



# **SILVERBACK**

OPERATING INSTRUCTIONS EPAC / PEDELEC BICYCLES

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## INTRODUCTION

Congratulations! You have taken ownership of one of the most advanced products in the cycling industry. The following pages will provide you with the information you need to properly use, adjust, maintain and service your new bike, so you can get the most out of every ride.

It is essential that you read this owner's manual thoroughly before riding your bicycle - we know you're anxious, but trust us, it will only take a few minutes, and then you can unleash the full potential of your Silverback bicycle.

Please pay special attention to the safety information and cautions located throughout this owner's manual, as they are in place to help you avoid serious injury. If you encounter any issues with your bicycle that aren't covered in this manual, please contact your nearest authorized Silverback dealer. As your number one resource, your Silverback dealer can answer questions, perform required maintenance, recommend the best equipment and gear to complement your ride and provide a completely customized bike fit.

Thank you for buying a Silverback! We're proud to be your brand of choice.

**Enjoy the Silverback brand experience!**

## LEGAL REQUIREMENTS

### EN 15194 / EN 17404 (ELECTRICALLY POWER-ASSISTED CYCLES)

Legislation within the EU results in a fairly uniform approach to handling PEV and E-Bike laws within most countries in Europe. EU directive 2002/24/EC exempts certain bicycle or electric bike models from type approval. A **pedelec** (from **pedal electric cycle**) or **EPAC** (**e**lectronically **p**ower **a**ssisted **c**ycle), is a type of low-powered electric bicycle where the rider's pedalling is assisted by a small electric motor. However, unlike some other types of e-bikes, pedelecs are classified as conventional bicycles in many countries by road authorities rather than as a type of electric moped. Pedelecs include an electronic controller which cuts power to the motor when the rider is not pedalling or when a certain speed – usually 25 km/h (16 mph)– is reached.

- **You are not allowed to ride a bike if you have not reached 14 years old.**
- **No license plate is needed.**
- **No driver license is needed.**
- **It's recommended for your own safety to wear a helmet.**
- **It's obligatory to ride on cycling lanes in and out of town.**
- **The child seat use is permitted (but please check the "permissible weight of the E-bike.")**
- **Child trailer addition is allowed on the e-bike.**

If you want to participate on public roads with your E-bike, your E-bike must be equipped in accordance with local regulations. In Germany this is governed by the Road Traffic Licensing Regulations (StVZO) and the Road Traffic Act (StVO).

### **STVZO**

To legally use a bike on a public road in Germany it must conform to the Road Traffic Regulations (StVZO). The requirements relate to the brake and lighting system and bell. Every rider is obliged to maintain his bike at a roadworthy state. The general traffic rules that apply to automobiles also apply to bicycles. Please familiarize yourself with the traffic regulations.

### **THE BRAKING SYSTEM**

The braking system of an E-bike must have at least two independently functioning brakes (front and rear wheel). The mode of operation is not strictly regulated.

### **LIGHTS**

All lighting devices on the bike need to display the official mark. This mark consists of a wavy line, the letter "K" and a number. Only lights (battery powered and dynamo) with this mark can be used on public roads. The §67StVZO states that the front and rear light must be operated by the same fixed power source (battery or dynamo). Front and tail light can be switched on and off separately. The rated power and voltage must be at least three watts or six volts. The rear light must be mounted at a height of at least 25 cm above the road surface and the center of the front light cone must touch the road surface no further than 10 meters from the front of the E-bike.

### **REFLECTORS**

In addition to the light sources, each bicycle must also have the following reflectors:



- as large as possible white reflector in combination with the headlights.
- in the rear, at least two red reflectors with a large area with the "Z" mark. The tail light can be combined with the rear reflectors.
- two lateral yellow reflectors per wheel must be attached. Alternatively white reflective rings can be attached to the spokes around the complete circumference of the wheel or on the rim edge or on the sidewalls of the tires.
- two yellow reflectors per pedal (front and rear).

**NOTE:** Before using your bicycle in a country other than Germany, research and seek advice from local dealer regarding any legal peculiarities in your country.

### **GENERAL WARNING:**

Like any sport, bicycling involves risk of injury and damage. By choosing to ride a bicycle, you assume the responsibility for that risk, so you need to know — and to practice — the rules of safe and responsible riding and of proper use and maintenance. Proper use and maintenance of your bicycle reduces risk of injury.

This Manual contains many **“Warnings”** and **“Cautions”** concerning the consequences of failure to maintain or inspect your bicycle and of failure to follow safe cycling practices.

- The combination of the safety alert symbol  and the word **WARNING** indicates a potentially hazardous situation which, if not avoided, could result in serious injury or death.
- The combination of the safety alert symbol  and the word **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or is an alert against unsafe practices.
- The word **CAUTION** used without the safety alert symbol indicates a situation which, if not avoided, could result in serious damage to the bicycle or the voiding of your warranty.

Many of the **Warnings** and **Cautions** say “you may lose control and fall”. Because any fall can result in serious injury or even death, we do not always repeat the warning of possible injury or death.

**This manual meets EN Standards 14764, 14766 and 14781 Because it is impossible to anticipate every situation or condition which can occur while riding, this Manual makes no representation about the safe use of the bicycle under all conditions. There are risks associated with the use of any bicycle which cannot be predicted or avoided, and which are the sole responsibility of the rider.**

March 2023 edition.

<b>Pedal assistance:</b>	Up to 25 km/h (15.5 mph) maximum
<b>Helmet:</b>	Recommended
<b>Driver license or moped license:</b>	No (check local laws)
<b>Registration or EU type approval:</b>	CE mark (until 2024/12)
<b>Insurance plate:</b>	No
<b>Riding on cycle lanes:</b>	Obligatory in and out of town
<b>Vehicle class:</b>	Bicycle
<b>Legal age:</b>	14 years
<b>Child seat:</b>	Permitted (check “categories” & “Permissible overall weight”)
<b>Child trailer:</b>	Permitted

## **FIVE THINGS YOU NEED TO KNOW BEFORE RIDING YOUR NEW E-BIKE**

### **1. Start slow**

We understand that fast can be fun. But e-bikes take a bit of getting used to. It may be tempting to put your e-bike into its fastest setting right away, but we recommend taking it nice and easy the first few rides. Find a quiet, spacious area. Start without any assistance until you're steady, and then turn on the low assist setting to learn the feel of free speed.

### **2. Brake earlier**

E-bikes are heavier than normal bikes. When you combine more power, more speed, and more weight, they take more effort to slow down. You will need more time to react, we recommend you start slowing down sooner on your e-bike than you would on a normal bike.

### **3. Stronger brakes**

Your e-bike features the latest brake technology to control the increased speed and weight. The increased stopping power may require some getting used to. Start braking lightly and gradually pull the brake levers more firmly.

Never apply only your front brake - brake with both front and rear evenly.

### **4. You're faster than you look**

Drivers, pedestrians and even YOU, might be surprised at the speed that your e-bike allows. Ride with extra care and pay greater attention to your surroundings. Always wear a helmet. Make yourself seen on the roads by other vehicles - Your ebike should have reflectors, a bright headlight, a tail light for riding at night, and a nice bike bell or a horn. Also, maintain a proper distance from other vehicles for more safety.

### **5. All bike rules still apply**

While your new e-bike delivers new thrills, new technology and new fun, you are still responsible for knowing and following all the rules of the road, paths, and trails in your area. Ride safely and responsibly!

## BICYCLE AND FRAME DIAGRAMS

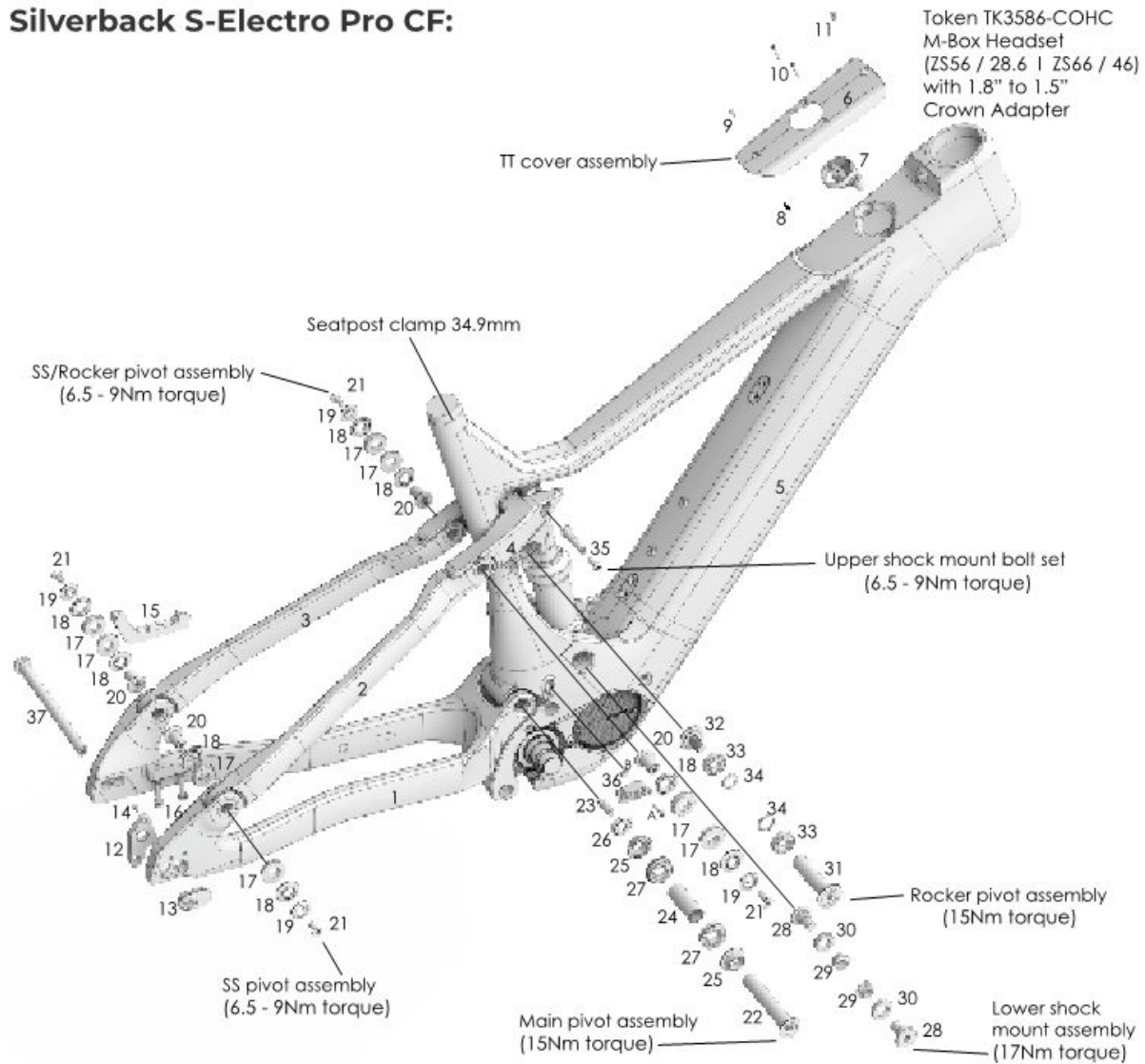
It is advised that, with any bicycle frame, all the bolts get inspected before riding to see if they are still intact. This is important for Rider Safety. Bolts do lose tension during riding and it is important to check.

We also advise that bolt Torque tension get checked every 2 months.



- |                    |                      |                            |
|--------------------|----------------------|----------------------------|
| 1. Saddle          | 11. Rim              | 21. Front axle             |
| 2. Seatpost        | 12. Tire             | 22. Front hub              |
| 3. Seatpost Clamp  | 13. Spoke            | 23. Front Disc Brake Rotor |
| 4. Seat Tube       | 14. Chainring        | 24. Suspension Fork        |
| 5. Seatstay        | 15. Crank arm        | 25. Head Tube              |
| 6. Rear Disc Brake | 16. Motor            | 26. Headset                |
| 7. Cassette        | 17. Rear Shock       | 27. Stem                   |
| 8. Rear Axle       | 18. Battery (inside) | 28. Handlebar              |
| 9. Rear Derailleur | 19. Down tube        | 29. Brake lever            |
| 10. Chain          | 20. Top Tube         | 30. Shifter                |

# Silverback S-Electro Pro CF:

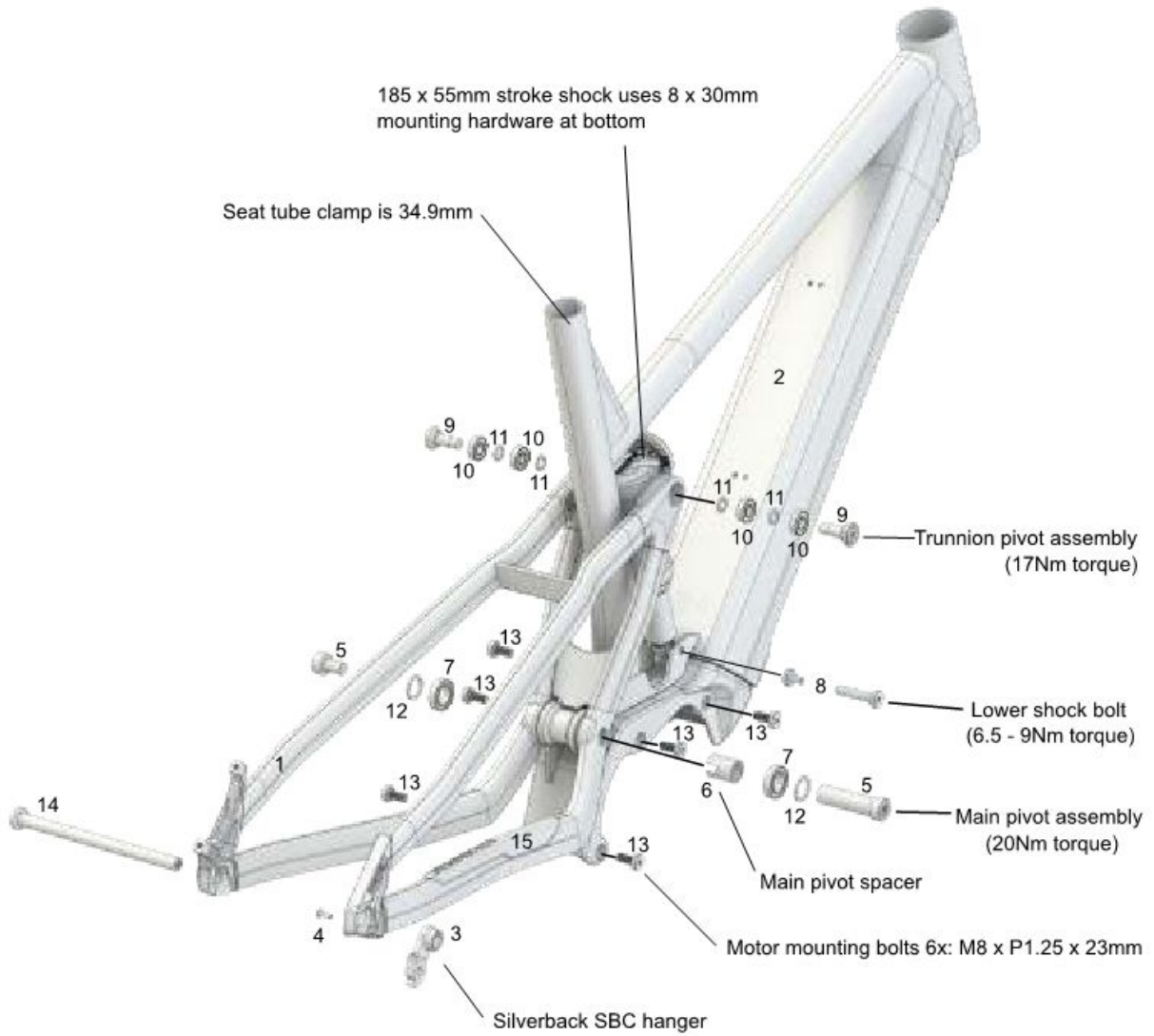


#	Part Description	Qty	13	Pro CF Hanger nut	1	26	M8 bolt cap	1
1	L+R Chainstay with Yoke	1	14	M4 countersunk hanger bolt	1	27	F6902 Flange Max bearing	2
2	Right Seatstay	1	15	Pro CF Post brake mount	1	28	Lower shock mounting bolt	2
3	Left Seatstay	1	16	M6 brake adaptor bolts	2	29	Lower shock mount washer	2
4	Rocker Linkage	1	17	F6901 Flange Max bearing	8	30	F6801 Flange Max bearing	2
5	Front Triangle - size specific	1	18	12mm diameter pivot washer	8	31	Rocker pivot axle	1
6	Top Tube cover	1	19	M6 bolt cap	4	32	Rocker pivot male bolt	1
7	Top Tube mount	1	20	M6 female pivot bolt	4	33	63802 Max bearing	2
8	USB C Port	1	21	M6 countersunk pivot bolt	4	34	Rocker pivot washer	2
9	USB C Port cover	1	22	Main pivot axle	1	35	Shock mount bolt set: M6 x 40/16mm	1
10	M3 countersunk adaptor bolt	2	23	Main pivot M8 bolt	1	36	S8 Chainguide / A: M3 bolt / B: nut	1
11	M5 countersunk TT cover bolt	1	24	Main pivot spacer	1	37	M12x148mm P1.5 Stealth Thru-Axle	1
12	Pro CF Hanger	1	25	Main pivot flange washer	2			



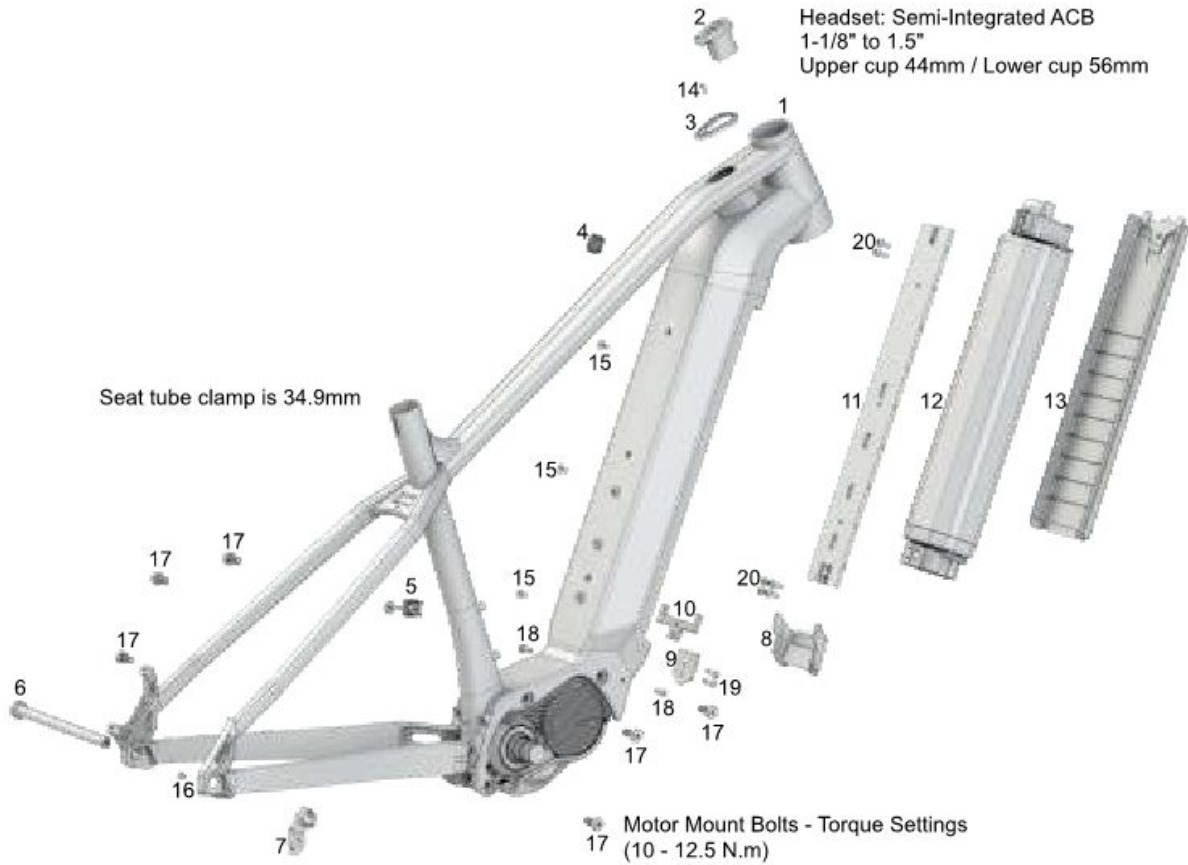
# Silverback S-Electro Elite AL:

Headset: Token TK1156SP S-BOX  
(IS52/28.6 / IS52/40)



