

# Old School BMW Maintenance Schedule

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BMW CCA Pocono Mountain Chapter President Rich Warren blasts through rural Northeastern Pennsylvania's fall foliage in his 1999 M3 convertible with Dinan Stage 2 suspension.

*BMW's Free Scheduled Maintenance program means that BMW will perform scheduled maintenance free of charge during the BMW New Vehicle Limited Warranty period.*

*Prior to the advent of BMW Free Scheduled Maintenance in the mid-1990s, approximate BMW maintenance recommendations were: automatic transmission fluid (ATF) and filter changes every 15,000 miles, manual gearbox and differential oil changes every 30,000 miles, annual brake fluid changes, and coolant changes every two years. Spark plugs, air filter, and fuel filters were typically replaced every 30,000 miles on most BMWs (this is a tune-up) except M cars up to 1995, which got new spark plugs and a valve adjustment every 15,000. Later advances in computer engine management and spark plug technology legitimately allow 60,000-mile spark plug life if not more.*

*Prior to Free Scheduled Maintenance, you couldn't change engine oil often enough according to most dealerships. And when the car was in the shop it would often be due for this service or that inspection, all at the owner's expense.*

*But once BMW began paying for scheduled maintenance, lo and behold the “schedule” was revised. Now the cars hardly need any maintenance at all. The 1,200-mile break-in service was done away with except for M cars. Engine oil suddenly lasts 15,000 miles (dealers are supposed to use BMW synthetic oil). Manual gearbox and differential oil? No worries there – now BMW says they NEVER need to be changed; it’s “lifetime fill.” Brake fluid and coolant service intervals were doubled with no change in the original BMW brake fluid and anti-freeze dealers are supposed to use. As of 2005, coolant is now “lifetime fill” as well – with no change in the actual coolant.*

*So, is Free Scheduled Maintenance all about marketing and cost reduction – BMW’s costs? Draw your own conclusions. There is no doubt that many buyers view BMWs as high maintenance cars, and that can be an impediment to sales – but it is also entirely correct. Nothing can address that more effectively than Free Scheduled Maintenance. The operative word in the name is “scheduled.” In my opinion, extended service intervals and “lifetime fill” came very close on the heels of Free Scheduled Maintenance.*

*Environmental issues also played a part in the demise of BMW maintenance. Governments around the world are pressuring car manufacturers to reduce liquid waste resulting from maintenance as well as the escape of gasoline vapor and crankcase vapors.*

*Personally, I believe the point of diminishing returns on environmental regulation is long past, and today governments are just looking for ways to enable corporate polluters to keep on polluting while placing the onus of remedial environmental regulation upon people who don’t have lobbyists, i.e., motorists like you and me. And there is an increasing sense of a cottage industry specializing in environmental alchemy – turning carbon into gold.*

*Regardless of what side you’re on, it’s important to bear in mind that the lubricants in your car will be drained someday. Doing so during regular maintenance has no additional affect on the environment as long as they are disposed of properly.*



BMW CCA member Ed Ullom’s 1982 320is. Turbocharged and tastefully modified for the street, Ullom has driven it in countless races, autocrosses, and other driving events. It’s got over 170,000 miles on the original drivetrain, and it runs perfectly. The secret? Routine maintenance, the Old School Way!

*This is an alternative to BMW's factory-recommended maintenance schedule. It is not, "Mike Miller's maintenance schedule." It is actually BMW's maintenance schedule, more or less, which was used prior to Free Scheduled Maintenance. It also represents my opinion, based upon my experience and that of my readers, tech advisors, and professional BMW technicians both dealer and independent. I have prepared it because of the large number of readers asking for this information. The fact that my opinions may differ from those of others does not mean anyone – including me -- is necessarily right or wrong. You will get a different answer from every person you ask about routine vehicle maintenance, and at the end of the day the only way to pinpoint an ideal oil change interval is through consistent use of oil analysis.*

