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Fixed Ops

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THE BLOOD TYPE AND VITAL SIGNS OF POWER STEERING FLUIDS

WHY AND WHEN THEY SHOULD BE SERVICED

BY RON MCELROY

The latest trend in the automaker's marketing arsenal is "Lifetime Fluids." While this sounds great to consumers, it comes at the detriment of dealership Fixed Operations business and presents an obstacle to providing proper fluid maintenance for our patrons.

The cold hard fact is that nothing lasts forever – especially vital fluids that are subjected to extreme conditions and temperatures. While great strides have been made to improve the performance and service life of lubricants and the various fluids that are essential to the health, longevity and safety of every modern vehicle (such as power steering fluid), there's little evidence to suggest that a new fluid alchemy exists that can extend a fluid's lifecycle indefinitely.

(Perhaps the closest thing we have to a modern-day "lifetime fluid" is coolant / antifreeze. In most cases, it's good for 100,000 miles or more. Considering today's operating environment and demands, the same cannot be said for brake, power steering or transmission fluids.)

This new marketing tool does beg the question: "Who benefits from a lifetime fluid?" And, if such technology were possible, why has it not been created for motor oil? In reality, it appears to be a marketing tactic by OEMs to reduce new car buyers' perceived "cost of ownership" during the warranty period – and designed to increase J.D. Power customer satisfaction ratings.

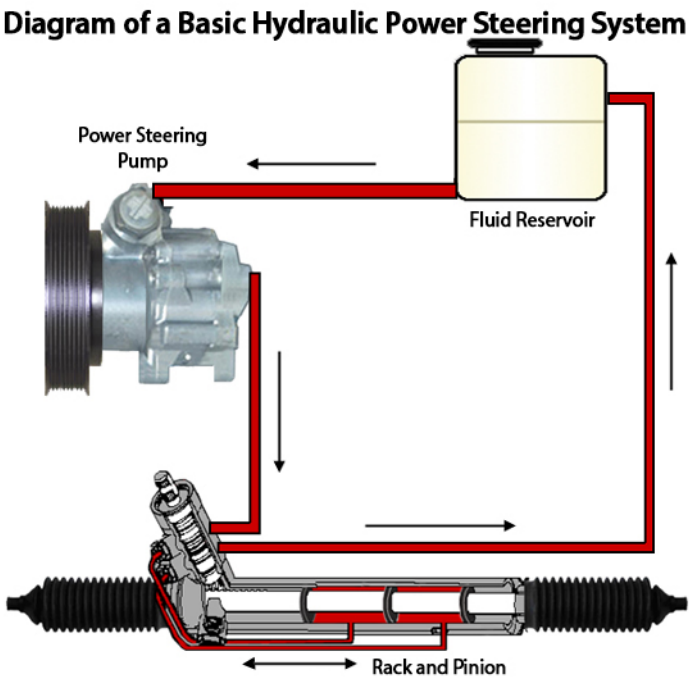
Power steering fluid is the lifeblood of the hydraulic system that steers the vehicle's wheels. This system is typically composed of an engine-driven pump, hydraulic cylinder, valves, hoses and a gear assembly. The properties the fluid and its additive package must include low compressibility, seal and pump lubricity and corrosion protection.

The first commercially produced vehicle equipped with power steering was the 1951 Chrysler Imperial. It was the development of "Hydraguide™" that made steering the massive front-end weight created by their new Hemi V-8 possible and practical. Soon, power steering was included on other high-end cars like Lincolns and Cadillacs and quickly became a luxury option available on select vehicles.

These early hydraulic steering systems were very robust, well-ventilated, operated under 500 psi and required minimum maintenance. Nearly bulletproof, little or no service was required to keep them operating properly. Therefore auto manufacturers didn't include any power steering services as recommended scheduled maintenance.

Until recently, power steering fluid was referred to as "the forgotten fluid". But today, it's perhaps the most overlooked element of fluid preventative maintenance, even though its health is critical to the performance of the vehicle's steering -- and preventing costly repairs.

