

# Apex 3 Operation and Maintenance



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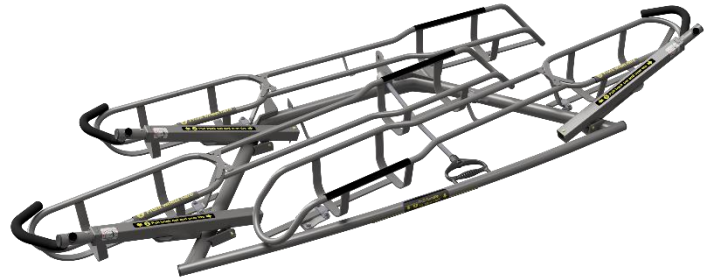
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## SCOPE OF THIS DOCUMENT

This document applies to all Apex 3 bicycle racks. The Apex 3 product line is a 3-position bike rack with stainless steel frame, wheel trays, and support arms. There are two main versions of the Apex 3 – one with standard trays and support arms, the other with Fat Tire compatible trays and support arms.



Apex 3 with standard trays and support arms



Apex 3 with Fat Tire compatible trays and support arms

100945-XXX denotes an Apex 3 with standard trays and arms

100945-FAT-XXX denotes an Apex 3 with Fat Tire compatible trays and arms

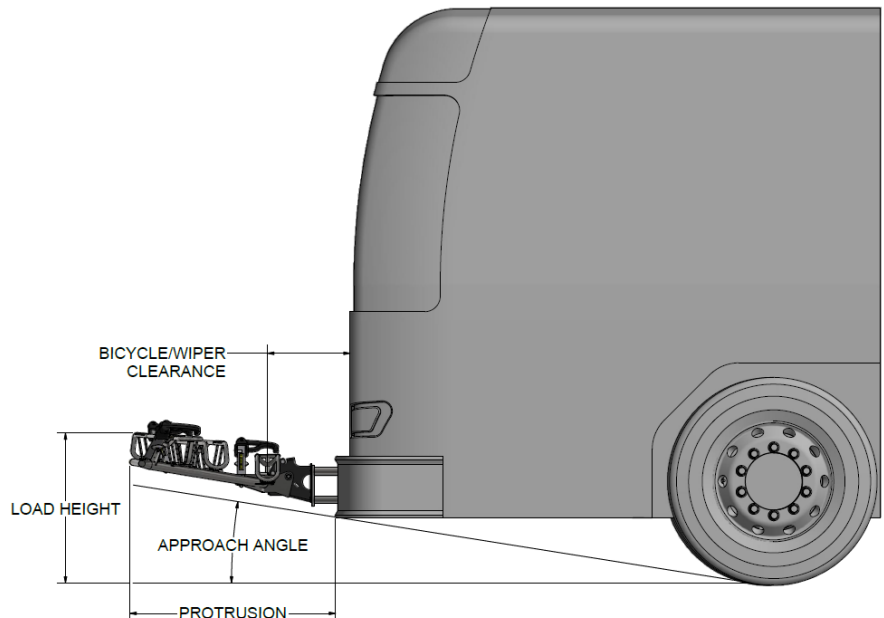
The standard and fat trays may also be mixed on the same rack.

## INSTALLATION & OVERVIEW

The installation is crucial to the safety and performance of the Sportworks Bike-Rack-for-Buses system. There are several factors that need to be addressed when mounting the rack. These factors include the:

- Load Height
- Approach Angle
- Protrusion
- Bicycle/wiper Clearance
- Front Mask Clearance
- Footprint/Headlight clearance

Carefully read and understand the following information regarding the positioning of the rack on the bus before beginning the installation process.



### Load Height

The load height is the vertical distance a bicycle must be lifted for placement in a deployed bike rack. If the rack is mounted too high, some riders may have difficulty loading the rack.

### Approach Angle

The approach angle is the angle created by a line from where the front tire contacts the pavement to the first obstruction ahead of the front tire. This obstruction would first touch the pavement when transitioning from flat to a very steep hill. APTA standards require a minimum approach angle of 8°, although some agencies in hilly areas may require 9°. The bike rack will limit the approach angle if it is installed on the bumper in a low enough position. The bike rack installer should be aware of this possibility. Investigate approach angle requirements in your area before mounting the rack.

### Protrusion

Protrusion measures the distance from the front of the bumper to the front edge of the bike rack in the deployed position. Once the bike rack is mounted to the coach, the protrusion distance is fixed. Protrusion is a measurement that needs attention for two important reasons.

1. Many state DOTs (Departments of Transportation) have set limits for bike rack protrusion (e.g. California, one of the most restrictive DOTs, has set a protrusion limit of 40 inches measured from the front mask of the coach).
2. The further a rack protrudes, the more likely it will affect a coach's approach angle and turning radius. It will also have an effect on bicycle/wiper clearance, which could cause interference with windshield wipers or a coach driver's visual field.

## Bicycle/Wiper Clearance

Bicycle/Wiper clearance is important to make sure that when a bicycle is loaded in the position closest to the bus, the handlebars do not come close enough to the wipers to interfere or be caught by them. Sportworks typically recommends ensuring at least 16 inches clearance between the center of the nearest tray and the wiper arms, although some vehicles may have unique requirements.

## Front Mask Clearance

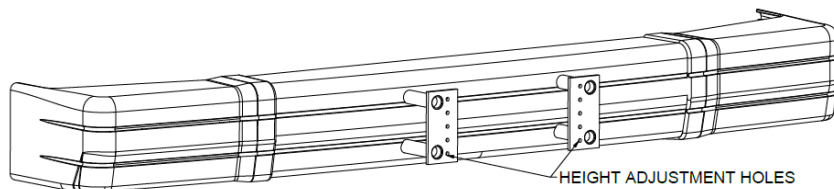
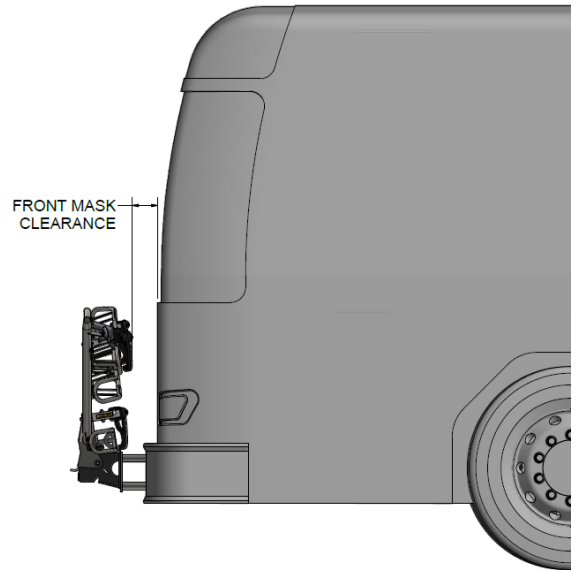
Front mask clearance is the clearance between the stowed rack and the wiper mechanism or front-most part of the bus mask. Sportworks recommends a minimum of 2 inches clearance, although some vehicles may have unique requirements.

