

15 – CARTRIDGE-BEARING PEDALS

ABOUT THIS CHAPTER

This chapter is about pedals with cartridge bearings. The design of this kind of pedal can vary tremendously, with almost every manufacturer designing pedals a different way. About the only factor these manufacturers have in common is that they all use a cartridge bearing (Hadley and Conrad are names that are sometimes used for the bearing) that is pressed into the pedal body. This chapter addresses the Look pedal (which is the same as the Mavic), the Time pedal, and the onZa pedal. The onZa pedal design is typical of a number of cartridge-bearing MTB pedals.

GENERAL INFORMATION

TERMINOLOGY

Pedal body: The main structure of the pedal. The pedal body includes the housing for the bearings and can also include a *pedal cage* or a *retention mechanism*.

Pedal cage: A one-piece or two-piece plate of metal that is on the front and back, or just the back, of the pedal. The pedal cage supports the shoe and may be the point to which a toe clip mounts.

Retention mechanism: This mechanism is similar to a ski binding. Usually by means of springs, the retention mechanism engages some sort of clip to the cleat that is attached to the rider's shoe.

Pedal axle: The shaft that threads into the crank arm and about which the pedal rotates.

Cartridge bearing: A fully self-contained bearing unit that cannot be disassembled. The bearing cartridge includes ball bearings and an inner and outer race. The bearings are usually hidden behind seals. The entire assembly is shaped like a short cylinder with a hole through the center.

Locknut: A nut that threads onto an axle against a bearing cartridge to lock the position of the bearing relative to the axle.

Dustcap: A piece of plastic, metal, or rubber that threads or presses onto the outer end of the pedal body to cover the hole through which the bearings are accessed.

Spline: A cylindrical fitting that has alternating ribs and grooves on its surface parallel to the axis of the cylinder. Splines are usually engaged by a tool with the opposite spline pattern. A spline is used as an alternative to a standard six- or eight-sided wrench fitting.

PREREQUISITES

Pedal removal and installation

It is optional, but strongly recommended, to remove the pedals from the crank arm to service the bearings. The procedures are written as though the pedals are removed from the crank arms. It is strongly recommended to overhaul only one pedal at a time, so as not to mix parts between pedals.

INDICATIONS

There are several reasons that the pedals may need bearing replacement, and several reasons they may need adjustment. Bearing replacement should be done as part of a regular maintenance cycle, the duration of which will change depending on the type of riding, the amount of riding, and the type of equipment. Adjustment should be done on the basis of need.

Maintenance cycles

If starting out with the pedals(s) known to be in good condition with good quality grease, they should be able to be ridden thousands of miles without needing bearing replacement. If the equipment sees little wet-weather riding, then an appropriate maintenance cycle would be 2000–3000 miles in most cases. If a lot of wet-condition riding is done, then the maintenance cycle might need to be as often as every 750–1000 miles. Parts rust whether the bike is being ridden or not, so another factor is how long the bike may be sitting before it will be used again; for example, if ridden 200 miles in the rain in the fall, then put away four months, it would be a good idea to overhaul the pedal(s) before putting the bike away.

Seal mechanisms used in these pedals *are not effective water-tight seals*. Their effectiveness varies with the brand and model. At best, they can lengthen the acceptable time between overhauls. With seal mechanisms, the best policy is to initially overhaul the

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pedal(s) on a normal length maintenance cycle (2000-3000 miles), and if the grease is found to be in good condition, then extend the cycle the next time.

Symptoms indicating need of bearing replacement

What symptom would lead to feeling the pedal(s) should have the bearings replaced? One is that when performing an “adjustment,” the looseness (free-play) in the bearings cannot be eliminated. Another is that when removing the pedal and rotating the axle, the end of the axle oscillates, indicating a bent axle (which should always be replaced).

Symptoms indicating need of “adjustment”

Cartridge bearings cannot be “adjusted,” but if the retaining mechanism that holds the pedal parts together is loose, it may seem like a loose bearing. When the retaining mechanisms are secured, the looseness may go away. If securing the retention mechanism does not eliminate the sensation of looseness, parts are probably worn out and need to be replaced. With Look, Mavic, and Onza pedals the retaining mechanism is the dustcap.

The primary symptom that will be experienced indicating the pedal(s) needs “adjustment” is looseness in the bearings. This can be detected by grasping the pedal and jerking it side-to-side while feeling for a knocking sensation. Inspect for loose bearings and loose locknuts every 300–500 miles. The only way to check for a loose locknut is to put a tool on the locknut and see if it is secure.

