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STS-053 (OV-103,FLT #15) OFFICIAL INFLIGHT ANOMALY REPORT 01/30/95

IFA NUMBER> STS-53-E-01

TITLE:ME-1 HPOTP Secondary Turbin Seal Cavity Pressure Channel B Exhibited Numerous Downward Spikes

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 337 : 13.24.00

IFA DATE: 12/02/1992

IFA STATUS: CLOSED : 01/29/1993 ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: UNKNOWN HOUSTON TIME: 07.24.00

PRCBD NUMBER: S044888B PHASE: ASCENT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

* ********NONE FOUND******* * ********NONE FOUND*******

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: P. SEITZ

2: L. GRANT EE23

0 DESCRIPTION:

At engine start (E/S) + ~18.14 seconds, ME-1 (Engine 2024) registered a Failure Identification (FID) on Channel B of the HPOTP secondary seal cavity pressure measurement. Data spiking of the measurement continued until 5 seconds after engine shutdown. No spikes occurred during the chill phase.

.

The Channel A measurement was nominal throught out the mission. The failed parameter was disqualified for channel B upon falling below the lower qualification limit of 4 psia, resulting in a loss of redundancy. The HPOTP SSC pressure is a redline parameter (criticality 1R failure. The same sensor design is used for all engine control and redlite monitoring. Similar CCC transducer failures have been experienced on STS-39,STS-50,and STS-47, and

tracked as IFAs (STS-39-E-1, STS-50-E-1,STS-47-E-1 respectively). This is the fourth similar sensor failure during flight and the eighth CCC sensor failure in program history. The background information regarding this CCC transducer (S/N 30886, P/N RE7001-222) reveals it had accumulated 18 starts and 5,315 seconds of hot-fire time. The component had flown on Engine 2109 (STS-11 mission) and Engine 2024 (STS-32,STS-35,STS-43, STS-45, and STS-53 missions).

.

The anomalous sensor was removed post-landing at Dryden Flight and Research Center (DFRC). The failure analysis duplicated the noted failure at Phillips Laboratory in Atlanta. The unit indicated shorting during vibration testing and failed the workmanship particle impact noise detection (PIND) testing. The noise generated from the PIND test was indicative of two or more internal objects (test sensitive down to 0.001 diameter gold ball). Also, a micro-focus x-ray revealed at least 3 particles (contaminants) between the outer housing and the inner cylindrical section (in the area of the compensation resistor network). The sensor was later returned to the vendor (CCC) for further evaluation testing and teardown. The pin to pin resistance and insulation resistance checks were normal. The ambient temperature calibration also tested to be normal. Conversely, the workmanship vibration test produced a noisy output in the X and Z axis. Likewise, a hard short developed in the X axis. The resistace varied between 223 ohms and 600 ohms with hand pressure on the case

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IFA NUMBER> STS-53-E-01

TITLE:ME-1 HPOTP Secondary Turbin Seal Cavity Pressure Channel B Exhibited Numerous Downward Spikes

0 DESCRIPTION: (Continued from previous page).

(squeeze). The sensor teardown disclosed three metallic contaminants with the largest chip located on the "null balance" resistor network. No contamination was found in the header or diaphram areas. The contaminant materials have been returned to Rocketdyne for ME&T identification.

.

Historical records of this pressure transducer unit show that a discrepancy was noted with the connector end during the original fabrication, and it was cut (machined) off and replaced. The corrective procedure would have provided the most probable scenario for contaminants to lodge into the annalus area. Complete lot reviews of this type transducer are expected soon for STS-54 and no similar sensor rework was evidenced. Also, controller functional checks and harness tests were satisfactorily completed with no anomalies noted.

.

The -200 pressure sensors (as on STS-53) were reworked/reidentified in the mid-eighties pre-return to the flight units. In response to high cycle fatigue (HCF) issues, a potting was added to the header pins for reinforcement. The -100 pressure sensors (new build) are less likely to experience the vacuum case short since a conformal coating was added to the case to address this issue.

.

Of the eight transducer failures noted previously, four have been on the -200 series and four on the -100 series. All four of the -200 sensors resulted from contamination, with three of the four failures occurring in-flight. Only one of the -100 sensor failures resulted from contamination, and none were during flight.

.

Future shuttle missions will utilize the -100 CCC sensors in all critical locations. The low probability of failure on the -100 configuration provides rationale for flight. The sensor's flight

experience of 1,070,000 bridge seconds with no in-flight failures substantiates the -100 series performance. The sensor mean time between failure (MTBF) is 2,960 flight (best estimate). Also, the worst case failure analysis consists of two scenarios which have an extremely low probability of occurrence. The first predicament regards a pad abort due to loss of redundancy. There are seven ignition confirm/redline/control sensors per engine. Only one abort has been experienced in 5,553 launches (best estimate, flight time only). The second hurdle pertains to a premature engine shutdown during ascent. A dual channel failure is required of any one of the five redline sensors per engine. The current flight database indicates one premature shutdwon in 1,168,000 flights (best estimate, flight time only). The problem report has been deferred for the next three flights (STS-54, STS-55, and STS-56) in the Level III MSFC PRACA tracking system. The IFA is expected to be closed at the Level II PRCB within the next two weeks.

.

The data spikes were caused by a metallic particle located between the

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STS-053 (OV-103,FLT #15) OFFICIAL INFLIGHT ANOMALY REPORT 01/30/95

PAGE 3

IFA NUMBER> STS-53-E-01

TITLE:ME-1 HPOTP Secondary Turbin Seal Cavity Pressure Channel B Exhibited Numerous Downward Spikes

0 DESCRIPTION: (Continued from previous page).

outer housing and the temperature compensation registor network. The contamination was most probably generated from a connector replacement during original fabrication. Corrective action will be re-allocation of -100 configuration pressure sensors to all critical locations.

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Flight Problem Report approved at a Special Level II Daily PRCB on

01/29/93 (PRCBD # S044888B).

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STS-053 (OV-103,FLT #15) OFFICIAL INFLIGHT ANOMALY REPORT 01/30/95

IFA NUMBER> STS-53-E-02

TITLE:ME-1 LPFTP Discharge Temp Channel A Exhibited A Single Negative Spike

0 MISSION CONSTRAINT: SUBS

IFA TIME GMT: 337 : 13.24.00

IFA DATE: 12/02/1992

IFA STATUS: CLOSED : 01/29/1992

ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: UNKNOWN

HOUSTON TIME: 07.24.00

PRCBD NUMBER: S044888C

PHASE: ASCENT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

A A032112

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: P. SEITZ

2: L. GRANT EE23

0 DESCRIPTION:

At engine start (E/S) plus 2.9 seconds, the ME-1 (Engine 2024) LPFTP discharge temperature channel A exhibited a single negative spike.

.

The LPFTP discharge temperature measurement has 2 channels, A and B, which are averaged and used to calculate fuel density for the mixture ratio control loop. Failure of both channels after launch (during ascent) results in the mixture ratio loop using a fixed value for fuel density. A single channel failure before engine start results in a major component failure (MCF), which leads to a launch scrub. A single channel disqualification after E/S but before SRB ignition would result in a report only failure identification (FID) and loss of redundancy (no MCF). Failure of both channels after E/S but before SRB ignition would result in a MCF (pad abort).

.

Although this particular sensor design has malfunctioned previously on ground tests (12 instances), this was the first occurrence observed during a shuttle flight. The temperature sensor (P/N RES7002-241, S/N 18638) had accumulated 21 starts and 4,313 seconds prior to STS-53. It has flown on three flights (STS-9, STS-28R, and STS-31R) and three FRF's (2,3, and 5). There has never been a case where both channels failed on a single sensor. Of the noted 12 ground test failures, 4 are confirmed and 8 are non-confirmed.

.

CONFIRMED FAILURES:

- o 2 due to glass cracks (hard open circuit)
- o 2 due to lead wire bends/breaks in connector cavity (shifted output)

NON-CONFIRMED FAILURES:

- o 7 output anomalies due to frost on the pins or residue in the pins or residue in the connector
- o 1 similar single data point event - no UCR condition (test 902-528)
- o no recurrence of problem with 33 subsequent hot-fire tests

.

The observed failure could have resulted from a problem in either the sensor, harness, or controller. In addition, this condition could be the consequence of: 1) intermittent open circuit in pin 3 lead wire

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IFA NUMBER> STS-53-E-02

TITLE:ME-1 LPFTP Discharge Temp Channel A Exhibited A Single Negative Spike

0 DESCRIPTION: (Continued from previous page).

2) intermittent connection or shorting of all 3 pins at the connector

3) intermittent short to ground at pins 1,2 or element wire

.

The data output spiked towards negative or null (28 deg R block II, was 44.5 deg R block I). This eliminates the glass crack and element wire fracture scenarios as potential explanations.

.

The sensor was removed at Dryden Flight and Research Cneter (DFRC) on 12-11-92. Two metallic particles were found in the channel A connector. The part was subsequently shipped to Rosemount Inc. (Eagan Mn.) on 12-14-92. The largest particle (0.050" long) was considered insufficient to cause a short condition. The ME&T analysis is underway to determine material source and identification. Repeated calibration analyses, thermal cycle tests, vibration tests, and X-ray examinations have been completed with no identified anomalies. Likewise, repeated functional tests of the controller and harness did not generate any problems which could possibly explain this failure.

.

The rationale for use of this sensor on future flights is based on a low probability of occurrence analysis. For single channel failures in the prestart phase (launch scrub condition), history reveals two LPFTP temperature sensor failures in 4,000 bridge exposures which would give a best estimate probability of one failure in 333 flights. In the case of dual channel failures between engine start and SRB ignition (pad abort condition), the sensor history reveals ten single bridge failures in 8,000 bridge exposures, which would give a best estimate probability of only one failure in over one million flights.

.

The problem report has been deferred for the next three flights (STS-54, STS-55, and STS-56) in the Level III MSFC PRACA tracking sustem. The IFA is expected to be closed at the Level II PRCB within

the next two weeks.

.

No failure cause was identified during sensor, controller or harness functional tests. A similar single negative data spike occurred on a different unit during a ground test. The sensor was removed for analysis and no cause was identified. The unit was returned to ground test service with no problems in 33 subsequent tests. There have been 12 single channel cryogenic temperature sensor failures in program history.No dual channel failures. The best estimate single channel failure probability before engine start is one in 333 flights. The best estimate dual channel failure probability between engine start and SRB ignition is one in over 1 million flights. Corrective action is sensor replacement and restriction to ground test only.

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Flight Problem Report approved at a Special Level II Daily PRCB on 01/29/93 (PRCBD # S044888C).

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STS-053 (OV-103,FLT #15) OFFICIAL INFLIGHT ANOMALY REPORT 01/30/95

PAGE 6

IFA NUMBER> STS-53-P-01

TITLE:During ODERACS Deploy OPS, The Expected Feedback From The Payload To The Controller Was Not Received.

0 MISSION CONSTRAINT: 56 SUBS IFA TIME GMT: 339 : 11.14.00

IFA DATE: 12/04/1992

IFA STATUS: CLOSED : 02/10/1992 ELAPSED TIME: 001 : 21.50.00

PRACA STATUS: UNKNOWN HOUSTON TIME: 05.14.00

PRCBD NUMBER: S044888E PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

M PYLD-05

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: P. LUCAS

2:

0 DESCRIPTION:

Verified all APC/APC batteries/SSP ports with no joy. Signal path to PLB verified. Suspected failure is discharged GCD battery in ODERACS. ODERACS was not deployed.

.

Flight Problem Report approved at a Special Level II Daily PRCB on 02/10/93 (PRCBD# S044888E).

.

This PRCBD was processed outside the formal Space Shuttle PRCB.

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STS-053 (OV-103,FLT #15) OFFICIAL INFLIGHT ANOMALY REPORT 01/30/95

PAGE 7

IFA NUMBER> STS-53-V-01

TITLE:MADS Did Not Start When Commanded

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 337 : 13.08.00

IFA DATE: 12/02/1992

IFA STATUS: CLOSED : 03/09/1992 ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: CLOSED : 1994-03-28 HOUSTON TIME: 07.08.00

PRCBD NUMBER: S044888L PHASE: PRE-LAUNCH

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
M	INCO-01	O	INS-3-16-0622
P	IM/53RF-01		

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: W. LEVERICH X30960

2: C. COUNTS

0 DESCRIPTION:

Initial ON command OK. Inadvertently commanded to STBY/OFF 11 seconds later. Recorder would not restart. Suspect broken tape due to

abnormal command sequence in one g. KSC will R&R recorder. No ferry impact.

.

The probable casue of this failuer was removing power from the tape recorder while it ws running at 15 IPS thereby causing the reel brakes to be applied abruptly which in turn caused tape slack and looping to occur. When power was reapplied, the tape loop snapped taut, snagged, was cut or tore, and subsequently broke which incapacitated the MADS recorder. A contributory cause of this failure is a design limitaiton of the tape recorder which allowes the tape to fall out of its guides when the tape recorder is running, is in a launch orientation, and the power is removed.

.

Recorder s/n 1006 has been removed and sent to the vendor for failure analysis. Some corrective actions have been implemented.

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Flight Problem Report approved at a Special Level II Daily PRCB on 03/09/93 (PRCBD# S044888L).

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STS-053 (OV-103,FLT #15) OFFICIAL INFLIGHT ANOMALY REPORT 01/30/95

PAGE 8

IFA NUMBER> STS-53-V-02

TITLE:Speedbrake FCS Channel 3 Position Feedback Anomaly

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 337 : 13.34.00

IFA DATE: 12/02/1992

IFA STATUS: CLOSED : 02/11/1992 ELAPSED TIME: 000 : 00.10.00

PRACA STATUS: CLOSED : 1993-02-17 HOUSTON TIME: 07.34.00

PRCBD NUMBER: S044888F PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

K IPR56V0002 M GNC-01

O OEL-3-16-0377

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: W. LEVERICH X309060

2: L. CAIN

0 DESCRIPTION:

The OI position feedback measurement (V57H0252A) indicated 45 degrees (0 volt position) for approximately 48 minutes, then returned to normal. No visibility of flight critical measurement (V57H0203C). Variable D/L established to monitor FC measurement for possible recurrence. Did not recur during FCS c/o or entry. Insufficient flight data available to isolate anomaly to instrumentation only. Postflight troubleshooting plan in-work. No ferry impact.

.

The anomaly observed during ascent was caused by transducer signal dropout due to intermittent contact of pin 27 in connector 50J38. Had the anomaly occurred during a time when the speedbrake flight control system was active. a flight control channel 3 failure would have been annunciated.

.

The faulty connector has been repaired and retested. Consideration will be given to flight software change proposals to either allow redundancy management to run during ascent, or to place the flight critical position feedback measurements in the ascent downlist. This would provide data to differentiate between an instrumentation failure or an actual control system failure.

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Flight Problem Report approved at a Special Level II Daily PRCB on 02/11/93 (PRCBD# S044888F).

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IFA NUMBER> STS-53-V-03

TITLE:Supply Water Nozzle Temp Drop

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 337 : 23.16.00

IFA DATE: 12/02/1992

IFA STATUS: CLOSED : 02/29/1992 ELAPSED TIME: 000 : 09.52.00

PRACA STATUS: CLOSED : 1993-07-02 HOUSTON TIME: 17.16.00

PRCBD NUMBER: S044888G PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

K IPR 56V-0012 M EECOM-01

P 53RF08-010

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: P. OLIVER 33323

2:

0 DESCRIPTION:

The cause of the supply water nozzle temperature drop is unexplained at this time. The most probable cause is an intermittent open in the heater. All heater circuits in the supply water dump valve and the dump nozzle have had continuity checks performed as well as wire-wiggle tests in an attempt to locate any intermittent opens in the circuit. The testing did not reveal any anomalous conditions. Should the anomaly recur on an future flight, the nozzle heater will be replaced as part of the troubleshooting effort to determine the cause of the anomaly..

.

Flight Problem Report approved at a Special Level II Daily PRCB on 02/22/93 (PRCBD# S044888G).

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IFA NUMBER> STS-53-V-04

TITLE:MPS HE Regs 3A and 1B Exceeded LCC Limits

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 000 : 00.00.00

IFA DATE: 12/02/1992

IFA STATUS: CLOSED : 01/25/1992 ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: CLOSED : 1993-07-02 HOUSTON TIME: 00.00.00

PRCBD NUMBER: S044888A PHASE: PRE-LAUNCH

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

K IPR 53V-184 P IM/53RF05

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: S. MCMILLAN X35913

2:

0 DESCRIPTION:

Prior to bringing MPS HE tanks to flight pressure, both regs exceeded the 785 psia LCC upper limit. Attributed to known characteristic of new -0006 regulator design. LCC and OMRSD to be reviewed. No KSC action required. LCN 378 under review. No ferry impact.

.

Changes were made to the LCC and OMRSD to increase the allowable outlet pressure for -0006 regulators. The time effectivity for the LCC limit was changed from start of ET cryogenic loading to initiation of purge sequence 4, which is after helium tank pressurization to flight pressure.

.

Flight Problem Report approved at a Special Level II Daily PRCB on 01/25/93 (PRCBD# S044888A).

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IFA NUMBER> STS-53-V-05

TITLE:Supply Water Dump Valve Leakage

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 339 : 10.14.00

IFA DATE: 12/04/1992

IFA STATUS: CLOSED : 02/29/1992 ELAPSED TIME: 001 : 20.50.00

PRACA STATUS: CLOSED : 1993-02-12 HOUSTON TIME: 04.14.00

PRCBD NUMBER: S044888H PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

M EECOM-03

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: P. OLIVER X33323

2: S.KOERNER

0 DESCRIPTION:

Valve burped some water following the second supply water dump. Changed procedure to bake out nozzle to 250 deg F following dumps, but anomaly recurred on all subsequent dumps. Has occurred previously on OV-103 (STS-48) Reference CAR 48RF-04, and on OV-104 (STS-44). Suspect ice formation in valve. No ferry impact. KSC will inspect heater installation around dump valve. Possible drawing change required.

.

The most probable cause of the supply water dump valve leakage is the formation of ice in the valve around the bellows and this causes the bellows to expand and allows water to flow. The cause of the ice build-up is most likely the line heater not being installed correctly. The installation drawing is being updated to correct the heater installation deficiencies. The OV-103 supply water dump valve heater will be removed and reinstalled per the correct print. The OV-104 supply water dump valve will be inspected and installed correctly during OMDP, if it is found to not have been installed correctly.

.

Flight Problem Report approved at a Special Level II Daily PRCB on 02/22/93 (PRCBD# S044888H).

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STS-053 (OV-103,FLT #15) OFFICIAL INFLIGHT ANOMALY REPORT 01/30/95

IFA NUMBER> STS-53-V-06

TITLE:L RCS Oxidizer A Leg Regulator Leaked Through Primary Stage

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 339 : 01.00.00

IFA DATE: 12/04/1992

IFA STATUS: CLOSED : 03/08/1992 ELAPSED TIME: 001 : 11.36.00

PRACA STATUS: CLOSED : 1993-10-08 HOUSTON TIME: 19.00.00

PRCBD NUMBER: S044888K PHASE: ON-ORBIT

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
K	IPR 56V-0003	P	IM/53RF02

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: S. MCMILLAN 35913

2:

0 DESCRIPTION:

When RCS tank isol valves were closed after L OMS interconnect, the L RCS OX ullage and tank pressures increased past the primary stage lockup pressure to the secondary lockup pressure of 261.5 psia. Leakage calculated to be 2500 scch (OMRS limit = 360). Approximately 300 scch noted prelaunch. Suspect particulate contamination in poppet area.

.

The most probable cause of the primary regulator leakage is particulate contamination which affected the poppet seals. The left OMS pod LP04 was replaced with LP01 for the next flight of OV-103. The regualtor will be removed from LP04 and undergo failure analysis.

.

Flight Problem Report approved at a Special Level II Daily PRCB on 03/08/93 (PRCBD# S044888K).

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STS-053 (OV-103,FLT #15) OFFICIAL INFLIGHT ANOMALY REPORT 01/30/95

IFA NUMBER> STS-53-V-09

TITLE:Jet F1L Ox Leak During Entry

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 344 : 19.55.00

IFA DATE: 12/09/1992

IFA STATUS: CLOSED : 02/02/1992 ELAPSED TIME: 007 : 06.31.00

PRACA STATUS: CLOSED : 1993-03-09 HOUSTON TIME: 13.55.00

PRCBD NUMBER: S044888D PHASE: ENTRY/LANDING

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

K IPR 56V-0005 M PROP-01

P IM/53RF-03

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: S. MCMILLAN X35913

2: C. CLEMENT

0 DESCRIPTION:

RCS thruster F1L began leaking oxidizer following the forward RCS dump burn. Ferry flight impact, drain manifold and apply 20 psig N2 pad pressure. Manifold ISO VLV 1 (OX and fuel) were the only ones closed. KSC is reviewing procedures.

.

RCS thruster FIL experienced oxidizer leakage that was most probably caused by contamination on the oxidizer-valve Teflon seat. When the oxidizer valve closed following the FRCS dump, the contamination presented a leak path on the seat.

.

The thruster was removed and replaced. Since the oxidizer valve is the -505 configuration, the thruster will be flushed at WSTF and returned to service.

.

Flight Problem Report approved at a Special Level II Daily PRCB on 02/02/93 (PRCBD # S044884D).

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STS-053 (OV-103,FLT #15) OFFICIAL INFLIGHT ANOMALY REPORT 01/30/95

IFA NUMBER> STS-53-V-10

TITLE:PP02 Sensor C Erratic

0 MISSION CONSTRAINT: SUBS

IFA TIME GMT: 344 : 20.12.00

IFA DATE: 12/09/1992

IFA STATUS: CLOSED : 02/22/1992

ELAPSED TIME: 007 : 06.48.00

PRACA STATUS: CLOSED : 1993-11-22

HOUSTON TIME: 14.12.00

PRCBD NUMBER: S044888J

PHASE: ENTRY/LANDING

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
K	IPR 56V-0013	M	EECOM-04
P	IM/53RF-04		

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: P.OLIVER X33323

2: C. CLEMENT

0 DESCRIPTION:

Sensor C experienced erratic output. Shifts noted of up to 1.2 psi. New style sensor. Postlanding inspection showed sensor to be loose in amplifier. Sensor removed at Dryden for shipment to vendor. Amplifier removal also required.

