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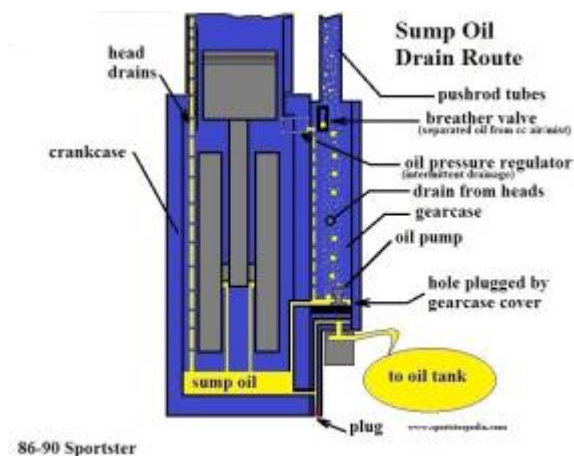
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EVO: Oiling & Lubrication - Sub-01F

Drain Oil Passages Through Pics

86-90 Engines

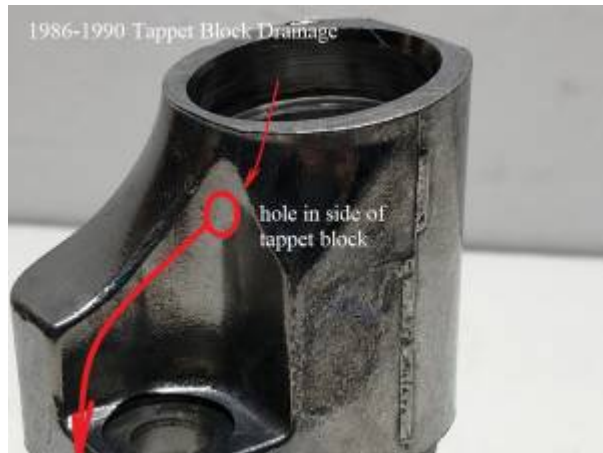


1)

Gravity Drains

- **Gravity oil** (drained from rocker boxes and head/cylinder drainage) falls on moving parts and into the crankcase.
 - Oil collected in the rocker box is returned to the crankcase through a passage in the cylinder and the head.
 - Oil collected in the push rod areas of the heads / rockers flows down the pushrod covers.
 - Then it flows down into the gearcase / cam chest through drain holes through in the tappet blocks.
 - Collected oil in the gearcase is routed to the crankshaft sump area via a low hole in the wall between them on the right side of the pinion shaft.
 - Excess oil mist drawn into the gearcase breather is separated from crankcase air pressure at the gearcase breather valve.
 - The separated oil (and condensed oil in the exit hose) flows into a drain hole below the breather valve and back into the gearcase.

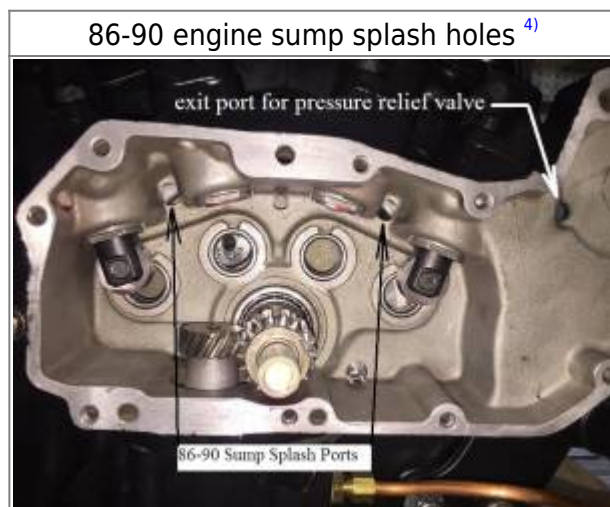
Tappet blocks are directional (rear exhaust shown below).



