Main Street Vehicle Owner's Manual

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View our Repair How-To Videos on our Main Street Mobility YouTube page:
www.youtube.com/channel/UCiQ02KwCfchtyNLJEvdjnHg

Section I: Vehicle Frame

A. Brakes

1. Rear Hydraulic Brake Bleeding

for Wilwood brake system

Filling and bleeding of the brake system is routine maintenance. This procedure should be performed at least every three months, when brake fluid is noticeably dirty, when there is a loss of fluid (a leak in the system) or a line that has been damaged or recently removed. Only DOT 5 silicone brake fluid should be used in the system.

Tools and Supplies needed:

¼" straight wrench or line wrench
At least 2 fl. Oz. DOT 5 brake fluid
30-60 cc syringe with clear 5/32" plastic tubing
Container to catch discarded fluid
Phillips screwdriver

The bleed kit available online in the MSP Parts Store contains 4oz of DOT 5 brake fluid and a 60cc syringe with clear plastic tubing.

Take care not to get brake fluid on brake pads at any time. Clean immediately with brake cleaner or alcohol if fluid is not where supposed to be.

This procedure must be done with the Vehicle with all three wheels on level ground or with the rear wheels jacked up only a few inches off the ground.

In order to bleed or fill the system with fluid or replace any components, follow these steps:

1. Remove the two Phillips screws on the top of the master cylinder reservoir on the handlebars and remove the cap. (Fig. 1)

Figure 1. Cap removed from master cylinder reservoir

The bleeding process pushes fluid from the rear caliper up into the reservoir, so the reservoir will need to be empty enough to accept 2 oz of fluid without overflowing. The syringe can be used to remove fluid from the reservoir. *Discard this fluid.*
NOTE: When reservoir is low, DO NOT compress the brake lever. This will introduce air into the brake system.

2. Fill the syringe with new DOT 5 brake fluid and clear it of all air bubbles. This can be done by allowing bubbles to rise to the top with the hose pointing up, then press plunger to force air out. Direct the hose back into your brake fluid container.

3. With your line wrench already in place on the bleed screw furthest from brake hose on caliper, fit plastic hose onto nipple of bleed screw. Loosen bleed screw at least 1/4 to 1/2 turn. You can hold hose onto bleed screw by hand, then start slowly pressing plunger of syringe to force fluid through system. If any air bubbles are still present in syringe take care not to introduce them into brake system. By keeping the syringe vertical with the plunger at the top, the air bubbles will stay on that end and not go through hose. Keep slowly forcing fluid through the system until fluid begins to fill master cylinder reservoir. At this point the caliper and line are full of fluid and you may close the bleed screw.

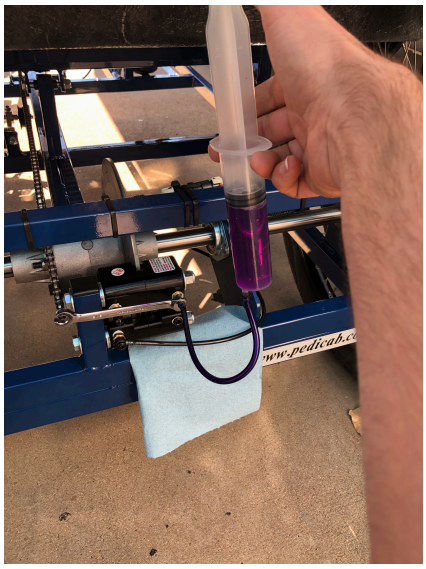


Figure 2. Syringe on bleed screw

4. Add some more fluid to reservoir up to "full" line. With bleed screws closed, slowly press and release brake lever several times. Some air bubbles may rise through fluid in reservoir. Once large air bubbles stop coming up there should be a nice firm feel at lever.

5. To ensure no air is trapped at caliper, pump lever several times to a firm feel and set parking brake latch on it. Now, any air in the caliper will be compressed. Go back to the bleed screw you started on, and with a container in front of it to catch any fluid squirting out, open the bleed screw. Any air will escape as a spettery-spitty spray. Close bleed screw. Now, repeat for other bleed screw. When there is no more air, the fluid will come out in a smooth, quiet stream with no frothiness. This is what you want to see. Make sure bleed screws are closed.

Figure 3. Dual caliper brake system

6. Check feel of brake system by squeezing lever. Check for leaks at all connections. Adjust fluid level in reservoir and replace cap with the two phillips screws holding it down firmly.

2. Rear Hydraulic Brake Adjustment

Rear brake performance is dependent on the adjustment of brake pads and position of brake rotor. Ideally, the brake pads will be sitting parallel to rotor and as close as possible without rubbing while driving. The brake caliper

has two adjustment screws on each brake pad to move the pad closer or further from brake disc. This adjustment can be done either with the Vehicle standing up or with the frame on jack stands so that the wheels can be turned. Use a 1/4" allen wrench to tighten adjustment screw (turning clockwise) to move pad closer to brake disc. Make sure to adjust both on each pad to keep it parallel to brake disc. You do not want one end of brake pad closer than the other. It is important to rotate wheels to check if the brake disc is rubbing as it turns.

A good check on your adjustments is to set the parking brake. With a well-bled brake system, it should be able to hold the cab from rolling with one good squeeze and setting the parking brake. If it is too hard to set, the pads are probably too close to the brake disc. You can back off the pads just a little bit until it feels good. If it takes more than one squeeze to pump up the brake and have the parking brake hold, then the pads are probably too far from brake disc. Try adjusting them in a little closer.

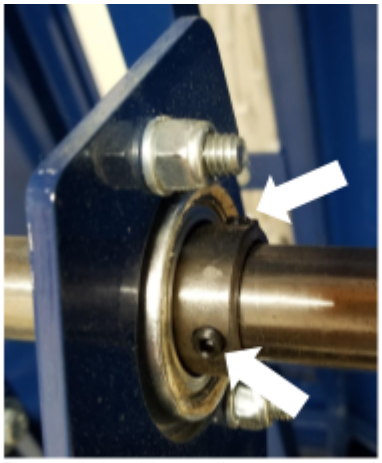


Figure 4. Locking collar setscrews (x3)

3. Front Rim Brake Adjustment

The front brakes may need to be adjusted to account for cable stretching, brake pad wear and replacement, or if the brakes become weak or misaligned for any other reason.

Note: The primary braking power for the Vehicle and the weight it carries is intended to come from the rear hydraulic brake. Using only the front brake to stop a large load can result in fork, frame, or wheel damage.