TOOL CHOICES

Each type of pedal requires some different special tools that will be needed; therefore, there is no tool list. Reading the complete procedure is recommended before preparing to service the pedal. It is also a good idea to know what tools will be needed before starting.

TIME AND DIFFICULTY RATING

Overhauling a pedal (including pedal removal, disassembly, cleaning, assembly, and bearing adjustment) is a 10–15 minute job of little difficulty. Double this time for two pedals. Adjusting the pedal alone is a 1–2 minute job of little difficulty.

COMPLICATIONS

Limited parts availability

Some pedals have limited parts availability or no parts availability. This is because the value of the labor required to service the pedal exceeds the replacement value of the pedal. Before beginning service of a pedal, make sure there is a source for parts.

Damaged body parts

Pedals are extremely exposed to damage. If the main structure of the pedal is damaged, there is usually no point in overhauling the pedal. If body parts are loose and cannot be tightened, it will interfere with checking whether the bearing adjustment is loose.

Mixing left and right pedal parts

Parts are often similar, but not interchangeable, between left and right pedals. Even experienced mechanics do not overhaul pedals frequently, so it is a good idea to have only one pedal apart at a time, to eliminate any possibility of mixing parts between the left and right pedals.

ABOUT THE REST OF THIS CHAPTER

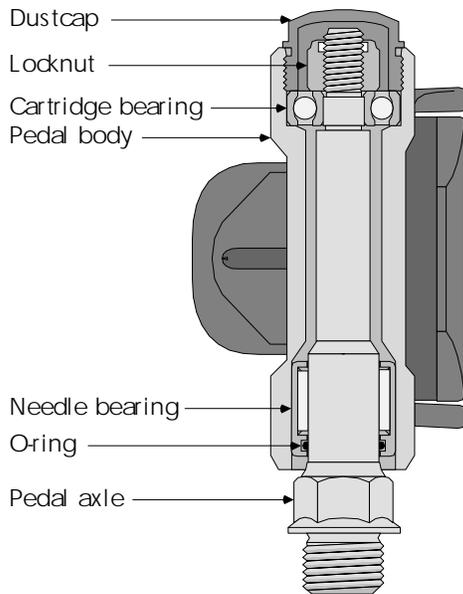
There are three sections to the rest of this chapter: the first section is **LOOK/MAVIC PEDALS**; the second section is **TIME PEDALS**; the third section is **ONZA PEDALS**.

LOOK/MAVIC PEDALS

PEDALS THIS SECTION COVERS

This section covers almost all Look pedals and Mavic pedals that are the “Look-clipless” style, as well as some models that use toe-clips. All the models covered have a dustcap in the outside end of the pedal. If the pedal has no dustcap, this section does not cover it, with one exception.

Look makes a pedal that is similar in appearance and external configuration to the Shimano and Campagnolo “Look-style” models that have no outside-end dustcap (see figure 14.2 on page 14-2), but once the pedal-axle assembly is extracted from the pedal body, you will find that it has cartridge bearings instead of adjustable-cone/cup bearings.



15.1 A Look/Mavic pedal.

PEDAL REMOVAL AND PRELIMINARY INSPECTION

1. [] Do steps 1–6 of *PEDAL REMOVAL, REPLACEMENT, AND INSTALLATION* procedure (page 24-3).

In the next step, inspect the end of the axle for oscillation, which indicates it is bent. A bent axle is an axle in the process of breaking and should be replaced.

2. [] Spin pedal axle and observe whether there is any oscillation in the end of the pedal axle, indicating that it is bent.

ACCESS PEDAL BEARING

It is strongly recommend that only one pedal is disassembled at a time. There are parts that are unique to each pedal. If both pedals are disassembled at the same time and parts get mixed from right to left, each overhaul will have to be done all over again (at best); at worst, getting the parts mixed up between left and right pedals will damage some parts.

In step #3, the dustcap is removed. Older models had a plastic dustcap with a hex-nut on its face. The dustcap should be tight and the plastic is soft, so it is important to use a 6-point socket on this dustcap to prevent rounding the corners. More recent models have a dustcap with multiple pin holes. A bottom-bracket pin spanner can be used to remove these.

3. [] Remove pedal dustcap from outside end of pedal.

