SSVEO IFA List **Date:02/27/2003**

STS - 75, OV - 102, Columbia (19) **Time:04:05:PM**

Tracking No	Time	Classification	Documentation		Subsystem
MER - 2	**MET:** 00:00:00:06	Problem	**FIAR**	**IFA** STS-75-V-01	INST, D&C, SSME
Booster-02	**GMT:** 053:20:18:06		**SPR**	**UA**	**Manager:** L. Vazquez
			IPR 78V-0002	**PR**	x37478
					Engineer: A. Farkas

Title: Left Main Engine Pc Tape Meter Instrumentation Biased Low (ORB)

Summary: The crew reported that the left main engine Pc tape meter indicated 40% until throttle down, at which time the Pc dropped to 0%; it returned to 40% at throttle up. They later concluded that the Pc tape was biased low 60% because it had appeared to track the other engines throughout ascent. An analysis of the Pc meter circuit has identified a possible failure mode. A fault to ground in the scaling circuit of the output servo for the meter can cause the bias observed. Several possible failure modes in MDM FF2 (analog IOM-8, channel 0) have also been identified. These failures can affect single or multiple channels. Initial KSC testing consisted of running calibration commands on the Pc meter. During this testing, no bias was observed. The Pc meter was removed on 3/15 and sent to the NSLD for further troubleshooting. Troubleshooting at the NSLD failed to identify a problem with the Pc meter. The bias was subsequently seen on the replacement Pc meter. As a result, MDM FF2 was removed and replaced.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 6	**MET:** 00:04:12	Problem	**FIAR**	**IFA** STS-75-V-02	APU
MMACS-02	**GMT:** 054:00:03		**SPR**	**UA**	**Manager:** B. Irlbeck
			IPR 78V-0005	**PR**	x38617
					Engineer: W. Scott

Title: APU 1 Fuel Pump Inlet Pressure Low (ORB)

Summary: At approximately 054:03:00 G.m.t. (00:04:12 MET), APU 1 fuel pump inlet pressure (V46P0110A) decreased below an expected minimum pressure of approximately 100 psia. It continued to decrease to approximately 38 psia (22 psia based on known instrumentation bias), with slight transient pressure increases

corresponding to heater cycles. An analysis of the condition was performed and no concerns were identified regarding the use of APU 1. Data suggests that the low inlet pressure was caused by leakage past the fuel pump seal and into the seal cavity drain system. The MER recommendation was to proceed with nominal operations for the remainder of the mission. Per the normal plan, APU 1 was used during FCS checkout and its performance was nominal. A decrease in the fuel pump inlet pressure was seen following both the FCS checkout and entry runs of APU 1. On 3/14, KSC drained approximately 98 cc of liquid from the catch bottle. The decision was made to fly APU 1 as-is.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 7	**MET:** -00:00:00:09	Problem	**FIAR**	**IFA** STS-75-V-03	MPS
	GMT: 053:20:17:51		**SPR**	**UA**	**Manager:** P. Cota x39037
			IPR 78V-0008	**PR**	**Engineer:** M. Burghardt x39064

Title: SSME 2 LH2 Recirculation Valve Closure Unconfirmed (ORB)

Summary: A closed indication was not received for the engine 2 LH2 recirculation valve (PV15) after it was commanded closed at T-9.5 seconds. Loss of the valve open indication was nominal. Note that recirculation valve position indications are monitored by a ground bus and are lost at T-0. All three engine recirculation valves are closed by removal of open pneumatic pressure from a common solenoid valve. The engine 1 and 3 valves operated nominally. The LH2 recirculation valve is only critical in the event of an engine out situation to contain trapped LH2 in the feed system. A review of post-MECO engine-inlet and LH2-manifold pressure data indicate that PV15 was closed at that time. This indicates that the problem may be with the valve position indication; however, a sluggish valve is also a possibility. KSC troubleshooting indicates that the valve did close and it is not leaking. Also, the valve's closed indication functioned properly. The valve has been removed and replaced.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 12	**MET:** 02:00:42	Problem	**FIAR**	**IFA** STS-75-V-04	PRSD
EGIL-03	**GMT:** 055:21:00		**SPR**	**UA**	**Manager:** H. Wagner x39048
			IPR 78V-0010	**PR**	**Engineer:** R. Gonzales

x45403

Title: H2 Tanks 4 and 5 Quantity Divergence (ORB)

