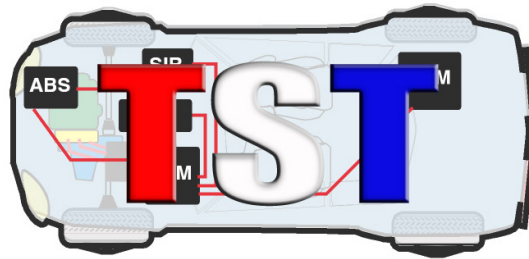


January 2020



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"Oil Loss And What To Do About It "

Have you noticed lately that some of your customers' engine oil levels are low even though the mileage interval has not been met? Well, you're not alone, since many OEs have been using thinner viscosity oil for their new engine designs to meet the CAFÉ (Corporate Average Fuel Economy) standards.

Before we go too deep into this subject, we need an understanding of the oil that is required in today's modern engine. For years, we looked at an oil bottle, only taking notice of the name brand and oil weight to maybe decide on whether to use it in the engine we are working on. Those days are over; now there are recommendations called service ratings that classify passenger and commercial vehicle motor oils by the American Petroleum Institute (API). You're most likely familiar with the API donut that is on every oil bottle that has the two-letter rating of the oil. The letters that you need to look for currently are either SM or SN, which supersede the previous ratings. The donut also has the Society of Automotive Engineers (SAE) viscosity grade that has the common numbers on the bottle, such as 0W-20 or 5W-30 and so on.

By the way, the "W" after the first number does not stand for weight, but rather for a "winter" designed oil. A 5-30 is not the same as a 5W-30 oil, so be careful to use the specific recommended oil.

(Con't on page 2)

"Oil Loss And What To Do About It" (con't from p. 1)

Manufacturer requirements and specifications are listed in all the popular service information systems.

Another important thing to remember is the difference between gasoline and diesel engine requirements. The specification for the engines are different, and it is vital that the correct oil be used. Ra-



ther than the SN-rated oil, diesel engines require the use of a CJ-4 oil. The C stands for commercial engines (diesel engines) and J is the current performance level, while the 4 in a J-4 oil indicates a 4-stroke diesel engine. Believe it or not, there is still more to understand before we move on to some problem vehicles. The OEs require the correct oil, and in some cases the oil filter, to be installed in the engine before they will even think about running their oil consumption test. More on the test later in the article, but for now let's move on with a few more bits of important information. There is another bunch of letters that are on the oil bottle, such as ILSAC (International Lubricant Standardization and Approval Committee) that is common on oils that are used in Asian vehicles, such as GF-5 that is now recommended. The next standard, ACEA (Association des Constructeurs Européens d'Automobiles), is a specification that must be used if you are changing oil on any European engine. The ACEA is a performance/quality classification, such as A3/A5 tests that are used in Europe. This standard for European engines is more stringent than the API and ILSAC standards. Be aware if there is an engine issued due to lubrication — the OE will take an oil sample and send it to a lab for testing. When the lab results come back, it

(Con't on page 6)



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Mark Warren of World Pac / Motor Magazine

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"Oil Loss And What To Do About It" (con't from p. 2)

Must indicate the correct viscosity along with the approved rated oil for the engine was used or no warranty bucks will be paid out. Don't be left on the hook for an expensive engine repair job due to improper oil usage. It's always better to purchase a good quality oil that has the correct specifications to prevent damage to today's very expensive engines.

