



# STS-117 MDM OA2 Card 5 Failure Impacts BFS

Boeing  
Flight Systems & Software Engineering

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# STS-117 MDM OA2 Card 5 Failure Impacts - BFS

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- ◆ **The failure of MDM OA2 Card 5 results in the loss of all data from the MDM for the BFS**
  - **BFS fetches its 90 words from the MDM in one transaction**
    - **Includes data from Card 5**
    - **49 words are used in OPS 0 and/or 3**
  - **The “E” bit error on the Card 5 data causes BFS to terminate its input transaction, and mark all data from the MDM as invalid**
  - **BFS SM processing for display or FDA checks the data validity flag**
  - **If the validity flag is set (bad data), BFS SM processing:**
    - **Bypasses calculation of new values for display**
    - **Sets the display field’s associated status indicator to “M”**
    - **Bypasses any FDA processing**

# STS-117 MDM OA2 Card 5 Failure Impacts - BFS

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- ◆ **3 of the 49 words used affect FDA indirectly**

- **V75M3736P (parent) bit 2 (V46S1127E – APU 1 INJECTOR COOL CMD B)**
  - **Used in APU\_SPD to start the 210s timer for FDA on APU 1 COOL DOWN alert**
- **V75M3740P (parent) bit 4 (V46S0226E – APU 2 START/RUN CMD A)**
  - **Used in APU\_SPD to start the 10s timer for FDA on APU 2 for turbine speeds during start-up**
    - **Result is no low limit speed annunciation**
- **V75M3751P (parent) bit 2 (V46S0129E – APU NO 1 SPEED SELECT-HIGH CMD)**
  - **Used in APU\_SPD to change FDA upper limit for APU 1 turbine speeds to 122% for high-speed operation**
    - **Result is annunciation during high-speed operation**

# STS-117 MDM OA2 Card 5 Failure Impacts - BFS

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- ◆ **Effects of loss of MDM OA2 data**
- ◆ **The remaining 46 words used directly affect display and/or FDA processing**
  - **Status indicators are set to “M” (missing) on BFS cockpit displays**
  - **The affected displays and fields affected are:**
    - **GNC System Summary 2 (GNC SPEC 19)**
      - **OMS R FU INJ T**
    - **SM System Summary 2 (SM SPEC 79)**
      - **APU 1 B/U EGT, OIL OUT, SPEED %**
      - **APU 2 TEMP EGT, OIL IN, GG BED, INJ, SPEED, FUEL QTY, OIL OUT P**
      - **HYD 1 PRESS**
      - **HYD 2 ACUM P, RSVR T, QTY**
      - **EVAP OUT T 1**

# STS-117 MDM OA2 Card 5 Failure Impacts - BFS

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- ◆ **Effects of loss of MDM OA2 data (cont'd)**
  - **Affected displays and parameters are: (cont'd)**
    - **Thermal (SM)**
      - **HYD SYS TEMP PRIME BDYFLP, L OB**
      - **HYD SYS TEMP STBY BDYFLP, R OB**
      - **HTR TEMP PRPLT POD C, D, F**
      - **HTR TEMP EVAP A NOZ**
      - **HYD BLR/HTR 3**
      - **GG/FU PMP HTR 2 A, B, C, E**
      - **APU TK/FU LN HTR 1 A, D**
      - **APU TK/FU LN HTR 2 B, C**
      - **APU TK/FU LN HTR 3 E**
      - **PUMP/VLV 2 A**
      - **LEFT,RIGHT IB,OB TIRE PRESSURE 2**

# STS-117 MDM OA2 Card 5 Failure Impacts - BFS

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- ◆ **Effects of loss of MDM OA2 data (cont'd)**
  - **Fault Annunciation processing on the affected parameters is not performed, therefore no messages will be annunciated when parameters exceed established limits**
    - **Many BFS Fault messages are driven by multiple parameters which may come from different sources**
    - **The following messages will appear if FDA limits are exceeded by parameters from sources other than MDM OA2**

# STS-117 MDM OA2 Card 5 Failure Impacts - BFS

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## ◆ Effects of loss of MDM OA2 data (cont'd)

### - Fault Annunciation messages that will not be set:

|                                     |         |   |
|-------------------------------------|---------|---|
| - SM0 THRM PRPLT                    | OPS 0/3 |   |
| - SM0 THRM APU                      | OPS 0/3 |   |
| - R OMS TEMP                        | OPS 3   | * |
| - SM2 APU 2                         | OPS 0/3 |   |
| - SM2 APU SPD HI, LO 2              | OPS 0/3 | * |
| - APU 2 COOL DOWN                   | OPS 0/3 | * |
| - SM2 APU TEMP 1, 2                 | OPS 0/3 |   |
| - SM0 TIRE PRESS ROB, RIB, LOB, LIB | OPS 3   |   |
| - SM2 HYD PRESS 1                   | OPS 0/3 | * |

