Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:**	Problem	**FIAR**	**IFA** STS-71-V-01	
	GMT:		**SPR**	**UA**	**Manager:**
			IPR	**PR**	
					Engineer:

Title: Deleted before baselining of IFA's to the PRCB ()

Summary: INVESTIGATION/DISCUSSION:

CAUSE(s)/PROBABLE Cause(s): CORRECTIVE_ACTION: RATIONALE FOR FLIGHT:

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:**	Problem	**FIAR**	**IFA** STS-71-V-02	FC/PRSD
EGIL-01	**GMT:**		**SPR** 71RF01	**UA**	**Manager:**
			IPR 74V-0006	**PR**	x39048
					Engineer:

Title: PRSD H2 Manifold 1 Valve Did Not Close (ORB)

Summary: INVESTIGATION/DISCUSSION: At 179:00:06:13 G.m.t., the crew commanded the O2 and H2 manifold 1 valves to “CLOSE” prior to the first sleep period. The O2 valve closed properly, but the H2 valve (S/N 20) continued to indicate “OPEN”. The crew attempted to close the valve again by holding the switch in the “CLOSE” position for 10 seconds, but the valve again failed to respond. Positive indication that the valve did not close occurred 20 minutes later, at 179:00:26 G.m.t., when the H2 manifold 1 pressure tracked the pressure rise due to a heater-on cycle in H2 tank 3. At 179:00:34 G.m.t., the O2 manifold 1 valve was opened. The H2 and O2 manifold 2 valves were then successfully closed at 179:00:36 G.m.t. No further attempts were made during the mission to close the valve.

Similar failures-to-close have happened previously in the program (ref. IFA’s 34-V-12, 37-V-03, 43-V-09, 49-V-02, 57-V-03, and 57-V-06) on OV-104 and OV-105. On-vehicle testing could never recreate the failures. The STS-43 anomaly was on valve S/N 8 which was also in the H2 manifold 1 position on OV- 104. After STS-57, one of the manifold valves that had previously experienced problems was removed and tested under laboratory cold-flow conditions. At temperatures below -75 oF the anomaly was consistently repeated. The valve failures were attributed to the inability of the closing spring to overcome the excessive magnetic latching forces under cold-flow conditions. A cold- flow screening test was baselined for each isolation valve to be performed at OMDP to screen out any valves with this problem. S/N 20 had successfully passed its cold-flow screening test. Analysis performed during the mission could not identify any common failure mode that would have caused this problem and the false-closed indication problem experienced on this same valve (IFA STS-71-V-05). Postflight inspection revealed that the lug which fastened the valve command path ground wire to structural ground had been broken. The broken lug and ground wire were sent to Rockwell-Downey for failure analysis. This ground wire was not removed and replaced when valve S/N 8 was removed and replaced with S/N 20. CAUSE(s)/PROBABLE Cause(s): The STS-71 H2 manifold valve 1 failure-to-close was caused by a broken grounding lug which introduced a discontinuity in the valve command circuit. Failure analysis showed that a crack had been induced during installation, had grown due to cyclic movement, and finally broke in one final event. The final break involved more than half of the original material thickness, and the surfaces of the final break appeared fresh. This indicates that there was no intermittant contact before the failure, and that the failure most likely occurred during the STS-71 flow. CORRECTIVE_ACTION: The broken grounding lug was removed and replaced. RATIONALE FOR FLIGHT: The grounding lug has been removed and replaced. Even if the failure recurs, a second manifold isolation valve is available. No external leak requiring the closure of manifold isolation valves has occurred in the history of the Shuttle Program.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:**	Problem	**FIAR**	**IFA** STS-71-V-03	MPS
	GMT:		**SPR** 71RF02	**UA**	**Manager:**
			IPR 74V-0005	**PR**	x39037
					Engineer:

Title: Slow Closure Of MPS E1 LH2 Recirc Valve (ORB)

Summary: INVESTIGATION/DISCUSSION: During the STS-71 terminal count down, the LH2 Space Shuttle Main Engine (SSME) 1 Recirculation Valve (PV14) was slow to close. The cycle times were 3.19 seconds switch-to-switch and 4.282 seconds signal-to- switch. The maximum allowed times are 1.1 sec switch-to-switch and 2.0 seconds signal-to-switch.

