

A PUBLICATION FOR INDEPENDENT BMW SERVICE PROFESSIONALS MAY 2005



### INTERNAL ENGINE DIAGNOSIS • MODEL IDENTIFICATION

### TO OUR READERS

- What could be more useful to independent service technicians who work on BMWs than a publication dedicated specifically to them?
- That's the idea behind the magazine you're holding, TECHDRIVE. BMW of North America both sponsors the publication and provides much of the information that's included. A big part of the rationale behind TECHDRIVE is the belief that if you are able to diagnose, repair and maintain BMW vehicles properly and efficiently, your reputation and ours will be enhanced.
- TECHDRIVE's combination of feature service articles (written from both BMW tech information and interviews with successful independent BMW specialists), new technical developments, systems evolution, as well as the correct BMW replacement part, and service bulletins are intended to help you fix that BMW right the first time, on time. Our list of BMW dealers will assist you in finding Original BMW Parts.
- There's more to this effort, including highly-informative and user-friendly web sites, which we'll explain in future issues.
- We want to make TECHDRIVE the most useful and interesting technical magazine you receive, and you can help us do that. Please let us know what topics you'd like to see covered, and provide any other comments you might have. With your involvement, this publication can evolve into one of your most important tools.

Thanks for your continued interest.

For more information please email us at: editor@techdrivemag.com



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#### A PUBLICATION FOR INDEPENDENT BMW SERVICE PROFESSIONALS MAY 2005

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FEATURE ARTICLES

# Original BMW Parts



### INTERNAL ENGINE DIAGNOSIS

The prices involved in engine repair today are so incredibly high, you'd better be very sure you're right about what's wrong

### BMW MODEL DESIGNATIONS

BMW engineers use a different identification system than the marketing people do, so here's how to zero-in on the right service information and parts.

#### PARTS LINE

Whether for vehicles long out of production or for modern ones, your best source for Original BMW Parts is BMW.

#### **TECH BRIEFS**

These suggestions for technical problems are from service bulletins published by BMW, selected and adapted for independent repair shops.

#### ORIGINAL BMW PARTS... NEARBY

Wherever you are in the United States, there's a nearby source of Original BMW Parts for your customers' BMW vehicles.

#### TECHDRIVE Magazine

For the independent BMW service professionals



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### FEATURE ARTICLE



### A Clear Path to Accurate Internal Engine Diagnosis

Yeah, we know. You don't get as much internal engine work as you once did. But you still get some, and the prices involved in these repairs today are so incredibly high, you'd better be very sure you're right about what's wrong.

Throughout its history, BMW has been in the forefront of engine innovations and has won many awards for clever, sophisticated designs. From our discussions with service professionals who work on these cars, they've also garnered a reputation as having great general durability and very few particular internal engine problems. But any mechanism more complicated than an anvil will eventually wear out or break. When that finally happens, typically after propelling the vehicle for many years and a great number of miles (you have, of course, noticed that people are driving their cars up to mileages that would've been unthinkable a couple of decades ago), you'll be presented with the challenge of finding out what, exactly, has failed, and a mistaken diagnosis would be an embarrassing blotch on your reputation.

Consider also that what made a person an "A" technician in the past was consummate skill in internal engine diagnosis and repair. Today, that's been skewed to refer to the ability to troubleshoot electronic engine management systems, but motor work is still part of the "A" package.

#### **Big Picture**

As with all repairs, careful communication with the customer at the outset is of primary importance, and that's especially so given the high costs involved in this kind of work. What, specifically, is the complaint? Rough idling, high oil consumption, noises, poor performance and puddles of oil on the driveway are probably the most common symptoms of something amiss in the engine assembly. Taking a test drive with the car's owner aboard will help prevent misunderstandings.

Next, we all should remember to step back and look at the big picture before we jump to any unfortunate conclusions. For example, we recently had a European OHC V8 in our shop with a low-power, rough-



All the electronics in the world can't make up for a serious internal engine problem. So, make sure your customer understands that changing plugs, replacing sensors, or reflashing the computer won't help. He or she needs a skilled tech to get inside and fix actual metal parts.

running complaint. The car was in beautiful condition otherwise, so we jumped right into our standard diagnostic mode, neglecting to note the odometer reading. After wasting quite a bit of time, we finally noticed the mileage – 243,000! No mystery then that the nylon timing chain tensioning components should have disintegrated. Lesson: Look at the big picture. Besides mileage, how was it maintained? Has anybody else ever been inside that motor? What kind of driving has the vehicle been subjected to (long-trip cruising takes a lower toll than commuting in stopand-go traffic, or short hops)? A bulletin search is another crucial preliminary. It would be pretty embarrassing to miss a pattern failure.

One of the keys to successful internal engine diagnosis is how much ground work you do before rendering the engine inoperable. The best "major men" we know all commented that getting as much information as possible from the full assembly prior to teardown gave them the best chance at locating and repairing the problem once they were down to the dirty parts.

#### First, compression

Compression: You can't leave home without it. It's one leg of the tripod that supports internal combustion, just as important as fuel and ignition. Regardless of all the gee-whiz technology in modern engines, that basic physical fact is exactly the same now as it was well over a century ago when the Otto cycle was invented. So, underneath that high-tech exterior there's still just a piston pump.

Sure, today's cars typically go a long, long way before they develop conditions that reduce compression. But the key word here is "typically" -- there will always be plenty of exceptions. Then there are vehicles that have exceeded that long, long way, but are still worth fixing. BMWs are a prime example of that. People love them, so will commonly want to get them back up to snuff at any price.

As far as probabilities are concerned, the most likely culprits are burned valves, a violated head/block seal, valve train or lift troubles, failed rings, and damaged pistons, in that order.

#### Listen up

The first thing to do is listen carefully, both to what your brain is trying to tell you about the symptoms and to the powerplant itself. Asking a few question in your head will help: Is the idle uneven? Are power and fuel mileage declining? Does it smoke and use a lot of oil? How about backfiring, hard starting, or high emissions that resulted in failure of a pollution test? Start it up and note if it cranks unevenly or takes a long time to fire up, both of which suggest poor compression.

Use your scope to find out if the ignition system is in good shape -- we've seen heads pulled when the real culprit was a bad plug, wire, or cap. Then, do electronic or relative compression and cylinder balance tests.

Of course, many old-fashioned technicians like to get an initial idea of the situation with a manual cylinder balance check.



Although the results will usually be inconclusive, the use of an old-fashioned vacuum gauge can at least give you an idea of an engine's pumping ability. Pulling one plug wire at a time to find out if a particular hole has little or no effect on idle quality and speed when disabled is about the most useful troubleshooting trick known to man for older cars, especially where there's a definite miss. That is, if you remember to disable whatever computerized idle stabilization device is present. And use well-insulated boot pliers or that hotstuff electronic ignition might blow your pacemaker. With coil-over direct ignition, of course, this isn't so easy anymore. Where possible, kill injection instead of spark.

