Technical training.
Product information.

G30 Powertrain

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BMW Group University
Technical Training
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BMW Service

General information

Symbols used

The following symbol is used in this document to facilitate better comprehension or to draw attention to very important information:

Contains important safety information and information that needs to be observed strictly in order to guarantee the smooth operation of the system.

Information status and national-market versions

BMW Group vehicles meet the requirements of the highest safety and quality standards. Changes in requirements for environmental protection, customer benefits and design render necessary continuous development of systems and components. Consequently, there may be discrepancies between the contents of this document and the vehicles available in the training course.

This document basically relates to the European version of left hand drive vehicles. Some operating elements or components are arranged differently in right-hand drive vehicles than shown in the graphics in this document. Further differences may arise as the result of the equipment specification in specific markets or countries.

Additional sources of information

Further information on the individual topics can be found in the following:

- Owner's Handbook
- Integrated Service Technical Application.

Contact: conceptinfo@bmw.de

The information contained in this document forms an integral part of the BMW Group Technical Qualification and is intended for the trainer and participants in the seminar. Refer to the latest relevant information systems of the BMW Group for any changes/additions to the technical data.

Information status: **September 2016**
Technical training.

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1. Introduction

The development code for the new 7th generation BMW 5 Series is G30. The G30 will be available from SOP November 2016 and retail in early 2017.

1.1. History

Historical overview of the BMW 5 Series

Index	Development code
1	E12 (1972–1981)
2	E28 (1981–1987)
3	E34 (1987–1995)
4	E39 (1995–2003)
5	E60/E61 (2003–2010)
6	F10/F11 (2010–2016)
7	G30 (SOP late 2016 as 2017 MY)

1.2. Overview of system descriptions

Many of the systems used are already known from the current BMW 7 Series G12. The “Comparison of G12 with G30” chapter lists the common elements and the differences. The explanations of the systems already familiar from the G12 are kept brief. The system descriptions can be reviewed from the various technical reference manual’s listed below.

Topic	Technical Reference Manual
Drive variant 530i and 530i xDrive	ST1512 B46 engine
Drive variant 540i and 540i xDrive	ST1505 B58 engine
Drive variant M550i xDrive	ST1511 N63TU2 Engine
Air intake duct	ST1501 G12 Powertrain
Exhaust emissions regulations	ST1501 G12 Powertrain
Engine cooling	ST1512 B46 engine, ST1505 B58 engine, ST1511 N63TU2 engine
Engine control unit	ST1501 G12 Powertrain

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1. Introduction

Topic	Technical Reference Manual
Automatic engine start/stop function	ST1501 G12 Powertrain
Automatic transmission 8HPTU	ST1501 G12 Powertrain
xDrive	ST1501 G12 Powertrain

1.3. Drive comparison G12 with G30

Many G30 systems have already been introduced in the G12. The following table provides an overview of the differences and common features between the two series.

Engines	G12	G30
B46 Engine (4-cylinder gasoline engine)	—	●
B58 Engine (6-cylinder gasoline engine)	●	●
N63TU2 Engine (8-cylinder gasoline engine)	●	●

Systems/components	G12	G30
Electrical exhaust flap(s)	●	●
8th generation DME	●	●
Active air-flap control with two servomotors	●	●
Automatic transmission 8HPTU	●	●
Transfer box ATC13-1	●	●

1.4. Engine designation

The engine designation is used to uniquely identify the various engines. The following table provides an overview of the composition of the different engine codes.

Position	Meaning	Index	Explanation
1	Engine developer	M, N, B P S W	BMW Group BMW M Sport BMW M GmbH Bought-in engines
2	Engine type	3 4 5 6 7	3-cylinder in-line engine (e.g. B38) 4-cylinder in-line engine (e.g. B48, B46) 6-cylinder in-line engine (e.g. B58) V8 engine (e.g. N63) V12 engine (e.g. N74)
3	Change to the basic engine concept	0 1 – 9	Basic engine Changes, e.g. combustion process

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1. Introduction

Position	Meaning	Index	Explanation
4	Working method or fuel type and possibly installation position	A B C D H K	Gasoline, transverse mounted Gasoline, longitudinally mounted Diesel, transverse mounted Diesel, longitudinally mounted Hydrogen Gasoline, horizontal mounting
5 + 6	Displacement in 1/10 liter	12 15 20 30 40 44 60	1.2 l 1.5 L 2.0 L 3.0 L 4.0 L 4.4 L 6.0 L
7	Performance class	K U M O T S	Lowest Lower Middle Upper Top Super
8	Revision relevant to approval	0 1 – 9	New development Redesign

