Crossover™ Extensible Knee

“Infinite Possibilities”

Congratulations on your decision to purchase a Crossover™ Extensible Knee! We have taken our original Bartlett Tendon Knee (BTK) design and made it even better! The new Crossover™ is an ambulatory Extensible knee that transforms into a sports knee in less than three minutes!

This state-of-the-art prosthetic knee system will be very gratifying if you service and maintain it accordingly.

Please enter the serial numbers of your knee below. You will provide this number if the knee unit requires servicing. Serial numbers are located on the knee frame under the protective cover.

This owner's manual contains the latest information for this model (as of June 2016). Future minor differences due to developments in the knee design cannot be ruled out completely.

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Crossover™ Knee Walking Configuration

1. Multidurometer impact/kneeling pads
2. ABS protective cover
3. ABS protective X/CAM™ covers
4. Rubber socket flexion limiters
5. Urethane lower frame bumpers
6. Easy to access “On Demand” shock controls
7. RT3 pneumatic/hydraulic shock
1. X/CLIP™ removable composite tendon connectors
2. Urethane tendons
3. X/CAM™ 3 position guide wheels
4. Urethane lower tendon guide wheels
5. Lower tendon retaining clamp
6. Multidurometer impact/kneeling pads
7. ABS protective cover system
8. SS removable X/CAM™ locking pin
9. Rubber socket flexion limiters
10. RT3 pneumatic/hydraulic shock
11. Tendon lock plate
1. Multidurometer impact/kneeling pads
2. Urethane lower tendon guide wheels
3. Urethane lower frame bumpers
4. X/CAM™ 3 position guide wheels
5. Lower tendon retaining clamp
6. Urethane tendons
7. X/CLIP™ removable composite tendon connectors
8. RT3 shock pump
9. ABS X/CAM™ cover
10. ABS protective cover, knee frame
11. RT3 pneumatic/hydraulic shock
Crossflex™ Preflexion Wedges

1. 20° Crossflex™ wedge
2. 30° Crossflex™ wedge
3. 40° Crossflex™ wedge

When installing Crossflex™ preflexion wedges, take care as to not tear the foam section that locks into the knee unit.

Note: For instructional video visit www.leftsideindustries.com
Lower Tendon Connector

1. Placement of tendons into lower connector
2. Back locking plate attached to connector
3. Lower tendon connector
4. Lower tendon connector in open position
5. Lower tendon connector in closed position with locking plate
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General Knee Description

Designed exclusively for lower limb prosthetic fittings, the Crossover™ knee is a monocentric (single axis) articulated Extensible knee that can be used for general ambulation or—with simple additions/adjustments—can be used for high activity sports. Designed similar to the Mauch S-N-S knee unit, the Crossover™ knee has the advantage of having the ability to add a patented highly adjustable Tendon and Three-Position X/CAM™ system when the user wants to participate in high activity sports or other activities.

Design Features & Function

- Single-axis pneumatic/hydraulic knee system with swing and stance control adjustments
- Designed for multispeed ambulation and sport activities
- Adjustable Variable Extension Dampening “VED” bumper system (kneeling and impact)
- Multi-faceted mode selector to control flexion and extension
- Patented urethane tendon and Three (3) Position X/CAM™ system, offering infinite tunable resistance and return in a removable Extensible format
- Crossflex™ preflexion foam wedges for sport activities. Three pack kit comes in 20°, 30° and 40° degree wedge settings
- Removable ABS protective impact cover
- Ultra lightweight CNC machined 6061-T aircraft aluminum frame with stainless steel inserts
- Oilite™ self-lubricating bushings:
  - No maintenance with increased durability
  - Smooth motion in light use or heavy impact situations
  - Reduced play
  - All parts serviceable
- Water and salt water resistant
Crossover™ Kit Contents

The Crossover knee kit comes with everything you will need to get your patient up and walking and participating in sports or other high activities.

Kit Contents: (PN: 1001-3)

- Crossover™ Knee with 75 durometer Variable Extension Dampening “VED” bumpers (upper/lower)
- Protective ABS impact covers with X/CAM™ covers
- Shock pump
- 2 pair urethane tendons
- X/CLIPs™ with removable hardware
- Easy hinged lower tendon clamp with locking system
- 6061-T CNC three (3) position X/CAMs™ with removable hardware
- 2 pair urethane lower frame tendon guide wheels for sport configuration
- 2 pair urethane lower frame bumper stops for ambulation configuration
- Tendon connector placement template
- User manual

Note: Consumable Products: The following items are classified as “Consumable Products” and will require replacement when visual wear, cracks or tears are present. See “Periodic Maintenance Table” (Pages 20-22)

- Urethane tendons
- “VED” dampening bumpers
- Protective cover
- Crossflex™ inter-changeable preflexion wedges

Note: Available additional items NOT included in the Crossover™ kit:

- Crossflex™ adjustable preflexion wedges are available for purchase in a three (3) pack kit (PN: C113)
- 85 durometer “VED” bumper set
## Compatible Activities, Sports and Rehabilitation

### Ambulation
- Walking and community ambulation.

### Winter Sports
- Alpine skiing
- Telemark skiing
- Cross country skiing
- Snowboarding
- Snow shoeing
- Ice Skating
- Hockey
- Snow kiting

### Water Sports
- Water skiing
- Wakeboarding
- Wind surfing
- Surfing
- SUP
- Kite boarding
- Scuba diving
- Rowing / crewing
- Swimming

### Summer Sports
- Mountain biking
- Road cycling
- Skate boarding
- Inline skating
- Backpacking
- Fighting sports
- Hiking
- Golf
- Beach days

