PRINT DATE: 12/18/96

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE
NUMBER: 02-1B-054 -X

SUBSYSTEM NAME: LANDING/DECELERATION - BRAKE/SKID CONTROL SYS
REVISION: 0 08/29/88

PART DATA

	PART NAME **VENDOR NAME**	**PART NUMBER** **VENDOR NUMBER**
	: MULTIPLE	
LRU	: BRAKE PRESSURE TRANSDUCER	ME449-0177-6176 PA8103-2M-22171

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
BRAKE PRESSURE TRANSDUCER

QUANTITY OF LIKE ITEMS: 8
4 LEFT
4 RIGHT

FUNCTION:
PROVIDE BRAKE PRESSURE INFORMATION FOR CREW/GROUND PERSONNEL USE.

FAILURE MODES EFFECTS ANALYSIS FMEA -- NON-CIL FAILURE MODE
NUMBER: 02-1B-054- 01

REVISION#: 1 12/20/96
SUBSYSTEM NAME: LANDING/DECELERATION - BRAKE/SKID CONTROL SYS
LRU: BRAKE PRESSURE TRANSDUCER **CRITICALITY OF THIS**
ITEM NAME: BRAKE PRESSURE TRANSDUCER **FAILURE MODE:** 1R3

FAILURE MODE:
LOSS OF OUTPUT

MISSION PHASE: DO DE-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY:

102	COLUMBIA
103	DISCOVERY
104	ATLANTIS
105	ENDEAVOUR

CAUSE:
PIECE-PART FAILURE, PROCESSING ANOMALY, MECHANICAL SHOCK

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN
A) PASS
B) PASS
C) PASS

PASS/FAIL RATIONALE:
A)

B)

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:
NO EFFECT.

(B) INTERFACING SUBSYSTEM(S):
LOSS OF BRAKE PRESSURE INDICATION FOR AFFECTED BRAKE CHANNEL.

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL FAILURE MODE NUMBER: 02-1B-054- 01

(C) MISSION:
FAILURE OF ONE OF THE PRESSURE TRANSDUCERS WILL PREVENT DETECTION OF UNCOMMANDED BRAKE PRESSURE IF IT EXISTS. ADDITIONAL FAILURE OF BRAKE ISOLATION VALVE (OPEN) COULD CAUSE POSSIBLE LOSS OF CREW/VEHICLE IF VEHICLE LANDS WITH UNCOMMANDED BRAKE PRESSURE.

(D) CREW, VEHICLE, AND ELEMENT(S):
SAME AS (C).

(E) FUNCTIONAL CRITICALITY EFFECTS:

DESIGN CRITICALITY (PRIOR TO DOWNGRADE, DESCRIBED IN (F)): 1R2

(F) RATIONALE FOR CRITICALITY DOWNGRADE:

-DISPOSITION RATIONALE-

(A) DESIGN:
CONSTRUCTION IS WELDED FOR HERMETIC SEAL. A SECONDARY BARRIER IS PROVIDED TO CONTAIN PRESSURE MEDIA UP TO AND INCLUDING THE BURST PRESSURE AT THREE TIMES THE PRESSURE RANGE. MATERIALS AND PROCESSES USED ARE COMPATIBLE WITH THE ENVIRONMENTAL CONDITIONS, FLUIDS AND GASES AS SPECIFIED.

(B) TEST:
UNIT IS TESTED PER ATP AND INCLUDES MULTIPLE THERMAL CYCLES, AND MULTIPLE PRESSURE CYCLES THROUGH THE COMPLETE OPERATING TEMPERATURE RANGE. FOUR FULL SCALE PRESSURE CALIBRATIONS ARE PERFORMED AT AMBIENT, MINIMUM AND MAXIMUM SPECIFIED TEMPERATURES.

(C) INSPECTION:
RECEIVING INSPECTION
RECEIVING INSPECTION PERFORMS VISUAL AND DIMENSIONAL EXAMINATION OF ALL INCOMING PARTS. CERTIFICATION RECORDS/TEST REPORTS ARE MAINTAINED CERTIFYING MATERIALS AND PHYSICAL PROPERTIES.

