HUFF

OzHPV inc.

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From the editor

Articles for HUFF have been getting a bit lean of late. Maybe it's the reduction of HPV activities during the winter but I'm sure many are still tinkering in the garage if not out riding.

If you think you are involved in something of interest I'm always happy to help out where I can if you have trouble writing this up. It's certainly not stagnant in the manufacturing scene here in Australia going by the correspondence and new designs from suppliers.

HPM's

In a following article on page 7 some questions are raised about the viability of human powered lawnmowers (HPM).

I've put a bit of thought into this over the years and think it has some similarity to the question some ask about HPA's. Can one make a machine that will allow almost anyone to hop on and fly easily.

I believe both require a considerable amount of power to achieve that I can't see avoidable without added assistance and in many ways these are not practical because of this.

However saying this, I think a HPM has some chance of working if configured to work in different ways to current powered machines.

The book, Human Powered Vehicles has some info on HPM's (if not that another fairly common HP book) and I remember reading about a ride on mower that worked like this.

Basically moving over the grass and mowing didn't happen at the same time. The mower was pedalled into a stationary position. The blade system was engaged and the pedalling action spun said blades as well as drove

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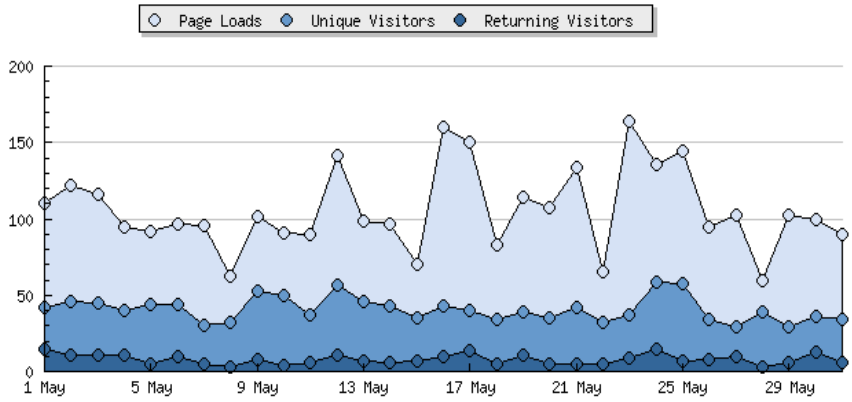
OzHPV Website Usage

The OzHPV website is intended to serve the HPV community by providing information on OzHPV activities and HPV's in general. It complements the VicHPV and WAHPV websites by providing information with a broader applicability and serves as a source of information and a repository for reports and images from national events.

To help understand who is using the OzHPV website, counters have been placed on many of its pages. The counters (free from statcounter.com) provide useful information on its usage:

Hits

In May 2005 the OzHPV website averaged 106 hits per day. The main page is the most popular, with the For Sale, Resources, Links and HUFF pages not far behind. This tells us that people are interested in HPV's and what we are doing, and that the For Sale page does get your items in front of a lot of people.



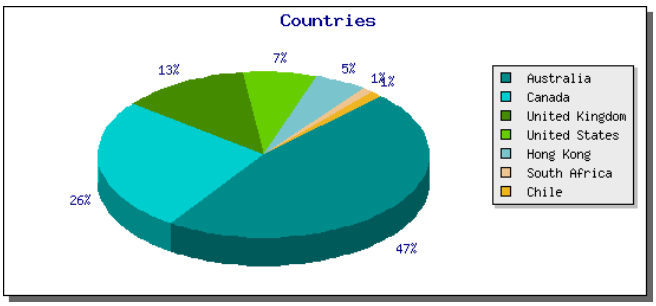
Where from?

The site is visited by people from all over the world - usually around half are from Australia. The graph below shows the last 100 visitors as at 31 May - there were lots of Canadians oot and aboot that day. The counters can also tell us what link was used to get to the OzHPV site. Most seem to arrive at the OzHPV site through Google searches, with others arriving from links at sites like Greenspeed, Flying Furniture or the like. Some arrive directly by typing our URL into their browser's address box. See graph next page.

