

Dutch speed bicycles

version GAKS2_2.9UK KS2 Recumbent Kit

This kit was designed and produced with great care. To turn it into a great recumbent you will have to finish it with care and attention. Bad work here can only lead to an unpleasant, noisy and wobbly bike that will bring you little pleasure. So please give this project the attention and effort it deserves. Finish all details careful and mount everything rattle-free. This way you will make sure that you will have many enjoyable rides on you Dutch Speed Bicycle. Good luck!

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This instruction manual is intended for the Dutch Speed Bicycle KS2 recumbent kit

Version

This is version see above of the instruction manual for the KS2 recumbent kit. Alterations to the last version are in italic. (Deze gebruiksaanwijzing is er ook in het Nederlands zie onze website.)

Pictures

Some details shown in the pictures may be different from what is supplied or from what is shown on our site.

Important !

- Check, before ordering the kit, whether or not the donor bike you intend to use is suitable. Most bikes will be, but check nevertheless before you take a saw to it!
- Make sure you have downloaded the latest version of the instruction manual. Should you need a different version (exceptional) this will be mentioned on your delivery confirmation

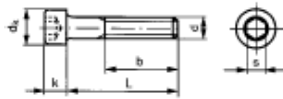
Assumptions

Skills

We assume that you are familiar with working on a bike and that you have the basic DIY skills and that you have only one left hand. Read a good book on bicycle maintenance if you think that will help you.

Left and right

If we talk about left and right we assume to be looking from the rear to the front of the recumbent.



Front and rear

Naming front and rear we observe the direction of travel.

Sizes

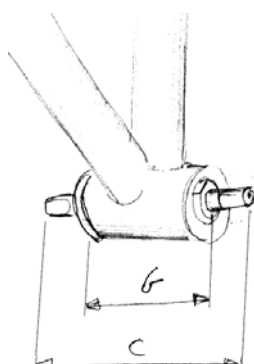
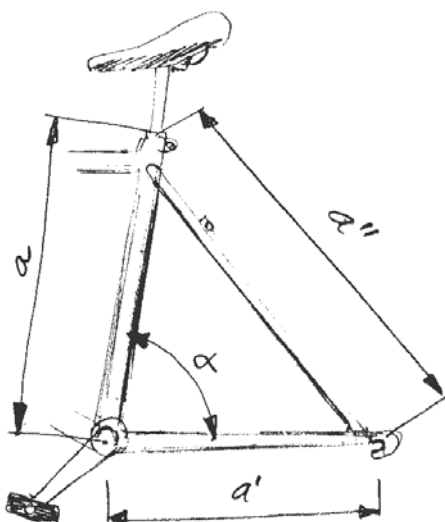
All non-bicycle specific parts we supply are metric.

A bolt of M6 x 70 means the thread is approximately 6 mm in diameter and the length below the head is 70 mm. For a countersunk bolt the head is included in the length.

What is essential in the donor bike?

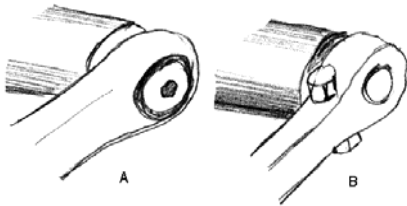
Try to get a bike with good parts, like wheels and gears. Otherwise you'll find yourself buying all kinds of new parts and spending more money. It's not a problem if the paint is bad. It's repainted anyway. It should have a derailleur type gearing.

- The length (size a) of the saddle tube must be between 480 and 620 mm. If this is shorter the spring may also be attached on the seat post itself but the spring should not be opposite of the seat post clamp. That would be v hard to attach. (the centreline of the spring is 470 mm above the centreline of the crankshaft)
- The length (size b) of the bracket may not be larger than 85 mm
- The length (size c) of the crankshaft must be at least 115 mm
- Rear wheel must be size 26, 27 or 28 inch = ETRTO size 559, 571, 594, 590, 622, 630 or 635 mm
- For a bike with a 27" or 28" wheel (622, 630 or 635) angle α must be between 60° and 72°
- For a bike with a 26" wheel (559, 571, 584 or 590) angle α must be between 63° and 71°
- The lower beam of the rear frame should not be more than 500 long. (form wheel-axis to crankshaft -axis) But around 450 mm is better.



Other requirements

- The bike must have derailleur type gearing
- Rear wheel in good condition (you could consider buying a new one)
- Do not use an ultra light racing bike, it will not be strong enough!
- The bike must have a square spindle type (pegless /keyless) crankshaft. If you donor bike does not meet this requirement you can still use it, but you will need a crankshaft as well as a new set of cranks. You will not be able to use the old ones.
- Try to use a donorbike that has a lot of usable parts. This will be much cheaper than buying all those parts new!



