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# Home

This is the home of the BFB multiple head calibration space.

To help you on your way, we've inserted some of our favourite macros on this home page. As you start creating pages, adding news items and commenting you'll see the macros below fill up with all the activity in your space.

## Recently Updated

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There are no pages at the moment.

## Navigate space

# Multiple print head XY calibration manual

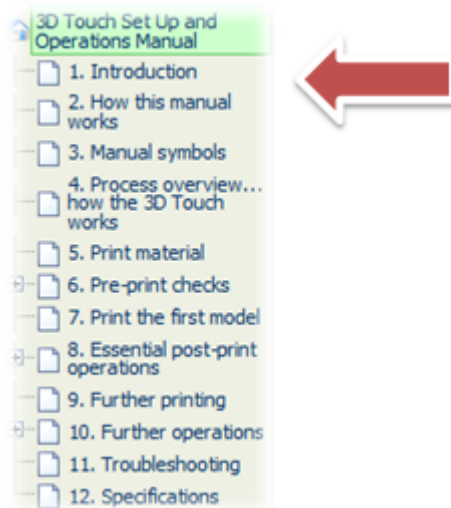
Welcome to the calibration manual. This manual is designed to get your multiple print heads calibrated as quickly as possible. It can be read either on-line or off-line (see below). To print out a copy of this manual, simply follow the off-line instructions to generate a PDF, and then print the PDF.

To complete the exercises in this manual the user will need a BFB printer.

## On-line reading (recommended)

If you prefer to view this document on-line:

- Start by clicking links on the navigation bar at the left of the screen:

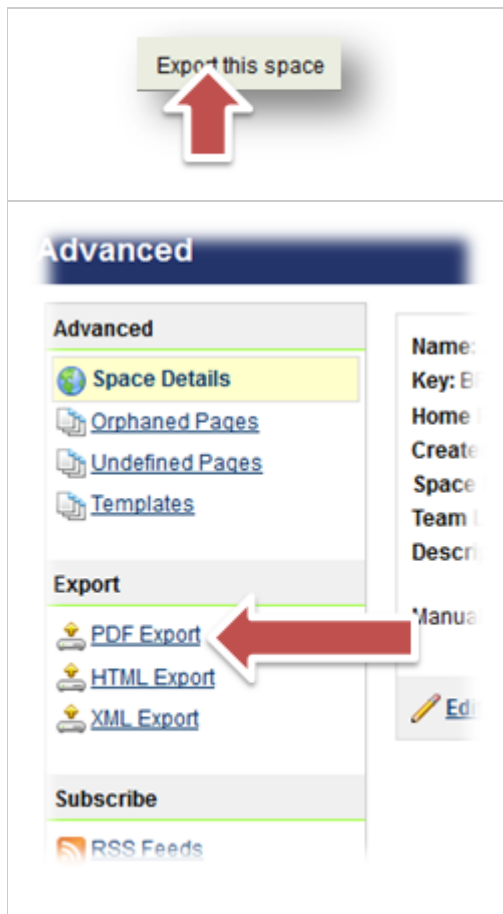


## Off-line reading

If you prefer to view this document off-line:

- Simply click on the "Export this space" button at the top left of the screen to export the manual to a PDF. Follow the on screen instructions.
- For printing it is suggested that your print mode is set to "picture". This will slow the print speed but make the document much clearer to

