ULTRA MOTOR

A2B™

clean mobility technology

A2B Metro Service Manual

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Chapter One

GENERAL INFORMATION

TERMS

Left and Right

The terms left and right in this manual refer to the rider's point of view when seated on the A2B Metro and facing forward. The right side of the A2B Metro is the chain side. The left side is the brake side.

NOTE, CAUTION and WARNING

The terms NOTE, CAUTION and WARNING have specific meanings in this manual. A NOTE provides additional information to make a procedure easier or clearer.

A CAUTION emphasizes precautions that must be taken to avoid damage to tools or the A2B Metro. Disregarding a CAUTION could lead to mechanical damage.

A WARNING emphasizes a situation where negligence could lead to injury or death. Take WARNINGS seriously. Failure to heed a WARNING could result in serious personal injury or death.

LUBRICANTS

Grease

In general, use a lithium-based grease where grease is called for in this manual. Always use grease made specifically for a bicycle, such as grease from Bullshot, Campagnolo, and Shimano.

Oil

Always use oils made specifically for bicycle use. Bicycle oils need to be thin enough to penetrate tight places, they should be durable so they can withstand exposure to the elements, and they must resist the accumulation of dirt.

Suitable oils include Alsop, Bullshot, Campagnolo, Finish Line, Lube Wax, Phil Wood Tenacous Oil, Pedros, Superlube, and Triflow.

Motor oil, WD40, 3-in-1 Oil, sewing machine oil, gun oil, and other common oils are not suitable and should not be used.

In general, applying oil from a drip applicator is superior to using aerosols. Aerosols promote over-lubrication, which leads to excessive accumulation of dirt. Apply oil sparingly. Apply enough oil to do the job, but not so much that it starts to drip from the component. After applying any oil, wipe off the excess.

THREADLOCK

A threadlocking compound should be used on most fasteners on the A2B Metro. Threadlocking compound prevents loosening caused by vibration and helps seal out moisture.

Loctite 242 (blue) or its equivalent is recommended for threadlocking applications. Loctite 242 is a medium-strength threadlocking compound that permits disassembly with common hand tools.

Before applying Loctite to threads, clean oil, grease, and other residue from the thread surfaces. Apply a small amount of Loctite. Excess compound could work its way down the threads and bond parts together. Table 5 (this chapter) provides torque specifications and Loctite recommendations for particular fasteners.

SPECIAL TOOLS

The following special tools are needed when servicing the A2B Metro.

Tool	Part number
Hex wrench set: 4mm, 5mm, 6mm	Park AWS-1
Hex wrench set	Park AWS-11C
Hex wrench set: 2mm, 5mm, 3mm	Park AWS-3
Fourth-hand cable stretcher	Park BT-2
Chain checker	Park CC-2C
Chain breaker (screw type)	Park CT-3
Crank wrench	Park CCW-14R
Cable and housing cutter	Park CN-4C
Gearclean brush	Park GSC-1
32mm & 36mm head wrench	Park HCW-15
Pedal wrench	Park PW-3
Spoke wrench (black)	Park SW-0
Spoke wrench (red)	Park SW-2
Tire lever set	Park TL-1C
Freewheel tool	Part Tool FR-1
Bottom-bracket-cartridge tool	Park Tool BBT-2

SPECIFICATIONS

Table 1: Mechanical Specifications

Component	Specification
Headset	VP-A50AC
Stack height	10.3 mm (0.41 in.)
Dimensions	1 1/8 x 44 x 30
Front fork	Spinner
Type	FK-001
Handlebar	Kalloy AL-021
Rise	9°
Width	670 mm (26.38 in.)
Handlebar stem	MJ Cycle ST-001
Seatpost	Kalloy SP-600
Tires	Kenda K1032 20 in. x 3.0 in.
Rims	Alex DX 32
Rim runout (with or without tire)	
Axial runout	1 mm (0.039 in.)
Radial runout	1 mm (0.039 in.)
Spokes	
Front	14 gauge
Rear	13 gauge
Bottom bracket (B/B)	Chin Haur CH-52
Freewheel	Long Yi LY1107, 7-speed, 11/28t
Chainring	Hsiang An HA-804G, 170 mm, 46T
Chain	KMC Z50 ½ x 3/32 x 158L

Table 2: Gear Ratios

Chainring	Freewheel	Gear Inches	Ratio
46	11	83.6	6.3
46	13	70.8	5.3
46	15	61.3	4.6
46	18	51.1	3.8
46	21	43.8	3.3
46	24	38.3	2.9
46	28	32.9	2.5

Table 3: Electrical Specifications

Component	Specification
Battery	36-volt
Type	Lithium ion
Capacity	11.4 amp-hrs (422 watt-hrs)
Charger	High Power, HP8204C(10s)
Input	115/230 VAC, 60/50 Hz, 1.5/0.9 A
Output	42VDC/2A

Table 4: Performance Specifications*

Item	Specification
Top speed	20 mph (per regulation)
Range (flat terrain, no wind)	20 miles

*180-pound rider with tires inflated to 60 psi.

Table 5: Torque Specifications

Item	Nm	in.-lb.	ft.-lb.	Special Instructions
Bottom-bracket cartridge adapter ring	29.4-38	-	21.7-28	Apply grease to the threads
Brake caliper anchor bolt	5-7	40-60	-	
Brake caliper CPS bolt	8-10	70-90	-	
Brake caliper mounting bolt	5-7	40-60	-	Apply Loctite 242
Brake disc bolt	6.2	55	-	Apply Loctite 242
Brake lever clamp bolt	3-3.9	26.5-34.7	-	
Chainring bolt	6-8	53-71	-	
Crank arm bolt	35-40	-	26-30	Apply grease to bolt threads
Derailleur anchor bolt	4.1	36.5	-	
Derailleur mounting bolt	7.9	70	-	
Front fender	3	26.5	-	
Handlebar binder bolt	6	53	-	Apply grease to the bolt threads
Handlebar stem clamp bolt	12	106	-	
Pedal	3-4.9	26.5-43.4	-	Apply grease to the stud threads
Rear axle nut	60-65	-	44-48	
Rear fender bolt	4	35	-	
Rear fender stay bolt	2	17.7	-	
Seat post clamp bolt	10-12	89-106	-	
Shifter set screw	3-3.9	26.5-34.7		
Shock absorber bolt	16-20	-	12-14.5	Apply Loctite 242
Swingarm bolt	18-22	-	13-16	Apply Loctite 242
Throttle set screw	3-3.9	26.5-34.7	-	
Torque arm bolt	9-10	80-89	-	Apply Loctite 242

Chapter Two

STEERING and FRONT SUSPENSION

HANDLEBAR REPLACEMENT

1. Note the position of the throttle and the shifter relative to its handlebar grip. If necessary, measure the gap between each item and its handlebar grip or make a drawing so these components can be reinstalled with the proper positioning and orientation. Also note the orientation of the handlebar within the handlebar stem.
2. Remove the left and right handlebar grip. Remove the grip spacer on the inboard side of each spacer.
3. Loosen the throttle set screw **(A, Figure 1)**, shifter set screw **(A, Figure 2)**, the reflector clamp bolt, and the clamp bolt on each brake lever (B, **Figure 2**)

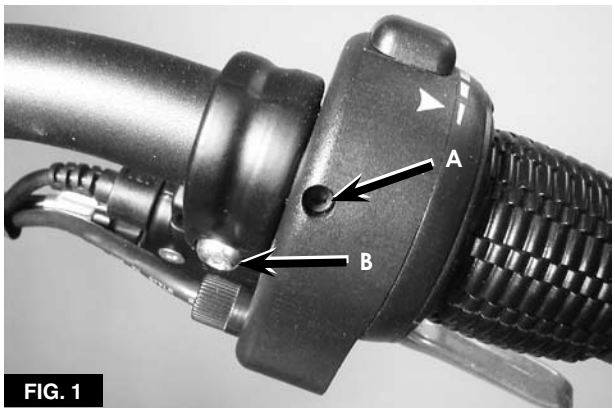


FIG. 1

4. Remove the handlebar binder bolts (**Figure 3**).
5. Lower the handlebar from the handlebar stem.
6. Slide the throttle, shifter, each brake lever and the reflector assembly from the handlebar ends, and remove the handlebar.

FIG. 2

7. Install the handlebar by reversing the removal procedures.

a. Make sure the handlebar is centered and properly oriented within the handlebar stem.

b. Apply grease to the handlebar binder bolts (**Figure 3**), and evenly tighten the bolts in a star pattern so the gap at the top of the clamp is the same as the gap at the bottom. Torque the handlebar binder bolts to the specification in Table 5.


FIG. 3

c. Slide the reflector, each bake lever, the throttle and the shifter onto their respective handlebar ends.

d. Install a grip spacer and handlebar grip onto each handlebar end.

e. Position the throttle or shifter relative to its handlebar grip as noted during removal. Tighten their set screws.

f. Slide each brake lever so its bracket seats against the throttle or shifter. Rotate the brake lever to the position noted during removal, and torque the brake lever clamp bolts to the specification in Table 5.

g. Rotate the throttle and shifter so their barrels rest against the brake lever. Torque the throttle set screw and the shifter set screw to the specifications in Table 5.

THROTTLE

Removal

1. Note the position of the throttle relative to its handlebar grip. If necessary, measure the gap between the throttle and the right handlebar grip or make a drawing so the throttle can be properly positioned and oriented during installation. Also note the orientation of the handlebar within the handlebar stem.
2. Remove the battery from the battery compartment (Chapter Seven).
3. Disconnect the 4-pin throttle connector and the 3-pin state-of-charge connector.
4. Tie a string to the throttle half of a connector. Make sure the string is long enough run through the frame. It will be used to pull the new throttle wire through the frame.
5. Remove the handlebar grip and grip spacer from the right handlebar end.
6. Loosen the throttle set screw (A, **Figure 1**), and remove the throttle from the handlebar end. If necessary, remove the handlebar (this chapter) to ease throttle removal.
7. Carefully pull the throttle wire until the connector and string emerge from the frame cutout at the steering head. If necessary, have an assistant guide the connector up the frame downtube.
8. Carefully remove the heat shrink tubing from the top of the cable shroud, and clip the cable tie. Note how tightly the cable tie sits around the shroud and cables. A new cable tie will have to be tightened to the same diameter.
9. Pull the wire and string through the cable shroud. Untie the string from the throttle connector and remove the throttle. Leave the string in place so it can be used to pull the new throttle wire through the frame.

Installation

1. Slip a new piece of heat shrink tubing over the top of the cable shroud.
2. Tie the string to the connector at the end of the throttle wire.
3. While an assistant pulls the string at the battery compartment, guide the throttle wire through the shroud, into the frame cutout, and through the frame downtube until the connector emerges from the battery compartment.
4. Untie the string from the throttle connector. Connect the 4-pin throttle connector and the 3-pin state-of-charge connector to their mates.
5. Install the battery and the battery cap (Chapter Seven).
6. Slide the throttle onto the handlebar end, and seat it against the brake lever bracket.
7. Install a grip spacer and handlebar grip onto each handlebar end.
8. Position the throttle relative to its handlebar grip as noted during removal. Temporarily tighten the set screw (A, **Figure 1**).
9. If necessary, slide the brake lever so its bracket seats against the throttle or shifter. Rotate the brake lever to the position noted during removal, and torque the brake lever clamp bolt (B, **Figure 1**) to the specification in Table 5.
10. Rotate the throttle so its wire barrel rests against the brake lever bracket, and torque the throttle set screw (A, **Figure 1**) to the specification in Table 5.
11. Install a new cable tie around the top of the cable shroud. Tighten the cable tie to the diameter noted during removal.
12. Slide the heat shrink tubing over the cable tie and shroud end. Use a heat gun to shrink the tubing.

HANDLEBAR STEM

Removal

1. If necessary, remove the handlebar binder bolts (**Figure 3**), and remove the handlebar from the handlebar stem. Use a bungee cord to suspend the handlebar from the frame.
2. Loosen the handlebar stem clamp bolt (A, **Figure 4**).

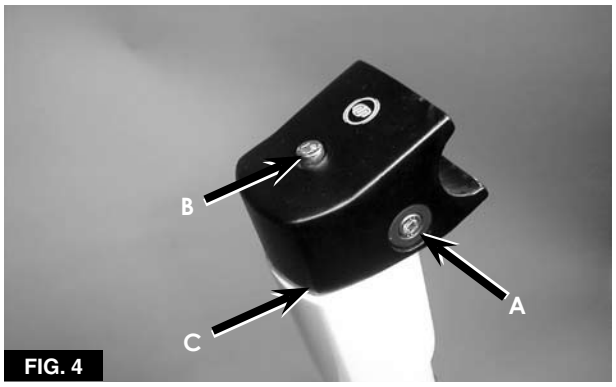


FIG. 4

3. Remove the handlebar stem bolt (B, **Figure 4**) and washer from the top of the handlebar stem
4. Lift the handlebar stem (C, **Figure 4**) from the head tube.
5. If necessary, remove the upper bearing by performing the following:
   a. Lower the fork within the head tube as needed, and remove the seal (**Figure 5**).

