

SSVEO IFA List

Date:02/27/2003

STS - 51L, OV - 99, Challenger (10)

Time:04:23:PM

<u>Tracking No</u>	<u>Time</u>	<u>Classification</u>	<u>Documentation</u>	<u>Subsystem</u>
MER - 0	MET: Prelaunch	Problem	FIAR	IFA STS-51L-V-01 MECH
None	GMT: Prelaunch		SPR None IPR None	UA PR Manager: Engineer:

Title: Side Hatch Closed Indication Failed (ORB)

Summary: DISCUSSION: During prelaunch closeout, one of the two side hatch closed indications did not operate. The ground crew closed the hatch 4 times to insure proper closure. The cabin leak check verified that the side hatch was closed. The prelaunch side hatch closure checks isolated the problem to the rigging of the limit switch. This condition was not a constraint to launch.

CONCLUSION: Failure of one of the two side hatch closed indications to indicate closed was due to faulty rigging of the limit switch. **CORRECTIVE_ACTION:** Ground procedures have been changed to require that the side hatch limit switches be checked for proper rigging prior to prelaunch closeout.

EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

<u>Tracking No</u>	<u>Time</u>	<u>Classification</u>	<u>Documentation</u>	<u>Subsystem</u>
MER - 0	MET:	Problem	FIAR	IFA STS-51L-V-02 GSE
None	GMT:		SPR 33F002 IPR None	UA PR Manager: Engineer:

Title: Ground Support Equipment Hatch Closing Fixture Could Not Be Removed After Crew Ingress. ()

Summary: DISCUSSION: The hatch closing fixture, Ground Support Equipment (GSE) model number A70-0719, could not be removed from the Orbiter hatch on January 27, 1986. One of the three fasteners used to attach the handle to the hatch was "free spinning". The ground crew sawed the fixture free after removing the other two fasteners. During this delay, the crosswind at the Kennedy Space Center (KSC) runway increased above the acceptable limits for a return-to-launch-site abort and the

launch was delayed 24 hours. The ground crew reattached the sawed-off portion of the hatch-closing fixture using only two attach bolts. This arrangement caused excessive stress to the Orbiter hatch-attach points due to an increased moment arm.

It was later determined that the hatch-closing fixture used on OV-099 was not GSE, but was a shop aid fabricated at KSC. The fasteners are a sleeve bolt-receptacle fastening system and the optimum combination of the two halves is governed not only by the material thickness, but by the stud protrusion of the receptacle and the grip length of the sleeve bolt. This requirement was not met in the manufacture of the shop aid and this probably resulted in the bottoming out of the stud. In addition, subsequent tests have shown that the "free spinning" failure mode can only result when the fastener is overtorqued to 485 inch pounds, approximately 10 times the stated 53 inch-pound torque requirements in the Operations and Maintenance Requirements and Specifications Document (OMRSD). CONCLUSION: The Orbiter hatch-closing fixture could not be removed because one of the fasteners had been overtorqued, which sheared the stud or stripped the threads, thus allowing the sleeve bolt to spin freely. This failure probably occurred during installation of the tool in the Orbiter Processing Facility (OPF). The use of a shop aid rather than GSE could have also been a contributor to the failure as the critical dimensions required for the hatch-closing fixture could not be confirmed. CORRECTIVE_ACTION: KSC will review OMI procedures to assure that correct torque limits are identified for this unit. A reevaluation of all shop aids and their use is being performed by KSC. Those shop aids which interface with the vehicle are either going to be discarded or upgraded to GSE using the appropriate procedures. This problem will be tracked by CAR 33F002. EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

<u>Tracking No</u>	<u>Time</u>	<u>Classification</u>	<u>Documentation</u>	<u>Subsystem</u>
MER - 0	MET: Prelaunch	Problem	FIAR	IFA STS-51L-V-03 Atmospheric
None	GMT: Prelaunch		SPR None	UA Revitalization Subsystem
			IPR None	PR Manager:
				Engineer:

Title: Partial Pressure Oxygen Sensor "A" Failed. (ORB)

Summary: DISCUSSION: The reading from partial pressure oxygen (PPO2) sensor "A" dropped almost to zero prior to launch. Sensors "B" and "C" operated normally. A spare sensor was placed on board for inflight maintenance (IFM), if required. There was no mission impact.

