Whirlwind Cargo Tricycle Assembly

Assembly instructions for the Whirlwind Cargo handcycle Tricycle

For videos on assembly and adjustment visit http://www.whirlwindwheelchair.org/tech-support

Ralf Hotchkiss riding the Cargo Handcycle Tricycle
CARGO TRIKE ADJUSTMENTS

SEAT HEIGHT UP AND DOWN
SEAT POSITION FRONT-BACK

CRANK HEIGHT UP AND DOWN
BACKREST HEIGHT

SEAT ANGLE
TENSION ADJUSTABLE BACKREST
BACKREST ANGLE

SCI SEATING KIT: LATERAL WEDGES, CHEST STRAP, AND PRESSURE RELIEF CUSHION
Accessories

Additional Accessories not pictured:

SCI Kit

Cargo Canopy/ Overhead storage and shelter

Sun Canopy
Identify all components, from front to back

1) Front wheel
2) Fork
3) Crank Boom
4) Chain Idler assembly
5) Chain
6) Left Crank
7) Right Crank with Chainring
8) Crank handles
9) Optional Front Brake
10) Steering Centering Spring
11) Front Frame
12) Frame attachment location with bolts
13) Rear Frame
14) Brakes
15) Brake Mount Clamp
16) Brake Lock Assembly
17) Seat Frame
18) Seat base/cushion
19) Optional Pressure relief cushion with separate seat base (not shown)
20) Backrest Frame
21) Backrest posts
22) Tension adjustable backrest straps
23) Backrest cover
24) Rear wheel, Left
25) Rear wheel, right
The following components are pre-assembled:

- Bottom bearing cone “crown race” installed on fork steerer tube
- Top and bottom bearing cups are installed in head tube on front of mainframe
- Chain idler wheels (2) installed on rotating bar of chain idler, with torsion spring installed.
- Tensioned chain idler pulley with bearings is installed securely.
- Rear wheel clamp bolt and lock bolt are installed on rear main frame.
- Center spring clamp is installed on front main frame
- Bolt and wedge are installed on stem quill.
- Chain Idler brace is installed on crank boom
- Bottom bracket is installed on Crank Boom, with the long side of the bottom bracket spindle on the right side when viewed from the back of the trike.
- Handrims, rim strip, tube, and tire are installed on rear wheels. Refer to the RoughRider wheelchair assembly materials available from Whirlwind. Note: There are different left and right wheels. The right wheel has the adjustable cup of the hub on the same side as the handrim, and the left wheel has the fixed cup on of the hub on the same side as the handrim.
- The crank chain ring has chain guards discs installed on both sides of the cog.
- Hand grips are installed onto “pedals”/ crank arms.
- The TAB tension adjustable backrest straps are installed on the backrest posts.
- Brake lock parts are attached to brake arm.
- Brake plastic bushings are installed on brake pivot tubes.
- Foot guards are installed.
- Centering spring clamp protector is installed.
- Fenders are installed on seat.
- Quick release bolts installed on crank boom and idler brace.
Assembly Instructions:

1. Apply grease to the bearing cups on the headtube.

2. Apply grease to the bearing on the “crown race” of the fork. The bearing should be installed with the ball retaining ring on the bottom side.

3. Insert the fork steerer tube through the head tube.
4. Install the centering spring (this is easier to install before the headset is tightened).

5. Install the top bearing with the ball retaining ring on the top side.
6. Install the threaded headset cone and lockring. Tighten the lockring against the cone, so that the bearings spin freely but there is no wiggle in the bearings. This is a standard bicycle assembly.

7. Install the chain idler with the idler wheels on the same side as the chain rings (right side when viewed from the rear).

8. Install the crank boom with the crank facing backwards.

9. The bottom bracket / crank spindle is the same as a bicycle. Make sure that the longest side of the spindle is on the right side with the gears, when viewed from the back of the trike. Note: the left side may be “left-hand threaded” and tighten counter-clockwise (opposite from most bolts).
The left side cup may also be welded to the frame, depending on manufacturer. This part is pre-installed.