#### Sucker

A vacuum gauge can be helpful at this point, although its readings may be inconclusive or ambiguous. You'll get the most useful results at curb idle speed with the engine fully warmed up. A typical healthy powerplant will produce 15-20 in. Hg.

A steady low reading may be caused by a vacuum leak or late valve timing due to a worn or jumped camshaft drive mechanism. If the needle drops at regular intervals, suspect a leaking valve, whereas if such drops occur irregularly, a sticking valve is indicated. Floating over a wide range suggests a bad head gasket seal. Rapid needle vibration is evidence of loose valve guides.

Since backpressure can interfere with cylinder filling, check for a clogged catalytic converter or crimped pipe by holding 2,500 rpm. The reading will drop when you first open the throttle, then stabilize. If it starts to fall afterwards, there's probably an exhaust restriction.

#### Squeezability

Whether or not you've isolated a cylinder or two as the source of the problem, it's time to unscrew the spark plugs and do a traditional dry/wet compression test. Old hat? Maybe, but a medical analogy we've run into is apt: A fellow automotive editor



There's still nothing that can give you such a good inside picture of the pressure tightness of that cylinder than the traditional dry/wet compression test. But don't just look at the max reading. Instead, observe how the needle jumps with each of four impulses.

had a routine check up, and his cardiogram (a very simple, quick test) showed a problem. His cardiologist ordered a stress test, an echo cardiogram, then a nuclear stress test. Nothing further showed up -- in fact, the patient scored very well on all counts. But the cardiologist was like a good mechanic. He said no matter what the high-tech exams had shown, the old-fashioned cardiogram had indicated trouble, so something was wrong. He sent the man to have a heart catherization (also called an angiogram, it's the gold standard of cardiac tests), which showed that there was an 80% blockage in the "widow maker" artery. In other words, if that were to occlude, there would be no chance of survival. They installed a stent, and the man is healthy today. So, the old-fashioned cardiogram probably saved his life. The situation with the compression test is similar. You'll know if there's a problem even if nothing else says so.

You already know how to do a compression test, of course, but here are a few subtleties that'll help you avoid a costly mistake:

• On aluminum heads, better loosen those plugs with the engine cold, then just snug them back down enough to fire it up.

• Readings will only be accurate at normal operating temperature.

• Blow out the plug wells or flotsam and jetsam could hold a good valve off its seat.

• Pull all the plugs at once to make cranking easier.

• Make sure the battery and starter are up to the task of achieving normal cranking rpm.

• Block open the throttle plate.

• Disable the ignition, preferably on the primary side. Letting those dangling wires arc won't only zap the secondary circuit components with more voltage than they might be able to take, it's also asking for an explosion.

• Even though the clear-flood mode is supposed to halt injection during WOT (Wide Open Throttle) crank, you can be doubly certain to eliminate gasoline spray by shutting down the fuel pump and blowing the residual pressure through the rail's test Schrader into a rag, or by unhooking injector connectors.

• To do the test right, you need at least four pulses per cylinder

Record the first and fourth pushes of the needle. Why? Let's assume a normal reading of 185 psi. A constant (unwanted) hole

in the cylinder will allow pressure to built uniformly with each push. For example, you may see 30-60-90-120. This tells you that the leak is there all the time and is uniform in size -- a burnt valve, perhaps, or a badly blown gasket. On the other hand, 90-100-110-120 tells you that the cylinder is sealed up to a point, after which something breaks down or leaks. This is typically how rings fail, but a leaky head gasket will also behave this way. As a rule, the first push should be half or more of the fourth push. For our 185 psi cylinder, we'd expect to see 120-145-165-185, or thereabouts.

Test dry, then wet -- add a tablespoon of oil to each cylinder. Wet testing isn't always effective, however, because the oil may not get evenly distributed around the top ring, especially on "V"-type engines. If a low reading jumps substantially after the addition of a few squirts of oil, you've got a ring/bore problem. On the other hand, if wet readings are only slightly higher, and this rise is roughly the same for all cylinders, valves are implicated.

The difficult part is judging how much variation among cylinders, or between dry and wet readings, represents a serious problem. Say you've got 80 psi in one, but about 120 in the others, and adding oil brings them up only five psi or so. Is a valve job necessary?

That depends. Obviously, the low one is leaking somewhere, probably through an exhaust valve, and erosion is going to make it get worse pretty rapidly, so the proper thing to do is get in there and attend to the seats and faces. On the other hand, if it's not bad enough to cause a miss yet, and the customer has been frittering away his or her money on luxuries like food and shelter and can't afford major work this month, maybe he or she can simply live with it. Just make sure the customer understands that no amount of tuning or other external attention will make that engine run any better or go any farther before that cylinder loses it altogether. At least there's some good news -- the rings are okay.

# You promised the car by 5, so he could start his trip



Will fit parts that usually don't and knock off parts that cause expensive comebacks, the story's not new. ZF first started supplying driveline and chassis components to BMW in 1937. Today we continue to do our part to ensure the driving machines from BMW remain "the Ultimate". Since 1979 ZF Sales and Service North America LLC has worked with BMW North America to provide technical support, parts, and remanufactured components to keep owners enjoying their cars. We'll keep working with BMW to raise the driveline and chassis technology benchmark. You just take care of that customer who needs his car by 5 with original BMW Parts available at your local BMW Center.

6°MKI

ZF Sales and Service North America LLC ...but that knock off part won't fit and it's 4:30.



Poor pressure in two adjacent cylinders should make you think about a blown head gasket. Confirm this by looking for coolant in the oil or on the spark plug, and by checking for evidence of compression in the cooling system. Hold the probe of an exhaust analyzer over the radiator filler neck to see if you get an HC reading, or remove the thermostat housing and water pump belt, then watch for bubbles. Another possibility is one of those water-filled testers you stick in the radiator neck -- again, bubbles are the tip off.

#### Hisssss

Gauging compression isn't the only timehonored procedure that's still useful for assessing an engine's ability to squeeze air. There's also the cylinder leakage test, which is done by pumping maybe 90 psi into the spark plug hole with the valves closed, and listening to where it escapes. Hissing at the intake points to the inlet valve, and the same sound at the tailpipe indicates the exhaust.

There'll always be some noise at the oil filler hole because even the best rings can't seal completely (gaps, you know). The trick is to tell when it's excessive, which you can probably do by comparing cylinders. And this test is great for fingering a leaky head gasket -- remove the radiator cap and listen.

An improvement on this theme is the use of a gauge that lets you know what percentage of the available pressure is escaping, which is called a cylinder leak-down test. With the plugs out, bump the engine over until the cylinder in question is at TDC of its compression stroke. Use a regulated air supply of 70 to 100 psi, which you compare to the pressure the cylinder is capable of holding. Older engines tend to run some pretty high leakage numbers, so look for consistency and don't worry too much about those big numbers if the engine is running smoothly at idle. We've seen engines with uniform leakage numbers of



Another excellent troubleshooting procedure is the cylinder leak-down test. The gauge set lets you know what percentage of the pressure being pumped into the cylinder is escaping.

50% perform just fine. We've also tried to fix those numbers, and found out that going from 50% to 20-25% made no appreciable difference in the way the engine ran. Newer engines typically produce low numbers -under 10%. If you get a high reading on a cylinder with no recorded misfires, check for carbon. Crank the engine over a few times to dislodge particles and repeat the test. If the numbers come down, you may be fighting carbon.

Since you need to be at TDC only to get both valves closed, on a lot of late models with negative overlap it's tempting to try to do two at once. But with only a few degrees of negative overlap sometimes there's not enough seating pressure to get a good reading.

There's more to throw into your mental threshing machine before you make your grand diagnostic pronouncement. Anything that holds a valve open, such as a broken spring or a sticking guide, will certainly cause a low compression reading. While these can usually be fixed without removing the head, chances are the valve is burned to a crisp (it can only cool when closed, after all) and/or bent. You can try making the repair and see what happens, but there's no guarantee of success.

Low cylinders that don't produce more pressure after oil has been introduced into them may not have valve sealing trouble. A wiped cam lobe or other valve train failure can result in a miss because the cylinder isn't being properly packed. Check lift before you start unscrewing head bolts.

Absolutely no compression in a cylinder does not necessarily mean a valve is stuck open or burned away, either. There could be a hole in the piston, and we remember an engine that was still running, albeit roughly, even though the piston was entirely gone along with the whole rod so that when we yanked the head we were looking down on what was left of the crank pin.

In cases where the car suddenly refused to start and you got weird compression readings, a snapped OHC drive belt or a jumped timing chain is a more likely possibility than bad valves, which deteriorate gradually. If the powerplant isn't freewheeling (that is, the valves hit the pistons if they're out of synch), however, you're going to have to remove the head anyway for the replacement of some bent stems.

#### Knockers

The sound is distinctive -- a deep, hollow rap, not at all like valve train click-clacking. The universal term for this disturbing noise is knocking, and it's perfectly appropriate because it makes you think of knuckles on a wooden door. And it's a pretty sure indication of a problem in the engine's foundation, the precursor of certain catastrophe.

But conclusion jumping is a dangerous sport. Your plans for a simple rod bearing job will have to be greatly modified if the



Many a technician has been embarrassed (and probably ridiculed) for mistaking a rod small-end bushing knock for a loose rod bearing. Follow the procedure and you can be pretty sure of your diagnosis. One good thing: After you drop the pan and remove the rod caps, you'll know if the bearings are okay. If so, you'll just have to escalate your estimate to include engine R&R. crank turns out to be bad, the rod big ends are stretched so there's no crush factor to keep the bearings from spinning, or the knock is really emanating from a sloppy wrist pin fit.

Identifying the source of that nerve-jarring rap can be tricky, and the biggest challenge is distinguishing between a loose rod bearing and a worn-out wrist pin. It's indeed unfortunate that one sounds pretty much like the other.

With a little patience, however, you should be able to determine what's at fault. Start your investigation by pulling the dipstick to find out the condition and level of that all-important liquid lube. Then, use a stethoscope to listen to the engine while it's idling hot. A rod bearing makes more noise at the oil pan than elsewhere, and a wrist pin will make more racket up on the water jacket. Hold rpm at 2,500, jerk the throttle open and let it snap closed. This will accentuate rod knock, whereas pin noise won't change very much.

#### **Oil pressure**

Next, check oil pressure by screwing in a mechanical gauge. Specifications are usu-



What's in the crankcase, anyway? Either too thick or too thin is a big problem. Think gasoline contamination (in the days of carburetors, we used to try to light the dipstick), or lack of maintenance that turns motor oil into tar. Your oil pressure readings will vary accordingly.

ally given hot, at idle and between 2,000 and 2,500 rpm. Why low and high speed? Pump speed naturally affects the volume pumped, and, of course, an oil pump generates volume only. Pressure is built by trying to push that volume through small spaces, such as the bearing clearances. Because the pump is of the positive-displacement variety, it'll move anything you put into it, pressure will rise as the discharge is restricted up to the set point of the pressure relief valve. The old standard of 10 psi per thousand rpm still works fairly well, but in an effort to reduce horsepower losses, late models often have reduced maximum pressures. Always refer to specs.

Make sure you've let it run for plenty of time before you render a verdict -- 50 psi cold can turn into 5 psi hot. Also, don't rule out a pump or bypass relief valve problem or the presence of low viscosity oil (we once knew a guy who liked to fill his crankcase with ATF). The relationship of flow to bearing clearance is important. Assuming that normal clearance is .001 in., flow will increase by a factor of five if you just double the clearance to .002. If you go to .004, oil flow increases by a factor of 25. Sooner or later, the pump's volume is exhausted, pressure drops and the light comes on.

If the pressure fluctuates, think low level, entrained air or suction leaks. Maybe the pan is running dry due to the installation of a high-volume pump. Or, perhaps a massive internal leak is draining the pan. A high-volume pump needs more pan capacity because at high rpm the oil is pulled out of the pan and held in windage. The oiling system is just that: a system. More is not always better unless all the components are matched. Any suction leak between the oil pickup and the pump will create fluctuations, as will air pulled in due to excess flow through worn-out bearings that sucks the pan dry.

If oil pressure is low all the time, suspect an internal leak such as bad bearings, or a leaky oil gallery plug. A worn-out oil pump can cause low psi, but as it's the best-oiled piece in the machine it's not a good sign for the rest of the internals.

If pressure's low at idle, but okay at high rpm, the pressure relief valve is probably stuck open. In cases where the psi is fine at idle, but low at high rpm, think restricted pickup screen, although a suction leak could be the culprit. Pressure high all the time? The relief valve is probably stuck shut, which can blow the filter.

#### Carbon knock



Whether the surgical tubing and diaphragm type, or one of the new electronic amplified versions, a mechanic's stethoscope is about as indispensable as it gets where nailing down noises is concerned.

Killing cylinders, either with a scan tool or manually, is often mandatory for nailing down the offender. A rod knock tends to quiet down with the cylinder killed, but a pin tends to get louder. Still sounds the same? You may be dealing with a carbon knock. If a heavy carbon ridge has formed above the top of piston travel, it can eventually force a violent rock-over, producing a harsh, loud piston-slap type of noise. Also, carbon can build up in the guench areas to the extent that the piston actually contacts it at TDC, which causes a mechanical knock or even a slap knock. In the early stages, a carbon knock will mimic a slap in that it will go away as the temperature comes up.

We've seen enough of this lately to recommend de-carbonizing as a first step. You may have to treat the engine two or three times. If you've worked on BMWs long enough, you may remember the walnut shell blasting method of removing carbon, which the company approved a couple of decades ago. Today, we have such good chemical intake tract and combustion chamber cleaning systems that everybody's abandoned the walnut shell method.

One of the techniques used to find out if that noise is carbon-related is the floating throttle rev test. Take the engine up to about 2,000 rpm, snap the throttle open to increase cylinder pressure, then rapidly close it to pull high intake vacuum. Watch that rpm -- it's easy to over-speed the engine. What you're trying to accomplish is loading and unloading the pistons, pins and rod bearings. You have to do this rapidly, about two or three times per second, from snap open to closed in order to achieve maximum load. If there's mechanical looseness in the rod/piston/pin, the rap will get a lot louder as you do this. If the noise remains constant (other than going away some as it heats up), it's probably carbon.

#### Lube in the fire

Finally, as we all know, excessive oil consumption is usually due to bad valve stem seals or guides. But not always -- rings still fail. Unfortunately, you can't check an oil control ring because it's the third one down. The compression rings may be fine, but the oil ring may be varnished, jammed, or "unitized." Valve guides or seals also cannot be effectively tested. As a rule, if it smokes on start-up or after a long, hard decel, it's probably guides or seals. If it smokes on acceleration, it's probably rings.

### FEATURE ARTICLE



### Cut the Confusion: External Versus Internal BMW Model Designations

The engineers use a different identification system than the marketing people do, so here's how to decode the situation and zero in on the right service information and parts. Plus, valuable explanations of VIN, build date, anti-theft labeling and paint codes

Here's the scenario: A new customer arrives smiling. He says he's heard good things about your work, and he'd like you to take a look at his beloved BMW. Sure, you say, no problem. You walk out to the lot with him and -- hmm -- it's a model you've never worked on before. That won't be an issue as far as your technical expertise is concerned, but how about looking up exactly the right service information, or ordering parts? No matter what that nicely-sculpted badge may say, you need to know how this particular vehicle is identified within its manufacturer's information and catalog systems.

Hence, this article. We've included a handy chart that gives you the model, series, engine, years of manufacture and code for all the BMWs ever imported into the U.S. since 1980. That's a quarter of a century. If you need to go back farther than that, you're a restoration shop. We've printed it on both sides of one page so you can tear it out and hang it on the wall for quick reference. You may even want to laminate it in clear plastic to avoid grease spots from hard-working fingers.

#### Positioning in the market

The story of how these designations came about is interesting. BMW uses two



In spite of what you might expect, all 323i models, which are designated E46, are equipped with 2.5L engines (that is, the M52TU)

different systems of identifying its products. External designations, called "trunk badges," exist to help consumers differentiate among models. Essentially, they're a marketing tool, the names by which owners know their vehicles. They're created by the sales and marketing department to position every model in exactly the right place as far as the competition is concerned.

Most BMW badges are a combination of numbers and letters. The first number represents the series. Typically, the next two digits give the engine displacement in liters, although occasionally the actual displacement does not match the designation. This is a marketing decision designed to bolster familiar name recognition from one version to the next and to create spacing between models. Examples of this include:

- •1996-1999 318ti with a 1.9 liter engine
- •1996-2001 740i with a 4.4 liter engine
- All 323i models are equipped with a 2.5 liter engine.



You'll find a 4.4L engine in the 740i. This one has an "L" at the end, meaning it has a long wheelbase.

There is, of course, another series of badges that begin with a letter followed by a single digit. These are found on the Z3 roadster and M3 coupe, X5 SAV, Z8 roadster and motorsport versions of various cars.

(Continued on page 18)

# **CONSISTENTLY COOL**



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Remanufactured to OEM Specification

Increase Customer Satisfaction

Lower Cost of Ownership

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# BMW REMANUFACTURED A/C COMPRESSOR



### CYLINDER BLOCK & FRONT/REAR HOUSING

Cleaned, inspected and brought to O.E. specifications, or replaced with new components if necessary, to insure proper fit.

#### **DISCHARGE REED VALVE**

Inspected, cleaned, and polished, or replaced by new components as necessary, to insure compressor performs as "new."

#### STEEL GASKET

Replaced 100% with new components to insure compressor performs as "new."

#### **O-RINGS & SEALS**

Replaced 100% with O-Rings compatible with both R12 & R134a refrigerant to achieve O.E. performance and maximum service life regardless of which refrigerant is utilized. s

service life.

PISTON

as "new."

SHOES

SHAFT KEYS

OIL

SHOES

Replaced 100% with R134a

compatible oil to insure long

Inspected and cleaned, or

surface is damaged, to insure

compressor performs as "new."

SHAFT & SWASH PLATE

replaced by new if Teflon

Cleaned, polished, and

inspected, or replaced with new components if necessary,

Replaced 100% with new

OEM spec. tolerances.

components to insure new

Inspected for deterioration and

cleaned to eliminate contaminants.

or replaced by new components. Gauged and sized for noise reduction.

to insure compressor performs

CYLINDER BLOCK

#### SNAP RINGS

Replaced 100% with new components to insure compressor performs as "new."

#### SUCTION REED VALVE

Inspected, cleaned, and polished, or replaced by new components, to insure compressor performs as "new."

#### THRUST BEARING

Inspected for deterioration and cleaned to eliminate contaminants, or replaced by new components if necessary.

#### VALVE PLATES

Inspected, cleaned, and polished, or replaced by new components, to insure compressor performs as "new."



### Vehicle Model Designations (Continued from page 15)



But trunk badges don't all have to start with numbers, as this M3 coupe proves.

Additional letters sometimes follow the badge numbers and are used to further identify each model's special characteristics, such as:

- C Coupe
- L Long Wheelbase
- i Fuel Injected
- s Sport
- x All-Wheel Drive
- ti touring internationale



This E36 has an M52 engine, and boasts an "s" for "sport."

#### **Insider** info

Then there are internal designations, which the company itself and authorized dealer personnel use to identify particular



The "x" means all-wheel drive, and the engineering designation is E53.

production versions with all their subtle differences. These are created by the engineering and technical development departments to identify a new model during the design process. The use of internal designations carries over to the technical support and parts groups after the car is produced, and they refer to the entire vehicle series of a particular body/chassis design. Not all design concepts make production, so internal designations are not necessarily sequential.

These start with the letter "E" for all BMW vehicles, which is followed by a two-digit number. For instance, E46 refers to all 3-series cars. Often, there's an additional number separated by a slash (/):

- E36/7 (Z3)
- E46/3 (Sport Wagon)
- E46/16 (All-Wheel Drive)
- E36/5 (3-Door Touring)
- E46/2 (Coupe)
- E46/5 (3-Door Touring)

#### Vehicle Identification Numbers

For the mandated Vehicle Identification Number (VIN), BMW uses a 17-character structure, which provides all pertinent information.



