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idbox! 3D PRINTER

Pack 01

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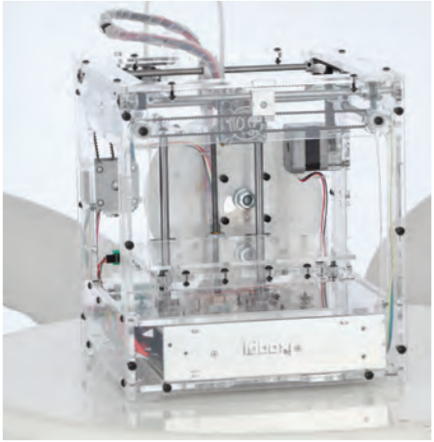
MODEL SPACE™

BUILD YOUR OWN idbox! 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.

DeAGOSTINI MODEL SPACE™

www.model-space.com

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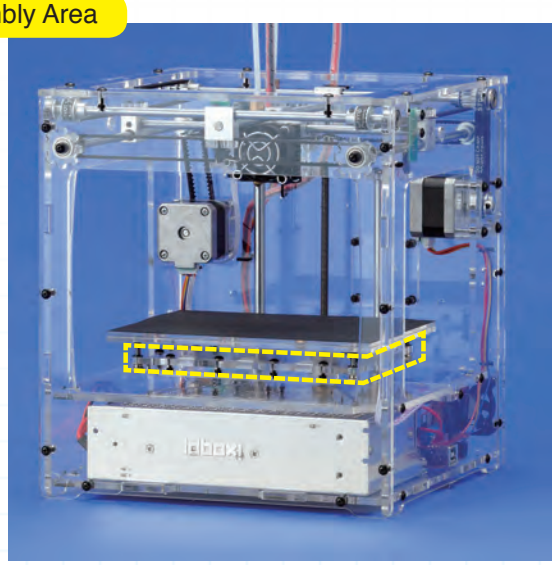
Stage 1 Assembly Area

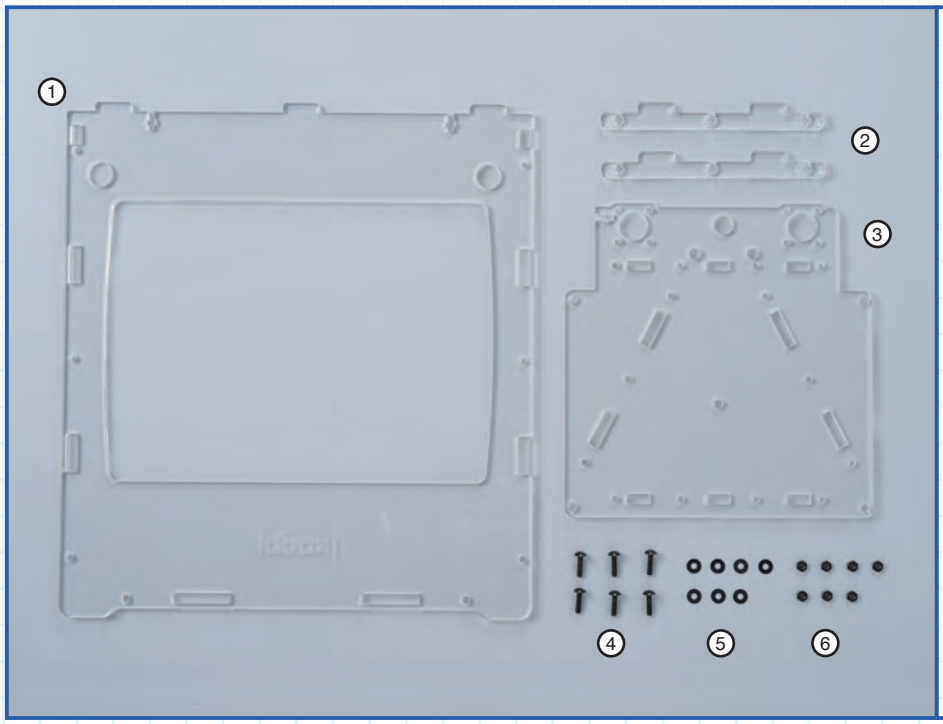


Stage 1: Attach reinforcing plates to the table base

It is time to start assembling your very own 3D printer. The assembly process is not only fun, but gives you an intimate understanding of how it works. Construction is broken down into simple-to-follow stages.

In this stage, you start work on the table, the part of the printer on which your 3D objects are created. The task here is to attach reinforcing plates to the lower section of the base of the table.

The reinforcement plates have tabs that fit into grooves in the base and are secured with screws and nuts. Care must be taken not to overtighten these screws or the plates might crack.



Stage 1 Components

1 Front panel × 1
2 Reinforcing plates × 2
3 Table base (lower section) × 1
4 M3 truss head screws (12mm) × 6
5 M3 washers × 7
6 M3 nuts × 7

NOTE: There is one spare washer and one spare nut supplied with the parts for this stage.

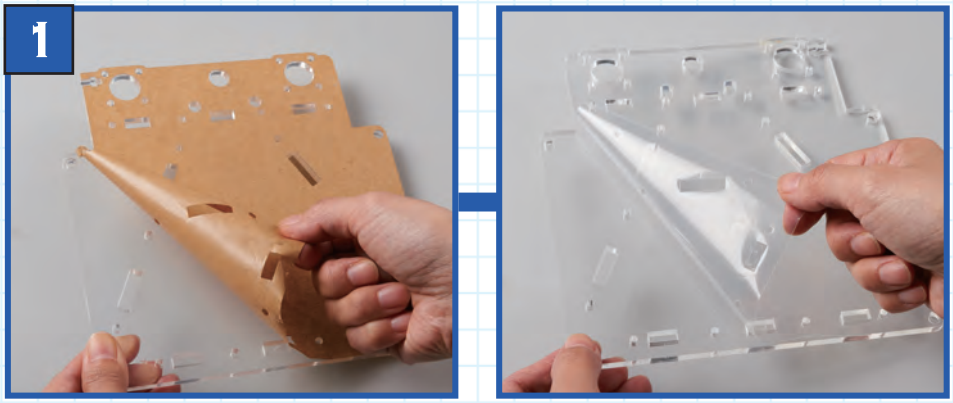
Tools you will need

Phillips screwdriver (size 1)

Useful items

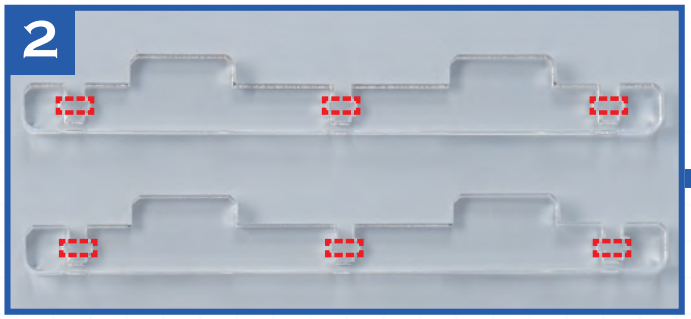
PVA glue, toothpick, tweezers

Remove the protective layers

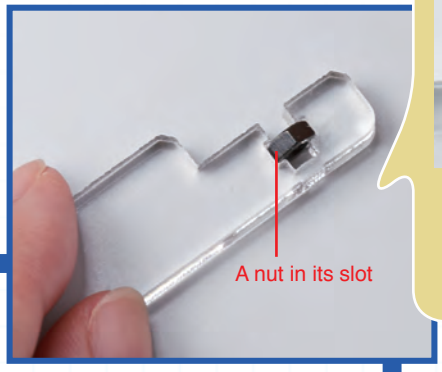


First, peel off the protective brown paper and transparent film from the lower section of the table base and the two reinforcing plates. Do this slowly to avoid damaging the surfaces. Leave the protective layers on the front panel for now as this is not needed in the Stage 1 assembly. Remember always to handle the acrylic surfaces carefully to avoid scratching them.

