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IH: Oiling & Lubrication - Sub-03I

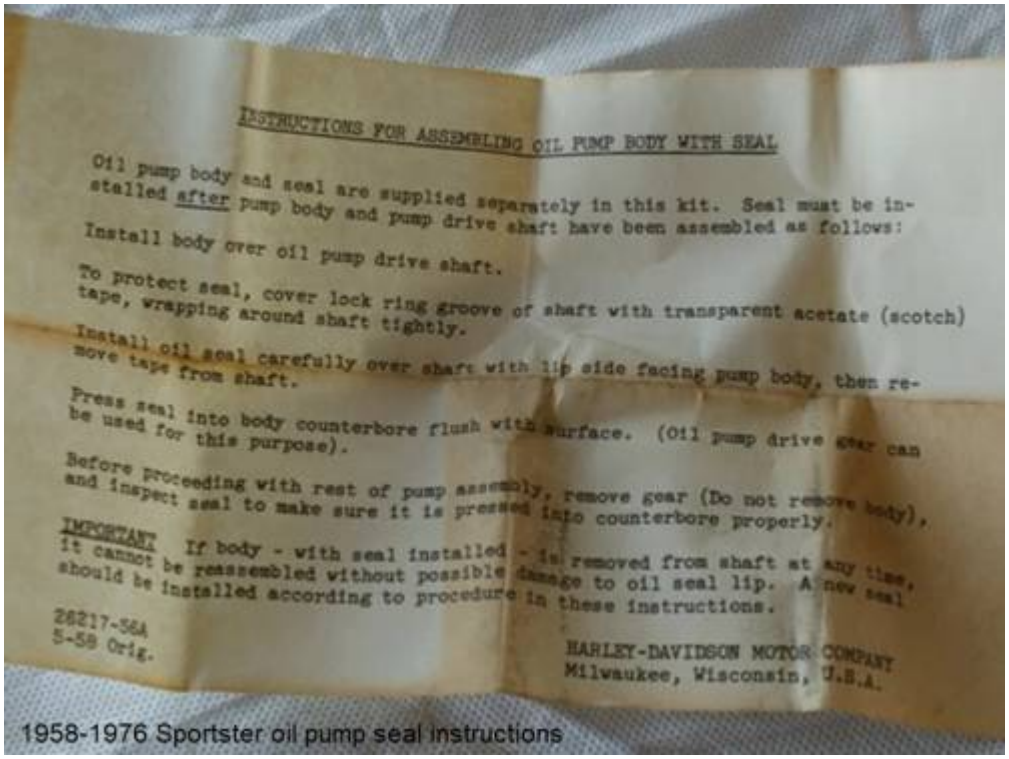
57-76 Oil Pump Assembly

Per the FSMs,
Clean all parts in gas or solvent. Blow out the orifices, pump nipple passage and nipple valve spring guide with compressed air.
Examine the check valve nipple surface and threads for damage or debris that would hinder the ball from seating or operation of the spring.
Inspect the ball spring for breakage or rust. Check the free length of the spring.
Inspect the check ball for wear rings or rust.
Balls not perfectly round should be replaced.
Inspect the ball seat in the pump body using a light. Check for pitting or debris that would hinder the ball and seat.

Check the body and parts for wear or cracks.

Shaft Seal

The seal lip goes toward the feed gears.
Oil seals are installed with the open lip side towards the pressure which makes the lip expand against the shaft and seal.
Installed the other way the oil can just push past the lip.
Be sure to push the seal all the way in or it will add resistance to turn on the gears. [1)]
Here are the official instructions for installing the seal in the pump. Click on pic to enlarge.


INSTRUCTIONS FOR ASSEMBLING OIL PUMP BODY WITH SEAL

Oil pump body and seal are supplied separately in this kit. Seal must be installed after pump body and pump drive shaft have been assembled as follows:

Install body over oil pump drive shaft.

To protect seal, cover lock ring groove of shaft with transparent acetate (scotch) tape, wrapping around shaft tightly.

Install oil seal carefully over shaft with lip side facing pump body, then remove tape from shaft.

Press seal into body counterbore flush with surface. (Oil pump drive gear can be used for this purpose).

