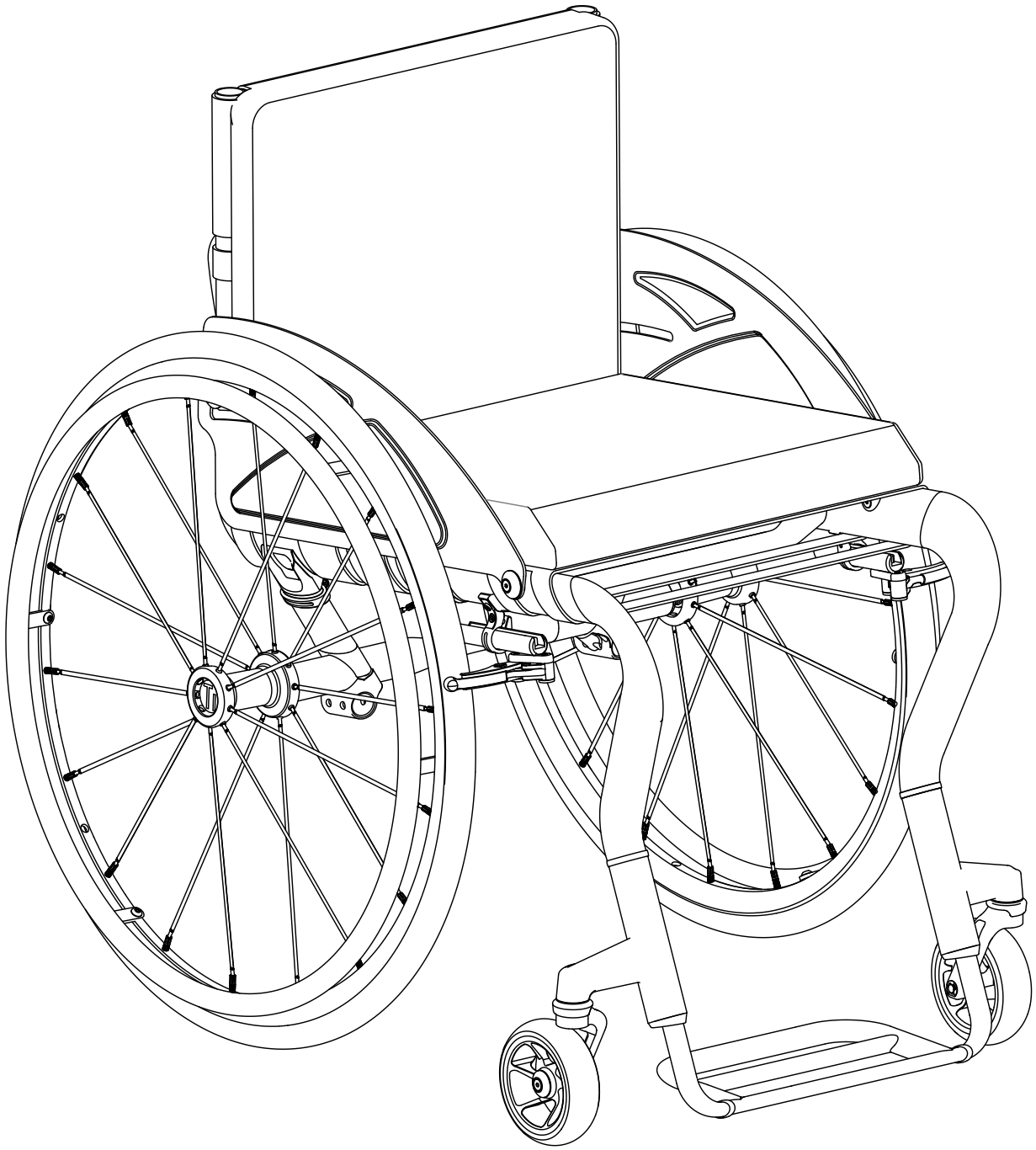
Service Manual

TiLite® CR1



permobil

Table of Contents

Symbols Glossary

Warning: Indicates that not following the specified procedure could lead to potentially hazardous conditions resulting in serious injury.	Manufacturer	Date of manufacture	Add Loctite to threads
Caution: Indicates that not following the specified procedure could lead to potentially hazardous conditions resulting in minor to moderate injury or damage to the equipment or other property.	Medical Device	Serial number	Weight limit
Consult instructions for use	Unique Device Identifier		

Contact Information

TiSport, LLC
2701 W. Court St.
Pasco, WA 99301 USA

Customer Support:
U.S.A.:
800-736-0925
Fax: 866-586-2416
customerservice.tilite@permobil.com

permobil.com

Please Note

The information detailed within this service manual applies to the Permobil TiLite CR1.

Product information is changed as needed; current product information is available at permobil.com.

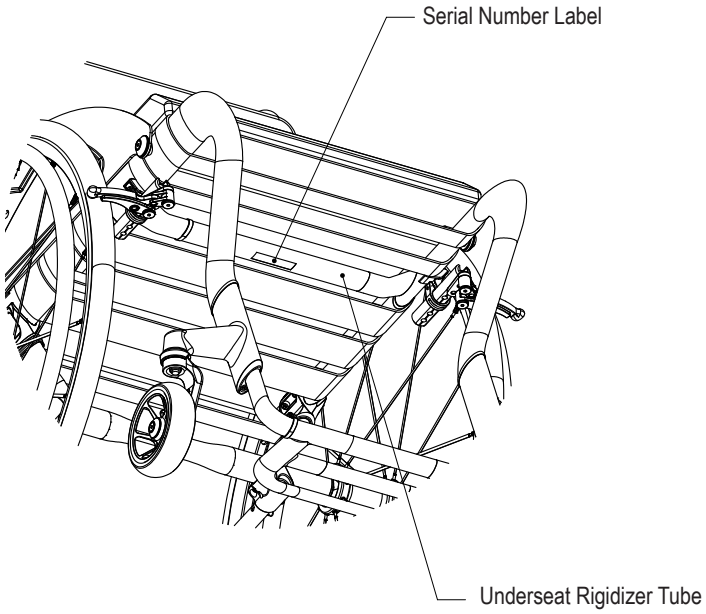
TiLite is part of Permobil.

Rev. 2023-08-29

General Information

Product Labeling

The serial number and other important information can be found on the label applied to the center of the under seat rigidizer tube.



Medical Device Combinations

It may be possible to configure this Permobil wheelchair with one or more other Medical Devices, accessories, or products. In the event that a provider wishes to do so, a risk assessment should be performed by competent equipment providers to ensure the safety and efficacy of the combination. Any installation of aftermarket equipment that requires permanent modifications to the wheelchair will void the manufacturer's warranty.

