



B H S I

BICYCLE HELMET SAFETY INSTITUTE

A program of the Washington Area Bicyclist Association

4611 Seventh Street South Arlington, VA 22204-1419 (703) 486-0100 (voice or fax)

Vol. 8, No. 3

November, 1990

THE HELMET UPDATE

PLEASE CHECK TO SEE IF YOU HAVE OUR ADDRESS!!

We moved in April, and have mentioned it in two Updates. We are still getting mail sent to the old address. Our current and permanent address is:

Bicycle Helmet Safety Institute
4611 Seventh Street South
Arlington, VA 22204-1419

Telephone: (703) 486-0100 (voice or fax)

Thanks! This newsletter is free, but donations are always needed and are gratefully accepted from anybody not connected with the manufacture or sale of helmets.

SNELL ISSUES NEW STANDARD

The Snell Foundation has issued a regular 5-year update of its bicycle helmet standard. It will be called B-90, replacing the current B-84 standard. The changes are minimal, but by eliminating a previously-permitted margin of error in the impact testing the standard in effect became about 10% more stringent. Drop heights remain at 2 meters on the flat anvil and 1.2 meters on the hemispheric anvil. The strap test is unchanged except for specifying a two minute period for the 23 kg. preload before the strap is yanked. Snell says that most of the helmets now certified to the older B-84 standard will meet the new B-90. Snell currently lists 77 helmets certified to B-84. The B-90 list will be out in January.

The most visible change will be the color of Snell's new sticker: blue instead of green. Look for them to show up in bike shops in early 1991, with the green B-84 sticker gradually phased out over the year. For all practical purposes either sticker means the same thing to the consumer. The list of Snell-approved helmets is growing rapidly despite the cost to the manufacturer of Snell certification, which starts with the 40¢ per helmet sticker fee

and continues to cover Snell's costs for its periodic purchase of samples from bike shops in the field and retesting. Since the ANSI standard does not necessarily require a manufacturer to do any testing at all, we think the extra is well spent even if all of the cost is passed on to the consumer. Manufacturers will of course try to do that, but competitive pressures may force them to eat some of the cost themselves.

Snell's standard booklet has been edited to make it clearer and more understandable to non-technical readers. From that point of view we think it is better than any other bicycle helmet standard in the world. For a free copy of the standard booklet write to Snell Foundation, P. O. Box 493, St. James, NY 11780. Ask for the 1990 Snell B-90 bicycle helmet standard.

ATLANTIC CITY SHOW REVEALS NEW HELMET MODELS FOR 1991 SEASON

The annual bicycle show in Atlantic City featured some new helmet models, but no revolutions. Most soft shell helmets will now be reinforced by something, either internally or in the form of a thin micro shell. There are some new materials in use, including kevlar, and some new imports. Most manufacturers expect their micro shell models to be the best seller for 1991. Hard shells now constitute only about 10% of helmet sales. The total helmet market for 1991 may be up 35% over 1990, which was in turn up 50% from 1989. Below are some specific observations. The data on who meets the Snell standard is limited to Snell's B-84 standard, as of November 1, since the B-90 list is not out yet.

B & B Imports Importer of helmets made by SLG company of Sweden. Looking for a distributor in the U.S. Their Bambino model for children has a flocked surface (sliding resistance?). Both their Bambino and Magnum models are Snell-certified.

Bell Models include Image microshell, Quest softshell, Spectrum softshell, V-1 Pro hardshell, Cruiser child's "durable" hardshell, Stretrider child's softshell and L'il Bell Shell toddler's helmet, which was the original softshell. All are advertised as Snell-certified, although the Cruiser does not appear on Snell's current B-84 list. Largest sizes now are 7 3/4, with the V-1 Pro their best bet for oversized wide heads and the other models for eggheads. Bell dropped its new kevlar-reinforced microshell Premier model for quality control reasons after initial ads had appeared in magazines, but before actual shipment. The Bell display featured prominently their promotion campaign for schools and other local groups, which Bell works through dealers. Velo News reports that Bell will increase their support of the Safe Kids campaign from \$250,000 last year to \$350,000 this year.