DISASSEMBLE BEARING

The pedal axle must be held securely from rotating while removing the locknut. Soft jaws made of copper, aluminum, or plastic are recommended to protect the threads of the pedal axle from damage while clamped firmly in the vise.

4. [] Clamp threaded portion of pedal axle in vise, using soft jaws to protect threads from steel jaws of vise.

In step #5, remove a locknut, which could be a right-hand or left-hand thread, depending on whether the pedal is from the left or right side of the bike. Be sure to pay attention to the clockwise/counter-clockwise notations in this step. Older Mavic quill pedals that use toe clips have right-hand thread on both left and right pedal locknuts.

5. [] Hold axle from turning with a pedal wrench while breaking loose locknut with an 11mm socket wrench (counterclockwise for right pedal, clockwise for left pedal).
6. [] Support pedal body on vise so that axle is free to drop down between jaws. Use punch to drive end of axle down through outer bearing.
7. [] Turn pedal body over so outer bearing cartridge will drop out of pedal body.

At this point, a cylindrical cage of needle bearings is still inside the pedal body. Although Mavic instructions indicate that this cylindrical cage is removable, and the replacement part is available, removal is not recommended. Using the tools and methods Mavic describes has proven unreliable and the installation tool is difficult, if not impossible, to find.

8. [] Clean all parts, including outside of pedal.

INSPECTION

9. [] Rotate outer bearing cartridge to check for rough feeling, indicating need of replacement.

In step #10, inspect the polished cylindrical surface that is the inner race for the needle bearing, which is still inside the pedal body. If this surface on the axle is gouged or pitted, then the bearing is probably bad as well. Because the bearing cannot be replaced, replacing only the axle will provide a very short-term benefit, and would be a waste of money. Suggest to the customer that they ride with a bad pedal bearing until it becomes intolerable, or suggest replacing the pedals now.

10. [] Inspect polished cylindrical surface on axle that rolls inside of needle bearing assembly for gouges and pits.

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Next, inspect the axle for bends. This was already inspected for in step #2, but this is another way of looking at it, and is worth doing. Roll the axle on a flat smooth surface such as a Formica counter top or a glass counter top. Look under the axle as it rolls for a humping up and down that indicates it is bent. A bent axle is an axle in the process of breaking and should be replaced.

11. [] **Inspect axle for bends. Good? Bad?**

ASSEMBLY

12. [] **Grease needle bearings in inside-end of pedal body.**

13. [] **Grease bearings of outside-end cartridge bearing.**

14. [] **Insert axle into pedal.**

15. [] **Grasp fat threaded end of axle in soft jaws in vise.**

16. [] **Slip outside-end cartridge bearing onto end of axle.**

To remove the outside-end bearing from the axle, impact is needed. Instead of using impact to install a new bearing, the locknut on the end of the axle can be used as a press to drive the bearing onto the axle. Do not be surprised by the high resistance encountered when threading the locknut down.

Once again, note that left and right pedals differ in regards to whether this locknut is a left-hand or right-hand thread. Pay attention to the clockwise/counterclockwise notations.

17. [] **Holding axle from turning with pedal wrench, use 11mm wrench to secure locknut (counterclockwise for left pedal, clockwise for right pedal). Tightening locknut presses bearing onto spindle.**

ADJUSTMENT

A surprising feature of this pedal is that the dustcap fixes the location of the axle/bearing assembly in the pedal body. When the dustcap is not in place, or not tight, then the pedal body will move in and out on the axle by several millimeters.

18. [] **Install and secure dustcap.**

INSTALL PEDAL

19. [] **Do steps 14–23 of *PEDAL REMOVAL, REPLACEMENT, AND INSTALLATION* procedure (page 24-4).**

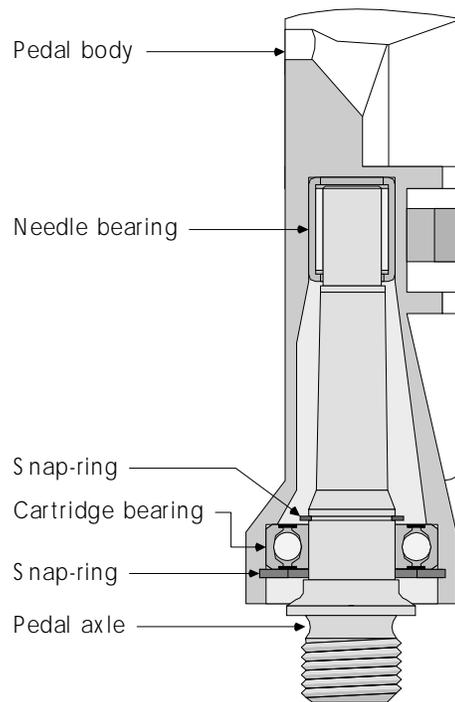
TIME PEDALS

PEDALS THIS SECTION COVERS

This section covers the original Time pedals, which feature a large-diameter cartridge bearing in the inside end of the pedal, which is retained by a circlip, and a small-diameter needle bearing permanently fixed in the outside end of pedal.

