# OWNER'S MANUAL

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FROG
★bikes★

# INTRODUCTION

Thank you for choosing a Frog bike. We hope it will give you many hours of cycling pleasure. The following pages will help you fully understand your bike and how to look after it. They will provide you with the information you need to properly use, adjust, maintain and service your new bike, so you can get the most out of every ride. Please pay attention to any safety information – it's there to help you avoid serious injury.

## IMPORTANT

This manual contains important safety, performance and service information. Please read it before you ride your new bike, and keep it for reference.

Additional safety, performance and service information for specific components such as suspension or pedals on your bike, or for accessories such as helmets or lights that you purchase, may also be available. Ensure your stockist has given you all the literature that was included with your Frog bike 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 your stockist.

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

Please note all instructions are subject to change without notice.

Please visit **www.frogbikes.com** for technical updates.

# CONTENTS

# WARNINGS

## General Warning:

Like any sport, cycling involves a risk of injury and damage. By choosing to ride a bike, you assume the responsibility for that risk, so you need to know the rules of safe and responsible riding and correct use and maintenance. Proper use and maintenance of your bike reduces risk of injury.
This manual contains many "Warnings" and "Cautions" concerning the consequences of failure to maintain or inspect your bike, 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 bike or your warranty being void.

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

As 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 bike 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.

## 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 the bike 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 bike; and that you and your child have learnt, understand and obey not only the applicable local motor vehicle, bicycle and traffic laws, but also the common sense rules of safe and responsible cycling. As a parent, you should read this manual as well as review its warnings and the bike's functions and operating procedures with your child before letting your child ride the bike.

⚠ WARNING: Make sure your child always wears an approved bicycle helmet when riding but always removes it when not cycling. A helmet should not be worn while playing, in play areas, on playground equipment, while climbing trees, or at any time while not riding a bicycle. Failure to follow this warning could result in serious injury or death.

⚠ WARNING: Make sure your child's bike is sized correctly so that when the saddle is adjusted correctly both feet can touch the ground. If your child's new bike doesn't fit, ask your stockist to exchange it before you ride it.

## Intended Usage and Usage Limitations:

•Frog Tadpole balance bikes are toys and not to be used in traffic.

•Frog City Bikes fall into Condition 1 specified in EN17406 (see table below for details).

•Frog First Pedal, Hybrid and Road Bikes fall into Condition 2 specified in EN17406 (see table below for details).

•Frog Mountain Bikes fall into Condition 3 specified in EN17406 (see table below for details).

•Track bikes are designed for TRACK use and are not supplied with brakes, a bell or reflectors. Frog Track Bikes are not road legal. Adapting Frog Track Bikes for road use is entirely at the owners' risk. The owner is entirely responsible for complying with their local laws and ensuring that the bike is safe to use.

⚠ WARNING: The use of the bikes outside of their recommended riding condition will void any manufacturer's warranty.


| Conditions | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| **Description** | Applies to bicycles and EPACs used on regular paved surfaces where the tyres are intended to maintain ground contact at average speed with occasional drop. | Applies to bicycles and EPACs and includes Condition 1 as well as unpaved and gravel roads and trails with moderate gradients. In this set of conditions, contact with irregular terrain and repeated tyre contact with the ground may occur. Drops are intended to be limited to 15 cm or less. | Applies to bicycles and EPACs and includes Condition 1 and Condition 2 as well as rough trails, rough unpaved roads, and rough terrain and unimproved trails that require technical skills. Jumps and drops are intended to be less than 60 cm. | Applies to bicycles and EPACs and Includes Condition 1, 2, and 3, or downhill gradients on rough trails at speeds less than 40 km/h, or both. Jumps are intended to be less than 120 cm. | Applies to bicycles and EPACs and includes Condition 1, 2, 3, and 4; extreme jumping; or downhill gradients on rough trails at speeds in excess of 40 km/h; or a combination thereof. | Applies to bicycles and EPACs and includes Condition 1, to be used in competition or otherwise at high speed in excess of 50 km/h such as when descending or sprinting. |
| **Typical average speed range** km/h | 15 to 25 | 15 to 25 | Not relevant | Not relevant | Not relevant | 30 to 55 |
| **Intended drop/jump height** cm | < 15 | < 15 | < 60 | < 120 | > 120 | < 15 |
| **Intended riding purpose** | Commuting and leisure with moderate effort | Leisure and trekking with moderate effort | Sportive and competitive with moderately challenging technical trail features | Sportive and competitive with highly challenging technical trail features | Extreme sports | Sportive and competitive with intensive effort |
| **Type of bicycle (examples)** | City and urban bikes | Trekking bike, travel bike | Cross country and marathon | All mountain, trail | Downhill, dirt jump, freeride | Road racing, time trial, triathlon |
| **Recommended riding skills** | No specific riding skills required | No specific riding skills required | This requires technical skills and practice | This requires technical skills, practice and good riding control | Extreme technical skills, practice and riding control | This requires technical skills and practice |

# 1/ INTRODUCTION

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 here for any issue which you don't completely understand. Please note that not all bikes have all the features described in this manual. Ask your local stockist to point out the features of your bike.

## A. Bike Fit

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

## B. Safety First

1. Always wear an approved helmet when riding your bike, and follow the helmet manufacturer's instructions for fit, use and care.
2. Do you have all the other required and recommended safety equipment? See Section 2. It's your responsibility to familiarize yourself with the laws of the areas where you ride, and to comply with all applicable laws.
3. Do you know how to correctly secure your front and rear wheels? Check Section 4.A.1 to make sure. Riding with an improperly secured wheel can cause the wheel to wobble or disengage from the bike, and cause serious injury or death.
4. If your bike has toe clips and straps or clipless ("step-in") pedals, make sure you know how they work (see Section 4.E.) These pedals require special techniques and skills. Follow the pedal manufacturer's instructions for use, adjustment and care.
5. Do you have "toe overlap"? On smaller framed bikes your toe or toe clip may be able to contact the front wheel when a pedal is all the way forward and the wheel is turned. Read Section 4.E. to check whether you have toe overlap.
6. Does your bike have suspension? If so, check Section 4.F. Suspension can change the way a bike performs. Follow the suspension manufacturer's instructions for use, adjustment and care.
7. Placing fingers in or around the chain area risks entrapment and injury.
8. When handling a bike with disc brakes, beware of sharp edges and residule heat in the disc rotor after braking.

## C. Assembly and 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 bike are correctly tightened, refer to the Fastener Torque Specifications in Appendix D 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 your bike. If you choose to work on your own bike, you must use a torque wrench and the correct tightening torque specifications from the bike or component manufacturer or from your stockist. If you need to make an adjustment we urge you to exercise care, and to have the fasteners checked by your stockist as soon as possible.

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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. Does anything sound, feel or look loose? Do a visual and tactile inspection of the whole bike. Are there any loose parts or accessories? If so, secure them. If you're not sure, ask your nearest stockist to check

Tyres and wheels: Make sure tyres are correctly inflated (see Section 4.G.1.) 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 tyre deflection. Compare what you see with how it looks when you know the tyres are correctly inflated; and adjust if necessary. Are the tyres in good condition? Spin each wheel slowly and look for cuts in the tread and sidewall. Replace damaged tyres before riding the bike. Are the wheels "true"? Spin each wheel and check for brake clearance and lateral wobble. If a wheel wobbles side to side even slightly, or rubs against the brake pads, take the bike to your stockist to have the wheel corrected.

Fitting the front wheel: For bicycles with v-brakes or caliper brakes (see section C for details), please make sure that the brake is disconnected. Insert the wheel into the dropouts of the fork.

For the first pedal bikes and the balance bikes, make sure the hooked washer is on the outside of the fork legs with the hook facing towards the fork. Insert the hooked part of the washer into the hole above the dropout (fig.1). Ensure that the wheel is central and tighten with a 5mm Allen key to the recommended torque.

fig.1

For bicycles with Quick Release axles, find the quick release skewer and place it through the wheel. Make sure that there is a spring either side of the wheel; the wide parts of each spring should be furthest away from the wheel. Insert the wheel into the dropouts of the forks. Many people prefer the quick release lever to go on the left side of the bike; however for bikes with disc brakes, it is recommended for the lever to go on the non-disc (right) side of the bike. In case of a V- or Caliper brake, make sure that the rim is aligned centrally between the brake pads (see section 4.C). In case of a disc brake, make sure that the disc is aligned centrally between the brake pads (see section 4.C). Tighten up the nut on the opposite side to the quick release lever and then close the lever with firm pressure. If it is too hard to close, undo the nut a little and then close it again. For bicycles with V-brakes or Caliper brakes, reconnect the brake once the wheel is securely in place and test that the brake is working correctly.

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

Wheel rims clean and undamaged? Make sure the rims are clean and undamaged at the tyre 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. For disc brakes, make sure that the disc rotors and pads are not damaged or contaminated with oil.

WARNING: Bicycle wheel rims are subject to wear. Ask your stockist about wheel rim and disc 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. Using a wheel or disc rotor that is at the end of its usable life can result in wheel failure, which can cause you to lose control and fall.

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Brakes: The brakes need to be set up according to the correct country's law. It's very important for your safety that you learn and remember which brake lever controls which brake on your bike. Traditionally in the UK, the right brake lever controls the front brake and the left brake lever controls the rear brake; but, to ensure that your bike's brakes are set up correctly, squeeze one brake lever and look to see which brake, front or rear, engages. Now do the same with the other brake lever.

Check the brakes for proper operation (see Section 4.C.) Squeeze the brake levers. Are the brake quick-releases closed? Are all the control cables in place? If you have rim brakes, do the brake pads contact the wheel rim squarely and make full contact with the rim? If you have disc brakes, do the brake pads contact the rotor squarely and make full contact with the rotor? Do the brakes begin to engage within an inch of brake lever movement? Can you apply full braking force without the levers touching the handlebar? If not, your brakes need adjustment. Do not ride the bike until the brakes are properly adjusted by a professional mechanic. Wheel retention system: Make sure the front and rear wheels are correctly secured. See Section 4.A.

Seat post: If your seat post has an over-centre cam action fastener for easy height adjustment check that it is properly adjusted and in the locked position. See Section 4.B.

fig.2

Fitting the handlebars correctly: (see fig.2) The handlebars need to be fitted to the bike. Unscrew the 4 bolts at the front of the stem and take off the front plate in order to position the handlebars centrally on the stem. Note the ridges on the handlebar indicate the centre. Next, ensure the handlebars are straight. Loosen the side bolts with an allen key. Flip the rubber cap out of the headset, then loosen with allen key. Position the handlebars to line up the stem with the front wheel. Tighten the top cap bolt first, then tighten the bolts on either side of the stem. Reposition the rubber cap

Fitting the saddle: To adjust the height of the saddle, loosen the quick-release lever on the seat post clamp or undo the Allen bolt depending on the bike. Raise or lower the saddle so that it's the same height as your child's inside leg measurement, then close the quick-release lever or re-tighten the Allen bolt (see section 3B for further details).

