

B.C. RANDONNEUR Marathon Bicycling



Founding Member: 1985

The Newsletter of the BABC Randonneur Committee
February-March 1993 (Issue #2)

1993 EXECUTIVE

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300K - Your name here

400K -

Dave Charnock & Judy Dwyer (Burnaby) 433-7549

600K -

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1000K -

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& Ted Milner (Burnaby) 421-0371

FROM THE FRONT BICYCLE SEAT

(Manfred Kuchenmuller)

This winter's overdone snowfall and miserable cold lost some of its bite during each of our monthly committee meetings. The story sessions that were an integral part of our committee work allowed us to conjure up visions of sunshine, flora in full bloom, long roads, pace lines, and occasional stops which always feel so good. With the snow and cold weather retreating, that vision will soon be a reality; get those bodies and bicycles ready, the 1993 Randonneuring season is just around the corner.

We will start rolling at 7pm on March 12th, with our social at the ANZA Club, followed the next day with a Fitness and Training seminar for endurance cyclists. If things go as planned we also hope to have a Randonneuring booth at the Bicycle and In-Line-Skate Show at B.C. Place Stadium from March 19th to 21st.

Despite all the time which your committee has occupied with fun and games, they have made and are making progress at becoming a more autonomous sector in Cycling B.C., and streamlining the various tasks associated with our club. Dan McGuire has made a formal submission to Cycling B.C. for separate sector recognition of the Randonneurs within Cycling B.C.; a committee has worked at standardizing and entering Brevet routes on a computer for easy access and modification, and we are beginning to compile a procedural handbook to aid committee members and volunteers in doing the many administrative, regularly recurring, and time-consuming jobs associated with Randonneuring.

Our Populaire and Series advertisements will be available at bicycle shops and fitness and community centres in the Lower Mainland, Vancouver Island, and Interior, by February 15th. Look for these colourful peach and purple brochures sporting Dan McGuire's "permanent" Dogwood logo and Mike Hagen's 1993 thirteen-cog pin design. For 1993 we have combined the former Vancouver and Fraser Valley rides into a double series of Lower Mainland rides. We hope that this arrangement will allow everyone to complete more rides, and attract riders who up to now have been unable to sign up for the early series.

Finally, I must admit that in reality I have never occupied the front bicycle seat, or even had it in sight for more than one or two hundred metres. I have been quite content and often mesmerized by the view from the back. Recent developments however, (namely Gordon Cook's rigorous training and undaunted belief that limits are unnecessary burdens) have inspired me to keep at least his bicycle seat in sight.

See you all on March 12th at the ANZA Club.

BARB'S CABLE STOP (aka Editorial)

We Randonneurs really know how to tell it like it is. We like to talk about every aspect of our sport, from the gruelling, wet, cold, windy rides, to the scenic, sunny, warm, satisfying rides. The articles I have seen in the 1991/1992 season are too good to forget, so I've decided to put together a quotable quotes column - hope you enjoy it. If you've got quotes you think I should add, please let me know.

I have set some tentative (subject to availability of the computer at Cycling B.C., etc) newsletter submission deadlines for the coming season, as follows:

Nwsl #3 - submissions by April 20th, mailout by April 23rd.

Nwsl #4 - submissions by May 18th, mailout by May 21st.

Nwsl #5 - submissions by June 30th, mailout by July 5th.

There will be more newsletters after issue #5, but that's too far ahead for me to plan.

The Annual Rando Social is on Friday March 12th. See notice elsewhere in this issue.

Please volunteer. Contact your favourite ride coordinator before he/she contacts you. Helping out with a ride is truly a rewarding experience.

I've just received information from Lon Haldeman regarding his "Grand PAC Tour" Stage Race Across the United States. He reckons this event would be perfect for Randonneurs because the daily miles are long, the riding is great and the companionship is friendly. He hopes many of our members can join him. Read the article in this newsletter.

My name and address remain unchanged; Barbara Lepsoe, 4720 Quebec Street, Vancouver, B.C. V5V 3M1. Tel, (604)876-5228, Fax in care of Cycling B.C., (604) 738-7175.

RANDONNEUR BIKE DESIGN

(Harold Bridge)

Randonneurs are fortunate in that within reason, any bike frame can be adapted to their needs; however, Randonneurs are also in the saddle and on the go for far longer periods of time than most other cyclists. It pays then, to have a frame that is designed for the specific purpose of riding randonnees.

