

Table of Contents

E63 M6 Complete Vehicle

Subject	Page
Introduction	3
M6 Heritage - E24	4
M6 Heritage - E63	5
Technical Data	6
Technical Data Views	7
Vehicle Overview	8
Modifications and New Features	8
S85B50 Engine	8
Unfiltered Air Snorkel, Intake Silencer	8
Fuel Supply System	9
Exhaust System	9
SMG/Gearshift	9
Driveshaft	9
Chassis and Suspension	10
Electronic Damper Control (EDC)	10
Traction Control Systems	10
Front Axle Suspension	10
Rear Axle Suspension	11
Wheels/Tires	11
Electrical System	11
Brakes	12
Brake Operation (hydraulic system)	12
Electric Vacuum Pump	12
Actuation	12
Diagnosis	13
Emergency Programs of the Safety Concept Manager	13
Body	14
Roof	14
Front Bumper	15
Rear Bumper	16
Left/Right Sill Panel	17
Displays, Indicators and Controls	17

E63 M6 Complete Vehicle

Production: From 05/2006

OBJECTIVES

After completion of this module you will be able to:

- Identify the unique characteristics of the E63 M6

Introduction

With the new M6, BMW M GmbH presents the sports-oriented 6 Series luxury coupe: 5 liter displacement, 10 cylinders, 500 hp output, 383lb-ft torque and engine speeds beyond the 8000 rpm boundary.

But power is not everything. What is more significant are the acceleration characteristics and the vehicle dynamics, which in turn depend, on the one hand, on the vehicle weight and, on the other hand, on the actual thrust at the drive wheels that is derived from the engine torque and the overall transmission ratio. The 7-speed SMG is the ideal manual gearbox for optimally transferring the power from the V10 engine via the drive train to the rear wheels. Together with the excellent, uncompromising chassis with its sports oriented tuning, this power plant launches the BMW M6 into the ranks of a super sports car.

Yet, in contrast to its normally two-seater competitors, the M6 offers the space and comfort of a typical 2+2 seater as well as the well-appointed interior trim and equipment of a typical luxury class BMW.



M6 Heritage - E24



The E24 M6 was introduced in 1987 as a 2 door coupe.

It was equipped with the S38 six cylinder engine which produced 286 hp and had a top speed of 155m/h (approximately). The M6 was available for only two years.

Vehicle-specific data

Cylinders	6 in-line, mid mounted 24 valve
Capacity	3453 cc
Power	256 hp @ 6500rpm
Torque	243 hp @ 4500rpm
Weight	3570 lbs
Max speed	149 mph
Acceleration	0-60 mph in 6.8 sec
Fuel consumption	10 mpg city/19 mpg highway
0-60 mph	6.6 sec
0-100 mph	15.7 sec
Top Speed	149 mph

M6 Heritage - E63



BMW has been crafting sleek and fast coupes since 1936, but more strictly speaking the M6's heritage encompasses just four predecessors: the 3.0 CSL, the M1, a first-generation M6 and the 850CSi. All, to one degree or another, were products of BMW M, or BMW Motorsport as it was originally called.

With the new M6, BMW M continues the proud tradition of performance coupes manufactured by BMW.

Technical Data

Engine-specific data

Engine designation	S85B50
Engine type	V10, 90°
Displacement	5 L / 4,999 ³ cm
Bore	3.62 in / 92 mm
Stroke	2.96 in / 75.2mm
Output	500hp at 7,750 rpm
Torque	383 lb-ft / 520Nm at 6,100 rpm
Engine speed (max)	8,250 rpm
Compression ratio	12:1
Valves per cylinder	4

Vehicle-specific data

Acceleration (0-60 m/h)	4.5s
Top speed	155 m/h
Unladen weight	3909 lbs
Transverse acceleratio	1.4g
Power to weight ratio	3.5kg/bhp
Drag coefficient	0.32 Cd
Vehicle weight	1710kg
Wheelbase	278 cm
Toe, front/rear	1567/1584mm
Turning circle	12.5 m
Luggage compartment	450 litre
Length	482 cm
Width	185.5 cm
Height	137.5 cm

