## BUILD YOUR OWN BUILD YOUR OWN BUILD YOUR OWN BUILD YOUR OWN

Pack 10

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**3D** technology is now available for you at home!



# BUILD YOUR OWN BUILD YOUR OWN BUILD YOUR OWN BUILD YOUR OWN

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**Assembly Guide** 

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The next five detailed and easy-to-follow stages of construction for your 3D printer.

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WARNING: Not suitable for children under the age of 14. This product is not a toy and is not designed or intended for use in play. Items may vary from those shown.



#### Stage 41 Assembly Area

## Stage 41: Add the Z-axis and feeder motor drivers, and the feeder motor cable

In this stage, you add the Z-axis motor driver to the driver board, then add the feeder motor driver before plugging the feeder motor cable into the driver board.

The two motor drivers you add to the driver board this time are identical to each other and also to the two you added in Stage 39. This time the motor drivers are for the Z-axis and feeder motors. Remember to make sure they are fully

seated and that they are plugged in the right way round. You then secure the feeder motor cable to the housing and plug it into the driver board. Finally, connect your PC to the circuit board using the USB cable.







Stage 41 Components

- 1: Motor drivers x 2
- 2: Feeder motor cable (650mm) x 1
- 3: Cable ties x 4

4: USB cable x 1

You will need

Ruler

Marker pen

Scissors PC to connect to idbox via USB cable

#### Parts to have ready



Get ready the printer housing and turn it so that the front is facing you.



Have a look at the driver board and the diagram, left - make sure you know where to plug in the Z-axis motor driver and the feeder motor driver. Locate the feeder motor cable plug, below.

#### Plug the motor drivers into the driver board



AUTION! Make sure that the circular element on the top of the motor driver is on the left when viewed with the front of the housing facing you. Be careful not to touch this element.

Hold one of the motors drivers as shown and plug it into the position for the Z-axis motor driver (see previous page, Step 2). Make sure that the circular structure on the driver is aligned as shown above. Hold the driver parallel to the driver board while you plug it in slowly and firmly until it is in all the way.



Make absolutely certain that the motor drivers are correctly plugged in, with their pins in the correct sockets and the circular structures

to the left. Failure to do so might result in fire during operation of the printer.

CAUTION!



#### HINT

Now plug the other motor driver into the position for the feeder motor driver. Again, press firmly while holding it parallel to the driver board until it is fully inserted.

Ensure the driver motors are not at an angle to the driver board and that the pins are all the way in.

#### Attach the feeder cable to the housing, then plug it into the driver board



With a marker pen, make a mark on the feeder motor cable 12cm in from the end of the cable, measuring from the smaller (motor end) connector.





Turn the housing so the rear panel is facing you. Put a cable tie through each of the four sets of holes outlined in red in the image above left. Align the tie at the top right with the mark on the feeder motor cable and, with the motor end socket on the right, tighten the cable tie around the cable. Trim off the excess cable tie with scissors.



At the other three cable tie positions (outlined in red, above), use the cable ties to secure the feeder motor cable and the spiral tube to the housing. When you've done up each cable tie, trim off the excess with scissors.



Pass the feeder motor cable through the hole in the casing to the left of the noise filter.



Turn the housing so the front is facing you. Untwist the feeder motor cable you've just passed into the housing (if necessary) and plug the connector into the pins (outlined in yellow, above) on the motor board for the feeder motor cable.

#### Check the power supply from a computer to the circuit board



With the right side of the printer facing you, plug the B-type connector of the USB cable into the USB port on the circuit board.









The circuit board is powered via the USB cable by your computer. When you connect the USB cable to your computer you should see a green light come on on the circuit board (lower photo). Check this, then remove the USB cable and keep it safe.

> The Z-axis motor and feeder motor drivers have been fitted to the driver board and the feeder cable has been plugged into the driver board.



With your computer turned on, plug the A-type USB connector into a USB port on the computer.

## Stage finished



# Stage 42: Connect up the power supply and fix it to the housing

In this stage, you will wire up the power supply, then attach it to the housing. After that, connect up more of the wiring inside the housing. It is vital to get the wires connected properly, so take care as you do it.