*Finally, it has to be recognized that the benefits of good drivetrain lubricant maintenance do not accrue until the car matures. The difference between the car that ran 15,000-mile oil change intervals and never had its gearbox or differential oil changed and the one that ran high-end synthetic lubricants and had its driveline maintained in contravention of BMW's instructions, is the strong likelihood that the second car will be running strong at 200,000 miles whereas the first car will likely have a worn out drivetrain.*

*BMW's, and most modern cars, will run 100,000 miles just fine with zero maintenance, and I think that's the key for BMW – the new vehicle life paradigm is 100,000 miles/seven years. Maybe for some folks, but not for me!*

*So, if you're maintaining the car religiously only to sell it at 75,000 miles then you're a good guy for helping out subsequent owners. That's nice, but to realize the fruits of your diligence, you need to keep the car for the long haul. If you're not going to keep the car past the warranty or 100,000 miles then there's really no reason to spend money on extra maintenance.*

### **Break-in Service for New Cars: 1,200 miles**

Traditionally, BMW performed a break-in service at 1,200 miles on new cars, which included changing the engine oil and filter, manual gearbox oil, and differential oil. With the advent of Free Scheduled Maintenance, BMW stopped performing break-in services except on M cars.

I have seen that the engine and driveline oils in new modern BMWs are literally full of metal at 1,200 miles – as has always been the case with any new car. For this reason, I recommend a 1,200-mile break-in service. Note: In case of automatic transmission, no ATF and filter change is necessary at 1,200 miles.

As for break-in technique, my best advice is to break-in the engine over an extended road trip comprised of as much mountainous terrain as possible, for as long as possible up to 1,200 miles, and keep the rpms within the limits BMW recommends.

I also recommend a 1,200-mile break-in service for rebuild engines and other rebuild drivetrain components.

## Engine



The author's freshly-rebuilt M10-powered 1977 320i.

### **Oil and Filter Intervals: Variable 3,000 to 10,000 miles**

BMW recommends their Castrol 5W-30 synthetic motor oil in all BMWs except contemporary M cars, for which they recommend their Castrol TWS Motorsport 10W-60 synthetic motor oil. The factory oil change interval is controlled electronically, but is presently about every 15,000 miles. If you are running BMW's oil, I recommend an oil and filter change interval between 5,000 and 7,500 miles.

If you have an S54, S62, or S85 engine, I recommend ONLY the original BMW 10W-60 engine oil changed every 7,500 miles.

In Europe, BMW endorses Elf 5W-30 and 5W-40, and LubriMoly 5W-30, 0W-40, and 5W-40 for the non-M cars. These are PAO synthetics like Red Line, and I'd have no problem running them 7,500 to 10,000 miles. Of course, they are not available at Wal-Mart; like Red Line, you have to order them for UPS delivery.

In my cars I use Red Line synthetic oil ([www.redlineoil.com](http://www.redlineoil.com)) in 5W-30, 10W-40, 15W-50, or 20W-50, depending on factory recommendation, ambient temperatures, and severity of service (track use, sustained high rpm use), with a drain interval – 7,500 to 10,000 miles depending on engine and severity of service. Under racing or track conditions I'd use a short interval; same for carbureted engines which tend to get some fuel into the oil. I would run the same intervals with very high end "designer synthetics" such as Agip, Amsoil, Lubrication Engineers Monolec Ultra, Elf, Lubro Moly, or Motul.

All other commercially available synthetic oils, 5,000-7,500-mile drain intervals.

BMW's High Performance Synthetic 5W-30 and their Motorsport 10W-60 can go 7,500 miles.

Old fashioned petroleum oil, same viscosities, 3,000-to-5,000 mile drain intervals (I prefer Kendall)

Please note that the above represent guestimates based on experience. The only way to validate any oil drain interval with any oil in any engine is by oil analysis. I use [www.blackstone-labs.com](http://www.blackstone-labs.com).