Check the tension in the brake lever - the cable should pull tight before the brake lever hits the handlebar. Make finer adjustments as needed with the barrel adjuster on the brake lever.

The small pin on the back side of the brake calipers is placed into one of three holes on the fork to achieve the correct amount of tension on the spring inside the caliper arm (Fig. 5,A). The tension on both sides needs to be equal, so it is likely that both arms will use the same hole position. The factory setting is in the middle hole. Tighten down the bolts that hold the calipers onto the fork with a 5mm allen key.

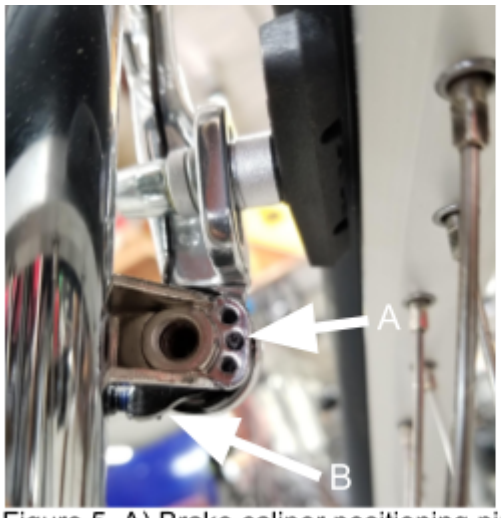


Figure 5. A) Brake caliper positioning pin
B) Tension adjustment screw

3. Adjust the left/right alignment of the calipers. Moving the pin behind the caliper (Fig. 5,A) can make very large adjustments. Smaller adjustments can be made by adjusting the small Phillips head screw coming out of the bottom outside corners of the caliper arms (Fig. 5,B). Tightening this screw will result in more tension (pulling the brake pad away from the rim) on that side. Adjust until brakes are centered. Both calipers should move an equal amount when the brake handle is pulled, and the pads should not rub on the rims when the handle is released.

The spacers that hold the brake pad onto the caliper go onto the brake pad stud typically include a thin concave spacer, convex spacer, thick concave spacer, and thin washer. The concave/convex sides fit together and the flat sides go against the caliper, on either side of the caliper arm, to allow the brake pad to be fully adjustable. Spacers should be chosen based on rim width so that the caliper arms are pointing as closely to vertical (Fig. 5a) and parallel with each other as possible, to maximize braking force.

Figure 5a. Correct vertical caliper arm positioning

To adjust front rim brakes:

1. Adjust the placement of the brake pad using a 5mm allen key. Make sure the wheel is centered between the fork stanchions. Rim brake pads should be positioned with a 'toe-in', where the leading edge of the brake pad hits the rim first. (Figure 6a) This does not need to be an exaggerated angle, with pressure the entire pad should contact the rim. Place a credit card or similar thickness spacer between the back edge of the brake pad and the rim. Hold both caliper arms in against the rim while simultaneously loosening the allen nut on one brake pad bolt. Try to get the brake pad centered between the tire and the inside edge of the rim, and have the brake pad bolt perpendicular to the rim surface to get the most efficient braking power (Fig. 6). Repeat this step for the opposite side.

Figure 6. Correct brake pad positioning

Figure 6a. 'Toe-in' diagram

2. Pull the cable through the tops of the calipers and set the cable tension with the 5mm allen bolt on the top of the left caliper. Hold the calipers together while tightening down the allen bolt. Adjust to gain correct tension in the brake lever.

B. Gears and Shifters

1.1 Shifter and Derailleur Adjustment

Your drivetrain consists of shifters on the handlebars connected by cables to derailleurs to select gears on the front chain. The front chain has a front and rear derailleur (unless it is an electric assist model it will have only the rear derailleur). The 7 speeds the rear derailleur operates is at the transfer hub. The transfer hub has a 7-speed freewheel on one side and fixed cog on the other side, driving the rear chain. The rear chain connects to the sprocket on the differential of the rear axle.

The general idea of derailleurs is that they align the chain with the gears and force the chain to move to a different gear. The rear derailleur should exactly line up to whichever gear it is selected to and the front derailleur should be able to run in gear without rubbing on the chain or chainrings.

Checking and adjusting the operation of the derailleurs involves checking alignment of chain placement when shifting. Shifting gears should only be done while turning the cranks forward with light pedal pressure. Trying to shift while not moving or while applying a lot of torque, such as climbing uphill, can cause excessive wear or possibly damage. The rear derailleur is "indexed". This means each click should align with a different gear on the rear freewheel. The original equipment front shifter is not indexed, meaning that it's clicks do not align to specific gear. This allows "trim" adjustment when shifting gears during riding. This is when the front derailleur will be moved up or down one or two clicks just to keep from rubbing, but not enough to move chain to a different front chainring. If the gears are not shifting properly and smoothly, it should be corrected to prevent excessive chain and gear wear. Some of the most likely reasons for poor shifting are cable stretch, excessive wear of chain or gears, or damage or excessive wear of derailleurs. "Cross-chaining" should not be done. This is when the chain is at opposite sides of gears available, such as the small ring on front to the smallest gear on rear, or large front to large rear.

1.2 Rear Derailleur

Watch Park Tool's video on YouTube for a comprehensive and visual demonstration on

How to Adjust a Rear Derailleur – Limit Screws & Indexing
Park Tool • 119K views • 1 month ago
The majority of **rear** shifting problems can be solved with basic **adjustments** to the **limit screws** and **index setting** of the **rear** ...
4K

https://www.youtube.com/watch?v=UkZxPIZ1ngY&feature=youtu.be

Checking operation of rear derailleur should start with visual inspection. The cage of the derailleur is the part that extends downward with two pulleys for the chain to ride on. It is vulnerable to damage. It should be straight so that the chain rides on a vertical line straight up to gears of the freewheel, not angled left or right or twisted. If the cage is bent, the derailleur should be replaced.

If the derailleur looks straight, then check where it lines up when selecting gears. With the vehicle's wheel off the ground (either standing up on back end or securely raised on jackstands) slowly turn the cranks and shift the shifter all the way high or "7". This is the most slack position of the cable. Shifting to "6" should align the pulleys of the derailleur with the next gear of the freewheel. If it does not move far enough, there is not enough cable tension. Turning the barrel adjuster on the derailleur counter-clockwise effectively lengthens the cable housing, which in turn creates more tension to the cable. Slowly turn barrel adjuster while rotating cranks until the chain shifts to proper gear. Check again by shifting to 7 and back to 6. If the chain tries to go past the proper gear, it has too much tension. Turn barrel adjuster clockwise to lessen tension. Slowly shift all the way through gears and make small adjustments to cable tension as needed.