Summary: At approximately 055:21:00 G.m.t. (02:00:42 MET), while the fuel cells were using O2 and H2 tanks 4 and 5, H2 tanks 4 and 5 quantities began diverging, with the tank 4 quantity decreasing at a slower rate than tank 5. Analysis of fuel cell 3 current data indicate that the 'A' heater in tank 4 had failed-off and caused this divergence. The heaters to both tanks are controlled by a common controller and are therefore commanded on simultaneously. At 058:12:29 G.m.t. (04:16:11 MET), the crew switched to H2 tanks 6 and 7. Being unable to use the H2 in tanks 4 and 5 had no impact on the planned mission duration plus contingency days. A request was made to switch back to H2 tanks 4 and 5 using only the 'B' heaters in order to obtain data on the behavior of paired tanks with a quantity imbalance. This switch was made at 060:21:14 G.m.t. (07:00:56 MET). During operation of H2 tanks 4 and 5, the quantities within the tanks converged. The tanks were depleted at approximately 062:18:35 G.m.t. (08:22:17 MET).

Prior to detanking, the heater failure was confirmed on the ground. Testing following detanking again repeated the failure. Further troubleshooting started with a checkout of the fuse in the heater controller. Visual inspection did not reveal a problem; however, an X-ray examination revealed that the fuse was cracked. The failure was caused by thermal cycles, not excessive fault current. The fuse was removed and replaced

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Tracking No	Time	Classification	Documentation		Subsystem
MER - 15	**MET:** 08:11:46	Problem	**FIAR**	**IFA** STS-75-V-05	ECLSS
EECOM-01	**GMT:** 062:08:04		**SPR**	**UA**	**Manager:** N. Cerna x39045
			IPR 78V-0019	**PR**	**Engineer:** C. Dumis x45120

Title: FES Shutdowns (ORB)

Summary: A FES water dump was initiated at 062:08:04 G.m.t. (08:11:46 MET). Upon initiation of the dump, the FES shut down on the primary A controller without ever reaching the control band. Several minutes later, the FES was successfully restarted on primary A. However, approximately one and a half hours into that run, at 062:09:40 G.m.t. (08:13:22 MET), the FES shut down again. At 062:09:52 G.m.t. (08:13:34 MET) the FES was configured to the primary B controller and a FES startup was initiated with no response. A second attempt on the primary B was attempted five minutes later and the FES responded initially, but shut down before stabilized cooling was established. Icing was suspected and the FES core flush procedure was performed to flush ice from the core. It was believed that the first shutdown on the primary A controller and the subsequent FES core icing were procedurally induced. In order to verify this theory for the cause of the shutdowns, a supply water dump through the FES using the primary A controller was initiated at 065:07:20 G.m.t. (011:11:02 MET). The dump was terminated at 065:09:13 G.m.t. (011:12:55 MET) when

icing again led to a shutdown. A FES core flush was performed to clear the ice from the core. Subsequently, starting at 065:18:44 G.m.t. (11:22:26 MET), a 3 hour supply water dump using the B controller was performed in an effort to exonerate the B system and FES core. The data indicate that the performance of the B system was nominal. The FES primary A system was selected for topping evaporator supplemental cooling at 066:17:48 G.m.t. (12:21:30 MET) to obtain additional data in this mode. The FES primary A system was enabled for approximately 23 hours and during this time its performance was nominal. The FES was configured back to the primary B controller at 067:16:42 G.m.t. (13:20:24 MET).

The FES shut down at 068:11:30 G.m.t. (14:15:12 MET) while on the primary B controller. At the time, the radiator coldsoak (radiators at high set point) was being extended for the rev 236 deorbit opportunity. The FES core flush procedure was completed successfully at 068:11:57 G.m.t. (14:15:39 MET) to rid the FES of ice. The shutdown occurred after the FES outlet temperatures became unstable and increased above the temperature control band indicating that ice had formed in the core. This shutdown was similar to the two shutdowns that occurred during primary A system FES water dumps. Procedures to back out of deorbit prep were completed at approximately 068:15:33 G.m.t. (15:19:5 MET) following the waive-off due to forecasted cloud coverage at KSC. No further FES problems were encountered during the mission. KSC performed postflight troubleshooting. This troubleshooting included: an analysis of water samples taken from the vehicle and GSE to determine particulate, dissolved gas, and non-volatile residue (NVR) content; and a borescope inspection of the FES core to inspect for contaminants and corrosion. No anomalies were found with the water or with the FES core. The FES topping A and B valves were removed and replaced and shipped to Hamilton Standard for testing.