Recognising the type of Crankshaft

A) Pegless crankshaft. In the crank there is a plug or bolt along the axis of the shaft. [left]

B) Crank using a key. There is a bolt (the peg) perpendicular to the axis of the crank.

There is absolutely no objection to using a worn crankshaft here. But there must be an absolute absence of play. Otherwise the whole recumbent will feel wobbly. Many crankshafts are adjustable. Adjust if necessary to remove the play. If this means that there is some friction in the axis, don't worry, this is no problem. You must be able to turn the axis by hand though. If the axis cannot be adjusted you must replace it..



What you will need:

General tools

- Wrenches use open end wrenches [right] or better still, ring spanners [left]. These won't damage the nuts and bolts. All the non-bicycle-specific stuff we supply is metric.
- If you don't have a fitting wrench you might use a adjustable wrench. (bahco) [right] Never use waterpump pliers, this will damage or destroy the nuts and bolts. It is not nice to work with and it ruins the looks of your recumbent
- Set of socket head wrenches (hex key)
- Metal saw (or right angle grinder)
- Round and square file
- Jig-saw, preferably a corded (electrical) jig-saw. But it can be done by hand
- An electric drilling machine,
- Heat gun or burner. (gas cooker will do too)
- a Ø7 or 6.5 mm steel drill (OPTIONAL: Ø 5,5 for the gear support and Ø 10 for the Rawl nuts)
- Hammer
- Safety goggles (only if you use the right angle grinder)
- Measuring tape
- Paintbrush
- A pair of fine pliers
- Some sanding paper fine and coarse
- Sanding block
- Cloth polishing wheel and polishing agent (a cloth and brass polish will do fine too, it will just take longer.)
- Can of Hammerite Hammered Paint (<http://www.hammerite.com>) 250 ml =1/4 litre is sufficient.
- Some paint stirring sticks



Bicycle tools

- Screw Type Chain Tool This is an inexpensive but very useful tool that lets you remove chain rivets. This is also needed when adjusting a recumbent to a much longer or shorter cyclist.



- Crank arm puller for removing crank arm fixing bolts and nuts. If no bolt is visible, remove dust caps. Turn hex wrench fitting or bolt or nut head counter-clockwise and remove bolt or nut. Inspect inside arms for washers, and remove washers if present. Before installing crank arm puller into crank arm, turn puller nut away from internal driver as much as possible. If puller nut happens to unthread from internal driver, thread it back on only 3-4 turns. Thread nut of puller into arm, taking care not to cross thread. Tighten puller nut into crank arm using wrench. (some background info, for instance: <http://www.parktool.com/>)
- Bicycle ball bearing grease



Very useful:

A workbench with a vice or a workmate

You must buy

- Three lengths of chain
- A front wheel to match you rear wheel. Size ERT0 406. (20") You will have to order this at you local bicycle shop. Ask for a wheel with 36 spokes made in the ATB (all terrain bike) fashion. Good kids ATB wheels do just fine. Other 20" sizes should do as well.

Now for the real thing

Take the donor bike apart:

- Remove the saddle and the saddle pillar
- Remove the chain
- Remove the crank arms Use a puller, don't use a hammer or other forms of violence. Go see your friendly neighbour hood bicycle repair man if you have to.
- Remove the rear wheel
- Remove the rear brakes
- Remove the lock (if any)
- Remove the luggage carrier
- Remove the Derailleur
- Remove the mud guards
- And so on
- In short remove everything form the rear part of the donor bike except the crank shaft.

And now we start sawing

Rear frame

- Cut the donor bike at points A and B. It is helpful if the frame can be clamped in a vice or workmate.
- Tool Metal saw and file (or right angle grinder) If you use the latter please use safety goggles.
- Finish the ends with a file or using the right angle grinder. If you use the latter please use safety goggles.

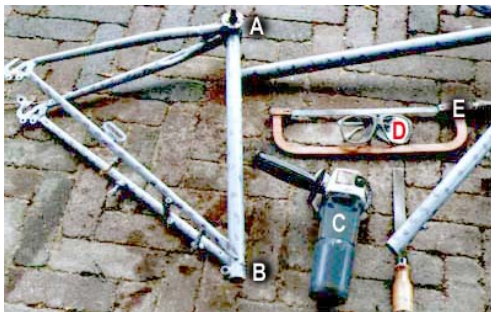
The part you have now created will be referred to as "rear" frame

Adjusting the crank shaft.

