

# Dimension 1200 and 1200es BST/SST

## Troubleshooting Guide

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## 1.0 How to Use the Guide

1.1 Determine what type of error you are experiencing; either a Code Error or Non-Code Error.

1.2 If you are experiencing a Code Error:

- A) Refer to the Code Error Section of the guide (Section 3.0)
- B) Match the code number with the number in the guide.
- C) Follow the corrective actions to fix the error.

1.3 If you are experiencing a Non- Code Error:

- A) Refer to the Non-Code Error Section of the guide (Section 4.0)
- B) If the display on the machine displays an error message, match that message to one of the buckets in the guide.
- C) If a message does not appear, match the problem to one of the buckets in the guide.

**Note:** The Non-Code Errors are listed in alphabetical order.

1.4 If you have any suggestions, additions or changes that need to be made to this guide please e-mail **ProdigyTSGuideTeam@Stratasys.com**.

The suggestions and changes will be brought to the troubleshooting meeting, where they will be discussed and approved.

1.5 There have been changes made to the electronics of the Dimension Printers. These changes will improve the operation and serviceability of the Dimension Printers. Since new versions are being released and will continue to be released, Dimension has changed the naming structure of the system electronics as follows:

"Old Electronics" will now be referred to as Generation 1 Electronics, or Gen 1 Electronics.

**Gen 1 Electronics are installed in machines with serial numbers ranging from P0001 to P3999.**

"New Electronics" will now be referred to as Generation 2 Electronics, or Gen 2 Electronics.

**Gen 2 Electronics are installed in machines with serial numbers ranging from P4000 to P08999.**

The third version of electronics will be referred to as Generation 3 Electronics, or Gen 3 Electronics.

**Gen 3 Electronics are installed in machines with serial numbers ranging from P09000 and above.**

## **2.0 Special Notes**

### **2.1 Field Special Notes**

- A. Verify that the machine is plugged directly into a wall outlet. Do not use an extension cord or power strip.**
- B. Verify you are running the current build software. Upgrade the software if necessary.**
- C. Power the machine down. Shut the machine off at the breaker.  
Move the head & Z-Stage away from the sensors. Power up the machine.**
- D. Check and reset connectors and pins.  
Give special attention to J7, J10, and J12 connectors. Make sure pins are not protruding from rear of connector housings.  
If pin protrudes, disconnect connector, push pin fully into connector, re-install connector.**
- E. When measuring DC voltages and signals using chassis ground is preferred.  
Do NOT measure AC voltages using chassis ground.**
- F. Check/reseat the three ribbon cables between the PDB (J14, J17, J19) and the controller board (J1, J2, J3) as part of the troubleshooting process.**
- G. Hyperterminal move commands are in inches.**
- H. Limit switch states are not displayed in Maraca for Gen 2 and 3 electronics (due to PMD changes).  
Check limit switch states using the test points and/or LED's on the PDB.**
- I. Replacement Hard Drive may take up to 45 minutes to boot. HD is running File System Check.**

### 3.0 Code Errors

**NOTE: Gen 1 = P0001 to P3999, Gen 2 = P4000 to P08999, Gen 3 = P09000 and above**

#### 3.1 Major Codes

**Note:** These codes are displayed on the system LCD.

- 01: Unknown Error** - No data on what error occurred
- 02: PUC Error** - Path, utilities and controller development library (Used for software testing)
- 03: No Display** - Process that runs LCD display generated error
- 04: Memory Error** - Single board computer experienced memory error
- 05: LCD Display** - Failed to write to LCD display board from SBC - Replace LCD
- 06: LCD Keypad** - Failed to read from LCD keypad to SBC - Replace LCD
- 07: Manager Channel** - Socket from manager internal manager process was on, SBC (Software error, will not be displayed)
- 08: Manager Disconnected** - Socket from manager internal manager process was off, SBC (Software error, will not be displayed)
- 09: Manager Send** - Failed to send from manager (SBC) (Software error)
- 10: Command Failed** - Sent legal command that was rejected (exp. Move Z command with door open) - Cycle power.
- 11: Queue Communication** - Socket from queue process was interrupted (broken) (Software error)
- 12: Joblog Message Buffer** - Failed to write to job log (Software error)
- 13: Joblog File** - Failed to create the job log (Software error)
- 14: Controller Abort** - Controller failure (See sub errors below)
- 15: Starting Up Failed** - Some part of the start up procedure failed
  - 15.1:** Using HyperTerminal check to make sure the controller gender matches the systems gender. If not, replace controller and load upgrade.
- 16: Find Z Failed** - Failed to find Z limit switch
- 17: Controller Load Failed** - Unable to load global parameters (exp. Temp values, flow control)
- 18: Temperature Failed to Regulate** - Liquefier or chamber failed to reach temperature within time constraints (No change in 7 min.)
- 19: Controller Initialization Failed** - Controller failed to reboot or start
- 20: Door Latch Command Failed.**
- 21: Ldrool Failed.**
- 22: Controller Communications Failed** - Not used.
- 23: Universal Device Name error.**

#### 3.2 Major Codes with Minor Codes

**Note:** Currently minor codes exist for major codes 14, 15 17-20, 22, & 23 only.

**Errors****Corrective Actions**

Controller Abort Minor Errors (Code: 14, XX)

NOTE: Gen 1 = P0001 to P3999, Gen 2 = P4000 to P08999, Gen 3 = P09000 and above

<b>14, 01: Abort : Z axis is jammed</b>	<ol style="list-style-type: none"> <li>1. Check for objects blocking Z stage.</li> <li>2. Check for purge material around lead screws.</li> <li>3. Power cycle machine including rear breaker.</li> <li>4. Using LED's/test points: Check Z position. See if both Z home &amp; Z limit boxes are checked. If so, check limit switches and/or Mid-Unit Harness.</li> <li>5. Check for loose or broken Z belt.</li> <li>6. HyperTerminal: Check to see if Z stage moves (mz 0.5 or mz -0.5). This will allow you to move the Z stage without tripping the Z jam sensor. + is down, - is up.</li> <li>7. Z stage motor maybe bad. Does motor "groan" when attempting to move the Z stage'</li> </ol>
<b>14, 02: Report: Attempt to raise foam/substrate sensor failed</b>	<ol style="list-style-type: none"> <li>1. Replace substrate.</li> <li>2. Power cycle machine.</li> <li>3. <b>Gen 2</b> -Check connector J10 (pin 19) on the PDB board for loose pins. <b>Gen 3</b> - Check connector J10 (pin 13) on the PDB board for loose pins.</li> <li>4. Using LED's/test points: Check to see Z <u>foam</u> box toggles when switch is activated. If not, check foam sensor and/or Umbilical Cable. <b>Gen 2</b> - Check signal at TP27 <b>Gen 3</b> - TP23.</li> <li>5. Using LED's/test points: Check to see Z <u>home</u> box toggles when switch is activated. If not, check Z home switch and/or Mid-Unit Harness. <b>Gen 2</b>- Check signal at TP13 <b>Gen 3</b> - TP9</li> <li>6. Check Z home switch position. Adjust if needed.</li> </ol>
<b>14, 03: Report: Substrate sensor up when it should be down.</b>	<ol style="list-style-type: none"> <li>1. Check the substrate sensor assembly for free operation.</li> <li>2. Check to see if the sensor arm is broken.</li> <li>3. Check connector J10 (pin 19) on the PDB board for loose pins</li> <li>4. Using LED's/test points: Check to see Z foam box toggles when switch is activated. If not, check substrate sensor, sensor assembly and/or Umb cable. <b>Gen 2/3</b> - Check signal at TP27.</li> </ol>
<b>14, 04: Report: Substrate sensor down when it should be up.</b>	<ol style="list-style-type: none"> <li>1. Push the sensor assembly up if it is down.</li> <li>2. Check to see if the tip-wipe brush is set too high.</li> <li>3. Run the FZ command using HyperTerminal -Verify the sensor is being pushed all the way up.</li> <li>4. Remove, clean and reinstall the substrate sensor assembly.</li> <li>5. Check spring (replace 5 coils with 7 coils) and verify that the foam sensor arm has a bump added</li> </ol>
<b>14, 05: Abort : Unexpected contact with X axis home sensor.</b> <b>14, 06: Abort : Unexpected contact with X axis EOT sensor.</b> <b>14, 07: Abort : Unexpected contact with Y axis home sensor.</b> <b>14, 08: Abort : Unexpected contact with Y axis EOT sensor.</b>	<ol style="list-style-type: none"> <li>1. Using LED's/test points: Check if home &amp; limit boxes are checked. If so check limit switches and/or Umbilical Cable (for X) / Mid-Unit Harness (for Y).</li> <li>2. Power Cycle the machine</li> <li>3. <b>Gen 2</b> - Check for loose pins on J10 &amp; J12 on the PDB. Check signals at TP3, 7, 16 &amp; 21. Note: X home -J10, pin 15, Y home- J12, pin 22, X EOT - J10, pin 24, Y EOT- J12, pin 11. <b>Gen 3</b> - Check for loose pins on J10 &amp; J12 on the PDB. Check signals at TP12, 13, 18 &amp; 19. Note: X home -J10, pin 2, Y home- J12, pin 22, X EOT - J10, pin 8, Y EOT- J12, pin 11.</li> <li>4. Check for an obstruction hitting the model.</li> <li>5. Manually move the XY table in X and Y checking for smooth operation.</li> <li>6. Check the XY table cable tension. Adjust if necessary.</li> <li>7. Incorrect length substrate arm installed. Replace substrate arm with the correct length.</li> <li>8. Check to make sure the homing sensors are clean.</li> <li>9. Check belt tension.</li> </ol>
<b>14, 09: Abort : Unexpected contact with Z axis home sensor.</b> <b>14, 10: Abort : Unexpected contact with Z axis EOT sensor.</b>	<ol style="list-style-type: none"> <li>1. Check the to make sure the switches are adjusted correctlyper the service guide procedure.</li> <li>2. Check to see if the switch is operating correctly (See if the switch is loose or broken).</li> <li>3. <b>Gen 2</b>- Check J12 on the PDB for loose pins. Z home-pin 3, Z EOT-pin 5. Check signals at TP14, TP13 <b>Gen 3</b>- Check J12 on the PDB for loose pins. Z home-pin 9, Z EOT-pin 11. Check signals at TP9, TP10</li> <li>3. Check the Z motor - Run the TZ command using HyperTerminal</li> <li>4. Check the Z belt condition and tension.</li> <li>5. If error occurs when running the "Find Z" command (FZ), replace the Z Foam Sensor.</li> </ol>