Etto Swedish manufacturer selling a helmet with an adjustable hard shell (fits 6 1/2 to 7 3/8), which they said meets the ANSI standard even though the leading edge of a cross-piece of the ABS shell protrudes about 7mm to 8mm above the outer surface, and the ANSI standard states: "there shall be no permanent external projections greater than 5mm above the outer surface of the shell." The liner also has a removable piece on each side to permit closing the shell up to a smaller size. A user can remove this piece and not close up the shell. This is not prohibited by the current ANSI standard, but is prohibited by Snell's B-90 standard. (We have suggested to the Snell Foundation, which chairs the ANSI Z90.4 Committee, that the new ANSI standard draft due soon be edited to make it clearer when a design does not meet the ANSI standard. We will also suggest that the new draft incorporate the language in Snell B-90 regarding detachable pieces). The Etto Piccolo toddler's helmet has a velour surface and optional ears (bear or monster) which attach to the outside. Etto's Classic retails for \$62.00. The Piccolo in velour sells for \$38 with an extra \$7.50 for the ears.

Giro Retail prices topped out at the show with Giro's "Bullet" model, a micro shell aero which meets UCI rules for racing. It retails for \$109.95. Giro's other models include the Aerohead softshell (their longer aero model whose name reflects Gyro founder Jim Gentes' wry sense of humor), Prolight softshell, Hammerhead microshell, and Air Attack microshell. The last three are Snell-certified; Giro says the Aerohead meets the ANSI standard. They are all now internally reinforced. Giro will be introducing a child's helmet called the Hardtop, a microshell model designed to take abuse. Their product literature emphasizes Greg LeMond's connection with their two aero helmets and claims that Gentes "invented the lightweight bicycle helmet."

Innova-Dex Canadian manufacturer of Leader helmets. Models include the Gara, Tempo, Avanti and Avanti Baby. All are said to meet ANSI and Snell standards, but the Tempo does not appear on Snell's current B-84 list. The Tempo fits up to size 8. Innova-Dex staff had not heard the comment we got from one bike shop owner that the Gara was difficult to adjust to prevent it coming off the user's head. The Gara comes in various colors including a chrome finish which is spectacular, but will be hard to get.

LT Manufactures for their own brand plus Trek, Time, Performance and Madison in the UK. Their 550 softshell and 650 microshell are standard single-density foam helmets, but the 700 softshell and 950 microshell have dual density foam. In this process a medium-density inner liner which crushes easily in lesser impacts is molded with a more dense outer liner to add protection in harder impacts as well. The 950 has a mesh reinforcement molded in. Largest size is now a 7 3/4 (their older 500 and 700 models were larger, and the 500 had an extra small child's size). All of LT's models are Snell certified. They will sell helmets for

rental use without the Snell sticker, labeled "for rental use only" at a reduced price. They handle school promotions through shops, not by direct sales.

Monarch Not at this show, but they are advertising a new model with what appears to be a kevlar-reinforced hard shell. They do not have any models on Snell's current B-84 certification list.

Pro-Tec Continuing their nylon mesh reinforced softshell Mirage model as well as the Pro-Tec child's hardshell, Pro-X hardshell for teens, and Pro-8.5 microshell. All are said to have Snell certification, although the Pro-8.5 does not appear on the Snell B-84 list. Largest size is 7 3/4. The Pro-X comes in 12 different colors, including hot pink, neon yellow and dayglow orange, and its high-density polyethylene shell is "warranted against cracking or breaking indefinitely." School promotions are handled through their distributors.

