



## Installation Instructions for KPMI Part No: **82-83250**

### Polaris Predator/Outlaw 500 • 2003 - '07

#### TOP END SERVICE KIT

*Congratulations! You have purchased the finest, most complete Top End Kit available. The piston in this kit is a unique high performance forging made from tough 2618 heat treated aluminum. The piston kit can be run at the factory clearances. These one piece forged Black Diamond™ Valves and High Performance Piston and Spring Kit are designed to provide you with trouble free, long lasting, high performance operation.*

#### A) 82-83250 Kit Includes

KPMI P/N	QTY.	Description	Specification
<b>82-82012</b>	1 Set	Spring Kit	Includes: Ti Retainers, CrSi Valve Springs, H.T. Steel Basewashers
<b>82-82052</b>	2 Pcs.	Intake, Standard Valve	Valves • Black Diamond™ • Black Nitroreg Stems
<b>82-82055</b>	2 Pcs.	Exhaust, Standard Valve	Valves • Black Diamond™ • Black Nitroreg Stems
<b>82-83251</b>	1 Set	Gasket Kit	Includes: Base gasket, Engine case gasket, Exhaust gasket, Head gasket, Washers, Valve stem seals
-	1 Set	Piston	Includes: Pin, Rings, Clips, Piston

**Note:** KPMI® Top End Service Kit contains components are that designed to function as a complete system. Several components, including the Piston, Pins and Pin Clips are **NOT interchangeable with OEM components**. Engine failure may occur if these components are misused or not installed correctly.

#### B) Recommended Installed Height - Intake

- 1. Installed Height ..... **1.370" - 1.380"**
- 2. Seat Pressure ..... **66 #**
- 3. Open Pressure at .375 lift ..... **157 #**
- 4. Open Pressure at .440 lift ..... **199 #**
- 5. Max Valve Lift ..... **0.440"**

#### C) Piston Kit Installation

**Refer to the Polaris shop manual for additional disassembly and reassembly instructions.**



## 1. Ring Installation

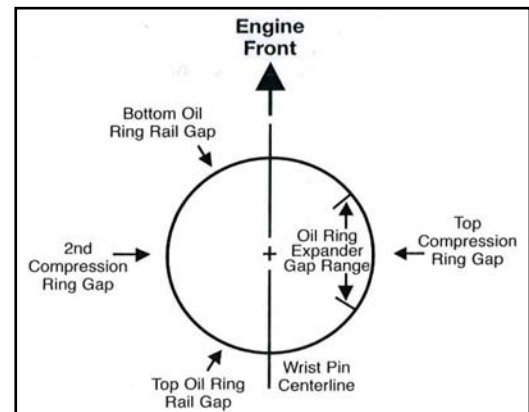
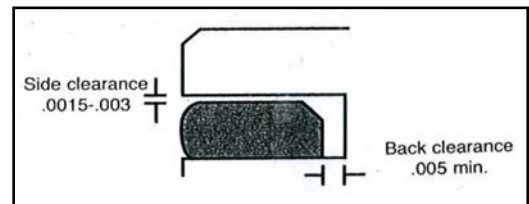
- Each ring must be checked for proper ring end gap.
- Place ring about 1" down in the cylinder and check gap with a feeler gauge.
- Using the RING ENG GAP FACTORS below calculate the required minimum gap.
- If necessary, use a ring file to open the gap to the minimum requirement and then remove sharp edges.
- When filing, only file one side so that the opposite side is used as a straight reference.
- Install ring on piston and check that it rotates freely. See Ring Orientation section below.
- Refer to diagrams below for placement on the piston.

<b>RING END GAP FACTORS</b>	Top Ring	Second Ring	Oil Scraper
Dirt Bike / ATV	.0040"	.0050"	.015" Min
Dirt Bike / ATV Race	.0045"	.0055"	.015" Min

Example : 96mm Bore, to convert it inches divide by 25.4 = 3.780"  
 3.780" X .0040" = .015" Minimum Top Ring gap.