<b>14, 11: Abort : Door opened while axis in motion</b>	<ol style="list-style-type: none"> <li>1. Check to see if door latch is activating using LED's/test points  <b>Gen 2-</b> Check signal at TP12    <b>Gen 3-</b> Check signal at J5 -pin 1</li> <li>2. Check J12 pin 1 on the PDB for loose contacts or bent pins.</li> <li>3. Look at LCD display, should show "Door Open" when machine is idle and door is open.</li> <li>4. Using LED's/test points: Check to see "Door Open" toggles when switch is activated.  If not, check door switch and/or Mid-Unit Harness.</li> <li>5. Wiggle the door, make sure the sensor reads the magnet with movement to the door.</li> <li>6. Check that the door magnet is present.</li> </ol>
<b>14, 12: Not Applicable for Dimension 1200</b>	
<b>14, 13: Abort : Under Run at vertex buffer</b> <small>(Asked for another vector interrupt, but none was available)</small> <b>14, 14: Abort : Under Run not in tool path</b> <small>(Asked for another vector interrupt, when it shouldn't have)</small>	<ol style="list-style-type: none"> <li>1. Reprocess the part and send again.</li> <li>2. If the frequency of the error is greater than once every three months, then replace the SBC or Hard Drive.</li> </ol>
<b>14, 15: Report: Head motor running without XY motion</b>	<ol style="list-style-type: none"> <li>1. Will not be displayed on LCD display. Will be seen only using HyperTermina</li> </ol>
<b>14, 16: Abort : Vertex FIFO tail is not on a 4 byte boundary.</b> <small>(vector is corrupted)</small>	<ol style="list-style-type: none"> <li>1. Communication error between controller board and the SBC - Power cycle system</li> </ol>
<b>14, 17: Abort : User abort.</b>	<ol style="list-style-type: none"> <li>1. Build was cancelled through the keypac</li> </ol>
<b>14, 18: Abort : User panic stop.</b>	<ol style="list-style-type: none"> <li>1. Will not be displayed on LCD (Opening door during build can cause this error)</li> </ol>
<b>14, 19: Abort : Idle loop is slow.</b> <small>(Housekeeper needs to be performed every second but did not)</small>	<ol style="list-style-type: none"> <li>1. Power cycle machine.</li> <li>2. If problem still continues send outfile to SSYS CS.</li> </ol>
<b>14, 20: Abort : XY axis not ready.</b> <small>(Chip that controls the PMD chip not ready)</small> <b>14, 21: Abort : Z axis not ready.</b> <small>(PMD chip not ready)</small>	<ol style="list-style-type: none"> <li>1. Power cycle machine.</li> <li>2. Using the HyperTerminal, type SS. "X Axis Ready"<u>should</u> be displayed.  If it is <u>not displayed</u>, then type the "FH" &amp; "FZ" commands. Finally type "SS" again.  If "X Axis Ready" still is not displayed, then replace the controller Board.</li> </ol>
<b>14, 22: Abort : Head temperature set-point too low.</b> <small>(Head temperature set to below 220C)</small>	<ol style="list-style-type: none"> <li>1. Go to Maraca and change temperature</li> <li>2. Verify the head temperature set point using Maraca. <ul style="list-style-type: none"> <li>- The model must be <u>above</u> 240 degrees.</li> <li>- The support must be <u>above</u> 240 degrees</li> </ul> </li> </ol>
<b>14, 23: Report: Begin curve parameters not in sequence.</b>	<ol style="list-style-type: none"> <li>1. Communication error between controller &amp; SBC - Cycle power</li> <li>2. If problem still continues send outfile to SSYS CS.</li> </ol>
<b>14, 24: Abort : X axis command error (PMD error)</b> <b>14, 25: Abort : Y axis command error (PMD error)</b> <b>14, 26: Abort : Z axis command error (PMD error)</b>	<ol style="list-style-type: none"> <li>1. Check to see if machine software is current release. If not, upgrade software to current build.</li> <li>2. Power cycle machine.</li> <li>3. If error continues - possible memory problem, replace SBC Ram.</li> <li>4. If the frequency of the error is greater than once every three months, replace the controller board</li> </ol>
<b>14, 27: Abort : X axis motion error (PMD error)</b> <b>14, 28: Abort : Y axis motion error (PMD error)</b> <b>14, 29: Abort : Z axis motion error (PMD error)</b>	<ol style="list-style-type: none"> <li>1. Check to see if machine software is current release.</li> <li>2. Power cycle machine.</li> <li>3. If the frequency of the error is greater than once every three months, replace the controller board.</li> </ol>
<b>14, 30: Abort : PMD axis command was not X, Y, or Z.</b> <small>(Tried to command axis other than X,Y or Z)</small>	<ol style="list-style-type: none"> <li>1. Check to see if machine software is current release. If not, upgrade to current build.</li> </ol>
<b>14, 31: Abort : Move absolute error.</b> <small>(Failed to move when commanded)</small>	<ol style="list-style-type: none"> <li>1. Check connectors to the X and Y motors.</li> <li>2. Check home and EOT switches for correct operation. Replace if defective</li> </ol>
<b>14, 32: Abort : PMD checksum error.</b>  <small>(Corrupted PMD command)</small>	<ol style="list-style-type: none"> <li>1. Check to see if machine software is current release. If not, upgrade to current build.</li> <li>2. Power cycle machine.</li> <li>3. If the frequency of the error is greater than once every three months, replace the controller board.</li> <li>4. Check the controller version using Maraca.</li> </ol>

<p><b>14, 33: Abort : Invalid being send to PMD chip.</b> (Error in format of data sent to PMD)</p>	<ol style="list-style-type: none"> <li>1. Check to see if machine software is current release. If not, upgrade to current build.</li> <li>2. Power cycle machine.</li> <li>3. If the frequency of the error is greater than once every three months, replace the controller board.</li> </ol>
<p><b>14, 34: Abort : Z axis table jammed</b> Not applicable with the 1200</p>	<p>Not used on 1200 systems</p>
<p><b>14, 35: Report: Time out while loading cartridge.</b> (Waited too long for filament to reach head drive motor)</p>	<ol style="list-style-type: none"> <li>1. See Load Failed Section (K) in the Non-Error Code Section.</li> </ol>
<p><b>14, 36: Report: Modeling material not moving in head.</b> <b>14, 37: Report: Support material not moving in head.</b> PMD chip on the controller board controls movement</p>	<ol style="list-style-type: none"> <li>1. Check/reset J9 on the PDB.</li> <li>2. Cycle power at the breaker.</li> <li>3. If error continues, then replace the controller board.</li> </ol>
<p><b>14, 38: Abort : Hardware turned off power supply.</b> Note: Symptoms of this error will be that system will  power down after a few seconds.</p>	<ol style="list-style-type: none"> <li>1. Reseat connectors to controller and PDB</li> <li>2. Replace the controller board</li> <li>3. Replace the PDB</li> <li>4. Replace umbilical cable.</li> <li>5. Jumper the WD to retrieve CFG to find additional errors.</li> </ol>
<p><b>14, 39: Abort : Head thermocouple fault.</b>  <b>Note:</b> Head Thermocouple is OPEN</p>	<ol style="list-style-type: none"> <li>1. Check thermocouple wire for damage.</li> <li>2. Operating temperature to be 18° C (64.4° F)</li> <li>3. Using a meter, check to see if thermocouple is open at head.</li> <li>4. Open may be in umbilical head cable. <b>Gen 2</b> - Check J10 on the PDB <b>Gen 3</b> - Check J9 on the PDB</li> <li>5. Check/reset the connectors on the head board.</li> <li>6. Check for unseated pins in J10 of the umbilical cable.</li> <li>7. Check the component leads on back of Head Board are not shorting to the translator</li> <li>8. Replace the head</li> <li>9. Replace the head board</li> </ol>
<p><b>14, 40: Abort : Chamber thermocouple fault.</b></p>	<ol style="list-style-type: none"> <li>1. Check to see if chamber thermocouple is plugged in to the PDB.</li> <li>2. Using a meter check if thermocouple is open. If so, replace thermocouple.</li> <li>3. Check chamber thermocouple and wire for damage.</li> </ol>
<p><b>14, 41: Abort : Motion command while door open.</b> <b>14, 42: Abort : Load cartridge while door open.</b> <b>14, 43: Abort : Modeling command while door open</b> <b>14, 44: Abort : Select head command while door open.</b>  <b>14, 47: Abort : Tip wipe command while door open.</b></p>	<ol style="list-style-type: none"> <li>1. Close door</li> <li>2. Check to see if door solenoid is operating properly. Toggle solenoid using Maraca.</li> <li>3. Look at LCD display, should read "Door Open" when machine is idle and door is open.</li> <li>4. Cycle power.</li> <li>5. Using LED's/test points: Check to see Door open box toggles when switch is activated. If not, check door switch and/or Mid-Unit Harness.</li> <li>6. Make sure door magnet is present.</li> <li>7. Check to see if door has warped.</li> </ol>
<p><b>14, 45: Report: Unable to write to modeling material cartridge</b>  <b>14, 46: Report: Unable to write to support material cartridge</b> NOTE: Will see in log file only</p>	<ol style="list-style-type: none"> <li>1. Try a different cartridge. Also verify that material is the correct type for system.</li> <li>2. Check the LED on card reader board. Should be blinking. If reader board is seeing cartridge, LED blinking speed will double.</li> <li>3. Reseat and check pins on J7 on the PDB</li> <li>4. Replace cable running from receiver to the PDB board.</li> <li>5. Replace card reader board.</li> <li>6. Replace the controller board.</li> </ol>