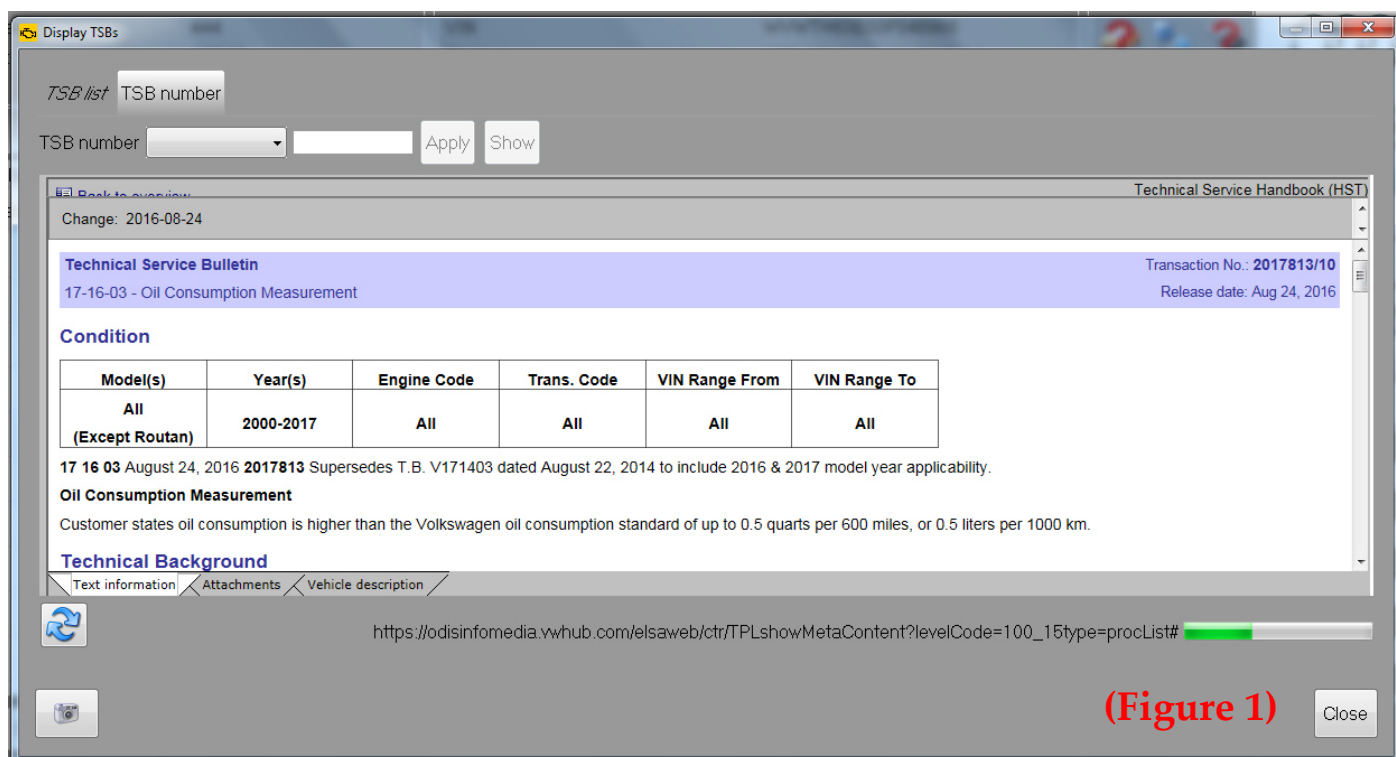
Consumption Causes

There are many issues with oil consumption on today's engine, whether it's a leak due to poor engine breathing or sealing. Consumption can also be caused by poor engine design, such as piston ring, piston or engine block design issues. Since the engines we are working on are not our father's Oldsmobile design, the amount of oil usage is different than years ago. The amount of normal oil usage has drastically changed in the past five to 10 years. For many years, the normal amount of oil consumption was considered to be a quart of oil every 3,000 to 4,000 miles after completing the engine break-in period. This is not the case today, as you can see by the ODIS VW factory scan tool screen shot (**Figure 1**) that states that up to 0.5 quarts of oil in 600 miles is normal on VWs built from 2000 to 2017! Anyway, VW is not the only OE that has an oil consumption issue. GM, Toyota, Subaru and Honda are just a few that also have problems. We had one of our customers with a Subaru return to the dealer due to a high consumption and had a new motor installed for free under warranty. Many Camry hybrid owners, including one of ours, have received the complete engine assembly replacement along with catalytic converters for free. A Toyota TSB (Technical Service Bulletin) states that some 2006 to 2011 model year vehicles equipped with the 2AZ-FE engine may exhibit engine oil consumption issues and a P0300 DTC. The fix for this issue is the replacement of an updated piston assembly that has been changed to minimize oil consumption. Some other issues that I will cover in this article related to oil are the high failure rates of timing chains and related components. There have been studies conducted into the abnormal wear of timing chains, gears and the other components that has been linked to poor oil quality. The oil quality is a big factor in the accelerated wear of the previously mentioned components. Besides low oil quality, oil