Handlebar and saddle alignment: Make sure the saddle and handlebar stem are parallel to the bike's centre line and clamped tight enough so that you can't twist them out of alignment. See Sections 3.B. and 3.C.

Handlebar ends: Make sure the handlebar grips are secure and in good condition. If not, ask your stockist to replace them. Make sure the handlebar ends and extensions are plugged. If not, ask your stockist to 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.

Adding the front reflector: To fit the front reflector, assemble the reflector to the clamp (fig.3). Unscrew the screw so that the collar fits around the handlebar. Make sure that the reflector is facing forwards and re-tighten the screw.


fig.3

Adding the rear reflector: To fit the rear reflector, assemble the reflector to the clamp (fig.4). Clip the reflector to the saddle as shown in the picture ensuring that it faces rearwards (fig.5).


fig.4


fig.5

Adding pedals: The pedals are pre-greased and marked Right and Left. Insert the Right pedal into the right crank arm (on the chain side) and turn clockwise to fit. Insert the Left pedal into the left crank arm and turn anticlockwise to fit. The spanner should not initially be required - screw the pedals in with your fingers and then tighten using a size 15mm spanner. Avoid over tightening with the spanner.

Adding the bell: To fit the bell, unscrew the screw so that the collar fits around the handlebar. Position it so that the rider's thumb can reach the bell easily, then re-tighten the screw.

⚠ WARNING: Loose or damaged handlebar grips, end plugs or extensions should be replaced, as they can expose the ends of the handlebar, which have been known to cause injury, and they can cause you to lose control and fall. Unplugged handlebars or extensions can cut you and cause serious injury in an otherwise minor accident. This warning is particularly important for children's bikes, which should be inspected regularly to ensure adequate protection for the ends of the handlebar are in place.

## VERY IMPORTANT SAFETY NOTE:

Please also read and become thoroughly familiar with the important information on the lifespan of your bicycle and its components in Appendix B on Page 44.

## D. First Ride

When you go for your first ride on your new bike we recommend doing so away from cars, other cyclists, obstacles or hazards. Aim to become familiar with the controls, features and performance of your new bike. Familiarise yourself with the braking action of the bike (see Section 4.C.) Ensure that the brakes are set up according the correct countries law, traditionally in the UK the rear brake is actuated by the left hand brake lever and the front brake is actuated by the right hand brake lever. 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 bike has toeclips or clipless pedals, practice getting in and out of the pedals. See paragraph B.4. above and Section 4.E.4. If your bike has suspension, familiarize yourself with how the suspension responds to brake application and the position of your body. See paragraph B.6. above and Section 4.F.
Practice shifting / changing the gears (see Section 4.D.) Never shift/change gears while pedalling backwards, nor pedal backwards immediately after having moved the shifter. This could jam the chain and cause serious damage to the bike.

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

## A. The Basics

⚠ WARNING: The area in which you ride may require specific safety devices. It is your responsibility to familiarise 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 pavements, laws regulating bike path and trail use, helmet laws, child carrier laws, and special bicycle traffic laws. It's your responsibility to know and obey the laws.

1. Always wear a cycling helmet which meets the latest certification standards and is appropriate for the type of riding you do. Always follow the helmet manufacturer's instructions for fit, use and care of your helmet. Many serious bike injuries involve head injuries which might have been avoided if the rider had worn an appropriate helmet. (see fig.6)


fig.6

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

2. Always do the Mechanical Safety Check (Section 1.C.) before you get on a bike.
3. Be thoroughly familiar with the controls of your bike: brakes (Section 4.C.) Ensuring that they are set up the correct way round according to the correct countries law; pedals (Section 4.E.); shifting (Section 4.D.)
4. Be careful to keep body parts and other objects away from the sharp teeth of chain-rings, the moving chain, the turning pedals and cranks, and the spinning wheels of your bike.
5. Always wear:
   - Shoes that will stay on your feet and will grip the pedals. Make sure that shoe laces cannot get into moving parts, and never ride barefoot or in sandals.
   - Bright, visible clothing that is not so loose that it will get tangled in the bike or snagged by objects at the side of the road or trail.
   - Protective eyewear, to protect against dirt, dust and insects – tinted when the sun is bright, clear when it's not.
6. Don't jump with your bike. Jumping a bike, particularly a BMX or mountain bike, can put huge and unpredictable stress on the bike and its components. Riders who jump their bikes risk serious damage and injury. Before you attempt to jump, perform stunts or race with your bike, read and understand Section 2.F.
7. Ride at a speed appropriate for conditions. Higher speed means higher risk.

## B. Riding Safety

1. Obey all rules of the road.
2. Respect the rights of motorists, pedestrians and other cyclists.
3. Ride defensively, anticipating dangers. Always assume that other road users and pedestrians do not see you.
4. Look ahead and be ready to avoid:
   - Vehicles slowing or turning, entering the road or your lane ahead of you, or coming up behind you.
   - Parked car doors opening.
   - Pedestrians stepping out.
   - Children or pets playing near the road.
   - Pot holes, manhole covers, railway tracks, expansion joints, road or pavement 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 bike ride.

5. Ride in designated bike lanes if available, 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 laws.
6. Stop at stop signs and traffic lights; slow down and look both ways at street intersections. Remember that a bike comes off second best in a collision with a motor vehicle so be prepared to give way even if you have the right of way.
7. Use approved hand signals for turning and stopping.
8. Never ride wearing headphones or earphones. They mask traffic sounds and emergency vehicle sirens, distract you from concentrating on what's going on and the wires can tangle in the moving parts of the bike, causing you to lose control.
9. Never carry a passenger, unless it is a small child wearing an approved helmet and secured in a correctly mounted child carrier or a child-carrying trailer.
10. Never carry anything which obstructs your vision or your complete control of the bike, or which could become entangled in the moving parts of the bike.
11. Never hold on to another vehicle.
12. Don't perform stunts, wheelies or jumps. If you intend to do stunts, wheelies, jumps or go racing with your bike despite our advice not to, read Section 2.F. Downhill, Stunt or Competition Biking. Think carefully about your skills before deciding to take the large risks that go with this kind of riding.
13. Don't weave through traffic or make any moves that may surprise people with whom you are sharing the road.
14. Observe and give way to those who have the right of way.
15. Never ride your bike under the influence of alcohol or drugs.
16. If possible, avoid riding in bad weather when visibility is obscured, at dawn, dusk or in the dark, or when extremely tired. Each of these conditions increases the risk of accident.

## C. Off-Road Safety

**We recommend children do not ride on rough terrain unless accompanied by an adult.**

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

**Off Road Respect**

Obey the local laws regulating where and how you can ride off-road, and respect private property. You may be sharing the route with others — hikers, equestrians, other cyclists. Respect their rights. Stay on the designated cycle trail if there is one. Don't exacerbate erosion by riding in mud or with unnecessary sliding. Don't disturb wildlife by taking shortcuts through vegetation or streams. It is your responsibility to minimize your impact on the environment. Leave things as you find them.

## D. Wet Weather Riding

⚠ WARNING: Wet weather impairs traction, braking and visibility, both for the cyclist and 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 tyres don't grip as well. This makes it harder to control speed and easier to lose control. To make sure you can slow down and stop safely in wet conditions, ride more slowly and apply your brakes earlier and more gradually than you would in dry conditions. See also Section 4.C.

## E. Night Riding

Riding a bike at night is much more dangerous than riding during the day. A cyclist 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 equipment which helps reduce that risk. Consult your stockist 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 be recognised as a moving bicyclist.

⚠ CAUTION: Check reflectors and their mounting brackets regularly to make sure that they are clean, straight, unbroken and securely mounted. 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 tyre 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 bike. They are an integral part of the bike's safety system. Removing the reflectors reduces your visibility to others. The reflector brackets may protect you from a brake straddle cable catching on the tyre in the event of brake cable failure. If a brake straddle cable catches on the tyre, 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 front and rear lights which meet all regulations and provide adequate visibility.
- Wear light coloured, 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 bike. Any reflective device or light source that moves will help alert approaching motorists, pedestrians and other traffic.
- Make sure your clothing or anything you may be carrying on the bike does not obstruct a reflector or light.
- Make sure your bike 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 drivers can see you and predict your movements.
- Be alert. Ride defensively and expect the unexpected.
- If you plan to ride in traffic regularly, ask your stockist about cycling safety courses or a good source of information on traffic safety.

## F. Extreme, Stunt or Competition Riding

Extreme or aggressive riding is dangerous and you voluntarily assume a greatly increased risk of injury or death.

Not all bikes are designed for extreme riding, and those that are may not be suitable for all types of aggressive riding. Check with your stockist about the suitability of your bike.

When riding downhill you can reach speeds achieved by motorbikes, and therefore face similar hazards and risks. Make sure your bike is in perfect condition.

Consult with expert riders or officials (if in competition) on conditions and wear appropriate safety gear such as a full face helmet, full finger gloves and body armour. It is your responsibility to have proper equipment and to be familiar with course conditions.

⚠ WARNING: Although many catalogues, advertisements and articles 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 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 recognise that the stresses imposed on your bike by this kind of activity may break or damage parts of the bike and void the warranty.
- Take your bike to your stockist if anything breaks or bends. Do not ride your bike when any part is damaged.
- If you ride downhill at speed, perform stunts or ride in competition, know the limits of your skill and experience. Ultimately, avoiding injury is your responsibility.

## G. Changing Components or Adding Accessories

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

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

⚠ WARNING: Changing the components on your bike with other than genuine replacement parts may compromise the safety of your bicycle and may void the warranty. For example, replacement forks must have the same rake and steerer tube inner diameter as those originally fitted with the bicycle. Check with your stockist before changing the components on your bike.

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

⚠ WARNING: Make sure that the seat position is adjustable so that the feet of a seated rider can touch the ground. This warning is particularly important for children. If your bike does not fit properly you may lose control and fall. If your new bike doesn't fit, ask your stockist to exchange it before you ride it.

