DATE: October 16, 1990

[illegible]

END ITEM EFFECTIVITY:

X	X	X
OV102	OV103	OV104

MODEL NO/NAME: S70-0505, Mid-Body Umbilical Carrier Plate

ORBITER SUBSYSTEM: Electrical Power Generation (fuel cell reactants)

PART NUMBER:	PART NAME:	REFERENCE DESIGNATION:	QUANTITY (PER SYSTEM)
MC276-0010	Disconnect, Fluid	80505 PD030,031, 040,041,450,451, 550,551 80505 PD010,011, 020,021,410,411, 500,501	16

CRITICALITY NUMBER: 1

FUNCTION: Provide connection to orbiter mid-body for fill, drain, and vent of LH_2 and LO_2 for PRSD system tanks.

CRITICAL FAILURE MODE: External leakage before separation.

CAUSE: Defective, damage or contaminated metal-to-metal interface seal, broken spring, low or leaking actuating pressure, jammed piston, mechanical shock

FAILURE EFFECT ON:

(A) END ITEM: Possible damage to carrier plate components from fire hazard due to leaking LH_2 or LO_2 if purge also fails.

(B) INTERFACING SUBSYSTEM(S): Possible damage to ground fuel/oxidizer system (hoses, valves) from fire hazard due to leaking LH_2 or LO_2 if purge also fails.

(C) ORBITER: Loss of orbiter from fire hazard if purge fails.

(D) PERSONNEL: None.

HAZARDS: Leakage of LH_2, LO_2; fire/explosion of cryogenic fluids during carrier plate operation at launch pad.

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ACCEPTANCE RATIONALE

DESIGN: Disconnect types have slight variances in inlet port sizes to preclude mismating of same part number disconnects carrying different fluids (different dash numbers). Flight halves are opened by spring force when mated, and ground halves are opened by a bellows pressurized with inert gas. The non-latching class of QD used in the carrier plate supports bi-directional flow at any attitude. The QD requires no lubrication, is composed primarily of corrosion resistant steel with a built-in 25-micron wire mesh filter, and is designed to prevent fluid entrapment after disconnection. Its operating life is 2,000 cycles, 20,000 hours.

TEST:
ACCEPTANCE TESTS: Acceptance tests per MC276-0010 include examination of product, proof pressure, external leakage, poppet leak path capability verification, internal leakage, pressure drop, poppet spring force, actuator functionality and cleanliness. A static leak test is also performed during ATP. However, no dynamic leak test is required to be performed because servicing of the vehicle is not required in dynamic mode.

CHECK-OUT TESTS: Check-out tests per MC276-0010 include acceptance, proof pressure, external leakage, internal leakage, filter element, pressure drop, shock, sand and dust, vibration, thermal cycle, mating operation, operating life, vacuum leak check, burst pressure, bubble point, post test inspection.

CERTIFICATION OR QUALIFICATION TESTS: The disconnect is in compliance with source control drawing MC276-0010. Also at Final Assembly the Mid-Body Umbilical Carrier Plate (including disconnect MC276-0010) is certified per document ML0209-0040, Rockwell CR NO. 15-276-0010-0110G.

PRE-OPERATIONAL: Testing includes precision mating to flight half per V3538, parallel flow testing pressurization and leak check using inert gas per V1040. Pneumatic flexlines are tested per V6C95.

INSPECTION: Subassemblies are handled in a class 100,000 clean room, and must meet cleanliness level 100A of MA0110-301. They are inspected for identification and damage prior to carrier plate installation. Prepacking is in accordance with precision cleaned items standards per MA0110-301. Preservation and packaging are per MC276-0010 specification and per MIL-STD-794 levels A and B. Corrosion protection is verified by inspection.

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Prior to carrier plate assembly, inspections are made for identification, damage, and cleanliness. During assembly, inspections cover torque and other precision measurements (angle and depth of insertion, alignment).

OPERATIONAL USE: Leakage would require termination of flow, drain and purge of cryogenic fluid lines up to and including orbiter lines per V1040. Leakage could be detected by the launch pad hazardous gas detection system and pressure transducers. Terminate and purge fuel supply if leakage exceeds 3.5% per launch commit criteria.

FAILURE HISTORY: No critical failures were reported which would have caused catastrophic results because of leakage before or after separation during the actual fuel/oxidizer loading task.