ZPrinter® 650

Troubleshooting Guide

Part Number 09915

Revision B

Z CORPORATION®

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Rev A ECN 2590 BWH 10/22/08

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Preface

Troubleshooting Z Corporation's line of 3D printer can sometimes be a frustrating, complex and tedious process but it doesn't have to be this way. Often a technician goes into a situation with blinders on, focusing on one problem and jumping to conclusions that have fixed other machines. Every encounter with an error or problem should start the same way. There are a few simple steps and processes that can help you to narrow down the problem you are facing and get you the help you need quickly and efficiently.

In the Preface section Troubleshooting 101 you will find a list of steps that you should perform EVERY time you encounter a problem on one of Z Corporations line of 3D printers and in the Preface section Getting Help from ZCentral 101 you will find a checklist of items that the ZCentral Dept. needs in order to help you more efficiently and effectively. Remember that ZCentral is there to be your second support option and provide you with the help that you need but can only do so with the proper information.

Troubleshooting 101:

1. Understand the problem at hand! *(example: Printer Won't Boot= Not very descriptive. Printer Won't Boot= I turn the printer on and do not get any lights or readout on the monitor plugged into the machine)* is much more descriptive.
2. Check to make sure that the customer is following proper storage procedures for consumables and that their products are not expired.
3. Clean the machine thoroughly! This includes all parts of the service station, axis rails, pulley teeth and top deck. Remove any debris build up at the ends of travel, on the axis rail and even on axis rail supports.
4. Perform a quick inspection of the machine, remove side panels and covers, lubricate the machine and re-tension all belts. During the inspection you should be looking for any signs of leaks, loose screws or nuts and worn parts. Badly worn items should be replaced during this service visit, screws and covers need to be tightened and leaks should be fixed immediately.
5. Turn the machine off and move the carriage and fast axis to the middle of the build bed and re-boot the machine. It is very important that you watch, study and become familiar with the boot process of the Z Corp 3D printer you are working on.

Many problems can be identified and possibly solved by simply performing these 5 steps but sometimes it takes a little more work.

6. Once the machine has rebooted and come back "Online" take a quick look through the printers log file and take a look at the print head report. In the log file look for trends leading up to the error or problem you are

experiencing*(example: repeated 1006 Head Too Hot errors with a head will lead to 40800 Head Check Failed or other errors)*. With the same points in mind, a clear print head with over 1000ml on it or a color print head with over 500ml of binder through it may start to experience 1006 Head Too Hot errors which are normal.

If you haven't found the problem you were looking for by now you are actually just getting ready to start the troubleshooting process. Change one part at a time. We are trying to find the root cause of an issue not only to help this customer but to make our equipment better. If that part does not fix the problem then it needs to be removed and placed back into your spares kit or sent back to Z Corp.

Getting Help from ZCentral 101:

Having the below information ready for the ZCentral team WILL make your initial information inquiry more fruitful and help you to get your customer up and running in the least amount of time.

1. Serial Number
2. Customer Name
3. Log File *(Service Menu> View Printer Log: Save As)*
4. .INI File *(Service Menu> Edit .INI File: Save As)*
5. .CSV File*(Z450 and Z650: Service Menu> Receive File: Type spread.csv)*
6. Head Report Information
7. Binder/Powder Type
8. Binder/Powder Expiration
9. EXACT Error Code/ Description of Problem
    a. Understand and be descriptive of the problem at hand. *(Remember example: Printer Won't Boot= Not very descriptive. Printer Won't Boot= I turn the printer on and do not get any lights or readout on the monitor plugged into the machine)*
    b. What's changed? If you have recently replaced an EBox, Fast Axis or any other part and are now having a different problem or even the same problem then it's best for you and for the ZCentral service staff to have and know this information.

Failure to follow the above steps and provide the above information can result in your questions not being answered to you or your customers' satisfaction and definitely lead to a more drawn out service call.

Notices

Copyright and Trademarks

Proprietary Information

Use of Equipment

Z Corporation's Equipment, and use of the Equipment, may be subject to limitations imposed under patents licensed to or owned by Z Corp., and is to be used solely for the fabrication of appearance models and prototypes using new Z Corporation-supplied consumables from Z Corporation or its authorized distributors in the original packaging. Other uses may be restricted; contact Z Corporation for further information. Consult the User's Manual before operation of any Z Corporation Equipment.

The Equipment is designed to be used by design engineers and other professionals in the production of early-stage 3D appearance models and prototypes. The Equipment is not to be used to produce, either directly or indirectly, medical or other products that may require precise dimensions or tolerances to ensure the safe and effective operation of such products. You agree to indemnify, defend and hold Z Corporation and its officers, directors and employees harmless from and against any and all claims, losses, damages, costs and expenses resulting from any use of the Equipment other than for the production of early-stage appearance models and prototypes.

Warranty

Your ZPrinter is guaranteed to be free of defects in materials and workmanship, when used for production of early-stage appearance models and prototypes and with Z Corporation consumables, for the period described below under WARRANTY PERIOD. All consumables and materials are guaranteed to perform as described in their specifications when stored and used as directed, up to the expiry date printed on the label. THE COMPANY MAKES NO WARRANTIES, EXPRESS OR IMPLIED, AND DISCLAIMS ALL WARRANTIES INCLUDING, BUT NOT LIMITED TO, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND ANY OTHER OBLIGATIONS OR LIABILITIES WHETHER IN CONTRACT, WARRANTY, NEGLIGENCE OR OTHERWISE. THE COMPANY IS NOT LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, PUNITIVE, CONSEQUENTIAL OR INCIDENTAL DAMAGES INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF BUSINESS PROFITS OR BUSINESS INTERRUPTION ARISING OUT OF THE USE OR INABILITY TO USE PRODUCTS OR SERVICES SOLD HEREUNDER. IN NO EVENT WILL THE COMPANY'S LIABILITY EXCEED THE TOTAL CHARGE OF THIS Z ZPRINTER 650.

WARRANTY PERIOD: In the U.S., warranty is for 90 days and covers service, parts and training material. In the EU, warranty is for 1 year and covers service, parts and training material.

Symbols

The following symbols are used on the ZPrinter 650 and in this manual.

	**General Caution:** User should use care to avoid possible damage to equipment.
	**Hot Surface:** User should use care when working near or on the labeled item.
	**High Voltage:** User should use appropriate electrical safety precautions.

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Print Head and Pogo Issues: Print head, pogo and alignment issues

1003: I2C read failed for Head x

This error is caused by the printer not being able to read the data off of the HP11 print head's smart chip and specifically refers to being able to read from the top 4 pins of the pogo card.

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
1003: I2C read failed for Head x	Print head not seated properly / contacts dirty	Clean print head contacts and Pogo Pins; Reinsert print heads	09577 ZPrinter650 User Manual
1003: I2C read failed for Head x	Bad/Old HP11 Print Head	Replace HP11 Print Head	09577 ZPrinter650 User Manual
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
1003: I2C read failed for Head x	Bad Carriage Cable	Replace 50080 Pogo Flex Cable	85026 ZPrinter 650 Carriage Cable Removal and Replacement
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
1003: I2C read failed for Head x	Bad Pogo PCB	Replace 50019 Pogo PCB	85022 ZPrinter 650 Pogo PCB Removal and Replacement
Please follow the above listed suggestions and remember that a bad print head can cause the same error so it is always beneficial to use new print heads while troubleshooting. If the problem remains after trying the above contact the ZCorp service Dept.			

1004: Head x fire voltage failed

This error is caused by the printer not being able to power the print heads. The most common causes for this error are a short between the print head and Pogo PCB, a dead print head, or a short on the Pogo PCB.

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
1004: Head fire voltage failed	Print head not seated properly / contacts dirty	Clean print head contacts and Pogo Pins; Reinsert print heads	09577 ZPrinter650 User Manual
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
1004: Head fire voltage failed	Bad/Old HP11 Print Head	ReplaceHP11 Print Head	09577 ZPrinter650 User Manual
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
1004: Head fire voltage failed	Bad Carriage Cable	Replace 50080 Pogo Flex Cable	85026 ZPrinter 650 Carriage Cable Removal and Replacement
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
1004: Head fire voltage failed	Bad Pogo PCB	Replace 50019 Pogo PCB	85022 ZPrinter 650 Pogo PCB Removal and Replacement
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
1004: Head fire voltage failed	Bad festoon cable assembly	50108 Festoon Cable Assembly	*(Figure 1)*
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
1004: Head fire voltage failed	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
Please follow the above listed suggestions and remember that a bad print head can cause the same error so it is always beneficial to use new print heads while troubleshooting. If the problem remains after trying the above contact the ZCorp service Dept.			

1006: Head x temperature too high

This error is caused by a print head overheating due to low binder flow, poor cleaning of the print head by the service station or a failed electrical circuit including the print head. This is a common error when print heads have reached their life expectancy.

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
Heads are getting powder on them	Out of ZC6	Add ZC6	09577 ZPrinter650 User Manual
1006: Head x temperature too high	Expired Binder	Check the expiration date of the materials in the machine and custom's stock.	Sanitize System: DO NOT USE BLEACH: Use 06965 Sanitation Kit
1006: Head x temperature too high	Print head not seated properly / contacts dirty	Clean print head contacts and Pogo Pins; Reinsert print heads	09577 ZPrinter650 User Manual
1006: Head x temperature too high	Bad/Old Print Head	Replace Print head	09577 ZPrinter650 User Manual
After performing the above step try performing a purge print head, alignment and a small test print. If the machine performs the tasks the problem should be solved.			
1006: Head x temperature too high	Low flow rate of binder to the print head	Check and verify the flow rates according to the reference document	85052 ZPrinter 650 Flow Rate Test
Heads are getting powder on them	Service station is dirty or the squirter block is clogged	Clean the 6 service station squirter block holes or replace the 30008 squirter block	09577 ZPrinter650 User Manual *(Figure 2)*
Heads are getting powder on them	Service Station Wiper is Worn	Replace 30011 Service Station Wiper	*(Figure 3)*
Heads are getting powder on them	Parking Spittoon is not clean or is damaged	Clean Parking Spittoon	9572 ZPrinter650 User Manual
1006: Head x temperature too high	Air in Fluid System	See Fluids	
1006: Head x temperature too high	Binder system is leaking	See Fluids	
1006: Head x temperature too high	Air Vent is clogged (May happen during transport)	Replace Air Vent	*(Figure 5)*
1006: Head x temperature too high	Out of binder and float switch has failed	Troubleshoot float switch and add binder	*(Figure 6)*
1006: Head x temperature too high	Lines are contaminated or Clogged	Sanitize System: DO NOT USE BLEACH: Use 06965 Sanitation Kit	Coming Soon
The first steps in troubleshooting should always be to check the print head life, verify the flow rate is correct, and try another print head! Once a print head has thrown an over temp error the print head is usually dead and must be replaced.			

1007: Head x current too high

This error is caused by the current for a specific print head being too high. This error can also be displayed as 1007: Head current too high 255v. In the ZPrinter650, this voltage comes from the PC104+ card, through the festoon cables, Adapter PCB, and carriage cable to power the Pogo PCB.

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
1007: Head x current too high	Bad/Old Print Head	Replace Print Head	09577 ZPrinter650 User Manual
1007: Head x current too high	Print head not seated properly / contacts dirty	Clean print head contacts and Pogo Pins; Reinsert print heads	09577 ZPrinter650 User Manual
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
1007: Head x current too high	Bad Carriage Cable	Replace 50080 Pogo Flex Cable	85026 ZPrinter 650 Carriage Cable Removal and Replacement
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
1007: Head x current too high	Bad Pogo PCB	Replace 50019 Pogo PCB	85022 ZPrinter 650 Pogo PCB Removal and Replacement
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
1007: Head x current too high	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
Please follow the above listed suggestions and remember that a bad print head can cause the same error so it is always beneficial to use new print heads while troubleshooting. If the head current is displayed as 255v then the problem may be located in the carriage cable, festoon cable or PC104+. If the problem remains after trying the above contact the ZCorp Service Dept.			

1009: Head fire voltage stuck

This error is caused by the current for the print heads being locked on. In the ZPrinter650, this voltage comes from the PC104+ card, through the festoon cables, Adapter PCB, and carriage cable to power the Pogo PCB.

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
1009: Head fire voltage stuck	Bad/Old Print Head	Replace Print Head	09577 ZPrinter650 User Manual
1009: Head fire voltage stuck	Print head not seated properly / contacts dirty	Clean print head contacts and Pogo Pins; Reinsert print heads	09577 ZPrinter650 User Manual
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
1009: Head fire voltage stuck	Bad Carriage Cable	Replace 50080 Pogo Flex Cable	85026 ZPrinter 650 Carriage Cable Removal and Replacement
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
1009: Head fire voltage stuck	Bad Pogo PCB	Replace 50019 Pogo PCB	85022 ZPrinter 650 Pogo PCB Removal and Replacement
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
1009: Head fire voltage stuck	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
Please follow the above listed suggestions and remember that a bad print head can cause the same error so it is always beneficial to use new print heads while troubleshooting. If the problem remains after trying the above contact the ZCorp service Dept.			

1010: Invalid head temperature

This error is caused by a bad reading of the print head temperature. You can find which head is causing the problem by looking in the printers log file for the following log entry: Head Alarm 10: 46 45 41 43 256 invalid temp reading

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
1010: Invalid head temperature	Service station is dirty or the squirter block is clogged	Clean the 6 service station squirter block holes or replace the 30008 squirter block	09577 ZPrinter650 User Manual *(figure 2)*
1010: Invalid head temperature	Service Station Wiper is Worn	Replace 30011 Service Station Wiper	*(Figure 3)*
1010: Invalid head temperature	Print head not seated properly / contacts dirty	Clean print head contacts and Pogo Pins; Reinsert print heads	09577 ZPrinter650 User Manual
1010: Invalid head temperature	Bad/Old Print Head	Replace Print head	09577 ZPrinter650 User Manual
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
1010: Invalid head temperature	Bad Carriage Cable	Replace 50080 Pogo Flex Cable	85026 ZPrinter 650 Carriage Cable Removal and Replacement
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
1010: Invalid head temperature	Bad Pogo PCB	Replace 50019 Pogo PCB	85022 ZPrinter 650 Pogo PCB Removal and Replacement
The main cause of this error is fluid getting onto the Pogo and print head contacts. A clean service station is key to keeping the machine free of this error. This error can usually be troubleshot by cleaning the electrical contacts on the Pogo PCB and print head or replacing the print head.			

