BluePrint ENGINES®

THE AUTHORITY IN CRATE ENGINES.

ENGINE INSTALLATION GUIDE

EVERY ENGINE DYNO TESTED

LEADING MANUFACTURER 400K+ ENGINES BUILT

30 MONTH/ 50,000 MILE WARRANTY

UNMATCHED CUSTOMER SERVICE (308) 236-1050

100% NEW PARTS DESIGNED & OPTIMIZED BY US

PROUDLY MADE IN USA

WWW.BLUEPRINTENGINES.COM

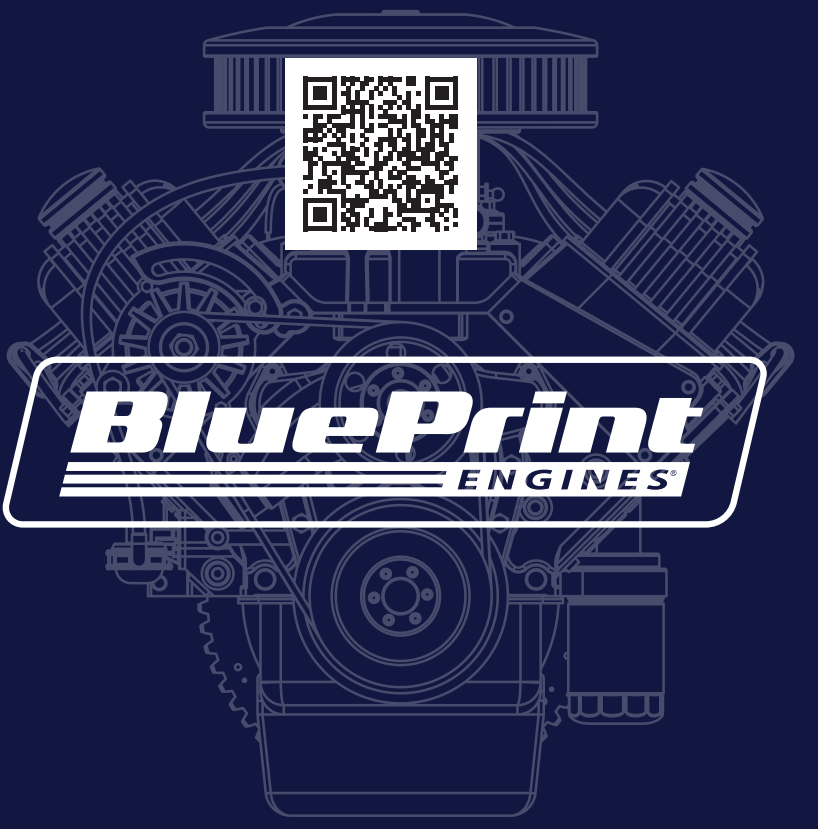
CONGRATULATIONS!

Your new BluePrint Engine is the best performing, best-valued high-performance engine on the market. We sincerely thank you for your purchase and are excited to welcome you to the BluePrint Engines family. Whether you're cruising, heading to the racetrack, or navigating your favorite off-road trail, your BluePrint Engine is built for maximum performance and enjoyment at every turn. Inside this installation guide you'll find the information and direction you need for proper engine installation, break-in, and maintenance. Follow these instructions to ensure years of trouble-free performance and driving pleasure. If at any point you need additional assistance after fully reading this guide, please reach out to us via phone, our website links, or email. We look forward to helping!

This publication provides general information on components and procedures that may be useful when installing or servicing your BluePrint Engine. Please read this entire publication before starting your installation.

IMPORTANT INFORMATION ONLINE:

Important details pertaining to your new high-performance BluePrint Engine are located at www.BluePrintEngines.com. Use the search bar to enter your engine's part number and view details about what is included with your engine, a list of recommended add-on parts, and engine specifications. You will also find recommended octane rating (example: most BluePrint Engines require 91 octane fuel, but we do also offer some configurations that only require 87 octane). For your convenience, scan the QR code below to go directly to our technical support page:



INSTALLATION PROCESS at-a-glance

1. Review this installation guide carefully before beginning installation.
2. To find the list of recommended add-on parts as well as specifications for your engine, use our search bar feature at **www.BluePrintEngines.com** and enter your engine's part number.
3. Remove your engine from its crate and check for:
   a. Possible damage during shipping.
   b. All parts that were ordered to complete your install.
4. Read and follow any and all TAGS attached to your engine. These are extremely important and include things like fluid capacities and types.
5. Prepare a complete list of add-ons that you will need to complete your engine installation, including new and existing parts. Refer to add-on recommendations for your engine at **www.BluePrintEngines.com**.
   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).
6. Be sure all add-on parts are as recommended and properly cleaned prior to installation.
7. Install engine in vehicle, along with the ignition and fuel systems (if not ordered with your engine).
8. Follow engine pre-lubrication procedures.
9. Follow start-up and break-in procedures, including ignition timing.
10. Register your BluePrint Engines warranty online at www.BluePrintEngines.com under the "Warranty" tab on the top of the page.

