Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** Prelaunch	Problem	**FIAR**	**IFA** STS-42-V-01	FCP, EPD&C
EGIL-01	**GMT:** Prelaunch		**SPR** 42RF01	**UA**	**Manager:**
			IPR 53V-0001	**PR**	
					Engineer:

Title: Fuel Cell 2 Hydrogen Pump Motor Condtion Spike/AC Bus 2 Phase Current Anomaly (ORB)

Summary: DISCUSSION: During the prelaunch activities, at approximately 022:07:02:34 G.m.t., the fuel cell 2 hydrogren pump motor condition increased from 0.60 V to over the 1.0 V Launch Commit Criteria (LCC) limit. The motor condition remained above the LCC limit for approximately 6 seconds, reaching a maximum value of 1.48 V before returning to normal levels. Coincidentally, ac bus 2 phase C showed an approximate 0.16-ampere decrease, phase B showed an approximate 0.25-ampere increase, and phase A remained unchanged.

Assessment of the problem during the prelaunch timeframe ruled out an inverter problem since no ac bus voltage fluctuations were observed and the main engine controllers did not indicate a phase shift or a voltage violation. The most likely cause of the problem was deemed to be a possible intermittent high resistance path to phase C of the hydrogen pump motor. An LCC waiver was generated with rationale based on a worst-case assumption of an open circuit to one phase of both the hydrogen and coolant pumps for fuel cell 2. This would cause operation of both pumps on two phases for which both pumps were certified. The phase C circuit breaker to the pumps was cycled to clear any possible contamination within the circuit breaker. Nominal launch operations were then resumed. The anomaly did not recur during the mission or postlanding operations. While the mission was progressing, test equipment was set up at the JSC Electrical Power Laboratory using actual ac inverters and fuel cell hydrogen and coolant pumps. Tests on this equipment showed that the symptoms of this anomaly could not be duplicated by varying phase angles. By inserting a 17-ohm resistance in line with the phase C circuit breaker to the pump, or by inserting a 52-ohm resistance in line with the hydrogen pump's phase C motor winding, the 1.48 V pump motor condition spike and the phase B and C current trends seen on the Orbiter could be recreated. However, the magnitude of the phase B and C current trends could not be duplicated. Troubleshooting consisted of end-to-end electrical resistance and wiggle tests between the pump phase C circuit at panel L4 and the interface of the pump, a visual checkout of the associated phase C connectors, and a pull test on each individual connector pin. The resistance test showed no anomalous condition, and no problems were noted with the connectors. KSC then decided that the fuel cell 2 electronic control unit (ECU) will be removed and replaced to eliminate another possible cause of the problem. CONCLUSION: The cause of this anomaly is presently unknown. The most probable cause was a non-repeatable transient high resistance in the phase C wiring to the hydrogen pump motor. Another possible, but unlikely cause was a failure in each of two parallel relays in the fuel cell 2 ECU, one of which would not be detectable other than at the relay level. This masked failure would be a high contact resistance in one relay with the second failure being an intermittent open of the parallel relay. If this problem should recur, it will not impact crew safety or mission success. A worst case recurrence would be the loss of an ac phase ot the pump, and the pump is certified to perform its function on only two phases. CORRECTIVE_ACTION: The fuel cell 2 ECU will be removed and replaced and all related wiring/connector interfaces have been checked. Relay functions of the removed ECU will be verified upon return to the vendor. EFFECTS_ON_SUBSEQUENT_MISSIONS: None.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0 INCO-01, INCO-09, INCO-08	**MET:** 000:16:05:27.008 **GMT:** 023:06:58:00.000	Problem	**FIAR** A. BFCE 029-F044, B. BFCE 029-F047, C. BFCE-029-F0 **SPR** **IPR** None	**IFA** STS-42-V-02 **UA** **PR**	GFE, C&T **Manager:** **Engineer:**

Title: A. CCTV Camera D DegradationB. CCTV Camera A Color Wheel StuckC. Camera C Degradation (GFE)

Summary: DISCUSSION: A. During STS-42, the Camera D automatic light control circuitry cycled from full bright to dark then back again. Postflight troubleshooting recreated this anomaly.

