



INSTALLATION PROCESS

1. Review this installation guide carefully before beginning installation.
2. Remove your engine from its crate and check for:
 1. Possible damage during shipping.
 2. All parts that were ordered to complete your install.
3. Prepare a complete list of add-ons that you will need to complete your engine installation, including new and existing parts. Do not assume everything from your old engine is identical to the new one. (example: iron-headed engines take different spark plugs than aluminum headed engines).
4. Be sure all add-on parts are as recommended and properly cleaned prior to installation.
5. Install engine in vehicle, along with the ignition and fuel systems (if not ordered with your engine).
6. Follow engine pre-lubrication procedures.
7. Follow start-up and break-in procedures, including ignition timing.

HOW TO PREVENT ENGINE FAILURE

WHY ENGINES FAIL	HOW TO PREVENT FAILURE
Bearing failure due to improper pre-lubrication	Follow the “Pre-lubrication procedure” to ensure engine is primed and ready to fire.
Improper break-in and not using oil with a zinc Additive for flat tappet cams. Note: Zinc additive not required for engines with roller cams	For flat tappet cams, oil containing zinc or a zinc additive is required for break-in <ul style="list-style-type: none"> • Comp Cams Zinc Additive pn.159 • Driven - Break-in oil pn.01806 • Lucas - Break-in oil pn.10630
Wrong tune-up specifications.	Follow the “Engine Start Up and Break-In” procedure and use recommended specifications for correct timing listed under “Setting Engine Timing”

Overheating	Always install a new thermostat with a bypass hole for your engine. Ensure mechanical engine timing is increased to achieve 24° to 34° when performing flat tappet cam break-ins.
Leaking gaskets due to inadequate torque or loosening during heat cycles	Always retorque manifold bolts after a heat cycle to ensure proper seal. If using aftermarket headers, contact the manufacturer for proper gaskets. Recheck intake, front accessory, and water pump bolts to ensure nothing has loosened from heat cycling.
Poorly cleaned add-on parts that result in premature Failure.	Clean all add-on parts professionally to prevent abrasives from getting in the oil. Never use abrasive sanding discs or blasting media to clean parts.
Leaking intake manifold and intake vacuum (oil consumption).	Follow the instructions that came with your intake manifold gaskets for proper installation.
Excess vibration from improperly installed or incorrect flexplate and/or harmonic balancer.	Refer to your Engines Specifications

READY FOR INSTALL

1. Your engine has been assembled with select parts based on the engine configuration you ordered. Prior to installation, check to be sure your engine arrived with the parts you ordered (base, base dressed, or fully dressed).
2. Next, determine the add-on parts you need to complete your installation. Add-on parts recommendations and specifications for your engine are available at www.jbspowercenter.com. Depending on the engine you ordered, add-on recommendations and related specifications may include the harmonic balancer, flexplate/flywheel, spark plugs, water pump, etc.
3. Certain items like water pumps, harmonic balancers, flexplates/flywheels, are easier to install prior to the engine being lowered into the vehicle.
4. Certain components, like distributor caps or crank pulleys, may be best installed after the engine is lowered into the vehicle for firewall or frame clearance.

**Be sure to PRELUBE YOUR ENGINE before start-up/break-in.
Failure to do so WILL VOID YOUR WARRANTY.**

PRE-LUBRICATION

WARNING: FAILURE TO PRIME THIS ENGINE CAN CAUSE PREMATURE BEARING DAMAGE

DO NOT SUPPLY FUEL TO THE ENGINE DURING THIS PROCESS

1. Fill the CRANKCASE and OIL FILTER with the recommended oil and amount of oil based on the type of cam your engine has:
 1. **FLAT TAPPET CAMS:**
We highly recommend purchasing Break-In Oil with your engine, as well as a new oil filter.
 2. **ROLLER CAMS:**
Oil containing zinc or a zinc additive is not required, but is “cheap insurance” for ensuring piston ring seating, rocker arm break-in, cam gear break-in, etc. Using Break-In Oil, for 500 km is recommended on any non-catalytic converter equipped vehicle. Otherwise, use an O.E. recommended or API SN service-rated multi-viscosity (non-synthetic) oil.
2. If you do not have a proper "[Oil Pump Priming Tool](#)" then proceed on with steps 2 through 4
- Verify the ignition source does not have power. This will eliminate the possibility of any fuel in the cylinders igniting prematurely.
3. Remove the spark plugs and proceed to crank engine over with the starter for short, 20 second runs, allowing starter to cool 20 seconds in between cranks.
Note: Oil pressure may not be visible on certain electronic gauges, so we recommend using a mechanical gauge to ensure oil pressure and promote pre-lubing friction surfaces.
4. Reinstall spark plugs and proceed with initial setup.

COOLING SYSTEM

COOLANT:

We recommend you use a quality name brand extended life coolant. Check the label of the brand you choose to ensure the compatibility of the coolant with your engine metals (cast iron, or cast iron and aluminum) and radiator material. Use a 50/50 mix of antifreeze and distilled water to fill the radiator and engine.

The Engine should be filled from the highest spot in the cooling system, be it the water neck, radiator cap, or a remote fill. This is to help prevent air pockets from developing in the cooling system. For vehicles with long, or uphill radiator hoses, it may be necessary to lift the front of the vehicle, or fill the system from multiple locations. This may require installing the water neck or upper radiator hose after some initial filling. Doing this will ensure no big air pockets will be in the system.

THERMOSTAT:

Install a new performance thermostat equipped with a bypass hole. This allows trapped air to escape during heat cycles. As a general rule, we recommend a thermostat that will keep your cooling system in the 180° to 190° F range.

