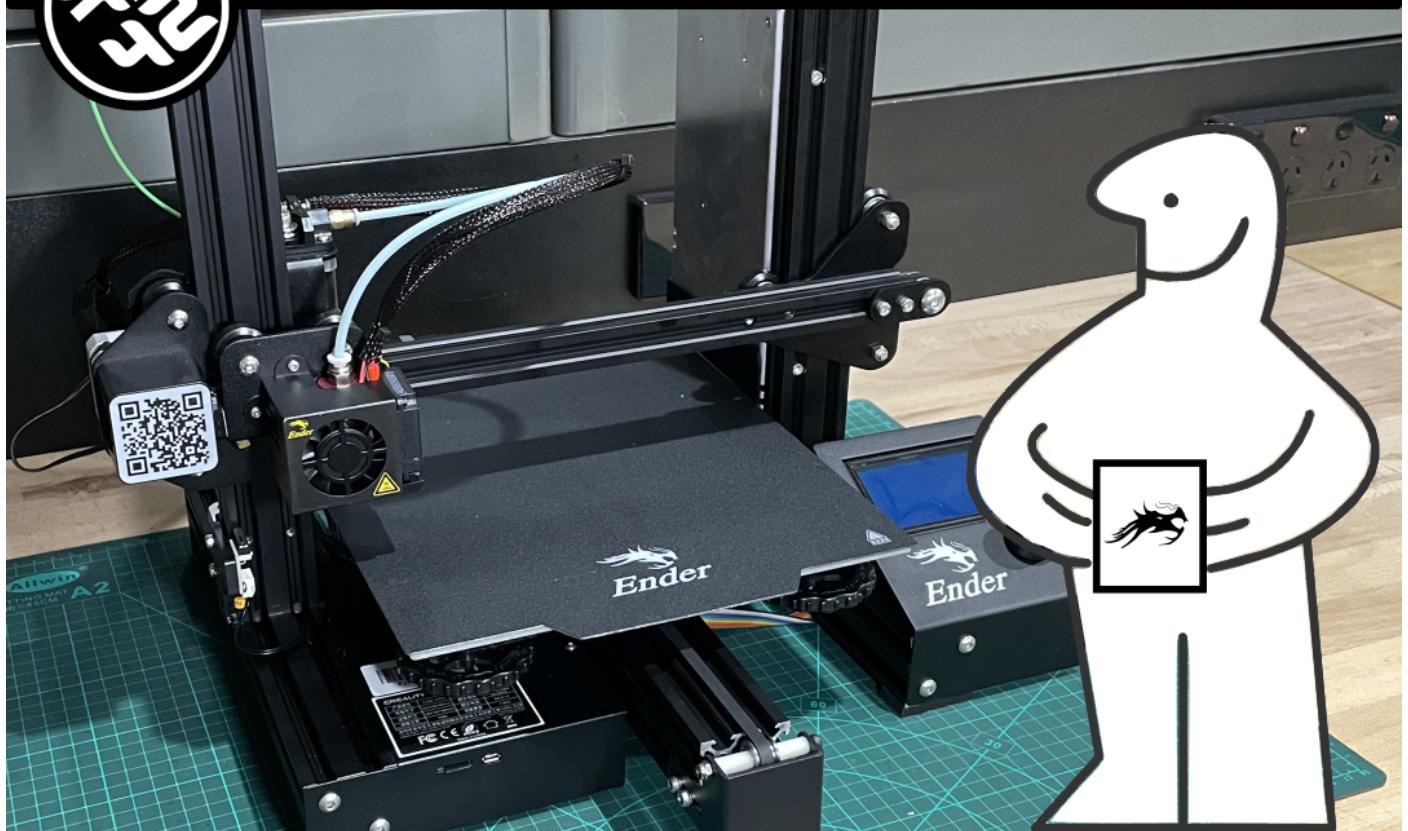




ENDER 3 PRO



ASSEMBLY INSTRUCTIONS

Version 1.0

Ender 3 Pro Assembly Instructions

Version: 1.0

Release Date: 13.7.2021

Author: RB42

The following assembly instructions are for the Creality Ender 3 Pro desktop 3D printer. The steps outlined in this manual are based on the following two manufacturers' manuals:

- Ender-3 Pro assembly instruction_EN V-2-2
and
- Ender-3 Pro_EN V.2.2

Please reference these manufacturers manuals for further information regarding the assembly process for this particular printer. Both documents are available from the Creality website.

Use correct safety practices, appropriate tools (in good and working condition) and suitable personal protective equipment while assembling the 3D printer as risk of personal injury or property damage may result. The Author (RB42) takes no responsibility for injury or property damage as a result of user error while following the steps outlined in this manual.

This document is the PDF version of assembly instructions originally published on the RB42 website. For further information please visit the assembly instruction website at the following link: <https://rb42.blog/creality-ender-3-assembly-instructions/>

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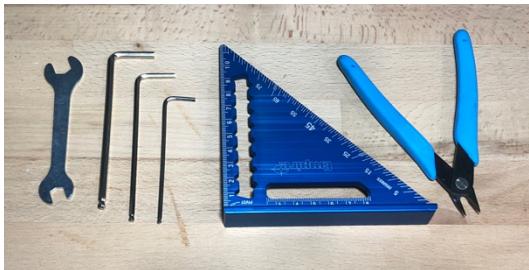


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Tools



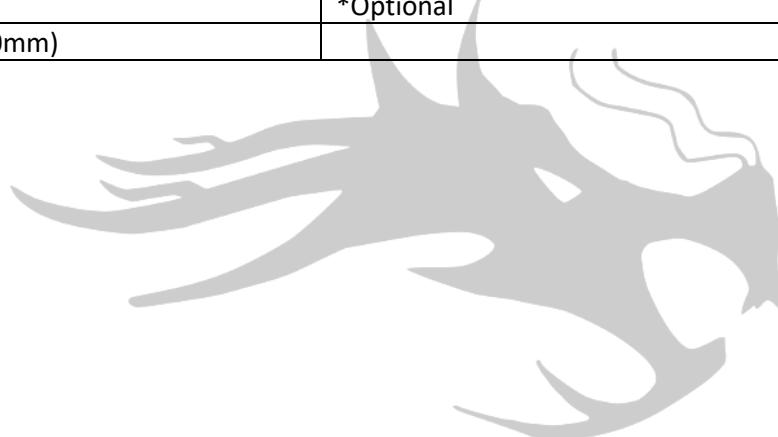
- M5 Hex Key (Allen Keys)
- M4 Hex Key (Allen Keys)
- M2.5 Hex Key (Allen Keys)
- Open Ended Wrench (included in kit)
- Side Cutters
- Square (machinist square, set square, rafters square etc.)

Fixings

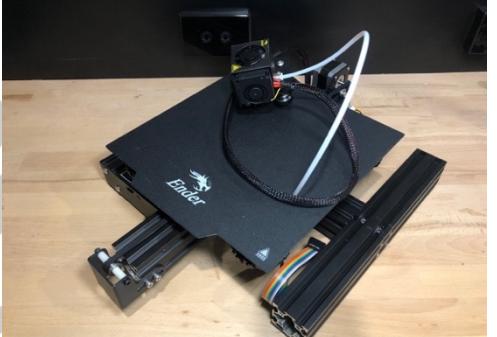
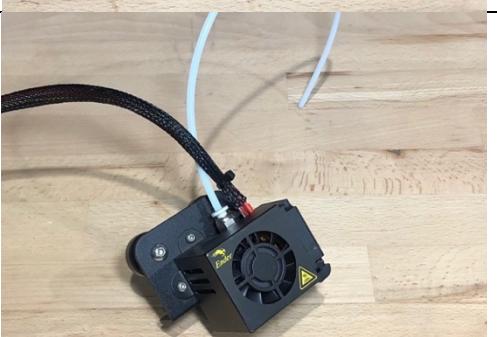
QTY	Fixing
4	M5x45 hex socket cap screw
4	M5x8 hex socket button head screw
4	M5x25 hex socket cap screw
2	M5 T-Slot nut
2	M4x20 hex socket cap screw
4	M4x16 hex socket button head screw w/ captive washer
1	1.75mm Bowden Coupler fitting

Consumables

Loctite 222	*Optional
Cable ties (2.5mm x 100mm)	



Parts

01	LCD display screen	
02	Printer Base	
03	Power supply	
04	Z-axis passive block	
05	Extruder carriage	



06	XE stepper motor kit	
07	X-axis idler pulley	
08	Z-axis motor assembly	
09	Z-axis limit switch kit	
10	Spool holder tube	



11	Spool holder frame	
12	2020 Endcap (x2)	
13	IEC mains power cable	
14	Synchronous Belt (77cm)	
15	Z-axis profile left (2040)	



16	Z-axis profile right (2040)	
17	Z-axis lead screw (T-type, T8xM8 370mm)	
18	X-axis profile (2020)	
19	Top profile (2020)	



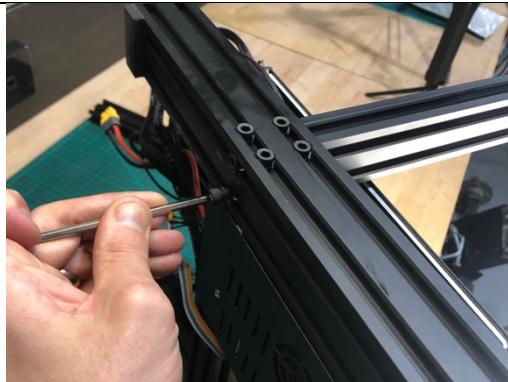
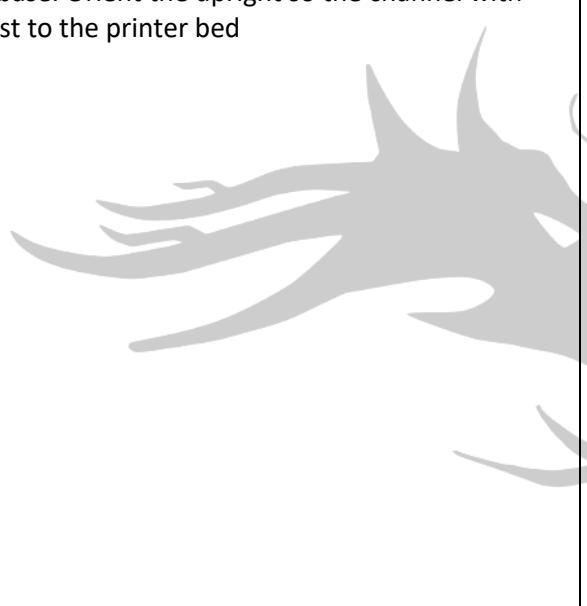
Step 1 - Z axis profiles

