

This page contains the BMW S38B38 Technical Info. It is actually the official BMW AG training centre documentation for the dealers.

This article was originally given to me in Dutch, and, with a lot of help from a Dutch friend of mine (Thanks Reinier!), we managed to do a translation into English.

We haven't tried for a word for word translation, but to try and preserve the original intent. There are some words that I wasn't able to translate, so I have left them in Dutch, but in Italics. If you know what these words mean, please let me know! If anyone (anyone at all!) has comments, or improvements in the translation, then I will gladly update this page.

Just send me some e-mail at jrobbo@bigpond.net.au

1. Introduction

In 1992, the new BMW ///M5 entered the market.

The competition, the expectations of our customers, but also the traffic conditions and the environment are new challenges for the engineers of sporting automobiles. These are the reasons the engineers of BMW Motorsport have further developed the ///M5, which by the way has been named as the best sports sedan in the world.

The combination of it's powerful engine which now yields even more torque, the electronically controlled suspension and the high quality interior makes the new ///M5 the most harmonic combination between sports car and 5-persons sedan.

As an extra variant, the ///M5 is also available as touring.



2. Changes at a Glance

Engine:

- 3.8 litre engine (S38B38)
- Digital Motor Electronics (DME) M3.3 with hot-wire air mass metering
- Altered air-inlet system, with the resonance flap now controlled by the DME
- Power is 250kW (340 hp) at 6900 rpm (ECE)
- Power is 255kW (347 hp) at 6900 rpm (DIN)
- Torque is 409 Nm at 4750 rpm

Suspension / Transmission

- Adaptive shock absorbers with electronic control
- New light metal wheels with 5 spoke wheel covers
- Getrag 280 5 speed manual transmission

- ABS anti lock braking system with microprocessor
- Dual mass flywheel

Chassis

- New, special colors available, including 6 metallic colors, 3 non metallic colors, and 3 metallic colors specific to ///M (Avus Blue, Daytona Violet, and Mugello Red)
- Contrasting spoiler color

Interior

- New seat trims with cloth inserts and leather bolsters and headrest
- New high-quality sill plates

