CUNNINGHAM™ OFFROAD BIKE INFOPAC

1987 EDITION

Charlie Cunningham
Cunningham Applied Technology

Includes bikes by Cunningham, components by WTB, options, drawings, and price list.

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PRICE $2.00
1.00

INTRODUCTION

I began building mountain bikes with oversize aluminum tubing in 1978 making it the first application of this technology to offroad bikes in the USA. As the advantages become more widely recognized, other manufacturers are beginning to offer such bikes. Although welded and heat treated aluminum tubing is not new, its applicatiom to offroad bike frames is relatively new and my own experience indicates that there are many subtleties that the builder must be aware of to work successfully with this material. As other companies hasten to make aluminum mountain bikes available, they risk making mistakes from lack of experience and adequate testing. This is a big concern for the potential buyer and on a larger scale is something that could cloud the reputation of aluminum as a frame material. It is my conviction that aluminum, if properly engineered, will prove in time to be widely accepted as the ideal material for high performance bike frames. It is already used in almost all quality bike components. Every person that acquires a Cunningham ballooner can help support my effort to insure that aluminum gains an impeccable reputation as a frame material by providing me with information gleaned from the use of their bikes under all conditions.

As an avid rider myself, I am totally inspired by the unique performance characteristics of these aluminum bicycles. There are few experiences that compare to riding one of these finely tuned, high efficiency machines in the rough terrain they are designed for. My enthusiasm for wilderness riding, and the desire to make the experience available to others is why I have chosen to build a limited number of bikes each year. Every one is built to the highest possible standards, and I stand behind every one 100 percent.

I can report with great satisfaction that of the growing number of Cunningham bikes in use at the time of this writing, they all have happy owners.

CUNNINGHAM APPLIED TECHNOLOGY

Cunningham bicycles grow on special trees cultivated for the purpose by Cunningham Applied Tech! Actually, much as I would like such a set up, they are still being designed and hand built by me personally at my shop. The forks and many of the other components are also developed and built here. I ride every day, as do the Cunningham Team racers, so the workings of the bikes are always being evaluated and new ideas tested. The result is that the latest offroad technology is available to Cunningham owners before it is adopted by the industry and becomes widely available. Likewise, the format of this information packet is chosen in preference to a glossy brochure so I can update it easily and keep you informed on the latest equipment.

WILDERNESS TRAIL BIKES

In 1982, Steve Potts, Mark Slate and I combined our talents and resources with a partnership, Wilderness Trail Bikes, in which we work together to develop the finest in offroad equipment. Through WTB we are able to insure availability of our components for use on the bikes we build and also make them available to other offroad enthusiasts.

ALUMINUM FRAMES, MYTHS, PAINT, AND THE ZEN OF BICYCLE TECHNOLOGY

To eliminate misconceptions and help people understand oversize aluminum as a frame material, I offer the following survey of its characteristics to help you determine if a Cunningham Ballooner is the bike for you.

Most people are attracted to the aluminum frame by its performance and efficiency. The Cunningham frameset is lighter, stronger and more energy efficient than a well designed chromoly frameset. For example a 21" Cunningham frame is 2.5 to 3 lbs lighter than a top quality 21" lugless chromoly frame and is more than twice as strong in a frontal impact. (See Aug 83 Biketech for test results. Most lugless brazed steel frames bend comparitively easily at the headtube joints because of the annealing effect the slow cooling brass has on the nearby steel.) The large aluminum tubes produce a further benefit; a bottom bracket which is exceptionally flex resistant. This means that more of your energy goes into moving the bike forward, instead of becoming lost motion. For anyone that does a lot of riding these attributes are impressive. (The unparalled performance and efficiency of the bike is what got me involved in the first place!)

While large diameter aluminum frames excel structurally, they are slightly more susceptible to denting than a comparable steel frame. Denting has been extremely rare in the nearly 150 frames I've built, possibly because some of the tubes in a Cunningham are actually less dentable than their steel counterparts due to their greater thickness.

Aluminum also scratches more easily. Special care is needed when transporting aluminum bikes with steel bikes next to them to prevent steel from vibrating against the aluminum which can mar the frame.

Welded aluminum frames and the equipment and skills to work on them are rare and any modification or further work should be done by the manufacturer. This is usually the case with any custom frame, but it is especially true with aluminum frames. For this reason, I place a high priority on prompt response to your needs. I am usually able to do work and ship it out within a day or two of receipt. (The headset, bottombracket bearings, seatpost and other components are standard and can be replaced in any well equipped shop.)

"Oversize" aluminum tube bicycles seem to inspire either strong enthusiasm or stubborn skepticism in people. Occasionally heard comments from the Myth Department are: "They probably won't last." and "They must give a hard ride because the frames are so stiff." I would like to comment.

First, the experience I have gained working with aluminum frames for eleven years, combined with excellent engineering, results in a frame that will last at least as long as the finest steel frames. The frameset is guaranteed to the original owner. I will replace or repair without cost any frame or fork that fails due to defective materials or workmanship during normal use. (It is noteworthy that during the many years of production none of my frames or forks have needed replacement.)

Another interesting aluminum frame myth I occasionly hear is that when an aluminum frame breaks, it snaps in half and the hapless rider eats dirt! While this is possibly true with the more brittle alloys used in glued and lugged frames, it simply is not the case with the alloy I use. Cunningham frames are quite springy and forgiving as tests (and horrors!...crash results) have shown. About the only way to bend one of these frames is to run over it with a car. And they will bend, not break.

When I began building frames many years ago I made some outrageously thin frames and didn't heattreat them to see how they would fail. After almost two years of pounding they began to creak around the headtube and an obvious crack grew for a week or so of use before the test was called off. I've learned over the years that failures from impact and fatigue are very rare and do not result in catastrophic self destruction as some people would have us believe.

Secondly, as for ride quality, my experience indicates that it is *not* the frame material that produces a hard or soft ride in a mountain bike. Most mountain bike frames, regardless of whether they are made of oversize aluminum or some other material,*do not flex enough in the vertical plane to absorb road shock.* Frames don't act as springs in this direction because of the triangulated shape. A flexible frame can however twist and flex from side to side but this doesn't help absorb road shock, it only wastes precious energy. Some people claim that aluminum absorbs vibration better than steel which I have found to be true,but it has been my experience that the forks in particular and also the tires and frame geometry affect ride quality far more than the type of metal used in the frame. This is why I offer several forks with different ride characteristics and also different frame geometries... so I can set the bike up to match your individual needs.