Before proceeding with rest of pump assembly, remove gear (Do not remove body), and inspect seal to make sure it is pressed into counterbore properly.

IMPORTANT If body - with seal installed - is removed from shaft at any time, it cannot be reassembled without possible damage to oil seal lip. A new seal should be installed according to procedure in these instructions.

26217-56A
5-59 Orig.

HARLEY-DAVIDSON MOTOR COMPANY
Milwaukee, Wisconsin, U.S.A.

1958-1976 Sportster oil pump seal instructions

Note:
For anybody who modded their pump to add a second seal in the top cover, the open lip goes towards the gears to keep oil from getting into the breather. [2)]


[3)]


[4)]

Click here for the 57-76 Oil Pump Damage and Repair page in the Sportsterpedia.

Gear Shaft Pin(s)

A roll pin is installed into the breather gear shaft to operate either the feed drive gear or both feed and return drives gears depending on year pump.
Some came with a roll pin and some came with a solid pin. It's best to replace the roll pin with a solid pin instead. [5)]

The pin drives the gear as a key would on one side only. If you look at the wear pattern on used gears you will see this.

The roll pin is .09375“ x .50”. It's notorious for breaking or failing at times.
The pin fits into the two slots in the drive gear that drives that pair of gears and should stick out evenly on each side. [6)]
Roll pins are a very tight fit in the hole (initially bigger than the hole they install into).
They compress as they are driven into the hole. You file a taper on one end to get them started if needed. [7)]
You could try a to use a bench vise to press it in. Close it slowly, watching to ensure that it keeps going in straight. [8)]
Roll pins should compress relatively easy while installing them.
If you have to use excessive force to push them in, STOP. Pull the pin out, measure the hole to make sure you got the right size pin before continuing.
Aftermarket gear shafts or ones that have been worked on previously may have undersized holes.

The solid pin is .094“ x .50”. The gear slot is longer. The solid pin is loose in most all pumps. Tight or loose isn't vintage related.
Tight solid pins are kinda rare.

Check for Pump Binding

General advice

Check for pump assembly binding:

1. If you're spinning the breather gear in the iron housing before the entire pump is assem'd, the breather gear can sit too deep in housing. This can bind the breather. Try assembling breather, iron housing, body, and lower plate. Leave gears, retainers, drive pins and keys out for this test. [9)]
2. Before installing the pump in the case, check the “feel” of the pump gears rotating freely by spinning the driveshaft by hand.
3. The resistance (or drag) may tighten up a little once the upper and lower covers get tightened to the body.
4. To account for that, lube the gears and install bolts and nuts to tighten the upper and lower covers (in hand) to similate the “assembly”
   under normal torque.
5. Spin the driveshaft by hand. That should give you a base “feel” of normal drag on the gears.

Check for pump installation binding:

1. Remove the pinion gear. [10)]
2. Remove the drive gear from the pinion shaft.
3. Check oil pump body pins 1971<. Does it have two dowel pins in the alum body that register in the holes of the iron upper housing? It should.

4. Install crankcase screen. Prelube and install the oil pump. (Snug all bolts first and torque evenly to 100 in/lbs in a cross pattern). [11)]
5. Check for pump binding. You can spin the pump now as there is no drive gear.
6. If bound, loosen bolts and retighten as you spin the pump. Often different torqueing sequence will resolve the bind.
   In more extreme cases, lightly tapping of the aluminum body while bolts are half tight may shift things into better alignment.
   Pre AMF pumps with the dowels often bolt right up with no fuss. 1972-1976 pumps with no dowel pins can be more frustrating.
7. Many 72-76 pumps will drag when installed if the breather gear isn't held to it's upper end of it's float during the bind test.
   But the gear shouldn't be so tight that you need to pry it up. Full up drag greater than twist-off cap on a beer isn't real good. [12)]

Tightening / adjusting the mounting nuts / bolts:
Do not over tighten the oil pump bolts as that may bind up the pump and ruin it. The gaskets make up part of the oil pump clearances. [13)]

- You can modify the stud mounted pumps to use bolts instead. [14)]
  1. Drill the mounting holes in the pump body 1/64“ oversize.
  2. Remove the studs and use regular cap head screws to mount the pump. That pretty well eliminates any binding issues caused by tweeked studs.
- Grade 8 bolts (1/4-20 x 2”) will give a better wrench feel. [15)]
- To adjust the mounting bolts (if you didn't use gasket sealer on the 3 gaskets); You may be able to leave the engine in the frame.
  - In this case, loosen all 5 bolts and then tighten them a little at a time.

