



Raven Twin Mk3 S&S

Issue 4.3
Spring
2023

*These tandems are designed
specifically for use with the*

Rohloff EX hub

Prices, in printed
copies of this
brochure, may no
longer be correct.
The current prices,
given in the on line
brochure, are correct
and will always be
honoured.

**Are you disabled? - Or do you ride with, a disabled stoker?
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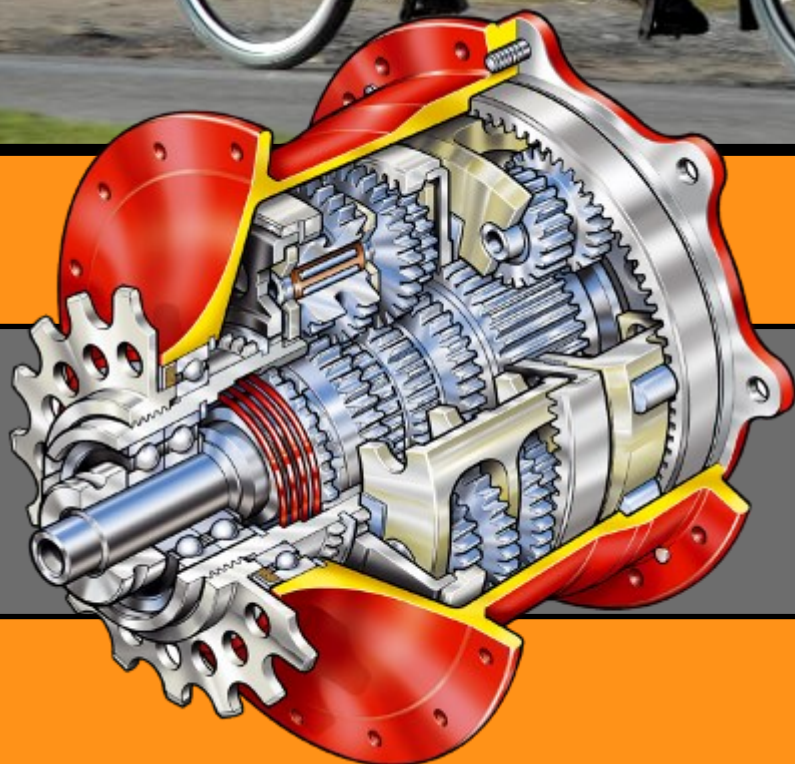
Please note:

The prices, some of the specifications and products
in this document are out of date!

It does however contain useful information on
Tandem cycling and setup.

For current specification and prices please contact
our Thorn Sales team on:

01278 441505 or sales@thorncycles.co.uk



It takes two...

...me and you!



Thorn Touring Tandem

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This is our new DEMO tandem - with a previously-booked appointment, you can test ride this actual machine.

Size M/M



The Pure Orange size M/M (above) is shown with several of our most recommended upgrades for light touring on hilly country roads.

(3 BRAKES - Brake option C1, Rim option [3] CSS FRONT, FFT Bars, Pilot's GP5L & Stoker's GP3 grips, 2 Profile cages, Vega carrier, Spur cycles bell, and Stoker's Cane Creek Thudbuster LT seat post.)

The Gunmetal size L/S (below) is shown in a start price spec apart from the Pilot's GP5L grips and the Stoker's GP3 grips.

This bike may also be test ridden if the size M/M doesn't suit.

Size L/S



Size S/M



The Pure Orange size S/M (Left) is shown with several of our most recommended upgrades for medium to heavy touring anywhere - with an experienced blind stoker.

(3 BRAKES - Brake option H3 (Stoker operated Hope 203mm ventilated hydraulic rear disc brake), Rim option [2] CSS FRONT and REAR, eXp Bars, Pilot's GP5L & Stoker's GP3 grips, 4 Profile cages, Thorn expedition front and rear carriers).

[This bike may also be test ridden if the size M/M doesn't suit.](#)



NEW Size L/M

The photo of the Gunmetal size L/M (Above) is of a customer's bike - it's a very high spec machine; we had the frame airfreighted specially for this customer.

We expect to have our own demo bike in the showroom and to be able to deliver pre-ordered L/M bikes in mid-Autumn 2018.

This size is for tall and powerfully built cyclists, who may need the extra strength that the double marathon frame provides and who will be prepared for the inevitable increase in weight (And the extra £150 that it costs).

The Gunmetal size S/S (Right) is shown, in the interests of transparency, in a completely standard spec - i.e. without any upgrades at all - so it would cost **£3999**

We've chosen to fit Thorn Comfort bars, rather than Flat Track bars, as comfort bars can't have and don't need, bar ends, whereas Flat Track bars are definitely better with bar ends - which are an upgrade of course.

[This bike may also be test ridden if the size M/M doesn't suit.](#)

Size S/S



I sincerely hope that you enjoy reading the Raven Twin Mk3 Brochure, it's been a labour of love. I also hope that you will realise that the attention to detail, in this brochure, is indicative of the attention to detail, that has been incorporated into the Raven Twin Mk3's design and development - which was also a labour of love and first hand experience!

These are not "blue sky" concept bikes, aimed, by a committee of accountants, at a poorly market-researched demographic, where 90% of design time is concerned with decals and paint colour. Neither do we allocate 50% of the cost to be spent on advertisements, which

contain precious little, apart from; pictures of beautiful bronzed people, with gleaming, polar white smiles, a few clever buzz words and the "artistic" use of blank space!

If you have dreams of exploring our planet by tandem, or of simply sharing the many, varied and delightful experiences of riding tandem, the Raven Twin Mk3 will enable you to fulfil your dreams - together - upon the perfect machine. No other tandem feels as secure, as well thought out, or as reliable.

Andy Blance Oct 2017

Why ride tandem?

There are many reasons why it makes sense to ride tandem. Listed below are 6 of them; at least 2 should apply to everybody.

[1] For partners of unequal cycling ability, going cycling together can be a cause of great frustration and concern. The more unequal their abilities - the greater the frustration and concern can be.

It's frustrating to have to constantly wait for your partner to catch up but that's nothing compared to the frustration of constantly being waited for - only to see your partner disappear into the distance, as soon as you start cycling again!

It can be very irritating for some, yet it can be soul-destroying for others, to know that you're trying your hardest and yet you're still detracting from your partner's enjoyment.

It can also cause great concern, to both parties, to become separated, in an unfamiliar environment.

Although the above scenario is very common, it's not always the stereotype of a man waiting for a woman! Most partners of unequal ability, would find that riding tandem, is the perfect way of enjoying cycling together. Now they'll always arrive at the same time and they'll each get the degree of physical work out that they (individually) want. This new tandem partnership should find, as have many thousands before them, that not only does their desire to go cycling together increase but also that the distances, they can cover comfortably, will also increase.

Frequently, one of them finds that their, often dreamed of adventurous cycling holiday, or cycle event, is starting to look both possible and attractive to the other - a whole new world beckons.

[2] For those with balance problems, visual impairments or extreme cases of Asperger's, stoking a tandem is possibly

the only way to obtain full cardiovascular fitness - in the open air.

[3] A tandem fitted with kiddy cranks, or even better, a child back tandem enables families to continue cycling together, during the early years of parenthood. It also introduces children to the pleasures of cycling in a safe, controlled environment.

Being part of a team, is much more fun! Learning the ropes, as part of a team, on a fast stable machine is much more likely to turn them into keen cyclists, than is being dragged along, by a keen parent, on an unstable child trailer.

[4] When two cycling fit parties ride tandem, the result is a shared athletic experience, of a quality beyond words - it's also very fast!

[5] It's only necessary for one of you to be able to ride a bike - clearly that person should be at the front!

Indeed, the best stokers are often those who can't cycle on their own!

[6] Riding tandem is fun! It makes you smile - it makes others smile.



of upper body strength to control a tandem - especially at low speed. The heavier the stoker is, the more upper body strength the pilot ought to have but we've sold several replacement tandems to 55kg women to pilot their, considerably heavier, blind partners. They're all managing fine now, thanks to our extra-stiff frames!

A good pilot will take care, to ensure that riding tandem is always a pleasure for their stoker - they understand the simple equation:- No stoker = No tandem ride

A good stoker knows their physical limitations - they'll always pace themselves and will try and keep something in reserve - in case a few extra coals are needed on the fire.

Two tandem terms explained.

Pilot - the one on the front (often called captain) but that is not really PC.

Stoker - the one on the back.

Who should be pilot, who should be stoker?

Sometimes body size makes this a really



THORN RAVEN TWIN Mk3

The first series of Raven Twins was introduced in 2003 and was immediately acclaimed as a ground breaking new advance in tandem design.

The next series of frames were introduced in 2011 in 5 sizes 4A, 6A, 7A, 8A and 12A. These tandems redefined the nature of tandeming.

The New Raven Twin Mk3 is available in 5 sizes, whilst I've tweaked some of the dimensions slightly, these sizes correspond to sizes 4A, 6A, 7A, 8A and 12A

The sizes are now called S/S; L/S; S/M; M/M and L/M.

All of these sizes have S&S couplings installed as standard (see pages 18 & 19)

We have some Mk1 L/L S&S frames for really tall crews for sale. (see page 24)

We've used our unrivalled knowledge and experience to make the definitive tandem frame - whichever size you need.

To make certain that we could have exactly what we wanted, rather than have to make do with what was available, we've had our own tube set made.

This superb tube set starts life as the finest seamless Japanese Cro-Mo steel blanks, these are then cold drawn and butted, into the size and gauge that we require, finally the tubes are heat-treated to ensure the maximum strength, longevity and performance. These tubes are crafted into frames, by only the very finest of the builders, from probably the cycle trade's most respected factory. The frames have provision for every desirable feature incorporated into them, allowing multiple choice of operation of key functions.

These are the finest frames we've ever had made and represent the experience we've gained from sizing customers with the previous frames. There has been so much care, experience and thought invested into these frames, as well as a massive financial investment, that we fully intend and expect them to remain both current and "cutting edge" for at least a decade! The original Raven Twins were at the cutting edge for thirteen years - we've only made a few minor changes to the latest Mk3 frames. We almost certainly have a frame to delight and suit both of you, for your entire cycling lives!

The frames themselves are enough to get excited about and we have obviously had them built specifically to use the ultra-reliable, Rohloff Speedhub! (This is an internal hub gear, which has 14 speeds!) We've used Rohloff hubs, for many years, on touring bikes; we've used them for commuting; we've used them on mountain bikes, we've enjoyed long, heavily loaded tours in the wildest of wild places and we've used them on Tandems - they are superb - we'd never want to use derailleurs again on any bike!

(There's much more information available in our "Living with a Rohloff" brochure.)

As good as our solo bikes are, we feel that perhaps the biggest advantage of all, for a Rohloff hub, is when riding tandem! **The biggest trouble with derailleur gears, on**

on the pedals and strain? Do you and your stoker, get off and does your stoker then hold the rear wheel off the ground, whilst you rotate the cranks?

Can you make your derailleur gears operate perfectly in the work stand, only to find that they don't work properly when you're under load?

Have you ever wanted to change your cassette (and chain) only to find that your system is now obsolete? If you have managed to buy new stuff, have you then found all the spacers mysteriously need changing in your chainset? We've all been there and we've put up with the inadequacies of derailleurs, because we love riding tandem so much.

The Rohloff changes all that - as a tandem crew, you really can consign derailleurs to the recycling bin of cycling history. Rohloff makes everything so simple - as long as all the accommodations, necessary for its perfect installation, have been made. Be assured that we've spent the time (and the money) to make certain that our Rohloff-specific frames are Rohloff-perfect! (We've had ten different types, of cable guide, cast from stainless steel; we've had our own Rohloff-specific dropouts and BB shell cast, again from stainless steel)

We've always had the most enviable reputation for frame design; Cass Gilbert said of the derailleur geared Adventure, in his article about riding the Silk Road, "For our ride across Turkestan, we used Thom's Adventure tandem. Its steel frame is beautifully made with a perfect geometry for long distance riding." He then went on to say "The Adventure's excellent handling surprised us off-road and there were few trails we were not able to venture, albeit slowly".

I dislike false modesty even more than I dislike conceit.

The reason all of our bikes always score so well is that I actually ride the bikes themselves, for long periods of time, in different and difficult conditions - if I feel that something could be improved - I improve it at the prototype stage - before we manufacture the bikes!

Believe me, when I say, I'm a very experienced cyclist and tandem pilot and (certainly as far as cycles are concerned) I'm only happy with perfection. I imagine that I'll own and ride every bike I design! Having learned how to make a tandem handle perfectly; I'm certainly not going to forget all that hard won experience and make a retrograde step. I've set about the task of how best to incorporate a Rohloff hub, into a perfectly designed frame. I'm convinced that, because it puts such a vastly superior machines within the financial reach of so many cyclists, the Raven Twin Mk3 will be regarded as my best work so far. Whilst words can be cheap and actions certainly do speak louder; please remember, that if you don't agree, inside 100 days, that this is the best handling tandem you've ridden, with the best transmission, we'll refund you in full, when you return the bike. Don't think that there is a catch in these words, or small print which allows us to cop out - you only have to not want to keep it (without giving a reason at all) and we'll refund you. It's simply that we want you to test your ideal machine yourselves! We really don't get many back! (Please see our Guarantee of satisfaction on page 31)

Are 14 gears enough for riding tandem?

If you study the gearing charts in our literature, you'll see that actually, on a 30 speed derailleur machine, you don't have 30 gears - at best you have 15. Perhaps you only have 13 different gears - you have the same (or very similar) gears several times and you often have to change chain rings and sprockets, to obtain the next gear. The Rohloff Speed hub has 14 different gears, operated by one shifter. The next gear is always just that - the next gear! The overall range of gears, is similar to that found on many current mountainbikes - 526%.

You've a choice of gearing on your Raven Twin, you choose how low you want your bottom gear to be - top gear is then always 526% higher than this. (All the intermediate ratios are at constant 13.6% intervals). Rohloff insist on a lower limit of 43 x 17 on a tandem (43 teeth on the chainring and 17 on the rear sprocket, which in the lowest gear is almost identical to 22 ring x 32 sprocket with a derailleur) - there's no upper limit (Imposed by Rohloff) on your choice of gear range.

What if the Rohloff hub goes wrong? I know lots of little tricks, which may keep a derailleur running but I couldn't possibly take one of these hubs apart.

Rohloff have never had a total failure of the hub. Nobody has reported being stuck anywhere, with a hub that's lost drive. We searched the internet for problems before we contemplated making the first solo prototypes, you need have no worries about reliability - It's German

engineering at its best! Would you feel that you needed to know how to strip the auto transmission on a German car before you set out on a journey? If you change the oil every 5,000km and replace the cables, drive chains, sprocket and possibly the chain rings too, around every 20,000km, you'll have no worries at all.

Perhaps you've heard that the hubs need running in? Rohloff say that they don't actually need running in but, in my experience, it seems to take about 1,000km, on average, for them to become really smooth and much quieter. **In dramatic contrast to a derailleur system, the hub gets better as it gets older!**

Rohloff have sold more than 80,000 hubs and some owners have used them for 200,000km of demanding cycling - nobody has yet worn one out!

Can we honestly say that 32 spokes are enough, when we told you that you needed 48 on your derailleur tandem?

Rohloff have measured the stresses in the spokes. The forces on each spoke are lower, with a Rohloff hub, than they are on a 145mm spaced, 48 spoke tandem derailleur hub. The flanges on the Rohloff hub are much further apart than a 145mm spaced derailleur hub, these wider flanges give much more triangulation. The Rohloff hub also builds into a dishless wheel - there's still some dish in a 145mm spaced derailleur hub, which means that 24 spokes are doing most of the work; whereas all 32 spokes share the work evenly with a Rohloff hub. It's easy to replace a spoke in a Rohloff; the flanges are so large, that the sprocket does not need to be removed, in order to feed the spokes through the holes.

We're convinced that you don't need more than 32 spokes - especially if you've chosen 26" wheels.

We can now fit a 203mm front disc brake to one of our tandems - but please read the following warning.

When I originally designed the Raven Twin, I had to choose either a comfortable fork, with provision for V brakes, or a fork which would withstand the considerable (and very different) forces created by a disc - I choose the comfortable fork! To make a fork suitable for tandem use, with a 203mm disc front brake, would've required an exceptionally beefy fork. I knew how uncomfortable such a fork would be from our 1999 tandem tour in Australia, I hope I never have to endure such discomfort again! I certainly didn't wish to produce a bike with forks, which



were even less comfortable!

I've no worries about our Raven Twin fork, when we hit a cattle grid at 50mph, on our Raven Twin! Yet, when I put an ISO disc mount on a pair of forks, with identical blades, I managed to write them off, on an unloaded solo bike - was I behaving like an idiot? No, I was simply simulating an emergency stop, from 10mph and I was only using a 160mm front brake! Even the most careful and nervous of cyclists should expect to have to do an emergency stop from 10mph. (I still have this fork, if you want to see it). A tandem fork for a 203mm disc must be substantially heavier duty than this!

We now offer an alternative steel disc tandem fork. You can choose either the comfy fork, with front V brake and 26" wheels, or the very stiff disc fork with 26", 650B or 700c wheels but the laws of physics haven't changed since I wrote the above warning.

Why do our tandems have 26" wheels?