## Footprint/Headlight Clearance

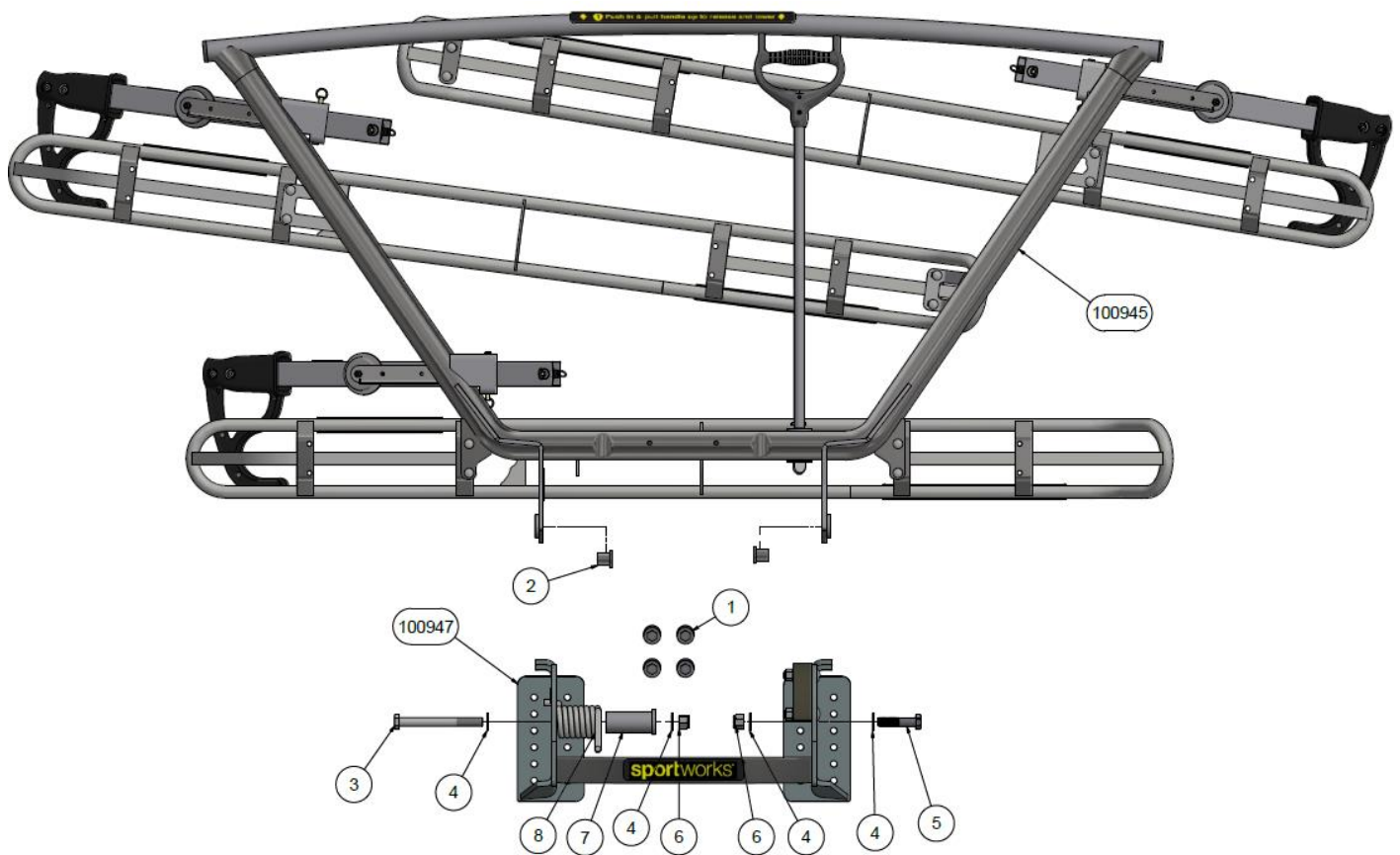
The footprint is the outline of a bike rack against the front of the bus when the rack is in the stored position.

Avoid obstructing headlights, hi-beam headlights and turn signal indicators. To change the position of the rack, remove the bike rack from the pivot plate. Remove the pivot plate from the C-Brackets or other bracket pieces and position the pivot plate up or down as required. Remount the pivot plate to the bracket pieces and the rack to the pivot plate.

Some bracket assemblies may not have multiple height adjustment holes. If this is the case, the bracket assembly is designed for an optimum position in terms of minimal headlight interference and proper loading height. Height adjustment is not required.



## Mounting the Apex 3



**Note: Standoffs can shift during service because of impacts. When installing the Apex pivot plate on pre-installed standoffs, it may be necessary to loosen the standoffs from the back bumper structure in order to align them to the 14" and 18" hole pattern. Bolt the pivot plate to standoffs, and tighten standoff bolts.**

1. Install pivot plate using supplied hardware Item #1 and 14" or 18" hole pattern.
2. Install pivot tab bushings Item #2 in rack with flanges inside.
3. Place rack on pivot plate in stowed (up) position. The pivot plate will support the rack while you insert the fasteners.
4. Insert the supplied fasteners Items 3, 4 and 5. Insert the supplied fasteners and torsion spring Items 6, 7, and 8. The bent end of the torsion spring hooks into the pivot plate and the large end of the torsion spring mount Item #7 should be toward the nut.
5. Torque 1/2"-13 bolts to values listed in General Torque Specs section.

## General Torque Specs

Most of our brackets are attached to the bus bumper using Grade 8 ½-13 HHCS. Our standard pivot plates are attached to the brackets using Grade 8 3/8-16 HHCS.

Recommended torque values:

- ½-13 Grade 8 – 80-90 FT-LB
- 3/8-16 Grade 8 – 30-40 FT-LB

If you are using quick-release hardware to attach the bike rack to the pivot plate or are using a Ten Second Bracket (TSB), please tighten the knobs by hand as tightly as possible and do not tighten with tools.



