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IH: Engine Mechanicals - Sub-07A

Timing the 76< Breather Valve

The rotary breather valve is timed to open on the downstroke of the pistons. ¹⁾

This allows crankcase exhaust air pressure to expel the scavenge oil from the crankcase breather oil trap into the gearcase.

The breather valve closes on piston upstroke, creating vacuum in the crankcase.

The breather valve must be retimed if disengaged from the oil pump (spherical) drive gear on the pinion shaft.

Finding the advance timing mark on the flywheel



The flywheel needs to be positioned so the advance timing mark on the front cylinder is in the timing window. ²⁾ The single vertical line in most ironhead motors indicates the advance mark used for timing with a timing light. ³⁾ This line is also used for setting the breather and has nothing to do with pinion gear marks, cam marks or TDC of the pistons.

The FSM says to remove the timing plug, rotate the engine until the advance timing mark is centered in the timing hole.

See also [Timing Marks](#) in the IH section of the Sportsterpedia for the correct factory advance marks.

However, any particular bike may not have the original flywheels. So it is most important to always do a simple check to verify which mark to use on the flywheel. ⁴⁾

Aftermarket flywheels have been known to have the timing marks cut wrong also.

Pull the front spark plug, and using a wooden dowel or a drinking straw, feel the piston come up as you

rotate the engine.⁵⁾

Before it gets to the top, the advance mark will show. As the piston hits the top of the stroke, the TDC mark will come up.

The first mark to come up makes the motor fire “earlier” than the second dot to come up.

Earlier, is advanced. So the first mark to come up, is the advance mark. Some later bikes are reversed, so the type of mark is not consistent, but the geometry is.

Normally, a single vertical line is the advance timing mark on earlier ironheads, not the dot.

To state it another way, rotate the motor forward until the front piston tops out.⁶⁾

Check the mark, that is front TDC.

Now slowly rotate the motor backwards and the first mark you come to will be the front (advanced) timing mark for timing the breather valve.

This will work on any flywheels ever made.

Lock the engine when you've found the advance timing mark so the engine doesn't rotate and lose that position.

Timing the Breather Valve

- **Caution:**

- Improper breather timing causes poor oil scavenging from flywheel cavity and incorrect crankcase air pressure.⁷⁾

These conditions may cause unwarranted engine oil leaks around gaskets and seals and probable oil burning due to oil blow by past the piston rings.

- Improper pinion gear spacing may cause incorrect breather timing and poor oil scavenging from flywheel cavity.

This condition may cause unwarranted engine oil leaks around gaskets and seals and probable oil burning due to oil blow by past piston rings.

- Improper pinion gear spacing may cause unwarranted contact between pinion gear shim and pinion shaft splines resulting in damage to gear cover and / or other engine components.

Rotate the engine to get the advanced timing mark in the timing window as above.

Remove the pinion shaft gear, and turn the engine so the mark on the oil pump drive on the shaft is pointing straight up.

See the [Pinion Gear Tools](#) in the REF section of the Sportsterpedia for some helpful ideas on a gear puller / remover.

The pump drive gear is a slip fit over splines on the pinion shaft.

A mark is cut on one side of it which should face outward against the pinion gear when installed.

Line up the timing hole on the breather sleeve gear on the oil pump to be in the notch (window) in the front. It may take a few tries to roll it into place.

Don't sweat it too much if you can't get the dot exactly centered in the notch.

It is not uncommon to have the DOT slightly to the left just entering the notch of the pump.⁸⁾

Then reinstall the pinion gear. It should have one larger spline to engage the shaft and it can only go on one way and have the line facing out.⁹⁾

It's a light press fit onto the pinion shaft.

You can heat the gear up in a grill, oven or with a propane torch just enough to make it expand enough to slide it back on the pinion shaft.

It should not be heated to 'red hot' but just enough to allow it to expand some.



Pinion gear should be installed onto shaft so the outer face of the gear is 5/16" outboard of the gasket surface. ^{10) 11)}

In that position the oil pump drive gear has a lot of end play between the shaft shoulder and the back of the pinion gear as shown in your picture.

When the engine runs the drive gear is thrust against the back of the pinion gear.

So if you time the pump with the gear in the opposite direction pushed against the shaft shoulder it's very easy to get the lineup off a tooth.

If you are going to pull the pinion gear off you'll need to determine the position where the drive gear will end up with the pinion gear installed.

Measuring from the gasket surface the length of the gear minus 5/16" should do it.

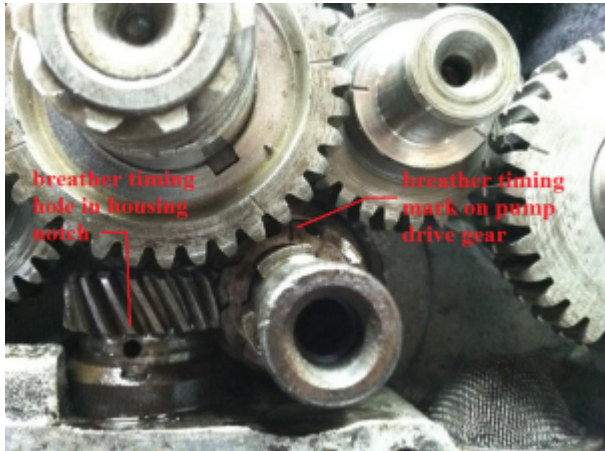
Note: Once the breather valve is correctly timed, the position of the flywheel and breather valve timing marks can be disregarded when installing timing gears (cams).



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