

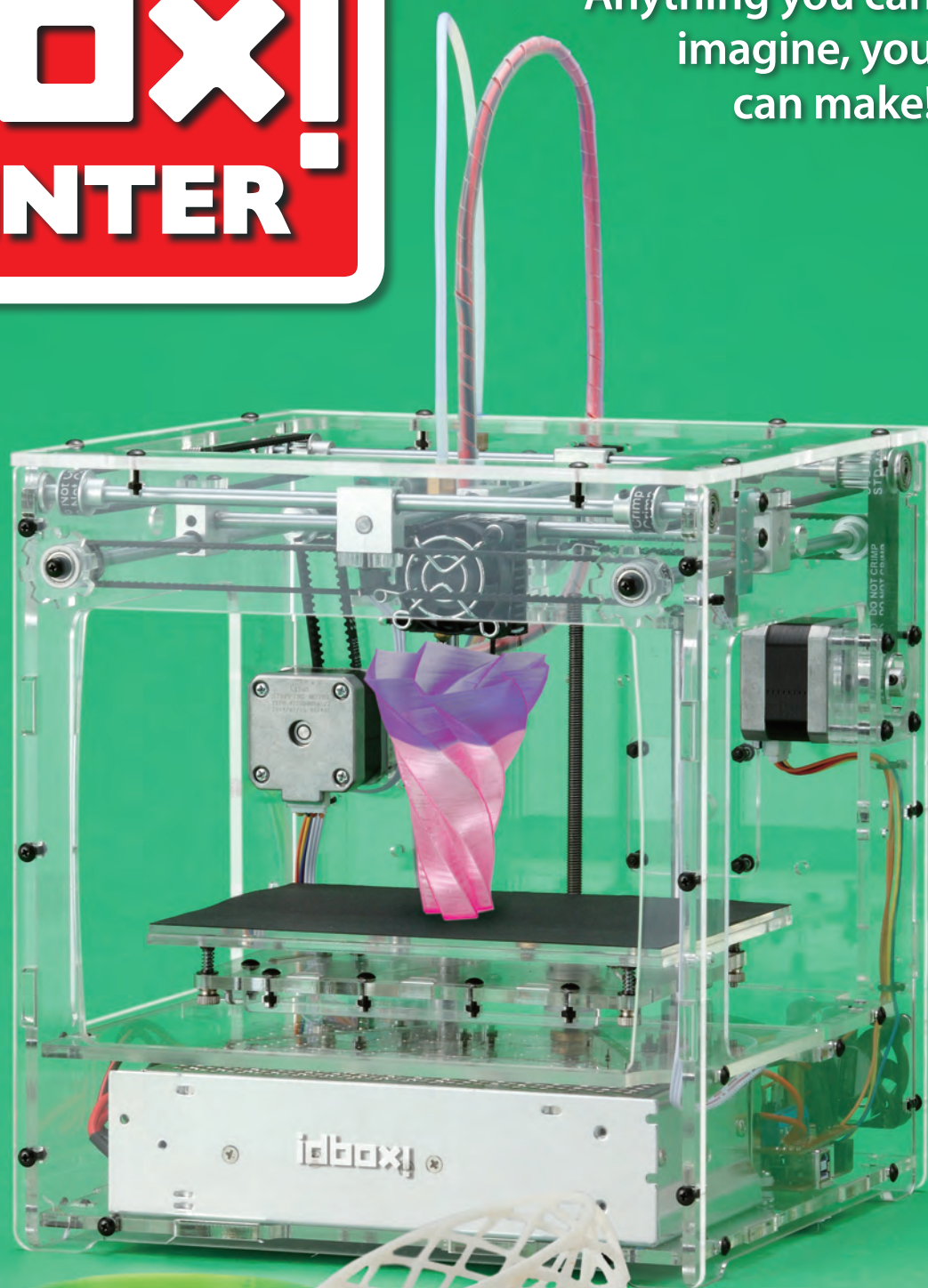
BUILD YOUR OWN **idbox!** **3D PRINTER**

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BUILD YOUR OWN **idbox!** **3D PRINTER**

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Assembly Guide

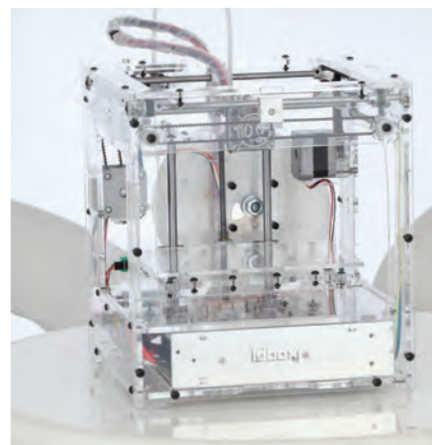
32-45

The next four detailed and easy-to-follow stages in the construction of 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.

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Published in the UK by
De Agostini UK Ltd,
Battersea Studios 2,
82 Silverthorne Road,
Battersea, London SW8 3HE

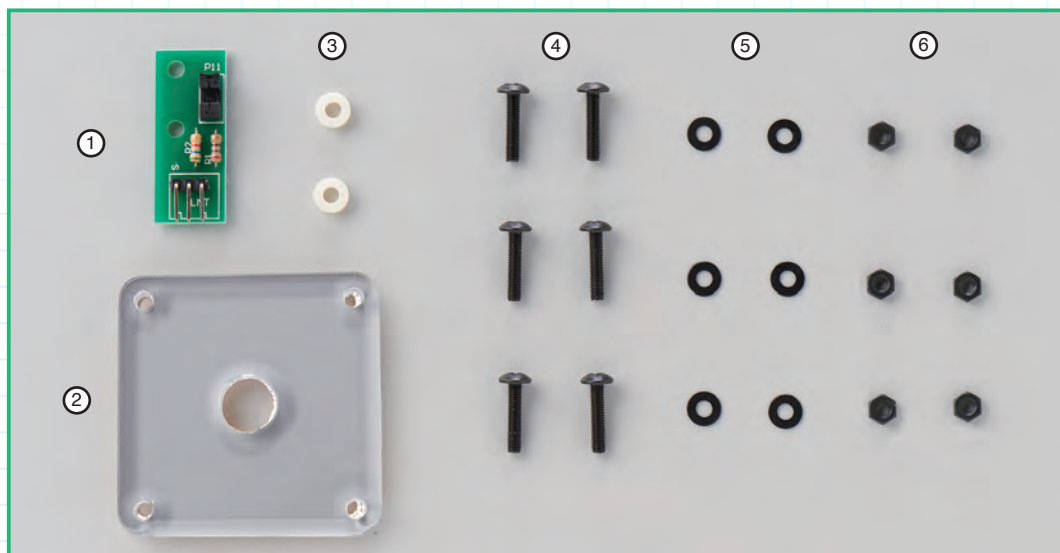
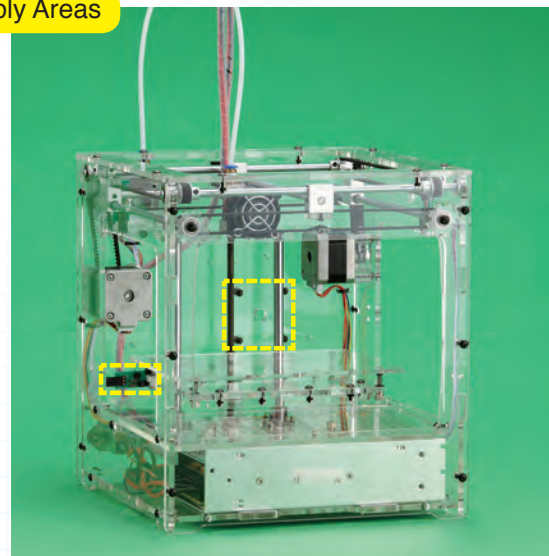
Published in the USA by
De Agostini Publishing USA Inc.,
915 Broadway, Suite 609,
New York, NY 10010

Stage 8: Add the Z-axis limit switch and a reinforcing plate

Continuing your work with the rear panel, you now add the Z-axis limit switch and the reinforcing plate for the filament holder.

In this stage, you will add the Z-axis limit switch to the rear panel of your printer. The procedure is much the same as when you added the X-axis limit switch in Stage 7. Remember to tighten the nuts to finger-tightness only at this time. In Stage 9,

you will be supplied with a spanner that lets you do this properly. Unlike the limit switches, which are installed on the inside of the rear panel, the reinforcing plate that you also add in this stage is attached to the outside of the rear panel.



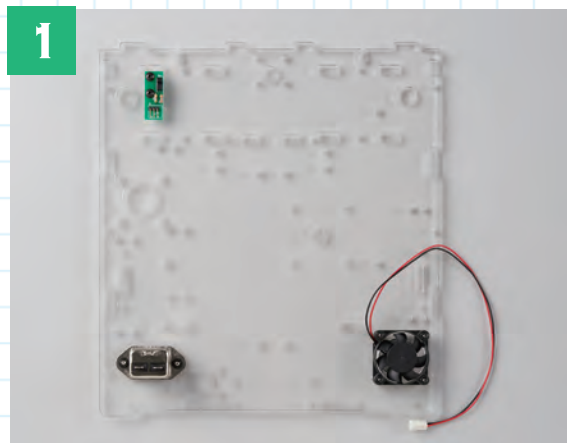
Stage 8 Components

- 1: Limit switch × 1
- 2: Reinforcing plate × 1
- 3: Spacers (3mm) × 2
- 4: M3 truss head screws (14mm) × 6
- 5: M3 washers × 6
- 6: M3 nuts × 6

Tools you will need

Phillips screwdriver (size 1)

Parts to have ready



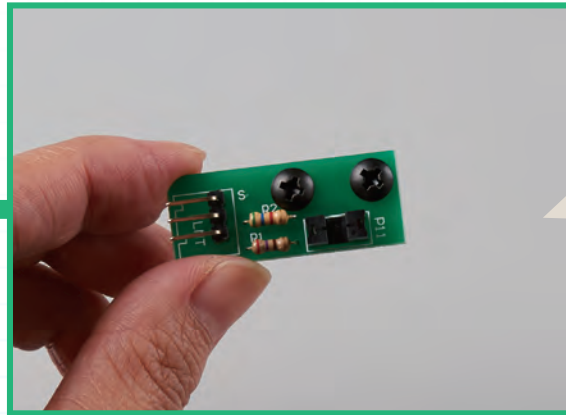
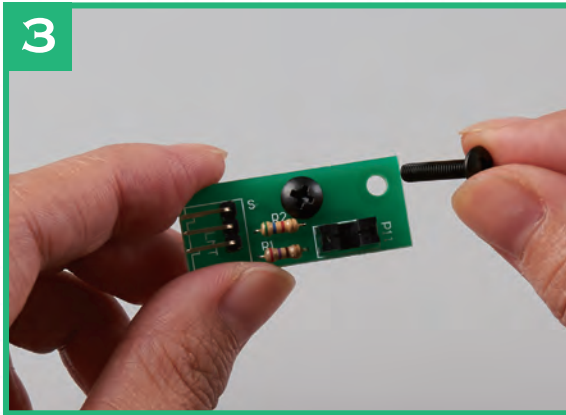
You will need the rear panel for this stage. By now, you will have already added the cooling fan, noise filter and X-axis limit switch to it.