FIG. 5

   b. Remove the collar (**Figure 6**) and upper bearing (**Figure 7**). Note that the bevel on the bearing inner race faces up.


FIG. 6


FIG. 7

Installation

1. If removed, install the upper bearing by performing the following:
   a. Press the front fork up into the head tube.
   b. Slip the upper bearing over the fork column, and seat the bearing in the head tube (**Figure 7**). Make sure the bevel in the bearing inner race faces up.
   c. Install the collar (**Figure 6**) so its cone seats against the bevel in the bearing inner race.
   d. Install the seal, and press it into the head tube until the seal bottoms (**Figure 5**).
2. Set the handlebar stem onto the head tube, and turn in the handlebar stem bolt and washer (B, **Figure 4**).

WARNING

The handlebar stem bolt and clamp bolt must be tightened as described below. Overtightening the stem bolt can damage the headset bearings. If the handlebar stem clamp bolt is not properly torqued, the fork may not turn when the handlebar is turned.

3. Perform the following to set the headset bearings and to secure the handlebar stem in place and in alignment with the front wheel.

a. Tighten the handlebar stem bolt (B, **Figure 4)** until there is no play in the steering.

b. Tighten the stem bolt an additional 120 degrees (clockwise), and then loosen it 90 degrees (counterclockwise).

c. With the front wheel off the ground, turn the handlebar from full stop to full stop. The fork should turn smoothly.

d. Torque the handlebar stem clamp bolt (A, **Figure 4**) to the specification in Table 5.

e. Tighten the handlebar stem bolt (B, **Figure 4**) an additional 30 degree (clockwise).

f. With the front wheel off the ground, again turn the handlebar from full stop to full stop. The fork should turn smoothly.

FRONT FENDER

Removal/Installation

1. Remove the front wheel.
2. Remove the fender bolt (A, **Figure 8**) from each side of the slider.
3. Remove the inner fender bolt (B, **Figure 8**), and remove the fender from between the fork legs.

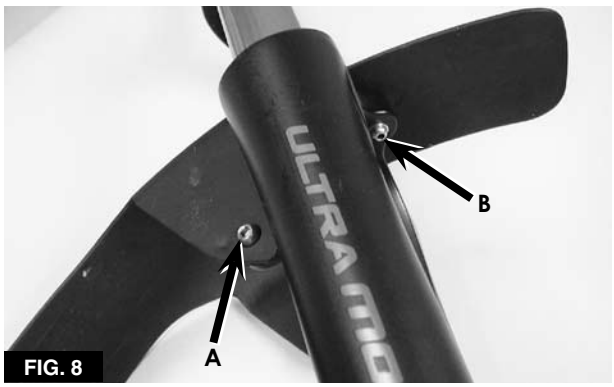


FIG. 8

4. Install the front fender by reversing the removal procedures. Torque the fender bolts (A and B, **Figure 8**) to the specification in Table 5.

FRONT FORK

Removal

The front fork is not serviceable. If the fork is damaged, it must be replaced.

1. Remove the handlebar (this chapter).
2. Carefully pry open the cable holder on the fork slider (A, **Figure 9**), and release the front brake cable (B) from the holder.

FIG. 9

3. Remove the caliper mounting bolts (A, **Figure 10**), and slide the front brake caliper (B) from the brake disc. Suspend the caliper with a bungee cord.
4. Remove the front wheel.

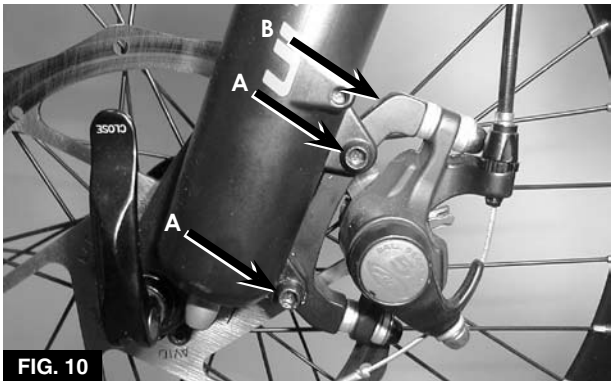


FIG. 10

5. Remove the handlebar stem and the upper bearing as described in this chapter.
6. Lower the fork until the fork column clears the head tube, and remove the front fork.
7. Visually inspect the seal on each side of the upper bearing (A, **Figure 11**) for damage. Manually turn the bearing inner race, and confirm that the bearing rotates smoothly.

8. Visually inspect the seal (B, **Figure 11**) and the cone on the upper-bearing collar (C) for nicks or other damage.

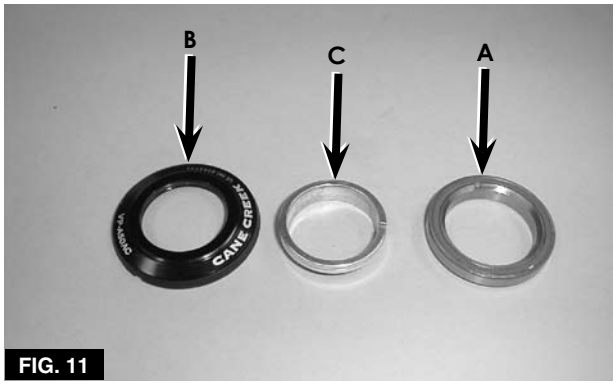


FIG. 11

9. Inspect the lower bearing in the head tube (**Figure 12**). Note that the bevel on the lower-bearing inner race faces down, away from the head tube. A new bearing must be installed with the same orientation.


FIG. 12

10. Inspect the cone of the lower-bearing collar (**Figure 13**).
11. If either bearing is faulty, replace both bearings, the upper-bearing collar (C, **Figure 11**) and the lower-bearing collar (**Figure 13**) as a set.

Installation

1. Slide the fork column up into the head tube until the lower-bearing collar (Figure 13) rests against the lower bearing (**Figure 12**).
2. Install the upper bearing and the handlebar stem as described in this chapter.
3. Install the front wheel.
4. Carefully slide the front brake caliper onto the brake disc so the disc does not mar the brake pads. Apply Loctite 242 to the threads of caliper mounting bolts (A, **Figure 10**), and evenly tighten the bolts. Torque the caliper mounting bolts to the specification in Table 5.
5. Install the handlebar (this chapter).


FIG. 13

Chapter Three

BRAKES

BRAKE LEVER

Removal

1. Note the position of the throttle or the shifter relative to its handlebar grip. If necessary, measure the gap between the item and its handlebar grip or make a drawing so these components can be reinstalled with the proper positioning and orientation. Also note the orientation of the handlebar within the handlebar stem.
2. Remove the battery from the battery compartment (Chapter Seven).
3. Disconnect the halves of the left or right brake switch connector.
4. Tie a string to the brake-lever half of the connector. Make sure the string is long enough to run through the frame. It will be used to pull the new switch wire through the frame.
5. At the brake lever, loosen the adjuster locknut (A, **Figure 1**) and turn the adjuster barrel (B) from the brake lever.
6. Turn the adjuster barrel and the locknut until their slots align with the slot in the brake lever housing.
7. Pull the cable housing from the adjuster barrel (B, **Figure 1**), and slide the inner wire (C) through the slots in the lever housing, adjuster barrel and locknut.
8. Press the brake lever toward the handlebar, and disconnect the inner wire end (A, **Figure 2**) from the anchor (B) on the brake lever.
9. Remove the handlebar grip and grip spacer from the handlebar end.
10. Loosen the set screw, and remove the shifter or the throttle from the handlebar end. If necessary, remove the handlebar (Chapter Two) to ease shifter or throttle removal.

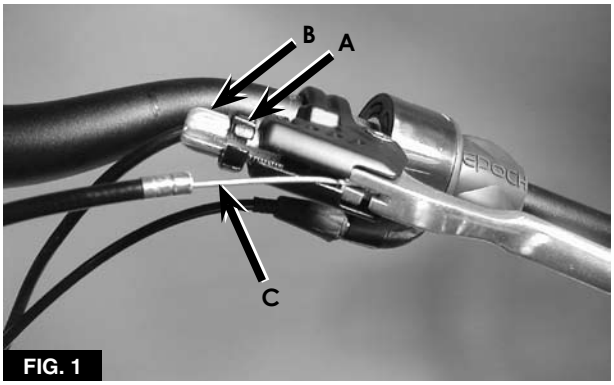


FIG. 1

11. Carefully remove the heat shrink tubing from the top of the cable shroud, and clip the cable tie. Note how tightly the cable tie sits around the shroud and cables. A new cable tie will have to be tightened to the same diameter.
12. Slide the brake lever from the handlebar end. Carefully pull the brake switch wire until the connector and string emerge from the frame cutout at the steering head.
13. Pull the wire and string through the cable shroud. Untie the string from the switch connector and remove the brake lever assembly. Leave the string in place within the shroud and frame.

Installation

1. Slide the new brake lever onto the end of the handlebar.
2. Slip a new piece of heat shrink tubing over the top of the cable shroud.
3. Tie the string to the connector at the end of the brake switch wire.

4. While and assistant pulls the string, guide the brake switch wire through the shroud, into the frame cutout, and through the frame downtube until the switch connector emerges from the battery compartment.
5. Install the battery (Chapter Seven).
6. Untie the string from the brake lever switch connector. Connect the switch connector to its mate in the battery compartment, and install the battery cap (Chapter Seven).
7. Make sure the slots in the adjuster barrel and the locknut align with the slot in the brake lever housing (**Figure 1**).
8. Connect the end of the brake cable inner wire (B, **Figure 2**) to the anchor (A) on the brake lever.

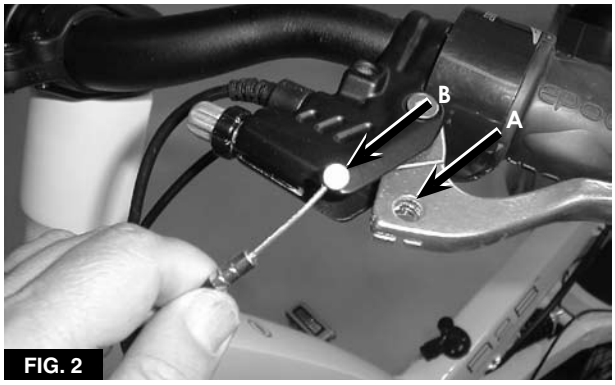


FIG. 2

9. Pull the cable housing, and slide the cable inner wire (C, **Figure 1**) through the slots in the brake lever, adjuster barrel (B) and locknut (A). Seat the cable housing ferrule into the adjuster barrel.
10. Slide the throttle or shifter onto the handlebar end.
11. Install a grip spacer and handlebar grip onto the handlebar end.
12. Position the throttle or shifter relative to the handlebar grip as noted during removal. Temporarily tighten the set screw.
13. Slide the brake lever so its bracket seats against the throttle or shifter. Rotate the brake lever to the position noted during removal, and torque the brake lever clamp bolt to the specification in Table 5.
14. Rotate the throttle or shifter so its barrel rest against the brake lever. Torque the throttle set screw or the shifter set screw to the specification in Table 5.
15. Install a new cable tie around the top of the cable shroud. Tighten the cable tie to the diameter noted during removal.
16. Slide the heat shrink tubing over the cable tie and shroud end. Use a heat gun to shrink the tubing.

BRAKE CABLE INNER WIRE

Removal

The cable inner wire can be replaced without removing the cable housing.
1. Remove the battery from the battery compartment (Chapter Seven).
2. Clip the cable ferrule from the brake cable inner wire.
3. Turn out the anchor bolt (A, **Figure 3**), and release the inner wire from the pinch mechanism.

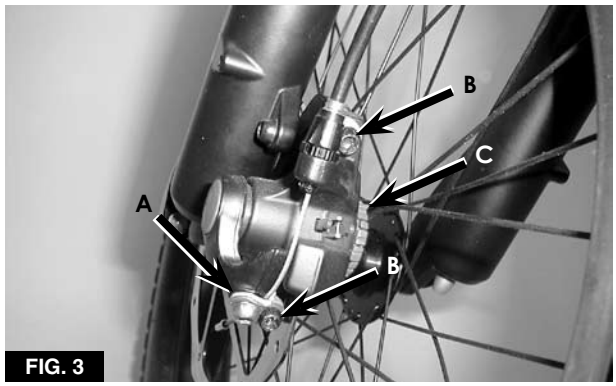


FIG. 3

4. Pull the cable housing and inner wire from the caliper barrel adjuster.
5. At the brake lever, loosen the adjuster locknut (A, **Figure 1**) and turn the adjuster barrel (B) from the brake lever.
6. Turn the barrel adjuster and the locknut until their slots align with the slot in the brake lever housing.
7. Pull the cable housing from the adjuster barrel, and slide the inner wire (C, **Figure 1**) from the slots in the housing, adjuster barrel and locknut.
8. Press the brake lever toward the handlebar, and disconnect the inner wire end (A, **Figure 2**) from the anchor (B) on the brake lever.
9. Pull the inner wire from the cable housing until the far end emerges from the cable housing.