<b>14, 48: Abort : Vertex command error.</b> (Illegal command on vertex channel)	<ol style="list-style-type: none"> <li>1. If this message is displayed on LCD ONLY, replace SBC Ram.</li> <li>2. If this message is not displayed on the LCD, (seen in outfile), RAM is NOT the root cause.</li> <li>3. If the frequency of the error is greater than once every three months, replace the controller board.</li> </ol>
<b>14, 49: Internal : PCode Error, Bad Curve.</b>	This error will not be displayed. Software development use only
<b>14, 50: Internal : PCode Error, DY within curve.</b>	This error will not be displayed. Software development use only
<b>14, 51: Abort : Model material not loaded.</b> <b>14, 52: Abort : Support material not loaded.</b> <b>14, 53: Abort : Model head motor not ready.</b> <b>14, 54: Abort : Support head motor not ready.</b>	<b>Note:</b> System does not recognize material is loaded <ol style="list-style-type: none"> <li>1. Reload material</li> </ol>
<b>14, 55: Abort : Find home failed, X home and X eot both on</b> <b>14, 56: Abort : Find home failed, Y home and Y eot both on</b>	<ol style="list-style-type: none"> <li>1. Power cycle machine - remember to move head away from switches.</li> <li>2. <b>Gen2</b> - Check for loose pins on J10 &amp; J12 on the PDB. Check signals at TP3, 7, 16 &amp; 21.            Note: X home -J10, pin 15, Y home- J12, pin 22, X EOT - J10, pin 24, Y EOT- J12, pin 11.  <b>Gen 3</b> - Check for loose pins on J10 &amp; J12 on the PDB. Check signals at TP12, 13, 18 &amp; 19.            Note: X home -J10, pin 2, Y home- J12, pin 22, X EOT - J10, pin 8, Y EOT- J12, pin 11.</li> <li>3. Using LED's/test points: Check to see if switch state toggles.            If not, check sensor and/or umbilical cable (for X) / mid-unit harness (for Y).</li> <li>4. Using LED's/test points: Check to see if switch state toggles.            If not, check switch and/or umbilical cable (for X) / mid-unit harness (for Y).</li> </ol>
<b>14, 57: Abort : Find home failed, X home timeout</b> <b>14, 58: Abort : Find home failed, Y home timeout</b> <b>Note:</b> These errors occur most often due to a problem with the motor, not the switch	<ol style="list-style-type: none"> <li>1. Power cycle machine - remember to move head away from switches.</li> <li>2. If chatter in motor, check motor and/or motor cable (for Y) / umbilical cable (for X).</li> <li>3. Check for obstacles obstructing X or Y movement.</li> <li>4. Using LED's/test points: Check to see home box toggles when sensor is activated.            If not, check sensor and/or umbilical cable (for X) / mid-unit harness (for Y).</li> </ol>
<b>14, 59: Abort : Find home failed, X home not tripped</b> <b>14, 60: Abort : Find home failed, Y home not tripped</b> <b>Note:</b> These errors occur most often due to a problem with the motor, not the switch	<ol style="list-style-type: none"> <li>1. Power cycle machine - remember to move head away from switches.</li> <li>2. Using LED's/test points: Check to see home box toggles when sensor is activated.            If not, check sensor and/or Umbilical Cable (for X) / Mid-Unit Harness (for Y).</li> <li>3. <b>Gen 2</b> - Check for loose pins on J10 &amp; J12 on the PDB. Check signals at TP3, 7, 16 &amp; 21.            Note: X home -J10, pin 15, Y home- J12, pin 22, X EOT - J10, pin 24, Y EOT- J12, pin 11.  <b>Gen 3</b> - Check for loose pins on J10 &amp; J12 on the PDB. Check signals at TP12, 13, 18 &amp; 19.            Note: X home -J10, pin 2, Y home- J12, pin 22, X EOT - J10, pin 8, Y EOT- J12, pin 11</li> </ol>
<b>14, 61: Abort : Find home failed, X home tripped</b> <b>14, 62: Abort : Find home failed, Y home tripped</b>	<ol style="list-style-type: none"> <li>1. Power cycle machine - remember to move head away from switches.</li> <li>2. Using LED's/test points: Check to see home box toggles when sensor is activated.            If not, check sensor and/or umbilical cable (for X) / mid-unit harness (for Y).</li> <li>3. <b>Gen 2</b> - Check for loose pins on J10 &amp; J12 on the PDB. Check signals at TP3, 7, 16 &amp; 21.            Note: X home -J10, pin 15, Y home- J12, pin 22, X EOT - J10, pin 24, Y EOT- J12, pin 11.  <b>Gen 3</b> - Check for loose pins on J10 &amp; J12 on the PDB. Check signals at TP12, 13, 18 &amp; 19.            Note: X home -J10, pin 2, Y home- J12, pin 22, X EOT - J10, pin 8, Y EOT- J12, pin 11</li> </ol>



<p><b>14, 63: Abort : Find home failed, X eot tripped</b>  <b>14, 64: Abort : Find home failed, Y eot tripped</b></p>	<p>1. Power cycle machine - remember to move head away from switches.  2. Using LED's/test points: Check to see limit box toggles when switch is activated.  If not, check switch and/or umbilical cable (for X) / mid-unit harness (for Y).  3. <b>Gen 2</b> - Check for loose pins on J10 &amp; J12 on the PDB. Check signals at TP3, 7, 16 &amp; 21.  Note: X home -J10, pin 15, Y home- J12, pin 22, X EOT - J10, pin 24, Y EOT- J12, pin 11.  <b>Gen 3</b> - Check for loose pins on J10 &amp; J12 on the PDB. Check signals at TP12, 13, 18 &amp; 19.  Note: X home -J10, pin 2, Y home- J12, pin 22, X EOT - J10, pin 8, Y EOT- J12, pin 11</p>
<p><b>14, 65: Abort : Find home failed, X eot not tripped</b>  <b>14, 66: Abort : Find home failed, Y eot not tripped</b></p> <p>Note: Receive interrupt but switch not tripped.</p>	<p>1. Power cycle machine - remember to move head away from switches.  2. Using LED's/test points: Check to see limit box toggles when switch is activated.  3. <b>Gen 2</b> - Check for loose pins on J10 &amp; J12 on the PDB. Check signals at TP3, 7, 16 &amp; 21.  Note: X home -J10, pin 15, Y home- J12, pin 22, X EOT - J10, pin 24, Y EOT- J12, pin 11.  <b>Gen 3</b> - Check for loose pins on J10 &amp; J12 on the PDB. Check signals at TP12, 13, 18 &amp; 19.  Note: X home -J10, pin 2, Y home- J12, pin 22, X EOT - J10, pin 8, Y EOT- J12, pin 11</p>
<p><b>14, 67: Abort : Head temperature too high</b>  - Liquefier is too hot, smell burning plastic (+300deg)</p>	<p>1. T/C is bad reporting below set point temperature..  2. Head Board is bad  3. Head T/C cables are not plugged in.  4. Replace the umbilical cable.</p>
<p><b>14, 68: Abort: Illegal PMD Command</b></p>	<p>1. If error occurs more than once a month replace the controller board</p>
<p><b>14, 69: Abort: XY PMD Read Checksum error</b></p>	<p>1. If error occurs more than once a month replace the controller board</p>
<p><b>14, 70: Abort: XY PMD Write Checksum error</b></p>	<p>1. If error occurs more than once a month replace the controller board</p>
<p><b>14, 71: Abort: Z PMD Read Checksum error</b></p>	<p>1. If error occurs more than once a month replace the controller board</p>
<p><b>14, 72: Abort: Z PMD Write Checksum error</b></p>	<p>1. If error occurs more than once a month replace the controller board</p>
<p><b>14, 73: Abort: Head TC Board Configuration error</b></p>	<p>Not used on 1200 systems</p>
<p><b>14, 74: Unexpected contact with unknown limit.</b>  This message occurs when we interrupt for contact with a limit switch, but when we read which limit we interrupted for, there are no limit switches set. This is normally associated with an intermittent wire in the harness to one of the limit switches.</p>	<p>1. Power cycle machine - remember to move head away from switches.  2. Using LED's/test points: Check to see limit box toggles when switch is activated.  If not, check switch and/or umbilical cable (for X) / mid-unit harness (for Y).  3. <b>Gen 2</b> - Check for loose pins on J10 &amp; J12 on the PDB. Check signals at TP3, 7, 16 &amp; 21.  Note: X home -J10, pin 15, Y home- J12, pin 22, X EOT - J10, pin 24, Y EOT- J12, pin 11.  <b>Gen 3</b> - Check for loose pins on J10 &amp; J12 on the PDB. Check signals at TP12, 13, 18 &amp; 19</p>
<p><b>14, 75: Unknown</b></p>	<p>No error code associated with an error</p>
<p><b>14, 76: Software bug</b>  (Internal software bug)</p>	<p>Cycle power.</p>
<p><b>14, 77: Buffer is larger than the data</b>  <b>14, 78: Buffer is smaller than the data</b>  (Command channel formatting issue between controller and SBC)</p>	<p>1. Cycle power.  2. Replace single board computer.</p>

