

### Kickstand

I hate always looking for a tree or wall to lean my VISION against. We recommend the Cannondale CODA kickstand for your bike - it fits the oversized VISION rear chainstay like a glove, and has an adjustable height that makes balancing the bike a snap.



There is another technique for standing the VISION that can be used if you don't have a rack or fenders. Simply flip the bike on its back and let it rest on the rear wheel and the seat back. Note - this technique will not work on long wheelbase VISIONs!

### Fairing

Advanced Transportation Products has available for your VISION a clear lexan plastic fairing. It mounts to any VISION on the front derailleurs tube and waterbottle mounts, and includes a light mount bar and two waterbottle braze-on positions. There is about a



10% - 15% reduction in aerodynamic drag with the fairing, but the real advantage of the fairing is the weather protection it offers. Riding in cold and wet weather is a joy in comparison to an unfaired bike, and there is an optional "Poncho" available that will keep all the wet stuff off your body. A must for year-round commuting.



### T-Shirts

Declare to the world that you are a VISION owner - has the VISION logo embroidered over the left breast. Available in Large and XL.

### QA80 Tandem quick Boom / frame Adjuster kit

The VISION **Tandem Quick Adjuster** allows you to set the boom and frame length for different size VISION riders, without cutting the chain each time - it makes demo rides and switching the captain and stoker a snap!

# DOUBLE

# TANDEM



Models VR82  
VR85

# Owner's Manual

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***Seat Back Bag***

## **Seat Back Bag**

Advanced Transportation Products has designed a custom bag to sit on your seat back. It has approx. 800 cubic inches of storage capacity in two sections: a main storage compartment with flap, and a zippered pouch on the main flap for wallet, keys, etc. The main section features two pockets, handy for tools, powerbars, etc. The bag slips over the back of your

VISION seat, and straps around the seat crossbar. Off the bike it features a comfortable shoulder strap. The bag is ideal as a day bag, or a touring companion bag for carrying valuable items. Fits on both the Captain's and Stoker's seats.



## **Rear Rack / Panniers**

Your VISION is equipped from the factory with mounting positions for a standard mountain bike type rear rack, allowing you to use any standard pannier set for touring/commuting.



***Rear Fender***

## **Fenders**

For wet weather riding your VISION will accept fenders. We make a matched 20"/26" set: the "FEN80", available from your local bike shop.

## Chapter 4: Customize your VISION

Now that you are comfortable riding your new VISION, I'm sure that you will want to customize it for your particular riding needs. Your VISION recumbent has been designed to accept a full range of standard bicycling accessories, as well as some custom items that have been designed by ATP.

### Cateye Fashion Mirror

If you ride in traffic, a mirror is a must. Options include a helmet mounted mirror or the Cateye Fashion bar mounted mirror. For above-bar VISION riders, the Cateye works well, as well as any good bar-end mountain bike mirror.

### Computer

Virtually any small bicycle computer will fit on your VISION. We recommend that you mount the computer on the handlebars, although make sure that on underbar steering models the computer doesn't interfere with the seat frame as you turn the handlebars from side to side. Most computer instruction manuals won't give a calibration number for a 20" front wheel, so you must calculate it. Generally the computers are looking for the wheel diameter or circumference in millimeters;

for the 20" front wheel the circumference is 1430mm and the diameter 455mm. On my Vetta C-15 computer, for example, my calibration number is 1430.



**Computer and Mirror**



### Water bottles

Don't forget to drink plenty of water! There are braze-ons in the front VISION frame for a waterbottle cage. In addition, you can carry waterbottle in the seat back with "cup caddy" type waterbottle holders. Our day bag has an optional water bladder available.

### Cup Caddy

### Pedals/Toeclips

Your VISION will accept all standard pedaling systems. Clipless pedals such as the SPD and LOOK work extremely well on recumbents - just remove your original pedals and screw in the new (the left pedal is left-hand thread). Toeclips are also recommended - practice getting in/out of them a while before hitting the streets. One technique for entering toeclips is to "flip" the toeclip forward with your toe so that it swings around onto your foot. After a while it becomes second nature!

## Chapter 1: Read me First!

**Thank you** for choosing a Double VISION Tandem Recumbent! We here at



Advanced Transportation Products have tried to build for you the most advanced, full featured tandem recumbent available. Please take a few moments now to fill out your warranty registration card - we want to know what you think about your new bike.

Before we explore your new VISION's features, we would like to take a few moments to discuss some important points about recumbents and bike riding in general:

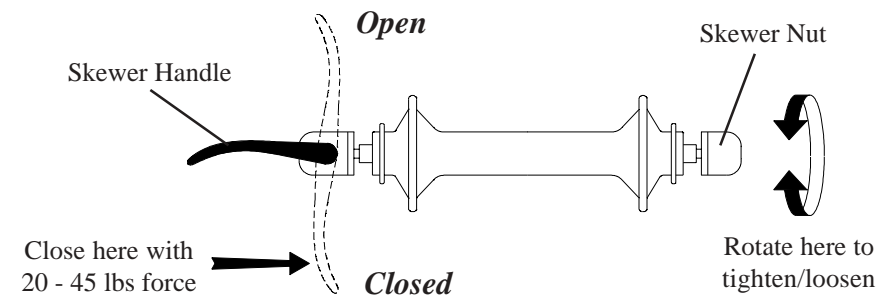
**Always wear an ANSI or Snell approved helmet** -- Yes, with their lower center of gravity and feet-first position, recumbents are significantly safer than upright bicycles. You still need to protect your most valuable body part. Modern bicycle helmets are light, cool, and offer lifesaving protection.

**Check your bike carefully before each ride** -- Spend a few moments before each ride inspecting your VISION for problems.

\*Check all the nuts, bolts and other fasteners to make sure none are loose.

\*The tires should be inflated to the pressure moulded on the sidewall, and free of cuts or imperfections.

