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

STS - 81, OV - 104, Atlantis (18) **Time:04:03:PM**

Tracking No	Time	Classification		Documentation		Subsystem
MER - 1	**MET:** 00:04:53	Problem	**FIAR**	**IFA** STS-81-V-01		STR
IFM-02	**GMT:** 012:14:21		**SPR**	**UA**		**Manager:** Lynda Estes
			IPR	**PR** STR-4-19-4416		x38945
						Engineer: Ev Sallee

Title: LiOH Stowage Door Latch Difficult to Open (ORB)

Summary: The crew reported that the aft-port latch on the LiOH stowage door was difficult to open. They were unable to open the latch by hand and a tool was used. The plan was to leave the latch open until entry day. A stress analysis was performed and it was determined that the maximum load that the LiOH door could withstand with the recumbent seat installed met full 20g crash capability, even in the event that the latch could not be closed for entry.

Both the STS-76 and -79 crews had trouble with this latch and that work was done prior to STS-79 (PR STR-4-17-4226). A procedure was developed that had the crew perform an on-orbit inspection of the latch and use foil tape to make mold impressions of the pin-to-hole alignment. The crew reported that when they performed the procedure, the pin got stuck mid-way to the latch position. It required such force to get it moving again that they were unable to keep it from puncturing the foil tape. There did not seem to be any problem with the pin fitting into the hole. The crew report stated that it felt as if the pin was bent, causing it to bind. No problems were reported when the LiOH door was latched closed on entry day. KSC has begun troubleshooting. The latch was cycled on the ground and no binding was noted. Mold impressions were made to determine the latch pin/latch hole alignment, the door was checked for flatness, the fittings and the latch pins were visually inspected, and no problems were noted. KSC believes the problem is the lateral tolerance in the piano hinge. This tolerance allows the door to rack left to right approximately 0.010 inch. With the door racked full starboard, the aft-port latch pin does not bind. With the door racked fully to the port side, the aft-port latch binds hard. The condition is repeatable. The aft port fitting was removed and sent to the shop to machine approximately 0.020 inches from the hole (in the y-axis). The LiOH door was removed for access and it will be checked for flatness.

Tracking No	Time	Classification		Documentation		Subsystem
MER - 6	**MET:** 03:05:15	Problem	**FIAR**	**IFA** STS-81-V-02		GN&C
GNC-03	**GMT:** 015:14:42		**SPR**	**UA**		**Manager:** Scott Murray

IPR **PR** GNC-4-19-0140

Engineer: Phil Perkins

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

Summary: At approximately 015:14:42 G.m.t. (03:05:15 MET), IMU 3 (s/n 201) began exhibiting increasing X- and Y-axis drift rates and drift rate trending. The drift rates increased to the 8-10 sigma range (1 sigma is 0.006 deg/hr). The performance signature was similar to that seen previously (most recently on STS-75), where the cause of the degradation has been determined to be inadequate or contaminated lubrication in the vertical (x-y axis) gyro.

IMU 3 was taken to stand-by at 017:14:33 G.m.t. (05:05:05 MET) to preserve it for use during entry and landing. IMUs 1 and 2 performed nominally throughout the mission and IMU 3 was not considered to be failed. IMU 3 was taken to operate at 022:06:21 G.m.t. (09:20:54 MET) and as expected, its performance was similar to that seen prior to its being taken to standby. The unit supported throughout entry. IMU 3 was removed and shipped to the vendor for failure analysis. IMU s/n 216 was installed.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 8	**MET:** 04:15:33	Problem	**FIAR**	**IFA** STS-81-V-03	FC
EGIL-02	**GMT:** 017:01:01		**SPR**	**UA**	**Manager:** John Miller
			IPR 84V-0003	**PR** INS-4-19-0373	x36908
					Engineer: Bill McKee
					x35448

Title: Fuel Cell 1 Indicated Performance Degradation (ORB)

