CARBON BUILDUP REMOVAL

Carbon buildup in the engine can cause anywhere from a ticking sound similar to a lifter to a rather loud knocking noise similar to a main bearing knock. The piston hits the carbon accumulation in the combustion chamber and makes the sound, which is often misdiagnosed as a lifter or bearing problem. An accurate diagnostics is important as cylinder balance testing, injector, or ignition system disabling will have no effect on the noise. Because the carbon swells up upon engine cool down, the noise will be more prevalent on startup following prolonged downtime.

When following this carbon buildup top engine cleaning 2-step removal procedure, you must observe the following cautions or serious engine damage may result:

! Do not allow liquid to into the engine fast enough to bend a connecting rod!
! For treatment, use only professional quality Top Engine Cleaners (TEC) (e.g. GM Part number 10550002, 1052626, 12345088; Delco Carburetor tune-up conditioner P/N X66-P, BG 210).
! After completion, don't forget to reconnect the air pump.

1. Allow the engine to reach operating temp. With the engine idling, follow the applicable procedure:
   a. Engines with direct **air intake sensing** (MAF sensor):
      i. Disconnect the PCV hose from the valve or metering orifice.
      ii. Spray or suck the TEC into the open end of the vacuum hose.
      iii. If the PCV vacuum hose isn't centrally located on the intake manifold, try to use a centrally located vacuum source to introduce the TEC. Otherwise use the vacuum ports located at each end of the intake manifold or the TEC will only go into part of the engine.
      iv. If possible to operate the engine with the MAF sensor disabled, introduce the TEC directly into the throttle body.

   b. Engines **without air intake sensing** (speed density):
      i. Remove whatever is necessary to gain access to the throttle housing
      ii. Spray the TEC directly into the throttle body or use a hose and funnel.

   c. Engines with **air pump**: Disable pump to prevent air from being pumped into the exhaust manifold or the converter. Failure to do so may damage the catalytic converter.

2. Raise the engine speed to about 2000 RPM and slowly introduce 1/2 can of Top Engine Cleaner (TEC) into the engine.
   a. Have an assistant operate the throttle to keep the engine running while the TEC is added and then release the throttle allowing the engine to stall.
   b. Restart the engine and rev it up to 2000 RPM. There will be billows of white smoke.
   c. Let the engine run at 2000 RPM until it stops running rough.
   d. Then introduce the remaining TEC into the engine as fast as possible. Take care not to introduce the TEC too fast. DO NOT flood and hydrostatic lock the engine! Be patient and judicious!

3. Immediately shut off the engine and allow the TEC to sit for at least ½ hour, preferably overnight allowing time for the cleaner to soak into the deposits.

4. Restart the engine and increase the RPM to 2,000. There should be more white smoke.

5. If the noise is still present:
   a. Warm the engine to full operating temperature.
   b. Introduce water instead of TEC.
   c. The shock of the relatively cool water and steam should dislodge the carbon adhering to the piston faces, valves, and combustion chamber.
   d. While keeping the engine at 2,000 RPM introduce 2 quarts of water into the engine slowly enough to prevent it from stalling.

6. Change the oil and filter to remove excessive TEC from the crankcase.

If the engine noise is still present after carrying out this 2-step cleaning procedure, further testing is needed to find the mechanical cause and major engine work may be necessary to rectify the problem.