

Stainless Steel Snorkel

Written By Scott & Lisa for Team MudRhino



WWW.MUDRHINO.COM.AU

With the number of offroad vehicles being produced now days, you would imagine that at least one manufacturer would get their design right and install their engine's air intake in a suitable position. In most instances, most offroad vehicles have their air intakes located in the most vulnerable and awkward positions imaginable, including under the passenger's front guard, or even under the radiator, making them extremely susceptible to water, mud, dirt and dust contamination. This is of particular concern when you consider that one of the quickest ways to do extensive damage to your vehicle is to get water in the engine air intake and hydro-lock the engine. In some instances, the water will simply stop your motor, and if you're really lucky, you might not suffer any major damage. Unfortunately in most instances, damage is almost always incurred.

In short, owing to the incompressible quality of liquids, if one or more of your cylinders fill with water, your engine will stop, and in the process of doing so will more than likely bend or break your connecting rods, or crack a piston. Worse still, if you have a diesel motor in your vehicle, you might need an entire new engine because diesel motors typically utilise high compression (small clearance volume between the piston and the head), so even a small amount of water finding its way into the cylinder could cause the engine to break pistons, crankshafts, connecting rods, and other assorted parts, resulting in complete engine damage.

So how do you go about ensuring that your motor is not going to fill with mud and water next time you drive through a puddle? The simple solution is to relocate your vehicle's air intake by installing a snorkel. There are numerous brands of snorkel available on the market, but if you're interested in something a little flashier than the typical black plastic specials you find at your local 4wd store, or perhaps you have high air flow requirements due to a large turbo system, you might want to consider building your very own stainless steel unit – here's how.



Typical Snorkel



Stainless Steel Snorkel

Required Tools: *Angle grinder, tin snips or jig saw, screw driver, metal file, a tape measure, a rivet gun, tap and die, Allan keys, spanner or socket set, Stanley knife and side cutters.*

Required Materials (for 4" stainless steel snorkel): *2 metres of 4" stainless steel (approx. we allowed for extra), 1 x 90 degree rubber bend, 2 x 45 degree rubber bends, 7 hose clamps, 5 metres of 4" flexible pipe (wire wound), 30 cm of small rubber edging, 1 x big pop rivet and washer, 4 x bolts and 1 x small section of stainless steel (for bracket). The rubber bends were purchased from Pirtek, and the rubber wire pipe was purchased from Purple Pig.*

Step 1: Marking out your hole

To start off with, you will need to figure out where exactly you want your snorkel to fit. You can pretty much fit it anywhere you like, but most vehicles actually have points where panels already have holes in them, and choosing to place your snorkel in these areas will make your life a hell of a lot easier. We opted to place the snorkel on the passenger's front quarter panel – a typical place for most GQ vehicles. Placing the snorkel in this area provided us with the best access point into the engine bay where we would not have to move any other components.



Once the position of the snorkel was finalised, we figured out the point at which the snorkel would enter the engine bay via the passenger's side quarter panel, and marked it on the panel. A centre punch was used to mark the centre, and masking tape was added on the panel surrounding the intended hole to reduce the possibility of slip when drilling with the hole saw, and to stop the paint from cracking.

Initially a 100mm hole saw was used to create an opening, but this was not big enough to fit the rubber bends, as they have a larger than 100mm external diameter. To expand the size of the whole, some touching up was required with the jig saw.

You should note that if you intend to put a rubber grommet around the hole cut into the quarter panel, you will need to make the hole even bigger to accommodate the extra size of the rubber grommet trim you will insert.



For a nice snug fit between the snorkel rubber bend and the quarter panel, you should elongate the hole you cut on the side closest to the windscreen to allow for the bend to sit deeper in the guard. Be sure to give the bare metal a quick coat of paint to ensure it won't rust a few days down the track, and then add the rubber edging around the circumference of the hole to secure the snorkel bend, and make sure the rough metal doesn't cut through it.



Step 2: Inner guard cut

Now that you have the outer quarter panel ready to go, you will need to cut the inner guard. If you're not fortunate enough to already have a hole on the inner guard, you're going to have to go through the same process as you did with the outer guard.



Being no one is going to be seeing the inner guard (unless you pop the bonnet), you don't have to be as meticulous as you were with the outer. For simplicity, we opted to cut a square hole into the inner guard. Once the square was marked out, an angle grinder was used to cut it (using an angle grinder is always so much faster, but less precise). When you have done this, be sure to give the bare metal a quick coat of paint so that rust won't set in at a later date.