# STS-117 MDM OA2 Card 5 Failure Impacts - BFS

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## ◆ Effects of loss of MDM OA2 data (cont'd)

### - Fault Annunciation messages that will not be set: (cont'd)

|                    |         |   |
|--------------------|---------|---|
| - SM0 THRM HYD     | OPS 0/3 |   |
| - SM2 EVAP OUT T 1 | OPS 0/3 | * |
| - SM0 THRM EVAP    | OPS 0/3 |   |
| - CRG SPLY T       | OPS 0/3 | * |
| - CRG ACCUM LN T   | OPS 0/3 | * |
| - SM2 W/B QTY 2, 3 | OPS 0/3 | * |
| - SM2 HYD QTY 2    | OPS 0/3 | * |
| - SM2 HYD RSVR T 2 | OPS 0/3 | * |
| - SM2 HYD ACUM P 2 | OPS 0/3 | * |
| - SM2 APU SPD HI 2 | OPS 0/3 | * |

\* Messages that will not be annunciated. Other messages may be annunciated by data from other than MDM OA2 exceeding limits



# STS-117 MDM OA2 Card 5 Failure Impacts - BFS

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- ◆ **Effects of loss of MDM OA2 data (cont'd)**
  - **BFS downlist of any included parameter, either directly or indirectly through other calculations will be static or incorrect**
  - **Affected BFS downlist words:**
    - **V98Q1951C – APU 2 FUEL TK QTY**
    - **V98Q1971C – HYDR SYS 2 H2O BLR FL QTY**
    - **V98Q1972C – HYDR SYS 3 H2O BLR FL QTY**
  
- ◆ **Downlink stream from the PCMMU is unaffected**
  - **Only Card 5 data will be affected**

# STS-117 MDM OA2 Card 5 Failure Impacts - BFS

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- ◆ **Effects of loss of MDM OA2 data (cont'd)**
  - **At BFS activation, I/O errors for OA2 and an associated Fault message will be annunciated**
    - **“E” bit error on BCE Element x'51' (OA2) I/O error message will be logged in I/O Error log (downlist only)**
    - **I/O ERROR PCM fault message**
  
- ◆ **Other than the effects listed, the BFS will remain fully operational with the loss of MDM OA2**

