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# **N62 Engine Update**

**Model: All with N62**

**Production: From 2004**

# **OBJECTIVES**

After completion of this module you will be able to:

- Understand the Modifications and Updates to the N62 Engine
- Understand the New Features of the N62 B48 Engine
- Understand the New Features of the N62B48TU Engine

## Introduction

Since the initial introduction of the N62 in the 2002 E65, there have been several new modifications to the original design. The N62B44 was also subsequently installed in the 5, 6 and X5 series vehicles beginning with 9/03 production.

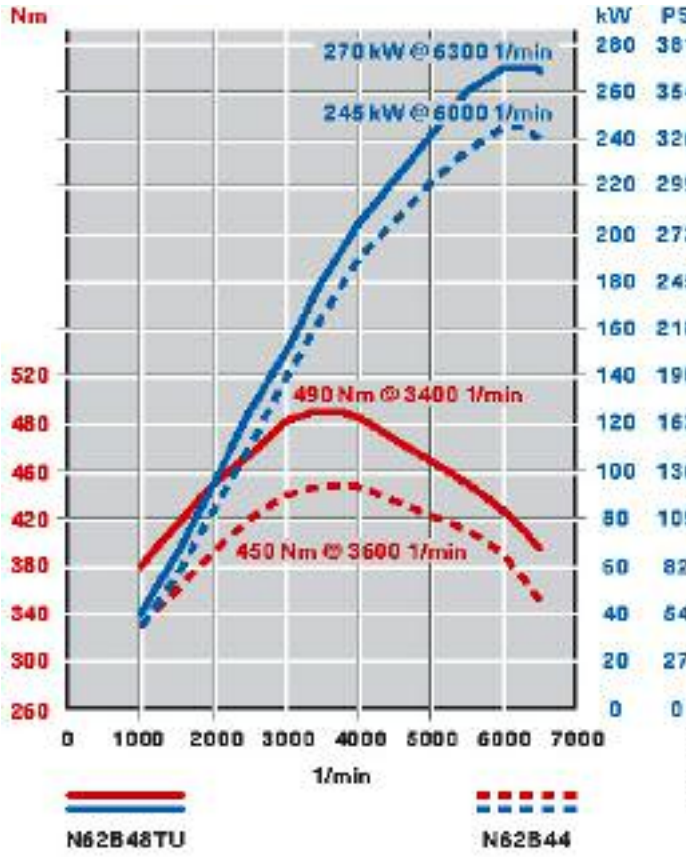
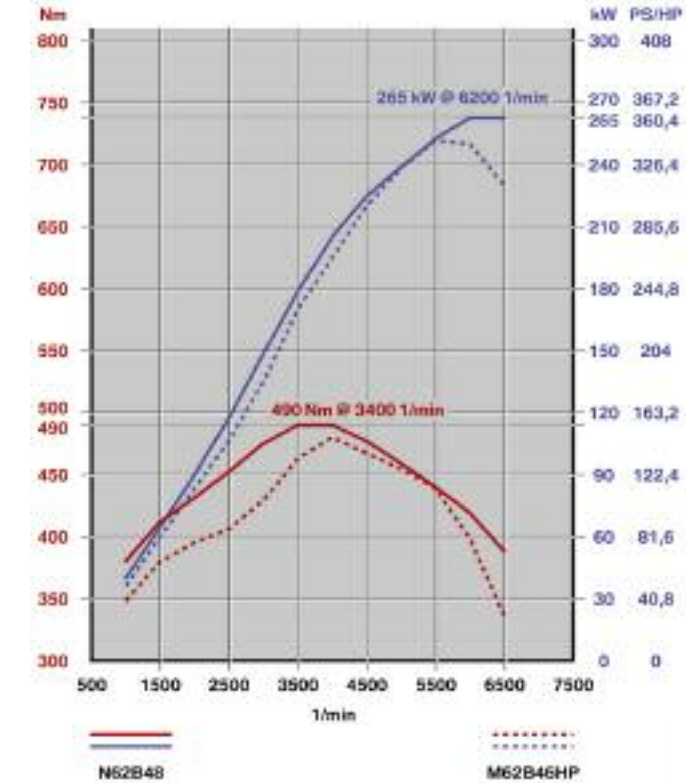
The X5 4.6is, which uses the M62TUB44, has been replaced by the X5 4.8is from 4/04. The new E53 4.8is variant uses the modified N62 with a displacement of 4.8 liters. The power output and torque figures were also increased as well.

