

# Top End® Force™

Force-2, Force K, Force RX, Force CC

## EN Handcycle Series User Manual



This manual **MUST** be given to the user of the product.  
**BEFORE** using this product, read this manual and save for future reference.



**Yes, you can.®**

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Please record your serial number SN#\_\_\_\_\_.

The SN is required for any warranty claims and placing aftermarket parts orders.

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# I General

## I.1 Symbols

### Warnings

Signal words are used in this manual and apply to hazards or unsafe practices which could result in personal injury or property damage.

See the information below for definitions of the signal words.



#### **WARNING!**

– Warning indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



#### **CAUTION!**

– Caution indicates a potentially hazardous situation which, if not avoided, may result in property damage or minor injury or both.



– Indicates a hazardous situation that could result in damage to property if it is not avoided.



Gives useful tips, recommendations and information for efficient, trouble-free use.

## I.2 Intended Use

Top End Hand Cycles are designed and built solely for transportation of a single rider for use in recreational, road racing, time trialing and off road enjoyment. They are intended to be used for longer, faster rides in recreational areas including paved, crushed gravel, riding paths or off road courses. They are not intended to be used as a daily

wheelchair or the treatment of any medical condition but only for recreational purposes. Any other use is prohibited.

Max. user weight: 250 lbs (113.4 kg).

## I.3 Dealer/Technician Information

The term “qualified technician” in this manual refers to an Invacare qualified technician or a Shimano® certified bicycle repair technician.

## 2 Safety

### 2.1 General Guidelines

The safety section contains important information for the safe operation and use of this product.



#### **WARNING!**

- DO NOT use this product or any available optional equipment without first completely reading and understanding these instructions and any additional instructional material such as owner's manuals, service manuals or instruction sheets supplied with this product or optional equipment. If you are unable to understand the warnings, cautions or instructions, contact a dealer or technical personnel before attempting to use this equipment - otherwise, injury or damage may occur.
- A qualified technician MUST perform the initial set up of this wheelchair. also, a qualified technician must perform all procedures specifically indicated in the manual.



#### **WARNING! ACCESSORIES**

- Invacare products are specifically designed and manufactured for use in conjunction with Invacare accessories. Accessories designed by other manufacturers have not been tested by Invacare and are not recommended for use with Invacare products.

### 2.2 Proper Fit

The handcycle MUST be adjusted to fit the rider. Check the seat position, back angle, threaded axles, footrest fore/aft position, hand crank height for proper fit and smooth operation of your handcycle.

Refer to adjustment procedures below to achieve the following.

- The rider MUST be able to see over the hand crank.
- The rider MUST have a slight bend at the elbow when the handpedals are toward the front of the handcycle (farthest from the rider's face).
- The rider MUST have a slight bend at the knee when feet are in the footrests. Feet should be flat against footrest hoop.
- Force Series requires an 18" turning radius. If leg touches tire during turn and the user cannot sense this, a leg guard attachment is recommended.
- The rider's knees MUST not obstruct hand crank operation.

### 2.3 Operating Information



#### **WARNING! TRANSPORT**

- Invacare recommends that a handcycle user is NOT transported in vehicles of any kind while in a handcycle. As of this date, the Department of Transportation has not approved any tie-down systems for transportation of a user while in a handcycle, in a moving vehicle of any type.



**WARNING!**  
**SEAT POSITIONING STRAP**  
**SERIOUS INJURY CAN OCCUR IN THE EVENT**  
**OF A FALL FROM THE PRODUCT.**

- ALWAYS wear your seat positioning strap. Invacare strongly recommends using the seat positioning strap as an additional safeguard for the handcycle user. The seat positioning strap is a positioning belt only. It is not designed for use as a safety device withstanding high stress loads as are auto or aircraft safety belts. If signs of wear appear, the belt **MUST** be replaced **IMMEDIATELY**.



**WARNING!**  
**BRAKES**

- If the brake cable show signs of wear or if it has become tangled because of improper transportation techniques, the cable **MUST** be replaced or the brake may fail. Should the primary brake fail, the parking brake can be used a backup emergency brake.
- Before riding your handcycle, **ALWAYS** check the function of the brakes. Be sure that the brakes and all other features of your handcycle are operating properly.



**WARNING!**  
**RISK OF INJURY OR DAMAGE**

- Care, consideration and practice **MUST** be taken and observed in the following safety points. Otherwise, injury or damage may occur.
- Safe use requires the close attention of the user as well as the assistant. This user manual points out the most common procedures and techniques involved in the safe operation and maintenance of the handcycle. It is important to practice and master these safe techniques until you are comfortable in maneuvering the handcycle.
- A helmet **MUST ALWAYS** be worn when operating the handcycle.
- Shoes **MUST ALWAYS** be worn and feet **MUST** be secured to the footrests with the straps when operating the handcycle.
- **ALWAYS** keep fingers and hands away from the chain while using the handcycle.



**WARNING!**  
**RISK OF INJURY OR DAMAGE**

- The Backrest **MUST** be adjusted properly. Otherwise, user's elbows may contact rear wheels during use. Operate with caution.
- **DO NOT** let children play near the handcrank or the chain. Otherwise, injury or damage may occur.
- The user is responsible for normal upkeep and maintaining the handcycle in proper operating condition.
- The manufacturer is not responsible for failure, damage or injury caused by improper operation or maintenance by the end-user.
- To determine and establish your particular safety limits, practice transferring activities in the presence of a qualified health care professional before attempting active use of the handcycle.
- Care **MUST** be taken when operating on roads, streets or highways. **ALWAYS** use safety flag that is provided with the handcycle.
- Operation of the handcycle is subject to all traffic rules and regulations. (This may include the use of a safety lights and reflectors for dusk/night riding.) Give pedestrians the right of way.
- Slow down when turning or cornering; otherwise, injury or damage may occur.
- Use proper hand signals when turning.
- Slow down at all street intersections and observe in both directions at least twice before proceeding.
- **DO NOT** attempt to move up or down an incline with an ice or oil film. Avoid all surface hazards.



**WARNING!**  
**RISK OF INJURY OR DAMAGE**

- **DO NOT** attempt to ride over curbs or obstacles or speed bumps. Doing so may cause your handcycle to "bottom out" and/or turn over and cause bodily harm or damage to the handcycle.
- **DO NOT** attempt to lift the handcycle by any removable (detachable) parts. Lifting by means of any removable (detachable) parts of an handcycle may result in injury to the user or damage to the handcycle.
- **DO NOT** stand on the seat or frame of the handcycle.
- **DO NOT** carry any riders.
- **DO NOT** carry any items that may obstruct your view or prohibit you from operating the handcycle properly.

**TIRE PRESSURE**

- **DO NOT** use your handcycle unless it has the proper tire pressure (p.s.i.). **DO NOT** overinflate the tires. Failure to follow these suggestions may cause the tire to explode and cause bodily harm.
- **DO NOT** ride on flat or under inflated tires. Riding on flat or under-inflated tires can cause injury as well as damage to the tire, tube and handcycle wheels.

**WEIGHT LIMITATION**

- The Invacare Force handcycles have a weight limitation of 250 lbs (113.4 kg).





**WARNING!**  
**RISK OF INJURY OR DAMAGE**  
**STABILITY AND BALANCE**

- For stability and proper operation of your handcycle, you **MUST** at all times maintain proper balance. Turning and cornering affects the stability and balance of the handcycle and user. Your handcycle should remain upright and stable during turns and cornering when operated correctly.
- Invacare recommends using seat positioning strap for additional safety.

**A NOTE TO HANDCYCLE ASSISTANTS**

- When learning assistance techniques for the handcycle, have an experienced assistant help you before attempting it alone.
- When you are assisting with a transfer to/from the handcycle, remember to use good body mechanics. Keep your back straight and bend your knees when lifting or positioning the handcycle for the end-user.
- Also, be aware of detachable parts. These must **NEVER** be used for lifting supports or to move the handcycle, as they may be inadvertently released, resulting in possible injury to the user and/or assistant.

**PERCENTAGE OF WEIGHT DISTRIBUTION**

- Transferring in and out of the handcycle, turning and cornering will cause a change to the normal balance, the center of gravity, and the weight distribution of the handcycle. To determine and establish your particular safety limits, practice transferring activities in several combinations in the presence of a qualified health care professional before attempting a transfer alone.
- Proper positioning is essential for your safety.

## 2.4 Transferring Into/Out of the Handcycle



**WARNING!**

- Before attempting to transfer in or out of the handcycle, every precaution should be taken to reduce the gap distance. Position the handcycle on level ground and as close as possible to the object you are transferring into or out of.
- The object you are transferring into or out of **MUST** also be secured before attempting any transfer.
- The parking brake of the handcycle **MUST** be engaged before attempting any transfer.

**WHEELCHAIRS**

- Wheel locks are not brakes.
- Engaging the wheel locks may not prevent the wheelchair from moving on all floor surfaces including those that may be wet or slick.
- **ALWAYS** exercise caution when transferring into or out of the wheelchair.



**CAUTION!**


- When transferring, position yourself as far back as possible in the seat. This will prevent damage to the upholstery.




This activity may be performed independently provided you have adequate mobility and upper body strength.

1. Position the handcycle on level ground and as close as possible along side the object to/from which you are transferring.
2. If possible, position the handcycle at a 45° angle to the object to/from which you are transferring.
3. If installed, apply the parking brake on the handcycle.

4. Position the handcycle handles as far forward as possible. This will create more room to transfer.

 If necessary, lift the front wheel off the ground and rotate the front tire.

5. Secure object that you are transferring into or out of. Apply wheel locks (if installed) if the object is a handcycle.

 During independent transfer, little or no seat platform will be beneath you. Although it may be difficult to wedge the transfer board between the handcycle seat and the handcycle seat, use a transfer board if necessary.

6. Lift and place left leg past the front frame across the seat and over the center tube.
7. Place one hand on far side of seat.
8. Shift body weight onto object while transferring.
9. To transfer out of the handcycle, reverse the procedure and use the backrest to push off.



**WARNING!**

– If installed on handcycle, parking brake and wheel locks **MUST** be engaged.

**2.4.1**

The steps below are specifically for transfer to/from a wheelchair and do not correspond to the steps in the procedure on the previous page. Follow a similar procedure to transfer to/from an object other than a wheelchair. Refer to the steps on the previous page for more information.

STEP A: Shift body weight to the edge of the wheelchair upholstery closest to the handcycle (A).

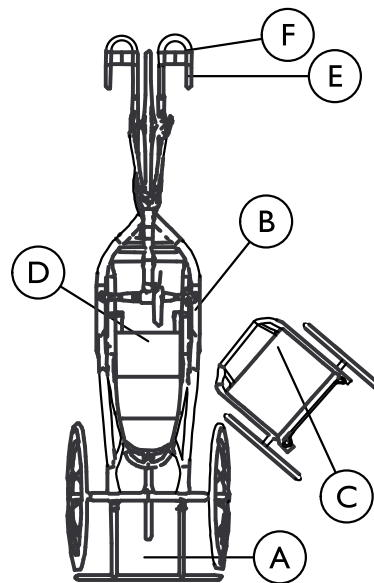
STEP B: Lift and place LEFT leg across seat.

STEP C: Place LEFT hand on the left side of handcycle seat frame (B), NOT on crank.

STEP D: Place RIGHT hand on the wheelchair frame (D).

STEP E: Lift and shift weight down into handcycle seat (E).

STEP F: Place both legs onto handcycle footrests (F) and secure safety straps.



Handcycle shown for clarity.

Handcycle pedals are rotated to the 3 o'clock position.

## 2.5 Safety Inspection Checklist



Every six months or as necessary, take your Top End handcycle to a qualified technician for a thorough inspection and servicing. Regular cleaning will reveal loose or worn parts and enhance the smooth operation of your handcycle. For safe and proper operation, your handcycle **MUST** be cared for just like any other vehicle. Routine maintenance will extend the life and efficiency of your handcycle.

Initial adjustments should be made to suit your personal body structure and preference. Thereafter, follow these maintenance procedures:

### Inspect/Adjust Initially and Weekly

- Inspect for bent or broken frame.
- Inspect parking brake - Adjust brake shoes to front rim. Check for worn or missing shoes. Check for wax or oil on rim.
- Ensure cable anchor is attached securely to brake arm.
- Ensure the brakes are working before you begin a ride. When fully applied, the handcycle should come to a complete stop.



### CAUTION!

– As with any vehicle, the wheels/castors and tires should be checked periodically for cracks, flat spots and wear, and should be replaced.

- Ensure axle nuts are tight. Wheel should be centered in fork. Keep wheel bearings adjusted and keep spokes tight and wheel in proper alignment.
- Inspect rim and fork assembly for damage.
- Ensure axle nut and wheel mounting nuts are secure.
- Inspect wheels for excessive side movement or binding when lifted and spun.
- Inspect for flat spots, wear and proper inflation.

- Inspect chain/chain guard for damage, rust, tension and stretch. Adjust if necessary. Lubricate each link (3-in-1 oil® or a quality bike lubricant). Check for damage or looseness.
- Adjust shifter/brake cables according to shifter/brake manufacturer's instructions (included with the handcycle).
- Inspect front fork. Keep tight and lubricate (All purpose grease).
- Inspect footrest mounting hardware is tight and footrest secure.
- Inspect footrest straps for wetness and/or damage.
- Inspect seat positioning strap for any signs of wear. Ensure buckle latches. Verify hardware that attaches strap to frame is secure and undamaged. Replace if necessary.
- Inspect upholstery for rips or sagging.
- Clean upholstery with light detergent and water.
- Check that all labels are present and legible. Replace if necessary.
- Ensure that axles are free of debris.