Cause of the sensor failure is unknown. The vehicle and sensor are not available for troubleshooting. CONCLUSION: PPO2 sensor "A" failed prior to launch. Cause of sensor failure is unknown. CORRECTIVE_ACTION: None EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

<u>Tracking No</u>	<u>Time</u>	<u>Classification</u>	<u>Documentation</u>	<u>Subsystem</u>	
MER - 0	MET: Prelaunch	Problem	FIAR	IFA STS-51L-V-04	OMS/RCS
None	GMT: Prelaunch		SPR None	UA	Manager:
			IPR None	PR	Engineer:

Title: Right Reaction Control System Vernier Thruster R5D Oxidizer Inlet Line Temperature Sensor Failed. (ORB)

Summary: DISCUSSION: The right reaction control system (RCS) vernier-thruster R5D oxidizer-inlet-line temperature sensor (V42T3560A) failed just before lift-off. This temperature measurement is used to evaluate the pod heater performance and to insure that the oxidizer minimum temperature is not violated. The oxidizer inlet temperature to vernier-thruster R5D can be extrapolated from other pod measurements as a back up for the failed sensor. Loss of the vernier thruster oxidizer-inlet-line temperature sensor had no impact on the mission.

Cause of the sensor failure is unknown. Previous flight experience has not indicated a problem with this temperature sensor. The vehicle and sensor are not available for troubleshooting. CONCLUSION: The right RCS vernier-thruster R5D oxidizer-inlet-line temperature sensor failed just prior to lift-off. Cause of the sensor failure is unknown. CORRECTIVE_ACTION: None EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

<u>Tracking No</u>	<u>Time</u>	<u>Classification</u>	<u>Documentation</u>	<u>Subsystem</u>	
MER - 0	MET: 000:00:00	Problem	FIAR	IFA STS-51L-V-05	GN&C
None	GMT: 028:16:38		SPR None	UA	Manager:
			IPR None	PR	Engineer:

Title: HOLD_CLEAR_BIAS I-Load For The Flight Control System SRB Pitch Trim Command Had A Small Error. (ORB)

Summary: DISCUSSION: Postflight analysis revealed that the initial value of the HOLD_CLEAR_BIAS I-load for the solid rocket booster (SRB) pitch trim was not updated on STS 51-L from the value developed for STS 51-E. This I-load should be updated each time the SRB trim profile is changed. The resulting error between the actual and desired value was small enough (0.087 degree) to escape detection during normal preflight verification in the Software Production Facility (SPF) and the Shuttle Avionics Integration Laboratory. This error, plus a slightly higher sway-induced pitch rate at lift-off combined to degrade the clearance margin for the north SRB support posts approximately 0.3 inch from the nominal value of about 18 inches. The nozzle/support post geometry can tolerate thrust-misalignment errors an order of magnitude greater than the effect of this I-load anomaly. The net clearance margins on this mission were well within previous experience.

CONCLUSION: The initial value for the HOLD_CLEAR_BIAS I-load for the SRB pitch trim was not updated on the STS 51-L mission from the value developed for STS 51-E. The I-load was implemented in accordance with the published requirements. However, the requirements were not updated correctly. The resulting very small error had a negligible effect on system performance. CORRECTIVE_ACTION: The correct value for the HOLD_CLEAR_BIAS I-load will be determined for each future mission. Starting with STS-26, the automated continuity check in the SPF will be implemented to require that the initial term in the HOLD_CLEAR_BIAS I-load have a value equal in magnitude and opposite in sign to the first value in the SRB trim table. EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE
