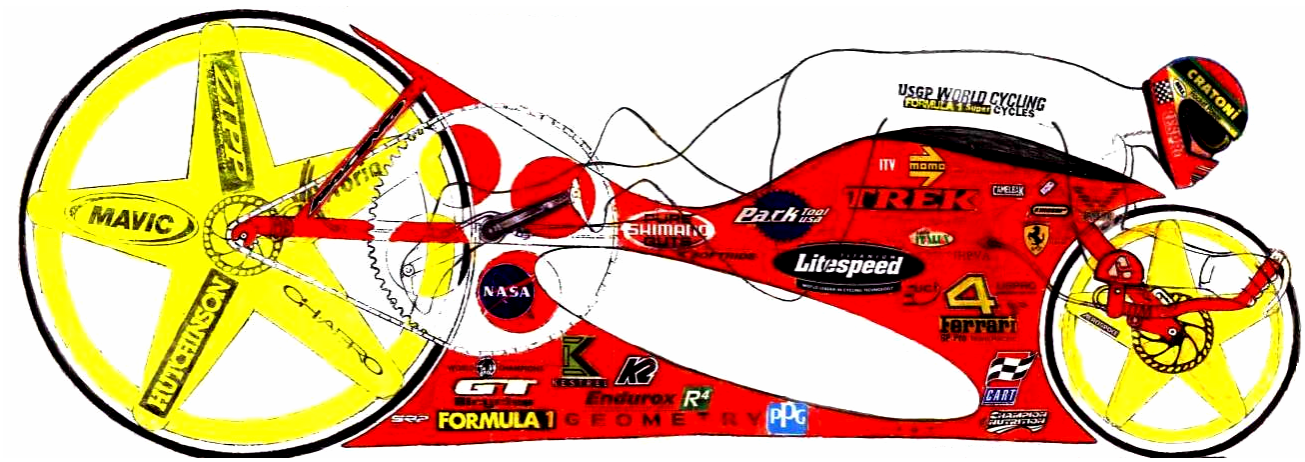
FORMULA ONE GEOMETRY
IN
HUMAN POWERED LAND VEHICLE DESIGN

By G.K. WALKER



This report was compiled based on the following conceptual guidelines:

1.) **Advanced Aerodynamics. Utilizing flat, oval, or fractal angled airfoil frame geometry and repositioning the cyclist for increased comfort and higher cadence to improve frame aerodynamics, optimal pedaling mechanics and overall biomechanical function for minimum drag and maximum velocity. Aerodynamics is one of the few areas in professional cycling that has not been fully exploited, because of the Union Cycliste governing body league restrictions that limit a frame's aerodynamic innovations.**

2.) **Design For Manufacturability (DFM), after an extensive refinement of the structural components and materials performance testing; utilization as many off-the-shelf components as possible that are easily serviceable.**

3.) **To identify from a real world sensibility the target consumer and market respectively; Corporate Sponsors willing to affiliate their brand identity with organized constructor teams and cross**

promotional exhibitions, appealing to a broad extreme sports and racing enthusiast audience, a $200 Billion youth culture oriented market.

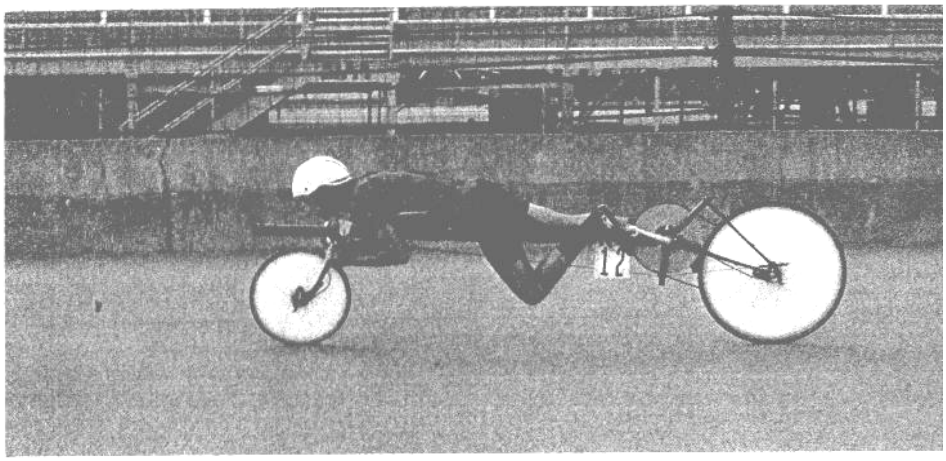
4.) Using F.I.A Formula One Motor sports as a template, design a prototype years ahead in performance, with frame materials and cycling technology conceptualized specifically for an organized league of corporate sponsored, two man or cyclists per team, closed course criterium racing competition. A prototype never intended as a product for the open consumer market.

Abstract: F-1 Geometry Cycling

Two articles greatly inspired the direction of this ongoing design study. The first, of which I have included excerpts in this report, is a June 1983 Article published in Scientific American Magazine on "The Aerodynamics of Human Powered Land Vehicles' by the founders of the International Human Powered Vehicles Association (I.H.P.V.A.), an association dedicated to promoting improvement, innovation and creativity in the use, design and development of human-powered vehicles. The Article is a basic 101 lesson on the physical laws that govern cycling performance. The second article, titled 'Speed Bikes", was written by Dennis Dowlens for the September 1985 issue of I.D.: Magazine of International Design. Although excerpts of this article are not included in this report, it showcased an annual I.H.P.V.A. competition between experimental standard, recumbent and forward prone position bikes. The ID Magazine article also commented favorably on the potential of one prototype in particular, the Superbee (pictured below); an understatement in forward prone position design simplicity, which utilized a pre-stressed cable tension frame, faired wheels and simple, flat, rectangular thorax padding to support the body trunk and simple bars attached to the front wheel fork. It was slower than the recumbent competition, but I felt that the basic concept, with a few improvements, could outperform the other types of h.p.v types and at speeds beyond anyone's expectations.

Speed bikes

by Dennis Dollens



Understated and elegant, Super "B" was not only an interesting design, but a top performer as well.

In my opinion, both articles exposed the forward prone position as the most difficult, yet promising new direction to explore in cycling performance and aerodynamic efficiency. Yet I noticed that few bike designers and h.p.v enthusiasts were developing any new concepts since the 1985 Superbee prototype.

I decided to begin a design study to make the forward position h.p.v. concept as biomechanically efficient and stable while maneuvering as possible; and also work on redesigning the steering bars so they also serve as a means of weight disbursement.

The Tech Report article written by Leonard Zinn for the April 1998 issue of Velonews and all of the article and references to cycling products, components, materials and manufacturing technologies included in this study, help to advance my design thesis as a probable, future evolution of the conventional racing bike.

A properly designed and fabricated, aerodynamically faired frame, forward prone position human powered racing vehicle would generate, potentially, the fastest, most intense and aggressive, cycling performance from a weight to energy output ratio standpoint.

My early research revealed that an anatomically arced, forward prone position vehicle could produce the greatest aerodynamic and biomechanical return in performance. On my advanced speed frame design, the pro cyclist is positioned in a 110 to 120 degree (depending on

the rider's height), angled, gently sloped, arced stance. An anatomically comfortable and effective 3-Point Interface Forward Prone Position; The middle to upper of the pro cyclist's body trunk weight is displaced evenly between the custom designed thorax saddle (which is blended into the frame housing), and the elbow rests of the ergonomic steering bars, positioned on the front wheel fork. This is critical to aerodynamics, and to generating explosive power in the prone position, all while maintaining rider comfort.

This 3-Point Interface both lowers the cyclist and frees his riding center of gravity (the lower body trunk and hips) in multiple planes of motion. This 110 to 120 degree, arced, forward prone position is stable because the cyclist pedals below the plane of the arced body trunk and below the axial plane of the of the rear wheel hub.

Equal parts time trial bike, track bike and rigid wind sail, my prototype design is an innovative mixture of aviation materials and cycling technology. I have identified this biomechanically efficient, forward prone positioning and aeronautical vehicle architecture as Formula One Geometry Cycling Theory. The real challenge was to identify the components and fabrication processes currently in use that will make this experimental prototype functional, comfortable, ultra lightweight, yet sturdy and highly feasible to develop.

Over the years, new innovative cycling components, materials, CAD refinement and manufacturing technologies have evolved to a degree sufficient to present my design study to related academic resources, manufacturing and sponsorship resources, professional cycle sport organizations and sports marketing resources for to review and to evaluate the project's potential. A vital element to this design feasibility study involves the sports promotion and marketing of the experimental prototype as the anchor of a proposed new separate class of professional cycling, in association with the existing professional racing organizations such as the U. S. Pro Cycling Federation (U.S. Pro), Union Cycliste International (U.C.I.), and the I.H.P.V.A.

As a part of this design feasibility study, I outline a probable, hypothetical direction for the marketing and promotion of F-1 Geometry Cycling as a successful organized racing sports venture; The Grand Prix Professional Cycling Organization Project (GP Pro Cycling). Organized racing competition is the best way for a manufacturer to learn way of improving their product; by getting technical input from teams of top, world class riders and performance data equipment, that can be used to refine the experimental prototype.

Design Study Criteria

The following outline notes specific criteria for my future sports selections and related conceptual products:

I wanted to identify relatively simple future sports that could exist today, namely variations on existing sporting events; yet have a real futuristic or technology influenced presence. Products designed for a future sport based on an existing sporting event that today is relatively obscure or only marginally popular worldwide. The conceptual sports products are designed for relatively non-violent competitions that promote the best ideas of sportsmanship.

The sporting events selected must be very intense to participate in and exciting for the spectator. The conceptual sports products must be revolutionary; they must enhance or redefine the sport and greatly improve the sports mass market appeal.

Conceptual sports products developed for sporting events where aerodynamics are a key factor. Simple manufacture must also factor into the design process.

Outline marketing and promotional strategies, planning notes, from licensed merchandising to broadcast rights, accompany each conceptual sports product.
A Proof-of- Concept Prototype to pitch to industry for full development.

The conceptual sports products developed for future sports events are targeted at capturing the $200 Billion Youth Market.

These specific criteria narrow the selection of future sports candidates and related conceptual products considerably. The following sports products represent concepts with the greatest potential for successful manufacture, marketing and promotion.

I have selected the human powered bipedal vehicle, which is long considered among engineering and industrial design theorists to be one of man's most innovative creations. As a portfolio subject, consider its simple perfection as a machine, its economy and health benefit. The bike is not only the world's most popular mode of transportation by volume, with over one billion people utilizing them daily for exercise or as a primary mode of transportation. This historically significant invention has influenced countless innovations. From its influence on the development

of the first motorcycle and the automobile, to the Wright Brothers founding efforts at controlled flight, this simple machine has been at the core of man's first stages of motorized transportation.

The 21st Century's technological advances in transportation, now, in turn, affect the modern performance racing bike. This is evidenced in the utilization of computer aided design, the use of carbon fiber composites, thermal plastics, titanium and other hybrid materials in frame building, in new gearing and braking systems, wireless performance data and telemetry.

Keep in mind what makes this simple 500 year old invention unique, besides its historical influence and high tech infusion; the cyclist is the engine, the sole source of energy generation and locomotion. Any improvements to the machine benefit the competitive professional cyclist's overall performance.

My prototype had to be a high performance work of art, timeless, organic sculpture on wheels that could be identified as a probable, future direction for human powered cycle sports. Not to be confused as 'vapor gear', a cycling industry term used to describe here-today-gone-tomorrow new technology will never to be manufactured, similar to the fantasy concept cars seen at the annual auto show. On the contrary, I wanted to conceptualize an exotic vehicle that professional cyclists would long to push to the edge of high velocity, in premier organized closed course criterium racing. A futuristic prototype with the potential to make its debut in team competition the fastest, most intense national cycling tour ever organized.

Designed exclusively for championship competition, the experimental prototype can theoretically surpass the elusive 70 mile-per-hour barrier and beyond. The radical prototype was heavily influenced by many far ranging, unconventional sources, which include; F.I.A. Formula One, CART, LMP P1 and P2 class motorsports, F.I.M. and A.M.A. Superbike racing. Also, the Lockheed Martin X-35 Joint Strike Fighter Project , the 1985 Super Bee I.H.P.V.A. Prototype, the GT Bicycles' Razor Thin Project for the 1996 Olympics, the works of Luigi Colani and visual futurist Syd Mead.

Whether the GP Pro project develops into a successful new professional cycling league or merely passes under the radar, either unnoticed or not taken seriously by the professional cycle sports organizations or cycling industry culture, is irrelevant. What is important is that the preliminary research is recorded and open for scrutiny. I feel strongly that my findings are interesting and warrant further Proof-of-Concept research to validate my claims and projections. My prototype design is the Formula One of Human Powered Land Vehicles and points toward a valid solution to all of the criteria that inspired the design study's initial undertaking.
GENE KEITH WALKER

The Concepts Behind the Concepts

The following components are a good example of the bike industry's design directions. The product samples include standard road racing, and triathlon bikes. Note the innovative materials and unconventional frame geometry.

Old School

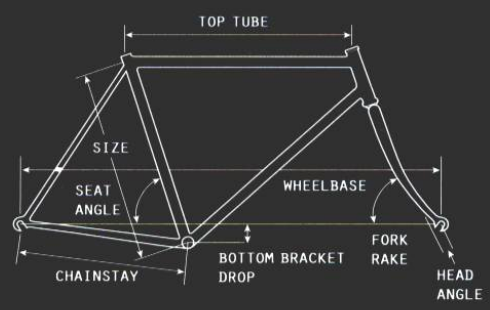
Standard frame geometry defines the handling characteristics of a conventional bike. With angles too steep, the bike is jittery and unpredictable and the cyclist must make constant steering corrections to

keep the line of the vehicle steady. With angles too lax, the ride is unresponsive. Add in varying tube lengths, heights, fork rake and pedal clearance and the formula for agile, stable frame geometry becomes complicated.

Classic road race frame geometry requires the bike to be comfortable enough for all day touring, stable at high speeds and close quartered competition, yet responsive and agile enough to win a sprint. It is truly a science. With most frames, the top tube is slightly longer than the seat tube to give the cyclist room to distribute the body between the bars and the saddle. Also, the seat tube angle places the cyclist just behind the pedals creating a leveraged, powerful position for agile responsive steering. The head tube angle is a bit steeper than the seat tube angle.

This is the time tested, proven frame geometry design that works. But, what will the next generation high performance h.p.v. look like?

Bike Frame Geometry Chart

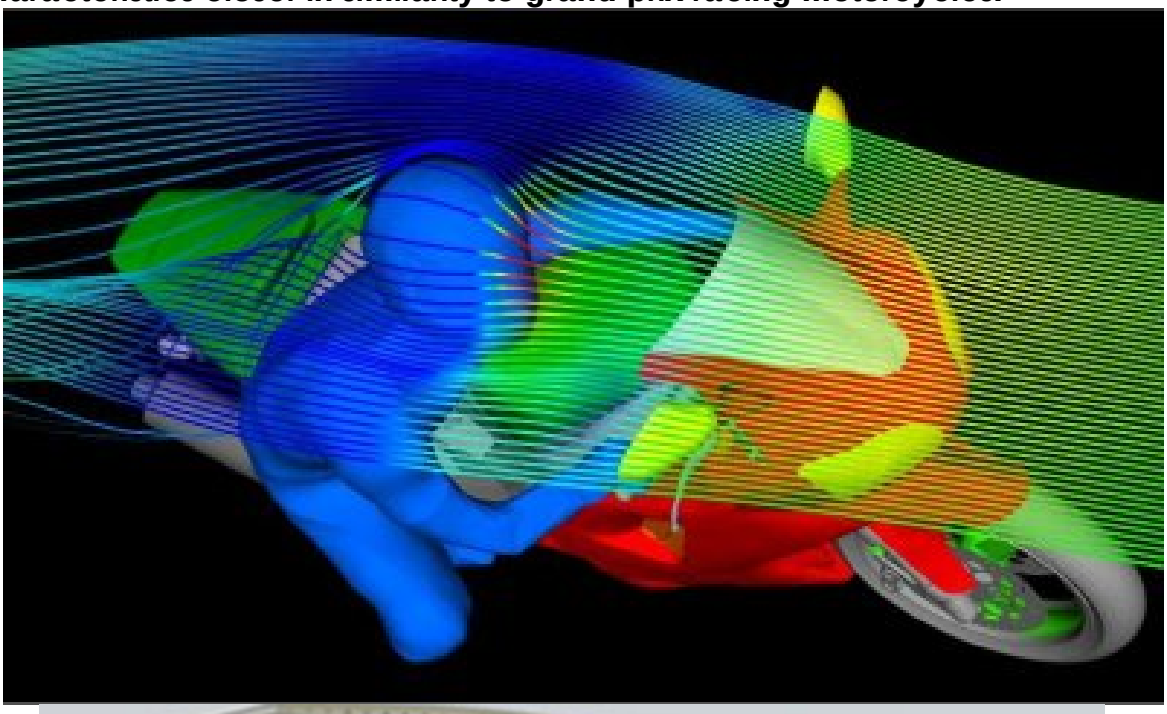


SIZE CM	TOP TUBE (CTO C)	HEAD ANGLE	SEAT ANGLE	FORK RAKE	CHAINSTAY	WHEELBASE	BOTTOM BRACKET DROP (C TO C)
47	51.0	72	74.5	4.7	41.2	96.5	7
49	52.0	72.5	74	4.7	41.2	96.7	7
51	53.2	72.5	73.75	4.7	41.5	98.0	7
53	54.5	73	73.25	4.7	41.5	98.4	7
55	56.5	73.5	73	4.3	41.5	99.5	7
57	57.5	73.5	72.5	4.3	41.5	100.0	7
59	59.0	74	72.5	4.3	41.8	100.7	6.8
61	60.5	74	72	4.3	41.8	102.1	6.8

New School

The next breakthrough in h.p.v. design will be developed to lower the rider's center of gravity and position the rider in a comfortable, more aerodynamic stance. The rider and vehicle will blend seamlessly for

aerodynamic efficiency. The next generation bike will have handling characteristics closer in similarity to grand prix racing motorcycles.



