

Chrysler IIIH Task Force  
Conference Call Minutes  
June 30, 2014

Attendees

Chrysler: Jeff Betz, Haiying Tang

SwRI: Sid Clark, Karin Haumann, Bill Buscher

Intertek: Charlie Leverett, Addison Schweitzer

Lubrizol: George Szappanos, Mike Conrad

Afton: Ed Altman, Dave Glaenzer

Ashland: Amol Savant

Oronite: Kaustav Sinha

OHT: Jason Bowden

TMC: Rich Grundza

Karin opened the meeting with a review of action items from an earlier meeting;

- 1) Karin indicated she has received the final Engine Controller calibration for prove-out testing using the fixed camshaft phasers. Karin planned to start a test running the new calibration with the fixed camshaft gears June 30, 2014.
- 2) The group discussed availability of the IMTS Cylinder Heads. Karin figured current needs would be one set of heads for each test stand, currently planned for eight (8) test stands. If all stands are running the requirement will be 16 heads / week, 64 heads / month. Current Seed Materials will provide two months inventory. Charlie Leverett questioned whether we would have a minimum six month inventory available at the start of Matrix Testing. Jeff Betz informed the group that Chrysler has 160 heads sitting in storage at Chrysler for this program and he felt the program should be self-sustaining by the time we were ready for Matrix Testing as the labs should be providing pull-off materials by that time.
- 3) The group discussed print availability for Stand Set-up Materials, i.e., Front Engine Mount, Harness Connections, and Thermocouple installations for the Oil Cooler. Karin indicated she went back and looked for the Exhaust Turn Downs and sent photos to the group. Karin also clarified the thermocouple insertion depth for the oil cooler to be 5mm back from full insertion contact.
- 4) The group discussed progress on the Chrysler Engine Assembly Manual. Sid informed everyone that the photos were out for cropping and the basic structure of the document was in progress.
- 5) The group discussed plans to conduct an engine build class at Chrysler. Jeff Betz indicated the class would most likely be two days and agreed it would be tailored to more test specific content. Additional discussion focused on questions about honing and Bill Buscher commented that should be conducted in San Antonio. Karin has been working on honing procedures using the SV-10 honer and plans to work with Intertek to finalize the process once test pistons are

received. Ed Altman asked if it might be possible to spend an additional day after the GMOD Engine Build Class to review honing at SwRI for the Chrysler Test. Charlie Leverett commented the class might be better held until September. Ed Altman suggested possibly being able to review the Chrysler Honing Process at SwRI during the GMOD Workshop regardless whether the pistons are actually available. Karin commented she felt that could be arranged.

Additional discussions focused on availability of special test materials with an update on the status of materials from Jeff Betz and Jason Bowden.

Engines are available through Chrysler 70 currently with plans for 200 after the first of the year. Bill Buscher commented that the PCEOCP indicated the GF-6 Matrices would not be starting until the first of the year (January 1015).

Jason commented:

- Pistons are still expected around the end of July
- Piston Rings are still waiting on quote from the supplier and Jason can't give any lead time info until receiving the quote.
- OHT has a small quantity of fixed phasers, waiting on SwRI approval testing for larger order.
- Modified Pump Adaptor, Coolant Cross Over, Dyno Harness & Jumper Harness are available.
- Oil Pans are currently waiting on final design criterion. The group discussed concerns over design variations between displacement blocks and welded chambers in the oil pan. Their recommendations were to use the same design at all labs, and incorporate additional drain plugs for inside welded chambers so the pans could be checked for leaks. Karin commented she preferred displacement blocks but agreed welded designs could be viable.

Karin asked Intertek for a stand installation update:

Addison reported IAR is in the Test Stand De-bugging phase with plans to run their first test the second week of July.

George asked TMC about supplying reference oils for the Chrysler Test.

Rich Grundza suggested contacting Frank Farber as any reference oil release for the Chrysler Test would require data reporting to TMC. Rich went on to say the TMC does not have any of the REO2 or REO3 oils and prefers not to send out any 434-1, waiting on approval of 434-2. Rich believes there is ample supply of reference oils 438 with questionable supply of 435.

Dependent Lab Updates:

Lubrizol reported they were in stand shakedown mode with plans to build a test engine with proper piston ring gaps starting that test possibly early after the second week of July.