Let's make certain we are very clear about what we are saying. We like 26" road-going-mountain bike tyres, which are at least 1.6" wide - we prefer 26 x 2.0" for most applications! The Raven Twin Mk3 V brake forks will accept 26 x 2.25" tyres. The disc forks will accept 26 x 2.4" tyres, 27.5 x 2.0" or 700 x 40c wheels and tyres. There is a load of detailed information on pages 32, 33 and 34 of the **THORN MEGA BROCHURE** - see link at the bottom

tandems, has always been the front mech - it's always difficult to set up the front mech, so that it always changes rings when you want it to - without jamming, dropping or overshooting the chain in the process. There's no possibility of this happening with our Rohloff Tandems - there's no front mech!

All 14 gears are operated via one shifter; the gear mechanism runs on multiple bearings and is enclosed in the rear hub. **As a bonus, you don't even need to be pedaling to change gear!** How many times have you come to a halt on a derailleur tandem, only to find that you were in the wrong gear to restart? What do you do then? Do you panic about keeping your balance, whilst you stand

of this column. Yes, this is written with solo bikes in mind. With a tandem it's even more important to have strong wheels and reliable tyres. It's a fact that tandems are more likely to write off a tyre than solo bikes—it's also a fact that high quality 26" tyres are available everywhere in the world. Compared to narrow 700 x 40c tyres, they grip the road better; they're far superior on loose surfaces. They are much, much more comfortable. The wheels are stronger and a wheel/tyre combination, suitable for a tandem, is also lighter, which means it can be accelerated more quickly.

In our opinion, it's foolhardy or downright foolish, to have any size other than 26" on a new tandem without a very good reason.

Years ago, my (then) stoker and I owned several tandems, at the same time. We had a Reynolds oversize 753 700c machine custom built for us - it was probably the finest machine in the country, when it was built. We later had a less expensive 26" machine built, for mega-hilly spring and autumn long distance Audax rides. There were 5 other tandem crews in our club at the time. We had the opportunity to ride 700c and 26" tandems back to back, on club rides and Audax events. The 26" tandem was our favorite; it blew the 700c away on the hilly events and was even quicker to ride on the flat! It was more comfortable and handled better - even though it cost half of what we'd paid for the 700c!

We think that, weighing the pros and cons carefully, there may be overall advantages, for some cyclists, with 26" wheels on a lightweight touring solo. We're convinced that there are overall advantages to 26" wheels, for all cyclists, on a heavy touring solo.

We know, beyond a doubt, that there are overwhelming advantages to having 26" wheels on a tandem! Especially for heavily loaded touring

If you'd like to see if the Raven Twins are as good as we say, you can have a test ride, on our demo bike. You may even borrow it for a weekend, as long as you arrange it with us (01278 441505) in advance!

If you can't get here, you can still see how good the Raven Twin is, without any significant financial risk!

Buy a perfectly fitting machine, with your preferred individual specification and try it on roads you are familiar with. We'd like to remind you that we offer you a 100 day money back trial - if you don't wish to keep the machine, for any reason, return the bike and we will refund you in full.

Frame Specification

The frames are painstakingly TIG welded, using our own exclusive mega-oversized, seamless, cold drawn, butted, heat treated top quality Japanese Cro-Mo tubes - we call it "Thorn 9/6/9".

The Raven Twins have both chains on the same side of the bike, we do this for 3 reasons:-

Firstly, it means that we can use conventional solo chainsets, which we have in a huge variety of different lengths. This also makes the sourcing of spare parts much easier, if you damage a crank whilst on tour. Secondly, having the chains on the same (right hand) side, means that the strain, on the rear bottom bracket, is considerably reduced - which should quadruple its service life! (The rear BB of a tandem was, historically, always a

problem area).

Thirdly, having all the chains on one side, means that there's a "clean" and a "dirty" side to the tandem - this is useful when lifting or storing the machine! We've chosen to fit the most comprehensive set of fittings, ever seen on a tandem frame, these include:-

[1] All Mk3 frames are fitted with S&S couplings (see pages 18 and 19)

[2] V brake bosses, on the back of the 19mm seat stays.

[3] ISO disc mount on the base of the LHS seat stay

[4] Reinforcing tubes to spread the forces, generated by disc brakes, between the seat stays and the chain stays. (Because these tubes also reinforce the carrier mounts, we've also fitted a matching tube on the RHS of the frame - this wouldn't be possible with derailleur gears)

[5] Cast stainless steel guides are used for gear and brake cables/lines, these allow for many different permutations of brake setups (please see "rear disc options"). We fit open stainless guides, for the disc brake line, to make servicing a hydraulic disc easy.

[6] We've fitted 4 bottle bosses on all 4 frame sizes.

[7] We've made provision for the longest possible pump on the top of the base tube.

[8] We fit heavy duty 6mm stainless rear carrier bosses

[9] We have specified 5mm bosses under the bridges for the neat, secure and direct fitting of mudguards.

[10] We use our exclusive cast stainless steel vertical, Rohloff-specific rear dropouts.

[11] All frames have two stainless steel eccentric bottom bracket shells (with stainless steel threads) The rear one provides for drive chain tension adjustment, whilst the front one allows the connecting chain tension to be adjusted.

[12] The oversized seat tubes make for a very rigid and robust frame - we provide shims to allow the fitting of 28.6mm seat posts.

[13] We use integral cast stainless seat clamps front and rear, these tighten up really securely onto the seat posts.

Fork specification

There's now a choice of forks, see A or B

[A] We have our hallmark twin plate crown fork

which is only for use with 26" wheels this features:-

[1] V brake bosses

[2] Reynolds tandem fork blades, which have a legendary balance of comfort and strength.

[3] Our tried, tested and highly acclaimed "twin plate" crown is used... this allows the comfort of Reynolds forks to be retained, whilst making the fork laterally much more rigid, than a (heavier) single crown fork.

[4] Conventional 100mm front axle spacing, which gives a dishless wheel with rim brakes

[B] We have a new disc only fork (see page 7) for use with 26", 650B or 700c wheels this features:-

[1] ISO DISC mount

[2] Extra heavy duty fork blades

[3] Unicrown fork crown.

[4] 135mm front axle spacing—which gives a dishless



front disc wheel.

PLEASE NOTE:

- (i) The disc fork does **NOT** have V brake bosses.
- (ii) The frame's rear V brake bosses are removable but they can **ONLY BE USED** with 26" wheels.

Both forks A and B have the following features that you'd expect from a Thorn.

[5] 5mm bosses are provided under the crown, to allow the neat, secure and direct fitting of mudguards

[6] We've fitted 6mm heavy duty stainless bosses for our Lo-loader carriers - these will allow huge loads to be carried, when necessary, without any fear of shearing the fitting screws.

[7] Bosses are provided, to mount the mudguard stays in an elevated position. This means that, should an object (a stick or drinks can for example) get jammed between the wheel and the mudguard, the gap (between the tyre and the mudguard) will get larger, as the wheel's rotation causes the stays to be bent upwards. Without this provision a front mudguard is a potentially dangerous fitment, or a cause of rattles, if a "break free" fitting is used.



CLICK HERE For THORN MEGA BROCHURE PARTS 1, 2, 3 and 4

This is a very large file (39Mb) it may take a considerable time to open, please be patient.



THORN 135mm FDS (Front Disc Standard) TANDEM DISC FORK

400mm 1 1/8" Heavy Duty Steerer - ED coated.
(Full length not shown)

Stainless M6 Boss for Headlight Bracket

2 x Stainless M5 Bosses on plate under crown for Direct-fitting of mudguard (Not visible)

Heavy Duty TANDEM Fork Blades

Stainless M6 Bosses for THORN Mk5 Lo-Loader

Stainless open guide for brake cable or hydraulic line

Stainless M6 Bosses for mudguard stays

Stainless ISO Calliper Mount Cable or Hydraulic

135mm spacing between stainless dropouts - suits Hope FatSno or Son 135mm FDS Dynohub.
(This allows the front wheel to be dishless - which is much stronger and IMO, is essential on a tandem)

Finish

Our frames are treated and painted, in a modern high tech facility. The frames and forks are first given a multi-stage anti-rust treatment, followed by an etched primer and then they're sprayed in Du-Pont Imron - which is a twin pack epoxy based paint, which produces a tough finish. The decals are applied and then sealed in, with a coat of high gloss twin pack epoxy lacquer, the fitting of an exclusive stainless steel Thorn head badge, is the final detail.

We have 2 very different colour options.

[1] Subtle, refined GUNMETAL GREY. In natural light this has a deep lustre, which hasn't been captured in my photographs.

[2] Totally in your face PURE ORANGE. Again the photos don't show just how bright this orange is. I asked for samples of the brightest non-florescent orange possible. The outdoor, daylight pic on page 30 may help.



Please read the following 2 pages carefully.

If you're cycling in any country and you see a loaded (solo) touring bike with drop bars, it's very likely that the rider is from the UK, or from West coast USA. The rest of the world tends to use straight bars for loaded touring!

In the previous brochure, we had options for drop bars on our tandems.

Rohloff don't make a suitable shifter for drop bars and we don't really like any of the available options - especially on a tandem!

Having used straight bars with bar ends for 16 years now, I would want straight bars on any tandem that I rode - even if a perfect solution for shifting gear with drops was available and suddenly decided that I wanted drop bars on a solo bike again. It's sometimes necessary to take firm control of a tandem, particularly when going slowly in tricky situations and straight bars give far superior control. They also enhance the social nature of riding tandem.

We sold hundreds of our original Raven Twin tandems and I don't remember anyone ever having drops. I made the top tubes shorter on the A frame sizes to make them more suitable for drops - we still didn't sell any with drops! Therefore I've made the Mk3 top tubes slightly longer again, to make them even better with straight bars. In order to make choosing your ideal spec slightly less confusing, I've now removed the options for drop bars. (We could fit them, if you want to be the only Raven Twin team with drops - but NOTE, the pilot's position would necessarily be very sporty)



Fiona using straight bars (Flat Track Bars) with bar ends (above left) and the comfort bars, that she helped us develop (above right).

Fiona and I have used Thorn Comfort Bars + Ergon grips, extensively for cycle camping, mountain biking and for general cycling.

During these activities we do have different hand positions - these are cycling and not cycling!

(Activities best undertaken off the bike, include eating, making tea, resting, looking at maps, examining flora and taking pics of beautiful scenery)

The three most useful positions (with drops) can be duplicated and even improved upon by using "straight bars" and bar ends. On the next page you'll see 4 different handlebar options, here you can see 3 different grip options.

STRAIGHT BARS + BAR ENDS

BAR ENDS are available in many different configurations and materials. Bar ends are biomechanically efficient - particularly when climbing out of the saddle.

Compared to the primary position, bar ends allow a 90° rotation of the wrists, which not only gives relief to the palms, the change also re-orientates the elbows, which then in turn re-align the shoulders, which then use different muscles in the cervical spine. Simply rotating your wrists through 90° produces a completely different position, which helps greatly, especially if you ride for hour after hour without breaks.

Ergon GP5-L grips, with the built in "L" shaped bar end are exceptionally comfortable. **They're our preferred choice for PILOTS for almost every TANDEM TOURING application. NOT SUITABLE FOR STOKERS - The L bend will impede the pilot's thigh.** They offer 4 different positions and the rubber inlays give exceptional grip - even when wearing woolly gloves.

Ergon GP1L grips, these are beyond doubt, the best choice of grip for comfort bars, or when bar ends are not required.

Ergon GP3 grips, these in my opinion the **PERFECT STOKERS' GRIPS** - especially when the pilot has chosen GP5-L



In my opinion, whatever bars have been chosen front and back, it makes great sense to have them the same width. The tandem is then better behaved when being leant against walls.

It's potentially dangerous, when negotiating tight gaps, if the stoker's bars are wider than the pilot's bars.

THORN COMFORT BARS

are 620mm wide and are available polished or anodised black, they were developed by us with input from a senior physiotherapist. They are supremely comfortable, especially when used with Ergon grips, because they have an 18° bend, which puts the wrists into perfect alignment with the forearm and thence with the elbow.

PLEASE NOTE:- only one hand position is available with Comfort Bars.

The bends use up width and there isn't enough room to fit bar ends and average sized hands, onto the relatively short straight section.

COMFORT BARS CAN NOT be CUT to REDUCE THEIR WIDTH.

In my opinion, these bars are the perfect width for relaxed cycling with one single "hands on the grips position". Comfort Bars "sweep back" around 45mm which means that they need a much longer stem, to get a specific reach, than would be used with 5° "straight bars."

Comfort Bars gain around 50mm of height, which makes them an excellent choice, where a very relaxed and thus fairly high position is required.

THORN Mk3 FLAT TRACK BARS I've recently redesigned these bars, they're essentially "straight" bars with a 10° bend.

The bend still starts immediately after the stem. The centre swell length is unchanged - so we still have the longest length of 22.2mm section tube possible, for any given width of bar. They still have a numbered scale etched every 5mm into both ends of the bar, to facilitate shortening them to individual requirements.

These bars are now hard anodised black and 580mm wide, which is wide enough for many tandem applications - Please choose **eXp** bars for **HEAVY DUTY** use.

TANDEM UPDATE:-

Feedback has been extremely positive. I can certainly recommend 550mm - 560mm Flat Track Bars for sporty set ups and 570mm - 580mm Flat track bars for slightly more relaxed set ups.

I suspect that **FFT** bars at 590 - 600mm will prove to be ideal for the majority of riders.



Thorn COMFORT Bars silver or black

Thorn Mk3 Flat Track Bars.
Triple butted AL7075
NOW HARD ANODISED

The scales on both ends of these bars makes it easy to cut them from 580mm to 570mm, 560mm or 550mm

The narrow centre swell gives plenty of useful bar space.



LEFT. Fiona getting her breath back after cresting yet another steep climb, into a raging headwind on Ruta Cuarenta (RN40) in Argentine Patagonia. Fiona's Mk1 FLAT TRACK BARS were 640mm wide, they were fitted with Zoom Ski bends. We would now fit Thorn **eXp** bars and **GP5L** grips to Adventure Touring bikes, Expedition bikes and Expedition Tandems



GP5L Grips

GP3 Grips

FFT Bars
front
and rear

These bars and grips are the ideal set up for both lightweight and for general touring TANDEMS



THORN eXp EXPEDITION HANDLEBARS.
12.5° BEND - 31.8mm CENTRE 680mm to 590mm WIDTH POLISHED and HARD ANODISED

Materials experts have told me that Al 7050 is the best possible alloy, for making a bar, with a long service life, that can survive big knocks.

At 330g, **eXp Bars** certainly aren't light weight but I've done everything that I can do, to make them the most bombproof bars currently available. for Heavy Tandem Touring

I designed our **THORN eXp Bars** for seriously heavy duty use. They are 680mm wide but have scales for cutting them down, in 10mm increments to 590mm. As the bars are not designed to be used shorter than 590mm, I've been able to keep the centre swell sufficiently long, to enable bar bags, lights, cycle computers etc. to be fitted to it. Unlike other Thorn bars, the centre of the bars is 31.8mm therefore an oversize stem is required.

The eXp Bars have been polished and then hard anodised, to give them the best possible protection against corrosion.

The **NEW**, POLISHED and HARD ANODISED **THORN FFT Bars** are the same dimensions as the **eXp Bars** - except, at 620mm, they're narrower. With some set ups, it may be possible to trim them to 570mm but, for most people using a Rohloff shifter, 590mm is probably the minimum possible width.

At 220g, the **FFT Bars** are significantly lighter than eXp bars. I must stress that these bars are ideal for tandem use on sealed roads or on reasonably smooth tracks.

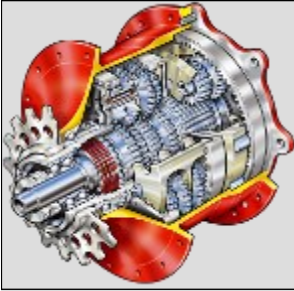
FFT bars are not suitable for heavy duty use - whether that's heavy tandem teams with heavy bags or simply heavy bags on really rough trails - after all, that's why we have **eXp Bars**!



THORN FFT (Fat Flat Track) HANDLEBARS - 12.5° BEND 31.8mm CENTRE 620mm to 570mm* WIDTH NEW!

Don't be tempted to try and save 4ozs each in such critical areas on such a tandem!

WHEELS



Rohloff EX box DISC Hub

I've designed the Raven Twin frames to have the perfect cable routing for the Rohloff EX hub - for the Mk3 we've decided to fit the disc version as standard.

Tidy routing prolongs the service life of the cables and provides a smoother shift. We got Rohloff to make us a special axle plate for our tandems, which allows the EX box to point slightly downwards - when used with our dropouts. This means that water doesn't run down the outer casing of the cables, into the box also, if the box is submerged, water can run out. This axle plate also enhances cable routing.

All Rohloff hubs are hard anodised to architectural quality - this is an expensive process. You have the choice of 3 colours:-

SILVER ANODISED, BLACK ANODISED and RED ANODISED.

See page 24 of this brochure.

A disc hub is essential if you want a rear disc - it also future-proofs your tandem, should you wish to add a rear disc later.

