



Yes, you can.®

# ***TOP END***®

**EN**



Invacare® **Crossfire™ T7A** Wheelchair

## **User Manual**

**DEALER:** This manual **MUST** be given to the user of the product.

**USER:** **BEFORE** using this product, read this manual and save for future reference.

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## I General

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### 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.



#### **DANGER**

Danger indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



#### **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.



#### **IMPORTANT**

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.

## 1.2 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 Crossfire frame to be free from defects in materials and workmanship for the 5 years from the date of purchase. All component parts including, but not limited to folding back, camber tubes, caster forks are warranted against defects in materials and workmanship for a period of one year from the date of purchase except armrests and upholstery, push handle grips, 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. This warranty does not include any labor or shipping charges incurred in replacement part installation or repair of any such product. Invacare's sole obligation and your exclusive remedy under this warranty shall be limited to such repair and/or replacement.

For warranty service, please contact the dealer from whom you purchased your Invacare product. In the event you DO NOT receive satisfactory warranty service, please write directly to Invacare at the address on the back page. Provide dealer's name, address, date of purchase, indicate nature of the defect and, if the product is serialized, indicate the serial number. DO NOT return products to our factory without our prior consent.

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.

## 2 SAFETY

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### 2 Safety

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

#### 2.1 General Guidelines



#### **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 healthcare professional, dealer or technical personnel before attempting to use this equipment - otherwise, injury or damage may occur.



#### **ACCESSORIES WARNINGS**

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.



#### **NOTICE**

THE INFORMATION CONTAINED IN THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE.

Check all parts for shipping damage and test before using. In case of damage, DO NOT use. Contact Invacare/Carrier for further instruction.



#### **WARNING**

##### **Wheelchair User**

As a manufacturer of wheelchairs, Invacare endeavors to supply a wide variety of wheelchairs to meet many needs of the end user. However, final selection of the type of wheelchair to be used by an individual rests solely with the user and his/her healthcare professional capable of making such a selection.





## WARNING

### Wheelchair Tie Down Restraints

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

It is Invacare's position that users of wheelchairs should be transferred into appropriate seating in vehicles for transportation and use be made of the restraints made available by the auto industry. Invacare cannot and does not recommend any wheelchair transportation systems.

### Stability Warning

The position of the footrest, camber tube (COG - Center of Gravity), seat angle, back angle, the tautness of the back upholstery as well as the user's condition are directly related to the wheelchairs stability. Any change to one or any combination of the six may cause the wheelchair to decrease in stability. Use EXTREME caution when using a new seating position. The addition of anti-tippers may be required.



When changes to the left hand column occur, follow across the chart and refer to the ✓ procedure to maintain the proper stability, safety and handling of the wheelchair.

	FOOTREST POSITION	CAMBER TUBE (COG)	BACK ANGLE	BACK UPHOLSTERY	USER CONDITION	SEAT ANGLE
FOOTREST POSITION	●		✓		✓	✓
CAMBER TUBE (COG)		●	✓		✓	✓
BACK ANGLE	✓		●	✓	✓	✓
BACK UPHOLSTERY			✓	●	✓	✓
USER CONDITION	✓	✓	✓	✓	●	✓
SEAT ANGLE	✓	✓	✓	✓	✓	●

## 2 SAFETY



### **WARNING**

#### **Repair and Service Information**

Unless otherwise noted, all service and adjustments should be performed while the wheelchair is unoccupied.

#### **Operating Information**

To determine and establish your particular safety limits, practice bending, reaching and transferring activities in several combinations in the presence of a qualified healthcare professional before attempting active use of the wheelchair.

DO NOT attempt to reach objects if you have to move forward in the seat.

DO NOT attempt to reach objects if you have to pick them up from the floor by reaching down between your knees.

DO NOT lean over the top of the back upholstery to reach objects from behind as this may cause the wheelchair to tip over.

DO NOT shift your weight or sitting position toward the direction you are reaching as the wheelchair may tip over.

DO NOT tip the wheelchair without assistance.

DO NOT attempt to stop a moving wheelchair with wheel locks. Wheel locks are not brakes.

NEVER leave an unoccupied wheelchair on an incline.

DO NOT use an escalator to move a wheelchair between floors. Serious bodily injury may occur.

DO NOT operate on roads, streets or highways.

DO NOT climb, go up or down ramps or traverse slopes greater than 9°.

DO NOT attempt to move up or down an incline with a water, ice or oil film.

DO NOT attempt to ride over curbs or obstacles. Doing so may cause your wheelchair to turn over and cause bodily harm or damage to the wheelchair.

DO NOT attempt to lift the wheelchair by any removable (detachable) parts. Lifting by means of any removable (detachable) parts of a wheelchair may result in injury to the user or damage to the wheelchair

DO NOT stand on the frame of the wheelchair.

ALWAYS keep hands and fingers clear of moving parts to avoid injury.



## WARNING

Check all Allen screws that secure the footrest/raised footrest system to the wheelchair frame before using the wheelchair, especially if engaging in any contact sport.

Anti-tippers **MUST** be used at all times. When outdoors on wet, soft ground or on gravel surfaces, anti-tippers may not provide the same level of protection against tip over. Extra caution **MUST** be observed when traversing such surfaces. Inasmuch as the anti-tippers are an option on this wheelchair (you may order with or without the anti-tippers), Invacare strongly recommends ordering the anti-tippers as an additional safeguard for the wheelchair user.

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.

**ALWAYS** use the handrims for self-propulsion. Inasmuch as the handrims are an option on this wheelchair (you may order with or without the handrims), Invacare strongly recommends ordering the handrims as an additional safeguard for the wheelchair user.

**DO NOT** use the footplate as a platform when getting in or out of the wheelchair.

### Seat Positioning Straps

**ALWAYS** wear your seat positioning strap. Inasmuch as the seat positioning strap is an option on this wheelchair (you may order with or without the seat positioning strap), Invacare strongly recommends ordering the seat positioning strap as an additional safeguard for the wheelchair user. The seat positioning strap is a positioning strap only. It is not designed for use as a safety device withstanding high stress loads such as auto or aircraft safety belts. If signs of wear appear, strap **MUST** be replaced **IMMEDIATELY**.

With regards to seat/chest positioning straps - it is the obligation of the DME dealer, therapists and other healthcare professionals to determine if a seat/chest positioning strap is required to ensure the safe operation of this equipment by the user. Serious injury can occur in the event of a fall from a wheelchair.

### Tire Pressure and Information

**DO NOT** use your wheelchair 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. The recommended tire pressure is on the sidewall of the tire.

Replacement of the tire or tube **MUST** be performed by a qualified technician.

### Weight Training

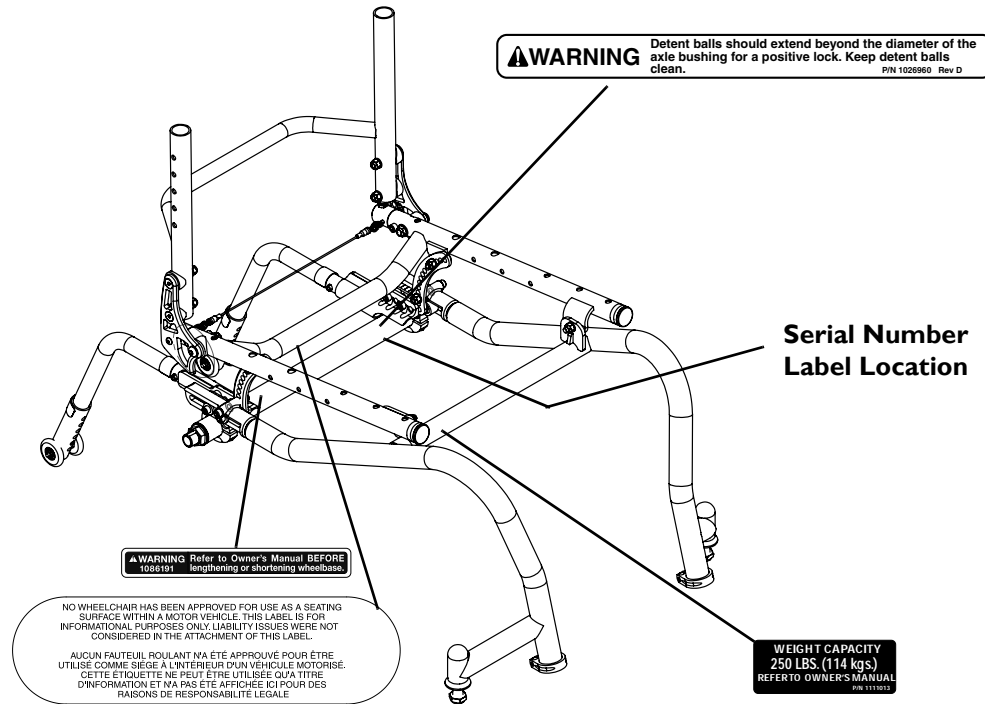
Invacare **DOES NOT** recommend the use of its wheelchairs as a weight training apparatus. Invacare wheelchairs have not been designed or tested as a seat for any kind of weight training. If occupant uses said wheelchair as a weight training apparatus, Invacare shall not be liable for bodily injury and the warranty is void.

**Weight Limitation:** Invacare's Top End Crossfire T7A wheelchair has a weight limitation of 250 lbs.

### 3 OVERVIEW

## 3 Overview

### 3.1 Label Locations



3.2 Component Identification



### 3 OVERVIEW

#### 3.3 Typical Product Parameters



All specifications are approximate.

	CROSSFIRE T7A
<b>MODEL NUMBER:</b>	CT7A
<b>FRONT FRAME:</b>	Tapered front end (Standard), V-Style (Optional)
<b>FRONT FRAME ANGLE:</b>	70°, 75°, 80°, 85°
<b>FOOTREST:</b>	Tubular footrest in same material as frame (Standard), Adjustable Angle NCO, Plastic or Carbon Fiber Cover (Optional)
<b>SEAT HEIGHT</b> FRONT: REAR:	16 to 21 inches in 1/2 inch increments (Fixed) 14 to 20 Inches (adjustable)
<b>ARMS (OPTIONAL):</b>	Swing-away Padded, T-arm
<b>SIDE GUARDS (OPTIONAL)</b> FOLDING BACK: FIXED BACK:	Removable, Removable with Fender Fixed Aluminum, Fixed Carbon Fiber, Fold In
<b>SEAT WIDTH:</b>	12 to 19 inches (Standard), 20 inches (Optional),
<b>SEAT DEPTH:</b>	14 to 19 inches (Standard), 20 inches (Optional)
<b>BACK STYLE:</b>	Lock Down, Folding (Standard)
<b>BACK HEIGHT</b>	8 to 11, 10 to 14, 12 to 16, 14 to 18, or 16 to 20 inches

	CROSSFIRE T7A
<b>BACK ANGLE FOLDING:</b>	-8°, -4°, 0°, +4°, +8°
<b>BACK UPHOLSTERY:</b>	U850 (Ballistic Black) - Adjustable Tension by Straps Breathable Mesh (Black) Adjustable Tension by Straps Foldover
<b>SEAT UPHOLSTERY:</b>	Sail Cloth - Screw-On
<b>AXLE POSITIONS/CENTER OF GRAVITY:</b>	Range of Adjustability in both positions: Active Position: $\frac{3}{4}$ to 4 inches Extended Position: $-1\frac{5}{8}$ to $1\frac{5}{8}$ inches
<b>REAR WHEEL AXLE:</b>	Quick Release (Standard), Quad-Release or Titanium (Optional)
<b>REAR WHEEL CAMBER CAMBER TUBE:</b>	0°, 3°, 6°, or 9°
<b>REAR WHEELS</b> REAR WHEEL TYPE: REAR WHEEL SIZE:	Sun Zero - G 30 Spoke with Primo Tires (Standard), Spinergy® Spox, knobby, solid, Schwalbe®, Kenda High Pressure Pneumatic and Treaded Pneumatic Tires (Optional $1\frac{3}{8}$ pneumatic, Pneumatic with flat free insert) 22, 24 or 25-inch (Standard), 26-inch (Optional)
<b>HANDRIMS:</b>	Aluminum Anodized (Standard) Titanium, Coated, Natural Fit® (Optional)
<b>WHEEL LOCKS:</b>	Pull/Push to Lock (Standard) or Scissor lock, Hill Holders (Optional)
<b>FRONT FORKS:</b>	Non-Suspension (Standard), Suspension (Optional), One Sided

### 3 OVERVIEW

	CROSSFIRE T7A
<b>CASTERS</b> CASTER SIZE: CASTER TYPE:	3, 4 or 5-inch Semi-pneumatic (Standard), Soft Roll or Lighted (Optional)
<b>ANTI-TIPPERS:</b>	Optional
<b>*WEIGHT:</b>	17.8 lbs
<b>SHIPPING WEIGHT:</b>	30 lbs
<b>WEIGHT LIMITATION:</b>	250 lbs



\*16 x 16 w/ Spinergy wheels, Primo hi-pressure tires, screw - on seat upholstery, mesh back upholstery w/ adjustable tension & 4" semi-pneumatic casters are included in the weight.



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## 4 Safety/Handling of Wheelchairs

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### 4.1 Safety/Handling of Wheelchairs

“Safety and Handling” of the wheelchair requires the close attention of the wheelchair user as well as the assistant. This manual points out the most common procedures and techniques involved in the safe operation and maintenance of the wheelchair. It is important to practice and master these safe techniques until you are comfortable in maneuvering around the frequently encountered architectural barriers.

Use this information only as a “basic” guide. The techniques that are discussed on the following pages have been used successfully by many.

Individual wheelchair users often develop skills to deal with daily living activities that may differ from those described in this manual. Invacare recognizes and encourages each individual to try what works best for him/her in overcoming architectural obstacles that they may encounter, however, ALL WARNINGS and CAUTIONS given in this manual MUST be followed. Techniques in this manual are a starting point for the new wheelchair user and assistant with “safety” as the most important consideration for all.

### 4.2 Stability and Balance



#### **WARNING**

ALWAYS wear your seat positioning strap. Inasmuch as the seat positioning strap is an option on this wheelchair (you may order with or without the seat positioning strap), Invacare strongly recommends ordering the seat positioning strap as an additional safeguard for the wheelchair user. The seat positioning strap is a positioning strap only. It is not designed for use as a safety device withstanding high stress loads such as auto or aircraft safety belts. If signs of wear appear, strap MUST be replaced IMMEDIATELY.

DO NOT attempt to lift a wheelchair by lifting on any removable (detachable) parts. Lifting by means of any removable (detachable) parts of the wheelchair may result in injury to the user or damage to the wheelchair.

ALWAYS check hand grips for looseness before using the wheelchair. If loose and/or worn, replace IMMEDIATELY.

Anti-tippers MUST be attached at all times. Inasmuch as the anti-tippers are an option on this wheelchair (you may order with or without the anti-tippers), Invacare strongly recommends ordering the anti-tippers as an additional safeguard for the wheelchair user.

DO NOT climb, go up, or down ramps or traverse slopes greater than 9°.

## 4 SAFETY/HANDLING OF WHEELCHAIRS



### **WARNING**

Invacare strongly recommends proceeding down ramps or slopes slowly to avoid hard braking or sudden stops.

Be aware that carrying heavy objects on your lap while occupying the wheelchair may adversely affect the stability of the wheelchair, resulting in serious bodily injury to the user, damage to the wheelchair and surrounding property.

This wheelchair has been designed to accommodate one individual. If more than one individual occupies the wheelchair this may adversely affect the stability of the wheelchair, resulting in serious bodily injury to the user and passenger and damage the wheelchair and surrounding property.

To assure stability and proper operation of your wheelchair, you **MUST** at all times maintain proper balance. Your wheelchair has been designed to remain upright and stable during normal daily activities as long as you **DO NOT** move beyond the center of gravity.

Virtually all activities which involve movement in the wheelchair have an effect on the center of gravity. Invacare recommends using seat positioning straps for additional safety while involved in activities that shift your weight.

**DO NOT** lean forward out of the wheelchair any further than stability will allow. Make sure casters are pointing in the forward position whenever you lean forward. This can be achieved by advancing the wheelchair and then reversing it in a straight line.



### **WARNING**

**DO NOT** attempt to reach objects if you have to move forward in the seat or pick them up from the floor by reaching down between your knees.

The position of the footrest, camber tube, back angle, the tautness of the back upholstery as well as the user's condition are directly related to the wheelchair's stability. Any change to one or any combination of the five may cause the wheelchair to decrease in stability. Use **EXTREME** caution when using a new seating position. The addition of anti-tippers may be required.

Many activities require the wheelchair owner to reach, bend and transfer in and out of the wheelchair. These movements will cause a change to the normal balance, the center of gravity, and the weight distribution of the wheelchair.

To determine and establish your particular safety limits, practice bending, reaching and transferring activities in several combinations in the presence of a qualified health-care professional before attempting active use of wheelchair.

Proper positioning is essential for your safety. When reaching, leaning, bending forward, it is important to use the front casters as a tool to maintain stability and balance.

## 4 SAFETY/HANDLING OF WHEELCHAIRS

- Lengthening the wheelbase will increase the stability and maintain standard maneuverability of wheelchair.
- Shortening the wheelbase will decrease the stability, increase the maneuverability and distribute additional weight onto the rear wheels.

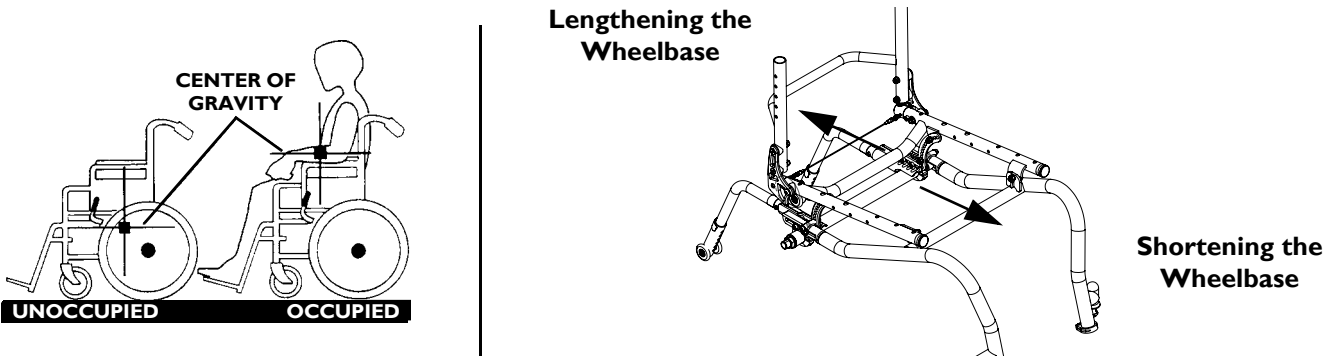


FIGURE I Stability and Balance

### Reaching, Leaning and Bending - Forward



#### **WARNING**

DO NOT attempt to reach objects if you have to move forward in the seat or pick them up from the floor by reaching down between your knees.