3011: SEQUENCER: error in DPC, flags

This error is caused by the PC104+ not being able to communicate with the pogo pcb.

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
3011: Sequencer: error in DPC flags	Bad/Old Print Head	Replace Print Head	09577 ZPrinter650 User Manual
3011: Sequencer: error in DPC flags	Print head not seated properly / contacts dirty	Clean print head contacts and Pogo Pins; Reinsert print heads	09577 ZPrinter650 User Manual
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
3011: Sequencer: error in DPC flags	Bad Carriage Cable	Replace 50080 Pogo Flex Cable	85026 ZPrinter 650 Carriage Cable Removal and Replacement
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
3011: Sequencer: error in DPC flags	Bad Pogo PCB	Replace 50019 Pogo PCB	85022 ZPrinter 650 Pogo PCB Removal and Replacement
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
3011: Sequencer: error in DPC flags	Bad festoon cable assembly	50108 Festoon Cable Assembly	*(Figure 1)*
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
3011: Sequencer: error in DPC flags	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
Please follow the above listed suggestions and remember that a bad print head can cause the same error so it is always beneficial to use new print heads while troubleshooting. If the problem remains after trying the above contact the ZCorp service Dept.			

40006: AUTOALIGN: weak sensor reading

This error is caused by the alignment sensor not being able to read the initial refraction.

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
40006: AUTOALIGN: weak sensor reading	Dirty sensor Window	Clean Window and Retry	09577 ZPrinter650 User Manual *(figure 7)*
After performing the above step try performing an alignment. Watch the alignment pattern to make sure that the light for the alignment comes on. If you do not see the green light during alignment proceed to Pogo PCB replacement. If the machine performs both tasks the problem should be solved.			
40006: AUTOALIGN: weak sensor reading	Build bed is not Flat	Perform Fill Bed	09577 ZPrinter650 User Manual *(figure 21)*
40006: AUTOALIGN: weak sensor reading	Poor Spread	"See Spread Issues"	"See Spread Issues" *(figure 18)*
After performing the above step try performing an alignment. Watch the alignment pattern to make sure that the light for the alignment comes on. If you do not see the green light during alignment proceed to Pogo PCB replacement. If the machine performs both tasks the problem should be solved.			
40006: AUTOALIGN: weak sensor reading	Dirty Sensor on Pogo or oil has leaked in the carriage	Clean sensor on Pogo with alcohol and clean inside the carriage then retry	85022 ZPrinter 650 Pogo PCB Removal and Replacement
40006: AUTOALIGN: weak sensor reading	Pogo Card is crooked or sensor is not snapped in	Realign the pogo card	85022 ZPrinter 650 Pogo PCB Removal and Replacement *(figure 9 and 9.1)*
After performing the above step try performing an alignment. Watch the alignment pattern to make sure that the light for the alignment comes on. If you do not see the green light during alignment proceed to Pogo PCB replacement. If the machine performs both tasks the problem should be solved.			
40006: AUTOALIGN: weak sensor reading	Bad Pogo PCB	Replace 50019 Pogo PCB	85022 ZPrinter 650 Pogo PCB Removal and Replacement
After performing the above step try performing an alignment. Watch the alignment pattern to make sure that the light for the alignment comes on. If you do not see the green light during alignment proceed to Pogo PCB replacement. If the machine performs both tasks the problem should be solved.			
40006: AUTOALIGN: weak sensor reading	Bad Carriage Cable	Replace 50080 Pogo Flex Cable	85026 ZPrinter 650 Carriage Cable Removal and Replacement
After performing the above step try performing an alignment. Watch the alignment pattern to make sure that the light for the alignment comes on. If you do not see the green light during alignment proceed to Pogo PCB replacement. If the machine performs both tasks the problem should be solved.			
40006: AUTOALIGN: weak sensor reading	Sensor window is damaged or missing	50007 Fast Axis Assembly	85021 ZPrinter 650 Fast Axis Removal and Replacement
The most common cause is a dirty alignment window. It is imperative that the window is cleaned before every alignment.			

40007 AUTOALIGN: alignment of Axis x failed

This error is axis specific (Axis0 or Axis1) and is caused by the sensors lack of ability to properly align the heads.

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
40007 AUTOALIGN: alignment of Axis x failed	Dirty sensor Window	Clean Window and Retry	09577 ZPrinter650 User Manual *(Figure 7)*
After performing the above step try performing a service print head and an alignment. Watch the alignment pattern for print quality. If the machine performs both tasks the problem should be solved.			
40007 AUTOALIGN: alignment of Axis x failed	Build bed is not Flat	Perform Fill Bed	09577 ZPrinter650 User Manual
40007 AUTOALIGN: alignment of Axis x failed	Poor Spread	"See Spread Issues"	"See Spread Issues" *(figure 18)*
After performing the above step try performing a service print head and an alignment. Watch the alignment pattern for print quality. If the machine performs both tasks the problem should be solved.			
40009 AUTOALIGN: alignment of Axis x failed	Stripy printing	"See Part Quality Troubleshooting"	"See Part Quality Troubleshooting" *(Figure 8)*
After performing the above step try performing a service print head and an alignment. Watch the alignment pattern for print quality. If the machine performs both tasks the problem should be solved.			
40007 AUTOALIGN: alignment of Axis x failed	Dirty Sensor on Pogo or oil has leaked in the carriage	Clean sensor on Pogo with alcohol and clean inside the carriage then retry	85022 ZPrinter 650 Pogo PCB Removal and Replacement *(Figure 9 and 9.1)*
40007 AUTOALIGN: alignment of Axis x failed	Pogo Card is crooked or sensor is not snapped in	Realign the pogo card	85022 ZPrinter 650 Pogo PCB Removal and Replacement *(Figure 9 and 9.1)*
After performing the above step try performing a service print head and an alignment. Watch the alignment pattern for print quality. If the machine performs both tasks the problem should be solved.			
40007 AUTOALIGN: alignment of Axis x failed	Bad Pogo PCB	Replace 50019 Pogo PCB	85022 ZPrinter 650 Pogo PCB Removal and Replacement

Stripy printing is one of the most common causes of this error. The key to troubleshooting this error is defining the problem that you are dealing with. You must differentiate weather the problem is caused by stripy printing or an axis problem. When this error is encountered the machine will do a stripe test over the alignment pattern. If that stripe test looks good then the problem may be related to a dirty sensor window or movement problems with the indicated axis.

40008: AUTOALIGN: can't pick reference head

This error is caused by the sensors lack of ability to read the contrast refraction from the yellow binder just before the alignment pattern is printed.

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
40008: AUTOALIGN	Dirty sensor Window	Clean Window and Retry	09577 ZPrinter650 User Manual
40008: AUTOALIGN	Build bed is not Flat	Perform Fill Bed	09577 ZPrinter650 User Manual
40008: AUTOALIGN	Poor Spread	"See Spread Issues"	"See Spread Issues" *(figure 18)*
After performing the above step try performing a service print head and an alignment. Watch the alignment pattern for print quality. If the machine performs both tasks the problem should be solved.			
40008: AUTOALIGN	Stripy printing	"See Part Quality Troubleshooting"	"See Part Quality Troubleshooting" *(figure 8)*
After performing the above step try performing a service print head and an alignment. Watch the alignment pattern for print quality. If the machine performs both tasks the problem should be solved.			
40008: AUTOALIGN	Dirty Sensor on Pogo or oil has leaked in the carriage	Clean sensor on Pogo with alcohol and clean inside the carriage then retry	*(Figure 7)*
40008: AUTOALIGN	Pogo Card is crooked or sensor is not snapped in	Realign the pogo card	*(Figure 9 and 9.1)*
After performing the above step try performing a service print head and an alignment. Watch the alignment pattern for print quality. If the machine performs both tasks the problem should be solved.			
40008: AUTOALIGN	Bad Pogo PCB	Replace 50019 Pogo PCB	85022 ZPrinter 650 Pogo PCB Removal and Replacement
After performing the above step try performing a service print head and an alignment. Watch the alignment pattern for print quality. If the machine performs both tasks the problem should be solved.			
40008: AUTOALIGN	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure

Stripy printing is one of the most common causes of this error. The key to troubleshooting this error is defining the problem that you are dealing with. You must differentiate weather the problem is caused by stripy printing or an axis problem. When this error is encountered the machine will do a stripe test over the alignment pattern. If that stripe test looks good then the problem may be related to a dirty sensor window or movement problems with the indicated axis.

40800: Head x check failed

The printer cannot perform a continuity check on the indicated print head.

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
40800: Head x check failed	Print head not seated properly / contacts dirty	Clean print head contacts and Pogo Pins; Reinsert print heads	09577 ZPrinter650 User Manual
40800: Head x check failed	Bad/Old HP11 Print Head	ReplaceHP11 Print Head	09577 ZPrinter650 User Manual
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
40800: Head x check failed	Bad Carriage Cable	Replace 50080 Pogo Flex Cable	85026 ZPrinter 650 Carriage Cable Removal and Replacement
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
40800: Head x check failed	Bad Pogo PCB	Replace 50019 Pogo PCB	85022 ZPrinter 650 Pogo PCB Removal and Replacement
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
40800: Head x check failed	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
Please follow the above listed suggestions and remember that a bad print head can cause the same error so it is always beneficial to use new print heads while troubleshooting. If the problem remains after trying the above contact the ZCorp service Dept.			

60400: FPGA: comm error on pogo card

This error indicates that the PC104+ cannot communicate with the Pogo PCB. In the ZPrinter650, this communication comes from the PC104+ card, through the festoon cables, Adapter PCB, and carriage cable to the Pogo PCB.

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
60400: FPGA: comm error on pogo card	Print head not seated properly / contacts dirty	Clean print head contacts and Pogo Pins; Reinsert print heads	09577 ZPrinter650 User Manual
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
60400: FPGA: comm error on pogo card	Bad/Old Print Head	Replace Print Head	09577 ZPrinter650 User Manual
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
60400: FPGA: comm error on pogo card	Bad Carriage Cable	Replace 50080 Pogo Flex Cable	85026 ZPrinter 650 Carriage Cable Removal and Replacement
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
60400: FPGA: comm error on pogo card	Bad Pogo PCB	Replace 50019 Pogo PCB	85022 ZPrinter 650 Pogo PCB Removal and Replacement
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
60400: FPGA: comm error on pogo card	Bad festoon cable assembly	50108 Festoon Cable Assembly	*(Figure 1)*
60400: FPGA: comm error on pogo card	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
While print heads may cause this error the most common cause of this error is a cable disconnect, bad cable or a bad pogo. This error can be diagnosed through the control panel on the machine by going through the PC104+ and Pogo tests.			

60501: POGOPOWERSPI: timed out

This is a communication error between the pogo pcb and the PC104+. In the ZPrinter650, the communication starts at the PC104+ card, through the festoon cables, Adapter PCB, and carriage cable to power the Pogo PCB.

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
60501: POGOPOWERSPI	Bad Carriage Cable	Replace 50080 Pogo Flex Cable	85026 ZPrinter 650 Carriage Cable Removal and Replacement
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
60501: POGOPOWERSPI	Bad Pogo PCB	Replace 50019 Pogo PCB	85022 ZPrinter 650 Pogo PCB Removal and Replacement
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
60501: POGOPOWERSPI	Bad slow axis festoon cable	50108 Festoon Cable Assembly	*(Figure 1)*
60501: POGOPOWERSPI	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
While print heads may cause this error the most common cause of this error is a cable disconnect, bad cable or a bad pogo. This error can be diagnosed through the control panel on the machine by going through the PC104+ and Pogo tests.			

60502: POGO POWER: read error

The PC104+ card cannot read information from the Pogo PCB. In the ZPrinter650, this communication comes from the PC104+ card, through the festoon cables, Adapter PCB, and carriage cable to the Pogo PCB.

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
60502: POGO POWER: read error	Bad Carriage Cable	Replace 50080 Pogo Flex Cable	85026 ZPrinter 650 Carriage Cable Removal and Replacement
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
60502: POGO POWER: read error	Bad Pogo PCB	Replace 50019 Pogo PCB	85022 ZPrinter 650 Pogo PCB Removal and Replacement
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
60502: POGO POWER: read error	Bad slow axis festoon cable	Replace 50108 Festoon Cable Assembly	*(Figure 1)*
60502: POGO POWER: read error	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
While print heads may cause this error the most common cause of this error is a cable disconnect, bad cable or a bad pogo. This error can be diagnosed through the control panel on the machine by going through the PC104+ and Pogo tests.			

60520: HP11 COMMANDSPI: timed out

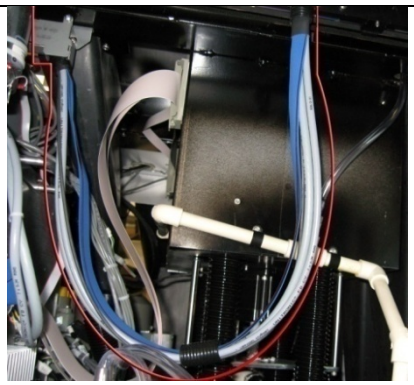
The PC104+ card cannot read the pogo card

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
60520: HP11 COMMANDSPI: timed out	Bad Carriage Cable	Replace 50080 Pogo Flex Cable	85026 ZPrinter 650 Carriage Cable Removal and Replacement
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
60520: HP11 COMMANDSPI: timed out	Bad Pogo PCB	Replace 50019 Pogo PCB	85022 ZPrinter 650 Pogo PCB Removal and Replacement
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
60520: HP11 COMMANDSPI: timed out	Bad slow axis festoon cable	Replace 50108 Festoon Cable Assembly	*(Figure 1)*
60520: HP11 COMMANDSPI: timed out	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
The most common cause of this error is a cable disconnect, bad cable or a bad pogo. This error can be diagnosed through the control panel on the machine by going through the PC104+ and Pogo tests.			