10. During maintenance of the crank / “bottom bracket”, the Right side / adjustable cup should be tightened last, with the lockring tightened against the right side cup so that the spindle can spin freely, but there is no wiggle. This should be secured quite tight, and is a standard bicycle assembly.

11. Attach the left crank to the spindle; make sure that the bolt touches the flat face in the spindle securely and is very tight.

12. Attach the right crank with the gear to the spindle; make sure that the bolt touches the flat face in the spindle and is very tight. Note: The cranks can be installed with handles together or opposite, depending on user preference. Use the flat faces in the spindle to set this position.
13. Tighten the crank boom with 2 quick release bolts or 2 regular bolts; make sure that the crank gears are aligned and parallel on the top and bottom.

14. Check that the centering spring is installed correctly.

15. Install the stem quill into the fork steerer tube. Tighten. The height of the exposed tube should be approximately 50mm above the top of the fork steerer tube.
16. Slide the chain idler down over the stem quill. Position the chain idler such that the idler wheels can rotate freely without touching the crank boom quick release bolts. Tighten the chain idler with the quick release bolt.
17. Install the chain. First install the chain on the Top chainring. Second install the chain on the bottom cassette on the wheel. Third, rotate the Chain idler 1 (one) full revolution or until the torsion spring is wound enough to hold the chain tight. Install the chain as shown. Make sure that the chain is guided over the tensioned idler wheel.
18. Install the front wheel. If the wheel has a drum brake, the brake should clamp to the left side of the fork, and the cog for the cassette will be on the right side, when viewed from the back of the trike. Tighten the front wheel securely with a 15mm wrench. Make sure that the tire is centered in the fork and is vertical when viewed from the front or rear.

19. Install the chain guard on the axle of the front wheel. This chain guard helps keep the chain on the lower gear (cassette) if the chain tension is too loose, and on very rough terrain.
20. Attach the front and back chassis/main frame pieces together with four (4) M12 bolts. The bolt heads should be on the outside of the trike frame, and the nuts and washers on the inside. If it is difficult to align the holes, install one at a time and do not tighten fully until they are all installed. Tighten fully with two 19mm wrenches/socket wrenches. Note: If required, a screwdriver or other flat metal tool can be inserted between the locknut and the trike frame to prevent rotation. Tighten securely with large wrenches if possible. It is unlikely that these bolts will need to be removed.
21. Identify the RIGHT REAR WHEEL. This wheel has the Adjustable cup of the hub (with lockring) on the same side as the handrim. Install the right wheel onto the right side of the main frame chassis, when viewed from the rear. Inflate the right rear wheel.
22. Insert the axle with the slot / flat part facing up, and position the axle so the M8 bolt on the top of the axle clamp can be tightened into that slot. Tighten the axle security bolt and locknut with a 13mm wrench. Next, tighten the M12 axle clamp bolt with two (2) 19mm wrenches.

![Axle View](image)

**ABOVE: LEFT WHEEL VIEWED FROM UNDER SEAT LOOKING OUT.**

**RIGHT WHEEL. (AXLE SLOT FACES UP FOR INSTALLATION ON BOTH WHEELS)**

23. Repeat for the LEFT REAR WHEEL. Inflate the left rear wheel. The left wheel has the Fixed cup of the hub on the same side as the handrim.

24. Install the Left rear wheel (same method as right side).
25. Identify the holes on the seat which will be used for the seat clamps and seat rail guides. Different riders require different seating positions. The seat can be adjusted forward and backwards after it is installed.

Example: Seat mounting for 46cm seat height at 12 degree seating angle

FRONT: SEAT RAIL GUIDE
(Shown with bolt above tube, and can be installed with bolt below tube for low seats for riders with short legs)

REAR: SEAT CLAMP
(Shown with bolt above tube, and can be installed with bolt below tube for low seats for riders with short legs)
26. **Note on seat height:** the bolts on the seat clamp and seat rail guide are usually installed *above* the seat rail but can also be installed below in order to lower the seat.