Position the front casters so that they are extended as far forward as possible and engage wheel locks.

### Reaching, Leaning - Backwards



#### **WARNING**

DO NOT lean over the top of the back upholstery. This will change your center of gravity and may cause you to tip over.

Position wheelchair as close as possible to the desired object. Point front casters forward to create the longest possible wheelbase. Reach back only as far as your arm will extend without changing your sitting position.

## 4 SAFETY/HANDLING OF WHEELCHAIRS

**Reaching, Leaning,  
and Bending -  
Forward**



**Reaching, Leaning,  
and Bending -  
Backwards**

**FIGURE 2** Stability and Balance - Reaching, Leaning, and Bending - Forward/Backward

### 4.3 Coping with Everyday Obstacles

Coping with the irritation of everyday obstacles can be alleviated somewhat by learning how to manage your wheelchair. Keep in mind your center of gravity to maintain stability and balance.

### 4.4 A Note to Wheelchair Assistants

When assistance to the wheelchair user is required, remember to use good body mechanics. Keep your back straight and bend your knees whenever tilting the wheelchair or traversing curbs, or other impediments.



#### **WARNING**

Do not attempt to lift a wheelchair by lifting on any removable (detachable) parts. Lifting by means of any removable (detachable) parts of a wheelchair may result in injury to the user or damage to the wheelchair.

Also, be aware of any removable (detachable) parts. These **MUST NEVER** be used to move the wheelchair or as lifting supports, as they may be inadvertently released, resulting in possible injury to the user and/or assistant(s).

When learning a new assistance technique, have an experienced assistant help you before attempting it alone.

### 4.5 Tipping



#### **WARNING**

DO NOT tip the wheelchair without assistance

Do not let the wheelchair drop the last few inches to the ground. This could result in injury to the occupant.

When tipping the wheelchair, an assistant should grasp the back of the wheelchair on a non-removable (non-detachable) part. Inform the wheelchair occupant before tilting the wheelchair and remind him/her to lean back. Be sure the occupant's feet and hands are clear of all wheels and/or pinch points. Apply a continuous motion until the balance point is achieved. At this point, the assistant will feel a difference in the weight distribution. Turn the wheelchair in the desired direction if necessary. Slowly lower the wheelchair in one continuous movement.

#### **Tipping - Curbs**



#### **WARNING**

Invacare does not recommend that sport wheelchairs be used where traversing curbs present an obstacle. Possible injury to occupant and/or assistant(s) can occur. Transfer to an everyday use wheelchair is recommended if any such obstacles may be encountered.

After mastering the techniques of tipping the wheelchair, use the following method to tackle curbs, short stairs, etc.

Turn the anti-tippers, if equipped, so the wheels are facing UP. Unless the first assistant has exceptional upper body strength, it is recommended that two assistants perform this operation. The second assistant should be positioned at the front of the wheelchair lifting upward on a non-removable (non-detachable) part of the wheelchair frame when lifting the wheelchair and stabilizing the wheelchair when the wheelchair is being lowered to the ground.

The first assistant should stand on the sidewalk and turn the wheelchair so that the rear wheels are against the curb. The wheelchair should be tilted back to the balance point and, in one continuous upward movement, the rear wheels should be pulled up and over the curb. DO NOT return the front casters to the ground until the wheelchair has been pulled backward far enough for the front casters to clear the edge of the curb.

## 4 SAFETY/HANDLING OF WHEELCHAIRS



### WARNING

When lowering the front casters of the wheelchair, Do not let the wheelchair drop the last few inches to the ground. This could result in injury to the occupant and/or damage to the wheelchair.

Roll the wheelchair backward and slowly lower the wheelchair in one continuous movement. DO NOT let the wheelchair drop the last few inches to the ground. This could result in injury to the occupant. Turn the anti-tippers so the wheels are facing down.

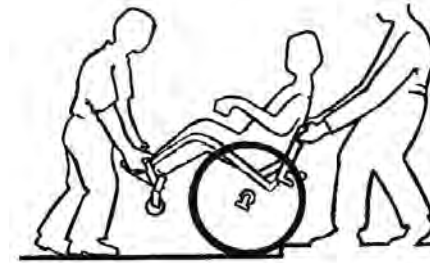


FIGURE 3 Tipping - Curbs

### 4.6 Stairways



### WARNING

Extreme caution is advised when it is necessary to move an occupied or unoccupied wheelchair up or down the stairs. Invacare recommends that, if possible, the user be removed from the wheelchair prior to moving. Invacare recommends using two assistants and making thorough preparations. Make sure to use only secure, non-detachable parts for hand-held supports.

Follow this procedure for moving the wheelchair between floors when an elevator is not available:

#### Moving Up Stairs

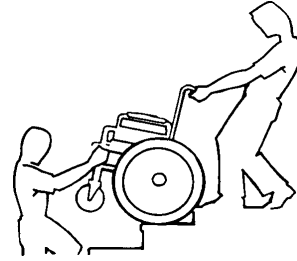
1. If necessary, rotate the anti-tippers so the wheels are facing up.
2. One assistant (positioned behind the wheelchair), securely grasps a non-removable (non-detachable) part of the wheelchair for leverage and tilts the wheelchair back to the balance point.
3. After the wheelchair has been tilted back to the balance point, the assistant behind the wheelchair backs the wheelchair up against the first step.
4. The second assistant (positioned in the front of the wheelchair), with a firm hold on a non-detachable part of the framework, lifts the wheelchair up and on to the next stair above and steadies the wheelchair as the assistant behind the wheelchair places one foot on the next stair above and repeats process.

## 4 SAFETY/HANDLING OF WHEELCHAIRS

5. The wheelchair should not be lowered until the last stair has been negotiated and the wheelchair has been rolled away from the stairway.
6. If necessary, rotate the anti-tippers so the wheels are facing down.

### Moving Down Stairs

1. If necessary, rotate the anti-tippers so the wheels are facing up.
2. One assistant (positioned behind the wheelchair), securely grasps a non-removable (non-detachable) part of the wheelchair for leverage and tilts the wheelchair back to the balance point.
3. After the wheelchair has been tilted back to the balance point, the assistant behind the wheelchair rolls the wheelchair up to the edge of the first step.
4. The second assistant (positioned in the front of the wheelchair), with a firm hold on a non-detachable part of the framework, lowers the wheelchair down and on to the next stair below and steadies the wheelchair as the assistant in the rear places one foot on the next stair below and repeats process.
5. The wheelchair should not be lowered until the last stair has been negotiated and the wheelchair has been rolled away from the stairway.
6. If necessary, rotate the anti-tippers so the wheels are facing down.



**FIGURE 4** Stairways

## 4 SAFETY/HANDLING OF WHEELCHAIRS

### 4.7 Escalators



#### **WARNING**

DO NOT use an escalator to move a wheelchair between floors. Serious bodily injury may occur.

### 4.8 Transferring To and From Other Seats



#### **WARNING**

Before attempting to transfer in or out of the wheelchair, every precaution should be taken to reduce the gap distance. Turn both casters parallel to the object you are transferring onto. Also be certain the wheel locks are engaged to help prevent the wheels from moving.

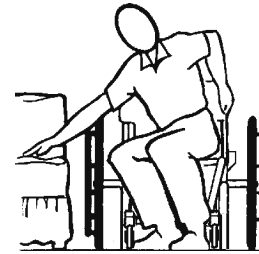
When transferring, position yourself as far back as possible in the seat. This will prevent damaged upholstery and the possibility of the wheelchair tipping forward.



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

Position the wheelchair as close as possible along side the seat to which you are transferring, with the front casters parallel to it. Remove the armrest, if installed. Engage wheel locks. Shift body weight into seat with transfer.

During independent transfer, little or no seat platform will be beneath you. Use a transfer board if at all possible.



**FIGURE 5** Transferring To and From Other Seats



## 5 Safety Inspection



Every six months, take your wheelchair 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 wheelchair. To operate properly and safely, your wheelchair **MUST** be cared for just like any other vehicle. Routine maintenance will extend the life and efficiency of your wheelchair. Clean upholstery with mild soap and water or spray disinfectant using a sponge. **DO NOT** use bleach or wash in a washing machine.

### 5.1 Safety Inspection Checklist



#### **CAUTION**

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

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

#### **Inspect Initially**

- Ensure wheelchair rolls straight (no excessive drag/pull to one side).
- Ensure wheel locks **DO NOT** interfere with tires when rolling.
- Ensure pivot points are free of wear and looseness.
- Ensure wheel locks are easy to engage and prevent the wheels from moving.
- Ensure that the casters are free of debris.
- Inspect seat and back upholstery for rips or sagging.
- Inspect upholstery fastening flaps to ensure they securely latch.
- 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.
- Ensure hand grips (if equipped) are not loose.

## 5 SAFETY INSPECTION

- Ensure quick release axles and camber inserts are clean.
- Ensure camber bar mounting clamps are securely tightened.
- Ensure quick/quad release axles lock properly.
- Ensure no excessive side movement or binding when lifted and spun.
- Inspect handrims for signs of rough edges or peeling.
- Inspect spokes for bent or broken spokes.
- Ensure all spokes are uniformly tight.
- Clean upholstery and armrests.
- Inspect wheel/fork assembly for proper tension by spinning caster; caster should come to a gradual stop.
- Loosen/tighten locknut if wheel wobbles noticeably or binds to a stop.
- Ensure wheel bearings are clean and free of moisture.
- Inspect tires for flat spots and wear.
- If pneumatic tires check for proper inflation.
- Check that all labels are present and legible. Replace if necessary.

### **Inspect/Adjust Weekly**

- Ensure wheel locks are easy to engage and prevent the wheels from moving.
- Ensure that the casters are free of debris.
- Ensure hand grips (if equipped) are not loose.
- Ensure quick release axles and camber inserts are clean.
- Ensure quick/quad release axles lock properly.
- Inspect handrims for signs of rough edges or peeling.
- Inspect spokes for bent or broken spokes.
- Ensure All spokes uniformly tight.
- Inspect wheel/fork assembly for proper tension by spinning caster; caster should come to a gradual stop.

- Inspect tires for flat spots and wear.
- If pneumatic tires check for proper inflation.

### **Inspect/Adjust Monthly**

- Ensure wheel locks DO NOT interfere with tires when rolling.
- Ensure that the casters are free of debris.
- Ensure pivot points are free of wear and looseness.
- Inspect upholstery fastening flaps to ensure they securely latch.
- 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.
- Ensure camber bar mounting clamps are securely tightened.
- Loosen/tighten locknut if wheel wobbles noticeably or binds to a stop.
- Ensure wheel bearings are clean and free of moisture.

### **Inspect/Adjust Periodically**

- Ensure wheelchair rolls straight (no excessive drag/pull to one side).
- Ensure wheel locks are easy to engage.
- Ensure that the casters are free of debris.
- Inspect seat and back upholstery for rips or sagging.
- Ensure camber bar mounting clamps are securely tightened.
- Ensure no excessive side movement or binding when lifted and spun.
- Inspect handrims for signs of rough edges or peeling.
- Clean upholstery and armrests.
- Ensure wheel bearings are clean and free of moisture.
- Check that all labels are present and legible. Replace if necessary.

## 5 SAFETY INSPECTION

### 5.2 Troubleshooting

CHAIR VEERS RIGHT	CHAIR VEERS LEFT	SLUGGISH TURN OR PERFORMANCE	CASTER FLUTTERS	SQUEAKS AND RATTLES	LOOSENESS IN CHAIR	SOLUTIONS
X	X	X	X			Check tires for correct and equal pressure.
		X	X	X	X	Check for loose stem nuts.
				X	X	Check spokes and nipples.
X	X		X			Check that both casters contact the ground at the same time.

### 5.3 Maintenance

#### Maintenance Safety Precautions



#### **WARNING**

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

Replace any labels that are missing, worn, or torn. Refer to [Label Locations](#) on page 12 for a listing of the labels and their locations

#### **CAUTION**

DO NOT overtighten hardware attaching to the frame. This could cause damage to the frame tubing.

### Suggested Maintenance Procedures

1. Before using your wheelchair, make sure all nuts and bolts are tight.
2. Check all parts for damage or wear and replace.
3. Check all parts for proper adjustment.
4. Keep quick/quad-release axles free of dirt and lint to ensure positive locking and proper operation. Refer to [Adjusting Quick-Release Axles](#) on page 63 or [Adjusting Quad-Release Handles](#) on page 64.



#### **WARNING**

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

5. Clean quick-release axles and camber inserts once a week with a Teflon<sup>®</sup> lubricant.



#### **WARNING**

DO NOT use your wheelchair 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. The recommended tire pressure is on the sidewall of the tire.

#### **CAUTION**

As with any vehicle, the wheels and tires should be checked periodically for cracks and wear, and should be replaced if damaged. Replace as recommended, refer to [Replacing/Repairing Rear Wheel Tire/Tube](#) on page 30 and [Replacing/Repairing Caster Tire/Tube](#) on page 30.

## 5 SAFETY INSPECTION

6. Periodically adjust wheel locks in correlation to tire wear. Refer to [Replacing/Adjusting the Wheel Locks](#) on page 59.



Tire wear is excessive if:

- Pneumatic Tires - there is missing tread or the tires are bald.
- Urethane Tires - there are cuts, surface defects or the tires are loose on the rims.
- Rubber Tires - 30% or more of the tire has worn away.

Invacare recommends that rear wheel tire/tube and caster tire/tube be replaced every five years.

7. Regularly check for loose spokes in the rear wheels. If loose, have them adjusted. Contact a qualified technician or Invacare customer support at the telephone numbers on the back of this manual.
8. Periodically check handrims to ensure they are secured to the rear wheels. Refer to [Handrim Replacement](#) on page 65.
9. Periodically check caster wheel bearings to make sure they are clean and free from moisture. Use a Teflon<sup>®</sup> lubricant if necessary.
10. Check upholstery for sagging, rips or tears.
11. Clean upholstery with mild soap and water.
12. Replace any labels that are missing, worn or torn.

### Replacing/Repairing Rear Wheel Tire/Tube



#### **WARNING**

Replacement of solid urethane tires is not recommended. If the solid urethane tire needs repaired, Invacare recommends replacing the complete wheel assembly.

Replacement of rear wheel tube must be performed by a qualified technician.

### Replacing/Repairing Caster Tire/Tube



#### **WARNING**

Replacement of solid urethane or semi-pneumatic tires is not recommended. If the solid urethane or semi-pneumatic tires need replaced, Invacare recommends replacing complete caster assembly.

For pneumatic tires, replacement of the tube must be performed by a qualified technician.

## 6 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.

ALWAYS perform this procedure in the presence of an assistant. The position of the footrest, camber tube, seat angle, back angle, the tautness of the back upholstery as well as the user's condition are directly related to the wheelchairs stability. Any change to one or any combination of the five may cause the wheelchair to decrease in stability. Use **EXTREME** caution when using a new seating position. The addition of anti-tippers may be required.

Check **ALL** allen screws that secure the footrest/raised footrest system to the wheelchair frame to make sure they are securely tightened **BEFORE** using the wheelchair. **ESPECIALLY** if engaging in **ANY** contact sport.

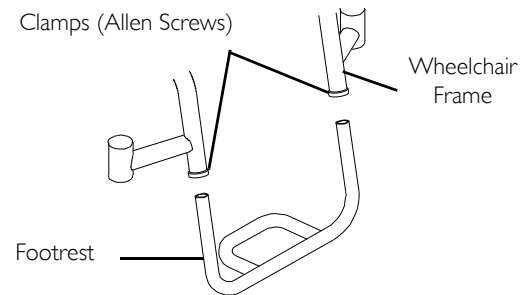
The footrest assembly **MUST** be at least 1¾-inches above the ground/floor to avoid hitting protruding objects when using this wheelchair.

### 6.1 Adjusting/Replacing Standard Footrest

1. Loosen the allen screw of the two clamps that secure the footrest to the wheelchair frame.

#### Replacing the Footrest

1. Remove existing footrest.
2. Install new footrest.



**FIGURE 1** Adjusting/Replacing Standard Footrest

## 6 FOOTREST



### **WARNING**

The standard footrest has an open hoop. A footplate cover is recommended for wheelchair users that have leg spasticity or whose feet have a possibility of falling through the footrest hoop. A calf strap is provided with each wheelchair to prevent the feet from slipping backwards off of the footrest. Be sure the calf strap is secure when using the wheelchair.

### **Adjusting the Footrest**

1. Position new/existing footrest to desired height.
2. Tighten the allen screw of the two clamps that secure the footrest to the wheelchair frame.

### **6.2 Replacing/Adjusting Optional Adjustable Angle Footrest**

#### **Replacing the Footrest**

1. Loosen, but DO NOT remove the allen screw of the two clamps that secure the footrest to the wheelchair frame.
2. Slide the existing footrest tubes out of the wheelchair frame and install new footrest by reversing this step.
3. Position the new footrest to a determined height.
4. Tighten the allen screw of the two clamps that secure the footrest to the wheelchair frame.
5. Adjust the footplate to the desired position. Refer to [Adjusting Footplate Angle](#) on page 32 and/or [Adjusting Footplate Depth](#) on page 33.

#### **Adjusting Footplate Angle**

1. Loosen, but DO NOT remove the two mounting screws and locknuts (not shown) that secure the footplate to the two footrest tubes.
2. Position the footplate to the necessary angle to accommodate the user.
3. Retighten the two mounting screws and locknuts.



The locknuts should lie in the channel of the footplate clamp.



