Water Crossings

Water has the potential to ruin your trip – you need to take extreme care with any water crossing, no matter how simple it looks.

Know your vehicle's capabilities

You need to know where your vehicle's axle and transmission breathers are located and if they're extended above typical fording depth – most modern 4x4s lack extended breathers.

Many new 4x4s have computers located in vulnerable positions and powered seats have low-mounted electric motors. You need to avoid drowning them so it's a good idea to know where they're located.

Checking the depth

Measuring the depth and checking the condition of the bottom of any water crossing is essential. You cannot trust even a concrete ford to have constant depth, because many have been damaged by floodwaters and have large pieces missing.

Now before we go any further into this topic, let's rule out walking across any stretch of water that's likely to be inhabited by estuarine crocodiles - 'salties'. You shouldn't even think about crossing any creek in croc country that can't be assessed from the shore – polaroid sunnies are a help in 'seeing through' the water surface.

The volunteer 'depth gauge' walker needs to be an experienced off-road driver – there's no use sending someone into the water who is incapable of assessing the depth, the current flow and the likely grip factor of the bottom.

You're also looking to avoid snags such as sharp tree branches and deep holes or large stones.

Sandshoes, sailing shoes or sandals are the optimum footwear for creek walking – not thongs that slide easily out from under your feet, or become irretrievably stuck in the mud. Short-shorts, swimmers or clean undies are fine for covering the festive bits.

The best water crossing measuring method is to walk one way in the track you expect your left wheels to follow and walk back in the track you expect your right-side wheels to follow.

The human leg makes a fine depth gauge, because most of us measure around 50cm to the top of the knee and that's the upper fording limit for nearly all modern 4x4s.

If the best route isn't obvious from the shore you may need to mark the track with branches stuck into the bottom.

A 4x4 isn't a boat

Many people have a distorted idea of a typical 4x4's capabilities, particularly when it comes to water crossings.

Steel components don't like water, regardless of whether they're part of car, truck or 4x4 mechanicals. Get water into gears or bearings and failure is a certainty. Electrical components don't like water either.

It amazes us that TV advertising for 4x4s shows them being driven at high speed on beaches, with salt water spraying everywhere. If you drive your new 4x4 like that and the dealer finds any trace of salt water under it you can kiss your warranty good-bye. It's called 'driver abuse' – but not, apparently, when the maker's advertising agency does it.

Driving through water at high speed forces water into places it normally wouldn't get and, if it's salt water mixed with sand it will stay damp forever, quietly corroding whatever metal it sticks to.A 4x4 isn't a boat, but drive one into deep, fast-flowing water and you can believe you're in one. A fast current has enormous power – more than enough to 'float' a heavy 4x4 off a causeway and send it over the edge.

A 4x4 that drowns its engine and sinks to bonnet depth is almost certainly going to be a write-off, because of extensive – and expensive – mechanical and electrical damage.

Cool off rather than blow up

Before crossing even a shallow creek it's a good idea to stop the convoy and let the machines cool down a bit. Dipping a hot axle into a cold creek is a sure way of encouraging water to get sucked past axle and hub seals – regardless of the breather arrangement on the axle. Unfortunately, oil seals are designed principally to keep oil inside the housings, not to keep water out. (Some military and 4x4 competition vehicles have pressurised axle housings, to prevent water and dust ingress.)

The cool-down period also ensures that your viscous-coupled cooling fan or thermostatic electric fan isn't turning when you restart the engine and drive into the water. An operating fan tries to pull water through the core, bending the blades forward in the process, often far enough to cut into the radiator.

Water-crossing preparation

If you have any uncertainty about the standard fording ability of your 4x4 you can reduce your anxiety by doing some pre-crossing preparation.

Protection for the people on board is the first priority, so if there's any chance of a stranding in deep water unlock the doors and open the windows. That way, if the engine dies and the battery shorts out, you and your passengers aren't locked inside by failed central locking and fast glass.

The best protection for the engine bay is a radiator blind. You can cobble one up using a folded vinyl ground sheet, but it's better to make one before you leave home. You can cut a vinyl sheet to a size that lets it jam under the bonnet, above the radiator, and fall down in front of the bull bar or the grille.

The blind needs to have enough 'tail' to flow back under the vehicle, about as far as the axle centre line, and sufficient width to cover the entire front of the vehicle. The idea is to make the water flow around the engine bay, not through the radiator.

Our blind doubles as a ground sheet when we lie under the vehicle doing a chassis inspection or positioning the jack.

If you have a snorkel, a pre-crossing check should include inspecting the clamps, to ensure they're airtight – and watertight. Petrol engines can be snuffed by water on the ignition components, so they should be covered with plastic if possible, or sprayed generously with water dispersing fluid. The cheapest water shrouding for a distributor is a washing up glove, with slits at the fingertips for the cables to exit – a V8 needs both hands!