### Moto Sports
- Moto-cross
- Enduro and trail
- Motorcycle ADV
- Snowmobile

### Rehabilitation
- Build muscle
- Weight lifting / squatting
- Promote general fitness
- Increase active, quality time with family
New Features and Benefits

- 8° - 140° expanded range of USABLE flexion
- No fade after 90° degrees flexion
- New compact, lighter, stronger and 5cm (2”) shorter frame
- Easy removable hinged lower tendon connector with lock (no need to remove feet)
- ABS impact covers for sport and ambulation
- Multi-durometer Variable Extension Dampening “VED” bumper system
- Kneeling pad
- 3ea Crossflex™ adjustable pre-flexion position wedges
- Oilite™ bushings that require no service
- Demo/trial program

Technical Specifications

- Maximum weight 125kg (275lbs)
- Net weight 908g (2lbs)
- Frame size 20cm (8 inches)
- 8° to 150° knee flexion available range
Understanding the Crossover™ Knee System

**Ambulation Configuration**

- In the ambulation configuration the Crossover™ knee functions like a monocentric (single axis) S-N-S knee unit, with a free swing feature utilizing a pneumatic/hydraulic shock with micro adjustment capabilities and a unique “VED” impact multi-durometer inter-changeable bumper system to address swing and stance gait phases.

- Under normal ambulation conditions no tendons and X/CAMs™ are used. However, the tendon and X/CAM™ system may be used for highly active walking situations like—for example—back packing or hiking.

- The Crossover™ knee utilizes a highly adjustable pneumatic/hydraulic cylinder to control flexion and extension adjustments.

- Variable Extension Dampening “VED” bumper system is also used to address stance phase.

**Sport Configuration**

- In the sport configuration the Crossover™ knee functions the same as in the ambulation noted above. But, when combined with the relatively linear spring rate of the tendons and X/CAM™ system the Crossover™ delivers a smooth even energy absorption and return. It is this smooth isotonic stability that makes the Crossover™ knee such a good choice for rehab and sport applications.

- Under sporting conditions, the tendon and X/CAM™ system are generally used. This system takes a user about 3 minutes to add to the knee.

- Crossflex™ adjustable preflexion wedges may also be used to position the user into a more preflexed position. For example, snowboarding uses a 30° preflexion position.

- In general more air is added to the shock during heavy sport activities in combination with the tendon and X/CAM™ system.
How the Systems Work Together

Tendons

The tendon system is the heart of the Crossover™ knee, offering a highly variable and infinitely tunable resistance and return mechanism. This relatively linear spring rate of tendons and X/CAM™ system delivers a smooth, even energy absorption and return. This patented tendon and X/CAM™ system is what makes it possible for the user to get extension/resistance moments that provide the needed assistance to enable exiting and absorbing the extreme flexion moments associated with sport activities.

- This system is comprised of four primary components: tendons, tendon connectors, three (3) position X/CAM™ guide wheels, and lower tendon connector.

- Only one tendon durometer is needed with the Crossover™ knee.

- One OR two tendons may be used at a time.

- The primary goal in setting selections is to find the winning combination that provides the optimal flexion resistance and extension assistance that will balance forces like a natural leg for the activity the user is doing. The idea is: “helping, but not hindering.”

Upper Tendon Connectors

The carbon tendon connectors form the proximal connection between the socket and the tendon system. These connectors form the pocket that the flattened ball end of the tendon slips into.

- They are connected with removable hardware or they can be bonded to the socket.

- Optimal location is between 5” to 9” proximal of knee center.

- Ensure the tendon has a clear path on the socket to the tendon guide wheel.
Lower Tendon Connector

The lower tendon connector is the distal attachment point for the ball end of the tendon.

This connector can slide up or down the pylon, and is used as additional adjustment for the tendons sliding distally to increase tension and proximally to reduce tension. The lower connector that comes in the kit is designed to fit a 30mm pylon and is hinged for easy on and off.

X/CAM™ Guide Wheels

To enhance the fluid dynamic feel of the tendons a three (3) position tendon X/CAM™ Guide Wheel system is used in conjunction with the tendons at the knee axis. These X/CAMs™ allow the highest tuning of tendon response within further progression of knee flexion.

Having a tendon resistance properly tuned within a specific range of flexion is very important as it means the user can tune specific points in flexion for the tendon to CAM into action, offering additional support where it’s need it, or X/CAM™ out the energy for explosive returns. Because of this X/CAM™ action Crossover™ users also achieve much lower preflexion resistance allowing them to conserve much needed energy while still providing the power and support needed flexing 25 degrees and beyond.

Each X/CAM™ offers three levels of progression and an additional 4th non-pinned option on each side, and can be used with the Crossover™ tendons in singles or pairs. These selections offer an unsurpassed series of options within the full range of flexion that can all be done on-the-fly without tools. The X/CAMs™ can also be utilized in reverse (4th option) or in a non-pinned free movement position delivering the identical performance of the previous BTK model with a round guide wheel.

- Pos.1 (single dot): This position is suggested for the least amount of X/CAM™ effect with knee flexion (least amount of resistance).
- Pos.2 (two dots): This position is suggested for a mid-range of X/CAM™ effect with knee flexion (middle range of resistance).
- Pos.3 (three dots): This position is suggested for a maximum X/CAM™ effect with knee flexion (maximum range of resistance).
- Pos.4 (no locking pin): In this position the X/CAM™ is in a FREE motion state with no increased resistance. This position is suggested if the amount of flexion tension with the tendon is desired in the very least amount of tension as the X/CAM™ will not engage during knee flexion.
RT3 Shock

The Crossover™ knee utilizes a pneumatic/hydraulic shock. This shock uses a combination of air, oil and valving to control and change flexion and extension moments. Air pressure is user adjustable and the regulated air spring/air pressure will dictate how firm that spring is. The user controls will regulate flexion and extension rates.