Specialized Lineup now includes the Mega Force child's softshell, Velo Force adult softshell, Team Force microshell for ATB use, Air Force "aero" softshell for "style-seeking offroad enthusiasts", Air Force II microshell, and the Aero Force softshell with rubberized lycra cover, designed with help from Chet Kyle. The Aero Force will retail for \$100. It is not on Snell's B-84 list, although all of the other Specialized helmets are Snell-certified. There is useful reflectorized tape on some Specialized models and unnecessary Kevlar reinforcing in some of their nylon straps. Specialized has product literature describing aerodynamic test comparisons with competitors and giving sales tips for dealers. They have a one year "no fault" replacement policy for crashed helmets.

Time Not at the Atlantic City show, but they advertise a helmet with "huge" front vents and a multi-density foam liner. It is advertised as meeting the Snell standard, and presumably is the Time helmet manufactured by LT which appears on Snell's B-84 list. It is interesting that they were able to meet the Snell hemispheric anvil impact with those large front vents.

Tong Ho Hsing Taiwanese manufacturer seeking a distributor in the U.S. market for their Flying Horse line. Showed 9 hard and soft shell models for adults and children. Microshell models are in development. Sales rep said they meet ANSI, Snell and Australian standards, but he had no test data and the helmets had no stickers inside. Tong Ho Hsing does not appear on the Snell list of B-84 certified helmets.

Troxel Showed a softshell helmet for the first time, along with their Elan microshell, Coronado hardshell, Xtreme teens hardshell, Niño children's hardshell and L'il Niño infants microshell. No Troxel helmets are Snell certified. According to Troxel this is to keep retail costs down. All carry an ANSI

sticker. Largest adult size fits 24 $\frac{1}{4}$ " head, which should be a 7 5/8 size. Troxel has been active in direct promotions with schools and other local groups. Their helmets are available directly from them with a TIPP program coupon for \$19.95.

XL Marketing Import the Kiwi from Switzerland, and market the Zephyr softshell. Have modified the Zephyr, reducing the number of front vents, and said it will now be certified by Snell. It does not appear on the Snell B-84 certification list. Largest size is 7 5/8 (for 23 7/8" head). New products coming up include a microshell version of the Zephyr.

MANDATORY HELMET LAWS ARE COMING!

Following on the heels of Maryland's Howard County, other state and county governments are considering laws to require either children or all bicyclists to wear helmets. California and New York already had requirements for helmets on child seat occupants up to age 5. Cyclists in various states have been surprised to discover that a mandatory helmet law is pending in their own legislature. New Jersey is considering a law to require all new bicycles to have a top tube hangtag recommending helmets. A tide is rising.

Members of the League of American Wheelmen noted that some of the draft laws had provisions which made cyclists responsible for their own injuries if they were not wearing a helmet, no matter who was at fault for the crash. In some cases this did not parallel state laws on seatbelts, which did not make motorists responsible for their injuries if not wearing a seatbelt. LAW has issued a very well prepared position paper on mandatory helmet laws to cover this and other problems, and has appended a suggested law which may be better than some of those offered elsewhere. LAW is not advocating mandatory helmet laws, but is giving its members guidance on how to shape such a law if is introduced in their state or locality. For a copy of the LAW study, contact Anne Markham, Government Relations Director, League of American Wheelmen, Suite 209, 6707 Whitestone Road, Baltimore, MD 21207-4106 (tel. 301-944-3399).

We continue to believe that it is too early to mandate helmets and expect meaningful compliance. Seatbelt laws took years, and helmet laws will too. They can be passed now but will have little effect until there is a broad recognition that helmets for bicyclists are necessary. We certainly applaud the motivation for the bills, but hope that states will devote more time to educating cyclists about helmet use before passing unenforceable laws.

NEW CANADIAN STANDARD TOUGHER IN SOME RESPECTS THAN ANSI

Attached is a quick comparison of the major elements of some international bicycle helmet standards, with accompanying graphs. It highlights the differences in the new Canadian CSA standard, both in the fail criterion for impact tests and in the strength of the strap test. The CSA requirement for a flat anvil drop of 1.6 meters is that the accelerometer in the headform not register more than 200 g's. For the cylindrical anvil test at 1.1 meters drop the requirement is for acceleration to remain under 250 g's. Both U.S. standards specify 300 g's for all drops, while the Australian standard uses 400 g's for the acceptable peak.

