DISCLAIMERS

THIS TUTORIAL IS NOT OFFICIAL IN ANY FORM AND IM SURE IMPROVEMENTS TO MY METHOD CAN BE MADE. IF YOU BREAK SOMETHING WHILE ATTEMPTING THIS TUTORIAL, I AM NOT RESPONSIBLE. THIS IS A RELATIVELY LOW RISK ADVENTURE BUT THERE IS ALWAYS SUCH POSSIBILITIES.

THIS TUTORIAL WAS WRITTEN FOR NOVICES AND MAY CONTAIN A LOT OF EXTRA INFORMATION THAT MORE EXPERIENCED READERS WILL FIND UNNECESSARY AND EXCESSIVE. I WANT TO MAKE SURE EVEN NEWBIES CAN GET THIS UPGRADE.

If you have not yet leveled your X axis. I suggest you do this before switching out parts.
if this is off, you have trouble leveling your plate with the ABL. And also your prints will be skewed.

* Here is a super easy way to do it. I have made printable models that take about 1 hr to print. And there is an instruction pdf on this website too.
https://www.printables.com/model/853057-x-axis-leveling-blocks-guide-for-ender-3-v3-se

*this printers pretty much needed every mechanical aspect re-tuned.

You need to get screws, thumbscrew nuts, and silicone spacers. You can buy a "kit" to save money but the screws in the kit are too long and will need cut. If you do not have any way to cut screws, then purchase the screws and nuts separately.

Here are some suggestions from Aliexpress. These are probably also on Amazon and maybe even at your local hardware store. I have highlighted the key important features that you need.

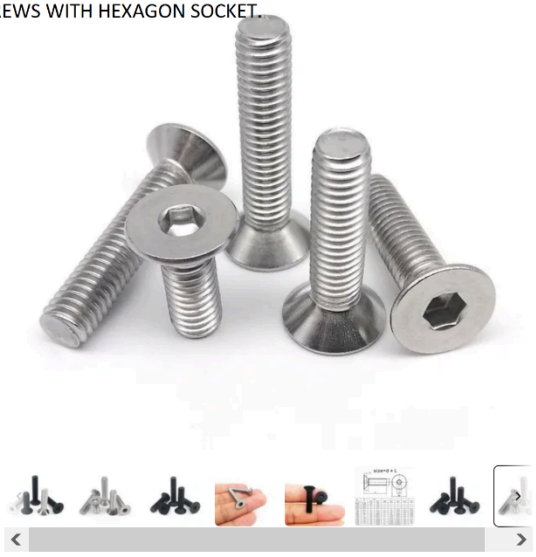
1. 4x countersunk hex screws: size M3X30mm
2. 4x thumbscrew nuts: size M3 with hole through entire part.
3. 4x silicone spacers

   *Do not purchase kits with M4 screws as these will not work. The original screws/holes in the plate are M4 and will not be appropriate for adjustments.
   *Do not purchase kits with larger adjustment wheels/nuts. There is not enough clearance under the plate for larger nuts and these will not be useful anyway (I will explain further down).

SUGGESTED MATERIAL SOURCES: (all on Aliexpress)

YOU NEED **4X M3X30MM** COUNTER SUNK SCREWS.

I SUGGEST GETTING A PACK OF AT LEAST 5 AND GETTING SCREWS WITH HEXAGON SOCKET.



Welcome deal

$0.99 ~~$3.39~~ -70%

Wholesale 10+ pieces, extra 10% off

10/50pcs M3 M4 M5 M6 M8 DIN7991 Black Grade 10.9 Steel 304 Stainless Steel Hexagon Hex Socket Flat Countersunk Head Screw Bolt

4.9 653 Reviews | 2,000+ sold

Coupon & Discount

$6.00 off
On orders over $129.00

$10.00 off
On orders over $199.00

Color: 304 stainless steel

EITHER MATERIAL IS PROBABLY FINE

Thread Diameter: M3 50pcs

M4 10pcs | M8 10pcs | M3 50pcs | M5 10pcs | M6 10pcs

Length: 30mm

5mm | 6mm | 8mm | 10mm | 12mm | 14mm | 16mm | 18mm

20mm | 22mm | 25mm | 30mm | 35mm | 40mm | 45mm | 50mm

55mm | 60mm | 65mm | 70mm | 75mm | 80mm | 85mm | 90mm

AND

MAKE SURE HOLE GOES THROUGH ENTIRE NUT!