27. **With the seat off of the tricycle:** Install the front seat rail guides with M8 bolts to the front ladder of the seat as shown. The bolt head should be outside the seat, and the M8 locknut is trapped inside the channel. Align the faces of the nut so that it is secured inside the channel.
Put the seat on the tricycle. It is easiest to install the seat rail guides onto the rails at the front corner of the seat rails. SEE SEAT HEIGHT ADJUSTMENT SECTION OF THIS GUIDE AND VIDEO FOR MORE INFORMATION

More information at http://www.whirlwindwheelchair.org/provider-resources

28. Position the seat at the desired seat angle, and install one of the rear seat clamps. Note that the bolt head is facing out and the nut is trapped inside the channel. Do not tighten fully yet. Install the opposite side seat clamp into the matching hole.

29. Tighten 2 two rear clamps and two front seat rail guides securely with a 13mm wrench. Note: The seat can be adjusted front-back by simply loosening the two rear seat clamp bolts and sliding the seat. These clamps must be removed in order to adjust the seat height or seat angle.

30. Install the backrest to the seat with the M8 bolts. The bolt heads should be on the outside. Ensure that the backrest can pivot up and down freely. Note: The cross bar on the backrest must be in the back (away from the riders’ back).
31. Install the backrest adjustment ladder though the slots in the backrest, and attach to the seat using M8 bolts.

32. Attach the springs between the adjustment ladder and the seat, pulling securely. Check to make sure that the backrest ladder falls into every set of notches evenly and easily (For rider safety).
33. Lay out the backrest TAB and posts to be ready for installation. The wide Velcro is on the front of the TAB. Each strap should wrap around each backrest cane without tangle. Refer to the RoughRider backrest installation and fitting guides for information about installing the backrest.

http://www.whirlwindwheelchair.org/backrest-and-tab
34. Attach remaining backrest straps through the trike backrest, avoiding the adjustment mechanism as much as possible. The number of straps below the backrest ladder will change depending on the backrest cane height, which will be selected in a seating assessment. One strap will be below for the tall backrest height, two straps for the medium backrest height, and three straps for the low backrest height.
35. Install the backrest cover with the reflector facing back, with the wings wrapped around the backrest from the front to the back. Refer to the RoughRider backrest installation information. Note: If this trike will be set up with the SCI Kit, lateral support wedges will be installed between the backrest cover and the TAB straps, to be comfortable for the rider.

36. Install the cushion onto the seat. The cushion should be installed with the cut out relief position matching the tubes on the seat. (The front edge is square, the rear edge has notches.) Note: If this trike will be set up with the SCI Kit, a different seat base is used that is thinner.

37. Attach the left and right brakes together, if required. Washers should be used to space the components, and can be adjusted if needed later. (Some trikes might not have this feature).

38. Identify the right side of the brake. This side has the brake lock, which should be attached at this point. Refer to photograph for correct installation.
39. Position the brake assembly on the trike. This is easily done if the trike is tipped vertical or upside down. Ensure that the brake curve follows the curve of the wheel.

40. Install the brakes using the clamp plates with M6 bolts. Use threadlocking compound such as medium strength Loctite® for security. These plates should be positioned over the plastic bushing. The bushing should have the wide flange on the outside edge. When tightened, they must allow the brake cross tube to rotate inside.

41. Press the brake clamp over the seat rail and bend the clamp together as needed to secure with the bolt. Attach the clamp the seat rail at a position so that the Brake does (1) not touch the tire when the lock is released and (2) holds the tire securely when the lock is engaged. The lock is operated by moving the front end up to lock and down to release. The clamp is attached to the seat rail between the front seat guide and the rear seat clamp.
a. SCI Kit (Spinal Cord Injury Kit): This accessory supports riders wanting additional seating support, including those with spinal cord injuries, with a pressure relief cushion, lateral support wedges for the backrest, and a chest strap. Refer to WHO wheelchair seating materials for information about appropriate seating for riders with varying seating needs. The seat base for the SCI kit has thin foam on a plastic base. This replaces the standard seat + cushion on the tricycle. The Pressure Relief Cushion (PRC) attaches with Velcro to the seat base. Refer to Whirlwind and WHO information about seating assessment and pressure relief cushion fitting. The lateral support wedges are inserted between the front of the TAB backrest straps and the backrest cover. Refer to the information in the “Provision” Section of the tricycle guide for more information. The chest strap attaches around the rider’s chest and seat backrest, wherever feels safe and comfortable for the rider.
b. Rear Cargo bag: Attach the Velcro straps to the frame, using cord as needed to secure the bag at 6 points.

