

A guide to get-you-home cycle repairs by CTC – the UK's national cyclists' organisation. Words and pictures by Chris Juden

ROAD & TRAILSIDE REPAIR

**8-PAGE
GUIDE TO ROAD
& TRAILSIDE REPAIR**
Price £1.50. Free to CTC members with
Cycle magazine, Dec/Jan 2008-09



- PREVENTING PROBLEMS
- ESSENTIAL TOOLS
- REMOVING & REPLACING WHEELS
- CHANGING AN INNERTUBE
- FIXING A PUNCTURE
- ADJUSTING BRAKES & GEARS
- TRUING A WHEEL
- FIXING A CHAIN
- GET-YOU-HOME TIPS

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CHRIS'S ESSENTIAL TOOLKITS

Don't leave home without

■ **TOPEAK MINI 9:** because it's so light and yet strong, with all the bits that I want for my bikes. Your needs may differ.

■ **TOPEAK MORPH:** the Mini version (right) for emergencies, or the Turbo with gauge for greater convenience and precision.

■ **VAR 425:** the neat lever that also really helps you re-fit a tyre.

■ **SPARE INNERTUBE**



Add for longer, more pessimistic rides

■ **TIP-TOP PUNCTURE KIT**

■ **VISE-GRIP 4WR:** too many uses to mention, see last issue of Cycle.

■ **SRAM POWERLINK:** also fits Shimano chain. Lives with Tip-Top.

■ **SPOKEY:** grips three corners, not two, with hard steel where it's needed, light plastic where it aint.

■ **TYRE BOOT:** any strong cloth will do.



Add for tours

■ **SPARE SLIP-IN BRAKE PADS**

■ **OIL:** Finish-Line XC in a Tippex thinner bottle.

■ **RE-USABLE ZIP-TIES:** re-usable ones have even more uses.

■ **PVC ELECTRICAL INSULATING TAPE**

■ **LITTLE POT OF SPARES:** containing: cleat screw, long and short M5 and M6 cap screws with washers and nuts, a mudguard stay bolt, solderless nipple...

■ **3-WAY BOX SPANNER:** 8, 9, 10mm.

■ **PARK CONE SPANNERS:** thin, light, strong.

■ **BIG OLD MONKEY:** wrench with handle-slide expands wider (36mm) than other longer and heavier adjustable spanners, but doubles as a hammer nevertheless!

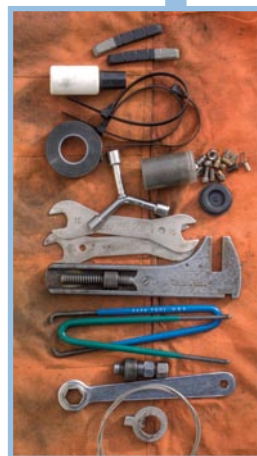
■ **PARK PIN WRENCHES:** are light and can be sprung to whatever size.

■ **CRANK TOOL AND WRENCH:** but it's better to

convert the crankset to one-key release and save weight!

■ **TNBT2:** cassette locking tool that uses the bike frame as a spanner and its transmission as a chain wrench.

■ **SPARE CABLES:** rear brake and gear can also be used for the front.



CAN YOU FIX IT?

This is about fixing the things that most commonly go wrong when you're out riding and that you should be able to fix with a few simple tools and spares. If you don't have these or the necessary skills, ask a passing cyclist for help – or improvise. Cycling folklore is rich with tales of bodes and dodges. Some do really work; tyres stuffed with grass really don't.

If all else fails, phone a taxi, or be thankful you took out CTC Cycle Rescue insurance. It's only £30 a year (see p78). If you have no mobile or signal, knock on a door. The mercy of strangers is not to be underestimated.

Cycle Rescue won't come out for just a puncture, so you'd better be ready to fix those and should always carry at least one spare innertube. Other useful spares include a no-tools replaceable chain link, a tyre boot, a spare gear cable (rear) and brake cable (also rear).

Prevention not cure

Heard of 'Sunday maintenance'? It's when cyclists stand around in the cold waiting for someone to fix what you should have sorted the week before!

Well-maintained bikes don't usually break down. So unless you're up to the job yourself, get your bike professionally serviced at regular intervals. How regular depends on how much you ride it. Every 2,000 road miles is a good rule of thumb. Twice as far if you ride only in the dry, but halve it off-road and half again for actual mountain-biking.