Electrical

- 140A / 1960W Alternator

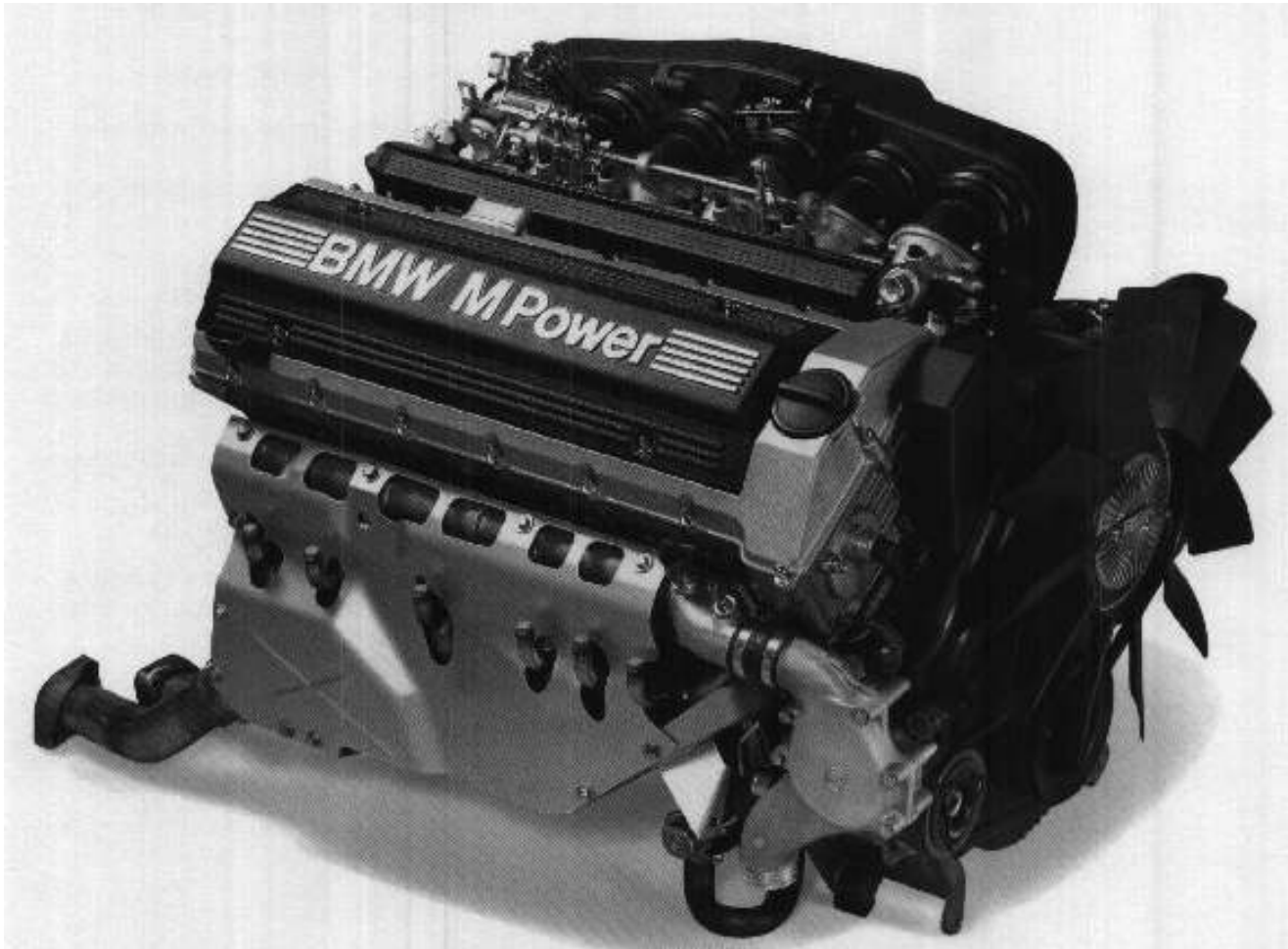
3. S38B38 Motor

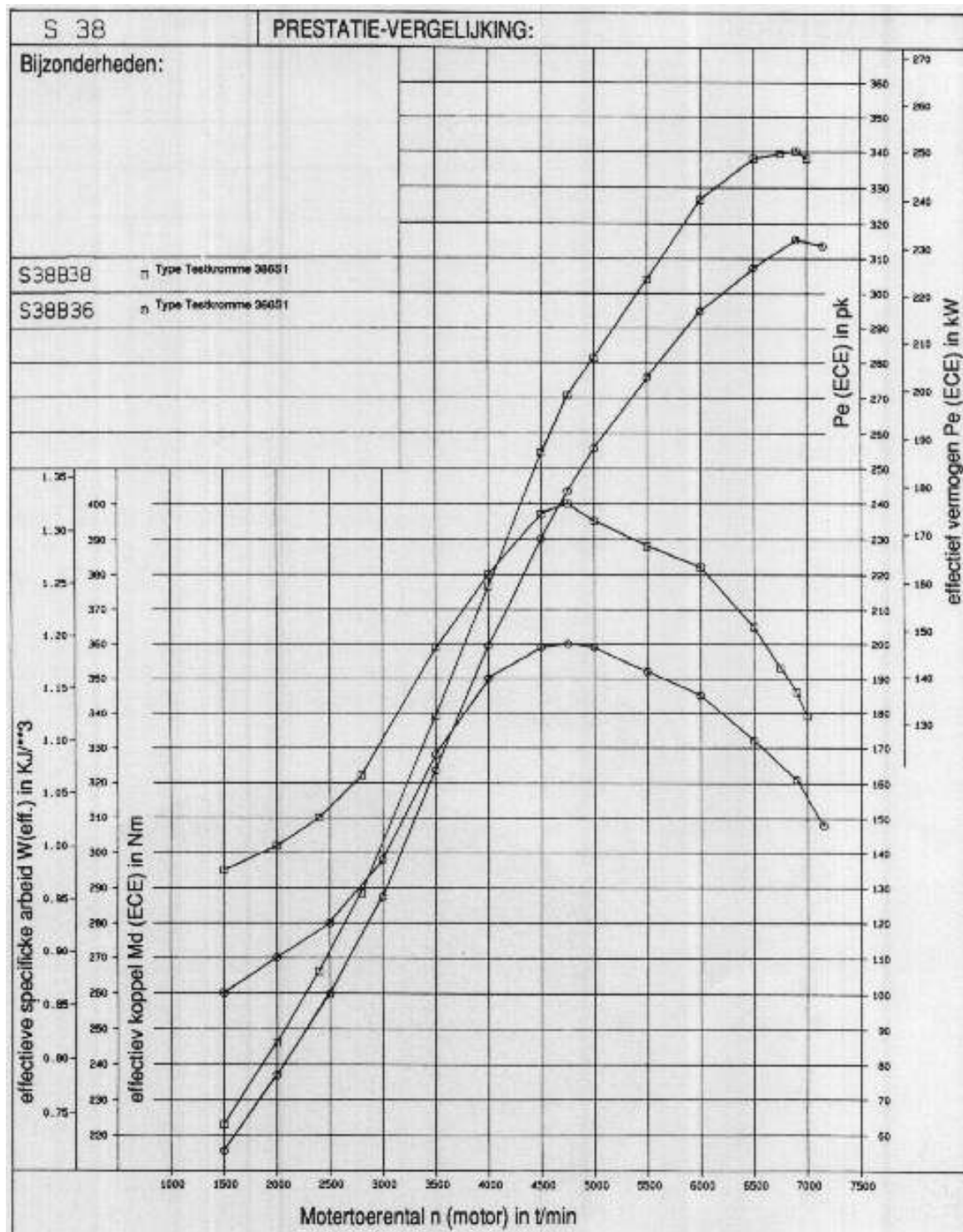
Most of the work that went into the further advancement of the M5 went into the engine.

