Reference Manual

G80 - G82
COMPLETE VEHICLE

Technical Training

Technical training.
Product information.

G80/G82 Complete Vehicle.

Edited for the U.S. market by:
BMW Group University
Technical Training
ST2108 3/1/2021

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.

Originally Published: October 2020

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.

The information contained in the training course materials is solely intended for participants in this training course conducted by BMW Group Technical Training Centers, or BMW Group Contract Training Facilities.

This training manual or any attached publication is not intended to be a complete and all inclusive source for repair and maintenance data. It is only part of a training information system designed to assure that uniform procedures and information are presented to all participants.

For changes/additions to the technical data, repair procedures, please refer to the current information issued by BMW of North America, LLC, Technical Service Department.

This information is available by accessing TIS at www.bmwcenternet.com.

Additional sources of information

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

- Owner's Manual
- Integrated Service Technical Application
- Aftersales Information Research (AIR)

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1. Introduction.

The epitome of a racing feeling in everyday traffic starts a new lap. Thirty five years after the debut of the first BMW M3, BMW M GmbH presents the latest generation of its high-performance vehicles in the mid-range premium segment.

Together the new BMW M3 Sedan and the new BMW M4 Coupe represent an interpretation of extremely dynamic driving pleasure in everyday traffic characterized by traditional sportsmanship and realized with state-of-the-art technology.

Apart from the independent vehicle concepts of a sedan with space for five passengers and a four-seater Coupe, the drive technology also offers unparalleled scope for individuality.

Both models are powered by an in-line engine with M TwinPower turbo technology and high-speed characteristics, which is available in two power levels.

Unique in the segment is the availability of a 6-speed manual transmission for the high-performance sports cars. Also included in the offer: an 8-speed M Steptronic transmission with Drivelogic, as well as the intelligent all-wheel-drive system M xDrive from summer 2021, as an alternative to the classic rear-wheel drive.

The market introduction of the new high-performance vehicles starts in March 2021.

1.1. Vehicle profiles

G80/G82 Complete Vehicle.

1. Introduction.

1.1.1. Vehicle profile G80 BMW M3

G80, BMW M3

- **Design and aerodynamics:** 4-door high-performance sports sedan. M-specific characteristics in front, side and rear area. Clever aerodynamic design in front, side and rear area and vehicle underbody.
- **Engine/transmission/power transmission:** 3-liter 6-cylinder TVDI engine. Efficient, with even more powerful and more spontaneous linear power development. 3 selectable engine dynamics control programs. Rear wheel drive with 6-speed manual transmission. Electronically controlled M rear-axle differential lock.
- **Engine sound:** Ambitiously sporty in both the lower and upper speed and performance range, as well as an Active Sound Design system which makes the engine sound in the passenger compartment, in conjunction with the original noise, a desired overall experience. The engine sound can be influenced via the setting of the exhaust flaps with a sound button.
- **Steering:** Direct and precise variable M EPS with selectable Servotronic support (in 2 stages). M steering wheel incl. M shift paddles (with automatic transmission) and with 2 freely configurable M buttons.
- **Chassis and suspension/Chassis and suspension dynamics design:** M suspension, selectable driving dynamics program from comfortable to sporty in 3 stages. Optimal driving precision and adapted interplay of steering, suspension and damping action according to the selected program.
  M Dynamic Stability Control integrated M DSCi with 2 braking curves and with M Dynamic Mode MDM instead of Dynamic Traction Control DTC.

- **Seating comfort:** M Sport seats with high-quality upholstery in "fine-grain merino" plain or two-color leather.
- **interior:** M instrument cluster, M Head-Up Display, M-specific decorative strips, M footrests and sill trims.
- **Display and operation:** Additional exclusive M MODE for rapid configuration of the vehicle to the individual customer experience. Two programs are available: "ROAD" and "SPORT".
- **Assistance systems:** Availability of the assistance systems in the same scope as for the G20.

Further information about the assistance systems and their function can be found in the ILM "G20" or in the chapter "Assistance Systems".

1.1.2. Vehicle profile G82 BMW M4 Coupe

- **Design and aerodynamics:** 2-door high-performance sports Coupe. M-specific characteristics in front, side and rear area. Clever aerodynamic design in front, side and rear area and vehicle underbody.
- **Engine/transmission/power transmission:** 3-liter 6-cylinder TVDI engine. Efficient, with even more powerful and more spontaneous linear power development. 3 selectable engine dynamics control programs. Rear wheel drive with 6-speed manual transmission. Electronically controlled M rear-axle differential lock.
- **Engine sound:** Ambitiously sporty in both the lower and upper speed and performance range, as well as an Active Sound Design system which makes the engine sound in the passenger compartment, in conjunction with the original noise, a desired overall experience. The engine sound can be influenced via the setting of the exhaust flaps with a sound button.
- **Steering:** Direct and precise variable M EPS with selectable Servotronic support (in 2 stages). M steering wheel incl. M shift paddle (with automatic transmission) and with 2 freely configurable M buttons.
- **Chassis and suspension/Chassis and suspension dynamics design:** M suspension, selectable driving dynamics program from comfortable to sporty in 3 stages. Optimal driving precision and adapted interplay of steering, suspension and damping action according to the selected program.
  M Dynamic Stability Control integrated M DSCi with 2 braking curves and with M Dynamic Mode MDM instead of Dynamic Traction Control DTC.
- **Seating comfort:** M Sport seats with high-quality upholstery in "fine-grain merino" plain or two-color leather.
- **interior:** M instrument cluster, M Head-Up Display, M-specific decorative strips, M footrests and sill trims.
- **Display and operation:** Additional exclusive M MODE for rapid configuration of the vehicle to the individual customer experience. Two programs are available: "ROAD" and "SPORT".
- **Assistance systems:** Availability of the assistance systems in the same scope as for the G22.

Further information about the assistance systems and their function can be found in the ILM "G20" or in the chapter "Assistance Systems".

G80/G82 Complete Vehicle.

1. Introduction.

1.1.3. Vehicle profile Competition models

G82, BMW M4 Coupe with Competition package

- **Design and aerodynamics:** The mirror caps, diffuser and rear spoiler are painted high-gloss black as standard. The sill panels "skateboards" with the sections in the bumper panel at the front and rear are also painted high-gloss black as standard. The additional model designation on the rear with the "M3/M4 Competition" inscription in black ultimately distinguishes the external appearance of the Competition model from the BMW M3 and BMW M4 Coupe.
- **Engine:** 3-liter 6-cylinder TVDI engine. Efficient, with even more powerful and more spontaneous linear power development. 3 selectable engine dynamics control programs. The Competition engine comes with an increased power output of 503 hp and makes the BMW M3 and BMW M4 as Competition models 0.3 s faster from 0 - 60 mph and with M all-wheel drive 0.6 s faster from 0 - 60 mph.
- **Transmission/Power transmission:** M automatic transmission with Drivelogic combined with rear-wheel drive or M all-wheel drive (from July 2021). M all-wheel drive, fully variable between the front and rear axles, or between the rear and front axles, with the option of selecting a pure standard drive that enables the customer to handle the vehicle in highly dynamic situations. Electronically controlled M rear-axle differential lock.

G80/G82 Complete Vehicle.

1. Introduction.

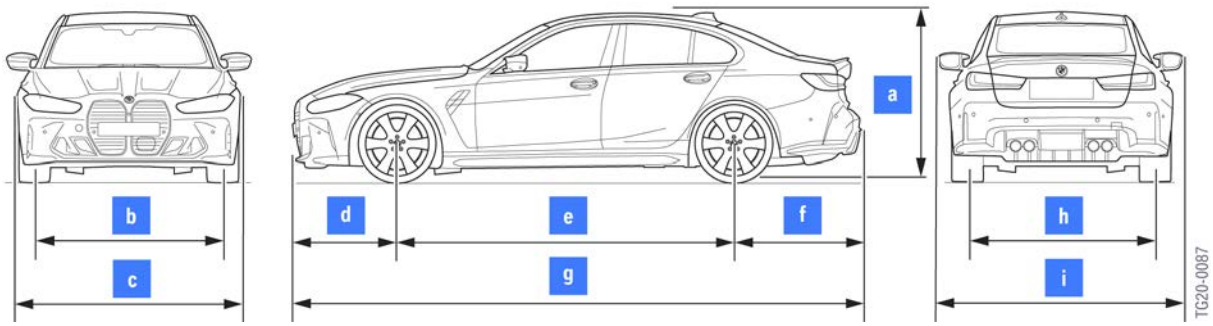
- **Engine sound:** M exhaust system with exhaust tailpipes in black chrome with even more sports-style sound both in the lower and upper rev and power bands, more emotive starting sound and an Active Sound Design system. The engine sound can be influenced via the setting of the exhaust flaps with a sound button.
- **Chassis and suspension/driving dynamics setup:** Adaptive M suspension with selectable driving dynamics programs in 3 stages with the emphasis on even more sportiness. With M all-wheel drive and 19" wheels with 275/35 ZR 19 front tires and 20" wheels and 285/30 ZR 20 rear tires highlight the external appearance of the Competition models.
- **Interior:** Sill trims and a badge on the center console with the "Competition" inscription add the finishing touches to the interior equipment of the Competition model.

G80/G82 Complete Vehicle.

2. Technical data.

2.1. Dimensions

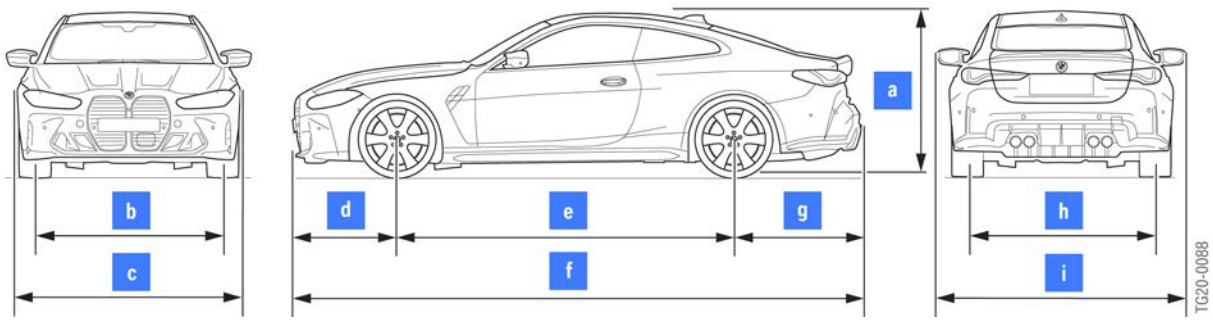
BMW M3



G80, M3 dimensions

Index	Explanation
a	1433 mm
b	1617 mm
c	1903 mm
d	860 mm
e	2857 mm
f	1077 mm
g	4794 mm
h	1605 mm
i	2068 mm

BMW M4 Coupe



G82, M4 dimensions

G80/G82 Complete Vehicle.
2. Technical data.

Index	Explanation
a	1393 mm
b	1617 mm
c	1887 mm
d	860 mm
e	2857 mm
f	4794 mm
g	1077 mm
h	1605 mm
i	2081 mm

2.2. Comparison of technical data

2.2.1. BMW M3

The BMW M3 is used as a rear-wheel drive with manual transmission from production date November 2020.

Designation	Unit	F80 M3	G80 M3
Engine series		S55B30T0	S58B30O0
Engine control		MEVD17.2.G	DME 8.6.S
Transmission type designation		GS6-45BZ 6-Speed MT	GS6-45BZ 6-Speed MT
Length	[mm]	4671	4794
Width without mirror	[mm]	1877	1903
Height	[mm]	1424	1433
Number of seats		5	5
Luggage compartment volume	[ft³]	16.9	16.9
Maximum speed	[mph]	155*/174**	155*/180**
Acceleration 0-60 mp h	[s]	4.1	4.1
Nominal engine power at engine speed	[hp] [rpm]	425 5500-7300	473 6250
Torque at speed	[lb-ft] [rpm]	406 1850-5500	406 2650-6130
Aerodynamics			
c_x (drag coefficient) value)		0.34	0.33-0.34

G80/G82 Complete Vehicle.
2. Technical data.

Designation	Unit	F80 M3	G80 M3
A (area)	[m^2]	2.29	2.34
c_x x A (drag)	[m^2]	0.78	0.77-0.8
Vehicle curb weight			
DIN	[lbs]	3640	3840
Rear axle load section, empty (DIN)	[%]	48.2	47.1
Payload	[lbs]	885	860
Permissible total weight	[lbs]	4630	4870
Approximate fuel tank capacity	[gal]	15.8	15.6

* Electronically limited.

** with M Drivers Package (SA 7ME).

Please always compare values with current sales documents!

2.2.2. BMW M3 Competition

The BMW M3 Competition is used as a rear-wheel drive with automatic transmission from production date November 2020. The BMW M3 Competition with automatic transmission and M all-wheel drive M xDrive is used from production date July 2021.

Designation	Unit	F80 M3 Competition	G80 M3 Competition
Engine series		S55B30T0	S58B30T0
Engine control		MEVD17.2.G	DME 8.6.S
Transmission type designation		GS7D36BG 7-speed M DKG	M8HP76 8-speed M automatic transmission
Length	[mm]	4671	4794
Width without mirror	[mm]	1877	1903
Height	[mm]	1431	1433
Number of seats		5	5
Luggage compartment volume	[ft^3]	16.9	16.9
Maximum speed	[mph]	155*/174**	155*/180**

G80/G82 Complete Vehicle.
2. Technical data.

Designation	Unit	F80 M3 Competition	G80 M3 Competition
Acceleration 0-60 mph	[s]	3.8	3.8 3.5***
Nominal engine power at engine speed	[hp] [rpm]	444 7000	503 6250
Torque at speed	[lb-ft] [rpm]	406 2350-5500	479 2750-5500
Aerodynamics			
c_x (drag coefficient) value)		0.34	0.33-0.34
A (area)	[m^2]	2.29	2.34
c_x x A (drag)	[m^2]	0.78	0.77-0.8
Vehicle curb weight			
DIN	[lbs]	3865	3890
Rear axle load section, empty (DIN)	[%]	47.9	46.9
Payload	[lbs]	885	860
Permissible total weight	[lbs]	4675	4870
Approximate fuel tank capacity	[gal]	15.8	15.6

* Electronically limited.

** with M Drivers Package (SA 7ME).

*** Expected values with M xDrive

Please always compare values with current sales documents!

2.2.3. BMW M4 Coupe

The BMW M4 Coupe is used as a rear-wheel drive with manual transmission from production date November 2020.

Designation	Unit	F82 M4	G82 M4
Engine series		S55B30T0	S58B30T0
Engine control		MEVD17.2.G	DME 8.6.S
Transmission type designation		GS6-45BZ 6-Speed MT	GS6-45BZ 6-Speed MT
Length	[mm]	4671	4794

G80/G82 Complete Vehicle.
2. Technical data.

Designation	Unit	F82 M4	G82 M4
Width without mirror	[mm]	1870	1877
Height	[mm]	1383	1393
Number of seats		4	4
Luggage compartment volume	[ft³]	15.7	15.5
Maximum speed	[mph]	155*/174**	155*/180**
Acceleration 0-60 mph	[s]	4.1	4.1
Nominal engine power at engine speed	[hp] [rpm]	425 6250	473 6250
Torque at speed	[lb-ft] [rpm]	406 2350-5500	406 2650-6130
Aerodynamics			
c_x (drag coefficient) value)		0.34-0.35	0.34
A (area)	[m^2]	2.23	2.29
c_x x A (drag)	[m^2]	0.76	0.78
Vehicle curb weight			
DIN	[lbs]	3625	3830
Rear axle load section, empty (DIN)	[%]	47.7	47.3
Payload	[lbs]	770	770
Permissible total weight	[lbs]	4500	4750
Approximate fuel tank capacity	[gal]	15.8	15.6

* Electronically limited.

** with M Drivers Package (SA 7ME).

Please always compare values with current sales documents!