Twenty years ago a good racing bike that allowed the fitting of mudguards and lighting, was probably a good choice. These days, with most racing being done on top class roads, racing bikes have become shorter and steeper so that they are function-specific, and not really suited to longer distances and variable quality surfaces. What is the ideal then? I think it is a racing weight and quality frame with touring geometry, what we used to call (in England) a handbuilt club lightweight. It would be suitable, with all the gear, for club riding and touring in winter and summer. Stripped down and with racing wheels and bigger gears, it performed well in competition. Perhaps the word "lightweight" should be explained. It doesn't refer to the total bike but rather to the frame. As it would be made from thin-gauge butted tubing, it would be a pound or two lighter than a regular off-the-peg plain-gauge-tubing frame.

When designing a frame, a good starting point is a parallel design on square dimensions. That means head and seat angles are the same, and top tube length and seat tube length are equal. There are, however, various reasons for deviating from this. Steering geometry is obviously quite important. Adding a mudguard (fender) to a bike not designed for it can create clearance problems for ones feet. It is no use just increasing the fork rake. There is a fixed relationship between head angle, wheel diameter and fork rake and is given by: $Rake = 0.5 (R \tan (90-A))^*$, where R = wheel radius and A = head angle. It is intended to provide the ideal mixture of stability and responsiveness and should allow the steering column to be turned from side to side without the top tube going up and down.

There is a general misconception that short wheelbases are good. Certainly, if you are riding criteriums or team time trials, there is a benefit in cutting down the centre-to-centre distance between hubs. But for long distance riding where there is no need for sprinting, it serves no useful purpose. This isn't to say one should fix ones mind on a preconceived "long" wheelbase. With footclearance, required top tube length, and a rear triangle long enough to handle a mudguard, pump and generator, the wheelbase is decided by these vital statistics. In itself it isn't a vital statistic, just the result of a collection of V.S.

For those of rather non-standard dimensions, a custom frame makes very good sense. To handle a long back and long thigh, the top tube can be lengthened within a reasonable wheelbase by increasing the head angle and decreasing the seat angle. For those of short back and thigh, the reverse can be done, perhaps a 71° head and 74° seat. The individual differences of back-to-thigh proportions should normally be handled by the horizontal adjustment of the saddle and by varying the handlebar extension length.

One other aspect of rear triangle length is worth mentioning. We are in the age where someone shortly is going to turn up with 24 gears. Eight speeds are the competition norm now and I see nothing in the way of a Randonneur combining one with a triple chainring. This concept, combined with a short rear triangle, would lead to some excessive chain misalignment if used inexpertly. Obviously, the shorter the chainstays the more angular deflection the chain is subjected to.

Personally, I dislike triples, but I must admit that if anyone needs one it's a Randonneur. As a tourist, I don't need the big ring and as a racer I don't need the small ring. Randonneuring does often put one fair and squarely between those two extremes. Even with 175mm cranks on my touring bike, I find a top gear of 44x13 (89") or 48x14 (90") to be adequate.

Perhaps I should explain my use of inches in reference to gears for those to whom it is new. It goes back to the days of the "High" bicycle, or "Ordinary", as it was called, to differentiate from the new "Safety" bicycles that had small wheels and a geared drive. The "Penny-Farthing" had a big driving wheel, the diameter of which was dictated

by the leg length of the rider; 54" was the norm, although a long-legged guy (Curtis, I think) was the first man to ride 20 miles in one hour on a velodrome and he used a 60" wheel. To relate the gearing of the newer designs to the wheel size of the obsolete one, the gear ratio was expressed in inches. It is, rather than a gear reference, better described as "Effective Rear Wheel Diameter." Convert to metres and multiply by pi and you have the continental gear expressed as the distance travelled per pedal revolution in metres. Most people never seem to use that, they always refer to, for instance, 52x14, or 50x13. How they know which is bigger without doing a calculation, I don't know.

$$\frac{52 \times 27}{14} = 100.3 \text{ (8 metres)}$$

14

$$\frac{50 \times 26.57}{13} = 102.2 \text{ (8.15 metres)} * 700 \text{Cx}23 \text{mm}$$

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RANDO ANNUAL SOCIAL NIGHT

WHERE? AT THE ANZA CLUB

#3 West 8th Avenue,
Vancouver, B.C.

WHEN? MARCH 12TH 1993,

TIME? 7PM

Please bring your friends, and \$5.00 to cover food and other costs. If you'd like to entertain us, please let Manfred Kuchenmuller know.