An Exact Science

F-1 Geometry Prototype Specifications

The Formula One Geometry Prototype is an exotic, aerodynamic, ultra light frame consisting of two contoured halves of high compression, heat molded carbon fiber reinforced with Nomex honeycomb Kevlar; a formed thorax saddle composite housing integrated into a lower and rear frame fairing, this is all heat-bonded in an autoclave over an oval shaped, titanium sub-frame. The center spine substructure is the source of the frames strength and torsional stability.

The F-1 Geometry custom prototypes have a length, depending on the professional cyclist's body measurements and the prototype model (the F110 or F120), from 94 to 102 inches; the height to the top of the thorax saddle will range from 27 to 30 inches, and will have a saddle incline, of either 110 or 120 degrees. The prototype has a saddle housing width of 9 inches, tapering down to a lower frame fairing of 3 millimeters. Frame geometry will be customized and, again, vary according to the individual professional cyclist. Determining the optimum biomechanically efficient pedaling position involves measuring and adjusting the pedaling stance from the crank to mid abdomen to the breastplate or sternum. This is where the professional cyclist's optimum mid-range leg extension zone and most responsive and comfortable saddle incline, or "angle of attack" on the experimental prototype will convert the pedal stroke into peak power. Computer aided design (CAD) refinement, digital motion analysis of biomechanical cycling motion, and an adjustable frame sizing buck designed to measure patellofemoral joint forces generated during pedaling with an ergonometer and a force transducer mounted on the pedals, are the main tools necessary to determine a professional cyclist's custom frame specifications for optimum down stroke power in the forward prone position with a high degree of accuracy.

With a 0.05 drag coefficient and the smallest effective frontal area of any open wheeled, unfaired h.p.v, from the dramatically sculpted nose to its rear fin fairing, the mako shark-shaped prototype slices a razor thin, slippery line through the air. The rear frame fairing flairs at the mid-to-upper rear tire well equal to the tires' width, then tapers from the mid-tire well into a flat, wafer thin lower airfoil side surface that is 3 millimeters thick from the rear to the front of the speed frame. The lower frame fairing provides additional structural rigidity, vibration dampening and enhanced

side surface aerodynamics. This is a sculpted body with a backbone to match, but the F-1 Geometry's exotic, arced profile is a work of substance beyond mere art. The ultra-light weight Teflon coated frame slices a direct slipstream through the air efficiently, diverting turbulent air away from the centerline. This inhibits the formation of low pressure regions under the vehicle. The thin, rigid lower fairing generates a greater side surface area or wind sail effect area, which will generate more speed and aerodynamic efficiency in crosswinds. At an estimated weight of 4 pounds, the clean airfoil frame is more of a rigid wind sail than it is a speed bike. The area of the speed frame just below the saddle housing is the "sweet spot", an area of ongoing acceleration efficiency research. Airflow vents in this strategic area of the side surface fairing may provide more than a marginal increase in acceleration and high-speed turning-stability, vane design variations may allow some unharnessed crosswind to flow through, creating a controlled side surface. The addition of a rear disc wheel also greatly increases the prototype's leaning-turn stability, like the keel of a yacht.

The muscular profile is fluid and aggressive. The ultra-light, exotic, razor blade on wheels is designed to do only one thing; generate huge quantities of raw power, unmatched by any other human powered land vehicle. Its all about transferring that pedaling power, aerodynamics and advanced materials into peak efficiency and all out performance and pure unwasted energy transfer from the professional cyclist to the road. The scale renderings reflect a hybrid racing heritage. If Enzo Ferrari had built forward prone position speed bikes, they would have looked like this.

The F-1 Geometry Prototypes will be assembled from the following materials and by the noted manufacturers:

- **Sub-Frame-6Al/4V Titanium Alloy Sub-Frame to withstand vertical loads. Litespeed**
- **Outer Frame-Carbon Fiber Weave Epoxy composite, Saddle Housing and Airfoil Shaped Fairing, with an added inner layer of Nomex honeycomb Kevlar within the Saddle Housing structure, cut from computer generated templates and layered between the Saddle Housing material to resist torsional loads. This also increases the structural stiffness and ultimate strength of the speed frame. The carbon composite frame is bonded to the titanium sub-frame at key points (other potential frames material options are noted in the Design Notes section). GT Bikes, Trek, Soft Ride, Titanflex, Kestrel, VeloKraft, Colnago**
- **Aerofork-Titanium or aluminum. Right front and left rear disc break mounts comparable with industry standards. Litespeed, Kinesis**

- **Thorax Saddle-A 1/2-inch layer of urethane gel elastomer over 2-inches of high density closed cell foam. Saddle covers of durable materials. Momo, Giro Fizik, Selle Italia, Specialized, DuPont**
- **Articulating Aerobar Steering System-1/2-inch Gel elastomer over 1-inch closed cell foam padded elbow rests. ITM, Scott USA, Design Profile, Syntace**
- **Hydraulic Front and Rear Disc Braking System (internal cable routing)- Similar to system in use on mountain bikes. Cable actuated, mineral oil filled. Hayes, Shimano, Amp Research, Coda, Avid**
- **Chainwheels- 56, 72, 88, and112 Tooth only. 72/56 Ironman and Crtterium Competition chainring set. Stainless steel or titanium only. Shimano**
- **Gearsets-12 Tooth Cog Direct Drive for Track and Time Trial only. 9 Speed Ironman /Criterium Cog Derailleur Set only. Ongoing gearing, shifter wireless derailleur and bike automatic transmission systems research and development. Shimano, Manitou, Browning.**
- **Telemetry-A next generation system with linking software for downloading performance data that is integrated into the F-1 Geometry Prototype with PC Telemetry for professional cycling. Power Tune Tap**
- **Wheels and Tires-19-inch diameter, deep aerodynamic profile, carbon composite Front Wheel and disc variation. Aerospoke, Mavic, Spin, Spinergy, Zipp, Nimble**
- **Puncture resistant, low rolling resistance, Kevlar belt, 22-inch radius clincher tire, 200p.s.i. helium inflated. Vittoria, Michelin, Hutchinson, Continental**
- **33-inch diameter, ultra-lightweight disc Rear Wheel. Aerospoke, Mavic, Spin, Spinergy, Zipp, Nimble. Power Tune Tap telemetry system integration into the rear wheel hub for performance data.**
- **Puncture resistant, low rolling resistance, Kevlar belt, 36-inch diameter clincher tire, 250 p.s.i. helium inflated. Vittoria, Michelin, Hutchinson, Continental**

F-1 Geometry Prototypes Component Weight Estimates

Frame	1900 Grams	4 lbs
Saddle	225 Grams	0.5 lbs
Aerobars	400 Grams	0.88 lbs
Disc Brakes	450 G/per Pair	1 lbs/per Pair
Fork	450 Grams	1 lbs
Speed Play Pedal Sys.	225 G/per Pair	0.49 lbs/per Pair
56 Tooth Chainwheel	400 Grams	0.88 lbs
70 Tooth Chainwheel	450 Grams	1 lbs
56/42 Crank Set	600 Grams	1.8 lbs
Wheels		
Rear Disc	600 Grams	1.3 lbs
Front (avg.)	400 Grams	0.88 lbs

Design Notes on Prototype Development

The F-1 Geometry Prototype is theoretically the fastest open wheeled, unfaired (uncovered) single rider, human powered land vehicle ever designed. But power is only part of the equation. The output is smoothly transferred into motion by a rider positioned to optimize every foot-pound of torque. The end result is a machine like no other. In its speed record 112x12 configuration, or its 88x12 or 72x12 track bike inspired direct drive gear configuration (also a 70/56 chain wheel and derailleur configuration), strong yet ultra light composite frame and titanium sub-frame, 3-point prone positioning, and 36-inch rear wheel, generating greater speeds than conventional or recumbent bikes--- the finished product will be as good on the road as it is in projected performance. The radical track style inspired drive train represented in this report will not be the preferred drive train for team criterium competition. Although the derailleur and telemetry systems are not represented in the illustrations, these leading edge technologies are pivotal in solving the forward prone position rider's requirements for break away acceleration and consistent power with reduced fatigue.

Power Surge

The dynamic power to propel the F-1 Geometry Prototype to record breaking speeds comes from a 36-inch diameter rear wheel, approximately 188-inches in circumference. The rear wheel rotates approximately 2150 degrees or 6 times in a 360 degree pedal rotation, not withstanding rolling resistance, wind pressure drag and wind friction drag, forces that are in constant opposition to the h.p.v.

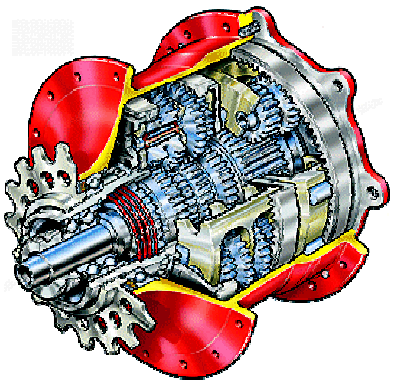
A professional cyclist will be able to perform two 360 degree pedal revolutions, or cadences, per second easily, and a higher cadence at full sprint, theoretically up to four per second. Using these factors, the average minimum touring and sprint speeds can be estimated for a12 lbs F-1 Geometry Prototype and its 160 lbs to175 lbs athlete. Again, the 72x12 Track Cycle direct drive fixed gear is not the preferred configuration for organized criterium racing. It is for speed record performance. At a distance of 1416-inches or 118-feet per second, the distance that the rear wheel will travel in two 360 degree revolutions (.20 horsepower), a professional cyclist can maintain an average touring speed of 40 m.p.h. At sprint cadences, four to five per second (.35hp), a pro cyclist will be able to breach the elusive 70 mile barrier and beyond.

Ongoing Research

The finished F-1 Geometry Prototype will be a result of testing variations in the design that chip away at the small details. Those include:

- **Gearing systems refinement; from standard to wireless, single gear drive, multispeed drive.**

Rohloff Speedhub
14-speed Internal-Gear Hubs:

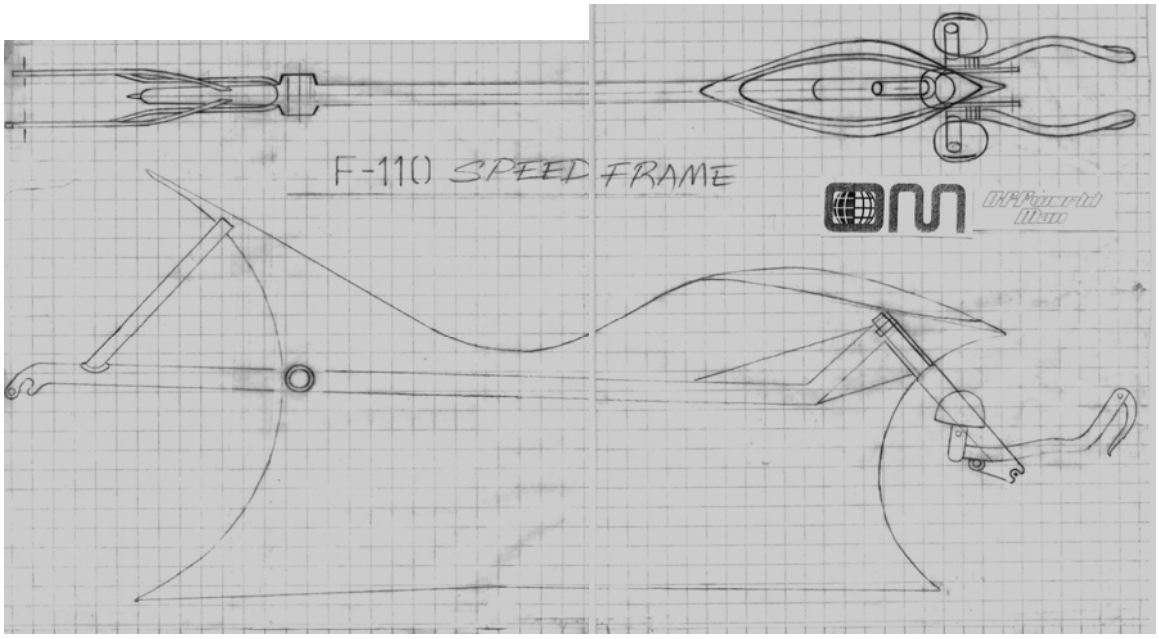


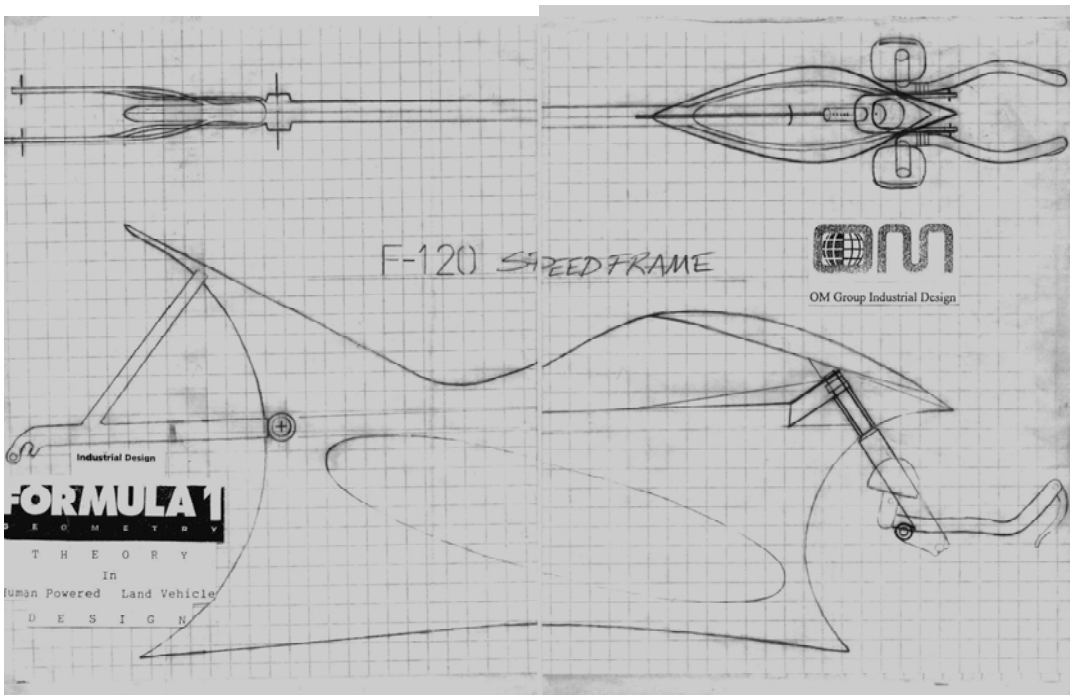
- **Feasibility of a Centrifical derailleur, and the new bike Auto transmission Derailleur systems integrated into the F-1 Geometry Prototype design.**

- **Crank arm lengths size-specific to the individual cyclist's body measurements to improve cadence and fluidity.**

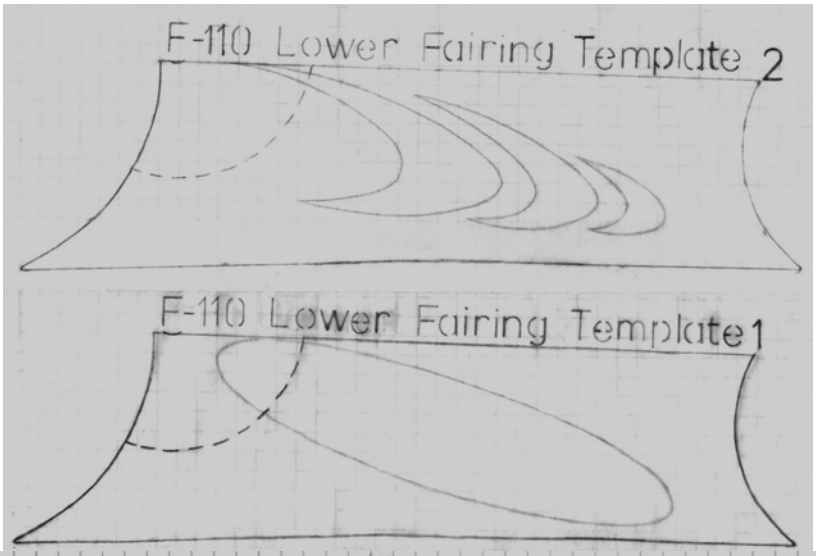
- **Composite Shell Frame and Titanium Sub-Frame Integration; Removable Bolt assembly -versus- Permanent Bond assembly. Fork rake tension studies, repositioning the front wheel to tighten the steering radius.**

- **Reduced Thorax Saddle and Frame Housing width design study to improve aerodynamics without sacrificing 3-Point Interface efficiency.**