<b>14, 79: Run-time error</b>	<ol style="list-style-type: none"> <li>1. Cycle power.</li> <li>2. Check for other errors.</li> <li>3. Replace SBC.</li> <li>4. Replace controller.</li> </ol>
<b>14, 80: Index out of bounds</b>	Cycle power.
<b>14, 81: Invalid argument</b>	Cycle power.
<b>14, 82: Invalid channel</b>	Cycle power.
<b>14, 83: Invalid command</b>	Cycle power.
<b>14, 84: Invalid command opCode</b> (Malformed commands)	Cycle power.
<b>14, 85: The operation is not implemented</b> (Command not applicable for that gender)	Software error; will not be displayed.
<b>14, 86: Timeout</b> (System failed to complete a task)	Cycle power.
<b>14, 87: Resource already in use</b> (System trying to use resource already in use)	Cycle power.
<b>14, 88: The dual-port memory is corrupted</b> (header stamped on dual-port memory (DPM) is corrupt)	Cycle power.
<b>14, 89: No valid ISR callback routine set</b> (Failed to setup interrupt)	Cycle power.
<b>14, 90: An internal queue has overflowed</b>	Cycle power.
<b>14, 91: Address not properly aligned</b>	Cycle power.
<b>14, 92: Message too big for queue</b>	Cycle power.
<b>14, 93: Data unit size violation</b>	Cycle power.
<b>14, 94: Checksum bad</b>	<ol style="list-style-type: none"> <li>1. Cycle power.</li> <li>2. Check 5/12 VDC power (5 and 12VDC LEDs will repeatedly dim). Replace 5/12 VDC power supply</li> <li>3. Replace controller board</li> </ol>
<b>14, 95: PMD Host IO Error</b>	<ol style="list-style-type: none"> <li>1. Cycle power.</li> <li>2. Check 5/12 VDC power (5 and 12VDC LEDs will repeatedly dim). Replace 5/12 VDC power supply</li> <li>3. Replace controller board</li> </ol>
<b>14, 96: Unidentified interrupt occurred</b>	Cycle power.
<b>14, 97: Invalid data type</b>	Cycle power.
<b>14, 98: Find home failed, X EOT timeout</b> <b>14, 99: Find home failed, Y EOT timeout</b>  Note: No interrupt detected.	<ol style="list-style-type: none"> <li>1. Power cycle machine - remember to move head away from switches.</li> <li>2. Using voltmeter:- Check using PDB test points to see if signal toggles when switch is activated. If not, check switch and/or umbilical cable (for X) / mid-unit harness (for Y).</li> <li>3. <b>Gen 2</b> - Check for loose pins on J10 &amp; J12 on the PDB. Check signals at TP3, 7, 16 &amp; 21. Note: X home -J10, pin 15, Y home- J12, pin 22, X EOT - J10, pin 24, Y EOT- J12, pin 11. <b>Gen 3</b> - Check for loose pins on J10 &amp; J12 on the PDB. Check signals at TP12, 13, 18 &amp; 19</li> </ol>

<p><b>14, 100: Find home failed, Z HOME (BOT) not tripped</b>  <b>14, 101: Find home failed, Z EOT not tripped</b>  <b>14, 102: Find home failed, Z HOME (BOT) timeout</b>  <b>14, 103: Find home failed, Z EOT timeout</b></p>	<ol style="list-style-type: none"> <li>1. Check for objects/parts on Z stage.</li> <li>2. Look for debris on Z-Stage casting - remove debris</li> <li>3. Check for purge material around lead screws. Remove material, clean and lube.</li> <li>4. Toggle power switch.</li> <li>5. Manually move the table <u>away</u> from the upper and lower Z limit switches then cycle power.</li> <li>6. <b>Gen 2-</b> Check J12 on the PDB for loose pins. Z home-pin 3, Z EOT-pin 5. Check signals at TP14, TP13</li> <li>7. <b>Gen 3-</b> Check J12 on the PDB for loose pins. Z home-pin 9, Z EOT-pin 11. Check signals at TP9, TP10</li> <li>7. HyperTerminal: Check to see if Z stage moves (mz 0.5 or mz -0.5). This will allow you to move the Z stage without tripping the Z jam sensor. + is down, - is up.</li> <li>8. Table is not level. Check and level per the service manual using the head leveling fixture.</li> <li>9. Z-axis motor has failed (see 14.1)</li> <li>10. Z-axis belt is loose or worn. Adjust tension or replace belt.</li> <li>11. Check pins on Z-axis motor connectors (both ends) to make sure that they are fully seated in connector housing.</li> <li>12. 14.101 error only - Check 5/12 VDC power (5 and 12VDC LEDs will repeatedly dim) Replace 5/12 VDC power supply</li> </ol>
<p><b>14, 104: Surface not found</b> (Substrate didn't find switch)</p>	<ol style="list-style-type: none"> <li>1. No modeling base</li> <li>2. Modeling base is used/defective, has low spot.</li> <li>3. Verify substrate sensor is working.</li> </ol>
<p><b>14, 105: Controller not ready to build a model</b></p>	<p>Cycle power</p>
<p><b>14, 106: BOT offset is higher than the BOT switch</b> (Find home completed)</p>	<ol style="list-style-type: none"> <li>1. Calibration error occurred.</li> <li>2. Forgot a minus sign in the Z offset value.</li> <li>3. Customer may be shaving the foam and adjusted Z offset accordingly. Use new substrate and run Z calibration.</li> <li>4. Check/adjust Z home sensor.</li> </ol>
<p><b>14, 107: End model command while not modeling</b></p>	<p>Software error; will not be displayed.</p>
<p><b>14, 108: Operation was killed</b></p>	<p>Software error; will not be displayed.</p>
<p><b>14, 109: Out of memory</b></p>	<p>Software error; will not be displayed.</p>
<p><b>14, 110: Cartridge communication error</b></p>	<ol style="list-style-type: none"> <li>1. Replace cartridge.</li> <li>2. Replace cartridge reader card.</li> <li>3. Replace receiver cable.</li> </ol>
<p><b>14, 111: Invalid frame check sequence</b></p>	<ol style="list-style-type: none"> <li>1. Cycle power.</li> <li>2. If error repeats, replace controller board.</li> </ol>
<p><b>14, 112: EEPROM communication error</b></p>	<p>Software error; will not be displayed.</p>
<p><b>14, 113: Door not latched</b> (Solenoid current not detected)</p>	<ol style="list-style-type: none"> <li>1. Inspect solenoid and wiring. Note: Solenoid may be catching on spring - rotate spring.</li> <li>2. Check for 24VDC on the midunit cable at the solenoid power connection.</li> <li>3. Replace solenoid</li> <li>4. Replace PDB</li> <li>5. Possible bad 24VDC supply, replace supply</li> </ol>
<p><b>14, 114: Thermocouple snap switch tripped</b></p>	<ol style="list-style-type: none"> <li>1. Reseat connectors to controller and PDB</li> <li>2. Replace the PDB</li> <li>3. Replace the midunit harness cable.</li> <li>4. Replace the umbilical cord.</li> <li>5. Replace the controller board</li> </ol>

<b>14, 115: Z stage planarity beyond tolerance</b>	1. Substrate may be out of level or damaged, replace substrate. 2. XY table or tray out of level.
<b>14, 116: I2C configuration info is corrupt</b>	Software error; will not be displayed.
<b>14, 117: A command failed while modeling</b>	1. Download CFG file - check error code details 2. Toggle failure - reference 14.129 and 14.130 3. Check for loose pins on J12. 4. Possible bad 24VDC connection to head motor. Remove shrink tubing from 24VDC tabs at the motor. If wire is loose at the tab, re-solder the wires to the motor tabs or replace motor. 5. Gantry/part calibration values have been set to zero - check using Maraca. Download CAL files to restore values. 6. Replace PDB. (U8 chip failure)
<b>14, 118: Invalid cyclic redundancy check</b>	Cycle power.
<b>14, 119: Operation already active</b>	Software error; will not be displayed.
<b>14, 120: Invalid vector detected</b>	1. Reprocess the part and send again. 2. If the frequency of the error is greater than once every three months, then replace the SBC or hard drive
<b>14, 121: Processor Exception</b>	Cycle power.
<b>14, 122: Processor halted</b>	Cycle power.
<b>14, 123: Watchdog timeout</b>	1. Cycle power. 2. Check 5/12 VDC power (5 and 12VDC LEDs will repeatedly dim). Replace 5/12 VDC power supply
<b>14, 124: Stack overflow</b>	1. Cycle power. 2. Replace Controller Board
<b>14, 125: Runtime error</b>	Cycle power.
<b>14, 126: Operation active - try again</b>	Cycle power
<b>14, 127: Invalid gender</b>	Cycle power.
<b>14, 128: Invalid platform</b>	1. Cycle power. 2. Replace Controller Board
<b>14, 129: Toggle head failure</b> Failure to toggle	1. Check toggle bar for excessive play. If loose, check security of toggle plate or replace toggle bar. 2. Reflector on toggle bar missing or damaged - replace toggle bar. 3. Reseat connectors on the head board. 4. <b>Gen 2</b> - Check voltage (5V) on PDB for toggle signal: TP10-Model; TP25-Support. If not see steps 1-3. <b>Gen 3</b> -Check LED DL9-Model; DL10- Support to see if singel is working properly. If not see steps 1-3. Also double check voltage (5V) on PDB for toggle signal: TP17-Model; TP16-Support 5. 1200 only - Check voltage (5V) on head board for toggle signal: TP201-Model; TP101-Support 6. Replace toggle bar and toggle sensor. 7. Replace head board 8. Using HT run AH to toggle the head. Monitor system movement to help determine root cause of issue. 9. Toggle plate is warped - replace toggle plate assembly
<b>14, 130: Temperature setback is active</b>	Cycle power