Check Gearshaft for Trueness

A bent driveshaft will cause pump binding.
You can lay the shaft on a straight piece of glass and roll the cover while pushing down on the end of the shaft.
If there is any daylight between the shaft and the glass (use a feeler guage if needed), replace the gearshaft.

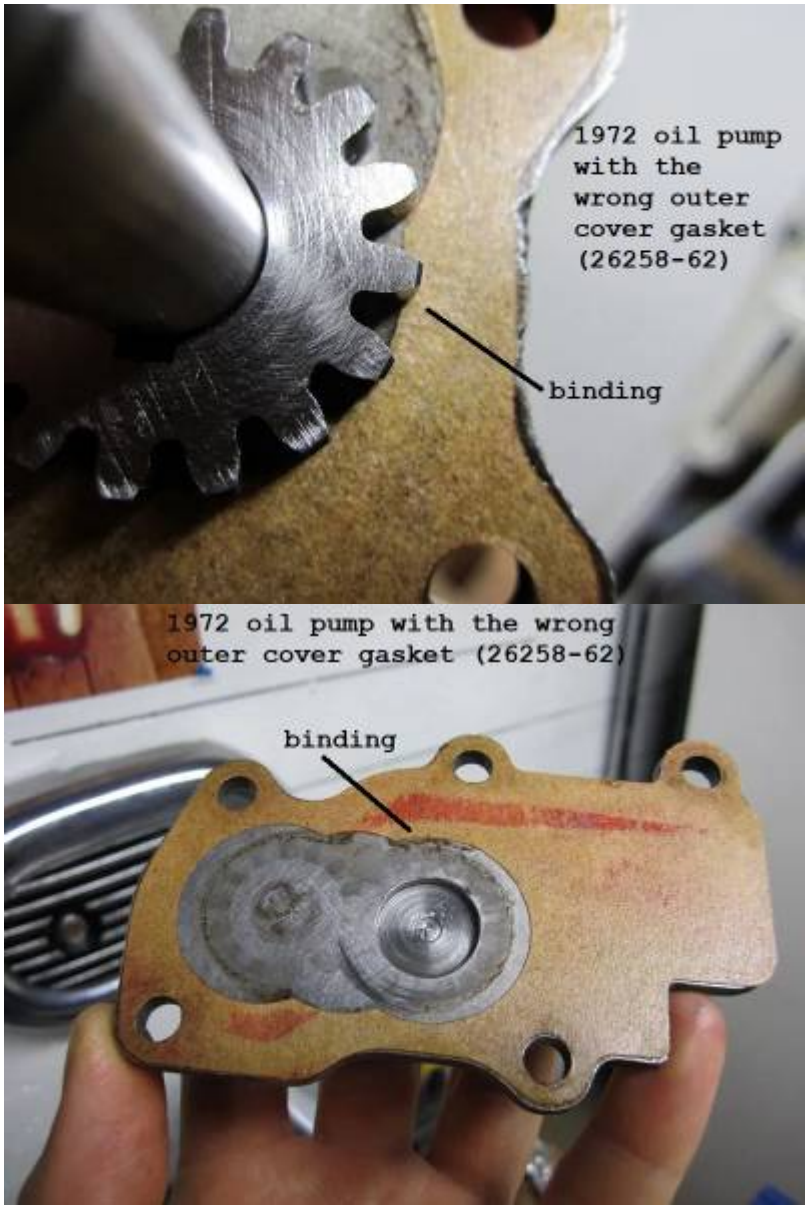
The gearshaft below appears to be bent but there was also some repair done on the cover. This shaft was binding.
You can see in the pic below how the shaft was leaning into one side of the cover bore. [16)]

Check Both Pump Body Gaskets

Using the wrong gaskets will either add to the possiblty of binding or reduce the amount of oil pumped out (or both) depending on which pump you have.