(Con't on page 7)

"Oil Loss And What To Do About It" (con't from p. 6)

level, volume, pressure, viscosity and the use of oils that don't meet specifications, there are oil additives that can accelerate timing chain and component wear. The goal in this article is not to provide you with all the TSBs on oil consumption or timing chain problems, since that would be redundant to give you information you can find in your shop's service information system. With that said, you might want to search "oil consumption" next time you're logged in!



Case Study Time

A 2009 Chevy Traverse 3.6L came in with a check engine light on, along with the following DTCs: P0017 (crankshaft position exhaust correlation Bank 1, **(Figure 2)**, P0300, P0301, P0303 and P0306. Since this engine is known for engine-related DTCs that are caused by timing chain issues, we know what we have to check. Rather than spending time diagnosing ignition or fuel issues, we are going to concentrate on the mechanical side. The 3.6L engine that is in our problem vehicle has known issues related to timing chain, gear and timing chain guides. In fact, GM will replace the

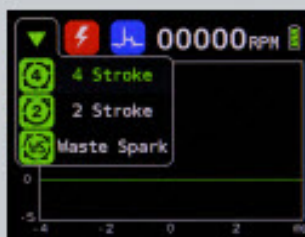
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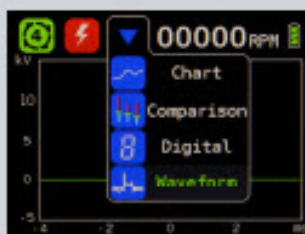
Displays secondary ignition waveforms.



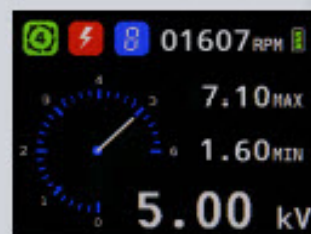
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Chart mode used for detecting intermittent or infrequent failures and misfires.