\*The wheel quick release skewers should be clamped shut with at least 20 lbs (14kgf) of force, and a sharp blow to the top of the tire should not knock the wheel loose. Study the wheel / seat skewer operation diagram - the skewer handle has a curve



**Wheel / Seat Skewer Operation**

in it that will face the tire when properly closed. Open the skewer handle, tighten the skewer nut slightly, then close the skewer handle ( curve facing toward the wheel). It should take 20-45 lbs of force to close the handle as shown, and the skewer should emboss the metal of the wheel dropout.

\* The wheels should be straight and not wobble.

\*Squeeze each brake lever to make sure there is no binding and the brake pads press hard enough on the rims to stop the bike. The brake pads should be adjusted so they are 1/16" (2mm) away from the rim when not applied. The brake pads should be centered on the rim and not touching the tire itself.

\*The seat quick release skewers should be closed with at least 20 lbs (14kgf) of force (see the skewer diagram).

\*Sitting on the bike, swing the handlebars from side to side checking for binding or interference. Check to make sure the stem bolt is tight. The handlebars should not rotate in either direction when 60 lbs of force is applied to a grip.

\*Check the tightness of the boom and main frame pinch bolts, and make sure the frame anti-rotation bolt is installed. **Do not ride a Double VISION without the frame anti-rotation bolt! (See Chapter 2).**

\*If you are unsure of the condition of your VISION recumbent, **Do Not Ride It** until the problem has been corrected. If you have any questions at all, see your VISION dealer.

**Wear gloves** -- with its low center of gravity, you don't fall very far on a recumbent, but you will touch down with your hand first! A set of bicycling gloves will protect your skin.

**Wear eye protection** Riding down the road at speed is no time to get a bug or dirt stuck in your eye! Goggles, glasses or both will save your sight and protect against a crash.

**Practice riding your VISION** -- before you mix it up with traffic, spend enough time on your recumbent on a parking lot, driveway or other open area to get used to its unique riding position. We also recommend that a new Captain ride the VISION Tandem solo for a while before adding the Stoker. Chapter 3 has some important information about riding your VISION.

**Never ride at night without a front and rear light!**

**Experiment** with different seat positions, seat angles, and boom lengths during your practice period -- Your VISION recumbent has many adjustments and special features that fit the bike to you. Try them all!

**Be careful when riding in wet conditions-** No brakes, whatever their design, work as effectively in wet weather as they do in dry. Stopping distances and brake lever pressures all will increase.

but shifts slower and is more prone to pressure-induced miss-shifts. The rear derailleur (controlled by your right hand control) operates over a range of seven or eight gears, shifts faster and cleaner when you need it, but each shift is a smaller "jump". The most important thing to remember is to practice shifting back to a nice starting gear **BEFORE** you come to a stop. Try to start the bike in a high gear (like starting your car in fourth) and you will see why it's so important to remember to shift back to your favorite start gear. With a little practice, you will know what gear you want for different condition starts (uphill, level terrain, etc.) and be able to quickly dial in that gear.

Now it's time to add your partner. While everyone will probably find their own favorite method of mounting and starting the bike, we've found a favorite technique. The captain holds the bike and allows the stoker to mount. When comfortable, the stoker supports the bike and allow the captain to mount and clip into the pedals. Once the captain is ready, they signal their intention to ride, and start pedaling away. The stoker then lifts their legs and clips into the pedals. At stops, the captain signals the stoker to "prepare to stop" and the stoker releases their feet from the pedals and gets ready to drop their feet. When the captain brings the bike to a halt, the stoker drops their feet and supports the bike, allowing the captain to remain in the pedals, ready to accelerate away. If the stoker is much lighter than the captain, you might be better off reversing this procedure, but it is so easy to support the Double Vision from the stoker's position that this method is usually the most comfortable. If your bike is equipped with the I.P.S., then it is even easier to start and stop; the stoker's and captain's cranks are independent of each other, so one won't be spinning madly with the other.

It's important for the captain and the stoker to understand their own responsibilities to the other. The captain should always advise their stoker of starting and stopping intentions, warn of potholes or bumps, and in general keep their stoker informed of their plans. The stoker should acknowledge all communications with the captain, and try to sit still without a lot of moving about. It's OK to turn your head and look at the scenery, just try to not shift your upper body about, and keep all your movements smooth and predictable. You shouldn't feel like you have to do everything in one session. Many novice riders actually do much better working up to the open road in several short training sessions, often days apart.



With some practice, the captain and the stoker become a team, involved in the joy of cycling together. Enjoy your bike, and have a world of fun with it!

manual—it's important to be able to actually look around behind you. This not only gives you options on checking out traffic, but practicing this will increase your skills and confidence on the bike.

At this point you should be feeling pretty good about life, zooming along nice and comfortable, relaxed and thinking about how much fun you are going to have on this thing. Well don't get too cocky yet. Before you hit the open road there are a some more exercises you should do. Practice circling, both to the right and to the left. Start out with gentle curves, and progress to tighter and tighter radius "U" turns. You should really try to master turning slowly in as tight a curve as possible quite a few times, this gets you ready for the real world of poor directions and detours. If you find yourself wobbling or jerking the handlebars around, you are probably too tense. Relax, let your hands grasp the bars in a light but firm manner. Let your shoulders droop, relax your neck, don't "death-clench" your teeth. Once you relax you will have more control over the bike.



*Foot Starting Position*

Next, you should practice using the brakes. Stop and take off a few times, getting a feel for how much pressure on the lever it takes to slow down or stop the bike. Remember to always use both brakes together, with gentle pressure at first to stop the bike smoothly. Drop both your feet to the pavement while giving the brakes the final squeeze to stop the bike. Lean forward a bit and stand up, while reaching behind you for the seat frame to steady the bike. Practice stopping and dismounting, then starting off again. You should also practice stopping by dropping only one leg, typically your non-dominant leg. This exercise will help you deal with momentary stops, such as at stop signs and traffic lights. It does take a little practice to balance the bike leaning onto a single leg. Remember to keep one hand clamped on a brake to prevent the bike from rolling, it really helps. I usually immediately cock my "crank-bound" leg for the start, and then hold pressure against the brake until I'm ready to go. You should also carefully investigate what happens to the bike with gradually increasing brake lever pressure, so you will be comfortable with quick decisions on the road.