None of these numbers has a precise basis in medical fact. Tests on cadavers at Wayne State University in the 1950's established 400 g's as the threshold where most adult cadavers suffered irreversible brain damage. Snell Foundation's founders reduced that number to 300 g's to provide a safe margin, and many other standards now use 300 g's. The Wayne State curves seemed to show that lesser impacts for longer durations would also be lethal, and some standards specify maximum periods in milliseconds when the impact can remain higher than 150 g's or 200 g's.

The Canadian standard uses 250 and 200 g's because some researchers believe that the foam now used in helmets designed to meet the 300 g standard is too stiff, and does not crush readily enough in lesser impacts. This would mean injury without foam crush. We have not seen evidence of that occurring, but if you see a helmet after somebody's crash with no measurable foam crush, worn in a crash where the wearer was head-injured, please let us know. That would be the best indication that 300 g's is too high a threshold. One might ask why CSA set the g threshold at one level for the flat anvil and another for the cylindrical anvil impact, since the same head with the same tolerance to impact would be in the helmet no matter which surface it hit. Despite questions about what threshold is optimal, we strongly agree that thicker, softer liners are better for impact protection than thinner, denser ones. Some manufacturers at the Atlantic City show (see below) told us that they are moving in that direction. At least one, LT, is using two layers of foam of different densities to try to cover both hard and very hard impacts.

We do not yet have any indications from test labs of whether any actual helmets now being marketed pass the Canadian standard but flunk our own Snell or ANSI standards, or vice versa.

HODGSON TESTING AGAIN AT WAYNE STATE

Dr. Voigt Hodgson has resumed testing helmets for sliding resistance at Wayne State University, completing the new series at the end of October. This time he included microshell helmet models as well as an EPP helmet, and will use three different slabs of concrete as impact surfaces, with two of them rougher than the original slab used in last year's tests. We hope to have a report on his new testing later in the year.

"HAIRNETS" BACK ON THE MARKET

A New England mail order bike shop now features a large catalog spread for its leather-covered foam strip helmet (the infamous hairnet design of earlier times). This relic of the past is touted as "lighter and cooler than an ANSI-standard helmet." It sells for \$39.95 plus shipping. The Bicycle Federation forwarded the ad to the Consumer Product Safety Commission as evidence that a CPSC standard is needed to enforce a minimum standard of protectiveness for all helmets sold in the U.S. market.

PRO BIKE CONFERENCE FEATURES HELMETS PROMINENTLY

The bi-annual Pro Bike Conference put on by the Bicycle Federation featured a separate helmet seminar before the conference and a lot of discussion of helmet promotion in workshops. Helmets vied with off-road cycling as the subject of the year, which was a welcome development.

FEEDBACK AND NEW DOCUMENTS NEEDED

We continue to add new materials to our Documentation Center listing, and will send out an addition to the annotated bibliography with the next issue of the Update. If you spot a new document that should be shared, please send it along to us.

We could use more feedback from you too. What items are useful in this newsletter? Which helmets are not fitting well or coming off people's heads or snagging or exploding on impact? Let us hear from you!

Randy Swart
Director

ANOTHER SOURCE OF LOW-COST HELMETS: THE MARKET!

These K-Mart ads are for helmets made by Bell Helmets under their BSI brand. While the appearance and graphics may not be exciting, these helmets all at least meet the ANSI standard. They may be available in your local K-Mart or other discount store without need of special promotions or coupons. A bicycle shop seeing this competition may be willing to at least offer discounts even if it cannot meet this price. These ads appeared in Sunday newspapers during September, 1990.