QUOTABLE QUOTES

"Cliffs rose abruptly from the side of the road, views into pristine, clear water welcomed our thirsty eyes." (Carol Hinde)

"Riding in the rain wasn't that bad once you got used to it. And Lord knows we had enough time to get used to it." (Mike Hagen)

"Norm and I stood dripping water all over the floor of the Priddis, Alberta, general store, teeth chattering, limbs shaking uncontrollably, unable to hold a styrofoam cup of coffee steady in both hands." (Jimmy Vallance)

"For every rotten person you encounter, there are five others who treat you with overwhelming generosity. Struggling to stay awake with a cup of coffee at Denny's, a waitress offered me the use of her camper in the parking lot to stretch out for an hour or two." (Doug Cho)

"I intended PBP/91 to be my swan song. In one form or another I have been trying to do one of those since 1964." (Harold Bridge)

"I really enjoy the ritual of cleaning my bike's drive train, truing the wheels, lubricating cables etc. I even give the outside of my water bottles a good scrubbing." (Gary Fraser)

"The end of a ride is a different story though - my bike and I are truly a disgusting mess. My bottom bracket and down tube are encrusted with the sugary detritus of various carbohydrate drinks. My jersey is stained with a variety of mysterious substances. My seat bag is a horror of crumbled date squares and mashed-up bananas, tights, patch kits, and inner tubes. Talk about a transformation - talk about one of life's complete experiences..." (Gary Fraser)

"The simple presence of another set of wheels, of another rider shifting position in the saddle was enough of a novel stimulus to keep my brain from tuning out." (Ted Milner)

"I had lots of bananas, in fact, in the 2.5 days of my ride I figure that I ate at least 60 of them." (Ged McLean)

"I was loaded with a Nelson Carradice Long Flap Camper saddlebag." (Harold Bridge)

COGS, SPROCKETS AND GEARS

(Harold Bridge)

In her account of RAMROD, our editor refers to a "Grannie Gear" and asks, "what do you think Harold?" "Grannie Gear", along with "Half Step", is some weird American mumbo jumbo I have never understood, but I assume "Grannie" is bottom gear. What is "Half Step"? To me it is what I used to use when time-trialling on a regular basis, 50-48 or 52-50 with 14,15,16,17,19 sprockets. The two-tooth difference in chainrings give very fine graduations of gear increments, but what do all these numbers mean?

As far back as 1944 when I first started club riding with my local section of the Cyclists' Touring Club, I quickly became known as the walking gear table, so I guess I have these things firmly implanted in whatever takes the place of a mind. Of course, in those days we mostly rode fixed wheel (if the wheel is revolving so are the pedals), and having the correct gear was of more concern than now when a flick of a lever resolves any cadence/pressure problems we might be having. It's worth understanding these things as the range of gears you will need can vary according to your condition, the intended terrain and the purpose of your ride. On any given hill, for instance, as a tourist you would need a lower gear than as a randonneur, and as a competitor, you would probably use a bigger gear yet.

The transition from the old Ordinary, or high-wheeler, or pennyfarthing, to the new safety bicycle with its geared smaller wheel, brought with it the need for some

arithmetic. The riders wanted to compare the geared small wheel with the direct-drive big wheel. They did it by multiplying the wheel diameter by the ratio of the chainring and the sprocket. Leg length dictated the wheel diameter on the old design and the longer the leg, the further the rider could travel per pedal revolution. Thus, if he rode (he, is historically correct; I don't think the womens' movement was too far advanced in those days) a 52 inch wheel and went to a safety bicycle with a 26 inch wheel he would need a 2:1 gear ratio to travel as far per pedal revolution. This became known as a 52 inch gear. It is more correctly called effective rear wheel diameter. With a nominal 27 inch wheel, 42x21 gives a gear of 54 inches. Obviously, one gets the same result with 24 x12 or 60x30. Most people these days seem to ride the new standard of 700C which is somewhat smaller than a 27 inch wheel. With a 32mm tyre, a 700C is just about 27 inches, but with a 20mm tyre, it is not much bigger than a full 26 inch wheel. The accompanying gear table is based upon a 700C wheel with a 23mm tyre which is just about 26.6 inches. That's about midway between fat and skinny - like me.

The Europeans went one better than the Brits by putting some pi into their calculations and expressing their gear as metres travelled per pedal revolution, but I have yet to meet anyone brought up in the European tradition who quotes their gear in metres travelled per revolution. They always talk about, for instance, 53x12 or 52x14. How do they compare them? What is the bigger gear, 52x14 or 50x13?