#### This 2002 model was built in Munich by BMW AG.

<ul> <li>The first three letters and or digits are the manufacturer's code:</li> </ul>	<b>NOTE:</b> I, O, Q, U and Z are not used because they can easily be mistaken		
4US = BMW MFG. Corp. Spartanburg*	for numbers.		
NC0 = BMW South Africa*	B=1981		
WBA = BMWAG	C=1982		
WBS - Motoroport	D=1983		
WBS - Motorsport	E=1984		
<ul> <li>Spartanburg and South Africa not used</li> </ul>	F=1985		
after 1999.	G=1986		
<ul> <li>Letters and numbers in the four through</li> </ul>	H=1987		
seven spaces are the model code.	J=1988,		
• The eighth space is reserved for the	K=1989		
restraint system identifier:	L=1990		
0 = Soat bolts	N-1991		
	D-1003		
1 = Seat belts and Driver airbag	R=1990		
2 = Seat belts and dual airbags	S=1995		
3 = Seat belts and second generation	T=1996		
dual front airbags	V=1997		
4 = Seat belts and dual-stage advanced	W=1998		
front airbags	X=1999		
• The ninth space is occupied by a check	Y=2000,		
digit determined by the VIN.	1=2001		
• The letter or number in the 10th space	2=2002		
is the model vear identifier (started in	3=2003		
1980). So, A=1980, progressing	4=2004		
forward sequentially:	5=2005		

**NOTE:** 6 through 9 will represent 2006 through 2009, then it starts alphabetically again with A=2010.

• The letter in the 11th space is the plant code:

A, F, K = Munich, Germany C, B, D, G = Dingolfing, Germany E, J, P = Regensburg, Germany L, M = Spartanburg, U.S.A. N = Roslyn, South Africa W = Graz, Austria V = Leipzig, Germany

• Letters/numbers 12 through 17 are the sequential production numbers.

You can find the VIN in the following locations:

- Left lower corner of the instrument panel. This is viewed through the windshield from outside the vehicle.
- B-pillar compliance label, which is on the driver's side door jamb.

Additionally the VIN is stamped into the chassis in one of two locations:

- Under the hood on the right side of the engine compartment bulkhead.
- Under the hood on right side shock tower.



#### When was it built?

The production date can be found on the B-pillar compliance label. This information is required quite often when a repair procedure affects only a certain run of vehicles.

The date shown on the label reflects the actual month and year the vehicle was produced. It is not a model year indicator.



#### Anti-theft

- Since 1987, the National Highway Traffic Safety Administration (NHTSA) has required that the VIN be marked on specific parts of the car during manufacture for theft identification. Some models are exempt if the total number of vehicles imported is below a certain threshold.

The following parts carry the VIN:

- -Engine
- -Transmission
- -Hood
- -Trunk lid
- -Front and rear bumpers
- -Front Fenders
- -Doors
- -Quarter panels

#### Color code

- Whenever you have to order a prepainted part, you'll need the vehicle's paint code, a three-digit number printed on the color identification tag in the engine compartment.

### **BMW Model Designation Chart**

MODEL	SERIES	ENGINE	YEAR	CODE
320i/Manual	E21	M10	80,81,82,83	1733
323Cic	E46	M52TU	2000	BR33
320i/Automatic	E21	M10	80,81,82,83	1743
323CicA	E46	M52TU	2000	BR43
323iT	E46	M52TU	2000	AR33
318i/2 Dr. Manual	E30	M10	84,85	1074
32311A 219:/2 Dr. Auto	E46	M521U	2000	AR43
3101/2 Dr. Auto 323Ci	E30 E46	M52TH	64,65 2000	1004 BM33
318i/4 Dr. Manual	E40 F30	M10	85	1374
323CiA	E46	M52TU	2000	BM43
318i/4 Dr. Automatic	E30	M10	85	1384
325Ci	E46	M54	2001,02,03	BN33
318is/2 Dr.	E30	M42	91	AF93
325CiA	E46	M54	2001,02,03	BN43
3181/4 Dr.	E30	M42	91	AJ93
323010 219i Convertible	E40 E20	M42	2001,02,03	D000 BA72
325Ci	E30 F46	M54	2004.05	BD33
325/e/es/2 Dr. Manual	E30	M20	85,86,87.88	1254
325CiA	E46	M54	2004.05	BD43
325/e/es/2 Dr. Automatic	E30	M20	85,86,87,88	1264
325CiA SULEV	E46	M56	2004,05	BV23
325/e/es/4 Dr. Manual	E30	M20	85,86,87,88	1554
JZDUC 225/o/oo/4 Dr. Automotic	E40	M54 M20	2004,05	BW33
325/e/es/4 Dr. Automatic 325CicΔ	E3U E46	₩20 M54	00,00,07,00 2004 05	1004 BW//3
325i/2 Dr. Manual	E40 F30	M20	2004,00 87.88.89 90 91	1113
325CicA	E46	M54	2001,02.03	BS43
325i/2 Dr. Automatic	E30	M20	87,88,89,90,91	1123
325CiA SULEV	E46	M56	2003	BN83
325i/4 Dr. Manual	E30	M20	87,88,89,90,91	1413
325i	E46	M54	2001	AV33
3251/4 Dr. Automatic	E30	M20	87,88,89,90,91	1423
3231A 225i Convortible/Manual	E40 E20	M20	2001 97Through 02	AV43 BB12
325i	E30 F46	M54	2002 03 04 05	EV33
325i Convertible/Auto.	E30	M20	87 Through 93	BB23
325iA	E46	M54	2002,03,04,05	EV43
325iX/2 Dr. Manual	E30	M20	88,89,90,91	1293
325iA SULEV	E46	M56	2003,04,05	AZ43
325iX/2 Dr. Automatic	E30	M20	88,89,90,91	1203
325i (South Africa)	E46	M54 M20	2001	AN37
3251X/4 Dr. Automatic	E30 E46	M54	2001	1503
325iX/4 Dr. Manual	E40 E30	M20	89 90 91	1593
325i (South Africa)	E46	M54	2002,03,04,05	ET37
M3	E30	S14	88,89,90,91	1003
325iA (South Africa)	E46	M54	2002,03,04,05	ET47
325xi	E46	M54	2001	AS33
325i Convertible/Manual	E36	M50	94,95	BJ53
325xiA	E46	M54	2001	AS43
325i Convertible/Auto.	E36	M50	94,95	BJ63
325XI M2	E46	M54 850	2002,03,04,05	EU33 RE02
wo 325xi∆	E30 F46	350 M54	90 2002 03 04 05	6193 FI143
M3 Automatic	E36	S50	95	BF03
325iT	E46	M54	2001	AW33
M3	E36	S52	96,97,98,99	BG93
325iTA	E46	M54	2001	AW43
M3 4 Dr.	E36	S52	97,98	CD93
325iT	E46	M54	2002,03,04,05	EN33
M3 4 Dr. Automatic	E36	552 ME 4	97,98	CD03
32311A M3 Convertible	E40 E36	1VI54 S52	2002,03,04,05 08 00	EN43 RK03
325iTA SUI EV	E30 F46	352 M56	2003 04 05	DX23
M3 Convertible Auto	E36	S52	98.99	BK03
325xiT	E46	M54	2001	AR73
318is/2 Dr.	E36	M42	92,93,94,95	BE53