Weekly or monthly (you decide, reckoning on a dozen such checks between full services) look over your bike for anything loose, broken or worn. Tyres may need pumping more often than that: daily for narrow tyres under 25mm, weekly for normal 28 to 38mm, monthly for fat ones. And don't just throw the bike in the shed after a ride. Now is the time to clean it if the ride was dirty, apply moisture repellent if it was wet and see to any faults or niggles not bad enough to fix on the ride.

Failures often happen when small problems are left to fester. Soft tyres have more punctures and let potholes damage your rims. Loose spokes let adjacent spokes do all the work, then snap. Dry and worn chains shift badly, occasionally jam and later break. Maladjusted gears do the same. A worn brake block could be chewing the rim or half missing it...



Quick release should be hard to close

WHEEL REMOVAL/REFITTING

Removing and fitting your bike's wheels is an important skill, not just for changing an innertube or fixing a puncture but for packing the bike down for transit – in the back of an emergency taxi, for example.

If the wheel has a rim brake, you'll need to release it unless the tyre is flat. See page 6 for that. And don't forget to re-connect the brake when you put the wheel back! We've all done it once.

If the wheel has a drum or roller brake in the hub, disconnect the cable from the brake and the brake's reaction arm from the frame. Refer to the owner's manual.

Front wheel removal

The most common sort of wheel fastener is a quick release lever. On old bikes the wheel will drop out when you undo this. On new bikes you'll have to hold the lever and unscrew the adjuster nut on the other side, to clear the dropout's security lips. If not quick-release there may be a security skewer, unfastened with an allen-key or a special tool. Or else there will be simple axle nuts, requiring a suitable spanner.

Always note which side the lever was (normally the left) and put the wheel back the same way. Failure to do so may damage the bearings*. With axle nuts: screw in the right one as a reminder.

(*A loose cone on the right screws inwards, crushing the bearings, so the right-hand

cone should not be disturbed and all bearing adjustments done on the left.)

Rear wheel removal

If the bike has derailleurs gears, shift into top at the back. Then open the quick release or other axle fastener as for a front wheel. Lift the bike, pull the rear derailleur back, and let the wheel drop. If it needs some persuasion, press the ends of the axle down with your thumbs.

With a singlespeed or internal gear hub, first disconnect any gear cable (check the manual). Then loosen the axle fastener(s) including any 'tugs'. Slide the hub forward a bit, pull the chain off the rear sprocket and hang it around the dropout. Now slide the wheel out of the frame. Note the position of anti-turn washers on the axle of a gear hub.

Front wheel fitting

Before re-fitting a quick-release wheel, check the lever is open. Apart from that, you need only to remember which way round the wheel goes (bike computer magnet may be a clue), guide the tyre between the brake blocks, locate the axle in the dropout slots, and push down on the handlebars to ensure it's fully home as you tighten the fastener(s) – securely.

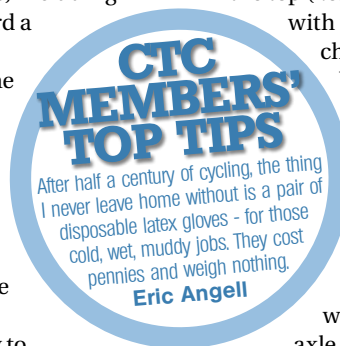
With a quick-release that means holding the lever in the open position and tightening the adjuster until when you fold over the lever

it leaves and imprint in the palm of your hand! As a rule of thumb, the lever should become snug when halfway closed, i.e. sticking out in line with the axle.

Rear wheel fitting

With a rear derailleur wheel: pull the mech backwards so that the axle and sprockets can be poked into the loop of chain as the wheel is angled into the frame. Engage the top (i.e. smallest) sprocket with the upper run of chain, guide the tyre between the brake blocks, then pull the wheel backward to guide the axle into the dropout slots. Push down on the saddle to ensure the axle is fully home whilst re-tightening the axle fastener(s). See front wheel for how.

With single-speed and internal gear wheels: reverse the removal process, paying attention to the positions of washers and nuts etc on the axle. Put the chain on the sprocket and chainwheel, then pull the wheel backwards to tension the chain while tightening the axle nuts.





PSSST... PUNCTURE!

Fitting a new innertube is quicker than mending, but don't rush or you may puncture that too. Never fit a new tube before you've found what punctured the old one.

Removing the tube

Remove the valve cap, deflate the tube and unscrew any ring before pushing the valve up into the tyre, to free it.