$1.32 / lot (5 Pieces) YOU NEED AT LEAST 4X

$1.55 -15%

5PCS Nickel Plated Knurled Thumb Screws Nuts M3 M4 M5 M6 M8 Thin High Head Step Hand Nuts Through Hole

4.0 2 Reviews | 4 sold

Coupon & Discount

$3.00 off
On orders over $150.00

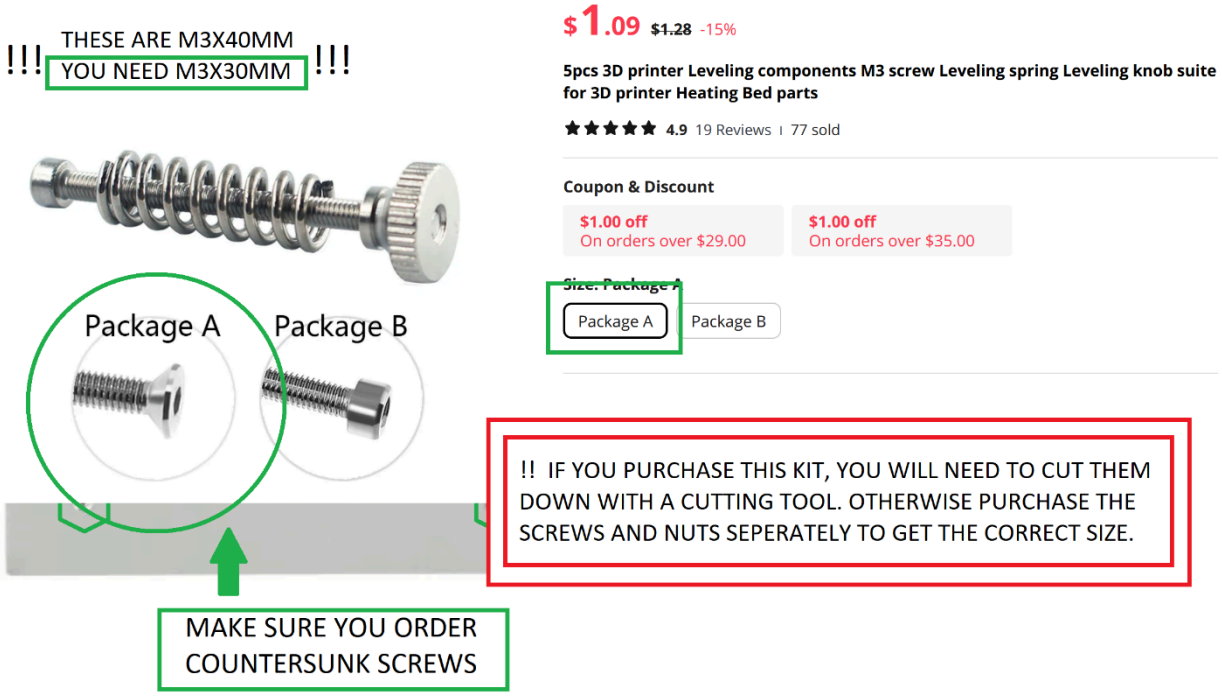
5% off
Buy 5 pieces

Size: M3xD8xH6mm

M3xD8xH6mm | M4xD10xH7mm | M5xD13xH7(Thin nuts) | M5xD13xH9m

M6xD13xH9mm | M6xD16xH10mm | M8xD19xH12mm

OR (ONLY IF YOU HAVE A CUTTING TOOL!)