### Adjusting Footplate Depth

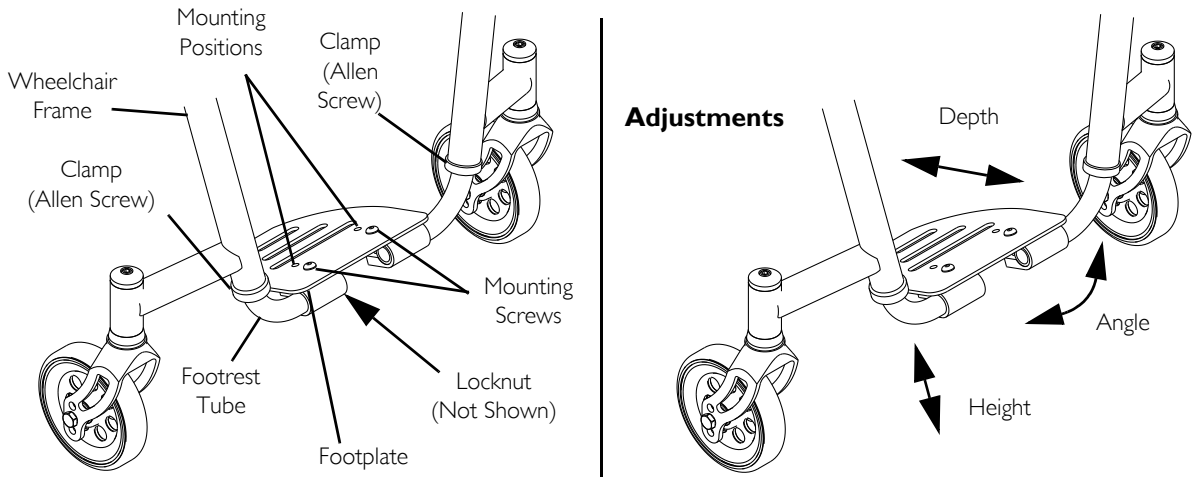
1. Remove the two mounting screws and locknuts (not shown) that secure footplate to the footrest tubes.

**i** Observe the angle of footplate for reinstallation.

2. Move the footplate to one of two mounting positions to accommodate the user.

3. Using the two mounting screws and locknuts, secure the footplate to the footrest tubes.

**i** The locknuts should lie in the channel of the footplate half clamp.



**FIGURE 2** Replacing/Adjusting Optional Adjustable Angle Footrest

## 7 Arms



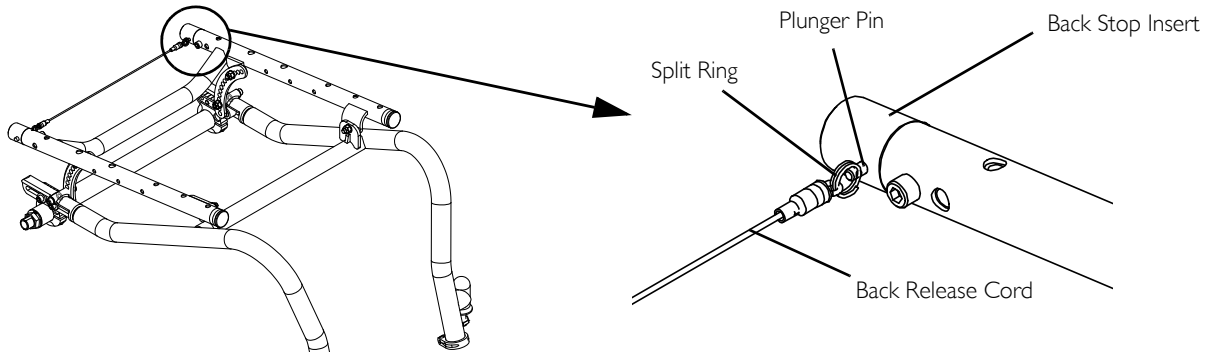
### WARNING

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

Do not attempt to lift or tilt a wheelchair by using any removable (detachable) parts. Lifting by means of any removable (detachable) parts of a wheelchair may result in injury to the user or damage to the wheelchair.

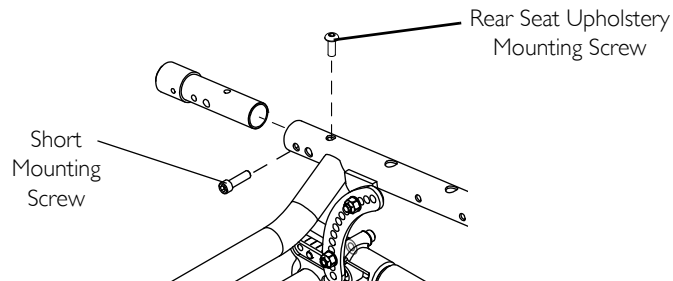
### 7.1 Installing the Swingaway Padded Armrest Socket

1. Remove the back. Refer to [Removing/Installing the Back Frame](#) on page 55.
2. Remove the split ring of the back release cord from the plunger pin in the back stop insert.
3. Remove the plunger pin from the back stop insert.
4. Perform STEPS 2-3 on remaining back stop insert.



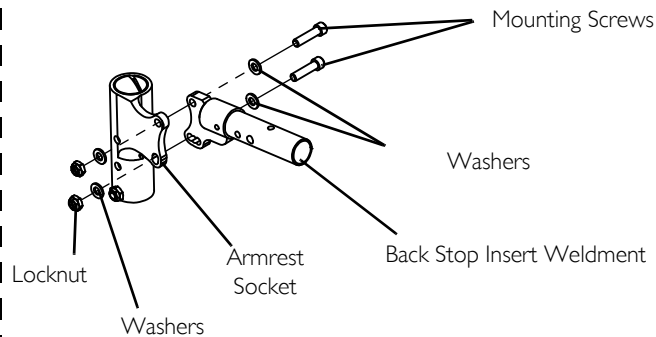
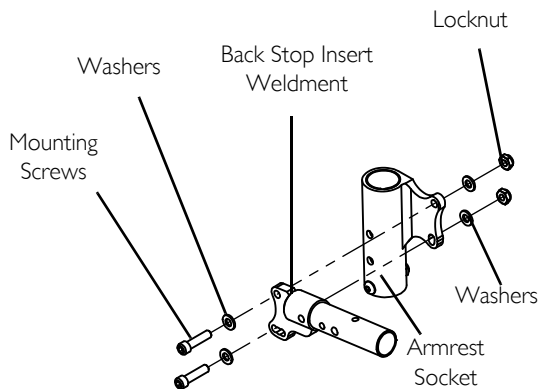
**FIGURE 1** Disconnect Back Release Cord

5. Remove the rear seat upholstery mounting screw and short mounting screw (FIGURE 2).
6. Remove the back stop insert from seat rail (FIGURE 2).
7. Perform STEP 5-6 on remaining back stop insert.
8. Secure the back stop insert weldment to the armrest socket, in the orientation shown, with two mounting screws, four washers, and two locknuts. Tighten securely (FIGURE 3).
9. Perform STEP 8 for remaining back stop insert weldment/armrest socket.



**FIGURE 2** Remove Back Stop Insert

**Right Side Armrest Socket**

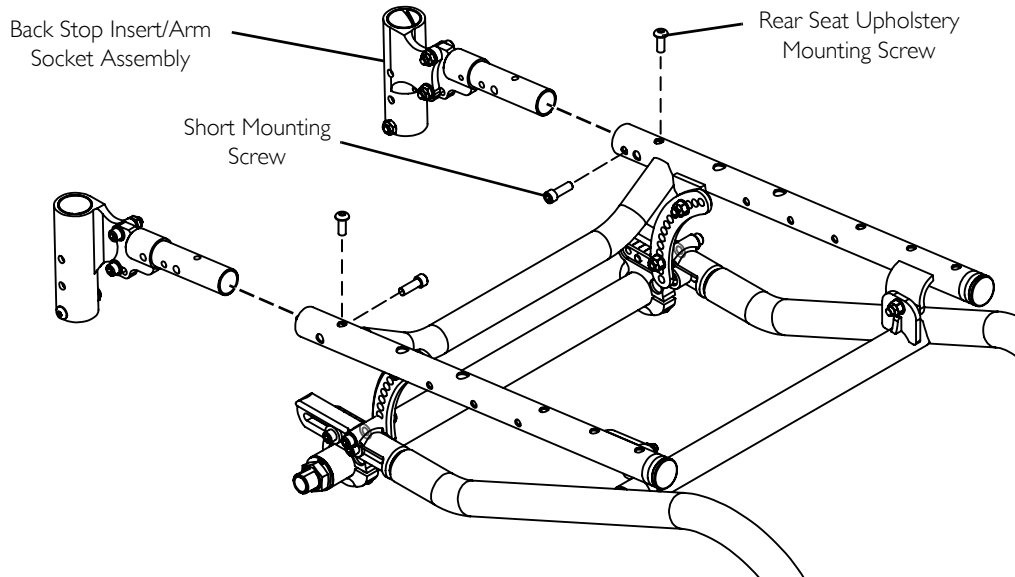


**Left Side Armrest Socket**

**FIGURE 3** Assemble Back Stop Insert and Arm Socket

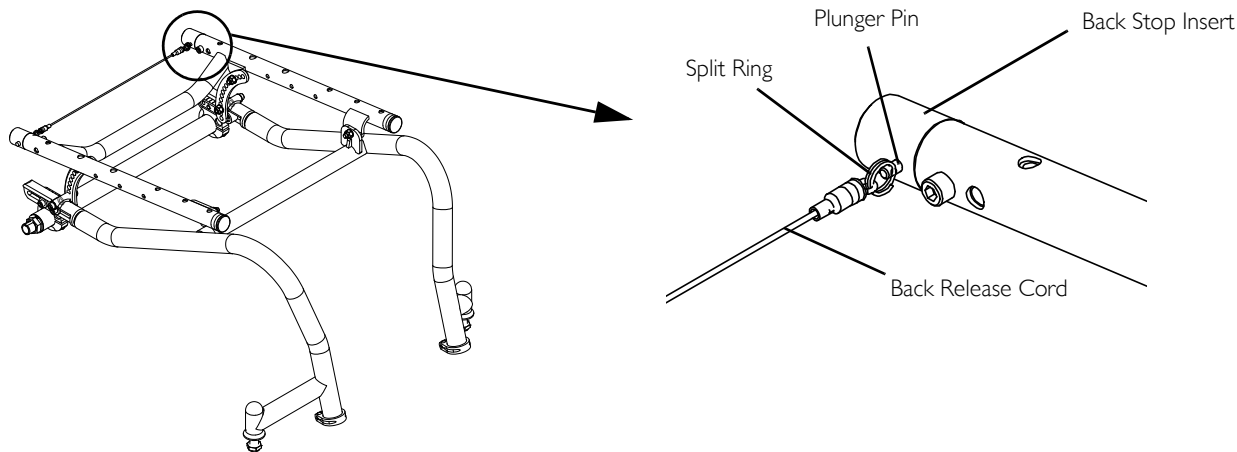
## 7 ARMS

10. Install the back stop insert/arm socket assembly into the seat rail.
11. Install short mounting screw through seat rail and into back stop insert/arm socket assembly. DO NOT tighten.
12. Install rear seat upholstery mounting screw. DO NOT tighten.



**FIGURE 4** Install Back Stop Insert/Arm Socket Assembly

13. Install the plunger pin into the back stop insert (FIGURE 5).
14. Secure the split ring of the back release cord onto the plunger pin in the back stop insert (FIGURE 5).
15. Repeat STEPS 21-22 for remaining back stop insert.



**FIGURE 5** Connect Back Release Cord

16. Install the back. Refer to Removing/Installing the Back Frame on page 55.

## 7 ARMS

### 7.2 Installing/Removing/Adjusting the Swingaway Padded Armrest

#### Installing

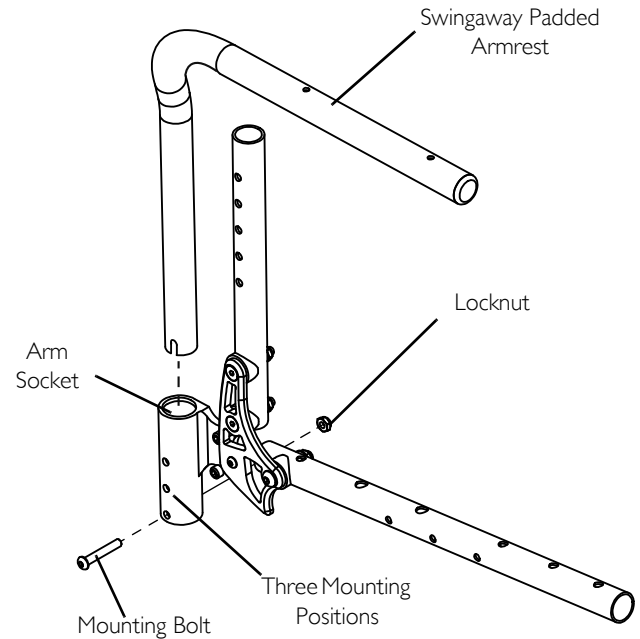
1. Secure mounting bolt and locknut in desired mounting hole. Tighten securely.
2. Insert swing away padded armrest into armrest socket so that notch fits around mounting bolt.

#### Removing

1. Remove swing away padded armrest from armrest socket.

#### Adjusting Height

1. Remove the swing away padded armrest from the arm socket.
2. Remove the mounting bolt and locknut mounted in the arm socket.
3. Reposition mounting bolt to one of three positions in the arm socket depending on the desired height.
4. Install locknut and securely tighten.
5. Reinstall the swing away padded armrest into the arm socket.
6. Repeat STEPS 1-5 for the opposite side, if necessary.



**FIGURE 6** Installing/Removing/Adjusting the Swingaway Padded Armrest

### 7.3 Removing/Installing and Adjusting T-Arms

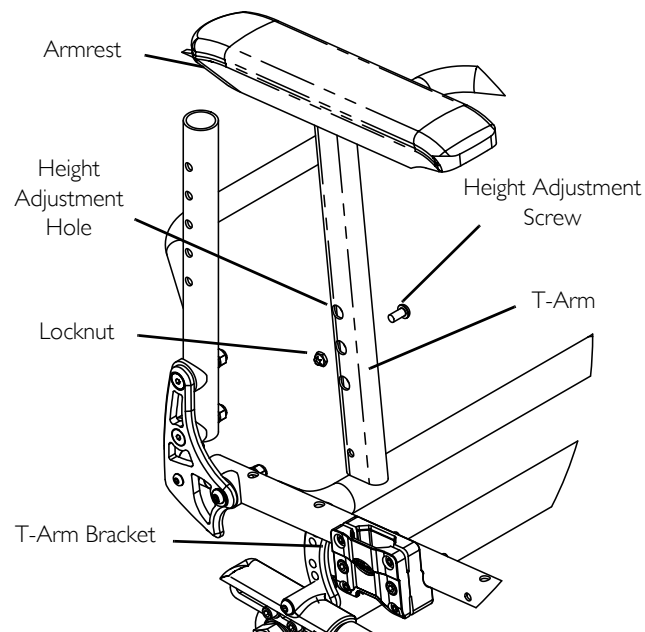
#### Removing/Installing T-Arms

**i** To remove the T-arm, reverse this procedure.

1. Align the T-arm with the socket in the T-arm bracket on the wheelchair frame.
2. Slide the T-arm into the T-arm bracket until the height adjustment screw rests on the top on the T-arm bracket.

#### Adjusting T-Arm Height

1. Remove the T-arm. Refer to [Removing/Installing T-Arms](#) on page 39.
2. Remove the height adjustment screw and locknut from the height adjustment hole.
3. Reinstall the height adjustment screw and locknut in one of the three height adjustment holes on the t-arm of the armrest. Secure tightly.
4. Reinstall the T-arm. Refer to [Removing/Installing T-Arms](#) on page 39.



**FIGURE 7** Adjusting T-Arm Height

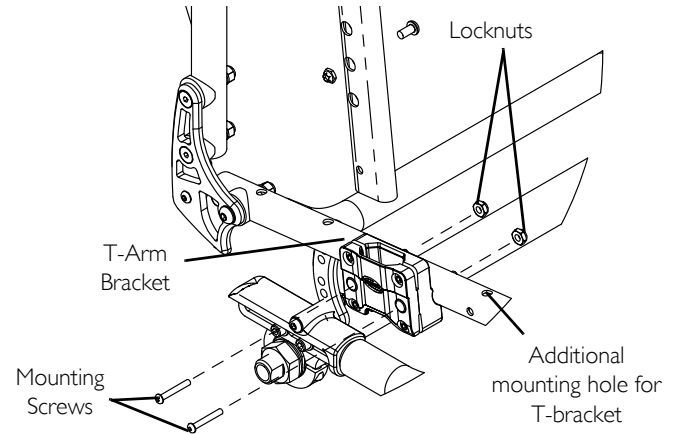
## 7 ARMS

### Adjusting T-Arm Position



T-arm can be mounted in one of two locations on the seat rail

1. Remove the two mounting screws and locknuts that secure the T-arm bracket to the seat rail.
2. Install T-arm bracket in desired mounting position on seat rail.
3. Secure the T-arm bracket to the seat rail with two mounting screws and locknuts. Securely tighten.



**FIGURE 8** Adjusting T-Arm Position



## 8 Back



### WARNING

ALWAYS perform these procedures in the presence of an assistant. The position of the footrest, camber tube, seat angle, back angle, the tautness of the back upholstery as well as the user's condition are directly related to the wheelchairs stability. Any change to one or any combination of the five may cause the wheelchair to decrease in stability. Use **EXTREME** caution when using a new seating position. The addition of anti-tippers may be required.

After ANY adjustments, repair or service and **BEFORE** use, make sure all attaching hardware is tightened securely - otherwise injury or damage may occur.

### 8.1 Unfolding/Folding the Back



### WARNING

After unfolding the back, ensure that the plunger pins are fully engaged in the mounting holes of the adjustment square in the back cane mounting brackets (Detail “A” in FIGURE 2). Back **MUST** be locked securely in place. Otherwise, serious injury could result.

1. To fold the back, pull up on the back release cord and push the back toward the seat of the wheelchair (Detail “A”).
2. To unfold the back, pull up on the back release cord and lift the back away from the seat until the back locks into place (Detail “B” and Detail “C”).