Improved traction in the low to mid rev range is due to the increase in bore and stroke over the 3.6 litre engine.

The engine is controlled by the most advance electronic control system, and features a distributorless ignition system with each cylinder having its own individual coil.

The engine has been designed to produce optimal power output, whilst improving upon the fuel consumption of the 3.6 litre engine.





3.1 Engine Block

	M5 '92	M5 '89
Capacity (cc)	3795	3535
Stroke (mm)	90	86
Bore	94.6	93.5

3.2 Crankshaft

The crankshaft has been altered to allow a stroke of 90mm, while being optimised for weight.

The 12 counterweights have been rounded on one side to reduce the inertia of the crankshaft.

The new dual mass flywheel has a harmonic balancer with four stretch bolts, and is fastened to the crankshaft with three phases. First the bolts are fastened by a specific torque, followed by two phases of a specific number of degrees.

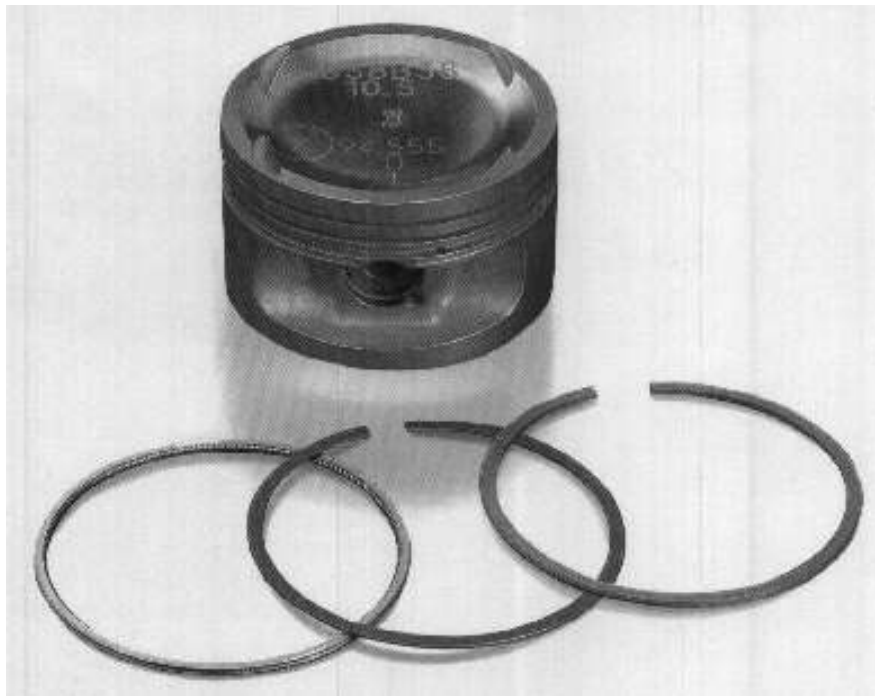


3.3 Conrods

The length of the conrods has been reduced from 144mm to 142.5mm

3.4 Pistons

New lightweight pistons are installed, made from high quality aluminium. The compression ratio has been raised from 10.0:1 to 10.5:1



Mounting guidelines:

With the mounting of the two top piston rings, it is important that the "TOP" mark is located to above.

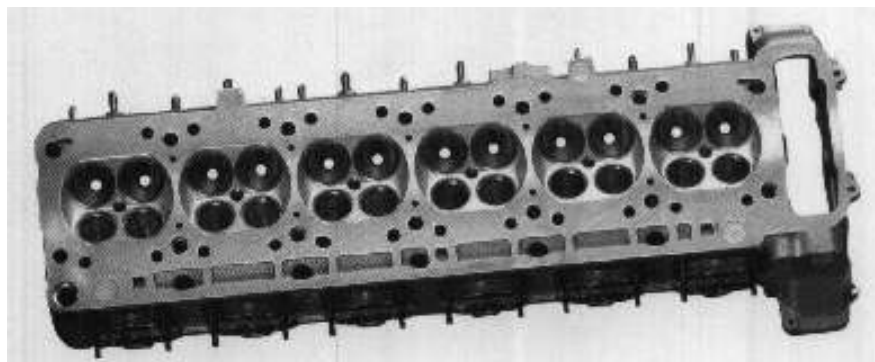
It is only allowable to use pistons of the same weight class in one engine. The arrow on the piston bottom signifies the direction of the motion.

3.5 Cylinder Head

From the outside, the cylinder head looks to be unchanged from the last model.

The diameter of the inlet ports has been enlarged to 29.2mm, up from 28mm

The new head features improved coolant flow around the combustion chambers and spark plugs



The individual coils are mounted underneath the plastic cover, directly above each spark plug



3.6 Camshafts

The camshaft duration has been changed to $264^{\circ}/108^{\circ}$, and lift has been increased to 10.7 mm for improved cylinder filling.