2.2.4. BMW M4 Coupe Competition

The BMW M4 Coupe Competition is used as a rear-wheel drive with automatic transmission from production date November 2020. The BMW M4 Coupe Competition with automatic transmission and M all-wheel drive M xDrive is used from production date July 2021.

G80/G82 Complete Vehicle.

2. Technical data.

Designation	Unit	F82 M4 Competition	G82 M4 Competition
Engine series		S55B30T0	S58B30T0
Engine control		MEVD17.2.G	DME 8.6.S
Transmission type designation		GS7D36BG 7-speed M DKG	M8HP76 8-speed M automatic transmission
Length	[mm]	4671	4794
Width without mirror	[mm]	1870	1877
Height	[mm]	1392	1393
Number of seats		4	4
Luggage compartment volume	[ft³]	15.7	15.5
Maximum speed	[mph]	155*/174**	155*/180**
Acceleration 0-60 mph	[s]	3.8	3.8 3.5***
Nominal engine power at engine speed	[hp] [rpm]	444 6250	503 6250
Torque at speed	[lb-ft] [rpm]	406 2350-5500	479 2750-5500
Aerodynamics			
c_x (drag coefficient) value)		0.35-0.35	0.34
A (area)	[m^2]	2.23	2.29
c_x x A (drag)	[m^2]	0.78	0.78
Vehicle curb weight			
DIN	[lbs]	3685	3880
Rear axle load section, empty (DIN)	[%]	47.4	46.9
Payload	[lbs]	770	770
Permissible total weight	[lbs]	4545	4750
Approximate fuel tank capacity	[l]	15.8	15.6

* Electronically limited.

** with M Drivers Package (SA 7ME).

*** Expected values with M xDrive

G80/G82 Complete Vehicle.

2. Technical data.

Please always compare values with current sales documents!

G80/G82 Complete Vehicle.

3. Body.

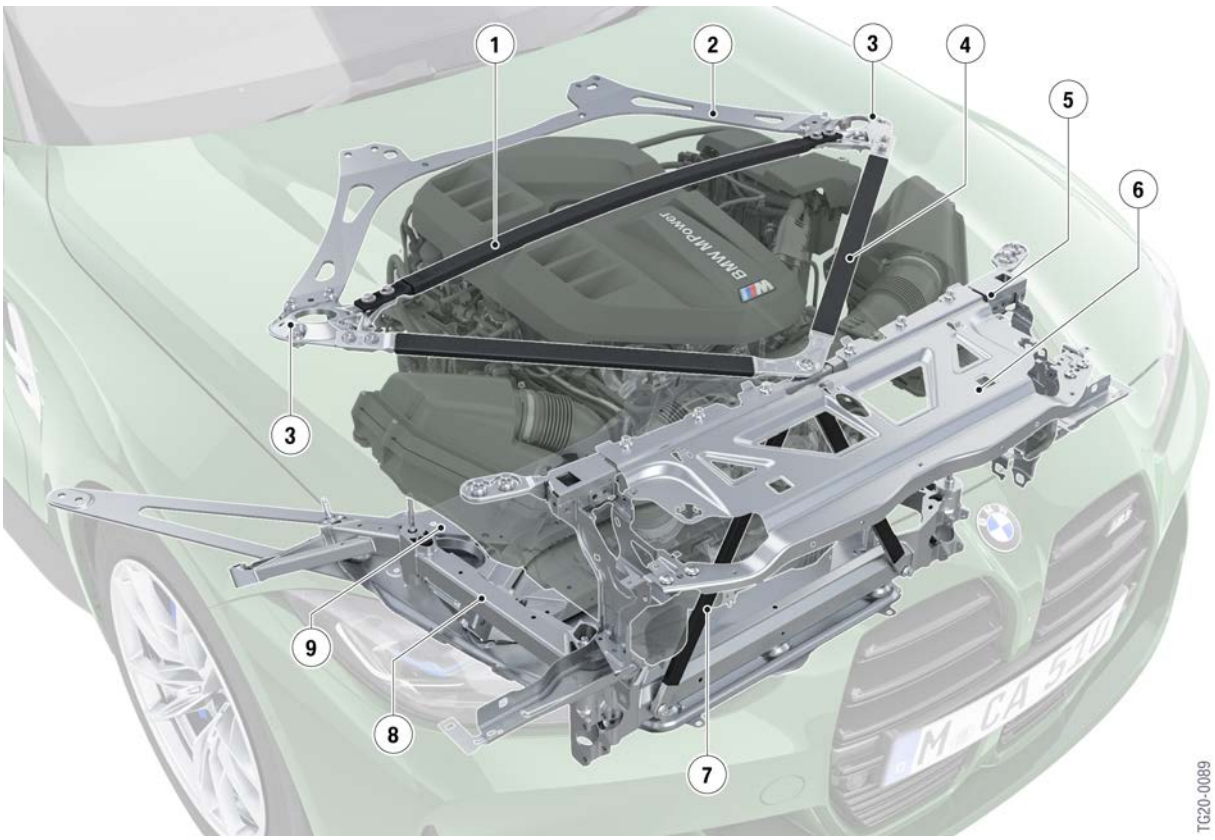
3.1. Rigidity

3.1.1. Chassis and suspension components and rigidity concept

Front end area G80/G82

The following identical measures on the G80 and G82 for connecting the chassis components and increasing the vehicle rigidity have been implemented in the front end area:

- Strut brace bridge made of steel.
- Dome firewall strut made of aluminum.
- Dome rings made from aluminum die casting alloy.
- Front end struts made of steel.
- Cross-member and perforated plate made of steel.
- Aluminum stiffening plate.
- Front axle support with additional connection to the body made of aluminum.
- Vertical struts for connecting the front axle support to the engine compartment strut structure made of steel.



G82, stiffness measures in the front area

G80/G82 Complete Vehicle.

3. Body.

Index	Explanation
1	Strut brace bridge
2	Shock-tower-to-firewall brace
3	Dome rings
4	Front end struts
5	Cross member
6	Perforated plate
7	Vertical struts
8	Front axle support (rear-wheel drive)
9	Stiffening plate

For the disassembly and installation of the strut package of the front end or parts of it, the screwing sequences and the tightening torques must be observed.

For necessary service work the current information and specifications in the documents in the Integrated Service Technical Application (ISTA) must be observed in each case.

All other measures for stiffening the front end are the same as in the G20/G22 production vehicle.

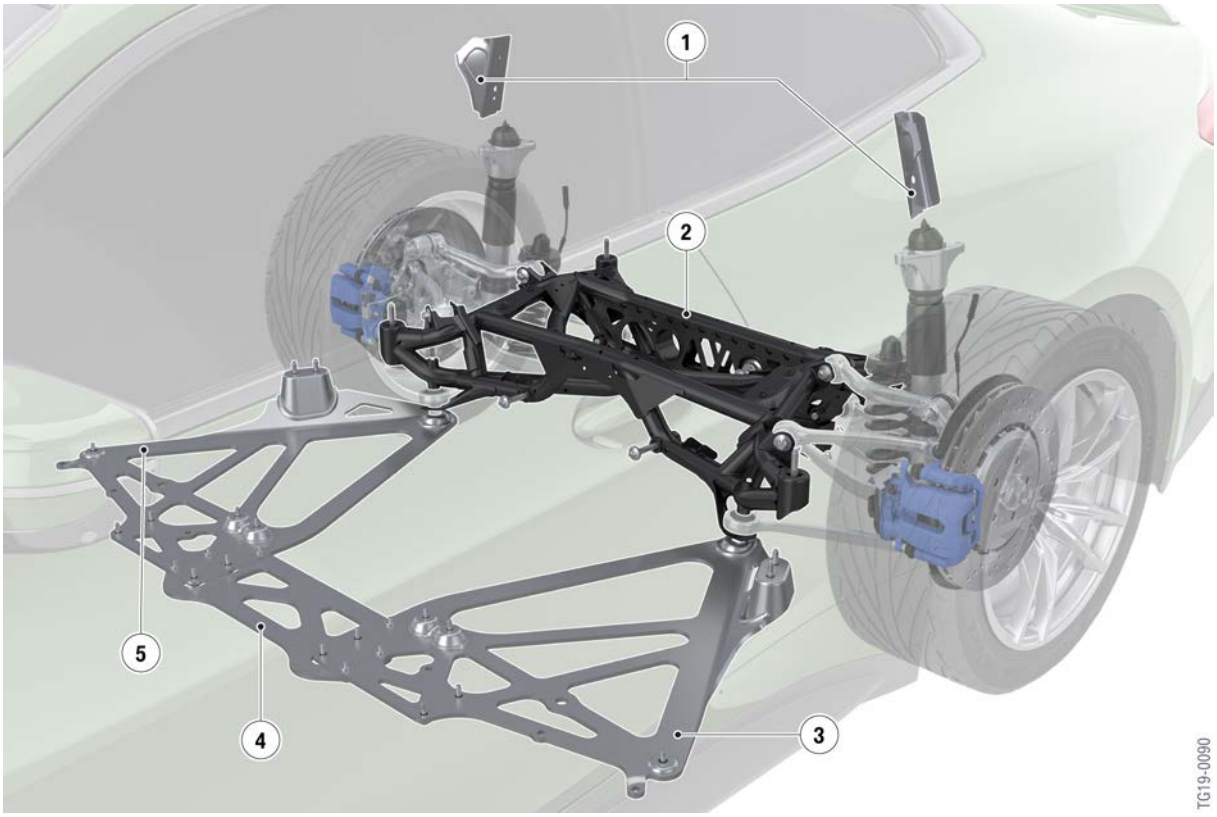
Rear area G80/G82

The following identical measures on the G80 and G82 for connecting the chassis components and increasing the vehicle rigidity have been implemented in the rear area:

- Luggage compartment reinforcement (draw and pressure plate) made of steel.
- Rear axle support screwed to the body made of steel.
- Rear axle stiffening plates made of aluminum with stainless steel inserts at the screw points.
- Tunnel brace made of aluminum with stainless steel inserts at the screw points.

G80/G82 Complete Vehicle.

3. Body.



G82, stiffness measures in the rear area

Index	Explanation
1	Luggage compartment reinforcement
2	Rear axle support
3	Stiffening plate, left
4	Tunnel brace
5	Stiffening plate, right

For the disassembly and installation of the strut package or parts of it at the rear area, the screwing sequences and the tightening torques must be observed.

For necessary service work the current information and specifications in the documents in the Integrated Service Technical Application (ISTA) must be observed in each case.

All other measures for stiffening the rear area are the same as in the G20/G22 production vehicle.

G80/G82 Complete Vehicle.

3. Body.

3.2. Exterior trim

3.2.1. Front

Bumper, front

In the front center sits the strong radiator grill of the BMW 4 Series in a maximum dynamic and reduced interpretation.

Streaks may form with the use of an automatic car wash due to the great height of the strong radiator grill. However, they can be easily removed with suitable cleaning measures.

The up-to-date information and specifications in the documents in AIR (Aftersales Information Research) or TSARA (Technical Support and Research Assistant) must be observed.

The one-piece bumper panel in the M-specific design which is painted in the vehicle color has flaps in black matte on the bottom left and right. An additional front spoiler lip made of rubber in black, for reducing the lift at the front axle, forms the base of the bumper at the front. Due to the necessary air inlets no fog lights are offered. The double-rib kidney bars are inside the BMW M radiator grill, like the radiator grill itself they are in high-gloss black for the G80 and G82 and the BMW M3 or BMW M4 model designation is in chrome. The horizontal alignment of the double-rib kidney bars ensures a fascinating contrast to the vertical BMW M radiator grill. The optional side view camera and the Parking Maneuvering Assistant PMA sensors, as well as the radar sensors, are integrated at the front/side similarly to the G20/G22 production vehicle.

The ornamental grills at the bottom are black. Optionally, radar sensors for the driver assistance systems are installed in the front bumper.

The sill extensions in the bumper, the so-called "skateboards", form the base of the bumper panel.

The large optimized air ducts in the ornamental grills on the left and right and the vertical radiator grill guarantee an optimal supply of cooling air for ensuring suitability on race tracks with regard to drive and brake cooling.

G80/G82 Complete Vehicle.

3. Body.

G82, front view

Front end and air ducts

There is an adapted air duct behind the bumper panel both for the center radiator assembly and for the outer radiators and the brakes.

A holding frame to the side of the horizontal radiator grill on the left and right behind the bumper panel holds the cooling air conduits for the two outer low-temperature coolers in the wheel arches and the brake cooling. At the same time, it includes the Flics in the air curtains, which together with the rotors on the strut covers and the aerodynamics crescent result in the optimization of the drag coefficient.

G80/G82 Complete Vehicle.

3. Body.

G80/G82, Flics

Index	Explanation
1	Flics
2	Rotor
3	Aerodynamics crescent
4	Front lip spoiler

The outside temperature sensor is located in the air curtain on the right in the G80/G82. The previous installation location for the outside temperature sensor in the air ducts for brake system cooling was not possible in the G80/G82 since the measured values were not plausible on account of the greater heat dissipated by the S58 engine and brake system while the vehicle is at a standstill.

The M wheel arch cover at the front with grills for discharging the cooling air from the low-temperature coolers forms the base of the bumper panel at the rear.

The lower bumper support is made of sheet steel and is secured at specific G80/G82 deformation elements. The shaped element in the upper bumper support is adapted to the shape of the G80/G82 bumper panel.

3.2.2. Headlight

The front headlights are carry-over parts from the G22/G23. The adaptive LED headlights are installed as standard. The M-specific bumper panel has been adapted to the position and shape of the headlights on the G80/G82.

G80/G82 Complete Vehicle.

3. Body.

3.2.3. Engine compartment lid

The separate hood on the G80/G82 is, like on the G20/G22, made of aluminum.

The supporting inner structure, as well as the outer skin of the engine compartment lid, are made from aluminum.

The lines of the vertical radiator grill continue in the hood and end at the windscreen. Two beads behind the respective individual radiator grills highlight the distinct design of the hood of the G80/G82.

In order to meet the requirements with regard to pedestrian protection, the hood is equipped with an active pedestrian protection system.

3.2.4. Side view

G80, side view

G82, side view

Exterior mirror and sill

As standard, the M-specific exterior mirrors are heated with integrated additional indicators, have memory and fold-in functions, and the front passenger's side exterior mirror has an Automatic Curb Monitor. The glass for each mirror also contain the warnings for the driver assistance systems. The mirror triangle and mirror cap at the bottom, including the weather strips and shaft covers, are grained as standard.

G80/G82 Complete Vehicle.

3. Body.

The BMW M3 and BMW M4 Coupe exterior mirrors have a prominent design and have been optimized in terms of their aeroacoustic properties.

The door sills in the G80/G82 are distinguished by their widened black sills compared with the G20/G22, which has the effect of a "skateboard" in the G80/G82. The "skateboard" sill area is inspired by motorsport, symbolizes the underbody pulled out from the side and creates the connection to the road. The skateboards create a strong visual connection to the road and are more dynamic.

G80/G82, gill and mirror

With the standard equipment "Ambient Lighting" SA 4UR, in the G80/G82 a staged light carpet by light projection is not used in the entry and exit area on the left and right. The required space for the light projectors is not available in the sill area due to the "skateboards" of the G80/G82.

Front side panel

The front side panels in the G80/G82 are new due to the M-specific design and made of aluminum, they are also new with regard to the tire clearance.

Striking design features include the so-called M side gills and the BMW M3/BMW M4 model designation on the front left and right side panels.

Wheel arch cover

The wheel arch cover and the covers of the steering assemblies are adapted to the new side panel. In addition, the covers of the steering assemblies in the all-wheel drive are different to the vehicle with rear-wheel drive.

Roof

The roof operating unit for the G80/G82 is made from a carbon fiber structure and is connected to the body by bonding. The roofline has an aerodynamic outline in the middle section, thus highlighting the sporting character of the G80/G82.

G80/G82 Complete Vehicle.