.

The erratic output produced by PP02 sensor C was caused by a

manufacturing defect that placed anode material on the cathode side of the sensor membrane. Until revised manufacturing procedures have been proven to eliminate the manufacturing defects from the sensor cell, the new design sensors will only be used in position C.

.

Flight Problem Report approved at a Special Level II Daily PRCB on 02/22/93 (PRCBD# S044888J).

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STS-053 (OV-103,FLT #15) OFFICIAL INFLIGHT ANOMALY REPORT 01/30/95

PAGE 15

IFA NUMBER> STS-53-V-11

TITLE:WSB 1B Steam Vent Temp Erratic

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 344 : 18.47.00

IFA DATE: 12/09/1992

IFA STATUS: CLOSED : 03/16/1992 ELAPSED TIME: 007 : 05.23.00

PRACA STATUS: OPEN HOUSTON TIME: 12.47.00

PRCBD NUMBER: S044888M PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

M MMACS-03

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: J. GRUSH X39033

2: J. KLING

0 DESCRIPTION:

About 2 1/2 hours after WSB 1 heater activation for entry, the WSB 1B steam vent temperature became erratic and fell below the 130 deg F WSB ready temp about 1 hour later. Switched to A controller and heater recovered. Following deorbit burn, switched back to B controller and heaters worked, although still erratic. Troubleshooting should include 4 hours on B controller with high data rate and 4 hours of A controller with high data rate.

.

The brase weld on the WSB 1 vent B heater is suspected to have caused the erratic temperature signature observed during the pre-entry period.

.

Troubleshooting of the WSB vent heater sustems included extended heater cycle runs starting from ambient temperaure. The heaters were powered-on for 4 hours with normal signatures. The troubleshooting was unable to reproduce the anomaly that occurred during entry. The WSB 1 vent assembly has been removed and replaced.

.

Flight Problem Report approved at a Special Level II Daily PRCB on 03/16/93 (PRCBD # S044888M).

-JFDPO12: NORMAL TERMINATION OF PROCESSING

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STS-054 (OV-105,FLT #3) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

IFA NUMBER> STS-54-E-01

TITLE:Increase In HPOTP (E2019) Synchronous Vibration Amplitude

0 MISSION CONSTRAINT: SUBS

IFA TIME GMT: 013 : 13.59.00

IFA DATE: 01/13/1993

IFA STATUS: CLOSED : 11/10/1993

ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: UNKNOWN

HOUSTON TIME: 07.59.00

PRCBD NUMBER: S044892K

PHASE: PRE-LAUNCH

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

A UCR/FAR A032237

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: W. TRAVIS EE22

2:

0 DESCRIPTION:

During the postflight data evaluation of ME-1 (E2019), HPOTP (U/N 9409) indicated higher levels of vibration than expected.

.

The ME-1 HPOTP showed an increase in synchronous vibration amplitude of 1 to 2 Grms when compared to STS-50 and the green-run data. HPOTP U/N 9409 has had 3 starts and 1330 seconds of acceptance test and hotfire time. It was installed on ME-1 (E2019) for both flights (STS-50 and STS-54). The synchronous levels between the initial green-run and STS-50 were comparable.

.

At approximately 400 seconds into the STS-54 launch, the amplitude increased to a maximum of 3.2 Grms at 104% RPL on accelerometer location 135-1. The average synchronous amplitude of the three HPOTP

accelerometers met the acceptance specification of <3 Grms and was approximately +2 sigma of the fleet. The increase in levels is considered real, since both the CADS and MADS data confirm this event. Also, the strain gage data illustrated the increased synchronous levels. No bearing related frequencies were evident at any time during the flight. This pump was removed and returned to Canoga Park for disassembly and inspection. The change in vibration data is considered to be most likely the function of test-to-test variation. Data analysis indicates HPOTP 9409 synchronous amplitude (as measured externally) are sensitive to speed and propellant inlet condtions. A HPOTP database comparison of flight-to-flight synchronous amplitude denotes changes of 1.7 Grms (average + 3 sigma). Prior pumps have experienced simialar changes and also revealed no anomalies upon disassembly. Rationale for future flights is based on all pumps meeting the acceptance criteria of <3 Grms synchronous amplitudes.

- CLOSURE RATIONALE:

The increase in synchronous vibration amplitude was not accompanied by an anomalous hardware condition. The increase is most likely explained by run to run variation. Vibrations amplitudes of this magnitude, as well as increases of this magnitude, have been observed before with no

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IFA NUMBER> STS-54-E-01

TITLE:Increase In HPOTP (E2019) Synchronous Vibration Amplitude

0 CLOSURE RATIONALE:(Continued from previous page).

anomalous hardware condition detected. The current acceptance test specification (RL00461) requirement of 3.0 GRMS maximum synchronous

amplitude insures rotor stability and provides adequate margin for continued safe flights.

1

STS-054 (OV-105,FLT #3) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

IFA NUMBER> STS-54-E-02

TITLE:ME-3 HPOTP Secondary Seal Cavity Pressure Spike

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 000 : 00.00.00

IFA DATE: 01/13/1993

IFA STATUS: CLOSED : 06/29/1995 ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: CLOSED : 1994-06-15 HOUSTON TIME: 00.00.00

PRCBD NUMBER: S044892M PHASE: ASCENT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

A A15134

0 CLOSURE INITIATED BY: RI-RKDN/A. HALLDEN |

RESPONSIBLE MANAGERS 1: P. JONES

2:

0 DESCRIPTION:

At engine start (E/S) +85.6 seconds, channel A of the ME-3 (Engine 2018) HPOTP SSC pressure measurement exhibited a single negative spike of 0.6 psia.

.

The sensor was not disqualified (4 psia lower limit), and no other anomalies were noted during the chill, mainstage, or post-shutdown phases. This sensor (P/N RES7001-102, S/N 88304) has experienced 6 starts and 1577 seconds of hot-fire time. The STS-54 mission was the first flight of this sensor. Pressure sensor spikes attributed to sensor failure have occurred on 3 previous flights and have been documented on 3 IFA's (STS-50-E-1, STS-47-E-1, STS-53-E-1). All of these spikes have been in the negative direction from a short circuit

condition, resulting from contamination introduced during the manufacturing process. A sensor screening plan is underway to detect this contamination prior to engine installation, and will include Particle Impact Noise Detection (PIND) testing of all flight pressure sensors. In addition, the micro-focus X-ray capabilities are planned to be possibly utilized within the SSME program.

.

SSME pressure sensors of this design have been categorized into two families: the -200 and -100 part number series. The -200 sensors have been either modified and/or re-identified since their original build. Statistical analysis has identified a higher failure rate for the -200 series sensors, and their use is restricted to non-critical locations. There is no conclusive explanation for the increased failure rate. The STS-54 data spike is the first in-flight failure of a -100 series sensor. Including this data spike in the failure analysis increases the probability of a pad abort for -100 series sensors from one in 5553 flights to one in 4007 flights.

.

The anomalous sensor was removed at KSC for postflight testing. No anomalies were identified during the harness wiggle tests and tap checks. As the sensor was being removed from the test configuration, +/- .3 psi spikes were observed. This behavior is indicative of contamination in the sensor. Consequently, PIND testing generated noise indicative of a single particle, smaller than that seen on STS-53 (last mission). The sensor output was monitored while

1

IFA NUMBER> STS-54-E-02

TITLE:ME-3 HPOTP Secondary Seal Cavity Pressure Spike

0 DESCRIPTION: (Continued from previous page).

undergoing vibration testing, and two single point negative spikes were observed in the "Y" axis. The micro-focus X-ray also suggested that two small particles (0.011" x 0.003", 0.005" diameter) existed in the vacuum case. Sensor teardown was later completed with a total of 6 pieces (5 solder and 1 copper) found in two different locations. The largest piece (solder) measured 0.022" x 0.013" (too small to create short circuit condtion). The single copper wire piece was located in the annulus region between the outer case wall and compensation resistor network. The five solder pieces were found in the sensor reference cavity. The individual particle sizes were insufficient to cause the short; however, a collection of multiple particles would have produced the short circuit condition.

- CLOSURE RATIONALE:

Internal contamination introduced during build caused a short within the sensor. Six contaminates were found after dissection, one piece of CU wire and 5 solder balls. Although none of the contaminates are large enough to bridge the smallest gap between the header pin and case, it is possible one of the solder balls was broken during disassembly or two or more particles combined to bridge the gap. The sensor was removed from the engine for analysis. A process consisting of PIND testing and micro-focus x-ray has been developed to allow only the most contamination free sensors for use in flight.

1

IFA NUMBER> STS-54-I-01

TITLE:Three Foreign Objects Noticed in the LH2 ET/Orbiter Umbilical Camera Field of View After ET Sep

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 000 : 00.00.00

IFA DATE: 01/13/1993

IFA STATUS: CLOSED : 03/16/1993 ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: UNKNOWN HOUSTON TIME: 00.00.00

PRCBD NUMBER: S044892B PHASE: ASCENT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

* ********NONE FOUND******* * ********NONE FOUND*******

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: C. ABNER

2:

0 DESCRIPTION:

Three objects appeared in the LH2 ET/ORB umbilical camera field of view after the External Tank had separated and moved some distance away from the Orbiter. A metallic washer; metallic shear pin, or bolt; and nylon wire tie/identifier have not been positively identified as flight hardware, but appeared to originate from the LH2 ET/ORB umbilical area and may have been entrapped in the numerous cavities of the umbilical prior to purge barrier closeout.

.

Inspection of the OV-105 Orbiter Umbilicals after landing showed no missing hardware. Postflight inspection of OV-105 and film/photograph review by Orbiter did not identify debris as flgiht hardware. Objects identified in the separation films are unknown.

.

The OMI has been revised to identify the thermal barrier seals, ET door mechanisms, and small cavities in this area to be of specific concern. Technical interchange meetings have been held with the technicians who perform these inspections to educate and sensitize them regarding debris in this area.

.

Flight Problem Report approved at a Special Level II Daily PRCB on 03/16/93 (PRCBD# S044892B).

1

STS-054 (OV-105,FLT #3) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

IFA NUMBER> STS-54-M-01

TITLE:Pressure Spike In The RSRM-29B Measured Chamber Pressure

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 000 : 00.00.00

IFA DATE: 01/13/1993

IFA STATUS: CLOSED : 03/19/1993 ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: UNKNOWN HOUSTON TIME: 00.00.00

PRCBD NUMBER: S044892E PHASE: ASCENT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

D DR4-5/242

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: S.MUNSON

2:

0 DESCRIPTION:

During the postflight data evaluation of the right RSRM, a spike was observed in the measured chamber pressure, 67.5 seconds after the launch.

.

The magnitude of the pressure spike at 67.5 seconds measured approximately 13 psi (equates to thrust change of 51 klb). Although spikes have been observed on proeviously flown motors, the RSRM-29 (STS-54) occurrence is the largest to date. The thrust imbalance indication (which is a function of the pressure spike) was near the predicted K-sigma band width and approached the upper limit of the CEI specification, but did not violate it.

.

Historically, the RSRM, SRM, and HPM have exhibited pressure variations during the period of 65 to 75 seconds into motor burn time.

Although these occurrences vary in magnitude and time, all (including STS-54) have remained within specification limits. The frequency of occurrence and magnitude is more apparent after STS-37 (RSRM-14).

.

The worst-case safety aspect of this failure (FEA/CIL 10-01-02-01R/03) indicates that thrust imbalance between RSRM's from high or low chamber pressure may result in the loss of the RSRM, crew and vehicle. No adverse RSRM performance resulted from the STS-54 pressure spike, and the Shuttle system response accomodated the thrust imbalance. The 13 psi perturbation was measured by all three operational pressurre transducers (OPT's), indicating the problem did not result from a malfunction within the pressure sensing instrumentation. However, no abnormal effects have been found from the postflight inspection by Thermal Insulation Design Engineers. An investigation team has been formed to better understand this anomaly, and determine the cause and any necessary recurrence control. The team has formed a comprehensive fault tree which details 11 anomaly scenarios. Industry experts and NASA center consultants agreed with the thoroughness of the fault tree and anomaly scenarios. At present, the following items are considered the leading candidates associated with this anomaly.

.o Castable inhibitor anomaly combined with bore blockage

.o Forward segment propellant anomaly at factory joint

1

IFA NUMBER> STS-54-M-01

TITLE:Pressure Spike In The RSRM-29B Measured Chamber Pressure

0 DESCRIPTION: (Continued from previous page).

.o Aft segment propellant anomaly (unbond or slag driven)

The investigation effort is centered on developing evidence supporting the most probable anomaly mode. the team is also focused on defining and assessing the worst-case limiting condition of these failure mechanisms.

.

Flight Problem Report approved at a Special Level II Daily PRCB on 03/19/93 (PRCBD# S044892E).

1

STS-054 (OV-105,FLT #3) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

IFA NUMBER> STS-54-P-01

TITLE:IUS Stage 1 Battery Anomaly

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 014 : 00.50.00

IFA DATE: 01/14/1993

IFA STATUS: CLOSED : 04/21/1995 ELAPSED TIME: 000 : 10.50.30

PRACA STATUS: UNKNOWN HOUSTON TIME: 18.50.00

PRCBD NUMBER: S044892L PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

M PYLD-01

0 CLOSURE INITIATED BY: JSC-MT2/J. CONWELL

RESPONSIBLE MANAGERS 1: L. PLATH

2:

0 DESCRIPTION:

Following the IUS/TDRS deploy from the orbiter payload bay, and after the SRM-1 burn, the IUS B-side Stage 1 battery failed. The IUS was put on the A-side battery for the rest of the flight with no problems. The ASE batteries #1 and #2 are identical to the IUS Stage 1 batteries. An investigation concluded that the ASE batteries were not susceptible to a similar failure mode. EVA activities were completed during the mission as scheduled. The anomaly resolution is in work

but not completed

- CLOSURE RATIONALE:

Potassium Hydroxide (KOH) was expelled from the cell vents and produced an electrochemical bridge from cell terminal to battery case. The cell electrolyte (KOH) level has been optimized to decrease the likelihood of KOH expulsion. Additional absorbent material has been installed to prevent bridge building by expelled KOH. The entire terminal area has been potted to eliminate a shorting path.

1

STS-054 (OV-105,FLT #3) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

PAGE 9

IFA NUMBER> STS-54-V-01

TITLE:WSB 3 No Cooling

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 013 : 13.14.00

IFA DATE: 01/13/1993

IFA STATUS: CLOSED : 04/19/1993 ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: CLOSED : 1993-02-17 HOUSTON TIME: 07.14.00

PRCBD NUMBER: S044892H PHASE: PRE-LAUNCH

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
K	PR HYD-5-04-0104	M	MMACS-01
P	IM/54RF01		

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: D. GERLACH

2:

0 DESCRIPTION:

During ascent, WSB 3 failed to initiate cooling of the APU 3 lube oil while operating on controller A. WSB 3 was switched to controller B. Again, no cooling was evident. Approximately 40 seconds after APU

shutdown, WSB 3 began spraying on controller B. APU 3/WSB 3 was used for FCS C/O and performance was nominal on both controllers. The performance was also nominal during entry. Preliminary analysis indicate a freeze-up occurred. Troubleshooting plan has been developed. Will load WSB core with 4.4 lbs of water (nominal is 3.5 lbs).

.

The failure of the WSB to adequately regulate lube oil temperature during ascent resulted from a freeze-up of the APU lubrication oil water spraybar. On the next flight of OV-105, the WSB (3) will be flown with an increase in the water preload to 5 lb.

.

Flight Problem Report approved at a Special Level II Daily PRCB on 04/19/93 (S0448892H).

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STS-054 (OV-105,FLT #3) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

IFA NUMBER> STS-54-V-03

TITLE:EDO WCS Commode Fault Light On

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 016 : 14.22.00

IFA DATE: 01/16/1993

IFA STATUS: CLOSED : 03/10/1993 ELAPSED TIME: 003 : 00.22.30

PRACA STATUS: CLOSED : 1994-08-05 HOUSTON TIME: 08.22.00

PRCBD NUMBER: S044892C PHASE: ON-ORBIT

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
K	IPR 57V-0006	M	EECOM-04
P	IM/54RF02		

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: D. DILLMAN

2:

0 DESCRIPTION:

The WCS compactor caused the fault light to illuminate during the retraction phase of the compaction cycle. Postflight the vendor could not duplicate the problem, but did note a difference in the results from the troubleshooting current signature in comparison to the ATP data. Plan is to replace snubber (foam) to further damper the end of travel current spike. Will rework snubber at vendor, then reinstall/retest it.

.

Degradation of the snubber allowed a current spike to be produced that the controller interpreted as an overcurrent condition and shut the system down. Fabricate and install a new snubber to support STS-57. Train the crew to recognize this failure and provide updated procedu res onboard to continue operations, if this condition were to occurr on STS-57. Investigate modification to the controller to lengthen the time between the current-limit condition and the overcurrent condition, thus eliminating the need for the snubber.

.

Flight Problem Report approved at a Special Level II Daily PRCB on 03/10/93 (PRCBD # S044892C).

1

IFA NUMBER> STS-54-V-04

TITLE:Rudder Speedbrake Switching Valve Indication

0 MISSION CONSTRAINT: SUBS

IFA TIME GMT: 016 : 21.06.00

IFA DATE: 01/16/1993

IFA STATUS: CLOSED : 04/07/1993

ELAPSED TIME: 003 : 07.06.30

PRACA STATUS: UNKNOWN

HOUSTON TIME: 15.06.00

PRCBD NUMBER: S044892G PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

K IPR 57V-0012 M MMACS-03

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: D.MCCORMACK

2:

0 DESCRIPTION:

The rudder speedbrake switching valve indication (V58X1001E) failed to show that Hyd Sys 3 was selected while hyd circ pump 3 was operating at nominal pressure. Troubleshooting in-flight indicates that with additional pressure the valve will switch to the proper position. Postflight troubleshooting plan to include running test at 500 psi. Test complete. Data being evaluated.

.

The switching valve will switch positions when the minimum specification pressure differential is met. The circulation pump pressure measurement is not a good indication of the pressures at the switching valve. At very low temperatures and pressure, the switching valve spring may not return the spool to its system 1 (primary) position.

.

The Shuttle Operational Data Book is being updated to reflect the switching valve performance at low temperatures and pressures.

.

Flight Problem Report approved at a Special Level II Daily PRCB on 04/07/93 (PRCBD# S044892G).

1

IFA NUMBER> STS-54-V-05

TITLE:R1R Failed Off

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 018 : 07.58.00

IFA DATE: 01/18/1993

IFA STATUS: CLOSED : 03/16/1993 ELAPSED TIME: 004 : 17.58.30

PRACA STATUS: CLOSED : 1993-05-28 HOUSTON TIME: 01.58.00

PRCBD NUMBER: S044892D PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

K PR RP04-11-0353 M PROP-01

P IM/54RF03

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: D. MCCORMACK

2:

0 DESCRIPTION:

During the RCS hot fire test, jet R1R failed off and was deselected by RCS RM. Both Ox and Fu injector temp trends were nominal indicating that there was at least partial flow into the chamber. Failure most likely a failure of the oxidizer main stage valve to open. KSC to R&R jet. Spare available at KSC.

.

The most probable cause of the thruster fail-off was iron nitrate contamination in the oxidizer valve pilot stage that prevented its proper operation. KSC has removed and replaced thruster R1R and it will be transferred to the WSTF for the thruster flush program. Iron nitrate formation is assisted by the presence of water (moisture) in the oxidizer valve. Therefore, the primary thruster throat plugs are installed during turnaround to reduce the likelihood of moisture intrusion into the propellant system.

.

Flight Problem Report approved at a Special Level II Daily PRCB on 03/16/93 (PRCBD# S044892D).

IFA NUMBER> STS-54-V-07

TITLE:FUEL CELL 2 AND 3 ALTERNATE H2O LINES TEMPERATURE INCREASING

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 019 : 13.30.00

IFA DATE: 01/19/1993

IFA STATUS: CLOSED : 03/04/1993 ELAPSED TIME: 005 : 23.30.30

PRACA STATUS: CLOSED : 1993-07-02 HOUSTON TIME: 07.30.00

PRCBD NUMBER: S044892A PHASE: ENTRY/LANDING

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

M EGIL-02 P IM/54RF05

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: D. DILLMAN

2:

0 DESCRIPTION:

Leakage was indicated past the fuel cell alternate water line check valves for FC2 and FC3. KSC to perform modified OMRSD check valve checks. Chit to be written specifying test plan.

.

Both the fuel cell 2 and 3 alternate water line relief valves were within specification. However, both were very close to the limits. By being so close to the limits, these valves allowed small amounts of water to flow into the alternate water lines, cuasing the temperature profile noted. These valves are within OMRSD specifications. The small amount of water introduced into the altenate water line is inconsequential. Flow through the altenate water lines becomes a flight impact only if caused by constriction of flow in the primary water path, which was not a factor in this case.

.

Flight Problem Report approved at a Special Level II Daily PRCB on

03/04/93 (PRCBD # S044892A).