Afton reported they would be in stand shakedown mode around the end of July. Ed Altman also indicated that Afton fabricated their front engine mount similar to the Sequence IIIG front mount design. Lubrizol has also made this type mount for their application.

The group spent considerable time discussing the engine oil cooler design. The group reviewed presentation materials from George and Karin. Discussions included flow requirements, directions, and point of return for the engine oil cooler application. Additional comments included concerns about minimizing the amount of oil outside the engine and its potential effect on oil aeration.

Suggestions included several modifications with final focus on plumbing the coolant out from the oil cooler to the inlet side of the external coolant pump or dumping it straight into the coolant reservoir. (Presentations attached)

Lubrizol and Afton will wait further decision on the oil cooler application before finishing their stand installations.

SwRI is working on the DRAFT Procedure.

TMC is working on the Beta Version of the IIIH Data Dictionary

Action Items:

- 1) Karin will investigate the possibility of changing the front engine mount design to something similar to the Sequence III G type wrap around the lower portion of the oil pan area.
- 2) Karin will send photos of the coolant inlet to OHT.
- 3) TMC will check on release of the Data Dictionary

This is a compilation from notes recorded during the call, with comments from member participants during the Draft Review. Certain subjects may not necessarily be in exact order; however, they are believed to represent an accurate account of the call. If anyone feels changes or additional content may be necessary, please contact Sid Clark @ 586-873-1255 or [Sidney.Clark@swri.org](mailto:Sidney.Clark@swri.org)

Thanks, Sid



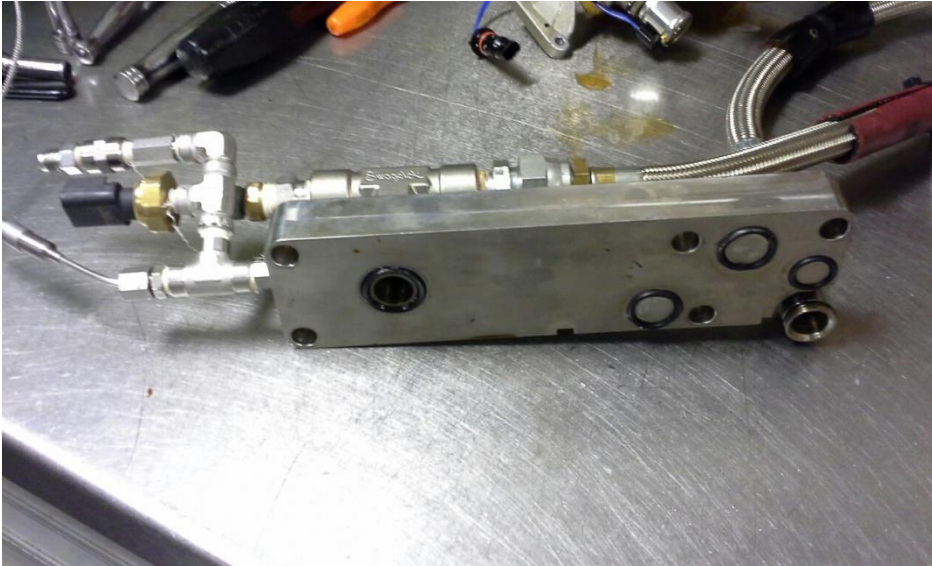
Oronite



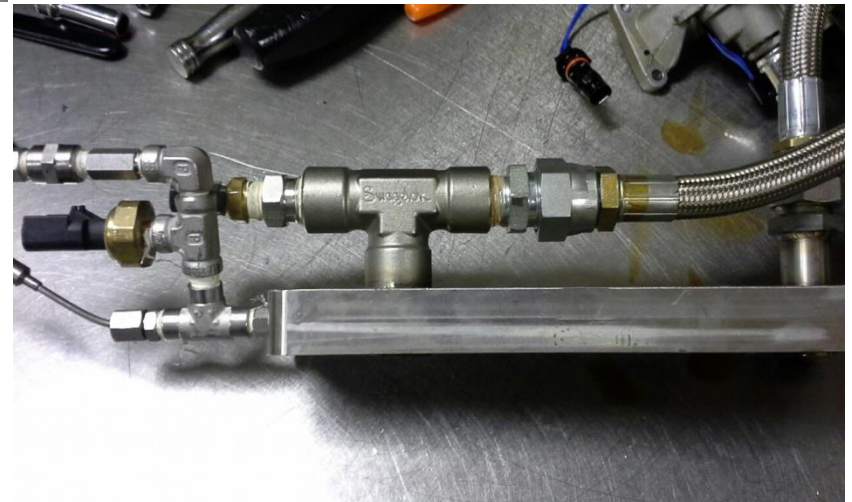
# Pentastar Coolant Flow

June 24, 2014

Plate used to block off coolant flow and condition the oil outside the engine.