Don't fall asleep on me yet, we're almost done. The last thing you should practice before hitting the open road is your shifting. You really need to be work on being aware of how the gears work. While the modern shifting systems work wonderfully, it's best to only shift with a light load on the pedals. That is, you should ease up on the pedaling pressure before you shift. This does take some practice, typically you only think to shift when it's almost too late; like when you're right in the middle of a monster hill. Try to anticipate what gear you will need, and when. Typically, the front derailleurs (your left handlebar control) with it's three positions controls a bigger "jump" in the gearing,

**Keep your pedal cadence high** - You can overstress your knees with the tremendous leverage you have on a recumbent. We recommend that you pedal in the 80-90 RPM range. If you experience knee pain, spin faster and check your leg length setting. It is probably too short - see Chapter 2 for leg length adjustment. You might also change your seat back angle.

**Communicate --** The key to successful tandem riding is teamwork between the captain and the stoker. Captains - tell your stoker when you are shifting, stopping, and if there are any bumps coming. Stokers - become part of the bike; don't make sudden movements that startle your Captain. One of the best parts of tandem riding is being able to talk to each other -- Do it!

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## **Quick Information**

### **Tire & Wheel information**

**Rear:** 559 bead seat diameter, 1.5" - 2.25" wide (ex. 26 x 1.5)

**Front:** 406mm bead seat dia, 1.5" - 2.0" wide (ex 20 x 1.5)

**Inflation pressures:** Inflate to the pressure moulded on tire sidewall

**Wheel dish:** Rear wheels are built without traditional dishing, call for exact specs.

### **Torque specifications**

Front Pinch bolts: 45 in-lbs (5N-M)

Frame Pinch bolts: 65 in-lbs (6N-M)

Pinch bolt type: 6mm x 1mm -- 25mm long

Handlebar Stem bolt: 65 in-lbs (6 N-M)

### **Chain**

240 links captain to stoker (maximum length rider)

238 links stoker to rear wheel (maximum length rider)

### **Serial number location**

On back plate of rear main frame, facing the rear wheel

### **The Advanced Transportation Products Inc. Warranty**

Advanced Transportation Products Inc. warrants each new VISION bicycle frame, fork, and seat frame against defects in workmanship and materials for the lifetime of the original owner. Paint and decals, seat fabric, and all original parts, are warranted for a period of one year from the date of purchase. This warranty is expressly limited to the repair or replacement of a defective frame, fork, seat or defective parts and is the sole remedy of the warranty. This warranty applies to the original owner and is not transferable.

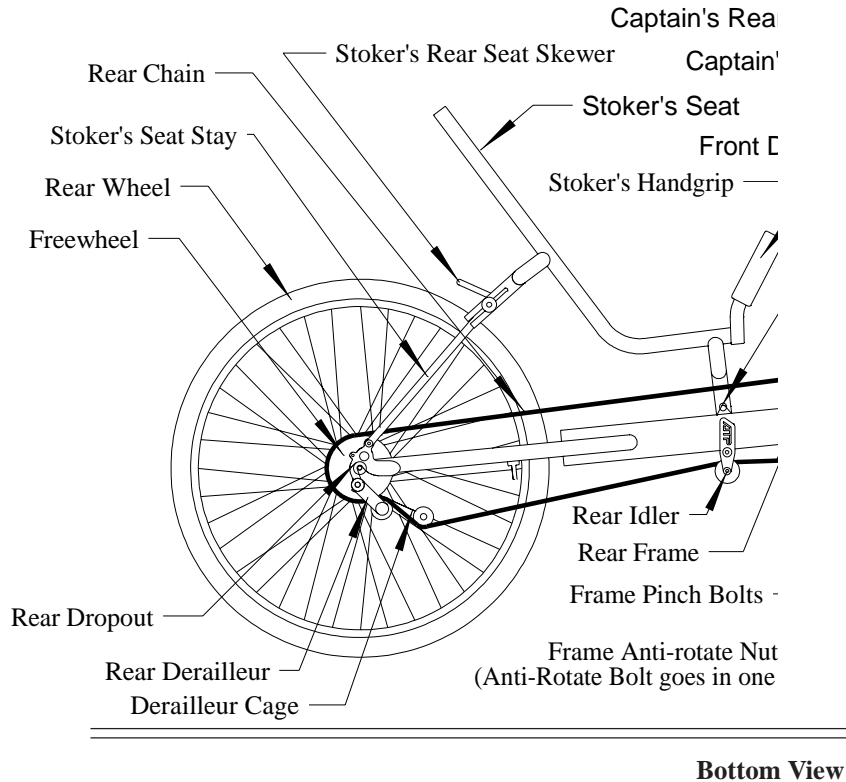
Claims under this warranty are to be made through an authorized VISION dealer. Proof of purchase is required. A Warranty Registration Card must be completed and received by Advanced Transportation Products Inc. before warranty claims may be processed.

The warranty does not cover normal wear and tear, improper assembly or maintenance, or installation of parts or accessories not originally intended or compatible with the bicycle as sold.

The warranty does not apply to damage or failure due to accident, abuse or neglect.

Advanced Transportation Products Inc. shall not be responsible for incidental or consequential damages. Labor charges for part changeovers is not covered by this warranty. The user assumes the risk of any personal injury or damage to the bicycle or other losses if the bicycle is used in any competitive event including but not limited to bicycle racing, triathalons, or similar activities.