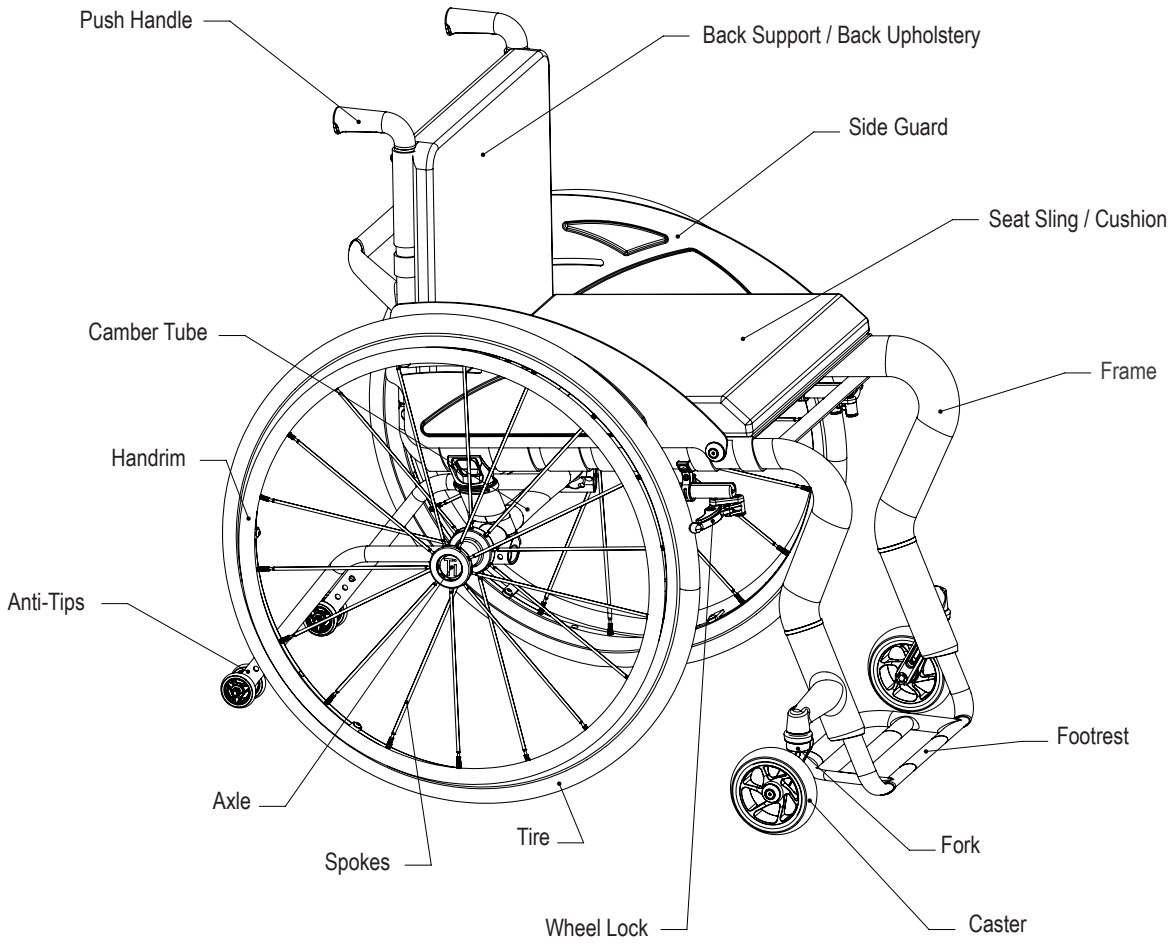
For information on proper mounting and configuration of a Permobil SmartDrive on the Permobil TiLite wheelchair, please refer to the Permobil SmartDrive product documentation. If the wheelchair came configured with a SmartDrive, make sure to read the user manual for the SmartDrive prior to operating the wheelchair.

Important Safety Information

⚠ Warnings and Cautions

- DO NOT perform any adjustment, removal or installation without first carefully and thoroughly reading and understanding all of the instructions provided in this service manual. If unable to perform any tasks in the service manual, seek assistance by contacting a clinician, equipment provider, or contact TiLite Customer Support.
- The wheelchair is made from carbon fiber tubing. While carbon fiber is extremely strong, it is imperative that a torque wrench is properly used when adjusting components clamped around the frame. Improper clamp force can destroy the wheelchair and is not covered under warranty!
- DO NOT use water-based lubricants on or around the front caster and fork or rear wheel axle as they can cause damage to the bearings.
- Only install replacement parts that were manufactured by Permobil.
- Make sure side to side symmetry is maintained when adjusting components of the wheelchair.
- Fasteners with thread patches can be removed and re-installed a maximum of two times before they need to be replaced. If in doubt, use Loctite 242 or equivalent on the last three threads to replicate thread patch functionality.
- Make sure that all detachable or small parts are handled with care. Keep small hardware components out of the reach of children and any individuals who have a tendency to place inedible objects in their mouth. Swallowing or inhalation may lead to serious injury or death. IMMEDIATELY seek emergency medical assistance.

Getting to Know the TiLite CR1



Fitting the TiLite CR1

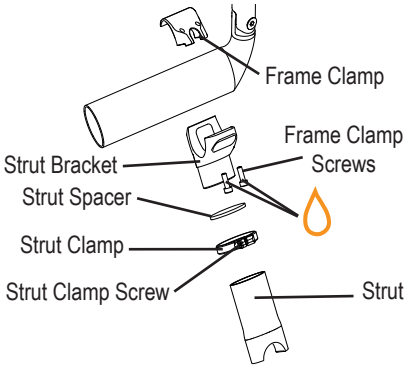
Center of Gravity

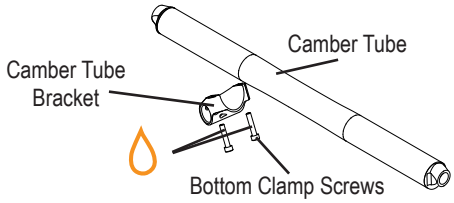
Parts:

1. Camber Tube Bracket
2. Bottom Clamp Screws - M5x25 SHCS
3. Camber Tube
4. Strut
5. Strut Clamp
6. Strut Clamp Screw - M4x12 SHCS
7. Strut Bracket
8. Strut Spacers
9. Frame Clamp
10. Frame Clamp Screws M5x16 SHCS

Tools:

1. 4mm Hex Wrench
2. 3mm Hex Wrench
3. Torque Wrench

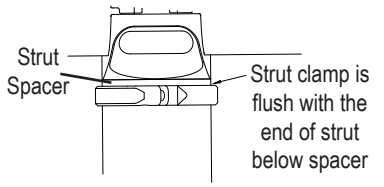




Adjustment:

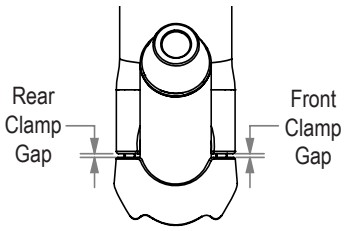
The CR1 allows for minor adjustment to the center of gravity to fine tune the wheelchair's feel and responsiveness to the user's preference. If an adjustment is desired, follow these steps:

1. Loosen, but do not remove, the bottom clamp screws located at the base of the strut assembly on both sides.
2. Loosen the frame clamp screws located on the inside of the assembly where the strut bracket connects to the frame on both sides. It is recommended to undo the rear strap of the seat upholstery and lift the back portion of the seat sling off of the support straps. This helps to allow their repositioning after the adjustment to the center of gravity position is complete.
3. Make the desired adjustment forward or backward.
4. Retighten the frame clamp bracket screws. **Torque to 8Nm / 6 ft lbs.** It is important to make sure the left and right strut assemblies are adjusted symmetrically to ensure proper alignment and performance. If a large enough adjustment is made, it will be necessary to add (if adjusting forward) an additional strut spacer to both vertical struts to ensure the caster forks remain square. If adding a spacer, it is important to make sure the strut clamp sits flush with the strut, just below the spacers, to ensure proper tightening of the strut onto the lower CG Bracket. If a large enough adjustment is made backward, it will be necessary to remove the existing strut spacer to ensure squareness. To determine if adding or removing a spacer is required for the desired change to the center of gravity position, please refer to the chart at the bottom of this page. The extra spacers (2) are included in the Owner's Packet.
    a. If strut spacers were added or removed, make sure the strut clamp is **torqued to 4Nm / 3.0 ft lbs.**
5. Install the replacement camber tube with camber tube bracket and bottom clamp screws into the strut.
6. Tighten the bottom clamp screws enough to secure the camber tube, but DO NOT fully torque. Check that the camber tube is centered and that the wheels are properly towed.

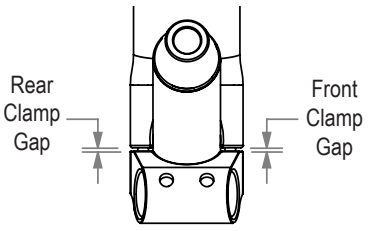


7. **Progressively torque screws in 2Nm / 1.5 ft lb increments,** switching between screws until torque listed in the images below pertaining to type of clamp on the wheelchair is achieved. If clamp gaps are significantly different, loosen screw on smaller clamp gap side by at least one turn, re-torque opposite bolt to specified value, then re-torque loosened bolt to specified value. It is acceptable to exceed specified **torque value by 2Nm / 1.5 ft lb** to achieve better equivalence in clamp gaps or until clamp gaps are nearly equal.
8. Re-check that the camber tube is centered and that the wheels are properly towed.

Non Anti-Tip Camber Clamp
Torque to 6Nm / 4.5 ft lbs



Anti-Tip Camber Clamp
Torque to 8Nm / 6ft lbs



Center of Gravity Adjustment Range Chart

	-1"	-¾"	-½"	-¼"	0"	¼"	½"	¾"	1"
Frame 1	-1 Spacer				No Change			+1 Spacer	
Frame 2		-1 Spacer			No Change		+1 Spacer		
Frame 3			-1 Spacer		No Change		+1 Spacer		+2 Spacers

Please note: The initial center of gravity position is shown as 0" in the chart above.