MODEL	SERIES	ENGINE	YEAR	CODE
325xiTA	E46	M54	2001	AR83
318isA/2 Dr.	E36	M42	93,94,95	BE63
325xiT	E46	M54	2002,03,04,05	EP33
318i/4 Dr.	E36	M42	92,93,94,95	CA53
325xiTA	E46	M54	2002,03,04,05	EP43
318iA/4 Dr.	E36	M42	93,94,95	CA63
328i	E46	M52TU	99,2000	AM53
318i Convertible/Manual	E36	M42	94,95	BK53
328iA	E46	M52TU	99,2000	AM63
318i Convertible/Auto.	E36	M42	94,95	BK63
328Ci	E46	M52TU	2000	BM53
318ti/2 Dr.	E36	M42	95	CG53
328CiA	E46	M52TU	2000	BM63
318tiA/2 Dr.	E36	M42	95	CG63
330i	E46	M54	2001	AV53
325is/2 Dr.	E36	M50	92,93,94,95	BF33
330iA	E46	M54	2001	AV63
325isA/2 Dr.	E36	M50	92,93,94,95	BF43
330i	E46	M54	2002,03,04,05	EV53
325i/4 Dr.	E36	M50	92,93,94,95	CB33
330iA	E46	M54	2002,03,04,05	EV63
325iA/4 Dr.	E36	M50	92,93,94,95	CB43
330Ci	E46	M54	2001,02,03	BN53
318i	E36	M44	96	CD73
330CiA	E46	M54	2001,02,03	BN63
318iA	E36	M44	96	CD83
33000	E46	M54	2001,02,03	BS53
3181/4 Dr.	E36	M44	97,98	0093
3300ICA	E40	W54	2001,02,03	B203
3 181AV4 Dr. 2200:	E30	N44	97,98	0003
33001 219ia/2 Dr	E40 E26	M44	2004,00	DU00 DE70
31015/2 DI. 2200:1	E30 E46	M54	90,97 2004 05	BD63
3300/A 218ic//2 Dr	E40 E36	MJ4 M//	2004,03	BE83
330Cic	E30 E46	M54	2004.05	BW53
318ti/2 Dr	E36	M44	96 97 98 99	CG73
330CicA	E00	M54	2004 05	BW63
318tiA/2 Dr.	F36	M44	96.97.98.99	CG83
330xi	E46	M54	2001	ES53
318iC	E36	M44	96.97	BH73
330xiA	E46	M54	2001	ES63
318iCA	E36	M44	96,97	BH83
330xi	E46	M54	2002,03,04,05	EW53
323is	E36	M52	98,99	BF73
330xiA	E46	M54	2002,03,04,05	EW63
323isA	E36	M52	98,99	BF83
M3 coupe	E46	S54	2001,02,03,04,05	BL93
M3 Convertible	E46	S54	2001,02,03,04,05	BR93
323iC	E36	M52	98,99	BJ73
323iCA	E36	M52	98,99	BJ83
220:0/2 Dr	E26	M52	06 07 09 00	DC12
52015/2 DI. 5201/Manual	E30 E12	M20	90,97,90,99	2005
320//vialiual 229/cs//2 Dr	E26	M50 M52	06,07,09,00	2222 2222
528i/Automatic	E30 F12	M30	90,97,90,99 80 81	3007
328i/4 Dr.	E36	M52	96,97,98	CD33
000'A/A D.	500	1450	00.07.00	0040
3281A/4 Dr. 520a (Manual	E30	ND2	90,97,98	6D43
	E20 E26			40/3
J2016 5280/Automatic	E30 E20	M20	30,31,30,33	DN/3
320C/Automatic	E26	M52	02 1110091100 06 07 02 00	4003 RK02
52010A 533i/Manual	E30 F28	M30	83.84	4274
	220	100	00,04	7614
533i/Automatic	E28	M30	83,84	4284
JZJI 525i/Monucl	E40		33,2000 05 06 07 00	AIVIJ
3331/1VidHudi 2221A	E20 E16	MEDTII	00,00,07,00	DU/4
525i/Automatic	E-40 E-28	M30	85 86 87 99	
323i (South Africa)	E20 E46	M52TH	2000	0004 0N22
524td	F28	M21	85.86	4224