2) 1986-1990 Tappet Block Oiling (rear exhaust shown) 3)

Splash

- **Occasional excess pressured oil (from the oil filter pad)** is dumped into the gearcase by the oil pressure relief valve.
 - High pressure oil, when cold (on startup), opens the pressure regulator.
 - The excess oil is dumped into the gearcase and routed to the sump area via the low hole in the wall between the gearcase and the crankcase.
- **Splash oil** in the sump area of the crankcase serves to lubricate the moving parts as well.
- Splash oil (from the up and down movement of the connecting rods, crankshaft and pressure generated under the pistons on downstroke) serves to lubricate;
 - Cylinder walls
 - Pistons, piston pins
 - Cam gears and bushings
 - Main bearings



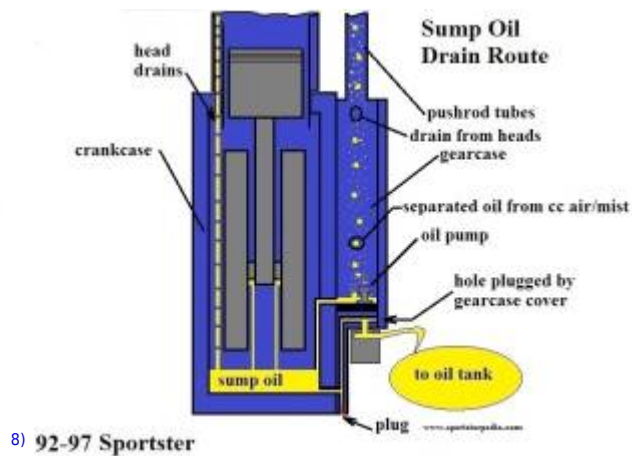
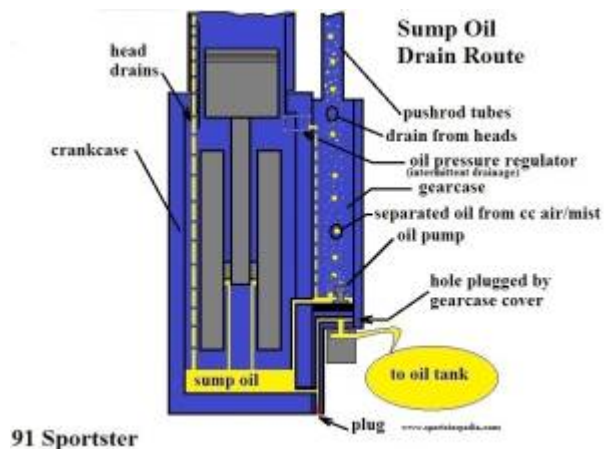
Oil Pump Scavenge

- **Drainage**

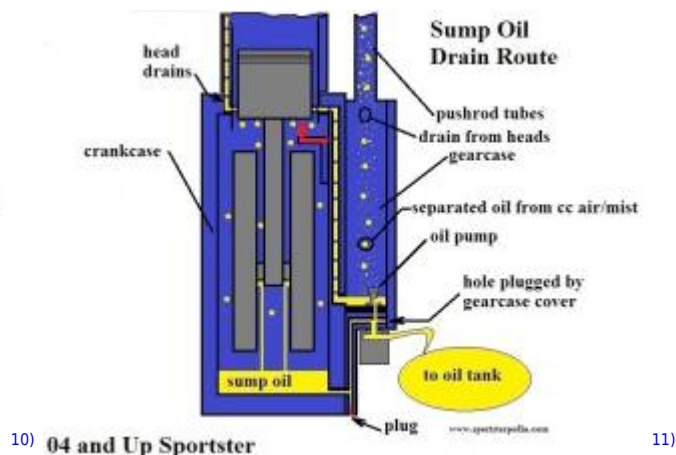
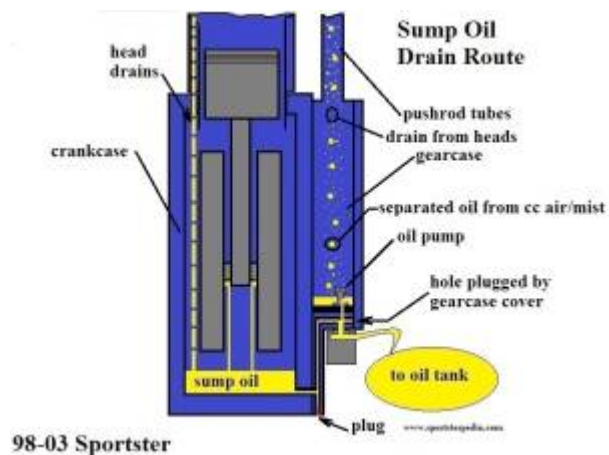
86-90 oil scavenging ⁵⁾	86-90 cam cover ⁶⁾	86-90 Oil Pump Oiling Paths. ⁷⁾
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91-Up Engines