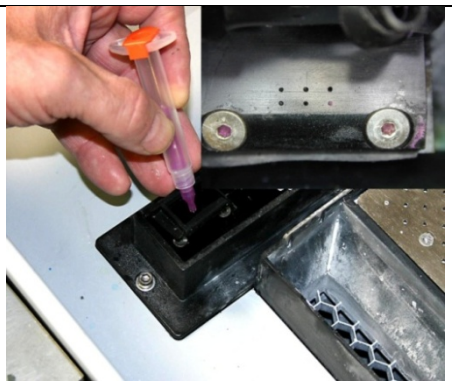
10040: POGOSTATUSSPI: timed out

The PC104+ card cannot read the pogo card

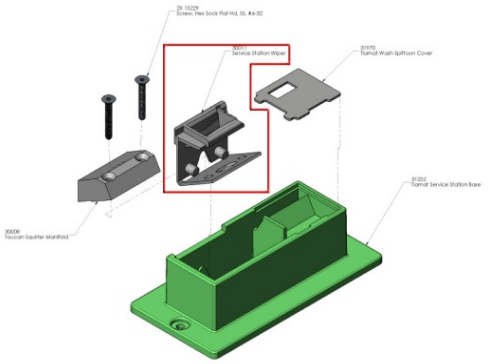
Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
70400: POGOSTATUSSPI: timed out	Bad Carriage Cable	Replace 50080 Pogo Flex Cable	85026 ZPrinter 650 Carriage Cable Removal and Replacement
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
70400: POGOSTATUSSPI: timed out	Bad Pogo PCB	Replace 50019 Pogo PCB	85022 ZPrinter 650 Pogo PCB Removal and Replacement
After performing the above step try performing a service print head and alignment. If the machine performs both tasks the problem should be solved.			
70400: POGOSTATUSSPI: timed out	Bad slow axis festoon cable	Replace 50108 Festoon Cable Assembly	*(Figure 1)*
While print heads may cause this error the most common cause of this error 50108 Slow Axis Festoon Cable+. This error may be diagnosed through the control panel on the machine by going through the PC104+ and Pogo tests.			



50108 Festoon Cable Assembly
Figure 1

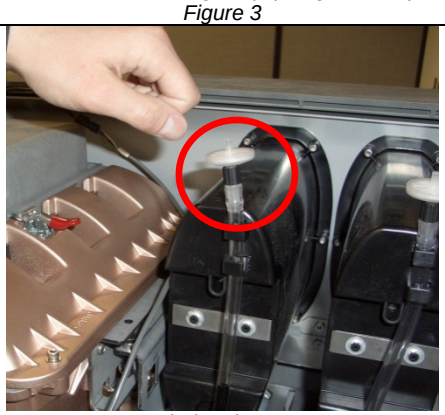


Service station squirter holes
Figure 2



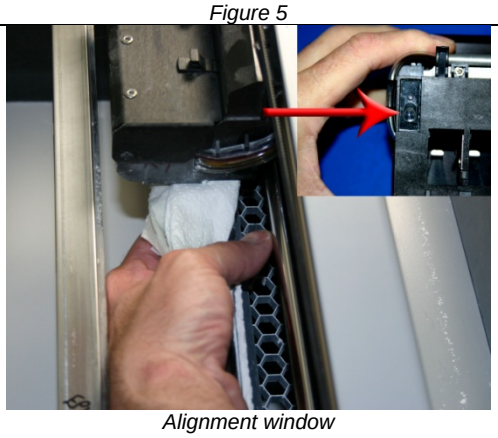
Service station diagram(squeegee in red)
Figure 3

Spittoon
Figure 4

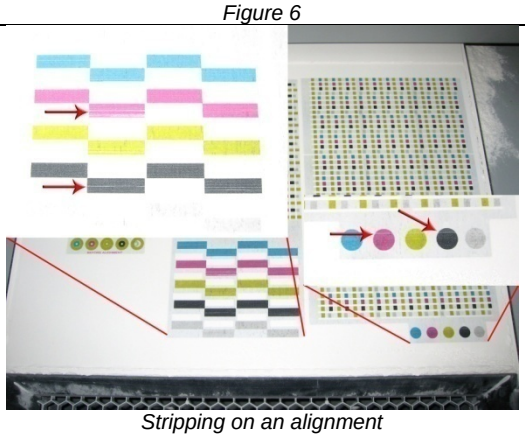


Binder air vent
Figure 5

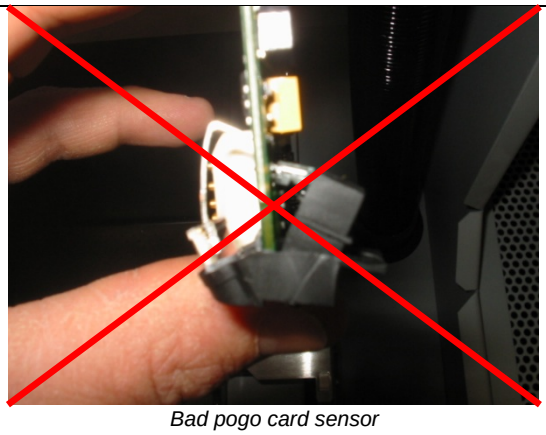
Binder bottle float switch and connector
Figure 6



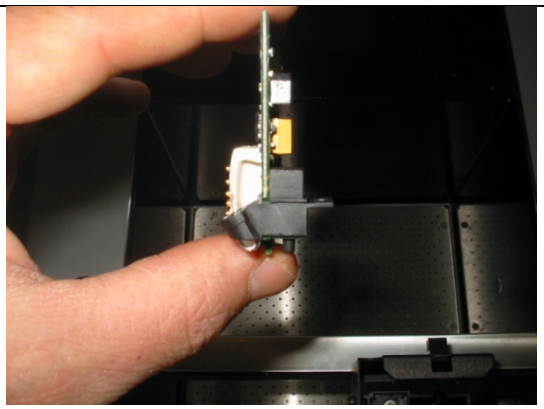
Alignment window
Figure 7



Stripping on an alignment
Figure 8



Bad pogo card sensor
Figure 9



Good pogo card sensor
Figure 9.1

Motion Errors: Axis Problems

2301(0): MOVER: axis 0 destination out of range			
This error indicates that the gantry was not able to move to the desired position			
Monitor Read-Out or Secondary Symptom	**Cause / Problem**	**Solution**	**Reference Documents**
2301(0)	SKIP_REZERO is set to 1 in the .ini file	Let the machine come online and then edit the .ini file through the ZPrint Software and delete the line item for SKIP_REZERO 1	
2301(0)	Gantry is obstructed	Remove obstruction	
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
2301(0)	Rails, ends of travel are dirty	Clean rails and ends of travel	09577 ZPrinter650 User Manual *(Figure 14)*
2301(0)	Slow axis belt is loose/worn	Re-tension the slow axis belt or replace the 50059 Tiamat Slow Axis Belt Ass'y	
2301(0)	Slow Axis bearings need lubrication	Grease Slow Axis bearings (reset the Maintenance in the software)	09577 ZPrinter650 User Manual
2301(0)	Slow Axis idler pulley is dirty/worn	Clean Pulley with a dental Pick. If worn, replace slow axis idler pulley 06564	*(Figure 11 and 12)*
2301(0)	Slow axis motor pulley is dirty/worn	Clean Pulleys with a dental Pick. If worn replace 31174 Pittman Motor 14205 24V Modified	*(Figure 11 and 12)*
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
2301(0)	Slow axis bearings are damaged	Replace 04265 Slow axis bearings	08867 ZPrinter650 Slow Axis Bearing Removal and Replacement Procedure
2301(0)	Bad slow axis motor	Replace 31174 Slow Axis Motor	
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
2301(0)	Add-On PCB Failed	Replace 50017 Add-On PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
2301(0)	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
The main cause of this error is the line item SKIP_REZERO 1 in the ZPrinter's INI file.			

2303(0): MOVER: axis 0 excessive position error

This error is caused by the presence of or the appearance of excessive friction on the slow axis rails front to back.

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
2303(0): MOVER: axis 0 excessive position error	Carriage is obstructed	Remove obstruction	
2303(0): MOVER: axis 0 excessive position error	Rails, ends of travel are dirty	Clean rails and ends of travel	09577 ZPrinter650 User Manual *(Figure 14)*
2303(0): MOVER: axis 0 excessive position error	Slow axis belt is loose/worn	Re-tension the slow axis belt or replace the 50059 Tiamat Slow Axis Belt Ass'y	
2303(0): MOVER: axis 0 excessive position error	Slow Axis bearings need lubrication	Grease Slow Axis bearings (reset the Maintenance in the software)	09577 ZPrinter650 User Manual
2303(0): MOVER: axis 0 excessive position error	Slow Axis idler pulley is dirty/worn	Clean Pulley with a dental Pick. If worn, replace slow axis idler pulley 06564	*(Figure 11 and 12)*
2303(0): MOVER: axis 0 excessive position error	Slow axis motor pulley is dirty/worn	Clean Pulleys with a dental Pick. If worn replace 31174 Pittman Motor 14205 24V Modified	*(Figure 11 and 12)*
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
2303(0): MOVER: axis 0 excessive position error	Slow axis bearings are damaged	Replace 04265 Slow axis bearings	08867 ZPrinter650 Slow Axis Bearing Removal and Replacement Procedure
2303(0): MOVER: axis 0 excessive position error	Bad slow axis motor	Replace 31174 Slow Axis Motor	
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
2303(0): MOVER: axis 0 excessive position error	Add-On PCB Failed	Replace 50017 Add-On PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
2303(0): MOVER: axis 0 excessive position error	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
The main cause of this error is the buildup of powder and dirt on the axis rails and poor lubrication.			

2303(1): MOVER: axis 1 excessive position error

This error is caused by the presence of or the appearance of excessive friction on the fast axis rails left to right.

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
2303(1): MOVER: axis 1 excessive position error	Carriage is obstructed	Remove obstruction	
2303(1): MOVER: axis 1 excessive position error	Rails, ends of travel and anti-rotates are dirty	Clean rails, ends of travel and anti-rotates	09577 ZPrinter650 User Manual *(Figure 10 and 13)*
2303(1): MOVER: axis 1 excessive position error	Fast axis bearing needs oil	Lubricate the fast axis bearing (reset the Maintenance in the software)	09577 ZPrinter650 User Manual
2303(1): MOVER: axis 1 excessive position error	Fast axis belt is loose/worn	Retension the fast axis belt or Re-tension the fast axis belt or replace the 31503 Tiamat Fast Axis Belt	08861 ZPrinter650 Fast Axis Removal and Replacement Procedure
2303(1): MOVER: axis 1 excessive position error	Fast Axis idler pulley is dirty/worn	Clean Pulley with a dental Pick. If worn, replace the 50038 Tiamat Fast Axis Idler Tensioner Ass'y	*(Figure 11 and 12)*
2303(1): MOVER: axis 1 excessive position error	Fast axis motor pulley is dirty/worn	Clean Pulley with a dental Pick. If worn, replace the 31175 Pittman Motor 9234 19.1V Modified, RoHS	*(Figure 11 and 12)*
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
2303(1): MOVER: axis 1 excessive position error	Fast Axis Bearing failure	Replace 06566 Fast Axis Assembly	08861 ZPrinter650 Fast Axis Removal and Replacement Procedure
2303(1): MOVER: axis 1 excessive position error	Bad slow axis motor	Replace 31175 Fast Axis Motor	
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
2303(1): MOVER: axis 1 excessive position error	Add-On PCB Failed	Replace 50017 Add-On PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
2303(1): MOVER: axis 1 excessive position error	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
The main cause of this error is the buildup of powder and dirt on the axis rails and poor lubrication.			

2305(0): MOVER: axis 0 didn't settle

This error typically happens while the print heads are trying to service and can be caused by the same things that can cause the other 230x errors.

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
2305(0): MOVER: axis 0 didn't settle	Gantry is obstructed	Remove obstruction	
2305(0): MOVER: axis 0 didn't settle	Rails, ends of travel are dirty	Clean rails and ends of travel	09577 ZPrinter650 User Manual *(Figure 14)*
2305(0): MOVER: axis 0 didn't settle	Slow Axis bearings need lubrication	Grease Slow Axis bearings (reset the Maintenance in the software)	09577 ZPrinter650 User Manual
2305(0): MOVER: axis 0 didn't settle	Slow axis belt is loose/worn	Re-tension the slow axis belt or replace the 50059 Tiamat Slow Axis Belt Ass'y	
2303(0): MOVER: axis 0 excessive position error	Slow Axis idler pulley is dirty/worn	Clean Pulley with a dental Pick. If worn, replace slow axis idler pulley 06564	*(Figure 11 and 12)*
2303(0): MOVER: axis 0 excessive position error	Slow axis motor pulley is dirty/worn	Clean Pulleys with a dental Pick. If worn replace 31174 Pittman Motor 14205 24V Modified	*(Figure 11 and 12)*
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
2305(0): MOVER: axis 0 didn't settle	Slow axis bearings are damaged	Replace 04265 Slow axis bearings	08867 ZPrinter650 Slow Axis Bearing Removal and Replacement Procedure
2303(1): MOVER: axis 1 excessive position error	Bad slow axis motor	Replace 31174 Slow Axis Motor	
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
2305(0): MOVER: axis 0 didn't settle	Add-On PCB Failed	Replace 50017 Add-On PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
2305(0): MOVER: axis 0 didn't settle	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
The main cause of this error is the buildup of powder and dirt on the axis rails and poor lubrication.			