26" Andra 30 Rims

Are fitted for a long and reliable service life, these build into the strongest wheels that we've ever sold. They certainly stand up to tandem expeditions. The Rohloff hub has a very large flange diameter, which means that the spokes are at a more acute angle to the rim. We have got Ryde (the manufacturer) to drill the rear rim specifically for Rohloff hubs. The spoke holes are angled, so that the nipple protrudes through the rim in perfect line with the spokes.

The CSS brake surface

CSS stands for carbide super sonic; tungsten carbide is (apparently) fired at the rim, in a plasma jet at 5 times the speed of sound! At this speed of impact, it fuses permanently with the aluminium. The brake surface is ground smooth and the rim is ready for a really long and hard life.

There are only 2 downsides, apart from the small extra cost; some of these rims, particularly the front, can make the brakes squeal loudly. In a short time, this will diminish and then disappear, provided you continue to use the brakes! I tell you this now, so that you can decide for yourself whether or not, you can

cope with this noise. Not all the rims squeal but it is best to assume that yours will. A paste of sandy mud, applied to the brake surfaces and some steep hills, will hasten the return of harmony. You need specific brake pads for CSS rims. These are included in the upgrade price if you choose this option. The first

set of pads will wear very quickly, as the rims are ground smooth - a second set may never need replacing and ordinary pads can be used if a third set ever becomes necessary.

The other downside to CSS rims is that eventually the brake surface becomes polished smooth. This still gives awesome brake performance in the dry, with almost zero pad and rim wear but in severe wet conditions, braking performance can be drastically impaired.

Without a rear disc brake, we recommend a CSS rear rim and a plain front rim. This means that the Rohloff rear wheel won't need rebuilding for ages and it also means that you'll always have a front brake which works in severe weather and doesn't squeal when new.

With a rear disc brake we recommend having a CSS front rim and plain rear. In severe conditions you can then rely on the disc to stop you. (You could have pair of CSS rims without issue.)

SPOKES

Rohloff's HUB FLANGE warranty is dependant upon their spokes being used - we comply!

We use Sapim stainless DB spokes for the front wheel. We include 3 spare of each spoke - don't lose the Rohloff spares!

The most important ingredient in a wheel.

The "best" hub, the "best" rim and the "best" spokes are items which are often talked about by cyclists. The most important "best" ingredient in a wheel, is the person who built it! Top quality builders cannot make a superb wheel out of dodgy components but they can make a sound wheel, which would last well. However a dodgy builder can make rubbish, out of top quality components. We have the exclusive services of a master wheel builder and that's why many of our customers have travelled continuously, for years, without ever needing to use a spoke key. But accidental damage can mean spare spokes become necessary.

Tubes

We only use top quality tubes in our tandems. There are 2 valves which are used on modern bikes. The Presta valve was designed especially for bicycles and it's much easier to inflate tyres, using a hand pump with this valve.

The Schrader valve was designed for motor vehicles and garage air-lines. It's always more difficult (sometimes impossible) to inflate a tube with this valve, using a hand pump.

The trouble is that in some countries only tubes with a Schrader valve are available. This fact has lead to some very bad advice on forums. The quality of tubes available in these countries is invariably very poor - the rubber does not stretch enough and the valves often pull out. You really do not want to rely on using such tubes. The best advice is to take 2 spare high quality Presta tubes, plenty of patches and 2 tubes of rubber solution. Fiona and I get almost no punctures and when we do, I always mend the tube and replace it, unless it is dark or severe weather has closed in, in which case I use one of the spare tubes and mend the punctured tube later, when it is more convenient to do so. I believe that you'll have few problems, if you take my advice. I'm equally sure you will have problems with Schrader valves, if you don't. If you're cursed by bad luck, you can always have your rims drilled locally for locally available tubes.

Tyre pressures PLEASE READ THIS!

Tyres have a maximum and a minimum recommended pressure; you should consider the implications of different pressures.

Please look at our tyre pressure matrix on the right. Pressure is in pounds per square inch and there are lots of square inches in a fat carcass!

The REAR pressures are the maximum pressures that you should ever put into various width tyres. I've found that my bikes handle best, when the front tyre is at a slightly lower pressure than the rear.

PLEASE NOTE: For reasons, known only to themselves, tyre manufacturers often quote higher maximum pressures, for fat tyres, than any rim can withstand.

SUCH PRESSURES WILL CAUSE THE RIM TO FAIL - YOU'VE BEEN WARNED!

At our stated maximum pressures, the tyres are less able to squirm around on the rims and consequently quicker changes in direction can be made and big, out of the saddle efforts, result in more immediate forward propulsion.

At lower pressures, tyres roll more easily on uneven surfaces, this fact comes as a shock to many cyclists - perhaps the more uncomfortable the ride, the faster they think that they are going? Tyres running lower pressures are much more comfortable to ride.

See **Mega Brochure** pages 36 & 37

Tyres

Tyres make more difference to the way a bike goes and feels, than anything that I can do with frame tubes or frame geometry. There is no "best tyre", just best for a specific purpose. During my years of cycling I have used many different tyres for different purposes.

Fiona and I have been using the **1.6" Marathon Supreme** on our tandem for Audax rides and we find them very quick and adequately comfortable. Whilst I would quite happily use 2.0" Schwalbe Marathon Supreme tyres, at relatively low

WARNING!

IMPORTANT NOTES on TYRE PRESSURES

Pressures are in psi. It may be necessary to over-inflate the tyres, in order to get the tyre beads to seat correctly on the rim.

Once seated, the pressure should be immediately dropped to suit.

Tyres must not be ridden when inflated to higher than MAX pressure - otherwise the rims may be permanently damaged, or fail catastrophically.

The MIN pressures are the lowest pressures that the tyres ought to be run at. Such pressures may be used to enhance comfort or for improved grip on tricky surfaces. When running at the MIN pressures, extra care must be taken to avoid large stones, and potholes - this is especially important if heavy loads are being carried.

At my recommended pressures, you should find the perfect balance, for most road conditions, between comfort, efficiency and reliability.

Andy Blance Mar 2017

TYRE width	TANDEM			
	Recommended Pressure		ABSOLUTE Pressures	
	FRONT	REAR	MAX	MIN
1.35"	72	80	80	50
1.60"	64	70	70	44
1.75"	58	63	65	41
2.00"	50	55	58	38
2.10"	46	51	54	36
2.25"	43	47	50	34
2.35"	41	45	48	32

pressures, for very brisk riding on a solo bike and it may seem counter-intuitive to prefer 1.6" tyres on a tandem for very brisk cycling. **Why is that?**

Tandems are always rev-limiting - I can maintain a cadence of 90-100rpm all day on a solo bike but tandems start to "bounce" at around 70-80rpm. This "bouncing" gets more and more pronounced as a resonant frequency develops. Using higher pressures allows a higher cadence. But when you look at the tyre



Schwalbe Folding Marathon Mondial

In my opinion the **Schwalbe Marathon Mondial** is almost as good an expedition tyre as the excellent but now discontinued Marathon XR.

The Mondial is quite simply the best expedition tyre currently available.

The Mondial needs rough roads and heavy loads to enable its unique qualities to shine through...otherwise it is just too much tyre (865g) and ruins the feel of a lightly loaded bike. **Don't have Mondials fitted, unless you really are going on a big trip.**

Schwalbe Marathon



SCHWALBE DUREME



pressure chart, you'll see that the 1.6" tyres can be run safely at higher pressures. (70psi compared to 58psi) Unlike much of our solo bike riding, our tandem riding has been about riding (or at least attempting!) very brisk cycling. If that was not the case I would have fitted the 2.0" Marathon Supremes and reaped the benefit of the extra comfort and surer grip that they offer.

You must decide whether you really do want to sacrifice some comfort in order to be able to maintain a higher cadence.

To avoid any confusion, I can assure you that the 2.0" Supremes run at 58psi will roll out faster - and be more comfortable, than the 1.6" Supremes run at 70psi.

We've used **2.0" Schwalbe Marathon Supreme** tyres in India, on tarmac which varied from smooth to very broken and they were truly excellent. They were remarkably quick, comfortable and grippy but they could be a challenge in any loose, or slippery, off road situation. If you only cycle on sealed roads, these are probably the ultimate tyre for heavy loads and long distances.

Schwalbe Folding Marathon Dureme

This tyre really could take you anywhere. The 26 x 2.0" Dureme rolls really well, it grips really well, it has a little bit of off road capability, it's exceptionally comfortable and it doesn't take too much energy to accelerate. It's one of the most puncture resistant tyres ever made. The Dureme is also an exceptionally durable tyre.

Plus (Not shown)

I'm not a fan of the 1.75" Schwalbe Marathon Plus Smart guard tyre - it isn't fat enough to be comfortable and simply feels dead and heavy and makes even the nicest bike feel like an old clunker.

The Marathon Plus has its uses though. I have to concede that if I was travelling on glass strewn routes, through dodgy areas of certain cities, I may feel that risking a puncture, was also risking a mugging.

There is no more reliable tyre than the Marathon Plus but faced with the situation above, I'd look for another route, even if it was an extended loop!

I used to hate seeing any new bike leave the shop, with the heavy (890g) Marathon XR tyres on it, even though these were the best tyres we'd ever used on our big trips. I knew how much they sap performance on a smooth road, without a load, which is where the bike was about to make a first impression on its new owner (s). That impression would be entirely different if the bike had 1.6 Schwalbe Supreme tyres. First impressions count and it takes time (or a rough road and a heavy load!)

to create a better one.

Spare tyres

All the tyres that we recommend are highly reliable, for most trips you should not need to carry a spare. If your trip is an epic adventure, you may wish to consider what you will do when you wear your tyres out. Swapping front to rear, every few thousand miles, will help get the maximum life from the tyres. Some trips may be so long that even this will not suffice.

You must then decide whether you will carry your next tyres with you, whether you can purchase new tyres, of suitable quality, en-route, or whether it's best to rendezvous with new tyres at a pre-arranged point.

26" (559) tyres are the most common tyre size in the world.

They're available in every country in the world but some of the tyres you will find will not last long with heavy loads - they will enable you to keep cycling until you can arrange something better though.

Unforeseen events can occur and then we all have 20:20 hindsight.

A folding Marathon Supreme, in either 1.6" or 2.0" takes up little space and makes an excellent spare for most situations.

My

Conventional steel bead or folding bead?

All of my own tyres have folding beads, they save 70g per wheel. However it's not simply the small weight saving that makes me choose them. Look carefully at the Schwalbe brochure and you will see that the folding tyres also use a superior casing and use a superior rubber compound.

ALL THORN BIKES are supplied with folding tyres - because, as I've said, tyres make such a difference to the way a human powered bike rides.



Schwalbe Mondial



recommendation for tyres.

Unless I knew about a specific trip you were contemplating, I'd recommend that you purchase your Raven Twin with 2.0" Supreme tyres and choose 55mm mudguards.

For using a Raven Twin for faster road work on tarmac, in between big trips, my very best advice is to have your Raven Twin supplied with 1.6" supreme tyres and 45mm mudguards and have us supply you with a pair of 2.15" Marathon Mondial tyres.

You can then fit the Mondials for big trips, after removing the mudguards.

Mudguards don't travel well. They also mean that it is difficult to reduce the size of the bike. When on big trips, I've used an Ortlieb dry bag fitted along the length of the carrier as a very effective rear mudguard, which has invariably kept the insert in my shorts dry. The combination of "Crud Catcher" and that necessary evil, the bar bag, has always prevented muck from getting in my eyes or teeth.

In very specific situations, where only sealed tarmac roads are to be used, the 1.6 Marathon Supreme could be the ultimate long distance touring tyre for your Raven Twin.

BRAKING.

Tandems are quicker than Solo bikes on the flat, they're significantly quicker than solo bikes down hills.

As weight of two riders on a tandem is also considerably more than that of a single solo bike - it follows that tandems need to have the best possible brakes.

"V" BRAKES Vs DISC BRAKES

For every day use and for touring, we prefer the simplicity, ruggedness and ease of maintenance of V brakes. We even prefer the "feel" of top quality V brakes.

We have rims available, with a tungsten carbide braking surface, which provides fantastic braking combined with exceptional longevity.

People say that it's about time that bikes caught up with cars and motorcycles, which all now use disc brakes. There's no doubting the improvements to braking performance that disc brakes have made to all forms of motorised transport. However these vehicles have moved from drum brakes to disc brakes. Bicycles have been using disc brakes for more than 100 years. Bike rims are disc rotors - but instead of having large 550+mm aluminium discs, bikes are now being offered with 160mm stainless steel discs.

There's no doubt that hydraulic disc brakes are preferable to V brakes in the deep, muddy conditions often found in UK mountainbiking. They are, however, more easily damaged (especially in transit) and a bent rotor is much more difficult to straighten than an "out of true" wheel. Indeed, if the rotor is warped enough, the wheel won't even turn! Don't compare the 8 to 10mm thick, cast rotors, found on modern cars and motorcycles, with the 2mm thick, stainless steel plate, rotors found on bicycles.

Our bikes use raked fork blades, these are exceptionally comfortable, they will withstand the forces of cycling (and have done so for generations) but raked forks will not withstand the forces generated by a disc brake, which are very different to the forces generated by V brakes, even at the same rate of retardation.

In recent tests on a 1Km long 25% gradient, I determined to my satisfaction that a well set up V brake will stop a loaded tandem from speed more positively than a 203mm disc brake.

This is not the whole story though - clearly there is rim wear Vs rotor wear to consider. We've been advocating using 3 brakes on a tandem for 30 years and we've been selling tandems with 2 V brakes and a supplementary rear disc for over a decade.

I have bowed to pressure and introduced the option of a tandem disc fork. This is very heavy duty and 135mm wide, so that there's no dish in the front wheel, it will stand up to the forces involved but it's significantly less comfortable than our twin-plate crown V brake fork.

So you can have a Thorn tandem with 2 disc brakes but I recommend that you don't have it! It may seem odd to take the trouble to make the best possible disc fork and then try to persuade customers not to buy it - but that's us! I made the disc fork for 2 reasons, firstly, I'm sure that some people thought that the advice was given because we couldn't supply a disc fork - well we can and the advice is still the same!

The second reason is that some customers have said that they'd like a 650B tandem and others want to run 700c. Well they could now if they wish but only by having 2 disc brakes. Perhaps it may make sense to some customers to have one of our sturdy frames and bomb-proof Rohloff hub built as a sporty, high performance 700c machine?

If you must have 650B wheels, nobody makes a suitably strong 650B rim brake rim, so you must have 2 disc brakes. If either of these options appeal to you and you'll ride in hilly terrain, please choose the Hope 203mm ventilated upgrade [DD] rather than the 203mm TRP option [CC] see page 28

V Brakes

We decided that it makes no sense to fit anything other than the best V brakes available to the Raven Twin Mk3 tandems. It's currently beyond doubt that the best V brakes are

Shimano XT.

The XT V brake pivots in bronze bushings and has longer, forged arms to provide more mudguard clearance than other V brakes.



Shimano XT

levers last a long time and have a superb feel.



Rear Disc Brakes for tandems.

Tandems weigh more than solo bikes! Clearly there's considerably more mass to stop but also bear in mind that, when descending steep hills, tandems can reach a much higher terminal velocity than a solo!

We've spent much time evaluating various disc brakes on Crowcombe Hill, which is local to us and is 25% for most of its 1km length. If you didn't brake, until the bottom, you'd reach over 65mph. I know this is correct - because I've done it! As long as they're adjusted correctly, the standard XT V brakes will bring you to a stop from this speed and your rims will be merely "quite hot".

If you decide that you want to descend at a more cautious 20mph, you would generate so much heat, that you are very likely to melt the seam in your inner tubes, which would cause a blowout (Instant deflation of the tyre) which may lead to catastrophic loss of control. The safest way to descend this hill, on a tandem, is to let the machine roll up to around 40mph, brake hard down to 10mph and let it roll up to 40 again, which will cool the rims. You must be prepared to repeat this procedure, as often as is necessary.

If this sounds scary and you are unwilling to adopt this procedure, or if you intend to ride an outfit with a particularly heavy overall weight, down long and/or steep hills you need to do one of the following:-

[1] Change your plans and avoid hilly terrain otherwise be prepared to walk down any steep hills, that you fail to avoid.

[2] Stop frequently, to let the rims cool.

[3] Have a supplementary 203mm cable operated TRP rear disc brake and learn to alternate the braking between the 3 brakes.

This is best achieved by using just the front brake for a while, then using just the rear disc, whilst the front rim cools down and then use just the rear V brake, whilst the front brake and rear disc cool down, then use just the front brake - etc. etc.

This configuration (Brake option C1 page 28) is our most highly recommended brake option for most crews. It's especially suitable for long distance touring as, if you have any issues with your rear disc (damaged rotor? Worn out pads and no spares?) you can easily route the rear V brake cable to the (now unused) rear brake lever and continue your ride, with caution, using strategies [1] or [2]. It's also incredibly easy to make full use of the S&S feature of the Mk3 frames with a cable operated rear disc - we have simple, quick and easy to use cable splitters that do the job perfectly.

[4] Dig a bit deeper into your pockets and fit a supplementary 203mm Hope hydraulic ventilated rear disc brake and use that on it's own for most of your braking but you must give it chance to cool down by using the front brake alone for short periods of time. The rear V brake is unlikely to be needed - except in

emergencies, which is why it makes the most sense to have it on a ratchet thumb shifter so that it can earn its place as a parking brake. Bear in mind that it takes quite a bit longer and is more of a hassle to separate an S&S tandem with a pilot-operated hydraulic disc brake than it does with a pilot-operated cable disc brake.

