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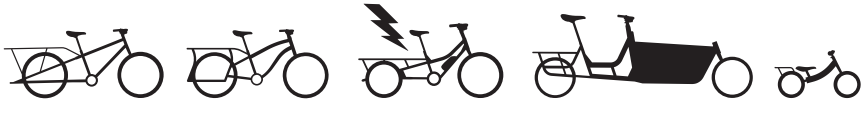
OWNERS MANUAL



IMPORTANT:

This manual contains important safety, performance and service information. Read it before you take the first ride on your new bicycle, and keep it for reference.

This manual is designed to be read together with the separate user manual provided with your electric bike's drive system. Be sure to read all provided documents before your first ride.

Additional safety, performance and service information for specific components such as suspension or pedals on your bicycle, or for accessories such as helmets or lights that you purchase, may also be available. Make sure that your dealer has given you all the manufacturers' literature that was included with your bicycle or accessories. In case of a conflict between the instructions in this manual and information provided by a component manufacturer, always follow the component manufacturer's instructions.

If you have any questions or do not understand something, take responsibility for your safety and consult with your dealer or the bicycle's manufacturer.

NOTE:
This manual is not intended as a comprehensive use, service, repair or maintenance manual. Please see your dealer for all service, repairs or maintenance. Your dealer may also be able to refer you to classes, clinics or books on bicycle use, service, repair or maintenance.

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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.

Your bicycle is designed for use by persons 16 years old and above. Riders must have the physical coordination, reaction time and mental capability to ride and manage traffic, road conditions, sudden situations and also respect the laws governing bicycle use where they ride, regardless of age.

If you have an impairment or disability such as a visual impairment, hearing impairment, physical impairment, cognitive/language impairment, or a seizure disorder, consult your physician before riding any bicycle.

Warning and caution statements

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.

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.

You should save this manual, along with any other documents that were included with your bicycle, for future reference. However, all content in this manual is subject to change or withdrawal without notice. Visit www.CurrieTech.com to download the latest version. Currie Tech makes every effort to ensure the accuracy of its documentation and assumes no responsibility or liability for any errors or inaccuracies that may appear herein.

A special note for parents

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.

Your electric bicycle is for use by persons 16 years old and older, only. Do not let a child younger than 16 years old ride the bicycle.

Section 1:
First

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 bicycles have all of the features described in this Manual. Ask your dealer to point out the features of your bicycle.

⚠ WARNING

Your bicycle comes with additional manuals and documents provided by the manufacturers of the bicycle's drive system and other components. You should read each of them before riding your bike for the first time.

Bike fit

- Is your bike the right size? To check, see "Standover height" on page 18. 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.
- Is the saddle at the right height? To check, see "Saddle position" on page 19. If you adjust your saddle height, follow the Minimum Insertion instructions in "Saddle position" on page 19.
- Are saddle and seatpost securely clamped? A correctly tightened saddle will allow no saddle movement in any direction. See "Saddle position" on page 19.
- Are the stem and handlebars at the right height for you? If not, see "Handlebar height and angle" on page 21.
- Can you comfortably operate the brakes? If not, you may be able to adjust their angle and reach. See "Control position adjustments" on page 22 and "Brake reach" on page 22.
- 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.

Safety first

- Always wear an approved helmet when riding your bike, and follow the helmet manufacturer's instructions for fit, use and care.
- Do you have all the other required and recommended safety equipment? Proper attire such as helmets, bright clothing, protective glasses, and sturdy shoes are recommended even where not demanded by law. See the section discussing "Safety" on page 8. It's your responsibility to familiarize yourself with the laws of the areas where you ride, and to comply with all applicable laws.
- Do you know how to correctly secure your front and rear wheels? Check "Wheels" on page 24 to make sure. Riding with an improperly secured wheel can cause the wheel to wobble or disen-

gage from the bicycle, and cause serious injury or death.

- If your bike has toeclips and straps or clipless (“step-in”) pedals, make sure you know how they work (see “Pedals” on page 36). These pedals require special techniques and skills. Follow the pedal manufacturer’s instructions for use, adjustment and care.
- Do you have “toe overlap”? On smaller framed bicycles your toe or toeclip may be able to contact the front wheel when a pedal is all the way forward and the wheel is turned. Read “Pedals” on page 36 to check whether you have toeclip overlap.h
- Does your bike have suspension? If so, check “Bicycle suspension” on page 37. Suspension can change the way a bicycle performs. Follow the suspension manufacturer’s instructions for use, adjustment and care.
- Because electric bicycles are so different from regular bikes, additional steps are needed to ride them safely. Please be sure to read “Riding an electric bike” on page 48
- Cargo bicycles handle differently than regular bikes. Please be sure to read “Cargo” on page 54.

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 “Fastener Torque Specifications” on page 74 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 lose 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 & Wheels

- Make sure tires are correctly inflated (see “Tires” on page 39). 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 truing 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 “Brakes” on page 30). 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 “Wheels” on page 24.

Seatpost

- If your seatpost has an over-center cam action fastener for easy height adjustment, check that it is properly adjusted and in the locked position. See “Seatpost cam action clamp” on page 29.

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 "Saddle position" on page 19 and "Handlebar height and angle" on page 21.

Handlebar ends and grips

- 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 on page 68.

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 "Brakes" on page 30). 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 the paragraph about toeclips on page 5 and the paragraph about clipless pedals on page 37.

If your bike has suspension, familiarize yourself with how the suspension responds to brake application and rider weight shifts. See the paragraph about suspension on page 5 and "Bicycle suspension" on page 37.

Practice shifting the gears (see "Shifting gears" on page 33). 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.

Section 2: Safety

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.

- 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.

fig. 2-1

⚠ WARNING

Failure to wear a helmet when riding may result in serious injury or death.

⚠ WARNING

Be sure to read the Electric Bikes section on page 42 for important safety information related to electric bikes.

⚠ WARNING

Be sure to read the Cargo section on page 54 for important safety information related to cargo and passengers.

- Always do the Mechanical Safety Check "Mechanical safety check" on page 5 before you get on a bike.
- Be thoroughly familiar with the controls of your bicycle: brakes ("Brakes" on page 30); pedals ("Pedals" on page 36); shifting ("Shifting gears" on page 33
- 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.
- 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 "Extreme, stunt or competition riding" on page 13.
- Ride at a speed appropriate for conditions. Higher speed means higher risk.

Riding safety

- Obey all Rules of the Road and all local traffic laws.
- You are sharing the road or the path with others — motorists, pedestrians and other cyclists. Respect their rights.
- Ride defensively. Always assume that others do not see you.
- 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
- 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.
- 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.
- Use approved hand signals for turning and stopping.
- 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.
- 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.

⚠ WARNING

Check the drive system manufacturer's manual, or other system manual included with your bike, for warnings regarding trailer usage. When towing a trailer, do not exceed 20 miles per hour.

- 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.

- Never hitch a ride by holding on to another vehicle.
- 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 "Extreme, stunt or competition riding" on page 13 now. Think carefully about your skills before deciding to take the large risks that go with this kind of riding.
- Don't weave through traffic or make any moves that may surprise people with whom you are sharing the road.
- Observe and yield the right of way.
- Never ride your bicycle while under the influence of alcohol or drugs.
- 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.

Off-road safety

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

- 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.
- Wear safety gear appropriate to the kind of riding you plan to do.
- 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.
- 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.
- 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.
- Signal with voice or bell when passing.
- Don't block the trail. Move your bike off to the side of the trail if you stop.
- Walk your bike up and down access ramps.
- Be prepared. If something goes wrong while you're riding off-road, help may not be close.
- Before you attempt to jump, do stunt riding or race with your bike, read and understand "Extreme, stunt or competition riding" on page 13.

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.

Off-road electric bicycles

Riders of off-road electric bikes must take additional precautions, and follow additional rules of trail etiquette.

- Maintain a minimum of 10 feet behind the bike in front of you.
- Do not use electric assist on level and downhill grades if people are visible on the trail.
- Do not use electric assist if small children or pets are within 100 feet.
- Be aware that your extra speed, and the extra weight of your bike mean you must be more careful, especially around other trail users.

Electric bike safety

Because electric bicycles are so different from regular bikes, additional steps are needed to ride them safely. Please be sure to read "Riding an electric bike" on page 48.

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 "Brakes" on page 30

⚠ WARNING

Wet weather may lessen the grip of the rider's feet on the pedals. If your feet slip off the pedals, it could lead to a fall.