The diameter of the inlet valves has been increased from 37mm to 38.5mm

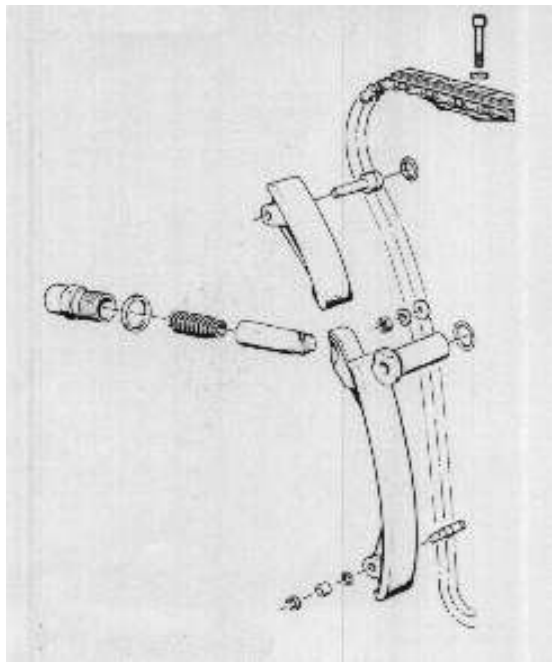
The diameter of the exhaust valves has been increased from 32mm to 32.5mm

For a better cooling, the exhaust valves are sodium filled

The membrane damper which is used until now is removed due to a new design of the chain tensioner (below). This new tensioner improves overall reliability.

Chain tensioner procedure

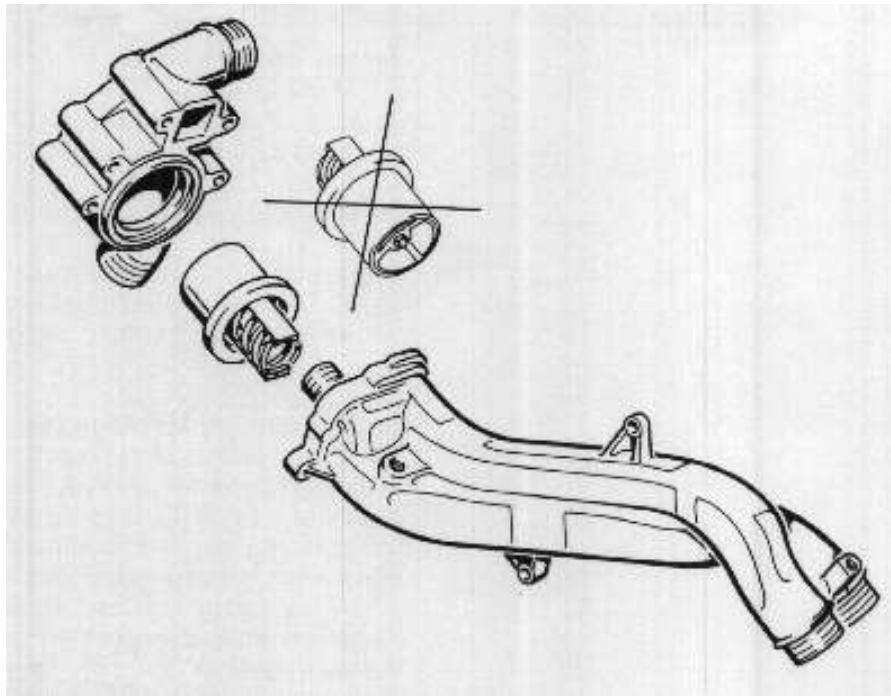
- 1 - Put the seal on the new chain tensioner and place the tensioner by hand (The tensioner hook will get the tensioner rail)
- 2 - Torque the Chain tensioner to 55 Nm
- 3 - Put the gearbox in 5th gear and push the car for-and backwards (or turn the crankshaft several times). Repeat this until the camshafts start turning. (The resistance will increase). This causes that the chain tensioner will be unlocked.
- 4 - Before checking the unlocking, the crankshaft has to be turned within the tolerance of the chain. This means that the camshafts may not turn. The chain tensioner is unlocked if the maximum movement near the vibration damper is one tooth and one tooth hole.
- 5 - If this is not the case, turn the M8 bolt at the back side of the chain tensioner until you feel resistance. Turn the bolt loose again and repeat the procedure from point 3 and start checking the chain tensioner again with point 4.



