

Perking UP a Perkins Phaser T110 motor



The UGLY ONE at time of purchase.

I must say that from the first time I drove our OKA I was very impressed with the Perkins. Great gobs of stump pulling torque from idle, fuel economy was good considering the size and shape of the OKA. Unfortunately out on the highway she was a total slug, absolutely useless for long distances on our busy highways. No way was I going to live with this type of performance. For me it was either fix it or sell it. Everything else about the OKA was better than the best so fix it simply had to happen. John Perrott recently summed up the highway performance very well "I followed a Franna Crane all the way to Townsville, because I couldn't overtake it".



Franna Crane

The biggest bummer was that Perkins, in their wisdom fitted a turbo with a boost curve suited for a boat (stationary motor). This is the single main problem with the Perkins motor in our OKA's. Full boost is reached at full rpm. This means that when you change up a gear you are off boost thus only getting naturally aspirated horsepower and torque. Swapping out the turbo for a modern water-cooled, (no need for turbo timer) needle roller turbo with a WASTE GATE cost nearly \$3,000 before a cent went towards fitting it let alone the Glycol intercooler.

Where to find someone who can sort out the Perkins?

Over the last few years we have been exhibiting our seatcovers at Landcruiser Parks EXPO weekend. I could not help noticing the dyno event. For \$25 you get your 4x4 put on a dyno, most horses in class wins. What was very interesting is the punters were getting Leone Mehl to do a \$340 dyno tune up at a budget price. The fellas thought this was excellent value especially considering that Leon is regarded as the top man in Brisbane for dyno tuning. We started selling our seatcovers through Leon's family www.northside4x4.com.au Caboolture shop. What was of special interest to me is that Leon's brother Jamie was making glycol intercoolers for individual vehicles. Jamie committed sight unseen to sort out Old Ugly. So we set off South for Brisbane, our first family holiday in the OKA.

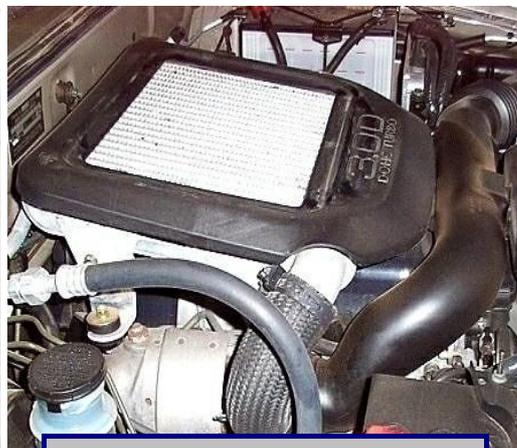


A little about Glycol intercoolers

Glycol intercoolers do not have the lag problem that front mounted intercoolers have due to very short ducting. They also work from idle due to good fresh intake air through their front heat exchanger. Engine topped intercoolers suffer from low fresh airflow until some significant forward vehicle speed is reached (Ram air), not very practical for 4x4's.



Front mounted Intercooler
Note the very long ducting



Top mounted intercooler
Great once ram airflow starts

The one big problem with glycol intercoolers is the awkward shape of the heat exchanger. To overcome this some manufacturers swap the heat exchangers air/water passages around. This gives you a compact tubular packaged intercooler that can fit into most engine bays. A very big problem with this design is that the boosted air is passing through the water galleries, which greatly reduces the efficiency of the heat exchanger. Due to the flow restrictive design of the water galleries a significant drop in boost pressure also occurs.