B. At various times throughout the flight, the Camera A color wheel became stuck and later unstuck. Postflight troubleshooting pointed to the camera lens assembly. C. When Camera C was used for downlink of payload bay view, the camera appeared to have delamination or some type of film on the faceplate. Postflight troubleshooting results show that this degradation was not caused by the camera. CONCLUSION: A. The Camera D automatic light control (ALC) circuitry has been found by the manufacturer, GE, to have some failed components and these components are to have sustained permanent damage to the anti-reflective coatings on the lens elements. This lens may not be repairable and is being replaced in the lens assembly. JSC materials analysis is in work to determine the source and cause of the lens damage. B. The stuck color wheel problem has not been duplicated by the vendor and further investigation is planned. However, while troubleshooting the stuck color wheel problem, GE found a lens distortion problem with the color lens assembly (CLA). The lens has been returned to Canon for repair. C. When Camera C was used to downlink payload bay views, there appeared to be some sort of distortion present in the lens. Postflight analysis by JSC Materials indicates that the CLA anti-reflective coating appears to have been separated from the lens elements and then redeposited. Further analysis to determine the source and the cause of the lens damage is in work. The lens is being replaced and sent to the vendor for repair. Investigation by GE also found that the silicon intensifier tube (SIT) image sensor has sustained a faceplate delamination. The tube is being replaced in the camera and has been returned to the vendor for possible repair. CORRECTIVE_ACTION: A. The camera and lens assembly have been sent to the vendor for troubleshooting and repair. B. The camera and lens assembly have been sent to the vendor for troubleshooting and repair. C. The camera and lens assembly have been sent to the vendor for troubleshooting and repair. EFFECTS_ON_SUBSEQUENT_MISSIONS: None.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	MET:	Problem	FIAR	IFA STS-42-V-03	ECLSS
EECOM-02, EECOM-04	GMT:		SPR 42RF02	UA	Manager:
			IPR	PR ECL-3-15-0859	
					Engineer:

Title: WCS Commode Control Handle Linkage Failure (GFE)

Summary: DISCUSSION: At approximately 024:16:10 G.m.t., the crew reported that the waste collection system (WCS) control knob that opens the slide valve could not be moved. Troubleshooting indicated that the commode valve remained in the vacuum position when it should have been in the fan-separator position. The crew could not open the slide valve because it was still exposed to vacuum. The symptoms of this failure were similar to a failure that occurred on STS-33 (IFA STS-33-02), so the in-flight maintenance procedure (IFM) used on STS-33 was uplinked and executed by the STS-42 crew. While performing the procedure, the crew commented that when the commode handle was pulled upward, the remainder of the commode valve linkage did not move. This indicated the failure or loss of the pin connecting the commode handle ot the linkage. The IFM was completed, restoring the use of the WCS by enabling the crew to manually rotate the commode valve linkage with a pair of vise grips.

Two days later, the crew reported that the linkage had to be turned 135 degrees to allow the WCS to repressurize. The commode valve has a roll pin located within the shaft housing to limit the travel to 90 degrees during bench testing. The normal in-flight hardstops for the linkage rotation were contained within the already broken portion. Therefore, the roll pin had become the new hardstop, and after two days of use, the pin had sheared. A procedure was executed to have a crewmember regain the proper zero starting position for continued rotation of the linkage. Linkage rotation from the zero point to the required 90 degrees was then visually estimated for each WCS usage. CONCLUSION: The commode valve linkage was removed at the landing site after the mission. Inspection verified that the dowel pin connecting the commode control handle to the rest of the linkage had failed. Subsequent shearing of the roll pin was also verified. CORRECTIVE_ACTION: The original design for the connection between the commode control handle and the rotational linkage has the connecting dowel pin inserted only halfway into the rotational shaft. This allows the handle to come loose with a single shear failure of the pin as occurred on this flight. A design change is in work for STS-50 and subsequent flights that will insert the dowel pin completely through the rotational shaft and thereby double the strength of the connection. In addition, the shaft material will be changed to inconel to enable the system to handle additional loads. For flights preceding STS-50, if the failure should recur, function of the WCS can be regained through an IFM, and an IFM tool will be manifested that will allow the crew to more easily rotate the commode valve. EFFECTS_ON_SUBSEQUENT_MISSIONS: None.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	MET: 004:01:17	Problem	FIAR JSC-EE-0668	IFA STS-42-V-04	GFE, C&T
INCO-03	GMT: 026:16:10		SPR	UA	Manager:
			IPR	PR COM3-15-0193	