# Anatomy of a



**Main Frame Joint detail - Anti-Rotate Bolt installation**

front wheel from side to side. Squeeze the brake levers. Yodel a few times. Do whatever it takes to relax. Many first time riders try to sit forward on the seat, not being used to the relaxed, laid back position. Sit back! Enjoy the comfort!

Now pick a dominant leg. For most people this is your right leg, but go with whatever is most comfortable for you. Pick your leg up and swing the crank arm around so you can easily reach the pedal. If you are using toe straps, flip the pedal clip over your foot, but keep the strap nice and loose to start with. Swing the crank around until your foot is in a "cocked" position; somewhere close to the top of the pedal stroke. This spot is different for everyone, the key is to find the spot where you feel best about putting a lot of power into the pedal. It helps to hold the bike from rolling with either brake. When you're ready, release the brake, and push forward firmly on the pedal. As you start moving, lift your other foot up and keep peddling. At first you probably will wobble a little, but don't panic and tense up! Just relax and concentrate on making small corrections with the handlebars. The most common beginners' error is to over-control the bike, ending up steering a set of "S" curves down the lane. If you relax and let your hands sit lightly on the handlebars, you will find it easier to avoid this syndrome. Lean back! You are probably trying to lean forward, to mimic that



**Dismounting**

other type bike you've been riding. Another common first time mistake is to stare at your feet — after all, you've never seen them before! Look ahead, see the scenery you've been missing. Once you're riding smoothly in a straight line, it's time to practice looking around. Now don't laugh, I'm not being funny nor condescending. Compared to a traditional bike you will find yourself looking at the world from a whole new perspective, a comfortable one. The biggest problem you will face is keeping your mind on the road. Since you are riding in a relaxing reclined position it's all too easy to forget about everything except the scenery in front of you. Looking behind you is not difficult, but it does take practice. As you ride in a straight line—and are sure you're not about to take a long ride on a short pier—practice swinging your head to the left and right, taking quick glances behind you. The first time you do this you will inevitably shift your weight and hand position, causing the bike to swerve. Don't panic, this is why we are practicing in the park instead of a congested street. While many riders like to use a helmet or bicycle mounted mirror—and we sell a beautiful unit that mounts onto the handlebar, see the accessories section of this

here is to spend some relaxed time getting to know your bike before you get 20 miles into nowhere, or involved with city traffic. Pack a lunch and head for the park, relax and enjoy the day for a bit, and then set yourself up to ride in the parking lot, or any open space with no traffic.

Before you start to ride, look at your gears and make sure that you are set in a good gear to start in. On a flat surface this usually is in the middle chainring (up front) and in one of the three largest cogs (on the back). If the bike is not in one of these gears, have someone hold the rear wheel off the ground so you can spin the cranks and shift the gears. Don't forget that you should only shift when pedaling! As you gain experience you will find yourself thinking ahead and shifting into your favorite "start-up" gear before you come to a stop. Your VISION's gears are shifted with "Rapid Fire" type shifters - they're right under your hands, on the forward part of the handlebar grips. You don't have to take your hands off the handlebar at all to shift - just toggle the lever with your thumb and forefinger.

Now let's get on the bike. I tend to always mount from the left, like on a horse, but the important thing is to establish a pattern and do it the same way every time so it becomes a habit. Starting on the left side, hold the seat back with your right hand. Standing in front of the handlebar and facing the bike, swing your right leg over the front boom.



**Mounting - Step 1**



**Step 2**



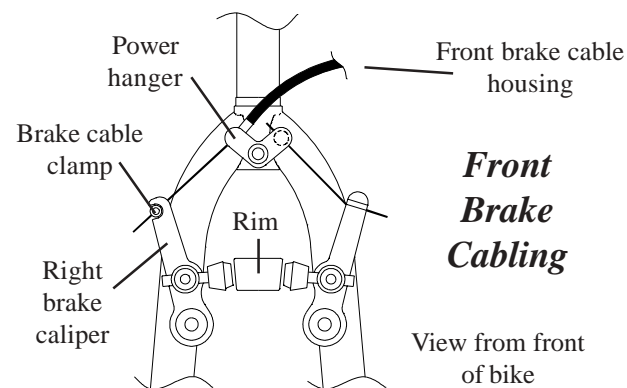
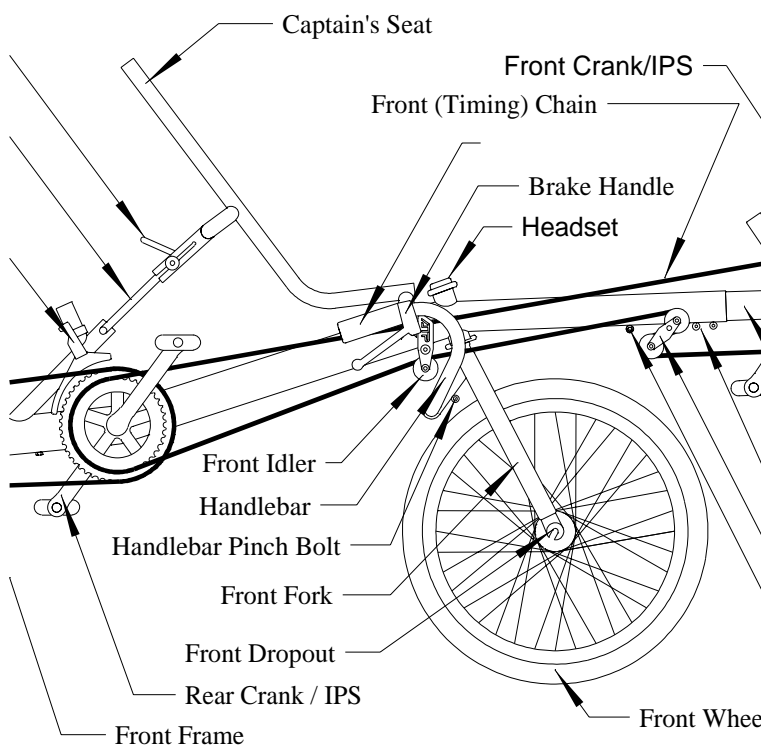
**Step 3**

You are now looking forward, straddling the bike.