1

STS-054 (OV-105,FLT #3) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

IFA NUMBER> STS-54-V-08

TITLE:Hyd SYS 3 Pump Outlet Pressure High-Post Ascent APU Shutdown

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 013 : 14.14.00

IFA DATE: 01/13/1993

IFA STATUS: CLOSED : 04/30/1993 ELAPSED TIME: 000 : 00.14.30

PRACA STATUS: CLOSED : 1994-08-30 HOUSTON TIME: 08.14.00

PRCBD NUMBER: S044892J PHASE: ON-ORBIT

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
K	IPR 57V-0008	M	MMACS-02
P	IM/54RF09		

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: D. GERLACH

2:

0 DESCRIPTION:

Following the early APU 3 shutdown post-MECO because of the APU 3 bearing over-temp, the hydraulic supply pressure failed to decay as expected. The pressure initially dropped to about 1600 psia, then increased and stayed locked up at about 2400 psia for more than 40 sec following APU 3 shutdown. The pressure bled off when the SSME/TVC isolation valves were closed. Postlanding troubleshooting did not repeat the condition seen during ascent. Test plan has been developed. Test partially complete. Data being reviewed.

.

The conditions leading to the hydraulic system supply pressure recovery were caused by backdriving of the speedbrake motor.

Analysis, test data, and flight data have shown that the flight control system can accommodate a repeat of this phenomena with no impact to flight safety. Recurrence of supply pressure recovery due to backdriving phenomenon.

.

Flight Problem Report approved at a Special Level II Daily PRCB on 04/30/93 (PRCBD #S044892J).

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STS-054 (OV-105,FLT #3) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

PAGE 15

IFA NUMBER> STS-54-V-11

TITLE:EMU Battery Charger Noisy

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 000 : 00.00.00

IFA DATE:

IFA STATUS: CLOSED : 03/22/1993 ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: CLOSED : 1994-06-09 HOUSTON TIME: 00.00.00

PRCBD NUMBER: S044892F PHASE: POST LANDING

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
K	IPR 56V-0017	P	IM/54RF10

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: B.G.SWANN

2:

0 DESCRIPTION:

The EMU power supply/battery charger was reported postflight as exhibiting excessive audible noise. No KSC action. Will ask for DTO on STS-57 to measure noise, so the necessary corrective actions can be performed.

.

The most probable cause of the noise is within the PS&BC inverter; however, the actual cause needs to be isolated. Current plans are to

measure the acustical-noise level on as many Orbiters as possible to determine Orbiter vehicle end item (OVEI) specification compliance, acoustical impact, and the potential need for corrective action to the PS&BC.

.

Flight Problem Report approved at a Special Level II Daily PRCB on 03/22/93 (PRCBD # S044892F).

-JFDPO12: NORMAL TERMINATION OF PROCESSING

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IFA SPECIFIC INFORMATION 03/08/94

PAGE 1

STS NUMBER> 0055 ELEMENT> D IFA NO> 001

TITLE:Inadvertent Loss of Communications

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 124 : 04.24.00

IFA DATE: 05/04/1993

IFA STATUS: CLOSED ELAPSED TIME: 007 : 13.34.00

CLOSED DATE: 05/27/1993 HOUSTON TIME: 23.24.00

PRCBD NUMBER: S044893B PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

M INCO-08

0 RESPONSIBLE MANAGERS 1: H. BLACK

2:

0 DESCRIPTION:

While configured for two way Ku-band communications during a TDRS H/O, the Ku failsafe circuit was disabled via a stored program command (SPC). However, the command that was intended to reenable the failsafe was incorrect and inadvertantly turned the Ku to standby.

.

Procedures for Ku SPC building will be reevaluated.

.

Flight Problem Report approved at a Special Level II Daily PRCB on 05/27/93 (S044893B).

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IFA SPECIFIC INFORMATION 03/08/94

PAGE 1

STS NUMBER> 0055 ELEMENT> D IFA NO> 002

TITLE:MCC-01 LOSS OF SCIENCE DATA

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 120 : 12.15.00

IFA DATE: 04/27/1993

IFA STATUS: CLOSED ELAPSED TIME: 003 : 21.25.00

CLOSED DATE: 05/27/1993 HOUSTON TIME: 07.15.00

PRCBD NUMBER: S044893C PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

M MCC-01

0 RESPONSIBLE MANAGERS 1: L. VERNON

2:

0 DESCRIPTION:

Unable to lock on 32 meg. data channel 3 for approx. 13 min. from GMT 120:12:15 to 120:12:28. A White Sands chain fail over was performed and still no lock on channel 3. Locked on channel 3 TV at 120:12:28.

.

Impact: loss of 1 meg. science r/t data. Not recoverable.

.

Resolution: operator error, an incorrect code was put into the format field of the GCMR configuring the network for NRZ-S instead of NRZ-L.

.

Flight Problem Report approved at a Special Level II Daily PRCB on 05/27/93 (S044893C).

1

IFA SPECIFIC INFORMATION 03/08/94

PAGE 1

STS NUMBER> 0055 ELEMENT> D IFA NO> 003

TITLE:Abort Region Determinator (ARD) System Parameter Error

0 MISSION CONSTRAINT: 57 SUBS IFA TIME GMT: 000 : 00.00.00

IFA DATE: 03/22/1993

IFA STATUS: CLOSED
ELAPSED TIME: 000 : 00.00.00

CLOSED DATE: 05/27/1993
HOUSTON TIME: 00.00.00

PRCBD NUMBER: S044893D
PHASE:

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

* ********NONE FOUND******* * ********NONE FOUND*******

0 RESPONSIBLE MANAGERS 1: M. HENDERSON/JSC-DA8

2:

0 DESCRIPTION:

During the ARD performance accessment of the vehicle at the first launch attempt, an incorrect parameter annunciated a "no-go" message. The problem was corrected by the time of actual launch.

.

Flight Problem Report approved at a Special Level II Daily PRCB on 05/27/93 (S044893D).

1

IFA SPECIFIC INFORMATION 03/08/94

PAGE 1

STS NUMBER> 0055 ELEMENT> E IFA NO> 001

TITLE:Exceedance of the Oxidizer Preburner Purge Redline at Engine Start During First Launch Attempt

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 000 : 00.00.00

IFA DATE: 03/22/1993

IFA STATUS: CLOSED
ELAPSED TIME: 000 : 00.00.00

CLOSED DATE: 05/25/1993
HOUSTON TIME: 00.00.00

PRCBD NUMBER: S044893A
PHASE: LAUNCH

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

A A15303 A UCR A032353

0 RESPONSIBLE MANAGERS 1: J. VAUTIN/ROCKETDYNE

2:

0 DESCRIPTION:

During the first launch attempt (03-24-93) of STS-55, a redline exceedance of the oxidizer preburner purge system occurred at engine start +1.44 seconds on ME-3 (E-2011). The anomaly resulted in an on-pad abort of the mission by the RSLS.

.

The noted purge redline was established to protect against a failure of the fuel preburner Augmented Spark Ignition (ASI) purge check valve (possible criticality 1 condition). The unwanted mixture of oxidizer with hydrogen-rich hot gas, coupled with a possible ASI line failure could result in over-pressurization of the Orbiter aft compartment. The redline uses two pressure transducers upstream of the five oxidizer check valves. Of these five check valves in the oxidizer purge system, four have orifices upstream of the valves which restrict leakage flow and are considered criticality 3 (no threat to mission or flight safety).

.

A joint NASA/Rocketdyne team has investigated the problem and determined the cause to be contamination in the OPB ASI check valve. Contamination in the form of a piece of nitrile (buna-n) o-ring (0.146"x0.046"x0.018") was found inside of the check valve during the destructive disassembly. This material was introduced into the valve during the manufacturing process. The o-ring is a part of the equipment used to clean the check valve prior to it being welded into the final assembly. Since manufacturing of this valve, procedures have been developed to revise the checkout tool installation sequence and to inspect the o-ring for damage after use.

.

The o-ring has an area outside of the sealing surface which can be a trap for contamination. This area is downstream of the poppet flow holes and upstream of the valve flow control area. The contamination was found in this region. Combined reverse flow check data, showing

consistently higher readings than the database, support this conclusion.

.

The corrective actions addressing this issue fall into the following three groups.

NEAR TERM PLAN

Establish a new combined reverse leak check with a combined

1

IFA SPECIFIC INFORMATION 03/08/94

PAGE 2

STS NUMBER> 0055 ELEMENT> E IFA NO> 001

TITLE:Exceedance of the Oxidizer Preburner Purge Redline at Engine Start During First Launch Attempt

0 DESCRIPTION: (Continued from previous page).

allowable leakage of <7 SCIM (was <50 SCIM). Failure of this criteria requires isolation leak checks to find the individual leaking valve. Any valve with leak value >5 SCIM would be replaced. Individual check valve isolation leakage sum must match combined leakage within 3 SCIM or additional cycles would be requred. Combined leak checks with >11 SCIM and with no isolated valve found >5 SCIM, and combined leakage not within the 3 SCIM limit shall cause all check valves to be replaced in that system. Eight consecutive successful checks will be conducted on new valves or systems which had check valves or lines replaced since the last hot-fire. These additional requirements improve the probability of finding a contaminated check valve. This is the rationale for flight until a new screening method is developed.

Note: STS-56, STS-55, and STS-57 were cleared for flight by accounting for at least eight consecutive leak check cycles using data from engine consecutive leak check cycles using data from engine build to present. Any valve(s) which did not have at least eight were required to have enough cycles completed at KSC to bring them to that total.

This work was completed per Rocketdyne Action Requests (RAR).

LONG TERM PLAN

Reverse flush the valve/line assembly at the component level. Perform the eight leak check cycles at the component level to eliminate these checks at KSC. Eliminate or minimize all potential sources of contamination from build and test equipment, and make procedures for use of this equipment reflect this intent. Revise procedures to inspect and provide for protection of orifice plate alignment pins. Make leak check and installation procedures consistent at all sites. These procedures shall be sensitive to accuracy of 1 SCIM. Require one combined leak check with the preceeding purge for each engine flow.

ASSESS REDESIGN OPTIONS

The following measures are presently being evaluated as redesign options. Desensitize system for leakage in an attempt to delete the redline. Change the system/software to reduce susceptibility for redline shutdown. Eliminate the need for alignment pins in any system susceptible to contamination. Evaluate NDT processes and filters to assure system cleanliness. In conclusion, this problem was caused by contamination trapped under the seat in the OPB ASI check valve. It was introduced into the valve at manufacture and was not detected until the abort. The additional reverse leak check cycles on the oxidizer check valves should provide confidence for the present that the valves are not contaminated. Other corrective actions will be considered for the long term, as well as options regarding possible redesign improvements.

.

The problem report was deferred on 04/22/93 for six months in the Level III MSFC PRACA tracking systems, presently covering flights STS-57, STS-51, and STS-58.

.

Flight Problem Report approved at a Special Daily Level II PRCB on

1

IFA SPECIFIC INFORMATION 03/08/94

PAGE 3

STS NUMBER> 0055 ELEMENT> E IFA NO> 001

TITLE:Exceedance of the Oxidizer Preburner Purge Redline at Engine Start During First Launch Attempt

0 DESCRIPTION: (Continued from previous page).

05/25/93 (S044893A).

1

IFA SPECIFIC INFORMATION 03/08/94

PAGE 1

STS NUMBER> 0055 ELEMENT> E IFA NO> 002

TITLE:ME-3 HPFTP COOLANT LINER PRESSURE FLUCTUATIONS DURING FLIGHT

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 000 : 00.00.00

IFA DATE: 05/10/1993

IFA STATUS: CLOSED ELAPSED TIME: 000 : 00.00.00

CLOSED DATE: 11/10/1993 HOUSTON TIME: 19.00.00

PRCBD NUMBER: S044893Z PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

A A032456 A A15403

0 RESPONSIBLE MANAGERS 1: W. TRAVIS EE21

2:

0 DESCRIPTION:

During ascent of the STS-55 mission, the ME-3 (E-2029) HPFTP MCC coolant liner pressure exhibited (at 104% operation) erratic behavior.

.

Although coolant liner pressure shifts of the discussed magnitude have been observed on the engine testing and development program, this

permutation falls outside the return-to-flight database (30 flights). The pressure shifts also violated the RL00461 (green-run) specification of 300 psid (maximum), which is determined between the coolant liner pressure, minus MCC hot gas injection pressure, plus 100 psid. Conversely, the 400 psid redline margin was maintained throughout the flight.

.

This HPFTP (U/N 4015) had accumulated two starts and 935 secods prior to the STS-55 mission. The unit was acceptance tested and then flew on STS-49 (05-07-92). The coolant liner pressure was normal and steady during the test and STS-49 flight.

.

The pressure during STS-55, however, exhibited perturbations as high as 110 psid. This magnitude of pressure change is at the upper end of experience with the enlarged coolant liner discharge orifices. A pressure change of up to 113 psi has been observed on the engine development program. HPFTP flight unit 2026 experienced a 70 psi change on the STS-26R mission. This was the maximum flight experience value on coolant liner delta p prior to STS-55.

.

The most likely cause for the noted perturbations is hot-gas leakage by the mount ring static seals. The phenomenon is well understood and is considered a benign condition. The static seals degrade over time due to the turbopump installation deflections and the operational environment. The pump-end outer diameter seal typically degrades prior to the inner diameter seal. The installation deflections overload the seal and then cracks form from the Hydrogen Environment Embrittlement (HEE). The operational deflections reduce the compression on the pump-end inner diameter seal. Fretting then reduces the sealing capability.

.

Perturbations in the coolant liner pressure will also occur if the

1

STS NUMBER> 0055 ELEMENT> E IFA NO> 002

TITLE:ME-3 HPFTP COOLANT LINER PRESSURE FLUCTUATIONS DURING FLIGHT

0 DESCRIPTION: (Continued from previous page).

inner seal degrades prior to the outer seal. Experience has shown that replacement of the static seals restores the pressure to normal levels and behavior.

.

There has been extensive successful turbopump operation with the enlarged orifice configuration. There have been 110 builds tested for 626 starts and 252,872 seconds. The maximum pressure change observed was 113 psi with a 122 psi margin to the redline. The three Endeavour (STS-57) HPFTP units have exhibited normal and steady coolant liner pressures during their respective tests and flights (each unit has flown once).

.

The anomalous HPFTP unit 4015 has been returned to Rocketdyne at Canoga Park for disassembly and investigation/analysis. The problem report has been deferred for STS-57 within the Level III MSFC PRACA tracking system, pending the results of the disassembly. The IFA closure submittal is expecited soon for Level II PRCB approval.

- CLOSURE RATIONAL:

The results of turbine (U/N 4015) diagnostic disassembly show that the inboard and outboard static seal were degraded as has been the case in the other two IFAs. Degradation of the static seals has no detrimental effects on turbopump performance, and the seals are replaced at each pump recycle. No other hardware anomalies were noted. Static seal

cracking is a maintenance item and not detrimental to turbopump operation and no recurrence control is required. Pump was removed and returned to Rocketdyne for analysis and recycle.

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IFA SPECIFIC INFORMATION 03/08/94

PAGE 1

STS NUMBER> 0055 ELEMENT> P IFA NO> 001

TITLE:Prime Orbiter Refrigerator/Freezer Failure

0 MISSION CONSTRAINT: 58 SUBS IFA TIME GMT: 116 : 16.59.00

IFA DATE: 04/26/1993

IFA STATUS: CLOSED ELAPSED TIME: 000 : 02.09.00

CLOSED DATE: 07/21/1993 HOUSTON TIME: 11.59.00

PRCBD NUMBER: S044893L PHASE: ON-ORBIT

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
K	IPR 58V-0009	M	PYLD-01

0 RESPONSIBLE MANAGERS 1: E. TERRELL

2:

0 DESCRIPTION:

The prime OR/F displayed a temperature of -12 dec Cel. The nominal planned temperature is from -21 deg to -23 deg. Mission success requires OR/F maintaining the proper temperature. The prime OR/F had been put into operation 4 days before launch and proper operation had been verified as late as 1.5 hours before launch. It remained powered during launch and through the time when the discrepant temperature was noticed on orbit at 2 hrs, 9 min MET. It was powered off and the enhanced OR/F (the backup unit) was activated. The enhanced OR/F cooled down to the proper temperature and performed nominally for the rest of the mission. An IFM was performed to see if the prime OR/F would restart. The IFM was unsuccessful.

.

Postlanding, the prime OR/F was tested in the orbiter at Dryden, and it cooled. However, it was retested in a ground facility after removal from the orbiter and it did not work in the retest.

.

Both OR/F's have been shipped to Houston and troubleshooting of the prime OR/F is underway.

.

Flight Problem Report approved at SSP PRCB on 07/21/93 (PRCBD # S044893L).

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IFA SPECIFIC INFORMATION 03/08/94

PAGE 1

STS NUMBER> 0055 ELEMENT> V IFA NO> 002

TITLE:IMU 2 Platform Fail BITE Indication

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 114 : 04.42.00

IFA DATE: 04/23/1993

IFA STATUS: CLOSED ELAPSED TIME: 000 : 00.00.00

CLOSED DATE: 08/05/1993 HOUSTON TIME: 23.42.00

PRCBD NUMBER: S044893T PHASE: PRE-LAUNCH

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

I IM/55RF01 K PR GNC-2-14-0094

0 RESPONSIBLE MANAGERS 1: B.ELIASON/JSC-VF32 X36037

2: M. JONES/JSC-EG4 X38278

0 DESCRIPTION:

During moding from standby to operate for the 4/24 launch attempt, IMU 2 (a KT-70) showed a platform fail BITE indication. Several subsequent STDBY/OPERATE cycles failed to indicate a problem. Problem believed to be with the DC/DC1 card. Scrubbed launch and R&R'd IMU.

.

The problem lies within the DC/DC 1 card. The specific failure within that card is not currently understood. The card was removed from the IMU, and is currently undergoing analysis at the vendor.

.

Flight Problem Report approved at SSP PRCBD on 08/05/93 (PRCBD # S044893T).

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IFA SPECIFIC INFORMATION 03/08/94

PAGE 1

STS NUMBER> 0055 ELEMENT> V IFA NO> 003

TITLE:FMCA 2 Ops Stat 2 Did Not Invert

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 116 : 16.48.00

IFA DATE: 04/26/1993

IFA STATUS: CLOSED ELAPSED TIME: 000 : 01.58.00

CLOSED DATE: 08/02/1993 HOUSTON TIME: 11.48.00

PRCBD NUMBER: S044893M PHASE: ON-ORBIT

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
I	IM/55RF06	K	IPR 58V-0007
M	GNC-01		

0 RESPONSIBLE MANAGERS 1: B. SWANN/JSC-VF32 X32525

2:

0 DESCRIPTION:

Ops Stat 2 did not return to a "1" when -Z star tracker door opened. Door drive time and currents were nominal. This could be an indicator problem or a failed closed relay (K16).

.

Troubleshooting indicated a failed-closed relay. FMCA 2 has been R&R'd.

.

Troubleshooting at NSLD isolated the problem to a faulty contact on the K16 relay. The FMCA has been removed and replaced. The failed hybred relay will be replaced, an acceptance test will be performed on the FMCA, and the FMCA will be returned to KSC stores as the only available spare. The hybred relay will be sent to Rockwell-Downey for failure analysis.

.

Flight Problem Report approved at SSP PRCB on 08/02/83 (PRCBD # +S044893M).

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IFA SPECIFIC INFORMATION 03/08/94

PAGE 1

STS NUMBER> 0055 ELEMENT> V IFA NO> 004

TITLE:Waste Water Tank GN2 Leak

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 117 : 16.50.00

IFA DATE: 04/27/1993

IFA STATUS: CLOSED ELAPSED TIME: 001 : 02.00.00

CLOSED DATE: 07/14/1993 HOUSTON TIME: 11.50.00

PRCBD NUMBER: S044893G PHASE: ON-ORBIT

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
I	IM/55RF02	K	PR ECL-2-14-0083
M	EECOM-01,2		

0 RESPONSIBLE MANAGERS 1: D.DILLMAN JSC/VF32 X31733

2:

0 DESCRIPTION:

The wall of the waste water tank has been punctured causing a loss of pressurization of all H2O tanks. There are no signs of liquid leak. The waste tank will be isolated from the GN2 pressurization system by IFM. This will allow for pressurization of remaining H2O tanks. A plan for removal, inspection, and failure analysis of the waste tank

has been developed.

.

The tank was R&R'd and sent to RI/Downey for failure analysis.

.

Flight Problem Report approved at an SSP PRCB on 07/14/93
(PRCBD # S044893G).

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IFA SPECIFIC INFORMATION 03/08/94

PAGE 1

STS NUMBER> 0055 ELEMENT> V IFA NO> 006

TITLE:RCS L4D Primary Heater Fail-On

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 117 : 22.23.00

IFA DATE: 04/27/1993

IFA STATUS: CLOSED ELAPSED TIME: 001 : 07.33.00

CLOSED DATE: 07/14/1993 HOUSTON TIME: 17.23.00

PRCBD NUMBER: S044893K PHASE: ON-ORBIT

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
I	IM/55RF04	K	PR LP05-04-0071
M	PROP-01		

0 RESPONSIBLE MANAGERS 1: D. MCCORMACK VF3 X45187

2:

0 DESCRIPTION:

At approximately 117:19:05 G.m.t., it was observed that the heater on primary thruster L4D had failed on. The cockpit switch for this heater controls the heater on five other thrusters. The heaters are being managed manually. The thruster will be R&R'd.

.

The most probable cause of the heater failure is a short of the capacitor in the C3 position in the heater controller circuit. The

thruster was removed and replaced and transferred to the White Sands Test Facility (WSTF). This opportunity will be used to flush the thruster prior to the heater onctroller being removed and replaced at athe WSTF by the vendor. The thruster will then be returned to spares at KSC.

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Flight Problem Report approved at a SSP PRCB on 07/14/93 (PRCBD #S044893K).

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IFA SPECIFIC INFORMATION 03/08/94

PAGE 1

STS NUMBER> 0055 ELEMENT> V IFA NO> 007

TITLE:Anomalous Hydraulic System 3 Main Pump Case Drain Temperature.