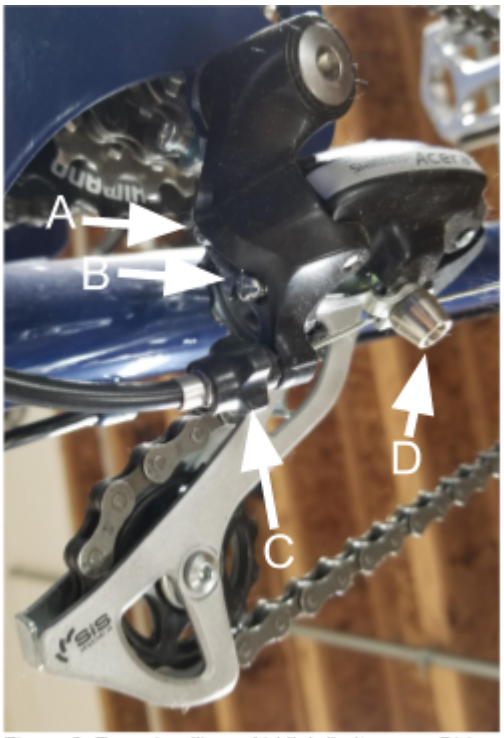


Figure 8. Rear derailleur. A) High limit screw; B) Low limit screw; C) Barrel Adjuster; D) 5 mm cable bolt

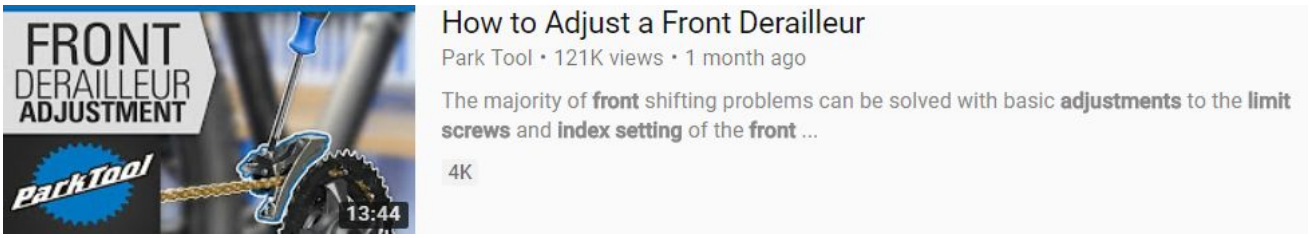
Replacement of Rear Derailleur

- Remove chain.
- Disconnect cable clamp bolt.
- Disconnect derailleur's mounting bolt from frame.
- Bolt replacement derailleur in place.
- Preset limit screws on derailleur. The derailleur idler pulleys should align vertically with the high gear (smallest gear) of the freewheel as it is with no cable tension. Turning high limit screw counter-clockwise will allow the derailleur to move outward, toward high gear and dropout/hanger section of frame. Turning it clockwise will move the limit of derailleur's movement back towards lower gears of freewheel. Now push derailleur by hand towards low gear (largest gear on freewheel). Turning limit screw counter-clockwise will allow derailleur to go more toward low gear. Turning clockwise will bring limit towards the higher gears.
- Turn barrel adjuster all the way in, or clockwise, and then back out about one full turn, counter-clockwise. This will give plenty of room for adjustment tightening the cable, and just a little room to loosen the cable if needed.
- Attach cable by passing through barrel adjuster and placing in groove of cable clamp. Take care that all sections of cable housing are seated in proper positions on frame, and that shifter is at highest gear selection, then pull cable tight by hand while tightening cable clamp bolt.
- Reinstall chain (Is your chain good?) by routing properly through derailleur. Start by guiding end of chain over gear of freewheel, along front side of upper pulley, then around backside of lower pulley. Take care that it passes through the derailleur cage and is not running over either of the lateral sections of the cage. Reconnect chain.

- Slowly turning cranks, move shifter from highest position (7) to next gear (6). If it does not shift easily, look at vertical alignment of idler pulley to desired gear of freewheel. If it needs to move further toward low gears, adjust cable tension by turning barrel adjuster counter-clockwise. If it needs to align more toward high gear, then turning barrel adjuster clockwise will lessen cable tension. Shift back to 7 then shift to 6 again. Try shifting one gear at a time through the entire range.
- Now further adjustment of limit screws may be needed. If shifting to either the highest or lowest gear is difficult the limit screw may need adjusted counter-clockwise to allow more movement. If the chain tries to jump off of either high or low gear past the freewheel, then the limit is set too far and should be turned clockwise until the chain will stay on when shifting. After limit screws are initially set, they will usually not ever need adjustment again.
- Cable tension adjustment may be needed after initial adjustments. Even the highest quality cables will undergo some stretch as they break-in to use. Usually this will be noticed as shifting to lower, larger gear becomes slightly more difficult. Use the barrel adjuster at the shifter to keep derailleur exactly aligned with the selected gear.

1.1 Front Derailleur

Watch Park Tool's video on Youtube for a comprehensive and visual demonstration on adjusting a front derailleur.



https://www.youtube.com/watch?v=ZNG7g83ll-s

Checking the front derailleur should also start with a visual inspection. The cage of the front derailleur should be parallel with the chainrings when viewed from above. The derailleur cage should sit 2-3mm above the largest chainring when viewed from the side. These adjustments to the position come from loosening the attachment clamp bolt of the derailleur's frame clamp. Adjust position if needed and tighten to 7Nm/62in-lbs. These adjustments are most commonly compromised by accidentally being kicked or stepped on by the rider. Since the front shifter is not indexed, it may only be apparent if more tension is needed by trying to shift from 2(middle chainring) to 3(largest chainring).

Figure 7. Front derailleur positioning; A) limit screws

The front derailleur does not have a barrel adjuster, but the shifter does. By turning the barrel adjuster counter-clockwise, it lengthens the housing and tightens the cable. Turning it clockwise shortens housing and loosens the cable.