Summary: The fuel cell 1 calculated performance (delta voltage) started degrading at a faster-than-normal rate at 017:01:01 G.m.t. (04:15:33 MET). The degradation rate shifted from a nominal value of approximately 0.008 V/hr to a rate of 0.018 V/hr. The third on-orbit purge was performed on all three fuel cells at 017:14:39 G.m.t. (05:05:11 MET). Data indicated tha fuel cell 1 recovered some of its performance after this third purge, but it still appeared to be lower-than-normal. Consequently, an additional (manual) purge of only fuel cell 1 was performed at 017:14:52 G.m.t. (05:05:24 MET). The additional purge did not appear to change the performance level of fuel cell 1. Since a fuel cell 1 problem could not be immediately ruled out, a main A and B bus tie was performed prior to the sleep period following flight day 6.

A comparison of the fuel cell 1 voltage (V45V0100A) to the main bus A voltage (V76V0100A) indicated that the fuel cell 1 voltage was reading 0.1 to 0.5 V low which would lead to an erroneous calculated degradation rate. When main bus A voltage was plotted against the fuel cell 1 predicted performance, the performance appeared nominal. Therefore, it is believed that the indicated performance degradation was caused by an offset in the fuel cell 1 voltage measurement. All other fuel cell 1 parameters indicated nominal performance throughout the mission. The main A and B bus tie was broken at 019:01:58 G.m.t. (06:16:30 MET). KSC troubleshooting did

not find anything abnormal. Card 1 in DSC mid number 1 was removed and replaced.

Tracking No	Time	Classification		Documentation	Subsystem
MER - 11	**MET:** 07:22:39	Problem	**FIAR**	**IFA** STS-81-V-04	FC
EGIL-03	**GMT:** 020:08:06		**SPR**	**UA**	**Manager:** Howard
			IPR	**PR** FCP-4-19-0226	Wagner
					x39048
					Engineer: Ray Gonzales

Title: Fuel Cell 2 Cell Performance Monitor Self-Test Duration Erratic (ORB)

Summary: The fuel cell 2 (S/N 120) cell performance monitor (CPM) experienced several self-test cycles which lasted up to 3.5 minutes, whereas nominal self-test duration is about 2 seconds. CPM self-tests occur every seven minutes. Substack delta volt values were nominal between self-test operations, indicating that FC performance was acceptable. CPM self-test operations returned to normal after the anomalous cycles, and the condition does not impact FC operations.

KSC has removed and replaced the CPM.

Tracking No	Time	Classification		Documentation	Subsystem
MER - 14	**MET:** 07:16:52	Problem	**FIAR**	**IFA** STS-81-V-05	SOFTWARE
INCO-02	**GMT:** 020:02:20		**SPR**	**UA**	**Manager:** Bill Pruett
			IPR	**PR** DR110320	
					Engineer: Ted Keller

Title: Time Execute Command (TEC) Failed to Disable Ku-band EVA Protect Mode (ORB)

Summary: A problem was reported by INCO when a time executed command (TEC) (DSM13405) was uplinked at 020:01:39 G.m.t. (07:16:11 MET). The TEC failed to toggle the Ku-band EVA protect mode bit in the Ku-band/S-band control word at its scheduled time of 020:02:20 G.m.t. (07:16:52 MET). This problem appears to be the result of an incomplete implementation of Ku-band crew member protection software (CR 90850C) on OI-25.

The Ku-band crew member protection feature added a Ku-band EVA protect mode capability to the flight software (FSW). Using this feature, the ground can define a protection "box" for an EVA crewman (or for the Mir) using Orbiter pitch and roll angles. If the Ku-band antenna points into this "box" while the mode is enabled, the FSW turns off the Ku-band?s traveling wave tube (TWT), preventing the Ku-band antenna from radiating within the "box". This mode can be enabled or disabled from the ground using the Ku-band antenna control word. The ground has two ways of commanding the Ku-band EVA protect mode capability: the Ku-band/S-band antenna control uplink load (uplink OP code 7), and the TEC (uplink OP code 46). These two uplinks go through separate paths in the FSW; OP code 7 implemented in the module

