Blocked oilways in Sq4s that have been stored or have had infrequent oil changes.

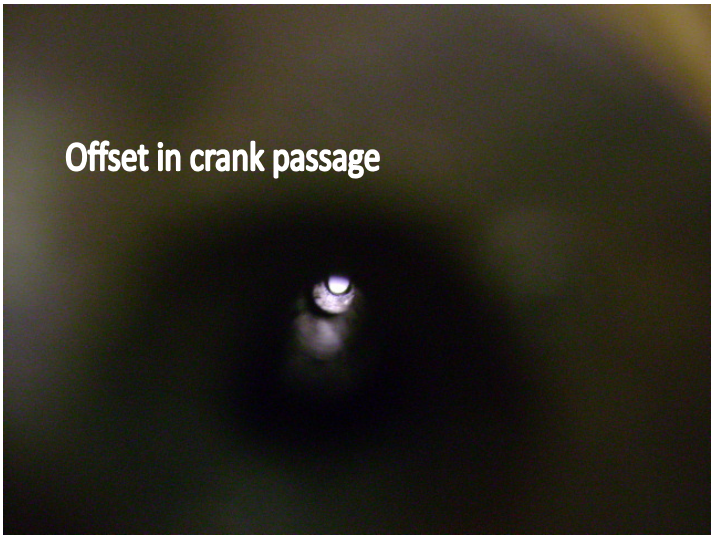
The following tell how and why to remove the sludge that blocks the crankshaft oilways in Sq4s. They were posted as e-mails but the wealth of experience and technical information is so great that I saved them here.

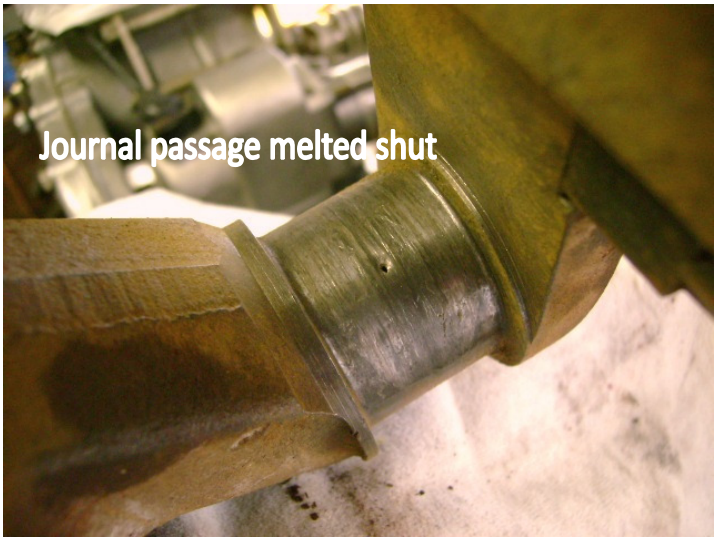
Summary
Sludge builds up in the crankshaft unless the oil is changed every 500-700 miles. Sludge progressively starves the connecting rod bearings of oil. Because the #4 rod bearing is the last in line to get oil, it will be the first to seize, breaking the rod and punching a hole in the crankcase. The sludge will be present unless oil changes have always been very frequent, consequently more than half of Sq4s have seized a rod bearing. The presence of sludge cannot be detected without opening the crankcase, and it is so hard that it cannot be flushed out with solvent. The cranks must be removed and the sludge drilled out.

Note: A related issue is metal fatigue in Sq4 connecting rods. I have been on a ride with a recently rebuilt Sq4 where one of the con-rods failed due to fatigue. In 2012 the UK club had a run of Sq4 connecting rods remanufactured by an American company (Carrillo?) to solve the metal fatigue problem. They are available through the AOMCC and Draganfly.

From: TERRY B.
The sludge in my crankshaft (1955 Sq4) was the consistency of black concrete. There is no solvent that would dissolve it in my opinion. I had to buy an extended length bit and use an electric drill to remove it. Then lots of flushing with solvent. Any one who starts a Sq up after extended storage without cleaning the oilways is looking for trouble and a big repair bill. I am now restoring a second Sq 4 (1939 Sq4) and the oilways are plugged just like the last one.