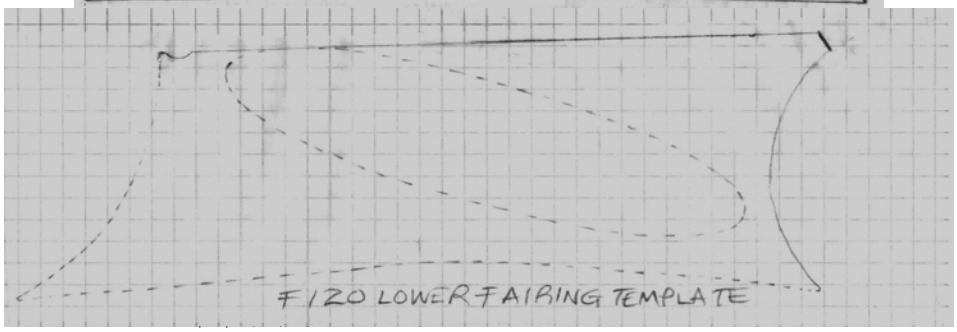


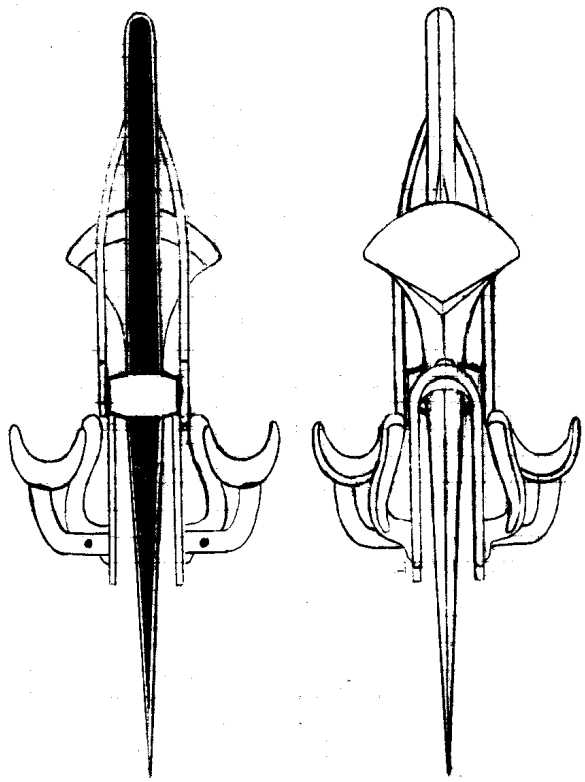


- **Structural refinement of the rear Frame; ground clearance refinement of the lower Frame fairing, ongoing studies.**

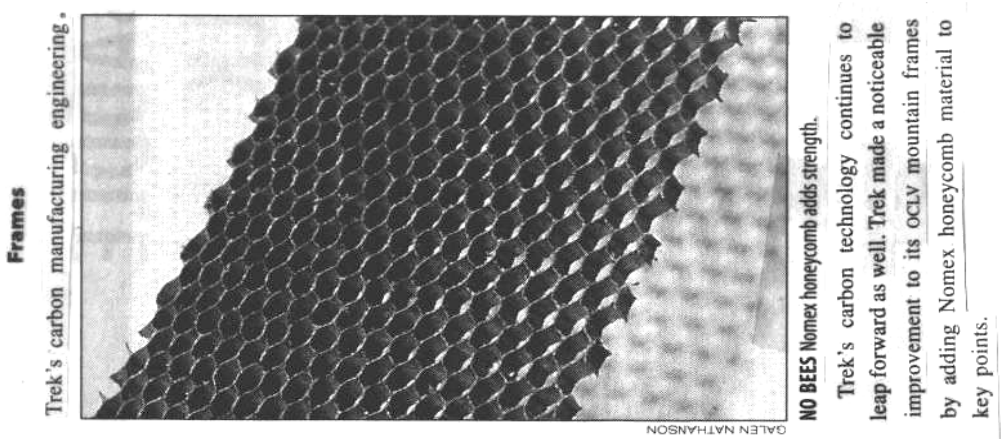

F-110 Lower Fairing Template 2

F-110 Lower Fairing Template 1


F120 LOWER FAIRING TEMPLATE

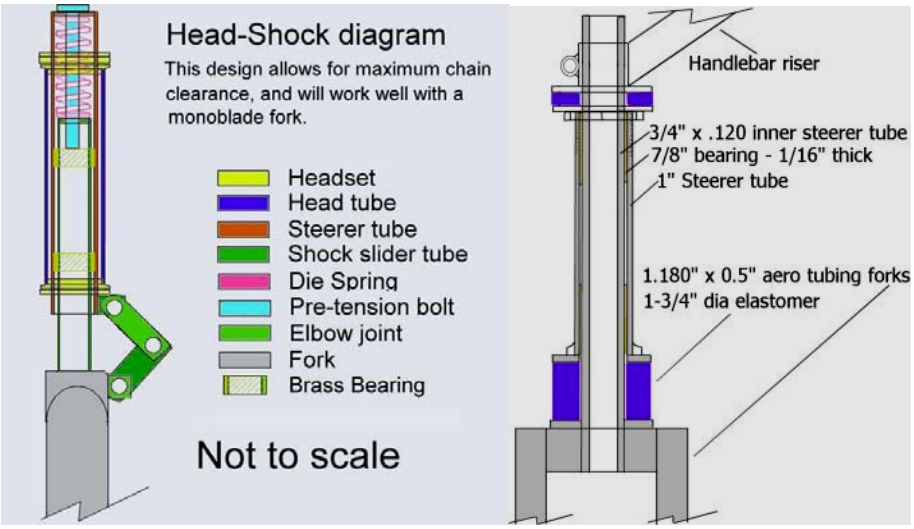


- **Carbon composite and Nomex honeycomb Kevlar reinforced Frame Shell and Titanium Sub-Frame structure feasibility -versus- Lost Core VRTM complete Thermoplastic Frame structure feasibility, without a Titanium Sub-Frame as standard frame component.**

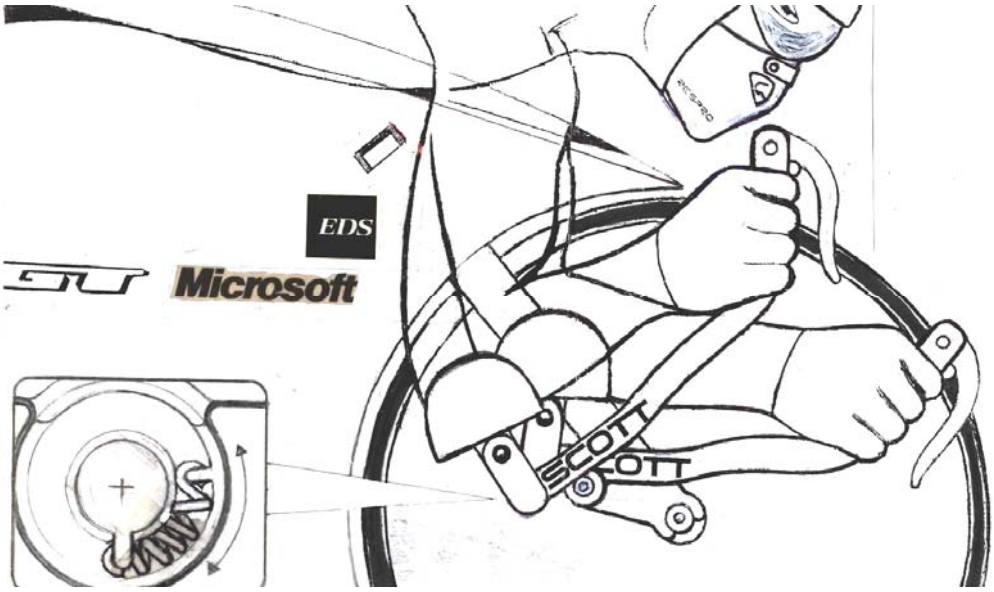


- **Feasibility of an all Aerospace Aluminum frame similar to the Technique Sports Superbike designed by RMIT University-Melbourne and Bocar.**

- **Front fork stem head shock suspension feasibility.**



- **Refinement of the steering aerobar function; study a non-articulating aerobar -versus- a 45 degree upswinging, spring loaded articulating aerobar for steering efficiency in high-speed leaning turns or sharp turns. Feasibility of integrating a grip mounted lock and release control feature in the articulating aerobar system. Variations in the aerobar design per pro cyclist's individual specifications.**



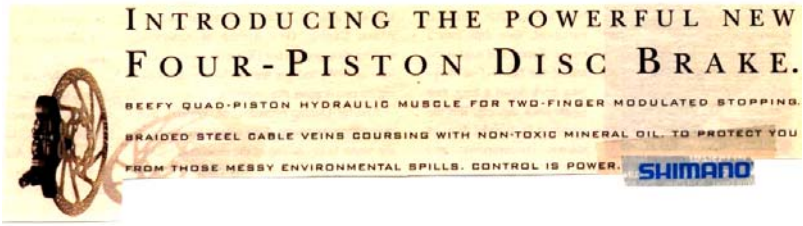
- **Feasibility of a wireless telemetry system embedded into the rear wheel hub.**

Power-Tap is a new, economical device for measuring power and other physiological data that can be mounted on most road or mountain bikes.

GALEN NATTHANSON

Mavic Mektronic
Wireless digital technology. Wireless remote shifting of the rear derailleur. Choose from three positions to shift from. Integrated computer relays all of your important information. Batteries good for 20,000 shifts, or 2 years. Works with Shimano 9speed or Campagnolo 9speed. Same weight as STI or an Ergo setup. Kit includes brake/shift levers, rear derailleur, and computer

- **Feasibility of mountain bike style disc brake -versus- standard linear bike braking systems; weight savings and braking performance at high speeds, simplicity of mounting integration into the F-1 Geometry Prototype frame.**



- **Feasibility of inertia bike brake system, which in concept, captures the energy lost in braking; a piezoelectric clamp and wheel rim apparatus that transmutes the braking energy into electrical storage, similar to the function found on the braking mechanism of some hybrid gas electric vehicles. Stored energy may be used for bike telemetry or two-way ear-mike communication between riders and teams.**

- **Mini camera mount at the nose of the prototype.**

Improvements and refinements will result in exceptional performance, once the technical expectations and their limits of the prototypes are redefined.

F-1 Geometry Thorax Saddle

With its sculpted lines and organic curves, the futuristic prototype may be mistaken for the latest creation of special effects wizards from Hollywood's Central Casting, but this is not a prop from the film studios' next Science Fiction movie. The F-1 Geometry Prototype is the world's fastest unfaired human powered land vehicle, composed of materials commonly used on standard time-trial bikes, on racing sport motorcycles and in open wheeled motorsports.

At first glance the Pro cyclist might appear to be in an uncomfortable position on the F-1 Geometry Prototype. However, the Thorax Saddle, at a length of 18-inches, a middle width of 9-inches and a thickness, at its uppermost center-point, of only 2½-inches, in combination with gel elastomer padded elbow rests of the aerobars, provides a balanced 3-point weight displacement of the body trunk from the sternum to the lower abdomen. Variations on the Thorax Saddle design such as the inset illustrated examples may well facilitate narrower Saddle frame housings and greater aerodynamic efficiency.

With standard road racing bikes, there are certain health risks posed by regular bike seats creating pressure and discomfort on the sensitive perineal nerves and pudendal arteries. There are regular reports of testicular and prostate damage for male cyclists, and discomfort and swelling for female cyclists, as a result of uncomfortable standard bike saddles. There are a wide variety of new, specialty saddles that attempt to address this problem.

The F-1 Geometry Prototype design solves this problem by placing the cyclists in a in a forward, 3-point interface prone position that places the rider completely off of the delicate tissue and "sit bones" of the pelvis. The Thorax saddle's 3-point interface is an innovation in design and function.

There are two basic versions of this frame geometry:

- **The F-110, the first prototype with a 110 degree saddle housing incline.**

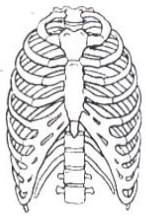
- **The F-120, with a120 degree saddle housing incline.**

All speed frames will be customized within these two parameters to fit the individual team rider's body and comfort specifications. Most professional

cyclists will favor the F-120 speed frame configuration, as it places the rider in the most aggressive pedaling position.

HIGH PERFORMANCE PRONE POSITION HPV DESIGN

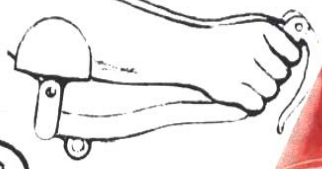
tho·rax [thôr′aks] *n.* **1** The part of the body between the neck and the abdomen, enclosed by the ribs; chest.

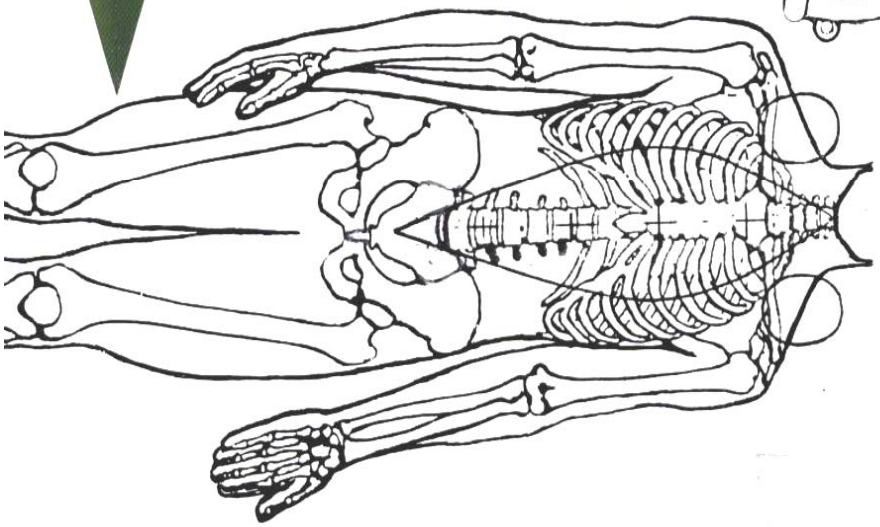


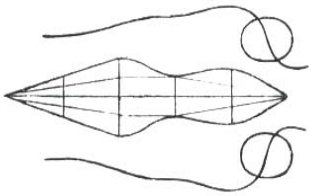
Thorax

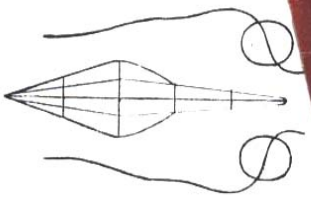
UNION OF ATHLETE AND MACHINE

Patent-pending DESIGN









The illustrated 112 x12 direct drive track style configuration may be as radical as the rest of the prototype and give the impression of being difficult to bring up to speed. The prone cyclist may also require assistance in mounting the F-1 Geometry Prototype. Remember, this prototype is a professional racing vehicle, not designed for the consumer, but for organized cyclesports. Also of note, a formation lap prior to race start will also facilitate rapid acceleration at the beginning of a race. Time trial competitions traditionally use a ramp incline to get the rider out the gate at racing speed.

Pure Superman Aero Positioning

Professional cyclists on standard racing bike ride in a crouched over position with their arms extended on aerobars and their shoulders, elbows, forearms, knees and feet pulled inward for aerodynamic effect. From an understanding of this hunched positioning, often unfavorably labeled by U.C.I cycling traditionalists as “Superman Aero” or getting “Low and Narrow”, F-1 Geometry design postulates that, on a biomechanically efficient, advanced speed frame, a forward, fully prone position professional cyclist will achieve a far greater aerodynamic benefit and extend the current speed limits for human powered land vehicles.

For example, visualize a cyclist on a standard racing bike, riding in a hunched, nearly shoulder high position, scooping air into his chest like a parachute. The cyclist makes up 80 percent of the effective frontal area. The wind resistance will dramatically slow his effort. The cyclist makes a high-speed, leaning turn. He cannot pedal into and throughout the turn, for fear of his pedal scraping or clipping the road, which will pitch the precariously unstable vehicle. If he leans too much or steers into too sharply, an improper line of direction, into the turn, the cyclist risks loosing complete balance. Collar bone shattering spills and massive pile ups are just a few of the problems a pro cyclist faces on a standard road racing bike.

Now in contrast, visualize a fully forward prone position rider, just over two feet from the road surface, on a biomechnically efficient vehicle design that maximizes the cyclists mid-range, free-hip leg extension pedal stroke, with pedaling clearance that enables the prone position cyclist to pedal through a sharp, leaning turn. This is not a mere bike; this is a hybrid human powered racing vehicle with motorsports inspired handling.

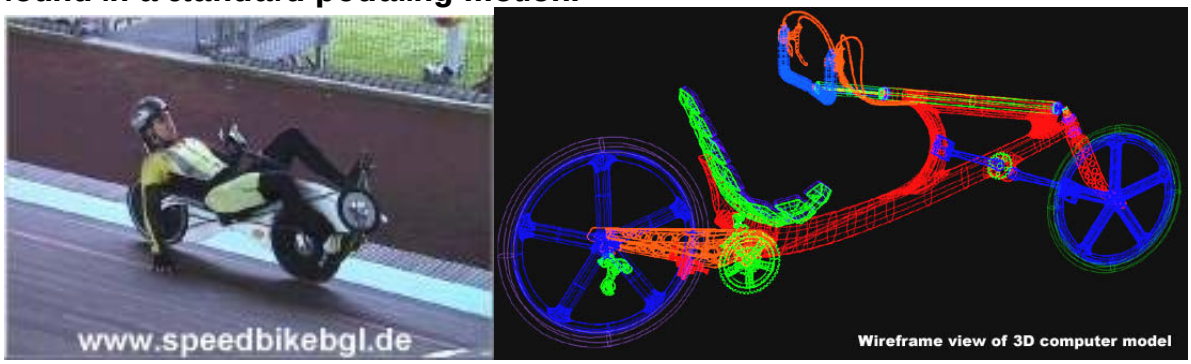
The F-1 Geometry Prototype was designed for superior performance and to give the cyclist a better chance of walking away unscathed from any

kind of mishap during competition, a far greater chance than on a standard road racing bike. The F-1 prototype and pro cyclist also create a far smaller wake passing through the air. The cyclist on a standard bike will expend most of his effort to merely overcome the forces of drag. F-1 Geometry design is in theory, as aerodynamically low and narrow as an aggressive cycling position can get.