In conclusion, it is my opinion that Cunningham frames use your energy more efficiently and with a wide range of component choices can be tuned to compliment your own riding style. They are the culmination of many years of riding and engineering experience and are the best bikes available anywhere for competition or touring.

If you really are looking for the best mountain bike, you shouldn't make your choice entirely on what sellers or builders, including myself, tell you. I give you my first hand knolwledge,but you owe it to yourself to ride the bikes you are considering and experience the differences first hand. There is so much hype and confusion created in a competitive marketplace about what is good and what isn't that the only way is to see for yourself. Give the bikes the last word with a test ride.

Last, I would like to consider beauty and aesthetics. My bikes reflect different values than those common in the bike industry. As builder and offroad rider I'm drawn to fine craftsmanship and technology that makes the bike *work better*. I consider cosmetics and "flash" of lower importance. Many people expect a beautiful, thrilling paint job with a bike of this cost. Such thinking is partly from the racing 10-speed world where flash is definitely "in" and the bikes are so similar that the paint job takes on special significance.

Steel frames need paint to protect them. My frames don't need paint to protect them and the polished aluminum frame gives one freedom from having to worry about the paint job. Out in the real dirt is where that beautiful paint job that was so attractive on the showroom floor loses its thunder. This is where you discover what you have really got and where a Cunningham won't let you down. Personally, I prefer not to add something to the bike that it doesn't need. I want a bike that is trouble free, totally reliable and fun to ride and I don't need paint on my bike to accomplish this. I do offer Imron colors as an option and don't object at all to someone ordering their frame painted.

When someone asks, "Hey, how come ya can see the welds?", I try to explain that there is beauty in efficient, functional design and that fine weld beads are beautiful to those who can appreciate them. Why try to hide them?

I offer this explanation to help people understand my bikes, not as an apology or a judgement on other peoples values.

FORKS

Fork requirements for mountain bikes are much different than road bikes. The narrow high pressure tires on road bikes can't absorb much shock, so a fairly flexible fork is needed to contribute to shock absorbtion. On mountain bikes the large tires are the primary source of suspension because of their much greater compressibility. The "New Generation Tires" such as the Ground Control are perfectly suited to the task because of the exceptional suppleness and dampening qualities engineered into them. Flexible forks can add to shock absorbtion on a mountain bike but they have some drawbacks due to the fact that they behave like *undamped springs.* (Undamped means they continue to bounce after impact. Imagine riding a motorcycle with springs but no shock absorbers.)

The ideal balance of flexibility and stiffness in a fork is a matter of personal preference. I offer several different fork styles that cover a wide range of needs. Fork choice is important and should include the following considerations:

There is a simple, unavoidable tradeoff with unsprung forks involving comfort, handling and braking control. (Sprung forks with springs and\or even shock absorbers have their own problems, including high weight, complexity and rider energy absorbtion and aren't considered here.)

A fork with flexible blades will give a softer, more comfortable ride, but the same flexibility that provides comfort detracts from control under hard braking and can resonate in a way that adversly affects handling. A rider that places a high priority on maximum comfort and rarely uses the front brake hard may not need a stiff fork while a rider that has powerful front brakes and uses them hard, can appreciate the stability that the stiffer fork styles provide. Rider weight is also an important factor in fork selection. Light riders can use a more flexible fork than heavy riders with comparable ride qualities.

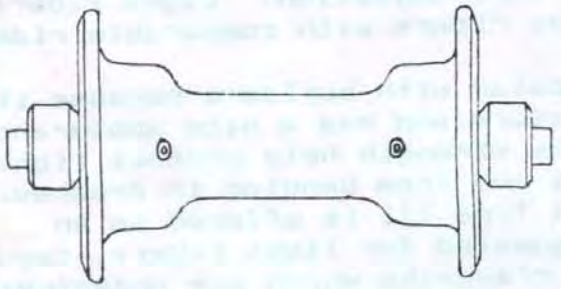
The common "unicrown" fork is popular with builders because it is light, easy and inexpensive to manufacture and has a nice appearance. Its high flexibility and relatively low strength help protect light gauge steel frames from fatigue cracks and from bending in crashes. A Cunningham designed and built Unicrown Type III is offered as an option on Cunningham frames and is suggested for light riders, casual riding or long distance touring. Its drawbacks which are undesireable resonances and "autosteer" (twisting and side to side flex) only show up under agressive riding. For Type III fork,subtract $20 from price of frameset.

A Cunningham designed Type I Fork is standard on Cunningham framesets at no extra cost. The crown is tubular 4130 chromoly, with carefully designed shape, manufactured by myself to receive special Reynolds oval blades. The oval blade/tubular crown design produces a very efficient shape that excels at shock absorbtion while resisting undesirable twisting and flex from braking. The Type I is a beautiful, curved fork that gives a responsive, comfortable ride and has strength well matched to the unusually strong Cunningham frame. I consider it to be the best fork for most riders. The steerer on this fork and also the Type II racing fork has extra wall thickness in the crown race area compatible with the strong crown and blades. All of the mountain bike forks have 2.0" offset.

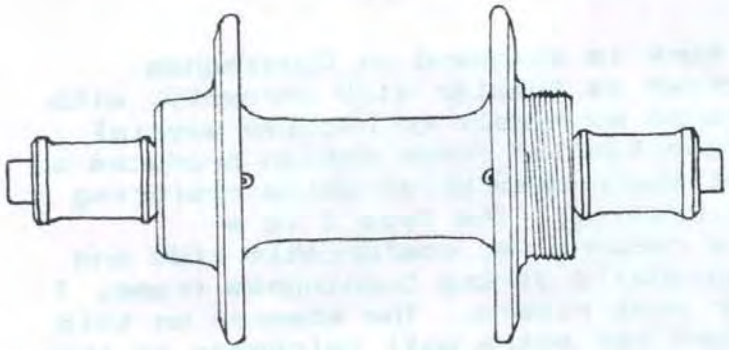
Another option, the Cunningham Type II fork is suggested for racing. It is also fabricated from a Cunningham 4130 tubular crown, but uses straight large diameter, thinwall, internally butted blades. It is the most labor intensive of the forks to build. Weight is equal to the Type III but its qualities are on the opposite end of the spectrum.