<b>14, 131: Toggle when head motor is running</b> System "thinks" toggle bar moved while building	<ol style="list-style-type: none"> <li>1. Check toggle bar for excessive play. If loose, check security of toggle plate or replace toggle bar.</li> <li>2. Reflector on toggle bar missing or damaged - replace toggle bar.</li> <li>3. Reseat connectors on the head board.</li> <li>4. <b>Gen 2</b>- Check voltage (5V) on PDB for toggle signal: TP10-Model; TP25-Support. If not see steps 1-3.</li> <li>    <b>Gen 3</b> -Check LED DL9-Model; DL10- Support to see if singel is working properly. If not see steps 1-3. Also double check voltage (5V) on PDB for toggle signal: TP17-Model; TP16-Support</li> <li>5. 1200 only - Check voltage (5V) on head board for toggle signal: TP201-Model; TP101-Support</li> <li>6. Replace toggle bar and toggle sensor.</li> <li>7. Replace head board</li> <li>8. Using HT run AH to toggle the head. Monitor system movement to help determine root cause of issue.</li> <li>9. Toggle plate is warped - replace toggle plate assembly</li> <li>10. Replace Umbilical Cable</li> </ol>
<b>14, 132: UPS low power</b>	<ol style="list-style-type: none"> <li>1. UPS is shutting down. Check UPS and AC power</li> </ol>
<b>14, 133: Head liquefier is not heating up</b> Note: 14:133 error differs from code 18 errors in that the 14:133 error signal is sent from the Controller instead of the SBC.	<ol style="list-style-type: none"> <li>1. Liquefier heater is open (infinite resistance).</li> <li>2. Liquefier T/C may be crushed. Test using meter.     If crushed, reading will be 0 Ohms between pin 1 and ground.</li> <li>3. Check for 120 VDC at head board, if OK heater is bad. Replace head.</li> <li>4. The umbilical cable to the heater is broken or has a bad connector.</li> <li>5. Make sure the machine is plugged directly into a wall outlet.</li> <li>6. <b>Gen 2</b> -Check that D10 on the PDB is lit. If not 120VDC circuit maybe bad - replace PDB.</li> <li>    <b>Gen 3</b> -Check that DL18 on the PDB is lit. If not 120VDC circuit maybe bad - replace PDB.</li> <li>7. <b>Gen 3</b> -Monitor DL23 (Model) and DL24 (support). LED's should turn on when head is commanded to heat.     If not lit - check 120VDC, if absent replace PDB.</li> <li>8. Check the thermocouple connectors, heater connectors..</li> <li>9. Check PDB output voltage to model. If OK, check output voltage to support.     If support voltage is low, auxiliary 120VDC power supply.</li> <li>10. Verify that hard drive has not lost its .CAL values. If values are lost, download .CAL files</li> </ol>
<b>14, 134: Invalid packet size</b>	Software use only
<b>14, 135: Initialization failure</b> Note: Software is not finding a hardware device	<ol style="list-style-type: none"> <li>1. Use LE command in HyperTerminal (display exception log)</li> </ol>

#### Starting Up Failed Minor Errors (15.XX)

<b>15, 01: Startup state activation failed</b>	Software use only
<b>15, 02: Timeout period expired while starting up</b>	Software use only

#### Controller Load Failed Minor Errors (17.XX)

<b>17, 01: LG_COMMAND Failed on Controller</b>	Software use only
<b>17, 02: LG_COMMAND Timeout</b>	Software use only

## Temperature Failed to Regulate Minor Errors (18.XX)

**Note: SW "Code:18" on the display. It does not differentiate between Chamber and Head temperature regulation failures.**

<p><b>18, 01: Temperature not changing fast enough.</b></p>	<ol style="list-style-type: none"> <li>1. Status--Details: Check to see if current envelope temperature is above 65 before starting a model.</li> <li>2. Status--Details: Check to see if envelope temperature set point is 75C. If not, toggle power switch.</li> <li>3. Check heaters, chamber fans, and heater cables.</li> <li>4. Check chamber thermocouple - see 14.40.</li> <li>5. Check if head board grounding wire is connected (not grounded).</li> </ol>
<p>- Liquefier won't heat up (its cold).</p> <p><b>Note: 89.5 Deg = 0 Deg.</b></p>	<ol style="list-style-type: none"> <li>1. Liquefier heater is open (infinite resistance).</li> <li>2. Liquefier T/C may be crushed. Test using meter. If crushed, reading will be 0 Ohms between pin 1 and ground.</li> <li>3. Check for 120 VDC at head board, if OK heater is bad. Replace head.</li> <li>4. The umbilical cable to the heater is broken or has a bad connector.</li> <li>5. Make sure the machine is plugged directly into a wall outlet.</li> <li>6. <b>Gen 2</b> -Check that D10 on the PDB is lit. If not 120VDC circuit maybe bad - replace PDB. <b>Gen 3</b> -Check that DL18 on the PDB is lit. If not 120VDC circuit maybe bad - replace PDB.</li> <li>7. <b>Gen 3</b> -Monitor DL23 (M) and DL24 (S). LED's should turn on when head is commanded to heat. If not lit - check 120VDC, if absent replace PDB.</li> <li>8. Check the thermocouple connectors, heater connectors..</li> <li>9. Use Maraca to check to see if the temp is going over 182 Deg.</li> </ol>
<p>- Liquefier is warm but doesn't reach operating temperature.</p>	<ol style="list-style-type: none"> <li>1. Check AC input and that no extension cords or power strips are attached to the system.</li> <li>2. Liquefier heater has higher than normal resistance, <b>correct value should be 175 to 216 ohms</b> If incorrect replace head.</li> <li>3. The umbilical cable has an intermittent connection</li> <li>4. Replace the head board.</li> <li>5. Grounding problem at head board.</li> </ol>
<p>- Chamber temperature too high (over 75 degrees)</p>	<ol style="list-style-type: none"> <li>1. Chamber T/C has failed.</li> <li>2. Chamber temperature offset is incorrect. Correct using Maraca.</li> </ol>
<p><b>18, 01: Temperatures not moving in correct direction</b></p>	<ol style="list-style-type: none"> <li>1. Cycle power - If it repeats check head and chamber heaters and thermocouples</li> </ol>
<p><b>18, 02: Temperature failed to regulate within 7 degrees</b></p>	<ol style="list-style-type: none"> <li>1. Status--Details: Check to see if head temperature set point is 300 degrees C.</li> <li>2. Check Liquefier Thermocouple wire and/or Heater wires</li> <li>3. Check for torn or damaged insulation on the liquefier, especially at the tip.</li> <li>4. Check head T/C and umbilical cable for a loose connection.</li> </ol>
<p><b>18, 03: Incorrect model head temperature. ALSO SEE 18.01</b></p>	<ol style="list-style-type: none"> <li>1. Using Maraca, set model temperature to default of 300C for 1200 &amp; 1200es</li> </ol>
<p><b>18, 04: Incorrect support head temperature</b></p>	<ol style="list-style-type: none"> <li>1. Using Maraca, set support temperature to default of 300C for 1200 &amp; 1200es</li> </ol>
<p><b>18, 05: Incorrect chamber temperature</b></p>	<ol style="list-style-type: none"> <li>1. Incorrect Chamber Temperature. Using Maraca, set model temperature to default of 75C</li> </ol>

**Controller Initialization Failed Minor Errors (19.XX)**

19, 01: IN_COMMAND Rejected by Controller	Software use only
19, 02: IN_COMMAND Timeout Failed to load globals	1. Cycle power 2. Replace controller board 3. Replace hard drive

**Door Unlatch Failed (20.XX)**

20, 01: Unlatch command rejected	1. Check door latch solenoid wiring
20, 02: Timeout period expired waiting for head to stop	2. Check ability of door to latch

**Controller Communications Failed Sub Errors (22.XX)**

22, 01: FC_SERVICE event not received	NA - This error is incorporated on controller software build 1164 or 1166 only.
22, 02: Insufficient material to complete job	

**Universal Device Name Error (23.XX)**

23, 00: UDN controller command failed	1. Check network for connectivity
23, 01: UDN controller command timed out	2. Cycle power

## **4.0 Non-Code Errors**

**NOTE: Gen 1 = P0001 to P3999, Gen 2 = P4000 to P08999, Gen 3 = P09000 and above**

- A) "Build Error" displayed on LCD
- B) Tip Depth Incorrect
- C) "Corrupted Upgrade" displayed on LCD
- D) "Could Not Read Cartridge" displayed on LCD
- E) Door Latch
- F) "Door Open" displayed on LCD
- G) Download
- H) Loss of Extrusion (LOE)
- I) Lights
- J) Load Failed
- K) Network Communications
- L) Part Quality
- M) Pauses During Build
- N) Power Down
- O) Power Up / Boot
- P) "Can't Find Home - Check Modeling Base" displayed on LCD
- Q) System VERY slow to reach temperature
- R) Calibration Issues
- S) Unexpected behavior
- T) Z Calibration Failure



**Errors****Corrective Actions****A). "Build Error" displayed on LCD**

1. Part stops building before complete.	1. Partial or bad model file sent to unit. - Check and reprocess the STL and redownload the file.
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**B). Tip depth is incorrect**