Fitting the TiLite CR1, continued

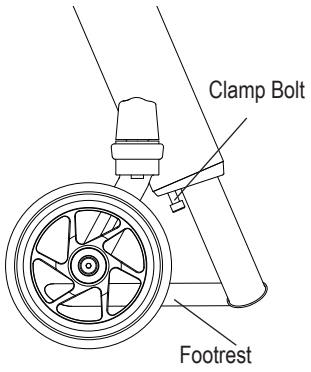
Seat to Footrest

Parts:

1. Footrest
2. Clamp Bolt - M5x22 SHCS
3. Clamp Housing
4. Clamp Wedge

Tools:

1. 4mm Hex Wrench
2. Torque Wrench
3. Mallet



Adjustment:

1. Back the clamp bolt out three full turns on both sides of the footrest on both sides of the frame.
2. The footrest should now be free to move. Make the desired adjustment and **torque the clamp bolts to 10Nm / 7.4 ft lbs.**
    a. Sometimes the clamp wedges can bind between the clamp housing and the frame and remain engaged while the clamp bolt backs out of the clamp wedge. If the bolts are at least three turns loose and the footrest doesn't slide easily, tap the bolt head with a mallet to aid in disengaging the clamp wedge. Repeatedly tap, if needed.

Wheel Locks

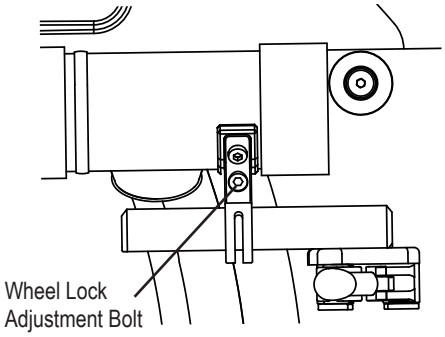
Parts:

1. Wheel Lock
2. Wheel Lock Clamp
3. Wheel Lock Adjustment Bolt - M4x14 SCHS

Tools:

1. 3mm Hex Wrench
2. Torque Wrench

IMPORTANT! The effort required to engage or disengage the wheel lock is an indication of blade engagement against the wheel and the wheel lock's performance. A reduction in wheel lock holding force over time could be an indicator of an underinflated tire.



Adjustment:

The wheel locks on the CR1 come pre-installed but can be adjusted to an individual's preference.

1. Loosen, but do not remove, the wheel lock adjustment screw.
2. Slide the lock assembly forward to reduce blade engagement, or backward to increase blade engagement.
3. **Torque the wheel lock adjustment bolt to 4Nm / 3.0 ft lbs.**

Anti-Tips

Parts:

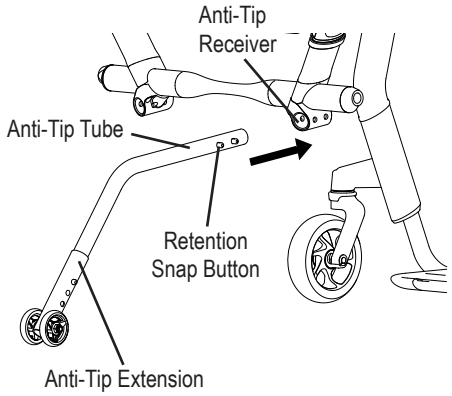
1. Anti-Tip Tube
2. Anti-Tip Extension
3. Anti-Tip Receiver
4. Anti-Tip Adjustment Button
5. Retention Snap Button

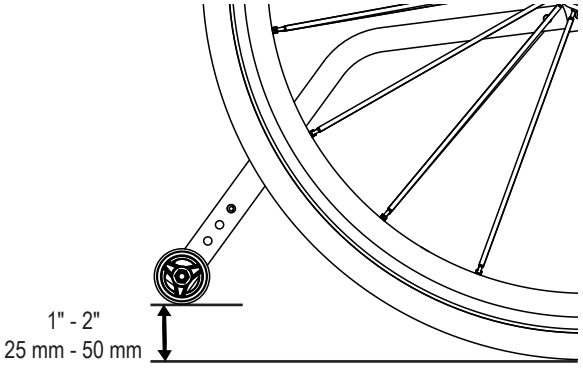
IMPORTANT! Make sure the adjustment tube is properly aligned and the buttons have fully popped out of the hole so the anti-tip will perform properly.

Height Adjustment:

The anti-tip extension contains a height adjustment section at the end of the tube that consists of a pattern of holes above the anti-tip wheels.

1. Press the adjustment button on both sides of the anti-tip extension and slide the extension to the desired adjustment hole.
2. When the wheelchair is placed on a flat surface, the anti-tip wheels should be between 1" (25 mm) and 2" (50 mm) off the ground for optimal performance.





Replacing Parts on the TiLite CR1

Caster Wheels

Parts:

1. Axle Bolt - M5x16 FHCS with Thread Patch
2. Caster Cap
3. Caster
4. Axle

Tools:

1. 3mm Hex Wrench
2. Torque Wrench

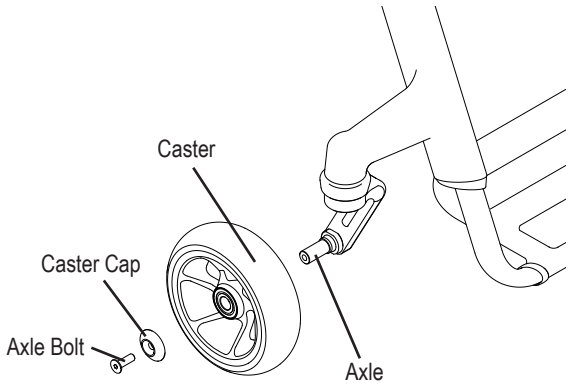
IMPORTANT! When replacing caster wheels, both casters need to be replaced at the same time to maintain proper ride quality.

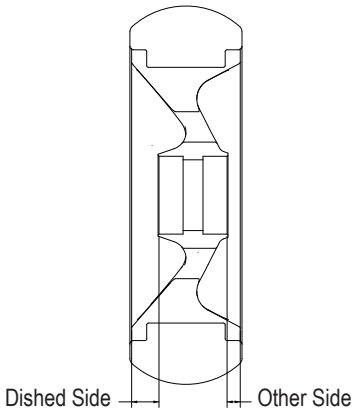
Removal:

1. Remove the axle bolt and caster cap on the outside of the caster.
2. Slide the caster off the axle.

Installation:

1. Slide the new caster over the axle, ensuring the dished side of the caster wheel is facing away from the fork. Note that some of casters have a dished wheel where the hub is slightly off center. If the casters have a dished wheel, make sure the dished side is facing outward.
2. Install the caster cap and bolt. **Torque the axle bolt to 6 NM / 4.5 Ft Lbs.**





Forks

Parts:

1. Fork
2. Stem Nut - M8 Nyloc Nut
3. Stem Washer - M8 Washer
4. Stem

Tools:

1. 17mm Hex Socket
2. Torque Wrench

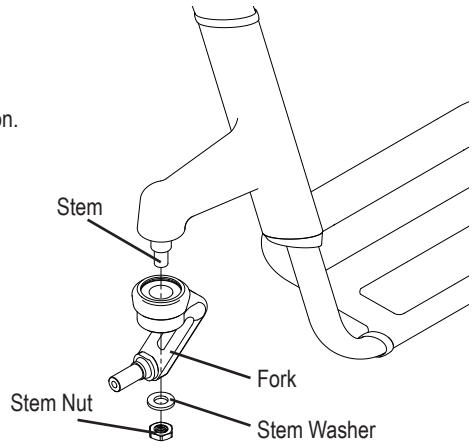
IMPORTANT! New casters are not required when replacing the forks.

Removal:

1. Remove the caster from the wheelchair by following the steps outlined in the “Caster Wheels” section.
2. Loosen and remove the stem nut and stem washer.
3. Slide fork off of the stem.

Installation:

1. Slide fork over the stem and reinstall stem nut and washer.
   Torque the stem nut to 15Nm / 11 ft lbs.
2. Reinstall casters by following the steps outlined in the “Caster Wheels” section.



