

# ***TOP END***<sup>®</sup>



## **User Manual**

**EN**

Invacare<sup>®</sup> **Top End Reveal**<sup>™</sup> Wheelchair

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



***Yes, you can.***<sup>®</sup>

© 2011 Invacare Corporation. All rights reserved. Republication, duplication or modification in whole or in part is prohibited without prior written permission from Invacare. Trademarks are identified by ™ and ®. All trademarks are owned by or licensed to Invacare Corporation or its subsidiaries unless otherwise noted.

Natural Fit is a registered trademark of Three Rivers.

Spinery is a registered trademark of Spinery, Inc.

3-in-1 oil is a registered trademark of American Home Products Corporation.

WD-40 is a registered trademark of WD-40 Company.

Loctite 242 is a trademark of the Loctite Corporation.

Teflon is a registered trademark of E.I. Du Pont De Nemours and Company.

Schwalbe is a registered trademark of Ralf Bohle Gmbh & Co. KG Corporation, Germany.

<b>1</b>	<b>GENERAL</b>	<b>6</b>
	Symbols .....	6
	Limited Warranty .....	7
<b>2</b>	<b>SAFETY</b>	<b>8</b>
	General Guidelines .....	8
<b>3</b>	<b>OVERVIEW</b>	<b>12</b>
	Label Locations .....	12
	Component Identification .....	13
	Typical Product Parameters .....	14
<b>4</b>	<b>SAFETY/HANDLING OF WHEELCHAIRS</b>	<b>17</b>
	Safety/Handling of Wheelchairs .....	17
	Stability and Balance .....	17
	Coping with Everyday Obstacles .....	20
	A Note to Wheelchair Assistants .....	20
	Tipping .....	21
	Stairways .....	22
	Escalators .....	24
	Transferring To and From Other Seats .....	24
<b>5</b>	<b>SAFETY INSPECTION</b>	<b>25</b>
	Safety Inspection Checklist .....	25
	Troubleshooting .....	28
	Maintenance .....	28

## CONTENTS

<b>6 FOOTREST</b>	<b>32</b>
Adjusting/Replacing Standard Footrest.....	32
Replacing/Adjusting Optional Adjustable Angle Footrest.....	33
<b>7 ARMS</b>	<b>36</b>
Installing the Swingaway Padded Armrest Socket .....	36
Installing/Removing/Adjusting the Swingaway Padded Armrest.....	41
Removing/Installing and Adjusting T-Arms .....	42
<b>8 BACK</b>	<b>43</b>
Unfolding/Folding the Back .....	43
Back Angle Adjustment .....	45
Adjustable Tension Back Upholstery .....	50
Removing/Installing Foldover Back Upholstery.....	56
Back Height Adjustment.....	57
Removing/Installing the Back Frame .....	59
<b>9 SEAT</b>	<b>60</b>
Replacing Seat Upholstery .....	60
Changing Seat Angle/Changing Rear Seat Height .....	61
<b>10 WHEEL LOCKS</b>	<b>63</b>
Replacing/Adjusting the Wheel Locks .....	63
Changing Wheel Lock Handle Position .....	64
Converting Wheel Lock From Push-to-Lock to Pull-to-Lock or Pull-to-Lock to Push-to-Lock .....	65
<b>11 WHEELS</b>	<b>66</b>
Removing/Installing Rear Wheels.....	66
Adjusting Quick-Release Axles .....	67

Replacing Quad-Release Axles..... 68

Adjusting Quad-Release Handles ..... 68

Handrim Replacement ..... 70

Adjusting Wheelbase Length [Adjusting Center of Gravity (COG)] ..... 71

Adjusting Wheelbase Width ..... 74

Removing/Installing the Camber Tube..... 75

Adjusting the Camber Tube ..... 77

Determining/Setting Toe In/Toe Out..... 78

---

**12 CASTER 80**

---

Adjusting Fork Tension ..... 80

Removing/Installing/Repositioning the Caster Assemblies ..... 82

Removing/Installing the Fork Assembly ..... 83

Repositioning the Front Caster Housings..... 85

Caster Housing Angle Adjustment ..... 86

---

**13 ANTI-TIPPER 89**

---

Adjusting/Replacing Anti-tipper ..... 89

Reversing Anti-tipper Bracket Orientation ..... 93

# I General

---

### I.1 Symbols

#### Warnings

Signal words are used in this manual and apply to hazards or unsafe practices which could result in personal injury or property damage. See the information below for definitions of the signal words.



#### **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 Reveal frame to be free from defects in materials and workmanship for the original purchaser 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

---

### 2 Safety

---

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

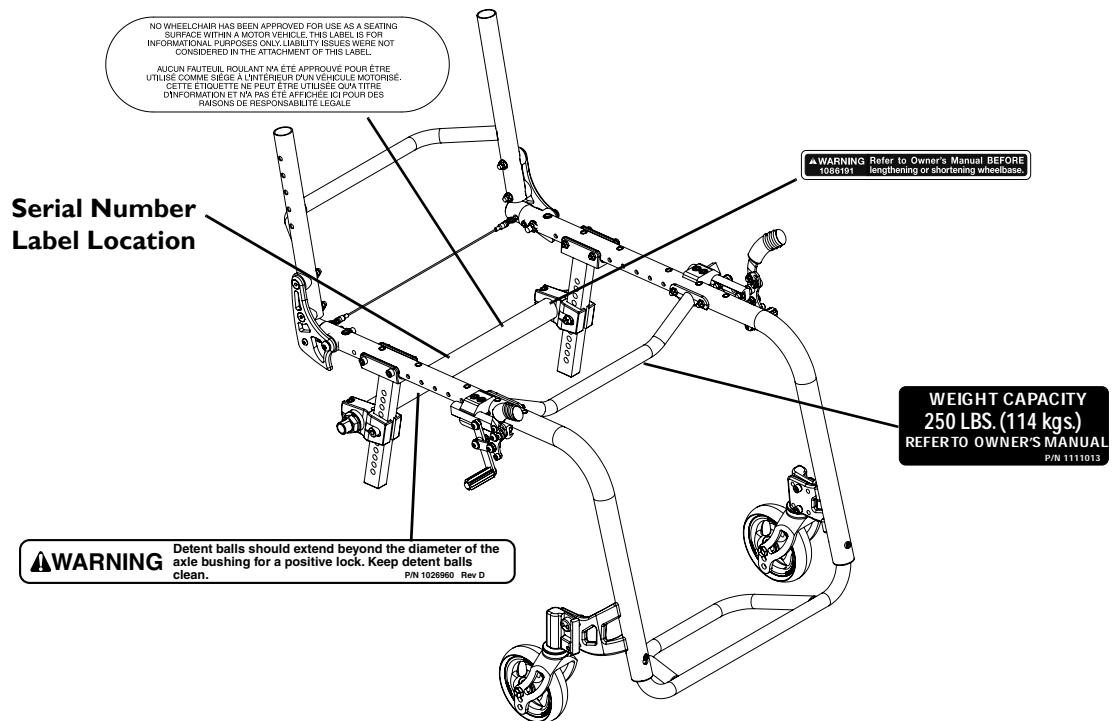
Invacare **DOES NOT** recommend the use of its wheelchairs as a weight training apparatus. Invacare wheelchairs have not been designed or tested as a seat for any kind of weight training. If occupant uses said wheelchair as a weight training apparatus, Invacare shall not be liable for bodily injury and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

**Weight Limitation:** Invacare's Top End Reveal 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.

	REVEAL RVL
<b>MODEL NUMBER:</b>	RVL
<b>FRONT FRAME:</b>	Non Tapered front end (Standard)
<b>FRONT FRAME ANGLE:</b>	75°, 85°
<b>FOOTREST:</b>	Tubular footrest (Standard), Adjustable Angle, Plastic Cover (Optional)
<b>SEAT HEIGHT</b> FRONT: REAR:	15 - 20 inches (Fixed) 14 to 20 Inches (Adjustable)
<b>ARMS (OPTIONAL):</b>	Swing-away Padded, T-arm
<b>SIDE GUARDS (OPTIONAL)</b>	Removable, Removable with Fender, Fold-In
<b>SEAT WIDTH:</b>	12 to 20 inches
<b>SEAT DEPTH:</b>	12 to 20 inches
<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
<b>BACK ANGLE</b> FOLDING:	-8°, -4°, 0°, +4°, +8°

	REVEAL RVL
<b>BACK UPHOLSTERY:</b>	U850 (Ballistic Black) - Adjustable Tension by Straps Breathable Mesh (Grey) Adjustable Tension by Straps Foldover
<b>SEAT UPHOLSTERY:</b>	Sail Cloth - Screw-On
<b>AXLE POSITIONS/CENTER OF GRAVITY:</b>	Range of Adjustability: 1 to 3 inches
<b>REAR WHEEL AXLE:</b>	Quick Release (Standard), Quad-Release
<b>REAR WHEEL CAMBER CAMBER TUBE:</b>	0° or 3°
<b>REAR WHEELS</b> REAR WHEEL TYPE: REAR TIRES:  REAR WHEEL SIZE:	Light Weight Performance Spokes, Fusion 16 Spokes, Spinergy® Spox Knobby, Solid, Schwalbe®, Kenda High Pressure Pneumatic and Treaded Pneumatic Tires (Optional 1 <sup>3</sup> / <sub>8</sub> pneumatic, Pneumatic with flat free insert) 22, 24 or 25-inch (Standard), 26-inch (Optional)
<b>HANDRIMS:</b>	Aluminum Anodized (Standard) Coated, Natural Fit® (Optional)
<b>WHEEL LOCKS:</b>	Pull/Push to Lock (Standard) or Hideaway Undermount Lock, Hill Holders (Optional)
<b>FRONT FORKS:</b>	Non-Suspension (Standard), One Sided (Optional)
<b>CASTERS</b> CASTER SIZE: CASTER TYPE:	4, 5 or 6 inch Semi-pneumatic (Standard), Soft Roll or Lighted (Optional)
<b>ANTI-TIPPERS:</b>	Optional

### 3 OVERVIEW

	REVEAL RVL
<b>*WEIGHT:</b>	19.71 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.



---

## 4 Safety/Handling of Wheelchairs

---

### 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.

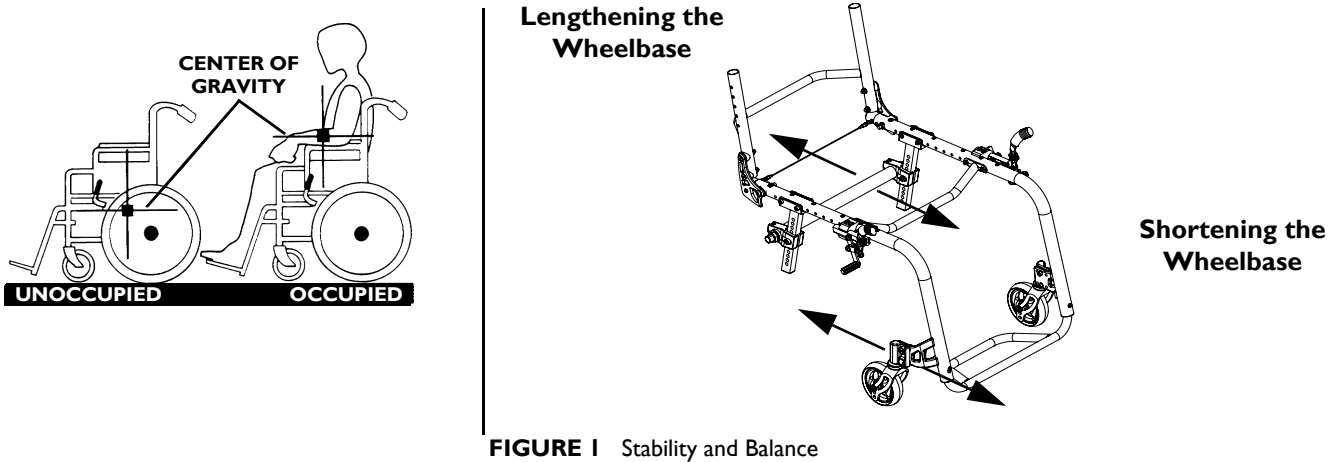


FIGURE I Stability and Balance

### 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.

## 4 SAFETY/HANDLING OF WHEELCHAIRS

### Reaching, Leaning - Backwards

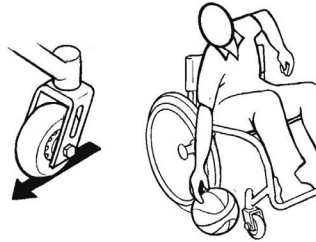


#### **WARNING**

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.