Insert a tyre lever under the tyre bead (its edging), pull up and over the rim edge then hook this lever behind a spoke. Insert another about 10cm away and slide it around the rim, lifting the tyre bead completely off one side.

Pull the tube out and lay it down as it came out of the tyre. To help remember which way around it was, attach a pump from the side away from the wheel. Pump the tube until you hear hissing or until it's fatter than the tyre.

Find the hole

Tip: hold the tube near your lips, feel the air and dab the hole with your tongue. Then make a big cross with a ballpoint pen – one line along the tube, the other all around it. (Dipping the tube in water to look for bubbles is a last resort.)

Align the tube with the tyre, valve by hole in rim. Examine the tyre adjacent to that mark, feeling for sharp things inside and looking for cuts or embedded objects outside. Feel all round for any further puncture-makers - or in case you flipped the tube.

Sometimes the cause of a puncture is so obvious it's quickest to find the hole in the tube by reference to that, rather than vice-versa. Mark it, then fit your spare.

Check the rim

If the hole is on the rim-facing surface of the tube, ensure the rim tape is central in the rim

and able to prevent punctures from spoke heads and holes. Check for protruding spokes etc. Nothing obvious? Cover the edge of the rim tape and the adjacent bare-metal bead seats with a layer of PVC tape. A broken rim tape can also be mended or substituted with enough layers of PVC tape.

Fit the tube

If you took the tyre off, fit one side back onto the rim. Inflate the tube just enough to give it shape, then remove pump, fit valve to rim and push the tube inside the tyre.

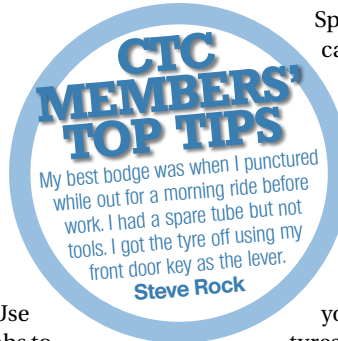
Fit the tyre

To make fitting easier, start opposite the valve. Use your fingers and/or thumbs to fit the second tyre bead. Stop when you get to the final tight part and go back over the length already fitted, kneading it deeper into the central well of the rim, to make some slack. If necessary, fully deflate the tube so it doesn't push back. Fit a bit, knead a bit, working back and forth to slacken that tight

section and make it short enough to roll over with one hand. When that stage is reached, push up the valve with your other hand so the base of the valve is not pinched by the tyre.

Special fitting difficulties are caused by puncture-resisting features that stiffen the tread, pulling the bead back up onto the bead seat as fast as you can push it down in the well. The solution is to push it down and tie it down, with string or zip-ties! If you struggle with stubborn tyres, get a Var 425 tool.

Once the tyre is fitted, inflate it to less than one bar (a few psi) and spin the wheel. If the tyre wobbles, push and pull it straight. Inflate to the recommended pressure and check the bead again. Replace the valve cap.



FIXING A PUNCTURE



Find and mark the hole as described opposite, with a cross at least three times bigger than the patch. The smallest patches are fine for thorn and pin holes. Use bigger ones for glass and flint cuts. Cuts longer than about 3mm (1/8in) will grow under the patch. Mend them if you must, but discard the tube as soon as you can. Self-adhesive (glueless) patches are also temporary. Apart from those exceptions, a well-patched tube can be just as reliable as a new one.

Apply solution

With the tube inflated or stretched over something (e.g. saddle nose) thoroughly sand it to remove any moulding marks and make the tube a darker matt black over an area twice the size of the patch. Keep the arms of your cross still visible. Let out all the air and spread ONE thin film of solution over the target area with a clean, dry finger in one or two quick movements. Let it dry. Really dry. It's easy to put on too much and be too hasty. Be patient and never re-touch the centre of the target area or blow on it – your breath is damp.

Note: most patches now come with a vulcanising solution that works better on modern butyl tubes than old-style rubber solution. But don't mix up the solutions and patches!

Apply patch

Peel off the backing (usually metal foil) and centre the patch on the target. Press it down firmly, working from the centre outwards. Pinch the tube and patch to crack the cellophane (or paper) topping and peel that off from the centre outwards.

If the repair is good the patch will stretch with the tube. If not, that'll be because you didn't clean the tube enough, didn't let the solution dry properly or put it on too thick, so it was still wet underneath. It's always worth a second go with the failed patch. Peel it off, put a thin solution on both patch and tube, wait longer, and re-apply. Sounds mean, but usually works perfectly well and is quicker than starting over with a new patch.