We spent a lot of time evaluating various disc brakes. All bicycle disc brakes are (or have been) developed from disc brakes, designed for mountainbiking racing. The very essence of racing, is to go faster than others - you don't win races with unnecessary heavy braking! MTB brakes are designed to loose a lot of speed, in a short time. They do this well. We set fire to rear MTB disc brakes inside 200m, when using them as the sole means of holding our tandem at 10mph, down Crowcombe Hill. We tried every brake that we could lay our hands on. Every manufacturer said "No worries, our brake will do the job." None ever did. Even the 6pot, 203mm Hope world class downhill MTB racing brake burned out, within 400m and I was having to use both hands on the lever after 300m. If the brake burns out, it is almost useless, even when it has cooled - what do you do then, if you're riding in Mountains? Walk down everything? Sometimes, when a brake overheats and you release the lever, the fluid boils inside the line, turning to a gas. Gasses compress, whereas brake fluid doesn't - so the transition, from poor brake, to no brake at all, is almost instant - do you continue overheating the brake, risking burnout, or do you release the lever, risking total rear brake loss? **This is a serious dilemma and one which is best avoided!**

The tandem market is too small for any disc brake manufacturer to be interested in and for years the 6pot Hope was the best we could offer. However Alpine MTB events became really popular in Europe (some of them are 3 day events and require camping kit to be carried) and guess what? **As soon as mountainbikers tried to hold loaded MTBs back, on exceptionally long, steep**

We fit the front brake to the RHS, in the UK. If you want it on the LHS, please make certain that we know this!

Be warned, the Hope hydraulic disc brake we supply, needs to be so big and powerful in order to be able to dissipate heat. It's much more powerful than could ever be needed, simply for stopping - it can lock the rear wheel, at any speed, if too much force is applied.

descents, they too burned out their brakes!

Hope were quick to develop brakes for this market. Their V2 brakes have massive ceramic pistons, which help to prevent the fluid behind them, from boiling. The biggest improvement however, is that Hope have made a ventilated rotor available, this has a double skin rotor (look closely at the pic) which presents a much larger surface area to cooling air.

With this brake only, we're able to hold 10mph for almost 800m down Crowcombe Hill, on just the rear brake. I believe that this brake is good enough for us to withdraw our previous caveat:- that we would not supply a tandem, which only had a disc for a rear brake. Hope make every part of their brakes themselves. They produce them remotely, from a keyboard, using CNC machines. Because of this, they will always have spare parts for every disc brake they've ever made, or will ever make. The Hope Disc upgrade is very expensive but it really is top quality kit, which is designed to last and is designed to be serviced either by themselves or by the customer which, in my view, makes it genuine value for money. (They have excellent video clips on their website)

There are many permutations and combinations, regarding the positioning of the brake levers,

all! This is not sexist or elitist, it is common sense. You don't let somebody else have a brake, when you're driving, why should it suddenly be a good idea on a tandem?

There are some situations, which a pilot must be trusted to have been monitoring, where suddenly losing the ability to get beyond a hazard may prove fatal - imagine the following scenario:-

You're descending a steep hill and there's a vehicle parked on your side of the road, which will require you to pass it on the other side of the road. There's a stream of traffic coming towards you. You've made the calculations and you know that you'll be back on your side of the road before the traffic reaches you. The oncoming drivers see what you're doing and make their own calculations. You all know what you and the other parties are doing and there's no danger. You've passed the point, where you could stop behind the parked vehicle, when your stoker suddenly looks up and, seeing a vehicle heading for you, panics and brakes hard. You may crash immediately as a result of the rear wheel locking up. If the leading oncoming vehicle slams on their brakes and, if your stoker releases their death grip on the rear brake, you may somehow manage regain your side of the road, without hitting the stationary vehicle, or the oncoming vehicle. You may still be doomed, because one of the following cars may be caught off guard by the leading vehicle's emergency stop and may swerve into you, to avoid rear ending the vehicle in front.

Still not convinced? You're braver than me!

Feel free to choose one of the other options.

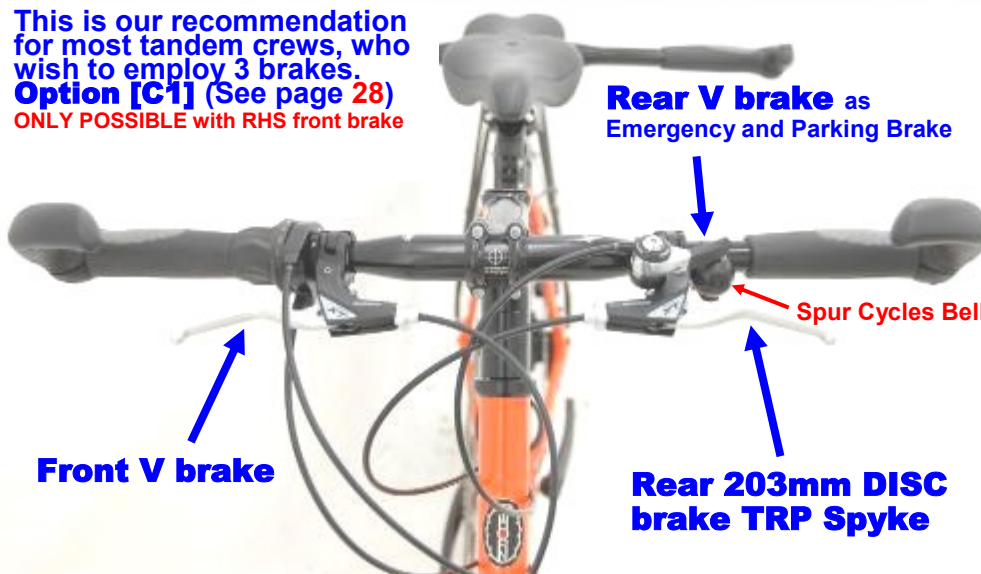
Our preferred options [C1] and [H1] with sighted stokers, is to have the pilot operate the front brake, on the side they normally have it - have the shifter on that side too. Then have the rear disc, also operated by the pilot, on the other side of the bars and finally, have an emergency rear V brake, operated via a thumbshifter, on the same side as the disc brake. An emergency brake may be useful, if you damage your disc, wear through the pads, or whatever.

You may need to employ 3 brakes, in rotation, on a really steep and tricky descent, when heavily loaded - you can still use the thumbie for this. On a long tour, you may wish to carry the spare V brake lever (you have to buy them in pairs, so we supply you with it in any case!) this'll allow you to have two conventionally operated V brakes, if the disc packs up. The ratchet thumbie must never be applied and forgotten, as it will overheat the rim - believe me, some hills are steep enough to make you unaware that this brake is partially on! You may never require the emergency brake but the thumbie does have one really useful function, which you will use most times you ride - it makes an excellent parking brake and ensures that the bike will stay put, whenever you lean the stoker's handlebar against any immovable object.

In the case of a blind stoker, there's absolutely no problem in letting them have the disc, if they are experienced stokers or cyclists. As they're seated above the disc, they almost certainly have a finer degree of control, than you could have. You just need to ask them to apply as much, or as little brake as you deem necessary.

You'll always be able to execute an emergency stop with the 2 rim brakes that you control.

This is our recommendation for most tandem crews, who wish to employ 3 brakes. Option [C1] (See page 28) ONLY POSSIBLE with RHS front brake



when 3 brakes are being used. These can be read about briefly on page 28.

Most crews are advised to have straight handlebars and our favourite methods for straight bars are:- **For stokers with sight, we recommend that they don't have control of a brake at**

The tandem below, the size we expect most crews to want M/M, it has most but not all, of the recommended upgrades, to produce the ultimate Sports Touring Tandem... Perhaps you would prefer a more sporty build? Perhaps you would prefer a heavier duty build for expedition touring?



We'll build *your* Raven Twin Mk3 the way that *you* want it!

Perhaps you'd like to have all the upgrades? It could have another pair of bottle cages, and computer. Not all stokers want or need a suspension seat post



There's no standard specification of Raven Twin.

Even at the start price, there are many different choices you must make.

Helpful advice is always available from our bike sales team - if you require it.

There are no duff components anywhere on a Raven Twin, we supply a very high quality headset, good quality bottom brackets and reliable chains.

You couldn't find higher quality chain rings anywhere.

We use only the finest cables and we don't skimp on the tyres, tubes or rim tapes either.

Mudguards are included at the start price - pedals, pumps bar ends and carriers are not.

You may choose your own personal specification, from the items on pages 27, 28 and 29 of this brochure.

I hope the information, given in this brochure is helpful.

Your Raven Twin should last you a

lifetime and it will bring you untold pleasure.

Whilst it's less expensive to upgrade, or change, components, when you buy the bike, than it is afterwards - you can always upgrade components later, if you wish, or if you decide to focus it differently, or when you have more money!



A nice looking Mk2 Raven Twin

Most of the cost of a Raven Twin Mk3, is in the frame and the Rohloff hub - you'll get excellent value for money from these items!



Andy B and partner, Fiona on their original size #8 Raven Twin.



A proud crew with their Mk1 Raven Twin S&S



James and Paula on a Mk1 Raven Twin

Cranks and Crank lengths.

A crank is simply a lever. A lever to which you attach the chainring and the pedals. The ideal length of the crank depends upon the length of your legs. If your cranks are too long - your knees will have more of a bend in them, when the crank is vertical and you're more likely to suffer injury. If the cranks are too short, you may not be making power as efficiently as possible.

A trick for tandem crews of mixed ability

Often the pilot is a more experienced cyclist than the stoker. Stokers often complain that the cadence (crank revs per minute) is too high for them and ask the pilot to change up a gear. This may not suit the pilot, who may then fear for their knees. We've found, in these circumstances, that if the pilot chooses cranks which are 5mm longer than they'd normally use and if the stoker has cranks which are 5 to 10mm shorter, than would normally be suggested, the problem is diminished considerably. The longer cranks maintain a higher leg speed, at the same rpm and the shorter cranks reduce the stokers leg speed, at the same rpm.

On easy, flat terrain, a touring solo cyclist may perform 300 reps, with each leg, for every mile covered. (about 190 per kilometre) That's a lot of reps over a lifetime of cycling - it's important to make sure that you look after your knees! The old "rule of thumb" was that the length of your cranks should be around 20% of the length of your legs. Some rules of thumb are more helpful than others - unfortunately this isn't one of them.

Men of above average height, or with above average length legs, should use 175mm cranks, as should women with, legs this long.

Men of average height, with average length legs, should use 170mm cranks, as should women, with legs this long.

Women of average height and leg length (and men with shorter than average length legs) will benefit from using 165mm cranks.

We've been able to have some fairly nice quality cranks made for us and we've been able to have these drilled in 150, 155, 160, 170, 175, 180 and 180mm lengths.

Customers with short legs should choose 160mm cranks.

Our cranks use a "conventional square taper" BB. When a BB unit become worn out, it creaks and squeaks, I've never heard of one failing in the sense that it stops working. Believe me, your BB will let you know when it needs replacing. If that's in the third world, don't worry, the 2 degree square taper design has been around for years and has made it across the globe.

Crank choices can be seen on page 28.

Chainrings.

We've had chainrings made especially for us. These rings are exclusively for hub or single geared bikes. They have very special shaped teeth - long deep teeth, designed for maximum service life! These rings would be useless on a derailleur bike.

We have 104bcd which fits our own Thorn cranks. Our chainrings are made from 7075 series aerospace alloy - you couldn't find better!

They're also double sided, that is, you can wear them into a hook shape, then turn the ring around and get some more wear out of them. You'll see that we offer a huge range of sizes, you can choose the range of gears that will suit you both and the type of cycling **you both** prefer.

GEARING

The advice given to a tandem crew is different, to the advice given to solo riders.

For the majority of riders, it's not possible to have a gear which is too low on a tandem!

Unfortunately it's also not possible to have a gear which is too high either! Regrettably, it's not possible to have both and a **compromise** needs to be struck, there are 2 reasons for this:

[1] Tandems are much more efficient than solos - almost twice the power, with less than twice the weight, combined with aerodynamics which are only slightly poorer than a solo. This makes tandems very quick. We can maintain a speed on the flat which is around 5mph quicker than either of us can manage on a solo. Downhill, the difference is significantly greater than that!

[2] It's not possible to maintain the same high cadences on a tandem, as it is with a solo. Fiona and I can pedal comfortably at 100rpm on our solos but we max out at about 75 rpm, on our tandem. (See 1.6" Schwalbe Supreme tyres on page 11 where I explain the main reason for this) Fiona and I like to ride tandem for the sheer pleasure of going quickly. We're prepared to freewheel down hill but we want gears which allow us to go as quickly as possible on the flat, with a favourable wind. We've compromised with gears that are about 12% higher than the gears we use on lightweight sporty solos. This does make steep hills a bit of an issue for us but that's our choice I've written a lot about gearing, which you can read in our "Living with a Rohloff" brochure.

The Rohloff hub has an overall range of 526%. That is, the bottom gear gives more than 5 times the leverage of the top gear.

Or think of it like this, at the same speed you have to pedal more than 5 times faster in bottom gear than you do in top.

The old "Ordinary" bikes (Penny Farthings) used to have the cranks connected to the front wheel, without



gearing -

one rotation of the cranks was one revolution of the wheel. Riders use to talk of the size of the wheels in inches (taller riders could pedal a bigger wheel). The single geared safety bicycle was invented when chain technology allowed a chain ring to drive a sprocket. The safety aspect was that the rider was not way up in the air and now had brakes which worked. Riders used to calculate the gearing and refer to it as if was the actual size of a wheel. i.e. a 2:1 gear ratio on a 26" wheel produced the same gear as a 52" Penny Farthing. In much of the native English speaking world, we still use this system today.

11th gear on the Rohloff is 1:1 direct drive. Therefore if you divide chainring teeth by sprocket teeth and multiply by the wheel size you get **11th gear in inches.**

If you multiply this by 0.279 you'll get **bottom gear in inches.** If you multiply bottom gear by 5.26 you'll get **top gear in inches.**

You don't need to do any of this because I've made the GEAR CHART on page 17

With tandems, the lowest gear that Rohloff say you're permitted to use is a 2.5:1 ratio between chainring and sprocket size - for example:- 43t chainring and a 17t sprocket gives:- Bottom =18.4", Top = 96.6" (with 26" wheels)

With a 19t sprocket you could use a 48t sprocket, which gives almost identical gears to those above but gives longer chain life. This should allow you to climb just about anything

but won't be high enough, if you want to go as quickly as possible, especially when prevailing conditions and terrain are favourable to you.

Purely for reference, here are 2 examples of the gears used on a modern derailleur bike.

A modern MTB with an 11-34 cassette and 22/32/44 chainrings has a bottom gear of, $22/34 \times 26 = 16.8"$ and a top gear of, $44/11 \times 26 = 104"$

A modern sports bike may have a 34/50 chainset and a 12-27 cassette with a 700c wheel, it therefore has a bottom gear of, $34/27 \times 27 = 34"$ and a top gear of, $50/12 \times 27 = 112.5"$

With a Rohloff hub, you can have pretty much whatever gearing you require but top will always be 526% higher than bottom.

Recommended gearing.

I get asked frequently by customers, what I'd recommend. I then ask if the customer is happy with their current gearing, they say "yes" or no, they'd like it to be different in some way. (Higher or lower)

I then ask what gears they are currently using and most people just don't know.

I do know that cyclists' ideal choice of gearing varies hugely, from person to person, how am I supposed to know what would suit this customer?

To work out what gears you currently have, turn the bike upside down, be prepared to get your fingers dirty and count the teeth - then double-check - before you wash your hands!

Sometimes customers don't have bikes, that they can check the gearing of, so here are my rules of thumb. For Rohloff tandems.

Two experienced fit cyclists, who are seeking to make the absolute most of a tandem's potential to go quickly, who avoid carrying loads and also avoid cycling up really steep hills (or who are prepared to walk up them if necessary) who also want to pedal down most hills may need the highest gear we can offer, which is **50 x 15...Bottom =24.2", Top = 127.1"**

If you're fit cyclists, seeking to enjoy a tandem's potential to go quickly, you avoid carrying loads and you also generally avoid cycling up really steep hills but are prepared to walk up them if necessary. If you're prepared to freewheel down steep hills, **50 x 17** should be a good gear for you. **Bottom = 21.3", Top = 112"**

If you wish to cycle over, whatever hills you come across and you cycle in hilly areas and you wish to try and do this, with whatever kit you have on the bike and you're prepared to freewheel down any noticeable hills, **my advice is - gear as really low - perhaps 43 x 17...Bottom = 18.4", Top = 96.6"**

Or potentially even better (?) see yellow box 46 x 19...Bottom = 17.6", Top = 92.3"

If you're a trim, elderly couple, who still love to cycle in the hills, you may wish to consider what I say on page 17

For the majority of tandem crews, I suggest that **47 x 17** is the **perfect compromise** of all the various conflicting considerations.

47 x 17...Bottom = 20.0", Top = 105.5"

You may have to walk up very steep hills but you'll be able to take advantage of tail winds.

