PRINT DATE: 04/21/9

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL HARDWARE
NUMBER: G0-AD-200000-X

SUBSYSTEM NAME: EDO CRYO TANK HANDLING

REVISION : 0 04/21/92 W

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU :	WINCH ASSEMBLY	GW70-540887 (MODEL H70-0887)

PART DATA

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
TO INSTALL AND REMOVE PRSD CRYOGENIC TANKS WHEN EDO PALLET IS REMOVED FROM ORBITER.

QUANTITY OF LIKE ITEMS: 1
ONE

FUNCTION:
THE MID-BODY COMPONENT HANDLING SLING IS PRIMARILY USED FOR HANDLING, DURING INSTALLATION OR REMOVAL, OF ALL MID-BODY LRU'S WEIGHING UP TO 500 POUNDS. THE SLING, WHEN USED WITH H70-0695 ADAPTER, IS CAPABLE OF HANDLING LH2 OR LO2 TANKS FROM A TRANSPORTATION DOLLY AND POSITIONING IT SO IT CAN BE INSTALLED OR REMOVED FROM AN UNINSTALLED EDO PALLET. THE SLING IS EQUIPPED WITH AN ATTACHMENT FLANGE TO ALLOW ATTACHMENT BY FOUR BOLTS TO THE H70-0695 EDO CRYO TANK HANDLING FIXTURE.

THE UNIT IS MADE PRIMARILY OF ANODIZED ALUMINUM TUBING AND PLATE AND CONSISTS OF THE FOLLOWING ASSEMBLIES: (1) UPPER BEAM ASSEMBLY, (2) VERTICAL STRUT, (3) DIAGONAL BRACE, (4) SWIVEL FITTING, AND (5) FLANGED ADAPTER.

THE UPPER BEAM ASSEMBLY PROVIDES A SERIES OF SHACKLE ATTACH HOLES SO THE LOAD/SLING CAN BE BALANCED FOR ALL LOAD CONDITIONS.

THE SWIVEL FITTING PROVIDES THE CAPABILITY OF ADJUSTING THE FLANGED HEAD AT +15, 0 DEG, -15 DEG, -30 DEG, -45 DEG, -90 DEG FROM THE HORIZONTAL AS DETERMINED BY LINE REPLACEABLE UNIT (LRU) ADAPTER REQUIREMENTS.

THE TWO POSITION FLANGED ADAPTER WILL PROVIDE COMMON INTERFACE WITH ALL LRU ADAPTERS. THE INTERFACE IS A FLANGE WITH FOUR 5/8 INCH DIAMETER BOLT HOLES EQUALLY SPACED ON A 4.500 INCH DIAMETER CIRCLE. THE BOLTS CAN BE INSTALLED THROUGH THE LRU ADAPTER INTO FOUR TAPPED HOLES IN THE FLANGE OR THROUGH FOUR CLEARANCE HOLES IN THE FLANGE INTO TAPPED HOLES IN THE LRU ADAPTER. THE FLANGED ADAPTER CAN BE

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REPOSITIONED 45 DEG TC FIT EITHER REQUIREMENT.

THE SLING INCLUDES A WINCH AND CABLE ASSEMBLY TO LIFT LO2 CR LH2 MID-BODY CRYO TANKS TO AND FROM THE DOLLY (MODEL #H70-0851). HCWEVER, THE WINCH IS TEMPORARILY RELOCATED ON THE EDO TANK HANDLING FIXTURE (H7C-0895).

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: G0-AD-200000-01
REVISION: 0 04/21/92 W

SUBSYSTEM: EDO CRYO TANK HANDLING
LRU WINCH ASSEMBLY
ITEM NAME: WINCH ASSEMBLY

CRITICALITY OF THIS FAILURE MODE: 2

FAILURE MODE:
BROKEN OR CRACKED WELDS, STRUCTURE FAILURE, AND BROKEN OR MISSING BOLTS

MISSION PHASE:
GT GROUND TURNAROUND

VEHICLE/PAYLOAD/KIT EFFECTIVITY: 102 COLUMBIA
: EDO MISSION ONLY

CAUSE:
WELDING CONTAMINATION/WORKMANSHIP, METAL FATIGUE, CORROSION, DAMAGE BY ANCILLARY EQUIPMENT, AND STRUCTURE DAMAGE DURING TRANSPORTATION

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:
STRUCTURAL FAILURE MAY CAUSE DAMAGE TO THE EDO LH2/LO2 TANK AND/OR EDO CRYO PALLET DURING INSTALLATION OR REMOVAL.

(B) INTERFACING SUBSYSTEM(S):
EDO CRYO PALLET MAY ALSO BE DAMAGED DUE TO (A)

(C) MISSION:
NO MISSION EFFECT.

(D) CREW, VEHICLE, AND ELEMENT(S):
POSSIBLE DAMAGE TO THE EDO LH2/LO2 TANK AND/OR EDO CRYO PALLET DURING

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CRITICAL FAILURE MODE
NUMBER: GO-AD-200000-01

INSTALLATION OR REMOVAL.

(E) FUNCTIONAL CRITICALITY EFFECTS:
N/A

- DISPOSITION RATIONALE -

(A) DESIGN:
THE WINCH ASSEMBLY IS DESIGNED TO SUPPORT AT LEAST FIVE TIMES THE SPECIFIED STATIC LOAD. THE WINCH ASSEMBLY IS FABRICATED FROM HIGH-STRENGTH STEEL AND PROTECTED AGAINST CORROSION. ATTACHMENT BOLTS ARE STANDARD NAS BOLTS.

(B) TEST:
THE WINCH ASSEMBLY IS TESTED AT THE SYSTEM LEVEL, WHERE THE CRYO PALLET SLING IS TESTED UNDER TWICE THE DESIGN LOADS.

(C) INSPECTION:
ALL PARTS ARE INSPECTED FOR WEIGHT, WORKMANSHIP, FINISH, DIMENSIONS, CLEANLINESS, 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:
THERE ARE NO REPORTED FAILURES IDENTIFIED IN THE PRACA DATA BASE.

(E) OPERATIONAL USE:
N/A

- APPROVALS -

RELIABILITY ENGINEERING	M. ALVAREZ	
RELIABILITY MANAGER	M. P. RAGUSA	4-28-92
DESIGN MANAGER	A. J. RICHARDS	4-23-92
DESIGN ENGINEERING	D. NGO	4-22-92
QUALITY ENGINEERING	O. J. BUTTNER	
NASA RELIABILITY		5/18/92
NASA SUBSYSTEM MANAGER		5/14/92
NASA QUALITY ASSURANCE		5/5/92