

# CS7.2 Classifier Assembly Guide

## Printing the parts

The models for the 3d printed parts for the classifier base are available in the “Classifier” folder in the GitHub CS7.2 repo.

<https://github.com/sjseth/Al-Case-Sorter-CS7.2/tree/main/Models/Classifier>

From this folder, you need to print all models.

- CS7.2 Classifier Base
- CS7.2 Classifier Drop Nozzle
- CS7.2 Drive Gear
- CS7.2 Feed Bracket
- CS7.2 Homing Sensor
- CS7.2 Tension Cam Shim
- CS7.2 Tension Cam
- CS7.2 Wheel Lock – Light Shade

In addition, you need to print a caliber feed set for the caliber you wish to sort. The caliber feed sets are available in the **CaliberFeedSets** folder at:

<https://github.com/sjseth/Al-Case-Sorter-CS7.2/tree/main/Models/CaliberFeedSets>

From the caliber selected, (for example 9mm), there are two parts needed:

- CS7.2 Feed Nozzle 9mm
- CS7.2 Feed Wheel 9mm

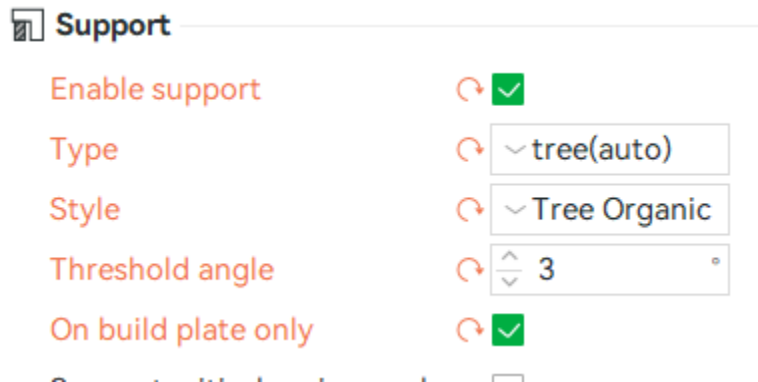
For these parts here are the basic recommendations:

**Filament:** PLA+ or PETG.

**Color:** For some of the parts, the color effects the imaging quality. It is recommended to print the classifier base, feed wheel, tension cam and light shade in black. If you choose another color, be sure to paint or black out the bottom surfaces of these parts which are visible by the camera. The other parts can be any color which suits your tastes.

**Layer Height:** .2 or finer

**Support:** Recommend using tree support for entire project, however, use the support mode you get the best results with on your printer. For Bambu printers, I have found these settings work well:



Note that other slices such as Cura, the support angle may read 87 degrees (opposite of Bambu/Orca slicer)

**Strength/Density:** 3 walls, 20% infill

## Assembly

**Important!** Before starting the assembly of the classifier base, you need to first assemble the Camera module and the homing sensor module. Please refer to the Camera Module Assembly Guide and the Homing Sensor Guide for those assembly steps.

Once you have completed those assemblies, you can continue with the classifier assembly.

### Tools Required:

- Screwdriver with bits or Allen keys for M3, M4, M6 socket head cap screws
- Soldering Iron or other heat source for installation of heat set insert

### Hardware required:

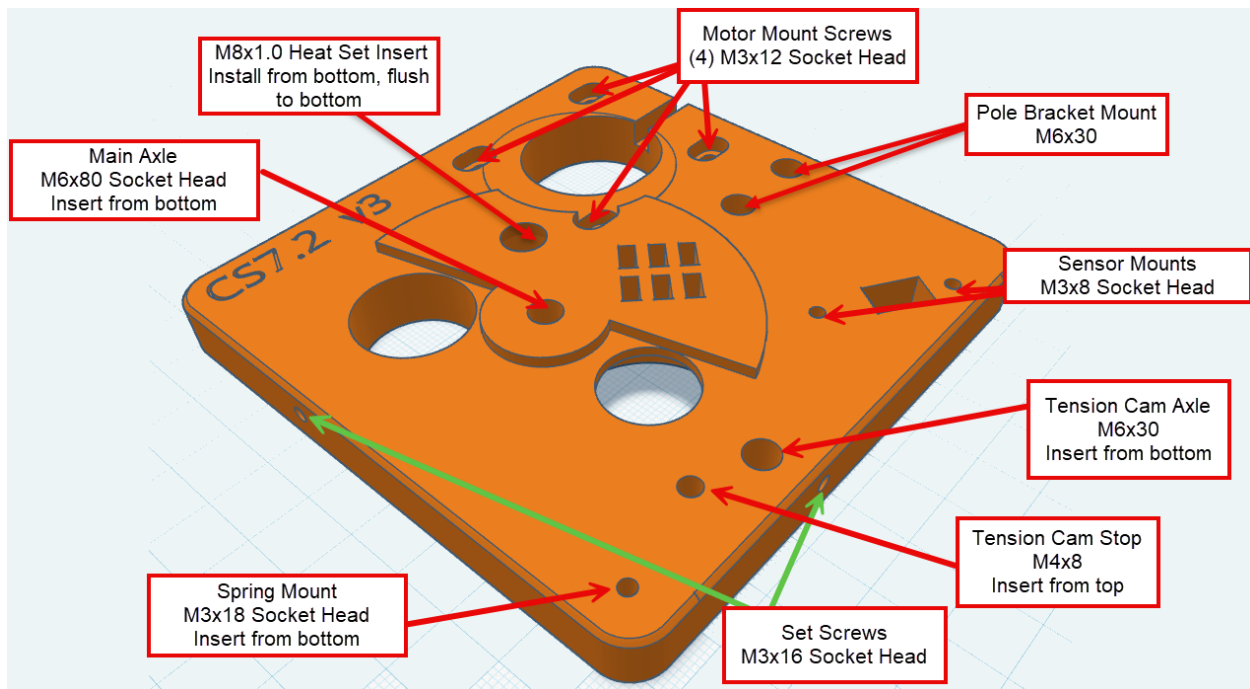
- (1) Nema17 Motor
- (2) M3x16 Socket Head Cap Screws
- (4) M3x12 Socket Head Cap Screws
- (1) M3 Nut (tension cam mount lock)
- (3) M3x8 Socket Head Cap Screws
- (4) M3x12 Phillips Head Screws (for drive gear)
- (1) M4x8 Socket Head Cap Screw
- (1) M6x80 Socket Head Cap Screw

