Technical Service Bulletin
DATE: January 30, 2025

TSB

CATEGORY: Smart Bike **TSB# 02202025**

Title: **SB20 Flywheel Bearing Replacement**
Product Models: **Stages SB20**

Introduction:
Cases of SB20 flywheels knocking or making noise have been observed by customers due to manufacturing tolerances. This document aids in the field repair of certain flywheels by teardown and reassembly utilizing a new SB20 Flywheel Repair Kit 001-2561.

Purchasing this kit and following this procedure should be done only after following these procedures:

- SB20 Troubleshooting Guide
- Flywheel Bearing PTFE Application

Witnessed Service Concerns:
Some SB20 flywheels make a knocking sound coming primarily from internal or external bearings as well as ticking noises normally associated with flywheel and shroud contact.

Common Noises from the Flywheel:
Issue A - Knocking Sound

Knocking sounds typically originate from the flywheel or axle bearings. The application of the Loctite 609 will eliminate movement in the bearing cartridge and resolve any knocking sounds. Apply Loctite to the outer races and allow **24 hours** to dry prior to spinning the flywheel after re-assembly.

When performing the teardown and re-assembly, please utilize the Repair Kit (001-2561) contents to replace any worn, damaged, or obviously weathered components. In many cases, it is preferred to use all items provided in the repair kit as replacements.

Additionally, it is advised to replace the two bearing sets and reassemble them with Loctite 609 to ensure the flywheel performs at a near-new level of performance after re-assembly. Refer to the diagram on the next page for the exploded view of the flywheel.

Issue B - Ticking Sound

Ticking sounds typically are the result of the flywheel contacting the plastic shroud or belt cover. Ensure there is a sufficient gap between any moving components and the plastic shroud.

Service Action:
Check these common items prior to replacement of any component, and re-ride if adjusted:

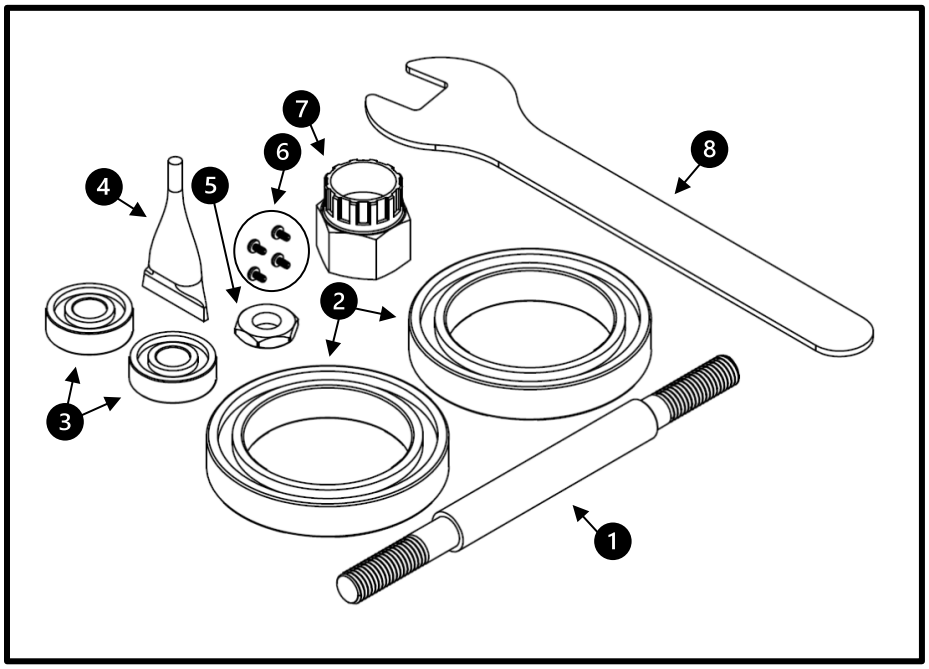
- Verify that there are appropriate gaps between the belt guard, shroud, end caps, flywheel plastic and the moving flywheel.

- Verify that the belt is appropriately tensioned to 28-40 Hz. The approximate belt deflection by squeezing near the flywheel pulley should be 12-15 mm. To measure the frequency of the belt, download the Carbon Drive Belt Tension Tool by Gates Carbon Drive on the App Store for iOs, or the Carbon Drive by Gates Corporation on the Google Play Store for Android and follow instructions on the app. A quiet environment is needed to use this app.
- The axle nuts are tight. To check this, follow the procedure until it is time to loosen the axle nuts. If they are already loose, tighten them and test the bike.
- The large flywheel nut is tight. To check this, follow the procedure until it is time to loosen the 54mm flywheel nut. If it is already loose, tighten it, rebuild the bike, and test the bike.

If issues are still present, the 001-2561 repair kit contains components that likely need to be replaced. The large flywheel bearings should only be replaced if they easily slide out of the bearing counterbore. Removal of these bearings when not loose within the counterbore could cause damage to the counterbore or coil assembly if attempting to remove them. Be sure to fully read through the following instructions before beginning the repair process.

Repair Kit contents:

Item No.	Description	Qty
1	Axle	1
2	Flywheel Bearing (6000)	2
3	Axle Bearing (NSK 6910ZZ)	2
4	Loctite® 609™ Retaining Compound	1
5	Jam Nut	1
6	PCB Screws	4
7	Cassette Lockring Tool	1
8	17mm Cone Wrench	1



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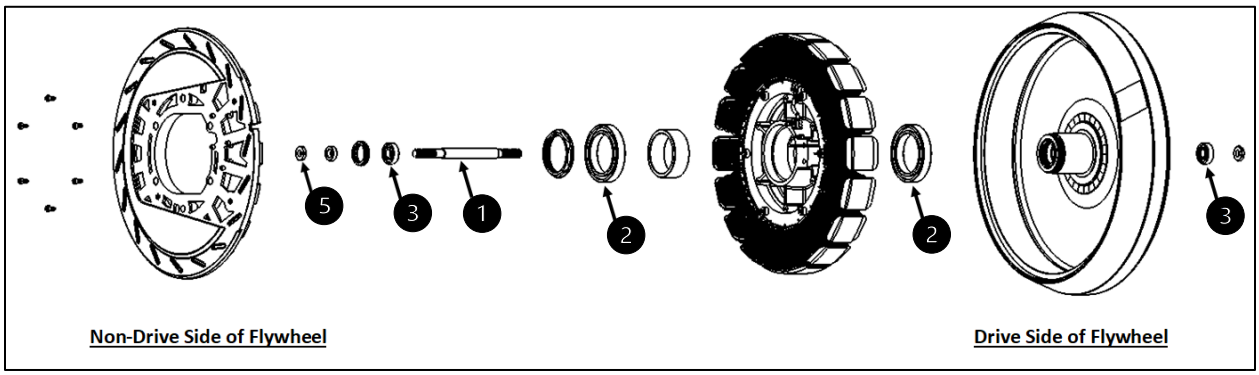
Exploded view of the flywheel and location of some parts included in the service kit:



Service Procedure

Service Preparation

1. Fully read through this procedure to understand the process and confirm your mechanical aptitude to complete the process.
2. Understand the time commitment of this process. It is estimated to take approximately 2 hours, then a 24-hour period to cure the retaining compound, and then 1 hour to complete the process.

3. Confirm that you have the additional necessary service tools & materials below.

Additional Necessary Service Tools & Materials:

- 14 mm wrench
- 19 mm wrench
- 17 mm deep socket and ratchet
- 3 mm hex key
- 5 mm hex key
- 6 mm hex key
- 7 mm nut driver (or socket)
- Adjustable wrench
- Small Phillips head screwdriver
- Hammer
- 12-inch parallel jaw pliers (Amazon link)
- 3/8 inch metal punch (Amazon link)
- Torque wrench
- 2x4 lumber (between 6-12 inches)
- 2x4 lumber (between 30-50 inches)
- Rag
- Towel

Removal and Disassembly of the Flywheel and Coil Assembly

1. Unplug the connector from the bike.

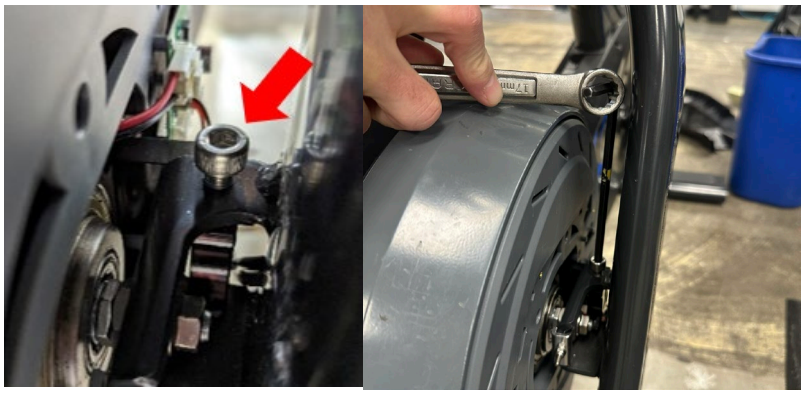
2. Remove the driveside pedal. Note: Driveside is the term that will be used for the right side of the bike. This is the side that contains the belt and pulleys. Non-driveside is the term that will be used for the left side of the bike without these driving components.

3. Using a 3 mm hex key, remove both end caps (2x screws each), flywheel cover (2x screws) and the drive side belt shroud (7 screws) from the bike. Keep these screws separate and labeled. Note that on the driveside belt shroud, the longer 4 screws are used to attach to the non-driveside belt shroud, and the shorter 3 screws are used to attach to the frame. To remove the drive side belt shroud, position the drive side crank at the 7-8 o'clock position and slide down and left to remove. Be cautious of the shroud catching on the belt during removal.

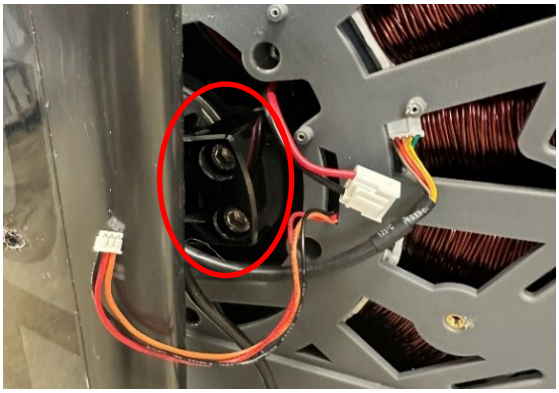
4. Apply PTFE spray to the driveside bearing surface as shown in the below image. Wipe away any excess lubricant from the area after application.

5. Disconnect all four connectors from the power board by pulling on the plastic connector. Do not pull on the wires. Remove the board from the bike using a small Phillips head screwdriver. Keep in a safe location.

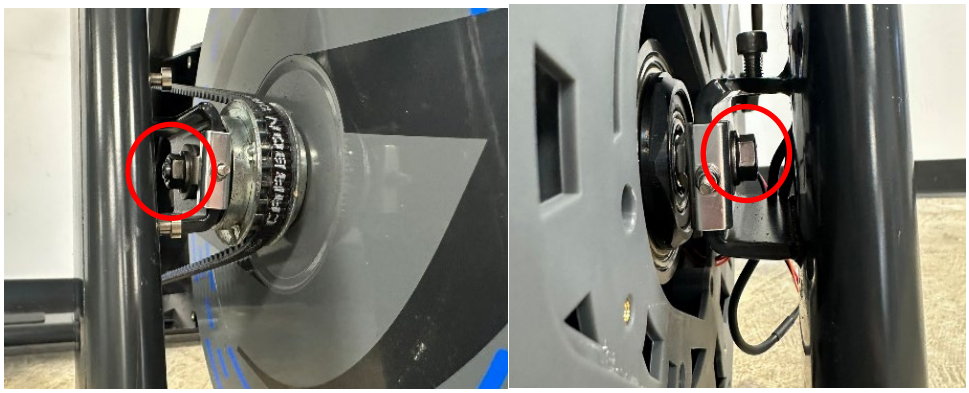
6. Using a 6 mm hex key, loosen the flywheel brake stay bolt so that the black brake stay can rotate freely 2-3mm. If needed, use the ball end of the hex wrench and use one of your open wrenches for increased leverage.