My 2005 Dinan S2-325Ci received a break-in service at 1,200 miles using Red Line 10W-40, followed by oil and filter changes using the same product at 10,000, 20,000, 30,000, and 40,000 miles. At the 40,000-mile oil change, I had Blackstone Labs perform an oil analysis. The results were excellent, showing no wear, viscosity good and well within the 40W range, TBN of 1.4 indicating some active additive left. The 10,000-mile interval is perfect for Red Line 10W-40 in this engine. Oil analysis is really the only way to validate *your* oil choice and *your* drain interval.

**The following information is courtesy of Motorwatch.com:**

“Redline is Group V (polyol ester) based (POE or esters).

“Amsoil and Mobil-1 are Group IV (poly-alpha olefin) based (PAO or synthesized hydrocarbons SHC).

“Castrol Syntec and all the others calling themselves synthetic are Group III (hydrocracked slack wax).

“The petroleum motor oils are all mineral oil based and make up Group II.

”We really should group Red Line by itself, and put the others in separate categories (according to the groups) because their performance is so different.

“See [motorwatch>AutoMotiveBible>Oil Change Intervals>oil classifications](http://www.motorwatch.com/images/oilclassifications.jpg)

“[AutoMotiveBible> Oil Change Intervals>oil change intervals](http://www.motorwatch.com/images/oilchangeintervals.jpg)”

Original BMW filters are recommended for price and quality, or MANN, Mahle, Bosch, or Knecht filters

## Spark Plugs: Variable 15,000 to 60,000 miles



Replacing spark plugs in an M54 engine.

There is no reason to deviate from the factory-recommended Bosch or NGK spark plug specification, changed at 30,000-to-60,000-mile intervals, depending upon the car and severity of service. Basically, any BMW engine produced after 1993 including the S54, S65, and S85 can easily run 60,000 miles on a set of spark plugs.

The factory also has part numbers and applications for “100,000-mile spark plugs.” These are good too, and are capable of 100,000 miles of service assuming no other problems, which might cause them to foul during that time. However, in engines with spark plugs recessed into the middle of the cylinder head, oil can leak into the spark plug recesses past the valve cover gaskets. This is a hidden leak if the plugs are left in service for an extended period of time, because no one looks in there until they’re changing the plugs or chasing a problem. An oil leak in the spark plug recesses, left to fester, can cause ignition coil failure and even ECU failure. So, even if you want to leave the plugs in service, you should at least check the spark plug recesses for signs of oil leakage at least every 60,000 miles. And at the point you’re in there, you might as well replace the plugs. This is the issue with 100,000-mile plugs.

Moreover, while you may not have any problems running spark plugs for 100,000 miles in some BMWs, this does not mean the plugs will not be worn, or that that wear is not affecting engine performance. In other words, for optimum engine performance, most BMWs want spark plugs about every 60,000 miles.

Note that older M cars with the S14 and S38 engines want plugs about every 15,000 miles.

Stay away from platinum plugs in BMWs for which they are not the factory-recommended spark plugs. These don't last as long as the regular Bosch copper or silver plugs and NGK plus, and have been known to fail in other ways. The regular old Bosch Platinum single electrode plug is, however, a very good choice for cars *OTHER THAN* BMWs.

### **Original BMW Bosch Spark Plugs vs. Aftermarket Bosch Spark Plugs**

Like just about everything else on the modern BMWs, Bosch spark plug choice is complicated and confusing. The short answer is if you order the spark plugs from BMW (usually there is a choice between Bosch or NGK), then you are good to go and there is no confusion. But they are expensive.

Savvy enthusiasts have found that Bosch has a part number for commercially-available spark plugs that cross-references to the BMW original equipment Bosch spark plugs, often at a fraction of the price. The problem is, the commercially-available (aftermarket) Bosch spark plugs ARE NOT the same as the original BMW Bosch plugs even though they cross-reference and they do work.