2305(1): MOVER: axis 1 didn't settle

This error typically happens while the print heads are trying to service and can be caused by the same things that can cause the other 230x errors.

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
2305(1): MOVER: axis 1 didn't settle	Carriage is obstructed	Remove obstruction	
2305(1): MOVER: axis 1 didn't settle	Rails, ends of travel or anti-rotates are dirty	Clean rails, ends of travel and anti-rotates	09577 ZPrinter650 User Manual *(Figure 10 and 13)*
2305(1): MOVER: axis 1 didn't settle	Fast Axis bearing needs oil	Oil Fast Axis bearing (reset the Maintenance in the software)	09577 ZPrinter650 User Manual
2305(1): MOVER: axis 1 didn't settle	Fast axis belt is loose/worn	Re-tension the fast axis belt or replace the 31503 Tiamat Fast Axis Belt	08861 ZPrinter650 Fast Axis Removal and Replacement Procedure
2305(1): MOVER: axis 1 didn't settle	Fast Axis idler pulley is dirty/worn	Clean Pulley with a dental Pick. If worn, replace the 50038 Tiamat Fast Axis Idler Tensioner Ass'y	*(Figure 11 and 12)*
2305(1): MOVER: axis 1 didn't settle	Fast axis motor pulley is dirty/worn	Clean Pulley with a dental Pick. If worn, replace the 31175 Pittman Motor 9234 19.1V Modified, RoHS	*(Figure 11 and 12)*
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
2305(1): MOVER: axis 1 didn't settle	Fast Axis Bearing failure	Replace 06566 Fast Axis Assembly	08861 ZPrinter650 Fast Axis Removal and Replacement Procedure
2303(1): MOVER: axis 1 excessive position error	Bad slow axis motor	Replace 31175 Fast Axis Motor	
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
2305(1): MOVER: axis 1 didn't settle	Add-On PCB Failed	Replace 50017 Add-On PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
2305(1): MOVER: axis 1 didn't settle	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
The main cause of this error is the buildup of powder and dirt on the axis rails and poor lubrication.			

2400(0): REZERO: axis 0 can't find end of travel

This error is caused by the printer not being able to reach it's desired slow axis location (front to back)

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
2400(0): REZERO: axis 0 can't find end of travel	Gantry is obstructed	Remove obstruction	
2400(0): REZERO: axis 0 can't find end of travel	Rails, ends of travel are dirty	Clean rails and ends of travel	09577 ZPrinter650 User Manual *(Figure 14)*
2400(0): REZERO: axis 0 can't find end of travel	Slow Axis bearings need lubrication	Grease Slow Axis bearings (reset the Maintenance in the software)	09577 ZPrinter650 User Manual
2400(0): REZERO: axis 0 can't find end of travel	Slow axis belt is loose/worn	Re-tension the slow axis belt or Replace the 50059 Tiamat Slow Axis Belt Ass'y	
2400(0): REZERO: axis 0 can't find end of travel	Slow Axis idler pulley is dirty/worn	Clean Pulley with a dental Pick. If worn, replace slow axis idler pulley 06564	*(Figure 11 and 12)*
2400(0): REZERO: axis 0 can't find end of travel	Slow axis motor pulley is dirty/worn	Clean Pulleys with a dental Pick. If worn replace 31174 Pittman Motor 14205 24V Modified	*(Figure 11 and 12)*
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
2400(0): REZERO: axis 0 can't find end of travel	Slow axis bearings are damaged	Replace 04265 Slow axis bearings	08867 ZPrinter650 Slow Axis Bearing Removal and Replacement Procedure
2303(1): MOVER: axis 1 excessive position error	Bad slow axis motor	Replace 31174 Slow Axis Motor	
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
2400(0): REZERO: axis 0 can't find end of travel	Add-On PCB Failed	Replace 50017 Add-On PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
2400(0): REZERO: axis 0 can't find end of travel	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
The main cause of this error is a buildup of dirt and debris on the ends of travel. Cleaning the areas where the slow axis comes to a hard stop should fix the problem. *(Figure 14)*			

2400(1): REZERO: axis 1 can't find end of travel

This error is caused by the printer not being able to reach it's desired fast axis location (left to right)

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
2400(1): REZERO: axis 1 can't find end of travel	Carriage is obstructed	Remove obstruction	
2400(1): REZERO: axis 1 can't find end of travel	Rails ends of travel or anti-rotates are dirty	Clean rails, ends of travel and anti-rotates	09577 ZPrinter650 User Manual *(Figure 10 and 13)*
2400(1): REZERO: axis 1 can't find end of travel	Fast Axis bearing needs oil	Oil Fast Axis bearing (reset the Maintenance in the software)	09577 ZPrinter650 User Manual
2400(1): REZERO: axis 1 can't find end of travel	Fast axis belt is loose/worn	Re-tension the fast axis belt or replace the 31503 Tiamat Fast Axis Belt	08861 ZPrinter650 Fast Axis Removal and Replacement Procedure
2400(1): REZERO: axis 1 can't find end of travel	Fast axis motor pulley is dirty/worn	Clean Pulley with a dental Pick. If worn, replace the 31175 Pittman Motor 9234 19.1V Modified, RoHS	*(Figure 11 and 12)*
2400(1): REZERO: axis 1 can't find end of travel	Fast Axis idler pulley is dirty/worn	Clean Pulley with a dental Pick. If worn, replace the 50038 Tiamat Fast Axis Idler Tensioner Ass'y	*(Figure 11 and 12)*
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
2400(1): REZERO: axis 1 can't find end of travel	Fast Axis Bearing failure	Replace 06566 Fast Axis Assembly	08861 ZPrinter650 Fast Axis Removal and Replacement Procedure
2303(1): MOVER: axis 1 excessive position error	Bad slow axis motor	Replace 31175 Fast Axis Motor	
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
2400(1): REZERO: axis 1 can't find end of travel	Add-On PCB Failed	Replace 50017 Add-On PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
2400(1): REZERO: axis 1 can't find end of travel	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
The main cause of this error is a buildup of dirt and oil on the ends of travel. Cleaning the areas where the fast axis comes to a hard stop (bumpers) should fix the problem. *(Figure 13)*			

3012: SEQUENCER: spurious interrupt

This error is caused by the fast axis drive not keeping up with the printer's location requests

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
3012: SEQUENCER: spurious interrupt	Rails or anti-rotates are dirty	Clean rails and anti-rotates(do not lubricate)	09577 ZPrinter650 User Manual *(Figures 10 and 13)*
3012: SEQUENCER: spurious interrupt	Bearings need lubrication	Lubricate axis rails	09577 ZPrinter650 User Manual
3012: SEQUENCER: spurious interrupt	Fast axis motor pulley is dirty/worn	Clean Pulley with a dental Pick. If worn, replace the 31175 Pittman Motor 9234 19.1V Modified, RoHS	*(Figure 11 and 12)*
3012: SEQUENCER: spurious interrupt	Fast Axis idler pulley is dirty/worn	Clean Pulley with a dental Pick. If worn, replace the 50038 Tiamat Fast Axis Idler Tensioner Ass'y	*(Figure 11 and 12)*
3012: SEQUENCER: spurious interrupt	Slow Axis idler pulley is dirty/worn	Clean Pulley with a dental Pick. If worn, replace slow axis idler pulley 06564	*(Figure 11 and 12)*
3012: SEQUENCER: spurious interrupt	Slow axis motor pulley is dirty/worn	Clean Pulleys with a dental Pick. If worn replace 31174 Pittman Motor 14205 24V Modified	*(Figure 11 and 12)*
3012: SEQUENCER: spurious interrupt	Fast axis belt is loose/worn	Re-tension the fast axis belt or Re-tension the fast axis belt or replace the 31503 Tiamat Fast Axis Belt	08861 ZPrinter650 Fast Axis Removal and Replacement Procedure
3012: SEQUENCER: spurious interrupt	Slow axis belt is loose/worn	Re-tension the slow axis belt or Replace the 50059 Tiamat Slow Axis Belt Ass'y	
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
3012: SEQUENCER: spurious interrupt	Add-On PCB Failed	Replace 50017 Add-On PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
3012: SEQUENCER: spurious interrupt	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
Cleaning and lubricating should help with this error.			

3013: SEQUENCER: timed out finishing swath

This error is caused by the fast axis drive not keeping up with the printer's location requests

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
3013: SEQUENCER: timed out finishing swath	Rails or anti-rotates are dirty	Clean rails anti-rotates(do not lubricate)	09577 ZPrinter650 User Manual
3013: SEQUENCER: timed out finishing swath	Bearings need lubrication	Lubricate axis rails	09577 ZPrinter650 User Manual
3013: SEQUENCER: timed out finishing swath	Fast Axis idler pulley is dirty/worn	Clean Pulley with a dental Pick. If worn, replace the 50038 Tiamat Fast Axis Idler Tensioner Ass'y	*(Figure 11 and 12)*
3013: SEQUENCER: timed out finishing swath	Fast axis belt is loose/worn	Re-tension the fast axis belt or replace the 31503 Tiamat Fast Axis Belt	08861 ZPrinter650 Fast Axis Removal and Replacement Procedure
3013: SEQUENCER: timed out finishing swath	Fast axis motor pulley is dirty/worn	Clean Pulley with a dental Pick. If worn, replace the 31175 Pittman Motor 9234 19.1V Modified, RoHS	*(Figure 11 and 12)*
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
3013: SEQUENCER: timed out finishing swath	Bad Carriage Cable	Replace 50080 Pogo Flex Cable	85026 ZPrinter 650 Carriage Cable Removal and Replacement
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
3013: SEQUENCER: timed out finishing swath	Bad festoon cable assembly	50108 Festoon Cable Assembly	*(Figure 1)*
3013: SEQUENCER: timed out finishing swath	Add-On PCB Failed	Replace 50017 Add-On PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
3013: SEQUENCER: timed out finishing swath	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
Cleaning and lubricating should help with this error.			

43000: SEQUENCER: missed position

This error is caused by the carriage being out of position to fire the print heads

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
43000: SEQUENCER: missed position	Carriage is obstructed	Remove obstruction	
43000: SEQUENCER: missed position	Fast or slow axis rails or anti-rotates are dirty	Clean rails and anti-rotates	09577 ZPrinter650 User Manual
43000: SEQUENCER: missed position	Bearings need lubrication	Lubricate axis rails	09577 ZPrinter650 User Manual
43000: SEQUENCER: missed position	Fast axis motor pulley is dirty/worn	Clean Pulley with a dental Pick. If worn, replace the 31175 Pittman Motor 9234 19.1V Modified, RoHS	*(Figure 11 and 12)*
43000: SEQUENCER: missed position	Fast Axis idler pulley is dirty/worn	Clean Pulley with a dental Pick. If worn, replace the 50038 Tiamat Fast Axis Idler Tensioner Ass'y	*(Figure 11 and 12)*
43000: SEQUENCER: missed position	Slow Axis idler pulley is dirty/worn	Clean Pulley with a dental Pick. If worn, replace slow axis idler pulley 06564	*(Figure 11 and 12)*
43000: SEQUENCER: missed position	Slow axis motor pulley is dirty/worn	Clean Pulleys with a dental Pick. If worn replace 31174 Pittman Motor 14205 24V Modified	*(Figure 11 and 12)*
43000: SEQUENCER: missed position	Fast axis belt is loose/worn	Re-tension the fast axis belt or Re-tension the fast axis belt or replace the 31503 Tiamat Fast Axis Belt	08861 ZPrinter650 Fast Axis Removal and Replacement Procedure
43000: SEQUENCER: missed position	Slow axis belt is loose/worn	Re-tension the slow axis belt or Replace the 50059 Tiamat Slow Axis Belt Ass'y	
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
43000: SEQUENCER: missed position	Add-On PCB Failed	Replace 50017 Add-On PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
43000: SEQUENCER: missed position	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
The main cause of this error is the buildup of powder and dirt on the axis rails and poor lubrication.			

60300: REZERO: fast axis length out of tolerance

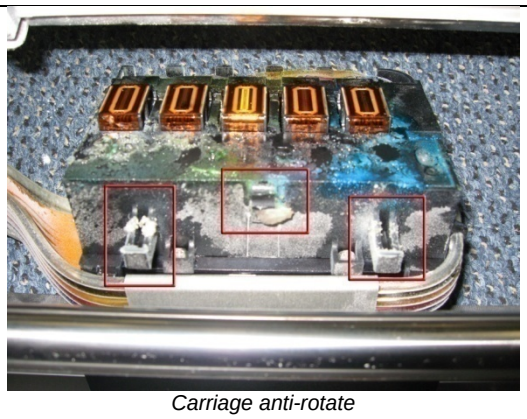
This error is caused by the fast axis length being out of tolerance while rebooting. The length of travel is measured while booting.