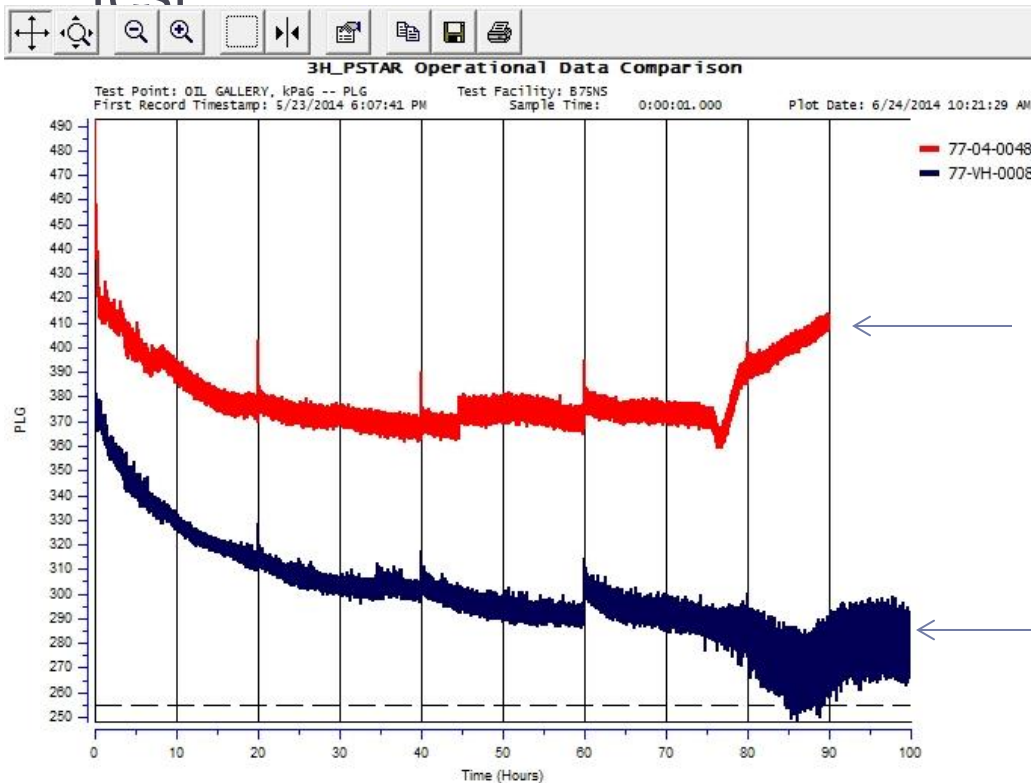


We originally ran with this plate in place of the oil cooler. Eleven tests were run with the oil being conditioned outside the engine.



# Issues

Volume of oil taken outside the engine created a lower level in the oil pan that resulted in oil aeration at the end of the test