Replacing Parts on the TiLite CR1, continued

Footrest

Parts:

1. Footrest
2. Clamp Bolt - M5x22 SHCS
3. Clamp Housing
4. Clamp Wedge

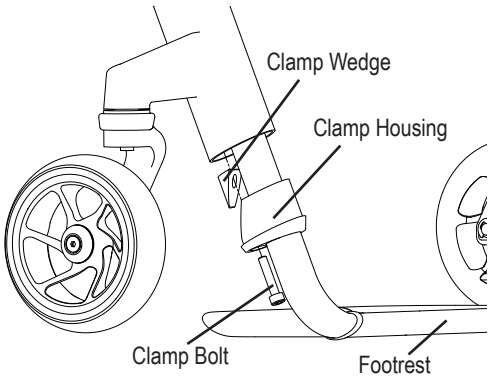
Tools:

1. 4mm Hex Wrench
2. Torque Wrench
3. Mallet

IMPORTANT! Verify that the correct seat to footrest measurement is achieved and the footplate is level with the ground. Also check for floating casters, as sometimes floating casters can happen after an adjustment to the footrest is made. If a floating caster is present, see "Troubleshooting" section.

Removal:

1. Back the clamp bolt out three full turns on both sides of the footrest.
2. Slide the footrest and clamp assemblies down and out of frame.
    a. Sometimes the clamp wedges can bind between the clamp housing and the frame and remain engaged while the clamp bolt backs out of the clamp wedge. If the bolts are at least three turns loose and the footrest doesn't slide easily, tap the bolt head with a mallet to aid in disengaging the clamp wedge. Repeatedly tap, if needed.



Installation:

1. Partially assemble the clamp housing, clamp wedge, and clamp bolt, leaving the bolts at least three turns loose from fully tight.
2. Slide the partially assembled clamps over the footrest extensions, ensuring the bolt and wedge are on the rear (trailing) side of the footrest.
3. Simultaneously insert the footrest and clamps into the openings in the frame.
4. Push the clamps upward into the frame until the flange stops against the frame openings.
5. Lightly tighten the bolts in the clamps to place enough friction on the footrest so that it holds its position against gravity but can still be slid up and down by hand.
6. Position the footrest at the desired seat to footrest dimension, ensuring the footplate is even on both sides of the frame and that there are no floating casters.
7. **Torque the clamp bolts to 10Nm / 7.4 ft lb.**

Push Handles

Parts:

1. Back Support Cane
2. Push Handle
3. Push Handle Bolt - M5x16 BHCS
4. Upholstery Ear

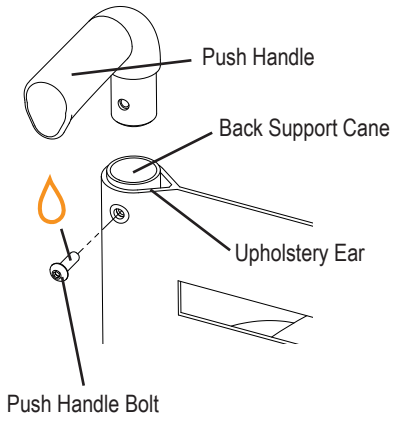
Tools:

1. 4mm Hex Wrench
2. Torque Wrench
3. Loctite 242 (Blue)

IMPORTANT! It is critical that the push handle bolt be installed properly and torqued to the correct value as a failure of this bolt could cause the push handle to detach from the wheelchair.

Removal:

1. Remove the push handle bolt at the top of the back support cane.
2. The push handle should easily slide up and out of the back support cane.



Installation:

1. Insert the push handle into the back support cane, aligning the threaded hole in the push handle with the hole in the back support cane and the grommet in the upholstery ear.
2. **Apply Loctite 242 to the end of the push handle bolt, ensuring coverage of at least three threads.**
3. Thread the bolt through the grommet and cane into the push handle.
4. **Torque to 4Nm / 3.0 ft lbs.**
5. Repeat these steps for the other side.

Replacing Parts on the TiLite CR1, continued

Side Guards

Parts:

1. Outer Pivot Bolt – M5x14 FHCS
2. Side Guard Cap
3. Pivot O-Ring
4. Thrust Washer
5. Inner Coved Washer
6. Outer Coved Washer
7. Pivot Axle
8. Inner Pivot Bolt – M5x12 FHCS
9. Track Bolt – M5x25 FHCS
10. Track Bolt Cap
11. Track Bolt O-ring
12. Track Thrust Washer
13. Back Support Track Standoff
14. Side Guard

Tools:

1. 3mm Hex Wrench (x2)
2. Torque Wrench
3. Loctite 242 (Blue)

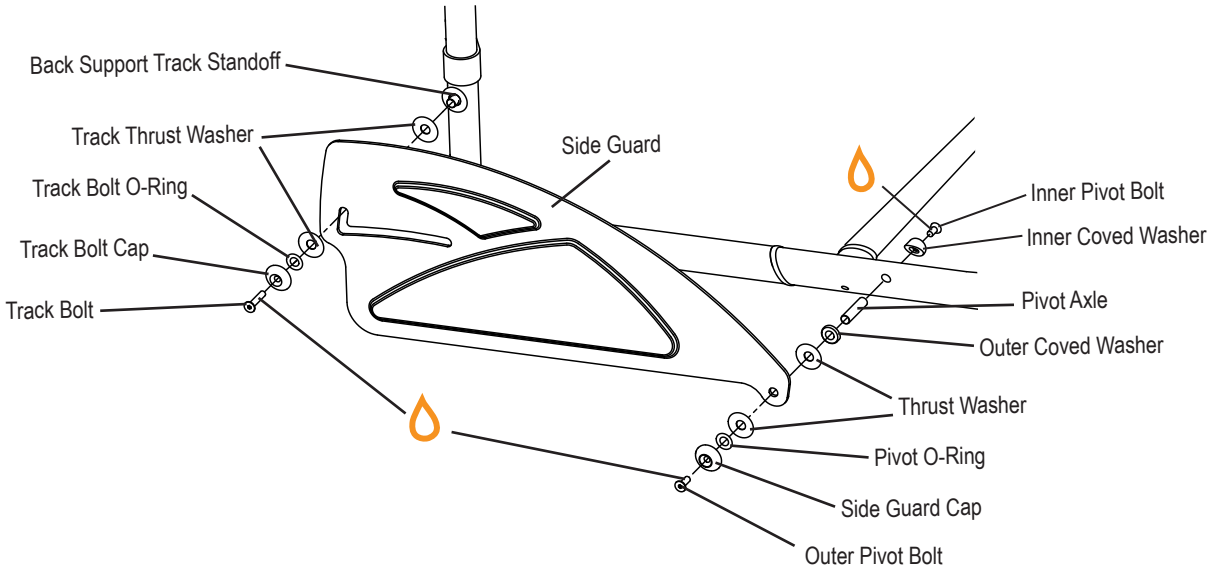
IMPORTANT! If the replacement side guard panel has different track geometry than the parts that are currently installed, remove both side guards before installing the new side guards.

Removal:

1. Remove all of the pivot assembly hardware (parts 1-8) and all track hardware (parts 9-12) from the side guard assembly.
2. Remove side guard panel.

Installation:

1. Assemble the inner pivot bolt, inner coved washer, and pivot axle. When installing the inner pivot bolt, **apply Loctite 242 on last three threads of the bolt.**
2. Thread assembly through hole in frame.
3. Install the outer coved washer and thrust washer onto the pivot spacer.
4. Install the side guard onto the pivot spacer.
5. Install the thrust washer, pivot o-ring, pivot cap and outer pivot bolt. When installing outer pivot bolt, **apply Loctite 242 on last three threads of the bolt.**
6. Using the hex wrench to hold the inner pivot bolt, **torque the outer pivot bolt to 5Nm / 3.7 ft lbs.**
7. Match the track slot on the rear of the side guard up with the standoff on the back support cane. Pass the side guard over the standoff.
8. Install the track thrust washer, track bolt o-ring, track bolt cap and track bolt onto the standoff. When installing the track bolt, **apply Loctite 242 on last three threads of the bolt.**
9. **Torque the track bolt to 5Nm / 3.7 ft lbs.**



Replacing Parts on the TiLite CR1, continued

Back Support

Parts:

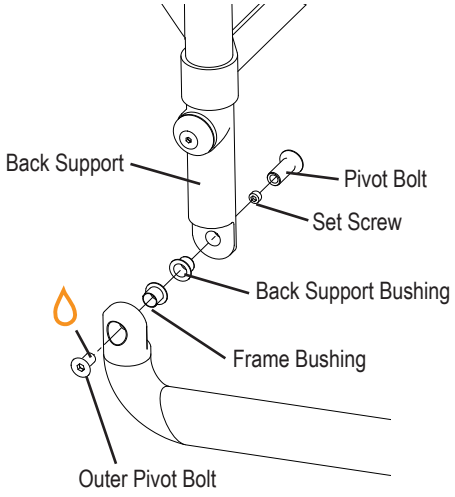
1. Outer Pivot Bolt
2. Frame Bushing
3. Back Support Bushing
4. Set Screw
5. Pivot Bolt
6. Back Support

Tools:

1. 3mm Hex Wrench
2. 4mm Hex Wrench
3. 5mm Hex Wrench
4. 3/8” Drift (Removal)
5. 1/2" or larger mm Drift (Installation)
6. Torque Wrench
7. Loctite 242 (Blue)

Removal:

1. Remove the side guards by following the instructions in the "Side Guards" section.
2. Remove the outer pivot bolt.
3. Slide the pivot bolt out.
4. Repeat for the opposite side.
5. Remove the back support from the wheelchair.
6. To remove the bushings, carefully push on the non-flange side of the bushing through the hole with a 3/8" drift or punch.



