

BLUEPRINTING YOUR OUTBOARD ENGINE

A good blueprinted engine is one that has a very free lower end, (connecting rod, crankshaft and bearing), and a good seal (good compression) between the piston and sleeve and most importantly, has been broken in properly. More on breaking in later.

Through no fault of the manufacturers, foreign or domestic, all engines are not created equal. No matter how close the manufacturer tries to hold all tolerances, it's no cut and dry situation, they will vary. Consequently, some engines will feel better out of the box. However all engines require a little TLC. I'm no rocket scientist, so I don't have any graphs or formulas for you. I'm just your average Joe boater, and I learned from friends and experience. My method does not always work on used engines, so it's best to perform it on a new one. My experience is mostly on K&B Outboard engines, 3.5cc in particular. However, my method will work on any size or brand of engines, be it outboard or inboard. So, I will attempt to teach you how to "blueprint" your engine my way.

Remove the power head from the lower unit. Disassemble it leaving the crankshaft assembly intact, but remove the carburetor. Place some hot water and detergent in a large bowl. Immerse the crankshaft assembly completely in the bowl, and by grasping it by the casting with one hand, and the crankshaft threaded end with the other, spin it several times, rotating the assembly so that each ballbearing faces the bottom of the bowl. This will remove any thick bearing grease and wash them out completely. Spin rinse the assembly under the tap while running hot water. Dry completely and set aside. Spin the backplate assembly under the hot soapy water as well by grasping the Power Take Off shaft between your thumb and finger. Repeat the rinse procedure and dry thoroughly. Wash the remaining parts in the soapy water, rinse and dry as well.

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After all the parts and assemblies are completely dry inside and out, lightly spray WD40 on all the front and backplate bearings. Spin the crankshaft as you did under water to determine if it free spinning. It must spin smoothly with no indication of drag. If it is that, lubricate the bearings with Prather after run oil, Mystery Marvel oil, or Corrosion X, and set aside. Spin the backplate as you did the front plate. If it is also free spinning, no blueprinting is required on either component. However, if either does not spin freely, it's blueprint time.

This process doesn't really blueprint your engine, it's just a term used when we completely seat the bearings in their sockets and relieve all parts of minute stresses, as well as check the head clearance and piston & sleeve fits.

You will require a small hard plastic, wood, or rawhide mallet. Also required is to heat the assemblies so that they are almost too hot to the touch. (A hair dryer will do just fine.) If the parts are too hot to handle, use a glove or rag to hold them.

Grasp the front plate by the casting and tap lightly on the threaded end of the crankshaft with the mallet just hard enough to push it out the other end about 1/8 inch. (Note:) Crankshafts on the newer K&B engines are now slip instead of press fitted and most can be pressed

out by hand. However, some may require the mallet treatment. Next, sharply tap on the casting around the front and rear bearings, then in the samemanner, tap on the crankshaft counterweight in an attempt to seat the rear ballbearing completetly. 9 out of 10 times this will free the front plate assembly. Lubricate with oil as mentioned before. The back plate receives the heating and mallet treatment, including the heavier oiling.

THE PISTON & SLEEVE:

Good fits between all parts is an important factor for good performance, but the piston and sleeve is the most important. You personally are a big factor in making or breaking a well seated and feeling piston an sleeve, and the magic word is proper break-in. In my mind, proper break-in is something like raising a child. It takes patience, care and pride. It takes "patience" to have to run the engine at a rich needle setting when you want to go super fast from the start. It takes special "care" to flush your engine clean at the end of the days running. Note:I prefer to use Coleman lantern fuel spiked with about 25 % Mystery Marvel oil. The lantern fuel evaporates leaving a coating of oil in the engine.

To flush, remove the glow plug, and while spinning the engine for about 15 seconds, pour some cleaner mixture into the open carburetor. This will flush and remove any moisture from inside the engine that would otherwise corrode and ruin the bearings. K&B has added two lubricating holes on their engines, one on the lower unit flange for oiling the rear bearing on the power head, and one on the crankshaft housing for oiling the front bearing. However, to insure that these two bearings do get flushed out and oiled well, I go ahead and remove the powerhead from the lower unit and the backplate from the engine. Completely flush all the parts with your cleaner. Lubricate all the bearings as well as the piston, sleeve, and connecting rod bushings, but do not remove the piston and sleeve from the crankcase. This is a good time to inspect and lubricate the drive cable, and while I'm on the subject, it's good practice to grind off the tips of the drive cable. On occasion they will be slightly long and will push against the propeller shaft causing a slight drag. Lubricate the cable with silicone or graphite base marine grease. (Auto parts store) A thick grease is better than an STP type grease because it will remain on the cable much longer. Pride is when your buddies tell you how well your engine runs and feels.

BREAK-IN:

Piston and sleeve fits will vary as they come from the manufacturer, no matter if they come in an American or foreign engine. Some will feel firmer when you bring the piston up to compression, and some will not feel as firm. Both require TLC during break-in. Run the engine at a full rich setting for 3 to 4 tanks full....

This is a good time to explain my break-in theory. The pistons are either honed, ground, or diamond machined to size. This process exposes pores in the metal and as you run the engine, these pores are filled with deposits and a glaze begins to form on the outside diameter of the piston. The glaze is essential for a good seal between the piston and sleeve, (good compression.) So it's very important for engine longevity and performance that you don't run the engine at a lean fuel setting

until a good glaze is formed. Otherwise, overheating will result in a scored piston from lack of proper lubrication. After you have made the full rich runs, you can start leaning down the needle valve setting. Make at least 5 runs at a fast slightly rich setting. After you have made the 5 runs, you can start to make some fast runs at an almost race needle valve setting. Make a full throttle run down the front straight and back off to half throttle down the back straight. This causes the piston to heat up down the front straight, and cool off down the back straight. This will help the piston to season and along with the glaze, toughen the outer skin. Continue to run the engine in this manner until you notice a slight silver ring forming close to the top of the piston. At this point your engine should be ready for competition. I should mention that it's best not to use your engine in competition during break-in. You may be tempted to run it too lean, (I speak from experience) and as mentioned before, could result in a scored piston.

A word about your fuel. It's common knowledge that the lubricants are blended into the fuel. This is the only way your engines parts are lubricated during running. Many engine parts are lost from lack of sufficient lubrication when the engine is run too lean. Ever hear of a thrown rod, that's how it happens. For your engines well being, I suggest that you find out if the fuel you are using has castor oil blended into it. If it doesn't, I recommend that you acquire some industrial grade "A" castor oil, and add 1oz. to your gallon of fuel.

Proper engine break-in and maintenance is not difficult, but it does take time and TLC if you want your engine to last more than one maybe two seasons.

I personally have had engines last me for not several seasons, but several years.