Current Position The current X, Y and Z position in micro steps.

X and Y = 16000 micro-steps per inch.

Z = 128000 micro-steps per inch.

- Position and Temperatures
- Versions
- Travel Limits
- Filament
- Door
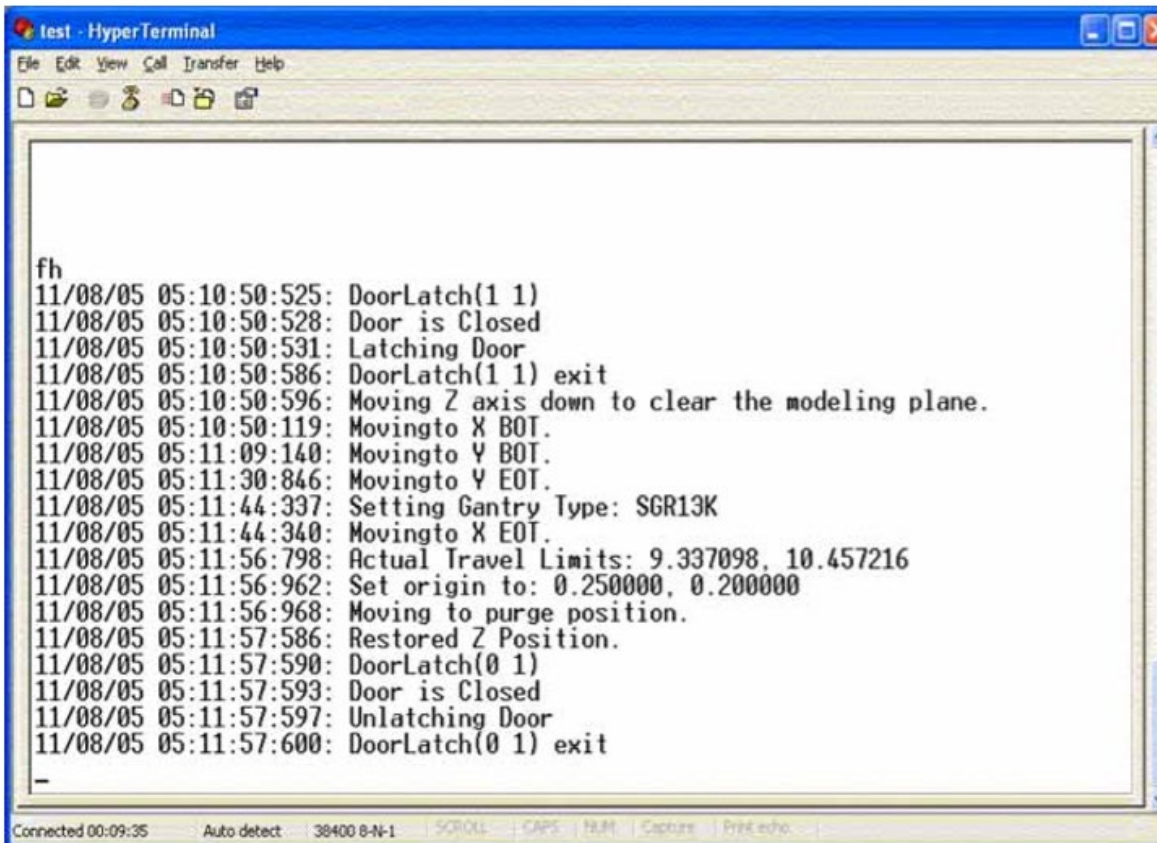- Setting the Serial Number

Position and Temperatures

Current Position	The current X, Y and Z position in micro steps. X and Y = 16000 micro-steps per inch. Z = 128000 micro-steps per inch.
Current / Total Layers	The current build layer and the total number of layers in the model
Current Curve	The current curve number of the model
Current Vertex	The current vertex number of the model.
Head Temp	The actual head temperature and its set point in C.
Head PWM	The pulse width modulation value 0 = off / 255 = 100%
Support Temp	The support liquefier temperature and its set point (SST only)
Support PWM	The pulse width modulation value 0 = off / 255 = 100%
Chamber Temp	The actual chamber temperature and its set point in C.

1. **Fh =Find Home.**

This command determines the XY axis home position. It locates the X and Y axis limit switches, sets the origin, and places the head over the purge bucket.

Example= fh   The values which are displayed are explained below, see Figure 10.