MODEL	SERIES	ENGINE	YEAR	CODE	MODEL	SERIES	ENGINE	YEAR	CODE
323iA(South Africa)	F46	M52TU	2000	AN43	Z3 roadster 2.8	F36	M52	97.98	CJ33
M5	F28	S38	88	DC93	530iA	E60	M54	2004 05	NA83
M5	E24	C30	01 02 02	HD03 D020	73 madster 2 8 Automatic	E36	M52	07 08	C 1/13
740;	E20	000 M60	91,92,95	CE62	EAE:	E60	NGO	2004.05	ND22
	EJO		90 00	0010	0401 70 m a data = 0.0	EUU	NUZ	2004,00	
5251/Manual	E34	IVIZU	89,90	HU13	23 roadster 2.8	E30	NISZ I U	99,2000	
740iL	E38	M60	95	GJ63	545IA	E60	N62	2004,05	NB43
525i/Automatic	E34	M20	89,90	HC23	Z3 roadster 2.8 Automatic	E36	M52TU	99,2000	CH43
740iL	E38	M62	96,97,98	GJ83	Z3 coupe 2.8	E36	M52TU	99,2000	CK53
525i/Manual	E34	M50	91,92,93,94,95	HD53	633CSi/Manual	E24	M30	80,81	5235
740iA	E38	M62	97,98	GF83	Z3 coupe 2.8 Automatic	E36	M52TU	99,2000	CK63
525i/Automatic	E34	M50	91,92,93,94,95	HD63	633CSi/Automatic	E24	M30	80,81	5245
740i	F38	M62	99,2000.01	GG83	M roadster	F36	S52	98,99,2000	CK93
525i Touring	E34	M50	92 93 94 95	H.I63	633CSi/Manual	F24	M30	82	5236
7/0il	E38	M62	00 2000 01	CH83	M coupe	E26	\$52	00 2000	CM03
520i/Manual	E00	MGO	04.05		622CCi/Automatia	E00	M20	00	5246
740: meteotien	L34 F20	MCO	94,9J 2000 01		72 readator 2 5:	L24 F26	MEA	2001 02	0N22
740L protection	E30		2000,01		23 IOduster 2.51	E30	IVI34	2001,02	61133
530I/Automatic	E34	M00	94,95	HEZ3		EZ4	M30	83,84	5274
750iL	E38	M73	95,96,97,98	GK23	Z3 roadster 2.51 Auto.	E36	M54	2001,02	CN43
530i Touring/Automatic	E34	M60	94,95	HK23	633CSi/Automatic	E24	M30	83,84	5284
750iL	E38	M73	99,2000,01	GJ03	Z3 roadster 3.0i	E36	M54	2001,02	CN53
535i/Manual	E34	M30	89,90,91,92,93	HD13	635CSi/Manual	E24	M30	85,86,87,88,89	5374
750iL protection	E38	M73	2000,01	GK93	Z3 roadster 3.0i Auto.	E36	M54	2001,02	CN63
535i/Automatic	E34	M30	89,90,91,92.93	HD23	635CSi/Automatic	E24	M30	85,86,87,88,89	5384
			,,.,.,,	-	M roadster	E36	S54	2001,02	CL93
540i	E34	M60	95	HE53	M6/Manual	F24	S38	87.88	5514
745i	E65	N62	2002,03,04,05	GL63	Z3 coupe 3.0i	F36	M54	2001.02	CK73
540i/Automatic	E34	M60	94,95	HE63	L 6/Automatic	E30 F24	M30	87	5281
760i	E65	N73	2005	GL83		E26	M54	2001 02	0004
					23 coupe 3.01 Auto	L30	10134	2001,02	0100
745Li	E66	N62	2002,03,04,05	GN63	M coupe	E36	S54	2001,02	CN93
525i	E39	M54	2001,02,03	DT33	645Ci	E63	N62	2004,05	EH73
760Li	E66	N73	2003,04,05	GN83	645CiA	F63	N62	2004 05	FH83
525iA	E39	M54	2001,02,03	DT43	74 madster 2 5	E85	M54	2003 04 05	BT33
						LUU	1013-4	2000,04,05	DTUU
52511	E39	M54	2001,02,03	DS33	24 roadster 2.5 Auto.	E85	M54 NG2	2003,04,05	B143
840Ci/Automatic	E31	M60	94,95	EF63		L04 E05	MEA	2004,03	DTEO
525iTA	E39	M54	2001,02,03	DS43	24 roadster 3.0	E80	NCO	2003,04,05	BI33
840Ci/Automatic	E31	M62	96,97	EF83	645CICA	E04	N62	2004,05	EN83
528i	E39	M52	97,98	DD53	Z4 roadster 3.0 Auto.	E85	M54	2003,04,05	B163
850i/850Ci	E31	M70	91,92,93	EG13	733i/Manual	F23	M30	80.81	6633
528iA	E39	M52	97,98	DD63	X3 2 5i	E83	M54	2004.05	PΔ73
850iA/850Ci/Automatic	E31	M70	91,92,93,94	EG23	733i/Automatic	E00 E23	M30	80.81	6643
528i	E39	M52TU	99,2000	DM53	Y2 2 5i A	E83	M54	2004 05	DV83
850CiA	E31	M73	95.96.97	EG43	722:/Manual	E00	M20	2004,03	6624
528iA	F39	M52TU	99 2000	DM63		EZ3 E02	MEA	02	0034
850CSi	E31	S70	94 95	FG93	A3 3.01	EOS	IVI34	2004,05	PA93
529iT	E20	ME2TH	00,2000	DD52	/33i/Automatic	E23	M30	82	6644
52011	L39	WJZTU	33,2000	DFJJ	X3 3.0i A	E83	M54	2004,05	PA03
528iAT	E39	M52TU	99,2000	DP63	733i/Manual	E23	M30	83,84	6674
Z8	E52	S62	2000,01,02,03	EJ13	733i/Automatic	F23	M30	83 84	6684
530i	E39	M54	2001.02.03	DT53		E53	M62	2000 01 02 03	FR/3
BMW Alpina Roadster V8	F52	M62	2003	F.I13	725i/Manual	E00	M20	05 06 07	6074
530iA	F39	M54	2001.02.03	DT63		L20 E52	NGO	2004 05	CO14
	200	1110 1	2001,02,00	2100	AJ 4.41 A	E00	NUZ	2004,00	FD03
Spartanburg Production:					7 351/Automatic	EZ3	M30	85,86,87	6884
540i	E39	M62	97,98	DE53	X5 3.0i	E53	M54	2001,02,03	FA53
318i/4 Dr.	E36	M42	95	CC73	L7	E23	M30	86,87	6724
540iA	E39	M62	97,98	DE63	X5 3.0i A	E53	M54	2001,02,03	FA63
318iA/4 Dr.	E36	M42	95	CC83	X5 3.0i	E53	M54	2004,05	FA13
540i	E39	M62	99,2000,01,02,03	DN53	735i/Automatic	E32	M30	88,89,90,91,92	GB43
318i/4 Dr.	E36	M44	96	CD73	X5 3.0i A	E53	M54	2004,05	FA23
540iA	E39	M62	99,2000,01,02,03	DN63	735iL/Automatic	E32	M30	88,89,90,91,92	GC43
318iA/4 Dr.	E36	M44	96	CD83	X5 4.6is A	E53	M62	2002,03	FB03
540iA protection	E39	M62	99 2000	DN83	740i/Automatic	E32	M60	93.94	GD43
328i/4 Dr.	E36	M52	96	CD13	X5 4.8is A	E53	N62	2004.05	FA03
540iAT	E30	M62	99 2000 01 02 02	DR63	740iL/Automatic	F32	M60	93.94	GD83
328iΔ/4 Dr	E38	M52	96	CD23		202			2200
520MH DI. ME	E20	NUJZ CGO	2000 01 02 02	DE02	MINI	<b>F</b> 66		00 <b></b>	0000
IVIJ 70.1.0	E39 E30	302	2000,01,02,03	0123	750iL/Automatic	E32	M70	88 Through 94	GC83
23 1.9	E30	WI44	90,97,98	UH/3	Cooper	R50	W10	2002,03,04,05	RC33
Z3 1.9/Automatic	E36	M44	96,97,98	CH83	Cooper Automatic	R50	W10	2002,03,04,05	RC43
525	E60	M54	2004,05	NA53	Cooper Convertible	R52	W10	2005	RF33
Z3 roadster 2.3	E36	M52TU	99,2000	CH93	Cooper Conv. Automatic	R52	W10	2005	RF43
525iA	E60	M54	2004,05	NA63	Cooper S	R53	W11	2002,03,04,05	RE33
Z3 roadster 2.3 Automatic	E36	M52TU	99,2000	CH03	Cooper S Convertible	R52	W11	2005	RH33
530i	E60	M54	2004,05	NA73	Cooper S Conv. Auto	R52	W11	2005	RH43