Installation

A fourth-hand tool (Park Took BT-2) is needed for this procedure.

1. Apply oil to the inside of the cable housing.
2. Insert the inner wire through the brake-lever end of the cable housing until the wire emerges from the caliper end of the housing.
3. Press the brake lever toward the handlebar, and connect the inner wire end (B, **Figure 2**) to the anchor (A) on the brake lever.
4. Pull the cable housing, and slide the cable inner wire (C, **Figure 1**) through the slots in the brake lever, adjuster barrel (B) and locknut (A). Seat the cable housing ferrule into the adjuster barrel.
5. At the caliper, turn the barrel adjust all the way into the caliper.
6. Feed the inner wire through the caliper barrel adjuster, and seat the cable housing in the adjuster.
7. Route the inner cable through the pinch mechanism on the caliper.
8. Use the fourth-hand tool to remove the slack from the cable, and torque the brake caliper anchor bolt (A, **Figure 3**) to the specification in Table 5.
9. Loosen the CPS bolts (B, **Figure 3**) so the caliper can move freely.
10. Turn the inboard pad adjuster (C, **Figure 3**) clockwise (inward toward the caliper) until the brake disc (A, **Figure 4**) is centered within the caliper body (B). The caliper is properly adjusted if the space on each side of the brake disc is the same.

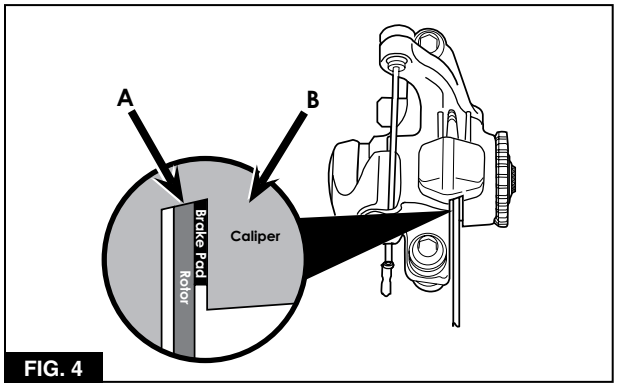


FIG. 4

11. Pull in and hold the brake lever. Check that the rotor is still centered within the caliper body.
12. Pull in and hold the brake lever. Torque the CPS bolts (B, **Figure 3**) to the specification in Table 5 while holding the brake lever in.
13. Release the brake lever, and spin the wheel. Listen for the sound of the inboard pad rubbing against the brake disc.
14. If rubbing is noted, turn the inboard pad adjuster counterclockwise (out from the caliper) two or three clicks, and recheck.
15. Repeat Steps 13 and 14 as needed.
16. Trim the inner wire end so its end extends no more than 20 mm (3/4 in.) beyond the anchor. Crimp a new cable ferrule onto the cable end.
17. Use the barrel adjuster (B, **Figure 1**) at the brake lever to remove any cable slack. Turn the adjuster outward until brake lever freeplay is eliminated. However, do not go so far that the caliper torque arm is moved. Make sure the caliper torque arm is completely released, and tighten the adjuster locknut (A) against the brake lever housing.

BRAKE CALIPER

Removal

The following procedure shows the removal of a front caliper. This procedure also applies to a rear caliper.

1. If the caliper is being replaced, perform the following:
   a. Clip the cable ferrule from the brake cable inner wire.
   b. Turn out the anchor bolt (A, **Figure 3**), and release the inner wire from the pinch mechanism.
   c. Pull the cable housing and inner wire from the caliper barrel adjuster.
2. Remove the caliper mounting bolts (A, **Figure 5**), and slide the brake caliper (B) from the brake disc.

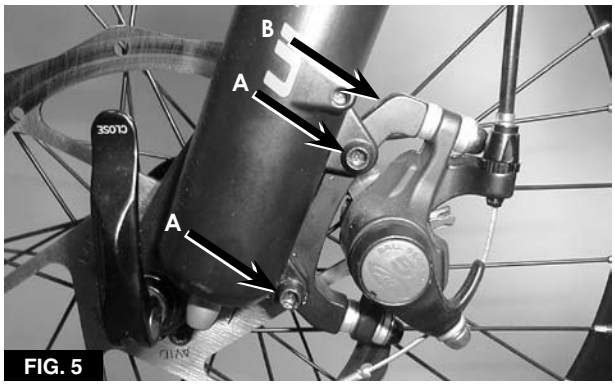


FIG. 5

Installation

1. Carefully slide the brake caliper over the brake disc. Seat the caliper against the inboard side of the mounting bosses on the fork slider or swingarm.
2. Apply Loctite 242 to the threads of the caliper mounting bolts, and turn in the bolts (A, **Figure 5**, typical). Torque the brake caliper mounting bolts to the specification in Table 5.
3. If necessary, complete caliper installation by performing Steps 5-17 of Brake Cable Inner Wire Installation (this chapter).

BRAKE PAD REPLACEMENT

The following procedure shows brake pad replacement on a rear caliper. This procedure also applies to a front caliper.
1. Turn the inboard pad adjuster (A, **Figure 6**) counterclockwise (out from the caliper).
2. Pull the pad spreader (B, **Figure 6**) from between the brake pad arms.
3. Remove the outboard brake pad (C, **Figure 6**) and then the inboard pad (D) from the caliper.

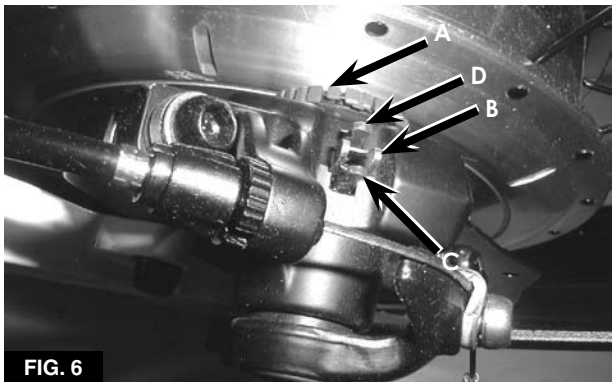


FIG. 6

4. The brake pads are color coded and must be installed on the correct side of the brake disc. Install the black pad (A, **Figure 7**) on the outboard side of the brake disc. Install the blue pad (B, **Figure 7**) on the inboard side of the disc. Make sure the pad material on each brake pad faces the brake disc.
5. Gently squeeze the tangs of the pad spreader (C, **Figure 7**), and press the spreader (B, **Figure 6**) into place between the brake pad arms.

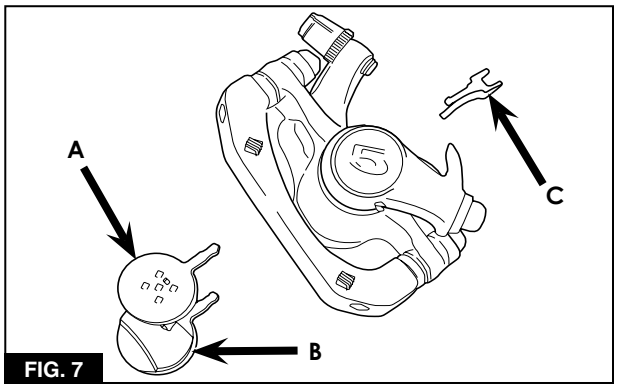


FIG. 7

BRAKE DISC

Removal/Installation

1. Remove the relevant wheel.
2. Turn out the brake disc bolts (A, **Figure 8**), and remove the disc from the wheel hub.
3. Install the disc so its arrow (B, **Figure 8**) points in the direction of forward wheel rotation.
4. Apply Loctite 242 to the brake disc bolts, and evenly tighten the bolts in a crisscross pattern. Torque the brake disc bolts (A, **Figure 8**) to the specification in Table 5.

FIG. 8

Chapter Four

SHIFTER and DERAILLEUR

SHIFTER

Removal

1. Note the position of the shifter relative to the left handlebar grip. If necessary, measure the gap or make a drawing so the shifter can be properly positioned during installation.
2. Remove the left handlebar grip and grip spacer.
3. Loosen the shifter set screw (A, **Figure 1**), and slide the shifter from the handlebar end.

Installation

1. Slide the shifter onto the handlebar end.
2. Install the grip spacer, and completely install the handlebar grip.
3. Move the shifter to its position relative to the handlebar grip as noted during removal. Temporarily tighten the set screw (A, **Figure 1**) enough to hold the shifter in position.

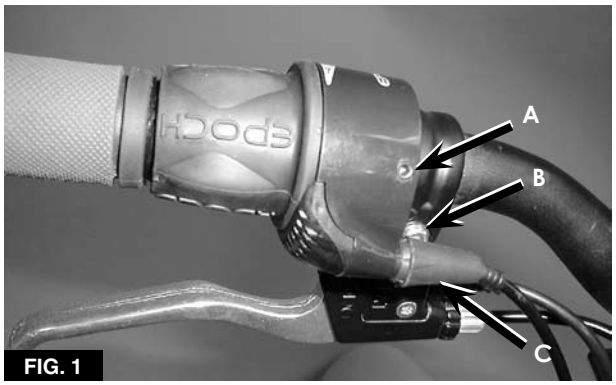


FIG. 1

4. If the brake lever was moved perform the following:
   a. Slide the brake lever so its bracket rests against the shifter.
   b. Rotate the brake lever to the position noted during removal, and torque the brake lever clamp bolt (B, **Figure 1**) to the specification in Table 5.
5. Rotate the shifter so its barrel seats against the brake lever, and torque the shifter set screw (A, **Figure 1**) to the specification in Table 5.

SHIFTER CABLE INNER WIRE

Removal

The cable inner wire can be replaced without removing the cable housing.
1. Operate the shifter and move the chain to the smallest cog (high gear).
2. Remove the battery (Chapter Seven).
3. Clip the cable ferrule from the cable end (A, **Figure 2**).
4. Loosen the anchor bolt (B, **Figure 2**), and release the cable inner wire from the from the derailleur pinch mechanism.

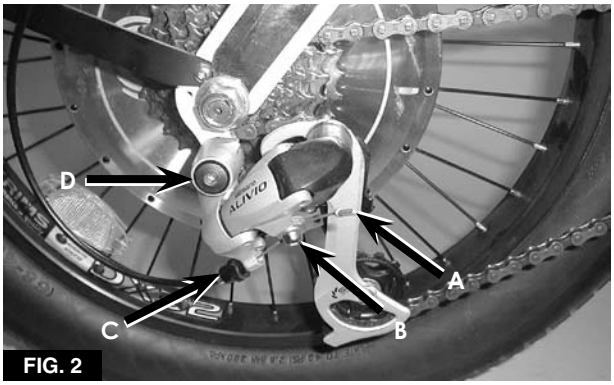


FIG. 2

5. Remove the cable housing and inner wire from the derailleur barrel adjuster (C, **Figure 2**).
6. Remove the hand grip from the left handlebar end.
7. Loosen the shifter set screw (A, **Figure 1**) and the brake lever clamp bolt (B). Slide the brake lever out of the way.
8. Gently pry the cover plate (A, **Figure 3**) from the shifter housing.
9. Slide the twist grip (B, **Figure 3**) from the shifter drum.

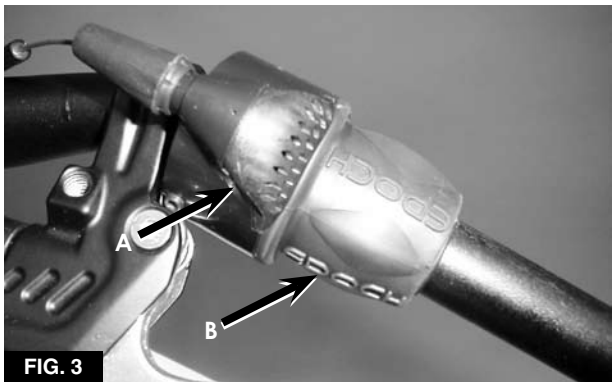


FIG. 3

10. Push the inner wire into the shifter until the cable end emerges from the socket in the shifter drum (**Figure 4**).
11. Pull the inner wire from the shifter drum.