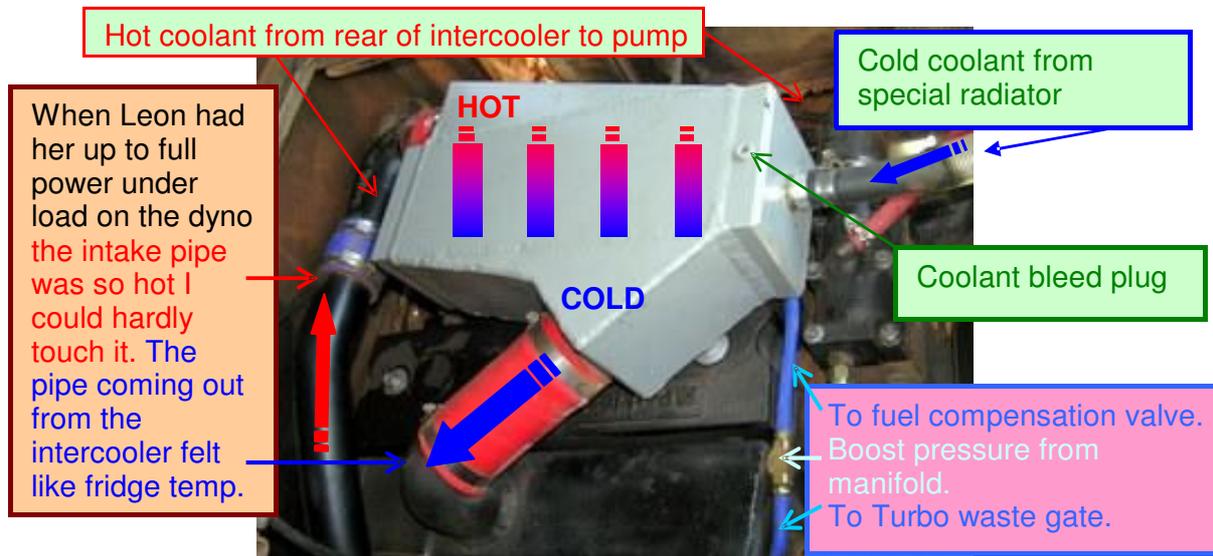


Looks pretty but size and efficiency are more important



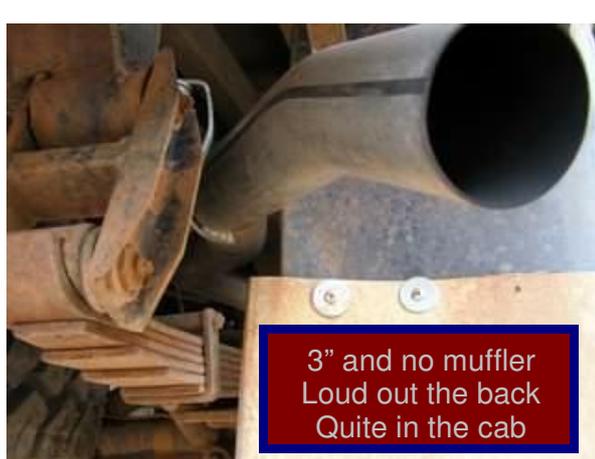
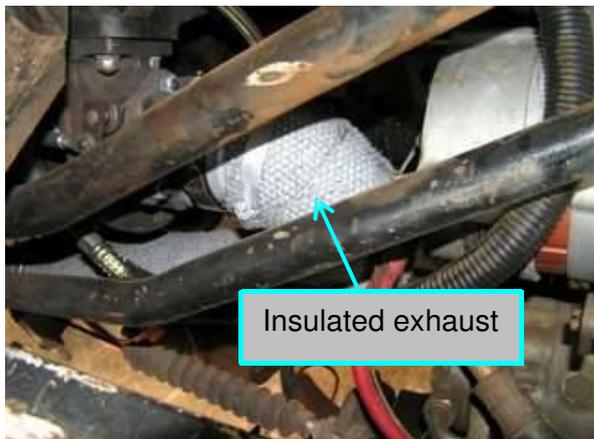
BIG, over four times the size and running the air through the air galleries thus the heat exchanger works as designed.