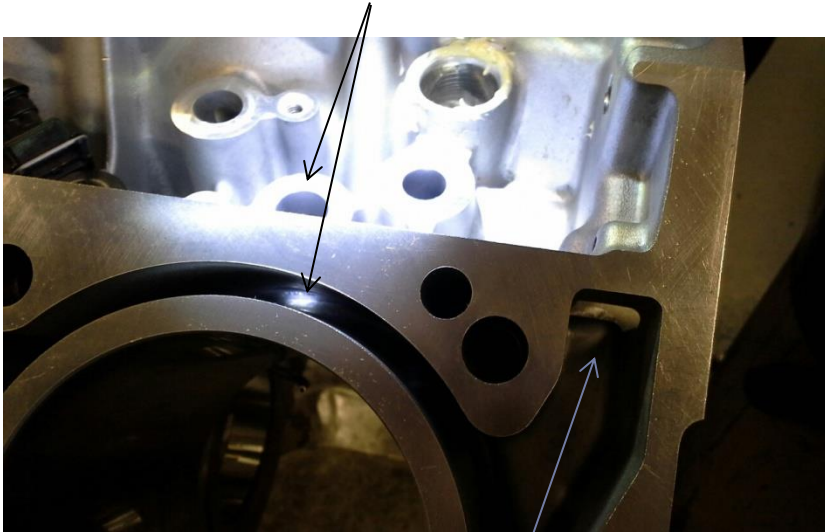


← Stock Configuration

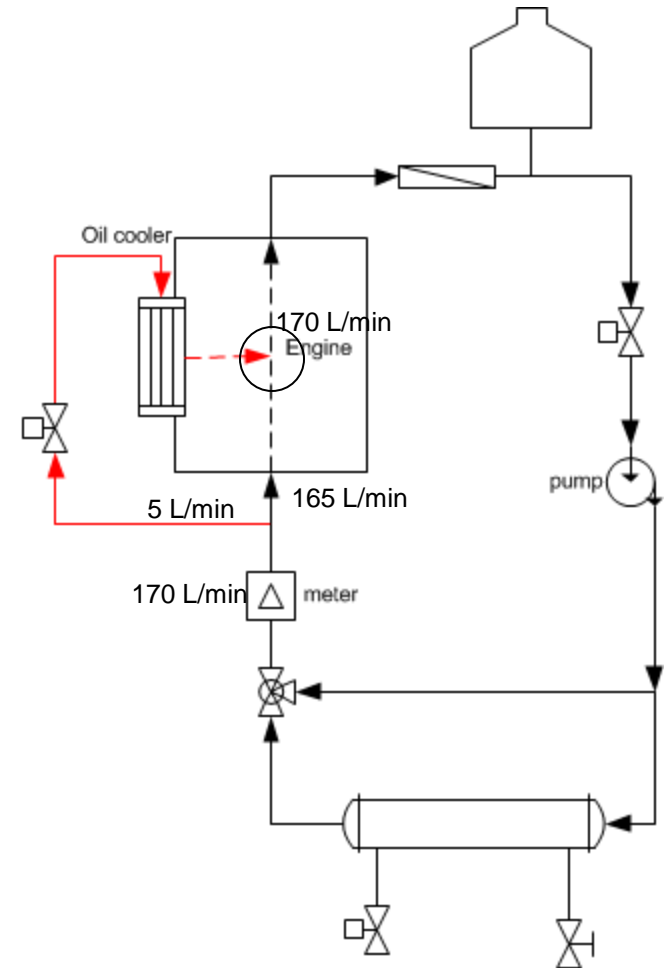
← Oil Conditioned Outside of Engine

# Current Coolant Flow

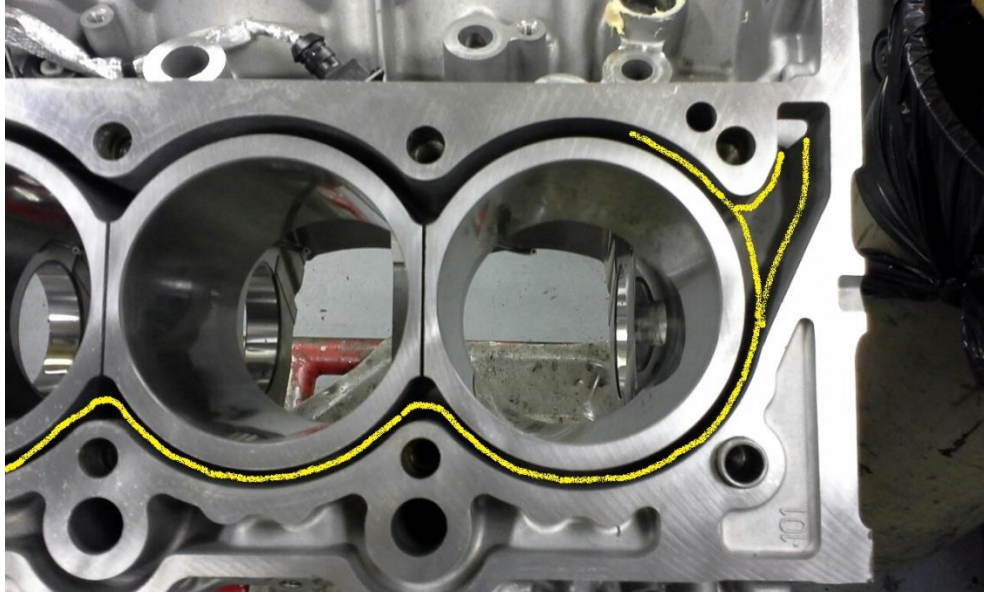
Flow into the block from cooler



Flow into the block from pump



# Flow Through the Block

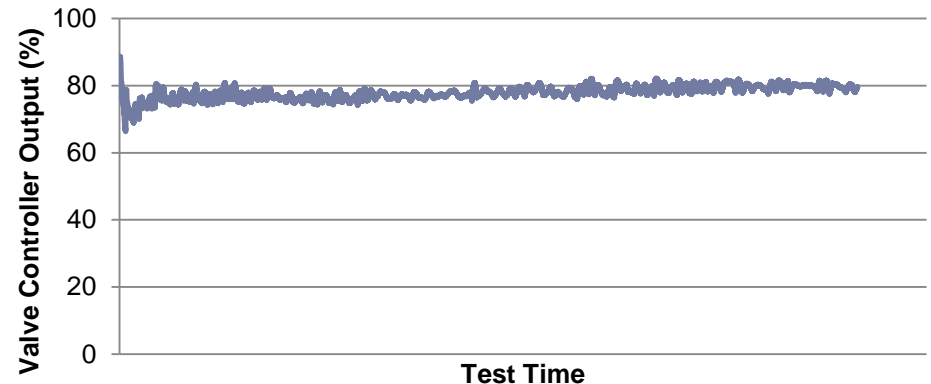


According to the Chrysler, the typical flow rate through the engine is 190 L/min with a maximum flow of 16 L/min through the oil cooler.

Average controller output for oil temp valve is  $79 \pm 1.5\%$ .

At 70% controller output the potential reduction in flow is  $\sim 2.4$  L/min on each side of the block. The yellow area is the portion of the coolant jacket possibly affected??