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# BACKUP DATA

**BFS OA2 Parameter List**  
**BFS Displays Affected**

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# BFS OA-02 Parameter List

**Items highlighted and in bold text are applicable to  
OPS 0 and/or OPS 3**

**BFS Impacts for PCM OI DATA --- MDM OA2**

| MSID             | PCM ADDR    | Nomenclature                            | Impact  |
|------------------|-------------|---|---|
| V41P1260A        | 61          | MPS E2 GH2 PRESS OUTLET PRESS           | GH2 OUT P on GNC SYS SUMM 1, 465 - MPS H2 OUT P L (OPS 1 (MM102-MM106) and 6)   |
| V41P1650A        | 110         | MPS PNEU ACCUM PRESSURE                 | MPS PNEU HE P ACUM on GNC SYS SUMM 1, 462 - MPS PNEU P ACUM (OPS 1 and 6)   |
| V41T1271A        | 164         | MPS E2 GO2 PRESS OUTLET TEMP            | GO2 OUT T on GNC SYS SUMM 1, 469 - MPS O2 OUT T L (OPS 1 (MM102-MM106) and 6)   |
| V42T3204A        | 2334        | RCS R AFT OX MANF TEMP-1                | Acquired from MDM OA2 during cyclic reads but not used.   |
| <b>V43T5216A</b> | <b>2367</b> | <b>OMS-R POD OXDZR ENG INLET TEMP</b>   | <b>HTR TEMP PRPLT POD C on THERMAL, 148 - SMO THRM PRPLT (On-Orbit OPS0, MM104-106, MM301-303)</b>  |
| V43T5315A        | 2316        | OMS-R POD FU TANK TEMP-LOWER            | Acquired from MDM OA2 during cyclic reads but not used.   |
| V43T5641A        | 2333        | OMS-R ENG OX VLV TEMP                   | Acquired from MDM OA2 during cyclic reads but not used.   |
| <b>V43T5643A</b> | <b>2315</b> | <b>OMS-R ENG FUEL INJECTOR TEMP</b>     | <b>FU INJ T R on GNC SYS SUMM 2, 324 - R OMS TEMP (OPS 1 and 3)</b>   |
| V43T5703A        | 2323        | OMS R POD UPPER Y-WEB INBD TEMP         | Acquired from MDM OA2 during cyclic reads but not used.   |
| <b>V43T5704A</b> | <b>2324</b> | <b>OMS R POD OX DRAIN PNL TEMP 1</b>    | <b>HTR TEMP PRPLT POD D on THERMAL, 148 - SMO THRM PRPLT (On-Orbit OPS0, MM104-106, MM301-303)</b>  |
| <b>V43T5705A</b> | <b>2325</b> | <b>OMS R POD OX DRAIN PNL TEMP 2</b>    | <b>HTR TEMP PRPLT POD F on THERMAL, 148 - SMO THRM PRPLT (On-Orbit OPS0, MM104-106, MM301-304)</b>  |
| V43T6219A        | 2319        | OMS-AFT FUSLG XFD R GIMBAL LINE TEMP    | Acquired from MDM OA2 during cyclic reads but not used.   |
| V43T6244A        | 2362        | OMS-AFT FUSLG OX XFD LINE R TEMP        | Acquired from MDM OA2 during cyclic reads but not used.   |
| V45T0699A        | 2336        | FCP H2 VENT LINE TEMP 1                 | Acquired from MDM OA2 during cyclic reads but not used.   |
| <b>V46P0200A</b> | <b>2352</b> | <b>APU 2 FUEL TANK PRESS</b>            | <b>Used in APU 2 Fuel Qty calculation to initialize Fuel Tank Pressure. APU FUEL QTY 2 on SM SYS SUMM 2, 161 - SM2 APU 2 (OPS 0,1,3,6). There is a TMBU available (APU 2 Press Out Flag) that allows Fuel Tank Outlet Pressure to be substituted for Fuel Tank Pressure. BFS downlists V98Q1951C for APU 2 Fuel Tank Qtv.</b> |
| <b>V46P0205A</b> | <b>2331</b> | <b>APU 2 FUEL TANK OUTLET PRESS</b>     | <b>Used in APU 2 Fuel Qty calculation to initialize Fuel Tank Pressure. APU FUEL QTY 2 on SM SYS SUMM 2, 161 - SM2 APU 2 (OPS 0,1,3,6). There is a TMBU available (APU 2 Press Out Flag) that allows Fuel Tank Outlet Pressure to be substituted for Fuel Tank Pressure. BFS downlists V98Q1951C for APU Fuel Tank Qtv.</b>   |
| V46P0251A        | 2354        | APU 2 GEARBOX GN2 PRESS                 | Acquired from MDM OA2 during cyclic reads but not used.   |
| <b>V46P0253A</b> | <b>2370</b> | <b>APU 2 GEARBOX LUBE OIL OUT PRESS</b> | <b>APU OIL OUT P 2 on SM SYS SUMM 2, 161 - SM2 APU 2 (OPS 0,1,3,6)</b>  |
| <b>V46R0235A</b> | <b>2353</b> | <b>APU 2 TURBINE SPEED</b>              | <b>APU SPEED 2 on SM SYS SUMM 2, 57/61/205 - SM2 APU SPD HI/LO 2 (OPS 0,1,3,6), 488 - APU 2 COOL DOWN (OPS 0,1,3,6)</b>   |