Figure 10: Find Home

```
fh
11/08/05 05:10:50:525: DoorLatch(1 1)
11/08/05 05:10:50:528: Door is Closed
11/08/05 05:10:50:531: Latching Door
11/08/05 05:10:50:586: DoorLatch(1 1) exit
11/08/05 05:10:50:596: Moving Z axis down to clear the modeling plane.
11/08/05 05:10:50:119: Movingto X BOT.
11/08/05 05:11:09:140: Movingto Y BOT.
11/08/05 05:11:30:846: Movingto Y EOT.
11/08/05 05:11:44:337: Setting Gantry Type: SGR13K
11/08/05 05:11:44:340: Movingto X EOT.
11/08/05 05:11:56:798: Actual Travel Limits: 9.337098, 10.457216
11/08/05 05:11:56:962: Set origin to: 0.250000, 0.200000
11/08/05 05:11:56:968: Moving to purge position.
11/08/05 05:11:57:586: Restored Z Position.
11/08/05 05:11:57:590: DoorLatch(0 1)
11/08/05 05:11:57:593: Door is Closed
11/08/05 05:11:57:597: Unlatching Door
11/08/05 05:11:57:600: DoorLatch(0 1) exit
```

```
fh
11/08/05 05:10:50:525: DoorLatch(1 1)
11/08/05 05:10:50:528: Door is Closed
11/08/05 05:10:50:531: Latching Door
11/08/05 05:10:50:586: DoorLatch(1 1) exit
11/08/05 05:10:50:596: Moving Z axis down to clear the modeling plane.
11/08/05 05:10:50:119: Movingto X BOT.
11/08/05 05:11:09:140: Movingto Y BOT.
11/08/05 05:11:30:846: Movingto Y EOT.
11/08/05 05:11:44:337: Setting Gantry Type: SGR13K
11/08/05 05:11:44:340: Movingto X EOT.
11/08/05 05:11:56:798: Actual Travel Limits: 9.337098, 10.457216
11/08/05 05:11:56:962: Set origin to: 0.250000, 0.200000
11/08/05 05:11:56:968: Moving to purge position.
11/08/05 05:11:57:586: Restored Z Position.
11/08/05 05:11:57:590: DoorLatch(0 1)
11/08/05 05:11:57:593: Door is Closed
11/08/05 05:11:57:597: Unlatching Door
11/08/05 05:11:57:600: DoorLatch(0 1) exit
```

Setting Gantry Type:	During the home sequence, the machine is also looking at which table is installed in the machine (cable drive or Belt drive). SGR13K means, the Gear Ratio is 13000 microsteps/inch.
Actual Travel Limits:	This is the distance between the BOT (Begin Of Travel) and EOT (End Of Travel) Sensors in inches.

X:9.33 = 237.162mm Y: 10.45 = 265.613mm

Origin 6.35 mm 5.08

X EOT 9.337098
Y EOT 10.457216

```
as indicated by the limit switches.

    Parameters:

        float offset
            Defines the relative offset distance in inches from the

        measurement.
```

```
xt 4
11/08/05 05:18:35:941: Measuring distance to limit switch from an offset of 4.00
0000 inches
11/08/05 05:18:35:945: DoorLatch(1 1)
11/08/05 05:18:35:948: Door is Closed
11/08/05 05:18:35:952: Latching Door
11/08/05 05:18:35:  6: DoorLatch(1 1) exit
11/08/05 05:18:35: 13: quadrant 2 X EOT Y EOT X offset 5.337098 Y offset 6.45721
6
11/08/05 05:19:01:838: quadrant 3 X EOT Y BOT X offset 5.337098 Y offset 4.00000
0
11/08/05 05:19:28:837: quadrant 0 X BOT Y BOT X offset 4.000000 Y offset 4.00000
0
11/08/05 05:19:55:286: quadrant 1 X BOT Y EOT X offset 4.000000 Y offset 6.45721
6
X BOT delta is 4.258176
X EOT delta is -3.74042
Y BOT delta is 4.208786
Y EOT delta is -3.796235
11/08/05 05:20:24:569: DoorLatch(0 1)
11/08/05 05:20:24:572: Door is Closed
11/08/05 05:20:24:575: Unlatching Door
11/08/05 05:20:24:579: DoorLatch(0 1) exit
```

2 X offset 135.38
0 X offset 101.6 Y offset 101.6

1 X offset 101.6 Y offset 164.0131

as indicated by the limit switches.