## OPERATION OF THE BIKE RACK

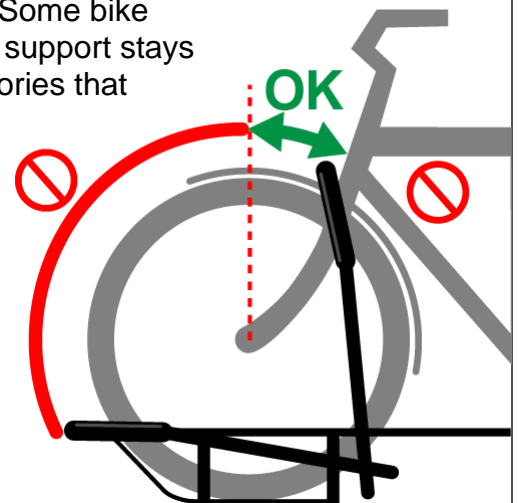
The Sportworks Bike-Rack-for-Buses has been designed to make the lowest impact possible on transit operations. All loading and unloading of bikes can be done by the bike rider. Sportworks suggests that loading of children's bikes be done by an accompanying adult, though the rack can be easily loaded by young children.

### Steps for Loading Bikes

1. Prepare your bike for loading. Remove water bottles, pumps, panniers, bags, and other loose items that could fall off while the transit vehicle is in motion.
2. Inform the transit operator that you will be loading your bike. You must load your bike from the curb or from in front of the transit vehicle. Do not step beyond the driver's side of the vehicle into passing traffic to load your bike.
3. If the rack is in the stowed (vertical) position, squeeze the latch handle to release the latch, then fold the bike rack down. You need only use one hand to unlatch and pull the bike rack down, so that your other hand is available to hold your bike. It is not necessary to lean your bike against the transit vehicle.
4. Lift your bike onto the bike rack, fitting your front wheel into a wheel slot labeled for a front wheel. The purpose of the directional placement is to make adjacent bikes easy to load and unload.
5. Raise the Support Arm Hook over the front tire. The primary purpose of the Support Arm is to keep the bike secure while the transit vehicle is in motion. Some bikes may sit in the wheel tray without use of the Support Arm, but the rack must not be used without the Support Arm

**The Support Arm Hook must be between the highest point of the tire and the head tube.** Incorrect Support Arm Hook placement may result in the bike falling from the rack, potentially damaging the transit vehicle or other vehicles. Place the Support Arm Hook over fenders as required to achieve the correct hook position. Some bike accessories such as front racks and baskets with vertical support stays may preclude correct hook placement. Bikes with accessories that conflict with correct support arm placement must not be loaded onto the rack.

6. Board the transit vehicle and enjoy the ride! Choose a seat near the front of the vehicle to keep an eye on your bike. **DON'T FORGET** you have a bike with you when you get off at your stop.

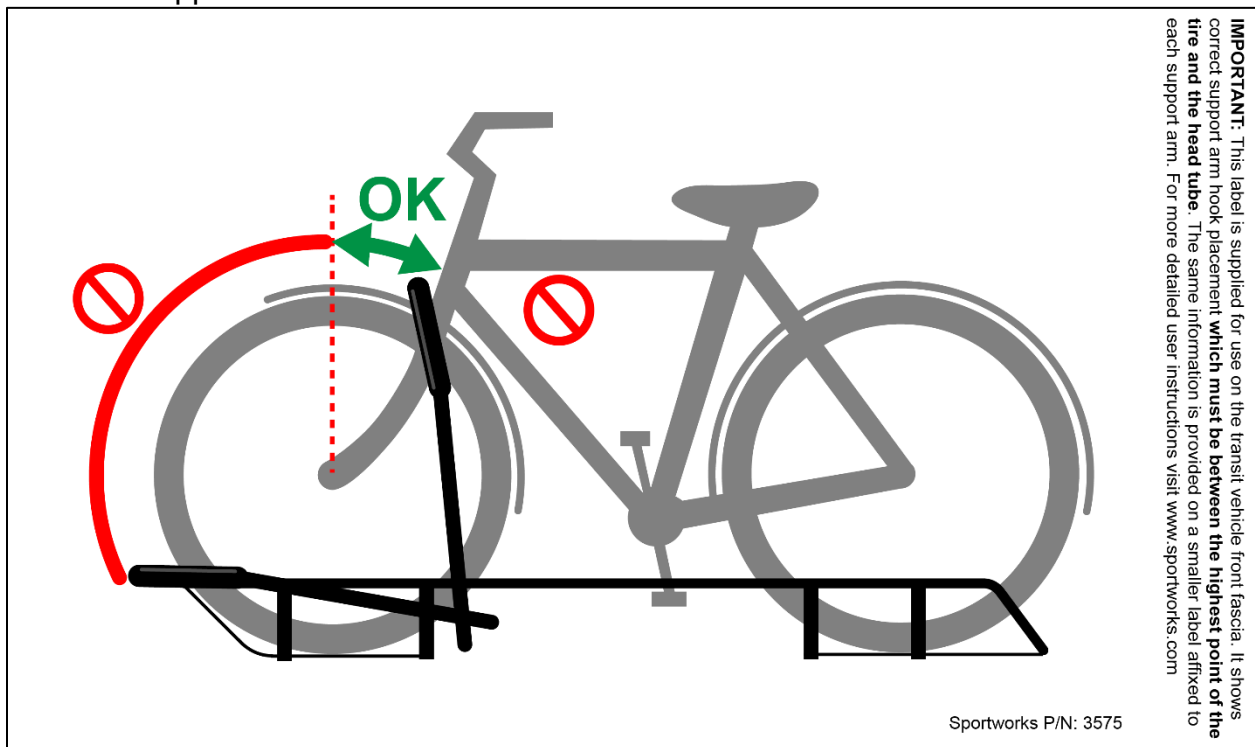


## Steps for Unloading Bikes

1. Inform the transit operator driver that you will be unloading your bike as you approach your stop. Use the front door to exit the transit vehicle. Unload your bike from in front of the vehicle or from the curb, not from the street.
2. Raise the Support Arm Hook up and off the tire and return it to its stowed position.
3. Lift your bike out of the bike rack.
4. Fold up the Bike-Rack-for Buses if there are no bikes on the rack and no one else is waiting to load their bike. The bike rack will lock into place in the stowed position.
5. Step away from the transit vehicle with your bike onto the curb.