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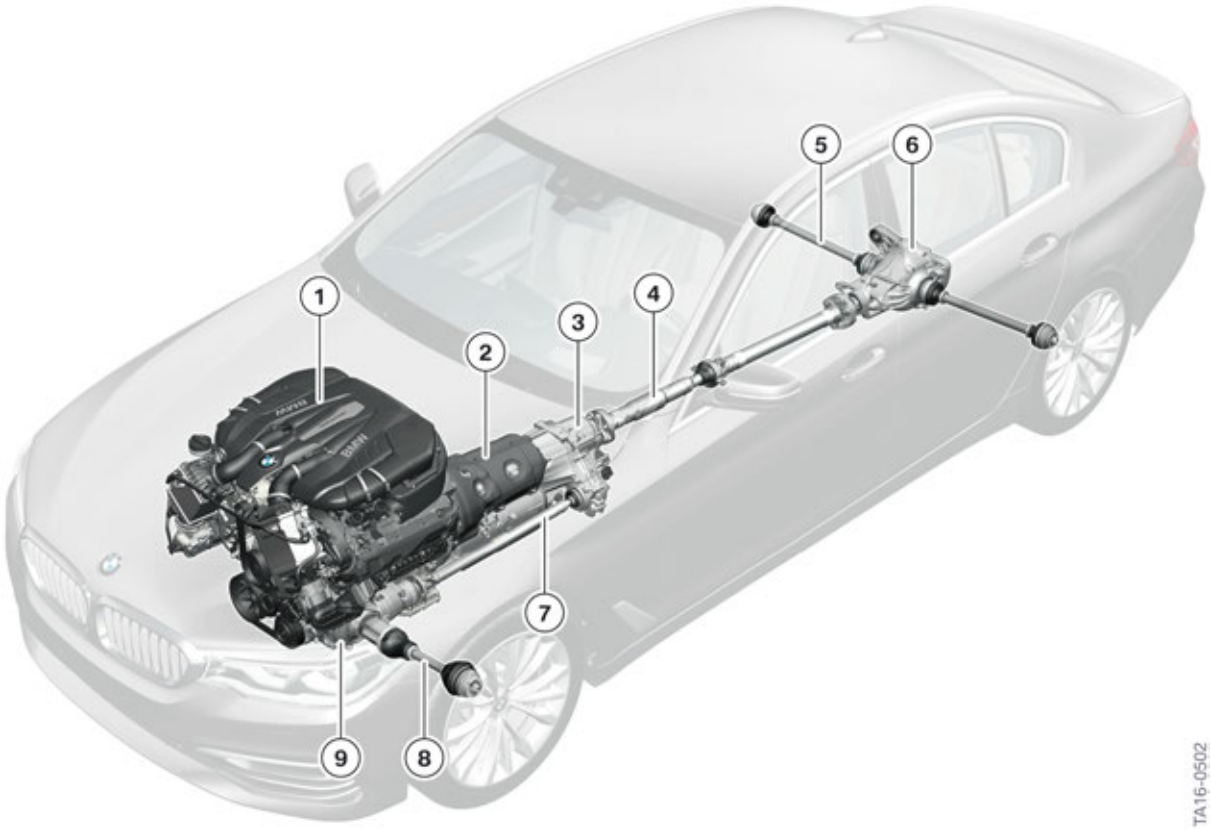
2. Drive Variants

Like in the predecessor, the G30 is offered with optional xDrive all-wheel drive. All models receive the 8-speed Sport automatic transmission as standard.



Drive overview G30

Index	Explanation
1	Engine
2	Automatic transmission
3	Transfer box VTG (only for xDrive)
4	Prop shaft
5	Output shaft, rear
6	Rear axle differential
7	Front drive shaft (only for xDrive)
8	Front output shaft (only for xDrive)
9	Front axle differential (only for xDrive)

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2. Drive Variants

2.1. Models

With the exception of the 8-cylinder gasoline engine (N63TU2), which has had an engineering upgrade, the newly-developed modular engines are used. All engines meet the ULEV II or SULEV regulations for the US.

- ULEV II = Ultra-Low Emission Vehicle
- SULEV = Super Ultra-Low Emission Vehicle

2.1.1. G30 models

G30	Engine	sDrive	xDrive	Sport Automatic transmission	Manual gearbox
530i	4-cylinder engine	●	●	●	—
540i	6-cylinder engine	●	●	●	—
M550i	8-cylinder engine	—	●	●	—

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3. Gasoline Engines

The engines of the G30 are already known from the BMW 7 Series G12. The following table shows the common features and differences in terms of power and torque specifications in the various performance classes:

Engine	G12		G30	
B46 4-cylinder gasoline engine	740e*	190 kW (258 HP) 400 Nm (295 lb-ft)	530i	185 kW (248 HP) 350 Nm (258 lb-ft)
B58 6-cylinder gasoline engine	740i	240 kW (326 HP) 450 Nm (332 lb-ft)	540i	250 kW (335 HP) 450 Nm (332 lb-ft)
N63 8-cylinder gasoline engine	750i	330 kW (445 HP) 650 Nm (480 lb-ft)	M550i	340 kW (455 HP) 650 Nm (480 lb-ft)