c. Rear Cargo Box: This accessory is an alternative to the Rear Cargo Bag (and cannot be used at the same time). Secure the box to the floor of the cargo trike with bolts. The cargo box can be locked with a padlock (not provided) to secure valuables and other cargo.

d. Front Cargo Rack: Insert the angled tubes into the receivers on the cargo trike frame. The front cargo rack should be secured to the receiver tube to prevent accidental removal while lifting on the front rack to move the trike (with or without rider). The rack can be fitted with a Front Cargo Box accessory, or a basket, bin, box, crate, or other container of a riders’ preference. Please note that while this rack is strong and attached to the tricycle frame (instead of the fork+wheel), it is not designed to carry passengers, and that steering will be difficult with heavy cargo on the Front Cargo Rack.

e. Front Cargo Box: This box is installed on the front cargo rack, with bolts installed through the tube frame of the Front Cargo Rack. This box can also be locked with padlocks (not provided).

f. Under seat Cargo Box: This box attaches with screws from the inside of the box into a custom frame. Currently, the tricycle needs to be built with a custom mounting bracket if you want to install this box into the trike. Note that the box is a sliding drawer, and can be opened either from its position under the seat, or it can be slid forward into the footrest area for improved access to the box. There is a latch to prevent the box from sliding into the footrest area during riding.
The Whirlwind Cargo Handcycle Tricycle is a mobility device, and should be provided similarly to a wheelchair following best-practices for service provision for seating and mobility. Refer to the World Health Organization (WHO) Basic Wheelchair provision training and guides. The following information describes adjustments and seating options specific to this tricycle, and should be used as a reference for experienced wheelchair providers.

The Whirlwind Cargo Tricycle may be an appropriate product for riders who can maintain an upright seated position and have good head control. With the optional “SCI Kit” the tricycle may be appropriate for riders without trunk control, if determined to be appropriate by the rider and an experienced service provider. Refer to the Whirlwind RoughRider service provision “quickstart” for more information.

The cargo tricycle large, and may not be appropriate for use indoors.

Refer to the Trike Spec sheet for information regarding the range of adjustment for people with different body sizes.
Quickstart for
Cargo Handcycle Tricycle

Whirlwind Wheelchair
Features:

Adjustable seating position: For optimized comfort, safety, and power.
   Includes adjustments in crank height, seat position, seat height, seat angle, backrest height, and backrest angle.

Running and parking brakes: pull to activate

Seating: Tensional adjustable seat back, on-the-fly backrest angle adjustment, plywood seat with comfort or pressure relief cushion options.

Compact for shipping: Trike disassembles into components for shipping
   (approximately twice the size of a RoughRider for shipping)

Bicycle components on drivetrain and rear wheels:
   Provides durability and easy and affordable repairs.

Accessories include front cargo rack, canopy, box storage
Wheelbase: 1060mm / 41.75"
Overall Length: 1650mm / 65"
Track Width: 725mm / 28.5"
Overall width (outside handrims): 815mm / 32"
Propulsion: Crank Propulsion (Single Speed / Freewheel) + Pushrim Propulsion
Brakes: Coasting and parking
Seating
Seat: Plywood seat with pressure relief cushion or comfort cushion options.
Tension Adjustable Backrest allows for customization of back support curvature.
3 Backrest heights
On-the-fly backrest angle adjustment
Backrest
Crank Adjustment
Crank Grips
Cargo capacity: Under seat (Front Rack Optional)
Rider weight capacity: 100 KG.
Rider + cargo weight capacity: estimated 200 KG
Seating Dimensions:
- Seat Width: 18 1/2"
- Seat depth: 14"
- Backrest height: 14", 16", 18"
- Seat height from footrest: from 15.5" - 19"
- Rear wheel: 24" X 1.75"
  Mountain bike tire and tube, wheelchair pushrim
- Front wheel: 20" X 1.75"
  single speed bicycle wheel
# CARGO TRICYCLE