3. Body.

The use of a CFRP roof produces a weight saving of 3.3 lbs compared with the standard steel roof on the G20/G22 . The weight saving in the roof area increases the vehicle's agility and dynamics by lowering the center of gravity towards the road.

The production of the CFRP roof is constructed as a multilayer design in wet compression process and is sealed with a layer of clear coat.

If the customer decides in favor of an electrical glass moonroof SA 403 in the G80/G82, the CFRP roof is deleted and a steel roof as in the G20/G22 is installed.

The electrical glass moonroof SA 403 is not offered for the G80/G82 with M Drivers Package 7ME. A pressure resistance of the glass moonroof cannot be guaranteed from 155 mph, therefore it is not used for the G80/G82 M Drivers Package 7ME.

G80, CFRP roof

G80/G82 Complete Vehicle.

3. Body.

Rear side panel

The rear side panels in the G80/G82 are new due to the M-specific design and are made of steel. In addition, they are also new in relation to the accommodation of the M-specific axles and the required tire clearance of the BMW M wheels. Therefore, the side panels are very wide, thus providing extremely brawny wheel arches.

Wheel arch cover

The wheel arch cover has been adapted to the new side panel. To ensure the legally required wheel arch area cover in the rear, in the G80/G82 wheel arch covers made of plastic are installed on the rear side panel, continuing on from the wheel arch extensions. The dimensions of the covers are adapted to the country regulations in each case and therefore vary with the national-market version.

3.2.5. Rear view

A striking design feature is the 4 round exhaust tailpipes.

G80, rear view

G80/G82 Complete Vehicle.

3. Body.

G82, rear view

The rear bumper panel is a BMW M3 and BMW M4 Coupe design and is different in the G80/G82 due to the different styling of the trunk. It is painted in the vehicle color, including the PDC sensors, and includes the vertical rear reflectors at the side, which set the typical M accent at the rear.

The rear view of the BMW M3 with the extended wheel arches creates associations with the distinctive rear wheel section of the first BMW M3 (E30).

The optional radar sensors for the driver assistance systems of the G80/G82 are integrated at the rear/sides, similar to the G20/G22 production vehicle.

The M-specific diffuser has been specifically adapted to the 4 exhaust tailpipes and is painted in the vehicle color. The sill extensions in the bumper, the so-called "skateboards", form the base of the bumper panel.

3.2.6. Rear lights

LED TAIL LIGHTS G80

The tail lights of the BMW M3 are fully implemented in high-quality LED. A striking element is the straight, extensively illuminated tail light bar in the typical BMW L shape. It fits in perfectly with the modern appearance of the rear. The lights are further emphasized by the use of smoked glass, which makes the entire contour appear slim and athletic.

LED TAIL LIGHTS G82

With their slim contour the full LED tail lights highlight the sporty horizontal alignment of the BMW M4 Coupe rear and the position on the road. When active the three-dimensional outer glass appears to glow red. This energetic interpretation of the striking L shape in the form of a large LED light element makes the rear very recognizable as a BMW M4 Coupe. The light extends to the side panel, thus creating a dynamic transition from side and rear sections. In the transparent section of the tail lights, which is darkened by the smoky glass, horizontal outer discs break up the lighting design and set a modern and elegant accent.

3.2.7. Tailgate

The tailgate of the G80/G82 is a standard part adopted from the G20/G22. The tailgate is enhanced with a M-specific Gurney (rear lip spoiler) (BMW M4 in vehicle color). The rear diffuser and the Gurney reduce the rear axle drive, in particular at higher speeds.

A Gurney is an aerodynamic component and functions as a tear-off edge. The Gurney was so-called after a former Formula 1 driver. The Gurney reduces the drive power at the rear axle and thus contributes to the optimization of the driving dynamics.

With Comfort Access SA 322 in conjunction with automatic tailgate operation SA 316, the "Contactless opening and closing of the tailgate" function is not available for the G80/G82 with the optional equipment SA 71C M Carbon exterior package (carbon diffuser).

With the 2nd generation of Comfort Access SA 322, a third aerial is installed in the rear area in the G80/G82. This makes automatic locking and unlocking with Comfort Access 2.0 possible when approaching/walking away from the vehicle across the entire area of the vehicle.

3.2.8. Sound insulation

In order to save weight in the G82 in the course of the lightweight construction potential, the following insulating materials are deleted for the sound insulation for the interior:

- Insulating material for the sealing of the C-pillar over the wheel arch, rear left and right.
- Insulating material for sound insulation of A-pillar at bottom to door wiring harness, left and right.
- Insulating material for sound insulation of A-pillar in the middle in the area above the cowl panel, left and right.
- Insulating material for sound insulation of A-pillar in the middle in the area below the cowl panel, left and right.
- Insulating material for sound insulation of A-pillar to the sill transition, bottom left.

Compared to the production vehicle G22, there are noticeable losses of comfort for the customer in the area of the interior noises due to the design with the deletion of the sound insulation in the G82.

3.2.9. Underbody, thermal protection and cooling

G80/G82 Complete Vehicle.

3. Body.

Underbody

The complete underbody is fully panelled as part of the aerodynamic concept of the G80/G82 in order to reduce and uniformly distribute the lift at the front and rear axles. This highlights and optimizes the driving dynamics concept, particularly at higher speeds. The underbody panelling was adapted in terms of the cooling and flow around and through the drive components and chassis and suspension components, without compromising the aerodynamics.

Underbody panelling

New underbody panelling:

- The specific engine compartment shielding in the middle. It includes in the center the air duct of the horizontal engine oil cooler and optimizes its flow.
- Specific cover of the steering assemblies in the all-wheel drive to the vehicle with rear-wheel drive, left and right.
- Two-part wheel arch covers, left and right front
- Thrust arm covers, left and right, with rotors
- Undershields, center left and right
- Undershields, fuel tank, left and right
- One-part wheel arch covers, rear left and right
- Rear diffuser.

Heat shield:

- Heat shield, engine mount, right
- Heat shield, engine mount for transition to firewall
- Heat shield for the M Electronic Power Steering (M EPS)
- Heat shield at the side to the left of the automatic transmission
- Heat shield at the side to the right of the automatic transmission
- Heat shield of the tunnel
- Heat shield above the gasoline particulate filter to the tank
- Heat shield of the luggage compartment
- Heat shield of the rear silencer, front and rear
- Heat shield of the rear silencer, left and right.

Wheel rim design, standard equipment

Forged 18" M light-alloy wheels are used as standard at the front and 19" M light-alloy wheels are used as standard at the rear. Mixed tires with the sizes 275/40 ZR18 at the front and 285/35 ZR19 at the rear are used.

G80/G82, wheel rim design, standard equipment

Index	Explanation
1	18"/19" M wheel 824M

Wheel rim design, optional equipment

The forged M light-alloy wheels with 19" at the front, 20" at the rear with mixed tires in the size 275/35 ZR19 at the front and 285/30 ZR20 at the rear can also be ordered as optional equipment. For more information please see the chapter "Wheels/Tires".

G80/G82, wheel rim design, optional equipment

Index	Explanation
1	19"/20" M wheel 825M Jet Black Bi-color
2	19"/20" M wheel 825M Orbit Grey Matte
3	19"/20" M wheel 826M Jet Black Bi-color
4	19"/20" M wheel 826M Jet Black

G80/G82 Complete Vehicle.

3. Body.

3.3. Interior equipment

3.3.1. Driving area and steering wheel

M driving area

G80/G82, M vehicle cockpit (example of BMW M4)

M leather steering wheel

The M leather steering wheel with MFL is built on a magnesium skeleton and is based on the steering wheel used with the F90 M5. Above the thumb rests are the M shift paddles with M gearshift logic: downshift on the left, upshift on the right.

The steering wheel has increased in its outer diameter to 380 mm compared with the G20/G22. The steering wheel rim is reinforced and ergonomically optimized from a round to an oval cross-section, improving the driver's grip.

Shift paddle (with automatic transmission) left **"-"** downshift, right **"+"** upshift.

The colored M stitching constitutes another difference from the production steering wheels. The M leather steering wheel in the double-spoke design with a stainless steel center trim and with M inscription is black leather.

The vibration element for lane departure warning and lane change warning is integrated in the steering wheel.

There are 2 red M buttons mounted on top of the multifunction pad because the multifunction button clusters for the driver assistance systems remain on the steering wheel as on the G20/G22. For more details, please see the chapter "M menu".

G80/G82, M leather steering wheel (example of BMW M4)

With the optional equipment M carbon interior trims SA 4MC, the steering wheel decorative panels and the shift paddles in conjunction with the automatic transmission are designed in carbon.

3.3.2. Seats

M sports seats

The fully electric M sport seats are standard equipment and are carried over from the F97/F98.

These are fully electric sports seat with integrated side airbag and a seat belt buckle pretensioner. The seats are operated by means of a control switch on each seat. The 3 memory functions for the driver's seat can be called up via the 3 buttons in the seat panel. The control unit is installed at the bottom of the seat. To increase safety, the crash-active head restraints are installed as standard.

M seat features (driver and front passenger):

- Fine-grain Merino leather with perforated 3D stitching, one-color or two-color
- Heated seats
- Electrically adjustable seat length, height, tilt and backrest angle
- Electric headrest height adjustment
- Pneumatic lumbar support
- Pneumatic backrest width adjustment

- Manual seat depth adjustment
- Illuminated M logo in the head restraint
- In the "Parking" state the head restraint travels downwards fully into the rest state.

Optional equipment for the M sports seat

- Active seat ventilation as optional equipment SA 453 for G80 and G82
- Memory function for the driver's seat

The following additional changes have been made in the area of the M sport seats for the G80/G82:

- The G80 has active seat ventilation like the G82 (in contrast: No seat ventilation is offered for the G20).
- In order to allow the "Park" status of the head restraints on both front seats, the G80 also has a front passenger seat module SMBF high on the passenger's side.

M CFRP bucket seat

A M CFRP bucket seat can be ordered as optional equipment for the G80/G82. The M CFRP bucket seat has a weight advantage of 19.8 lbs compared with the M sport seat.

M CFRP bucket seat features (driver and front passenger):

- Fine-grain Merino leather
- Heated seats
- Electrically adjustable seat length, height, tilt and backrest angle
- Pneumatic backrest width adjustment
- Illuminated M logo in the head restraint
- Memory function as optional equipment for the driver's seat.

G80/G82 Complete Vehicle.

3. Body.

G80/G82, M CFRP bucket seat

Index	Explanation
1	View from front
2	View from rear

The M CFRP bucket seat offers the following customer benefits:

- Combination of properties of a full bucket seat with the functionality of a M sport seat.
- Distinctive racing seat contour with lightweight construction openings in backrest and side bolsters, as well as functional belt guides for six-point safety belts.
- Bucket seat character with ideal basic contour of seat for optimal long-distance comfort.
- Improved side support thanks to design of the side contact surfaces in black Alcantara (regardless of the selected upholstery color).
- Functional, supporting CFRP structure with visible carbon areas, also complete backrest and center section of seat surface.
- Fully electric adjustment of seat height, seat tilt and backrest tilt including memory for driver's side.
- Option to remove the headrest to create more room for driving with helmet on the race track.

Rear seats

The full-foam seat in 3-seater version for the G80 and 2-seater version for the G82 with armrest and seat division is adopted from the G20/G22. The split ratio is 40/20/40.

A cupholder in the center armrest is not offered in the G80/G82.

Optional equipment for the rear seat

- Heated seats
- Remote backrest unlocking from the luggage compartment

3.3.3. Seat belts

The seat belts of the G80/G82 with Competition package SA 7MA have contrast stitching in the BMW M colors as standard.

A seat belt extender is not offered in the G82 compared with the G22.

3.3.4. Doors and strips

Doors

Upper door trims (shoulders) in “black soft nappa" leather with contrast stitching.

M decorative strips

The following trims are offered in the G80/G82:

- High-gloss black
- Aluminum Tetragon
- Carbon fiber.

With the optional equipment M carbon interior trims SA 4MC, the decorative trims of the center console, including the lid for the storage compartment, as well as the decorative strip of the instrument panel on the passenger's side, are designed in carbon fiber.

Sill trims, footrest and compact spare wheel

- Sill trims with M lettering
- Competition package SA 7MA with illuminated "Competition" lettering
- M footrest (LHD only)
- An emergency spare wheel is not offered for the G80/G82. A Mobility Set is included with the vehicle as standard.

G80/G82 Complete Vehicle.

4. Drive.

4.1. S58 engine

The S58 engine is described in a separate Reference Manual.

TA20-0314

G80/G82, S58 engine

In this reference manual only the changes to the S58 engine in the G80/G82 to the S58 engine in the F97/F98 are described.

4.2. Power and torque graph

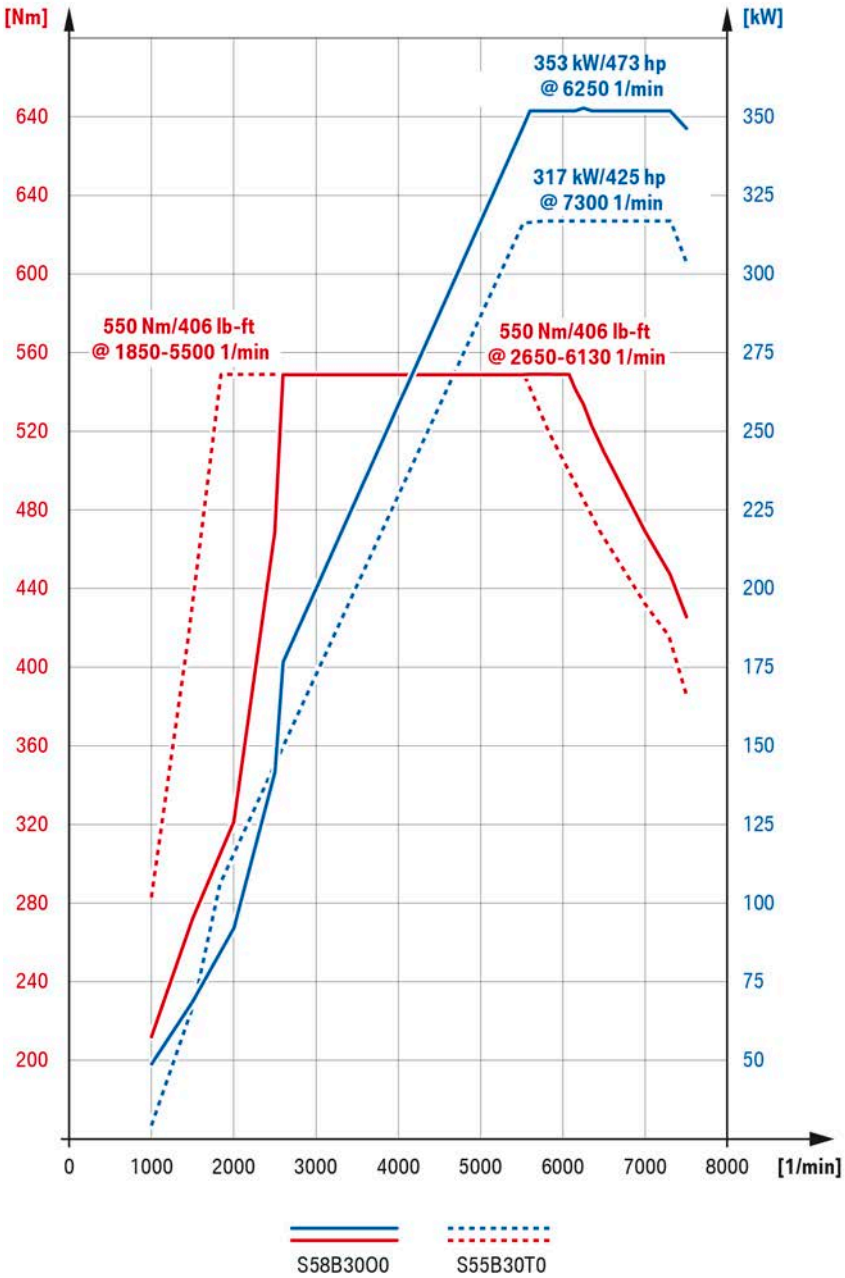
In the G80/G82 two engines are used, each of which have a separate engine identification:

- The S58B30O0 engine is used in the base model of the G80/G82 with manual transmission and develops a power output of 473 hp and a torque of 406 lb-ft.
- The S58B30T0 engine is used in the Competition model of the G80/G82 with automatic transmission and develops a power output of 503 hp and a torque of 479 lb-ft.