Dust around the repair (with any old dust that comes to hand) to de-sticky the tube, re-fit and pump up to full pressure.



BOOTING A GASHED TYRE



If you get a gaping tear in the tyre, your spare tube will extrude and explode. A ready-made tyre boot (or layers of PVC tape) puts a more wear-resistant barrier between the tube and the road. A traditional tyre boot works better for longer and is easy to improvise or carry.

You need a piece of any strong cloth (e.g. denim), wide enough to line the full inside surface of the tyre whilst also wrapping around the beads and up the outside, so that pressure between tyre and rim clamps it firmly in place. A square 3½ times the tyre section (32mm tyre: 11cm square) will be enough to fit bead to bead.

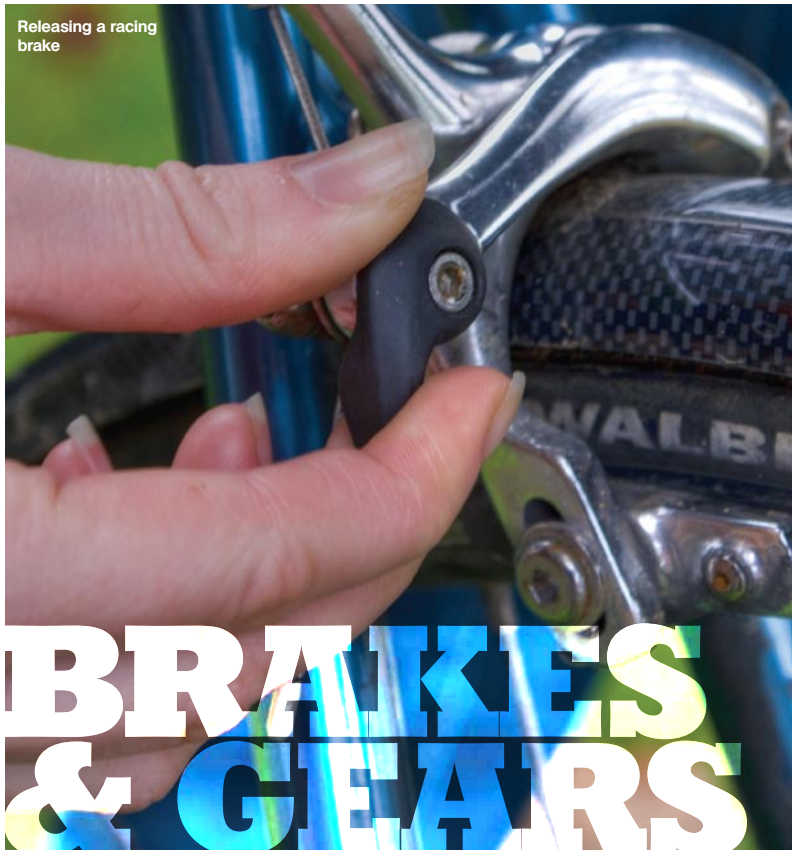
To fit: take the gashed tyre completely off the wheel and put the softly inflated innertube



inside it. Pull the tube down at the gash, drape the square of cloth over it then snug back up inside. Ensure that the same amount of cloth hangs down both sides. Fit one side of the tyre to the rim, starting at the boot, whilst holding that edge of it folded up outside the tyre. Check that at least 5mm of this edge is visible above the rim.

Fit the other side of the tyre as usual, starting at the boot, which in the process will naturally fold into place, with its other edge showing above the rim – provided it's wide enough. Inflate the tyre and check that the boot is doing its job.

A large gash may still bulge slightly; and if the boot is liable to contact the road it's best also to apply a self-adhesive boot, or a patch of some other tough material taped into place, before fitting the full-width boot.



Releasing a racing brake



Releasing a cantilever brake



Adjusting the H stop screw



Pull the cable taut whilst clamping it

Brakes and gears are both operated by cables, and can usually be tightened the same way: by unscrewing a barrel adjuster. The picture centre right shows one of these adjusters on a rear gear mechanism (mech), but they can be found elsewhere. When you've tightened all you can with the barrel adjusters – but need more – screw the adjuster(s) in again, loosen the cable clamp, pull some cable through it, then re-tighten the clamp.

Releasing a brake

When working on a rim brake or removing a wheel it can help to release the brake. Racing brakes often have a release lever where the cable attaches. On V-brakes the 'noodle' tube can be pulled out of its yoke and on cantilever brakes it's usually possible to unhook the nipple on the end of the straddle cable from one brake arm. You'll need to pull the arms together to make enough slack to do this. Sometimes you can't unhook the noodle or nipple without screwing the barrel adjuster back in to give yourself more slack.