1. Tip Depth is wrong (too deep or above the substrate)	<ol style="list-style-type: none"> <li>1. Check the substrate - replace if necessary.</li> <li>2. Cycle the power at the breaker.</li> <li>3. Run Z calibration again</li> <li>4. Check and/or clean the Z foam sensor. - See the Service Data Bulletin 00044</li> <li>5. Replace the Z foam assembly and sensor.</li> </ol>
2. Builds above the foam consistently.	<ol style="list-style-type: none"> <li>1. Verify Z foam sensor value changes using HT. Possibly intermittent open in umbilical cable</li> <li>2. Run Z calibration again</li> <li>3. Replace Z foam sensor and assembly.</li> <li>4. Replace controller board (noise on signal)</li> </ol>

**C). "Corrupted Upgrade" Displayed on LCD**

	<ol style="list-style-type: none"> <li>1. Verify the CD is the correct gender. (Same as the system)</li> <li>2. Cycle power and try download again. If not possible or fails again replace hard drive.</li> <li>3. Verify the Hard Drive and the controller board are not from a different "class" system.</li> </ol>
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**D). "Could Not Read Cartridge" Displayed on LCD**

1. Cartridge reads empty (with more than 5 wraps left).	<ol style="list-style-type: none"> <li>1. Remove the cartridge &amp; cycle the power. Reload the cartridge.</li> <li>2. Cartridge spool e-prom has failed. Load a different cartridge.</li> <li>3. Check 'heartbeat' LED on card-reader card. If slower than 1 beat per second, replace card-reader assembly.</li> <li>4. Loose J7 on the controller board. Check for spread pins and reseat connector.</li> <li>5. Loose connector on the card reader. Remove and reseat the card reader connector.</li> <li>6. Check to make sure the cartridge reader board LCD is blinking</li> </ol>
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**E). Door Latch**

1. Door doesn't latch/unlatch.	<ol style="list-style-type: none"> <li>1. Check to see if door has delaminated or is bowed. If so replace door.</li> <li>2. Door solenoid (rod) has been bent.</li> <li>3. Door solenoid has failed. Check by toggling using Maraca.</li> <li>4. Cable (wire) to solenoid is open.</li> <li>5. PDB has failed (won't latch only).</li> </ol>
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**F). "Door Open" Displayed on LCD**

	<ol style="list-style-type: none"> <li>1. The door is open.</li> <li>2. The door switch is bad. Check using Maraca/DataStat Status</li> <li>3. The latch mechanism is not contacting the switch.</li> <li>4. The door is warped. Replace door.</li> <li>5. Misaligned or missing magnet.</li> </ol>
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**G). Download**

<ol style="list-style-type: none"> <li>1. Model sent to system, but did not appear in queue.</li> </ol>	<ol style="list-style-type: none"> <li>1. Send the file again.</li> <li>2. Reprocess and send the file again.</li> <li>3. Cycle power on both the system and the work station.</li> <li>4. Check the STL file.</li> <li>5. Downloading starts but fails during download process. External or internal network cable bad. Try different network cable or replace pigtail (internal) network cable.</li> </ol>
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**H). Loss of Extrusion (LOE)**

<ol style="list-style-type: none"> <li>1. Liquefier doesn't extrude material</li> </ol>	<ol style="list-style-type: none"> <li>1. Drive wheel or mushroom jam. Refer to Loss of Extrusion section in the Users Guide</li> <li>2. Material jammed in cartridge. Replace or repair cartridge.</li> <li>3. Tip is plugged.             <ol style="list-style-type: none"> <li>3a. See 'Clearing a Clogged Liquefier Tip', chapter 4 of Service Guide (under LOE section)</li> <li>3b. Replace tip.</li> </ol> </li> <li>4. Perform the head alignment procedure.</li> <li>5. Check air plenum for: proper hose connection; properly seating; cracks or damage.</li> <li>6. Replace toggle plate assembly.</li> <li>7. Check to make sure head blower fan hose is connected to blower.</li> <li>8. Possible bad 24VDC connection to head motor.             <ul style="list-style-type: none"> <li>Remove shrink tubing from 24VDC tabs at the motor.</li> <li>If wire is loose at the tab, re-solder the wires to the motor tabs or replace motor.</li> </ul> </li> <li>9. Blower fan not supplying enough air flow - weak or stalling. Replace fan.</li> <li>10. Intermittant blower fan operation Pins on fan wire connector are spread. Replace fan.</li> <li>11. Liquefier heater has higher than normal resistance, value should be about 98 ohms             <ul style="list-style-type: none"> <li>Replace toggle plate if value is incorrect.</li> </ul> </li> <li>12. Replace head board</li> <li>13. If on first layer and on a used substrate, retry with a new one</li> <li>14. Replace umbilical cable</li> </ol>
<ol style="list-style-type: none"> <li>2. Filament motor is running very fast.</li> </ol>	<ol style="list-style-type: none"> <li>1. Make sure the head connectors are seated properly.</li> <li>2. Bad motor. Replace motor.</li> <li>3. Broken wire in the umbilical cable.</li> </ol>
<ol style="list-style-type: none"> <li>3. <b>Waterworks</b> filament frequently breaking (More than once per 1000 hours)</li> </ol>	<ol style="list-style-type: none"> <li>1. Drive wheel or mushroom jam. Refer to Loss of Extrusion section in the Users Guide</li> <li>2. Material jammed in cartridge. Replace or repair cartridge.</li> <li>3. Clean drive wheels of excess material.</li> <li>4. Check for twisted feed tubes. NOTE: If twisted the support tube must be replaced</li> </ol>
<ol style="list-style-type: none"> <li>4. Filament slips at head</li> </ol>	<ol style="list-style-type: none"> <li>1. High pull force or jammed cartridge - replace cartridge.</li> <li>2. Plugged Liquefier - replace tip.</li> <li>3. Worn filament tubes - replace filament tubes.</li> </ol>
<ol style="list-style-type: none"> <li>5. Filament motor moves in reverse when building</li> </ol>	<ol style="list-style-type: none"> <li>1. Reseat connectors.</li> <li>2. Replace controller and PDB.</li> </ol>

3. Replace head motor.
4. Replace umbilical cable.

**I). Lights**

<b>1. Chamber lights won't come on.</b> (Unit is otherwise functioning normally)	1. Lights are burnt out - replace lights 2. Open wire to light - check for continuity
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**J). Load Failed**

<b>1. Cartridge won't load (no movement) after pressing load.</b>	1. Filament is being cut off too long at cartridge. Less than 1/4" should be exposed 2. Smart spool e-prom has failed. Replace cartridge. 3. Receiver encryption board has failed. Replace cartridge. 4. Pogo pins bent or failed. 5. Cartridge not in all the way and latched. 6. Insure the Z stage is not on the lower or upper limit switches.
<b>2. Cartridge failed to load after three tries.</b>	1. Cartridge is defective (e.g. material jammed in cartridge, worn drive wheel). Replace 2. Cartridge is empty. Replace cartridge. 3. Filament left in head or needs to be cleaned. 4. Load solenoid or motor not working. Check connections to motor/solenoid. 5. Filament is being cut off too long at cartridge. Less than 1/4" should be exposed. 6. Filament guide tubes are kinked or bad. Replace filament tubes. 7. Head filament motor not running. Verify that motor runs though head maintenance. 8. Filament guides are out of alignment with motor blocks.
<b>3. "Load Failed" is displayed shortly after hitting "Load"</b>	1. Check that the Z stage is not hitting the lower Z limit switch. Manually raise the Z stage several inches above the lower Z limit switch.
<b>4. Filament makes it to drive wheel pinch point but "Load Failed" is displayed.</b>	1. Retry loading material 2. Perform the drive wheel alignment procedure 3. Idler wheel stuck on axle. Realign idler wheel. If wheel remains stuck replace toggle. 4. Check that pivot block spring is mounted on the pivot blocks, not the idler wheel shafts. 5. Check idler wheel stop adjustment. 6. Replace tips.
<b>5. Filament makes it to drive wheel pinch point but does NOT purge.</b>	1. Retry loading material 2. Perform the drive wheel alignment procedure 3. Idler wheel stuck on axle. Realign idler wheel. If wheel remains stuck replace toggle. 4. Check that pivot block spring is mounted on the pivot blocks, not the idler wheel shafts. 5. Check idler wheel stop adjustment. 6. Replace tips.

**K). Network Communication**

1. System boots, but won't talk to network.	<ol style="list-style-type: none"> <li>1. If using static - Wrong IP address, check that IP in machine and Admin are the same.</li> <li>2. If using static - Make sure the IP address is static on the customer's network.</li> <li>3. Network Internal (Pigtail) cable bad. Plug network cable directly into SBC to test.</li> <li>4. Check pin alignment on rear RJ45 socket.</li> <li>5. OS on Hard Drive maybe corrupt - replace the hard drive.</li> <li>6. Network interface on SBC has failed - green LED on SBC should blink when system is pinged, or green LED stays on when network cable is unplugged. Replace the SBC.</li> </ol>
2. Cannot communicate using a crossover cable with XP. Microsoft Small Business Server adds a piece of software called Firewall Client. This must be turned off.	<ol style="list-style-type: none"> <li>1. From Control Panel open the Firewall Client Options dialog box.</li> <li>2. Uncheck the box that says "Enable Firewall Client".</li> </ol>
3. Need to find MAC address (SBC)	<ol style="list-style-type: none"> <li>1. From a DOS prompt type arp -a and hit return.</li> <li>2. If system is running controller software build 1204 or higher go to "Setup" menu.</li> </ol>
4. When sending a part, an error window displays	<ol style="list-style-type: none"> <li>1. From a DOS prompt type arp -a and hit return.</li> <li>2. If system is running controller software build 1204 or higher go to "Setup" menu.</li> <li>3. "Missing close-brace" in error window - replace both cartridges.</li> </ol>