* G12 PHEV iPerformance vehicle with modified B48 engine

3.1. Technical data

	530i	540i	M550i
Engine designation	B46B20O0	B58B30M0	N63B44O2
Power output	185 kW (248 HP)	250 kW (335 HP)	340 kW (455 HP)
Torque	350 Nm (258 lb-ft)	450 Nm (332 lb-ft)	650 Nm (480 lb-ft)
Exhaust emission standards	SULEV	ULEV II	ULEV II
Automatic transmission	8HP50	8HP50	8HP75

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3. Gasoline Engines

3.2. Technical data BMW 530i engine

B46B20O0 engine in the G30

Parameters	Unit	B46B20O0
Displacement	cm^3	1998
Cylinder layout	—	In-line
Number of cylinders	—	4
Firing order	—	1–3–4–2
Bore	mm	82
Stroke	mm	94.6
Compression ratio	ε	10.2
Combustion process	—	Turbo-Valvetronic direct injection
Permitted fuel	ROZ95	91–100
Oil quantity	liters	5.25

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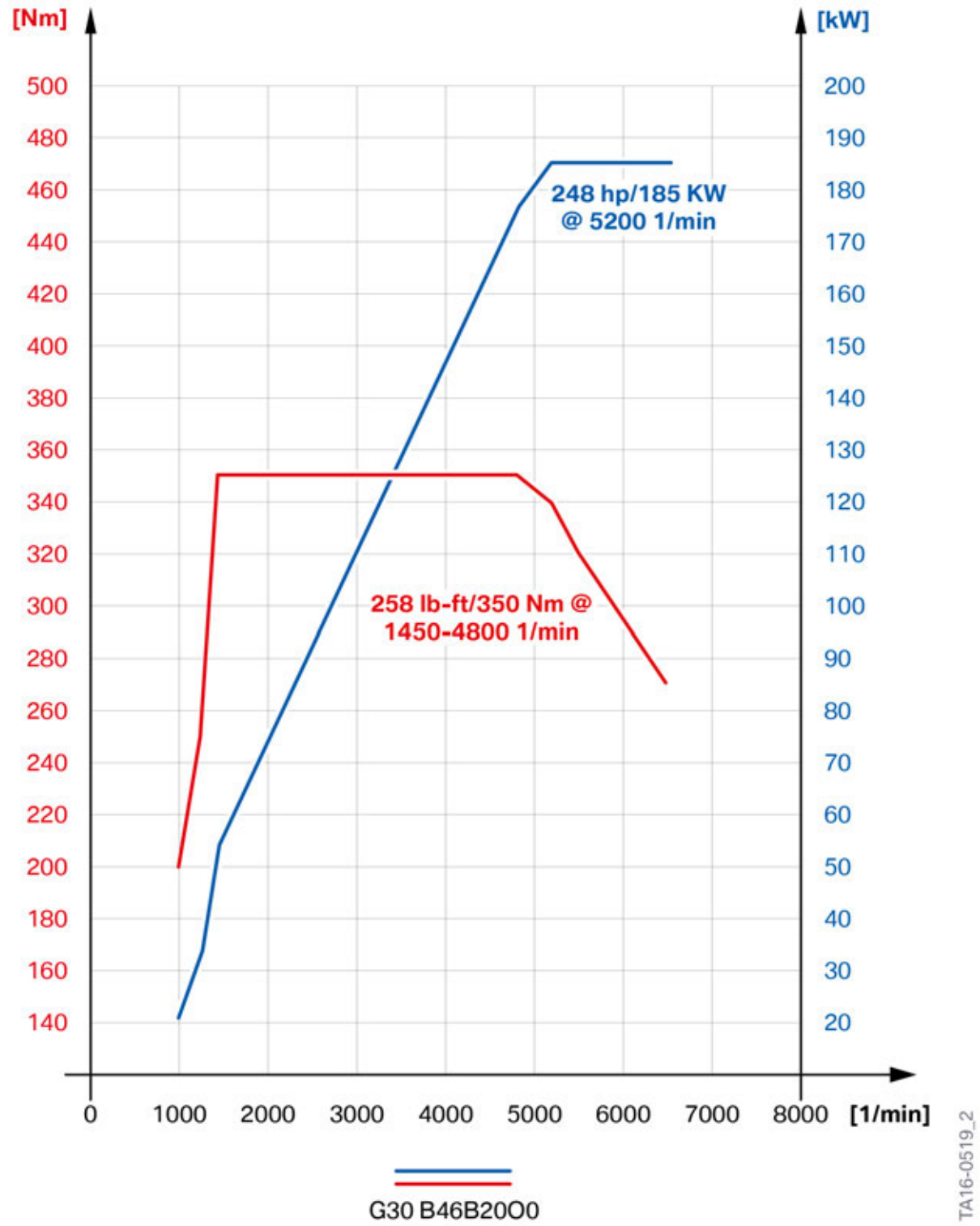
3. Gasoline Engines

3.2.1. Engine highlights B46B20O0

List of the most important special features:

1 Direct rail injection system with 200 bar pressure.
2 4th generation Valvetronic.
3 Twin-scroll turbocharger with electrical wastegate valve controller.
4 Intake air system with integrated charge air cooler.
5 Switchable coolant pump.
6 Heat management module.
7 Characteristic map-controlled oil pump with integrated vacuum pump.