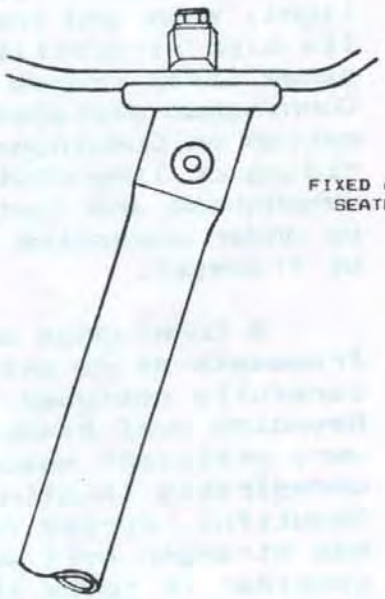
Although it gives a slightly harder ride than the others, it is characterized by unusual "dampness". Many riders including myself have observed that this fork resonates the least after the wheel hits an irregularity in the road and it has been found to be the most stable under braking. Thus, this fork is well suited to hard high speed riding where maximum control is worth a slight loss of comfort. For Type II Fork option, add $75 to price of frameset.

CUNNINGHAM
LIGHT WEIGHT
QUICK RELEASE



WTB HUBS





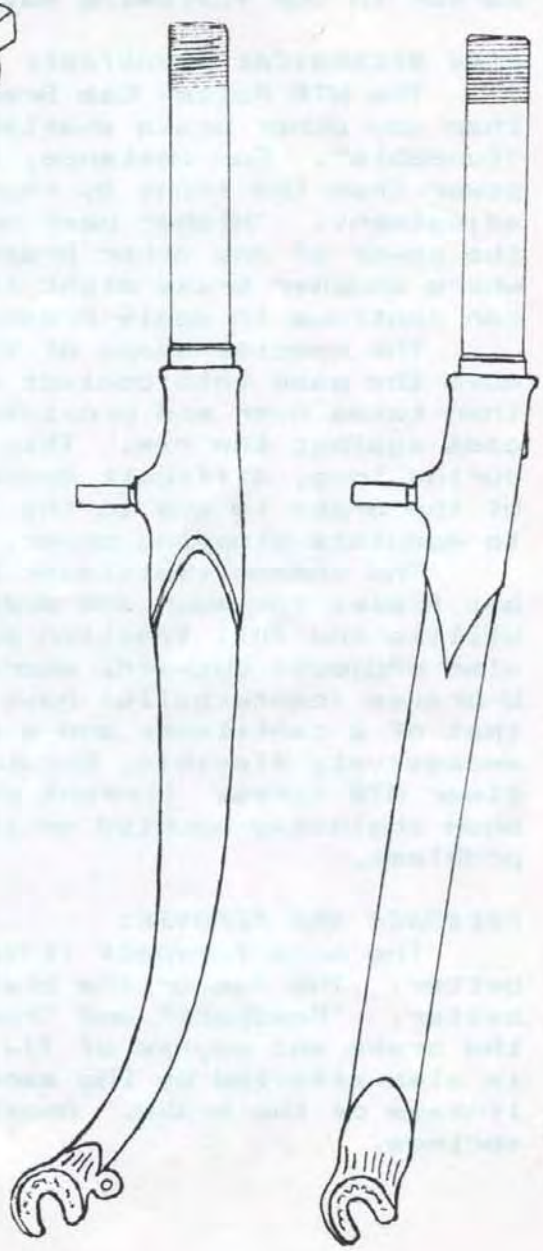
FIXED ANGLE
SEATPOST

SPEEDMASTER

WTB ROLLER CAM BRAKE

CUNNINGHAM TYPE I FORK

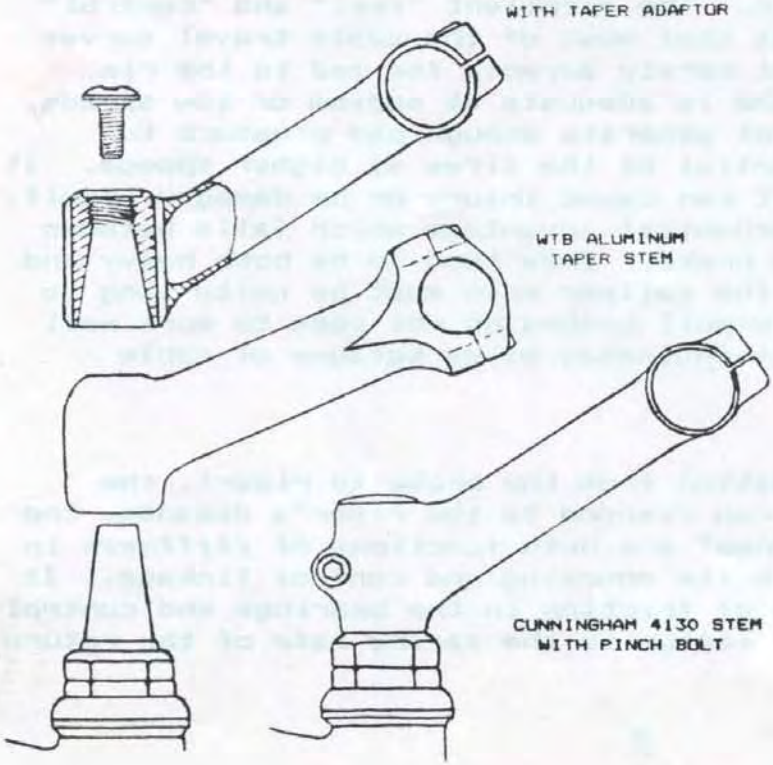
CUNNINGHAM TYPE II FORK



CUNNINGHAM GOOSENECK STEM

CUNNINGHAM 4130 STEM WITH TAPER ADAPTOR

WTB ALUMINUM TAPER STEM



CUNNINGHAM 4130 STEM WITH PINCH BOLT

THE WTB ROLLER CAM BRAKE

The original WTB Roller Cam Brake is, without exception, the finest brake available for all terrain bicycles. It is the outcome of a developmental effort that began eleven years ago, when I needed to design a brake system for my own bike which perfectly suited the unique and new requirements of ATBs. This brake is mechanically very different from the Suntour versions and is not hampered by the functional problems associated with such mass-produced brakes.