## A. Standover Height

**1. Diamond frame bikes**

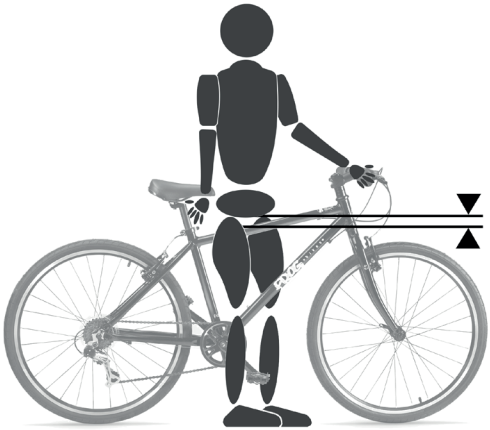


fig.7

Standover height is the basic element of bike fit (see fig.7). It is the distance from the ground to the top of the bike'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 on your heels. If your crotch touches the frame, the bike is too big for you. A bike which you ride on roads and don't take off-road should give you a minimum standover height clearance of two inches (5 cm). A bike you'll ride on unpaved surfaces should give you a minimum of three inches (7.5 cm) of standover height clearance. A bike you'll use off road should give you four inches (10 cm) or more of clearance.

**2. Step-through frame bikes**

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

## B. Saddle Position

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

# 3/ FIT

1. Up and down adjustment. To check for correct saddle height (see fig. 8):

fig.8

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

If your leg is not completely straight, your saddle height needs to be adjusted. If you need to rock your hips 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 stockist to set the saddle for your optimal riding position and to show you how to make this adjustment. If you choose to make your own saddle height adjustment:

- Loosen the seat post clamp
- Raise or lower the seat post in the seat tube
- Make sure the saddle is straight
- Re-tighten the seat post clamp to the recommended torque (see Appendix D).

Once the saddle is at the correct height, make sure that the seat post does not project from the frame beyond its "Minimum Insertion" or "Maximum Extension" mark (see fig. 9).

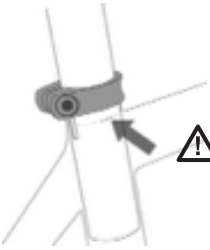


fig.9

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

⚠ WARNING: If your seat post is not inserted in the seat tube as described in B.1 above, the seat post may break, which could cause you to lose control and fall.

2. Front and back adjustment. The saddle can be adjusted forwards or back to help you achieve the optimal position on the bike. Ask your stockist 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 the clamp mechanism is clamping on the straight part of the saddle rails and not touching the curved part of the rails, and that you are using the recommended torque on the clamping fastener(s) (see Appendix D).

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 stockist can adjust saddle angle or teach you how to do it. If you choose to make your own saddle angle adjustment and you have a single bolt saddle clamp on your seat post, it is critical that you loosen the clamp bolt sufficiently to allow any serrations on the mechanism to disengage before changing the saddle's angle, and then that the serrations fully re-engage before you tighten the clamp bolt to the recommended torque (see Appendix D).

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

NOTE: If your bike is equipped with a suspension seat post, the suspension mechanism may require periodic service or maintenance. Ask your stockist for recommended service intervals for your suspension seat post.

Small changes in saddle position can have a substantial effect on performance and comfort. To find your best saddle position, make only one adjustment at a time.

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

If, in spite of carefully adjusting the saddle height, tilt and fore-and-aft position, your saddle is still uncomfortable, you may need a different saddle design. Saddles come in many different shapes and sizes. Your stockist 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 stockist about saddle adjustment or a different saddle.

## C. Handlebar Height and Angle

Frog bikes are equipped with a “threadless” stem, which clamps on to the outside of the steerer tube.
Your stockist 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 stockist. Do not attempt to do this yourself, as it requires special knowledge.

⚠ WARNING: On some bikes, 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 bike.

⚠ 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.

⚠ 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 bike 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 aren’t tight enough.

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

## D. Control Position Adjustments

The angle of the brake and shift control levers and their position on the handlebars can be changed. Ask your stockist 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 (see Appendix D).

## E. Brake Reach

Many bikes have brake levers which can be adjusted for reach. If you have small hands or find it difficult to squeeze the brake levers your stockist 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. If the brake lever travel isn't enough to apply full braking power it can result in loss of control, which may result in serious injury or death.

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

## A. Wheels

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

If you have a mountain bike equipped with through axle wheels make sure your stockist has given you the relevant instructions, and follow those when installing or removing a through axle wheel. If you don’t know what a through axle is, ask your stockist.

Frog Bikes wheels are secured in one of two ways:

- Frog 52 upwards use a hollow axle with a shaft (“skewer”) running through it which has an adjustable tension nut on one end and an over-centre cam on the other (see fig.10).

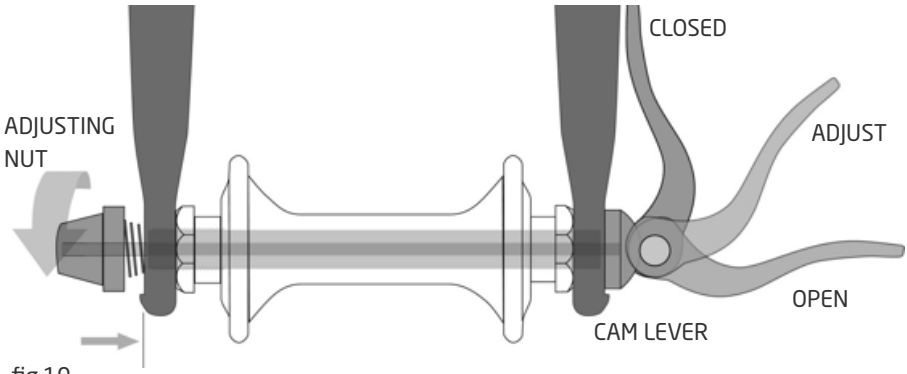



fig.10

Tadpole mini, Tadpole, Tadpole+, Frog 43, Frog 48 and Frog 52s have 15 hex nuts or hex key bolts which are threaded onto or into the hub axle.
(see fig.11)

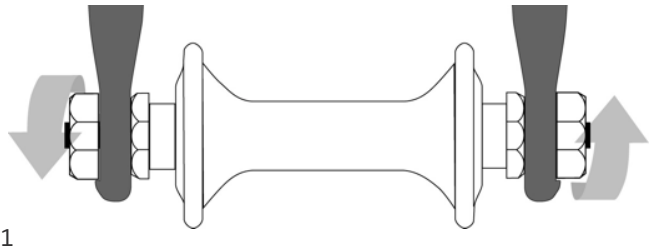


fig.11

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

It is very important that you understand the type of wheel securing method on your bike, 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 stockist to instruct you in correct wheel removal and installation, and ask them to give you the relevant instructions.

# 4/ TECHNICAL INFORMATION

⚠ WARNING: Riding with an improperly secured wheel can allow the wheel to wobble or fall off the bike, which can cause serious injury or death. Therefore, it is essential that you:

- Ask your stockist to help you make sure you know how to install and remove your wheels safely.
- Understand and apply the correct technique for clamping your wheel in place.
- Check that the wheel is securely clamped each time before you ride.

Therefore, it is essential that you:-

- Make sure that the clamping action results in a completely secured wheel that embosses the surfaces of the dropouts.

**1. Front Wheel Secondary Retention Devices**

Most bikes 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:

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

Ask your stockist 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.

**2. Wheels with Cam Action Systems**

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

a. Adjusting the traditional cam action mechanism

The wheel hub is clamped in place by the force of the over-centre 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 anticlockwise 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

b. Adjusting the cam-and-cup mechanism

The cam-and-cup system on your front wheel will have been correctly adjusted for your bike by your stockist.

Ask them to check the adjustment every six months. Do not use a cam-and-cup front wheel on any bike other than the one for which it was adjusted.

**3. Removing and Installing Wheels**

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

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

⚠ ATTENTION: For bikes with disc brakes, make sure that on the front wheel the cam lever is located on the non-disc side (right side when sitting on the bike) to avoid interference of the cam lever with the disc.

Fig. 12

a. 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 tyre and the brake pads (See Section 4.C. fig. 13 to 15).

(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. 10). If your bike has through bolt or bolt-on front wheel retention (fig. 11), 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. 10) 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. 11), squeeze the cup and cam lever together while removing the wheel. No rotation of any part is necessary with the cam-and-cup system.

(4) You may need to tap the top of the wheel with the palm of your hand to release the wheel from the front fork.

b. 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 disc, caliper or brake pads when re-inserting the disc into the caliper. Never activate a disc brake's control lever unless the disc is correctly inserted in the caliper. See also Section 4.C.

(1) If your bike has cam action front wheel retention, move the cam lever so that it curves away from the wheel (fig. 10). 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 the rider's left-hand side of the bike (fig. 10). 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. If you have a cam-and-cup system: the nut and cup 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. 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 Appendix D 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 anti-clockwise a 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 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.

(5) If you disengaged the brake quick-release mechanism in Section 3. a. (1) above, re-engage it to restore correct brake pad-to-rim clearance.

(6) Spin the wheel to make sure that it is centred in the frame and clears the brake pads; then squeeze the brake lever and make sure that the brakes are operating correctly.

c. 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 stockist 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 Section 4.C., figs.20 to 23).

(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. 11). 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.

d. Installing a disc brake or rim brake rear wheel

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

(1) With a cam action system, move the cam lever to the 'Open' position. The lever should be on the side of the wheel opposite the derailleur and cassette spockets.

(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 cassette spocket.

(3) On single-speed bikes, 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 chain-ring; pull the wheel back in the dropouts so that it is straight in the frame and the chain has about 6mm (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. The lever should now be parallel to the seat stay or chain stay and curved toward the wheel. To apply enough clamping force, you should have to wrap your fingers around the fork blade for leverage, and the lever should leave a clear imprint in the palm of your hand.

(7) With a through-bolt or bolt-on system, tighten the fasteners to the torque specifications in Appendix D 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 anti-clockwise a 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.

(8) If you disengaged the brake quick-release mechanism in Section 3. c. (2) above, re-engage it to restore correct brake pad-to-rim clearance.
(9) Spin the wheel to make sure that it is centred in the frame and clears the brake pads; then squeeze the brake lever and make sure that the brakes are operating correctly.

### B. Seat Post Cam Action Clamp

Some bikes are equipped with a cam action seat post binder. The seat post cam action binder works exactly like the traditional wheel cam action fastener (Section 4.A.2). While a cam action binder looks like a long bolt with a lever on one end and a nut on the other, the binder uses an over-centre cam action to firmly clamp the seat post (see fig. 5).

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

1. Ask your stockist to help you make sure you know how to correctly clamp your seat post.

2. Understand and apply the correct technique for clamping your seat post.
3. Before you ride the bike, first check that the seat post is securely clamped.