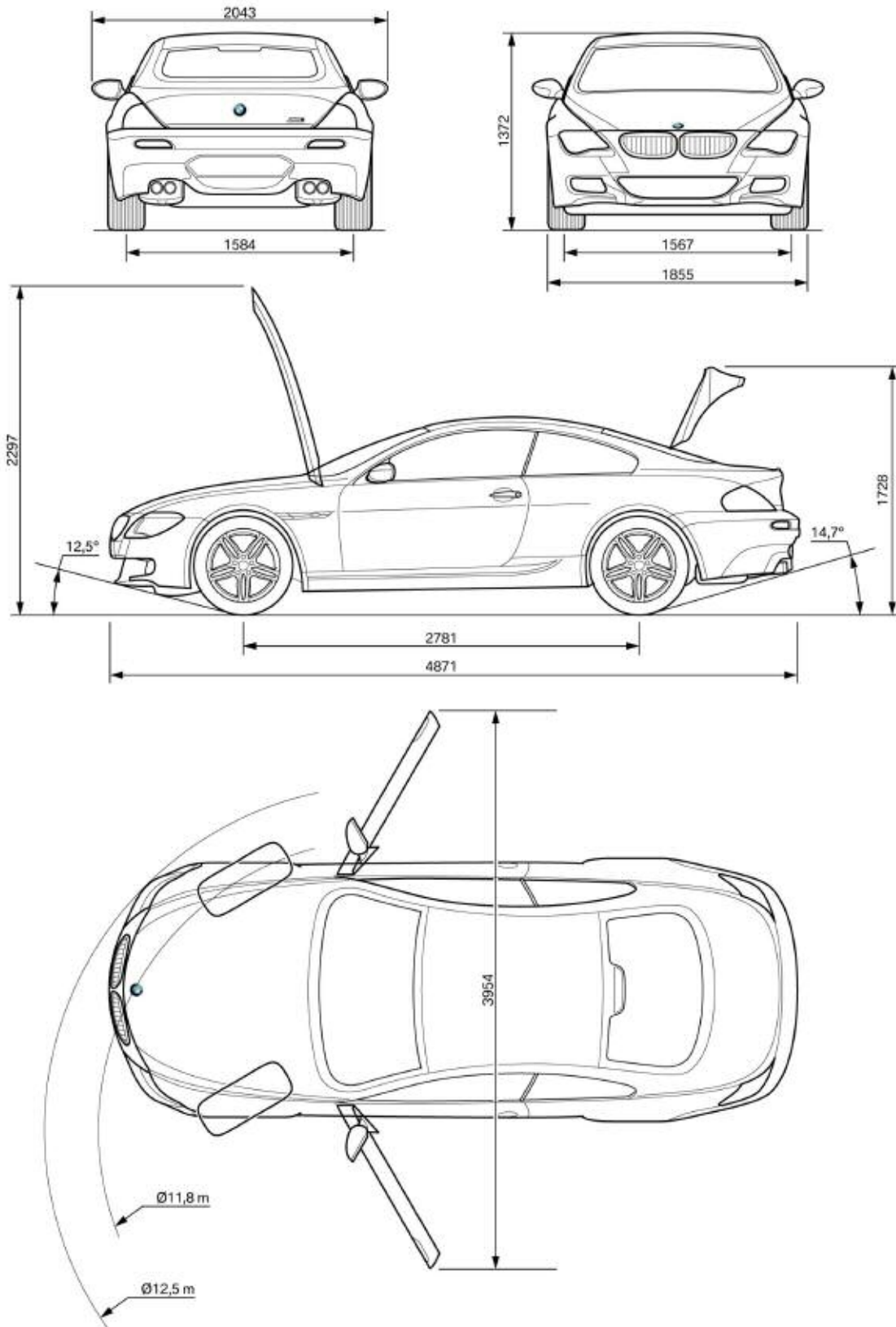
Tires and Wheels

Tires front	255/40ZR-19
Tires rear	285/35ZR-19
Wheels front	19 x 8.5
Wheels rear	19 x 9.5

Transmission

SMG Gear	Ratios
First / Reverse	3.99:1
Second	2.65 : 1
Third	1.81 : 1
Fourth	1.39 : 1
Fifth	1.16 : 1
Sixth	1.00 : 1
Seventh	0.83 : 1
Final Drive Ratio	3.62 : 1

Technical Data Views



Vehicle Overview

Modifications and New Features

The following system components have been adopted from the E60 M5:

- S85B50 engine including engine management
- Fuel supply system
- 7-speed SMG with Drivelogic function
- Steering with 2 Servotronic characteristic maps
- Final drive unit/rear axle carrier
- Instrument cluster
- General vehicle electrical system

S85B50 Engine

The engine add-on parts have been adapted to the E63 engine compartment.

Unfiltered Air Snorkel, Intake Silencer

The primary intake is a common part of an E63 with the N62 (cyl. 6-10) engine. The primary intake of cylinders 1-5 is inversely symmetrical, while taking into account the arrangement of the secondary air pump.

The secondary air duct is the same as on the E60 M5 but adapted to the shape of the front apron on the E63 M6.