AND

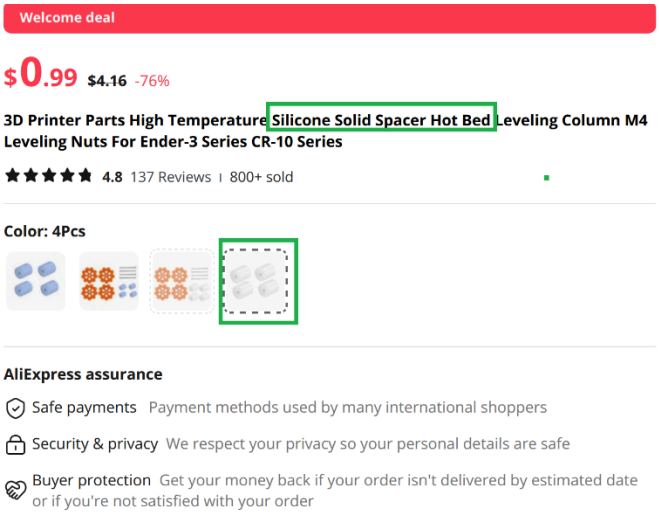
4X SILICONE SPACERS

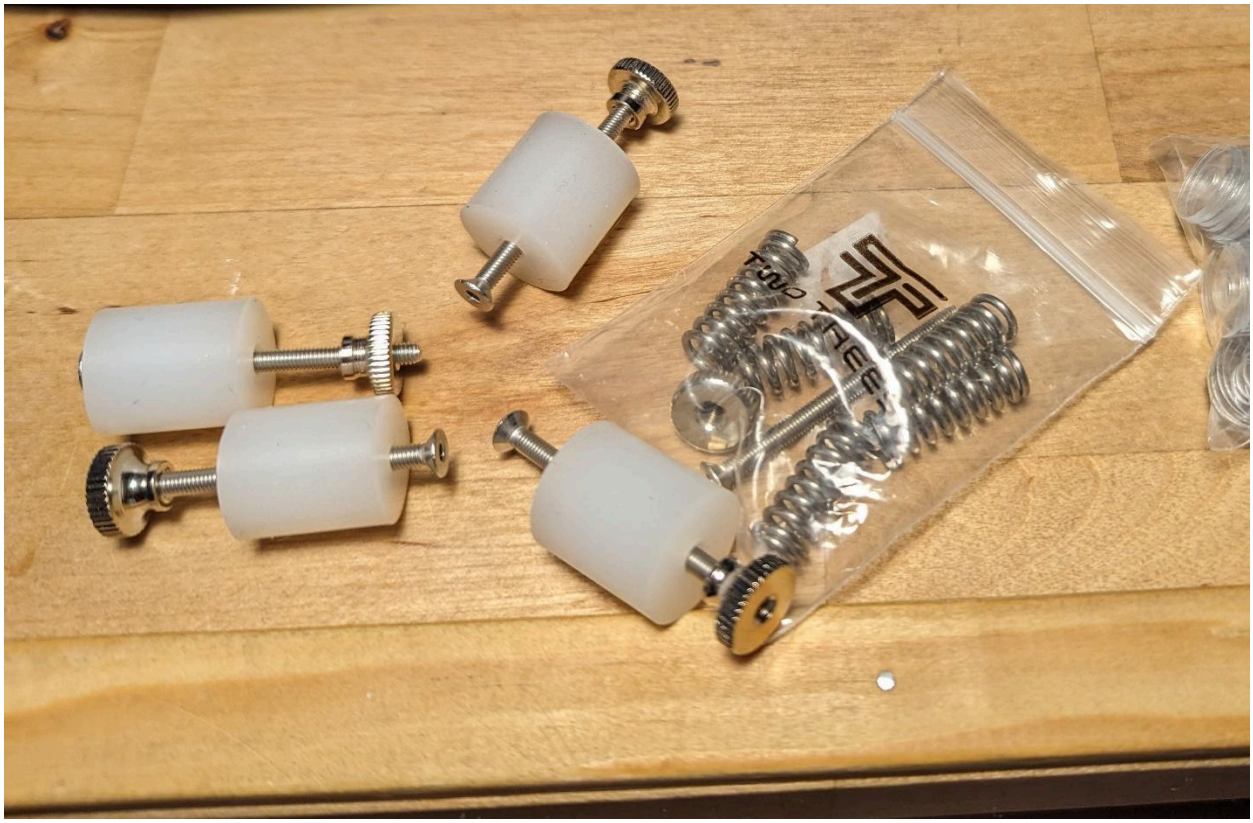
I ORDERED BOTH BLACK AND WHITE ONES. THE WHITE ONES APPEARED TO BE A FEW MM TALLER. BUT EITHER ARE PROBABLY FINE. THEY FELT ABOUT THE SAME IN TERMS OF HARDNESS.

MAKE SURE YOU ORDER A SET WHERE ALL ARE THE SAME SIZE. MANY SETS CAME WITH ONE SHORTER FOR OTHER TYPES OF PRINTERS.

MAKE SURE THE SET YOU ORDER HAS ALL 4 THE SAME SIZE. SOME SETS HAVE ONE THAT IS SHORTER.







IF YOU BOUGHT THE KIT (LIKE I DID):

1. DISCARD SPRINGS

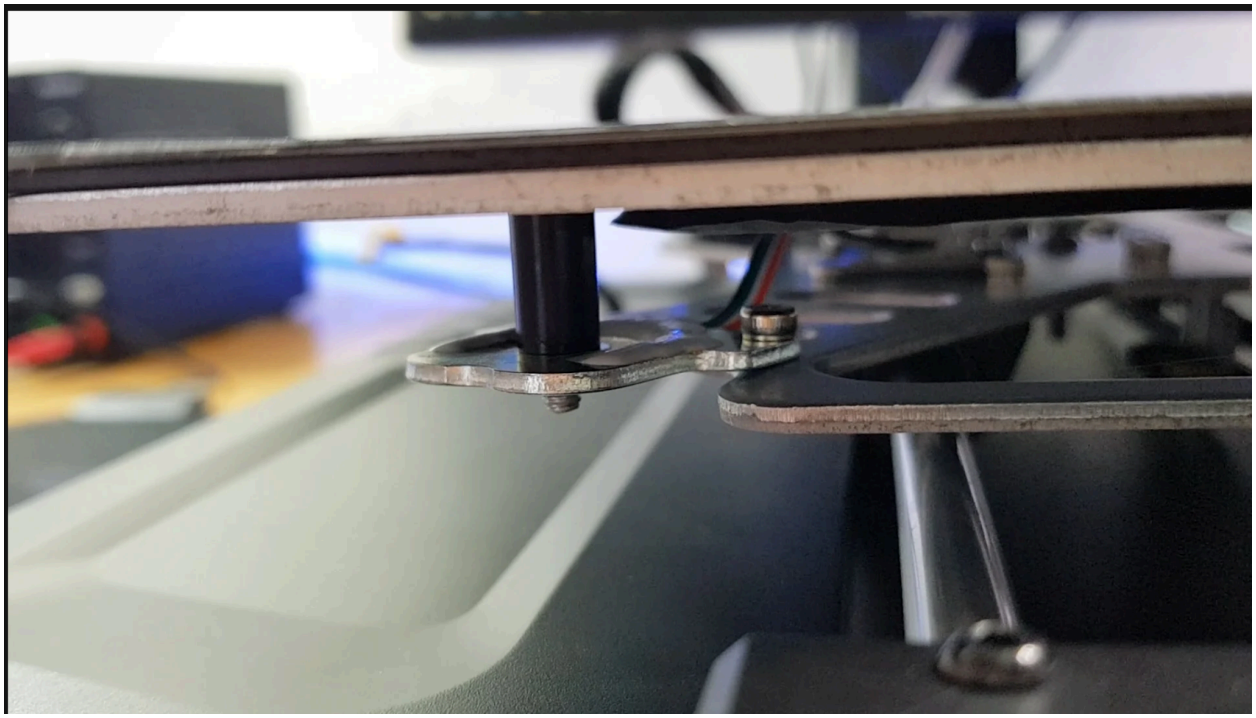
2. CUT SCREWS DOWN TO AROUND 30MM IN LENGTH. I USED A DREMEL WITH A CUTTING WHEEL. WEAR SAFTEY GEAR!