Carefully peel off both the brown paper and the transparent protective layers, taking care not to scratch the acrylic. As usual, when working with the acrylic parts of your printer, put some paper down on your work surface to prevent the parts getting scratched.



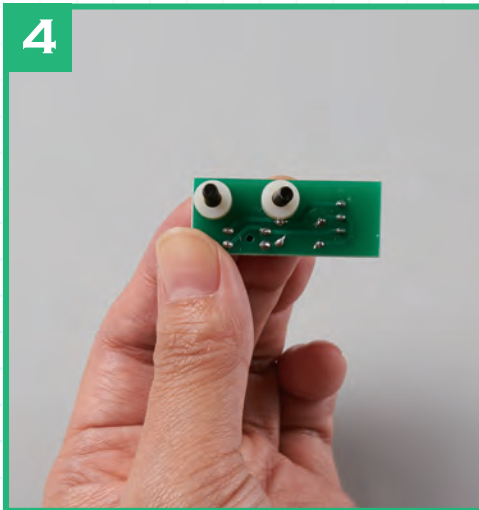
Attach the limit switch to the rear panel



HINT

The limit switch is a very delicate part, so handle it with care. Don't touch it if your hands are wet, and only hold it by the green circuit board. Do not touch any of its components, especially the metal ones, with your fingers.

Insert a 14mm truss head screw into each of the screw holes in the limit switch, as shown above. Remember to handle the switch carefully.



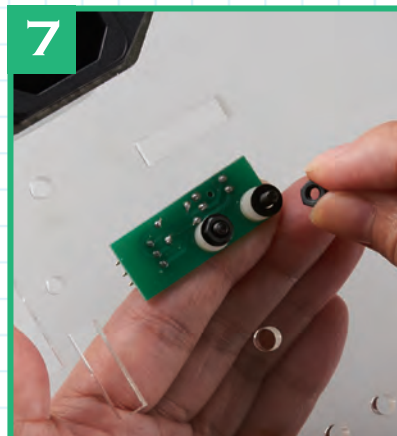
Turn the limit switch around, and, holding the screws in position with your fingers, place a 3mm spacer on each of the screws.



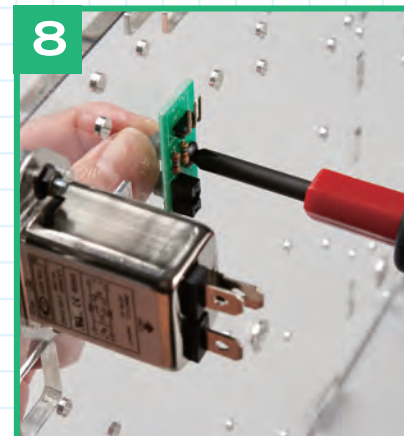
Hold the back panel with your left hand so that the noise filter is at the bottom left. Put the screws through the screw holes (ringed in red) on the back panel. Make sure that the metal pins of the limit switch are on the left, as shown above.



Hold the screws in place and turn the panel over. Put a washer on each of the screws.

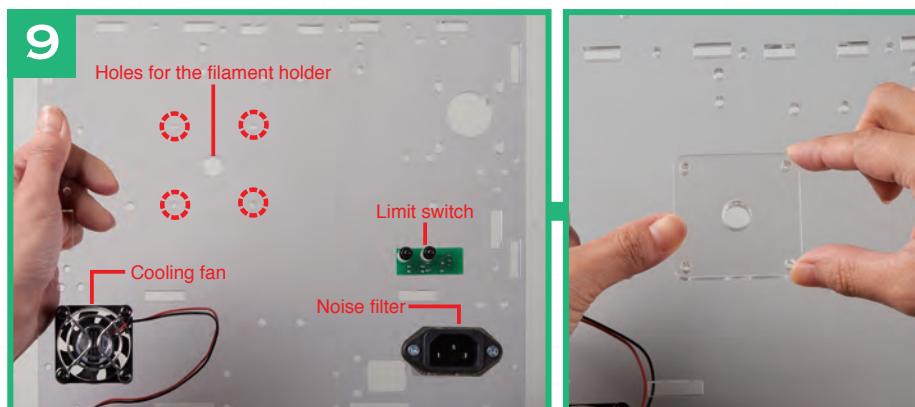


Thread an M3 nut onto each of the screws, and tighten each one with your fingers.



Turn the panel over again and, for now, tighten the screws loosely with a screwdriver, just enough to hold the switch securely in place.

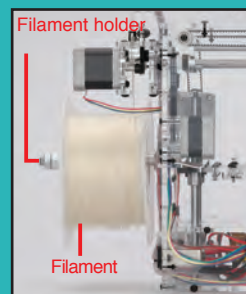
Attach the reinforcing plate for the filament holder



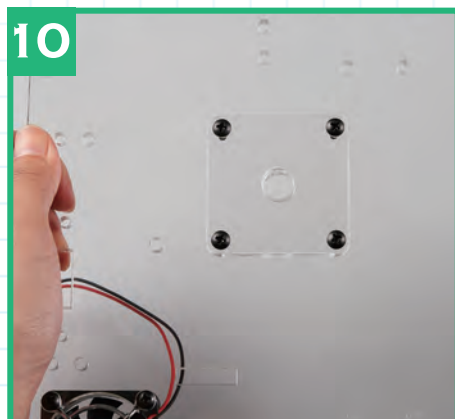
Turn the rear panel over so that the cooling fan is at the lower left and the noise filter is at the lower right. The screw holes for the reinforcing plate are shown ringed in red in the photo above left.

The filament

The filament is held on a reel at the back of your printer. The reel fits onto a spindle (a metal rod), and this is attached to the rear panel. The reinforcing plate helps support the weight of the spindle and filament holder.



NOTE: The filament holder shown is not the same as the one on your idbox.



Put an M3 screw through each of the four screw holes.



Turn the panel over and put a washer over each of the screws.

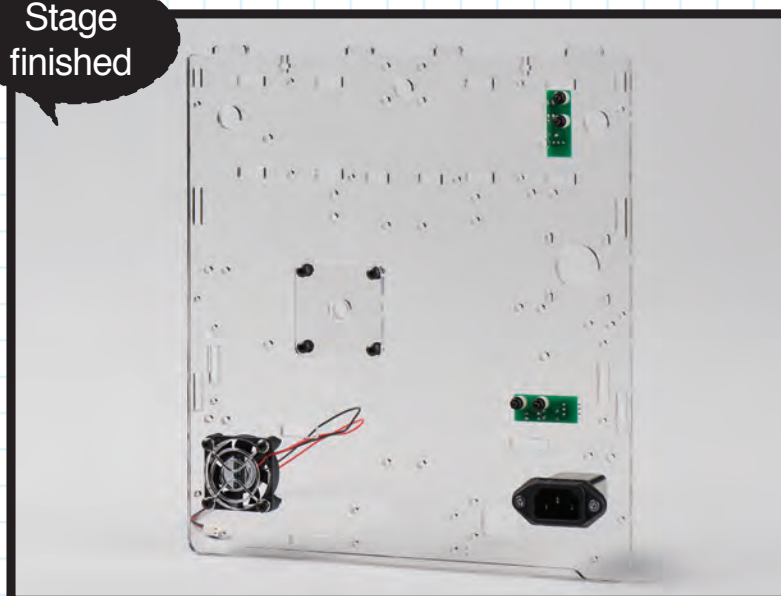


Thread a nut onto each of the screws.



Turn the panel over and tighten each of the screws to finger-tightness only using the screwdriver.

Stage finished



The rear panel now has another limit switch and the reinforcing plate for the filament holder. Keep the panel safe.