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
60300: REZERO: fast axis length out of tolerance	Carriage is obstructed	Remove obstruction	
60300: REZERO: fast axis length out of tolerance	Rails, ends of travel or anti-rotates are dirty	Clean rails, ends of travel and anti-rotates	09577 ZPrinter650 User Manual *(Figure 10 and 13)*
60300: REZERO: fast axis length out of tolerance	Fast Axis bearing needs lubrication	Lubricate Fast Axis bearing (reset the Maintenance in the software)	09577 ZPrinter650 User Manual
60300: REZERO: fast axis length out of tolerance	Fast Axis idler pulley is dirty/worn	Clean Pulley with a dental Pick. If worn, replace the 50038 Tiamat Fast Axis Idler Tensioner Ass'y	*(Figure 11 and 12)*
60300: REZERO: fast axis length out of tolerance	Fast axis motor pulley is dirty/worn	Clean Pulley with a dental Pick. If worn, replace the 31175 Pittman Motor 9234 19.1V Modified, RoHS	*(Figure 11 and 12)*
60300: REZERO: fast axis length out of tolerance	Fast axis belt is loose/worn	Retension the fast axis belt or Re-tension the fast axis belt or replace the 31503 Tiamat Fast Axis Belt	08861 ZPrinter650 Fast Axis Removal and Replacement Procedure
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
60300: REZERO: fast axis length out of tolerance	Fast Axis Bearing failure	Replace 06566 Fast Axis Assembly	08861 ZPrinter650 Fast Axis Removal and Replacement Procedure
2303(1): MOVER: axis 1 excessive position error	Bad slow axis motor	Replace 31175 Fast Axis Motor	
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
60300: REZERO: fast axis length out of tolerance	Add-On PCB Failed	Replace 50017 Add-On PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
60300: REZERO: fast axis length out of tolerance	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
Make sure that the rubber bumpers are in place and that the ends of travel are free of dirt and debris. *(Figure 13)*			

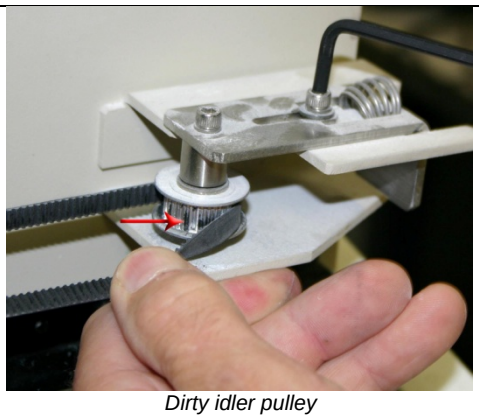
60301: REZERO: Slow axis length out of tolerance

This error is caused by the slow axis length being out of tolerance while rebooting. The length of travel is measured while booting.

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
60301: REZERO: Slow axis length out of tolerance	Gantry is obstructed	Remove obstruction	
60301: REZERO: Slow axis length out of tolerance	Rails, ends of travel are dirty	Clean rails the rails and ends of travel	09577 ZPrinter650 User Manual *(Figure 14)*
60301: REZERO: Slow axis length out of tolerance	Slow Axis bearings need lubrication	Grease Slow Axis bearings (reset the Maintenance in the software)	09577 ZPrinter650 User Manual
60301: REZERO: Slow axis length out of tolerance	Slow Axis idler pulley is dirty/worn	Clean Pulley with a dental Pick. If worn, replace slow axis idler pulley 06564	*(Figure 11 and 12)*
60301: REZERO: Slow axis length out of tolerance	Slow axis motor pulley is dirty/worn	Clean Pulleys with a dental Pick. If worn replace 31174 Pittman Motor 14205 24V Modified	*(Figure 11 and 12)*
60301: REZERO: Slow axis length out of tolerance	Slow axis belt is loose/worn	Re-tension the slow axis belt or Replace the 50059 Tiamat Slow Axis Belt Ass'y	
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
60301: REZERO: Slow axis length out of tolerance	Slow axis bearings are damaged	Replace 04265 Slow axis bearings	08867 ZPrinter650 Slow Axis Bearing Removal and Replacement Procedure
60301: REZERO: Slow axis length out of tolerance	Bad slow axis motor	Replace 31174 Slow Axis Motor	
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
60301: REZERO: Slow axis length out of tolerance	Add-On PCB Failed	Replace 50017 Add-On PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
60301: REZERO: Slow axis length out of tolerance	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
Make sure that the rubber bumpers are in place and that the ends of travel are free of dirt and debris. *(Figure 14)*			

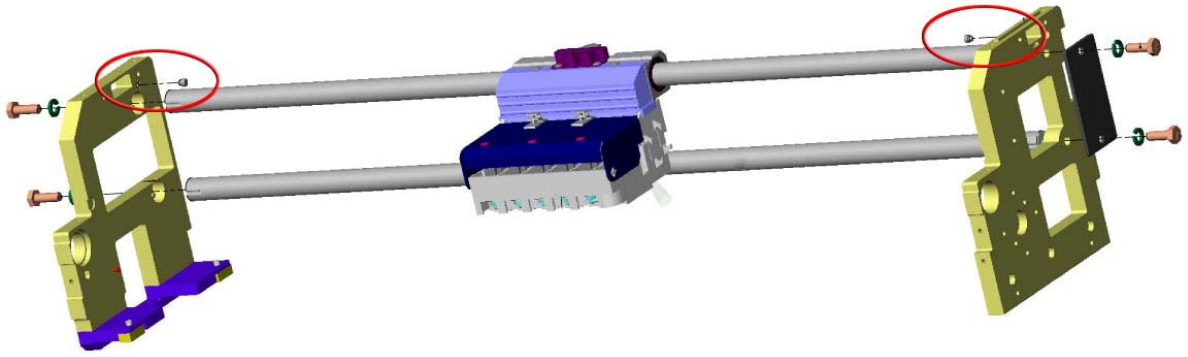


Carriage anti-rotate
Figure 10

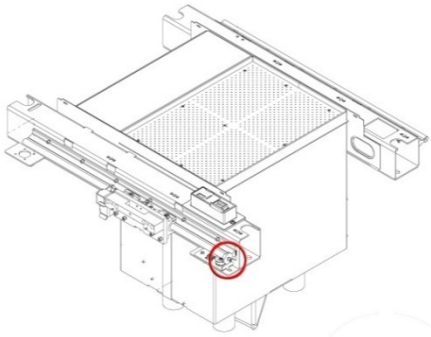


Dirty idler pulley
Figure 11

Worn pulley Figure 12



Fast axis ends of travel bumpers
Figure 13



Slow axis end of travel stop
Figure 14

Spread Issues: Problems with spreading powder efficiently

Spread Not Smooth

The Printer is not laying down powder in a consistent manner. *Figure 18 and 21*

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
Fast Axis is not sitting flat	Fast Axis is not sitting flat	Remove fast axis, level and replace	
Spread not Smooth	Snowplows are damaged or not sitting properly	Reseat/Replace 06839 Left Snowplow and 06840 Right Snowplow	*(Figure 22)*
Spread not Smooth	The roller is dirty or the roller scraper is worn	Clean the spreader roller or replace the 31506 ZPrinter 650 Roller Scraper Blade	
Spread not Smooth	Roller belt is stripped	Replaced 15375 Roller Belt	
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
Roller is not moving	Pulley is loose or worn	Replace 30834 Roller Motor	
Roller is not moving	Motor is damaged	Replace 30834 Roller Motor	
Roller is moving in the wrong direction. (top of roller moves away from the front of the printer)	Roller motor is keyed wrong or miss-wired	Reseat/Replace 30834 Roller Motor	
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
Fast axis "jumping". If hard error occurs, see hard error	Slow Axis motor shaft is loose. (shaft should have zero vertical play)	Replace 31174 Pittman Motor 14205 24V Modified	
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
Spread not Smooth	Bad Roller Bearing (remove belt and move roller by hand)	Replace 06566 Fast Axis Assembly	08861 ZPrinter650 Fast Axis Removal and Replacement Procedure
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
Roller is not moving/ Roller is moving in the wrong direction. (top of roller moves away from the front of the printer)	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
Spread not Smooth	Powder is old	Replace powder or add fresh powder to old powder	09577 ZPrinter650 User Manual

Feeder is not dispensing enough powder (Short Spreading Figure 21)

This error occurs may be due to many things but it is noticeable by the build box not being full while printing.

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
Fast Axis is not sitting flat	Fast Axis is not sitting flat	Remove fast axis, level and replace	
Short Spreading	Build box was not smooth when print started	Stop job, fill bed and restart the job	09577 ZPrinter650 User Manual *(Figure 21)*
Short spreading during fill bed	Piston is not re-zeroed	Re-zero Piston	08860 ZPrinter650 E-Box Removal and Replacement
Short spreading during fill bed	Piston is a tiny amount too low when at Peak Position	Adjust FILL BED SPREAD setting in INI	09912 ZPrinter650 Installation Manual
Short Spreading	Tune feeder is required	Tune Feeder	09912 ZPrinter650 Installation Manual
Short Spreading	Debris Separator is full	Empty, and clean the separator	09577 ZPrinter650 User Manual
Short Spreading	Snowplows are damaged or not sitting properly	Reseat/Replace 06839 Left Snowplow and 06840 Right Snowplow	*(Figure 22)*
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
Short Spreading	Load Cell is reading improperly	Replace 50011 Feeder	See Appendix B and 08862 ZPrinter650 Feeder Removal and Replacement
Short Spreading	Feeder slats are damaged	Replace 50011 Feeder	See Appendix B and 08862 ZPrinter650 Feeder Removal and Replacement
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
Short Spreading	Add-On PCB Failed	Replace 50017 Add-On PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
Short Spreading	Load Cell is not registering Properly	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
Fast axis "jumping". If hard error occurs, see hard error)	Slow Axis motor shaft is loose. (shaft should have zero vertical play)	Replace 31174 Slow axis motor	
Fast axis is not perpendicular to build box	Fast axis is not perpendicular to build box	Call Z Corp	Call Z Corp

5001: POWDER: no more feed

This error occurs when the feeder runs out of powder or it thinks it is out of powder

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
5001: No More Feed	Feeder is out of powder	Check Powder Level	09577 ZPrinter650 User Manual
User hose has weak suction	See "No/Little suction on User Hose"	See "No/Little suction on User Hose"	
5001: No More Feed	The Overflows are over packed	Remove powder and check hoses for leaks	
5001: No More Feed	Feeder slot cover is bent or broken	Replace 50070 Feeder Slot Cover Assembly	
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
5001: No More Feed	Metering bearings failed	Replace 50011 Feeder	See Appendix B and 08862 ZPrinter650 Feeder Removal and Replacement
5001: No More Feed	Load cell damaged	Replace 50011 Feeder	See Appendix Band 08862 ZPrinter650 Feeder Removal and Replacement
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
5001: No More Feed	Add-On PCB Failed	Replace 50017 Add-On PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
5001: No More Feed	Load Cell is not registering Properly	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure

60100: Feeder timeout

This error occurs when the feeder drive motor is not responding

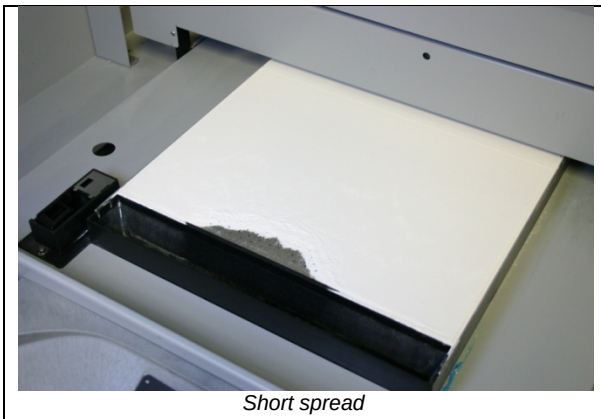
Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
60100: feeder timeout	Powder is Packed	Choose the fluidize powder option from the service menu on the ZPrinter 650	
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
60100: feeder timeout	Metering motor encoder is damaged or dirty	Remove the metering motor encoder cover and clean with compressed air	See Appendix A
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
60100: feeder timeout	Metering motor is damaged	Replace 50011 Feeder	08862 ZPrinter650 Feeder Removal and Replacement
60100: feeder timeout	Metering bearings failed	Replace 50011 Feeder	08862 ZPrinter650 Feeder Removal and Replacement
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
60100: feeder timeout	Add-On PCB Failed	Replace 50017 Add-On PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
60100: feeder timeout	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
In extreme cases the powder can pack in the feeder very tightly, such as during transport. If this occurs then the covers must be removed and the powder must be removed manually till you can see the metering wheel.			

40204: TI: Build piston driver overload

This error is caused by a failed piston drive

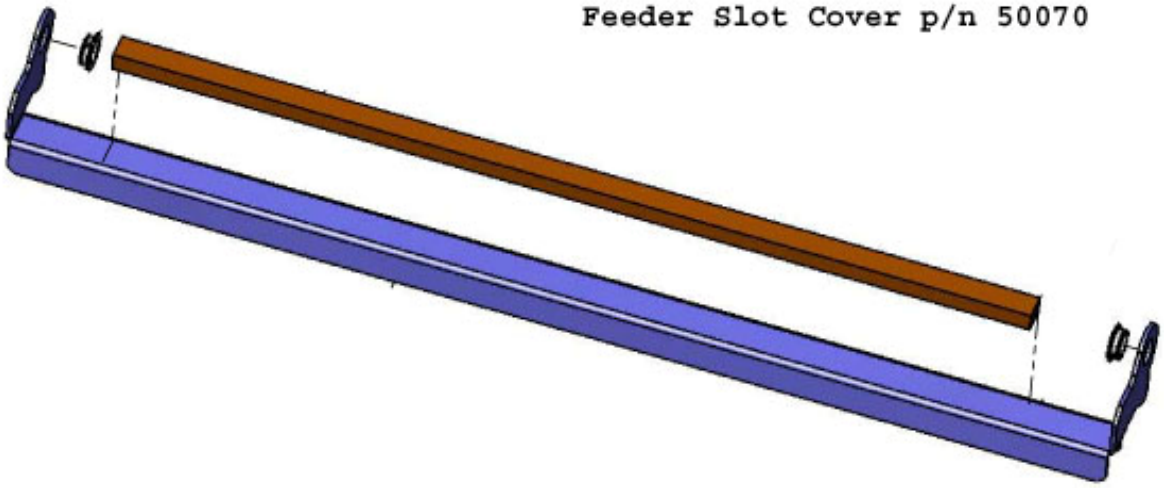
Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
Piston is not moving	Piston motor cables disconnected	Reconnect piston motor cables	
Piston is not moving	Shaft screws came loose	Retighten screws (Piston will need to be re-zeroed)	*(Figure 24)*
Piston is not moving	Powder is over packed in the piston	Vacuum powder into feeder (Piston will need to be re-zeroed)	
Piston Position is Incorrect	Piston position incorrect	Re-zero pistons (must be done after installation of new E-Box)	08860 ZPrinter650 E-Box Removal and Replacement
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
Piston is not moving	Piston seal is sticking to build chamber wall	Replace the 31479 Piston Seal	*(Figure 25)*
Excessive Powder Build up Under Piston	Piston Seal is failed	Replace the 31479 Piston Seal	
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
Piston is not moving	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
Piston is not moving	Piston Motor Failed	Replace 30695 Piston Motor	

The main reason for this error and the piston getting stuck in a position is the triangular plate and guide rods getting a little twisted. All that is needed to fix the error is to loosen the screws holding the plate and re-tighten. The piston must be re-zeroed after this procedure.