Similar in function to the S-N-S Mauch units this pneumatic/hydraulic shock provides the ability to manage average ambulation requirements, and when combined with the tendon, X/CAM™ and Crossflex™ wedges (see below), provides the additional dampening and rebound for high activity sports.

Crossflex™ Wedges

Crossflex™ preflexion wedges are a mid-durometer foam wedge system that is user added to change the preflexion angle/position per sport activity. Different sports require different preflexion settings. Snowboarding for example may require 30° whereas mountain biking may do better at 10°.

Crossflex™ wedges are designed to act like knee cartilage and provide a small amount of compression absorption. This feature absorbs a small percentage of impact energy keeping it from directly translating into the prosthetic limb. The net result is a less stressed prosthetic limb.

Crossflex™ wedges require no tools to add to the knee and are inserted at the knee axis.

20, 30 and 40 degree angle/positions are available. Note: When standing forces are placed on the wedges, there is an average compression rate of 5 to 10% to the wedges.

Variable Extension Dampening “VED” Bumper System

VED bumpers come in 75° and 85° durometer ratings and can be interchanged to address knee performance during stance phase. 85 durometer VED pads can be ordered separately. (Page 26)
Alignment and Initial Ambulation Settings

This procedure addresses both ambulation and sport

When setting up the Crossover™ knee for the first time on a new patient, the goal is to align the knee in a stable condition for ambulation. All adjustments to tune the knee are after the patient is set in a stable alignment.

Make sure the patient is in parallel bars for safety as the knee will be in free swing with no or very little resistance in the initial set up phase.

1. Unpack the box and make sure all items are in the package.
2. Remove air cap on shock and remove any residual air pressure. Depress valve to remove air. (Figure 1)
3. Set all shock settings to the zero position. (Page 11-12)
4. Remove protective covers for easy adjustments.
5. Attach Crossover™ to prosthetic.
6. For recommended beginning alignment. (Figure 2)

WARNING! If the patient is not stable they can fall at this stage of the fitting.
Alignment & First Time Set-Up

The alignment reference line is equal to the weight line

1. Alignment Reference Line (Socket Bisection)

2. Knee Axis Reference Point

   • Establish a vertical pylon.
   • Establish the knee center height.
   • Establish the appropriate socket angles. 5 degrees of socket flexion is recommended.
   • Position the socket so that the alignment reference line bisects the lateral wall at the ischial level of the socket and falls through or slightly posterior to the knee axis.
   • Establish the correct length of the prosthesis.

If the weight line is too far anterior to the knee axis, the knee may require much more effort to create a hyperextension moment that will engage the knee axis and allow for fluid initiation of the knee flexion.

Premature knee flexion may result from a weight line position too posterior to the knee axis and will make the knee unstable.

Figure 2/A displays alignment with a socket flexed at 10 degrees.
Understanding Shock Controls

**Flexion Resistance—Blue Lever**

This lever controls flexion, also known as “dampening” on this shock. The flexion lever has three positions. Looking at the shock in the knee frame, these positions are 10, 2 and 6 O’clock.

On the shock these positions are labeled as the following: (Figure 3)

- 10 O’clock = Unlock
- 2 O’clock = Pedal
- 6 O’clock = Lock

**Most common setting for ambulation:**

- 10 O’clock position = Lowest flexion resistance. “Unlock” (Figure 4)

**Additional settings most commonly used to address ambulation on uneven terrain, stairs and steep declines:**

- 2 O’clock position = Medium flexion resistance. “Pedal” (Figure 5)
- 6 O’clock position = Highest flexion resistance. “Lock” (Figure 6)

*Note: With higher air pressures the 6 O’clock setting can act as an on demand extension lock.*
**Extension Resistance—Red Dial**

This red dial controls extension, also known as “rebound” on this shock. The red dial is located directly behind the blue flexion lever. The red extension dial has a BLACK notch on it to indicate its position.(Figure 7)

- The dial rebound adjuster has ten positions with audible/tactile clicks
- Clockwise rotation = slow extension (rebound) 🐢
- Counter-clockwise rotation = faster extension (rebound) 🐇

**Air Pressure:**

Air pressure influences flexion and extension based on the amount of air pressure added to the shock.

- High air pressures create more resistance and are better for heavy impact sport.
- Lower air pressures create less resistance and are better for walking.
- You can run 1psi to 275psi depending on the user’s requirements and the activity.
Walking the Patient and Adjusting the Shock

**Step 1.**
Set the shock to the zero set point.
- Set the Blue Lever to the 10 O’ Clock position.
- Turn the Red Dial in a clockwise rotation until it stops.
- Remove all the air from the shock.
- Remove air cap and depress the valve with a tool.

**Step 2.**
Set shock to “Recommended Home Position.” *This is your starting position for each change in air pressure.*
- Blue Lever set to the 10 O’ Clock position.
- Turn Red Dial (4) clicks counter clockwise. The black notch should be at the 7 O’ Clock position.
- Add 10 psi to the shock using the supplied shock pump.

**Step 3.**

> **Warning! If the patient is not stable they can fall at this stage of the fitting.**

> **Note: Keep notes on settings while working through adjustments.** (Page 26)

- With the knee set at “Home Position” have the patient walk a few times in the parallel bars. They should feel a slight resistance in the shock. This is a good starting point for ambulation tuning.

- The first adjustment to address is extension. Adjust the red dial either COUNTER-CLOCKWISE (faster extension) or CLOCKWISE (slower extension) from the original 7 O’clock home position. Find the desired extension speed of the knee while walking the patient in the parallel bars. Move the dial one click at a time faster or slower as it may only take one click either way to find the desired settings.

- The second adjustment should be to flexion by adjusting the Blue Lever into one of three position options on the shock.