Parameters:

    float offset
        Defines the relative offset distance in inches from the

    measurement.

```
xt 4
11/08/05 05:18:35:941: Measuring distance to limit switch from an offset of 4.00
0000 inches
11/08/05 05:18:35:945: DoorLatch(1 1)
11/08/05 05:18:35:948: Door is Closed
11/08/05 05:18:35:952: Latching Door
11/08/05 05:18:35:  6: DoorLatch(1 1) exit
11/08/05 05:18:35: 13: quadrant 2 X EOT Y EOT X offset 5.337098 Y offset 6.45721
6
11/08/05 05:19:01:838: quadrant 3 X EOT Y BOT X offset 5.337098 Y offset 4.00000
0
11/08/05 05:19:28:837: quadrant 0 X BOT Y BOT X offset 4.000000 Y offset 4.00000
0
11/08/05 05:19:55:286: quadrant 1 X BOT Y EOT X offset 4.000000 Y offset 6.45721
6
X BOT delta is 4.258176
X EOT delta is -3.740421
Y BOT delta is 4.208786
Y EOT delta is -3.796235
11/08/05 05:20:24:569: DoorLatch(0 1)
11/08/05 05:20:24:572: Door is Closed
11/08/05 05:20:24:575: Unlatching Door
11/08/05 05:20:24:579: DoorLatch(0 1) exit
```

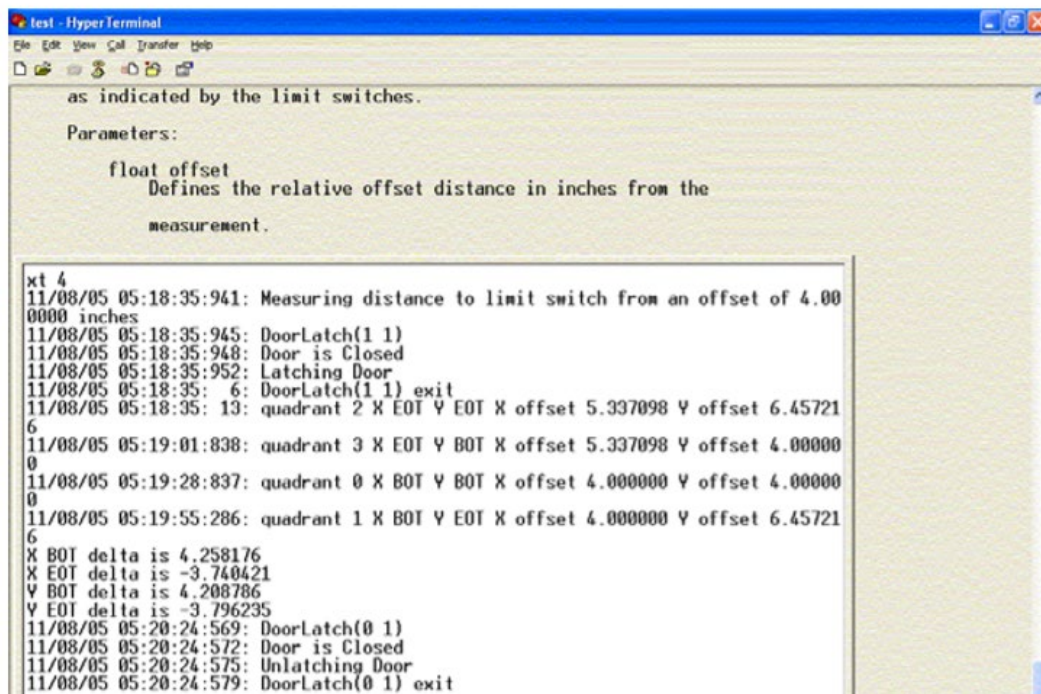Connected 00:19:31   Auto detect   38400 8-N-1   SCROLL   CAPS   NUM   Capture   Print echo

5. xt=Test XY Limits

Tests the XY axis by moving from corner to corner, stopping at each corner and measuring the offset against the actual position as indicated by the limit switches.

 The command can be used for testing the Z-Stage. To do so, repeat the **tz** command at least 2 times and compare the **X BOT delta** values, **X EOT delta** values**, Y BOT delta** values and the **Y EOT delta** values. Parameters: Float Offset: Defines the relative offset distance in inches from the limit switch. The offset is the starting point for the measurement. **Example= xt 2.0**   2.0= distance, where the machine starts to look for the sensors. For repeating the command, type in the following: **rt 2 1 "xt 2.0"**. For more information see the rt command (item #8) in this manual.