STEPS

1. MAKE SURE YOUR PRINTER IS TURNED OFF AND IS COOL.
2. REMOVE THE MAGNETIC PLATE (THE REMOVABLE PLATE THAT YOU PRINT DIRECTLY ON).
    a. UNDERNEATH THE MAGNETIC PLATE, THERE IS A MAGNETIC BED. THE BED HAS 6 SCREWS VISIBLE. ONLY REMOVE THE 4 SCREWS IN EACH OF THE FOUR CORNERS AS INDICATED IN THE IMAGE BELOW.



3. IF YOU LOOK UNDER YOUR PLATE, YOU WILL SEE HARD BLACK PLASTIC SPACERS UNDER EACH CORNER SCREW. THESE MAY HAVE ROLLED OFF WHEN YOU REMOVED YOUR SCREWS. BE SURE TO GATHER THEM AND NOT LET THEM ROLL AROUND IN THE UNDERSIDE BY THE BELT OR YOU ARE GOING TO HAVE A BAD TIME. SAVE THEM INCASE THIS ADVENTURE GOES TITS UP.

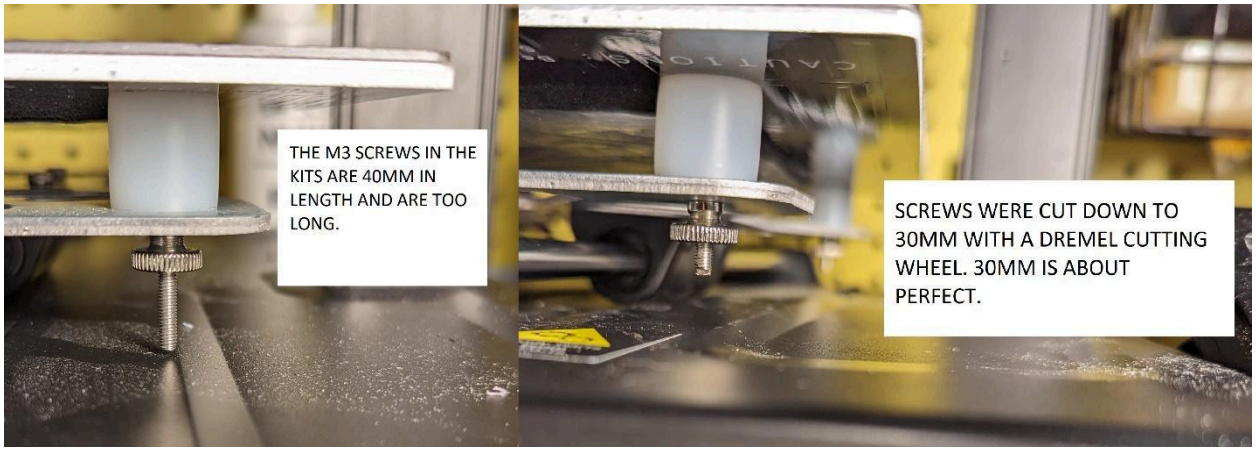


THE BACK LEFT CORNER (not pictured) HAS AN ADDITIONAL PLASTIC PART THAT SITS UNDERNEATH THE BLACK PLASTIC SPACER. IT SORT OF LOOKS LIKE A COASTER. THIS CONNECTS TO THE CABLE THAT HEATS YOUR BED. YOU SHOULD **NOT** UNHOOK THIS! BUT YOU DO NEED TO BE GENTLE WHEN MOVING THIS AROUND TO REMOVE THE BLACK SPACER AND WHEN YOU ADD THE NEW ONE.