Tools for this step	M4 Hex Key (Allen Key)
	Square
Parts for this step	1x (02) Printer Base 1x (15) Z-axis vertical profile left (2040) 1x (16) Z-axis vertical profile right (2040)
Fixings	4x M5x45 hex socket cap screw
Consumables	Loctite 222

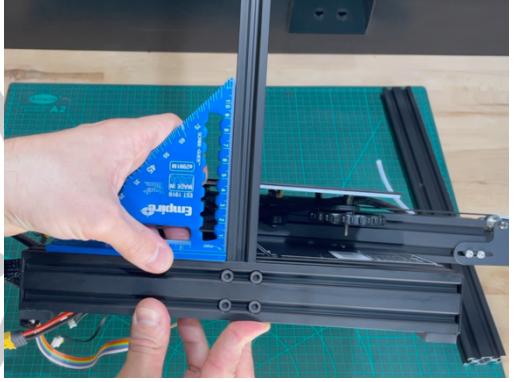
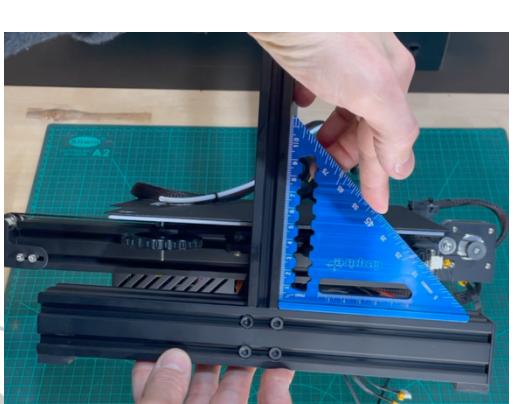
Process

1.1	<p>From the underside of the (02) Printer Base, insert 2x M5x45 hex socket cap screws through the predrilled holes on the left of the frame, so the thread is sticking out through the top face of the aluminium profile</p>	
1.2	<p>Identify each of the Z-axis vertical profiles to be used in this step: (15) Z-axis vertical profile left (2040) and (16) Z-axis vertical profile right (2040). While they may look the same there are subtle differences:</p> <p>The (15) left vertical profile can be Identified as having two threaded holes, one next to the other, positioned close to the end. The end with these two holes is the base of the upright and will be attached to the (02) Printer base;</p> <p>The (16) right vertical profile features two threaded holes, one on-top of the other. Positioning of these screw holes are not symmetrical, with the hole closest to the end of the profile being the bottom hole. This end, with the screw hole closest to the end, is the base of the upright and will be attached to the (02) Printer base.</p>	



1.3	<p>Position (15) Z-axis profile left on the left-hand side of the (02) Printer Base, directly above the two M5x45 cap screws (from step 1.1) protruding through the base. Using an M4 hex key (Allen key), proceed to screw the M5 cap screws into the base of the Z-axis upright and tighten until upright held firmly in position.</p> 	 
1.4	<p>Repeat the process for the opposite side and (16) Z-axis profile right. The process will remain the same albeit now on the right-hand side of the base. Orient the upright so the channel with the holes is closest to the printer bed</p> 	 



		
1.5	Confirm each of the Z-axis uprights are squared to the base by using a Square (e.g. machinist square, set square, rafters square etc.) to ensure an angle of 90°. If not exactly square, untighten the screws and attempt to reseat the upright. If still not square after this, additional frame bracing or gussets may be required.	 



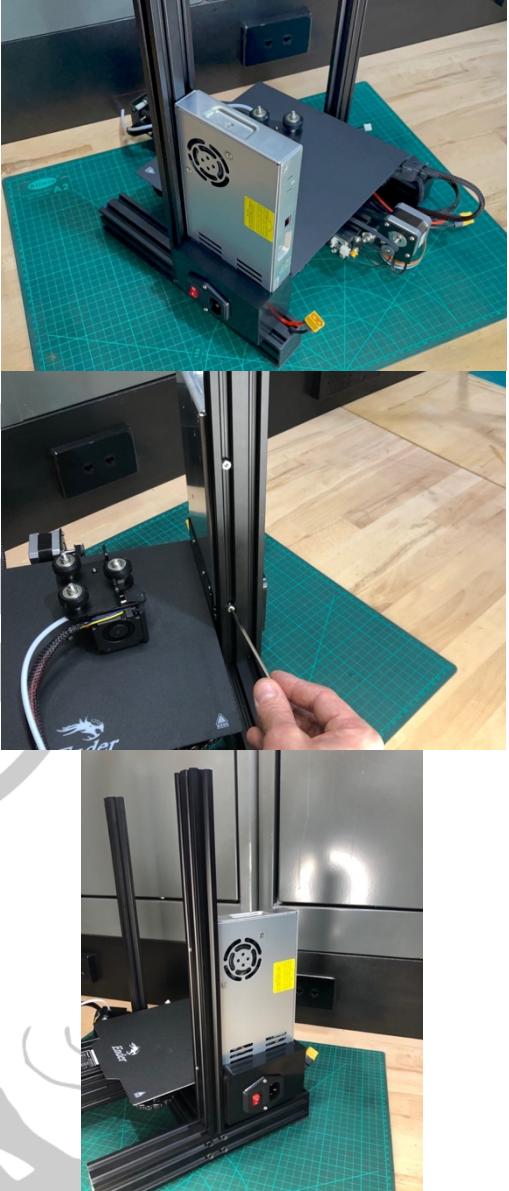
Step 2 - Power supply and display

Tools for this step	M3 Hex Key (Allen Key)
Parts for this step	1x (01) LCD display screen
	1x (03) Power supply
Fixings	2x M5x8 hex socket button head screw
	2x M4x20 hex socket cap screw
Consumables	Loctite 222

Process

- 2.1** Set the power supply to the required mains voltage. The voltage is altered by toggling the red switch on the back of the power supply from either reading 230v for 230v 50hz mains supply or 115v for 115v 60hz mains supply. Ensure voltage is set correctly as incorrectly selected voltage will cause damage to the printer and may cause further electrical hazards.



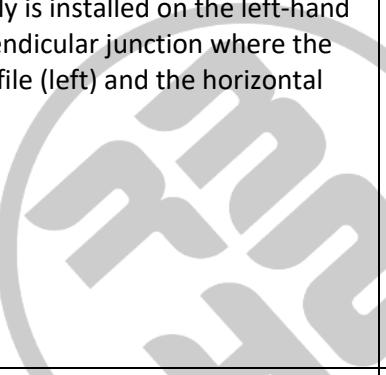
2.2	<p>Mount the (03) power supply to the reverse side of (16) Z-axis vertical profile right (from step 1.4), the power supply is held in place with 2x M4x20 hex socket cap screw which are inserted from the front face of the Z axis profile using a M3 hex key (Allen key).</p>	
2.3	<p>Attach the (01) LCD display to the front face of (02) printer base on the right-hand side with 2x M5x8 hex socket button head screws using an M3 hex key (Allen key) to screw securely in place.</p>	



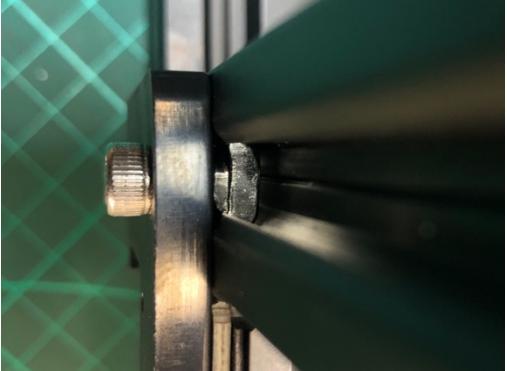
Step 3 - Z axis limit switch

Tools for this step	M3 Hex Key (Allen Key)
Parts for this step	1x (09) Z axis limit switch assembly

Process

3.1	(09) Z axis limit switch assembly is installed on the left-hand side of the frame, at the perpendicular junction where the vertical (15) Z-axis vertical profile (left) and the horizontal (02) printer base meet.	
3.2	Insert the T-slot nuts of the (09) Z axis limit switch assembly into the channel on the side of the Z-axis vertical profile by rotating the nuts so that they are in the same orientation as the channel on the profile so that they are placed into the channel without obstruction.	
3.3	Position the (09) Z axis limit switch assembly so that the positioning tab is resting on top of (02) printer base horizontal profile.	

