Metroboard Timing Belt/Driven Wheel/Motor Bracket Replacement Procedure

Step 1

Set Skateboard on its side with the driven wheel facing up as shown. Remove these 2 screws (and lock washer and flat washer) with a Philips Head Screwdriver.

Call Ilan at 360-335-3211 with any questions during this procedure!

Step 2

Carefully remove *transmission cover* by pulling away from the wheel as shown by the GREEN arrow. Be careful not to catch the timing belt when removing.
Step 3

Loosen the 2 motor mount nuts using a 5/16” (8 mm) socket nut driver. Just loosen them enough so that the motor can slide freely in its slots, but do not overloosen!

Step 4

Push the motor body until the end of its slot in the direction shown by the GREEN arrow. This will untension the timing belt.
Step 5

With the motor pushed all the way to the end of its slot, carefully pull the timing belt over the flanged edge of the motor pulley. Be careful not to damage the timing belt as you pull it over the edge, especially if you are going to reuse it! If you find it difficult to remove the belt, you can loosen the motor mount nuts a bit more, allowing you to tilt the top of the motor pulley more towards the wheel, which should make removal easier.

Step 6

Remove the timing belt by lifting over the wheel. Try to avoid getting any dirt from the wheels on the belt teeth as you remove it. If you are going to reuse the timing belt, note the orientation of the belt (which edge is up), so you can reassemble in the same orientation (this will ensure a cleaner break in period). Note that if you are replacing the standard wheels with the Premium (Black) Wheels, you should install a new timing belt.
**Step 7**
If you are replacing the motor bracket hanger (due to damage), **STEP A**) completely remove the 2 motor mount nuts (and flat washers) and while holding the motor body, allow the motor to carefully drop below the motor bracket. **Be very careful not to let the motor pulley teeth bump the edges of the motor bracket slot as the motor drops below, as this can permanently damage the teeth!**

Set the motor next to the deck, being careful not to pull on the motor leads which will still be connected to the skateboard. Note the way the motor leads are oriented, so that you can reassemble in the same way.

**STEP B)** Remove the driven wheel, and regular wheel. Note that there is a washer on each side of the wheel. Make sure you don’t lose these! **Note that when installing the Premium (Black) Wheels, you should install an extra Silver washer on the pulley side of the driven wheel, so that there are two washers total on this side (first Silver, then Black washer, then wheel, then black washer, then nut). These washers should be cleaned and dried prior to reinstalling.**

**STEP C)** Remove the Kingpin Nut, Outer Cup Washer and Outer Bushing, and then remove the truck hanger from its base plate.

**STEP D)** Using the new truck hanger, reassemble, following steps C, B, A, in that order. When you put the driven wheel back on, make sure the nut is tight enough that the wheel can spin freely, but with very little wobble. Also, tighten the 2 motor mounting nuts (and flat washers) so that the motor can freely slide in its slot but with very little slop. The best way to accomplish this is to tighten the 2 mounting nuts till the motor can’t slide any more, then gradually loosen till the point that the motor just begins to slide freely.

**STEP**

If you see any debris on either the motor or wheel pulley teeth, you can carefully brush it off using a clean and dry toothbrush.

With the motor pushed in its slot as close to the driven wheel as possible, **carefully** replace the timing belt (with either a new one or existing one), by first assembling onto the wheel pulley teeth and then carefully pulling over the motor pulley flange and onto the motor pulley teeth. **Be careful not to let the motor pulley flange dig into the belt teeth as you assemble.** Note that if you are replacing the standard wheels with the Premium (Black) Wheels, you should install a **new** timing belt.
Step 9

Slide the motor in the direction shown by the GREEN arrow, in order to put some tension in the timing belt. With a little bit of tension from your hand on the motor body, spin the driven wheel with your other hand to ensure that the belt teeth are meshing with the pulley teeth, and that the motor pulley spins when you spin the driven wheel.

