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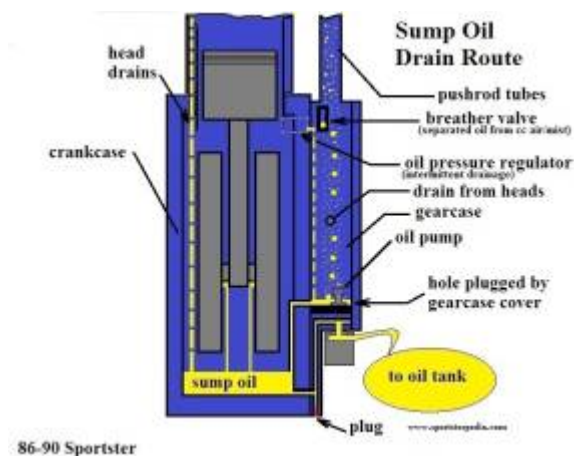


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# EVO: Oiling & Lubrication - Sub-01F

## Drain Oil Passages Through Pics

### 86-90 Engines

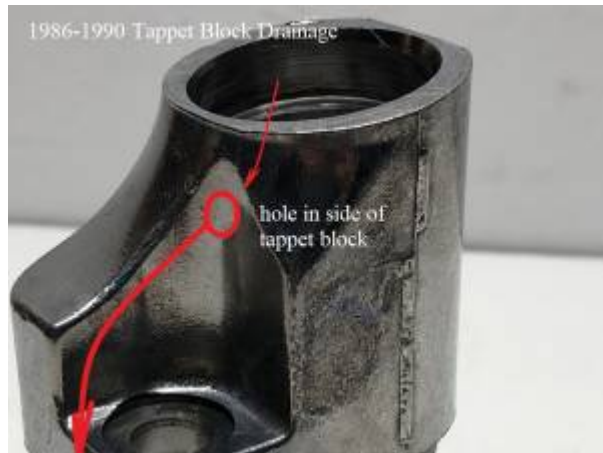


1)

### 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.

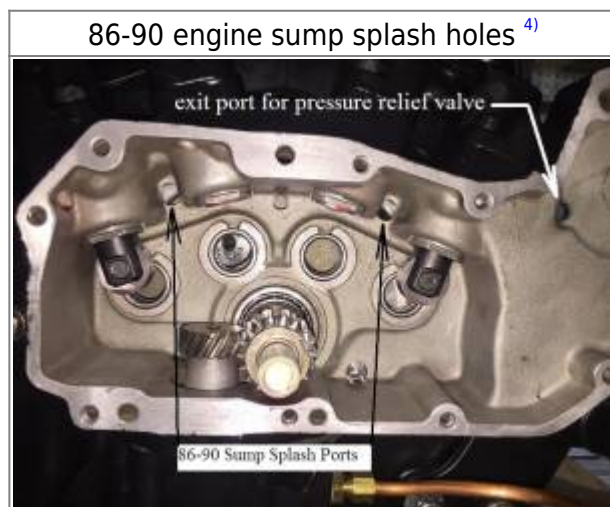
Tappet blocks are directional (rear exhaust shown below).