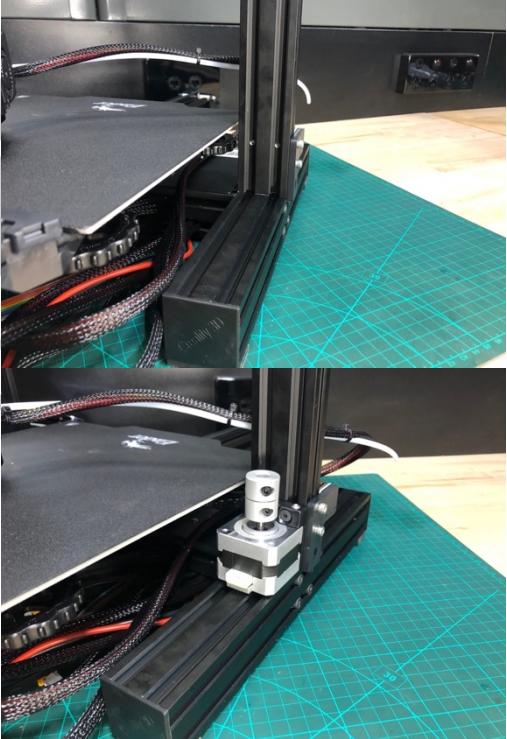


3.4	<p>Once in the channel, using an M3 hex key (Allen key) rotate the orientation of the T-slot nuts by 90 degrees, making them perpendicular to the channel of the vertical profile. Continue to tighten the hex socket cap screws so the limit switch is firmly held in place. Confirm both the T-slot nuts are remaining at 90 degrees to the vertical Z axis profiles once the screws have been fully tightened.</p>	
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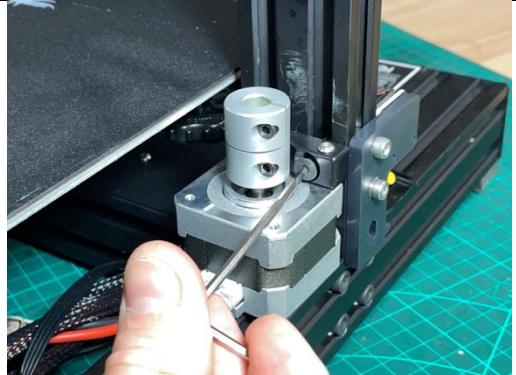
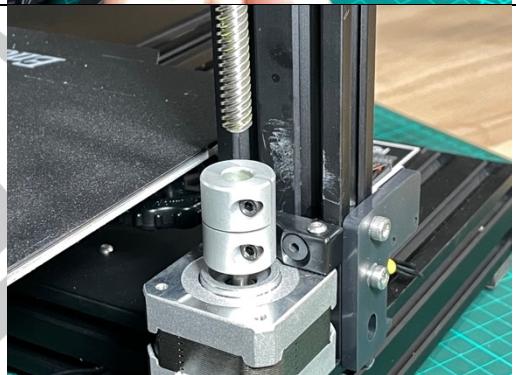
Step 4 - Z axis lead screw

Tools for this step	M2.5 Hex Key (Allen Key)
Parts for this step	1x (08) Z-axis motor assembly
	1x (17) Z-axis lead screw (T-type, T8xM8 370mm)
Fixings	2x M4x18P hex socket countersunk screw
Consumables	Loctite 222

Process

4.1 On the reverse face of the (15) Z-axis vertical profile (left), position the (08) Z-axis motor assembly on the (02) printer base with the stepper motor resting on the top surface of the aluminium extrusion and shaft pointing directly upwards.	
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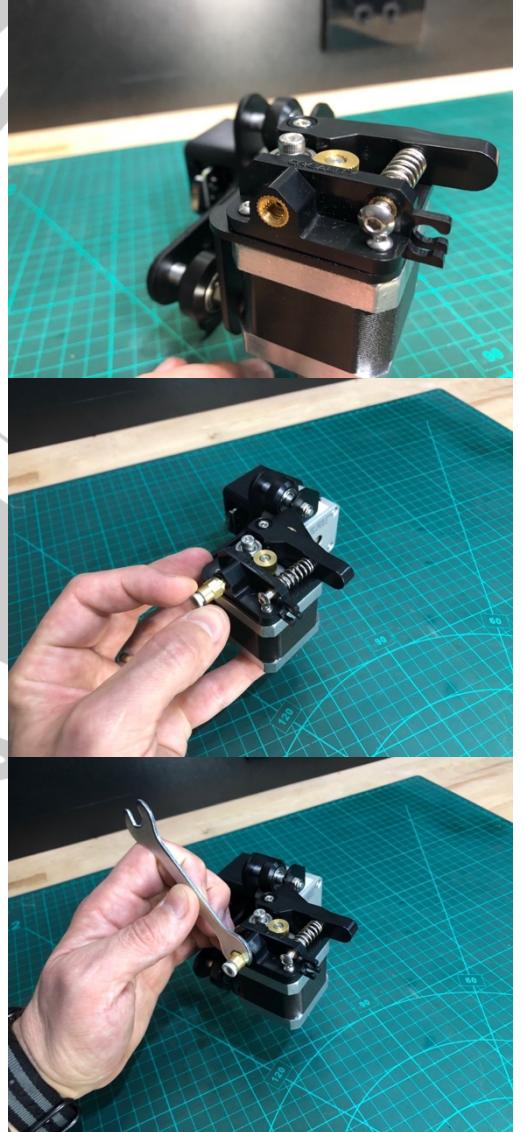
4.2	<p>Secure the stepper motor into place with the 2x M4x18P hex socket countersunk screws and tightened into place using the M2.5 hex key (Allen key). These screws are feed through two holes on either side of the plastic mounting block attached to the top of the stepper motor and screwed into the matching threaded holes in the (15) Z-axis vertical profile (left).</p>	
4.3	<p>Insert the (17) Z-axis lead screw into the Z-axis shaft coupling on top of the (08) Z-axis stepper motor.</p>	
4.4	<p>Slightly torque the grub screws using an M2.5 hex key (Allen key) enough so the lead screw is held in place. At this point in the assembly process do not tighten too much as we will need to set the final position of this screw in a later step (step 9.3).</p>	



Step 5 - X-axis and Extruder (XE) stepper motor assembly

Tools for this step	M2.5 Hex Key (Allen Key)
	Kit Open Ended Wrench
Parts for this step	1x (06) XE stepper motor kit
	1x (18) X-axis profile (2020)
Fixings	2x M4x16 hex socket button head screw w/ captive washer
	1x 1.75mm Bowden Coupler fitting
Consumables	Loctite 222

Process

5.1	Attach the 1.75mm Bowden Coupler fitting to the (06) XE stepper motor kit by screwing into the threaded hole on the extruder housing attached to the top of the extruder stepper motor. Tighten the coupler into place using the open-ended wrench from the tool kit supplied with the printer.	
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5.2

Using an M2.5 Hex Key (Allen Key), fix the (06) XE stepper motor kit on to the reverse side of the (18) X-axis profile using the 2x M4x16 hex socket button head screws. Make sure the XE motor kit is positioned correctly on the left-hand side (right on the reverse) of the (18) X-axis profile, using the 2 predrilled and threaded mounting holes.



Step 6 - X-axis Synchronous Belt

Parts for this step	1x (14) Synchronous Belt (77cm)
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Process

- 6.1** Feed the (14) Synchronous Belt (77cm) under the plastic cover and around the X-axis pulley (GT2, 20 teeth). The easiest way to wrap the belt around the pulley is to feed the belt through the cover, going in one side and out the other, then bending the belt around and feeding back through the cover once again.



6.2	<p>Loosely wrap the (14) Synchronous Belt (77cm) around the opposite end of the (18) X-axis profile. At this point the build there is no pulley for the belt to go on, it will be installed in step 8.</p>	
6.3	<p>Approximately position the (14) Synchronous Belt so that the end tabs are in the centre of the X-axis profile. The belt should roughly be in line with the centre channel of the X-axis profile.</p>	



Step 7 - Hot-end carriage and Z-axis passive block

Tools for this step	M2.5 Hex Key (Allen Key)
Parts for this step	1x (04) Z-axis passive block
	1x (05) Hot-end carriage
Fixings	2x M4x16 hex socket button head screw w/ captive washer
Consumables	Loctite 222

Process

7.1	<p>Slide the (05) Hot-end carriage over the end of the (18) X-axis profile, ensuring the V-slot wheels go into the channel of the aluminium extrusion, with two wheels being on top and the single wheel at the bottom. The (05) Extruder carriage is oriented with a majority of the assembly (fans, hot-end and cover) on the front side of the (18) X-axis profile, opposite side to that of the (06) XE stepper motor kit assembly already attached (from step 5).</p>	
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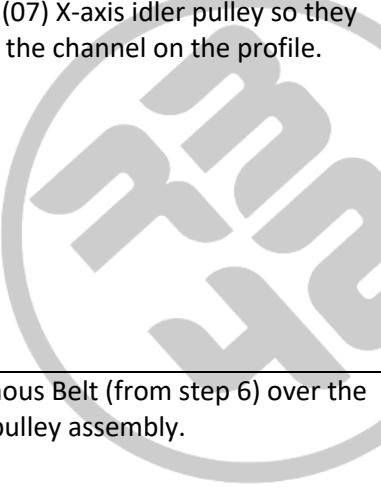
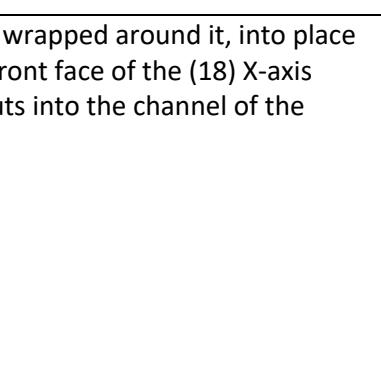
7.2	<p>Slide the tabbed ends of the X-axis synchronous belt (from step 6) into the slotted tabs on the back of the (05) Hot-end carriage. These slotted tabs are located either side of the single v-slot wheel at the bottom of the extruder carriage.</p>	
7.3	<p>On the reverse side of the X-axis profile, fix the (04) Z-axis passive block with 2x M4x16 hex socket button head screws using an M2.5 hex key (Allen key) to screw into place. The (04) Z-axis passive block is positioned on the reverse, left hand side (on the right when viewed from front) and predetermined by the 2 threaded holes in the aluminium profile.</p>	



Step 8 - X-axis idler pulley

Tools for this step	M2.5 Hex Key (Allen Key)
Parts for this step	1x (07) X-axis idler pulley

Process

8.1	Position the T-slot nuts of the (07) X-axis idler pulley so they are in the same orientation as the channel on the profile.		
8.2	Wrap the X-axis (14) Synchronous Belt (from step 6) over the pulley of the (07) X-axis idler pulley assembly.		
8.3	Move the assemble, with belt wrapped around it, into place on the right-hand end of the front face of the (18) X-axis profile and insert the T-slot nuts into the channel of the aluminium extrusion.		