For more information on specifications and fitting of Whirlwind products see [www.whirlwindwheelchair.org/tech-support](http://www.whirlwindwheelchair.org/tech-support)

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<th>Rider Name</th>
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<th>Yes</th>
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<tr>
<td>1. Rider has head control</td>
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<td>2. Rider can maintain upright sitting position</td>
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<td>3. Rider does not have significant contractures</td>
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<td>4. Rider needs pressure relief cushion. Notes:</td>
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If any of the answers are "No" in the grey boxes, the Cargo Tricycle may not be appropriate for this rider without intermediate-level service.

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One Trike size with Adjustability is Available

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Whirlwind Wheelchair

[http://whirlwindwheelchair.org](http://whirlwindwheelchair.org)
Cargo Trike Quickstart: Assessment and Adjustment

Information intended to support an experienced provider and the WHO Basic Service Provision Materials

A: Hip Width
- Position the rider sitting with the pelvis upright on a firm surface.
- Measure the distance between the widest points of the hips or thighs without compressing any tissue.
- Record this measurement and determine if the trike width is appropriate for this rider.

The Cargo Trike seat width is measured inside the frame tubes. The Trike is available currently in only 18 1/2" width. If a rider has a hip width wider than 18 1/2", the cargo tricycle may not be appropriate for that rider.

B: Seat Depth/Upper Leg Length
With the rider sitting upright on a firm surface measure the distance from the back of the pelvis to the back side of the lower leg (the back of the knee). Record this measurement as lower leg length. Subtract 1 1/2" to find the maximum seat depth, to allow for space between the knee and seat fabric, then add 1 1/2" for backrest sag. The trike has only one seat depth (1 1/2") plus 1 1/2" space behind the seat to the backrest. Actual length of seat surface. If an additional 1 1/4" of seat depth is required, a seat extension can be ordered or adapted from a RoughRider Wheelchair.

C: Lower Leg Length
With the rider sitting on a firm surface wearing the footwear they will be using, measure the distance from the bottom of the foot to the underside of the front of the thigh. Record this measurement. Subtract approximately 1 1/2" for the cushion, to find the desired length between the seat upholstery and the foot plate/cargo floor of the trike. The seat height can be adjusted when the trike is fit for a rider.

D: Backrest Height
Often the top of the back support is located just below the bottom of the shoulder blade. Measure from the seat surface to the point on the back that is most appropriate for this rider. The actual sitting angle is adjusted with the seat angle, backrest angle, and the Tension Adjustable Backrest straps. The Cargo Trike backrest height is adjustable at 14", 16", and 18" above seat surface.

E: Arm Length
The rider's arm length from the sling seat support surface to the center of the fat when fully extended is used to determine the trike seat position. The seat position front-back, combined with the crank height, affects the propulsion and comfort of the trike rider. Many riders are the most comfortable when the seat position is set so that their shoulder is still in contact with the backrest and the farthest part of the crank stroke. A good starting point for this setting is the seat so that the riders arm fully extended, is 0 to 3 cm past the center crank handle at the farthest part of the crank. Remember that the trike backrest is a sliding backrest, and to accommodate for the curve of the backrest when measuring riders.

F: Knee Height
After the seat height and angle are set, the crank on the trike should be adjusted so that the riders hand can move around the cranks without hitting the knee. The lowest height that is comfortable often works best for riders, for good propulsion and comfort of the trike.

Whirlwind Wheelchair http://whirlwindwheelchair.org
Cargo Trike Quickstart: Continued

Cushion
Check Sensation Level. (WHO Basic Service Provision) Riders without full sensation at seat surface should use a pressure relief cushion. The cushion should be about 1/2" wider than the seat width, to hold the cushion in place in the chair. The rider should sit on their cushion for the next fitting steps. The standard trike seat has an integrated foam cushion and is not a pressure relief cushion.