Replacement of Front Derailleur

- Remove chain
- Disconnect cable by loosening cable clamp bolt.
- Loosen bolt on frame clamp of derailleur.
- Place clamp of replacement derailleur.
- Around frame, thread bolt in but leave loose enough to move derailleur.
- Check positioning by viewing vertical to align derailleur cage parallel with front chainrings. From side view, the derailleur cage should sit 2-3mm above teeth of largest chainring.
- Tighten derailleur clamp bolt in this position.
- With front shifter all the way to lowest gear position (1), guide cable through housing stop of derailleur and under clamp of the clamp bolt. Take care that all cable housing sections are seated proper position on frame, then pull cable tight by hand and tighten clamp bolt.
- *Some derailleurs come with a "block" in place that holds them about in the middle of their range. Take care to remove this by gently moving derailleur towards larger chainring and releasing block. Do this before tightening cable or it will not be in proper position.
- Preset limit screws by viewing from above to see if low gear, smallest chainring, is approximately in middle of derailleur cage. Turning low limit screen counter-clockwise will allow derailleur to move toward frame. Turning clockwise will move toward larger chainrings.
- Move derailleur to highest position to align biggest chainring in middle of derailleur cage. Turning limit screw counter-clockwise will allow cage to move out toward the big chainring.
- Reinstall chain. Pass chain through derailleur cage and around chainring and reconnect.
- (Rear derailleur should be adjusted) Start slowly turning cranks and shift front derailleur to lowest (small ring) gear if not already there. Shift rear to lowest gear also (biggest gear). It should be able to go onto the small ring without rubbing on the derailleur cage. Adjust limit screws as needed. The derailleur cage should be as close as possible without rubbing. If cage is too far inward, the chain may derail off inside of small chain ring.
- Now, shift rear derailleur to highest (largest) chainring. The derailleur cage should be as close as possible without rubbing on outside side of chain. If it's adjusted too far the chain will be able to derail off outside of chainring towards pedal. Adjust limit screw as needed.
- If shifter is unable to move front derailleur far enough to easily shift onto big chainring, then cable needs more tension. Turn barrel adjuster counter-clockwise to add tension.
- If barrel adjuster won't provide enough tension, then adjust at derailleur by moving cable in clamp. Turn barrel adjuster all the way clockwise, loosen clamp bolt, pull cable tight by hand and then tighten clamp bolt.
- Cable tension adjustment may be needed after initial adjustments. Even the highest quality cables will undergo some stretch as they break-in to use. Usually this will be noticed as shifting to lower, larger gear becomes slightly more difficult. Use the barrel adjuster at the shifter to keep derailleur exactly aligned with the selected gear.

1.3 Shifter cable replacement

Shift cable housing is a "wear-item". It should be replaced when replacing a cable or during full tune-up. There is a nylon lining inside the housing that allows the cable to move easily inside. As this wears through, friction inside will increase and shifting will become more difficult or less precise. If the cables are frayed at all, corroded or broken, they need replaced.

- Disconnect cable clamp bolt at derailleur.
- Cable end-cap may need pulled or cut off. If end of cable is very frayed, it may be easier to remove after cutting fayed section off.
- Pull cable out of housing.
- To remove cable from original equipment- grip shifters, move shifter to "loosest" cable position (7 for rear, 1 for front shifter)
- Push cable with fingers very close to barrel adjuster. The head end of cable should emerge from a small opening of rubber on grip shift. Pull cable all the way out.
- Slide end of new cable through opening in rubber of grip shift until it comes out barrel adjuster. Pull all the way through until head of cable is seated inside shifter.
- When replacing housing, be careful to make sure inner liner is not collapsed closed from cutting. Place housing ferrules on ends before inserting new cable.
- Insert cable in housing and route through back to derailleur. Adjust according to derailleur adjustment instructions.
- Cut excess cable and crimp on cable end cap.

2. Transfer Hub

Use the following instructions to disassemble and rebuild your transfer hub to replace any of its parts.

Tools and Supplies needed:

19mm wrench or deep-well socket
19mm flat/cone wrench
Vice or large adjustable wrench
Park Tool FR-1/Shimano Universal Freewheel Remover
Plastic-coated mallet or wood block/hammer

2.1 Removal/Disassembly

1. Remove the transfer hub from the Vehicle by loosening the 19mm nuts on the outside of the axle, and lifting it out of the dropouts and off the chains.

2. Remove the outer nuts, spacers, and inner nuts from the axle. (Fig. 9)

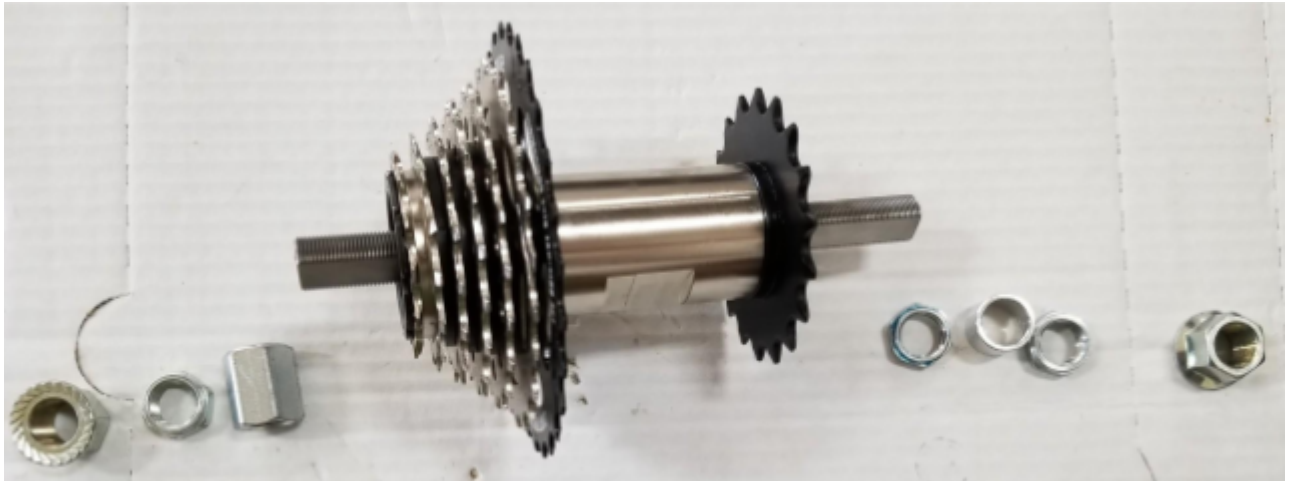


Figure 9. Transfer hub should use on freewheel side an outer jam nut, and then a wide nut up against bearing. The rear cog side will have an outer jam nut, spacer and inner jam nut against bearing.