8.4	<p>Apply tension to the X-axis (14) Synchronous Belt by pulling or pushing on the (07) X-axis idler pulley as if trying to remove it from the end of the channel.</p> <p>While ensuring the belt is seated correctly in the centre on the idler pulley, apply enough force in order to keep the belt tight but with a small amount of slack when pressed down upon, 3-5mm deflection (no more than this) will be enough.</p>	
8.5	<p>While still applying adequate tension on the (14) Synchronous Belt, use a M2.5 Allen Key (hex key) to rotate the T-slot nuts 90 degrees, making them perpendicular to the channel and then continuing to tighten so the assembly is held firmly in place with no movement. Confirm that both the T-slot nuts remain at 90 degrees to the (18) X-axis profile once fully tightened in place.</p>	



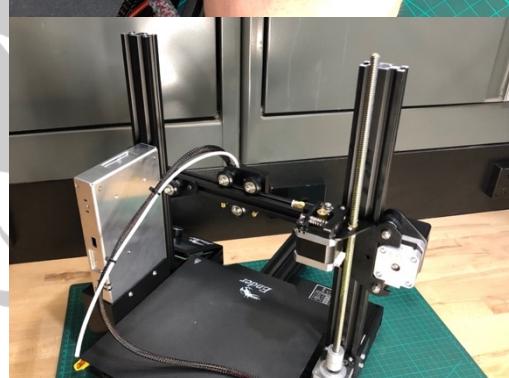
Step 9 - Installing of X-axis gantry onto the Z-axis vertical uprights.

Tools for this step	M2.5 Hex Key (Allen Key)
Parts for this step	X-axis gantry assembly, comprising of: <ul style="list-style-type: none"> • 1x (04) Z-axis passive block • 1x (05) Extruder carriage • 1x (06) XE stepper motor kit • 1x (07) X-axis idler pulley • 1x (14) Synchronous Belt (77cm) • 1x (18) X-axis profile (2020)
	Printer base assembly, comprising of: <ul style="list-style-type: none"> • 1x (02) Printer Base • 1x (08) Z-axis motor assembly • 1x (15) Z axis profile left (2040) • 1x (16) Z axis profile right (2040) • 1x (17) Z-axis lead screw (T-type, T8xM8 370mm)

Process

<p>9.1 Place the assembled X-axis gantry over the tops of the Z-axis vertical uprights, ensuring the V-slot wheels are lined up with the channels on the vertical profiles and sitting true and correctly within the slot.</p>	
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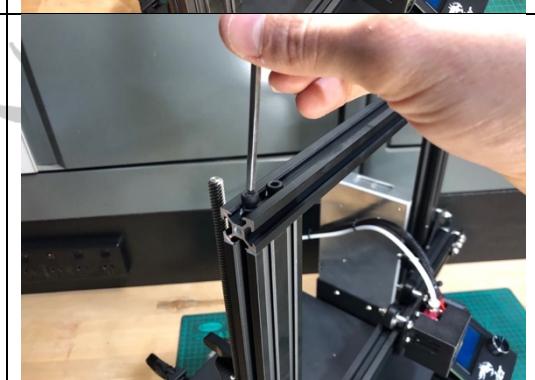
9.2	<p>With the X-axis gantry sitting over the Z-axis uprights, thread the (17) Z-axis lead screw (from step 4) through the nut (goldish coloured) on the gantry backing plate, turn the (17) Z-axis lead screw by hand enough for the X-axis gantry to be lowered down towards the print bed and clear from the top of the Z-axis vertical uprights. Lower the gantry down by approx. 50-100mm, however you can lower it as much as you feel like.</p> 	   
9.3	<p>After the X-axis gantry has been positioned onto the vertical uprights and the (17) Z-axis lead screw has been manually threaded and lowered slightly, with an M2.5 hex key (Allen key) proceed to fully tighten the grub screws in the coupler on the (08) Z-axis motor assembly (from step 4).</p>	



Step 10 - Top profile

Tools for this step	M4 Hex Key (Allen Key)
Parts for this step	1x (19) Top profile (2020)
	2x (12) 2020 Endcap
Fixings	4x M5x25 hex socket cap screw
Consumables	Loctite 222

Process

<p>10.</p> <p>1 Position the (19) Top profile (2020) at the top of the Z-axis vertical profiles (from step 1), paying particular attention to the orientation of the 2020 profile making sure to have the correct side facing in the upward direction as shown in image.</p>	
<p>2 Line up holes on either side of the (19) Top profile with the threaded holes in the tops of the Z-axis uprights. Once correctly lined up, fix the (top) profile into place with 4x M5x25 hex socket cap screws, with 2 screws being used on either end of the 2020 profile, torque firmly into place using the M4 hex key (Allen key).</p>	



- 10.** With the (19) top profile securely in place, push a (12) 2020 Endcap into each end of the 2020 extrusion, covering the exposed aluminium ends. Ensure the endcaps are both square to the profile of the extrusion and not on an angle.
- 3**



Step 11 - Spool holder

Tools for this step	M3 Hex Key (Allen Key)
Parts for this step	1x (10) Spool holder tube 1x (11) Spool holder frame
Fixings	2x M5x8 hex socket button head screw 2x M5 T-Slot nut
Consumables	Loctite 222

Process

11. 1	Insert the 2x M5x8 hex socket button head screws into the base of the (11) Spool holder frame, so the threads of the screws are hanging down. Loosely thread the 2x M5 T-Slot nuts onto the ends of the threads of the M5x8 button screws applying only a few turns of thread to hold the nut onto the screw.	 
11. 2	Insert the T-slot nuts into the channel on the top surface of the (19) Top profile by rotating the nuts so that they are in the same orientation as the channel and can be slotted in without obstruction.	



	<p>11. 3 Position the (11) Spool holder frame onto of the top surface of the (19) Top profile (from step 10) in a suitable location, typically this is 50-60mm (approx.) from the end of the (19) Top profile on the left-hand side. Ensure the orientation of the frame is with the folded tabs of the part facing towards the rear of the printer.</p>	
	<p>11. 4 Once in the channel, rotate the T-slot nuts by 90 degrees making them perpendicular to the channel and the profile. When in the correct position, tighten the M5x8 hex socket cap screws, using an M3 Hex Key (Allen Key), so the spool holder frame is firmly held in place. Confirm that both the T-slot nuts remain at 90 degrees to the top profile once fully tightened in place.</p>	
	<p>11. 5 Remove the locking nut off the (10) Spool holder tube and then insert the main body of the tube into the hole at the top of the (11) Spool holder frame. Position the tube so it is orientated towards the rear of the printer and sitting more or less directly inline and above the extruder. Secure the main body in place to the frame with the locking nut, tightening securely to ensure no free play or movement of the tube.</p>	  



Step 12 - Wiring Loom and Bowden Tube

Tools for this step	Side Cutters
Consumables	
Consumables	Cable ties (2.5mm x 100mm)

Process

- 12.1** Untangle the wiring loom coming from the control box located underneath the build plate of the printer. Identify all cable ends and their associated components.

Listed below are the various loom plugs, what they are labelled and an approximate location for their termination on the printer:

6 Pin (4 wire) plugs - stepper motors

[E] **Extruder** | (06) XE stepper motor assembly on X-axis gantry (from step 5)

[X] **X-axis** | (06) XE stepper motor assembly on X-axis gantry (from step 5)

[Z] **Z-axis** | (09) Z axis limit switch assembly (from step 3) on left hand side of machine

3 Pin (2 wire) - Limit switches

[X] **X-axis** | (06) XE stepper motor assembly on X-axis gantry (from step 5)

[Z] **Z-axis** | (09) Z axis limit switch assembly (from step 3) on left hand side of machine

Yellow XT60 | Control board extra low voltage (ELV) power connection from power supply (from step 2)

EXT3 | Digital LCD display (from step 2)

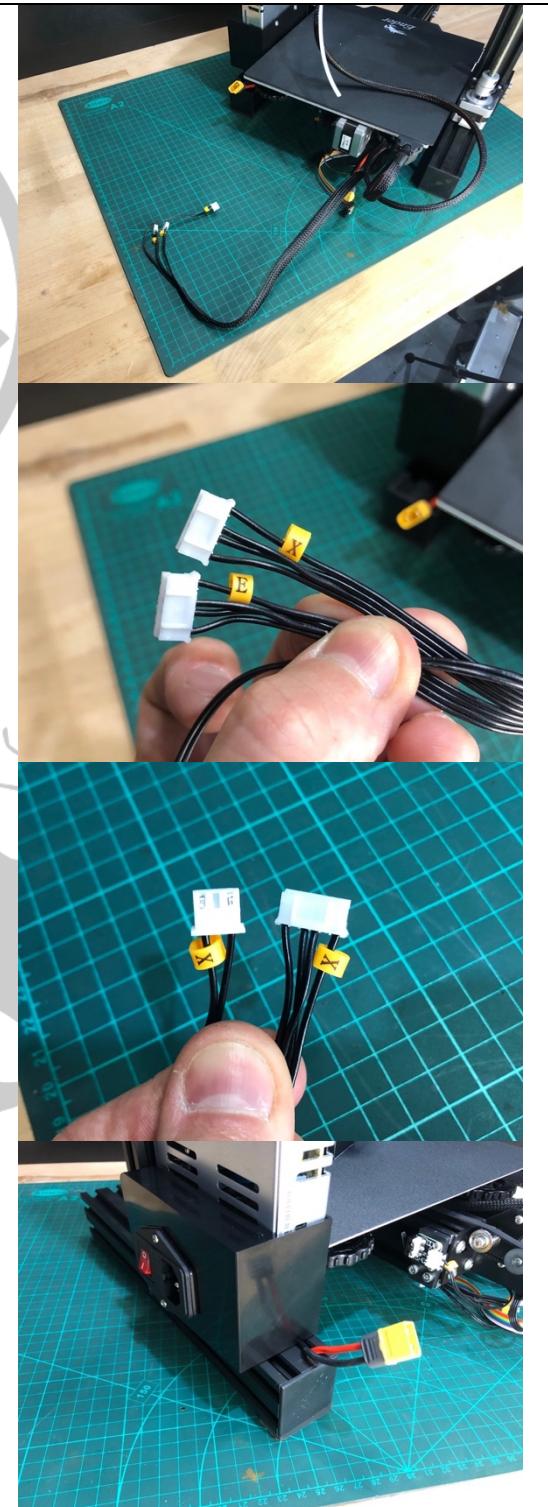
**The following components are already plugged in on the printer from the factory:

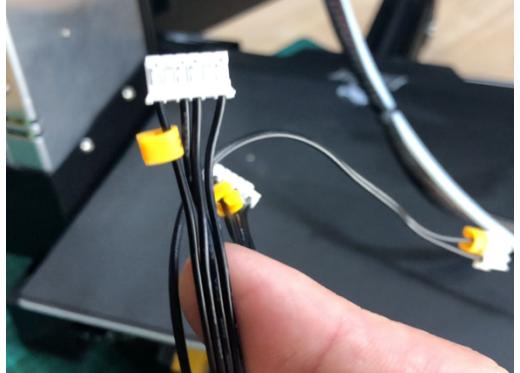
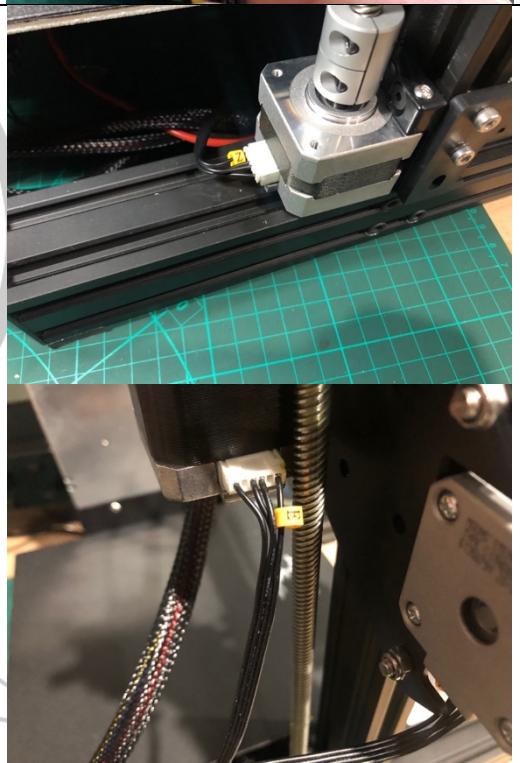
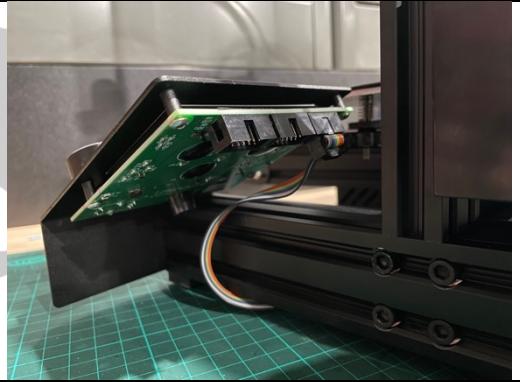
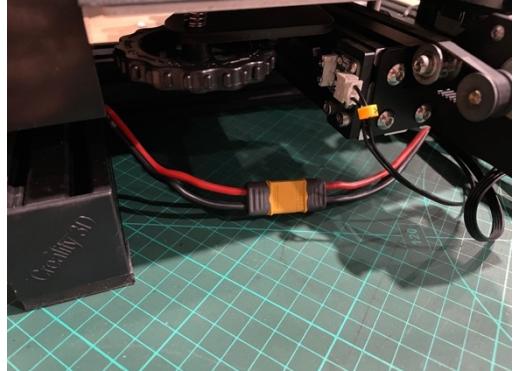
6 Pin (4 wire) plugs - stepper motors

[Y] **Y-axis** | (02) printer base towards the rear of the machine

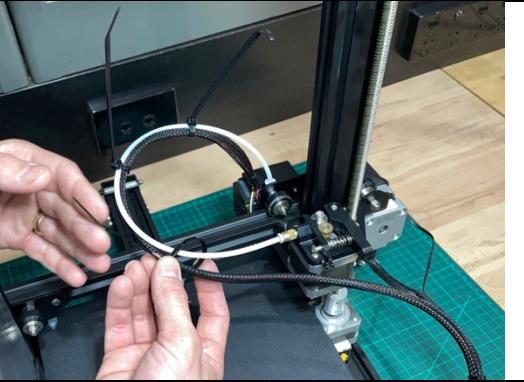
3 Pin (2 wire) - Limit switches

[Y] **Y-axis** | (02) printer base towards the rear of the machine



12.2	<p>Run each of the loom plugs to their required locations and plug into the associated socket, paying particular attention to the directional nature of the plugs going into the sockets. If plugged in incorrectly could cause damage to the pins in the plug or the plug housing.</p>	
12.3	<p>Double check labelling of plugs and sockets match up as required with no interchanged or mismatched pairings.</p>	
12.4	<p>Connect EXT3 to the back of the digital LCD display, inserting the plug into the right-hand socket of the 3. The Left-hand socket and centre socket are not used in this setup.</p>	
12.5	<p>Connect the ELV power connection (yellow XT60) from the power supply to the control board.</p>	



12.6	<p>Firmly push the loose end of the Bowden tube into the coupler fitting on the (05) Hot-end carriage (from step 7). Confirm <i>both</i> ends of the Bowden tube are securely in place by applying some force on the tube and attempting to pull out from the fitting, they should not be able to be removed from the fittings if correctly inserted.</p>	
12.7	<p>Tidy up the wiring and Bowden tube using the supplied cable ties where necessary to hold wiring in place.</p>	

Step 13 - Powering up

Parts for this step	(13) IEC mains power cable
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Process

13.1	<p>With the supplied (13) mains power cable, plug the printer in at the mains and turn on at both the mains outlet and then on the (03) power supply of the printer. Once powered on the LCD display will turn on and display the loading/boot-up screen followed by the information home screen.</p>	 
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NOTE>> For the following steps (14 though 19) Use the navigation dial to enter the main options menu from the main information screen, turning the navigation dial either clockwise or anti-clockwise to scroll through the listed menu options and pressing the dial to make selections at the appropriate menu option.

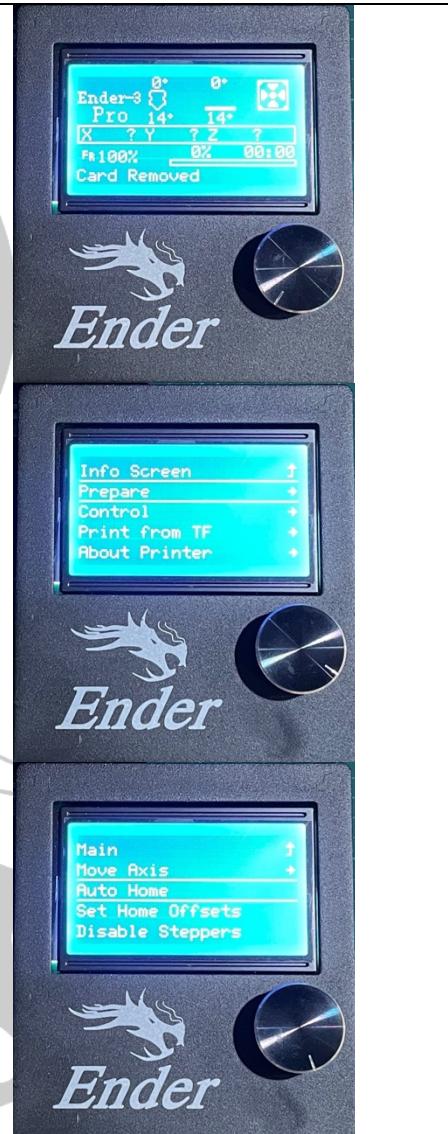
Step 14 - Auto homing

Process

- 14.1** In the main options menu, select prepare and then Auto Home to initiate an auto home command for each of the printers axis'.

Main>Prepare>Auto Home

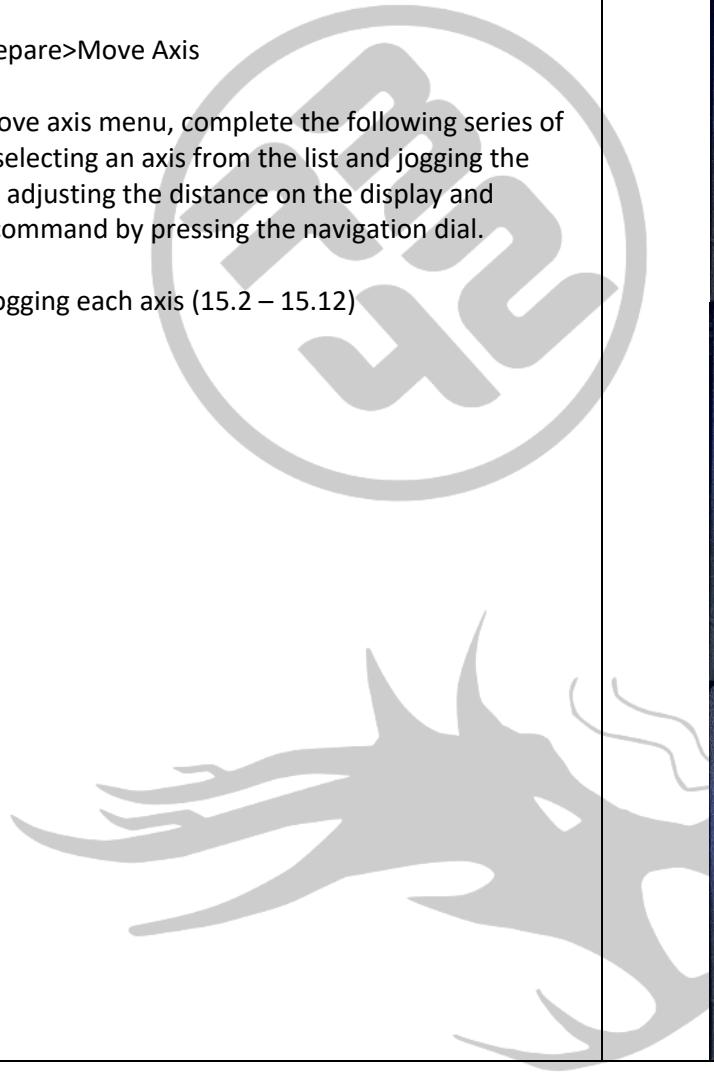
The printer will run an Auto Homing process and place the printer head in the front left of the build plate once the process has been run.



Step 15 - Stepper motor directions

The purpose of the below process of moving stepper motors is to ensure they are correctly plugged into their corresponding components, are travelling in the correct direct as programmed by the user and that there are no obstructions in the way of the various assemblies as they move along their respective paths.