With the probability that sometime in the near future we are going to see randonneurs with 24 gears, it is obvious that a bike can be set up for any eventuality and left that way, but for me, I like to feel that the gear spread is correct for any particular circumstance. Case in point; we have a very popular 300km route which has very gentle terrain until about 210kms where we ascend the ugly side of Woodside Mountain. For that I need a low gear, but there isn't too much that requires even-steps down to it. I therefore, have a bigger jump from the next-to-bottom gear to bottom gear than I might use on a more evenly-terrained route. I like close ratios, but as I also need lower gears than I once did, I find the low end of my gear range tends to develop wide steps. Yes, I could put the triple back on and it may come to that yet, but I don't like triples. I got bogged down at the foot of a few steep climbs in New Zealand by slipping the chain between rings. The double is much more positive.

A typical gear range for me is 48-39 x 14,15,16,19,22,26. As I get fitter I might close that up to 14,15,16,17,20,24, or if Dan McGuire has come up with some sadistic 400 or 600 route I might spread the gears out to 13,14,16,18,21,25,30. I went to a 7 block for PBP in 1991. Because of the hole in the middle of my gear range I decided to go to a 7. The biggest top sprocket for a 7 is a 13, so, as I intended to use the touring bike, I changed the 48 big ring to a 44 as 44x13 is almost the same as 48x14 (89" & 90").

That size of gear is good up to about 50kph and I'm happy to free wheel if I'm going that fast. I rode PBP on 44-34x13,14,15,16,17,20,24, or, 89" to 38".

The gear table in this article should give you something to read during your next 1000.

HALDEMAN'S GRAND PAC TOUR

Legendary ultra-marathon bicyclist Lon Haldeman, who each summer organizes a series of ultra-distance cycling events in northern Illinois and Wisconsin, has announced a race to end all races: 18 days of bicycling, averaging 178 miles per day for a total of 3,205 miles. The longest day is 210 miles and the shortest, 130 miles. The east-west route begins in Charleston, South Carolina and ends in Ventura, California, crossing eight states.

The Grand PAC Tour is planned for the fall of 1994 and will include a variety of unpaced time trials and several pack stages.

"We are hoping the race will appeal to durable USCF racers, strong triathletes, fast RAAM riders and adventure-some tourists, Haldeman says. "As this distance has never been raced before, we aren't sure which cyclist will handle the format the best."

"There is only one qualification", Haldeman points out. "Since most days will be ridden in 9 to 10 hours, and there will be only 12 hours of daylight, the only qualification standard we have at this time is that riders prove they can ride 200 miles consistently in 11 hours."

Not only will participants have to ride long distances in a relatively short time, they'll be faced with a good number of climbs.

Several age divisions are planned for single bikes and men and women. There will also be tandem and HPV divisions. Because of logistical considerations, the total field will be limited to 100 to 150 riders.

For more information, contact Lon Haldeman, Grand PAC Tour, P.O. Box 73, Harvard, IL 60033; (815) 943-3171. (*Lon sent me (Barb) complete details so let me know if you'd like copies - (604) 876-5228.*)

CANADIAN IDENTITY AT PARIS-BREST-PARIS 1995

(Harold Bridge)

I thought the B.C. crowd at PBP 1991 looked sharp in their team jerseys, but one of our riders had a sibling from Montreal who was riding in some nondescript clothing that looked out of place among all us smart people (albeit, we looked less smart as time wore on).

I also noticed that the Scandinavian riders had coordinated their jerseys so they were of common design but with "NORGE" or "SUEDE" emblazoned on them as appropriate.

It is true that we aren't quite into the 1993 season yet and here I am talking about the end of the 1995 one. I suspect though, that coordinating something like this across Canada is going to be like mating elephants and we need time.

I suggest that we get a mutually-agreed design finalised by, shall we say March 31, 1994 and that will give us a lot of time to get jerseys sized, ordered, paid for, and distributed before people go rushing off to Paris in July or August 1995.

I envisage a design wherein all groups have the same jersey with the exception that there would be a provincial emblem incorporated into the design with the name emblazoned across the back, (and perhaps front). Thus, if we agreed on a motif that included a Maple Leaf, for instance, it would have implanted in the middle, the provincial flag or flower, etc, and would have the appropriate name across the jersey as well. All jerseys would have CANADA incorporated in the design as well, of course.

Please send comments, suggestions and designs to: Harold Bridge, #22, 3046 Coast Meridian Road, Port Coquitlam, B.C. V3B 5B6. (604)941-3448 (home), (604) 942-5223 (office), (604) 942-7577 (fax).

EFFINGDOGSHIT!