3.7 Thermostat

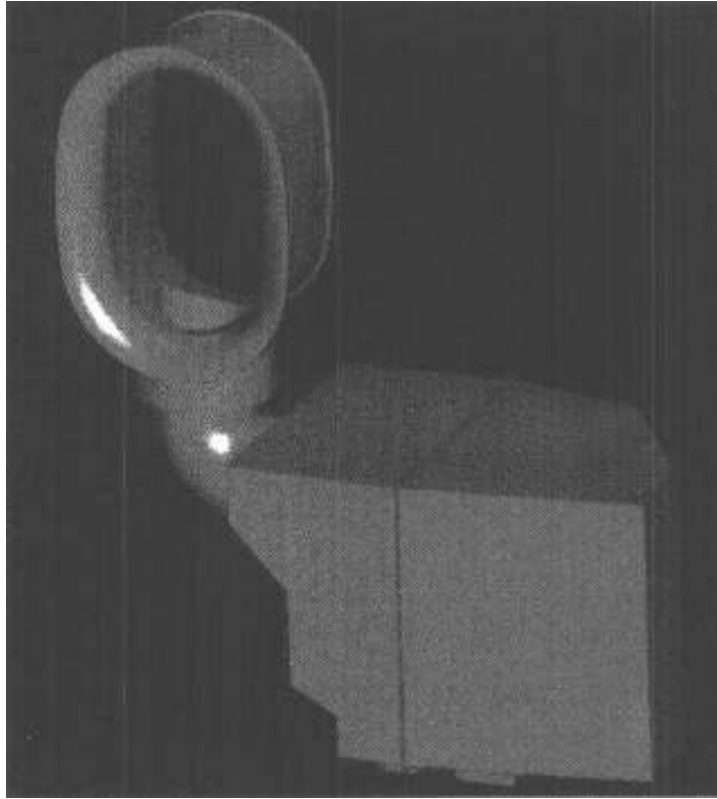
The thermostat housing has been redesigned; it contains an annular slide valve which is actuated by a temperature-dependent expansion element containing wax.

Please note its proper position when reinstalling this element.



3.8 Inlet Air System

To reduce induction noise, the air filter now has a resonator to lessen pressure waves

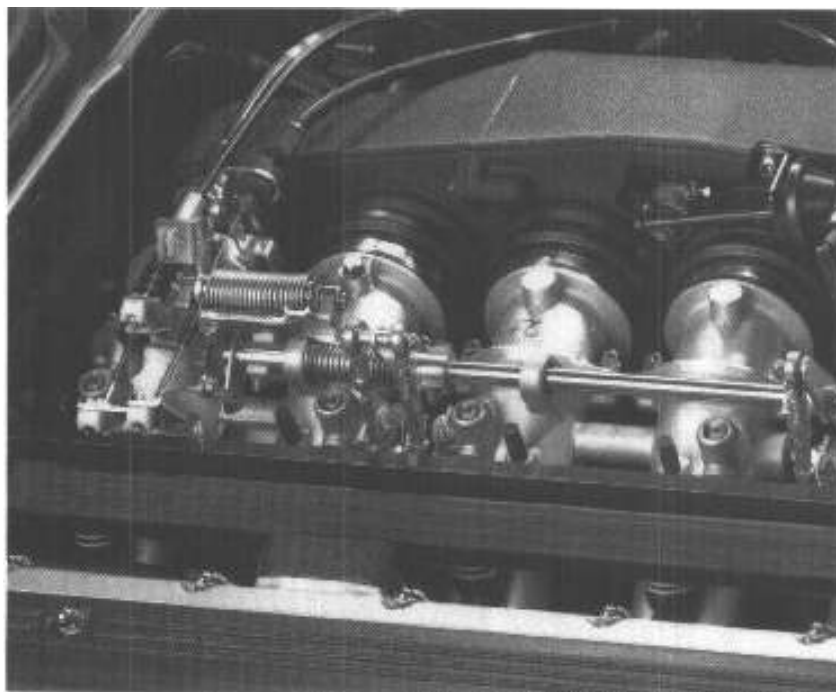


Throttle body manifold:

The diameter of the butterfly valves of the intake system with 6 different butterfly valves is increased to 50mm

To regulate the top speed to 250km/h, the butterfly valves are withdrawn by a servo motor.