Attach the reinforcing plates



Place an M3 nut into each of the slots outlined in red in the photo above. The nuts fit sideways into the reinforcing plates as shown in the photo above right. Do not use excessive force to get the nuts into the slots.

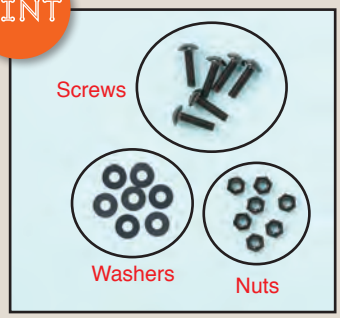


POINT

Each nut must be put into its slot so that its sides are parallel with the sides of the slot.

When you have fitted the nuts in the plates, you might find that they fall out when you move the plates. If this hinders the construction process, you can, if you want, secure the nuts in position in the plates with a small amount of PVA glue (see box below left).

HINT

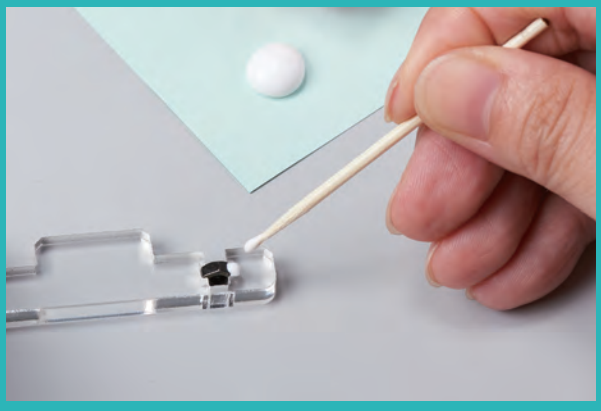


Keep the screws, nuts and washers in a safe place during assembly. Store them in a small container with a lid, and place them on brightly coloured paper during use so they are easy to find.

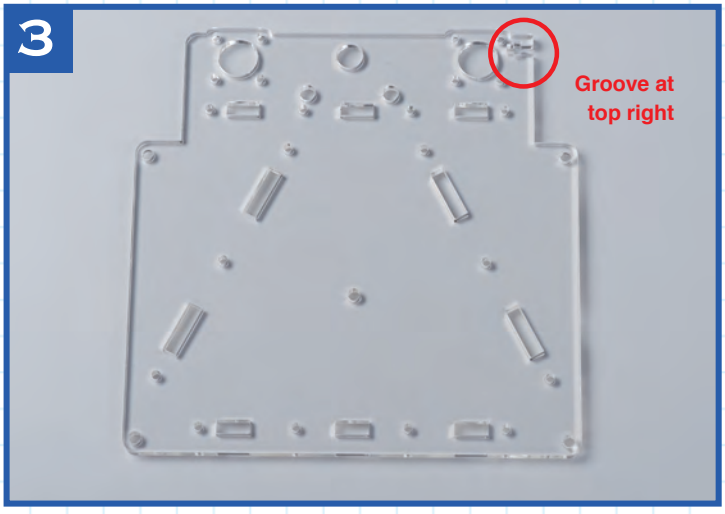
HINT

The reinforcing plates are relatively delicate, so do not force the nuts into their slots or you might break a plate. If it is difficult to insert a nut, try turning the plate over and inserting the nut from the other side. If the nuts are difficult to handle using your fingers, try using tweezers to position them in their slots. Acrylic is easily scratched, so put the plates on a clean flat surface such as a piece of paper or cloth.

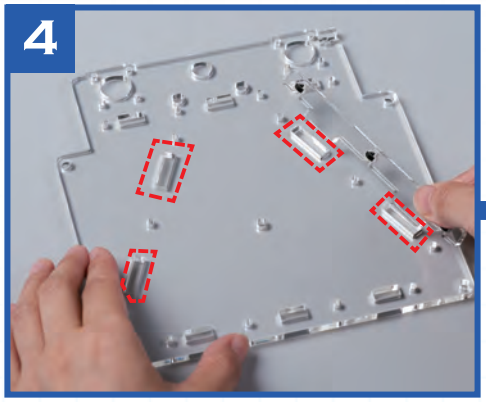
How to secure the nuts with PVA glue

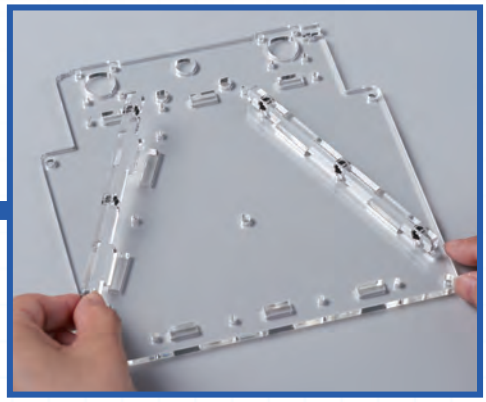


You can use PVA glue to secure the nuts in their slots. You only need a tiny amount of adhesive, and by using PVA, which is transparent when dry, the look of your printer will be unaffected. Put some PVA onto a sheet of paper and pick up a little on the end of a toothpick. Dab the glue into the correct place, using a small amount only.

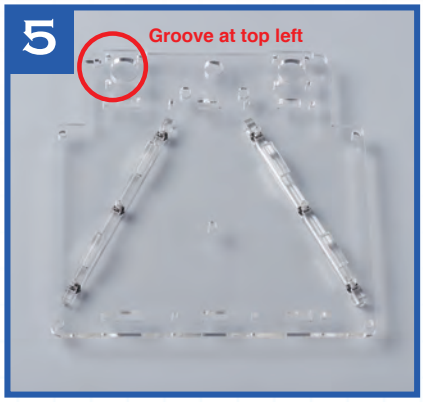


Position the table base so that the groove ringed in red, above, is at the top right, as shown.





Take the reinforcing plates (with the nuts inserted) and fit the tabs of the plates into the grooves (outlined in red, above) in the table base.



Hold the reinforcing plates in position and turn the table base over. Be careful that the nuts do not fall out. The groove in the base should now be at the top left.

Before inserting the screws into the screw holes, put a washer on each screw.

Put the screws with their washers into the screw holes in the table base and tighten each one loosely (see box, right). Then continue to tighten the screws in turn, little by little. If the screws are overtightened, the acrylic might crack.

Attention!

If you overtighten the screws and the acrylic cracks or breaks, it can be repaired using adhesive designed for acrylic.

