Wilderness Trail Bikes
New Paradigm Cassette Hub

Dear WTB Distributors, Dealers, and Customers:

Thank you for purchasing a WTB New Paradigm Cassette Hub. Wilderness Trail Bikes is dedicated to designing and manufacturing the best mountain bike components in the world. We have taken a lot of time designing the New Paradigm Cassette Hub. We believe that you are the proud owner of a cassette hub that will provide all aspects of value including quality materials, performance, long-life, ease of maintenance, aesthics, education, and freedom. The following paragraphs explain some our rationale for design features incorporated into the New Paradigm Cassette Hub.

Shimano has patented the best way to make a cassette hub. It is structurally superior, placing the axle bearing as close to the drop out as possible. The freewheel body is bolted to the hub shell. The Shimano freewheel body contains an axle bearing that supports the drive side of the axle. This positions the axle bearing 17mm from the drive side dropout. Both axle bearings last longer because of the distance between them. An oversize axle is not necessary. The freewheel spins on a different pair of ball bearings that are slightly inboard of the drive side axle bearing.

A number of hub manufacturers design around Shimano's patent by not bolting the freewheel body to the shell. Instead, a short threaded ring is screwed into the hub shell. The freewheel body rotates on a separate pair of cartridge bearings mounted on the axle, driving the threaded ring and hub shell. The two axle bearings that carry the hub shell are very close together. (105mm for the WTB New Paradigm vs. about 50mm for others). One drawback of this method is that it places the drive side hub bearing about 50mm away from the dropout (compared to 17mm for the Shimano design that WTB uses). By cantilevering the axle 50mm beyond the bearing, excessive loads are applied to the two axle bearings that carry the hub shell. This causes a high rate of bearing wear and also causes the axle to flex. The flex of the axle changes the distance and alignment between the pawls and the drive ring leading to premature failure of the cassette drive mechanism.

Another approach to get around the Shimano patent is being used by Sachs and Zip in their rear cassette hubs. They make the inside of the freewheel mechanism (the part the pawls are mounted on) as an integral part of the aluminum drive side flange. The aluminum of the flange is extended outward about 45mm in the form of a tube to carry the pawls and to support the drive side axle bearing close to the end of the axle like the Shimano method. The problem with this approach is that the inside diameter of the Shimano HyperGlide Cassette limits the diameter of the pawl carrier. As a consequence this part is subjected to very high compressive and sheer loads from the pawls in addition to great bending loads from the hub shell. (Clever Shimano probably knew this when they patented the only practical way to use steel in this part.) We are concerned that the use of aluminum for this thin, extended part will cause it to fail. Time will tell if this approach is reliable or not but WTB does not want our customers to be guinea pigs in this experiment.

We are interested in providing WTB customers with the best engineering available. We believe Shimano has patented the best freewheel mechanism design for using the HyperGlide cog cassette. If the freewheel mechanism fails, an owner of the WTB New Paradigm cassette hub can replace it with a stock Shimano part available worldwide. We believe we have made the best choice given the patent situation and the worldwide popularity and availability of Shimano cassettes.

Without GREASE GUARD, the drive side axle bearing in the freewheel body lasts about as long as the freewheel mechanism itself. We believe that it does not benefit the customer to prolong the

life of the drive side axle bearing with GREASE GUARD because it will be replaced at the same time as the freewheel mechanism.

It is noteworthy that both axle bearings in the WTB New Paradigm cassette hub can be adjusted to compensate for wear, unlike cassette hubs using standard cartridge bearings. The distance between axle bearings on the New Paradigm Hub is greater than any other design, which will add to bearing life.

WTB wants buyers of our hubs to feel they are getting their money's worth. GREASE GUARD can be added to the drive side of our hub. The cost of the hub would go up significantly. We believe we have made the best choice given the wide popularity and availability of Shimano cassettes. If you feel that we should offer a WTB hub with GREASE GUARD on the drive side, we will consider it.

Please let us know if you understand our reasons for designing the New Paradigm hub to use the Shimano cassette body and whether you believe these reasons have been effectively communicated.

New Paradigm Cassette Hub Specifications

The New Paradigm Cassette Hub uses a 1994 Shimano XT 8 Speed Compact Drive or 1994 7 Speed LX cassette body bolted directly to the hub shell. The 8 Speed Cassette provides state-of-the-art shifting, while the 7 Speed Cassette builds a stronger wheel with zero dish. The cassette hub shell will accept a 1994 Shimano XTR 8 speed cassette, or a 1994 Shimano LX 7 Speed cassette if you first install a 3mm spacer before installing the cogset. The Cassette Hub is available in 32 or 36 hole drillings. 378 grams.

Adjustment for Bearing Wear

It is normal for bearings to wear, even with perfect lubrication. Diligent attention to timely greasing of your New Paradigm Cassette Hub will extend bearing life. For the longest possible bearing life expectancy, the Cassette Hub must be adjusted to correct play. The Cassette Hub uses a trick WTB bearing adapter to adapt the non-drive side of the Shimano axle to the WTB adjustable cartridge bearing. When free-play is detected in the Cassette Hub, tighten the bearing adapter adjusting nut with a 5/8" or 16mm cone wrench to remove play while avoiding over tightening so the wheel binds. Adjustment is easy and can be done a number of times before the bearings must be replaced.

We hope you enjoy your New Paradigm Cassette Hub. If you have any questions, problems, or comments, please call. Your satisfaction is our guarantee of future business.

Best Regards,

Charlie Cunningham, Mark Slate, Patrick Seidler, Steve Potts, and the rest of the WTB Crew

(PLEASE CHECK OUT THE ILLUSTRATION ON THE REVERSE SIDE FOR MORE INFORMATION ON THE WTB NEW PARADIGM CASSETTE HUB)

Wilderness Trail Bikes
New Paradigm Cassette Hub

The Wilderness Trail Bikes New Paradigm Cassette Hub features an oversized shell diameter, adjustable angular contact bearings, wide flange spacing, the widest bearing stance in the industry, and the patented GREASE GUARD® Bearing Lubrication System. Built in America, the design criteria for the New Paradigm Cassette Hub were durability, high-performance, easy maintenance and long life, for the Ultimate Upgrade.

The New Paradigm Cassette Hub's oversized shell diameter enables a thinning of the hub shell that both saves weight and improves strength. The Cassette Hub is micro-adjustable to correct bearing play for a stronger, longer lasting hub. The Cassette Hub's flange spacing is the ideal width for maximum wheel strength, given the constraints of the Shimano cassette dimensions.

The bearing stance on the Cassette Hub is farther apart than any other hub currently available. Wide bearing spacing makes an axle harder to bend, thus the Hub is stronger. The wide bearing spacing also makes the bearings last longer because the loads are lower. Finally, the wide bearing spacing reduces bearing play (side to side motion from bearing wear) at the rim.

The New Paradigm Cassette Hub is equipped with the GREASE GUARD® Bearing Lubrication System. The patented GREASE GUARD System independently lubricates each bearing, purging contaminated grease without disassembly, yielding long-life durability through easy maintenance. Due to cost and life-expectancy considerations, the New Paradigm Cassette Hub is equipped with GREASE GUARD only on the non-drive side of the hub, where the WTB angular contact bearing is located. Although WTB could equip the Shimano side with GREASE GUARD, it would be very expensive and complicated. Also, the bearings inside the Shimano cassette will wear out (after about two years). They are not designed to be maintained. Rather, when they get old, the cassette can be unbolted from the hub body and tossed along with the Shimano axle bearing. Replacement Shimano cassette bodies and axle bearing are available in nearly all bike shops in the USA and internationally.

Adjustment for Bearing Wear

It is normal for bearings to wear, even with perfect lubrication. Diligent attention to timely greasing of your New Paradigm Rear Hub will extend bearing life. For the longest possible bearing life expectancy, we use micro-adjustments for the Rear Cassette Hubs. This method yields precise adjustment for zero play as the Hub wears. The Rear Hub uses a trick WTB bearing adapter to adapt the non-drive side of the Shimano axle to the WTB adjustable angular contact cartridge bearing. Adjustment is easy and can be done a number of times before the bearings must be replaced.

Rear Hub Cartridge Bearing Adjustment

When free-play is detected in the Cassette Hub, tighten the bearing adapter adjusting nut with a 5/8" or 16mm cone wrench to remove play while avoiding over tightening so the wheel binds.

New Paradigm Cassette Hub Specifications

The New Paradigm Cassette Hub uses either a 1994 Shimano XT 8 Speed Compact Drive Free Hub or a 1994 7 Speed LX cassette body which is bolted directly to the hub shell. The 8 Speed Cassette Hub provides cogset versatility, while the 7 Speed Cassette Hub builds a stronger wheel with minimal dish. The 8 Speed Cassette Hub will accept 1994 Shimano XT or XTR 8 speed cassettes, or a 1994 Shimano LX 7 Speed cassette if you first install a 3mm spacer before installing the cogset. The Cassette Hub is available in 32 or 36 hole drillings. 378 grams.

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STRONGER REAR WHEELS WITH A 7 SPEED CASSETTE HUB

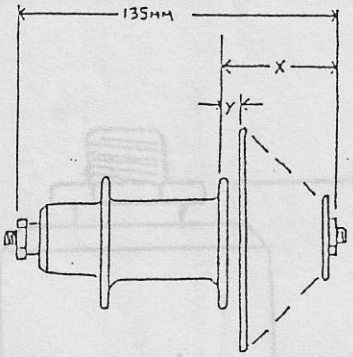
All of us at Wilderness Trail Bikes want our customers to have strong, reliable wheels. We have designed our New Paradigm Rear Cassette Hub to give you maximum axle strength and bearing life. We have also reduced wheel dish and improved the spoke bracing angle as a much as possible, given the constraints of the existing cassette dimensions.

All hub manufacturers are having to cope with the fact that 8 cogs are now being packed into 135mm dropout spacing. This results in less-than-ideal wheel configuration no matter how manufacturers deal with it. As is traditional at WTB, we have optimized our hub dimensions for the best possible wheel strength, regardless of the number of cogs chosen. We believe our rear hub dimensions maximize wheel strength better than all other hubs on the market.

We want you to know that the 7-speed Shimano LX cassette will provide significantly better wheel strength than will the 8-speed XT cassette due to the cassette and cog block dimensions.

The 7-speed LX cassette accomplishes this in two ways. It places the big cog closer to the drive flange. See Y dimension in FIG.1. It also has one less cog, reducing the X dimension.

FIG. 1



	X	Y
LX 7 speed	45mm	7mm
XT 8 speed	49mm	8mm

The result of these more compact dimensions is that your rim will be one cog's width closer to zero dish with the 7-speed LX cassette than it will with the 8-speed cassette. By using the 7-speed cassette you can significantly improve your wheel life and even your ergonomic efficiency.

Your rear wheel must transmit drive torque and resist lateral loads from stand-up riding, jumps and hard cornering. A dished, or offset wheel is not as strong and stiff laterally. It can come out of true easily. The wheel flexes more allowing the rim to rub on the brake pads during climbing and hard corning. This happens often in mountain riding. Some people using the new 8-speed cassettes are having a difficult time keeping their rear wheel true.

We appreciate the popularity and features offered by the 8-speed XT cassette and we do not want to discourage its use. However, our experience tells us that some riders would be better served by using the 7-speed cassette due to the terrain they ride in, their weight or their riding style. We offer this information to help our customers choose the cassette that best suits their needs.

WTB offers another solution that is great for those that want the Hyper Glide shifting and who feel 7 rear cogs are adequate. This method converts the 8-Speed Hyper Glide cassette block to a 7-speed by deleting the 13 tooth cog (the second-to-smallest cog). The cog spread becomes: 12, 14, 16, 18, 21, 24, 28. This method creates zero dish with 135mm dropout spacing.

The advantages, in addition to improved wheel strength and better power transmission efficiency, are:

- Less Weight
- Better Chain Line
- Can use latest shifters

The downside:

- You don't have eight cogs anymore. You won't miss the 13 tooth unless you are road racing on your mountain bike.

Following is a description of how to do it.. (By the way, the same method can be used to covert a stock Shimano hub with a 7-speed DX or LX to a 6-speed.)

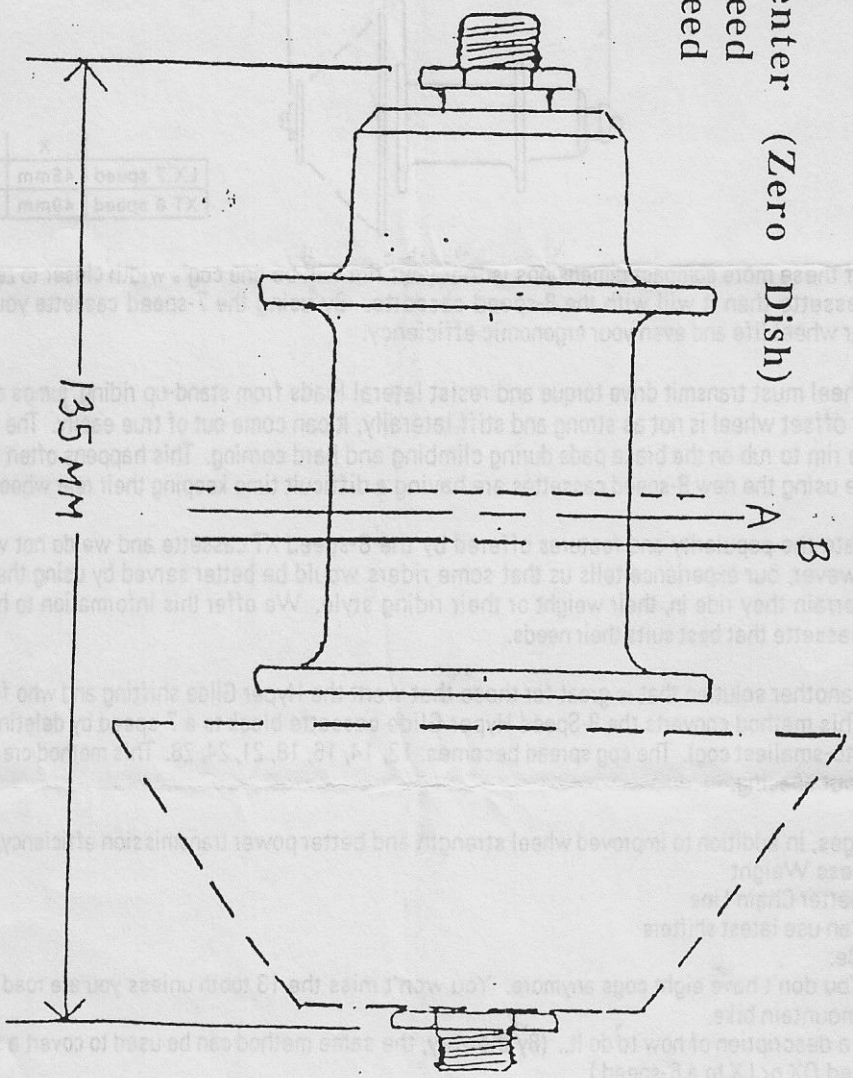
PLEASE SEE OTHER SIDE

Back off the locknut on the non-drive side. Take off the locknut, washer(s) and cone. Remove the axle. back off the locknut on the drive side. Remove the two washers. Reassemble the hub with the two drive side washers on the non-drive side. You now have equal distance from each locknut face to the flanges.

Note: A stock seven speed cog block will not fit in the space you just created. Use an 8 speed 12-28 or any 8 speed where you feel you can do without the cog next to the highest gear. The Shimano cog fixing nut will need a washer between it and the high gear cog to tighten down properly. Use a 1mm thick washer known as a "freewheel shim." They are available from us or UBP. The outside diameter is perfect for use with the 12 tooth cog and the Shimano fixing nut that goes with it. The inside diameter is oversized, so you will have to be sure the washer doesn't get clamped in an eccentric position, which would not allow the chain to seat properly in high gear.

This is a scale drawing showing the rim center line in relation to the hub flanges.

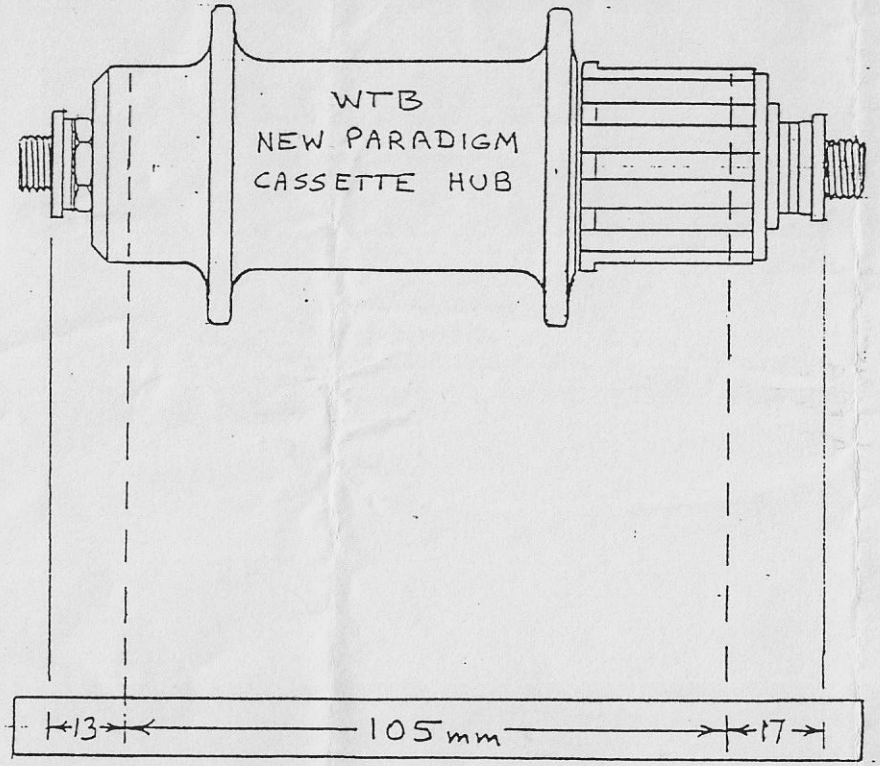
----- = Perfect Center (Zero Dish)
A = LX 7 - Speed
B = XT 8 - Speed

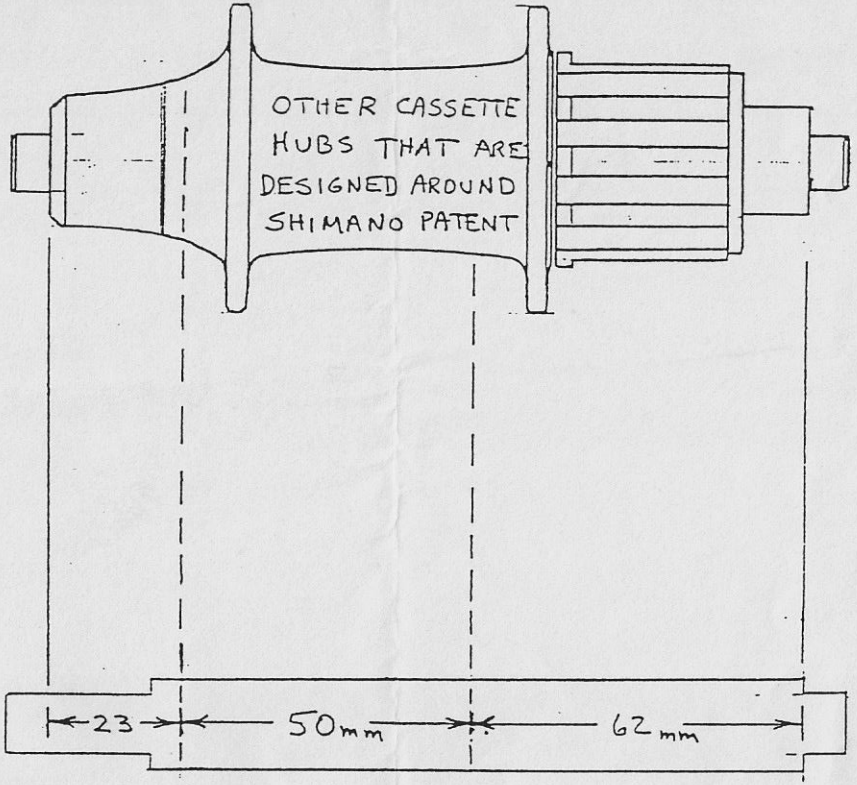


Note the relative distance of the rim from Perfect Center in the case of A and B. The wheel becomes radically weaker the farther the rim centerline is from Perfect Center. If your top priority is strong, energy efficient wheels, consider using the 7-speed LX cassette instead of the 8-speed XT.

VIEW OF AXLE BEARING LOCATIONS

(BROKEN LINES SHOW CENTERLINE OF AXLE BEARING LOCATIONS)





PLACING THE AXLE BEARINGS CLOSER TOGETHER GREATLY ACCELERATES BEARING WEAR AND AXLE FLEX, BOTH OF WHICH CAN LEAD TO CASSETTE FAILURE AND OTHER MAINTENANCE PROBLEMS.