Tracking No	**Time**	**Classification**	**Documentation**		**Subsystem**
MER - 16	**MET:** 07:10:08	Problem	**FIAR**	**IFA** STS-75-V-06	GN&C
GNC-01	**GMT:** 061:06:26		**SPR**	**UA**	**Manager:** T. Pham
			IPR	**PR** GNC-2-20-0119	x36123
					Engineer: P. Perkins

Title: IMU 3 X- and Y-Axis Excessive Drift (ORB)

Summary: The IMU 3 (s/n 210) Y-axis drift increased steadily over the course of the flight. A one sigma compensation for a HAINS IMU is 0.006 deg/hr. A Y-axis compensation of 1.5-sigma was performed at 057:14:31 G.m.t. (3:18:13 MET) and a 3-sigma compensation was uplinked at 061:06:26 G.m.t. (7:10:08 MET). Up until that time, the drift rate trend had been increasing linearly in the Y-axis and very little drift rate trend had been seen in the X-axis. At approximately 8 days MET, a significant increase was seen in the Y-axis drift rate trend and a drift rate trend was also seen in the X-axis. At 062:19:33 G.m.t. (8:23:15 MET), an 8-sigma compensation was uplinked for the Y-axis and a 3-sigma compensation was uplinked for the X-axis in an attempt to arrest the observed drift. A fourth compensation (3-sigma to the Y-axis and 2-sigma to the X-axis) was performed at 063:14:26 G.m.t. (09:17:08 MET). This magnitude of drift is out-of-family for a HAINS IMU.

An analysis of the drift signature indicates that the IMU X-Y (vertical) axis gyro is failing. Past failure history suggests a lubrication problem within the bearings of that gyro. As a result, to preserve the remaining useable life of the IMU, a recommendation was made to power it down until shortly before entry. The IMU was powered down at 064:00:12 G.m.t. (10:03:54 MET). It was subsequently powered back up at approximately 068:00:48 G.m.t. (14:04:30 MET), and commanded from standby to operate at 068:01:50 G.m.t. (14:05:32 MET) in support of landing. As expected, the IMU exhibited drift rate trending similar to what was seen prior to shut down. When the nominal end-of-mission landing opportunities were waived-off because of cloud coverage, the IMU was powered off to preserve operating time. IMU 3 was powered up prior to the subsequent landing and again its performance was as expected. No additional drift rate uplink compensations were required and the unit performed within the redundancy management thresholds. The IMU was briefly operated in the vehicle to determine its postflight condition prior to shipment. It was then removed and replaced and shipped to the manufacturer for failure analysis and repair.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 20	**MET:** 13:15:06	Problem	**FIAR**	**IFA** STS-75-V-07	MDM
DPS-01	**GMT:** 067:11:24		**SPR**	**UA**	**Manager:** R. Macias
			IPR 78V-0013	**PR**	x38351
					Engineer: L. Shelby

Title: MDM FA1 AOD Card 0 Failure (ORB)

Summary: During FCS checkout, at 067:11:24 G.m.t. (13:15:06 MET), a problem was noted during the FCS channel 1 aerosurface tests. MDM FA 1 was identified as the likely cause of the problem, and the I/O error FA 1 procedure was performed by the crew. A port mode and power cycle of the MDM were performed, as well as a power cycle of the ASA. The MDM was port moded again to return to primary ports. None of the recovery procedures were successful. The data could be explained by a failure of the analog output differential (AOD) card 0 in FA1. A BITE status register (BSR) read was performed on the primary port, with 8080 being the response. A response of 8000 is nominal; 8080 indicates that bit 9 is set, which indicates an internal error. This bit would be set if a sequence control unit (SCU) has a problem handing off data to a card. BITE-4 tests on card 0 were performed in-flight and resulted in initial timeout errors. AOD card 0, among other things, commands aerosurfaces via ASA 1. Possible failure modes include an IOM/SCU reply line failure that would prevent processing the GPC command or a failure of the card's power supply. Postflight troubleshooting of the MDM has been performed on the vehicle. The power supply BITE was good; however, the SCU BITE test was failed, which indicates a possible failure of the IOM/SCU reply line. The MDM was removed from the vehicle and sent to the NSLD for troubleshooting and repair. That troubleshooting did find a failure in the power supply for the card.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 21	**MET:** 014:11:41	Problem	**FIAR**	**IFA** STS-75-V-08	C&T