3.2.2. Full load diagram



Full load diagram B46B20O0 engine

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3. Gasoline Engines

3.3. BMW 540i engine technical data

B58B30M0 engine in the G30

Parameters	Unit	B58B30M0
Displacement	cm^3	2998
Cylinder layout	—	In-line
Number of cylinders	—	6
Firing order	—	1–5–3–6–2–4
Bore	mm	82
Stroke	mm	94.6
Compression ratio	ε	11
Combustion method	—	Turbo-Valvetronic direct injection
Permitted fuel	RONZ95	91–100
Oil quantity	liters	6.5

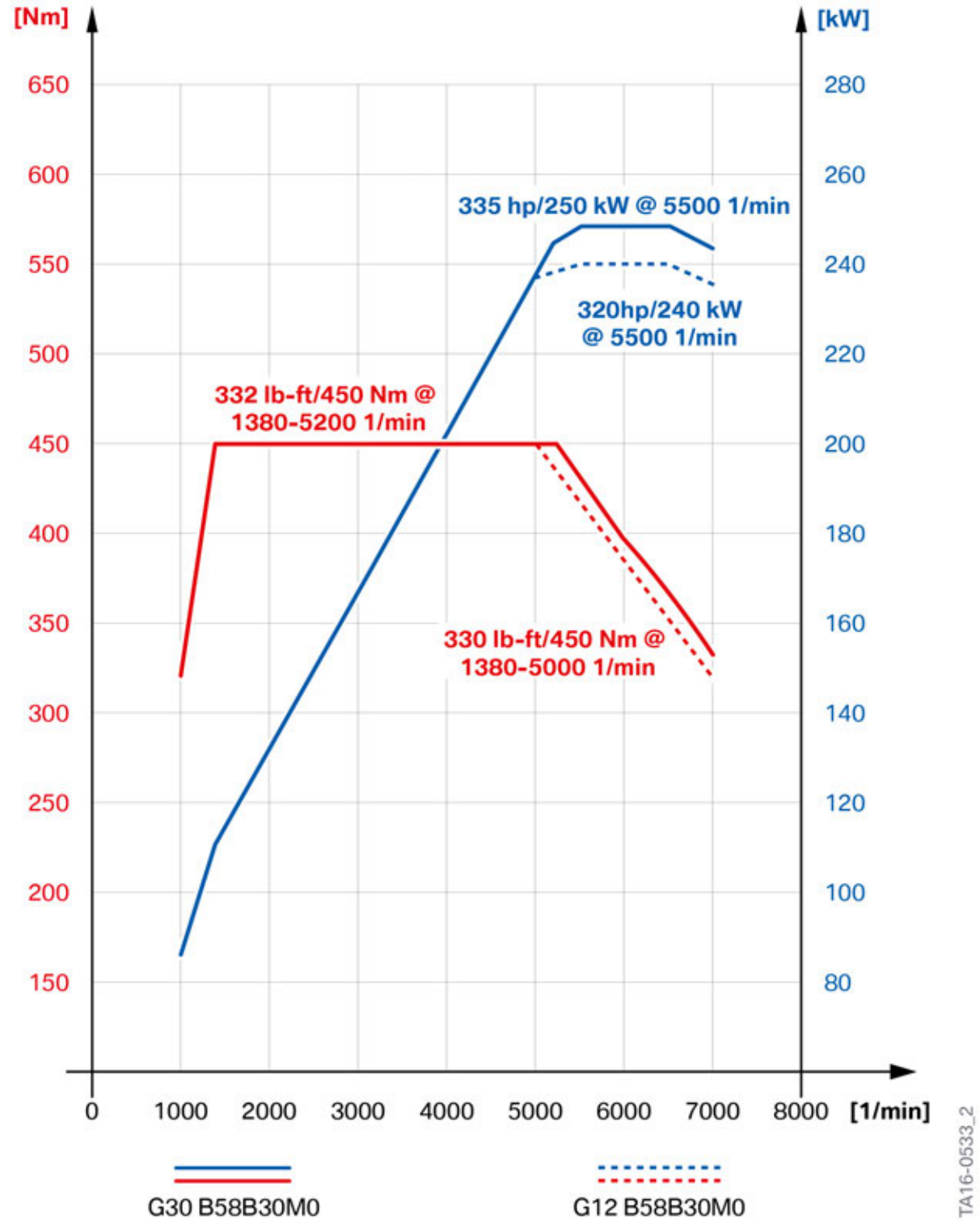
G30 Powertrain
3. Gasoline Engines

3.3.1. Engine highlights B58B30M0

List of the most important special features:

1 Direct rail injection system with 200 bar pressure.
2 Valvetronic 4th generation.
3 Heat management module.
4 Intake air system with integrated charge air cooler.
5 Twin-scroll turbocharger with electrical wastegate valve controller.
6 Exhaust manifold with expansion compensation elements.
7 Characteristic map-controlled oil pump with integrated vacuum pump.
8 8th generation Digital Motor Electronics (DME).