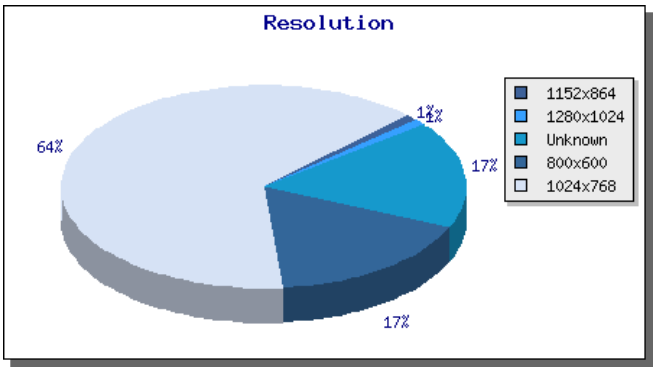
Other Stuff

The counters can even tell us what screen resolution browsers are using when they visit our site. A screen resolution of 1024 by 768 is the most popular, and the site is optimised for this resolution. An overwhelming 97% of users are browsing the site with Microsoft Internet Explorer. All browsers had Java enabled. Around 67% of visitors are using Windows XP. Some 38% of trike riders sport beards.

Head Up Feet First is the Newsletter of OzHPV Incorporated. The ever developing Web site can be found at http://www.ozhpv.org.au/index.htm.
If you want to contact OzHPV by mail the address is OzHPV Inc, PO Box 189 HRMC NSW 2310



Ok maybe I made that one up, but it's amazing the level of information that can be obtained from one little piece of code on a web page.



Input.

As webmaster, I am always interested in feedback on ways the OzHPV website can serve us better. Visit the website (**http://www.ozhpv.org.au**) and if you have a comment just click on the "webmaster" e-mail link on the bottom of the page.

Andrew Stewart - **andrew.stewart@aca.gov.au**

HUFF Back-issues

Ed. There's been some interest in the purchase of all the electronic editions of HUFF on a CD lately. It was decided by membership quite some time ago that all HUFF's wouldn't be offered on the OzHPV web site, only a few to entice people to join and particularly not the latest editions. It was also deemed unfair that if someone was to join they could then have free access to every edition of HUFF produced whilst the cost of producing these HUFF's were born by existing members over a period of many years.

Our esteemed membership secretary David (**admin@ozhpv.org.au**) offers a service whereby he will burn every single copy of HUFF that's ever been produced!! (1997 to 2005) if you make a donation to OzHPV. I seem to remember that the donation was set at $20 but I could be wrong.

Contact David (**admin@ozhpv.org.au**) if you want to know more.

Atholl Reid - **secretary@ozhpv.org.au**

OzHPV LOGO

To all OzHPV members

Recently you were invited to submit any number of suggestions for a new OzHPV logo or for modifications to the existing logo.

The time to submit your suggestions has now expired.

This notice will now be posted to the OzHPV website and printed in the September/October issue of HUFF.

Two entries have been received.

As proposed in my original notice the existing logo and the two new entries are set out below.

HPV-1. Existing Logo.

HPV-2. Suggestion submitted.

HPV-3. Suggestion submitted.

In the next two weeks we will be sending each financial member a numbered ballot paper with instruction on how to vote. There will be one vote per financial membership irrespective of whether the membership is a single or family membership. There will be an opportunity to vote by phone, email or snail mail.

1. All votes must be received by Close of Business on 21 September 2005.

2. The results of the voting will be posted to the OzHPV website on 26 September 2005 and published in the next issue of HUFF.

3. In the event of a tied vote, the executive comprising the president, secretary and treasurer will cast the deciding votes.

Rudolf Werner, OzHPV President. **rudolf@fourthwave.com.au**

Ed. Another OzHPV member had a go at combining the existing logo with one of the entrants and came up with this. It's too late for consideration but I thought it wasn't a bad effort.

Continued from page 1 - From the Editor

them either forward or backward on runners covering a set length. The mower is then pedalled forward and the process started over again. So it's drive, switch to cutting, back to drive.

