

Roadside Repair for Bike Event Marshals

June 2025

Introduction

As a volunteer on a bike event, your role includes helping participants with their mechanical difficulties. After this talk, you'll be more familiar with the kinds of things that go wrong on bike rides, the best ways to fix them, and what pitfalls to avoid.

Before the ride

- Many flats occur because riders started their day with low pressure in their tires.
- Low-pressure flats are preventable if you can find the riders before they start riding.
- If you are with riders at the start, wander around holding your pump, ask if anyone needs air.
- Some riders will ask you to check their tires as they have no idea what a properly inflated tire feels like.

Common mechanical problems during rides

- Flats! More detail below, but remember these rules - 1. **Always** find the source of the puncture, or flat is likely to recur. 2. **BEFORE** removing the tire from the wheel, use a pen or marker to mark the tire next to the valve, and the side of the valve, so you can quickly match up the hole in the tube with the tire. 3. **Always** check the rider's other tire's pressure, it may also need air.
- Gear shifting complaints - first look at the bike, are the gears cross-chaining? If so, explain to the rider how they can't use all the gears, With a typical 1-2-3 on the front they can use 2 with all gears, 1 with the five lowest gears on the back, and 3 with the five highest but they probably don't pedal fast downhill so they'll never need 3 on the front.
- If they're not staying in gear on the rear derailleur, and there's no obvious problem like bent drop-out or derailleur askew, tighten the rear shift cable barrel adjuster by a half turn or so. Gear (and brake) cables are always stretching out, a little tightening usually clears things up for the day.
- Chain falls off in front - the easy and fast fix works 90% of the time - pick up bike, ask rider to slowly turn the pedals forward, use front derailleur to hop chain back onto smallest chainring. With practice you can do this solo. If this works, you never touch the chain and thus don't get your hands dirty. Another way is to push in the rear derailleur with your foot (produces slack in the chain), then use a stick, paper, leaf, whatever, to slip under the chain and reseat it onto the smallest front chainring. Presto; chain back on and hands clean!
- Chain falls off and jams - you'll need to get your hands dirty (or carry gloves in your kit). You might need a screwdriver to pry the chain out of whatever mess it's in. Remember that it got stuck with forward motion from the pedals so pulling the chain in the opposite direction from the jammed position should get it out. Do not use your chain tool unless the situation is desperate, it's rarely necessary.
- Chain breaks - you can fix it with a chain tool, BUT 9 speed and up chains do NOT support re-insertion of pins. You can carry quick links (used ones are OK for this) but be sure they match

the chain. REMEMBER, before using a chain tool, check whether the existing chain has a quick link.

- Brakes shoes rubbing (rim brakes) - first make sure shoes are hitting rim properly (rim only, not touching tire, not touching air) and adjust the shoes if needed. Then look at centering shoes and/or adjusting cable. Do the minimum needed for them to get to the end of the ride or the next bike repair stop - if the wheel is wiggly you can loosen the brakes a little as long as brakes are safe (can lock wheel without brake lever hitting the handlebars).
- Sometimes, rubbing brakes are due to the brake not fully releasing. Show the rider how to let the brake levers "snap" open after braking, this might get them through the ride.

Less common mechanical problems during rides

- Pedal falls off - check that they didn't swap left/right pedals by accident. Once the correct pedal for each side is identified, screw pedal in backwards until it snaps into threads, then screw forwards. **Remember, the left-hand pedal is reverse threaded!** If the pedal will not engage threads, try threading it through the other side of the crank all the way in, about half the time this will re-carve enough thread to let you get the pedal back on properly when you go back to the correct side. If this doesn't work, they are out of luck.
- Crank falls off or is loose - there are two types of crank bolts - 8mm Allen key (easy to carry, comes with most multitools) or 14mm socket wrench (only the truly prepared carry these). Keep some spare Allen key crank bolts in your kit - they should be able to replace either type of bolt if lost. You can partly tighten a socket-style crank bolt with a crescent wrench but it will just loosen up again.
- Rear rack or water bottle falling off - they've probably lost a frame bolt or two. Look the bike over for braze-ons not in use - there might be a spare bolt there. Do you carry spare bolts in your kit? Duct tape, zip ties, or a bungee cord (thread the hook through the holes of the rear rack and frame to replace the bolt) can also work for short term fix.
- Disc brakes - not much goes wrong with them, if the rotor is wildly out of true you can bend it (carefully!) back towards normal with a crescent wrench - but if it's just noisy and not slowing them down much, tell them to keep riding until the next bike shop or rest stop with a mechanic.
- Freewheel stops engaging - the pawls that draw back when the freewheel is turned backwards are not springing out when the rider pedals forward, probably due to dirt in the mechanism. Take out the wheel, hold it horizontally and drip some oil into the mechanism where it might reach the pawls. Let it sink in and then start banging the wheel around the edges to shake the oil down and maybe shock the pawls into springing out. If this works, warn the rider to get the freewheel overhauled or replaced after the ride.