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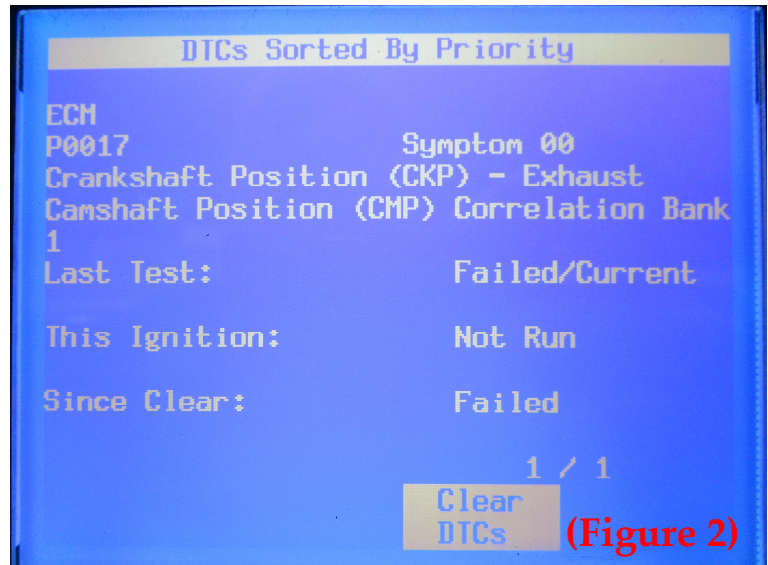
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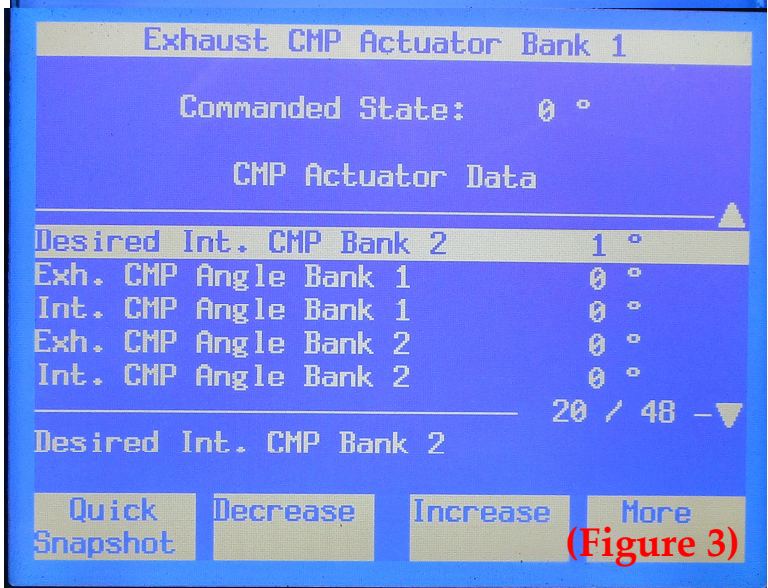
"Oil Loss And What To Do About It" (con't from p. 7)

damaged components at no charge up to 120K.

The GM dealer will replace the timing chains, inspect and only replace the gears and timing chain guides if there is extreme wear. Their research has uncovered a problem with timing chain stretch as being the main issue, so they no longer change all the components as they have done in the past. But hold on, the reason this engine has timing chain issues is due to oil and oil change intervals. GM had previously recommended a semi-synthetic DEXOS 5W-30 oil be used in the engine and changed at 7,500 miles. Their new specification for oil is a full synthetic DEXOS 5W-30 that now has a shorter recommend oil change interval of 5,000 miles. As you are surfing through service information, you will find that GM has a few TSBs that have references to timing chains and oil change requirements. Another tidbit of information on this 3.6L engine is that one quart of oil in 2,000 miles is classified as normal oil consumption.



(Figure 2)



(Figure 3)



(Figure 4)

(Con't on page 11)

"Oil Loss And What To Do About It" (con't from p. 10)

The first thing that you should always check besides the oil level is the often overlooked PCV (Positive Crankcase Ventilation) system. Many times, the No. 1 problem of oil consumption is oil being pulled through the PCV system. Make sure that the PCV valve and all the passages are clear of obstructions, along with using the OE PCV valve to avoid oil consumption problems. Any PCV restriction can cause oil consumption issues along with oil leaks from gaskets and seals.

Since the PCV and the passages were operating as designed, our first step in diagnosing the DTCs was to check the PID for camshaft



degrees. We used the scan tool data to compare actual cam degrees compared to the desired (Figure 3) of both Bank 1 and Bank 2. Notice from the screen shot in (Figure 2) that Bank 1 was OK at the time, while Bank 2 was displaying 1 degree. Since Bank 2 was currently only displaying a small amount off the desired PID, there must be an issue at different times related to engine speed and load. The same had to be true of the reading on Bank 1, since it was showing the exact degree of the desired PID. Obviously there had to be a bigger degree difference from actual to desired to set the DTCs, but the scan tool was not currently displaying the difference. With Bank 2 one degree off, it most likely did not go far enough out of specifications or it would have set a P0018 or P0019 Bank 2 Intake and Exhaust Correlation DTC. The scan tool data indicates an issue that leads to the random and

(Con't on page 14)

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"Oil Loss And What To Do About It" (con't from p. 11)

Cylinder number 6 misfire DTCs.