SUL and OP code 46 implemented in module PMQ. The ability to enable or disable the Ku-band EVA protect mode was added to the OP code 7 uplink (SUL), but apparently was not added to the OP code 46 uplink (PMQ). As a result, the capability to enable or disable the Ku-band EVA protect mode in the TEC software module PMQ results in a null operation. Although this is the third flight of OI-25 software, it is the first time that Ku-Band EVA protect mode commanding was attempted as part of a TEC. A software discrepancy report (DR110320) has been opened against this condition. The software will be fixed in OI-27.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 16	**MET:** 08:21:01	Problem	**FIAR**	**IFA** STS-81-V-06	RCS
PROP-01	**GMT:** 021:06:28		**SPR**	**UA**	**Manager:** Chris Budahl
			IPR	**PR** FRC4-19-0435	x34561
					Engineer: Bill Manha

Title: Primary RCS Thruster F3F Fail Off (ORB)

Summary: During the reaction control system (RCS) hot-fire test, primary RCS thruster F3F failed off on its first attempted firing. Review of chamber pressure and injector temperature data from the firing, as well as vehicle acceleration data, indicates that the failure was most probably caused by iron nitrate contamination of the thruster's oxidizer valve. The thruster remained deselected for the remainder of the mission.

KSC has inspected the thruster F3F Pc tube for blockage and, as expected, found that it was clear. Thruster F3F and the other three thrusters on the manifold have been removed and replaced. The problem with F3F was been determined to be a failure of the fuel valve (most probably an extruded teflon seal).

Tracking No	Time	Classification	Documentation		Subsystem
MER - 18	**MET:** Postlanding	Problem	**FIAR**	**IFA** STS-81-V-07	APU,INST
MMACS-02	**GMT:** 022:14:37		**SPR**	**UA**	**Manager:** Brad Irlbeck
			IPR 84V-0008	**PR** APU-4-19-0519	x38617
					Engineer: Walter Scott

Title: APU 3 Chamber Pressure Shifted Downward (ORB)

Summary: Approximately 15 minutes after wheels stop, the APU 3 gas generator chamber pressure measurement shifted downward about 200 psi (in two steps). Data review indicates that the shift was most probably caused by a bias shift in the chamber pressure transducer. This would be the fourth transducer that has exhibited this performance in the past 18 months. This transducer gives the best indication of proper APU performance and is mandatory for launch in the LCC .

KSC troubleshooting has verified that the chamber pressure transducer caused the shift. The APU has been removed and replaced.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 10	**MET:** 07:04:44	Problem	**FIAR**	**IFA** STS-81-V-08	CCTV
INCO-01	**GMT:** 019:14:12		**SPR**	**UA**	**Manager:** Bernie Embrey x30184
			IPR 84V-0009	**PR**	**Engineer:** Wendell Rowan x30177

Title: Unable to View ODS Centerline Camera Video (ORB)

Summary: After hatch closing, the crew disconnected the Mir camcorder from the ODS TV connector and configured for the ODS centerline camera. The crew reported their attempts to view centerline camera video were unsuccessful. Working with the ground, the crew confirmed that the on-board configuration was correct. However, downlink of the centerline camera (VSU input PL2) did not provide interleaved data indicating that either the centerline camera (CTVC) was powered off, or video from the camera was not reaching the VSU. The same condition was evident with the backup centerline CTVC and the crew reported that they had the same problem earlier in the mission. During troubleshooting, the crew successfully activated the prime centerline CTVC to middeck TV port MO58F. The crew then reported that they reseated the ODS-to-Mir plug on the CIP and power cycled the centerline camera from SSP 2 and the ODS centerline camera video was recovered. The crew reported no problems with the truss camera indicating that at least part of the Mir-to-ODS plug was always functioning correctly.

Questions were sent to the crew in an effort to better understand the actions taken in restoring the video. Data evaluation and crew responses to the questions has lead engineering to believe that the camera was not receiving power, perhaps due to problem at the SSP (circuit breaker, switch, wiring). KSC will troubleshoot.