3.3.2. Full load diagram



Full load diagram B58B30M0 engine

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3. Gasoline Engines

3.4. BMW M550i engine technical data

TA15-0832

N63TU2 engine in the G30

Parameters	Unit	N63B44O2
Displacement	cm^3	4395
Cylinder layout	—	V-engine
Number of cylinders	—	8
Firing order	—	1–5–4–8–6–3–7–2
Bore	mm	89
Stroke	mm	88.3
Compression ratio	ε	10.5
Combustion process	—	Turbo-Valvetronic direct injection
Permitted fuel	RONZ95	91–98
Oil quantity	liters	10

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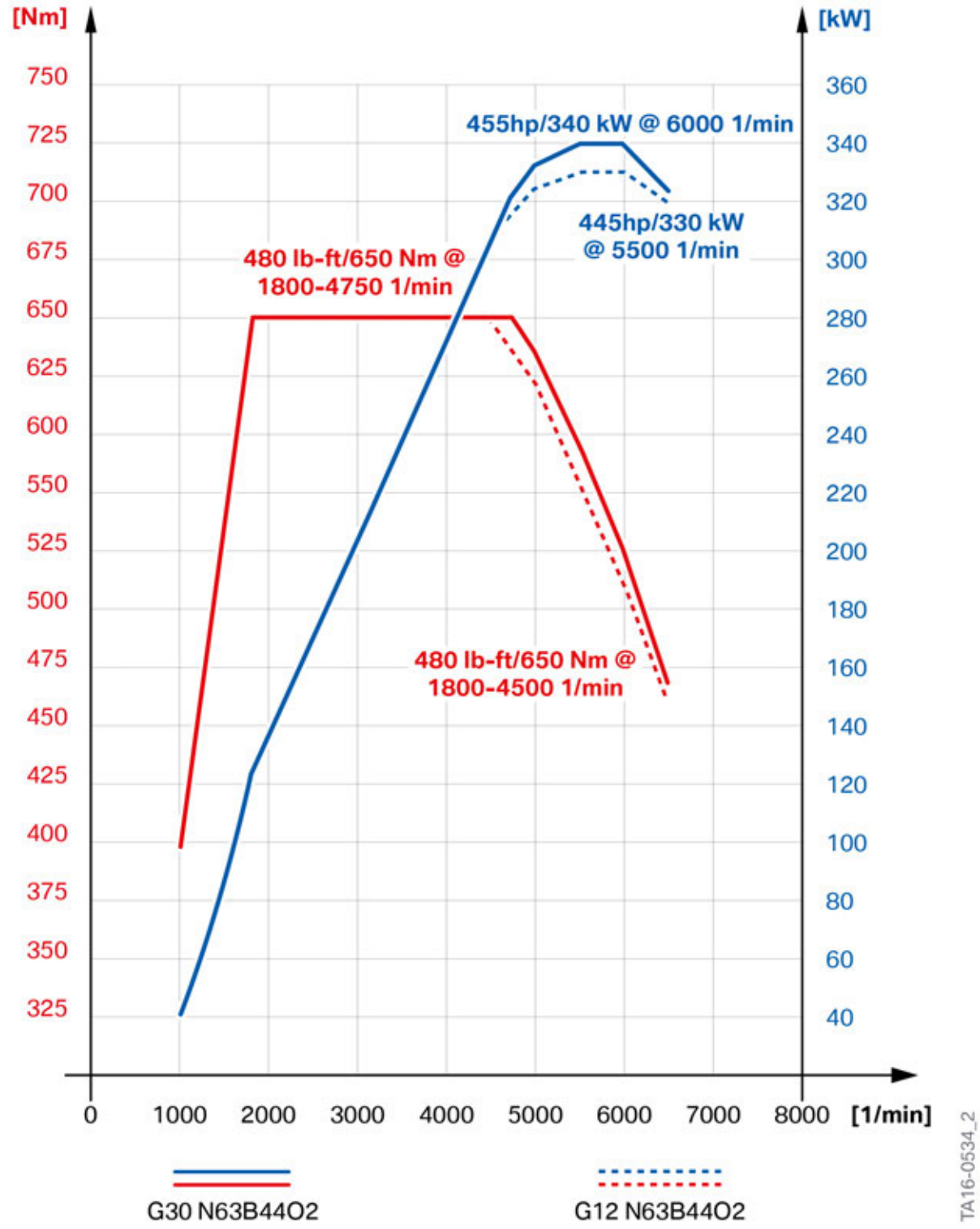
3. Gasoline Engines

3.4.1. Engine highlights N63B44O2

List of the most important special features:

1 Map-controlled oil pump.
2 Engine temperature management Split-Cooling-Combined (SCC).
3 Engine oil/coolant heat exchanger integrated in the v-space.
4 New coolant-cooled 8th generation Digital Motor Electronics (DME).