BEARING ADJUSTMENT ONLY

There is no bearing adjustment. Excess play or tightness means the bearings are damaged or worn out.



15.2 A Time pedal.

PEDAL REMOVAL AND PRELIMINARY INSPECTION

1. [] **Do steps 1–6 of *PEDAL REMOVAL, REPLACEMENT, AND INSTALLATION* procedure (page 24-3).**
2. [] **Spin pedal axle and observe whether there is any oscillation in the end of the pedal axle, indicating that it is bent.**

ACCESS PEDAL BEARING

3. [] **Use internal snap-ring plier to remove snap-ring from inside face of pedal body.**

The pedal axle must be held securely from rotating while removing the locknut. Soft jaws made of copper, aluminum, or plastic are recommended to protect the threads of the pedal axle from damage while clamped firmly in the vise.

4. [] **Clamp threaded portion of pedal axle in vise, using soft jaws to protect threads from steel jaws of vise.**
5. [] **Pull up sharply on pedal body to remove it from axle assembly.**
6. [] **Use external snap-ring plier to remove snap-ring (just outside of cartridge bearing) from axle.**

In the next step, use impact to remove the cartridge bearing from the axle. This impact can damage the bearing, so do not remove the bearing unless prepared to replace it.

7. [] **Remove axle from vise and support outer perimeter of bearing on jaws of vise with threaded end of axle down and use ball peen hammer to gently tap axle out of bearing.**

At this point, all the parts that can be removed have been removed. There is a needle bearing still in the pedal at the outside end of the pedal that cannot be removed.

8. [] **Clean all parts, including outside of pedal.**

INSPECTION

9. [] **Rotate bearing cartridge to check for rough feeling, indicating need of replacement.**

Inspect the polished cylindrical surface that is the inner race for the needle bearing, which is still inside the pedal body. If this surface on the axle is gouged or pitted, then the bearing is probably bad as well. The axle can be replaced with the bad bearing still in the pedal; however, it would probably be a waste. Either suggest riding with the bad axle until it becomes intolerable, or replace the pedals.

10. [] **Inspect polished cylindrical surface on outside end of axle for gouges and pits.**

Next, inspect the axle for bends. This was already inspected for in step #2, but this is another way of looking at it and is worth doing. Roll the axle on a flat smooth surface such as a Formica counter top or a glass counter top. Look under the axle as it rolls for a humping up and down that indicates it is bent. Bent axles are axles in the process of breaking and should be replaced.

11. [] **Inspect axle for bends. Good? Bad?**

ASSEMBLY

12. [] **Grease bearings in inner-end of pedal body.**

13. [] **Slip inward-side cartridge bearing onto end of axle. Support bearing on vise jaws and tap axle in with plastic hammer if necessary.**
14. [] **Use external snap-ring plier to install small snap-ring on axle.**
15. [] **Insert axle into pedal.**
16. [] **Use internal snap-ring plier to install large snap-ring into inside face of pedal.**

INSTALL PEDAL

17. [] **Do steps 14–23 of *PEDAL REMOVAL, REPLACEMENT, AND INSTALLATION* procedure (page 24-4).**

ONZA PEDALS

PEDALS THIS SECTION COVERS

This section covers original onZa pedals, which have a cartridge bearing in the outer end of the hole through the pedal body, and a brass bushing in the inner end of the hole through the pedal body.

BEARING ADJUSTMENT ONLY

There is no bearing adjustment. If the dustcap or locknut on the axle is loose, it will allow the pedal body to float laterally on the axle assembly. If there is excess play or tightness once the dustcap has been checked, it means the bearings are bad.