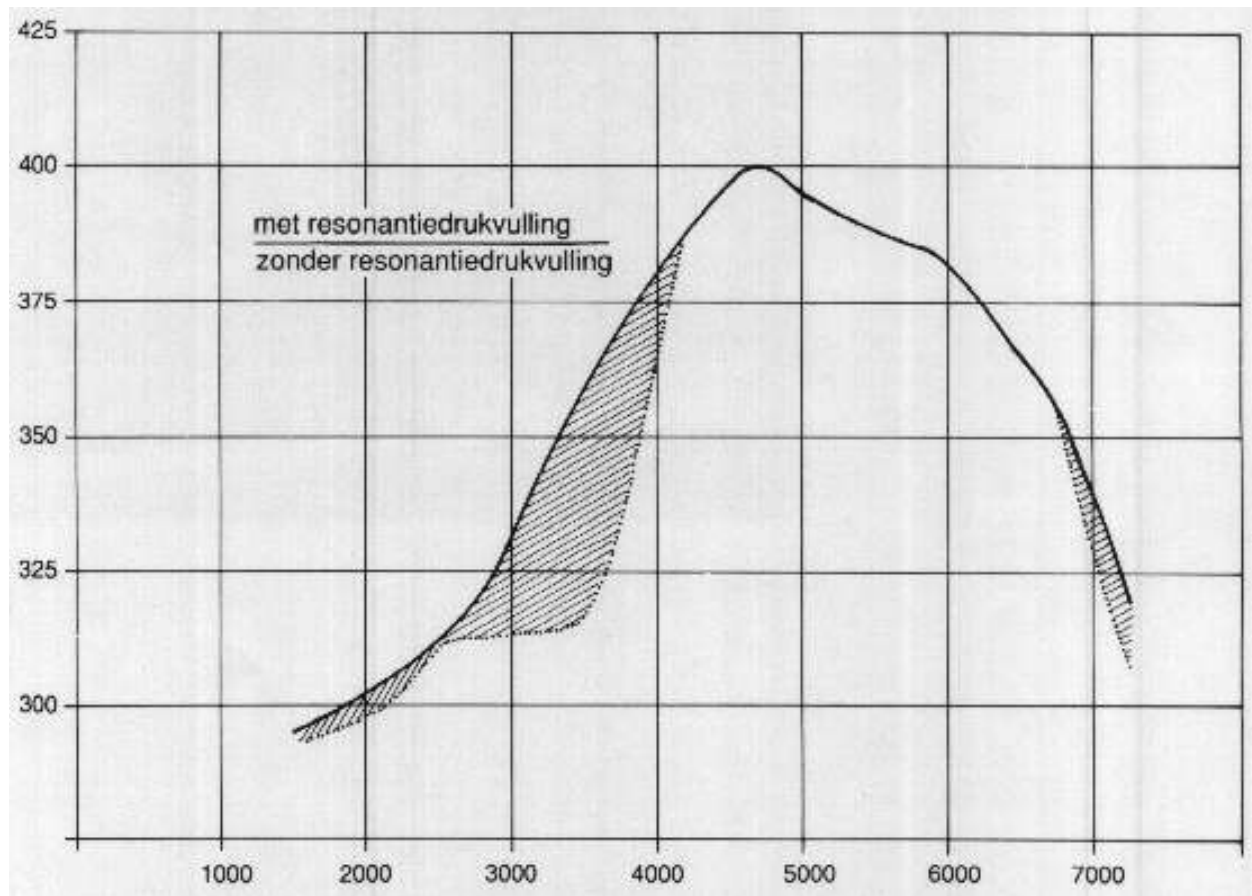
A short, funnel shaped tube and a new airfilter box with an improved air flow handles the suction of the intake air outside the engine compartment.



The resonance flap principles are unchanged from the previous engine. However, the resonance flap is now

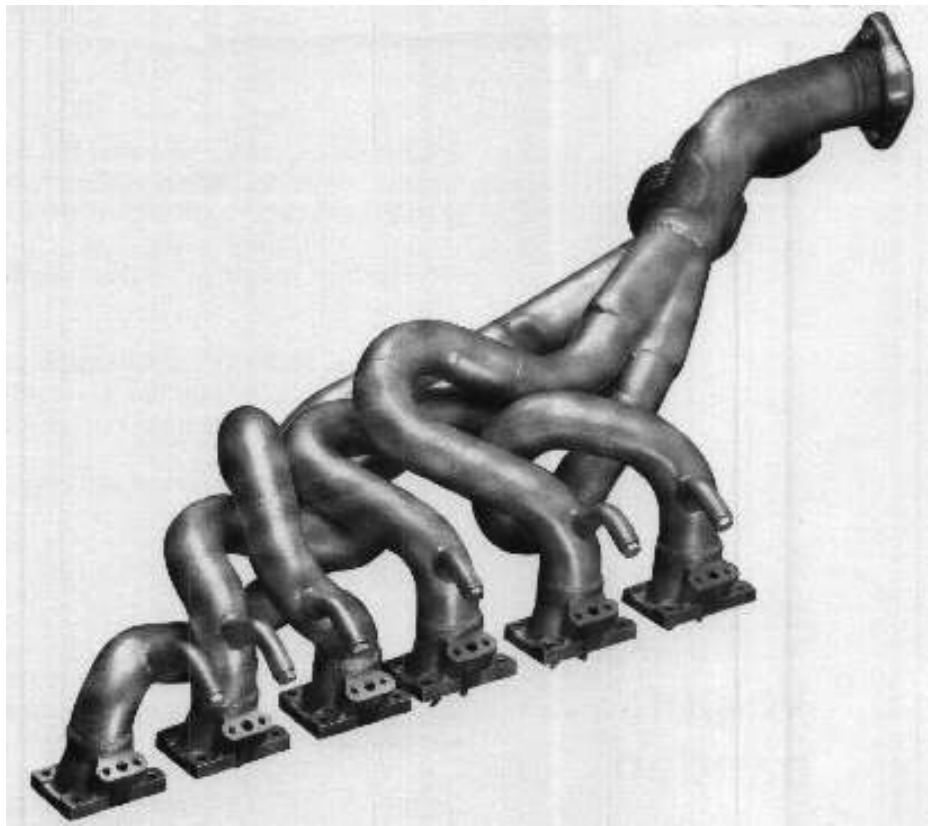
controlled by the DME3.3 instead of by a separate control unit.

There is also an extra switch point added at 2480rpm, as is shown in the torque graph below.



