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# Bmw M20 Engine Overview

Posted by acs3sport - 2008/03/16 03:21

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BMW M20 engine.

Manufacturer: BMW  
Production: 1965–1994  
Predecessor: None  
Successor: BMW M50  
Class: Straight-6  
Engine: 2.0 L (1990 cc/121 in<sup>3</sup>)  
----- 2.3 L (2316 cc/141 in<sup>3</sup>)  
----- 2.5 L (2494 cc/152 in<sup>3</sup>)  
----- 2.7 L (2693 cc/164 in<sup>3</sup>)  
Similar: Mercedes-Benz M110

The M20 was an I6 piston engine of BMW.

The 12-valve, belt driven SOHC design was introduced in the 1976 BMW 520/6 and 320/6. With displacements ranging from 2.0 to 2.7 liters, it was the "little brother" to the larger BMW M30 engine.

Powering the E21 and E30 3-Series, as well as E12, E28 and E34 5-Series cars, it was produced in 4 decades, with the last models of the E30 325i touring built in 1992. At that time, the newer M50 engines with 4 valves and DOHC were already used in the E36 and E34 for some years.

As BMW M21, it became a Diesel, also available with a turbocharger.

## M20B20

The small 2 Liter engine, the entry-level version to the six cylinder ranges, was very smooth running, but lacked torque and required higher revs, resulting in higher fuel consumption. It was never imported to North America due to federal emissions regulations. It used the same cylinder head casting as the 2.3 liter m20 in the e12 and e21 2.3 liter motors and the pre 1987 2.7 liter eta motors. All of the 2 liter versions were carbureted until the e30 320i, which used Bosch Motronic version 1.1/1.3 to work with a catalytic convertor.

Applications:

- 1977–1981 E12 5-series
- 1977–1982 E21 3-Series
- 1982–1987 E28 5-Series
- 1983–1993 E30 3-Series
- 1988–1990 E34 5-series

## M20B23

The 323i began as an E21 model and continued with better fuel injection and several internal revisions in the e30 323i. The e21 used the same cylinder head casting as the pre-1987 eta cars, only drilled to oil a seven bearing cam. The e30 323 used a specialized head casting with much larger ports. Though it had the same combustion chambers and valves as the e21 and eta heads, it had much more potential for high rpm power. The e30 323 head can be bolted on to an eta 2.7 liter block in conjunction with other modifications to the intake, exhaust and fuel injection systems to make very good power.

Applications:

- 1977–1982 E21 323i
- 1983–1985 E30 323i

## M20B25

The German version of the M20B25 produced 169 HP with a catalytic converter, and 171 without. It featured a 12-valve SOHC head with larger valves, 84 mm (3.3 in) bore, and 75 mm (3 in) stroke. Most significantly it had redesigned pistons and combustion chambers for better power, more resistance to detonation and higher thermodynamic efficiency. It was equipped with Bosch Motronic 1.1/1.3 Adaptive fuel injection. With a minor modification that adjusts the idle speed of a cold engine, the 325i fulfills Euro 2 emission requirements in Germany, resulting in a lower tax compared to Euro 1 (as of 2005).

Applications:

- 1986–1994 E30 3-Series
- 1989–1990 E34 5-Series
- 1988–1991 E30 Z1

## M20B27

The 2.7 L M20B27 was designed for efficiency (thus the e for the Greek letter eta in 325e). It had an 84 mm (3.3 in) bore and with 81 mm (3.2 in) a longer stroke, for a total displacement of 2693 cc. The eta had only four effective camshaft bearings for reduced internal friction, with all seven cast into the head but only four corresponding journals on the cam. The heads were drilled to oil accordingly.

Output was between only 121 hp (up to 1987) and 127 hp (after 1987) but fuel efficiency was fairly good for the period and for that size engine. The low-revving high torque design was reasonably well received, but the 325e designation caused it to be compared to the later 325i which had more power and a more exciting sound with its higher range of revs.

It is interesting to note that the eta and the b25 engine, despite a 47 hp disparity in power output, produce a similar amount of torque at about 170 ft-lbf at medium revs. In theory, this should have resulted in similar acceleration in top gear, but due to differences in gearing these were different. The 325/325e(s) used 2.79 and 2.93 rear axle ratios depending on the model year. The 325i sedan used a 3.64 ratio, and 3.91 in the touring and late ix variant. This equates to lower torque at the wheels on eta cars and results in substantially milder acceleration.

All eta engines used Bosch Motronic engine management systems that were calibrated for maximum fuel economy. The result was a very conservative spark advance curve and fuel delivery curve. In addition, the Motronic had a built-in rev limiter that engaged at around 4700 rpm. This very low redline was the result of the four bearing cam, soft valve springs, intake manifold design and camshaft design. Considering the very low overlap and short duration the motor didn't make any real power up high anyway.

For the 1988 model year, the eta cars got a warming over from the factory. This entailed the previously mentioned Bosch Motronic Fuel Injection, a 325i head with the larger 325i valves, ports and revised combustion chambers, special pistons to fit the 2.7 liter stroke with the 2.5 liter head, a dual pipe exhaust system and a 5300 RPM rev limit. Though it only made slightly more power in stock form, it could be easily boosted by bolting on a 325i head with a more aggressive performance camshaft, a complete 325i intake manifold and throttle and plugging in the 325i engine control unit with a performance chip. Depending on which cam and chip is used, that motor can make over 200 horsepower.

In aftermarket modifications that are inspired by custom versions of Alpina and AC Schnitzer, the long-stroke eta engine block is often combined with a 325i head to a so-called 327i that combines the high low-rev torque of the eta with the top-range power of the 325i.

Applications:

- 325/325e/325es
- 1982–1987 525e (or 528e in the US)

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## Re: Bmw M20 Engine Overview

Posted by imieazmi - 2008/04/11 01:20

### History The One That Started It All - The BMW 2002

By the late 1960's BMW built the series that would eventually turn legendary among enthusiasts. It all began with the 1600-2, the "-23 being used to designate a body style - the two door. After the first one rolled off the line it was an instant success, February issue of Car and Driver called the 1600 "the best small sedan we ever drove" and "the best economy car ever offered to an undeserving American public." In the conclusion they wrote "It also looks, drives, feels, and sounds like it ought to kick the bejeezus out of the competition."

The 1600 was cheap \$2,500 made the dash to 60 in 11.4 seconds and topped out at 102mph, economical the 1600 got up to 30 m.p.g. highway and was highly reliable. As always Europe gets all the cool stuff first, and BMW started introducing derivatives of the original model.

Altogether there would be fourteen variations on the two door body style, not counting the 2000c/cs coupes - 1600-2, 1600 cabriolet, 1600ti, 2002, 2002ti, 1600 Touring, 1802, 1800 Touring, 2002 Cabriolet, 2000 Touring, 2002tii, 2002tii

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Touring, 2002 Turbo and 1502.

However due to strict U.S. Emission controls the 1968 twin carb engine under the bonnet of the 1600ti made it unavailable to import, even though this motor was related to the 1800ti and 2000tilux four door sedans all available to the states.

Being that BMW engineers are probably enthusiasts themselves they decided to install the largest four-cylinder engine into their smallest body coupe and therefore created a legend.

Car and Driver wrote:

“Turn your hymnals to 2002—David E. Davis, Jr. blows his mind on the latest from BMW. If the 1600 was the best \$2,500 sedan C/D ever tested, the 2002 is most certainly the best \$2,850 sedan in the whole cotton-picking world....Feel free to test-drive one, but please don't tell any of those ten million squares who are planning to buy something else. They deserve what they get. Now turn your hymnals to Number 2002....”

1977-1983 - E21The 3 Series has and always will be the car to set the bar higher and higher for all others. It's reputation for outstanding performance, driving dynamics and quality of craftsmanship are second to none. However back in the 70's the birth of the 3 Series was not a sure thing.

By the mid 70's BMW was faced with having to replace the gracefully aging 2002 coupe. However BMW did not forget that the 2002 embodied much of the companies spirit, so the next generation could not fall short of it.

By May 2, 1975 BMW had rolled the first 3 series off the Milbertshofen assembly line, upon public debut many people that never considered owning a smaller car found themselves attracted to the beautifully crafted piece. By the next year sales of the 3 series reached 221,298 units in the European market, by 1977 when the 3 series hit North American shores that year sales had reached beyond 290,000 in the 1978 they were pushing 320,000.

Designated the E21 body style, the 320i was slightly larger than its counterpart the 2002 at 100.93, the 3 Series wheelbase was 2.53 longer and 1.53 longer in overall width coming in at 177.53, this was all done to produce a more stable car with better ventilation and a more road manner. Just like its counterpart the 2002, the 3 Series was only available in a 2 door coupe, most of the major styling cues were carried over including the unforgettable trademark leaned forward kidney shaped grill.

Upon closer inspection when we dissect the 3 Series we'll find a huge step forward in suspension engineering from the 2002. Up front you will find the McPherson struts and outback the trailing arm suspension, don't forget the front disc/rear drum power braking station, slightly different from in specs but very similar in design to the 2002. Under the bonnet, there was a 2.0 liter Bosch K-Jetronic fuel injected inline four pushing 110 ponies, amazingly it met emission standards without a "cat". The Getrag four speed remained, the three-speed automatic was optional.

Then it happened in 1980 the E21 320i took a step backwards, BMW replaced the 2.0 liter with a 1.8 liter inline four, and added a three way catalytic converter to control emissions, taking the rating down to 100 horsepower. BMW engineers redeemed themselves by adding in the five-speed manual tranny. However even with the loss of power and tighter emission controls America still embraced it, sales still grew steadily.

1984-1991 - E30In 1984 the most the biggest thing about the second generation E30 318i was its price tag base price \$18,210, this was more than double than that of the E21 320i. In general the E30 was no different, with the exception of the new saloon body style.

Continuing on down the grille was layed back a bit, with less forward rake, headlights were flushed, and the hood sloped gently into the front fascia making for a more curvaceous look, overall length was down slightly. The most noticeable attribute the E30 had was how tight the build quality was and its amazing dependability.

The horsepower was up slightly with a 101 ponies still keeping the 1.8 liter inline four. Adding a model the 325e, BMW borrowed the 2.7 liter inline six from its larger brother the 528e sedan, adding more compression but a low redline and economy like gearing. With its 121 horsepower it was the most BMW had offered to the U.S. market since the 2002ti, making the gallop up to 60 took 8.9 seconds and completed the quarter mile in 16.6 seconds at 81.5 mph.

In 1985 BMW introduced the saloon or four door sedan along with a all new four-speed automatic. In 1986 the 318i 4 cylinder demand dropped out, and the model was cut from the lineup. Four wheel anti-lock disc brakes were standard and a 325es coupe was introduced.

1987 was a big year for the E30 when the 325i, 325is and 325iC (convertible) models were unveiled. These were also the first sport models made available to the U.S. since the 2002tii mentioned earlier. Car and Driver stated "The new 325is is the first genuinely sporting BMW to reach our shores since the 2002tii went out of production in 1975.". The larger displacement six cylinders produced 168 horsepower and 164 pound-feet of torque. Upon testing Car and Driver's 325is

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zoomed up to 60 in just 7.4 seconds completed the quarter mile in 15.6 secs @ 88mph. Feeling so gratified with the new motor reviewers felt the high price tag of \$27,475 was worth it.

The Motorsport division of BMW had already been established early in 70's already cranking out hot rod BMW street and race cars. Already being established as a exemplary sports-car building house by 1987, the division had never touched the 3 series.

By 1988 the original M3 had made it's way over to the states. Under the bonnet BMW kicked it up a notch by adding the "M Power" 2.3 liter four-cylinder, twin cam four valve rated at an astounding 192 horsepower reaching redline at 6,750RPM mated to a five speed manual transmission, that was actually a modified inline 6 cylinder head minus two cylinders. The main intention on releasing the M3 was to take on the Mercedes Cosworth 190E 2.3-16 in the FIA Group A racing league. All this dropped into a two-door 3 series body with heavily flared fenders, raked rear window, and a higher trunk lid, only the hood was left untouched. Car and Driver wrote "This is not a car for yuppies," on their first test run of the US spec M3 with a as-tested price of \$34,810 the M3 was dubbed the king of 3 Series. During the testing Car and Driver posted a run to 60 in just 6.9 seconds and a quarter mile in 15.2 at 141 mph with a 92 mph trap speed, Whew just saying gets me excited!

In 1988 BMW had introduced the 325ix all wheel drive model, and as expected "M Power" fanatics such as myself would get their imaginations running as a "Evolution" model wouldn't be a bad idea, just think an all wheel drive masterpiece of Motorsport engineering. However with the E30 being phased out of production in 1991, motorsport fans would have to keep dreaming.