My guess is the only way to do both actions at once would be to have the mower move forward very slowly and the blades spin but also rotate slowly around the whole mower, I guess in a planetary action. Either that or sit pedalling for an hour storing up energy into a system that could then release that energy for the mow. In other words, I agree with a previous comment who said it's hard enough to ride on grass let along have the excess power to cut grass too.

A hybrid system might be more achievable where you pedal to move the machine and battery power spins the blades. (or battery/motor drives and the pedalling spins blades) This sort of setup might even capture the imagination of the public if it was marketed well and get the Australian public out doing exercise.

Timothy Smith - **tas@ozhpv.org.au**

HPV Resource

When you look at it there's quite a lot of material on HPV's available in Australia but you have to know where to look.

Greenspeed sell most of the magazines and several books and I notice doing a library search around each State that many books and video's turn up there too.

Probably the best HPV book I believe is called Human Powered Vehicles by Abott and Wilson. This covers not only cycles but many other HP types. See the review at **http://ihpva.org/SourceGuide/Library/books.html** and **http://www.onlinesports.com/pages/I,HK-BABB0827.html**

For a more general but extremely well presented and colourful book you can't go past Richards Ultimate Bicycle Book by Richard Ballantine & Richard Grant. I have heard of some buying these for next to nothing at sales. **http://www.totalbike.com/reviews/richards_21st_century_bicycle_book_1126.htm**

The best book I have come across for instructional welding of tubes such as CroMo would have to be Performance Welding by Richard Finch. **http://www.amazon.com/exec/obidos/tg/detail/-/0760303932/002-2280775-0820052?v=glance**

Magazine wise the American Recumbent Cycle News **http://www.recumbentcyclistnews.com/** and UK's Recumbent UK as well as VeloVision **http://www.velovision.co.uk/** are all worth considering. Also Encyclopedia has had a following over the years. **http://www.encycleopedia.com/**

On the Internet, Bent Rider Online, a monthly online magazine appears to be very popular. **http://www.bentrideronline.com/** Also check out Ebent, an online recumbent touring magazine **http://www.e-bent.com/** and Recumbent and Tandem Rider magazine at **http://www.rtrmag.com/**

Quite a few years ago I produced a web page listing a lot of this material and showing where it's available in Australian Libraries. It's getting a bit old now so not all links will work but you may well find something there worth pursuing. **http://www.ihpva.org/people/tstrike/resorce.htm**

For current information many HPV groups produce a newsletter which you could receive by subscribing to their organisation. If you're considering going this way I receive newsletters from Kiwi HPV **(http://www.kiwihpv.org.nz/)**, BHPC **(http://www.bhpc.org.uk/newsletter.html)** and find these very informative.

We've mentioned this not too long ago but a CD containing every edition of the Technical Journal for the IHPVA, Human Power can be purchased from OzHPV very cheaply. **http://www.ozhpv.org.au/resource.htm**)

Timothy Smith - **tas@ozhpv.org.au**

Cycling Cadence and Bicycle Gearing

If you want even the nerds to consider you a nerd, try getting enthusiastic about bicycle gearing. There is probably no topic with poorer esteem or poorer coverage in any book on cycling. There are three reasons for this low estate: 1) newbies don't understand it, 2) strong cyclists don't need it, and 3) most people dislike math. If these things are true, why do I want to approach the task? — Simply because cadence and gearing are important for the newbie, the tourer, and the person with weak muscles.

The Value of Gearing

I became convinced that gearing was an important topic through experience. I had moved to an area with some long, very steep climbs, 12% and over, and I started having trouble; after making one climb, I would feel a popping and tearing of the muscles in my knees. However, my bike had impressively low gears, at least for a 10-speed, down in the low 30's. Investigation on my part revealed to me that the bike had only six useful gears and I needed much lower gears for my climbs, so I purchased a 15-speed bike without paying much attention to its gearing. That did not solve the problem either, so I had to do further reading. I ended up having to purchase new cranks, chainrings, rear derailleur, and freewheel to get the gears I needed, increasing the cost of my bike by almost 50%. But now I have a bike that can climb mountains.

