



MERCRUISER SERVICE BULLETIN

Section: XII (Bulletins)

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Pre-Ignition and Detonation Explanation (P. 2 of Section III)

PRE-IGNITION

(For P. 2 of Engine, Tuneup Section III)

Normal ignition is timed to give the maximum thrust to the piston as the pressure rises due to burning of the fuel. This provides maximum power and fuel economy. Pre-ignition is an abnormal condition in which the fuel is ignited by a combustion chamber hot spot that causes the combustion pressure to rise too early. Control of the start of ignition is lost, and the upward motion of the piston is opposed by the early pressure rise. Power loss, rough running and a large increase in combustion chamber temperature can cause extensive damage to the internal parts. The most prominent causes of preignition:

1. Hot spots in the combustion chamber due to glowing deposits (due in turn to the use of improper oils and/or fuels).
2. Overheated spark plug electrodes (improper heat range or defective plug).
3. Any other protuberance in the combustion chamber, such as an overhanging piece of gasket, an improperly seated valve or any other inadequately cooled section of material, can serve as a source.



Pre-Ignition Damage

DETONATION

Normal burning or combustion in a four-cycle gasoline engine starts at the spark plug, and a wave of flame moves across the combustion chamber. This results in a smooth pressure rise in the combustion chamber which pushes the piston downward.

Detonation has many names, such as "fuel knock", "spark knock", or "carbon knock", and is the phenomenon of abnormal combustion of the fuel. Detonation starts out as normal combustion, with the spark ignited flame progressing across the combustion chamber while applying heat and pressure to the unburned portion of fuel. Then, instead of continuing to burn smoothly and evenly, the last portion of fuel explodes violently, causing overheating of spark plugs, pistons, valves and, in severe cases, results in preignition. It should be pointed out that even without preignition, damage to the pistons, cylinder heads, valves, rings and bearings can occur because of detonation.

(OVER)

Detonation can occur at any speed and at times only during acceleration periods and is often not detected because of boat noise against the water. Also, better insulated engine hatches may keep the sounds of detonation from the boat driver's ears. Undetected detonation may result in serious engine damage.

Use of LOW OCTANE GASOLINE is one of the most COMMON CAUSES OF DETONATION. However, even with high octane gasoline, detonation will occur occasionally when engine maintenance is neglected. A few other more common causes of detonation are:

1. Over advanced ignition timing.
2. Lean fuel mixture at or near full throttle (could be caused by carburetor or even a leaking intake manifold).
3. Cross-firing spark plugs.
4. Excess accumulation of deposits on piston and/or combustion chamber (results in higher compression ratio).
5. Inadequate cooling of the engine by deterioration of cooling system.

Engine failures, which result from the above conditions, are beyond the control of Kiekhaefer Mercury, therefore, no warranty will apply to failures which occur under these conditions.



Detonation Damage