3D Touch

Set Up and Operations Manual
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6. Pre-print checks

It is **essential** that all pre-print checks are carried out before starting a print on the 3D touch. This section of the manual guides the user through these checks:

- a. Clearing the print bed
- b. Check the print bed is fitted correctly
- c. Power up
- d. Test all axes
- e. Check the hot-end nozzles are clean from plastic debris
- f. Check the print bed is level
- g. Check the bed is referenced to the extruder nozzles
- h. Load the extruders
- i. Extruder control
- j. Purge the extruder
- k. How to start a print
- l. Print a successful raft
a. Clearing the print bed

It is essential to clean the print bed before printing. This makes sure that the first printed layer makes a good contact with the bed.

Remove the bed label

The label on your bed needs to be removed before printing begins.

Ensure the bed transport stopper has been removed
For transit, a white stopper is fitted to the front bed keyhole. This prevents the bed from coming off the bed arms during transport. Remove this stopper and retain for future transport.

Do not attempt to print with the white stopper in place. Remove the white bed stopper before printing.

**Remove existing prints from the print bed**

We do test prints on each 3D Touch as part of our quality control. We leave these on the print bed to show that the printer has been checked, and to demonstrate some basic prints.

Remove any previous prints with the model removal tool. Slide the edge between the bed and the first layer to remove the entire print.

If the model is difficult to remove from the bed in situ, you can take the whole bed out of the machine to make the removal process easier (refer to b. Check the print bed is fitted correctly).

**Check the bed is clear of any build material**
Ensure that all build material is completely removed from the bed. Use the model removal tool to remove any stuck-fast tracks.

It is normal for prints to leave marks on the bed, and for the model removal tool to lightly scratch the surface of the bed. This will not affect the printer's operation. However, take care to avoid gouging the surface with the material removal tool – the bed must be flat.
b. Check the print bed is fitted correctly

Ensure that bed is correctly fitted to the printer. The three bed bolt heads should sit flush in the countersinks. If not, remove the bed, then refit it - as shown in the next two sections.

How to remove the bed

- Tip: removal is easier if the bed is near the bottom of the machine. If it is too high, you can manually lower the z-axis (see "Manual move").
How to fit the bed

- Tip: fitting is easier if the bed is near the bottom of the machine. If it is too high, you can manually lower the z-axis (see "Manual move").

- Check all bolt heads are fitted correctly (see "Check the bed is fitted correctly").
c. Power up

- Ensure the power cable is attached, and that power is being supplied to the printer. To start the printer, press and hold the function button for 2 seconds. This will boot the printer, activating the boot screen (the BFB logo). Touch the screen to show the home menu.
d. Test all axes

It is important to check that the print head can move freely in all 3 axes: X, Y and Z. This procedure makes sure that all packaging material has been removed before first use. First power up the printer, then use the manual move function to move the print head in all three axes:

Get familiar with moving the axes around:

- Ensure that the bed is fitted properly to the machine (see b. Check the print bed is fitted correctly).
- After powering up select the ‘Manual move’ function:

- Use X, Y and Z buttons to move each axis respectively.

<table>
<thead>
<tr>
<th>Caution: Always move the Z axis first to ensure that bed is away from the extruder nozzles, and does not collide during an X/Y move. Collisions between the extruder nozzles and the bed may damage both.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caution: Observe each X/Y axis movement. In these axes, it is possible to drive the extruders too far away from the “Home” position (shown in the picture below) into the printer frame. Avoid this. Excessive collisions will damage the printer.</td>
</tr>
<tr>
<td>Caution: Observe each Z axis movement. In this axis, it is possible to drive the bed too high (into the extruder nozzles) or too low (into the motor coupling). Avoid this. Excessive collisions will damage the printer.</td>
</tr>
</tbody>
</table>

- After confirming free movement for all axes, press the function button to return to the main menu.
e. Check the hot-end nozzles are clean from plastic debris

Ensure that the metal nozzle tips are clean from any plastic debris. All tips should be clearly visible.