- 1952-E1962 and 1972-1976 16T pumps use:
  - Inner cover gasket (26259-52)
  - Outer cover gasket (26258-52)
- L1962-1971 14T pumps use:
  - Inner cover gasket (26259-62)
  - Outer cover gasket (26258-62)

In the pic below, a -62 outer cover gasket is shown on a 1972 oil pump.
The gear will ride over the surface of the gear and possible create binding and heat.



17)

Check Gearset Widths

Both feed gears should be the same width and both return gears should be the same width.
Ever heard, “as long as you see oil returning in the tank, you're good?”.
That is generally stated to make sure you can see that the return gears are turning.
However, that is not entirely true as to the overall health of the oil pump.

From this XLForum thread, the return gears were mismatched from different year pumps during assembly.
On a 1972-1976 pump, one return gear width at .397“ and one at about .341” still returned a small steady stream of oil into the tank.
(even with an oil filter and an oil cooler plumbed inline in the return hose)
That's .056“ difference in gearset widths. So in that instance, oil was returning to the tank, just not

enough oil.
The breather vent was puking oil and oil was pooling up over the cam gears due to the pump not up to the task with the wide gear face clearance.

Both opposing gears should be the same width (or height).
Gears should be flush with body surface +/-.001” [18)]
Normally there is a small clearance between the gear and cover to allow oil migration for added cooling. This is designed in at the factory. The gasket thickness provides the clearance.
The bigger the difference in width, the more oil will recirculate from feed to scavenge chambers which lowers overall oil output.
That's to say it will still pump oil to a certain degree but less than it was designed to pump.
As in the example above, decide what is acceptable before installing the pump and finding oil pressure too low.
It's always a good idea to measure the gear widths before installing the pump.

The gears below are different widths by a slight amount. This is not detrimental as the example above. But again, a little less oil will be pumped out due to the width difference which adds to the face clearance.

[19)]

Smoke Testing the Oil Supply

This is not required but doesn't sound like a bad idea to test the oil pump and supply feed passages on a new engine or pump build.
It has more advantages for 57-76 motors since you have to pull the engine to replace the oil pump if something is wrong.

But it also isn't a bad idea for 77-up engines. As the article says, cheap insurance.
Plus it'll let you know if your feed and return lines are crossed before it's too late to do anything about it.

This is a excerpt of an article from Ironheacycle.com [20)]

> I hook up the oil pump supply line and fill it with engine oil, sometimes a funnel stuck in the end of a hose is all you need, in this case I hooked it right up to the oil tank. Then I grab the rods and spin the motor over until oil wells up in the holes that go to the rocker boxes. This makes sure that the pump is working and that all the oil passages are free and clear. Sometimes it is hard to make a new motor start pumping oil, in those cases I put an air hose on the oil tank and pressurize the tank with maybe three or four PSI out of my air hose to force oil into the supply line. I had to do that on this motor. It is not unusual. After oil wells up into those rocker box supply holes, I plug them. I usually just stick an old ball bearing in the fitting for the rocker supply line. Then keep spinning the motor, after just a little bit you should see oil coming out from around the connecting rods. If you don't you've got a problem. And as bad as it is to find that out now, it is a lot better to fine out now than after you've fired and fried the engine. All the oil you see around these rods is oil that got there by me spinning the engine over just by grabbing the ends of the connecting rods. I also dumped a little oil into the cam chest through the lifter block holes, after just a little spinning oil started being pumped out of the return to the tank fitting, so now I know the scavenge side of the pump is also working. I do this procedure on every engine I have the heads and barrels off on. It is cheap insurance to avoid costly problems down the road.

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1)
Jaime1840
https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-era-specific-and-model-specific/ironhead-sportster-motorcycle-talk-1957-1985/202622-74-ironhead-oil-pump-breather-valve-gear-drag-video
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yoshi

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11)

1970-1978 Sportster FSM, pg 3-25

12) , 15)

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16) , 19)

pic by CanadianTux of the XLFORUM, labeled by Dr Dick
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