Metro Area Recumbent Society

Projects

Click **HERE** to go back to the top Vacuum Foamshell page
Click **HERE** to go back to the main Projects page
Click **HERE** to go back to John Tetz's Projects
Click **HERE** to go back to the Foamshell Links Page

Left hand drive freewheel

Left hand drive freewheel on hub
Several years ago I took notes while modifying the freewheels I built for my front wheel drive bikes, but I lost that write-up, so I modified another freewheel – it was a rainy weekend. This took about five hours, including taking notes, dimensions, and photos. For a source of freewheels I went to a bike shop which had some old 6-speed hubs with freewheels. To start:

a) Remove the axle and main ball bearings, saving the balls in a small plastic bag.

b) Pry out the dust cap (not used) with a large screwdriver.

c) Clamp the hub in a vise. You might need to use a wood spacer if the hub diameter varies.

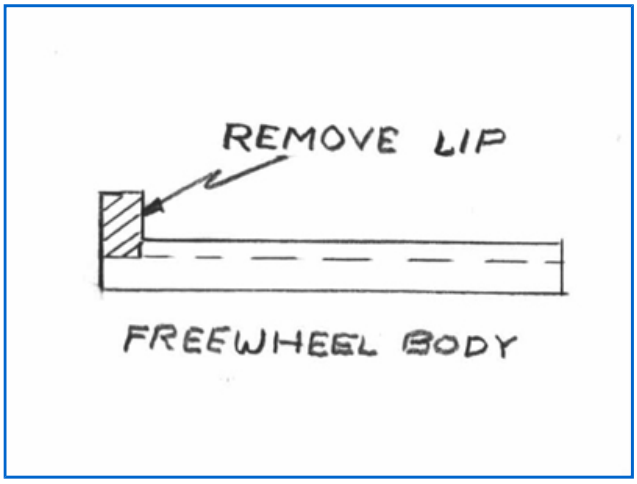
d) Remove the main bearing race using a drift and a hammer (unless you have the correct spanner). There are two slots, so place the drift at a low angle and hit it quite hard. Alternate one slot at a time. This bearing is a LEFT hand thread, clockwise if the assembly is facing up. Loosen the bearing, but do not remove it.

e) Remove the entire freewheel assembly from the hub using a 10 mm Allen key wrench. There is a large diameter hex bolt in the center of the hub, which is usually quite tight.

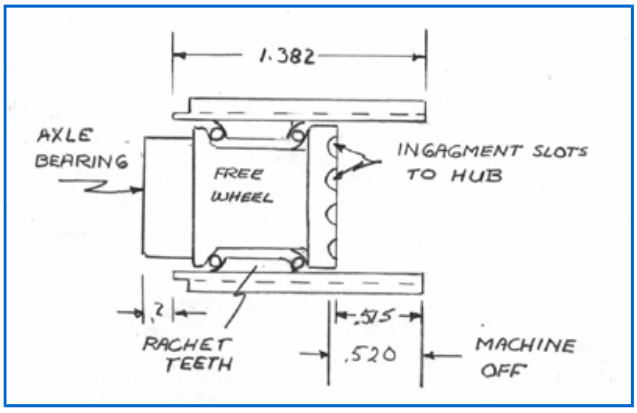
f) Unscrew the main bearing over a sheet of paper. You will see many tiny bearings ready to run out all over the floor. Caution: there is a set of similar

bearings on the bottom, so hold the freewheel by the bottom as you remove the upper bearings. Then slide the freewheel assembly out of the main body and store the bearings in a plastic bag. There are spacer washers between the main bearing and the freewheel which set the preload on those tiny bearings (very important).

Machining the freewheel: mentally picture shifting the now empty freewheel body from its normal right side position to the left side of a hub, maintaining the same orientation. This then keeps the internal ratchet teeth in the correct direction.