HOW TO PREVENT engine failure!

WHY ENGINES FAIL	BEST WAYS TO PREVENT FAILURE
Bearing failure due to improper pre-lubrication.	Follow pre-lubrication procedure to ensure engine is primed and ready to fire. **See Page 3.**
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 (such as **BluePrint Engines Break-In Oil, PN BPP710**). Follow instructions on **Page 4.**
Wrong tune-up specifications.	Follow instructions and use recommended specifications for correct timing on **Page 5.**
Overheating	Always install a new thermostat with a bypass hole for your engine. Ensure mechanical engine timing is increased to 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 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 engine's specifications at **www.BluePrintEngines.com**

NOTE: Your BluePrint Engine is a high-performance engine with an aggressive cam profile. It is normal for your BluePrint Engine to sound different than a regular stock engine. High performance engines require the proper supporting equipment, such as properly matched torque converters, radiators, etc. Consult our website, or a tech agent if you have questions about install.

1. GETTING READY for your engine 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). Next, determine the add-on parts you need to complete your installation.

2. Add-on parts recommendations and specifications for your engine are available at www.BluePrintEngines.com on your engine's product page. Depending on the engine you ordered, add-on recommendations and related specifications may include the harmonic balancer, flexplate/flywheel, spark plugs, spark plug gap, 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.

5. If distributor must be removed for installation into vehicle, please make sure to set your harmonic balancer to zero degrees, with the distributor rotor pointing forward. it's important to note the rotor position, and that the distributor is installed with the rotor pointing in the same direction. The distributor shaft will need oriented so when it slips down over the cam gear, the rotor lands in exactly the same position.

! CAUTION: Your engine's assembly lube was washed away during dyno testing. Be sure to PRELUBE YOUR ENGINE before start-up/break-in. Failure to do so WILL VOID YOUR WARRANTY.

2. PRE-LUBRICATION of your engine

! 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** with the recommended oil and amount of oil based on the type of cam your engine has:

   FLAT TAPPET CAMS:
   We highly recommend purchasing BluePrint Engines BPP710 Break-In Oil with your engine, as well as a BluePrint oil filter. You may reference the oil tag included with your engine for other options.

   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 BluePrint Engines BPP710 Break-In Oil, or BluePrint Engines Service Oil BPP10W30, for 500 miles 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.

   BluePrint Engines BPP10W30 Service Oil can continue to be used after break-in of a roller cam engine. Any conventional 10W30 oil is also acceptable.

   NOTE: All BluePrint Engines with valve covers and oil pan installed have been pre-lubed and dyno tested but requires additional preventative maintenance before initial startup.

2. Fill oil pan to recommended capacity.

3. Verify the ignition source does not have power. This will eliminate the possibility of any fuel in the cylinders igniting prematurely.

4. Remove spark plugs and proceed to crank engine over with starter for short, 20 second runs, allowing starter to cool 20 seconds in between cranks.

   Oil pressure may not be visible on certain electronic gauges, so we recommend using a mechanical gauge to ensure oil pressure and promote prelubing friction surfaces. Pre-Lubing the engine also allows the oil filter to fill, removing the need to pre-fill the oil filter. Note that pre-filling the oil filter can sometimes cause an air lock, as air has no escape path. On SBF engines, if pressure still reads zero after pre-lube, it may be necessary to slowly loosen the oil filter (just enough to break the seal) , and allow some air to escape. Have a rag handy to prevent a mess, and don't forget to re-tighten the filter after "burping" the system. Pressure should register while cranking, after air is removed from the system.

5. Reinstall spark plugs and proceed with initial setup.

Blueprint Engines Sales & Technical Assistance

Sales: (308) 236-1010
Support: (308) 236-1050
International: 1-800- 483-4263
Email: info@blueprintengines.com
Website: www.BluePrintEngines.com

3. COOLING SYSTEM: Add coolant and install new thermostat

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.

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.

We recommend that you use a heater hose fitting, located on the top of the intake manifold, to allow air to purge out of the block and cooling passages, while filling the system. This is especially important on small block Ford style engines, as they seem to trap air in the front of the block more frequently than their GM or Chrysler counterparts.

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 waterneck 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, such as **BluePrint Engines BPP180TS** thermostat.

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.

4. FUEL REQUIREMENTS: Use premium gasoline or a gas/ethanol blend

We recommend using a **PREMIUM GASOLINE with a minimum octane rating of 91** for your high performance engine, unless otherwise noted on our website. Fuel requirements may vary for engine types. Visit www.BluePrintEngines.com and click the "Recommendations" tab on your engine's product page to view its octane requirements.

5. ENGINE START-UP and break-in procedure

! SAFETY FIRST: Before starting your engine, be sure to set the emergency brake. If the vehicle is on the ground, chock the wheels, and make sure the vehicle cannot slip into gear.