Seat Width
Check that the seat width is appropriate for the rider (no more than Grade 1 pressure on the hips, see Whirlwind’s Cushion Fitting Guide). See WHO basic service provision materials.

Seat Depth
Check that the front of the seat fabric is not pressing on the back of the rider’s legs. Look for a minimum of 1/2" gap (1 1/4" is preferable). The 14" seat depth can be adjusted to 16" with a seat depth extension accessory, using an 18 1/2" RoughRider wheelchair seat extension.

Seat Height (from footrest)
With the rider sitting in the chair wearing the footware they will be using in the trike, place one hand under the lower thigh (closer to the knee) on the cushion and one hand holding the sole of the foot. Find the optimal height of the seat where there is moderate pressure under the thigh. where the foot is not hanging, and both foot and thigh bear approximately equal amounts of weight. One 13mm wrench needed.

Backrest Height
Check that the backrest supports the rider’s back, first supporting the rider’s trunk, and secondly allowing pushing on the handtrims. Check the backrest height again later if cushion height is changed in the fitting process. The backrest height can be adjusted to 14", 16", and 18" from the seat surface.
Two 13mm wrenches needed

Pressure Relief Cushion Adjustment (if needed)
Evaluate pressure on seat surface, and add additional cutouts layers under the cushion or carve away foam where needed. See cushion fitting guide on the following pages.

Rider Orientation to Tricycle
A wheelchair rider should train new riders and attendants in independent and assisted skills including moving in the chair, the use of parking brakes, transfers, pressure management, wheelies and leaning for rough terrain, and managing curves and steps. Additional topics are maintenance, cleaning, repairs, and wheelchair adjustments including footrest and rear axle position. A game of “follow the leader” over mixed terrain helps riders learn and teach each other riding skills.

Check Comfort
Ask about comfort and feel for high pressure grades after a half hour or more of use, and make adjustments if needed. This is a critical fitting step.

Whirlwind Wheelchair
http://whirlwindwheelchair.org
Size Adjustments:

Trike/Hip Width:

The Whirlwind Cargo tricycle is available in one width only: 18 1/8". Riders with narrower hip widths may prefer to place foam between their hips and the frame.
**Backrest Height + Tension Adjustable Backrest**

The backrest can be adjusted for the highest support of the backrest to be 14”, 16”, or 18” above the seat surface. The Tension Adjustable backrest straps can be adjusted to fit each rider.

Refer to the RoughRider backrest adjustment information.


Video of backrest strap adjustment for changing backrest height: [http://vimeo.com/60119609](http://vimeo.com/60119609)
**Tension Adjustable Backrest Setup**

*(By the rider and a service provider)*

Whirlwind recommends that riders consult with service providers who have experience with wheelchair seating to promote comfort and posture. The following notes are provided as a reference for riders and service providers and are not a replacement for a skilled service provider.

The RoughRider (and Cargo Tricycle) backrest supports comfort for riders with good head and trunk control, who have the ability to maintain an upright seated position.

*Remove the backrest cover, and loosen the buckles to release tension on the all of the straps.*

*The rider should transfers into the wheelchair/tricycle.*

*If the rider cannot maintain the upright posture independently, the service provider supports the rider in the upright posture and guides a helper to tighten the straps.*

*It is usually best if the service provider supports the rider to ensure that the posture is maintained in the correct alignment.*

*First tighten the straps at the top of the pelvis and the lumbar spine. Quite a bit of force is required to give the correct tension.*

*The straps over the upper trunk area are tightened next. They are tightened lightly only. Check with the rider to make sure they feel balanced and that the strap is not pushing them forward.*

*The straps over the buttocks area are tightened last. These are also done up very lightly to prevent pushing the bottom forward. For riders with lots of soft tissue in this area, ensure that the straps are sufficiently loose.*

*Check the rider's balance and adjustments. Usually it is the straps at the top and middle sections which require fine tuning.*

*The rider should now transfer out of the chair.*

*Check the contour of the adjusted backrest. This should be the same as the contour of the spine.*

*Secure the straps so that they cannot be accidently adjusted / slide out of position, by ensuring that the ends of the straps are secured with the velcro. (Note: the top strap is different from the others, requiring an additional buckle.)*