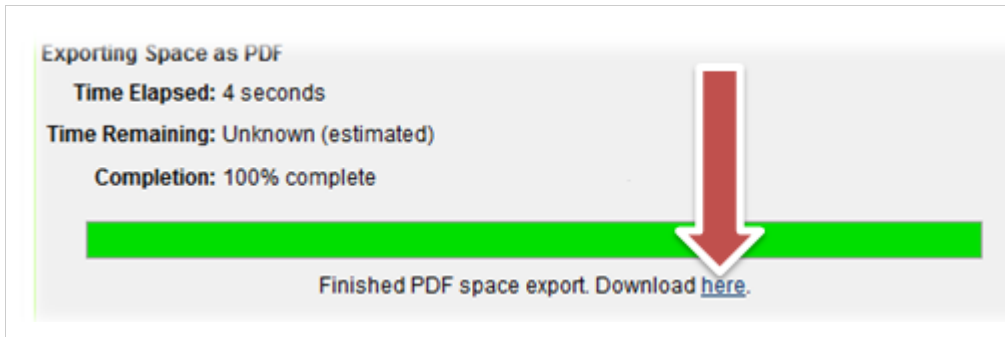
read.



If you have a slow internet connection, it is possible to select individual sections of the manual to export, making it possible to download small sections at a time. Simply tick the boxes next to the sections you need.

Alternatively, if bandwidth is not an issue, select all.





### 3. Downloading the XY calibration file

Download the calibration file here:

Printer	2 heads	3 heads
RapMan	<a href="#">Download file</a>	N/A
BFB-3000 (Plus)/3D Touch	<a href="#">Download file</a>	<a href="#">Download file</a>

### 4. Printing the XY calibration file



All heads need to be printing in PLA.  
The calibration file is much easier to read if printed with different colours and if you are using clear PLA it is recommended that this is used in extruder 2 to make reading the scale easier.

- Printing with BFB-3000 (plus) & 3D Touch
- Printing with RapMan 3.0 & 3.1
- Printing with RapMan 3.2

#### Printing with BFB-3000 (plus) & 3D Touch

- Save BFB print file to SD card/USB stick and print as normal.

#### Printing with RapMan 3.0 & 3.1

Put the file on your SD card and use with your printer as normal **BUT** you need to make a change to the settings before running. On the control box, please navigate to the following:

Settings > General Settings

You will see "Ignore G92" this needs to be changed to "No":

- Use the Z buttons to select the option.

- Press X+ to save, or Escape to quit without saving.

Once you have **completed** the calibration, you need to turn the "**Ignore G92**" back to yes for your subsequent prints, as this is one of the remembered settings.

## Printing with RapMan 3.2

Put the file on your USB stick and use with your printer as normal **BUT** you need to make a change to the settings before running. On the control box, please navigate to the following:

Settings > General Settings

You will see "**Ignore G92**" this needs to be changed to "**No**":

- Tap the screen to toggle the option.
- Press the touch button to quit and save.

Once you have **completed** the calibration, you need to turn the "**Ignore G92**" back to yes for your subsequent prints, as this is one of the remembered settings.

