# **DRUM ALIGNMENT MADE EASY**

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This document is designed to make drum alignment easier and understandable. As with all such tasks, read through the entire document and contact us if you have any questions before, during, or after following the steps found herein.

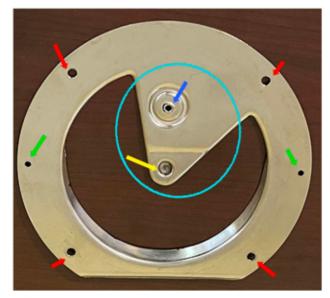
I have assembled this mass of knowledge, the result of over two decades of working on Hottop coffee roasters, personally and professionally, and distilled it down to an easy(ier) to understand mass. Overall, following these directions will extend the life of the drum motor.

### The Bearing Plate

# Parts of the Bearing Plate

RED - Mounting screw holes
GREEN - Alignment pin holes
BLUE - Gold Knob threaded hole
YELLOW - Dimple (drum's axle-end fits here)
CYAN - Tongue

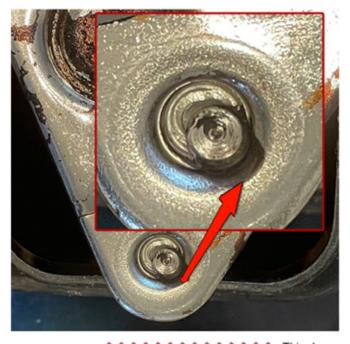
The surface of this side of the bearing displayed here is referred to as the *FACE* because it faces the drum.



#### The bearing plate has two jobs which, together, maintain the drums position in the roast chamber:

- 1 To support the end of the drum's axle at the front of the roaster in the dimple
- 2 To supply a bit of force to push against the front end of the drum's axle, pushing the drum towards the drum motor to secure the lateral position of the roasting drum.

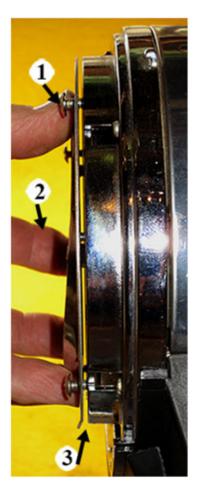
The alignment of the roasting drum in the roast chamber begins with a bearing plate in good condition. The most important portion of the bearing plate is the dimple in which the end of the axle rests. I present this photo as an example of one that failed. I took this photo of a bearing which over years of use had worn so badly that the axle was allowed to drop to a substantially lower position and at a slight offset.



Begin your drum alignment procedure by removing the bearing plate and examining the bearing plate's dimple (the bump that holds the end of the drum's axle). Carefully look for grooves, wear, cracks, or any other such deformation before attempting to adjust the roasting drum. The red arrow is not pointing at a shadow! That is a groove created by the drum's axle.

Now examine the flat area on the inside face of the bearing plate which match the location of the drum's front edge. Do you see any scrapes or gouges? These might be in the black deposits or actual scratches or gouges in the metal. A sure sign that the drum is out of alignment. If any wear is observed, replace the bearing plate before proceeding.

## Installing And Adjusting The Bearing Plate



Proper bearing plate fitting is important for the life of the drum motor. When replacing the bearing plate you want to make sure the drum's axle is properly located in the bearing plate's dimple! Be aware that this or any other adjustment to remedy a scraping noise or other related problems will likely be difficult or impossible with a worn bearing plate's dimple.

If the bearing plate puts too little force on the axle, the front of the drum will drop slightly and make alignment difficult. If the bearing plate puts too much force on the axle it will put additional strain on the drum motor's gear box. This strain is indicated by a repetitive or constant whining sound from the drum motor. Here is how to check and correct this condition (numbers below refer to numbers in the photo).

- 1 Insert the bearing plate's screws loosely to help hold the bearing plate in its place. Note how loose they are in the photo.
- 2 Lightly hold the bearing plate aligned, ready to engage the alignment pins but do
  not push it into place. Just hold it against the drum's axle with enough pressure to be sure
  the drum's axle is fully seated in the drive coupling as well as the dimple in the thumb of the
  bearing plate, but do so without flexing the bearing plate.
- 3 While holding the plate in this position and keeping it parallel to the face of the bezel as seen here (note the gap), there should be approximately 2 mm of clearance between the bearing plate and the bezel. If the clearance is excessive or insufficient the bearing plate needs to be adjusted.