BACKGROUND Approximately 15 minutes after the liquid level reaches 5% in the LH2 tank, the LH2 Recirculation Valves are opened to support LH2 Recirculation Pump operation. One valve per engine system is opened pneumatically by energizing a single 3-way solenoid valve, LV36. The recirculation valves remain open until T-9.5 seconds when LV36 is de-energized and the recirculation valves are spring-loaded closed. The recirculation valve is a simple ball valve which rotates 90 degrees about a shaft which is geared to a pneumatic piston actuator. STATUS Following the landing of STS-71, a number of tests and inspections were performed on the LH2 recirculation system. An inspection of LV36 and PV14 foaming was done to verify that the LV36 vent port was not plugged and that PV14 foam was not excessive.

Either of these conditions could potentially cause a slow closure. No anomalous conditions were noted. Next, a number of cycle tests were performed at ambient conditions. All timings were within requirements. The valve was then removed and sent to NSLD for additional testing. Timing, internal and external leakage, and shaft seal leakage tests were performed at both ambient and LN2 temperatures with no anomalies noted. The valve was then sent to Rockwell-Downey for LH2 testing. Part of this testing included a moisture added purge which was a purge, vent and drain (PV&D) issue during the loading of STS-71. During the first launch attempt a waiver was taken to allow an excessive water vapor content in the Orbiter aft. This additional moisture was due to an obstructed chiller water sump. It was during the moisture added testing that the failure was repeated. It is believed at this time that moisture is entering through the actuator vent port and potentially causing binding of the mechanism. Further testing and teardown of the valve are being discussed. CRITICALITY The recirculation valves are criticality 1R2 for failure to close/remain closed. If an SSME experiences an uncontained shutdown, recirculation valve closure is critical to prevent hydrogen from reaching a potentially flammable area. Four similar valve designs exist in seven other locations. All of these configurations carry criticalities of 1R2 or 1R3. CAUSE(s)/PROBABLE Cause(s): The slow closure of the recirculation valve is most likely due to moisture entering through the actuator vent port and causing binding of the mechanism. CORRECTIVE_ACTION: The recirculation valve was removed and replaced. The failed valve was sent to NSLD and then on to Rockwell-Downey for further testing. The failure analysis will be documented in corrective action report 71RF02. RATIONALE FOR FLIGHT: The recirculation valve was removed and replaced. The valve slugishness can be prevented on future flights by maintaing the proper purge air water content specifications.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:**	Problem	**FIAR**	**IFA** STS-71-V-04	MPS
	GMT:		**SPR** 71RF03	**UA**	**Manager:**
			IPR	**PR**	x39037
					Engineer:

Title: Main Engine 3 GH2 Flow Control Valve Sluggish (ORB)

Summary: INVESTIGATION/DISCUSSION: The Space Shuttle main engine (SSME) 3 gaseous hydrogen (GH2) flow control valve (FCV) cycles were slow during the last half of ascent. Three of this valve's 57 cycles between its low-flow and high-flow positions were 0.3 to 0.4 second in duration, exceeding the 0.3-second maximum specification. Ten other cycles were slower than normal. This sluggishness did not affect overall GH2 system performance.