For the G80/G82 the performance variants are controlled via the difference of the engine identifications.

G80/G82 Complete Vehicle.

4. Drive.



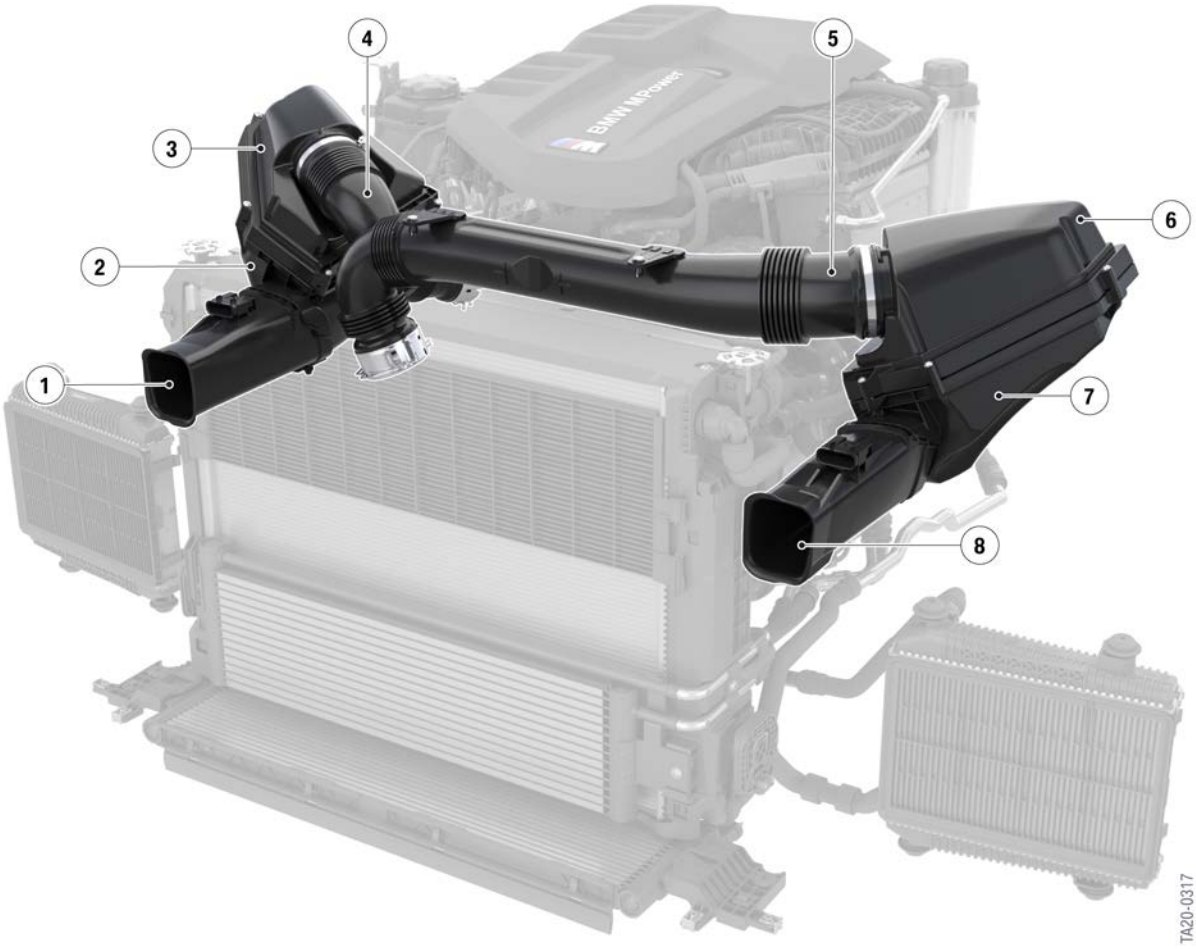
G80/G82, S58B30O0 engine, performance diagram

4.3. Air intake duct

The air duct of the S58 engine was adapted to the installation position of the G80/G82. The air duct has been optimized for minimum loss of pressure in order to achieve the level despite the increased air flow rates in contrast to the F80/F82 and F83. This is also assisted by the deletion of a hot film air mass meter, as with the S58 engine in the F97/F98. The two intake silencers in the air intake duct contain large air filter inserts and an additional HC fleece in the upper parts of the intake silencers for the US equipment specifications.

G80/G82 Complete Vehicle.

4. Drive.



G80/G82, air intake duct

Index	Explanation
1	Unfiltered air inlet, cylinder bank 2
2	Intake silencer, cylinder bank 2
3	Lid of intake silencer, cylinder bank 2 (with HC fleece for US equipment specifications)
4	Clean air line, cylinder bank 2
5	Clean air line, cylinder bank 1
6	Lid of intake silencer, cylinder bank 1 (with HC fleece for US equipment specifications)
7	Intake silencer, cylinder bank 1
8	Unfiltered air inlet, cylinder bank 1

The intake of the untreated air is realized in the G80/G82 in the area behind the headlights, compared with the intake upstream from the radiator in the F80/F82 and F83. This gives the G80/G82 the opportunity to meet the requirements of a water crossing despite the absence of an air flap control and thus ensure increased safety of the fording ability.

G80/G82 Complete Vehicle.
4. Drive.

4.4. Crankshaft

The crankshaft drive has been optimized to the specific requirements for torque, output and rotational speed. For improved response characteristics of the engine, a new weight-optimized lightweight construction crankshaft is used for the first time in the S58 engine in the G80/G82.

4.5. Engine mount

The right engine mount of the S58 engine in the G80/G82 is more rigid than the left engine mount. The torque increase of 36 lb-ft in the G80/G82 compared with the F97/F98 results in better support of the engine torque at the front axle support. This reduces force applications by the drive system during the build-up of the torque by the S58 engine from the rest of the drivetrain of the vehicle.

4.6. Oil pump

For the S58 engine, like for the S63TU4 engine, a so-called external gear pump with integrated suction pump is used. This combination is more compact at a higher delivery rate than the volume-flow-controlled pendulum-slide pump for the S55 engine.

Please note the following information due to the design of the external gear pump for the S58 engine and in the S63B44T4 engine:

At low outside temperatures and with the low viscosity of the engine oil, increased operating noises of the oil pump may occur. These increased operating noises at low outside temperatures are due to the design with the concept of the oil pump as an external gear pump and do not represent a malfunction.

The up-to-date information and specifications in the documents in AIR (Aftersales Information Research) or TSARA (Technical Support and Research Assistant) must be observed.

Further information about the S58 engine and the S63 engine can be found in the reference manuals "ST1926 S58 Engine" and "ST1916 S63TU4 Engine".

4.7. Oil sump

Depending on the drive concept, for the S58 engine in the G80/G82 an engine oil sump for all-wheel drive, with the apertures for the front drive shaft or an engine oil sump for rear-wheel drive is installed.

G80/G82 Complete Vehicle.
4. Drive.

4.8. Exhaust system

4.8.1. Overview of available exhaust systems

Standard exhaust system	ECE Europe version	US version
Upstream catalytic converter	●	●
Underbody catalytic converter	●	●
Petrol particulate filter	●	Not used in US market
Front oxygen sensor	●	●
Monitoring oxygen sensor	●	●
Differential pressure sensor, gasoline particulate filter	●	Not used in US market
Temperature sensor upstream of gasoline particulate filter		Not used in US market
Temperature sensor downstream of gasoline particulate filter		Not used in US market
Exhaust flap	●	●
Chrome-plated tailpipe trims	●	●
Continuous exhaust flap	●	●
Competition model		
Black chrome-plated tailpipe trim	●	●

4.8.2. Catalytic converter

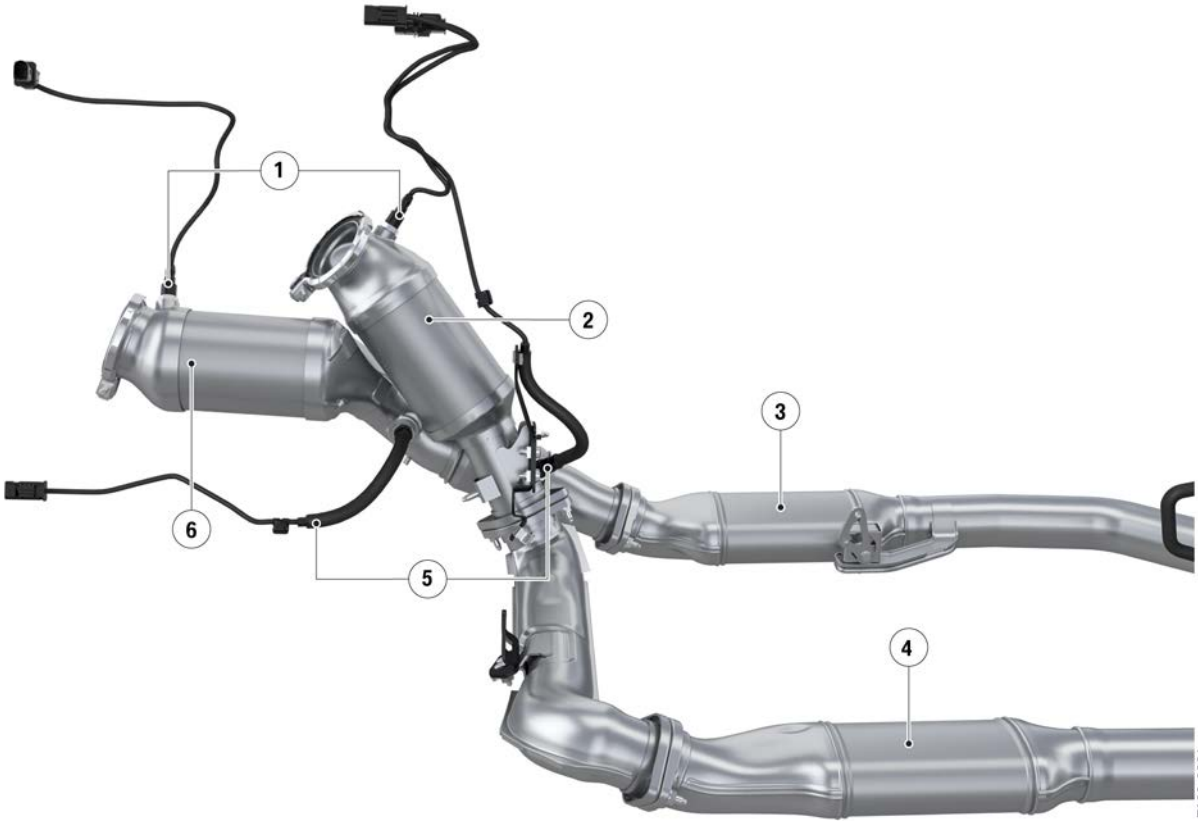
The S58 engine in the G80/G82 has 2 catalytic converters, 1 catalytic converter near engine, each with 2 ceramic monoliths, and 1 underbody catalytic converter with metal monolith, per cylinder bank.

The routing of the exhaust system has been modified at the underbody. Unlike other vehicle models with 6-cylinder engine, the exhaust system for the G80/G82 is not directed past the transmission with two exhaust pipes on the right, but is directed past the transmission in a Y-shape on the left and right. This allows more installation space for the two larger underbody catalytic converters.

In order to keep the exhaust gas pressure for the S58 engine as low as possible, the largest possible pipe diameter has been selected; this makes it possible to ensure the highest level of efficiency for the two single-scroll exhaust turbochargers.

G80/G82 Complete Vehicle.

4. Drive.



G80/G82, catalytic converters

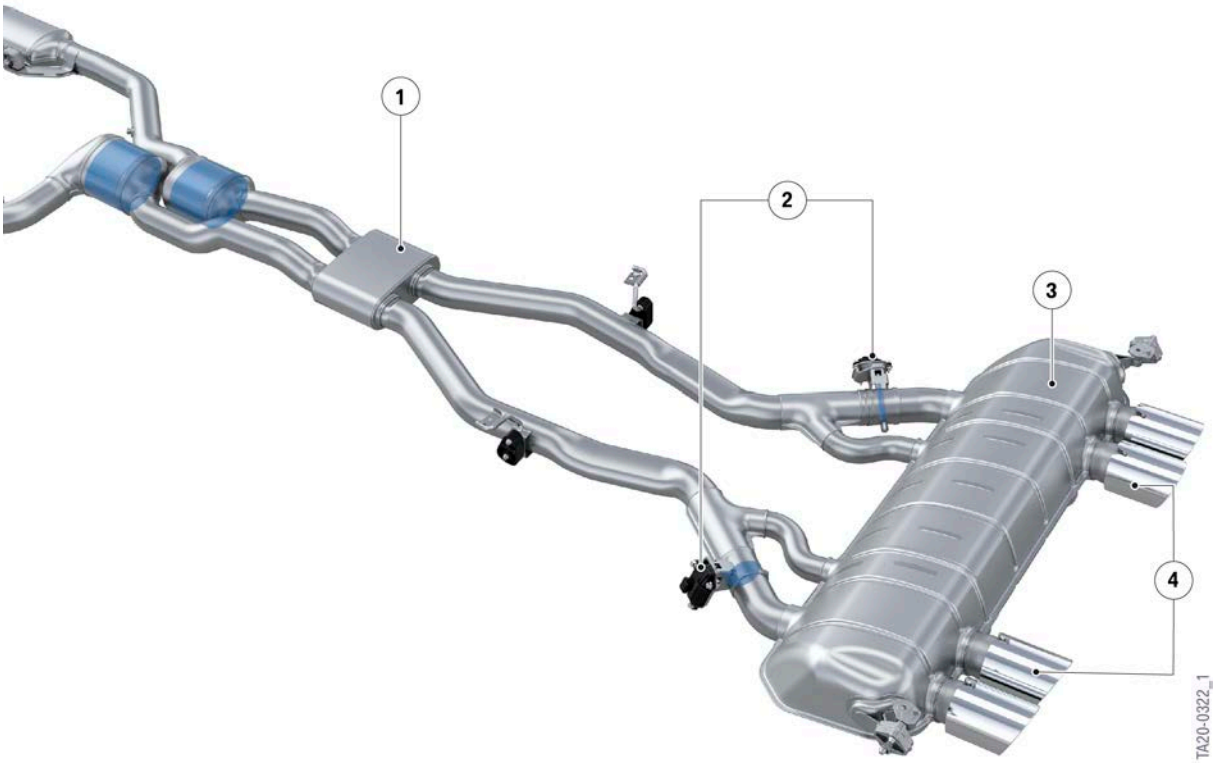
Index	Explanation
1	Lambda oxygen sensor LSU 5.2
2	Catalytic converter near engine, bank 2
3	Underfloor catalytic converter, bank 1
4	Underfloor catalytic converter, bank 2
5	Monitoring oxygen sensor LSF Xfour
6	Catalytic converter near engine, bank 1

4.8.3. Exhaust system

- M-specific, emotive startup sound on engine starting
- Sporty and unmistakable feedback of the exhaust sound to the vehicle occupants.

G80/G82 Complete Vehicle.