Now reach down and grab the handlebar grips, apply the brakes, and sit down. Settle yourself into the seat and get comfortable, remember, let's try this alone for the first couple of rides. The Double Vision rides beautifully with only a captain, and you can spend some time getting comfortable with the bike without having to worry about what the stoker is doing.

Sit awhile, rock back and forth and from side to side. Notice how the seat cradles you, and how comfortably close to the ground you are. Grasp the handlebars and rock the

# Double



## Front Brake Cabling

## Chapter 2: Assembly and Set-up

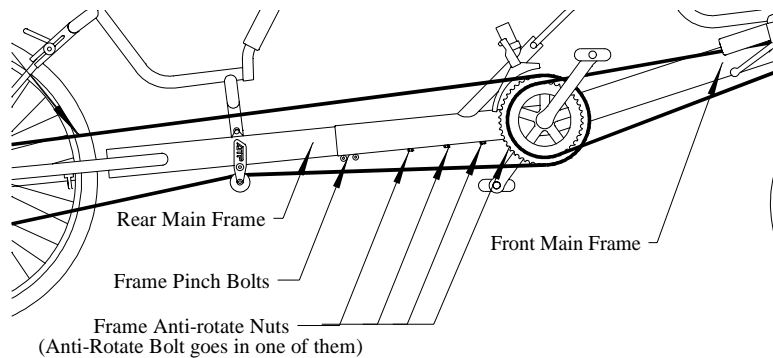
Your VISION dealer should have put your tandem together and set the adjustments for you. We don't recommend riding your VISION at all until the following procedures have been accomplished or checked by a qualified bicycle mechanic. We will review the assembly instructions here, and also point out some areas that need continuing inspection. Refer to the "Anatomy of a VISION" section for part names and locations.

### Unpacking the Double VISION

Your VISION recumbent comes shipped from the factory in two large cardboard boxes. These boxes are UPS shippable - in fact, you may want to keep them around in case you ever want to ship your bike or take it on the airlines. Remove your VISION from the boxes.

### The Double VISION main frame

The bike comes packed with all components installed except the front boom, pedals and the chains. The main frame comes in two parts - start by sliding the rear frame section into the front frame section. Do not grease the rear frame! The frame main



### *Main frame anti-rotate bolt installation*

tube is made out of stainless steel -- it will not rust under normal use. You can align the two frame halves by lining up the scribed line on the rear frame with the notch in the front frame.

The rear frame also has a slot on the underside of the slider section - **there must be a frame anti-rotate bolt installed in the anti-rotate nut that is over this slot!** There are four anti-rotate bolt positions on the front section of the main frame. Only one bolt position is used at a time - if the rear frame is inserted all the way in the front frame to approx. one inch out, the rear frame slot will be aligned with the forward most anti-rotate bolt position. If the rear frame is from approx. one inch to four inches extended, the slot will align with the second nut on the front frame. Approximately

## Chapter 3: Riding your Double VISION

Riding a Vision recumbent tandem is no more difficult than riding a traditional diamond frame tandem, or a single rider recumbent. If you are new to cycling, you'll find it easy to learn to ride on a Vision. If you are an experienced rider, you'll have to learn some new habits, but the benefits of riding a recumbent far outweigh the small learning curve involved. Either way, it's important to spend a little time adjusting to your new bike before riding in traffic or committing to a long ride. In this chapter I'm going to discuss some things that will make the transition to recumbents, or learning to ride on a recumbent, easier. We recommend that the captain take the Double Vision out solo for the first few rides, to get adjusted to the handling characteristics of the bike.



First of all, be sure to read the previous chapter about set up of the bike. To ride well you have to be comfortable, and to be comfortable you need to be sure that your Vision is adjusted to fit you properly. The seat angle is adjustable, and really affects how you feel on the bike. If you're just starting out with recumbents you will probably want to set the seat as upright as

possible. Later you can recline the seat incrementally until you find your own ideal position.

If you're comfortable on your bike, it's time to go riding. First and foremost, the most important part of riding any bike is to wear proper safety equipment. We discussed safety equipment in Chapter 1, but I will repeat it here. It is essential to wear a helmet, all the time, anytime you ride. It's also very important to wear gloves when you ride. If you do have an accident and fall over, you'll probably catch yourself with your hands, so save your palms and wear gloves. You should also wear protective eyewear; road grit and flying insects do not make for happy eyes. Wearing cycling shoes, shorts and jerseys can help you be more comfortable, but they are not as essential as the helmet, gloves and glasses.

Now you're all set to hop on your Vision and pedal away into the sunset, right? Wrong! The key to riding smoothly and in a controlled fashion on any bicycle, recumbent or not, is to be comfortable enough to relax. If you are nervous and tense, you will tend to ride in a jerky, over-controlling fashion. Not only does this make you more uncomfortable, which leads to even worse riding, but it doesn't look cool. So you need to approach the bike as your friend, someone you'll enjoy spending the day with. The intent

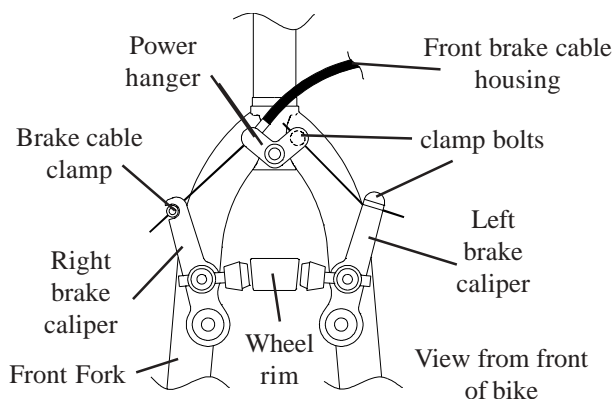


If the derailleur cage is to the left of the fourth sprocket, then turn the adjustment barrel clockwise one quarter turn. Turn the pedals by hand a few turns and then look at the alignment again; repeat the adjustment steps until the derailleur cage is perfectly aligned with the sprocket, and the chain shifts effortlessly between sprockets when the shifter is moved between "clicks".