CONTAMINATION CONTROL

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL FAILURE MODE NUMBER: 02-1B-054- 01

QC VERIFIES REQUIRED PROCEDURES/SHOP PRACTICES ARE UTILIZED FOR CONTAMINATION CONTROL. CLEANLINESS LEVELS ARE VERIFIED TO LEVEL 190. CORROSION PROTECTION IS VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION
A DETAILED INSPECTION IS PERFORMED ON ALL PARTS PRIOR TO NEXT ASSEMBLY. A CRIMP LOG IS MAINTAINED, AND CRIMP TOOL CALIBRATION VERIFICATION COMPLIES WITH MSC-SPEC-Q-1A: PARTS ARE INSPECTED VISUALLY, DIMENSIONALLY, AND INCREMENTALLY PER REQUIREMENTS. TOOL CALIBRATION IS VERIFIED BY INSPECTION. MANDATORY INSPECTION POINTS ARE INCLUDED IN THE ASSEMBLY PROCESS.

CRITICAL PROCESSES
ALL CRITICAL PROCESSES AND CERTIFICATIONS ARE MONITORED AND VERIFIED BY INSPECTION.

THE CRITICAL PROCESSES ARE:
SOLDERING;
HEAT TREATMENT;
PARTS PASSIVATION;
WELDING.

TESTING
ATP, INCLUDING PROOF PRESSURE TEST IS OBSERVED AND VERIFIED BY QC.

HANDLING/PACKAGING
PARTS PACKAGED AND PROTECTED BY INSPECTION TO APPLICABLE REQUIREMENTS. SPECIAL HANDLING PER DOCUMENTED INSTRUCTIONS IS VERIFIED, TO PRECLUDE DAMAGE, SHOCK, AND CONTAMINATION DURING COMPONENT HANDLING/TRANSPORTING PACKAGING BETWEEN WORK STATIONS.

(D) FAILURE HISTORY:
REFERENCE CAR# 25F011-010 - DURING THE LANDING PHASE OF OV-103 FLIGHT-5 (51-G) AT DFRC, MEASUREMENT V51P0522 (LDG GR OUTBD BRAKE PRESS NO. 4, 2000 PSIA) READ LOW AS COMPARED TO OTHER SIMILAR MEASUREMENTS (E.G., V41P0524 READ 1500 PSIA WHEN V51P0522 READ 1000 PSIA). KSC COULD NOT REPEAT THE PROBLEM AFTER 51-G AND NO CONSTRAINT WAS MADE AGAINST 51-I. DATA FROM 51-I LANDING AT DFRC SHOWED NO FURTHER PROBLEM. KSC HAD CONCLUDED THAT NO FURTHER ACTION WAS REQUIRED AND THAT THIS PROBLEM BE CLOSED AS A ONE TIME UNEXPLAINED ANOMALY.

(E) OPERATIONAL USE:
AFTER DETECTION OF THIS FAILURE THE CREW WILL IMPLEMENT EXISTING WORKAROUND PROCEDURES. IF THE FAILED TRANSDUCER IS ON THE HYDRAULIC SYSTEM 2/3 LEG, ISOLATION VALVES 2 AND 3 WILL BE KEPT CLOSED UNTIL NOSE GEAR TOUCHDOWN TO PREVENT UNDETECTED UNCOMMANDED BRAKE PRESSURE. IF THE FAILED TRANSDUCER IS ON THE HYDRAULIC SYSTEM 1/3 LEG, THE ISOLATION VALVES WILL NOT BE CLOSED BECAUSE ISOLATION VALVES #1 MUST BE OPEN TO ALLOW DEPLOYMENT OF THE LANDING GEAR.

PRINT DATE: 12/18/96

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL FAILURE MODE
NUMBER: 02-1B-054- 01

- APPROVALS -

EDITORIALLY APPROVED	: RI	: Robert Stell, Jr. 12/18/96
EDITORIALLY APPROVED	: JSC	: Tom Searcy 9-16-99
TECHNICAL APPROVAL	: VIA JSC	:96-CIL-011