Recumbent -versus- F-1 Geometry

There are recumbent, or reclining prone position, bikes on the market such as the fully rider enclosed or fully faired Easy Racer 'Gold Rush Legend', and the Vector Single that set the standard in aerodynamics. Then there are the open unfaired styles such as Lightning Bikes and Wiz Wheels. By comparison the unfaired F-1 Geometry design is theoretically up to 10 miles faster than the fully faired rider enclosed Vector and the cumbersome Gold Rush Legend.

In recumbent bike design, the cyclist pedals with an unnatural transfer of energy. There is a kinetic pulling effect—instead of a natural energy like that found in a standard pedaling motion.



The F-1 Geometry prototype not only places the cyclist in an aggressive, biomechanically efficient forward prone position, it optimizes the rider's energy input. This creates powerful, fluid pedal strokes and responsive acceleration. It is the difference between a front wheel drive commuter automobile and an exotic, mid-engine sports car; a pure adrenaline rush and an ability to change direction with great agility, because the majority of the rider's mass and center of gravity is lowered and there is power to spare.

Sport Cycling

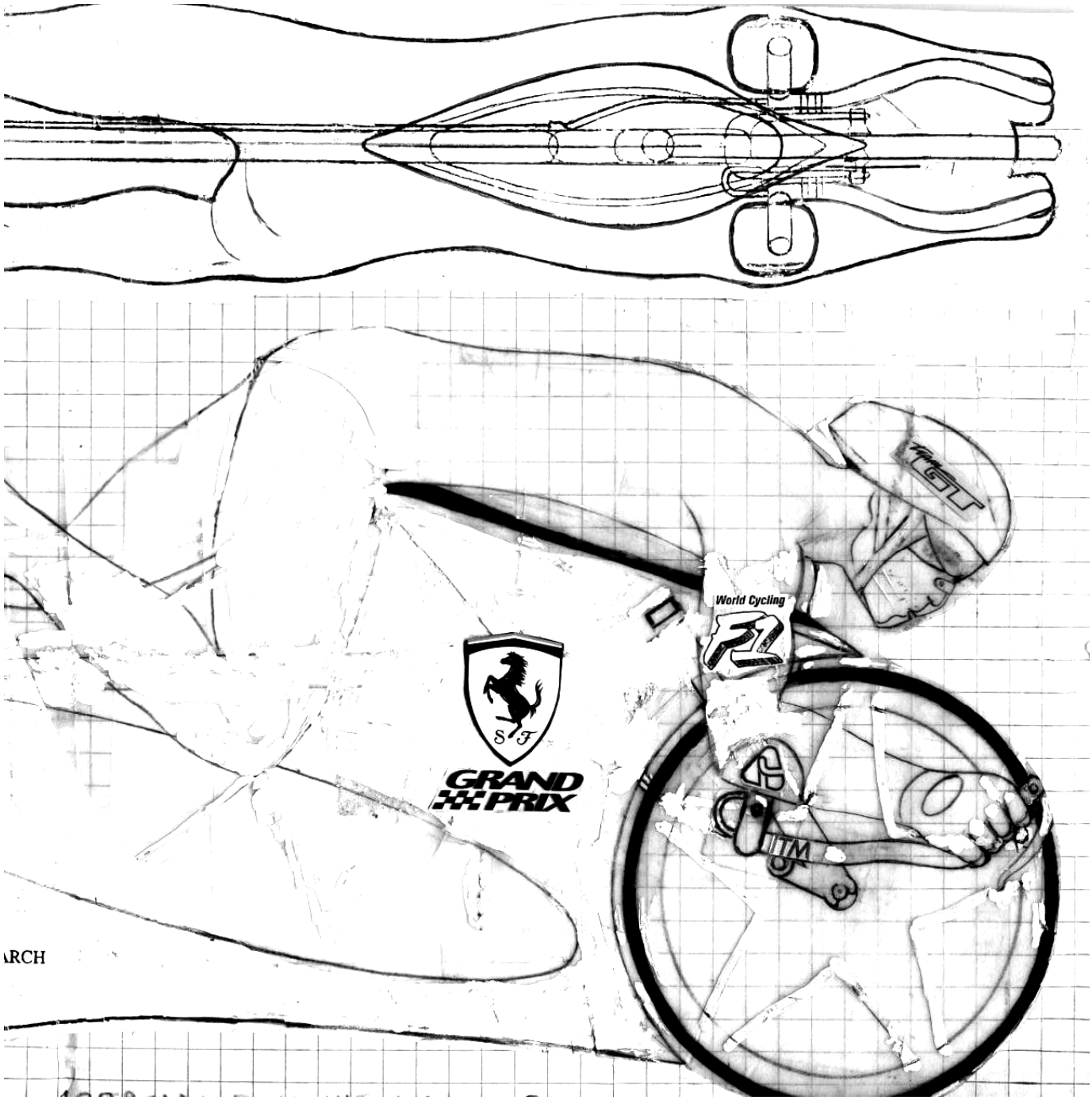
F.I.M and A.M.A Motorcycle Racing had a predominate influence in this ongoing design feasibility study. I wanted to develop a speed frame design with handling characteristics that would closely simulate Pro

Superbike Racing. Although the cyclist's center of gravity remains in the lower abdomen and pelvis, F-1 Geometry design rotates the cyclist over on this CG axial plane, from standard cycling's aero position to an anatomically and biomechanically efficient forward prone aero position. This gives the pro cyclist a greater range of free hip multiple plane mobility to stabilize the prototype in high-speed, leaning turns, just like a racing motorcycle.

Smaller Rear Wheel Dynamics

The argument can be made that a 20-inch front wheel, 27-inch or 700c rear wheel prone position design may perform impressively in leaning turn stability, more closely simulating the handling characteristics of a racing motorcycle, with a slightly lowered drag coefficient. However, this would be at an unacceptable loss in speed, comfort and power, as was the case with most attempts at forward prone position design. Most forward prone bike prototypes and related design research, even today, rests the cyclist on a flat-pad, much too level to fully optimize pedaling efficiency.

In contrast, the arced Thorax Saddle and 36-inch rear wheel of the F-1 Geometry design places the cyclist in the most comfortable, weight displacing, properly sloped incline, to generate the most explosive power while keeping the rider's head level with the position of the heart, preventing light headedness.



Phase One: Frame Constructor Facilities

Professional cyclists and bike engineers dream of the h.p.v. that can break the 70 mile-per-hour barrier and beyond. Unlike the two-rider, fully faired Vector Tandem, the unfaired, single rider F-1 Geometry Prototype can conquer this elusive barrier, but only if all of the manufacturing resources of the period are utilized in the one-off experimental prototype's refinement, fabrication and performance testing.

Speed frames for Constructor Teams will have to be built by a consortium of contractors, those listed in the F-1 Prototype Specifications and Manufacturing Resource Notes and Directions sections of this report. Constructor Team contractors will continue the ongoing process of F-1 Geometry technical refinement through quality production. These contractors will already have in place test facilities and proving grounds to develop the custom speed frame prototypes, and an in-house biomechanics program to analyze performance data. Since the thorax saddle housing of the speed frame carries most of the rider weight and will absorb most of the road vibration and stress, its construction is a critical process.

Constructor facilities should consist of the following departments, teams of engineers and craftsmen:

Aerodynamics Performance - This department would be responsible for the final overall architecture and profile of the vehicle concept, from schematic, computer aided 3D and virtual design refinement, to wind tunnel development and or computational fluid dynamics, as per aerodynamic specifications.

Vehicle Dynamics - This department would test materials and componentry for use, including digital motion biomechanical analysis and performance data analysis gathered from road testing and organized competition.

Fabrication and Production- This department would look after materials buying, assembly and inspection, to include a Pattern shop, Composites shop, Machine shop for sub-frame fabrication, Saddle shop, Paint shop and Transport Services. Fabrication and Production would be responsible for producing all custom components such as sub-frames, thorax saddles, front forks, aerobars, and all custom gearing needed for final assembly.

The Basic F-1 Geometry Frame Fabrication Process

The Composites shop is one of the most labor intensive arrears of production. Modern carbon fiber composite is produced by heating and stretching acrylic fibers, first in air and subsequently in inert argon gas, a nitrogen rich atmosphere. This gives the material the strength and lightness which is so essential. Efficiency isn't just a refinement in choosing the right material, but also in determining how it is to be used and which f the myriad of fabric specifications to apply to a given use. A single carbon fabric strand has 6000 fiber ends, and engineers order groupings of these fibers in tows of woven fabric, used according to F-1 Geometry prototype specifications, in a process called Directional Fiber Alignment. Engineers control where the strength goes, and where the weight doesn't, by controlling the number of piles, stack angles, contours and tapers.

The woven fabric is impregnated with epoxy resin. Technicians would then cut, trim and layer the fabric over the computer generated, custom contoured mold halves of the outer thorax saddle housing and lower frame fairing. Thin sheets of Nomex honeycomb Kevlar material are cut from computer generated templates and layered between the sheets of the carbon fabric. This will increase the structural integrity of the Thorax saddle frame housing, the carbon fabric and Nomex Kevlar are layered at key points to improve vibrational dampening, stiffness, or flexibility where needed.

A point of ongoing research in this study involves the next phase of production:

Procedure A
The prototype may be produced as one piece at this point in fabrication by placing the titanium sub-frame in position and joining both halves of the outer frame molds together under high compression for autoclave firing.
Pros: Strongest frame; best torsional and load bearing performance.
Cons: Heavier weight; costly construction process.

Procedure B
Forego the titanium sub-frame for an all composite frame. Vacuum Resin Transfer Mold frame fabrication may also be researched as a plausible production method.
Pros: Lightest frame; most agile.

Cons: Greater chance of frame fractures, even shattering at higher speeds on rough street courses.

Procedure C
The prototype may be produced to be fully serviceable by keeping each sealed mold half separate, or heat bonding the two halves at the nose of the saddle housing assembly only, then (after autoclave firing) bolt the frame shell halves together with the inserted titanium sub-frame sandwiched in between.
Pros: Easier to service; reuseable subframe and components.
Cons: Heavier weight, lowered vibrational dampening.

Final Assembly

The frame is placed a huge, computer controlled oven called an autoclave, and heated at 120 degrees centigrade for up to four hours. The end product will be one fourth the weight of steel, but more than twice as strong. The other components are then assembled to the speed frame, which is then put through a production quality inspection checklist and road tested. The speed frame is then disassembled for the next, most colorful and creative area of customized prototype production for Sponsored Constructor Teams. The Paint shop will carry out all specialty, detailed painting of the frames in its distinctive Sponsor Team livery covers, and a meticulous application of all of the individual sponsor's logo badges. The application of Teflon coatings are the final processes to take place. Unlike conventional Cycling leagues, the F-1 geometry prototypes will have the visible star power and presence to compliment their explosive horsepower. This is where the Sponsor Teams and their colorful machines will stand out and energize the new cyclesport, called GP Pro, or Grand Prix Professional Cycling.

A New Cyclesport

GP Pro Cycling will be as perilous and exciting as motorcycle racing. To travel under your own power at over 60 miles-per-hour just three feet above the road surface takes courage and supreme physical conditioning. To literally "out fly" or out maneuver the competition, on your belly, at double the average speeds experienced by conventional pro cycling. From the muscle numbing, painful "burn" of exerting each rapid-fire pedal stroke in a full sprint, to the adrenaline rush of raw, competitive intensity, heightened visibility and agile vehicle responsiveness. There will be no equal to the performance of the F-1 Geometry prototypes in organized competition.

Summary of Phase One Prototype Development Program Objectives:

- **Computer aided design refinement and detailed engineering of the F-1 Geometry speed frames to varying specifications. Emphasis on quality materials and components in custom fabrication.**
- **CAD refinement to aid in the design of structural components and custom manufacture of all related components, to include;Ongoing gearset , derailleur, bike auto transmission systems and performance data systems and their integration into the F-1 Geometry design; aerobar and front fork refinement, custom manufacture and evaluation for strength and function; CAD refinement and custom fabrication of the various wheels and tires.**

- **Prototype testing and analysis of overall handling and performance characteristics.**

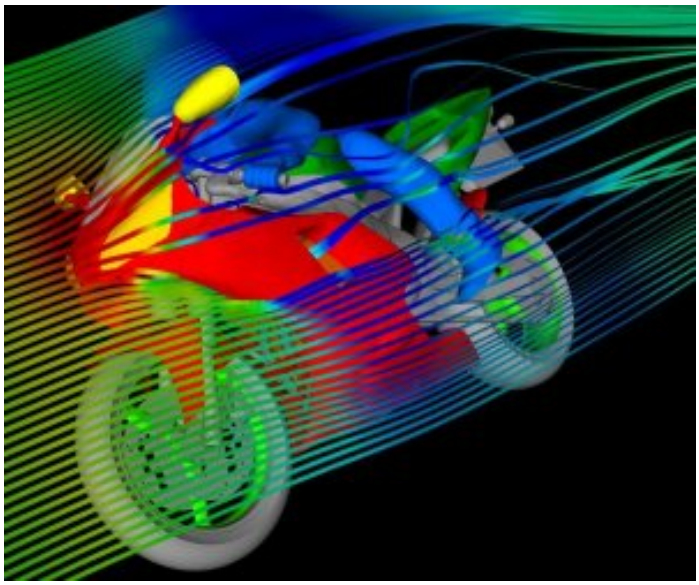
The Future of Aerodynamics As Applied to F-1 Geometry Frame Design:

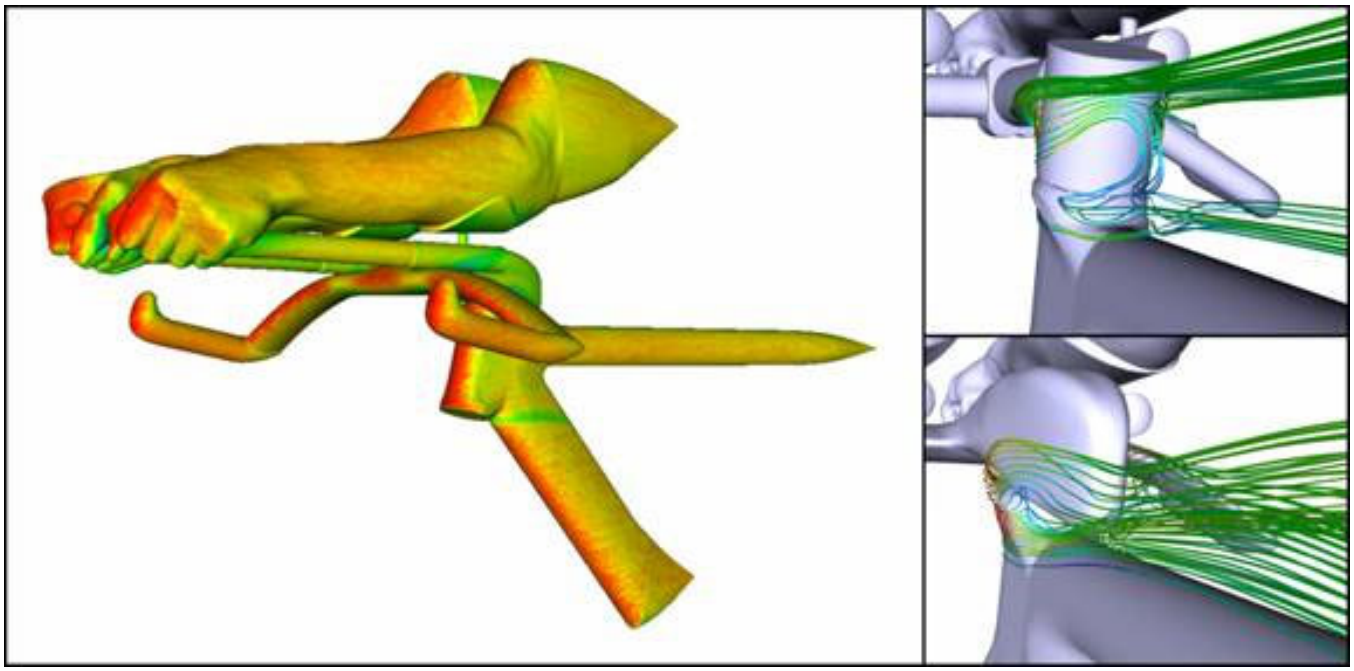
Digital Solutions Digital Motion Analysis

Digital Motion Analysis, the use of high speed digital cameras 9250 to 10,000 frames per second) may be applied to F-1 Geometry prototype refinement. By utilizing computer aided virtual design technology, along with an adjustable frame buck, digital motion cameras and software, a riders custom frame geometry can be determined with a high degree of technical precision, and each frame will be custom tailored to fit the rider's body. Digital motion cameras record the cyclists pedaling motion on the adjustable frame buck in various configurations. This information is fed directly into the computer with applicable DMA software. The cyclists wear skin suits with illuminated markers at key tracking points along the profile of the body, particularly the piston-like motion of the legs in motion. The software allows a point to be selected and tracked through the images and degrees of motion. This is the same technology that places high contrast markers on an athlete in motion for gaming or instructional software. Digital motion capture is an important tool to use not only in F-1 Geometry frame specifications, but also in design and optimum biomechanics, frame vibration and stability.