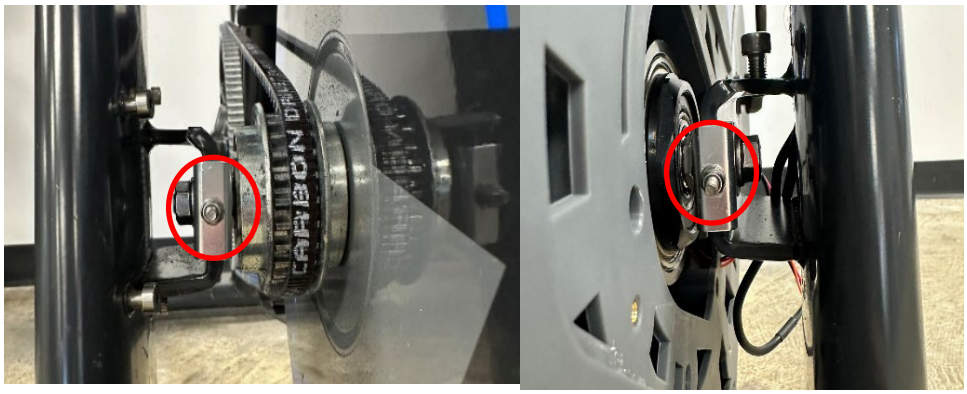
7. Using a 5 mm hex key, remove both flywheel brake stay bolts and the flywheel brake stay.



8. Using a 14 mm wrench, loosen both axle nuts on either side of the flywheel. There is no need to remove them yet.



9. Using a 7 mm nut driver, loosen both belt adjuster bolts evenly with the same number of turns. Record the number of turns you loosened the bolts here: _____ turns each. This will help to keep the flywheel aligned and give a great starting point when you re-tension the belt.

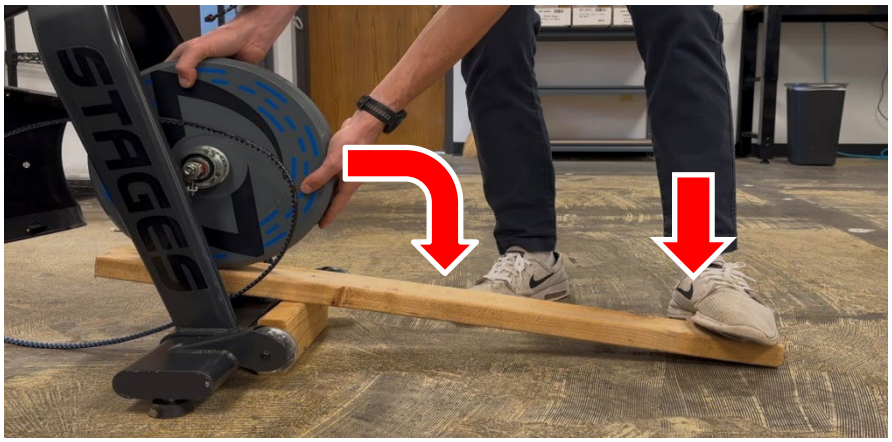


10. **DO NOT TWIST OR CRIMP THE BELT DURING BELT REMOVAL. DO NOT SPIN THE PULLEY DURING BELT REMOVAL. THIS COULD DAMAGE THE CARBON FIBERS IN THE BELT AND RESULT IN PREMATURE FAILURE.**

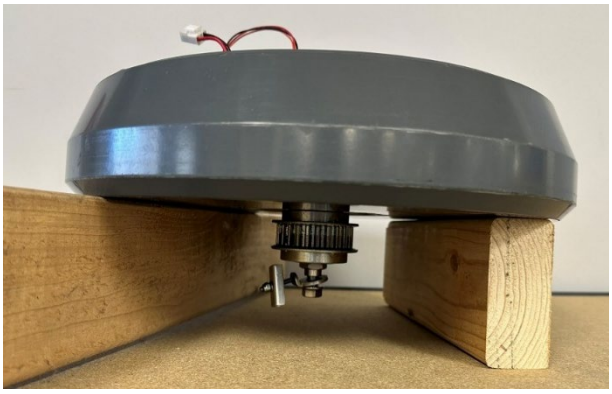
Remove the belt by sliding the belt off the crank pulley towards the outside of the bike.

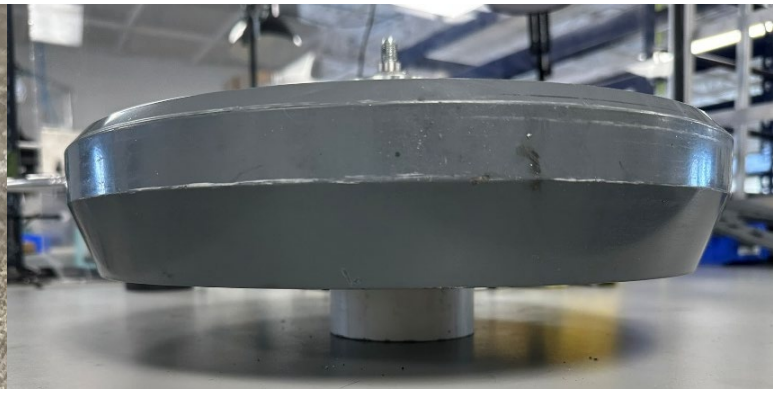
11. **USE CAUTION FOR THIS STEP! THE FLYWHEEL WEIGHS 50 LBS AND CAN CAUSE INJURY IF NOT PROPERLY SUPPORTED! FULLY READ THROUGH THIS STEP BEFORE PROCEEDING!**

The recommended method is to place a short piece of 2x4 lumber between the front transport wheels on its side, as a fulcrum. Place a longer 2x4 piece of lumber angled between the flywheel and the fulcrum, as a lever. The lever 2x4 should be resting in contact with the flywheel and the fulcrum 2x4, but not the ground. Place both hands on the flywheel. Using one foot, transfer some of your weight to the 2x4. This will lift the flywheel, and it will be pushed forward and begin to roll down the 2x4. Carefully roll the flywheel down the 2x4 until the flywheel is forward of the fulcrum point and it is no longer a seesaw. Place both feet on the ground and lift carefully and safely. Again, it is very heavy.

