

3.) Engine Starts But Has A P1211 Code

KOEO	14%
Crank to Start	Less than 30% typically with no leaks and engine starts
Idle	8 - 16% @ operating temperature
Full Load	Less than 50% with no ICP system leaks
No Start (Max Command)	54% for 94 to 97 MY 65% for 98 MY or newer

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IPR% higher than expected. Stall shortly after cold start may also be a symptom. Prior to diagnosing a vehicle with a P1211, [fuel pressure](#) should be verified.

This indicates a smaller leak in the high pressure system. Using the same block off plugs described earlier to block off one bank and observing IPR% when engine is running on each bank at similar rpms. Higher IPR% on one bank compared to the other would indicate a leak on the higher IPR% bank. Example:

	LEFT BANK	RIGHT BANK
COMMAND	IPR% @ idle 16%	IPR% @ idle 26% (higher than other bank and out of spec)
CONDITION	Starts quickly	Long crank to start compared to left bank
FINDING	No leak	ICP system has leak on this bank

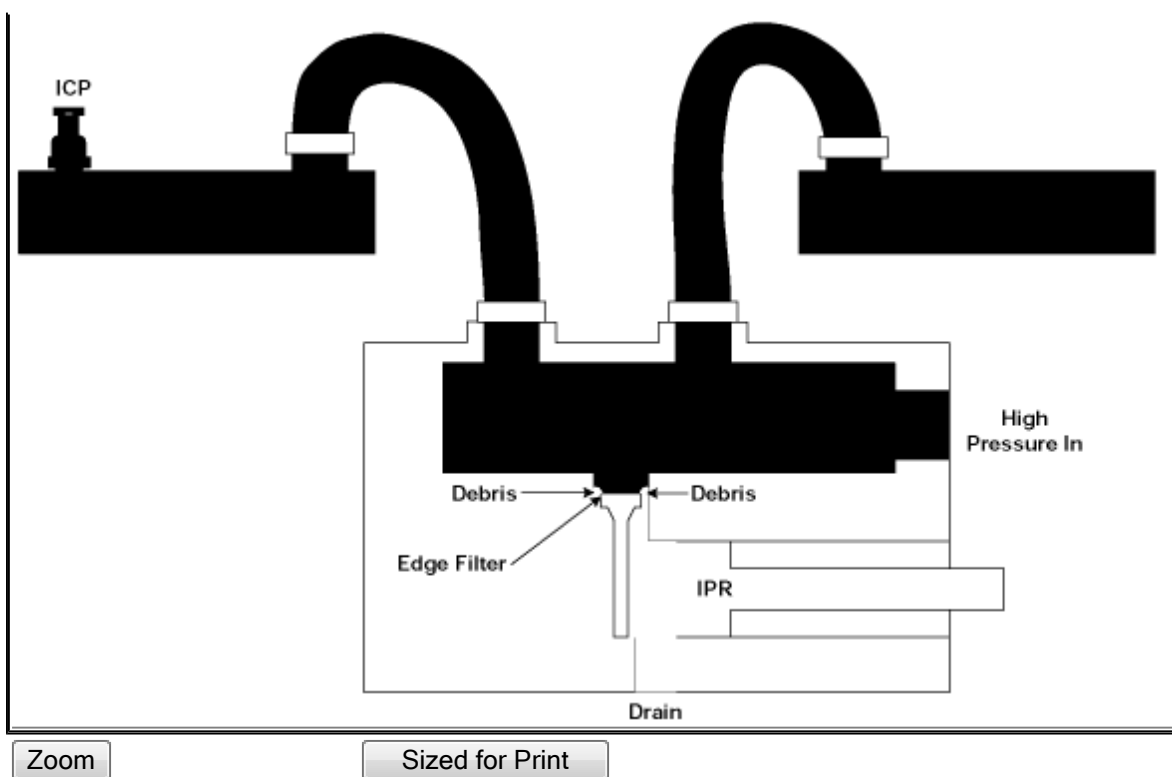
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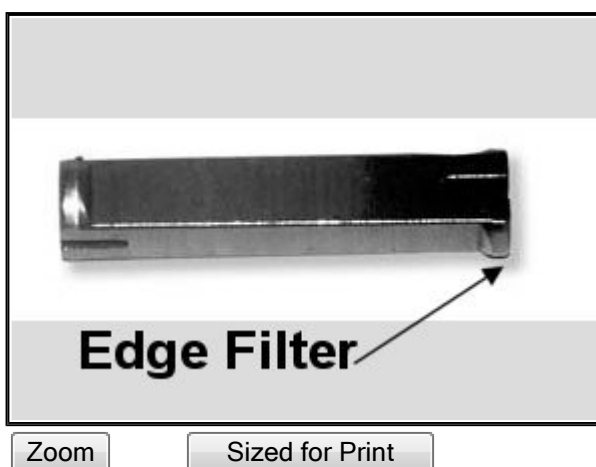
Repair as needed after locating leak as described in visual inspection in previous routing.

