

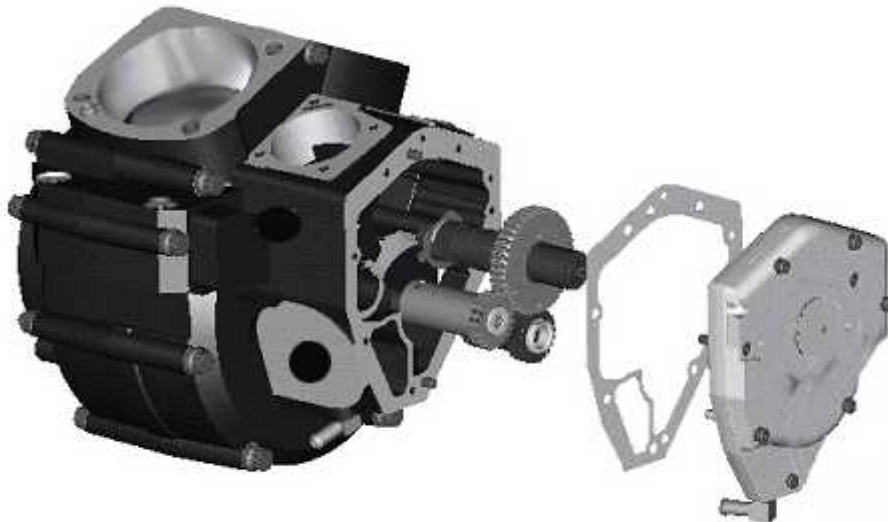


# OBSELETE PERFORMANCE ASSEMBLY SOLUTIONS

Work Instruction  
Page 1 of 6

<b>Operation Number:</b> 30B <b>Description:</b> Engine Assembly Procedure	<b>Prepared By:</b> Quality <b>Approved by:</b> Manufacturing
<b>Revision Date:</b> 04/21/03 <b>Revision Level:</b> 08	<b>Issue Date:</b> 04/24/03 <b>Issued by:</b> Quality
<b>Document Number:</b> PAS-WI-IMC-112002-6	<b>Document Tier:</b> 3
<b>Title:</b> Camshaft Installation	

## CAMSHAFT INSTALLATION



1.  Verify the squareness of the connecting rod to the head deck using a “Jim’s Connecting Rod Pin Gage”. Place the pin in the mating feature and lower the piston rod down so that the pin is contacting the head deck surface. There should be no daylight visible when the pin is dragged across the head deck surface.
2. Perform Air Flow Test for the Flywheel Oil Flow. Check appropriate box on the traveler.



# OBSOLETE PERFORMANCE ASSEMBLY SOLUTIONS

Work Instruction  
Page 2 of 6

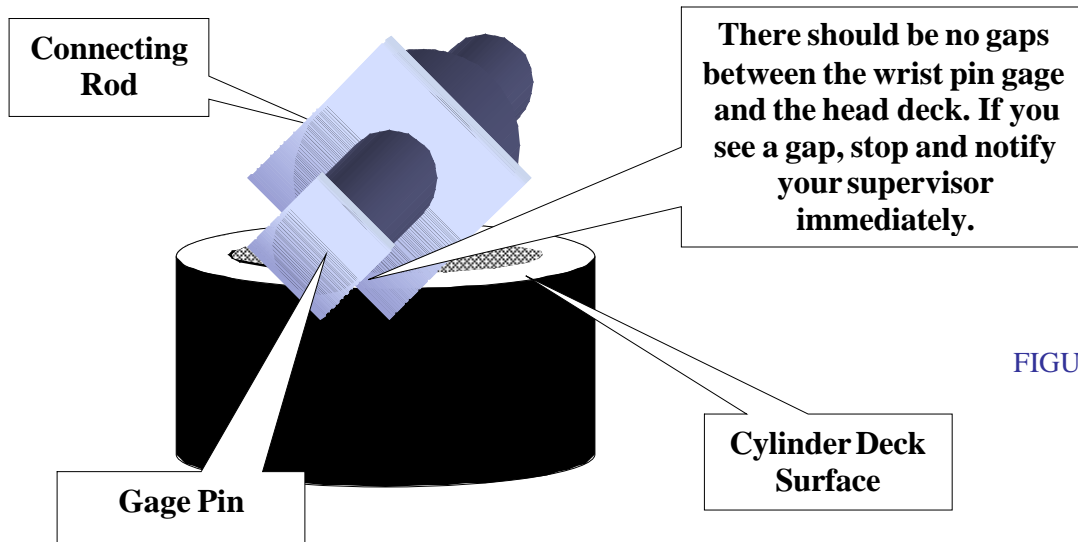


FIGURE 1.0

3. Install one key, if necessary, (PN01-081) into the lower pinion shaft keyway. The key may need to be tapped lightly with a small brass hammer to be seated correctly.  
(Note: *Key may already have been installed in clean room due to key/keyway size.*)
4. Install Driven Gear (PN01-048) on Pinion Shaft. The gear may need to be tapped lightly with a small hammer to be seated correctly.
5. Install Pump Spacer (PN01-049) on Pinion Shaft.