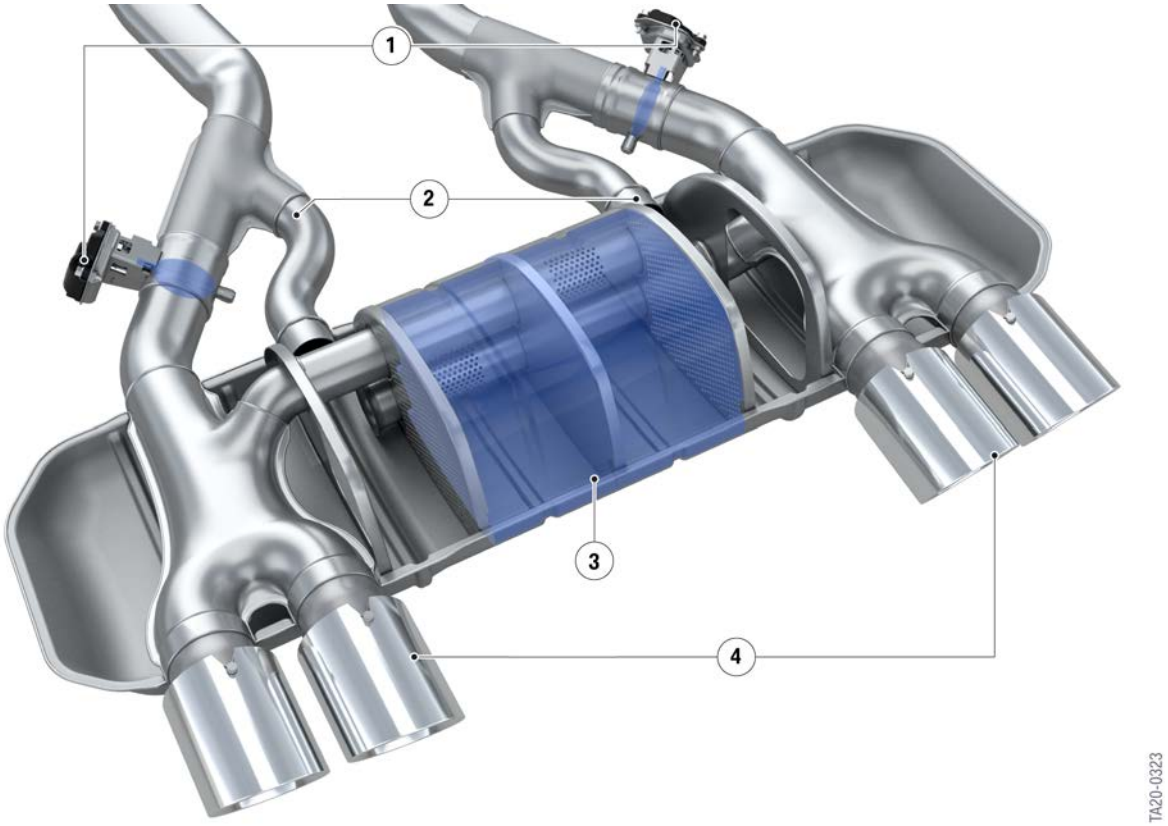
4. Drive.



G80/G82, exhaust system

Index	Explanation
1	Center silencer
2	Electrical exhaust flaps controller
3	Rear silencer
4	Twin tailpipe

The production exhaust system of the G80/G82 features 100 mm diameter chrome-plated tailpipe trims as a visual identifying feature.



G80/G82, rear silencer

Index	Explanation
1	Electrical exhaust flaps controller
2	Bypass pipe
3	Absorption silencer
4	Twin tailpipe

4.8.4. Electrically controlled exhaust flaps

Electrically controlled exhaust flap(s)

The exhaust flap is integrated into the rear silencer in the outer exhaust tailpipes. The exhaust flap is operated by an axially arranged electric motor with integrated gears and electronics. The electrical controller for the exhaust flap has the following connections:

- Voltage supply (+)
- Ground (-)
- Actuating wire (signal line)

The exhaust flaps furthermore help to suppress frequencies that are perceived as unpleasant and thereby improve driving comfort. At high engine speeds and high engine loads, the exhaust gas counterpressure can be reduced by opening the exhaust flap.

The exhaust flap is activated (using pulse width modulation) by the Digital Motor Electronics (DME). The input variables are:

- Engine speed
- Engine load
- Driving speed

Electrical exhaust flap	S58 engine
Installation location	right and left
PWM signal open	10% duty cycle
PWM signal closed	90% duty cycle

The exhaust flaps of the exhaust system can achieve intermediate settings. Therefore, it is possible for the exhaust flaps to be continuously variably adjusted to any position.

The exhaust flaps are actuated in accordance with demand and can be set via the function of the SETUP button in the central information display (CID) to **"EFFICIENT"**, **"SPORT"** and **"SPORT+"**.

The position of the exhaust flaps can additionally be influenced by means of the sound button in the center console switch cluster. Because no default value is stored in the "EFFICIENT" engine dynamics control for the engine start sound that would lower the noise level, it is possible that this would have an unfavorable effect on the sound produced by the vehicle in residential areas. For this reason, the exhaust flaps can be influenced and closed independently of the engine dynamics control setting to EFFICIENT, SPORT or SPORT+ via the sound button. By pressing the sound button, the sound produced can quickly be changed to a quieter exhaust sound without influencing the engine dynamics control settings.

The sound button is connected with the Body Domain Controller BDC via a LIN bus.

4.9. Cooling

4.9.1. System overview

The engine and charge air cooling both have separate cooling circuits.

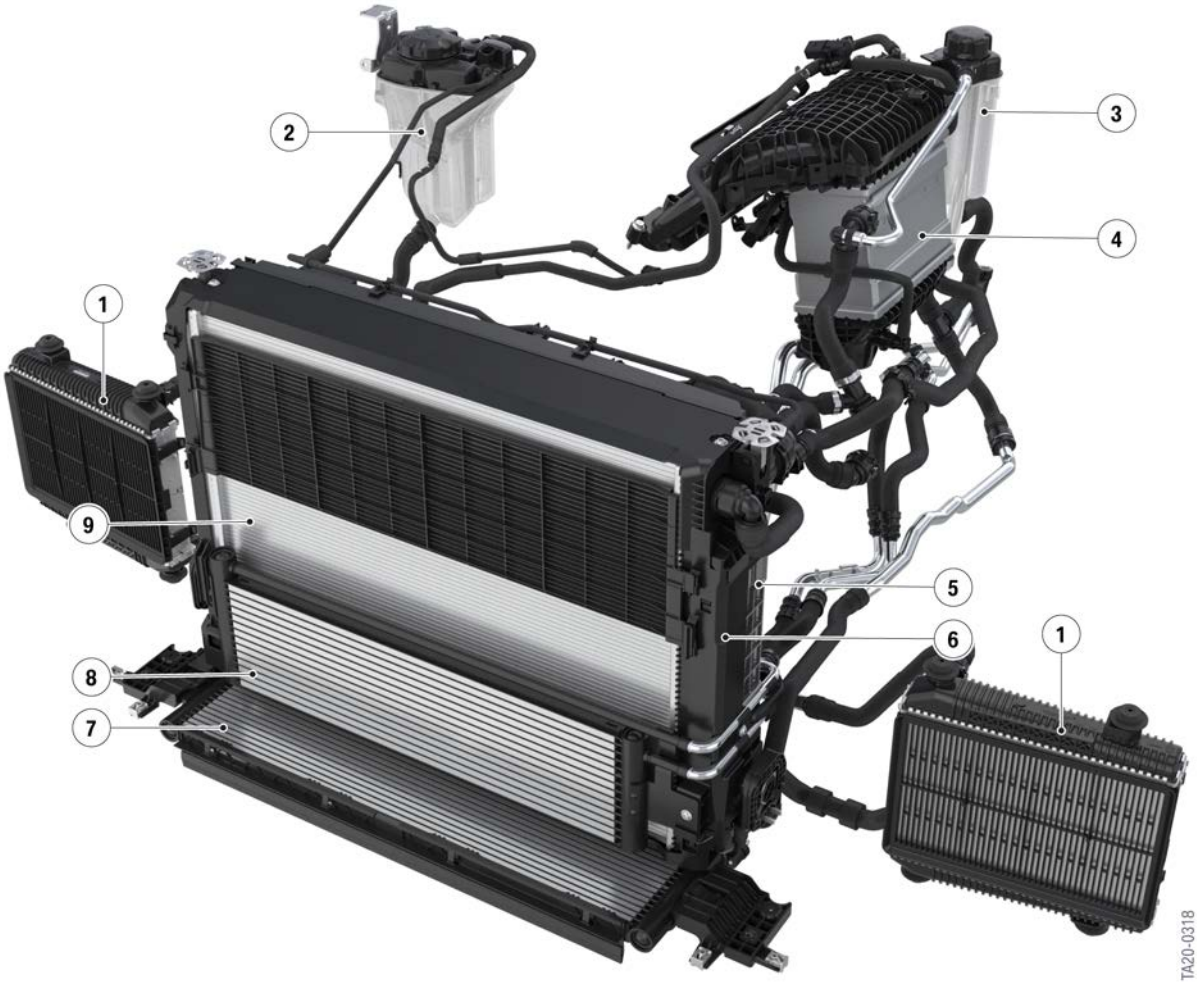
Differences in cooling between G80/G82 and F97/F98:

- Omission of the external low-temperature charge air cooler on the right.
- Additional external radiator on the right of engine.
- All coolant radiators are protected by a stone chip protective grid made of plastic.

G80/G82 Complete Vehicle.

4. Drive.

In order to ensure the cooling power of the cooling system in the S58 engine even in extreme race track applications, the external low-temperature charge air cooler on the right is deleted. An additional external radiator is installed in its place.



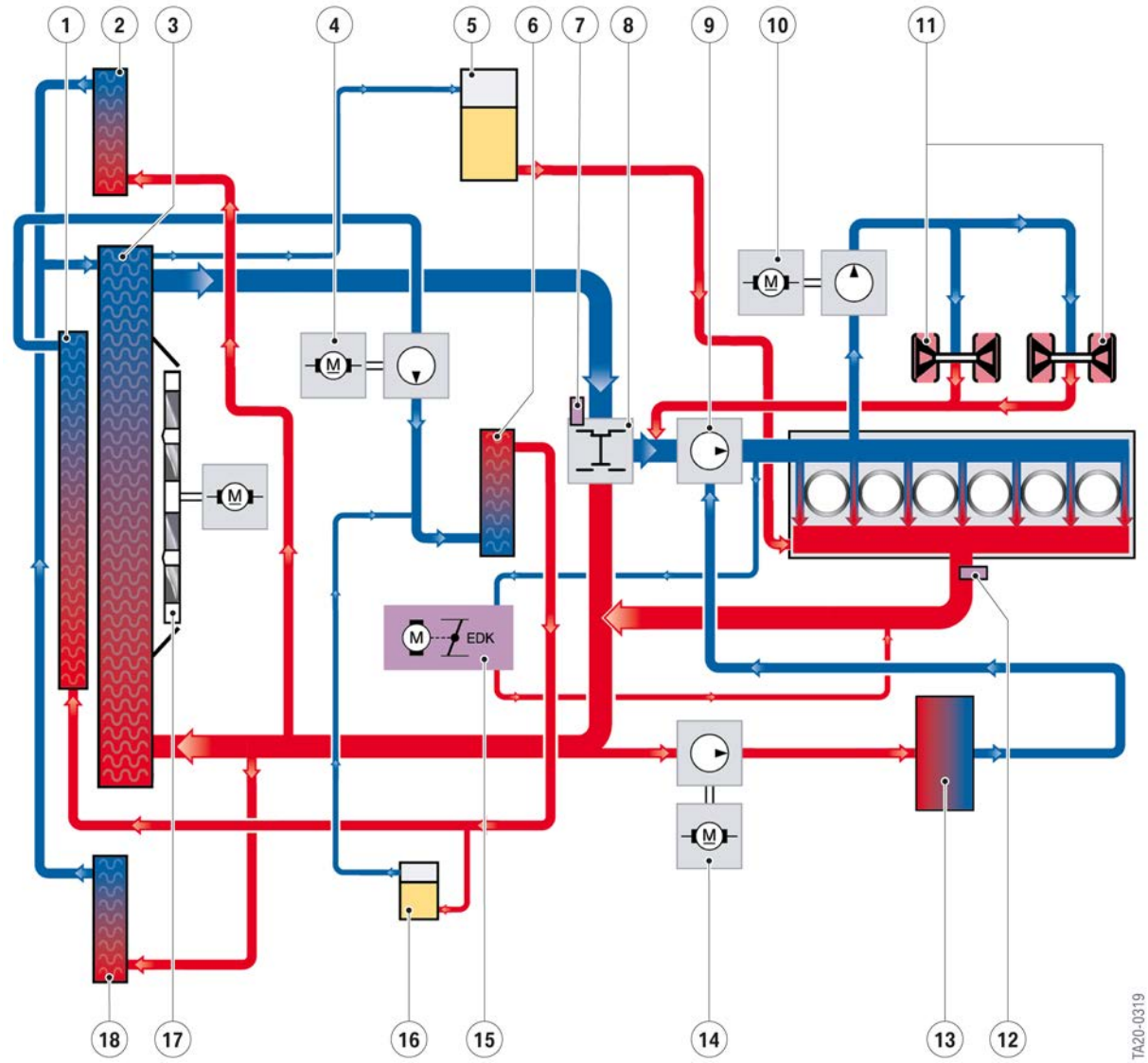
G80/G82, radiator/cooler assembly from front

Index	Explanation
1	External radiator with stone chip protective grid
2	Expansion tank, high-temperature circuit
3	Expansion tank, low-temperature circuit
4	Indirect charge air cooler
5	Radiator, engine
6	Low-temperature cooler, charge air
7	Engine oil cooler
8	Transmission oil cooler
9	Air conditioning condenser

G80/G82 Complete Vehicle.

4. Drive.

The aforementioned changes are carried over as of production date 11/2020 for the S58B30T0 engine in the F97/F98.

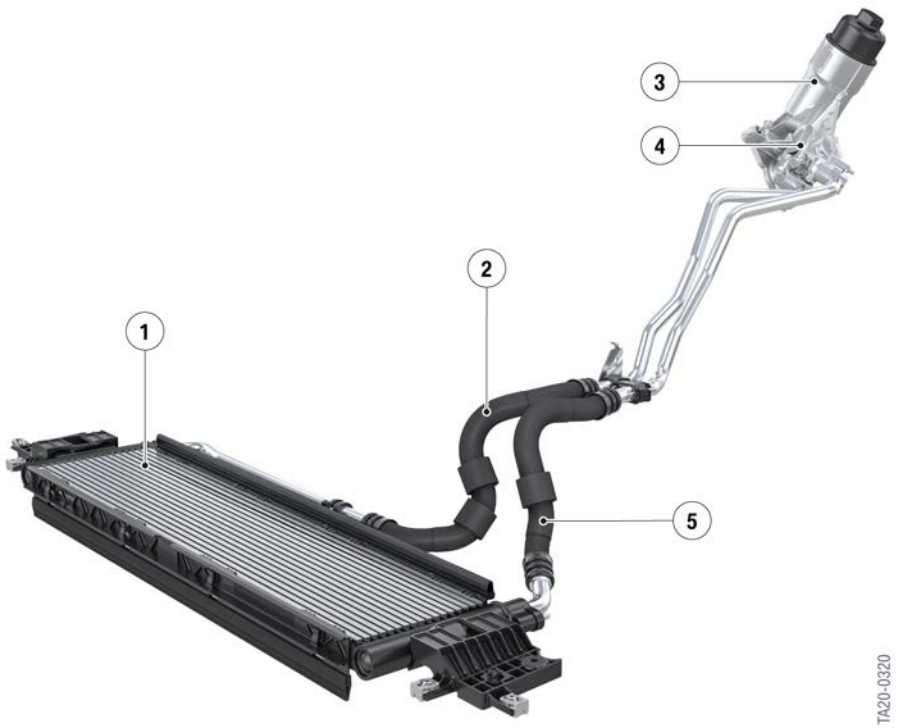


G80/G82, complete cooling system without oil cooling, schematic

Index	Explanation
1	Low-temperature cooler, charge air
2	External radiator, engine right
3	Radiator, engine
4	Electric coolant pump, low-temperature circuit, charge air 130 W
5	Coolant expansion tank, engine
6	Indirect charge air cooler
7	Heater, characteristic map thermostat
8	Data-map thermostat
9	Mechanical coolant pump
10	Electric coolant pump, exhaust turbocharger 20 W
11	Exhaust turbocharger
12	Coolant temperature sensor
13	Heat exchanger for heating system
14	Electric coolant pump, heating, vehicle interior
15	Coolant-cooled throttle valve
16	Coolant expansion tank, low-temperature circuit, charge air
17	Electric fan 1 kW
18	External radiator, engine left

4.9.2. Engine oil cooling

The S58 engine has an external air-oil heat exchanger for cooling the engine oil which is built-in flat in front of the cooling module. To quickly heat up the engine oil, a thermostat is integrated in the upper section of the engine oil sump. The thermostat releases the flow to the engine oil cooler as of an engine oil temperature of 100 °C (212 °F) and is fully open at an engine oil temperature of 145 °C (293 °F).