4.) Diagnosing P1211 With IPR% Less Than 8 at Idle





ICP more than 4110 psi above command for at least 7.5 seconds can set a P1211 code. IPR with low duty cycle (less than 8% @ idle) and engine running, indicates a restriction in the drain circuit. This restriction is taking the place of the IPR valve, driving the IPR duty cycle lower, with higher than expected ICP. The excess restriction will be in the reservoir, front cover, stuck IPR valve, or debris above the edge filter. The drain path through the reservoir and front cover can be visually verified. Typically the pump or IPR must be replaced to repair this concern. Do not replace both components at the same time.



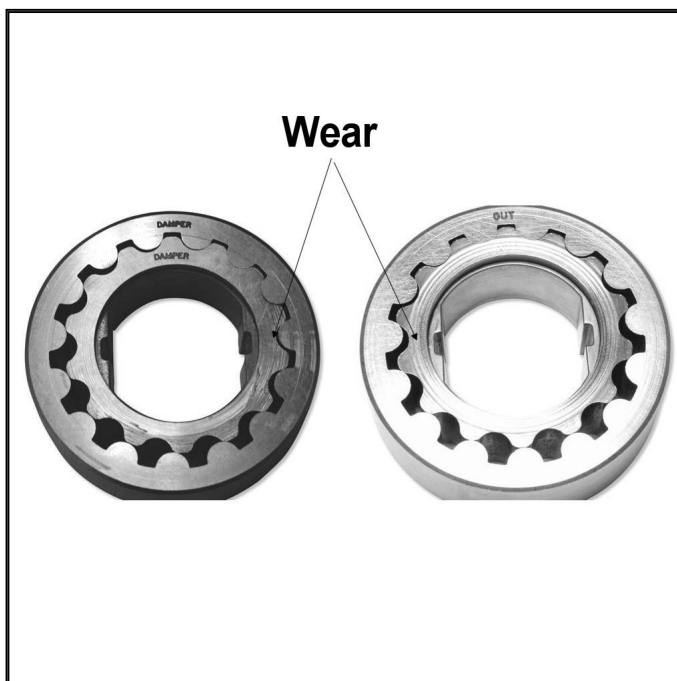
This often occurs after the oil pan is resealed where excess sealant is forced through the lube system (short circuit check valve) and trapped at the edge filter of the high pressure pump.

5.) Abnormal Long Crank/Stall after cold start

A worn lube oil pump can negatively affect ICP system's performance in the following ways.

- Cold engine, abnormal long crank to start. (Oil pressure gauge in dash moves immediately prior to start.)
- Cold engine, start then stall - then long crank to restart. (Oil pressure gauge in dash moves immediately prior to start.)