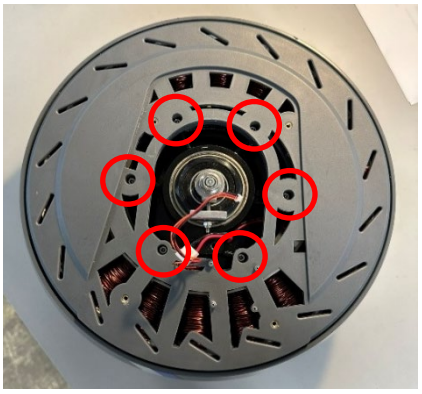


12. Lay the flywheel with the pulley facing down, coils facing up. Since the axle will not allow the flywheel to lay flat, it is recommended to use the two 2x4s to stabilize the flywheel. You can angle the 2x4s to add stability. Another option is to use a hollow cylinder (height between 3 and 6 inches, inner diameter at least 3 inches.)

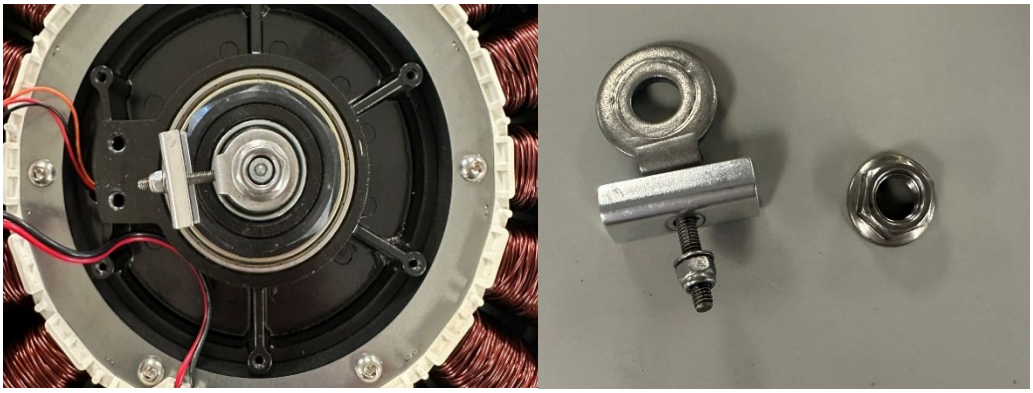




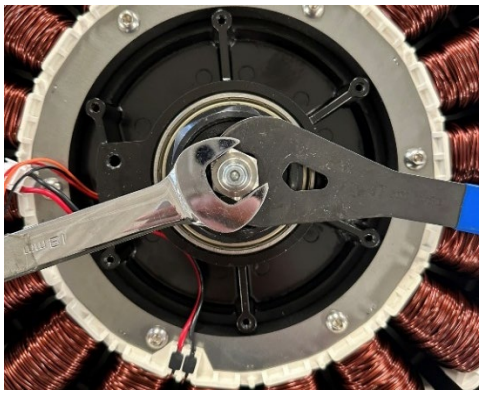
13. Using a 3 mm hex key, remove the 6 screws from the flywheel cover and remove it.



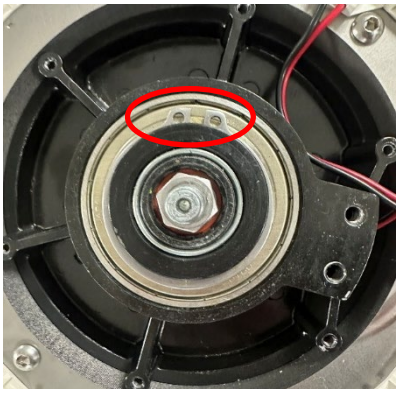
14. By hand, remove the axle nut and belt adjuster assembly.



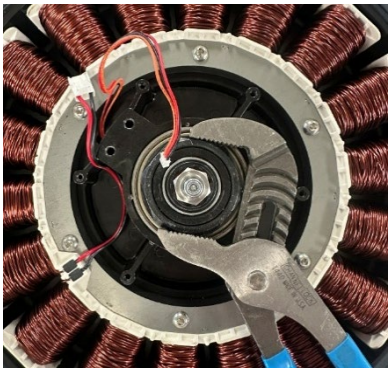
15. Hold the jam nut using the 17mm cone wrench and use the 19mm open wrench to remove the flange nut.



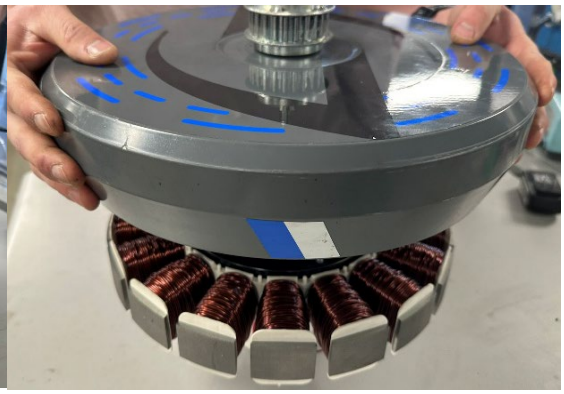
16. If your flywheel has a lock ring visible as in the photo below, skip steps 16-17 and go straight to the **Replacement of the Axle Bearings** section. Complete this section with the coil assembly still installed. If this retaining ring is not present, proceed to step 16.



17. Using your 12-inch parallel jaw pliers, remove the large flywheel nut. It may help to have someone else hold the flywheel in place as you remove the nut.

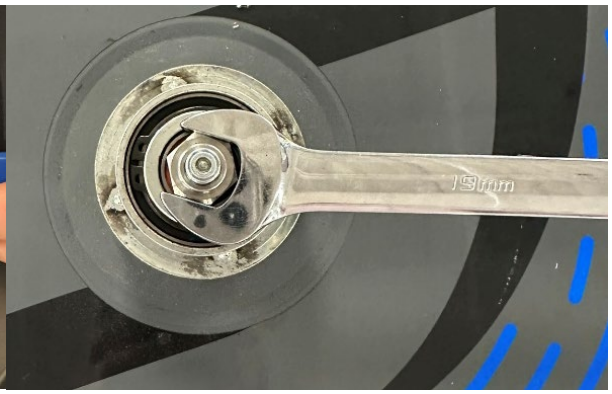


18. While holding the coil assembly inside the flywheel to ensure it does not fall out, flip the flywheel assembly to be driveside up on top of your flywheel support (cylinder or 2x4s). If you are not using a flywheel support, roll a towel up into a circle so the coils are supported by the towel when the flywheel is flipped. Remove the flywheel by lifting it up, the coil assembly will slip out as you lift.