Assessments of prior occurrences of similar anomalies determined that FCV cycling can become sluggish due to contaminants that accumulate in the valve and cause increased friction. A program to periodically refurbish FCVs was established, and modifications of the GH2 pressurization system were developed to control contamination. The first phase of these system modifications, replacement and reorientation of the FCV manifold, is being accomplished on OV- 104 during this flow. Additionally, all three FCVs have been removed and sent to the vendor for refurbishment, and three refurbished FCVs will be installed in the reoriented manifold. CAUSE(s)/PROBABLE Cause(s): The most probable cause for slow FCV cycling between the high-flow and low-flow positions is an accumulation of contaminants within the valve. The cause will be verified during valve refurbishment at the vendor. CORRECTIVE_ACTION: A program to periodically refurbish FCVs is in place, and modifications to the GH2 pressurization system to control contamination are planned. The first phase of these system modifications, replacement and reorientation of the FCV manifold, will be accomplished on OV-104 during this flow. Additionally, all three FCVs have been removed and sent to the vendor for refurbishment, and three refurbished FCVs will be installed in the reoriented manifold. RATIONALE FOR FLIGHT: The valves are currently removed from the vehicle and replaced after three flights. Additionally, if any sluggishness is noted in a valve, that valve is removed at the next opportunity. The sluggishness of one FCV will not affect system performance, and hard failure (fail-open or fail- closed) of a valve is managed by system redundancy.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:**	Problem	**FIAR**	**IFA** STS-71-V-05	FC/PRSD
EGIL-03	**GMT:**		**SPR** 71RF04	**UA**	**Manager:**
			IPR 74V-0007	**PR**	x39048
					Engineer:

Title: PRSD H2 Manifold 1 Valve False-Closed Indication (ORB)

Summary: INVESTIGATION/DISCUSSION: The PRSD H2 manifold 1 valve (S/N 20) indicated closed at 182:01:34:25 G.m.t. (3/06:02;06 MET), setting off a fault detection and annunciation alarm. The crew commanded the valve to “OPEN”, but the indicator did not change. The switch talkback, which is actuated by the same circuit as the software indicator, also showed a closed indication. This was verified as a false-closed indication since the H2 manifold 1 pressure continued to track the H2 tank 5 pressure after the heaters came on in tank 5. At 182:11:09:03 G.m.t. (3/15:36:44 MET), the valve position indication switched back to “OPEN”. This false-closed failure recurred five times during the remainder of the mission, ranging in duration from less than two minutes to more than thirteen hours.

This phenomenon has been experienced twice before during flight (ref IFA’s STS- 48-V03 and STS-56-V-02) on fuel cell reactant valves which are of identical design to the manifold valves. The causes of these problems could not be determined. Analysis performed during the mission could not identify any common failure mode that would have caused this problem and the failure-to-close problem experienced on this same valve (IFA STS-71-V-02). Postflight troubleshooting failed to recreate the problem. CAUSE(s)/PROBABLE Cause(s): The exact cause of the problem is unknown since the problem could not be recreated. The most probable cause is an intermittent open condition in the valve status indicator circuit. CORRECTIVE_ACTION: None. Fly as-is. RATIONALE FOR FLIGHT: The presence of a false manifold valve closed indication does not affect fuel cell or PRSD operation.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:**	Problem	**FIAR**	**IFA** STS-71-V-06	AIRLOCK
EECOM-01	**GMT:**		**SPR**	**UA**	**Manager:**
			IPR N/A	**PR**	x38876
					Engineer:

Title: Low Vestibule Depress Rate (ORB)

Summary: INVESTIGATION/DISCUSSION: At 184:19:59 G.m.t. (06:00:27 MET), the vestibule depressurization began. Low flow was observed when the primary depressurization valves were opened. After the low flow was noted, the secondary depressurization valves were also opened, but no change in flow rate occurred. The slow vestibule depressurization appeared to be due to a thermal insulation blanket blocking the depressurization valve port. The port is 1.5- inches in diameter with a debris screen across it. These blankets are mylar covered with tiny pin holes. The pin holes were allowing just enough air flow to vent the vestibule. In reviewing the drawings, no hole in the blanket was called out at the location of the valve port. The completed configuration with the blankets was never tested prior to flight. Vestibule depressurization during the undocking required 1.5 hours as opposed to the planned 5 minutes. When the pressure in the vestibule reached about 1.9 psia, the valves were closed and the hatch leak check was successfully performed. The valves were then reopened at 184:22:38 G.m.t. (06:03:06 MET), remained open overnight, and the vestibule vented completely. The thermal blanket drawing (V076-360104) now contains the cutout of the blanket over the depressurization valve port.