3.4.2. Full load diagram



Full load diagram N63B44O2 engine

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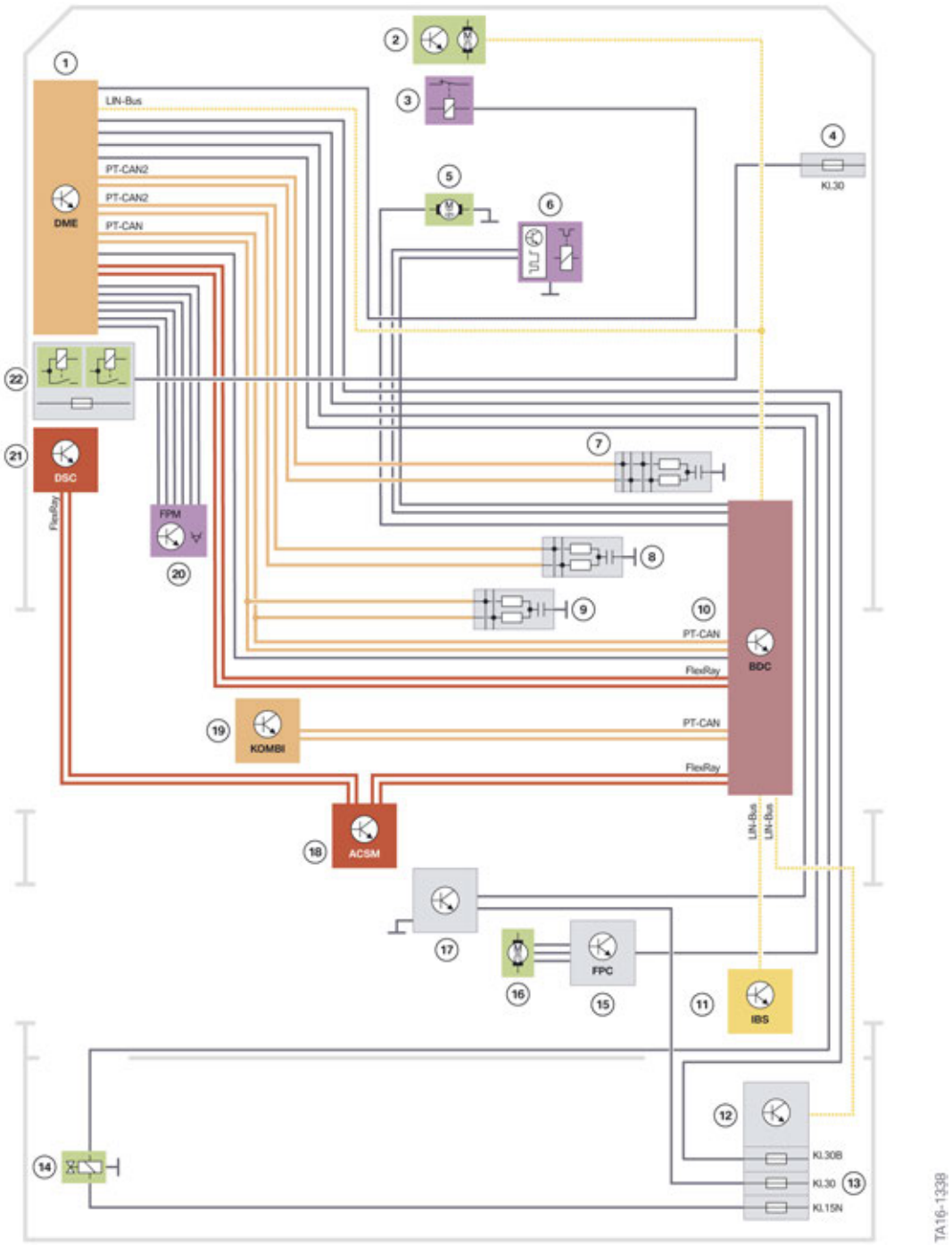
3. Gasoline Engines