#### 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.

## 4 SAFETY/HANDLING OF WHEELCHAIRS

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.

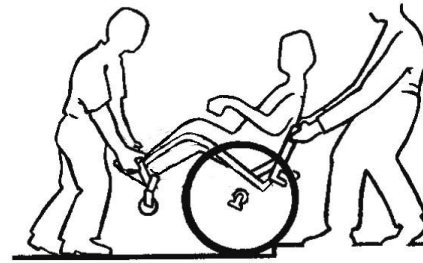


FIGURE 3 Tipping - Curbs

### 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

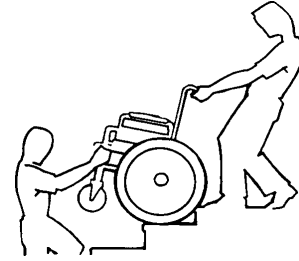
1. If necessary, rotate the anti-tippers so the wheels are facing up.
2. One assistant (positioned behind the wheelchair), securely grasps a non-removable (non-detachable) part of the wheelchair for leverage and tilts the wheelchair back to the balance point.
3. After the wheelchair has been tilted back 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 detent balls are fully expanded and locking onto axle bushing. Adjust as needed.
- 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.
- If caster flutter occurs, tighten fork stem nut to set needed drag.
- Inspect tires for flat spots, damage and wear. Replace as required.
- 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 and caster assembly fastened tightly.
- 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 that folding back is fully locking into place when back is open. Adjust as needed.
- Ensure wheel bearings are clean and free of moisture.
- Ensure fasteners holding seat upholstery are all tight. Tighten and/or replace fasteners as required.

### **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.

## 5 SAFETY INSPECTION

- Ensure wheel bearings are clean and free of moisture.
- Check that all labels are present and legible. Replace if necessary.

### 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 fork 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 67 or [Adjusting Quad-Release Handles](#) on page 68.



#### **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 SAFETY INSPECTION

5. Clean quick-release axles and camber inserts once a week with a Teflon® 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 31 and [Replacing/Repairing Caster Tire/Tube](#) on page 31.

6. Periodically adjust wheel locks in correlation to tire wear. Refer to [Replacing/Adjusting the Wheel Locks](#) on page 63.



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. Replace wheels if spokes are broken.
8. Ensure that folding back is fully locking into place when back is open. Adjust as needed.
9. Periodically check handrims to ensure they are secured to the rear wheels. Refer to [Handrim Replacement](#) on page 70.
10. Periodically check caster wheel bearings to make sure they are clean and free from moisture. Use a Teflon® lubricant if necessary.
11. Check upholstery for sagging, rips or tears and loose or broken fasteners. Replace or tighten as necessary.
12. Clean upholstery with mild soap and water.
13. 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.

#### **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 housing angle **MUST** also be changed to keep the caster fork perpendicular to the floor. Refer to [Removing/Installing/Repositioning the Caster Assemblies](#) on page 82 **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 89.

### 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

### 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 mounting 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 1 $\frac{3}{4}$ -inches above the ground/floor to avoid hitting protruding objects when using this wheelchair.

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.

#### 6.1 Adjusting/Replacing Standard Footrest



For this procedure, refer to FIGURE 1 on page 33.

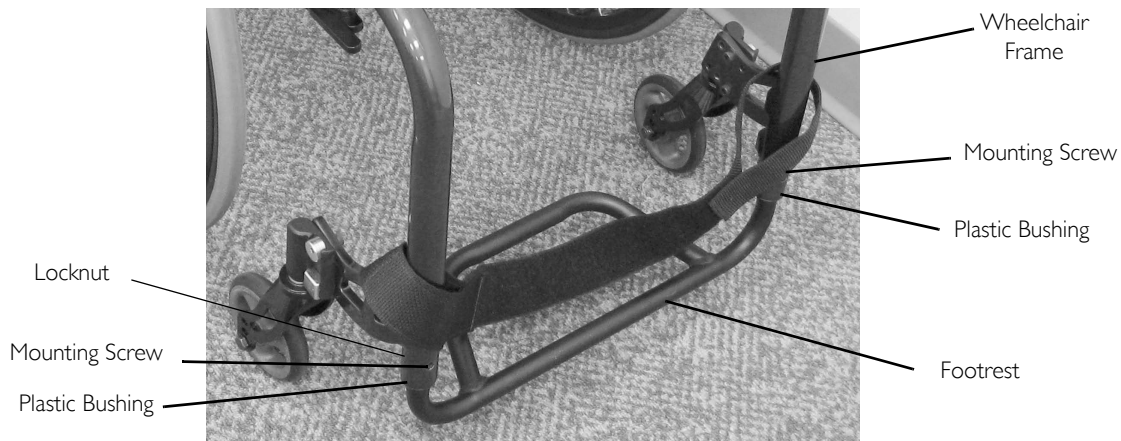
##### **Adjusting the Footrest**

1. Remove the two mounting screws and locknuts that secure the footrest to the wheelchair frame.
2. Adjust footrest to desired height.
3. Reinstall the two mounting screws to secure the footrest to the wheelchair frame.



### Replacing the Footrest

1. Remove the two mounting screws and locknuts that secure the footrest to the wheelchair frame.
2. Remove existing footrest.
3. Install new footrest.
4. Install the two mounting screws and locknuts to secure the footrest to the wheelchair frame. Tighten locknuts.



**FIGURE 1** Adjusting/Replacing Standard Footrest

### 6.2 Replacing/Adjusting Optional Adjustable Angle Footrest



For this procedure, refer to FIGURE 2 on page 35.

### Replacing the Footrest

1. Remove the two mounting screws and locknuts that secure the footrest to the wheelchair frame.

## 6 FOOTREST

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.



Be sure plastic bushings are in place before installing mounting screws.

4. Tighten the mounting screws and locknuts to secure the footrest to the wheelchair frame.
5. Adjust the footplate to the desired position. Refer to [Adjusting Footplate Angle](#) on page 34 and/or [Adjusting Footplate Depth](#) on page 34.

### **Adjusting Footplate Angle**

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

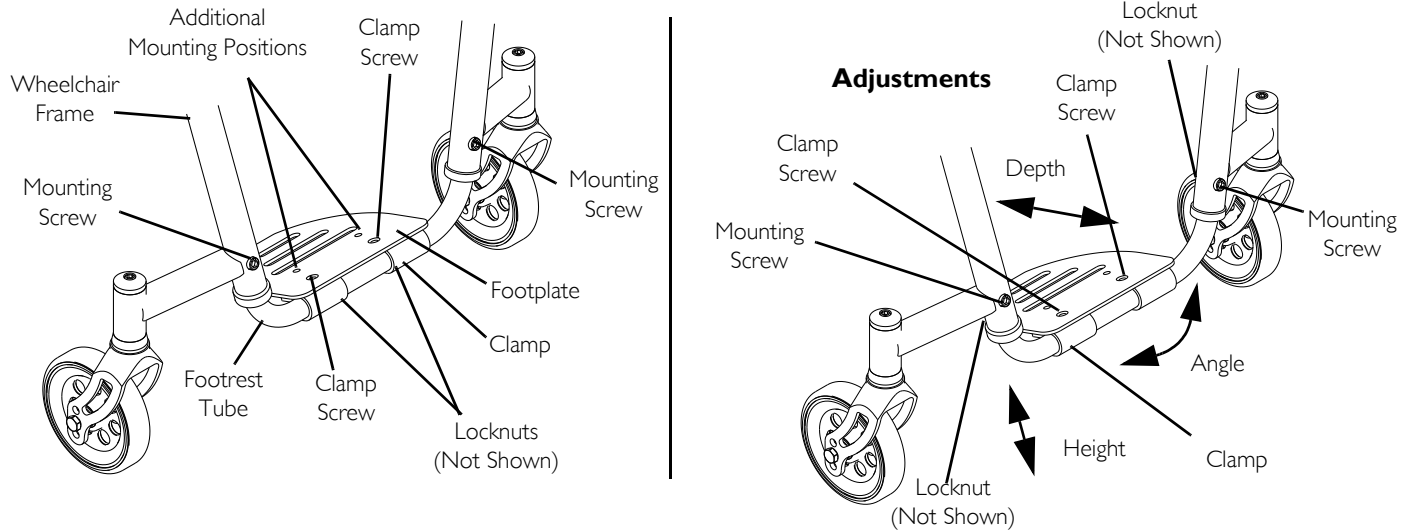
### **Adjusting Footplate Depth**

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



Observe the angle of footplate for reinstallation. Be sure footplate and clamp are centered in the width of the chair.

2. Move the footplate to one of two mounting positions to accommodate the user.
3. Using the two clamp screws and locknuts, secure the footplate to the footrest tubes and 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**



For this procedure, refer to FIGURE 1 on page 37, FIGURE 2 on page 37, and FIGURE 3 on page 38.

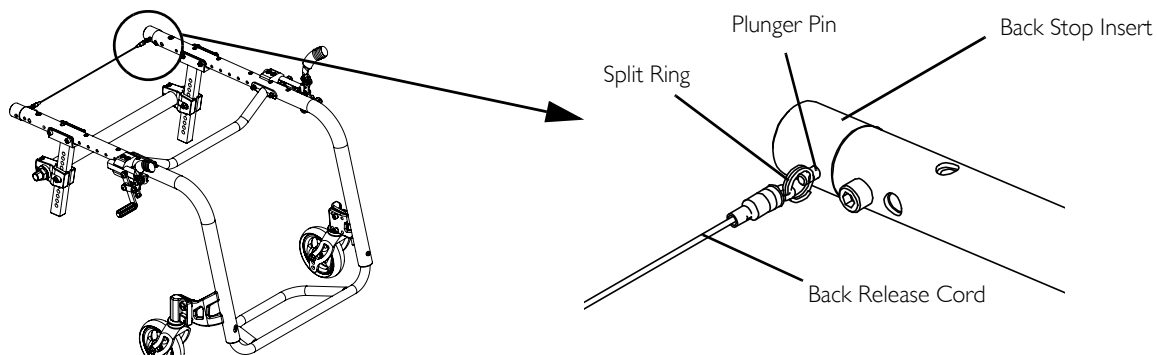
1. Remove the back. Refer to Removing/Installing the Back Frame on page 59.
2. Remove the split ring of the back release cord from the plunger pin in the back stop insert.



#### **WARNING**

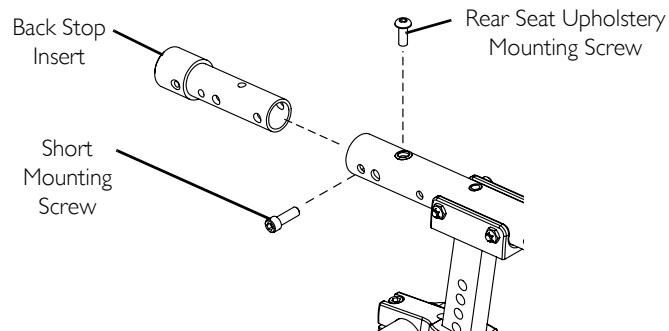
Plunger pin is spring loaded and can be projectile. Use caution when removing, otherwise injury may occur.

