

## Detonation Damage: Tune Your LPG System!



**AHS recently had contact from a customer who had purchased a Nissan Patrol TB42 cylinder head, and after fitting had a complaint of oil in the cooling system. The cylinder head had been on the vehicle for seven months and had only travelled 2000 km. The vehicle was dual fuel with petrol and LPG. The cylinder head was removed and sent back to AHS, along with the head gasket.**

Upon inspection, the head was found to be bent .010", with the obvious cause being severe detonation (which is uncontrolled combustion). This had melted the cylinder head around the combustion chamber fire ring area, leading to the head gasket failure, which is how the oil got into the coolant.

With some further investigation, it was discovered that the LPG system on the vehicle was in an unserviceable condition, and the owner was

instructed to only run it on petrol until the LPG system was fixed. This advice was ignored.

LPG provides a hotter environment in the combustion chamber, which in turn increases the temperature of the cylinder head and if you add detonation into the mix, the head can melt. In this case, the out of tune LPG system was found to be the cause of the detonation issues and the damage to the engine.

It is imperative with any fuel system and critical with LPG that the engine is kept in tune. Detonation can be caused by many things, but incorrect ignition timing, ignition advance curve and air/fuel ratio are some of the main culprits. Dual fuel applications add an extra complication due to the different characteristics of petrol and LPG.

At low rpm, the LPG burn rate is slower, so more ignition advance is needed, at high rpm the LPG burn rate is faster, so less advance is required.

*Detonation has melted the fire ring of the cylinder head.*

Both of these are the opposite of the requirements of petrol, which can then increase the chance of detonation if the advance curve is not recalibrated. Also if the air/fuel ratio is too lean, this will increase the speed and temperature of combustion, which again raises the chance of detonation.

The customer stated that there was no damage to the bottom end of the engine. This is lucky, as detonation can easily damage pistons, rings and bearing if it is left unchecked. AHS were able to repair the cylinder head and returned it to the customer. 🚩



*The excess heat and pressure in the combustion chamber from detonation has caused the head gasket to fail.*



We would like to thank Geoff, from All Head Services, for sharing this practical information and photos  
[www.allhead.com.au](http://www.allhead.com.au)