Today, power steering fluid exchanges are an integral Service component of proper fluid maintenance -- necessary to maintain the performance and integrity of this system. Why? Because today's much smaller rack & pinion systems, unlike the previous generation's, operate under considerably more pressure (up to 2,500 psi) which raises the normal operating temperature of the fluid to about 178°F.



Additionally, modern engine bays are tightly-packed. Thus, restricted airflow concentrates heat on this system. Over time, the fluid becomes burnt and oxidized. As the additive package breaks down, harmful contaminates are formed, thereby changing its viscosity. The net result? Heat and contamination stresses seals and hoses and cause components (including the pump and the rack and pinion) to work harder, which can lead to premature failure.

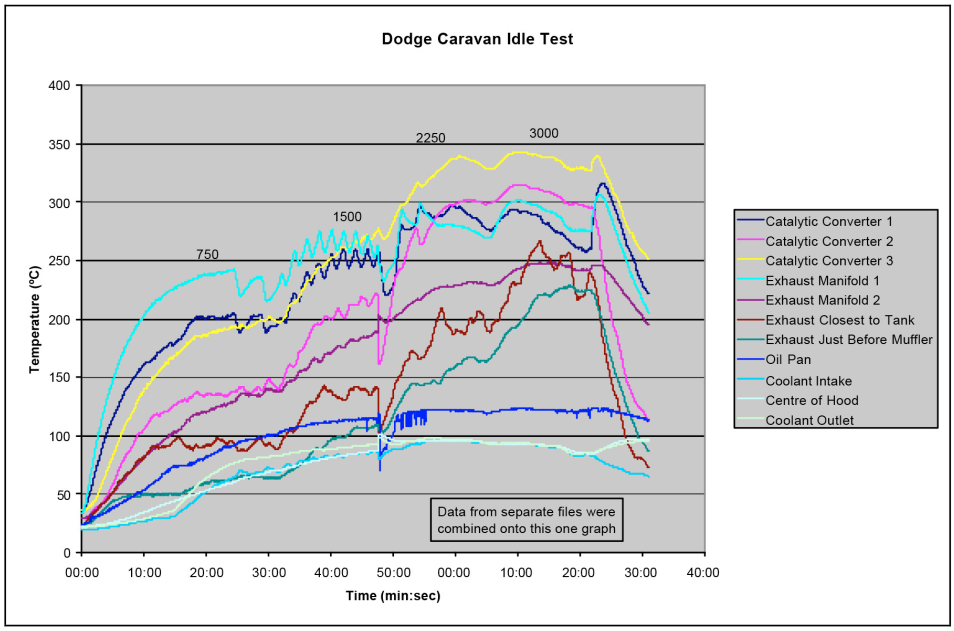
Conventional power steering fluids are usually composed of mineral oil or synthetic oil. These oils are blended with additives to control foaming, prevent corrosion and provide lubrication to the pump and steering gear. Common fluids used in power steering systems include conventional mineral oil, DEXRON® II or III, MERCON® ATF, ATF+4® and Pentosin®.

Each of these fluids is formulated to work in different environments. Most power steering fluids will not have the same level of friction modifiers as transmission fluids. Always verify applications because an incorrect substitution may cause premature failure of a power steering system.

Automatic transmission fluids are often used as power steering fluids because they maintain a relatively consistent viscosity throughout a wide temperature range, including colder temperatures. Most of these fluids are designed to lubricate and inhibit corrosion when used with specific kinds of materials. Some work well with polymers and exotic metals, while other will have harsh reactions with the same materials.

Friction and heat are the dynamic duo that drives shear and oxidation that depletes vehicle fluids. "Over time, seals and hoses decay and wear particles in the steering pump and gears can contaminate the fluid. Additive depletion and high operating and underhood temperatures will eventually cause the fluid to oxidized and break down," said Patrick Borrow, Technical Director at International Lubricants. "When this occurs, the fluid is no longer able to perform its intended function."