An audible “click” will be heard when the plunger pins fully engage into the adjustment square (Detail “C”) and the split ring will be flush up against the back stop insert.

The back should have a small amount of movement when locked in the open position. Plunger pins should snap in and release easily without resistance.

## 8 BACK

### DETAIL "A" - FOLDING THE BACK

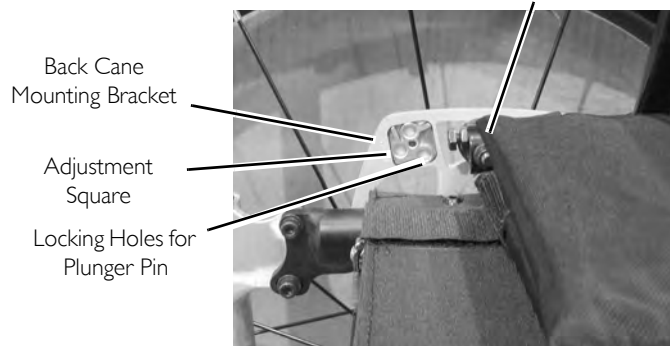


### DETAIL "B" - UNFOLDING THE BACK



### DETAIL "C"

Back Cane (Shown in Folded Position)



**FIGURE I** Unfolding/Folding the Back

## 8.2 Back Angle Adjustment



For this procedure, refer to FIGURE 2-5.



The numbers in the recess of the back angle plate are intended to define the resulting back angle of a chair that has 2 inch seat drop (at 17 inch depth) and that is measured relative to true vertical with the chair sitting on a level surface. The plus (+) sign increases the back angle and the minus (-) sign decreases the back angle. The resulting back angle will vary somewhat depending on your chair configuration. Refer to FIGURE 3 on page 46 to see these settings converted into back angle relative to the seat.

Perform this procedure on both sides of the wheelchair at the same time.

1. Fold down the back. Refer to [Unfolding/Folding the Back](#) on page 41.
2. Loosen the jam nut on the placement screw located at the bottom of the back cane (Detail “A”).
3. Tighten the placement screw so that the screw and jam nut are snug against the bottom of the back cane (Detail “B”).
4. Remove the mounting screw that secures the adjustment square to the back angle plate (Details “A” and “C”).
5. Remove the adjustment square from the recess of the back angle plate (Detail “C”).



Note the hole on the adjustment square. When the hole is positioned on top of the number inside the recess, this number represents the back angle relative to true vertical. One side of the adjustment square provides back angles of  $-8^\circ$ ,  $0^\circ$  and  $-4^\circ$ . Flip the adjustment square over to obtain back angles of  $8^\circ$ ,  $4^\circ$  and  $0^\circ$  (FIGURE 3).



### WARNING

If the adjustment square is installed into the recess of the back angle plate so that the adjustment square hole is not on top of a number, **DO NOT** use this position. Otherwise, injury will occur. When the adjustment square hole is not on top of a number, it prevents the locking pins from locking into position when the back is raised.

6. Position the adjustment square in the recess of the back plate with the hole located aligned with a number (FIGURE 3).
7. Secure the adjustment square to the back angle plate with the mounting screw. Tighten securely.

## 8 BACK

8. Repeat STEPS 2-6 for remaining back cane.



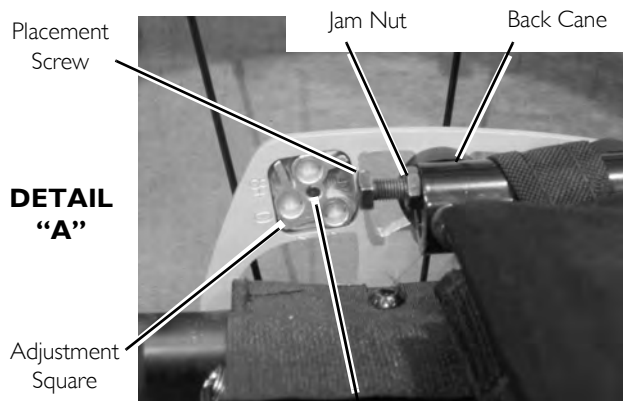
### **WARNING**

After unfolding the back, ensure that the plunger pins are fully engaged in the mounting holes of the adjustment square in the back angle plates (Detail “A”). Otherwise, serious injury could result.

9. Unfold the back until the plunger pins lock into the mounting holes in the adjustment square.
10. Unthread the placement screw until head of screw rests on seat rail (Detail “D”).
11. Completely tighten jam nut up against bottom of back cane (Detail “D”).

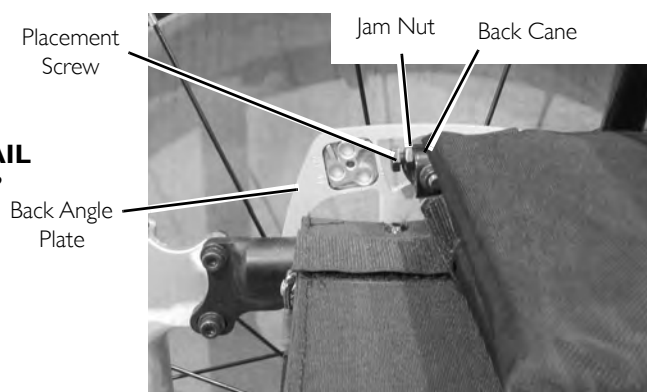


When adjusted properly, the back should have a small amount of movement when locked in the open position. Plunger pins should snap in and release easily without resistance.



Mounting screw secures the adjustment square from the other side of the plate

**DETAIL "B"**



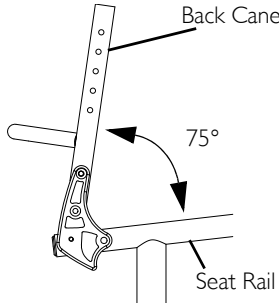
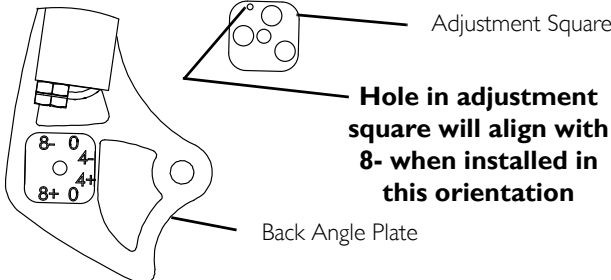
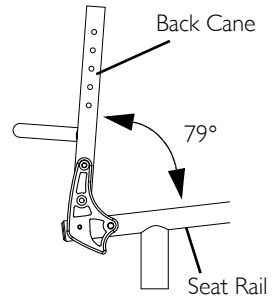
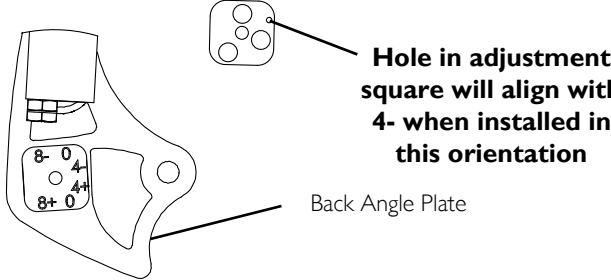
Back angle plate, mounting screw and adjustment square are removed for clarity.

**DETAIL "D"**

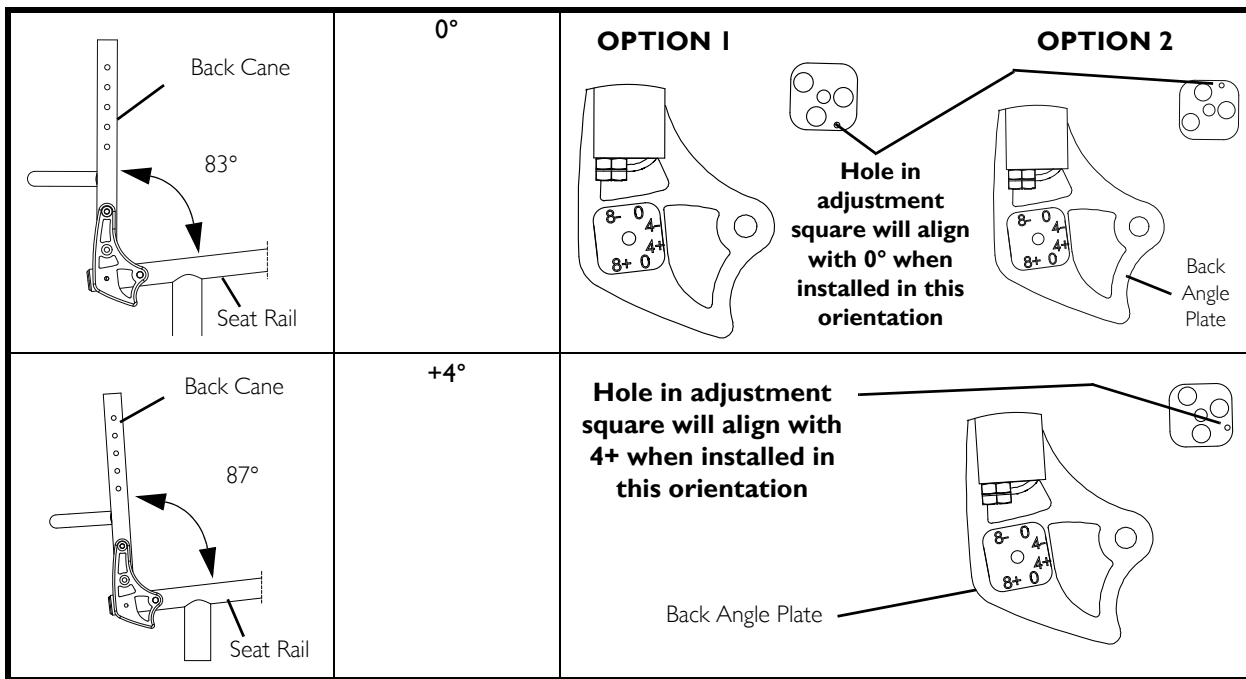


**FIGURE 2** Back Angle Adjustment

# 8 BACK

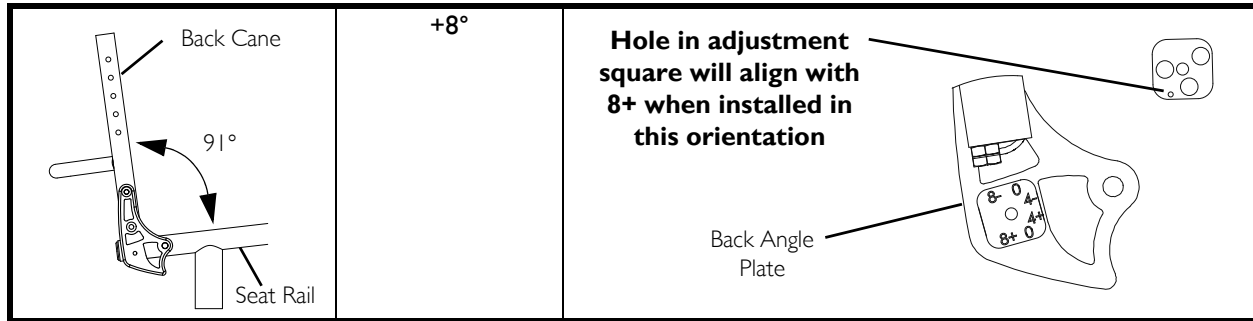
DESIRED SEAT ANGLE	ADJUSTMENT SQUARE POSITION	
	NUMERICAL	GRAPHICAL
 <p>Back Cane</p> <p>75°</p> <p>Seat Rail</p>	-8°	 <p>Adjustment Square</p> <p><b>Hole in adjustment square will align with 8- when installed in this orientation</b></p> <p>Back Angle Plate</p>
 <p>Back Cane</p> <p>79°</p> <p>Seat Rail</p>	-4°	 <p>Adjustment Square</p> <p><b>Hole in adjustment square will align with 4- when installed in this orientation</b></p> <p>Back Angle Plate</p>

**FIGURE 3** Back Angle Adjustment - Adjustment Square Position



**FIGURE 4** Back Angle Adjustment - Adjustment Square Position

## 8 BACK



**FIGURE 5** Back Angle Adjustment - Adjustment Square Position

### 8.3 Adjustable Tension Back Upholstery



#### **WARNING**

ALWAYS perform these procedures in the presence of an assistant. The position of the footrest, camber tube, seat angle, back angle, the tautness of the back upholstery as well as the user's condition are directly related to the wheelchair stability. Any change to one or any combination of the five may cause the wheelchair to decrease in stability. Use **EXTREME** caution when using a new seating position. The addition of anti-tippers may be required.

#### The Back Upholstery Cover



The back upholstery cover is designed for three reasons:

- The first is as a modesty cover.
- The second is to keep the cushion from sliding out of the back of the wheelchair.
- The third is a sacral support depending upon how far or tight the flap is pulled under the seat cushion.
- The adjuster fastening straps can be adjusted at various levels of tension to accommodate individual end-users.

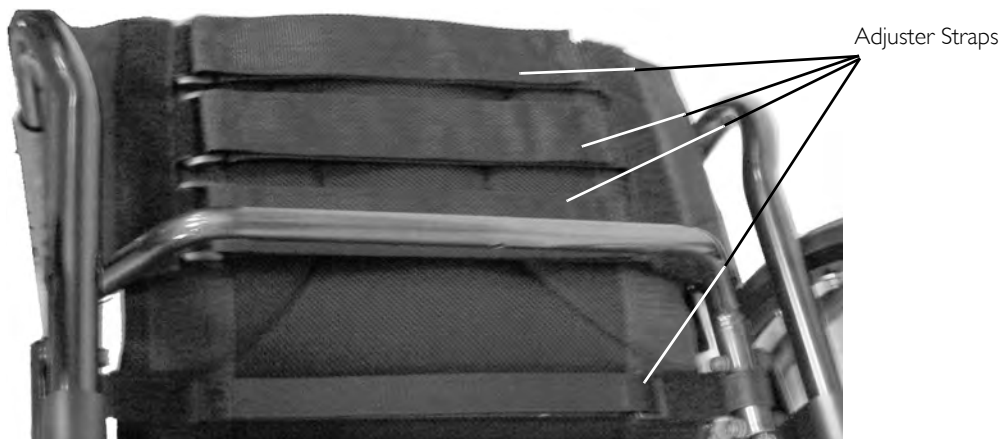


## Adjusting the Tautness of the Back

**i** The adjustable tension back upholstery consists of an upper and lower (lumbar) section.

To adjust the back tension, perform the following

1. Lift back upholstery cover up and flip over toward front of wheelchair
2. Tighten or loosen the adjuster fastening straps.



**FIGURE 6** Adjustable Tension Back Upholstery

## Removing/Installing the Back Upholstery Cover, Adjustable Tension Back Upholstery and Lumbar Strap

**i** For this procedure, refer to FIGURE 7 and FIGURE 8.

If replacing the back upholstery cover, adjustable tension back upholstery and/or lumbar strap, remove the existing upholstery/lumbar strap and install the new upholstery/lumbar strap.

## 8 BACK

### Removing the Back Upholstery Cover

1. Remove the seat cushion, if applicable.
2. Pull the back upholstery cover away from the adjustable tension back upholstery separating the fastening strips of the back upholstery cover from the fastening strips of the adjustable tension back upholstery and seat (Details “A” and “B”).
3. Remove back upholstery cover from wheelchair.

### Removing the Adjustable Tension Back Upholstery

1. Remove the back upholster cover. Refer to [Removing the Back Upholstery Cover](#).
2. Slide adjustable tension back upholstery off back canes (Details “C” and “D”).

### Removing the Lumbar Strap

1. Remove the back upholster cover. Refer to [Removing the Back Upholstery Cover](#).
2. Fold back forward. Refer to [Unfolding/Folding the Back](#) on page 41.
3. Loosen the top mounting screw but DO NOT remove (Detail “E”).
4. Remove the lower mounting screw, coved spacer, washer and locknut from each back cane (Detail “E”).
5. Slide lumbar strap off back canes (Details “D” and “E”).