S58 engine, engine oil cooling

Index	Explanation
1	Upstream engine oil cooler
2	Return line
3	Oil filter housing
4	Thermostat
5	Feed line

4.9.3. Cooling power limits

If under extreme conditions such as for example in countries with high outside temperatures and the cooling power reaching its limits on the race track under race conditions, the cooling power of the vehicle air conditioning is reduced as the very first measure. Reducing the cooling power for the air conditioning ensures that there is sufficient cooling power available for the engine cooling and charge air cooling. If the cooling power for the engine cooling and charge air cooling still cannot be ensured even after the cooling power of the air conditioning has been eliminated, the engine performance and engine speed are gradually reduced before the CC message is displayed. In this way, constant and rapid lap times over a lengthy period can be achieved on the race track even at high ambient temperatures. The customer is alerted by a Check Control message if the cooling power of the engine cooling or charge air cooling reaches its limits. In the event of a customer complaint relating to the cooling power of the vehicle's air conditioning system, it is essential first to take these conditions into consideration before starting troubleshooting on the cooling system and on the air conditioning.

G80/G82 Complete Vehicle.

4. Drive.

For necessary servicing and further guidance about driving on the race track, the current information and specifications in the documents in the Integrated Service Technical Application (ISTA) must be observed in each case.

4.10. Fuel preparation

Regarding the fuel treatment the following changes have been made compared to the G20/G22 basic vehicle.

4.10.1. Low-pressure fuel system

- For the surge tank with the electric fuel pump in the fuel tank, in the G80/G82 a different delivery unit is used than in the production vehicle G20/G22. The reason for this is that the necessary delivery volume of the electric fuel pump of the G20/G22 for safely filling the surge tank during acceleration of the G80/G82 with S58 engine could not be guaranteed.
- The suction jet pump in the fuel tank in the G80/G82 is located on the pressure side in the surge tank. As a result, there are greater pump flow rates from the left tank half to the right tank half.
- The fuel low-pressure sensor is located at the front right at the firewall in the area of the high pressure pump for cylinder bank 2.

G80/G82 Complete Vehicle.

5. Power transmission.

G82, power transmission

5.1. Transmission

5.1.1. Manual gearbox

A manual transmission is used as standard on the G80/G82. It is an adapted K transmission, which is known from the F80/F82. The transmission has been adapted to the new circumstances in the G80/G82. The following components were adapted:

- The clutch housing has been adapted to the S58 engine.

Transmission ratios G80/G82

	G80/G82
Transmission designation	GS6-45BZ (ZF) Manual gearbox
Steering axis inclination	4.86
Maximum engine speed [rpm]	7200
Torque [lb-ft]	406
Weight [lbs]	101.4
Ratio [:1] 1st gear	4.111

	G80/G82
Ratio [:1] 2nd gear	2.315
Ratio [:1] 3rd gear	1.542
Ratio [:1] 4th gear	1.179
Ratio [:1] 5th gear	1.000
Ratio [:1] 6th gear	0.846
Ratio [:1] reverse gear	3.727

Engine speed adaptation for a gear change (double clutch)

Similar to the F80/F82 and the modular engines with manual transmission, an engine speed adaptation for the manual transmission is used in the new G80/G82. The engine speed adaptation again highlights the sporting character of the new G80/G82 and its motor racing genes.

In addition, the engine speed adaptation is used to reduce the drag torque and also improve the driving stability in the dynamic limit range.

The engine speed adaptation includes the following components and functions:

- New gear sensor detects the gearshift request via the x-y-axis and communicates directly with the engine control unit.
- Clutch switch is two-stage and communicates directly with the DME.
- Engine speed adaptation characteristic is based on the selected driving mode.
- No reverse gear switch as detection via gear sensor.

Using the M SETUP button and the menu item "Gear Shift Assistant", the engine speed adaptation for the G80/G82 can be activated or deactivated.

The neutral sensor is capable of self-diagnosis and if necessary can store a fault in the fault memory. An additional display is not activated. After the replacement of the gear sensor it must be recalibrated with help of the BMW diagnosis system.

5.1.2. Manual transmission Launch Control

A Launch Control for the manual transmission is also used for the first time with the G80/G82.

During the first 3100 mile run-in distance, the Launch Control must not be used.

The Launch Control is active from the factory. The activation of Launch Control is not restricted to the 1200 mile running-in check.

Premature wear occurs as a result of the high load on the vehicle components when using Launch Control.

Launch Control

Function: Launch Control enables optimal acceleration when driving off on a non-skid roadway.

Sequence	Precondition/Action
1.	The vehicle must be stationary, the engine running and at operating temperature (approximately 6 mile warm-up journey).
2.	The steering angle at the steering wheel must not be greater than 30°.
3.	M Dynamic Mode MDM is activated.
4.	The clutch is gently pressed with the left foot and held.
5.	The 1st gear is engaged.
6.	The accelerator pedal is depressed fully and held in this position.
7.	A Check Control message is issued - "Launch Control is being prepared" (if not, check notes and steps 1-5).
8.	An optimum engine speed for pulling away is adjusted.
9.	A Check Control message is issued - "Launch Control Active".
10.	The left foot is taken off the clutch quickly and sensitively within 6 seconds.

Effect

- The optimal starting engine speed of approximately 3400 RPM is adjusted and the optimal charging pressure is built up.
- The Launch Control accelerates the vehicle with slip control in order to obtain the maximum traction as long as the driver keeps the accelerator pedal fully depressed.
- Upshift of the gears must be done by the driver.
- During the upshift the "full throttle" is active. Despite the release of the accelerator pedal during the gear change, the optimal charging pressure is maintained so that after the engagement the full engine torque is available again immediately.

Automatic deactivation

If the clutch is not released within 6 s, the Check Control message "Launch Control Active" goes out, and the Launch Control is cancelled. The engine revs continue to climb, if the foot is not released from the accelerator pedal, from the optimal starting engine speed of approximately 3400 RPM to 7200 RPM towards high RPM limiter. This is not a malfunction.

The optimal slip-controlled Launch Control is based on Michelin Pilot Sport 4S and Michelin Pilot Sport Cup-2 tires at operating temperature.

Premature wear occurs as a result of the high load of the vehicle with use of the launch control.

G80/G82 Complete Vehicle.
5. Power transmission.

5.1.3. Clutch

A double-disc clutch is used for the manual gearbox. The operating principle of the clutch is identical to the double-disc clutch systems already used.

5.1.4. M automatic transmission

In the G80/G82 the M automatic transmission with Drivelogic is used with the designation GM8HP76Z, hereinafter called M8HP76.

With the M8HP76 M Sport Steptronic transmission, which is based on the BMW AG 8HPTU2 gearbox, customers benefit from significantly improved gear shift responsiveness and even further optimized control of the converter lock-up clutch.

This has been made possible by the further development of converter technology to effectively dampen rotational irregularities in the drivetrain with a turbine torsional vibration damper. As a result, the operating ranges in which the converter lock-up clutch has to be controlled are reduced even further because the converter lock-up clutch is fully engaged in the vast majority of driving situations. This provides for an even more direct connection of the M8HP76 transmission to the complete drivetrain, resulting in an even sportier driving experience and reduced fuel consumption.

In the G80/G82 the **“Idle coasting”** function known from the BMW AG vehicles is not implemented. However, the M8HP76 supports, as known from the BMW AG vehicles, the **“ConnectedShift”** function.

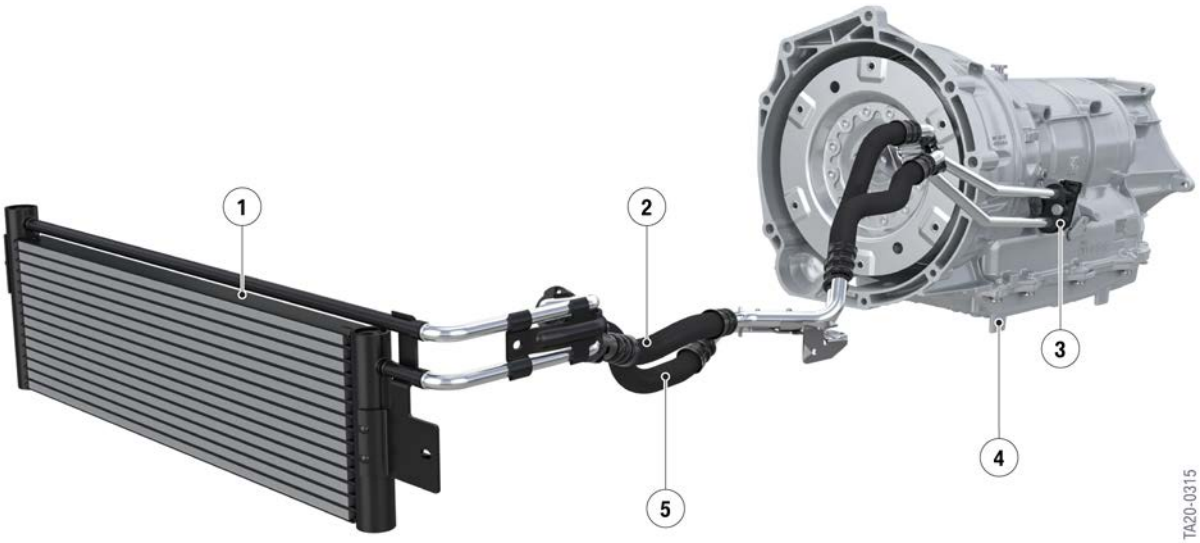
Transmission ratios, comparison of F80/F82 - G80/G82

	F80/F82	G80/G82
Transmission designation	GS7D36BG (Getrag) M DKG	GM8HP76Z (ZF) M automatic transmission
Steering axis inclination	7.2	7.8
Maximum engine speed [rpm]	7600	7200
Torque [lb-ft]	516	479
Weight [lbs]	183.4	197.7
Ratio [:1] 1st gear	4.806	5.000
Ratio [:1] 2nd gear	2.593	3.200
Ratio [:1] 3rd gear	1.701	2.143
Ratio [:1] 4th gear	1.277	1.720
Ratio [:1] 5th gear	1.000	1.313
Ratio [:1] 6th gear	0.844	1.000
Ratio [:1] 7th gear	0.671	0.823
Ratio [:1] 8th gear		0.640
Ratio [:1] reverse gear	4.172	3.478

Transmission oil cooling

The plastic transmission oil sump has been replaced by an aluminum version with larger cooling fins and the opening point of the transmission oil thermostats has been lowered, improving the cooling of the M8HP76 transmission.

A transmission oil cooler with a thermostat is used to cool the M8HP76 on the G80/G82. This additional transmission oil cooler, which is designed as a plate heat exchanger, operates according to the oil-to-air heat exchanger principle and is installed vertically in front of the radiator assembly.



G80/G82, transmission oil cooling

Index	Explanation
1	Transmission oil cooler (oil-to-air heat exchanger principle)
2	Transmission oil return
3	Thermostat
4	M automatic transmission with aluminum oil sump
5	Transmission oil feed

In some of the outside lines and hoses that carry transmission oil to the additional transmission oil cooler, the cross-section has been optimized. This results in a greater oil flow rate, translating into more efficient cooling of the M automatic transmission.

The thermostat has been routed in the G80/G82 from the lines carrying transmission oil to the transmission housing. The thermostat of the transmission oil cooler opens at 76 °C (168 °F) and is fully open at 96 °C (204 °F).

5.1.5. M gear selector lever/M GWS

The M automatic transmission is operated using the M gear selector switch (M GWS) or the shift paddle on the steering wheel.

G80/G82 Complete Vehicle.
5. Power transmission.

The M-specific shift pattern, as used for the M double-clutch transmissions, was retained for the M gear selector switch.

G80/G82, M gear selector switch (example of BMW M4 Competition)

Index	Explanation
1	Drivelogic button
2	Parking lock button
3	Gear display (with M-specific shift pattern)

In terms of design and function, the M gear selector switch (M GWS) has been adopted from the F95/F96 and comprises:

- At the gear selector switch - base made from Zamak alloy.
- Handle covered with nappa leather with the M embossing.
- Contrast stitching with the BMW M colors.

It is possible to choose and change between an automatic **"D mode"** and a sequential **"Manual mode"**. In each mode there are 3 driving programs, which can be selected and activated using the **"Drivelogic switch"**.

Drivelogic

A rocker switch is used on the G80/G82 for changing the transmission mode up or down.

After each change between manual mode and Drive mode, the last selected driving program is active.

After each engine start driving program 1 is active in Drive mode.

D mode/Drive mode

Automated mode, all the forward gears are automatically shifted. Kickdown is triggered by depressing the accelerator pedal beyond the resistance point.

Three driving programs are available for selection:

1: Efficient driving - Comfort shifting time

2: Fast driving - Sport shifting time

3: Sporty driving - Sport Plus shifting time.

Manual mode/sequential mode

The gears can be manually shifted by means of shift paddles on the steering wheel **"+"** or **"–"** or the gear selector switch **"forward"** and **"back"** at the matching driving speed and engine speed. The selected gear is maintained even when the engine speed limitation is reached, but an automatic downshift is performed when the vehicle drops below the gear-specific minimum driving speed.

When the manual mode is selected for the first time after terminal change (engine restart), the last Drivelogic stage used is active.

Three driving programs are also available here for selection:

1: Comfortable, smooth gearshifts in all driving conditions

2: Sporty, fast gearshifts, light gearshift jolts permitted at higher engine loads and speeds

3: Maximum sporty shift speed and gearshifts and the prerequisite for activation of Launch Control

To use the highest, i.e. the third driving program, M DSCi does not have to be activated.

5.1.6. Automatic transmission Launch Control

During the first 3100 mile run-in distance, the Launch Control should generally not be used.

The Launch Control is active from the factory. The activation of Launch Control is not restricted to the 1200 mile running-in check.

Premature wear occurs as a result of the high load on the vehicle components when using Launch Control.

Launch Control

Function: Launch Control enables optimal acceleration when driving off on a non-skid roadway.

Sequence	Precondition/Action
1.	The vehicle must be stationary, the engine running and at operating temperature (approximately 6 mile warm-up journey).
2.	The steering angle at the steering wheel must not be greater than 30°.
3.	M Dynamic Stability Control integrated (M DSCi) is deactivated. (4WD)
4.	The manual mode and the third Drivelogic driving program are selected.
5.	The brake pedal is gently pressed with the left foot and held.
6.	The accelerator pedal is depressed fully and held in this position.
7.	An optimum engine speed for pulling away is adjusted.
8.	A Check Control message is issued - "Launch Control is being prepared" (if not, check notes and steps 1-5).
9.	A Check Control message is issued - "Launch Control Active".
10.	The left foot is taken off the brake pedal within 5 seconds.

Effect

- Launch Control automatically shifts up using the shortest possible gearshift times and performance-optimized shift points as long as the customer keeps the accelerator pedal fully depressed.
- The Check Control message "Launch Control Active" in the instrument cluster remains active.