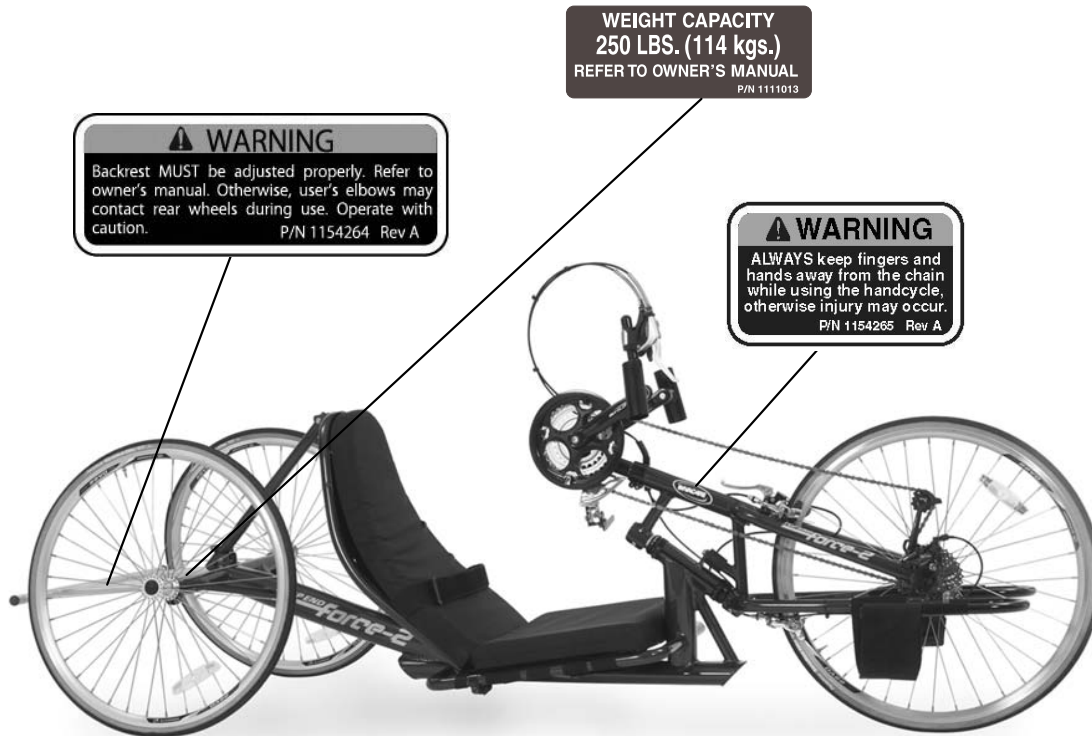
### Inspect/Adjust Periodically

- Inspect upholstery for rips or sagging.
- Clean upholstery with light detergent and water.
- Inspect hand grips for looseness. If loose, replace.
- Check that all labels are present and legible. Replace if necessary.

## 3 Overview

### 3.1 Label Locations

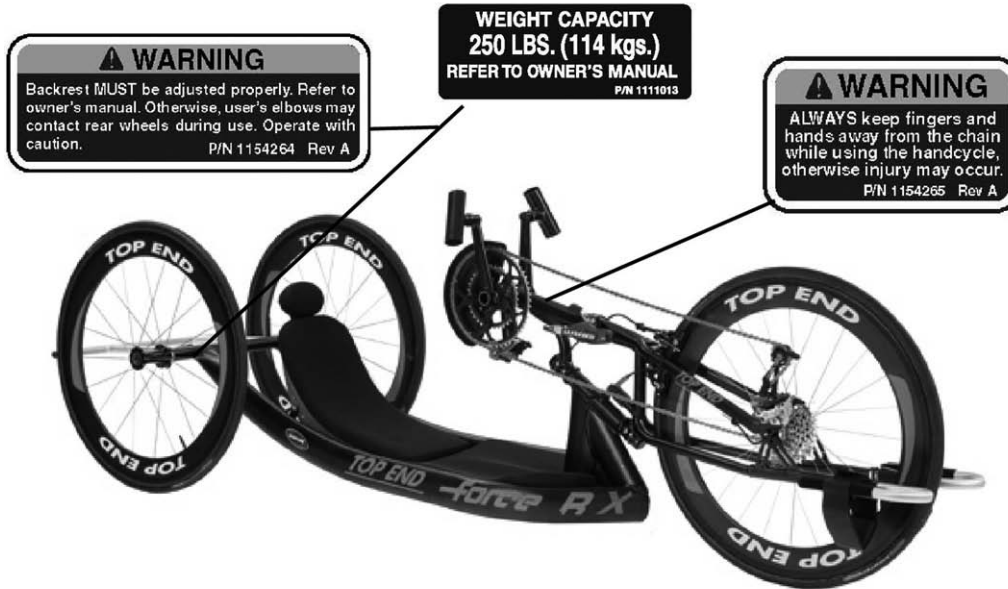
#### 3.1.1 Force-2 Label



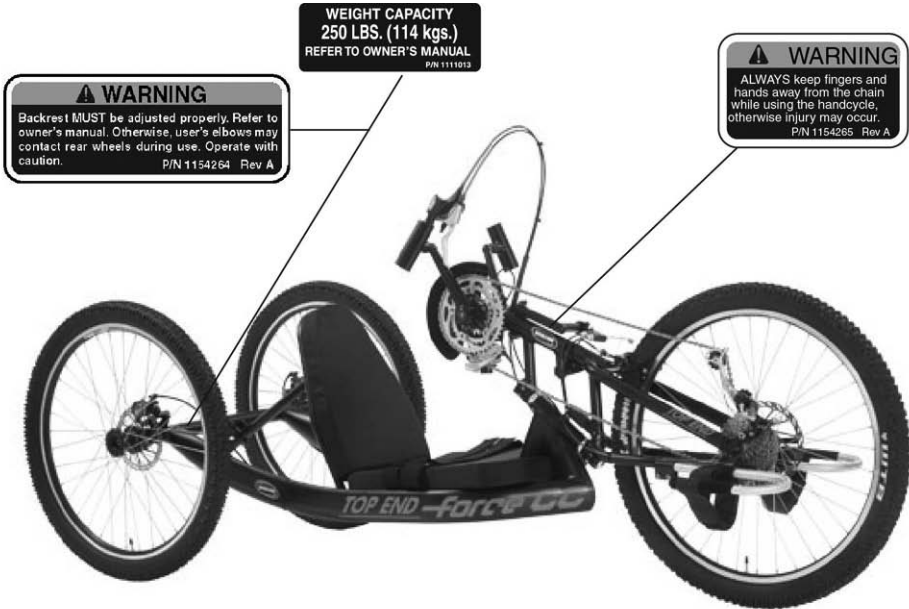
3.1.2 Force K Label



### 3.1.3 Force RX Label



### 3.1.4 Force CC Label



### 3.2 Typical Product Parameters

<b>Top End Force-2</b>	
Seat Width:	15 or 17 inches (38.1 to 43.1 cm)
Seat Depth:	14 inches (35.6 cm)
Seat-to-Floor (approx.):	Seat to Floor is 11.5 inches (29.21 cm) measured at the mid point of seat with 2" (5.1 cm) cushion
Back Style:	Adjustable Back Angle 55° - 90°, rear wards from 0° (0° = straight up)
Back Height Fixed/Adjustable Angle:	18 inches (Narrow, Tall) (45.72 cm)
Footrest:	Adjustable Fore and Aft
Side - Wheel Clearance:	2 inches - * 2½ inches (5.1 - 6.4 cm)
Rear Axle:	Threaded
Rear Wheel Camber:	9° - Standard (22.9 cm)
Wheels/Tires:	26-inch Spoke High Performance (66 cm)
Brakes:	Shimano® Tiagra Brake Set operated by Rapid Fire hands-on brake mounted on right or left pedal
Handles:	Ergonomic, Vertical, Ovalized Aluminum
Crankset:	Shimano® Octolink 170 mm x 14" wide non-V crank
Hub:	FRONT – Shimano® w/ 27 Speed External Cassette REAR - Precision Black Anodized with Threaded Axles



<b>Top End Force-2</b>	
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Spokes:	14 Gauge Stainless Silver
Shift Levers:	Rapid fire hands-on shifter mounted on right or left handpedal for lower derailleur Manual derailer for upper derailleur/chainrings
Gears:	27 Speed
Seat Cushion:	Foam Insert
Upholstery:	Nylon
Weight:	30 lbs (13.6 kg)
Shipping Weight:	65 lbs (29.5 kg)
Weight Limitation:	250 lbs (113.4 kg)
Standard Equipment:	Chain Guard, Safety Flag, Drafting Bumper, Seat and Back Cushions
Options: *see order form	Computer, Safety Lights, Helmet, Bike Rack, Water Bottle and Cage, Alignment Gauge, Backpack Hydration System, Indoor Training Roller

<b>Top End Force K</b>	
Seat Width:	Custom
Seat Depth:	Custom
Seat-to-Floor (approx.):	Custom
Back Style:	Custom
Back Height Fixed/Adjustable Angle:	Custom
Footrest:	Custom
Side - Wheel Clearance:	Custom
Rear Axle:	Threaded
Rear Wheel Camber:	3°, 0° or 6°
Wheels/Tires:	26-inch Spoke High Performance (66 cm)
Brakes:	Cane Creek® operated by hands-on brake mounted on right or left handpedal
Handles:	Ergonomic, Vertical, Ovalized Aluminum mounted on Top End V crankset
Crankset:	Top End V Crankset, custom widths/lengths (see order form)
Hub:	Front – SRAM with 30 Speed External Cassette Rear - Precision Black Anodized with Threaded Axles
Spokes:	14 Gauge Stainless Black
Shift Levers:	SRAM® 10 Speed Trigger Shifter mounted on Right Cable operated shifter for upper derailleur/chainrings

<b>Top End Force K</b>	
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Gears:	30 Speed
Seat Cushion:	Foam Insert
Upholstery:	Nylon
Weight:	30 lbs (13.6 kg)
Shipping Weight:	65 lbs (29.5 kg)
Weight Limitation:	250 lbs (113.4 kg)
Standard Equipment:	Chain Guard, Safety Flag, Drafting Bumper, Seat and Back Cushions
Options: *see order form	Computer, Safety Lights, Helmet, Bike Rack, Water Bottle and Cage, Alignment Gauge, Backpack Hydration System, Carbon Fiber Wheels, Indoor Training Roller

### Top End Force RX

Seat Width:	13 to 18 inches (30.5 to 45.7 cm)
Seat Depth:	14 inches (33 cm)
Seat-to-Floor (approx.):	5 inches (12.7 cm) with 2 inch (5.08 cm) cushion
Back Style:	Fixed with adjustable strapping or adjustable carbon fiber back
Back Height Fixed/Adjustable Angle:	Custom angle range, 27 inches (Narrow, Tall) (68 cm), Adjustable carbon fiber back
Footrest:	Adjustable Fore and Aft
Side - Wheel Clearance:	2 inches - * 2½ inches (5.1 - 6.4 cm)
Rear Axle:	Threaded
Rear Wheel Camber:	3° or 6°
Wheels/Tires:	26-inch Spoke High Performance (66 cm)
Brakes:	Pro Force
Handles:	Ergonomic, Vertical, Ovalized Aluminum mounted on crankset
Crankset:	Top End V Crankset, custom widths/lengths (see order form)
Hub:	Front SRAM components with 30 speed external cassette Rear: Precision Black Anodized with threaded
Spokes:	14 Gauge Stainless Black
Shift Levers:	SRAM® 10 Speed Trigger Shifter mounted on Right Cable operated or manual shifter for upper derailleur/chainrings

<b>Top End Force RX</b>	
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Gears:	30 speeds
Seat Cushion:	Foam Insert
Upholstery:	Mesh
Weight:	26 lbs (11.8 kg)
Shipping Weight:	65 lbs (29.5 kg)
Weight Limitation:	250 lbs (113.4 kg)
Standard Equipment:	Seat, Back and Head Cushions, Chain Guard, Safety Flag, Drafting Bumper
Options: *see order form	Computer, Safety Lights, Helmet, Bike Rack, Water Bottle and Cage, Alignment Gauge, Backpack Hydration System, Carbon Fiber Wheels, Indoor Training Roller, Power Plates

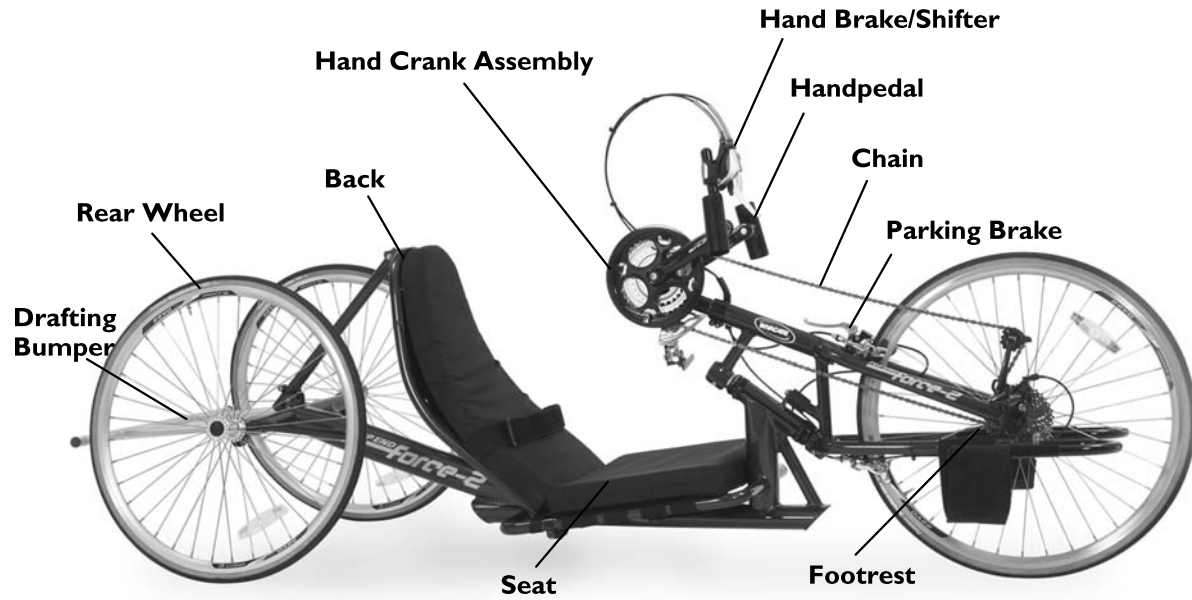
### Top End Force CC

Seat Width:	15 or 17 inches (38.1 to 43.18 cm)
Seat Depth:	14 inches (35.6 cm)
Seat-to-Floor (approx.):	12 inches (17.8 cm) measured at the mid point of seat with 2" (5.1 cm) cushion
Back Style:	Adjustable Back Angle, rear wards from 90 – 120°
Back Height Fixed/Adjustable Angle:	18 inches (Narrow, Tall) (45.7 cm)
Footrest:	Adjustable Fore and Aft
Side - Wheel Clearance:	2 inches — * 2 ½ inches (5.1–6.4 cm)
Rear Axle:	Threaded
Rear Wheel Camber:	0° — Standard
Wheels/Tires:	26 inch (66 cm) Spoke High Performance
Brakes:	Front disk brake, operated by Rapid Fire hands-on brake mounted on right handpedal, optional dual rear disk brakes operated by fork mounted brake lever
Handles:	Ergonomic, Vertical, Ovalized Aluminum mounted on Top End V crankset
Crankset:	Top End or V Crankset, length 170 mm, width 14 or 17 inches
Hub:	FRONT — Shimano® /Top End Components with 27 speed external cassette REAR —Precision Black Anodized with threaded axles
Spokes:	14 gauge stainless black
Shift Levers:	Rapid-Fire® hands-on shifter mounted on right handpedal for lower derailleur Cable operated shifter for upper derailleur/chainrings