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 specialized 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, at dusk, at night or at other times of poor visibility without an adequate bicycle lighting system and without reflectors is dangerous and 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

Vehicle racks

⚠ WARNING

Misuse of vehicle racks could result in a potentially hazardous situation which, if not avoided, could result in serious injury or death. Be sure to read and follow the instructions provided by the rack's manufacturer for more complete safety information.

CAUTION

Misuse of vehicle racks could result in damage to your bicycle, vehicle, or other property.

Especially when dealing with electric bikes, caution must be used when mounting a bicycle on a vehicle rack.

- Be aware that your electric bike is considerably heavier than a normal bicycle. Check the instructions provided by the manufacturer of your vehicle rack for information on maximum carrying capacity.
- If you cannot comfortably lift your bicycle onto a vehicle rack by yourself, you should request assistance. Never try to lift an electric bike onto a roof-mounted vehicle rack without assistance.
- When mounting your electric bicycle on a vehicle rack, always remove the battery first. A battery installed on a bicycle that is mounted on a vehicle may be damaged by water intrusion, suffer an impact to the battery housing, or even fall off the bike and become a projectile.

Extreme, stunt or competition riding

Whether you call it *Aggro, Hucking, 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.

Changing components & 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 *"Intended use of your electric bicycle" on page 62 and "The lifespan of your bike and its components" on page 68.*

⚠ 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.

⚠ WARNING

Choking hazard: Some bicycle accessories may present a choking hazard to small children. Keep these accessories away from small children.

After an accident

⚠ WARNING

After an accident, you must consider your bike unsafe to ride until you follow the instructions in this section. Failure to follow the instructions in this section could lead to component failure, injury, or death.

⚠ WARNING

Before performing ANY service, inspection, or maintenance on your electric bicycle, you should first remove the battery. Failure to remove the battery could lead to the bicycle turning on unexpectedly, causing serious damage or injury.

If you have to perform maintenance that requires the battery to be installed, you must be sure that even if the bicycle wheel, chain, or other drivetrain components begin moving unexpectedly, they will not be in a position to cause injury or damage.

- Be sure to read, understand, and comply with the drive system user manual. Do not disassemble or attempt to service components unless explicitly allowed by the manufacturer.
- Check the rechargeable battery. If the rechargeable battery is no longer properly in its holder or shows any damage, do not use your bike any longer, at least not in assistance mode. Switch off the motor and the battery separately, if necessary. A damaged battery can lead to a short-circuit or a sudden failure of the electric assistance right at the moment when you need it.

Damage to the outer housing of the rechargeable battery can result in the entry of water or moisture and that can lead to short circuits or electric shocks. The rechargeable battery could catch fire or even explode! In such a case contact your bicycle dealer immediately.

- Check whether the wheels are still firmly fixed in the dropouts and whether the rims are still centered with respect to the frame or fork. Spin the wheels and observe the gap either between the frame and tire or between the brake pads and rim sides.

If the width of the gap changes markedly and you have no way to true the wheel where you are, you will need to release the rim brake a little so that the rim can run between the brake pads without touching them. Please note that in this case the brakes may not act as powerfully as you are used to.

For more information, see “Wheels with cam action systems” on page 25, “Brakes”

on page 30, and “Wheels” on page 24 of this manual.

- Check that handlebars and stem are neither bent nor broken and that they are level and upright. Make sure the stem is firmly fixed on the fork by trying to turn the handlebars relative to the front wheel. Briefly lean on the brake levers to make sure the handlebars are firmly fixed in the stem.

Realign the components, if necessary, and carefully tighten the bolts to ensure reliable clamping of the components. The maximum torque values are printed directly on the components or specified in the enclosed operating instructions.

For more information see the section discussing “Fit” on page 18, especially “Handlebar height and angle” on page 21.

- Check whether the chain still runs on the chainrings and the sprockets. If your bike fell over to the chain side, check that the gears function properly. Ask somebody to lift the bike by the saddle and carefully shift through all the gears. Pay particular attention when shifting to the small gears and make sure the rear derailleur does not get too close to the spokes as the chain climbs onto the larger sprockets.

If the rear derailleur or the dropouts/derailleur hanger are bent, the rear derailleur may collide with the spokes. This can result in damage to the rear derailleur, the rear wheel and the frame. Check the function of the front derailleur, as a displaced front derailleur can throw off the chain, thus suddenly interrupting the drive of the bike.

For more information, see”Shifting gears” on page 33.

- Make sure the saddle is not out of alignment, using the top tube or the bottom bracket shell as a reference. If necessary, open the clamp, realign the saddle and re-tighten the clamp.

For more information, see “Seatpost cam action clamp” on page 29 and “Saddle position” on page 19.

- Let your bike bounce on the ground from a low height. If there is any rattling, see where it comes from. Check the bearings, the bolts and the proper seating of the battery and the connectors, as necessary.

- Check the display. Are all the values displayed as usual? Do not use your bike if the display shows an error message or a warning. If necessary, switch off the system and wait at least 10 seconds before checking it again.

Do not set off on your bike with drive assistance if the control element shows a warning. In such a case contact your bicycle dealer immediately.

You can find further information in the corresponding chapter of the system manual of the drive manufacturer.

- Finally, take a good look at the whole bike to detect any deformation, color changes or cracks. Ride back very carefully by taking the shortest route possible, only if your bike went through this check without any problems. Do not accelerate or brake hard and do not ride your bicycle out of the saddle. If you are in doubt about the performance of your bike, have yourself picked up by car, instead of taking any risks.

Back home you need to recheck your bike thoroughly once again. The damaged parts must be repaired. Ask your bicycle dealer for help.

⚠ WARNING

Deformed components, especially those made of aluminum, can break without previous warning. They may not be repaired, i.e. straightened, as the imminent risk of breakage will remain. This applies in particular to the fork, the handlebars, the stem, the cranks, the seat post and the pedals. When in doubt, it is always recommendable to have these components replaced, as your safety comes first. Ask your bicycle dealer for help.

Section 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.

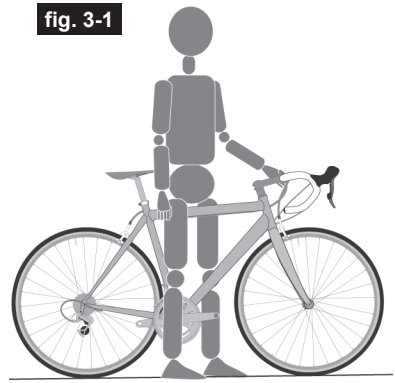
⚠ WARNING

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.

Standover height

Diamond frame bicycles

fig. 3-1



Standover height is the basic element of bike fit. 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 "Saddle position" on page 19 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 seatpost.

Saddle position

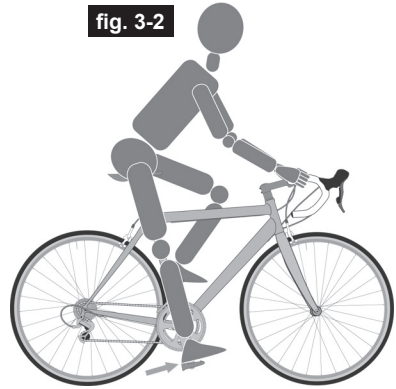
Correct saddle adjustment is an important factor in getting the most performance and comfort from your bicycle. If the saddle position is not comfortable for you, see your dealer.

The saddle can be adjusted in three directions:

1. Up and down adjustment. To check for correct saddle height (fig. 3-2):

- 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.

fig. 3-2

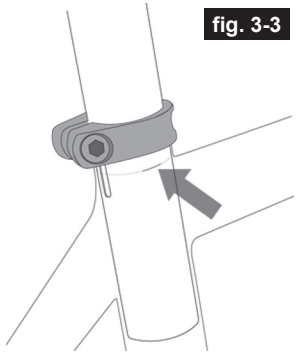


If your leg is not completely straight, your saddle height needs to be adjusted. If your hips must rock for the heel to reach the pedal, the saddle is too high. If your leg is bent at the knee with your heel on the pedal, the saddle is too low.

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 seatpost clamp.
- Raise or lower the seatpost in the seat tube.
- Make sure the saddle is straight fore and aft.
- Re-tighten the seatpost clamp to the recommended torque (“Fastener Torque Specifications” on page 74 or the manufacturer’s instructions).

fig. 3-3



Once the saddle is at the correct height, make sure that the seatpost does not project from the frame beyond its “Minimum Insertion” or “Maximum Extension” mark (fig. 3-3).