**PLEASE NOTE THAT  
LOADING OR UNLOADING  
A BIKE FROM THE STREET  
SIDE OF THE TRANSIT  
VEHICLE MAY CAUSE  
INJURY OR DEATH..**

Sportworks label #3575 depicted below is available for use on the transit vehicle front fascia. The label measures 9.5 inches by 6.0 inches. It contains the same graphic in a larger format as the label affixed to each support arm of the rack.



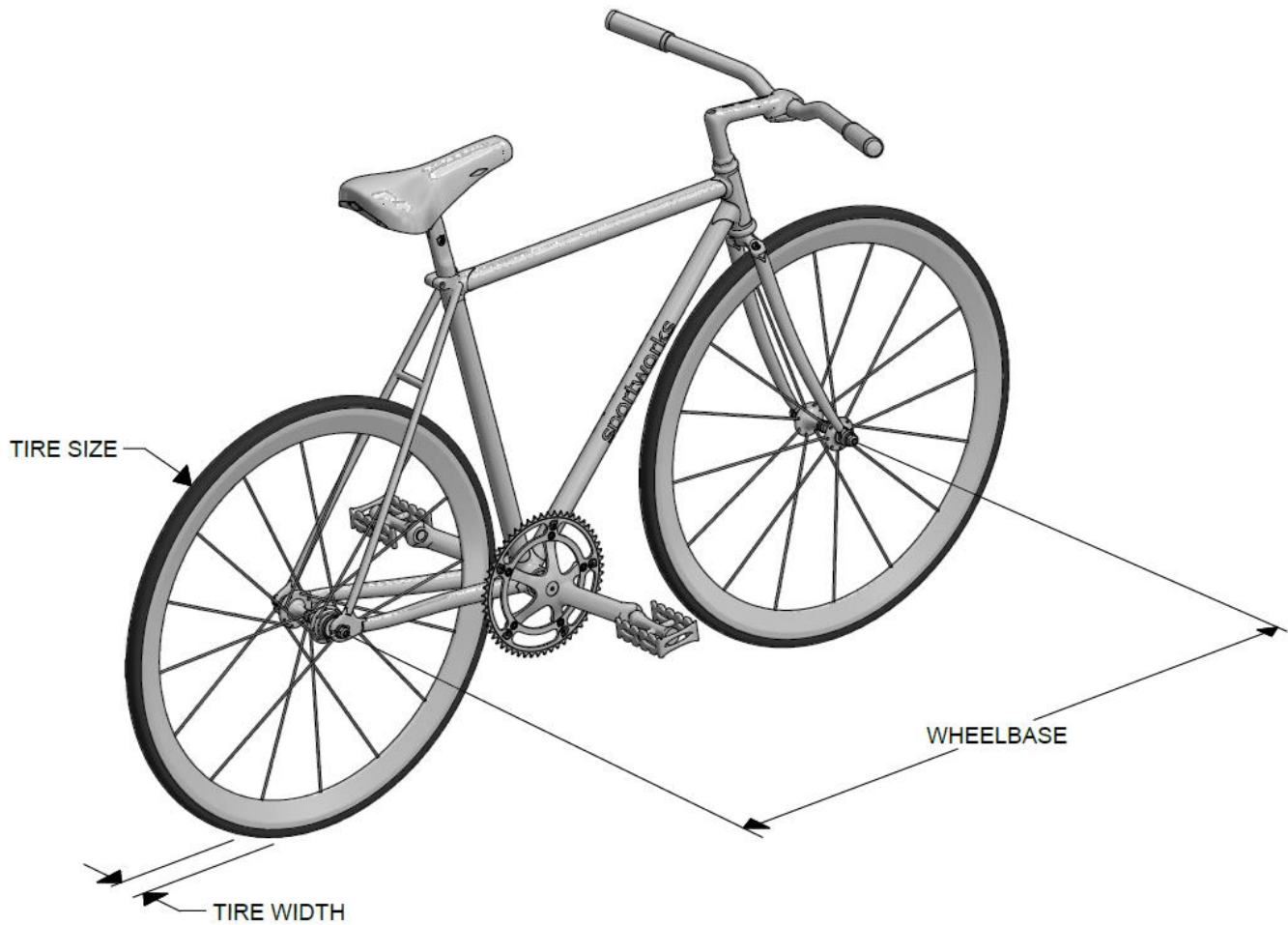


## Compatible Bike Dimensions and Weight

To ensure safe bicycle fit within the Apex 3 rack, each bicycle must comply with the following:

### For Apex 3 with standard trays and support arms:

- Wheelbase (max): 48.0in
- Tire width (max): 3.2in
- Tire size (min-max): 16-29in (incl. 700c)
- Weight (max): 75lbs
- Wheelbase (max): 51.0in
- Tire width (max): 5.5in
- Tire size (min-max): 24-29in (incl. 700c)
- Weight (max): 75lbs

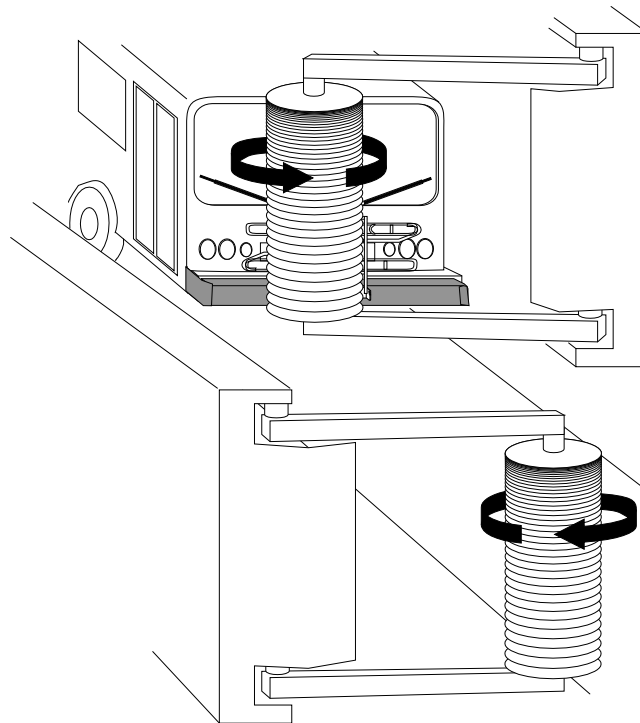


## BUS WASHING

The Sportworks Bike-Rack-For-Buses has been designed to safely pass through bus wash facilities. Before taking a newly mounted bike rack through a wash facility, the operator should check to ensure that the wash facility is properly set up for washing the bus with a rack on it. Most wash systems use either a "top fixed" or "top and bottom fixed" spinning brush system. The Sportworks rack has been designed with round tubing and round edges so that the wash brushes contact surfaces that will not catch or tear them.