Replacement of the Axle Bearings

1. With the flywheel vertical, hold the non-driveside jam nut with the 17mm cone wrench while you remove the driveside flange nut with the 19mm standard wrench.

2. Using the splined cassette lockring tool provided in the repair kit with the adjustable wrench, remove the bearing cap nut from the non-driveside.

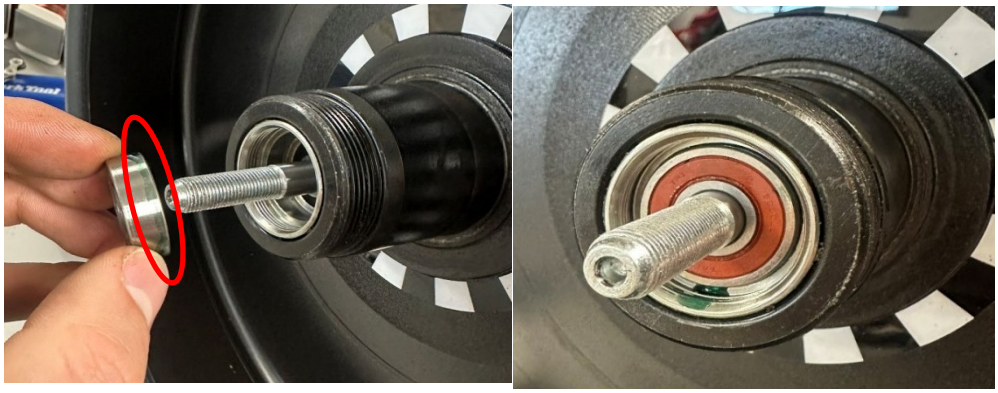
3. Using a 17 mm wrench on the non-drive side jam nut and a 17 mm deep socket on the drive side jam nut, loosen the jam nuts. Only one side will loosen, remove the jam nut on that side.


4. Tap the axle shaft on the side in which the jam nut was removed to knock the opposing axle bearing from the race. The axle shaft will fall through the flywheel once the bearing is knocked from the axle.

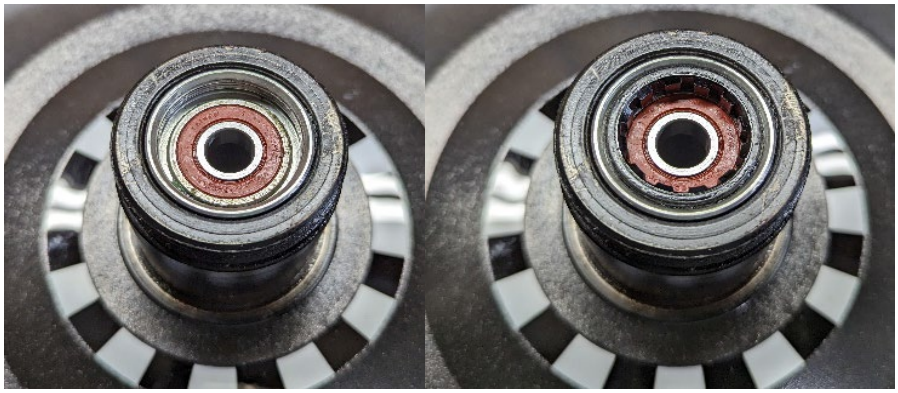
5. Place the axle shaft back into the flywheel from the same direction it came out from. Ensure the axle slides into the inner race of the remaining bearing and use a hammer to tap the end of the axle to knock the remaining bearing out of the flywheel.

6. Install a new axle bearing provided with the repair kit onto the **drive side** axle shaft (drive side of the axle has a **shorter** inner bearing race shoulder) and then the jam nut. Hand-tighten the jam nut.

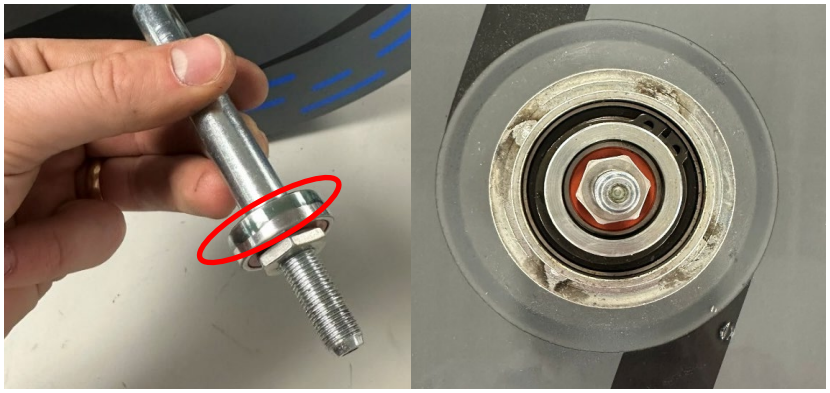
7. **Read this entire step before proceeding.** Note that the axle is present in the photos below, but it is not necessary. Locate the interior surface of the non-driveside of the flywheel that accepts the new axle bearing. Clean this surface and the outer race of the new axle bearing with a rag. Apply a ring of Loctite 609 to this inside face of the flywheel. Apply the Loctite 609 to one edge of the bearing as shown below. Leading with the edge of the bearing that has the Loctite 609, carefully rotate while inserting to ensure all surfaces are coated with the retaining compound. Tap into place to ensure the bearing fully seats into the flywheel. Wipe off the excess. Do not spin the bearing for 24 hours to ensure the retaining compound can properly set, but you may proceed through the next steps while it is curing.



8. Reinstall the bearing cap nut into the flywheel over the bearing and tighten down using the splined cassette tool provided with the repair kit. Torque to 40 Nm (30 lbf-ft).