Wind Tunnel Testing

Fluid Dynamics is the study of air or liquid around an object. Air is a fluid just like water, but not as dense, and behaves in accordance with the same equations concerning viscosity versus momentum. Wind tunnels determine the shape of a vehicle and replicate the behavior of high speed controlled air flow around a vehicle. This includes consistency of air flow; density, pressurization and constant temperature. Besides high performance automobiles and aircraft, wind tunnels have been used for more unusual projects, including a study of the micro-aerodynamics of golf club heads as they travel through the air. Aerodynamicists were able to reduce drag produced by the head of a driver club by 25 percent. Less drag means more force on impact, and that translates into a much more powerful drive. In a sense, the objectives are similar when it comes to reducing drag on a cyclist and bike, though the complexity of the problem---the interaction of the rotating wheels, the shape and proximity of the frame, the cyclist's positioning including legs and body movement, all factor into aerodynamic solutions. To design a high performance race vehicle without wind tunnel testing in modern times would be unthinkable. Wind tunnels are necessary to fine tune and tweak concepts before building full scale or final prototypes. If aerodynamicists have an idea that they think will make the prototype faster or perform better, the wind tunnel serves as a useful tool to test out any advantages. A design set-up is finalized based on the wind tunnel results. Pure aerodynamicists will want every bit of data on the behavior of every bit of air flow. It is very rare that something does not translate from the tunnel to the track. When it does happen, it's because there has been a mistake from the drawing to fabrication or from scale to full size. Overall, if a design is worth pursuing, the wind tunnel will produce the data needed to refine the final prototype and give the constructor team an advantage.





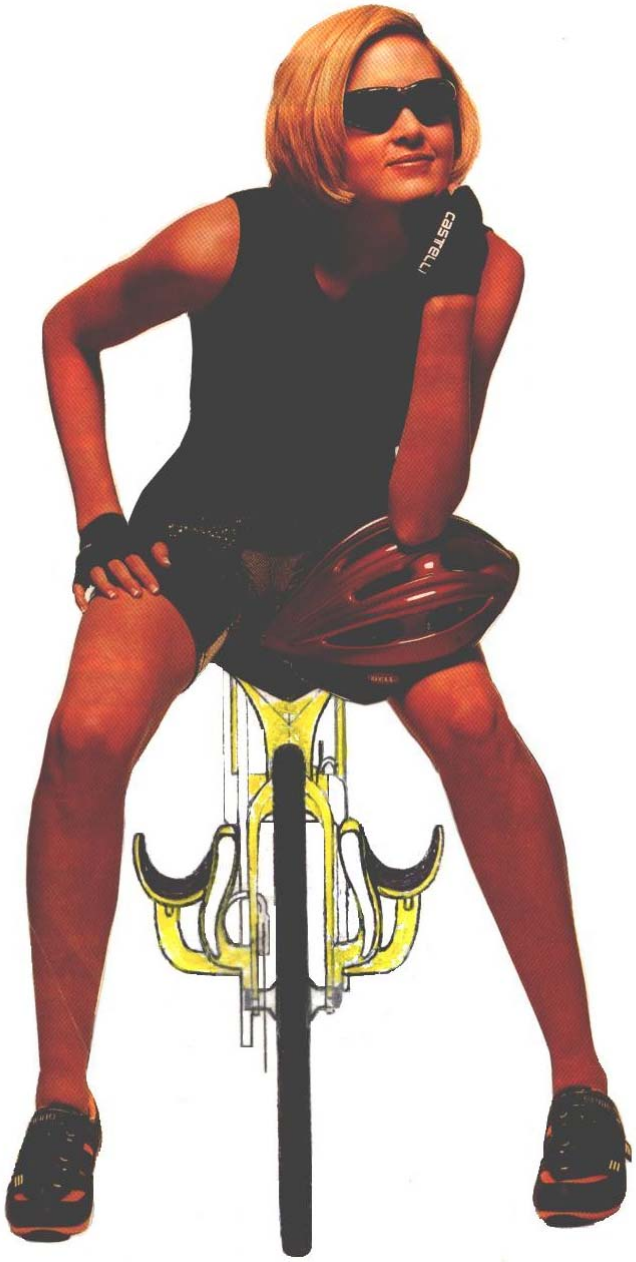
Computational Fluid Dynamics

Computational Fluid Dynamics is the new aerodynamics. The theory goes that wind tunnel tests will soon be a thing of the past, replaced by computer programs that replicate the behavior of air flow over whatever shape or vehicle by mapping the dimensions of the test shape digitally, and install the appropriate wind tunnel program to allow its multicolored airflows to chart the aerodynamic efficiency of the test shape. CFD will revolutionize wind tunnel testing. At present CFD is an incredibly complex program that is still at least a few years from the comparable reliability and accuracy of the wind

tunnel. In the future, race teams will be able to utilize CFD programs in place of conventional wind tunnel testing; once more powerful and inexpensive computers with a far greater capacity for data become available. In all probability, CFD will be a complimentary source of confirmation data for wind tunnel testing. For the true aerodynamicist, it will never comfortably replace the old standard.

Phase Two: Octagon Sports Marketing and GP Pro Racing

The remainder of this feasibility study does not fall within the argot of design theory. It involves the detailed outline of the best application of the prototype as it relates to its targeted market. In order to sell the feasibility of the design, I will attempt to sell its promotional value.



SPORTS MARKETING

OCTAGON is a global sports marketing group, with offices in over 20 countries and 1000 employees. Created in 1997 as a division of the INTERPUBLIC GROUP, one of the world leaders in advertising and marketing communications, Octagon is the first in the field to take a truly marketing-led approach to the business of sport. No company has more of the skills and global resources needed to develop and execute effective sports marketing strategies.

Octagon's philosophy is simple---The world is in love with sports. As it becomes ever more intense, the business opportunities in sport continue to grow. The time is right for a new approach to sports marketing, on the skills to turn that understanding into clear cut and achievable business objectives, and on the global resources to turn those objectives into results. As a division of the world's largest advertising and marketing communications groups, Octagon offers its clients world class marketing skills and brand expertise across eight major disciplines that make up the sports marketing and entertainment market; Athlete representation, Consultancy, Event Management, Property Representation, Television Rights Sales and Distribution, Television and Archive Rights Ownership, Licensing and Merchandising.

(Excerpts from the Octagon Website.)

If the performance parameters of the experimental prototype are met, or exceeded, F-1 Geometry design cycling will need a considerable partnership with an organization such as Interpublic Group's Octagon Sports Marketing, to build and promote a successful new championship national criterium series and governing body. I will designate this new, prospective racing league by the tentative title, Grand Prix Professional Cycling Organization, the GP Pro Project.

There exists within this GP Pro Project proposal a real world opportunity to expand the popularity of professional cycle sports and its advances in performance, similar to professional motorsports. GP Pro Cycling is the Next Generation of professional cycling; a progressive, human-powered racing sport that is the Perfect Promotional Vehicle for Corporate Sponsors to affiliate with their brand.

An Invitation

This ongoing feasibility study is the culmination of a long commitment to HPV design research. There is a Cycling Science website where mechanical engineers publish serious research studies in the field of aerodynamics, materials and biomechanical performance as it relates to professional cycling. I welcome any additional assistance to refine and further develop the F-1 Geometry prototype, and push beyond old barriers of human powered performance.

A product of hand-crafted high technology, built to stringent specifications, the sleek, futuristic speed frame will be race worthy and highly marketable, a dynamic new cyclesport can be anchored around the concept. However, it will require an affiliation with the established, governing cycling organizations and an executive organizational body with substantial resources, including; several constructor frame contractors, access to manufacturing and testing facilities with related technical support; sponsorship and race team recruitment, national race circuit organization, professional public relations, media communications and cross promotional organization.

The serious process of launching a new high-performance professional cycling organization and national tour will require resources and a commitment from sponsors and manufacturers on a scale equivalent to the effort necessary to promote professional motorsports. Anything less than the support of a coalition of venture capitalists and serious corporate commitments will hinder this project from advancing successfully beyond a 3D CAD exercise.

Grand Prix

Professional

ORGANIZATION PROJECT

GP PRO RACING FORMAT

When it comes to the marketing of athletic competition, image is everything.
F-1 Geometry cycling is the term used to describe the spirit of high velocity, forward prone position cycling. The nomenclature used to describe this project is described is Grand Prix Professional Cycling, or GP Pro, a blend of various racing sports traditions. The F-1 Geometry prototype and GP Pro Hyper Cycle are also terms developed to identify this unconventional prototype. GP Pro Racing format is patterned after the road rules and points system of FIA Formula One Motorsports.

- **GP Pro Races are ½ kilometer to 2 kilometer length, closed street circuit criterium courses, ranging from 20 to 50 laps.**
- **There will be a time trial qualifying run for the order of rider position prior to start.**
- **A points system based upon the established FIA 10-6-4-3-2-1 win/place system.**
  A monetary prize system for the top three riders per race on the tour, and a Sponsor Constructor's Team Points Competition, is the best most incentive bearing format to follow.
- **Only two riders in competition per Sponsor Livery Team, exactly like FIA Formula One. This will enhance the elite nature of championship GP Pro Cycling.**

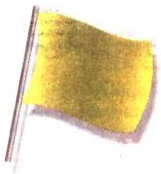
A two athlete limit would also make Group Corporate Constructor Team Sponsorship financially appealing; by spreading out the Livery expenses per season among 10 or more Corporate Sponsors, in exchange for the Sponsor's Corporate logo badge prominently placed on the teams speed frames. And, bragging rights among Constructors Teams with every race series win. No limit to the number of Livery Team Sponsors, upon Organization and Sponsor Team approval. Also, by reducing the number of team riders, 4 to 10 being the standard in most UCI sanctioned races, there is an elimination of the primary cause of mass pile-ups. GP Pro racing will redirect the focus back to racing technology, the tactical skill of the riders, the Sponsors that make it all possible, and the pure sport of F-1 Geometry cycling. Professional cyclists on standard bikes maintain average 'sprint' speeds of 40-plus mph in competition. An F-1 Geometry rider will be able to maintain touring speeds in excess of 50 mph and sprint speeds far beyond the stand road racing bike. And, envision second and third generation prototypes with a 56/42 chainring set, an electronic wireless derailleur or a fully functioning bike auto transmissions system. These future speed bikes will be extremely agile--- the pinnacle of human-powered land vehicle design.

FORMULA 1 GEOMETRY

Setting sights on 80 mph

TEAM GP PRO Racing

Start
Start of race, or end of caution



Caution
Danger; no passing; slow.

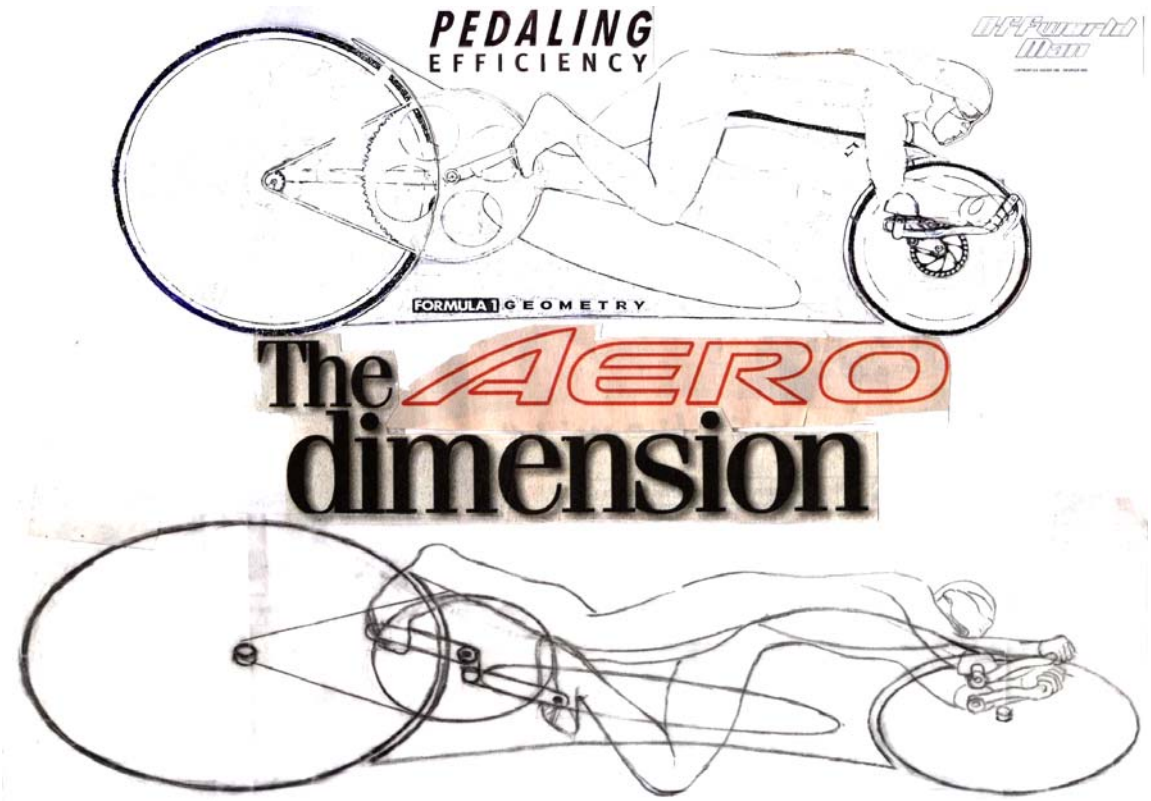
Stop
Race is stopped until further notice.

Move over
Make way for faster competitor.

Go to pit
Used in cases of rules violations.

Last lap
Can also indicate emergency vehicle on track

End of race
Take one cool-off lap and return to pits.



OFFICIAL F-1 GEOMETRY DESIGN FOR GP PRO RACING

Vehicle Design Regulations for organized team competition :

1. **A three-point interface THORAX SADDLE frame design only, approved within adherence to quality design, construction, and aesthetic standards.**
2. **Vehicle weight limit of 15 LBS.**
3. **A minimum 56 tooth, and maximum 72 tooth chainring sizes for criterium competition only, and a maximum112, 88, and 70 tooth chainwheel sizes for fixed-gear speed record, time trials, and track competitions only.**
4. **No restrictions on derailleur or rear gearset systems types for criterium competitions.**
5. **A 22- to 24-inch diameter front wheel allowance only.**
6. **No restrictions on fork mounted steering bar design within adherence to quality construction and safety standards.**
7. **A 36-inch diameter rear disc wheel design only, as part of the F-1 Geometry design formula for speed and high-speed turning stability.**
8. **No restrictions on rear hub telemetry systems within vehicle weight limits.**
9. **No restrictions on wheel or tire design within quality and safety standards.**
10. **Mandatory disc braking systems, front and rear.**
11. **Mandatory head, facial, forearm (hands, wrists and elbows), thorax (sternum), knee, shin, ankle, and foot protection; light weight in design, capable of protecting a rider during a spill or crash traveling at speeds**

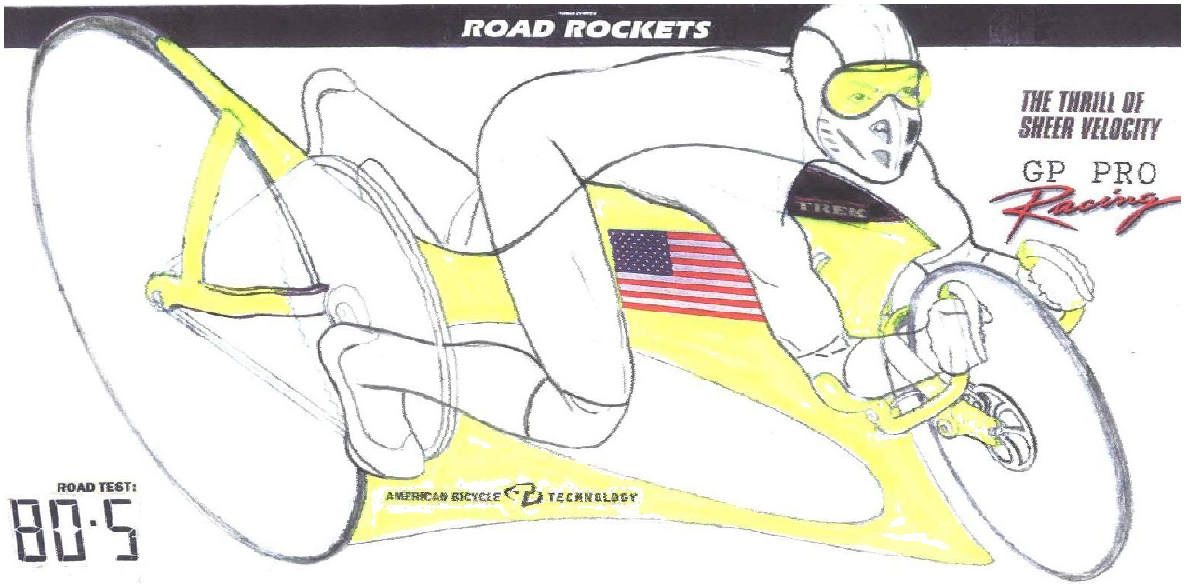
of 50 mph or greater. Protection similar to the equipment used by AMA or FIM Motorsports, but not as heavily layered or restrictive in movement.

The GP Pro Racing project is hypothetically, the best application of this design study, to create a new classification cyclesport, and develop a racing rivalry that is the human-powered equivalent of for example, Ferrari -versus- McLaren Mercedes, the two top racing organizations in FIA Formula One, in terms of dynamic vehicle presentation, management, engineering depth, and marketing; great teams, great resources and building facilities, and a great racing heritage.