There is absolutely no objection to using worn crankshaft here. IMPORTANT: But there must be an absolute absence of play. See above

Fitting the rear frame

Before painting the rear frame you must check if it fits. Mount it with the U-clamp. These must be mounted with self locking nuts (so they won't come off with vibration) but for this testing please use the normal nuts supplied. So the self locking nuts will not lose any of it's self locking properties. Use washers. IMPORTANT: Never ride the recumbent wit ordinary nuts at this location. IMPORTANT: Tighten the nuts only gently, they are heavily oversized



We advise to use the original crankshaft bolts, use one or more rings

The hole for the spring

- Mark the proper location of the hole for the spring on the rear frame. Putting a piece of adhesive tape at the approximate location can make marking easier.
- Mark a spot on the saddle tube of the rear frame that is on the same distance from the crank shaft. Use a measuring tape to find the proper spot. This must be accurate within 3 mm.
- Prepare the spot for drilling, make a small dimple using a nail (or a centre-punch) and a hammer. This will help keeping the drill at the proper spot.
- Drill a hole of 7 mm diameter.
IMPORTANT: This hole will be used for mounting the spring for the suspension. So it must be opposite of the attachment point in the frame.
- If you are sure you are not going to use a trailer (that needs a saddle pin) on your recumbent, than you can cut away a bit more of the top of the rear frame. But make sure the top of the saddle tube cut off straight, otherwise the cap will not fit.



Painting the rear frame

Use black Hammerite. It is durable and needs no primer. It is easy to apply and gives a professional finish whether you are a good painter or not. Also is easy to retouch.

- Make sure all parts except the crankshaft are removed.
- If the frame is dirty clean it. Using a high pressure cleaner is the easiest way. This will remove all grease and dirt from even the smallest corners. (Many a Car-wash has a good high pressure cleaner).
IMPORTANT: don't spray directly in to the crankshaft bearing.
- Remove any loose paint.
- Remove any rust with a steel brush. You don't have to remove completely but get rid of the loose stuff at least.
- If the frame's paint is still in good condition all you have to do is sand it lightly with very fine sanding paper.
- Degrease the frame with an ammonia solution (ammonia water) Do this outside or in a well ventilated room. Wait until the frame has dried.
- Suspend the frame from a hook that you have attached to the ceiling. In this manner you can paint the rear frame partly. Holding it by the unpainted part you can hang it in a different position. In this fashion you can paint the entire rear frame comfortably. Please note the transition between the two sections you paint remain somewhat visible. So choose these locations carefully.
- You may paint the old crank shaft as well if you like.
- Remember the new crank shaft needs some painting as well. This is a good time to do it. See below



The Seat

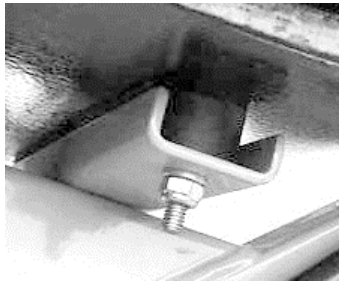
The contours of the pre-formed seat are indicated with a pencil line. If you are big or small you might decide to change the contours of the seat. If your legs are not so long it is a good idea to make the seat somewhat narrower. This will make it easier to get your feet to the ground. Also the length of the front is important. A good approach is to test drive with an unfinished (unpainted) seat. Once you are convinced this is good for you, you can paint it. Don't expose the bike to too much rain while the seat is unpainted. And remember: you can always make the seat smaller!

Sawing

Use a jig-saw to cut the contour in the desired shape. If you decide to use your own shape, make sure you have drawn it smoothly and symmetrically before you take the saw to it. You can fasten the seat temporarily to the workbench by means of a screw. In this fashion you will have two hands



available for the sawing. The small holes can be filled with putty before painting. Use a suitable saw with teeth pointing upwards.



Mounting the seat

Try the seat unpainted for while. If you are happy with the form, take the seat off again and paint it. A good way to judge the seat is using it without the foam cover. The foam cushion will only make things better.

- Mount the two of the three M6 vibration isolators using self locking nuts. Use washers. This is to protect the paint.
- Mount the third M6 vibration isolator on the main beam of the frame.
- Put the seat in place. There are three fixation points. 2 below and 1 at the top. (The distance between the two lower fixation points is 96 mm)
- **IMPORTANT:** Make sure the front of the seat rests on the front vibration isolator. The seat needs this support.
- Mount the seat using the M6 countersink bolts. Fastening the bolts will pull the heads in to the wood. Just make 7 mm holes here.
- On the top fixation point, put the rubber washer between the frame and the seat. This prevents an annoying squeak.