For the 2005 model year, the new N62B48TU has been added to the model line. The 5, 6 and 7 series vehicles have been re-named to reflect these changes. Beginning with May of 2005, the 550i, 650i and 750i/Li will be available with the new engine variant.



| Model/Series    | Engine   | Output (HP - US) | Torque             | Introduction |
|-----------------|----------|------------------|--------------------|--------------|
| E65/E66 745i/Li | N62B44   | 325 at 6100 RPM  | 450 Nm at 3600 RPM | 11/01        |
| E60 545i        | N62B44   | 325 at 6100 RPM  | 450 Nm at 3600 RPM | 9/03         |
| E63/E64 645Ci   | N62B44   | 325 at 6100 RPM  | 450 Nm at 3600 RPM | 9/03         |
| E53 4.4         | N62B44   | 315 at 6100 RPM  | 440 Nm at 3600 RPM | 9/03         |
| E53 4.8is       | N62B48   | 355 at 6200 RPM  | 490 Nm at 3600 RPM | 4/04         |
| E65/E66 750i/Li | N62B48TU | 360 at 6300 RPM  | 490 Nm at 3400 RPM | 5/05         |
| E63/E64 650Ci   | N62B48TU | 360 at 6300 RPM  | 490 Nm at 3400 RPM | 5/05         |
| E60 550i        | N62B48TU | 360 at 6300 RPM  | 490 Nm at 3400 RPM | 5/05         |

# Power Output



## N62B48

The N62B48 engine is an increased displacement variant of the N62B44. The following components have been modified for use in the E53 X5 4.8is:

- Intake Silencer
- Cylinder Head
- Engine Block
- Crankshaft
- Pistons and connecting rods
- Lubrication System
- Exhaust System
- Engine wiring harness

### Intake Silencer

On account of the higher intake capacity at high engine speeds the flow characteristics of the intake silencer have been optimized for the N62B48 and the silencer has been additionally equipped with a second intake snorkel. This intake snorkel is active in the area of the righthand fog light. The second intake snorkel does not have a negative effect on the fording depth. The second intake snorkel draws in additional air only when the engine is running at high load and speed. The main volume of air is drawn in via the sound absorption cover (3).



| Index | Explanation                             | Index | Explanation                                  |
|-------|---|-------|--|
| 1     | Intake snorkel (in area of RH foglight) | 3     | Sound absorption cover with main intake port |
| 2     | Intake silencer with air filter         | 4     | Fresh air gaiter with acoustic resonator     |

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## Cylinder Head

The cylinder heads of the N62B48 are variants of the N62B44. Due to the higher stress load, the cylinder heads on the N62B48 are made from a stronger aluminum-silicon alloy. The combustion chamber diameter in the cylinder head has been adapted to the larger cylinder bore of the N62B48. The flange pattern of the exhaust manifolds on the cylinder heads has been changed in line with the new exhaust manifolds. Due to the close proximity to the hood, a heat shield has been mounted over the new exhaust manifolds on the cylinder heads.

## Secondary Air System

The N62B48 is no longer equipped with a secondary air system so that the secondary air duct in the cylinder head is also rendered unnecessary. This modification has been made possible by using an optimized catalytic converter coating.

## Cylinder Head Gasket

The cylinder head gasket has been adapted to the larger combustion chamber diameter. For the N62B48 it is identified by two 6 mm holes on the left next to the BMW part number.

## Engine Block

Compared to the N62B44, the diameter of the cylinder bores in the N62B48 have been increased by 1 mm to 93 mm.