Adjusting the seat post cam action mechanism:

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

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

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

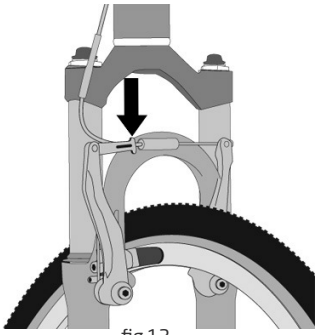


fig.13

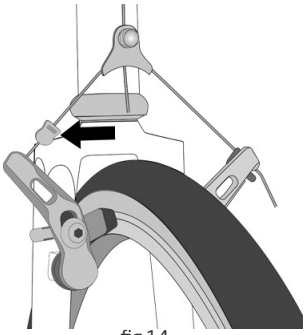


fig.14

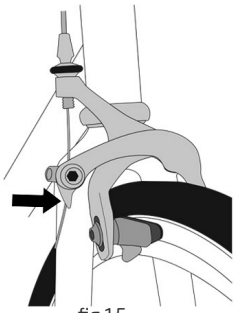


fig.15

## C. Brakes

There are three general types of bicycle brakes:

I. Rim brakes, which operate by squeezing the wheel rim between two brake pads
II. Disc brakes, which operate by squeezing a hub-mounted disc between two brake pads
III. 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 pedalling backwards. This is called a coaster brake and is described in Appendix C.

⚠ WARNING:

1. 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.
2. Applying brakes too hard or too suddenly can lock up a wheel, which could cause you to lose control and fall. Sudden or excessive application of the front brake may pitch the rider over the handlebars, which could result in serious injury or death.
3. Some bicycle brakes, such as disc brakes (fig. 16) and linear-pull brakes (fig. 13), are extremely powerful. Take extra care in becoming familiar with these brakes and exercise particular care when using them.

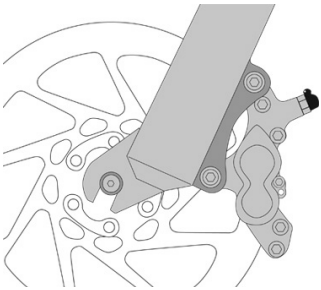


fig.16

4. Some bicycle brakes are equipped with a brake force modulator, a small cylindrical device through which the brake cable runs. Such a modulator is designed make the initial brake lever force gentler and to provide a more progressive application of braking force until full force is achieved.
5. Disc brakes can get extremely hot with extended use. Be careful not to touch a disc brake until it has had plenty of time to cool.
6. See the brake manufacturer's instructions for operation and care of your brakes, and for when brake pads must be replaced. If you do not have the manufacturer's instructions, see your stockist or contact the brake manufacturer.
7. If replacing worn or damaged parts, use only manufacturer-approved genuine replacement parts.

**C1. 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, in the UK the right brake lever controls the front brake and the left brake lever controls the rear brake;** but, to make sure your bike's brakes are set up the correct way for your country, squeeze one brake lever and look to see which brake, front or rear, engages. Now do the same with the other brake lever. If you need them swapped over, please ask your Frog Bikes stockist to do this.

Make sure your hands can reach and squeeze the brake levers comfortably. If your hands are too small to operate the levers comfortably, consult your stockist before riding the bike. The lever reach may be adjustable; or you may need a different brake lever design. Most rim brakes have some form of quick-release mechanism to allow the brake pads to clear the tyre when a wheel is removed or reinstalled. When the brake quick release is in the open position, the brakes are inoperative. Ask your stockist to make sure that you understand the way the brake quick release works on your bike (see figs. 13, 14, & 15) and check each time to make sure both brakes work correctly before you get on the bike.


fig.17

The brake lever can be adjusted with an allen key.

fig.18

**C2. How Brakes Work**

The braking action of a bicycle is a function of the friction between the braking surfaces. To make sure you have maximum friction keep your wheel rims and brake pads or the disc rotor and caliper clean and free of dirt, lubricants, waxes or polishes. 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 towards 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 going downhill shifts weight forward.

Two keys to effective speed control and safe stopping are controlling wheel lockup and weight transfer. This weight transfer is even more pronounced if your bike has a front suspension fork. Front suspension "dips" under braking, increasing the weight transfer (see also Section 4.F.) Beware that disc brakes are more powerful than rim brakes 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. Tyre 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 best way to maintain control on loose or wet surfaces is to go more slowly.

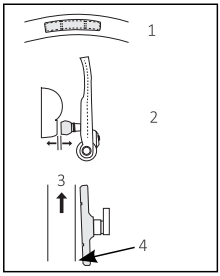



fig.19

**Brake pad alignment**

1. Brake-pad in alignment with rim surface
2. Pad and rim should be parallel, with 1-2 mm clearance
3. Direction that the rims turns
4. 0.5-1.0 mm toe-in

**C3. How to Adjust Brakes**

Once a month, inspect brake pads for wear. If the grooves in the braking surface are less than 2 mm deep, or 1 mm deep for direct-pull brakes, replace the pads. Replace disc brake pads that are thinner than 1.0 mm.

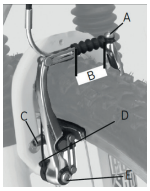



fig.20

V-Brake

A. Cable clamp bolt
B. No contact
C. Pad fixing bolt
D. Centering screw
E. Arm fixing bolt

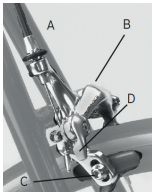



fig.21

Caliper Brake

A. Barrel adjuster
B. Centering screw
C. Pad fixing bolt
D. Brake release lever

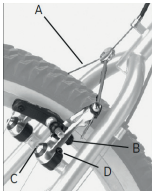



fig.22

Cantilever Brake

A. Link wire
B. Pad fixing bolt
C. Arm fixing bolt
D. Centering screw

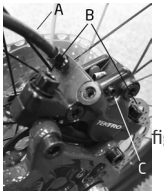



fig.23

Disc Brake

A. Brake hose/cable
B. Brake mounting bolts
C. Pad retention bolt

**To adjust brake pad clearance to the rim**

1. Turn the barrel adjuster. To increase the pad clearance, turn the barrel adjuster in (clockwise). To reduce the pad clearance, turn the barrel adjuster out (counter-clockwise).

For most direct-pull (v-brake), or cantilever systems, the barrel adjuster is on the lever. For most road caliper systems the barrel adjuster is on the brake itself.

2. If the brake pads cannot be adjusted properly, loosen the cable clamp bolt and re-attach the cable.

**To centre a V-type, cantilever, or caliper brake**

1. Rotate the centering screw. Turn in small increments and check for centering.
2. If the brake has two centering screws, adjust the overall spring tension while centering the brake.

**To adjust the alignment of the brake pads on a rim brake**

1. Loosen the brake pad fixing bolt.
2. Align the pads as shown on page 5, and tighten the pad fixing bolts:
   - Road caliper- 40-60 lb•in (4.5-6.8 N•m)
   - Direct-pull or cantilever- 70-80 lb•in (7.9-9 N•m)
3. After adjusting the brakes, test them by applying force to the levers. Ensure the cable does not slip, the pads close toward the rim at right angles, and the pads do not contact the tire.

**To align a hydraulic disc brake**

1. Loosen the brake mounting bolts.
2. Apply the lever fully, and gradually tighten the bolts to 100-110 lb•in (11.3-12.4 N•m).

**C4. How to Replace Brake Pads**

**Check brake pads**

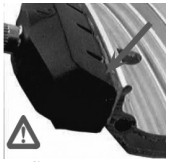


fig.24

When the pads are correctly aligned, there will be a gap (arrow) between the top of the pad and the top of the rim (see fig.24). As the pads wear down, check they don't overlap onto the tyre. Check also that curved pads follow the curve of the rim.

Now a check on pad wear. If there's a 'wear line', as on the pad at the front, they're OK until the line is reached. If there's no wear line, change the pads when they reach 2 mm from the bottom of the grooves, as on the back two pads.

If there's no gauge to help you set the toe-in, aim to position each pad so that there's a 1 to 2mm gap between the back of the pad and the rim. There's no need to measure it exactly, so long as the gap is **exactly the same both sides.** (see fig.25)

fig.25

fig.26

**How to replace a brake pad**

To fit new brake pads to standard cantilevers, slacken off the cable adjuster on the brake lever and then unhook the wire from the brake arm. Loosen the nut at the back of the pad holder, using a hexagon key to stop it turning round and around.

fig.27

Turn the pad clamp so that the brake pad faces away from the rim. Pull the worn pad out of the clamp and fit the new one. Align it with the rim leaving a gap at the top and set toe-in at 1mm. Check again when the pads have worn down.

fig.28

Check also that the angle of the brake pad brings it square on to the wheel rim. When you've checked all these points, tighten up the pad clamp nut. Make sure the pad doesn't move by holding the front of the pad clamp with a hexagon key.

fig.29

If a standard cantilever is not working well, check that the straddle wire lines up with the diagonal mark running across the cable carrier (arrow). If it doesn't, undo the straddle wire clamp and adjust the length of the straddle wire.

**How to replace a set of disc brake pads**

fig.30

Remove the wheel. Unscrew the allen bolt holding the pads in the caliper. Pull the pads out of the calipers. Note the orientation of the pads and the way that they are assembled. With the new pads, sandwich the spring in between the pads. Squeeze the pads together compressing the spring, and push into the caliper body. Screw the allen bolt back into place, securing the pads. Carefully insert the wheel and test that the brakes work correctly.

**How pads are fitted to V-brakes**

This type of pad fixing is similar to the one used on caliper brakes. The main difference is the use of two curved, interlocking washers each side of the brake arm, which allow the pad to be moved in any direction. You need a hexagon key for the fixing nut.

fig.31

fig.32

fig.33

fig.34

On the other common design of pad fixing, you need a spanner to undo the nut at the back of the brake arm. The dished washer allows you to adjust the pad in all directions.

## D. Shifting Gears

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

**D1. How a Derailleur Drivetrain Works**

If your bike has a derailleur drivetrain, the gear-changing mechanism will have:
- A rear cassette or freewheel sprocket cluster
- A rear derailleur
- Sometimes a front derailleur
- One or two shifters
- One, two or three front sprockets called chain-rings
- A drive chain

i. Changing Gears
There are several different types and styles of gear selectors, or shifters: levers, twist grips, triggers, combination shift/brake controls and push-buttons. Ask your stockist to explain the type of shifting controls on your bike, and show you how they work.

The vocabulary of shifting gears can be confusing. A downshift is a change to a "lower" or "slower" gear, one which is easier to pedal. An upshift is a shift to a "higher" or "faster" gear which is harder to pedal. 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 pedalling 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 key is to remember that shifting the chain in towards the centre of the bike is for accelerating and climbing and is called a downshift. Moving the chain out or away from the bike is for speed and is called an upshift.