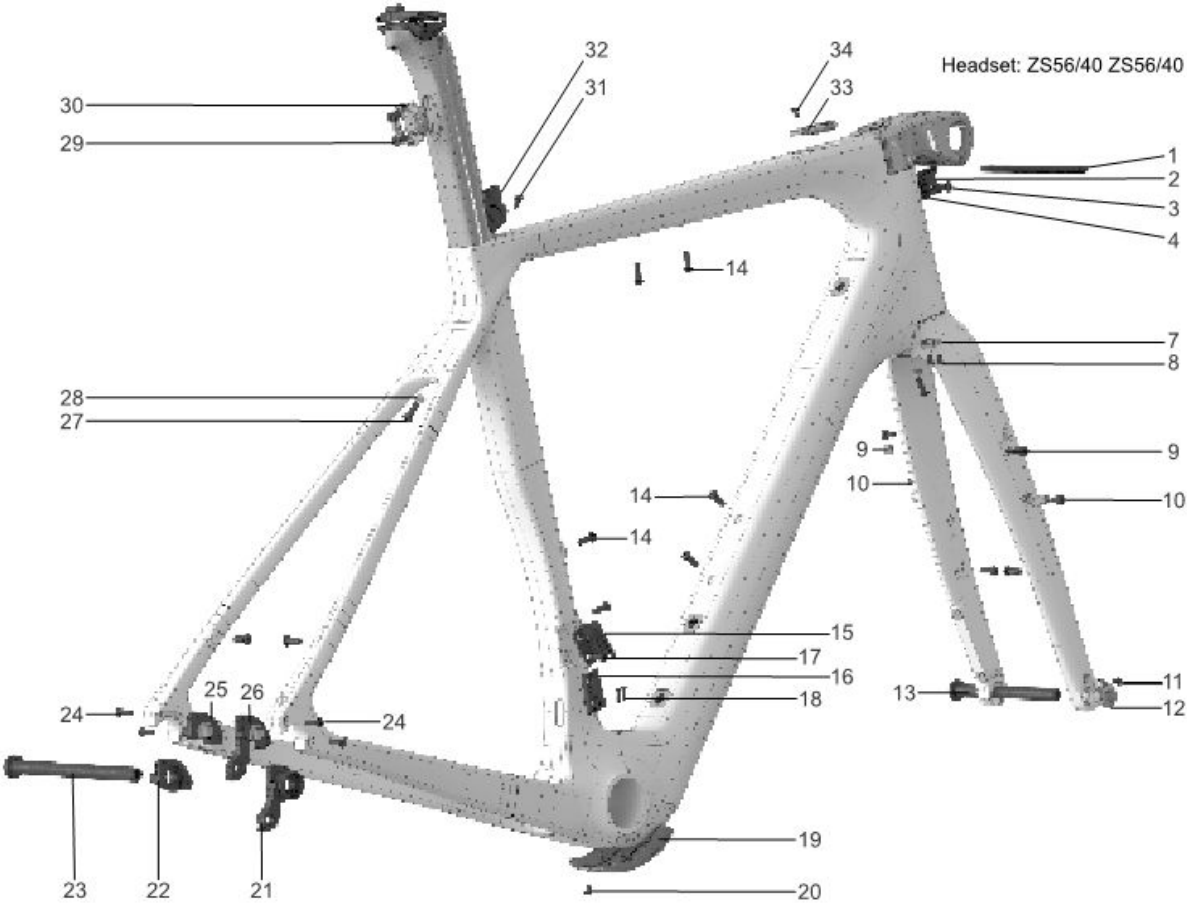
#	Part Description	Qty			
			8	Lower shock mount bolt set (M&F)	1
1	Solid Rear Triangle	1	9	Trunnion mount bolt	2
2	Front Triangle - size specific	1	10	6900-2RS MAX bearings	4
3	Silverback SBC Hanger	1	11	Trunnion mount washers	4
4	M4 Countersunk bolt	1	12	Main pivot washer	2
5	Main Pivot bolt set (M&F)	1	13	Motor mounting bolts	6
6	Main Pivot spacer	1	14	12mm through axle: 181mm x 1.75TP	1
7	6903-2RS MAX bearings	2	15	Chainstay protector	1

# Silverback S-Electro Diamond



#	Part Description	Qty	#	Part Description	Qty	Abbreviations	
1	Diamond Comp Alloy Frame 6061 - T6	1	11	Darfon 720Wh Battery Rail	1	N.m	Newton - Meter
2	Darfon On/Off switch w/ USB-C	1	12	Darfon 720Wh Battery	1	DH	Dome Head
3	Switch Wedge On/Off	1	13	Diamond Battery Cover Assembly	1	T & TP	Thread Pitch
4	Key Hole Cover - VLD-249	1	14	M3.5 x 10mm Self Tapping Screw	1	Wh	Wattour
5	Darfon Charge Port	1	15	Battery Rail Bolts-CSK M5x0.8Tx10mm	3	CSK	Countersunk
6	Thru Axle Rear 12x181mm 1.75mm TP	1	16	SBC Hanger Bolt-CSK M4x0.75Tx8mm	1		
7	SBC Alloy Hanger 1.75mm TP	1	17	Motor Mount Bolts-M8x1.25Tx20mm	6		
8	Diamond Scraper Plate V2	1	18	Skid Plate Bolts-CSK M5x0.8Tx16mm	2		
9	Diamond Plastic Tongue - Flat	1	19	Tongue Bolts-CSK M5x0.8Tx16mm	2		
10	Diamond Alloy Tongue Back - V1	1	20	Battery Mount Bolts-M5x0.8Tx16mm DH	6		

# Silverback S-Electro Superfast



#	Part Description	Qty	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34																																										
			Axle M12x126xP1.50, 100mm OLD	1	Hanger DS 135x9mm	1	Stem Device Mount	1	Dome Head M5x12xP0.80	1	Dome Head M5x12xP0.80	8	Stem GoPro Mount	1	Bolt Spacer 3mm	4	Dome Head Bolt: M5x16xP0.80	1	Front Derailleur Hanger	1	Front Hanger Cover	1	Countersunk M5x12xP0.80	2	Countersunk Bolt: M5x8xP0.80	1	Quarter Turn Mount	1	Seat Clamp Assembly	1	Socket Head M4xTBExP0.70	1	Seatpost Clamp Assembly	1	Top Tube cover	1	Bottom bracket cover	1	Countersunk M4x8xP0.70	2	Countersunk M3x12xP0.50	2	Button And USB-C Carrier	1	Steering Stop	1	Countersunk M4x8xP0.70	1	Countersunk M4x20xP0.70	4	Countersunk M4x8xP0.70	1	Countersunk M4x8xP0.70	1	Fork Hanger	1	Hanger NDS 142x12mm	1	Axle M12x164xP1.50, 142mm OLD	1	Hanger DS 142x12mm	1	Countersunk M4x8xP0.70	1	Hanger NDS 135x9mm	1

## INTENDED USE OF YOUR BICYCLE

**⚠ WARNING: Understand your bike and its intended use. Choosing the wrong bicycle for your purpose can be hazardous. Using your bike the wrong way is dangerous. No one type of bicycle is suited for all purposes. Your retailer can help you pick the “right tool for the job” and help you understand its limitations. There are many types of bicycles and many variations within each type. There are many types of mountain, road, racing, hybrid, touring, cyclocross and tandem bicycles.**

There are also bicycles that mix features. For example, there are road/racing bikes with triple cranks. These bikes have the low gearing of a touring bike, the quick handling of a racing bike, but are not well suited for carrying heavy loads on a tour. For that purpose you want a touring bike.

Pedelecs (Pedal electric cycles) or EPAC's (Electrically Power Assisted Cycles) have an auxiliary motor that only switches on when you move the pedals. The motor switches off when you stop pedaling. This is the category of bicycle your SILVERBACK e-bike belongs to.

Within each of type of bicycle, one can optimize for certain purposes. Visit your bicycle shop and find someone with expertise in the area that interests you. Do your own homework. Seemingly small changes such as the choice of tires can improve or diminish the performance of a bicycle for a certain purpose. Industry usage conditions are generalized and evolving. Consult your dealer about how you intend to use your bike.

Legal regulations for riding a pedelec in EU is as follows:

**⚠ WARNING: There are different types of e-bikes that are subject to different legal frameworks. Please check and observe regulations for riding on public roads as well as other landscapes.**

**⚠ WARNING: Understand the category of bike to which your e-bike belongs. The category specifies the basis on which you are allowed to ride and the actions your e-bike is designed for. See “categories” and ask your dealer for more information.**

**⚠ WARNING: Never modify/manipulate your e-bike. There is a serious risk of accident! This will make your e-bike an illegal one, voiding your warranty and personal liability coverage. You will no longer be permitted to use your e-bike on public roads and trails.**

**⚠ WARNING:** It is not recommended to allow kids under the age of 14 to use an e-bike.

① **Keep this instruction manual as well as system instructions for the drive manufacturer, for future reference and pass it on to the respective user in case you sell, lend or pass on your e-bike.**

① **Rules and regulations surrounding e-bikes are constantly being revised. Stay informed about current legislation and changes.**

① **We strongly urge that you take out private liability insurance and make sure that damage caused during cycling by bicycle or e-bike is covered by the policy. Consult your insurance company for details.**

On the following pages, we generally outline the intended uses of various types of bikes. The higher the category of your e-bike, the greater the direct influence of your riding skills on the service life of your e-bike. Even on terrain that is approved for your e-bike, defects may occur due to riding mistakes. Industry usage conditions are generalized and evolving. Consult your dealer about how you intend to use your bike.



#### **Category 1 “Road”**

Intended for use on public roads and cycle lanes with tarred surface. Wheels remain in constant contact with the ground.



#### **Category 2 “Lifestyle, Commuting, Cyclo-Cross, Fitness”**

Intended for use on hard-surface terrain: Category 1 as well as field track with gravel, sandy or earthy surface.



### **Category 3 “Cross-Country, Marathon, Hardtails”**

Intended for off-road use. Category 1 and 2 as well as on trails and technical sections characterized by roots, stones, ditches and loose ground. Official mountain bike trail jumps with built up landings up to a height of 60 cm (23.6”) are permitted.

Suitable trail parks such as “flow trails” are permitted as long as the trails are free of construction characteristics for higher categories. Jumps carried out by inexperienced riders can result in improper landings, where the forces exerted on your bike are significantly higher than those with proper riding technique. This can result in damage and injuries.

More frequent bike inspection and services are recommended. Please consult your Silverback bicycle dealer.



### **Category 4 “Trail, AM, Enduro”**

Intended for off-road use. Category 1, 2 and 3 as well as rough terrain with blocked sections. Jumps on official mountain bike trails with built-up landings to a height of 120cm are permitted.

Suitable trail parks such as “flow trails” are permitted as long as the trails are free of construction characteristics for higher categories. Jumps carried out by inexperienced riders can result in improper landings, where the forces exerted on your bike are significantly higher than those with proper riding technique. This can result in damage and injuries.

More frequent bike inspection and services are recommended. Please consult your Silverback bicycle dealer.



### **Category 5 “Gravity, Freeride, Downhill, Dirt Jump”**

Intended for off-road use. Category 1, 2, 3 and 4 as well as jumps on official mountain bike trails with built-up landings beyond a height of 120cm are permitted.

Extensive use in bike parks is permitted.

Jumps carried out by inexperienced riders can result in improper landings, where the forces exerted on your bike are significantly higher than those with proper riding technique. This can result in damage and injuries.

More frequent bike inspection and services are recommended. Please consult your Silverback bicycle dealer.

### **Permissible overall weight**

An electric bike is a bicycle with an attached electric motor, which allows the rider to expel less energy to travel a longer distance at a faster speed. These bikes are intended to complement human power and not replace it, so the rider is required to pedal in unison.

### **Importance of Weight Limit**

There are a few reasons why following the weight limit on your electric bike is important:

- **Safety** – An electric bike needs to be able to safely slow down the rider when going down hills or making sudden stops in traffic, following the weight limit will ensure the bike's proper performance. Excess weight can wear down and damage the brakes, rims, spokes, and saddles.
- **Performance** – An electric bike that is at its maximum weight capacity can reduce the rider's range and speed.

The permissible overall weight of your Silverback Ebike consists of the rider's total weight in kg, baggage and pedelec weight all together as well as weight of the trailer and cargo's within the trailer:

Rider weight (kg)  
+ e-bike weight (kg)  
+ baggage weight (kg)  
+ total trailer (incl cargo and/or persons) (kg)  
= Permissible overall weight (kg)

## **SPECIAL NOTE TO PARENTS:**

**⚠ ATTENTION: Minors may only ride E-bikes, when they have reached the required age and possess the necessary license respectively.**

As a parent or guardian, you are responsible for the activities and safety of your child, and that includes making sure that the bicycle is properly fitted to the child; that it is in good repair and safe operating condition; that you and your child have learned and understand the safe operation of the bicycle; and that you and your child have learned, understand and obey not only the applicable local motor vehicle, bicycle and traffic laws, but also the common sense rules of safe and responsible bicycling.

As a parent, you should read this manual, as well as review its warnings and the bicycle's functions and operating procedures with your child, before letting your child ride the bicycle.

**⚠ WARNING: Make sure that your child always wears an approved bicycle helmet when riding; but also make sure that your child understands that a bicycle helmet is for bicycling only, and must be removed when not riding. A helmet must not be worn while playing, in play areas, on playground equipment, while climbing trees, or at any time while not riding a bicycle. Failure to follow this warning could result in serious injury or death.**

**⚠ WARNING: Failure to wear a helmet when riding may result in serious injury or death.**

**⚠ DANGER: Note that the E-bike immediately moves when you put your foot on the pedal and the E-bike drive is switched on. So first pull the brake and then get on the E-bike. Otherwise the unexpected move can lead to accidents and hazards.**

**⚠ DANGER: Shut off the E-bike drive and remove the battery before you start to work at your E-bike. Unintended activation of the E-bike drive can lead to injuries.**

**⚠ DANGER: Your E-bike is basically intended for the transportation of a single person only. One exception is the transportation of a child in a child seat or a child trailer. Please note the terms of your national legislation. Pay attention to the use of high quality child seats and trailers. Pay attention to the maximum gross weight.**



## 1. BEFORE YOUR FIRST RIDE

NOTE: We strongly urge you to read this Manual in its entirety before your first ride. At the very least, read and make sure that you understand each point in this section, and refer to the cited sections on any issue which you don't completely understand. Please note that not all Silverback bicycles have all of the features described in this Manual. Ask your dealer to point out the features of your bicycle.

**⚠ Caution: Users who are not professionally trained for bicycle assembly should not attempt to install, disassemble or modify components.**

### 1 A. NEW BIKE REGISTRATION

Registration records your serial number and contact information for future communication, tracking, safety and warranty. Your new bike will include a warranty registration sticker with QR code or please visit:  
<https://silverbackbikes.de/pages/warranty-registration>

### 1 B. BIKE FIT

1. Is your bike the right size? To check, see Section 3 A. If your bicycle is too large or too small for you, you may lose control and fall. If your new bike is not the right size, ask your dealer to exchange it before you ride it.
2. Is the saddle at the right height? To check, see Section 3.B If you adjust your saddle height, follow the Minimum Insertion instructions in Section 3.B.
3. Are saddle and seat post securely clamped? A correctly tightened saddle will allow no saddle movement in any direction. See Section 3.B.
4. Are the stem and handlebars at the right height for you? If not, see Section 3.C.
5. Can you comfortably operate the brakes? If not, you may be able to adjust their angle and reach. See Section 3.D and 3.E.
6. Do you fully understand how to operate your new bicycle? If not, before your first ride, have your dealer explain any functions or features which you do not understand.

### 1 C. SAFETY FIRST

1. Always wear an approved helmet when riding your bike, and follow the helmet manufacturer's instructions for fit, use and care.
2. Do you have all the other required and recommended safety equipment? See Section 2. It's your responsibility to familiarize yourself with the laws of the areas where you ride, and to comply with all applicable laws.
3. Do you know how to correctly secure your front and rear wheels? Check Section 4.A.1 to make sure. Riding with an improperly secured wheel can cause the wheel to wobble or disengage from the bicycle, and cause serious injury or death.
4. If your bike has toeclips and straps or clipless ("step-in") pedals, make sure you know how they work (see Section 4.E). These pedals require special techniques and skills. Follow the pedal manufacturer's instructions for use, adjustment and care.
5. Do you have "toe overlap"? On smaller framed bicycles your toe or toeclip may be able to make contact with the front wheel when a pedal is all the way forward and

- the wheel is turned. Read Section 4.E. to check whether you have toeclip overlap.
6. Does your bike have suspension? If so, check Section 4.G. Suspension can change the way a bicycle performs. Follow the suspension manufacturer's instructions for use, adjustment and care.

#### **1 D. MECHANICAL SAFETY CHECK**

Routinely check the condition of your bicycle before every ride.

Nuts, bolts screws & other fasteners: Because manufacturers use a wide variety of fastener sizes and shapes made in a variety of materials, often differing by model and component, the correct tightening force or torque cannot be generalized. To make sure that the many fasteners on your bicycle are correctly tightened, refer to the Fastener Torque Specifications in Appendix B of this manual or to the torque specifications in the instructions provided by the manufacturer of the component in question. Correctly tightening a fastener requires a calibrated torque wrench. A professional bicycle mechanic with a torque wrench should torque the fasteners on you bicycle. If you choose to work on your own bicycle, you must use a torque wrench and the correct tightening torque specifications from the bicycle or component manufacturer or from your dealer. If you need to make an adjustment at home or in the field, we urge you to exercise care, and to have the fasteners you worked on checked by your dealer as soon as possible.

**⚠ WARNING: Correct tightening force on fasteners – nuts, bolts, screws – on your bicycle is important. Too little force, and the fastener may not hold securely. Too much force, and the fastener can strip threads, stretch, deform or break. Either way, incorrect tightening force can result in component failure, which can cause you to loose control and fall.**

- Make sure nothing is loose. Lift the front wheel off the ground by two or three inches, then let it bounce on the ground. Anything sound, feel or look loose? Do a visual and tactile inspection of the whole bike. Any loose parts or accessories? If so, secure them. If you're not sure, ask someone with experience to check.
- Tires & Tubes: Make sure tires are correctly inflated (see Section 4.H). Check by putting one hand on the saddle, one on the intersection of the handlebars and stem, then bouncing your weight on the bike while looking at tire deflection. Compare what you see with how it looks when you know the tires are correctly inflated; and adjust if necessary.
- Tires in good shape? Spin each wheel slowly and look for cuts in the tread and sidewall. Replace damaged tires before riding the bike.
- Wheels true? Spin each wheel and check for brake clearance and side-to-side wobble. If a wheel wobbles side to side even slightly, or rubs against or hits the brake pads, take the bike to a qualified bike shop to have the wheel trued.

**⚠ CAUTION: Wheels must be true for rim brakes to work effectively. Wheel trueing is a skill which requires special tools and experience. Do not attempt to true a wheel unless you have the knowledge, experience and tools needed to do the job correctly.**

- Wheel rims clean and undamaged? Make sure the rims are clean and undamaged at the tire bead and, if you have rim brakes, along the braking surface. Check to make sure that any rim wear indicator marking is not visible at any point on the wheel rim.

**⚠ WARNING: Bicycle wheel rims are subject to wear. Ask your dealer about wheel rim wear. Some wheel rims have a rim wear indicator which becomes visible as the rim's braking surface wears. A visible rim wear indicator on the side of the wheel rim is an indication that the wheel rim has reached its maximum usable life. Riding a wheel that is at the end of its usable life can result in wheel failure, which can cause you to lose control and fall.**

- **Brakes:** Check the brakes for proper operation (see Sections 4.C). Squeeze the brake levers. Are the brake quick-releases closed? All control cables seated and securely engaged? If you have rim brakes, do the brake pads contact the wheel rim squarely and make full contact with the rim? Do the brakes begin to engage within an inch of brake lever movement? Can you apply full braking force at the levers without having them touch the handlebar? If not, your brakes need adjustment. Do not ride the bike until the brakes are properly adjusted by a professional bicycle mechanic.
- **Wheel retention system:** Make sure the front and rear wheels are correctly secured. See Section 4.A
- **Seat post:** If your seat post has an over-center cam action fastener for easy height adjustment, check that it is properly adjusted and in the locked position. See Section 4.B.
- **Handlebar and saddle alignment:** Make sure the saddle and handlebar stem are parallel to the bike's center line and clamped tight enough so that you can't twist them out of alignment. See Sections 3.B and 3.C.
- **Handlebar ends:** Make sure the handlebar grips are secure and in good condition. If not, have your dealer replace them. Make sure the handlebar ends and extensions are plugged. If not, have your dealer plug them before you ride. If the handlebars have bar end extensions, make sure they are clamped tight enough so you can't twist them.

**⚠ WARNING: Loose or damaged handlebar grips or extensions can cause you to lose control and fall. Unplugged handlebars or extensions can cut you and cause serious injury in an otherwise minor accident.**

**⚠ VERY IMPORTANT SAFETY NOTE: Please also read and become thoroughly familiar with the important information on the lifespan of your bicycle and its components in Appendix .**

## **1 E. FIRST RIDE**

When you buckle on your helmet and go for your first familiarization ride on your new bicycle, be sure to pick a controlled environment, away from cars, other cyclists, obstacles or other hazards. Ride to become familiar with the controls, features and performance of your new bike. Familiarize yourself with the braking action of the bike

(see Section 4.C). Test the brakes at slow speed, putting your weight toward the rear and gently applying the brakes, rear brake first. Sudden or excessive application of the front brake could pitch you over the handlebars. Applying brakes too hard can lock up a wheel, which could cause you to lose control and fall. Skidding is an example of what can happen when a wheel locks up.

If your bicycle has toeclips or clipless pedals, practice getting in and out of the pedals. See Section 1.C.4 and Section 4.E.