## Oil Temp Control Valve Position





# Conclusions

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- ▶ Changes in oil temperature valve position do not impact the 170 L/min flow rate circulating through the engine.
- ▶ Increasing flow through the oil cooler has an undetermined affect on the pattern of the flow through the block.



# Proposal to include a remote oil cooler Chrysler IIIH Oxidation and Deposit Test

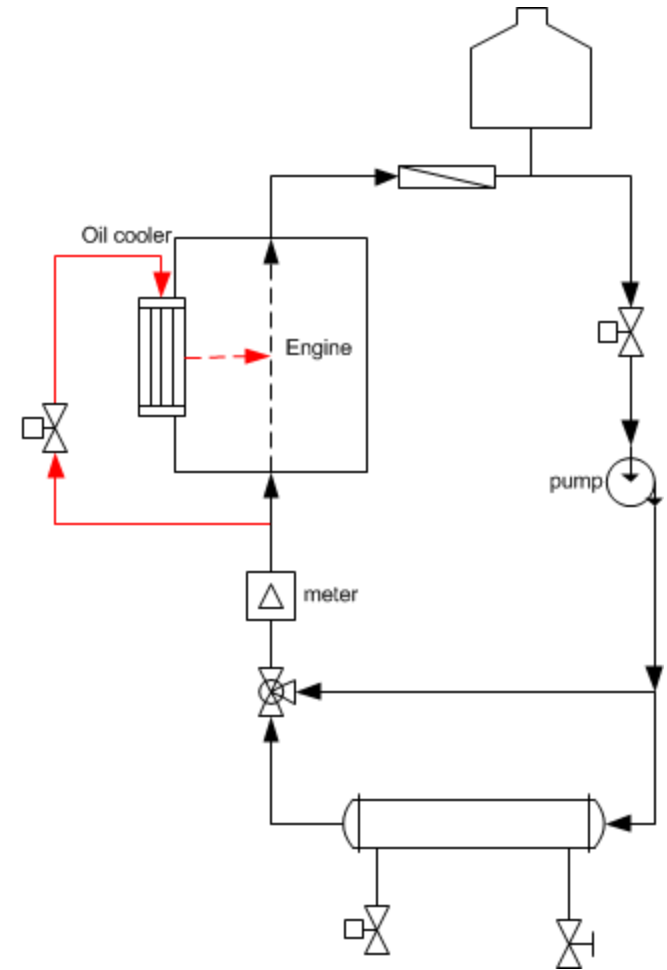
6/19/2014

# What's the issue



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- By remotely relocating the main engine coolant pump, two things occur:
  - The coolant flow through the oil cooler is reversed
  - The **measured** coolant flow is split between the engine and oil cooler
- The latter is the more significant, as it impacts the heat load to the engine and the average engine temperature