I began by experimenting with various mechanical brake systems, gaining design insight both from personal experience, and the many different riders who tested the prototypes. This led to the choice of the cam-and-roller principle as the most suitable for reasons too numerous to mention here. This ancient concept has been adapted and refined in the WTB brake to meet the needs of modern offroad bicycles.

The WTB Roller Cam Brake is a light, simple, highly evolved design with many important proprietary features that are patent protected. This brake *noticeably* out performs any other brake on the market in the following ways:

PEAK MECHANICAL ADVANTAGE:

The WTB Roller Cam Brake has greater peak mechanical advantage than any other brake available and unlike others, the power level is "tuneable". For instance, the rear brake can be set up to have more power than the front by changing the ramp angle on the cam -- an easy adjustment. "Higher peak mechanical advantage" means: (a)you get all the power of any other brake but even more when you need it; (b)that, where another brake might level out in stopping power, the WTB brakes can continue to apply pressure. Result: no white knuckles!

The special shape of the WTB cam uses minimal cable travel to move the pads into contact with the rim. The "ramp" of the WTB cam then takes over and provides great mechanical advantage to squeeze the pads against the rim. This translates to less cramping of the hands during long, difficult descents. The excellent "feel" and "control" of the brake is due to the fact that most of the cable travel serves to modulate stopping power, not merely *advance the pad* to the rim.

The common cantilever brake is adequate at medium or low speeds, but flexes too much and does not generate enough pad pressure to utilize the full traction potential of the tires at higher speeds. It also projects outward, where it can cause injury or be damaged itself. U-brakes (centerpulls) have mechanical advantage which falls between that of a cantilever and a cam brake. They tend to be both heavy and excessively flexible, because the caliper arms must be quite long to clear ATB tires. Current centerpull brakes do not seem to work well when chainstay mounted on short-chainstay bikes because of cable problems.

FEEDBACK AND REPONSE:

The more *feedback* (information from the brake to rider), the better. The faster the brake can respond to the rider's demands, the better. "Feedback" and "response" are both functions of *stiffness* in the brake and *degree of flex* in its mounting and control linkage. It is also affected by the amount of friction in the bearings and control linkage of the brake. Another factor is the *spring rate* of the return springs.

The WTB brake is simply unexcelled in the "feedback-and-response" department. The WTB brake arms are light, compact, and stiff unlike U-brake centerpulls. The WTB brake has unusually low internal friction, and the return spring action is crisp and positive unlike the well-known, mass-produced cam brakes. The WTB mounting studs are larger diameter than those of other brakes and the bearing surface is mounted closer to the frame to minmimize flex. The studs are precision-ground, hardened steel unlike the others, which are soft and dimensionally less precise.

On Cunningham bicycles the brake is mounted underneath the chainstays, a location I pioneered in 1978. The chainstays are much shorter and thicker than the seatstays, providing a sturdier base for this powerful brake. Reducing stay flex in this way reduces the possibility of "brake squeal", and gives the rider more accurate control. Mounting the brake under the chainstays also helps protect the brake from damage in a crash, and keeps the projecting parts of the brake from injuring the rider. The chainstay location allows easy brake maintenance without interference from a rear rack.

MUD PROBLEMS:

Some well-known cam brakes (such as the Suntour X.C. and Sport) are reputed to have problems in heavy mud conditions. Experience has proven that even the worst mud does not prevent the WTB brake (as mounted on Cunningham frames) from working properly. Bicycles can be rendered almost immovable by really bad mud, but properly mounted WTB brakes will still work! They have been carefully designed to be insensitive to mud fouling. On Cunningham frames they are mounted so that they are protected from mud by the chainstay brace and a simple, curved deflector. At the incredibly muddy 1983 NORBA National Championships, the bikes with WTB Brakes were among the few with no brake problems. Constant all-weather use can cause the main pivot bearings on any type of brake to become sticky unless a lubrication means is provided. The Grease Guard (TM) option is offered on the WTB brake so these pivot bearings *can* be easily lubricated with the same grease gun used on the WTB Grease Guard Hubs. This option is $10.00 per arm ($20/brake).

RETURN SPRINGS:

An important feature of the WTB Roller Cam Brake that sets it apart from all others is the patent protected linear return spring system, which makes for independent adjustment of spring tension on each brake arm. This independent linear spring adjustment lets the rider tune the hand lever tension to meet his or her own preferences. In the WTB brake the linear springs also give much stronger pad centering than brakes with coil springs, because the WTB springs have a higher spring rate. This means it's very difficult to deflect the brake pads from their proper rim spacing on a WTB brake. This important proprietary feature maintains proper pad centering, even in severe mud conditions.

A newly designed option of the WTB Roller Cam Brake permits the brake arm to swing clear of the chainstay or fork blade for easy wheel removal. This option is a kit which includes several quality parts which will retro-fit on any WTB Roller Cam Brake, regardless of vintage (this option is best for people who use large tires and remove their wheels often). The only drawback is a very slight reduction of brake stiffness, barely perciptible in side-by-side comparative tests.

Quick Release Kit price is $22.50 /brake.

The price of the WTB Roller Cam Brakes mounted on your Cunningham frameset is $135 (front) and $175 (rear). This includes the new ultra low-friction, sealed ball bearing rollers.

I have recently designed a more compact version of the brake, specifically for use on narrow tire tandems, HPVs, and cyclo cross bikes. The WTB *Mini Cam* is a powerful, sensitive brake that totally outperforms standard brakes. I've used this brake on my personal "Expedition" bike for years, and it *still* amazes me with its power and effectiveness. It is an option on my skinny-tire Expedition bikes and is also sold in kit form with complete mounting instructions and jigs. Mini Cam option on Cunningham bikes: $135 (front) and $175 (rear). In kit form, each brake costs $189, or $375/pair.