ADULT OR TEEN HELMET
Choice of styles.
Regular 24.99

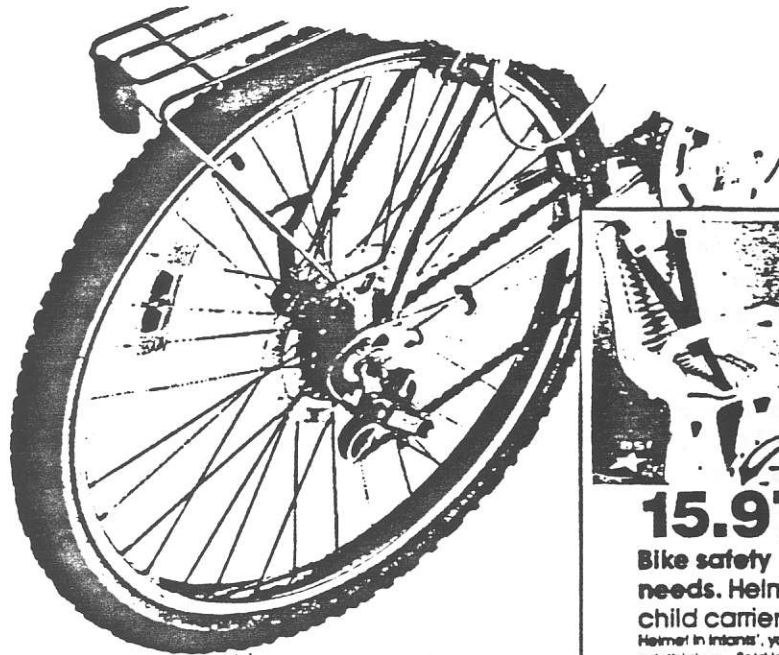
19⁹⁹

#12601
#22101
#22201
#14101



CHILD'S BIKE HELMET
Features adjustable sizing system
and lightweight uni-piece shell.
Regular 19.99

15⁹⁹



15.97 Ea.

Bike safety needs. Helmet or child carrier seat.
Helmet in infants', youths' or adults' sizes. Sold in Sporting Goods Dept.



**BHSI****BICYCLE HELMET SAFETY INSTITUTE**

A program of the Washington Area Bicyclist Association

4611 Seventh Street South Arlington, VA 22204-1419 (703) 486-0100 (voice or fax)

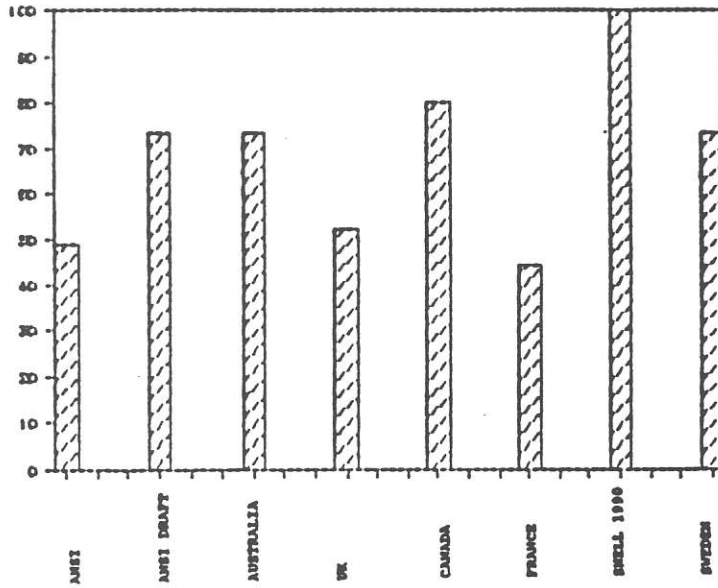
HELMET STANDARD COMPARISON

This summary chart compares eight international bicycle helmet standards based on 34 covered areas. It was initially prepared for the ANSI Z-90.4 bicycle helmet committee. The chart is graphed on the back of this page.