Engineer:

Title: Text and Graphics System Developer Paper Jams (GFE)

Summary: DISCUSSION: During STS-42, Text and Graphics System (TAGS) hardcopier S/N 003 failed. The unit was powered up but idle when telemetry indicated an illegal state (developing and empty). The panel displays were all good. The ground uplinked a power cycle which cleared the anomalous indications in the telemetry.

The next uplinked page was unsatisfactory. The text was not dark enough in either Mode One (test), Mode Two (map), or Mode Three (schematic). The crew could barely read the pages. However, Mode Four (photo) provided good images and was used for the rest of the mission. Problem Report PV6-018 117, dated 12/84, documents a microcircuit chip that failed, after which Mode One would not print and Modes Two and Three were pale. Mode Four was normal. The microchip in question is an electronic analog switch which selects brightness and contrast voltages for each mode. Its failure resulted in the switch outputting brightness and constrast voltages corresponding only to Mode Four. Later during the mission, while using Mode Four, several false jams (indicated jams with no paper jammed in hardcopier) were noted. Paper appeared to be spending too much time in the developer, but the paper did eventually come out. Postflight inspection revealed that a page was stuck in the developer. The page cause slippage in the developer, slowing the movement of pages through the developer. Software saw that a time-out violation had occurred and set the false jam indication. The page causing the slippage became stuck because the rollers guiding the paper out of the developer were not turing fast enough to keep up with the developer. This caused the developer to eventually "eat" one of the sheets of paper that were buckling. Any jam indication that occurs during transmission causes imaging to stop. As this was a developer jam indication, the result was incomplete imaging of the next page, which was being uplinked. A procedural workaround of starting the image in the partial image ready mode rather than the full image ready mode helped the situation. This technique maximizes the amount of the image that is printed. By using the procedural workaround mentioned above and transmitting only in Mode Four, ground controllers were able to successfully uplink TAGS messages for the remainder of the mission. CONCLUSION: Several failures occurred during the mission. Two separate chips failed, causing the initial erroneous telemetry and imaging problems. Additionally, the drive rollers which guide the paper out from the developer drum turned too slowly. This caused the developer to "eat" a page. The developer slipped on subsequent pages. The false jam indications and subsequent imaging problems resulted from paper slipping in the developer. CORRECTIVE_ACTION: The failed chips (part numbers CDP1852D, an eight-bit latch chip, and AD7502SD, a dual-four-pole analog switch) were replaced. The cogs which turn the output drive rollers were changed to ten-tooth cogs from 11-tooth cogs to better keep pace with the developer. The cog change will be effective STS-49 and subsequent missions on all TAGS units. EFFECTS_ON_SUBSEQUENT_MISSIONS: None.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 006:06:07	Problem	**FIAR**	**IFA** STS-42-V-05	OMS/RCS
PROP-01	**GMT:** 028:21:00		**SPR** 42RF03	**UA**	**Manager:**
			IPR	**PR** LP04-12-0361	
					Engineer:

Title: Left Aft RCS Thruster L3A Failed Leak (ORB)

Summary: DISCUSSION: Left aft reaction control system (RCS) primary thruster L3A was declared failed (leak) and was deselected by the RCS redundancy management (RM) at 028:21:00 G.m.t. when the oxidizer injector temperature dropped below 30 ?F. The oxidizer injector temperature initially dropped from 78 ?F to 18 ?F in 15 seconds while the fuel injector temperature, which was influenced by the oxidizer leak, reached a minimum and relatively constant temperature of 54 ?F within one hour of the start of the leak.