Once the system is capped and filled to the best of your ability, it's good practice to squeeze the lower hose several times to try and dislodge any trapped air in the block. You will recheck the coolant level at the highest practical point AFTER the engine has been run through a heat cycle and allowed to FULLY COOL!

You should also have a recirculating coolant bottle that can pull fluid back into the radiator once cool. A "catch can" that does not have a recirculation tube below the water level can lead to air being sucked back into the system, causing air pockets.

FUEL REQUIRMENTS

We recommend using a **PREMIUM GASOLINE with a minimum octane rating of 91** for your high performance engine, unless otherwise noted. Fuel requirements may vary for engine types.

ENGINE START UP AND BREAK-IN PROCEDURE

For the start-up and initial break-in process, total timing has been pre-set if your engine was ordered with a distributor. You are still required to verify your timing, in case it was bumped during shipping or install.

If your engine was not ordered with a distributor, please follow proper procedure to ensure you install your distributor properly and verify timing. Keep in mind that you may have to advance the distributor beyond normal timing settings to achieve the desired 32° to 34° of timing during cam break-in. In many cases, you may also be able to plug in the vacuum advance to achieve timing in the desired range. See "**SETTING ENGINE TIMING**" for further timing instructions.

FOR ROLLER CAM ENGINES:

Initial start-up will be to check for leaks and to heat cycle the components that may need to be retightened, such as intakes, headers, etc., as seen earlier in this guide. Roller cams do not require a break-in period.

Start your engine. Bring it to 2,000 RPM and get it running smoothly. While the engine is running, be sure to check oil pressure, coolant temperature, and check for fluid leaks, such as oil, transmission fluid, fuel, and coolant/antifreeze. Listen for any unusual sounds. **Should you hear an unusual sound, shut the engine off, check for the source, and correct it.**

FOR FLAT TAPPET CAMS:

The purpose of Flat tappet cam break-in is to wear in the cam lobes over a 20 minute cycle, where your zinc oil can properly break in the mechanical lifters and cam surfaces.

To do this, the engine needs to be set up in a configuration where it can maintain 2000-2500 RPM for a 20 minute cycle, while remaining cool. Please make sure to vary the RPM in this range for the 20 minute period. This ensures that the engine is spinning fast enough for splash oil lubrication. **Do not just lock the throttle and leave unattended.**

You also need to ensure the engine has enough timing to prevent overheating. The majority of overheats during break-in are attributed to not enough initial timing. Start your engine, immediately bring to **2000 RPM**, and check the timing. Rotate the distributor to achieve **24° to 34° of timing at 2000 RPM**. Run the engine in this configuration for 20 minutes while varying RPM between 2000-2400 to break in your cam.

Your carburetor will have an adjustment throttle screw on the side to allow increased RPM holding. While the engine is running, be sure to check oil pressure, coolant temperature, and check for fluid leaks, such as oil, transmission fluid, fuel, and coolant/antifreeze. Listen for any unusual sounds. **Should you hear an unusual sound? Shut the engine off, check for the source, and correct it.** Once resolved, restart the engine, immediately bring to 2,000 RPM, and resume the acceleration/deceleration cycle for a total run time of 20 minutes.

SETTING ENGINE TIMING

CAUTION: Improper timing can lead to abnormal combustion and/or detonation. **Neither condition is covered under warranty. No exceptions.**

Setting timing by the “total” timing method: We **DO NOT** recommend using vacuum advance on the majority of our engines.

- After start-up and the initial break-in period, verify the engine’s initial timing (10° to 16°) and total timing (32° to 34°). The timing instructions sent with the engine must be followed to prevent detonation or other issues.
- Total timing of 32° to 34° must be set first. This will determine initial timing. For accurate results, we recommend using a timing light without a built-in advance. **Failure to set the recommended total timing will result in engine damage not covered by your warranty.**
- If your engine was ordered with a distributor, the total timing was pre-set, but it must be verified during installation.
If ordered without a distributor or the distributor had to be removed during installation, total timing must be set or reset.
Many engines are ordered with a harmonic balancer. If your engine was not, we recommend using a harmonic balancer with the degrees marked on it (typically from 0° to 60°).

- Start by using a paint stick, chalk, or other marker to mark a line on the 32° to 34° mark. When checking total timing, this mark will line up with the zero on your timing pointer when total advance is obtained with engine at 3,500 RPM.
- With the **VACUUM ADVANCE UNHOOKED** and **PLUGGED**, set your timing.

EXAMPLE OF SETTING TIMING:

We will use 34° of mechanical timing.

1. Hook timing light to the number one spark plug wire.
2. At 3,500 RPM (or to the point mechanical timing stops advancing), turn the distributor to align the 34° mark on the balancer with the 0° mark on the timing pointer and lock down the distributor.
3. Let the engine idle down and then bring the RPM backup to verify the distributor is still set at 32° to 34° total advance. If needed, loosen and adjust again.
4. After total advance of 32° to 34° is set, let the engine idle down again and recheck the initial timing. If initial timing (advance at idle) is between 10° and 16°, timing adjustment is complete.

CAUTION: If the initial timing is not between 10° and 16°, contact a Fern Pedro at JB's Power Centre for assistance and/or have total advance verified by a shop to be fully advancing, and not exceeding your engine's recommended total mechanical timing of 32° to 34°.

CONGRATS!!!

THE INITIAL BREAK-IN PROCESS IS COMPLETE. YOUR ENGINE IS NOW READY FOR THE ROAD AND ITS 500KM BREAK IN.