|           |      |                                    |  |
|-----------|------|------------------------------------|--|
| V46T0104A | 2363 | APU 1 FUEL LINE TEMP NO 2          | APU TK/FU LN HTR 1A on THERMAL, 152 - SM0 THRM APU (OPS 0,1,3,6)   |
| V46T0140A | 2379 | APU 1 TURBINE EXHAUST TEMP NO 2    | APU B/U EGT 1 on SM SYS SUMM 2, 120 - SM2 APU TEMP 1 (OPS 0,1,3,6). Limits set Off-Scale.  |
| V46T0154A | 2320 | APU 1 GEARBOX LUBE OIL OUT TEMP    | APU OIL OUT 1 on SM SYS SUMM 2, 161 - SM2 APU 2 (OPS 0,1,3,6)  |
| V46T0184A | 2322 | APU 1 FUEL SERVICE LINE TEMP       | APU TK/FU LN HTR 1D on THERMAL, 152 - SM0 THRM APU (OPS 0,1,3,6)   |
| V46T0202A | 2335 | APU 2 FUEL TANK SURFACE TEMP       | Used in APU 2 Fuel Qty calculation to initialize Fuel Tank Temperature. APU FUEL QTY 2 on SM SYS SUMM 2, 161 - SM2 APU 2 (OPS 0,1,3,6). There is a TMBU available (APU 2 Temp Out Flag) that allows a Fuel Tank Temp constant to be substituted for Fuel Tank Surface Temp. BFS downlists V98Q1951C for APU 2 Fuel Tank Qty. |
| V46T0208A | 2339 | APU 2 FUEL LINE TEMP NO 1          | APU TK/FU LN HTR 2B on THERMAL, 152 - SM0 THRM APU (OPS 0,1,3,6)   |
| V46T0212A | 2378 | APU 2 FUEL PUMP DISCHARGE TEMP     | APU GG/FU PMP HTR 2C on THERMAL, 152 - SM0 THRM APU (OPS 0,1,3,6)  |
| V46T0222A | 2342 | APU 2 GAS GENERATOR BED TEMP       | APU GG BED 2 on SM SYS SUMM 2, 152 - SM0 THRM APU (OPS 0,1,3,6)  |
| V46T0228A | 90   | APU 2 FUEL LINE TEMP NO 3          | APU TK/FU LN HTR 2E on THERMAL, 152 - SM0 THRM APU (OPS 0,1,3,6)   |
| V46T0242A | 2330 | APU 2 TURBINE EXHAUST TEMP 1       | APU TEMP EGT 2 on SM SYS SUMM 2. Alarm class set to 0 (no alarm).  |
| V46T0250A | 2321 | APU 2 GEARBOX LUBE OIL RETURN TEMP | APU OIL IN 2 on SM SYS SUMM 2, 121 - SM2 APU TEMP 2 (OPS 0,1,3,6)  |
| V46T0261A | 2368 | APU 2 GEARBOX BEARING TEMP NO 1    | Acquired from MDM OA2 during cyclic reads but not used.  |
| V46T0274A | 133  | APU 2 INJ TUBE TEMP                | APU INJ 2 on SM SYS SUMM 2, 152 - SM0 THRM APU (OPS 0,1,3,6)   |
| V46T0283A | 2381 | APU 2 FUEL TEST LINE TEMP 1        | APU TK/FU LN HTR 2C on THERMAL, 152 - SM0 THRM APU (OPS 0,1,3,6)   |
| V46T0292A | 169  | APU 2 FUEL PUMP TEMP               | APU PMP/VLV 2A on THERMAL. Alarm class set to 0 (no alarm).  |
| V46T0386A | 2343 | APU 3 FUEL PUMP DRAIN LINE TEMP 1  | APU TK/FU LN HTR 3E on THERMAL, 152 - SM0 THRM APU (OPS 0,1,3,6)   |

