B's ENGINE & MACHINE

508 West Chandler St.
Culpeper, VA 22701
Phone: 540-825-6547

Engine Break-In Guide: 10 Tips to Help Properly Break in Your Engine

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Proper engine break-in procedure is critical.

The right steps during this procedure can save your engine, your bank account, and ultimately your sanity. With help from the engine experts at ATK High Performance Engines and Summit Racing, this post will provide you with invaluable tips to help protect your engine during the critical break-in period.

Start with an Inspection

Before you start the engine, ensure that all accessories, such as the headers, alternator, and power steering pump, are tight and check for any water or oil leaks. Even if your engine came as a complete, turnkey assembly, it's best to check all major components such as the distributor, spark plugs, ignition wires, carburetor. These items could have been damaged or disturbed during shipping.

Lubrication Considerations

When installing an oil filter, fill it about half way with oil, lube the rubber gasket the surrounds the filter with oil, and then tighten by hand. Consider using a premium brand oil and filter—a cheap filter will not be cheap if it costs you an engine. Use a 5w-30 or 10w-30 motor oil with an engine break-in additive (ZDDP or zinc camshaft additive), especially with flat tappet camshafts.

Prime the Pump

To avoid dry start-up, it is best to prime the oil system with an engine-priming tool or a pre-luber, even if the engine has already been dyno tested.

Use Conventional Wisdom

Even if you plan on running synthetic oil, you should break a new engine in with a conventional, mineral-type engine oil for the first 4,000-plus miles. If you fail to follow this procedure, the piston rings may never seat.

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Change Oil Often

On freshly built engines, you'll need to change your oil and filter much more frequently. After using a break-in oil, you should change your oil at 50 miles, 500 miles, and 1,500 miles. Again, at 4,000 miles or so, it's fine to switch to a synthetic oil if you choose.

Timing is Everything

Set the ignition timing after starting the engine. The starting point for most carbureted engines is 34 degrees before top dead center with vacuum advance disconnected at 3,000 rpm. Some experimentation with timing is required for optimum results with locally available fuel, but it should be between 32-38 degrees BTDC.

Take Care of Your Flat Tappets

If your engine uses a hydraulic flat tappet camshaft, keep the engine between 2,000 and 2,500 rpm, with no-load on the engine for the first 30 minutes. This is critical to break in the camshaft, although roller cams really do not need to follow this step.

Keep Your Cool

Most often, the cooling system on a fresh engine swap will have a lot of trapped air, which will lead to wild temperature gauge readings and possible water pump cavitation. To help alleviate trapped air in the cooling system, fill the cooling system with a 50/50 mix of quality coolant and water a few hours before you plan on starting the engine. Leave the radiator cap off during this time. This tends to help purge a fair amount of trapped air before you start the engine. You can also use a lever-vent type radiator cap on your radiator so you can manually purge trapped air while the engine is running. Your normal cap can then be re-installed after the engine cools off.

Vary the Load for Initial Break-In

For the first 200 miles, drive the vehicle with varying speeds and loads on the engine. Occasional full throttle runs from a rolling start (2,000 rpm or so) to 4,500 will help seat components such as piston rings, but the engine should be cooled after doing this. Also, it is wise to check rocker and valve clearance after 150-2oo miles to insure adjusters are tight and lash is proper. Re-check again at about 500 miles.

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Break-In Plan

Although it isn't necessary, ATK says the following procedure will help speed up the break-in process:

- Make five or six medium-throttle accelerations to about 4,500 rpm before letting off in gear and coasting back down to 20 miles-per-hour.
- Run a couple hard throttle accelerations up to about 5,000 rpm and once again coast back down to 20 miles-per-hour.
- Let the engine cool, change the oil and filter, and check the coolant level.
- Drive the next 500 miles normally, keeping the engine below 5,000 rpm and minimizing operation at idle.

Author: *David Fuller David Fuller is OnAllCylinders' managing editor. During his 20-year career in the auto industry, he has covered a variety of races, shows, and industry events and has authored articles for multiple magazines. He has also partnered with mainstream and trade publications on a wide range of editorial projects. In 2012, he helped establish OnAllCylinders, where he enjoys covering all facets of hot rodding and racing.*

Always refer to the Manufacturer's Recommended Specifications in completing these tasks.