The silicone is pretty close in height to the OG plastic spacer.



4. ADD THE NEW SPACERS AND THE NEW SCREWS. HOLD THE THUMB SCREW WITH ONE HAND AND USE AN ALLENWRENCH (one of the ones that came with the printer fits) TO TIGHTEN DOWN THE PLATE. TURN THE SCREW CLOCKWISE. THE PLATE SHOULD BE FIRMLY ANCHORED AND SHOULD NOT WIGGLE EVEN A LITTLE. THE SCREW ENDS STICKING OUT FROM THE BOTTOM OF THE THUMSCREW NUTS SHOULD LOOK ABOUT THE SAME FOR ALL CORNERS. **I KNEW ALREADY THAT THE REAR OF MY PLATE WAS ABOUT 2MM LOWER THAN THE FRONT AND I HAD PREVIOUSLY USED 2 METAL WASHERS TO ELEVATE THE BACK. BECAUSE OF THIS I WENT AHEAD AND TIGHTENED THE FRONT TWO LEVELING SCREWS A BIT TIGHTER THAN THE BACK TWO, TO LOWER THE FRONT.*



5. UNLIKE MOST BEDS WHICH ARE ADJUSTED WITH THE BOTTOM WHEEL/THUMBSCREW, YOU WILL BE ADJUSTING THIS BED WITH THE SCREWS AND YOUR ALLEN WRENCH. YOU COULD USE A LOCKING NUT TO CREATE A SETUP THAT WOULD ALLOW YOU TO USE THE BOTTOM WHEEL/NUT, BUT I DO NOT THINK THIS WOULD WORK VERY WELL FOR REASONS. SO THIS IS HOW WE WILL DO IT.

   AFTER ALL THE PARTS ARE PUT TOGETHER, TURN YOUR MACHINE ON.
   FOR SETTING THIS UP I CHOSE THE PRINT BED PLATE THAT WAS IN THE BEST SHAPE THAT I HAD. DO NOT USE ONE WITH CLUMPS OF GLUE OR DENTS. I USED THE OG PLATE THAT CAME WITH THE PRINTER SINCE I HAVEN'T ACTUALLY USED IT TO PRINT ON. JUST USE YOUR BEST PLATE.

6. AND RUN THE AUTO LEVELING. WE ARE GOING TO USE THIS TO MAKE ADJUSTMENTS.

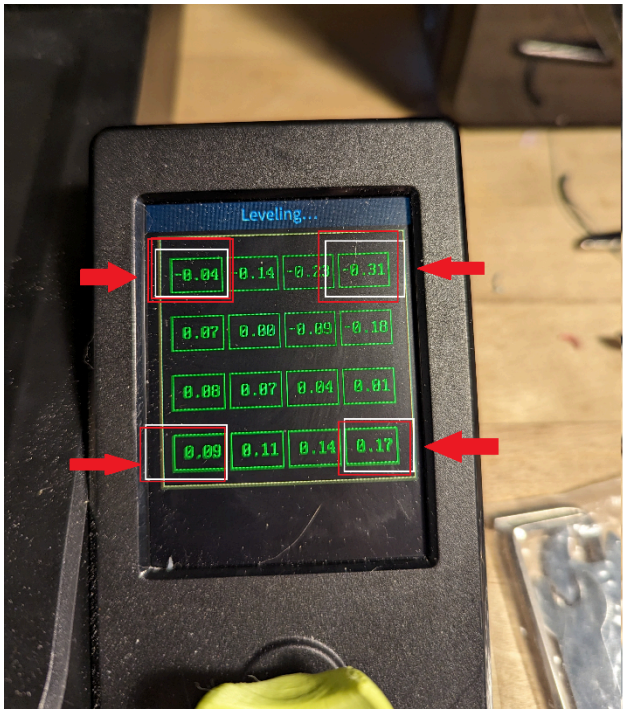
7. TO MAKE ADJUSTMENTS. YOU ARE GOING TO HOLD THE THUMB SCREW WITH ONE HAND (STEADY, DO NOT TURN WITH THIS HAND!) AND TURN THE SCREW WITH AN ALLEN WRENCH WITH THE OTHER. THIS MEANS YOU WILL NEED TO REMOVE THE MAGNETIC PLATE BETWEEN EACH AUTO LEVEL TRIAL.

   I AM GOING TO POST PICTURES OF MY RESULTS AND WHAT CHANGES I MADE TO EACH TRIAL UNTIL I WAS SATISFIED. IT TOOK ME ONLY 3 TRIALS. IT MAY TAKE YOU MORE DEPENDING ON YOUR EXPERIENCE WITH THIS KIND OF THING. THESE INCLUDE A LOT OF DETAILS FOR PEOPLE WHO HAVE NEVER DONE THIS TYPE OF THING BEFORE.