9)

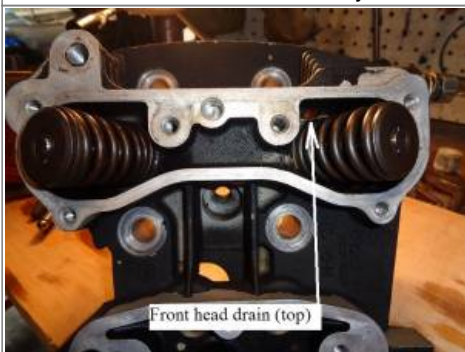


11)

Gravity

- **Gravity oil** (drained from rocker boxes and head/cylinder drainage) falls on moving parts and into the crankcase.
 - **(91 only) - Occasional excess pressured oil (from the oil filter pad)** is dumped into the gearcase by the oil pressure relief valve.
 - 91 engines kept the oil pressure relief valve that opens at 30-35 psi and dumps oil into the gearcase.

- The pressure relief was removed from future models.
- **91-03**
 - Oil collected in the rocker box is returned to the crankcase through a passage in each head and cylinder.
 - Oil collected in the push rod areas of the heads / rockers flows down the pushrod covers.
 - Then it flows down into the gearcase / cam chest through vertical drain holes in the tappet blocks.
 - Excess oil mist splashed into the rocker boxes is separated from crankcase air pressure at the breather baffles (plain umbrella valves).
 - The separated oil flows into drain holes in the rocker boxes and back into the crankcase.

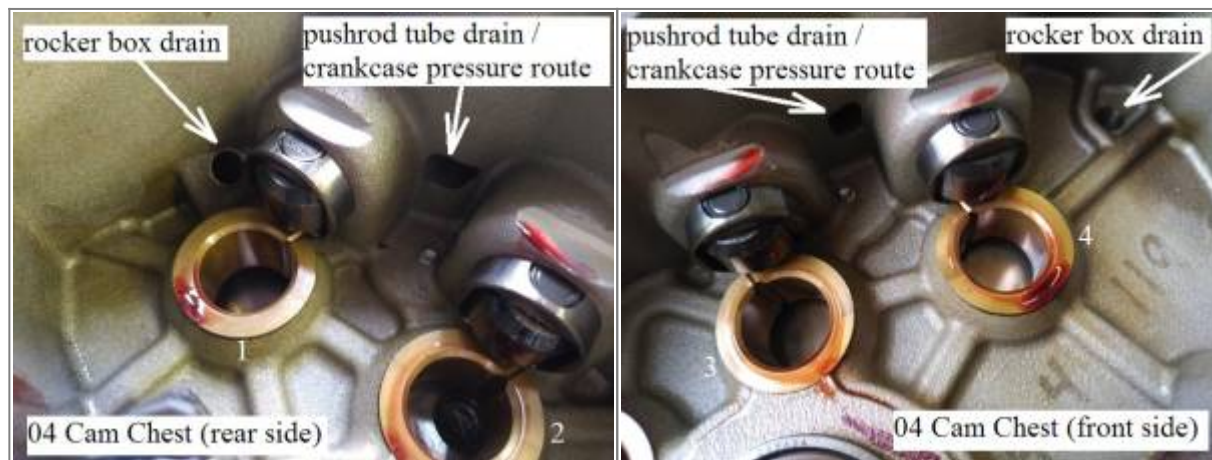
Rocker box drainage ¹²⁾91-03 breather holes in the rocker box sections and head ¹³⁾91-03 style front head drainage hole ¹⁴⁾Head drains in the cylinders ¹⁵⁾91-03 style rear head drainage hole ¹⁶⁾Head drains at the cylinder base on the case. ¹⁷⁾



• 04-Up

- Oil collected in the rocker box is returned to the gearcase through a passage in the head and the right case.
- Oil collected in the push rod areas of the heads / rockers flows down the pushrod covers.
 - Then it flows down into the gearcase / cam chest through vertical drain holes in the tappet blocks.
- Excess oil mist splashed into the rocker boxes is separated from crankcase air pressure at the breather baffles (fancy umbrella valves).
 - The separated oil flows into drain holes in the rocker boxes and back into the gearcase.

