



## J2 TECHNICAL ARTICLE

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From Octagon HEaven

Source: Mac Reynolds

Thanks Larry Lee

### ENGINE BREAK-IN

Everybody has a favorite method of breaking in a newly rebuilt engine ....Here's mine -

Some lads advocate gassing up the car and running it pell-mell to California. Some idle it hour after hour, and one poor soul (a Chicago boy) was deathly afraid to start his new engine - - - He hired a mechanic to push the starter button.

Here's where I disagree with all the above : My best judgment says that one should break his engine in as best he can during assembly. That way there are no surprises such as clanking rods, broken rings, frozen pistons, dry bearings, and other horrors. I chuckle with embarrassment every time I remember a 1931 engine "carefully assembled" that couldn't be turned over with a 30-ft. Tommy bar!

#### To begin

Clamp the crankshaft gently in your vise, liberally coat each rod bearing journal with an assembly grease (My favorite is Lubriplate #105; it comes in just about the biggest toothpaste tube you ever saw). Bolt each rod to the crank using 1/2-2/3 the full torque settings. Then, by hand, swing each rod round and round the crank journal until there is minimum drag. Number each rod to its journal and remove all the rods.

The next thing to do is to take the crank, clean it, coat the main bearing journals with #105 and set it in the block, torquing bearings to 1/2-2/3 of full settings as before. Spin the crank until it too spins without too much effort.

Problems: As you spun the Rods on the Crank, one or more may have been very tight, or spun freely for only part of a turn. Disassembly will show bright rub spots on the bearing surface.

If the bearings are of poured babbitt, you can oh-so-gently scrape the bright spots away with a new razor blade....the trial and error method.

I don't believe in scraping thin-backed shell insert bearings such as found in the XPAG/XPEG engines. If such a bearing is awfully tight, have the crankshaft grinding outfit polish the offending crank journal to fit.

Once in a blue moon the crankshaft journals will have been ground egg-shape - I've heard of such but haven't seen one. Nip this in the bud and ask the shop to mike the journals while you wait.

CONTINUED BACK SIDE

There is, however, a probability (more than a possibility) that the big ends of the connecting rods have been elongated by years of hard driving. The same shop that ground the crank can check for this and correct it. Elongation is recognized by the appearance of bright spots on opposite sides of the bearing surface, and none 90° away. Using a well-fitting bearing, such as Vandervell, will help insure that all is in roundness.

The elongation problem does not occur within poured babitted bearings because the bearing hole is drilled after pouring and thus is independent of any big end problem.

Pre-break-in: Carefully clean everything and coat all mating surfaces with 105 grease, reassemble the rods, pistons, rings, Gudgeon pins, and crankshaft. Torque to full settings and make sure you can somehow grab the flywheel and turn the engine by hand - both hands. Squirt oil into the crankshaft oil passages before fitting the last main bearing cap.

Break-in oils: Too heavy an oil and although you have protection, the oil flow is too small to carry away the excess bearing heat during break-in. Remember that roughly 1/3 of engine heat is carried off by the oil system, the balance by water and the exhaust pipe.

Too thin an oil and although you have good oil flow you have little protection. A good compromise is a top-grade #20 detergent oil. Fill the sump with this and loosely set the engine on top.

Break-in: Set the head (without spark plugs) loosely on top the block. Connect all the oil lines and fit a starter motor. In the case of overhead camshaft engines, fit the cam but not the dynamo. With XPAG/XPEG engines, remove the timing chain cover; also slosh #105 grease on cam lobes, followers, and oil the camshaft bearings; prime the oil pump, fill the oil filter, and all oil lines. You can pre-fill the oil gallery on XPAG/XPEG engines by removing a gallery plug on the nearside of the block near the oil pump. Attach an oil pressure gauge.

Now connect a battery and crank the engine with it until an oil pressure shows - any pressure; keep cranking until the starter heats up hot.

Check-out: After a total of about 10 minutes of this, have two strong fellers from the South Side hold the block up in the air while you lie on the floor with a flash light, making sure that oil is leaking from every bearing; make sure also that oil has been pumped to the timing chain, rocker arm faces, and the camshaft.

If all is o.k. crank by starter for perhaps 30 minutes - excluding starter motor cool-off time; squirt oil periodically into the cylinder bores. By now you should be able to grab the flywheel and turn the engine using one strong arm.

Incidentally, if you show about 40# oil pressure using the starter motor, this will translate to at least 60# when the engine runs on its own steam.

Final Break-in: Put the engine in the car, 5 gals petrol and one-half pint engine oil in the tank and fire up the engine. Some people find it necessary to call a priest at this time. My friend, Arnold, called his mother on the telephone. I couldn't overhear the conversation, but he seemed helped by it all.

Run the engine at 1500 RPM for 3 minutes. Do not "bleep" the gas pedal as some advise, keep an eye on the oil pressure and watch for a boiling radiator. If, after stopping the engine, the starter labors hard on re-start, run the engine for shorter periods so as to avoid overheating.

When you have about one hour idle time on the engine, take the car out in traffic and stay below 2500 RPM for the next 200 miles.

Use a commercial upper cylinder lubricant after the first 5 gals. of gas are gone; consider using one permanently if you have 4-ring pistons. Change oil and filter at 200 miles to SAE 30 or 40.

If you plan a long trip of several hundred miles, I'd suggest 20W50 racing oil, but whichever oil you use, make sure its a good detergent oil.

Mac Reynolds  
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