Four types of conditions may cause excessive wear or harm to the bike rack or the wash system. None of these conditions should exist when running a bus with a bike rack through the wash facility:

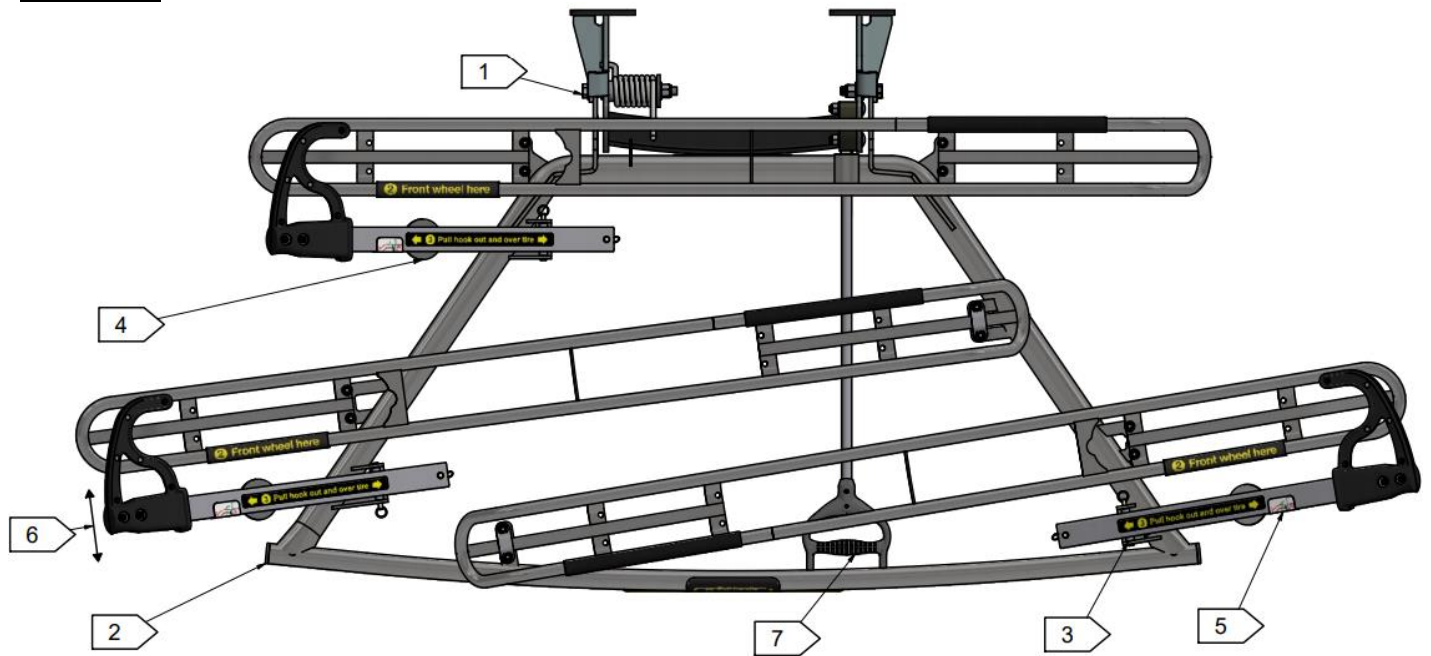
1. The brushes are spinning at too slow of an RPM. This may allow the brushes to hook on protruding objects such as rear view mirrors. If the axle of the brush assembly pushes against the rack or any part of the bus that has a crevice, it may allow bristles to become caught there.
2. The bus is traveling too fast through the wash system. This may cause the same type of damage as stated in number one, above.
3. The brush density is too low. There is less than the recommended number of brushes on the brush arm assembly. This is usually found when well-worn brushes are used for too long of a period.
4. The brushes are being turned into the bus path. Make sure the brushes are spinning so that they tend to climb up and over any protrusions they could catch on. See Figure 1. The illustration shows the recommended rotation for the brush assemblies. If the brush assembly is fixed to the driver's side, the brush needs to rotate counter-clockwise, as viewed from the top. If the brush assembly is mounted on the curb side, the brush assembly would need to rotate clockwise.



When operating the wash facility in the recommended way, one should find no deterioration above regular wear and tear to the bus, the bike rack and the wash system. If this is not so, take time to examine the rack setup on the bus and the setup of the wash facility. Please consult Sportworks at 425-483-7000 if you are experiencing any further problems.

# VISUAL INSPECTION

## Top View



## Side View



## Visual Inspection Checklist

Sportworks recommends the following quick visual inspection to ensure an operable bike rack. Use this page as an inspection sheet for your transit operators.

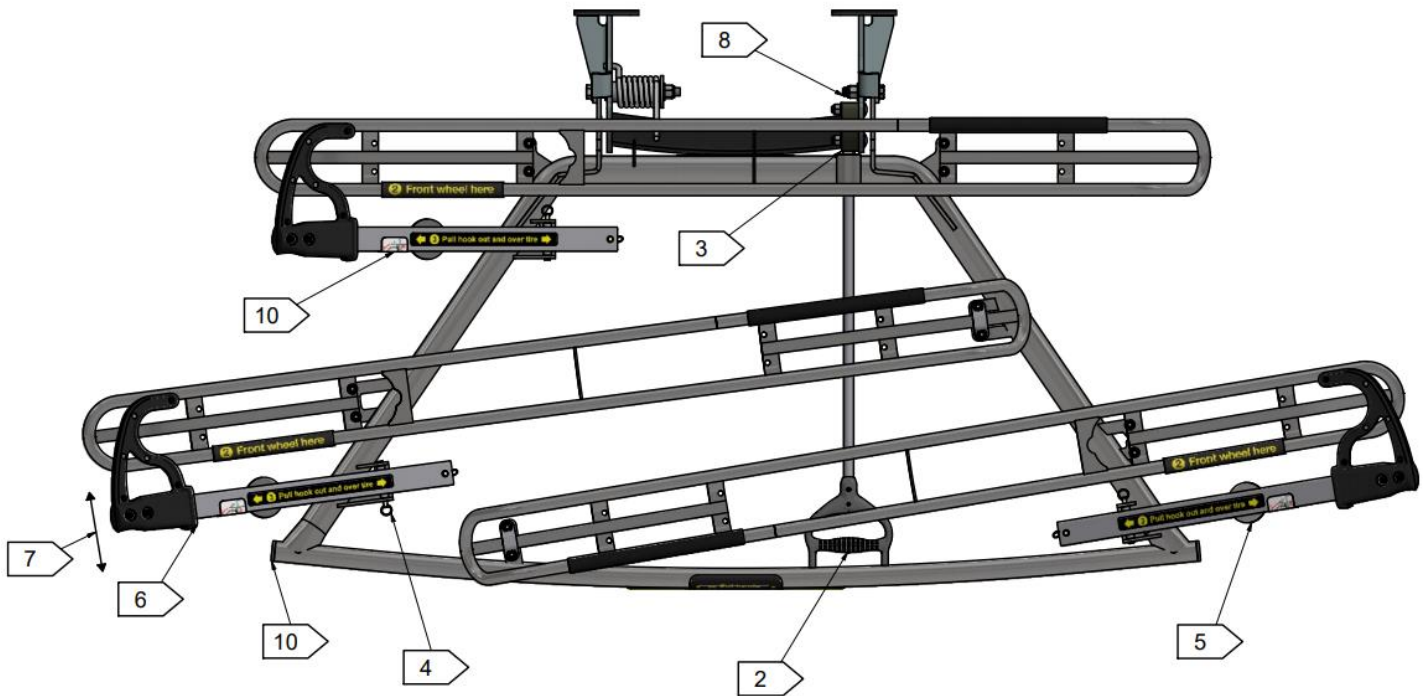
Examine the 7 items below before operating your coach. If the bike rack does not function properly, service it before putting it into operation.