NOTE: Some bicycles have a sight hole in the seat tube, the purpose of which is to make it easy to see whether the seatpost 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

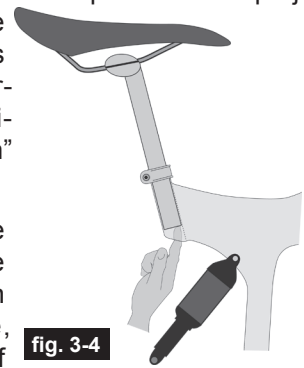


fig. 3-4

make sure the seatpost is inserted in the seat tube far enough to be visible through the sight hole.

If your bike has an interrupted seat tube, as is the case on some suspension bikes, you must also make sure that the seatpost is far enough into the frame so that you can touch it through the bottom of the interrupted seat tube with the tip of your finger without inserting your finger beyond its first knuckle. *Also see NOTE above and fig. 3-4*.

⚠ WARNING

If your seatpost is not inserted in the seat tube as described in the paragraph about saddle adjustment on page 19, the seatpost may break, which could cause you to lose control and fall.

2. 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) (“Fastener Torque Specifications” on page 74 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 seatpost, 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 (“Fastener Torque Specifications” on page 74 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 seatpost, the suspension mechanism may require periodic service or maintenance. Ask your dealer for recommended service intervals for your suspension seatpost.

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 seatpost clamp can cause damage to the seatpost, 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 saddle adjustment or a different saddle.

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.

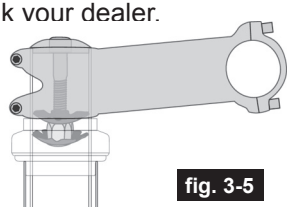


fig. 3-5

If your bike has a "threadless" stem (fig. 3-5) 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.

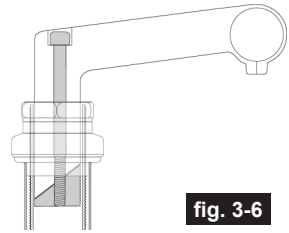


fig. 3-6

If your bike has a "quill" stem (fig. 3-6) 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.

⚠ WARNING

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 if. 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.

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 ("Fastener Torque Specifications" on page 74 or the manufacturer's instructions).

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.

Section 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 and C .*

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 "drop-outs" in the fork and frame, but some suspension mountain bikes use what is called a "thru axle" wheel mounting system.

If you have a mountain bike equipped with thru 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 thru axle wheel. If you don't know what a thru axle is, ask your dealer.

Wheels are secured in one of three ways:

1. 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. (cam action system, fig. 4-1 & fig. 4-2)

2. A hollow axle with a shaft ("skewer") running through it which has a nut on one end and a fitting for a hex key, lock lever or other tightening device on the other. (through-bolt, fig. 4-3)

3. Hex nuts or hex key bolts which are threaded on to or into the hub axle. (bolt-on wheel, fig. 4-4)

Your bicycle may be equipped with a different securing method for the front wheel than for the rear wheel. Discuss the wheel

fig. 4-1

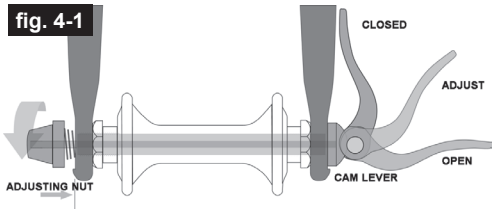


fig. 4-3

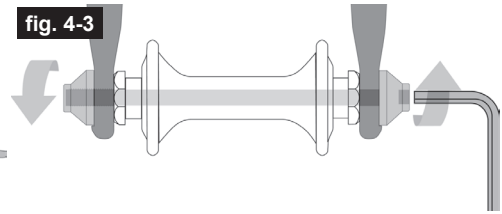


fig. 4-2

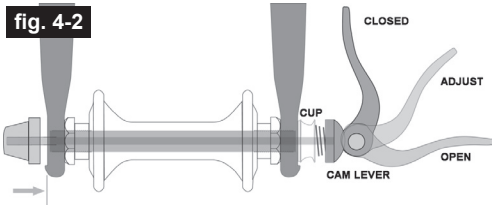
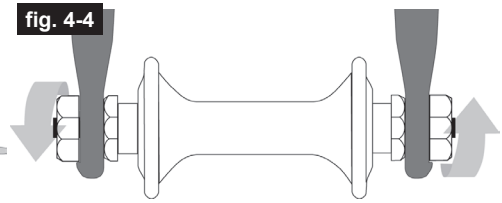


fig. 4-4



securing method for your bicycle with 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.

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:

1. The clip-on type is a part which the manufacturer adds to the front wheel hub or front fork.

2. 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.

Wheels with cam action systems

There are currently two types of over-center cam wheel-retention mechanisms: the traditional over-center cam (fig. 4-1) and the cam-and-cup system (fig. 4-2). 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. 4-1)

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 counter-clockwise 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 on page 25.

Adjusting the cam-and-cup mechanism (fig. 4-2)

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.

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.

Removing a disc 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 "Brakes" on page 30, fig. 4-5 through fig. 4-9).

2. If your bike has cam action front wheel retention, move the cam lever from the locked or CLOSED position to the OPEN position (fig. 4-1 & fig. 4-2). 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. 4-1) 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. 4-2) 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.

Installing a disc brake or rim brake front wheel

⚠ CAUTION

If your bike is equipped with a front disc brake, be careful not to damage the rotor, caliper or brake pads when re-inserting the rotor into the caliper. Never activate a disc brake's control lever unless the rotor is correctly inserted in the caliper. See also "Brakes" on page 30.

1. If your bike has cam action front wheel retention, move the cam lever so that it curves away from the wheel (fig. 4-2). 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. 4-1 & fig. 4-2). 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. 4-1). If you have a cam-and-cup system: the nut and cup (fig. 4-2) 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. 4-1 & fig. 4-2). The lever should now be parallel to the fork blade 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.

b) With a through-bolt or bolt-on system, tighten the fasteners to the torque specifications in "Fastener Torque Specifications" on page 74 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 counter-clockwise one-quarter turn and try tightening the lever again.

5. With a through-bolt or bolt-on system, tighten the fasteners to the torque specifications in "Fastener Torque Specifications" on page 74 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 on page 25.

6. If you disengaged the brake quick-release mechanism before removing the wheel, as described above, re-engage it to restore correct brake pad-to-rim clearance.

7. 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.

Removing a disc 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 disc 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 "Brakes" on page 30, fig. 4-5 through fig. 4-9).

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. 4-2). 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.

Installing a disc brake or rim brake Rear Wheel

⚠ CAUTION

If your bike is equipped with a rear disc brake, be careful not to damage the rotor, caliper or brake pads when re-inserting the rotor into the caliper. Never activate a disc brake's control lever unless the rotor is correctly inserted in the caliper.

1. With a cam action system, move the cam lever to the OPEN position (see fig. 4-1 & fig. 4-2). 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. 4-1 & fig. 4-2). 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 "Fastener Torque Specifications" on page 74 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 counter-clockwise 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 on page 25.

8. If you disengaged the brake quick-release mechanism before removing the wheel, as described 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.

Seatpost cam action clamp

Some bikes are equipped with a cam action seatpost binder. The seatpost cam action binder works exactly like the traditional wheel cam action fastener ("Wheels with cam action systems" on page 25). 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 seatpost (see fig. 4-1).

⚠ WARNING

Riding with an improperly tightened seatpost 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 seatpost.

3. Before you ride the bike, first check that the seatpost is securely clamped.

Adjusting the seatpost cam action mechanism

The action of the cam squeezes the seat collar around the seatpost to hold the seatpost 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 counter-clockwise 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 seatpost 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 seatpost safely.

⚠ WARNING

If you can fully close the cam lever without wrapping your fingers around the seatpost 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.

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

- **Riding with improperly adjusted brakes, worn brake pads, or wheels on which the rim wear mark is visible is dangerous and can result in serious injury or death.**
- **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.**
- **Some bicycle brakes, such as disc brakes (fig. 4-5) and linear-pull brakes (fig. 4-6), are extremely powerful. Take**

extra care in becoming familiar with these brakes and exercise particular care when using them.

- **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.**
- **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.**
- **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.**
- **If replacing worn or damaged parts, use only manufacturer-approved genuine replacement parts.**

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.

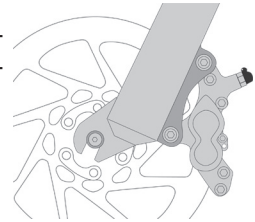


fig. 4-5

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.