It doesn't matter if the gearing is wrong when you buy the bike; it's very easy and relatively inexpensive (Free inside the first 100 days!) to raise or lower the gearing.

We like to send our bikes out with a 17t sprocket because the chain will last longer than if you use a 16t sprocket and much longer than if you choose a 15t sprocket!

PLEASE NOTE that with a large chainring, you have less ground clearance, which needs to be taken into account when pushing the tandem up kerbs etc. However a large chainring is necessary if you want high gears.

We fit KMC Rohloff specific chain throughout the transmission of Raven Twins.

	Gear	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Number of teeth on chainring x number of teeth on the sprocket	41 x 19	15.7	17.7	20.2	22.9	26.0	29.6	33.7	38.3	43.4	49.4	56.1	63.7	72.5	82.3
	42 x 19	16.1	18.2	20.7	23.5	26.7	30.3	34.5	39.2	44.5	50.6	57.5	65.2	74.3	84.3
	43 x 19	16.5	18.6	21.2	24.1	27.3	31.1	35.3	40.1	45.5	51.8	58.8	66.8	76.0	86.3
	44 x 19	16.9	19.0	21.7	24.6	28.0	31.8	36.1	41.0	46.6	53.0	60.2	68.3	77.8	88.3
	45 x 19	17.2	19.5	22.2	25.2	28.6	32.5	36.9	42.0	47.7	54.3	61.6	69.9	79.6	90.3
	46 x 19	17.6	19.9	22.7	25.7	29.2	33.2	37.8	42.9	48.7	55.5	62.9	71.4	81.3	92.3
	47 x 19	18.0	20.2	23.2	26.3	29.8	34.0	38.6	43.9	49.8	56.7	64.3	73.0	83.1	94.4
	48 x 19	18.4	20.8	23.6	26.9	30.5	34.7	39.4	44.7	50.8	57.9	65.7	74.6	84.9	96.4
	43 x 17	18.3	20.8	23.7	26.9	30.6	34.7	39.5	44.8	50.9	57.9	65.7	74.7	85.0	96.5
	44 x 17	18.8	21.3	24.2	27.6	31.3	35.4	40.4	45.9	52.1	59.3	67.2	76.4	87.0	98.8
	45 x 17	19.2	21.7	24.8	28.2	32.0	36.4	41.3	46.9	53.3	60.6	68.8	78.2	88.9	101.0
	46 x 17	19.6	22.2	25.3	28.8	32.7	37.2	42.2	47.9	54.5	62.0	70.3	79.9	90.1	103.3
	47 x 17	20.0	23.2	25.8	29.4	33.4	38.0	43.2	49.0	55.7	63.3	71.8	81.6	92.9	105.5
	48 x 17	20.5	23.7	26.4	30.1	34.1	38.8	44.0	50.0	56.8	64.7	73.3	83.4	94.9	107.7
	50 x 17	21.3	24.7	27.5	31.3	35.5	40.4	45.9	52.1	59.2	67.4	76.4	86.8	98.8	112.2
	50 x 16	22.7	25.7	29.3	33.2	37.7	42.9	48.8	55.4	62.9	71.6	81.3	92.2	105.0	119.2
	48 x 15	23.2	26.3	29.7	34.0	38.6	43.9	50.0	56.7	64.4	73.3	82.9	94.3	107.5	122.0
	50 x 15	24.2	27.4	30.9	35.4	40.2	45.8	52.1	59.1	67.1	76.4	86.4	98.3	112.0	127.1

26" wheel gear chart for TANDEMS with Rohloff hubs

All the gear combinations shown in the white, yellow and pink rows are APPROVED for use on TANDEMS, by ROHLOFF. (See page 16)

All the gear combinations shown in the white rows are recommended by THORN.

The 47 x 17 combination in the pink row is an ideal compromise for the majority of tandem crews.

The gear combination in the pale yellow row will wear chains and sprockets more quickly and gear combinations in the bright yellow rows will wear chains and sprockets quicker still - however you will have to accept higher wear, if you demand these very high gears.

The gear combinations in the red rows may be exactly what you need if you're an older crew but they're nevertheless not approved for tandem riding by Rohloff - even if you're still slim - despite Rohloff allowing significantly lower gears on powerful E-bikes with 250W motors - go figure and then make your own decision! I can confirm that we have 41 and 42t rings available.

For convenience, the green column shows 8th gear (which is the lowest of the silent gears).

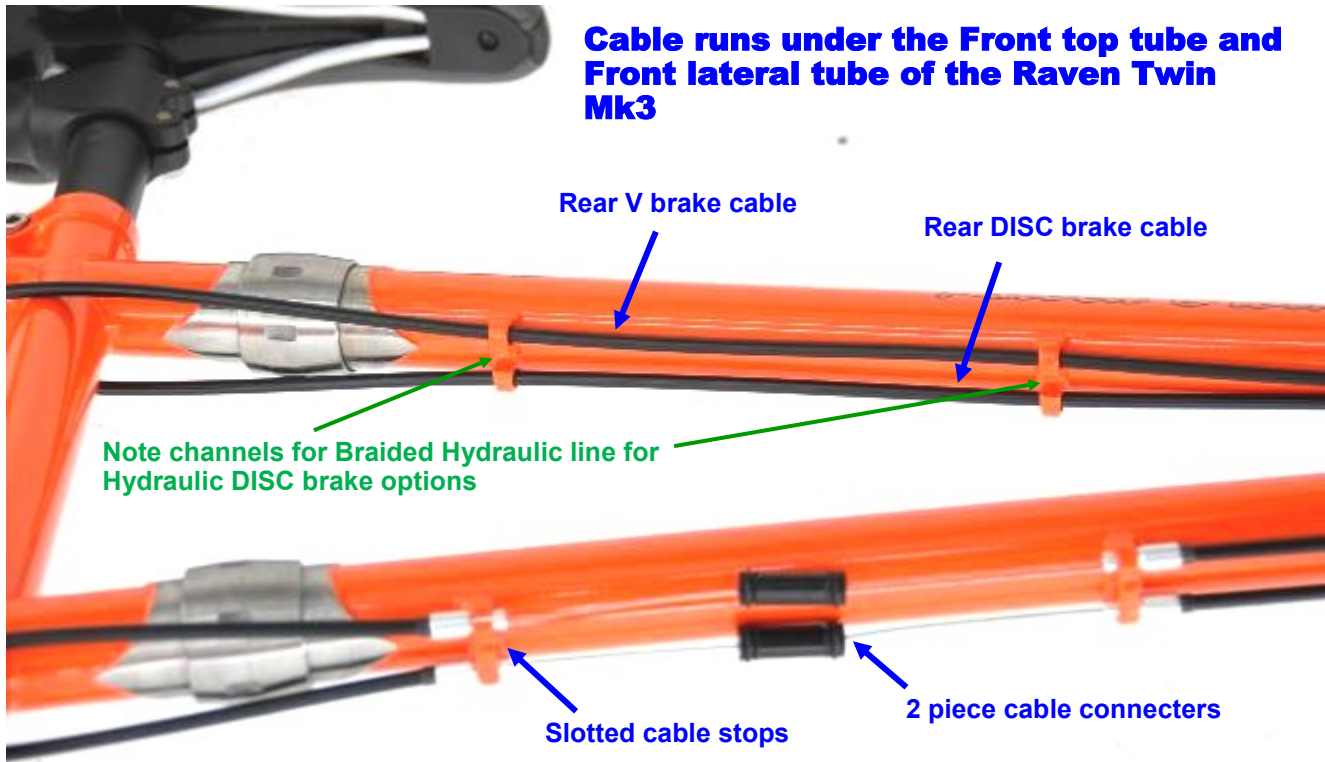
The blue column shows 11th gear which is direct drive and is marginally the most efficient gear.

I've not included 48 x 16, which is possible, because this means that the sprocket revolves exactly 3 times faster than the chainring, which in turn means that every 3 revolutions the same teeth on the sprocket and chain will line up with each other, at the same point in the power stroke, which will tend to cause irregular wear.

You may wish to skip or ignore the next bit!

For the longest theoretical service life, choose 2 prime numbers 47 x 19; 43 x 17 or 47 x 17 or numbers which have a large prime factor (e.g. 46 can only be broken down as far as 23)

(In the case of 47 x 19 it would take 893 revolutions before the same teeth lined up again, which is around once every 3 miles at a moderate pace)



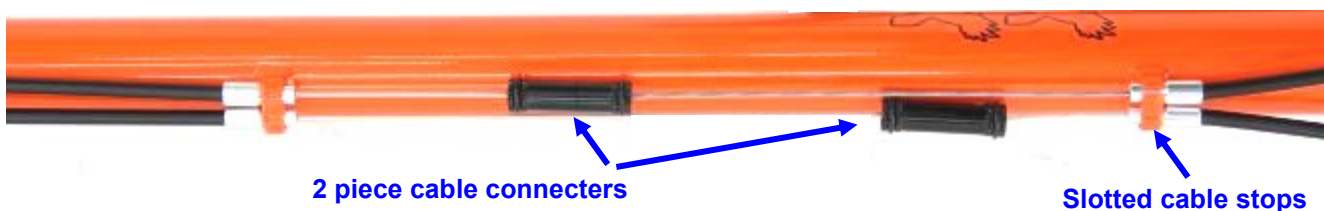
Rear Brake cables run under the top tubes and separate at the REAR.



Gear cables run under the lateral tubes and separate at the FRONT

Brake cable runs under Rear top tube of the

Raven Twin Mk3



All Mk3 frames have S&S Couplings.

Demand was so strong that we sold out of the S&S option with the Mk1 and Mk2 frames. Almost everybody wanted S&S - who can blame them it can be very handy to be able to make a tandem shorter than a solo bike!

We've always thought that it makes the most sense to make the frames so that the front comes off, rather than have 2 equal size sections, this way you can leave the dirty, messy chain on the dirty, messy chainrings and thereby avoid dirty, messy hands when you reassemble it.

It's simplicity itself to separate the front from the rear when

using a cable operated disc brake - see the diagrams above.

Separating the frame when using a hydraulic rear disc is a bit more work. The Hope lever is removed from the handlebars, which is easy thanks to the 2 piece clamp. The braided Hydraulic line is pulled from the channels which run between the cable guides on the front part of the frame, which I designed for it to run in and the lever stays with the rear part of the frame. The Hydraulic line runs through guides at the rear of the frame.

With the cables out of the way, it's easy to unscrew the couplings with the supplied tool.
(Please see the [next page.](#))

All the Raven Twin Mk3 frames are built with S&S couplings installed.

We've never had, or heard of, a single failure of S&S couplings. The frame is stronger with them, than without and they'll outlast even one of our frames!

Our tandems are very long - up to 2550mm but, with the front removed, they're all shorter than a solo bike! This can make it easier to transport a tandem than a pair of solo bikes.

Please note that there is no way that the Raven Twin Mk3 could ever fit into a pair of S&S boxes or backpacks.

Uncoupling the frames.

Here you can see a former mechanic showing how easy it is to uncouple a Mk3 with a V brake and a cable disc brake (Option C1 pages 13 and 28)



[1] (Above) The cable connectors are undone and the ferrules pulled out of the cable stops

[2] (Below) The brake and gear cables are separated and the couplings are now ready to be undone.



There are many upsides to having S&S couplings and only 2 downsides to them, the downsides are:-

- (1) You have to check them for tightness every day - which is no big deal.
- (2) They add about 650g to the frame, including the special cable guides and joiners.

The previous Raven Twins were available both with or without couplings.

We sold out of the S&S frames very quickly - (almost) everybody wanted an S&S coupled tandem. I avoided the problem altogether this time by making S&S couplings standard fittings on the Raven Twin Mk3.



[3] (Left) Standing on the chain ring side of the tandem, the supplied tool is engaged, whilst using the left hand to prevent the tool slipping, he pushes down on the tool and **loosens** the coupling. This operation is repeated on the other couplings.

[4] (Right) Look at the extreme high quality of the machining - once the first coupling is undone. **The other couplings are undone and...**



...[5] Voilà!





Suspension seat posts

If the stoker needs a suspension seat post, the **Cane Creek Thudbuster LT (Long Travel)** is the best suss post ever made, its parallelogram movement means that the distance between the Stoker's saddle and the pedals, doesn't vary much, even when the post takes out a really big bump.

If there's insufficient space to fit the **LT** when we come to build your bike, we'll fit the **Thudbuster ST** instead (Short Travel).

Whilst the **ST** is not quite as effective as an **LT**, it's better than anything else on the market that would allow the stoker's set up to be achieved.

The Thudbuster LT only weighs 450g, so it only increases the weight of the machine by 200 - 250g.

SADDLES

There's one question that I can never answer, "Which is the most comfortable saddle?"

This would be an easy question to answer - if only somebody made a saddle which was the most comfortable for everybody - but nobody does - and nobody could! Our anatomies are unique to us. Customers come to the showroom and press their thumb down into saddles and suck their teeth. If that was a valid test, most cyclists would choose a gel saddle. In fact I believe that almost everybody would find a gel saddle very comfortable, for a short period of time. I've yet to meet the person, who's happy to ride on one, for any great distance.

We sit on our "sit bones" which are a part of our pelvis called the **ischial tuberosities**. To protect the overlying muscle and skin from pressure, the tuberosities are covered by a fat pad, the "bursa". By supporting the weight of our bodies on these bones, we protect the delicate structures between and in front of them (our perineum) from pressure, which could cause bruising, numbness, pain and could possibly lead to problems of swelling and infections.

Men's Velo



Women's Velo



duration of the exercise. If too much is done too quickly, the bursas can become painfully inflamed, (bursitis).

With a gel saddle, your bones sink further and further into the gel and you end up supporting your weight on the soft tissue. Add to that the absence of fresh air and you get sweaty too, which does nothing to alleviate the problem. With a firm saddle your sit bones take your weight and prevent it from being borne, by the area of your anatomy least capable of doing so.

Our **Thorn Velo** saddles have a firm, but yielding plastic base and dense padding, you don't sink too far into them.

We think that they are excellent saddles to find as original equipment on any bike.

Many cyclists find the **San Marco Rolls** saddle very comfortable, it is beautifully made with leather "upholstery" over dense foam. The Rolls is one of a small number of saddles which have remained fundamentally unchanged for decades. We buy the Classic saddle for use as OEM on our bikes. This means that the Classic finish costs you considerably less than the myriad of other finishes available on the San Marco Rolls.

If you get on with a Rolls - you'll have a good friend for a very long time.

Why are women's saddles shorter than men's?

Neither Fiona, who's a senior physiotherapist, nor anyone else I asked, could offer an anatomical reason. Shortened ladies saddles first appeared in Holland, where it was commonplace for women to ride in cycling skirts. Dutch ladies bikes have a very short reach and, upon dismounting, cycling skirts often became hitched up on the saddles. Obviously women needed shorter saddles! Few women now ride in skirts. But designers have remembered that women need short saddles, without remembering why and so the myth persists. Does it matter? Yes - the rails of top quality saddles are actually springs. Springs provide comfort.

Short springs are stiffer than long springs.

Short saddles are therefore far less comfortable than regular saddles.

Ladies, don't assume you need a short saddle. Female sit bones are generally further apart than male sit bones - In all probability, you simply need a wider one.

Brooks leather saddles.

Brooks saddles have two reputations:- they're famous for being extremely comfortable - they're also infamous for being excruciatingly uncomfortable - I find them very comfortable!

The firm hide supports the sit bones, you gradually break the saddle in, to your shape and you gently condition your bursae to the shape of the saddle.

A great many people find their dream saddle with a Brooks - but usually only once it's broken in.

Why try a Brooks?

If you like your Brooks saddle, you'll not only be very comfortable, you'll also have the most robust saddle possible and it'll last ages. If you bond with your Brooks, I advise breaking in a second one, on short journeys, because even Brooks saddles

don't last for ever. With a back up Brooks saddle, you'll never be faced with the prospect of a big ride, on an unbroken saddle. Once you're happy with your first Brooks, you could consider a lighter Brooks saddle, with **titanium rails**; which have even more spring.

We can sell you a bike, equipped with a Brooks B17 saddle upgrade, for significantly less, than it would cost you to buy a B17 later. Ride it only for short trips to start with and see if it suits - you can't know unless you try - if you waste money, sorry, but at least you tried one.

Brooks B17 Honey



If you can't get on with a Brooks but you do manage to find a saddle that you really like - **take my advice** - and buy a load of them immediately. These days, very few products remain unchanged for long, very soon there will be a "new super whizz bang version", which may not be as good for **YOU** and the long search for a comfortable saddle will begin again.

UPGRADES and ACCESSORIES

SJSC's prices, in the accessory pages, are for guidance only.
The current online prices in the THORN MENUS are **CORRECT**.

FRONT HUBS. All Thorn Tandems have a Shimano Deore front hub as standard - this is OK. Tandems are heavy on wheels so it's worth specifying a better front hub.
PLEASE NOTE: It's essential if you've chosen a DISC fork.



For RIM BRAKES £65

HOPE front hubs are available for rim brakes or disc brakes - in 32h or 36h drillings. They have a 7075 machined body and use superb quality bearings.

We recommend this upgrade very highly.
You can choose from -
Anodised Silver, Anodised Black or Anodised Red - all at **£65**

If you've chosen the **DISC** fork option, you must choose a front disc standard (FDS) hub, we can fit either the **HOPE FATSNO 135mm FDS** or the **SON 135mm FDS Dynohub**.