The optimal slip-controlled Launch Control is based on Michelin Pilot Sport 4S and Michelin Pilot Sport Cup 2 tires at operating temperature.

A renewed Launch Control start is possible as long as the transmission oil temperature satisfies the prerequisites for this.

Automatic deactivation

- The customer releases (even if only briefly) the accelerator pedal full load range during acceleration.

A manual intervention in the automatic upshift, for example via the shift paddles on the steering wheel or the gear selector switch, does not interrupt the Launch Control process.

If one of these preheating/precooling conditions is breached, it is not possible to activate the Launch Control.

Also at excessive transmission oil temperature (e.g. repeat Launch Control or race-like start), activation is blocked until an acceptable temperature threshold is reached.

The Check Control message "Launch Control Active" goes out with every deactivation and the automatic forced upshift is cancelled.

Premature wear occurs as a result of the high load of the vehicle with use of the launch control.

5.1.7. Emergency gearbox release

A mechanical emergency transmission release is available and can be accessed through the vehicle underbody. In addition, an electronic emergency gearbox release is implemented as it is in automatic transmissions of the BMW AG vehicles. For towing away, please observe the information in the Owner's Manual of the vehicle.

Release is possible if the starter motor can crank the engine. Apply the parking brake before manual release of the parking lock to prevent the vehicle from rolling.

Sequence	Precondition/Action
1.	Engage selector lever position N.
2.	Press and hold the brake.
3.	Press the start/stop button (the starter motor must start up audibly).
4.	Keep the start/stop button pressed.
5.	With your free hand, press the selector lever into selector lever position N and keep it there until selector lever position N appears in the instrument cluster.
6.	A CC message is displayed in the KOMBI and in the CID.
7.	Release the start/stop button and the selector lever.
8.	Release the brake as soon as the starter motor stops.

Maneuver the vehicle out of the danger area and then secure to prevent it from rolling. Further information can be found in the Owner's Manual for the vehicle.

5.1.8. Service information

Transmission oil circuit

For work required on the oil circuit of the automatic transmission, for example after an accident, or if the oil circuit has to be opened owing to a repair, there must be maximum cleanliness. They include:

- Optimal cleaning of the outer oil circuit areas before disassembly of the components or opening the oil circuit.
- Immediate closure of openings and lines after disassembly without delay and using clean original plugs. Do not use unsealed components or replacement parts of the oil circuit without checking for cleanliness and where possible competent repair.
- The work bay in which an automatic transmission is opened must be extremely clean and secured against dirt contamination, also during work interruptions. For example by sufficiently clean and lint-free cover.

G80/G82 Complete Vehicle.

5. Power transmission.

Lifetime oil filling

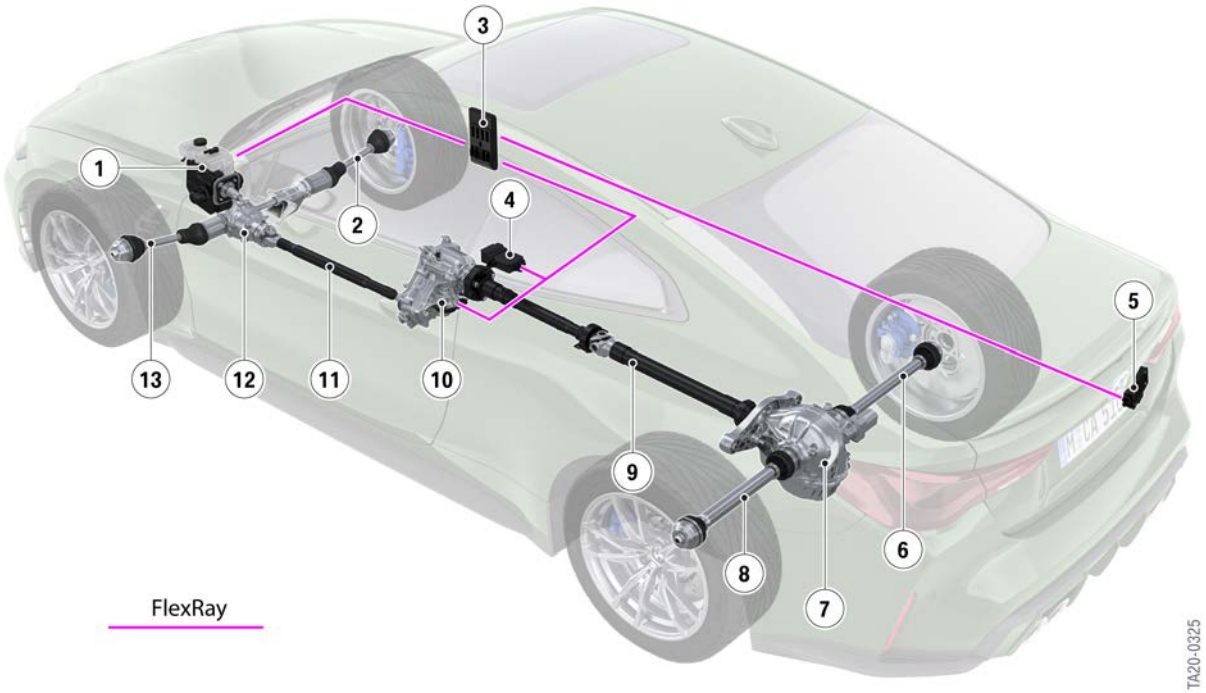
Currently, as with other M vehicles with M automatic transmission, for the G80/G82 with M automatic transmission a transmission oil change is **not** scheduled at 1200 miles (running-in check) or with every third engine oil change.

⚠

Current transmission oil recommendations and capacities can be found in the current documentation of the BMW workshop information system.

5.2. M xDrive

"High-performance driving dynamics on the one hand and the everyday usability on the other" is how we could describe the typical M concept approach in which the individual drivetrain components are perfectly matched with the M xDrive system. That enables the new BMW M3 and the BMW M4 Coupe to have the same familiar precise sports handling whether being driven on the race track or the public road. In addition, they are also a delight to drive even in unpleasant weather conditions such as rain and snow or off road thanks to noticeable extra traction and controllability right up to the limits of handling stability. The agile rear-oriented design is achieved by allowing the M xDrive to bring the front axle to bear only when the rear wheels have reached their limits and additional traction force is required. Even when adopting a very vigorous driving style using a lot of power, the new BMW M3 and the BMW M4 Coupe with M xDrive show themselves to be predictable and effortless to control for the driver, so that the outstanding performance of the vehicles can be experienced even more intensely.



G82, system overview, M xDrive

Index	Explanation
1	M Dynamic Stability Control integrated (M DSCi)
2	Front output shafts, right
3	Body Domain Controller (BDC)
4	Advanced Crash Safety Module (ACSM)
5	Control unit, regulated M rear axle differential lock (M GHAS)
6	Rear output shafts, right
7	M rear axle differential lock
8	Rear output shafts, left
9	Prop shaft
10	M transfer box (M VTG)
11	Front propeller shaft
12	Front axle differential
13	Front output shafts, left
FlexRay	FlexRay bus

5.2.1. M transfer box (M VTG)

The M xDrive used for the G80/G82 is based on the all-wheel drive of the G12 with the ATC13 transfer box and has been adopted from the F97/F98.

The torque generated by the engine is stepped up in the automatic transmission and is supplied via the transmission output shaft to the transfer box. The transfer box forming the next stage in the drivetrain has the task of varying the torque distribution between the front and rear wheels across the full range from 0:100% to 100:0% as demanded by the driving situation. Since a rigid connection of the rear axle with the front axle is not possible due to possible differences in the wheel speeds, there is a multidisc clutch inside the transfer box. The multidisc clutch performs the task of variable torque distribution between the two drive axles.

6-finger oil distributor

For the M transfer box (M VTG), a new oil distributor is used in the G80/G82 in the disc set of the multidisc clutch. The new oil distributor is a so-called 6-finger oil distributor with 21 oil outlet bores compared to the 3-finger oil distributor with 9 oil outlet bores of the predecessor generation of the ATC13 with the M transfer box (M VTG). Through additional input of cool transmission oil by the 6-finger oil distributor to the disc set, the potential of the M xDrive in the G80/G82 can be further improved.

Due to the permanent distribution of the drive torques between front axle and rear axle with an agile and sporty driving style and the arising influence of heat on the multidisc clutch, in the past the influence of heat on the clutch had to be reduced in order to protect the components. This is done by closing the multidisc clutch in order to reduce friction in the disc set. Closing the multidisc clutch

causes a distribution of the drive torque to the front axle, which in turn brings about an increase in driving safety, as it is generally easier for the customer to control understeering vehicles than oversteering vehicles.

With the use of the 6-finger oil distributor it is now possible to insert transmission oil evenly in an axial movement to the multidisc clutch in order to reduce the influence of heat. This means that the multidisc clutch can maintain the torque distribution between rear axle and front axle without having to reduce the typical M driving pleasure of a vehicle oriented at the rear-wheel drive in conjunction with the M xDrive.

Furthermore, the advantages of the 6-finger oil distributor are also assisted by the actuator wheel slip limitation ARBx for the M all-wheel drive. Further information can be found in the chapter "Actuator Wheel Slip Limitation ARB".

The following customer benefits arise from the combination of a 6-finger oil distributor in conjunction with the actuator wheel slip limitation ARBx:

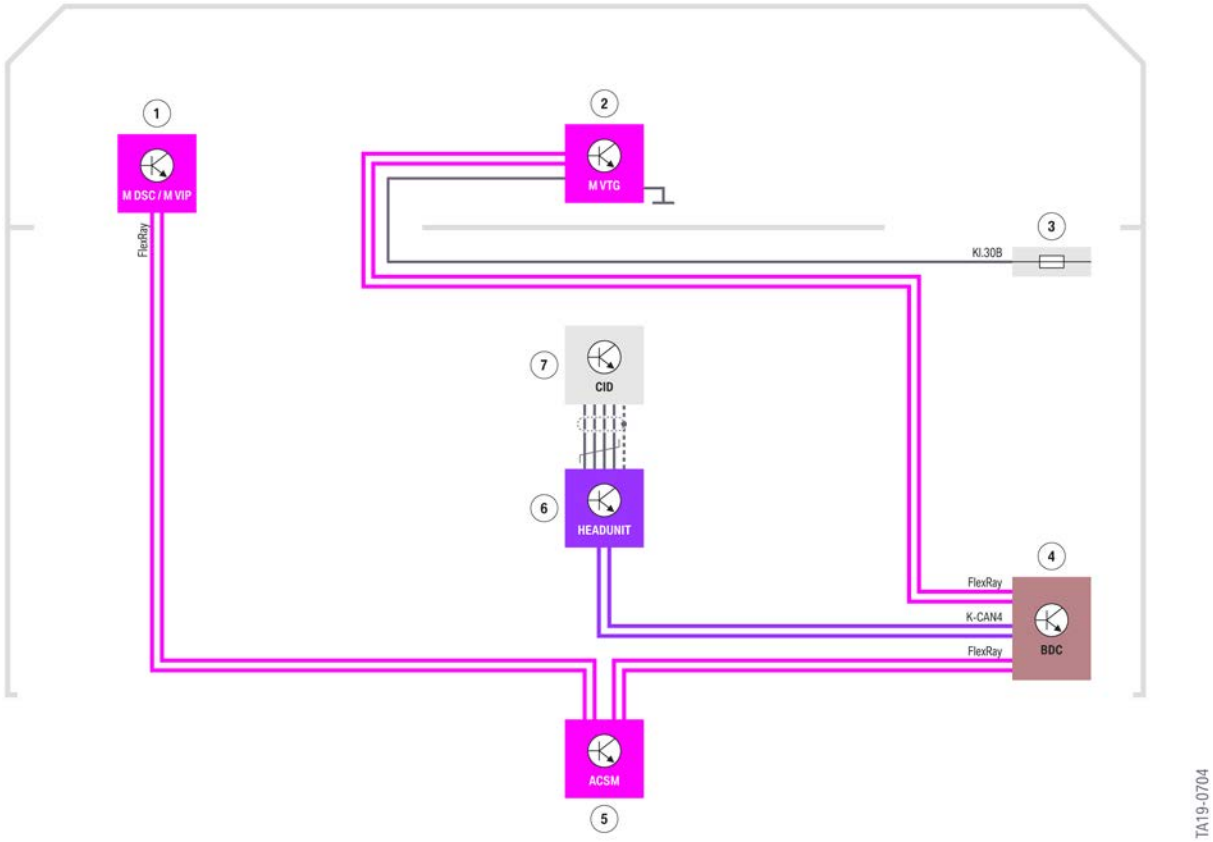
- Improvement of the temperature difference in the multidisc clutch, therefore better component protection.
- Better heat dissipation, as a result a higher availability of the M xDrive benefits in relation to permanent drive torque distribution in agile driving situations.
- Lower temperature level of the transmission oil for equal torque potential possible, as a result lower transmission oil damage/aging.
- Improved cooling effect, thus approximately 2x faster cooling phases of the multidisc clutch possible.
- Optimal interaction with the actuator wheel slip limitation ARBx, as a result there is an even more sensitive, agile M xDrive in the G80/G82 for the customer.

General information on BMW xDrive can be found in the reference manual "ST1501 G12 Powertrain".

G80/G82 Complete Vehicle.

5. Power transmission.

5.2.2. M VTG system wiring diagram



G80/G82, M transfer box system wiring diagram

Index	Explanation
1	M Dynamic Stability Control integrated (M DSCi)
2	M transfer box (M VTG)
3	Power distribution box, front right
4	Body Domain Controller (BDC)
5	Crash Safety Module (ACSM)
6	Head Unit High 3 (HU-H 3)
7	Central information display (CID)

5.2.3. Service information

- The vehicle must **not** be driven when the front propeller shaft has been removed.
- When carrying out work on a brake test stand, it is not necessary to take into account any all-wheel drive-specific points.

(Roller mode for testing the brake system is detected automatically.)

- The vehicle must **not** be towed if only one axle is raised.
- The oil filling of the transfer box is designed for the entire unit service life.
  However, a fault code entry with an oil change recommendation for the transfer box oil is stored when a mileage of 93,000 miles is exceeded.
  When refilling the transfer box oil, it is necessary to move the oil partition to the open position using the diagnosis system ISTA.
- Various test plans are available in the BMW diagnosis system ISTA for Service.

The tire tread depth as well as the tire manufacturer should be the same on the front and rear axles if possible in order to ensure proper functioning of the xDrive. It is also advisable to only use tires that have been approved or recommended by BMW M.

5.2.4. Lifetime oil filling

The oil filling of the transfer box is designed for the entire unit service life. This corresponds to a mileage of approximately 93,000 miles. A fault code entry with an oil change recommendation for the transfer box is stored when this mileage is exceeded.

The transfer box does not have an oil drain plug. The oil must be removed using an extractor unit.

The new transfer box oil can be filled using an oil filler plug.

In order to ensure that the entire oil filling has been exchanged, the oil partition must remain open for the duration of extraction and filling.

The Service employee can move the oil partition to the open position by means of the “Service function > Transfer box VTG > Oil change” in the BMW diagnosis system ISTA.

Current transfer box oil recommendations and capacities can be found in the current documentation of the BMW workshop information systems.

5.3. Differential

5.3.1. Front axle differential

The front axle transmission VAG 170 AL in the size VAG 170 (crown wheel Ø 170 mm), which is known from the G07, is used. This front axle transmission is also used in the G20/G22.

The gear ratio of the VAG 170 AL is 3.153:1, it weighs 29.1 lbs.

5.3.2. Rear axle final drive

The familiar active M Differential is used in the G80/G82 as a rear axle differential. This electronically/electromechanically controlled rear axle differential lock has been developed especially for the F10 M5 and is also used in the G80/G82. The electronically/electromechanically controlled rear axle differential lock of the G80/G82 is based on a derivation from the F97/F98.