1. \_\_\_\_\_√ PIVOT BOLTS ARE TIGHT  
Tighten if required.
2. \_\_\_\_\_√ ENDPLUGS ARE PRESENT (2 PLACES)  
Replace plugs if missing or damaged.
3. \_\_\_\_\_√ CLEVIS PINS AND SPLIT RINGS ARE PRESENT  
SECURE ARMS TO FRAME (3 PLACES)  
Replace missing parts.
4. \_\_\_\_\_√ MAGNETS ARE PRESENT (3 PLACES)  
Replace if missing. These magnets stow the support arms.
5. \_\_\_\_\_√ SUPPORT ARMS SLIDE IN/ OUT (3 PLACES)  
Hooks move smoothly in/out and self-stow on magnet.  
DO NOT LUBRICATE.
6. \_\_\_\_\_√ SUPPORT ARM SIDE PLAY NOT EXCESSIVE (3 PLACES)  
Verify that the Support Arm side to side play is less than 1.5" (measured at the hook with the support arm retracted, but not resting on the magnet). Possible Causes: Broken or bent support arm bracket. Missing, bent, worn or broken hinge clevis pin, ensure clevis pin is held in place with hair pin clip. Bent or broken support arm spar. Worn or missing bushings in the support arm housing.
7. \_\_\_\_\_√ LATCH HANDLE WORKS  
Latch is easy to release and does not get stuck.
8. \_\_\_\_\_√ BIKE RACK SWINGS FREELY AND LOCKS IN TWO POSITIONS  
Rack pivots and locks in both the deployed and stored positions.

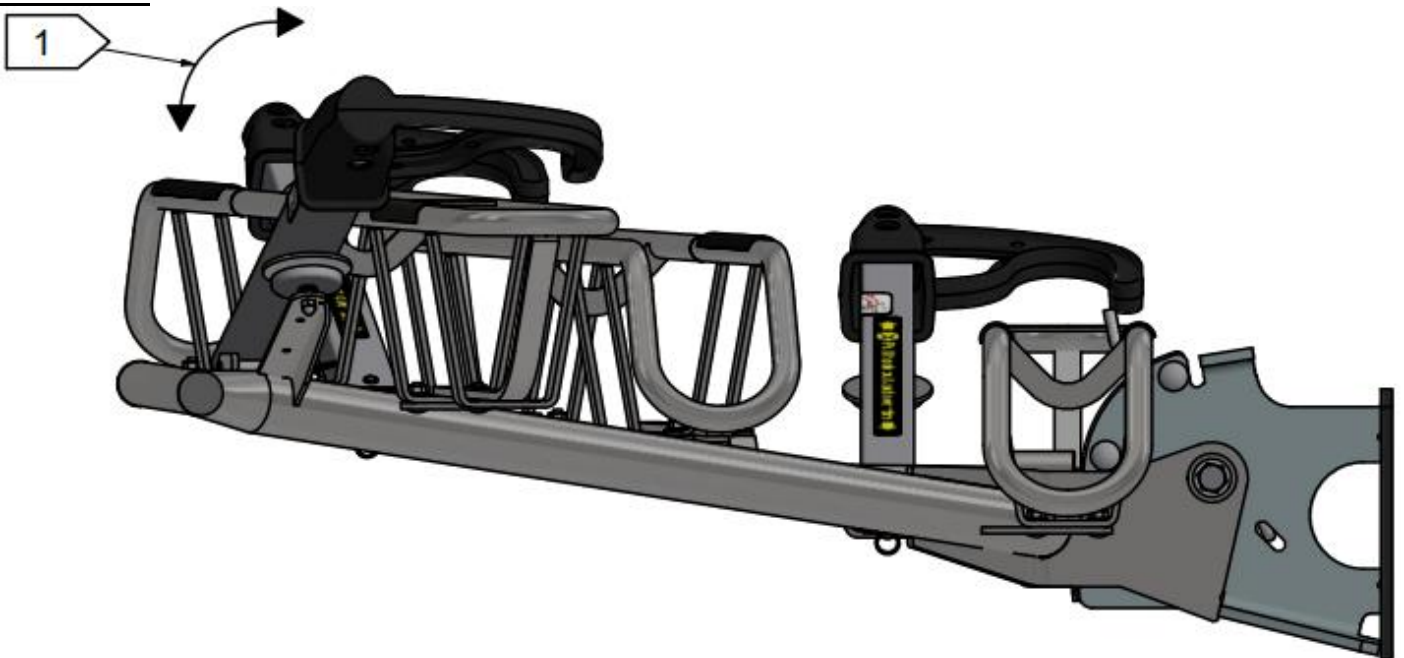
## MAINTENANCE

The Apex 3 and its accompanying brackets require very little service. **DO NOT LUBRICATE** any part of the bike rack. Sportworks has found lubricants may trap dirt/dust and inhibit the function of the rack. Regular suggested maintenance checks are included below.