Dealership technicians report problems with the commercially-available Bosch Platinum +4 spark plugs in BMW engines. I have never seen this personally, but physical inspection does reveal differences between the original BMW Bosch spark plugs for the modern cars and the commercially-available Bosch Platinum +4. I use the factory plugs in my E46.

Now, when we're talking about older BMWs, where the original BMW specified spark plugs are Bosch copper or silver plugs, everything is completely different. On those cars, there is absolutely no difference between the original BMW spark plugs and commercially-available Bosch cooper or silver plugs.

I realize this requires a certain intimate knowledge of Bosch spark plugs, and I don't know what to tell you about that except to ask if you don't know, or just buy them from the dealer.

### **Air Filter: Variable 15,000 to 30,000 miles**

Stock paper element, check every 15,000 miles, tap out dirt, replace if necessary, standard interval 30,000 miles, use Original BMW filters or aftermarket filters such as Knecht, MANN, Mahle, or Bosch

K&N oiled cotton gauze filters, clean every 15,000 to 30,000 miles depending on condition, use only K&N approved cleaner and oil, and follow K&N cleaning procedures. But really, I would very much prefer to simply replace the filter rather than clean it.

### **Interior Air Filter: Variable 15,000 to 30,000 miles**

On cars so equipped, the interior air filter service life really depends on where you drive and how often you operate the climate control system, especially if you do not use the recirculate mode. If the system is on all the time, figure on replacing the interior air filter every 15,000 miles. Otherwise, every 30,000 miles will probably be sufficient.

### **Fuel Filter: Variable 30,000 to 60,000 miles**

Replace every 30,000 miles on models produced up to 1992 (small fuel filter) and every 60,000 miles on models produced from 1992-on, (large fuel filter), also replace if fuel pump is replaced, use original BMW filters or Bosch, Knecht, MANN, or Mahle. Note that newer Bimmers have an integral fuel pressure regulator on the fuel filter, raising the price to \$60-\$80.

According to factory technicians, BMW is now teaching new technicians in school that the new cars have "lifetime fuel filters." The instructors say this means that when the car arrives at the shop on a roll back because the fuel filter is clogged and the engine won't start, the fuel filter's lifetime is over, and that is the time to replace the fuel filter. Ridiculous? I certainly think so. Why wait for a breakdown to perform this simple maintenance?

In reality, the service life of a fuel filter depends entirely on the fuel it filters. It's possible for a fuel filter to last indefinitely if it always filters clean gasoline. It's also possible for a fuel filter to last a block and a half if you fill up with sufficiently dirty gasoline. Usually gasoline cleanliness is in between those two extremes. There's no way to really tell how much dirt is trapped in a fuel filter without cutting it open or back-blowing the fuel into a receptacle. This is why the fuel filter is best replaced as a routine maintenance item.

### **Valve Adjustment: Variable 15,000 to 30,000 miles**

Perform every 15,000 to 30,000 miles on the M10, M20, and M30 engines; every 60,000 on the S54 and S85 engines

### **Timing Belt, Tensioner Pulley, and Front Cam Seal**

Replace every 5 years or 50,000 miles on vehicles so equipped, water pump replacement also recommended as preventative attendant service, but not required, 40,000 miles or four years on the E30 325iX (1988-1991)

Note that only two BMW engines in the U.S. market use timing belts: The M20 six-cylinder installed in various (but not all) BMWs from 1986-1992, and the M21 six-cylinder diesel engine in the E28 524td.

### **Engine Drive Belts**

Replace O.E. or O.E.M. BMW poly-ribbed serpentine belts every 60,000 miles

Replace O.E.M. Continental or Pirelli or original BMW V-belts every 30,000 miles

Replace “auto store” quality V-belts every 15,000 miles

### **Engine Coolant Service: Every two years**

The factory coolant change interval used to be every two years. Starting in the late 1990s, BMW lengthened the coolant change interval to every three years, then every four years. As of 2004, BMW says coolant is “lifetime fill.” There was no discernable change in original BMW anti-freeze during this transition, other than who pays for the service during the warranty period.