1992-1998 - E36As the E30 3 Series established itself as a full line including compact coupes, sedans and convertibles. The 3 Series quickly became the envy of the the industry with likes of the Cadillac Cimarron and Audi 4000 Quattro were nothing more than cheap imatations. BMW was now faced with replacing a perfect specimem, anything short of that would hail big time sales danger.

The E36 bretheren to the E30 was a jump forward in body styling with different proportions and styling breaking out of the details established by the 2002, this was an all new machine.

In every way the E36 saloon was just slightly larger than the E30, the wheelbase coming in at 106.33 was just 5.13 longer, overall length was up by 43. All this extra size accounted for more passenger room, a much stiffer body structure and 50/50 weight distribution. However the new wedge shape kept the E36 from looking much larger than the squarish E30, this new shape made for less wind noise and imporved aerodynamics.

Unchaged from the E21 BMW stayed with the MacPherson strut front end, but made some major changes out back. Dubbed the "Z-axle", going away from a trailing arm in previous 3 Series, engineers devised a multilink system, this made for improved camber changes throughout the suspensions cycle. Although the "Z-axle" wasn't cheap, it did make it's way into prototype form on the 5 and 7 Series. Some bits remained unchanged the E36 kept the rack and pinion steering, four wheel disc brakes and the ABS system.

The all new dual overhead cam 24 valve aluminum head, inline six cylinder made an astounding 189 horsepower in the 325i. This made for a 0-60 time of just 6.9 seconds, (just as quick as the E30 M3 in a production four door sedan!) and a quarter mile time of 15.3 at 91 mph. In 1993 the BMW VANOS variable valve timing system, was adopted by the M50 6 cylinder and made for a beautifully wider torque curve.

The 318i still used the four-valve four cylinder cranking out 138 horsepower, although most U.S. buyers were opting in exceptional new sixes. Following this trend made sales for the 318i to become fewer and fewer each year.

In 1991 the E36 saloon was introduced as a 1992 model, the coupe didn't make an apperance until later that year. Breaking out of the mold the new coupe wasn't a saloon with two less doors, it was an altogether more sporty car, the convertible remained unchanged. BMW added more rake to the front windshield laying it back, the same goes for the rear window. Pretty much from the A-pillar back the coupe was a totally different car, however upon inspection it looked a lot like the sedan keeping with the family design. Some critics complained that BMW could have made the coupe much more radical, although consumers still loved it.

Now everyone knows that Europe always gets the goods before the U.S. in doing so BMW wouldn't import the "Touring" wagon model E36, that was introduced in 1995. However they did import the "Compact" hatchback dubbed the 318ti. The hatchback had a semi-trailing arm suspension like that of the E30 3 Series, a semi "stripped down" interior compared to that of it's upper classmates and was backed up with a chopped off rearend. This compact version of the 3 Series was marketed towards entry-level buyers or the downmarket. In keeping with the previous 318i, BMW kept the 138 horsepower 1.8 liter four cylinder. Being that the 318ti had a narrow marketplace and was never accepted by the enthusiasts, by 1999 it left production.

By 1995 the 2.5 liter in the 325i and 325is, was swapped out for the larger 2.8 liter version putting out 190 horsepower up

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from 189, this isn't that significant however the torque rating went from 181 pound feet at 4,200 RPM to 207 pound feet at 3,950 RPM. There were some slight visual changes for the 1996 model year as well. The model designation numbers also changed due to the larger motor to 328i and 328is. By 1998 BMW decided to introduce another entry-level market car dubbed the 323i Convertible and 323is Coupe, under the bonnet lied a 2.5 liter inline six producing a 168 horsepower. Strangely there has been no one to come up with a convincing story on why they didn't dub them 325's.

Now for the new king of the 3 Series the M3. Coming into the U.S. market in 1995 the hard hitting M3 was an amazing piece of engineering. Unlike the previous version the coupe wasn't an all out track racing machine, but a well mannered road going rocket with a bulletproof motor and chassis. In the U.S. the M3 featured a bored and stroked version of the 325i's inline six, making it a 3.0 liter monster with 240 horsepower and 225 pound-feet of torque. However being that Europe gets all the good stuff the Euro version M3's received a 282 horsepower individual throttle bodied inline six.