To uncover the root cause of the DTCs, we decided to use the scan tool's bidirectional control to check the cam phaser solenoids. As we were commanding the phasers, we observed the actual to desired readings to see if oil had the ability to flow to the cam phasers. Since we did not see the expected difference in the actual to desired readings, it was time to connect our labscope to check the cam to crank sync. We needed to use four channels of the labscope so we could connect to the intake and exhaust cam sensors. Knowing where to put it is an important step, so Bill, my lead tech, located the PCM that was right up front on the left side of the radiator support. After looking at the wiring diagrams, Bill found both intake and exhaust camshaft position sensors and back probed them.

With the labscope connected, we were able to view the waveforms **(Figures 4, 5)** to see if the timing was off. Without a known good reference, it was difficult to tell if the waveforms were good or bad. We checked iATN and other internet sites for a good reference only to come up empty handed. Bill proceeded to do a bit more research and found a group of techs on Facebook that have a wavefile forum. The techs on the forum had a reference on what should be normal. We continued to check the camshaft waveforms as we commanded the phasers to check for proper movement and reference point. Our conclusion was that the timing chains were stretched, or the gears and guides were worn and needed replacement. Credit to Bill for doing good research, finding that GM would perform the repair for free up to 120K. With the information that Bill uncovered, it spurred me to call the GM dealer that I have purchased a few vehicles from. I asked if they could check the vehicle out and get the job done within the next few weeks. Since this is a big dealership with more than 40-plus bays and technicians, they had my customer drop his vehicle off the next day. The dealership told me that they have one technician who just does these timing chain jobs and that he had just finished one and was ready for another. We were surprised the job was completed that quickly since this is

(Con't on page 20)

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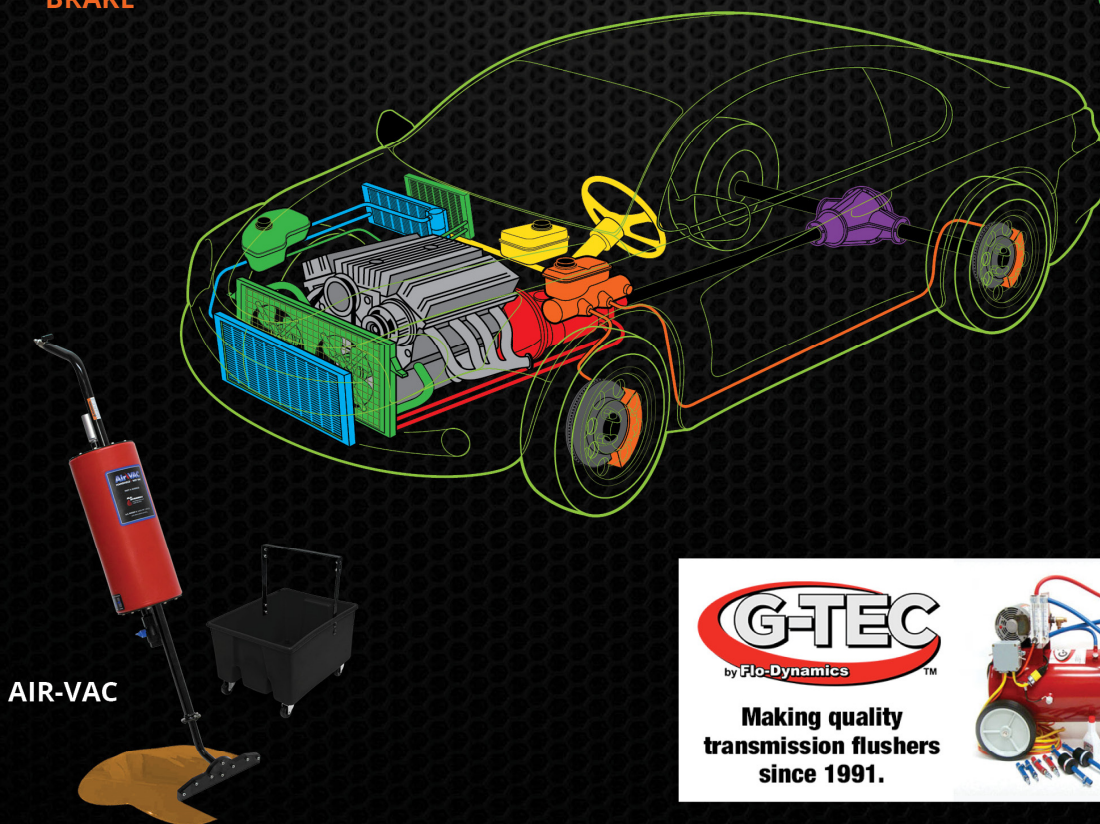
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"Oil Loss And What To Do About It" (con't from p. 14)