Step 3: Making your snorkel

Now that the holes have been cut, its time to assemble your snorkel.

Begin by inserting the 90 degree rubber bend into the hole you created in the quarter panel. Once this is done, slide the stainless tube into the rubber bend, and then measure how much of the metal tube you require to reach where the quarter panel and the bottom of the front window meet. Keep in mind that the stainless tube does not have to go all the way because you are going to be putting a 45 degree bend at the end of it. Mark the required length, then cut it with an angle grinder, drop saw or butter knife (just kidding).



There is a reasonable amount of room for error in cutting the length you require because you can slide the stainless tube in and out of the rubber bends a fair way. Remember – it's better to over cut and have too much stainless tube that you can trim down later, than to under cut and not have enough.

Once you have done this, your snorkel should resemble the image above taken of Daniel's GQ Patrol that was built at the same time.



For the second section of the snorkel that fits against the A pillar and travels to the roof line, you need to get the correct angle, otherwise it wont site correctly when you try and bolt it down, and furthermore – it wont look as aesthetically pleasing as it could.

To do this, all you need is for someone to hold the guard section of the snorkel horizontally level (we used the gold pinstripe on the vehicle as our horizontal reference point), then hold the A pillar section against the pillar and mark your where you will need to make your cuts.

We chose to have the top bend slightly higher than the roof and pointing towards the centre of the car, so we cut the pipe a little longer. Others tend to have the top bend run level with the roof gutter, which would require a lower cut.

If you don't have someone handy to hold the piping up against the vehicle as you measure, you could always just use a tape measure – but using this method doesn't guarantee that the end product will look the way it should. Don't forget to file the edges and burrs on your stainless tubing before adding the joins.

Step 4: Attaching snorkel to the vehicle

There are several ways you can attach the A pillar section of the snorkel to your vehicle. We opted to weld a bracket to the snorkel and then thread the bracket to the A pillar. If you don't wish to weld the bracket onto the snorkel, you can also rivet it, or screw it together. The weld on our snorkel was done at Millweld (www.millweld.com).

Once the bracket was welded on, the snorkel was held onto the vehicle at the desired angle (in this case the angle of the A pillar), and 4 points along the bracket were marked for the mounting holes. These holes were then drilled out of the bracket, and further drilled out of the A pillar. Once drilled, a tap and die were used to cut threads into the new holes in the pillar, and the bracket was bolted into place using 4 bolts. We used bolts with a button (hex) head for looks.



The snorkel was then disassembled, and hose clamps were put on to each rubber joint. Additionally we decided to pop rivet the hose clamp on the 90 degree bend to the guard for added support, but this could have been over kill on our behalf – as it's not really necessary.

In order to rivet the joint to the guard, a hole was drilled through the guard and snorkel, and then a small washer was placed between both, as a spacer.

The snorkel can also be attached to the car in other ways; this was just the method we chose to use.



Step 5: Under bonnet piping

To connect the rubber bend and the carbie together, we ran flexible spring tubing across the engine bay, and joined it to the rubber bend poking in from the panel with a small piece of left over stainless tube (see image below). Tightening the hose clamp around the rubber bend and metal piping was reasonably difficult. We suggest you remove the plastic inner guard so that you can reach the clamp.



Important things to keeping mind

There are a number of things worth keeping in mind when it comes to snorkels:

1. Snorkels are only useful whilst they remain air tight. If you do not maintain your snorkel's air tightness, you might as well not have it at all.
2. Having a snorkel doesn't mean you can drown your car like a submarine – it just means it won't swallow water. It won't protect your electricals.
3. Installing a snorkel is not like installing a 'blower'. In some instances, snorkels have been known to provide additional assistance to the motor by allowing air to be rammed in – but this is only on snorkels models that have the opening pointing forward. On the same token, snorkels can also deplete your vehicles power by ruining the air to fuel mixture. It is the state of your engine tune that will determine the extent of any possible power increase.

Well that's about it. I hope this guide is somewhat helpful in assisting you with your own project, and remember – above all else, don't be afraid to experiment.

This document was originally produced by Scott (BushTuckerNed) and Lisa (Humpys) for the Team MudRhino forum in 2007, and adapted by Evan (MudRhino) for publication. All rights of this document belong to the original author(s), who produced this information in good faith, and as such cannot, and will not be held responsible for any damage or liability arising by the information provided. Before undertaking anything written herein, it is suggested that you speak to a trained professional and obtain further direction. Remember, just because you can do it, or others have done it, does not make it okay – check with your local traffic authority for legal advice.