Everyone raved about the new M3 from the perfect suspension tuning to the beautifully crafted interior, and commented on how tastefully done the exterior ground effects were designed. Not to mention the car was fast! Upon Car and Driver's testing the M3 shot to 60 in just 5.6 seconds, and ran the quarter mile in 14.3 at 98 mph (From the previous E30 M3 that's an amazing 1.3 seconds quicker, and just shy of a second quicker in the quarter.), and keeping everyday drivability and civility.

Being that the newly embodied M3 was so succesful with enthusiasts BMW introduced the M3 lightwiewght in 1995. Sans air conditioning, radio, back seat and featuring nicely crafted forged 173 rims only available to the lightweight. It was a car truly made to grace the track coming in at 200 pounds less in total weight. As expected the 85 Lightweights imported sold quickly.

Another offspring of the M3 is the Evolution model featuring a 3.2 liter inline six producing an astounding 321 horsepower at 7,400 RPM in Europe (of course.). The American version differed as the power rating came down to 240 horespower but the torque rating grew slightly to 236 pound feet at 3,800 RPM. In 1997 the M3 was also offered as a saloon (four door) with a five-speed automatic transmission. Motor Trends test M3 saloon equipped with a manual transmission ran to 60 in just 5.5 seconds.

By 1998 BMW offered a convertible version and the E36 body style was nearing it's end.

1999 - 2006 - E46In 1999 the first of the newly restyled E46 3 Series rolled off the line, being that the E36 was introduced one model at a time the E46 did the same starting with the 323i and 328i saloons. How was the E46 changed you ask, well it came by way of an entirely new front end, a rounded roof line and nice wide wheel arches. On the front end the headlights received a new treatment featuring cutouts beneath the lenses, letting the traditional four headlight design shine through from past 3 series.

Following in the same footsteps as the E36 grew in size to the E30, BMW made the E46 larger as well, increasing it's wheelbase to 107.33 with an overall of 1763. As the E36 had grown in size in comparison to the E30, so grew the E46. Even though the E46 grew in size making it larger than the previous E36's it was still comfortable and smaller than the current Acura TSX.

On first look mechanically, major changes to the E46 were rather subtle. BMW engineers claimed the body was 70 percent stiffer than it's counterpart the E36 and the larger wheelbase allowed for perfect 50/50 weight distribution. The also used an extenzive amount of aluminum in the suspension, reducing unsprung weight, although the basic suspension, braking, steering system components, remained unchaged the track was widened. With the longer wheelbase the rear-seat was much roomier than the previous 3's, and front, side and side curtain airbags were also added.

BMW did away with offering the four cylinder models in the U.S. however they're offered elsewhere. The new inline 2.8 liter six cylinder featured an all aluminum block, Double VANOS variable valve timing system and an all new dual resonance intake, this made for 193 ponies at 5,500 RPM and 206 pound-feet of torque at 3,500 RPM for the 328i. Under the bonnet of the 323i we'll find a 2.5 liter inline six pushing out 170 ponies and 181 poud-feet of torque.

By the year 2000 the lineup was expanded with the introduction of the 323Ci and 328Ci two door coupe models, later that year came the 323iC convertible and for the first time in the U.S. a 323i wagon joined the family.

Even though the E46 was quite new, in 2001 and 2002 it was upgraded. The 2.5 liter was pushing out 184 ponies due to some modifications and the 2.8 liter was replaced by an all new version of the 3.0 liter inline six producing 225 ponies. The convertibles could now receive the larger motors, however the wagons were restricted to the smaller 2.5 liter. In keeping with the correct badging the 2.5 liters are 325's and the 3.0 liters became 330's. Once nice addition, BMW added the all wheel drive as an option on sedans and wagons (when are they going to make an all wheel drive coupe? All Wheel Drive M3, Anybody?) In 2002 BMW once again made an update to the front fascia and added new tail lights.

Now came the E46 M3, an entirely new monster from the Motorsport Engineering house.

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Featuring the all new side vents, nicely flared wheel arches and four beautifully chromed exhaust tips, the new M3 brought back the muscle the original E30 had.