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 118 : 05.12.00

IFA DATE: 04/28/1993

IFA STATUS: CLOSED ELAPSED TIME: 001 : 14.22.00

CLOSED DATE: 07/09/1993 HOUSTON TIME: 00.12.00

PRCBD NUMBER: S044893H PHASE: ON-ORBIT

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
I	IM/55RF10	K	IPR 58V-0008
M	MMACS-02		

0 RESPONSIBLE MANAGERS 1: D. GERLACH/JSC-VF32 X3337

2:

0 DESCRIPTION:

The hydraulic system 3 main pump case drain temperature (V58T0385A) has exhibited an unusual signature. The temperature has been responding to hydraulic system 3 circulation pump runs. The signature may indicate a wiring problem or a failed check valve in the filter module.

.

KSC troubleshooting determined that the sensor was bonded to the wrong hydraulic line. The sensor will be moved to the proper location.

.

Flight Problem Report approved at SSP PRCB July 9, 1993 (PRCBD#S044893H).

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IFA SPECIFIC INFORMATION 03/08/94

PAGE 1

STS NUMBER> 0055 ELEMENT> V IFA NO> 008

TITLE:FES Shutdowns

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 118 : 15.30.00

IFA DATE: 04/28/1993

IFA STATUS: CLOSED ELAPSED TIME: 002 : 00.40.00

CLOSED DATE: 08/02/1993 HOUSTON TIME: 10.30.00

PRCBD NUMBER: S044893N PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

M EECOM-03

0 RESPONSIBLE MANAGERS 1: D.DILLMAN/JSC-VF32 X31733

2: N. CERNA/JSC-EC3 X39045

0 DESCRIPTION:

Several FES shutdowns have been experienced while on the primary A controller. The first FES shutdown (118:15:30) occurred after a 2.5 hour FES water dump at cabin pressure. Two other shutdowns (118:23:59 and 119:00:06) occurred with the water tanks pressurized. Theory is that ice formed in the core during the dumps at cabin pressure and caused the shutdown. A FES topping core flush was performed successfully. No special KSC testing is required other than spray nozzle inspection during normal postflight OMRSD inspections.

.

The FES shutdowns were caused by ice build-up in the topping core as a result of FES operation at reduced supply water pressure.

.

The flight rules are being changed so that the FES will not be used with depressurized supply water tanks unless absolutely necessary. If FES operations with reduced supply water pressure must be performed and icing occurs, the existing flush procedure can restore use of the FES.

.

Flight Problem Report approved at SSP PRCB on 08/02/93 (PRCBD # S044893N).

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IFA SPECIFIC INFORMATION 03/08/94

PAGE 1

STS NUMBER> 0055 ELEMENT> V IFA NO> 009

TITLE:Loose Thermal Cover on Tunnel Adapter Hatch

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 117 : 00.30.00

IFA DATE: 04/27/1993

IFA STATUS: CLOSED ELAPSED TIME: 000 : 09.40.00

CLOSED DATE: 07/14/1993 HOUSTON TIME: 19.30.00

PRCBD NUMBER: S044893J PHASE: ON-ORBIT

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
I	IM/55RF11	K	PR TCS-2-15-2052
M	MMACS-01		

0 RESPONSIBLE MANAGERS 1: D.CORCORAN/JSC-VF32 X3329

2:

0 DESCRIPTION:

Downlink video shows the tunnel adapter EVA hatch thermal cover is open. Thermal impact for this mission is minimal. For top sun attitudes near the nominal EOM, the hatch may exceed the 113 deg F

touch temperature limit. The crew has been informed of this. Same problem seen on STS-40 (IFA STS-40-V-09). KSC to troubleshoot.

.

The cause of the loose thermal cover was degradation of the Velcro straps that secure the cover. The loose cover had no impact on the mission. The current Velcro hook and pile is being replaced with a stronger and more durable Velcro that is certified for use in the payload bay..

.

Flight Problem Report approved at an SSP PRCB on 07/14/93 (PRCBD #S044893J).

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IFA SPECIFIC INFORMATION 03/08/94

PAGE 1

STS NUMBER> 0055 ELEMENT> V IFA NO> 01A

TITLE:Disconnect PD3 Slow Closure Following Pad Abort

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 081 : 14.51.00

IFA DATE: 03/22/1993

IFA STATUS: CLOSED ELAPSED TIME: 000 : 00.00.00

CLOSED DATE: 08/02/1993 HOUSTON TIME: 08.51.00

PRCBD NUMBER: S044893Q PHASE: PRE-LAUNCH

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

I IM/KB2654 U UA-2-A0022

0 RESPONSIBLE MANAGERS 1: D.MCORMACK/JSC-VF32 X3327

2: P. COTA /JSC-EP2 X39037

0 DESCRIPTION:

The 4 inch ET/Orbiter disconnect valve closure was slow following the pad abort. Closure did not occur until the topping valve was closed 10 min, 42 sec after command (s/b 2.8 secs max). R&R'd actuator and

LV51 vent check valve. Visual inspection of 4 inch boot, plate gap, insulation, and valve mechanism showed no anomalies. Inital testing of actuator showed no problems. Valve performance has been nominal at MECO for four flights.

.

Flight Problem Report approved at SSP PRCB on 08/02/93 (PRCBD # S044893Q).

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IFA SPECIFIC INFORMATION 03/08/94

PAGE 1

STS NUMBER> 0055 ELEMENT> V IFA NO> 01B

TITLE:Disconnect PD3 Did Not Close At MECO

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 116 : 14.58.00

IFA DATE: 04/26/1993

IFA STATUS: CLOSED ELAPSED TIME: 000 : 00.00.00

CLOSED DATE: 08/02/1993 HOUSTON TIME: 00.00.00

PRCBD NUMBER: S044893Q PHASE: ASCENT

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
I	IM/55RF05	R	BSTR 01

0 RESPONSIBLE MANAGERS 1: D. MCCORMACK

2:

0 DESCRIPTION:

The LH2 4" disconnect did not close when commanded at MECO. The valve did close at MECO plus 10 seconds when the orbiter umbilical plate pulled back in preparation for ET SEP.

.

KSC troubleshooting is continuing. Will probably R&R PD3, LV50 and LV51 and send to RI/Downey for further troubleshooting.

.

Flight Problem Report approved at SSP PRCB on 08/02/93

(PRCBD # S044893Q).

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IFA SPECIFIC INFORMATION 03/08/94

PAGE 1

STS NUMBER> 0055 ELEMENT> V IFA NO> 010

TITLE:MMU 1 SM Checkpoint Fail

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 124 : 23.35.00

IFA DATE: 05/04/1993

IFA STATUS: CLOSED ELAPSED TIME: 008 : 08.45.00

CLOSED DATE: 08/05/1993 HOUSTON TIME: 18.35.00

PRCBD NUMBER: S044893U PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

I IM/55RF08 K PR DIG-2-15-0172

M DPS-01

0 RESPONSIBLE MANAGERS 1: B.ELIASON/JSC-VF32 X36037

2: K. DUNN /JSC-EK5 X38367

0 DESCRIPTION:

At 123:23:35 G.m.t., the crew entered an "ITEM 18 EXEC" to "SM SPEC 60" to initiate an MMU 1 checkpoint. Thirteen seconds later, "OFF/BUSY MMU 1" and "S60 CHECKPT FAIL" fault messages were annunciated by GPC 4. GPC 4 logged a single I/O error and an op code indicating an MMU OFF/FAIL during an MMU utility write. The crew power cycled the MMU per the malfunction procedure and successfully retried the SM checkpoint. The MMU performed nominally for the remainder of the mission.

.

The MMU will be R&R'd.

.

The most likely cause of this failure was an intermittent noise

problem with the ready discrete. The MMU was removed and replaced. The unit is currently being observed, and data will be collected and analyzed in the event of a recurrence of the failure.

.

Flight Problem Report approved at SSP PRCB on 08/05/93 (PRCBD # S044893U).

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IFA SPECIFIC INFORMATION 03/08/94

PAGE 1

STS NUMBER> 0055 ELEMENT> V IFA NO> 011

TITLE:CRT 4 Failure

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 124 : 12.59.00

IFA DATE: 05/04/1993

IFA STATUS: CLOSED ELAPSED TIME: 007 : 22.09.00

CLOSED DATE: 09/23/1993 HOUSTON TIME: 07.59.00

PRCBD NUMBER: S044893Y PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

I IM/55RF07 K PR DIG-2-15-0171

M DPS-02

0 RESPONSIBLE MANAGERS 1: B.ELIASON/JSC-VF32 X36037

2: K. DUNN /JSC-EK5 X38367

0 DESCRIPTION:

During a power up of CRT 4, GPC 4 annunciated an "I/O ERROR CRT 4" message. The crew reported that the DEU BITE flag was tripped and that CRT 4 was blank. The crew performed a power cycle, but the CRT was not recovered. CRT 4 remained powered down for the remainder of the mission. DEU 4 has been R&R's.

.

The two anomalous conditions were caused by two separate solder joints fracturing as a result of Uralane expanding and contracting, causing

stress to the solder joints. Contributing factors of the black DU solder joint failure include the amount of solder used, the shape of the leads, and the fact that the devices to which these ICs are attached draw large amounts of current, resulting in high temperatures.

.

The DEU was replaced. The solder joints were repaired. For the remaining DEUs, a screen has been put in place to inspect solder joints which are subject to this stress. This manner in which this screen will be implemented is currently undecided, and will be documented on the CARS.

.

Flight Problem Report approved at PRCB on 09/02/93 (PRCBD# S044893W).

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IFA SPECIFIC INFORMATION 03/08/94

PAGE 1

STS NUMBER> 0055 ELEMENT> V IFA NO> 012

TITLE:MPS Pneumatic He Pressure Decay During Ascent

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 116 : 14.58.00

IFA DATE: 04/26/1993

IFA STATUS: CLOSED ELAPSED TIME: 000 : 00.08.00

CLOSED DATE: 08/02/1993 HOUSTON TIME: 09.58.00

PRCBD NUMBER: S044893P PHASE: ASCENT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

K IPR 58V-0006

0 RESPONSIBLE MANAGERS 1: D.MCCORMACK/JSC-VF3 X3327

2: P.COTA /JSC-EP2 X39037

0 DESCRIPTION:

During ascent, the MPS pneumatic He system pressure decayed 80 psi (1

bit below the max allowable of 60 psi per OMRSD DV41AZO.150). Suspect internal leak with CV4 fill check valve or with valves in the interconnect system. Troubleshooting will consist of a test similar to File III requirement V41AZO.150, and the performance of every flow requirements V41AZO 100 and V41AZO.110.

.

Troubleshooting found an audible leak at the LV50 outlet B-nut.

.

The MPS pneumatic helium system pressure decay was caused by a leak at the LV50 outlet B-nut. Insufficient torque on the B-nut was determined to be the cause of the leak. This fitting had been removed and reinstalled on the pad in support of an inspection resulting from spilled hydraulic fluid. The LV50 outlet B-nut was removed, inspected, and torqued to the proper value and a leak check was performed. The leak did not recur.

.

Flight Problem Report approved at SSP PRCB on 08/02/93 (PRCBD # S044893P).

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IFA SPECIFIC INFORMATION 03/08/94

PAGE 1

STS NUMBER> 0055 ELEMENT> V IFA NO> 015

TITLE:Right OMS Propellant Tanks Pressure Decrease

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 126 : 13.33.00

IFA DATE: 05/06/1993

IFA STATUS: CLOSED ELAPSED TIME: 009 : 22.43.00

CLOSED DATE: 08/19/1993 HOUSTON TIME: 08.33.00

PRCBD NUMBER: S044893V PHASE: ON-ORBIT

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
K	IPR 58V-0017	M	PROP-02

0 RESPONSIBLE MANAGERS 1: D.MCORMACK/JSC-VF32 X2528

2: S. JONES /JSC-EP2 X39031

0 DESCRIPTION:

The right OMS oxidize and fuel tanks ullage pressure decreased 5 psi during the last 70 seconds of the deorbit burn (burn duration was 2 min 53 sec). The spec is 245 psi minimum and the fuel tank pressure dropped to 243 psi. The ROMS helium tank showed a decrease in its pressure decay rate when the propellant tank pressures decreased. The signature is indicative of a helium flow problem to the propellant tanks.

.

KSC to troubleshoot

.

The propellant tank ullage pressure drops seen during flight were repeated during ground testing. Test results indicate that the problem is in the A- and B-leg primary regulators. The performance degradation seen during flight and in testing only occurs at low inlet temperatures and pressures. The most probable cause of the anomaly is leakage past the primary stage piston slip ring and/or abnormally high frictional load at the piston shaft seal due possibly to contamination or improper sizing of the ring and/or seal.

.

The decision has been made to fly STS-58 as-is. Regulator usage during STS-58 will be benign compared to past missions due to the large ullage in the propellant tanks and the relatively short duration OMS-2 and deorbit burns. Also, regulator performance during the three flights of RP05 and during STS-55 postflgiht testing has been consistent and indicates that the propellant pressurization system will support any required OMS burns during the STS-58 mission. A reflight decision will be made after STS-58 based on an evaluation of the flight performance.

-JFDPO12: NORMAL TERMINATION OF PROCESSING

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STS-056 (OV-103,FLT #16) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

IFA NUMBER> STS-56-B-01

TITLE:LH Aft Skirt HDP 5 Blast Container Plunger and Spring Found on Pad After Launch

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 000 : 00.00.00

IFA DATE: 04/08/1993

IFA STATUS: CLOSED : 04/21/1993 ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: CLOSED : 1993-05-24 HOUSTON TIME: 00.00.00

PRCBD NUMBER: S044895A PHASE: ASCENT

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
A	A15350	A	PV403-4406

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: L. MORTON USBI

2: S. PATTERSON SA45

0 DESCRIPTION:

The plunger and spring from HDP 5 were found in the MLP support post after the launch. The plunger is designed to seal the exit bore within the debris containment device (DCD) to prevent potential debris from escaping into the SRB plume. This was the first occurrence of this type anomaly with the DCD design, dating back to STS-26R (28 flights).

.

The concern associated with this circumstance is that the plunger and spring become additional debris (not previously considered) during liftoff. A MSFC/KSC/USBI anomaly team was formed to better understand this failure and performed an investigation in the following areas: (1) Design and Analysis, (2) Loads and Environments, (3) Flight Hardware, and (4) Assembly and Installation. All affected components

were tested and correct material properties were verified. Examination of the plunger shoulder fracture surfaces directed the investigation to conclude that the plunger failed in a multiple event sequence. First, the plunger struck the tip of the frangible nut halves, breaking off four sections at the edges (shoulder) of the flange cutouts. It has been demonstrated by test that zero or near zero skewed firing contributes to frangible nut recontact with the plunger. The physical evidence indicates zero skew existed during the firing of the NASA standard detonators (NSD's). Second, the plunger impacted the spherical washer at the seating surface, causing the remaining edges of the plunger to fail.

.

USBI and R/I performed statistical analyses to determine the debris risk to the vehicle. The reliability of the plunger assembly operation on any given flight was determined to be 0.9646. Rockwell reevaluated the probability of vehicle impact due to the additional debris (spring and plunger) and concluded the probability to be less than 0.054%. The analyses concluded that the reliability of the plunger systems in combination with the low probability of debris impact yields a composite probability of no HDP debris impact to the vehicle of 0.99998. Consequently, this problem is not considered a safety of flight issue. Since this incident is a random occurrence which presents very low probablily of debris impact to the vehicle, no corrective action is required. It should also be noted that the

1

IFA NUMBER> STS-56-B-01

TITLE:LH Aft Skirt HDP 5 Blast Container Plunger and Spring Found on Pad After Launch

0 DESCRIPTION: (Continued from previous page).

affected hardware involves non-reusable parts.

The problem report was deferred on 04-14-93 in the Level III MSFC PRACA tracking system for the next six months (STS-55, STS-57, STS-51, and STS-58).

The problem report was subsequently closed in the Level III MSFC PRACA tracking system for STS-57 and subs on 05/24/93.

Flight Problem Report approved at a Special Level II Daily PRCB on 04/21/93 (S044895A).

1

STS-056 (OV-103,FLT #16) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

PAGE 3

IFA NUMBER> STS-56-D-01

TITLE:FLIGHT DEORBIT MANUEVER/RANGE AT EI (OPENED & CLOSED BY R1, 4-21-93)

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 106 : 11.00.00

IFA DATE: 04/16/1993

IFA STATUS: CLOSED : 04/21/1993 ELAPSED TIME: 008 : 05.31.00

PRACA STATUS: UNKNOWN HOUSTON TIME: 06.00.00

PRCBD NUMBER: S044895R1 PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

D DR #238469 M FDO-01

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: M.HENDERSON JSC-DA8

2: W. TRACY

0 DESCRIPTION:

After the waive-off of the deorbit on Friday, initial deorbit targeting was performed for the Saturday prime KSC opportunity. During this process, the FDO generated the desired target set and

transferred the maneuver to the trajectory profile (EPHEMERIS). The resulting entry profile indicated an abnormal drag vs velocity profile (thermally more severe). At the end of the shift, FDO requested DM explore the change in the drag profile.

.

No software anomaly was identified. The process of generating the initial deorbit solution was based on vent and attitude timelines that reflected the Friday deorbit. Between the maneuver generation and the transfer to the Ephemeris, an attitude timeline update occurred which caused the vent model to significantly change the 24 hours vector integration (to the Saturday opportunity). The Paramax team has completely accounted for the observed profile differences.

.

Anomaly opened and closed at Special Level II Daily PRCB on 04/21/93. PCIN number pending.

1

STS-056 (OV-103,FLT #16) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

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IFA NUMBER> STS-56-E-01

TITLE:ME-1 (E2024) Anti-Flood Valve Skin Temp Measurement Read Above Nominal

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 098 : 05.28.59

IFA DATE: 04/08/1993

IFA STATUS: CLOSED : 11/10/1993 ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: CLOSED : 1994-02-28 HOUSTON TIME: 00.28.59

PRCBD NUMBER: S044895P PHASE: PRE-LAUNCH

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
A	A032498	A	A15452

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: J. EBERT RKDN

0 DESCRIPTION:

During STS-56 propellant loading 4/6/93 and 4/8/93, both of the ME-1 (E2024) anti-flood valve (AFV) skin temperature measurements read 60 to 70 degrees above nominal.

.

The aft compartment environment was believed to be different this flow and the reason has not yet been identified. All aft compartment parameters, both orbiter and SSME, have been reviewed and no condition was observed that indicated any associated anomaly existed. It has been demonstrated (STS-26R FRF) that the AFV skin temperatures are influenced by the aft compartment environment.

.

After much discussion, a LCC deviation (PRCBD 72379DA) was written to implement a workaround for ME-1. The AFV skin temperatures #1 and #2 and GO2 interface temperature were monitored from T-2M55S to T-31S via RPS stripcharts for a 5 degree temperature drop maximum to verify no leakage past the ME-1 AFV.

.

The AFV LCC limit ensures protection against oxidizer leakage. The LCC limit is set for 100 degree below the observed aft compartment temperature. The limit assures that no liquid oxidizer formation reaches the heat exchanger coil. Postflight inspection of the associated SSME hardware (skin temperature sensors and/or purge ducts) revealed nominal conditions and configuration. Efforts have been presently directed toward the Orbiter to detemine if any purges to the aft compartment or vents from the drag chute compartment were different for STS-56. The investigation is continuing.

.

The IFA will not be addressed until the next two missions have flown (waiting for the Discovery flight, STS-51). This will help determine if this condition resulted from a problem with the sensors or

Discovery's aft compartment/environment, since Engine 2024 is assigned to a different Orbiter (Columbia instead of Discovery). If the countdown and flight data from these missions establish the sensor or engines are not responsible, the SSME Project will recommend that the IFA either be transferred to Shuttle Integration, if appropriate, or be closed out as an unexplained anomaly.

1

IFA NUMBER> STS-56-E-01

TITLE:ME-1 (E2024) Anti-Flood Valve Skin Temp Measurement Read Above Nominal

0

- CLOSURE RATIONALE:

Aft compartment purge ducting and anti-flood valve skin temperature sensors were inspected with no anomalies. Subsequent chills of both OV-103 and E2024 have shown nominal AFV skin temperature readings. The cause for the higher than normal AFV skin temperature readings is unknown. If this condition should occur again, a contingency LCC will be invoked. This contigency LCC was presented and accepted at the STS-55 Level I FRR Action Item Closeout Meeting on 4/20/93.

1

IFA NUMBER> STS-56-I-01

TITLE:High Data Rate Downlink Problems

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 098 : 12.30.00
IFA DATE: 04/08/1993

IFA STATUS: CLOSED : 01/13/1994 ELAPSED TIME: 000 : 07.01.00

PRACA STATUS: UNKNOWN HOUSTON TIME: 07.30.00

PRCBD NUMBER: S044895U PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

K IPR 51V-0003 M INCO-02/04

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: W. ARCENEAUX

2:

0 DESCRIPTION:

Downlink data quality degraded on both Ku-Band Channels 2 and 3 when 32 MBPS or 48 MBPS data was put on the Ku-Band Channel 3 in Payload Max (PL MAX) mode (PM Mode). When 2 MBPS data was put on Channel 3 in PL MAX mode, data quality was intermittant. B45 chit approved to delay removal of ATLAS.

1

IFA NUMBER> STS-56-I-02

TITLE:Universal Pointing Total DAP Error Buildup

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 099 : 13.30.00

IFA DATE: 04/09/1993

IFA STATUS: CLOSED : 06/02/1993 ELAPSED TIME: 001 : 08.01.00

PRACA STATUS: UNKNOWN HOUSTON TIME: 08.30.00

PRCBD NUMBER: S044895C PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

M GNC-01

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: C. ALFORD

2:

0 DESCRIPTION:

During execution of the SUSIM Alignment Procedure Part B, there was an unexpected change in roll attitude while DAP was in the INRTL Mode. While holding this attitude, roll total errors indicated a change in roll attitude of approximately -0.03 deg/min; however, DAP errors remained within the 0.033 attitude dead band. The problem was repeated and a workaround of using DAP auto mode was proven successful.

.

No KSC action.

.