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



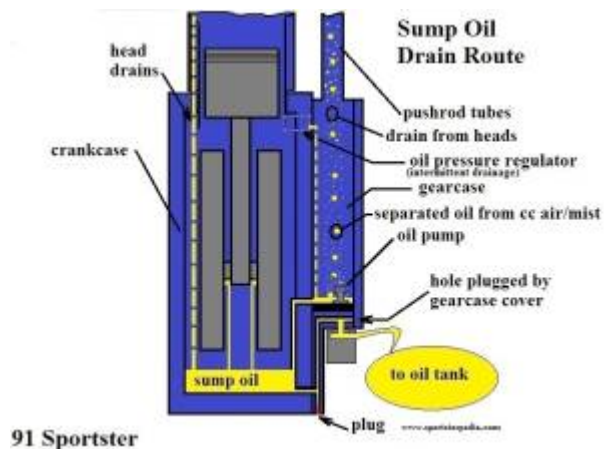
## Oil Pump Scavenge

- **Drainage**

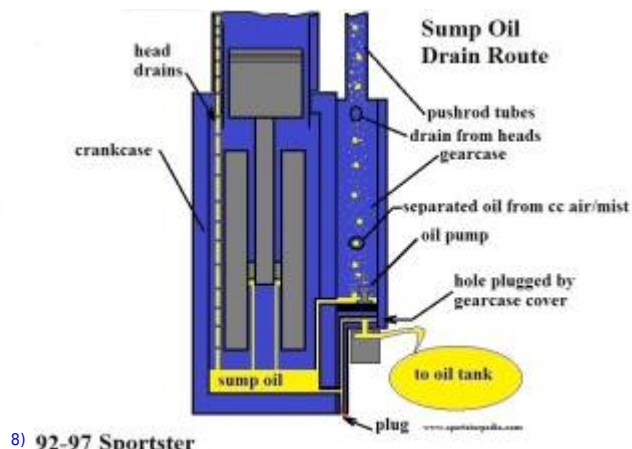
86-90 oil scavenging <sup>5)</sup>	86-90 cam cover <sup>6)</sup>	86-90 Oil Pump Oiling Paths. <sup>7)</sup>
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## 91-Up Engines

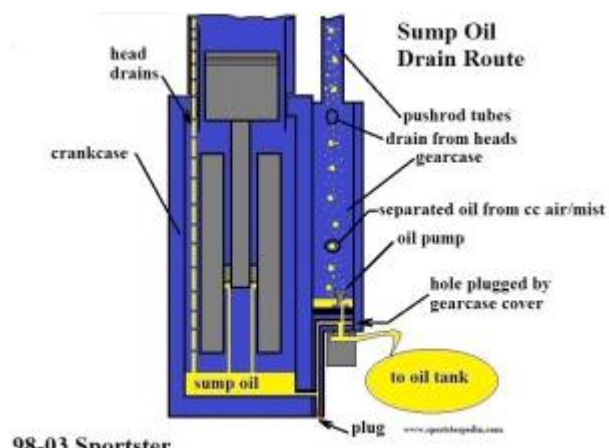


91 Sportster

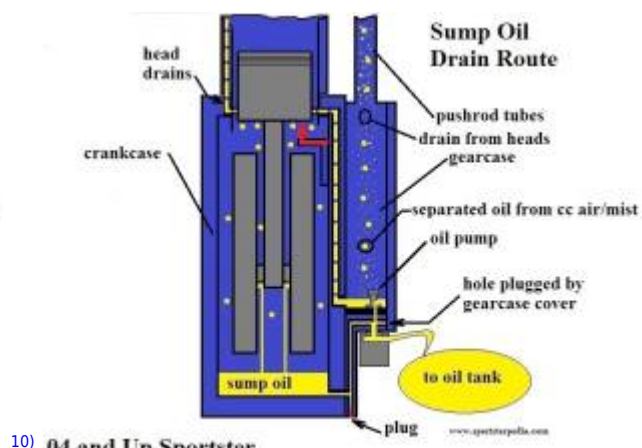


8) 92-97 Sportster

9)



98-03 Sportster



10) 04 and Up Sportster

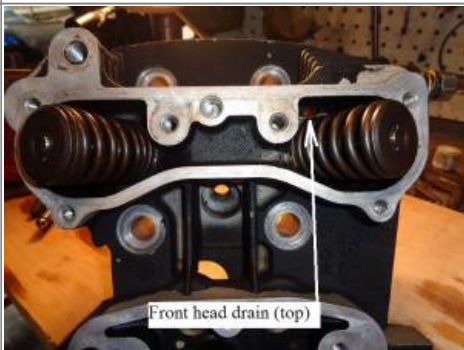
11)

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

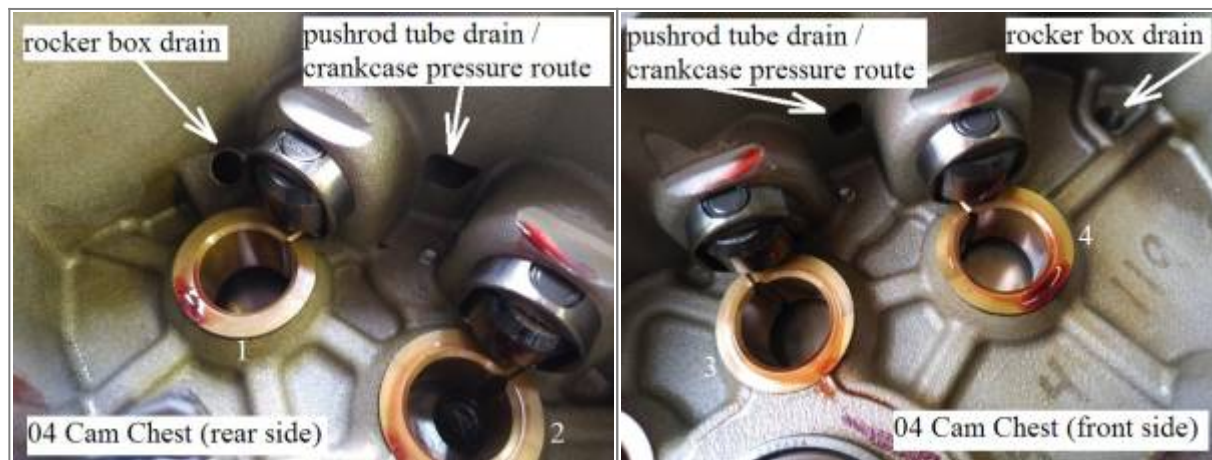


#### • 04-Up

- 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.