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

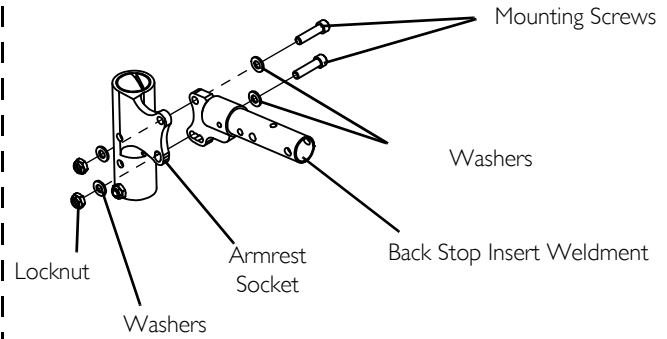
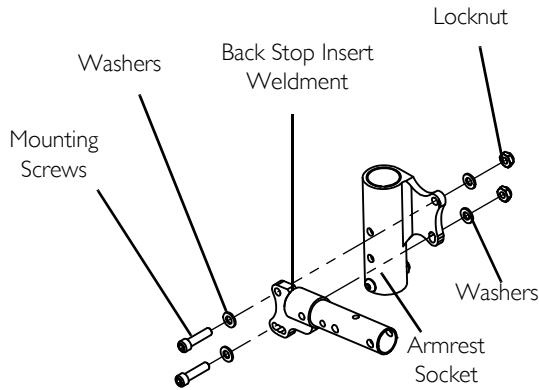
5. Remove the rear seat upholstery mounting screw and short mounting screw (FIGURE 2).
6. Remove the back stop insert from seat rail (FIGURE 2).
7. Perform STEPS 5-6 on remaining back stop insert.
8. Secure the back stop insert weldment to the armrest socket, in the orientation shown, with two mounting 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

## 7 ARMS

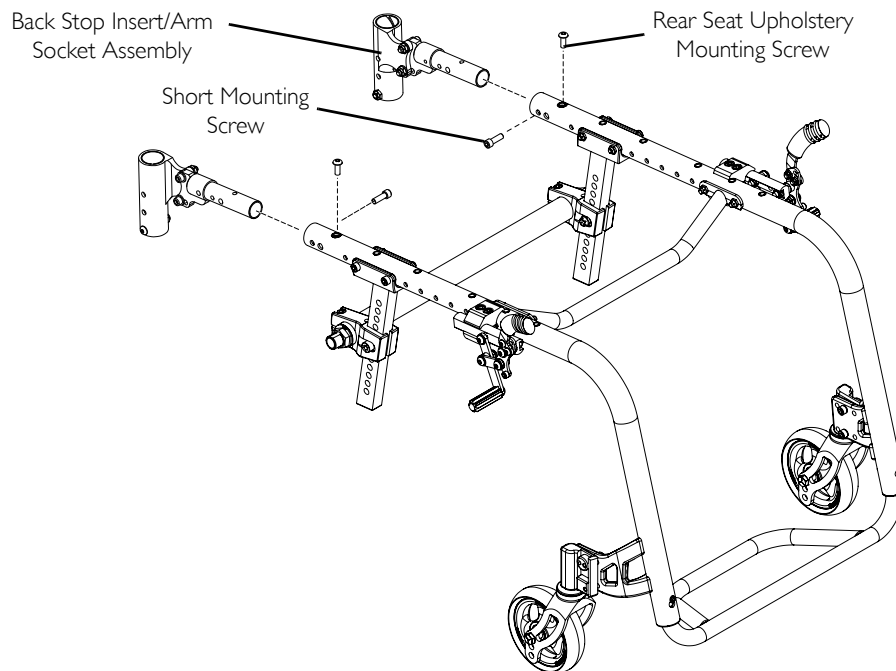
### Right Side Armrest Socket



### Left Side Armrest Socket

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

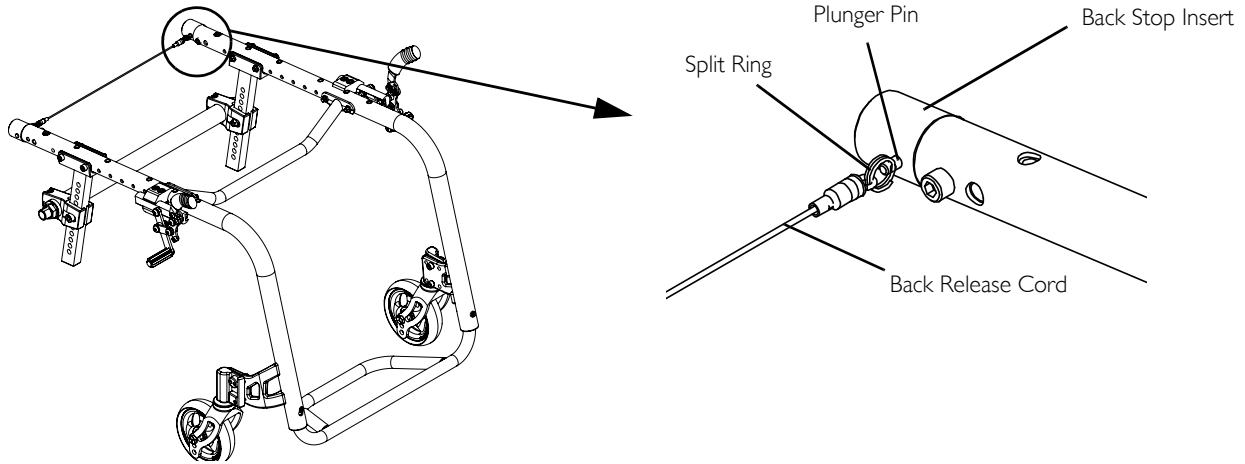
10. Install the back stop insert/arm socket assembly into the seat rail.
11. Install short mounting screw through seat rail and into back stop insert/arm socket assembly. DO NOT tighten.
12. Install rear seat upholstery mounting screw. DO NOT tighten.



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

## 7 ARMS

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 10-14 for remaining back stop insert.



**FIGURE 5** Connect Back Release Cord

16. Install the back. Refer to [Removing/Installing the Back Frame](#) on page 59.



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

### Installing

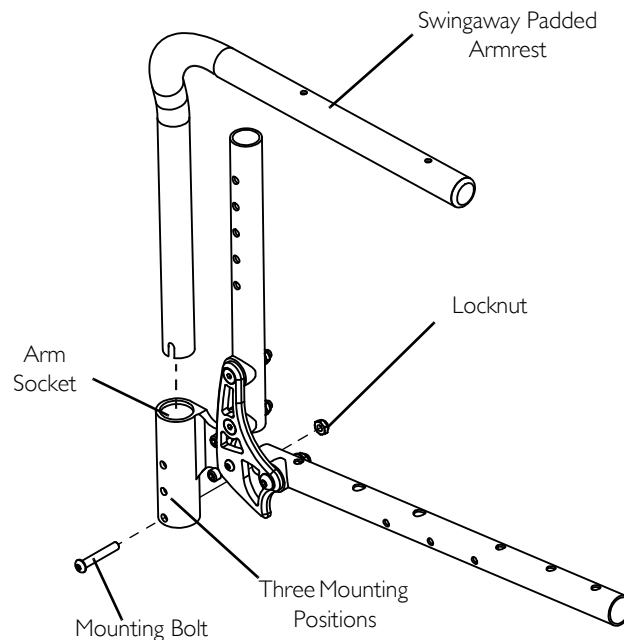
1. Tighten mounting bolt and locknut in desired mounting hole.
2. Insert swing away padded armrest into armrest socket so that notch fits around mounting bolt.

### 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 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 ARMS

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

#### Removing/Installing T-Arms

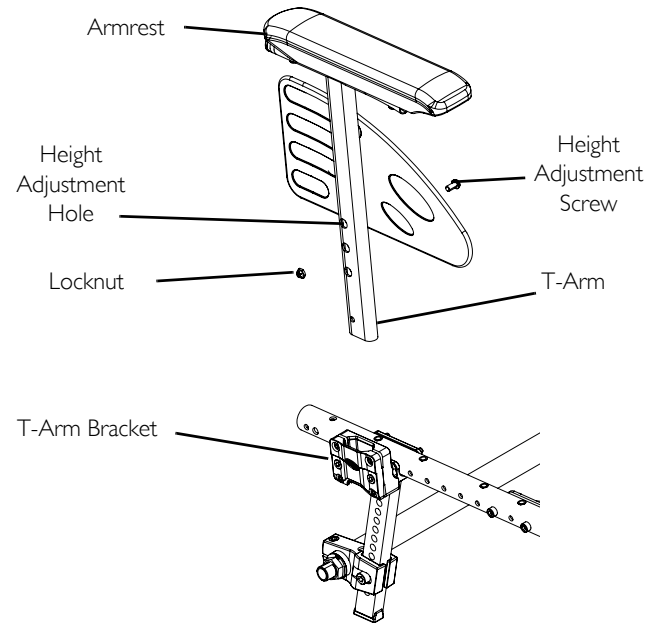


To remove the T-arm, reverse this procedure.

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 42.
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 42.



**FIGURE 7** Adjusting T-Arm Height

## 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 "C" in FIGURE 1). Back **MUST** be locked securely in place. Otherwise, serious injury could result.



For this procedure, refer to FIGURE 1 on page 44.

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"



**FIGURE 1** Unfolding/Folding the Back


## 8.2 Back Angle Adjustment

 For this procedure, refer to FIGURE 2 on page 47, FIGURE 3 on page 48, FIGURE 4 on page 49, and FIGURE 5 on page 50.

 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 48 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 43.
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°, 0° and -4°. Flip the adjustment square over to obtain back angles of 8°, 4° and 0° (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.



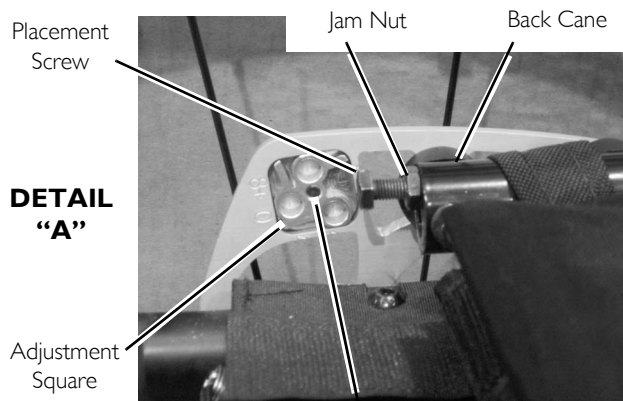
### **WARNING**

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”).

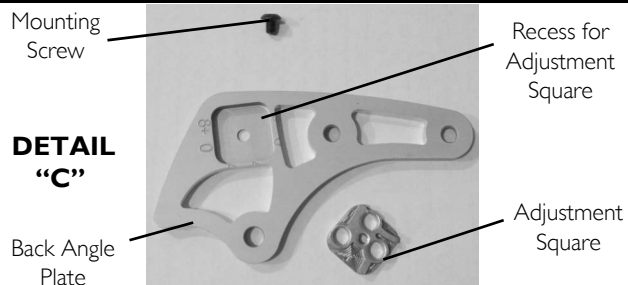
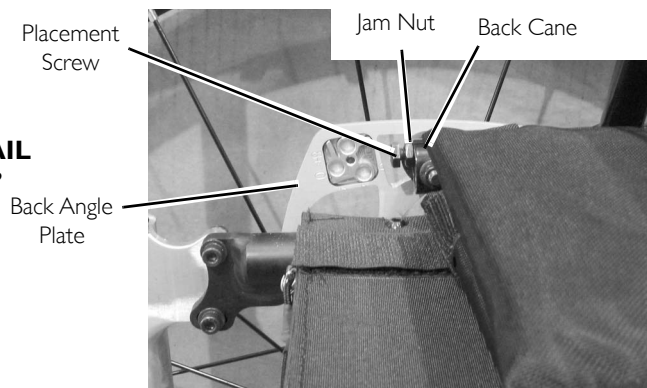


When adjusted properly, the back should have a small amount of movement when locked in the open position. Plunger pins should snap in and release easily without resistance.