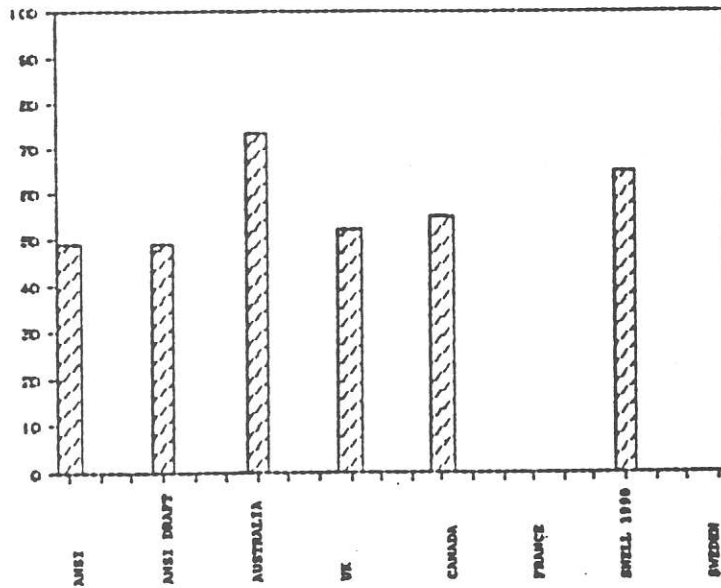
| STANDARD | IMPACT | | FAIL CRITERION | STRAP STRENGTH JERK (IN JOULES) or STATIC PULL |
|-----------------------|------------|---------------------------------------|--|---|
| | FLAT ANVIL | DROP HEIGHT HEMI OR OTHER ANVIL | | |
| ANSI | 1.0 | 1.0 | 300 g | 19.6 |
| ANSI DRAFT | 1.5 | 1.0 | 300 g | 19.6 |
| AUSTRALIA/NZ | 1.5 | 1.5 | 400 g peak 200g for 3ms 150g for 6ms | Static 163 lb. pull |
| UK | 1.1 | 1.1 | 300 g | 29.4 |
| CANADA | 1.6 | 1.1 | 200/250 g | 50.0 |
| FRENCH DRAFT | 0.9 | none | 300 g peak 150 g for 5ms | 9.8 |
| SNELL BICYCLE 1990 | 2.0 | 1.3 | 300 g | 26.1 |
| SWEDEN | 1.5 | Striker | 250 g | Static 112 |

1 Joule = .74 Foot Pounds

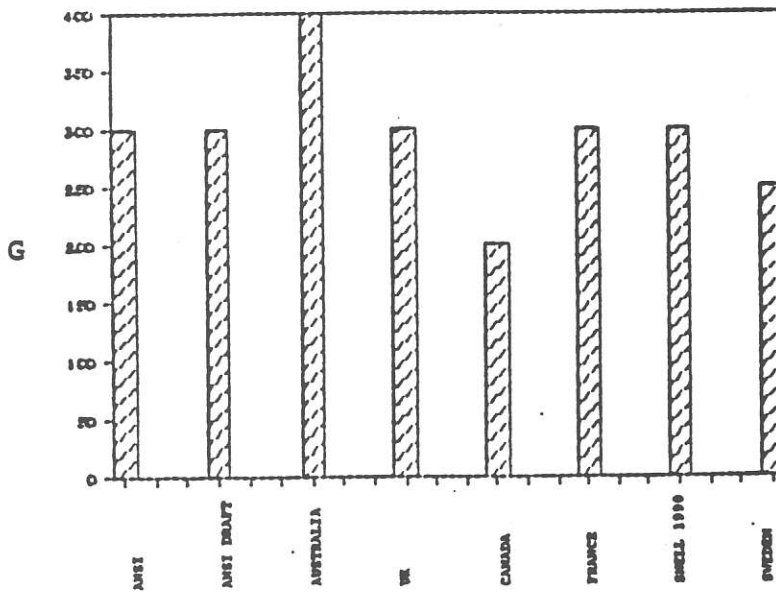
FLAT ANVIL IMPACT



OTHER ANVIL IMPACT



FAIL CRITERION



Consumer Reports

Published by Consumers Union

August 15, 1990

Randy Swart, Director
Bicycle Helmet Safety Institute
4611 Seventh Street South
Arlington, VA 22204-1419