not an easy job. The only way to properly perform this repair is to drop the subframe along with the complete powertrain.

After the vehicle was repaired, the Traverse owner dropped by saying that the engine was running great, but the steering did not feel right. He said he called the dealership and was told he needed struts and a wheel alignment. We checked the vehicle out and found that his struts were all good and not leaking, and while it was in we checked the camshaft signals (**Figures 5**) so we could have a known good signal.

They were correct on one of the two repairs they recommended. It did need a wheel alignment since the engine subframe was taken down and moved from its original position. After the wheel alignment was completed, the problem was resolved and the vehicle was back to the way it was designed. Needless to say, the owner was happy that we were able to resolve his steering and suspension problem, along with helping him with the timing chain replacement. The Traverse owner did have one concern about the dealership even though they completed all the work for free. He wondered why the dealer told him that he needed struts and a wheel alignment when there was nothing wrong with the struts. On the owner's behalf, I contacted the dealership and asked if GM could reimburse him for the wheel alignment since it should have been performed along with the timing chain job, in my opinion. The last I heard, the dealer is considering the issue and will get back to me.

A Honda Next

Our next oil-related problem vehicle is a 2010 Honda CR-V with a 2.4L engine and 70k miles on it. We have been servicing this vehicle since it was new and changed the oil using 0W-20 SN/ GF5-rated full synthetic Idemitsu, then Eneos Japanese's oil before switching to Pennzoil Platinum oil with no change of oil consumption. We researched the oil consumption problem for our customer since the engine was using a quart of oil in less than 600 miles. Th is CR-V is not driven hard — a mother uses it for normal transportation around town and on the highway. We explained to

(Con't on page 21)

"Oil Loss And What To Do About It" (con't from p. 20)

the customer that the local Honda dealer would perform an engine oil consumption test on the motor to see if it passes or fails the test. The first step the dealer will perform will be to drain the oil and change the filter, using the OEM-required oil and filter. If it fails the consumption test, Honda will refund the cost of the oil and filter change along with replacing the pistons, piston rings and possibly the complete motor for free if it is less than 8 years old or has been driven less than 150k miles (whatever comes first).

We made sure before telling her about this information that we checked and replaced the PCV components to rule out any problem in the PCV system, along with making sure there were no existing oil leaks. The CR-V owner is busy being a mom and has not yet had Honda perform the test. You can't fix what you can't control.

BMW In The Bay

BMW's have an oil consumption problem mostly due to poor engine breathing issues. It is recommended that you use a manometer along with checking the specification for the BMW engine you're working on to check if it is in specification. We normally encounter many BMW's, as well as Benz owners, who buy more car than they can afford and they don't follow the proper maintenance schedules or the recommended services. The problem with BMW, Benz and Audi are neglected breather systems, but it is not totally the fault of their owners. As I stated, most of the owners who come to our shop can't really afford to maintain the vehicle properly, so they look for the cheapest way out. Going the cheap way causes the Euro owners to spend a lot more bucks on their vehicles as a result of their poor maintenance.