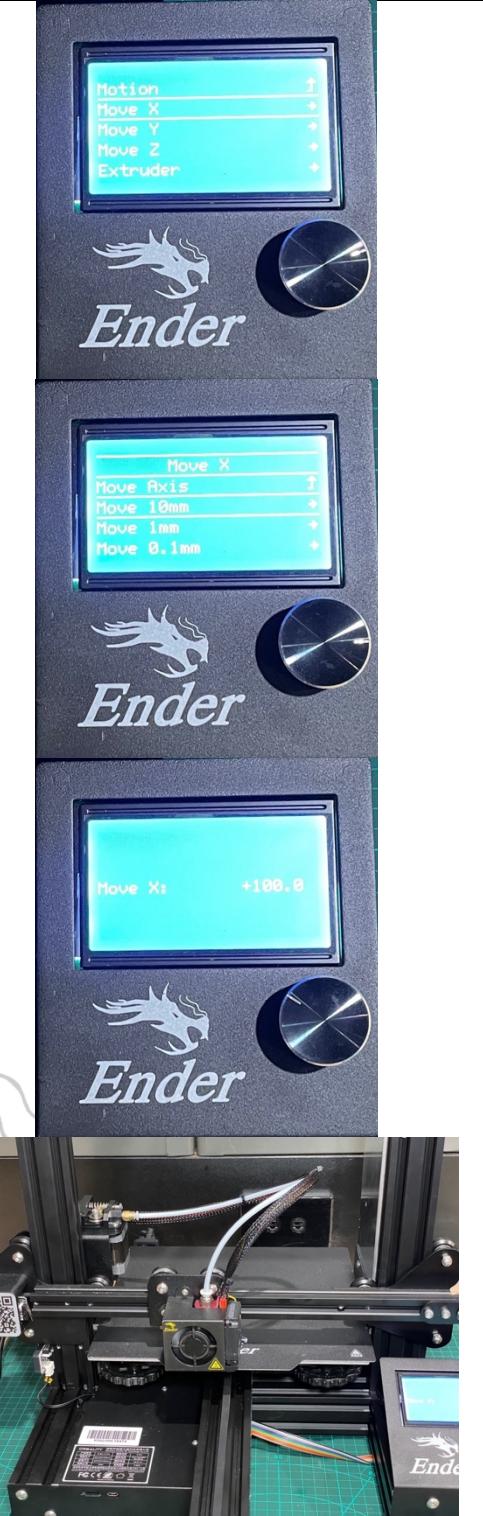
Process

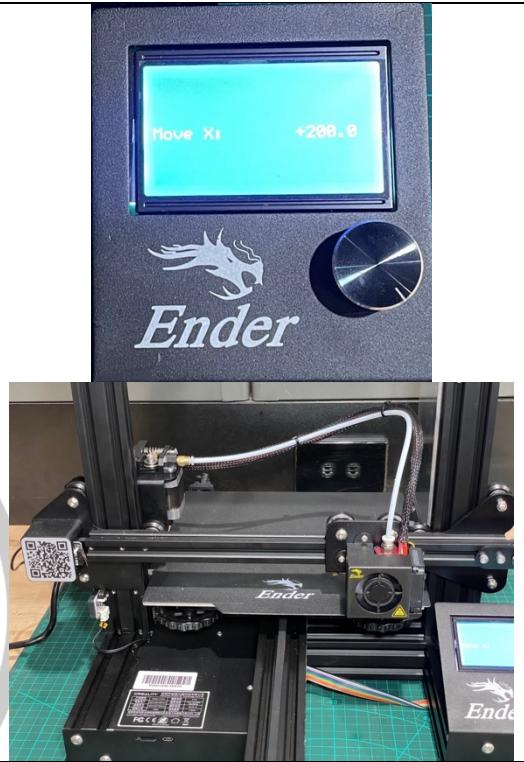
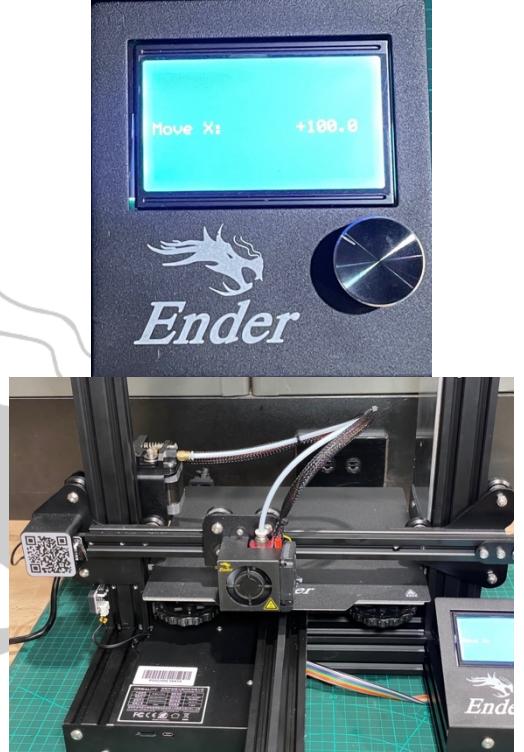
15.1	<p>From the main options menu, select Prepare and then Move Axis.</p> <p>Main>Prepare>Move Axis</p> <p>When in the move axis menu, complete the following series of commands by selecting an axis from the list and jogging the stepper motor, adjusting the distance on the display and executing the command by pressing the navigation dial.</p> <p>Sequence for jogging each axis (15.2 – 15.12)</p> 	 <ul style="list-style-type: none">Ender-3 0° 0°Pro 14° 14°[X ? Y ? Z ?]F100% 0% 00:00Card Removed <p>Info Screen ↑</p> <p>Prepare ↓</p> <p>Control ↓</p> <p>Print from TF ↓</p> <p>About Printer ↓</p> <p>Main ↑</p> <p>Move Axis ↓</p> <p>Auto Home ↓</p> <p>Set Home Offsets ↓</p> <p>Disable Steppers ↓</p>
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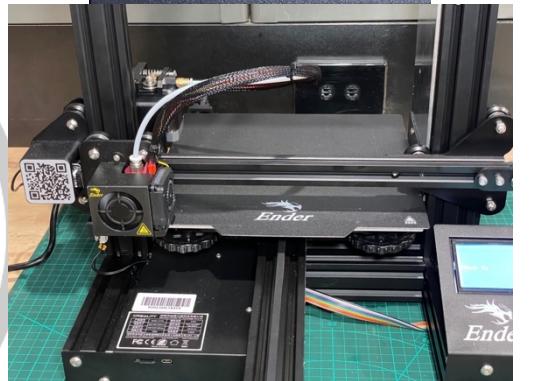
15.2

Move X> Move 10mm> +100: Moves X-axis carriage right to approx. halfway;

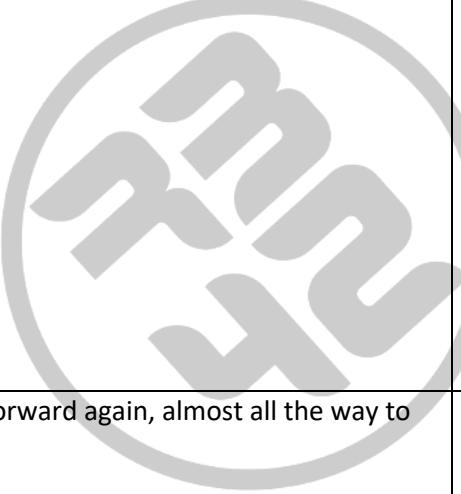
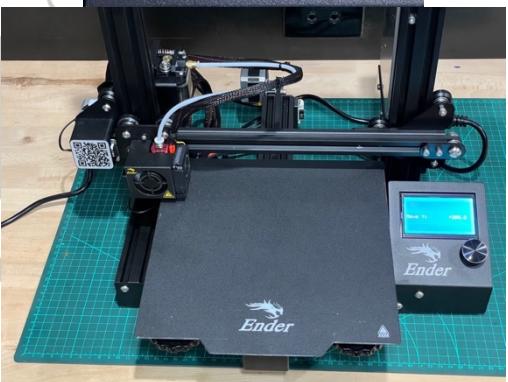


15.3	<p>X> +200: Moves X-axis carriage further right almost to the extreme right;</p> 	
15.4	<p>X> +100: Moves X-axis carriage left back to approx. halfway;</p> 	

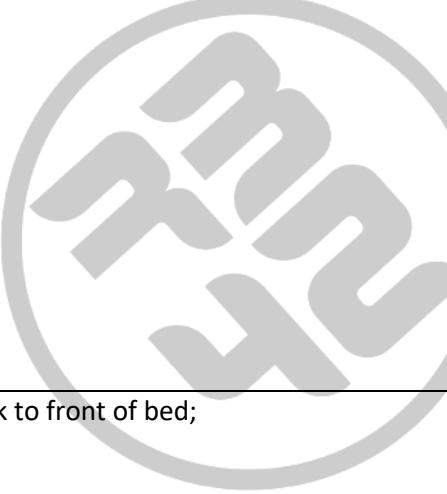
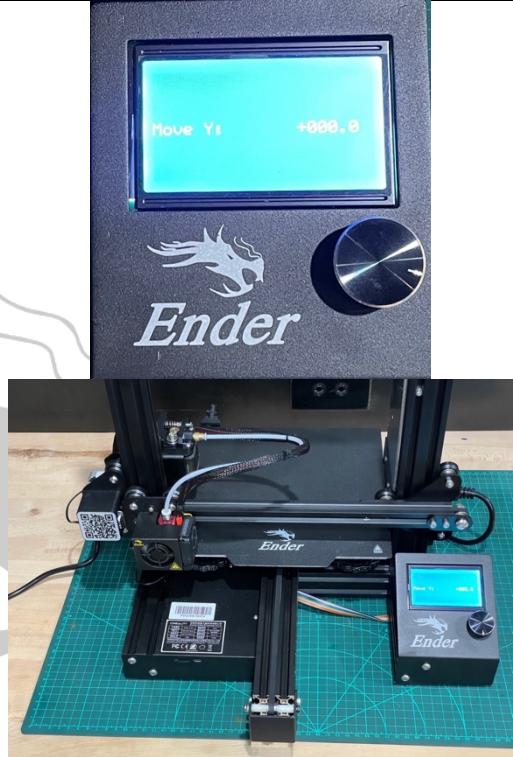