3.5. System wiring diagram

3.5.1. B46/B58 Engine



System wiring diagram B68/B58 engine in G30

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3. Gasoline Engines

Index	Explanation
1	Digital Motor Electronics (DME)
2	Electric fan
3	Relay for electric fan
4	Power distribution box, engine compartment
5	Pinion starter
6	Air conditioning compressor
7	CAN terminator 6
8	CAN terminator 5
9	CAN terminator 4
10	Body Domain Controller (BDC)
11	Intelligent Battery Sensor (IBS)
12	LIN interface
13	Rear right power distribution box
14	Electrical exhaust flap
15	Fuel Pump Control (FPC)
16	Electric fuel pump
17	Tank leak diagnosis (Natural Vacuum Leak Detection NVLD)
18	Advanced Crash Safety Module (ACSM)
19	Instrument panel (KOMBI)
20	Accelerator pedal module
21	Dynamic Stability Control (DSC)
22	Integrated supply module

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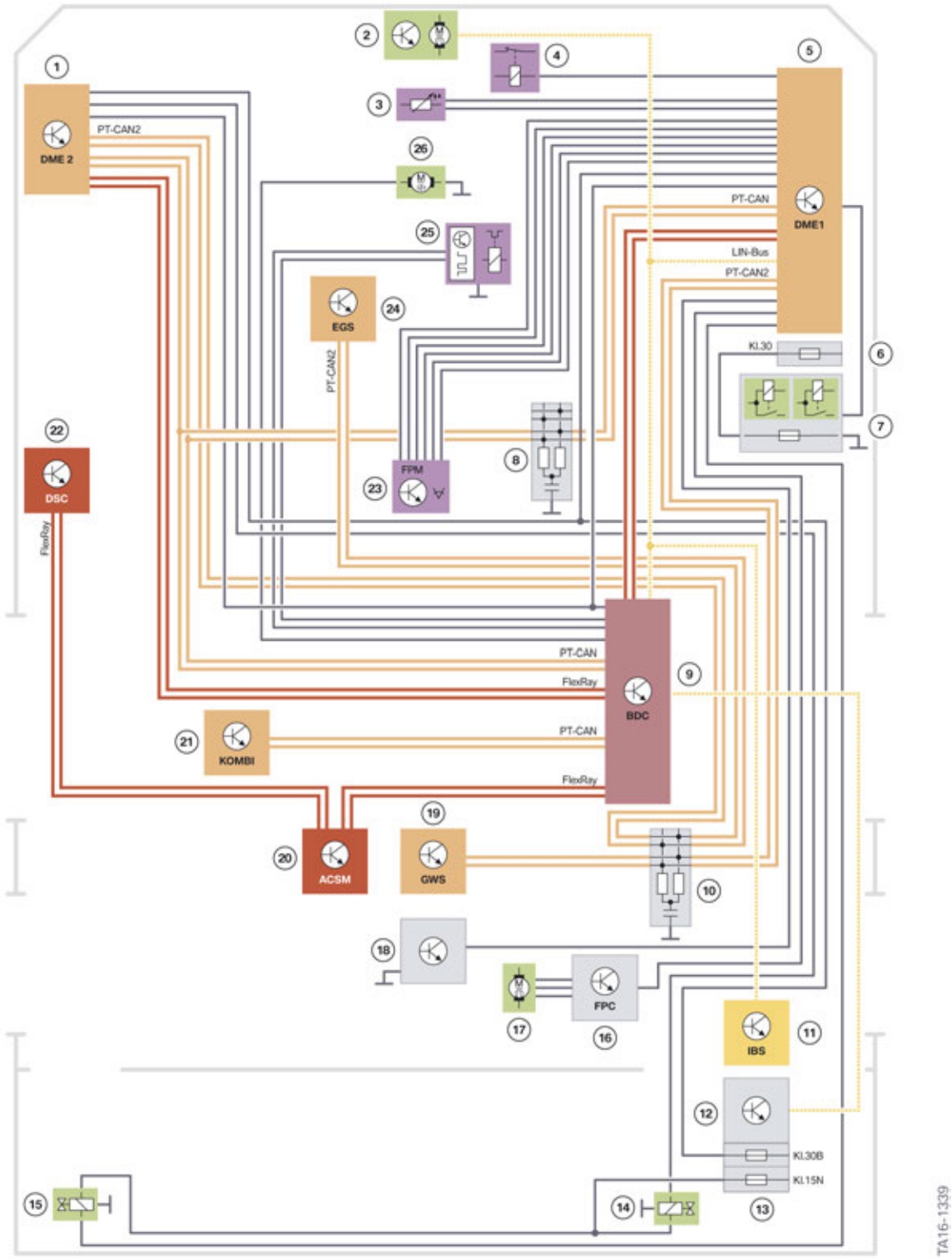
3. Gasoline Engines