Fuel Supply System

The fuel lines have been adapted to the S85B50 engine.

The fuel tank is the same as on the E63 645i but the components built into the fuel tank, including the delivery unit, are from the E60 M5.

The carbon canister (AKF) is the same as on the E63. The line connection has been adapted to the larger carbon canister LEV2.

Exhaust System

The exhaust system is new.

Only the intermediate silencer and the diameter of the tail pipes at the rear silencers have been adopted from the E60 M5.

The acoustic characteristics has been tuned to a more 'sports-oriented sound'.



SMG/Gearshift

The selector lever has been adopted from the E46 M3 with its length correspondingly adapted. The selector lever knob is the same as on the E60 M5.

The three Power, EDC and DSC buttons have been integrated in the selector lever cover.



Center Console Switches

Index	Explanation
1	Selector lever with function lights
2	Power
3	DSC
4	EDC
5	Drivelogic

Driveshaft

The two-piece steel propeller shaft is the same as installed on the E60 M5. The length has been adapted accordingly.

Chassis and Suspension

The chassis of the M6 differs from that of the M5 by a shorter wheelbase and an even lower center of gravity thus increasing agility.

Electronic Damper Control (EDC)

The electronic damper control system has been adopted from the E60 M5 and the software adapted to the E63 M6.

Traction Control Systems

The DSC Mk60E5 has been adopted from the E60 M5 with the software configuration (coding data set) adapted to the E63 M6.

Front Axle Suspension

The stabilizer bar on the front axle is designed as a tubular stabilizer bar and has been adapted to match the chassis tuning. The link, rubber mount and bracket have been adapted from the E60 M5. Due to the design of the front axle, there are sections with different outside and inside diameters.

The spring strut corresponds to that of the E60 M5 but the spring plates have been adapted to the E63 M6 in terms of the kinematic requirements as well as spring tuning and length.

The geometry of the cylindrical coil spring is the same as on the E39 M5. The spring plate and top spring mount are identical to those on the E46 M3.

■ Front Axle Mounting

The thrust panel on the front axle is a common part with the E60 M5 and is made from aluminum.

The material thickness is 2.5 mm on the E63 645i and 3.5 mm on the E63 M6.

The control arms are the same as installed on the E63 645i but fitted with rubber mounts from the E61.

The heat shield panels on the left and right of the front axle carrier have been adapted to the S85B50 engine.

■ Wheel Bearings

Apart from the camber modification, the swivel bearing is a common part with the E63 645i.

Negative camber E63 645i: 12 min

Negative camber E63 M6: 60 min (1°).

Rear Axle Suspension

The spring strut and the shock absorbers correspond to those on the E60 M5, however, they have been adapted in terms of tuning and length.

The springs together with the mounting assembly and stabilizer bar are the same as on the E60 M5 but adapted to the specific requirements of the E63 M6.

■ Final Drive

The final drive unit is the same as the M-limited slip differential of the E60 M5.

Gear ratio E63 M6: $I = 1:3.62 = 47:13$ teeth

Basic model E63 645i: $I = 1:3.46$.

Wheels/Tires

■ Front

Weight-optimized light-alloy wheel, forged and polished 8.5x19 ET 12 mm.

Hole pitch circle diameter: 120 mm

Center diameter (hub): 72.5 mm

Summer tires 255/40R19 Styling No. 167M.



■ Rear

Weight-optimized light-alloy wheel, forged and polished 9.5x19 ET 17 mm for summer tires 285/35R19 Styling No. 167M.

Winter wheel same as on E60 M5 (front and rear) 8x18 rim offset (ET14 mm new).

Tires: 245/45 R18, ContiWinterContact TS 810S, Michelin Pilot Alpine 2

Snow chains can be mounted on winter wheels only.

Electrical System

Wiring Harness

The main wiring harness is new. It is designed as a one-piece, modular structure specific to the equipment configuration.

The MOST system is integral. The wiring to the hood lock is new - necessary with SMG.

Brakes

Brake Operation (hydraulic system)

The brake lines for are the same as on the E60 M5 but specifically adapted to the E63 M6.

Electric Vacuum Pump

The assistance of an external vacuum pump is required under various operating conditions (e.g. race track mode, driving off with the engine cold or rolling at terminal 15 with the engine not turned on) to ensure sufficient vacuum in the brake booster at all times.

An electric vacuum pump has been installed with the introduction of the E63 M6. It is installed on the left in the engine compartment under the left microfilter for the heating/air conditioning system. This vacuum pump is also installed with the series launch of the E60 M5.