HOPE FATSNO 135mm FDS
Anodised Silver, Anodised Black or Anodised Red - all at **£73**

Solo disc forks are 100mm wide and require a wheel with substantial dishing. I know that having a front wheel with a large amount of dish would be a danger on a tandem, so I made our Tandem **DISC** fork 135mm wide to avoid this - hence the need for a 135 FDS hub.



SON 135mm FDS Dynohub
silver or black at **£240**
red **NOT AVAILABLE**

DYNO HUBS. An upgrade to a front dyno hub ought to be a serious consideration for many cyclists. Schmidt are the only manufacturer that I'd recommend, the hubs are top quality and run on top quality sealed bearings. They're the most efficient and reliable dyno hub on the market. When it's not generating electricity, the wheel spins almost as freely as a "normal" front hub, even when it is generating power, it's difficult to notice the slight increase in drag.

The NEW Schmidt SON 28

is the best choice if you wish to use it to recharge GPS batteries. As a front for a Rohloff bike it makes sense to have 32 holes. The New SON 28 disc version has 6-bolt rotor mounts.

The SON NEW 28 is available in a choice of 4 colours.
Polished alloy, Anodised silver or Anodised black.....**£160**
Anodised red.....**£170**. Prices are for a hub with SON A/K Nuts.



Dynamo Headlights.

Schmidt Edelux II LED This 2.4w front light is simply awesome! It's awesome in terms of the quality of light output, it's awesome to think that one is producing such a light, without batteries and without noticeable effort! **The beam produced is superior to some 15w halogen rechargeable systems I've owned.** The Edelux is very well made - the casing is CNC machined from a solid billet.

The Edelux has a magnetic switch with 3 positions; on, off and sensor. The sensor position automatically switches on the light when light levels fall. The Edelux has a built in capacitor, which will produce several minutes of highly visible light after the wheel stops turning. The LED has a copper heat sink to ensure a very long life and the lens is a superb example of cutting edge optical technology.

The Edelux II is available in silver or black at £125 or red at £135

The price includes installation, using a substantial stainless bracket.



USB Charging devices.

Sinewave - at last there's a reliable, real world, USB charging system for your dynohub!

Many attempts have been made by other manufacturers to produce such a product but all have either suffered from water ingress or have burned out when being ridden downhill. Both **Sinewave devices** are completely waterproof, (see photo!) and they will not burn out, or overcharge whatever speed you're able to reach downhill. You can charge any electronic device, which can be charged with a 1amp input. A **Sinewave** has some very clever technology in it, for example, it won't try and charge your device until it has detected an input for 10 seconds - this ensures that your device (particularly iPhones) realises that it is being charged and accepts the charge. The USB port is completely sealed at the back and has gold plated contacts. It starts charging at 3.5mph (5.5km/h) and reaches full charge at 9mph (14km/h).



This Revolution has been functioning in a glass of water for over 2 years!



Sinewave Revolution fitted & installed £120

Sinewave Reactor (below) fitted & installed £235
Colours Available:

Black, Silver, Red and Blue



Moon pulsar rear LED light.

The very latest technology is encapsulated into this light. It uses a 1pc COB LED which has 15 separate LEDs and most importantly to us, uses 2 x AAA alkaline batteries. In the Overdrive mode it is amazingly bright - think modern vehicle fog lights. It has several easily accessed functions both constant and flashing and a particularly useful 50% mix of flashing and constant.



£25 inc a very specific bracket to fit a rear carrier, which is the only sensible place to position your only rear light!

SADDLES

We fit "OK" Velo saddles to every Thorn Tandem, as standard, therefore the upgrade charge is the same for every bike.

You can have any saddle currently in stock at SJSC at **£15 off SJSC retail price.**

Remember you can have your new bike with **"NO SADDLE"** and receive a **£15** reduction.

We'd rather do this than ask SJSC to get a saddle they don't stock.

We've purchased a range of BROOKS OEM SADDLES.

These are supplied to cycle manufacturers solely for the purpose of fitting to NEW BIKES, they come without any packaging.

We can only offer these **CRAZY PRICES** if you specify it to be fitted to your **NEW BIKE.**

Brooks B17 Standard

This saddle is available at a really super price but in **BLACK** or **HONEY ONLY.**



£30

B17 Narrow

Suits some men but almost never suits any women.

BLACK Only



£30

We've found the **B17 Standard** to be not only the correct width for the majority of men but also for practically all women.

PEDALS

Thorn Tandems aren't supplied with pedals as standard equipment. There's many opinions about what's best and many cyclists already have their own pedals.

In our opinion it's vital that both pilot and stoker use either SPD pedals or clips and straps.

If your partner suddenly starts (or stops) pedalling, your feet can slip off the pedals, with potentially very serious consequences.

It's hard to advise what pedals to use on tour, it depends upon many factors. I've used SPD pedals for more than 2 decades now, I'd hate to use anything else. I feel really safe in them - my feet can't accidentally get bumped off the pedals.

So far, I've always been happy with MTB racing shoes, the areas we like to cycle in are only cold at night! MTB racing shoes transfer power really well and they're exceptionally comfortable to cycle in. I always take another pair of shoes; either Gore-Tex walking shoes or sandals - depending upon where we are. I'd hate to only have one pair of shoes and so it doesn't matter if my cycling shoes look weird when I'm off the bike.

Below you'll see 4 popular pedal options.

We can supply your bike with any pedals currently in stock at SJSC, at SJSC retail price.

You can try real SPD pedals **Shimano M520** for only **£27**



There's nothing that I've ever used that's benefited my pedalling as much as using SPD pedals.

If you've never ridden with SPD pedals, whether or not I'd recommend you to try them, really depends upon how old you are.

You will topple over once or twice, when you forget that you have SPDs - but you'll never have your feet locked into them when you hit the ground! **Getting used to SPD pedals, away from traffic is a good idea!**

Whilst our current stock lasts, we're supplying M520 SPD pedals with clip-on

There's a nice pedal on the market, which I've used on a couple of tours, it has **SPD** on one side and a flat platform on the other. The latest version is **PD A530**

£55 in silver (shown opposite)
£45 in black (not shown - whilst stocks last)
I think that you're better off not having the option of using flat pedals.

You'll see that we absolutely don't advocate using flat pedals on a tandem, I can see the attraction of using flat pedals with walking shoes or sandals on a solo.

If you choose to ignore our advice, the very best of this type of pedal currently on the market is the Shimano **SAINT PD-MX80**. The large surface area reduces pressure when using flexible soled shoes. The stainless set screws help to grip slippery shoes.

£55

The traditional tourists' choice of toe clips and straps is my least favoured option on a solo bike.

They're difficult to use on a tandem. They're awkward to get your feet into and if you don't, the straps get caught on things. but once you're in you're unlikely to lose your footing. The clips can kill your toes but that's just my opinion, based on past experience. If you're convinced that you want clips and straps, you're unlikely to find better than **MKS GR9** with steel clips and nylon straps.

The cost, including clips and straps, (not shown) is **£43**



sjscycles



sjscycles

THORN EXPEDITION CARRIERS.

From the pics you can see that our carriers have a very substantial build. They are not lightweight but they are not particularly heavy either.

The most important thing to be sure about, with expedition carriers, is that they won't ever let you down.

Our carriers are constructed from 1mm thick, seamless, heat treated, tubular aerospace Cro-Mo.

Whether we're talking of the front or the rear, these are the undoubtedly the strongest expedition carriers on the market - we've sold thousands, we've never heard of one breaking and our customers really do travel in the back of beyond!

They're designed for installation with M5 or M6 screws.

You're contemplating the definitive bike - don't scrimp or attempt to save a few ounces on the carriers!



£80

Note:- although the mounting plate comes with the carrier, a rear light is an optional extra



£90

Special offer
BUY BOTH
for £150

Topeak mountain morph mini track pump

This is a superb piece of kit to take on tour. It fits easily into a rear pannier or large saddlebag and makes short work of inflating tyres to the desired pressure for the prevailing conditions.

This is my choice
£28



CYCLECOMPUTER

The Cateye Micro Wireless computer has 9 functions, including 2 independently re-settable trip distances. The large display is easy to read and you can have the current speed, the time and another function displayed at the same time. It has only one downside - it's a bit of a fiddle to reset but it becomes much easier, if you reset it in average speed mode

£40



Thorn 105mm Accessory bar. (Our part number 33509) This useful device clamps directly to the steerer tube of the bike's fork, in place of some spacers. It can be used to mount various accessories, including lights and computers. The accessory bar is strong enough to accept a handlebar bag. See some of Andy and Fiona's pics. The lower a bar bag is mounted, the less detrimental effect it will have on the bike's handling. Many bikes have their bars high enough to allow a handlebar mounted light, to shine over the top of a bar bag, that is mounted on one of our accessory bars.



£20

And only costs
£20

Tubus OEM VEGA carrier £60 Lightweight Tubular Cr-Mo 510g

BUY NOW and SAVE £££'S



Ideal for fitting to bikes for light to medium weight touring

The PROFILE cage is very durable and comes very highly recommended, you should consider having 4 fitted. This cage will also take 1 litre or 1 1/4 litre Coke bottles or 1 litre Sigg bottles.



ONLY £5 each!



BLING with a PING!

Fiona and I got used to having a bell in India - where it was essential. We'd feel lost without one now, as it certainly helps when using shared paths. We also use it to communicate to each other - 2 pings means "I'm back on your wheel" and lots of pings means "Stop I'm in trouble". We fit all THORN bikes with a bell, to comply with the law - it's OK. A customer came in last year with a

SPUR CYCLES BELL,

which is engineered (yes really!) in the USA.

We now have these in stock.

This tiny bell gives a 115db.
"pitch-perfect ping"

You have to hear it to believe it and once you've seen how well it's made, you may persuade yourself to part with £50 for the burnished stainless bell - or you may even feel that you must have the diamond hard black finish at £55. I know that I've lost most of you reading this now but the **SPUR BELL** is actually worth that kind of money - if something ever happens that this bell could've prevented, it would've earned its keep many times over!

A rock-solid fit on any bar or stem.
Or a super present for a caring cyclist.

FRAME SIZING

The Raven Twin Mk3 frames are produced in 5 different sizes in a choice of 2 different colours - rich, lustrous and tastefully discrete Gunmetal. Or totally in your face Pure Orange. Both colour options are finished in tough and beautiful Du Pont Imron twin-pack polyester paint.

The original Raven Twins were made in 2 childback sizes and 9 adult/adult sizes. All the sizes had S&S couplings as an option. We sold out of the S&S coupled frames very quickly- almost everybody wanted the benefit of quickly making their tandem shorter than a solo bike! With the experience we've gained, from fitting hundreds of customers to these machines, I've been able to reduce the number of sizes and despite the recent crash of the £, we've been able to hold prices down.

I apologize in advance to the small percentage of female pilots for my decision to size the frames as if the **pilot is male** and as if the **stoker is female** - especially as I made size **S/M** with female pilots of blind stokers in mind!

Further notes on sizing.

We've seen many, many different tandem pairings. We believe that this new range of sizes will still provide over 90% of tandem crews with an elegant looking machine, which functions perfectly. We think that we'll be able to provide perfectly fitting, perfectly functional machines for the majority of other tandem pairings - it may not look quite as elegant, as we both would've liked. Always check your stand over heights the way we ask for them, as explained on the page 25 -

then we should get it right first time - if we don't, please be assured that we consider it's our responsibility to correct matters, to your complete satisfaction, this is in addition to your statutory rights and runs parallel with our 100 days trial period.

The amount of clearance you should have, over the top tube, depends upon how tall you are. Very tall people may have more than 100mm clearance; very short people may be almost touching the tubes.

Most pilots are advised to have 25 to 50mm clearance at the very front of the machine; this will give much more clearance at the mid-tube position, where they are most likely to stand, whilst straddling the machine (except on size **#S/M** which only has a very small slope). Sometimes it's impossible to achieve this clearance at the very front - but we say that you must have clearance at the mid-tube! Stokers should have at least 25mm of clearance at the mid tube (their bars prevent them from standing much further forward than this). Sometimes it's necessary to accept 1mm of clearance, if you have really short legs - but this can mean that there's no room to fit a suspension seat post. Some pilots say that, as they hold the machine upright, their stoker doesn't need any clearance at all! This is a personal choice.

In my opinion, aesthetics are not the most important things in life - but, provided they don't interfere with function, I believe that they should be considered! The correct reach to their bars, will be shorter for stokers, than on their solo bike. This is because, on a solo, when travelling at speed, a cyclist gets a "lift" from the air. At the back of a tandem, stokers are sitting in comparatively still air and consequently, more weight is borne by their arms, there's no need for most stokers to adopt a racing crouch in order to be very aerodynamic!

The further behind the pilot the stoker sits, the more they can see to the front. This should be balanced by the fact

In cases where the stoker is taller than the pilot, it's even more essential that the pilot can straddle the machine (because of the higher center of gravity) and therefore it's sometimes necessary to choose a frame which is smaller than the stoker may prefer. However, as long as the stoker can sit at their correct height (we have 400mm seat posts) it really doesn't matter. Stokers who are taller than their pilot may have problems with handlebar height, the problem is that their pilot's saddle and spine occupy the space where they'd like their bars! We're able to fit the stoker's bars considerably higher than the pilot's saddle **but note**, this will reduce the length of the stoker's cockpit. Frame size **#S/M** has a very long rear top tube and is likely to be the best option for such a crew. Sometimes the stoker could /should be the pilot instead. (See also "**Who should be pilot, who should be stoker?**" page 4)

that conversation can become difficult, if they sit too far away! (Which may be a bonus for some people) In the past, it was true that the shorter a tandem was, the stiffer it was. A tandem can not be too stiff laterally. Our Mk3 Raven Twin frames are very stiff, a stoker can have more room than they've been used to, if they wish. A short stiff tandem may be slightly better through tight bends but a long stiff tandem is more stable. If we were to make super-mega-long tandems, perhaps this could have an effect upon aerodynamic efficiency and handling - but our tandems are merely "long" and that's fine!

We still have several size #11 S&S (L/L) Double Marathon frames for sale. As explained elsewhere, we sold so few of this huge size that I couldn't justify ordering more in a Mk3 version. These frames and forks are all finished in the UK by the best powder coat specialist we've ever used, in Steel Grey (as similar to Gunmetal as it was possible to get). If you really need a huge frame you can order one of these at the same cost and on the same menu as the Mk3 frames. **NOTE** There would be a slight miss-match of colour if you chose a disc fork.

PLEASE NOTE: All S/O heights given below assume 26 x 2.0" (559) wheels and tyres.

Please also note that, for consistent sizing purposes, we assume a male pilot and female stoker. We also assume that an average height woman is around the same height as a shorter than average man. **I've assumed Thorn customers' average heights to be ... Male - 5' 8" (1.72m) and ... Female - 5' 4½" (1.64m)**

Size **S/S** is for a shorter than average male pilot and shorter than average female stoker, **L/S** is for a taller than average male pilot and shorter than average female stoker- due to shorter base tubes, **S/S** and **L/S** are unlikely to be suitable for male stokers.

Size **S/M** would suit a shorter than average male pilot and an average height female stoker - in fact I designed **S/M** frames for average height **FEMALE pilots** & Male stokers of various heights- hence the short front top tube and the extra long base tube!

Size **M/M** is for an average height male pilot and an average height female stoker - **M/M** would also suit a taller than average female pilot and male stokers up to, or just beyond, average height.

Size **L/M** is for taller than average male pilots and average (or taller) height stokers of either sex. It has an extra stiff double marathon frame, which allows us to have a really long base tube.

MODEL	SIZE FRONT/REAR	Virtual FRONT SIZE C to Cmm	Virtual FRONT TOP TUBE C to Cmm	BB Heights (F&R)	Stand Over Height FRONT	S/O Height FRONT middle of top tube	BASE TUBE (Effectively the length of the rear top tube)	REAR Seat Tube C to C	S/O Height REAR Middle of top tube	Bottle cages
Raven Twin Mk3 Direct lateral	S/S	530	580	275	805	783	720	400	705	4
Raven Twin Mk3 Direct lateral	L/S	600	620	275	872	839	720	400	727	4
Raven Twin Mk3 Direct lateral	NOTE SMALL FRONT! S/M	510	560	275	795	778	780	450	740	4
Raven Twin Mk3 Direct lateral	M/M	570	600	275	850	825	760	420	742	4
Raven Twin Mk3 DOUBLE MARATHON	L/M	610	620	275	870	845	800	450	745	4
Raven Twin Mk1 Double Marathon (Size 11 S&S)	L/L	600	625	285	870	855	784	520	815	4

TANDEM SIZING

If you can't visit us, we obviously need some dimensions (see page 26)

We need either [1] or [2]
[1] Body dimensions for both or all of those who will ride. diagram on the left will help with BFSO.

[2] Set up dimensions taken from a tandem, or solo bike, that you're happy with the position of. See diagram + tables below.



There are 2 problems with measuring BFSO

[1] How far into the crotch should you push the square?

The answer is, until it causes the soft tissue to gently touch bone.

[2] It's possible to tilt the pelvis without realising it, which makes a nonsense of the result.