The Mehl brother's design their intercooler heat exchangers for each engine/vehicle application. So if you want to power up a common Nissan GU so that it can tow the five bedroom five star fifth wheeler, they have an off "their shelf" kit (new Turbo, Glycol intercooler and brackets) fitted and tuned for about \$8,000. To get a one off OKA done I needed (Di's actually) big pockets; leave the ugly one in Caboolture for an undetermined number of months and lots of begging. *Jamie now hates OKA's; he got his hand stuck in the grill one night. Pretended to be working on her ugliness for the next two hours waiting for the swelling to come down enough to extract his hand. Swore me to secrecy, aye.*



The new Glycol Intercooler.

Have a look through the pics and see what you think. I am going to change the front grill headlight area, so left Jamie with instructions to simply get the front heat exchanger working, don't finesse on looks or long term fixture (rub points etc).



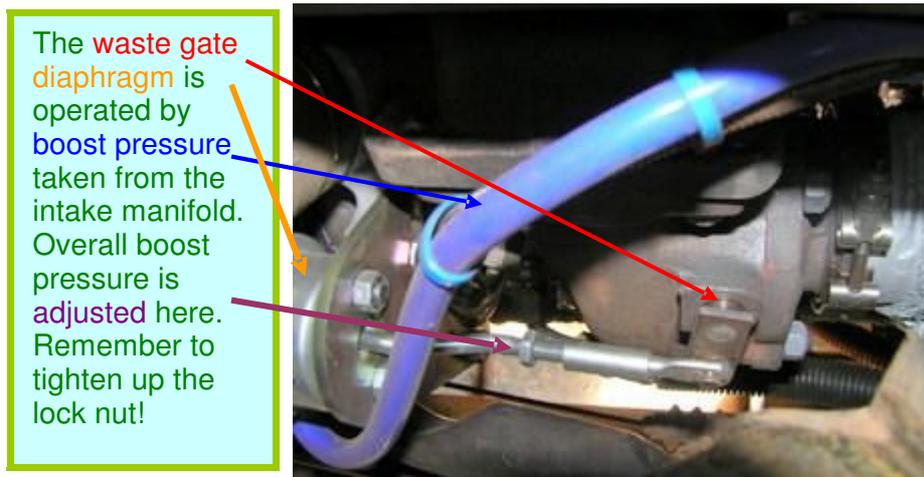
A couple of drawbacks.

The air-con condenser now gets hot air directed onto it from the Intercoolers front heat exchanger. It now works OK for most of the time but driving into the sun does tax it even with the secret illegal front windscreen tint. I plan on replacing the condenser with a modern design that has a much higher rate of efficiency. I am also planning on installing a 12v WAECO roof air conditioner for the back cab as we have already had too many air-con failures with the factory system. I am working on a better compressor-mounting bracket, story to follow. So the air-con problem is solvable but if we lived south of the tropics I would not worry about it.

Engine oil filler access is now a must use funnel job. Jamie planned on putting the intercooler directly over the rocker cover. This would leave easy access to the injectors. Direct the boosted air into the exact centre of the intake manifold. To do this he needed to weld a new oil filler onto the front of the rocker cover. The Rocker cover, being plastic, made this impossible. I have found out that Perkins did make an Aluminium rocker cover on the earlier Phaser motors. (Keep an eye out in wrecker's yards for me please). Jamie can now import the turbo with the Perkins flange casting. This will make fitting a lot simpler.

Waste gate?

The Waste Gate changes the speed of the exhaust gases through the turbine.