- (1) M6x30 Socket Head Cap Screws
- (1) M8x1.0 Heat Set Insert (for proximity sensor)
- (1) M3 Heat Set Insert (for light shade)
- (1) .5x5x30 Stainless Steel Tension Spring
- (1) 5mm Motor Flange with lock screws
- (optional) Small Zip Ties .1"W x 4"L

## Electronics

- (1) PNP-NO Proximity Sensor (LJ8A3-2-Z/BY)
- (1) Camera Module (see Camera Assembly Guide)
- (1) Nema 17 Motor
- (1) Optical Homing Sensor (see Homing Sensor Assembly guide)

The following diagram is a quick reference to where the hardware belongs.



## Assembly Steps

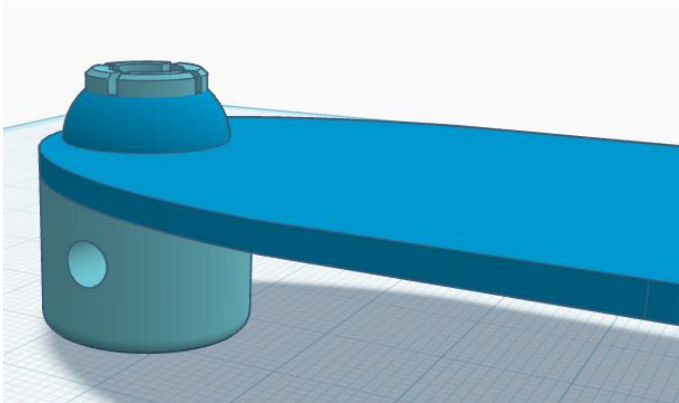
1. Turn the classifier base upside down and remove the 3d printing supports from the camera hole.
2. Prepare your proximity sensor by removing the nuts and lock washers from it. Set it to the side in a convenient location as you will need to access quickly after the next step.
3. On the bottom of the classifier base, without using heat, press the narrow end (smooth end) of the M8 heat set insert into the appropriate hole (see diagram above). It should look like the following image:



4. With the soldering iron on medium heat (if adjustable), push the soldering iron straight down in the center of the insert with light pressure. It should only take a few seconds before it begins to move and then use firm pressure to set it flush to the base. Do not overheat the nut or it will continue to melt through. Quickly remove the iron and thread the proximity sensor in a few turns. The nut will still be hot and the plastic pliable so use this opportunity to align the sensor so that is perpendicular to the base. Hold it in place until the plastic cools down (usually 10 – 15 seconds). You can always reheat the nut if needed but just be careful not to overheat. As soon as the nut moves a little bit, remove the iron as there is a small delay as the heat radiates through the insert.
5. Remove the proximity sensor. (we will install it a bit later. )
6. Install the main axle M6x80 from the bottom. Be sure not to overtighten and just thread it until it stops. If using an electric driver, it is a good idea to use the clutch or go slow so you don't strip the plastic.
7. Install the cam shaft axle (M6x30) from the bottom. Same procedure as above to prevent stripping.
8. Install the spring mount (M3x18) from the bottom.