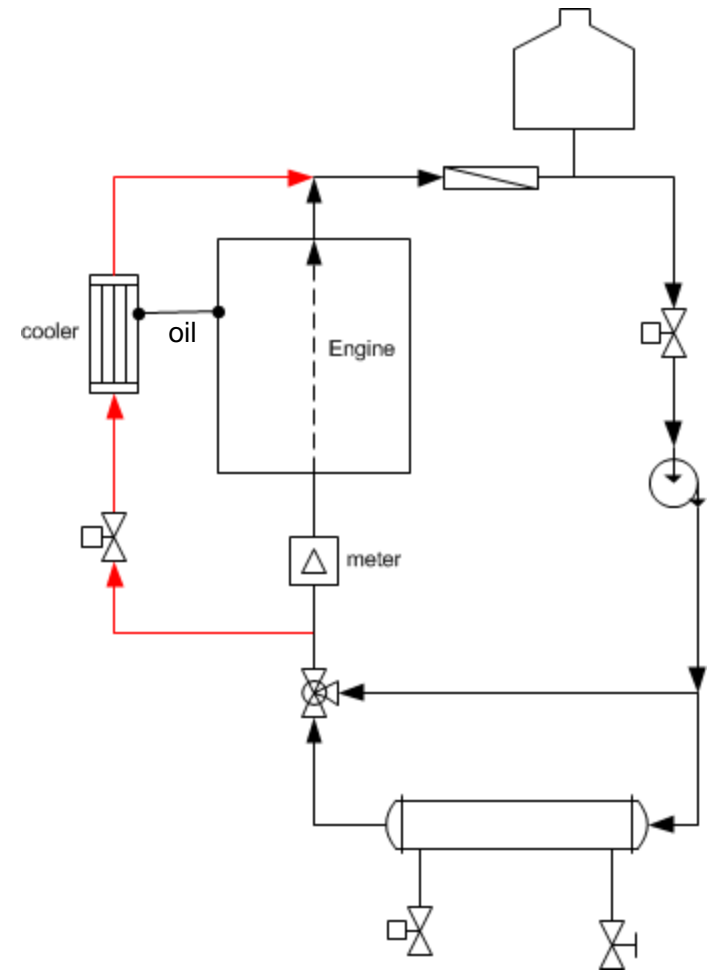
# Options -



- A. Leave as is and convince ourselves that although theoretically it makes a difference, practically it does not
  - Would require testing
  - Without thoroughly investigating the impact, we are leaving ourselves open to test variability
- B. Reconfigure the oil cooling circuit
  - Removes all doubt / concern
  - Would require some additional hardware
    - Block-off adaptor of OE oil cooler that eliminates that component in the system
    - A remote oil cooler, mounted closely to minimize additional oil volume