<b>Top End Force CC</b>	
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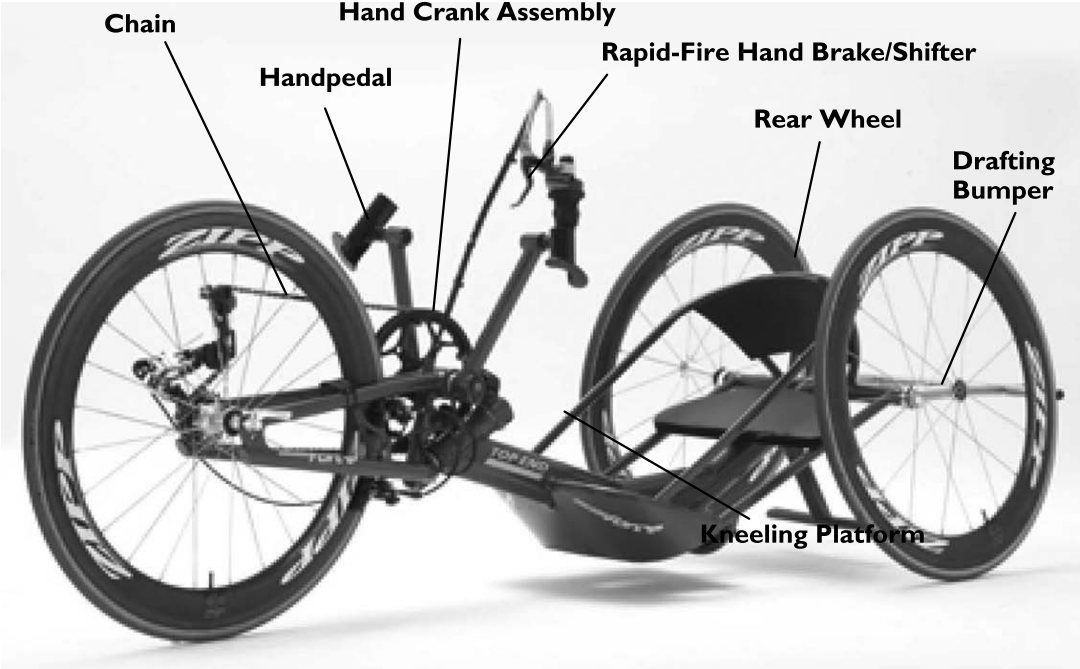
Gears:	27 speed
Seat Cushion:	Foam Insert
Upholstery:	Nylon
Weight:	30 lbs (13.6 kg)
Shipping Weight:	65 lbs (29.5 kg)
Weight Limitation:	250 lbs (113.4 kg)
Standard Equipment:	Seat and back cushions, chain guard, safety flag, seat, back cushions, drafting bumper
Options: *see order form	Computer, Safety Lights, Helmet, Bike Rack, Water Bottle and Cage, Alignment Gauge, Backpack Hydration System, Carbon Fiber Wheels, Click straps, Indoor Training Roller, Leg Guard, Mirror, Crank Width Adaptor, Heart Rate Monitor


### 3.3 Component Identification Force-2



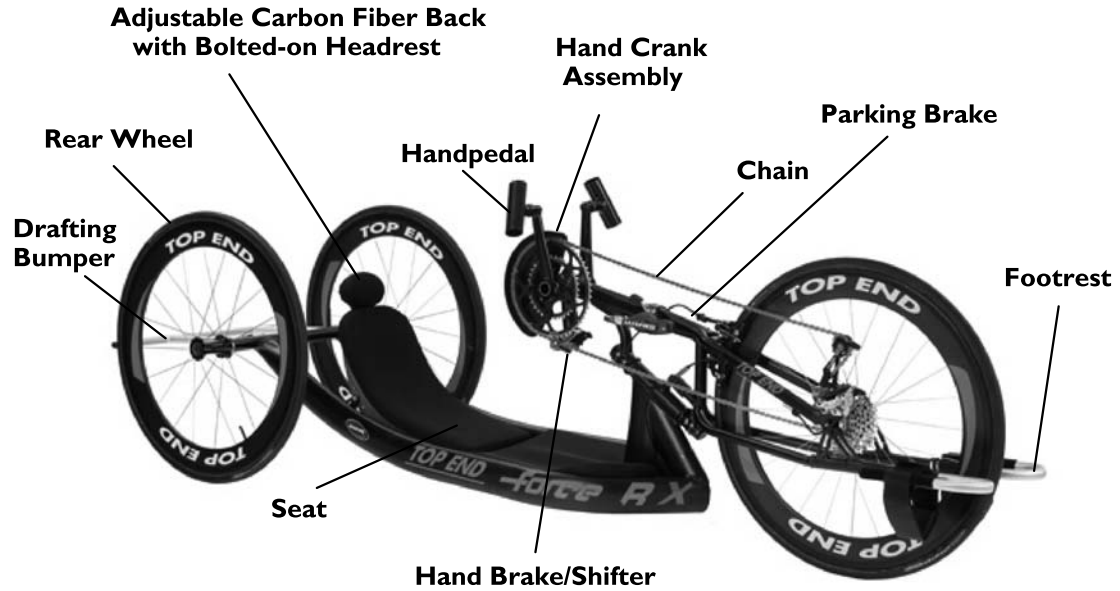


Force K



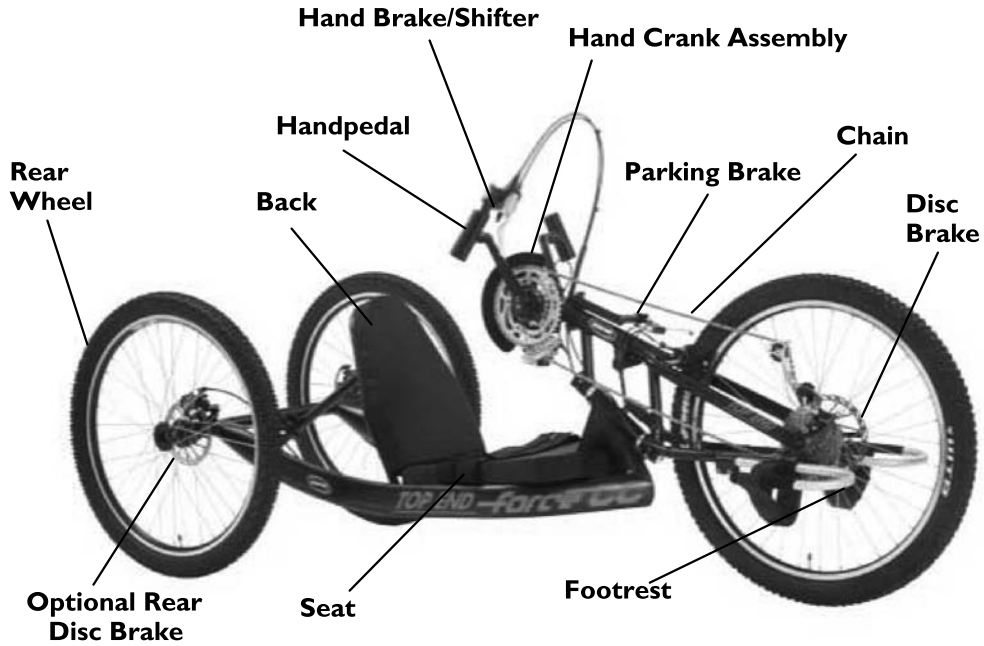
 Parking Brake available on request.

## Force RX



Fixed back not shown

**Force CC**



### 3.4 Tire Pressure Conversion



PSI rating is printed on the side of the tire.

Conversion formula: 1 psi = 6.895 kPa (approx. 7 kPa).

PSI	KILOPASCALS
50	345
55	379
60	414
65	448
70	483
75	517
80	552
85	586

## 4 Assembly- Force-2 Only

### 4.1 Assembling the Force-2 Handcycle



#### **WARNING!**

- After any adjustments, repair or service and before use, make sure all attaching hardware is tightened securely.
- Otherwise, injury or damage may occur.



Required tools:

- 1/2-inch (1.27 cm) box wrench
- 10mm box wrench
- Metric Allen wrench set (includes 4mm, 5mm, and 6mm wrenches)

1.



Use the 5mm Allen wrench to tighten the camber tube clamps on each end of the frame.

2.



Insert an axle into each rear wheel.

3.



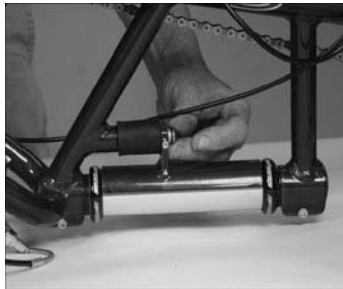
Use the 6mm Allen wrench to attach the rear wheels to the frame. Tighten securely.

4.



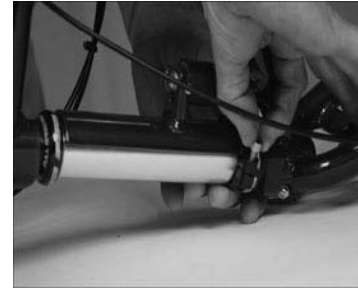
Set the frame on a flat stable surface with a support underneath the front frame.

5.



Attach the plate to the rubber dampener by threading the bolt into the dampener.

6.



Place the fork clamp loosely over the lower part of the fork.

7.



Slide the lower half of the clamp over the lower section of the front of the frame.

8.



Place the second clamp over the frame and the fork/frame attachment plate.

9.



Securely tighten the upper and lower clamps. There should be 1/8 inch (0.3175 cm) gap between the frame and fork/frame attachment plate.



**CAUTION!**

– Do not overtighten.

10.



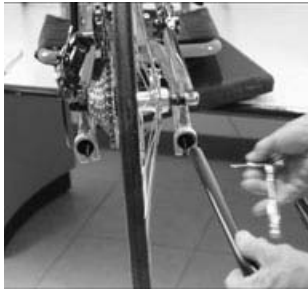
Loosely tighten the dampener bolt to hold the fork in place.

11.



To center the front wheel, tighten the set screws on each side of the dampener plate. After the front wheel is centered, tighten the dampener screw.

12.



On each fork, loosen the footrest clamp and slide a footrest into the end of the fork using the 5mm Allen wrench.

13.



Attach the footrest strap.

14.



Remove protective backing from stick back hook and loop fastener on the back of the back cushion.

15.



Align the back cushion with the back rest and carefully press the back cushion onto the backrest.



16.



Place the seat cushion on top of the seat.

17.



Remove the bottom clamp of the chain guard with a 5mm Allen wrench.

18.



Place the chain guard clamp around the bottom bracket and tighten the screw on the right side.

19.



Tighten the clamp on the left side making sure it does not interfere with the chain.

20.



Remove the backrest support bar from the clamp on the frame.

21.



Remove and retain the bolt, nut and washer. Insert the curved spacers.

22.



Slide a washer onto the bolt. Use a small wrench to align the holes and slide the bolt through the holes and secure with the nut.

23.



Tighten the top of the backrest support bar to the top of the backrest using a 5mm wrench and 10mm box wrench.

24.



Slide the backrest support bar through the clamp on the frame. Tighten with the 5mm Allen wrench.

25. Adjust the backrest angle as required. Refer to 5.10 Adjusting Back Angle, page 49.

26.



Remove left drafting bumper clamp.

27.



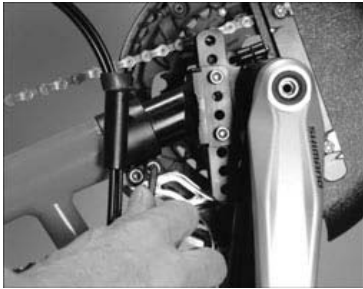
Slide the flag holder over the bumper receiver in place of the drafting bumper clamp removed in STEP 26.

28.



Slide the drafting bumper into the bumper receivers and tighten both right and left bumper clamps with a 4mm wrench.


29. Insert flag.
- 30.



31. Tighten crank support with a 5mm Allen wrench.



Adjust footrests to proper length and tighten with a 5mm Allen wrench.


 DO NOT overtighten. The footrests should not turn.

- 32.



Place caps over outside of rear wheel axles.

33. If the leg guard is not installed, refer to 9.7 Additional Options, page 74 .

 The Rapid Fire Shifter and Brake is mounted on the right handpedal. It can be moved to the left handpedal if required.

34. To move the Rapid Fire Shifter and Brake, loosen the attaching hardware, move the assembly to the left handpedal and attach with hardware. Tighten securely.

## 5 Operation

### 5.1 General Operation Instructions



#### **WARNING!**

- After any adjustments, repair or service and before use, make sure all attaching hardware is tightened securely. Otherwise, injury or damage may occur.
- Before operating the handcycle, review the General Guidelines in this user manual.
- DO NOT operate the handcycle if handcrank obstructs your view. If the handcrank obstructs your view, adjust the handcrank height before using the handcycle - otherwise injury or damage may occur.