**L). Part Quality**

<b>1. Part surface is rough.</b> <b>1.1 Part is overfilled.</b>	<ol style="list-style-type: none"> <li>1. STL wall thickness is too thin</li> <li>2. Check XY table for loose hardware</li> <li>3. Filament diameter is too large (should be between .068 - .072). - Try another WHITE cartridge.</li> <li>4. Toggle spring is deformed - replace toggle spring</li> </ol>
<b>1.2 Just Plain Rough</b>	<ol style="list-style-type: none"> <li>1. Replace tip shroud</li> <li>2. Loose tip. Tighten screws.</li> <li>3. Loose heater block. Tighten screws.</li> <li>4. Replace tip.</li> <li>5. Check XY table for loose hardware</li> <li>6. If part is curling, rerun Z calibration.</li> <li>7. Check that Y belt clamp is tight.</li> <li>8. Deformed toggle spring. Replace spring</li> </ol>

<b>1.3 Hysteresis Problem</b>	<ol style="list-style-type: none"> <li>1. Reprocess part and resend.</li> <li>2. Loose tip. Tighten screws.</li> <li>3. Loose heater block. Tighten screws.</li> <li>4. Lube the XY Guide Rods.</li> <li>5. Check and adjust belt tension.</li> <li>6. Build XY test part (part pending).</li> </ol>
<b>1.4 Extreme over extrusion.</b>	<ol style="list-style-type: none"> <li>1. Filament motor runaway. - Check motor connection and connectors on</li> <li>2. Umbilical cable to the filament motor is bad</li> <li>3. Reprocess the part and resend</li> </ol>
<b>1.5 Witness Mark (a vertical scar/groove on the part) from trailing tip.</b>	Not applicable
<b>1.6 Surface appears very slightly shifted</b>	<ol style="list-style-type: none"> <li>1. Make sure that XY guide rods are tight.</li> <li>2. Check Z Stage for loose screws and loose guide rods</li> <li>3. Make sure Y Belt clamps are tight</li> <li>4. Replace motors</li> <li>5. Replace XY table</li> </ol>
<b>2. Support is embedded in model.</b>	1. Run Z Calibration and check / adjust XY Tip Offset
<b>3. Model has shifted during build.</b>	<ol style="list-style-type: none"> <li>1. Power off the machine and manually move the XY. Ensure the movement is smooth and consistent - if not smooth, could have bad bearings, motors or belts.</li> <li>2. Check for rust on rods - clean small amounts</li> <li>3. Reprocess part and resend</li> <li>4. Problem with XY table - Check belts and bearings. Check lubrication.</li> <li>5. Replace motor</li> <li>6. Substrate wasn't latched (multiple shifts in y-axis).</li> <li>7. Loose tip or heater block - Tighten heater block screws and run Z calibration.</li> <li>7. Bad motor cable (x-axis shift only).</li> <li>8. Bad Y motor drive belts.</li> <li>9. Overflowing Purge Bucket</li> <li>11. Purge Blobs - look for damaged Tip Shroud</li> <li>12. CFG file can be used to determine if the shift is Toggle induced or an XY caused shift.</li> </ol>
<b>4. Part shifted in X only</b>	<ol style="list-style-type: none"> <li>1. Check Toggle Plate Assembly Force <ol style="list-style-type: none"> <li>a. Material build-up behind toggle plate or inlet tube - remove material</li> <li>b. Thrust washers on lower toggle shaft are installed backwards or are missing</li> <li>c. Physical interference with the toggle.</li> </ol> </li> <li>2. Bad Toggle Sensor - replace toggle sensor board</li> <li>3. Bad Head Board - replace head board</li> </ol>

<b>4. Burn marks in part</b>	<ol style="list-style-type: none"> <li>1. Check tip wipe brush and flicker.</li> <li>2. Replace Tip Shroud</li> <li>3. Loose tip.</li> <li>4. Material build-up behind the tip - remove excess material</li> </ol>
<b>4. Yellow Streaks in Part</b>	1. Re-Orient part
<b>5. Part Fell Over</b>	<ol style="list-style-type: none"> <li>1. Run Z-Calibration.</li> <li>2. Reprocess - Resend part</li> <li>3. Overfill / part curl / unstable geometry</li> <li>4. Bad Z motor - test with HyperTerminal and running the TZ command.</li> </ol>
<b>6. Wavy Roads</b>	<ol style="list-style-type: none"> <li>1. Problem with XY table - Check belt tension and bearings.</li> <li>2. Reprocess STL at a higher resolution</li> </ol>
<b>7. Part Curl</b>	<ol style="list-style-type: none"> <li>1. Part is too dense - try "Sparse" fill</li> <li>2. Re-run Z Calibration</li> <li>3. Check that all chamber fans are working</li> <li>4. Check for loose heater covers</li> <li>5. Verify the chamber temperature using a thermometer</li> </ol>
<b>8. Part shifts in the Z Direction</b>	<ol style="list-style-type: none"> <li>1. Check that lead screw is clean and well lubricated</li> <li>2. Binding Z stage nuts -replace nut.</li> <li>3. Bad Z motor - test with HyperTerminal and running the TZ command.</li> <li>4. Z drive belt is worn or loose</li> </ol>
<b>9. Wavy parts</b>	<ol style="list-style-type: none"> <li>1. X or Y Motor issue - replace motors</li> <li>2. Replace Toggle plate Assembly</li> <li>3. Idler pulley problem - replace XY table</li> <li>4. Reprocess STL at a higher resolution</li> </ol>
<b>10. Underfill</b>	<ol style="list-style-type: none"> <li>1. Install a new material cartridge.</li> <li>2. Replace tips</li> <li>3. Reprocess part using CatalystEX default settings</li> <li>4. Check to make sure Work Station is running the latest version CatalystEX</li> <li>5. Inspect for Spaghetti Head</li> <li>6. Replace head board</li> </ol>
<b>11. Model material sagging on curved parts</b>	Change material.

**M). Pauses During Build**

<p><b>1. Chamber won't heat up to at least- 75 degrees</b></p>	<p>1. Heater element(s) are burnt out. Using a thermometer check if one side is blowing cooler air than the other 2. Check heaters connections. J3 on the controller 3. Heater bad. Check heater resistance - should be about 36 ohms. 4. Check chamber fans.</p>
<p><b>2. Head not maintaining temperature.</b></p>	<p>1. Low AC input power. Make sure system is NOT attached to an ext. cord/power strip 2. One of the four heaters is bad. 3. Head board ground wire loose or not attached. Using a meter, ohm to head chassis 4. Check for 120VDC output from the PDB. If voltage is not present or low - replace the PDB. 5. Umbilical cable connector loose at head board - check to make sure it is fully seated. 6. 1200es only - T/C board is bad. Replace T/C board 7. Head Board is bad. Replace Head Board 8. Check ground between Toggle Plate and Head Board. 9. Head T/C wire is shorted to the head chassis. Check or torn or damaged wire insulation. 10. The heater wires in the umbilical cable are broken 11. Head T/C is not fully inserted into heater block. Check that T/C is installed correctly. 12. Head T/C is crushed. Check by ohming from the T/C connector pin to the head body Reading should show open.</p>
<p><b>3. Pausing during build and temperatures are correct.</b> <b>NOTE:</b> Pausing may be caused by multiple read/write errors not temperature issues.</p>	<p>1. Check CFG for valid (over 60) R/W errors. If errors are noted: a. Check card reader LED for heartbeat - if none check connector J18 on the 186. b. Replace card reader c. Replace receiver cable/receiver d. Replace the controller board</p>
<p><b>4. STOPS during build, display still shows building, does not start to build again.</b></p>	<p>1. Cycle power 2. Follow TS instructions for Pausing issues (see above) 3. If issue continues (randomly) replace SBC (SBC is unexpectedly rebooting)</p>



**N). Power Down**

1. Fails to shutdown.	1. Toggle the <u>power down switch</u> again. 2. Shut system off at the breaker.
2. Display indicates "Recovery after uncontrolled shutdown" Display indicates "Lost Power" Display indicates "Recovery after controlled loss of power"	1. AC power was interrupted. Check customers AC power. 2. Bad control power down switch cable.
3. Shuts down immediately after the control power down switch is thrown.	1. Check to make sure all connectors are seated on the SBC. 2. Replace the PDB. 3. Replace the SBC.

**O). Power UP / Boot**

1. Chamber won't heat up to at least:  65 degrees	1. Envelope Heater bad. Check heater resistance -should be about 36 ohms 2. Heater element(s) are burnt out. Using a thermometer check if one side is blowing cooler air than the other 3. Check heaters connections. J3 on the controller 4. Heater bad. Check heater resistance - should be about 36 ohms. 5. Check chamber fans.
2. Head won't heat up.	1. Liquefier heater is bad. Check for 120VDC at head. If OK replace head. 2. Fuse on the 120 VDC supply is blown (on PDB). 3. Check for 120VDC output from the PDB. If voltage is not present or low - replace the PDB. 4. AC input power is inadequate. Check AC input power. 5. Liquefier heater is open (infinite resistance). 6. Low AC input power. Make sure system is NOT attached to an ext. cord/power strip 7. One of the four heaters is bad. 8. Head board ground wire loose or not attached. Using a meter, ohm to head chassis 9. Umbilical cable connector loose at head board - check to make sure it is fully seated. 10. Head Board is bad. Replace Head Board 11. Check ground between Toggle Plate and Head Board. 12. Head T/C wire is shorted to the head chassis. Check or torn or damaged wire insulation. 13. The heater wires in the umbilical cable are broken 14. Head T/C is not fully inserted into heater block. Check that T/C is installed correctly. 15. Head T/C is crushed. Check by ohming from the T/C connector pin to the head body Reading should show open.