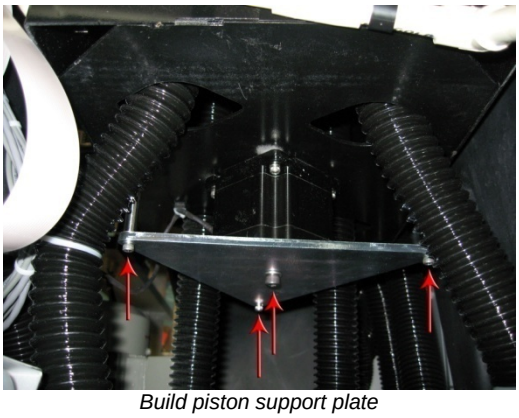


Short spread
Figure 21

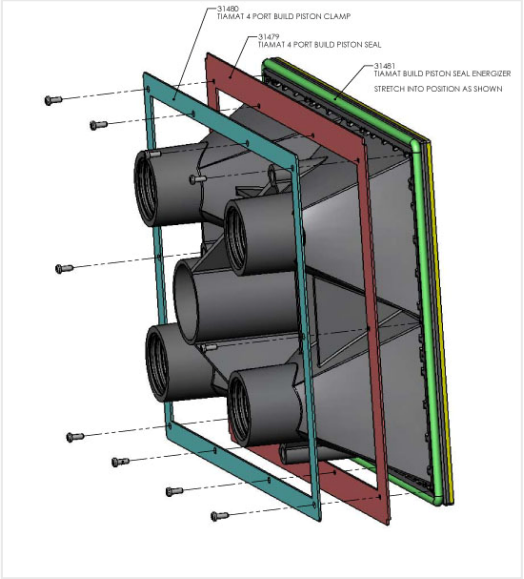
Snowplows on correctly
Figure 22



Feeder slot cover
Figure 23



Build piston support plate
Figure 25



Build piston assy
Figure 25

Powder Handling: Issues with Depowering, Auto Gross De-powdering, Vacuum

Front/Rear Overflow is full or not emptying

The overflows have not emptied after a print job

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
Front/Rear Overflow is full or not emptying	Air Valves are not in proper position	Re-zero Air Valves via the control panel service menu or reboot	
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
User Hose has Light suction	See "No/Light Suction on User Hose"	See "No/Light Suction on User Hose"	
Front/Rear Overflow is full or not emptying	Vacuum hose has a leak	Check hose for leaks	
Air Valve is not Moving	Vacuuming tubing is twisted or a hose clamp is caught in the gears	Un-twist the tubing or rotate the hose clamp	
Air Valve is not Moving	Bad Motor or Gear work	Replace 06597 Vacuum Valve Assembly	
Air Valve is not Moving	Bad/Improper cabling	Check Air Valve Cabling	
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
Air Valve is not Moving	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
No Vacuum	Vacuum Motor is not working	Replace 06802 Vacuum motor	
No Vacuum	Inverter PCB Failed	Replace 06834 Inverter PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
Powder is jammed	Powder is jammed	As a last resort, edit the RECOVER BY LAYERS Variable in the .INI file	

Build Bed will not empty

The build bed is not emptying after a print job

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
Build Bed will not Empty well	Software setting is set to not empty the bed	Change setting as desired	09577 ZPrinter650 User Manual
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
Build Bed will not Empty well	Air Valves are not in proper position	Re-zero Air Valves via the control panel service menu or reboot	
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
Front/Rear Overflow is full or not emptying	Vacuum hose has a leak	Check hose for leaks	
User Hose has Light suction	See "No/Light Suction on User Hose"	See "No/Light Suction on User Hose"	
Air Valve is not Moving	Vacuuming tubing is twisted or a hose clamp is caught in the gears	Un-twist the tubing or rotate the hose clamp	
Air Valve is not Moving	Bad/Improper cabling	Check Air Valve Cabling	
Air Valve is not Moving	Bad Motor or Gear work	Replace 06597 Vacuum Valve Assembly	
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
Automated depowdering is not working	Bad piston motor	Replace 06881 Piston Motor RoHS Ass'y	
Automated depowdering is not working	Bad PC104+	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
Air Valve is not Moving	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
No Vacuum	Vacuum Motor is not working	Replace 06802 Vacuum motor	
No Vacuum	Inverter PCB Failed	Replace 06834 Inverter PCB	85070 ZPrinter 650 E-Box Field Repair Procedure

No/Light Suction on User Hose

The user hose has light suction, which when plugged in; the other vacuum functions may not work well.

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
No Suction on User Hose	Hose is split	Replace 30861 User Hose	
No Suction on User Hose	Hose is Clogged	Unclog hose. You maybe have to remove the debris separator ass'y	
No Suction on User Hose	Feeder Cover is unlatched	Latch Cover	
No Suction on User Hose	Feeder filter is not seated properly	Reseat filter	
Debris Separator is full	Debris Separator is clogged	Empty Separator	
No Suction on User Hose	Tighten Hose Clamps	Tighten Hose Clamps	
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
Feeder Filter motor isn't rotating	Filter Cleaner motor is failed or jammed causing filter to clog	Replace 06828 Feeder Cover	
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
Vacuum not running	Vacuum Motor is not working	Replace 06802 Vacuum motor	
Debris Separator is full/Feeder is full of powder	Load Cell Registering improperly	See 5001:POWDER: no more feed	Appendix A
Vacuum not running	Inverter PCB Failed	Replace 06834 Inverter PCB	85070 ZPrinter 650 E-Box Field Repair Procedure

De-powdering Chamber is full of powder while de-powdering

Powder is not emptying the depowdering chamber

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
De-powdering Chamber is full of powder while de-powdering	Air Valves are not in proper position	Re-zero Air Valves via the control panel service menu or reboot	
Front/Rear Overflow is full or not emptying	Vacuum hose has a leak	Check hose for leaks	
Air Valve is not Moving	Vacuuming tubing is twisted or a hose clamp is caught in the gears	Un-twist the tubing or rotate the hose clamp	
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
Air Valve is not Moving	Bad/Improper cabling	Check Air Valve Cabling	
Air Valve is not Moving	Bad Motor or Gear work	Replace 06597 Vacuum Valve Assembly	
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
Air Valve is not Moving	Failed PC104+	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
No Vacuum	Vacuum Motor is not working	Replace 06802 Vacuum motor	
No Vacuum	Inverter PCB Failed	Replace 06834 Inverter PCB	85070 ZPrinter 650 E-Box Field Repair Procedure

No Compressed Air or not enough Compressed Air.

The compressor is not kicking on.

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
Compressor is on	Compressor is not working (there are no adjustments)	Replace 06797 Compressor	08859 ZPrinter650 Compressor Removal and Replacement
Compressor is Off. Voltage is present	Compressor is damaged	Replace 06797 Compressor	8860 ZPrinter650 Compressor Removal and Replacement
Compressor is Off. Voltage is not present	Add-On PCB Failed	Replace 50017 Add-On PCB	85070 ZPrinter 650 E-Box Field Repair Procedure

Powder is seeping out of printer

Powder is coming from various spots on the printer

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
Powder is leaking from the feeder while the machine is idle	Feeder slot cover is bent or the seal is torn	Replace 50070 Feeder Slot Cover	
Powder blowing out back Panel	Feeder Filter is not seated correctly	Clean Filter, reseat filter and replace 06802 Vacuum Motor	
Powder blowing out back Panel	Feeder filter installed upside-down	Install a new filter correctly. Replace vacuum motor.	
Powder coming from feeder	Feeder Filter is torn	Replace 30502 Filter, 06828 Feeder Cover and 06802 Vacuum Motor	
Powder coming from feeder metering bearings	Metering wheel bearing seals are worn	Replace 50011 Feeder	08862 ZPrinter650 Feeder Removal and Replacement

Boot Failure and Inverter Issues: Printer will not come online

60200: LOWLEVEL: 15v supply voltage out of tolerance

The PC104+ is having problems powering the pogo pcb.

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
60200: LOWLEVEL: 15v supply voltage out of tolerance	Bad Carriage Cable	Replace 50080 Pogo Flex Cable	85026 ZPrinter 650 Carriage Cable Removal and Replacement
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
60200: LOWLEVEL: 15v supply voltage out of tolerance	Bad Pogo PCB	Replace 50019 Pogo PCB	85022 ZPrinter 650 Pogo PCB Removal and Replacement
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
60200: LOWLEVEL: 15v supply voltage out of tolerance	Bad festoon cable assembly	50108 Festoon Cable Assembly	*(Figure 1)*
60200: LOWLEVEL: 15v supply voltage out of tolerance	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure

61300: INVERTER: bad version number

This error indicates a bad version or unreadable version of code in the inverter card

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
61300: INVERTER: bad version number	Inverter fuse is Blown	Replace 16336 Inverter Fuse	
61300: INVERTER: bad version number	Inverter is Damaged	Replace 06834 Inverter PCB	85070 ZPrinter 650 E-Box Field Repair Procedure

61301: Timeout waiting for SPI bus

This error is Caused by the printer's inability to communicate with the Inverter PCB in the E-Box

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
61301: Timeout waiting for SPI bus	Inverter misread power intake	Unplug the printer for 5 minutes and try again	
61301: Timeout waiting for SPI bus	Inverter fuse is Blown	Replace 16336 Inverter Fuse	
61301: Timeout waiting for SPI bus	Inverter is Damaged	Replace 06834 Inverter PCB	85070 ZPrinter 650 E-Box Field Repair Procedure

61302: INVERTER: comm error

This error is caused by the printer's inability to communicate with the Inverter PCB in the E-Box

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
61302: Inverter Comm. Error	Inverter misread power intake	Unplug the printer for 5 minutes and try again	
61302: Inverter Comm. Error	Inverter fuse is Blown	Replace 16336 Inverter Fuse	
61302: Inverter Comm. Error	Inverter is Damaged	Replace 06834 Inverter PCB	85070 ZPrinter 650 E-Box Field Repair Procedure

61305: INVERTER: Heater driver over temp

This error is caused by a failure in the Inverter PCB causing the driver to over temp

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
61305: INVERTER: Heater driver over temp	Faulty heater module	Replace 50026 Z650 Heater Module	
61305: INVERTER: Heater driver over temp	Inverter is Damaged	Replace 06834 Inverter PCB	85070 ZPrinter 650 E-Box Field Repair Procedure

61308: INVERTER: Line under voltage

This error indicates there is insufficient power going into the printer

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
60200: INVERTER: Line undervoltage	Insufficient power going into the unit	Take a voltage reading from the power outlet.	
60200: INVERTER: Line undervoltage	Inverter misread power intake	Unplug the printer for 5 minutes and try again	
60200: INVERTER: Line undervoltage	Inverter fuse is Blown	Replace 16336 Inverter Fuse	
60200: INVERTER: Line undervoltage	Inverter is Damaged	Replace 06834 Inverter PCB	85070 ZPrinter 650 E-Box Field Repair Procedure

The ZPrinter 650 draws a lot of power. Make sure the printer is the only thing on that electrical circuit, and plug the printer directly into the outlet. Surge protectors and UPS systems have been known to cause this error.

Blank Illuminated LCD

The LCD is powered on, but blank. LED's are on. No movement

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
Disk Boot Failure	Failed Flash Drive	Replace 50159 Flash Drive	85070 ZPrinter 650 E-Box Field Repair Procedure
Ready for Debugger Commands	Cabling	Check all Cables for missed connections	
Ready for Debugger Commands	PC104+ Failed	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
Ready for Debugger Commands	Bad E-Box	Replace 50012 ZPrinter650 E Box Ass'y	08860 ZPrinter650 E-Box Removal and Replacement

Net Init Failed

The printer has not found an IP address form the network

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
Net Init Failed	Network Initialization failed	Press Control Panel Button: Printer will enter Setup Mode	09577 ZPrinter650 User Manual 08605 Ethernet Connection Setup

Boot Failure: No Power

The printer has no power at all. No LED's, control panel power or movement

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
LCD Panel has no Power	Power not connected	Plug in to appropriate voltage (Universal Power Supply)	
LCD Panel has no Power	Loose Cabling inside E-Box	Check cabling inside E-Box	
LCD Panel has no Power	Failed PC104+	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure

The Z Printer 650 requires a dedicated 15AMP circuit and will draw a lot of power. Most UPS (Uninterruptable Power Supply) and surge protectors will not supply adequate power to the machine.

Communication and Software Errors: Errors that are caused by communication and software problem

Packet timeout: Printer not found: Before Printing

The printer is not being found before printing. If there is an error code on the printer, troubleshoot that error code first.

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
Printer is not ONLINE	Printer is not ONLINE	Put printer ONLINE or troubleshoot accordingly	
Normal: May be sleeping or ONLINE	Lost Connection	Go to "3D Print Setup" under 'File' and refresh the connection	Software Manual
Normal: May be sleeping or ONLINE	Printer or PC is not properly configured	Configure Printer and PC	09577 ZPrinter650 User Manual and 08605 Ethernet Setup Procedure
Normal: May be sleeping or ONLINE	Bad/Wrong Type Ethernet Cable	Replace Cable	9571 ZPrinter650 User Manual and 08605 Ethernet Setup Procedure
Normal: May be sleeping or ONLINE	See your MIS Manager: Note that Windows firewall, wireless networking, and other security features may prevent the printer from connecting to the PC	See your MIS Manager	

The main cause of a printer not being found is that it has not been located through the 3D Print Setup window in the software. If a build file is opened it will contain the settings from the last printer that was used or may be set to Offline.