Seat angle

- The best seat angle is easily found. The back of the seat is more or less parallel to the (short) third beam in the frame. Of course you can vary according to your own views. Just make sure the front of the seat rests on the small vibration isolator.
- Beginners usually like their seats more upright.
- You can put some extra washers between the seat and the frame at the top fixation point. This will make the seat more upright.

Sanding and painting

- Wrap a piece of coarse sanding paper around a piece of wood and sand the edges.
- Put putty in all the holes you won't be needing anymore and let it dry properly
- Sand the entire seat with fine sanding paper
- Paint the seat using the same Hammered Paint that you used for the rear frame. Give it two coats of paint at least. (Give special attention to the edges, that's the part that will be most visible)



The foam seat cover

Don't cut the foam until you are satisfied with the shape of the seat.

The best time is when you are ready to paint the seat. It will be dismantled and easy to handle

- Make a mould out of cardboard that matches the shape and size of the seat. Make sure the curves are smooth.
- Cut the foam to size using a SHARP knife. A disposable break-knife in fully extended position will do fine. Make sawing motions during the cutting and apply only minimum force on the foam.
- Cut following the mould.

Fixing the foam

Do this after the painting. Wait for the paint to be completely dry.

- Fix the foam using the supplied barbed (velcro) tape.
- Cut the tape in two shorter pieces of equal length
- Stick one piece to the low end and one to the high end (about 10 cm away from the edge) *In case the kit comes alternatively supplied with only one strip of barbed (velcro) tape is supplied it's intend to go on the seat only. It is so coarse the foam will stick directly to this tape.*
- Stick the opposite parts to the tape you have just glued to the foam.
- Remove the covers
- Place the foam in position on the seat.
- Press on the foam to glue the pieces to the seat



Nice to know: The glue in the tape will work better if it is warm. Use a hairdryer. Also very useful when re-fixing the tape. You may use staples or small nails to attach it even better to the seat



Mounting the headset

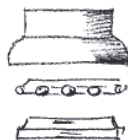
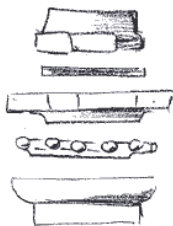
The ball bearing rings must be forced (pressed) into the frame.

- Press the ring in position by hand and use a wooden or rubber hammer to drive the ring in. Never use an ordinary hammer directly on the ring. This will damage the ring and render it useless. If you put a block of wood on the ring you can use an ordinary hammer.
- If the ring fits too tight use a file to remove some (not too much) material from the inside of the tube using a file. Make sure to remove evenly around the circumference.
IMPORTANT: Never remove material from the top or bottom of the tube (the edges or ends) This will misalign the rings.
- IMPORTANT: Make sure the rings rest on the ends of the tube.
- Should the rings be too small fixate them with a proper glue.
- It may be that the rings are pre-mounted to the frame.

The Fork

Thanks to an outrageous lack of standardisation the fork must be slightly adapted to fit the ring of the head set.

- Remove the ring that is mounted on the fork (just hammer it off gently) You won't be needing this ring anymore.
- This ring must be replaced by the ring that comes with the headset.
- Use a file to remove material from the fork. Make sure you do this evenly. To make sure you remove evenly turn the fork around its axis. So file a bit then turn, then file again, then turn again and so on. Continue until the ring can be pressed in place. Make sure you don't file the support the ring rests on. This could cause misalignment. It is best to use a file with one blank side.
- Mount the fork. Use enough bicycle ball bearing grease.
IMPORTANT: To prevent wear the bearings must run free by without play. Check this regularly (once every 1000 km)



The crankshaft unit

Painting the crankshaft

- De-grease the middle section of the crankshaft.
- Paint it using the same Hammered Paint that you used before. Don't paint the polished outer ends. If you spill any paint here remove it with a piece of cloth. (This is to prevent rust)

The supports

The supports of the set are made of good quality aluminium. To make them affordable they are finished precise but they are unpolished. It is however very easy to turn these unattractive parts into the showpiece of the bike. The crankshaft unit is the centrepiece of your recumbent. So it is worthwhile to invest some effort here!

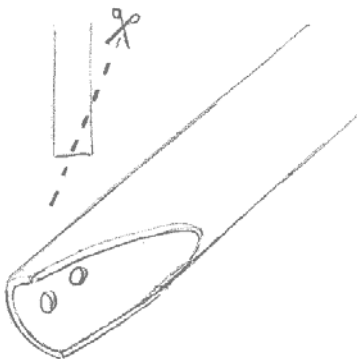
Use a knife to gently take off the sharp edge off the hole so that the plastic part of the crankshaft is easy to put in.