†T†A	Processed Vehicle Speed	IHKA	Automatic Heating and A/C
AB	Airbag	IHKR	Regulated Heating and A/C
ABS	Anti-lock Braking System	IHKS	Standard Heating and A/C
ADS	Engine Intake Air Control	IKE	Instrument Cluster Electronics
ADV	W/wiper Pressure Control	IR	Infrared
AGS	Adaptive Transmission Control	ISN	Individual Serial Number
AIC	Rain Sensor	K-Bus	Karroserie(body) bus
ASC	Automatic Slip Control	KL	Terminal Designation
ASC+T	ASC+Traction	KOMBI	Instrument Cluster
AST	Slip Control Marketing term	KW	Crankshaft
AUC	Automatic Air Recirculation	LCM	Lamp Check Module
В	Benzine (gasoline)	LDP	Leak Diagnosis Pump(fuel tank)
BC	Board Computer	LEV	Low Emissions Vehicle
BWRI	Board Monitor	LL	Closed I hrottle
BS	Block Diagram	LSM	Seat /Steering Column Memory
	Corner Braking Control		Lamp Switching Center
CAN-DUS	Controller Area Network (bus)		Vertical Headinght Alming
	Convertible Ten Medule	LWS D	Steering Angle Sensor Maximum Braka Control
	Diagnosis Rus (camo as TYD)		Motor Controlled Throttle Valve
	Diagnosis Dus (same as TAD) Dynamic Brake Control	MEI	Multi Eurotion Stooring Whool
	Dealer Communication System	MID	Multi-Information Display
DDF	Digital Diesel Electronics	MRS	Multiple Restraint System
DIN	German Industrial Standards	MSR	Engine Drag Torque Reduction
DIS	Diagnosis and Information	OBC	On-Board Computer
DISA	Diffferential Air Intake Control	OBD	On-Board Diagnosis (SAE)
DK	Throttle Housing	OPPS/OPS	Optical Testing & Programming System
DKI	Throttle Position	PB	Pin Assignments
DME	Digital Motor Electronics	P-BUS	Periphery Bus
DM-TL	Diag.Module Tank Leakage	PDC	Park Distance Control
DSC	Dynamic Stability Control	PWG	Pedal Position Sensor
DSP	Digital Sound Processing	RDC	Tire Pressure Control
DWA	Theft Deterrent System	RM	Relay Module
DWS	Lire Pressure Warning System	RPS	Rollover Protection System
EBV	Electronic Brake Proportioning	KXD DZV	Wake-up Diagnosis Line
	Engine control module (SAE)	RZV CD	Direct Stationary Ignition
	Electronic Dampening Control	JD CDE	Fuse Assignments
EDK	Electronic transmission control	SDE	Soft close Actuator
EUS	Electronic Height Control	202	Sont close Actuator Sont Integrated Bolt System
FKM	Electronic Rody Module	SHD	Suproof Module
EKP	Electronic fuel pump	SM	Seat Module
ELV	Electronic Steering Lock	SP	Schematic
EM	Electro-Mechanical	ST	Connector Views
EML	Electronic Motor Load Regulation	SULEV	Super Ultra Low Emission Vehicle
EO	Component Location	SZM	Central Switch Center Module
EPC	Electronic Parts Catalog	TD	Engine Speed
ETM	Elec. Troubleshooting Manual	TLEV	Transitional Low Emission Vehicle
EWS	Electronic driveaway protection	ti	Injector on time
FB	Function Description	TU	Iechnicaly Updated
FBZV	Radio Frequency Locking System		Iransmiting Diagnosis Line
GAL	Speed dependant volume		Ultra Low Emission Venicle
GINI CDII	Dasic Module Cruice control	VANUS VI	variable Carrisriait Liming
CT1	Group Tester	VL 7/15	Fuii ioau - wide operi trirottie
HDC	Hill Decent Control	ZAE 7KE	Central Body Electronics
HEM	Air mass meter	2NL 7\/M	Central locking Module
IR	Interior lighting control signal	ZWD	Idle Control Valve
I-Bus	Information Bus	2110	

## Will aftermarket parts really perform properly on that BMW repair?

### Keep your fingers crossed!

On the one hand... you think you're saving money by using aftermarket parts for a BMW repair.

On the other hand... you're hoping those parts fit and perform properly or you could lose time, money and a valuable customer.

Only Original BMW Parts assure you absolute perfect fit and function. With most parts in stock at new, competitive pricing along with BMW's no-nonsense limited warranty, Original BMW Parts are the hands down best choice.

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### PARTS LINE



Your local BMW center continues to be your one-stop shopping source for Original BMW Parts and Accessories with access to more than 60,000 parts.

#### Guarantee

Original BMW Parts and Accessories not only make it easier for independent repair shops to meet their customer needs, it also enables them to exceed customer expectations by providing Original BMW Parts and Accessories covered by a limited warranty of 24 months and unlimited mileage.

#### Service

Our centers are interested in partnering with you to provide you with the level of service that you not only expect but demand. This means that they are committed to providing exceptional availability, competitive pricing, delivery, assistance with parts ordering and technical assistance.

#### **Technical Assistance**

BMW stands committed to our wholesale parts program. We have recently introduced a new **Electronic Parts Catalog (EPC)**, which may be accessed through our new **Aftersales Assistance Portal (ASAP)**. Please contact your local Authorized BMW center for details. Our centers are eager to assist you with the purchase of Original BMW Parts and Accessories that are factory tested and guaranteed for absolute perfect fit and function.

Contact you local authorized BMW center for availability and ordering information.

### **TECH BRIEFS**

#### 7 Series with N62 Engine: Whistling, MIL on and Mixture Codes

- A complaint of a whistling sound from the engine combined with an illuminated MIL and/or mixture fault codes stored in the DME may be caused by a leaking diaphragm in either or both of the crankcase vent valves located on the valve covers.

- Even if only one diaphragm is bad, replace both valves. The repair kit contains the parts to repair one crankcase vent valve, so order two.



- The repair is simple. Remove the four screws securing the acoustic cover to the engine, then remove the trim covers from both valve covers to expose the crankcase vent valves (1 in the first drawing). Using a pick (2), release the six clips securing the vent valve.



Remove the vent valve cover (1 in the second drawing), diaphragm (2), and spring (3). The kit contains all three parts. Install in the reverse order ensuring that the cover is in the correct position and that all six clips are securely engaged.

- The part number for the repair kit is 11 12 7 537 733.

#### Rough Idle from Binding Water Pump Impeller Shaft

#### 8 Series with M62 engine up to 8/97, and 540 and 740 with M62 up to 8/98

- It may seem hard to believe, but an intermittent rough idle with the transmission in Drive and the A/C on may actually be from the extra drag of a binding water pump impeller shaft.

- It seems that this extra load at idle and/or water pump chatter picked up by the knock sensors gives the DME reason enough to retard the ignition timing. This, in turn, alters the air mass meter signal and the injection pulse width signal (see below).

- Remove the belt and spin the water pump pulley by hand. Slight resistance as might be felt with a new water pump is okay. Next, remove the pulley so you can see the water pump shaft bearing. It should be recessed into the pump housing one or two millime-



ters, as shown in the first illustration. If, on the other hand, it is protruding 2mm or more, you've found the problem. Replace the pump.

#### Coolant Leak at Water Pump

#### (745i with N62 engine produced before 11/5/2001)

- You may find a slight coolant leak at the back of the water pump. This is probably due to an O-ring groove for the heater return pipe that is too wide. Installing a new O-ring will not cure the leak. The water pump must be replaced. Use part number 11 51 7 508 496.

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