THE WILDERNESS TRAIL BIKES GREASE GUARD (tm) COMPONENT SYSTEM

INTRODUCTION:

We proudly introduce the Wilderness Trail Bikes Grease Guard Hubset as the first of a full line of WTB Grease Guard bicycle components which will include the Grease Guard Bottom Bracket, Headset, and Clip-on Grease Gun. The engineering experience, materials, precision machining and care of assembly in the WTB Grease Guard hubset are unequaled. Its performance, combined with the revolutionary WTB Grease Guard Bearing System, will set new standards of excellence for components on all terrain and touring bicycles.

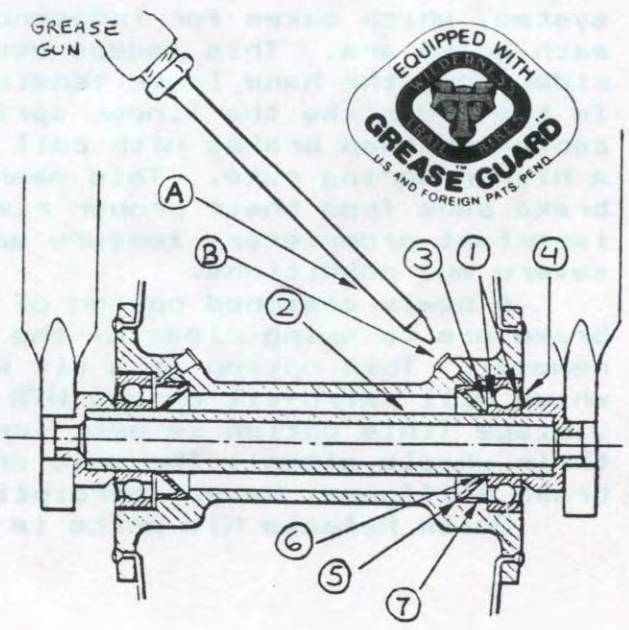
Following is an explanation of what the WTB Grease Guard Bearing System is and how it works:

THE PROBLEM:

Active cyclists know how quickly the bearings on a bicycle can rust, wear, and degrade to the point where they require adjustment or replacement. Too much time and expense has been required to maintain the bearings on an actively used bicycle, especially one used under all weather conditions. Improved bearing seals have helped to solve the problem, but their effectiveness is limited. No matter how good the bearing seals are on any given component, water and contaminants always find a way in and begin doing damage.

Wilderness Trail Bikes Grease Guard Hub

A. Grease gun for lubricating through the aircraft ball check valve in hub shell
B. Aircraft ball check valve
1. bearing cavities
2. tube chamber
3. inside edge of bearing
4. outer seal
5. plastic elastomer seal
6. minimum contact area
7. flapper valve



THE MECHANISM OF FAILURE:

A common example of seal failure is found when the bike is at ambient air temperature and is them brought in contact with cool water (rain, stream crossings, and wash water are typical). *The cooling effect of the water causes the air in the bearing cavities (refer to(1) on diagram) and nearby tube chambers (2) to contract which in turn sucks water and abrasive contaminants past even the best seals into the bearing.* This situation is common on all bikes and demonstrates why seals alone have not provided adequate bearing protection.

THE SOLUTION:

Wilderness Trail Bikes has designed and applied for United States and foreign patents on a componentry system incorporating bearing protection called Grease Guard, which is equally effective with cup and cone or cartridge bearings. This system effectively solves the problem of wear due to contamination.

Specifically, Grease Guard is a carefully thought out and tested means by which the various bearings on the bicycle can be flushed with low viscosity, waterproof grease. *A key aspect of the Grease Guard Bearing System is that it accomplishes this result with exceptionally low rotational friction by avoiding undesirable "grease shear".* For instance, excess friction from grease shear is produced if the chamber (2) between axle and hub shell are simply filled with grease. With Grease Guard, the grease begins flushing from the inside edge of the bearing (3) and moves through the bearing and then under the outer seal (4), pushing contaminants ahead of it and filling the bearings with fresh, clean grease. Grease Guard components use a special flexible seal (5) which makes *minimum contact* with the axle mating surface (6) untill actual greasing takes place. Only during greasing does hydraulic pressure cause the seal to deform, positivley forming the inner seal which prevents grease leakage into the chamber (2) between the bearings.

An unusually low viscosity, waterproof grease is used with the Grease Guard Component System because the bearing is filled frequently. The high friction, high viscosity grease which is normally used for long duration service is not necessary. With Grease Guard, there are no air voids left in the bearing after greasing, making it very hard for contaminants to enter the bearing. The Grease Guard result is extra-low bearing friction, and exceptionally long life.

SUMMARY:

The WTB Grease Guard comoponents give you full control over bearing wear in your bicycle. There is a definite satisfaction in being more self-reliant. With WTB Grease Guard Components you will spend a lot less time and money replacing worn-out bearings or paying someone else to do it. We believe our new Grease Guard Hubset will provide years of trouble-free service. We will appreciate any feedback our customers and fellow enthusiasts can give us.

DIRECTIONS AND USE:

Your WTB Grease Guard Hubset will need to be greased before use. First, fill the enclosed grease gun with the low-viscosity waterproof grease supplied by WTB. This is done by unscrewing and filling the reservoir to the top. This can be done with your fingers, while being careful to put the grease in so that air pockets are not produced.

Next, the cast cap should be filled flush and screwed onto the reservoir. Pump the plunger as many times as necessary to get it to prime so it will pump grease. A long screwdriver or rod can be pushed into the hole at the bottom of the reservoir while pushing the plunger to help it prime.

The small aircraft grease fittings are then carefully wiped free of dirt (a Q-tip works well), and the tip of the grease gun is pressed firmly into place. Pump the grease slowly into the fitting. For the best possible protection, the greasing should be done soon after water or mud has contacted the bearings. This is usually immediately after your ride. If you are going on an extended ride, consider taking the grease gun with you.

The results of greasing after a wet ride are dramatic as beads of water and dirty grease are forced out of the bearing. As soon as clean grease appears, stop greasing and wipe the excess off with a rag. It is important to realize that a missed greasing when it was needed will allow water and grit to begin damaging the bearings. Diligent attention to greasing soon after wet or muddy rides has proven that bearing wear can be virtually eliminated. Several of our personal test bikes that have received heavy all-weather use for more than a year still have no sign of bearing wear. The life of the bearing will depend on your attention to lubrication when needed. During the winter, greasing after each ride is not unusual. In the summer it can be much less frequent if the bike doesn't get wet.