One popular vehicle in our area is the BMW 328xi E90 with 3.0L N52K package that often has oil issues. The oil issues are mostly from leaks due to the breather/PCV system **(Figure 6)** that is not properly flowing oil vapors. We use our digital manometer with a special oil cap

(Figure 7)

(Con't on page 24)



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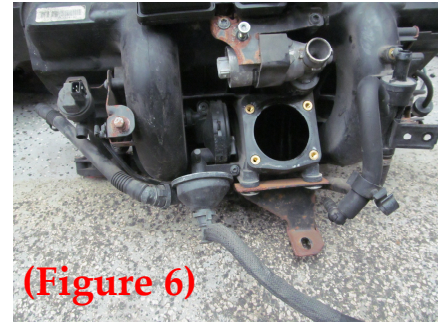
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"Oil Loss And What To Do About It"(con't from p.21)

We from AGA Tools, since most of the Euro engines we work on do not have oil dip sticks. Using the BMW recommendation for the engine of 33 mBar with a 10 percent variation, but not more than 5 mBar difference, will reveal a problem or not. More than a few BMW owners have come in with issues of poor running, performance, MIL illuminated or oil leaking that they could not get resolved on their neglected Beemers.



(Figure 6)

After performing a breather test that fails, we recommend the replacement of the breather components with the BMW cold weather package that includes the pressure regulator valve, separator, backpressure valve and hoses. We ask the vehicle owner to return in 1,000 miles so we can check for leaks and see if the engine is consuming oil. BMW oil requirements are a 5w30 ACEA approved oil only. One quart of oil in 750 miles is what BMW states as acceptable. Wow, that sucks!



(Figure 7)

In ending this article, I want to remind you to always check the oil level in every vehicle that comes into your shop, making sure it is at the proper level. If the oil is found to be low, adjust the level until it's full or change it if it's overdue for service. Always check the OE requirements of oil and the specification that is recommended, along with a good quality filter. Don't forget to check engine TSBs that may include oil information and oil consumption test procedures. Happy motoring

***Article By
"G" Jerry Truglia
TST Founder and President
ASE World Class Triple Master L1, L3, F1, A9, X1 C1, Technician***

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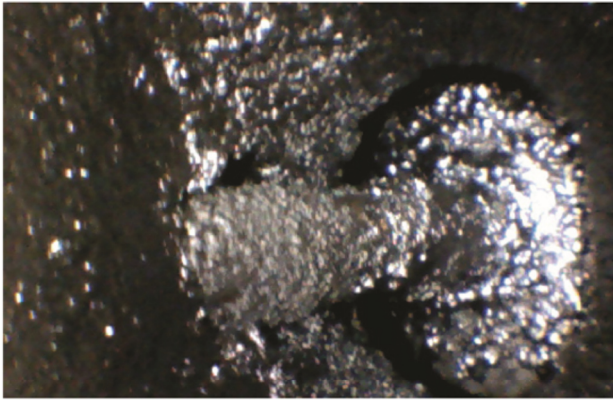


Finally...

A Cleaning Solution That Actually Works!

1.6L Turbo Mini Cooper at 83,000 miles

Before Cleaning



After Cleaning



3C Intelligent Induction Cleaner

Patent Pending

3C Intelligent Induction Cleaner (Patent Pending) removes heavy carbon deposits from the internal combustion engine's induction system in just 20 minutes.

Air Assist Injection Nozzle (Patent Pending) delivers chemical in small droplets that are suspended and carried to the carbon deposits by the engine's air flow. This air assisted nozzle is superior to any other nozzle available for carbon removal.

Chemical Layering (Patent Pending) removes more carbon because it alters the application of chemical mixtures between chemical A and Chemical B in on/off cycles, then washes the induction system with Chemical C.

Micro-Burst Injection Technology (Patent Pending) delivers the maximum amount of chemical during the cleaning process while still allowing the engine to run well.

3C Chemical A, 3C Chemical B, 3C Chemical C (Patent Pending) are laboratory proven to remove more carbon weight from different carbon types than any other commercially available induction carbon cleaning chemical, while having a low HMIS health rating of (2).