Prior to the leak, the thruster had not been fired and there were no primary thruster firings at the time of the leak that might have induced it. The thermal environment of this thruster was nominal with temperatures between 75 and 90 ?F prior to the leak failure. The leak rate was estimated to be 200 cc/hr. Flight and ground experience has shown that maintaining pressure on valves with leakages of low magnitude is effective in sealing leaks; therefore, the manifold isolation valves were not closed. The leak stopped after approximately 5.6 hours and the thruster L3A was reselected and placed in last priority. The leak did not recur and the thruster was not fired during the RCS hot fire or at any other time during the mission. CONCLUSION: Based on previous flight experience, the most probable cause of the leak is iron nitrate or particulate contamination at the main or pilot poppet valve seats. However, this leakage was unusual in that it occurred spontaneously instead of immediately following a thruster firing, which is typically the case. Currently, there is no explanation for the spontaneous nature of the leakage. CORRECTIVE_ACTION: Thruster L3A will be removed, replaced and shipped to the vendor. The oxidizer valve will be removed from the thruster and undergo failure analysis. It will then be shipped to the White Sands Test Facility (WSTF) for flushing and leak testing. If nothing unusual is uncovered at either the vendor or WSTF, the valve will be used for the fleet leader program at WSTF. It should be noted that the oxidizer valve is a -501 configuration valve that is being replaced on an attrition basis. The failure analysis is being tracked on CAR 42RF03. EFFECTS_ON_SUBSEQUENT_MISSIONS: None. Primary thrusters have multiple redundancy for all nominal mission phases.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 007:12:14	Problem	**FIAR**	**IFA** STS-42-V-06	OMS/RCS
PROP-02	**GMT:** 030:03:07		**SPR** 42RF04	**UA**	**Manager:**
			IPR	**PR** RP03-16-0513	
					Engineer:

Title: Thruster R4U Oxidizer Leak (ORB)

Summary: DISCUSSION: At approximately 030:04:38 G.m.t., a visible leak coming from the area of the right aft reaction control system (RCS) was noticed by a crewmember. At 030:05:04 G.m.t., when multiplexer-demultiplexer (MDM) flight-critical aft (FA) 4 was powered on -- it had been powered-off as part of a power-dwown to conserve energy -- primary thrust R4U was immediately declared failed-leak due to low oxidizer injector temperature and was deselected by the RCS redundancy management (RM). Based on propellant tank quantity divergence, it was estimated that the leak started at 030:03:00 G.m.t. The leak rate was estimated to be 1500 cc/hr based on the decrease in oxidizer tank quantity. As a result of propellant tank quantity divergence and concerns regarding entering with a leak, the manifold 4 isolation valve was closed at 030:11:45 G.m.t.

Prior to the leak, the thruster had not been fired and there were no primary thruster firings at the time of the leak that might have induced it. However, due to the attitudes and the beta angle that were flown during STS-42, thruster R4U, as well as several others, experienced temperatures that were significantly warmer than usual. The injector temperatures on R4U ranged from 75 ?F to 165 ?F with a cumulative time above 150 ?F of approximately 20 hours. The thruster R4U leak occurred after these higher temperature excursions when the injector temperatures were at approximately 85 ?F. These high temperatures were anticipated and preflight analysis indicated that thruster valve seats could be allowed to reach 175 ?F as long as a thruster was not fired with its valve seat temperature above 150 ?F. This restriction would prevent valve seat damage due to closing the valve at high temperatures. For real-time monitoring, thruster valve seat temperatures were estimated to be 10 ?F cooler than injector temperatures during heat up and 10 ?F warmer during cool down. The valve seat maximum temperature was not exceeded and the primary thrusters were not fired with a valve seat temperature of greater than 150 ?F. CONCLUSION: The oxidizer valve was removed from thruster R4U and subjected to cut-apart for failure analysis. The Teflon seats used in the valve's main and pilot poppets showed no signs of thermally induced damage. The most probable cause of the leak is that the thermal cycles uncovered flaws that were already present in the seals, allowing the valve to leak on-orbit. Flaws large enought to cause the leakage experienced were seen on the main stage seat. These flaws were the type caused by closing the valve on hard particulate. Noting that R4U had a history of leakage during the past few turnarounds, these leak paths were probably plugged by nitrates. When exposed to the extreme thermal cycles seen during STS-42, the Teflon valve seats would alternately expand and contract. It is speculated that leak paths (flaws) on the Teflon that had been plugged by nitrates would be worked by the thermally induced expansion/contraction cycles, causing the leak paths to open. CORRECTIVE_ACTION: Thrust R4U has been removed and replaced. The oxidizer valve has undergone failure analysis, the results of which will be documented on CAR 42RF04. EFFECTS_ON_SUBSEQUENT_MISSIONS: None. Primary thrusters have multiple redundancy for all nominal mission phases.