9. Repeat step 7 for the bearing that is already on the axle. Wipe clean and apply a ring of Loctite 609 to the inside face on the driveside of the flywheel that will accept the outer race of the bearing. Apply a ring of Loctite 609 on the leading edge of the bearing that is already on the axle. Slide the axle shaft into the flywheel, through the pre-installed bearing. Leading with the edge of the bearing that has the Loctite 609, carefully rotate while inserting to ensure all surfaces are coated with the retaining compound. Tap the axle gently into place to ensure the bearing fully seats into the flywheel. Wipe off the excess. Do not spin the bearing for 24 hours to ensure the retaining compound can properly set, but you may proceed through the next steps while it is curing.

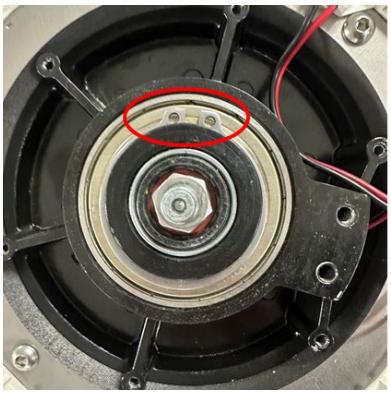


10. Reinstall the generator spacer and jam nut onto the non-drive side of the axle shaft and tighten down with the 17 mm cone wrench by holding the driveside jam nut using the 17 mm deep socket. Torque to 25 Nm (18 lbf-ft).

11. Reinstall the flanged axle nuts onto both sides of the axle and tighten down by holding the appropriate jam nuts using the 17 mm cone wrench or deep socket. Torque to 25 Nm (18 lbf-ft). Note the difference between the flanged nuts (left) and axle nuts (right) in the photo below. The round shoulder of the nut should be on the outside of the flywheel, with the hexagonal section on the inside.

Replacement of the Flywheel Bearings (only to be done if the bearings easily slide out of the counterbore)

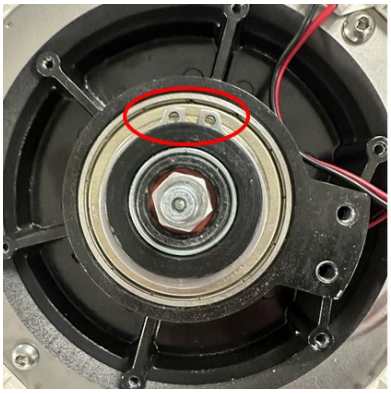
1. If your flywheel has a retaining ring visible on the non-driveside and you have not removed your coil assembly (see photo below from page 10), skip this section and proceed to Flywheel Bearing Staking.



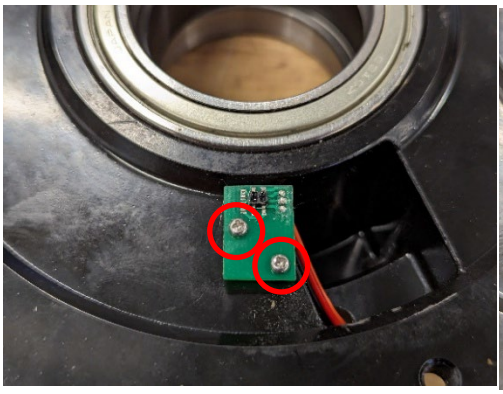
2. Pull on the inner race of the bearing to remove. If the bearing gets stuck, use a punch to lightly tap on the inner race from the opposing side by alternating side to side while moving the 50 mm spacer out of the way.
3. Once one bearing is out, remove the 50mm spacer and remove the remaining bearing following the same process.
4. Wipe the inner surface of the flywheel clean with a rag. Apply a ring of Loctite 609 to the leading edge of the new bearing, and the contacted surface of the coil assembly.
5. Lightly tap on the outer race to install a new bearing, being careful to insert it perpendicularly. Rotate while installing to ensure the retaining compound is spread across all surfaces. Wipe off the excess retaining compound.
6. Flip the coil over and place the 50 mm spacer on top of the previously installed bearing.
7. Repeat steps 4-5 with the other bearing.

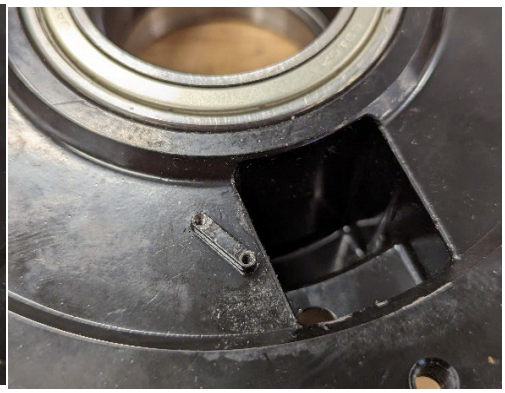
Flywheel Bearing Staking

1. This section is to be completed regardless of whether you replaced the flywheel bearings or not. If your flywheel has a retaining ring visible and you have not removed your coil assembly (see photo below from page 10,) you will skip steps 2, 8, and 9.

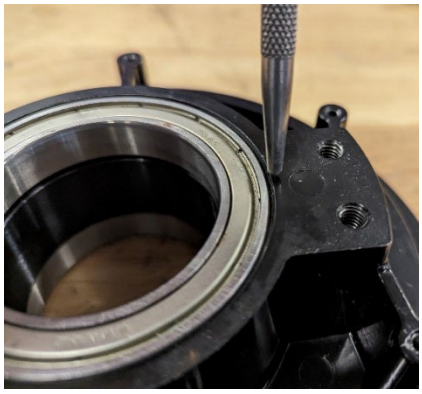


2. Remove the optical sensor on the back of the stator. Be careful not to misplace the sensor or the screws. These screws are not interchangeable with the 4 PCB screws already removed.



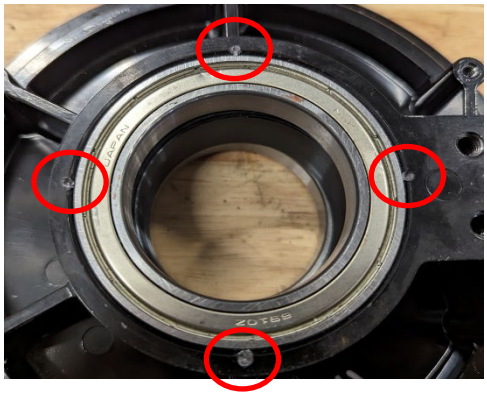


3. Place the tip of the metal punch within 1-2 mm of the edge of the outer bearing on the black stator.



4. Using a hammer, strike the metal punch ensuring the tip of the punch is still on the black stator and not on the bearing race. Verify the aluminum stator has been deformed like the picture below. This may require several strikes with the hammer to achieve this.