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

⚠ CAUTION: Never move the gear selector or shifter while pedalling backward, nor pedal backwards immediately after changing gear. This could jam the chain and cause serious damage.

ii. Shifting the Rear Derailleur
The right shifter controls the rear derailleur. 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. Pedalling in the higher gears requires greater pedalling effort, but takes you a greater distance with each revolution of the pedal crank. The larger sprockets produce lower gear ratios. Using them requires less effort but takes you a shorter distance with each revolution. Moving the chain from a smaller sprocket of the gear cluster to a larger sprocket results in a downshift. Moving the chain from a larger sprocket to a smaller sprocket results in an upshift. In order for the derailleur to move the chain from one sprocket to another, the rider must be pedalling forward.

iii. Shifting the Front Derailleur
The front derailleur, which is controlled by the left shifter, shifts the chain between the larger and smaller chain-rings. Shifting the chain onto a smaller chain-ring makes pedalling easier (a downshift). Shifting to a larger chain-ring makes pedalling harder (an upshift).

iv. Which gear should I select ?

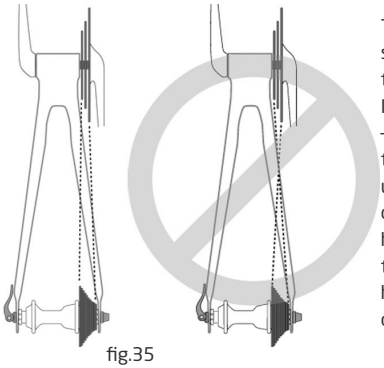


fig.35

The combination of largest rear and smallest front gears is for the steepest hills. The smallest rear and largest front combination is for the greatest speed. It is not necessary to shift gears in sequence. Instead, find the "starting gear" which is right for your level of ability – a gear which is hard enough for quick acceleration but easy enough to let you start from a stop without wobbling – and experiment with upshifting and downshifting to get a feel for the different gear combinations. At first, practice shifting where there are no obstacles, hazards or other traffic until you've built up your confidence. Learn to anticipate the need to shift, and shift to a lower gear before the hill gets too steep. If you have difficulties with shifting, the problem could be mechanical adjustment. See your stockist 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.

v. 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 the mechanism needs adjustment. Take the bike to your stockist to have it adjusted.

**D2. How an Internal Gear Hub Drivetrain Works**

If your bike 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 chain-ring
- A drive chain

i. 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.
ii. 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 to a harder, "faster" gear 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.

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 a hill gets too steep. If you have difficulties with shifting the problem could be mechanical. See your stockist for help.

iii. 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 the mechanism needs adjustment. We recommend that you take your bike to your local stockist.

iv. How to adjust a single-speed drivetrain
If your bike has a single speed drivetrain, the chain requires tension to make sure it doesn't come off the sprocket or chain-ring. Chain tension requires a fine-tuned adjustment. We recommend chain tension is adjusted by your stockist.

v. To adjust the gears yourself

**Front Derailleur**

**To adjust the small chainring position:**
1. Shift the chain onto the smallest front chainring and the largest rear cog.
2. Loosen the front derailleur cable clamp bolt until the cable is free.
3. Turn the low gear adjusting screw (marked "L") until the inner chain guide of the derailleur is approximately 0.5 mm from the chain.
4. Pull on the cable end, and down-shift the left shift lever several times so that it is in the small-chainring position.
5. On the shifter or down tube, turn the shift cable adjusting barrel to its most clockwise position.
6. Insert the cable in the groove found next to the derailleur cable clamp bolt, pull the cable taut, and tighten the bolt:

• Front derailleur cable clamp bolt- 44-60 lb•in (5.0-6.8 N•m).

**To adjust the big chainring position:**
1. Shift the rear derailleur to the smallest rear cog.
2. Turn the high-gear adjusting screw (marked "H") counter-clockwise until it cannot interfere with the motion of the derailleur.
3. Hand-turn the cranks, and use the shifter to carefully shift the chain onto the outside chainring.
4. Position the outer chain guide of the front derailleur approximately 0.5 mm from the chain.
5. Re-tighten the high gear adjusting screw until it meets resistance.
   If you have turned the screw too far, the front derailleur will move toward the small chainring.
6. Go through the various gear combinations. Make sure the chain does not fall off when you shift, and the derailleur cage does not rub on any part of the crankset.

**To adjust the middle gear position, with three chainrings:**
1. Shift the chain onto the largest front chainring and the smallest rear cog.
2. Rotate the cable tension barrel-adjuster (on the downtube, or on the lever) counter-clockwise, increasing cable tension to align the inner derailleur cage until it just touches the chain.
3. Go through the various gear combinations to ensure the chain smoothly lines up with all the chainrings.

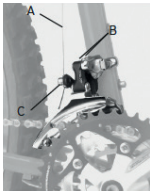
Note - some front shifters have a 'tab' feature: slightly downshift the lever and the derailleur will move in slightly, no longer touching the chain.

**Rear Derailleur**

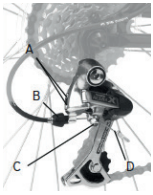
**To adjust the small cog position:**

1. Shift the chain onto the smallest rear cog and the largest front chainring.
2. Loosen the cable clamp bolt (fig. 30) until the cable is free.
3. Stand behind the bicycle to see that the smallest rear cog, the chain, and the two derailleur pulleys are in line.
4. If they are not aligned, turn the high gear adjusting screw (usually marked "H") until this line is established.
5. While pulling on the cable, up-shift until the shifter is in the small cog position.
6. On the shifter or down tube, turn the adjusting barrel all the way clockwise. Turn the adjusting barrel on the rear derailleur all the way clockwise, and then one turn counter-clockwise.
7. Insert the cable into the clamp bolt groove on the rear derailleur, pull the shift cable taut, and tighten the cable clamp bolt to 44-60 lb•in (5.0-6.8 N•m).

fig.36




**Front Derailleur**
A. Cable
B. Adjust screws
C. Cable clamp bolt




**Rear Derailleur**
A. Adjust screws
B. Barrel adjuster
C. Cable clamp bolt
D. Cable

**To adjust the large cog position:**

1. Turn the low gear adjusting screw on the rear derailleur (usually marked "L") far enough counter-clockwise that it will not restrict the movement of the derailleur.
2. Carefully shift the chain onto the smallest front chainring and the largest rear cog.

   Do not over-shift the rear derailleur, or the chain may wedge between the large cog and the spokes.
3. Position the rear derailleur pulleys in line with the largest cog.
4. Turn the low gear adjusting screw clockwise until it meets resistance.

   If you have turned it too far, the derailleur will move toward the outside of the bicycle.
5. Go through the various gear combinations. Make sure the chain does not fall off when you shift.

## E. Pedals

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

⚠ WARNING: BMX pedals are designed to provide greater grip capability of the pedal tread surface than that provided by an ordinary pedal. This can result in the pedal tread surface being very rough and containing sharp edges. To avoid injury, riders should not ride barefoot and should always wear a pair of shoes with thick soles to ensure adequate protection.

⚠ WARNING: Toe overlap could cause you to lose control and fall. Ask your stockist to help you determine if the combination of frame size, crank arm length, pedal design and shoes you will use results in pedal overlap. Replacement of crank arms or tyres can result in a reduction in toe overlap clearance. Whether you have overlap or not, you must keep the inside pedal up and the outside pedal down when making sharp turns.

2. Some bikes 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 bike has this type of high-performance pedal, you must take extra care to avoid serious injury from the 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 stockist can show you a number of options and make suitable recommendations.

3. Toeclips and straps are a means to keep feet correctly positioned and engaged with the pedals. The toeclip positions the ball of the foot over the pedal spindle, which gives maximum pedalling 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 stockist 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 automatic action, the technique requires concentration which can distract your attention and cause you to lose control and fall. Practice the use of toeclips and straps where there are no obstacles, hazards or traffic. Keep the straps loose and don't tighten them until your technique and confidence in getting in and out of the pedals warrants it. Never ride in traffic with your toe straps tight.

4. Clipless pedals (sometimes called "step-in pedals") are another means to keep feet securely in the correct position for maximum pedalling 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 stockist 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.

⚠ WARNING: Practice is required to learn to engage and disengage the foot safely. Until engaging and disengaging the foot becomes a automatic 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 stockist or contact the manufacturer.

## F. Bicycle Suspension

Many bikes are equipped with suspension systems. Detailed information about Frog fork is provided in this section. However, there are many different types of suspension systems – too many to deal with individually here. If your bike 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 stockist 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 Section 4.C.

WARNING: Changing suspension adjustment can change the handling and braking characteristics of your bike. Never change suspension adjustment unless you are thoroughly familiar with the manufacturer's instructions and recommendations, and always check for changes in the handling and braking characteristics of the bike 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 bike 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 manufacturer to make sure what you want to do is compatible with the design. Failing to do so can result in catastrophic frame failure.

### Frog suspension fork

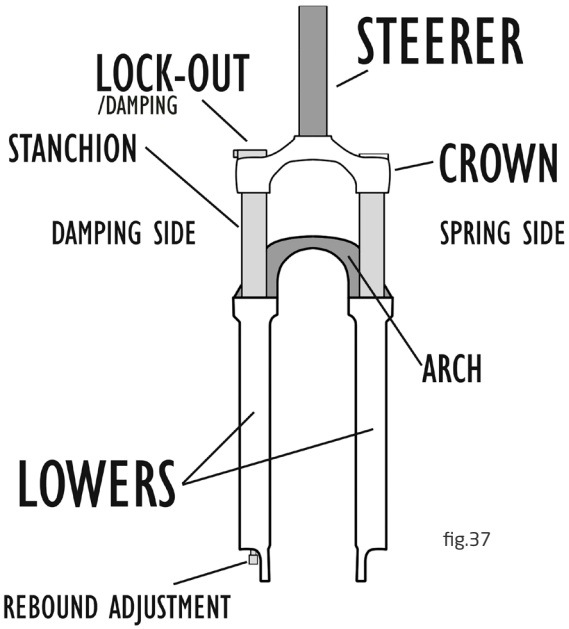



fig.37

# 4/ TECHNICAL INFORMATION

Please read these instructions before using your suspension fork.

Improper use can result in damage to the fork, which can lead to severe injuries or even death to the rider. Frog suspension forks are made for a single rider only. Suspension contains highly pressurised gases and liquids. Do not attempt to open a Frog fork cartridge, as this is highly dangerous, due to the aforementioned pressurised system. Use only original replacement parts from Frog or a Frog stockist, as using other manufacturer parts will void the warranty of your fork, it could also lead to improper functioning of the fork.