*Place the cover over the straps. Ensure that you follow the contour of the straps (the cover should not be stretched tighter than the straps). Secure the tabs on the bottom of the backrest cover.*

*Final tip: In some cases, the straps may not be able to reach lumbar curve. This curve can be supported by adding some foam to the front of the back support. Be careful to avoid pressure on the bony part of the spine and top of the pelvis.*
Seat Height (for Lower leg length) and Seat Angle

The seat angle can be adjusted by selecting holes for mounting the seat clamp. Some factors to consider when selecting seat angle, seat height, and seat position front/back include the following:

- Comfort and safety of seating position (refer to WHO Wheelchair Provision materials for more information)
- Height of front of seat/cushion from the footrest to support riders’ feet and legs
- Distance from the backrest support to the cranks (also affected by TAB adjustment and backrest angle relative to seat.
- Note that as the seat angle is adjusted, the backrest angle changes with the seat.
- Example: To achieve a 90-90-90 seating position (the most upright backrest angle is approximately 86 degrees from the seat) the seat angle might be set at 12 degrees, with the backrest in the most upright position with the top straps loosened to create a 90 degree seating angle with lumbar support. The Front Seat Rail Guide will be positioned 2 holes higher than the Rear Seat Clamp. The particular configuration shown in the photo will give a seat height (from the floor to the top of the integrated cushion) of 46cm.
Example: Seat mounting for 46cm seat height at 12 degree seating angle

FRONT: SEAT RAIL GUIDE
(Shown with bolt above tube, and can be installed with bolt below tube for low seats for riders with short legs)

REAR: SEAT CLAMP
(Shown with bolt above tube, and can be installed with bolt below tube for low seats for riders with short legs)
Low seat positions:

Image: Showing lowest seat position with 5 degree seat angle, 34cm seat height from footrest. The rear seat clamp is bolt-on-bottom in the top hole (1 of 6). The front seat guide is bolt-on-bottom in second hole, 2 of 6.
Seat Depth:

The seat on the cargo trike is 14” deep, which gives a total seat depth of approximately 15” to back of the sling backrest. If a longer seat is required, the tricycle and be fit with a seat extension from an 18.5” RoughRider wheelchair. Riders may also choose to install a seat extension without the strap to provide a handle for transfer. The seat extension can be installed following the instructions for the Roughrider Wheelchair. Note that the cushion is 14” deep only. *Note: This seat extension is not included with each tricycle, and must be ordered as an accessory. Please inform Whirlwind if your experience fitting tricycles indicates that this should be included with each tricycle.*

Website: [http://whirlwindwheelchair.squarespace.com/seat-extension/](http://whirlwindwheelchair.squarespace.com/seat-extension/)

Video: [http://vimeo.com/60116938](http://vimeo.com/60116938)
**Crank Height:**

Many riders prefer the lowest cranks possible because there is less of a visual obstruction in front of them. The lowest position of the cranks that will be comfortable for riders will likely be set such that the riders’ hand is only slightly above their knee when propelling the trike forward. To set the crank height before the rider sits in the trike, measure from the ground or footrest where the rider’s feet are resting to the top of the knee and add 5 cm for the hand and clearance. Set the center of the handgrip at its lowest this distance from the trike footplate.

Note: A longer chain can be used for the highest chain positions. This should be available from the manufacturer, and can be lengthened or replaced by a bicycle mechanic.
Seat Position Front-back

The seat position front-back, combined with the crank height, affects the propulsion and comfort of the trike rider. Many riders are the most comfortable when the seat position is set so that their shoulder is still in contact with the backrest and the farthest part of the crank stroke. A good starting point for this setting is 3 cm shorter than the fully extended arm length from the center of a closed fist to the surface supporting the rider’s back. Remember that the trike backrest is a sling backrest, and to accommodate for the curve of the backrest when measuring riders.
For more information contact

info@whirlwindwheelchair.org

and visit

http://www.whirlwindwheelchair.org/tech-support

http://www.whirlwindwheelchair.org/provider-resources