FIG. 4

Installation

A fourth-hand tool (Park Took BT-2) is needed for this procedure.
1. Clean the shifter housing, however, do not use solvents. They could attack the plastic used in these parts.
2. Preset the derailleur adjustment screws before installing the inner wire.
a. Stand behind the derailleur, and check the position of the guide pulley. It should align with the smallest cog (high gear) as shown in **Figure 5**.
b. If necessary, adjust the outward limit by turning the H-screw (high-gear limiter screw). Tightening the H-screw moves the guide pulley inward. Loosening the screw moves the pulley outward.
c. Manually move the derailleur to its innermost position. Hold the derailleur against the stop, and check the guide pulley. It should align with the largest cog (low gear) shown in **Figure D-4**.
d. If necessary, adjust the inward limit by turning the L-screw (low-gear limiter screw). Tighten the L-screw to adjust the derailleur outward. Loosen the screw to adjust the derailleur inward.

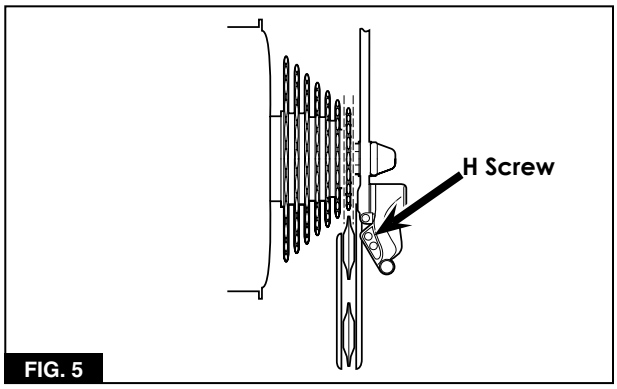


FIG. 5

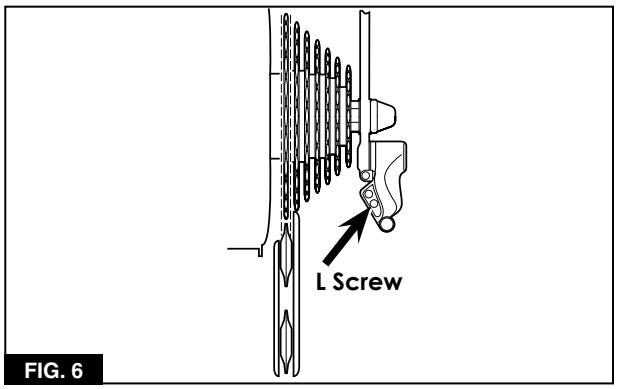


FIG. 6

3. Lubricate the inner wire and cable groove in the shift drum with Grip Shift Jonnisnot grease or petroleum jelly.
4. Insert the free end of the wire through the socket in the shifter drum until the wire's barrel end is seated in the socket (**Figure 7**).
5. Insert the wire through the barrel adjuster, and seat the wire in the cable groove (**Figure 8**).


FIG. 7


FIG. 8

6. Check shifter operation by pulling the wire and turning the shifter. The inner wire should move in and out, and the shifter should click.
7. Insert the inner wire through the ferrule in the upper end of the cable housing. Feed the wire through the housing until the wire emerges from the housing end at the derailleur.
8. At the shifter, slide the upper housing along the inner wire, and seat housing ferrule in the barrel adjuster.
9. Install the cover (A, **Figure 3**) and twist grip (B) onto the shifter.
10. At the derailleur, insert the inner wire through barrel adjuster and through the cable pinch mechanism. Make sure the lower cable ferrule seats in the derailleur barrel adjuster (C, **Figure 2**) and the inner wire is properly routed through the pinch mechanism.
11. Manually tighten the anchor bolt (B, **Figure 2**) so the inner wire is secured in the pinch mechanism groove. Look directly at the pinch mechanism. The tab on the pinch plate should be inboard of the inner wire as shown in **Figure 9**.
12. Loosen the anchor bolt. Pull the slack from the inner wire with the fourth hand tool, and torque the derailleur anchor bolt (B, **Figure 2**) to the specification in Table 5. Make sure the inner wire still sits in the pinch-mechanism groove.
13. Cut the excess from the inner wire. Leave a couple of inches for future adjustment.
14. Fit a new cable ferrule (A, **Figure 2**) over the inner wire end, and crimp the ferrule in place.
15. Install the battery and battery cap (Chapter Seven).
16. Install the shifter onto the handlebar as described in this chapter.
17. Adjust the derailleur and then the cable tension as described in this chapter.

DERAILLEUR

Derailleur Lubrication

Lubricate to the following components on the derailleur. See **Figure 10**.
1. Each edge of the pulley-wheel dust cap.
2. Both ends of each pivot on the parallelogram.
3. The mounting bolt treads.
4. The barrel adjuster threads.
5. The anchor bolt treads.

Derailleur Adjustment

Three screws are used to adjust the derailleur. The H-screw (high-gear limiter screw) sets the outward limit of the derailleur's movement. The L-screw (low-gear limiter screw) sets its inward limit. The B-screw adjusts the distance between the bottom of the cogset and the derailleur's guide pulley.

A fourth–hand tool (Park Tool BT-2) is required to perform this procedure
1. Check the cable attachment to the derailleur pinch mechanism.
a. Check the position of the inner wire in the pinch mechanism. The wire should follow the groove in the pinch plate, and the pinch plate tab should be inboard of the wire when you look directly at the pinch-mechanism stud (**Figure 9**).

b. Loosen the anchor bolt (B, **Figure 2**). Use the fourth-hand tool to pull the slack from the inner wire.

c. Torque the derailleur anchor bolt to the specification in Table 5.

d. Check that the inner cable still sits within the groove in the pinch-mechanism plate.

2. Set the derailleur as close as possible to the cogset by performing the following.

a. Shift the chain to the largest cog (low gear).

b. Completely loosen the B-screw.

c. Back-pedal, and check for bouncing at the guide pulley (**Figure 11**). The B-screw is too loose if bouncing is noticed.

d. Tighten the B-screw (**Figure 10**) one turn, and repeat the bounce check.

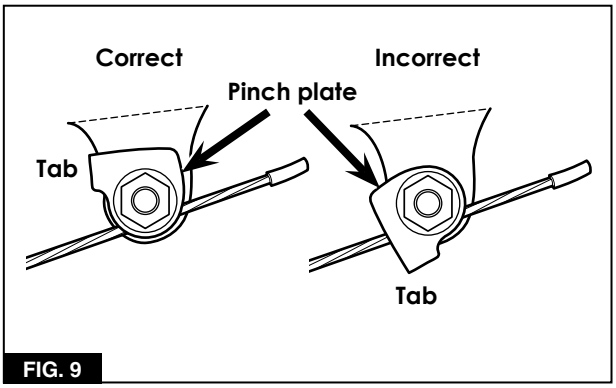


FIG. 9

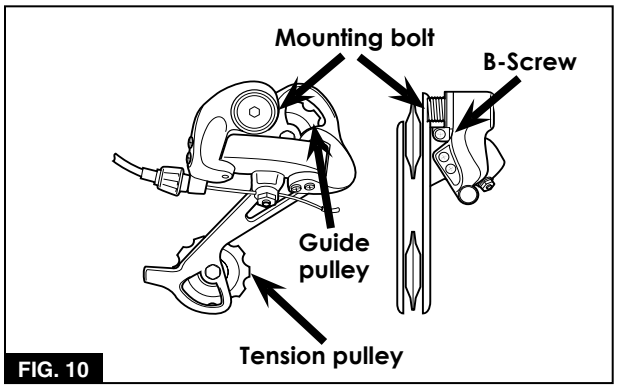


FIG. 10

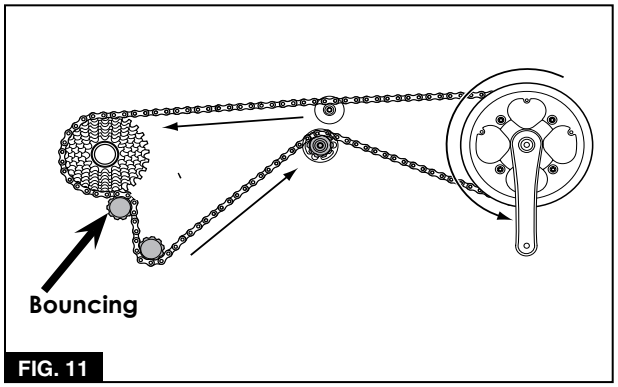


FIG. 11

3. Set the derailleur's outward limit as follows:

a. Shift the derailleur so the chain sits on the smallest cog (high gear).

b. Stand behind the derailleur, and check the position of the guide pulley. The pulley should align with the smallest cog as shown in **Figure 5**.

c. If necessary, use the H-screw to adjust the outward limit. Tighten the H-screw to move the derailleur inward; loosen the H-screw to move it outward.

4. Set the derailleur's inward limit as follows:

a. Shift the derailleur so the chain rests on the largest cog (low gear).

b. Stand behind the derailleur, and check the position of the guide pulley. The pulley should align with the largest cog as shown in **Figure 6**.

c. If necessary, use the L-screw to adjust the inward limit. Tighten the L-screw to move the derailleur outward; loosen the L-screw to move it inward.

Setting Cable Tension

A fourth–hand tool (Park Tool BT-2) is required to perform this procedure

1. Loosen the derailleur anchor bolt (B, **Figure 2**).
2. Turn the derailleur barrel adjuster (C, **Figure 2**) to its fully-in position, and then back out the adjuster three full turns.
3. Turn the shifter barrel adjuster (C, **Figure 1**) to its fully-in position, and then back it out one full turn.

NOTE

Do not pull the inner wire so much that the derailleur begins to move.

4. Use a fourth-hand tool to pull the slack out of the inner wire.
5. Torque the derailleur anchor bolt (B, **Figure 2**) to the specification in Table 5. Check that the inner wire still sits within the pinch-mechanism groove.

Derailleur Installation

1. Lubricate the derailleur as described above.
2. Align the mounting bolt (D, **Figure 2**) with the hole in the hanger.
3. Rotate the derailleur clockwise so the stop tab on the derailleur mounting plate (or the end of the B-screw) sits forward (clockwise) of the stop tab on the derailleur hanger.
4. Turn the mounting bolt into the hanger. Finger-tighten the bolt.
5. Rotate the derailleur counterclockwise until the derailleur stop tab presses against the stop tab on the hanger.
6. Torque the derailleur mounting bolt (D, **Figure 2**) to the specification in Table 5.

Chapter Five

CHAIN and CRANKSET

CHAIN

Inspection

The chain inspection tool (Park Tool CC-2C) is needed for this service.

1. Following the manufacturer's instructions, install the chain inspection tool onto the chain. Both of the tool's pegs must sit inside a chain link.
2. Rotate the tool's dial so the pegs press against the inside of the chain rollers.
3. The number opposite the V-notch on the dial indicates the chain's condition.
   a. 0-1: the chain is in good condition.
   b. 1-2: the chain is moderately worn.
   c. 2-3: the chain is approaching the wear limit.
   d. 3 or more: the chain is worn beyond the wear limit.

Checking Chain Length

1. Secure the A2B Metro in a stand at an angle that matches the angle when the bike sits upright on a level surface.
2. Shift the derailleur and move the chain to the outermost cog (high gear).
3. Check the angle of a line drawn through the center of the two derailleur pulleys relative to the ground or floor.
   a. The chain length is perfect if this line is perpendicular (90 degrees) to the ground (**Figure 1**).
   b. Chain length is acceptable if the tension pulley sits 1.75 in. or less forward or rearward of the guide pulley.
4. Visually inspect the chain.
   a. The chain is too long if the upper run sags as shown in **Figure 2**.

b. Chain length is acceptable if the tension pulley sits 1.75 in. or less forward or rearward of the guide pulley.

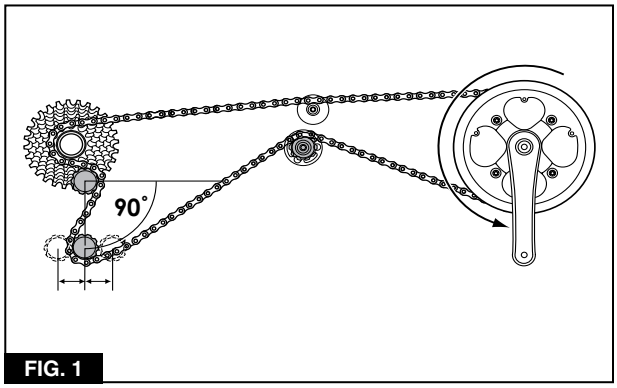


FIG. 1

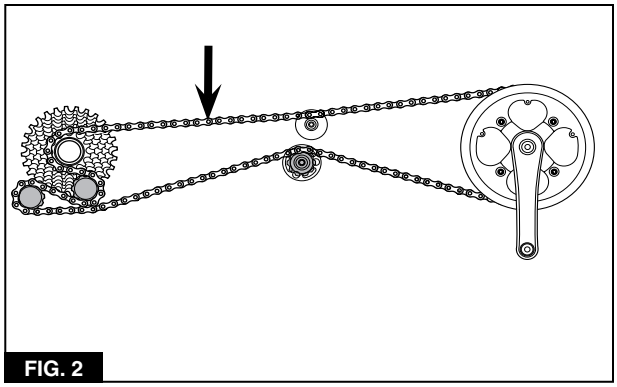


FIG. 2

4. Visually inspect the chain.
   a. The chain is too long if the upper run sags as shown in Figure 2.
   b. The chain is too long if it contacts itself or any part of the derailleur once the chain leaves the tension pulley (**Figure 3**).
5. Shift the derailleur and move the chain to the innermost cog.
6. Check the chain as it passes through the derailleur.
   a. The chain should bend twice as passes through the derailleur. The chain is too short if it does not. See **Figure 4**.