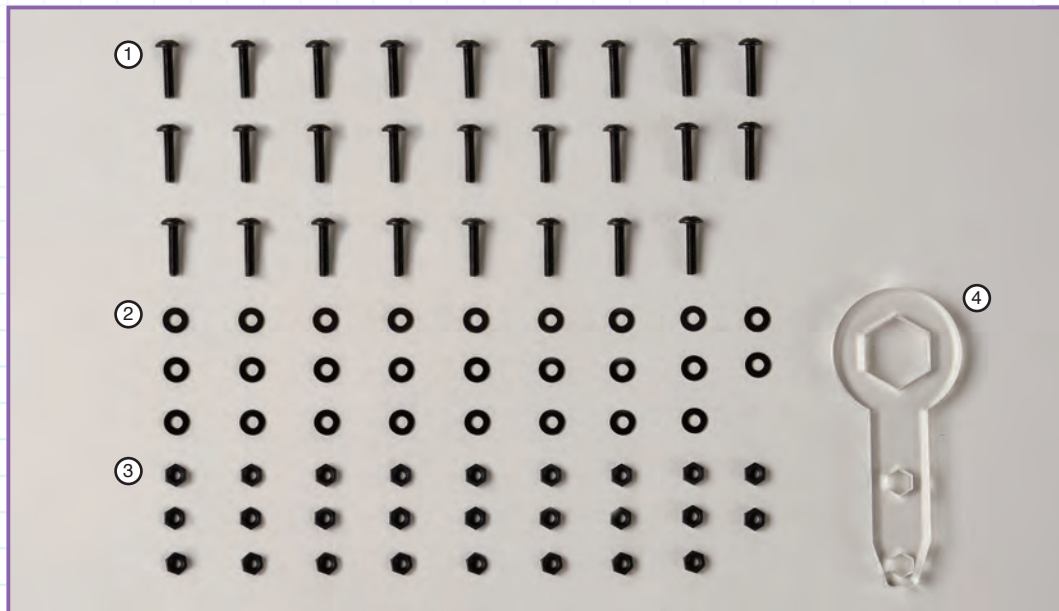
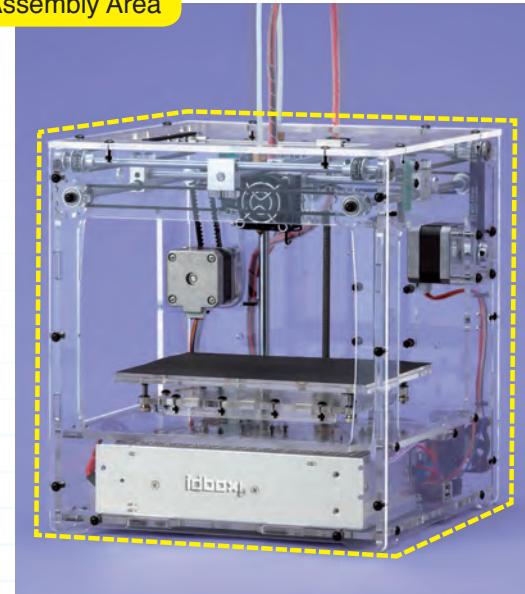
Stage 9 Assembly Area

Stage 9: Enclosure assembly

In previous issues, you have been given the front panel, rear panel, left side panel, right side panel and bottom panel for your printer. Now, it is time to put these panels together to make the outer housing, or enclosure, for your idbox.

The five panels you are putting together this time form the housing of your printer. The panels are shown on the next page, so you should have no trouble assembling

them correctly. They are secured with 24 sets of screws, nuts and washers. In case you lose any, there are two spares for each supplied with this stage.



Stage 9 Components

- 1: M3 truss head screws (14mm) x 26
- 2: M3 washers x 26
- 3: M3 nuts x 26
- 4: Spanner x 1

NOTES:

There are two spare screws, washers and nuts supplied with the parts for this stage.

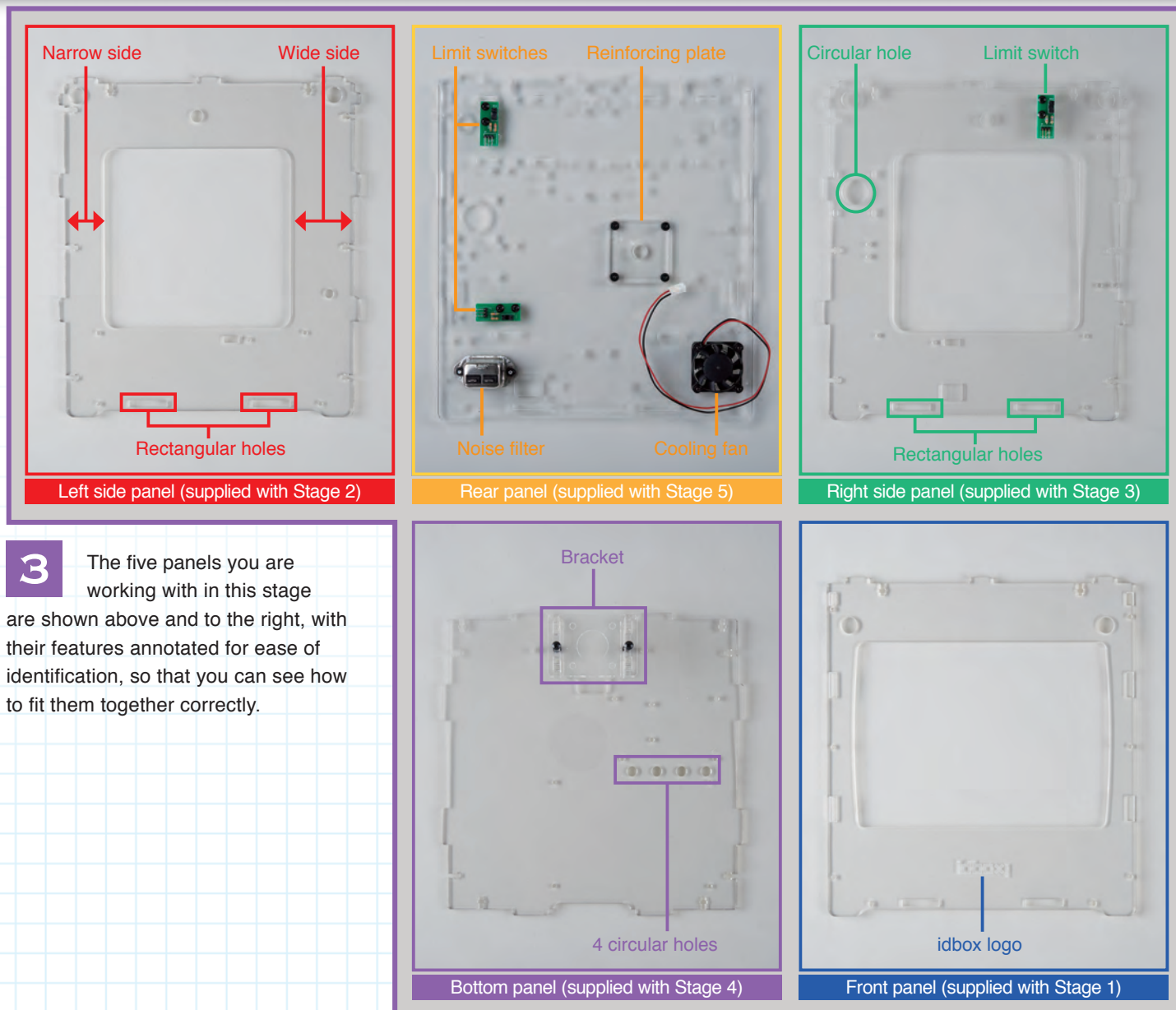
The spanner supplied with this stage is for use in the next stage, so keep it safe.

Parts to have ready



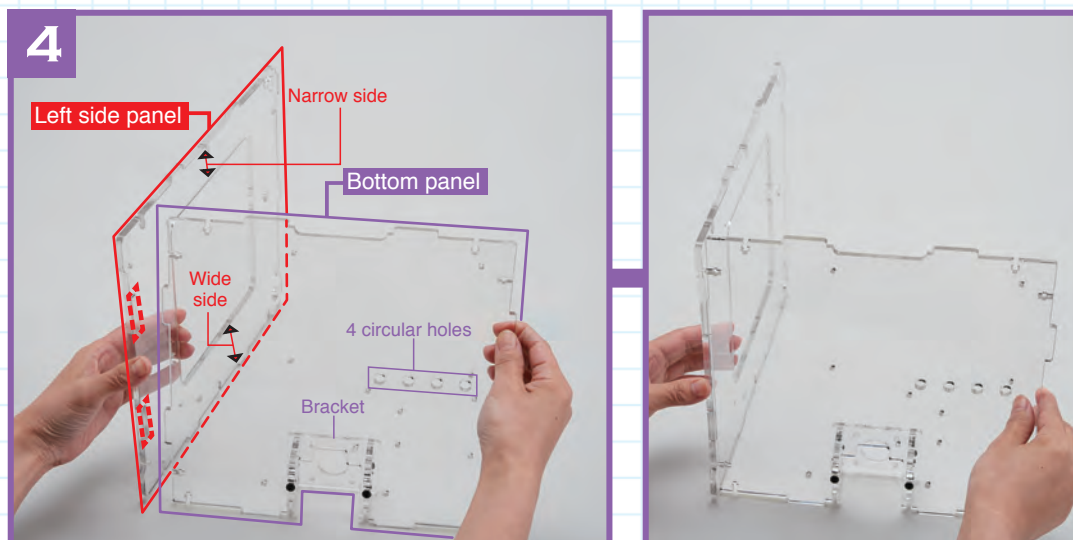
Prepare both the front panel (supplied with Stage 1) and the left side panel (supplied with Stage 2) by peeling off both their brown paper and transparent protective coverings. If the paper is difficult to remove from around the idbox logo – especially inside the letters – try wetting it.

Get ready the screws, washers and nuts supplied with this stage.



3 The five panels you are working with in this stage are shown above and to the right, with their features annotated for ease of identification, so that you can see how to fit them together correctly.

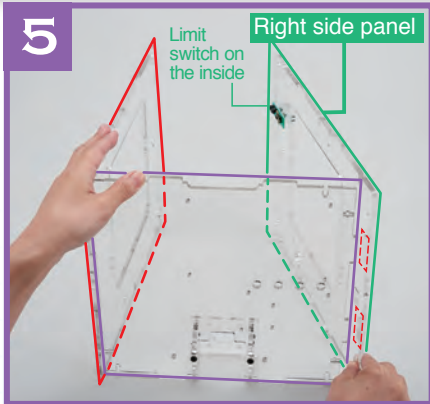
Assemble the left, bottom, right and front panels



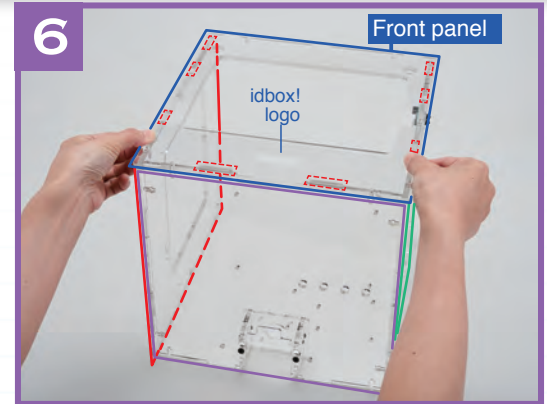
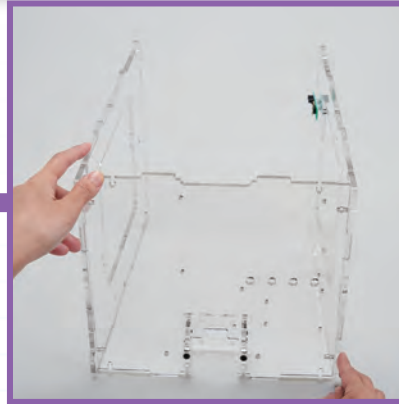
HINT

Take care when working with acrylic panels. It's a good idea to use a large work surface covered with soft paper to prevent them getting damaged.