Packet timeout: Printer Not Found: While Printing

If error code is on Control Panel, check respective troubleshooting section as this is not a communication problem

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
Normal: May be sleeping or ONLINE	Power Management Is Enabled	Disable all power management	
Normal: May be sleeping or ONLINE	Ethernet Cable was interrupted or is bad	Reseat Cable and try again or replace Ethernet cable	
Normal: May be sleeping or ONLINE	PC does not meet required specs	Upgrade System to proper Specifications	09577 ZPrinter650 User Manual
Normal: May be sleeping or ONLINE	Printer is not keeping up with Z Print Demands	PC may be over tasked. Z Print requires a dedicated PC	
Normal: May be sleeping or ONLINE	Excessive network traffic	A temporary increase in network traffic may have caused Z Print data to slow down	

1905: LAYERS: layer is too big

This error occurs when the layer being sent is too large for the buffer.

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
1905: LAYERS: layer is too big	Layer is too large for printer's buffer	Reduce file size	
1905: LAYERS: layer is too big	Layer is too large for printer's buffer	Try tilting the part up to 5 degrees	

3900: SOCKETS: can't initialize WinSock interface

The printer has lost communication with the PC

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
3900: SOCKETS: can't initialize WinSock interface	Ethernet Cable was interrupted or is bad	Reseat Cable and try again or replace Ethernet cable	
3900: SOCKETS: can't initialize WinSock interface	Printer or PC is not properly configured	Configure Printer and PC	09577 ZPrinter650 User Manual and 08605 Ethernet Setup Procedure
3900: SOCKETS: can't initialize WinSock interface	See you MIS Manager	See you MIS Manager	

Fluids: Fluid leaks within the printer

Service station is full of fluid

Service Station drain has backed up

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
Service station is full of fluid	Service Station Drain is Clogged	Clean drain area	
Service station is full of fluid	Waste line is clogged	Use a syringe to back wash the system from the waste container up.	See Appendix B

Binder on Top deck

Binder has leaked onto the top deck

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
Binder on top deck	Binder cartridge not plugged in	Reinsert Cartridge	09577 ZPrinter650 User Manual
Binder on top deck	Binder Cartridge Leaking	Replace Cartridge	09577 ZPrinter650 User Manual
Binder on top deck	Binder Intake Valve Leaking	Replace 06595 Binder Intake Valve	
Binder on top deck	Septum is leaking	Replace 06419 Septum	85023 650 Septum Removal and Replacement
Binder on top deck	Reservoir is leaking	Tighten float switch nut	

Binder leaking from bottom of printer

Binder is leaking and building up under the printer

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
Binder leaking form bottom of printer	Solid Waste Container is overflowing	Replace 50065 Solid waste container	09577 ZPrinter650 User Manual
Binder leaking form bottom of printer	Loose fitting	Remove panels and check binder fittings for potential leak	

Air in Lines

Air Bubbles have formed inside the printers tubing

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
Air in Lines	Loose fitting	Tighten Fittings: Bleed Air out of System.	
Air in Lines	Out of binder and float switch is failed	Troubleshoot float switch and add binder	
Air in Lines	Binder Intake Valve Leaking	Replace 06595 Binder Intake Valve	

Software says the binder Reservoir is empty

Reservoir thinks it is empty (or actually is). This will come up just before a job

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
Out of binder	Out of binder	Add binder only if existing Cartridge is empty	09577 ZPrinter650 User Manual
Binder Reservoir is Empty, but the Binder Cartridge is Full	Binder Cartridge not inserted properly	Reseat Binder Cartridge	09577 ZPrinter650 User Manual
Binder Reservoir is Empty, but the Binder Cartridge is Full	Binder Cartridge Damaged or valve not working	Try a new Binder Bottle	09577 ZPrinter650 User Manual
Binder Reservoir is Empty, but the Binder Cartridge is Full	Binder Intake Valve not functioning	Replace 06595 Binder intake valve	
Binder Reservoir is Full	Float switch in reservoir not reading properly, due to foam in reservoir	Let the bottle settle for a while	
Binder Reservoir is Full	Float switch in reservoir stuck in the down position	Remove switch and rinse with distilled water	
Binder Reservoir is Full	Float switch in reservoir not reading properly. (To Bypass, circuit should be closed to read a full bottle)		
Binder Reservoir is full	Float switch in reservoir not reading properly, but bypass does not work	Check/Replace Cabling	
Binder Reservoir is full	Float switch in reservoir not reading properly, but bypass does not work	Replace 50016 PC104+ PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
Binder Reservoir is Empty, but the Binder Cartridge is Full	Clog in line	Sanitize System: DO NOT USE BLEACH: Use 06965 Sanitation Kit	08855 ZPrinter650 Sanitization Procedure

Sensors and Switches: Errors that are related to the ZPrinter's Sensors and switches

Top Cover Open

The top cover is open or the printer thinks it is

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
Top Cover Open	Top Cover is Open	Close Top Cover	
Top Cover Open	Cover Switch is damaged	Replace 31383Top Cover (Interlock) Switch	

1008: Head Cover Open

There is no cover sensor over the heads. This cover is caused by the top cover having been opened

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
1008:Head Cover Open	Top Cover Open	Close Top cover	
1008:Head Cover Open	Top Cover witch damaged	Replace 31383Top Cover (Interlock) Switch	

Heater is not coming up to Temperature

The heater is not turning on or not coming up to temperature

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
Heater not reaching temperature	Top cover open	Close top cover	
Heater not reaching temperature	Panels are missing or removed	Install or tighten panels	
Input Voltage is good	Heater Module is damaged	Replace 50026 Z650 Heater Ass'y (universal Voltage)	
Input Voltage is bad	Add-On PCB Failed	Replace 50017 Add-On PCB	85070 ZPrinter 650 E-Box Field Repair Procedure

Miscellaneous Errors: Errors that do not fall into any other category

3202: Monitor thread took too long

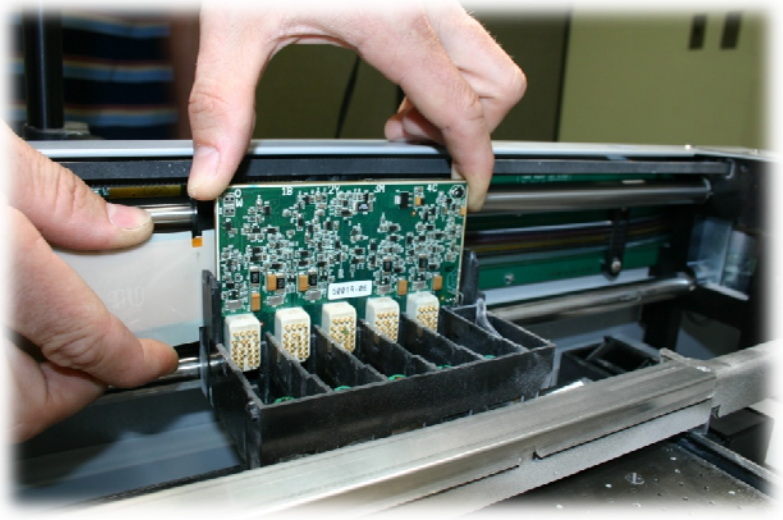
This error is caused by data not transmitting between the E box and The fast axis

Monitor Read-Out or Secondary Symptom	Cause / Problem	Solution	Reference Documents
3202 Monitor Thread took Too Long	Mechanical Issue	Treat initially like a 2303(1): See 2303(1)	See 2303(1)
3202 Monitor Thread took Too Long	Motherboard Fan is not working Properly	Replace 15725 Motherboard PCB	85070 ZPrinter 650 E-Box Field Repair Procedure
After performing the above steps try performing a service print head and alignment. If the machine performs both tasks then proceed with a test print.			
3202 Monitor Thread took Too Long	Other issue in E-Box	Replace 50012 ZPrinter650 E Box Ass'y	08860 ZPrinter650 E-Box Removal and Replacement

Appendix:

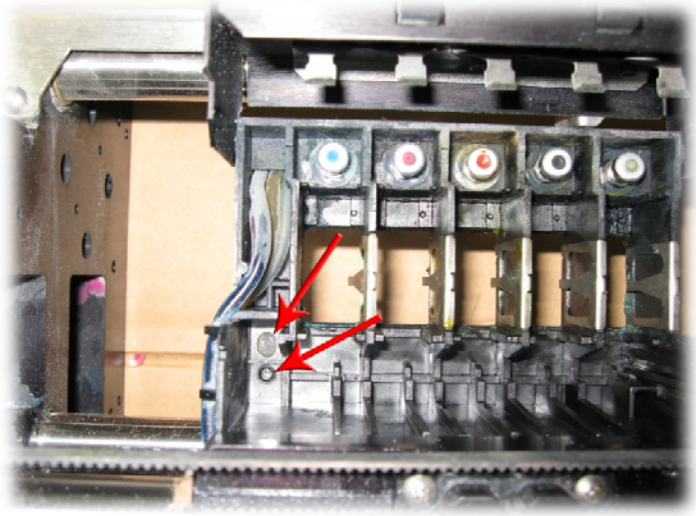
Appendix A: Cleaning the alignment sensor

If the fast axis is over oiled during maintenance on the ZPrinter 650 the alignment sensor on the Pogo PCB and alignment window on the carriage may become coated with oil. Below are the steps you may need to take in order to correct the error 40006: AUTOALIGN: weak sensor reading.



Step 1: Remove the Pogo PCB

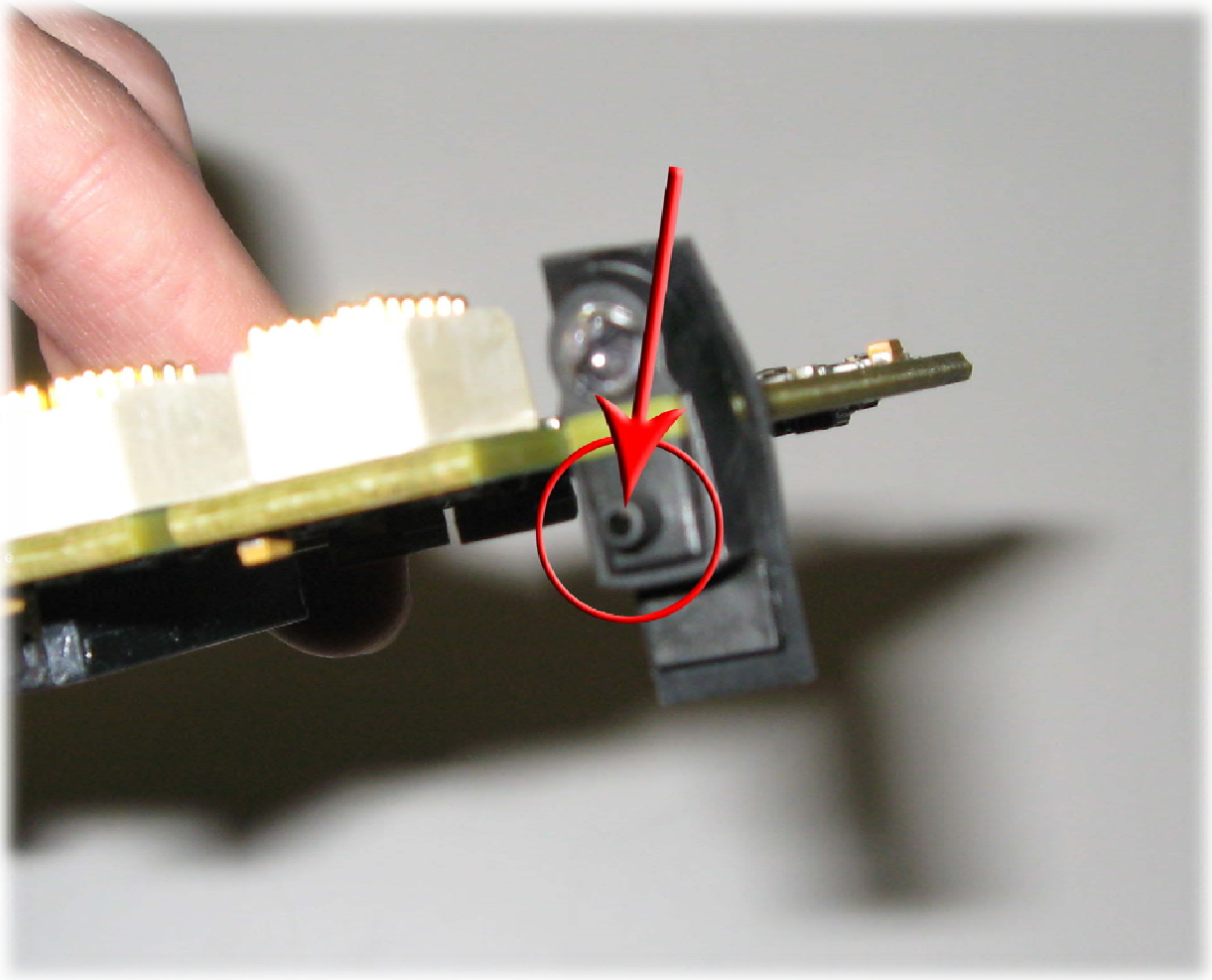
85022 ZPrinter 650 Pogo PCB Removal and Replacement



Step 2: Clean the alignment window in the Carriage with alcohol and a cotton swab. Make sure you can see clearly through the window when done and that no liquid remains.

Appendix A: Cleaning the alignment sensor *(cont.)*

Step 3: To clean the alignment sensor on the Pogo PCB you can submerge that side of the Pogo in a cup of alcohol. Shake the Pogo dry once you are done and all it to air dry to 15 minutes.



The area to clean is indicated above with the red arrow.