WTB GREASE GUARD HUB DIMENSIONS:

The WTB Grease Guard Hubset is available in the following dimensions:

Rear Dropout Spacing	Freewheel Spacing
126 mm	Ultra-6, Std-5
131 mm	Ultra-7, Std-6
136 mm (order this size for Cunningham bikes)	Ultra-7, Std-6

36 hole front $86.25	36 hole rear $101.25
32 hole front $92.25	32 hole rear $107.25

Extra lite "slo-release" skewers with stainless pin, recommended for Cunningham bikes: front $9.50, rear $15.50

Tools, accessories, and replacemet parts for WTB Grease Guard Hubs are available through WTB.

The bottom bracket on your new Cunningham bike can be ordered with Cunningham designed Grease Guard cartridge bearings which are lubricated with the same grease gun that comes with the WTB Grease Guard Hubs. These special bearings are dimensionally the same as the standard ones. This option is $45.00

GREASE GUARD EDCO HEADSET

The Edco headset normally supplied with Cunningham frames can be drilled in the lower bearing race to accept the grease guard gun. This allows the headset to be regreased without dissassembly. This system has proven, over the years, to at least triple the life of a properly adjusted headset. This option is $12.50

FIXED ANGLE SEATPOST

The WTB fixed angle seatpost is Cuningham designed and is offered in 320mm extension. It allows normal fore and aft adjustment of the saddle. The saddle rail clamp on this seatpost is about an inch *farther forward* than with most other seatposts. This unique feature makes it possible for a rider to position the saddle farther forward than would normally be possible with any given seattube angle. (The effect is equivilant to a seattube angle about one degree steeper.) The appeal of this post is its light weight, reliability and clean simple appearance. Its limitation is that once the angle is set properly, a change of saddle types sometimes requires a readjustment of the angle, a process which involves some careful filing. (I will re-mill the angle for $10.) Add $62 to price of frameset for this option.

LIGHT WEIGHT SEATPOST QUICK RELEASE

The Cunningham designed quick release is based on a cam lever principle and is made out of 7075-T6 aircraft aluminum. It is about an ounce lighter than the normal steel Suntour quick release that is standard on the bikes. The moving parts are, however, more exposed to the elements so it requires an occasional drop of oil to insure that it works smoothly. Add $50 to price of frameset for this option.

WTB ALUMINUM TAPER STEMS

The unique WTB Taper Stems are works of art, fully machined from high grade 7075-T6 aluminum. The combination of beautifully polished finish, structural integrity, and light weight put these stems in a class of their own. They mount on a 4130 taper tube which is silver brazed into the steerer. This original WTB Taper mounting allows the 6mm socket stainless steel fixing bolt to be on top where it blends perfectly with the form of the stem and the knees won't hit it. They also feature a four bolt removable cap plate which makes handlebar changes and adjustments easy. The rise angle on these stems is 25 degrees and they can be ordered in 10, 12, and 13cm lengths. Included with the stem is a simple threaded puller. They are also offered with standard expander plug mounting so they can be retrofitted to any mountain bike, tandem or road bike. Bar hole size is same as the chromoly stem, 1.030". For a WTB Taper Stem mounted on your Cunningham (includes taper tube silver brazed in steerer), add $110.

CUNNINGHAM CHROMOLY STEMS

Two mounting systems are available. The innovative WTB taper system uses a precision aluminum adaptor which fits into the back of the stem. When the stainless steel bolt is tightened, the adaptor expands and locks the stem to the taper tube resulting in beautiful and clean lines with no bolt in the back to hit your knees on.

The other system is the straight 7/8" O.D. 4130 tube which is also silver brazed into the steerer. This stem attaches with a recessed allen socket pinch bolt on the back end. This system is offered for those who want to mount stems or bars made by other manufacturers on the bike. Both mounting systems are light, simple and reliable. Each stem style is custom built from 4130 tubing which is joined by fillet brazing with the joints carefully smoothed and finished with silver Imron. They can be ordered in 20 or 30 degree rise and any extension from 6cm to 14cm in 1.0cm increments. The bar hole is 1.030" I.D. A machined 2 piece aluminum shim is used to mount the WTB Flatbar or other 7/8" O.D. bar in the stems.

Similarly built chromoly Gooseneck Stems are also made expressly for drop bar use on Cunningham offroad bikes. They mount on either the 7/8" bushing or the taper with an aluminum taper adaptor. They position the bars higher and are available in various extensions and heights, and are normally used with Cinelli 64 drop bars which have had the bends modified for offroad racing or the new WTB Aluminum Bar. No shim is necessary in this case. For Flat Bar Stem add $150. For Gooseneck Stem add $160. Cunningham 2 piece handlebar shim, 1.030" to 7/8": $9.25

WTB ALUMINUM HANDLEBARS

The new WTB Aluminum Handlebars are a carefully researched design resembling a modified drop bar but with less drop and reach and a slightly different hand angle. The bar combines the advantages of drop bars and flat bars. It is normally used with drop bar brake levers and barcon shifters or the custom WTB shifters which mount on the inner sides of the bar near the brake lever. The WTB Aluminum Bars are made of special gauge heattreated aluminum tubing with an integral sleeve which eliminates the need for the 2 piece shim. WTB Alum Bars and WTB Shifter Adaptors are available thru WTB at (415) 381-6413.

WTB PEDAL FLIP

The WTB Pedal Flip mounts on the rear of the pedal and is sold in pairs with mounting hardware. It is designed expressly for touring or racing use with touring type shoes and toe clips. They allow the foot to get into the clips very quickly and easily with one clean stroke. They are made of plated spring steel and the shape of the barb has been carefully researched for years. It is very advantageous for cyclo-cross or when doing trail riding where dismounts and remounts are frequent. They were used by nine of the top ten racers at the 85 NORBA Nationals. WTB Pedal Flip, $9.95 pr.

COLORS

For $110 additional, the frame, fork, and stem can be painted your choice of Imron colors. The paint is applied on the carefully prepared as welded frame.