Tracking No	**Time**	**Classification**	**Documentation**		**Subsystem**
MER - 0	**MET:** 004:15:37	Problem	**FIAR** BFCE 029-F045,	**IFA** STS-42-V-07A	GFE, C&T
INCO-04	**GMT:** 027:06:30		BFCE 029-F046	**UA**	**Manager:**
			SPR	**PR**	
			IPR		**Engineer:**

Title: Crew Remote Unit Failure (GFE)

Summary: DISCUSSION: During STS-42, the crew experienced problems with two crew remote units (CRU's). The eight CRU's that were flown on STS-42 were returned to JSC for troubleshooting. One CRU was found failed. It is believed that the other reported CRU failure was a result of a faulty wall unit. The wall unit anomaly will be addressed in flight problem report STS-42-V-07B.

CONCLUSION: Troubleshooting at JSC isolated the CRU failure to the transmit synthesizer. The synthesizer was replaced and the unit now functions properly. CORRECTIVE_ACTION: Further troubleshooting will be performed on the synthesizer. The CRU's for the next flight have been tested, and all are functional. EFFECTS_ON_SUBSEQUENT_MISSIONS: None. Each crewman has a CRU, plus one spare CRU is always flown. Several other means of communications are available, such as hand-held microphones and the launch/entry suit communications carrier assembly (a hardline which may be used to backup the wireless communications system) should this failure recur.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 004:15:37	Problem	**FIAR** BFCE 029-F054,	**IFA** STS-42-V-07B	GFE, C&T
INCO-05	**GMT:** 027:06:30		BFCE 029-F055	**UA**	**Manager:**
			SPR	**PR**	
			IPR		**Engineer:**

Title: Wall Units A and C Degraded Performance (GFE)

Summary: DISCUSSION: The crew experienced problems with constant beep tones when using audio interface unit (AIU) -C and intermittent transmissions when using AIU-A, channel 1. The AIU's were returned to JSC for troubleshooting.

CONCLUSION: Troubleshooting AIU-C and AIU-A could not recreate the in-flight anomalies. Beep tones can be caused by a failure in 1 of 2 or both receive-audio modules inside the radio, although this condition could not be duplicated in ground troubleshooting on AIU-C. Also, the AIU-A intermittent transmissions could not be duplicated; however, one crew remote unit was found to have had a bad synthesizer module which could have cause this intermittent problem (reference IF STS-42-V-07A - Crew Remote Unit Failure). CORRECTIVE_ACTION: AIU-C and AIU-A have been tested several times and are functioning properly. Troubleshooting on these units will continue. EFFECTS_ON_SUBSEQUENT_MISSIONS: None. Three AIU's are flown on the Orbiter for five crewmember missions and five AIU's are flown on the Orbiter for seven crewmember mission. The crew has the option of manifesting a spare unit on each flight. If these anomalies recur, the crew could use the spare channel (2 channels per AIU). However, if both channels failed, then either the spare unit if manifested, hand held microphones, or hardline mode can be used.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 004:15:37	Problem	**FIAR** JSC EP-0152	**IFA** STS-42-V-07C	GFE, C&T
	GMT: 027:06:30		**SPR**	**UA**	**Manager:**
			IPR	**PR**	
					Engineer:

Title: Low Battery Life (GFE)

Summary: DISCUSSION: The wireless crew communications system (WCCS) batteries flown on STS-42 did not discharge to 60 hours as expected. Thirty-six batteries were flown on this flight and the discharge times ranged from two hours to thirty-six hours. The batteries that were recycled in-flight delivered no more than four hours of additional use. The batteries were returned to JSC for evaluation and troubleshooting.