Flight Problem Report approved at a Special Level II Daily PRCB on 06/02/93 (S044895C).

1

STS-056 (OV-103,FLT #16) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

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IFA NUMBER> STS-56-K-01

TITLE:Igniter Heater Cable Attach Point Not to Drawing Specs

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 000 : 00.00.00

IFA DATE:

IFA STATUS: CLOSED : 12/16/1993 ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: UNKNOWN HOUSTON TIME: 00.00.00

PRCBD NUMBER: S044895Q PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

T PFAR 360L031A-04

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: S. MUNSON

2:

0 DESCRIPTION:

The igniter heater power cable, just exiting the egress tab, was

connected to two radially oriented cable tie bases instead of the single circumferentially oriented cable tie base. This cable routing condition was not installed as directed per the cable installation OMI (Operations and Maintenance Instructions) and engineering requirements.

.

Igniter heater performed as designed. Installed condition did not violate acceptable electrical practices.

1

STS-056 (OV-103,FLT #16) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

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IFA NUMBER> STS-56-M-01

TITLE:Scratch on Aft Dome Boss Primary Sealing Surface

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 000 : 00.00.00

IFA DATE:

IFA STATUS: CLOSED : 05/25/1993 ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: CLOSED : 1993-05-20 HOUSTON TIME: 00.00.00

PRCBD NUMBER: S044895B PHASE: POST LANDING

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
A	A15394	D	DR4-5/247
T	PFAR 360L031A-05		

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: S. MUNSON

2: S. THORNTON EE52

0 DESCRIPTION:

During postflight inspection of the left RSRM nozzle-to-case joint, a small axial scratch was observed on the aft dome boss primary sealing surface at 55.8 deg.

.

The scratched primary sealing surface was 0.58 inch from the forward

edge of the aft dome boss ID and measured 0.040 inch long. Raised metal was detected, however, no damage was found on any of the nozzle-to-case joint o-rings. Also, the damaged metal sealing surface did not affect the sealing function of the joint o-rings, which performed flawlessly during the flight.
performed flawlessly during the flight. A mold impression of the scratch was taken and later measured at the Thiokol laboratory. The measured impression reflected the scratch was 0.0003 inches deep with 0.0002 inches of raised metal.

.

This condition caused concern that the damaged metal sealing surface could adversely affect seal function. Similar conditions have been observed on other recent flights. As a result, a "Scratch and Contamination Elimination" team was formed in September 1992, consisting of principal MSFC and TC personel. Since this trend has not been completely explained and continues to recur, the PRCB assigned this item as an IFA with emphasis on a scratch team action to return with results and recommendations of their investigation. The cumination of the teams' efforts determined appropriate recurrence control which has been implemented in three areas: 1)operator awareness and sensitivity, 2)communications, and 3)process reviews. Operator awareness was heightened by the implementation of centralized training, eliminating contaminants and scratches throught the improvement and standardization of operator understanding and skill. Communication improvement was realized by increasing the involvement of the work centers toward timely and effective PFAR closures. Finally, the process reviews have resulted in improved general cleanliness practices (ie.cleaning of workbenches, enhancements to handling and protection of hardware, better use of contamination clothing and tooling, and the use of lifting arrangements without weight test date). The actions taken by this team are adequate to

IFA NUMBER> STS-56-M-01

TITLE:Scratch on Aft Dome Boss Primary Sealing Surface

0 DESCRIPTION: (Continued from previous page).

minimize the occurrence of similar damage to future hardware. Since these enhancements are not effective until STS-60 (RSRM-35), it is possible that similar findings of contamination and scratches may be noted during the interm period.

.

Several factors provide rationale for safe future flight during the interim period and beyond. (1) A preflight leak check provides positive verification of the joints' sealing capability. The nozzle-to-case joint's primary o-ring, secondary o-ring, and packings with retainers are tested at high pressure (920 +/- 10 psig) and at low pressure (30+/- 3 psig) with low bolt torque and again at high pressure with high bolt torque. (2) The postflight assessment of the joint o-rings revealed no damage to the seals because of the minimal surface flaw (0.0003 inch deep with 0.0002 inch of raised metal). (3)The minimum o-ring footprint for the nozzle-to-case joint o-ring is 0.116 inch at 14.49% squeeze (TWR-50063). The minimum footprint for the subject primary o-ring (as built) was 0.143 inches at 19.5% squeeze (TWR-63650-31). The discussed scratch length of 0.040 inch violates only 35% of the minimum o-ring footprint.

.

The problem report was closed in the Level III MSFC PRACA tracking system for STS-57 and subs on 05-20-93.

.

Flight Problem Report approved at a Special Level II Daily PRCB on 05/25/93 (S044895B).

1

IFA NUMBER> STS-56-P-01

TITLE:STL Overheat Condition

0 MISSION CONSTRAINT: 59 SUBS IFA TIME GMT: 099 : 05.49.00

IFA DATE: 04/09/1993

IFA STATUS: CLOSED : 01/07/1994 ELAPSED TIME: 001 : 00.20.00

PRACA STATUS: UNKNOWN HOUSTON TIME: 00.49.00

PRCBD NUMBER: S044895T PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

M PYLD-09

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: L. GONZALES

2:

0 DESCRIPTION:

STL temperatures have been reading 41 deg C since FD1. They should be approximately 37 deg C. STL science may be severely degraded if temperatures continue to rise.

.

An IFM is currently in work to provide additional cooling via the elephant trunk located in the airlock. An STL IFM that moved STL to airlock and provided cooling via the elephant trunk was performed at 3:18:24. Crew read down STL rail temperatures at 3:21:33. All temperatures have fallen to expected values.

1

IFA NUMBER> STS-56-P-02

TITLE:PDU Failure

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 102 : 11.22.00

IFA DATE: 04/12/1993

IFA STATUS: CLOSED : 05/19/1995 ELAPSED TIME: 004 : 05.53.00

PRACA STATUS: UNKNOWN HOUSTON TIME: 06.22.00

PRCBD NUMBER: S044895W PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

M PYLD-11

0 CLOSURE INITIATED BY: JSC-MT2/F. MORENO |

RESPONSIBLE MANAGERS 1: G. FORD

2:

0 DESCRIPTION:

The Hercules PDU shutdown during Hercules operations. If PDU is not operating, loss of ability to tag stored images for downlink. Still able to downlink previously tagged images and execute real time downlinks.

.

The PDU was power cycled and is running intermittenly. Will continue nominal ops unless PDU fails completely. Will perform PDU to PGSC swap procedure if PDU fails completely.

- CLOSURE RATIONALE:

The HERCULES Playback/Dounlink Unit (PDU) shut down on Mission Day 4. Power was recycled but PDU operated intermittently for the remainder of the mission. PDU Serial # 1001 was extensively bench tested after the mission. All power interface components were inspected for damage. The problem was isolated to a loose wire connection on the PDU AC power cable used during the mission. The loose wire connection on the AC power cable was repaired and the AC power cable was inspected to assure there were no other loose connections.

1

STS-056 (OV-103,FLT #16) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

IFA NUMBER> STS-56-P-03

TITLE:Hercules HAP Error

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 098 : 15.02.00

IFA DATE: 04/11/1993

IFA STATUS: CLOSED : 05/19/1995 ELAPSED TIME: 000 : 09.33.00

PRACA STATUS: UNKNOWN HOUSTON TIME: 10.02.00

PRCBD NUMBER: S044895V PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

M PYLD-01

0 CLOSURE INITIATED BY: JSC-MT2/F. MORENO |

RESPONSIBLE MANAGERS 1: M. MEYER

2:

0 DESCRIPTION:

During an attempted HIMU align on mission day 6, a HAP failure occurred twice, both times resulting in the loss of the align. The HAP was reset, and a subsequent align opportunity was successful. The error data is saved in the Hercules PDU (PGSC). The anomaly is not understood at this time and postflight investigation is planned. Payload customer has requested four more flights for Hercules. None are manifested at this time.

- CLOSURE RATIONALE:

The HAP error anomalies were caused by a cessation of data communications between the HAP and the PDU. This communication failure was caused by an occasional missed processor interrupt in the HAP. This is a correctable software problem. HERCULES software was updated

to ensure HAP/PDU communication by forcing the HAP to periodically reestablish communication with the PDU. A missed processor interupt that stops communicating with the PDU will persist only a very short time until the HAP reestablished the link. The corrective fix was tested extensively and also with the STS-70 "Configuration B". HERCULES also passed a full functional test and the problem has not reoccurred despite attempts to induce it.

1

STS-056 (OV-103,FLT #16) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

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IFA NUMBER> STS-56-T-01

TITLE:External Tank Acreage Divots

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 000 : 00.00.00

IFA DATE:

IFA STATUS: CLOSED : 07/29/1993 ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: CLOSED : 1993-09-22 HOUSTON TIME: 00.00.00

PRCBD NUMBER: S044895N PHASE: ASCENT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

A A15370 A T-065PF

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: C.BRAMON EE31

2:

0 DESCRIPTION:

A postflight review of the astronauts' handheld camera film revealed approximately ten rather large and unique divots of the ET intertank acreage (-Z axis).

.

The ET's intertank TPS application, effective ET-51 and subs, employs the use of two CPR foam spray guns which fill the valleys between the structural stringers and cover them in a single foam spray.

.

Task I. Failure Investigation (Pending investigation)

Task II. Corrective Action (Pending investigation)

Task III. Clearance of Effectivities (ET-56, STS-55) Based on the Previous Flights of the Same Intertank Configuration.

The following applies:

- Divots are within experience base
- Evaluation of divots indicates shallow surface foam loss
- Photographs do not indicate bondline concerns
- No heating concern for intertank
- Orbiter tile damage for STS-56 and other two-gun spray ET's is within flight experience base
- STS-42 IFA resulted in a detailed review of spray process qualification, build and nonconformance paper for ET's 51,52 and 53. No definitive cause identified

Task IV. Cause and Corrective Action Summary (Pending Investigation)

Based on the effectivities discussion within Task III (above), the problem was deferred on 04-22-93 for the next six months in the Level III MSFC PRACA tracking system. This deferral presently covers flights STS-55, STS-57, STS-51, and STS-58.

.

Flight Problem Report approved at a SSP PRCB on 07/29/93 (PRCBD # S044895N).

1

IFA NUMBER> STS-56-V-01

TITLE:MPS LH2 High Point Bleed Valve (PV-22) Failed To Indicate Closed

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 096 : 06.31.00

IFA DATE: 04/06/1993

IFA STATUS: CLOSED : 06/24/1993 ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: CLOSED : 1994-05-06 HOUSTON TIME: 01.31.00

PRCBD NUMBER: S044895H PHASE: PRE-LAUNCH

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

K IPR 51V-0002 P IM/56RF01

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: W.ARCENEAUX VF32 X33335

2:

0 DESCRIPTION:

MPS LH2 high point bleed valve (PV-22) failed to indicate closed, causing launch countdown temination at T-11 seconds. Subsequent testing showed valve cycled with no response from closed indication. During second launch attempt, closed indication returned at T-3.5 sec, and then operated normally when valve was cycled for vacuum inert.

.

The problem was caused by either a fault in the PV22 closed-position indication circuitry or a mechanical failure which caused the ball valve to stop moving in the closed direction after flow was terminated but before the closed-position limit switch was activated. The valve's ability to clsoe and terminate LH2 flow was confirmed by leak testing and the response of a downstream temperature measurement.

.

PV22 and the attaching connector assembly were removed and shipped to R/D for failure analysis. LCC MPS-12 was changed to require verifying either the PV22 closed indication ON or the GSE hight point bleed line temperature above -409.5 deg F (1 of 2) betoween T-14 and T-10 seconds. GLS software was changed to command PV22 closure at T-26 seconds to provide sufficient time for high point bleed line warm-up.

.

Flight Problem Report (PRCBD #S044895H) approved at SSP PRCB on 06/24/93.

1

STS-056 (OV-103,FLT #16) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

IFA NUMBER> STS-56-V-02

TITLE:Fuel Cell 1 O2 React VLV False Close Indication

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 098 : 06.46.00

IFA DATE: 04/08/1993

IFA STATUS: CLOSED : 06/24/1993 ELAPSED TIME: 000 : 01.17.00

PRACA STATUS: CLOSED : 1993-06-22 HOUSTON TIME: 01.46.00

PRCBD NUMBER: S044895J PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

M EGIL-01 P CAR 48RF03

U UA-3-A0023

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: S. MCMILLAN VF32 X35913

2:

0 DESCRIPTION:

The fuel cell 1 O2 reactant valve indicated closed at 098:06:46:54 G.m.t. Busses A and B were tied together initially. Later busses A and C were tied together. The fuel cell continued to operate properly, confirming an instrumentation-only failure. Repeat of IFA STS-48-V-03 (OV-103). Proper indication occurred after valve cycled postlanding for fuel cell shutdown/inerting.

.

The false fuel cell 1 O2 reactant valve close indication was most probably caused by a temporary open condition in the valve status indicator circuit. The entire panel, which is the line replaceable unit, containing the reactant valve and manifold valve was removed and replaced.

1

STS-056 (OV-103,FLT #16) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

IFA NUMBER> STS-56-V-03

TITLE:Low Frequency Uplink Command Difficulty

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 098 : 14.57.00

IFA DATE: 04/08/1993

IFA STATUS: CLOSED : 06/24/1993 ELAPSED TIME: 000 : 09.28.00

PRACA STATUS: CLOSED : 1993-11-22 HOUSTON TIME: 09.57.00

PRCBD NUMBER: S044895K PHASE: ON-ORBIT

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
K	IPR 51V-0005	M	INCO-01
M	INCO-05	P	IM/56RF04

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: W. ARCENEAUX VF32 X3333

2:

0 DESCRIPTION:

Degraded comm was observed on NSP 2 and on NSP 1. Both occurrences were after several hours of nominal use of the respective NSP's. Low freqency is a common denominator, switching to high frequency cleared up the problem. Switched back to low frequency on FD7.

.

Two extended periods of high noise in the S-Band PM system low-frequency communication path caused uplink command difficulties. Possible causes of the noise appear to be either intemittnet noise sources within the transponder, intermittent noise sources within the preamplifier assembly, or an intermittent failure of one of the semi-rigid coaxial cable assemblies. Ground testing was unable to reproduce the anomaly. No component replacement or repair was performed.

.

Flight Problem Report (PRCBD #S044895K) approved at SSP PRCB on 06/24/93.

1

STS-056 (OV-103,FLT #16) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

IFA NUMBER> STS-56-V-05

TITLE:AFT BULKHEAD THERMAL BLANKET LOOSE

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 101 : 17.15.00

IFA DATE: 04/11/1993

IFA STATUS: CLOSED : 06/07/1993 ELAPSED TIME: 003 : 11.46.00

PRACA STATUS: CLOSED : 1995-03-04 HOUSTON TIME: 12.15.00

PRCBD NUMBER: S044895D PHASE: ON-ORBIT

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
K	PR TCS-3-17-1673	M	EECOM-01
P	IM/56RF02		

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: K. BROWN VF32 X33891

2:

0 DESCRIPTION:

Payload bay thermal blanket on the aft bulkhead is partially detached.

.

Further inspection at KSC revealed 2 blankets detached and 8 blankets partially detached.

.

The cause of the detached blankets has not been corrected or positively identified. The most probable cause is air intrusion during the first 90 seconds of ascent due to the inability of the

payload bay door (PLBD) environmental seals to maintain pressure integrity. Until the cause of the detached blankets has been properly identified and corrected, detached blankets will continue to occur on some flights.

.

Flight Problem Report approved at a Level II PRCB on 06/07/93. (PRCBD# S044895D).

1

IFA NUMBER> STS-56-V-07

TITLE:SUPPLY WATER POST DUMP "BURPS" *** DELETED OSB, 5-14-93 ***

0 MISSION CONSTRAINT: SUBS

IFA TIME GMT: 101 : 20.45.00

IFA DATE: 04/11/1993

IFA STATUS: CLOSED : 05/14/1993

ELAPSED TIME: 003 : 15.16.00

PRACA STATUS: UNKNOWN

HOUSTON TIME: 15.45.00

PRCBD NUMBER: S044895R2

PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

M EECOM-02

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: M. ENGLE

2:

0 DESCRIPTION:

The water supply "burps" occurred following the supply water dump. The downlink video verified water ommision occurred about 1 minute 13 seconds after the line temperature showed the first occurrence.

.

During IFA baselining on 04/15/93, Orbiter recommended not baslining STS-56-V-07. B. Shaw deferred decision until subsequent conversation with VF3/M.Suffredini, at which time he concurred with Orbiter

recommendation.

.

IFA STS-56-V-07 deleted from baselined list by PRCBD# S044895R2 on 05/14/93.

- CLOSURE RATIONALE:

PRBCD S044895R2 (05/14/93) issued to delete STS-56-V-07 from baseline.

1

STS-056 (OV-103,FLT #16) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

IFA NUMBER> STS-56-V-09

TITLE:ATVC 4 Power Loss Indication

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 104 : 07.07.00

IFA DATE: 04/14/1993

IFA STATUS: CLOSED : 06/03/1993 ELAPSED TIME: 006 : 01.38.00

PRACA STATUS: CLOSED : 1993-12-10 HOUSTON TIME: 02.07.00

PRCBD NUMBER: S044895E PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

K IPR 51V-0004 M GNC-02

P IM/56RF06

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: K. BROWN VF32 X33323

2:

0 DESCRIPTION:

During FCS c/o switch test, ATVC 4 showed anomalous power signature on all SSME actuators. Indicative of an internal power supply anomaly in ATVC 4.

.

KSC troubleshooting no joy. ATVC 4 R&R'd. F/N 29 installed.

.

Ground testing of the FCS channel 4 switch, ATVC 4, and wiring did not reproduce the flight signatures. The ATVC has been removed and replaced with a spare ATVC s/n 0029. A frequency response test (FRT) was performed after the ATVC replacement and the results were satisfactory. Failure analysis will be performed under CAR 56RF03-010.

.

Flight Problem Report approved at a Special Level II Daily PRCB on 06/03/93 (S044895E).

1

IFA NUMBER> STS-56-V-12

TITLE:Fuel Cell 1 Substack 3 Delta V Increases During Purge

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 106 : 22.58.00

IFA DATE: 04/16/1993

IFA STATUS: CLOSED : 06/24/1993 ELAPSED TIME: 008 : 17.29.00

PRACA STATUS: CLOSED : 1994-04-19 HOUSTON TIME: 17.58.00

PRCBD NUMBER: S044895L PHASE: ON-ORBIT

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
K	PR FCP-3-17-XXXX	M	EGIL-03
P	IM/56RF05		

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: S.MCMILLAN VF32 X35913

2:

0 DESCRIPTION:

Substack 3 delta volts increase during reactant purging and gradually decrease between purges. Increase during purges is a few millivolts larger with each succeeding purge. Indicative of reactant port

plugging in one or more cells in substack 3.

.

The most probable cause of the fuel cell 1 increased CPM readings during purges was fuel-cell corrosion contaminants blocking one or more reactant ports within the cells in substack 3. Since the number one fuel cell is to be intentionally shut down as part of a development test objective during the next flight of OV-103, the decision was made to remove and replace this fuel cell after flgiht and perform failure analysis to verify the cause of the observed behavior. Failure analysis will be reported under the listed CAR.

.

Flight Problem Report (PRCBD #S044895L) approved at SSP PRCB on 06/24/93.

1

STS-056 (OV-103,FLT #16) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

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IFA NUMBER> STS-56-V-13

TITLE:L5D Heater Failed On

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 000 : 00.00.00

IFA DATE:

IFA STATUS: CLOSED : 06/23/1993 ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: CLOSED : 1993-08-09 HOUSTON TIME: 00.00.00

PRCBD NUMBER: S044895M PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

K IPR 51V-0011

P IM/56RF07

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: S.MCMILLAN VF32 X35913

2:

0 DESCRIPTION:

L5D ox and fu injector temps stayed above 220 deg F during flight. Normal ops decreases below 175 deg F. Temps decreased steadily when heaters turned off pre-entry. Possible failed-on 10W thruster heater.

.

Vernier thruster L5D was removed from the vehicle. Testing duplicated the in-flight problem. The vendor replaced the heater controller and temperature sensor. The thruster was retested with good results and reinstalled on the vehicle. The failure analysis of the heater controller and temperature sensor is being conducted under CAR 56RF07-010.

.

Flight Problem Report (PRCBD# S044895K) approved at SSP PRCBD on 06/23/93.

-JFDP012: NORMAL TERMINATION OF PROCESSING

1

1

1

STS-057 (OV-105,FLT #4) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

IFA NUMBER> STS-57-B-01

TITLE:APU S/N 152 BROKEN FUEL PUMP SHAFT

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 000 : 00.00.00

IFA DATE:

IFA STATUS: CLOSED : 09/02/1993 ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: CLOSED : 1993-11-09 HOUSTON TIME: 00.00.00

PRCBD NUMBER: S044896G PHASE: POST LANDING

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

A A15565

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: C.TAYLOR USBI

2:

0 DESCRIPTION:

The fuel pump shaft most likely sheared during the postflight GN2 spin due to a preload beam which lodged between a drive gear and the inlet window. The preload beam was introduced into the low pressure side of the pump during assembly.

.

All assembled APUs will be x-rayed prior to flight using a proven x-ray technique. If x-ray reveals beam is not in proper location then APU will be removed and replaced. Assembly inspection requirements have been changed to verify proper installation of the preload beam.

.

Recurrence control will be implemented and the problem will be closed in MSFC PRACA system (A15565).

.

Flight Problem Report approved at Level II PRCB on 09/02/93
(PRCBD # S044896E).