|           |      |                                    |  |
|-----------|------|------------------------------------|--|
| V51P0472A | 34   | MLG RH OUTBD TIRE PRESS 2          | TIRE PRESS MG RIGHT OB on THERMAL, 143 - SMO TIRE PRESS ROB (OPS 3,6)  |
| V51P0473A | 38   | MLG RH INBD TIRE PRESS 2           | TIRE PRESS MG RIGHT IB on THERMAL, 142 - SMO TIRE PRESS RIB (OPS 3,6)  |
| V51P0572A | 26   | MLG LH OUTBD TIRE PRESS 2          | TIRE PRESS MG LEFT OB on THERMAL, 141 - SMO TIRE PRESS LOB (OPS 3,6)   |
| V51P0573A | 27   | MLG LH INBD TIRE PRESS 2           | TIRE PRESS MG LEFT IB on THERMAL, 140 - SMO TIRE PRESS LIB (OPS 3,6)   |
| V57T0018A | 126  | BDY FLAP PDU TEMP                  | Acquired from MDM OA2 during cyclic reads but not used.  |
| V58P0115A | 2373 | HYD SYS 1 SUPPLY PRESS B           | HYD PRESS 1 on SM SYS SUMM 2, 104 - SM2 HYD PRESS 1 (OPS 0,1,3,6)  |
| V58P0231A | 2329 | HYD SYS 2 RSVR FLUID PRESS         | Acquired from MDM OA2 during cyclic reads but not used.  |
| V58P0237A | 2359 | HYD SYS 2 CIRC PUMP PRESS          | Acquired from MDM OA2 during cyclic reads but not used.  |
| V58P0247A | 2358 | HYD SYS 2 H2O BLR GN2 TANK PRESS   | Used in WSB 2 Qty calculation to initialize GN2 tank pressure. W/B H2O Qty 2 on SM SYS SUMM 2. 197 - SM2 W/B QTY 2 (OPS 0, 1, 3, 6). BFS downlists V98Q1971C.  |
| V58P0304A | 2357 | HYD SYS 3 H2O BLR GN2 REG OUTLET P | Used in WSB 3 Qty calculation to initialize GN2 regulator outlet pressure. W/B H2O Qty 3 on SM SYS SUMM 2. 198 - SM2 W/B QTY 2 (OPS 0, 1, 3, 6). BFS downlists V98Q1972C.                                    |
| V58Q0202A | 2356 | HYD SYS 2 RSVR FLUID VOLUME        | HYD QTY 2 on SM SYS SUMM 2, 189 - SM2 HYD QTY 2 (OPS 0,1,3,6)  |
| V58T0169A | 29   | HYD SYS 1 BODY FLAP RTN LN T 1     | HYD SYS TEMP BODYFLP PRIME on THERMAL.   |
| V58T0194A | 170  | HYD SYS 1 ROE RTN LNT              | Referenced in FDASDT. Alarm class set to 0 (no alarm).   |
| V58T0198A | 2380 | HYD SYS 1 RSB RETURN LINE TEMP     | Acquired from MDM OA2 during cyclic reads but not used.  |
| V58T0201A | 2317 | HYD SYS 2 RSVR FLUID TEMP          | HYD RSVR T 2 on SM SYS SUMM 2, 193 - SM2 HYD RSVR T 2  |
| V58T0206A | 91   | HYD SYS 2 H2O BLR GN2 TANK TEMP 2  | Used in WSB 2 Qty calculation to initialize GN2 tank temp only if WSB Controller B is powered ON (V58S0250E). W/B H2O Qty 2 on SM SYS SUMM 2. 197 - SM2 W/B QTY 2 (OPS 0, 1, 3, 6). BFS downlists V98Q1971C. |
| V58T0220A | 2340 | HYDR SYS 2 FLUID HEATER OUT TEMP   | Acquired from MDM OA2 during cyclic reads but not used.  |
| V58T0222A | 2382 | HYDR SYS 2 RETURN LINE TEMP        | Acquired from MDM OA2 during cyclic reads but not used.  |
| V58T0263A | 2365 | HYDR SYS 2 H2O BLR TEMP NO 2       | Acquired from MDM OA2 during cyclic reads but not used.  |
| V58T0264A | 92   | HYDR SYS 2 H2O BLR H2O TANK TEMP 2 | Used in WSB 2 Qty calculation to initialize W/B tank temp only if WSB Controller B is powered ON (V58S0250E). W/B H2O Qty 2 on SM SYS SUMM 2. 197 - SM2 W/B QTY 2 (OPS 0, 1, 3, 6). BFS downlists V98Q1971C. |
| V58T0266A | 2366 | HYDR SYS 2 H2O BLR VENT TEMP NO 2  | Acquired from MDM OA2 during cyclic reads but not used.  |