An even more strikingly beautiful effect is created where all of the joints are made perfectly smooth by hand file work and the use of a special low density filler before painting. The process requires days of labor but results in an incredible dimension of beauty that will appeal to those with a refined sense of aesthetics. This option is $450.

FRAME CONSTRUCTION

The frames are constructed from large diameter 6061 aluminum tubing which is TIG welded in a special jig designed to insure perfect alignment. The choice of tubing size and wall thickness throughout the frame is based on many years of experience. The tubing is carefully taylored to obtain the balance of flexibility and stiffness which is optimal for each area of the frame. Butted tubing is used to increase structural efficiency in some parts of the frame. The problems usually associated with TIG welded steel frames such as the small size of the weld bead resulting in stress concentrations and also weld zone embrittlement caused by high cooling rate are not present in a properly built aluminum frame. After welding, Cunningham frames are heattreated in a carefully controlled sophisticated process which completely stress relieves the welded aluminum and brings it to its full strength (the T-6 condition). Maintaining alignment during the process is crucial. A process based on much testing and experience is used to accomplish this. Each frame receives two alignment checks during its manufacture. The frames also receive several unique proprietary treatments that further enhance their characteristics and really distinguish them from all other welded aluminum frames.

Cunningham offroad frames have an unusually wide bottombracket shell for better spindle support and extended bearing life. The special WTB designed Chris King stainless steel spindle has exceptional strength. The cable core guides are made of carefully formed stainless steel parts which are silver brazed together by hand. These and the unique Cunningham machined aluminum cable stops are attached to the frame using techniques derived from the aerospace industry. More desirable than cable-housing guides, cable stops allow crisp brake and derailleur control. The frames are guaranteed for life to the original owner.

FRAME GEOMETRIES

I build three distinctly different ballooner framestyles; the INDIAN, the RACER, and the LITTLE PEOPLES BIKE. The geometries of each are the results of knowledge accrued from countless hours of offroad riding by myself and other experienced riders.

THE INDIAN

Named with regard to the Native Americans who lived here before us, and whose respect for and attunement to the land is a model for contemporary lovers of the wilderness. The Indian is designed with moderate angles and wheelbase which makes it an excellent, practical all around bike with very forgigving handling qualities. The Indian is "user friendly". It is stable, well balanced, comfortable to ride, and is ideal for offroad touring. This frame has excellent clearance for the biggest tires on the market. This is the bike which is prefered by some racers for mountainbike racing. You can ride this bike off road all day and feel comfortable and relaxed on the bike at the end of the day.

INDIAN Geometry:

Fork offset	2.0"
Wheelbase:	43.2"
Chainstays:	17.6"
Bottombracket:	12.0" with 2.125 tires
Headtube Angle:	69.5 degrees
Seattube Angle:	71 deg (72 on 22&23" frames)
Seatpost Diam:	27.0mm
Rear dropout spacing:	135mm
Sizes availavble:	19, 20, 21, 22, 23"

THE RACER

The Racer is a shorter frame with slightly steeper angles which gives it quicker handling. The short chainstays allow a greater percentage of weight to transfer to the rear wheel when climbing out of the saddle, and the short wheelbase makes it easy for the rider to rapidly modulate wheel loading. The shorter wheelbase and steeper angles demand greater experience on fast decents and require more attention from the rider. The Racer excells on narrow single track trails and steep climbs. Its nimble responsive nature make it popular for racing and fast lightly loaded touring. This frame is now built with full clearance for the largest 2.125 tires.

RACER geometry:

Fork offset:	2.0"
Wheelbase:	42.0"
Chainstays:	17.1"
Bottombracket:	11.875" with Ground Control Tires
Headtube angle:	70 degrees
Seattube angle:	71 deg(72 deg on 22" frames)
Seatpost diameter:	27.0mm
Rear dropout spacing:	135mm
Sizes:	19, 20, 21, 22"

SLOPING TOPTUBE AND LARGE DIAMETER SEATPOST OPTION

The Indian and Racer frames are also available with a sloping toptube and large diameter seatpost. This option makes the frame about 1/2 lb. lighter and further stiffens the bottombracket area for added energy transfer efficiency. The sloping toptube gives added crotch clearance which can be used to advantage on difficult terrain

such as rough trails where one can lower the body, extend a leg over obstacles, and pull the bike over without dismounting. This type of frame is easily shouldered for carrying, but there is usually not enough room to hook the arm around the toptube as on a horizontal toptube. *This option does not change the handling of the bike, as the geometry is unchanged.* The greater surface area of the large seatpost creates more sliding friction. People that raise and lower the seatpost a lot would be better advised to use the standard size seattube. The other drawback of this option is that your seatpost and front derailler are non-standard which is something to be considered if you are touring in distant lands. Add $320. for this option.

THE LITTLE PEOPLES BIKE

Designed for the many people who are unable to find a proper fit on conventional small mountainbikes. The bike uses normal 26" wheels instead of the 24" wheels sometimes offered on other bikes which compromise efficiency and handling qualities. The design also avoids the tiny headtube found on many small frames which puts enormous loads on the headset bearings. This bike has an unusually low toptube to ground clearance. This is accomplished by sloping the toptube and seatstays downward. This is not possible with cantilever brakes because the rider's heels would hit them. It is possible though with the compact WTB Roller Cam Brake which also dramatically increases stopping power. Presumably the shorter person is also lighter, and can appreciate a 24 lb bicycle. The people currently using them include a national class woman racer, an offroad tour leader, and a Harvard professor. Each has his or her reasons for a top quality bike, and each is overjoyed to have a bike that fits and handles perfectly. The frame is built with full tire clearance.

LITTLE PEOPLES BIKE Geometry:

Fork Offset	2.0"
Wheelbase:	42.0"
Chainstays:	17.1"
Bottombracket:	11.5" (with Ground Control Tires)
Headtube angle:	70 degrees
Seattube angle:	70 degrees
Rear dropout spacing:	135mm

Size: One size for those who would normally need a frame smaller than 19".