If your bike has suspension, familiarize yourself with how the suspension responds to brake application and rider weight shifts. See Section 4.G.

Practice shifting the gears (see Section 4.D). Remember to never move the shifter while pedaling backward, nor pedal backwards immediately after having moved the shifter. This could jam the chain and cause serious damage to the bicycle.

Check out the handling and response of the bike; and check the comfort. If you have any questions, or if you feel anything about the bike is not as it should be, consult your dealer before you ride again.

Familiarize yourself with your **e-bike drive system (4.I)**.

## 2. SAFETY

### 2 A. THE BASICS

**WARNING:** The area in which you ride may require specific safety devices. It is your responsibility to familiarize yourself with the laws of the area where you ride and to comply with all applicable laws, including properly equipping yourself and your bike as the law requires.

Observe all local bicycle laws and regulations. Observe regulations about bicycle lighting, licensing of bicycles, riding on sidewalks, laws regulating bike path and trail use, helmet laws, child carrier laws, special bicycle traffic laws. It's your responsibility to know and obey the laws.

1. Always wear a cycling helmet which meets the latest certification standards and is appropriate for the type of riding you do. Always follow the helmet manufacturer's instructions for fit, use and care of your helmet. Most serious bicycle injuries involve head injuries which might have been avoided if the rider had worn an appropriate helmet.

**⚠ WARNING: Failure to wear a helmet when riding may result in serious injury or death.**

2. Always do the Mechanical Safety Check (Section 1.D) before you get on a bike.
3. Be thoroughly familiar with the controls of your bicycle: brakes (Section 4.C.); pedals (Section 4.E.); shifting (Section 4.D.)
4. Be careful to keep body parts and other objects away from the sharp teeth of chainrings, the moving chain, the turning pedals and cranks, and the spinning

wheels of your bicycle.

5. **Always wear:**

- Shoes that will stay on your feet and will grip the pedals. Make sure that shoe laces cannot get into moving parts, and never ride barefoot or in sandals.
- Bright, visible clothing that is not so loose that it can be tangled in the bicycle or snagged by objects at the side of the road or trail.
- Protective eyewear, to protect against airborne dirt, dust and bugs — tinted when the sun is bright, clear when it's not.
- Don't jump with your bike. Jumping a bike, particularly a BMX or mountain bike, can be fun; but it can put huge and unpredictable stress on the bicycle and its components. Riders who insist on jumping their bikes risk serious damage, to their bicycles as well as to themselves. Before you attempt to jump, do stunt riding or race with your bike, read and understand Section 2F.

6. Ride at a speed appropriate for conditions. Higher speed means higher risk.

**2 B. RIDING SAFETY**

1. Obey all Rules of the Road and all local traffic laws.
2. You are sharing the road or the path with others — motorists, pedestrians and other cyclists. Respect their rights.
3. Ride defensively. Always assume that others do not see you.
4. Look ahead, and be ready to avoid:
  - Vehicles slowing or turning, entering the road or your lane ahead of you, or coming up behind you.
  - Parked car doors opening.
  - Pedestrians stepping out.
  - Children or pets playing near the road.
  - Pot holes, sewer grating, railroad tracks, expansion joints, road or sidewalk construction, debris and other obstructions that could cause you to swerve into traffic, catch your wheel or cause you to have an accident.
  - The many other hazards and distractions which can occur on a bicycle ride.
5. Ride in designated bike lanes, on designated bike paths or as close to the edge of the road as possible, in the direction of traffic flow or as directed by local governing laws.
6. Stop at stop signs and traffic lights; slow down and look both ways at street intersections. Remember that a bicycle always loses in a collision with a motor vehicle, so be prepared to yield even if you have the right of way.
7. Use approved hand signals for turning and stopping.
8. Never ride with headphones. They mask traffic sounds and emergency vehicle sirens, distract you from concentrating on what's going on around you, and their wires can tangle in the moving parts of the bicycle, causing you to lose control.
9. Never carry a passenger, unless it is a small child wearing an approved helmet and secured in a correctly mounted child carrier or a child-carrying trailer.
10. Never carry anything which obstructs your vision or your complete control of the bicycle, or which could become entangled in the moving parts of the bicycle.
11. Never hitch a ride by holding on to another vehicle.
12. Don't do stunts, wheelies or jumps. If you intend to do stunts, wheelies, jumps or go racing with your bike despite our advice not to, read Section 2. F, Downhill, Stunt

or Competition Biking, now. Think carefully about your skills before deciding to take the large risks that go with this kind of riding.

13. Don't weave through traffic or make any moves that may surprise people with whom you are sharing the road.
14. Observe and yield the right of way.
15. Never ride your bicycle while under the influence of alcohol or drugs.
16. If possible, avoid riding in bad weather, when visibility is obscured, at dawn, dusk or in the dark, or when extremely tired. Each of these conditions increases the risk of accident.

## **2 C. OFF ROAD SAFETY**

We recommend that children not ride on rough terrain unless they are accompanied by an adult.

1. The variable conditions and hazards of off-road riding require close attention and specific skills. Start slowly on easier terrain and build up your skills. If your bike has suspension, the increased speed you may develop also increases your risk of losing control and falling. Get to know how to handle your bike safely before trying increased speed or more difficult terrain.
2. Wear safety gear appropriate to the kind of riding you plan to do.
3. Don't ride alone in remote areas. Even when riding with others, make sure that someone knows where you're going and when you expect to be back.
4. Always take along some kind of identification, so that people know who you are in case of an accident; and take along some cash for food, a cool drink or an emergency phone call.
5. Yield right of way to pedestrians and animals. Ride in a way that does not frighten or endanger them, and give them enough room so that their unexpected moves don't endanger you.
6. Be prepared. If something goes wrong while you're riding off-road, help may not be close.
7. Before you attempt to jump, do stunt riding or race with your bike, read and understand Section 2 F.

## **OFF ROAD RESPECT**

Obey the local laws regulating where and how you can ride off-road, and respect private property. You may be sharing the trail with others — hikers, equestrians, other cyclists. Respect their rights. Stay on the designated trail. Don't contribute to erosion by riding in mud or with unnecessary sliding. Don't disturb the ecosystem by cutting your own trail or shortcut through vegetation or streams. It is your responsibility to minimize your impact on the environment. Leave things as you found them; and always take out everything you brought in.

## **2 D. WET WEATHER RIDING**

**⚠️ WARNING: Wet weather impairs traction, braking and visibility, both for the bicyclist and for other vehicles sharing the road. The risk of an accident is dramatically increased in wet conditions.**

Under wet conditions, the stopping power of your brakes (as well as the brakes of other

vehicles sharing the road) is dramatically reduced and your tires don't grip nearly as well. This makes it harder to control speed and easier to lose control. To make sure that you can slow down and stop safely in wet conditions, ride more slowly and apply your brakes earlier and more gradually than you would under normal, dry conditions. See also Section 4.C.

## **2 E. NIGHT RIDING**

Riding a bicycle at night is much more dangerous than riding during the day. A bicyclist is very difficult for motorists and pedestrians to see. Therefore, children should never ride at dawn, at dusk or at night. Adults who chose to accept the greatly increased risk of riding at dawn, at dusk or at night need to take extra care both riding and choosing specific equipment which helps reduce that risk. Consult your dealer about night riding safety equipment.

**⚠ WARNING: Reflectors are not a substitute for required lights. Riding at dawn, dusk, night or at other times of poor visibility without an adequate bicycle lighting system & without reflectors is dangerous & may result in serious injury or death.**

Bicycle reflectors are designed to pick up and reflect car lights and street lights in a way that may help you to be seen and recognized as a moving bicyclist.

**⚠ CAUTION: Check reflectors and their mounting brackets regularly to make sure that they are clean, straight, unbroken and securely mounted. Have your dealer replace damaged reflectors and straighten or tighten any that are bent or loose.**

The mounting brackets of front and rear reflectors are often designed as brake straddle cable safety catches which prevent the straddle cable from catching on the tire tread if the cable jumps out of its yoke or breaks.

**⚠ WARNING: Do not remove the front or rear reflectors or reflector brackets from your bicycle. They are an integral part of the bicycle's safety system. Removing the reflectors reduces your visibility to others using the roadway. Being struck by other vehicles may result in serious injury or death. The reflector brackets may protect you from a brake straddle cable catching on the tire in the event of brake cable failure. If a brake straddle cable catches on the tire, it can cause the wheel to stop suddenly, causing you to lose control and fall.**

If you choose to ride under conditions of poor visibility, check and be sure you comply with all local laws about night riding, and take the following strongly recommended additional precautions:


- Purchase and install battery or generator powered head and tail lights which meet all regulatory requirements and provide adequate visibility.
- Wear light colored, reflective clothing and accessories, such as a reflective vest, reflective arm and leg bands, reflective stripes on your helmet, flashing lights attached to your body and/or your bicycle ... any reflective device or light source that moves will help you get the attention of approaching motorists, pedestrians and

- other traffic.
- Make sure your clothing or anything you may be carrying on the bicycle does not obstruct a reflector or light.
  - Make sure that your bicycle is equipped with correctly positioned and securely mounted reflectors.
  - While riding at dawn, at dusk or at night:
    - Ride slowly.
    - Avoid dark areas and areas of heavy or fast-moving traffic.
    - Avoid road hazards.
    - If possible, ride on familiar routes.
  - If riding in traffic:
    - Be predictable. Ride so that drivers can see you and predict your movements.
    - Be alert. Ride defensively and expect the unexpected.
    - If you plan to ride in traffic often, ask your dealer about traffic safety classes or a good book on bicycle traffic safety.

## **2 F. EXTREME, STUNT OR COMPETITION RIDING**

Whether you call it Aggro, Huckling, Freeride, North Shore, Downhill, Jumping, Stunt Riding, Racing or something else: if you engage in this sort of extreme, aggressive riding you will get hurt, and you voluntarily assume a greatly increased risk of injury or death.

Not all bicycles are designed for these types of riding, and those that are may not be suitable for all types of aggressive riding. Check with your dealer or the bicycle's manufacturer about the suitability of your bicycle before engaging in extreme riding. When riding fast down hill, you can reach speeds achieved by motorcycles, and therefore face similar hazards and risks. Have your bicycle and equipment carefully inspected by a qualified mechanic and be sure it is in perfect condition. Consult with expert riders, area site personnel and race officials on conditions and equipment advisable at the site where you plan to ride. Wear appropriate safety gear, including an approved full face helmet, full finger gloves, and body armor. Ultimately, it is your responsibility to have proper equipment and to be familiar with course conditions.

** WARNING: Although many catalogs, advertisements and articles about bicycling depict riders engaged in extreme riding, this activity is extremely dangerous, increases your risk of injury or death, and increases the severity of any injury. Remember that the action depicted is being performed by professionals with many years of training and experience. Know your limits and always wear a helmet and other appropriate safety gear. Even with state-of-the-art protective safety gear, you could be seriously injured or killed when jumping, stunt riding, riding downhill at speed or in competition.**

** WARNING: Bicycles and bicycle parts have limitations with regard to strength and integrity, and this type of riding can exceed those limitations.**

We recommend against this type of riding because of the increased risks; but if you



choose to take the risk, at least:

- Take lessons from a competent instructor first
- Start with easy learning exercises and slowly develop your skills before trying more difficult or dangerous riding
- Use only designated areas for stunts, jumping, racing or fast downhill riding
- Wear a full face helmet, safety pads and other safety gear.
- Understand and recognize that the stresses imposed on your bike by this kind of activity may break or damage parts of the bicycle and void the warranty
- Take your bicycle to your dealer if anything breaks or bends. Do not ride your bicycle when any part is damaged.
- If you ride downhill at speed, do stunt riding or ride in competition, know the limits of your skill and experience. Ultimately, avoiding injury is your responsibility.

## **2 G. CHANGING COMPONENTS OR ADDING ACCESSORIES**

There are many components and accessories available to enhance the comfort, performance and appearance of your bicycle. However, if you change components or add accessories, you do so at your own risk. The bicycle's manufacturer may not have tested that component or accessory for compatibility, reliability or safety on your bicycle. Before installing any component or accessory, including a different size tire, make sure that it is compatible with your bicycle by checking with your dealer. Be sure to read, understand and follow the instructions that accompany the products you purchase for your bicycle. See also Appendix A and B

**⚠ WARNING: Failure to confirm compatibility, properly install, operate and maintain any component or accessory can result in serious injury or death.**

**⚠ WARNING: Changing the components on your bike with other than genuine replacement parts may compromise the safety of your bicycle and may void the warranty. Check with your dealer before changing the components on your bike.**

### 3. FIT

NOTE: Correct fit is an essential element of bicycling safety, performance and comfort. Making the adjustments to your bicycle which result in correct fit for your body and riding conditions requires experience, skill and special tools. Always have your dealer make the adjustments on your bicycle; or, if you have the experience, skill and tools, have your dealer check your work before riding.

**⚠ WARNING: If your bicycle does not fit properly, you may lose control and fall. If your new bike doesn't fit, ask your dealer to exchange it before you ride it.**

#### 3 A. STANDOVER HEIGHT



##### DIAMOND FRAME BICYCLES

Standover height is the basic element of bike fit (see fig.2). It is the distance from the ground to the top of the bicycle's frame at that point where your crotch is when straddling the bike. To check for correct standover height, straddle the bike while wearing the kind of shoes in which you'll be riding, and bounce vigorously on your heels. If your crotch touches the frame, the bike is too big for you. Don't even ride the bike around the block. A bike which you ride only on paved surfaces and never take off-road should give you a minimum standover height clearance of two inches (5 cm). A bike that you'll ride on unpaved surfaces should give you a minimum of three inches (7.5 cm) of standover height clearance. And a bike that you'll use off road should give you four inches (10 cm) or more of clearance.

##### STEP-THROUGH FRAME BICYCLES

Standover height does not apply to bicycles with step-through frames. Instead, the limiting dimension is determined by saddle height range. You must be able to adjust your saddle position as described in B without exceeding the limits set by the height of the top of the seat tube and the "Minimum Insertion" or "Maximum Extension" mark on the seat post.

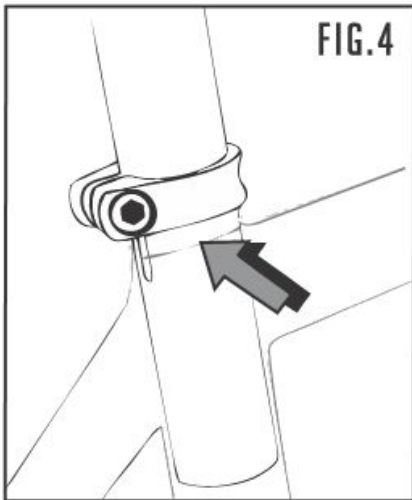
#### 3 B. SADDLE POSITION

Correct saddle adjustment is an important factor in getting the most performance and comfort from your bicycle. If the saddle position is not comfortable for you, see your dealer. The saddle can be adjusted in three directions:



Up and down adjustment. To check for correct saddle height (fig. 3):

- sit on the saddle;
- place one heel on a pedal;
- rotate the crank until the pedal with your heel on it is in the down position and the crank arm is parallel to the seat tube.



If your leg is not completely straight, your saddle height needs to be adjusted. If your hips must rock for the heel to reach the pedal, the saddle is too high. If your leg is bent at the knee with your heel on the pedal, the saddle is too low. Ask your dealer to set the saddle for your optimal riding position and to show you how to make this adjustment. If you choose to make your own saddle height adjustment:

- loosen the seat post clamp
- raise or lower the seat post in the seat tube
- make sure the saddle is straight fore and aft
- re-tighten the seat post clamp to the recommended torque (Appendix C or the manufacturer's instructions).

Once the saddle is at the correct height, make sure that the seat post does not project from the frame beyond its "Minimum Insertion" or "Maximum Extension" mark (fig. 4).

**NOTE: Some bicycles have a sight hole in the seat tube, the purpose of which is to make it easy to see whether the seat post is inserted in the seat tube far enough to be safe. If your bicycle has such a sight hole, use it instead of the "Minimum Insertion" or "Maximum Extension" mark to make sure the seat post is inserted in the seat tube far enough to be visible through the sight hole.**

**⚠ WARNING: If your seat post is not inserted in the seat tube correctly, as described above, the seat post may break which could cause you to lose control and fall.**

Front and back adjustment. The saddle can be adjusted forward or back to help you get the optimal position on the bike. Ask your dealer to set the saddle for your optimal riding position and to show you how to make this adjustment. If you choose to make your own front and back adjustment, make sure that the clamp mechanism is clamping on the straight part of the saddle rails and is not touching the curved part of the rails, and that you are using the recommended torque on the clamping fastener(s) (Appendix D or the manufacturer's instructions). 3. Saddle angle adjustment. Most people prefer a horizontal saddle; but some riders like the saddle nose angled up or down just a little. Your dealer can adjust saddle angle or teach you how to do it. If you choose to make your own saddle angle adjustment and you have a single bolt saddle clamp on your seat post, it is critical that you loosen the clamp bolt sufficiently to allow any serrations on the mechanism to disengage before changing the saddle's angle, and then that the serrations fully re-engage before you tighten the clamp bolt to the recommended torque (Appendix C or the manufacturer's instructions).

**⚠ WARNING: When making saddle angle adjustments with a single bolt saddle clamp, always check to make sure that the serrations on the mating surfaces of the clamp are not worn. Worn serrations on the clamp can allow the saddle to move, causing you to lose control and fall.**

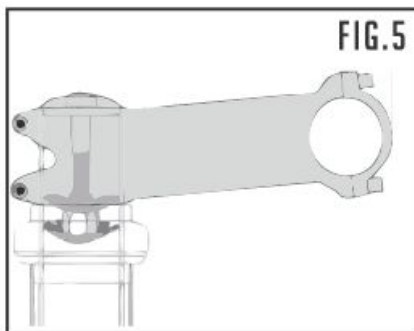
Always tighten fasteners to the correct torque. Bolts that are too tight can stretch and deform. Bolts that are too loose can move and fatigue. Either mistake can lead to a sudden failure of the bolt, causing you to lose control and fall.

**NOTE:** If your bicycle is equipped with a suspension seat post, the suspension mechanism may require periodic service or maintenance. Ask your dealer for recommended service intervals for your suspension seat post. Small changes in saddle position can have a substantial effect on performance and comfort. To find your best saddle position, make only one adjustment at a time.

**⚠ WARNING: After any saddle adjustment, be sure that the saddle adjusting mechanism is properly seated and tightened before riding. A loose saddle clamp or seat post clamp can cause damage to the seat post, or can cause you to lose control and fall. A correctly tightened saddle adjusting mechanism will allow no saddle movement in any direction. Periodically check to make sure that the saddle adjusting mechanism is properly tightened.**

If, in spite of carefully adjusting the saddle height, tilt and fore-and-aft position, your saddle is still uncomfortable, you may need a different saddle design. Saddles, like people, come in many different shapes, sizes and resilience. Your dealer can help you select a saddle which, when correctly adjusted for your body and riding style, will be comfortable.

**⚠ WARNING: Some people have claimed that extended riding with a saddle which is incorrectly adjusted or which does not support your pelvic area correctly can cause short-term or long-term injury to nerves and blood vessels, or even impotence. If your saddle causes you pain, numbness or other discomfort, listen to your body and stop riding until you see your dealer about.**

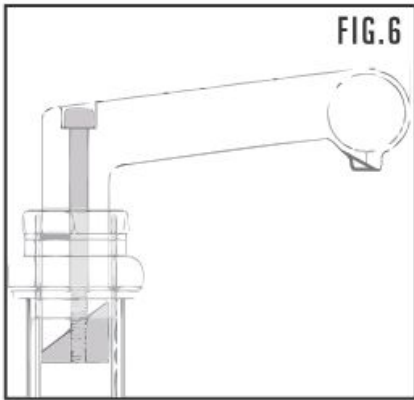


### 3 C. HANDLEBAR HEIGHT AND ANGLE

Your bike is equipped either with a “threadless” stem, which clamps on to the outside of the steerer tube, or with a “quill” stem, which clamps inside the steerer tube by way of an expanding binder bolt. If you aren’t absolutely sure which type of stem your bike has, ask your dealer.

If your bike has a “threadless” stem (fig. 5) your dealer may be able to change handlebar height by moving height adjustment spacers from below the stem to above the stem, or vice versa. Otherwise, you’ll have to get a stem of different length or rise. Consult your dealer. Do not attempt to do this yourself, as it requires special knowledge.

If your bike has a “quill” stem (fig. 6) you can ask your dealer to adjust the handlebar height a bit by adjusting stem height.



A quill stem has an etched or stamped mark on its shaft which designates the stem's "Minimum Insertion" or "Maximum Extension". This mark must not be visible above the headset.

**⚠ WARNING: A quill stem's Minimum Insertion Mark must not be visible above the top of the headset. If the stem is extended beyond the Minimum Insertion Mark the stem may break or damage the fork's steerer tube, which could cause you to lose control and fall.**

**⚠ WARNING: On some bicycles, changing the stem or stem height can affect the tension of the front brake cable, locking the front brake or creating excess cable slack which can make the front brake inoperable. If the front brake pads move in towards the wheel rim or out away from the wheel rim when the stem or stem height is changed, the brakes must be correctly adjusted before you ride the bicycle.**

Some bicycles are equipped with an adjustable angle stem. If your bicycle has an adjustable angle stem, ask your dealer to show you how to adjust it. Do not attempt to make the adjustment yourself, as changing stem angle may also require adjustments to the bicycle's controls.