|           |      |   |  |
|-----------|------|---|--|
| V58P0267A | 118  | HYD SYS 2 BOOTSTRAP ACCUMULATOR P       | HYD ACUM P 2 on SM SYS SUMM 2, 213 - SM2 HYD ACUM P 2 (OPS 0,1, 3,6)   |
| V58T0269A | 2337 | HYDR SYS 2 BODY FLAP RTN LN T           | HYD SYS TEMP BODYFLP STBY 1 on THERMAL.  |
| V58T0305A | 2345 | HYD SYS 3 H2O BLR GN2 TANK TEMP 1       | Used in WSB 3 Qty calculation to initialize GN2 tank temp only if WSB Controller A is powered ON (V58S0349E). W/B H2O Qty 3 on SM SYS SUMM 2. 198 - SM2 W/B QTY 3 (OPS 0, 1, 3, 6). BFS downlists V98Q1972C. |
| V58T0361A | 2346 | HYDR SYS 3 H2O BLR H2O TANK TEMP1       | Used in WSB 3 Qty calculation to initialize W/B tank temp only if WSB Controller A is powered ON (V58S0349E). W/B H2O Qty 3 on SM SYS SUMM 2. 198 - SM2 W/B QTY 3 (OPS 0, 1, 3, 6). BFS downlists V98Q1972C. |
| V58T0362A | 2347 | HYDR SYS 3 H2O BLR H2O TEMP NO 1        | HYD BLR/HTR 3 on THERMAL, 156 - SM0 THRM HYD (ON ORBIT OPS0, MM104-106, MM 301-303)  |
| V58T0365A | 2348 | HYDR SYS 3 H2O BLR VENT TEMP NO 1       | Acquired from MDM OA2 during cyclic reads but not used.  |
| V58T0384A | 2369 | HYD SYS 3 RSB RTN LN T                  | Acquired from MDM OA2 during cyclic reads but not used.  |
| V58T0394A | 173  | HYD SYS 3 LOE RTN LNT                   | Referenced in FDASDT. Alarm class set to 0 (no alarm).   |
| V58T0833A | 2318 | HYD SYS 3 LH INBD ELVN RTN LN TEMP      | Acquired from MDM OA2 during cyclic reads but not used.  |
| V58T0883A | 2338 | HYD SYS 2 LH OTBD ELVN RTN LN TEMP      | Acquired from MDM OA2 during cyclic reads but not used.  |
| V58T0980A | 2364 | HYDR SYS RH OUTBD ELVN ACTR TEMP        | Acquired from MDM OA2 during cyclic reads but not used.  |
| V63T1207A | 2341 | FCL 1 EVAP OUT TEMP                     | THERM CNTL EVAP OUT T 1 on SM SYS SUMM 2, 080 - SM2 EVAP OUT T 1 (OPS 0,1,3,6)   |
| V63T1810A | 2377 | FLASH EVAP TOPPING DUCT TEMP HTR F      | Acquired from MDM OA2 during cyclic reads but not used.  |
| V63T1879A | 2344 | FLASH EVAPORATOR TOPPING NOZ RH T-HTR G | HTR TEMP PRPLT EVAP TOP NOZ R on THERMAL, 155 - SM0 THRM EVAP (ON ORBIT OPS0, MM104-106, MM 301-303)   |
| V63T3038A | 178  | CARGO SUPPLY LINE HTR ZN 3 TEMP         | CARGO LOOP SPLY T on CRYO PALLET/CARGO, 424 - 168 CRG SPLY T (OPS 0,1,3,6)   |
| V63T3042A | 134  | CARGO ACCUM LINE TEMP 2                 | CARGO LOOP ACUM LN T on CRYO PALLET/CARGO, 852 - 168 CRG ACCUM LN T (OPS 0,1,3,6)  |
| V75M3734P | 44   | MDM OA2 DIH CARD 01 CHAN 00             | Bit 4, MPS E1 LH2 PREVLV (PV4) CL IND - BEC  |
| V75M3735P | 2326 | MDM OA2 DIH CARD 01 CHAN 01             | Acquired from MDM OA2 during cyclic reads but not used.  |
| V75M3736P | 2327 | MDM OA2 DIH CARD 01 CHAN 02             | Bit 2, V46S1127E - APU 1 INJECTOR COOL CMD B. Used in APU_SPD to start the 210s timer for FDA on APU 1 COOL DOWN alert.  |
| V75M3740P | 2349 | MDM OA2 DIH CARD 05 CHAN 00             | Bit 4, V46S0226E - APU 2 START/RUN CMD-A. Used in APU_SPD to start the 10s timer for FDA on APU 2 for turbine speeds during start-up. Essentially no low limit turbine speed processing.                     |
| V75M3741P | 2350 | MDM OA2 DIH CARD 05 CHAN 01             | Acquired from MDM OA2 during cyclic reads but not used.  |