The power supply has no fewer than nine terminals to which you attach cables in this stage. After wiring up the power supply, you attach it to the inside of the base of the housing and connect it to the thick power cables, the fan cables and the noise filter. Make sure you follow the instructions carefully and be sure to check over your assembly so you can be certain that the cables are all connected properly. This is extremely important, as if the cables are not correctly wired up, there is a real danger that the printer will fail when the power is switched on.





#### Parts to have ready



The printer housing.

#### Set the input voltage to 230V (for UK)



where you can select the input voltage from the mains to the power supply. For the UK, make sure it is switched to 230V and not 115V. Incorrect

115/230V is selected by switch Before power on please check Input voltage avoiding damage. 115V 230V

Connect up the nine screw terminals on the power supply





There are nine screw terminals on the end of the power supply. Use a size 2 Phillips screwdriver to loosen them all before you start attaching cables.



Plug the Y-shaped end of one of the yellow power lines into the terminal on the left with the letter L above it. Tighten the screw of the terminal with the screwdriver.



Plug the second of the two yellow power lines into the terminal with the letter N above it and tighten the screw.



Plug the green Earth cable into the terminal with the Earth symbol above it and tighten the screw.



Plug the black wire for the fan power supply line into the fourth terminal from the left, which has COM above it. Put the pink wire into the seventh terminal, which has +V above it. Tighten the screws.



Turn the housing so its left side is facing you. Place the power supply as shown, so it is to the right of the housing. Pass the rightmost of the two thick pink power cables from the driver board through the opening in the front panel of the housing and plug it into the rightmost terminal of the power supply, which has +V above it, and tighten the screw.



Take the rightmost of the two thick black cables from the driver board and plug it into the sixth from the left of the power supply's terminals, which has COM above it, and tighten the screw.



Take the other thick black cable from the driver board and plug it into the fifth from the left of the power supply's terminals, which has COM above it, and tighten the screw.



Pass the second thick pink cable from the driver board through the hole in the front panel and plug it into the power supply's eighth terminal from the left, which has a +V above it, and tighten the screw.

CAUTION!

It is very important that the wires connected to the power supply are in the correct terminals. Check particularly that the pink and black wires are in the correct positions as shown below.



#### Attach the power supply to the housing





Pass the power supply through the front panel (you'll have to angle it to get it through). Make sure the cables do not go under the power supply, and beware of damaging the housing while you manoeuvre the power supply.



With the front panel facing you, rotate the housing by 90 degrees so it lies on its right panel. Support the power supply while you do this.





Hold the power supply in position with one hand so that the four screw holes in its underside align with the screw holes in the bottom panel (ringed in red). Insert an 8mm M3 truss head screw into each of the screw holes and screw them in with your fingers.



Tighten all four of the screws with a size 1 Phillips screwdriver.

#### Connect the remaining cables





Turn the housing so its base is back on your work surface. Plug the two yellow power supply lines as shown above onto the two lower terminals of the noise filter, which is at

the rear left of the housing. Push them all the way on, firmly yet gently.

POINT

The noise filter has three metal pins. Of these, two are side by side and have a black cover to their bases. These are the pins for the power lines. The other pin is for the Earth wire. Make sure you plug the correct wires onto the correct pins.





Plug the connector of the green Earth wire onto the central, upper metal pin on the noise filter.



When tidying the thick power cables to the bottom of the housing, unplug the motor cables one at a time and plug them back in as soon as you can to avoid mixing them up.



Tuck the four thick power cables (two black, two pink) into the bottom of the housing, as shown above left and above right. If you unplug any of the connectors from the driver board while you do this, make sure you get them back into the correct locations.



Take the connector for one branch of the fan power supply wires, and plug it into the connector for the fan at the lower back right of the housing. (The connector leading to the fan can be connected to either branch.)





Plug the connector for the fan in the printer head into the connector on the other branch of the power supply wires.



In the photo, you can see where the various cables you have connected up in this stage run from and to. In the next stage, more cables are added, and the wiring is tidied up with cable ties.

> The power supply terminals have been wired up, and the power supply has been fixed inside the housing.

Stage finished



The fan power

connectors are designed to be put together so the ribs on one side of the smaller connectors fit into the slots on the larger connectors.