**⚠ WARNING: Always tighten fasteners to the correct torque. Bolts that are too tight can stretch and deform. Bolts that are too loose can move and fatigue. Either mistake can lead to a sudden failure of the bolt, causing you to lose control and fall. Your dealer can also change the angle of the handlebar or bar end extensions.**

**⚠ WARNING: An insufficiently tightened stem clamp bolt, handlebar clamp bolt or bar end extension clamping bolt may compromise steering action, which could cause you to lose control and fall. Place the front wheel of the bicycle between your legs and attempt to twist the handlebar/stem assembly. If you can twist the stem in relation to the front wheel, turn the handlebars in relation to the stem, or turn the bar end extensions in relation to the handlebar, the bolts are insufficiently tightened.**

**⚠ WARNING: During use of aero extensions you will have less control over the bicycle. You will have a diminished ability to steer. You will also need to reset your hands to operate the brakes, which means your response to braking will take longer.**

### **3 D. CONTROL POSITION ADJUSTMENTS**

The angle of the brake and shift control levers and their position on the handlebars can

be changed. Ask your dealer to make the adjustments for you. If you choose to make your own control lever angle adjustment, be sure to re-tighten the clamp fasteners to the recommended torque (Appendix D or the manufacturer's instructions).

### 3 E. BRAKE REACH

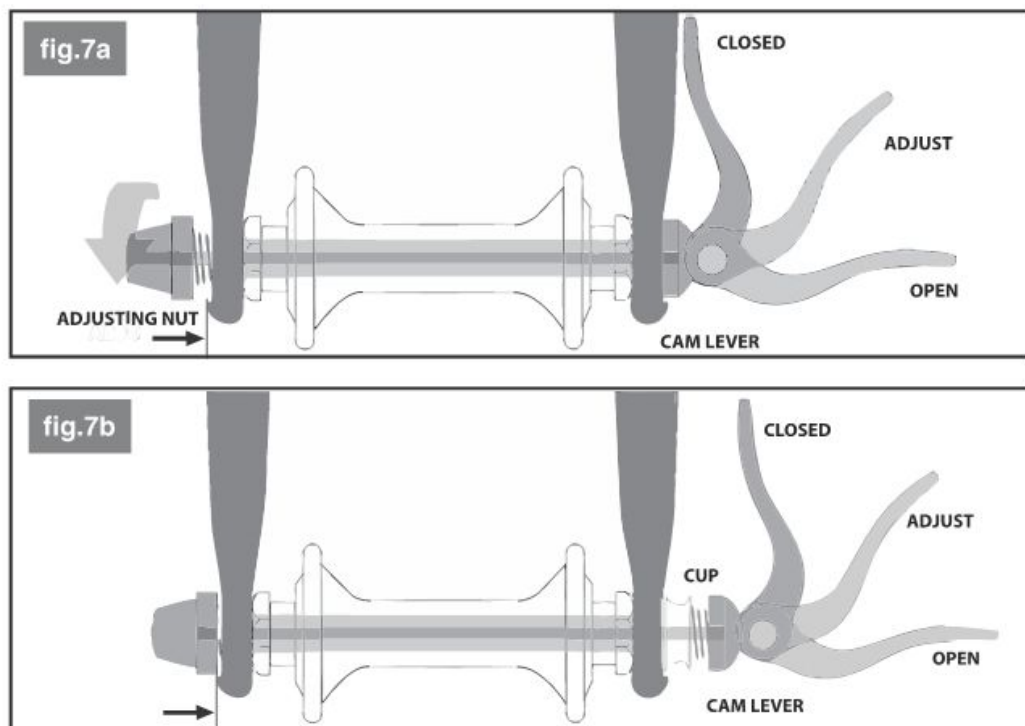
Many bikes have brake levers which can be adjusted for reach. If you have small hands or find it difficult to squeeze the brake levers, your dealer can either adjust the reach or fit shorter reach brake levers.

**⚠ WARNING: The shorter the brake lever reach, the more critical it is to have correctly adjusted brakes, so that full braking power can be applied within available brake lever travel. Brake lever travel insufficient to apply full braking power can result in loss of control, which may result in serious injury or death.**

## 4. TECH

It's important to your safety, performance and enjoyment to understand how things work on your bicycle. We urge you to ask your dealer how to do the things described in this section before you attempt them yourself, and that you have your dealer check your work before you ride the bike. If you have even the slightest doubt as to whether you understand something in this section of the Manual, talk to your dealer. See also Appendix A, B, C and D.

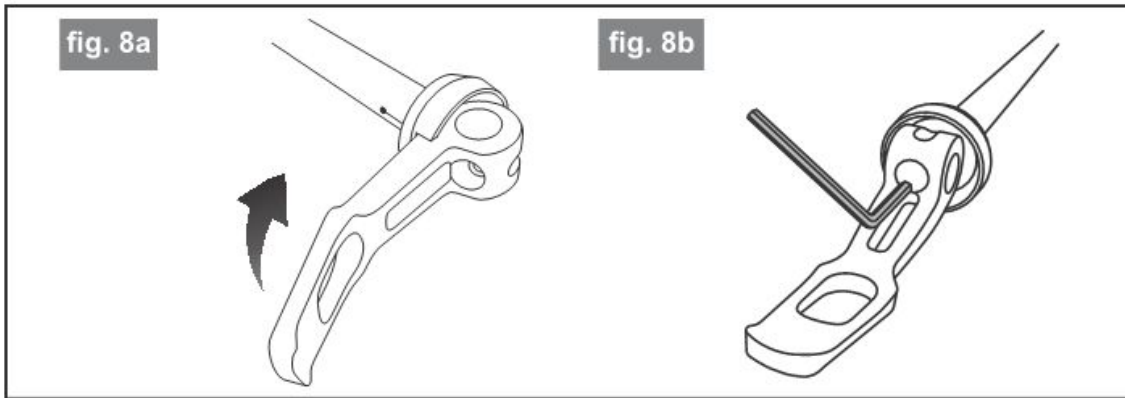
### 4. A. Wheels



Bicycle wheels are designed to be removable for easier transportation and for repair of a tire puncture. In most cases, the wheel axles are inserted into slots, called “dropouts” in the fork and frame, but some suspension mountain bikes use what is called a “through axle” wheel mounting system.

**Wheels are secured in different ways:**

- A hollow axle with a shaft (“skewer”) running through it which has an adjustable tension nut on one end and an over-center cam on the other (fig.7 a & b)
- Quick Release thru-axle which are threaded into the fork lowers, and tightened with QR lever. Check if QR lever is secure at allen key bolt. (Fig 8a and 8b)
- Your bicycle may be equipped with a different securing method for the front wheel than for the rear wheel. Discuss the wheel securing method for your bicycle with your dealer.



**Through-Axle**

If you have a mountain bike equipped with through axle front or rear wheels, make sure that your dealer has given you the manufacturer’s instructions, and follow those when installing or removing a through axle wheel. If you don’t know what a through-axle is, ask your dealer.

It is very important that you understand the type of wheel securing method on your bicycle, that you know how to secure the wheels correctly, and that you know how to apply the correct clamping force that safely secures the wheel. Ask your dealer to instruct you in correct wheel removal and installation, and ask him to give you any available manufacturer’s instructions.

**⚠ WARNING: Riding with an improperly secured wheel can allow the wheel to wobble or fall off the bicycle, which can cause serious injury or death.**

Therefore, it is essential that you:

1. Ask your dealer to help you make sure you know how to install and remove your wheels safely.
2. Understand and apply the correct technique for clamping your wheel in place.
3. Each time, before you ride the bike, check that the wheel is securely clamped. The clamping action of a correctly secured wheel must emboss the surfaces of the dropouts.

#### 4. A 1. FRONT WHEEL SECONDARY RETENTION DEVICES

Most bicycles have front forks which utilize a secondary wheel retention device to reduce the risk of the wheel disengaging from the fork if the wheel is incorrectly secured. Secondary retention devices are not a substitute for correctly securing your front wheel.

Secondary retention devices fall into two basic categories:

- The clip-on type is a part which the manufacturer adds to the front wheel hub or front fork.
- The integral type is molded, cast or machined into the outer faces of the front fork dropouts.

Ask your dealer to explain the particular secondary retention device on your bike.

**⚠ WARNING: Do not remove or disable the secondary retention device. As its name implies, it serves as a back-up for a critical adjustment. If the wheel is not secured correctly, the secondary retention device can reduce the risk of the wheel disengaging from the fork. Removing or disabling the secondary retention device may also void the warranty.**

Secondary retention devices are not a substitute for correctly securing your wheel. Failure to properly secure the wheel can cause the wheel to wobble or disengage, which could cause you to lose control and fall, resulting in serious injury or death.

#### 4. A 2. WHEELS WITH CAM ACTION SYSTEMS

There are currently two types of over-center cam wheel retention mechanisms: the traditional over-center cam (fig. 7a) and the cam-and-cup system (fig. 7b). Both use an over-center cam action to clamp the bike's wheel in place. Your bicycle may have a cam-and-cup front wheel retention system and a traditional rear wheel cam action system.

- **Adjusting the traditional cam action mechanism (fig. 7a)**  
The wheel hub is clamped in place by the force of the over-center cam pushing against one dropout and pulling the tension adjusting nut, by way of the skewer, against the other dropout. The amount of clamping force is controlled by the tension adjusting nut. Turning the tension adjusting nut clockwise while keeping the cam lever from rotating increases clamping force; turning it counterclockwise while keeping the cam lever from rotating reduces clamping force. Less than half a turn of the tension adjusting nut can make the difference between safe clamping force and unsafe clamping force.

**⚠ WARNING: The full force of the cam action is needed to clamp the wheel securely. Holding the nut with one hand and turning the lever like a wing nut with the other hand until everything is as tight as you can get it will not clamp a cam action wheel safely in the dropouts. See also the first WARNING in this Section.**



- **Adjusting the cam-and-cup mechanism (fig. 7b)**

The cam-and-cup system on your front wheel will have been correctly adjusted for your bicycle by your dealer. Ask your dealer to check the adjustment every six months. Do not use a cam and-cup front wheel on any bicycle other than the one for which your dealer adjusted it.

#### **4. A 3. REMOVING AND INSTALLING WHEELS**

**⚠ WARNING: If your bike is equipped with a hub brake such as a rear coaster brake, front or rear drum, band or roller brake; or if it has an internal gear rear hub, do not attempt to remove the wheel. The removal and re-installation of most hub brakes and internal gear hubs requires special knowledge. Incorrect removal or assembly can result in brake or gear failure, which can cause you to lose control and fall.**

**⚠ CAUTION: If your bike has a disc brake, exercise care in touching the rotor or caliper. Disc rotors have sharp edges, and both rotor and caliper can get very hot during use.**

#### **4. A 4. REMOVING A DISK BRAKE OR RIM BRAKE FRONT WHEEL**

1. If your bike has rim brakes, disengage the brake's quick-release mechanism to increase the clearance between the tire and the brake pads (See Section 4.C).
2. If your bike has cam action front wheel retention, move the cam lever from the locked or CLOSED position to the OPEN position (figs. 7a & b). If your bike has through bolt or bolt-on front wheel retention, loosen the fastener(s) a few turns counter-clockwise using an appropriate wrench, lock key or the integral lever.
3. If your front fork has a clip-on type secondary retention device, disengage it and go to step (4). If your front fork has an integral secondary retention device, and a traditional cam action system (fig. 7a) loosen the tension adjusting nut enough to allow removing the wheel from the dropouts. If your front wheel uses a cam-and-cup system, (fig. 7b) squeeze the cup and cam lever together while removing the wheel. No rotation of any part is necessary with the cam-and-cup system. You may need to tap the top of the wheel with the palm of your hand to release the wheel from the front fork.

#### **4. A 5. INSTALLING A DISK BRAKE OR RIM BRAKE FRONT WHEEL**

**⚠ CAUTION: If your bike is equipped with a front disk brake, be careful not to damage the disk, caliper or brake pads when reinserting the disk into the caliper. Never activate a disk brake's control lever unless the disk is correctly inserted in the caliper. See also Section 4.C.**

1. If your bike has cam action front wheel retention, move the cam lever so that it curves away from the wheel (fig. 7b). This is the OPEN position. If your bike has through bolt or bolt-on front wheel retention, go to the next step.
2. With the steering fork facing forward, insert the wheel between the fork blades so

that the axle seats firmly at the top of the fork dropouts. The cam lever, if there is one, should be on rider's left side of the bicycle (fig. 7a & b). If your bike has a clip-on type secondary retention device, engage it.

3. If you have a traditional cam action mechanism: holding the cam lever in the **ADJUST** position with your right hand, tighten the tension adjusting nut with your left hand until it is finger tight against the fork dropout (fig. 7a). If you have a cam-and-cup system: the nut and cup (fig.7b) will have snapped into the recessed area of the fork dropouts and no adjustment should be required.
4. While pushing the wheel firmly to the top of the slots in the fork dropouts, and at the same time centering the wheel rim in the fork:
  - (a) With a cam action system, move the cam lever upwards and swing it into the **CLOSED** position (fig. 7a & b). To apply enough clamping force, you should have to wrap your fingers around the fork blade for leverage, and the lever should leave a clear imprint in the palm of your hand.
  - (b) With a through-bolt or bolt-on system, tighten the fasteners to the torque specifications in Appendix C or the hub manufacturer's instructions.

**NOTE: If, on a traditional cam action system, the lever cannot be pushed all the way to a position parallel to the fork blade, return the lever to the OPEN position. Then turn the tension adjusting nut counterclockwise one-quarter turn and try tightening the lever again. With a through-bolt or bolt-on system, tighten the fasteners to the torque specifications in Appendix C or the hub manufacturer's instructions.**

**⚠ WARNING: Securely clamping the wheel with a cam action retention device takes considerable force. If you can fully close the cam lever without wrapping your fingers around the fork blade for leverage, the lever does not leave a clear imprint in the palm of your hand, and the serrations on the wheel fastener do not emboss the surfaces of the dropouts, the tension is insufficient. Open the lever; turn the tension adjusting nut clockwise a quarter turn; then try again. See also the first WARNING in this Section.**

5. If you disengaged the brake quick-release mechanism in 4.3.A.1 above, re-engage it to restore correct brake pad- to-rim clearance.
6. Spin the wheel to make sure that it is centered in the frame and clears the brake pads; then squeeze the brake lever and make sure that the brakes are operating correctly.

#### **4. A 6. REMOVING A DISK BRAKE OR RIM BRAKE REAR WHEEL**

1. If you have a multi-speed bike with a derailleur gear system: shift the rear derailleur to high gear (the smallest, outermost rear sprocket). If you have an internal gear rear hub, consult your dealer or the hub manufacturer's instructions before attempting to remove the rear wheel. If you have a single-speed bike with rim or disk brake, go to step (4) below.
2. If your bike has rim brakes, disengage the brake's quick-release mechanism to

increase the clearance between the wheel rim and the brake pads (see Section 4.C).

3. On a derailleur gear system, pull the derailleur body back with your right hand.
4. With a cam action mechanism, move the quick-release lever to the OPEN position (fig. 7b). With a through bolt or bolt on mechanism, loosen the fastener(s) with an appropriate wrench, lock lever or integral lever; then push the wheel forward far enough to be able to remove the chain from the rear sprocket.
5. Lift the rear wheel off the ground a few inches and remove it from the rear dropouts.

#### 4. A 7. INSTALLING A DISK BRAKE OR RIM BRAKE REAR WHEEL

**⚠ CAUTION: If your bike is equipped with a rear disk brake, be careful not to damage the disk, caliper or brake pads when reinserting the disk into the caliper. Never activate a disk brake's control lever unless the disk is correctly inserted in the caliper.**

1. With a cam action system, move the cam lever to the OPEN position (see fig. 7a & b). The lever should be on the side of the wheel opposite the derailleur and freewheel sprockets.
2. On a derailleur bike, make sure that the rear derailleur is still in its outermost, high gear, position; then pull the derailleur body back with your right hand. Put the chain on top of the smallest freewheel sprocket.
3. On single-speed, remove the chain from the front sprocket, so that you have plenty of slack in the chain. Put the chain on the rear wheel sprocket.
4. Then, insert the wheel into the frame dropouts and pull it all the way in to the dropouts.
5. On a single speed or an internal gear hub, replace the chain on the chainring; pull the wheel back in the dropouts so that it is straight in the frame and the chain has about 1/4 inches of up-and-down play.
6. With a cam action system, move the cam lever upwards and swing it into the CLOSED position (fig. 7 a & b). The lever should now be parallel to the seat stay or chain stay and curved toward the wheel. To apply enough clamping force, you should have to wrap your fingers around the fork blade for leverage, and the lever should leave a clear imprint in the palm of your hand.
7. With a through-bolt or bolt-on system, tighten the fasteners to the torque specifications in Appendix C or the hub manufacturer's instructions.

NOTE: If, on a traditional cam action system, the lever cannot be pushed all the way to a position parallel to the seat stay or chain stay, return the lever to the OPEN position. Then turn the tension adjusting nut counterclockwise one-quarter turn and try tightening the lever again.

**⚠ WARNING: Securely clamping the wheel with a cam action retention device takes considerable force. If you can fully close the cam lever without wrapping your fingers around the seat stay or chain stay for leverage, the lever does not leave a clear imprint in the palm of your hand, and the serrations on the wheel**

**fastener do not emboss the surfaces of the dropouts, the tension is insufficient. Open the lever; turn the tension adjusting nut clockwise a quarter turn; then try again. See also the first WARNING in this Section, p. 19.**

8. If you disengaged the brake quick-release mechanism in 4.3.C.2 above, re-engage it to restore correct brake pad-to-rim clearance.
9. Spin the wheel to make sure that it is centered in the frame and clears the brake pads; then squeeze the brake lever and make sure that the brakes are operating correctly.

#### **4. B. SEAT POST CAM ACTION CLAMP**

Some bikes are equipped with a cam action seat post binder. The seat post cam action binder works exactly like the traditional wheel cam action fastener (Section 4.A.2) While a cam action binder looks like a long bolt with a lever on one end and a nut on the other, the binder uses an over-center cam action to firmly clamp the seat post (see fig. 7a).

**⚠ WARNING: Riding with an improperly tightened seat post can allow the saddle to turn or move and cause you to lose control and fall.** Therefore:

1. Ask your dealer to help you make sure you know how to correctly clamp your seatpost.
2. Understand and apply the correct technique for clamping your seat post.
3. Before you ride the bike, first check that the seat post is securely clamped.

Adjusting the seat post cam action mechanism The action of the cam squeezes the seat collar around the seat post to hold the seat post securely in place. The amount of clamping force is controlled by the tension adjusting nut. Turning the tension adjusting nut clockwise while keeping the cam lever from rotating increases clamping force; turning it counterclockwise while keeping the cam lever from rotating reduces clamping force. Less than half a turn of the tension adjusting nut can make the difference between safe and unsafe clamping force.

**⚠ WARNING: The full force of the cam action is needed to clamp the seat post securely. Holding the nut with one hand and turning the lever like a wing nut with the other hand until everything is as tight as you can get it will not clamp the seat post safely.**

**⚠ WARNING: If you can fully close the cam lever without wrapping your fingers around the seat post or a frame tube for leverage, and the lever does not leave a clear imprint in the palm of your hand, the tension is insufficient. Open the lever; turn the tension adjusting nut clockwise a quarter turn; then try again.**

#### **4. C. BRAKES**

There are three general types of bicycle brakes: rim brakes, which operate by squeezing the wheel rim between two brake pads; disc brakes, which operate by squeezing a hub-

mounted disc between two brake pads; and internal hub brakes. All three can be operated by way of a handlebar mounted lever. On some models of bicycle, the internal hub brake is operated by pedaling backwards. This is called a Coaster Brake.

**⚠ WARNING:**

1. Riding with improperly adjusted brakes, worn brake pads, or wheels on which the rim wear mark is visibly worn is dangerous and can result in serious injury or death.
2. Applying brakes too hard or too suddenly can lock up a wheel, which could cause you to lose control and fall. Sudden or excessive application of the front brake may pitch the rider over the handlebars, which may result in serious injury or death.
3. Some bicycle brakes, such as disc brakes and linear-pull brakes, are extremely powerful. Take extra care in becoming familiar with these brakes and exercise particular care when using them.
4. Some bicycle brakes are equipped with a brake force modulator, a small, cylindrical device through which the brake control cable runs and which is designed to provide a more progressive application of braking force. A modulator makes the initial brake lever force more gentle, progressively increasing force until full force is achieved. If your bike is equipped with a brake force modulator, take extra care in becoming familiar with its performance characteristics.
5. Disc brakes can get extremely hot with extended use. Be careful not to touch a disc brake until it has had plenty of time to cool.
6. See the brake manufacturer's instructions for operation and care of your brakes, and for when brake pads must be replaced. If you do not have the manufacturer's instructions, see your dealer or contact the brake manufacturer.

#### **4. C 1. BRAKE CONTROLS AND FEATURES**

It's very important to your safety that you learn and remember which brake lever controls which brake on your bike. Traditionally, the right brake lever controls the rear brake and the left brake lever controls the front brake; but, to make sure your bike's brakes are set up this way, squeeze one brake lever and look to see which brake, front or rear, engages. Now do the same with the other brake lever.