The snap-off points

The snap-off points that were used during production must be removed

- Clamp the side in a workmate or a vice (If you use a vice you must protect the aluminium part by putting pieces of wood between the part and the vice (stirring sticks come in handy here). Or better still use two pieces of Aluminium L-profile (available in DIY shops) to make protection covers.





- File away all these snap-off points. Make the surface as even as you can.

Polishing

- Sand the parts with extremely fine waterproof sanding paper. **IMPORTANT:** Don't sand the inside of the holes. These are accurate dimensions. No sanding or polishing here!
- Now polish the parts, This is done best using a cloth-polishing-wheel in an electric drill and polishing agent. However you can do the job just as well using a cloth and brass polish. It just takes a bit longer.

What is going to be visible once the parts are mounted? The outside of left support, and the top, front and back of both supports. The outside of the right support (with a recess on both sides) will be hardly visible behind the chain rings. So if you are polishing by hand, save yourself the trouble.

Mounting the crankshaft unit

IMPORTANT: The crankshaft has two different sides, the axis is longer on one side.

The side with the longer axis goes right. There is a left and right support. The right support has a recess on both sides.

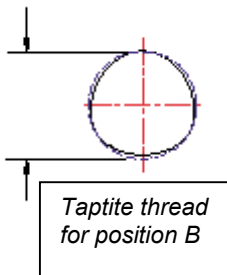
- Put the plastic ring on the crankshaft. Put the sides over the shaft too before you put on the second ring!
- Press the plastic ring into the support. Support the support on two blocs of wood with identical height. This ring should go in without too much hammering.
- Repeat this on the other side.
- Connect the two supports using the stainless steel socket head bolts M6 x 70. Use washers beneath the heads.
- Slide the crankshaft unit over the main beam of the frame.
- For now (until you have established the proper location for the unit) tighten the bolts very lightly for the crankshaft unit can damage the paint.
- Before any cycling can be done, the bolts must be tightened firmly. **IMPORTANT:** using the crankshaft unit without the bolts firmly tightened can lead to excess damage to the paint. But don't overdo it. It is just aluminium, and tightening too much could damage the thread.

Mounting the gearing support (optional)

PLEASE NOTE: Suitable for derailleur with connection point for outer cable or for bottom cable feed derailleur **WITHOUT** connection point for outer cable. Not suitable for derailleur without connection point for outer cable and cable coming in from the top.

- Prepare the part in the same way as the crankshaft supports.
- Fasten the gearing support using 2 bolts M4 x 20 The right-hand-side-support has two M4 fixation points.
- IF YOU ARE RETROFITTING IT TO ONE OF THE EARLY KS2'S that does not yet have these fixation points, make these yourself. Drill through the gearing support to make sure you have the proper location. Use a drill press, so that the hole is perpendicular to the right-hand-side-support. If you order it with the kit you will not have to do all this) Use a cut thread Tap to cut the tread. That is easy to do in Aluminium.
- Cut a piece of tube from the remains of the donor bike, about 150 mm long (Check the diameter to fit your front gearing, it should be 30mm).
- Cut away at one side (see sketch) so it is easier to reach the holes.
- Drill two holes $\varnothing 5,5$ at 10mm distance. The first at 5mm from the end.
- Paint this piece of tube with black Hammerite
- Fasten the tube to the gearing support using M5 bolts and self locking nuts. Keep the nuts on the inside.
- Cover the top with the supplied plastic cap.
- If the position of the tube is too close to the chain rings for the derailleur you are using, put some washers between the support and the tube.

- If you are using a bottom cable feed derailleur WITHOUT connection point for outer cable than you must use the cable support part that has been supplied with this option.(A)
- To prevent the crankcase from moving sideways (and disturbing the adjustment of the derailleur) drill a hole in position B with the supplied \varnothing 2.7 mm drill and use the M3 self-tapping "taptite" screws (the only supplied bolts with a slot head)



Adjusting the crankshaft unit

Adjusting is quite simple. Please note that this type of construction inevitably leaves a mark on the frame. So try to put it in the proper position straight away and fasten it firmly before you apply any force (=pedalling)!

- Mark the present location gently using a pencil.
- Release the for bolts several turns.
- Pull the two supports a bit away from each other by hand. (Sometimes a few taps with a bloc of wood or the back of a screwdriver can help)
- Slide the unit to the desired position.
- The proper position is when you can, sitting relaxed, can just touch the pedals with you feet pointing straight upwards
- It may be necessary to adjust the length of the chain.
- The proper length is found by putting the chain on the largest sprocket and the largest chain ring and using two shackles more than absolutely necessary.