The crankshaft bearing caps feature apertures (1) for the purpose of improving ventilation lengthways in the crankcase and reducing pump and splashing losses in the crankcase.



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## **Crankshaft**

For strength reasons, the crankshaft material in the N62B48 has been changed from lamellar graphite to steel. The journal width of the crankshaft has been adapted to the modified connecting rods and therefore reduced from 42 mm (N62B44) to 36 mm (N62B48). To increase the displacement, the stroke of the crankshaft journals has been increased from 82.7 mm to 88.3 mm.

## **Pistons and Connecting Rods**

The pistons have been adapted to the increased cylinder bore diameter. The connecting rods of the N62B44 feature an asymmetric form. The connecting rods are symmetrically formed on the N62B48. The symmetrically formed connecting rods permit a more uniform force application.

Consequently, it has been possible to reduce the width of the connecting rods from 21 mm (N62B44) to 18 mm (N62B48), matching the width of the crankshaft journals. In view of the higher mechanical loads in the big-end bearing, different bearing shells are used on the bearing cap and rod sides in the N62B48. Glyco 199 (sputter bearings) are used on the connecting rod end in the N62B48. These bearings are very important as the bearing shells on the connecting rod end are subject to high pressure loads.

Glyco 81 (three-component bearings) are fitted on the bearing cap end to withstand the tensile loads that occur at this point.

## **Lubrication System**

Shorter oil spray nozzles are used on the N62B48. They have been adapted to the longer stroke of the piston and must not be confused with the oil spray nozzles of the N62B44.

The N62B48 is equipped with a modified oil pan. The bottom section of the oil pan has been lowered by 16mm to accommodate the increased displacement of the N62B48. This modification minimizes power losses that occur in the crankcase as the result of pumping and splashing movements. By lowering the bottom section of the oil pan it was necessary to open up the thrust panel in this area. As a result, the bottom section of the oil pan on the N62B48 was no longer supported by the thrust panel and lies freely on the underbody. For this reason, the oil pan material has been changed from cast aluminum to sheet steel. The bottom section of the oil pan is made from 2 mm thick sheet steel and is less susceptible to mechanical influences compared to the B44 (cast aluminum).

The dipstick has been lengthened in line with lowering the bottom section of the oil pan. Due to the lowered bottom section of the oil pan in the N62B48, an extended intake snorkel is installed on the oil pump.

The N62B48 features an oil cooler with increased cooling capacity. It is located in front of the radiator under the A/C condenser in the cooling module. The function and design are identical to those of the oil coolers already used in the N62 for the Hot Climate variants.

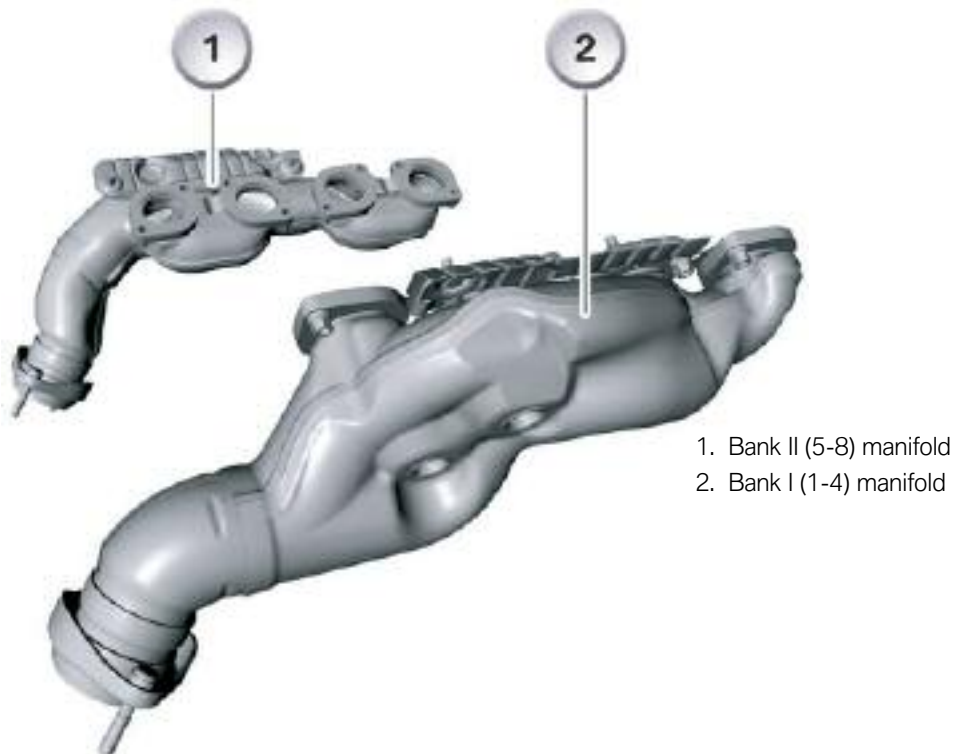
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## Exhaust System