## 2. Ring Orientation

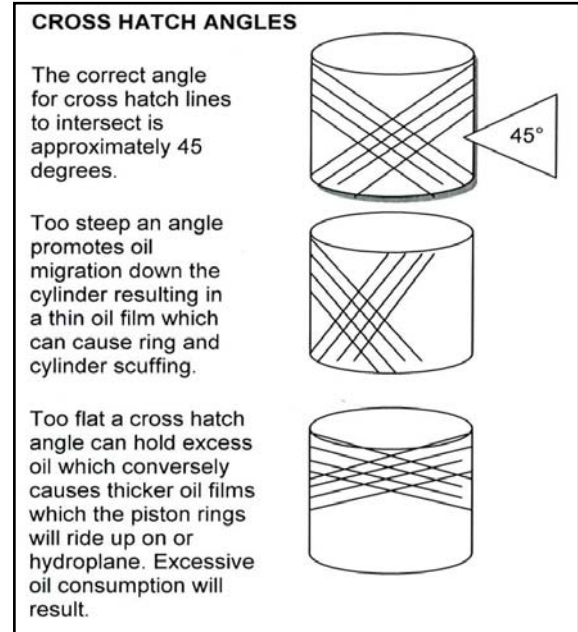
- First check for proper clearance in both Side (Axial) and Back (Radial) dimensions. (see diagram right)
- Top Ring: If ring has a DOT, install DOT UP. If there is NO DOT but there is an inside bevel, install with the bevel UP. If there is no DOT or bevel the ring can be installed in either direction.
- Second Ring: If ring has a DOT install DOT UP with inside bevel DOWN. If no DOT install bevel side DOWN.
- Oil Ring: Install expander with ends butted together but not overlapped. Double check after scraper rings are installed.
- Coat cylinder, piston skirt, pin, pin boss and rings in petroleum based oil before inserting into cylinder.
- Align rings as per diagram (right) - double check oil expander has not overlapped itself after the scraper rings were installed.





### 3. Cylinder Wall Preparation

- Piston to Cylinder Wall Clearance    0.0012"- 0.0022"  
**Note:** Measure piston at 90° to the pin axis across thrust faces, at multiple elevations, with micrometer. Set clearance from largest measured diameter.
- Stone Grit Size: Final hone, Sunnen 280 to 300 grit.
- After honing, the cylinder must be washed to remove ALL traces of honing oil and abrasive. Wash with solvent followed by a degreaser type soap.
- Cylinder is considered clean when wiped with a lightly oiled non-lint white rag and comes out clean.



### D) Spring Installation Notes

- The difference between The installed height and The coil bind height is considered "Free-Travel"  
 The coil bind height is determined by compressing the spring or springs with the retainer and basewasher in place, a vice can be used for this operation, once springs are compressed measure the distance between the retainer and basewasher where the outer spring contacts them.
- Free-travel should always be gross valve lift +.060" for safe operation.
- Retainer to seal and retainer to guide clearance should also be gross valve lift +.060" for safe operation.
- Failure to check valve train clearances can result in serious damage to an engine

### E) Piston Clip Installation Notes

- Failure to check that piston clips are installed propely can resulte in serious damage to an engine
- When installed, clips should be fully seated in groove and piston pin should rotate freely