CAUSE(s)/PROBABLE Cause(s): The slow vestibule depressurization was caused by thermal insulation blanket blocking the valve port. CORRECTIVE_ACTION: The engineering drawing (V076-360104) for the thermal blankets have been modified and released on July 7, 1995, to ensure the proper configuration around the valve port. RATIONALE FOR FLIGHT: The engineering drawings have been changed to ensure proper configuration and allow proper depressurization.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:**	Problem	**FIAR**	**IFA** STS-71-V-07	OMS/RCS
PROP-01	**GMT:**		**SPR** 71RF05	**UA**	**Manager:**
			IPR	**PR** RP04-15-0498	x39030
					Engineer:

Title: RCS Thruster R2U Failed Off (ORB)

Summary: INVESTIGATION/DISCUSSION: At 187:11:23:27 G.m.t. (008:15:51:08 MET) reaction control subsystem (RCS) primary thruster R2U (S/N 224) was declared failed-off when used during the RCS hotfire. The thruster was deselected after 320 ms when the chamber pressure failed to exceed the deselect limit of 36 psia for three consecutive redundancy management (RM) cycles. The peak chamber pressure reached was 2.4 psia. This was the first attempted firing of this thruster during the mission.

The S/N 224 thruster had flown on 19 missions prior to STS-71, 11 of which were with the current -505C oxidizer-valve. The oxidizer valve main stage failed closed during the 18-month valve signature test during the Orbiter Maintenance Down Period (OMDP). The thruster was sent to White Sands Test Facility (WSTF) for flushing. Following the flush, the oxidizer valve failed its post-bake helium leak check with a leak rate of approximately 600 scch compared with a limit of 350 scch. After cycling the valve, the leak rate was approximately 200 scch during a subsequent leak check. Although it was not a requirement at the time, the valve was then subjected to a cold-temperature leak test (40 ?F) as a confidence check, and the leak rate increased to approximately 600 scch. After a return to ambient temperature, the valve leak rate returned to 200 scch. Due to a shortage of spares, the decision was made to accept the thruster based on the final leak check results. The S/N 224 thruster was installed into RP04 in the R2U position during the STS-66 flow. It was fired twice on STS-66 during the RCS hotfire and was not used again until its failure during the STS-71 RCS hotfire. The desiccant for thruster R2U was changed out, for the first time since the thruster's installation for STS-66, on May 8th, 50 days prior to launch. The desiccant was changed out every four to five days up until the week before flight when the rate increased to once a day. The desiccant changeout rates, while high just before launch, are considered in-family when compared to other thrusters in the fleet. To prevent contamination of other thrusters on the manifold during the removal and replacement (R&R) of R2U, all three thrusters on the manifold were removed and sent to WSTF. Thrusters R2R and R2D will be flushed and returned to spares. The failed thruster, R2U, will undergo valve cycle tests prior to the R&R of the oxidizer valve. Once repaired, the thruster will be flushed and returned to spares. The RP04 R2 manifold will be decontaminated prior to thruster installation. CAUSE(s)/PROBABLE Cause(s): The cause of the thruster fail-off was most probably metallic-nitrate contamination in the oxidizer-valve pilot-stage that prevented its proper operation. CORRECTIVE_ACTION: All three thrusters on the manifold, R2U, R2R, R2D were removed and sent to WSTF. The oxidizer valve on thruster R2U will be replaced and the thruster flushed. Thrusters R2R and R2D will be flushed. Following the flush procedures, all three thrusters will be returned to the spares inventory. RATIONALE FOR FLIGHT: System redundancy is adequate to support the failure rate of the primary RCS thrusters. There have been no changes to the thruster design or to the RCS turnaround processing procedures that would adversely affect this failure rate.