To illustrate Patrick's point regarding heat, the accompanying graph shows underhood temperature measurements taken at idle on a Dodge Caravan. For example at idle (750 rpm) the manifold temperature is 243°C or 469°F. As we documented in our previous "Lifetime Fluids" article (Fixed Ops Magazine, March/April 2014) the normal operating temperature for ATF fluids, including some of the same fluids use for power steering, is approximately 170°F. For every 20°F increase in the fluid's operating temperature, the resulting rate of oxidation doubles, thereby cutting the fluid's service life in half.

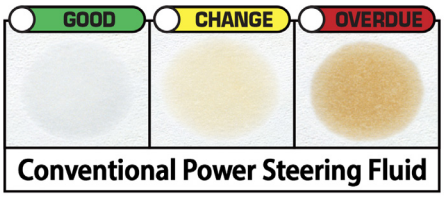


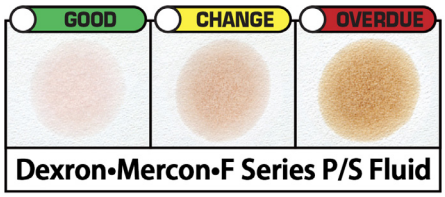
"IN THE END, FIXED OPERATIONS PROFESSIONALS ARE IN THE SERVICE BUSINESS AND PREVENTATIVE MAINTENANCE IS WHY OUR CUSTOMERS COME TO US. "LIFETIME FLUIDS" NEED SERVICING, TOO."

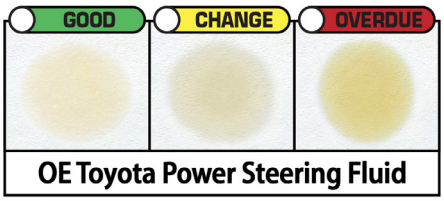
It's a scientific fact that operating a vehicle on depleted fluids leads to premature component failure. That's why testing and verifying a fluid's condition is as important as following OE time / mileage Service recommendations. And in some cases, even more so.

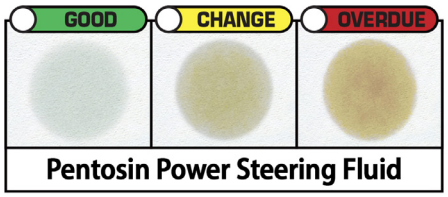
One accredited method for on-the-spot testing is chromatographic analysis. Here's how it works.

All modern lubricants contain additives that help inhibit breakdown. As these additives are depleted, sludge is formed. One drop of sample fluid is placed on the test sheet. As the fluid percolates through the unique filter paper, bands and / or zones of different hues and densities (even unwanted wear metals and debris) form a chromatogram. Changes in the appearance of the zones or bands are a clear indication that something in the lubricant has changed. A closer look at the zones, their unique formation and the debris fields contained therein reveals high particle-counts that can be correlated to ISO Code.









The following instant lubricant diagnostics chromatographic charts show how specific power steering fluids, including OE "lifetime fluids", appear at different points of depletion, as correlated to ISO laboratory analysis.

"With the advent of "lifetime fluids" it's become more important now than ever before to test all vital fluids and verify their condition," said Mike Holmes, General Manager at Bill Pearce Courtesy Honda in Reno, Nevada. "Our financial gains for our dealership speak for themselves, but we believe the most important aspect of fluid evaluation is the trust factor we have developed with our customers. It allows them to make informed decisions on the maintenance of their vehicles."

The bottom line is that "lifetime fluids" – while a wonderful idea – are no more a reality than a lifetime tire, the "100-MPG carburetor" (remember that one?) or the 10-year car wax. In the end, Fixed Operations professionals are in the Service business and preventative maintenance is why our customers come to us. "Lifetime fluids" need servicing, too.

Ron McElroy is CEO and Founder of Fluid Rx Diagnostics by Magna-Guard, Inc. He has received two "Best New Product Awards" and four "Product Innovation Awards" for creating and bringing to the automotive market innovative new products that have revolutionized the way we integrate aftermarket electronics into OEM systems and that have changed the dynamics of performing fluid preventative maintenance services.