5. Repeat this process in four locations at roughly 90-degree increments around the bearing.



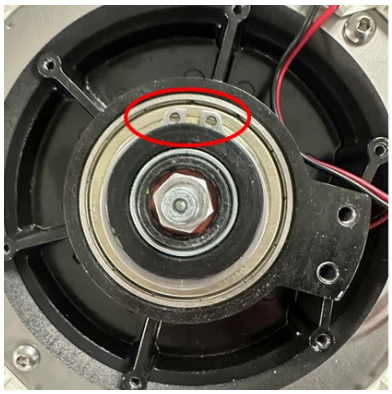
6. Spin the inner bearing race by hand and ensure the outer bearing race does not spin or move. If this does occur, more force may be required in the existing staking locations or additional stakes may be needed. Four more stakes can be made at equal spacing between the existing stakes.

7. Flip the stator and repeat the process on the opposite bearing.

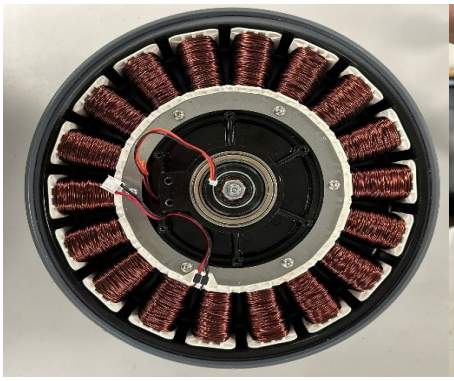
8. Reattach the optical sensor with the two screws.

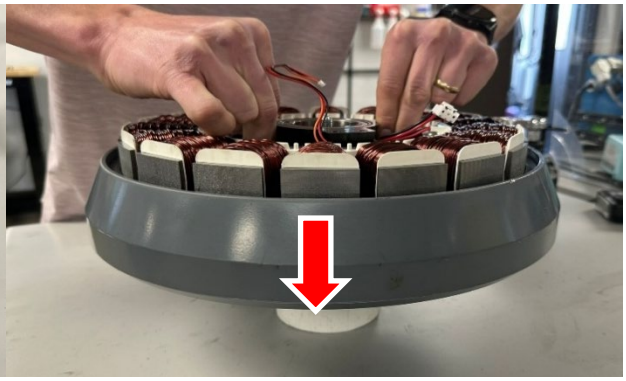
Flywheel Reassembly

1. If your flywheel has a retaining ring visible and you have not removed your coil assembly (see photo below from page 10) you will skip steps 2-3

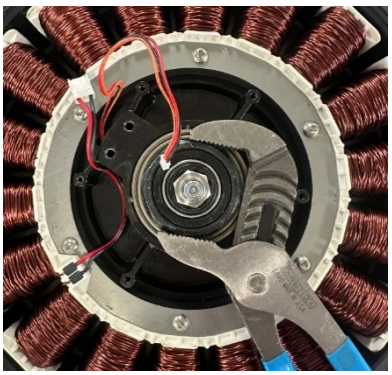


2. Carefully place the coil assembly back into the flywheel with the wires facing up. Use the black aluminum ribs to grip the coil assembly.

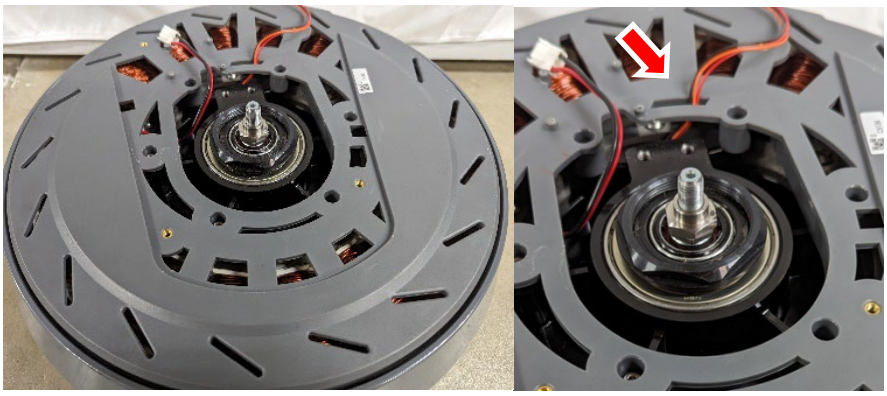




3. Using the 12-inch parallel jaw pliers, install the large flywheel nut back in place and tighten to 39 Nm (29 lbf-ft). A good estimation is to hold the flywheel with one hand and tighten as much as you can with the wrench in the other hand.

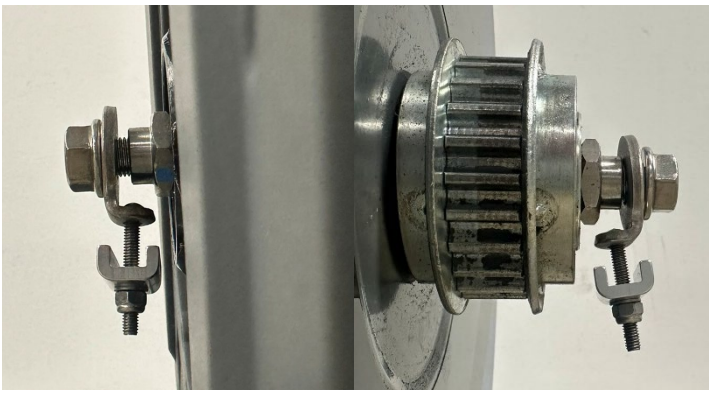


4. Place the flywheel cover back into place and route the wiring into the correct locations as seen below. The orange/red/black wire assembly should be routed through the wire guide hold with the red/black wire assembly through the large center hole.