Let me present a simple problem to illustrate the problem of gearing: imagine that you are going on a touring trip and will be carrying your own gear and supplies. On some days, you will be climbing for half a day on a 6% grade. Your current bike has a 28 tooth large cog in the back and a 32 tooth small chainring in the front. Do you need to change your gearing or not? If you know the answer to this question, then you can quit reading right now. Or if you would never be caught dead carrying a heavy load up a mountain, you should quit also. On the other hand, if the prospect of such a trip sounds nice but you don't know the answer, reading what I have to say will be of value. With the proper gears, the length of the climb and the height of the mountain are unimportant.

Problems in Getting the Right Gearing

There are three problems in the quest for the right gears. First, the manufactures are very conservative about placing low gears on bikes. Basically, if the range between high and low gear is modest, the derailleurs work a little better. A wide gear range can require a slack chain, something no manufacturer is going to allow. Second, the cyclists who write cycling books tend to be very strong and therefore don't even recommend or even understand low gears. For instance, in one book (which was much better than most), the author said that a 27-inch gear was the equivalent of walking. Actually, a 12-inch gear would allow you to climb at 4.83 klm/hr at 80 rpm, but I doubt that you could walk that fast while pushing your bike on the same hill. A 27-inch gear would be equivalent to jogging up the same hill. Third, when you decide what you really need, then you might find that it's hard to achieve because the manufacturers have not been thinking along the same wavelengths.

Why Tourers Need Lower Gears

A mountain is a completely different obstacle to the racing cyclist and to the touring cyclist. The racing cyclist, the strongest of the strong, in the peak of condition, is riding an ultra-lightweight machine, with speed as his primary objective. The touring cyclist, more of a Nature-lover than a jock, somewhat overweight and very tired, is riding a heavy bike with a heavy load, with pleasure as the primary object. The racing cyclist stands on his machine and speeds up the hill, running at his anaerobic threshold, averaging as fast a speed as the tourist does on flat ground. The tourist sits on the way up, riding at a pace he can maintain all day long, well below his threshold.

The Basics of Gearing

At this point, I am going to have to explain the basics of gearing, so if you find this unnecessary, please skip on down, because I will be getting beyond the basics after a few paragraphs.

What is gearing and why is it necessary? Click and Clack had to answer this question about cars recently, and I was tickled to see that they used a bicycle to explain the point because I have always used a car. Let me compare it to walking. In walking up a hill, your pace will become shorter and your forward movement slower, while in walking down a hill, your pace will become longer and your movement quicker. If you tried walking up a steep hill without slowing down, you would rapidly become exhausted. However, on a bicycle, you don't slow down the speed of your legs, but you gear down to reduce the amount of pressure you have to apply to the pedals. So a cyclist going up a hill and down a hill may be spinning his legs at the same pace and making the same effort, but the bike travels a shorter distance with every turn of the crank while going uphill and a longer distance with every turn of the crank while going down. The cyclist on the uphill gives up speed to save effort, the same as the person walking up a hill. The cyclist even has an advantage over the walker: because his legs are moving faster, the blood flow is better, and thus he doesn't have as much fatigue.

At one time, bicycle racers did not believe in multi-geared bikes. But Velocio, who invented the derailleur, thought of a test to prove them wrong. He challenged a champion racer to a race in the mountains with a young woman. The champion had a single-speed bike; the woman a three-speed. The champion lost.

Gearing is achieved by having chainrings on the front and cogs on the rear with various numbers of teeth. Let us suppose that you are riding a bike, and the chain is on a 30-tooth sprocket on the front and a 30-tooth cog on the rear. At this point you have a 1 to 1 drive. What gear size is it? The gear that you're in at this point is the same as the tire size on the rear wheel. If you have a 27-inch wheel or 700 C wheel, you are in 27-inch gear.