- The patient should be at an air pressure range that they can walk with while the Blue Lever is in the 10 O’clock position. (labeled as “Unlock” on the shock)
Walking the Patient and Adjusting the Shock

Additional Information:

As noted in the previous “Understanding Shock Controls” section, the additional two blue lever settings are commonly used to address ambulation on uneven terrain, stairs and steep declines as they can be adjusted quickly “on-the-fly” by the patient when on-demand flexion resistance is needed. These two settings provide the on-demand flexion resistance that deliver additional security when desired without the need to add more air to the shock.

Step 4.

While walking the patient and changing adjustments as needed, determine whether or not 10 psi is a good air pressure for your patient’s ambulation needs. If more air pressure is required, add more air with the air pump.

- When adding air go up at a scale of 5-10psi if you are close to where you’d like the patient to be. If not, close jump up 10-20psi at a time.
- Repeat adjustment process as in Step 3 until desired ambulation is met.
Sports Set-Up

There are two common sport mode applications for this knee:

1. Low Impact: SUP, hiking, golfing, snorkeling, snow shoeing, etc.
2. High Impact: downhill skiing, alpine skiing, snowboarding, moto, skydiving, etc.

Low Impact Sport

For low impact applications the Crossover™ can be utilized in the “Walk Mode” with the addition of more air pressure to get desired resistance levels while adjusting the shock adjustments to fit the ideal 3 position (Blue Lever) operating range.

High Impact Sport

For high impact applications the Crossover™ will need to be converted to the X/CAM™ sport mode configuration.

This conversion can be done in just minutes while the patient is wearing the knee with a rotator device (this is suggested) in the knee or simply by removing the leg and making these changes.

Installing X/CLIPS™ and Lower Tendon Mounts and X/CAM™

Required Tools: 3, 4, 5mm Allen wrench & Phillips screwdriver

Step 1. X/CAMS™

- Using a 3mm Allen tool, remove the screws on both side covers. Place in bag for safe keeping.

- Using a 4mm Allen tool, attach the X/CAMS™ to the sides of the Crossover™. Torque to 8nm.

Step 2. Lower Tendon Guide Rollers

- Using a 5mm Allen wrench remove the rubber caps on the lower part of Crossover™, replace with rubber tendon rollers and re-install. NOTE: all screws/ bolts are pre-Loctite but with frequent removal and re-install you may want to re-Loctite with Blue 242. Hand tighten.
Step 3. Lower Tendon Retaining Connector

- Remove the two screws holding the rear "Tendon Locking Plate" on, and remove from the connector.

- Remove the 5mm SS clamping screw from the connector and pull apart. Place the lower tendon connector on the 30mm pylon facing posterior.

- Normal starting position is just under the tube clamp adaptor.

- Check build height of prosthesis and knee position before moving onto the next step: mounting carbon X/CLIP™ connectors to socket.

  Note: The lower tendon connector can be adjusted up and down the pylon to increase/ decrease tension on the tendon. This is dependent on available space.

Step 4. X/CLIPs™ Upper Tendon Connectors

- Utilizing the X/CLIPs™ tendon template, cut out the inside of the square boxes on the template paper with a bladed tool to use as your placement template on the patient’s existing socket or new test socket.

- Check the placement of template by taking a tendon and placing the half ball end flush on the socket at bottom half of the cut out window to check the placement. Look for the tendon to line up with a tendon X/CAM™ guide wheel on the knee (Note: no need to stretch into place, you are only looking to see that the tendon lines up with the drive groove in the guide wheel).

- Placement of the X/CLIP™ connectors on the socket is recommended to be 5" (12.7cm) to 9" (22.86cm) from knee center. Keep this in consideration if you are building a new socket. If this is not possible, lower is better if you have room to slide the lower tendon connector down to increase tension. Once placement of template has been checked horizontally and vertically and lines up well with the guide wheels, use a marker to mark the X/CLIPs™ outline on the socket utilizing the cut out square box on template then remove paper from the socket. At this point (if applicable) remove the inner flexible socket from the carbon socket to easily access the socket wall.

  Note: If the socket shape or design does not allow for good placement, see our “Creative Solutions” section at www.leftsideindustries.com.

- Place the X/CLIP™ carbon clip on the corresponding template space and mark the area to be drilled. Using a sharp (#1/.228) drill bit, drill the two mounting holes.

- Remove the template. Large and small SS removable mounting hardware is included in the package. Use the best fitting hardware and mount the carbon clips.
• Remove the template. Large and small SS removable mounting hardware is included in the package. Use the best fitting hardware and mount the carbon clips.

Tendons Set Up

• Once the Crossover™ knee build has been completed and the X/CLIP™ connectors have been secured to the socket you can apply the tendons by simply slipping the tendon half ball end from the top of the connector (tendon may be tight when brand new, use of small amount of lubricant or rubbing alcohol can ease placement and removal of the tendon into connector) and sliding it down in locking into place.

• Next, flex the assembled prosthetic and knee allowing the tendon ball end to hang down so as you can easily secure the ball end into the lower tendon connector (best to do one side at a time), making sure that the ball is completely secured into the recessed position of the lower connector. Reattach the locking back plate and torque screws to 8mm.

• Finally, extend the prosthesis to full extension. Now stretch the tendon “Lift and Set” onto the tendon guide wheel groove, making sure that tendon is not “rolled” into the groove as it will want to twist out of groove. Also, check that the tendon is seated behind the small guide wheel on the lower knee frame, allowing for a straight pull from the lower connector.

Crossflex™ Wedges Set Up

• Crossflex™ preflexion wedges are easy for the user to install and require NO tools. Crossflex™ wedges are only used during sport activities.

