

Locating and Curing Detonation and Pre-ignition Problems

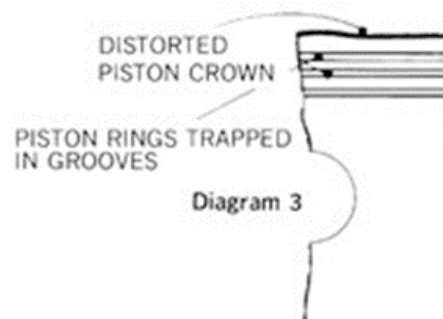
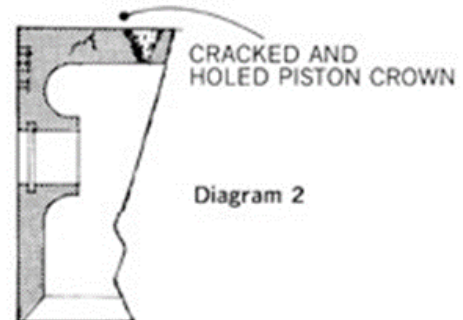
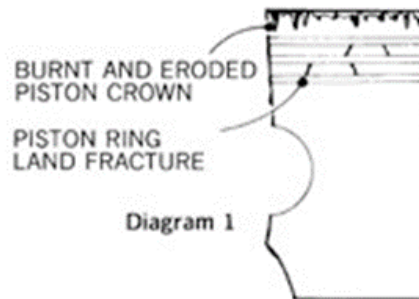
When fuel ignites in an engine, it should burn in a rapid but controlled manner: it should not explode. The power from fuel exploding can damage the valves, spark plugs, pistons and bearings.

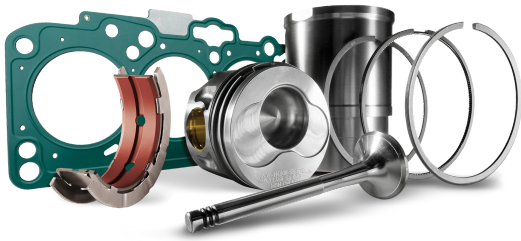
Most fuels detonate when sufficiently compressed. Fuels with a higher grade or octane rating have a greater resistance to detonation.

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