Holding the left side and bottom panels as shown (far left), with the narrow side of the left side panel uppermost, insert the two rectangular projections on the edge of the bottom panel into the rectangular holes (outlined in red) in the left side panel.

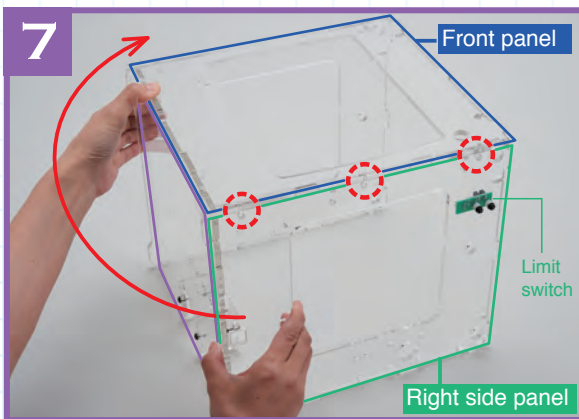


With the limit switch on the inside of the right side panel, insert the two rectangular projections on the right of the bottom panel into the two rectangular holes (outlined in red) in the right side panel as shown above.

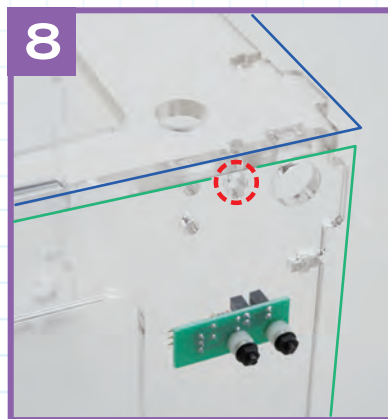


With the idbox! logo facing outwards, insert the rectangular projections in the 'U'-shaped assembly made up of the left side panel, the right side panel and the bottom panel, into their matching rectangular holes (outlined in red) in the front panel.

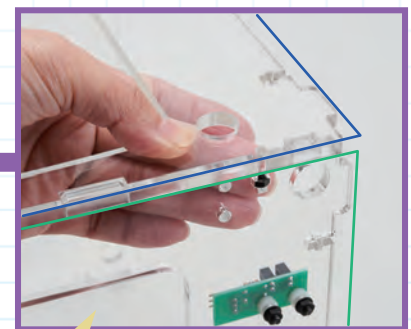
Add the 8 front panel fastenings



Turn the assembly so that the right side panel is at the front (with its limit switch at the top right) and the front panel is on the top, as shown above. Make sure all the projections are still in the rectangular holes. The first three of the eight places where fastenings are used are shown ringed in red.



The area shown ringed in red in the image above is the groove in the side panel into which an M3 nut is inserted. Push it in carefully, making sure that it is centrally located (see right). Position it accurately by holding your fingers on the inside to stop it going in too far.



POINT

Make sure the nuts are centrally located within their grooves when viewed from above (see below), otherwise it will be hard to screw the screws into them.

Correct

Incorrect

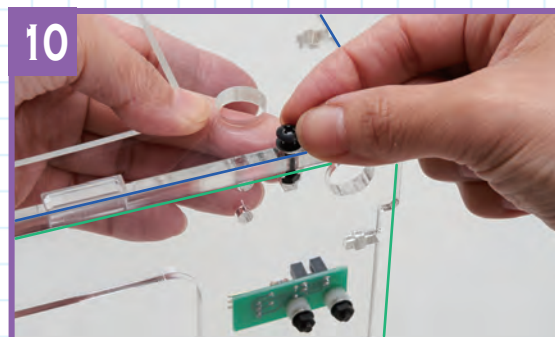


HINT

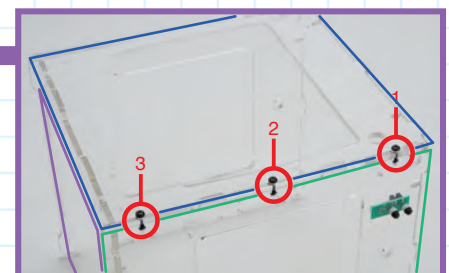
If the nut does not go in easily, make sure its sides are parallel with the sides of the groove it is being inserted into. If it is a tight fit from one side, try inserting it from the other.

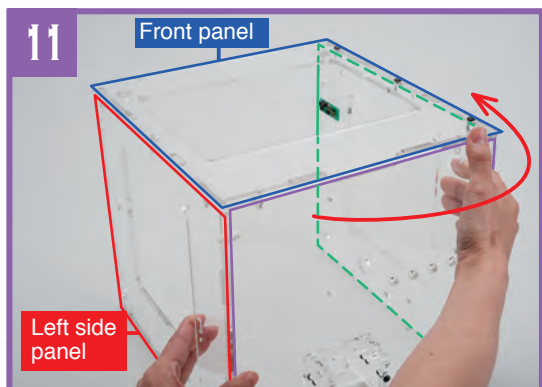


Put an M3 washer on one of the 14mm M3 truss head screws. (Each of the 24 screws used in this stage's assembly stage will need to have a washer on it before it is screwed into its nut.)

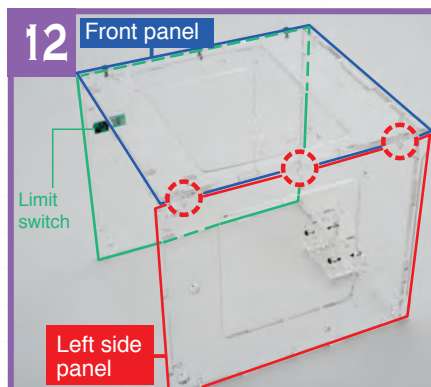


Insert the screw through the screw hole in the front panel and screw it into the nut in the side panel. Tighten it to finger-tightness only for now. Repeat this for the other two screws as shown right so that the screws in the fastenings numbered 1 to 3 are all loosely done up.

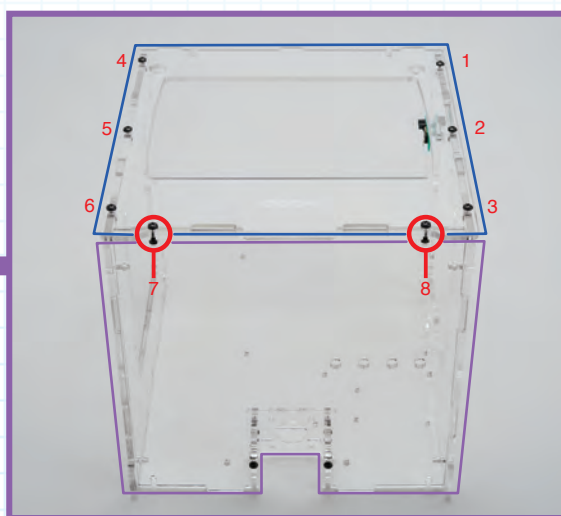
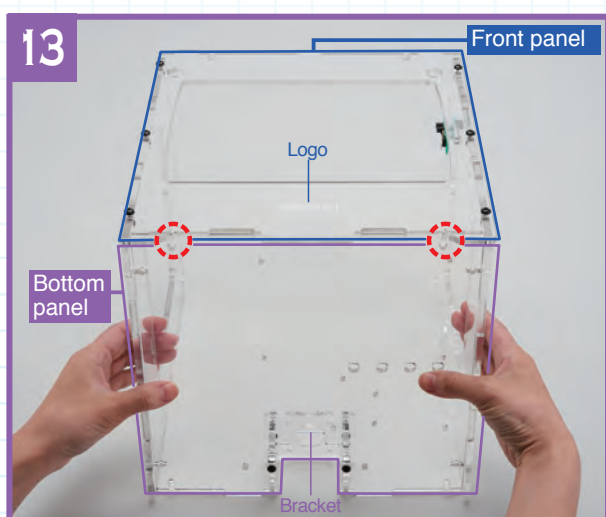




Turn the assembly so that the left side panel is at the front and the limit switch on the right side panel is at top. Handle the assembly carefully so the projections do not come out of their holes.

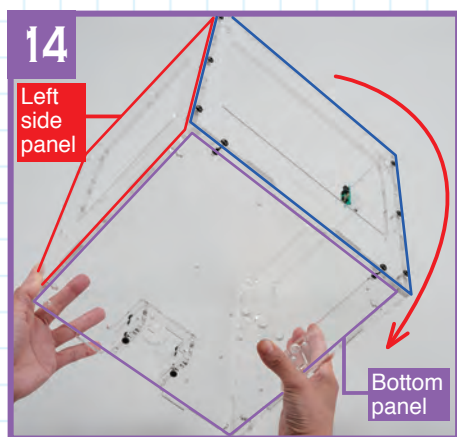


At the three places ringed in red in the image above, repeat the procedure of inserting the nuts into the grooves, putting washers on the screws and screwing the screws, as explained in Steps 8 to 10 on the previous page. This time, you will be working on the three fastenings numbered 4, 5 and 6 as shown above right. Finger-tighten the screws only.

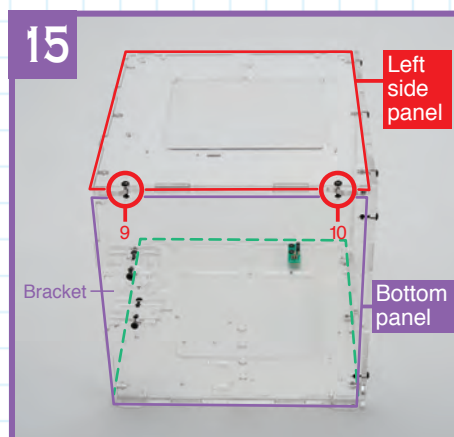


Turn the assembly again so that the bottom panel is at the front. You will be putting the remaining two fastenings for the top panel into the places ringed in red and marked 7 and 8 above right. Repeat the procedure for inserting fastenings in positions 7 and 8 as described in the previous few steps, just finger-tightening the screws for now.