For the start-up and initial break-in process, total timing was set at the factory 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. Note that there is a chisel mark at the base of the distributor indicating where it was set. If your engine was not ordered with a distributor, please follow proper procedure to ensure you install your distributor properly and verify timing.

FOR ROLLER CAM ENGINES:
Initial start-up will be to check for leaks and to heat cycle the components that may need 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:
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

(Step 5 continues next page)

(Step 5 continued)

can maintain 2000-2400 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.

6. 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:

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 set at the factory, but it must be verified during installation (distributors installed at BluePrint will have a small chisel mark for reference). 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.

1. For this example, we will use 34° of mechanical timing.
2. Hook timing light to the number one spark plug wire.
3. 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.
4. Let the engine idle down and then bring the RPM back up to verify the distributor is still set at 32° to 34° total advance. If needed, loosen and adjust again.
5. 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. You may then connect a vacuum advance line, if desired.

   CAUTION: If the initial timing is not between 10° and 16°, contact a technician at BluePrint Engines for assistance at **(308)-236-1050** 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°.

NOTE: Keep a record of the initial timing for later reference. This will allow the timing to be set again, if needed, without verifying the total advance.

The initial break-in process is complete. Your engine is now ready for the road and its 500-mile break-in.

POST INITIAL START-UP / HEAT CYCLE CHECK

After you have started your engine, and have run it through several heat cycles, it's important to recheck all fasteners and fluid levels. It's not uncommon for external fasteners to need retorqued after the engine has been brought to temperature several times.

- **With engine still warm:**
  Recheck intake manifold bolts, header bolts, carburetor mounting stud nuts, water pump bolts, and valve cover bolts.
- **Once engine cools:**
  Recheck all fluid levels, all front accessory drive bolts, torque converter bolts, distributor hold down bolt/stud, and starter bolts.

FIVE HUNDRED MILE BREAK-IN

NOTE: DO NOT use synthetic oil during the break-in period!!! It is not recommended, required, or necessary.

For your engine's first 500 miles, avoid hard acceleration for sustained periods. Periodically change the engine speed while driving to help seat the rings. After the first 500 miles, change the oil and the oil filter.

BluePrint Engines does not find the use of synthetic oils to be necessary, or beneficial. If you must run synthetic, it is only advised after 9,000 miles and only on roller cam engines.

Synthetic oils by composition are thin, and "slicker" than fossil oils. They tend to increase leaks and can promote improper break-in. Please take this into consideration before changing to a synthetic oil.

FOR FLAT TAPPET CAM ENGINES: We recommend the continued use of **BluePrint Engines BPP10W30**, or approved oil with zinc or a zinc additive for the life of your engine.

FOR ROLLER CAM ENGINES: Without catalytic converters installed, you may also use **BluePrint Engines BPP10W30**

MAINTENANCE

DO NOT use synthetic oil during the break-in period!!
Even after break-in, synthetics are NOT required, and not necessary for BluePrint engines. If you must run a synthetic, please wait 9,000 miles.

- During the break-in period, check all fluid levels frequently.
- Recheck external bolts that may loosen with use or heat cycles, such as intake manifold, headers/exhaust, front accessories, etc.
- Change the oil and oil filter every **3,000 miles**, or **3-4 months** if the vehicle is not driven regularly. If your engine is used in a heavy duty or dusty environment, the oil and oil/air filters should be changed more frequently.
- In colder regions, lower viscosity oil may be required for better flow characteristics.
- **Use 91 octane gasoline**, unless otherwise noted on the recommendations tab of your engines specific product page.

DYNO TESTING

Every BluePrint Engine comes with YOUR Dyno sheet! That's the BluePrint Engines Dyno Promise! If you misplace or can't locate your sheet, contact our service department with your engine's serial number and we will gladly provide it for you. (Serial numbers are six digits and located on the block.) Every BluePrint Engine shipped with an oil pan and cylinder heads is dyno tested. We then do multiple pulls on the dynamometer to determine and record the torque and horsepower readings over a range of RPM readings to ensure your engine meets or exceeds its design specifications. We monitor critical temps, oil pressure, air/fuel ratio, leak inspection, and perform a comprehensive oil filter and oil analysis test. The crankcase is then drained and your engine is approved and prepared for shipping. BluePrint Engines does not "fine-tune" the carb for your elevation or for peak economy. Tuning of the carb for idle mixture adjustments, jet changes, or other necessary tuning is required by the installer or owner.

WARRANTY REGISTRATION

To Register your BluePrint Engines Limited Warranty, go to **www.BluePrintEngines.com** and complete the registration form as soon as your engine is installed. With proper installation, break-in and maintenance, you can look forward to years of trouble-free performance.

JOIN OUR BLUEPRINT ENGINES OWNERS GROUP ON FACEBOOK, AND FOLLOW US ONLINE!

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