Removing the fan belt

In the days before viscous fan hubs 4x4 fans ran all the time, so it used to be normal to remove the fan belt before attempting creek crossings. That way there was no chance of the fan blades hitting the water and bending forward into the radiator.

With a viscous-coupled or electric fan the blades turn only when the air flowing through the radiator is hot enough to thicken the viscous fluid in the hub or trigger the fan-on electric switch, making the blades rotate. If you allow sufficient engine cool-down time before attempting the crossing the fan won't rotate.

It's also wise to leave the air conditioner switched off during the crossing, to stop the condenser heating up and triggering the electric fan that's often fitted to aircon condensers.

Breathing underwater

A secure snorkel ensures that no water gets into the engine air intake, while the engine's running, but won't necessarily stop water ingress up the exhaust pipe or through the air cleaner if the engine stalls. Many 4x4 air cleaners have 'flapper' valves that are kept shut by engine suction, but open when the engines aren't running, to let dirt and small stones fall out of the canisters. If an engine stalls mid-crossing such a valve may open, letting water flow into the inlet air tract.

'Flapper' valves can be sealed with a strip of duct tape, for water crossings.

The engine air intake isn't the only water entry possibility. A length of marine rubber exhaust pipe, slipped over the tailpipe and bent up the back of your 4x4 ensures water can't flow up the exhaust pipe and into the engine if the engine stalls mid-creek – a distinct possibility with low-slung 4x4s

A loose dipstick or crankcase ventilation piping can allow water to flow into the sump.

Breather care

Breathers are necessary to allow airflow in and out of engines and gear cases – diffs, axles and transmissions – as the temperature of these housings rises and falls.

Engine breathers used to be external – normally incorporated into the oil filler caps on rocker boxes – but are now closed-loop designs, linked to the air inlet.

The most common breathers on gear cases are top-mounted units, but these can be upgraded with tube extensions that lift the filters above any likely water level. There's not much point elevating just the axle breathers, if the transmission breathers will go under.

Extended breathers are good anti-water insurance, but they won't keep water out if the axle and transmission seals can pass water – and they will, if hot components are plunged into icy cold water.

The resulting drop in housing temperature will cause the seals to contract, letting water past.

Driving technique

All the water-crossing preparation in the world won't count for much if your driving technique is faulty. Driving with spray flying, as in almost all the photos you see in 4x4 magazines and on TV ads, is wrong.

The aim is to make smooth progress through the water, with enough speed to ensure a gentle, just-breaking bow-wave in front of the bumper bar. This speed ensures a 'pile up' of water in front of the engine bay and a lowering of the water level below the engine.

A radiator blind pushes a water-resistant shape through the water and thus gives the best bow-wave.

Speed is easy to regulate if the creek bottom is smooth and provides good grip. A stony bottom can result in slip and grip progress and it can be difficult to maintain a constant speed. Too slow is better than too fast in these conditions.

Generally speaking, a 4x4 should be in low range for water crossings, with all traction aids engaged – diff locks or traction control.

It's important that the engine be kept running, so manuals are best driven in a lower gear than is absolutely necessary, to keep the engine spinning above its peak torque rev point. A hand throttle is very useful for ensuring that engine speed stays well above idle revs.

If the engine stalls, try to restart it immediately, to keep water out of the exhaust pipe. The only exception to this action is a diesel that has taken a 'drink' through the air intake. Starting it will cause the engine to compress water, which it doesn't do without causing serious engine damage.

Post-crossing check

Never, never, never drive straight off after a creek crossing – take off the radiator blind, for a start. Always have a look under bonnet for signs of fan contact with the radiator, or water entry into places it shouldn't have gone.

If the axles or transmissions have been submerged for more than a few seconds during the crossing, crack the drain plugs to see if water has found its way in. It's likely that no damage will have been done, if you drain the water out immediately, but once water has been churned with hot oil into a grey emulsion your gear life is very limited.

If there is any emulsification of engine or transmission oil it must be drained and the casing filled with clean oil, before driving any further.

If you're doing a trip that involves many creek crossings you should be carrying engine, transmission and axle oil.

Water recovery

Getting a stranded 4x4 out of a creek can be very, very difficult and sometimes dangerous. The first priority is safety – you can always buy another lump of tin.

Get people out of the machine and safely on shore, then plan the recovery operation, based on the number of assisting vehicles and the equipment you have.

A tow vehicle has many times the horsepower of a winch, so if towing is an option it should be attempted as soon as possible. If it's physically impossible to tow the stuck machine out, then it's time for winching.

With the engine dead and the 4x4 slowly filling with water its electric winch may be useless – particularly if the solenoid pack or the batteries are underwater. We once spent two hours hand-winching a fully-kitted Troopie out of a swollen creek, after its winch went AWOL.

Other 4x4s' electric winches can be used – as many as you can line up eases the individual winch strain.