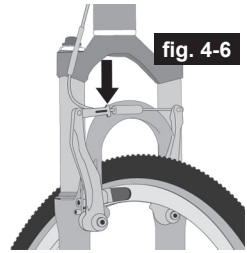


fig. 4-6

Most rim brakes have some form of quick-release mechanism to allow the brake pads to clear the tire when a wheel is removed or reinstalled. When the brake quick release is in the open position, the brakes are inoperative. Ask your dealer to make sure that you understand the way the brake quick release works on your bike (see fig. 4-6 through fig. 4-8) and check each time to make sure both brakes work correctly before you get on the bike.

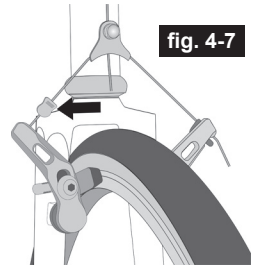


fig. 4-7

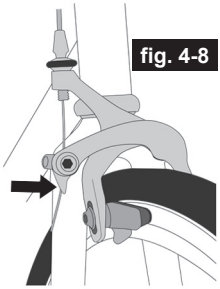


fig. 4-8

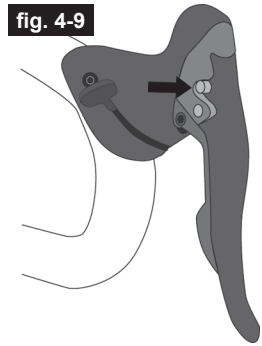


fig. 4-9

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 disc 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 "Bicycle suspension" on page 37). 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.

Shifting gears

Your multi-speed bicycle will have a derailleur drivetrain (see "How a derailleur drivetrain works" on page 34), an internal gear hub drivetrain (see "How an internal gear hub drivetrain works" on page

35) 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

Shifting Gears

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.

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 derail-

leur to move the chain from one sprocket to another, the rider must be pedaling forward.

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).

Which gear should I be in?

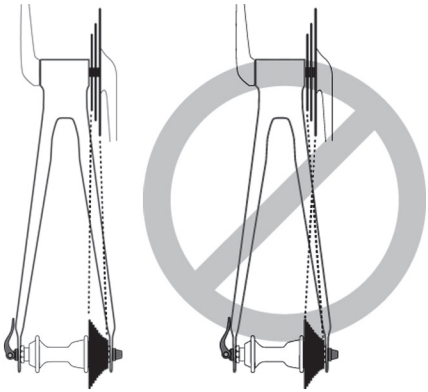


fig. 4-10

The combination of largest rear and smallest front gears (fig. 4-10) 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.

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.

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

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.

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.

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.

Pedals

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.

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.

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.

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.

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.

⚠ 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 “Brakes” on page 30.

⚠ 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.

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 (see fig. 4-11). The part of this information which is most important to you is Tire Pressure.

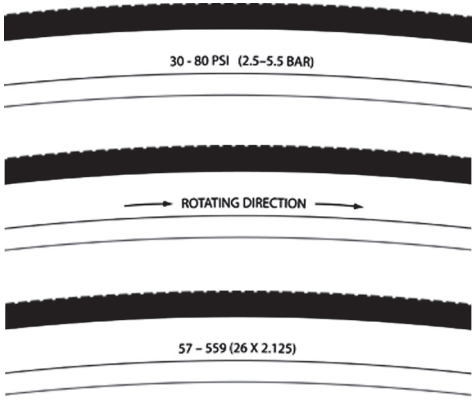


fig. 4-11

⚠ 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 as described in "Mechanical safety check" on page 5 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 Schrader Valve and the Presta Valve. The bicycle pump you use must have the fitting appropriate to the valve stems on your bicycle.

The Schrader valve (fig. 4-12) is like the valve on a car tire. To inflate a Schrader valve tube, remove the valve cap and clamp the pump fitting onto the end of the valve stem. To let air out of a Schrader valve, depress the pin in the end of the valve stem with the end of a key or other appropriate object.

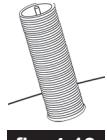


fig. 4-12

The Presta valve (fig. 4-13) 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 (counter-clockwise) 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 Schrader 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 Schrader 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.

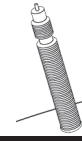


fig. 4-13

⚠ 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 lose control and fall. Replace a patched tube as soon as possible.

Section 5
Electric Bikes

Electric bike components

Motors

Electric bicycles can be built with various types of motors, which differ in strength, efficiency, rotational speed, mounting location, and other factors.

Electric motors are generally mounted on bicycles in one of 3 locations: the front wheel, the rear wheel, or centrally on the seat tube or around the bottom bracket.

Hub motors

Most wheel-mounted motors are hub-type motors. These motors sit in the center of the front or rear wheel, and drive that wheel directly. The hub motor's axle is held fixed in either the front or rear dropouts, and its shell is spun by internal electronics. The rotation of a hub motor is independent of any bicycle drivetrain components, like the cranks, derailleur, or cassette.

Most electric bikes use rear hub motors, meaning the motor is contained in the rear wheel. This configuration usually gives the best handling characteristics, which means the bike is easier to control; in some cases, however, a front hub motor is preferable for a given application.

Hub motors are further classified by whether they are gearless (direct drive), or geared. Geared motors are built with internal planetary reduction gearing. They give high torque at low speeds, and freewheel without any drag. Gearless motors generally reach higher speeds than geared motors, are quieter (some are completely silent), can be rated for higher wattage, and are capable of regenerative braking (see "Does it charge the battery when I pedal?" on page 43). They also produce less torque, especially at low speed, and have some inherent drag when freewheeling.

Center drive motors

Centrally mounted motors which add power to the bike's normal drivetrain by driving the chainwheel are growing in popularity. These "center drive" systems are ideal for off-road applications because of their high torque, as well as other factors. For example, in full-suspension bikes, a center drive motor greatly reduces unsprung weight when compared to a hub motor.

Because they integrate with the bicycle's standard drivetrain, center drive motors usually require more interaction from the rider than a hub motor does. The rider must shift the bicycle's chain into the proper position for a given situation: high gear for speed, low gear for torque. This extra effort is paid back by a system that is able to excel in a wide variety of terrains.

Motor power

Electric bike motors are generally classified by wattage and torque. Watts are a measurement of the capacity of the motor to do work. A motor that is consuming more watts feels more powerful and usually reaches higher speeds, but drains the battery faster. Torque is measured in Newton-meters and is a measurement of the rotating force produced by the motor. This

is most felt when starting from a standstill or climbing a hill.

Does it charge the battery when I pedal?

Generally, no. Like electric cars, some electric bikes are able to push a small amount of power back into the battery as the wheel spins. This is called regeneration. When a motor is regenerating power, its drag increases significantly, slowing the bike down. For this reason, "regen" mode is usually triggered when the rider depresses the bike's brake lever.

Only direct drive hub motors can be used to regenerate power because they are always engaged (the coils inside the motor are always moving). Geared hub motors freewheel (their coils remain stationary when not powered), so they cannot generate power. Center drive motors cannot generate power for the same reason: the spinning wheel is mechanically disengaged from the electrical system except while the motor is running.

Pedal-assist sensors

Most electric bikes use pedal assist sensors to naturally combine the motor's effort with the rider's. The most common sensors electronically measure pedal crank rotation (cadence), pedal pressure (torque), or wheel speed. Many bikes make use of all three types together.

Throttles

Most electric bikes sold in the United States are equipped with a throttle. Like on a motorcycle, throttles are designed to let the user apply 0-100% of the motor's power at will. Depending on the bike, the throttle either acts independently, or in tandem with a pedal assist sensor.

Brakes

The brakes on an electric bike are the same as on a normal bike, with one exception: most have integrated cutoff switches which kill the motor when activated. These "inhibitor" switches are a safety feature designed to prevent the motor from accidentally engaging and causing injury. If for any reason you need the motor to stop turning, remember to simply squeeze one of the brake levers.

⚠ CAUTION

Not all electric bikes have brake inhibitor switches. Be sure to read the instructions provided with your bike to learn more about its specific features.

⚠ WARNING

You should check the operation of your brake inhibitor switches before every ride. While riding slowly in a controlled environment (like a driveway), engage the motor, then squeeze each brake in turn. The motor should lose power immediately and remain off as long as a brake lever is depressed.

Battery capacity gauges

Most electric bikes have a gauge that indicates remaining battery charge. The gauge may be either on the battery itself, on the throttle, on an LCD display near the handlebars, or elsewhere.

The most basic battery charge gauges are based on a simple measurement of battery voltage. This voltage is translated directly to what is shown on the display; for

example, the gauge may call the battery full above 36 volts, and near empty around 32. This type of gauge is generally accurate, but because a battery's voltage fluctuates based on its load (how much energy is being drained from it at a given moment), the gauge will also not always be stable; it will indicate less charge remaining while the bike is accelerating or climbing a hill, and more when the bike is stopped or being ridden at a steady pace on flat ground.