1ST AUTO LAYER OUTPUT

Loosen = counterclockwise = spacer expands = bed lifts up (moves towards positive number)

Tighten = clockwise = spacer is compressed = bed lowers (moves towards negative)



WE ARE ONLY GOING TO LOOK AT THE FOUR COURNER MEASUREMENTS.

WE ARE THEN GOING TO TAKE LEFT TO RIGHT, AND TOP TO BOTTOM DIFFERENCES TO DETERMINE THE APOXIMATE CHANGES WE NEED TO MAKE. IT IS UNNECESSARY TO DO THIS BUT I WANT TO ILLUSTRATE HOW I AM USING THE OUTPUT TO DETERMINE WHAT ADJUSTMENTS TO MAKE.

-.04 (-.04 - - 0.31= 0.35) **-0.31**

(-0.4-0.09 =-0.13) (-0.31- 0.17=-0.30)

0.09 (0.09 - 0.17 = -0.8) **0.17**

THE BACK NUMBERS OF -.04 AND -0.31 TELL US THAT THE BACK IS LOWER THAN THE FRONT. WE NEED TO LOOSEN (COUNTER CLOCKWISE) THE RIGHT BACK SCREW. HOWEVER, THE BACK LEFT SCREW IS VERY CLOSE TO 0. FOR NOW I WILL NOT ADJUST IT.

THE FRONT NUMBERS. THE BOTTOM LEFT NEEDS TIGHTENED (CLOCKWISE) A WEE BIT AND THE BOTTOM RIGHT ONE ABOUT 2X AS MUCH AS THE LEFT.

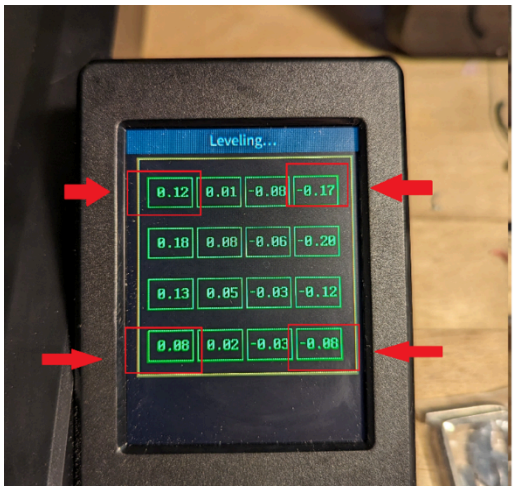
YOU CAN THINK OF TIGHTENING SCREWS AS MOVING HANDS ON A CLOCK.

BACK LEFT WAS LOOSENED (COUNTER CLOCKWISE, OR "BACKWARDS") FROM THE 12 O CLOCK POINT TO THE 8 OCLOCK POINT.

THE FRONT LEFT WAS TIGHTENED FROM 12 OCLOCK TO ABOUT 1 1/2 OCLOCK. THE BOTTOM RIGHT WAS TIGHTENED ABOUT A QUARTER OF A TURN OR 12 OCLOCK TO 3 OCLOCK.

NOW THESE ADJUSTMENTS WONT NECESSARILY APPLY TO YOURS BECAUSE IT WILL DEPEND ON HOW TIGHT YOU SET THESE INITIALLY. BUT THINKING OF TURNS LIKE MOVING THE HANDS ON A CLOCK CAN BE VERY HELPFUL. SINCE ALLEN WRENCHES HAVE A LITTLE HANDLE, YOU CAN THINK OF THIS AS THE HAND ON A CLOCK. THE STARTING POINT IS ALWAYS 12 OCLOCK.

2ND AUTO LEVELING



I ADJUSTED THE BACK LEFT WHEN I SHOULD HAVE PROBABLY LEFT IT ALONE AS I SAID TO DO ON THE PREVIOUS INSTRUCTIONS. BUT LETS MOVE TO THE NEXT ADJUSTMENT.

WHILE ADJUSTING I DECIDED ON A MARGIN OF ERROR I WOULD BE SATISFIED WITH AND DECIDED 0.05 DIFFERENCE WAS ACCEPTABLE AND POSSIBLY EVEN .10. (STILL FAR SUPERIOR TO WHERE IT HAD BEEN).

0.12 -0.17

0.08 -0.08

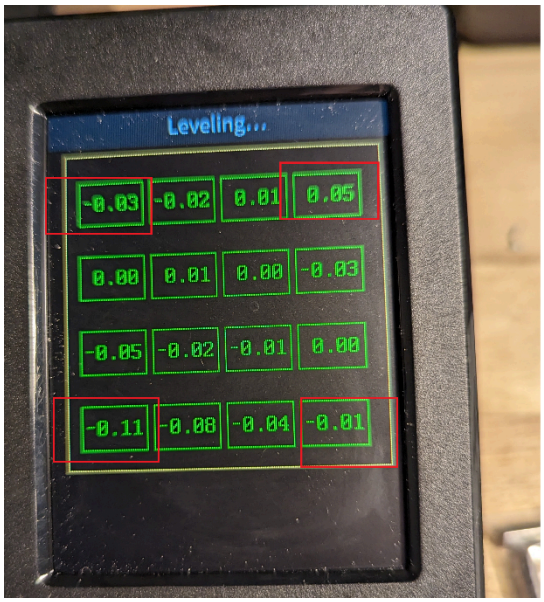
THE BACK LEFT IS TOO HIGH
THE BACK RIGHT IS TOO LOW
THE FRONT LEFT IS TOO HIGH (TINY BIT)
THE FRONT RIGHT IS TOO LOW (TINY BIT)