If you have a 26-inch wheel, you are in 26-inch gear, and so on. Now let's shift gears until the sprocket in front is twice the size of the one in the rear, say a 52 chainring in the front and a 26 cog in the rear. What gear is that? Well, 52/26 X 27 = 54, so if you have 27-inch wheels, you are in 54 inch gear. This gear is the equivalent of having a direct drive bike (such as the old high wheeler) with wheels 54 inches in diameter. If you then change gears in the back, so that you are on a rear cog of 13 teeth (the equation is 52/13 x 27 = 108), you now have the equivalent of wheels 108 inches in diameter. Gear inches are proportional and are not an equal distance apart: thus a shift down from a 25 inch gear to a 20 inch gear is equivalent to a shift down from a 100 inch gear to an 80 inch gear, and the difference between an 11 inch gear and a 33 inch gear is the same as the difference between a 33 inch gear and a 99 inch gear. Two other terms are also used instead of gears or gear inches. Gear ratios refers to the ratio between the front sprockets and back cogs; this term is seldom used correctly. Development refers to the distance travelled when the cranks are rotated 360°; usually this is measured in meters because development is favoured over gear inches in Europe, where the metric system is used.

The Importance of Cadence

In order to understand gearing, we also have to look at the mystery of cadence. Cadence is very simply the speed at which you turn the cranks, measured in revolutions per minute (rpm). However, bound into the concept of cadence is the idea that some rpms are better than others. What difference does it make how fast you spin? Well, try a very low gear, the smallest sprocket on the front with the largest cog on the back, and pedal very fast on flat ground. The result is that you travel very slowly but your legs tire very quickly from having to spin that fast. Now try a very high gear, the largest sprocket on the front with the smallest cog on the back. Now, the problem is that you have to push very hard to move forward. This causes your legs to tire also. Therefore, a middle speed has to be found. Most people who begin cycling like to spin at about 60 rpm, yet touring cyclists like to spin at about 80 rpm.

Why do cyclists prefer a higher speed? The best cadence is a balance between leg speed and pedal pressure, but as a cyclist puts more energy into the task, both increase. So, the non-cyclist will pedal at 60 rpm going 16.1 klms an hour, the tourist will spin at 80 rpm going 24.15 klms an hour, and the racer will twirl at 100 rpm going 32.2 klms an hour.

The cycling books like to pretend, however, that a touring cyclist will pedal 80 rpm in the flats and 40 rpm on the steep hills. Now if touring cyclists were strong enough to stand and pedal the whole distance up the mountain, they could do that, but it makes much better sense to gear down, sit down, and keep the cadence up. The length of the climb makes a difference. On a short climb, standing provides a good opportunity to stretch. However, from observing myself closely, I am convinced that sitting and spinning is quicker and less tiring even for fairly short distances.

What Gears Are Appropriate?

Now we're ready for the $64,000 question: what gears do cyclists need? Well, as you may have already figured out, the answer is not going to be the same for everyone. Some people are stronger than others.

How long will it take to climb your chosen hill? In my own case, I find my maximum output is about 37.03 klm/hr, but I can only keep that up for 20 minutes or so. On the other hand, I can keep up an 28.98 klm/hr pace all day long; that doesn't mean that I will average 28.98 klm/hr; my average speed will be lower, but that will be my speed on flat smooth ground. At that output, I can climb a 6%grade hill at 8.21 klm/hr in a 21-inch low gear. However, these figures are for my weight, the weight of my bike, tools, bags, and water on a local ride. When I am on a touring ride, I will be travelling 25 kilos heavier (total 125 kg's.). In that case, my speed will be 80% as great, thus I will need a low gear only 80% as high, thus a low gear of 16 is called for. In figuring what low gears you need, be sure to convert for your weight.

Actually, I can climb 6% grades on my touring bike with a 20 inch gear. What I have to do is to make a harder effort, the equivalent of riding at 31.2 klm/hr on level ground. This is also equivalent to climbing an 8% grade without my touring load, and I do that all the time too. However, I am pushing myself to climb that hard, which is why I stop and walk a bit after half an hour or so. At that pace, I could climb a klm in 2 1/2 hours, not counting rests along the way. According to the chart, I can also climb a 12% grade on a local ride or 9% while touring by using my maximum 37.03 klm/hr effort. Actually, I can climb steeper grades than that around home by standing on my pedals and slowing down my cadence, but I can't climb anything as steep as 9% on a trip. My touring bike is too heavy for me to stand and ride for more than a few minutes and, while on a trip, I am always somewhat tired from the day before, so I can't exert my maximum effort.