• While the leg is on, simply flex the leg so the upper knee opening is at its widest point.

• Insert the narrow end of the Crossflex™ wedge into the open knee cavity. The foam hook will create a lock on the inside of the knee holding the wedge in place.

• Remove in reverse, being careful not to tear or damage the foam.

Note: See video at www.leftsideindustries.com for example.
Baseline Activity Recommendations Chart

All baseline settings are provided as a guideline for initial setup. The final settings will vary from user to user based on user preferences and conditions.

*N/A indicates no use of the Crossflex™ Wedges or X/CAM™ and tendons necessary for particular application

*(10) Unlock = , (2) Pedal, (6) Lock = - indicate the position of the Flexion Lever (Blue Lever) on the shock body

*Fast, Medium, Slow – indicates the Extension Speed (Red Dial) of the Knee

<table>
<thead>
<tr>
<th>Ambulation</th>
<th>Crossflex™ Wedge</th>
<th>Flexion Resistance</th>
<th>Extension Speed</th>
<th>X/CAM™ Position</th>
<th>Air Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking &amp; Community ambulation</td>
<td>N/A</td>
<td>Unlock (10) / Pedal (2)</td>
<td>Medium to Slow</td>
<td>N/A</td>
<td>5-30psi</td>
</tr>
</tbody>
</table>

**Winter Sports**

<table>
<thead>
<tr>
<th>Ambulation</th>
<th>Flexion Resistance</th>
<th>Extension Speed</th>
<th>X/CAM™ Position</th>
<th>Air Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpine Skiing</td>
<td>Pedal (2) / Lock (6)</td>
<td>Medium to Slow</td>
<td>1st &amp; 2nd</td>
<td>15-60psi</td>
</tr>
<tr>
<td>Telemark Skiing</td>
<td>Pedal (2) / Lock (6)</td>
<td>Medium to Slow</td>
<td>2nd &amp; 3rd</td>
<td>15-80psi</td>
</tr>
<tr>
<td>Cross Country Skiing</td>
<td>Unlock (10) / Pedal (2)</td>
<td>Medium to Fast</td>
<td>4th &amp; 1st</td>
<td>15-60psi</td>
</tr>
<tr>
<td>Snowboarding</td>
<td>Pedal (2) / Lock (6)</td>
<td>Medium to Slow</td>
<td>3rd &amp; 4th</td>
<td>25-165psi</td>
</tr>
<tr>
<td>Snow Shoeing</td>
<td>Pedal (2) / Lock (6)</td>
<td>Medium to Fast</td>
<td>N/A</td>
<td>5-35psi</td>
</tr>
<tr>
<td>Ice Skating</td>
<td>Pedal (2) / Lock (6)</td>
<td>Medium to Fast</td>
<td>N/A</td>
<td>15-80psi</td>
</tr>
<tr>
<td>Hockey</td>
<td>Pedal (2) / Lock (6)</td>
<td>Medium to Fast</td>
<td>1st &amp; 2nd</td>
<td>15-60psi</td>
</tr>
<tr>
<td>Snow Kiting</td>
<td>Pedal (2) / Lock (6)</td>
<td>Medium to Slow</td>
<td>3rd &amp; 4th</td>
<td>15-140psi</td>
</tr>
</tbody>
</table>
## Baseline Activity Recommendations Chart

### Water Sports

<table>
<thead>
<tr>
<th>Activity</th>
<th>Angle</th>
<th>Pedal Method</th>
<th>Speed</th>
<th>Pressure Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Skiing</td>
<td>None to 20°</td>
<td>Pedal (2) / Lock (6)</td>
<td>Medium to Fast</td>
<td>N/A</td>
</tr>
<tr>
<td>Wakeboarding</td>
<td>20° / 30°</td>
<td>Pedal (2) / Lock (6)</td>
<td>Medium to Slow</td>
<td>3rd &amp; 3rd</td>
</tr>
<tr>
<td>Wind Surfing</td>
<td>20° / 30°</td>
<td>Pedal (2) / Lock (6)</td>
<td>Medium to Slow</td>
<td>2nd &amp; 3rd</td>
</tr>
<tr>
<td>Surfing</td>
<td>None to 20°</td>
<td>Pedal (2) / Lock (6)</td>
<td>Medium to Slow</td>
<td>N/A</td>
</tr>
<tr>
<td>SUP</td>
<td>None to 20°</td>
<td>Pedal (2) / Lock (6)</td>
<td>Medium to Fast</td>
<td>N/A</td>
</tr>
<tr>
<td>Kite Boarding</td>
<td>20° / 30°</td>
<td>Pedal (2) / Lock (6)</td>
<td>Medium to Slow</td>
<td>3rd &amp; 3rd</td>
</tr>
<tr>
<td>Scuba Diving</td>
<td>N/A</td>
<td>Unlock (10)</td>
<td>Fast</td>
<td>4th &amp; 1st</td>
</tr>
<tr>
<td>Swimming</td>
<td>N/A</td>
<td>Unlock (10)</td>
<td>Fast</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### Summer Sports