I recommend changing engine coolant at two-year intervals, using only factory BMW anti-freeze mixed 50-50 with distilled water (reason – BMW anti-freeze is phosphate free, phosphates cause aluminum oxidation, which blocks cylinder head coolant passages and causes head gasket failure, others may claim to be “aluminum safe” or “phosphate free” – make your choice, but I’ve used BMW anti-freeze exclusively in many cars and have *never* had an aluminum oxidation or head gasket problem)

### **Water and Fuel Hoses: Every 150,000 miles**

Replace water and fuel hoses every 150,000 miles, highly recommended use of O.E. or O.E.M. hoses only, along with the original hose clamps or Wurth/Zebra replacements. The original BMW hose clamps are far superior to anything you’ll find in a U.S. auto store.

## Cooling System Preventive Maintenance M50, M52, M54, S50, S52 (US-spec) Six Cylinder Engines



Problematic OE/OEM water pump (l), compared with EMP Stewart High Performance Water Pump. Yes, the pump on the left has a metallic Impeller – that doesn't make any difference in longevity. Both the plastic and metallic impeller OE/OEM pumps fail prematurely, just in different ways.

First, it doesn't matter if you have the plastic or metallic impeller; both fail premature only in different ways. The original design of the OE pump had a plastic impeller, which would disintegrate and cause overheating and sometimes engine damage. The later OE design had a metallic impeller, and the bearing would seize, causing overheating and sometimes engine damage or destruction. Now we're back to plastic impellers.

I recommend the following preventive replacement schedule for the cooling system on this car:

Every 60,000 miles: water pump, thermostat, plastic thermostat housing if so equipped (or replace it once with the aftermarket aluminum thermostat housing)

Every 90,000 miles: radiator, expansion tank, fan and fan clutch if so equipped (for cars you're going to keep forever, consider using the all-aluminum radiator and expansion take from [www.zionsvilleautosport.com](http://www.zionsvilleautosport.com) and you won't have to do it again at 180,000)

Every 150,000 miles: all coolant hoses

Every two years: drain and fill coolant, including draining the engine block by opening the drain plug on the right side under the exhaust manifolds, replace using fresh original BMW anti-freeze mixed 50-50 with distilled water

As for the EMP Stewart Heavy Duty Water Pump, they are too new for a verdict really. I do note they are marketed as a "high performance" water pump and much is made of their supposedly improved efficiency. They look good on paper and in person, though, and I plan on installing one on my car. Note the performance of the original water pumps was never a problem. Their DURABILITY is the problem.

It actually pains me to recommend replacing the entire cooling system preventively before 100,000 miles, as above. Yet experience has shown this maintenance is cheap compared to the alternative. It is unbelievable the number of engines destroyed in these cars by premature cooling system failures.

### **Power Steering Fluid: 30,000 miles**

This is a very neglected operating fluid and changing it at a reasonable interval can easily make the power steering pump, rack or box last a great deal longer.

I just open a line down by the pump, and, with the engine off, work the steering wheel back and forth to evacuate the old power steering fluid from the system.

Almost all BMWs use automatic transmission fluid in the power steering system, except for some E32 7 Series cars, which use Pentosin hydraulic oil. Nothing will balls up the works faster than using one when you should be using the other. Check the sticker on the reservoir, check the owner's manual, and if you are still confused, take the car to a pro or e-mail me.

Many modern BMWs require Pentosin CHF 11.S special hydraulic oil in the power steering system. These cars all have a sticker on the top of the power steering fluid reservoir cap setting forth whether they require Pentosin CHF 11.S or ATF. Do not screw this up, or you will be in a world of hurt.

After much debate, I've decided to recommend using ATF in BMW power steering fluid systems that call for ATF, and not Red Line Synthetic Power Steering Fluid. Red Line D4 ATF is fine if you want to use a premium ATF.