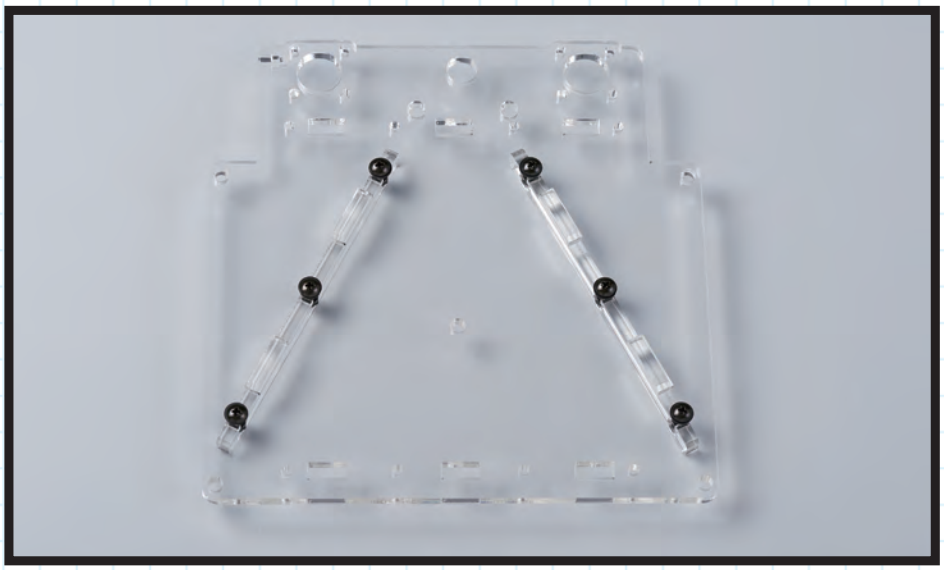
Choosing the correct screwdriver

If you use a screwdriver that is the wrong size, you might damage the head of the screw. Select one that is a tight fit so it has no play when inserted into the screw head.

Tightening the screws

When a screw is inserted and tightened loosely, the screw should just be lightly touching the acrylic. When all the screws are in loosely, do not tighten one screw all the way but tighten them evenly in turn a bit at a time. Keep the screwdriver perpendicular to the screw hole.

Stage finished

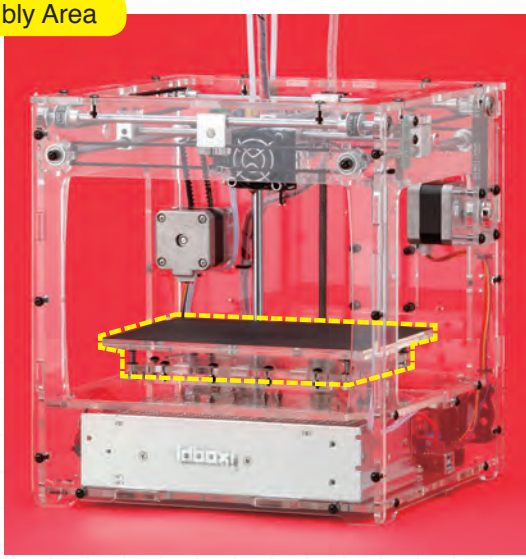


The two reinforcing plates have been attached to the table base. If the acrylic is dirty – perhaps with fingerprints – remove these by wiping gently with a soft cloth, such as the type used to clean spectacle lenses.

Keep it safe

Store the unused front panel safely for use later; leave its protective coverings intact.

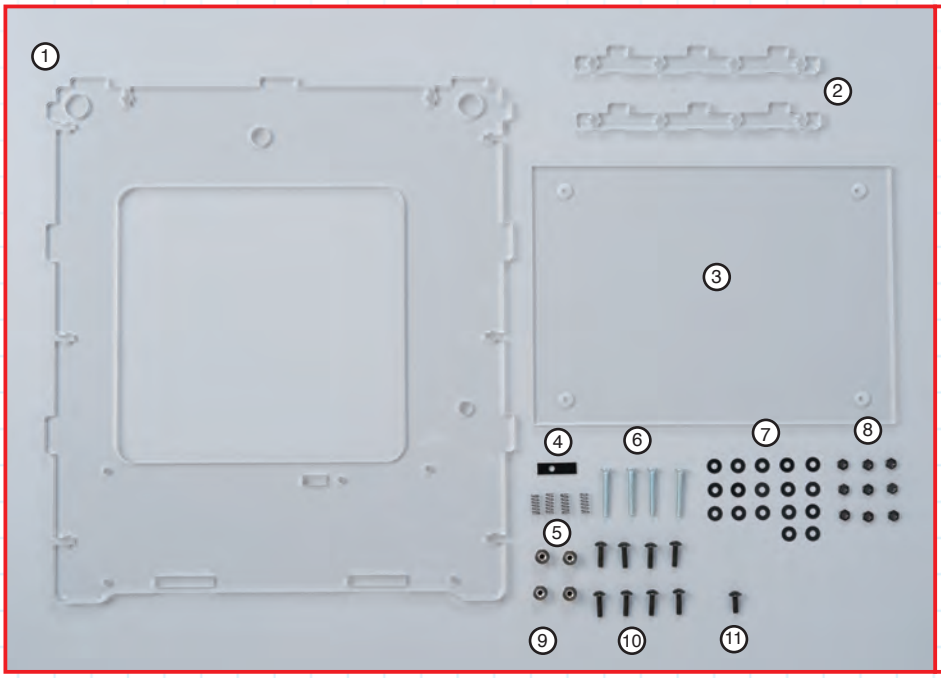
Stage 2 Assembly Area



Stage 2: Assembling the table base

In this stage, you add two more reinforcing plates to the lower table base and attach the upper part of the table base to the lower. You also assemble a metal plate or 'dog' into the lower part of the table base.

This stage involves the installation and tightening of some 13 screws of two different types and three different sizes! These are used in the attachment of more reinforcing plates to the lower section of the table base, adding a metal plate to the base and the addition of the upper part of the table base. It is detailed work that requires patience, and care is needed so you don't lose any of the parts involved.



Stage 2 Components

1: Left side panel × 1
2: Reinforcing plates × 2
3: Table base (upper section) × 1
4: Small metal plate × 1
5: Springs × 4
6: M3 countersunk screws (25mm) × 4
7: M3 washers × 17
8: M3 nuts × 9
9: Knurled nuts × 4
10: M3 truss head screws (12mm) × 8
11: M3 truss head screw (10mm) × 1

Tools you will need

Phillips screwdriver (size 1)

Useful items

PVA glue, toothpicks, tweezers

Preparation

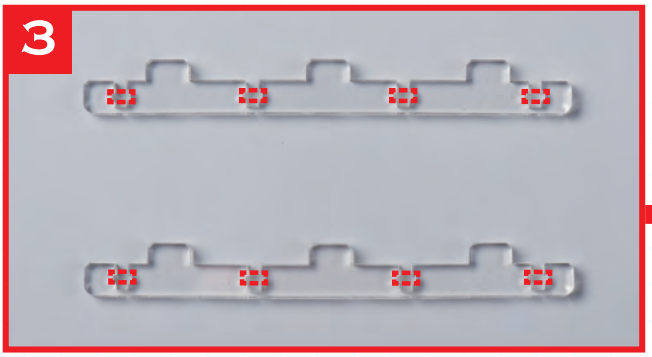
1

Get ready the parts you assembled in Stage 1: the lower table base with the two reinforcing plates attached.