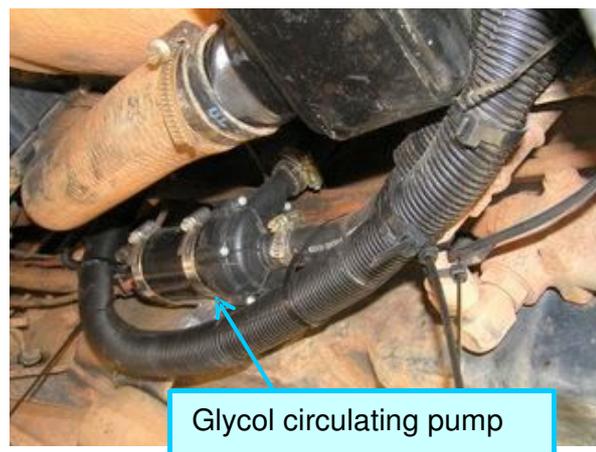
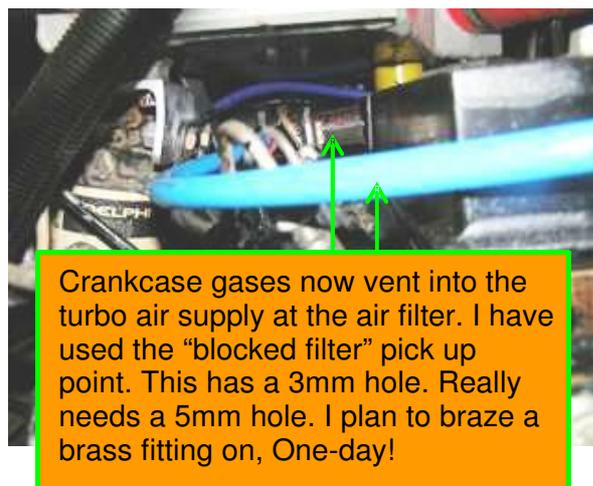


At low rpm the compressor makes low boost pressure until the waste gate (turbine by-pass) diaphragm senses this and closes the waste gate. This then speeds up the gas flow through the turbine which spins the turbine faster. The turbine then drives the compressor faster thus more boost pressure. This is termed spooling up. At high rpm the waste gate opens up, allowing full flow for the greatly increased exhaust gases. *Read about the problems that JCB had with DIESEL MAX, holder of the diesel powered land speed record. www.jcbdieselmax.com. The fighter pilot had to stand on the brakes to make both engines feel load so that both sets of turbos spooled up. This gave the 2.7tonne, 4x4, most beautiful vehicle on planet, its power and top speed of over 350mph.*

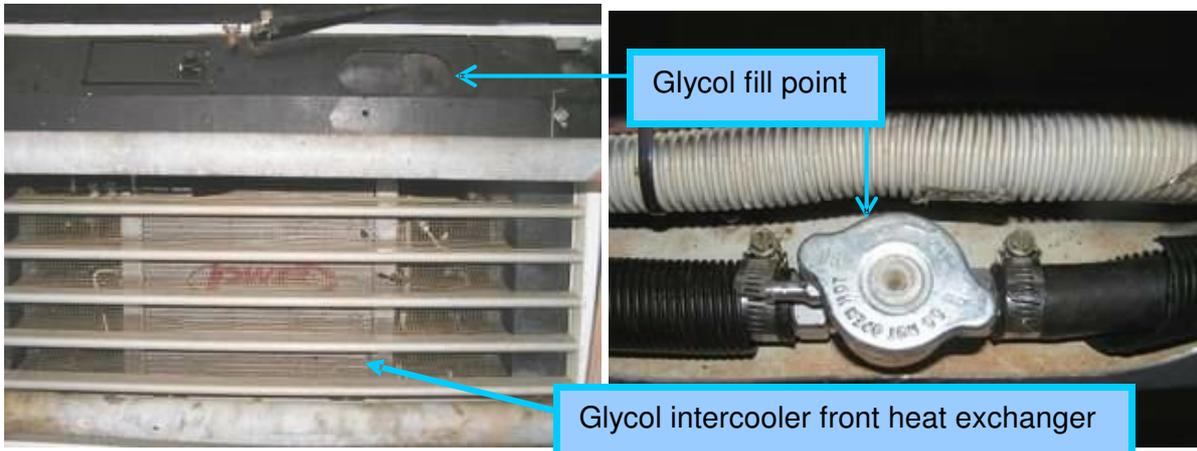
Anyway back to her ugliness.

To get the new turbo to fit into place required modifying the exhaust manifold flange, plugging the inefficiently located intake manifold's intake and notching out the gear selector arm.