If not:

- Lower the bed to make access to the nozzles easy.
- Position the extruders in approximately the middle of the machine (see d. Test all axes), to make access to the nozzles easy.
- Pull away any light plastic debris away from the nozzle tip using the pliers.
- If plastic debris is stubborn, you may need to heat the extruder to make the plastic soft enough to remove. To heat the extruder up, please refer to i. Extruder control.

| Caution: When heating up nozzles to remove plastic debris, do not touch the nozzle tips with your fingers. Extruders will burn if touched when hot. |
f. Check the print bed is level

To get a good print, the bed must be level. We make every effort to level the bed before the machine leaves our factory. However, the bed may move in transit, therefore it is essential to check that the bed is still level. The print bed is mounted on three sprung bolts which allow adjustment of the bed height in three places.

The 'Level Bed' function moves the extruder carriage around the corners of the bed so the operator can adjust the bed bolts to achieve a level bed.

- Check the bed is fitted correctly.
- On the touch screen select ‘Level Bed’ function:

  ![Level Bed function](image)

  Use the Up and Down arrows to raise and lower the bed to adjust the gap between the hot end and bed. Start with approximately 10 mm distance between the nozzle and the bed. This will enable rough levelling.

  ![Bed Gap](image)

  - Touch the ‘Clockwise’ and ‘Anti-clockwise’ buttons to automatically move the carriage around the corners of the print bed (view on-screen)
instructions for more movement options):

- During each movement along the side of the bed, observe from the side of the machine any change in distance between the bed and extruder's hot-end as it moves along.

- Adjust the height of the bed bolts to make each side level using the 3mm hex driver from the toolkit.

Caution: Ensure that the three bolts are not tightened so much that the spring starts to become spring bound. If the springs are tightened too much, the bed will be too low for position sensing, and will hit the waste bin standoffs before registering position.

- Underneath each of the 3 bed bolts is a locking nut which must be loosened with the 8mm spanner before the bolt can be adjusted.
• It may take several movements of the extruder, and consequent bolt adjustments to ensure that the bed is level.
• Ensure that axes are checked from the appropriate side of the machine (to better judge flatness):

**PHOTOGRAPHS TAKEN FROM ABOVE**

View the movements in the X axis from the front of the machine.

Loosen locking nut to adjust bolt.

View the movements in the Y axis from the sides of the machine.
Use the Up and Down arrows to reduce the gap between the hot end and bed to approximately 2 mm. This will enable finer levelling.

Repeat the levelling process.

Press the Function button to leave the ‘Level Bed’ menu, and return to the main menu.

Caution: Observe each extruder movement. The nozzle should not touch the bed. Moving the extruder with the nozzle touching the bed will damage the nozzle and the bed. If the nozzle touches the bed, immediately lower the bed using ‘down arrow’ icon.

Finally, check the centre location of the bed by pressing Y+. This can be used to identify an excessively worn or warped print bed as the height in the middle will differ from the perimeter of the bed.

Press the function button to return to the main menu.

Remember to lock the 3 bed bolts in position by tightening the lock nut under each, using the 8mm spanner. Whilst tightening the nut, make sure that the bolt does not spin by holding it in position with the 3mm hex driver, from the top side of the bed.
g. Check the bed is referenced to the extruder nozzles

After levelling the bed, the nozzles must be set to the correct height, to ensure that the first printed layer sticks properly (if the nozzle is too high the filament will not stick to the bed, if the nozzle is too low the bed may block the nozzle). Use the ‘Set Z Height’ function to accurately adjust the height of the nozzle for the first layer.

- On the touch screen select ‘Z-High’ function:

![Z-High function](image)

- Observe the gap between the nozzle and bed from the front of the machine. Press and hold the Z+/- buttons to move the bed.
- Start with a gap between the bed and the nozzle. Move the bed towards the nozzle. Observe the bed as it approaches the nozzle. Stop raising the bed as soon as the nozzle touches the surface of the bed. If the bed goes too far, simply move the bed back and repeat the approach.
- The bed should just touch the nozzle, without any compression in the bed springs:

![Bed touch](image)

Caution: If the nozzle is pushed too hard against the bed, the nozzle will be forced into the bed for the whole first layer of printing. This will damage the nozzle and the bed. Ensure that setting the nozzle against the bed does not compress the bed springs.