BACK LEFT TIGHTEN CLOCKWISE A TINY BIT. LIKE 1 HOUR FORWARD.
BACK RIGHT, LOOSEN COUNTERCLOCKWISE FROM 12 OCLOCK TO 10 ISH.

FRONT LEFT. TINY BIT CLOCKWISE TIGHTEN. LIKE 1 HOUR FORWARD ON THE CLOCK.
FRONT RIGHT. ABOUT ONE HOUR BACK.

*AT THIS POINT YOU MIGHT BE FIGURING OUT ABOUT HOW MANY CLOCK HOURS GIVE YOU THE DESIRED EFFECT.

THIRD AUTO LEVELING



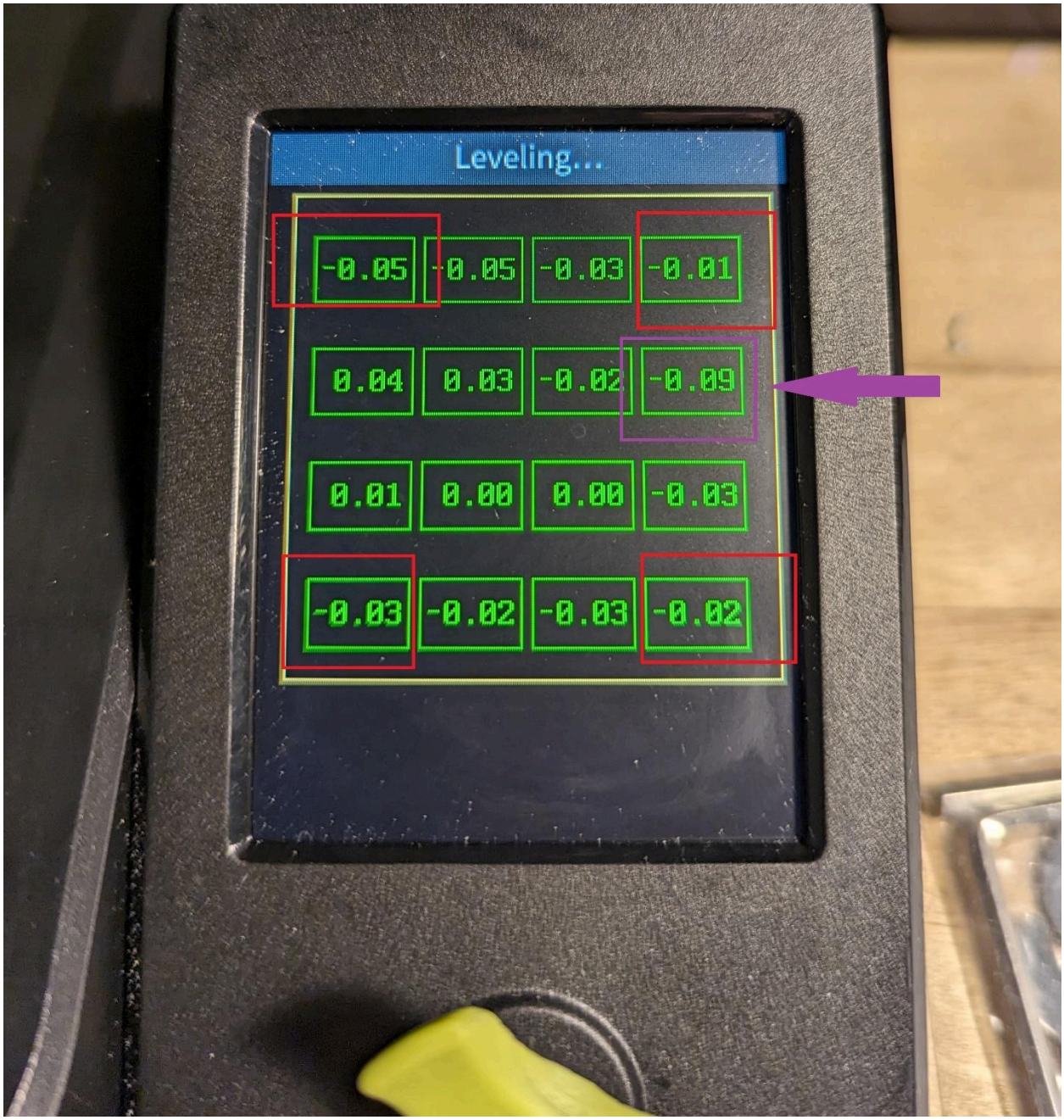
-0.03 -.05

-0.11 -0.01

THE ONLY CORNER THAT IS OUTSIDE OF MY PERSONAL CHOICE ERROR OF 0.05 IS THE BOTTOM LEFT. IT IS SLIGHTLY TOO LOW

BOTTOM LEFT. TURN SCREW 1/2 OF AN HOUR COUNTER CLOCKWISE.
NO OTHER ADJUSTEMNTS MADE.

