



CIB #: CIB00050
Date: Oct 2017
Status: Non-confidential

Subject: Windows 7 SLS Software – ProX and sPro platforms

DSP Real-Time Monitor Status-Bar

With ProX SLS 500 v6.1. and sPro v5.1 software release; Local time, DSP heartbeat, Fatal Error (ID, Beacon), Following Error (X, Y and Z) count, re-home attempts, current layer number, and whether a failure occurred in APL/Scan mode are read from the DSP every second and displayed on the DSIF status bar

The DSPIF Window Status Bar has been chosen for displaying this information because it is present for Sinter, SinterDiag, and MFC Servo.

The motivation for this is to provide more instant DSP diagnostic information for troubleshooting the “wait for scan time out” and related re-home problem if needed:

- Monitor from the PC side any DSP side re-homing attempts to be certain that the current two fixes address all problems in re-homing functionality, and that there are no additional re-homing problems showing up disguised as "wait for scan time out" errors.
- Add a 1 second beacon sent by the DSP to Sinter indicating that a DSP fatal error has occurred and its cause. This information would be vital in case the "re-homing" problem is not the only cause of the "wait for scan time" error. Without this, a fatal error and a DSP hard crash show up as a DSP lockup

Typically, fatal errors are posted and logged by the legacy Sinter software. But, as we experienced with the “Wait for scan done” timeout and related re-home problem, this may fail. Therefore this extra layer of DSP Real-Time Monitor has been added using the DSP board FPGA Com Regs instead of the traditional DMA/Interrupt method (simpler, no handshake, protected from DSP crash).

For more information,
Contact 3D Systems’
Customer Hotline at
(800) 793-3669,
Or contact your local
account representative

DSPIF Status Bar (DSP Real-Time Monitor)

```
13:48:39 | Heartbeat: 59 | Fatal Err (ID,Beacon): 0,0 | Folwng Err (X,Y,Z): 3,0,0 | Rehom (Str,Cpl,Rt): 3,3,3 | Ly No: 0 | APL
```

Local Time (hh:mm:ss):

13:48:39 |

The purpose of this is to verify that the **DSPIF** is not locked up. If the time display changes every second then the DSPIF is OK.



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DSP Heartbeat:

|Heartbeat: 59|

Increments every second and only right most 2 digits are displayed.

The purpose of this is to verify that the **DSP** is not locked up. If the DSP experiences a hard crash or fatal error the heartbeat will stop and a related error message is posted and logged to the *dspifError.tlog*.

dspifError.tlog:

"Tue Sep 13 14:12:58 2016" DSP_MONITOR: Heartbeat stopped, APL layer #0, at 22985 (Figure 1).

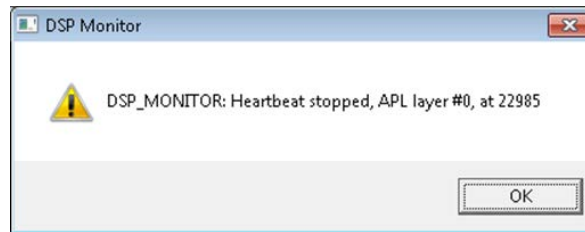


Figure 1

Fatal Error (ID, Beacon):

|Fatal Err (ID,Beacon): 0,0|

If the DSP experiences a fatal error it will stop program execution and appear to be locked up (Figure 2). However, now, it will send a 1 second beacon to the PC indicating that it is in the fatal error state and is not locked up because of a hard crash. The ID indicates the source of the error, and the beacon increments every second. Only the right most 2 digits are displayed. A related error message is posted and logged to the *dspifError.tlog*.

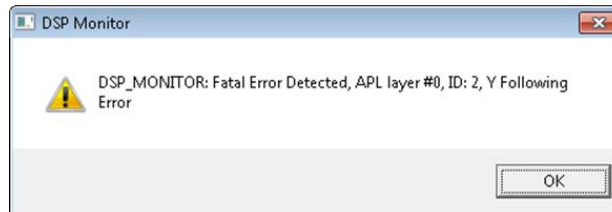


Figure 2

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dspifError.tlog:

"Tue Sep 13 14:12:53 2016" DSP_MONITOR: Fatal Error Detected, APL layer #0, ID: 2, Y Following Error

Following Error (X, Y, and Z):

| Folwng Err (X,Y,Z): 3,0,0 | This shows the number of X, Y, and Z following errors that occurred since the DSP was initialized. A change in a following error count is logged to *dspifError.tlog*:

"Tue Sep 13 15:42:08 2016" DSP_MONITOR: Following Error, APL layer #13, total x: 5, y: 6, z: 0

The accumulated number of following errors and re-home attempts will give an indication which scanner axis (x, y or z) is potentially degrading.

Re-home (Str,Cpl,Rt):

Str: Number of re-homes **started**, since DSP initialization
Cpl: Number of re-homes **completed**, since DSP initialization
Rt: Number of re-home **retries**.

| Rehom (Str,Cpl,Rt): 3,3,3

Re-homes are logged, when a change of a count is detected, to the *dspifError.tlog* with layer number and whether they occurred during APL or scanning:

"Tue Sep 13 15:40:36 2016" DSP_MONITOR: Re-homing started, scanning layer #11, total: 10, retries: 10

"Tue Sep 13 15:40:56 2016" DSP_MONITOR: Re-homing completed, scanning layer #11, total: 10

Layer Number:

This shows the current layer number for APL or scanning. This is logged as part of the re-home log entry (see *dspifError.tlog* above). This layer number gives information to inspect the part for shifts at that layer.