When using a voltage-driven battery gauge, the best way to determine how much battery life is remaining is to check the throttle LEDs after reaching cruising speed on a flat straight road. This allows the battery voltage to stabilize at a medium load and gives the best reading.

More advanced gauges do not rely on battery voltage. Instead, circuitry in the battery measures exactly how much energy has left (or entered) the pack during use, and then calculates how much charge is remaining based on that measurement (the battery's "State of Charge"). This type of battery gauge is more accurate, and will not fluctuate under load.

Battery care & safety

⚠ WARNING

Failure to properly use, charge, and store your battery as instructed will void the warranty and may cause a hazardous situation. Before using your battery for the first time, read this section of the manual in its entirety.

If you have any questions about this battery or its usage, please contact EBCC customer service department at (800) 377-4532.

Proper maintenance and care of batteries will maximize their lifespan and capacity. Accell North America (ANA) warrants your new battery from the date of purchase only if properly cared for—please refer to the limited warranty for details.

Your hybrid electric bicycle uses a Li-Ion (lithium-ion) battery. Various types of lithium-ion batteries include LFP (Lithium Iron Phosphate), LMO (Lithium Manganses Oxide), and others. Lithium-ion is a very user-friendly type of battery when cared for properly. Even with proper care, however, rechargeable batteries do not last forever. Every time the battery is discharged and subsequently recharged, its relative capacity decreases by a small percentage. You can maximize the life of your battery by following the instructions in this guide.

What to do when you receive your new battery

- Batteries are not shipped with a full charge. You should charge your battery for 4-6 hours as soon as possible after you receive it.

General use and FAQ

- Most electric bikes are equipped with a five-minute sleep function. If no activity is detected after five minutes, the bike will go into “stasis” mode to conserve battery power. Simply cycle the bike off then on again to re-activate the battery.
- The rated output capacity of a battery is measured at 77°F (25°C). Any variation in this temperature will alter the performance of the battery. High temperatures especially reduce overall battery life & run time.

Do I need to “break-in” my battery?

No. Although battery break-in may be necessary with some products, our battery packs go through the break-in process before they leave the manufacturer.

Is it normal that the battery gets warm when recharging?

Yes, it is normal that the battery will become warm to the touch during the recharging process. This is because of the pack’s internal resistance and losses in energy conversion efficiency from electric energy to chemical energy.

How long will my battery last before needing replacement?

Average battery life depends on use and conditions. Even with proper care, rechargeable batteries do not last forever. Conservatively, a Li-Ion battery will last about 500–750 cycles. A partial charge/discharge counts fractionally against those numbers; running the battery down halfway then recharging it completely uses up one half of a charge cycle.

“End of useful life” refers to the point at which a battery can no longer supply 70% of its original rated capacity in ampere-hours. After this point, the aging process will accelerate and the battery will need to be replaced.

Does my battery have a “memory”?

No, Li-Ion batteries do not have any memory. Partial discharge/charge cycles will not harm the battery’s capacity or performance. It is OK to charge the battery as often as is convenient.

Charging

- Be sure to read any documentation included with the battery charger, or printed on the charger itself.
- Improper use of the battery charger can cause a fire resulting in severe injury or death, and property damage.
- After a ride, fully recharge your battery as soon as it has cooled to room temperature. A lithium-ion battery left in a discharged condition will deteriorate much faster than a fully charged battery.
- Do not block the fan vent on the charger while charging the battery. This can cause the charger to overheat.
- The battery charger supplied with this battery is for INDOOR use only.
- Avoid any contact with water or other fluids while charging the battery. If the battery, charger or any connections become wet, immediately unplug the charger and thoroughly dry all components prior to charging the battery.
- Use only the battery charger supplied with this battery. If you use any other bat-

tery charger, you will void the warranty, you may damage the battery, and you could cause a fire resulting in severe injury or death, and property damage.

- Never charge a battery continuously for longer than 12 hours.
- Charge your battery during the day and only in rooms which have a smoke or a fire detector; but not in your bedroom. During the charging process, place the battery on a non-flammable surface such as metal, ceramic, or glass.

Charger FCC information

The charging equipment provided with your bike has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

⚠ CAUTION

Changes or modifications to the battery charger not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Storage

When storing your battery for a long period of time (longer than two months):

- Remove the battery from the bike.
- Lithium-ion batteries are best stored at a 40–60% charge level. During long term storage, recharge your battery to 40–60% every 90 days. Determine charge level using either the built-in charge indicator on the battery pack, or the battery gauge on the bike. Batteries slowly self-discharge when left unused for a long period of time; if the battery cells are allowed to reach a critically low voltage, their lifespan and capacity will be permanently reduced.
- Always disconnect your charger from the wall outlet and battery before storing the battery.
- Avoid storing your battery in extreme temperatures, whether hot or cold.
- Batteries are best kept in a cool, dry place. Do not allow your battery to accumulate condensation, as this could cause corrosion or a short-circuit.

- The recommended storage temperature for Li-Ion batteries is between 32–77°F (0–25°C).

Transport

- Lithium-ion batteries are subject to many regulations, and are often considered dangerous material by carriers. Be sure to check for relevant laws, and ask the carrier for approval prior to shipping a lithium-ion battery, or transporting it by air.

Disposal

- Be friendly to the environment! Be sure to recycle your old batteries at a local battery-recycling center. Do not throw them in the garbage! Check www.Call2Recycle.org for more information on free battery dropoff locations.

Safety

⚠ WARNING

- **Use only the battery provided with your bicycle. Even if it is physically possible to connect another type of battery, it is dangerous and potentially damaging to do so.**
- **DO NOT use this battery with any other vehicle or appliance. Use of this battery with any other product will void the warranty, and may create a hazardous condition that could cause a fire resulting in severe injury or death, and property damage.**
- **Never disassemble the battery or open the battery case. There is a risk of electric shock and damage to the battery.**
- **Never short circuit the discharge terminals of the battery. A short circuit will damage the battery and could cause a fire resulting in severe injury or death, and property damage. When handling the battery outside the bicycle, be aware of conductive materials that may short the battery terminals, such as coins, nails, etc.**
- **Never crush or puncture the battery. A punctured or crushed battery could catch fire or explode, which could lead to serious injury or death.**
- **Protect the battery from water or other moisture. If the battery becomes wet from rain during use, dry it as soon as possible. Remove the battery from the electric bicycle before washing the bicycle. Clean the battery with a dry or slightly moist rag; do not submerge or spray with pressurized water.**
- **Keep the battery away from excessive heat (104°F or higher) and/or open flames. Avoid long term exposure to direct rays from the sun.**

⚠ CAUTION

- **Protect the battery from materials that may contaminate the charge port or the output port, such as dirt and sand; the ports may be difficult or impossible to clean out.**
- **To avoid damage to the battery, never subject it to intense physical shock or severe vibration.**

Riding an electric bike

Safety

⚠ WARNING

Because electric bikes are faster and heavier than normal bicycles, they require extra caution and care while riding. Failure to heed the following safety instructions could lead to a crash, injury, or death.

- Before your first ride, familiarize yourself with the model-specific operation instructions included with your bike.
- Before traveling on streets or around others, practice riding in a safe area away from pedestrians and traffic (such as a driveway or empty parking lot).
- Always use the lowest assist setting until you are comfortable with the bike and feel confident controlling the electric assist. See the specific operation instructions included with your bike for more information.
- When mounting your bike, make sure not to step on the pedals until you are sitting on the saddle and gripping the handlebars tightly. If you apply pressure to the pedals, or move them, the motor assistance might switch on suddenly and result in an uncontrolled start of your bike.
- Always wear a helmet, closed-toe shoes, and eye protection when riding.
- Never ride at a speed outside your comfort zone, or that you feel may be unsafe for the given conditions.
- Keep your hands on the brake levers, and remember that they will always slow or stop the bike if pulled. Even on bikes without brake inhibit switches (see “Brakes” on page 43), the brakes are always more powerful than the motor.
- Heavy electric bikes take longer to slow down; leave extra space for stopping safely.
- Electric bikes are considerably heavier than normal bicycles. For this reason parking, pushing, lifting and carrying the bike is more difficult. Bear this in mind when loading your bike into a car and unloading it, or when mounting it on a bicycle carrier system.
- Remember that all the information in this manual referring to bicycle safety also applies to your electric bike.

⚠ WARNING

Make no modifications to the bike’s electrical system that are not explicitly approved by the manufacturer.