⚠ ATTENTION: The instructions below contain the necessary information for correct installation, maintenance, and servicing of your Frog fork. Be aware that the correct qualifications and tools are required to maintain, install and service the fork. General bicycle maintenance knowledge is likely to be insufficient to service the Frog fork. Therefore, we recommend that you use a qualified bicycle mechanic to perform the aforementioned tasks. Improper maintenance, servicing and installation could result in failure of the fork, causing accidents or even death.

⚠ PLEASE NOTE: The Frog suspension fork falls into Condition 3 specified in EN17406 (see page 5 of this manual). As such, it is not intended for aggressive downhill riding, jumps, dirt jumps or freeride. Improper use can result in failure of the fork, which could cause accidents or even death. Disregarding these instructions will void the warranty of the fork.

**BEFORE EVERY RIDE**

⚠ WARNING: Before you ride your bike, please go through the checklist below. If you experience any of the described issues, do not attempt to ride the bike, as this may lead to accidents or even death. Please correct any issues and/or contact your Frog stockist to inspect the bicycle.

1. Are any cracks or dents visible on the fork or the bicycle? If there are, contact your Frog stockist.
2. Lock out the suspension and hold the front brake, whilst rocking the bike backwards and forwards. Is any movement? If there is, contact your Frog stockist.
3. Is there any oil leaking from the fork? Check around the stanchions of the fork. If there is any sign of leaking oil, contact your Frog stockist.
4. Check the movement of the suspension. If it is not moving smoothly contact your Frog stockist.
5 Does the fork feel too soft? Check the sag of the fork (air pressure) to ensure that the fork is set to the correct pressure (see table below).
6. Make sure that all the necessary bolts and parts of the bicycle are tightened to the correct torque. Also make sure that all the parts (e.g., brakes) are functioning correctly.
7 For quick-release systems, ensure that they are correctly tightened.
8. Ensure that the cables do not impede the intended movement of the bicycle. If cables need to be shortened, please contact your Frog stockist.
9. For bikes with disc brakes, make sure that on the front wheel the cam lever is located on the non-disc side (right side when sitting on the bike) to avoid interference of the skewer with the disc

# 4/ TECHNICAL INFORMATION

**AIR PRESSURE AND SAG**

Sag is the compression of the fork caused by the weight of the laden rider. The SAG is 15-30% of the forks maximum travel, although this can vary depending on the intended use and personal preferences.

1. Unscrew the valve cap on top of the fork (blue cap, on the Frog fork). This will uncover a valve, which the shock pump can be screwed onto. (see fig.38)

2. Screw the fork/shock pump onto the fork. Pump the fork up to the desired pressure level (see fig.39) (Do not exceed the maximum pressure for the fork).

3. Remove the pump and set the red rubber O-ring on the fork stanchion to the bottom of the travel. (see fig.40)

4. Sit on the bicycle in a normal riding position and measure the distance that the rubber O-ring has moved. The measured distance is your sag.

fig.38


fig.39


fig.40

| RIDER WEIGHT | | PRESSURE | |
|---|---|---|---|
| KGS | LBS | PSI | BAR |
| 20-30 | 44-66 | 20-30 | 1.38-2.07 |
| 30-40 | 66-88 | 30-40 | 2.07-2.76 |
| 40-50 | 88-110 | 40-50 | 2.76-3.45 |
| 50-60 | 110-132 | 50-60 | 3.45-4.14 |
| 60-70 | 132-154 | 60-70 | 4.14-4.83 |

fig.41

The maximum air pressure in the Frog forks is: 100 PSI

**ADJUSTING REBOUND DAMPING**

Rebound damping is only applicable to the 26" MTB Frog fork.
Rebound damping is the ability to control the speed at which the fork returns to its non-compressed state after being compressed. To adjust the rebound, turn the adjuster knob found on the bottom of the fork leg. (see fig.42)To reduce the rebound speed, turn the knob anticlockwise.


fig.42

To increase the rebound speed, turn the knob clockwise. To locate the correct rebound speed, turn the knob clockwise as far as possible. This will set rebound speed at its minimum. If you place your bodyweight over the fork and release it, the fork will spring back to place. Gradually turn the dial anticlockwise and repeat this process in an iterative fashion. If the rebound of the fork results in the front wheel almost leaving the ground, you have found an appropriate approximate setting for the rebound. The exact setting will depend on personal preference, but please note that a fast rebound can cause a loss of traction.

**LOCK-OUT AND COMPRESSION DAMPING**

Compression damping is the ability to control the speed, at which the fork compresses. To adjust the compression speed, turn the lock-out cap on top of the fork leg. (see fig.43). The further you turn the dial, the more damping is applied. When you turn the dial fully clockwise the fork will be locked out, stopping the suspension from working.

fig.43

## G. Tyres and Tubes

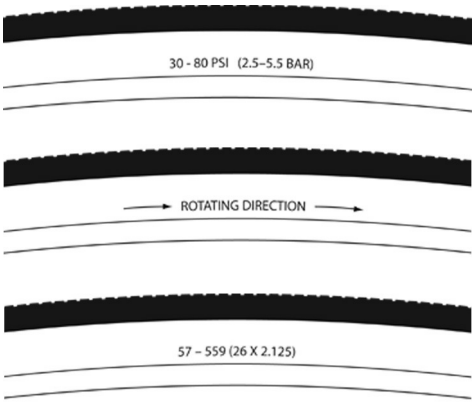



fig.44

G1. Tyres

Bicycle tyres are available in many designs and specifications, ranging from general-purpose designs to tyres designed to perform best under specific weather or terrain conditions. Once you've gained experience with your new bike, if you feel a different tyre might better suit your needs, your stockist can help you select the most appropriate design.

The size, pressure rating and, on some highperformance tyres, the specific recommended use are marked on the sidewall of the tyre. (see fig.44) The part of this information which is most important to you is tyre pressure. Most Frog Bikes bicycle tyres are covered by pressure rating ranges based on tyre size; however, certain tyres have different pressure ranges based on the intended use of the tyre. To determine the correct tyre pressure range for a specific tyre, please refer to the tyre pressure range specified on the sidewall of the tyre, or refer to www.FrogBikes.com for a list of tyre pressures by tyre model.

**TABLE OF INFLATION PRESSURES**

| PSI | BAR | KPa |
|---|---|---|
| 35 | 2.38 | 238 |
| 40 | 2.72 | 272 |
| 45 | 3.06 | 306 |
| 50 | 3.40 | 340 |
| 55 | 3.74 | 374 |
| 60 | 4.08 | 408 |
| 65 | 4.42 | 442 |
| 70 | 4.76 | 476 |
| 75 | 5.10 | 510 |
| 80 | 5.44 | 544 |

| PSI | BAR | KPa |
|---|---|---|
| 85 | 5.78 | 578 |
| 90 | 6.12 | 612 |
| 95 | 6.46 | 646 |
| 100 | 6.80 | 680 |
| 105 | 7.15 | 715 |
| 110 | 7.48 | 748 |
| 115 | 7.83 | 783 |
| 120 | 8.17 | 817 |
| 125 | 8.62 | 862 |
| 130 | 8.96 | 896 |

⚠ WARNING: Never inflate a tyre beyond the maximum pressure marked on the tyre sidewall. Exceeding the recommended maximum pressure may blow the tyre off the rim, which could cause damage to the bike and injury. The best and safest way to inflate a tyre to the correct pressure is with a bicycle pump with a built-in pressure gauge.

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

Tyre pressure is given either as maximum pressure or as a pressure range. How a tyre performs under different terrain or weather conditions depends largely on tyre pressure. Inflating the tyre to near its maximum recommended pressure gives the lowest rolling resistance but also produces the harshest ride. High pressures work best on smooth, dry roads. Very low pressures, at the bottom of the recommended pressure range, give the best performance on looser or rougher surfaces. Tyre pressure that is too low for your weight and the riding conditions can cause a puncture by allowing the tyre to deform sufficiently to pinch the inner tube between the rim and the riding surface.

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

Ask your stockist to recommend the best tyre pressure for the kind of riding you will most often do, and ask them to inflate your tyres to that pressure. Then check inflation as described in Section 1.C. so you know how correctly inflated tyres should look and feel when you don't have access to a gauge. Some tyres may need to be brought up to the correct pressure every week or two so it is important to check your tyre pressures before every ride. Some special high-performance tyres have unidirectional treads: their tread pattern is designed to work better in one direction than in the other. The sidewall marking of a unidirectional tyre will have an arrow showing the correct rotation direction. If your bike has unidirectional tyres, be sure that they are mounted to rotate in the correct direction.

G2. Tyre Valves

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

The Schrader valve is like the valve on a car tyre. 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. .

The Presta valve has a narrower diameter and is only found on bicycle tyres. To inflate a Presta valve tube using a Presta headed bicycle pump, remove the valve cap; unscrew (anti-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 stockist) 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.

⚠ WARNING: We highly recommend 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.

# 4/ TECHNICAL INFORMATION

# 5/ SERVICE AND MAINTENANCE

All moving parts on your bike will need lubrication from time to time: how often depends on the sort of use it gets. The more you use your bike, and the worse the conditions, the more it will need lubricating. As a rough guide: Lubricate the chain and gears every 2 weeks and lightly oil them after washing or riding in the rain. Re-grease your pedals, bearings and brackets every 6 months. We recommended that you take your bike to your local stockist for this 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 bike. 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 stockist. Equally important is that your individual maintenance requirements will be determined by everything from your riding style to geographic location. Consult your stockist 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 bike until you have learned from your stockist how to properly complete them. We recommend that significant mechanical repairs should be carried out by a qualified mechanic. Improper adjustment or service may result in damage to the bike or in an accident which can cause serious injury or death.

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

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

We recommend you ask your stockist 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 adjusted everything correctly. Since that will require the time of a mechanic, there may be a modest charge for this service. We also recommend you ask your stockist for guidance on what spare parts, such as inner tubes, light bulbs, etc. you will need once you have learned how to replace such parts.

## A. Service Intervals

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

1. Run-in period: Your bike will last longer and work better if you run 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 stockist.

Your Mechanical Safety Check (Section 1.C.) will help you identify some things that need readjustment. But even if everything seems fine to you, it's best to take your bike back to the stockist for a check-up. Stockists typically suggest you bring the bike in for a 30-day check-up. Another way to judge when it's time for the first check-up 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 stockist before riding it again.

2. Before every ride: Mechanical Safety Check (Section 1.C.)

3. After every long or hard ride, if the bike has been exposed to water or grit, or at least every 100 miles: Clean the bike and lightly lubricate the chain's rollers with a good quality bicycle chain lubricant. Wipe off excess lubricant with a lint-free cloth. Lubrication is a function of climate. Talk to your stockist about the best lubricants and the recommended lubrication frequency for your area. Avoid contaminating the rims with lubricant!
4. After every long or hard ride or after every 10 to 20 hours of riding:

- Squeeze the front brake ( lock out a suspension fork if you have one )and rock the bike forward and back. Does everything feel solid? If you feel a clunk with each forward or backward movement of the bike, you probably have a loose headset. Ask your stockist to check it.
- If you have a suspension fork test to see if it moves smoothly and locks out.
- Lift the front wheel off the ground and swing it from side to side. Does it feel smooth? If you feel any binding or roughness in the steering, you may have a tight headset. Ask your stockist to check it.
- Grab one pedal and rock it toward and away from the centre-line of the bike; then do the same with the other pedal. If anything feels loose ask your stockist to check it.
- Inspect the brake pads. If they are starting to look worn or not hitting the wheel rim squarely they might need to be adjusted or replaced.
- Check the control cables and cable housings for signs of rust, kinks or fraying? Replace if worn.
- 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 tension? If any feel loose, ask your stockist to check for tension and trueness.
- Check the tyres for excess wear, cuts or bruises. Replace them if necessary.
- Check wheel rims for excess wear, dents and scratches. Consult your stockist if you see any damage.
- Check to make sure all accessories are still secure, and tighten any that are not.
- Check the frame, particularly in the area around all tube joints; the handlebars; the stem; and the seat post for any deep scratches, cracks or discolouration. These are signs of stress-caused fatigue and indicate that a part is at the end of its useful life and needs to be replaced. See also Appendix B.

⚠ WARNING: Like any mechanical device, a bicycle and its components are subject to wear and stress. Different materials and mechanisms wear or fatigue from stress at different rates and have different life cycles. If a component's life cycle is exceeded, the component can suddenly and catastrophically fail, causing serious injury or death to the rider. Scratches, cracks, fraying and discolouration 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 bike or of individual components may be covered by a warranty for a specified period of time, this is no guarantee 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 bike. A warranty does not mean the bike cannot be broken or will last forever. It only means that the bike is covered subject to the terms of the warranty.

Please be sure to read Appendix A, Intended Use of Your Bicycle and Appendix B, The Lifespan of Your Bike and its Components, starting on page 40

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

## B. If your bike sustains an impact:

First, check yourself for injuries, and take care of them as best you can. Seek medical help if necessary. Next, check your bike for damage. After any crash, take your bike to your stockist for a thorough check. Carbon composite components, including frames, wheels, handlebars, stems, crank sets, brakes, etc. which have sustained an impact

must not be used until they have been disassembled and thoroughly inspected by a qualified mechanic. See also Appendix B, Lifespan of Your Bike and its Components.

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

## Intended Use of Your Bicycle

⚠ WARNING: Understand your bike and its intended use. Choosing the wrong bike for your purpose can be hazardous. Using your bike the wrong way is dangerous.

No one type of bicycle is suited for all purposes. Your retailer can help you pick the "right tool for the job" and help you understand its limitations. There are many types of bicycles and many variations within each type. There are many types of mountain, road, racing, hybrid, touring, cyclo-cross and tandem bicycles.

There are also bikes that mix features. For example, there are road/racing bikes with triple cranks. These bikes have the low gearing of a touring bike, the quick handling of a racing bike, but are not well suited for carrying heavy loads on a tour. For that purpose you want a touring bike. Within each type of bike, you can optimize for certain purposes. Visit your bike Stockists and find someone with expertise in the area that interests you.

Do your own homework. Seemingly small changes such as the choice of tyres 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 stockist about how you intend to use your bike.

All Frog Bikes have been tested to a maximum weight of 280kg.
Bikes classified and marked as Kids bikes (EN 14765) Frog 43 and Frog 48 have a maximum combined rider/cargo/bike weight limit of 45kg - however, they have been tested to a weight of 280kg. For all Frog Bikes the permissible total weight of the rider plus luggage and the maximum total weight (bicycle + rider + luggage) = 280kg.

## 1. High-Performance Road

**For riding on paved surfaces only**

- CONDITION 1: Bikes designed for riding on a paved surface where the tyres do not lose ground contact.
- INTENDED: To be ridden on paved roads only.
- NOT INTENDED: For off-road, cyclo-cross, 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 Appendix B.

## 2. General Purpose Riding

**For riding on improved paths and roadways only. No jumping!**

- CONDITION 2: Bikes designed for riding Condition 1, plus smooth gravel roads and improved trails with moderate grades where the tyres 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 tyres that are well suited to gravel or dirt paths. Some come with relatively narrow tyres that are best suited to faster riding on pavement. If you ride on gravel or dirt paths, carry heavier loads or want more tyre durability talk to your stockist about wider tyres.

## 3. Cyclo-cross

**For riding on improved paths and roadways only. No jumping!**

- CONDITION 2: Bikes designed for riding Condition 1, plus smooth gravel roads and improved trails with moderate grades where the tyres do not lose ground contact.
- INTENDED: For cyclo-cross riding, training and racing. Cyclo-cross involves riding on a variety of terrain and surfaces including dirt or mud surfaces. Cyclo-cross bikes also work well for all weather rough road riding and commuting.
- NOT INTENDED: For off road or mountain bike use, or jumping. Cyclo-cross riders and racers dismount before reaching an obstacle, carry their bike over the obstacle and then remount. Cyclo-cross bikes are not intended for mountain bike use. The relatively large road bike size wheels are faster than the smaller mountain bike wheels, but not as strong.

## 4. Cross-Country, Marathon, Hardtails

**For riding on unimproved trails with small obstacles**

- 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 tyre 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, hard pack and depressions). Cross-country and marathon equipment (tyres, shocks, frames, drive trains) are light-weight, favouring 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 pedalling efficiency and uphill speed.

## 5. All-Mountain

**For riding on rough trails with medium obstacles**

- 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 bikes 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 stockist about your needs and these models.
- NOT INTENDED: For use in extreme forms of jumping/riding such as hardcore mountain, freeriding, downhill, dirt jumping 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.

## 6. For children only

Bikes designed to be ridden by children. Parental supervision is required at all times. Avoid areas involving cars and obstacles or hazards including inclines, curbs, stairs, sewer grates or areas near drop-offs or pools.

# 7/ APPENDIX B

## The Lifespan of Your Bike and its Components

**1. Nothing lasts forever, including your bike**

When the useful life of your bike or its components is over, continued use is hazardous. Every bike and its component parts have a finite 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 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 bikes and their components will usually have a shorter life than heavier bikes and their components. In selecting a lightweight bike or components you are making a trade-off, favouring 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 bike and its components checked periodically by your stockist 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, injury to the rider and shortened product life.

**2. Perspective**

Today's high-performance bikes 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 bike. We discuss some of the trade-offs made in designing your bike and what you can expect from your bike; and we provide important, basic guidelines on maintenance and inspection. We cannot teach you everything you need to know to properly inspect and service your bike; and that is why we repeatedly urge you to take your bike to your stockist for professional care and attention.

⚠ WARNING: Frequent inspection of your bike is important to your safety. Follow the Mechanical Safety Check in Section 1.C. of this manual before every ride. Periodic, more detailed inspection of your bike is important. How often this more detailed inspection is needed depends upon you. You have control and knowledge of how often you use your bike, how hard you use it and where you use it. Because your stockist cannot track your use, you must take responsibility for periodically bringing your bike to your stockist for inspection and service. Your stockist 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 stockist, we urge you to read this Appendix in its entirety. The materials used to make your bike determine how and how frequently to inspect. Ignoring this WARNING can lead to frame, fork or other component failure, which can result in serious injury or death.

## A. Understanding metals

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

**Properties of Metals**

Please understand that there is no simple statement that can be made that characterizes the use of different metals for bikes. What is true is that the way the metal 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 it will rust. Aluminium and titanium quickly develop an oxide film that protects the metal from further corrosion. Both are therefore quite resistant to corrosion. Aluminium is not totally corrosion resistant and particular care must be used where it contacts other metals as galvanic corrosion can occur.

Metals are comparatively ductile. Ductile materials bend, buckle and stretch before breaking. Generally speaking, of the common frame building materials steel is the most ductile, titanium less ductile, followed by aluminium. Metals vary in density. Density is weight per unit of material. Steel weighs 7.8 grams/cm3 (grams per cubic centimetre), titanium 4.5 grams/cm3, aluminium 2.75 grams/cm3.

Contrast these numbers with carbon fibre composite at 1.45 grams/cm3.

Metals are subject to fatigue. With enough use, at high enough loads, metals will 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 fork may be severely bent and the frame undamaged. Aluminium 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, the down tube buckled and broken, leaving the head tube and fork separated from the main triangle.

When a metal bike crashes, you will usually see some evidence of this ductility in bent, buckled or folded metal. It is now common for the main frame to be made of metal and the fork of carbon fibre. See Section B, Understanding Composites below. The relative ductility of metals and the lack of ductility of carbon fibre means that in a crash scenario you can expect some bending or bucking in the metal but none in the carbon. Below a given load the carbon fork may be intact even though the frame is damaged. Above a given load the carbon fork will be completely broken.

**The Basics of Metal Fatigue**

Common sense tells us that nothing lasts forever. The more something is used, and the harder it is used, and the worse the conditions in which it is used, 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.

Parts can be designed with such strength that fatigue life is almost infinite but this requires a lot of material and a lot of weight. Any structure that needs to be light and strong will have a finite fatigue life. Aircraft, race cars,

motorcycles all have parts with finite fatigue lives. If you wanted a bicycle with an infinite fatigue life, it would weigh far more than any bike sold today. So we all make a trade-off: the wonderful, lightweight performance we want requires that we inspect the structure.

**What to look for:**

- ONCE A CRACK 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 a 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 (chains, cables, bottom bracket, pedals & hubs), protect your bike from salt and remove any salt as soon as possible.

- STAINS AND DISCOLOURATION CAN OCCUR NEAR A CRACK. 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? Remember 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. Regard such a noise as a serious warning signal because a well-maintained bike will be very quiet and free of creaks and squeaks.
  SIMPLE RULE 5: Investigate and find the source of any noise. It may not be a crack, but whatever is causing the noise should be fixed promptly.

**Fatigue**

Fatigue is not a perfectly predictable science, but here are some general factors to help you and your stockist determine how often your bike should be inspected. The more you fit the "shorten product life" profile, the more frequent your need to inspect. The more you fit the "lengthen product life" profile, the less frequent your need to inspect.