Make sure that your hands can reach and squeeze the brake levers comfortably. If your hands are too small to operate the levers comfortably, consult your dealer before riding the bike. The lever reach may be adjustable; or you may need a different brake lever design.

Ask your dealer to make sure that you understand the way the brakes work on your bike and check each time to make sure both brakes work correctly before you get on the bike.

#### **4. C 2. HOW BRAKES WORK**

The braking action of a bicycle is a function of the friction between the braking surfaces. To make sure that you have maximum friction available, keep your wheel rims and brake pads or the disk rotor and caliper clean and free of dirt, lubricants, waxes or polishes.

Brakes are designed to control your speed, not just to stop the bike. Maximum braking force for each wheel occurs at the point just before the wheel “locks up” (stops rotating) and starts to skid. Once the tire skids, you actually lose most of your stopping force and all directional control. You need to practice slowing and stopping smoothly without locking up a wheel. The technique is called progressive brake modulation. Instead of jerking the brake lever to the position where you think you’ll generate appropriate braking force, squeeze the lever, progressively increasing the braking force. If you feel the wheel begin to lock up, release pressure just a little to keep the wheel rotating just short of lockup. It’s important to develop a feel for the amount of brake lever pressure required for each wheel at different speeds and on different surfaces. To better understand this, experiment a little by walking your bike and applying different amounts of pressure to each brake lever, until the wheel locks.

When you apply one or both brakes, the bike begins to slow, but your body wants to continue at the speed at which it was going. This causes a transfer of weight to the front wheel (or, under heavy braking, around the front wheel hub, which could send you flying over the handlebars).

A wheel with more weight on it will accept greater brake pressure before lockup; a wheel with less weight will lock up with less brake pressure. So, as you apply brakes and your weight is transferred forward, you need to shift your body toward the rear of the bike, to transfer weight back on to the rear wheel; and at the same time, you need to both decrease rear braking and increase front braking force. This is even more important on descents, because descents shift weight forward.

Two keys to effective speed control and safe stopping are controlling wheel lockup and weight transfer. This weight transfer is even more pronounced if your bike has a front suspension fork. Front suspension “dips” under braking, increasing the weight transfer (see also Section 4.F). Practice braking and weight transfer techniques where there is no traffic or other hazards and distractions.

Everything changes when you ride on loose surfaces or in wet weather. It will take longer to stop on loose surfaces or in wet weather. Tire adhesion is reduced, so the wheels have less cornering and braking traction and can lock up with less brake force. Moisture or dirt on the brake pads reduces their ability to grip. The way to maintain control on loose or wet surfaces is to go more slowly.

#### **4. D. GEARS**

Your multi-speed bicycle will have a derailleur drivetrain (see 4.D1 below), an internal gear hub drivetrain (see 4.D2 below) or, in some special cases, a combination of the two.

How a derailleur drivetrain works if your bicycle has a derailleur drivetrain, the gear-changing mechanism will have:

- a rear cassette or freewheel sprocket cluster
- a rear derailleur

- usually a front derailleur
- one or two shifters
- one, two or three front sprockets called chainrings
- a drive chain

#### **4. D 1. GEAR SHIFTING**

There are several different types and styles of shifting controls: levers, twist grips, triggers, combination shift/brake controls and push-buttons. Ask your dealer to explain the type of shifting controls that are on your bike, and to show you how they work.

The vocabulary of shifting can be pretty confusing. A downshift is a shift to a “lower” or “slower” gear, one which is easier to pedal. An upshift is a shift to a “higher” or “faster”, harder to pedal gear. What’s confusing is that what’s happening at the front derailleur is the opposite of what’s happening at the rear derailleur (for details, read the instructions on Shifting the Rear Derailleur and Shifting the Front Derailleur below). For example, you can select a gear which will make pedaling easier on a hill (make a downshift) in one of two ways: shift the chain down the gear “steps” to a smaller gear at the front, or up the gear “steps” to a larger gear at the rear. So, at the rear gear cluster, what is called a downshift looks like an upshift. The way to keep things straight is to remember that shifting the chain in towards the centerline of the bike is for accelerating and climbing and is called a downshift. Moving the chain out or away from the centerline of the bike is for speed and is called an upshift.

Whether upshifting or downshifting, the bicycle derailleur system design requires that the drive chain be moving forward and be under at least some tension. A derailleur will shift only if you are pedaling forward.

**⚠ CAUTION: Never move the shifter while pedaling backward, nor pedal backwards immediately after having moved the shifter. This could jam the chain and cause serious damage to the bicycle.**

#### **4. D 2. SHIFTING THE REAR DERAILLEUR**

The rear derailleur is controlled by the right shifter. The function of the rear derailleur is to move the drive chain from one gear sprocket to another. The smaller sprockets on the gear cluster produce higher gear ratios. Pedaling in the higher gears requires greater pedaling effort, but takes you a greater distance with each revolution of the pedal cranks. The larger sprockets produce lower gear ratios. Using them requires less pedaling effort, but takes you a shorter distance with each pedal crank revolution. Moving the chain from a smaller sprocket of the gear cluster to a larger sprocket results in a downshift. Moving the chain from a larger sprocket to a smaller sprocket results in an upshift. In order for the derailleur to move the chain from one sprocket to another, the rider must be pedaling forward.

#### **4. D 3. SHIFTING THE FRONT DERAILLEUR:**

The front derailleur, which is controlled by the left shifter, shifts the chain between the larger and smaller chainrings. Shifting the chain onto a smaller chainring makes

pedaling easier (a downshift). Shifting to a larger chainring makes pedaling harder (an upshift).

#### **4. D 4. WHICH GEAR SHOULD I BE IN?**

The combination of largest rear and smallest front gears is for the steepest hills. The smallest rear and largest front combination is for the greatest speed. It is not necessary to shift gears in sequence. Instead, find the “starting gear” which is right for your level of ability — a gear which is hard enough for quick

acceleration but easy enough to let you start from a stop without wobbling — and experiment with upshifting and downshifting to get a feel for the different gear combinations. At first, practice shifting where there are no obstacles, hazards or other traffic, until you’ve built up your confidence. Learn to anticipate the need to shift, and shift to a lower gear before the hill gets too steep. If you have difficulties with shifting, the problem could be mechanical adjustment. See your dealer for help.

**⚠ WARNING: Never shift a derailleur onto the largest or the smallest sprocket if the derailleur is not shifting smoothly. The derailleur may be out of adjustment and the chain could jam, causing you to lose control and fall.**

#### **4. D 5. WHAT IF IT WON'T SHIFT GEARS?**

If moving the shift control one click repeatedly fails to result in a smooth shift to the next gear chances are that the mechanism is out of adjustment. Take the bike to your dealer to have it adjusted.

#### **4. D 6. HOW AN INTERNAL GEAR HUB DRIVETRAIN WORKS**

If your bicycle has an internal gear hub drivetrain, the gear changing mechanism will consist of:

- a 3, 5, 7, 8, 12 speed or possibly an infinitely variable internal gear hub
- one, or sometimes two shifters
- one or two control cables
- one front sprocket called a chainring
- a drive chain

#### **4. D 7. SHIFTING INTERNAL GEAR HUB GEARS**

Shifting with an internal gear hub drivetrain is simply a matter of moving the shifter to the indicated position for the desired gear ratio. After you have moved the shifter to the gear position of your choice, ease the pressure on the pedals for an instant to allow the hub to complete the shift.

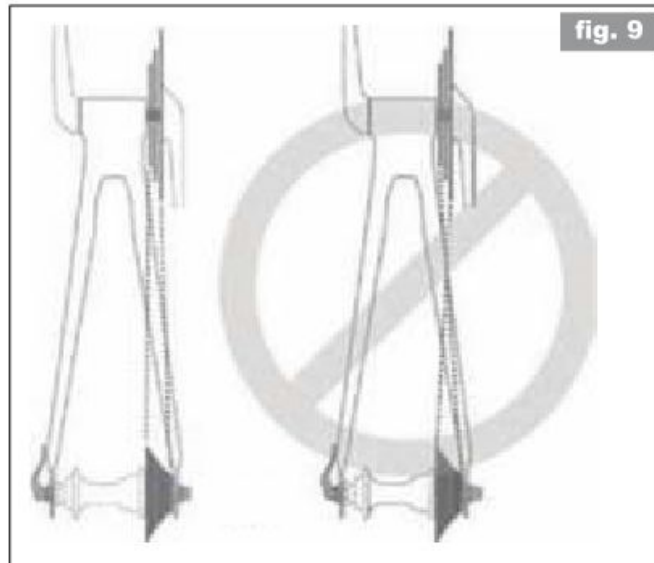


fig. 9



#### **4. D 8. WHICH GEAR SHOULD I BE IN?**

The numerically lowest gear (1) is for the steepest hills. The numerically largest gear is for the greatest speed. Shifting from an easier, “slower” gear (like 1) to a harder, “faster” gear (like 2 or 3) is called an upshift. Shifting from a harder, “faster” gear to an easier, “slower” gear is called a downshift. It is not necessary to shift gears in sequence. Instead, find the “starting gear” for the conditions — a gear which is hard enough for quick acceleration but easy enough to let you start from a stop without wobbling — and experiment with upshifting and downshifting to get a feel for the different gears. At first, practice shifting where there are no obstacles, hazards or other traffic, until you’ve built up your confidence. Learn to anticipate the need to shift, and shift to a lower gear before the hill gets too steep. If you have difficulties with shifting, the problem could be mechanical adjustment. See your dealer for help.

#### **4. D 9. WHAT IF IT WON'T SHIFT GEARS?**

If moving the shift control one click repeatedly fails to result in a smooth shift to the next gear chances are that the mechanism is out of adjustment. Take the bike to your dealer to have it adjusted.

#### **4. E. PEDALS**

- 1. Toe Overlap is when your toe can touch the front wheel when you turn the handlebars to steer while a pedal is in the forwardmost position. This is common on small-framed bicycles, and is avoided by keeping the inside pedal up and the outside pedal down when making sharp turns. On any bicycle, this technique will also prevent the inside pedal from striking the ground in a turn.**

**⚠ WARNING: Toe Overlap could cause you to lose control and fall. Ask your dealer to help you determine if the combination of frame size, crank arm length, pedal design and shoes you will use results in pedal overlap. Whether you have overlap or not, you must keep the inside pedal up and the outside pedal down when making sharp turns.**

2. Some bicycles come equipped with pedals that have sharp and potentially dangerous surfaces. These surfaces are designed to add safety by increasing grip between the rider’s shoe and the pedal. If your bicycle has this type of high-performance pedal, you must take extra care to avoid serious injury from the pedals’ sharp surfaces. Based on your riding style or skill level, you may prefer a less aggressive pedal design, or chose to ride with shin pads. Your dealer can show you a number of options and make suitable recommendations.
3. Toeclips and straps are a means to keep feet correctly positioned and engaged with the pedals. The toeclip positions the ball of the foot over the pedal spindle, which gives maximum pedaling power. The toe strap, when tightened, keeps the foot engaged throughout the rotation cycle of the pedal. While toeclips and straps give some benefit with any kind of shoe, they work most effectively with cycling shoes designed for use with toeclips. Your dealer can explain how toeclips and straps

work. Shoes with deep treaded soles or welts which might make it more difficult for you to insert or remove your foot should not be used with toeclips and straps.

**⚠ WARNING: Getting into and out of pedals with toeclips and straps requires skill which can only be acquired with practice. Until it becomes a reflex action, the technique requires concentration which can distract your attention and cause you to lose control and fall. Practice the use of toeclips and straps where there are no obstacles, hazards or traffic. Keep the straps loose, and don't tighten them until your technique and confidence in getting in and out of the pedals warrants it. Never ride in traffic with your toe straps tight.**

4. Clipless pedals (sometimes called "step-in pedals") are another means to keep feet securely in the correct position for maximum pedaling efficiency. They have a plate, called a "cleat," on the sole of the shoe, which clicks into a mating spring-loaded fixture on the pedal. They only engage or disengage with a very specific motion which must be practiced until it becomes instinctive. Clipless pedals require shoes and cleats which are compatible with the make and model pedal being used. Many clipless pedals are designed to allow the rider to adjust the amount of force needed to engage or disengage the foot. Follow the pedal manufacturer's instructions, or ask your dealer to show you how to make this adjustment. Use the easiest setting until engaging and disengaging becomes a reflex action, but always make sure that there is sufficient tension to prevent unintended release of your foot from the pedal.

**⚠ WARNING: Clipless pedals are intended for use with shoes specifically made to fit them and are designed to firmly keep the foot engaged with the pedal. Do not use shoes which do not engage the pedals correctly.**

Practice is required to learn to engage and disengage the foot safely. Until engaging and disengaging the foot becomes a reflex action, the technique requires concentration which can distract your attention and cause you to lose control and fall. Practice engaging and disengaging clipless pedals in a place where there are no obstacles, hazards or traffic; and be sure to follow the pedal manufacturer's setup and service instructions. If you do not have the manufacturer's instructions, see your dealer or contact the manufacturer.

#### **4. F. DROPPER SEATPOST**

If your bike is fitted with a dropper seatpost the following instructions apply. First time use: push the remote lever on the handlebar until the seat post reaches full extension, once fully extended set the seatpost to the riders normal riding position with the seat clamp. Normal use: push the remote lever on the handlebar while seated to drop the seatpost when approaching a technical section or descent to allow more freedom of movement around the bike, release the lever once the desired height is achieved. Once the technical section has passed or the descent has been completed push and hold the lever and stand up on the bike to allow the seat post to reach full extension, now

release the lever and return to the normal sitting position.

#### **4. G. BICYCLE SUSPENSION**

Many bicycles are equipped with suspension systems. There are many different types of suspension systems — too many to deal with individually in this Manual. If your bicycle has a suspension system of any kind, be sure to read and follow the suspension manufacturer's setup and service instructions. If you do not have the manufacturer's instructions, see your dealer or contact the manufacturer.

If your Silverback is a dual suspension bicycle, it has a very advanced multi-link suspension design. Proper care and maintenance is critical to your safety and also to ensure long lasting performance. All maintenance and repairs should be performed by your Authorized Silverback dealer.

**⚠ WARNING: Failure to maintain, check and properly adjust the suspension system may result in suspension malfunction, which may cause you to lose control and fall.**

If your bike has suspension, the increased speed you may develop also increases your risk of injury. For example, when braking, the front of a suspended bike dips. You could lose control and fall if you do not have experience with this system. Learn to handle your suspension system safely. See also Section 4.C.

##### **Setup & Maintenance**

For proper set up and maintenance please consult the owner's manual for the suspension fork and/or rear shock that you received with your bicycle. If you did not receive the manual(s) please contact the fork or shock manufacturer and they can send you one, or download one from their website.

##### **Inspection of Front and/or Rear Suspension**

Before every ride ensure that the suspension fork and/or rear shock is operating properly. After every 10 hours of use inspect the front fork to make sure there is no hydraulic oil leaking from the fork and that it is operating properly. On the rear suspension, check shock mounting bolts and pivot bolts for tightness. For other areas that should be checked, consult your owner's manual for your front fork and/or rear shock.

**⚠ WARNING: Changing suspension adjustment can change the handling and braking characteristics of your bicycle. Never change suspension adjustment unless you are thoroughly familiar with the suspension system manufacturer's instructions and recommendations, and always check for changes in the handling and braking characteristics of the bicycle after a suspension adjustment by taking a careful test ride in a hazard-free area.**

Suspension can increase control and comfort by allowing the wheels to better follow the terrain. This enhanced capability may allow you to ride faster; but you must

not confuse the enhanced capabilities of the bicycle with your own capabilities as a rider. Increasing your skill will take time and practice. Proceed carefully until you have learned to handle the full capabilities of your bike.

**⚠ WARNING: Not all bicycles can be safely retrofitted with some types of suspension systems. Before retrofitting a bicycle with any suspension, check with the bicycle's manufacturer to make sure that what you want to do is compatible with the bicycle's design. Failing to do so can result in catastrophic frame failure.**

#### **4. G 1. REAR SHOCK CONTROLS**

##### **Installing Your Shock**

If you are installing your shock on a bike in which the shock is not original equipment:

1. Install the shock.
2. Remove the main air chamber air cap and let all the air out of the main air chamber.
3. Carefully cycle the suspension through its entire travel.
4. Check that all parts of the shock are clear of the frame and swingarm as it cycles through the travel.
5. Pressurize your main air chamber to a minimum of 50 psi and no more than 300psi. You will tune to a more specific air pressure in the Setting Sag section below.
6. Set sag.

##### **General Maintenance**

There may be a small amount of air sleeve lubricant residue on the body. This is normal. If this residual air sleeve lubricant is not present, this is an indication that the air sleeve should be relubricated. Some other things to consider for all shock models:

- If you ride in extreme conditions, service your shock and air sleeve more frequently. Check the maintenance schedule for your shock.
- Wash your shock with soap and water only.
- Do not use a high pressure washer to clean your shock.
- Internal service should be performed by an Authorized Service Center.

##### **Before You Ride**

1. Clean the outside of your shock with soap and water and wipe dry with a soft dry rag. Do not use a high pressure washer on your shock.
2. Inspect entire exterior of shock for damage. The shock should not be used if any of the exterior parts appear to be damaged. Please contact your local dealer for further inspection and repair.
3. Check that quick-release levers (or thru-axle pinch bolts) are properly adjusted and tightened.
4. Check headset adjustment. If loose, adjust according to manufacturer's recommendations.
5. Check that brake cables or hoses are properly fastened.
6. Check that the front and rear brakes operate properly on flat land.

## Setting Sag

To set sag:

1. Measure sag, and compare it to the recommended sag setting shown in the Air Spring Setting Guidelines table below. Continue if the sag is not to specification.
2. Locate the Schrader air valve on the shock and remove the air valve cap.
3. Screw the High Pressure Pump onto the air valve until the pump shows pressure on the gauge. Do not over-tighten.
4. Add air pressure until desired pressure is shown on the gauge. Refer to the Air Spring Setting Guidelines table below for the proper sag setting.
5. Unthread the pump from the air valve and measure sag.
6. Repeat steps 2-5 until proper sag is achieved, then replace the air valve cap.

## Adjusting Rebound

Rebound controls the rate at which your shock returns after it has been compressed. The proper rebound setting is a personal preference, and changes with rider weight, riding style and conditions. A rule of thumb is that rebound should be as fast as possible without kicking back and pushing the rider off the saddle. For slower rebound, turn the red adjuster knob clockwise. For faster rebound, turn the red adjuster knob counterclockwise.

## 4. G 2. FORK CONTROLS

### Air Spring

An air spring is used to achieve maximum performance as well as saving weight over using a steel coil spring. With air you can achieve an infinitely adjustable spring rate that feel much more natural and sensitive than a traditional fork.



### Turn & Lock

A hydraulic cartridge damping system with compression adjustment and lock-out.



### Rebound Adjust

A hydraulic adjustable cartridge that lets you externally set the forks rebound.



### **Mechanical Lock**

Mechanical lock-out system (not hydraulic).



### **Preload Adjustment**

An adjustable top cap that lets a rider adjust the pre-load of the spring depending on rider weight and desired feel.



### **Firm mode - fork and shock**

This mode is should be used in situations where the bike will be used on smooth surfaces and suspension is not necessary. This setting is increases low speed compression damping and firms up the suspension for increased pedaling efficiency. This mode should not be used for bumpy off-road terrain. For these scenarios use medium and open mode.

### **Medium mode - fork and shock**

This mode is should be used in situations where the bike will be used on smooth to moderately rough terrain and mostly in situations that involve more pedaling. This is a good option for climbing and flat long sections of riding. The low speed compression damping is increased and the suspension is less sensitive to slow and small movements. Large impacts will still be absorbed.

### **Open mode - fork and shock**

This mode is should be used in situations where the bike will be used on rough terrain and works well for high speed riding. This should always be used when descending. The suspension will be plush and smooth and will be more optimized for large impacts. Small bump sensitivity will be improved due to decreased low speed compression damping.



## 4. H. TIRES AND TUBES

### Tires

Bicycle tires are available in many designs and specifications, ranging from general purpose designs to tires designed to perform best under very specific weather or terrain conditions. If, once you've gained experience with your new bike, you feel that a different tire might better suit your riding needs, your dealer can help you select the most appropriate design.

The size, pressure rating, and on some high performance tires the specific recommended use, are marked on the sidewall of the tire. The part of this information which is most important to you is Tire Pressure.

**⚠ WARNING: Never inflate a tire beyond the maximum pressure marked on the tire's sidewall. Exceeding the recommended maximum pressure may blow the tire off the rim, which could cause damage to the bike and injury to the rider and bystanders.**

The best and safest way to inflate a bicycle tire to the correct pressure is with a bicycle pump which has a built-in pressure gauge.

**⚠ WARNING: There is a safety risk in using gas station air hoses or other air compressors. They are not made for bicycle tires. They move a large volume of air very rapidly, and will raise the pressure in your tire very rapidly, which could cause the tube to explode.**

Tire pressure is given either as maximum pressure or as a pressure range. How a tire performs under different terrain or weather conditions depends largely on tire pressure. Inflating the tire to near its maximum recommended pressure gives the lowest rolling resistance; but also produces the harshest ride. High pressures work best on smooth, dry pavement.

Very low pressures, at the bottom of the recommended pressure range, give the best performance on smooth, slick terrain such as hard-packed clay, and on deep, loose surfaces such as deep, dry sand.

Tire pressure that is too low for your weight and the riding conditions can cause a puncture of the tube by allowing the tire to deform sufficiently to pinch the inner tube between the rim and the riding surface.