# Option B – remote cooler

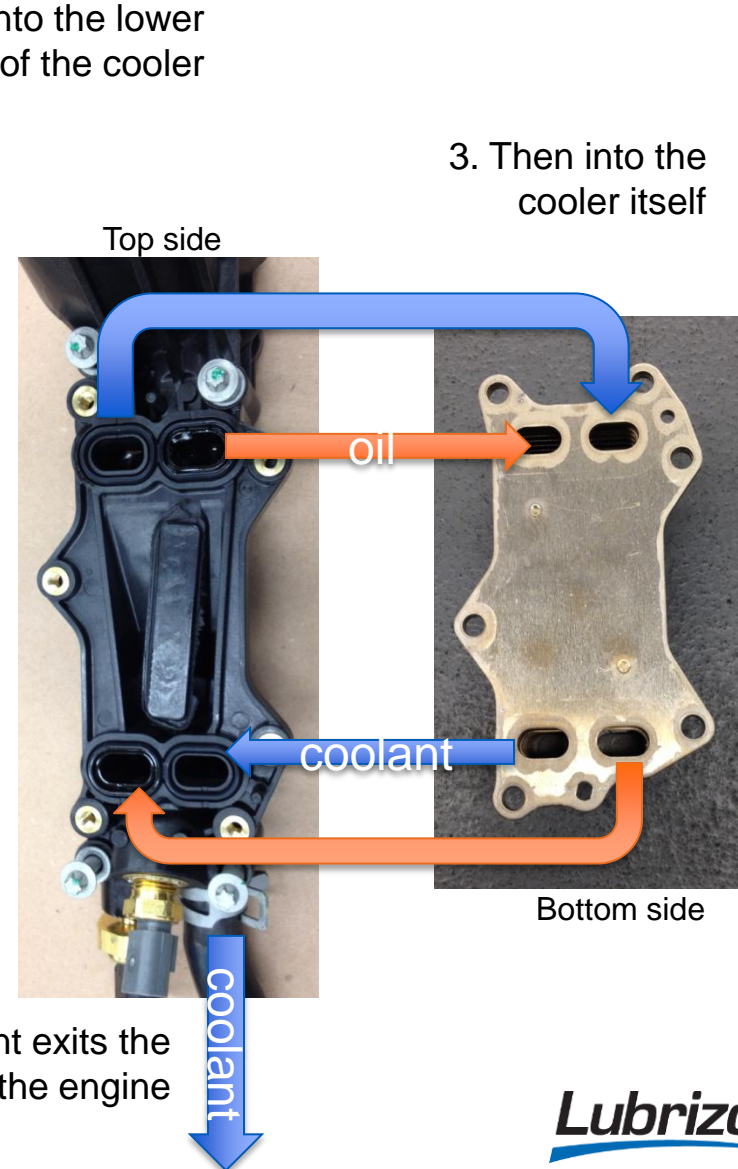
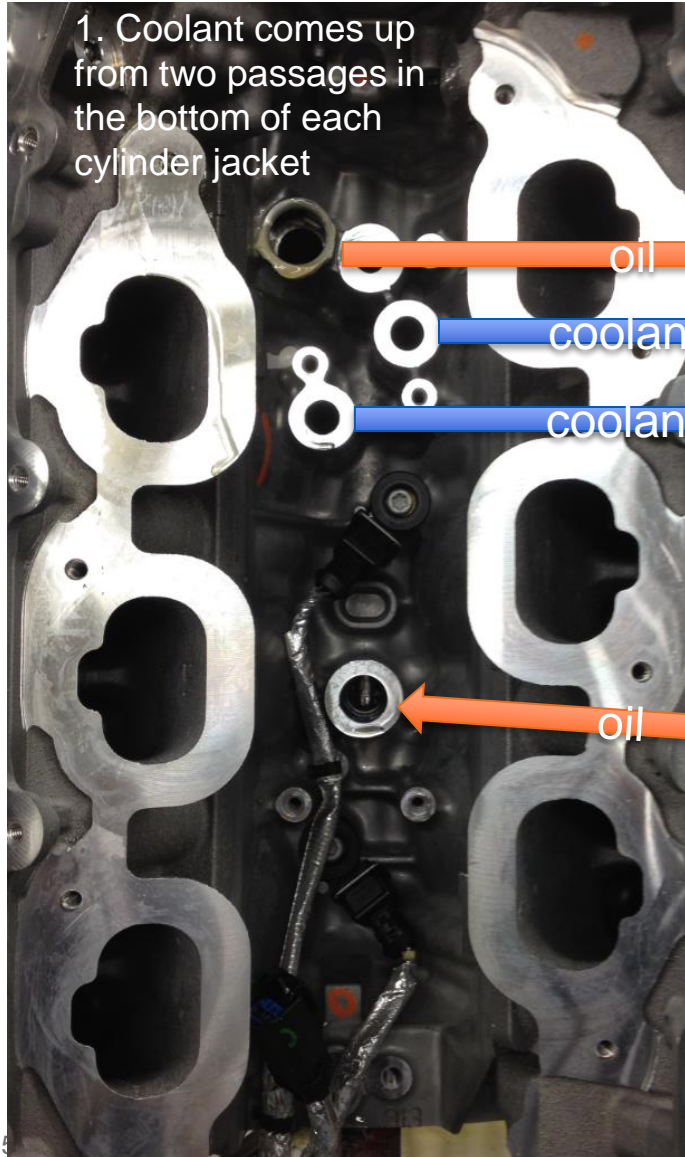
- Insures consistency
- Fairly straightforward modification
  - Routes oil to remote cooler
  - Cooler draws coolant flow from unmeasured source
  - Blocks coolant flow at cooler/block location
  - OE oil cooler “outlet” can be left uncapped
- Need to mount oil cooler close to engine to minimize additional oil volume in lines
- Uses OE / factory cooler