The flow characteristics of the exhaust system have been optimized for the N62B48. The pipe diameter has been widened.

### Exhaust Manifold

The exhaust manifolds have been newly developed for the N62B48 and are designed as 4-2-1 exhaust manifolds. The newly developed form prevents residual gasses entering the combustion chamber, thus improving the cylinder charge and the torque progression in the lower engine speed range.



### Catalytic Converters

The catalytic converters feature an optimized catalytic coating. This coating has a faster response characteristic and higher temperature resistance. The faster response characteristic of the catalytic converters renders the secondary air injection after starting the engine unnecessary on the N62B48.

### Engine Wiring Harness

The engine wiring harness has been lengthened for the oil level sensor due to the lowered bottom section of the oil pan. As from the launch of the N62B48, the same wiring harness will also be installed in the N62B44.



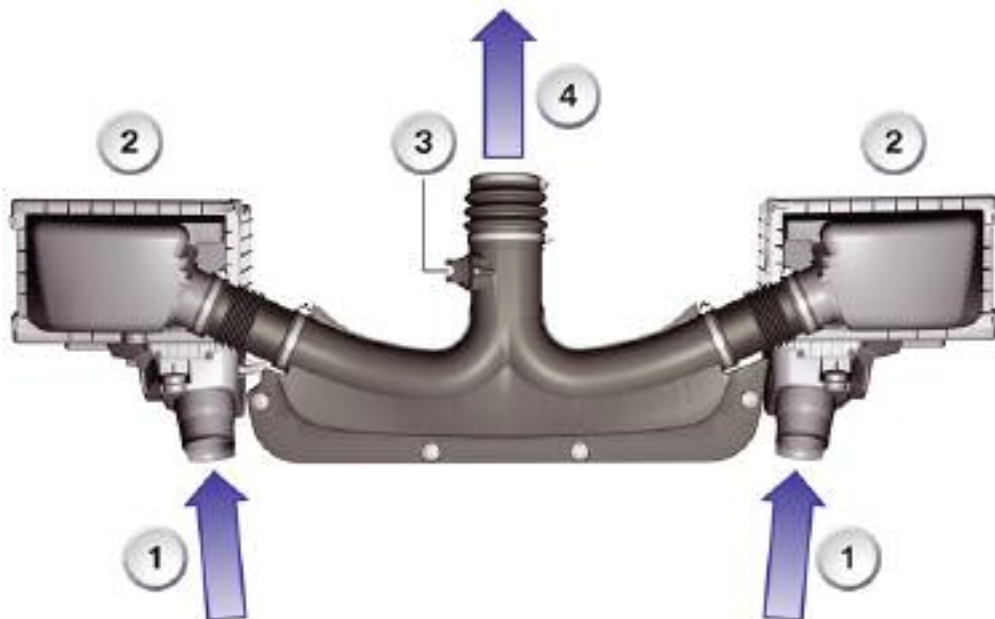
## N62TU

The N62 engine is replaced by the N62TU engine as of April 2005. The N62TU engine features changes from its predecessor in the following areas:

- Air intake duct
- Differentiated intake system (DISA)
- Crankshaft
- Oil dipstick
- Oil pump
- Inlet and exhaust valves
- Spark plugs
- DME 9.2.2
- Secondary Air System

### Air Intake Duct

The N62B48TU engine has a greater displacement and thus a larger air requirement. Due to the new lower profile hood design of the 7 series, a new air intake ducting is required. A larger, two-channel air intake duct is therefore used.