### Attaching the front brake cable

Your Vision has been shipped with the front brake cable length set. If you need to replace the cable you will have to set this length yourself. Study the front brake cabling diagram to check that you have all the proper parts in the right order. To release the brakes, simply pull the brake cable clamp out of the right brake caliper and pull the brake cable housing

out of the power-hanger. To attach the brakes, reverse the process. Squeeze the brake lever a few times to test the brake action - There should be 1/16" (2mm) of clearance between the brake pad and the rim, the pads should contact the rim face squarely, not touch any part of the tire, and the brake handle should not be able to touch the handlebar grip under full braking power.



**Front Brake Cabling Details**

### Final Inspection

Your VISION is complete! One last thing to do -- **and also before each ride** -- is to inspect all the nuts and bolts on the bike, looking for any parts that may have loosened in shipment. Check the alignment of the wheels, and inspect the brakes to make sure the shoes contact the rims squarely and don't bind. The handlebars should be aligned and able to turn from side to side without binding or interference. Check that the wheel skewers are secure, and that a sharp blow on the wheel while you hold the bike off the ground will not jar the wheel loose. See Chapter 1 for more details.

every three inches of extension you will have to move the anti-rotate bolt to the next hole rearward. The rear frame is at maximum extension when the anti-rotate bolt is in the last anti-rotate bolt position and the frame will not move backwards. Make sure the anti-rotate bolt is properly installed by trying to rotate the rear frame with the pinch bolts loosened - you should not be able to turn the frame more than five (5) degrees to either side relative to the front frame.

**WARNING! -Riding without the frame anti-rotate bolt can result in the front wheel folding underneath you. A crash and serious injury could result! Do not ride a Double VISION without the frame anti-rotate bolt installed properly!**

### The Front Boom

Unwrap the front boom assembly, and install it into the front of the VISION frame. Install the pedals - the right pedal (as you sit on the bike) has a right hand thread, and the left pedal has a left hand thread. Grease the threads before installation, then tighten with a 15mm wrench.

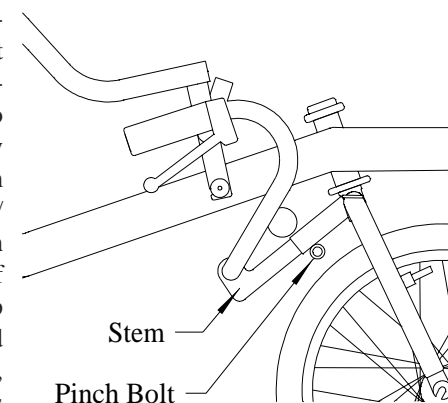
### The Front Wheel

Your Double VISION has been packed with the front wheel removed. Install it in the front fork with the handle of the skewer on the left side of the tandem. Tighten the skewer as shown in chapter one.

**WARNING! Failure to tighten the front wheel skewer properly could result in the front wheel leaving the bike. Serious injury could result!! If you are unsure of the proper wheel skewer operation, have your dealer demonstrate it for you!**

### The Handlebar

Your VISION handlebar has been installed on your bike at the factory, but removed from the fork stem for shipment. Insert the stem all the way into the fork tube, then level the handlebar by sitting on the bike, turning the bars from side to side, and checking for seat/handlebar interference. Tighten the pinch bolt. Adjust the fore and aft position of the handlebars so that the handlebar grip is parallel or angled slightly downward from the seat frame. To check alignment, sit on the seat, grasp both handlebar grips firmly, and turn the handlebar side to side



- there should be no interference between the seat frame and your arms. If there is, rotate the grips rearward in the stem. Tighten the stem binder. The bars should be tight enough that they will not rotate with 60lbs/27kg force on the handle, but not so tight that they will not rotate under a sharp blow (such as laying the bicycle on its side).

### Routing the rear brake and derailleur cables

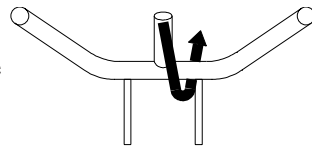
The rear brake and derailleur cables have been removed from their cable stops for shipment. Install the rear brake housing for the brake in the proper stops and re-attach the brake straddle cable. There are two separate cable housings to install on the derailleur cable - finish by tightening the cable in the rear derailleur.

### The VISION Seat

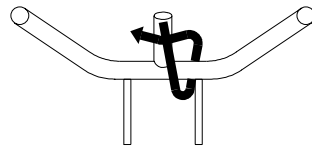
Remove the packing materials from the seat and attach the fabric to the seat back. The bottom of the seat should be installed already - study it to use when attaching the other panels. The following photo's and illustrations should help -- the key is to get the fabric panels as tight as possible on the seat, and make sure you rub the velcro pieces together over their entire area vigorously!

#### Front Tension Strap attachment

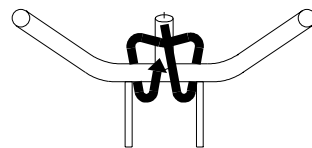
Step 1. Looking at the front of the seat, with the seat fabric laying on the seat frame, take the thin strap and loop it around the frame cross-piece.



Step 2. Loop the strap in front of the small stub tube but behind the strap.



Step 3. Loop the strap back around the seat frame crosspiece and strap through the ladder buckle.



The seat fabric bottom section is installed at the factory, and we suggest studying the front strap attachment carefully before removing it. In case you forget, see the front tension strap attachment diagram. This strap should be tightened periodically.