Installation:

1. To install a bushing, locate the bushing over the hole with the flange facing the inside of the joint surface.
2. Start pressing the bushing into the bore by hand until it becomes too difficult to continue. This step aligns the bushing with the bore.
3. Using a drift with a face diameter larger than 1/2", press the bushing the rest of the way into the bore until the flange meets the face.
4. Repeat these steps for all bushings.
5. Install the pivot hardware in the reverse of disassembly. **Apply Loctite 242 on outer pivot bolt, ensuring coverage of final three threads.**

   Check the performance of the hinge:

   a. If the pivot hardware doesn’t feel secure / tight, or is able to rock back and forth, insert a 3mm hex through the head of the pivot bolt fastener. The hex will engage with a set screw inside the fastener. Loosen this set screw, then tighten the outside bolt. Any observed rocking in the pivot hardware should be fixed. Using the same hex wrench, tighten the set screw until resistance is met.

   b. Fold the backrest to ensure desired friction has been achieved in the pivot. If too tight, loosen the outer pivot bolt and retighten the set screw. If too loose, loosen the set screw, tighten the outer pivot bolt, then re-tighten the set screw. Repeat this process until the desired friction is achieved.
6. Reinstall the rear side guards by following the instructions in the "Side Guards" section.

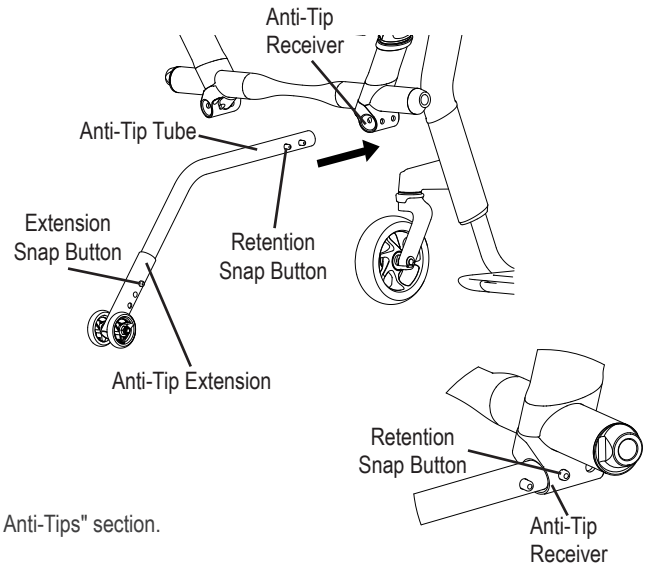
Anti-Tips

Parts:

1. Anti-Tip Extension
2. Anti-Tip Tube
3. Retention Snap Button
4. Extension Snap Button
5. Anti-Tip Receiver

Removal:

1. Press the retention snap button.
2. Slide the anti-tip assembly out of the receiver.



Installation:

1. Insert the anti-tip assembly into the anti-tip receiver while pressing the single sided snap button. It is critical to verify that the retention snap button is fully engaged into the respective holes in the clamp.

   a. The snap buttons should be pointing towards the outboard side of the wheelchair on both sides of the wheelchair. Only the first snap button should be engaged.
2. To set the anti-tip wheel in the correct location, refer to the "Fitting the TiLite CR1, Anti-Tips" section.

Replacing Parts on the TiLite CR1, continued

Center of Gravity Camber Clamps

Parts:

1. Camber Tube Bracket
2. Bottom Clamp Screws - M5x25 SHCS
3. Camber Tube
4. Strut
5. Strut Clamp
6. Strut Clamp Screw - M4x12 SHCS
7. Strut Bracket
8. Strut Spacers
9. Frame Clamp
10. Frame Clamp Screws - M5x16 SHCS

Tools:

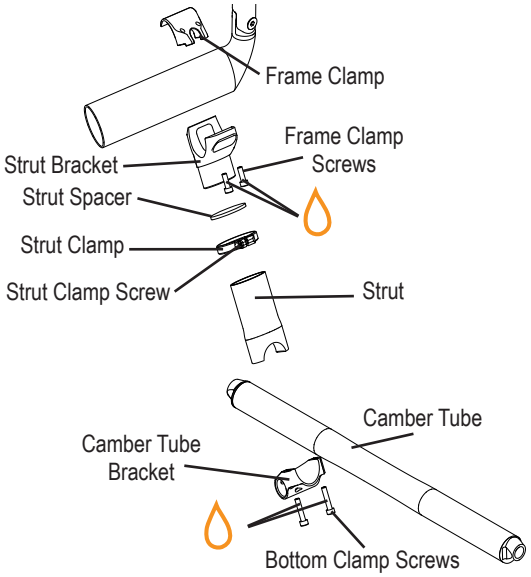
1. 4mm Hex Wrench
2. Torque Wrench
3. Loctite 242 (Blue)
4. Washable Marker

Removal:

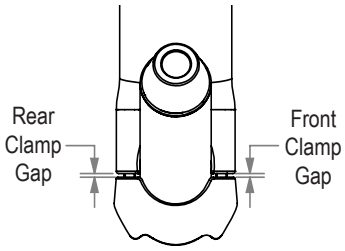
1. Loosen and remove the bottom clamp screws and the camber tube bracket.

Installation:

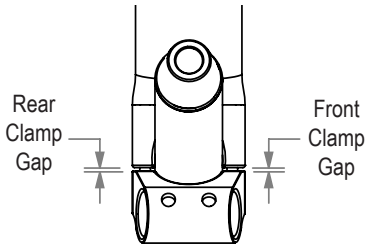
1. With replacement camber tube bracket and bottom clamp screws in hand, **apply Loctite 242 on screws, ensuring coverage of at least three threads toward the end of the screw.**
2. Install camber tube bracket with bottom clamp screws into the strut. Make sure the camber tube bracket is located at the temporary mark. **Progressively torque screws in 2Nm / 1.5 ft lb increments,** switching between screws until torque listed in images below pertaining to type of clamp on the wheelchair is achieved. If clamp gap is significant, loosen screw on smaller clamp gap side by at least one turn, re-torque opposite bolt to specified value, then re-torque loosened bolt to specified value. It is acceptable to exceed specified **torque value by 2Nm / 1.5 ft lb** to achieve better equivalence in clamp gap or until clamp gaps are nearly equal. Repeat these steps for all bushings on the other side of the wheelchair.
3. Verify the camber tube is properly centered and that the wheels are properly towed.



Non Anti-Tip Camber Clamp
Torque to 6Nm / 4.5 ft lbs



Anti-Tip Camber Clamp
Torque to 8Nm / 6ft lbs



Replacing Parts on the TiLite CR1, continued

Camber Tube

Parts:

1. Camber Tube Bracket
2. Bottom Clamp Screws - M5x25 SHCS
3. Camber Tube
4. Strut
5. Strut Clamp
6. Strut Clamp Screw - M4x12 SHCS
7. Strut Bracket
8. Strut Spacers
9. Frame Clamp
10. Frame Clamp Screws - M5x16 SCHS

Tools:

1. 4mm Hex Wrench
2. 3mm Hex Wrench
3. Torque Wrench
4. Loctite 242 (Blue)

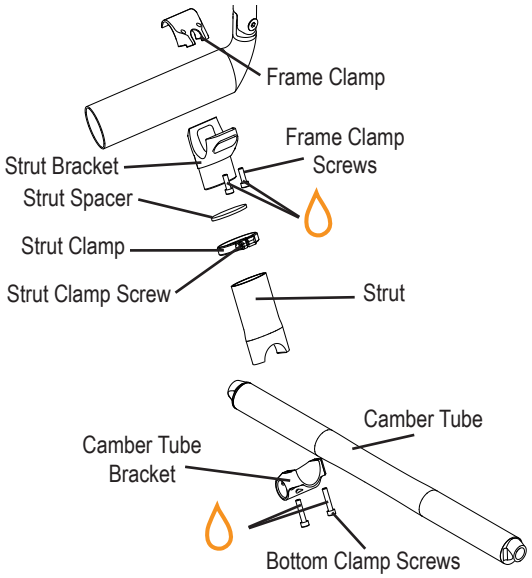
IMPORTANT! If the replacement camber tube has a different camber, the Center of Gravity will need to be adjusted per "Fitting the TiLite CR1, Center of Gravity" section.