15.5	<p>X> +0: Moves X-axis carriage left back to home position;</p> 	 
15.6	<p>Y> +100: Moves print bed forward approx. halfway;</p> 	 



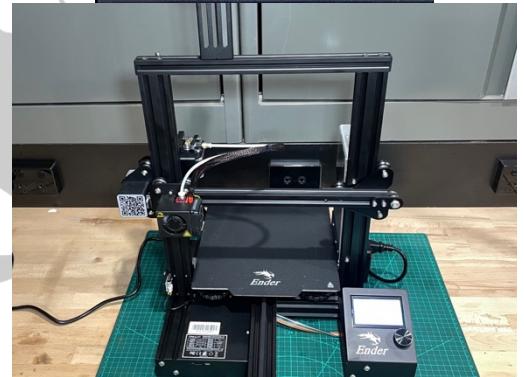
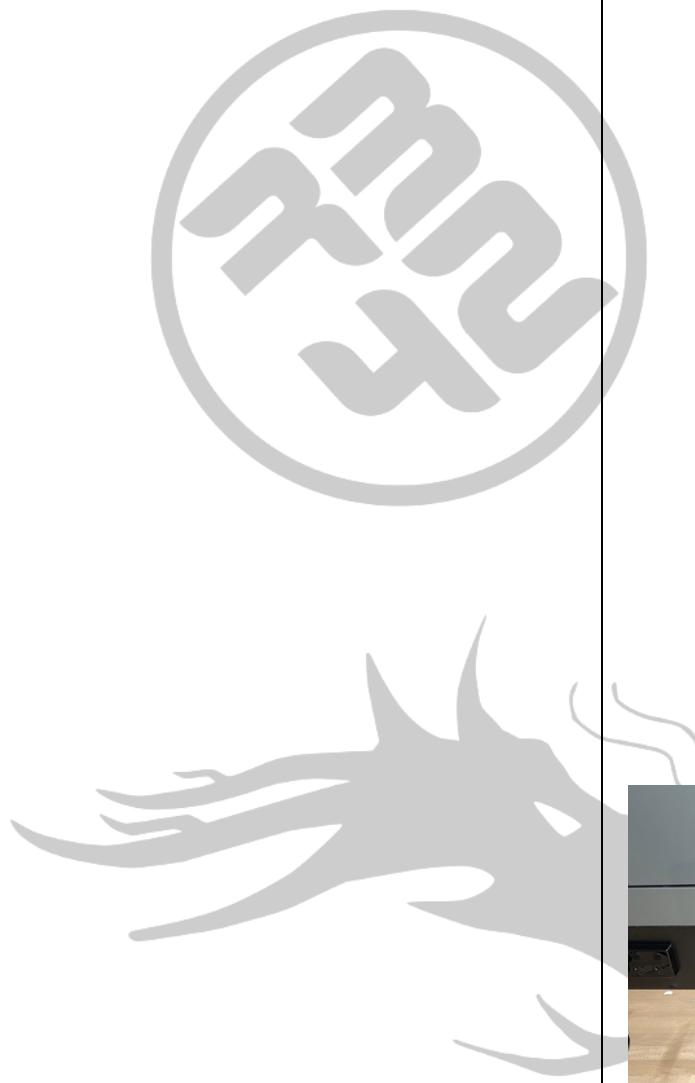
			 
15.7	Y> +200: Moves print bed forward again, almost all the way to the rear of the bed;		 

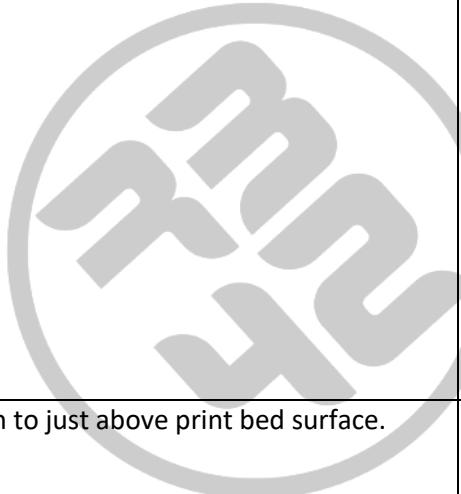
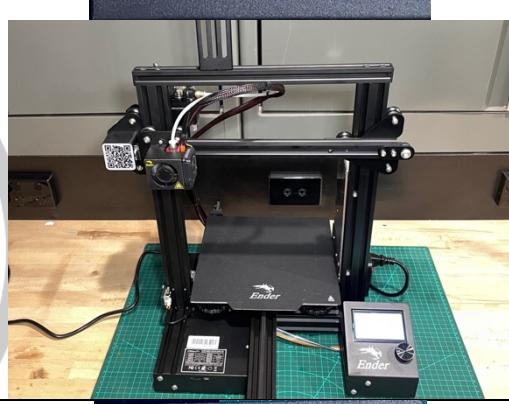
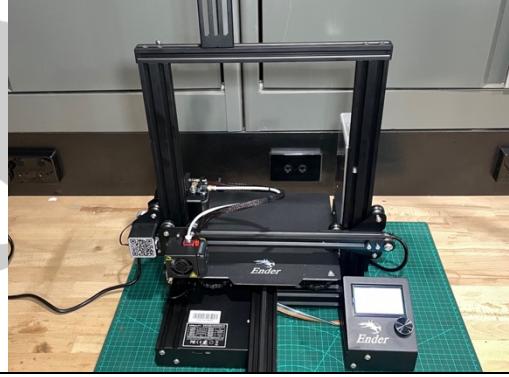


15.8	<p>Y> +100: Moves print bed back to approx. halfway;</p> 	
15.9	<p>Y> +0: Moves print bed back to front of bed;</p> 	



15.10 Z> +120: Moves gantry up to approx. halfway;



15.11	Z> +220: Moves gantry up to approx. top of frame;	  
15.12	Z> +20: Moves gantry down to just above print bed surface.	  
15.13	<p>If a motor happens to be incorrectly plugged-in swap the required plugs around until the correct set-up is achieved.</p> <p>In the extremely unlikely chance a motor is travelling in the opposite direction that it was commanded to travel, a setting must change in firmware to correct;</p> <p>If there is an obstruction in the path of an object, clear whatever could be encroaching and use cable-ties to tidy up any loom or wiring as necessary.</p>	



- 15.14** Provided all motors have been confirmed as operating correctly, repeat the Auto Homing command as described in step 14.



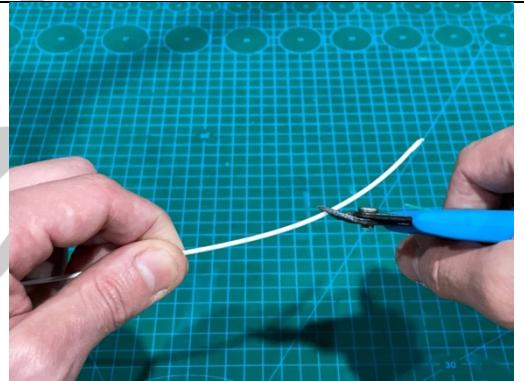
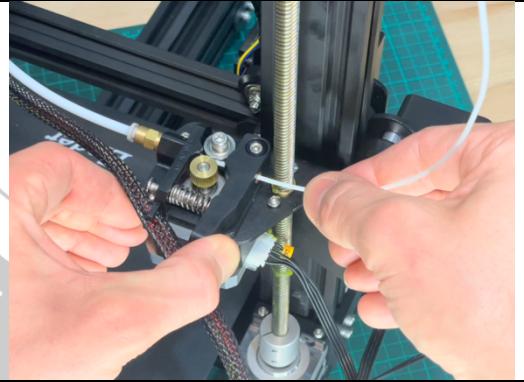
Step 16 - Loading filament and priming the hot-end

**Prior to printing, the hot-end needs to have filament loaded into it, this is known as priming. For this step, it is preferred that the nozzle of the hot end is visible, if the hot-end is in the home position (or close to the build surface) it should be raised enough so as to be able to see filament as it comes out the tip of the nozzle.

The hot-end can be raised by going through the main options menu and selecting move axis. Moving the Z-axis up by 50mm should be enough for the purpose.

Main>Prepare>Move Axis>Z axis>Move 10mm> [rotate navigation dial to +50mm]

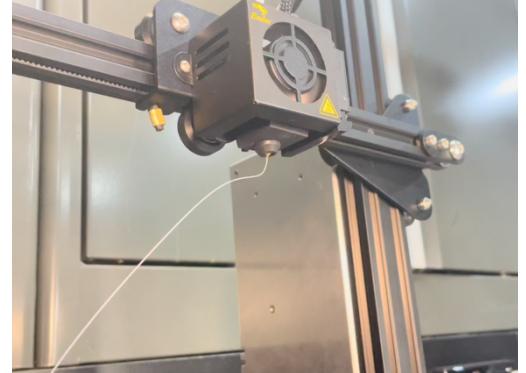
Process

16.1	Prepare the spool of PLA material to be used, remove from packaging and find the end of the spool. Cut the end at a 45° angle, this will help when feeding through the extruder and Bowden tube.	
16.2	While pressing in the idler tensioner arm in order to compress the spring, feed the end of the PLA into the extruder through the hole in the idler tensioner arm (located close to the Z-axis lead screw). The material is to be fed between the spur gear of the extruder and idler wheel and then into the Bowden coupler fitting. When into the Bowden tube, continue to feed down the tube until it reaches the end and cannot be feed in any further.	