The seat back is attached next. There are two webbing pockets on the seat fabric top that go over the seat side rail backs - attach these first, then follow the instructions for

If the captain and stoker want to trade places, and their leg lengths are the same, great! Otherwise, you must adjust the boom and frame to the proper lengths. For the Captain, this is not a problem - the chain tensioner will allow about 3" of boom movement if the chain is set correctly. If you will be switching stokers often, we recommend our QA80 tandem quick adjuster kit. This includes three quick release skewers (one front, two rear) to replace your pinch bolts, and a rear adjuster idler to quickly adjust the rear chain length.

### Adjusting the derailleurs

We are almost there! The final step is to adjust the gear system.

#### Front Derailleur

The front derailleur is non-indexed, that is the system is set to the proper position by the rider. The front derailleur is properly adjusted when the chain will not rub the derailleur cage on the highest setting, and the chain will not jump off the smallest chainring when shifted from the largest chainring down.

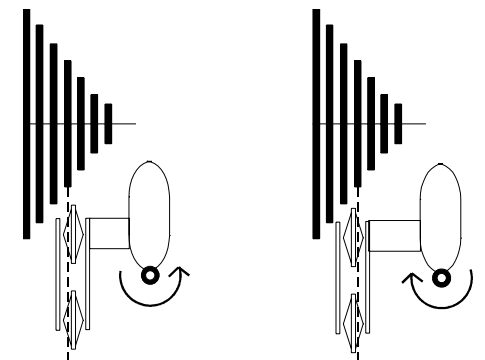
#### Rear Derailleur

The rear derailleur on your VISION is an indexed system, that is the gears shift up and down in preset intervals corresponding to "index" clicks of your shifter. This system requires a little patience to set up, but once it is it will give a season of proper performance.

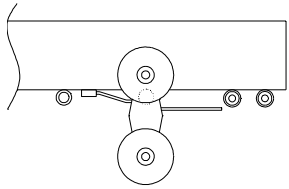
The rear derailleur also has two limit screws, and these must be adjusted properly before the index system will work. Set the shifter on the high sprocket end of its travel and adjust the high limit screw so that the derailleur cage aligns with the high sprocket. Repeat for the low sprocket. Now with the chain on the high (smallest) rear sprocket, turn the pedals and shift the shifter up three clicks. The rear derailleur cage should align with the fourth sprocket up from the smallest (see illustration). If the derailleur cage is to the right of the proper sprocket (as seen from the rear of the bike), turn the adjustment barrel counterclockwise on quarter turn.

#### Rear Index adjustment

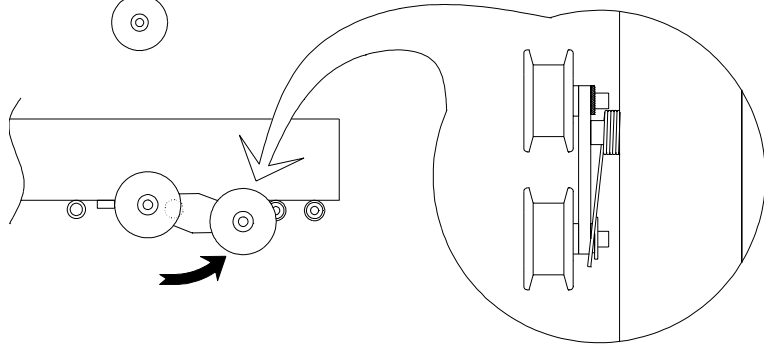
Derailleur and cassette as seen from rear of bike



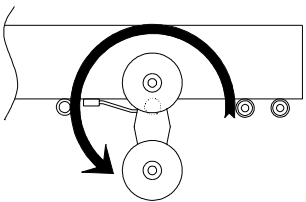
## Front chain tensioner installation



**Step 1** -View of chain tensioner as it hangs on tandem. Note that the long arm of the chain tensioner hangs down at the 6'oclock position.



**Step 2** - turn the chain tensioner counter clockwise one quarter turn so the long arm is at the 3'oclock position. Flip the spring arm behind the washer on the long arm.

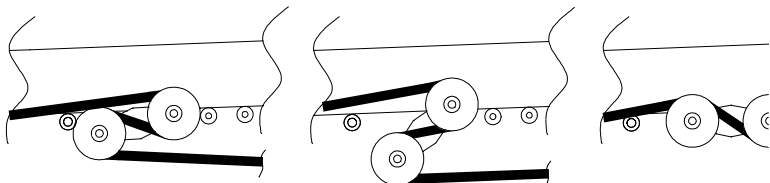


From idler

To chainring

**Step 3** - Continue turning the tensioner counter- clockwise 3/4 turn until the long arm is again in the 6'oclock position. This will be hard - you are turning against the spring tension.

**Step 4.** Route the return (bottom) part of the chain from the idler wheel to the top of the chain tensioner. wind the chain through the tensioner as shown, then continue to the bottom of the chainring



Maximum chain wrap - remove chain links

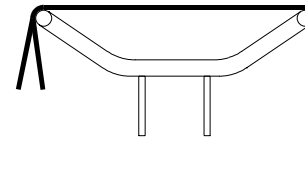
Ideal chain wrap

Minimum chain wrap - add chain links

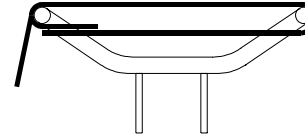
## Front chain tensioner wrap adjustment

## Attaching the Seat Fabric Panels to the Seat

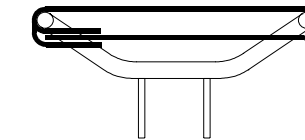
The following are instructions for installing the upper seat fabric panel; the other three panels attach the same way. The view is from above the seat back.



**Step 1.** Drape the seat fabric over the seat side rails as shown



**Step 2.** **Stretch** (hard!) the long flap toward the short side pulling the inner short flap toward the long side, and attach together. Rub the entire attachment area together **firmly**.



**Step 3.** **Stretch** the remaining short flap over the other two and attach. Again rub the entire area together **firmly**.

the seat panel attachment.