<p><b>3. No fans, lights, text and no LCD back light (no nothing)</b></p>	<ol style="list-style-type: none"> <li>1. Check if the main thermostat is open.</li> <li>2. 24VDC power supply is bad. Replace 24VDC supply.</li> <li>3. Check cable from 24VDC supply to PDB.</li> <li>4. PDB has failed, no 24 volt output. Replace PDB.</li> <li>5. Bad Thermal safety switch - Replace Head Board</li> </ol>
<p><b>4. No fans, lights, text and LCD back light is ON</b></p>	<ol style="list-style-type: none"> <li>1. Use HyperTerminal and/or CFG File to check for <u>additional error codes (root cause)</u>.</li> <li>2. Thermal safety switch has opened. Reset switch by cycling power</li> <li>3. Replace head board, chamber heater cable, and/or umbilical cable</li> </ol>
<p><b>5. System won't boot, no display after 5 minutes.</b> Fans and lights are operating <b>NOTE:</b> Replacement Hard Drive may take up to 45 minutes to boot.</p>	<ol style="list-style-type: none"> <li>1. If system homes: Check LCD ribbon cable, if OK replace LCD</li> <li>2. If system does NOT home: Power on for at least 10 minutes, repeat 2 more times if there is still no text. If after three power cycles of 10 minutes each and there is still no text replace the hard drive.</li> <li>3. Measure for 12VDC from the PDB (to the hard drive). Replace PDB</li> <li>4. Replace SBC.</li> </ol>
<p><b>6. System powers off after a few seconds.</b></p>	<ol style="list-style-type: none"> <li>1. Check that ALL the dip switches are in the proper position (see Service Guide).</li> <li>2. Use HyperTerminal and/or CFG File to check for <u>additional error codes (root cause)</u>.</li> <li>3. 24VDC power supply may be crow-barring. Measure resistance at the PDB If resistance is within tolerance replace supply, if not there is most likely a short in the system.</li> </ol>
<p><b>7. System reaching temp, does not go to "Idle" screen and head hits into the right side of the machine</b></p>	<ol style="list-style-type: none"> <li>1. Modeling base sensor broken. System is attempting to retract sensor. Replace the sensor.</li> </ol>

**P). "Can't Find Home - Check Modeling Base" displayed on LCD**

1. Head stops over Z stage/modeling base	1. No modeling base 2. Modeling base is used/defective - Replace
2. Head moves to lower modeling base sensor but does NOT move over substrate	1. Modeling base sensor is NOT turning off before performing touchdown (verify using LED) 2. Y EOT sensor is not operating correctly. Check using Maraca or DataStat 3. Debris on Z Stage casting prevents Z stage from finding home
3. Head completes finding modeling base routine then displays error message.	1. Z offset value is incorrect (out of operating range) Check/adjust value using Maraca or download CAL file from floppy to restore factory calibration values. 2. Flatness check may have failed. Use HT to read the touchdown values. Compare these values to the "tolerance" value displayed. If this value is over 1728 replace the substrate. 3. If failure reoccurs check XY table level using the head bracket and dial indicator. Values should be a band of 0.010 total for the four points (0.003 total) If values are out of spec: Check for loose tray mounting screws. If so level per procedure. If screws are tight, level the XY table per procedure. 4. If failure reoccurs the X rear guide rod may be out of alignment. Replace XY table.
4. Head stops moving while attempting to lower Z detect sensor plunger	1. Using PDB LED's check to see that all sensors are working correctly. If not check sensor connections/wires or replace sensor 2. Z offset value is incorrect (out of operating range) Check/adjust value using Maraca or download CAL file from floppy to restore factory calibration values.

**Q). System VERY slow to reach temperature**

1. Envelope takes unusually long (over 40 minutes) to reach temperature.	1. Replace PDB (Loose SS relay) 2. Envelope heater(s) bad. Check heater resistance - should be about 36 ohms.
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**R) Calibration Issues**

<b>1. Tip offset cal part - support and model over .78" offset</b>	1. Check that tip offset values are close to default values. default = 0.78, 0.00
<b>2. Tip offset values change but do not take.</b>	Tip offset is changed in Maraca and the change is stored correctly in the hard drive (verified by viewing the CFG file). When the tip_offset part is run though, the offset does not change. Replace SBC.

**S) Unexpected Behavior**

<b>1. System continues to display "load upgrade" after performing upgrade (upgrade loop)</b>	1. Try loading upgrade at lease three times. 2. Controller firmware is not upgrading. Verify by reading the CFG file. Upgrade firmware using HT and running sndbin
<b>2. Substrate sensor arm does not fully retract sensor after finding substrate.</b>	1. Substrate sensor is turning on prematurely. 2. Check if sensor assemble is loose.

**T) Z Calibration Failure**

<p><b>1. First layer too deep into substrate</b></p> <p><b>Solution: Z offset +.010</b></p>	<p><b>SST</b></p> <p><u>Left square (SS)</u>  <i>Upper layers</i> - Missing  <i>1st layer</i> - May be visible, but looks choked off. Etches may be visible in substrate.</p> <p><u>Right square (model)</u>  <i>Upper layers</i> - Missing or barely stuck to substrate. Part layer shifted.  <i>1st layer</i> - May be visible, but looks choked off. Etches may be visible in substrate.</p>	<p><b>BST</b></p> <p><u>Left square (BASS)</u>  <i>Upper layers</i> - Missing/barely stuck to substrate  <i>1st layer</i> - May be visible, but looks choked off. Etches may be visible in substrate.</p> <p><u>Right square (model)</u>  <i>Upper layers</i> - Did not build completely. May be some wisps of model material.  <i>1st layer</i> - May be visible, but looks choked off. Etches may be visible in substrate.</p>
<p><b>2. First layer tip too high off substrate</b></p> <p><b>Solution: Z offset -.010</b></p>	<p><b>SST</b></p> <p><u>Left square (SS)</u>  <i>Upper layers</i> - Missing or barely stuck to substrate  <i>1st layer</i> - Missing or barely stuck to substrate</p> <p><u>Right square (model)</u>  <i>Upper layers</i> - Missing or barely stuck to substrate  <i>1st layer</i> - Missing or barely stuck to substrate</p>	<p><b>BST</b></p> <p><u>Left square (BASS)</u>  <i>Upper layers</i> - Missing or barely stuck to substrate  <i>1st layer</i> - None</p> <p><u>Right square (model)</u>  <i>Upper layers</i> - Missing or barely stuck to substrate  <i>1st layer</i> - None</p>
<p><b>3. Support tip much lower than model tip</b></p> <p><b>Solution: Z offset -.010</b></p>	<p><b>SST</b></p> <p><u>Left square (SS)</u>  <i>Upper layers</i> - Built OK  <i>1st layer</i> - OK</p> <p><u>Right square (model)</u>  <i>Upper layers</i> - Missing or barely stuck to substrate.  <i>1st layer</i> - OK</p>	<p><b>BST</b></p> <p><u>Left square (BASS)</u>  <i>Upper layers</i> - Did not build completely.  <i>1st layer</i> - May be visible, but roughed up form the support tip</p> <p><u>Right square (model)</u>  <i>Upper layers</i> - Built OK  <i>1st layer</i> - OK</p>

<p><b>4. Support tip much higher than model tip</b></p> <p><b>Solution: Z offset +.010</b></p>	<p><b>SST</b></p> <p><u>Left square (SS)</u> Upper layers - Built OK 1st layer - OK</p> <p><u>Right square (model)</u> Upper layers - Did not build completely. may be some wisps of model material. 1st layer - May be visible, but roughed up from the support tip</p>	<p><b>BST</b></p> <p><u>Left square (BASS)</u> Upper layers - Missing/barely stuck to substrate 1st layer - OK</p> <p><u>Right square (model)</u> Upper layers - Built OK</p> <p>1st layer - OK</p>
<p><b>5. Bad tip shroud</b></p> <p><b>Solution: Replace tip shroud</b></p>	<p><b>SST</b></p> <p><u>Pad (SS)</u> Upper layers - Part built, but surface looks rough or looks OK but cal failed 1st layer - OK</p> <p><u>Right square (model)</u> Upper layers - Part built, but surface looks rough or looks OK but cal failed 1st layer - OK</p>	<p><b>BST</b></p> <p><u>Pad (BASS)</u> Upper layers - Part built, but surface looks rough or looks OK but cal failed 1st layer - OK</p> <p><u>Right square (model)</u> Upper layers - Part built, but surface looks rough or looks OK but cal failed 1st layer - OK</p>
<p><b>6. Model filament not loaded</b></p> <p><b>Solution: load material</b></p>	<p><b>SST</b></p> <p><u>Left square (SS)</u> Upper layers - Built OK 1st layer - OK</p> <p><u>Right square (model)</u> Upper layers - Missing. No evidence of ABS extrusion. 1st layer - OK</p>	<p><b>BST</b></p> <p><u>Left square (BASS)</u> Upper layers - Missing/barely stuck to substrate 1st layer - Missing. No evidence of ABS extrusion</p> <p><u>Right square (model)</u> Upper layers - Missing. No evidence of ABS extrusion 1st layer - OK</p>
<p><b>7. Support filament not loaded</b></p> <p><b>Solution: load material</b></p>	<p><b>SST</b></p> <p><u>Left square (SS)</u> Upper layers - Missing. No evidence of SS extrusion 1st layer - Missing. No evidence of SS extrusion</p> <p><u>Right square (model)</u> Upper layers - Missing or barely stuck to substrate. 1st layer - Missing. No evidence of SS extrusion</p>	<p><b>BST</b></p> <p><u>Left square (BASS)</u> Upper layers - Missing. No evidence of BASS extrusion 1st layer - OK</p> <p><u>Right square (model)</u> Upper layers - Built OK</p> <p>1st layer - OK</p>