## 5. Reading the calibration file

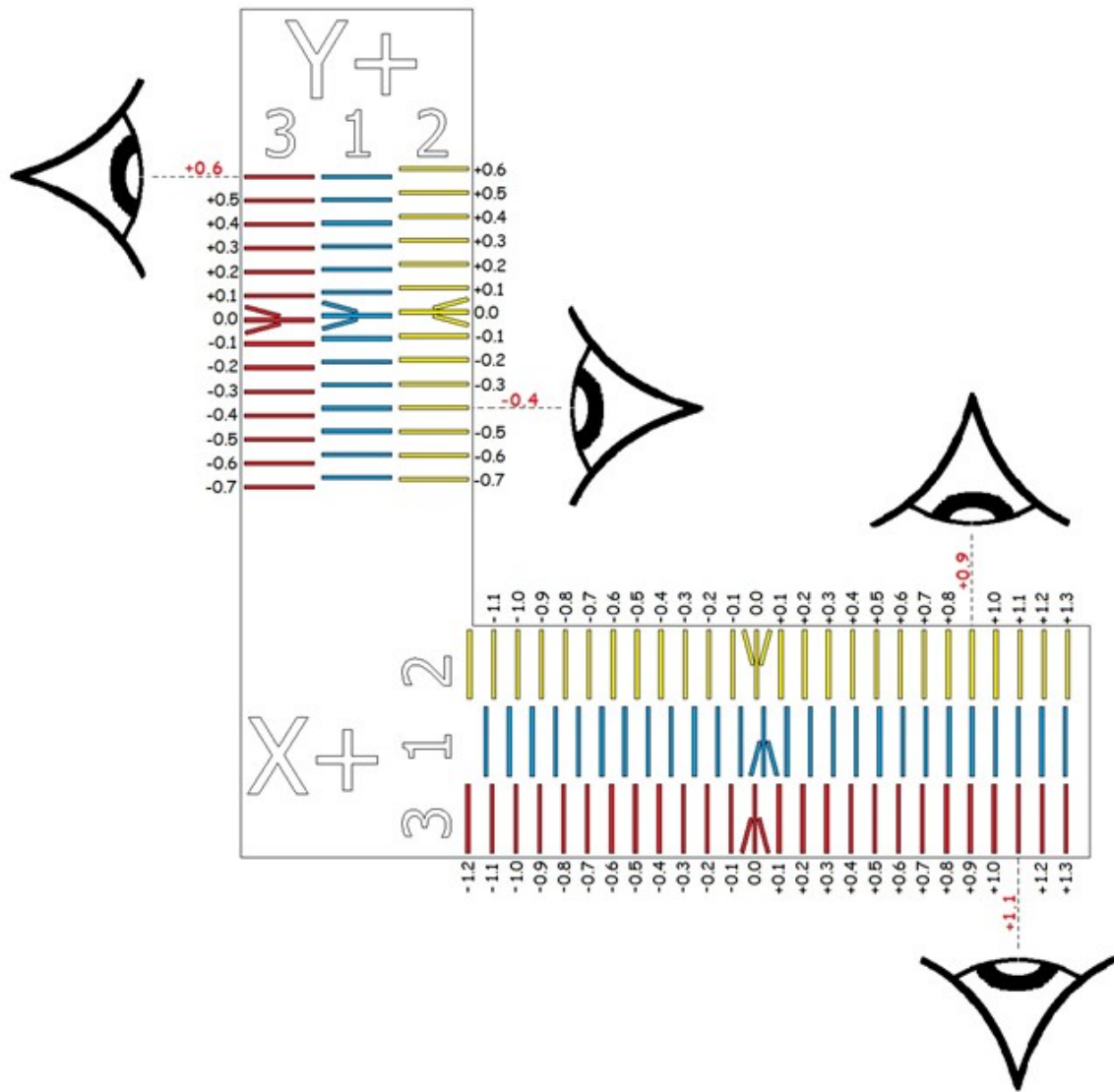
**This section demonstrates a 3 head calibration. If you are only calibrating a 2 (double) head, you will not see the "extruder 3" scale.**

The lines on the calibration print are offset by 0.1 mm. The amount of misalignment can easily be calculated by counting the amount that scale 2 or 3 is offset from scale 1.

Scale 1 is printed by extruder 1, this is the reference extruder and all offsets are relative to extruder 1.

Scale 2 is printed by extruder 2, this amount of error is the amount extruder 2 requires its offsets to be adjusted by.

Scale 3 is printed by extruder 3, this amount of error is the amount extruder 3 requires its offsets to be adjusted by.



**Note:** for a double head machine, all "extruder 3" instructions can be ignored.

## Extruder 2 Y Offset

1. Compare the lines on the "Y scale 1" looking for the lines that line up most accurately with the "Y scale 2". Due to the very small variation it can be easiest to spot 3 that all look to line up - if this is the case simply use the middle one of the three as the correct one.
2. Mark this line with a marker pen to make identification easier.
3. On "Y scale 2" count from the centre line (with the arrow) to the marked line. If you are counting down the scale the number is negative. If you are counting up the scale the number is positive.
4. Write down the offset.
5. In the example shown in Figure 1 the Y offset for extruder 2 is -0.4mm.