While I had great experience with Red Line Synthetic Power Steering Fluid in an E30 with a ZF power steering pump (200,000 and counting on the original rack and pump), that has not been the case universally. There is a problem with Red Line Synthetic Power Steering Fluid causing the pumps to squeal in cold weather upon cold start.

### **Manual Gearbox Oil: 30,000 miles**

Only synthetic oil should be used in BMW manual gearboxes, drain interval 30,000 miles

BMW-specified factory synthetic gearbox oil is MTF-LT-2 available at the dealer, and the spec often changes. It is a good product; I just wouldn't leave it in service forever.

Red Line products are also highly recommended ([www.redlineoil.com](http://www.redlineoil.com)).

All the BMW gearbox rebuilders I know use Red Line MTL exclusively, regardless of model year or gearbox. The general consensus is MTL is the better lubricant.

However, Red Line D4ATF will require less shifter babying during cold operation. I use Red Line MTL in manual gearboxes except where I can't trust the driver to shift properly when the gearbox is cold, in which case I use Red Line D4 ATF.

Red Line MT-90 as slightly higher viscosity than their MTL product, which can be useful in reducing gearbox rattle, which can occur in neutral with the clutch pedal out in vehicles that do not have dual mass flywheels. The rattle does not affect gearbox function. The Getrag 280 gearbox in the E28 and E34 M5 and E24 M6 favors Red Line MT-90.

BMW sequential manual gearboxes (SMG) use the same lubricant as the "real" manual – MTF-LT-2 or Red Line MTL.

### **M Double Clutch Gearbox: 30,000 miles if you can get the oil**

BMW has gone back to "lifetime fill" with the optional M Double Clutch Gearbox on the E90-family M3, and this gearbox requires a special lubricant: BMW DCTF-1 Pentosin. It is only available at the dealer. As per always, I recommend changing it at 1,200 miles and every 30,000.

### **Automatic Transmission Fluid (ATF) and Filter: Variable 15,000 to 60,000 miles**



Used automatic transmissions waiting on the shelves at Euro Depot in New Hampshire. They won't be waiting long, thanks to "lifetime fill" automatic transmission fluid!

For older automatics using Red Line or other synthetic ATF, drain interval 30,000 miles. Old fashioned petroleum ATF, drain interval 15,000 miles

The short answer for the modern BMWs with "lifetime fill" ATF: Change it and the filter at least every 60,000 miles using ONLY the factory BMW proprietary ATF. Here is the long answer...

At various production dates in the mid-1990s, which vary according to model, BMW switched to their so-called “lifetime fill” ATF in automatic transmissions, as well as manual gearbox lubricant and differential oil. The reason for this, as far as anyone can tell, is marketing and not engineering – the idea being to foster the notion of the low-maintenance BMW.

There was no explanation of what “lifetime” meant, i.e., lifetime of the car, the component, or for that matter the driver. If it was the component, then obviously anything could be “lifetime fill”. The factory’s initial position is that these lubricants never need to be changed. Then, some time later, it came out that “lifetime” means 100,000 miles. Many dealerships are now recommending manual gearbox and differential oil changes be done at customer expense every 60,000 miles. Every independent BMW technician I know recommends a 30,000-60,000-mile interval, and many recommend Red Line synthetic oils ([www.redlineoil.com](http://www.redlineoil.com)), but not for automatics with “lifetime fill” – you need the factory proprietary ATF for “lifetime fill” automatics.

Older automatic transmission models, which do not have “lifetime fill” should have ATF and filter services every 15,000 miles if using petroleum ATF; every 30,000 miles with synthetic.

However, the modern automatic transmissions are different. No one knows exactly what BMW’s proprietary ATF is, so no one knows if there are viable alternatives. We do know that BMW dealerships charge about \$500 for an ATF and filter service, due to the price of the ATF. And that’s assuming you can get them to do the job, which is not often the case.

Bavarian Autosport ([www.bavauto.com](http://www.bavauto.com)) is now importing the proprietary “lifetime fill” ATF at reasonable prices, which they sell along with filter kits, for independent BMW shops and do-it-yourselfers.