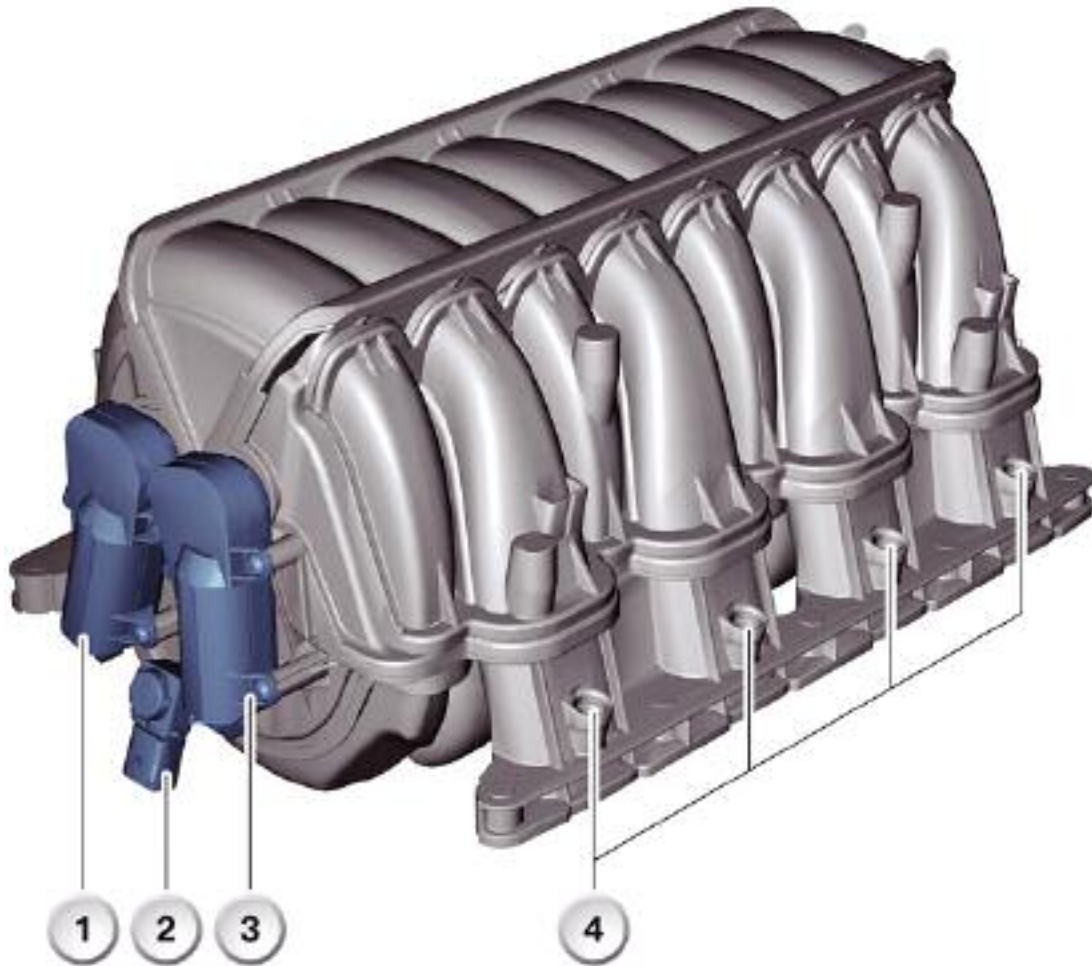


| Index | Explanation          | Index | Explanation                   |
|-------|----------------------|-------|-------------------------------|
| 1     | Intake Air (ambient) | 3     | Hot-film Air Mass Meter (HFM) |
| 2     | Intake silencer      | 4     | Filtered air to engine        |