Electric Vacuum Pump

Index	Explanation
1	Pressure Regulator
2	Vacuum Pump

Actuation

The electric vacuum pump is actuated by the DME (digital motor electronics) MS_S65. An external pressure sensor (see illustration below) signals the pressure difference from the brake booster compared to the ambient pressure to the DME.

When vacuum is required, the DME activates the relay which in turn then actuates the electric vacuum pump. The cut-in and cut-out thresholds are controlled as a function of the differential pressure and the vehicle speed.

The software in the DME is configured such that the correct vacuum is available in the brake booster under all driving conditions.

With relatively little vacuum in the brake booster, the engine must be running or the vehicle must be rolling with terminal 15 on in order to activate the electric vacuum pump.

Diagnosis

A test module is provided in DIS for the electric vacuum pump.

The differential pressure sensor on the brake booster is used for the purpose of monitoring the pump. The plausibility is checked by the pressure difference between the vacuum and ambient pressure calculated internally in the DME. It is evaluated and, in the case of fault, shown in the instrument cluster and displayed as a CC message (check control).

If the electric vacuum pump is found to be defective during the self-diagnosis procedure, the safety concept manager (SK manager) intervenes and shuts down the cylinder bank 6-10. The smaller opening cross section in the intake duct of cylinder bank 6-10 thus ensures adequate vacuum in the brake booster.

In the case of fault the safety concept manager triggers an "engine" symbol as well as a CC message (check control) "engine malfunction/power loss" in the instrument cluster.

■ Emergency Programs of the Safety Concept Manager

The fault code "electric vacuum pump for Mastervac" (Mastervac = brake booster) is stored in the fault code memory in connection with the fault types "short to positive", "short to ground" and "line break". The following actions are initiated:

- Maximum torque 200 Nm
- Maximum engine speed 3500 rpm
- Maximum vehicle speed 150 km/h

The following actions are initiated in connection with the fault "pump not running":

- Maximum torque 100 Nm
- Maximum engine speed 2000 rpm
- Maximum vehicle speed 50 km/h

Body

Apart from the carbon roof, front and rear bumpers as well as the left and right side sill panels, the body corresponds to that of the basic E63 645i.

The outside mirror is the same as on the E60 M5.

Changes to the body:

- Roof
- Front bumper
- Rear bumper
- Left/right sill panel

Roof

As already used on the E46 M3 CSL in other markets of the world, the E63 M6 features a visible carbon fiber reinforced plastic (CFK) outer roof skin panel.

The carbon fibre-reinforced plastic roof is 7 kg lighter than the standard steel roof therefore lowers the vehicle's center of gravity. This has a particularly positive effect on the vehicle dynamics.

Minor scratches can be painted. The roof must be replaced in the event of more extensive damage (e.g. a hole). The carbon fibre-reinforced plastic roof is bonded to the body (see Repair Instructions No. 41 31 000)



Carbon Roof

Note: The panoramic roof option SA is not available.

Front Bumper

The front bumper is designed as a lightweight bumper.

It has its own distinctive appearance and is aerodynamically optimized. The design specifically takes into account the brake cooling function and the air intake for the V10 engine.

It consists of:

- Advanced composite plastic carrier with deformation element (a glass fiber reinforced plastic (GFK) braiding as replacement for the standard, heavier aluminum section)
- Shock absorber (foam material)
- Plastic paneling (material same as on the E63 basic vehicle)
- No body moulding



Front Bumper

Index	Explanation
1	Cooling air duct on left and right for wheel arch, brakes, secondary unfiltered air duct for intake silencer
2	Center cooling air duct
3	Primary air duct for intake silencer

Note: The fog light and ACC (active cruise control) options are not available.

Rear Bumper

The front bumper is designed as a lightweight bumper.

It has its own distinctive appearance and is aerodynamically optimized (see illustration).

It consists of:

- Advanced composite plastic carrier with deformation element (a glass fiber reinforced plastic (GFK) braiding as replacement for the standard, heavier aluminum section)
- Shock absorber (foam material)
- Plastic paneling (material same as on the E63 basic vehicle)
- No body moulding



Rear Bumper

Index	Explanation
1	80 mm Diameter Exhaust Tail Pipes
2	Integrated Diffuser

Left/Right Sill Panel

The left and right sill panels are new parts with a distinctive appearance and developed in accordance with aerodynamics aspects. The ram air lips (see magnified view in illustration below) in front of the rear wheel are made from stone chip-resistant material.

The sill panels are an integral part of the aerodynamic design package of the M6 coupe.



Displays, Indicators and Controls

The center console switch cluster is the same as on the basic model E63 645i. The RPA button (tire failure indicator) and the electronics (software) are identical to those on the E60 M5.