INCO-03 **GMT:** 068:07:59 **SPR** **UA** **Manager:** J. Myrann

IPR 78V-0024 **PR**

Engineer: B. Seibert

Title: Loss of S-band Forward Link (ORB)

Summary: At 068:07:51 G.m.t. (014:11:33 MET) on orbit 231 TDRS-E LOS, the S-band PM system was handed down to Diego Garcia for comm in the ZOE. At 068:07:59 G.m.t. (014:11:41 MET) at TDRS-W AOS, the S-band PM system was handed back to TDRS mode. At that time, forward link communications to the vehicle was lost. The return link was not affected. Communications was re-established with the crew at 068:08:49 G.m.t. (014:12:31 MET) via UHF radio. The S-band PM system was configured from string 2 to string 1 the forward link was re-established. On-orbit troubleshooting was performed in an attempt to isolate the cause of the forward link problem. At 068:09:05 G.m.t. (14:12:47 MET), transponder 2 continued to sweep without locking on to TDRS-W during a 20 second test. At 068:09:27 G.m.t. (14:13:09 MET), transponder 2 acquired Indian Ocean in the SGLS mode and at 068:10:25 G.m.t. (14:14:07 MET), transponder 2 was able to acquire TDRS-W after 30 seconds. Additional tests were performed the following day and string 2 performed nominally. Transponder 1 was used for the remainder of the mission. It is believed that there is an intermittent failure in transponder 2. KSC performed troubleshooting per chit J4909. Transponder 2 was found to be the cause of the anomaly and it has been removed and replaced.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 24	**MET:** 15:17:40	Problem	**FIAR**	**IFA** STS-75-V-09	C&T
GNC-02	**GMT:** 069:13:58		**SPR**	**UA**	**Manager:** R. Nuss
			IPR 78V-0014	**PR**	x31484
					Engineer: L. Borden

Title: MSBLS 2 Failed to Lock in Range (ORB)

Summary: The microwave scan-beam landing system (MSBLS) unit 2 range failed to lock on. Azimuth and elevation for this unit were nominal, as was the performance of all parameters on MSBLS units 1 and 3. The unit passed its self-test during FCS checkout. KSC troubleshooting could not repeat the anomaly. The RF assembly was removed and replaced, and sent to the comm and track lab for testing.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 25	**MET:** 00:00:08:48	Problem	**FIAR**	**IFA** STS-75-V-10	MECH

GMT: 053:20:26:48	**SPR**	**UA**	**Manager:** C. Campbell
	IPR	**PR** PYR-2-20-0150	x38948
			Engineer: P. Diggins
			x30347

Title: LH Aft Structural Attach Blade Valve Not Fully Closed (ORB)

Summary: During the post-landing walk-around video, it was noted that one of the six blades on the blade valve mechanism at the left-hand aft structural-attach point did not fully close. The blade was one of three in the lower (outer) blade set. No ordnance fragments were found on the runway beneath the umbilical cavity. The blade valve assembly was removed on 3/15 for failure analysis. STS-75 was the eigth flight of the Program since implementation of the blade valve mechanism modification (3 flights each on OV-104 and OV-105 and 2 flights on OV-102). This is the first in-flight problem with the blade valve mechanism.

The failure analysis showed that the blade had seized on its hinge pin. The clearance between the blade and pin was found to be too tight. Minor modifications of the pin and blade bore diameters is being implemented to make the valves less critical to the manufacturing process. The NSLD modified the OV-102 LH blade mechanism and it will be reinstalled on the vehicle. The OV-102 RH blade mechanism was also removed and sent to the NSLD for modification.