### Installing the Lumbar Strap

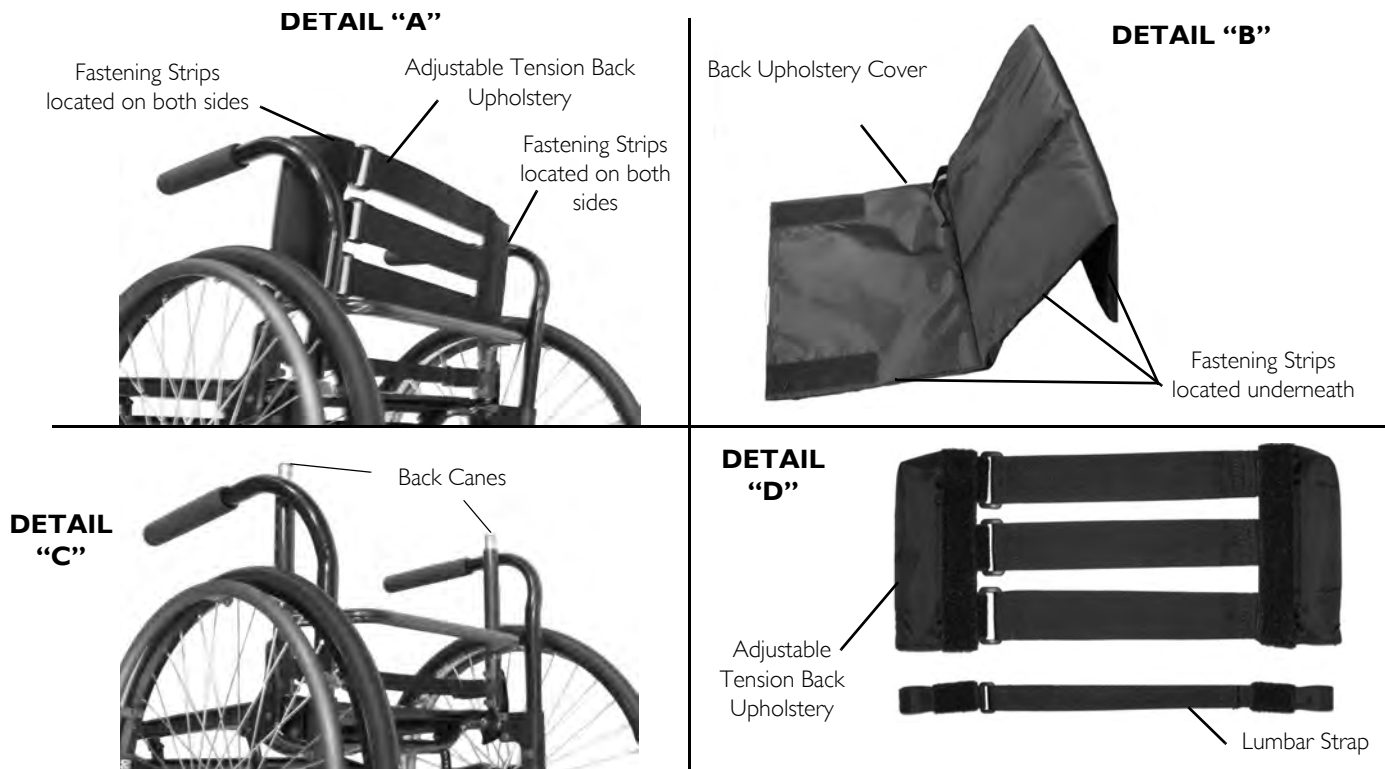
1. Install lumbar strap (Details “D” and “E”).
2. Install lower mounting screw, coved spacer, washer and locknut onto each back cane (Detail “E”).
3. Tighten the top and bottom mounting screws (Detail “E”).
4. Return back to upright position. Refer to [Unfolding/Folding the Back](#) on page 41.
5. Install the back upholstery. Refer to [Removing the Back Upholstery Cover](#)

### Installing the Adjustable Tension Back Upholstery

1. Install the adjustable tension back upholstery onto the back canes (Details “D”, “F”, and “A”).

**Installing the Back Upholstery Cover**

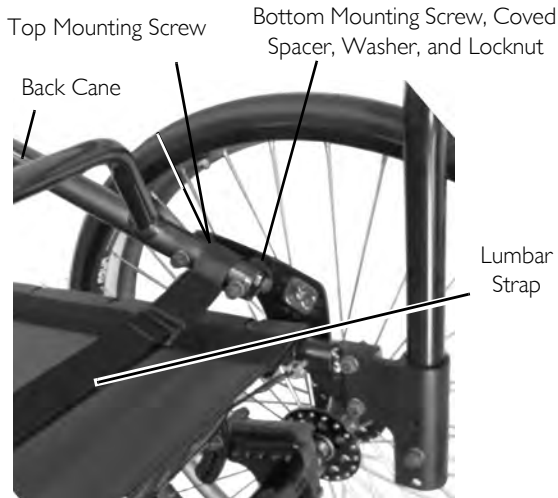
1. Install back upholstery cover onto the adjustable tension back ensuring the fastening strips on the back upholstery cover are aligned with the fastening strips of the adjustable tension back and seat (Detail "F").



**FIGURE 7** Removing/Installing the Back Upholstery Cover, Adjustable Tension Back Upholstery and Lumbar Strap

## 8 BACK

### DETAIL “E”



### DETAIL “F”



**FIGURE 8** Removing/Installing the Back Upholstery Cover, Adjustable Tension Back Upholstery and Lumbar Strap

### 8.4 Removing/Installing Foldover Back Upholstery



#### **WARNING**

ALWAYS perform these procedures in the presence of an assistant. The position of the footrest, camber tube, seat angle, back angle, the tautness of the back upholstery as well as the user's condition are directly related to the wheelchairs stability. Any change to one or any combination of the five may cause the wheelchair to decrease in stability. Use **EXTREME** caution when using a new seating position. The addition of anti-tippers may be required.

## Removing Foldover Back Upholstery

1. Unfasten the two fastening flaps that secure the bottom of the existing back upholstery to the back canes.
2. Unfold the top of the back upholstery.
3. Lift up on the existing back upholstery and remove from the wheelchair.

## Installing Foldover Back Upholstery

1. Install the new back upholstery onto the back canes.
2. Wrap the end of a fastening flap around the back cane.
3. Insert the end of the fastening flap through the loop.
4. Wrap the fastening flap around the back cane again and press firmly to secure.
5. Fold the top of the back upholstery down over the back canes towards the front of the wheelchair.
6. Press firmly to secure the fastening strips.

## 8.5 Back Height Adjustment



Observe the tautness of the back upholstery for reinstallation.

1. Remove the back upholstery cover and adjustable tension back upholstery. Refer to [Removing/Installing the Back Upholstery Cover, Adjustable Tension Back Upholstery and Lumbar Strap](#) on page 49.

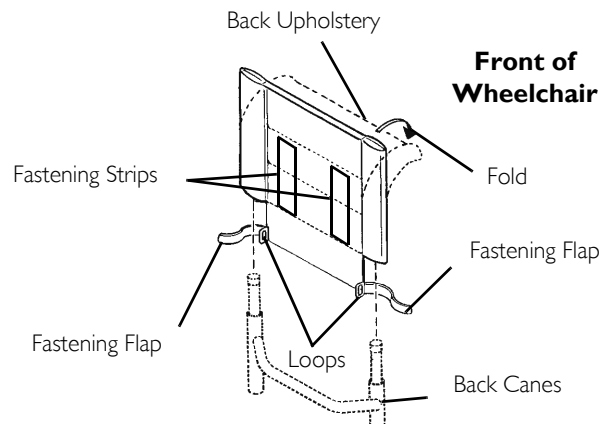


### **WARNING**

Adjustment pin **MUST** be protruding through hole in back cane.

Ensure that both back cane inserts are at the same height **BEFORE** reassembling the wheelchair.

2. Press the adjustment pin on the back cane insert tube in and adjust the back height to one of four heights depending on original back height:



**FIGURE 9** Removing/Installing Foldover Back Upholstery

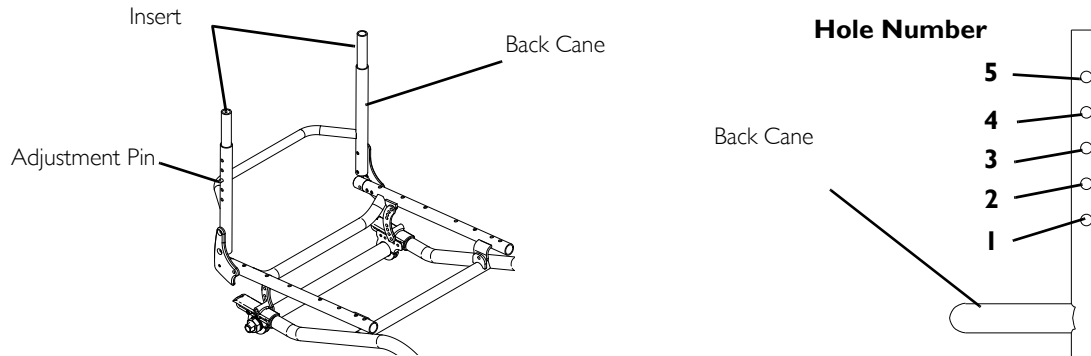
## 8 BACK

HOLE* NUMBER	BACK HEIGHT (IN INCHES)				
	8 - 11	10 - 14	12-16	14 - 18	16-20
1	8	10	12	14	16
2	9	11	13	15	17
3	10	12	14	16	18
4	11	13	15	17	19
5	NA	14	16	18	20



\*Holes numbered from bottom to top for reference only. (There are no numbers on the back canes.)

- Reinstall the back upholstery cover and adjustable tension back upholstery. Refer to [Removing/Installing the Back Upholstery Cover, Adjustable Tension Back Upholstery and Lumbar Strap](#) on page 49.
- Check the tautness of the back. Refer to [Adjusting the Tautness of the Back](#) on page 49.



**FIGURE 10** Back Height Adjustment

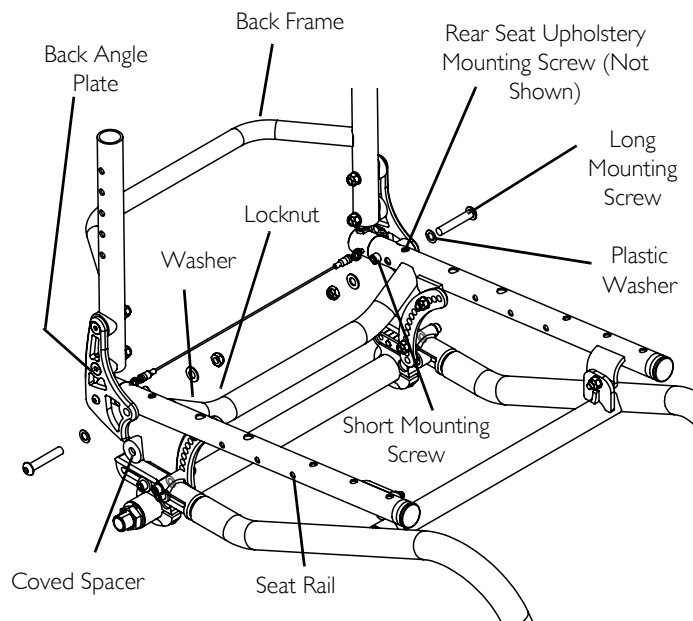
## 8.6 Removing/Installing the Back Frame

### Removing

1. Fold the back down. Refer to [Unfolding/Folding the Back](#) on page 41.
2. Loosen rear seat upholstery screw and short mounting screw but **DO NOT** remove.
3. Remove the two mounting screws, plastic washers, coved spacers, washers, and lock nuts that secures the back angle plates to the seat rails.
4. Remove the back assembly from the wheelchair.

### Installing

1. Place back assembly on wheelchair frame in folded position. Refer to [FIGURE 1](#) on page 42.
2. Install the long mounting screw through plastic washer, back angle plate, cover spacer and seat rail.
3. Install washer and locknut onto long mounting screw.
4. Perform **STEPS 1- 3** for remaining back angle plate.
5. Tighten long mounting screw enough to secure the back to the seat rail, while allowing the back to fold properly.
6. Securely tighten the locknut on the long mounting screw while holding the long mounting screw from rotating.
7. Securely tighten the short mounting screw and rear seat upholstery mounting screw.
8. Repeat **STEPS 17 - 18** for remaining back angle plate.
9. Unfold back to upright position. Refer to [Unfolding/Folding the Back](#) on page 41.



Back shown in upright position and seat upholstery not shown for clarity of hardware location.

**FIGURE 11** Removing/Installing the Back Frame

## 9 Seat



### WARNING

ALWAYS perform these procedures in the presence of an assistant. The position of the footrest, camber tube, seat angle, back angle, the tautness of the back upholstery as well as the user's condition are directly related to the wheelchairs stability. Any change to one or any combination of the five may cause the wheelchair to decrease in stability. Use **EXTREME** caution when using a new seating position. The addition of anti-tippers may be required.

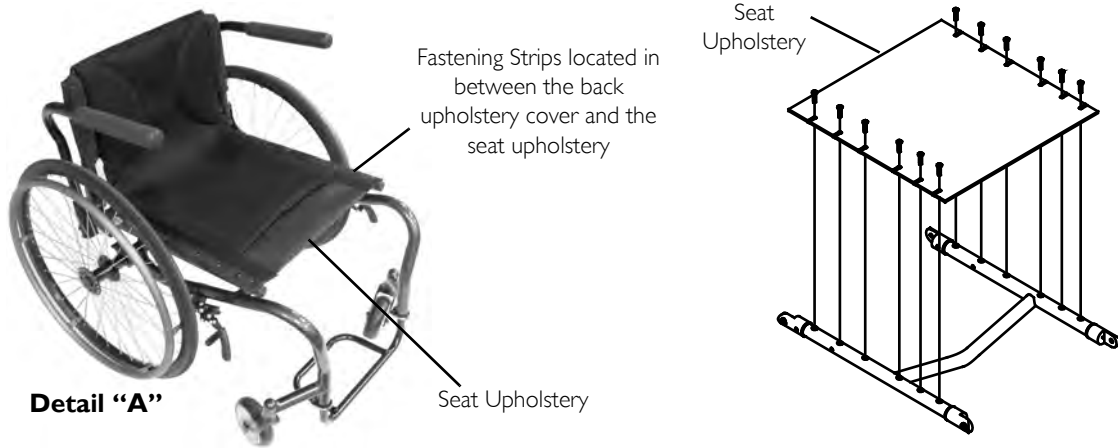
After **ANY** adjustments, repair or service and **BEFORE** use, make sure all attaching hardware is tightened securely - otherwise injury or damage may occur.

### 9.1 Replacing Seat Upholstery

1. Remove the seat cushion from the wheelchair.
2. Remove the mounting screws that secure the seat upholstery to the seat frame.
3. Lift up on the back upholstery cover separating the fastening strips of the back upholstery cover from the fastening strips of the seat (Detail "A").
4. Remove the existing seat upholstery.
5. Install new seat upholstery and secure in place with mounting screws. Tighten securely.
6. Install the seat cushion onto the wheelchair.

WHEELCHAIR DEPTH	NUMBER OF SCREWS
14 to 15 inches	10
16 to 17 inches	12
18 inches	14
19 to 20 inches	16





**FIGURE 1** Replacing Seat Upholstery

## 9.2 Seat Angle Adjustment



The seat angle can be changed by raising or lowering the rear of the seat frame relative to the side frame.

1. Fold the back. Refer to [Unfolding/Folding the Back](#) on page 41.
2. Flip wheelchair upside down.
3. Loosen, but DO NOT remove, the two mounting screws that secure the front of the seat frame to the side frame.
4. On the top of each crescent link, remove the locknut and washer from the mounting screw.
5. On the bottom of each crescent link, remove the locknut and washer from the mounting screw.
6. Adjust seat angle by performing one of the following:
  - Moving top mounting screws to a new adjustment hole in each crescent link.

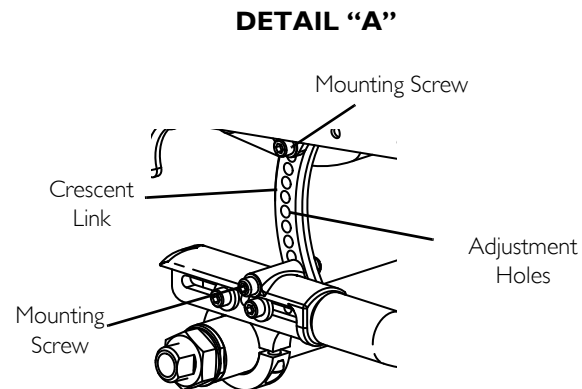
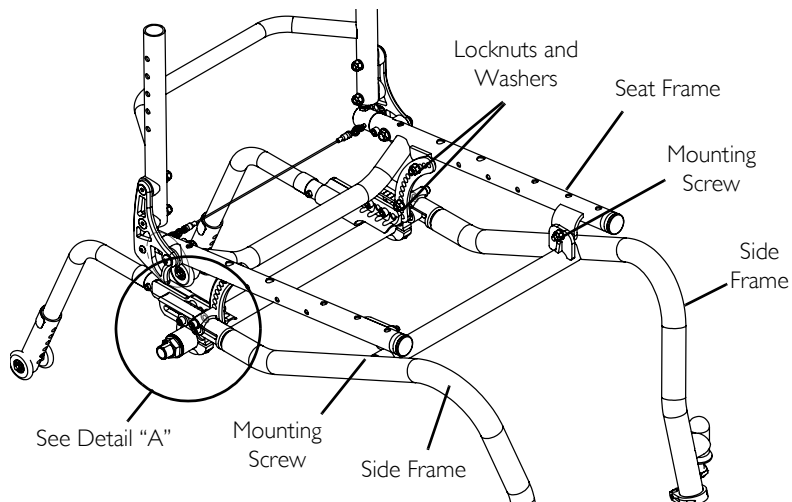
## 9 SEAT

- Moving bottom mounting screws to a new adjustment hole in the crescent link.
- Moving both mounting screws to a new adjustment hole in the crescent link.



Mounting screws in both crescent links **MUST** be adjusted to the same adjustment hole.

7. Once seat angle has been adjusted, install one washer and one locknut onto each mounting screw in the crescent links.
8. Securely tighten all four mounting screws and locknuts.
9. Securely tighten both mounting screws and locknuts that secure the front of the seat frame to the side frame.
10. Position wheelchair right side up.
11. Unfold back. Refer to Unfolding/Folding the Back on page 41.
12. Check for stability. Refer to on page 9.



**FIGURE 2** Seat Angle Adjustment

---

## 10 Wheel Locks

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**WARNING**

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

### 10.1 Replacing/Adjusting the Wheel Locks

**WARNING**

If wheel locks DO NOT hold the occupied wheelchair in place contact a qualified technician - otherwise injury or damage may occur.



Before adjusting or replacing wheel locks, ensure that the tires are inflated to the recommended psi on the sidewall of the tire.

#### Replacing the Wheel Lock

1. Loosen the two mounting screws and remove the existing wheel lock from the wheelchair.
2. Using the two mounting screws, install the new wheel lock. Securely tighten.

#### Adjusting the Wheel Lock

1. Engage the wheel locks.



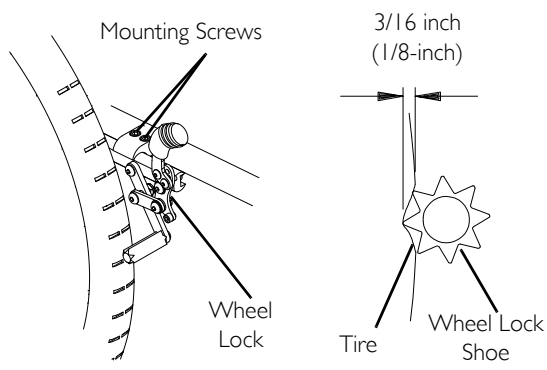
Any wheel lock adjustment should embed the wheel lock shoe at least 3/16-inch into the pneumatic tire (1/8-inch for urethane wheels) when engaged.