(Barbara Lepsoe)

Nothing upsets me more than effingdogshit on my tires! As I rolled the steed out the door one morning, I must have backed the rear wheel over a pile of freshly-deposited gross and disgusting effingdogshit, for as I began my journey to the office of Cycling B.C., I heard - "flump, flump, flump, flump." On getting off my bike I saw nothing but icky blicky effingdogshit nicely smoothed into each groove of my newly-acquired winter tires, purchased with traction-in-the-snow qualities in mind - not effingdogshit! Hanging from the rear fender stays were fine threads of effingdogshit. Smoothed onto the rear fender were pats of effingdogshit. Wrapped around the rear spokes were plops of effingdogshit.

Fortunately it was a cold, frosty morning and with luck the shit would freeze. I parked my bike in the bike room at Sport B.C., spent an hour lecturing prospective couriers, returned to the bike room, opened the door, only to be greeted by a great wafting pong of warmed-up effingdogshit. The gag reflexes threatened to bring up my oatmeal breakfast! I felt sorry for those cyclists who'd arrived after me. Once downtown, I used a gas station's high-pressure water hose to blast the crap off. Passers-by stopped to watch effingdogshit fly.

Once home at the end of the day, considerable time was spent on the lawn - wheel in one hand, toothbrush and soapy water in the other. From the gnarly tread, spokes, and fender stays, a stick removed what tenacious effingdogshit the toothbrush couldn't.

The consolation? It's just as well I have fenders! The moral? Stick with slicks! The revenge? My neighbour now uses a brown toothbrush, and the dog has been disembowelled!

FITNESS & TRAINING WORKSHOP

(Ted Milner)

The School of Kinesiology of Simon Fraser University will present a fitness and training workshop for Randonneurs on March 13th, from 10am to 4pm at the SFU downtown campus (Harbour Centre, 515 West Hastings). The workshop is being arranged through the Geraldine and Tong Louie Human Performance Centre at the Harbour Centre campus. The presentations deal with:

- Nutrition for long-distance cycling
- Biomechanics of cycling
- Endurance training
- Fitness testing
- Prevention and treatment of cycling related injuries

The speakers participating in the workshop will include faculty members from Kinesiology (SFU), Physical Education (UBC), and the Sports Medicine Clinic (UBC).

The registration fee is \$15.00 and must be paid in advance to Cycling B.C., 332-1367 W. Broadway, Vancouver, B.C. V6H 4A9. Due to limited space, no more than 50 registrations can be accepted.

Ted Milner, a Randonneur and Kinesiology professor at SFU is organizing the workshop. For more information call him at (604) 291-3499 (weekdays and evenings), or (604) 421-0371 (weekends).

FLECHE PACIFIQUE

(Harold Bridge)

The traditional date for the original "Arrow" ride has always been Easter. Named after a noted French enthusiast, the Fleche Velocio attracts large numbers of Europeans in teams of from three to five machines. They congregate for a big meet at the chosen rendezvous and celebrate the completion of this 24-hour team ride.

To qualify for the Super 5000 award, a randonneur had to include a Fleche Velocio in the total distance covered. This obviously excluded people from beyond easy reach of France and thus the Fleche Pacifique was instituted in 1989 so that we in the Pacific Northwest stood a chance of the Super 5000. As we live in the "Great White North", we were given dispensation to allow the Fleche to take place later than Easter if required. We find too, that many people coming as they do into cycling relatively late in life haven't trained their families to accept the fact they will be away all Easter. Thus our non-Easter date for the event.

The rules are:

A team consists of from three to five machines. Thus, if 15 people were able to find five triplets, they could ride as one team. To qualify for the team award, a minimum of three of the original team members must finish. It should be emphasized that in the event of a multi-person machine being included, almost always a tandem, then that only counts as

one of the three, despite being two people.

In the 24-hour period the team must cover a minimum of 360kms. Their route must be presented to the organiser by the closing date for entries, for approval. It is expected that each team will keep its planned route secret as there is an award for the team who covers the greatest distance in the 24 hours.

The verification requirements are similar to those for randonnees. A control card needs to be signed and timed at the route extremities, for each team member of course. There is an extra requirement however: it has to be shown that the team covered at least 25kms in the last two hours. This is to prevent a team from blasting away to the finish and not spending at least 23 hours on the ride.

The finish will be at Harrison Hot Springs. There will be a meal and at least three team members must be at the meal in order to collect their award.

Regular randonneur type lighting and fender regulations are desirable although there isn't the same mandatory rules as for randonnees.

Each team can choose its own start location and they don't have to run out time at Harrison Hot Springs. For instance, a team may plan on 500kms but at their 24 hour point, may be 10kms away. They get credited with 490 kilometres. Teams are allowed a 10% discrepancy from their planned itinerary.