3.9 Exhaust System

The exhaust manifold is made of special steel and is equipped with air injection connectors and 6 separate connectors for a CO probe. An ideal cylinder balance is achieved by using this exhaust manifold.



The new engine features a double metallic catalytic converter (ESD: reflection technology) with 6 monoliths. With this catalytic converter, the ///M5 complies with the most severe emissions regulations. This construction has the following advantages over a ceramic converter:

- lower back pressure while remaining compact
- lower specific heat conduction
- better resistance to high temperatures



4. Interior and Exterior

New special colors are the motorsport colors "avusblau-metallic" (avus blue), "daytonaviolett-metallic" (daytona violet) and "mugello-rot" (mugello red). In addition, "granit-silber" (granite silver) is available as a standard color.

The interior of the ///M5 is further refined by using the new materials.

The new "fine cloth" clothing is standard. For the sidewalls of the seats and the headrests in two color design (black/silvergrey) Amaretta (nature leather character) is used. (See also changes at a glance)

5. Tyres and Wheels

New are the five spoke alloy wheels. A better cooling of the brakes is achieved by the combination of larger openings and the fins placed in the driving direction.

The two piece rim consists of a forged alloy carrier rim and a cast alloy cover.

The AH-system (assymetric hump) with the flat tyre driving capabilities is not changed.

In combination with the higher rear axle weight, the ///M5 touring is equipped with 9J*17 rims with 255/40ZR17 tyres.

6. Drivetrain

To improve comfort at idle and low speed and at the same time to tract the higher engine power and torque, the drivetrain has been altered as follows:

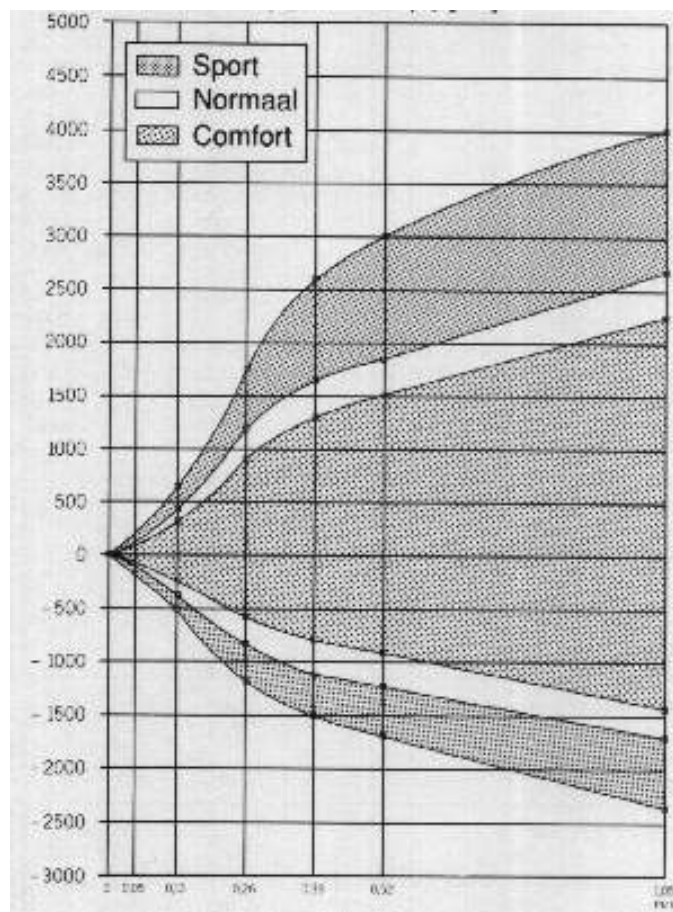
- New reference fields for the motor electronics (DME).
- Dual mass flywheel.
- Clutch with a changed diaphragm spring
- The lining is now glued to the clutch plate
- The gearbox is the Getrag 280/5/52

7. Suspension

The new ///M5 is standard equipped with the adaptive ///M-suspension, which means the EDCIII+ system with automatic electronic control of the shock absorbers with three reference lines. This system offers more comfort on bad road surfaces whilst improving the sporting driving behaviour.

For the most demanding sportive driver, the Nurburgring option is available as an extra. By means of a switch it is possible to shift the limiting values of the reference fields to the direction of the sportive behaviour.

The Nurburgring option also includes a thicker rear swaybar of 19mm instead of 18mm, wider tyres (255/40ZR17) on 9J*17 rims for the rear axle and a specially for the ///M5 adjusted servotronic steering. The manouverability and roadholding are now allmost comparable to a racing car.