## Differential Intake Air System (DISA)

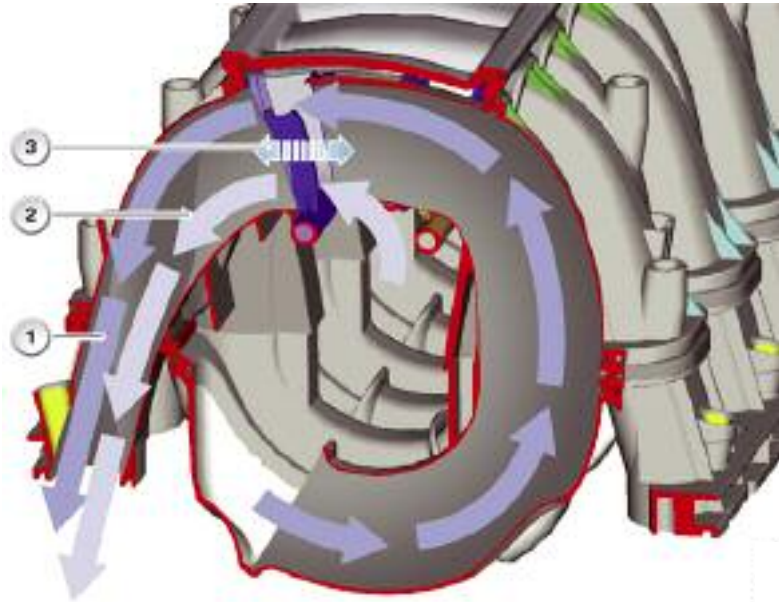
The previous fully variable intake system is no longer used in the N62TU engine. A new two-stage intake system (DISA) is used instead. The previous intake manifold was made from magnesium, the new intake is manufactured from glass fiber reinforced plastic.

There are two servomotors which provides a 2-stage (long/short) function of the intake manifold runners. Due to the increased displacement and engine power, the fully variable intake system is no longer needed.



| Index | Explanation                  | Index | Explanation                 |
|-------|------------------------------|-------|-----------------------------|
| 1     | Servomotor, cylinder bank 1  | 3     | Servomotor, cylinder bank 2 |
| 2     | Differential Pressure Sensor | 4     | Bores for fuel injectors    |

## 2-Stage DISA (Functional Principle)



| Index | Explanation          | Index | Explanation                             |
|-------|----------------------|-------|---|
| 1     | Long Intake Passage  | 3     | Directional movement of sliding sleeves |
| 2     | Short Intake Passage |       |   |

In the intake system a sliding sleeve (3) is located at the intake manifold for each cylinder. The displacement of the sleeves determines whether the intake passage is long (1) or short (2). At idle a long intake passage is set (torque setting).

From 4700 rpm, the sleeves are pushed back and a short intake passage is thereby set (power setting). When there is no flow, the sliding sleeves remain in their respective position.

Varying the intake passages controls the pressure wave in the intake manifold in such a way as to produce a boost effect in the high rpm range. The sliding sleeves are driven by a servomotor assigned to each cylinder bank. The two servomotors together with the differential pressure sensor form a single component.