Common non-mechanical problems

When you come up on slow riders, take a look to see if there are any visible problems that you can help remediate:

- Rider is sweating and visibly fatigued, and they do not have water bottles or a hydration pack: Ask them how they're doing and if they're carrying water. If not, offer them some of yours. If they have water packed away, suggest they stop and drink some, advise them to learn how to drink while biking as otherwise they won't drink enough. Advise them to stop regularly on the rest of the ride in order to drink. On rides that give away bottled water, carry a couple of extras to give to cyclists in need.

- Rider is going slowly and their knees never unfold - the seat is clearly too low: Chat them up to see if they know anything about seat height - sometimes they have special physical needs and the low seat is intentional. Explain that a higher seat will let them go farther with less work, and find an opportunity to stop and adjust it. **HOWEVER**, only raise the seat by a small amount each time - novice riders generally need to learn new mount/dismount technique with the seat at the right height, and today is not the day they're going to learn that. Stay with them for a few minutes after the adjustment - they might not be comfortable and will want you to lower it a bit or even go back to the original height.
- Rider has stopped - stop and ask them how they're doing. If they report thirst or low energy, offer them water or snacks from your kit (you're a marshal, always carry some extra snacks and water!). If they have cramps, advise them to drink water, eat something with potassium (bananas are ideal, pickle juice is also pretty awesome), and stretch gently against the cramp (counterintuitive but it works). They can also massage the cramped area. Stay with them until they're ready to ride or decide to bail.

How to check a bike after a crash

- **FIRST** make sure the scene of the crash is safe, everyone is out of the road and any medical issues are addressed. Don't rely only on what the cyclist reports - adrenaline from the shock of the crash can temporarily block the pain from an injury. Always ask the cyclist if their head hit anything and whether they blacked out after the crash - counsel the rider to seek medical assistance immediately if there is evidence of a head injury.
- If the rider wants to keep on riding, ask permission to look their bike over. Use the standard "2-minute bike check" or "ABC check", but pay extra attention to these items:
 - Are the handlebars lined up properly? If standard stem, try turning them back by hand (hold wheel between legs, yank). If threadless, it was probably loose before the crash, check stem carefully.
 - Road bike brake levers twisted in or out? You can usually push it back into position by hand, otherwise open the brake's quick-release and push the brake lever all the way down to access the brake lever's anchor bolt. You may need to shine a flashlight into the gap behind the lever to find the bolt head.
 - Check wheels for wobble and loose or broken spokes
 - Check seat is pointing straight ahead
 - Make sure brakes are safe
 - Check front fork for cracked paint, unusual bends or other signs of damage
- **Always** follow the rider for a few minutes to make sure they are OK riding and that no new mechanical or injury problems turn up.

Spoke adjustments

- Roadside adjustments to spokes should be limited to making the bike rideable
- If you're new to this, practice on your own bike first or at a bike co-op session
- Rim brake rub - find the closest point of wobble, adjust there by loosening spokes on that side of tire and tightening spokes of the far side.
- Always check the rest of the wheel for loose spokes.

- Broken spoke - re-tension its neighbors to reduce the wobble. The rider should go to a bike shop within a day or two for proper repair. Tape up or attach any dangling parts of spoke to a neighbor spoke to keep it from harming the rest of the bike.
- Two or more broken spokes - rider needs to go to the first available bike shop, before more spokes start breaking.

What NOT to do

Riders may ask you for oil when they don't really need any, or to fix their cyclometer or other accessory. If they don't need it, don't do it - whatever it is might take longer than you think and keep you from helping someone who is actually broken down.

When making repairs, always do the minimum necessary - it's faster and less likely to encounter problems. Your job on event day is to get people rolling again.

What to carry on ride day

Tools - minimum kit

- Pump with gauge
- Tire levers
- Patch kit (write the date on it, solvent dries up on old kits even if unopened)
- Multi-tool (such as Crank Brothers M19, Topeak Alien) - should have 1 thru 8mm hex keys, screwdrivers, chain tool, spoke wrench
- Ballpoint pen or Sharpie marker
- Duct tape
- Zip ties

Tools for more complex problems

- 15mm / 14mm open-end wrench (Hex bolts for non-QR axles, seat bolts for low-end seat clamps, can also be used as a pedal wrench)
- 6" crescent wrench (adjust various small nuts and bolts, increase torque on Allen keys, doubles as small hammer)
- Presta/Schraeder adapter - extends valve when replacement tube stem is too short for rim
- Misc small open-end wrenches - 8 thru 13mm
- Third hand tool (for clamping brake shoes together when fixing brakes)
- Vise-grip (locking pliers) - small locking pliers work well and don't weigh much, can substitute for many other tools
- Crank wrench for socket-style crank bolts
- Swiss Army-style knife (scissors for cutting Tyvek boots)
- Floor pump (should be visible while you ride - people will see it and ask you for help)

Parts - minimum kit

- Spare tube for yourself
- Extra, unopened patch kit (so you won't be caught short on solvent)

- Tyvek envelope or old ride bib numbers for tire boots

Parts for less likely problems

- Spare crank bolts
- Spare frame bolts (i.e. water bottle cage/rear carrier bolts)
- Spare Presta and Schrader valve cores, Presta valve core tightener.
- Spare brake and gear cables (and a cable cutter tool to trim them, the vise-grip can cut bike cables but not very well)
- Spare cable tips
- Spare V-brake “noodle” kit
- Some duct tape (wrap a short length around your pump or a pencil)
- Some electrical tape (for re-securing handlebar tape, duct tape is too messy for that)

Flat-fixing technique

REMEMBER: ALWAYS FIND THE SOURCE OF THE PUNCTURE!