The event is intended to be a sociable hard ride, but there is nothing wrong with going all out. I see that in the 1992 Fleche Velocio the leading team amassed a total of 666kms. There were 162 teams who completed with three or more members surviving and another eight that finished with two riders. There were five teams (including one of the two-man teams) with over 600kms, 26 with 500-599, 51 with 400-499, and the rest 360-399.

As the date is relatively early for such long distances by our standards I am hoping to spur you all on to get fit enough to tackle this event. That means getting out and putting in some riding during the expected inclemency of February, March and early April.

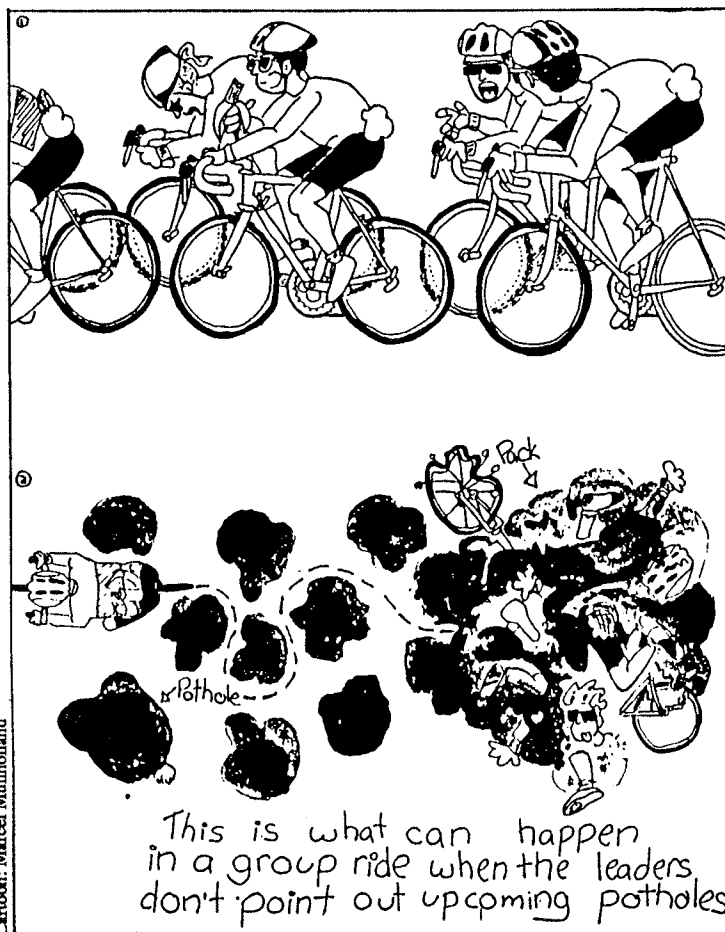
For more information and entry details, contact Harold Bridge, #22, 3046 Coast Meridian Road, Port Coquitlam, B.C. V3B 5B6. (604) 941-3448 (home), (604) 942-5223 (office).

NO ENTRIES WILL BE ACCEPTED AFTER March 31, 1993. The cost is \$5.00 per rider.

BIKE AND IN-LINE SKATE SHOW

(Gordon Cook)

For all you dedicated Randos who would love to contribute something to our sport but don't have the time to contribute on an ongoing basis, HERE IS YOUR OPPORTUNITY! On March 19 to 21, there will be a Bike and In-Line Skate Show at B.C. Place Stadium and we've been asked to help out with a mountain bike show. We need volunteers to cover five points around the track. Since this is an ongoing event, five people will be required all day for every day of the show. This breaks down to about 12 hours per day we require coverage. If we can get ten volunteers per day, each would have to work for six hours. For this the Randonneurs get a booth free of charge for the promotion of Randonneuring for the three days of the show. The booth is a \$750.00 value so it is well worth the effort. We will also need volunteers to help in the booth for two to four-hour shifts (or whatever time you can give) from March 19 to 21. Please call Manfred, 253-4858, Judy, 879-3661, or Gord, 594-4644 if you can help - PLEASE!



GEAR TABLE FOR 700C x 23mm WHEEL (212 CM COMPUTER SETTING) (26.57" DIA).