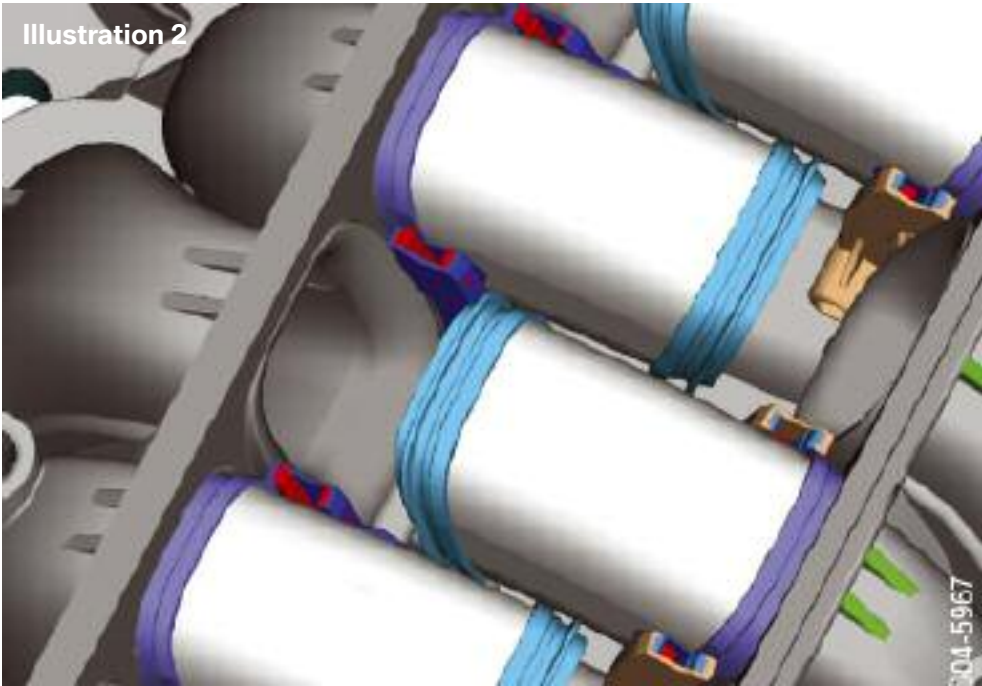
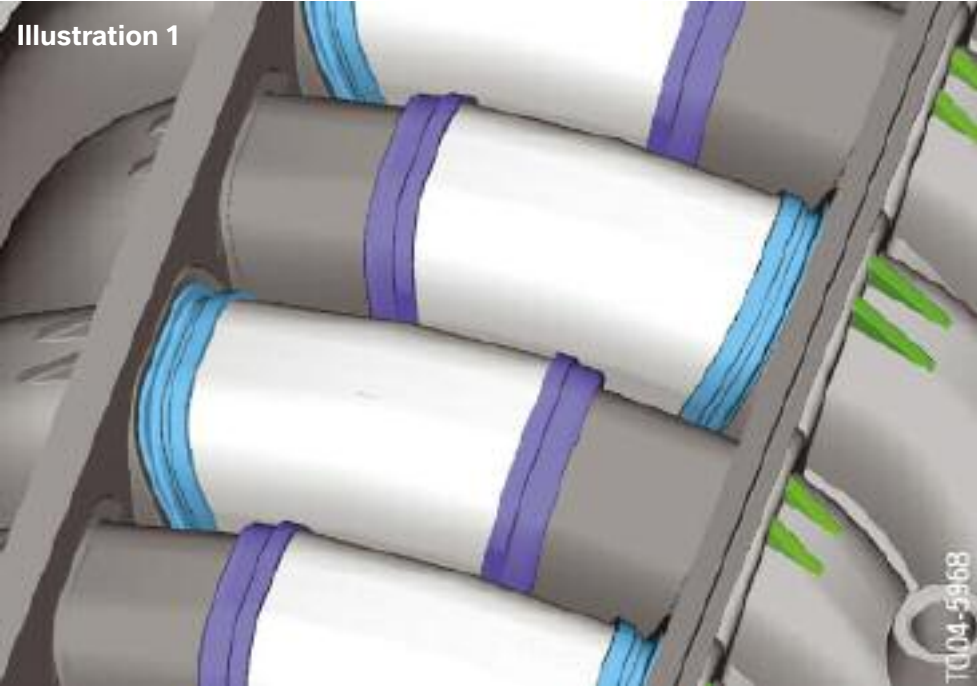
The 12V servomotors are actuated by the ECM via a PWM signal. While the sliding sleeves are open (power setting), the servomotors are actuated with a 5 % PWM signal in order to hold the sleeves in their open position.