To avoid tilting the pelvis, stand against a vertical wall, with your head, heels and shoulder blades touching the wall.

Now try and touch the small of your back and calf muscles against the wall, the pelvis is immobilised and a meaningful measurement may now be taken. **See pic on left, where Sarah measures Steve**

You'll need someone else to help you to take this measurement.

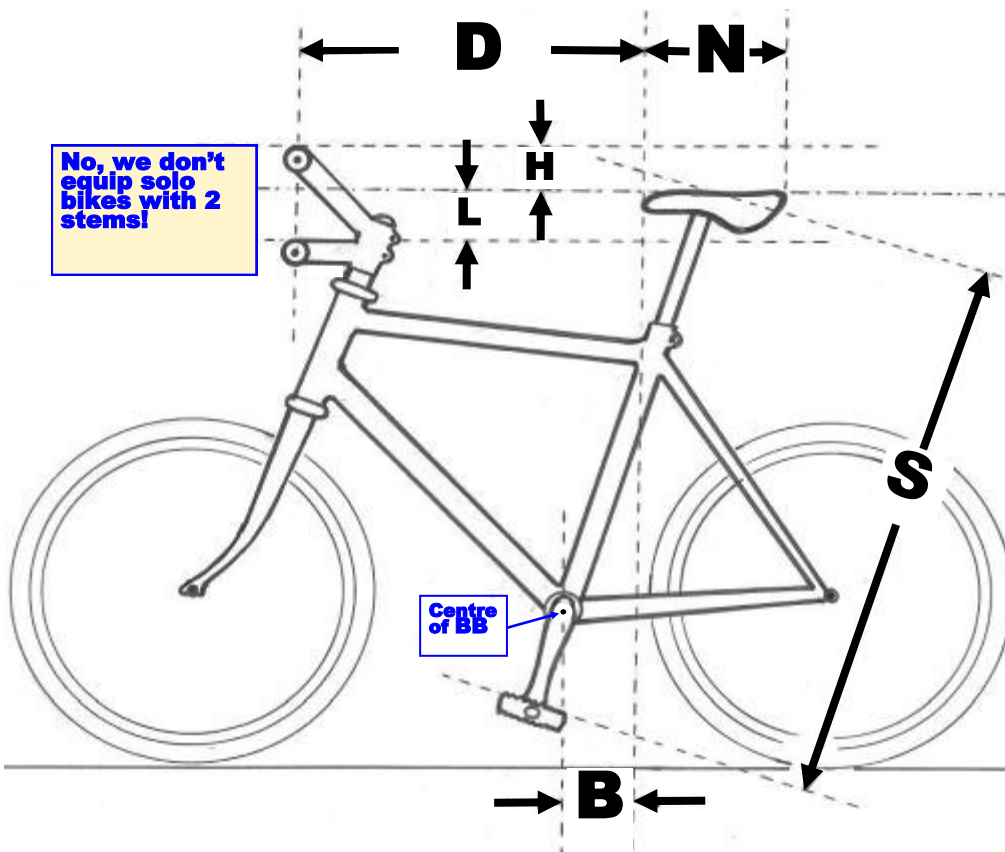
You may need to improvise to find a suitable square. Really big coffee table books are an option.

A carefully cut and folded sheet of card, taken from an extra large carton is another option.

ARM SPAN. This is very simple to measure. Stand facing a wall and, with your arms horizontal, touch the corner of the wall with the longest finger of one hand and then see how far you can extend the corresponding finger of the other hand. Mark this point. It's then easy to measure from the corner to the mark.

The dimensions we need to duplicate your position. See diagram below

N	Overall saddle length in mm. and/or name of saddle.	L	On a STRAIGHT BAR BIKE , it's the distance that the TOPS of the GRIPS are LOWER than saddle. On a DROP BAR BIKE , it's the distance that the TOP of the BARS are LOWER than the saddle. Use a long bubble level or a straight edge with a small bubble level taped to it and measure from the top of the saddle to the top of the bars (at their closest pint to the stem). The bike must be on a level surface.
S	The distance in mm. FROM THE UPPER SURFACE OF THE LOWER PEDAL (with crank in line with seat tube) to the top of the saddle, measured along the seat tube. MAKE CERTAIN THAT YOU GET THIS RIGHT - PLEASE CHECK CAREFULLY WHAT WE'RE ASKING FOR - WE'RE NOT ASKING FOR CENTRE OF BB TO TOP OF SADDLE - IF YOU GET THIS WRONG YOU WILL ALMOST CERTAINLY GET THE WRONG SIZE FRAME.	H	On a STRAIGHT BAR BIKE , it's the distance that the TOPS of the GRIPS are HIGHER than saddle. On a DROP BAR BIKE , it's the distance that the TOP of the BARS are HIGHER than the saddle. You can use the same methodology as described in L above to measure this
B	The distance that a plumb line falls behind the CENTRE of the BB , when suspended from the nose of the saddle. IF YOU GET THIS WRONG IT WILL SERIOUSLY AFFECT THE REACH.	DS	This is the distance from the nose of the saddle to the centre of the bars, on a bike with 3-5° STRAIGHT BARS . These are the most common straight bars in use - most MTB low rise bars are 5°. Our THORN STRAIGHT BARS and THORN NARROW BARS are both 5° BARS.



No, we don't equip solo bikes with 2 stems!

Correction of 'D'

The table below shows how much shorter, or longer a stem probably needs to be in order to achieve a similar position with a different handlebar, compared to 5° straight bars.

DS 5° bend	0mm
DD Drop Bars	-55mm
DF 10 - 12.5° Flat Track, eXp & FFT	+15mm
DC Thorn Comfort Bars	+35mm

Raven Twin Mk3 order form

Mk3 (or Mk1 size #11) S&S Frame and fork only...£1849

Frame, FORK & Rohloff DISC hub (built into a wheel) from...£2879

Complete bike (without pedals) **Start Price...£3999**

Surcharge for size #L/M (Double Marathon frame)...£150

Size
S/S; L/S; S/M or M/M.

COLOUR:-
GUNMETAL
OR
PURE ORANGE

Please choose:-
Front brake
lever on RIGHT?
Front brake
lever on LEFT?

THORN
Raven Twin Mk3
frames in common with those
on all our cycles, have our
"Original owner,
lifetime warranty"
against faulty materials
or faulty workmanship.

To get the total cost
of your ideal tandem,

add the cost of chosen options
on pages 27, 28 & 29 to the

Start Price

(See above)

Please remember upgrade prices
already credit our retail prices for
parts you won't need.

All our prices include VAT...

...but carriage is not included.

Buy a **Raven Twin**, ride it for 100
days and, if not totally delighted,
return it to us either in person or
safely packaged in a Thorn bike
box, we will refund you the
purchase price of the bike
including any or all items from
the Raven Twin bike build menu.
This offer does not include
pedals or accessories. This offer
applies to complete bikes and to
UK and EU customers only.



Invoice No

Male ☐
Female ☐

Title _____

First
name _____

Surname _____

Address _____

Town _____

County _____

Postcode _____

Country _____

Telephone numbers.

Home _____

Mobile _____

Work _____

Email address _____ @ _____



Call on
505

01278 441

Email sales@thorncycles.co.uk
Online www.thorncycles.co.uk

St John St Cycles,
Thorn Cycles Ltd,
91-93 St John St,
BRIDGWATER,
Somerset
TA6 5HX

PLEASE NOTE:- Occasionally some items become
unavailable for long periods of time. We reserve the right
to substitute items of similar (or greater) value, where
there will be no adverse affect on function. No surcharge
will be made for this

St John St Cycles is a trading style of Thorn Cycles Ltd
(Incorporated in England 4121096 -
registered office: St John St Cycles, 91-93 St John St,
Bridgwater, TA6 5HX)

Please fill in one of the
set up dimension forms
for **each pilot...**
...and another for
each stoker.

Why have we said "each"?
Several tandems are sold each year, for use
by different pilots and different stokers.
If that's what you require, it will help us to
make certain that you get the most
appropriate size, if we have as much
information as possible, on **all** those who
will ride the machine.
On the other hand, if that was not your plan,
please don't try and think who *may* want to
ride the bike because it will be better for you
and for your stoker...if we *simply* build the
bike perfectly...for the two of you!

MOST IMPORTANT PLEASE READ THIS!

SET UP DIMENSIONS

In order to make something as special as
your next THORN bike, we must have very
specific and perhaps to some people, very
personal information.
We need **every bit** of the information
requested in table 1 on the right.

Alternatively, you may be able to complete
the set up details requested in table 2 on the
far right.

You will find details of both sets of
measurements in our documents:-

"HOW TO GET THE PERFECT SET UP
ON YOUR THORN BIKE"
...**CLICK HERE** for link to pdf file.

Or, of course, you can come and
visit us and we will measure you.

Without one of these 3 options
being complied with, we are unable
to guarantee the results and only
your statutory rights will apply.

1 DATA FOR THE PERSON THE BIKE IS FOR:

Name

PILOT or STOKER? Please delete

DIMENSIONS AND OTHER DATA.

We must have
an answer in
every box.

POSITION
REQD.
Please tick one
box, or 2
boxes.
If you tick 2
boxes, we will
aim for a position
between them.

CHOICE of
SADDLE
TYPE of
HANDLEBARS
REQUIRED.
Please tick one
box which relates to
the track bars are
chosen.

OTHER
ESSENTIAL
INFORMATION
Please tick one
box.

GENDER M OR F

WEIGHT (kg)

AGE

HEIGHT (bare feet in mm.)

BFSD (Bare foot stand
over height in mm.)

SHOE SIZE (Continental)

ARM SPAN (mm)

VERY RELAXED

RELAXED

FAIRLY RELAXED

FAIRLY SPORTY

SPORTY

SADDLE LENGTH (mm)
Or NAME and MODEL

CONVENTIONAL DROPS

STRAIGHT

FLAT TRACK width (mm)

COMFORT

Experienced, fit and confident
cyclist.

Less experienced but keen and
reasonably fit cyclist.

Casual and/or nervous cyclist.

2 The dimensions we need to duplicate your position.

N

Overall saddle length in mm.
And/or name of saddle.

S

The distance in mm. from the UPPER
SURFACE of LOWER pedal to the top of
the saddle, measured along the seat tube.

B

The distance that a plumb line falls behind the BB,
when suspended from the nose of the saddle.

L

On a straight bar bike, this is the distance
that tops of the GRIPS are lower than saddle.
On a drop bar bike, it is the distance that the
top of the stem is lower than the saddle.

H

On a straight bar bike, this is the distance
that tops of the GRIPS are higher than saddle.
On a drop bar bike, it is the distance that the
top of the stem is higher than the saddle.

DS

This is the distance from the nose of the
saddle to the centre of the stem on a bike
with 3-5" STRAIGHT BARS.

DD

This is the distance from the nose of the
saddle to the centre of the stem on a bike
with DROP BARS

DF

This is the distance from the nose of the
saddle to the centre of the stem on a bike
with THORN FLAT TRACK, EXP or FIT BARS

DC

This is the distance from the nose of the
saddle to the centre of the stem on a bike
with THORN COMFORT BARS

See page 25 for information on
how to get these dimensions

Choice (Please circle your choice)	Cost
STEEL FORK OPTIONS See pages 6 and 7	
THORN TWIN PLATE CROWN V BRAKE FORK STURDY AND COMFORTABLE , with a MULTITUDE of fittings. NOTE 26" WHEELS ONLY	£0
THORN UNICROWN DISC BRAKE FORK STURDY, WITH a MULTITUDE of fittings BUT NOTE - NO V BRAKE BOSSES FITS WITH 26", 650B or 700c WHEELS	£30
Handlebars see pages 8&9 Please note that for several good reasons, we generally recommend having the same bars, at the same width, for both Pilot and Stoker...please make clear notes if this is not what is required.	
Thorn Flat Track bar 580mm wide, short 25.4mm centre swell. Scale markings allow bars to be easily cut to 550mm if required. 10 degree bend gives natural position. These are a good choice for many crews and for many applications. Write width in notes.	£0
THORN eXp Bars (Expedition strength) 680mm wide, long 31.8mm centre swell. Etched scale markings allow bars to be easily cut to 590mm if required. 12.5° bend gives natural position. REQUIRES 31.8 STEM, 330g The bars to choose for Heavy Duty use Write width in notes.	£20
THORN FFT Bars (Fat Flat Track) 31.8 620mm wide, long 31.8mm centre swell. Etched scale markings allow bars to be easily cut to 590mm if required. 12.5° bend gives natural position. REQUIRES 31.8 STEM, 220g These are THE BEST CHOICE for most crews and for most applications. Write width in notes.	£20
Thorn Mk2 comfort bar. 620mm wide. Not everybody's choice but considered absolutely brilliant, by those who like them. Note only 1 hand position. Silver	£0
Thorn Mk2 comfort bar. As above but Black	£0
Grips and Bar ends. see pages 8&9	
Ergon GP1-L Anatomic grips large black. The most comfortable grip we have ever used very highly rec'd. Suitable for straight bars, and comfort bars.	£0
Ergon GP5L Anatomic grips with built in bar ends. Long "L" shaped bar end incorporated. 4 distinct positions. Ideal choice for PILOT with Flat Track, eXp or FFT bars.	£20
Ergon GP3 Anatomic grips with built in bar ends. Shorter bar ends, without the "L" bend. Ideal choice for STOKER , especially with narrow or medium width bars, which could cause "L" bend to collide with the pilot's thighs.	£20
Rohloff DISC hub COLOUR choices Includes shifter, 17t sprocket, 3 ROHLOFF spokes and 3 spare spokes for the front wheel.	
BLACK SPOKES. (Aesthetic consideration only) Have your wheels built with BLACK SPOKES (if you choose this option, your spare spokes will also be black.)	£28
Silver anodised Rohloff DISC hub - architectural quality anodising is highly resistant to corrosion and oxidation.	£0
Black anodised Rohloff DISC hub - architectural quality anodising is highly resistant to corrosion and oxidation.	£0
Red anodised Rohloff DISC hub - architectural quality anodising is highly resistant to corrosion and oxidation.	£0

Choice (Please circle your choice)	Cost
Front Hub upgrades V Brake FORK See page 21	
Silver Deore front hub,	£0
Black Deore front hub,	£0
Silver HOPE front hub,	£65
Black HOPE front hub,	£65
Red HOPE front hub,	£65
Silver anodised Son 28 front dyno hub,	£170
Black Son 28 front dyno hub,	£170
RED Son 28 front dyno hub,	£180
Front hub upgrades One of these MUST be chosen with DISC Brake 135mm width FORK	
SILVER HOPE FATSNO 135mm FDS front hub,	£73
BLACK HOPE FATSNO 135mm FDS front hub,	£73
RED HOPE FATSNO 135mm FDS front hub,	£73
SILVER Son 28 DISC 135mm FDS front dyno hub,	£240
BLACK Son 28 DISC 135mm FDS front dyno hub,	£240
LED Head lamps for dyno-hub and USB Charging Devices see page 21	
Schmidt Edelux Mk2 LED headlamp The best and brightest LED dynamo headlamp available. Architectural quality hard anodised SILVER	£125
Schmidt Edelux Mk2 LED headlamp as above but BLACK	£125
Schmidt Edelux Mk2 LED headlamp as above but RED	£135
SINEWAVE REVOLUTION Totally reliable USB charging from a dynohub.	£120
SINEWAVE REACTOR Totally reliable, neat and functional USB charging from a dynohub. SILVER, BLACK or RED	£235
26" RIM OPTIONS	
[1] Andra 30 plain alloy brake surface 32h Exceptionally heavy duty rim ideal for day to day use and also for the longest and toughest trips. Works very well with V brakes but considering the small upcharge, you should consider options [3] or [4]. This is our recommendation for use WITH FRONT + REAR DISC BRAKES.	£0
[2] Andra 30 CSS brake surface 32h front and rear Andra rim with tungsten carbide brake track for exceptionally long life. Upgrade includes Blue Swissstop pads. Ideal for heavy touring with V brakes but... NOT recommended for use in extreme wet conditions. These would obviously work with FRONT and REAR disc brakes but they offer no advantages over [1] except possibly aesthetics.	£86
[3] Andra 30 CSS 32h FRONT and Andra 30 plain REAR complete with a pair of spare front and also rear pads. Our recommendation for general use and also for expedition touring on tandems WITH a REAR DISC BRAKE.	£56
[4] Andra 30 CSS 32h REAR and Andra 30 plain FRONT complete with a pair of spare front and also rear pads. Our recommendation for general use and also for expedition touring on tandems WITHOUT a REAR DISC BRAKE	£56
650B (27½") RIM OPTIONS MUST USE 2 x DISC BRAKES ONLY Best discussed with one of our sales staff	Prices Vary
700c RIM OPTIONS MUST USE 2 x DISC BRAKES ONLY Best discussed with one of our sales staff	Prices Vary

