SYSTEM:	Electrical	FUNCTIONAL CRIT:	1R *
SUBSYSTEM:	GH2 Pressurization System	PHASE(S):	a, b
REV & DATE:	J, 12-19-97	HAZARD REF:	E.01, P.06, S.04, S.09
DCN & DATE:			
ANALYSTS:	J. Joseph/A. Oser		

FAILURE MODE: Fails Shorted

FAILURE EFFECT: a,b) Loss of mission and vehicle/crew due to structural failure from overpressure.
b) Loss of mission and vehicle/crew due to structural failure (tank buckling).
Loss of mission and vehicle/crew due to fire/explosion when relief valve opens.
Loss of mission and vehicle/crew due to NPSP loss prior to SRB separation.

TIME TO EFFECT: Minutes

FAILURE CAUSE(S):
A: Abrasion of Wire Insulation
B: Faulty Pin
C: Faulty Backshell
D: Faulty Ferrule
E: Faulty Connector

REDUNDANCY SCREENS:
Screen A: PASS
Screen B: FAIL - Not detectable in flight.
Screen C: FAIL - Failure of cable tray.

FUNCTIONAL DESCRIPTION: Harnesses route the excitation voltage indication and return functions between the ET/Orbiter interface and each pressure transducer.

FMEA ITEM CODE(S)	PART NO.	PART NAME	QTY	EFFECTIVITY
3.4.2.2	80933003704-379 (314W01 J1/J2/Splices)	Harnesses	1	LWT-54 thru 88
	-549		1	LWT-89 & Up
3.4.3.2	80933003704-380 (314W02 J1/J2/Splices)	Harnesses	1	LWT-54 thru 88
	-550		1	LWT-89 & Up
3.4.4.2	80931003704-420 (305W01 P2/P3/P4/P5/ J23/J33)	Harnesses	1	LWT-54 thru 88
	-520		1	LWT-89 & Up

REMARKS: * Item criticality is increased to 1 during intact abort since the ET pressurization system is not single failure tolerant with one SSME out (one FCV nonfunctional). Failure of an ullage pressure transducer circuit such that the corresponding FCV fails open causes ullage pressure to increase until the relief valve opens. Subsequent venting of GH2 is criticality 1 since there is always a possible ignition source such as lightning.

These harnesses are grouped since the failure mode and rationale for retention are the same.

SYSTEM:	Electrical	REV & DATE:	J, 12-19-97
SUBSYSTEM:	GH2 Pressurization System	DCN & DATE:	
FMEA ITEM CODE(S):	3.4.2.2, 3.4.3.2, 3.4.4.2		

RATIONALE FOR RETENTION

DESIGN:

Engineering process specification, STP6508 establishes the requirements for fabrication and installation of airborne electrical interconnecting wire and cable assemblies. Harness assemblies produced as specified in STP6508 will meet the applicable requirements of MIL-W-8160 and 40M39582A.

The wire is procured from vendors that have qualification approval from Lockheed Martin. The vendors meet material specification STM E659.

For additional weight savings on SLWT, spare wires were eliminated from the harnesses.

Crimped splices are used to connect harnesses to the pressure transducers.

A: Electrical wires, cables, and bundles are routed to avoid abrasion, cutting or piercing of the insulation by contact with rough surfaces or sharp edges along the mounting surfaces. Sufficient slack is provided for installed harnesses to avoid strain on the conductors within the harnesses, termination points and associated connectors.

B: The connector is designed with alignment tolerances to ensure proper insertion. Pins have rounded tips and the insert is designed with a tapered entry to guide the male contact for a firm mating and to preclude bent pins.

C: The backshells are designed to the same standards as the connector to ensure proper cable support and handling characteristics.

D: Ferrules are designed to fit tightly over wire or bundle with inner formation ring of a harder material. The outer crimp ring is a soft material. When installed per Spec, on wire or bundle, the shield/ferrule termination is a snug fit. This termination is insulated and supported by shrinkable tubing.

E: The connector is designed with a positive locking mechanism which ensures a positive lock for the coupling ring when the plug is fully mated with the receptacle and provides an audible sound when the coupling ring is sealed in the positive lock position.

Redundancy Description

Since each transducer circuit is in a separate cable harness and since the fails shorted mode gives rise to either false high or false low readings, the redundancy description and effects of loss of redundancy are the same as described for the corresponding mode of the GH2 pressure transducers.

SYSTEM: Electrical
SUBSYSTEM: GH2 Pressurization System
FMEA ITEM CODE(S): 3.4.2.2, 3.4.3.2, 3.4.4.2

REV & DATE: J, 12-19-97
DCN & DATE:

RATIONALE FOR RETENTION

TEST:

The harnesses and harness components are certified. Reference HCS MMC-ET-TM08-L-E051.

Vendor:

Piece parts for the electrical system are procured and tested to approved Lockheed Martin specifications E659 and E741 and Government Specifications 40M39569 and 40M39582.

MAF:

B, D: Perform Crimp Tool Certification Test (STP6504 for pins and sockets and STP6503 for ferrules and splices).

A-E: Perform Dielectric Withstanding Voltage Test (STP6508 and TM04k).

A-E: Perform Isolation Resistance Test (TM04k).

A-E: Perform Functional Test (TM04k).

A-E: Perform Operation Test (TM04k).

Launch Site:

A-E: Perform Harness and Transducer Operation Test (OMRSD FILE II).

INSPECTION:

Vendor:

Surveillance by Lockheed Martin Procurement Quality is performed to ensure compliance with Specifications.

MAF Quality Inspection:

A: Inspect wire for freedom of nicks, scrapes, cuts, breaks, abrasion or other physical damage prior to assembly (STP6508).

A: Inspect the installed harnesses per the installation requirements (STP6508).

B, E: Inspect connector, pins and sockets for freedom of damage and are not broken, bent, misaligned or corroded and connector is free of foreign material (STP6501).

SYSTEM:	Electrical	REV & DATE:	J, 12-19-97
SUBSYSTEM:	GH2 Pressurization System	DCN & DATE:	
FMEA ITEM CODE(S):	3.4.2.2, 3.4.3.2, 3.4.4.2		

RATIONALE FOR RETENTION

INSPECTION: (cont)

C: Inspect for freedom of damage of connector, backshell, attaching hardware and grommet (STP6501).

B, D: Inspect for proper crimp configuration and free of physical damage (STP6503 for ferrules and splices and STP6504 for pins and sockets).

B, D: Verify certification of crimping tool (STP6503 for ferrules and splices and STP6504 for pins and sockets).

A-E: Witness Isolation Resistance Test (TM04k).

A-E: Witness Dielectric Withstanding Voltage Test (STP6508 and TM04k).

A-E: Witness Functional Operation Test of Transducer (TM04k).

A-E: Witness Operation Test of Transducer (TM04k).

Launch Site:

A-E: Witness Harness and Transducer Operation Test (OMRSD FILE II).

FAILURE HISTORY:

Current data on test failures, unexplained anomalies and other failures experienced during ground processing activity can be found in the PRACA data base.