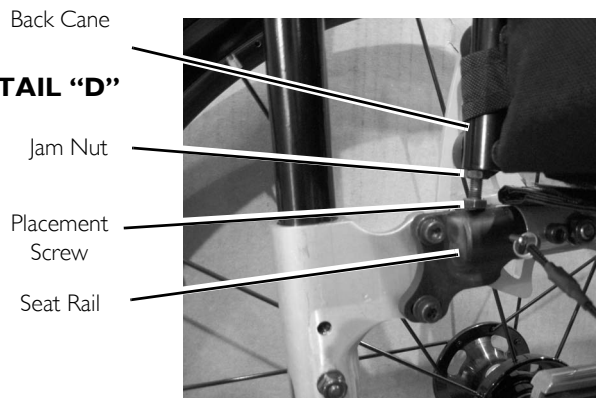
Mounting screw secures the adjustment square from the other side of the plate

**DETAIL "B"**



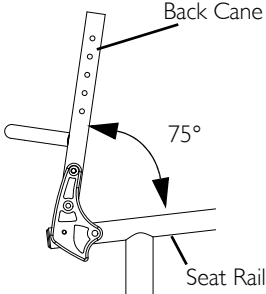
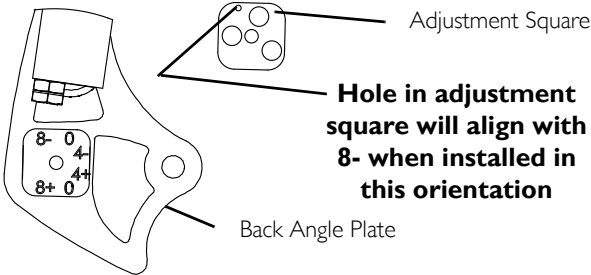
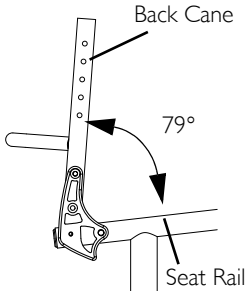
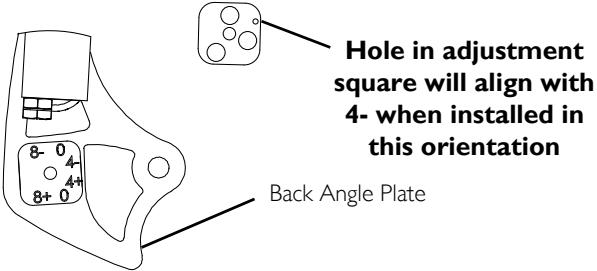
Back angle plate, mounting screw and adjustment square are removed for clarity.

**DETAIL "D"**



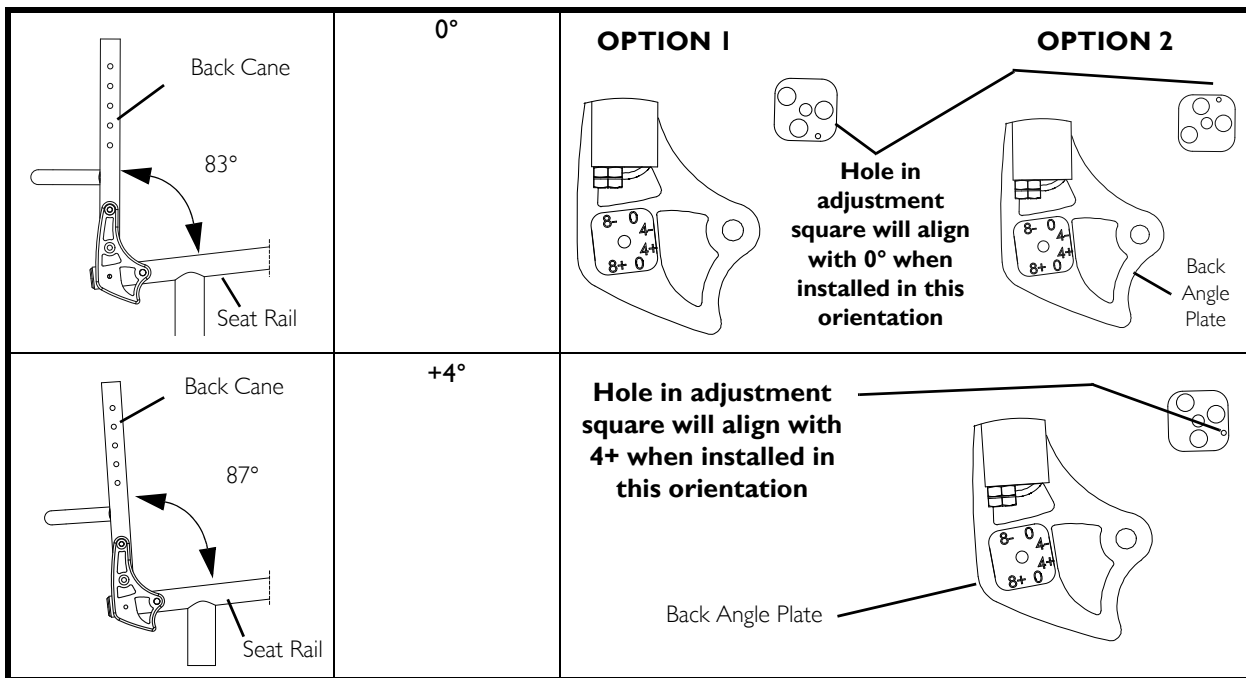
**FIGURE 2** Back Angle Adjustment

# 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>

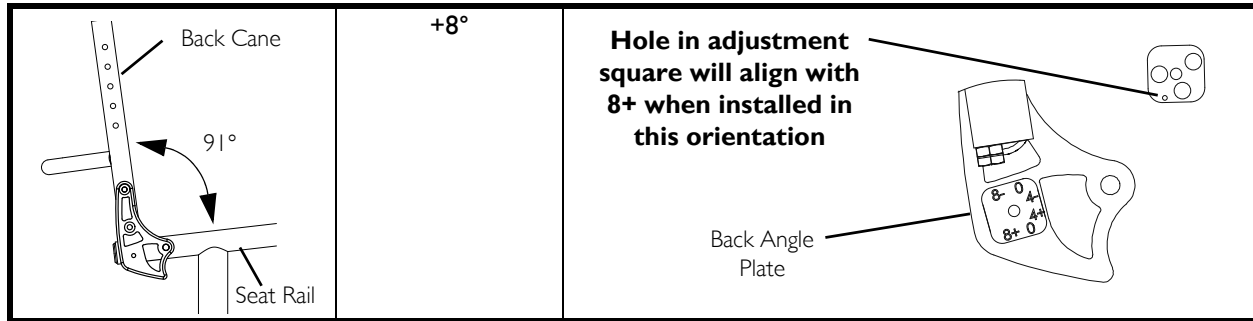
**FIGURE 3** Back Angle Adjustment - Adjustment Square Position





**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'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.

#### The Back Upholstery Cover



The back upholstery cover is designed for three reasons:

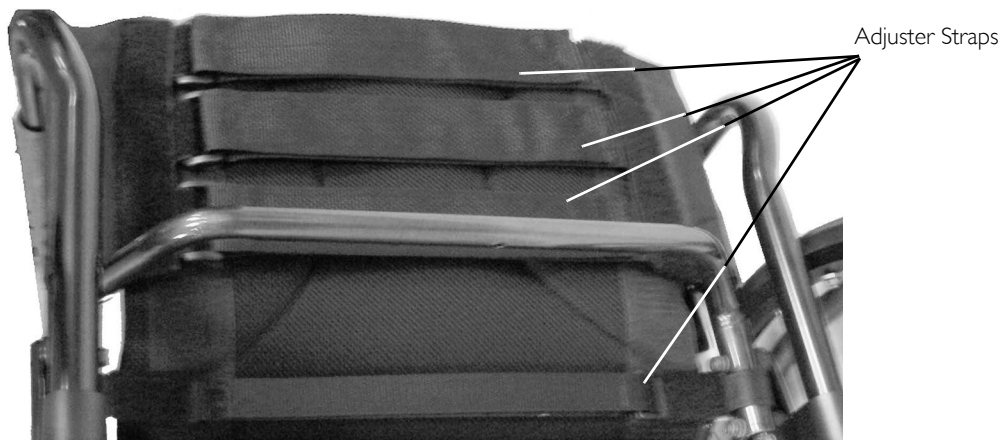
- The first is as a modesty cover.
- The second is to keep the cushion from sliding out of the back of the wheelchair.
- The third is a sacral support depending upon how far or tight the flap is pulled under the seat cushion.
- The adjuster fastening straps can be adjusted at various levels of tension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

## Adjusting the Back Tension

**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 - Adjusting the Back Tension

## 8 BACK

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



For this procedure, refer to FIGURE 7 on page 54 and FIGURE 8 on page 55.

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.

#### 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 upholstery cover. Refer to [Removing the Back Upholstery Cover](#) on page 52.
2. Slide adjustable tension back upholstery off back canes (Details “C” and “D”).

#### Removing the Lumbar Strap

1. Remove the back upholstery cover. Refer to [Removing the Back Upholstery Cover](#).
2. Fold back forward. Refer to [Unfolding/Folding the Back](#) on page 43.
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 43.
5. Install the back upholstery. Refer to Removing the Back Upholstery Cover

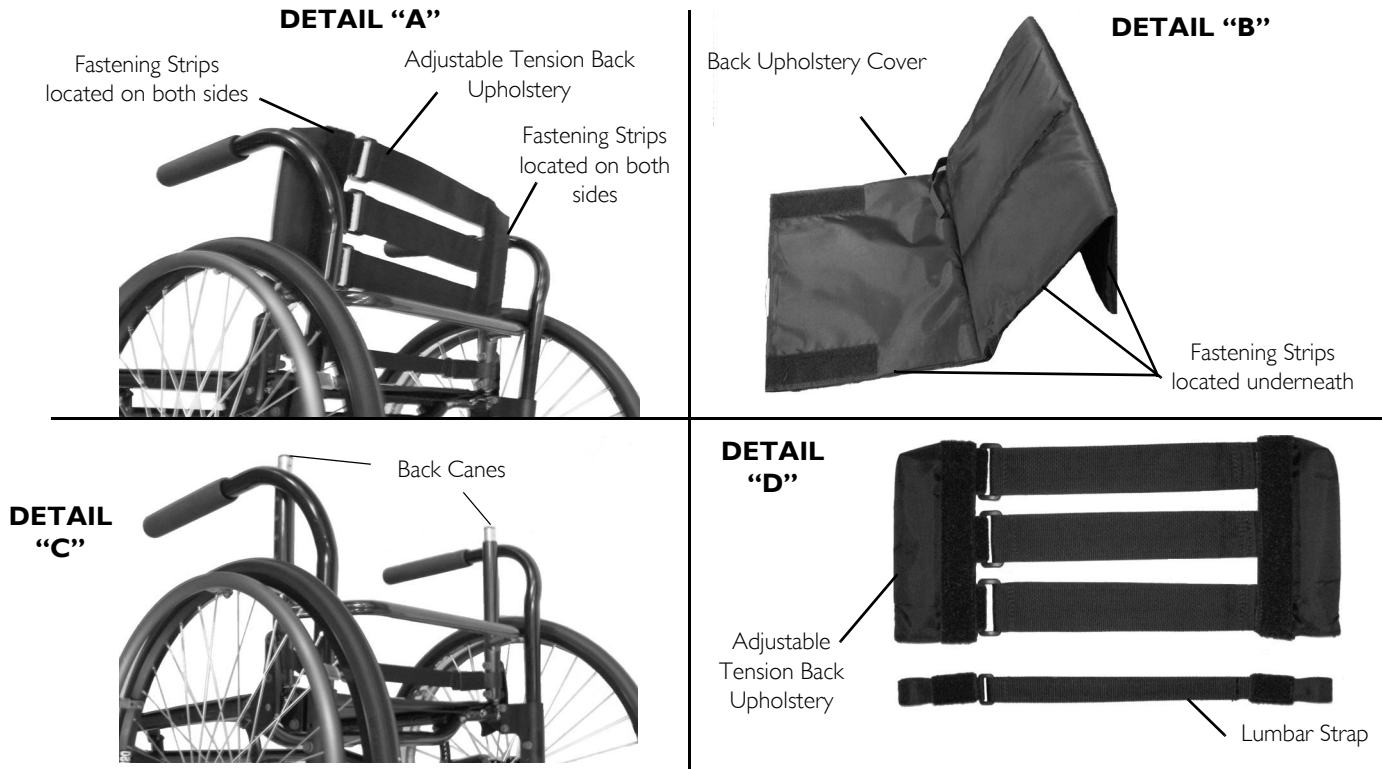
#### **Installing the Adjustable Tension Back Upholstery**

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

#### **Installing the Back Upholstery Cover**

- I. 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”).