3. Remove the 18 tooth track cog for the rear chain by placing the center casing in a vice or large wrench and using a sprocket remover/chain whip (a wrench with a chain attached to the end) to turn the cog counterclockwise.

4. To remove the 7 speed freewheel, start by securing flat sides of axle in a vise. Remove outer jam nut and then inner jam nut. If inner jam nut is too tight, it may be necessary to loosen both jam nuts on other side slightly.

5. Secure body of transfer hub in vise. Leave one nut on end of axle threads. This will allow you to gently strike with the hammer against the nut and not directly against the end of the axle. (This could damage the end of the threads)

6. Drive bearing out other side by gently hammering axle through hub. As soon as bearing releases from bore in hub, then remove the nut and remove the axle.

7. Now a standard freewheel removal tool will fit in freewheel to remove it by turning counter-clockwise.

8. The bearing on the freewheel side of hub can now be driven out if needed.

2.2 Reassembly

1. Fit the bearings and axle into the casing with a mallet and wood block. The outside faces of the bearings should sit flush with the outer edge of the casing when fully seated.

2. Replace all of the 19mm axle nuts and spacers. On the cassette side, there is the long nut on the inside and one thin nut on the outside. On the 18 tooth threaded cog side, there is one thin nut on the inside, one spacer, and one thin nut on the outside. The inner nuts should only be tightened until they touch the bearings -- any more can put too much load on the bearing and cause it to wear prematurely. Hold inner nuts with a cone wrench when tightening the outer nuts, otherwise turning the outer nuts will cause the inner nuts to turn and over-tighten.

Figure 10. Freewheel hub remover

3. Tighten on the threaded cog for the rear chain with the chain whip or sprocket remover, turning clockwise.

4. Install freewheel with the freewheel remover, turning clockwise. May thread on by hand.

5. Install the transfer hub back onto the frame. Be sure that it sits perpendicular to the dropouts.

Note: Checking the 19mm nuts on the outside of the transfer hub to be sure they are tight should be part of daily maintenance.

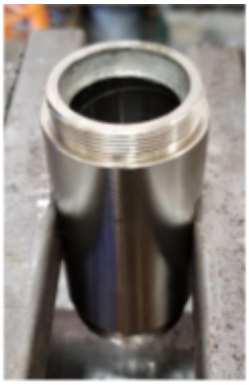


Figure 11. Empty casing

3. Chains

Main Street Vehicles are equipped with a 1/8” bicycle chain in the rear (between the transfer hub and the final drive gear on the rear axle) and a 3/32” chain in the front (between the front chainring and the cassette on the transfer hub).
Both chains are subject to wear from normal riding. They should be kept lubricated with an appropriate chain lube. The chain should not make any squeaky or grindy noises. That is a strong sign of an un-lubed chain, which will accelerate wear. Chain wear can be checked with a chain checker tool (such as a Park CC-2, CC-3.2 or others). Chain should be under at least some tension to measure. Checking a slack chain will not be accurate. Another method is to simply measure the chain with a ruler. A 24 link section of chain should measure exactly 12 inches pin to pin. Once it measures 12 1/16" it is worn and should be replaced. Over 12 1/8" is very worn and indicative of worn gear teeth. If the gear teeth on either the freewheel or front chainrings are badly worn they should also be replaced when replacing a chain. A new chain should not be used on badly worn gear teeth as it

will not shift or perform well and accelerate wear. A worn chain should not be used on new gear teeth for the same reasons. The chains should be replaced more often than gears, at least once a year with light use, and more often with heavy use. If replacing chain before it is too worn, the freewheel and chainrings should survive through 3-4 chains. Either front or rear chain can be reconnected with just the pin from the chain link and a chain breaker tool if done correctly. When done correctly the pin will protrude the same amount out of the outer link-plates while maintaining adequate free movement at the reconnected link. If this is not possible, a quick link or master link can be used. The front chain will take a 7/8 speed master link, while the rear uses a 1/8" single speed master link.

3.1 Rear Chain Replacement

The length of the rear chain should be determined by where the transfer hub sits within the dropouts. The transfer hub is used to tension the rear chain. The chain should be measured with the transfer hub closer to the open end of the dropout so that when the chain is tensioned the transfer hub ends up positioned about halfway down the dropouts. (Fig. 12)

Figure 12. Transfer hub positioned halfway down dropouts

Install the chain over the front transfer hub (18 tooth track cog) and the final drive gear on the rear axle. Use your hand to pull the transfer hub forward and put tension on the chain and tighten nuts. Press down in the middle of the chain (between the two gears) to measure chain deflection. The correct amount of chain tension will allow a small amount of chain deflection, at least ½" with light pressure. (Fig. 13) The chain is too tight if binding noises can be heard when spinning the rear axle, and if the axle slows down noticeably just after being spun. The chain is too loose if it sags noticeably between the two gears, just with gravity.

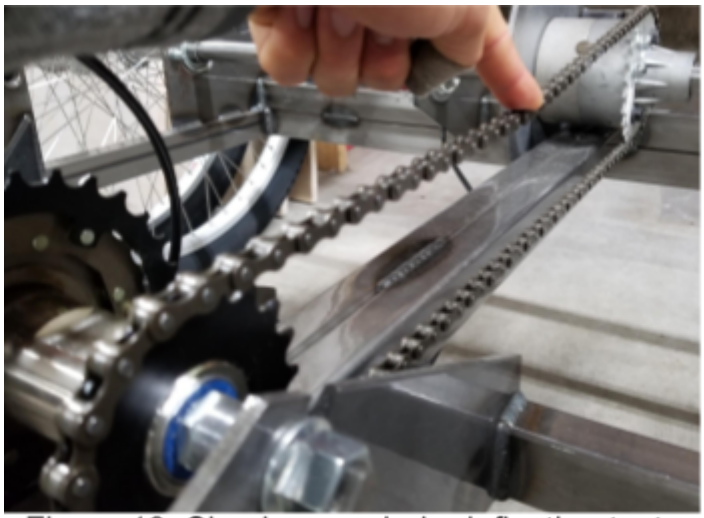


Figure 13. Simple rear chain deflection test

3.2 Front Chain Replacement

The front chain length should be set so that when the chain is shifted to the smallest chainring (1) on the front and the smallest cog (7) on the rear, the rear derailleur hangs as far back as it can go without touching any part of the frame. If your derailleur arm is extended forwards to it's limit when the chain is shifted to the largest gears, the chain may be too short. If you notice the front chain whipping up and down while the cab is being pedaled, the chain may be too long.
Measure the chain on the smallest chainring and the smallest cog, and check that it will also fit around the largest chainring and the largest cog without stretching the limit of the rear derailleur forward.

