

Read All Safety Instructions Prior to Use of This Machine

Follow set-up and component installation sequence closely. Note all parts have been fitted with close tolerances. Some change in equipment component may occur with substantial temperature variations outside of a normal controlled shop environment. The key to success with this machine is tightening component with hand tools for a firm hold and not to over torque. Ensure components move freely as per instruction.

With a little practice, you will know your set-up is accurate simply by how everything feels during set-up.

Before getting started fabricate a stand or platform to hold engine block cylinder upright and provide a surface that you can stand on during boring operations. Boring platforms and stands are available from E-Z Bore Inc. if needed.

Check our catalogs or brochures for suggested mounting platforms. Platforms for the Briggs and Stratton Raptor blocks can easily be fabricated from a piece of 5/8" or 3/4" plywood cut approximately 12" X 16" in length. Using nut inserts to secure the engine block with 5/16 bolts in the center of the platform. These dimensions will provide an area on either side of the block to stand during boring operation.

Hydraulic Unit Stop Collar

Stop collar at the top of hydraulic unit needs to be set after shipping. This same collar will be set in different locations base on boring operation. Open bypass valve on hydraulic unit and push bottom of bar up towards hydraulic unit. Take measurements from the end of shaft to the top of lock collar.

Stop Collar Approximate Settings:

2 1/4" -- Raptor Engine Blocks – total bore clean-up

2 13/16" -- Raptor Engine Blocks – bottom step for large diameter sleeves

3 15/16" -- Animal/Intek, Honda and Yamaha – total bore clean-up

Set-up for Upper Adaptor Plate and Lower Bearing Assembly

Disassembled block completely (Raptor model engines require removal of valves). Clean top of block to remove old gasket material and top of cylinder bore to remove carbon. Remove PTO bearing and seal from side cover. Clean outer cover seal flange area and 4 bolt holes for the side cover support screws. Clean gasket surface of block and side cover to removed old material, dress gasket surfaces with a file to remove any dings or high spots.

Measure bore of block to ensure correct fit with centering plug and proper selection of starting cutter.

Place centering plug in the top of the cylinder resting on the step that closest represent current bore size of block. Place the upper adaptor plate down around the plug until seated on the deck surface. Secure adaptor plate to block with socket cap screws taking note of special screw location and washers. (Raptor plate requires a front screw with a half moon washer – plate has been slotted for location of this screw) Visually check that any washers securing plate due not touch centering plug in any way. Plug should be free to turn and easily removed from plate. If plug is tight loosen cap screws and realign adaptor plate with cylinder bore.

The lower bearing shaft assembly will be installed in the block like a crankshaft. Dual bearing type blocks, will require removing flywheel bearing and installing a solid bushing provided in kit.

Install side cover support assembly. Tighten four (4) retaining screws, turn middle portion of support to ensure proper centering to seal flange bore. The middle portion of clamp assembly has a 3/16 cap screw used to lock shaft assembly, position the screw, facing up before final torque of 4 retaining screws.

Install shaft assembly in block. Assembly side cover without gaskets and tighten to block with side cover bolts.

Lower bearing shaft assembly will be suspended, between block and PTO bearing surfaces and should be free to rotate and move horizontally back and forth. Any binding in this area can be caused by improper installation, of side cover clamp assembly or misalignment with bearing bores from the manufacturing process. Both would require disassembling cover and clamp to determine cause. In the case of bearing bore misalignment simply switch side covers to correct. At this point mark side cover and block for future identity as a machined set.

Install 1 ½" X 1" O.D. stepped bushing and knurled knob on PTO side of lower shaft. Install 1" O.D. hollow spacer, flat washer and knurled knob on flywheel side of lower shaft. Visually look down cylinder and position lower shaft with bearing facing up and approximately centered at the bottom of bore. Lightly tighten knurled knobs and 3/16 locking cap screw on PTO side cover clamp.

Line-up Bar Installation and Set-Up

Before installing line-up bar, hold black lower flange and turn shaft in a **clockwise** direction to reduce center pilot/ expander diameter. Lower line-up bar assembly down through cylinder bore into lower shaft support bearing. Turn shaft assembly until slots in flange engage with two (2) low profile screws located on each side of the lower shaft support bearing.

Insert ¼" drive pin through lower hole of line-up bar. Place centering plug, slot side down on line-up shaft and over ¼" pin. Apply even downward pressure to top of line-up bar while using centering plug as a knob to tighten pilot expander inside lower shaft support bearing. **Note: To tighten line-up bar turn, counter clockwise.**

Even downward pressure to shaft, ensures flange is seated square with lower shaft. Firm pressure with centering plug is all the torque required for a rigid lock to lower support bearing.

Remove pin, centering plug will rest near opening of top plate. Simply adjust knurled knobs to move line-up bar until centering plug drops in opening of the top plate. Plug should be free to slide on line-up bar and centered in top plate opening.