## 8 BACK



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

**DETAIL "E"**

Bottom Mounting Screw, Covered  
Spacer, Washer, and Locknut

Back Cane

Top Mounting Screw



Lumbar  
Strap

Fastening Strips located in between the back upholstery cover and  
the adjustable tension back (both sides)

Adjustable Tension  
Back Upholstery

**DETAIL "F"**

Back Upholstery Cover

Fastening Strips located in  
between the back  
upholstery cover and the  
seat upholstery



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

## 8 BACK

### 8.4 Removing/Installing Foldover Back Upholstery



#### **WARNING**

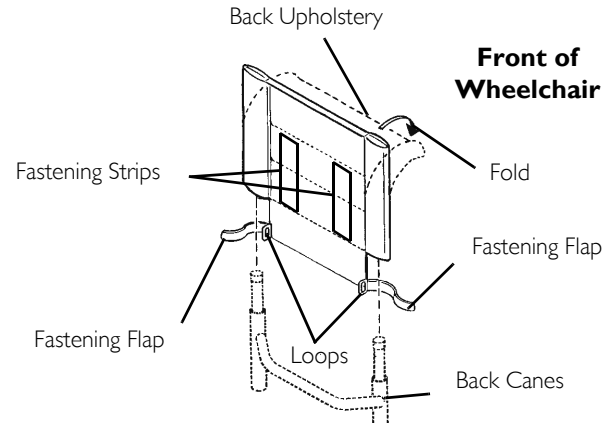
ALWAYS perform these procedures in the presence of an assistant. The position of the footrest, camber tube, seat angle, back angle, the tautness of the back upholstery as well as the user's condition are directly related to the wheelchairs stability. Any change to one or any combination of the five may 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.



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



## 8.5 Back Height Adjustment



Observe the tautness of the back upholstery for reinstallation.

For this procedure, refer to FIGURE 10 on page 58.

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 52.



### 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:

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.)

3. 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 52.
4. Check the tautness of the back. Refer to Adjusting the Back Tension on page 51.

## 8 BACK



**FIGURE 10** Back Height Adjustment

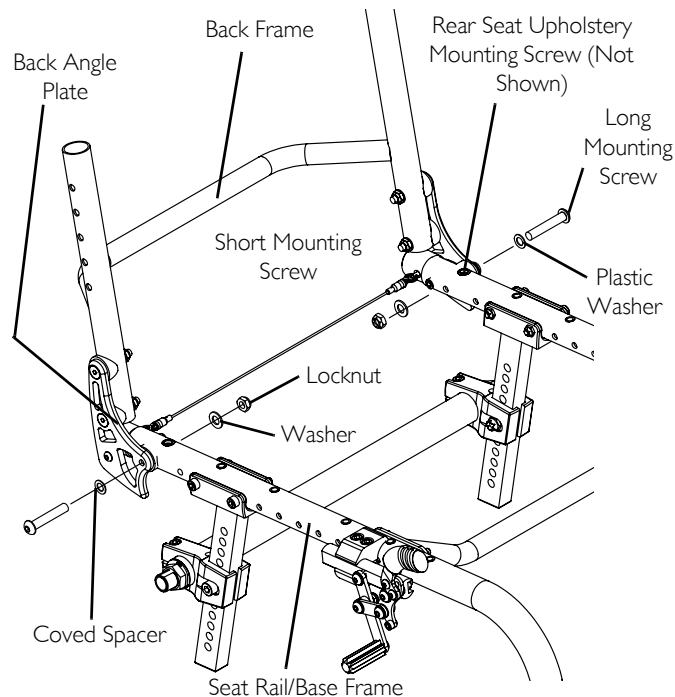
## 8.6 Removing/Installing the Back Frame

### Removing

1. Fold the back down. Refer to [Unfolding/Folding the Back](#) on page 43.
2. Loosen rear seat upholstery screw and short mounting screw but DO NOT remove.
3. Remove the two long mounting screws, plastic washers, coved spacers, washers, and lock nuts that secures the back angle plates to the seat rails/base frame.
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 44.
2. Install the long mounting screw through plastic washer, back angle plate, coved spacer and seat rail/base frame.
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 43.



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

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



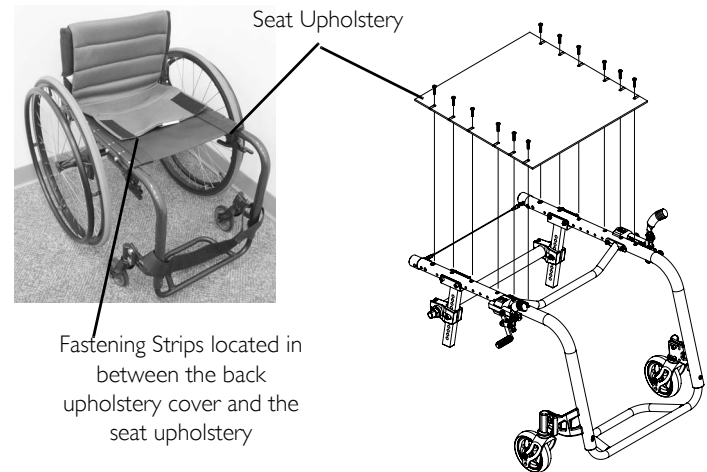
## WARNING

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 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.
4. Remove the existing seat upholstery.
5. Secure new seat upholstery with mounting screws. Tighten securely.
6. Install the seat cushion onto the wheelchair.
  - For 12 to 13 depth, use 8 mounting screws
  - For 14 depth, use 10 mounting screws
  - For 15 to 16 depth, use 12 mounting screws
  - For 17 to 19 depth, use 14 mountings screws
  - For 19 to 20 depth, use 16 mounting screws



**FIGURE 1** Replacing Seat Upholstery

## 9.2 Changing Seat Angle/Changing Rear Seat Height



For this procedure, refer to FIGURE 2 on page 62.

If the wheelchair has 3° camber, the camber will need to be adjusted after completing this procedure. Refer to Refer to Determining/Setting Toe In/Toe Out on page 78.

When changing the seat angle/rear seat to floor height, the caster housing will have to be adjusted perpendicular to the floor. Refer to Removing/Installing/Repositioning the Caster Assemblies on page 82.

1. Fold the back down. Refer to Unfolding/Folding the Back on page 43.
2. Remove the rear wheels. Refer to Removing/Installing Rear Wheels on page 66.
3. Turn wheelchair upside down.
4. Remove the mounting screw and locknut that secures the camber tube clamp assembly to the height adjustment bar.
5. Repeat STEPS 4 - 5 for remaining side of wheelchair.



### CAUTION

While performing STEP 6, ensure to move camber tube clamp assembly evenly on both height adjustment bars. Moving one side faster than the other will result in the camber tube clamp assembly jamming between the height adjustment bars making it extremely difficult to adjust to desired mounting position.

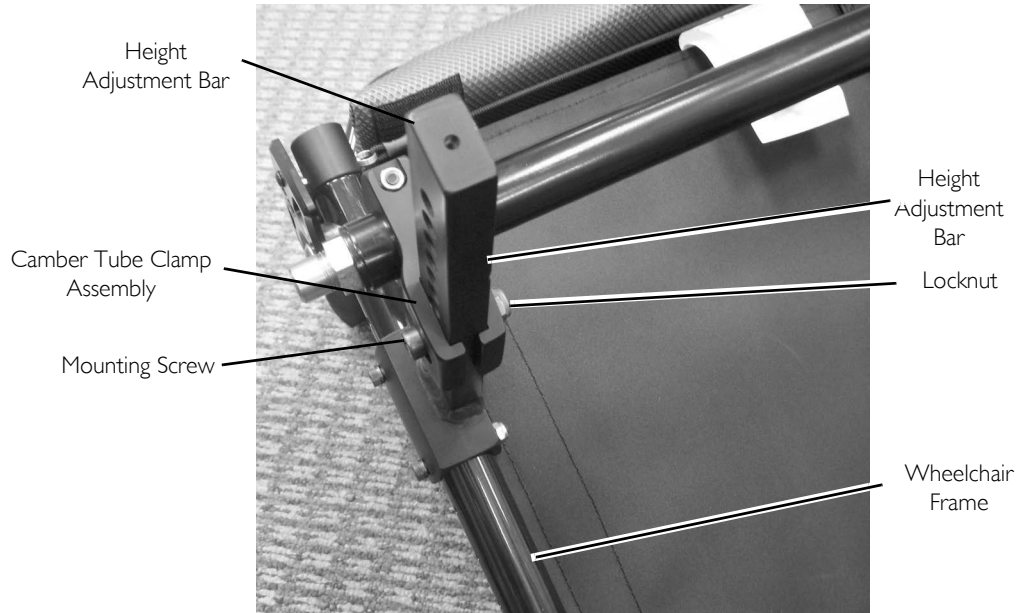


It may be necessary to gently pry open the camber tube clamp using a screwdriver.

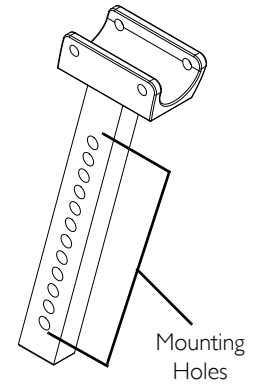
6. Slide camber tube clamp assembly to the desired mounting position on the height adjustment bar.
7. Secure camber tube clamp to height adjustment bar with mounting screw and locknut.
8. Repeat STEP 7 for remaining camber tube clamp. Tighten securely.
9. Install rear wheels. Refer to Removing/Installing Rear Wheels on page 66.
10. Unfold back. Refer to Unfolding/Folding the Back on page 43.

## 9 SEAT

### Bottom View



### Height Adjustment Bar



**FIGURE 2** Changing Seat Angle/Changing Rear Seat Height

## 10 Wheel Locks



### 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.



For this procedure, refer to FIGURE 1 on page 64.

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.



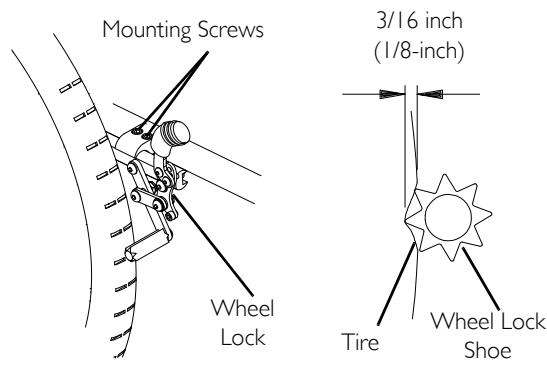
Any wheel lock adjustment should embed the wheel lock shoe at least 3/16-inch into the pneumatic tire (1/8-inch for urethane wheels) when engaged.

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.

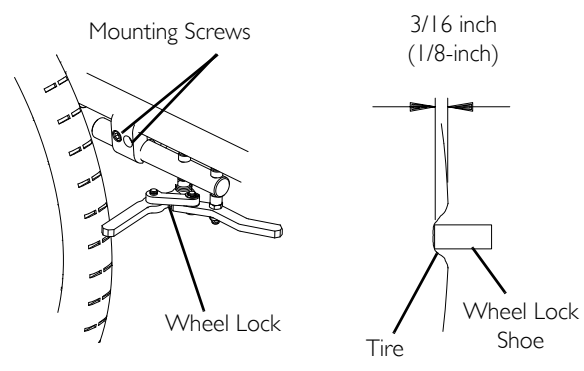
## 10 WHEEL LOCKS

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

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



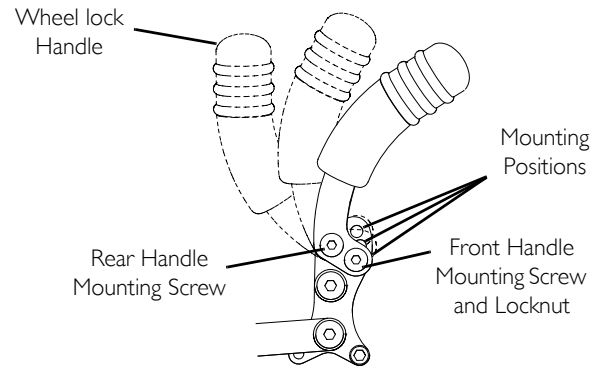
### Under Mount Wheel Lock



**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”).



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 63.

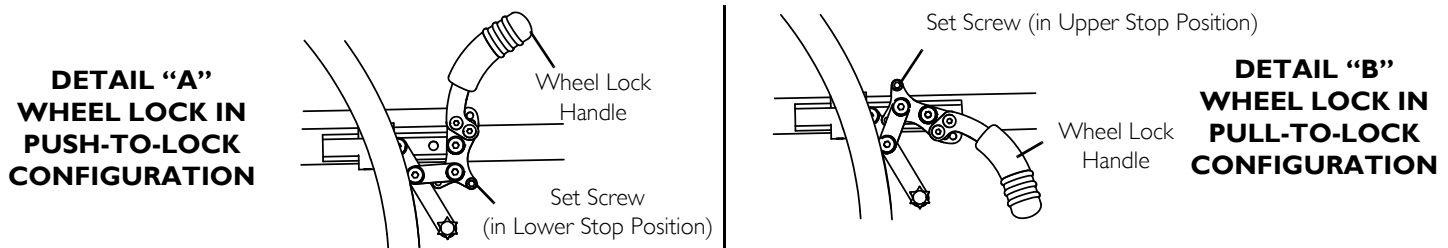
#### Converting From Pull-to-Lock to Push-to-Lock

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



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 63.