|                  |             |                                    |  |
|------------------|-------------|------------------------------------|--|
| V75M3742P        | 2351        | MDM OA2 DIH CARD 05 CHAN 02        | Acquired from MDM OA2 during cyclic reads but not used.  |
| <b>V75M3744P</b> | <b>2360</b> | <b>MDM OA2 DIH CARD 07 CHAN 01</b> | <b>Bit 8, V58X0289E - HYDR SYS 2 H2O BLR BYPASS CL IND 2. Used in WATER_BLR to initialize bypass valve closed indicators for WSB 2.</b>                              |
| V75M3745P        | 2361        | MDM OA2 DIH CARD 07 CHAN 02        | Acquired from MDM OA2 during cyclic reads but not used.  |
| <b>V75M3750P</b> | <b>2371</b> | <b>MDM OA2 DIH CARD 10 CHAN 01</b> | <b>Bit 12, V58X0381E - HYDR SYS 3 H2O BLR BYPASS CL IND 1. Used in WATER_BLR to initialize bypass valve closed indicators for WSB 3.</b>                             |
| <b>V75M3751P</b> | <b>2372</b> | <b>MDM OA2 DIH CARD 10 CHAN 02</b> | <b>Bit 2, V46S0129E - APU NO 1 SPEED SELECT-HIGH CMD-A. Used in APU_SPD to change BFS upper FDA limit for APU 1 turbine speeds to 122% for high speed operation.</b> |
| V75M3752P        | 2374        | MDM OA2 DIH CARD 12 CHAN 00        | Acquired from MDM OA2 during cyclic reads but not used.  |
| V75M3753P        | 2375        | MDM OA2 DIH CARD 12 CHAN 01        | Acquired from MDM OA2 during cyclic reads but not used.  |
| V75M3754P        | 2376        | MDM OA2 DIH CARD 12 CHAN 02        | Acquired from MDM OA2 during cyclic reads but not used.  |
| V75M3757P        | 2383        | MDM OA2 DIL CARD 14 CHAN 01        | Acquired from MDM OA2 during cyclic reads but not used.  |
| V75M3758P        | 2384        | MDM OA2 DIL CARD 14 CHAN 02        | Acquired from MDM OA2 during cyclic reads but not used.  |
| V76C2811A        | 2332        | PAYLOAD AFT MAIN B CURRENT         | Acquired from MDM OA2 during cyclic reads but not used.  |
| V76C3096A        | 2355        | AFT PCA MAIN BUS B AMPS            | Acquired from MDM OA2 during cyclic reads but not used.  |
| V76V3092A        | 2328        | AFT PCA-5 VOLTAGE                  | Acquired from MDM OA2 during cyclic reads but not used.  |

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# BFS Displays Affected

**Pictures reflect how BFS displays appear with missing OA2 data**

# GNC System Summary 2 – with fault

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3021/000/019   GNC SYS SUMM 2   5 011/17:19:25
                                BFS 000/00:10:26
OMS AFT QTY      L      R      OMS      L      R
      OXID 30.1  30.1   TK P   HE 5000  5000
      FU  30.1  30.1   OXID      255   255
      FU INJ T 149   149M  FU      255   255

```

| FWD  |     |      |      | RCS  |     |  |  | JETISOL |    |      |     |
|------|-----|------|------|------|-----|--|--|---------|----|------|-----|
|      |     | OXID | FU   | FAIL | VLV |  |  | OXID    | FU | FAIL | VLV |
| HE   | P   | 3504 | 3504 |      |     |  |  |         |    |      |     |
| TK   | P   | 250  | 250  |      |     |  |  |         |    |      |     |
| QTY  |     | 91   | 91   |      |     |  |  |         |    |      |     |
| MANF | 1 P | 500  | 500  |      |     |  |  |         |    |      |     |
|      | 2 P | 500  | 500  |      |     |  |  |         |    |      |     |
|      | 3 P | 500  | 500  |      |     |  |  |         |    |      |     |
|      | 4 P | 500  | 500  |      |     |  |  |         |    |      |     |
|      | 5   |      |      |      |     |  |  |         |    |      |     |
| HE   | P   | 3504 | 3504 |      |     |  |  |         |    |      |     |
| TK   | P   | 250  | 250  |      |     |  |  |         |    |      |     |
| QTY  |     | 97   | 97   |      |     |  |  |         |    |      |     |
| MANF | 1 P | 500  | 500  |      |     |  |  |         |    |      |     |
|      | 2 P | 500  | 500  |      |     |  |  |         |    |      |     |
|      | 3 P | 500  | 500  |      |     |  |  |         |    |      |     |
|      | 4 P | 500  | 500  |      |     |  |  |         |    |      |     |
|      | 5   |      |      |      |     |  |  |         |    |      |     |