5. Using a 3 mm hex key, install the 6 screws from the flywheel cover. Torque to 4 Nm (3 lbf-ft).

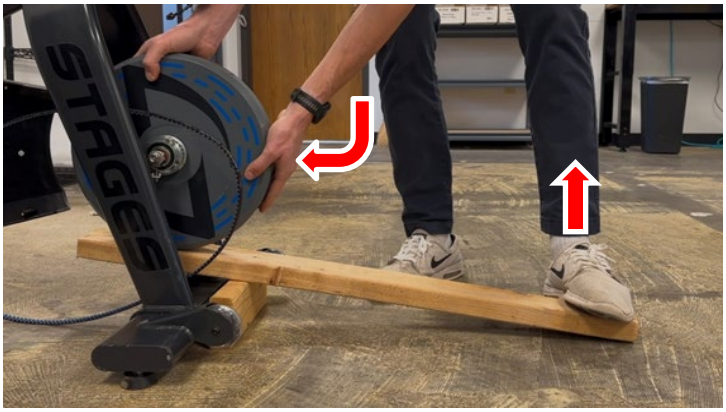
6. Install the belt adjusters with the bent section of the tab on the inside, then thread the axle nuts back onto the acle shaft. Do not tighten.



7. Set up the 2x4s to create the same fulcrum as when removing the flywheel. Ensure that the belt is surrounding the frame dropout on the driveside so that it can then be installed on the pulley.

8. **USE CAUTION FOR THIS STEP! THE FLYWHEEL WEIGHS 50 LBS AND CAN CAUSE INJURY IF NOT PROPERLY SUPPORTED! FULLY READ THROUGH THIS STEP BEFORE PROCEEDING!**

Using a similar method as before, place your foot on the lever and carefully roll the flywheel up the 2x4. As the flywheel rolls backward of the flywheel, keep your foot on the lever. Roll the flywheel gently into the dropouts. While using one hand to stabilize the flywheel, use your other hand to position the belt adjusters so that the axle can slide into the dropouts with the axle nuts outward of the dropout. When ready, gently begin to remove weight from your foot that is on the lever, this will lower the flywheel. Gently push the axle into the dropouts as you lower it. Do not tighten the axle nuts or the tensioning nuts yet.



9. Install the flywheel brake stay back into place and tighten the two flywheel anchor bolts using a 5 mm hex key.

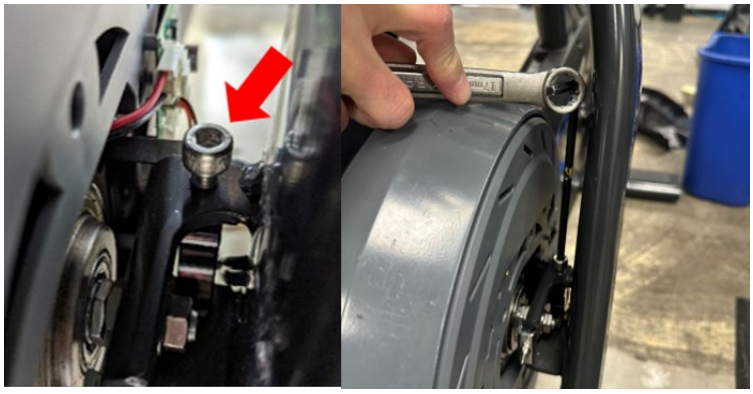
10. **DO NOT TWIST OR CRIMP THE BELT DURING BELT INSTALLATION. DO NOT SPIN THE PULLEY DURING BELT INSTALLATION. DO NOT "ROLL THE BELT ON," AS YOU CAN WITH BIKE CHAINS. THIS COULD DAMAGE THE CARBON FIBERS IN THE BELT AND RESULT IN PREMATURE FAILURE.**

Route the belt back over the crank pulley by sliding it on from the side. Do not spin the crank to aid in putting the belt back on, this will damage the belt.

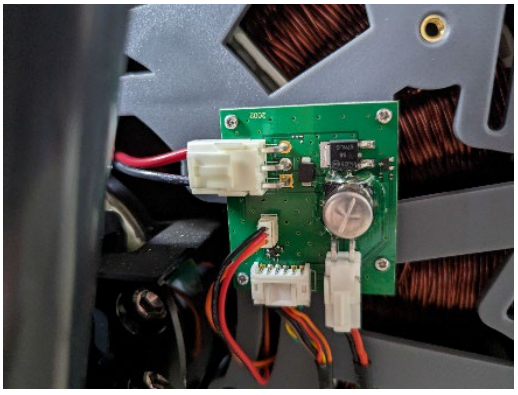
11. Tighten the tensioning nuts **evenly** using a 7 mm socket. Start by re-tightening the tensioning nuts the same number of turns they were previously loosened on page 6. Adjust both nuts together to achieve target tension of 28-40 Hz on the belt. The approximate belt deflection by squeezing near the flywheel pulley should be 12-15 mm. To measure the frequency of the belt, download the Carbon Drive Belt Tension Tool by Gates Carbon Drive on the App Store for iOs, or the Carbon Drive by Gates Corporation on the Google Play Store for Android and follow instructions on the app. A quiet environment is needed to use this app.

12. Tighten down the drive side axle nut then the non-drive side axle nut using a 14 mm wrench. Torque to 30 Nm (22 lbf-ft). Recheck the belt tension after tightening the axle nuts. If it needs adjustment, repeat the previous step.

13. Using a 6mm hex key, tighten the flywheel brake stay back into the frame dropouts. Use the same method with a closed wrench to increase leverage if needed.



14. **Only proceed if the retaining compound has cured for 24 hours.**
15. Hand pedal the bike with lightly with the non-driveside pedal to make sure there are no rubbing noises or anything unusual.
16. Ride the bike to test the feeling of the bike, listening for unusual noises as well.
17. If no noises exist, proceed with completing the re-assembly.
18. If any noises exist, re-check previous steps to ensure everything is assembled properly.
19. Reinstall the lower board back onto the flywheel with a small Phillips head screwdriver and reconnect all 4 wires. Use the PCB screws provided in the kit if you lost any original screws.



20. Reinstall the flywheel board cover, belt shroud, and endcaps.

Please reach out to the Stages Cycling customer support team for more information on replacement part availability and pricing. They can be reached by emailing support@stagesbike.com or by phone at +1 (720) 263-1668. For customers outside of the United States, contact your regional dealer or distributor for more information.