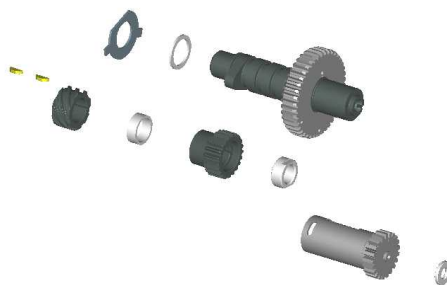



Figure 1.1



# OBSELETE PERFORMANCE ASSEMBLY SOLUTIONS

Work Instruction  
Page 3 of 6

6. Clean end of Pinion, taper and threads with alcohol and cloth. Examine the components for burrs and damage.
7. Install second key into Pinion Shaft keyway. It may be necessary to lightly tap into place with a small brass hammer.
8. Install Pinion Gear. (PN01-068)
9. Clean the Pinion Nut threads, Apply red thread lock to both the threads on the shaft and the nut, and install Pinion Nut (PN01-064) on the end of the pinion shaft. Torque to 38-42 foot lbs using tool# I-10. NOTE: **This is a left-hand thread!**
10.  Install thrust washer (PN01-105) with the beveled side facing the inside of the case and the flat edge facing the lifter block hole at the rear of the engine.
11. Inspect the Cam for defects. NOTE: Andrew Camshafts feature a serial number printed on top to distinguish them from obsolete camshafts. Check the phase of the cam using the Cam Gage. (Gage #I-020)  Refer to posted Gage Instructions at work station. Install the cam shaft, with a cam shim. (size depends on feedback from previous assemblies)
  - a) Lubricate the Cam Bearing and the end of the Cam Shaft (PN01-092) with a thin coating of oil.
  - b)  Line up the timing marks, the “hash” mark on the cam shaft, with the timing mark on the Pinion Gear.
12.  Lubricate with oil and install the Oil Breather Gear (PN01-046) into the case by lining up the timing mark on the Oil Breather Gear with the Timing Mark on the Cam Shaft; Line up the “DOT” with the “hash” mark.