1. Engage the parking brake, if equipped. Refer to 5.4 Braking, page 42.
2. Transfer into the handcycle. Refer to 2.4 Transferring Into/Out of the Handcycle, page 9.
3. Check chest clearance and arm length. A combination of crank, back angle and backrest adjustment may be needed to achieve chest clearance and proper arm length.
  - Backpedal by placing hand on handpedal and pedal backwards.
  - If crank arms do not clear chest area move the backrest rearward. If equipped with diagonal crank adjustment, adjust crank away from the body allowing more room. This adjustment will move the crank lower and away, and in addition may require you to shorten the chain.
  - Check arm length by placing hands on handpedals. There should be a slight bend in the elbow.
4. Check and adjust back angle for comfortable trunk position and proper arm length.

5. Be sure you can see over the top of the hand crank. Refer to 5.8 Adjusting Hand Crank, page 46.
6. Check leg clearance by backpedaling. If the handpedals do not clear the legs while stationary in straight line, raise the crank height. Refer to 5.8 Adjusting Hand Crank, page 46.
7. Ensure the footrest is adjusted properly.



There should be a slight bend in the knee when the sole of the shoe is touching the inside edge of the footrest.

8. Ensure the seat is adjusted properly.



Seat should be adjusted so that when seated with feet in the footrests, there is a slight bend at the knee and a slight bend at the elbow when the hand crank is furthest away.

9. Check Brake and Disc Brakes (if so equipped)
  - Check cables for signs of wear or fraying.
  - Squeeze the brake lever firmly and check for proper brake function.
  - Adjust for pad wear if necessary.
  - Check pads for wear and replace if necessary.
  - Ensure rotors are free of foreign substances and oils.
10. Secure each foot in the legrests with strapping.

11. Release the parking brake, if equipped. Refer to 5.4 Braking, page 42.



**WARNING!**

– The hand crank assembly is used for propelling and steering of the handcycle. At least one hand **MUST** be on the hand crank assembly at all times. Otherwise, injury or damage may occur.

12. Place at least one hand onto the handpedals. Rotate the handpedal forward (toward the front) to propel the handcycle forward.



## 5.2 Shifting Gears



### CAUTION!

- DO NOT attempt to shift gears while bike is stationary.
- DO NOT press both shifter levers down at the same time. Doing so may damage the shifter and will void the warranty. The gears WILL NOT shift when both levers are pressed simultaneously.
- DO NOT use excessive force. This may damage the shifter and void the warranty.

To shift gears, you MUST turn the crank forward with the chain under some tension while the bike is moving.

There are two shifters installed on the handcycle. The right handpedal shifter operates the nine gears on the lower derailleur and the cable driven or manual shifter (manual shifter is on Force-2 Model only) operates the three chain rings on the upper derailleur.

9 gears X three chain rings = 27 speeds

10 gears X three chain rings = 30 speeds

Shifting the chain on the lower derailleur towards the centerline of the handcycle is for climbing/accelerating (easier cranking) (lever A) and is called a downshift. Moving the chain on the lower derailleur out or away from the centerline of the handcycle is for speed (harder cranking) (lever B) and is called an upshift.

During operation, the chain should run smoothly over the chain rings. If there are problems with the chain, discontinue use and contact your local bike shop.

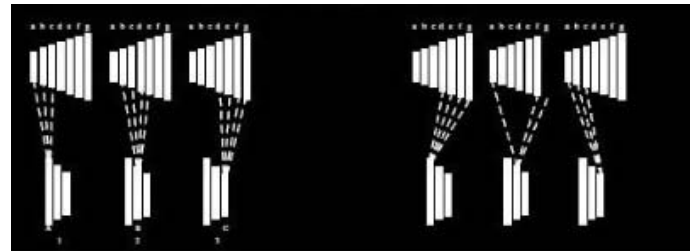
Refer to the chart for an explanation and use of the upper derailleur chain rings in combination with the lower derailleur gears:

- If your pedaling cadence is too slow, shift into a lower gear
- If your pedaling cadence is too fast, shift into a higher gear
- The chain should not rub on the front of the derailleur chain guide
- Shift into a lower gear in order to facilitate easy start-up
- NEVER shift gears while stationary or while pedaling backwards
- Keep eyes on the road when changing gears

Lower derailleur gears (right shifter)	Upper derailleur chain rings (manual shifter or cable driven shifter)	Use for:
1-9	Smallest	Climbing Hills or Strong Headwinds
10-18	Medium	Flats or Gradual Rolling Terrain
19-27	Largest	Descending Hills or Strong Tailwinds

### Recommended

### Not Recommended




### Lower Derailleur (Right Side Shifter)

- Shifting from Harder Gears to Easier Gears (Downshift) — Firmly press the shifter down to downshift.

#### Rapid Fire or Trigger Shifter —




 Range: 1–9

Push shift lever closest to center with thumb and release. Repeat until the desired gear is achieved.

### Grip Twist Shifter —



 Range: 1–9

Twist the shifter from number to number (5 to 4, 4 to 3, 3 to 2, etc.) until the desired gear is achieved.

#### SRAM Double Tap Red Shifter —



- Shifting from Easier Gears to Harder Gears (Upshift) — Lightly press the shifter down to upshift.



**Rapid Fire or Trigger Shifter —**

Pull shift lever located towards the outside using thumb or index finger and release. Repeat until the desired gear is achieved.

**Grip Twist Shifter —**

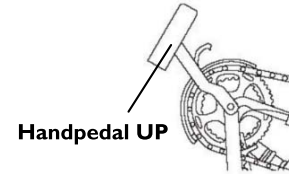
Twist the shifter from number to number (4 to 5, 5 to 6, 6 to 7, etc) until the desired gear is achieved.

**Upper Derailleur (Manual Shifter or Cable Driven Shifter)**

- Shifting from Easier or Smaller Chainring to Harder or Larger Chainring (Upshift) —  
**Cable Driven —**  
Push lever down until chain runs smoothly over the chain ring while the handcycle is moving.  
**Manual Shifter (Force-2 Only) —**  
Move shifter lever up.
- Shifting from Harder or Larger Chainring to Easier or Smaller Chainring (Downshift) —  
**Cable Driven —**  
Push lever up until chain runs smoothly over the chain ring teeth while the handcycle is moving.  
**Manual Shifter (Force-2 Only) —**  
Move shifter lever down.

**5.3 Backing-Up and Maneuvering in Tight Areas****CAUTION!**

- Take care not to tangle the cables. KEEP the handles up to prevent the cables from becoming tangled in the crank assembly.

**Backing Up**

1. Turn the front wheel straight and put the handpedals in the up position.
2. Place one hand on a rear wheel (or ground) and the other hand on one of the handpedals and start to back up, keeping control of the handcycle at all times.

**Maneuvering in Tight Areas**

If you cannot make a full turn, just crank a half or quarter crank, bring the crank back up again, turn a little bit at a time until you turn your way around.

If you need to turn a full 180°, you will need to keep the handpedals in the up position so the cables do not get tangled up and push backwards on the rear wheel with your other hand. Move the handcycle forward with the handpedals and use the rear wheels to manually push backwards until you are turned around.

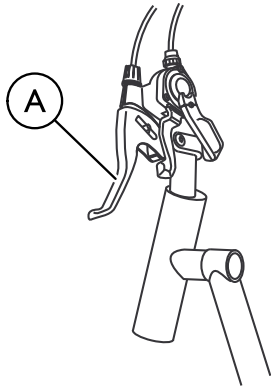
## 5.4 Braking

### Hand Brakes/Hands-On Brakes

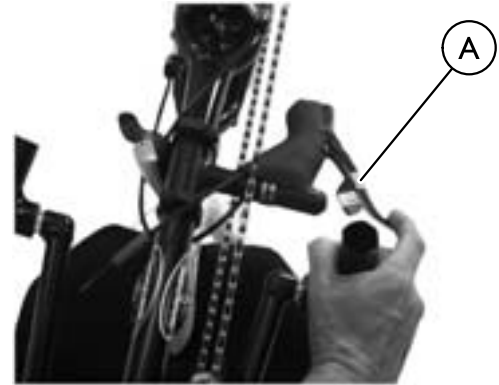


#### WARNING!

- If the primary brakes fail for any reason, the parking brake can be used as an emergency brake.
- Reverse pedaling **WILL NOT** stop the bike.
- In situations where caution is advised (heavy traffic, intersections, etc.) hands should be kept in the "ready" position to prepare for braking.



1. Make sure your hand is in ready position to use this brake.
2. Squeeze brake handle(s) **A** as needed to slow or come to a complete stop.
3. Release when desired speed is achieved.



#### Fork Mounted Shifter and Brake


1. Make sure your hand is in ready position to use this brake.
2. Squeeze brake handle(s) **A** as needed to slow or come to a complete stop.
3. Release when desired speed is achieved.

#### Disk Brakes



It may take 20 to 40 complete stops to break in disc brake pads.

## Force CC Rear Disk Brake Option Lever

 To maintain control when descending a steeply inclined surface, use the front and rear disk brake options.

The location of the front disk brake lever is on the right handpedal.



1. If equipped, make sure your hand is in ready position to use this brake.
2. Squeeze brake handle/lever **A** with left hand as needed to slow or come to a complete stop. Maintain control of the steering with right hand.
3. Release when desired speed is achieved.

## Using Parking Brake



### WARNING!

- The parking brake can be used as an emergency brake and can be repositioned for ease of use.
- Before attempting to transfer in or out of the handcycle, every precaution should be taken to reduce the gap distance. Position the handcycle on level ground and as close as possible to the object you are transferring into or out of.
- The object you are transferring into or out of **MUST** also be secured before attempting any transfer.
- The parking brake of the handcycle **MUST** be engaged before attempting any transfer.



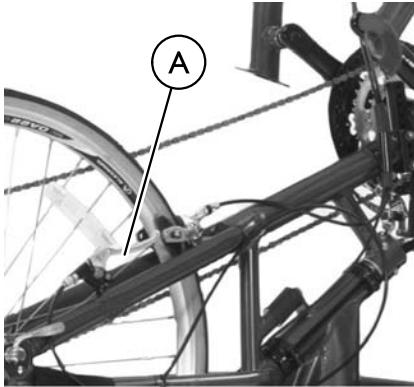
The Force-2 handcycle has a stop-button parking brake. Press button and squeeze lever to engage.

- To Engage the Force 3 Parking Brake **A** - Squeeze the handle and push the push button until the handle locks in place.
- To Disengage the Parking Brake - Squeeze and release the handle.
- To activate Cable Driven brake **B** simply push lever forward until handle locks in place.

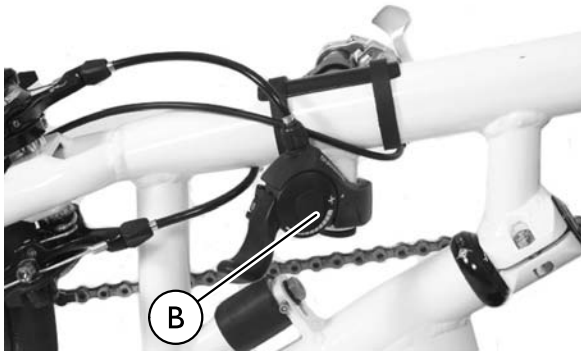


Refer to photos on next page and in 3.3 Component Identification, page 24 for parking brake locations.

### Force-2 Parking Brake



### All Other Force Models



## 5.5 Steering, Turning and Cornering

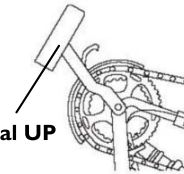


### WARNING!

– DO NOT attempt to corner the handcycle at high speeds. This could result in a fall causing injury and/or damage to the handcycle.

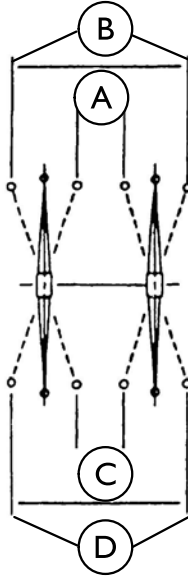
To steer the handcycle, use the hand crank to direct the front fork and wheel assembly in the direction you intend to go (straight, right, or left).


- Steering can be done while rotating the hand crank (pedaling) or coasting.




- When turning or cornering, it is recommended that you slow the handcycle, stop pedaling, steer the handcycle and coast through the turn. Hands should be up in the crank cycle (at approximately between the 11 and 2 o'clock position).

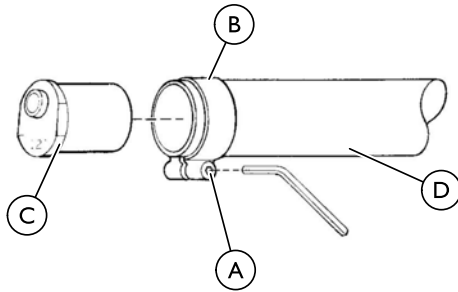
## 5.6 Determining Toe In/Toe Out



 Top view of handcycle

1. Inflate all pneumatic tires to recommended tire pressures (listed on the sidewall of the tire).
2. Measure the distance between the center lines at the rear and front of the rear wheels at approximately 12 inches (30 cm) from the ground/floor.
  -  For optimum accuracy, perform STEP 2 with the handcycle occupied.
  - STEP 2 may be performed with using alignment gauge (available as an option for the handcycle). Refer to 9.6 Using the Alignment Gauge, page 73.
3. Determine the difference between the two measurements. If the difference between the two measurements is greater than 1/8-inch (0.3175 cm) (for maximum rollability), one of two conditions exists:
  - If the back centerline measurement of the rear wheels is smaller than the front centerline measurement of the rear wheels **C**, a toe-out condition **B** exists.
  - If the back centerline measurement of the rear wheels is LARGER than the front centerline measurement of the rear wheels **D**, a toe-in condition **A** exists.
4. If the difference between the measurements is greater than 1/8-inch (0.3175 cm), correct the toe-in/toe-out condition. Refer to 5.7 Adjusting Toe In/Toe Out, page 46.

## 5.7 Adjusting Toe In/Toe Out



1. Loosen, but do not remove the socket screws (A) and clamps (B) that secure camber inserts (C) to the camber bar (D).
2. Slowly rotate the camber insert (C) until the rear wheels are approximately in a straight line.
3. Securely tighten the socket screws (A) and clamps (B) that secure the camber inserts (C) to the camber bar (D).
4. Measure the distance between the center lines at the rear and front of the rear wheels at approximately 12 inches (30 cm) from the ground/floor. Refer to 5.6 Determining Toe In/Toe Out, page 45.
5. Repeat STEPS 1-4 until the toe in/toe out measurement is less than 1/8-inch (0.3175 cm) (for maximum rollability).