Another question that could be asked is, what high gear is needed? This is really a question of how steep the downhills are or how strong the tailwinds are and how fast the cyclist wants to go. A 100 inch gear, the normal high gear, allows the bike to travel at 40.25 klm/hr @ 80 rpm and 48.3 klm/hr @ 100 rpm. I have been able to pedal up to 61.18 klm/hr in that gear. What touring cyclist would need to pedal faster than that? Indeed, there is some justification for using a lower high gear. There are few opportunities to travel over 32.2 klm/hr and then coasting would achieve about the same speed. But downhill pedalling helps pump out of the legs some of the toxins acquired on the trip up the hill. The legs feel better and the next hill is easier if the legs have worked a little on the way down.

How Many Gears?

Assuming that we have decided on a high of 100 and a low of 20, now comes the hard step. How many gears are needed between 20 and 100? I experimented with a good variety of cogsets and chainrings, the cogsets from 14-21 to 14-36. What I discovered was that a 10% change between these gears seemed the most natural. In fact, my son's bike was set up with

a 12% change, my touring bike with a 10% change, and my around town bike with an 8% change, so I have had lots of time to test these assumptions. Here's what happens: if the gear range is too wide, I'm wanting to shift gears when no gear is available, and when the gear range is too narrow, I tend to skip over them. The perfect gear change seems to me to be 10% while my son prefers his wider setup. I am sure that anything wider than 16% would be too wide.

So, just having a lot of gears or even an even progression of gears is not what I want. I want a 10% change, or close to it, from bottom to top. Let me show you what a perfect set of gears would be, starting from the bottom, based on 10%:

20 22 24 27 29 32 35 39 43 47 52 57 63 69 76 84 92 101

And here's a second set of perfect gears based on 12%:

20 22 25 28 31 35 39 44 50 55 62 70 80 87 98

Of course, due to the small number of teeth on cogs and chainrings, this perfect set of gears can only be approximated.

Gear Planning

There are three possible ways to plan the gears. The first system is used with the current 7 to 9 cog freehubs. The last is used with the older 5 and 6 cog freewheels.

With the individual system, you go downhill in the big chainring, level with the middle chainring, and uphill with the small chainring. Most of the shifting is done with the rear derailleur. This is the method used on new bikes now days. A bike with this setup usually has many duplicate gears. With this method, the percent change between the teeth on the rear cogs should be 10% or 12%, but usually the chainrings are too close together in size and the change on the rear is much larger. This system has a major flaw of having too much duplication.

The jumping system is very similar to the individual system, except there is no overlap or a one cog overlap between the different sets. With this method in shifting down, when you get to the biggest cog that's used with the large chainring, you must shift to the smallest cog and the middle chainring. For example, you could use a 54-36-24 front with a 14-21 freewheel and get this gearing. You don't shift very often but, when you do, it's a major jump. This setup is rarely used and never on bikes sold in stores.

The alternating setup uses the front derailleur more. To shift downward through all the gears without skipping any of them, you would have to use both derailleurs on every other shift. Thus you would shift down with the front derailleur to get to the second lowest gear, and to get to the third, you would shift down with the rear derailleur and shift up with the front derailleur. While this method seems to require an awful lot of shifting, half of it double shifting, in actuality, no one ever shifts through all the gears like this. Instead, this setup makes finding the exact gear very easy, as they are in a logical progression. The chainrings must have a 10% or 12% difference in the number of teeth, but the teeth in the cogset must change by exactly twice that percentage. This system avoids duplication.

By the way, my own setup of 52-48-24 and 14-17-21-26-32 is both alternating (the outside pair of chainrings) and jumping (the inside pair). This means that there is double the gap between the lowest gears, something I'm not completely happy with. However, I do get 14 useful gears out of 15 this way. Also, the second chainring should be a 47, so with a 48, I alternate between 8% and 12%.