1

IFA NUMBER> STS-57-D-01

TITLE:Orbiter AC 3 Phase-To-Phase Short

0 MISSION CONSTRAINT: SUBS

IFA TIME GMT: 176 : 21.44.00

IFA DATE: 06/25/1993

IFA STATUS: CLOSED : 09/02/1993

ELAPSED TIME: 004 : 08.36.38

PRACA STATUS: UNKNOWN

HOUSTON TIME: 16.44.00

PRCBD NUMBER: S044896C

PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

M EGIL-04

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1:

2:

0 DESCRIPTION:

The right vent door #5 motor 2 experienced an AC 3 phase B to phase C short when commands to open and close the vent door were present simultaneously. The MCA power AC 3 mid 4 circuit breaker opened due to high current.

The primary cause of the phase-to-phase short was the failure to send the required reset commands between the right vent door 5 close command and the right vent door 5 open command. A generic vent door procedure was incorrectly modified to cycle a single vent door, and the error was not detected because an integrated review of the command procedure was not conducted.

The MIssion Operations Directorate Safety Advisory Board met to review the command incident and presented the board findings and recommendations to the Endeavour Electrical System Incident Panel. MOD has completed a review of all orbiter command policy and procedures with special emphasis on nonstandard procedures and their review process. Changes and additions to the procedures resulting from this review include positive control of the command execution process, identification of potential hazardous steps, and standardization of procedures formats. These changes have been approved and incorporated into the Flight Control Operations Handbook and the individual discipline console handbooks to support STS-51.

Flight Problem Report approved at PRCB on 09/02/93 (PRCBD# S044896C).

1

STS-057 (OV-105,FLT #4) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

PAGE 3

IFA NUMBER> STS-57-V-02

TITLE:PP02 Sensor B Biased Low

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 172 : 17.58.00

IFA DATE: 06/21/1993

IFA STATUS: CLOSED : 12/08/1993 ELAPSED TIME: 000 : 04.50.38

PRACA STATUS: CLOSED : 1994-02-23 HOUSTON TIME: 12.58.00

PRCBD NUMBER: S044896M PHASE: ASCENT

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
K	PR ECL-5-05-0320	M	EECOM-01

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: M. ENGLE

2:

0 DESCRIPTION:

Sensor B indicates approximately .14 to .18 psi lower than A&C. Prelaunch bias was .06 to .08 (LCC and Flight Rule require <.15). Sensor has been inhibited from onboard computation. Old sensor design. Normal R & R post flight.

- CLOSURE RATIONALE:

The time accumulated on sensor B's internal components may have caused an out-of-range bias in its pressure readings. After attaining a total bias of 0.18 psia the sensor output stabilized and tracked the remaining two sensors for the duration of the flight.

Sensor B was removed and replaced per the standard changout schedule pe performed after each flight. Since sensor B was one of the -1065 series sensors, which are being phased out of the program, a failure analysis was considered both unnecessary and not cost efective. Consequently, no conclusions may be drawn concerning the failure mode. In the future, all -1065 sensors will be replaced with the new design -3165 sensors. The -3165 series is a long life sensor (minimum 12000 hrs) that has successfully completed qualification testing.

1

IFA NUMBER> STS-57-V-03

TITLE:PRSD O2 Manifold 1 ISOL Valve Failed to Close

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 172 : 19.17.00

IFA DATE: 06/21/1993

IFA STATUS: CLOSED : 10/07/1993 ELAPSED TIME: 000 : 06.09.38

PRACA STATUS: CLOSED : 1993-07-12 HOUSTON TIME: 14.17.00

PRCBD NUMBER: S044896U PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

M EGIL-01 P CAR 57RF05-010

P IM/57RF-05 U UA-5-A0002

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: W. ARCENEAUX X33335

2:

0 DESCRIPTION:

Valve failed to close when configuring for sleep. Isol valve operated successfully during O2 PRSD manifold valve cycle test. (180:04:04). Has occurred previously on OV-105 (STS-49 and STS-54). Has also occurred on OV-104 (STS-34 and STS-37). Could not be reproduced on ground. Deferred UA-5-A0002 still open. The O2 manifold #2 ISO valve from OV-104 is presently at NSLD being tested. Anomaly repeated. Potential vehicle mod for STS-61 to add instrumentation to valve coils. Reference open CAR 37RF-03-010.

- CLOSURE RATIONALE:

PRSD O2 valve panel number 1 was replaced by a spare assembly that was successfully tested under cold-flow conditions, and installation retests were satisfactorily completed. The removed valve panel assembly was sent to the NSLD for a failure analysis of the O2 manifold 1 isolation valve that will include cold-flow testing followed by valve disassembly and component-level testing. Final corrective action will be documented in CAR 57RF05-010.

Cold-flow testing will be performed on all PRSD valve panel assemblies during OMDP. Spare valve panel assemblies will be cold-flow tested prior to installation. Acceptance test procedures are being changed to include cold-flow testing of new solenoid latching valves and valve panel assemblies.

1

IFA NUMBER> STS-57-V-04

TITLE:EVA Waist Tether Hook Failure (GFE)

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 174 : 21.17.00

IFA DATE: 06/23/1993

IFA STATUS: CLOSED : 01/27/1994 ELAPSED TIME: 002 : 08.09.38

PRACA STATUS: UNKNOWN HOUSTON TIME: 16.17.00

PRCBD NUMBER: S044896W PHASE: ON-ORBIT

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
D	DR BE 130089	M	EVA-01

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: E.M. ENGLE X33300

2:

0 DESCRIPTION:

During EMU checkout the crew discovered that the waist tether small tether hook (S/N 181) would not lock closed. The lock/lock buttons do pop out but the tether hook does not lock. Work around IFM has been performed.

- CLOSURE RATIONALE:

Operation of the tether hook was verified during the preflight inspection acceptance (PIA) prior to shipment to KSC. The failure was probably caused during ground handling (post PIA) by extreme loads being applied to the keeper locking mechanism without simultaneously depressing the two lock/lock buttons. This subsequently overloaded the Vespel plungers and compression spring within the internal locking mechanism, causing severe fragmentation and distortion of these components. Since the loads required to cause this type of damage are probably much greater than a crewmember could exert with a gloved hand, the damage probably occurred during preflight handling.

Ground handling procedures have been clarified and additional steps have been added to the appropriate operational maintenance instructions (OMI), and to the PIA, to ensure than the tether hooks are not damaged prior to or during installation in the Orbiter. A redesign effort is also under way to assess the use of more robust materials for the internal locking mechanism. In additon, the Flight Data File crew procedures will be modified to include checkout of the tether hooks prior to beginning an EVA.

1

STS-057 (OV-105,FLT #4) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

PAGE 6

IFA NUMBER> STS-57-V-05

TITLE:S-Band Intermittent Losses of Forward and Return Link Using The Lower Left Quad Antenna

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 176 : 03.57.00

IFA DATE: 06/24/1993

IFA STATUS: CLOSED : 09/23/1993 ELAPSED TIME: 003 : 14.49.38

PRACA STATUS: CLOSED : 1994-03-28 HOUSTON TIME: 22.57.00

PRCBD NUMBER: S044896H PHASE: ON-ORBIT

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
K	IPR 61V-0005	M	INCO-03
P	IM/57RF-02		

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: B. ARCENEAUX

2:

0 DESCRIPTION:

At West to East TDRS handover on orbit 56E the S-band did not establish a forward link. The forward link remained bad for the orbit 56E pass except for the last 6 minutes of the pass. Forward & return link dropouts occurred at other times using lower left quad antenna. Link dropouts occurred in both high & low frequency modes.

.

Troubleshoot at KSC.

- CLOSURE RATIONALE:

The anomaly was repeated during ground troubleshooting, and a hot connector (P2) was found on cable W536 in avionics bay 3A leading to the lower left antenna. Connector P2 on cable W536 between the S-band antenna switch assembly and the lower left antenna overheated and caused an intermittent signal degradation. Cable was replaced and sent to R/D for failure analysis. The S-band system was retested with satisfactory results.

1

STS-057 (OV-105,FLT #4) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

PAGE 7

IFA NUMBER> STS-57-V-06

TITLE:FC3 H2 React Valve Failed to Close

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 177 : 11.49.00

IFA DATE: 06/26/1993

IFA STATUS: CLOSED : 10/07/1993 ELAPSED TIME: 004 : 22.41.38

PRACA STATUS: CLOSED : 1995-03-04 HOUSTON TIME: 06.49.00

PRCBD NUMBER: S044896T PHASE: ON-ORBIT

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
K	IPR 61V-0004	M	EGIL-03
P	IM/57RF-03	P	57RF03-010

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: W. ARCENEAUX X33335

2:

0 DESCRIPTION:

During fuel cell shutdown/restart (DTO 412) FC3 H2 react valve failed

to close. A second attempt to close valve yielded same result. The DTO was not performed on FC3. Valve is similar design to O2 manifold valve (ref. IFA STS-57-V-03).

.

Valve was successfully closed and opened during post landing test.

- CLOSURE RATIONALE:

PRSD H2 valve panel number 2 was replaced by a spare assembly that was successfully tested under cold-flow conditions, and installation retests were satisfactorily completed. The removed valve panel assembly was sent to the NSLD for a failure analysis of the FC3 H2 reactant valve that will include cold-flow testing followed by valve disassembly and component-level testing. Final corrective action will be documented in CAR 57RF03-010.

Cold-flow testing will be performed on all PRSD valve panel asemblies during OMDP. Spare valve panel assemblies will be cold-flow tested prior to installation. Acceptance test procedures are being changed to include cold-flow testing of new solenoid latching valves and valve panel assemblies.

1

IFA NUMBER> STS-57-V-08

TITLE:MCA Power AC3 MID 4 Circuit Breaker Anomaly

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 176 : 19.14.00

IFA DATE: 06/25/1993

IFA STATUS: CLOSED : 09/09/1993 ELAPSED TIME: 004 : 06.06.38

PRACA STATUS: CLOSED : 1994-01-11 HOUSTON TIME: 14.14.00

PRCBD NUMBER: S044896D PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

K PR DDC-0046 M EGIL-05

P IM/57RF-13

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: D GERLACH X33337

2:

0 DESCRIPTION:

Crew reported CB 13 on panel MA73 would not remain closed when pushed in. Data indicated no circuit anomalies. Subsequent attempt to close breaker with greater force successful. Suspect mechanical malfunction of breaker. KSC to test closing force.

.

The MCA logic power AC3 3-phase mid 4 CB 13 on panel MA73C required a force that exceeded drawing specification to close. The panel MA73C was sent to NSLD and CB 13 was removed for testing and refurbishment or replacment. Troubleshooting and teardown analysis will be documented on IM57RF-13.

.

Flight Problem Report approved at PRCB on 09/09/93 (PRCBD# S044896D).

1

STS-057 (OV-105,FLT #4) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

PAGE 9

IFA NUMBER> STS-57-V-09

TITLE:L1/R1 Manifold Driver Switch Failure

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 175 : 18.21.00

IFA DATE: 06/24/1993

IFA STATUS: CLOSED : 11/08/1993 ELAPSED TIME: 003 : 05.13.38

PRACA STATUS: CLOSED : 1993-11-22 HOUSTON TIME: 13.21.00

PRCBD NUMBER: S044896V PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

K PR DDC-0047 M PROP-01

P IM/57RF-06

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: P.OLIVER X33323

2:

0 DESCRIPTION:

Review of data concerning the RJDA 1 L1/R1 manifold driver (switch S4, panel 015) indicates all four poles opened when the switch was placed off for Group B power down. One pole subsequently remade contact while the other three remained open.

.

KSC R&R switch. Spare available.

- CLOSURE RATIONALE:

The most likely cause of th anomaly is a short-circuit condition caused by copper shavings within the switch body. The copper shavings were most likey introduced into the switch during the manufacturing process. The switch has been replaced and a complete functional test has been performed on the switch panel 015.

1

IFA NUMBER> STS-57-V-10

TITLE:SPI Speedbrake Command Bias

0 MISSION CONSTRAINT: SUBS

IFA TIME GMT: 179 : 08.07.00

IFA DATE: 06/28/1993

IFA STATUS: CLOSED : 09/09/1993

ELAPSED TIME: 006 : 18.59.38

PRACA STATUS: CLOSED : 1994-02-22

HOUSTON TIME: 03.07.00

PRCBD NUMBER: S044896F

PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

K IPR 61V-0010 K PR DIG0044

M GNC-01

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: D. GERLACH X33337

2:

0 DESCRIPTION:

During FCS checkout SPI command indicator was 7% low (should be < 5%). Indication was near limit on previous turnaround test. SPI removed, will be replaced.

.

During turnaround testing prior to the STS-57 flight, the SPI speedbrake command indication was noted by KSC personnel to be near its requirement specification limits of +/- 5 percent of commanded (indication read 5% low). To verify that the mulitplexer/demultiplexer (MDM) was operating correctly postflight, KSC performed a built-in test equipment (BITE) checkout of the MDM. This test isolated the SPI as the failed hardware. The SPI was removed postflight and sent to the NASA Shuttle Logistics Depot (NSLD) for testing and refurbishment.

.

Flight Problem Report approved at PRCB on 09/09/93 (PRCB# S044896F).

1

STS-057 (OV-105,FLT #4) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

PAGE 11

IFA NUMBER> STS-57-V-11

TITLE:EURECA GRAPPLE FIXTURE POWER TRANSFER UNSUCCESSFUL

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 175 : 14.58.00

IFA DATE: 06/24/1993

IFA STATUS: CLOSED : 08/03/1994 ELAPSED TIME: 003 : 01.50.38

PRACA STATUS: UNKNOWN HOUSTON TIME: 09.58.00

PRCBD NUMBER: S044896P PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

M PDRS-02 M PYLD-04

0 CLOSURE INITIATED BY: JSC-VF3/E. ENGLE

RESPONSIBLE MANAGERS 1: M. ENGLE X33300

2:

0 DESCRIPTION:

Eureca Thermal Control Units (TCU) transfer from internal power to grapple fixture power at low hover position was unsuccessful. The crew worked malfunction procedure, concluding that the TCU's could not be powered through the RMS. Eureca TCU's remained on internal power until spacecraft deactivation. TCU's were successfully transfered to ROEU power. Postflight investigation/testing is required to resolve this anomaly.

.

KSC inspection confirms incorrect mounting. No apparent damage.

1

IFA NUMBER> STS-57-V-12

TITLE:LRCS Crossfeed 3/4/5 Switch Talkback Failure

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 180 : 13.22.00

IFA DATE: 06/29/1993

IFA STATUS: CLOSED : 10/21/1993 ELAPSED TIME: 008 : 00.14.38

PRACA STATUS: CLOSED : 1994-02-22 HOUSTON TIME: 08.22.00

PRCBD NUMBER: S044896Y PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

K IPR 61V-0012 M PROP-02

P 57RF21-010

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: K. BROWN X33891

2:

0 DESCRIPTION:

During RCS Reconfiguration the crew moved the LRCS 3/4/5 crossfeed switch 33 on panel 07 from GPC to close. Indicator showed barberpole. Telemetry indicated a nominal close switch and valve configuration. Suspect intermittent indicator failure. KSC to troubleshoot.

- CLOSURE RATIONALE:

The most probable cause is an intermittent open circuit on the event indicator coil. Ground troubleshooting was unable to repeat the flight problem or discover any unusual signtures that may have caused the flight problem. The hardware will be flown as is and its performance will be monitored.

1

STS-057 (OV-105,FLT #4) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

PAGE 13

IFA NUMBER> STS-57-V-13

TITLE:R5D Heater Failed On

0 MISSION CONSTRAINT: SUBS

IFA TIME GMT: 180 : 09.44.00

IFA DATE: 06/29/1993

IFA STATUS: CLOSED : 10/07/1993

ELAPSED TIME: 007 : 20.36.38

PRACA STATUS: CLOSED : 1994-09-28

HOUSTON TIME: 04.44.00

PRCBD NUMBER: S044896J

PHASE: ON-ORBIT

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
K	PR RP04-0361	M	PROP-03
P	CAR 57RF09-010	P	IM/57RF09

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: K. BROWN 33891

2:

0 DESCRIPTION:

Injector Temperature decay rate during periods of no jet firings are indicative of failed-on heater. Thruster removal planned for controller replacement.

- CLOSURE RATIONALE:

The failed-on heater on vernier thruster R5D was caused by the heater controller. Vernier thruster R5D was removed from the vehicle. Testing duplicated the in-flight problem. The vendor replaced the heater controller. The thruster was retested with good results and reinstalled on the vehicle.

1

STS-057 (OV-105,FLT #4) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

PAGE 14

IFA NUMBER> STS-57-V-14

TITLE:PLBD Latch Microswitch Anomalies

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 180 : 13.33.00

IFA DATE: 06/29/1993

IFA STATUS: CLOSED : 02/03/1994 ELAPSED TIME: 008 : 00.25.38

PRACA STATUS: CLOSED : 1994-01-18 HOUSTON TIME: 08.33.00

PRCBD NUMBER: S044896Z PHASE: ON-ORBIT

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
K	IPR 61V-0009	M	MMACS-03

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: P. OLIVER

2:

0 DESCRIPTION:

A. STBD FWD A Release Intermittent

B. Centerline 5 8A Release Intermittent

C. Part Forward B Release Intermittent

When PLB doors were reopened following the first landing wave-off, these latch microswitches failed to indicate release. Release was confirmed via redundant microswitches drive times and currents. Indicators recovered after approximately 10 minutes. Anomaly did not repeat following second wave-off. Did not repeat in KSC postflt test.

- CLOSURE RATIONALE:

The cause of the temporary failure of the three latch-open indication release switches is unexplained. However, the following facts strongly suggests that the thermal environment, and its effect on the combined power drive unit (PDU) and latch mechanism, played a role in the anomalies:

a. Each switch began indicating properly in the order in which they were opened;

were opened;

b. the failure occurred in two different latch designs;

c. Each switch began toggling on and off with increasing frequency until it remained on;

d. The second day door temperatures were slightly higher than on the first day;

Because of the 3/3 criticality of the latch-open indicator switches, with all hardware passing the functional checks, and the inability to duplicate the problem, no hardware will be removed from the vehicle.

1

IFA NUMBER> STS-57-V-15

TITLE:Ammonia Boiler Systems A and B Failure to Cool

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 182 : 13.10.00

IFA DATE: 07/01/1993

IFA STATUS: CLOSED : 01/27/1994 ELAPSED TIME: 010 : 00.02.38

PRACA STATUS: CLOSED : 1994-10-17 HOUSTON TIME: 08.10.00

PRCBD NUMBER: S044896N PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

K IPR 61V0007 M EECOM-03

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: M. ENGLE X33300

2:

0 DESCRIPTION:

Postlanding the NH3 systems A and B failed to control with either primary or secondary controller. Duct bore scope inspection of first 8.5 ft inconclusive. Additional Boroscope and functional test planned.

Boiler functional test at KSC inconclusive. Borescope inspection revealedno anomaly. Will perform gas flow chceckou.

- CLOSURE RATIONALE:

The failure of the ABS to control the Orbiter coolant temperature was most probably due to the presence of the polyethylene oxide contaminants in the ABS. The ABS pallet was replaced with a spare pallet verified free of contamination and the pallets on the other Orbiters will be inspected for contamination. Existing Flight Rules which rely on flash evaporator system (FES) outlet temperatures as a guideline for implementing emergency powerdown procedures will be changed to use the avionics and cabin temperatures instead. Assuming a nominal pre-orbit radiator coldsoak, these temperatures are expected to remain within

allowable limits for about 60 minutes (assuming no payload cooling requirements) postlanding.

1

STS-057 (OV-105,FLT #4) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

IFA NUMBER> STS-57-V-17

TITLE:A. FOAM ADHERED TO LH2 UMBILICAL PLATE, B. FOAM LODGED IN LO2 DOOR, C. CRACKED PHENOLIC ON UMBILICAL PLATE

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 000 : 00.00.00

IFA DATE:

IFA STATUS: CLOSED : 10/28/1993 ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: CLOSED : 1995-06-30 HOUSTON TIME: 00.00.00

PRCBD NUMBER: S044896QR1 PHASE: POST LANDING

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

K PR V070-5-05-0063,61 P IM/57RF08

P IM/57RF18

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: D. GERLACH X33337

2:

0 DESCRIPTION:

A. 15" piece of material was found adhered to the umbilical plate near the 4" disconnect.

B. Material was found lodged between edge member and thermal barrier on RH ET door hinge line.

C. Postflight inspection revealed a crack approx 3" long in fiberglass plate.

- CLOSURE RATIONALE:

Due to a processing irregularity, foam was found postlanding on the LH2 umbilical curtain attach plate. Foam of a similar size as experienced on STS-57 is both the LH2 and the LO2 umbilical areas can be successfully crushed by the ET door, if this problem should recur on future flights.

Additional investigation into the foam debonding and Super Korpon debonding will be tracked under CAR 57 RF08 and CAR 57RF18.

PRCBD S044896Q is issued to authorize the closeout of STS-57-V-17 parts A and B. The closeout of part C will be presented at a subsequent PRCB.

PRCBD S044896QR1 is issued to authorize the closeout of STS-57-V-17 part C on 10/28/93

1

STS-057 (OV-105,FLT #4) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

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IFA NUMBER> STS-57-V-21

TITLE:Hydraulic System 1 Priority Valve Sluggish

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 182 : 12.08.00

IFA DATE: 07/01/1993

IFA STATUS: CLOSED : 10/07/1993 ELAPSED TIME: 009 : 23.00.39

PRACA STATUS: CLOSED : 1994-01-19 HOUSTON TIME: 07.08.00

PRCBD NUMBER: S044896L PHASE: ON-ORBIT

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
K	HYD-0126	K	PR HYD-0126
P	CAR 57RF14		

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: D. GERLACH

2:

0 DESCRIPTION:

Equalization of hydraulic supply pressure and bootstrap accumulator pressure took more than 11 seconds after system 1 hydraulic main pump pressure was switched to "normal" position during entry. Requirement is NGT 1 second. KSC to R/R.

- CLOSURE RATIONALE:

The delay in hydraulic system 1 accumulator pressure matching the associalted main pump pressure was most probably the result of contamination and scoring of the check valve internal to the priority valve which restricted the check valve movement.