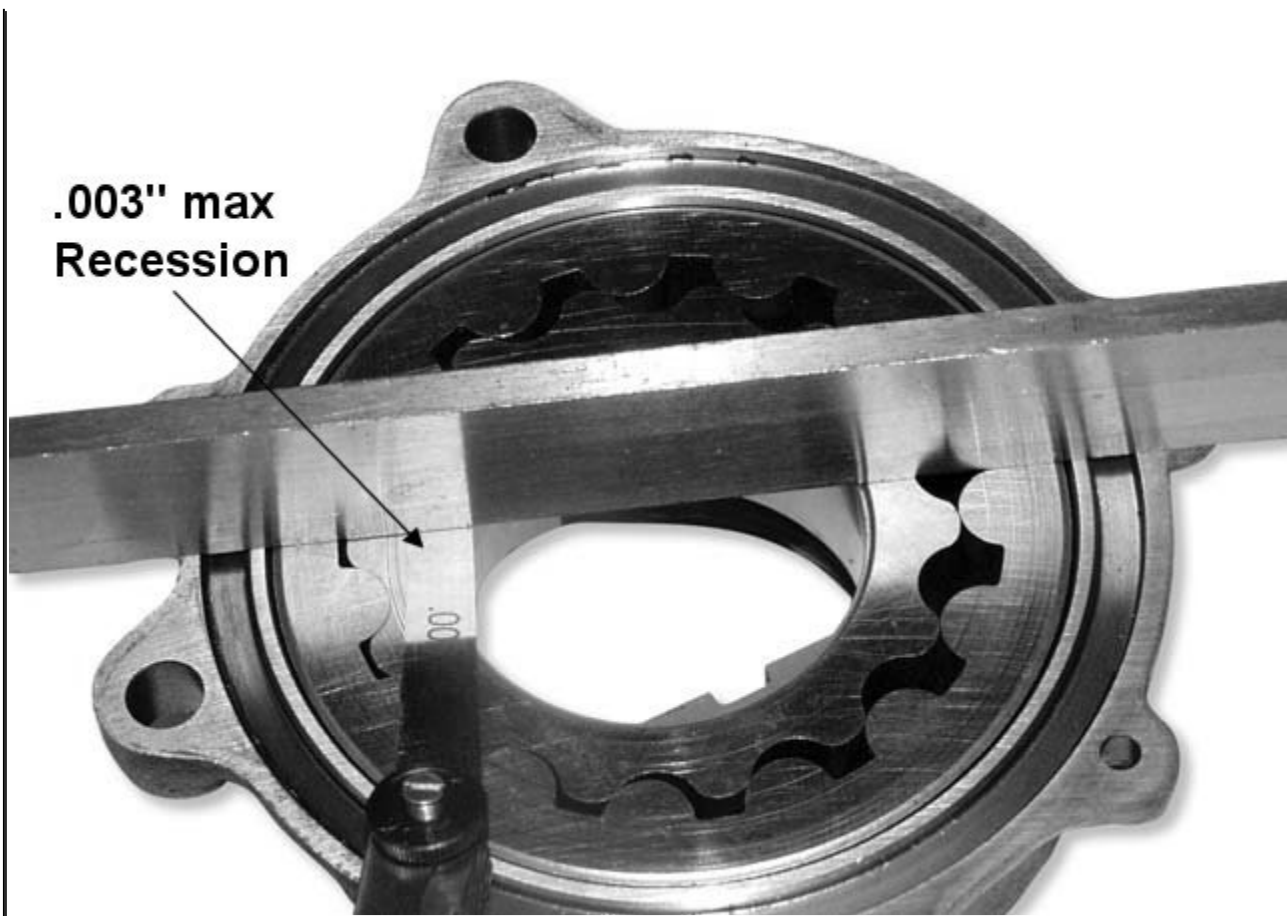
These symptoms are often mis-diagnosed as high pressure oil (ICP) concerns. Both symptoms may be caused by wear in lube oil pump or thick oil (poor maintenance). Pump wear causes a decrease in pump efficiency. Cold, thick oil becomes to move. Any lube oil system failure can negatively affect the performance of the ICP system.



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Recession greater than .003" causes long crank to start and/or stall.