Packaged By: \_\_\_\_\_

Date: \_\_\_\_\_

# TECH TIPS

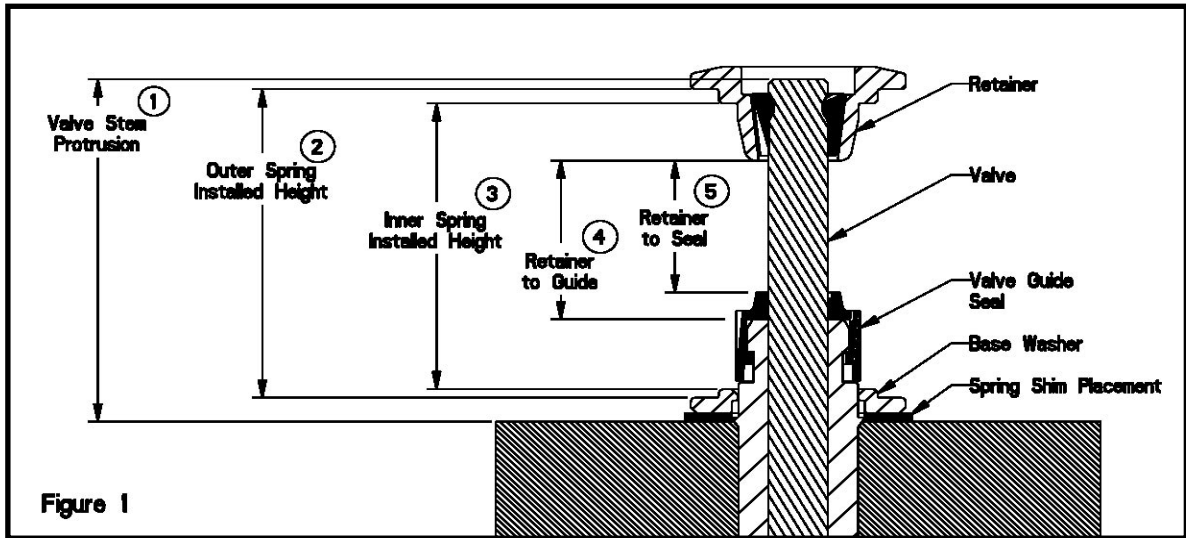


Figure 1

## Valve Train Terminology

1. Stem Protrusion is measured from the tip of the valve stem to the cylinder head. See Figure 1.
2. Outer spring installed height is measured where the outer spring contacts the retainer and lower component when assembled. See Figure 1.
3. Inner spring installed height is measured where the inner spring contacts the retainer and lower component when assembled. See Figure 1.
4. Retainer to guide clearance is the distance between the valve guide (w/o the seal) and the bottom of the retainer, with the valve in the closed position. See Figure 1 and Notes 3 & 4.
5. Retainer to seal clearance is the distance between the valve stem seal and the bottom of the retainer, with the valve in the closed position. See Figure 1 and Notes 3 & 4.

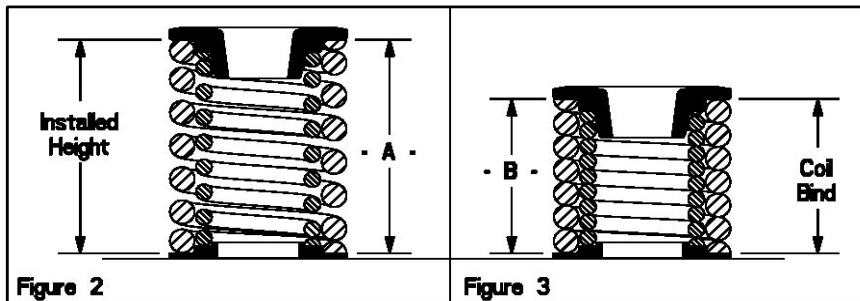


Figure 2

Figure 3

## Installed Height

1. In Figure 2 the installed height is measured from where the outer spring contacts the retainer and the basewasher. This measurement is taken when the valve, basewasher, retainer, and keepers are assembled in the cylinder head.

## Coil Bind / Solid Height:

1. In Figure 3 the coil bind height is determined by compressing the spring or springs with the retainer and basewasher in place, a vice can be used for this operation, once springs are compressed measure the distance between the retainer and basewasher where the outer spring contacts them.

## Notes:

1. The difference between the installed height and the coil bind height is considered "Free-Travel"
2. Free-travel should always be gross valve lift  $+0.060"$  for safe operation.
3. Retainer to seal and retainer to guide clearance should also be gross valve lift  $+0.060"$  for safe operation.
4. Failure to check valve train clearances can result in serious damage to an engine.