The hydraulic system 1 priority valve was removed and replaced. A failure analysis will be performed to determine the cause of the problem. Improvements to the hydraulic bootstrap system which includes the priority valve are under investigation.

-JFDPO12: NORMAL TERMINATION OF PROCESSING

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STS-058 (OV-102,FLT #15) INFLIGHT ANOMALY REPORT 10/19/98

IFA NUMBER> STS-58-D-01

TITLE:BFS PAYLOAD PARAMETER PROCESSING ERROR IN THE TMBU

0 MISSION CONSTRAINT: 0061 SUBS IFA TIME GMT: 288 : 11.23.00

IFA DATE: 10/15/1993

IFA STATUS: CLOSED : 12/02/1993 ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: UNKNOWN HOUSTON TIME: 05.23.00

PRCBD NUMBER: S044897A PHASE: PRE-LAUNCH

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

M DPS-01

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: G. SHAM

2: M. HENDERSON - MOD

0 DESCRIPTION:

In the prelaunch timeframe, an error was discovered in the BFS payload parameter processing portion of the TMBU workstation (w/s) application program. The error was traced to an OI-21 BFS software change that was not accounted for in the TMBU program. Basically, the BFS GNC constants TMBU capability was deleted, and subsequently the BFS payload parameter FDA data types were redesignated.

FDA limits of BFS payload parameters would not be set to the desired values if the TMBU w/s application program is used to generate the TMBU. However, the MCC would be able to monitor the data for any out of limit conditions. No impacts exist for TMBU's to any pass parameter or any other BFS parameter.

1

STS-058 (OV-102,FLT #15) INFLIGHT ANOMALY REPORT 10/19/98

PAGE 2

IFA NUMBER> STS-58-D-02

TITLE:UNABLE TO PROCESS BERMUDA, WALLOPS, OR MADRID DATA AT MCC-GSFC

0 MISSION CONSTRAINT: 0061 SUBS IFA TIME GMT: 287 : 09.15.00

IFA DATE: 10/14/1993

IFA STATUS: CLOSED : 12/02/1993 ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: UNKNOWN HOUSTON TIME: 03.15.00

PRCBD NUMBER: S044897B PHASE: PRE-LAUNCH

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

M STDN-01

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: E. KLEIN

2: M. HENDERSON

0 DESCRIPTION:

When running interface checks in the network countdown, the MCC was unable to process multiple sites' data.

No go condition for launch (BDA).

GSFC was using a mesage switcher upgrade (MSU) for the first time for flight. They put the old switcher (MSS) online and all problems with processing the data cleared. GSFC will support with MSS prime and MSU backup for future launch attempts.

1

STS-058 (OV-102,FLT #15) INFLIGHT ANOMALY REPORT 10/19/98

PAGE 3

IFA NUMBER> STS-58-D-03

TITLE:MOC RESIDING IN HOST-4 STOPPED PROCESSING AND DYNAMIC STANDBY COMPUTER (DSC) STOPPED PROCESSING DURING LANDING PHASE

0 MISSION CONSTRAINT: 0061 SUBS IFA TIME GMT: 298 : 04.36.00

IFA DATE: 10/24/1993

IFA STATUS: CLOSED : 12/02/1993 ELAPSED TIME: 006 : 13.42.50

PRACA STATUS: UNKNOWN HOUSTON TIME: 22.36.00

PRCBD NUMBER: S044897C PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

M MCC-03 M MCC-04

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: A.DAVIS, D.HOLLY (MCC-03)

2: N. TALBOTT (MCC-04)

0 DESCRIPTION:

During a low activity period (crew sleep), MOC processing went into a 100% wait state (stopped) due to loss of its interface with the dedicated DASD's (Direct Access Storage Device). The time of the failure correlates with a motor generator (MG-1 A, bus) failure. There was no loss of MOC processing for 32 minutes, with no loss of data. Data has been replayed to new MOC (Host-3).

Lost the dedicated DASD, CICU-A1/A2 and CIC-B for Host-4 (DSC) during landing phase. This was coincident with Bldg-48 diesel #4 sensing a power reversal and tripping offline, causing a frequency deviation on the A1 power bus. The MOC backup was lost.

1

IFA NUMBER> STS-58-F-01

TITLE:AIR INGESTION INTO GALLEY

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 000 : 00.00.00

IFA DATE: 10/14/1993

IFA STATUS: CLOSED : 10/04/1994 ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: UNKNOWN HOUSTON TIME: 00.00.00

PRCBD NUMBER: S044897M PHASE: PRE-LAUNCH

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

A PV6-258500 K IPR 63V0002

0 CLOSURE INITIATED BY: JSC-SP4/G. BRANCH

RESPONSIBLE MANAGERS 1: M. ENGLE X33300

2:

0 DESCRIPTION:

After the L-4 hour drain of potable water tank A (first Launch attempt), the tank quantity rise rate was higher than the fuel cell water production rate, indicating gas in the water system. After the scrub, the galley supply valve was closed and tank A repressurized. No significant change was seen in tank A quantity, indicating gas in the galley. It is speculated that a leak in the galley allowed air ingestion and subsequently allowed the backflow of water into supply tank A. The galley is currently scheduled for removal postflight.

- CLOSURE RATIONALE:

The solenoid dispense valves are the only components in the SORG which shut off in only one direction. Tests performed on the OV-102 SORG since STS-58 have confirmed that during the L-4 depressurization of Tank A, the negative pressure differential between cabin atmosphere (which is seen at the SORG dispense needle) and the pressure of Tank A (since the galley supply valve was open) was great enough to cause the solenoid dispense valves to open, allowing air to enter the SORG water lines through the dispense needle in the opposite direction of valve shut-off. On future missions, the galley supply valve wil be closed during the L-4 potable water drain. This will prevent a negative pressure across the SORG's dispense solenoid valves. The crew

procedures have also been changed to require the crew to open the supply valve on-orbit.

1

IFA NUMBER> STS-58-F-02

TITLE:WCCS AIU-D TONE PROBLEM (BEEPING)

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 296 : 21.20.00

IFA DATE: 10/23/1993

IFA STATUS: OPEN ELAPSED TIME: 005 : 06.26.50

PRACA STATUS: UNKNOWN HOUSTON TIME: 15.20.00

PRCBD NUMBER: S044897 PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

M INCO-02

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: B. SWAN X32528

2: M. ENGLE JSC-VF3

0 DESCRIPTION:

Crew call down that they consistently got a 1 Hz beep on wall unit D (in the lab) whether configured for ICOM or A/G. Crew changed batteries - no joy - and tried one of the other crew headsets with wall unit D and also got beeping. Did not get beeping on wall unit E.

1

IFA NUMBER> STS-58-K-01

TITLE:COMMAND MESSAGE ENCODER VERIFY (CMEV) #2 FAILURE

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 000 : 00.00.00

IFA DATE: 10/14/1993

IFA STATUS: CLOSED : 04/21/1994 ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: UNKNOWN HOUSTON TIME: 00.00.00

PRCBD NUMBER: S044897K PHASE: PRE-LAUNCH

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

K 0A 6006:04

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: C. ABNER - KSC

2:

0 DESCRIPTION:

At approximately T-1 minute, the Range called a hold for a CMEV (Command Mesage Encoder Verify) #2 failure. LCC requires 2 of 2 at T-31 seconds. Problem could not be resolved and a 24 hour recycle was initiated.

1

STS-058 (OV-102,FLT #15) INFLIGHT ANOMALY REPORT 10/19/98

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IFA NUMBER> STS-58-K-02

TITLE:DURING FRAME SYNC THRESHOLD COMPARE TEST, NO AGC SIGNAL AT CONSOLE FOR TRANSPONDER #1

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 000 : 00.00.00

IFA DATE: 10/18/1993

IFA STATUS: CLOSED : 12/05/1994 ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: UNKNOWN HOUSTON TIME: 00.00.00

PRCBD NUMBER: S044897N PHASE: PRE-LAUNCH

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

K IPR 58V-0122

0 CLOSURE INITIATED BY: T. HAWKINS KSC-TV-EDT-3

RESPONSIBLE MANAGERS 1: C. ABNER KSC-PEO

2:

0 DESCRIPTION:

Prior to tanking, during the frame sync threshold compare test, no AGC

signal was noted at the console for transponder #1. Signal returned to normal after a few minutes. IPR was deferred to allow post flight troubleshooting (UA rationale was documented on the IPR). KSC Frequency Analysis personnel discovered that we were experienceing inteference while a local television (Channel 9) van was transmitting the 11:00 p.m. news (8 MHz delta). The Electronic Systems Test Lab at JSC is currently conducting tests to determine band width protection. Note: Shuttle Program just recently changed to low frequency operations.

- CLOSURE RATIONALE:

ESTL testing established that the AGC phenomenon was indicative of an interfering signal. Testing also showed that interference can occur with modulated signals as low as -100 dbm within a bandwidth of 10 Mhz of the uplink frequency. Arrangements have been made with KSC frequency analysis to monitor during Comm Command to Launch for any RF transmissions within the protected bandwidth.

1

IFA NUMBER> STS-58-T-01

TITLE:ET INTERTANK ACREAGE DIVOTS AND JACKPAD CLOSEOUTS

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 000 : 00.00.00

IFA DATE:

IFA STATUS: CLOSED : 05/23/1994 ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: CLOSED : 1994-08-29 HOUSTON TIME: 00.00.00

PRCBD NUMBER: S044897L PHASE:

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
A	A15695	A	A15696
A	T-066	A	T-066-1

0 CLOSURE INITIATED BY: MSFC-ET/P. COUNTS

RESPONSIBLE MANAGERS 1: C. BRAMON EE31

2:

0 DESCRIPTION:

During postflight review of the STS-58 (ET-57) unbilical well camera film, three areas along the ET intertank acreage exhibited the loss of TPS. One ET intertank acreage divot and the two jackpad closeouts were identified as the TPS locations affected.

A long divot (approximately 24"l x 4"w) was observed on the +Z axis of the intertank acreage, directly under the Orbiter nose. The remaining two areas of missing intertank TPS were identified as major portions of each jackpad closeout (2 total), which are located between the intertank bipod attach fittings (+Z axis also). For clarity, the following IFA discussion has been divided based on the two noted issues.

A. Jackpad Closeouts

This makes the sixth documented occurrence of jaackpad related anomalies. Complete and/or partial loss of the jackpad closeout has been previously observed on STS-32R (ET-32), STS-50 (ET-50)(tracked as IFA No. STS-50-T-01), STS-52(ET-55), STS-54(ET-51), and STS-55(ET-56). The evaluations attributed the failures to cryopumping of a substrate void in the PDL material. When the LH2 level dropped below the closeout region and aeroheating warmed this area, the PDL closeout popped loose.

B. Intertank Divot

In the case of divots along the ET intertank acreage, seven occurrences have now been documented. Five instances have been identifed with the old two tone SOFI intertank configuration, and two have now been identifed with the new two spray gun method of intertank TPS application (effectivity of ET-51 and subs). These may be respectively investigated

on IFA tracking numbers STS-32-T-1, STS-35-T-1, STS-42-T-1, STS-50-T-1, STS-47-T-1, STS-56-T-1, and STS-58-T-1).

The problem investigation is currently underway.

1

IFA NUMBER> STS-58-T-01

TITLE:ET INTERTANK ACREAGE DIVOTS AND JACKPAD CLOSEOUTS

0

- CLOSURE RATIONALE:

MSFC is the design center for ET while KSC is responsible for the jackpad closeouts and application process of TPS to the intertank. Flight Problem Report closed by PRCBD.

1

IFA NUMBER> STS-58-V-01

TITLE:S-BAND TRANSPONDER 2 UPLINK FAILURE

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 288 : 11.58.00

IFA DATE: 10/15/1993

IFA STATUS: CLOSED : 01/14/1994 ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: CLOSED : 1994-05-10 HOUSTON TIME: 05.58.00

PRCBD NUMBER: S044897D PHASE: PRE-LAUNCH

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

K PR COM A0036 P IM/58RF01

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: B. SWAN X32528

2: M. ENGLE JSC-VF3

0 DESCRIPTION:

At approximately 288:11:58 gmt during the second launch attempt, uplink lock was lost on the S-band PM system. Transponder 2 was being used at the time and trouble shooting indicated that this transponder (S/N 301) had failed. Note that the downlink was operating properly through transponder 2. The launch attempt was scrubbed and the failed transponder was removed and replaced with S/N 309.

- CLOSURE RATIONALE:

Transponder 2 receive-function failed. Failure analysis at the vendor found two failed transistors: one appeared to have failed short circuit, overstressing the second, resulting in an intermittent open circuit which caused the observed loss of function.

The failed transponder was removed an replaced with serial number 309. Troubleshooting at the vendor has repeated the anomaly and isolated the intermittent failure to two transistors in the second intermediate frequency module. Further troubleshooting and analysis will be tracked by CAR 58RF01. Replacement transistors are available in the logistics spares inventory.

1

IFA NUMBER> STS-58-V-03

TITLE:L OMS PRESSURE TRANSDUCER FAILED OFF-SCALE-LOW

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 291 : 14.53.10

IFA DATE: 10/18/1993

IFA STATUS: CLOSED : 02/09/1994 ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: CLOSED : 1995-04-18 HOUSTON TIME: 08.53.10

PRCBD NUMBER: S044897H PHASE: ASCENT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

K IPR 62V0003 M PROP-01

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: B. WAGSTER X33329

2: M. ENGLE JSC-VF3

0 DESCRIPTION:

At lift-off, the left OME chamber pressure (V43P4649C) failed off-scale-low. The chamber pressure indication remained OSL during OMS-2. The crew reported that the cockpit Pc meter did not work during OMS-2.

- CLOSURE RATIONALE:

The failure was isolated to a bad channel on ABA CRD 6 in DSC OL2 in theleft OMS pod. Component failure precipitated by vibration occurring at main engine start-up is suspected as the cause.

The failed card was removed and replaced and the measurement function restored. The card has been sent to NSLD for failure analysis and repair.

1

IFA NUMBER> STS-58-V-04

TITLE:E1 GH2 FLOW CONTROL VALVE SLUGGISH

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 291 : 14.53.30

IFA DATE: 10/18/1993

IFA STATUS: CLOSED : 02/16/1994 ELAPSED TIME: 000 : 00.00.20

PRACA STATUS: CLOSED : 1995-10-24 HOUSTON TIME: 08.53.30

PRCBD NUMBER: S044897F PHASE: ASCENT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

K IPR 63V0004 K MPS-2-16-0978

P IM/58RF02

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: B. ARCENEAUX X33335

2: M. ENGLE JSC-VF3

0 DESCRIPTION:

Main engine 1 GH2 flow control valve exhibited a sluggish response during ascent. The pressure decay after valve opening was not a step function as expected. The most probable cause is contamination in the poppet assembly.

- CLOSURE RATIONALE:

The problem was caused by a slow build-up of contaminants in the FCV which slowed the valve response. The most likely sources of the contamination are the pre-pressurization line check valve and self-generated wear products.

The engine 1 FCV poppet sleeve assembly was replaced and sent to Rockwell-Downey for refurbishment. The engine 2 and 3 FCV poppet sleeve asssemblies were removed, wiped clean, and reinstalled.

1

IFA NUMBER> STS-58-V-05

TITLE:FLUID FOUND ON WCS ODOR/BACTERIA FILTER LID

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 293 : 22.35.00

IFA DATE: 10/20/1993

IFA STATUS: CLOSED : 02/09/1994 ELAPSED TIME: 002 : 07.41.50

PRACA STATUS: CLOSED : 1994-09-21 HOUSTON TIME: 16.35.00

PRCBD NUMBER: S044897G PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

K PR ECL0936 M EECOM-01

P IM/58RF03

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: M. ENGLE X33300

2:

0 DESCRIPTION:

The crew reported that a small amount of fluid was found on the WCS Odor/Bacteria filter lid. The crew also reported that fluid was found in this location on three earlier occasions, the first instance occurring before the galley hot water flush to the WCS was performed (see IFA STS-58-V-02). Liquid carryover from FAN SEP 1 to the Odor/Bacteria filter line is one of the suspected causes. FAN SEP 2 was started and the crew reported that no additional fluid was observed around the Odor/Bacteris cover seal. Recent startups of FAN SEP 1 have shown no signs of back-leakage through the FAN SEP 1 check valves. The crew has reported that air flow through the urinal hose has not changed since the flight began, indicating that the filter is probably not saturated with liquid. WCS will be pulled postflight.

- CLOSURE RATIONALE:

The cause of the problem was excessive liquid being "carried over" in the exhaust air from FAN SEP 1. Normally, any minor carryover is trapped by the O/B filter and the liquid is gradually evaporated. The excess carryover on this mission was great enough to allow some liquid to migrate through the O/B filter before evaporating, thus resulting in the observed leakage. The filter was dissected and inspected postflight and no leak path or anomalous channeling in the filter bed was discovered.

FAN SEP 1 is a new design fan separator. Until the cause of the excess carryover associated with the new desgn is determined and corrected, the old design separator bowl will be installed in the WCS. The old design bowls will reduce the amount of liquid carryover entering the filter. Additional testing is being performed to correct the excessive carryover condition

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STS-058 (OV-102,FLT #15) INFLIGHT ANOMALY REPORT 10/19/98

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IFA NUMBER> STS-58-V-07

TITLE:PAYLOAD RECORDER TAPE BROKE **REASSIGNED FROM STS-58-F-3 SEE REV 2**

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 301 : 02.02.00

IFA DATE: 10/27/1993

IFA STATUS: OPEN ELAPSED TIME: 009 : 11.08.50

PRACA STATUS: UNKNOWN HOUSTON TIME: 20.02.00

PRCBD NUMBER: S044897 PHASE: ON-ORBIT

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
K	PR INS1017	M	INCO-02

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: P. OLIVER X33323

2: M. ENGLE JSC-VF3

0 DESCRIPTION:

The payload recorder was performing a Serial Record B record on track 9. When the recorder performed its normal turnaround at EOT, the percent tape readings went to 0% and the recorder indicated both EOT and BOT. This is indicative of a broken tape.

This IFA reassigned from STS-58-F-3 per S044897R2, OSB 10/27/95

1

STS-058 (OV-102,FLT #15) INFLIGHT ANOMALY REPORT 10/19/98

IFA NUMBER> STS-58-V-09

TITLE:WHITE OBJECT CAME OFF VEHICLE AT T+45 SECONDS

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 291 : 14.54.55

IFA DATE: 10/18/1993

IFA STATUS: CLOSED : 02/09/1994 ELAPSED TIME: 000 : 00.01.45

PRACA STATUS: UNKNOWN HOUSTON TIME: 08.54.55

PRCBD NUMBER: S044897J PHASE: ASCENT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

* ********NONE FOUND******* * ********NONE FOUND*******

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: B. WAGSTER X33329

2: M. ENGLE JSC-VF3

0 DESCRIPTION:

During ascent (about 1 minute 45 seconds after liftoff) a piece of white debris was observed exiting the area between SSME 1 and 3. Postlanding inspections showed damage to the engine 3 dome heat shield.

- CLOSURE RATIONALE:

Photo analysis conducted prior to landing determined that the Dome-Mounted Heat Shield (DMHS) blankets were the most probable source of the debris. This was supported by past flight history.

This failure of the DMHS blankets is within the experience base for such occurrences. While the current design is adequate to protect the vehicle, the availability of new materials has enabled modifications to the design which increase blanket life, reduce turnaround rework effort, and improve reliability.

The damaged blankets were removed and replaced. Repairs will be made as needed per standard procedures and the blankets will be returned to spares. Modifications to the DMHS blanket design have been successfully implemented on OV-103 and OV-105, resulting in a considerable reduction of turnaround rework. Engineering is evaluating implementation of these modifications on OV-102 and -104.

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STS-058 (OV-102,FLT #15) INFLIGHT ANOMALY REPORT 10/19/98

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IFA NUMBER> STS-58-V-10

TITLE:LO2 UMBILICAL LIGHTNING STRIP DETACHED

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 291 : 15.02.05

IFA DATE: 10/18/1993

IFA STATUS: CLOSED : 02/04/1994 ELAPSED TIME: 000 : 00.08.55

PRACA STATUS: CLOSED : 1994-12-13 HOUSTON TIME: 09.02.05

PRCBD NUMBER: S044897E PHASE: ON-ORBIT

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
*	********NONE FOUND*******	*	********NONE FOUND*******

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: P. OLIVER X33323

2: G. KATNER - KSC

0 DESCRIPTION:

The lightning contact strip across the forward section of the ET Orbite r LO2 Umbilical had detached completely. The strip was observed n the Umbilical camera film freely floating near the external tank box beam. It driffted slowly aftward til lost from field of view. The Lightning Control strip should remain until after ET separation.

- CLOSURE RATIONALE:

The most probable cause of the lightning contact strip detaching on this flight is an improper bonding of the lightning contact strip to the ET umbilical (see STS-37).

R/D is processing evaluation of several modifications to the ET/Orbiter umiblical, one of which is an improved attachment method for the lightning contact strip. Only if a cost effective method of preventing the debonding of the strip is found will the change be included in the exchange package for the ET/Orbiter umbilical.

-JFDPO12: NORMAL TERMINATION OF PROCESSING

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STS-059 (OV-105,FLT #6) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

IFA NUMBER> STS-59-B-01

TITLE:LH AND RH AFT SKIRTS K5NA SEP FROM HYPALON AND PRIMER AT BSM SUPPORT BRACKETS

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 099 : 11.05.00

IFA DATE: 04/09/1994

IFA STATUS: CLOSED : 06/21/1994 ELAPSED TIME: 000 : 00.00.15

PRACA STATUS: CLOSED : 1994-09-21 HOUSTON TIME: 06.05.00

PRCBD NUMBER: S062101A PHASE: ASCENT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

A A15986

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: L.MORTON USBI

2:

0 DESCRIPTION:

LH and RH aft skirts have K5NA separated from Hypalon and primer at the BSM support brackets. Hypalon is on BTA and primer is on metal substrate. The failure at K5NA to Hypalon bond most probably due to the improper surface preparation on substrate. An action to evaluate STS-65 hardware resulted in rework on RH SRB at same location.