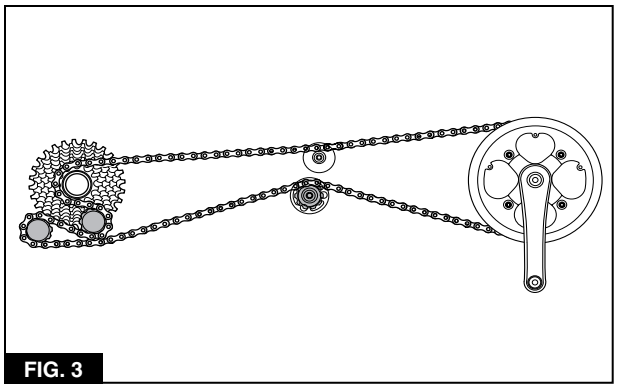


FIG. 3

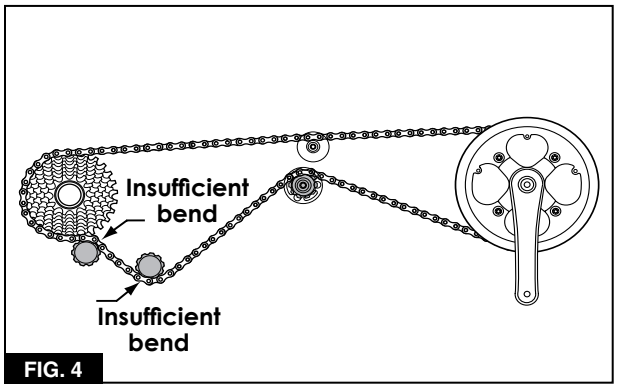


FIG. 4

Removal

A chain breaker (Park CT-3) is needed for removing and installing the chain.

1. Shift the derailleur and move the chain to the smallest cog (high gear). Note how the chain passes over the upper idler (A, **Figure 5**) and through the lower idler (B). The chain must be routed along the same path during installation.
2. Inspect the drive pin of the chain breaker. Replace the tool if the pin is not straight.

CAUTION

Some chain breakers have two cradles. Use cradle furthest from the guide pin when removing or installing the chain. Use the cradle closest to the guide pin when adjusting a tight link. Always use the correct cradle for the task.

3. Install the chain breaker onto a link in the chain's lower run. Fully seat the rollers in the tool's cradle, and center the drive pin on a chain rivet.
4. Turn the tool handle until the drive pin just touches the rivet.

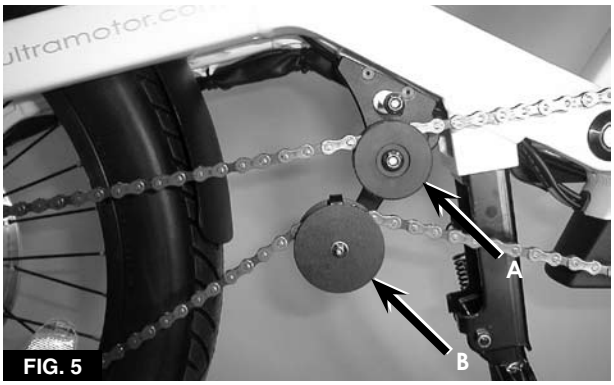


FIG. 5

NOTE

Press the rivet the minimum distance needed to separate the chain and stop. Do not drive the rivet completely from the inner plate on the inboard side of the chain. The chain can be separated once the rivet extends 0.5 to 1.0 mm into the inside of the inner chain plate. See **Figure 6**.

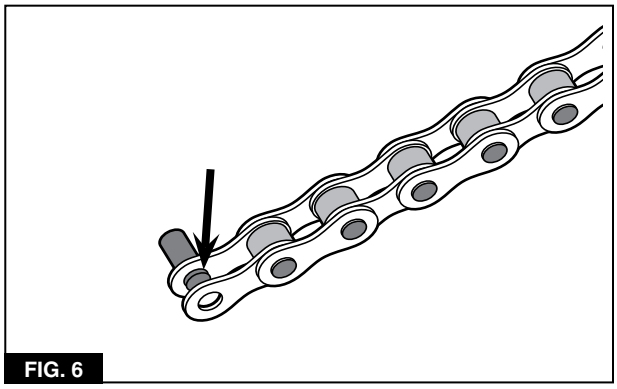


FIG. 6

5. Turn the tool handle five full turns, and remove the tool.
6. Flex the chain laterally as needed to separate the links.
7. Carefully pull the end with the rivet, and remove the chain from the lower idler, derailleur, and chainring.

Cleaning

1. Soak the chain in solvent.
2. Clean both side of the chain with a stiff brush.
3. Exercise caution when brushing the rollers, but make sure the rollers are completely clean.
4. Rinse the chain in clean solvent, and dry it with compressed air.

Installation

1. Route the non-riveted end of the chain under and around the rear of the derailleur tension pulley. Following the derailleur cage, feed the chain up the front and over the top of the guide pulley. Once the chain emerges from the derailleur cage, route it under and around the smallest cog (high gear).
2. Route the chain over the upper idler and around the chainring.
3. Feed one end through the lower chain idler. Make sure the chain passes over and engages idler cog.
4. Move the chain so the two free ends meet in the lower chain run.
5. Slip the non-riveted end of the chain over the rivet protruding from the other end of the chain.
6. Install the chain tool onto the chain. Pay attention to the following:
   a. If the tool has two cradles, use the cradle furthest away from the tool handle.
   b. Fully seat the rollers on the tool cradle.
   c. Center the drive pin on the rivet.
   d. Make sure the side plates are properly aligned.
7. Turn the tool handle, and drive the rivet until it is centered within the link. The distance from the outer side plate to the end of the rivet should be the same on each side of the chain (**Figure 7**).

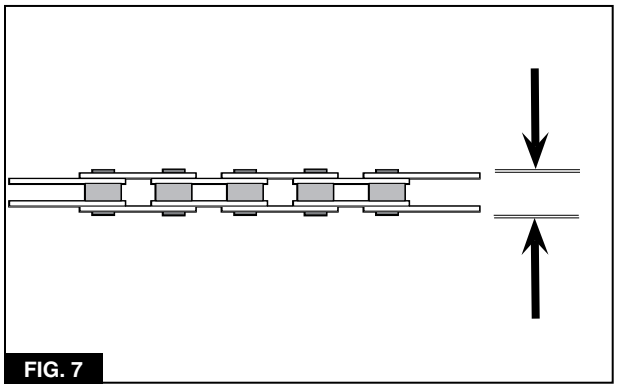


FIG. 7

Lubrication

CAUTION

Use oil designed for bicycles. Automotive and household oils are unsuitable for the A2B Metro chain.

NOTE

Do not apply excessive amounts of lubricant to the chain. Excess oil accumulates dirt which accelerates chain wear.

1. Oil the contact areas between the inner and outer side plates on each link (A, **Figure 8**), and oil the contact areas between the inner side plates and each end of the rollers (B, **Figure 8**).

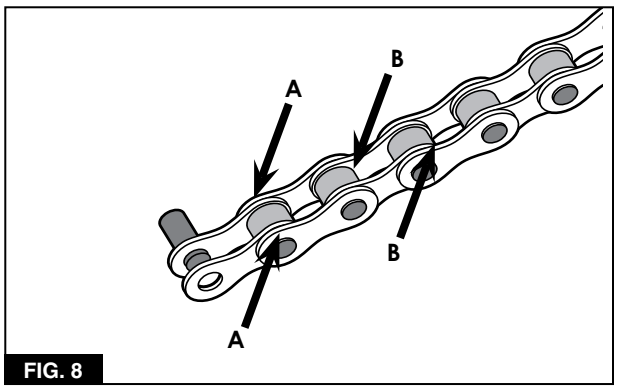


FIG. 8

2. If the chain is installed on the A2B Metro, back pedal for 30 seconds. If the chain is not installed, wiggle the chain for 30 seconds. This helps the lubricant penetrate the crevices within the chain.
3. Wipe excess oil from the chain with a clean, lint-free cloth.

CRANK ARM

Removal

A cotterless crank wrench (Park Tool CCW-14R) is need when removing the crank arm.
1. If the pedal requires the service, remove the pedal from the crank arm.
2. Pull the plug from the crank arm, and examine the crank arm bolt (A, **Figure 9**).

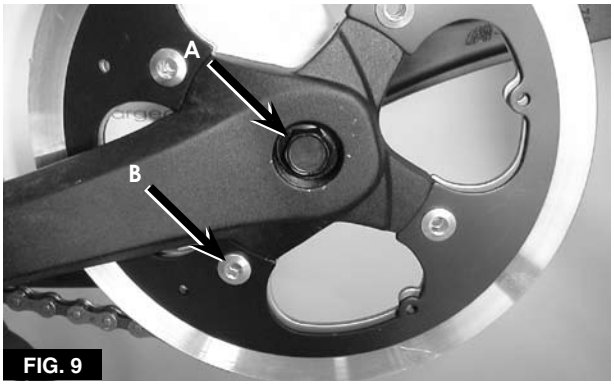


FIG. 9

3. Turn out and remove the crank arm bolt.
4. Inspect the position of the spindle end. It should be recessed within the crank-arm square hole. The crank arm is excessively worn, if the spindle end is flush with the surface of the crank-arm square hole. Replace the crank arm.
5. If the crank arm will be reinstalled, mark a corner of the spindle end and a corresponding mark on the crank arm (**Figure 10**). The marks will facilitate assembly.

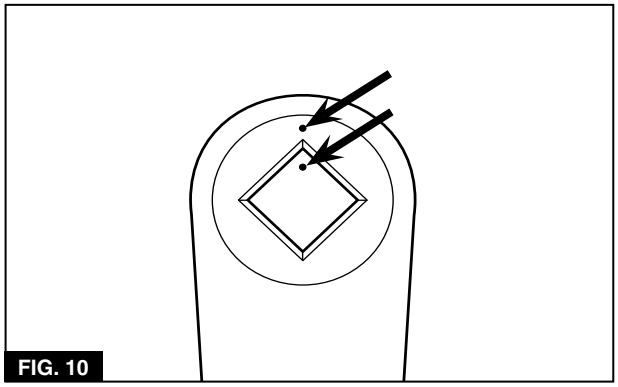


FIG. 10

6. Carefully turn the crank-wrench body onto the crank arm. Finger-tighten the body until it bottoms in the arm. Use an adjustable wrench to snug the body into the crank arm, and turn in the crank-wrench handle (**Figure 11**).


FIG. 11

CAUTION

If the crank-wrench body rotates or if the body pulls from the crank arm when the crank wrench is tighten, remove the crank-wrench body and identify the problem. The crank wrench threads may be damaged. Correct the problem before proceeding.

7. If removing the right arm, remove the chain from the chainring.
8. Turn the crank-wrench handle clockwise, and press the crank arm off the spindle.

Inspection

1. Inspect the spindle flats for signs of a loose or worn crank arm. If the crank-arm marks on the spindle flats extent along the entire surface of the flats (**Figure 12**), the crank arm is worn. Replace it.

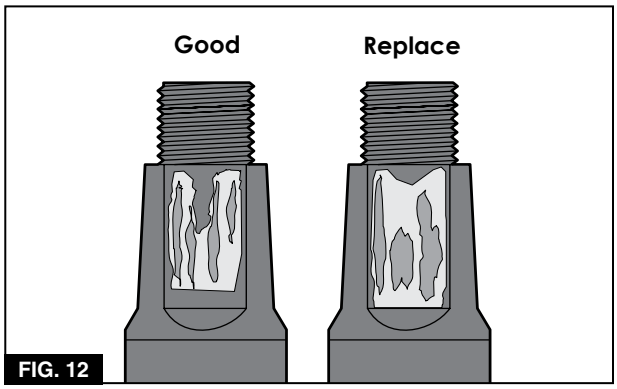


FIG. 12

2. Inspect the square hole in the crank arm (**Figure 13**). The flats of the hole should be straight and even. Replace the crank arm if its square hole shows signs of wear or damage.
3. Inspect the crank arm for cracks or other signs of wear. Pay particular attention to the area around the mounting holes at either end of the crank arm. Replace the crank arm if it is worn.