Removal:

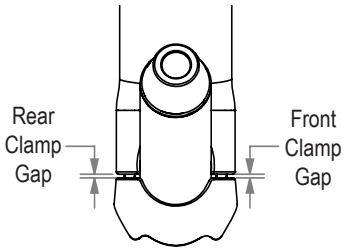
1. Loosen and remove the bottom clamp screws and the camber tube bracket on both sides of the wheelchair. Remove the camber tube.

Installation:

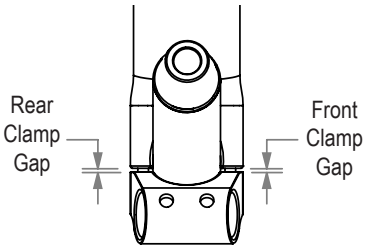
1. **Apply Loctite 242 on the bottom clamp screws, ensuring coverage of at least three threads toward the end of the screw.**
2. Install the replacement camber tube with camber tube bracket and bottom clamp screws into the strut.
3. Tighten the bottom clamps screws enough to secure the camber tube, but do not fully torque.
4. Check that the camber tube is centered and that the wheels are properly towed.
5. **Progressively torque screws in 2Nm / 1.5 ft lb increments,** switching between screws until torque listed in images below pertaining to type of clamp on the wheelchair is achieved. If clamp gaps are significantly, loosen screw on smaller clamp gap side by at least one turn, re-torque opposite bolt to specified value, then re-torque loosened bolt to specified value. It is acceptable to exceed specified **torque value by 2Nm / 1.5 ft lb** to achieve better equivalence in clamp gaps or until clamp gaps are nearly equal.
6. Re-check that the camber tube is centered and that the wheels are properly towed.



Non Anti-Tip Camber Clamp
Torque to 6Nm / 4.5 ft lbs



Anti-Tip Camber Clamp
Torque to 8Nm / 6ft lbs



Replacing Parts on the TiLite CR1, continued

Center of Gravity Strut and Clamp

Parts:

1. Camber Tube Bracket
2. Bottom Clamp Screws - M5x25 SHCS
3. Camber Tube
4. Strut
5. Strut Clamp
6. Strut Clamp Screw - M4x12 SHCS
7. Strut Clamp Nut
8. Strut Bracket
9. Strut Spacers
10. Frame Clamp
11. Frame Clamp Screws - M5x16 SHCS

Tools:

1. 4mm Hex Wrench
2. 3mm Hex Wrench
3. Torque Wrench
4. Loctite 242 (Blue)

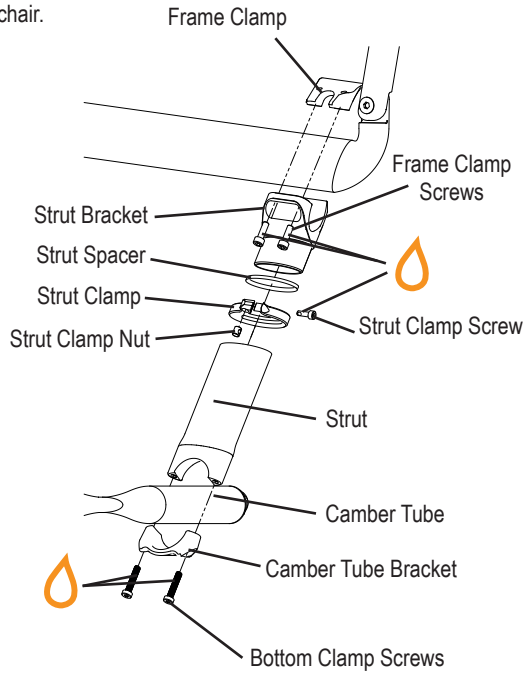
IMPORTANT! If adding or removing spacers, the Center of Gravity may need to be adjusted per the "Fitting the TiLite CR1, Center of Gravity" section.

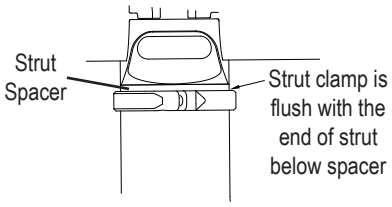
Removal:

1. Loosen and remove the bottom clamp screws and the camber tube bracket on both sides of wheelchair. Remove the camber tube.
2. Loosen but do not remove the strut clamp screws, so that the strut can be removed from the frame clamps. Repeat for opposite side.

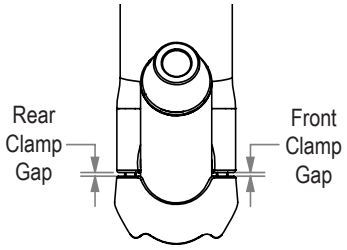
Installation:

1. If replacing strut clamps, assemble the replacement strut clamp, screw, and nut. Tighten screw for retention of nut, do not torque. Prior to assembling screw, **apply Loctite 242 ensuring coverage of at least three threads towards the end of the screw.**
2. Assemble the strut and strut clamp by sliding the strut clamp assembly over the strut (replacement strut if replacing strut), ensuring that the top clamp face is flush with the strut end face.
3. Repeat step 2 for opposite side.
4. If adding or removing spacers for adjustment, slide on or off spacers on the frame clamp plug.
5. Slide the strut and strut clamp assembly over the frame clamp plug. **Torque the strut clamp screw to 5Nm / 3.7 ft lbs.** Repeat for the opposite side.
6. Re-install camber tube with the camber tube bracket and bottom clamp screws into the strut.
7. Tighten the bottom clamp screws enough to secure the camber tube, but do not fully torque.
8. Check that the camber tube is centered and towed.
9. **Progressively torque screws in 2Nm / 1.5 ft lb increments,** switching between screws until torque listed in images below pertaining to type of clamp on the wheelchair is achieved. If clamp gaps are significantly different, loosen screw on smaller clamp gap side by at least one turn, re-torque opposite bolt to specified value, then re-torque loosened bolt to specified value. It is acceptable to exceed specified **torque value by 2Nm / 1.5 ft lb** to achieve better equivalence in clamp gaps or until clamp gaps are nearly equal.
10. Re-check that the camber tube is centered and towed.

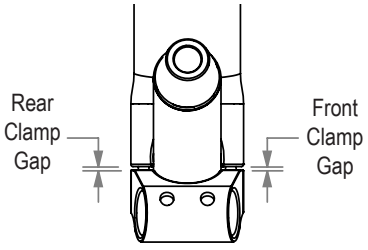




Non Anti-Tip Camber Clamp
Torque to 6Nm / 4.5 ft lbs



Anti-Tip Camber Clamp
Torque to 8Nm / 6ft lbs



Replacing Parts on the TiLite CR1, continued

Center of Gravity Frame Clamp

Parts:

1. Camber Tube Bracket
2. Bottom Clamp Screws - M5x25 SHCS
3. Camber Tube
4. Strut
5. Strut Clamp
6. Strut Clamp Screw - M4x12 SHCS
7. Strut Clamp Nut
8. Strut Bracket
9. Strut Spacers
10. Frame Clamp
11. Frame Clamp Screws - M5x16 SHCS

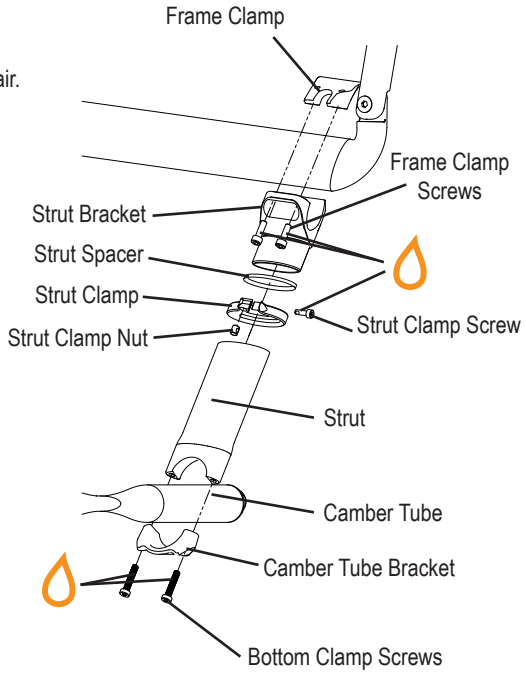
Tools:

1. 4mm Hex Wrench
2. 3mm Hex Wrench
3. Torque Wrench
4. Loctite 242 (Blue)
5. Washable Marker

IMPORTANT! If installing any other replacement parts on the Center of Gravity, the Center of Gravity may need to be adjusted per the "Fitting the TiLite CR1, Center of Gravity" section.