```

N2 TK P   HE 5000  5000
    OXID      255   255
    FU      255   255
    N2 TK P   5000  5000
    REG P     325   325
    P VLV     0P    0P
ENG IN P
    OXID      0     0
    FU        0     0
    VLV 1 -   8    - 8
        2 -   8    - 8

```

ILLEGAL ENTRY  
SPEC 019 PRO

# SM System Summary 2 – with fault

| 0001/ /079      |      | SM SYS SUMM 2 |      |            |              | 5     | 011/17:16:09 |   |
|-----------------|------|---------------|------|------------|--------------|-------|--------------|---|
|                 |      |               |      |            |              | BFS   | 000/00:00:00 |   |
| CRYO TK         | 1    | 2             | 3    | 4          | 5            | MANF1 | MANF2        |   |
| H2 PRESS        | 223  | 223           | 223  | 223        | 223          | 274   | 274          |   |
| O2 PRESS        | 762  | 762           | 762  | 762        | 762          | 698↓  | 698↓         |   |
| HTR T1          | - 34 | - 34          | - 34 | - 34       | - 34         |       |              |   |
| T2              | - 34 | - 34          | - 34 | - 34       | - 34         |       |              |   |
| APU             | 1    | 2             | 3    | HYD        |              | 1     | 2            | 3 |
| TEMP EGT        | 763  | 763M          | 763  | PRESS      | 3200M        | 3200  | 3200         |   |
| B/U EGT         | 633M | 633           | 633  | ACUM P     | 2960         | 2960M | 2960         |   |
| OIL IN          | 142  | 142M          | 142  | RSVR T     | 119          | 119M  | 119          |   |
| OUT             | 184M | 184           | 184  | QTY        | 67           | 67M   | 67           |   |
| GG BED          | 300  | 300M          | 300  | W/B        |              |       |              |   |
| INJ             | 7L   | 7M            | 7L   | H2O QTY    | 83           | 100M  | 100M         |   |
| SPEED ×         | 103M | 103M          | 103  | BYP VLV    | BYP          | BYP   | BYPM         |   |
| FUEL QTY        | 73   | 73M           | 73   | THERM CNTL |              | 1     | 2            |   |
| PMP LK P        | 25   | 25            | 25   | H2O PUMP P |              | 62    | 62           |   |
| OIL OUT P       | 87   | 87M           | 87   | FREON FLOW |              | 2326  | 2326         |   |
| FU TK VLV       |      |               |      | EVAP OUT T |              | 48M   | 48           |   |
| A T             | 102  | 102           | 102  |            |              |       |              |   |
| B T             | 102  | 102           | 85   |            |              |       |              |   |
| AV BAY          | 1    | 2             | 3    |            |              |       |              |   |
| TEMP            | 87   | 87            | 87   |            |              |       |              |   |
| FAN ΔP          | 2.72 | 2.72          | 3.32 |            |              |       |              |   |
| BCE STRG 1 PASS |      |               |      | 5          | 00!00!00(11) |       |              |   |
| SPEC 079 PRO    |      |               |      |            |              |       |              |   |

# Thermal – with fault

| 0001/         |          | THERMAL     |            |       |       | 5 011/17:20:06   |       |  |  |
|---------------|----------|-------------|------------|-------|-------|------------------|-------|--|--|
|               |          |             |            |       |       | BFS 000/00:00:00 |       |  |  |
| HYD           | SYS TEMP | BDYFLP      | RD/SB      | L OB  | L IB  | R IB             | R OB  |  |  |
|               | PRIME    | +110M       | +117       | +119M | +119  | +119             | +119  |  |  |
|               | STBY 1   | +110M       | +119       | +119  | + 86  | + 86             | +119M |  |  |
|               |          | BRAKE PRESS |            |       |       |                  |       |  |  |
|               |          | HYD SYS 1/3 |            | 0L    | 0L    | 0L               | 0L    |  |  |
|               |          | 2/3         |            | 0L    | 0L    | 0L               | 0L    |  |  |
| HTR TEMP      | L/A      | R/B         | FREON LOOP |       | 1     | 2                |       |  |  |
| PRPLT         |          |             | ACCUM QTY  |       | 63    | 63               |       |  |  |
| POD           |          | MM M        | RAD OUT T  |       | 80    | 80               |       |  |  |
| OMS CRSFD     |          |             | H2O SUP P  |       | 25    |                  |       |  |  |
| EVAP          |          |             | TIRE PRESS |       |       |                  |       |  |  |
| HI LOAD       |          |             | MG         | LEFT  | RIGHT |                  |       |  |  |
| TOP DUCT      |          | M           | IB         | 250   | 250M  | 250              | 250M  |  |  |
| NOZ           |          |             | OB         | 250   | 250M  | 250              | 250M  |  |  |
| FDLN          |          |             | NG         | 250   | 250   | 250              | 250   |  |  |
|               |          | 1           | 2          | 3     |       |                  |       |  |  |
| HYD BLR/HTR   |          |             |            | M     |       |                  |       |  |  |
| APU           |          |             |            |       |       |                  |       |  |  |
| GG/FU PMP HTR | L        | MMM M       | L          |       |       |                  |       |  |  |
| TK/FU LN HTR  | M M      | MM          | M          |       |       |                  |       |  |  |
| PUMP/VLV      |          | M           |            |       |       |                  |       |  |  |
| ILLEGAL ENTRY |          |             |            |       |       |                  |       |  |  |