<table>
<thead>
<tr>
<th>Activity</th>
<th>Angle</th>
<th>Pedal Method</th>
<th>Speed</th>
<th>Pressure Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mountain Biking (DH)</td>
<td>20° / 30°</td>
<td>Pedal (2) / Lock (6)</td>
<td>Medium to Slow</td>
<td>3rd &amp; 3rd</td>
</tr>
<tr>
<td>Mountain Biking (XC)</td>
<td>20° / 30°</td>
<td>Unlock (10) / Pedal (2)</td>
<td>Medium to Slow</td>
<td>1st &amp; 2nd</td>
</tr>
<tr>
<td>Road Biking</td>
<td>20°</td>
<td>Unlock (10) / Pedal (2)</td>
<td>Medium to Fast</td>
<td>N/A</td>
</tr>
<tr>
<td>Skate Boarding</td>
<td>None to 20°</td>
<td>Pedal (2) / Lock (6)</td>
<td>Medium to Fast</td>
<td>N/A</td>
</tr>
<tr>
<td>Inline Skating</td>
<td>None to 20°</td>
<td>Pedal (2) / Lock (6)</td>
<td>Medium to Fast</td>
<td>N/A</td>
</tr>
<tr>
<td>Backpacking</td>
<td>N/A</td>
<td>Unlock (10) / Pedal (2) / Lock (6)</td>
<td>Medium to Fast</td>
<td>N/A</td>
</tr>
<tr>
<td>Fighting Sports</td>
<td>N/A</td>
<td>Pedal (2) / Lock (6)</td>
<td>Medium to Fast</td>
<td>N/A</td>
</tr>
<tr>
<td>Hiking</td>
<td>N/A</td>
<td>Unlock (10) / Pedal (2) / Lock (6)</td>
<td>Medium to Slow</td>
<td>N/A</td>
</tr>
<tr>
<td>Golfing</td>
<td>N/A</td>
<td>Unlock (10) / Pedal (2) / Lock (6)</td>
<td>Medium to Slow</td>
<td>N/A</td>
</tr>
<tr>
<td>Beach Days</td>
<td>N/A</td>
<td>Unlock (10) / Pedal (2) / Lock (6)</td>
<td>Medium to Slow</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Baseline Activity Recommendations Chart

<table>
<thead>
<tr>
<th>Activity</th>
<th>Flexion Angle</th>
<th>Pedal Location</th>
<th>Flexion Control</th>
<th>Pressure Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moto Sports</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motocross</td>
<td>30º / 40º</td>
<td>Pedal (2) / Lock (6)</td>
<td>Medium to Slow</td>
<td>3rd &amp; 3rd</td>
</tr>
<tr>
<td>Enduro &amp; Trail</td>
<td>20º / 30º</td>
<td>Pedal (2) / Lock (6)</td>
<td>Medium to Slow</td>
<td>1st &amp; 2nd</td>
</tr>
<tr>
<td>Motorcycle ADV</td>
<td>None to 20º</td>
<td>Pedal (2) / Lock (6)</td>
<td>Medium to Slow</td>
<td>N/A</td>
</tr>
<tr>
<td>Snowmobile</td>
<td>30º / 40º</td>
<td>Pedal (2) / Lock (6)</td>
<td>Medium to Slow</td>
<td>3rd &amp; 3rd</td>
</tr>
</tbody>
</table>

Knee Maintenance

General Inspection

Before you use your Crossover™ knee, personally inspect the knee before each use. Check the knee for:

- Loose or missing bolts or screws
- Proper air pressure as indicated by your prosthetist determined during knee set up for the corresponding activity you intend to do
- Cracks or damage to protective covers
- Tear or damage to a rubber tendons and rubber pads
- Carbon attachments secured to socket

Periodic Maintenance Schedule

To maintain the high performance, safety, and long life of your Crossover™ knee, it is required that you periodically check the knee system and perform routine maintenance on your shock. If you use the shock and knee in extreme conditions, compliance checks and maintenance should be performed more frequently.
# Knee Maintenance

**Normal use. Walking and occasional sports. No water.**

## Wear and Tear Parts

<table>
<thead>
<tr>
<th>Component</th>
<th>Interval (hours)</th>
<th>Replace</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspect rubber tendons for excessive wear, abrasion or tears. Replace if necessary.</td>
<td>8hrs or after every sport activity</td>
<td>Annually</td>
</tr>
<tr>
<td>Inspect 75 durometer terminal impact pads for excessive wear, abrasion or tears. Replace if necessary.</td>
<td>100hrs</td>
<td>Annually</td>
</tr>
<tr>
<td>Inspect 85 durometer terminal impact pads for excessive wear, abrasion or tears. Replace if necessary.</td>
<td>100hrs</td>
<td>Annually</td>
</tr>
<tr>
<td>Inspect ABS protective cover for excessive wear, abrasion or cracks. Replace if necessary.</td>
<td>8hrs or after every sport activity</td>
<td>As indicated by damage</td>
</tr>
<tr>
<td>Inspect Crossflex™ adjustable preflexion wedges for excessive wear, abrasion or tears. Replace if necessary.</td>
<td>After every sport activity</td>
<td>As indicated by damage or wear.</td>
</tr>
</tbody>
</table>

## Shock Maintenance Service Chart

<table>
<thead>
<tr>
<th>Task</th>
<th>Interval (hours)</th>
<th>Replace</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean your shock with mild soap and a toothbrush.</td>
<td>8</td>
<td>NA</td>
</tr>
<tr>
<td>Keep mounting hardware clean and lubricated.</td>
<td>8</td>
<td>NA</td>
</tr>
<tr>
<td>Remove, clean, and grease mounting hardware.</td>
<td>20</td>
<td>NA</td>
</tr>
<tr>
<td>Clean and inspect extension/preflexion spacers. Replace if necessary.</td>
<td>20</td>
<td>NA</td>
</tr>
<tr>
<td>Inspect eyelet bushings and mounting hardware for wear and play. Replace if necessary</td>
<td>100</td>
<td>Annually</td>
</tr>
<tr>
<td>Replace all seals.</td>
<td>100</td>
<td>Annually</td>
</tr>
<tr>
<td>Inspect shaft, reservoir, damper body and air can for scratches or damage (if applicable). Replace if necessary.</td>
<td>100</td>
<td>Annually</td>
</tr>
<tr>
<td>Replace damping fluid (if applicable).</td>
<td>100</td>
<td>Annually</td>
</tr>
</tbody>
</table>