**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.



For this procedure, refer to FIGURE 1 on page 67.

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**

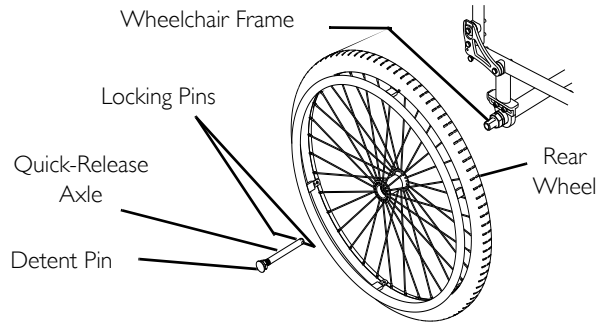
Pull on the rear wheel to make sure the detent pin and locking pins of the quick/ quad-release axle are fully released before operating wheelchair.

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 67 or [Adjusting Quad-Release Handles](#) on page 68.



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



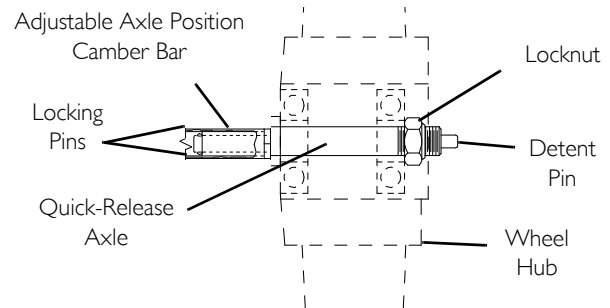
**FIGURE 1** Removing/Installing Rear Wheels

## 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 66.
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 66.



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 66.
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 66.
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 68.
8. Repeat STEPS 1-7 for the opposite rear wheel.

### 11.4 Adjusting Quad-Release Handles



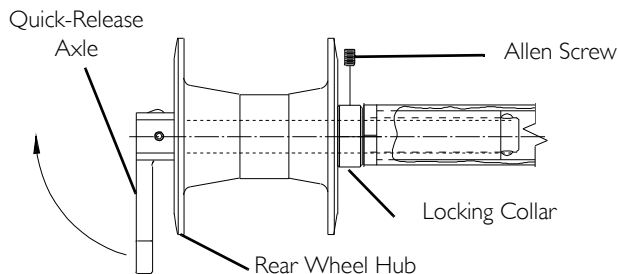
For this procedure, refer to FIGURE 4 on page 69.

#### In and/or Out

1. Remove rear wheel and the quad-release axle from the wheelchair. Refer to [Removing/Installing Rear Wheels](#) on page 66.
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.



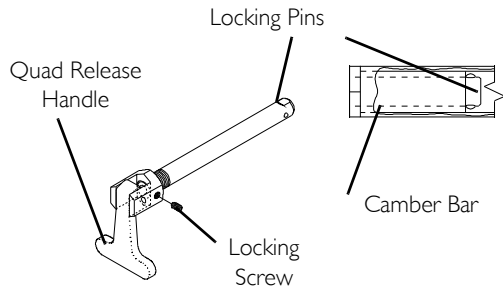
End of Quick Release axle is shown for reference only. It is not visible when inserted into camber bar.



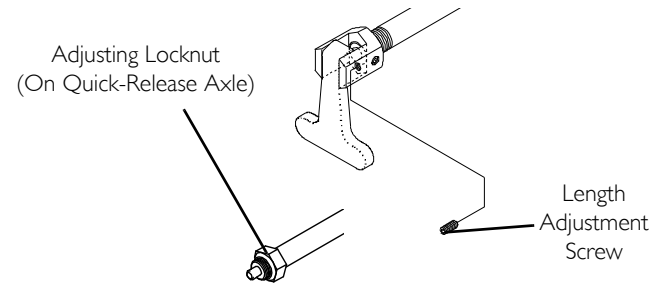
**FIGURE 3** Replacing Quad-Release Axles

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 66.
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 WHEELS

### 11.5 Handrim Replacement

1. Remove the rear wheel from the wheelchair. Refer to [Removing/Installing Rear Wheels](#) on page 66.



#### **WARNING**

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

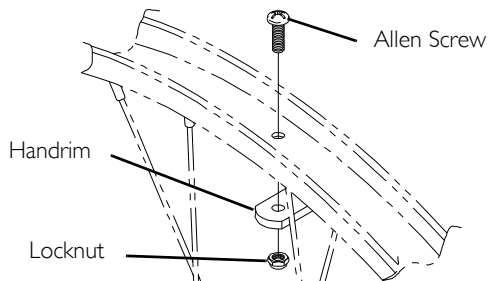
2. Remove all air from the tube by pressing down on the pin in the center of the valve stem.
3. While carefully holding the tire, tube and rim strip to one side, hold the allen screws and remove the locknuts that secure the handrim to the rear wheel.
4. Remove the existing handrim.
5. Install new handrim 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 66.
8. Repeat STEPS 1-7 for opposite rear wheel if necessary.



**FIGURE 5** Handrim Replacement

### 11.6 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.

#### **Determining Wheelbase Length**

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



**FIGURE 6** Wheelbase Length

## 11 WHEELS



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

- Moving the height adjustment bar forward or back on the frame.
- Moving the caster housing forward or back on frame

### Moving the height adjustment bar forward or back on the frame.<sup>6</sup>

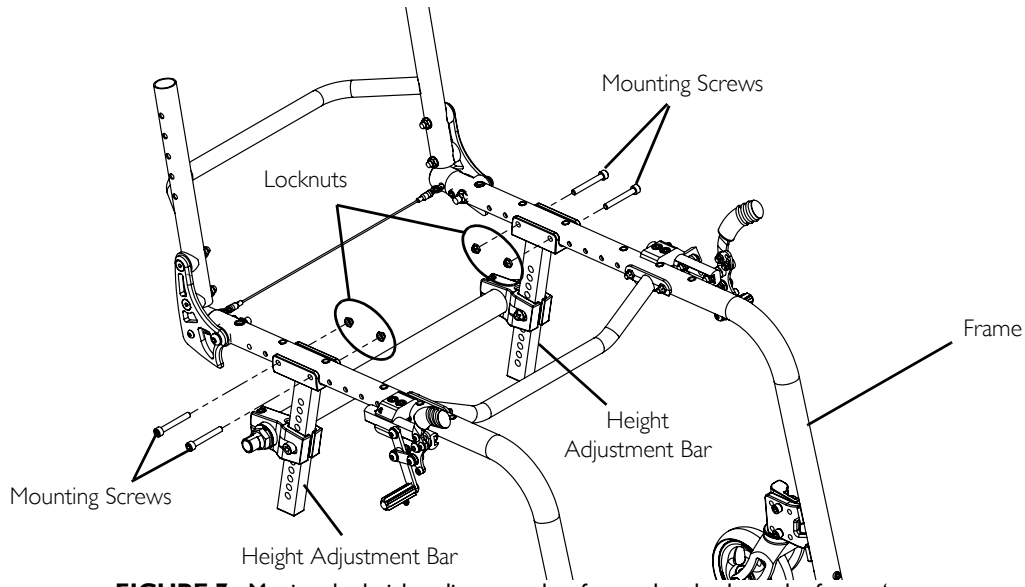


#### **WARNING**

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.

1. Fold the back down. Refer to [Unfolding/Folding the Back](#) on page 43.
2. Remove the rear wheels. Refer to [Removing/Installing Rear Wheels](#) on page 66.
3. Remove the mounting screws and locknuts that secure the height adjustment bar to the frame.
4. Repeat STEP 3 for remaining height adjustment bar.
5. Slide height adjustment bars forward or back to the desire mounting location on the frame.
6. Secure the height adjustment bars to the frame with two mounting screws and locknuts. Tighten securely.





**FIGURE 7** Moving the height adjustment bar forward or back on the frame. ‘

## 11 WHEELS

### 11.7 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  $\frac{3}{4}$  per side =  $1\frac{1}{2}$  inch total range of adjustment.

1. Remove the rear wheels. Refer to [Removing/Installing Rear Wheels](#) on page 66.
2. Loosen the axle nut and rotate axle busing 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 or measure the amount of axle bushing showing beyond the axle nut.



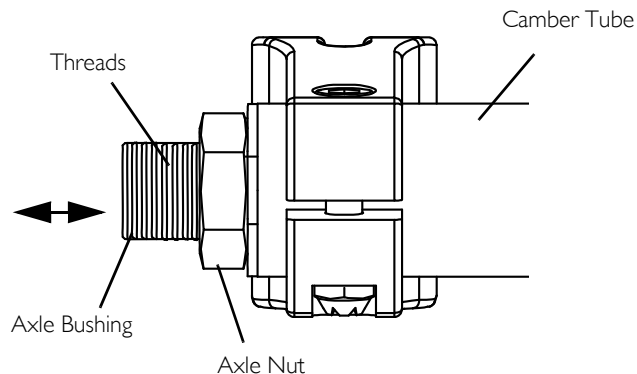
#### WARNING

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



The amount of axle bushing showing beyond the nut should be equal on both sides of the wheelchair. Otherwise, wheelchair performance may be affected.

5. Repeat STEPS 2-4 for the opposite axle bushing.
6. Install the rear wheels. Refer to [Removing/Installing Rear Wheels](#) on page 66



**FIGURE 8** Adjusting Wheelbase Width

## 11.8 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.



For this procedure, refer to FIGURE 9 on page 76.

### Removing the Camber Tube

1. Remove the rear wheels. Refer to [Removing/Installing Rear Wheels](#) on page 66.



It may be necessary to gently pry open the camber tube clamp assembly using screwdriver.

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.

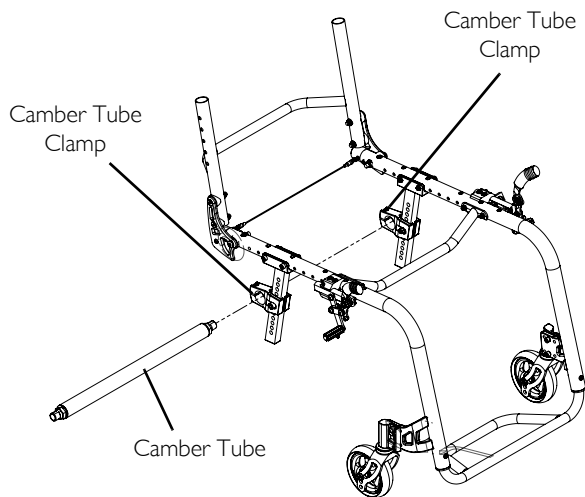
### Installing the Camber Tube

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 77.

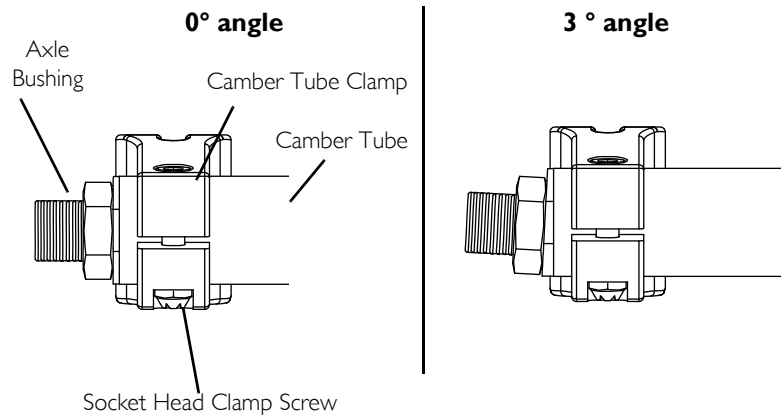


There are two types of camber tubes: 0° and 3°. If the camber tube being used is 3° degrees, then the camber tube **MUST** be rotated so that the axle bushings at the ends of camber tube are angled up (Detail "A"). Installing the camber tube in any other orientation will directly impact the angle of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

## 11 WHEELS



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



**FIGURE 9** Removing/Installing the Camber Tube

11.9 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.