CONCLUSION: Upon postflight receipt of the batteries, each battery was visually inspected, weighed to determine the weight change during the mission, and electrically checked to determine the open circuit voltage (OCV) and one-minute load voltage. None of the batteries had external leakage and no outstanding discrepancies were noted from these checks. Two batteries were randomly selected from the 36 for a total dissection to allow visual and electrical inspection of the inside of the battery. There were no signs of leakage, all of the electrical circuitry passed continuity checks (i.e., no evidence of short circuits), and all the cells had an OCV and load voltage within acceptable limits. Eight batteries underwent a postflight discharge cycle. The eight batteries selected were four batteries that had a small weight increase, indicating a small usage time in-flight; and four batteries that had the greatest amount of weight increase, indicating the longest usage time during the flight. As expected, the batteries indicating low in-flight usage discharged the longest, up to 20 hours. The eight batteries that were discharged had their lids removed for visual inspection and additional discharge. When the battery lids were off, the cells were exposed to more oxygen. Exposure to more oxygen did not prove to extend the battery discharge by more than a few hours. Nine zinc-air cells representative of the seven flights on which the current battery design has flown were dissected, and the gross inspection did not reveal a cell anomaly. The cabin air flow and humidity and the launch stowage configuration for STS-42 were nondiscrepant. The reason why the batteries deliver 60+ hours in the laboratory, 60+ hours on some missions (i.e. STS-40), or only 2 to 36 hours on some missions, as on STS-42, is unknown at this time.   CORRECTIVE_ACTION: The cell vendor is continuing to troubleshoot the cathode seating and the zinc amalgamation process for these cells. For upcoming Spacelab missions, crew members are being advised to conserve batteries for use in the Spacelab if a performance problem recurs. EP5 has initiated investigations of alternative cells for the WCCS battery should future problems occur.   EFFECTS_ON_SUBSEQUENT_MISSIONS: Effects on Subsequent Missions: None. If the batteries are not functioning, communications can be maintained with hardline to the wall units or with use of the hand-held microphone.

Tracking No	**Time**	**Classification**	**Documentation**		**Subsystem**
MER - 0	**MET:** 006:02:13	Problem	**FIAR**	**IFA** STS-42-V-08	ECLSS
EECOM-05	**GMT:** 028:17:06		**SPR** 42RF05	**UA**	**Manager:**
			IPR 53V-0008	**PR**	
					Engineer:

Title: Degraded Waste Dump Flowrate (ORB)

Summary: DISCUSSION: At approximately 028:17:06 G.m.t., the second waste dump was initiated. The flowrate for the first segment of the dump started at an acceptable rate of 1.9 percent/minute and degraded to 1.5 percent/minute, breaking the OMRSD lower limit of 1.6 percent/minute. The remaining three segments of the dump exhibited relatively constant flowrates of 1.6 percent/minute. The first was dump, performed approximately four days earlier, exhibited nominal flowrates of approximately 1.9 percent/minute.