## Knee Frame and Knee Parts

<table>
<thead>
<tr>
<th>Component</th>
<th>Interval (hours)</th>
<th>Replace</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspect X/CAM, for dings or sharp edges that may cut into tendons. Inspect 4mm SS attachment screws for damage. Replace if necessary.</td>
<td>After each sporting activity</td>
<td>If damaged</td>
<td>8nm</td>
</tr>
<tr>
<td>Inspect carbon tendon X/CLIPS and SS mounting hardware for damage. Replace if necessary.</td>
<td>After each sporting activity</td>
<td>If damaged</td>
<td>4nm</td>
</tr>
<tr>
<td>Inspect lower tendon mount for dings or sharp edges that my cut into tendons. Inspect 5mm SS attachment screws for damage.</td>
<td>After each sporting activity</td>
<td>If damaged</td>
<td>8nm</td>
</tr>
<tr>
<td>Knee frame. Inspect for any damage.</td>
<td>Annually</td>
<td>If damaged</td>
<td>NA</td>
</tr>
<tr>
<td>Inspect protective ABS cover 3mm mounting screws.</td>
<td>After each removal</td>
<td>If damaged</td>
<td>Hand tight</td>
</tr>
<tr>
<td>Inspect nylon washers, rubber O-rings, and cir-clips.</td>
<td>Annually</td>
<td>If damaged</td>
<td></td>
</tr>
</tbody>
</table>
# Knee Maintenance

**High Use: Mostly Sports. Fresh and Saltwater.**

## Wear and Tear Parts

<table>
<thead>
<tr>
<th>Wear and Tear Parts</th>
<th>Interval (hours)</th>
<th>Replace</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspect rubber tendons for excessive wear, abrasion or tears replace if necessary.</td>
<td>After every sport activity</td>
<td>As indicated by damage or wear.</td>
</tr>
<tr>
<td>Inspect 75 durometer terminal impact pads for excessive wear, abrasion or tears replace if necessary.</td>
<td>30hrs</td>
<td>As indicated by damage or wear.</td>
</tr>
<tr>
<td>Inspect 85 durometer terminal impact pads for excessive wear, abrasion or tears replace if necessary.</td>
<td>30hrs</td>
<td>As indicated by damage or wear.</td>
</tr>
<tr>
<td>Inspect ABS protective cover for excessive wear, abrasion or cracks replace if necessary.</td>
<td>After every sport activity</td>
<td>As indicated by damage.</td>
</tr>
<tr>
<td>Inspect Crossflex™ adjustable pre-flexion wedges for excessive wear, abrasion or tears replace if necessary.</td>
<td>After every sport activity</td>
<td>As indicated by damage or wear.</td>
</tr>
</tbody>
</table>

## Shock Maintenance Service Chart

<table>
<thead>
<tr>
<th>Shock Maintenance Service Chart</th>
<th>Interval (hours)</th>
<th>Replace</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean your shock with mild soap and a toothbrush</td>
<td>After every sport activity</td>
<td>NA</td>
</tr>
<tr>
<td>Keep mounting hardware clean and lubricated</td>
<td>After every sport activity</td>
<td>NA</td>
</tr>
<tr>
<td>Remove, clean, and grease mounting hardware</td>
<td>After every sport activity</td>
<td>NA</td>
</tr>
<tr>
<td>Inspect eyelet bushings and mounting hardware for wear and play. Replace if necessary.</td>
<td>30</td>
<td>As indicated by damage or wear.</td>
</tr>
<tr>
<td>Replace all seals</td>
<td>30</td>
<td>Annually</td>
</tr>
<tr>
<td>Inspect shaft, reservoir, damper body and air can for scratches or damage (if applicable). Replace if necessary.</td>
<td>30</td>
<td>Annually</td>
</tr>
<tr>
<td>Replace damping fluid (if applicable)</td>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>

## Knee Frame and Knee Parts

<table>
<thead>
<tr>
<th>Knee Frame and Knee Parts</th>
<th>Interval (hours)</th>
<th>Replace</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspect X/CAM™ for dings or sharp edges that may cut into tendons. Inspect 5mm SS attachment screws for damage. Replace if necessary.</td>
<td>After each sporting activity</td>
<td>If damaged</td>
<td>8nm</td>
</tr>
<tr>
<td>Inspect carbon tendon X/CLIPS™ and SS mounting hardware for damage. Replace if necessary.</td>
<td>After each sporting activity</td>
<td>If damaged</td>
<td>4nm</td>
</tr>
<tr>
<td>Inspect lower tendon mount for dings or sharp edges that may cut into tendons. Inspect SS attachment screws for damage.</td>
<td>After each sporting activity</td>
<td>If damaged</td>
<td>8nm</td>
</tr>
<tr>
<td>Knee frame. Inspect for any damage.</td>
<td>After each sporting activity</td>
<td>If damaged</td>
<td>NA</td>
</tr>
<tr>
<td>Inspect protective ABS cover 3mm mounting screws</td>
<td>After each removal</td>
<td>If damaged</td>
<td>Hand tight</td>
</tr>
<tr>
<td>Nylon washers, rubber O-rings, circlips</td>
<td>Annually</td>
<td>If damaged</td>
<td></td>
</tr>
</tbody>
</table>
Warranty

Leftside Industries, Inc.

Leftside Industries Inc. warrants its products to be free from defects in materials and/or workmanship for a period of 36 months from date of original purchase. This warranty is non-transferable and voided if the serial number or production code has been deliberately altered, defaced or removed. Claims must be accompanied by original proof of purchase. All shipping costs are the responsibility of the party making the warranty claim.