#### Stage 43 Assembly Area

## Stage 43: Connect the X-, Y- and Z-axis limit switches to the driver board

In this stage, you connect up the three limit switches to the driver board using the two cables supplied with this stage and the one supplied with Stage 3. You will also plug in the thermistor cable to the driver board and tidy up the cables.

When you insert the pins on the limit switches into the connectors on the ends of the cables, be sure to do this carefully and not bend the pins. Make sure you get the connectors in the correct positions on the driver board.

Secure the limit switch cables using ties supplied with this stage and others attached to the housing in Stage 39. After you have plugged the thermistor cable into the driver board, tidy up the cables in the bottom of the housing.





#### Parts to have ready





Get ready the printer housing and the limit switch cable that was supplied with Stage 3.

#### Connect the cables to the limit switches



The Z- and X-axis limit switches are at the rear and the Y-axis limit switch is on the right.



Connect the X-axis limit switch first. Turn the cable's connector so that you can see the side where the metal parts show. Plug it in carefully from below until just the bases of the switch's pins are visible.

HINT

The sides of the connectors are different. Make sure you plug them in so the metal parts show.





Now connect the Z-axis limit switch. Carefully plug the pins on the switch into the sockets on the connector, making sure the metal parts of the connector are visible, as shown above.



Turn the printer housing so its left side is facing you, and plug in the Y-axis limit switch cable connector from below. Again, put in the connector so its metal parts are showing.

#### Connect the limit switch cables to the driver board



Turn the printer housing so the front panel is facing you and find the location of the pins for the limit switch cables, outlined in yellow above, and shown in close-up on the right.

#### POINT

You must get the connectors from the limit switches plugged into the correct sets of pins or the printer will not operate properly. Take care!









Untwist the cable from the X-axis limit switch, if necessary, and plug the connector into the first column of pins on the right. The side of the connector where the metal parts are visible should be facing to the left.



Untwist the cable from the Y-axis limit switch if necessary, and plug the connector into the third column of pins from the right. The side of the connector where the metal parts are visible should be facing to the left.



Untwist the cable from the Z-axis limit switch, if necessary, and plug the connector into the sixth column of pins from the right. The side of the connector where the metal metal parts are visible should be facing to the left.

#### Secure the limit switch cables to the housing



Turn the housing so its rear panel is facing you. Pass cable ties through the two sets of holes (outlined in red) and do up the ties to secure the cables for the X-axis limit switch, as shown above. Trim the excess from the cable ties with scissors.



Put the X-axis limit switch cable together with the X-axis motor cable and bind them to the housing with the upper cable tie inserted (but not tightened) in Stage 39.



Add the Z-axis limit switch cable to the bundle of the X-axis limit switch and motor cables at the lower cable tie (Stage 39), and do it up.



Trim off the excess from the straps of the ties and turn the housing so the front is facing you so you see how the cables have been fixed in place.







Move the Y-axis limit switch cable into the gap between the power supply and the housing, as shown above.

#### Connect the thermistor cable to the driver board



The thermistor, which is in the head block, has a cable that needs to be connected to the driver board. Locate the thermistor cable, which emerges from the spiral wrap that enters the rear of the housing.



The pins on the driver board for the thermistor are the two on the right (with TØ by them) in the row of six pins in front of the Z-axis motor connector. The thermistor connector can be plugged in either way.



#### Gather together the cables at the bottom of the housing





Start by gathering together the cooling fan cable and the X-axis and feeder motor cables. Make loops in the cables if necessary to make the bundle neater, then bind them together with a cable tie as shown above, trimming the excess with scissors.



Next, gather the Z- and X-axis limit switch and the thermistor cables into a neat bundle and bind them with a cable tie. Note that the Y-axis limit switch, the Y-axis motor, the power supply and the cartridge heater cables are not held together.



The limit switch cables have been connected and the thermistor cable plugged into the driver board. The cables in the bottom of the housing have been tidied up.



Keep the brackets, washers, nuts and truss head screws supplied but not used with this stage somewhere safe.

## Stage 44: Attach two brackets to the housing and add a linear bush to the modelling table

In this stage, you will attach two brackets to the housing, then add a linear bush to the table base using cap bolts (bolts with hexagonal sockets in their heads). The bush acts as a bearing that keeps the table moving smoothly up and down on the Z-axis rods.