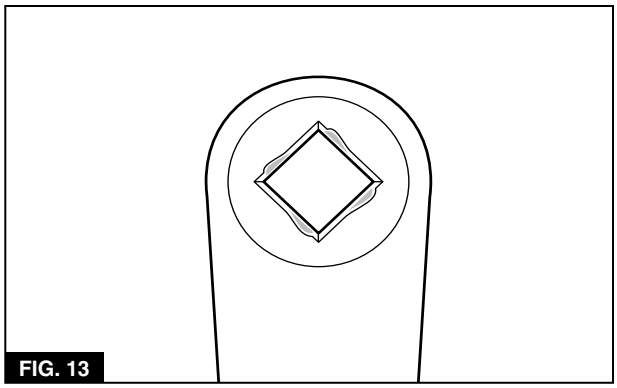


FIG. 13

4. Inspect the spokes (spider arms) (A, **Figure 14**) on the right crank arm. Replace the crank arm if any spoke is cracked or shows signs of damage.

Installation

When installing both crank arms, install the right crank arm first, and then install the left crank arm so it is oriented 180 degrees from the right arm.
1. When installing a new right crank arm or a new chainring, check chainring wobble as described in this chapter.
2. Use acetone or alcohol to clean the flats of the spindle.
3A. When reinstalling an old crank arm, align the indexing marks (**Figure 10**) made during removal. Tap the crank arm onto the spindle with a plastic mallet.
3B. If installing a new right crank arm and/or new chainring, perform the following:
a. Rotate the spindle so the reference mark from the chainring wobble test is at the position that produced the least amount of wobble.
b. Fit the chainring into the chain.
c. Rotate the derailleur forward, and seat the crank arm onto the spindle so the arm sits at 6 o'clock.
d. Tap the crank arm with a plastic mallet.
4. Apply grease to the crank arm bolt. Turn in the bolt, and torque crank arm bolt (A, **Figure 9**) to the specification in Table 5.
5. Repeat for the left crank arm if necessary. Make sure the left crank arm is 180 degrees opposite the right crank arm.

CHAINRING

Removal

1. Remove the right crank arm as described in this chapter.
2. Inspect the inboard side of the crankarm/chainring. Note that the chainring is mounted so the cutout with the tab aligns with the crank arm (B, **Figure 14**). The chainring must be mounted in this position during installation.
3. Use a screwdriver to hold the chainring nuts (C, **Figure 14**), remove the chainring bolts (B, **Figure 9**), and remove the chainring from the crank arm.

Installation

1. Fit the chainring onto the spokes (spider) so the chainring mounting holes align with the holes on the spokes.
2. Position the chainring so the cutout with the tab (B, **Figure 14**) aligns with the crank arm.

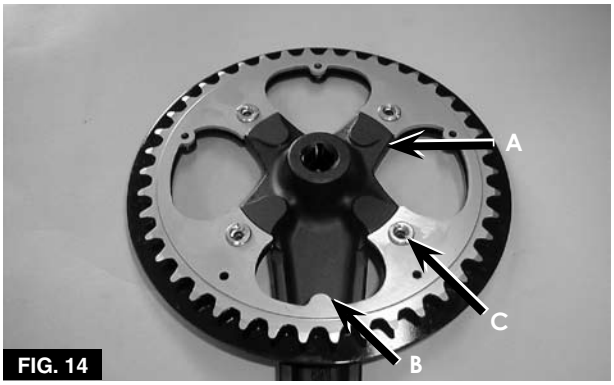


FIG. 14

3. Apply oil to the threads of the chainring bolts.
4. Fit a nut (C, **Figure 14**) into the inboard side of the chainring, and turn in a chainring bolt (B, **Figure 9**). Repeat until all bolts are turned in.
5. Evenly tighten the chainring bolts in a crisscross pattern. Torque each bolt to the specification in Table 5.

Chainring Wobble Check

When installing a new right crank arm or reinstalling a right crank arm with a new chainring, the crank arm must be installed in the position that produces the least amount of chainring wobble. Perform the following to determine that position.
1. Place a reference mark in one corner of the end of right spindle.
2. Rotate the spindle so this reference mark sits at 12 o'clock.
3. Fit the right crank arm onto the spindle so the arm points to 6 o'clock.
4. Strike the arm with a plastic mallet so the arm is securely seated on the spindle.
5. Rest a hand against the frame down tube. Lightly touch the inside of the chainring with the end of a forefinger (**Figure 15**).


FIG. 15

6. Rotate the crank arm, and note the amount of wobble in the chainring.
7. Remove the crank arm from the spindle
8. Rotate the spindle so the reference mark is now at 3 o'clock, and repeat steps 3-7.
9. Rotate the spindle so the reference mark is at 6 o'clock, and repeat steps 3-7.
10. Rotate the spindle so the reference mark is at 9 o'clock, and repeat steps 3-7.
11. Note the position that produces the least amount of chainring wobble. Install the crank arm with the reference mark in this position.

PEDAL

The right-side pedal uses right-hand threads. The left-side pedal uses left-hand threads. The end of each pedal stud is stamped with an L or R to identify the pedal threads. Keep this in mind when removing and installing pedals onto the crank arms.

Removal

1. Rotate the crank so the arm with the pedal being removed points rearward.
2. Place a wrench onto the pedal flats so the shaft of the wrench is horizontal and pointing forward.
3. Break the pedal loose.
4. While facing the crank, hold the pedal with one hand and the wrench with the other. Rotate the pedal forward (normal pedaling motion) and remove the pedal.
5. Repeat this procedure for the opposite pedal.

Installation

1. Inspect the threads of the pedal stud. Install the pedal with the right-hand thread onto the right side. Install the pedal with the left-hand threads onto the left side.
2. Apply grease the threads of the pedal stud.
3. Turn the pedal into the crank arm. Tighten the pedal stud as far as possible by hand.
4. Face the pedal, and fit a wrench onto the pedal flats (**Figure 16**). Hold the pedal with one hand and hold the wrench with the other.
5. Rotate the crank arm rearward (opposite the direction of normal pedal rotation) until the pedal is snug.
6. Torque the pedal to the specification in Table 5.


FIG. 16

CAUTION

Metal burrs are often created when the pedal is tightened against the crank arm. Use a rag to wipe up excess grease so you will not have to deburr a finger.

7. Use a rag to wipe excess grease from the crank arm.
8. Repeat this procedure for the other pedal.

BOTTOM-BRACKET CARTRIDGE

The A2B Metro uses a Chin Haur bottom-bracket cartridge. The bottom-bracket on the A2B Metro is a cartridge that threads into the right side of the bottom-bracket. Its adapter ring threads into the left side of the bottom bracket.

The adapter ring on this cartridge has standard right-hand threads. The main body, however, has left-hand threads.

A bottom-bracket-cartridge tool (Park Tool BBT-2) is required for removing and installing the bottom-bracket cartridge.

Removal

1. Remove both crank arms.
2. Install the bottom-bracket cartridge tool onto the adapter ring, and remove the ring from the left side of the bottom-bracket shell.

NOTE
The main body of the cartridge has left-hand thread. Turn the cartridge clockwise to remove it.

3. Install the bottom-bracket cartridge tool onto the cartridge main body, and remove the cartridge from the right side of the bottom bracket (**Figure 17**).

FIG. 17

Installation

NOTE
The bottom-bracket cartridge has very fine threads. These can be easily damaged. Check the threads in the bottom-bracket shell before installation. Dress the threads as necessary.

1. Apply grease to the threads of the cartridge main body.

NOTE
The main body uses left-hand threads. Turn the cartridge counterclockwise to install it.

2. Carefully threads the cartridge into the right side of the bottom-bracket shell. Turn the main body counterclockwise (**Figure 17**) until the cartridge is snug in the bottom-bracket shell.
3. Apply grease to the threads of the adapter ring.
4. Carefully thread the adapter ring into the left side of the bottom-bracket shell.
5. Install the bottom-bracket-cartridge tool, and torque the bottom-bracket adapter ring to the specification in Table 5.

Chapter Six

REAR SUSPENSION

SHOCK ABSORBER

Removal/Installation

1. Securely support the swingarm so it will not collapse once the shock absorber is removed.
2. Before removal, measure the spring length, which is the distance from the upper spring seat (A, **Figure 1**) to the lower adjusting ring (B) on the shock absorber.
3. From the left side, remove the shock absorber bolts (C, **Figure 1**) from the upper and lower pivot pins.

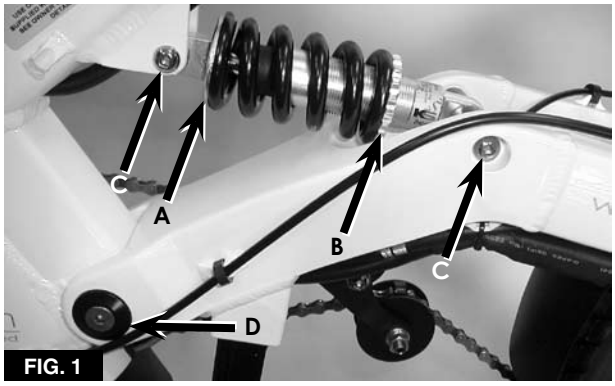


FIG. 1

4. Use an appropriate size drift to drive each pivot pin from the shock absorber, and remove the pins (A, **Figure 2**) from the right side.
5. Remove the shock absorber and its spacers.
6. Visually inspect the spring (A, **Figure 3**) for cracks or signs of fatigue. If necessary, remove the adjusting ring (B) from the shock absorber and remove the spring.
7. Inspect the shock housing for leaks or other damage.

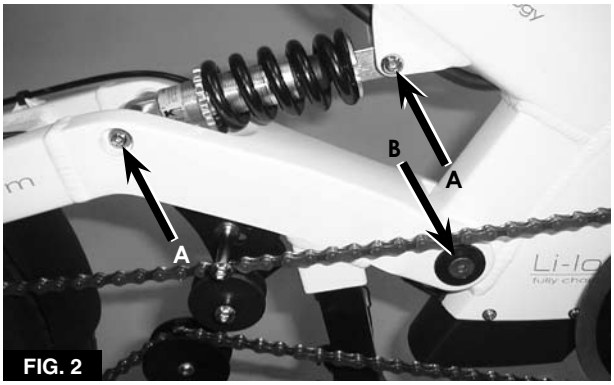


FIG. 2

8. Inspect the upper and lower shock mounts for elongation or excessive wear. The shock absorber is not serviceable. If damage is noted, replace the shock absorber.
9. Inspect the pivot pins (C, **Figure 3**) for bends or other damage. Roll the pivot pins along a surface plate or a piece of plate glass. Replace the pins as needed.
10. Reverse the removal procedures to install the shock absorber. Note the following:
   a. Lubricate each pivot pin with grease.
   b. Install the pins from the right side; the bolts from the left.

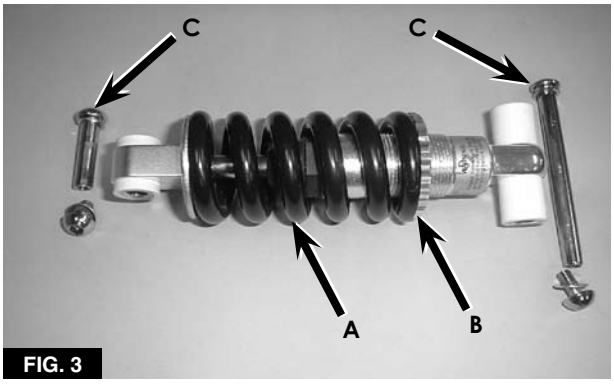


FIG. 3

c. Apply Loctite 242 to the bolt threads, and torque each shock absorber bolt (C, **Figure 1**) to the specification in Table 5.

d. If necessary, turn the adjusting ring (B, **Figure 1**) and set the spring length to the value noted during removal.

REAR WHEEL

Removal/Installation

Electrical heat shrink tubing and cable ties are needed for this procedure.

1. Shift the derailleur to the smallest cog (high gear).
2. Clip the cable ties that secure the motor wires to the swingarm.
3. Carefully remove the heat shrink tubing from the motor power wire.
4. Disconnect the halves of the motor power connector (A, **Figure 4**). Turn out the lock on the controller signal connector (B), and disconnect the connector halves.