GP PRO WORLD CYCLING ORGANIZATION

F1 CYCLING

BEYOND PASSION



FORMULA 1

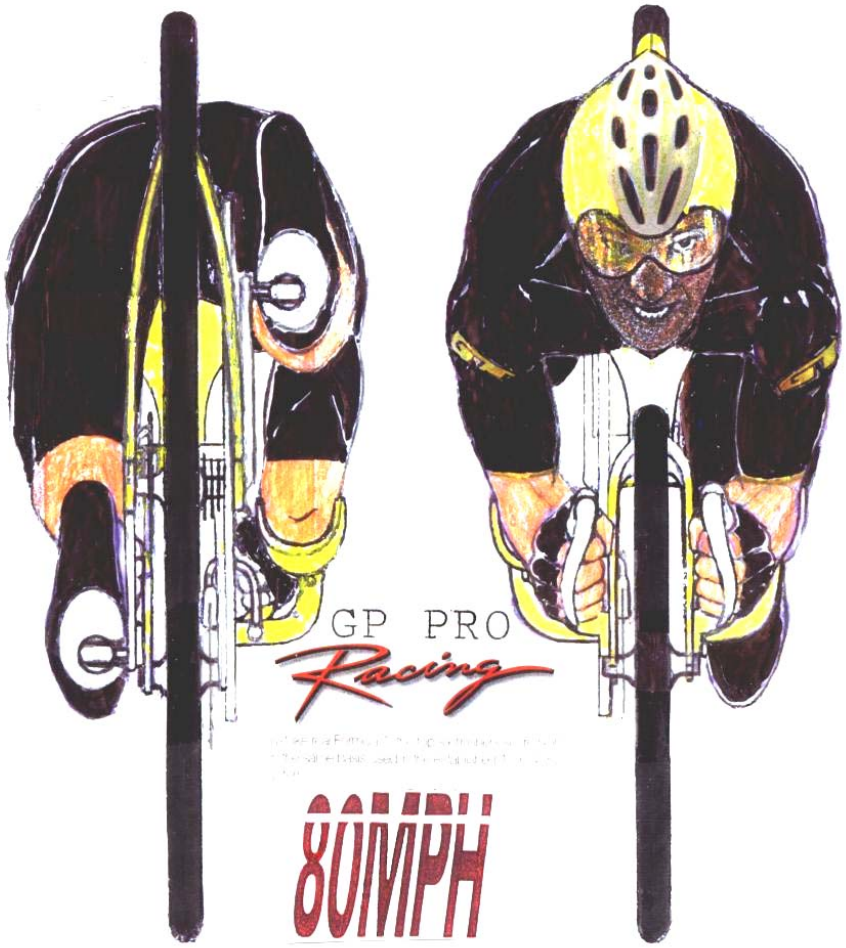
GEOMETRY

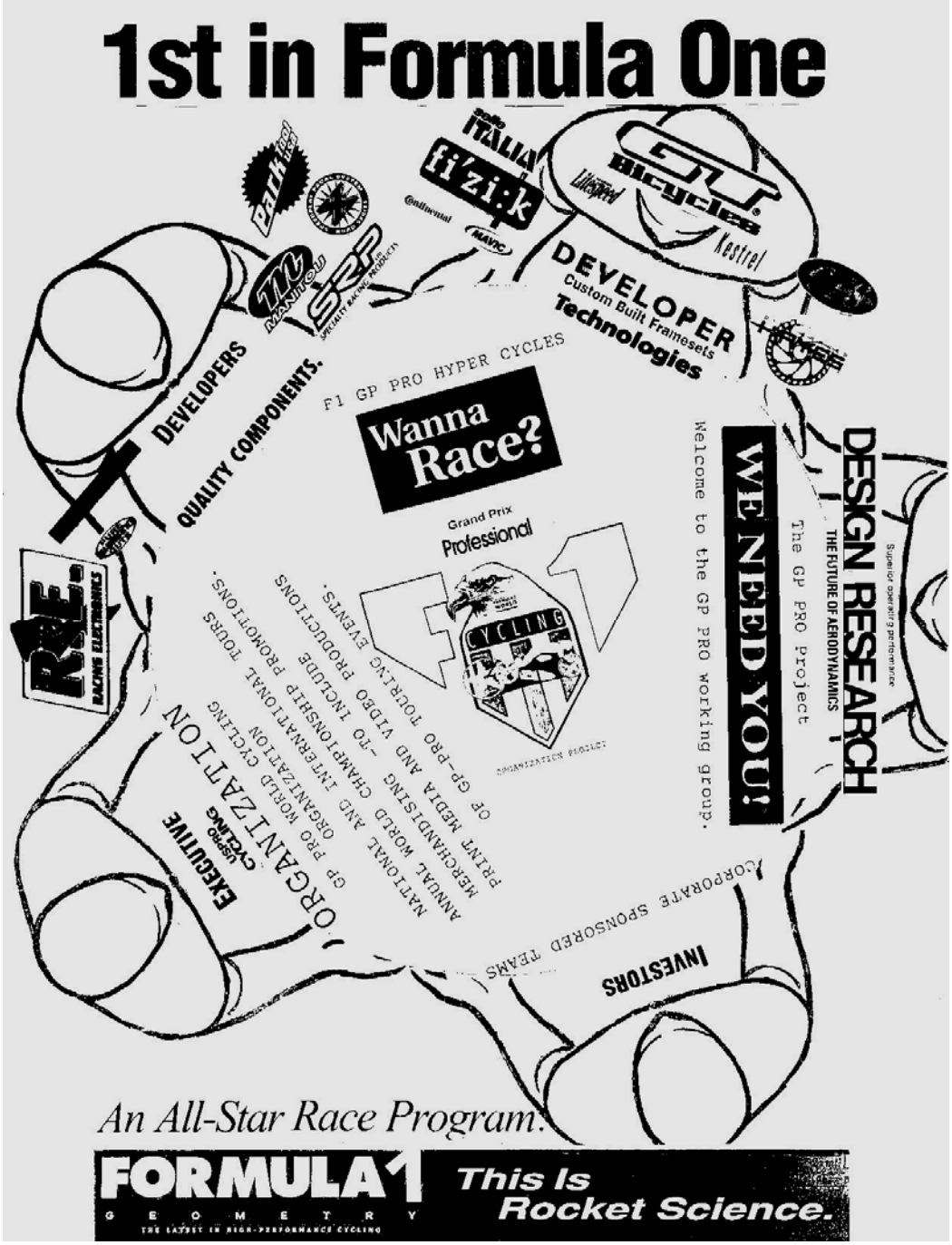
THE LATEST IN HIGH-PERFORMANCE CYCLING

IT'S REAL

Human Powered

ROCKET SCIENCE





CROSS PROMOTIONAL PARTNERSHIPS

The GP Pro project, the proposal for organized F-1 Geometry criterium racing on national tour, is the only human-powered cyclesport that can extract the core essence of open wheeled motorsports; the exciting elements and emotional atmosphere, and adapt them to into a hybrid, scaled down, human-powered version. Maintaining this image would be critical to the commercial success of GP Pro Racing. Hypothetically, the

prototypes rollout into the racing sports world and its growing expansion into a separate, elite professional cycling class will need to be carefully staged. The new cyclesport will need to build on the public's interest, in an effort leading to a separate, televised national tour schedule. Cross promotional exhibition races, prior to televised motor sports events, would be the preferred marketing tool.

Following in USPRO and USCF Tracks

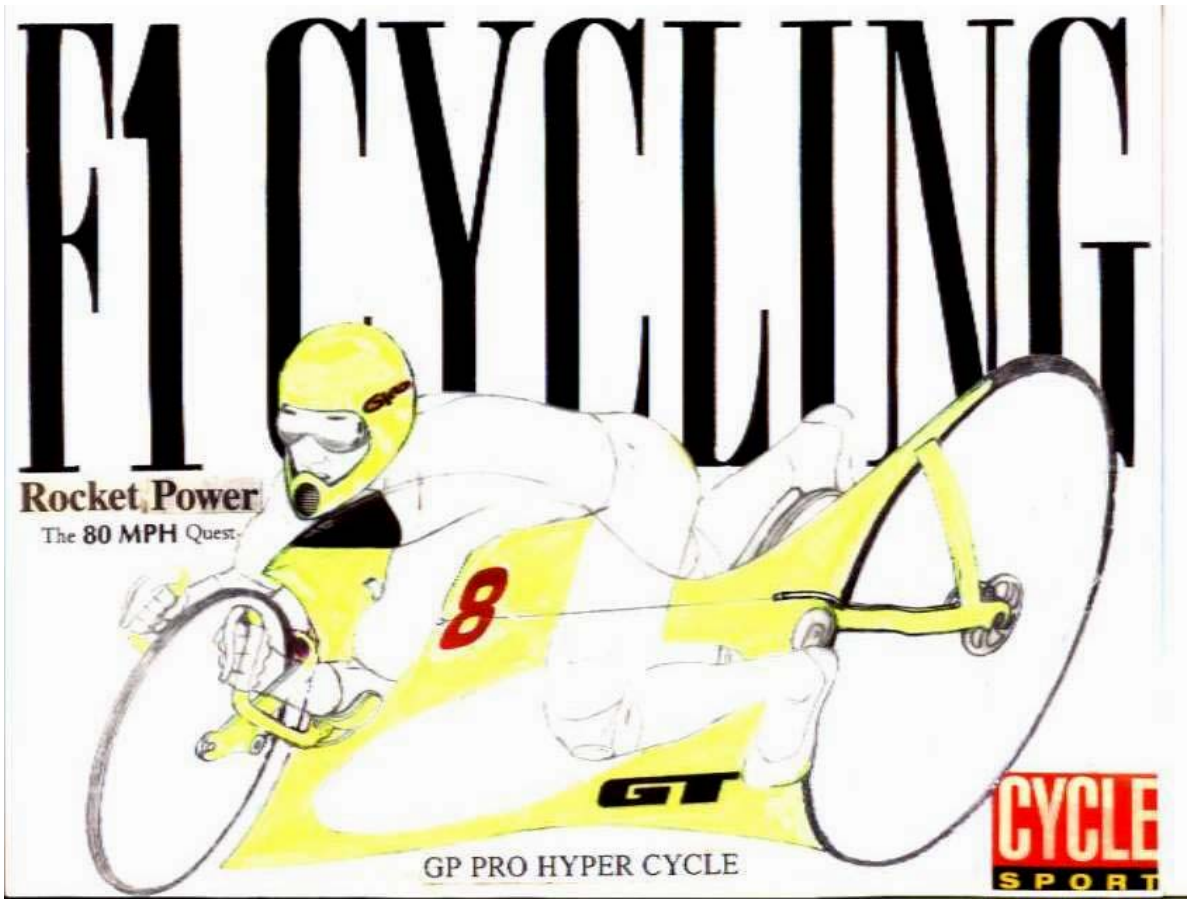
The standard professional cycling road racing seasons for the existing leagues begin in early spring and end by late fall. GP Pro Criterium racing would benefit from a cross-promotional criterium racing schedule with the US Professional Racing Association and the United States Cycling Federation.

Using the CART Series as a Winning Foundation

But by far, a cross-promotion with Championship Auto Racing Teams and FIA Formula One Motorsports would greatly increase the popularity of GP Pro cycling and tap into the leading edge, high-tech racing theme.

Rapid Fire

Long, drawn-out, oval track races can test the interest and attention of a viewing audience, but scaled down street circuits offer far greater excitement and entertainment value. The wheel –to-wheel battles through tight chicanes and hair-pin turns. The brilliant team colors and breath taking excitement of a fast moving struggle for position. The skill it takes in professional motorsports to go to the edge in a high- velocity, wheeled land projectile; the pit crews and their efforts to quickly service their machines and communicate with their drivers; the colorful advertising, promotion and media coverage surrounding the racing spectacle. From the Championship Auto Racing Teams' Street Circuits to the Indianapolis Formula One U.S. Grand Prix, to Superbike and F.I.M racing over seas, open wheeled motor sports are currently enjoying a period of growth in popularity. To take full advantage of this resurgence, GP Pro Racing will need to be promoted in new, innovative ways to capitalize on its hybrid image derived from motor sports influences. A cross-promotion featuring exhibition races of 20 to 30 laps during a motor sports weekend, and displaying the F-1 Geometry prototypes at auto, motorcycle, and bike trade shows will benefit the project. Whether its FIA Formula One, Championship Auto Racing Teams, FIM of AMA World Superbike Racing, these elements always electrify the unique atmosphere of a premiere Grand Prix event.



GP PRO/CART CROSS-PROMOTIONAL EXHIBITION TOUR

Visualize, as the gates open to motorsports fans and spectators at 8AM, a GP Pro Exhibition Race could get underway, signaling the first promotional event of a motorsports weekend, before the circuit is inundated by motorized road-rockets and shredded rubber. Along with the vendor merchandise oriented atmosphere, surrounding a motorsports weekend, a cross-promotion is the perfect environment to exhibit the world's fastest human powered land vehicles.

INDIANAPOLIS

The FIA Formula One United States Grand Prix held annually in Indianapolis, and the CART Series street circuits both meet the desired criteria for exhibition racing, including a huge live racing enthusiast audience and well maintained grids. The Long Beach, Detroit, Cleveland, Toronto, Vancouver, and Houston street circuits in particular, will bring GP Pro Exhibition Cycling directly to a crossover audience that is primarily a youth sports market, and attract cycling fans to the North American equivalent of European FIA Formula One motorsports, CART. The CART street circuits could become part of the permanent GP Pro National Tour Schedule. The AMA Chevrolet U.S and Canada Superbike, Supersport, and Formula Xtreme Schedules may also prove to be an exciting promotional prospects for F1 Geometry cycling.

INDIANAPOLIS ANNUAL FIA FORMULA ONE GP PRO CROSS-PROMOTION

The new Indianapolis 500 circuit and paddock, built specifically for Formula One's annual U.S. Grand Prix, <u>must be</u> a part of the GP Pro Cross-Promotional Tour, and eventually, a permanent part of any proposed National Tour Schedule. The IHPVA has long held competitions at America's most famous

speedway. So a cross-promotional exhibition, featuring the world's fastest human-powered land vehicles is plausible. After all, Formula One has heavily influenced the design direction of the prototype and racing format of GP pro Cycling.

CONSISTANT INTENSITY

The key to successful organized team competition will lie in the ability of the GP Pro cyclists to perform at a higher level of intensity; maintaining a high cadence and maximum sustainable aerobic energy output throughout the duration of a criterium race. Races of shorter duration, 30 to 50 laps, and street circuits no longer than a kilometer, will enable teams to compete at a higher athletic level, enhancing the commercial appeal of televised races and reduce cardiovascular and muscular recovery time.

GP Pro Racing represents the next level of elite, human powered cycle sports. An organized GP Pro national must not only tour through major metropolitan cities, its criteriums—scaled down, closed course street circuit races must provide clear, unobstructed views of the action. Specially designed race courses in large stadiums would also allow larger audiences to view the spectacle of hyper sports GP Pro Racing.

A GP Pro National Tour Season should be comprised of 24 bi-monthly rounds of criterium circuit races from coast to coast, similar to a CART or FIA Formula One schedule, which would allow for muscular and aerobic recovery time, and travel logistics per tour destination.

Each tour should be emphasized as a Grand Prix Event, for example, the GP Pro Long Beach or GP Pro Miami. From track marshals, to rider and constructor team trophy presentation, and the traditional champagne ceremony, to the post race press conference. All the traditions of motorsports events will continually reinforce the image and elite nature of F-1 Geometry cyclesports. This will place GP Pro Racing on par with its open-wheeled motorsports influences as the most progressive, high-performance competitive series of any of the human-powered race leagues. SPEED, EXCITEMENT, INTENSITY, AND POWER--- WITHOUT MACHINES.
Any racing sports enthusiasts and investors looking for a new sports venture—should seriously weigh the potential of GP Pro Racing.

OTHER PLAUSIBAL EVENTS / APPLICATIONS

F-1 Geometry Cycling as a Summer Olympic sport? Well, with the way new X-Games type Olympic events are being added every four years, and with the popularity of established, standard-cycling Olympic events (track, time trial, road and keirin), giving the world's athletes an opportunity to compete on F-1 Geometry speed frames seems highly plausible. The F-1 Geometry speed frame is also well suited for the annual X-Games, Gravity Games and triathlon events as well, similar to the Ironman Tour. Visualize a GP Pro Triathlon Sponsored by Tag Huer, G Shock, and Suunto watches; the only Triathlon with F-1 Geometry speed frames competing exclusively in its bike stage.

IRONMAN
TRIATHLON WORLD CHAMPIONSHIP

THE GP PRO WORKING GROUP

This team is a diverse collaborative group to advance this ongoing design feasibility research study will need substantial resources, and a passion for human-powered performance and racing sports.

From refined engineering and development resources, to sanctioned, organized team competition; dedicated Prototype Development, along with the formation of 10-to-20 Corporate Sponsored, two-athlete, Constructor Livery Teams. And, also international Sports Marketing and Merchandising. This will advance the GP Pro Project and human-powered racing sports to the next level of exciting, high-profile performance.