16.3	<p>Set the hot-end temperature for printing PLA by selecting the prepare PLA command from the options menu.</p> <p>Main>Prepare>Preheat PLA>Preheat PLA</p> 	 <ul style="list-style-type: none"> Screenshot 1: Info Screen showing 'Card Inserted'. Screenshot 2: Options menu with 'Preheat PLA' highlighted. Screenshot 3: Temperature menu with 'Preheat PLA' highlighted. Screenshot 4: Information screen showing 'Ender-3 Pro Ready.'
16.4	<p>Allow the hot end to heat up to the predetermined set point, observe both the hot end temperature as it raises on the information screen. There should be gradual and consistent increases in the temperature until it reaches the set points.</p>	 <p>The screen shows the following data:</p> <p>Ender-3 Pro 200° C X 0 Y 0 Z 140 F100% 0% 00:00 Card Inserted</p>



16.5	<p>Once the hot-end has reached the required set point, push more filament down the Bowden tube and into the hot-end, again while pressing in the idler tensioner arm to compress the spring. Observe the nozzle of the hot end, a small amount of PLA material, something resembling spaghetti, will feed out from the nozzle. At this point hot-end has now been primed and is ready for printing.</p>											
16.6	<p>There must be consistent flow of material through the hot-end when at operating temperature, there is potential to reduce the lifespan or damage componentry of the printer if material flow is stopped for an extended period of time. Hence, if not printing right away it is good practise to turn off the hot-end. This can be done by selecting Cooldown command from the prepare menu.</p> <p>Main>Control>Temperature>Cooldown</p>	 <p>The images show the following menu structures:</p> <ul style="list-style-type: none"> Prepare Menu: <ul style="list-style-type: none"> Info Screen Prepare Control Print from TF About Printer Temperature Menu: <ul style="list-style-type: none"> Main Temperature Motion Filament Store Settings Cooldown Settings: <table border="1"> <tr> <td>Bed:</td> <td>60</td> </tr> <tr> <td>Fan Speeds:</td> <td>100%</td> </tr> <tr> <td>Preheat PLA Conf</td> <td>+</td> </tr> <tr> <td>Preheat ABS Conf</td> <td>+</td> </tr> <tr> <td>Cooldown</td> <td></td> </tr> </table> 	Bed:	60	Fan Speeds:	100%	Preheat PLA Conf	+	Preheat ABS Conf	+	Cooldown	
Bed:	60											
Fan Speeds:	100%											
Preheat PLA Conf	+											
Preheat ABS Conf	+											
Cooldown												



Step 17 - Levelling the bed

** Before the first print, the printer bed must be levelled (or the more accurate term: trammed) in order to get the best possible surface conditions for initial layer of the print. The aim is to set a tiny distance between the tip of the hot-end nozzle and the build surface, this distance is approximately the thickness of a sheet of paper or about 0.1-0.2mm.

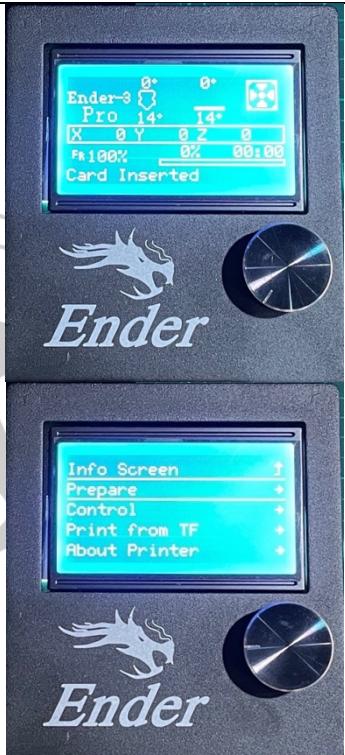
To correctly tram the Ender 3 it must first be brought up to the temperature that will be used during printing, typically this is a build plate temperature of 60-70°C for PLA and 80-90°C for ABS and a hot end temperature of 180-220°C for PLA and 210-250°C for ABS.

It is important to do a preheat of the printers components prior to levelling. When at operational temperature the bed and nozzle will expand with the heat and therefore changing clearances, as a result this needs to be done when the heated bed is on and up to temperature, hence it's a good opportunity to also confirm the heated bed and hot end are both operational and heating up properly.

For this example, temperatures used are for printing with PLA.

Tools for this step	Piece of Paper	
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Process

17.1	<p>From the main options menu, select the PLA preheat command, allowing the temperatures of the heated bed and hot end to rise and get to setpoint.</p> <p>Main>Prepare>Preheat PLA>Preheat PLA</p> <p>This command is programmed to heat both the hot-end and the heated bed up to a pre-set temperature, saving the need of manually adjusting 2 individual set points.</p> <p>**If there is any filament oozing from the nozzle, use the scraper to remove and clean off.</p>	
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17.2	<p>Once at the required temperatures, complete an Auto Homing command (step 14) and allow the printer to home each axis.</p> <p>Main>Prepare>Auto Home</p>	

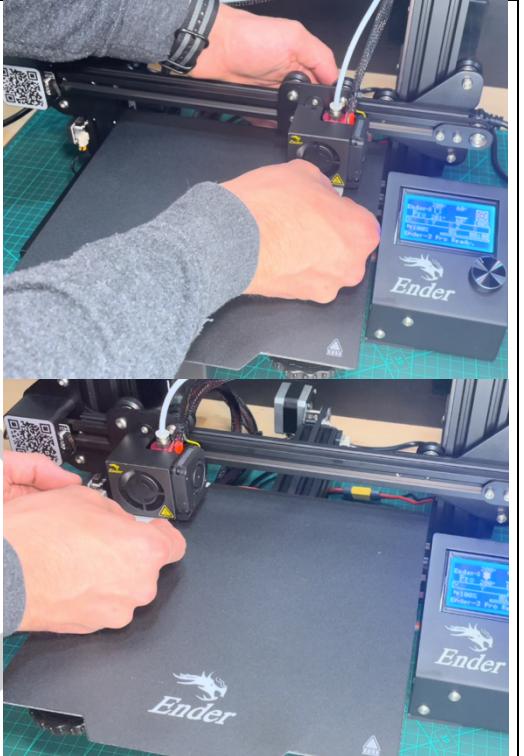


		
17.3	<p>Once Auto Home has completed, select the Disable Steppers command from the main options menu. This (as the name suggests) disables power to each of the stepper motors, allowing to manually move the Hot-end carriage (X-axis) and the build plate (Y-axis) by hand.</p> <p>Main>Prepare>Disable Steppers</p>	 

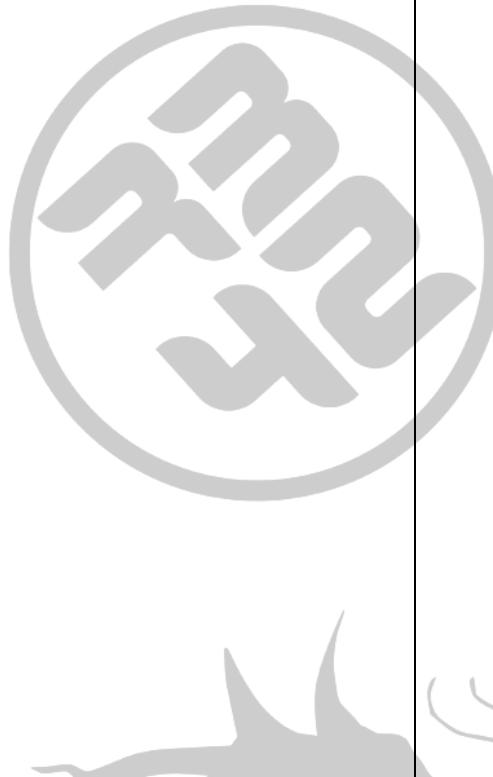


17.4	<p>Starting in the front left corner of the build plate, use the piece of paper to determine this gap from tip of the hot-end nozzle and the build surface.</p> <p>Moving the paper back and forward between nozzle and build surface, the clearance should be enough that nozzle just catches the paper as it is moved underneath it. It will take some practise to get a feel for it, but there should be slight resistance on the paper as it is moved, too much resistance and the bed is too close to the nozzle, little to no resistance and the nozzle is too far away.</p>	
17.5	<p>Use the adjustment knobs (under the build platform in each corner) to move the bed either up by turning clockwise or down by turning counter-clockwise.</p>	
17.6	<p>Repeat the process, for each corner of the build plate:</p> <ul style="list-style-type: none"> -front left -front right -back right -back left <p>ensuring the paper is catching in the manner as described above (in step 17.4) and consistently this way at each of the corners.</p>	



		
17.7	Repeat the corner adjustments twice at each corner to ensure an accurately trammed bed.	



17.8	<p>If not printing right away, turn off the heated bed and hot end by using the cooldown command selected from the Prepare menu</p> <p>Main>Control>Temperature>Cooldown</p> 	
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Step 18 - Slice and load G-code onto microSD

**For the purpose of this tutorial, I will keep the slicing of a STL and saving to file to as simple form as possible. Slicing software and associated software for 3D printing is a topic for another post as there is too much to cover in enough detail here.

Process

18.1	Using your preferred slicing software, create a G-code file and name it accordingly.	
18.2	Save the G-code onto the microSD	

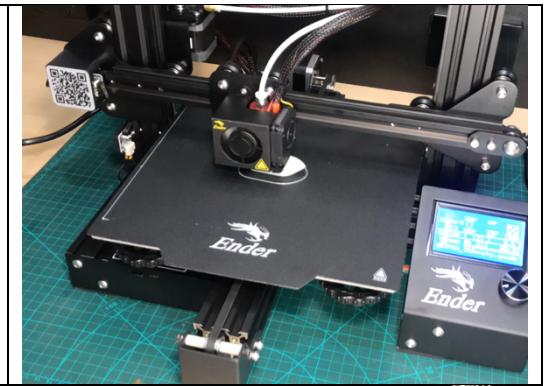


Step 19 - Load SD card and print G-code

Process

19.1 Once the Bed has been levelled correctly (step 17) and the material loaded and hot-end primed (step 16), insert the microSD card with G-code loaded into the microSD card slot, located on the printer base at the front next to the USB port. The bottom line of text on the printer display will change from being 'Card Removed' and instead read 'Card Inserted'. If this change does not happen and the display is not showing 'Card Inserted' then there may be an issue with the SD card you are using.	
19.2 After the SD card has been initiated and is recognised by the printer, select the G-code file loaded on the SD card to be printed. Main>Print from TF card> [select G-code file to be printed] *Some versions of the firmware installed on the Ender 3 will read 'SD card', whereas others (such as the Ender used in this manual) use 'TF card'.	



19.3	The printer will start printing your G-code.	
19.4	Celebrate:)	



Document Revisions

<u>Version</u>	<u>Date</u>	<u>Author</u>	<u>Revision detail</u>
V1.0	13.7.2021	RB42	Initial Release