Choice (Please circle your choice)	Cost
26" TYRES	
Schwalbe Marathon Supreme 1.6" folding reflex. The definitive tyre for fast touring on B roads, even with heavy loads over long distances. Not the best choice for slippery muddy roads.	£0
Schwalbe Marathon Supreme 2.0" folding reflex. The definitive tyre for brisk riding on smooth + broken roads, with heavy loads over long distances. Not ideal for unsealed roads. NOT the best choice for slippery muddy roads.	£0
Schwalbe Marathon Dureme 2.0" folding reflex. A superb 4 season tyre. Quick, comfortable, grippy, lasts for ages and has excellent resistance to punctures. Now made specially for us.	£16
Schwalbe Marathon Mondial 2.15" Evo reflex folding tyre. An expedition tyre - fantastic on expeditions - too slow and heavy for brisk everyday use. Looks just like the original and much missed Marathon XR	£0
Schwalbe Marathon plus 1.75 smart guard. The best puncture protection available but we find them hard work - like riding through melted tar! Best avoided like the plague.	£0
650B (27½") TYRE OPTIONS MUST USE 2 x DISC BRAKES ONLY Best discussed with one of our sales staff	Price Varies
700c TYRE OPTIONS MUST USE 2 x DISC BRAKES ONLY Best discussed with one of our sales staff	Price Varies
Crank lengths & Gearing Choose for pilot, then choose again for stoker. Unless stated in the notes, we'll assume that the longer cranks go at the front. See page 13	
CRANKS for PILOT Thorn conventional square taper black chainset, for 104 bcd rings, not a high tech item but it does the job perfectly. Available in the following lengths:- 150, 155, 160, 165, 170, 175, 180 and 185mm (Please circle the length required)	£0
CRANKS for STOKER Exactly as above. 150, 155, 160, 165, 170, 175, 180 and 185mm (Please circle the length required)	£0
THORN 104 bcd 7075 series double-sided (Reversible) alloy ring. Designed for hub gear and single speed. You could never find better! Rohloff insist that 2.5:1 is the lowest gearing that they will allow for tandem use, such gearing ought to allow you to pedal up very steep hills. 43 x 17, 45 x 18 or 48 x 19 are all Rohloff legal Available rings: 43, 44, 45, 46, 47, 48 & 50	£0
SPROCKETS	
Rohloff 17t sprocket, fitted as original equipment to all our Rohloff hubs, to enhance chain life. You can always swap to 15 or 16 if you wish to raise the overall gearing later.	£0
Rohloff Splined 15t sprocket. Note: If you require higher gears, a larger chainring is a better option when buying the bike.	£0
Rohloff Splined 16t sprocket. Ideal if you know that you want high gears, with a smaller chain ring, at the time of purchase.	£0
Rohloff Splined 18t sprocket. Note: Must NOT be used with chain ring smaller than 45t . Almost identical gearing to 43 x 17 but longer transmission life.	£2
Rohloff Splined 19t sprocket. Note: Must NOT be used with chain ring smaller than 48t . Identical gearing to 43 x 17 but even longer transmission life.	£4

Choice (Please circle your choice)	Cost
BRAKE OPTIONS For more info - see pages 12 & 13	
Shimano Deore XT V brakes Complete with Shimano XT levers These are superb brakes with really nice levers. 26" WHEELS ONLY Used in all brake options EXCEPT [CC] and [HH]	£0
CABLE DISC brake options All the options below use the TRP CABLE DISC BRAKE with 203mm rotors. It's QUICKER and more CONVENIENT to use S&S COUPLINGS with cable operated brakes.	
[C1] PILOT operated REAR ONLY DISC and Shimano XT front V brake. Rear XT V brake operated by pilot via a Suntour thumbshifter. ...3 BRAKES. A VERY SOUND CHOICE FOR MOST CREWS RIDING IN HILLY TERRAIN and PERFECT FOR EXPEDITION TANDEMING 26" WHEELS ONLY	£109
This [C1] is what I'd have myself and what I'd recommend for the majority of customers.	
[C2] PILOT operated REAR ONLY DISC + Shimano XT front V brake. Stoker operation of rear V brake (Unused XT lever supplied as a spare) ...Yes it has 3 BRAKES but... It's potentially VERY DANGEROUS for sighted stokers to have control of a brake. 26" WHEELS ONLY	£87
[C3] REAR ONLY Disc lever operated by STOKER Shimano XT front and rear V brakes operated by PILOT (Unused XT lever supplied as a spare) ...3 BRAKES but, in our opinion, THIS OPTION IS ONLY SUITABLE for HIGHLY EXPERIENCED BLIND STOKERS... In which case it's probably an excellent solution. 26" WHEELS ONLY	£87
[CC] CABLE DISC BRAKES FRONT AND REAR + XT levers 2 BRAKES ONLY - DO NOT USE in HILLY TERRAIN unless you are highly skilled and brave tandemists.	£136
[CC1] CABLE DISC BRAKES FRONT AND REAR + XT levers Rear XT V brake operated by pilot via a Suntour thumbshifter ...3 BRAKES we're happier with this option than [CC] 26" WHEELS ONLY	£179
HYDRAULIC DISC options All the options below use the Hope Tech V4 rear hydraulic brake, 203mm ventilated floating Rohloff fitting rotors and Hope Tech lever, to save repetition we have called this simply "disc lever" SLOWER using S&S COUPLINGS with HYDRAULICS	
[H1] REAR ONLY Disc lever operated by PILOT XT front V brake and lever. Rear XT V brake operated by pilot via a Thorn thumbshifter... 3 BRAKES (Unused XT LHS lever supplied as a spare) A GOOD CHOICE FOR MOST CREWS RIDING IN HILLY TERRAIN. 26" WHEELS ONLY	£342
[H2] REAR ONLY Disc lever operated by PILOT XT front V brake and lever, stoker operation of rear XT V brake ... Yes it has 3 BRAKES but it's potentially VERY DANGEROUS for sighted stokers to have control of a brake. 26" WHEELS ONLY	£283
[H3] REAR ONLY Disc lever operated by STOKER . XT front and rear V brakes and levers operated by PILOT ... 3 BRAKES but, in our opinion, this powerful brake is only suitable for HIGHLY EXPERIENCED BLIND STOKERS...In which case this is probably the definitive solution for heavy crews. 26" WHEELS ONLY	£262
[HH] HYDRAULIC DISC BRAKES FRONT AND REAR ...2 BRAKES ONLY...CAUTION advised in hilly terrain. If I didn't want 26" wheels and therefore had to have only 2 disc brakes, I'd have HYDRAULIC DISC brakes.	£434
[HH1] HYDRAULIC DISC BRAKES FRONT AND REAR + Rear XT V brake operated by pilot via a Thorn thumbshifter... 3 BRAKES...a safer option than [HH] 26" WHEELS ONLY	£544

Choice (Please circle your choice)	Cost
Mudguards	
SKS P45 mudguards. Ideal for 1.75" will cope with 2.0" tyres with minimal clearance silver.	£0
SKS P45 mudguards. Ideal for 1.75" will cope with 2.0" tyres with minimal clearance black.	£0
SKS P55 mudguards. Ideal for 2.0" will cope with 2.25" tyres with minimal clearance silver.	£0
SKS P55 mudguards. Ideal for 2.0" will cope with 2.25" tyres with minimal clearance black.	£0
SKS P65 mudguards. Ideal for 2.25" looks odd with 1.75" tyres (excessive clearance) silver.	£0
SKS P65 mudguards. Ideal for 2.25" looks odd with 1.75" tyres (excessive clearance) black.	£0
Rear Seat posts	
Thorn 28.6mm black alloy seatpost and appropriate shim	£0
Cane Creek LT OEM Thudbuster 400mm suspension seat post. The best you can get and only available at this price on new bike sales. We generally only fit these for the stoker - for those who really need it - but we could potentially fit one for the pilot.	£96
Cane Creek ST OEM Thudbuster 400mm suspension seat post. As above but with shorter travel. Only available at this price on new bike sales. WHICH THUDBUSTER SHOULD YOU CHOOSE? We suggest that you specify the LT - if there isn't room for it, when we build your tandem, we will fit the ST .	£86
Cane Creek ST Thudbuster 350mm Short travel as above with but also with a shorter post. No OEM version exists if you need a 350mm post	£143
Saddles Enter 2 saddles, be certain to write in notes where each saddle goes.	
Thorn Velo MEN'S saddle nice quality, firm padding. Could be perfect for you, if you don't want a Brooks. Men's default option	£0
Thorn Velo WOMEN'S saddle nice quality, firm padding. Could be perfect for you, if you don't want a Brooks. Women's default option	£0
Selle Royal MEN'S Travel Lite Gel saddle. We've never met anyone who was uncomfortable on a good gel saddle for short periods of time, or anyone who was comfortable on one for long periods!	£0
Selle Royal WOMEN'S Gel saddle. The comments above also apply here.	£0
Brooks BLACK B17 Standard saddle. Suits most Men and most Women. How do you know it won't be bliss, when broken in, unless you try it? But you may hate it and it may never suit you. Black steel rails. This is a real bargain because we buy B17 Standard in quantity to fit as original equipment.	£30
Brooks HONEY B17 Standard saddle, as above but Honey	£30
No saddle...deduct £15 each saddle	-£15 (MINUS £15)
Any saddle currently in stock at SJSC at £15 off SJSC retail price.	£'s Vary

Unique and exclusive to THORN

We're so confident that we have built the wheels perfectly that we give a 10 year warranty on the Hub Flange of all of our Rohloff equipped bikes with 32 spoke hubs.

This is for the original owner and is dependant upon you ensuring that ROHLOFF spokes are used if ever you need to have a spoke replaced.

Of course our wheel building is so good that it's highly unlikely that you'll break a spoke whilst cycling - no matter how rough the road or however heavily loaded you are but accidental damage whilst touring is always a possibility.

We now supply all of our bikes with spare spokes - make certain that you at least take your Rohloff spokes with you on tour.

Andy B. Autumn 2017

Choice (Please circle your choice)	Cost
Pedals Choose 0, 1 or 2 pairs, please advise which goes where if collecting your tandem. When we despatch bikes we don't fit pedals, therefore we don't need to know who's having what. See what Andy Blance says on page 22	
MKS GR9 pedal a classic platform pedal. Single side, so no use without toe clips. Supplied with M, L or XL chromed steel clips and nylon toe straps.	£43
Shimano Saint PD-MX 80 double sided BMX pedal. Large flat platform, excellent grip. High quality, tough, durable. Ideal for walking boots, trainers or flip flops.	£55
Shimano PD A530 SPD one side and concave platform the other. Ideal for touring. You can use MTB racing shoes or "ordinary footwear" without changing pedals. SILVER	£55
Shimano PD A530 SPD as above but BLACK	£45
Shimano PD M520 SPD pedals. A bargain. You can try SPD pedals without great expense. Silver. Currently with flat top adaptor.	£27
Carriers and Accessories	
Cat Eye Micro wireless cycle computer 9 functions black. Unlike modern aps, enables you to keep a record of distance for oil changes	£40
Thorn Expedition carrier. Heat treated Cro-Mo tubes. Super strong and rigid. Durable black powder coat finish. 6mm fittings. Could carry more than you can!	£90
Thorn Mk5 Lo-Loader. Heat treated Cro-Mo tubes. Super strong and rigid. Durable black powder coat finish. 6mm fittings. Could carry 15kg per side!	£80
One of each of the above - special price	£150
TUBUS VEGA rear carrier. Won't carry the same load as our carrier but, as it's significantly lighter, it is a better choice for those who only ride day rides, or travel exceptionally light on short hotel based tours.	£60
Profile Design Kage. The best bottle cage ever. Will carry std bottles, Sigg type 1litre aluminium bottles or up to 1.25litre plastic "Coke" bottles (Other carbonated drinks are available.) ALL sizes of Raven Twin Mk2 will take 4 cages	£5
Profile Design Kage. As above but 2 cages	£10
Profile Design Kage. As above but 3 cages	£15
Profile Design Kage. As above but 4 cages	£20
Moon pulsar rear LED light including Moon bracket. Amazingly bright and visible!	£25
Thorn accessory bar Mk2 105mm extension. Fits in place of some spacers on steerer tube. Allows bar bag to be fitted lower than would otherwise be possible, frees up space on the bars.	£20
Topeak mountain morph mini track pump. Superb piece of kit quickly reaches reqd. pressure	£28
Zefal HPX BLACK pump size 4. This fits on the base tube.	£20
Spur cycles bell POLISHED STAINLESS Ultra small but mega loud! 115db pitch perfect Superbly Engineered in USA. The best we have ever seen by a huge margin. Fits any bars or stem. Expensive, even at these special New Bike prices - but worth it.	£50
Spur cycles bell DIAMOND BLACK STAINLESS (As above, except diamond hard black finish)	£55
Other accessories can be fitted.	£'s Vary
Spares, Rohloff spares and tools	
Rohloff full oil change kit	£17
Rohloff special chain lubricant	£6
Teng Tools Torx T20 T grip	£8
Schwalbe SV13 Presta inner tube 26 x 1.5" -2.5" Original equipment on our 26" wheel bikes. The best tube on the market in this size.	£4
Schwalbe AV13 Schrader valve tube 26 x 1.5" - 2.5" Only applicable if you requested us to drill your rims	£4
Schwalbe SV13D Schrader valve tube 26 x 2.1" - 3.0" Very thick walls, an extra 100g of rubber = higher rolling resistance - Do you have a good reason to want this?????	£5



**This is how bright the Pure Orange looks in good daylight - if viewing online.
(Depending of course upon the quality of your monitor)**



About Thorn

The business began as St John Street Cycles, in 1984 when Robin Thorn took over an almost defunct toy and cycle shop at 36 St John Street. He chose Bridgwater quite by chance – he was having holiday in the area from his home in Norfolk, and was amazed to see the number of people on bicycles in the town. In an instant the decision was made and the shop was leased that day.



Robin borrowed a small sum from his parents and worked all hours of the day and night to build up the business. He soon became a well-known figure with his oil-stained brown overall and wild hair and beard, often working on the pavement in the sunniest weather to draw further attention to his shop.

In 1989, the first employee was taken on – Andy Blance, a friend and very experienced Audax rider.

In 1992, the first tentative moves were made into national advertising, concentrating on the touring and tandem markets, which were the particular interests of Robin and Andy. The emphasis had completely changed from cheap bikes to very high quality, specialist machines, though still often sold at a bargain price made possible by Robin's buying prowess.

In 1993, Robin decided to move up the road to number 91-93. The entire building front was gutted to give a modern, light, air-conditioned shop and a very superior workshop; the rear was left as a long single-storey brick store. St John Street Cycles was rapidly becoming known as one of the major touring and tandem suppliers in the country. We were gaining an extremely good reputation for the quality of our service and the breadth of our knowledge in the field.

In late 1995 we began to consider manufacturing our own bikes. We had become increasingly frustrated by the mistakes and missing features on the bikes we could buy and wanted to design what we considered to be the ideal touring bike and the ideal tandem. Andy used his wealth of experience and study of the subject to design the bikes, and the THORN brand was launched. The first bikes were so well received that we didn't even have to advertise them – they sold as quickly as we could get them made. At this point we set up our own frame shop and Andy designed complete ranges of Thorn bikes. Thorn quickly became established as a premier brand in the tandem touring market. At the same time, our mail order business and online store had been growing apace, and our internet site recognised as an industry best.

In 2000, the limited company Thorn Cycles Ltd. Was formed, with Robin and Helen Thorn as joint owners. St John Street Cycles remains as a trading name of the company.



(1) Robin and Andy back in 1992

(2) Robin 2007

(3) Andy 2007

Steel is real

High quality steel is the best possible material for a strong, comfortable, well equipped, long lasting **TANDEM** frame - all our bikes' and our tandems' frames are, always have been and always will be, made from high quality **heat treated steel** - we wouldn't wish to build our bikes with anything else and we wouldn't wish to use anything else for our own cycling!

The final heat treatment process can double the cost of a steel cycle tube. Heat treatment significantly raises the UTS (ultimate tensile strength) which makes the tubes stronger and more resistant to cracking, it also makes the tubes more resistant to denting. It also greatly enhances steel's much talked of and easy to notice but hard to describe quality of "resilience". Because heat treatment is so expensive, the steel tubes used in most cycles aren't heat treated. If a frame doesn't say "heat treated", you can be certain that the tubes won't be. I'll repeat...

All the tubes used in THORN frames are heat treated.

Cheap (thick-walled) aluminium

All of our bikes have a **LIFETIME frame warranty** for the original purchaser. We also offer **Money back guarantees of satisfaction.**



Buy a **Thorn Raven Twin Mk3 Rohloff equipped tandem**, ride it for 100 days and, if you're not totally delighted, return it to us either in person, or safely packaged in a Thorn bike box.

We will refund you the purchase price of the bike including any or all **UPGRADES** and accessories found in this Raven Twin Mk3 Brochure

This offer does **NOT** include, pedals, tools or accessories **NOT** found in this brochure.

This offer applies to sales of **complete tandems** and to EU customers only*.

* The Money back guarantees can also apply to Customers outside the EU but only upon the strict understanding that they **must return the bike in person** - otherwise we would end up paying import duty on the returned machine!

frames are strong enough, they could have the fittings required on a touring Tandem but they're heavy and very uncomfortable.

Expensive (thin walled) aluminium frames are less uncomfortable and they're quite light but they can't have the fittings required for touring and they break! Dealing with a broken lightweight aluminium frame is easy - you recycle it into bottle tops!

You can read much in more detail about other frame materials (which we don't use!) in the **Mega Brochure** on pages

8 and 9

Please see the link on page **6** of this brochure.





**A big
smile as
Sarah
takes
control!**

