

SUBSYSTEM: GAMMA RAY OBSERVATORY

REVISION# 1 01/23/91 R

ITEM NAME: RETRACT/RETENTION ARM

CRITICALITY OF THIS
FAILURE MODE:2/2

- **FAILURE MODE:**
ARM FAILS TO RETRACT.

MISSION PHASE:
00 ON-ORBIT

- **VEHICLE/PAYLOAD/KIT EFFECTIVITY:** 103 DISCOVERY
: 104 ATLANTIS
: 105 ENDEAVOUR

- **CAUSE:**
FAILURE/DEFECTIVE INTERNAL PART, CONTAMINATION/FOREIGN OBJECT/DEBRIS,
CABLE HARNESS INTERFERENCE, BROKEN LINKAGE, RETRACT ARM SPRING FAILURE

- **CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO**

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

PASS/FAIL RATIONALE:

- A)
- B)
- C)

- FAILURE EFFECTS -

- **(A) SUBSYSTEM:**
NONE
- **(B) INTERFACING SUBSYSTEM(S):**
PAYLOAD CANNOT BE DEPLOYED.
- **(C) MISSION:**
LOSS OF GRO MISSION.

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- (D) CREW, VEHICLE, AND ELEMENT(S):
NONE

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- (E) FUNCTIONAL CRITICALITY EFFECTS:
N/A

- DISPOSITION RATIONALE -

- (A) DESIGN:

DESIGN TOLERANCES ALLOW ADEQUATE ROOM FOR ENVIRONMENTAL DISTORTIONS. SIMPLE SPRING-LOADED MECHANISM WITH PIVOTED UPPER AND LOWER ARMS AND ROTATING BASE. SAFETY FACTOR IS 1.4 MINIMUM.

- (B) TEST:

QUALIFICATION TESTS: QUALIFICATION TESTS INCLUDE QUALIFICATION ACCEPTANCE VIBRATION TESTS (QAVT), SEPARATION CYCLES AT AMBIENT, +200 DEG F, -75 DEG F, AND THERMAL VACUUM.

ACCEPTANCE TESTS: ACCEPTANCE TESTS INCLUDE VISUAL INSPECTION, ELECTRICAL CONTINUITY AND RESISTANCE, SEPARATION AT AMBIENT, +200 DEG F AND -75 DEG F, AND ACCEPTANCE VIBRATION TESTING (AVT) 20-80 HZ, +3DB/OCT; 80-350 HZ, 0.067 G²/HZ; 350-2000 HZ, -3DB/OCT WITH SEPARATION.

OMRSD: GROUND TURNAROUND INCLUDES STANDARD UMBILICAL RETRACTION/RETENTION SYSTEM (SURS) DISCONNECT VERIFICATION, VERIFYING POWER TO SURS DISCONNECT SOLENOIDS, AND SURS DISCONNECT VERIFICATION IN ACCORDANCE WITH MLO103-0574 AND VERIFIED BY OMRSD FILE II VOL II ANNEX 9 (PAYLOAD REQUIREMENTS).

- (C) INSPECTION:

RECEIVING INSPECTION

MATERIAL AND PROCESS CERTIFICATION ARE VERIFIED BY INSPECTION.

CONTAMINATION CONTROL

CONTAMINATION CONTROL AND CORROSION PROTECTION ARE VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

DETAIL PARTS, WIRE/CABLE HARNESSES MANUFACTURED PER DRAWING ON MANUFACTURING ORDERS VERIFIED BY INSPECTION. ELECTRICAL HARNESSES AND COAXIAL CABLES INSTALLED TO ARM ASSEMBLY PER DRAWING AND VERIFIED BY INSPECTION ON MANUFACTURING ORDERS. ASSEMBLY OF UMBILICAL ARM ASSEMBLY PER DRAWING VERIFIED BY INSPECTION, INSTALLATION OF THREADED FASTENERS AND TORQUE REQUIREMENTS ARE VERIFIED BY INSPECTION.

STS89-0690
CHANGE PACKAGE
FEBRUARY, 1991

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NON-DESTRUCTIVE EVALUATION
DYE-PENETRANT INSPECTION IS VERIFIED BY INSPECTION.

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CRITICAL PROCESSES
ELECTRICAL BOND AND TEST PER APPLICABLE SPECIFICATION AND VERIFIED BY INSPECTION.

TESTING
ATP IS VERIFIED BY INSPECTION.

HANDLING/PACKAGING
HANDLING AND PACKAGING REQUIREMENTS ARE 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:
AN EVA WORKAROUND PROCEDURE IS AVAILABLE TO RETRACT THE SURS IN THE EVENT THIS FAILURE MODE OCCURS.

- APPROVALS -

RELIABILITY ENGINEERING: M. P. RAGUSA
DESIGN ENGINEERING : R. DIVINSKI
QUALITY ENGINEERING : M. F. MERGEN
NASA RELIABILITY :
NASA SUBSYSTEM MANAGER :
NASA QUALITY ASSURANCE :

C.E.S.
: M.P. Ragusa 1/24/91
: R. Divinski 2/12/91
: M.F. Mergen 2/16/91
: [Signature] 3/19/91
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