STS-126
MMT L-2 DAY REVIEW
ORBITER PROJECT (MV)
Multifunctional Display Unit Error

November 12, 2008
OV-105 CRT2 MEDS 1553
Bus Error
Bus Error

Observation:

- Multifunction display unit (MDU) CRT2 annunciated to integrated display processor 2 (IDP) minor error message “CRT2 MEDS 1553 bus error” on numerous power ups starting on 10/31/08
  - Error message indicates a transient, self-clearing loss of communication with its IDP during power up when using the ground processing technique
  - IDP error log indicates error due to “busy bit” in MDU status response and not the result of a 1553 bus transmission error
  - Function of IDP and CRT unaffected by the message

Concern:

- Progression of observed signature to a condition that results in loss of MDU functionality
OV-105 CRT2 MEDS 1553
Bus Error

Background:

• MEDS hardware installed in OV-105 has been installed and successfully flown for 2 flights (18 total for fleet)
• MEDS IDP software recently upgraded to VI 6.00
  • Significant SAIL runtime has not encountered this bus error problem
  • OV-103 software upgraded in mid Sept 08
    • No problems have been noted to date
  • OV-105 software upgraded in mid Oct 08
• On 10/31/08, bus error messages began to be issued only on CRT2/IDP 2
• CRT 2 MDU S/N 523 replaced with S/N 531 on 11/07/08
• Same error messages have continued to be issued at power up and during troubleshooting approximately 50% of the time following R&R
OV-105 CRT2 MEDS 1553
Bus Error

Risk Assessment:

• MEDS PRT highly confident that the source of the errors is not resident in the IDP

• Integrated review with EPDC PRT has identified other potential causes of the errors
  
  • Dedicated remote power controller (RPC) located in forward power control assembly 2 (FPCA)
    
    • Transient voltage drop during power up would explain the signature
    • No transients during steady state operations have been observed
    • Only function of this RPC is to provide power to MDU CRT 2
  
  • IDP2/CRT 2 Switch
    
    • Error only occurs when power is applied via this switch
    • Observed failure mode is not typical for this component
  
  • The anomaly has only occurred during IDP2/CRT2 power-up and has never occurred during steady state operation
  
  • The anomaly as seen to date would not affect flight operations and would be transparent to the crew
  
  • No other problems noted with the FPCA 2 bus, MDU/CRT 2, or the wire paths
Risk Assessment:

• Effect of observed signature is benign
• Redundancy for CRT 2 is provided through CRT 1 & 3
  • 4 other non-CRT MDUs could be reconfigured to pick up CRT 2 functionality
• Criticality of the CRT MDU is 1R3 for loss of function
• LCC requires scrub for loss of CRT
• LCC for recurrence of error message requires:
  • Single event – continue
  • Multiple events - scrub
• Flight rule impact for first failure on-orbit is NEOM
• IFM available to replace CRT 2 with CRT 4 or AFD 1 in event of hard fail
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Bus Error

Flight Rationale:
• Error only occurs during a particular power on sequence that is used exclusively during ground processing
• Error message is nuisance only, transient / self-clearing, is transparent to the crew, and does not impact hardware functionality
• Adequate redundancy exists for worst case failure causing complete loss of this CRT MDU slot

Recommendation
• Accept observed signature for STS-126 and defer further troubleshooting to STS-127 flow