# Intended "factory" oil cooler flow schematic



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# Adaptor plate proposal

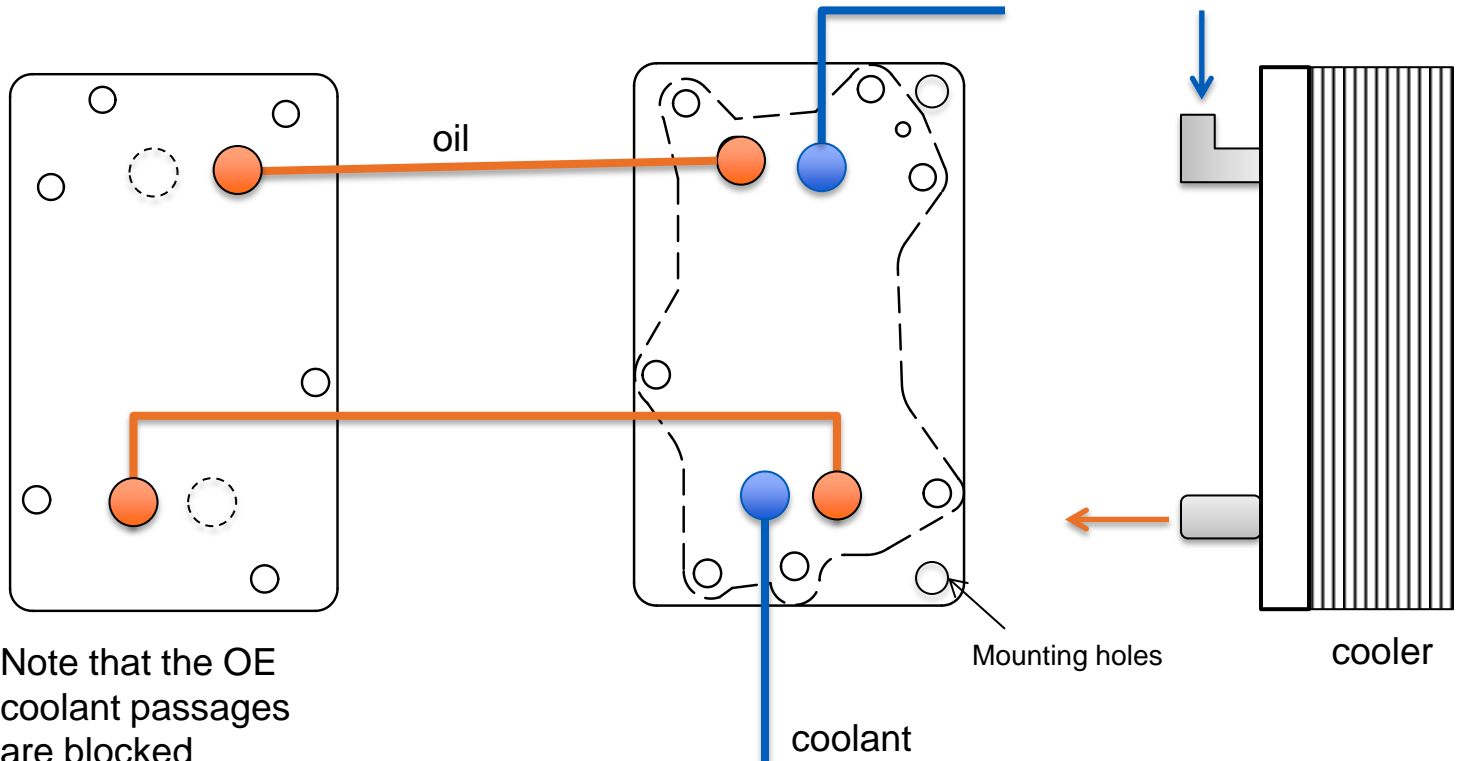


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Adaptor plate on **engine**, with NPT holes for oil line fittings

Remote mounting plate for OE cooler, near rear of engine

Side view, cooler bolted to remote mounting plate



Note that the OE coolant passages are blocked

Chrysler Oil Cooler Plumbing as discussed during the call on June 30, 2014