Tracking No	**Time**	**Classification**	**Documentation**		**Subsystem**
MER - 0	**MET:**	Problem	**FIAR**	**IFA** STS-71-V-08	C&T - S-Band
INCO-06	**GMT:**		**SPR** 71PR06	**UA**	**Manager:**
			IPR	**PR** COM-4-15-0181	
					Engineer:

Title: S-Band Transponder 2 Frame-Synch Dropouts ()

Summary: INVESTIGATION/DISCUSSION: During STS-71 on-orbit operations, network signal processor (NSP) frame synchronization (sync) dropouts were experienced using S- band transponder string 2 configured in Spacecraft Tracking and Data Network (STDN)-Hi mode for a landing-minus-one-day system checkout with the Merritt Island Launch Area (MILA) at 187:15:33 G.m.t. (08:20:01 MET). During this time, the receiver remained locked in coherent mode with nominal uplink signal strength, and NSP 2 maintained bit sync. NSP frame sync dropouts continued after commanding the system back to Tracking-and-Data-Relay-Satellite (TDRS) mode upon completion of the MILA pass. The dropouts were observed when the system was configured in STDN-Hi mode for a similar checkout with Dryden, but ceased during the checkout over Goldstone. When the communications system was returned to TDRS mode, dropouts were continuous.

A second Dryden/Goldstone checkout was performed with S-band transponder 1 cross-strapped to NSP 2 to isolate the anomalous hardware. Once modulation was dropped and re-applied, the NSP maintained frame sync lock without dropouts. When S-band transponder 2 was reselected, the dropouts resumed. The signature again repeated on transponder 2 during a zone of exclusion (ZOE) pass with Diego Garcia in space-to-ground-link-system (SGLS) mode. Frame sync locked and unlocked continuously causing commanding difficulty while configured to S-band transponder 2 during this pass, and a stored program command was used to return to transponder 1 at acquisition of signal with the West TDRS satellite. Transponder string 1 was used for the remainder of the flight. S-band transponder 2 (serial number 308) was removed and sent to the vendor for test, teardown, and evaluation. The vendor was able to reproduce the symptoms, and the failure has been isolated to the receive voltage control auxiliary oscillator (VCXO) in the transponder. The failure occurred only during transition in thermal cycle. A review of the failure history of the receive-VCXO revealed no identical failure modes. The VCXO will be returned to the supplier, where it will undergo further failure analysis. CAUSE(s)/PROBABLE Cause(s): The frame sync dropouts were caused by a thermally- induced failure of the receive-VCXO in transponder 2. CORRECTIVE_ACTION: S-band transponder 2 (s/n 308) was removed and sent to the vendor for test, teardown, and evaluation. The replacement transponder was successfully retested. The receive-VCXO was determined to be the cause of the failure, and it has been removed and will be returned to the supplier. The receive-VCXO will be replaced. After the transponder undergoes acceptance test procedures, it will be returned to flight status. RATIONALE FOR FLIGHT: S-band transponder s/n 308 was removed and replaced. No indication of a generic failure cause has been identified, and adequate communications system redundancies are available.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:**	Problem	**FIAR**	**IFA** STS-71-V-09	APU
MMACS-04	**GMT:**		**SPR** 71RF07	**UA**	**Manager:**
			IPR 74V-0008	**PR**	
					Engineer:

Title: APU 3 Excessive Repressurization (ORB)

Summary: INVESTIGATION/DISCUSSION: Approximately 21 minutes after the auxiliary power unit (APU) 3 start for entry, the GN2 bottle pressure (V46P0352A) dropped from 180 psia to 35 psia as a result of numerous gearbox GN2 pressure transducer dropouts (V46P0351A). The APU gearbox must have a positive pressure present to prevent lube oil pump cavitation during APU operation. The gearbox pressure is monitored by the APU controller. If the gearbox pressure falls below 5.35 +/- 0.9 psia, the controller sends a signal to the gearbox GN2 repressurization valve to open until gearbox pressure increases 2.07 psia above the activation point, with 9.22 psia as the maximum valve de-energize pressure. The controller will signal the valve to open anytime the gearbox pressure indicates a low value, even in cases of erratic gearbox pressure outputs similar to the numerous instances that occurred during the STS-71 entry. Approximately 80 percent of the GN2 bottle was dumped into the gearbox before pressure equalization occurred. This excessive repressurization caused the gearbox pressure to rise over 30 psi; whereas a normal repressurization should increase the gearbox pressure to about 10 psi. The APU continued to operate nominally with no effect on performance. APU s/n 310 was installed on OV-104 (flight 14) in position 3. This was the first mission of APU s/n 310 since delivery to KSC on January 11, 1995. Gearbox pressure transducer p/n 58740-1, s/n V4B001 was installed on APU s/n 310 at Sundstrand on November 11, 1994. This same gearbox transducer p/n 58740-1, s/n V4B001 had been previously used on APU s/n 204 during STS-50 (OV- 102 flight 12, position 1). A similar gearbox re-pressurization occurred during entry on STS-50 (IFA STS-50-V-22, CAR 50RF13-1010, July 9, 1992).