This warranty does not apply to products that have been modified, incorrectly installed and/or improperly adjusted. This warranty does not apply to normal wear and tear, crash impact, abuse or non-compliance with the manufacturers’ specifications.

Final determination on all warranty claims is at the sole discretion of Leftside Industries Inc.

LIMITATIONS OF WARRANTY

This warranty does not apply to normal wear and tear. Wear and tear parts are subject to damage as a result of normal use, failure to service according to Leftside Industries recommendations and/or sports or installation in conditions or applications other than recommended.

Wear and tear parts are identified below and are NOT covered by the 36 month warranty. Please refer to maintenance service charts.

- Urethane tendons
- Variable Extension Dampening bumpers
- Protective ABS cover
- Crossflex™ adjustable pre-flexion wedges
- Shock (See shock warranty)

Shock Warranty

SRAM LLC WARRANTY

EXTENT OF LIMITED WARRANTY
Except as otherwise set forth herein, SRAM warrants its products to be free from defects in materials or workmanship for a period of two years after original purchase. This warranty only applies to the original owner and is not transferable. Claims under this warranty must be made through the retailer where the product or the SRAM component was purchased. Original proof of purchase is required. Except as described herein, SRAM makes no other warranties, guaranties, or representations of any type (express or implied), and all warranties (including any implied warranties of reasonable care, merchantability, or fitness for a particular purpose) are hereby disclaimed.

LIMITATIONS OF LIABILITY
To the extent allowed by local law, except for the obligations specifically set forth in this warranty statement, in no event shall SRAM or its third party suppliers be liable for direct, indirect, special, incidental, or consequential damages.

LIMITATIONS OF WARRANTY
This warranty does not apply to products that have been incorrectly installed and/or adjusted according to the respective SRAM user manual. The SRAM user manuals can be found online at sram.com, rockshox.com, avidbike.com, truvativ.com, or zipp.com.
Warranty

Fabtech Systems, LLC

This warranty does not apply to damage to the product caused by a crash, impact, abuse of the product, non-compliance with manufacturers specifications of usage or any other circumstances in which the product has been subjected to forces or loads beyond its design.

This warranty does not apply when the product has been modified, including, but not limited to any attempt to open or repair any electronic and electronic related components, including the motor, controller, battery packs, wiring harnesses, switches, and chargers.

This warranty does not apply when the serial number or production code has been deliberately altered, defaced or removed.

This warranty does not apply to normal wear and tear. Wear and tear parts are subject to damage as a result of normal use, failure to service according to SRAM recommendations and/or riding or installation in conditions or applications other than recommended.

Wear and tear parts are identified as:

- Dust seals
- Bushings
- Air sealing O-rings
- Glide rings
- Rubber moving parts
- Foam rings
- Rear shock mounting hardware and main seals

Snow & Water

⚠️

The Crossover™ knee is designed to be used in wet conditions. To ensure a long lifespan the unit should be rinsed with clean water after it has been used in salt water, resort snow (resort snow contains conditioning chemicals that may corrode parts), and in other conditions in which water is questionable. Never store the unit wet. After rinsing the Crossover™ knee off with fresh clean water it should be dried, then lubricated with a lithium based lubricant to all moving parts of the knee. Always store dry.

⚠️

Prolonged submersion of the shock will void the manufacture’s warranty. Diving and snorkeling while using the Crossover™ knee are recommended without the shock unit in, using tendons only. While performing activities such as water skiing, kite-boarding or wave running where the shock is recommended, simply follow snow and water care instructions and don’t submerge shock for prolonged periods.
Service Contact Information

Please contact:
Fabtech Systems, LLC
Phone: 1-800-322-8324
Email: staff@fabtechsystems.com
3304 Hill Ave, Everett WA 98203

Technical Support

Call 1-800-322-8324
9:00AM -5:00PM PST

L-Code Information

Phone: 1-800-322-8324
Email: staff@fabtechsystems.com
9:00AM -5:00PM PST

Component Options and Creative Solutions

Visit www.leftsideindustries.com for information on:

- Low profile adaptors
- Feet for specific activities
- Mounting carbon clips on flat base with adhesive
- Short sockets
- HiFi strut sockets – removable bridge
- Tips
## Set-Up Reference Notes

<table>
<thead>
<tr>
<th>Flexion Setting</th>
<th>Extension Setting</th>
<th>PSI</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Parts List:

- **PN#:C102**  75 Durometer Variable Extension Dampening Pads - 2ea/Pair
- **PN#:C103**  85 Durometer Variable Extension Dampening Pads - 2ea/Pair
- **PN#:C104**  Urethane Tendons - 2ea/Pair
- **PN#:C105**  Rubber Socket Flexion Limiter - 2ea/Pair
- **PN#:C106**  Urethane Lower Frame Bumper - 2ea/Pair
- **PN#:C107**  Urethane Lower Tendon Guide Wheel - 2ea/Pair
- **PN#:C108**  X/CLIP™ Carbon Attachment Clip - 2ea/Pair
- **PN#:C109**  X/CAM™ Guide Wheels & Hardware - 2ea/Pair
- **PN#:C110**  30mm Hinged/Lock Lower Tendon Connector
- **PN#:C111**  RT3 Hydraulic Shock
- **PN#:C112**  Protective ABS Cover - (3 piece & hardware)
- **PN#:C113**  Crossflex™ Preflexion wedges - (20,30,40 degree kit)
- **PN: C1S**  PLUSeries Composite Adhesive 50ml
- **PN: G50**  PLUSeries 50ml Dispensing Gun
Upper X/CLIP™ Carbon Tendon Connector Placement Template

After cutting the tendon attachment boxes out, position the center line on the anterior aspect of the socket aligned to the rotation of the knee unit. The recommended height placement is 5" - 9" from the center of the knee. This is the recommended position of the proximal connectors.