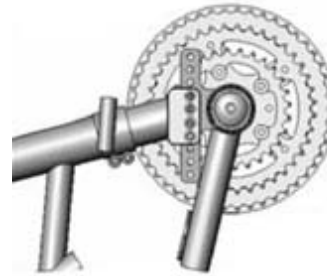
## 5.8 Adjusting Hand Crank



### WARNING!

– After any adjustments, repair or service and before use, make sure all attaching hardware is tightened securely. Otherwise injury or damage may occur.

### Diagonal Adjustment



1. Loosen, but do not remove the allen nuts that secure the crank handles to the fork.
2. Slide the crank handles up and/or down until the proper tension on the chain is achieved.



The proper chain tension will be approximately 1/2-inch (1.27 cm) of chain slack.

If crank is in desired position but chain tension is not correct, links **MUST** be added to or removed from the chain to correct the tension.

This should be performed by a qualified technician.

3. Tighten the clamp that secures the crank handles to the fork securely.

## Vertical Adjustment



1. Loosen, but do not remove the allen nuts securing the hand crank to the fork stem.
2. Move the hand crank assembly up or down in the fork neck until you are comfortable with the position for operational purposes.
3. Tighten the hex nut to secure the hand crank in the desired position.



### WARNING!

- If the crank is lowered, the chain may become loose and links may need to be removed from the chain. Otherwise, the chain may be lost or damaged.
- If the crank is raised, the chain can become overtightened and links may need to be added. Otherwise, the chain will lock up and damage to the derailleur may result.
- Before riding the handcycle, test shifting into all gears on a stationary indoor trainer or by lifting up the front wheel (simulating riding in a stationary position).

## 5.9 Adjusting Seat Fore/Aft



### WARNING!

- After any adjustments, repair or service and before use, make sure all attaching hardware is tightened securely. Otherwise, injury or damage may occur.

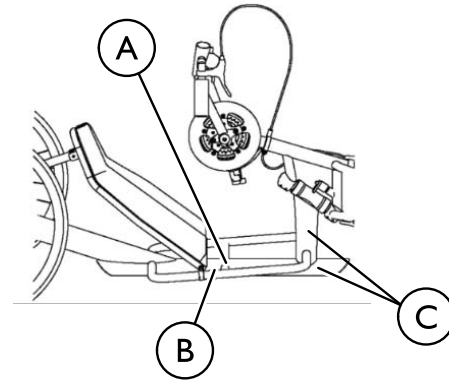
### Adjusting Seats (Force-2 and Force CC)



This procedure is not applicable for Force K and Force RX model handcycles.

Seat should be adjusted so that when seated with feet in the footrests, there is a slight bend at the knee and a slight bend at the elbow when the handpedal is furthest away.

### Force-2 and Force CC Models



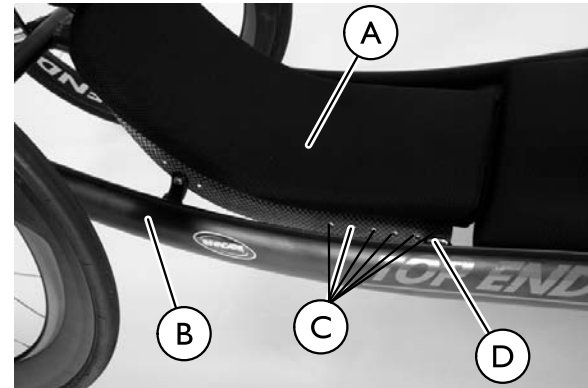
1. If applicable, remove the seat upholstery. Refer to 6.14 Replacing Seat Upholstery, page 61.
2. Adjust the seat position:
  - a. Force, Force-2 Models: Loosen, but do not remove the two mounting bolts and locknuts **A** securing the two back clamps **B** to the seat rails **C**. Slide back clamps **B** for (forward) or aft (rearward) along the seat rails to desired seat position.
3. Securely tighten the two mounting bolts and locknuts **A**.
4. If applicable, install the seat upholstery. Refer to 6.14 Replacing Seat Upholstery, page 61 .
5. If necessary adjust the back angle.

### Adjusting Seats (Force RX)



#### **WARNING!**

- This procedure is not applicable for Force-2 and Force CC model handcycles.
- Seat should be adjusted so that when seated with feet in the footrests, there is a slight bend at the knee and a slight bend at the elbow when the handpedal is furthest away.



1. Remove bolt **D** from carbon back **A** and wheelchair frame **B**.
2. Adjust carbon back **A** to desired depth and align mounting hole **C** in carbon back **A** with hole in handcycle frame **B**.
3. Insert bolt **D** in carbon back **A** and handcycle frame **B**.
4. Tighten securely.



## 5.10 Adjusting Back Angle



### CAUTION!

- The following directions are for Force-2 and Force CC.
- Do not attempt to use the following directions with Force RX.



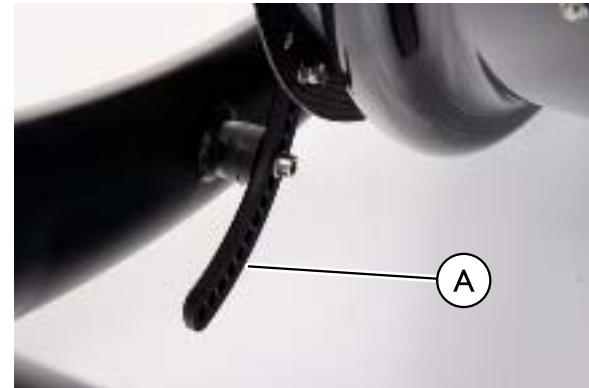
1. Loosen the top of the backrest support bar to the top of the backrest using a 5mm wrench and 10mm box wrench.
2. Perform one of the following:
  - Increasing Back Angle - While lifting up on the back support tubes (A), pull the seat upward to the desired position.
  - Decreasing Back Angle - While pushing down on the back support tubes (A), push the seat down to the desired position.
3. Tighten the top of the backrest support bar to the top of the backrest using a 5mm wrench and 10mm box wrench.

## Adjusting the Force RX Carbon Back ONLY



### WARNING!

- Do not put transfer weight to carbon back or headrest when adjusting the carbon back.
- If additional stability is needed while adjusting the carbon back, put transfer weight to the center of the backrest.
- For additional guidance on this issue, refer to the Top End website.



1. Remove bolt from crescent link bracket (A) and carbon back (B).
2. Adjust carbon back to desired angle aligning the hole with the crescent link bracket with the hole in the carbon back.
3. Insert bolt into hole in crescent link bracket (A) and carbon back (B).
4. Tighten securely.

## 6 Service Procedures

### 6.1 Installing Rear Wheels with Threaded Axles



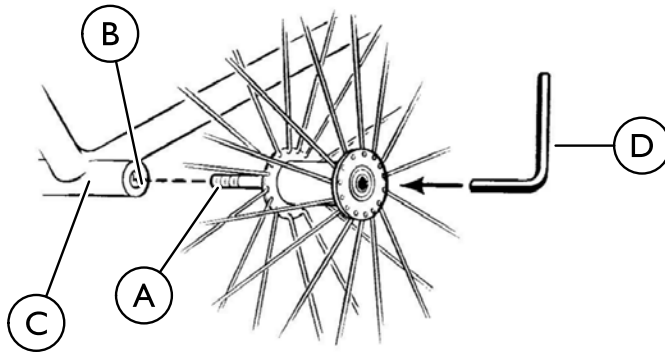
#### WARNING!

– After any adjustments, repair or service and before use, make sure all attaching hardware is tightened securely. Otherwise injury or damage may occur.



#### WARNING!

– DO NOT use the handcycle unless it has the proper tire pressure (p.s.i.). DO NOT overinflate the tires. Failure to follow these suggestions may cause the tire to explode and cause bodily harm. Tire p.s.i. is printed on the tire wall.



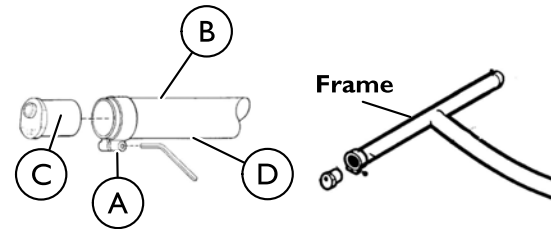
1. Apply a small amount of grease onto the axles (A).
2. Insert the axle (A) into the axle mounting hole (B) on the handcycle frame (C). Repeat for other wheel.
3. Securely each wheel to the frame (C) with the 6mm wrench (D). There should be no play or threads visible.

### 6.2 Replacing Tire/Tube and Tuning/Replacement of Spokes



Invacare recommends that these procedures be performed by a qualified technician.

### 6.3 Replacing Camber Inserts



1. Loosen, but do not remove the socket screws (A) and clamps (B) that secure the camber inserts (C) to the camber bar (D).
2. Remove the existing camber insert (C) from the camber bar (D).
3. Install the new camber insert (C) into the camber bar (D).
4. Adjust the toe in/toe out of the handcycle. Refer to 5.7 Adjusting Toe In/Toe Out, page 46 .

## 6.4 Removing/Installing the Fork

Force K and Force RX ONLY ( Force CC can only be done by an authorized bicycle technician)



### WARNING!

– After any adjustments, repair or service and before use, make sure all attaching hardware is tightened securely. Otherwise, injury or damage may occur.

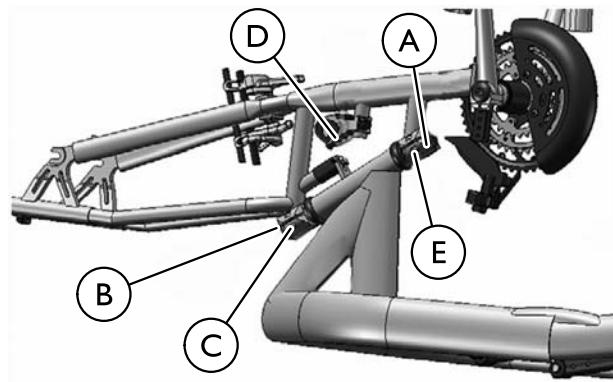


For Force-2, refer to 4.1 Assembling the Force-2 Handcycle, page 29

Adjusting the height of the crank may require using extra chain supplied with the handcycle.

These procedures require the use of a 5mm Allen wrench and 1/2-inch (1.27 cm) wrench.

## Removing the Fork



1. Set the front of the frame on a stable surface that elevates the frame slightly off the ground.
2. Remove front wheel.
3. Loosen the top cap bolts **A**. DO NOT remove.
4. Remove lower cap bolt **B**.
5. Loosen the lower fork clamp bolts **C**. DO NOT remove.
6. Remove lower cap **B**.
7. Loosen compensator set screws **D**.
8. Loosen the compensator bolt **D**. DO NOT remove.
9. Remove the upper fork clamp **E**.
10. Remove the compensator bolt **D**.
11. Tip the fork and slide off the end of the fork stem. Retain top clamp, caps and bolts.

## Installing the Fork

1. Set the front of the frame on a stable surface that elevates the frame slightly off the ground.
2. Slide lower fork clamp over the fork stem. Push the fork until the upper fork clamp engages the upper portion of the fork stem.
3. Install and loosely attach the compensator bolt.
4. Loosely attach upper fork clamp / bolts with the lock-nuts facing upwards. **DO NOT** fully tighten.
5. Install and tighten lower cap and bolt.
6. Tighten the lower fork clamp bolts.
7. Tighten the top cap bolt to remove play from the assembly.
8. Tighten the upper fork clamp.
9. Tighten the compensator bolt.
10. Tighten compensator set screws.
11. Install front wheel. Refer to 6.5 Removing/Installing the Front Wheel, page 53.

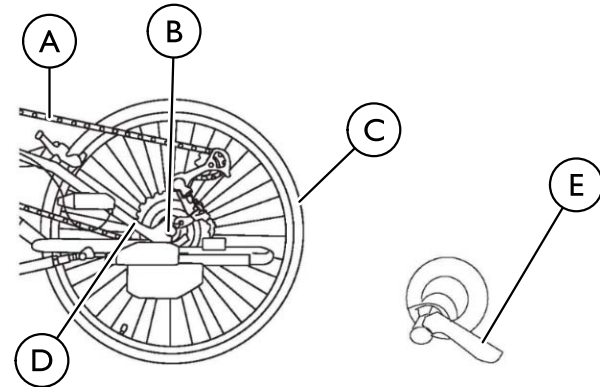
## 6.5 Removing/Installing the Front Wheel



### WARNING!


– After any adjustments, repair or service and before use, make sure all attaching hardware is tightened securely. Otherwise injury or damage may occur.

### Removing




1. Open the quick-release lever **E** securing the front wheel **C** to the fork **D** and loosen the knob on the opposite side of the quick-release lever.
2. Remove the wheel **C** from the fork **D**.
3. Remove the chain **A** from the front wheel **C**.

## Installing


 For ease of installation, secure the handcycle frame approximately 6 inches (15.24 cm) from the ground or seek assistance.

1. Loop the chain **A** over the front wheel sprocket **B**.
2. Position the front wheel axle **C** into the fork slots **D**.
3. Tighten the knob on the opposite side of the quick-release lever **E** and secure the wheel **C** to the fork **D** with the quick-release lever **E**.

## 6.6 Replacing the Crank Arms


 Right and left are determined from the user seated on the handcycle.

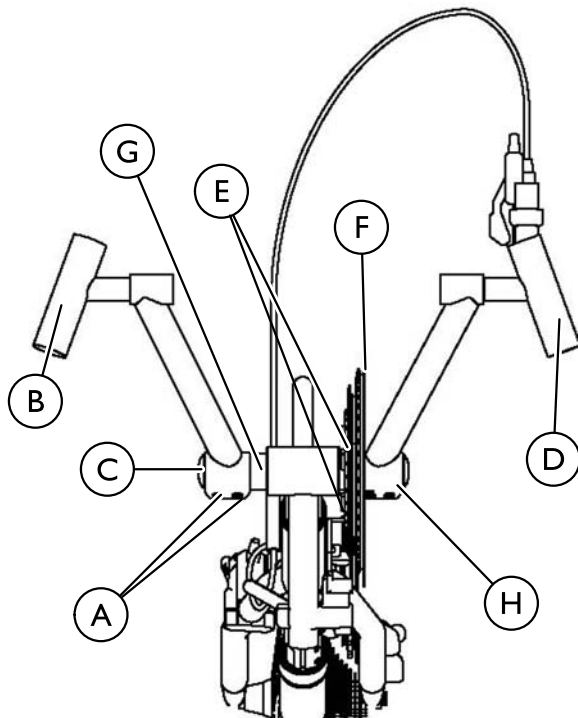
### Replacing the Left Side Crank Arms

 Refer to image on next page.