KSC troubleshooting after STS-50 did not discover any problems with the wiring harness, connectors, pins, controller, transducer or lube oil ullage. The gearbox transducer was removed and returned to the vendor for failure analysis. The failure analysis of the gearbox pressure transducer consisted of a vendor acceptance test procedure (ATP), as well as testing under various vibration, thermal, and pressure conditions. These tests were performed with nominal results. The transducer was then returned to spares stock at the APU contractor. KSC troubleshooting after STS-71 found no anomalies in the signal conditioning circuit which would contribute to an intermittent output. Based on the prior unexplained anomaly of this same pressure transducer (s/n V4B001) and STS-71 troubleshooting, the transducer was replaced with a new transducer from Sundstrand stock. A similar erratic output has been observed in the past with this type of pressure transducer. Based upon this previous experience, no failure analysis will be performed on this pressure transducer. The most likely cause is a small crack or discontinuity in the wiring or solder joints internal to the transducer. The p/n 58740-1 pressure transducer resistor beam assembly was manufactured using a vapor film deposition method whereas the replacement transducer p/n 5908455-1 uses the sputter film deposition method.

CAUSE(s)/PROBABLE Cause(s): The multiple gearbox repressurizations experienced during entry are attributed to the APU gearbox pressure transducer (p/n 58740-1,s/n V4B001). This conclusion is based on the similarities of the output signals seen in the STS-50 and STS-71 missions, the prior unexplained condition of pressure transducer s/n V4B001 that occurred on STS-50, and the troubleshooting results after STS-71. CORRECTIVE_ACTION: KSC troubleshooting during turnaround operations found no anomalies in the signal conditioning circuit which would contribute to an intermittent output. Based on this troubleshooting and the previous unexplained anomaly of the pressure transducer (s/n V4B001) on STS-50, the transducer was replaced with a new transducer from the APU contractor stock. Due to the obsolescence of the s/n V4B001 pressure transducer and the subsequent redesign, no further corrective action will be taken. RATIONALE FOR FLIGHT: If a gearbox pressure transducer were to cause excessive repressurization, the APU will continue to operate nominally. This failure has no effect unless a subsequent gearbox leak occurs. Then, repressurization might not be available if the GN2 bottle has been depleted.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:**	Problem	**FIAR**	**IFA** STS-71-V-10	FC/PRSD
EGIL-04	**GMT:**		**SPR**	**UA**	**Manager:**
			IPR IPR 74V-0009	**PR**	x39048
					Engineer:

Title: PRSD O2 Tank 5 Heater Assy 1 Temperature Measurement Excursions and Associated Master Alarm (ORB)

Summary: INVESTIGATION/DISCUSSION: At 188:14:53 G.m.t., the power reactant storage and distribution (PRSD) subsystem O2 tank 5 heater assembly 1 temperature measurement (V45T1507A) began behaving erratically. The indicated temperature rose from approximately 60 ?F to 175, 210, and 245 ?F during three separate excursions with durations of 14 seconds, 4 seconds, and 18 minutes respectively, as indicated in the one sample-per-second (s/s) downlink data. The tank 5 heater assembly 2 and tank 5 fluid temperatures both remained at approximately 55 ?F during the heater-1 temperature excursions.