Removal:

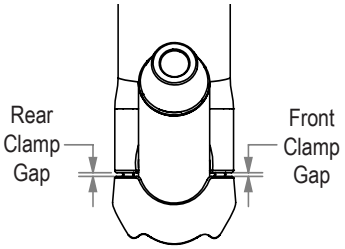
1. Make temporary marks on the camber tube and strut, and the frame clamps and frame to aid in re-installation.
2. Loosen and remove the bottom clamp screws and camber tube bracket on both sides of wheelchair. Remove the camber tube.
3. Loosen and remove the frame clamp screws, then remove the top frame clamp.
4. The strut, strut clamp, and bottom frame clamp should now be removable from wheelchair.
5. Loosen, but do not remove strut clamp screws, so that the frame clamp can be removed from the strut. Repeat for opposite side.



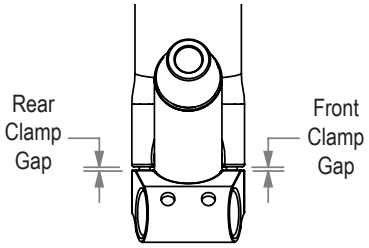
Installation:

1. Slide the strut and strut clamp assembly over the replacement frame clamp plug. **Torque the strut clamp screw to 5Nm**. Repeat for opposite side.
2. Install the replacement bottom frame clamp and strut assembly on the frame. Fasten the bottom frame clamp to the replacement top frame clamp using the frame clamp screws. Prior to threading screws, **apply Loctite 242 on at least three threads toward the end of the screw.**
3. Tighten the frame clamp screws enough to ensure frame clamps remain in place on the frame, but do not fully torque. Ensure frame clamps are aligned with temporary marks made during the removal process.
4. Re-install the camber tube with camber tube bracket and bottom clamp screws into the strut. Align camber tube and struts with temporary marks made during the removal process. Prior to installing bottom clamp screws, **apply Loctite 242 ensuring coverage of at least three threads toward the end of the screw.**
5. Tighten the bottom clamp screws enough to secure the camber tube, but do not fully torque.
6. Check that the camber tube is centered and towed.
7. **Progressively torque screws in 2Nm / 1.5 ft lb increments,** switching between screws until torque listed in images below pertaining to type of clamp on the wheelchair is achieved. If clamp gaps are significantly different, loosen screw on smaller clamp gap side by at least one turn, re-torque opposite bolt to specified value, then re-torque loosened bolt to specified value. It is acceptable to exceed specified **torque value by 2Nm / 1.5 ft lb** to achieve better equivalence in clamp gaps or until clamp gaps are nearly equal.
8. Re-check that the camber tube is centered and towed.
9. **Torque the frame clamp screws to 8Nm / 6 ft lbs.**

Non Anti-Tip Camber Clamp
Torque to 6Nm / 4.5 ft lbs



Anti-Tip Camber Clamp
Torque to 8Nm / 6ft lbs



Performance

The following items below should be checked regularly to ensure maximum performance.

Rear Tire Inflation

It is very important to maintain proper tire inflation for best performance and tire life. Air pressure in the tire drops gradually over time and use. Permobil recommends checking the tire pressure every 2-3 weeks at minimum and filling to the maximum pressure listed on the sidewall of the tire. If the air pressure has dropped, refill to the listed maximum pressure to maintain performance.

Rear Wheel Alignment

When making an adjustment to the Center of Gravity on the wheelchair it is also necessary to adjust the rear wheel toe angle. This is done by rotating the camber tube within the vertical strut assembly. A rear wheel can also be removed to check that the flat section of the camber tube end plug is perpendicular to the ground.

Center of Gravity Position

RESNA has found that the positioning of the rear axle is critical to getting the best performance out of a manual wheelchair. Ideally, the rear axle is positioned to distribute the weight as close to optimal as the user feels comfortable. Optimal weight distribution is considered to be when about 80% of the weight is carried by the rear wheels and about 20% of the weight is carried by the front casters. Weight balance is shifted onto the rear axle by moving the camber tube forward relative to the rest of the frame.

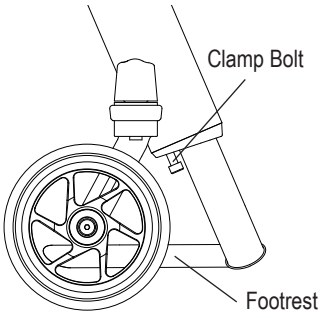
Troubleshooting

Please reference relevant product owner manuals or a knowledgeable equipment provider for any issues related to accessories not supplied by Permobil TiLite.

Floating Casters

Tools needed:

1. 4mm Hex Wrench
2. Rubber Mallet
3. Ruler or Measuring Tape
4. Smooth, level surface



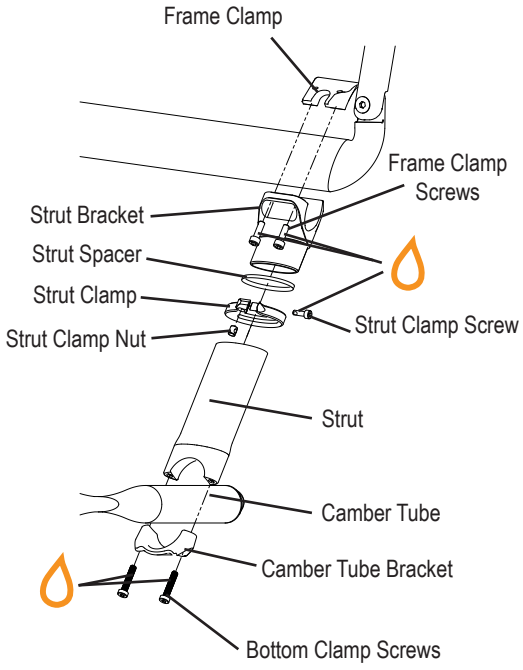
1. Place the wheelchair on a smooth, level surface with the casters trailing rearward.
2. Before making any adjustments to the wheelchair, it is important to check the following:

   a. The tires are properly inflated to the PSI rating shown on the sidewall of the tire.

   b. The camber tube is properly centered on the frame side to side and the camber tube is straight relative to the rear of the frame. For adjustments see "Replacing Parts on the TiLite CR1, Camber Tube" section.

   c. The toe-in / toe-out is correctly set up (See "Adjusting Toe-in / Toe-out" section).

   All items in this list are performed at the factory to ensure proper frame alignment before shipping. If an adjustment still needs to be made, complete it before proceeding. If no adjustment is needed, proceed to Step 3.
3. Loosen, but do not remove, the clamp bolt in the footrest clamp only on the side of the floating caster. Once the bolt is loose three full turns, strike the clamp bolt with a mallet upward to release the internal wedge in the footrest clamp.
4. Loosen, but do not remove, both bottom clamp bolts in the camber tube clamp on the side opposite the floating caster. Do not loosen the two bottom clamp bolts too much as to allow the camber tube to slide within the camber tube bracket.
5. Wiggle the wheelchair and let it settle on to the smooth, level surface to release any bind that may have existed within the wheelchair assembly.
6. Make sure the footrest is set to the desired seat-to-footrest measurement and, using a ruler or measuring tape, make sure the left and right sides of the footrest are the same distance from the level surface. It is important to have both sides of the footrest level and the footrest clamp bolt tightened before the bottom clamps and camber tube are tightened down.
7. **Torque the clamp bolts to 10Nm / 7.4 ft lb.**
8. Tighten the bottom clamp bolts starting with the bolt nearest the front of the wheelchair and working backward. **Progressively torque screws in 2Nm / 1.5 ft lb increments,** switching between screws until torque listed at the bottom of the page on "Replacing Center of Gravity Frame Clamp" pertaining to type of clamp on the wheelchair is achieved. If clamp gaps are significantly different, loosen screw on smaller clamp gap side by at least one turn, re-torque opposite bolt to specified value, then re-torque loosened bolt to specified value. It is acceptable to exceed specified **torque value by 2Nm / 1.5 ft lb** to achieve better equivalence in clamp gaps or until clamp gaps are nearly equal.



