

Getting Home After Serious Mechanical Trouble

Here are some ideas for diagnosing major mechanical problems and making bush repairs that should get you home.

Our thanks to Brad Newham (ARB Elizabeth SA) for his invaluable help in preparing this section.

CV Joint

Constant velocity joints take a hammering in severe bush terrain and busting one isn't unheard of. You can normally tell when you've got a grief-stricken CV joint, because you'll hear a cracking noise and the front axle will stop driving, unless you've got traction control or a front axle diff lock engaged at the time - in which case you'll have three-wheel-drive.

When you move the steering wheel from side to side you'll feel clicking or grinding in the mechanism and the steering arc may be restricted.

Driving on-road with busted CV joint can be dangerous, because you never know when the broken pieces will jam in the joint, potentially locking the wheel or the steering action.

The safest procedure is to remove the broken pieces from the steering knuckle and get home in two-wheel drive. You'll need to remove the wheel and the brake calliper, and dismantle the hub assembly to get at the busted CV bits. It's not easy without circlip pliers, but it can be done.

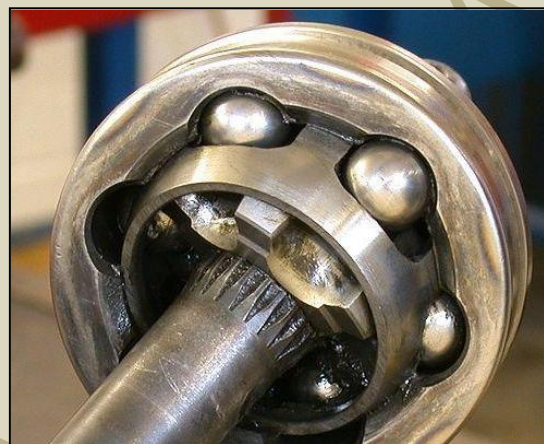
If you have an across-axle diff lock in the axle you can lock it and come home in three-wheel-drive.

Differential

Broken differentials are less common than broken CV joints, but they do happen – particularly to the front ends of Toyota 80s and 100s. When a diff goes bang, you'll hear and feel it. Your vehicle will become an instant two-wheel-drive machine.



The vehicle can then be driven in rear-wheel-drive.



You can distinguish a broken diff from a broken CV joint by jacking up both front wheels and rotating the wheels and the propeller shaft. Differential action may be absent entirely, or else it'll be noisy and the grating and friction will be felt in the diff region, not at the wheel ends.

In the case of a broken front diff in a part-time 4x4 the diff can be disabled by either manually unlocking the free-wheeling hubs or selecting 2WD on the selector switch or lever in the cabin and then reversing to unlock the automatic hubs.

In the case of a full-time-4x4 or a selectable full-time-4x4 you'll need to isolate the busted diff, by disconnecting the propeller shaft that drives it – front or rear shaft – and by pulling the half shafts out of the axle housing. That's relatively easy in the case of fully-floating rear axles (LandCruiser 60s, base-model 80s and 100s, and 75s and 78s), but is tricky with $\frac{3}{4}$ and semi-floaters.

Where rear axle half shafts form part of the hub pulling the half shafts isn't an option – you'll have to drive with them in place. Ideally, the half shafts need to be drawn, the damaged diff centre removed and the half shafts re-installed.

When you disconnect one of the diffs in a full-time or selectable full-time 4x4 you'll need to engage the centre diff lock, to get two-wheel-drive.

Clutch

Clutch trouble in the bush is usually of two types – not enough grip ('slipping') and too much grip (won't disengage).



Slipping is a classic symptom and often happens to heavily laden 4x4s in soft sand. Clutches can lose grip because of excess slipping and heat build up in the clutch facings, but regain some 'bite' if allowed to cool completely.

Another cause of apparent clutch failure is linkage trouble – cable or hydraulic system drama. Hydraulic system failure usually means that the clutch won't disengage, but a jammed cable that doesn't allow full engagement can give the symptoms of a slipping clutch.

If the clutch won't disengage the vehicle can be limped to civilisation by starting it and running it in second low. If you drive carefully and can pick the zero torque points in the driveline you can shift gears without the clutch.

If your clutch has completely packed it in and you don't have the option of driving the vehicle or being towed you may have to camp for a couple of days and pull it out. We've heard of desperados using a flat disc cut from an old 44 oil drum and fitted with the facings off the original to replace a 'spun' driven plate.

Half Shaft

A broken half shaft will relegate your 4x4 to two-wheel-drive until you can get to a parts shop. If possible it's best to pull the broken shaft pieces, so that they don't damage the diff, the bearings or the inside of the axle tube.