C. Pedals

1.1 Removal

To loosen the pedals, the wrench on the right pedal is turned counterclockwise, and the wrench on the left pedal is turned clockwise. The opposite direction will tighten the pedals.
Any set of bicycle pedals includes one left and one right pedal. These are NOT interchangeable. An easy way to remember is turning pedal axle/spindle forward (direction of trike travel) to go on, backward to come off.

1.2 Replacement

When installing pedals, always thread in by hand before tightening with a wrench. Threads can easily become ‘crossed’, which will result in stripped threads and require crank arm replacement. Once the pedal is threaded in all the way by hand, use a wrench to tighten it to approximately 35Nm/304in-lbs. Over-tightening pedal threads can also result in stripped threads.

D. Bottom Bracket

1.1 Crankset removal

1. Remove the crank bolt with an 8mm allen key. Both sides will turn counter-clockwise for removal.

2. Use a crank puller to remove the crank arms. Turn the puller nut (Fig. 14, A) into the crank arm until it stops, taking care not to cross-thread. This does not need to be tightened as long as all of the available threads are engaged.

3. Thread the spindle driver of the puller (Fig. 14, B) into the nut. Resistance will be felt when the driver meets the spindle. Continue turning the driver into the puller nut until the crank is removed.

4. Unthread the crank puller nut from the crank arm. Repeat process on the other side.

Figure 14. Crank puller installed.
A) Puller Nut; B) Spindle driver

1.2 Crankset replacement

1. Apply a thin layer of grease to the surfaces of the square taper spindle.

2. Press crank arms onto spindle. The right arm has the chainrings and the left is just an arm - these parts are specific to side and are NOT interchangeable. On mid-drive motors the crank arms are stamped with an “L” and “R”. Make sure the arms are pointing opposite directions from each other.

3. Thread in 8mm socket cap screw. Medium strength Loc-Tite (blue) may be used on these threads -- they have been known to come loose from normal riding. Make sure not to cross-thread these bolts. Tighten to **46Nm/34 ft-lbs**.

NOTE: Crank arm bolts should be checked daily following initial installation and re-torqued after the first week of use.

2.1 Bottom Bracket Removal

For conventional bottom bracket (models not equipped with a mid-drive motor):

Tools Needed:
Bottom bracket tool
Corresponding wrench

Bottom Bracket Tool

1. Remove the cup on the left side of the bottom bracket **first** with the bottom bracket tool. *To loosen the bottom bracket, the left side will turn counterclockwise, the right (drive) side will turn clockwise (rule of thumb: both sides turn over the top of the bottom bracket, towards the front of the bike).*

Left side of bottom bracket - turn counterclockwise to remove

Right (drive) side of bottom bracket - turn clockwise to remove

2. Loosen and remove the right side of the bottom bracket, which will contain the spindle and bearings.

2.2 Bottom bracket replacement

To install a bottom bracket, the right (drive) side turns counterclockwise while the left side (stationary cup) turns clockwise.

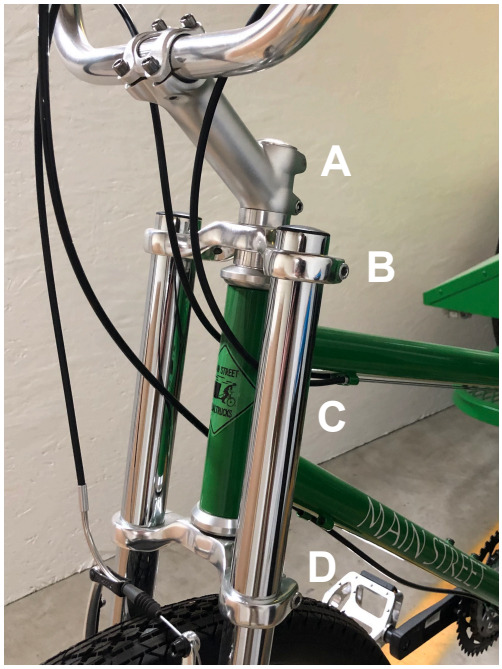
1. Ensure the bottom bracket shell of the frame is properly faced, threads are chased and cleaned. Inspect the bottom bracket shell threading of the frame for any damage and ensure the threading in your frame is compatible with the threading on the new bottom bracket cups. Use a brush and a mild degreaser to clean the inside and outer edges of the bottom bracket shell. Let threads dry before continuing.

2. Apply two drops of blue thread retaining compound (Loc-Tite blue medium strength or similar) to the threads on each bottom bracket cup. Thread the right (drive) side into the shell and apply approximately **30 ft-lbs** (40 Nm) of torque.

3. Thread in the left (stationary cup) side into the bottom bracket shell. This side only needs to be tightened until 'snug'; over-torquing this part can result in cracking the cup if it is made of plastic.
Note: Once cups have been installed, the blue thread retaining compound should be left to cure for 12 hours before being used.

E. Fork

Main Street Vehicles use a heavy duty, dual crown rigid fork. They use a straight-steerer, 1 1/8" external cup headset. It is important to monitor fork and headset condition during maintenance. The fork's clamping bolts should be kept tight. The fork should be inspected for any signs of stress fractures, or cracks. Particularly around the dropout sections, where the front axle connects. The fork legs, or stanchions, should be inspected for any bending or other deformities, wither from excessive weight or impacts. The fork crown sections (the aluminum part that clamps the stanchions) should be inspected for cracks or any deformities. If any damage is noticed the fork should be replaced before riding anymore.



A) Stem B) Upper Crown
C) Stanchion D) Lower Crown with steerer

The headset is an external cup, loose-ball type headset. It should be inspected to ensure that it is still in good condition and operating smoothly. Hold the front brake and gently rock the Vehicle forward and backward. No movement should be noticeable at the headset. With the front wheel off the ground, the for/handlebar assembly should turn smoothly left and right with no binding or noise. Headset cups should be inspected for any deformation or cracks, especially if movement has developed in headset. Then it should be replaced.

Replacing and Adjusting Headset and Fork

(If you are only replacing one, the procedure is about the same. Just reuse your good parts.)