When you add the brackets to the printer housing – one on the left and one on the right – you might find that adding a bit of PVA glue to hold the nuts in position will make it easier to do the assembly. As usual when working with acrylic, do not apply too much force when tightening the screws into the nuts; use just enough to tighten them securely. The same advice apples when you add the linear bush to the table, especially as it is easy to apply much more force using an Allen key.





#### Stage 44 Components

- 1: Linear bush x 1
- 2: M3 cap bolts (15mm) x 4 3: M3 spring washers x 4
- 4: M3 flat washers x 4
- 5: M3 nuts x 4
- 6: Allen key (50 x 2.5mm)

#### You will need

Phillips screwdriver size 1 Allen key (50 x 2.5mm) PVA glue

#### Parts to have ready



You will need the housing and the table that you last worked on in Stage 11. Also the two truss head screws, washers, nuts and brackets from Stage 43. Peel the protective coverings off both sides of the brackets.





Put an M3 flat washer on each of the 14mm M3 truss head screws. And put a nut into each of the nut slots in the brackets. You can, if you wish, fix the nuts in place with a drop of PVA glue to stop them falling out.

#### Attach the brackets to the left and right surfaces of the housing



Insert the tab of one of the brackets into the slot (outlined in red) in the left of the housing as shown above.



Screw the 14mm truss head screw (with washer) into the nut as shown, and tighten it with a size 1 Phillips screwdriver.



Repeat the process for the other bracket on the right of the housing.

#### Attach the linear bush to the table base



With the dog (protective metal plate) at the top left, locate the circular hole surrounded by four screw holes in the table base where the linear bush is to be attached.



Put the shaft of the bush through the hole and put a 15mm M3 cap bolt through each of the screw holes (ringed in red) in the bush. Hold the bolts in position and turn the table over.



Put an M3 flat washer, then an M3 spring washer over the shafts of each of the bolts and then screw an M3 nut onto each bolt with your fingers.



Turn the table again and, holding the nuts with your fingers, tighten each of the cap head bolts with the 50 x 2.5mm Allen key.



Stage finished



Two brackets have been attached to the housing and a linear bush has been added to the table base.

# Stage 45: Add a second linear bush to the table

This assembly is much the same as part of that in the previous stage (Stage 44), where you added a linear bush to the table base, fastening it in place with four cap head bolts. Remember to make sure the bush is the right way up in its hole in the table.

In this stage, the linear bush is put through a hole in the top left of the table, before being secured in place with the four cap head bolts supplied with this stage. Remember that when putting the washers onto the shaft of a bolt, the M3 flat washer goes on *before* the spring washer. The spring washer is followed by the nut. When you have secured the bush with the nuts, tighten the bolts using the 50 x 2.5mm Allen key supplied with Stage 44. Lastly, check and adjust the alignment of the metal dog, which is next to the newly-added linear bush.



## 

#### Stage 45 Components

- 1: Linear bush x 1
- 2: M3 cap bolts (15mm) x 4
- 3: M3 spring washers x 4
- 4: M3 flat washers x 4
- 5: M3 nuts x 4

#### You will need

Allen key (50 x 2.5mm) supplied with Stage 44

#### Parts to have ready



Get ready the table you worked on in Stage 44.

#### Attach the linear bush to the table base



With the dog at the top left, locate the circular hole surrounded by four screw holes at the top left of the table base where the second linear bush is to be added.



Put the shaft of the bush through the hole and put a 15mm M3 cap bolt through each of the screw holes (ringed in red) in the bush.



Hold the bolts in position and turn the table over. Put an M3 flat washer and then an M3 spring washer over the shafts of each of the bolts.



After you've put the washers onto each bolt, screw an M3 nut onto each of the four bolts with your fingers.



Turn the table and, holding each of the nuts with your fingers, tighten the cap head bolts in turn with the 50 x 2.5mm Allen key.

#### Adjust the position of the dog



Because it is difficult to adjust the dog after the table has been assembled into the housing, now is the time to check its alignment. Ensure that the underside is aligned with the table (as shown above) and tighten the screw to secure it in position. Stage finished



The second linear bush has been added to the table. Put the table somewhere safe until it is time to add it to the housing.





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