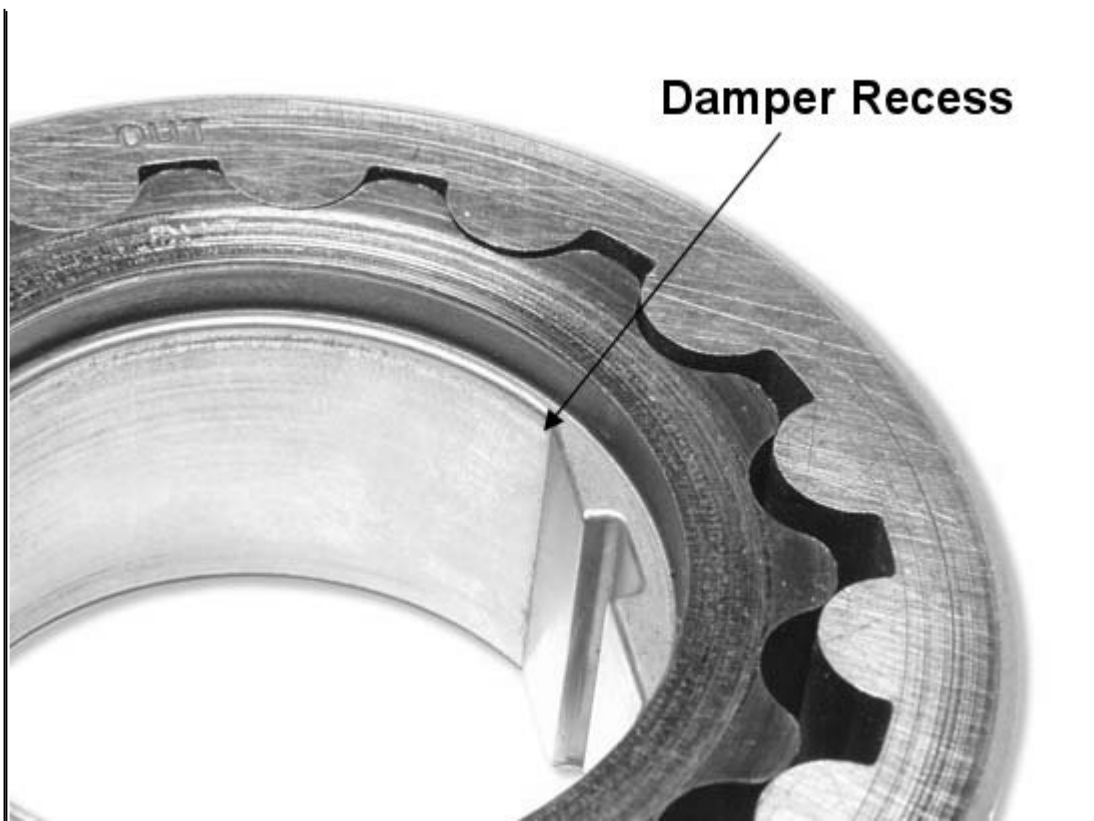


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To measure pump wear, place a straight edge across the pump housing and use a feeler gauge to measure clearance between the inner gear and the straight edge. A pump with excess gear recession will contribute to hard start issues.





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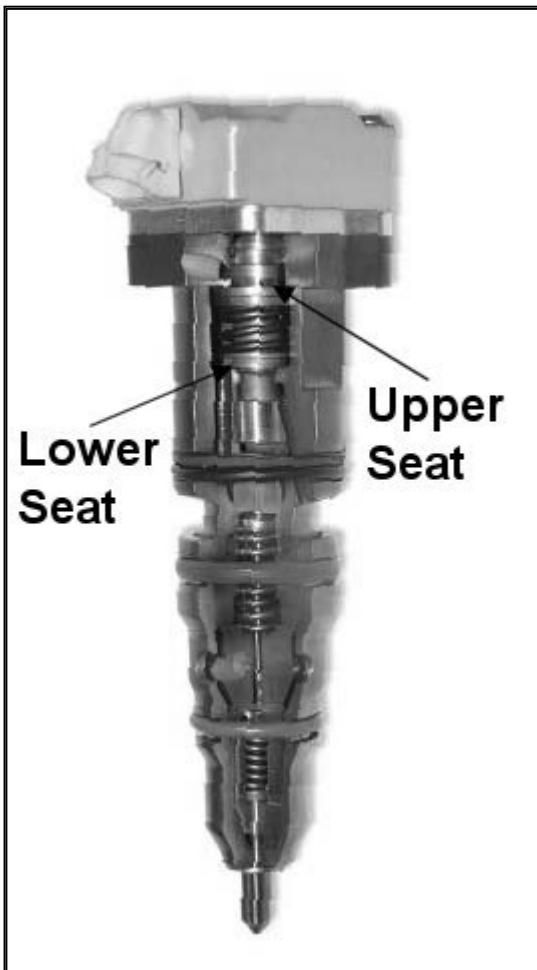
When replacing the pump, the directional marking ("out" or "damper") must face the vibration damper.

If installed correctly there is recess that the vibration damper fits into on the inner gear. If installed incorrectly, the inner gear will cause major damage to the front cover.

6.) For Hard Start Long Crank or No Start Where The Injector Will Not Buzz Loudly (Has Background Buzz Only) When Cold

Some engines have a no start/or long crank to start and the injector have a low background buzz, not a strong normal buzz. After performing the buzz test multiple times the injector may start to buzz and the engine may start and run fine the rest of the day until the next cold start. Typically, we find that this is a high mileage vehicle with poor maintenance as far as oil changes are concerned. What is occurring is that the poppet inside the injector is not able to move freely because of the thick old oil. If an oil change is performed after driving the vehicle and then driven again with new oil the next cold start the engine may improve.

Note: This concern is related to poor maintenance and extended the oil change intervals. If poor maintenance is the cause, then all 8 injectors will be affected.



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The audible sound heard while performing an injector buzz test is the poppet stopping at the upper and lower seat during actuation.