The spring

IMPORTANT: Do not attempt this in an impatient mood.

First mount the spring in the hole you have drilled in the rear frame. Use a socket head bolt M6 x 20 Use a M6 washer between the head and the spring.

- Put, to be able to use both hands for this demanding operation the rear frame in a vice or workmate. Use a cloth or something to protect the frame. Make sure the hole is facing upwards
- Not so easy: Position the bolt and the washer in the spring. Put a hex key in the bolt and put this subassembly somewhere within reach.
- Stick a M6 Self locking nut on the end of, for instance, a paint stirring stick using two sided adhesive tape or not to strong glue. The coloured side of the nut must be down. (The plastic bags used for packaging small drills could help here!)
- Make sure you can see in the hole
- Insert the stick into the saddle tube until the nut is aligned with the hole.
- Now take the spring including the washer, the bolt and the key and try to screw the bolt into the nut.
- Once you have the first (few) turn(s) the tape or glue will let go. Now take out the stick and slide an open end spanner onto the bolt. Now use the hex key to firmly fasten the bolt.

IMPORTANT: Never use anything but a self locking nut here!



The suspension vibration isolator

In the suspension the rubber vibration isolator is used as a simple shock absorber.

- Mount the M6 vibration isolator (the one with metal on only one side) in the lower hole at the back of the frame. (below the hole for the frame)
- Before you do this put a M6 nut on the shaft of the vibration isolator. This will allow adjustment later on.
- Turn it all the way in, but do not tighten it.
- It should be set to take effect just before the spring reaches its full compression. This will eliminate the "bang".
- If the vibration isolator cannot be adjusted to the correct position, make a piece of strong wood to fit the saddle tube. Paint it black and fix it with tie-wraps or strong glue



Mounting the rear frame

- Put the crankshaft of the rear frame in the mount on the frame and fasten it with the U-clamps. Use the self-locking nuts and washers.
- Tighten the nuts on the U-clamps going from the one to the other while tightening them more and more.
- IMPORTANT: Don't tighten too hard, you could easily bend the mount.
- IMPORTANT: Check that the plastic of the self locking nut is on the tread of the U-clamps. If not please contact Dutch Speed Bicycles
- IMPORTANT: Lean the spring against the frame it should be more or less in line with hole in the frame. If the misalignment is more than 10 mm (in the length of the frame) drill a new hole.



Adjusting the vibration isolator

IMPORTANT: The distance between the vibration isolator and the rear frame should be approximately 4 mm. (without exerting force on the spring, just the weight of the bike)

- Use an object with the proper thickness to check this.
- If you cannot adjust using the nut, remove the nut and use the right amount of washers.
- If the vibration isolator is still too high remove some rubber by filing or sanding.

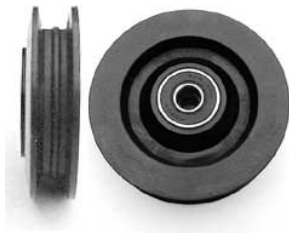
The other side of the spring.

IMPORTANT: Do not attempt this in an impatient mood.

- Attach the spring to the frame using a hex M8 x 25 bolt (not a hex key) and a washer.
- Make sure the frame is in such a position that you can work properly on the spring.
- Place the bolt and the washer in the spring using a pair of fine pliers.
- Fasten the bolt the first turn using the same pair of pliers,
- Tighten the bolt firmly using an open end spanner
- Should you be big, or pack a lot of luggage to the frame, then you can add another spring to the additional fixation point.(an ordinary saddle spring will do)

Before we go on

It is a good idea to suspend the recumbent for the ceiling. This will make working on it easier.



The chain rolls

- The two chain rolls are mounted using the M8 hex key bolts on the two rear mounting points. Do not use any washers.
- Tighten the bolts firmly
- Check to see if the rolls spin freely

The third mounting point is provided just in case you should choose to operate the recumbent without the chain tubes. The third roll is not provided with the kit.

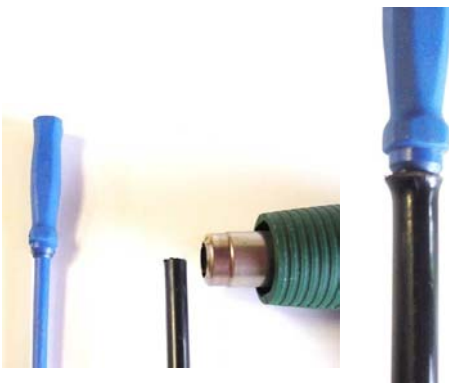
Chain

You will need three lengths of chain

The chain tube

The chain tube must be cut straight. There is a short tube for the topside of the chain and a long one for the lower part. Sizes can be derived from the bike once it is properly adjusted to your size. You can use the following general dimension if you want to: 90 cm and 140 cm

- Cut the tube with a sharp knife.
- Heat the tip while rotating it, using a heat gun or burner.
- When the edge softens push in a suitable (cone shaped) object to give it a trumpet like shape.



