TECHNICAL ARTICLE

CONVERTING THE SRAM P5 FIVE SPEED INTERNALLY GEARED HUB TO A THREE SPEED FIXED GEAR HUB

BY

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Introduction

Fixed gear's inherent simplicity can be a limiting factor for those who live in hilly areas, or who desire a range of gears for winter commuting. Sturmey Archer resolved this dilemma in the 1930s with its two and three speed internally geared fixed hubs. The three speed ASC, long out of production, now costs around $500 or more on eBay, and parts are not available.

There are several conversions of three speed internally geared hubs that can provide two fixed speeds, including mine using a SRAM T3 hub, (http://www.fixedgeargallery.com/articles/grahamwebster/grahamwebster1.pdf). All share the need for a complicated conversion process that includes disassembly of the hub internal, and welding or grinding of the internal parts and/or the hub shell. All but the SRAM T3 conversion end up with so much slack that they are hard to track stand on, unless a complicated and unreliable clutch is constructed at great cost.

The SRAM P5 conversion explained here is easy to do and shares the main attributes of the original ASC. They both start out as five-speed internally geared hubs using two sets of planetary gear sets, and both "short circuit" the two overdrive gears, resulting in a hub that provides direct drive, and two reductions. They both lock the output of the gear train to the hub, eliminating freewheeling. Slack is limited to the normal play between the gear sets and coupling gear.

The P5 is a modern hub with excellent availability, and can be converted in about 15 minutes using ordinary hand tools and a fixing block.

Considerations

The P5 conversion has some drawbacks. The hub, at 1330 grams, is quite a bit heavier than a track hub. The cable, shifter, and Clickbox clutter that simple look fixed gear is famous for. Still, the installation is straightforward and reliable. You can revert back to a standard fixed gear setup in a matter of minutes by removing the shifter and cable, and re-installing your old wheel. Many of us have more than one fixed gear bike, and you may find this to be a good setup for your rainy day or bad weather bike.

The SRAM twist grip shifter is the only one known to work with the P5. It is sized for a MTB handlebar (7/8”) and requires a Hubbub adapter to mount at the bar end of a road bar. It can also be mounted on an MTB bar end grip.

A word on the Hubbub: I have bought two from two different suppliers, and neither fit inside road handle bar without grinding down. The shifter would not slide over the outside part without reducing its diameter with coarse sandpaper. Ask your supplier to test fit yours to a real handlebar, and to the shifter, before you accept it.

Which gears should you select while using the converted hub? Gear position 1 provides low gear, positions 2 and 3 provide second gear, and 4 and 5 give direct drive or high gear. Position three occasionally skips under hard pedaling, and position 5 has a bit of gear whine, so avoid using those gears. Best performance is provided when using positions 1, 2 and 4. The numbers are clearly visible on the shifter.

The cable is attached to the shifter and the Clickbox, a device that carries out the shifting operation back at the hub. The cable is too long for short wheel base track bikes. BE VERY CAREFUL WHEN YOU SHORTEN THE CABLE. Read and re-read the official SRAM instructions before starting. The “elephant tool” shown in the SRAM instructions is best for setting inner cable length and eliminates two areas where you can go wrong: First, the spring inside the Clickbox must not be allowed to unwind. Install it on the end of the axle or insert the elephant tool before removing

the cable. Either way prevents the spring from unwinding. Second, the length of the inner cable must be carefully measured as shown in the SRAM instructions, or by using the elephant tool. Changing the cable in the shifter is all but impossible, so if you mess up, you will have to buy the whole business all over again.

Where to buy the hub, shifter, and Hubbub? Sheldon Brown is a good choice, as is Gilbert Anderson at North Road Bicycle (http://www.northroadbicycle.com/).

Which hub should I buy? Be sure you only use the freewheeling version, shown here: http://www.sram.com/en/sram/comfort/p5/freewheelhub.php

Gearing is a personal decision, and you should consult the Sheldon Brown gear calculator to get an idea of what results different combinations will provide. Ignore the results for original gears 4-5, as they are no longer operable. Gears 1, 2 and 3 are the ones that are left. Rear cogs are available in 1/8" and 3/32" widths. The smaller ones, from about 16 and below, will need the dish turned out, to avoid the chain rubbing the dust cover. A 52-tooth chain ring and a 16-tooth rear cog provide 85, 67, and 54 gear inches.