### Top View



### Side View





## 30 Day General Maintenance Inspection & Service

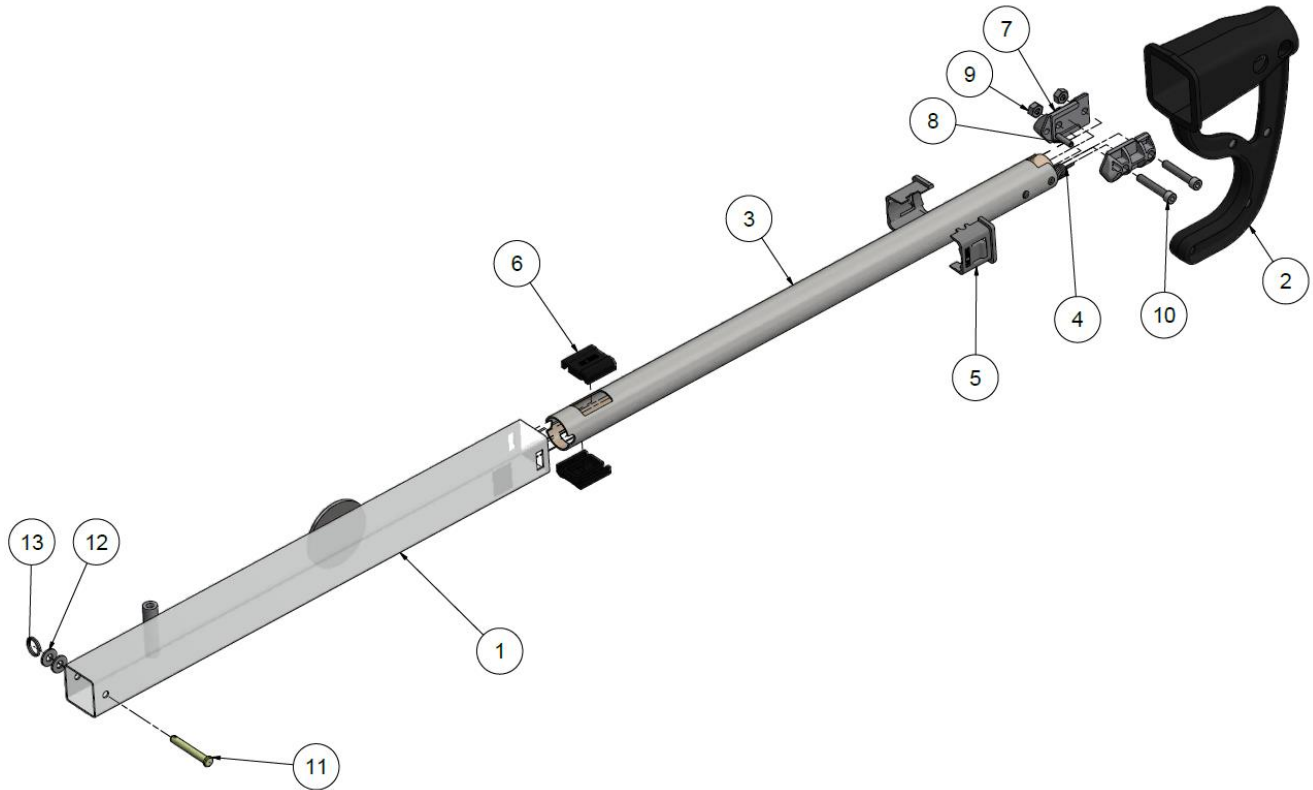
*Check every 30 days to ensure that:*

1. The rack swings freely and smoothly between the deployed and stowed positions.
2. The release latch easily unlatches, and the latch pin does not stick in the released position. If sticky, see section on servicing the latch handle.
3. The release latch automatically locks the rack in place when moved to the deployed or stored positions. If problems encountered, see section on servicing the latch handle.
4. Each support arm hinge allows the support arm to raise and lower without undue constraint. Inspect Support Arm Clevis Pin located at the lower end of the Support Arm. Inspect for wear in the area that the pin contacts the square Support Arm Housing and also near the Split Ring. If wear is evident replace pin, washers and the split ring. See section on servicing the support arm for further detail.
5. Each support arm magnet properly mates with and holds the support arm.
6. Each support arm hook pulls out smoothly, easily slides back into the stored position, and properly self-stows on the magnet when it is released. If resistance is encountered, see section on servicing the support arm for further detail.
7. Verify that the Support Arm side to side play is less than 1.5" (measured at the hook with the support arm retracted, but not resting on the magnet). Possible Causes: Broken or bent support arm bracket. Missing, bent, worn or broken hinge clevis pin, ensure clevis pin is held in place with hair pin clip. Bent or broken support arm spar. Worn or missing bushings in the support arm housing.
8. Both pivot bolt assemblies are tight. If you see excessive wear or cracks in the pivot bushings you must replace them immediately.
9. All fasteners are tight on the bike rack and mounting bracket, including hardware for the trays, quadrant, pivot plate to bracket pieces, and bracket pieces to bumper or coach body.
10. There are two black plastic end plugs inserted into the main frame of the rack located at either end of the lowering tube (the tube one grabs to engage the release latch). Replace if missing.
11. The instruction labels on the rack are intact. Replace if shredded, partially removed, non-readable, or not adhering properly. Clean the rack surface thoroughly (isopropyl alcohol) before replacing. Pay particular attention to the chain guard sticker.
12. If surface rust develops on stainless steel use naval jelly to remove.



## Servicing the Apex Support Arm

Note that the standard support arm is shown, Fat Bike compatible support arms have some different components – see Apex 3 Parts and Options Breakdown for more information on the differences. Contact Sportworks Sales and Support for replacement P/Ns.