There are some odd arrangements too. One is labelled as Alpine. In the old "Alpine" setup, an alternating setup was used with a greater difference in size between the two chainrings. Finding the best gear with this setup required taping a chart to the handlebars because the pattern was so complicated. The new "Alpine" setup uses the individual setup with a greater proportional difference in size between the largest cogs. This setup makes the shifting patterns unpredictable. Much more common is duplicate gearing: that is, both the front chainrings and the rear cogs have the same percent difference, thus rather than the number of useful gears being a multiple of the number of sprockets (i.e. 2 X 5 = 10), they are the product of an addition (i.e. 2 + 5 - 1 = 6). Thus a bike with "27 speeds" may have as few as eleven useful gears. Finally, some bikes have no pattern at all. Thus, the cyclist might find gaps in the high, middle, or low gears. Oval chainrings add another complication, since the actual gear changes during the pedal stroke. Not all ovals mount the same way either. In my opinion, none of these setups has any merit.

Planning the Rear Cogs

Now to give you the necessary teeth for the rear cogs (with a 10% change) for any of the three patterns, starting with a low of 32 (which allows a low gear of 20 with a 24 tooth front chainring):
Individual or Jumping
32 29 26 23 21 19 17 15 14 12
Alternating
32 26 21 17 14
And here they are for a 12% change:
Individual or Jumping
32 28 25 22 19 17 15 13 12
Alternating
32 25 19 15 12

If you want to compute your own cogsets, starting from another size large cog, just multiply by .9 each time for a 10% change, .88 for a 12% change, .86 for a 14% change, or whatever you want. Round off to the nearest whole tooth after figuring out the whole series.

Planning the Front Chainrings

The front chainrings should 1) be spaced the appropriate distance apart and 2) allow you to achieve the high and low gear that you want. With the alternating system, the chainrings are only 10 or 12% apart; with the jumping system, the distance between them should match the jump between the largest and smallest cog (in percent, not teeth), and with the individual system they can be whatever you want, as long as you achieve your high and low gears.

Determining High and Low Gear

Using this method to determine the gears for your bike avoids the necessity of having to figure out the gears for every combination. However, it is necessary to figure out two gears, your highest and your lowest. As said earlier, the highest gear for a touring bike should probably be between 90 and 100. And your low gear should come from the output chart. All that is necessary now is to look at a chart of the possible cogs and sprockets (both of these charts assume 27 inch or 700 C wheels; 26 inch wheels will result in slightly lower gears):

High Gear from Chainring and Cog Combinations

Chainring	12 cog	13 cog	14 cog
52	117	108	100
50	112	104	96
48	108	100	93
46	104	96	89
44	99	91	85

Low Gear from Chainring and Cog Combinations

Chainring	26 cog	28 cog	30 cog	32cog	34cog
30	31	29	27	25	24
28	29	27	25	24	22
26	27	25	23	22	21
24	25	23	22	20	19
22	23	21	20	19	17
20	21	19	18	17	16
18	19	17	16	15	14

Now, if you choose a larger or smaller rear cog than 32, as I used earlier, you will have to reconfigure the cogs, as I did using the 32 cog earlier, but is not necessary to calculate the gears for every combination.

Why Go to the Trouble?

I have to warn you that after you go through the task of figuring out what would be ideal for you that you then have to find the corresponding chainrings and cassettes and also the derailleurs which will work with them, which is not a simple task. Then why go to all this trouble? The goal is easy to understand: a sweet collection of gears which allow climbing the highest hill and shifting without having to speed up or slow down or fumble around for the right gear. If you aren't interested in going to this trouble, it's no problem for me. But I would recommend that, at the very least, you should figure how low your lowest gear should be.

In my own case, I happen to be pretty lucky in using the outmoded five cog freewheel. The amazing thing is that a near perfect arrangement and spacing is found on the most common five-"speed" sprockets, 14-32 and 14-28 (the 14-32 has a 10% change and the 14-28 an 8% change). I guess whoever decided on this arrangement had the same thoughts I had. Unfortunately, no bike ever sold in a store was given the correct chainrings to match them. There's a reason for that too, as I have mentioned before. In having my ideal gear combination with the wide range from 100 high to 20 low, I also have to accept another problem — chain slap. With some of my lowest gears, the chain runs loose because the derailleur does not have the ability to wrap that many teeth. The solution I use is to simply avoid swaying from side to side when climbing with those combinations. Future derailleurs might solve this problem.