APL/Scan mode:

| APL | This shows if the printer is currently performing an APL or is scanning. This is logged as part of the re-home log entry (see *dspifError.tlog* above).

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Vector Logging:

This is PC side only diagnostic feature. It provides vital information telling us if a lockup was caused on the DSP or Sinter side (PC).

It is written to existing *dspif_Trace.tlog* which is in the logs directory.

Below is an excerpt from the log:

```
"Tue Aug 09 20:17:54 2016" ***** ENTER drawLayer() *****
30565.119 sec - DSP Heartbeat: 500821
"Tue Aug 09 20:17:54 2016" Layer No: 2
"Tue Aug 09 20:17:54 2016" Number of Vectors: 80
"Tue Aug 09 20:17:54 2016" Part Number: 1
L2, P1, V0: JUMP (3.825, 1.79)
L2, P1, V1: DRAW (-0.175, 1.79)
L2, P1, V2: TRACEON
L2, P1, V3: JUMP (-4.825, 1.79)
L2, P1, V76: DRAW (-0.28, 2.05)
L2, P1, V77: JUMP (-0.3, 2.05)
L2, P1, V78: DRAW - Not Break Angle (-0.3, 6)
L2, P1, V79: DRAW (-0.3, 6)
"Tue Aug 09 20:17:54 2016" L2: flushQueue()
"Tue Aug 09 20:17:55 2016" L2: jumpToRest()
"Tue Aug 09 20:17:55 2016" L2: SCANNING_COMPLETE_S
"Tue Aug 09 20:17:55 2016" L2: Total Number of Layer Vectors: 80
30566.102 sec - DSP Heartbeat: 503032
"Tue Aug 09 20:17:55 2016" L2: EXIT drawLayer()
```

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List of Fatal Errors:

Error Enum/Code	Comments
FE_UNDEF,	// 0: Undefined
FE_X_FOLLOWING_ERR,	// 1: X Following Error
FE_Y_FOLLOWING_ERR,	// 2: Y Following Error
FE_Z_FOLLOWING_ERR,	// 3: Z Following Error
FE_CHAMBER_ISR_REENTERED,	// 4: Chamber ISR Re-entered
FE_CHAMBER_ISR_LATE,	// 5: Chamber ISR Late
FE_RD_WR_CONTR_PORT,	// 6: Read/Write Control Port Error
FE_READ_X_COUNTER,	// 7: Read X Counter Error
FE_IRQ_TOO_LONG,	// 8: IRQ Too Long
FE_SIGNATURE_TEST,	// 9: Signature Test
FE_XYZ_FOLLOWING_ERR,	// 10: X, Y, Z, Following Error
FE_Z_INDEX_NOT_FOUND,	// 11: Check Z Index not found
FE_CHECK_Z_MSGS,	// 12: CheckZMsgs
FE_LASER_TEMP_NOT_NORMAL,	// 13: Laser Temperature is Not Normal
FE_LASER_NOT_OPERATING_PROPERLY,	// 14: Laser Does Not Operate Properly
FE_CANNOT_LOCATE_X_INDEX_MARK,	// 15: Cannot Locate X Index Mark
FE_CANNOT_LOCATE_Y_INDEX_MARK,	// 16: Cannot Locate Y Index Mark
FE_NO_MIRROR_DRIVER_INTERRUPTS,	// 17: No Mirror Driver Interrupts
FE_CANNOT_ALLOCATE_DATA_ARRAYS,	// 18: Can't Allocate Data Arrays
FE_GEO_ROWS_COLS_TOO_LARGE,	// 19: Geo Rows or Cols Too Large
FE_INVALID_SPOT_SELECTION,	// 20: Invalid Spot Selection
FE_INVALID_FOCUS_MOTION_SETTING,	// 21: Invalid Focus Motion Setting
FE_INVALID_PC_COMMAND,	// 22: Invalid PC Command
FE_INVALID_CHAMBER_CTRL_CMND,	// 23: Invalid Chamber Controller Command
FE_NOT_USED_1,	// 24: Not Used
FE_R0_GREATER_THAN_99,	// 25: R0 > 99
FE_R0_LESS_THAN_0,	// 26: R0 < 0
FE_PWR_IDX_GREATER_THAN_MAX,	// 27: PwrIdx >= MAX_POWER_ENTRIES
FE_PWR_IDX_LESS_THAN_0,	// 28: PwrIdx < 0
FE_EXP_WATTS_PER_CNT_PER_TIC_LESS_THAN_0,	// 29: Exp_Watts_per_cnt_per_tic < 0
FE_EXP_FACTOR_LESS_THAN_0,	// 30: ExpFactor < 0
FE_MICROVECT_DIST_TOO_SHORT_MOV_BEG,	// 31: Microvector Dist Too Short - MoveBeg
FE_MICROVECT_DIST_TOO_SHORT_MOV_END,	// 32: Microvector Dist Too Short - MoveEnd
FE_INVALID_DIAG_CMND,	// 33: Invalid Diag Command
FE_UNDEF_FOLLOWING_ERR	// 34: Undefined Following Error

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IMP NOTE: Customers need to be informed to send the DSPIF Window status bar screenshot as part of troubleshooting information whenever they report any issue.

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In case of issues, please contact 3D Systems with all information requested on page <https://3dsystems.teamplatform.com/pages/154307?t=af2p8ovwtqb8>

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