- Pressing the Function button gives the option to save the setting to the printer’s memory, which is retained when the power is turned off. The Z offset value will be applied for each subsequent print.
h. Load the extruders

Before loading a reel, the end of the filament must be prepared to prevent damage to the delivery tubes. This procedure is essential to prevent any damage to the delivery tubes, which may in turn block a nozzle.

- Cut the end of the filament at 45° from both sides to produce a point.
- Remove all sharp edges. The tip should feel smooth.

- Reel positions for each extruder are indicated below.
- Note: delivery tubes for each extruder run from right to left as indicated below:
Load the type of materials into their reel positions according to the number of extruders in the 3D-Touch:

<table>
<thead>
<tr>
<th>Number of Extruders in the Printer</th>
<th>Material for Extruder 1</th>
<th>Material for Extruder 2</th>
<th>Material for Extruder 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ABS or PLA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ABS</td>
<td>PLA</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>ABS</td>
<td>PLA</td>
<td>Not needed in first print</td>
</tr>
</tbody>
</table>

After positioning the reels:

1. Insert the filaments into the appropriate delivery tubes
2. Feed filaments up to extruders
• Check the filaments exit the tubes at the correct extruders:

Extruder 1  Extruder 2  Extruder 3
4. Remove the pressure bearings (below) on the extruders.

4. Use the 4mm hex driver from the toolkit.

Pressure bearing assembly

5. Use pliers to push the filaments into the white tube for each extruder, as far as it will go (approximately 10 cm).

6. Re-attach the pressure bearings onto the extruders.
See c. Setting the extruder pressure bearings to refine the spring compression on the pressure bearing (nominally 12mm).
i. Extruder control

- Make sure all extruders are loaded.
- Use ‘Manual move’ (see d. Test all axes) to move the extruders to the centre of the machine, and lower the bed. This makes it easy to clean any purged material.
- On the control panel select the ‘Extruder control’ function

'Extruder control' manages one extruder at a time (E1, E2 or E3) using the buttons on the control panel.

Recommended maximum extrusion temperatures for materials:

<table>
<thead>
<tr>
<th>Material</th>
<th>Extrusion temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABS</td>
<td>260</td>
</tr>
<tr>
<td>PLA</td>
<td>195</td>
</tr>
</tbody>
</table>

Note: Extruders share power, therefore an extruder will heat up quicker if it is the only extruder with a high target temperature.
j. Purge the extruder

Before purging the extruders, position the axes using the move command:

- position the head in the middle of the machine, and
- move the bed half way down the machine, away from the nozzles. This prevents damage to the bed, and allows purging to be inspected easily.

- Ensure filaments are loaded into the extruders, as defined in the h. Load the extruders.
- Make sure the springs on the extruder pressure bearings are compressed (as detailed in c. Setting the extruder pressure bearings) enough to push the filament into the teeth of the drive shaft.
- Proceed by purging one extruder at a time.
- Heat the extruder (as shown in i. Extruder control) to the maximum temperature defined below, depending on the material in the extruder:

<table>
<thead>
<tr>
<th>Material</th>
<th>Extrusion temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABS</td>
<td>260</td>
</tr>
<tr>
<td>PLA</td>
<td>195</td>
</tr>
</tbody>
</table>

- Once the target temperature has been achieved, turn the RPM up to 30.
- Examine the movement of the filament at the pressure bearing. It should slowly be driven towards the nozzle. If not, ensure that the spring pressure bearing is compressed sufficiently (c. Setting the extruder pressure bearings).

- Observe the end of the nozzle. A thin bead of molten plastic should come out of the nozzle. Depending on how far the filament was loaded into the extruder, this could take several minutes.

- Allow material to purge for a few seconds before reducing the RPM to 0.
- Repeat the purge process for each extruder.
- Turn the machine off to allow the nozzles to cool.
- As the extruders cool, clean the nozzles (see "Check the hot-end nozzles are clean").
- Dispose of all waste filament from the nozzle.
k. How to start a print

Before starting any print, make sure that the all **pre-print checks** have been completed.