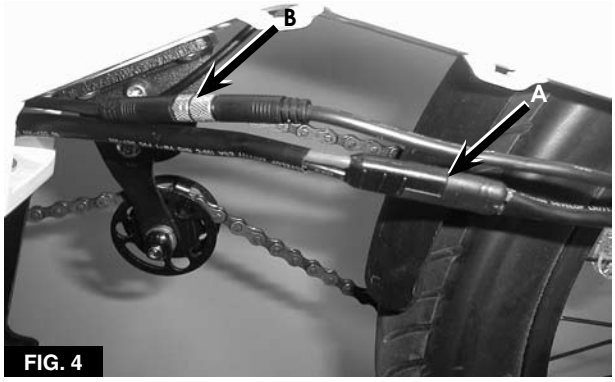


FIG. 4

5. Remove the torque arm bolt (A, **Figure 5**).
6. Break loose each rear axle nut.
7. Remove the right axle nut (B, **Figure 5**).
8. Pry the top of the torque arm (C, **Figure c**) from the swingarm cutout.

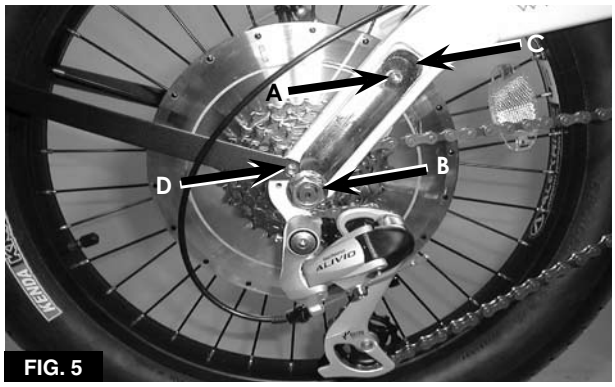


FIG. 5

9. Remove the left axle nut, and lower the wheel from the dropouts. Watch for the spacer collar on the right side of the axle and the washer on the left side.
10. Install the rear wheel by reversing the removal procedures. Note the following:

a. Make sure the spacer collar is in place on the right side of the axle and the washer on the left side. Each must sit on the inboard side of the swingarm.

b. Make sure the brake disc does not damage the brake pads during wheel installation. If necessary, remove the rear caliper.

c. Install the torque arm (C, **Figure 5**) over the rear axle, and seat the arm in the swingarm cutout. Hand tighten the torque arm bolt (A, **Figure 5**) at this time.

d. Torque the rear axle nuts to the specification in Table 5.

e. Tighten the torque arm bolt to the specification in Table 5.

f. Slip a piece of heat shrink tubing over the motor power connector (A, **Figure 4**), and then connect the connector halves. Use a heat gun to shrink the tubing.

g. Use new cable ties to secure the motor wires to the swingarm.

REAR FENDER

Removal/Installation

1. Remove the rear wheel as described in this chapter.
2. Remove the fender stay bolt (D, **Figure 5**) from each side of the swingarm.
3. Remove the fender bolts (**Figure 6**) from inside the rear fender, and remove the fender.


FIG. 6

4. Install the fender by reversing the removal procedure. Torque the fender bolts and the fender stay bolts to the specifications in Table 5.

SWINGARM

Removal/Installation

1. Secure the bicycle upside down in a stand.
2. Pry open the cable holders on the swingarm (**Figure 7**), and clip all the cable ties. The shifter cable, rear brake cable, motor power wire, and the controller signal wire must be free of the swing arm. Note how each cable is routed along or through the swingarm. Take a photograph or make a drawing of the cables. Each must be rerouted along its original path during installation.

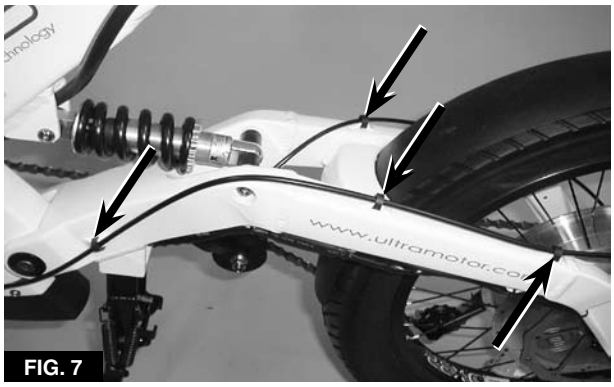


FIG. 7

3. Remove the rear wheel and rear fender as described in this chapter.
4. Remove the rear brake caliper (Chapter Three). Suspend the caliper from the frame.
5. Remove the derailleur anchor bolt, and pull the shifter cable from the barrel adjuster on the derailleur.
6. Pull the motor power wire and the controller signal wire through the hole in the center-stand boss. If necessary, remove the wire grommet from the battery compartment cutout.
7. Pull the shifter cable from the hole in the center-stand boss on the swingarm.
8. Support the swingarm arm to relieve stress on the swingarm pivot shaft and the shock absorber bolts.
9. From the left side, remove the shock absorber bolt (**Figure 1**) from the rear pivot pin.
10. Use an appropriate size drift to drive the rear pivot pin from the shock absorber. Remove the pivot pin from the right side.
11. Remove the swingarm bolt (B, **Figure 2**) and dust seal from the right side (chain side) of the swingarm pivot shaft.

CAUTION

Exercise caution when removing the swingarm pivot shaft so the pivot bearings will not be damaged.

12. Use an appropriate size drift to drive the pivot shaft from the swingarm and frame pivots. Remove the swingarm pivot shaft (D, **Figure 1**) and seal from the left side (brake side).
13. Remove the swingarm from the frame.
14. Install the swingarm by reversing the removal procedures.
   a. Carefully align the frame and swingarm pivots.
   b. Apply grease to the swingarm pivot shaft, and install the shaft from the left side.
   c. Apply Loctite 242 to the threads of the swingarm bolt (B, **Figure 2**), and torque the bolt to the specification in Table 5.
   d. Apply Loctite 242 to the threads of the rear shock absorber bolt (**Figure 1**), and torque the bolt to the specification in Table 5.
   e. Make sure the motor wire grommet is seated in the battery compartment cutout.

Chapter Seven

ELECTRICAL

CONNECTOR IDENTIFICATION

Figure 1 identifies the connectors found within the battery compartment, which is inside frame downtube. Remove the battery cap to access these connectors.

Some types of connectors are used more than once. When disconnecting any connector, label the connector halves so they can be easily identified for assembly. Identifying a connector half that has not been labeled can be very time consuming.

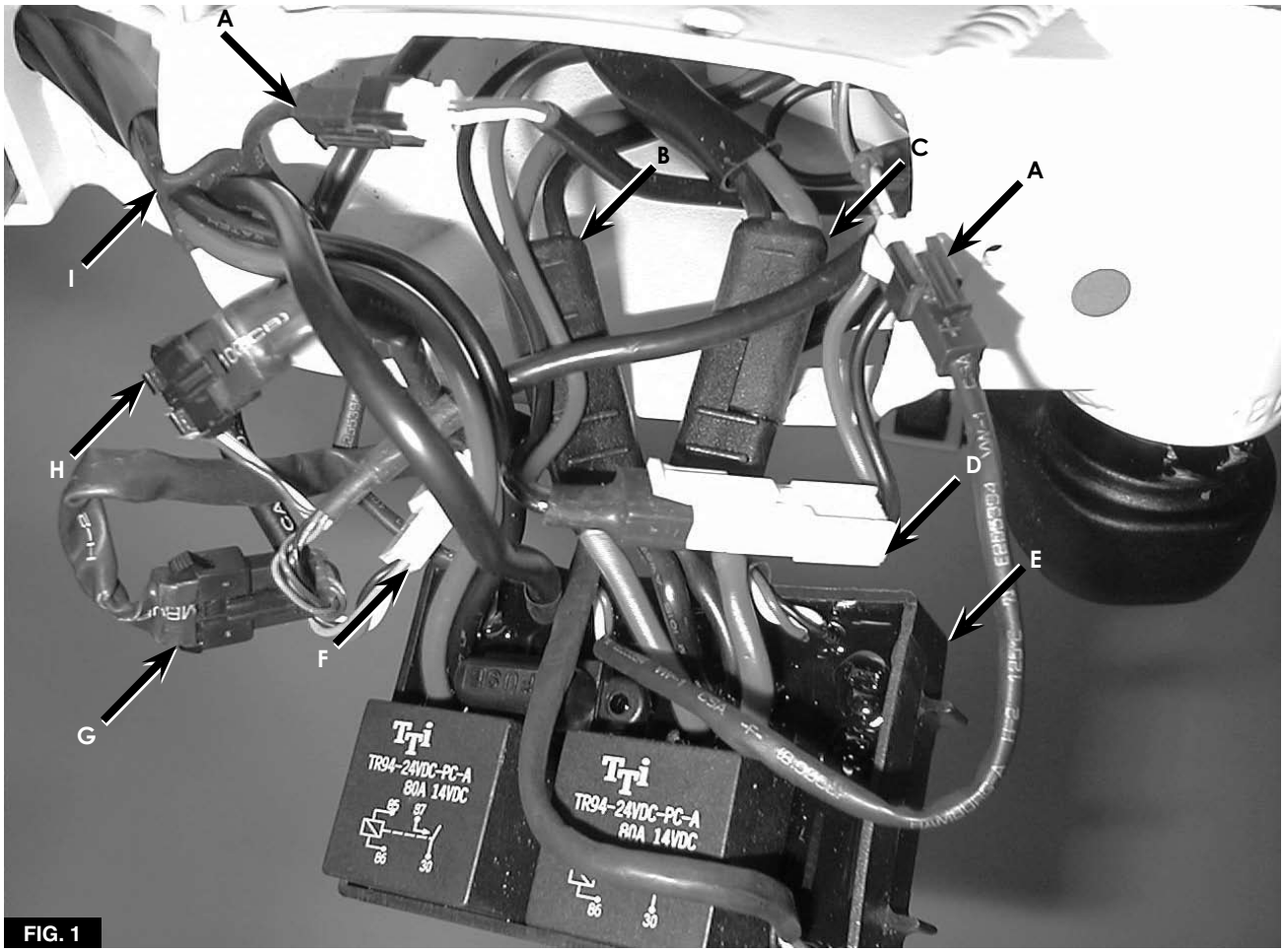


FIG. 1

A. Brake switch connector
B. Main battery connector (A battery)
C. Auxilliary battery connector (B battery)
D. Charger port connector (main battery)
E. Switch module
F. Key switch connector
G. Throttle connector (4-pin)
H. State-of-charge connector (3-pin)
I. Grommet

BATTERY CAP

Removal

1. Remove the right crank arm as described in Chapter Five.
2. Remove the battery cap screws (A, **Figure 2**) from each side, and remove the cap (B) from the frame downtube.
3. Note how the switch module (A, **Figure 3**) and wiring (B) fit within the battery compartment.
4. Install the battery cap by reversing the removal procedures.
   a. Position the switch module as noted during removal.
   b. Tighten the battery cap screws (A, **Figure 2**) securely. Do not overtighten the screws

FIG. 2

BATTERY

WARNING
Do not attempt to service this battery. It has no serviceable components in it. If the battery fails or is damaged, it must be replaced.

WARNING
Do not use this battery in any other vehicle or appliance. Use of this battery with any other product will void the warranty and may create a hazardous condition that could cause a fire resulting in property damage, severe injury, or death.

Removal

1. Remove the right crank arm as described in Chapter Five.
2. Remove the battery cap as described in this chapter.
3. Remove the switch module (A, **Figure 3**) and the wiring (B) from the compartment.

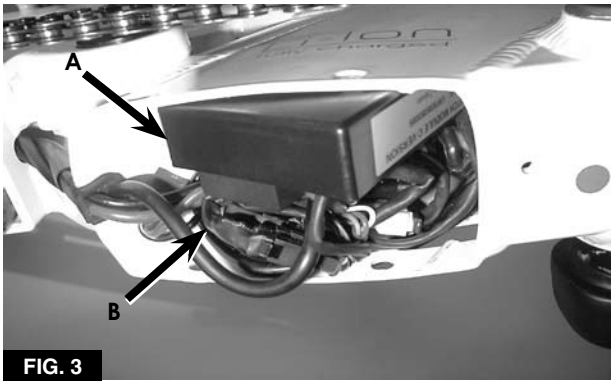


FIG. 3

4. Disconnect the main battery connector (B, **Figure 1**) and the charger port connector (D).
5. Move the switch module (E, **Figure 1**) and wiring out of the way. If this requires disconnecting other connectors, label the connector halves.
6. Insert a lever through a strap in the battery (A, **Figure 4**).
7. Use the lever to carefully pry the battery down the frame member, until the lever can be inserted through both straps.
8. Pull the lever until the battery emerges enough so an assistant can help, and remove the battery from the frame downtube.