**⚠ CAUTION: Pencil type automotive tire gauges can be inaccurate and should not be relied upon for consistent, accurate pressure readings. Instead, use a high quality dial gauge.**

Ask your dealer to recommend the best tire pressure for the kind of riding you will most often do, and have the dealer inflate your tires to that pressure. Then, check inflation so

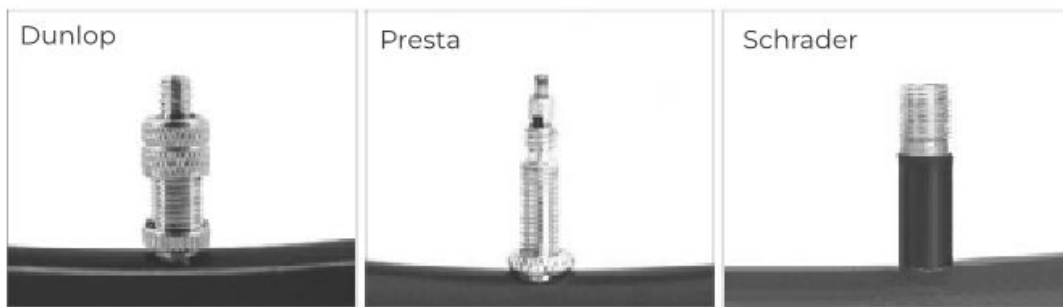
you'll know how correctly inflated tires should look and feel when you don't have access to a gauge. Some tires may need to be brought up to pressure every week or two, so it is important to check your tire pressures before every ride.

Some special high-performance tires have unidirectional treads: their tread pattern is designed to work better in one direction than in the other. The sidewall marking of a unidirectional tire will have an arrow showing the correct rotation direction. If your bike has unidirectional tires, be sure that they are mounted to rotate in the correct direction.

### Tire Valves

There are primarily two kinds of bicycle tube valves: The Schraeder Valve and the Presta Valve. The bicycle pump you use must have the fitting appropriate to the valve stems on your bicycle.

**The Schraeder valve** is like the valve on a car tire. To inflate a Schraeder valve tube,



remove the valve cap and clamp the pump fitting onto the end of the valve stem. To let air out of a Schraeder valve, depress the pin in the end of the valve stem with the end of a key or other appropriate object.

**The Presta valve** has a narrower diameter and is only found on bicycle tires. To inflate a Presta valve tube using a Presta headed bicycle pump, remove the valve cap; unscrew (counterclockwise) the valve stem lock nut; and push down on the valve stem to free it up. Then push the pump head on to the valve head, and inflate. To inflate a Presta valve with a Schraeder pump fitting, you'll need a Presta adapter (available at your bike shop) which screws on to the valve stem once you've freed up the valve. The adapter fits into the Schraeder pump fitting. Close the valve after inflation. To let air out of a Presta valve, open up the valve stem lock nut and depress the valve stem.

**⚠ WARNING: We highly recommend that you carry a spare inner tube when you ride your bike. Patching a tube is an emergency repair. If you do not apply the patch correctly or apply several patches, the tube can fail, resulting in possible tube failure, which could cause you to loose control and fall. Replace a patched tube as soon as possible.**



## 4. I. QUICKSTART GUIDE:

### S-ELECTRO E-BIKES (Shimano motor & Darfon battery)

1. **Charge the battery** (Refer to section 4.K.)

2. **Turn the power ON**

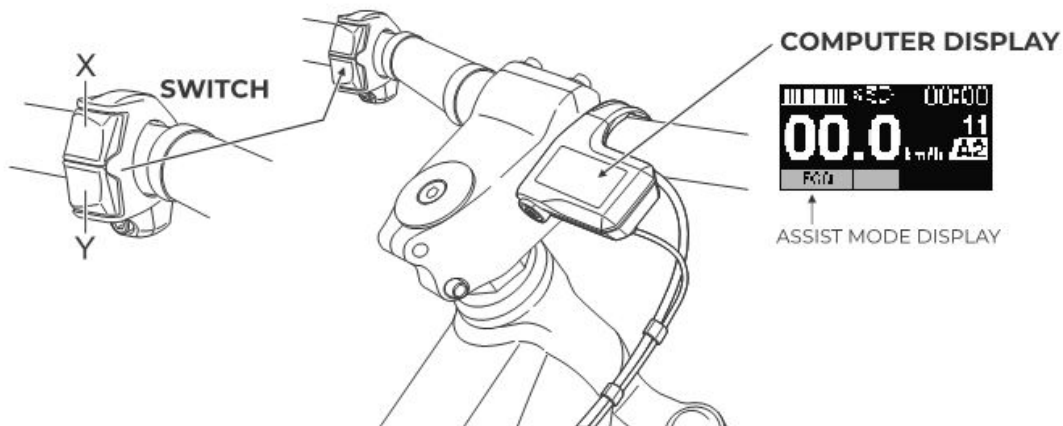
Power the system on by holding the power button located on the upper down tube non -drive side till the Shimano display mounted on the handlebar wakes up.



3. **Select assist mode:**

When the power is turned OFF, the assist mode resets to [OFF] and the bike will perform like a traditional bicycle.

To engage and control the Shimano STEPS motor assistance, use the X & Y buttons located on the handlebar switch. The selected assistance level will show on the Shimano SC-EM800 display. The X button will increase assistance, and Y button decrease assistance.



LED 2	ASSIST MODE DISPLAY
OFF	[OFF]
Y ▲	▼ X
LIGHT BLUE	[ECO]
▲	▼
GREEN	[TRAIL] / [NORMAL]
▲	▼
YELLOW	[BOOST] / [HIGH]

This diagram shows the display for the [BASIC] assist profile. For the [Fine tune] assist profile display, refer to the user's manuals for your cycle computer and switch unit.

**TIP:** Depending on the assist bicycle, you change the assist mode with the function switch of the satellite system ON/OFF switch. Refer to "Satellite System ON/OFF Switch User's Manual" for details.

For further adjustment of the comfort level of assistance and to update firmware, please visit the Shimano website: <https://bike.shimano.com/e-tube/project.html>

4. Intelligent "Walk Assist" engages the motor to assist you in pushing your bike, at up to 5 km/h, even without manually pedaling. To engage "walk assist" mode with the Shimano STEPS system, please follow these instructions:
  - Stop the bike and dismount, then hold down the Y button until the walk level of assistance is displayed on the unit, then release the button.
  - To use the walk assist, press the Y button and note that the pedals will rotate to push the bike forward.
  - To stop the assist, release the Y button.
  - To exit the walk assist level, press the X button.
5. The Shimano SC-EM800 display can send its display information to a Bluetooth® LE compatible device, and also connect to ANT® wireless devices such as 3rd party cycling computers to display the information on the SC-EM800 unit. E-TUBE RIDE can be used to check travelling data on a smartphone connected over Bluetooth® LE. For more information, visit: <https://bike.shimano.com/en-US/e-tube/ride.html>



#### 4. J. BATTERY (Darfon)

##### Charging

1. On bike charging can be done by connecting the charger to the charger port located on the lower non-drive side down tube. The battery charge level can be seen on the Shimano SC-EM800 display unit when powered on.
2. The charging light on the charger will [Blink] RED when actively charging and change to [Steady] GREEN when fully charged.

##### How to charge the battery externally (removed from the bike)

1. Make sure that the connectors on the adapter is alighted on the connectors on the battery. Please note the adapters are not included in the delivery of the bicycle. They must be purchased separately.

2. Plug the adapter in the battery and connect the charging cable to the adapter and now the battery can be charged externally.

### Accessory charging

Some e-bikes, such as the Silverback Diamond series, feature a USB-C port for charging accessories (cellphones, etc).



### Battery Removal

1. Remove battery cover from downtube - Using a flat screwdriver or coin, turn the locking tab 90° then gently pull the cover away from the frame.



2. Unlock to release the battery - Remove the rubber plug, insert key in the battery lock, support the battery with the hand at the bottom to avoid battery falling out of the bicycle. Turn to unlock the battery. The front portion of battery will release by a few mm and lean on its internal safety clip to stop battery falling out.



3. There is space then to insert a finger into this opening to pull on the metal release tab to allow battery to be taken out the frame by hinging the battery down and forwards.



### Battery Installation

1. Make sure that connectors on the battery are aligned with the connectors in the battery holder within the bike.



2. Insert the bottom of the battery into the frame's downtube (make sure the key is removed from lock), engaging the battery's lower bracket, and then engage the upper clip by pushing the battery upwards into the frame. The **battery must make 2 clicks** in order to be correctly installed.



3. The battery cover can now be inserted into the frame, with lower edge first. Close the cover against the frame and turn the battery cover tab 90 degrees upwards to secure the tab in the frame and ensure that it is not loose before riding.



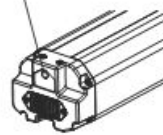
Darfon Battery & Charger	
Rated Voltage	36V DC
Rated Capacity	19.2Ah
Energy Content	708Wh
Rated Charge Voltage	41.25V
Maximum Charge Current	5.6A
Discharge Current	25A
Battery Type	Lithium ion battery
Operating Temperature Range: During Discharge	-10 °C ~55 °C
Operating Temperature Range: During Charge	0 °C ~45 °C
Storage Temperature	-20 °C ~ 55 °C (1 month)-20 °C ~45 °C (3 month) The best temperature in transport is 20 °C~25 °C
Dimensions	410 x 88,4 x 74 (mm)
Weight	4.1KG

### Battery LED Indicator

Battery Status	LED Display
Power OFF*	●●●●● No LED
Display Time Out	LED OFF - 5s later after pressing LED button ※ Support on Standby/Discharge Mode
Charging	Scrolling
Full Charge	○ ○ ○ ○ ○ 5 LEDs
Battery is going to shutdown	○ ● ● ● ● 1, 3, 5 LED-ON
0% - 5%	○ ● ● ● ● 1 LED Flashing
6% - 20%	○ ● ● ● ● 1 LED
21% - 40%	○ ○ ● ● ● 2 LEDs
41% - 60%	○ ○ ○ ● ● 3 LEDs
61% - 80 %	○ ○ ○ ○ ● 4 LEDs
81% - 100 %	○ ○ ○ ○ ○ 5 LEDs



LED Indicator



### Charger LED Indicator

Charger Status	LED Display
Only AC in (Battery is not connected)	Green
Charging	Red Flashing
Full Charge	Green
Battery Abnormal	Orange Flashing

Charger LED



### Battery Error LED Indicator

Error Status	LED Display
No Error	●●●●● 5 LEDs all OFF
Soft Start Fail	●●●●○ 2, 4 LEDs ON
Charger Fail	○●○●○● 2, 4 LEDs and 1, 3, 5 LEDs Flashing in turn
OCD Protection	○●●●○ 5th LED Flashing, 1 LED ON
SCD Protection	○●●●○ 5th LED Flashing, 1, 2 LEDs ON
OV Protection	○●●●○ 5th LED Flashing, 1, 2, 3 LEDs ON
UV Protection	○●●●○ 5th LED Flashing, 1, 2, 3, 4 LEDs ON
OTD Protection	●●●●○ 5th LED Flashing, 2 LED ON
OTC Protection	●●●●○ 5th LED Flashing, 2, 3 LEDs ON
UTD Protection	●●●●○ 5th LED Flashing, 2, 3, 4 LEDs ON
UTC Protection	●●●●○ 5th LED Flashing, 3 LED ON
Open Wire PF Protection	●●●●○ 5th LED Flashing, 3, 4 LEDs ON
Cell Unbalance PF Protection	●●●●○ 5th LED Flashing, 4 LED ON
OCC Protection	●●●●○ 5th LED Flashing, 2, 4 LEDs ON
AFE Fault PF Protection	○●●●○ 5th LED Flashing, 1, 3 LEDs ON

### Attention

- Please fully charge battery before first use.
- Please charge battery with specific Darfon charger in case battery will be deteriorated.
- Please store battery with approximately 70% capacity if it is not used for a long period.
- Please charge battery every 3-6 months to approx. 30%. Do not let battery become completely drained out.
- Please always keep the charge port cap well-covered while not using it.
- Do not wash battery/charge port with high pressure water.
- ※Any other use or use that goes beyond the above is considered improper and may result in the loss of the warranty.



## 4. K. QUICKSTART:

### S-ELECTRO SUPERFAST E-BIKE (FSA motor & battery)

NOTICE: The FSA System HM 1.0 is equipped with an integrated torque sensor that self-calibrates each time the System is switched on. It is absolutely essential that there is no load on the pedals during turning ON (do not put your feet on the pedals when turning ON), otherwise, the torque sensor cannot be calibrated correctly.

It is not recommend turning the System OFF and ON while riding the bike. If you want to ride without motor assistance, just select level 1 - green.

#### Operation

1. Completely charge the battery, before the first use.  
If you don't plan to use the battery for long periods (more than 3 months), store it at a charge level between 30% and 60%. After 6 months, check the charge level and top up, if necessary, between 30% and 60%. A battery left discharged for a long period of time can be damaged and/ or its significantly reduce its charging capacity.
2. To turn ON the system, press the button for 1 second.
  - When switched on, the system automatically selects the ECO level (green).
  - Meanwhile, do not please your feet on the pedals and do not move the bike, it must be stationary (0km/h), in order to allow the torque sensor and speed sensor to calibrate themselves.
  - As soon as the light turns the green, the bike can be mounted, and feet placed on the pedals.
3. To select the desired assistance level, press the button: with each successive press,

Level 1	Level 2	Level 3	Level 4	Level 5
ECO: Green Light	Blue light	Pink Light	Yellow Light	BOOST: Red Light
Neutral	Active	Active	Active	Active

the assistance level increases: 1 green, 2 blue, 3 pink, 4 yellow, 5 red. At selected level 5, a further pressure on the key will return to level 1.

4. While using the system, regardless of the level of assistance selected, it will be possible to check the battery charge level. A flash of light, will be displayed every 2

 75-100%	 50-75%	 25-50%	 25%+
Green Flash	Blue Flash	Yellow Flash	Red Flash

seconds, indicating the state of charge of the battery.

• An accurate reading of the battery charge level can be made via the APP.

5. To turn OFF the system, press and hold the button for 4 seconds.

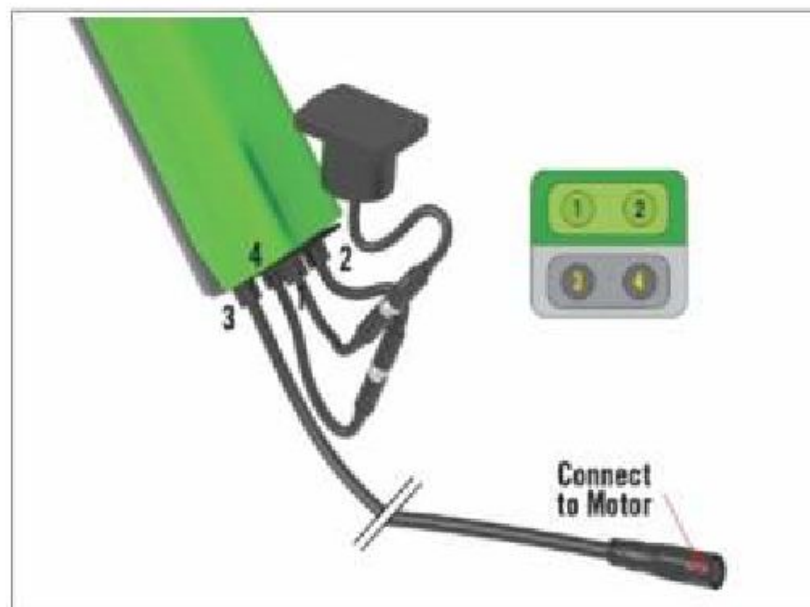
## Charging

Connect the battery charger to the main socket and connect the battery charger to the e-bike charging socket. The battery charger will automatically switch on and the e-bike button will start flashing every 2 seconds.

- **Red:** Charging. (Flashing e-bike button with colour level battery; See above, as battery level).
- **Green:** Full charge.

## Battery Removal

1. Ensure that the System is turned OFF before battery removal. Do not attempt to remove the battery, unless the bike is completely dry. A clean bike will limit the potential ingress of contamination into the electrical circuit.
2. Remove the top tube tray with button and USB-C, by undoing the countersunk bolt. Identify the button connector and disconnect it. Ensure the USB-C cable is not entangled with the battery. Reinstall the top tray, to ensure small parts are retained.
3. Remove the bottom bracket cover, by undoing the countersunk bolt. Identify the connectors for the charging port, USB-C and motor. Disconnect the aforementioned cables and ensure they are not entangles with the battery.
4. Locate the three battery fixing bolts on top of the down tube, located at the alloy carriers. Start with the top bolt, undoing it completely. The two lower bolt supports most of the battery weight and should be undone in unison, taking care not to drop the battery.
5. With the cables and fixing bolts removed, the battery can slide out from the down tube. Reinstall the bottom bracket cover to ensure small parts are retained.



## **Lights**

1. The front light is powered by the USB-C on the top tube. It is rated for 5V, 1A. Recommended front light is Supernova Mini 2 –USB-C to Supernova connector cable is required.
2. The rear light is powered independently and located on the seat post with a quarter turn mount. Recommended rear light is Garmin Varia RTL515 Rear-view Radar Taillight.

## **Sensors**

The FSA System HM1.0 sensors are integrated into the rear-hub motor. Allowing freedom of choice when it comes to crankset and chainring configurations.

## **Dropouts**

S-Electro Superfast features interchangeable dropouts to switch between 135x9mm for the rear-hub motor, and a conventional 142x12mm thru-axle configuration. Allowing the setup of conventional rear wheel to enable unassisted use of the bike. Both sets of dropouts are included with your purchase to ease any conversion need.

## **Front Axle**

Removal of the front axle is quick and easy. The non-drive side dropout is slotted, to allow for removal of the front wheel without removing the axle from the hub.

## **Steering Stop**

1. Fork race and bottom head tube feature a track and pin respectively, to limit the turning range. Due to the integrated nature of the stem, it is necessary to prevent the damage of the frame and stem.
2. In case of accidental damage to the pin, it can be interchanged for a new pin.

## **Fenders**

1. Although the S-Electro Superfast can take conventional fenders that make use of stays, it is also compatible with frame mounted fenders that have a floating appearance.
2. Locate the two fixing bolts and spacers under the fork crown to mount the front fender.
3. Locate the two fixing bolts and spacer behind the chainstay bridge and seat stay bridge respectively, to mount the rear fender.
4. Alternatively use the additional stay fixing points, should the fenders require additional fixing.

## **Device**

A outboard computer mount mounts under the stem, which houses a quarter turn tray. Your device of choice tray can be installed to use with your preferred cycling computer device.

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## **4. L. RIDING YOUR E-BIKE WITH / WITHOUT DRIVE ASSISTANCE**

### **Riding your E-bike without drive assistance**

All electric bikes function as normal bicycles when the motor is off, so you can simply ride your electric bike the same way you would a traditional bicycle, whether the motor is switched off or if the battery is dead. You can also ride the bike normally by simply switching the pedal-assist function to zero.

### **Riding with drive assistance**

It's a good idea to start in a flat, open, area. Electric bikes are heavier and switching gears while not riding is more difficult because of that weight. You need to wear a helmet riding an e-bike. If you can do it though, pick up the rear of the bike and turn the pedals a few times while shifting to an easy gear. Start out without assistance at all. Get the bike moving and when you feel steady and comfortable turn on the assistance. This process will help you feel in control as the assistance kicks in.

We recommend to do a test drive in an unfrequented surrounding and get used to the bike and power of strong motor and high acceleration before taking the bike to public places and riding it there, as it might cause the accidents.

Please make sure you have undergone training before riding a pedelec. Because pedelecs provide electric assistance for speeds up to 25 km/h and support your pedalling power, you can sometimes travel very quickly. Reaction times are different from those of a normal bicycle.

However, it also might not be possible to shift gears and start riding without the electric assist, because of the weight of an electric bike. If you need the electric assist to get started, go ahead and use it. Be aware of the direction of the bike. Make sure it's clear, and you are going to be able to concentrate on riding. Make sure the electric assist is in the lowest setting and that you know where the brakes are. Also, make sure you know which is the front brake and the rear brake.

In order to turn on the system, you simply hold down the power button located on the bike (depending on the model, it can be located either on the side or on the top tube), shown below. When it turns on, the display on the handlebar will light up with the "Shimano Steps" logo.

#### 4. M. E-BIKE RANGE

"E-Bike range is influenced by many factors, such as intensity of usage and other external factors such as terrain. Range values are calculated theoretically. Real use cases will differ".

It's important to keep in mind that riding range for all e-bikes depend on many factors including:

- Total payload, rider + gear
- Average speed
- Tire pressure
- Hill grade
- Wind
- Road Bumps
- Riding position
- Outside temperature
- How much you pedal
- Tire type
- Type of battery
- Age of the battery

There are several different characteristics of electric bikes that affect how many kilometres you get per charge. Like miles per gallon in a car, the range is there for a reason — there's no guaranteed number of miles or the number of hours you can ride per charge.