3.5.2. N63TU2 Engine



System wiring diagram N63TU2 engine in the G30

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3. Gasoline Engines

Index	Explanation
1	Digital Motor Electronics (DME) 2
2	Electric fan
3	Temperature sensor
4	Relay for electric fan
5	Digital Motor Electronics (DME)1
6	Power distribution box, engine compartment
7	Integrated supply module
8	CAN terminator 4
9	Body Domain Controller (BDC)
10	CAN terminator 5
11	Intelligent Battery Sensor (IBS)
12	LIN interface
13	Rear right power distribution box
14	Electrical exhaust flap, right
15	Electrical exhaust flap, left
16	Fuel Pump Control (FPC)
17	Electric fuel pump
18	Tank leak diagnosis (Natural Vacuum Leak Detection NVLD)
19	Gear selector switch (GWS)
20	Advanced Crash Safety Module (ASCM)
21	Instrument panel (KOMBI)
22	Dynamic Stability Control (DSC)
23	Accelerator pedal module
24	Electronic transmission control (EGS)
25	Air conditioning compressor
26	Pinion starter

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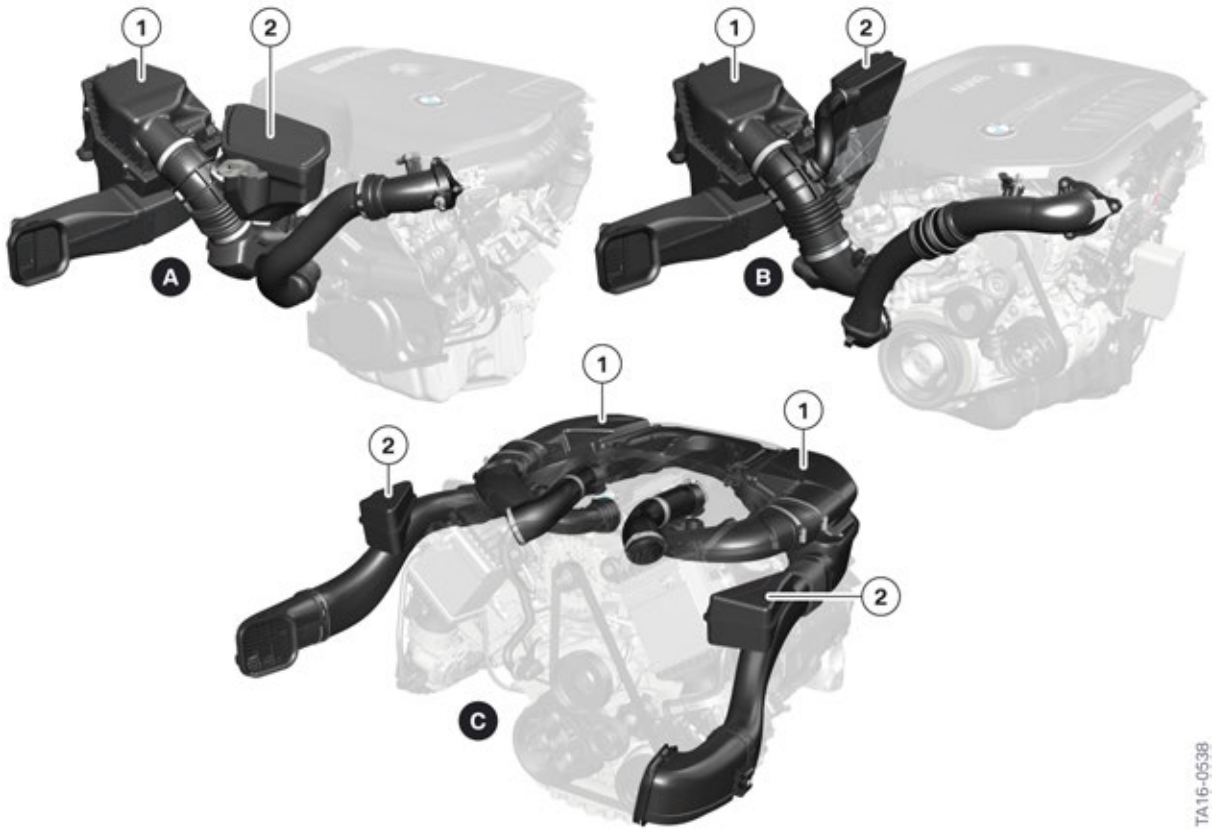
3. Gasoline Engines

3.6. Air intake and exhaust emission systems

3.6.1. Air intake duct

In contrast to the 4- and 6-cylinder gasoline engines, the 8-cylinder gasoline engine has a two-branch intake system. This ensures that the necessary air volume is made available to the engine in every load range.



Gasoline engine air intake duct in the G30

Index	Explanation
A	B46 engine
B	B58 Engine
C	N63TU2 Engine
1	Intake silencer
2	Resonator

Resonator

The pulsating gas exchange noise of the reciprocating engine is damped in the air intake duct. Helmholtz resonators are technical solutions for achieving the maximum air duct cross-section and minimum packaging space volume vehicle-specific damping specifications.

3.6.2. Hot film air mass meter

The intake air mass is filtered in all engines via an 8th generation hot film air mass meter.

The hot film air mass meter has the following four electrical connections:

- Voltage supply (+)
- Ground (-)
- Sensor signal (SENT data protocol)
- Not assigned

A manipulation-proof SENT signal is available for data transfer.