2. If necessary, loosen the two mounting screws that secure the wheel locks to the wheelchair frame and adjust position of the wheel lock until the 3/16-inch (1/8-inch for urethane wheels) measurement is obtained for correct wheel lock adjustment.
3. Securely tighten the two mounting screw(s).
4. Engage the wheel locks and push against the wheelchair and determine if the wheel locks engage the tires enough to hold the wheelchair.

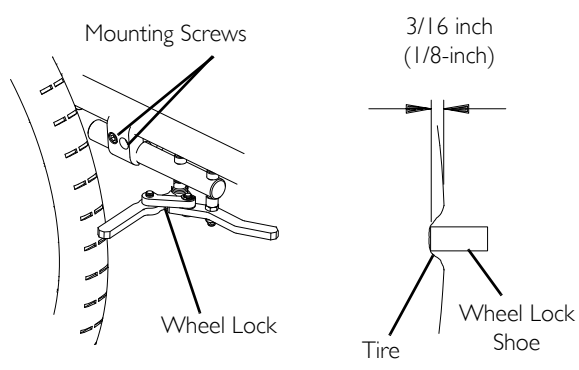
## 10 WHEEL LOCKS

- Repeat the above procedures until the wheel locks hold the wheelchair.

### Push-to-Lock or Pull-to-Lock Wheel Locks



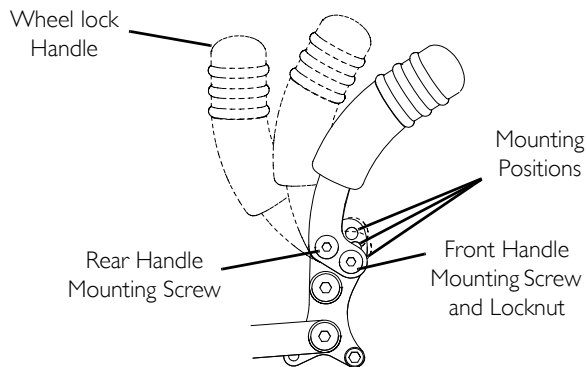
### Under Mount Wheel Lock



**FIGURE 1** Replacing/Adjusting the Wheel Locks

### 10.2 Changing Wheel Lock Handle Position

- Loosen, but DO NOT remove, the rear handle mounting screw.
- Remove the front handle mounting screw and locknut.
- Align the front handle mounting hole with one of three desired mounting positions on the wheel lock.
- Using the front handle mounting screw and locknut, secure the handle to the wheel lock.
- Securely tighten the front and rear handle mounting screws and locknuts.
- Repeat STEPS 1-5 on remaining wheel lock handle.



**FIGURE 2** Changing Wheel Lock Handle Position

### 10.3 Converting Wheel Lock From Push-to-Lock to Pull-to-Lock or Pull-to-Lock to Push-to-Lock

#### Converting From Push-to-Lock to Pull-to-Lock

1. Remove set screw from the lower stop position (Detail “A”).

**i** As the wheel lock handle is pushed downwards, the wheel lock will engage and then disengage the wheel.

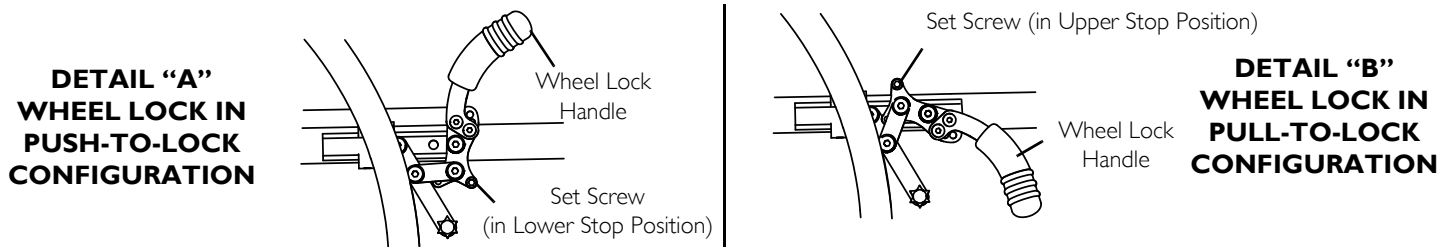
2. Push wheel lock handle down to access the upper stop position (Detail “B”).
3. Install set screw into upper stop position.
4. Pull wheel lock handle up to engage wheel lock. If wheel lock does not properly engage the wheel, refer to [Adjusting the Wheel Lock](#) on page 59.

#### Converting From Pull-to-Lock to Push-to-Lock

1. Remove set screw from the upper stop position (Detail “B”).

**i** As the wheel lock handle is pulled upwards, the wheel lock will engage and then disengage the wheel.

2. Pull wheel lock handle up to access the lower stop position (Detail “A”).
3. Install set screw into lower stop position.
4. Push wheel lock handle down to engage wheel lock. If wheel lock does not properly engage the wheel, refer to [Adjusting the Wheel Lock](#) on page 59.



**FIGURE 3** Converting Wheel Lock From Push-to-Lock to Pull-to-Lock or Pull-to-Lock to Push-to-Lock

## 11 WHEELS

### 11 Wheels



#### **WARNING**

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

#### 11.1 Removing/Installing Rear Wheels



#### **CAUTION**

Changing the size of the rear wheels can affect the performance of the wheelchair. Contact Invacare at the telephone numbers on the back of this manual before changing rear wheel size.

1. Perform one of the following:
  - Quick-Release - Push in the tip of the quick-release axle and pull axle and wheel away from the wheelchair.
  - Quad-Release - Lift up on the handle of the quad-release axle and pull axle and wheel away from the wheelchair.
2. Repeat STEP 1 for the opposite rear wheel.
3. Reinstall the rear wheels onto the wheelchair by reversing STEPS 1-2.



#### **WARNING**

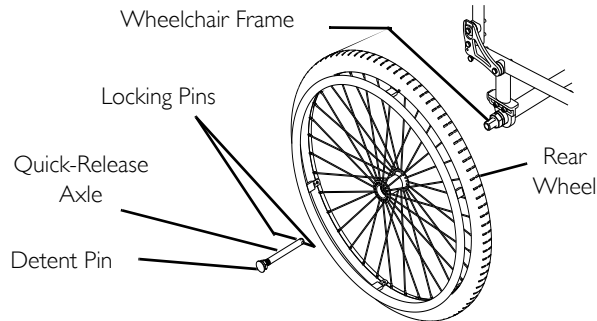
Pull on the rear wheel to make sure the detent pin and locking pins of the quick/ quad-release axle are fully released before operating wheelchair.

Keep locking pins clean.

4. If there is too much movement of the rear wheel assembly in an “in and out” motion, refer to [Adjusting Quick-Release Axles](#) on page 63 or [Adjusting Quad-Release Handles](#) on page 64.



Quad-Release Axle not shown. Locking pins on the Quad-Release Axle are the same as Quick-Release Axle.



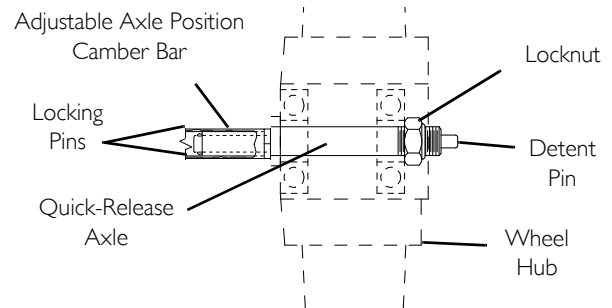
**FIGURE 1** Removing/Installing Rear Wheels

### 11.2 Adjusting Quick-Release Axles

1. Remove rear wheel and quick-release axle from the wheelchair. Refer to [Removing/Installing Rear Wheels](#) on page 62.
2. Depress detent pin in the quick-release axle and slide axle through the wheel hub.
3. Release detent pin ensuring that the locking pins are fully released.
4. Increase or decrease end play by adjusting the locknut on the end of the quick-release axle.
5. Reinstall rear wheel onto the wheelchair. Refer to [Removing/Installing Rear Wheels](#) on page 62.



End of Quick Release axle is shown for reference only. It is not visible when inserted into camber bar.



**FIGURE 2** Adjusting Quick-Release Axles

## 11 WHEELS

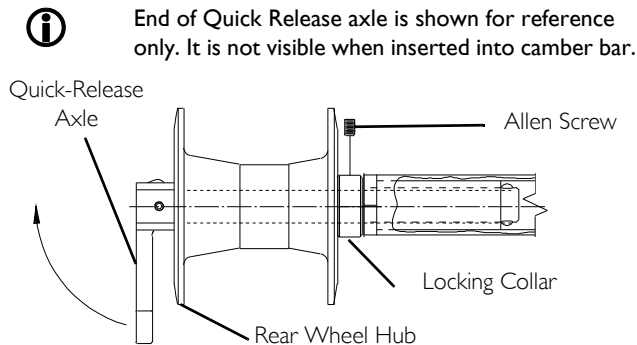
### 11.3 Replacing Quad-Release Axles

1. Remove rear wheel and the existing quick-release axle from the wheelchair. Refer to [Removing/Installing Rear Wheels](#) on page 62.
2. Remove existing quick-release axle from rear wheel.
3. Insert new quad-release axle through rear wheel hub.
4. Slide locking collar onto quad-release axle until it is snug against rear wheel and tighten securely with allen screw.
5. Reinstall rear wheel and the quad-release axle onto the wheelchair. Refer to [Removing/Installing Rear Wheels](#) on page 62.
6. Flip the handle of the quad-release axle down to release the detent pin ensuring that the locking pins are fully released.
7. If detent pin does not fully release, proceed to [Adjusting Quad-Release Handles](#) on page 64.
8. Repeat STEPS 1-7 for the opposite rear wheel.

### 11.4 Adjusting Quad-Release Handles

#### In and/or Out

1. Remove rear wheel and the quad-release axle from the wheelchair. Refer to [Removing/Installing Rear Wheels](#) on page 62.
2. Loosen the locking screw.
3. Make one or both of the following adjustments:
  - If the quad-release handle is not releasing the locking pins completely, rotate the quad-release handle approximately one-quarter turn clockwise.
  - If the quad-release handle hits the spokes of the rear wheel when assembled, rotate the quad-release handle approximately one-quarter turn counterclockwise.
4. Tighten the locking screw.
5. Reinstall the rear wheel and quad-release axle onto the wheelchair. Refer to [Removing/Installing Rear Wheels](#) on page 62.

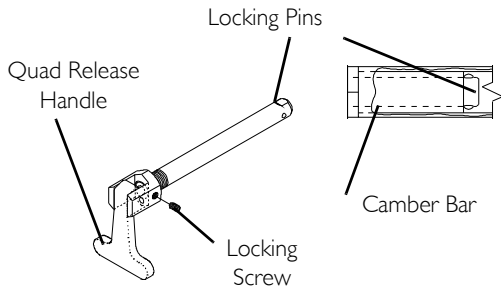


**FIGURE 3** Replacing Quad-Release Axles

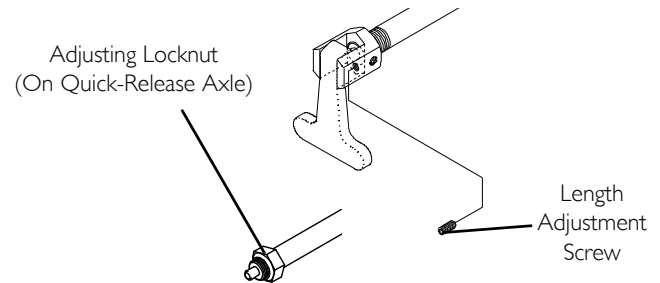


6. Flip the handle of the quad-release axle down to release the detent pin ensuring that the locking pins are fully released.
7. Repeat the above procedures until the quad-release axle locks correctly.

## Adjusting Quad-Release Handle In and/or Out



## Removing Play from Rear Wheels



**FIGURE 4** Adjusting Quad-Release Handles

## Removing Play from Rear Wheels

1. With the rear wheel and quad-release axle still mounted onto the wheelchair, make the following adjustment:
  - Tighten the length adjusting screw until there is no in and out movement of the quad-release axle and rear wheel.

## 11.5 Handrim Replacement

1. Remove the rear wheel from the wheelchair. Refer to [Removing/Installing Rear Wheels](#) on page 62.



### **WARNING**

Tire **MUST** be fully deflated before any disassembly procedures are performed. Otherwise injury or damage may result.

2. Remove all air from the tube by pressing down on the pin in the center of the valve stem.
3. While carefully holding the tire, tube and rim strip to one side, hold the allen screws and remove the locknuts that secure the handrim to the rear wheel.

## 11 WHEELS

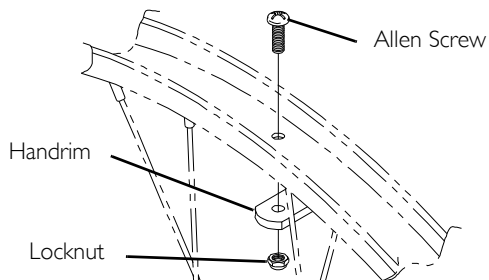
4. Remove the existing handrim.
5. Install new handrim by reversing STEPS 2-4.



### WARNING

DO NOT inflate tire until it is completely assembled. Otherwise injury or damage may result.

6. Inflate tire to correct psi rating on the sidewall of tire.
7. Reinstall rear wheel to the wheelchair. Refer to [Removing/Installing Rear Wheels](#) on page 62.
8. Repeat STEPS 1-7 for opposite rear wheel if necessary.



**FIGURE 5** Handrim Replacement

### 11.6 Repairing/Replacing Rear Wheel, Tire/Tube



### WARNING

Replacement of the tire or tube MUST be performed by a qualified technician.

### CAUTION

Changing the size of the rear wheels can affect the performance of the wheelchair. Contact Invacare at the numbers on the back cover BEFORE performing this procedure.



If replacing rear wheels with a different size than what was originally on the wheelchair, the front caster height and/or diameter MUST also be changed to keep the wheelchair frame parallel to the floor. Refer to [Removing/Installing/Repositioning the Caster Assemblies](#) on page 79 ONLY after contacting Invacare. Anti-tipper height (if applicable) MUST also be adjusted to maintain 1-1/2 to 2-inch clearance between bottom of the anti-tipper wheels and the floor. Refer to [Adjusting/Replacing Anti-tipper](#) on page 84.

11.7 Adjusting Wheelbase Length, Adjusting Center of Gravity (COG)



**WARNING**

ALWAYS perform this procedure in the presence of an assistant. The position of the footrest, camber tube, seat angle, back angle, the tautness of the back upholstery as well as the user's condition are directly related to the wheelchairs stability. Any change to one or any combination of the six may cause the wheelchair to decrease in stability. Use **EXTREME** caution when using a new seating position. The addition of anti-tippers may be required.



Measure the distance between the center of the front caster and the center of the rear wheel to determine the new wheelbase length.

The wheelbase length can be adjusted in one or more of the following combinations:

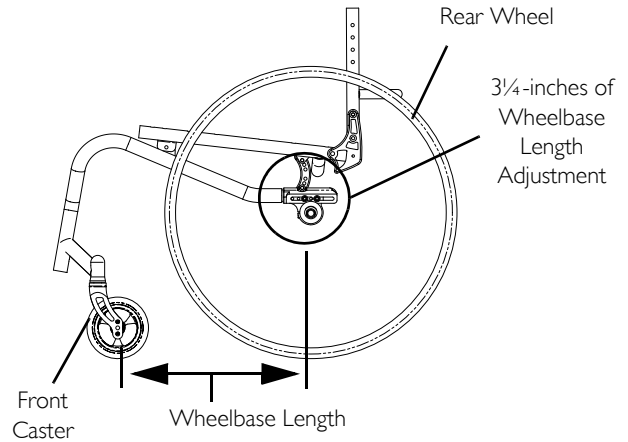
- Repositioning the camber tube clamps.
- Repositioning the camber tube clamps socket screws.
- Reversing the camber tube clamps direction

1. Refer to the chart below to determine the adjustments necessary to achieve the desired wheelbase length.



**CAUTION**

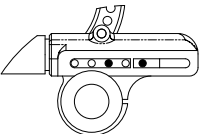
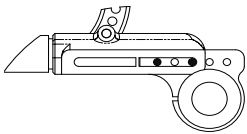
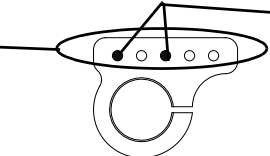
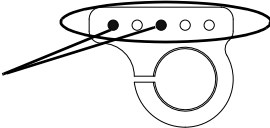
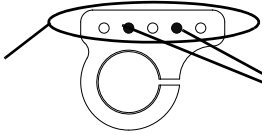
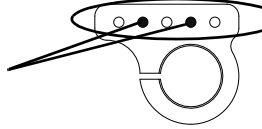
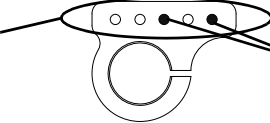
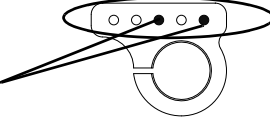
Ensure one empty mounting position remains between the two socket screws, otherwise damage to the wheelchair may occur.