As for the range value, it can be calculated theoretically with the following variables:

- Motor wattage
- Battery capacity
- Level of assistance and average speed
- Not taking into account external factors.

$$\begin{aligned} & \text{Battery Capacity} \\ & \div ( \text{Motor wattage} \times \text{Assistance level} ) \\ & \times \text{Average Speed} \\ & = \text{Theoretical Range} \end{aligned}$$

Examples:

**Low assist**

$$\begin{aligned} & 720 \text{ Wh} \\ & \div ( 250 \text{ Wh} \times 75\% ) \\ & \times 25 \text{ km/h} \\ & = 96 \text{ km} \end{aligned}$$

**Medium assist**

$$\begin{aligned} & 720 \text{ Wh} \\ & \div ( 250 \text{ Wh} \times 100\% ) \\ & \times 25 \text{ km/h} \\ & = 72 \text{ km} \end{aligned}$$

**High assist**

$$\begin{aligned} & 720 \text{ Wh} \\ & \div ( 250 \text{ Wh} \times 100\% ) \\ & \times 25 \text{ km/h} \\ & = 48 \text{ km} \end{aligned}$$

#### **4. N. E-BIKE USAGE WITH TRAILER**

Electric bikes are ideal for towing trailers. The assistance from the motor will allow you to go further and faster without noticing the extra weight - especially if you live in hilly areas. Whether you're towing an child trailer or need extra capacity for carrying cargo or camping equipment.

The trailer with its actual weight including cargo is regarded as part of the permissible weight of your Silverback pedelec, make sure that the permissible overall weight is not exceeded. Mounting the trailer coupling to frame tubes or to a rear stays of the frame or the seat post is not approved.

Most trailers attach to your rear axle. This means they will work with just about any bike with a quick-release skewer (including bikes with disc brakes). Depending on the bike's axle, a hitch adapter may be needed.

**⚠ WARNING: make sure you transport your children safely in the trailer, buckle them up, as uncontrolled movements of the child can make the your pedelec or the trailer topple over.**

#### **4. O. E-BIKE BATTERY USE, DRIVE MAINTENANCE AND CARE**

The battery use depends on the type of bike, the battery capacity, the ambient temperature and how you use it: a fit rider on flattish roads or trails may be riding without assistance a lot of the time, whereas a less fit rider on hilly terrain is likely to be calling on the motor to help a lot more.

An electric bike, like any bike, needs regular maintenance. Cleaning and taking care of your e-bike will keep it running smoothly, efficiently and safely, all of which can contribute to a longer lifespan for the bike and its battery and motor.

**⚠ WARNING: Keep your electric bike's battery stored (or your whole e-bike if the battery is not removable) someplace with normal room temperatures (20-22°C / 55-75°F). When storing your eBike for 30+ days, keep it charged at 50-70%. Do not expose your battery or the charger to the straight exposure of the sun.**

**⚠ WARNING: Lithium batteries (and indeed any type of rechargeable battery) do not like to be left discharged. It is good practice to recharge as soon as is reasonably possible after the battery goes flat. We recommend charging after every ride, that way your electric bike is always ready for your next outing.**

**⚠ WARNING: Do not use a rechargeable battery or a charger that is defective.**

**⚠ WARNING: Using a microfiber towel or other highly-absorbent cloth, wipe down the bicycle with special attention to bolts and electrical connections. After washing and drying your E-bike, remove the battery and ensure all connection**

ports are dry with a clean, dry microfiber towel. The drive is not approved for steam cleaning, high-pressure cleaning or cleaning with a water hose.

**⚠ WARNING:** Always dry your E-bike fully before storing it. Residual water left sitting on electrical components could cause damage to the drive unit and the battery.

**⚠ WARNING:** Charge your battery only with the supplied charger. Do not use the charger of any other manufacturer, even if the charger points are matching your battery charging points.

**⚠ WARNING:** These electronic components are NOT water resistant. Once we have cleaned the bike with cloths and rags, we can remove the battery for a more thorough cleaning of the battery compartment, always being careful not to exert too much pressure.

**⚠ WARNING:** Dirt and mud increase wear on components and, when mixed with water and grease, can form a paste that will, at best, decrease the efficiency of your bike and, at worst, quickly wear through consumable parts.

**⚠ WARNING:** Lubricate the transmission after flushing. Once cleaning is complete, it is time to lubricate the chain with a specific product. There are specific waxes and oils for dry and wet climates that can be found at very affordable prices. Re-lubricating the transmission is essential for the proper functioning of the gears and to extend the life of these components. Be careful not to get the disc brakes dirty, however, as this will make them less effective and could cause an accident.

**⚠ WARNING:** Recharge your batteries before they are completely dead. Not letting it die completely will extend the battery lifespan. If you are preparing to store your batteries for a period of time, make sure you do so at half charge. Charge the battery at a temperature between 0 - 40°C (32 - 104°F), preferably at an temperature of 20°C (68°F).

**⚠ WARNING:** If these batteries are recharged repeatedly after being only partially discharged, they gradually lose usable capacity due to a reduced working voltage. Lithium-ion batteries, in contrast, are considered to have no memory effect.

**⚠ WARNING:** Rechargeable batteries of any kind should not be placed in your trash can (or dumpster). It is illegal in some states to do so because rechargeable batteries contain heavy metals that can be hazardous to the environment.

**⚠ WARNING:** You should also regularly check your ebike's tyre pressures. Under-inflated tyres are not only potentially dangerous, but they can also waste power

and reduce efficiency, meaning you'll get less out of a battery charge. Equally, running tyres at too high a pressure can compromise comfort and grip, especially if you're riding off-road.

**⚠ WARNING:** Regularly safety check to ensure that all bolts and axles are tightened to the manufacturer's recommended torque settings, check your tyres for anything that might cause a puncture and test for any loose spokes.

**⚠ WARNING:** The motor itself is in a factory-sealed unit and you should never attempt to take it apart for maintenance or to try and fix a problem. If it seems like there is something wrong with the motor or system, visit the store where the bike was purchased or take the bike to a reputable dealer.

**⚠ WARNING:** Imminent risk of an accident! Do not mount new or spare parts that are not designed for your Silverback E-bike or that suspend the operating limitations of the 25 km/h assist and the rated power of 250 W. Your Silverback E-Bike is then no longer approved for use on public roads. You may lose insurance protection.

#### **4.P. E-BIKE TRANSPORTATION**

##### **Factors Affecting E-bike Transport**

Weight: E-bikes are heavier than bikes that do not have electric pedal-assist.

Battery: E-bikes have a battery and electronic components.

Before you start your trip, get yourself familiar about the transportation requirements for the Ebikes and read about the regulations and rules about the pedelec transport in the countries through which you intend to travel.

##### **Top Tips for Transporting E-bikes in or on a Vehicle**

- If you have a van, sport utility vehicle or hatchback, you can put your E-bike in the back of your vehicle. Transporting your bike inside ensures your bike and components (like brakes) stay clean, dry, and free of contamination.
- Removing the front wheel and battery before placing the bike inside your vehicle will make for a better fit and make the bike lighter weight and easier to lift.
- When transporting an E-bike inside a vehicle, make sure cables and handlebar mounted control systems are not getting rubbed or damaged. Place a blanket over the E-bike to protect it from damage.
- If using a bike rack, make sure the rack you have is rated for the weight of your E-bike(s), and can accommodate the size of the wheel/tire or frame.
- Generally speaking, the best bike racks for use with an E-bike is are hitch/receiver-mounted, tray/platform-style racks. Not only do they require less of a lift to get your bike onto the rack, they are also more likely to be rated to hold the weight of one or more E-bikes.
- Removing your battery before loading the E-bike onto the rack. Why? It will be

lighter and easier to load and prevent possible theft or loss.

- After your bike is on the rack, secure the E-bike properly with the straps on your rack. In addition, we recommend securing your bike with a lock.
- When transporting your E-bike on the back of your car, consider covering your bike to reduce the chance of damage and contamination.

#### **Take an electric bike on a plane:**

The main limitation in taking your electric bike on a plane is taking the battery. Airports and air carriers have strict limitations on the size and capacity of batteries taken on board a plane – whether through carry on or checked baggage. Battery capacity, or Watt-hour (Wh) rating, is generally limited to less than 100Wh to be allowed on board.

Batteries may also be allowed on board with watt-hour (Wh) capacity of between 100-160 Wh with prior air carrier approval. However, most electric bike batteries are larger than this, in the range of 300Wh to 900Wh and will most likely not be allowed on a plane. There are however a few options that you have when planning to fly with an e-bike, and still have power at your destination.

#### **4.Q. ELECTRIC BIKE SECURITY**

You need to take all the precautions you would to keep a standard bike safe. That includes a sturdy, ideally well-rated bike lock, lock through your wheels and frame and attached to an immovable object. Given the value of most e-bikes, you should store your e-bike somewhere secure.

When choosing a lock, look for certifications. The German Association of Damage Insurers (VdS), for example, regularly tests locks for bicycles and motorcycles. You can get tips for buying bike locks on its website (<https://vds.de>).

Several locks are better than one. For example, combine a simple frame lock with an expensive U-lock or a chain lock. The hurdles for thieves are already higher.

Your e-bike's battery is also an attractive item for thieves. Most models with a removable battery, will include a lock and key to secure it to the frame.

With their high value, unfortunately e-bikes are often targeted by thieves, so it's worthwhile paying for a good lock, being careful where you lock the bike, and buying insurance.

You can also find an overview of the best locks in our article "Bike lock with GPS how to protect your e-bike." <https://powunity.com/en/locks-for-bicycles-e-bikes-you-should-pay-close-attention-to-this-when-buying>

**But:** Even the best bike lock is no guarantee that your e-bike's security is guaranteed. Professional bike thieves are not deterred by any lock.

That is why the **police recommend:** If at all possible, lock your e-bike to a lamppost, a

fence, a permanently mounted bicycle stand, or another fixed object. That way, thieves have to pick the lock to steal your bike. With a little bit of luck and a good lock, this will keep them from trying. Of course, this recommendation does not just apply to e-bikes, but any bike.

## 5. SERVICE & MAINTENANCE

**⚠ WARNING: Technological advances have made bicycles and bicycle components more complex, and the pace of innovation is increasing. It is impossible for this manual to provide all the information required to properly repair and/or maintain your bicycle. In order to help minimize the chances of an accident and possible injury, it is critical that you have any repair or maintenance which is not specifically described in this manual performed by your dealer. Equally important is that your individual maintenance requirements will be determined by everything from your riding style to geographic location. Consult your dealer for help in determining your maintenance requirements.**

**⚠ WARNING: Many bicycle service and repair tasks require special knowledge and tools. Do not begin any adjustments or service on your bicycle until you have learned from your dealer how to properly complete them. Improper adjustment or service may result in damage to the bicycle or in an accident which can cause serious injury or death.**

### **If you want to learn to do major service and repair work on your bike:**

1. Ask your dealer for copies of the manufacturer's installation and service instructions for the components on your bike, or contact the component manufacturer.
2. Ask your dealer to recommend a book on bicycle repair.
3. Ask your dealer about the availability of bicycle repair courses in your area.

We recommend that you ask your dealer to check the quality of your work the first time you work on something and before you ride the bike, just to make sure that you did everything correctly. Since that will require the time of a mechanic, there may be a modest charge for this service.

We also recommend that you ask your dealer for guidance on what spare parts, such as inner tubes, light bulbs, etc. it would be appropriate for you to have once you have learned how to replace such parts when they require replacement.

### **5 A. SERVICE INTERVALS**

Some service and maintenance can and should be performed by the owner, and require no special tools or knowledge beyond what is presented in this manual. The following are examples of the type of service you should perform yourself. All other service, maintenance and repair should be performed in a properly equipped facility by a qualified bicycle mechanic using the correct tools and procedures specified by the manufacturer.



1. **Break-in Period:** Your bike will last longer and work better if you break it in before riding it hard. Control cables and wheel spokes may stretch or “seat” when a new bike is first used and may require readjustment by your dealer. Your Mechanical Safety Check (Section 1.C) will help you identify some things that need readjustment. But even if everything seems fine to you, it’s best to take your bike back to the dealer for a checkup. Dealers typically suggest you bring the bike in for a 30 day checkup. Another way to judge when it’s time for the first checkup is to bring the bike in after three to five hours of hard off-road use, or about 10 to 15 hours of on-road or more casual off-road use. But if you think something is wrong with the bike, take it to your dealer before riding it again.
2. Before every ride: Mechanical Safety Check (Section 1.C)
3. After every long or hard ride; if the bike has been exposed to water or grit; or at least every 100 miles: Clean the bike and lightly lubricate the chain’s rollers with a good quality bicycle chain lubricant. Wipe off excess lubricant with a lint-free cloth. Lubrication is a function of climate. Talk to your dealer about the best lubricants and the recommended lubrication frequency for your area. Avoid contaminating the rims with lubricant!
4. After every long or hard ride or after every 10 to 20 hours of riding:
  - Squeeze the front brake and rock the bike forward and back. Everything feel solid? If you feel a clunk with each forward or backward movement of the bike, you probably have a loose headset. Have your dealer check it.
  - Lift the front wheel off the ground and swing it from side to side. Feel smooth? If you feel any binding or roughness in the steering, you may have a tight headset. Have your dealer check it.
  - Grab one pedal and rock it toward and away from the centerline of the bike; then do the same with the other pedal. Anything feel loose? If so, have your dealer check it.
  - Take a look at the brake pads. Starting to look worn or not hitting the wheel rim squarely? Time to have the dealer adjust or replace them.
  - Carefully check the control cables and cable housings. Any rust? Kinks? Fraying? If so, have your dealer replace them.
  - Squeeze each adjoining pair of spokes on either side of each wheel between your thumb and index finger. Do they all feel about the same? If any feel loose, have your dealer check the wheel for tension and trueness.
  - Check the tires for excess wear, cuts or bruises. Have your dealer replace them if necessary.
  - Check the wheel rims for excess wear, dings, dents and scratches. Consult your dealer if you see any rim damage.
  - Check to make sure that all parts and accessories are still secure, and tighten any which are not.
  - Check the frame, particularly in the area around all tube joints; the handlebars; the stem; and the seatpost for any deep scratches, cracks or discoloration. These are signs of stress-caused fatigue and indicate that a part is at the end of its useful life and needs to be replaced. See also Appendix B.

**⚠ WARNING:** Like any mechanical device, a bicycle and its components are subject to wear and stress. Different materials and mechanisms wear or fatigue from stress at different rates and have different life cycles. If a component's life cycle is exceeded, the component can suddenly and catastrophically fail, causing serious injury or death to the rider. Scratches, cracks, fraying and discoloration are signs of stress-caused fatigue and indicate that a part is at the end of its useful life and needs to be replaced. While the materials and workmanship of your bicycle or of individual components may be covered by a warranty for a specified period of time by the manufacturer, this is no guarantee that the product will last the term of the warranty. Product life is often related to the kind of riding you do and to the treatment to which you submit the bicycle. The bicycle's warranty is not meant to suggest that the bicycle cannot be broken or will last forever. It only means that the bicycle is covered subject to the terms of the warranty. Please be sure to read Appendix A, Intended Use of your bicycle and Appendix B, The lifespan of your bike and its components.

5. As required: If either brake lever fails the Mechanical Safety Check (Section 1.C), don't ride the bike. Have your dealer check the brakes. If the chain won't shift smoothly and quietly from gear to gear, the derailleur is out of adjustment. See your dealer.
6. Every 25 (hard off-road) to 50 (on-road) hours of riding: Take your bike to your dealer for a complete checkup.

#### **5 B. IF YOUR BICYCLE SUSTAINS AN IMPACT:**

First, check yourself for injuries, and take care of them as best you can. Seek medical help if necessary.

Next, check your bike for damage.

After any crash, take your bike to your dealer for a thorough check. Carbon composite components, including frames, wheels, handlebars, stems, cranksets, brakes, etc. which have sustained an impact must not be ridden until they have been disassembled and thoroughly inspected by a qualified mechanic.

See also Appendix B, Lifespan of your bike and its components.

**⚠ WARNING:** A crash or other impact can put extraordinary stress on bicycle components, causing them to fatigue prematurely. Components suffering from stress fatigue can fail suddenly and catastrophically, causing loss of control, serious injury or death.

## 5 C. E-bike Maintenance Schedule & Guide

### Pre-Ride Checklist

(With a little practice this will take you around 5 minutes!)

TASK	TOOLS	INSTRUCTIONS
Check Tire Pressure	Tire Pressure Gauge	Check tire pressure is within the range specified by the manufacturer. The range or limits can be found on the sidewall of the tire. Fill or release air as necessary.
Inspect brakes	N/A	Whilst rolling your e-bike besides you, pull on one of the brake levers. The e-bike should come to a stop immediately. Repeat with the other lever.
Check Headset	N/A	Pull the front brake and rock the e-bike forward and backward. There should be no play in the handlebar mount. Tighten if needed and re-test.
Clean & Lube Chain	Chain Lube & Rag	With the tires of your e-bike off the floor, grasp the chain between the back gears and pedals with a clean rag. Spin the pedals a few times so that the chain runs a few cycles through the rag, cleaning off any dirt. Apply lube as instructed by the manufacturer.
Check Wheel Tightness	N/A	Check that each wheel's axle nuts are tight and there's no wheel wobble. Tighten as needed.
Check Battery Charge	N/A	Turn on your e-bike and ensure it is sufficiently charged for your journey.

### Post-Ride Checklist

(With a little practice this will take you around 10 minutes!)

TASK	TOOLS	INSTRUCTIONS
Inspect Tires & Rims	N/A	Look for debris and damage on the rims and tires.
Check Shifter & Derailleur	N/A	With your e-bike tires off the floor, turn the pedals and shift through the gears. Your e-bike should shift seamlessly. Additionally, check the derailleur for any debris.

Wipe Down Frame	Clean, damp rag	Take a rag and wipe the frame of the e-bike. Whilst doing so inspect for any damage and cracks.
Wipe Down Chain	Clean rag	With the tires of your e-bike off the floor, grasp the chain with the rag and spin the pedals a few times so the chain runs through the rag (The frequency of this step is dependent on both climate and the terrain you ride in. Some may need to do it daily others every month).
Check Pedals	N/A	Give your pedals a once over to check for any cracking.
Check Wheel Straightness	N/A	Turn each wheel in turn whilst looking straight down the tire. You should observe no wobble.
Charge Battery	Battery Charger	Put your battery on the charger so your e-bike is fuelled and ready for your next adventure.

### Maintenance Schedules

**⚠ Important - The checklists below may be labelled by a specific timescale however these time scales are directed at the daily rider. If you're just a weekend warrior or intermittent, casual rider then your e-bike is going to need these tuneups less frequently.**

If you're a daily rider then doing some further research and purchasing the tools and equipment necessary to complete these lists may be to your long term financial benefit. Plus, you get to become much more knowledgeable and in-tune (pun intended) with your daily ride.

#### Weekly E-Bike Checklist

*An easy undertaking, which can be done with basic bike tools.*

- Wipe down chainrings, cassette, and derailleur pulleys and check for proper alignment
- Inspect brake pads
- Check hardware for proper torque
- Oversee the condition of the frame, looking for any damage

#### Monthly E-bike Checklist

*A more in-depth inspection and tuneup which requires some in-depth research and special, but not hard to find, materials.*

- Check brake pad alignment and brake cable tension
- Verify if derailleur is shifting properly and check chain stretch

- Lube all braking and gear shifting cables including drivetrain
- Check spoke tension and true wheels if necessary
- Tighten any accessory mounting (rack bolts, fender hardware, and confirm alignment)

### **Six Month E-bike Checklist**

*This is also known as a complete tune-up in many locations and is recommended twice a year for daily users and one a year for weekend warrior or casual riders.*

- Adjust brakes to ensure proper functionality
- Adjust gear shifters to ensure proper functionality
- Lube both brake and gear shifting systems
- Ensure drivetrain is working as normal
- True your wheels
- Check bearing system
- Safety check all bolts
- Inspect all cables and housing

### **Annual Checklist**

More of an addition to the six-month checklist, the annual checklist involves everything from the six month checklist along with a full breakdown of your e-bike, checking all the components are working as they should be, cleaning said components, lubing them and putting your e-bike back together. For daily commuter and serious riders this should be completed annually. For weekend warriors or casual riders it is probably only necessary every 18 months to 2 years.

**⚠ Please make sure that for the sake of your own health, you need to service your Silverback bike at the authorized dealer for its first inspection after 100 - 300 km, 5 - 15 hours of initial use or 4 - 6 weeks, and at the very latest after three months.**

## **APPENDIX A**

### **THE LIFESPAN OF YOUR BIKE AND ITS COMPONENTS**

**1. Nothing Lasts Forever, Including Your Bike.** When the useful life of your bike or its components is over, continued use is hazardous. Every bicycle and its component parts have a finite, limited useful life. The length of that life will vary with the construction and materials used in the frame and components; the maintenance and care the frame and components receive over their life; and the type and amount of use to which the frame and components are subjected. Use in competitive events, trick riding, ramp riding, jumping, aggressive riding, riding on severe terrain, riding in severe climates, riding with heavy loads, commercial activities and other types of non-standard use can dramatically shorten the life of the frame and components. Any one or a combination of these conditions may result in an unpredictable failure.

All aspects of use being identical, lightweight bicycles and their components will usually have a shorter life than heavier bicycles and their components. In selecting a

lightweight bicycle or components you are making a tradeoff, favoring the higher performance that comes with lighter weight over longevity. So, If you choose lightweight, high performance equipment, be sure to have it inspected frequently.