- Raise front end of Vehicle.
- Loosen and remove stem cap bolt and stem cap.
- Loosen stem clamp bolts and remove stem. You may leave handlebars and control cables connected and just let gently hang to the side.
- Disconnect quick-release on brake cable connection to open v-brakes. (At this point if fork is being replaced, disconnect cable clamp bolt and remove v-brakes from fork stanchions. If fork will be reused, the brake cable can be removed from the lever by turning the barrel adjuster and it's jam nut until their slots align with the slot in the front side of lever, then pass cable through and remove cable-head from retainer on lever. Reverse this for reassembly.)
- Remove front wheel.
- Loosen all three clamp bolts on upper fork crown piece. All headset spacers and upper crown can now be removed.
- The fork may try to fall out now, but will probably be held by the compression washer. With one hand holding fork, lightly tap down on top of fork steerer with soft mallet. As soon as any downward movement is noticed, push the fork up and the compression washer will be de-compressed and ready to remove.
- Remove compression washer and top bearing race.
- Remove fork.
- Remove caged ball bearings.
- To remove the press-fit bearing cups, it is recommended to drive out with a bearing cup removal tool (such as Park Tool RT-1)
- The lower bearing race, or crown race, is also a press fit onto fork steerer tube. If removing, a crown race puller is recommended. (Park CRP-2)

REASSEMBLY

- Prepare frame by pressing in bearing cups (Park SBK-1 Bearing Press)
- Prepare fork steerer section by installing new crown race and star nut (Park CRS-15.2 Crown Race Setter, TNS-1 or TNS-4 Star Nut Setter)
  If reusing fork but replacing headset, the star nut can stay but the crown race should be replaced.
- Place headset dust seal and then caged ball bearings over steerer to crown race. Take note that the bearing goes on correctly. One side has a continuous metal edge of the cage portion. This side faces away from bearing cup, or down for this part.
- Insert steerer tube up into bearing cup in frame and hold in place with one hand. (Fork stanchions should not be installed at this point.)
- Next, place these pieces onto top of steerer tube in this order:
  caged ball bearing (continuous metal side of cage away from cup, or up), upper bearing race, compression washer, headset spacers (10mm worth), upper fork crown, headset spacers, stem, stem cap and stem cap bolt can thread in.
- The stem cap bolt sets bearing pre-load. Tighten and turn fork assembly back and forth by hand. Tighten until you feel slight binding or resistance to turning fork, then back off (loosen bolt) just until that binding feel goes away. If adjusting headset bearings on an assembled fork, all three clamp bolts on upper crown and stem clamp bolts must be loose.
- To secure the upper crown, it must be square and in line with lower crown. A clean flat piece of wood, or other perfectly flat piece, should be pressed against front of both crowns so that the outer part of where the stanchions clamp are all on the same plane. Tighten the middle clamp bolt of upper crown.

- Using a known-good front wheel hub, attach both stanchions to axle. Be sure axle is fully seated in dropout opening and tighten axle nuts snug, but leave at least one just loose enough to allow some alignment movement.
- Raise the wheel and stanchions into place and slide stanchions into fork crowns. The top of stanchion should only extend 5-6mm past top of upper crown. Tighten one side of upper crown to hold in place.
- Verify that wheel is centered in fork. Sometimes it takes some slight flex to one side or other. You will see the loose fork stanchion move slightly up or down from this. With wheel centered, tighten fork stanchion in clamp.
- Tighten remaining two clamps on lower crown.
- Align handlebars and stem straight and tighten stem.
- Tighten both axle nuts.
- Install and adjust front brake as per instructions.

F. Wheels

The conditions under which the average Vehicle operates put a great deal of stress on the wheels. It is important to do a daily inspection of the spokes to be sure that they all have tension in order to keep the rims straight and the wheels strong. Even spoke tension, that is high enough, is critical to any spoked wheel surviving, and more so on a Pedal Vehicle. Have your wheels regularly trued by a professional bicycle mechanic to help prevent broken rims and spokes.

1.1 Axle Nut Adjustment

The axle nuts which hold on the rear wheels should be checked on a daily basis to see that they are tight. Over-tightening the axle nuts can be destructive to the differential. If the axle nut is over-tightened it can overpower the holding of the bearing collar set screws and then put pressure on the c-clip on the axle inside the differential. If the c-clip is over-powered and forced out of place, it will cause severe damage to the differential. This is an extreme scenario, but very possible. Do not exceed 25 ft-lbs torque on the axle nuts. It is also imperative to keep the bearing collar set screws tight. Two-piece shaft collars may be used up against the outer most bearings to help protect against over-torque damage. (Figure 15.a)

Figure 15. Rear wheel hub and axle nut assembly. A) Axle spacer; B) Axle nut


Figure 15.a Two-piece shaft collar shown in place

G. Axle/Differential

1.1 Axle Removal

The cab portion of the Vehicle must be removed in order to remove and inspect the differential by this method.

1. Use a large adjustable wrench or 1 7/16” socket to loosen the axle nuts and slide the wheels off the axle.

2. Use a ½” socket wrench to remove the 8 nuts on the 4 bearing collars. Use a 1/8" allen key to loosen the set screws on the bearing collars. Slide the bearings away from their mounts on the axle to free the axle. Lift the axle out the top of the frame.

2.1 Differential Disassembly

1. Loosen and remove the 6 bolts that hold the differential together. Two bolts go directly into the housing and four bolts go all the way through with nylock nuts on the sprocket side (Fig. 16) and springs and spacers on the brake disc side.

Figure 16. Sprocket side of differential - showing two bolts going into housing and four nuts on bolts all the way through housing

2. Lift off the brake disc and let the sprocket come off so that all that is left is the axle and differential.

3. Open the differential housings by pulling apart the two axles. On the inside, these are the pieces you should find: On each axle, starting from the inside: locking collar (Fig. 17, A), axle sprocket, axle washer, differential housing, rubber seal (fits into housing). In the middle is the differential pin (Fig. 17, C) which has two sprockets (Fig. 17, B) with the gears facing in and a pin washer on the outside of each of the sprockets.