R/F	24	26	28	30	32	34	36	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
12	53.1	57.6	62.0	66.4	70.8	75.3	79.7	84.1	86.3	88.6	90.8	93.0	95.3	97.4	99.6	101.8	104.1	106.3	108.5	110.7	112.9	115.1	117.3	119.6
	4.24	4.60	4.95	5.30	5.65	6.01	6.36	6.71	6.89	7.07	7.25	7.42	7.60	7.77	7.95	8.12	8.31	8.48	8.66	8.83	9.01	9.18	9.36	9.54
13	49.0	53.1	57.2	61.3	65.4	69.5	73.6	77.7	79.7	81.7	83.8	85.8	87.9	89.9	92.0	94.0	96.1	98.1	100.1	102.2	104.2	106.3	108.3	110.4
	3.91	4.24	4.57	4.89	5.22	5.55	5.87	6.20	6.36	6.52	6.89	6.85	7.01	7.17	7.34	7.50	7.67	7.83	7.99	8.16	8.31	8.48	8.64	8.81
14	45.5	49.3	53.1	56.9	60.7	64.5	68.3	72.1	74.0	75.9	77.8	79.7	81.6	83.5	85.4	87.3	89.2	91.1	93.0	94.9	96.8	98.7	100.6	102.5
	3.63	3.93	4.24	4.54	4.84	5.15	5.45	5.75	5.90	6.06	6.21	6.36	6.51	6.66	6.81	7.01	7.12	7.27	7.42	7.57	7.72	7.88	8.03	8.18
15	42.5	46.1	49.6	53.1	56.7	60.2	63.8	67.3	69.1	70.8	72.6	74.4	76.2	77.9	79.7	81.5	83.2	85.0	86.8	88.6	90.3	92.1	93.9	95.6
	3.39	3.68	3.96	4.24	4.52	4.80	5.09	5.37	5.51	5.65	5.79	5.94	6.08	6.22	6.36	6.50	6.64	6.78	6.93	7.07	7.21	7.35	7.49	7.16
16	39.9	43.2	46.5	49.8	53.1	56.5	59.8	63.1	64.8	66.4	68.1	69.7	71.4	73.1	74.7	76.4	78.0	79.7	81.4	83.0	84.7	86.3	88.0	89.7
	3.18	3.45	3.71	3.97	4.24	4.51	4.77	5.04	5.17	5.30	5.43	5.56	5.70	5.83	5.96	6.10	6.22	6.36	6.50	6.62	6.76	6.89	7.02	7.16
17	37.5	40.6	43.8	46.9	50.0	53.1	56.3	59.4	60.9	62.5	64.1	65.6	67.2	68.8	70.3	71.9	73.5	75.0	76.6	78.1	79.7	81.3	82.8	84.4
	2.99	3.24	3.49	3.74	3.99	4.24	4.49	4.74	4.86	4.99	5.11	5.23	5.36	5.49	5.61	5.74	5.87	5.98	6.11	6.23	6.36	6.49	6.61	6.73
18	35.4	38.4	41.3	44.3	47.2	50.2	53.1	56.1	57.6	59.0	60.5	62.0	63.5	64.9	66.4	67.9	69.4	70.8	72.3	73.8	75.3	76.8	78.2	79.7
	2.82	3.06	3.30	3.53	3.77	4.01	4.24	4.48	4.60	4.71	4.83	4.95	5.07	5.18	5.30	5.42	5.54	5.65	5.77	5.89	6.01	6.13	6.24	6.36
19	33.6	36.4	39.2	41.9	44.7	47.5	50.3	53.1	54.5	55.9	57.3	58.7	60.1	61.5	62.9	64.3	65.7	67.1	68.5	69.9	71.3	72.7	74.1	75.5
	2.68	2.90	3.12	3.34	3.57	3.79	4.01	4.24	4.35	4.46	4.57	4.68	4.80	4.91	5.02	5.13	5.24	5.35	5.47	5.58	5.69	5.80	5.91	6.02
20	31.9	34.5	37.2	39.9	42.5	45.2	47.8	50.5	51.8	53.1	54.5	55.8	57.1	58.4	59.8	61.1	62.4	63.8	65.1	66.4	67.7	69.1	70.4	71.7
	2.55	2.75	2.97	3.18	3.39	3.61	3.81	4.03	4.13	4.24	4.35	4.45	4.56	4.66	4.77	4.88	4.98	5.09	5.19	5.30	5.40	5.51	5.62	5.72
21	30.4	32.9	35.4	38.0	40.5	43.0	45.5	48.1	49.3	50.6	51.9	53.1	54.4	55.7	56.9	58.2	59.5	60.7	62.0	63.3	64.5	65.8	67.1	68.3