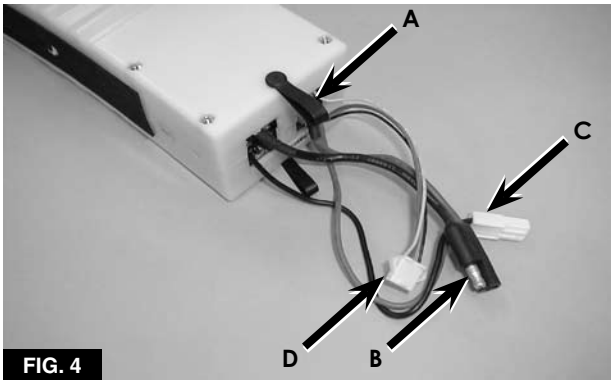


FIG. 4

Installation

1. Carefully slide the replacement battery into the frame until the battery bottoms in place.
2. Connect the main battery connector (B, **Figure 4**) and the charger port connector (C) to their mates from the switch module. The 3-pin connector (D) is not used in the A2B Metro.

3. Slide the switch module (A, **Figure 3**) into the position noted during removal, and press the wiring (B) into the battery compartment.
4. Install the battery cap (this chapter).

KEY SWITCH

Replacement

The key switch is damaged during removal. Have a new switch on hand before starting this procedure.
1. Remove the battery as described in this chapter.
2. If still connected, disconnect the key switch connector (F, **Figure 1**). Tie a string to the switch half of the connector. Make sure the string is long enough to run through the frame. It will be used to pull the connector of the new switch through the frame.
3. Pull the seal (A, **Figure 5**) from the key switch.

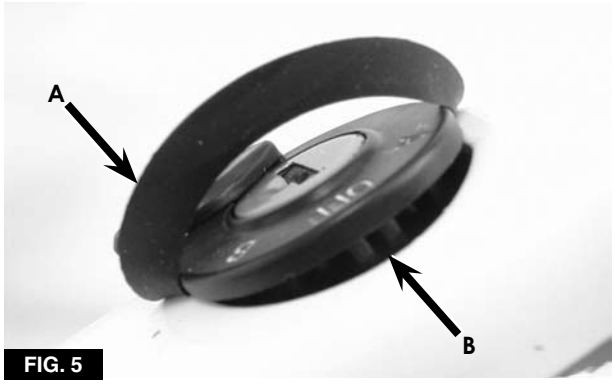


FIG. 5

4. The key switch is held in place by two tabs on opposite sides of the switch (B, **Figure 5**). Use a small screwdriver to compress each tab, and pry the switch from the frame.
5. Remove the switch, and pull its wire from the frame port until the switch connector emerges from the frame. Untie the string from the switch connector.
6. Make sure a new seal is in place on the new switch, and tie the string to the switch connector.
7. Guide the switch wire through the port as an assistant pulls the string until the switch connector emerges at the battery compartment. Connect the switch connector to its mate (F, **Figure 1**).
8. Align the switch tabs (B, **Figure 5**) with the cutouts in the frame, and press the switch into place. Make sure the switch seal is seated in place.
9. Install the battery and battery cap (this chapter).

CHARGER PORT

Replacement

1. Remove the battery as described in this chapter.
2. If still connected, disconnect the charger port connector (D, **Figure 1**). Tie a string to the port half of the connector. Make sure the string is long enough to run through the frame. It will be used to pull the new connector through the frame.
3. Turn out the port screws (A, **Figure 6**). Remove the charger port (B) and its gasket. Pull the port wire until its connector emerges from the frame opening. Untie the string from the connector, but leave the string in place.

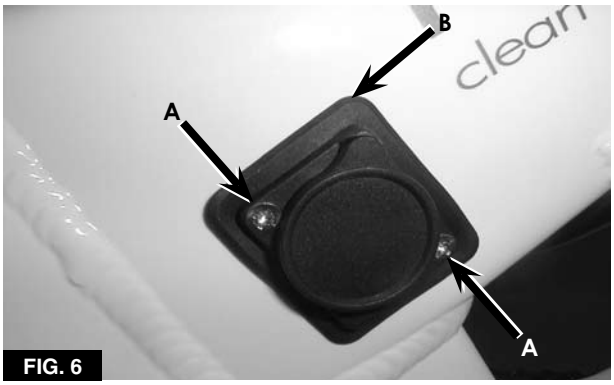


FIG. 6

4. Make sure a new gasket is in place on the charger port.
5. Tie the string to the connector of the new charger port.
6. While an assistant pulls the string, insert the wire and charger port into the frame.
7. Secure the port in place with the charger port screws.
8. Connect the charger port connector to its mate on the switch module (D, **Figure 1**).
9. Install the battery as described in this chapter.

ELECTRICAL TROUBLESHOOTING

Motor Input Voltage Test

1. Remove the heat shrink tubing, and disconnect the 2-pin motor power connector (**Figure 7**).


FIG. 7

2. Connect the test probes of a voltmeter to the red and black terminals in the switch-module side of the motor power connector.
3. Turn the key switch to A, and operate the throttle. The meter should indicated 36 volts DC or greater.
4. If the voltage is less than 15 volts DC, the battery is undercharged. It is either not charging or not holding a charge.
5. If an auxiliary battery is installed, turn the key switch to B and repeat the test.

Key Switch Test

1. Remove the battery cap (this chapter).
2. Disconnect the 4-pin key switch connector (F, **Figure 1**).
3. Connect one ohmmeter test probe to the white terminal in the switch side of the connector; connect the other test probe to the red terminal (switch side).
4. Turn the key switch to A, and read the meter. It should indicate continuity.
5. Connect one ohmmeter test probe to the black terminal in the switch side of the connector; connect the other test probe to the green terminal (switch side).
6. Turn the key switch to B, and read the meter. It should indicate continuity.
7. The key switch is faulty if it fails either portion of the test. Replace the switch.

Brake Switch Test

The A2B Metro has two brake switch connectors which are identical. Once the identity of a particular switch has been determined, label the switch side of each connector FRONT or REAR so the switches can be quickly identified in the future.
1. Remove the battery cap.
2. Disconnect the 2-pin brake switch connector (A, **Figure 1**).
3. Connect an ohmmeter test probes between the red and white terminals in the switch side of the connector.

NOTE
Make sure to press the correct brake lever when testing at particular brake switch connector. If pressing one lever does not produce continuity, repeat the test by pressing the other brake lever before concluding that the switch is faulty.

4. Apply the brake lever, and read the meter. It should indicate continuity.
5. Release the brake lever. The meter should indicate no continuity.
6. The switch is faulty if it fails either portion of this test. Replace the brake lever.

Relay Test

1. Remove the battery cap (this chapter), and remove the switch module from the battery compartment.
2. While listening to the relay, turn the key switch to A and turn to OFF. An audible click should be heard when the key switch is turned off.
3. If an auxiliary battery is installed, repeat Step 2 by turning the key switch to B and then OFF.
4. A relay is faulty if a click is not heard. Replace the switch module.

Charger Port Test

1. Remove the battery cap (this chapter).
2. Disconnect the halves of the 2-pin charger-port connector (D, **Figure 1**) for the main battery.

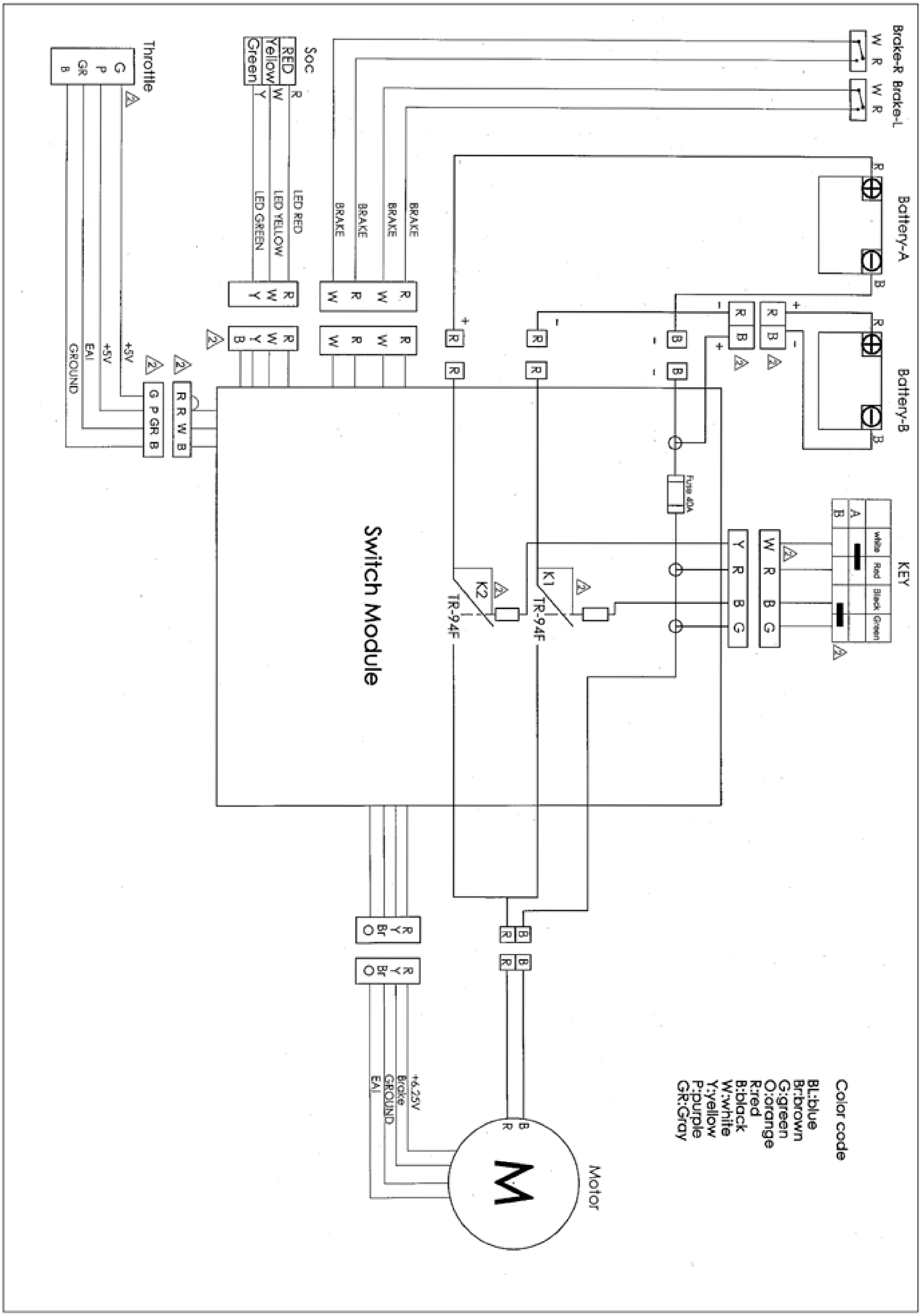
3. Check the continuity by performing the following:
 a. Connect one ohmmeter test probe to the red wire in port side of the charger-port connector, and connect the other test probe to the terminal No. 1 on the port. Continuity should be present.
 b. Connect one ohmmeter test probe to the black wire in the port side of the charger-port connect, and connect the other test probe to terminal No. 2 on the port. Continuity should be present.
4. If continuity is not present during each portion of the test, there is a break in the wire between the charger port and its connector. Locate and repair the open or replace the charger port and its wiring.

Battery Undercharged

1. Perform the charger port test described in this chapter. Replace the port if it is faulty.
2. Charge the battery as described in this chapter.
3. Remove the battery cap, and disconnect the battery connector for the affected battery (Main battery: B, **Figure 1**; auxiliary battery: C).
4. With the key switch off, measure the voltage across the black and red terminals in the battery side of the connector. The meter should read 36 volts or higher. Record the reading
5. Wait an hour and retest the battery voltage. The battery is faulty if the voltage is less than the reading taken earlier.

Motor Troubleshooting

Perform the following if the motor does not operate when the throttle is applied.
1. Perform the motor input voltage test.
 a. If the voltage equals 36 volts, the motor is faulty. Replace the wheel.
 b. If the voltage is below 30 volts, the battery is undercharged. Charge the battery and retest.
 c. If the voltage is 0 volts, proceed to Step 2.
2. Perform the key switch test.
 a. If the switch does not have continuity on the A side, replace the key switch.
 b. If the switch has continuity on the A side, proceed to Step 3.
3. Disconnect each brake switch connector (A, **Figure 1**). Turn the key switch to A, and operate the throttle.
 a. If the motor operates, one or both brake switches are faulty. Perform the brake switch test to identify a faulty switch. Replace a brake lever with a faulty switch.
 b. If the motor does not operate, proceed to Step 4.
4. Perform the relay test.
 a. If the relay clicks, it is good. Replace the throttle.
 b. If the relay does not click, it is faulty. Replace the switch module.


Brake-R
Brake-L
Battery-A
Battery-B
KEY
Soc
Throttle
LED RED
LED YELLOW
LED GREEN
BRAKE
+5V
EAI
GROUND
Fuse 40A
K1
K2
TR-94F
Switch Module
Motor
+6.25V
Brake
Color code
BL:blue
Br:brown
G:green
O:orange
R:red
B:black
W:white
Y:yellow
P:purple
GR:Gray

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