**FIGURE 6** Adjusting Wheelbase Length, Adjusting Center of Gravity (COG)


# 11 WHEELS

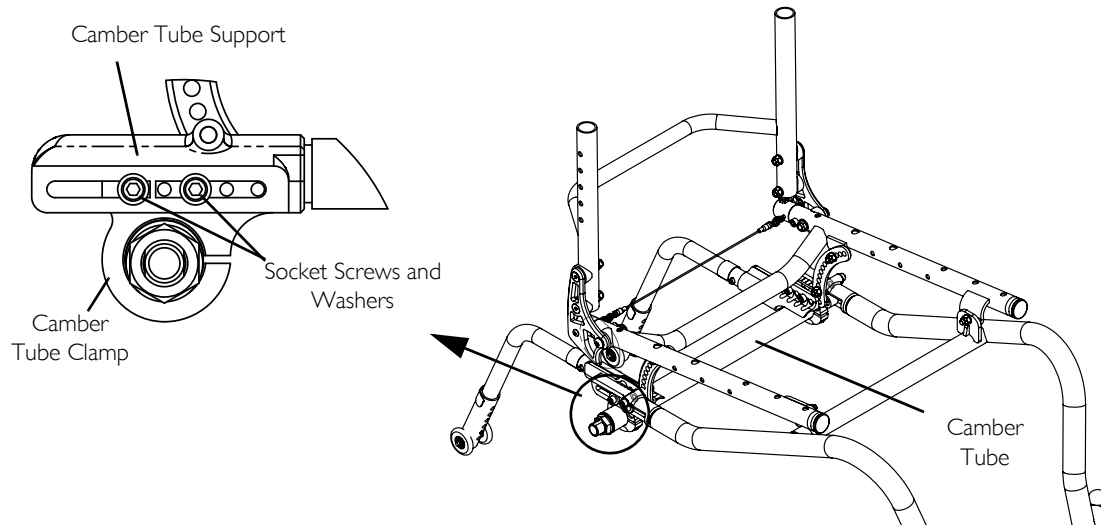
## SOCKET SCREW MOUNTING POSITIONS

CAMBER TUBE CLAMP FACING THE FRONT OF THE WHEELCHAIR	CAMBER TUBE CLAMP FACING THE REAR OF THE WHEELCHAIR
<p><i>NOTE: Camber tube clamp shown in forward most position.</i></p> <p>← <b>Front of Wheelchair</b></p> 	<p><i>NOTE: Camber tube clamp shown in rear most position.</i></p> <p><b>Rear of Wheelchair</b> →</p> 
<p>Mounting Positions</p>  <p>Socket Screws</p>	 <p>Socket Screws</p> <p>Mounting Positions</p>
<p>Mounting Positions</p>  <p>Socket Screws</p>	 <p>Socket Screws</p> <p>Mounting Positions</p>
<p>Mounting Positions</p>  <p>Socket Screws</p>	 <p>Socket Screws</p> <p>Mounting Positions</p>

**FIGURE 7** Adjusting Wheelbase Length, Adjusting Center of Gravity (COG)

## Repositioning the Camber Tube Clamps

1. Remove the rear wheels. Refer to [Removing/Installing Rear Wheels](#) on page 62.
2. Loosen, but DO NOT remove, the four socket screws and washers that secure the two camber tube clamps to the camber tube supports.
3. Slide the camber tube forward or backward to adjust the wheelbase length to the desired position.
  -  Ensure that both camber tube clamps are adjust to the same position in the camber tube support. This will ensure that the camber tube remains at 90° to each side frame.
4. Securely tighten the four socket screws and washers that secure the two camber tube clamps to the camber tube supports.
5. Install the rear wheels. Refer to [Removing/Installing Rear Wheels](#) on page 62.



**FIGURE 8** Repositioning the Camber Tube Clamps

## 11 WHEELS


### Repositioning the Camber Tube Clamp Socket Screws

1. Remove the rear wheels. Refer to [Removing/Installing Rear Wheels](#) on page 62.
2. Refer to [Socket Screw Mounting Positions](#) in to determine which socket screw(s) **MUST** be moved and to which mounting positions.
3. Remove the four socket screws and washers from both camber tube clamps.
4. Align the desired mounting positions of the camber tube clamps with the opening of the camber tube supports.



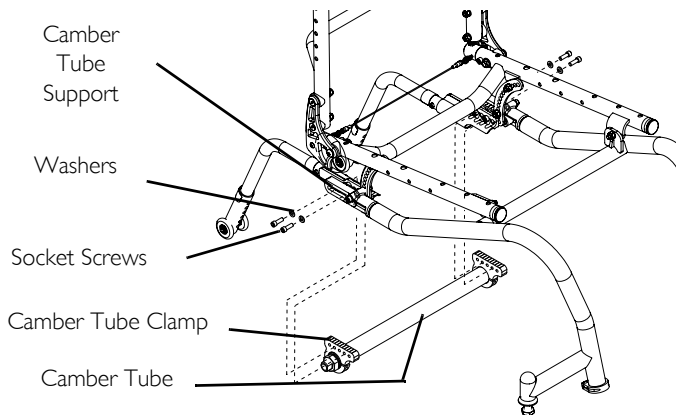
#### CAUTION

Ensure one empty mounting position remains between the two socket screws, otherwise damage to the wheelchair may occur.

5. Install the four socket screws and washers into the desired mounting positions of both camber tube clamps. Hand tighten.
-  Ensure that both camber tube clamps are adjust to the same position in the camber tube support. This will ensure that the camber tube remains at 90° to each side frame.
6. Slide the camber tube forward or backward to adjust the wheelbase length to the desired position. Securely tighten the four socket screws.
  7. Install the rear wheels. Refer to [Removing/Installing Rear Wheels](#) on page 62.

### Reversing the Camber Tube Clamp Direction

1. Remove the rear wheels. Refer to [Removing/Installing Rear Wheels](#) on page 62.
2. Remove the four socket screws and washers that secure the two camber tube clamps to the camber tube supports.
3. Rotate the camber tube so that the camber tube clamps face the opposite direction.



**FIGURE 9** Repositioning the Camber Tube Clamp Socket Screws

- Align the desired mounting positions of the camber tube clamps with the opening of the camber tube supports.



**CAUTION**

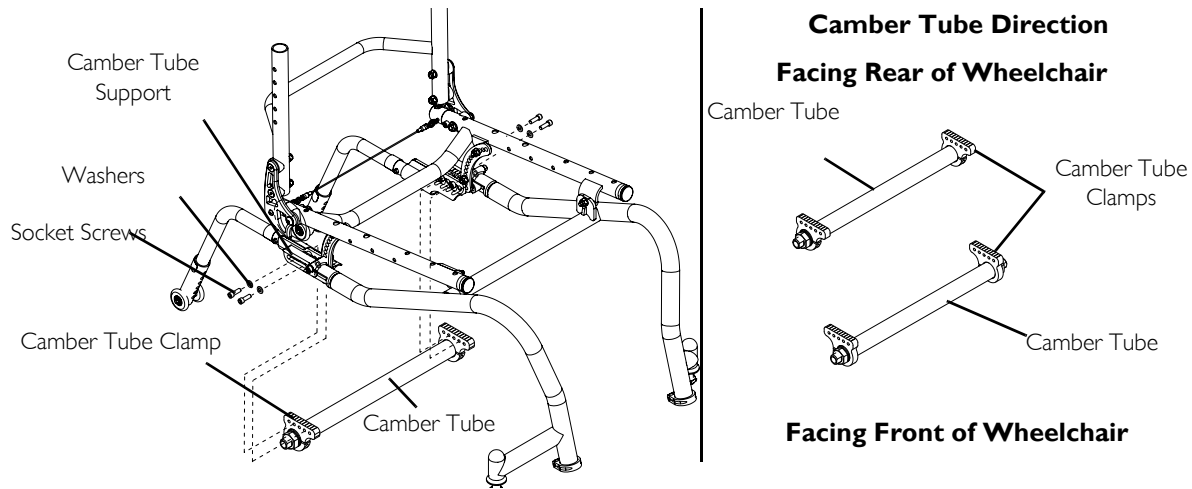
Ensure one empty mounting position remains between the two socket screws, otherwise damage to the wheelchair may occur.

- Install the four socket screws and washers into the desired mounting positions of both camber tube clamps. Hand tighten.



Ensure that both camber tube clamps are adjust to the same position in the camber tube support. This will ensure that the camber tube remains at 90° to each side frame.

- Slide the camber tube forward or backward to adjust the wheelbase length to the desired position. Securely tighten the four socket screws.
- Install the rear wheels. Refer to [Removing/Installing Rear Wheels](#) on page 62.



**FIGURE 10** Reversing the Camber Tube Clamp Direction

## 11 WHEELS

### 11.8 Adjusting Wheelbase Width



Perform this procedure on one side of the wheelchair at a time for ease of adjustment.

The wheelbase width can be increase/decreased by  $\frac{3}{4}$  inch per side =  $1\frac{1}{2}$  inch total range of adjustment.

1. Remove the rear wheels. Refer to [Removing/Installing Rear Wheels](#) on page 62.
2. Loosen the axle nut and rotate axle bushing to increase/decrease the wheelbase width.
3. Securely tighten axle nut. Torque nut to 30-35 ft.-lbs.
4. Count the number of threads showing on the axle bushing.



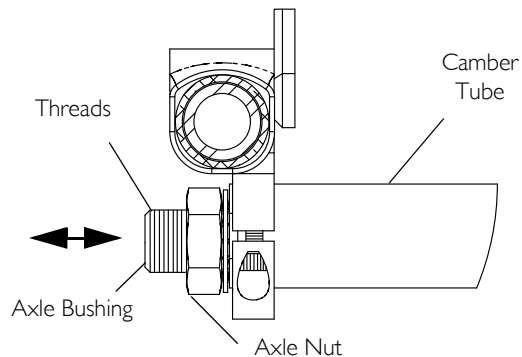
#### **WARNING**

ALWAYS leave  $\frac{3}{4}$  inch of axle bushing engaged into camber tube otherwise damage and/or injury may occur.



The number of threads showing on the axle bushing should be equal on both sides of the wheelchair. Otherwise, wheelchair performance may be affected.

5. Repeat STEPS 2-3 for the opposite axle bushing.
6. Install the rear wheels. Refer to [Removing/Installing Rear Wheels](#) on page 62



**FIGURE 11** Adjusting Wheelbase Width



### 11.9 Removing/Installing the Camber Tube



#### **CAUTION**

Camber tube clamps - Make sure the clamp screws are securely tightened before using the wheelchair, otherwise personal injury or damage to the wheelchair may occur.

#### **Removing the Camber Tube**

1. Remove the rear wheels. Refer to [Removing/Installing Rear Wheels](#) on page 62.
2. Loosen the two socket head clamp screws securing camber tube to the two camber tube clamps.
3. Slide the camber tube through the camber tube clamps.

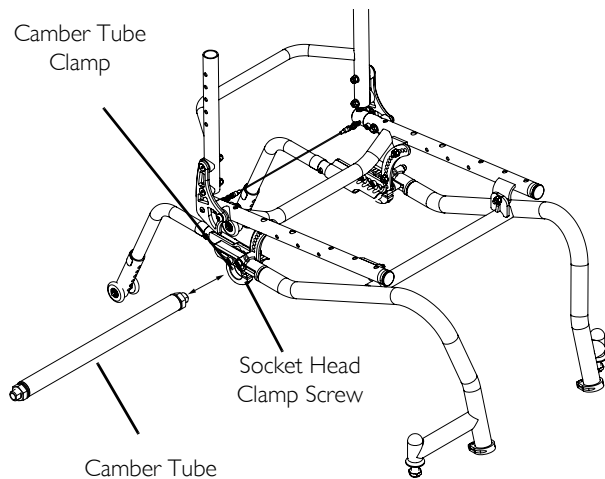
#### **Installing the Camber Tube**

1. Insert the camber tube into the camber tube clamps.
2. Center the camber tube in the camber tube clamps.
3. Adjust the camber tube. Refer to [Adjusting the Camber Tube](#) on page 75.

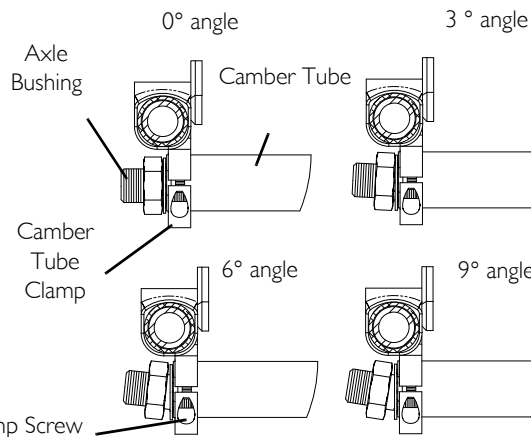


There are four types of camber tubes: 0°, 3°, 6° and 9°. If the camber tube being used is 3°, 6° or 9° degrees, then the camber tube **MUST** be rotated so that the axle bushings at the ends of camber tube are angled up (Detail “A”). Installing the camber tube in any other orientation will directly impact the angle of the rear wheel.

## II WHEELS



### DETAIL "A" - CORRECT ORIENTATION FOR EACH CAMBER TUBE



**FIGURE 12** Adjusting Wheelbase Length, Adjusting Center of Gravity (COG)

11.10 Adjusting the Camber Tube



**WARNING**

Camber tube clamps - Make sure the clamp screws are securely tightened before using the wheelchair, otherwise injury or damage to the wheelchair may occur.



Stand behind the wheelchair to determine left or right.

1. Loosen, but **DO NOT** remove, the socket head clamp screws in the camber tube clamps (Detail "A").
2. Using an "L" square, rotate the axle tube until the flat edge of the camber tube is at a 90° angle with the ground/floor.



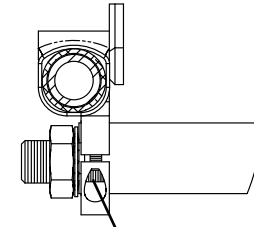
Ensure camber tube is centered between clamps.

This adjustment is made with the rear wheels attached to the chair and all four wheels contacting the floor.

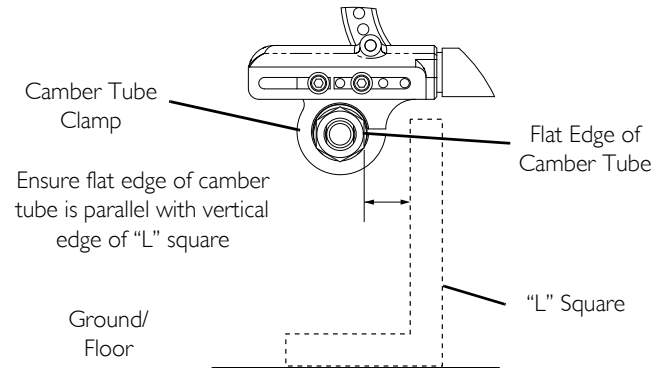
If camber tube is not 0° degrees, then it **MUST** be rotated so that the axle bushings are angled up at their ends (FIGURE 13).

3. Securely tighten the socket screw in the camber tube clamps (Detail "A").
4. Determine the toe in/toe out of the wheelchair. Refer to Determining/Setting Toe In/Toe Out on page 76.

**DETAIL "A" - SIDE VIEW**



Socket Head Clamp Screw



**FIGURE 13** Adjusting the Camber Tube

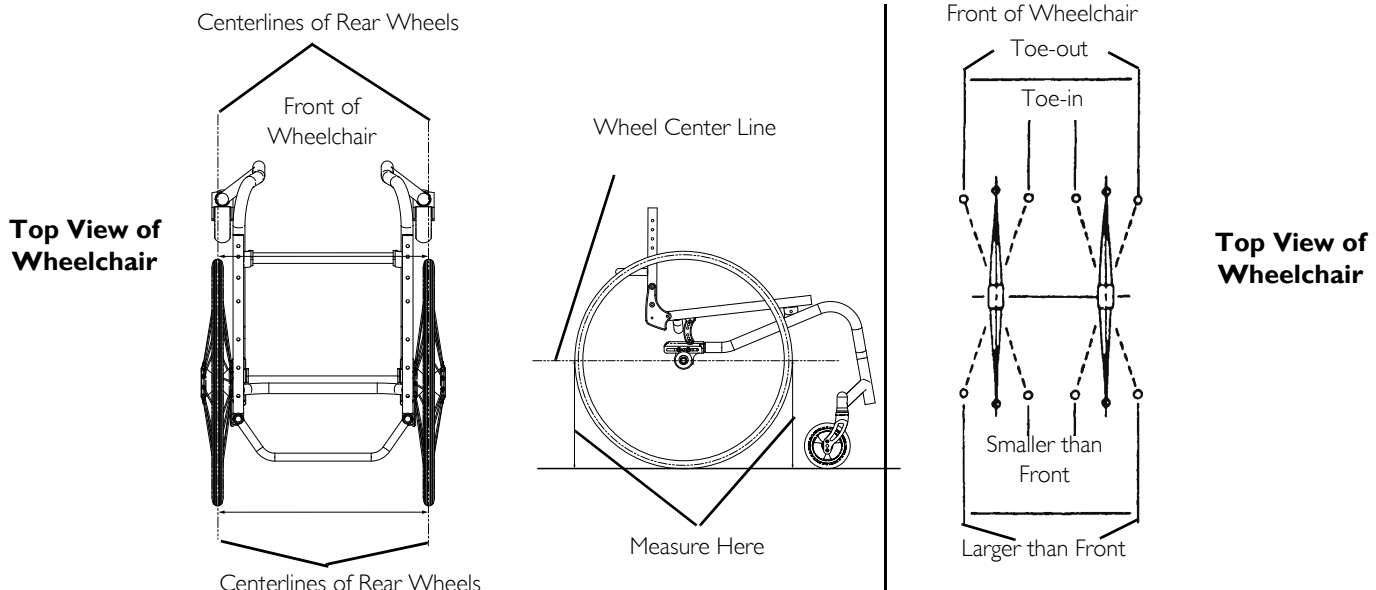
## 11 WHEELS

### 11.11 Determining/Setting Toe In/Toe Out



For this procedure, refer to FIGURE 12 on page 74 and FIGURE 14.

1. Inflate all pneumatic tires to recommended tire pressures (listed on the sidewall of the tire).
2. Measure the distance between the centerlines at the rear and front of the rear wheels at approximately 12 inches (for 24-inch diameter wheels) from the ground/floor (FIGURE 14).
3. Determine difference between two measurements. If difference between the two measurements is greater than  $\frac{1}{8}$  inch, 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, a **TOE-OUT** condition exists (FIGURE 14).
  - If the back centerline measurement of the rear wheels is **LARGER** than the front centerline measurement of the rear wheels, a **TOE-IN** condition exists (FIGURE 14).
4. If the difference between the measurements is greater than  $\frac{1}{8}$ -inch, correct the toe-in/toe-out condition by performing the following:
  - A. Loosen both mounting socket head clamp screws (FIGURE 12).
  - B. Rotate the camber tube until front and rear measurement are within  $\frac{1}{8}$ -inch (FIGURE 12).
  - C. Securely tighten both socket head clamp screws (FIGURE 12).