- Let it cool for a while and take out the object
 - The Tube now has a proper entry cone.
- Some handles of screwdrivers are suitable. You can make your own object by cutting and sanding a point to a round stick



Making an oblique entry cone (front ends)

The front of the chain tubes can be finished straight. But it is better to finish them at an angle. This will prevent the tube from catching the chain ring every time the recumbent goes through a bump in the road. This way you can bring the tube closer to the chain ring. It helps to keep your trousers clean.

- Make a suitable object to form the shape. You can do this by cutting and sanding an asymmetrical point to a round stick
- Cut the tube at an angle using a sharp knife
- Heat the tip while rotating it, using a heat gun.
- When the edge softens push in a suitable (cone shaped) object to give it a trumpet like shape.
- If necessary use fine pliers to adjust the edge.
- If you are not satisfied with the result simply heat it again.



Mounting the lower tube

- Put the chain trough the tube. This is easier to do while the tube is not mounted yet. Now you can let gravity do the work for you. You could use a straight piece of metal wire to pull the chain trough.
- Enlarge the hole in the brace to allow for the M8 bolt. Use a file. Do not use a drill for this might damage the brace.
- Mount the brace to the front M8 mount using a the M8 x 20 nut as a spacer.
- The tube must be well fixed. If necessary wrap a piece of tape or rubber from an inner tube around the chain tube.
- Keep an eye on the front end of the tube.
- You can use a spoke to fasten the lower tube to the fixation point for the lamp. This will almost eliminate chain jump (derailment) while going through bumps.

Mounting the upper tube

The upper tube is fastened using a spoke.

- Break away the threaded bit at the one end of the spoke. Just bend it off using a set of pliers
 - Bend the spoke in the proper form. The eye must be flat to allow for good mounting using a M6 bolt and washer.
 - Mount it on the rear M6 mount at the bottom of the frame.
 - Check to see if the spoke is properly bent. The end should be perfectly aligned with the chain tube while the chain is pulled tight.
- IMPORTANT:** if you don't get this right this will result in unnecessary friction and rotation and dislocation of the chain tube.
- Fasten the chain tube using two tie-wraps. Pull those tightly using a pair of pliers.
 - Cut off the ends.



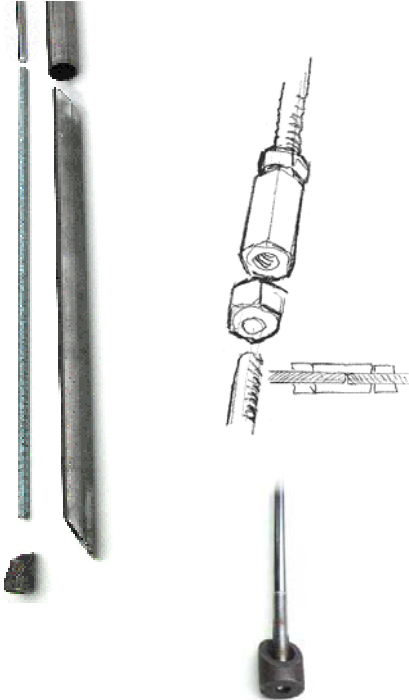
The Handle bar.

In general the handlebar can be reused. Racing bike handlebars are less suitable

- Dismount all parts from the handlebar. Take off brake levers, shifters and so on but leave the stem.
- If your donor bike's handlebar does not have an angled end make one by sawing off the end at more or less the proper angle (55°)
- Handlebars for a recumbent must be narrower. Take off a bit on each end (sawing) 25 cm is wide enough for a recumbent handlebar. You won't have to lean on it. All you will need it for is steering.
- Careful: make sure however that everything will still fit on the smaller handlebar.



- If the finish is not to good you can paint it using the same Hammered paint that you used before. Paint on chrome plated surface will only last if you carefully sand the surface before painting it.
- Put everything back on the handlebars but remember you will be mounting the handlebar backwards. It is probably worth while to buy new grips. You can cut them a bit shorter too.
- **IMPORTANT:** If your old bike did not have V-brakes, use the supplied brake lever.