Legality

In the United States, electric bikes are defined as “*a two- or three-wheeled vehicle with fully operable pedals and an electric motor of less than 750 watts (1h.p.), whose maximum speed on a paved level surface, when powered solely by such a motor while ridden by an operator who weighs 170 pounds, is less than 20 mph.*”

However, local and state regulations vary, and it is your responsibility to ensure your bike is legal in your particular area before riding it on public roads. If you’re unsure, ask your bicycle dealer for more information about local laws and regulations.

Range

Many factors affect the range that you will experience with the bicycle. These include:

- Battery state-of-charge.
- Mode setting (the bike will use less power in the pedal assist Mode due to the required contribution of the rider).
- Tire inflation pressure.
- Adjustment of the wheel bearings and brakes (tight bearings or a dragging brake shoe will adversely affect range).
- Rider weight (it takes more energy to accelerate a heavier person).
- The speed at which you travel, and local wind conditions (air resistance increases exponentially with speed).
- Terrain (road surface and hills; traveling on a soft surface, such as dirt or gravel, or climbing a hill uses energy faster).
- Lots of starts and stops (full power from a standing start draws the most amperage from the battery).

How to maximize your range

- Fully charge your battery before each ride.
- Ride in pedal assist mode and pedal! Enjoy the health benefits available from cycling. Every watt of power that you provide is one watt less that the battery has to provide. Make your bicycle a true human/electric hybrid!
- Check your tire pressure regularly and inflate the tires to the maximum pressure printed on the tire sidewall.
- Have your bicycle serviced periodically to ensure that the bearings turn freely and the brakes do not rub the rims (or rotors, for a disc brake) when they are not applied.
- Minimize the weight that you carry.
- Ride at slower speeds.
- Accelerate gently. Assist the system by pedaling as you accelerate to your cruising speed.

As your battery ages, it will gradually lose capacity. With proper care and maintenance, your Li-ion battery will retain up to 70% of its capacity for at least 500 discharge/recharge cycles. As capacity diminishes, you will notice a gradual drop-off in maximum range capability. When range falls to an unacceptable level, contact your authorized dealer for information regarding purchasing a replacement battery.

Hills

If you encounter a hill that causes the speed of your bicycle to drop below 7 miles per hour (11 kilometers per hour) on electric power only (throttle mode with no pedaling) with the throttle fully applied, PEDAL to assist the bicycle up the hill. Failure to do so could overstress the motor and controller, possibly causing those components to overheat. Further, failure to pedal up steep hills to assist the bicycle will overstress the battery, reducing its capacity and shortening its useful life.

Weather conditions

Your electric bike is built with components that are sealed against dust and water, and can safely operate in most weather conditions. To ensure the longest life of your

components, however, you should avoid riding in wet weather if possible.

⚠ WARNING

To avoid risk of electric shock and property damage, never submerge any of the bike's electrical components in a liquid.

⚠ WARNING

Electric bikes are faster and heavier than normal bikes. When riding in wet weather, you should use extra caution. You are more likely to fall from a wet road surface when traveling at high speed. Heavy electric bikes also take longer to slow down, and the required stopping distance in wet weather is even greater; be sure to leave ample room for stopping, and brake gently and evenly to avoid falling.

Riding an off-road electric bicycle

See "Off-road safety" on page 10.

Riding a high-speed electric bicycle

High-speed electric bikes are capable of easily traveling over 20 miles per hour. The same principles of operation, and the same safety considerations, apply as with other electric bicycles. However, even more caution must be taken because the higher speed of travel makes accidents more likely.

- Only ride at a speed at which you're comfortable. Just because the bicycle is capable of reaching high speed does not mean you must ride it at high speed.
- Make sure you consider how you are perceived by other road users. Cars, pedestrians and other cyclists will often underestimate your speed, and make decisions assuming you are traveling slower than you are. Be especially vigilant around driveways and intersections, or anywhere with cross traffic.
- Use extra caution when overtaking other cyclists or pedestrians; the greater difference in speed increases the risk and severity of a crash.
- Local laws may prohibit the use of high-speed electric bicycles on bike paths or trails. Be sure you are familiar with the laws in your area. Even if legal, it is usually not safe to ride at high speed on paths or trails around other users.
- Always wear a helmet, bright-colored clothing, and suitable glasses while riding at high speeds.

⚠ WARNING

Do not tow a trailer using a high-speed electric bicycle. Higher speeds can cause instability and lead to a crash.

Riding a center-drive bike

Operation

Since a center drive (like the Bosch or TransX system) outputs power through the bike's normal drivetrain, the rider needs to be more active in controlling motor output than on a bike with a hub motor. This is done by shifting the bicycle's gears.

Say a rider on a bike with a hub motor twists the throttle to 100%. The motor in response spins the bike's wheel to 100% of its maximum speed, and the bike travels, say, 20 miles per hour.

In contrast, on a bike with a center drive motor, when the rider twists the throttle to 100% the motor also spins to maximum speed. However, since the motor is driving the rear wheel through the pedal chain, the bike's current gear affects how fast the wheel actually spins. If the bike is in second gear, the bike may only go, say, 10 miles per hour, even though the motor is spinning at maximum speed.

Just like on a car with a manual transmission, the rider needs to cycle through first gear, second gear, third gear, and so on, until the desired speed is reached. Each gear shift up increases speed but reduces torque and acceleration.

Unlike a car, though, the gear selection is not critical. You can just as easily start pedaling with the bike in 6th gear, but for the best acceleration and performance it's a good idea to start in a low gear and shift up as you gain speed.

Hills

If your objective is not to reach maximum speed but to efficiently ride up a hill, you should consider that the system will give you more torque when in a lower gear. Shift down when you encounter a steep hill; the motor will be put under less strain, and your battery's range will increase.

Extending the life of your drivetrain

A center drive motor can put extra stress on drivetrain components such as the chain, cassette, derailleur, and derailleur hanger if not ridden with care. The best way to avoid excess wear on the drivetrain is to avoid shifting under load.

Shifting under load means to shift the derailleur while the motor or rider is pulling hard on the chain. The extra chain tension keeps the derailleur from shifting effectively and can cause damage to the drivetrain.

To shift properly, make sure you ease up (on both the throttle and pedals) just before and just after you shift. Let the chain drop into place fully before you start pedaling or throttling hard again.

⚠ WARNING

Shifting under load can cause the chain or other drivetrain components to break suddenly, leading to a crash.

Electric bike care

⚠ CAUTION

This section contains instructions that must be followed to avoid damage to the bike or electrical components.

Like any bicycle, you should take care of your electric bike to extend its life and keep it operating smoothly.

In addition to following the instructions in "Service" on page 58, mind the following instructions for keeping your electric bike like new.

- Maintain your batteries as described in "Battery care & safety" on page 44. This is especially important when storing batteries unused for long periods of time.
- Periodically inspect your bike's wiring and electrical connectors for damage. Frayed or heat-damaged wires, loose plugs, or bad connections could eventually cause damage to the system.
- Store your bike indoors. A bike left outside in the weather will deteriorate very

quickly. Never cover a stored bike with plastic as condensation buildup could cause damage to electrical components. Battery packs especially should be kept in a temperature controlled, dry environment.

- Review all component manuals and exercise caution before applying any chemicals, paint, or cleaning agents to the electrical components of the bike.

Electric bike service

If you have any questions, issues, or concerns regarding Bosch or Currie equipped bikes, please call the EBCC Technical and customer service department at (800) 377-4532. Do not ride a bike you suspect may not be functioning fully.

For all other questions please contact Yuba Bicycles Technical and customer service at department (877) 889-YUBA.

To find an authorized dealer in your area, check the Dealer Locater on www.yubabikes.com.

⚠ WARNING

There are no user serviceable elements incorporated into the motor, motor controller, battery, battery charger, throttle, or wiring harness of your electric bicycle. DO NOT ATTEMPT TO DISASSEMBLE OR ADJUST ANY OF THESE COMPONENTS. Doing so may cause extensive damage to these components, will void your warranty, and may cause a hazardous condition. If you cannot resolve a problem with your Bosch or Currie motor, contact your authorized dealer, or call the EBCC technical and customer service department at (800) 377-4532 for assistance. For all other systems and questions please contact Yuba Bicycles Technical and customer service at department (877) 889-YUBA.