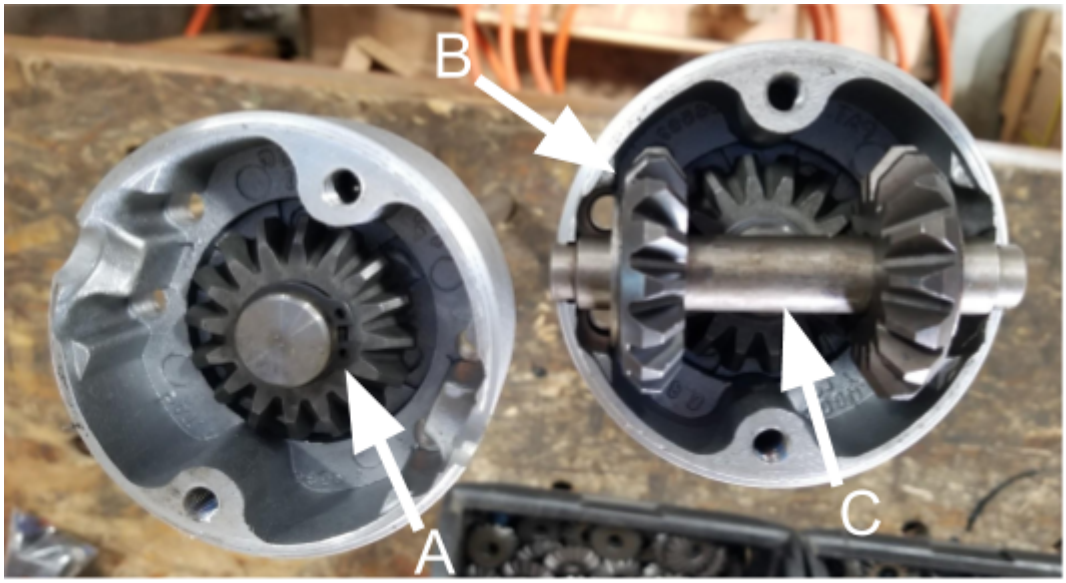


Figure 17. Axle halves. A) Locking collar; B) Sprocket; C) Differential pin

4. By removing the locking collar on the axle, all of the parts on the axle can be lifted off and the axle can then be replaced.

5. Reverse procedure for reassembly. All gears should be generously covered with a basic bearing grease upon assembly. Pay close attention to c-clips. If they do not spring closed into the groove, then they should be replaced.

A. Electric Motor System

1. Proper Usage of Electric Motor

Main Street Pedicabs and Pedal Trucks have the option to be "e-assist", with a Bafang mid-drive electric motor. The electric motor system is the most fragile component of your Vehicle and care must be taken to always use it in the proper way. Always start pedaling before you engage the electric motor. *It is important that the electric motor NEVER be used to start the Vehicle.*

The motor system is intended to *assist* the driver, after the driver has started pedaling. Using the electric motor to start the Vehicle will result in a burned out motor controller or primary reduction gear. Always continue to pedal once the motor is engaged.

If you are experiencing issues with your Bafang Mid-Drive motor system, many troubleshooting resources can be found online, or by speaking with a technician at Main Street Mobility. Main Street Mobility can provide motor repair services.

2. Lithium Battery

Bafang BBS01, BBS02, and BBS HD motors use a 48V Lithium Ion battery. Lithium batteries purchased from Main Street Mobility are shipped fully charged. To recharge your battery, connect it to the supplied charger in a safe charging location. The light on the charger will be red when charging and green when fully charged. A full charge can take up to 8 hours.

Lithium batteries are fragile and potentially dangerous. **Please read these safety instructions:**

Lithium batteries may explode and/or cause a fire, personal injury, or property damage if misused or defective. Lithium batteries should be stored and charged in areas where all other flammable materials have been removed. It is recommended that batteries be stored and charged in a fireproof container.

Do not charge lithium batteries unattended. When charging keep battery in a well-ventilated area. Do not recharge the battery while it is still in the vehicle. Do not charge the battery in your house or any structure where people could be injured or property damaged in the event of a fire. Only charge lithium batteries with chargers that were intended to be used, and supplied for that specific battery. Connect the charger to the electrical outlet before connecting it to the battery. Make sure of the polarity when connecting the battery - Red wire to red wire, black wire to black wire.

Keep lithium batteries away from children.

If a lithium battery is dropped or damaged, do not attempt to recharge it. Lithium batteries should be replaced or professionally inspected if dropped or damaged.

One sign of lithium battery failure is swelling, or ‘ballooning’ of one or more cells. This is a result of a chemical reaction inside the cells that produces Hydrogen or Hydrogen Fluoride gas, which are very dangerous and can cause fire, explosion, poisoning, and chemical burns. If you notice swelling, puffing, or ‘ballooning’ of any of your cells, have your battery professionally inspected or replaced immediately.

Dispose of old batteries in accordance with federal and local regulations.

B. 12 Volt Battery

Lighting systems on Main Street Vehicles use a 12 volt battery. *The 12 volt battery and charger are NOT interchangeable with any electric drive motor batteries or chargers.*

Section III: Cab (this section pertains to Pedicabs only. PedalTrucks typically do not have a fiberglass cab.)

1. Patching Fiberglass

Holes can be filled using Bondo Auto Body Filler and finished over with the proper color gelcoat, which can be obtained from Main Street Pedicabs. To fix a hole with Bondo, tape the back of the hole, fill with bondo, and depress the bondo below the surface, so that the gelcoat layer can be even with the surrounding surface. Bondo requires cream hardener.

Mix Gelcoat and fiberglass resin in a 1:1 ratio, then add liquid hardener (more hardener will dry faster). The gelcoat will be rock hard when dry, so apply it as evenly with the surrounding surface as possible to minimize sanding. Once the gelcoat has dried, use sandpaper to smooth out the area. Start with a medium grit (100-200) to work down the excess gelcoat and move towards a fine grit (600-1200) so get a smooth finish. Use rub-on auto body polish to shine the surface.

2. Fiberglass Reinforcement

Fiberglass can be reinforced from the backside using fiberglass resin, liquid hardener, and fiberglass repair cloth, which are all available at large hardware stores. Be sure to use disposable gloves to protect your hands, and a respirator rated to filter solvents from harmful fumes.

Mix the resin and hardener in a disposable container and use a disposable paintbrush to paint onto desired area. After the surface has been painted,lay down the cloth, then paint over the

cloth until it is saturated and all the bubbles have been pushed out to the side. Wait for this layer to dry and repeat if more strength is desired.

3. Rivet Replacement

Main Street Pedicabs use 3/16” rivets to affix the lights, canopy mounts, and several of the aluminum supports. These can be removed by using a 3/16” drill bit and drilling down through the top of the rivet. Keep the rivet from spinning by holding the back side of the rivet with pliers.

Insert the new rivet into the hole and install with a rivet gun or hand riveter.