## Extruder 3 Y Offset

1. Compare the lines on the "Y scale 1" looking for the lines that line up most accurately with the "Y scale 3". Due to the very small variation it can be easiest to spot 3 that all look to line up - if this is the case simply use the middle one of the three as the correct one.
2. Mark this line with a marker pen to make identification easier.
3. On "Y scale 3" count from the centre line (with the arrow) to the marked line. If you are counting down the scale the number is negative. If you are counting up the scale the number is positive.
4. Write down the offset.
5. In the example shown in Figure 1 the Y offset for extruder 3 is +0.6mm.

## Extruder 2 X Offset

1. Compare the lines on the "X scale 1" looking for the lines that line up most accurately with the "X scale 2". Due to the very small variation it can be easiest to spot 3 that all look to line up - if this is the case simply use the middle one of the three as the correct one.
2. Mark this line with a marker pen to make identification easier.
3. On "X scale 2" count from the centre line (with the arrow) to the marked line. If you are counting left on the scale the number is negative. If you are counting right on the scale the number is positive.
4. Write down the offset.
5. In the example shown in Figure 1 the X offset for extruder 2 is +0.9mm.

## Extruder 3 X Offset

1. Compare the lines on the "X scale 1" looking for the lines that line up most accurately with the "X scale 3". Due to the very small variation it can be easiest to spot 3 that all look to line up - if this is the case simply use the middle one of the three as the correct one.
2. Mark this line with a marker pen to make identification easier.
3. On "X scale 3" count from the centre line (with the arrow) to the marked line. If you are counting left on the scale the number is negative. If you are counting right on the scale the number is positive.
4. Write down the offset.
5. In the example shown in Figure 1 the X offset for extruder 3 is +1.1mm.

## 6. Entering the offsets

Once the offsets have been calculated they need to be entered into the machine.

- [Entering the offsets into the 3D Touch & RapMan 3.2](#)
- [Entering the offsets into the BFB-3000 \(Plus\) & RapMan 3.0 & 3.1](#)

### Entering the offsets into the 3D Touch & RapMan 3.2

- Enter the "Extruder Offsets" function.
- Record these existing offsets, in a table like the one demonstrated below.
- In the following calculations, it is very important to note all "-" symbols.

The following table records all data for this example:

	Existing offsets (from machine display above)	Measurement from calibration file
E2 X	-44.30	+0.9
E2 Y	0.00	-0.4
E3 X	-88.60	+1.1
E3 Y	0.00	+0.6

Use the formula:

$$\text{<Existing offset> +/- <measured offset> = new offset}$$

1. To set the X offset extruder 2 as per our example,  $-44.3 + 0.9 = -43.4$
  2. To set the Y offset extruder 2 as per our example,  $0.0 - 0.4 = -0.4$
  3. To set the X offset extruder 3 as per our example,  $-88.6 + 1.1 = -87.5$
  4. To set the Y offset extruder 3 as per our example,  $0.0 + 0.6 = 0.6$
- Enter the new values into the printer.

```
> Extruder 2 X -43.40
Extruder 2 Y -0.40
Extruder 3 X -87.50
Extruder 3 Y 0.60
```

- Use the Z buttons to select the extruders. Use the Y buttons to alter the values.
- Press X+ to save, or Escape to quit without saving.



Incorrect values will severely affect print quality.

## Entering the offsets into the BFB-3000 (Plus) & RapMan 3.0 & 3.1

Firmware versions 4.1.x or higher is required, if you have an earlier version please update.

- Make the menu selections shown below.

```
RUN FILE
EXTRUDER MAPPING
MANUAL MOVE
EXTRUDER CONTROL
HOME TOOL HEAD
> SETTINGS
```

```
> EXTRUDER OFFSETS
LEVEL BED
SET Z HEIGHT
SET BED TYPE
GENERAL SETTINGS
```

```
> Extruder 2 X -44.30
Extruder 2 Y 0.00
Extruder 3 X -88.60
Extruder 3 Y 0.00
```

- Record these existing offsets, in a table like the one demonstrated below.
- In the following calculations, it is very important to note all "-" symbols.