9. If the above adjustments correct the floater and all four wheels are flat on the level surface, the adjustment is finished. If a caster is still floating, repeat Steps 3 through 8. If you continue to have a floater that cannot be corrected using these steps, please contact TiLite Customer Support.

Troubleshooting, continued

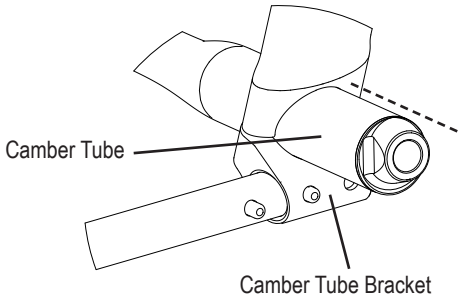
Adjusting Toe-In / Toe-Out

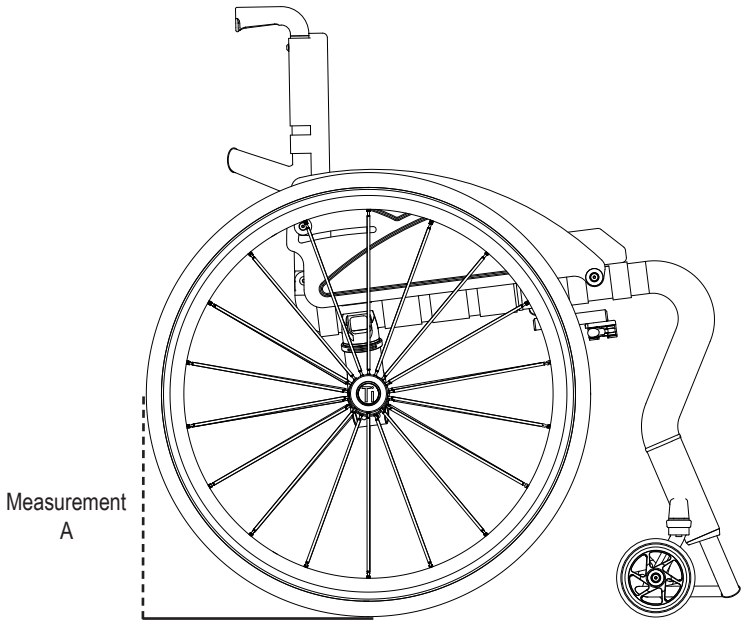
Tools needed:

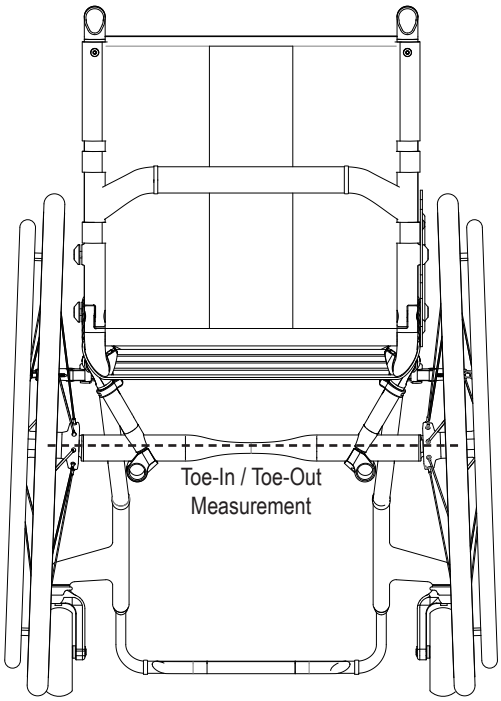
1. 4mm Hex Wrench
2. 23mm Open End Wrench
3. Ruler or Tape Measure
4. Felt Tip Pen

Note: Adjusting toe-in / toe-out does not apply to wheelchairs with 0° camber; however, it is still necessary to make sure that the camber plug flats are perpendicular to the ground.

1. Make sure the distance from the end of the camber tube to the camber tube bracket is identical on both sides of the wheelchair.
2. Make sure the rear wheels are properly inflated.
3. Place the wheelchair on all four wheels with the casters trailing toward the rear of the frame.
4. Measure from the floor to the center of the axle ("Measurement A"). Ensure the tape measure / ruler is perpendicular to the floor.
5. Fix the wheelchair so that it cannot roll forward or backward (do not use the wheel locks as this may affect the toe-in/toe-out adjustment).
6. Measuring from the floor at the rear of each tire, mark the tire with washable marker at the same height as Measurement A.
7. Measuring from the floor at the front of each tire, mark the tire with washable marker at the same height as Measurement A.
8. From behind the wheelchair, measure the horizontal distance between the left and right tires at the rear reference marks made in Step 6.
9. Measure the distance between the left and right tires at the front reference marks made in Step 7.
10. Compare the two measurements. If the measurements in Steps 8 and 9 are the same (within 1/8"), no toeing adjustment is needed, skip to Step 13. If not, proceed to Step 11.
11. Loosen the bottom clamp screws in each camber tube bracket that secures the camber tube in place.
12. If the measurement in Step 9 is less than the measurement in Step 8, rotate the camber tube rearward to toe-out the rear wheels. The 23mm open end wrench can be used to rotate the camber tube if it will not rotate by hand. If the measurement in Step 9 is greater than the measurement in Step 8, rotate the camber tube forward to toe-in the rear wheels. Continue adjusting the camber tube until these two measurements are equal.
13. Securely tighten the bottom clamp screws in the camber tube bracket.







Troubleshooting, continued

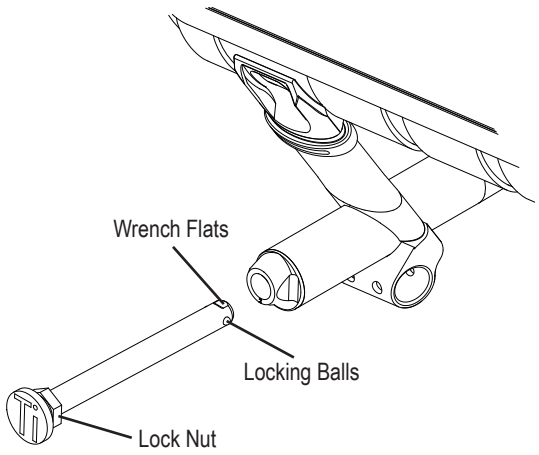
Stainless and Titanium Quick-Release Axles

⚠ **WARNING:** Quick-Release Axles are pre-adjusted to permit minimal “play” in the axle. Improperly adjusting the axle could cause it to malfunction—too much “play” can cause the axle to bend and become stuck in the camber tube; too little “play” can prevent the locking balls from engaging fully, causing the wheel to disengage from the wheelchair without warning.

Tools needed:

1. 19mm Open End Wrench
2. 11mm Open End Wrench

1. Press the release button and remove the rear wheel and Quick-Release Axle.
2. Remove the axle from the wheel by depressing the release button and sliding the axle through the rear wheel hub.
3. Once removed from the hub, release the release button (the locking balls should be fully extended).
4. Increase or decrease axle play by adjusting the lock nut with the 19mm open end wrench while holding the opposite end of the axle using the 11mm wrench at the flats at the end of the axle.
5. Press the release button on the Quick-Release Axle and slide the axle through the rear wheel hub.
6. Press the release button and reinstall the rear wheel into the camber tube.
7. Make sure the locking balls have fully secured the wheel in the camber tube by pulling on the hub without pressing the release button on the Quick-Release Axle. If the locking balls do not fully engage, repeat these procedures and increase the play (i.e., increase the distance between the lock nut and the locking balls) to permit the locking balls to fully engage properly. Also, check to make sure there is not excessive play in the axle.



Debris in Caster Axle

Hair and other debris caught in the caster axle is a common problem that causes a decrease in performance. To check for hair, remove the caster cap as shown in the "Replacing Parts on the TiLite CR1, Caster Wheels" section. Look for debris wrapped around the axle. If debris is found, remove and clean prior to reassembly.

PD13917 Rev. 2023-08-29

permobil

TiSport, LLC
2701 W. Court St.
Pasco, WA 99301

permobil.com