Again I will ask: why be stubborn, figure out gear inches, and go against what the manufactures want? Until people started defying the manufacturers, there was no such thing as triple gearing and as long as people will accept whatever they are given, there will be no future progress. At any rate, I get my reward for being stubborn every time I climb a mountain and shift smoothly from gear to gear on even the steepest grades.

Ron bottrell - **bottrell2001@msn.com**

Human powered Lawn Mowers

A couple of people from Queensland have contacted OzHPV by post about human powered lawn mowers.

This is their first letter:

We are writing to you wondering how much development has been done with human powered machines capable of lawn mowing. We have a walk behind style machine which is a modern remake of the pusher mowers from years ago. Our thoughts are, if there is nothing around as yet, it may be worth trying "ride on Mower" pedal powered devices.

It seems there is a growing concern of us running out of energy especially when so many rely on non-renewable resources. Obviously one thing OzHPV Inc. is achieving is an "energy form" that totally agrees with what should be needed in the future.

It would be much appreciated if we could do something with anyone who likes to look for answers with such things.

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When I received their letter, I had a quick look on the web and in the IHPVA archives and found some articles on such devices, so I printed them out posted them off in reply.

I have now had another letter from them as follows:

>>>

Thank you very much for the interest you are taking in following up our suggestions concerning human powered lawn mowers.

We are just so pleased to find that out there are others who also believe they are worth spending time on. We also feel that developing new ideas often requires team effort and a bit of competition here and there.

Without trying to "re-invent combine harvesters" as such, we would like to pursue ideas as we envisage them with OzHPV members. IT is a farming area where we live here and as need be our locals are putting more of their skills into common sense green energy (and organics).

Hopefully problems that may arise can be worked through; for example, as part of catering for different needs the highest and lowest gears built-in shouldn't be far from both too high and too low.

We would like to have information published as mentioned hoping to achieve better results. We would be willing to have our push-type human powered lawn mower used in experimentation as well as helping by donating building materials and parts.

If there's room for improvement on what's already in existence, it would be nice to be able to do things that are unique to us. We'd prefer people contact you first if that's OK and look forward to your involvement that you're comfortable with as well.

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I have transcribed the following notes from an annotated drawing included with the second letter:

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Thoughts on the design of a human powered lawn mower:

1 Cutters interchangeable for both ride on and push-type human powered lawn mowers
2 Body weight etc. mostly above rear wheels
3 Rear wheel drive (no pawl) for forward and reverse
4 Large range gearing
5 Safety wheels at the rear to prevent tipping in the backwards direction
6 Possibly four main wheels for stability
7 Long and wide wheel bases for stability
8 Adjustable extra outrigger wheels for stability
9 Light weight
10 Guards for cutting area etc.
11 Largely recumbent design
12 Single steering handle instead of handlebars, something not all that different from the way push-type human powered lawn mowers are made
13 Different angle and length setting for steering and seat so that it could be adjustable between upright and recumbent
14 Cutters at the front to help mow closer up to building etc.

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So ... does anyone have an interest in building and experimenting with human powered lawn mowing devices?

What about any thoughts on such things?
Maybe even experience of having built one?
Plans formulated but never followed to fruition?
Parts accumulated but still gracefully aging on a shelf in your garage, shed, spare bedroom or lounge room?

To begin with, as mentioned in the second letter, contact will be through me. I will collate any responses made to this list and any emails or hard copy stuff sent to me, and I will forward them on to the letter writers.

If you are interested, then to make life less complicated, let me have your postal address so that they can contact you directly.

Who knows ... maybe at the next OzHPV Challenge we will be able to mow the off-road course before we ride it!

Atholl Reid - **secretary@ozhpv.org.au**

If this Newsletter cannot be delivered please return to:
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