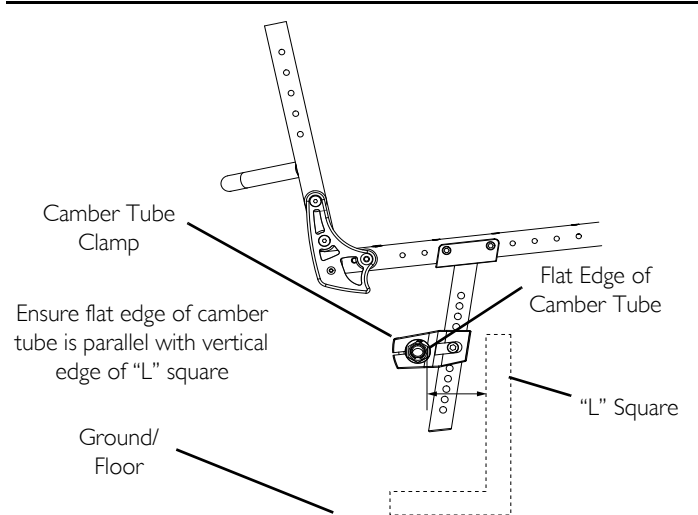
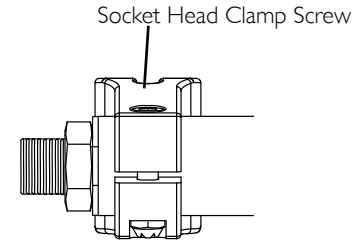
Ensure camber tube is centered between clamps.

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 10).

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 78.

**DETAIL "A" - SIDE VIEW**



**FIGURE 10** Adjusting the Camber Tube

## 11 WHEELS

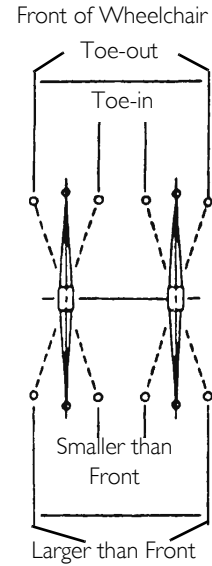
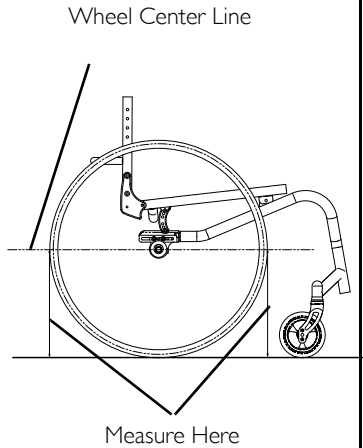
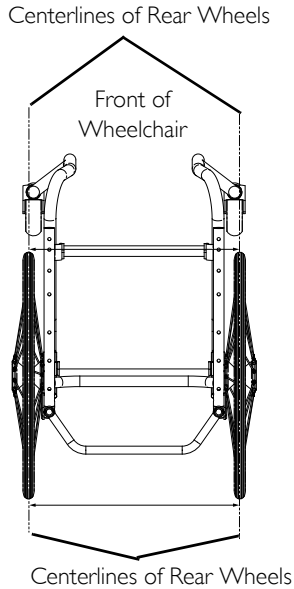
### 11.10 Determining/Setting Toe In/Toe Out



For this procedure, refer to FIGURE 9 on page 76 and FIGURE 11.

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 11).
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 11).
  - 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 11).
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 9).
  - B. Rotate the camber tube until front and rear measurement are within  $\frac{1}{8}$ -inch (FIGURE 9).
  - C. Securely tighten both socket head clamp screws (FIGURE 9).

**Top View of Wheelchair**



**Top View of Wheelchair**

**FIGURE 11** Determining/Setting Toe In/Toe Out

### 12 Caster



#### **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 Fork Tension**

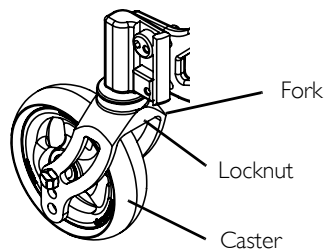


For this procedure, refer to FIGURE 1 on page 81.

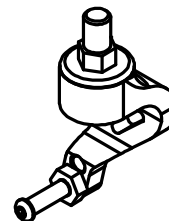
1. To properly tighten forks and guard against flutter, perform the following check on both forks:
  - A. Tip back the wheelchair to floor.
  - B. Pivot both forks and casters to top of their arc simultaneously.
  - C. Let casters drop to bottom of arc (wheels should swing once to one-side, then IMMEDIATELY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



**FIGURE I** Adjusting Fork Tension

## 12 CASTER

### 12.2 Removing/Installing/Repositioning the Caster Assemblies



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.

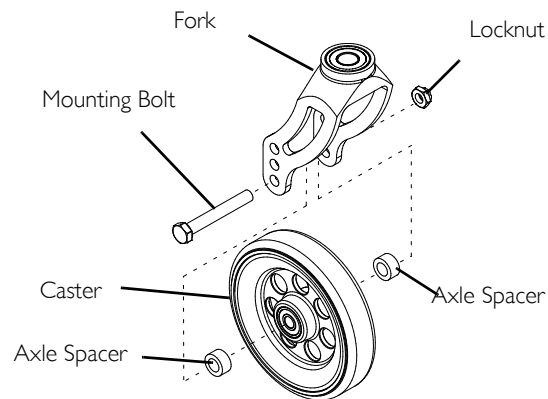
#### Standard Forks

##### 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.



**FIGURE 2** Removing/Installing/Repositioning the Caster Assemblies  
- Standard Forks

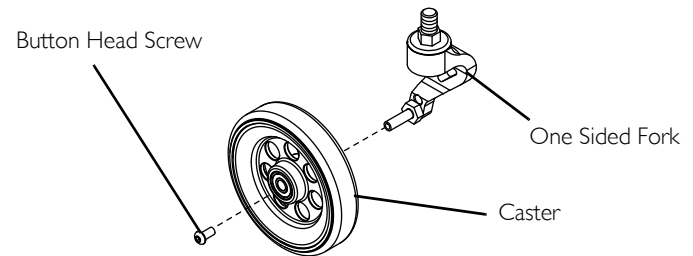
## One Sided Fork

### 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 3** Removing/Installing/Repositioning the Caster Assemblies  
- One Sided Fork

## 12.3 Removing/Installing the Fork Assembly



For this procedure, refer to FIGURE 4 on page 84.

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 82.
2. Perform one of the following:
  - Standard Forks - Remove locknut securing the fork and fork spacer from the fork stem (Detail "A").
  - One Sided Fork (Detail "B") -
    - a. Unscrew fork stem from head tube.


## 12 CASTER

### Installing Fork Assembly

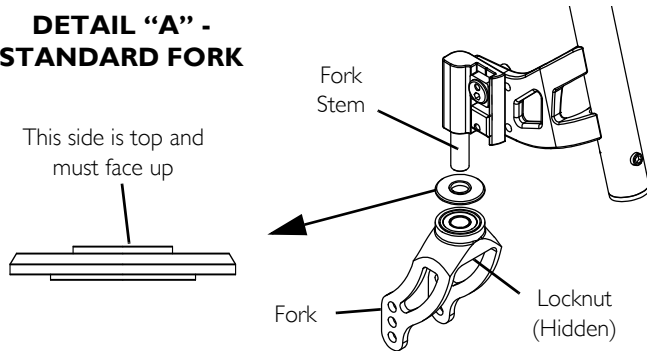


#### WARNING

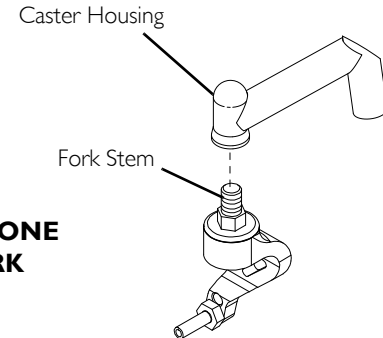
Use Loctite™ 242 on threads fork stem when reinstalling the one sided fork into the caster housing. Otherwise, the fork may become loose and disengage from the headtube. Possible injury or damage could result.

- I. Perform one of the following:
  - Standard Forks - Using a locknut, secure the spectre and fork to the fork stem (Detail “A”).
  -  Spacer orientation must be as shown in FIGURE 1.
  - One Sided Fork (Detail “B”)
    - a. Apply Loctite 242 on stem threads.
    - b. Screw fork stem into caster housing. Tighten securely.
2. Install the front caster. Refer to [Installing Front Caster](#) on page 82.

#### DETAIL “A” - STANDARD FORK



#### DETAIL “B” - ONE SIDED FORK



**FIGURE 4** Removing/Installing the Fork Assembly

## 12.4 Repositioning the Front Caster Housings



For this procedure, refer to FIGURE 5 on page 86.

1. Remove the top mounting screw, belleville washer and round adjustment nut and base that secures the caster housing to the front frame.
2. Remove the bottom mounting screw, belleville washer and square adjustment nut that secures the caster housing to the front frame.

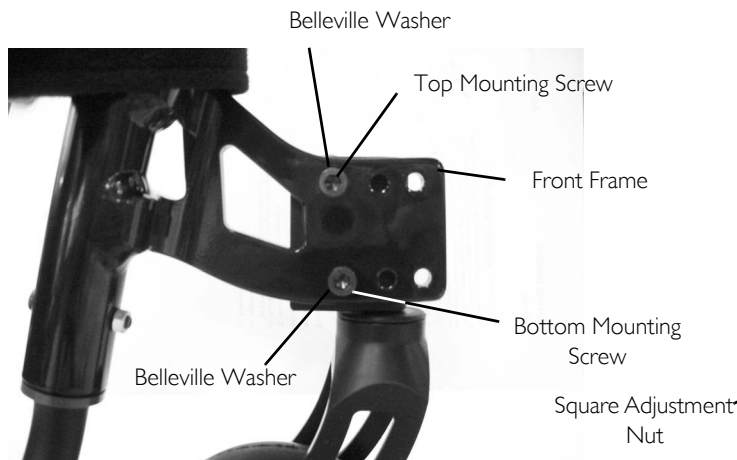


Mounting positions for caster housing on the front frame include one mounting screw on the top and one mounting screw on the bottom. The top and bottom mounting screws are **ALWAYS** aligned vertically and **NEVER** offset as shown in Detail “A” in FIGURE 5 on page 86.

3. Reposition the caster housing to one of three mounting positions on the front frame.
4. Install the top mounting screw and washer through the front frame and into round adjustment nut and base. Loosely tighten.
5. Install the bottom mounting screw and washer through the front frame and into the square adjustment nut. Loosely tighten.
6. Ensure the caster headtube is perpendicular (90°) to the ground/floor. Refer to [Caster Housing Angle Adjustment](#) on page 86.

## 12 CASTER

### DETAIL “A” - INSIDE VIEW OF CASTER HOUSING



### DETAIL “B” - OUTSIDE VIEW OF CASTER HOUSING



**FIGURE 5** Repositioning the Front Caster Housings

### 12.5 Caster Housing Angle Adjustment



For this procedure, refer to **FIGURE 6** on page 88.

The round adjustment nuts for smaller (fine tuning) angle adjustments.

The square adjustment block is for larger angle adjustments.

#### Small Angle Adjustments

1. If necessary, loosen the top mounting screw (Detail “A”).
2. Position a large right triangle or “L” square on the ground/floor and against the caster fork (Detail “C”).

3. Rotate the round adjustment nut clockwise/counterclockwise until edge of fork is flush with “L” square and is 90° to ground/floor (Detail “B”).
4. Tighten the top and bottom mounting screws securely (Detail “A”).

### Large Angle Adjustments

1. If necessary loosen the top mounting screw (Detail “A”).
2. Remove bottom mounting screw that secures the square adjustment nut in place (Detail “A”).

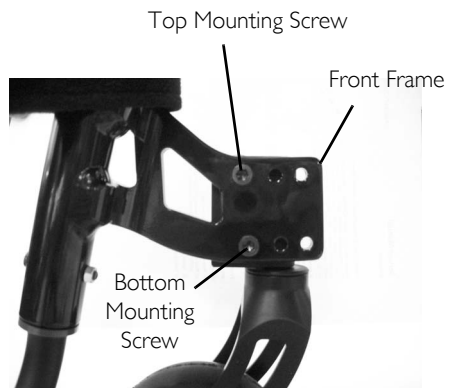


When performing STEPS 3/4, the square adjustment nut can't be placed with the mounting screw locator hole positioned as shown due to interference between the adjustment nut and the top of the caster fork (Detail “D”).