It is risky to drain a previously un-maintained automatic transmission with high mileage, even though if it were my car I would probably chance it. Still, I have seen it happen too many times, where a well-meaning owner or technician performs an ATF and filter service on a neglected but well-shifting automatic, and then all of the sudden it starts slipping. I can’t explain it, but my feeling is the fresh ATF flushes a bit of sludge from a place where it was doing no harm to a place where it does do harm. Overfilling, underfilling, and cleanliness are also issues in ATF and filter servicing, but these should not be problematic for a professional BMW technician, dealer or independent.

BMW has backed off its lifetime fill mantra for automatic transmissions, currently recommending an ATF and filter change every 100,000 miles.

Caveat: My inclination is to tell people to change “lifetime” ATF and filter every 30,000 miles. However I have seen BMW automatic transmissions that were maintained break anyway. In that event, say it happens at 90,000 miles, you would like to have that \$1,500

you spent on ATF and filter changes to put toward your new automatic transmission. And if I told you to spend it on maintenance you're probably not going to be very happy with me. On the other hand, I have seen maintained automatics last 200,000 miles. I have also seen un-maintained automatics last 200,000 miles, although both are very rare. There's just no predicting with these transmissions. When you choose to buy an automatic transmission, you also buy into the vagaries of the darn things, which is one reason technicians hate them.

Whether to maintain a modern BMW automatic is up to you. I am washing my hands of automatic transmissions – I don't like them, I don't buy them, and I don't mess around with them under the car. At the end of the day, for long-term durability, order the car with a manual gearbox.

At automatic transmission replacement time, we are confronted with the reality that the local transmission shop cannot rebuild BMW automatic transmissions, even those built by GM (BMW's GM transmissions bear no resemblance to GM transmission in domestic cars). There are some domestic specialists who concentrate in BMW automatic transmission rebuilding, and you'll see their ads in *Roundel* and *Bimmer*. However, I have no current experience with domestic rebuilders. My experience in the past is...well, the owner wound up buying a BMW factory rebuilt automatic transmission every time, and this is the course I recommend to readers – “back to the dealer.”

Some of you, having seen the light, may be interested in converting to a manual gearbox. This is always possible, but for most of us it won't be less expensive than a replacement automatic transmission. This is because of all the other parts and additional labor required. And the newer the car the harder and more expensive the job will be. It is certainly a doable swap, but there's no cost savings even if you do the work yourself. The exception would be if you have access to a manual gearbox donor car for little or no expense.

### **All-Wheel-Drive Transfer Cases: 30,000 miles**

E30 325iX: ATF Dexron® III formulation (Red Line D4 ATF)

E46/16 325xi/xiT, 330xi: MTF-LT-1 83 22 9 408 942 (MTF-LT-2 = 5 Liters) Or Red Line MTL

E53 X5 All models produced up to 2/2005 with NV125 transfer case: ATF Dexron III (Red Line D4 ATF)

E53 All models with X-Drive transfer case: TF0870 83 22 0 397 244 (1 Liter)

E60 All models: TF0870 83 22 0 397 244 (1 Liter)

E61 All models: TF0870 83 22 0 397 244 (1 Liter)

E70 All models: TF0870 83 22 0 397 244 (1 Liter)

E83 X3 All models with X-Drive transfer case: TF0870 83 22 0 397 244 (1 Liter)

E90, E91 and E92 All models: TF0870 83 22 0 397 244 (1 Liter)

**Note:** There is no aftermarket substitute for TF0870. Before opening the container, shake the container to evenly mix the additives with the oil.

### **Differential Oil: 30,000 miles**

Once again, BMW's specified synthetic differential oil is all good...just not forever. Note BMW has different products for open and limited slip differentials.

For open non-limited slip differentials, BMW recommends its Castrol SAF XO product.