If the half shaft is part of an independent suspension unit – front or rear – it must be removed, or 'splinted' like a broken leg with a wooden or metal splint, held in place by hose clips or zip ties. The vehicle should then be driven only in two-wheel-drive, if possible.

The procedure for removing a front half shaft is similar to that used for CV joint removal.

No More Spare Tyres



The first step is to check the other vehicles in the convoy for a compatible wheel and tyre. Many Japanese vehicles have common six-bolt wheel stud pitch circles, but make sure the replacement wheel clears your brake and suspension components and doesn't foul anything when the steering is moved from lock to lock. Often, the brake package at the rear of 4x4s is smaller than up front, so a wheel that fouls the front brake calliper may be safely fitted to the rear axle. If you can't find a compatible wheel and tyre combination, you'll have to demount someone's spare tyre and fit it to one of your rims. In extremis, we've heard of people stuffing flat tyres with spinifex to keep the rims off the road.

No Brakes

The most common cause of a 'no brakes' situation off road is a torn brake hose that's dumped all the brake fluid out of the system. A lack of brakes off road isn't necessarily as dangerous as it would be on road. If you're running in low-range it's possible to bring the vehicle almost to a standstill with engine braking and the gears alone – or at least to a speed where the handbrake will do the rest of the braking job.

If it's essential that you restore wheel braking power you can clamp off the torn hose and refill the brake system – ideally with brake fluid, but automatic transmission fluid will do at a pinch. You'll need to bleed air out of the system to restore pedal pressure.



Leaking Radiator

If the radiator has been holed it's often easy to patch the hole with epoxy putty – some of this stuff 'goes off' even on wet metal – or the affected section of the radiator can be pinched out of the circulation loop using needle-nosed pliers to crimp the affected tubes shut.

If the radiator is leaking because one of the tanks has separated from the core it's a bigger bush repair job that is best started by removing the radiator. (Don't forget to put a container under the engine drain cock to catch the coolant.)



Suspect a blown head gasket when you see this type of radiator damage.

Soldering a radiator tank back in place in the bush is tricky, because you need to get the whole assembly fairly hot to ensure the solder does its work. Campfire coals work fine, but don't overcook it!

The plastic tanks used on aluminium radiators can be stuck back together with glue, or with a fusible plastic 'stick' of the right repair stuff.

After any bush radiator repair leave the coolant system cap on its first click, so that the system isn't pressurised. The boiling point will be lower, but it's important to keep the internal pressure down, to avoid stressing the repair.

'Dead' Alternator

A mud-filled alternator will sometimes respond to a thorough water flushing and a 'drowned' alternator sometimes comes back to life if given the big treatment with water repellent spray.

If these steps don't work, a 'cactus' alternator needn't spell the end of your trip. We've limped back from Cape York, sharing batteries daily with other vehicles in the convoy. If you're on your own you can clutch start rather than use battery power.

Once under way, don't operate anything in the vehicle that uses electrical power. A mechanically-injected diesel places no demand on the alternator, so long as you don't use any ancillary equipment.

Flat Battery

Battery swapping can overcome a stuffed battery, or you can use your second, deep cycle battery as a starting battery. The battery won't like it long term, but it'll get you home.

Clutch starting the older 4x4 is another option when your battery dies – just remember to park on top of a grade.

Some diesels require glow plug warming to start in cold weather, so a clutch start may not work, unless you give the inlet manifold a squirt of the old standby 'Easy Start' or 'Start Ya Bastard' before you try.



Broken Spring

Almost everyone knows that you can strap a sapling into place to support a broken leaf spring. You can also use webbing ties or rope to fasten an axle to a leaf spring if the U-bolts have broken.

If your live-axled 4x4 has coil springs and one breaks you may be able to use the larger broken piece as a stopgap spring.



Stuffing the busted section full of tennis balls is surprisingly effective in improving spring rate.

An alternative is to slide in compressible material, such as cut-up old tyres between the axle and the chassis.

Coil springs and torsion bars in independent suspensions usually don't break, but if one does the suspension wishbone will rest on the bump stop.

You'll need to pack some compressible material between the wishbone and the bump stop to cushion road shocks.

Safety First

If one of the foregoing situations develops in the bush don't compound the problem by panicking. Unless there's a safety issue that demands instant action there's nothing to be gained by being hasty. The situation needs to be assessed coolly, with inputs from all members of the party.

The bush repair task needs to be planned, bearing in mind the level of mechanical skill of the group and the available tools.

If the job can't be done safely, it's best to opt for a tow from another vehicle, or to call for outside assistance. If you're travelling solo you'll obviously have an HF radio or a satellite phone, or both.