1. Remove the two socket screws **A** from the existing crank arm clamp **H**.
2. Remove socket screw and cap from the spindle **C**.
3. Use socket screw **A** from crank arm **B** (in the center hole) to open binder of crank arm.
4. Remove the existing crank arm **B** from the spindle **C**.
5. Position the new crank arm **B** onto the spindle **C** so that the new crank arm **B** is evenly aligned with the right side crank arm **D**.
6. Reinstall the socket screw and cap from the spindle **C**. **DO NOT** overtighten.
7. Using the two socket screws **A**, secure the new crank arm clamp **H** to the spindle **C**. Securely tighten.


## Replacing the Right Side Crank Arms


 Refer to image to the left.



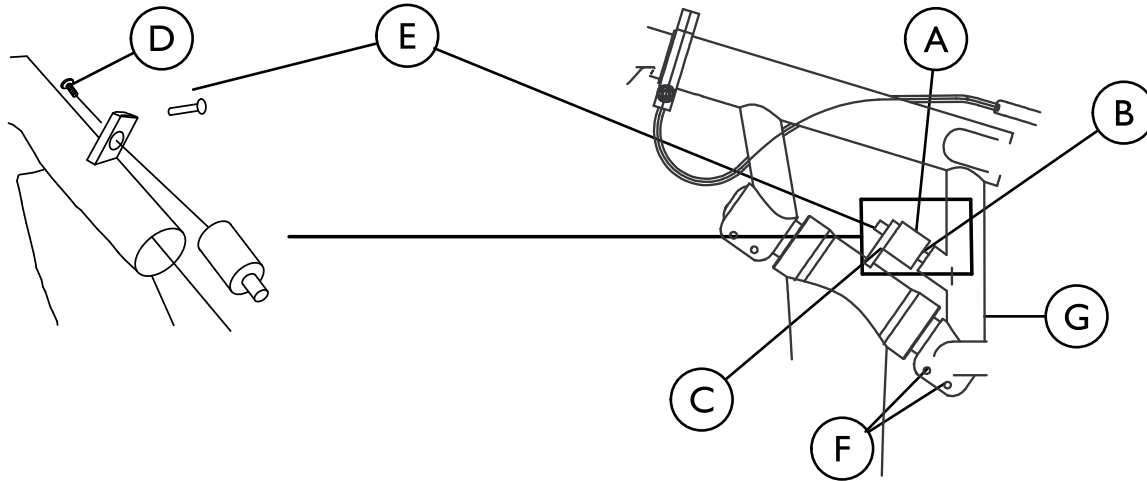
1. Remove the two mounting bolts (E) securing the chain ring disk (F) to the tabs of the existing crank arm (D).
2. Remove the two socket screws (A) from the existing crank arm clamp (H).
3. Use socket screw (A) from crank arm (D) (in the center hole) to open binder of crank arm.
4. Remove socket screw and cap from the spindle (C).
5. Remove the existing crank arm (D) from the spindle (C).
6. Position the new crank arm (D) onto the spindle (C).
7. Using the two mounting bolts (E), secure the tabs of the new crank arm (D) to the chain ring disk (F).
8. Ensure the new crank arm (D) is evenly aligned with the left side crank arm (B).
9. Reinstall the socket screw and cap from the spindle (C). DO NOT overtighten.
10. Using the two socket screws (A), secure the new crank arm clamp (H) to the spindle (C). Securely tighten.
11. Make sure that the spacers (G) between the bottom bracket and crank arms (B, D) do not spin freely.

## 6.7 Installing/Removing/Adjusting the Steering Dampener

 The steering dampener is designed to stabilize the handcycle during transfers and while riding and is not intended to keep the handcycle straight when pedaling but to keep the handcycle from leaning excessively to one side or another.


 :Refer to image below.

1. Screw the dampener (A) into tab at dampener clamp (B).
2. Rotate fork to align crank assembly tab (C) with hole on top.
3. Insert bolt (D) into the hole and tighten.
4. Gently tighten the set screws (E) on right and left side of the crank assembly tab (C).



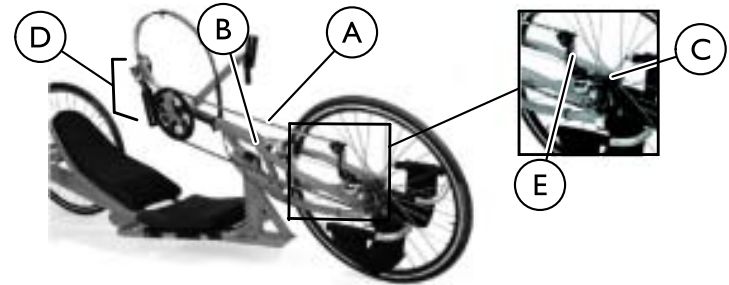


## Adjusting Steering Dampener


 Refer to image on previous page.

1. Loosen, but DO NOT remove, the two socket screws **F** securing the dampener clamp **B** to the handcycle frame **G**.
2. Ensuring the front wheel and dampener clamp **B** are inline with the handcycle frame **G**, securely tighten the two socket screws **F** securing the dampener clamp **B** to the handcycle frame **G**.
3. Test drive handcycle, if handcycle pulls to the left or right repeat STEPS 1-2 until handcycle drives straight.

## 6.8 Installing Twenty-Seven or Thirty Speed Cassette Chain




1. Spread the chain **A** out flat and run it around the chain ring **B** on the crank **D** and the sprocket **C** on the hub.

 It may be necessary to turn the hand crank in a clockwise motion to position the chain on the small sprocket.

2. Ensure that crank assembly **D** is loosened.
3. Lift up on the chain derailer **E** and thread the chain **A** under the derailer **E**.
4. Thread the chain **B** around the wheel sprocket **C**.
5. Run the chain **B** around the bottom of the wheel sprocket **C** and back up towards the hand crank sprocket **B**.
6. Attach the chain **A** together using the master link (w/clip) provided.

## 6.9 Adjusting Twenty-Seven or Thirty Speed Cassette Chain

1. Loosen, but do not remove the clamp that secure the crank handles to the fork.
2. Slide the crank handles up and/or down until the proper tension on the chain is achieved.

 The proper chain tension will be approximately 1/2-inch (1.27 cm) of chain slack.

If crank is in desired position but chain tension is not correct, links **MUST** be added to or removed from the chain to correct the tension. This should be performed by a qualified technician.

3. Tighten the clamp that secures the crank handles to the fork securely.

## 6.10 Installing Hand Crank Handles



### **WARNING!**

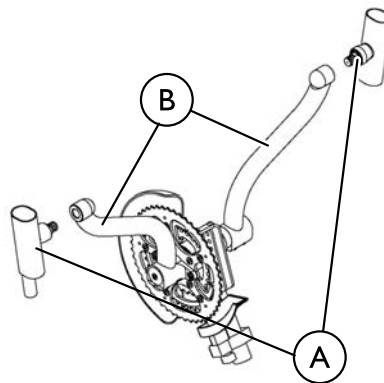
- Replacement/installation of V or S crank handles should be done by a qualified technician.

## 6.11 Installing V/S Crankarm Handles



### **WARNING!**

- After any adjustments, repair or service and before use, make sure all attaching hardware is tightened securely. Otherwise injury or damage may occur.
- Failure to install handle assembly properly could result in injury.
- It is recommended to inspect this assembly prior to and after each use.



Screw handle **A** into crankarm housing **B** (right handle has right-handed thread; left handle has left-handed thread).



Handle should spin freely with minimal play. If handle does not spin freely, contact Top End Customer Service at the phone number on the back cover of this manual.

## 6.12 Adjusting/Replacing the Primary Caliper Brake and Parking Brake



### WARNING!

- After any adjustments, repair or service and before use, make sure all attaching hardware is tightened securely. Otherwise, injury or damage may occur.
- Replacement of the parking brake **MUST** be performed by a qualified technician.



The Force-2 model has a stop-button parking brake that adjusts using this procedure. The Force RX, Force CC, and Force K have a cable driven parking brake.

### Adjusting

#### Cable

Loosen the hex nut and turn the adjuster barrel clockwise (tighten) or counterclockwise (loosen) to adjust the cable. Retighten hex nut.

#### Brake Pads

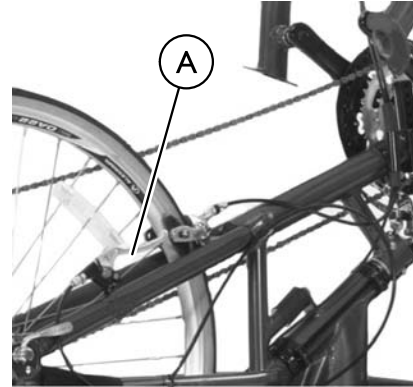
Adjust the brake pad assembly so that when the parking brake is engaged the brake pads rest solely on the rim of the wheel.

### Replacing

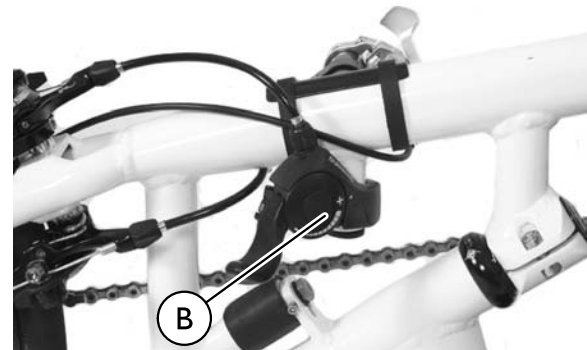
#### Brake Pads

1. Remove the mounting nuts and brake pads.
2. Secure the replacement brake pads with hardware and adjust.

### Force-2 Parking Brake



### All Other Force Models



## 6.13 Disc Brakes



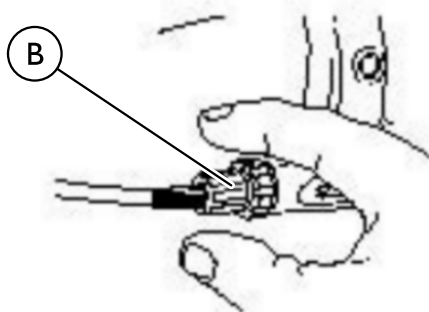
### WARNING!

- If wheel is not adjusted properly, pads may become unaligned and brake may not work properly.
- If this occurs, contact a Shimano certified bicycle technician.

### Cleaning

Under normal use and conditions, it is not necessary to clean the caliper rotor or pads. If necessary, use a solution of water and dish detergent to wash the caliper and rotor. Thoroughly rinse all soap residue from the rotor. Dry the components completely with a clean paper towel.

### Cable Adjustment



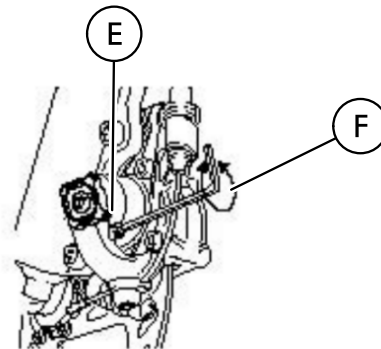
Use the barrel adjuster (B) to remove cable slack. Turn the barrel adjuster (B) until there is no free play in the brake lever but not so far

that the torque arm on the caliper (C) is advanced. Refer to Brake Pad Replacement image on page 68.



The torque arm should return completely when the brake lever is released.

### Spring Adjustment



To adjust spring tension, turn the spring tension adjustment screw (E) with a 2mm hex wrench (F). Turn the screw clockwise to increase the spring tension, which equals harder lever pull.

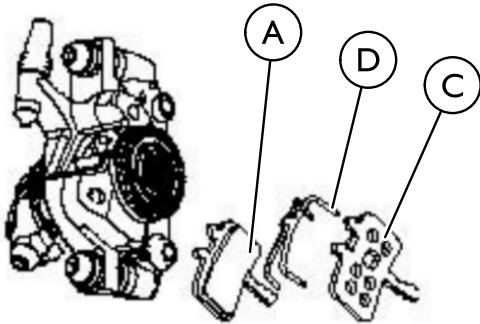
### Brake Pad Inspection, Replacement and Break In



A brake pad **MUST** be replaced when its thickness (backing plate and friction material) is less than 3 mm.

If the rotor is damaged or excessive wear is found, it should be replaced immediately by a qualified technician.

## Brake Pad Replacement



Inspect the brake pad **A** for thickness and wear. To replace brake pad **A**:

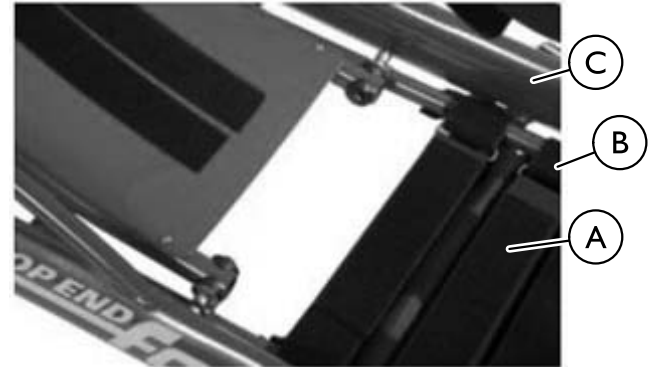
1. Remove the existing pad **A**.
  - a. Back both adjuster knobs **B** all the way out (counterclockwise).
  - b. Squeeze the pad tabs together and pull both pads **A** straight out of the caliper **C**.
2. Install replacement pad **A** and springs **D**.
  - a. Assemble the spring **D** between the new left and right pads **A**. The pad marked "R" goes on the spoke side of the brake.
  - b. Align the spring **D** to the pad **A** as shown.
  - c. Squeeze the brake pad **A** and spring clip assembly together then press firmly into the caliper **C** until it clicks into place.