**FIGURE 14** Determining/Setting Toe In/Toe Out

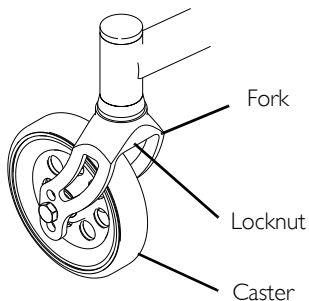
## 11.12 Adjusting Fork Tension

1. To properly tighten forks and guard against flutter, perform the following check on both forks:
  - A. Tip back the wheelchair to floor.
  - B. Pivot both forks and casters to top of their arc simultaneously.
  - C. Let casters drop to bottom of arc (wheels should swing once to one-side, then IMMEDIATELY rest in a straight downward position).
2. If necessary, perform one of the following to adjust the fork tension:

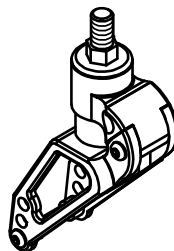
## 11 WHEELS

- Standard Forks - Adjust locknut according to freedom of caster swing (Detail “A”).
    - a. Tighten locknut to reduce caster swing.
    - b. Loosen the locknut to increase caster swing.
  - Suspension Fork (Detail “B”) -
    - a. Refer to [Removing the Elastomer](#) on page 82 to remove the elastomer and suspension fork bottom to access the locknut.
    - b. No tension adjustment can be performed on this fork.
    - c. Refer to [Installing the Elastomer](#) on page 83 to secure the suspension fork top to the elastomer and suspension fork bottom.
  - One Sided Fork (Detail “D”) -
    - a. No tension adjustment can be performed on this fork.
3. Test wheelchair for maneuverability.
  4. If necessary, repeat STEPS 1-2 to adjust locknuts until tension is correct for both forks.

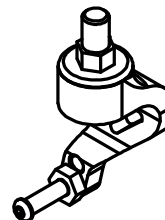
**DETAIL “A”  
STANDARD FORK**



**DETAIL “B”  
SUSPENSION FORK**



**DETAIL “C” - ONE  
SIDED FORK**



**FIGURE 15** Adjusting Fork Tension

## 11.13 Removing/Installing/Repositioning the Caster Assemblies

- i** If replacing a front caster note the mounting position of the existing front caster for installation of the new front caster.  
Both front casters **MUST** be the same size and adjusted to the same height.

### Standard Forks

#### Removing Front Caster

1. Remove the mounting bolt, axle spacers and locknut that secure the front caster to the fork.
2. Remove the caster from the fork.

#### Installing Front Caster

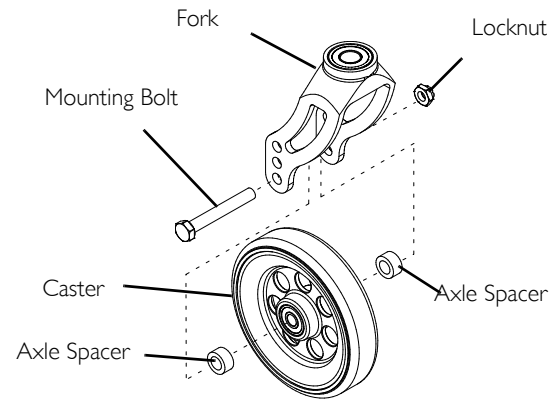
1. Using the mounting bolt, axle spacers and locknut, secure the caster to the desired caster mounting position.

### Suspension Forks

#### Removing the Caster

- i** One mounting screw will not turn.

1. Using two allen wrenches, turn mounting screws in opposite directions and remove one mounting screw from fork.
2. Remove the threaded bushing with mounting screw and two spacers securing the caster to the fork. **DO NOT** use excessive force.
3. Remove the caster from the fork.



**FIGURE 16** Removing/Installing/Repositioning the Caster Assemblies - Standard Forks

## 11 WHEELS

### Installing the Caster

1. Align the caster with the desired mounting holes in the fork.
2. Insert the threaded bushing with mounting screw, through the two axle spacers and caster. **DO NOT** use excessive force.



### WARNING

Use Loctite™ 242 when reinstalling the mounting screw into the threaded bushing. Otherwise the fork can become disassembled. Possible injury or damage could result.

3. Apply Loctite 242 to the mounting screw.
4. Reinstall the mounting screw into the threaded bushing and tighten securely.

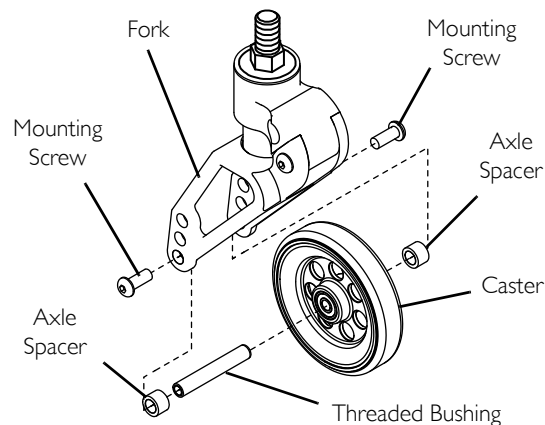
### One Sided Fork

#### Removing the Caster

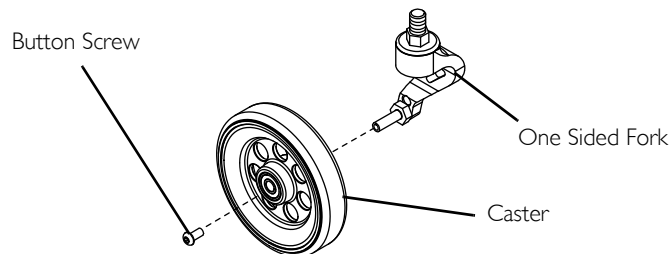
1. Remove the button head screw that secure the caster to the fork.

#### Installing the Caster

1. Secure caster to one sided fork with button head screw. Tighten securely.



**FIGURE 17** Removing/Installing/Repositioning the Caster Assemblies - Suspension Forks



**FIGURE 18** Removing/Installing/Repositioning the Caster Assemblies - One Sided Fork



### 11.14 Removing/Installing the Fork Assembly



If replacing a fork, note the mounting position of the existing front caster for installation of the new fork.

#### Removing Fork Assembly

1. Remove the front caster from the fork. Refer to [Removing Front Caster](#) on page 79.
2. Perform one of the following:
  - Standard Forks - Remove locknut securing the fork from the fork stem (Detail “A”).
  - Suspension Fork (Detail “B”) -
    - a. Unscrew fork stem from head tube.
  - One Sided Fork (Detail “C”) -
    - a. Unscrew fork stem from head tube.

#### Installing Fork Assembly



#### **WARNING**

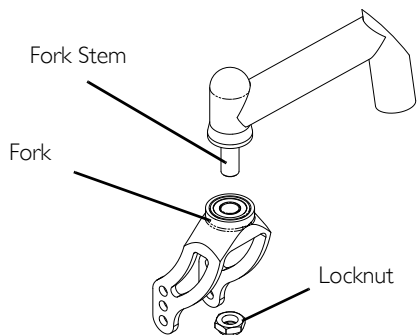
Use Loctite™ 242 on threads fork stem when reinstalling the suspension fork or one sided fork into the head tube. Otherwise, the fork may become loose and disengage from the headtube. Possible injury or damage could result.

1. Perform one of the following:
  - Standard Forks - Using a locknut, secure the fork to the fork stem (Detail “A”).
  - Suspension Fork (Detail “B”) -
    - a. Apply Loctite 242 on stem threads.
    - b. Screw fork stem into head tube. Tighten securely.
  - One Sided Fork (Detail “C”)
    - a. Apply Loctite 242 on stem threads.
    - b. Screw fork stem into head tube. Tighten securely.

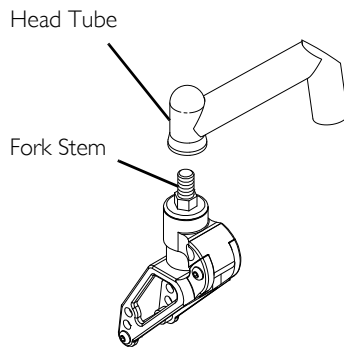
## 11 WHEELS

2. Install the front caster. Refer to [Installing Front Caster](#) on page 79.

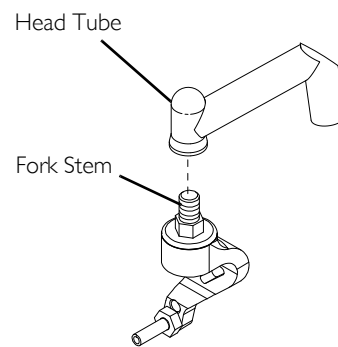
### DETAIL “A” - STANDARD FORK



### DETAIL “B” - SUSPENSION FORK



### DETAIL “C” - ONE SIDED FORK



**FIGURE 19** Removing/Installing the Fork Assembly

### 11.15 Removing/Installing the Elastomers (Suspension Forks Only)



#### **CAUTION**

DO NOT use excessive force when removing/installing the threaded sleeve from/onto the fork. Damage to the threaded sleeve may occur.

#### **Removing the Elastomer**



One mounting screw will not turn.

1. Using two allen wrenches, turn mounting screws in opposite directions and remove one mounting screw from fork.

2. Remove the threaded bushing and mounting screw securing the suspension fork top to the elastomer and the suspension fork bottom. **DO NOT** use excessive force.
3. If replacing the elastomer, discard the existing elastomer.

### Installing the Elastomer



Make sure the elastomer sits in the two recessed areas on the fork.

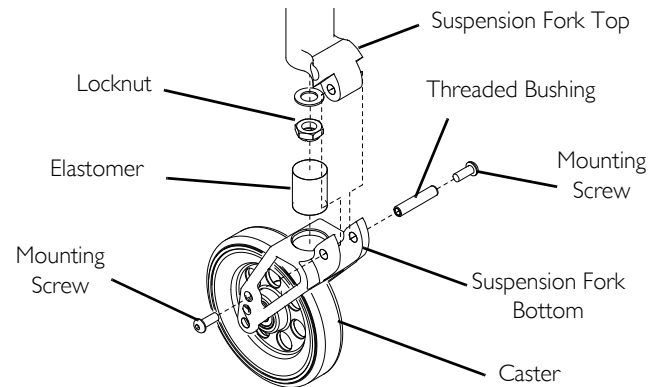
1. Position the new elastomer between the suspension fork top and suspension fork bottom.
2. Align the mounting holes in the suspension fork top and suspension fork bottom.
3. Using the threaded bushing and mounting screw, secure the suspension fork top and suspension fork bottom. **DO NOT** use excessive force.



### WARNING

Use Loctite 242 when reinstalling the mounting screw into the threaded bushing. Otherwise the fork can become disassembled. Possible injury or damage could result.

4. Apply Loctite 242 to the mounting screw.
5. Reinstall the mounting screw into the threaded bushing and tighten securely.



**FIGURE 20** Removing/Installing the Elastomers (Suspension Forks Only)

### 12 Anti-Tipper

---



#### **WARNING**

After ANY adjustments, repair or service and BEFORE use, make sure all attaching hardware is tightened securely - otherwise injury or damage may occur.

#### 12.1 Adjusting/Replacing Anti-tipper



For this procedure, refer to FIGURE 1 on page 86 and FIGURE 2 on page 87.



#### **WARNING**

Anti-tippers **MUST** be attached at all times. Inasmuch as the anti-tippers are an option on this wheelchair (you may order it with or without the anti-tippers), Invacare strongly recommends ordering the anti-tippers as an additional safeguard for the wheelchair user.

Anti-tippers **MUST** be fully engaged. Ensure the lock buttons of the anti-tippers fully protrudes out of the mounting hole in the anti-tipper bracket.

Ensure both anti-tippers are adjusted to the same height.



To ensure the correct model anti-tipper is used refer to FIGURE 1. Measurements for anti-tippers are approximate and are taken using the top adjustment hole on the anti-tipper (Detail "A").

## Adjusting Anti-tipper



### WARNING

When anti-tippers are used, anti-tippers **MUST** be adjusted to maintain a 1-1/2 to 2-inch clearance between the bottom of the anti-tipper wheels and the ground/ floor. This spacing should **ALWAYS** be checked whenever adjustments/changes are made to the wheelchair. Failure to maintain proper spacing may result in the chair tipping over backward causing serious injury or property damage.

1. Press in the lock button that secures the anti-tipper wheel assembly to the anti-tipper bar.
2. Adjust the height of the anti-tipper wheels to between 1-1/2 and 2-inches of the ground/floor.
3. Repeat STEPS 1-2 for the opposite anti-tipper.

## Replacing Anti-tipper



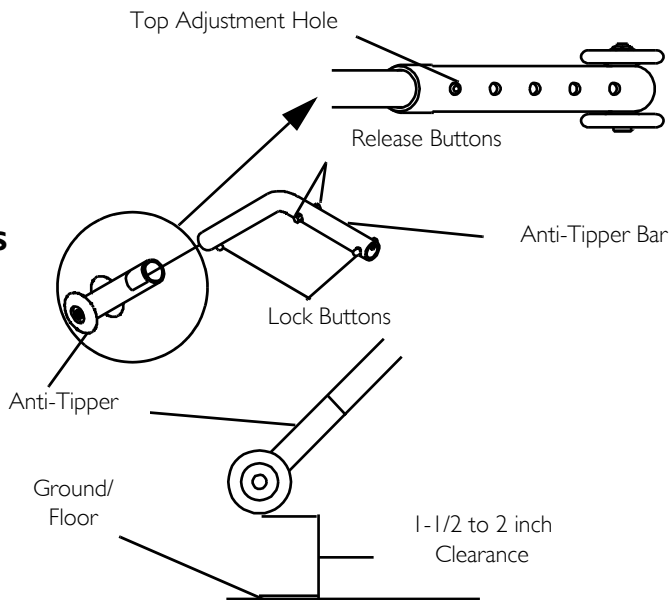
### WARNING

When anti-tippers are used, anti-tippers **MUST** be adjusted to maintain a 1-1/2 to 2-inch clearance between the bottom of the anti-tipper wheels and the ground/floor. This spacing should **ALWAYS** be checked whenever adjustments/changes are made to the wheelchair. Failure to maintain proper spacing may result in the chair tipping over backward causing serious injury or property damage.

1. Press in the release button that secures the existing anti-tipper to the anti-tipper bracket and remove the anti-tipper from the anti-tipper bracket.
2. Insert the new anti-tipper into the anti-tipper bracket until lock buttons protrude out of mounting hole.
3. Press in the lock button on the anti-tipper bar and install the anti-tipper wheels onto the new anti-tipper bar.
4. Repeat STEPS 1-3 for the opposite anti-tipper.
5. Measure the distance between the bottom of the anti-tipper wheels and the ground floor.
6. If necessary, adjust the height of the anti-tippers. Refer to [Adjusting Anti-tipper](#) on page 85.

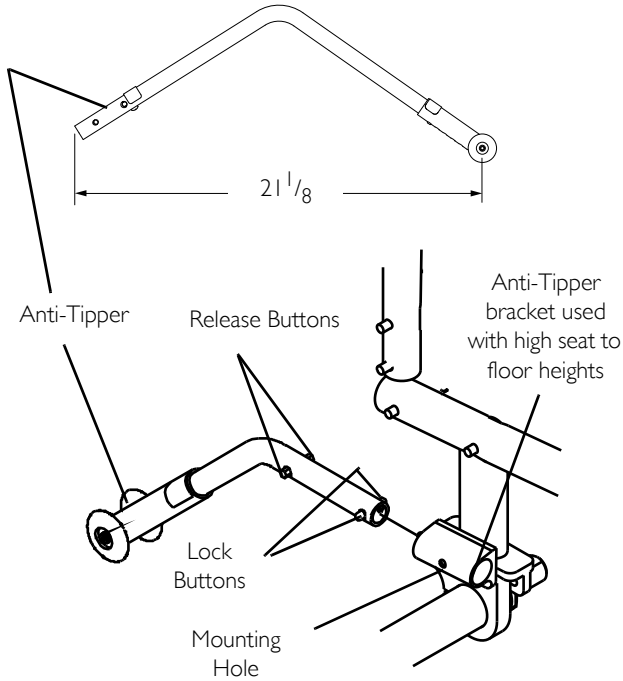
## 12 ANTI-TIPPER

### DETAIL "A" - ANTI-TIPPER ADJUSTMENT HOLES

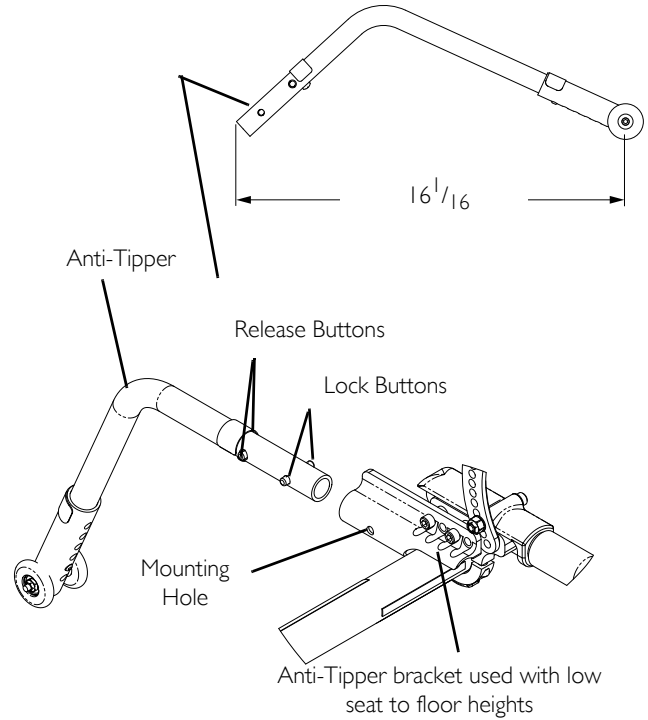


**FIGURE 1** Adjusting/Replacing Anti-tipper

**ANTI-TIPPERS USED WITH HIGH SEAT TO FLOOR HEIGHTS**



**ANTI-TIPPERS USED WITH LOW SEAT TO FLOOR HEIGHTS**



**FIGURE 2** Adjusting/Replacing Anti-tipper



Yes, you can.<sup>®</sup>

Part No 1167484

Rev A - 9/10



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