The servomotors do not have position feedback. The sleeves can be inspected visually through the throttle valve opening. The sleeves are opened and closed once when the ignition is turned on. This prevents the sleeves from seizing during extended operation in the torque setting.

The bores for the fuel injectors and the connections for crankcase and tank ventilation are located on the intake system as well.

The following illustrations show the sliding sleeves of the intake runner in their respective positions. The first illustration (1) shows the intake sleeves closed (long runner). This setting is for low RPM to create higher torque.

The second illustration (2) shows the intake sleeves open (short runner). This setting is for high RPM which takes advantage of the pressure wave effect for increased power.



## Crankshaft

Due to the increased demands, the N62B48TU engine has a steel crankshaft. In the interests of reducing power loss (oil churning losses in the crankcase), the crankpin width has been reduced from 42 mm to 36 mm. The connecting rods are adapted accordingly.

## Oil Pump

The geometry of the oil pump is specifically adapted. Oil churning losses in the crankcase are further reduced by the modified design of the oil deflector.

## Oil Dipstick

The E65 Facelift model series is equipped with an electronic oil level display. The engine oil dipstick has a modified handle in black. This eliminates the need for the customer to check the engine oil level twice.



## Inlet and Exhaust Valves

The stem diameter has been reduced from 6 mm to 5 mm. The moving masses reduced in this way result in a higher RPM capability.

## Spark Plugs

The previous surface-gap spark plugs with 2 ground electrodes have been replaced by spark plugs with the spark position brought forward and a hook electrode.

This enables better ignition of the fuel/air mixture. In the new spark plugs the center electrode is made of platinum (replacement interval: every 100,000 miles).

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## **Digital Motor Electronics (DME)**

The N62TU engine is equipped with DME ME9.2.2. The functions of the ME 9.2.2 are carried over from the previous ME 9.2 of the N62 engine.

The pin assignment of the ME 9.2.2 has not changed in relation to the ME 9.2.1. An ME9.2.2 control unit and a VALVETRONIC control unit are used to run the N62TU.

The following changes have been made:

- New processor (clock frequency 56 MHz)
- Lambda oxygen sensor LSU 4.9
- Hot-film air-mass meter HFM 6
- Software for electronic oil level measurement.

### **Lambda Oxygen Sensor**

An LSU 4.9 oxygen sensor is used as the control sensor for each cylinder bank. Compared with the LSU 4.2 oxygen sensor previously used, the LSU 4.9 oxygen sensor reaches operational readiness twice as fast.

Full operational readiness is reached after 10 seconds (LSU 4.2 = 20 seconds). This rapid starting capability is made possible by the use of a smaller ceramic element. The outer dimensions of the oxygen sensor remain unchanged.

The previous opening for the supply of ambient air (reference air measurement) has been dispensed with. The new sensor differs from the LSU 4.2 in that a porous layer permeable by air is used instead of a reference air channel. The function stays the same. The ambient air is directed to the measuring element via the connecting cable.

### **Hot-film Air-mass Meter (HFM)**

The HFM 6.4 is used in the N62TU engine. The sensor signal is already digitized in the HFM 6.4. The digitized signal is sent to the ECM (DME).



## Classroom Exercise - Review Questions

1. Which vehicles will use the N62TU?

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2. What is different about the engine block on the N62B48 (E53 4.8is)?

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3. What modifications have been made to the lubrication system on the N62B48?

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4. What modifications on the N62B48 allowed for the deletion of the secondary air injection system?

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5. On the N62TUB48 engine, What is new about the intake manifold?

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## Classroom Exercise - Review Questions

6. What are the two methods for checking the oil on the N62TU?

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7. What modifications have been made to the engine management system on the N62TU?

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8. What is the difference between the HFM signal on the new HFM 6.4 as compared to the previous HFM on the ME 9.2 system?

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