The following table records all data for this example:

	Existing offsets (from machine display above)	Measurement from calibration file
E2 X	-44.30	+0.9
E2 Y	0.00	-0.4
E3 X	-88.60	+1.1
E3 Y	0.00	+0.6

Use the formula:

$$\text{<Existing offset> +/- <measured offset> = new offset}$$

1. To set the X offset extruder 2 as per our example,  $-44.3 + 0.9 = -43.4$
  2. To set the Y offset extruder 2 as per our example,  $0.0 - 0.4 = -0.4$
  3. To set the X offset extruder 3 as per our example,  $-88.6 + 1.1 = -87.5$
  4. To set the Y offset extruder 3 as per our example,  $0.0 + 0.6 = 0.6$
- Enter the new values into the printer.

```
> Extruder 2 X -43.40
   Extruder 2 Y -0.40
   Extruder 3 X -87.50
   Extruder 3 Y  0.60
```

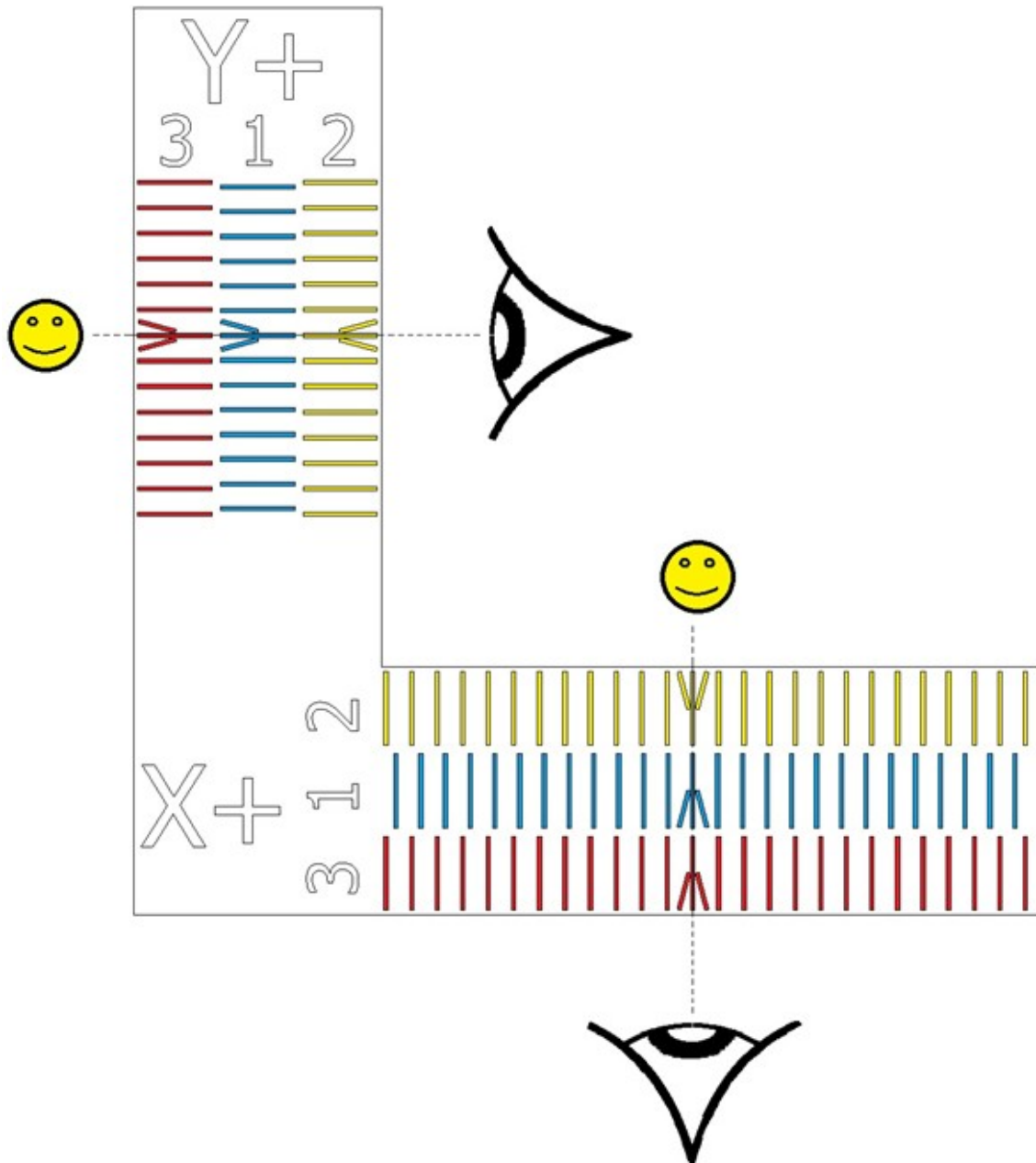
- Use the Z buttons to select the extruders. Use the Y buttons to alter the values.
- Press X+ to save, or Escape to quit without saving.