You should have your bicycle and its components checked periodically by your dealer for indicators of stress and/or potential failure, including cracks, deformation, corrosion, paint peeling, dents, and any other indicators of potential problems, inappropriate use or abuse. These are important safety checks and very important to help prevent accidents, bodily injury to the rider and shortened product life.

**2. Perspective.** Today's high-performance bicycles require frequent and careful inspection and service. In this Appendix we try to explain some underlying material science basics and how they relate to your bicycle. We discuss some of the trade-offs made in designing your bicycle and what you can expect from your bicycle; and we provide important, basic guidelines on how to maintain and inspect it. We cannot teach you everything you need to know to properly inspect and service your bicycle; and that is why we repeatedly urge you to take your bicycle to your dealer for professional care and attention.

**⚠ WARNING: Frequent inspection of your bike is important to your safety. Follow the Mechanical Safety Check in Section 1.C of this Manual before every ride.**

Periodic, more detailed inspection of your bicycle is important. How often this more detailed inspection is needed depends upon you.

You, the rider/owner, have control and knowledge of how often you use your bike, how hard you use it and where you use it. Because your dealer cannot track your use, you must take responsibility for periodically bringing your bike to your dealer for inspection and service. Your dealer will help you decide what frequency of inspection and service is appropriate for how and where you use your bike.

For your safety, understanding and communication with your dealer, we urge you to read this Appendix in its entirety. The materials used to make your bike determine how and how frequently to inspect.

Ignoring this **WARNING** can lead to frame, fork or other component failure, which can result in serious injury or death.

## **A.UNDERSTANDING METALS**

Steel is the traditional material for building bicycle frames. It has good characteristics, but in high performance bicycles, steel has been largely replaced by aluminum and some titanium. The main factor driving this change is interest by cycling enthusiasts in lighter bicycles.

### **Properties of Metals**

Please understand that there is no simple statement that can be made that

characterizes the use of different metals for bicycles. What is true is how the metal chosen is applied is much more important than the material alone. One must look at the way the bike is designed, tested, manufactured, supported along with the characteristics of the metal rather than seeking a simplistic answer.

Metals vary widely in their resistance to corrosion. Steel must be protected or rust will attack it. Aluminum and Titanium quickly develop an oxide film that protects the metal from further corrosion. Both are therefore quite resistant to corrosion. Aluminum is not perfectly corrosion resistant, and particular care must be used where it contacts other metals and galvanic corrosion can occur.

Metals are comparatively ductile. Ductile means bending, buckling and stretching before breaking. Generally speaking, of the common bicycle frame building materials steel is the most ductile, titanium less ductile, followed by aluminum.

Metals vary in density. Density is weight per unit of material. Steel weighs 7.8 grams/cm<sup>3</sup> (grams per cubic centimeter), titanium 4.5 grams/cm<sup>3</sup>, aluminum 2.75 grams/cm<sup>3</sup>. Contrast these numbers with carbon fiber composite at 1.45 grams/cm<sup>3</sup>. Metals are subject to fatigue. With enough cycles of use, at high enough loads, metals will eventually develop cracks that lead to failure. It is very important that you read The basics of metal fatigue below.

Let's say you hit a curb, ditch, rock, car, another cyclist or other object. At any speed above a fast walk, your body will continue to move forward, momentum carrying you over the front of the bike. You cannot and will not stay on the bike, and what happens to the frame, fork and other components is irrelevant to what happens to your body. What should you expect from your metal frame? It depends on many complex factors, which is why we tell you that crash worthiness cannot be a design criteria. With that important note, we can tell you that if the impact is hard enough the fork or frame may be bent or buckled. On a steel bike, the steel fork may be severely bent and the frame undamaged. Aluminum is less ductile than steel, but you can expect the fork and frame to be bent or buckled. Hit harder and the top tube may be broken in tension and the down tube buckled. Hit harder and the top tube may be broken, the down tube buckled and broken, leaving the head tube and fork separated from the main triangle.

When a metal bike crashes, you will usually see some evidence of this ductility in bent, buckled or folded metal.

It is now common for the main frame to be made of metal and the fork of carbon fiber. **See Section B, Understanding composites below.** The relative ductility of metals and the lack of ductility of carbon fiber means that in a crash scenario you can expect some bending or buckling in the metal but none in the carbon. Below some load the carbon fork may be intact even though the frame is damaged. Above some load the carbon fork will be completely broken.

### **The basics of metal fatigue**

Common sense tells us that nothing that is used lasts forever. The more you use

something, and the harder you use it, and the worse the conditions you use it in, the shorter its life.

Fatigue is the term used to describe accumulated damage to a part caused by repeated loading. To cause fatigue damage, the load the part receives must be great enough. A crude, often-used example is bending a paper clip back and forth (repeated loading) until it breaks. This simple definition will help you understand that fatigue has nothing to do with time or age. A bicycle in a garage does not fatigue. Fatigue happens only through use.

<b>WHAT TO LOOK FOR</b>	
<p><b>ONCE A CRACKS STARTS IT CAN GROW AND GROW FAST.</b> Think about the crack as forming a pathway to failure. This means that any crack is potentially dangerous and will only become more dangerous.</p>	<p><b>SIMPLE RULE 1:</b> If you find crack, replace the part.</p>
<p><b>CORROSION SPEEDS DAMAGE.</b> Cracks grow more quickly when they are in a corrosive environment. Think about the corrosive solution as further weakening and extending the crack.</p>	<p><b>SIMPLE RULE 2 :</b> Clean your bike, lubricate your bike, protect your bike from salt, remove any salt as soon as you can.</p>
<p><b>STAINS AND DISCOLORATION CAN OCCUR NEAR A CRACK.</b> Such staining may be a <b>warning</b> sign that a crack exists.</p>	<p><b>SIMPLE RULE 3 :</b> Inspect and investigate any staining to see if it is associated with a crack.</p>
<p><b>SIGNIFICANT SCRATCHES, GOUGES, DENTS OR SCORING CREATE STARTING POINTS FOR CRACKS.</b> Think about the cut surface as a focal point for stress (in fact engineers call such areas "stress risers," areas where the stress is increased). Perhaps you have seen glass cut? Recall how the glass was scored and then broke on the scored line.</p>	<p><b>SIMPLE RULE 4 :</b> Do not scratch, gouge or score any surface. If you do, pay frequent attention to this area or replace the part.</p>



So what kind of “damage” are we talking about? On a microscopic level, a crack forms in a highly stressed area. As the load is repeatedly applied, the crack grows. At some point the crack becomes visible to the naked eye. Eventually it becomes so large that the part is too weak to carry the load that it could carry without the crack. At that point there can be a complete and immediate failure of the part.

One can design a part that is so strong that fatigue life is nearly infinite. This requires a lot of material and a lot of weight. Any structure that must be light and strong will have a finite fatigue life. Aircraft, race cars, motorcycles all have parts with finite fatigue lives. If you wanted a bicycle with an infinite fatigue life, it would weigh far more than any bicycle sold today. So we all make a tradeoff: the wonderful, lightweight performance we want requires that we inspect the structure.

In most cases a fatigue crack is not a defect. It is a sign that the part has been worn out, a sign the part has reached the end of its useful life. When your car tires wear down to the point that the tread bars are contacting the road, those tires are not defective. Those tires are worn out and the tread bar says “time for replacement.” When a metal part shows a fatigue crack, it is worn out. The crack says “time for replacement.”  
Fatigue Is Not A Perfectly Predictable Science Fatigue is not a perfectly predictable science, but here are some general factors to help you and your dealer determine how often your bicycle should be inspected. The more you fit the “shorten product life” profile, the more frequent your need to inspect. The more you fit the “lengthen product life” profile, the less frequent your need to inspect.

**Factors that shorten product life:**

- Hard, harsh riding style
- “Hits”, crashes, jumps, other “shots” to the bike
- High mileage
- Higher body weight
- Stronger, more fit, more aggressive rider
- Corrosive environment (wet, salt air, winter road salt, accumulated sweat)
- Presence of abrasive mud, dirt, sand, soil in riding environment

**Factors that lengthen product life:**

- Smooth, fluid riding style
- No “hits”, crashes, jumps, other “shots” to the bike
- Low mileage
- Lower body weight
- Less aggressive rider
- Non-corrosive environment (dry, salt-free air)
- Clean riding environment

**⚠ WARNING: Do not ride a bicycle or component with any crack, bulge or dent, even a small one. Riding a cracked frame, fork or component could lead to complete failure, with risk of serious injury or death.**

## **B. UNDERSTANDING COMPOSITES**

All riders must understand a fundamental reality of composites. Composite materials constructed of carbon fibers are strong and light, but when crashed or overloaded, carbon fibers do not bend, they break.

### **What Are Composites?**

The term "composites" refers to the fact that a part or parts are made up of different components or materials. You've heard the term "carbon fiber bike." This really means "composite bike." Carbon fiber composites are typically a strong, light fiber in a matrix of plastic, molded to form a shape. Carbon composites are light relative to metals. Steel weighs 7.8 grams/cm<sup>3</sup> (grams per cubic centimeter), titanium 4.5grams/cm<sup>3</sup>, aluminum 2.75 grams/cm<sup>3</sup>. Contrast these numbers with carbon fiber composite at 1.45 grams/cm<sup>3</sup>. The composites with the best strength-to-weight ratios are made of carbon fiber in a matrix of epoxy plastic. The epoxy matrix bonds the carbon fibers together, transfers load to other fibers, and provides a smooth outer surface. The carbon fibers are the "skeleton" that carries the load.

### **Why Are Composites Used?**

Unlike metals, which have uniform properties in all directions (engineers call this isotropic), carbon fibers can be placed in specific orientations to optimize the structure for particular loads. The choice of where to place the carbon fibers gives engineers a powerful tool to create strong, light bicycles. Engineers may also orient fibers to suit other goals such as comfort and vibration damping. Carbon fiber composites are very corrosion resistant, much more so than most metals. Think about carbon fiber or fiberglass boats. Carbon fiber materials have a very high strength-to-weight ratio.

### **What Are The Limits Of Composites?**

Well designed "composite" or carbon fiber bicycles and components have long fatigue lives, usually better than their metal equivalents. While fatigue life is an advantage of carbon fiber, you must still regularly inspect your carbon fiber frame, fork, or components. Carbon fiber composites are not ductile. Once a carbon structure is overloaded, it will not bend; it will break. At and near the break, there will be rough, sharp edges and maybe delaminating of carbon fiber or carbon fiber fabric layers. There will be no bending, buckling, or stretching.

### **If You Hit Something Or Have A Crash, What Can You Expect From Your Carbon Fiber Bike?**

Let's say you hit a curb, ditch, rock, car, other cyclist or other object. At any speed above a fast walk, your body will continue to move forward, the momentum carrying you over the front of the bike. You cannot and will not stay on the bike and what happens to the frame, fork and other components is irrelevant to what happens to your body.

### **What should you expect from your carbon frame?**

It depends on many complex factors. But we can tell you that if the impact is hard enough, the fork or frame may be completely broken. Note the significant difference in behavior between carbon and metal. See Section 2. A, Understanding metals in this Appendix. Even if the carbon frame was twice as strong as a metal frame, once the

carbon frame is overloaded it will not bend, it will break completely.

### **Inspection of Composite Frame, Fork, and Components**

**Cracks:** Inspect for cracks, broken, or splintered areas. Any crack is serious. Do not ride any bicycle or component that has a crack of any size.

**Delamination:** Delamination is serious damage. Composites are made from layers of fabric. Delamination means that the layers of fabric are no longer bonded together. Do not ride any bicycle or component that has any delamination.

#### **These are some delamination clues:**

1. A cloudy or white area. This kind of area looks different from the ordinary undamaged areas. Undamaged areas will look glassy, shiny, or “deep,” as if one was looking into a clear liquid. Delaminated areas will look opaque and cloudy.
2. Bulging or deformed shape. If delamination occurs, the surface shape may change. The surface may have a bump, a bulge, soft spot, or not be smooth and fair.
3. A difference in sound when tapping the surface.
4. If you gently tap the surface of an undamaged composite you will hear a consistent sound, usually a hard, sharp sound. If you then tap a delaminated area, you will hear a different sound, usually duller, less sharp.

**Unusual Noises:** Either a crack or delamination can cause creaking noises while riding. Think about such a noise as a serious warning signal. A well maintained bicycle will be very quiet and free of creaks and squeaks. Investigate and find the source of any noise. It may not be a crack or delamination, but whatever is causing the noise must be fixed before riding.

**⚠ WARNING: Do not ride a bicycle or component with any delamination or crack. Riding a delaminated or cracked frame, fork or other component could lead to complete failure, with risk of serious injury or death.**

### **C. UNDERSTANDING COMPONENTS**

It is often necessary to remove and disassemble components in order to properly and carefully inspect them. This is a job for a professional bicycle mechanic with the special tools, skills and experience to inspect and service today’s high-tech high-performance bicycles and their components.

#### **Aftermarket “Super Light” components**

Think carefully about your rider profile as outlined above. The more you fit the “shorten product life” profile, the more you must question the use of super light components. The more you fit the “lengthen product life” profile, the more likely it is that lighter components may be suitable for you. Discuss your needs and your profile very honestly with your dealer. Take these choices seriously and understand that you are responsible for the changes.

A useful slogan to discuss with your dealer if you contemplate changing components is **“Strong, Light, Cheap –pick two.”**

### Original Equipment components

Bicycle and component manufacturers test the fatigue life of the components that are original equipment on your bike. This means that they have met test criteria and have reasonable fatigue life. It does not mean that the original components will last forever. They won't.

## APPENDIX B

### FASTENER TORQUE SPECIFICATIONS

Correct tightening torque of threaded fasteners is very important to your safety. Always tighten fasteners to the correct torque. In case of a conflict between the instructions in this manual and information provided by a component manufacturer, consult with your dealer or the manufacturer's customer service representative for clarification. Bolts that are too tight can stretch and deform. Bolts that are too loose can move and fatigue. Either mistake can lead to a sudden failure of the bolt. Always use a correctly calibrated torque wrench to tighten critical fasteners on your bike. Carefully follow the torque wrench manufacturer's instructions on the correct way to set and use the torque wrench for accurate results.

COMPONENT	CONNECTION	UNIT: Nm
WHEELS	Axle Nuts: Front	24 - 29
	Axle Nuts: Rear	29 Nm - 35
	QR:	Force from 90° until full closure
PEDALS		22 - 39
SEAT POST CLAMP		4 - 6.5 (Seat posts require only minimal tightening to not slip downward or sideways. Avoid over-tightening)
SADDLE CLAMP		19 - 38
STEERER CLAMP	Threaded Headset Locknut:	22 - 33
	Stem Binder Bolt Quill Type:	19 - 29
	Threadless Headset Stem Cap Bolt:	16
	Threadless Stem Single Binder Bolt:	11 - 16
	Threadless Stem Double Binder Bolt:	5 - 9
HANDLEBAR CLAMP	6mm Thread Bolt:	13 - 16
	>6mm Thread Bolt:	19 - 28

<b>CONTROL LEVER CLAMPS</b>	<b>Road Bike Brake &amp; STI Levers:</b>	5 - 7
	<b>Flat Bar Brake Levers:</b>	3 - 7
	<b>Flat Bar Shifters (Thumb):</b>	Shimano 5 ; SRAM 2.5 - 4
	<b>Flat Bar Shifters (Twist):</b>	Shimano 5 ; SRAM 2
	<i>Please refer to component torque specifications for aluminium vs. carbon torque requirements.</i>	
<b>DERAILLEURS</b>	<b>Front (Mount on frame)</b>	5 - 7
	<b>Front (Cable Clamp)</b>	5 - 7
	<b>Rear (Mount on frame)</b>	8 - 10
	<b>Rear (Cable Clamp)</b>	Shimano 5 - 7 ; SRAM 4 - 5
	<b>Rear (Pulley wheels)</b>	3 - 4
<b>CRANK</b>	<b>Crank Mount (Shimano Hollowtech II)</b>	12 - 15
	<b>Crank Mount (ISIS)</b>	31 - 34
	<b>Crank Mount (Spider)</b>	8 - 14
	<b>Direct Mount chainwheel/spder on drive</b>	40-50
<b>MOTOR</b>	<b>Motor Mount</b>	16
<b>BRAKE CALIPERS &amp; ROTORS</b>	<b>Brake caliper on frame/fork (Shimano)</b>	6 - 8
	<b>Brake caliper on frame/fork (SRAM)</b>	8 - 10
	<b>Brake caliper on frame/fork (Tektro)</b>	6 - 8
	<b>Disc rotor (6-holes)</b>	Shimano 4 ; SRAM 6 ; Tektro 4-6
	<b>Disc rotor (centerlock)</b>	40

For most accurate info, please check [www.shimano.com](http://www.shimano.com) ; [www.sram.com](http://www.sram.com) ; [www.tekro.com](http://www.tekro.com)

## APPENDIX C

### READING YOUR SERIAL NUMBER

The serial number on your Silverback bicycle consists of a series of letters and numbers engraved into the underside of the bottom bracket. Contained in the serial number are codes representing the dates of manufacture, frame style and size, and one sequence of numbers that is unique to your bicycle. The cable guide under the bottom bracket may obscure some of these numbers. This information is also included on a sticker which was attached to your bicycle from the factory, and which your retailer should have affixed to the inside of the back cover of this manual.

bottom bracket

Stamped on bottom of BB shell

Record your serial number here:


The serial number you need to record and to register with Silverback is located on a bar code label as shown in the drawing at the bottom of this page. Please record your bicycle's serial number in the 22 spaces at the bottom for your own records, and to complete your warranty registration.

Warranty registration can be done using the card located in the front of this book or at [www.silverbacklab.com](http://www.silverbacklab.com). It is important to register your bicycle so that we are able to contact you regarding any technical service bulletins or recalls.

**⚠ WARNING: A recall of your bicycle could involve an important safety issue. We urge you to take the few minutes necessary to complete the registration process.**

Even after you submit your warranty registration, you should keep your serial number and original sales receipt on file in a safe place, in case of theft or if warranty service is needed. It's your only proof of purchase to the police and your insurance company, or to the Silverback retailer, and it makes any claim easier to process.

**Silverback carbon frames** are engineered to withstand high stress, fatigue and peak performance. In the event of localized damage due to a crash or accident, Silverback encourages a replacement as the damage can affect the strength of the frame. Silverback provides a replacement program valid for 2 years from date of purchase, for the original owner, providing the consumer a frame at a reduced price.

#### **DEALER RESPONSIBILITY**

1. Damage to carbon products can be difficult to visually identify. Any external surface damage like dents, chips, fractures, gouges and fraying could be an indication of damage to the composite structure. Please refer to dealer for inspection.
2. It is the responsibility of the dealer to inspect frame and report to Silverback Technologies.
3. Improper tightening or over-torque of clamps, bolts, front derailleur's to frames, seatposts, stems and cages can result to damage and reduce strength. In this instance, warranty policy does not apply.
4. Another factor that can lead to frame failure, specifically on the seat tube, is the over extension of the seatpost. Over extension of the seatpost can result to damage and strength reduction on the seat tube. In this instance, warranty Policy does not apply.

**Dealers and Consumers must adhere to and conform to the following:**

#### **Torque Specification**

**Seat clamp:** 4.8 – 6.8 Nm

**Front Derailleur:** 4 Nm

**Seatpost Extension:** The Seatpost may not be extended in the excess of 150mm

#### **SILVERBACK LIMITED WARRANTY INFO**

Silverback Technologies offers a warranty policy to all alloy framesets as well as our

carbon aero technology framesets (CAT), on both road and mountain bikes, subject to stated and listed conditions and guidelines. <https://silverbackbikes.de/pages/warranty>  
Silverback bikes are sold exclusively through our network of authorized dealers only:

**Aluminium Alloy frames:** Limited lifetime warranty.

**ADC/Carbon frames:** 3 Years from the date of purchase.

**Full Suspension Frames:** 3 Years (Excl. Suspension Forks) from the date of purchase.

**Paintwork and Decals:** 1 year from the date of purchase.

**Original Parts:** 6 months from the date of purchase.

**Suspension Fork (Front) / Suspension Shock (Rear):** covered by the stated warranty of their original manufacturers.

#### **Conditions**

1. This warranty is against defects in materials and workmanship in the bicycle frame and is expressly limited to the repair or replacement of a defective frame, fork or defective part and is sole remedy of the warranty.
2. This warranty applies only to the original owner and is not transferable and extends from the date of purchase.
3. Claims must be made through an authorized Silverback dealer and proof of purchase is required.
4. The warranty does not cover normal wear and tear, improper assembly or followup maintenance, installation of parts or accessories not originally intended or compatible with the bicycle as sold, damage or failure due to accident, misuse or neglect, or modification of frame, fork or components.
5. This warranty does not apply where a Silverback bicycle has been modified in any way from its original specifications.

#### **DISCLAIMER**

Silverback Technologies shall not be responsible for incidental or consequential damages. Silverback Technologies reserves the right to make changes at any time, without notice, in color, materials, equipment, specifications, prices and models.

#### **All Rights Reserved**

“Silverback” is a registered trademark of Silverback Technologies.

#### **ADVANCED DYNAMICS CARBON (ADC)**

Silverback Carbon Frames are engineered to withstand high stress, fatigue and peak performance In the event of localized damage due to a crash or accident, Silverback encourages a replacement as the damage can affect the strength of the frame. Silverback provides a replacement program valid for 2 years from date of purchase, for the original owner, providing the consumer a frame at a reduced price.



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