Note: It maybe necessary to remove a little drag from the 3/16" side cover clamp in order to adjust knurled knobs. Tension should be tight enough to allow line-up bar to stand or stay in position while sliding plug in and out of top plate.

Once line-up bar has been positioned tighten knobs and side cover clamp to lock centered position. Plug, should still have free movement on shaft and in top plate.

With plug still positioned in top adaptor plate insert ¼" pin in top hole for line bar and turn **Clockwise** to release line-bar from lower support bearing. Lift out line-up bar and plug together.

Note: Centering plug is left in upper adaptor as additional support for line-up bar during removal procedure.

Set-up for Hydraulic Unit

The following procedure is a very important part of set-up. First ensure that the three (3) contact screws on the base of the hydraulic unit do not protrude, below lower base portion where hydraulic unit makes contact with upper adaptor plate. Open bypass valve and push bottom portion of boring bar up towards hydraulic unit to position the bar at the top of its travel.

Set boring unit in position on the adaptor plate with the bypass valve facing the front of engine (facing away from the valve side of engine block). Boring unit will set down in machine recess area of top plate and the bottom portion of shaft will go through lower support bearing.

Set 3 (three) contact screws on base of hydraulic unit. It's usually a good idea to back off (unthread) the base contact screws and then **lightly** tighten screws until they make contact with top plate. Tighten jam nuts to maintain those settings.

Note: Light pressure refers to brushing screws with finger tip until contact is made and setting at that position. The idea behind these screws is to allow boring unit to project 90 degrees from lower support bearing and be independent of deck surface angle.

Bring two (2) swing bolts with star knobs up and tighten with minimum pressure to secure boring unit to top adaptor plate.

At this point the hydraulic bar should be free to turn and once bypass valve is opened, bar should easily push down using light finger pressure. If hydraulic unit shaft feels tight, then release swing bolts and reset 3 (three) contact screws for hydraulic unit.

Once contact screws are set ensure jam nuts are locked and bar has been pulled back up to start position, **Close bypass valve**, remove boring unit from upper adaptor plate.

Note: If bypass valve is left in the open position once boring operation starts, cutter will fall through bore instead of cutting at desired feed rate.

Select cutter for next oversize larger than pre-measured bore. Install cutter on boring bar so the numbers/letters face away from hydraulic unit or down towards lower support bearings. Tighten pointed set screw, securing cutter to bar at top cutter location closest to hydraulic unit. (a second lower cutter location is provided for boring operations with the OHV engines)

Note: Cutters can be installed backwards so the carbide will be cutting in the wrong direction. With cutter markings facing down this will position carbide tip in the correct position for a clockwise rotation as view from the top of boring unit.

The E-Z Bore unit is powered by a 1/2" drive industrial type drill (not included with boring machine). E-Z Bore recommends a single speed gear reduction drill that operates in the 550 to 600 RPM range. The Hydraulic unit is designed to feed at .004 per revolution with a power unit turning the hydraulic shaft at that speed. Drill driver furnished will intersect with roll pin at the top of hydraulic bar during operation.

Before placing hydraulic unit on adaptor plate, spray cylinder with a liberal amount of WD-40 or a similar cutting fluid. Aluminum cylinders we recommend Aero-Kroil which has been supplied with your kit.

Place hydraulic unit into lower support bearing and top adaptor plate as previously performed during set-up. Secure hydraulic unit with two (2) swing bolts and tighten with minimum pressure. Start drill and continue rotational cut until bar has travel down to where stop collar comes in contact with the top of hydraulic unit. **Note: keep drill at continuous speed, until the entire length of cylinder bore has been completed.**

With boring completed, open by-pass valve and pull bar back towards top starting point. **Close bypass valve.** Release two (2) swing bolts and remove hydraulic unit from top adaptor plate.

Inspect cylinder to determine if it has been totally cleaned up during boring operation. If areas of cylinder didn't clean-up, simply wipe chips away from lower support bearing and install next oversize cutter on hydraulic unit. Repeat above procedure and make additional boring passes through cylinder until total clean-up is achieved.

The E-Z Bore system requires very little maintenance. We recommend that you take care in keeping machining chips out of lower support bearing and line-up bar. New tolerances on lower support bearing are .001" clearance fit, to boring bar shaft. Wear tolerances are allowed up to .005". As this bearing wears we strongly recommend, that you allow E-Z Bore Inc. to replace this bronze bearing and check matching line-up bar to assure precise accuracy for your machine. Many shops with high usage machines have this service performed on annual bases.

As with any E-Z Bore product our goal is to see your engine performance and services grow. Our technical help is just a phone call away for this unit, any of our products or any type of performance question that you may have. Please feel to contact us for comments, suggestions or help with additional operations that you can perform with you E-Z Bore.

We sincerely Thank You for your business ! --- John Moore