You are trying to establish the amount of pressure that the bearing plate will exert upon the axle. It needs push on the axle firmly enough to hold the axle in place but not so much as to exert excessive force on the motor's drive or to cause accelerated wear to the bearing plate itself.

## Adjusting The Bearing Plate's Tongue

If the tongue needs to be bent to achieve the clearance required in step 3 above, and in which direction the bearing plate's tongue needs to be bent remove the drum and reattach the bearing plate on the roaster without the drum, seat the screws, and carefully bend the tongue in the required direction manually. Begin by placing a straight edge across the flat surface of the face of the bearing plate to quantify the tongue's current position. This will establish a visual starting point for this adjustment.

- If the bearing plate's gap in step 3 above was as LESS than 2mm away from the bezel, bend the tongue INWARDS.
- If the bearing plate was MORE than 2 mm away from the bezel bend the tongue OUTWARDS.
- Use the straight edge once again to verify that the adjustment was sufficient.

Replace the drum, bearing plate, and insert and seat the screws as you did in the first part of this section. Now Once again, measure the distance of the plate from the bezel. Gently tighten the screws while holding the bearing plate in place. As you tighten, make sure that the two alignment pins properly engage the alignment holes in the bearing plate as you tighten the screws. Do not overdo the torque. The bearing plate is not under much actual stress and can easily stay in place with no more than having the screws seated all the way and then very gently tightened just a little more.

In extreme cases where when you have gone through this document to the end and tried all the solutions, try increasing the gap to 3mm or maybe after that 4mm. This will put more force on the axle and may help hold the end up at a better angle. But if the drum motor then sounds like it is straining, it may be time for a new bearing plate.

#### The Role Of The Gold Knob

Below is a diagrammatic view of the roast chamber and the parts relevant to this discussion. It is important to note that the only part only part of the bearing plate shown is these diagrams is the "tongue" and its dimple. The front cover has also been omitted for simplicity.

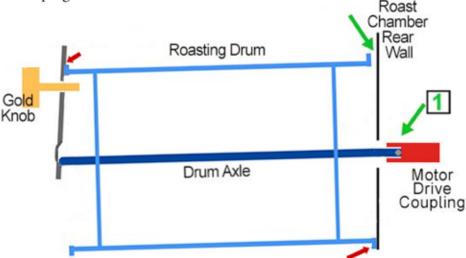
The drum's axle, where it is engaged in the drum motor's drive coupling, is always in a fixed position. The axle moves neither in nor out from this position while the roaster is operating. It is held in place by the spring-force of a properly adjusted bearing plate. The tongue of the bearing plate pushes on the axle and that force seats the drive pin of the axle into the drive coupling and keeps it there throughout the roast.

It is important to note that with a properly adjusted bearing plate's tongue, and with a bearing plate which in good condition, the drum's axle, and thus, the drum itself is set in place throughout a roast. It will not move towards the bearing plate nor will it move towards the drive coupling.

This roaster below is properly adjusted. The green arrows indicate that there is a little space between the front of the drum and the bearing plate, and at the same time there is a little space between the rear of the drum and the roast chamber's rear wall.



In the next illustration, the owner, hearing the drum rubbing inside the roast chamber somewhere, tightened the gold knob. This pulled the tongue away from the roast chamber (and towards the front cover). Look at the new position of the axle in the bearing plate's dimple. The drum's axle has dropped a millimeter or two, yet the axle is still fully engaged in the drive coupling. The red arrows in the image below indicate that the drum's clearance has actually changed to the point that it has likely made the scraping worse.



The user now panics and loosens the gold knob too far and chaff starts to fall out of the front of the drum and the scraping gets worse. What should they do??? Read the next page!

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### The Assigned Job Of The Gold Knob

The gold knob has one purpose and that is to hold the front cover in place. In rare instances, if during a roast there is a scraping sound on the bearing plate, a very slight tightening of the gold knob may help. We are talking about 1/8th of a turn. The temperature change in the roast chamber during a roast can be over 350 degrees. This causes metals to expand, and what was seemingly sufficient alignment before the roast may not exist during a roast. As illustrated in the last diagram, tightening of the gold knob may make things worse by allowing the front of the drum to drop.

So should you loosen the gold knob to increase the force on the drum's axle? No! The drum is already seated as far as it can possibly be in the drive coupling- the drum is already as far back as is possible. The only thing loosening the gold knob can accomplish is to make the front cover so loose that it allows chaff to escape the gap between the front cover and the roast chamber.