The GP Pro Project proposal should be submitted to a select group organizations and cycling companies (frame building and components), involved in professional cycling, Corporate entities targeted for potential Constructor Team Sponsorship, and Agencies specializing in Sports Marketing and Promotions. An open invitation to help forge a new era in cyclesports, and form a research coalition to develop the next generation of racing cycles, and in the spirit of athletic competition, create a new racing organization. The will advance only with the active involvement of the entities and organizations identified in this portion of the feasibility study. Prospective partners such as the following partial listing would be contacted and invited to form the GP Pro Working Group:

EXECUTIVE ORGANIZATION AND PROMOTION

THE INTERPUBLIC GROUP-OCTAGON SPORTS MARKETING

ORGANIZATION AFFILIATIONS

UNITED STATES PROFESSIONAL CYCLING FEDERATION
UNION CYCLISTE INTERNATIONAL
INTERNATIONAL HUMAN POWERED VEHICLE ASSOCIATION
SPEEDBIKE BERGISCH-GLADBACH

MANUFACTURING

GT BIKES
TREK BIKES
LITESPEED BIKES
KESTREL BIKES
SOFTRIDE BIKES
K2
CERVELO
JAMIS

KINESIS
ITM
PROFILE DESIGN
SYNTACE
SCOTT USA
KINESIS
COLNAGO
GIRO

MAVIC WHEELS
SPIN COMPOSITE WHEELS
AEROSPOKE WHEELS
ZIPP WHEELS
NIMBLE WHEELS
SPINERGY WHEELS
HUTCHINSON TIRES
VITTORIA TIRES

GIANT
DuPONT
CONTINENTAL TIRES

COMPONENTS

HAYES DICS BRAKES
AMP RESEARCH
CODA
ELECTRONICS
AVID
TRI-FLO LUBRICANTS
SHIMANO
SCRAM
MANITOU
BROWNING
SPECIALTY RACING PRODUCTS
TUNE POWER TAP
SPEED PLAY
RACING
PARK TOOLS

EQUIPMENT

AXO
NIKE
DIADORA
TIME
PEARL IZUMI
JT USA
THOR
NO FEAR
FOX RACING
BELL
CRATONI
RESPRO UK
PRO SLIDE
BODY GLOVE
BRIKO
OAKLEY
G-SHOCK
TAG HUER
CITIZEN

PERFORMANCE NUTRITION

PACIFIC HEALTH LABRATORIES
NATURES PLUS
HERBAL SUI LABS
CAMELBAK HTYDRATION SYSTEMS
CHAMPION NUTRITION
G-PUSH

PRINT MEDIA

INSIDE COMMUNICATIONS
CYCLE SPORT MAGAZINE

TELEVISED PRODUCTIONS

WORLD CYCLING PRODUCTIONS
OUTDOOR LIFE NETWORK
ESPN 2
SPEEDVISION CHANNEL

COLLECTORS MERCHANDISING

GT INTERACTIVE
SONY PLAYSTATION
REVEL MONOGRAM
SPEED GEAR
TESTER
MONOGRAM
SEGA SPORTS
TUNE POWER TAP SOFTWARE
ROAD CHAMPS
ACTION RACING COLLECTABLES
REVEL

CONSTRUCTOR TEAM SPONSORSHIP RECRUITMENT

A Prototype Development program for organized professional Constructor Race Team competition will need vast resources from a diverse group of investors. Elite racing will require elite Corporate Sponsorship such as, for example, the Fortune 500 'E-50'. Progressive, socially responsible Corporate Brands will lend stature and credibility necessary to establish this elite new cyclesport.

The listing in this section of the feasibility study notes specific examples of the type of companies that will be contacted and invited to co-sponsor a Constructor Team. Many in this listing of companies already have racing sports affiliations, and their corporate badges are already proudly displayed on the flanks of many race team vehicles. Among the many Sponsorship players are Telecommunications Industry and Wireless companies, Personal Computer and Software companies, Information Technology companies specializing in Data Acquisition and System Integration, leading-edge new Biotechnology companies , Automotive, Motorcycle and Aerospace Transportation industry giants, and Creative and Digital Entertainment Studios.

These are the companies in particular targeted for Sponsorship Recruitment, companies central to the real world marketing war that organized racing sports represents. The promotional strengths of Sponsoring Constructor Teams are:

1. **They impact a vital, youth oriented, $200 billion demographic, while reinforcing each company's technically sophisticated, high profile products and services around a hyper sports national race schedule.**

2. **Group Sponsorship is the best incentive, besides the high profile incentive. It spreads out the costs per Constructor Livery Team.**

3. **GP Pro Racing is an "Eco-friendly" or "Green" racing sport that integrates organic design with high-tech materials and components, in a way that is truly innovative, a 21st Century Cyclesport.**

MOBIL ADVERTISING ORIGINS

During the 1920's Depression, a powerful new marketing tool, conceived to raise confidence in the future was created. In Industrial design it is known as the term "product cleaning", inspired by the railroad trains of Raymond Lowery and Henry Dreyfuss. When product cleaning was finally incorporated into the design of road vehicles, it was called "streamlinimg". Streamlining took the 1930's business world by storm because it created a new mobile advertising tool. Fleet trucks became rolling billboards that could be seen by potential customers who were otherwise hard to reach with regular advertising.

Modern racing sports utilize a similar method of advertising---Corporate Sponsor Brand badges or logos on the body or shell of the team race vehicles. This has been a common practice for over 50 years. For example, in FIA Formula One, the reigning Constructor Points champion Ferrari, displays a diverse mix of Sponsor logo badges, from the Tic-Tac mints logo, to the Tommy Hilfiger apparel label, to the Malboro Tobacco brand.

Consider as a hypothetical example, if Coca-Cola, a long-time sponsor of standard pro cycling tours and events, were to sponsor a GP Pro Constructor Livery, and a two man riding team with colorful red and white, forward prone position road rockets, competing from coast-to-coast during a nationally televised, five to six month Criteium Tour Season. The Coca-Cola brand would be advertised in an exciting, progressive new way, especially if their riders win predominantly.

The F-1 Geometry speed frame is the perfect vehicle for corporate promotion. Although the speed frame was not designed to be a rolling billboard, its profile in televised competition will be prime real estate for advertising to a consumer audience. Hypothetically, GP Pro Racing would be essentially a scaled-down, human-powered version of motorized racing, and will need approximately only 5 percent of the average livery budget, spread out evenly between each Corporate Group Sponsor, per constructor team. For example; FIA Formula One Constructor Teams spend on average from $300 Million to $400 Million on their Livery, in order to maintain a competitive edge.

GP Pro Racing will need a similar commitment from its Corporate Group Sponsors, an annual commitment of $15 Million to $20 Million, spread out between 10 Corporate Group Sponsors at $150,000 to $200,000 a year, to finance a single Constructor Team Livery for the entire Criterium Tour

Season. That is a winning formula. That is also the minimum annual figure needed from each Corporate Sponsor for the Livery budget. At 10 Corporate Sponsors per team, and a goal of 10 to 20 Constructor Teams, GP Pro Racing will need to secure the commitment of a minimum of 200 companies to form a new league and governing body.

PROSPECTIVE CORPORATE GROUP SPONSORS

The following is a partial listing, of the type of prospective Corporate Entities that should be selected for Sponsor Recruitment:

MICROSOFT
APPLE
LUCENT TECHNOLOGIES
T-MOBILE
IBM
ORACLE
MOTOROLA
COMPAQ
DELL
FIRST DATA
COMPUTER ASSOCIATES
VERIZON
ADVANCED MICRO DEVICES
NEW CENTURY ENERGIES
CADENCE DESIGN
ABGENIX
CELERA GENOMICS
AGILENT TECHNOLOGIES
FUELCELL ENERGY
QUANTUM FIELDS LLC
SIGMA ANIMATION
TIME WARNER
SUNY ARTS
DREAM QUEST IMAGES
AVID TECHNOLOGIES
BOEING
BOMBADIER-LEAR
GENERAL DYNAMICS
GENERAL MOTORS
PORCHE
TOYOTA
KAWASAKI
GOOGLE

RAND CORPORATION
TRW
GLOBAL STAR
VERIZON
TERRA BEAM
BALL SEMICONDUCTOR
TRANSMETA
EDS
BROADCOM
CISCO SYSTEMS
SUN MICROSYSTEMS
NORVELL
UNITED TECHNOLOGIES
ANALOG DEVICES
MICRON TECHNOLOGIES
AMGEN
ES CELL INTERNATIONAL
PI RESEARCH
EVERGREEN SOLAR
SCALED COMPOSITES
DREAMWORKS SKG
OXFORD METRIC GROUP
MAINFRAME ENTERTAINMENT
PRINCETON VIDEO IMAGE
M PHASE TECHNOLOGIES
LOCKHEED MARTIN
GULFSTREAM
GENERAL ELECTRIC
DIAMLER-CHYSLER
HONDA
SUZUKI
JAGUAR
VIRGIN-MOBILE

INTEL
NORTEL
NEXTEL
SPRINT
ERICSSON
AOL
CORE DIGITAL
SILICON LABS
BMC SOFTWARE
Q-LOGIC
PALM
MITEL
XEROX
DIDYNE
PROGIDY
ICOS
GERON
ZYVEX
MEMS OPTICAL
AEROVIROMNENT
LUCAS ARTS
PIXAR
SONY
PIONEEER
PANASONIC
RAYTHEON
NASA
FORD
FERRARI
NISSAN
DUCATI
BMW

LIVERY COSTS AND ESTIMATES

Each F-1 Geometry prototype will be a custom hand crafted work of high performance art. A cursory estimate of the costs to fabricate the world's fastest human-powered land vehicle will range from $50,000 to $75,000 per prototype. In addition, each two man team will need two speed frames in race ready condition for each tour event. A rider may go through up to two dozen speed frames during a six-month tour season, and many team speed frames will need to be used for promotions during a tour season to promote the new cyclesport. Also, to maintain a competitive edge, the speed frames will require post-race structural analysis, ad a refitting of components and refinishing of the Teflon coating. The F-1 Geometry speed frames will be high maintenance, being far removed from the simple, standard racing bike. Estimate speed frames at $3Million per Constructor Team Livery.

That would leave $12M to $17M budget balance per Constructor Team to factor into salaries for elite athletes and competent veteran cycling team personnel. That would include a team manager, a physical therapist and or trainers, veteran frame builders, technicians and mechanics, handlers and support staff services.

That does not include a budget to establish the governing body and promote an annual national criterium tour. Factor in this additional figure per team, and the budget per team has just doubled. $ 40 Million per Constructor Livery team, or
$300,000 to 400,000 per Group Sponsor.

So for the annual equivalent of a major film studio's budget to produce and promote one motion picture, Venture capitalists and Corporate Sponsors will build and launch an exciting new cyclesport, as well as a new sports marketing and merchandising cottage industry.

GP Pro Racing is the Formula One of human-powered racing. The F-1 Geometry prototype is the world's fastest unfaired, open wheeled, human-powered land vehicle. As examples of the excitement these human-powered road-rockets will stir up in organized street circuit competition, just visualized the following scenario:

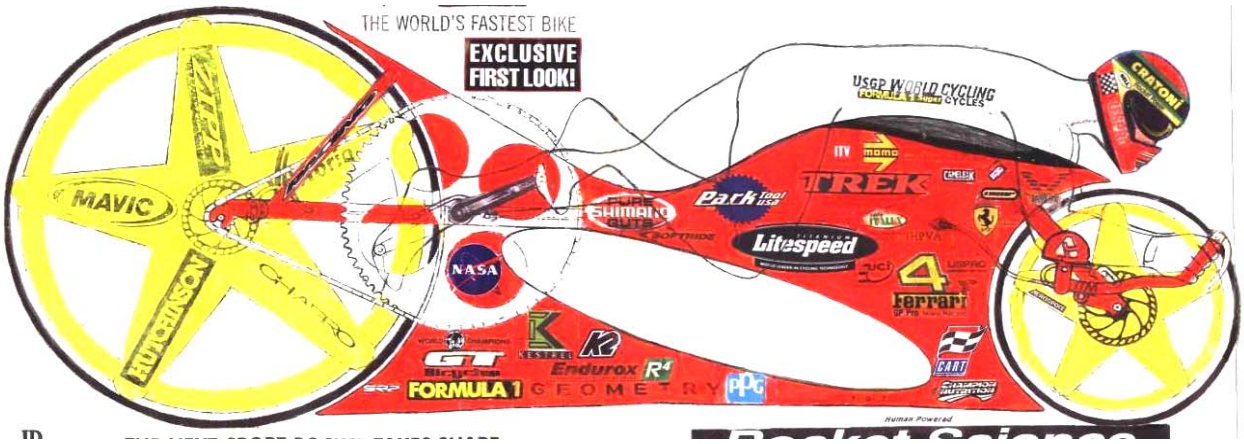
RACE TEAM PERSONNEL RECRUITMENT

U.C.I and U.S. Pro Cycling Federation athletes and race team personnel are contracted to form sanctioned, sponsored GP Pro Constructors Teams to tour North America in organized competition. Many of the constructor teams are named in honor of 'Cycling Legends'.

GP PRO WORLD CYCLING ORGANIZATION

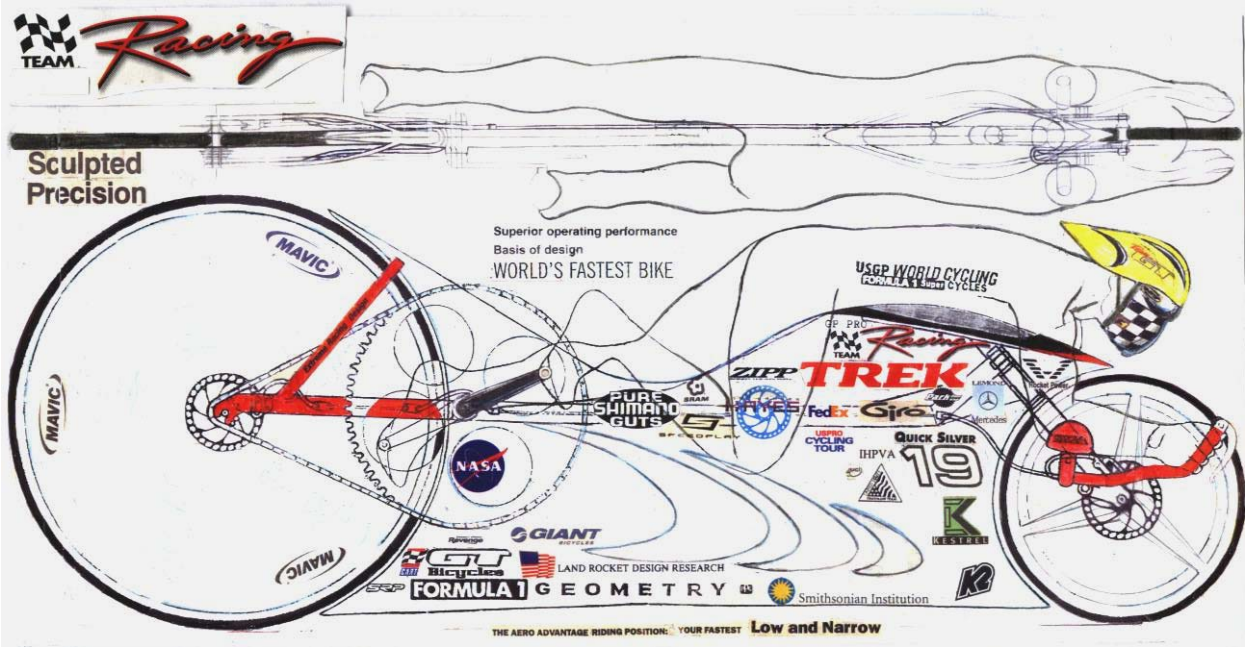
F1 CYCLING

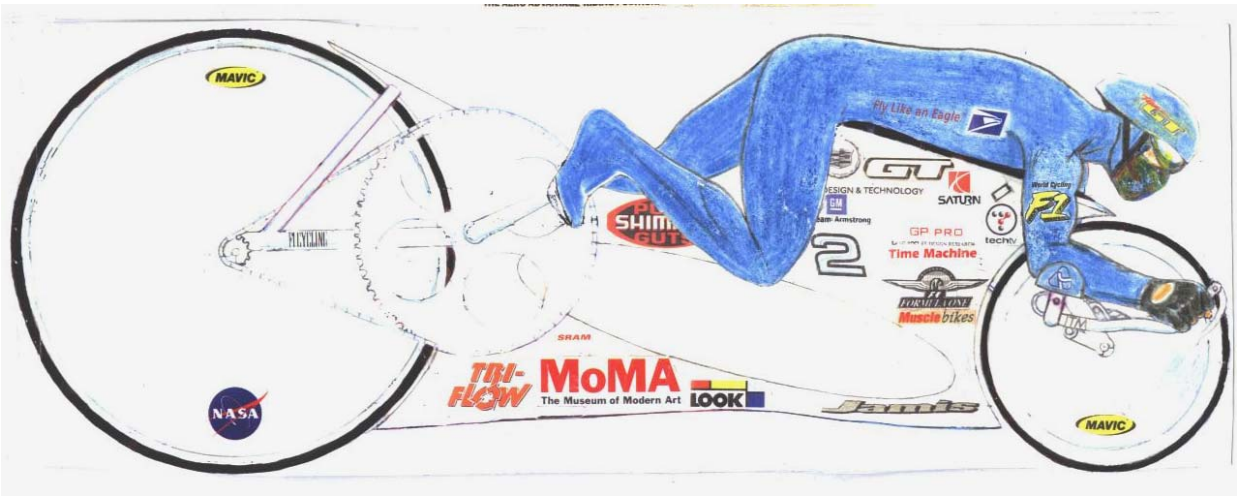
For example, visualize a Francesco Moser Team named in honor of the World's Hour Speed Record Holder from 1984-1993. The two rider Moser Team livery sponsors may include Ferrari, Ducati, Microsoft, Lucent Technologies and Lockheed Martin. The team's speed frames are fire red and constructed by GT, Colnago,Pinarello and K2. Its titanium sub-frame is manufactured by Litespeed, with Hayes disc brakes, Zipp wheels and Shimano components.



Now visualize a Greg Lemond Team, named in honor of the three-time Tour de France Champion. Sponsors may include Diamler-Chrysler, IBM, Oracle, Boeing, and Virgin. The Lemond

Team speed frames are metallic silver and fabricated by Trek, Kestrel, Softride, and Lemond Bikes; with AMP disc brakes, Mavic wheels and Shimano components.