Incorrect values will severely affect print quality.

## 7. Checking the calibration

- Print the calibration file again to check that the offsets are now correct. The arrows for all extruders must line up. If they don't, repeat the calibration procedure until they do.
- For firmware versions less than 5.0.0, if the firmware is updated in the future the calibration settings will be lost. Record your new settings in a save place so that they may be easily re-entered for the next firmware update.



## 1. Check you have the correct firmware

To learn how to check which version you are running, [click here](#).  
To install new firmware on your printer [click here](#).

- Firmware versions 4.1.x or higher is required. If you have an earlier version please update the firmware.
- Make sure that the firmware version installed on your printer matches the number of extruders you have.

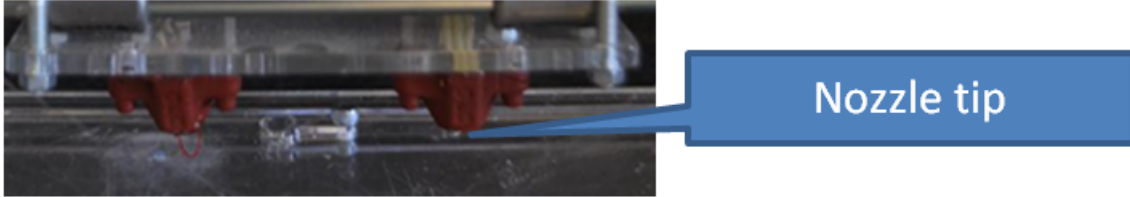
## 2. Level the nozzles

First check that the nozzles are horizontal. Use the links below, or on the left to find instructions for your printer.

- RapMan levelling the nozzles

## RapMan levelling the nozzles

It is important that both nozzle tips are horizontal, otherwise they may snag on the print.



1. Ensure that the bed has been levelled (as shown in the [operations manual](#)).
2. Make sure the nozzles are clean (unlike the photo!).
3. Wind the bed up to be close to the nozzles (the ends of the extruder heads).
4. Examine the heights of the tips of the nozzles with respect to the bed. They need to be level (horizontal with respect to the bed) to achieve a good quality double head print.
5. If they are more than approximately different in height, tighten the M5 nuts on the lowest hanging nozzle to bring the hot end closer to the extruder. Continue to do so until the nozzles are level.
6. If this is insufficient, detach the lowest extruder from the carriage. Insert paper/card shims between the extruder and the carriage and reattach the extruder. Repeat until the nozzles are approximately level.