	2.43	2.63	2.83	3.03	3.23	3.43	3.63	3.84	3.93	4.04	4.14	4.24	4.34	4.44	4.54	4.64	4.75	4.84	4.95	5.05	5.15	5.25	5.35	5.45
22	29.0	31.4	33.8	36.2	38.6	41.1	43.5	45.9	47.1	48.3	49.5	50.7	51.9	53.1	54.3	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2
	2.31	2.51	2.70	2.89	3.08	3.28	3.47	3.66	3.76	3.85	3.95	4.05	4.14	4.24	4.33	4.44	4.53	4.63	4.72	4.82	4.92	5.01	5.11	5.20
23	27.7	30.0	32.3	34.7	37.0	39.3	41.6	43.9	45.0	46.2	47.4	48.5	49.7	50.8	52.0	53.1	54.3	55.4	56.6	57.8	58.9	60.1	61.2	62.4
	2.21	2.39	2.58	2.77	2.95	3.14	3.32	3.50	3.59	3.69	3.78	3.87	3.97	4.05	4.15	4.24	4.33	4.42	4.52	4.61	4.70	4.80	4.88	4.98
24	26.6	28.8	31.0	33.2	35.4	37.6	39.9	42.1	43.2	44.3	45.4	46.5	47.6	48.7	49.8	50.9	52.0	53.1	54.2	55.3	56.5	57.6	58.7	59.8
	2.12	2.30	2.47	2.65	2.82	3.00	3.18	3.36	3.45	3.53	3.62	3.71	3.80	3.89	3.97	4.06	4.15	4.24	4.32	4.41	4.51	4.60	4.68	4.77
25	25.5	27.6	29.8	31.9	34.0	36.1	38.3	40.4	41.4	42.5	43.6	44.6	45.7	46.8	47.8	48.9	49.9	51.0	52.1	53.1	54.2	55.3	56.3	57.4
	2.03	2.20	2.37	2.55	2.71	2.88	3.06	3.22	3.30	3.39	3.48	3.56	3.65	3.73	3.81	3.90	3.98	4.07	4.16	4.24	4.32	4.41	4.49	4.58
26	24.5	26.6	28.6	30.7	32.7	34.7	36.8	38.8	39.9	40.9	41.9	42.9	43.9	45.0	46.0	47.0	48.0	49.0	50.1	51.1	52.1	53.1	54.2	55.2
	1.96	2.12	2.28	2.45	2.61	2.77	2.94	3.10	3.18	3.26	3.34	3.42	3.50	3.59	3.67	3.75	3.83	3.91	4.00	4.08	4.16	4.24	4.32	4.40
28	22.8	24.7	26.6	28.5	30.4	32.3	34.2	36.1	37.0	38.0	38.9	39.9	40.8	41.7	42.7	43.6	44.6	45.5	46.5	47.4	48.4	49.3	50.3	51.2
	1.82	1.97	2.12	2.27	2.43	2.58	2.73	2.88	2.95	3.03	3.10	3.18	3.26	3.33	3.41	3.48	3.56	3.63	3.71	3.78	3.86	3.93	4.01	4.09
30	21.3	23.0	24.8	26.6	28.3	30.1	31.9	33.7	34.5	35.4	36.3	37.2	38.1	39.0	39.9	40.7	41.6	42.5	43.4	44.3	45.2	46.1	46.9	47.8
	1.70	1.84	1.98	2.12	2.26	2.40	2.55	2.67	2.75	2.82	2.90	2.97	3.04	3.11	3.18	3.25	3.32	3.39	3.46	3.53	3.61	3.68	3.74	3.81
32	19.9	21.6	23.2	24.9	26.6	28.2	29.9	31.5	32.4	33.2	34.0	34.9	35.7	36.5	37.4	38.2	39.0	39.9	40.7	41.5	42.3	43.2	44.0	44.8
	1.59	1.72	1.86	1.99	2.12	2.25	2.39	2.51	2.59	2.65	2.71	2.78	2.85	2.91	2.98	3.05	3.11	3.18	3.25	3.31	3.38	3.45	3.51	3.57
34	18.8	20.3	21.9	23.4	25.0	26.6	28.1	29.7	30.5	31.3	32.0	32.8	33.6	34.4	35.2	35.9	36.7	37.5	38.3	39.1	39.9	40.6	41.4	42.2
	1.50	1.62	1.75	1.87	2.00	2.12	2.24	2.37	2.43	2.49	2.55	2.62	2.68	2.74	2.81	2.87	2.93	2.99	3.06	3.12	3.18	3.24	3.30	3.37

TOP NUMBER IN EACH LINE IS EFFECTIVE DRIVEN WHEEL DIA IN INCHES.
 BOTTOM NUMBER IN EACH LINE IS DISTANCE TRAVELLED PER PEDAL REV. IN METRES.