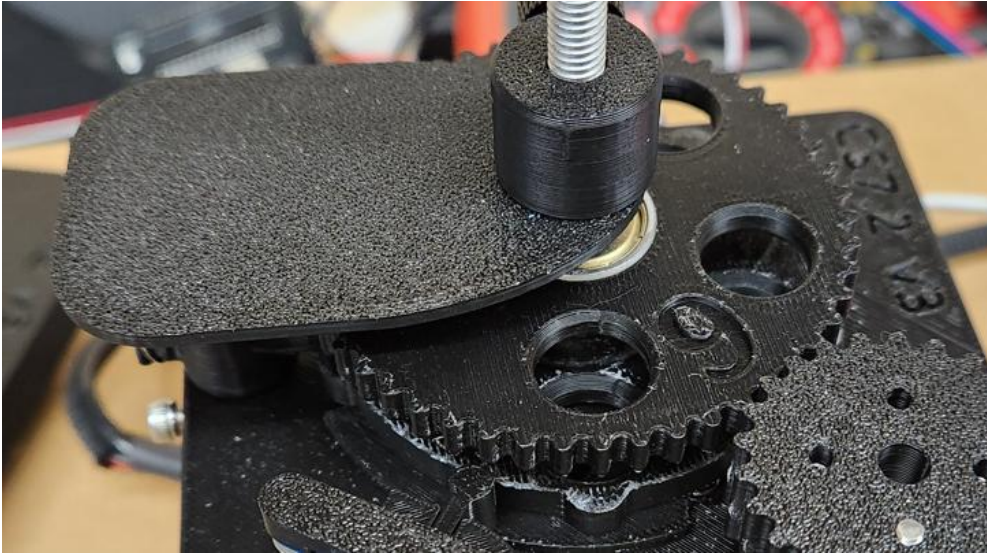
9. Install the Tension Cam Stop screw (M4x8 Socket Head Cap Screw) from the top threaded all the way down to the base but **DO NOT OVERTIGHTEN**.
10. Install the proximity sensor. Take one nut and thread it back on the sensor, thread the sensor into the insert until the top of the sensor is flush with the top of the base. It should not protrude above the base as it will interfere with the feed wheel.
11. Install the motor with the 4 m3x12 socket head screws. Position it so that it is pushed all the way back near the closest edge of the base. Tighten these screws until snug but **DO NOT OVERTIGHTEN**.
12. Install the camera and drop tube set screws (m3x16 socket head) so that they are flush with the holes they are setting for. Use a finger to feel for the screw as you thread it in and then back it out a little.
13. Install the camera so that the fan is facing away from the pole bracket mount. The camera has notches on the top which align with the existing two m6 axle screws. Once the camera is pressed firmly in place, tighten the set screw slowly until it locks the camera in place. **DO NOT OVERTIGHTEN**.
14. Install the drop nozzle and tighten set screw until it contacts the nozzle. **DO NOT OVERTIGHTEN**.
15. Install the homing sensor, the sensor should be positioned as far back (away from the center) as possible. We can move it forward later if not making good contact.
16. Install the Tension Cam shim. This should thread on easily by hand and sit flush to the base. If it is too loose or tight, you can quickly reprint this part and use the slicer to scale it up or down by 1%.
17. Remove any 3d printing support from the bottom of the tension cam and then attach one end of the extension spring to the knob on the tension cam. It may be necessary to use needle nose pliers to bend the loop on the spring out a little, so it fits over the knob.
18. Slide the tension cam over the axle and shim and attach the spring to the spring mount screw. Add an m3 nut to the top
19. Install the 5mm Motor flange onto the bottom (recessed) side of the Drive Gear. This should be installed using 4 of the Phillips head m3x12mm screws. The screws should go through the flange and thread into the gear.
20. Add set screws to the flange and then slide it down over the motor shaft, locking the set screws in place. One of the set screws should lock down on the flat side of the motor shaft.
21. Add two bearings to your caliber set feed wheel. The bearings are press fit but should pop into place with a bit of pressure.

22. Slide the caliber feed wheel down over the axle while pulling the tension cam out to let the wheel fully seat. The tension cam should snap back into place holding the wheel. You may need to twist or adjust the wheel to mesh with the drive gear.
23. Next we need to assemble the light shade. This requires the installation of an m3 heat set insert. The same procedure applies as was used for the larger m8 insert but since the main body of the light shade assembly is round, it is recommended to secure it lightly in a vice or clamp. Also it is recommended to put an extra M6 screw through center of the light shade body to prevent inserting the insert too far. Using heat, press in the insert. If it is contacting the m6 screw so that the screw cannot be removed, it is in too far, you can heat the insert a little and use the screw to push it flush to the inside of the hole. After you have installed the insert and let it cool down (this is important), thread an m3x8 socket head screw through the insert to ensure it can lock down on the m6 axle.
24. Now the light shade and the light shade body can be press fit or snapped together. It should look like the following diagram if done correctly:



25. Finally, we can install the shade and lock on the main axle. The narrow side (snap lock side) should face down and contact the bearing of the feed wheel.





26. Install the mount bracket to the classifier base using two M6x30 socket head screws.
27. Attach your homing sensor cable by sliding it up through the square hold provided and connecting it to the sensor
28. Now is the time for cable management. You can use the zip tie mount points on the bottom of the classifier base if needed or just organize the cables so they are cleaning passing through the channel in the base of the mounting bracket. See the following example:

