

CUSTOM CASSETTES

Why settle for stock gearing when you can easily have exactly what you want?

by Sheldon Brown

Twenty years ago, every self-respecting bike shop would have one or two "cog boards" with loose sprockets so that the old-fashioned thread-on freewheel clusters could be customized. For some reason, this is no longer the case. Many people assume that it is harder to customize the modern cassette-type clusters than it was with the old thread-on freewheels. This is incorrect — customizing cassettes is actually easier! The old-style freewheels typically had three different mounting splines/

threads, so a sprocket that would work in one position wouldn't work in a different position, even on the same freewheel body.

Cassette hubs, however, use the same spline pattern for all of the sprockets, and the only interchangeability issue is that the smallest sprocket should be one that is designed for the outermost position. I create custom cassettes so often that I've even given some of the combinations specific names. The most popular are the "Century Special" and the "Cyclotouriste" models, based on the standard 12-13-14-15-17-19-21-24-27 "road" cassette.

For the "Century Special," we ditch the useless 12 and stick a 30 on the bottom, creating a 13-14-15-17-19-21-24-27-30. This can be done by replacing just two sprockets: the 30, and also a top-position 13. The "Century Special" cassette will generally work fine with a "road triple" rear derailleur.

If that doesn't go low enough for you, there's the

"Cyclotouriste 13" and "Cyclotouriste 14." These go one better, adding a 34 to the "Century Special." You have to give up either the 13 or the 14 to make room, so the resulting cassette is either 13-15-17-19-21-24-27-30-34 or 14-15-17-19-21-24-27-30-34. The high gears on these cassettes are perfectly adequate for touring applications, with normal 52-tooth chainrings, and the jumps are much more civilized than the "mountain" cassettes.

The models listed above are particularly easy custom cassettes to make. Some others require a bit more work, because the larger sprockets are attached to one another by bolts or rivets. The two or three smallest sprockets are usually loose. The rest of the cassette is commonly held together by three long thin bolts. The bolts have very small Allen heads, usually 1.5 or 2 mm size, and are often mistaken for rivets. The cheaper 7- and 8-speed models do use rivets for this, but most, if not all 9-speed cassettes use bolts — unless they use "spider modules."

"High and Wide"

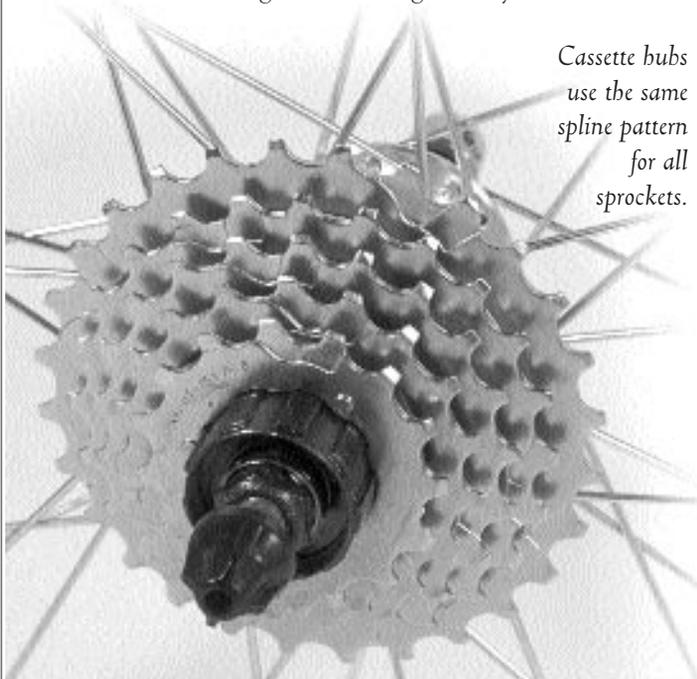
A relatively new option I've started offering is the "High and Wide," 11-12-13-14-16-18-21-24-28. This is based on the Shimano LX 11-12-14-16-18-21-24-28-32, with the 32 replaced by a 13. This is a nice setup for bikes with small wheels or small "mountain" cranksets used on the road.

Spider Modules

While most Shimano cassette sprockets have the same 9-spline attachment where they mate with the Freehub body, the higher-priced units use "spider modules" for the larger sprockets.

A spider module is an aluminum carrier that slips onto the Freehub body. Two or three steel (or titanium) sprockets are riveted onto the spider. Because the sprockets attach to the spider, instead of directly to the Freehub body, they don't need as much steel, so they save weight.

Cassette hubs use the same spline pattern for all sprockets.



The downside of this system is that you can't take a spider module apart and play "mix 'n' match" with the sprockets. For instance, the 27-tooth cog is only available as part of a spider module along with a 21 and a 24. Since the 27 is at the end of the spider module, however, there's no problem putting a bigger sprocket inboard of it, as long as you include an appropriate spacer between the module and the loose sprocket.

Sprocket Availability

Unfortunately, most shops don't stock much, if anything, in the way of individual sprockets. In some cases your local shop may be able to special order them for you, but even distributors don't generally carry them. Sometimes, it is necessary to cannibalize another cassette to get the sprocket size you need.

If your local shop can't get what you need, drop me an email (captbike@sheldonbrown.com) and I can help.

Sprockets come in "7-speed" "8-speed" and "9-speed" versions, varying in thickness. You might think this would be a problem, but it isn't, because the difference in thickness is so small it doesn't matter if you're just substituting two or three of them. "7-speed" sprockets are 1.85 mm thick; "8-speed" sprockets, 1.8 mm; "9-speed" sprockets, 1.78 mm. The main differences are in the spacers between the sprockets.

The outermost, smallest sprocket needs to have a built-in spacer, so the spacing will be different between an "8-

speed" and a "9-speed" sprocket, but even in this position, you can get by substituting an 8 for a 9. This is because the indexing for the top gear is regulated by the high-gear limit stop on the derailleur, rather than by the detents (click stops) in the shifter as is the case for the other gears.

Hyperglide

Shimano cassettes use a "Hyperglide" design, in which each sprocket is matched to the one next to it, for the smoothest possible shifting. If you do choose to go with a custom cassette, some of the jumps will be between mismatched pairs, so you'll lose the benefit of that functionality.

This is not the end of the world. Nobody had Hyperglide before the late 1980s, and people managed to shift just fine, even though their derailleurs and shifters were not nearly as good as modern ones. The non-Hyperglide shifts will make a little "click" noise as the chain moves, and you'll feel a slight momentary hitch through your pedals, but nothing that is a real problem in practice.

Further Reading

You might find my Web article on Shimano cassettes useful. It has more details on options, as well as a complete listing of all Shimano cassette combinations, 7-, 8- and 9-speed. It's at <http://sheldonbrown.com/k7.html>. 

Columnist Sheldon Brown is a man of many nicknames. Check them out on his Web site.