EXPEDITION BIKE

This is a rugged skinny tire bike which is built for tires up to 35mm or 1.375". The bike is a light 21 lbs with Specialized Expedition or Tri Cross tires. I have enjoyed my own Expedition Bike so much that it has inspired me to build this incredibly practical and fun bike for others. My appreciation of this type of bike stems from the fact that it is very efficient on pavement, while being tough enough to go anywhere a mountain bike can go with a little rider finesse. The bike is ideal for efficient travel over varied terrains, including pavement. With lighter tires it can double as an excellent road bike. The Expedition Bike is sold as a complete bike with the following specs:

WTB Mini Cam Brakes on rear, Mafac cantilever front brake, Cunningham Type IV Fork with Tubular Crown, Cunningham 4130 Taper Stem, Edco Competition headset, Araya 20A clincher rims, Wheelsmith spokes, WTB Hubs, and MP-1000 pedals.

The bikes have a 27x1.375" wheel on front and a 700Cx35mm on the rear for better handling. The sloping toptube/ large diameter seatpost option is also available on these bikes. Price is about $2900 depending on componentry and options.

Expedition Bike geometry:

Fork Offset	1.75"
Wheelbase	40.375"
Chainstays	16.375"
Headtube	72.5 deg
Seattube	72.5 deg
Seatpost	27.0 mm
Dropouts	135 mm
Sizes:	19,20,21,22,23"

If your needs can not be met with any of the bikes above, I am willing to build frames to your specifications if your request seems reasonable and I have time. Depending on the changes this may cost more due to increased set up and handling time.

My bikes are on display at the following locations where they can be test ridden and purchased or orders placed. I can send photos of the type of bike you are interested in if you are unable to see them at these shops. A complete bike can usually be delivered in 3 to 8 weeks. Framesets can be delivered with even less delay.

Complete bikes usually range in price from $1950 to $3650 depending on options and component choices.

After reading the Infopac and deciding what you want, an order is usually placed at one of the shops that sell the bikes. I like to be available to answer questions and to get to know the people that buy my bikes but there is so much work to be done that I need to limit the amount of time I spend talking. I would like to hear from you if you are buying a bike and definitely want to help take care of any problems that may come up that the shop can't handle.

Point Reyes Bikes, 11431 Hwy. One, Bx362, Point Reyes, Ca 94956
(415) 663-1768 Michael Castelli or Marshall Livingston

Mountain Avenue, 1865 Haight Street, San Francisco 94117
(415) 221-6630 Gene Maruszewski

Rim Cyclery, 94 West 1st North, Moab, Utah 84532
(801) 259-5333

FRAMESETS, COMPONENTS AND SERVICES

Basic framesets include the following:

Type I fork, Edco Competition alloy headset, easily replaceable standard 37mm sealed bearing bottombracket with special WTB designed Chris King stainless steel spindle, Suntour seatpost quickrelease, Suntour 300mm seatpost, front and rear Mafac cantilever brakes, Suntour Cyclone II or Shimano Deore front derailleur, water bottle cage mounts, all cable stops and rack bosses on dropouts. The various options listed elsewhere can be substituted or added to the basic frameset.

INDIAN frameset:	$1905.00
RACER frameset:	$1975.00
LITTLE PEOPLES frameset:	$1612.00

Custom aluminum front brake cable hanger: $7.50
Extra waterbottle cage mounts: $25/pr.
Blackburn rack mounted on rear: $32.50
Replace your bottombracket bearings: $15 labor
Retrofit your Cunningham Bottombracket for WTB Grease Guard (includes grease gun) $50.
Grease gun for WTB Grease Guard System $10.50
14 oz can of Lubriplate 105 grease for Grease Guard System. $8.50

1986 RACING SUMMARY

The Wilderness Trail/Trek/True Temper Offroad Team produced excellent racing performances throughout last year, WTB rider Casey Kunselman and Todd DeAngelis used their Cunningham race bikes to good advantage at all the major Pro-Am races with Casey earning a hard-won fourth place at the Nationals in Durango. The separately-financed Cunningham Offroad Team of NORBA Champion Jacquie Phelan and Tracy Smith of Crested Butte, got consistently high placings, culminating in Phelan's down-to-the-wire second at the Nationals.

The efforts of each of these four racers and others racing their Cunningham bicycles are greatly appreciated. They count on the extraordinary reliablity of the bikes and continue to be a valuable source of feedback in the development and testing of the of the latest Cunningham and WTB designs.

The 1987 Cunningham Team is already showing itself to be a major force on the dirt racing ciruit. Jacquie is still winning on "Otto",her trusty five year-old Cunningham Racer, and she is joined by newcomers to the sport Terry Griebel and Eric Stirling. Former motocrosser Griebel has demonstrated his phenomenal fitness and bike handling skills from the beginning of the season, as has the 35 year old Stirling.

SEATTUBE ANGLES

There is some confusion about steeper than usual seattube angles that have become popular with some mountainbike builders recently. Without going into the complex subject of frame geometry I'd like to say that I think "handling geometry" and rider fit should be considered independently. Handling geometry is what determines the handling qualities of the bike. It is: headtube angle, fork offset, wheelbase, chainstay length and bottombracket height. Then, a separate but related concern is the rider's seated position on the bike which is determined by seattube angle, seatpost type (see section on Fixed Angle Seatpost) and stem reach and height.

A frameset should be balanced and not be built in such a way as to require the rider to be in a certain position for it to work right. Rather, *the frameset should work properly when the rider is in his/her most ergonomically efficient position.* The location of saddle with respect to bottombracket is very important and varies widely from one rider to the next depending on build, leg length and riding style. For example a 73 degree seattube is usually way too steep for a short rider because it puts the saddle too far forward with respect to the bottombracket, and occasionally not even steep enough for a rider with very long legs. A steep seattube angle is right for some but definitely not all people.

I ride a bike with 17" chainstays, a 71 degree seattube and the tip of my saddle is 3.375" behind a vertical line thru the bottombracket. Some would say that I should be uncontrollably lifting my front wheel on steep climbs, but to the contrary, the geometry of the bike makes it possible for me to modulate the location of my weight by moving around on the saddle to maintain maximum traction (front wheel just shy of lifting). I can also easily loft the front wheel over obstacles when necessary. Then on decents my saddle location allows my weight to be well to the rear and low on the bike.

This is what works best for me. What you need depends on your build and riding style. If you know what your best riding position is, I can tailor the components and if necessary the seattube angle to position you correctly. The main point here being that the bike should be made to meet your needs, not the other way around.