Pulley Flange
Step 11

Insert the 1” long (1/4”-20 thread) black socket head cap screw that came with your Metroboard into the threaded post (which should then be inserted into the hole in the motor bracket aiming the black screw directly at the motor). Using a 3/16” allen key, gradually tighten the cap screw till it touches the motor body. Tension the belt by tightening the cap screw. **DO THIS VERY GRADUALLY, SINCE IT’S VERY EASY TO OVERTENSION THE BELT, WHICH CAN CAUSE PERMANENT DAMAGE TO YOUR METROBOARD!**

Once the cap screw touches the motor body, tighten the cap screw, **only 1/8 of a revolution at a time**, till the belt can be easily twisted with your fingers about 30° (from vertical), before it gets very hard to twist (see picture below). If you can easily twist more than 30°, then the belt is too loose. If you cannot easily twist to 30°, then it is too tight! This is how you know you are at the right tension. Due to manufacturing imperfections, you will notice that if you turn the driven wheel a quarter of a turn and check the tension again, it will likely be different. You should spin the driven wheel gradually to see where the highest and lowest tension position is, and make sure that the average between the two is about a 30° twist. For example, if at the high tension point you can only twist 15°, but at the lowest tension point, you can twist 45°, you would be ok!

**SEE NEXT PAGE FOR A MUCH MORE ACCURATE WAY TO TENSION THE BELT**
A more accurate way to adjust the belt tension is to measure the frequency of the belt by plucking it. We use a software based guitar tuner called AP-Tuner (freeware) http://download.cnet.com/AP-Tuner/3000-2133_4-10342381.html. Hold a microphone (e.g., a webcam with mic) very close to the belt and pluck the belt either with your finger or a pen or something stiff. You should do this in a quiet environment and you may need to pluck several times in a row to get a consistent reading. Background noise will make it hard to get a good reading. There will be some variation in belt tension as you rotate the wheel (due to manufacturing imperfections).

For the 85 mm Wheels (older versions) that use a 3M-HTD Belt (3 mm spacing between belt teeth), make sure the lowest tension is at least a "G3" and the high no more than an "E4".

For the 97 mm wheels which use a 5M-HTD Belt (5 mm spacing between teeth) and (and newer versions of the 85 mm wheels) make sure the lowest tension is at least a "F3" and the high no more than a "C4".

Note that you should double check the belt tension after tightening the motor mounting nuts, since the process of tightening these nuts, usually results in the tension increasing a bit more, so if it’s too high, you may need to redo the tensioning procedure (see step 12 on next page).

You can also watch the entire belt tensioning procedure in this video: http://www.youtube.com/watch?v=uNgRDnMev6Q#t=2m03s
Step 12

Once you have adjusted the belt tension, you need to completely tighten the 2 truck mounting nuts. *Don’t use a ratcheting type socket driver,* since this can apply too much torque and damage the threads. Just use a simple 5/16” hand driver as shown. You should tighten fairly tight using the hand driver, but be careful not to overtighten. Note that once you have tightened the nuts, you need to check the belt tension again, since often the process of tightening the nuts will increase the tension in the belt. If the tension is too high, then loosen the two nuts a bit (so that the motor can slide again) and unscrew the cap screw 1/8 of a turn, retighten the 2 nuts and check again.

Step 13

Once the belt has been tensioned correctly and the motor mounting nuts have been fully tightened you should *completely* remove the cap screw and store for future use. Don’t leave it attached to the motor bracket since it tends to make a rattling noise while riding.
Step 14

Replace the Transmission Cover by Sliding into place

Secure the Transmission Cover in place using the 2 Philips head screws (and lock and flat washers).

Before completely tightening the screws, you need to adjust the position of the transmission cover, such that the perimeter of the transmission aligns with the perimeter of the motor bracket, as shown by the GREEN lines in the picture. Also, there should be a consistent gap of about 2 to 3 mm between the diameter of the wheel and the curved edge of the transmission cover (as shown by the blue lines). This is very important so that the wheel does not rub against the transmission cover as it spins. Check this by spinning the wheel. Now completely tighten the transmission cover screws. Be careful not to overtighten!

Note that with the Premium (Black) Wheels, the gap may be hidden under the rounded inside edge of the wheel, but you should turn the board at an angle to verify that there is in fact a consistent gap.
Step 16

Check to make sure there is about a 2 to 3mm gap between the transmission cover and the timing belt as shown between the 2 green lines above (towards the ground side of the skateboard).

In the picture below there should be at least a 5 mm gap between the transmission cover and the timing belt as shown between the 2 green lines below (towards the deck side of the skateboard).