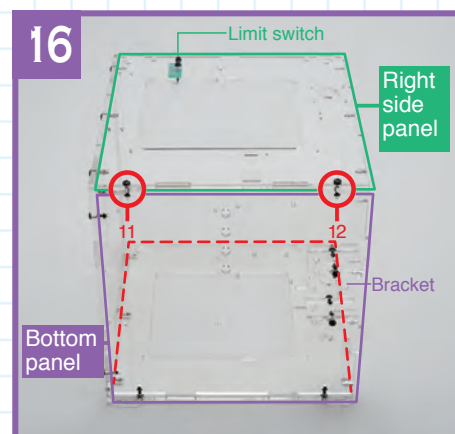
Add the 4 side panel fastenings



Now turn the assembly so that the left side panel is on the top and the bottom panel is still at the front.

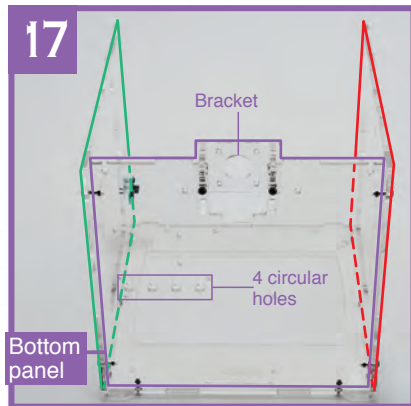


Add fastenings and finger-tighten them in the places shown ringed in red and numbered 9 and 10 in the image above.

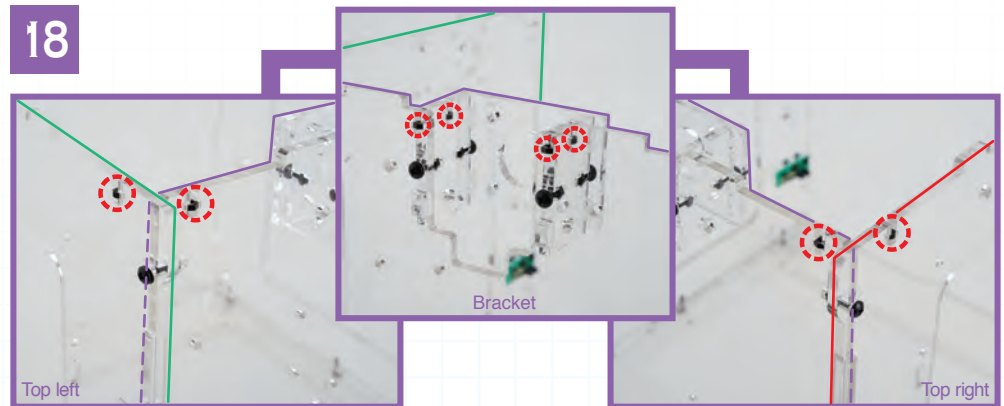


Turn the assembly so that the right side panel is at the top and the bottom panel is at the front and add fastenings 11 and 12 in the positions shown above, finger-tightening them.

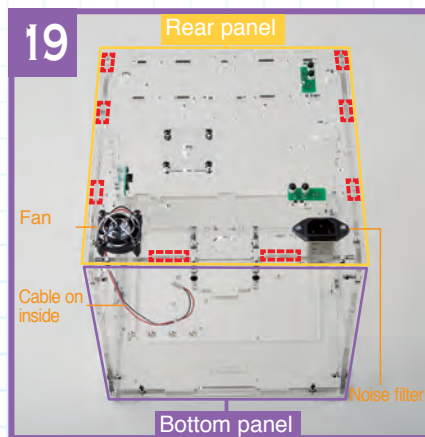
Add the 12 back panel fastenings



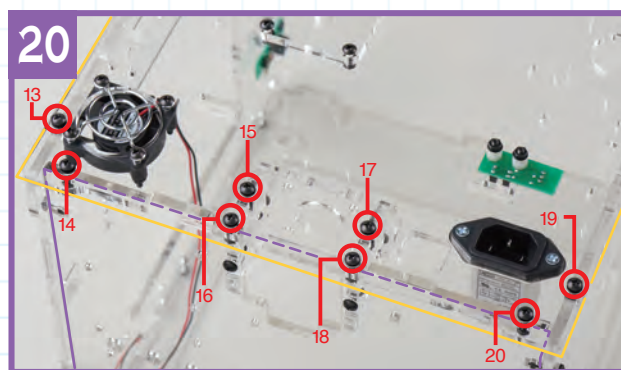
Turn the assembly so that the bottom panel is facing forwards, with its bracket at the top.



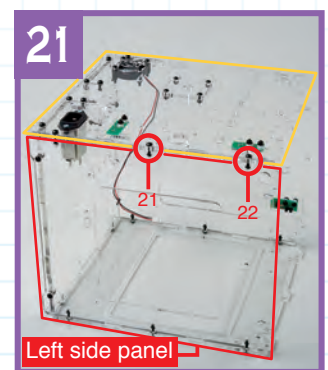
Put M3 nuts into their grooves at the locations ringed in red in the images above, with two at the top left, four in the bracket and two at the top right.



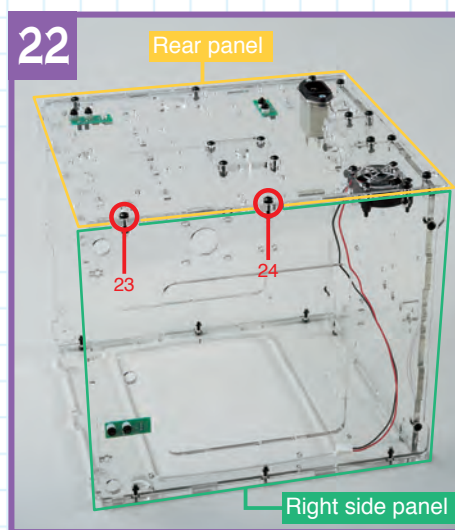
Hold the rear panel so the fan is at the bottom left (with its cable on the inside) and the noise filter is at the bottom right. Place the panel on the top of the assembly, fitting the projections into the rectangular holes in the rear panel.



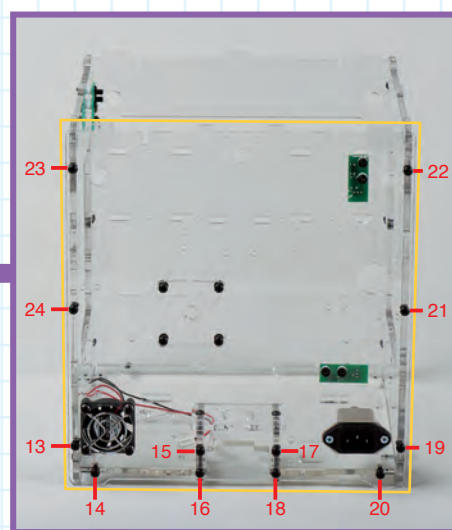
Put screws (with their washers already on them) through the screw holes and finger-tighten them into the nuts below for fastenings 13 to 20 as shown in the image above.



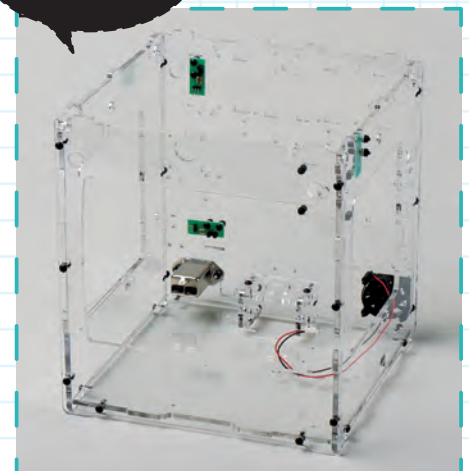
Turn the assembly so the left side panel is at the front and add nuts and screws with washers as before, to make fastenings 21 and 22.



Turn the assembly so the right side panel is at the front. Add nuts to the grooves in the right side panel, marked 23 and 24, then finger-tighten the screws in them. Make sure you have put in all 12 rear panel fastenings.



Stage finished



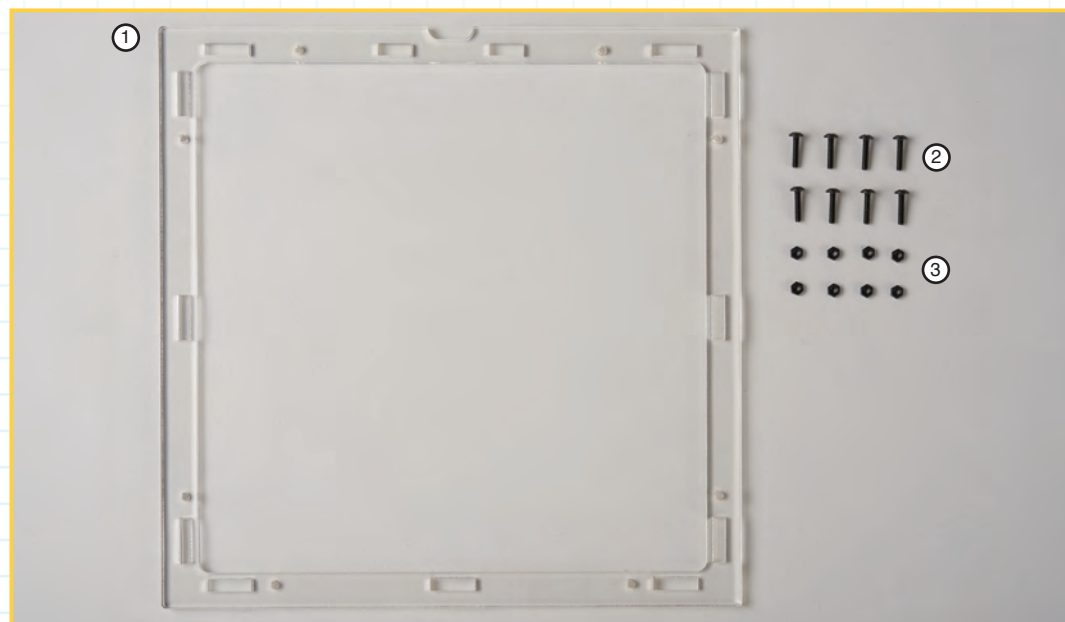
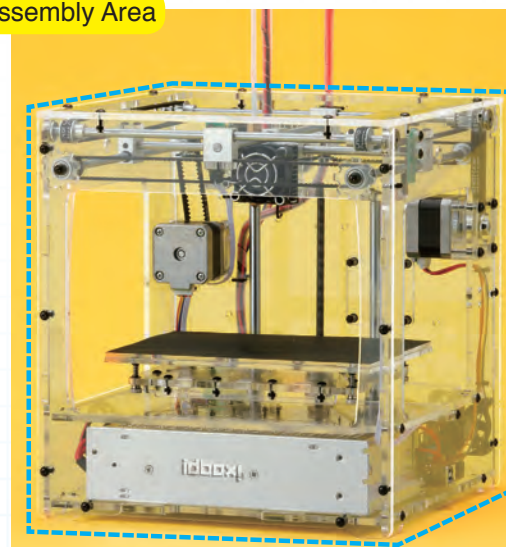
You have now put together the sides and bottom of your 3D printer. Store the assembly safely for next time.