I use and also recommend Red Line 75W-90 synthetic gear oil, drain interval 30,000 miles in any BMW differential except as noted below. It is okay to use Red Line 75W-90 in place of BMW "lifetime fill" gear oil.

The E46 M3, E39 M5, E60 M5, and E61 M6 should use Red Line 75W-140, as that is the viscosity of the factory fill Castrol SAF-XJ – or use Castrol SAF-XJ, BMW part number 82 22 2 282 583.

The difference between Red Line 75W-90 Synthetic Gear Oil and Red Line 75W-90NS Synthetic Gear Oil is that the former has friction additives for limited slip differentials whereas the latter does not. However, both are the same price, and there is no problem using the 75W-90 Synthetic Gear Oil with friction additives in an open, non-limited-slip, differential – the open diff doesn't mind the friction additives at all.

For my purposes out in my home shop, this means I only have to stock one differential gear oil rather than two (three if you count the 75W-140).

For my purposes in answering BMW tech questions, this means I recommend 75W-90, because if I discuss the differences between 75W-90 and 75W-90NS once, I'll have to do it every day, and there remains the fact that limited slip differential owners will then have a 50-50 chance of getting it wrong.

So, if your BMW has an open, non-limited-slip, differential, there is no problem using the 75W-90NS if you want. If you don't know what a limited slip differential is, then you probably haven't read this far, but use 75W-90.

Note that BMW did away with the differential drain plug on the E90/E91/E92 3 Series, which I find incredible, but it is what it is. We can still drain the differential through the fill hole, but this requires a suction device and a bent piece of pipe to reach the bottom of the differential.

Another note on BMW differentials: Since the E30 era, BMW differentials, with the exception of the M variable lock differential, have become progressively smaller. The pinion gear and its roller bearing are huge in the E30, smaller in the E36, and smaller still in the E46. The differential oil capacity has also become less and less with each generation of 3 Series cars since the E30.

Now, with the E90 3 Series, we have a very small pinion gear, no drain plug, and an oil capacity under 0.5 U.S. quarts. Moreover, and most incredibly, BMW did away with the strong tapered roller bearing in favor of old fashioned ball bearings. Worse, they are mounted in plastic bearing cages.

E90 family cars are simply too new for differential longevity predictions, but it's not looking good. BMW differential rebuilder Brett Anderson thinks maintaining the diff with oil changes is still the way to bet, but he is suspicious of plastic bearing cage failure, which of course is not lubrication-related. The bright side? E90 family rebuilt differentials from BMW (open only) are \$1,350; E30 limited slip differentials cost about \$2,500.

### **Brake Fluid: Once a year**



BMW Master Technician John Franchetti hooks up a pressure bleeder during a brake fluid change on a supercharged E46 330Ci convertible.

Recommend one-year brake fluid changes, or prior to each driving school or track event. BMW now recommends two-year brake fluid changes, but used to recommend a one-year interval.

Recommend Original BMW or ATE SL brake fluid for normal street use, ATE Type 200 or Pentosin Racing Brake Fluid for track work or very high performance use. Note that ATE Super Blue is the exact same product as ATE Type 200, except with blue dye. Personally, I can't stand the blue dye because it turns everything blue – the reservoir, my Vacula brake bleeder, my hands, etc. Blue brake fluid helps race teams identify the source of leaks in race cars, and that is its only benefit as far as I'm concerned.

Original BMW or Pentosin LV is recommended for BMWs that call for low-viscosity brake fluid, such as the xDrive models.

### **Maintenance Records**

It is important to keep records of vehicle maintenance, not only for your own reference but also for that of your mechanic and future owners of the vehicle. Keep the records in the car, where you or a mechanic will look if there is a problem. The factory service booklet, contained in the glovebox vehicle document portfolio, is the logical place to record maintenance. If you're the type of person who has to see everything on a computer screen, you can always keep a separate file on your hard drive – but it won't help your technician when he's trying figure out what has already been done and when. For that information he's going to look in the glovebox.

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