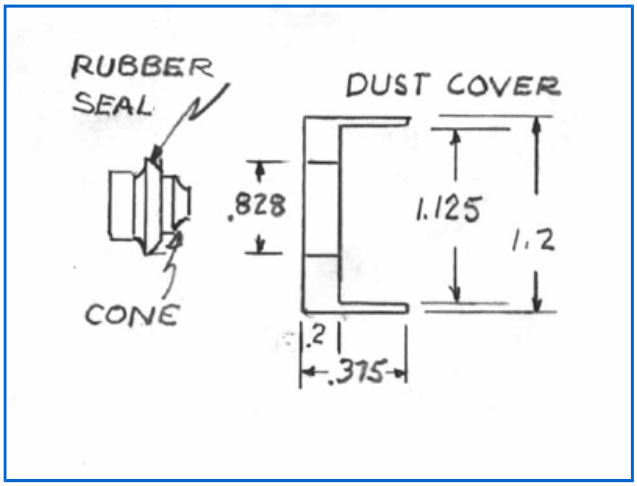
Heat the main body with a propane torch to remove the hardness. Let it cool slowly. Then machine off the lip. This drawing shows only a small section of the body. Removing the lip allows a cog to slide on the grooves from a new direction onto the body.



Temporarily reassemble the freewheel center inside the main body in order to measure how much metal must be removed from the main body.

Only the small freewheel bearings on the right side of the drawing are needed. Use grease to hold the bearings. Then measure the distance from the main body to the engagement side of the freewheel center. This is the 0.515" dimension using a 6-speed freewheel. Remove this dimension from the main body, plus about 0.008". The engagement side of the freewheel must project beyond the edge of the main body but not too far, otherwise dirt and water will get in.

Cone cap body
Use large snap rings to hold the cogs; I have two cogs to extend gear range. Determine the spacers to be used and machine the grooves in the main body. The snap rings need to be up against the cogs to keep them from rattling. Round snap rings work better and reduce machining tolerance requirements.



An aluminum dust cap must be made to protect the main bearings. The 1.125" dimension is a light press fit to the outer diameter of the main bearing race. A normal cone with rubber seal is used for the rotating seal.

A sealed bearing can be used. Heat the main bearing to remove the hardness, and then machine to ~1.02" inner diameter. A sealed bearing would slightly reduce the width of the freewheel.

Grind slots
The pawls need to be reversed to engage the ratchets properly. Before removing the pawls, note carefully how they lie in their machined cutouts. Note when compressing them they are flush with the outside surface of the freewheel body. They should not jut out because they could drag or even jam against the ratchet teeth. Don't lose the tiny spring. Using a 0.2" diameter x 0.4" long grinding stone, grind the opposite (left) side of the present cutouts. Push to the left and down while grinding, as shown above. Try to leave a lip on the right side of the grinding to hold the pawls in place. Note how deep the original shape is and try to duplicate this. Grinding should only take a half an hour. Suggestion: the small diameter grinding wheel gets very hot and will wear quickly, so use it in spurts to allow cooling.

Pawls end view
Temporarily assemble the freewheel to check if both pawls catch at the same time. If not, additional grinding may be necessary to lower the one that is late. Both pawls need to click together. You might want to assemble it using some upper bearings to check for proper operation. Then clean, re-lube, and assemble the freewheel, first the bottom freewheel bearings, using lightweight bike grease to hold them, then the spacer washers on the top side, then the upper freewheel bearings, and finally the main bearing race. Caution: on assembly do not get any grease on the threads of the main bearing race to freewheel joint (difficult). This joint is rotating in the wrong direction and will come unwound, resulting in excessive pressure on the main bearings, most likely destroying them, so use an ample amount of permanent Loctite. Finally, tighten the main bearing by placing the freewheel on an old hub that is clamped tightly in a vise and use the drift. You might temporarily hold the freewheel on the hub with the large diameter hex bolt.

Body drive side
Here is the assembled freewheel (without the snap ring groves), 1" long without the dust cover. This gives an overall dimension between fork legs of about 4.58".

Body bearing side
Another view of the assembled freewheel.

Next section: **LFWD carbon mesh seat construction**