# OBSOLETE PERFORMANCE ASSEMBLY SOLUTIONS

Work Instruction  
Page 4 of 6

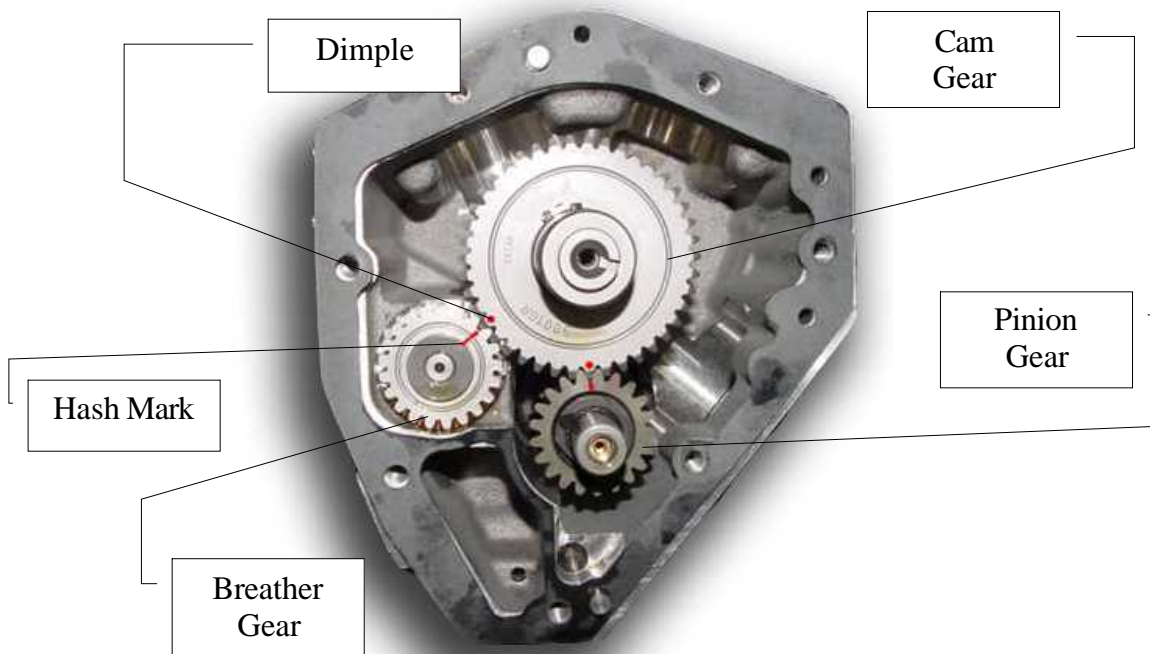



Figure 1.2

13. Lubricate the Breather Gear Thrust Washer (PN01-074) and install onto the Breather Gear.
14. Install two (2)  $\frac{1}{4}$  x  $\frac{3}{4}$  inch Dowel Pins (PN01-060), using a dead blow hammer, into the designated Cam Cover Assembly holes on the case.
15. Install the Cam Cover Gasket. (PN01-252).
16. Inspect the Cam Cover for scratches, finish damage, dirt, oil, debris, etc.
17. Lubricate the end of the cam and Pinion Shaft with oil and install the cam cover assembly.
18. Apply one (1) washer (PN#96-045) to (1)  $\frac{1}{4}$  20 x  $\frac{3}{4}$  inch socket head cap screw(s) and five (5) of six (6)  $\frac{1}{4}$ -20 x 1  $\frac{1}{4}$  inch socket head cap screws and a small amount of blue thread lock to (6)  $\frac{1}{4}$ -20 x 1  $\frac{1}{4}$  inch socket head cap screws. The screw under the trigger does not get a washer applied to it.
19. Install two (2) of the six (6)  $\frac{1}{4}$ -20 x 1  $\frac{1}{4}$  inch socket head cap screws in the holes shown below. Using Tool #I-09, torque to 8-12 ft lbs.  Check the end play with a feeler gage. End play must fall between .012 and .018 at this point.



# OBSELETE PERFORMANCE ASSEMBLY SOLUTIONS

Work Instruction  
Page 5 of 6

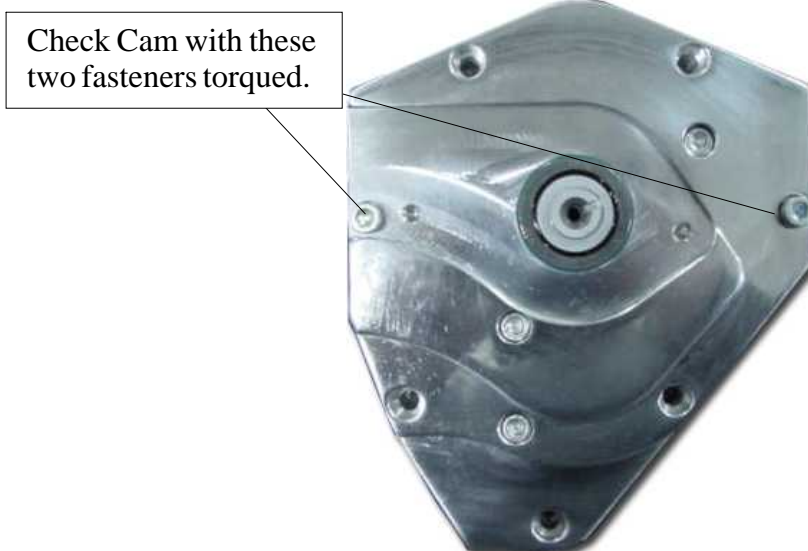



Figure 1.3

*THIS OPERATION REQUIRES ON THE JOB TRAINING!*

20.  With the cam cover installed and all fasteners torqued to spec, use a feeler gauge and slide it between the cam and the cam shim. End play MUST fall in between .008" and .014" to meet requirements.

**TO REPLACE THE CAM SHIM YOU MUST:**

- a) **Remove the fasteners from the cam cover.**
  - b) **Using the Cam Cover Puller, remove the cam and the cam shim.**
  - c) **Replace the shim and repeat above assembly procedure.**
21. Check rotation of camshaft for binding and interference.
22. Insert the remaining five (5) fasteners and, using tool# I-09 torque  to 8-12 ft lbs.
23. Check rotation of camshaft for binding and interference.
24. Check fasteners for torque using the click wrench after the gasket has been compressed.
25. Check once more to see that the assembly does not bind and the end play meets the required .008-.014" specification.
26. Apply a small amount of blue thread lock to one (1) bolt (PN24042).



# OBSELETE PERFORMANCE ASSEMBLY SOLUTIONS

Work Instruction  
Page 6 of 6

27. Install one (1) Ignition Rotor to the outside of the cam cover (PN00033) using the above fastener. Torque to 60 inch lbs with Tool#I-29



This pin fits into the  
key of the cam shaft.

Figure 1.4

28. Fill out all appropriate and applicable fields of the Assembly Traveler.