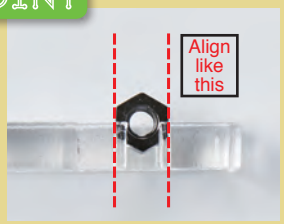
2

Slowly peel the brown protective paper and the transparent protective film off both of the reinforcing plates. Leave the protective layers on the left side panel for now, as this is not needed in the Stage 2 assembly.

Attaching the reinforcing plates



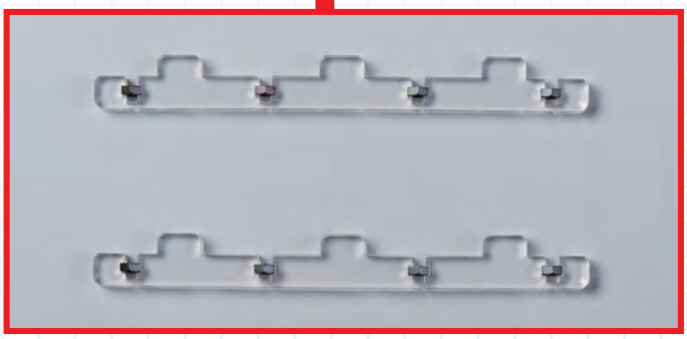
POINT

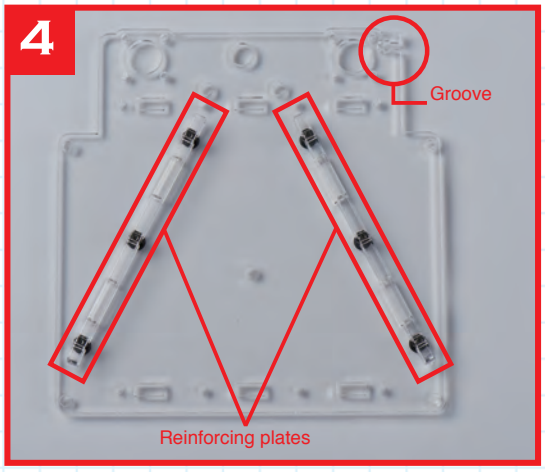


Each nut must be put into its slot so that its sides are parallel with the sides of the slot. Do not use excessive force as this might break the reinforcing plate.

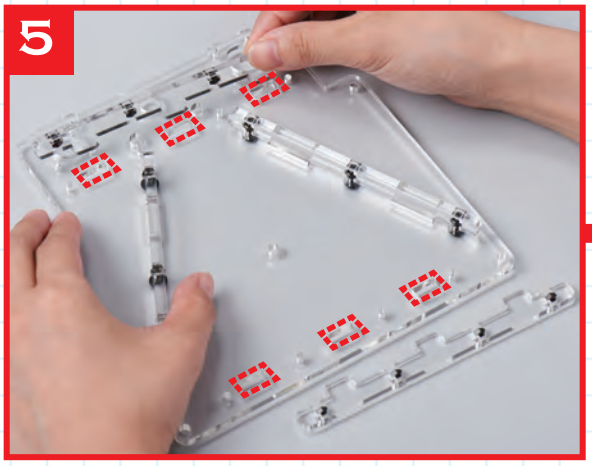
Place an M3 nut into each of the eight slots outlined in red in the photo above left. The nuts fit in sideways into the reinforcing plates, as shown in the photo above right. Do not use excessive force to get the nuts into the slots.

The plates are shown on the right with all eight nuts in their slots. When you move the plates, the nuts might fall out. To prevent this – and to prevent any nuts getting lost if they fall – you might want to fix nuts in place with some PVA glue (see Stage 1).

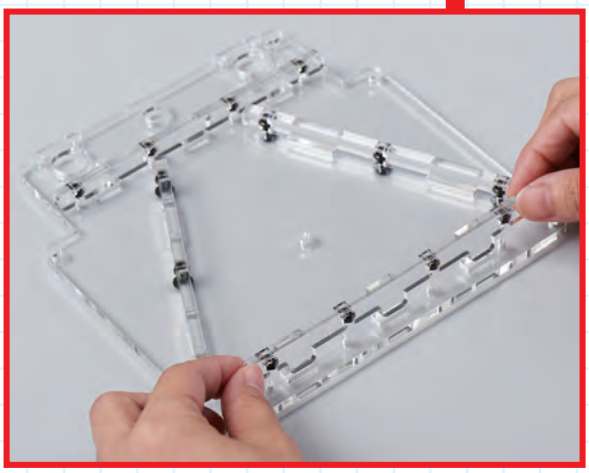




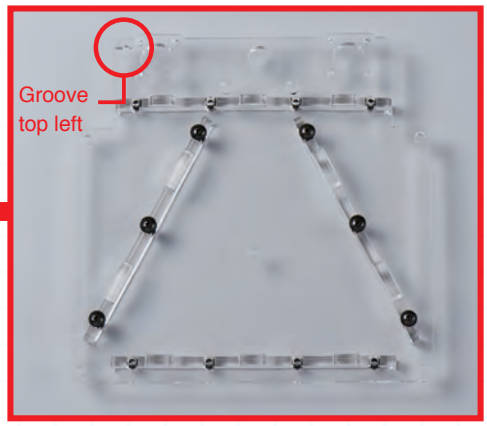
Align the table base you assembled in Stage 1 as shown above, with the groove ringed in red at the top right.



Take the reinforcing plates (with their nuts inserted) and fit the tabs of the plates into the grooves (outlined in red, above left) in the table base.



6

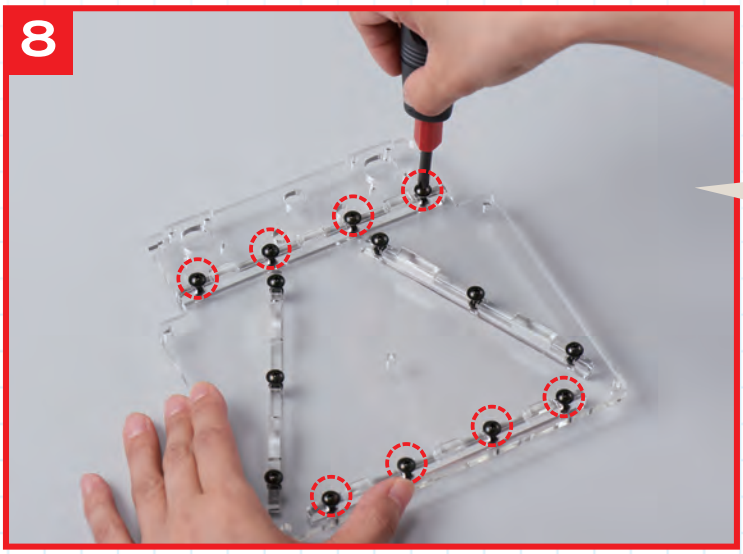


Hold the reinforcing plates in position with your fingers and turn the table base over. Do this carefully so the nuts do not fall out. The groove in the base should now be at the top left.

7

Before inserting the eight 12mm M3 truss head screws into their screw holes, put a washer on each screw.

8



Put the screws with their washers on them into the screw holes in the table base and tighten each one loosely (see box, above right). Then continue to tighten the screws in turn, little by little. If the screws are overtightened, the acrylic might crack.

HINT

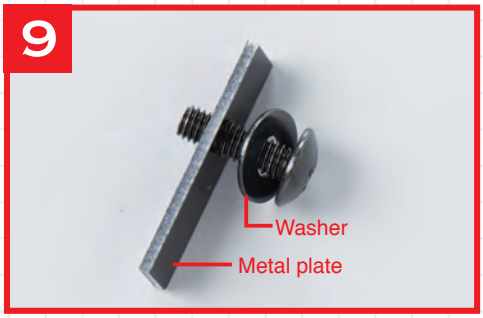
Be careful not to overtightening the screws. If you overtighten the screws and the acrylic cracks or breaks it can be repaired using adhesive designed for acrylic.

Tightening the screws

When a screw is inserted and tightened loosely, the screw should just be lightly touching the acrylic. When all the screws are in loosely, do not tighten one screw all the way but tighten them evenly in turn, a bit at a time. Keep the screwdriver perpendicular to the screw hole.

Attach the small metal plate

9



Put a washer on the 10mm M3 truss head screw and then put the screw through the hole in the small metal plate. Make sure you use the 10mm screw and not one of the 12mm screws.

10

Put an M3 nut into the slot ringed in red in the table base.

HINT

When you move the table base, hold the nut in place with your fingers to stop it falling out.

11

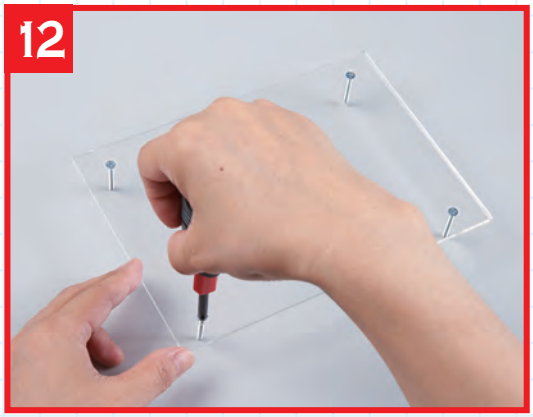
Holding the table base as shown in the photo above, insert the 10mm truss head screw (with its washer and metal plate) into the nut. Holding the nut and screw if necessary, carefully tighten the screw into the nut. The longer part of the plate should protrude from the base, and the sides of the plate must be parallel with the base (see Point box, right).

POINT

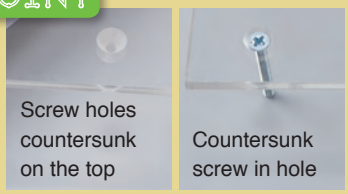
The small metal plate or 'dog' should align with the base as shown above. The plate is one of the components of a limit switch that will be installed during a later stage.

Attach the upper section of the table base

12



POINT



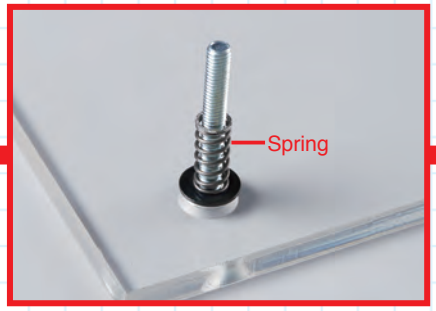
The screw holes are countersunk only on the top surface of the upper table base. Make sure the screws are inserted so their heads fit into the countersinks as shown above.

HINT

To prevent the countersunk screws catching on your work surface or possibly falling out, rest the upper table base on something, such as a thick paperback book, while you screw in the screws.

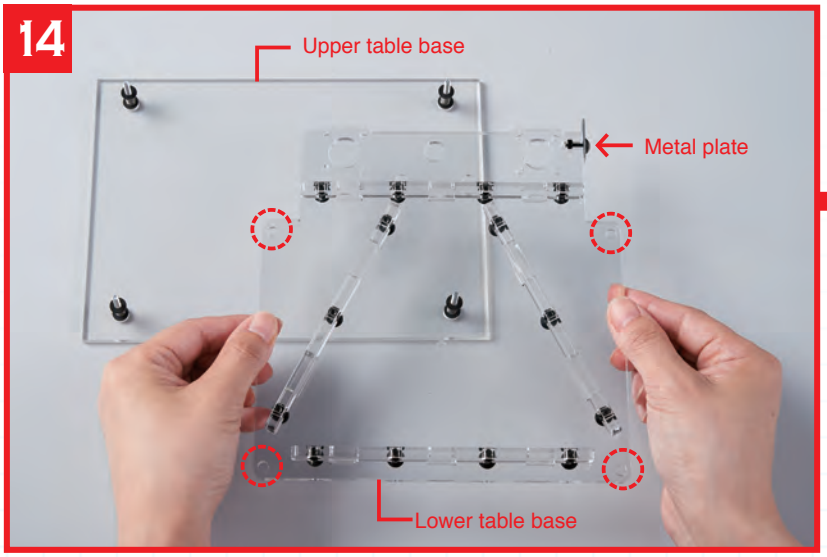
For this part of the assembly, you will need the table base's upper section. It has four screw holes and on the base's upper surface these have conical holes – countersink holes – so that the screws used will not protrude above its surface (see Point, above). Insert a 25mm countersunk screw into each of the four holes and using the screwdriver, screw each screw into the upper table base until it is all the way in. Do not overtighten the screws, and rest the base on something while you insert the screws (see Hint, above).

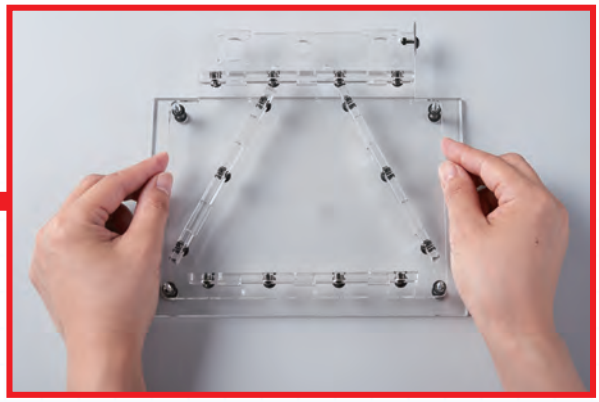
13



When you have inserted the screws, turn the base over and put a washer, then a spring, and then another washer on the shaft of each screw.

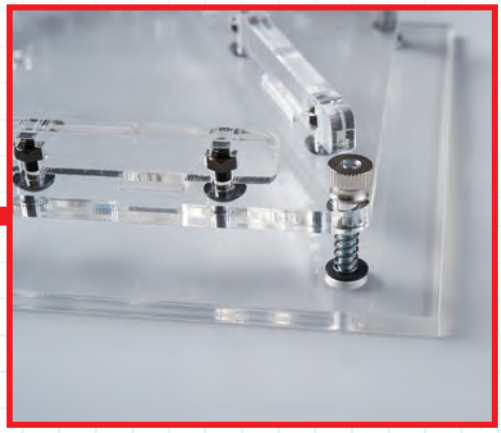
14





Pick up the lower table base and hold it so that the small metal plate is at the top right. Position the lower base so the four screws in the upper base fit through the pre-drilled holes (ringed in red, left) in the lower table base.

15

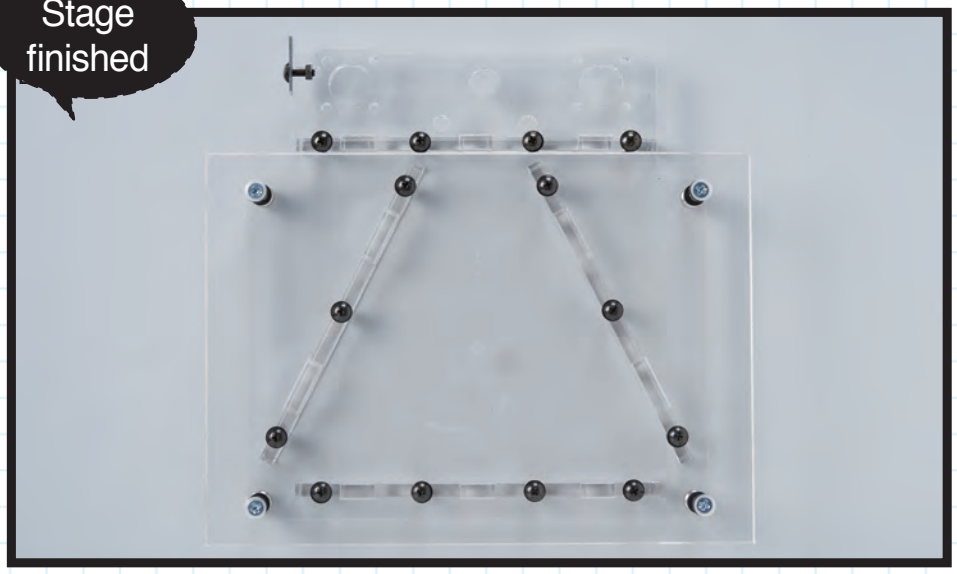


HINT

The knurled nuts are used to adjust the gap between the table base sections so they can be aligned parallel to each other. Check that the springs expand and contract when you turn the knurled nuts.

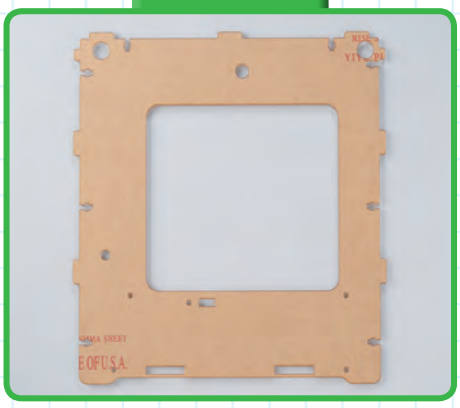
Screw the knurled nuts onto the screws by hand. Screw each one down by the same amount, so that each spring is compressed by approximately 2mm.

Stage finished



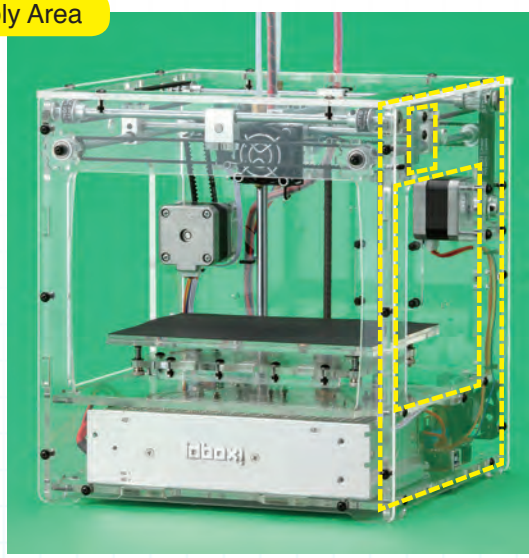
In this stage, you have added two more reinforcing plates to the lower table base and added the metal plate to it before then putting the two table bases together. Store your assembled parts carefully for later use.

Keep it safe



Store the unused left side panel safely for use later; leave its protective coverings intact so that its surfaces remains unblemished.

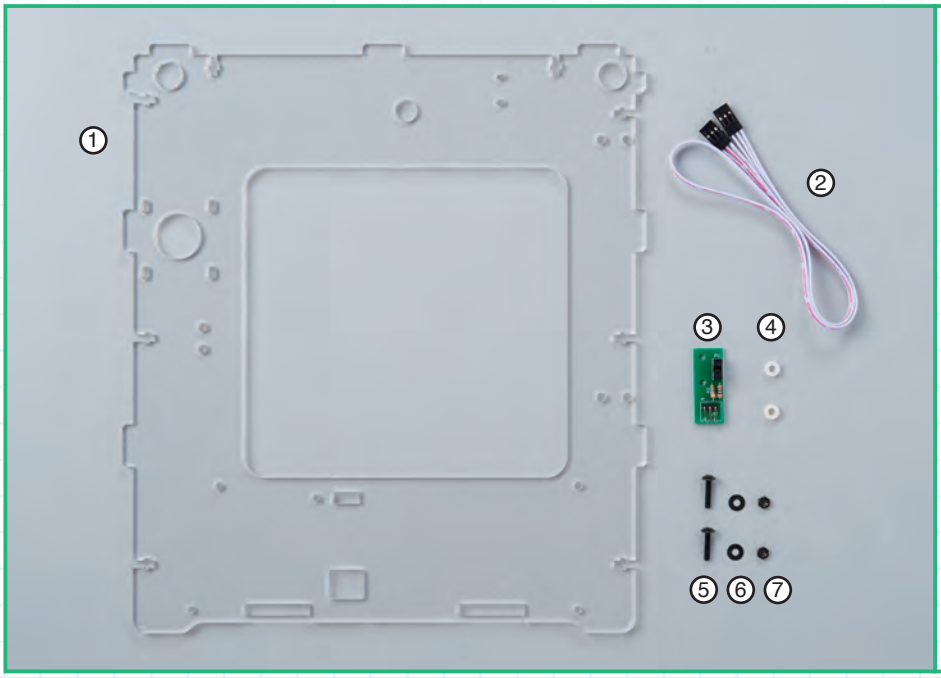
Stage 3 Assembly Area



Stage 3: Install the Y-axis limit switch

In this stage, the limit switch for the Y-axis is attached to the right side panel. This is a simple job as long as you put the switch on the correct location on the panel and handle this delicate component with care.

The limit switch is attached to the right side panel by two screws and two nuts. For now, tighten the screws into the nuts only loosely, using a screwdriver to turn the screws and your fingers to hold the nuts. As the switch is made up of electronic components on a circuit board, do not touch it with wet hands and do not touch any metal parts with your bare hands. Also, protect the switch from dust, humidity and static electricity.



Stage 3 Components

1: Right side panel x 1
2: Limit switch cable x 1
3: Limit switch circuit board x 1
4: Spacers x 2
5: M3 truss head screws (14mm) x 2
6: M3 washers x 2
7: M3 nuts x 2

Tools you will need

Phillips screwdriver (size 1)

Remove the protective layers

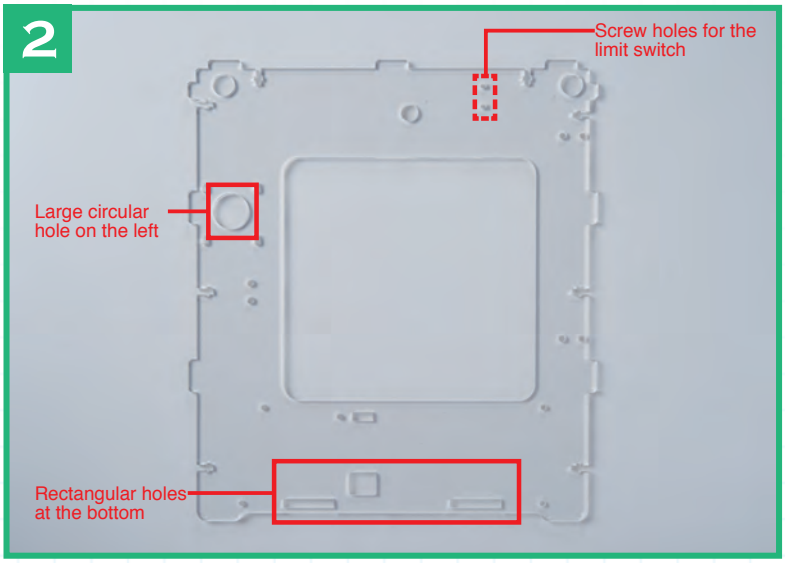
1

Carefully peel the protective layers off both sides of the right side panel. To prevent the acrylic getting scratched, clean your work surface and cover it with paper.

HINT

If you handle the acrylic parts of the printer with your bare hands, they will almost certainly pick up fingerprints. These can be cleaned off with a soft cloth, such as the type used to clean spectacle lenses.

Attach the Y-axis limit switch

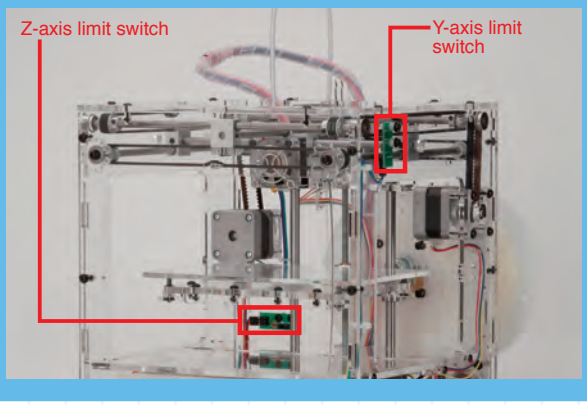


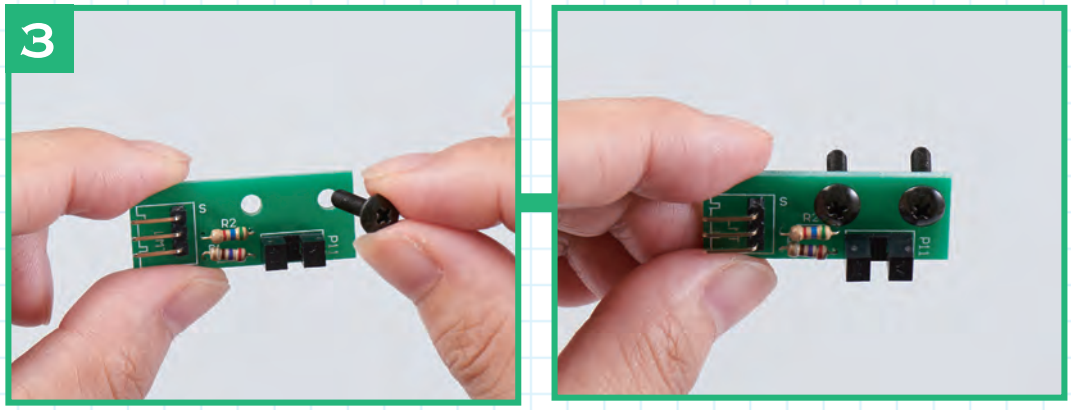
If you position the right side panel as shown in the photo above, with the large circular hole on the left and the rectangular holes at the bottom, the screw holes for attaching the limit switch should be at the top, to the right of centre.

CLOSE-UP

Limit switches

As your idbox printer creates a 3D object, the nozzle (which extrudes the molten plastic) moves from side to side (horizontally) and from front to back, while the modelling table moves vertically. Each of these directions corresponds to an axis: front to back is the Y axis, side to side is the X axis, and vertical is the Z axis. On each axis of movement of the printer is a limit switch that detects the point of origin for that axis. The limit switch installed in this stage is for the Y, or depth axis. The metal plate installed in Stage 2 is for the Z-axis limit switch.

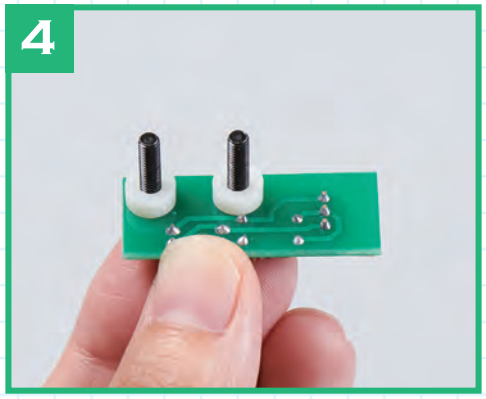




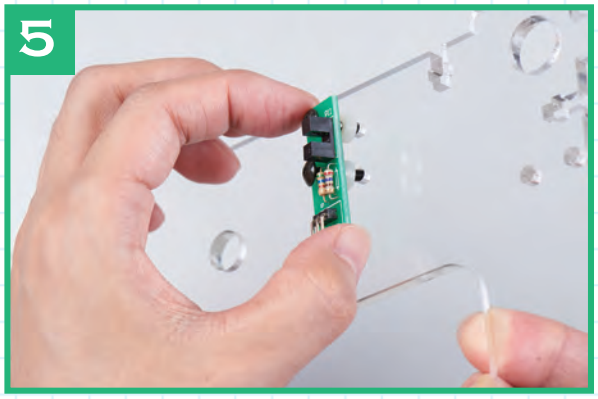
Put a 14mm truss head screw through each of the holes in the limit switch circuit board, as shown in the photos above.

HINT

Remember that the limit switch is a precision part. Do not handle it with wet hands and hold it by the green circuit board so that you do not touch any of its electronic components or metal parts with your bare hands.



Turn the limit switch over and holding the screws in place with your fingers, put a spacer on the shaft of each screw.

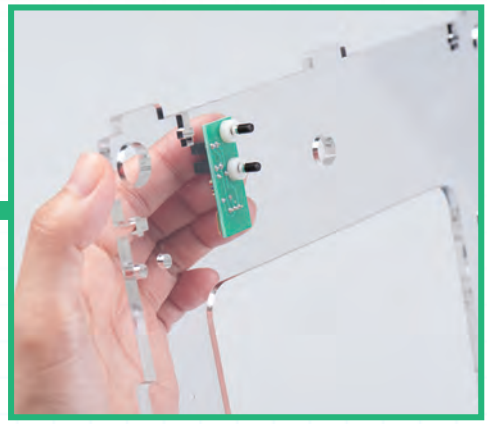


Insert the screws into their mounting holes in the side panel, holding the limit switch so that its three metal pins point in the direction shown.

HINT

If the spacers fall off the screws, you could try laying the panel flat, positioning the spacers over the screw holes and lowering the limit switch screws through them.

6

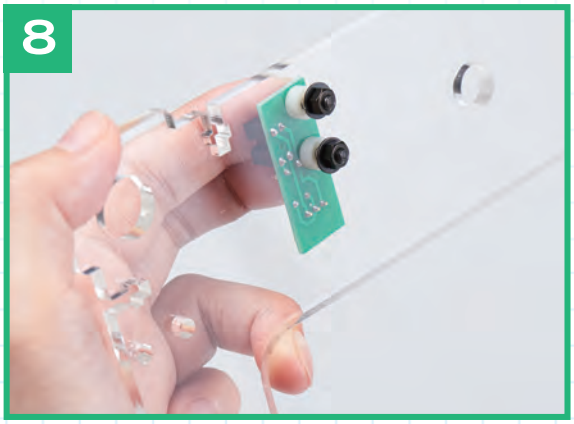


Hold the heads of the truss screws with your fingers so they do not fall out, and turn the panel so you can see the shafts of the screws.

7

Put a washer onto each of the screw shafts.

8

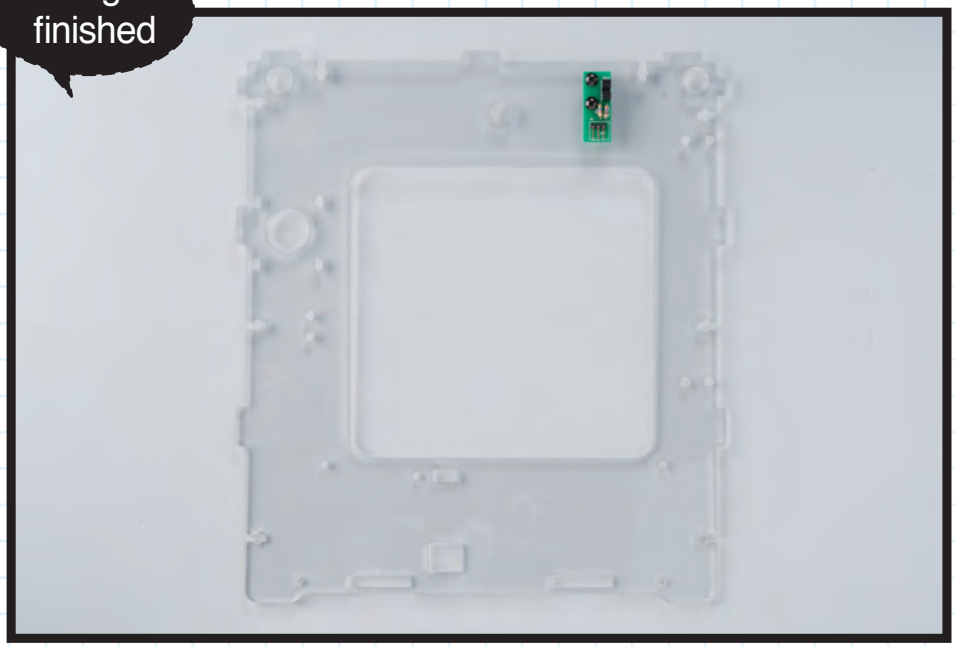


Holding the screws in place with your fingers, screw a nut onto each of the screws using your fingers.

9

Turn the panel round and loosely tighten the screws with a screwdriver, holding the nuts steady with your fingers. Final tightening of the screws will be performed later.

Stage finished



The Y-axis limit switch has been attached to the right side panel. Keep this assembly in a secure place until it is needed again.

Keep it safe

The limit switch cable will be needed later, so store it somewhere safe.

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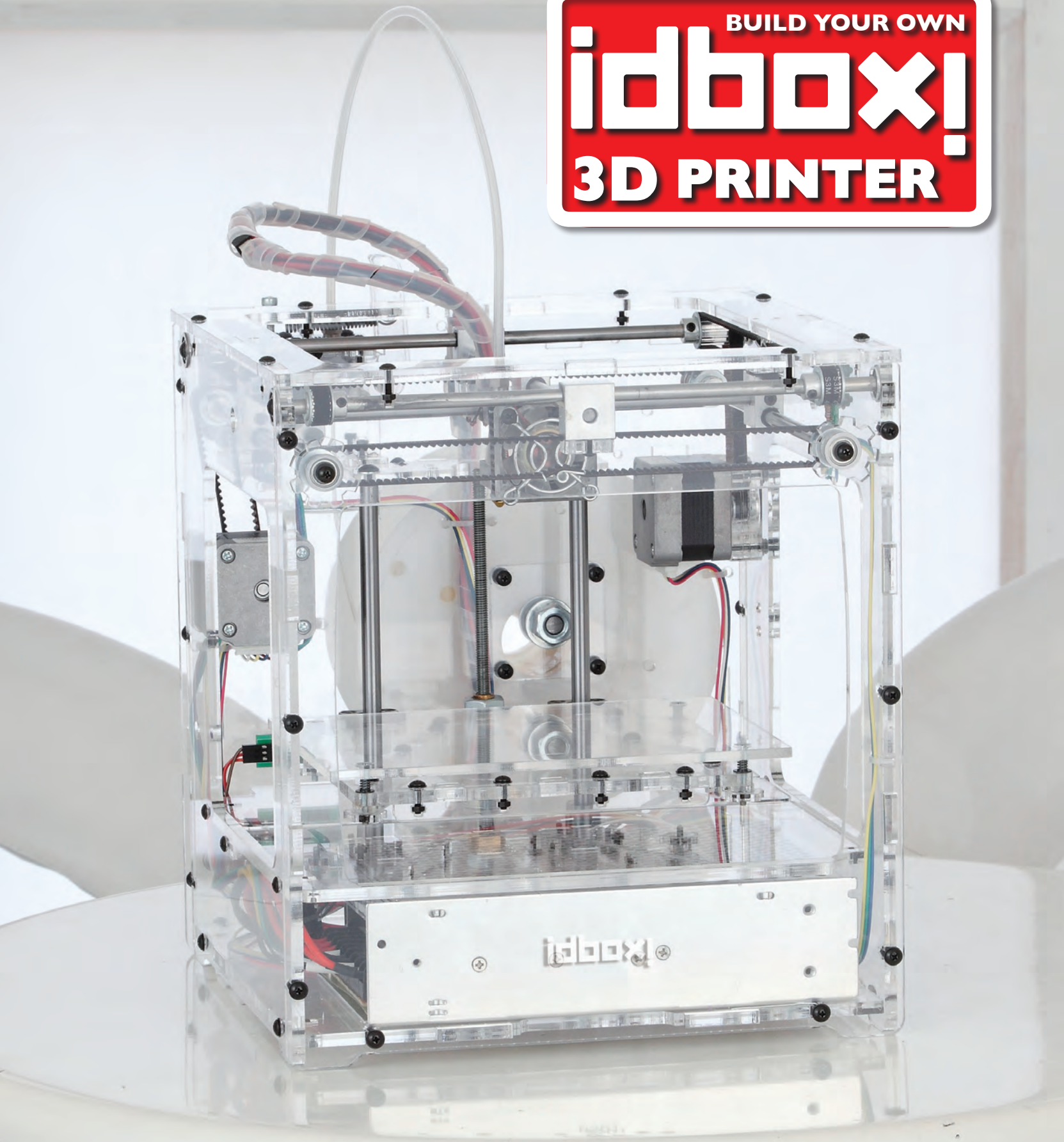

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