After the flight, the urine solids filter was removed from the waste management system and inspected. The filter showed no degradation or crumbling; however, contamination was found to be covering much of the filter. Analysis of the contaminant showed it to be calcium phosphate which is indicative of extensive urine solids build-up. This filter had flown the third of its three mission-specified life. CONCLUSION: The waste-dump flowrate degradation was caused by contamination of the urine solids filter. The cause and extent of the contamination is still under analysis. If the problem should recur, the waste dump line would still be usable, and even if the dump line becomes blocked, redundant methods of waste management are available. CORRECTIVE_ACTION: The OV-103 urine solids filter has been removed and replaced. A section of the waste dump line upstream of the filter will be cut out and analyzed to determine the cause and extent of the solids build-up. The waste dump line will be flushed to the extent necessary to insure proper flowrate. The urine solids filters for STS-49 (OV-105), STS-50 (OV-102) will be on their first flight, and the STS-46 (OV-104) filter will be on its second flight so a recurrence of this phenomenon, before the OV-103 analysis is complete is unlikely. Periodic inspections may be required depending on final failure analysis results. EFFECTS_ON_SUBSEQUENT_MISSIONS: None.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 008:00:37	Problem	**FIAR**	**IFA** STS-42-V-09	MPS
BSTR-01	**GMT:** 030:15:30		**SPR** 42RF06	**UA**	**Manager:**
			IPR 53V-0009	**PR**	
					Engineer:

Title: LH2 Topping Valve Position Open Indication Missing (ORB)

Summary: DISCUSSION: When the LH2 topping valve was commanded open during entry at 30:15:31 G.m.t., the open-indicator discrete (V41X1453E) was not received. At the same time the close-indicator discrete (V41X1456X) was lost which indicates that the valve did move. The valve was commanded closed at 30:15:59 G.m.t., and the closed indication returned.

CONCLUSION: The LH2 topping valve open indicator failed when the valve was commanded open during entry. Postflight troubleshooting repeated the problem and isolated it to a failed microswitch. The valve was verified to be operating nominally. CORRECTIVE_ACTION: The topping valve will be removed and replaced. The failed valve will be sent to the NASA Shuttle Logistics Depot for repair by the vendor, and a failure analysis of the microswitch will be performed under CAR 42RF06. EFFECTS_ON_SUBSEQUENT_MISSIONS: None. Loss of position indication for this valve has no effect on mission safety or success.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** Postlanding	Problem	**FIAR** BFCE-028-F006	**IFA** STS-42-V-10	GFE

None **GMT:** Postlanding **SPR** **UA** **Manager:**

IPR **PR** PV6-210885-2

Engineer:

Title: Orbiter Aft Fuselage Gas Sampler System (OAFGSS) (GFE)

Summary: DISCUSSION: During postflight checkout of the STS-42 Orbiter Aft Fuselage Gas Sampler System (OAFGSS), it was discovered that the right gas sampler assembly experienced a failure during flight. The OAFGSS is comprised of two self contained subsystems, right and left. Each subsystem has three sample bottles, six pyrotechnics, and one electronics and control unit that contains a battery, a control unit, and associated hardware. Each subsystem is acoustically activated at liftoff (135 db for 6 seconds) and proceeds sequentially to activate the bottle fire-open pyrotechnics in bottle 1 right side (+60 seconds), bottle 2 right side (+74 seconds), and bottle 3 right side (+116 seconds). Each bottle fire-closed pyrotechnic is activated 2 seconds after the open command. The respective bottle fire-open times for the left side are +74 seconds, +82 seconds, and +104 seconds.

On STS-42, the number 2 bottle (s/n 1377) fire-closed pyrotechnic did not fire and the number 3 bottle (s/n 1377) fire-open and fire-closed pyrotechnics did not fire. All other pyrotechnics/bottles fired as expected. Postflight troubleshooting could not duplicate the failure. The subsystem hardware was removed from the Orbiter and sent to the Boeing/Flight Equipment Processing Contractor at JSC for failure analysis. The initial theory is that the gas sampler system intermittently lost power during flight between the fire-open and fire-close commands on bottle number 2. CONCLUSION: Preliminary analysis indicates that the most probable cause of the failure was an intermittent open circuit which interrupted the sequential firing between the fire-open and fire-closed commands on bottle number 2 which also prevented bottle 3 from firing. CORRECTIVE_ACTION: A failure analysis test plan has been approved and is being performed to determine the location of the suspected intermittent open circuit. Completion of the failure analysis will be tracked by FIAR-BFCE-028-F006. EFFECTS_ON_SUBSEQUENT_MISSIONS: No mission impact.