Figure 13: Text XY limits

```
test - HyperTerminal
File  Edit  View  Call  Transfer  Help

      as indicated by the limit switches.

   Parameters:

      float offset
            Defines the relative offset distance in inches from the

      measurement.

xt 4
11/08/05 05:18:35:941: Measuring distance to limit switch from an offset of 4.00
0000 inches
11/08/05 05:18:35:945: DoorLatch(1 1)
11/08/05 05:18:35:948: Door is Closed
11/08/05 05:18:35:952: Latching Door
11/08/05 05:18:35:  6: DoorLatch(1 1) exit
11/08/05 05:18:35: 13: quadrant 2 X EOT Y EOT X offset 5.337098 Y offset 6.45721
6
11/08/05 05:19:01:838: quadrant 3 X EOT Y BOT X offset 5.337098 Y offset 4.00000
0
11/08/05 05:19:28:837: quadrant 0 X BOT Y BOT X offset 4.000000 Y offset 4.00000
0
11/08/05 05:19:55:286: quadrant 1 X BOT Y EOT X offset 4.000000 Y offset 6.45721
6
X BOT delta is 4.258176
X EOT delta is -3.740421
Y BOT delta is 4.208786
Y EOT delta is -3.796235
11/08/05 05:20:24:569: DoorLatch(0 1)
11/08/05 05:20:24:572: Door is Closed
11/08/05 05:20:24:575: Unlatching Door
11/08/05 05:20:24:579: DoorLatch(0 1) exit
```

10. mx = move x This command moves the head in the X axis. Parameters: Float Position: This is the position it moves to, in inches, when the command is sent from the Console and in device units when the command is sent through the DPM.

Example: mx 3.0   (moves the X-Axis 3 inches away from the X-Home sensor

11. **my = move y**

This command moves the head in the y axis.

Parameters:

Float Position:

This is the position it moves to, in inches, when the command is sent from the Console and in device units when the command is sent through the DPM.

Example: my 3.0   (moves the Y-Axis 3 inches away from the Y-Home sensor)

12. **cl = chamber light**

This command turns the chamber light on and off.

Parameters:

signed integer lightState

- 0 turns the light off.
- 1 turns the light on

Example: cl 1   (turns the lights on)

13. **dl = door latch**

This command controls the door latch solenoid. The door latch can be opened or closed.

Parameters:

signed integer state

- 0 - Open the door latch.
- 1 - Close the door latch.
- 2 - Place the controller in charge of the latch.

Example: dl 1   (closes the door latch)

14. **tm = monitors temperatures**

This command displays temperature information for the model Liquefier, support liquefier, and chamber heater. The chamber Door Latch (1 1)

The information is displayed on a single line in the following format:
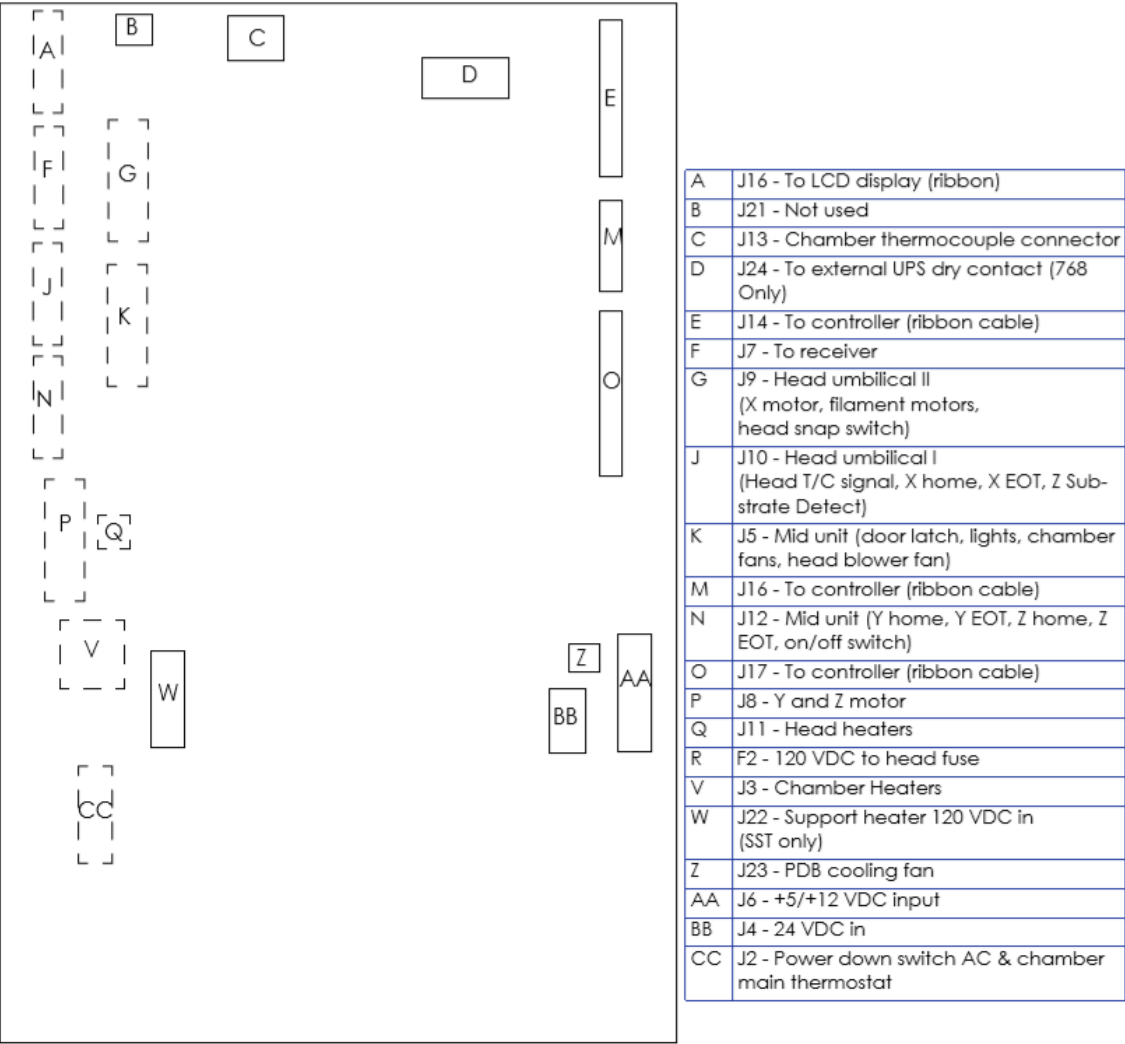
MM/DD/YY HH:MM:SS:

m <cur>/<set>/<pwm>/<ts> s <cur>/<set>/<pwm>/<ts> c <cur>/<set>/<on/off>

Required Tools

- Phillips screwdriver
- Small standard screwdriver
- Grounding wrist strap

Figure 80: Gen 2 power distribution board detail

A	J16 - To LCD display (ribbon)
B	J21 - Not used
C	J13 - Chamber thermocouple connector
D	J24 - To external UPS dry contact (768 Only)
E	J14 - To controller (ribbon cable)
F	J7 - To receiver
G	J9 - Head umbilical II (X motor, filament motors, head snap switch)
J	J10 - Head umbilical I (Head T/C signal, X home, X EOT, Z Substrate Detect)
K	J5 - Mid unit (door latch, lights, chamber fans, head blower fan)
M	J16 - To controller (ribbon cable)
N	J12 - Mid unit (Y home, Y EOT, Z home, Z EOT, on/off switch)
O	J17 - To controller (ribbon cable)
P	J8 - Y and Z motor
Q	J11 - Head heaters
R	F2 - 120 VDC to head fuse
V	J3 - Chamber Heaters
W	J22 - Support heater 120 VDC in (SST only)
Z	J23 - PDB cooling fan
AA	J6 - +5/+12 VDC input
BB	J4 - 24 VDC in
CC	J2 - Power down switch AC & chamber main thermostat

Device Voltages

Device	Voltage
Cartridge drive motor	12 VDC
Cartridge solenoids	24 VDC
Chamber heaters	120 VAC (parallel) 240 VAC (series)
Chamber heater fans	24 VDC
Chamber lights	24 VDC
Chamber fans	24 VDC
Door solenoid	12 VDC
Head drive motors	12 VDC
Home and EOT sensors	5 VDC
LCD display (backlight)	5 VDC
LCD display (text)	12 VDC
Liquefier	120 VDC (PWM)
X, Y and Z motors	24 VDC

Gen 2 Electronics Bay Area Components

Reference #	Part Number	Description
1	202143-CS05	Power distribution board
2	202325-0001	+24 VDC power supply
3	201403-0001	Electronics bay cooling fan
4	205503-CS01	+120 VDC aux. power supply
5	202326-0001	+5/12 VDC power supply
6	201525-0002	Circuit breaker
7	201598-0001	AC input
8	205509-0002	15 A Line filter board (behind input panel)
9	202329-CS05	Hard drive
10	201631-0001	Single board computer
11	202414-CS02	Controller board

Figure 10: Gen 2 electronics reference numbers