Misaligned brake blocks

Most brakes don't move their blocks in straight line towards the rim, but in a curve. So the position of the block changes as it wears down. If you're not careful, the block can either be nibbling at the tyre or so far off the rim that one really hard pull might pop it into the spokes!

Make sure that brake blocks hit the rim squarely, or with the front end a bit closer to the rim than the back. Some brake shoes have an open end for block replacement, which must face backwards.

Brakes don't usually start to rub during a ride, but it's worth noting that some have balancing screws near their pivots that you can screw inwards to stop that side rubbing. Already fully in? Unscrew the other side.

Rubbing discs

Hydraulic disc brakes are self-adjusting and there's not much to do with them during a ride. If they rub after a long descent it's likely the fluid has boiled. You've just got to wait for the calliper to cool. On cable discs, adjusting

the cable moves only one of the pads. You need to make the same adjustment on the static pad, usually with an allen key poked through the spokes.

Noisy gears

Gear shifts can become sluggish in the direction pulled by the cable. Tighten it with the barrel adjuster(s) on the mechanism, frame or shifter. If shifting then becomes reluctant in the other (return spring) direction, screw the adjuster back in a bit.

Gears may even become one whole click out of synch. Starting with the shifter (lever, twist-grip etc.) in top or bottom gear, whichever produces a slack cable, give it one click and make sure that this delivers the next gear. If not, you need to tighten the cable quite a lot – probably at the clamp.

If prompt shifts in one direction can't be had without sluggish shifts the other way, you have sticky cables. Lubricate them or replace the outer casings.

If the chain overshoots or simply will not engage the top or bottom gear, front or rear, you need to tighten (overshoots) or loosen (won't go) the High or Low limit screw on the relevant gear mechanism.

CTC MEMBERS' TOP TIPS
 If your front mech cable snaps, use a twig wedged between it and the frame to move it over to the middle ring so you have got the best range of gear ratios to get home.
 David Beeley

BROKEN CABLE

Replacing a broken gear or brake cable (carry both) isn't hard. Loosen the cable clamp on mech or brake arm and pull away the cable. With a gear cable, shift to the gear that gives most slack, i.e. lets you pull it. Some shifters have a cover over the place where the cable nipple lives: unscrew or pull it aside and pull out the cable. Then poke the new cable down the hole the old one came out of and seat the nipple in its socket. Thread the cable through all the other guides and pieces of casing (cleaning them first if you can) and lastly the clamp on the mech or brake. Screw in all barrel adjusters. Pull on the free end of cable and clamp in place. Adjust as above.



BUCKLED WHEEL

Looking down from the tyre, clockwise tightens the spoke

It happens sometimes, to front wheels if you take a tumble and to back wheels if you hit a bump. If the buckle is up to 5mm and mainly in one place, i.e. merely rubs the brake on that side, it should be easy to mend just by tightening a spoke or two, or three, maybe four.

Normal spokes are tightened by turning the nipple at the rim, with a spoke key, in a clockwise direction when viewed from the tyre. Vice-versa to loosen. Tightening a spoke moves the rim in the direction of that spoke. So: if the rim bends to the left, tightening a spoke that comes from the right side of the hub will reduce the size of the buckle.

Find the 'high spot' of the buckle, i.e. the middle of the section of rim that rubs the brake, or release the brake and rest your thumb on a brake block to feel for it, turning the wheel to and fro and moving thumb away from rim until it is touched only in one place. There will

be two spokes near that place. Select the one that comes from the far side of the hub and tighten it half a turn. Mark it, e.g. by wrapping tape around it, and check again.

Still buckled a lot? Give that spoke another half turn and the same also for each of the adjacent same side spokes. These will be two spokes away from our first, high spot spoke. Not enough? Loosen half a turn the two adjacent spokes from the same side as the buckle. Carry on like this, tightening far side and loosening same side, spreading out to two more spokes with each successive half-turn. This is a good method,

but don't follow it blindly. If a spoke already feels very tight, either tighten a less tight neighbour from that side of the hub, or loosen the other side.

Badly bent

If the wheel is badly buckled, like a Pringle™, you'll never get it true again but might be able to ride again by identifying the biggest buckle and hitting it hard in the opposite direction. Swing the wheel down hammer-like onto the top of a gatepost etc. You've nothing to lose: it's better than walking! Once the wheel is straight enough to go in the frame, you might be able to improve it a bit with the spokes. Keep the tension low.