Extra oil and radiator feeds were needed for the new turbo. The crank case vent was rerouted from exhausting into atmosphere to the intake system. (Something we all should do for the planet).



An extra radiator and electric circulating pump also need to be installed. The fill point is placed at the highest place so that bleeding the system is easy. All up very time consuming thus expensive.

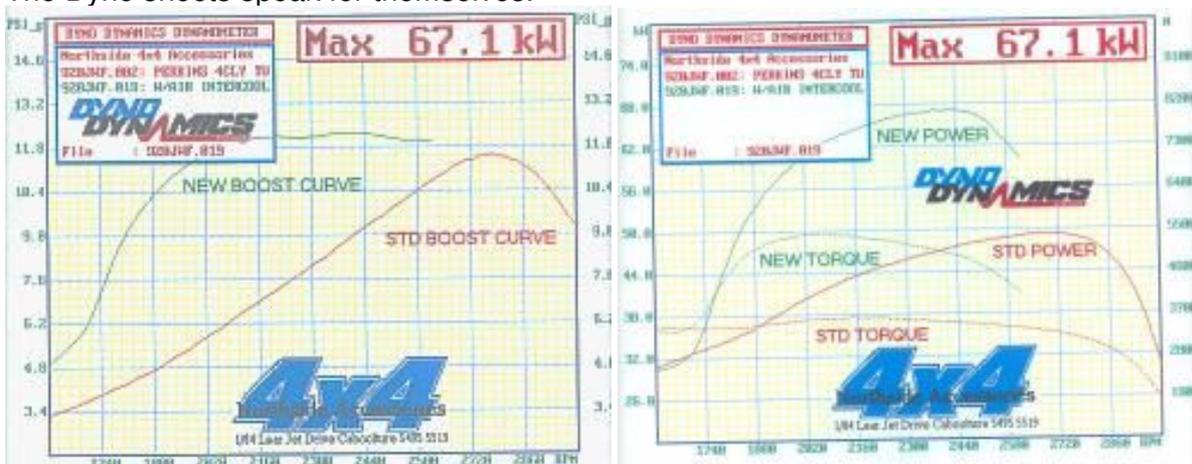


A couple of added bonuses, apart from the power increase, was the replacement of all the gear linkage rod ends and getting rid of the world's worst exhaust header. The gear linkages are painful damn things unless adjusted just right. I found that once the Oka has warmed up, the gear adjustment drifts a little, so expect a few warm wrists during the adjustment process. The factory header is designed to cook driver's, not to mention alternators, ok so it's got a little dicky heat deflector, big deal. I purchased a roll of 50mm exhaust insulation glass tape.



Leon wrapped the tape around the exhaust header for the first metre or so. There is almost no heat getting into the cabin. The engine bay stays very much cooler and the new alternator should see long and reliable service. I bought the tape, new engine bay insulation and insulated backed flooring vinyl from www.merlynproducts.com.au. They also make Turbo booties. They will have a bootie for the standard Perkins turbo but not for my new turbo. I believe that these booties make a significant decrease to engine bay temps.

The Dyno sheets speak for themselves.



If Jamie can be persuaded to do another OKA (he has a very short memory), look at \$8,000 to \$10,000 for the complete package. Maybe an engine swap would be cheaper. Don't forget that time is money and add the cost of labour to a replacement engine and probably a different gearbox. Our Perkins had a full rebuild about five years ago, so apart from millions of oil leaks, it is in great nick.

Leon set the boost pressure close to standard for reliability reasons. He did make comment that there is plenty of extra power to be unleashed with an increase in boost pressure. The New "on highway performance" is great, we can pass comfortably and the fuel consumption appears ok. Now that I have a Speedo that works and the fuel filling problem fixed, I can get some fuel economy figures next trip south.

Extra references.

www.exploroz.com/vehicle/technical/intercooler

My definition of UGLY.

"When the heart has soured and no longer performs to its true potential".