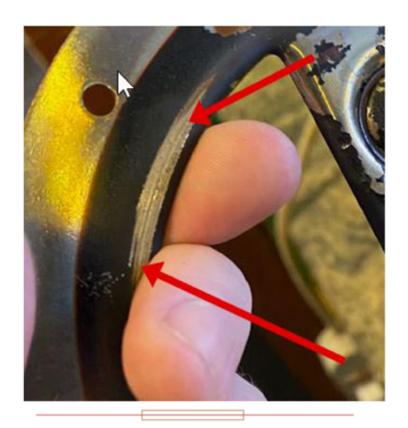
Another good reason, and likely a better one, to not adjust the gold knob during a roast is that it becomes quite hot enough to cause burns.

So what is the gold knob for?
The gold knob has one purpose...
.. and that is to hold the front cover on the roaster

So what should you do if you hear scraping or grinding sounds? Adjust the drum!

# Scraping Sounds, but from WHAT and WHERE?

If you hear scraping, rubbing, or other such sounds that indicate that the drum is contacting something inside the roast chamber it is critical to identify where this contact is taking place before attempting to eliminate it. Remove the roasting drum and place it aside. Examine the rear wall of the roast chamber with a strong light and examine the face of the bearing plate. The red arrows are indicating the evidence left by a drum rubbing on a bearing plate. If the drum is rubbing on the roast chamber rear wall the marks evident there will look much the same as these:



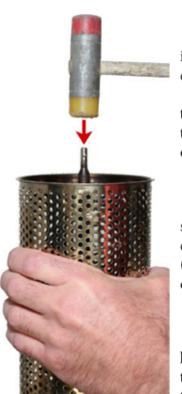
## Roast Drum Alignment to Eliminate Scraping Sounds

When the roaster is in operation there needs to be a space between the drum and the roast chamber's rear wall as well as between the drum and the bearing plate. If too close at either end the drum can rub and scrape which will increase the load on the drum motor and possibly shorten its useful life. If all the preceding possibilities have been checked and are acceptable but the scraping is continuing, the correct placement of the drum can be adjusted! Read and understand the following instructions before beginning!

#### Axle Position

It is important to note that during a roast, the location of the axle is fixed between the bearing plate's dimple and the drum motor's drive coupling. That position is fairly constant and not adjusted by the gold knob. So what we need to do is move the drum's position on the axle. Accomplishing that will achieve an adjusted position of the drum in the roast chamber to eliminate scraping. But how?

Using a hammer, you will be tapping on the axle in the following adjustment. What you are actually achieving is adjusting the drum's position in relation to the axle.



### If The Drum Is TOO CLOSE TO THE BEARING PLATE

If the scraping sounds are coming from the front of the roast chamber, the drum is scraping on the bearing plate. Examine the inside surface of the bearing plate and look for scratches or gouge marks.

Use a non-marring hammer and gently tap the end of the drum's axle that is inserted into the drum motor's drive coupling <u>as shown in this photo</u>. Tapping the drive coupling end of the axle as seen here in the photo MOVES THE DRUM CLOSER TO THE REAR WALL of the roast chamber.

#### If The Drum Is TOO CLOSE TO THE REAR WALL

If the scraping sounds are coming from the rear of the roast chamber, you will likely see scrape marks on the roast chamber's rear wall. Use a non-marring hammer and gently tap the end of the drum's axle that rests in the bearing plate. Tapping the 'dimple end' of the axle (not shown here) will MOVE THE DRUM AWAY FROM THE REAR WALL of the roast chamber.

#### IMPORTANT:

Even though the drum and axle are made of heavy metal, DO NOT think it takes a hard hit with a hammer to move the axle. In nearly all cases, you must use one or two GENTLE taps to begin with, and it is best to use a light hammer if you have one. You are likely only trying to move the shaft one or two millimeters (which is less than 1/10th of an inch)!

After tapping once or twice, replace the drum, reassemble the machine, and run an 'empty roast' (no beans) and listen for scraping sounds. You may need to repeat this adjustment a few times to get the proper alignment.

If an adjustment was necessary and the drum is now properly located in the roast chamber, do not be concerned if you need to repeat the adjustment after the next two or three roasts. This is because the heating and cooling cycles the roaster will experience may allow the metal to "relax" and cause the drum to move back towards its previous, incorrect alignment.

### **HELPFUL TIPS**

Hold the drum in the air in one hand over a bed, sofa, stuffed chair, or other soft surface in case it slips out of your hand. Do not place the drum on a fixed surface! If you have difficulty holding onto the drum, have another person hold the drum while you tap. Use a non-marring hammer and gently tap straight downward on the end of the drum's axle.