A BROKEN SPOKE

Identify the broken spoke – they usually break at the hub – and twist the remains around other spokes. Either leave it thus, safe against entanglement in the chain or unscrew the nipple from it (anti-clock viewed from the tyre) and remove the spoke.

Breakage of a spoke lets the rim buckle away from it and probably drag on the brake. To pull it back you must tighten the two adjacent spokes from the same side of the hub. Tighten them two or three turns then check, as described. Continue tightening these two until either the rim runs true enough to clear the brake, or you do not feel these two can take any more tightening. In which event, begin to loosen the two spokes immediately adjacent to the break, initially by one turn and check truth, then half a turn at a time. Continue until the rim runs true.

If you have a spare spoke and the means to fit it, simply tighten the existing nipple onto it until the wheel runs true. There should be no need to touch any of the other spokes.

CTC MEMBERS' TOP TIPS
Do your own repairs and upgrades at home. Then when something goes wrong, you know the bike and have a fighting chance to fix it. Also, if you are touring, carry the phone number of your mail order supplier so you can get bits mailed to you next day. I once got a rim sent poste restante to Ullapool Youth Hostel
Matt



Feeling for the high spot

FIXING A CHAIN



Disposing of a broken link

Chain breakages have become more common as chains have grown thinner. Another cause of chain breakage is a belief that chains can be separated and re-joined by driving a rivet out and back in again. Some can, but 9 and 10-speed can't – or only as a last resort.

Fit a master-link

Connex and Sram chains come with a master link, which joins the chain without driving a rivet. Always use these. They may be used in other makes of chain – e.g. Sram Powerlinks fit Shimano. They are not only easier to use, requiring no tools to fit, but also more reliable than the special joining pin preferred by some other makes. They can also be had for 8-speed chain.

A chain failure invariably starts with one end of rivet losing grip of one outer link-plate. All the tension goes onto the other link plate, bends and snaps it. The failed rivet falls out, leaving the remains of this outer link attached by the intact rivet. Use your chain tool to drive out the remaining rivet and fit a master-link.

The wider chain used on some hub-gear and single-speed bikes comes with a master-link. It's not worth taking a spare because they seldom break.

Using the chain tool

If you don't have a master-link, you'll have to shorten the chain and re-use a rivet to join it again. Lay this chain joint against the rear jaw of the tool, checking that it fits snugly. Try fitting the other way around if it doesn't. Screw the punch down onto the rivet, ensure it is centred and keep screwing. Do not push the pin all the way out. It must remain attached in one outer link plate, projecting slightly (0.5mm) into the inner link, so the chain has to be flexed to snap it apart. Bend towards the projecting rivet and pull.

If this rivet still projects, the other end of the chain can now be snapped into place. If not it's more tricky, but still possible, to place both sides of the new joint in the tool. First: derail the chain off the front chainwheels to make it slack and unscrew the chain tool punch, so that the joint in question can be placed in the tool with the protruding rivet facing the punch.

Screw the punch down onto the rivet, gently. Make sure that the rivet and punch are perfectly aligned, then tighten the punch. When the end of the rivet reaches the far outer plate, it may help to back off half a turn



Easing a tight rivet

CTC MEMBERS' TOP TIPS

If your chain breaks, it can be cable-tied together. Pedal forward and backward, keeping the broken section of chain on the underside between chainring and rear block.

Frank Turner

then continue – very slowly, watching for emergence of the far end of the rivet and ensuring that the end you're driving remains at the same level as adjacent rivets.

Stiff link

Slipping and jumping gears are sometimes caused by a stiff link. Joining a chain often leaves the joining rivet too tight. Find it by turning the pedals backwards, watching for the rear mech cage to make a jerk.

If your chain tool has a middle location for the chain, away from the rear jaw, you can use it to ease a tight link. Try pushing in the more protruding side of the rivet half a turn. It's also possible to ease a stiff link by bending the chain sideways with your fingers, pressing with your thumbs against the problem joint.

To learn more about bike maintenance, get a good book such as Park Tools' Big Blue Book of Bicycle Repair.

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CTC is the UK's national cyclists' organisation. CTC provides technical advice, information, a magazine, cycling legal aid, insurance, organised tours, specialist mail order, and thousands of cycling events annually. CTC is at the forefront in campaigning to improve the UK cycling environment.

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