Stage 10: Tightening the nuts and fitting the assembly jig

In this stage, you use the spanner provided to tighten up the nuts on the screws that secure the reinforcing plate and limit switches to the housing panels. It's also time to fit the assembly jig to the top of the printer.

Previously, you have attached the limit switches, one each for the X, Y and Z axes, plus the filament holder reinforcing plate. In this stage, you tighten the nuts onto the fixing screws so that these parts are securely fixed in position. After that

you add the assembly jig to the top of the printer. This is a temporary addition that keeps the housing rigid and properly aligned while you continue construction. In a future stage, you will remove the jig and replace it with the printer's top panel.



Stage 10 Components

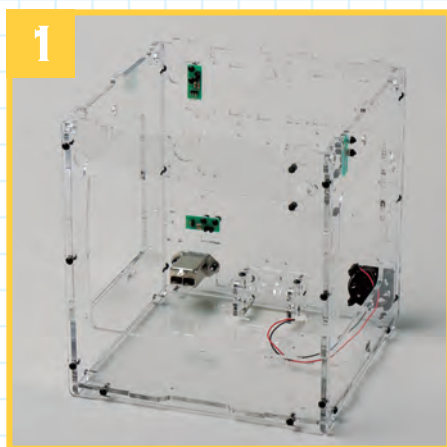
- 1: Assembly jig x 1
- 2: M3 truss head screws (14mm) x 8
- 3: M3 nuts x 8

Tools you will need



Spanner supplied with Stage 9 (shown above)
Phillips screwdriver (size 1)

Parts to have ready



You will need the enclosure you put together in the previous stage.

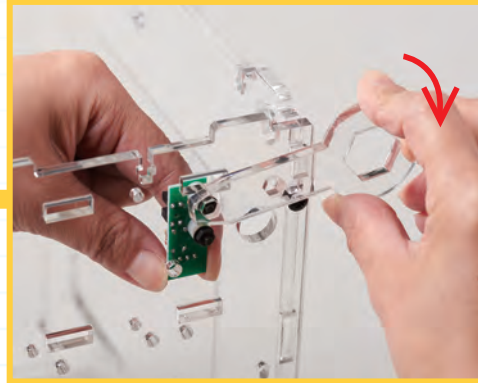
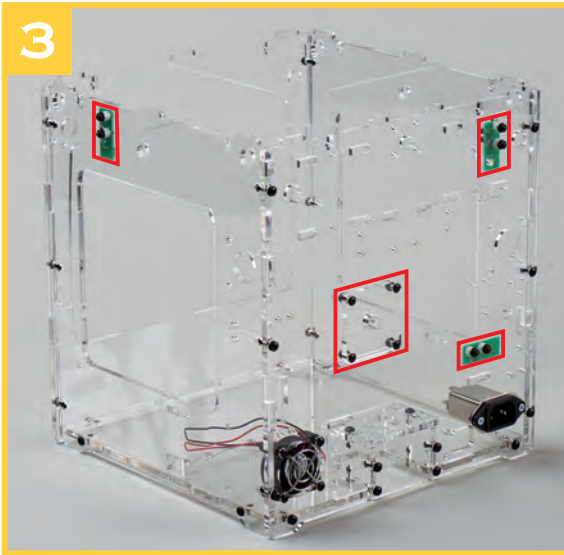


Prepare the assembly jig supplied with this stage and the spanner supplied with Stage 9 by carefully peeling off their protective coverings.



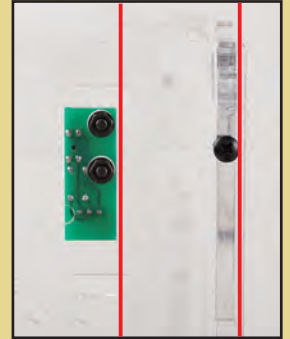
Tightening the limit switch and reinforcing plate nuts

3



POINT

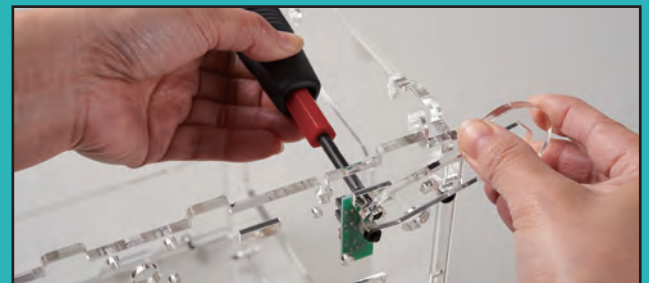
Hold the limit switches by the circuit board using your finger to keep them aligned properly when you tighten up the nuts with the spanner. Turn the nuts clockwise, a little at a time, one after the other.



So far, the nuts have only been loosely tightened for the three limit switches and the reinforcing plate shown outlined in red in the image above. Now, use the smallest hole on the spanner to tighten them up properly. When you tighten up each limit switch, hold the switch parallel to the side of the panel adjacent to it. Tighten up the two nuts that hold the switch little by little, one after the other, until you feel resistance to turning the spanner.

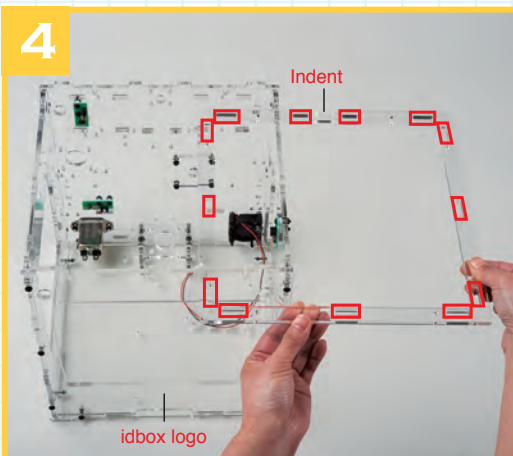
Using the spanner

The spanner comes with three different-sized hexagonal holes in it, each of which fits a different size of nut. To tighten nuts, you turn the spanner clockwise. When tightening, do not tighten the nut up completely all in one go; rather, turn the spanner a bit at a time until there is significant resistance to your turning action. Be careful to not use excessive force. If the screw turns while you are tightening the nut, hold the screw still with a screwdriver in the head of the screw as shown right.



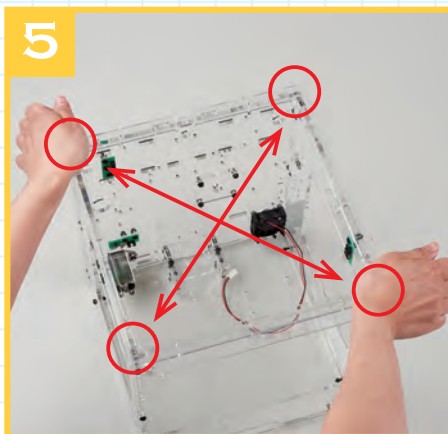
Attach the assembly jig and tighten the housing nuts

4



Position the housing so the idbox logo is at the front. Hold the assembly jig so that the crescent-shaped indent is at the rear and insert the projections in the housing into the rectangular holes in the jig, outlined in red above.

5



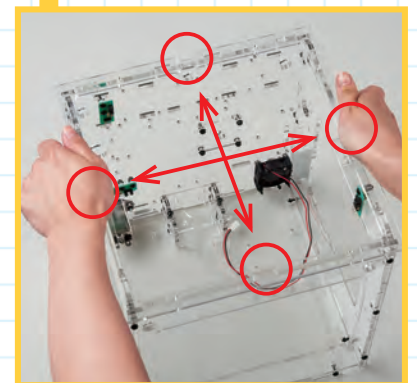
Push down with your hands on opposite corners of the jig in turn, then on opposite sides in turn, so that the jig holds the housing securely without there being any play in the housing.

HINT

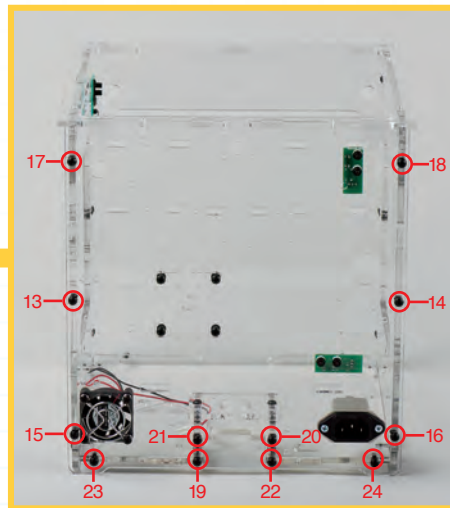
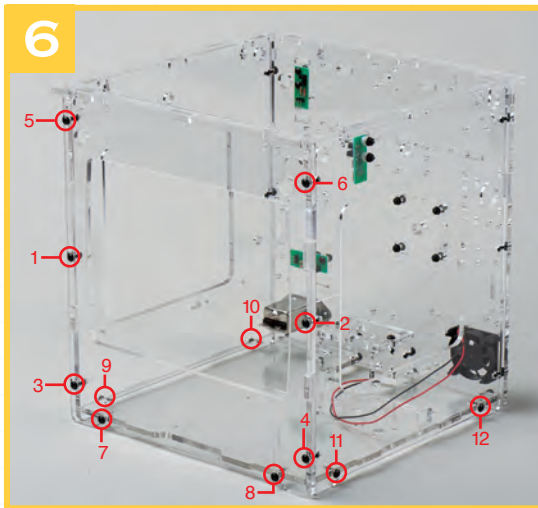
When adding the jig, use a level and flat work surface so the housing is held in position properly.