## 6.14 Replacing Seat Upholstery



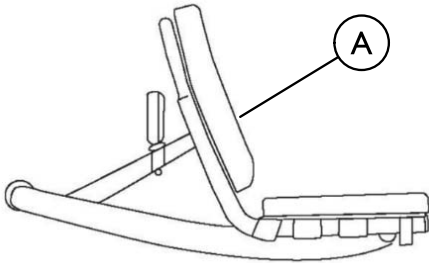
### WARNING!

– After any adjustments, repair or service and before use, make sure all attaching hardware is tightened securely. Otherwise, injury or damage may occur.



1. Remove seat cushion.
2. Unlatch the fastening flaps **A** that secure the seat upholstery **B** to the seat frame **C**.
3. Remove the existing seat upholstery **B**.
4. Install the new seat upholstery **B** making sure that the fastening flaps **A** that are in close proximity to one another are to the rear of the seat frame **C**.
5. Secure the fastening flaps **A** together.
6. Reinstall seat cushion onto chair.

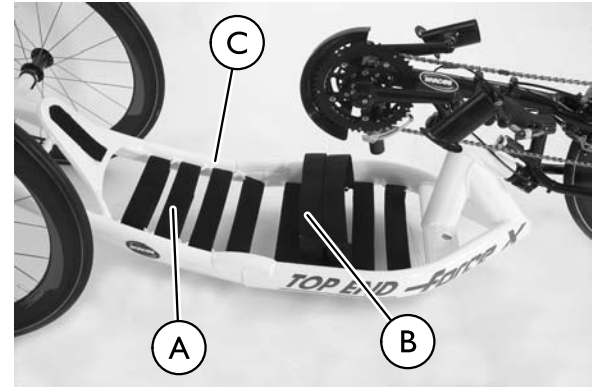
## 6.15 Replacing Back Cushion



1. Attach one side of the hook and loop strip to the back of the back cushion. Remove the plastic from the hook and loop to reveal the tape.
2. Align the fastening strips on the back frame with the fastening strips on the back cushion.
3. Press the back cushion **A** firmly against the back frame to secure.

## 6.16 Integrated Backrest Strap Replacement

Force RX Welded Back ONLY



1. If a strap **A** requires replacement, separate the hook and loop strips **B** that hold the strap **A** in place. Remove the existing strap **A**.
2. Thread the replacement strap **A** through the loops **C** in the frame **D**.
3. Secure the pieces of the straps together with the hook and loop strips **B**.

## 6.17 Replacing/Adjusting the Footrest



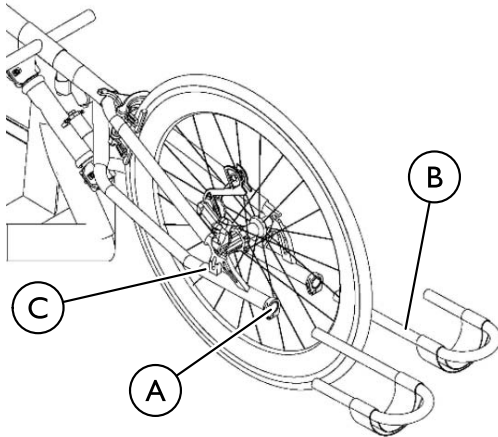
### WARNING!

– After any adjustments, repair or service and before use, make sure all attaching hardware is tightened securely. Otherwise, injury or damage may occur.

### Replacing Footrest

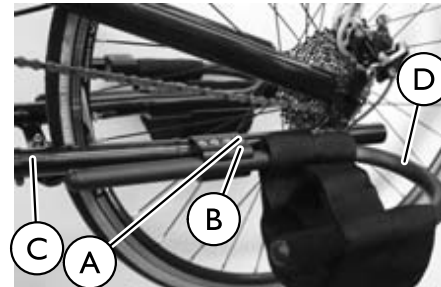


If replacing footrest take note of current position.



1. Loosen the hex bolt and locknut (A) that secure the footrest (B) to the fork (C). Remove the locknut (A).
2. If replacing footrest (B) perform the following:
  - a. Remove existing footrest (B) from clamp (A).
  - b. Insert new footrest into clamp.
3. Slide footrest (B) to desired position.
4. Install the locknut. Tighten securely.
5. Repeat STEPS 1-4 for the opposite footrest if necessary.

### Adjusting Footrest for Force-2, Force RX for short leg lengths



1. Loosen the four bolts (A) that secure the footrest clamp (B) to the wheelchair frame (C).
2. Adjust the footrest (D) to the desired position by sliding it through the footrest clamp (B).
3. Tighten the bolts (A) securely.

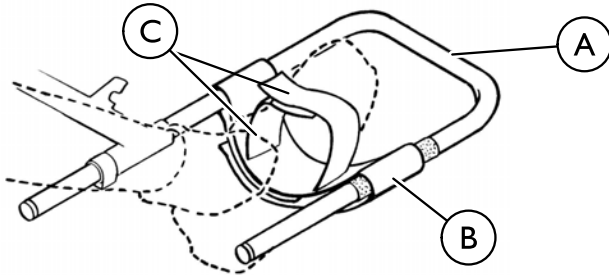
## 6.18 Using/Replacing the Footrest Strap



### WARNING!

- After any adjustments, repair or service and before use, make sure all attaching hardware is tightened securely. Otherwise, injury or damage may occur.
- Footrest straps must be inspected before each use. Exposure to moisture (e.g. wet weather or puddles) will damage fastening strips.
- Footrest strap will not hold feet securely in footrest if fastening strips are damaged. DO NOT operate handcycle if footrest straps are wet or damaged. Otherwise, severe injury may occur.
- Always wear shoes and securely strap feet in using straps provided. Severe injury may occur if feet are not secured while the handcycle is in motion.

### Using Footrest Strap

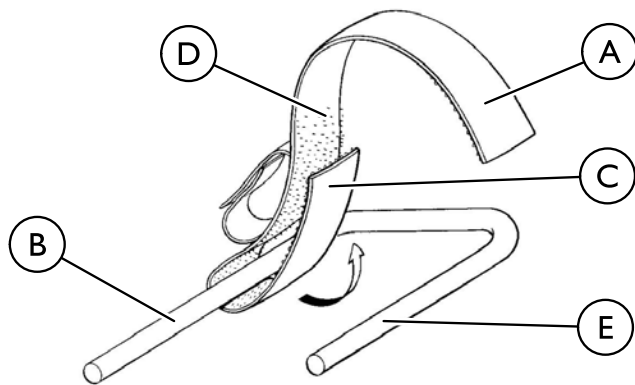


1. Place feet in footrest (A).
2. Secure feet to footrest strap (B) using small fastening straps (C).

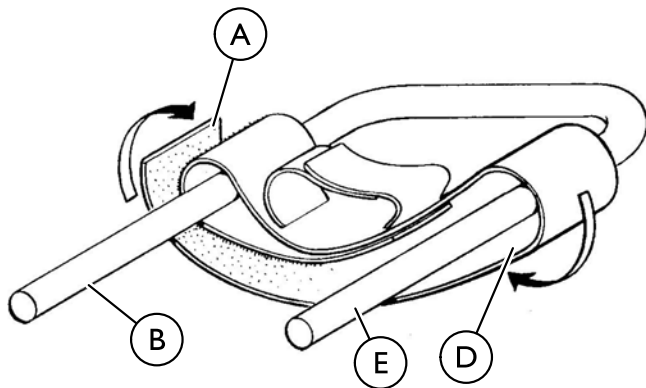


## Replacing Footrest Strap


### DETAIL "A"



### DETAIL "B"



1. Pull apart fastening straps securing existing footrest strap to footrest.

 The small fastening straps should face up.

2. Wrap end of footrest strap (A) over and around the inner footrest tube (B) and firmly connect the hook (C) and loop (D) portions of the footrest strap (detail "A").
3. Wrap end of footrest strap (A) over and around the outer footrest tube (E) and under the inner footrest tube (B) and firmly connect the hook (C) and loop (D) portions of the footrest strap (details "A" and "B").
4. Ensure the footrest strap is firmly attached to the loop fastening strip (D) on the outer footrest tube (E).

## 7 Troubleshooting

### 7.1 Troubleshooting

Veers Right	Veers Left	Sluggish Turn or Performance	Wheel Flutter	Squeaks and Rattles	Looseness in Handcycle	Solutions
X	X	X	X			Check tires for correct and equal pressure.
X	X					Check dampener hardware and adjustment.
		X	X	X	X	Check for loose axle nuts.
				X	X	Check spokes and nipples.
		X		X	X	Check chain for proper tension and adjustment.
			X		X	Check that goose neck fittings are secure.

## 8 Maintenance

### 8.1 Suggested Maintenance Procedures



#### **WARNING!**

- After any adjustments, repair or service and before use, make sure all attaching hardware is tightened securely. Otherwise, injury or damage may result.
- DO NOT overtighten hardware attaching to the frame. This could cause damage to the frame tubing.

1. Before using your handcycle, make sure all nuts and bolts are tight. Check all parts for damage or wear and replace. Check all parts for proper adjustment.
2. Check Brakes and Disc Brakes (if so equipped)
  - Check cables for signs of wear or fraying.
  - Squeeze the brake lever firmly and check for proper brake function.
  - Adjust for pad wear if necessary.
  - Check pads for wear and replace if necessary.
  - Ensure rotors are free of foreign substances and oils.
3. Check parking brake cable and shifter adjustment cables for proper adjustment and operation. Refer to 6.12 Adjusting/Replacing the Primary Caliper Brake and Parking Brake, page 59.



#### **WARNING!**

- DO NOT use WD-40<sup>®</sup>, 3-in-1 oil<sup>®</sup> or other penetrating lubricants on quick-release axles. Otherwise, binding and/or damage to the handcycle can occur.

4. Clean/oil quick-release axles and or threaded once a week with a Teflon<sup>®</sup> lubricant.

1171790-B

5. Keep quick-release axles free of dirt and lint to ensure positive locking and proper operation.



#### **WARNING!**

- DO NOT use the handcycle unless it has the proper tire pressure (p.s.i.). DO NOT overinflate the tires. Failure to follow these suggestions may cause the tire to explode and cause bodily harm.

6. Recommended tire pressure is listed on the side wall of the tire. If tire needs replaced, contact a local bike shop for replacement.



#### **CAUTION!**

- As with any vehicle, the wheels and tires should be checked periodically for cracks and wear, and should be replaced.

7. The wheels and tires should be checked periodically for cracks and wear and should be replaced if damaged.
8. Check chain for slack and readjust if necessary. Refer to 6.8 Installing Twenty-Seven or Thirty Speed Cassette Chain, page 57.
9. Regularly check for loose spokes in the front and rear wheels. If loose, have them aligned at a local bike shop.
10. Check steering dampner for proper operation. Refer to 6.7 Installing/Removing/Adjusting the Steering Dampener, page 56.
11. Check upholstery for sagging, rips or tears. Refer to 6.14 Replacing Seat Upholstery, page 61.
12. Check alignment of front wheel. If it wobbles or takes too much effort to turn by hand, have it aligned at a local bicycle shop.

## 9 Options

### 9.1 Installing Safety Lights



**WARNING!**

– After any adjustments, repair or service and before use, make sure all attaching hardware is tightened securely. Otherwise, injury or damage may occur.



**WARNING!**

– Operation of the handcycle is subject to all traffic rules and regulations (this may include the use of a safety lights and reflectors for dusk/night riding).

#### Batteries

1. Remove the lens cover.
2. Insert the AAA batteries with correct polarity (+ or -).
3. Reinstall lens cover.

#### Mounting the Safety Light

1. Remove the set screw from the clamp on the safety light.
2. Install the safety light.

a.

#### Rear Safety Light



Rear safety light: Pull the back cushion off of the back frame. Position the clamp onto the rear seat post. Install the set screw into the clamp and tighten securely.

b.

**Front Safety Light**

Front safety light: Position the clamp onto the side frame. Install the set screw into the clamp and tighten securely.

**Operating the Safety Light**

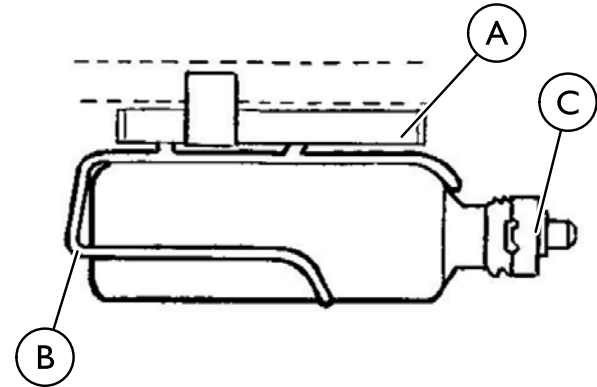
1. Press button to turn safety light on/off.

**9.2 Installing the Water Bottle**

1. Secure the water bottle mounting tube **A** using the hardware provided. See Detail "A" for Force-2, Detail "B" for Force RX.

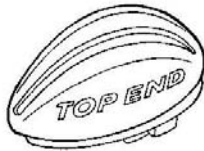
**i** Force-2 - make sure the water bottle mounting bracket mounting holes are facing downward.

2. Attach the water bottle mounting bracket **B** using the hardware provided.
3. Push water bottle **C** into mounting bracket **B** until secure.

**DETAIL "A" — Force-2****DETAIL "B" — FORCE RX**

### 9.3 Using Safety Helmet


Helmet



1. Secure helmet using the chin strap.
2. Ensure proper fit.

### 9.4 Installing the Computer



1. Install metal plug onto spoke of front wheel approximately 2 inches (5.08 cm) from wheel rim.
2. Align metal plug with fork assembly.
3. Secure sensor (A) to fork using hardware provided.
  -  Slot in sensor **MUST** align with metal plug for mileage, etc. to be registered on the computer.
4. Snap computer (B) into mounting bracket.
5. Install spacer on the back of the computer mounting bracket.
6. Secure mounting bracket to crank bottom bracket with zip or wire ties.