The following sections will ask you to run two test files: a raft check file, and a duck. When asked to print a file you will need to follow the procedure below:

- Insert the memory stick into the 3D Touch USB slot.
- Select the “Print” icon:
  - The first 8 characters of the filename will be displayed here. If the filename is longer than 8 characters only the first 6 characters of the filename will be displayed on the control box.
  - Select the correct print file using the left and right arrow keys.
  - Touch the name of the print file to start the print.
I. Print a successful raft

It is essential that a good raft is printed to guarantee a good build. Therefore the height of the hot-end nozzle over the bed for the first layer is critical:

- If the nozzle is too far away from the bed, the filament will not stick to the bed
- If the nozzle is too low it will not be able to extrude the filament, and there is a risk of damage to the bed and the nozzle.
Print the raft check file

If this is your first print, you can print the raft check file to gain familiarity with the print.

The print files required are already included on the USB memory stick supplied in your toolkit. If you do not have these files you can download them by clicking on the icon on the left. After downloading:

- Unpack the files to the root of your USB stick.
- The printer can only see uncompressed files at the root of the USB stick i.e. do not put them inside a folder.

- Make sure materials are loaded as per “Load the filament”.
- Follow the section k. How to start a print to print the appropriate raft check file for the material loaded in Extruder 1 (see table below).

<table>
<thead>
<tr>
<th>Material type in Extruder 1</th>
<th>File to print</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABS</td>
<td>RaftABS_CheckFile</td>
</tr>
<tr>
<td>PLA</td>
<td>RaftPLA_CheckFile</td>
</tr>
</tbody>
</table>

- Examine each raft pad in the check file, as detailed in the following section.
- Remove the raft print when complete.

Examine the raft check file
### Potential problems

- If the raft pad appears damaged, match the imperfection to the two scenarios below, and follow the corrective action suggested.
- Note that there may be some imperfections in the raft, but that the process is very forgiving and even the images shown below will generally not spoil a full print.

#### Track ripping

<table>
<thead>
<tr>
<th>RAFT</th>
<th>MAGNIFICATION</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
<td>NOZZLE TOO HIGH: Wavey tracks, or tracks narrower than 1.2 mm (use vernier calipers to check). See “Perfect the raft”</td>
</tr>
<tr>
<td><img src="image3.png" alt="Image" /></td>
<td><img src="image4.png" alt="Image" /></td>
<td>NOZZLE TOO LOW: Tracks sides pushed over neighbouring tracks. See “Perfect the raft”</td>
</tr>
<tr>
<td><img src="image5.png" alt="Image" /></td>
<td><img src="image6.png" alt="Image" /></td>
<td></td>
</tr>
<tr>
<td><img src="image7.png" alt="Image" /></td>
<td><img src="image8.png" alt="Image" /></td>
<td></td>
</tr>
<tr>
<td><img src="image9.png" alt="Image" /></td>
<td><img src="image10.png" alt="Image" /></td>
<td></td>
</tr>
<tr>
<td><img src="image11.png" alt="Image" /></td>
<td><img src="image12.png" alt="Image" /></td>
<td></td>
</tr>
<tr>
<td><img src="image13.png" alt="Image" /></td>
<td><img src="image14.png" alt="Image" /></td>
<td></td>
</tr>
</tbody>
</table>

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*Image representations and actual images may vary.*
Purge deposit

Perfect the raft

If analysis of the raft check file yields any problems, you will need to re-examine some of the setup stages:

<table>
<thead>
<tr>
<th>Error</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nozzle too high</td>
<td>See g. Check the bed is referenced to the extruder nozzles to adjust the height at which the nozzle starts printing.</td>
</tr>
<tr>
<td>Nozzle to low</td>
<td>See g. Check the bed is referenced to the extruder nozzles to adjust the height at which the nozzle starts printing.</td>
</tr>
<tr>
<td>Nozzle heights appear inconsistent across a single print</td>
<td>See f. Check the print bed is level</td>
</tr>
<tr>
<td>Track ripping</td>
<td>See e. Check the hot-end nozzles are clean from plastic debris</td>
</tr>
<tr>
<td>Purge deposit</td>
<td>See e. Check the hot-end nozzles are clean from plastic debris</td>
</tr>
</tbody>
</table>