Dear Mr. Swart:

Thank you for your review of our bicycle helmet article in your July newsletter. While we appreciate both your praise and your criticisms, there were several points that you apparently misunderstood from our article:

- 1) We did not decide that hard-shell helmets are too heavy to recommend. Weight was only a small factor in our Ratings. In general, the hard-shell helmets we tested did not perform as well as the no-shell models in our impact tests. That result, along with the other attributes we presented in the Ratings, led to the hard-shell helmets appearing lower in the Ratings order than no-shells.
- 2) At the time our story went to press, Dr. Hodgson's paper on sliding resistance was not yet available. As we stated in our report, there was no conclusive evidence available at that time concerning the question of sliding resistance. Even after a review of his paper, we think that it is premature to speculate on the hazards associated with impact adhesion under real crash conditions. However, we look forward to seeing additional research in this area.
- 3) You were critical of our hot-trunk test at 180 degrees F. Actually, this temperature can be reached inside a car parked in the sun on a hot summer day. We first discovered the problem of helmets not tolerating extreme heat when a staff member left a thin-shelled helmet in his car for several hours on a sunny day. The microshell warped and separated from the foam. We modeled our test after his experience.

- 4) We disagree with your statement that penetration resistance is irrelevant. It's not uncommon for cyclists to encounter branches, rocks, or other sharp objects when they fall. In fact, parts of the bicycle itself, such as the handlebar ends and shift levers, can present penetration hazards. Since some cyclists suspect no-shell helmets to present a risk by not protecting against penetration, we felt it was worth investigating. We agree, however, that the risk of penetration is small; for that reason, this attribute was not weighted heavily in determining our Ratings order.

- 5) Regarding your statements about our analysis of impact data, using a threshold of 300g's forces distinctions to be drawn on a pass/fail basis. We would be hard pressed to judge a helmet with a peak of 295g to be more protective than one with a peak of 305g, for example. Plus, as you know, a threshold of 300g may not be adequate for all people. When evaluating our impact test data, we used the 300g threshold as a guideline in assigning scores on our five-point Ratings scale. However, we believe that if a consumer is selecting from among helmets whose peak acceleration falls within a threshold from a fixed drop height, one with a smaller peak acceleration has a greater chance of protecting at higher drops. We doubt that small variations in drop heights would have much effect on the rank order of our scoring. Nonetheless, finding the maximum drop height at which a helmet can keep impact to the brain below a certain level would be worth investigating.

Thank you for your insightful review of our article. We share your concern that more consumers need to be exposed to the necessity of wearing bicycle helmets, and that helmets need to be more thoroughly tested for their protective ability. We wish you luck in your consumer education efforts and in the development of more comprehensive and realistic safety standards.

Sincerely,



Donald L. Mays
Head, Special Projects Division



SCHWINN
CYCLING AND FITNESS

July 26, 1990

Mr. Randy Swart
WABA
4611 Seventh St. So.
Arlington, VA 22204-1419

Dear Mr. Swart:

In your recent "helmet update" (July, 1990) you referred to the Paramount Team Issue helmet as being made by MPA/Vetta. This is not correct and we, naturally, want to clarify your information.

"Paramount" and "Paramount Design Group" are trademarks of Schwinn Bicycle Company. All Paramount helmets have been designed in the U.S. by and for the exclusive use of Schwinn. Vetta is not a Schwinn trademark, nor is Paramount a Vetta trademark.

MPA, of Italy, is currently manufacturing Paramount helmets for Schwinn. While it is true that MPA also manufactures helmets for Vetta, MPA's primary business is in motorcycle helmets for the European market. In any case, Paramount helmets are not Vetta products with a different label on them. They are, rather, competing products in a highly competitive market arena.

Please, in the future, make sure that anytime you refer to a trademark, you properly identify the company involved.

Regards,

Frank Brichetto
Project Manager
L14

FB/jc

cc: Chuck Gillis

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