The handle bar conversion unit (improved "JOS" version)

Since the handlebars must be much higher up you must use the supplied handle bar conversion unit. The donor bike's handlebar goes right into the top end. The expander bolt is elongated. The whole unit is only fastened in the fork. Just like a ordinary handlebar would. The outer tube is positioned against the headset. Adjusting is done by sliding the handlebars and together with the inner tube up or down.

- Polish the outer tube, it is made of stainless steel and will keep its shine.
- Slide the two tubes into one another. (New: No exact fitting required)
- Put the expander bolt through the handle bar.
- Use the long M8 nut to fasten the M8 thread end to the expander bolt
- Use the 2 M8 nuts to secure the connection. (make it nice and tight)
- **IMPORTANT:** The joint should be about halfway the long nut. And the two nuts should be drawn tight to the long nut on both ends. Otherwise, some day, you handlebars might become disconnected!
- Remove the expander-nut from the donor bike's handlebar
- Slide the unit in the front fork for at least 16 cm
- Fasten the expander. This
- Now you can mount the handlebar in the upper tube of the conversion unit.
- Should you encounter any problems with leg room you could experiment with reversing the conversion unit or the handlebar.

The V-brake

We supply a front brake. This a V-brake. It is powerful and small enough to fit beneath the frame.

- Mount the v-brake following the manufacturers instruction manual
- Take care to balance the brakes properly. Upon release both sides must clear the wheel. (You may need to adjust that several times on a new bike)
- **IMPORTANT:** If your old bike did not have V-brakes use the supplied brake lever.
- **IMPORTANT:** When braking very hard your recumbent could topple over. This tendency is minor compared to an upright bike but be careful nevertheless.



Caps

Plastic caps are supplied for the front and top of the frame and for the top of the rear frame.

- mount the caps firmly in the frame by enlarging them slightly putting some tape around the part that slides into the square tube.
- **IMPORTANT:** For the safety of you fellow road users you must make sure that the cap in the front of the frame is where it should be and that it is firmly fixed. Using glue here is a good idea!

Cables

You can mount the speedometer to the handlebar. Since the front wheel can be steered several times round make sure this would not destroy the delicate electrical cable. It is better to mount the sensor at rear wheel. But then you must make the wire longer. Do this using similar wire and soldering. Use tape to protect the connections and make sure they do not short circuit.

Make sure that none of the cables do not touch the frame this will cause wear in the long run. (Vibrations while driving will damage the paint, as the cable slides against the frame)

Dutch speed bicycles

version GAKS2_2.9UK KS2 Recumbent Kit



Aligning the rear wheel

For good handling characteristics the rear wheel must be aligned with the front wheel.

- Hold a long and strait ruler (or a long piece of wood) against both wheels.
 - Adjust the rear wheel until both tires touch the ruler at two places.
- Proper setting for

Driving

Riding a recumbent takes a little getting used to. Most cyclist take off right away. A bit wobbly at first but improving fast.

Speed will be a disappointment at first; your legs need time (1 or two months) to adjust to the slightly different motion.

Tips for beginners

- Squeeze the brake wile you get on or off the bike
- Lean back and relax, the seat is strong enough.
- Don't hang on to the handlebar. Just rest your hands on it.
- Takeoff: Keep one foot on the ground and the other on the pedal. Push the pedal and let go of the brake. As soon as you roll bring up the other foot to its pedal. Make sure you are in the proper gear. (You never attempt to drive away a car in 4th gear, now do you?)
- Continue pedalling in corners.
- Continue pedalling while going through a bump in the road will keep the chain from popping off.
- Get a mirror. Looking back on a recumbent is not easy. A mirror will give you a sense of what is behind you, This way you will move safer and more relaxed through traffic.
- If you get a stiff neck, put some extra washers behind the sear (see mounting the seat) The muscles in you neck need time to get used to the new demands made upon them. It will go away in time.
- When braking very hard your recumbent could topple over. This tendency is minor compared to an upright bike but be careful nevertheless.

Changes

Alterations to the last version are in italic

FAQ

Should you have any questions don't hesitate to ask. (Customer or no customer) We will try to answer your question and may use it to improve on this manual. Use e-mail. But look in the FAQ on our site first, please :-)

Story

We invite you to send us your story. All our customers can send in their story by e-mail. How was the actual building, how they like the bike and more. We will put their stories uncensored on our website.

Be it positive or negative. The only restriction is that content of a political, racist, pornographic or insulting nature shall be refused. A photo can be sent along and will be shown as well. If you ask us not to, we will not show your email address. But we hope you won't so others may contact you to inquire about your experiences

Should you, at some point, have an interesting holyday story with some nice pictures you may submit it as well.