For the first few weeks, the seat fabric will stretch a bit and appear loose. Simply tighten the fabric as needed - the fabric will stabilize after about 100 miles or so. Check the seat before each ride for abrasions, tears and tightness.

To install the seat on your VISION, simply insert the front of the seat frame into the main frame attachment and tighten the skewer. Slide the rear seat frame attachment fork into the seat stay skewer and tighten the rear seat skewer. One of the unique features of your VISION recumbent is its adjustable seat back angle - accomplished at



*Proper Leg Extension*

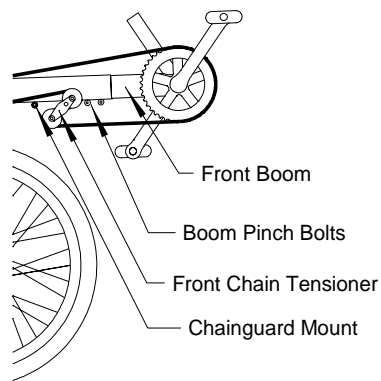
the rear seat attachment. For the first adjustment, set the rear seat back to the middle of its range, and close the skewer with at least 20 lbs force.

### Leg length / The Chain

The trickiest part of the VISION set up is setting the proper leg length. Since the front boom moves in and out to set the captain's leg length, and the rear frame slides to set the stoker's leg length, the chain will have to be set

after we determine the proper boom and frame settings for you.

Let's set the captain's leg length first. If possible, set your Double VISION on a rear wheel type wind trainer. If you don't have access to such a trainer, have the stoker stand behind the captain's seat and hold up the bike. Sit back and pedal the bike normally. When the leg length is set properly, you will be pedaling with just a slight bend in your knee at full extension. Take your time - this is a very important adjustment. Most riders start out with the boom set too short. To avoid this, start your adjustment process with the boom out too far and work back in.



**Front Boom Details**

**Note:** adjusting the seat back angle affects the boom length adjustment. Check leg length adjustment after a seat back angle change.

When you are comfortable on the bike, pedaling normally, and the leg length is perfect, get off and tighten the boom pinch bolts. Alternate tightening the bolts just one quarter turn at a time to equalize the pressure. The bolts should be snug, but you don't over-tighten. If the boom slips while riding, tighten the bolts. Start with a torque specification of 40 inch-lbs and tighten more if the boom slips under pressure.

**Note:** Replace the boom pinch bolts after every 10 boom adjustments to prevent the bolt shearing off in the frame. We have available a Quick Adjuster kit for those that need to adjust their VISION leg length often.

Now let's set the stoker's leg length. As before, either set the bike in a wind trainer, or have the captain stand behind the stoker to hold the bike steady. Slide the rear frame in and out of the front frame until the stoker's leg extension while pedaling matches the picture.

The rear frame has a slot on the underside of the slider section - **there must be a frame anti-rotate bolt installed in the anti-rotate nut that is over this slot!** There are four anti-rotate bolt positions on the front section of the main frame. After you have the frame extension set correctly, look under the frame and insert the anti-rotate bolt into the most rearward bolt position possible. The rear frame is at maximum extension when the anti-rotate bolt is in the last anti-rotate bolt position and the frame will not move backwards. Make sure the anti-rotate bolt is properly installed by trying to rotate the rear frame with the pinch bolts loosened - you should not be able to turn the frame more than five (5) degrees to either side relative to the front frame.

**WARNING!** -Riding without the frame anti-rotate bolt can result in the front wheel folding underneath you. A crash and serious injury could result!

**Do not ride a Double VISION without the frame anti-rotate bolt installed properly!**

To set the alignment between the front and rear frame, Align the line scribed on the rear frame top with the notch on the front frame.

### Installing the Rear chain

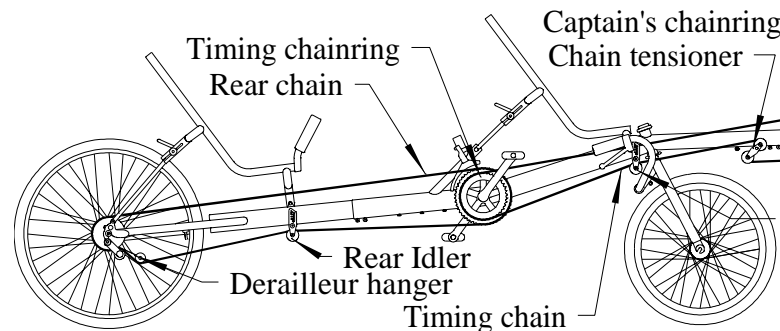
Your double VISION has two chains, the front (sometimes called the timing) chain and the rear (main) chain. We have supplied you with enough chain to fit the longest riders. More than likely you will need to shorten the chain for your leg length. To set the rear chain length, turn the the right (rear) gear shifter to the lowest setting (biggest rear sprocket), and the left (front) shifter to the highest setting (biggest front chainring). Route the chain as in the chain routing diagram.

When the chain is routed, pull on both ends until the rear derailleur hanger is in the position shown in the drawing. The two chain ends will now overlap. To set the proper length, simply mark a link on the overlap that corresponds to one of the chain ends, remove the excess with a chain breaking tool, then reassemble the two ends with the same tool (if you have never used a chain break tool before, have your dealer perform this task, or get some qualified instruction).

### Installing the Front (timing) chain

The front chain has a chain tensioner in the loop to keep the timing chain tight. Take a moment to study the chain tensioner installation diagram - go through the steps once and make sure you understand its operation. To install the timing chain, route as shown and then cut the chain length so that the chain tensioner sits close to the "ideal" position shown in the drawing. This angle is not critical, but do not let the tensioner wrap around so the chain drags on itself. If you are going to change captain's often, set the chain tensioner so that it is fully tensioned (minimum chain wrap) for the tallest rider.

### Trading places between the Captain and Stoker



**Chain Routing**