<p>Head drains in the cylinders <sup>18)</sup></p> <p>1 hole is plugged on each cylinder during installation.</p>	<p>Head drains at the cylinder base on the case <sup>19)</sup></p>
<p>Milled slots in the left case match milled slots in the right case for rocker box drain from valve side. <sup>20)</sup></p>	<p>Lower part of slots in the right case exit thru drilled holes into the gearcase. <sup>21)</sup></p>
<p>Rocker box drains into the cam chest. <sup>22)</sup></p>	





### • Drainage

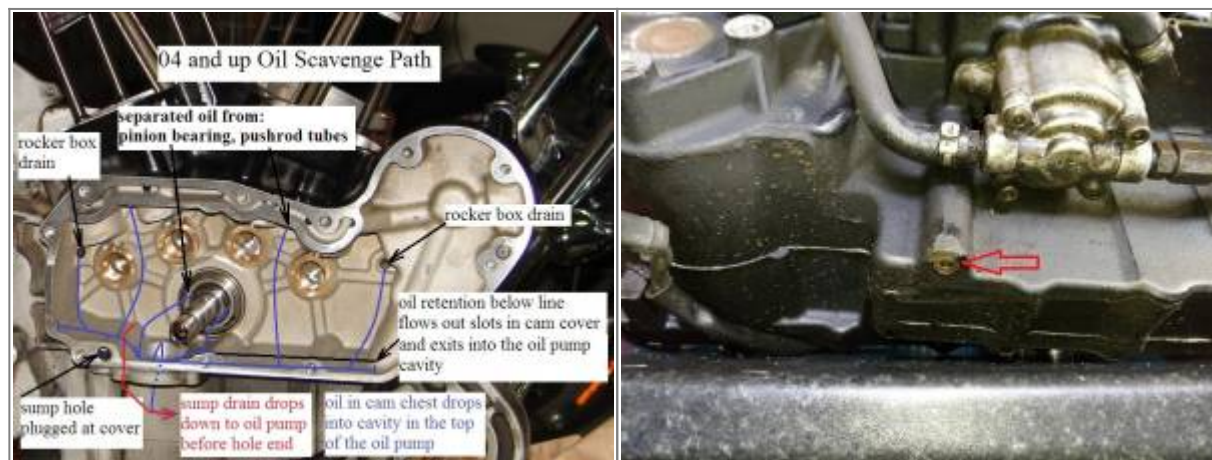
- Oil collected in the crankcase sump is passage-routed to the scavenger side of the oil pump. (by pressure generated by the downward stroke of the pistons and the scavenging effect of the pump)  
Sump oil is collected by the pump at the 'ladle, half spoon, duck bill' protruding from the back of it where oil drops onto the scavenge gerotors..<sup>23)</sup>
- 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.<sup>24)</sup>

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

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





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1) 8) 9) 10) 11)

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2) 3)

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

4) 5)

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<https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-motor-engine/sportster-motorcycle-bottom-end/183493-1986-evolution-sportster-cam-cover-install-help/page3?t=1974615&page=3>

6)

photo by engine of the XLFORUM

<https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-styles/sportster-motorcycle-project/13592-1200-conv-progress?t=22717>

7) 12) 15)

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13) 14) 16)

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19)

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[documentation/page3?t=691283&page=3](#)

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22)

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<https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-motor-engine/sportster-motorcycle-bottom-end/197307-sportster-crankcase-pressure-engine-breathing-wetsumping-and-mods/page67?t=2073932&page=67>

23)

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

24)

aswrcing of the XLFORUM

<https://www.xlforum.net/forum/buell-motorcycle-forum/buell-motorcycle-general-discussion-and-problems/140238-96-buell-s1-engine-problems-need-help/page3?t=1520811&highlight=oil+pump&page=3>

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<https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-era-specific-and-model-specific/efi-sportster-motorcycle-talk-2007-and-up/195584-oil-tank-building-pressure-blew-out-dipstick/page2?t=2071954&highlight=oil+tank+pressure&page=2>

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