Head drains in the cylinders ¹⁸⁾ 1 hole is plugged on each cylinder during installation.	Head drains at the cylinder base on the case ¹⁹⁾
Head Drain Holes 05 Cylinders	OIL DRAIN OIL DRAIN
Milled slots in the left case match milled slots in the right case for rocker box drain from valve side. ²⁰⁾	Lower part of slots in the right case exit thru drilled holes into the gearcase. ²¹⁾
oil drainage from heads milled slots in left case match milled slots in right case for oil transfer 04 1200R Left Case	lower part of slots drilled into gearcase to drain 06 883C Right Case Half 06 Cam Chest head drains hole plugged by cam cover
Rocker box drains into the cam chest. ²²⁾	



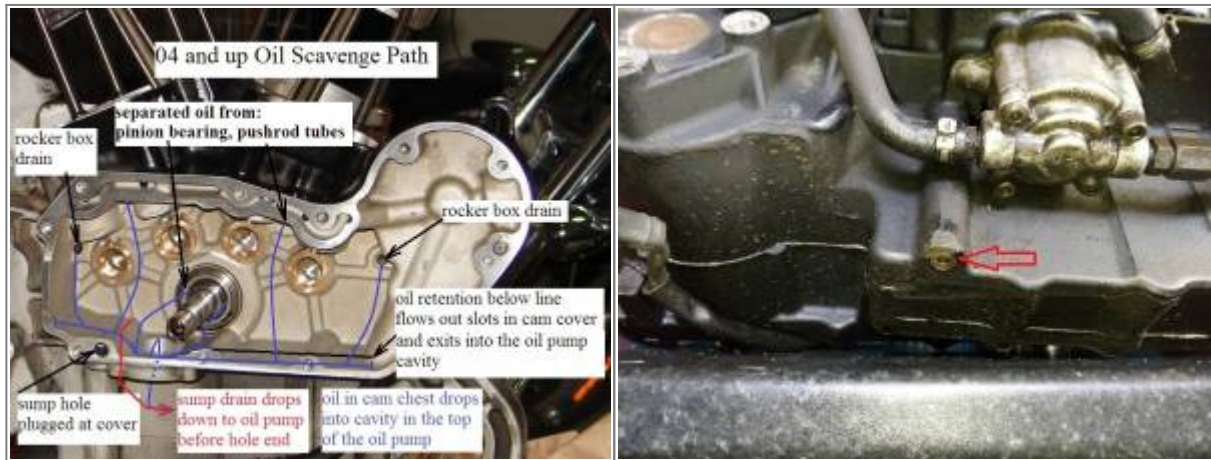
• Drainage

- Oil collected in the crankcase sump is passage-routed to the scavenger side of the oil pump. (by pressure generated by the downward stroke of the pistons and the scavenging effect of the pump)
Sump oil is collected by the pump at the 'ladle, half spoon, duck bill' protruding from the back of it where oil drops onto the scavenge gerotors..²³⁾
- Oil collected in the gearcase / cam chest is routed to a drain port in the top of the oil pump where it drops down onto the scavenge gerotors.
- Return oil fills a cavity above the pump's return gears from these dual inlets and pumps the oil back into the oil tank.

• Below is the case drain for a 98 engine.²⁴⁾

- It's also a rifling hole drilled to connect the sump drain to the oil pump scavenge galley.
- It could be plugged with a treaded pipe plug or a freeze plug.

Case drain / rifling hole for sump drain ²⁵⁾	Rifling hole is on the back side of hole on the right. ²⁶⁾
04 and up oil scavenge path ²⁷⁾	04_up sump drain plug. ²⁸⁾



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drawing by Hippysmack

2) 3)

photo courtesy of Ebay seller, Robison Motorcycles [Link to Ebay Store](#)

4) 5)

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6)

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13) 14) 16)

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<https://www.xlforum.net/forum/sportster-motorcycle-forum/lubrication-and-lubricants/187300-how-to-clear-a-sump-full-of-oil/page3?postid=5473151#post4009969>

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