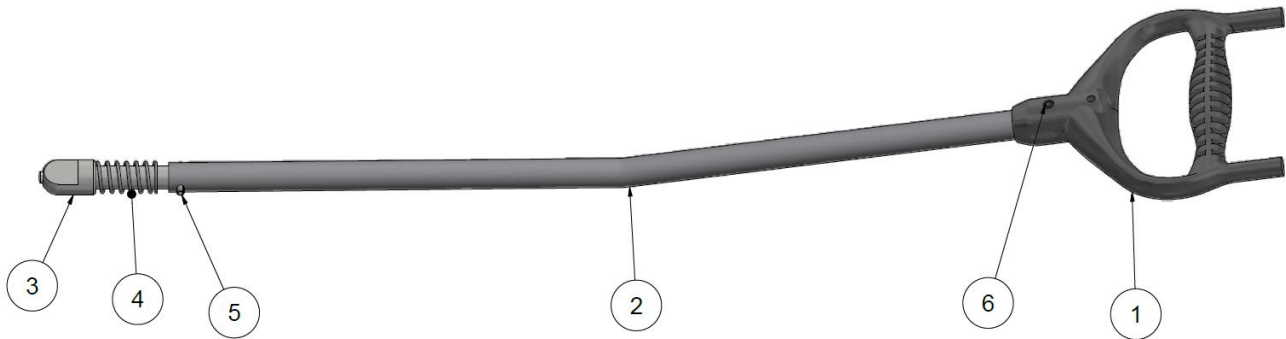


ITEM	QTY	TITLE
1	1	Weldment, Apex Support Arm Housing, Shot Peened
2	1	Support Arm Grip, Apex
3	1	Support Arm Spar, Apex
4	2	Support Arm Spring
5	2	Apex Upper Bushing
6	2	Apex Lower Bushing
7	2	Shank Support, Apex Support Arm Hook
8	1	Pin, Roll, 5/32 x 0.75, SS
9	2	Nut, 1/4-20 Deformed Thread, Self-Locking, SS
10	2	SHCS, .250-20 X 1.75
11	1	Pin, Clevis, 0.25 x 1.75
12	2	Washer, Flat, 1/4 SAE, SS
13	1	Ring, Split, 0.670 O.D. x 0.051 Wire Dia, SS

1. Examine the components inside of the support arm.
  - a. Remove the split ring from the clevis pin in the support arm pivot.
  - b. Remove the split ring (13) from the clevis pin (11) at the bottom of the support arm housing. Remove the clevis pin.
  - c. Remove the fasteners (10) from the support arm grip and remove the grip from the top of the spar. Carefully slide the stainless steel spar out the bottom of the support arm housing. Make note of how the two sets of nylon bushings (5) and (6) fit in the assembly.
  - d. Pull the shank support (7) out the top of the spar to free the support arm spring. Clean the spring and examine it for wear, overstress, and cyclical fatigue. Pay special attention to the end hooks of the spring. Replace the spring as necessary.
  - e. Clean the inside of the stainless steel support arm housing (1) using a stainless steel brush. Do not use a non-stainless wire brush.
  - f. Examine the two nylon bushings (6) that are inserted in the base of the spar. Replace them if they are excessively worn or marred.
  - g. Re-assemble the support arm in the reverse order of steps a-d. Use needle nose vise-grips similar tool to pull the spring into position when re-inserting the clevis pin (11) through the base of the support arm housing and the end hook of the spring.
  - h. Check the operation of the support arm once again. Each support arm hook should pull out smoothly, easily slide back into the stored position, and properly self-stow on the magnet when it is released.
2. Replace the spar tube if it is bent. The arm may bind if bent. **DO NOT LUBRICATE.**
3. Examine the support arm pivot. Check clevis pin for wear. Replace if damaged or worn.
4. Examine the rubber grip. Replace it if ripped, gouged, or bent.

## Servicing the Apex 3 Latch Mechanism

Contact Sportworks Sales and Support for replacement P/Ns.

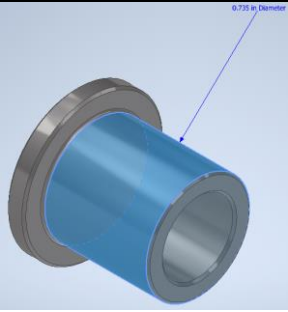
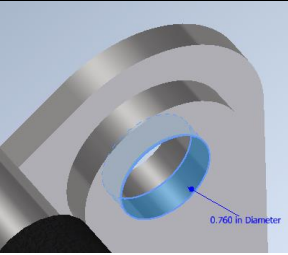
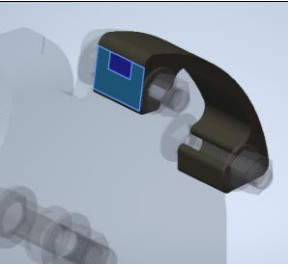
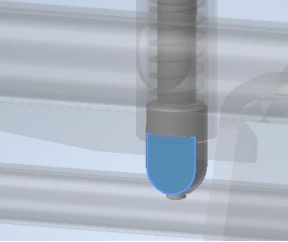
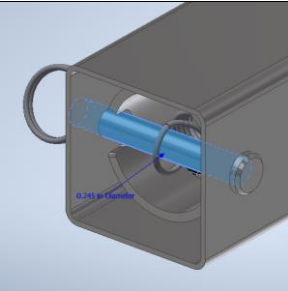


ITEM	QTY	DESCRIPTION
1	1	Molded Latch Handle - Yellow
1	1	Molded Latch Handle – Black (standard)
2	1	Apex 3 Latch Handle Tube
3	1	Apex Latch Pin
4	1	Apex Stainless Compression Spring
5	1	PIN, ROLL, 5/32 X 0.875 SS
6	1	PIN, ROLL 3/16 X 1.0 SS

1. Check that the release handle operates smoothly.
2. Examine the wear of the plastic insert in the tip of the latch pin. Replace the insert if the latch quadrant is being marred by the latch pin.
3. Examine the components inside of the latch housing.
  - a. Remove the roll pin attaching the latch stem to the latch pin.
  - b. After removing the roll pin, pull on the release handle to separate the latch stem from the latch pin.
  - c. Check the wear on the spring. Clean the spring and replace it if it is distorted or not functioning properly.
  - d. Remove any dirt and debris from inside the latch housing.
  - e. Re-assemble the latch mechanism in the reverse order of steps a-c.

**DO NOT LUBRICATE.**

**Wear Limits**

Item/Description	Image	Design Dimension	Wear Limit	Maintenance Action
5240 – Flange Bearing		Outer Diameter: Ø0.735+/- 0.001”	Ø0.730”	Replace bushings
Pivot Tab Bore		Inner Diameter: Ø0.760+/- 0.005”	Ø0.775”	Replace Bike Rack
3598-BLK - Quadrant		Mating surface: Flat	Worn groove exceeding .03” deep	Replace quadrant
3604 – Latch Pin		Mating surface: Flat	Visible damage or worn groove exceeding .03” deep	Replace latch pin
6056 – Clevis pin		Outer Diameter: Ø0.245+/- .0025	Ø0.242”	Replace pin

## DOCUMENT REVISION HISTORY

12/29/2020 – Initial Release

1/28/2021 – Added wear limits table and additional do not lubricate statement

3/11/2022 – Increased maximum weight to 75 lbs. per position