- CLOSURE RATIONALE:

As a result of the M&P findings from the STS-59 postflight evidence and visual examination of subsequent effectivities, the K5NA debond is attributed to a combination of:

a. Surface contamination on the uninsulated area of the bracket (residual ETA and Conoco grease) which the normal cleaning procedure is not intended to remove.

b. Inadequate cleaning and abrasion of the surfaces

c. Poor contact between K5NA and Hypalon during K5NA application

There is no thermal concern to the SRB hardware during ascent should a debond in this area result in loss of the K5NA. Heating of the BSM support bracket would be a reuse issue only. There are no debris concerns since the aft BSMs are not considered to be in a deris zone and the K5NA bonding surface contamination and preparation issues do not affect the forward assemblies.

The K5NA applied to the STS-65 aft BSM support brackets has been removed, all noted residues removed, surface preparation performed and the K5NA reapplied. This same rework will be performed on STS-68 aft BSM support brackets. Support brackets which have BTA applied, but to which the K5NA has not yet been applied, will be cleaned of all residual contamination. Aft skirt buildup procedures have been revised to require masking of the uninsulated area of the bracket prior to BTA application.

1

STS-059 (OV-105,FLT #6) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

PAGE 2

IFA NUMBER> STS-59-E-01

TITLE:ME-3 HPOTP TURBINE DISCHARGE TEMPERATURE ANOMALY

0 MISSION CONSTRAINT:	SUBS	IFA TIME GMT:	099 : 11.04.57
		IFA DATE:	04/09/1994
IFA STATUS: CLOSED	: 04/17/1995	ELAPSED TIME:	000 : 00.00.00
PRACA STATUS: CLOSED	: 1994-08-03	HOUSTON TIME:	06.04.57
PRCBD NUMBER: S062101N		PHASE:	PRE-LAUNCH

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

A A15973

0 CLOSURE INITIATED BY: MSFC-RKYDN/A. HALLDEN

RESPONSIBLE MANAGERS 1: D.HAUSMAN-MSFC ROCKETDN

2:

0 DESCRIPTION:

Main Engine 3 (ME-3) High Pressure Oxidizer Turbopump (HPOTP) Turbine Discharge temperature measurements had a 218 degree delta during mainstage which represents a 7.2 sigma compared to the flight database. Review of flight data shows that the measurements began to diverge at approximately engine start +3.5 seconds and remained separated throughout the flight. Channel B was close to the predicted value and Channel A was reading 150 degree low.

The most probable cause for the low indication is additional Hydrogen caused by plugging three adjacent Oxidizer Preburner oxidizer posts prior to STS-59 (MR 2018-0261). The 3 plugged posts are located in an area that would affect Channel A and not Channel B. This scenario is still under investigation.

- CLOSURE RATIONALE:

The most probable cause for the low indication is a cold streak due to limited mixing of the Hydrogen from the three adjacent plugged Oxidizer Preburner oxidizer posts with the surrounding Hot-Gas. The 3 plugged posts are located in an area that would affect CH-A and not CH-B.

1

IFA NUMBER> STS-59-I-01

TITLE:ME-1 SINGLE POINT SPIKES ON TWO PRESSURE MEASUREMENTS

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 099 : 11.04.57

IFA DATE: 04/09/1994

IFA STATUS: CLOSED : 07/29/1994 ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: CLOSED : 1994-06-17 HOUSTON TIME: 06.04.57

PRCBD NUMBER: S062101L PHASE: PRE-LAUNCH

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

A A15939 A A15940

A UCR A032959 A UCR A032960

0 CLOSURE INITIATED BY: JSC-WE3/C. YOUNG

RESPONSIBLE MANAGERS 1: D.HAUSMAN-MSFC ROCKETDY

2:

0 DESCRIPTION:

Maim Engine 1 experienced single point spikes on two pressure measurements. The HPFTP Coolant Liner Pressure spiked at engine start +83 seconds and the Fuel System Purge Pressure spiked at +91.5 seconds. The remainder of the flight showed no additional spiking.

The time and amplitude of the spikes match those believed to be caused by ground radar noise. Ref. Integration IFA STS-52-I-1 which was closed as an unexplained anomaly. At that time, spikes were observed on 28.5 degree inclination flights and were never observed on 57 degree inclination flights. The Range Safety Radar attenuation schedule for radar site 19.17 was modified and spikes were no longer observed on 28.5 degree inclination flights. Both sensors are the -100 configuration which has shown less susceptibility to contamination than the -200 configuration.

1

IFA NUMBER> STS-59-I-02

TITLE:RH ETA RING HAD A 2" X 1.5" X 1.75" INDENTION IN FWD FACE OF INSTAFOAM

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 099 : 11.05.00

IFA DATE: 04/09/1994

IFA STATUS: CLOSED : 06/22/1994 ELAPSED TIME: 000 : 00.00.00

PRACA STATUS: UNKNOWN HOUSTON TIME: 06.05.00

PRCBD NUMBER: S062101B PHASE: ASCENT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

* ********NONE FOUND******* * ********NONE FOUND*******

0 CLOSURE INITIATED BY:

RESPONSIBLE MANAGERS 1: L. MORTON USBI

2:

0 DESCRIPTION:

M&P evaluation shows heating occurred within the indentation. There is no conclusive evidence as to time of heating, therefore ascent occurrence cannot be ruled out. A chemical analysis shows no evidence of foreign material. A review of ETA ring Instafoam processing identified no anomalies and evaluation of SRB hardware identified no sources of debris contributing to indentation. The most probable causes of indentation are pre-existing processing anomaly or debris impact.

- CLOSURE RATIONALE:

The most probable cause of ETA ring indentation is impact from ice / debris from the righthand side of the ET (Lox feedline brackets / bellows). The vehicle experienced typical prelaunch icing conditions as defined in NSTS 08303. ET Feedline icing conditions defined in NSTS 08303 have been accepted by the Shuttle Program. Potential for damage was considered to be minimal and the hardware risk was judged acceptable.

1

TITLE:PAD A GOX VENT ARM DAMAGE DURING LAUNCH

0 MISSION CONSTRAINT: SUBS
IFA TIME GMT: 099 : 11.05.08
IFA DATE: 04/09/1994
IFA STATUS: CLOSED : 03/03/1995
ELAPSED TIME: 000 : 00.00.08
PRACA STATUS: UNKNOWN
HOUSTON TIME: 06.05.08
PRCBD NUMBER: S062101M
PHASE: ASCENT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

K PR U78-0001-00-001-0658

0 CLOSURE INITIATED BY: KSC-TM/C. ABNER

RESPONSIBLE MANAGERS 1: C. ABNER KSC

2:

0 DESCRIPTION:

At approximately launch plus eight seconds, the Gox Vent Arm (GVA) experienced significant movement up/down and a twisting motion of the vent hood. Post-launch inspection of the GVA revealed a structural failure of the vent hood right-hand axial adjuster weldment.

Preliminary failure analysis has verified that two welds (gusset-to-plate, pipe-to-gusset) failed due to overload conditions with no evidecne of pre-existing cracking, such as fatigue or stress-corrosion. It was observed by facility drawing (79K26352) that the gusset-to-plate weld should be a full penetration groove weld, whersas the physical hardware contained a fillet weld. Inspection of Pad B GVA is forthcoming.

- CLOSURE RATIONALE:

Film analysis had shown that the launch plume did not directly impinge the Gox Vent Arm/Hood. Data analysis had shown that the high winds (21 mph peak winds) and the easterly direction to the winds caused the shockwave to have a greater load effect on the Gox Vent Arm, causing the

launch damage. Failure analysis had shown that the Gusset Plate failed due to having an incorrect weld, a full penetration weld would have allowed the area to sustain higher loads. Four launches have been performed with the modified GVA Yo axial adjuster. Analysis of existing data has revealed positive margins. The modified GVA is operating per design.

1

STS-059 (OV-105,FLT #6) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

IFA NUMBER> STS-59-P-01

TITLE:KU-BAND MODE CHANNEL 2 OPS RECORDER DEGRADATION THROUGH TDRS/WEST

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 105 : 13.40.00

IFA DATE: 04/15/1994

IFA STATUS: CLOSED : 07/19/1994 ELAPSED TIME: 006 : 02.35.00

PRACA STATUS: UNKNOWN HOUSTON TIME: 08.40.00

PRCBD NUMBER: S062101K PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

M INCO-02

0 CLOSURE INITIATED BY: JSC-TA/R. DITTEMORE

RESPONSIBLE MANAGERS 1: F.MACFARLANE X30786

2:

0 DESCRIPTION:

SRL data on KU channel 3 caused intermittent data dropouts on KU channel 2 and possibly on channel 1. INCO worked around this interference by scheduling ops and payload recorder dumps during periods without SRL data takes. Troubleshooting was conducted during flight attempting to isolate interference to specific SRL data formats. Some SRL formats were acceptable with no interference while other formats caused interference. Inflight troubleshooting was inconclusive therefore MOD recommends controlled ground tests be conducted.

- CLOSURE RATIONALE:

Since the STS-59 post flight tests did not have access to the TDRSS/West satellite and the problems could not be re-created, this anomaly remains an unexplained anomaly. A troubleshooting plan will be available to aid in identifying the source of the problem if it should re-occur on the STS-68 flight.

1

STS-059 (OV-105,FLT #6) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

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IFA NUMBER> STS-59-V-01

TITLE:LMG DOOR UPLOCK INDICATION TEMPORARILY LOST

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 099 : 11.06.00

IFA DATE: 04/09/1994

IFA STATUS: CLOSED : 06/29/1994 ELAPSED TIME: 000 : 00.01.00

PRACA STATUS: CLOSED : 1994-07-05 HOUSTON TIME: 06.06.00

PRCBD NUMBER: S062101F PHASE: ASCENT

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
K	IPR 68V-0004	M	MMACS-02
P	IM/59RF03		

0 CLOSURE INITIATED BY: JSC-VF3/D. MCCORMACK

RESPONSIBLE MANAGERS 1: D.L. MCCORMACK 33327

2:

0 DESCRIPTION:

At approximately 1 minute MET, the LMG door uplock indication (V51X0116X) was lost for approximately 10 seconds. The LMG up indication (V51X0100X) was not lost. Both of these indications provide a signal to the LMG/door up indication (V51X0115E) and therefore it too was lost when the door uplock indication was lost. All indications were

nominal during the remainder of the mission. A similar event occurred for 12 seconds on STS-9 which was attributed to vibration at max q and close tolerance on the rigging of the proximity switch. Dryden reported that the latch mechanism looked good.

KSC will troubleshoot postflight. KSC determined that the proximity switch required re-rigging. It was also determined that the RMG door uplock proximity switch needed to be re-rigged.

- CLOSURE RATIONALE:

The transient "not-unlocked" indication from the LMG door-uplock prosximity sensor was caused by an improperly rigged proximity sensor coupled with nominal vehicle deflections during the period of max q. The proximity sensor has been re-rigged.

The LMG door-uplock proximity sensor was re-rigged. Inspection of the RMG door-uplock proximity sensor also indicated that it needed to be re-rigged. The left and right main gear up-lock proximity sensors as well as the nose landing gear door- and gear-uplock proximity sensors will also be inspected.

1

STS-059 (OV-105,FLT #6) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

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IFA NUMBER> STS-59-V-06

TITLE:WSB 2 FAILED TO COOL

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 099 : 11.21.00

IFA DATE: 04/09/1994

IFA STATUS: CLOSED : 07/01/1994 ELAPSED TIME: 000 : 00.16.00

PRACA STATUS: CLOSED : 1994-06-24 HOUSTON TIME: 06.21.00

PRCBD NUMBER: S062101J PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

M MMACS-01 P IM/59RF01

0 CLOSURE INITIATED BY: JSC-VF3/K. BROWN

RESPONSIBLE MANAGERS 1: K. BROWN X33891

2:

0 DESCRIPTION:

Cooling was never seen on WSB 2 during ascent. When the APU 2 lube oil return temperature reached approximately 305 deg F, the crew switched from the A to the B controller. APU 2 was shut down when the lube oil return temperature reached 323 deg F. The bearing temperature reached 348 deg F at APU 2 shutdown and 373 deg F following soakback. A hard freeze of the WSB 2 core is suspected. APU 2 was used for FCS C/O and its run time (~12 min) was extended to determine the health of WSB 2. WSB 2 performed nominally on the A and B controllers. WSB 2 performed nominally on the B controller during entry. No KSC action is required.

- CLOSURE RATIONALE:

WSB is believed to have had a hard freeze of the spray bars. The spray bars did not thaw out until after ascent which has been confirmed by test at Rockwell. The freeze-ups are known to be caused by design limitations of the WSB.

Nominal ground turnaround testing was scheduled for the WSB 2 system because of the good spraying seen on FCS checkout and entry. The checkout is completed and the results were good. A design enhancment to the WSB system is in work to eliminate the freeze up problems. The design change is the addition of heaters near the spray bars to prevent freezing of the water. The design will be implemented by starting with STS-69.

1

IFA NUMBER> STS-59-V-08

TITLE:R RCS FU MAN 4 ISO VALVE FAILED TO INDICATE CLOSED

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 110 : 17.18.00

IFA DATE: 04/20/1994

IFA STATUS: CLOSED : 07/01/1994 ELAPSED TIME: 011 : 06.13.00

PRACA STATUS: CLOSED : 1994-12-16 HOUSTON TIME: 12.18.00

PRCBD NUMBER: S062101H PHASE: POST LANDING

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
K	IPR 68V-0009	K	PRRP01-0724
M	PROP-01	P	IM/59RF14

0 CLOSURE INITIATED BY: JSC-VF3/K. GRIFFIN

RESPONSIBLE MANAGERS 1: D.L. MCCORMACK X33327

2:

0 DESCRIPTION:

During the post-landing redundant circuit verification testing the right RCS fuel manifold 4 isolation valve did not indicate closed when the switch was cycled to the close position. The crew cycled the switch to open and back to close with the same result. Manifold pressure data indicates that the valve closed each time. Most probably a failure of the position indication microswitch. The valve is currently in the open position and open is the position during ferry flight. The isolation valve actuator can be R&R'd in the OPF.

KSC will troubleshoot.

KSC troubleshooting isolated the problem to the microswitch in the actuator. The actuator was removed and replaced and retest has been completed.

- CLOSURE RATIONALE:

KSC troubleshooting has isolated the problem to the actuator. Previous failure history indicates a failure of the microswitch as the most probable failure mode. The actuator has been removed and replaced with a PIND tested actuator. The retest of the new actuator has been successfully completed. The actuator has been shipped to Parker Hannifin for TT&E and possible failure analyis.

1

STS-059 (OV-105,FLT #6) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

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IFA NUMBER> STS-59-V-10

TITLE:LH AND RH INBOARD TIRE DAMAGE

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 110 : 16.55.00

IFA DATE: 04/20/1994

IFA STATUS: CLOSED : 07/22/1994 ELAPSED TIME: 011 : 05.50.00

PRACA STATUS: CLOSED : 1994-07-05 HOUSTON TIME: 11.55.00

PRCBD NUMBER: S062101G PHASE: POST LANDING

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

K IPR 68V-0019 P IM/59RF16

0 CLOSURE INITIATED BY: JSC-VF3/D. GERLACH

RESPONSIBLE MANAGERS 1: D.A. GERLACH X33337

2:

0 DESCRIPTION:

Both the left- and right-hand inboard MLG tires sustained tire damage on the 2nd rib from the strut (i.e., outboard on the inboard tires). When tire damage does occur, it typically occurs at the location where it was seen on this flight. However, the tire damage sustained during STS-59 appears greater than that seen on the three previous landings at Edwards since the new commercial tread rubber tire was put in use. The cause of the damage is being investigated.

- CLOSURE RATIONALE:

The tire wear experienced during STS-59 is characteristic of previous flight tire wear. The additional tire wear was due to a high main gear touchdown velocity, a high speed maneuver to return the vehicle to centerline, and low energy braking without antiskid protection. Corretive action will be to review the Flight Rules that pertain to landing site/runway selection and touchdown velocities to minimize exposure to tailwind landings that can cause excessive touchdown velocities which exceed tire/gear ceritfication.

1

STS-059 (OV-105,FLT #6) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

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IFA NUMBER> STS-59-V-3A

TITLE:H2 TANK 5 CHECK VALVE FAILED TO SEAT

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 101 : 23.05.00

IFA DATE: 04/11/1994

IFA STATUS: CLOSED : 06/27/1994 ELAPSED TIME: 002 : 12.00.00

PRACA STATUS: CLOSED : 1995-01-21 HOUSTON TIME: 18.05.00

PRCBD NUMBER: S062101C PHASE: ON-ORBIT

0 TYPE	TRACKING NUMBER	TYPE	TRACKING NUMBER
K	IPR 68V-0007	M	EGIL-01
P	CAR 59RF05-010	P	IM/59RF05

0 CLOSURE INITIATED BY: JSC-VF32/W. ARCENEAUX

RESPONSIBLE MANAGERS 1: W.H. ARCENEAUX X33335

2:

0 DESCRIPTION:

H2 tank 5 check valve did not reseat properly after switching to tank 4 at 101:23:05 G.m.t. (02:12:00 MET). H2 tank 5 pressurized along with H2 tank 4, but only the H2 tank 4 heaters were being activated. H2 tank 5

was configured for high flow (fuel cell purging) at 103:22:35 G.m.t. for approximately one hour in an unsuccessful attempt to recover the check valve by flushing possible contaminant. After switching back to H2 tank 4 heaters, tank 5 pressure continued to track tank 4. During a heater-on cycle on H2 tanks 1 and 2, the H2 tank 5 CV seated itself at 105:03:48 G.m.t.

KSC will R&R. A spare is available. Removal, replacement, and retest of the CV has been completed.

- CLOSURE RATIONALE:

Transient contamination most probaby prevented proper seating of the H2 tank 5 check valve for several days during the flight. A differential pressure in the reverse-flow direction probably flushed the contamination from the check valve allowing the valve to seat. The H2 tank 5 check valve was removed and sent to the vendor (Aerodyne) for failure analysis. A spare check valve was installed and successfully retested.

1

STS-059 (OV-105,FLT #6) OFFICIAL INFLIGHT ANOMALY REPORT 08/17/95

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IFA NUMBER> STS-59-V-3B

TITLE:H2 TANK 2 CHECK VALVE STICKY

0 MISSION CONSTRAINT: SUBS IFA TIME GMT: 105 : 00.23.00

IFA DATE: 04/14/1994

IFA STATUS: CLOSED : 06/27/1994 ELAPSED TIME: 005 : 13.18.00

PRACA STATUS: CLOSED : 1994-09-28 HOUSTON TIME: 19.23.00

PRCBD NUMBER: S062101D PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

M EGIL-01 P IM/59RF09

0 CLOSURE INITIATED BY: JSC-VF32/W. ARCENEAUX

RESPONSIBLE MANAGERS 1: W.H. ARCENEAUX X33335

2:

0 DESCRIPTION:

The H2 tank 2 check valve stuck closed during three consecutive pressure cycles (105:00:23, 105:00:52 and 105:01:12 G.m.t.). The H2 tank 2 CV performed nominally during the remainder of the mission.

No KSC action is required.

- CLOSURE RATIONALE:

Transient contamination most probably caused the PRSD H2 tank 2 check valve to stick on several occasions requiring a higher differential pressure than normal to unseat the check valve. Nominal valve operation was restored after several cycles. The PRSD H2 tank 2 check valve will be reused as-is. The anomaly was temporary with the cracking pressure returning to the nominal 3 to 5 psid. The H2 tank 2 pressure did not exceed the normal tank pressure control range and did not impact crew safety or mission success.

1

IFA NUMBER> STS-59-V-3C

TITLE:O2 TANK 1 CHECK VALVE STICKY

0 MISSION CONSTRAINT: SUBS

IFA TIME GMT: 106 : 16.30.00

IFA DATE: 04/16/1994

IFA STATUS: CLOSED : 06/27/1994

ELAPSED TIME: 007 : 05.25.00

PRACA STATUS: CLOSED : 1995-04-08

HOUSTON TIME: 11.30.00

PRCBD NUMBER: S062101E

PHASE: ON-ORBIT

0 TYPE TRACKING NUMBER TYPE TRACKING NUMBER

P FCP-5-07-0060 P IM/59RF10

0 CLOSURE INITIATED BY: JSC-VF32/W. ARCENEAUX

RESPONSIBLE MANAGERS 1: W..H. ARCENEAUX X33335

2:

0 DESCRIPTION:

At approximately 106:16:30 G.m.t. (7:05:25 MET), with heaters cycling in O2 tank 3 (manifold pressure was cycling between 840 and 880 psia), the O2 tank 1 check valve stuck closed. Since heat leak into O2 tank 1 was not able to boil off reactants to the manifold, the pressure rose from 835 to 853 psia. At 106:20:54 G.m.t. (7:09:49 MET) the check valve opened and the pressure dropped back down to 830 psia. The O2 tank 1 check valve performed nominally during the remainder of the mission. During two previous flight sticking had been noted with this check valve. (S/N 61). An IFA was taken on STS-33 (V-08) and sticking was noted on STS-41.

KSC will R&R. A spare is available.

- CLOSURE RATIONALE:

The most probable cause of the anomaly is transient contamination. The PRSD O2 tank 1 check valve exhibited a temporary sticking behavior that was caused by either transient contmaination or high closing forces experienced during a previous mission, and a higher differential pressure than normal was required to unseat the check valve. Nominal valve operation was restored after the valve unseated. The PRSD O2 tank 1 check valve was removed and will be sent to the vendor (Aerodyne) for failure analysis. A spare check valve was installed in the O2 manifold valve asembly panel and retests were satisfactory.

-JFDPO12: NORMAL TERMINATION OF PROCESSING