From: TERRY C.
Following the recent oil passage and sludge trap comments, I opened the sludge traps on one of my "spare" front crankshafts and found the following. Predictably the sludge had impacted in the gallery in front of the two countersink screws, so hard it needed drilling out. Then I found that the gallery through the centre of the crankshaft is drilled to 5/32" (3,9mm). The hole appears to be original with an offset in the centre of about 1mm where the holes don't quite line up. It does not look to have been tampered with. The feed hole to the number one big end





bearing is 3/32" (2.4mm) but the feed hole to number four bigend is melted shut. The centre of the main gallery at the offset junction of the holes was blocked solid and needed hammering out with a thin rod. The supply hole in the main journal at number one is 7/32" (5,5mm). The crank has a "Y" stamped on one bigend casting if that means anything to anybody. Incedentally, the material that was blocking the gallery appears to be grit or sand based plus oil, with a few very small metal particles. total amount would probable fill two plastic valve caps. When the rod let go, it left some healthy dents in the crank; about 1.5mm deep.

From: Chuck W.

I'll try and explain what I've learned about this Sq 4 engine. I have kept records on most all of the 63 Sq 4 engines that I have re-done since 1959. This includes all the engines from 1937 to 59. I have never got into the cammys for a complete overhaul.

I believe I said in a previous mail that approx. 60 percent of all Sq. 4,s have thrown a rod or two in their service. Of the 63 that I have done , 37 of them had a rod seize and most of them made a big hole out the bottom. In most all cases it was either #3 or #4 rod that seized. More so on # 4 since it is the last to get oil. Never the rods fault. It was from the oil passage through the crank that got plugged solid from dirty oil, other metal or an engine that did not run for long periods and varnish, gum, and condensation formed into a solid that took a drill to drill it out. Early engines did not have a step from being drilled from both ends, which can break a drill if it hangs up. Later MK twos all had that step.

Some engines had thick loose sludge but most were caked solid. Engines that had run with frequent oil changes were in pretty good shape. My 56 MK 2 I bought new and when I first took It apart at 46,000 miles was clean. Again at 77,000 miles was still clean but I changed oil every 500-700 miles. The oil gets diluted very soon in this engine, as is very obvious. I never added a filter because I could see that the original pump was not sufficient to push 50 wt oil through it when cold. The new Morgo pump will do a good job of it, but I still change oil before it gets too dirty.

I drill out the cranks then fray the end of a large clutch cable and drag it back and forth through the hole then flush with high pressure cleaning fluid and MEK, Acetone or Lacquer thinner. The screws in each end of the cranks can be difficult to loosen but a couple of good taps with a stubby screw driver will shock the metal enough to help out.

Some engines froze because of the oil pump stoppage.(stripped worm drive, gears locked up from debris, or poor maintenance on the pump). The pump cannot push oil through plugged cranks. It delivers under pressure to the areas that are required, (main bushings on right side, over-head oil line, areas that have clearance) and that oil drains to the sump where the screen is located, then is scavenged back to the tank by the scavenge gears. When the crank oil passages are plugged , you will never know it until the rod seizes from lack of oil. As I've said many times, an engine will run fine at low RPM from splash oil getting to the sides of the rod bearings, but when at higher RPM and engine load there has to be oil fed to the journals under pressure. When they are plugged they don't get sufficient oil.

Return oil to the tank does not tell you that the rod journals are getting sufficient oil. All it tells you is that the pump is operating and is scavenging oil from the bottom of the engine. I do not have an original pump on any of my Sq 4s, I went to the Morgo pump. When I used the original pump, I pulled the oil cap on every engine start to check for pump operation, because the pump drive usually strips on eng. start, or froze after shut down.

Oil filter is a good route to go with the Morgo pump, but oil isn't that expensive to change more often.

This is pretty lengthy but maybe it will help some. The engine does have some troubles but can be a joy to operate and show.

Here’s an ebay picture of a Sq4 crankcase destroyed by a thrown rod.