POINT

If it is hard to get the jig on correctly, loosen some of the housing's screw and nut fastenings.



6



NOTE

If you use too much force when tightening the screws and the acrylic breaks or cracks, you can make repairs using adhesive for acrylic.

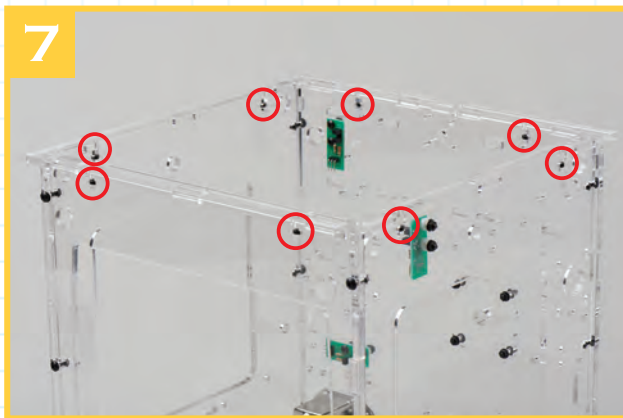


Now, fully tighten all the screws that you put in place in the previous stage. Tighten them up using a screwdriver little by little, in the numerical order shown. There are 24 to do in all, so take your time and do it carefully.

POINT

Once the jig is holding the housing in the correct shape, tighten the screws in the housing in the order shown a little at a time, repeating the cycle of tightening until they are all tightened to the same degree. If they are tightened fully one at a time, it is likely that the housing will be distorted, in which case, it would be impossible to output accurate 3D models.

7

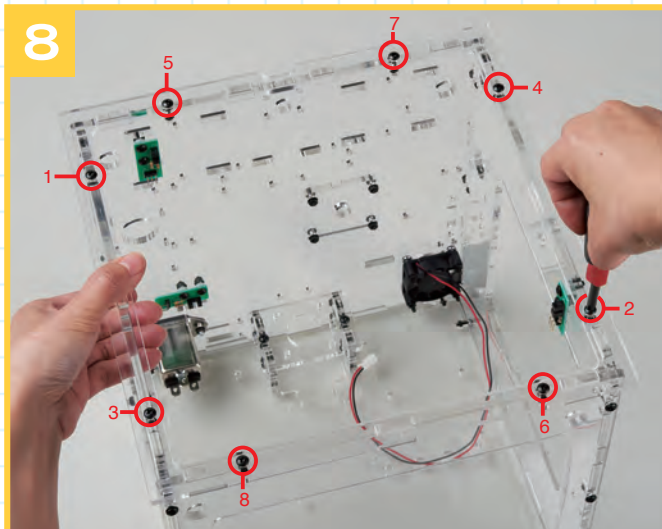


Screw tightening

Because screws are tightened up, it doesn't mean they're not going to work loose over time, perhaps as a result of vibration or other factors. When the idbox is finished, the screws should be checked for tightness and also regularly during operation.

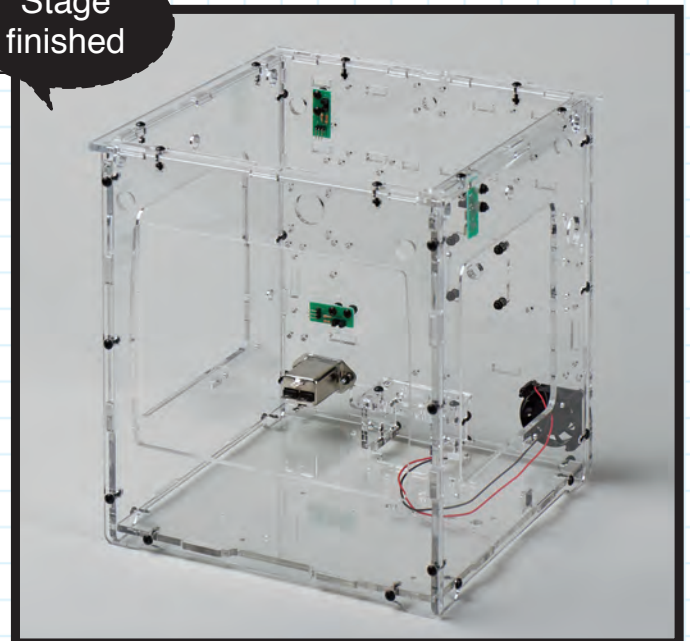
Insert an M3 nut into each of the slots shown ringed in red in the image above. There are two slots in each of the front, rear, left and right panels.

8



Screw a 25mm truss head screw into each of the nuts and tighten each screw in turn by a small amount, moving from screw to screw in the order shown here. Tighten each screw little by little and evenly until they are all tightened securely to the same degree.

Stage finished



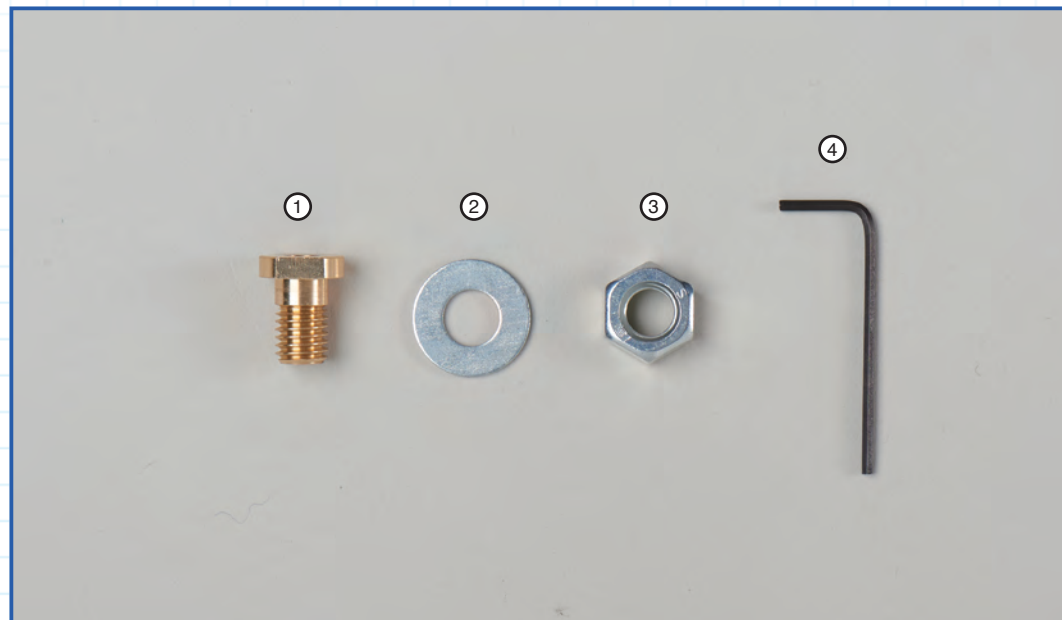
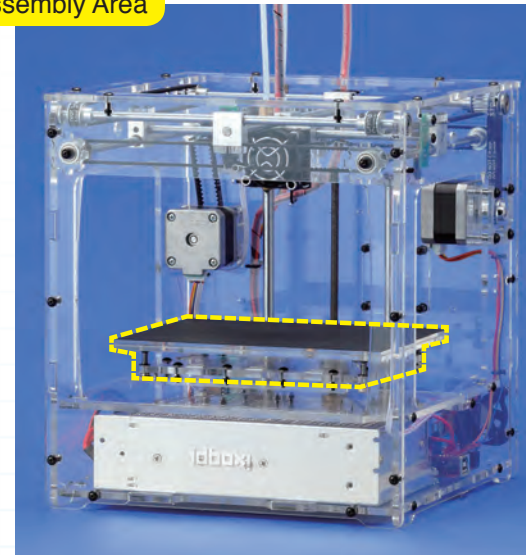
The nuts for the limit switches and reinforcing plate are now tight, as are the screws that hold the housing together. Store the assembly for the next stage.

Stage 11: Attach the lead screw nut to the table base

In this stage, you will attach the brass lead screw nut – ensure you line it up properly. It is attached using the spanner and an M10 nut.

The last time you worked on the table base was back in Stage 2. This time, you will attach a lead screw nut to the base, using the M10 washer and M10 nut supplied. When you tighten up the

nut onto the threaded section of the lead screw nut, you will have to use the largest of the three holes in the spanner that was supplied with Stage 9. Do not use excessive force when tightening.



Stage 11 Components

- 1: Lead screw nut x 1
- 2: M10 washer x 1
- 3: M10 nut x 1
- 4: Allen key (2mm) x 1

(Keep the Allen key safe as it will not be used until the next stage.)

Tools you will need

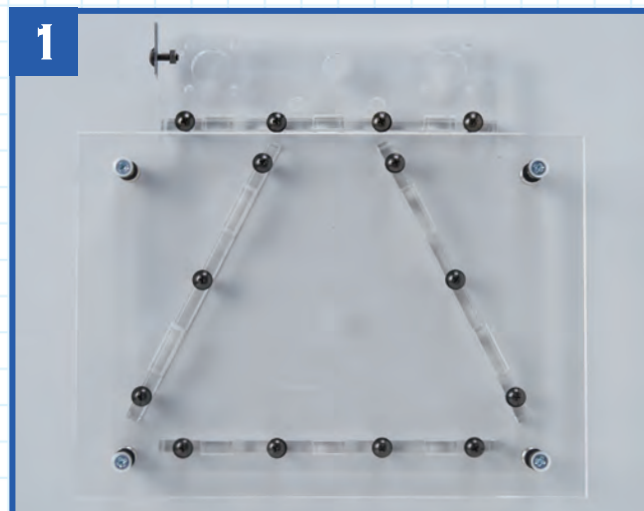
Spanner supplied with Stage 9



Other items needed

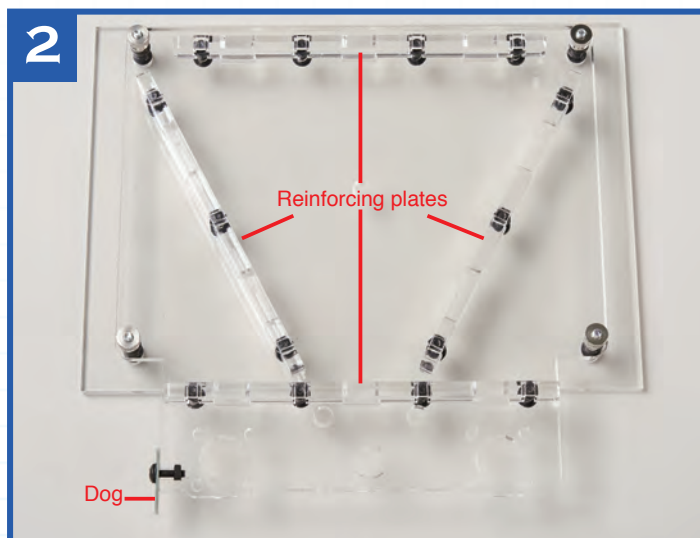
PVA glue, toothpicks

Parts to have ready



For this stage's assembly, you will need the table base you last worked on in Stage 2 and the spanner supplied with Stage 9.

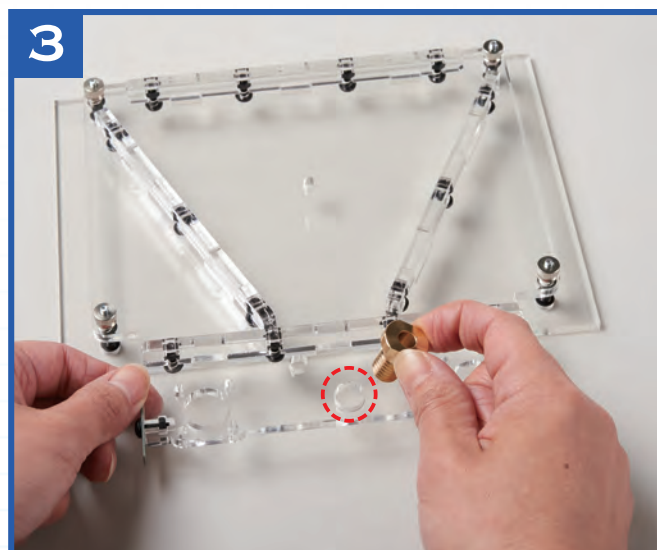
Attach the lead screw nut to the table base



Align the table base so that its underside is uppermost and the small metal plate, or 'dog', is at the lower left.

Fix the lead screw nut with PVA glue

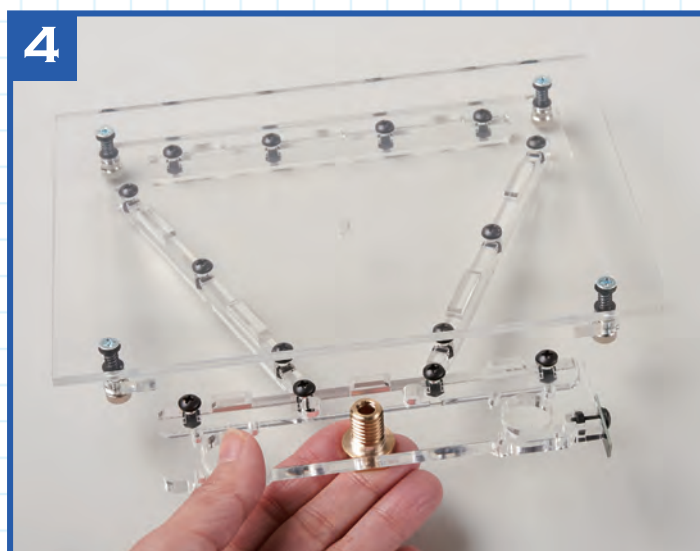
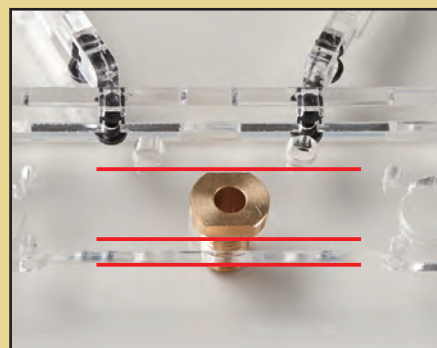
It is essential that the lead screw nut is firmly fixed to the table base. To make certain of this you might want to apply PVA glue (using a cocktail stick) to the underside of the nut's head before inserting it.



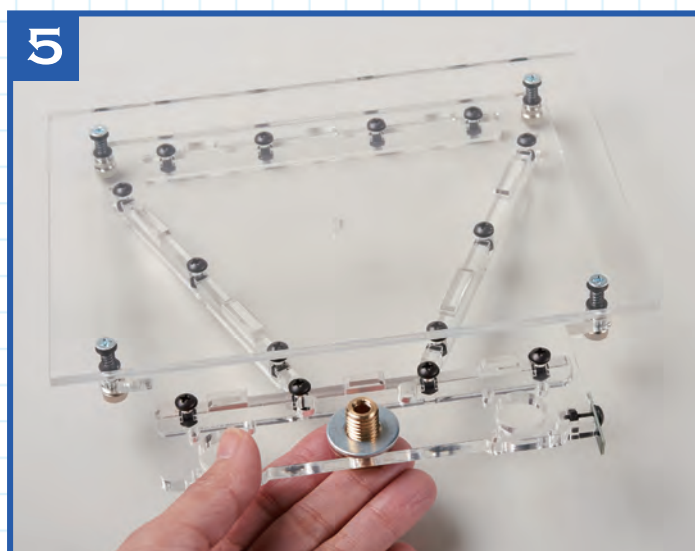
The lead screw nut is to be inserted into the hole shown ringed in red in the image above. Before doing this, you might want to stick it in place with PVA glue (see box, below left)

POINT

Align the lead screw nut in its hole so that the straight sides of its head are parallel with the edge of the table base.

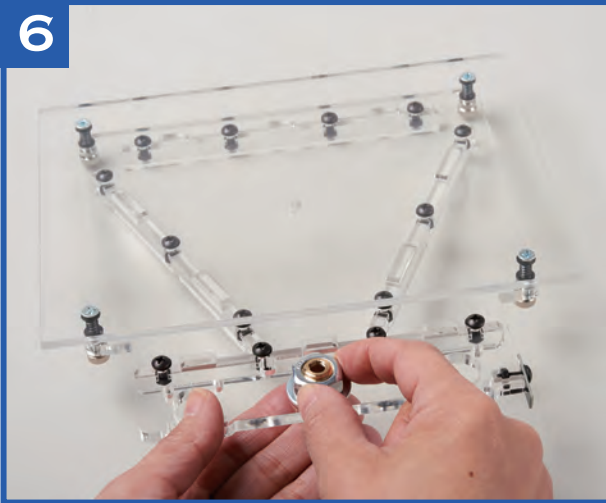


Turn the table base over and hold the lead screw nut with your fingers so it does not drop out.



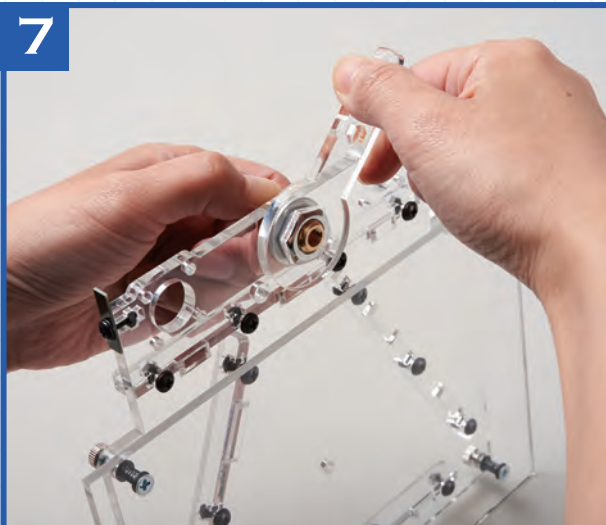
Put the M10 washer over the threaded section of the lead screw nut.

6



Holding the head of the lead screw nut with the fingers of one hand, thread the M10 nut onto the threaded shaft of the lead screw nut with your other hand.

7



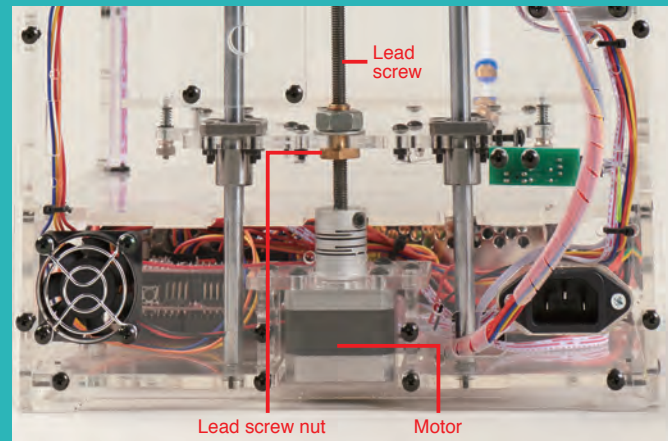
Stand the table base on its side and tighten the M10 nut using the largest hole in the spanner. Hold the lead screw nut to stop it rotating, while you turn the spanner clockwise.

The lead screw nut is now fixed firmly to the table base. Store the assembly carefully for use later.

How the lead screw nut and the lead screw move the table up and down

CLOSE-UP

The brass lead screw nut that is attached to the table base is an essential part of the system that raises or lowers the modelling table. A threaded rod, called the lead screw, runs through the centre of the lead screw nut, which is threaded on the inside. The lower end of the rod is connected to the Z-axis electric motor and when the motor turns, the rod turns too. When the rod rotates, the nut, which is fixed so it cannot rotate, has to move up or down on the lead screw (depending on which way the rod is rotating), taking the table with it.



Stage finished



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