Appendix B: Understanding and troubleshooting the ZPrinter 650 Load Cell

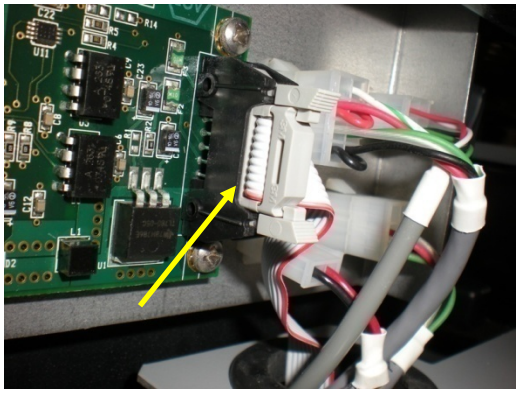
Important Note: Feeders with powder in them can weigh in excess of 50LBS. Careful when removing!

The ZPrinter650 uses a load cell to measure the weight of the powder. The Load Cell is basically a scale. The feeder sits on 4 metal slats so that the center of gravity pushes the feeder down against the load cell. The load cell is located just behind the feeder.

The load cell is extremely sensitive. Simply moving the printer will alter the reading on the load cell. When dealing with the load cell, absolute precision is a must. The problem that this presents is that every load cell is different and deciding if one is reading correctly becomes difficult.

The load cell reads in pounds from -40LBS to 330LBS. A load cell with no load reads between -36LBS and -24LBS.

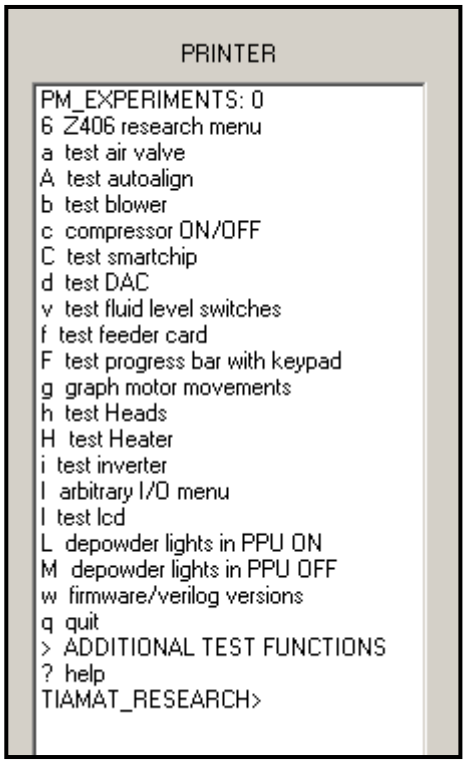
If the printer is throwing an **AD7730 ERROR** on reboot check that the ribbon cable is connected properly at the Feeder card and E-Box.



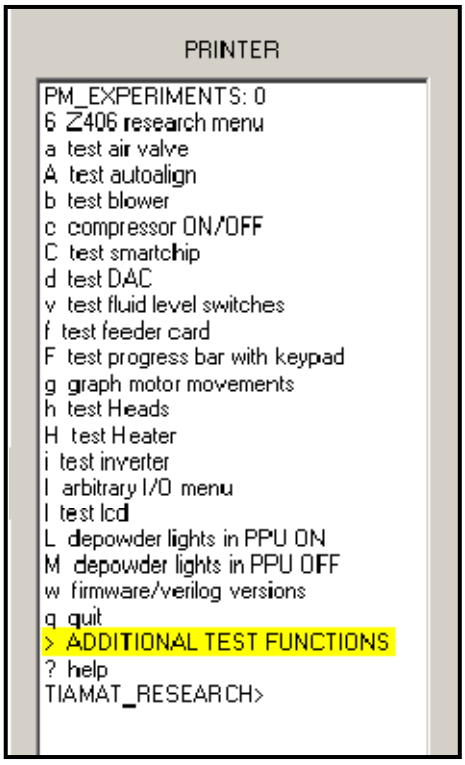
If the printer is not throwing errors but you still suspect a malfunctioning load cell follow these steps. To read the load cell:

- Plug in a keyboard and monitor into the rear of the printer or use the Z Monitor application
- Enter the following keyboard commands so that you will be able to view the readings coming from the Load Cell

1. Press the **"x"** key to bring up the **TIAMAT_RESEARCH** menu.

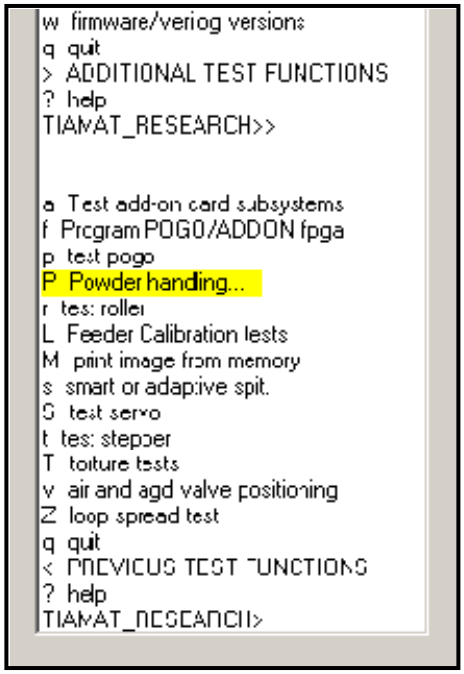


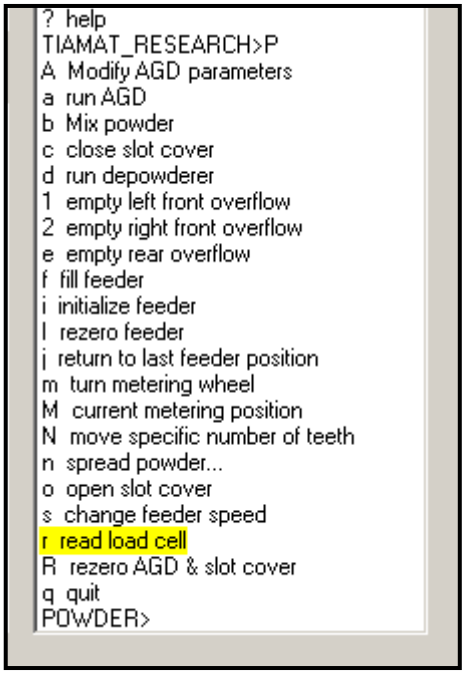
2. Now key in the **">"** character (shift-period) to proceed to the next screen.

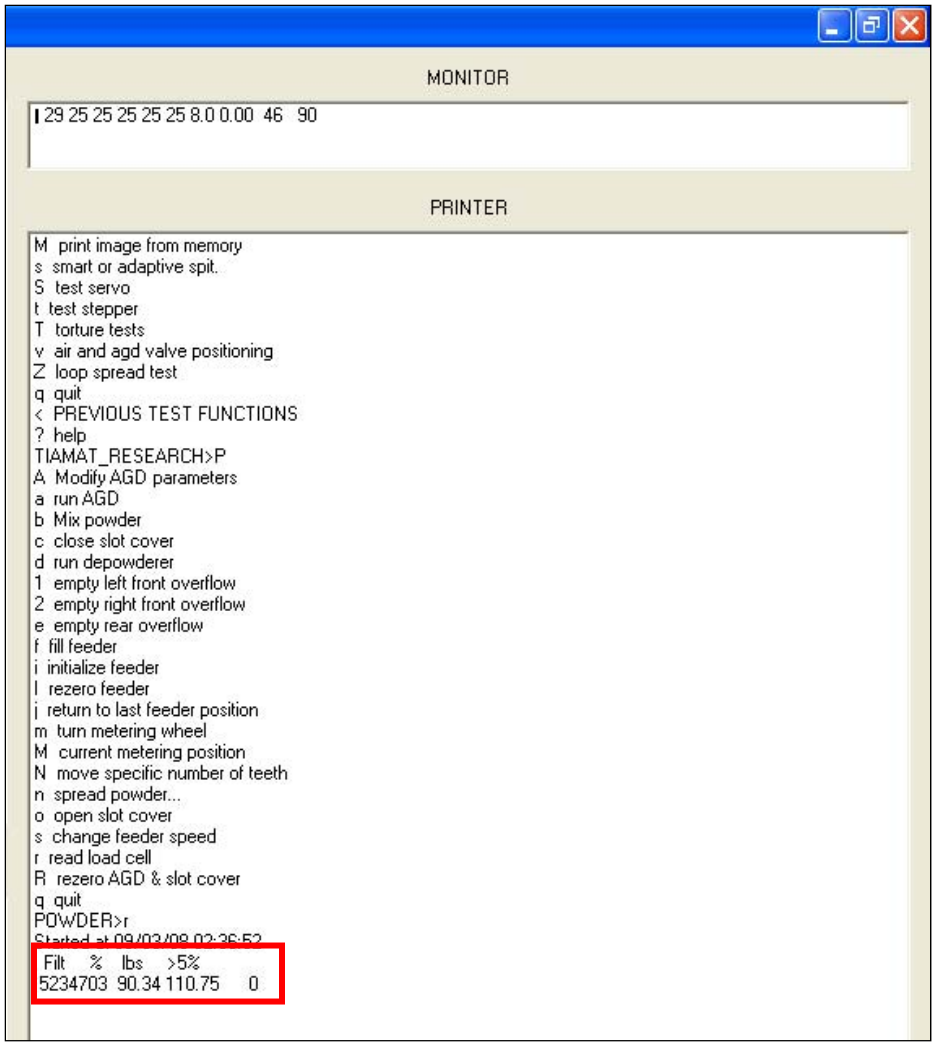


3. Now key in an uppercase **"P"** to proceed to the Powder Handling menu.

4. Now key in a lowercase **"r"** to read the Load Cell.


w firmware/verilog versions
q quit
> ADDITIONAL TEST FUNCTIONS
? help
TIAMAT_RESEARCH>>
a Test add-on card subsystems
f Program POGO/ADDON fpga
p test pogo
P Powder handling...
r test roller
L Feeder Calibration tests
M print image from memory
s smart or adaptive spit.
S test servo
t test stepper
T torture tests
v air and agd valve positioning
Z loop spread test
q quit
< PREVIOUS TEST FUNCTIONS
? help
TIAMAT_RESEARCH>


? help
TIAMAT_RESEARCH>P
A Modify AGD parameters
a run AGD
b Mix powder
c close slot cover
d run depowderer
1 empty left front overflow
2 empty right front overflow
e empty rear overflow
f fill feeder
i initialize feeder
I rezero feeder
j return to last feeder position
m turn metering wheel
M current metering position
N move specific number of teeth
n spread powder...
o open slot cover
s change feeder speed
r read load cell
R rezero AGD & slot cover
q quit
POWDER>



Note that when using ZMonitor the numbers are not always aligned well with the names:
Filt = 5234703
% = 90.34
LBS = 110.75
>5% = 0.

- **Filt:** This is the filtered read out from the load cell in ticks. Approximately 37,000 ticks is 1LB.
- **%:** This is the percent the feeder is full. Keep in mind that it will read 0% until about 15LBS of powder is in the feeder. This amount of powder will come just above the feed wheel.
- **LBS:** This is the weight of powder in the hopper. A reading of 0 would be an empty hopper. Unlike the % reading the LBS reading will increase as soon as powder is added.
- **>5%:** This is how many readings have been more than 5% different than the previous reading. If nothing is agitating the hopper and weight is not being added this should read 0. Adding weight or pushing down on the hopper will cause this number to increase.

A load cell calibration consists of two numbers; an offset and a slope.

To check the offset

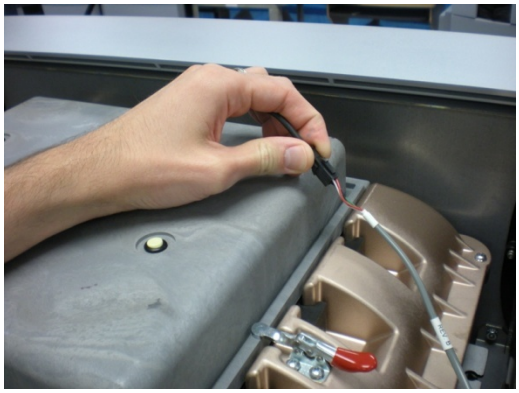
1. Completely empty the Feeder of powder.
2. Read the load cell LBS. The LBS reading should be between -1LBS and 1LBS.

If the offset is outside of the limits than the load cell was most likely damaged during shipping and needs to be replaced.

To check the slope

1. Disconnect the vacuum hose from the filter cleaner.

2. Disconnect the electrical cable from the filter cleaner.

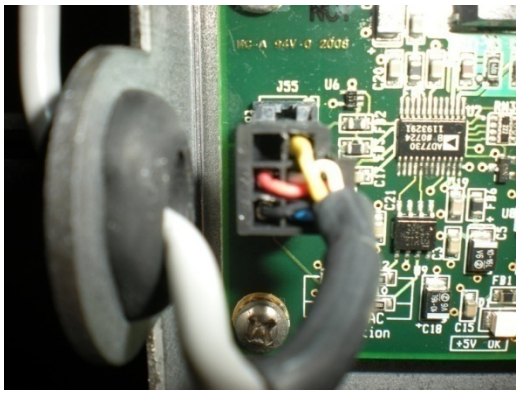


3. Read the load cell LBS. Make a note of the weight.
4. Unlatch the filter cleaner and set it aside.

5. Read the load cell LBS. The weight should drop by between 3.0 and 3.7 LBS from the reading in step 4. This is the weight of the filter cleaner.

If the load cell slope is off it is possible that something is interfering with the feeder. Make sure the gantry is not touching the feeder. Check that no tools or screws have somehow fallen between the feeder and the structure. Check that the flexures are not contacting the feeder.

Loose wires can also cause bad readings. Make sure that all 5 pins from the load cell wire are pushed all of the way into the connector. Make sure none of the wires look damaged.



If none of those checks fixes the problem then the feeder needs to be replaced.