The Clickbox can be set horizontally using a cable run that follows the down tube and chain stay, or can be angled up by routing the cable along the top tube and seat stay. The upwardly angled option provides the best heel clearance on short wheelbase track bikes. You might not experience heel contact in normal going, but when you push your body back to pedal brake, you may get heel strike on the Clickbox if it is in the horizontal position.

The hub seems to be symmetrical left to right, so the wheel dish is almost zero. Chain line issues can be finessed by flipping the rear cogs. Hub OLD is just right for a track bike. The axle nuts are the same size as your peanut butter wrench. Be sure to use the toothed anti-rotation washers supplied with the hub.

What tools will you need? The only special tool needed is a small retaining ring remover. These are available at auto pars stores or Sears. The rest can be handled with ordinary bicycle hand tools.

Conversion Instructions

The first thing you need to do, before anything else, is read the official SRAM instructions. Not because they are that good, which they are not, but because they give you a general orientation to the hub and its installation, and prepare you for what's to come. The most useful part is the section on the cable and the Clickbox. The exploded view is for the braked models, but the diagram shows how to put the internal back together if you ever want to strip it for cleaning and regreasing. You can download it here:

http://www.sram.com/_media/pdf/sram/dealers/TM_GHS_MY06_E.pdf

Step by step instructions:

1. Remove the two locknuts on the left side of hub, considering the cog side as the right side. Use two wrenches. Try to hold the big nut still with one wrench and unscrew the small one with the other wrench, then thread them both off the axle. A 10 mm open-end wrench on the flats of the axle is handy for keeping the axle from turning, though a bench vise is better. Set aside the bearings, bearing race with dust cover, and the keyed washer in a clean place. Keep everything clean at this stage and you won't have to clean the parts or add new grease later.

Note: You don't have to do anything with the right side.

2. Remove internal, sliding it carefully out of the hub shell. Lay it on a clean surface or on a clean rag.

3. Look at the left side of the internal. Remove the retaining ring holding the pawl carrier with the retaining ring pliers. This is the one with two little holes in it, not the other, smaller one. Leave the small one alone. You will have to re-use the retaining rig you removed, so only spread it the least amount possible to permit its removal. Don't overstretch it.

4. Remove pawl carrier. Just slide it off and lay it aside.

5. Remove pawls from ring gear and set aside. You can gently lift and twist these off with your fingers. Remove the wire spring. Save these parts and the pawl carrier in case you ever want to go back to five speed freewheel operation.

6. Test fit the fixing block in the hub. Make sure the shoulder faces out. It should be close fit, but should slide in easily. Each fixing block has been tested on a hub, but if it is too tight, then remove it, turn it a quarter turn in relation to the hub, and try again. Repeat as needed until you find a place where it slips in nicely. Also test fit the fixing block on the internal.

7. Slip fixing block on internal in place of pawl carrier.

8. Install retaining ring. Try not to over stretch it. Make sure it goes all the way down into the groove. At this point the internal should look like the second photo on the FGG page.

9. Install internal. You will need to wiggle the internal a bit so the fixing block enters the hub correctly. Pay close attention to the right side. The bearings can get cocked at this point. Make sure everything is aligned here and properly seated before going on to the next step. Hold it all together so the internal doesn't slide part way out. Clamping the right side axle in a bench vise, with the left side facing up, is the ideal way to continue assembly.

Note: If the right side bearings get cocked, then the retainer may bend when you set the tension on the left side. A couple of balls will probably get loose and fall down into the internal if this happens. This is not good. Check to see if the axle rotates smoothly before going too far. Check for an excessive gap between the right side bearing cone and the hub shell. If things go wrong, slide the internal out and inspect this area. The bent bearing retainer can be straightened with your fingers, and the balls can be pushed back into their little slots. Then try again.

10. You are almost finished. It is time to install the left side components. Lay the bearings into place, install the bearing race and dust cover, and then the keyed washer. Install locknuts, setting bearing preload. It should spin freely but have no end play. It is a new hub and will have

some rotating friction at first, but will soon loosen up and run free. You might want to recheck the end play after the first few hundred miles.

You have now completed the conversion of your hub. Now lace the wheel, install the controls, route the cable, set the cable adjustment, and enjoy.