4TH AUTO LEVELING



I WAS VERY HAPPY WITH THESE RESULTS. ALL FOUR CORNERS WERE WITHIN 0.05 OF 0. (MY PERSONAL CHOICE FOR ERROR TOLERANCE). THIS LEVELING IS FAR SUPERIOR TO ANYTHING I COULD HAVE ACHIEVED WITH PAPER. BY USING THE AUTO LEVELER TO MAKE ADJUSTMENTS, THE PLATE IS DAMN NEAR PERFECT… EXCEPT.. WAIT.

WHY IS THERE A -0.09 BETWEEN A -.02 AND A -.01 ? (RIGHT SIDE TOP AND BOTTOM). HOW CAN THIS BE IF THE PLATE IS PERFECTLY FLAT?
I RAN THE AUTO LEVELER AGAIN. SAME RESULTS.

I RAN THE AUTO LEVELER AGAIN WITH A DIFFERENT PLATE. EVEN THOUGH THE NUMBERS DEVIATED A LITTLE, THE SAME PATTERN OF HIGH SPOTS APPEARED ON 4 PLATES (YES I HAVE TOO MANY PLATES).

WHAT COULD CAUSE THIS.?
I CAN ONLY SPECULATE. THE EASY ANSWER: THE PLATE BED IS NOT FLAT. OTHER POSSIBILITY IS THAT BECAUSE THESE PLATES ARE REMOVABLE, AND THE MANNER THAT THEY ARE REMOVED JUST SO HAPPENS TO INCUR STRESS IN THAT AREA, THAT ALL THE PLATES ARE SLIGHTLY BOWED OR THAT REMOVAL OF THE PLATES IS SOMEHOW DAMAGING THAT SUPER SOFT SCRATCHABLE MAGNETIC SURFACE.

WHO KNOWS.
WHAT I DO KNOW IS THAT MY PRINTS ACTUALLY STICK UNIFORMLY TO THE PRINT BED NOW. AND THAT THE AUTO LEVELING COMPENSATION, THAT DOESN'T SEEM TO ACTUALLY WORK, ISNT REALLY NEEDED ANYMORE.

ALSO.
I HAD TO MANUALLY ADJUST THE Z OFFSET A BIT AFTER ALL THIS AUTO LEVELING. I THINK I HAD TO LOWER IT ABOUT 0.05. SO JUST LIKE USUAL.

MAKE SURE YOU DO THIS OR YOU MIGHT BE MAD AT ME THINKING I MADE YOU DO A LOT OF WORK FOR NOTHING.
This video will help you.
https://www.youtube.com/watch?v=gkfT2Prrfb0

I WOULD SUGGEST CHECKING BED LEVEL BEFORE ANY BIG LONG PRINT AND PROBABLY FAIRLY REGULARLY AS WELL.

HERE ARE SOME OTHER SUGGESTIONS.

MAKE SURE YOUR EXTRUDER TENSION IS SET

My extruder tension needed adjusted.
https://www.youtube.com/watch?v=8bACUeH6WDs&t=630sex

MAKE SURE THE BELT TENSION IS GOOD (BOTH BELTS RUB FROM MISALIGNMENT. THIS IS UNFORTUNATE AND NOT SUPPOSED TO HAPPEN BUT i DID FIGURE OUT A SOLUTION IF YOU WANT IT.
https://www.reddit.com/r/Ender3V3SE/comments/19232tn/x_axis_belt_rubbing_i_found_a_solution_and_i_hope/

MAKE SURE YOUR CARRIAGE IS WORKING PROPERLY.
My carriage wheels were so tight that one of the wheels didn't turn.
https://www.youtube.com/watch?v=GsEdU8ZtI6U&t=202s

MAKE SURE YOUR X AXIS IS FIXED. ITS PROBABLY OFF. IF YOU HAVE PROBLEMS GETTING YOUR PLATE TO LEVEL AFTER ALL THE STEPS I GAVE YOU. TRY FIXING THE X AXIS. THEN REDOING THE LEVEL ADJUSTMENTS. I suggest putting the hard black plastic spacers back on before doing this.

* I had to relevel the X axis manually. Here is a tool to use and instructions on how to use it. Takes about an hour to print the tool and 5 minutes to level your x axis gantry.
https://www.printables.com/model/853057-x-axis-leveling-blocks-guide-for-ender-3-v3-se