8. Electrical

The new alternator is capable of delivering 140A / 1960W

9 Technical Specifications

Technical Specifications			M5 '92	M5 Touring	M5 '89
Dimensions	Length/width/height	mm	4720		4720
	Width	mm	1751		1751
	Height	mm	1392		1392
	Wheelbase	mm	2761		2761
	Turning Circle	m	11.0		11.0
	Track, front	mm	1474		1474
	Track, rear	mm	1496	1492	1496
	Width at shoulder height, front	mm	1380		1380
	Width at shoulder height, rear	mm	1403		1403
	Width at elbow height, front	mm	1456		1456
	Width at elbow height, rear	mm	1446		1446
	Head room, effective, front	mm	980		980

	Head room, effective, rear	mm	950		950
	Luggage capacity	l	460		460
	Fuel Tank Capacity	l	90	90	90
	Fuel Tank Range	km	750	750	750
Weight	Dry Weight	kg	1650	1750	1670
	Maximum total weight	kg	2150	2250	2150
	Maximum Load	kg	500	500	480
	Axle weight, front	kg	1030		1030
	Axle weight, front	kg	1250		1200
	Maximum roof load	kg	100		100
	Allowable Trailer Weight	kg	700/1400		700/1400
Motor	Cylinders	-	6, 4V		6, 4V
	Capacity	cc	3795		3535
	Stroke	mm	90		86
	Bore	mm	94.6		93.4
	Power (ECE)	kW	250 @ 6900		230 @ 6900
	Power (ECE)	hp	340 @ 6900		312 @ 6900
	Power (DIN)	kW	255 @ 6900		232 @ 6900
	Power (DIN)	hp	347 @ 6900		315 @ 6900
	Torque (ECE)	Nm	400 @ 4750		356 @ 4750
	Torque (DIN)	Nm	409 @ 4750		360 @ 4750
	Specific Power (ECE)	kW/l	65.9		65.1
	Specific Power (DIN)	kW/l	67.2		65.6
	Specific Torque (ECE)	Nm/l	105.4		100.7
	Specific Torque (DIN)	Nm/l	107.8		101.8
	Compression Ratio	: 1	10.5		10.0
Gearbox	1st Gear	: 1	3.51		3.51
	2nd Gear	: 1	2.08		2.08
	3rd Gear	: 1	1.35		1.35
	4th Gear	: 1	1.00		1.00
	5th Gear	: 1	0.81		0.81
	Reverse Gear	: 1	3.71		3.71
	Differential	: 1	3.91		3.91
Performance	Coefficient of drag	Cw	0.32		0.32
	Coefficient of drag	CwXA	0.66		0.66
	Power to weight (ECE)	kg/kW	6.6		7.3
	Power to weight (DIN)	kg/kW	6.5		7.2
	Torque to weight (ECE)	Nm/kW	4.1		4.7
	Torque to weight (DIN)	Nm/kW	4.0		4.6
	Top Speed	km/h	250	250	250

	Acceleration 0 - 100km/h	s	5.9	6.1	6.3
	Acceleration 0 - 1000 m	s			26.0
	Acceleration 80 - 120 km/h	s			7.6
Fuel Consumption	5th Gear, 90km/h	l/100km	8.3		8.2
	5th Gear, 120km/h	l/100km	9.6		9.4
	City Traffic	l/100km	18.0		18.1
	Average	l/100km	12.0		11.9
Wheels & Tyres	Tyres, front		235/45ZR17	235/45ZR17	235/45ZR17
	Tyres, rear		235/45ZR17	255/40ZR17	235/45ZR17
	Special option, rear		255/40ZR17		255/40ZR17
	Wheels, front		8J x 17	8J x 17	8J x 17
	Wheels, rear		8J x 17	9J x 17	8J x 17
	Special option, rear		9J x 17		9J x 17
Electrical	Battery Capacity	Ah	85		85
	Alternator	A	140		115
	Alternator	W	1960		1610

10. Technical Data

Engine Construction	6 cylinder, inline
Capacity (cc)	3795
Bore (mm)	94.6
Stroke (mm)	90.0
Power ECE kW/hp	250/340 @ 6900
Torque ECE Nm	400 @ 4750 rpm
Maximum Engine Speed	7250 ± 50 rpm
Compression Ratio	10.5:1
Combustion Volume in cc	66.6
Compression pressure in bar (psi)	12 - 14 (174 - 203)
Cam Duration	264/108
Piston Clearance (mm)	0.036 - 0.064
Valve head diameter, Inlet in mm (in)	37 (1.457)
Valve head diameter, Exhaust in mm (in)	32 (1.260)
Valve Clearance (cold engine) in mm	0.28 - 0.33
Oil pressure in bar (psi)	3.0 - 4.0 (43 - 68) @ max speed and 190 - 210 F
Oil Capacity in l (qt) (includes oil filter)	5.0 ± 0.75 (5.3 ± 0.8) when changing filter. Oil cooler holds another 0.75 litre.
Radiator Fan	9 blade, 420 mm
Coolant Thermostat	opens at 79C (174F)
Ignition System	DME
Firing Order	1-5-3-6-2-4
Ignition Timing at idle	6° + 3° BTDC
Digital Motor Electronics	DME 3.3

Spark Plugs	Bosch Y 6 DC / Y 6 DCR
Spark Plug Gap	0.6 + 0.1 mm
Coils	May u. Christe 2052.0110.007
CO level	0.8 + 0.4 max
Idle speed	920 + 50 rpm