Section 6:
Cargo

The basics

- Carrying a load and riding a medium/long-wheelbase bike both require getting accustomed to.
- Practice maneuvering and braking on a flat, hazard- and traffic-free street with and without a load before going out onto a public or busy street.
- Carrying a seated passenger or heavy load involves risks, foremost of which can be decreased stability, decreased braking power and increased stopping distance.
- Always make sure you have at least two well-adjusted brakes. Drum, roller, or coaster brakes are not suited to hilly riding or heavy loads and can fail under serious strain—when you need them most!
- We strongly recommend rim and/or disc brakes, though these carry their own risks: under severe loads (as when carrying a passenger or heavy cargo at high speed- a very strong front brake can lead to accelerated material fatique and cause pre-mature failure of the front fork. For this reason, do not use the front brake by itself; the rear or rear and front brake should be used in all braking situations.

The carrier

⚠ WARNING

The load(s) attached or placed on the carrier of the cargo bicycle must be securely fastened. Check that no edges or parts of the load can get come into contact with moving parts of the bicycle.

The carrier is the space to be used for the transport of boxes, baskets, and cartons.

- It is essential to position the load evenly, and to securely attach it to the carrier using a rope, cam straps or some type of bungee cord.
- Standing, kneeling, sitting backwards or sideways (both legs on the same side of the bike) on the carrier seat while the bike is moving or stopped can easily, loss of control of the bike, destroyed rims, a destroyed bike frame, severe injury or worse.

Children

⚠ WARNING

The user of this product acknowledges both an understanding and an assumption of the risks involved in cycling, cycling with cargo, and cycling with a passenger.

- Children who are incapable of riding a bicycle on their own or are under the age of four should not ride on the bicycle as a passenger unless it is equipped with an approved Child Seat accessory.

- Children should not ride as passengers without an adult operating the bicycle.
- When carrying children older than four years old, a passenger handlebar, and feet support must be installed on the bike.
- Never leave a child unattended on the back of a bicycle.

Using good judgment

No warning is a substitute for good judgment. Always use good judgment. If you have reason to suspect that your own judgment isn't great, share your plans with somebody you respect, and ask for a second opinion.

Additional cargo considerations

⚠ WARNING

Always make sure you have at least two well-adjusted brakes. Under severe loads (as when carrying a passenger or cargo) at high speed a very strong front brake can lead to failure of the front fork

⚠ WARNING

Keep feet and hands away from moving wheel and chain. Contact with moving parts can result in serious injury.

⚠ WARNING

To reduce the risk of injury, use wheel-skirts, approved sidebags, sideloarder feet support and/or approved child seat when carrying passengers or children. Instruct passengers to keep feet and limbs outside of the wheel well and away from moving parts.

Pre-ride checklist

- Ensure straps cannot get caught in the wheels.
- Ensure bags, boxes or any other item are in a position where they cannot be caught in the spoke.
- Double-check your load for security and stability.
- Check that your brakes are well adjusted
- Check to see that your wheels are securely fastened
- That your helmet and passenger's helmet are securely fastened.
- Check that no components or frame members are cracked or broken (in general, if at any time you notice a crack or bend in your bike, stem, forks, or bars of your bicycle, stop riding immediately; take your rig to your local bike shop and have them inspect it)
- That your bike is equipped with the proper passengers accessories (childseat, foot pegs, handle bar, side bags,etc).

Kickstand

A bicycle kickstand is provided with each bicycle. There are a few important points to take into consideration when using a kickstand with a cargo bicycle.

- Kickstands are not designed for heavy loading, passenger loading or commercial applications.
- The user should always hold on to the bike when loading it. Or the user can

lean the bike against a wall or a pole to prevent the bicycle from falling over.

Maximum payloads

- Please refer to the safety decal on the chainstay stay behind the bottom bracket for the payload rating specific to each Yuba cargo bicycle.
- Kickstand (Yuba longtail cargo bikes) 50kg | 110 lbs
- Please call Yuba Bikes or visit the nearest bicycle dealer for more information.

Sideloader add-ons

- The integrated open end tubes found on the upper and lower sections of the carriers of some Yuba bicycles are add-on ports.
- Before inserting any add-ons, lubricate the tubing with bicycle grease.
- Visit yubabikes.com for more information about add-ons specific to Yuba cargo bicycles.

Carrying long loads

- Long loads up to 5m (or 15 ft) can be carried on the sideloaders of Yuba cargo bikes (if equipped).
- In some cases a block (foam for example) might be needed to keep the load(s) away from the pedal(s).
- Carrying long loads on the non-kickstand side of the bike helps keep the load(s) away from moving traffic and facilitate mounting on the bicycle.

Carrying passengers and children

- Carrying passengers by bicycle is subject to limitations and regulations in most countries. Check local traffic and regulations to learn more and comply with the law.
- Carrying children on a bicycle should only be done when using approved and certified child seat and equipment. Please call Yuba Bikes or visit the nearest bicycle dealer for more information.
- We recommend that riders always use wheelskirts, sidebags, and foot support when carrying children.
- Passenger should remain seated while bicycle is in motion.
- Presence of an additional passenger may require alteration of the method used by the rider to mount or dismount the bicycle. Care must be taken whenever the rider gets on or off the bicycle.
- For more tips and pictures on how to carry loads by bicycle, visit: yubabikes.com

Section 6:
Service

⚠ 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.

⚠ WARNING

Before performing ANY service, inspection, or maintenance on your electric bicycle, you should first remove the battery. Failure to remove the battery could lead to the bicycle turning on unexpectedly, causing serious damage or injury.

If you have to perform maintenance that requires the battery to be installed, you must be sure that even if the bicycle wheel, chain, or other drivetrain components begin moving unexpectedly, they will not be in a position to cause injury or damage.

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.

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.

- 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 (page 5) 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.
- Before every ride: Mechanical Safety Check (page 5).
- 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 (first consult the drive system manufacturer's user manual for specific cleaning instructions or warnings) 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.
- 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 tears. If you are unsure whether your tires are worn or damaged, ask your dealer, who can 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 “The lifespan of your bike and its components” on page 68.

⚠ 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 “Intended use of your electric bicycle” on page 62 and “The lifespan of your bike and its components” on page 68.

- 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.

- Every 25 (hard off-road) to 50 (on-road) hours of riding: Take your bike to your dealer for a complete checkup.

If your bicycle sustains an impact

For information on necessary service after an accident, see “The lifespan of your bike and its components” on page 68 and “After an accident” on page 15.

⚠ 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

Appendix A:
Intended use of your electric 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 electric bicycles, and many variations within each type.

There are also bicycles that mix features. Some may be suitable for more than one purpose, but there will always be trade-offs.

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.

On the following pages, we generally outline the intended uses of various types of bikes.

Industry usage conditions are generalized and evolving. Consult your dealer about how you intend to use your bike.

MAXIMUM WEIGHT FOR BICYCLES AND ACCESSORIES	
Bicycles	**Maximum weight with cargo[1]**
Non-folding bicycles	110 kg (242 lbs)
Folding bicycles	100 kg (220 lbs)
Bicycles with carbon-fiber wheels[3]	100 kg (220 lbs)
Accessories	**Maximum carrying weight[2]**
Luggage racks (front)	10 kg (22 lbs)
Luggage racks (rear)	25 kg (55 lbs)

1. Maximum carrying weight includes the weight of the rider (plus clothing, riding gear, etc), any added accessories and any cargo being carried. The weights listed are for general reference only; check the documentation included with your bike for specific weight limits.

2. Maximum carrying weight includes any attached battery, even if integrated into the rack. Always check if the manufacturer’s recommended weight is marked on the rack itself, or included in separate documentation, and do not exceed that recommendation.

3. Unless otherwise noted; check the instructions provided by the bike and wheel manufacturer.

High-Performance Road

Condition 1

Bikes designed for riding on a paved surface where the tires do not lose ground contact.

INTENDED To be ridden on paved roads only.

NOT INTENDED For off-road, cyclocross, or touring with racks or panniers.

TRADE OFF: Material use is optimized to deliver both light weight and specific performance. You must understand that (1) these types of bikes are intended to give an aggressive racer or competitive cyclist a performance advantage over a relatively short product life, (2) a less aggressive rider will enjoy longer frame life, (3) you are choosing light weight (shorter frame life) over more frame weight and a longer frame life, (4) you are choosing light weight over more dent resistant or rugged frames that weigh more. All frames that are very light need frequent inspection. These frames are likely to be damaged or broken in a crash. They are not designed to take abuse or be a rugged workhorse. *See also "Intended use of your electric bicycle" on page 62*

General Purpose Riding

Condition 2

Bikes designed for riding Condition 1, plus smooth gravel roads and improved trails with moderate grades where the tires do not lose ground contact.

INTENDED For paved roads, gravel or dirt roads that are in good condition, and bike paths.