Or a Lance Armstrong Team, named in honor of the seven-time Tour de France Champion. Team Sponsors may include General Motors, Discovery Channel, NASA, Global Star, and Agilent Technologies. The Armstrong Team's pearl white speed frames are fabricated by Cervelo, and Trek with Spin Composite wheels and Shimano components.

There would also be colorful livery teams named in honor of other 'Cycling Legends'; such as An Eddy Merckx Team, or a Miguel Indurain Team, both five-time Tour de France Champions; or a Chris Boardman Team, honoring the 1996 World Track Champion; or a Marty Norstein Team, honoring the

2000 Olympic Track Gold Medalist. And lets not forget IHPVA prone position pioneers honored with a Title Constructor Team named after them; such Legends as Chester Kyle, Greg Johnson, Cole Dalton, Allan Abbott, Steve Ball, Fred Markham, Gardner Martin, Paul Van Valkenburg, and Kurt Wold. A comprehensive, 'Cycling Legends' based team organization will anchor the new cyclesports league, similar to professional baseball, and attract the broadest demographic sports audience. GP Pro Racing will grow in popularity to a level on par with high performance motorsports--- the next level.

THE ELITE 40

Hypothetically, GP pro Racing would actively recruit for Constructor Teams from the standard cycling leagues, U.C.I, U.S. Pro, and NCAA Division I and II ranks. GP Pro Racing and standard league cycling are polar opposites in terms of vehicle design restrictions, but organizational affiliation would increase the exposure and popularity of all cyclesports.

Barring a cross-promotion, a GP Pro Racing Season could be scheduled at the end of U.C.I and U.S. Pro race seasons, for example; from late summer to early spring, beginning with a Miami Grand Prix and ending with a Long Beach GP Championship. Although the colder, unpredictable weather of a proposed winter season might create logistics changes (more races in areas with warmer weather), so as not to inhibit rider or vehicle performance, a late summer to early spring GP Pro Touring schedule would allow U.C.I and U.S. Pro riders and race team specialists and other personnel to compete on GP Pro Constructor teams without league commitment conflicts.

Another benefit to this proposal is that elite professional road cyclists would be able to compete in the GP Pro Racing league for the Team Rider's Points Championship (an additional monetary incentive besides contract salary), and maintain physical conditioning all year round.

F-1 Geometry cycling will be much more intense and exciting to watch than standard cycling because it is fast-lap, street-sprint oriented. And this is the reason that GP Pro Racing should have access to the best professional cyclists in the world for its Sponsored Constructor Teams.

For time trial position qualifying and actual criterium racing, once the rider is on the course grid, the pit teams input is limited. However, all of the teams will share an affinity for strategy and tactics. From the mechanics in the pit, to the technicians relaying cyclo-computer telemetry data to the rider, team communications will be a decisive factor. And, because there are only two riders per team, team managers will have to continually update their riders via wireless communications, in order to push their athletes to the edge, while simultaneously working out race strategy.

In this intricate game of tactics on the grid, the human and the mechanical will have to work in synergy like no other racing sport, and therein lays the sports' success.

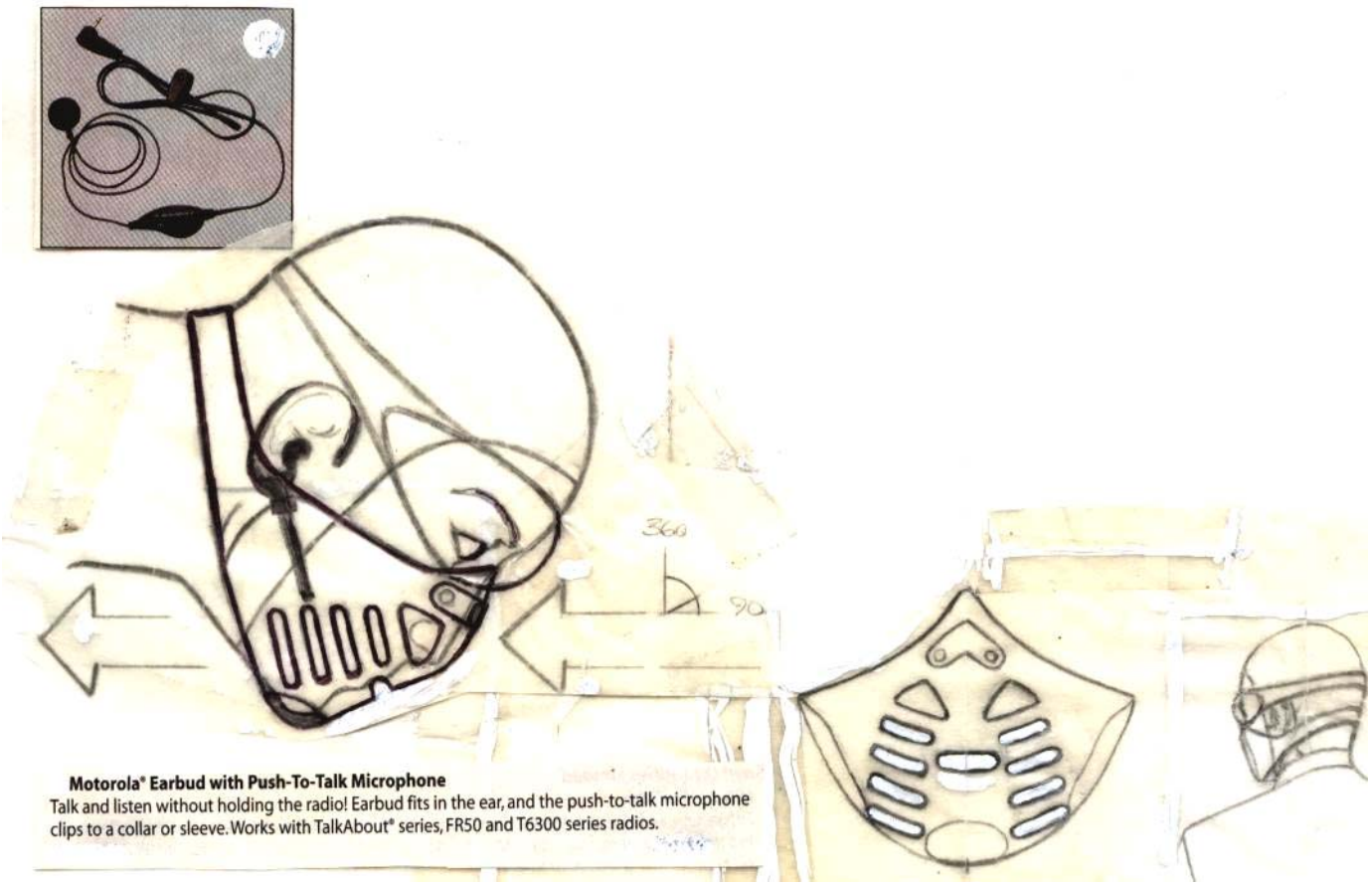
GP Pro Racing is a futuristic blending of high-tech materials and design, with the body as the engine of the machine, to extreme, high-velocity, intense competition; which translates into a highly entertaining spectator sport worthy of a televised national tour schedule.

A major difference in GP Pro racing and an incentive for U.C.I and U.S. Pro cyclists to compete on Constructor Teams in this elite, new national criterium tour, is that every cyclist "races to win". Every victory in competition will be earned, not maintained by a squad of team domestiques, as is the norm in standard road race cycling.

GP Pro Racing IS NOT patterned after U.C.I's antiquated rules. Domestique support riders on U.C.I or U.S. Pro teams would be star athletes as a member of a two-rider, GP Pro Constructor Team. A two athlete per

Constructor Team limit, which will never change, would effectively eliminate star politics. Only the fastest, tactical cyclist at the end of the race wins, and throughout the national criterium tour, riders must earn the individual points to win the championship title.

The forward prone position rider is susceptible to flying road debris during competition. In order to travel in this position at speeds over 50 mph safely, adequate head, facial and other protections become a priority. At a minimum, all PROTECTIVE RACING EQUIPMENT cyclists must wear an approved cycling helmet, at all times during operation. Bell, Giro, Specialized, and Cratoni manufacture the best helmets on the market. A BMX style or aerodynamic time trial style helmet will be necessary for GP Pro Racing.



Earbud wireless communications for riders would not only be useful for strategy in competition, they can also be utilized to alert them of grid conditions, and race delays caused by crashes and violations during a race. Motorola has been in the sports communications equipment market for many years.




Respro U.K. makes fabric and soft shell facial protection for urban cyclists. JT USA manufactures vented face guards and other body protection for paintball competition. Thor, Fox Racing, and No Fear also manufacture impact resistant body protection for BMX motorcross and motorcycle racing. Ventilated soft shell and breatheable fabric facial covering will need to be specially developed for GP Pro Racing.

Briko and Oakley manufacture superior eye protection for cyclists. An optical grade polycarbonate, in a wrap-around helmet visor design, with 100 percent UVA and UVB blocking, vented at the sides to prevent fogging and to dry sweat before it gets in the riders eyes, will need to be developed for F-1 Geometry cycling.

Team cycling gear must draw perspiration from the body anywhere the rider's body meets the speed frame; namely the thorax saddle. Gloves must also keep the hands dry and protect the wrists from loading and vibration. Pro cycling jerseys are generally made from sweat wicking materials and are closefitting to reduce wind resistance. Finally, cycling shoes have stiff soles that reduce foot fatigue and lock onto pedal clips for efficient cadence. Rider's gear such as gloves, elbow and knee pads and other protective bodywear, manufactured by companies such as Nike, Diadora, Time, Body Glove, and Proslide, will need t be specially developed for GP Pro Racing to ensure rider comfort and safety.

PHASE THREE: An International Sports Marketing and Merchandising Perspective; Selling GP Pro Racing

Professional athletes are revered as role models in popular culture. Licensed professional and collegiate sports collectables, merchandise and apparel markets have become a lucrative multi-billion dollar industry over the past few decades. Professional cycling merchandise and collectables, however, does not share significantly in this growth.

Hypothetically, GP Pro Racing has the potential to change this market. GP Pro Racing would attract a wide demographic of sports fans and racing enthusiasts. GP Pro Racing as a marketing franchise offers investors and prospective partners a major opportunity to help build this elite new cyclesport. Sports merchandising will play a major role in reinventing the image of pro cycling. Again, FIA Motorsports serves as the best template to follow. As examples of GP Pro Racing's licensed merchandise and marketing products, consider the following:
-Product and Promotional Endorsement. The Constructor Team Athletes as Spokesmen for charitable causes and sports related products. Cycling and Motorsports conventions.

-Broadcast Rights to the GP Pro National Criterium Tour. Televised events serve essentially as a 60 to 90 minute long promotion for team sponsors that are involved in organized competition. Octagon, Outdoor Life, World Cycling Productions, ESPN2

-A documentary on the formation of the GP Pro National Criterium Tour; from prototype refinement to the end of the inaugural racing season. A complete insiders view of the various elite constructor teams in high velocity hyper sports action from coast-to-coast, ending with a world championship event. Spectacular scenes of riders competing, and the strategic challenges livery teams face during a season. Well chronicled, including the more humorous moments from the tour. An inaugural season documentary will be exactly what GP Pro Racing needs to connect with its demographic audience and make cyclesports more of an attractive, highly entertaining commercial endeavor for sponsors and mainstream media. Octagon, World Cycling Productions

-Video Direct Markets. A feature length, sequential full set of each race season chronicled city by city. From pre-race qualifying time trial, to competition, to post race follow up. The complete criterium tour, including

the points championships and season ending awards event. A colorful showcase of each year's champions. Octagon, World Cycling Productions.

GP Pro Website
-Official league website with updated information on the constructor teams, the national criterion race season and an e-commerce shopping section for licensed sports collectables and merchandise. Presented in an entertaining manner that keeps GP Pro Racing fans returning to the site. Octagon

SPORTS ENTERTAINMENT

EXPOSURE

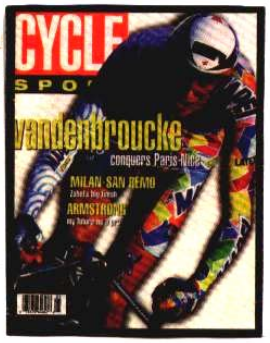
F1 CYCLING MAGAZINE

Keep in touch with the **teams**, the **riders**, and the **pit news**. Look **behind the scenes** with **top name interviews** and **feature articles**. See the **whole picture** in the **fastest**, and **toughest** **h.p.v** sport of all.

CYCLE SPORT MAGAZINE

PRO CYCLING'S PREMIER MAGAZINE

Since its founding, World Cycling Productions has brought you the best video coverage of the world's greatest bike races. Now WCP brings you the best behind-the-scenes information and news of the professional peloton with Cycle Sport Magazine. This English language, all-color monthly, widely regarded as the ultimate pro cycling magazine, employs the best writers and best photographers to provide angles on the pro scene you won't get anywhere else. Every issue combines in-depth analysis, up-to-date news and outstanding color photographs with profiles and probing interviews of the riders who are making the news.



VeloNews is the best of bicycle racing, with worldwide coverage of mountain-bike, road and track cycling. Each action-packed issue is filled with up-to-the-minute reports on major racing events, exclusive interviews with the pros, training and equipment tips, national and international events calendars, regional results ... and more!

YAHOO! Sports

VELONEWS
THE JOURNAL OF COMPETITIVE CYCLING

www.velonews.com

Signed Racing Prints & Posters
Autographed F-1 Race Programs

VELO press

velonews interactive

World Cycling Productions

ESPN

espn2

OLN
Outdoor Life Network
The Leader in Outdoor Adventure

itv SPORT

FOX SPORTS NET

SPEEDVISION
TELEVISION ON THE MOVE

techtv

GREAT outdoors.com

Join your favorite team and watch the world's finest sporting event.

SPORTS COLLECTABLES

GP Pro Racing Merchandise and Collectables will be highly prized items to the cycling and sports memorabilia investor. Sports Collectables will include:

Printed Media
- 40 double truck fold out signed magazine posters inserts with spectacular images of each constructor team rider in competition.
-An official GP Pro Racing magazine.
-All Elite 40 Constructor Team Riders in a sports collectors card set.
CycleSport Magazine, Inside Communications, Octagon

Racing Simulation Software
Computer and video games represent $15 Billion industry that eventually could rival the motion picture industry. Game sales have grown 15 percent a year according to the Digital Software Association.
-GP Pro Racing will license a software racing simulation program played from the constructor team rider's based on digital motion capture of each of the Elite 40 riders performance characteristics. The most realistic race field computer graphics imaging quality; simulating actual GP Pro Street Criterium Circuits from the rider's point of view, derived from helmet mounted, digitally recorded actual race footage, digital motion capture and CGI technology. Sony Playstation, Sega, GT Interactive, Tune Power Tap Software

Replica Collectables
-High quality 1/12 scale speed frames of the top two or three constructor teams, intricately detailed, fully assembled pieces, with moving parts, rubber tires and a team rider; a limited production under 5,000 each.
Action Racing Collectables Replicas, Road Champs
-Model kits in 1/6 scale of the Elite 40 Constructor Race Teams, in the various colors and sponsor logos. Both team speed frames included in each kit. Revel, Monogram, Tester

Specialty Products and Apparel
-A licensed sports nutrition drink ergogenically formulated for optimum energy replenishment and rehydration, marketed under the label ROCKET FUEL. Developed by Pacific Health Labs, Herbal Sui Labs, Natures Plus, G Push, and Champion Nutrition
-Apparel could range from colorful, high quality licensed Constructor team baseball-style caps and oversized, hockey-style,Constructor team cycling jerseys. Nike, Castelli, Pearl Izumi, Thor, Fox Racing, and No Fear

-Watches and official time keeping during the season by Tag Huer.

Footnotes

Industrial Design Materials and Manufacturing by Jim Lesko
Industrial Design by John Heskett
The Aerodynamics of Human Powered Land Vehicles by Albert C. Gross, Chester R. Kyle and Douglass J. Malewicki, Ph D., published in Scientific American, June 1983
Speed Bikes by Dennis Dowlens, published in I.D. Magazine, September 1985
Tech Report: Setting Up A Time Trial Bike by Leonard Zinn, published in VeloNews, April 1998
Saturn U.S. Pro Cycling Tour Road Season Journal
Material Assets by John Olsen, published in Bicycling Magazine, April 1999
Standard Bike Frame Geometry Secifications by Greg Lemond Bicycles, 1998
My Way; The Secret of Speed by Wayne Rainey, published in Superbike Magazine, March 1998
Racing Applications For Digital Motion Analysis by John Moloney, Stephen Coffey, and Andrew Perez, November 1998
Wind Tunnel Testing; The Future of Aerodynamics, published in Mercedes Benz Motorsport Magazine, 1999
Virtual Building by Dan McCosh, published in Popular Science Magazine, May 1999
Octagon Sports Marketing Website
Playing Dirty by John Brant, published in Outside Magazine, July 1999
How Protein Builds Carbohydrate Stores, from the book Optimal Muscle by Edmund r. Burke PHD. , published in VeloNews, February 2000
On Track Magazine
FIA Motorsports
Superbike Moto GP Motorsports
F-1 Racing Magazine
Champ Car Magazine
Superbike Magazine
Cycle World Magazine
IHPVA Archives, Human Power Technical Journal Vol. 7 No. 2, Issue No. 23, 1988
Union Cycliste International
USA Cycling
Federation Francaise de Cyclisme
Federazione Ciclistica Italiana
British Cycling Federation
Bund Deustscher Radfahrer
Real Federacion De Ciclismo
RMIT School of Aerospace and Mechanical Manufacturing Engineering