PEDAL REMOVAL AND PRELIMINARY INSPECTION

1. [] **Do steps 1–6 of *PEDAL REMOVAL, REPLACEMENT, AND INSTALLATION* procedure (page 24-3).**
2. [] **Spin pedal axle and observe whether there is any oscillation in the end of the pedal axle, indicating that it is bent.**

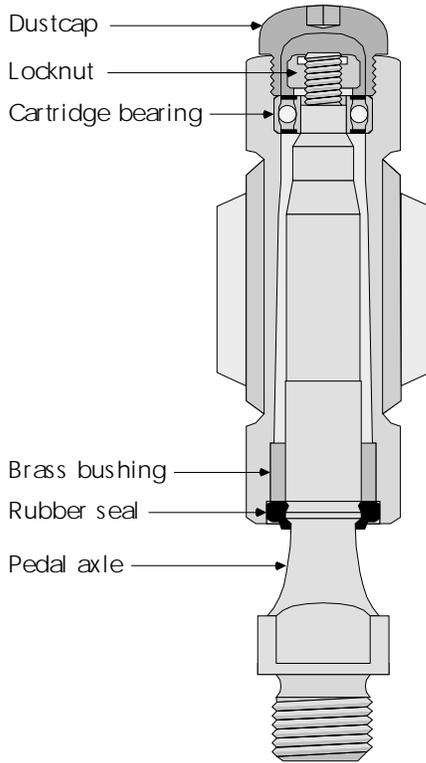
ACCESS PEDAL BEARING

It is strongly recommend that only one pedal is disassembled at a time. There are parts that are unique to each pedal. If both pedals are disassembled at the same time and parts get mixed from right to left, each overhaul will have to be done all over again (at best); at worst, getting the parts mixed up between left and right pedals will damage some parts.

3. [] **With 6mm Allen wrench, remove pedal dustcap from outside end of pedal.**

DISASSEMBLE BEARING

The pedal axle must be held securely from rotating while removing the locknut. Soft jaws made of copper, aluminum, or plastic are recommended to protect the threads of the pedal axle from damage while clamped firmly in the vise.



15.3 An Onza pedal.

4. [] Clamp threaded portion of pedal axle in vise, using soft jaws to protect threads from steel jaws of vise.
5. [] Hold axle from turning with a pedal wrench while breaking loose locknut with 8mm socket.
6. [] Pull pedal body off of axle.
7. [] Turn pedal body over so outer bearing cartridge will drop out of pedal body. If it will not drop out, drive it out with a 10mm diameter drift punch or same-size pipe.
8. [] Use small-tip screwdriver to pry rubber seal out of inside-end of pedal body.
9. [] Use 10.5–11.1mm diameter drift punch or same-size pipe (a long 10mm Allen wrench also works) to drive brass bushing out of inside-end of pedal body.

INSPECTION

10. [] Rotate outer bearing cartridge to check for rough feeling, indicating need of replacement.
11. [] Inspect polished cylindrical surface on axle that rolls on inside of bushing for gouges and pits.
12. [] Inspect inside of brass bushing for gouges and pits.

Next, inspect the axle for bends. This was already inspected for in step #2, but this is another way of looking at it and is worth doing. Roll the axle on a flat smooth surface such as a Formica counter top or a glass counter top. Look under the axle as it rolls for a humping up and down that indicates it is bent. Bent axles are axles in the process of breaking and should be replaced.

13. [] Inspect axle for bends. Good? Bad?

ASSEMBLY

14. [] Using same tool used for brass bushing removal, drive brass bushing back into hole (unthreaded) in inside-end of pedal.
15. [] Press rubber seal into hole in inside-end of pedal body (with inner-perimeter lip facing out of pedal body).
16. [] Oil or grease cylindrical bearing surface on inner end of axle and insert axle into pedal.
17. [] Insert bearing cartridge into hole (threaded) in outside-end of pedal body.
18. [] Thread locknut onto end of axle.
19. [] While holding axle from turning with pedal wrench, use 8mm socket to secure locknut. Torque to 10–15in-lbs (3.5–5.0lbs@3").

ADJUSTMENT

A surprising feature of this pedal is that the dustcap fixes the location of the axle/bearing assembly in the pedal body. When the dustcap is not in place or not tight, then the pedal body will move in and out on the axle by several millimeters.

20. [] Lube threads, install and secure dustcap to torque of 24in-lbs (4lbs@6").

INSTALL PEDAL

21. [] Do steps 14–23 of *PEDAL REMOVAL, REPLACEMENT, AND INSTALLATION* procedure (page 24-4).