- Before doing anything, mark the location of the valve on the tire with a ball-point pen or Sharpie. Mark valve stem (or tube, if the stem is metal) on the same side.
- Don't touch the rim brakes - in almost all cases, flat tire will pass through brakes and you don't need to open the quick-release (and thus won't forget to put it back afterwards)
- If you like to turn the bike upside down for repairs, first check the handlebar for lights and other accessories that might get damaged. Ask the rider to remove them as well as the water bottles (they leak when upside-down) before you start.
- Remove wheel, remove tire and tube, pump up tube and find leak. Draw “cross-hair” lines through the puncture point so you can find it later for patching. Make lines extra long so they well exceed the area where you'll be sanding around the puncture.
- **IMPORTANT:** Squeeze the leak with your fingers and keep pumping to check for any additional holes in the tube. Mark those and keep going until you've found them all.
- If a puncture is a snake bite, it was caused by underinflation. Use the large oval patch in the patch kit, two overlapping patches or replace tube, no need to check tire or rim. To overlap patches, patch one hole, carefully remove the plastic wrap from that patch and then apply the overlapping patch. Sand the first patch the same way you sand the tube.
- If the puncture is on the rim side of the tube, line up the tube with rim and examine rim carefully. If you don't find loose rim tape or other obvious source of puncture, patch the tube and put it back in the same orientation so patch is over suspect spot on rim and will protect against re-puncture.
- If the puncture is on the road-facing side of the tube, line the tire up with the tube using the marks and examine the tire in the puncture area. Source of the puncture (glass, tiny piece of wire, broken-off thorn, etc.) is likely still there and needs to be removed.
- If the puncture is on the side of the tube, CHECK TIRE CAREFULLY for sidewall tears or exposed bead. You will likely need the [Safety Belt Boot](#).
- If you can't find the puncture, look for a puddle or a bowl of water to test the tube.
- Patching won't work in the rain or drizzle. Find a sheltered location if you need to patch.
- Use the sandpaper in the kit to sand down the area of the tube around the puncture, at least as large as the patch but to be safe make it much larger.
- Apply the solvent in a thin coat, no glopping. Spread it around with your finger if necessary.
- WAIT until the solvent has had time to sink in - usually it will look dullish when ready.

- Using the target lines (because it's hard to see small holes in the tube once the solvent has been smeared over them), line up the patch over the hole and press all of it down. Burnish the patch with a hard surface like a coin, a tool handle, or the patch kit box.
- When you're done, check the other tire for underinflation - you may save the rider from a 2nd flat!

Sometimes there is no obvious source of the puncture no matter how hard you look. So you have to start guessing. Sprinkle water into a Schraeder valve to see if the valve core is loose or defective. Bend the valve stem around to see if there are any weak spots at base. Other possible suspects are overinflation, rim design that presents corners or indentations to the tube, spot overinflation from sitting out in the sun. Defective Schraeder valves that fail under pressure (but not when outside the tire) have also been observed.

The "Safety Belt" boot

When there is a big tear in the tire, the tube will bulge out through the tear, either causing a blowout or making the tear larger and then causing a blowout. Park Tool sells "tire boots" which stick on the inside of a tire, covering the hole to prevent the bulge-out, but they do nothing to prevent the tire from continuing to tear open.

The "safety belt" boot uses the tire's bead to anchor a strong material around the tube so that it doesn't pop out through the torn area of the tire. Here's how it works:

- Get a piece of Tyvek from an express mail / FedEx soft envelope, or use the bib number from your last large ride or running race event. In a pinch, you can use a dollar bill or maybe an energy bar wrapper or chip bag.
- With the tire and replacement tube halfway on the rim, route the boot material from one rim, up inside the tire between the tire and the tube, then down to the other rim. The boot should closely follow the tire and not "shortcut" across the tube.
- **THERE MUST BE ENOUGH BOOT MATERIAL TO SIT UNDER THE TIRE BEAD ON BOTH SIDES.** This is the secret of this boot - the tire beads hold the boot in place, the boot holds the tube in place, and the tube is prevented from bulging through the tear by the boot.
- Make sure the boot is in place protecting the torn sidewall area, then mount the tire fully on the rim. **THE BOOT MUST BE STICKING OUT UNDER THE BEAD ON BOTH SIDES.**
- Pump the tire up to no more than 50-75% of the rated pressure. The boot is likely to cut into the tube if you go to full pressure.
- Examine the tire - the sidewall tear should be slack, the top of the tire at the boot will have a small flat spot because the boot is containing the tube.
- On bikes with rim brakes, you need to trim away the excess boot material sticking out at the rim to avoid interfering with the brake.
- Advise the rider that they can probably finish the event on the booted tire, but they should replace the tire before their next ride.

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