Roaring underneath the bonnet you will find the most technologically advanced 3.2 liter inline six that BMW has ever rolled out it's doors. Producing an amazing 333 ponies, this M3 is not for the timid, that's 93 more than the previous M52 motor. What did BMW do to make this monster of a motor individual throttle bodies (Europe has had this since the first 95 E36 M3 rolled out), tweaked the variable valve timing, an 8,000 RPM redline and what BMW calls one of the freest-flowing exhausts ever installed in a production car". In recent tests the M3 rocketed to 60 in just 5 seconds flat and completed the quarter mile in 13.5 seconds at 105 mph that's almost a full second quicker in the quarter than the previous E36 M3.

How will BMW out do itself this time you ask? Well rumor has it the new M3 will feature the M5 V8 producing 400+ ponies. While the New M5 features an all new V10 pumping out a dizzying 500 horsepower.

By 2003 the DVD-based navigation system became an available option for 3 Series consumers. Some other standard new fitments include a front center armrest for the 325's and a rear center headrest for the saloons and wagons. The Performance Package for the 330i was also an added option featuring 10 more ponies under the hood, a six-speed manual transmission and some firmer springs riding on all new 183 wheels.

In 2004 BMW added the six speed SMG F1 style gearbox to models ranging beyond the M3 and the added option of an automatic in the 330i Performance Package. Some visual changes on the 330i included a black grille insert replaced the silver piece, the coupes and convertibles received new front facias and light cluster designs. A couple of new standard equipment bits for the sedans and wagons include rain sensing wipers and automatic headlights.

E90 - The Newest Edition to the BMW familyThe dynasty continues for 2006 with the E90, as the 2002 started it all 38 years ago. Once again the all new E 90 3 Series has all the usual trademarks of it's kin - the "power dome" hood, the "Hofmeister kink" and who can forget the kidney shaped grill, all this wrapped into a all new sporty design.

#### The Details

In keeping that BMW always increases the overall dimensions of thier cars between body styles the new E90 3 has greatly increased the interior and passenger room, and wheelbase over the 325i and 330i dimensions. The new E 90 3 employs weight saving magnesium in it's crankcase, an entirely new five-link suspension out back, and a much lighter 25% stiffer body. Engineers increased the output of the 3.0 liter inline six slightly to push out 255 ponies. As always BMW kept the interior a perfect balance of sport and elegance, interior materials were carefully selected to please even the most distinguished of occupants.

As always the new highly anticipated M3 is scheduled to debut in 2 years and will be powered by a all new 4.0 liter version of the previous V8 used in the old M5's pushing out somewhere around 400+ horsepower and backed by a quick-shifting SMG transmission, it's going to be a monster! However with more and more manufactures pushing out big ponies BMW might have to up the anti a bit. More information to follow when it's released.

All these details from the kidney shaped grill to the beatifully crafted roundel emblem on the trunk add up to carry on the legacy of the 3.

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### Re:Bmw M20 Engine Overview

Posted by acs3sport - 2008/04/11 02:55

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Amboi2, dh khatam sampai kitab E90 nie... Pdn la kete bro ada bunyi org bertukang..!!! Kn dh kantoi..!!! Anyway, gud info bro..!!! ;)

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### Re:Bmw M20 Engine Overview

Posted by imieazmi - 2008/04/11 21:43

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pase dah khatam sapai e90 la ade bunyi org bertukang dlm keta den ni! tp jgn tanya pase den xpaham2 lagi ni! tgh study! lepas den ajar anak murid2 den br boleh tanya :laugh: :laugh:

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## Re:Bmw M20 Engine Overview

Posted by bon - 2008/04/12 09:19

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gud info che'gu...

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## Re:Bmw M20 Engine Overview

Posted by imieazmi - 2008/04/12 19:50

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:cheer: 2 br den buat karangan english utk upsr! if utk spm x tau la panjang maner! utk upsr pun den sendiri xrape paham lg

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## Re:Bmw M20 Engine Overview

Posted by bon - 2008/04/13 01:18

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imieazmi wrote:

:cheer: 2 br den buat karangan english utk upsr! if utk spm x tau la panjang maner! utk upsr pun den sendiri xrape paham lg

provide for pre school level la bro... wa baru nak start...;)

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## Re:Bmw M20 Engine Overview

Posted by imieazmi - 2008/04/13 19:19

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pre school ye! nnt nak kena ngajar ngejo la pulak!  
cth: vanos

va + nos = vanos  
f + ad = fad

murid2: vanos fad .... :laugh:  
nnt x bilo nak abis pulak :laugh:

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