



Locating and Curing Detonation and Pre-ignition Problems

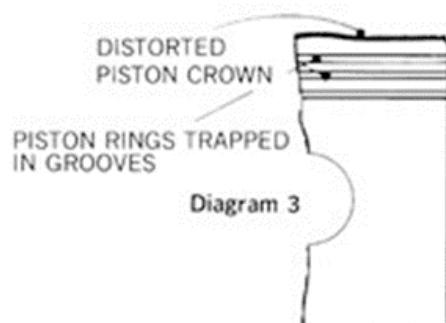
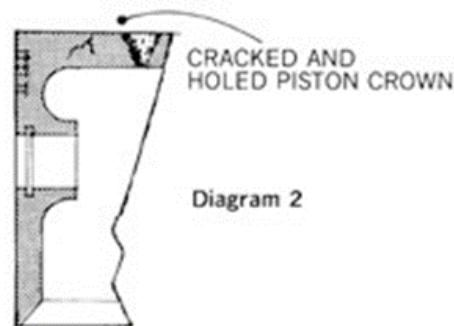
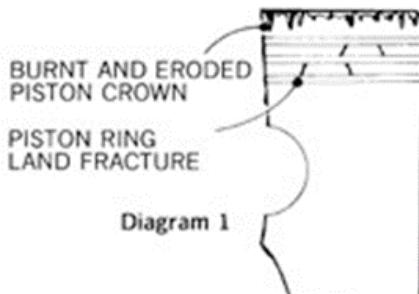
When fuel ignites in an engine, it should burn in a rapid but controlled manner; it should not explode. The power from fuel exploding can damage the valves, spark plugs, pistons and bearings.

Most fuels detonate when sufficiently compressed. Fuels with a higher grade or octane rating have a greater resistance to detonation.

Pre-ignition can cause detonation by igniting the fuel too early in the engine cycle. This causes very high combustion pressure when the piston is at the top of its stroke; the high pressure causes any unburnt fuel to detonate. Detonation in an engine can often be heard as a sharp metallic knock or "pinking". Detonation damage to pistons is easily recognisable from burning or severe erosion to edges of the crown. Piston ring lands may also fracture; the fracture starts at the second land and may damage lower lands. [Diagram 1] The piston crown may crack or have a hole punched through. [Diagram 2]

Pre-ignition, even without fuel detonation, causes higher than normal combustion chamber temperatures. It damages valves and spark plugs; may distort piston crowns and can overheat piston rings, trapping them in their grooves with consequential damage to the rest of the engine. [Diagram 3]

Replace the damaged components if detonation or pre-ignition occurs in an engine. But of equal importance, locate and correct the cause of the problem.





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Some of the more common causes of detonation and pre-ignition are:

- 1.Using too low a fuel grade
- 2.Incorrect ignition timing
- 3.Malfunction of the ignition auto advance
- 4.Incorrect type or damaged spark plugs
- 5.Lean fuel mixture or poor mixing of fuel and air
- 6.Air leaks between carburettor and combustion space
- 7.Compression ratio too high
- 8.Localised overheating caused by engine cooling problems.
- 9.Hot glowing carbon on metal projections in the combustion space
- 10.Poor driving technique e.g. low engine speed with high load
- 11.High quantity of oil in the combustion chamber
- 12.Damaged or leaking valves, or insufficient valve clearance