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

**Factors that lengthen product life:**
- Smooth, fluid riding style
- No "hits", crashes, jumps, other "shots" to the bike

- Low mileage
- Lower body weight
- Less aggressive rider
- Non-corrosive environment (dry, salt-free air)
- Clean riding environment

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

## B. Understanding Composites

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

**What are composites?**
The term "composites" refers to a part or parts made up of different components or materials. You've heard the term "carbon fibre bike." This really means "composite bike." Carbon fibre composites are typically a strong, light fibre in a matrix of plastic, moulded to form a shape. Carbon composites are light relative to metals. Steel weighs 7.8 grams/cm3 (grams per cubic centimetre), titanium 4.5 grams/cm3, aluminium 2.75 grams/cm3. Contrast these numbers with carbon fibre composite at 1.45 grams/cm3.

The composites with the best strength-to-weight ratios are made of carbon fibre in a matrix of epoxy plastic. The epoxy matrix bonds the carbon fibres together, transfers load to other fibres, and provides a smooth outer surface. The carbon fibres are the "skeleton" that carries the load.

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

**What are the limits of composites?**
Well designed "composite" or carbon fibre bikes and components have long fatigue lives, usually better than their metal equivalents. While fatigue life is an advantage of carbon fibre you must still regularly inspect your carbon fibre frame, fork, or components. Carbon fibre composites are not ductile. Once a carbon structure is overloaded, it will not bend; it will break. At and near the break, there will be rough, sharp edges and maybe delamination of carbon fibre or carbon fibre fabric layers. There will be no bending, buckling, or stretching. If you hit something or have a crash, what can you expect from your carbon fibre bike? Let's say you hit a curb, ditch, rock, car, other cyclist or other object. At any speed above a fast walk, your body will continue to move forward, the momentum carrying you over the front of the bike. You cannot and will not stay on the bike and what happens to the frame, fork and other components is irrelevant to what happens to your body.

**What should you expect from your carbon frame?**
It depends on many complex factors. But if the impact is hard enough the fork or frame may be completely broken. Note the significant difference in behaviour between carbon and metal. See Section 2.A. Understanding metals in this Appendix. Even if a carbon frame is twice as strong as a metal frame, once the carbon frame is overloaded it will not bend, it will break completely.

# 7/ APPENDIX B

## Inspection of Composite Frame, Fork, and Components

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

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

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

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

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

## C. Understanding Components

It is often necessary to remove and disassemble components in order to properly and carefully inspect them. This is a job for a professional bicycle mechanic with the special tools, skills and experience to inspect and service today's high-tech high-performance bikes 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 stockist. Take these choices seriously and understand that you are responsible for the changes.

A useful slogan to discuss with your stockist if you contemplate changing components is "Strong, light, cheap – pick two."

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

# 8/ APPENDIX C

## Coaster Brake

1. How the coaster brake works

The coaster brake is a sealed mechanism which is a part of the bicycle's rear wheel hub. The brake is activated by reversing the rotation of the pedal cranks (see below). Start with the pedal cranks in a nearly horizontal position, with the front pedal in about the 4 o'clock position, and apply downward foot pressure on the pedal that is to the rear (see fig.45). About 1/8 turn rotation will activate the brake.

The more downward pressure you apply, the more braking force, up to the point where the rear wheel stops rotating and begins to skid.

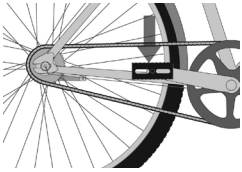


fig.45

⚠ WARNING: Before riding, make sure that the brake is working properly. If it is not working properly, ask your stockist to check it.

⚠ WARNING: If your bike has only a coaster brake, ride conservatively. A single rear brake does not have the stopping power of front-and-rear brake systems.

2. Adjusting your coaster brake

Coaster brake service and adjustment requires special tools and expert knowledge. Do not attempt to disassemble or service your coaster brake. Take the bike to your stockist.

# 9/ APPENDIX D

**Fastener Torque Specifications**

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

| Component | NM |
|---|---|
| Pedal-to-crank Interface | 34.3 |
| Internal hub bolt | 15 |
| Cranks | 32 |
| Chain-ring bolts | 9.4 |
| Stem to steerer bolts x4 | 4 - 5 |
| Stem to fork steerer bolts x2 | 4.5 |
| Shifter bolt | 4.5 |
| Derailleur | 4 - 5 |
| Seat tube collar | 4.5 |
| Brake leaver bolt | 4.5 |
| V brake to bosses | 4.5 |
| V brake pads | 4.9 |

| Compontent | NM |
|---|---|
| Freewheel | 42 |
| Nutted axle | 29.5 |
| Derailleur hanger | 6.8 |
| Water bottle cage | 4 |
| Bottom braket cable guide | 2.8 |
| Mudguard front | 4 |
| Mudguard rear | 4 |
| Bottom bracket | 30 |
| Cassette | 42 |
| Saddle to seat post | 10 |
| MTB calliper | 4 - 5 |
| MTB disc bolts | 4.5 |

# 10/ APPENDIX E

## Getting Started with a Tadpole Balance Bike

A Tadpole Balance Bike is the easiest way for a child to learn to ride a bike. Learning on a Tadpole Balance Bike separates the need to pedal and balance at the same time, and so very young children can learn to ride safely by learning the balance first without the need for pedalling. The rate at which children develop the necessary motor skills for balance may vary greatly, so don't worry if your child can't manage it straight away – just keep trying.

Follow these simple steps to ride a Tadpole Balance Bike safely:

- Choose a flat place for their first lesson with plenty of space and nothing for the child to bump into. This can be indoors or outdoors on firm grass.
- Help the child on to their bike and support them by holding them under the armpits from behind.
- If you have purchased a parent handle, connect this under the seat.
- Make sure the child holds the handlebars – it's the fastest way to learn.
- Younger children will often stand over the bike initially, rather than let the saddle take their weight. Try and encourage them to sit down.
- It's usual for your child to waddle cautiously at first. With practice they will gain confidence and will learn to stride and in time 'scoot' by lifting up their legs.
- Remember young children do not yet possess the judgement to assess risks so they must always be closely supervised.

# 11/ APPENDIX F

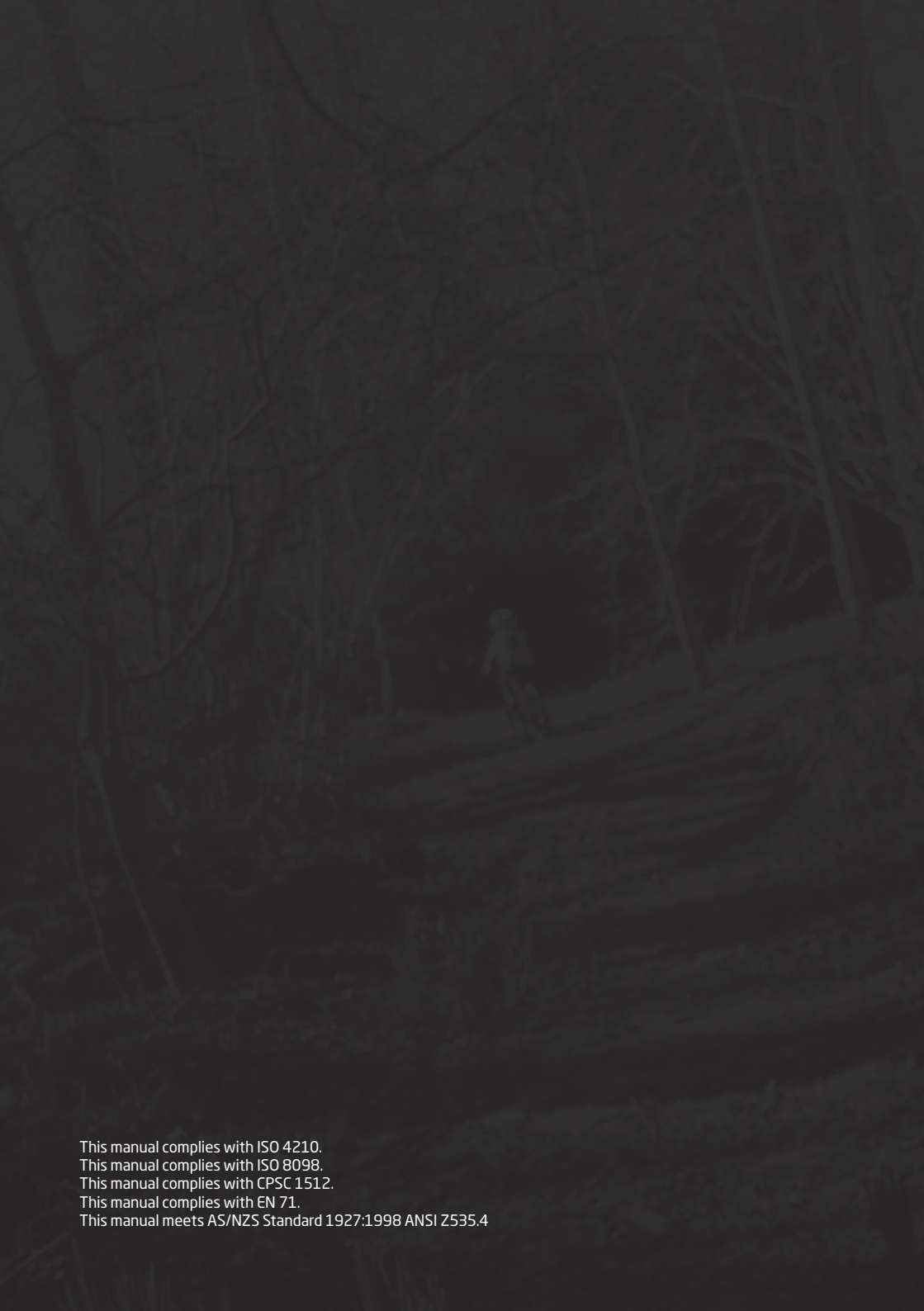
## Recommended tools for proper bicycle maintenance

- Torque wrench with lb•in or N•m gradations
- 2, 4, 5, 6, 8 mm allen wrenches
- 9, 10, 15 mm open-end wrenches
- 15 mm box end wrench
- Socket wrench, 14, 15, and 19 mm socket
- T25 torx wrench
- No. 1 phillips screwdriver
- Bicycle tube patch kit, tyre pump with gauge, and tyre levers
- Special high pressure air pump for rear shock or suspension fork

Note: Not all bikes require all these tools

## Warranty

A warranty covers your bicycle. For information on our warranty please visit our web site:
**www.frogbikes.com/warranty**



This manual complies with ISO 4210.
This manual complies with ISO 8098.
This manual complies with CPSC 1512.
This manual complies with EN 71.
This manual meets AS/NZS Standard 1927:1998 ANSI Z535.4