During one of the excursions, the crew reported a master alarm had occurred with no corresponding fault message. This has been attributed to the difference between the timing schemes in the software and the hardware caution and warning (C&W). The flight software annunciates a fault message if a parameter is out of limits (greater than 350 ?F in this case) for two consecutive samples with a 1 s/s rate. The anomalous excursions did not exceed the software limit long enough for the fault message to be annunciated. However, the hardware C&W samples the data at 80 s/s and annunciates the master alarm after eight consecutive violations (0.1 second). It is believed that the excursion actually exceeded 350 ?F, even though the 1 s/s downlink did not capture a limit violation. As a result, the excursion resulted in the master alarm. This phenomenon has been evaluated and is acceptable. Other parameters may result in a similar signature (master alarm with no fault message). Almost all of the 120 hardwired C&W parameters are analog in nature and have essentially no exposure to real transient operation as witnessed in this problem during STS-71. Therefore, the filter design to protect against the transients is minimal. The light matrix on panel F7 responds only as long as the parameter is out of limits. As a result, the crew cannot use this matrix as a backup to the message to determine the cause of the master alarm. However, the parameter is latched in the hardware C&W and can later be traced when the procedure to check it is performed by either the crew or ground personnel. The crew has accepted the situation and will treat subsequent similar occurrences as transient conditions that have recovered or as instrumentation in nature. Troubleshooting of the sensor, wiring, and signal conditioner was performed during vehicle turnaround at the Kennedy Space Center. A Megger check of the sensor and wiring in the tank did not identify any problems. A hipot and wiggle test of the cable between the sensor and the signal conditioner also showed no problems. A hipot test of the cable between the signal conditioner and the multiplexer/demultiplexer (MDM) was not performed due to the extensive checkout required following the test, but this cable was wiggled with no problems identified. A test signal was injected into the dedicated signal conditioner with nominal results. No cause for the excursions has been found. A simple short in the wiring, sensor, or signal conditioner circuitry is not likely due to the lengthy duration and signature of the spikes. The most likely cause is either a complex short between wires that allows another signal, unrelated to the subject temperature measurement, to appear on this channel; or an electrical connection, within a part such as a resistor or capacitor, which partially disconnects and reconnects with temperature changes, causing the part to change value. Of the two scenarios, the complex short is the worse case. Since no further work to isolate the cause of the failure is scheduled, it is likely to remain unexplained. The community has been unable to correlate the anomalous behavior of V45T1507A with an anomaly on any other measurement. Therefore, it is believed that, if a complex short is the cause, a recurrence of this anomalous behavior will not affect any other measurements. If the faulty electrical connection is the cause, no other measurements would be affected by a recurrence. No similar signatures have been observed before. Intermittent electrical connections do occur, but usually respond to vibration, as from liftoff, landing, or main engine cutoff. Since this was not the case, this failure is not considered similar to the previous occurrences. A review of the failure history of the type of signal conditioner used in this application revealed nine previous electrical-connection type problems in the card, but none had a signature similar to that observed during STS-71. No complex short in the Orbiter instrumentation system has occurred previously. Should the problem recur during flight, the outcome depends on the particular measurement affected and the actual cause of the discrepancy. Assuming the complex-short scenario, the worst case is the failure of a criticality 1 measurement or signal due to a short with the wiring for V45T1507A. This is unlikely because the long duration of this anomaly provided sufficient opportunity to observe anomalous behavior in other measurements and none was noted. CAUSE(s)/PROBABLE Cause(s): The most likely cause is either a complex short between wires that allows another signal, unrelated to the subject temperature measurement, to appear on this channel; or an electrical connection, possibly within a resistor or capacitor, which partially disconnects and reconnects with temperature changes. CORRECTIVE_ACTION: Testing at KSC did not reveal the cause of the anomalous data, and no corrective action has been taken. RATIONALE FOR FLIGHT: The worst-case failure of a criticality 1 measurement or signal due to a short with the wiring for V45T1507A is unlikely because of the long duration of this anomaly. If any other measurement were going to be affected by this problem, it would have most likely occurred during this particular event.