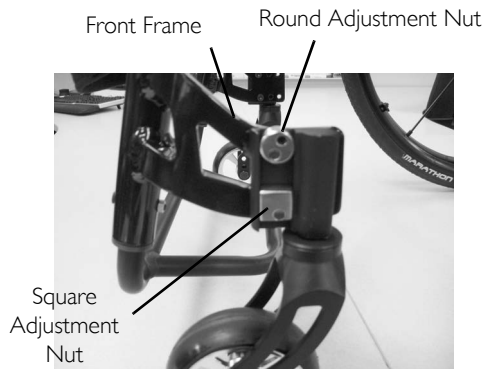
3. Remove the square adjustment nut and rotate in 1/4 turn increments (Detail “B”).
4. Reinstall into recessed area of caster headtube.
5. With one hand reinstall bottom mounting screw in front frame while rotating the caster headtube on the frame until the bottom mounting screw can be installed into the square adjustment nut.
6. If necessary, rotate the round adjustment nut clockwise/counterclockwise until edge of fork is flush with “L” square and is 90° to ground/floor (Detail “B”).
7. Tighten the top and bottom mounting screws securely (Detail “A”).

## 12 CASTER

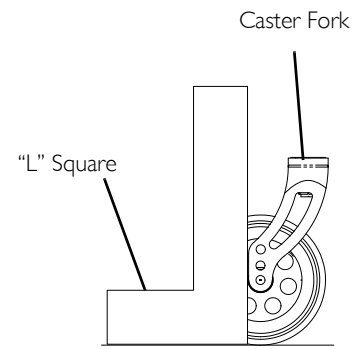
### DETAIL "A"



### DETAIL "B"

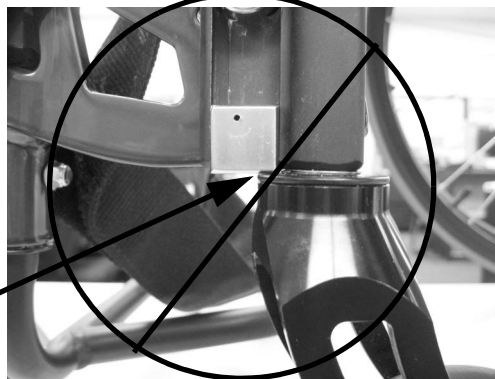


### DETAIL "C"



The square adjustment nut can't be positioned as shown because of interference between the adjustment nut and top of caster fork.

Interference occurs here.



### DETAIL "D"

**FIGURE 6** Caster Housing Angle Adjustment



## 13 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.

### 13.1 Adjusting/Replacing Anti-tipper



For this procedure, refer to FIGURE 1 on page 91 and FIGURE 2 on page 92.



### 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").

## 13 ANTI-TIPPER

### 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.



If specified adjustments of 1 1/2 - 2 inch can't be achieved, the anti -tipper bracket will have to be reversed. Refer to FIGURE 2 on page 92.

3. Repeat STEPS 1-2 for the opposite anti-tipper

### Replacing Anti-tipper



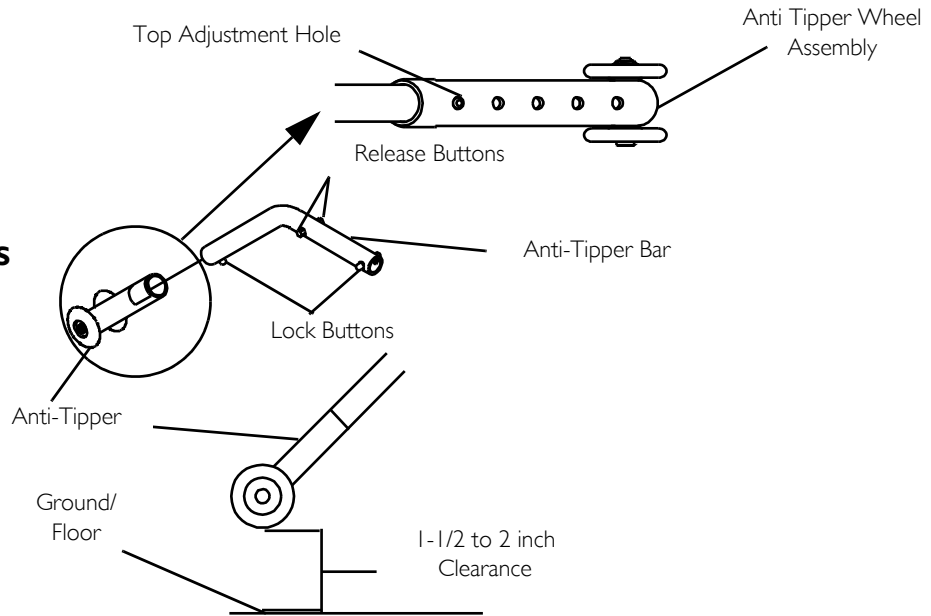
#### **WARNING**

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 wheel assembly 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.

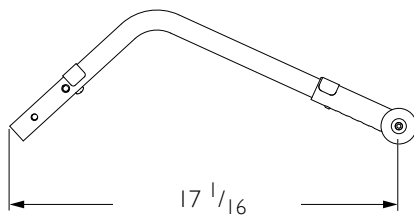
6. If necessary, adjust the height of the anti-tippers. Refer to Adjusting Anti-tipper on page 90.

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

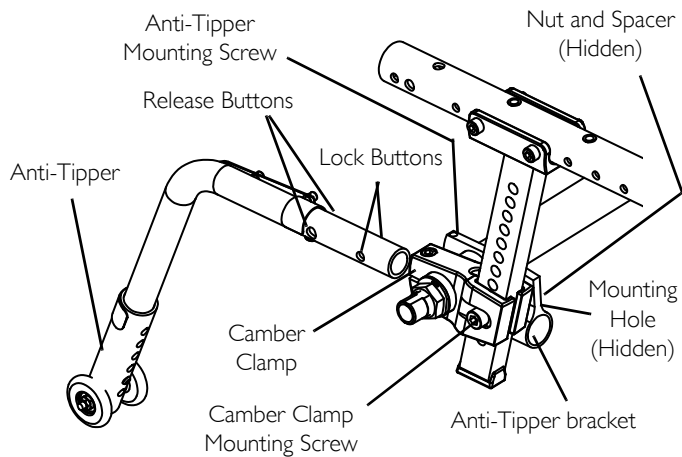


**FIGURE 1** Adjusting/Replacing Anti-tipper

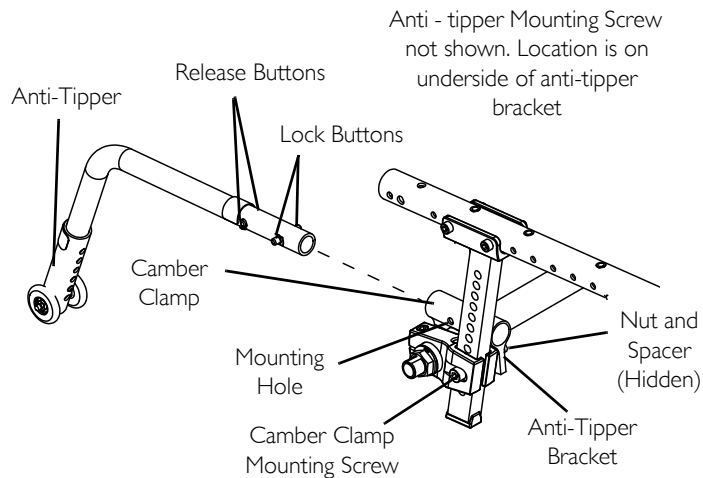
# 13 ANTI-TIPPER



## ANTI-TIPPERS BRACKET SETTING FOR HIGHER CAMBER TUBE



## ANTI-TIPPERS BRACKET SETTING FOR LOWER CAMBER TUBE



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

### 13.2 Reversing Anti-tipper Bracket Orientation

1. Press in the release buttons and remove the anti-tipper from the anti-tipper bracket.
2. Loosen, but DO NOT remove, anti-tipper mounting screws.
3. Remove the nut from the camber clamp mounting screws.
4. Slide anti-tipper brackets away from camber clamps exposing the spacer between them.
5. Remove camber tube. Refer to [Removing/Installing the Camber Tube](#) on page 75.

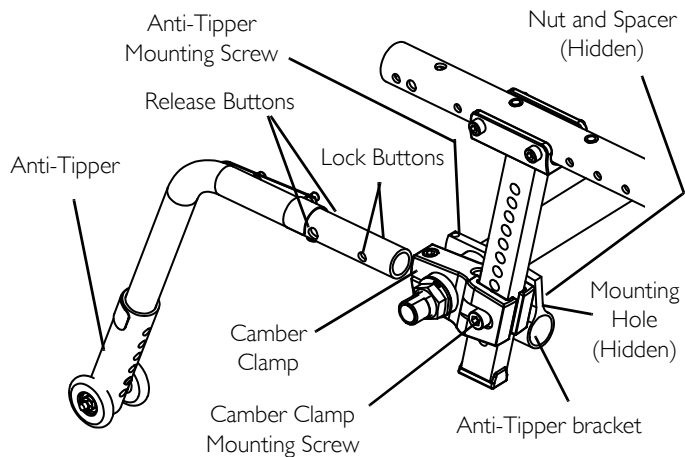


Anti-tipper mounting screws should be the last screws to be tightened.

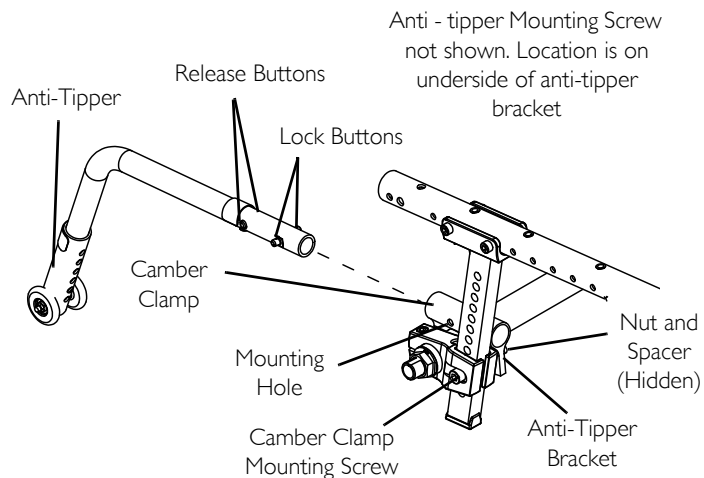
6. Install anti-tipper brackets onto opposite side of camber tube. Reverse procedure. Tighten fasteners securely.
7. Install camber tube. Refer to [Removing/Installing the Camber Tube](#) on page 75.
8. Install anti-tippers and adjust height. Refer to [Adjusting/Replacing Anti-tipper](#) on page 89.

## 13 ANTI-TIPPER

### ANTI-TIPPERS BRACKET SETTING FOR HIGHER CAMBER TUBE



### ANTI-TIPPERS BRACKET SETTING FOR LOWER CAMBER TUBE



**FIGURE 3** Reversing Anti-tipper Bracket Orientation

**NOTES**

Part No 1171880



Rev A - 10/11



**Invacare Corporation**

**USA**

One Invacare Way  
Elyria, Ohio USA  
44036-2125  
800-333-6900

**Canada**

570 Matheson Blvd E  
Unit 8  
Mississauga Ontario  
L4Z 4G4 Canada  
800-668-5324

[www.invacare.com](http://www.invacare.com)



## Free Manuals Download Website

<http://myh66.com>

<http://usermanuals.us>

<http://www.somanuals.com>

<http://www.4manuals.cc>

<http://www.manual-lib.com>

<http://www.404manual.com>

<http://www.luxmanual.com>

<http://aubethermostatmanual.com>

Golf course search by state

<http://golfingnear.com>

Email search by domain

<http://emailbydomain.com>

Auto manuals search

<http://auto.somanuals.com>

TV manuals search

<http://tv.somanuals.com>