NOT INTENDED For off-road or mountain bike use, or for any kind of jumping. Some of these bikes have suspension features, but these features are designed to add comfort, not off-road capability. Some come with relatively wide tires that are well suited to gravel or dirt paths. Some come with relatively narrow tires that are best suited to faster riding on pavement. If you ride on gravel or dirt paths, carry heavier loads or want more tire durability talk to your dealer about wider tires.

Cross-Country, Marathon, Hardtails

Condition 3

Bikes designed for riding Conditions 1 and 2, plus rough trails, small obstacles, and smooth technical areas, including areas where momentary loss of tire contact with the ground may occur. NOT jumping. All mountain bikes without rear suspension are Condition 3, and so are some lightweight rear suspension models.

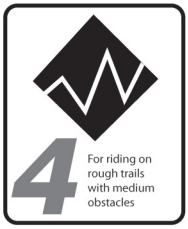
INTENDED For cross-country riding and racing which ranges from mild to aggressive over intermediate terrain (e.g., hilly with small obstacles like roots, rocks, loose surfaces and hard pack and depressions). Cross-country and marathon equipment (tires, shocks, frames, drive trains) are lightweight, favoring nimble speed over brute force. Suspension travel is relatively short since the bike is intended to move quickly on the ground.

NOT INTENDED For Hardcore Freeriding, Extreme Downhill, Dirt Jumping, Slopestyle, or very aggressive or extreme riding. No spending time in the air landing hard and hammering through obstacles.

TRADE OFF: Cross-Country bikes are lighter, faster to ride uphill, and more nimble than All-Mountain bikes. Cross-Country and Marathon bikes trade off some ruggedness for pedaling efficiency and uphill speed.

All Mountain

Condition 4



Bikes designed for riding Conditions 1, 2, and 3, plus rough technical areas, moderately sized obstacles, and small jumps.

INTENDED For trail and uphill riding. All-Mountain bicycles are: (1) more heavy duty than cross country bikes, but less heavy duty than Freeride bikes, (2) lighter and more nimble than Freeride bikes, (3) heavier and have more suspension travel than a cross country bike, allowing them to be ridden in more difficult terrain, over larger obstacles and moderate jumps, (4) intermediate in suspension travel and use components that fit the intermediate intended use, (5) cover a fairly wide range of intended use, and within this range are models that are more or less heavy duty. Talk to your retailer about your needs and these models.

NOT INTENDED For use in extreme forms of jumping/riding such as hardcore mountain, Freeriding, Downhill, North Shore, Dirt Jumping, Hucking etc. No large drop offs, jumps or launches (wooden structures, dirt embankments) requiring long suspension travel or heavy duty components; and no spending time in the air landing hard and hammering through obstacles.

TRADE OFF: All-Mountain bikes are more rugged than cross country bikes, for riding more difficult terrain. All-Mountain bikes are heavier and harder to ride uphill than cross country bikes. All-Mountain bikes are lighter, more nimble and easier to ride uphill than Freeride bikes. All-Mountain bikes are not as rugged as Freeride bikes and must not be used for more extreme riding and terrain.

Gravity, Freeride, and Downhill

Condition 5

Bikes designed for jumping, hucking, high speeds, or aggressive riding on rougher surfaces, or landing on flat surfaces. However, this type of riding is extremely hazardous and puts unpredictable forces on a bicycle which may overload the frame, fork, or parts. If you choose to ride in Condition 5 terrain, you should take appropriate safety precautions such as more frequent bike inspections and replacement of equipment. You should also wear comprehensive safety equipment such as a full-face helmet, pads, and body armor.

INTENDED For riding that includes the most difficult terrain that only very skilled riders should attempt.

Gravity, Freeride, and Downhill are terms which describe hardcore mountain, north shore, slopestyle. This is “extreme” riding and the terms describing it are constantly evolving.

Gravity, Freeride, and Downhill bikes are: (1) heavier and have more suspension travel than All-Mountain bikes, allowing them to be ridden in more difficult terrain, over larger obstacles and larger jumps, (2) the longest in suspension travel and use components that fit heavy duty intended use. While all that is true, there is no guarantee that extreme riding will not break a Freeride bike.

The terrain and type of riding that Freeride bikes are designed for is inherently dangerous. Appropriate equipment, such as a Freeride bike, does not change this reality. In this kind of riding, bad judgment, bad luck, or riding beyond your capabilities can easily result in an accident, where you could be seriously injured, paralyzed or killed.

NOT INTENDED To be an excuse to try anything. Read “Extreme, stunt or competition riding” on page 13.

TRADE OFF Freeride bikes are more rugged than All-Mountain bikes, for riding more difficult terrain. Freeride bikes are heavier and harder to ride uphill than All-Mountain bikes.

Appendix B
The lifespan of your bike and its components

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.

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 on page 5 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.

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/cm3 (grams per cubic centimeter), titanium 4.5 grams/cm3, aluminum 2.75 grams/cm3. Contrast these numbers with carbon fiber composite at 1.45 grams/cm3.

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 crashworthiness 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.

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.

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, and 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.

What to look for

▸ **ONCE A CRACKS STARTS IT CAN GROW AND GROW FAST.** Think about the crack as forming a pathway to failure. This means that any crack is potentially dangerous and will only become more dangerous.	SIMPLE RULE 1: If you find crack, replace the part.
▸ **CORROSION SPEEDS DAMAGE.** Cracks grow more quickly when they are in a corrosive environment. Think about the corrosive solution as further weakening and extending the crack.	SIMPLE RULE 2: Clean your bike, lubricate your bike, protect your bike from salt, remove any salt as soon as you can.
▸ **STAINS AND DISCOLORATION CAN OCCUR NEAR A CRACK.** Such staining may be a warning sign that a crack exists.	SIMPLE RULE 3: Inspect and investigate any staining to see if it is associated with a crack.
▸ **SIGNIFICANT SCRATCHES, GOUGES, DENTS OR SCORING CREATE STARTING POINTS FOR CRACKS.** 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.	SIMPLE RULE 4: Do not scratch, gouge or score any surface. If you do, pay frequent attention to this area or replace the part.
▸ **SOME CRACKS (particularly larger ones) MAY MAKE CREAKING NOISE AS YOU RIDE.** Think about such a noise as a serious warning signal. Note that a well-maintained bicycle will be very quiet and free of creaks and squeaks.	SIMPLE RULE 5: Investigate and find the source of any noise. It may not a be a crack, but whatever is causing the noise should be fixed promptly.

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
- Towing a trailer
- High mileage
- Riding near the bike’s maximum weight capacity (combined weight of rider, bike, and luggage)
- 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.

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 tests 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 C
Fastener Torque Specifications

Correct tightening torque of threaded fasteners is very important to your safety. 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.

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.

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.

	RECOMMENDED TORQUE VALUE	
COMPONENT	IN–LB	NM
Headset, Handlebar, Seat area		
Seat fixing bolt (seat rail binder)	174–347	19.7–39.2
Stem handlebar binder bolts (2)	174–260	19.7–29.4
Stem wedge (binder) bolt – quill type for threaded headset	174–260	19.7–29.4
Threaded headset locknut	130–150	14.7–16.9
Threadless stem clamp bolts	120–144	13.6–16.3
Crankset, Bottom Bracket, Pedal area		
Chainring bolt (aluminum)	44–88	5.0–9.9
Chainring bolt (steel)	70–95	7.9–10.7
Crank bolts	305–391	34.5–44.2
Pedal (into crank)	307–350	34.7–39.5
Derailleur, Shift lever area		
Front derailleur cable pinch	44–60	5.0–6.8

COMPONENT	RECOMMENDED TORQUE VALUE IN–LB	NM
Front derailleur clamp mount	44–60	5.0–6.8
Rear derailleur cable pinch bolt	35–45	4.0–5.1
Rear derailleur mounting bolt	70–86	7.9–9.7
Shift lever (MTB thumb–type)	22–26	2.5–2.9
Shift lever (SRAM “grip–shift” type)	17	1.9
Rack area		
Bicycle rack to frame (6mm bolts)	88.5	10
Wheel area		
Wheel axle nuts to frame/fork	360–390	29.4–44.1
Brakes		
Brake cable pinch bolt (linear pull)	53–69	6.0–7.8
Brake caliper (linear pull) to frame/fork	45–60	5.1–6.8
Brake lever (MTB type) to handlebar	53–69	6.0–7.8
Brake pad to caliper	50–70	5.6–7.9
Brake caliper (disc) to frame/fork	60–90	6.8–10.2
Disc rotor to hub	35–55	4.0–6.2

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yubabikes.com | info@yubabikes.com | (877) 889-YUBA