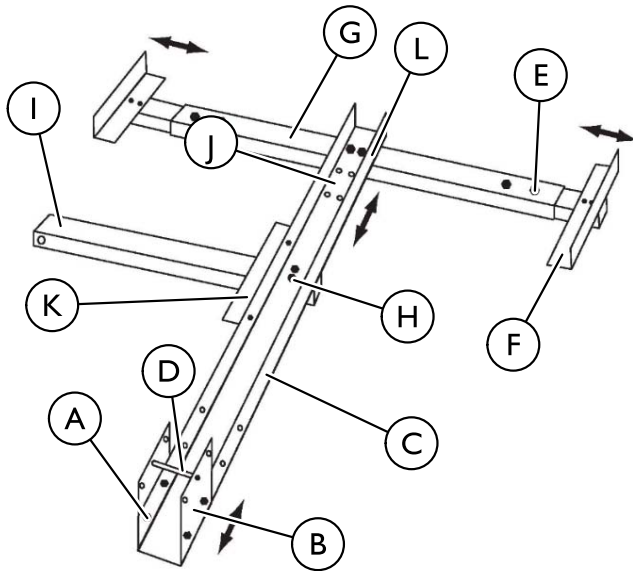
## 9.5 Assembling/Adjusting/Using the Handcycle Rack



### WARNING!

– After any adjustments, repair or service and before use, make sure all attaching hardware is tightened securely. Otherwise, injury or damage may occur.

### Assembling the Handcycle Rack



1. Position the receiver ① with the bracket ⑫ facing up.
2. Position the rear wheel bar ⑥ with the wheel brackets ⑫ facing up.
3. Remove the two large mounting bolts and locknuts ⑨ from the receiver ① and set aside.
4. Remove the two small mounting bolts and locknuts ⑩ from the receiver bracket ⑫ and set aside.
5. Secure the wheel tray ③ to the receiver ① with the two large mounting bolts and locknuts ⑨.
6. Using two small mounting bolts and locknuts ⑩, secure the receiver bracket ⑫ to the wheel tray ③.
7. Remove the two mounting bolts and locknuts ⑬ from the rear wheel bar ⑥ and set aside.
8. Using two mounting bolts and locknuts ⑬, secure the rear wheel bar ⑥ to the wheel tray ③.
9. Install the receiver ① onto the trailer hitch of the vehicle, according to the vehicle manufacturer's instructions.

### Adjusting the Handcycle Rack



### WARNING!

– After any adjustments, repair or service and before use, make sure all attaching hardware is tightened securely. Otherwise, injury or damage may occur.




To properly secure the handcycle, the wheel tray bracket should be adjusted to sit against the front wheel.

## Wheel Tray Bracket


1. Remove the four mounting bolts and locknuts **A** securing the wheel tray bracket **B** to the wheel tray **C**.
2. Position the wheel tray bracket **B** in the desired position.
3. Secure the wheel tray bracket **B** to the wheel tray **C** with the four mounting bolts and locknuts **A**.
4. If necessary, the wheel stop **D** may be adjusted to one of three positions to sit against the front wheel. To adjust the wheel stop **D**, perform the following steps:
  - a. Remove the mounting bolt and locknut **A** securing the wheel stop **D** to the wheel tray bracket **B**.
  - b. Position the wheel stop **D** in the desired mounting position.
  - c. Secure the wheel stop **D** to the wheel tray bracket **B** with the mounting bolt and locknut **A**.

## Rear Wheel Bar Brackets

 To properly secure the handcycle, the rear wheel bar brackets should be adjusted to sit against the rear wheels.

1. Loosen the two screws **E** securing the rear wheel bar bracket **F** to the rear wheel bar **G**.
2. Adjust the rear wheel bar bracket **F** in/out until they sit against the rear wheel.
3. Secure the rear wheel bar bracket **F** to the rear wheel bar **G** with the two screws **E**.
4. Repeat steps 1-3 for the opposite side if necessary.

## Rear Wheel Bar

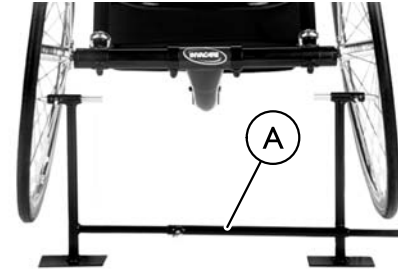
 To properly secure the handcycle, the rear wheel bar should be adjusted so the rear wheels sit in the rear wheel bar brackets.

1. Remove the two mounting bolts and locknuts **H** securing the rear wheel bar **G** to the wheel tray **C**.
2. Position the rear wheel bar **G** to one of three mounting positions on the wheel tray **C**.
3. Secure the rear wheel bar **G** to the wheel tray **C** with the two mounting bolts and locknuts **H**.

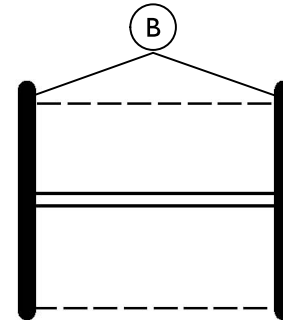


## 9.6 Using the Alignment Gauge

1. Inflate the tires to recommended tire pressures (listed on the sidewall of the tire).
2. Place the handcycle and alignment gauge **(A)** on a flat surface.
3. Position the alignment gauge **(A)** near the rear of the rear tires **(B)**.
4. Loosen the alignment screw on each side.
5. Position the alignment gauge **(A)** between the rear of the rear tires **(B)**.
6. Adjust the alignment inserts so the alignment gauge **(A)** fits snugly between the rear of the rear tires **(B)**.
7. Tighten the alignment screws to secure the alignment bar position.
8. Position the alignment gauge **(A)** at the front of the rear tires **(B)**.
9. Examine the gauge **(A)**. Perform one of the following:
  - a. If the alignment gauge **(A)** fits snugly between the front of the rear tires, the wheels are aligned. No toe in/toe out adjustment is required.
  - b. If there is extra space between the alignment gauge **(A)** and rear tires, the tires have a toe out condition. Refer to 5.7 Adjusting Toe In/Toe Out, page 46.
  - c. If the alignment gauge **(A)** does not fit between rear tires, the tires have a toe in condition. Refer to 5.7 Adjusting Toe In/Toe Out, page 46.



Front of Handcycle



Rear of Handcycle

## 9.7 Additional Options



These options are available to order through [www.topendwheelchair.com](http://www.topendwheelchair.com) or 1-800-532-8677.

### Leg mount mirror



The leg mount mirror attaches to the outside tube of the footrest with a clamp.

### Handle mount mirror



### Backpack hydration system



To install:

1. Pull cushion off of backrest.
2. Place hook and loop strap from back pack in-between the backrest and cushion.
3. Replace cushion. Attach small straps around the drafting bumper.

### Tool and tire repair kit



Attaches with buckles around the back bar of the handcycle frame.

### Cable kit



The cable kit is an extra set of brake and shifter cables.

### Heart rate monitor



The monitor is usually mounted on the crank assembly.

The user attaches the heart rate monitor around his/her chest with a strap that is included with this option.

### Indoor training roller



The indoor training roller is used to exercise or train when outside weather does not permit.

To use with the handcycle, loosen the footrest clamp and turn the footrest to vertical. Allow feet to rest on the floor.

### Click Strap



Attach with heavy duty zip ties to the seat or back frame.

### Wheel Bag



Wheel bag can fit up to three wheels.

Remove and place axles in the bottom of the wheel bag to ensure they are not damaged.

### Handcycle Travel Bag



The fork must be removed for the travel bag to fit onto the handcycle.

A separate foam protector for camber tube is included.

Wheels do not fit in the travel bag.

### Extra steering dampener



Refer to 6.7 Installing/Removing/Adjusting the Steering Dampener, page 56.

### Leg Guard



Attach the leg guard with a zip tie as shown and adjust as necessary for the user.

### Amputee Leg Support



Attach the amputee leg support as shown and adjust as necessary for the user. Refer to 6.18 Using/Replacing the Footrest Strap, page 64.

### LeMond Indoor Trainer with Power Pilot



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## 10 Warranty

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### 10.1 Warranty

#### United States Limited Warranty

**PLEASE NOTE: THE WARRANTY BELOW HAS BEEN DRAFTED TO COMPLY WITH FEDERAL LAW APPLICABLE TO PRODUCTS MANUFACTURED AFTER JULY 4, 1975.**

This warranty is extended only to the original purchaser/user of our products.

This warranty gives you specific legal rights and you may also have other legal rights which vary from state to state.

Invacare warrants the frames when purchased new and unused to be free from defects in materials and workmanship for a period of three (3) years from the date of purchase from Invacare or a dealer, with a copy of the seller's invoice required for coverage under this warranty. Invacare warrants the upholstered materials (seat and back) and remaining components of this product when purchased new and unused to be free from defects in materials and workmanship for a period of thirteen (13) months from date of purchase from Invacare or a dealer, with a copy of the seller's invoice required for coverage under this warranty.

All component parts including, but not limited to caster forks, and upholstery are warranted against defects in materials and workmanship for a period of one year from the date of purchase except bushings, bearings, and tires/tubes. If within such warranty period any such product shall be proven to be defective, such product shall be repaired or replaced, at Invacare's option, with refurbished or new parts. This warranty does not include any labor or shipping charges incurred in replacement part installation or repair of any such

product. Product repairs shall not extend this warranty. - coverage for repaired product shall end when this limited warranty terminates. Invacare's sole obligation and your exclusive remedy under this warranty shall be limited to such repair and/or replacement.

LIMITATIONS AND EXCLUSIONS: THE FOREGOING WARRANTY SHALL NOT APPLY TO SERIAL NUMBERED PRODUCTS IF THE SERIAL NUMBER HAS BEEN REMOVED OR DEFACED, PRODUCTS SUBJECTED TO NEGLIGENCE, ACCIDENT, IMPROPER OPERATION, MAINTENANCE OR STORAGE, COMMERCIAL OR INSTITUTIONAL USE, PRODUCTS MODIFIED WITHOUT INVACARE'S EXPRESS WRITTEN CONSENT, INCLUDING, BUT NOT LIMITED TO, MODIFICATION THROUGH THE USE OF UNAUTHORIZED PARTS OR ATTACHMENTS; PRODUCTS DAMAGED BY REASON OF REPAIRS MADE TO ANY COMPONENT WITHOUT THE SPECIFIC CONSENT OF INVACARE, OR TO A PRODUCT DAMAGED BY CIRCUMSTANCES BEYOND INVACARE'S CONTROL, AND SUCH EVALUATION WILL BE SOLELY DETERMINED BY INVACARE. THE WARRANTY SHALL NOT APPLY TO PROBLEMS ARISING FROM NORMAL WEAR OR FAILURE TO ADHERE TO THESE INSTRUCTIONS.

THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IN LIEU OF ANY OTHER WARRANTIES WHATSOEVER, WHETHER EXPRESS OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND THE SOLE REMEDY FOR VIOLATIONS OF ANY WARRANTY WHATSOEVER, SHALL BE LIMITED TO REPAIR OR REPLACEMENT OF THE DEFECTIVE PRODUCT PURSUANT TO THE TERMS CONTAINED HEREIN. THE APPLICATION OF ANY IMPLIED WARRANTY WHATSOEVER SHALL NOT EXTEND BEYOND THE DURATION OF THE EXPRESS WARRANTY PROVIDED HEREIN. the manufacturer SHALL NOT BE LIABLE

FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES  
WHATSOEVER.

THIS WARRANTY SHALL BE EXTENDED TO COMPLY WITH  
STATE/PROVINCIAL LAWS AND REQUIREMENTS.

## **10.2 European, Australian, and New Zealand Limited Warranty Information and Customer Service**

Terms and conditions of the warranty are part of the general terms and conditions particular to the individual countries in which this product is sold.

### **Australia**

1 Lenton Place, PO Box 5002, North Rocks, NSW 2151

Tel: (800) 460 460 Fax: (02) 8839 5353

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### 10.3 Usability Survey

Please complete the survey below to evaluate this manual.

Your participation in the evaluation assists in the development of effective and usable manuals for our customers.

The survey is also available online:

<http://www.invacare.com/TechnicalDocumentSurvey>

1. Please indicate your primary involvement with the product (choose one):

- |   |  |
|---|--|
| <input type="checkbox"/> Product User/Owner | <input type="checkbox"/> Product Service Technician    |
| <input type="checkbox"/> User Assistant     | <input type="checkbox"/> Health Care Provider          |
| <input type="checkbox"/> Product Dealer     | <input type="checkbox"/> Other (please specify): _____ |

2. Please indicate which product manual you are evaluating:

\_\_\_\_\_

3. Evaluate the content:

	YES	NO
After reading this document, do you have a better understanding of how to use the product?	<input type="checkbox"/>	<input type="checkbox"/>
Do you have a better understanding of any limitations on the use of this product?	<input type="checkbox"/>	<input type="checkbox"/>
Is there any irrelevant information?	<input type="checkbox"/>	<input type="checkbox"/>
Is the Table of Contents useful?	<input type="checkbox"/>	<input type="checkbox"/>
Does any information seem inaccurate/misleading?	<input type="checkbox"/>	<input type="checkbox"/>
Do you understand that misuse of the product can cause injury or damage?	<input type="checkbox"/>	<input type="checkbox"/>

Explain:

\_\_\_\_\_

\_\_\_\_\_

4. Evaluate the Warnings/Cautions:

	YES	NO
Are there any warnings/cautions that you do not understand?	<input type="checkbox"/>	<input type="checkbox"/>
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_____		

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	YES	NO
Is anything hard to locate/follow?	<input type="checkbox"/>	<input type="checkbox"/>
Are any headings missing/confusing?	<input type="checkbox"/>	<input type="checkbox"/>
Are there too many headings?	<input type="checkbox"/>	<input type="checkbox"/>
Should any material be a bulleted list or checklist instead of numbered steps or a paragraph?	<input type="checkbox"/>	<input type="checkbox"/>
Is there material that might be clarified by a visual?	<input type="checkbox"/>	<input type="checkbox"/>

Explain:

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6. Evaluate the illustrations:

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Are the illustrations useful?

Do the illustrations need more or less detail?

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Explain:

YES NO

**Thank You!** Thank you for completing this survey. If you have any questions or we may be of assistance to you, please feel free to contact us.

Send your survey to Invacare Technical Writing Department: [TechnicalWriting@invacare.com](mailto:TechnicalWriting@invacare.com)  
or Invacare Corporation: One Invacare Way, Elyria, Ohio 44035 FAX: 440-329-6975

Notes

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