The active M differential has been reworked for the G80/G82, which specifically involved adapting the rear axle differential housing to the rear axle supports of the G80/G82.

The M rear axle differential, size HAG 225 M (crown wheel Ø 225 mm), is used with a M rear axle differential lock. The system designation is "regulated M rear axle differential lock" and the control unit designation is M GHAS (German acronym for M geregelte Hinterachsgetriebesperre).

The gear ratio of the HAG 225 is 3.153:1 with the automatic transmission.

The gear ratio of the HAG 225 is 3.462:1 with the manual transmission.

This M rear axle differential II can be recognized by an aluminum oil sump mounted from below and an electric motor which is visible from the outside.

The HAG 225 weighs 94.7 lbs.

Further information about the active M differential can be found in the reference manual "ST1907 F97/F98 Complete Vehicle".

Current axle transmission oil recommendations and filling capacities can be found in the current documentation of the BMW workshop information systems.

5.3.3. Service information

- If the M GHAS control unit is exchanged, coding (activation of a vehicle-related characteristic curve) and then initial calibration are necessary, after which the fault memory must be deleted.
- After the replacement of the entire M rear axle differential a calibration must be performed and then the fault memory must be deleted.
- For a replacement of the electric motor, electric motor plus intermediate gear or oil temperature sensor, only the fault memory must be deleted.

The final drive oil is currently replaced at 1200 miles (running-in check) and at every third engine oil change.

Current rear axle differential oil recommendations and capacities can be found in the current documentation of the BMW workshop information systems.

If, due to a fault, the M GHAS lock function is switched off or fails, a locked differential is automatically opened as the lock function is not self-locking. The customer is warned/informed and the following effects can be expected:

1. Deterioration of traction with dynamic driving style and low coefficients of friction, particularly with different coefficients of friction, left/right.

2. Possible deterioration of stability in dynamic driving situations.

If the driver drives on a race track for the first time at high outside temperatures > 35 °C (95 °F), it can result in a warning message with regard to excess temperature in the rear axle differential. The reason for this is the behavior of the rear axle differential during run-in. After a sufficient run-in distance, which may vary depending on the load, the rear axle differential temperatures (in the rear axle differential oil and in the disc set) drop to a lower level so that a CC message no longer appears.

For necessary servicing and further guidance about driving on the race track, the current information and specifications in the documents in the Integrated Service Technical Application (ISTA) must be observed in each case.

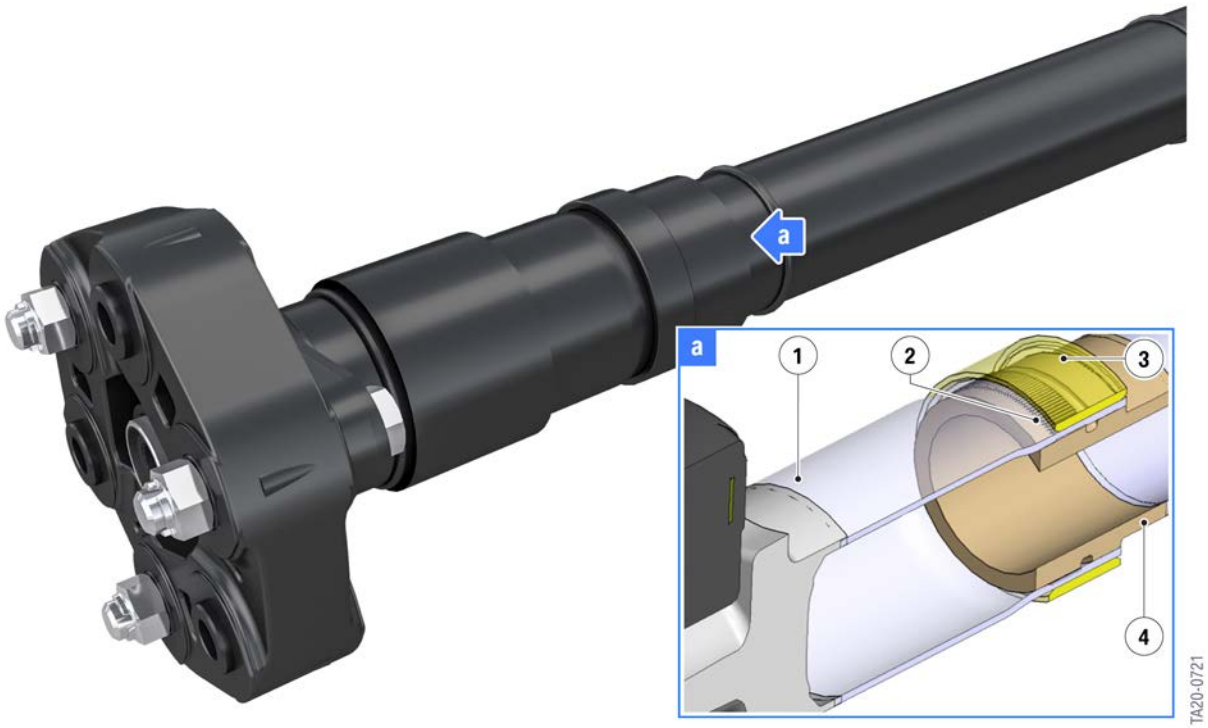
5.4. Propeller shafts and output shafts

5.4.1. Front propeller shaft

The propeller shaft at the front has been adopted from the F90, adapted to the higher rotational speeds and in its diameter from 40 mm in the F90 to 48 mm in the G80/G82.

5.4.2. Rear propeller shaft

The previously used crash element of the propeller shaft at the rear can no longer be used due to the reduction of the diameter of the propeller shaft. Therefore, a patented BMW new development, the so-called CSS-M (Crash Slip System-M GmbH), is being introduced for the G80/G82.



G80/G82, CCS-M

Index	Explanation
1	Pipe adapter
2	Outer knurl
3	Support ring
4	Crash adapter

The outer knurl of the crash adapter establishes the connection to the pipe adapter, which is screwed to the transmission via the flexible disc. The support ring provides additional support for the connection between pipe adapter and crash adapter. In the event of a crash, the pipe adapter is pushed from the support ring in an axial direction and diverted to the back via the crash adapter, the free space is used for the drive unit comprising engine and transmission for the necessary crumple zone in order to dissipate the crash energy.

After an accident the rear propeller shaft must be checked for impact or activation of the CSS-M.

For necessary service work the current information and specifications in the documents in the Integrated Service Technical Application (ISTA) must be observed in each case.

The connection of the propeller shaft and the rear axle differential via the longitudinal splines is bonded with adhesive in the factory using a BMW patented microcapsule and screwed using the recessed nut in order to avoid load change noises.

The repair instructions must be observed when releasing this connection and screwing the propeller shaft to the rear axle differential again.

It is important to follow the procedures in the current repair instructions in ISTA regarding inserted and screwed propeller shafts on the rear axle differential.

For necessary service work the current information and specifications in the documents in the Integrated Service Technical Application (ISTA) must be observed in each case.

Furthermore, the length of the front section is adapted to the respective drive concept, either for the all-wheel drive or rear-wheel drive.

The maximum permissible deflection angle of the propeller shaft must not be exceeded when working on the propeller shaft center bearing.

For necessary service work the current information and specifications in the documents in the Integrated Service Technical Application (ISTA) must be observed in each case.

5.4.3. Front output shafts

The front output shafts have been adopted from the F90 and adapted to the G80/G82.

5.4.4. Rear output shafts

The rear output shafts with the new VL3 joint system have been adopted from the F90 and adapted to the G80/G82. The design of the left output shaft is different to the design of the right output shaft in order to reduce the tramp tendency with the rear-wheel drive.

Tramp tendency with the rear-wheel drive

Specially in vehicles with UHP (Ultra-High-Performance) tires with hard rubber compounds or weather conditions, which cause this (e.g. in winter with extremely cold tires), a so-called tramp of the vehicle at the rear axle may occur in unfavorable starting conditions in vehicles with rear-wheel drive. The simultaneous lifting of the tire contact areas of the left and right drive wheels from the ground is called a tramp, which causes a high resonant oscillation in the rear area of the vehicle. This resonance is considered annoying and uncomfortable by the customer and also has a negative impact in relation to the best possible traction when driving off.

The tramp tendency in the G80/G82 can be reduced with the use of a short output shaft on the left which has a bigger diameter and is 25 % stiffer. With the property that the left output shaft is stiffer and shorter than the right output shaft, the left drive wheel enters a resonant oscillation when driving off first by the lifting of the tire contact area. The right drive wheel with the lighter and longer output shaft follows now with the entering into a resonant oscillation with a time delay. Due to this time delay of the resonant oscillations of left and right drive wheels, the resonant oscillations cancel each other out at the drive wheels and the tramp tendency is thus reduced.

With the additional use of the actuator wheel slip limitation ARB and the regulated rear axle differential lock at the rear axle, the following customer benefits arise for the G80/G82:

G80/G82 Complete Vehicle.

5. Power transmission.

- Best possible traction at the drive wheels.
- No annoying drive influences on the vehicle.

Further information can be found in the chapter "Actuator Wheel Slip Limitation ARB".

G80/G82 Complete Vehicle.

6. Chassis and suspension.

G82, chassis and suspension, complete

The chassis and suspension is based on the technology of the G2x and the F9x, whereby almost all components are again new and specific to M or have been adapted.

Designation	Unit	E9x M3	F80/F82–M3/M4 Coupe	G80/G82–M3/M4 Coupe
Wheelbase/Turning circle Turning circle of rear-wheel drive Turning circle of all-wheel drive	[mm] [m] [m]	2761 11.7	2812 12.2	2857 12.2 12.67*
Front track width	[mm]	1540	1579	1617
Rear track width	[mm]	1539	1603	1605
Front axle		M two-joint spring-strut front axle	M two-joint spring-strut front axle	M two-joint spring-strut front axle

G80/G82 Complete Vehicle.
6. Chassis and suspension.

Designation	Unit	E9x M3	F80/F82–M3/M4 Coupe	G80/G82–M3/M4 Coupe	
Steering		Hydraulic M rack-and-pinion steering with M Servotronic	Electrical rack-and-pinion steering (EPS) with M Servotronic	Electrical rack-and-pinion steering (EPS) with M Servotronic	
Average overall ratio		12.5	15	Rear-wheel drive	Four-wheel drive
				15.01	14.63
Steering wheel turns End stop-end stop		2.4	2.5	2.35	
Rear axle		M 5-link rear axle	M 5-link rear axle	M 5-link rear axle	
Axle ratio with manual transmission Axle ratio with automatic transmission		3.154	3.462	3.462 3.154	

*Expected values with M xDrive

6.1. Front axle

The front axle is based on the M double-joint spring-strut-type front axle of the G2x. All components and bearings are new or adapted for M-specific use.

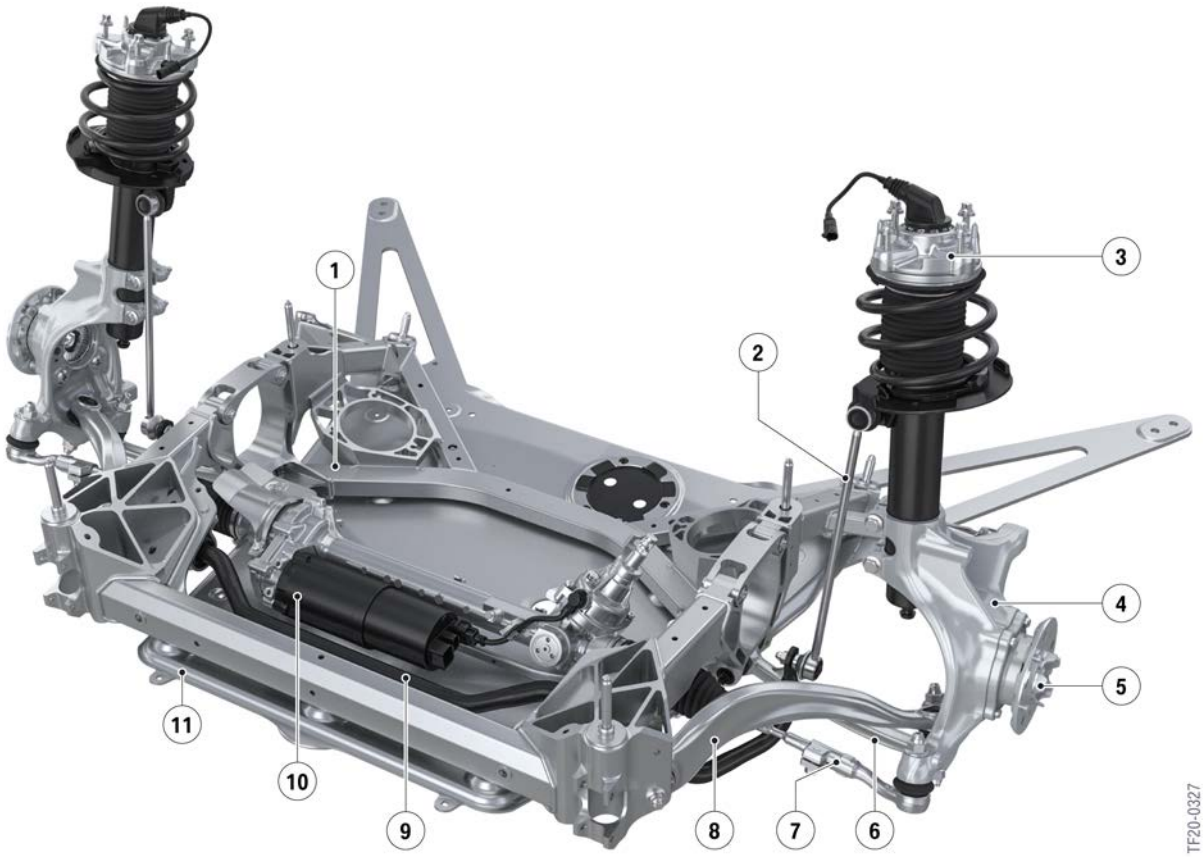
Two different front axle supports are used for the all-wheel drive and rear-wheel drive.

As an M all-wheel drive is used for the first time in a BMW M3 and BMW M4 Coupe, the double-joint spring-strut-type front axle including front axle support had to be completely revised again in relation to the axle geometry for use in the all-wheel drive vehicle.

The new axle geometry of the front axle for the all-wheel drive with the steering more further forward, the adapted anti-roll bar, as well as tension and traction strut and swivel bearing, combines typical M driving dynamics properties with reduced drive influences on the steering.

G80/G82 Complete Vehicle.

6. Chassis and suspension.



G82, double-joint spring-strut-type front axle with all-wheel drive

Index	Explanation
1	M front axle support
2	M anti-roll bar link
3	M spring strut with support bearing
4	M swivel bearing
5	M wheel bearing unit with wheel flange
6	M wishbone
7	M track rod
8	M tension strut
9	M anti-roll bar
10	M Servotronic (EPS)
11	M stiffening plate

All components have been redesigned for the increased requirements. Wheel guidance for compression and steering is achieved via the wishbone, the tension strut, the spring strut and the track rod.

G80/G82 Complete Vehicle.
6. Chassis and suspension.

In order to guarantee a precise wheel guide in transverse direction of vehicle, the power transmission is achieved from the swivel bearing to the front axle guide via ball joints with no play. In order to also guarantee this in a longitudinal direction, the chassis and suspension forces are transmitted in longitudinal direction of vehicle via specially developed elastomer bearings for the G80/G82 via the tension struts to the front axle support.

A lowered roll center, as well as increased after-run and spread values, ensure perfect steering response with good comfort. Toe and camber values have been optimized and together with the tires have been designed for maximum transverse dynamics.

The M front axle support made of aluminum (G2x; steel) is typical M with a stiffening plate with double sill connection, thus also reinforcing the rigidity of the front end.

The connection between the spring strut and the swivel bearing was realized by a clamp connection similar to the F8x.

6.1.1. Steering

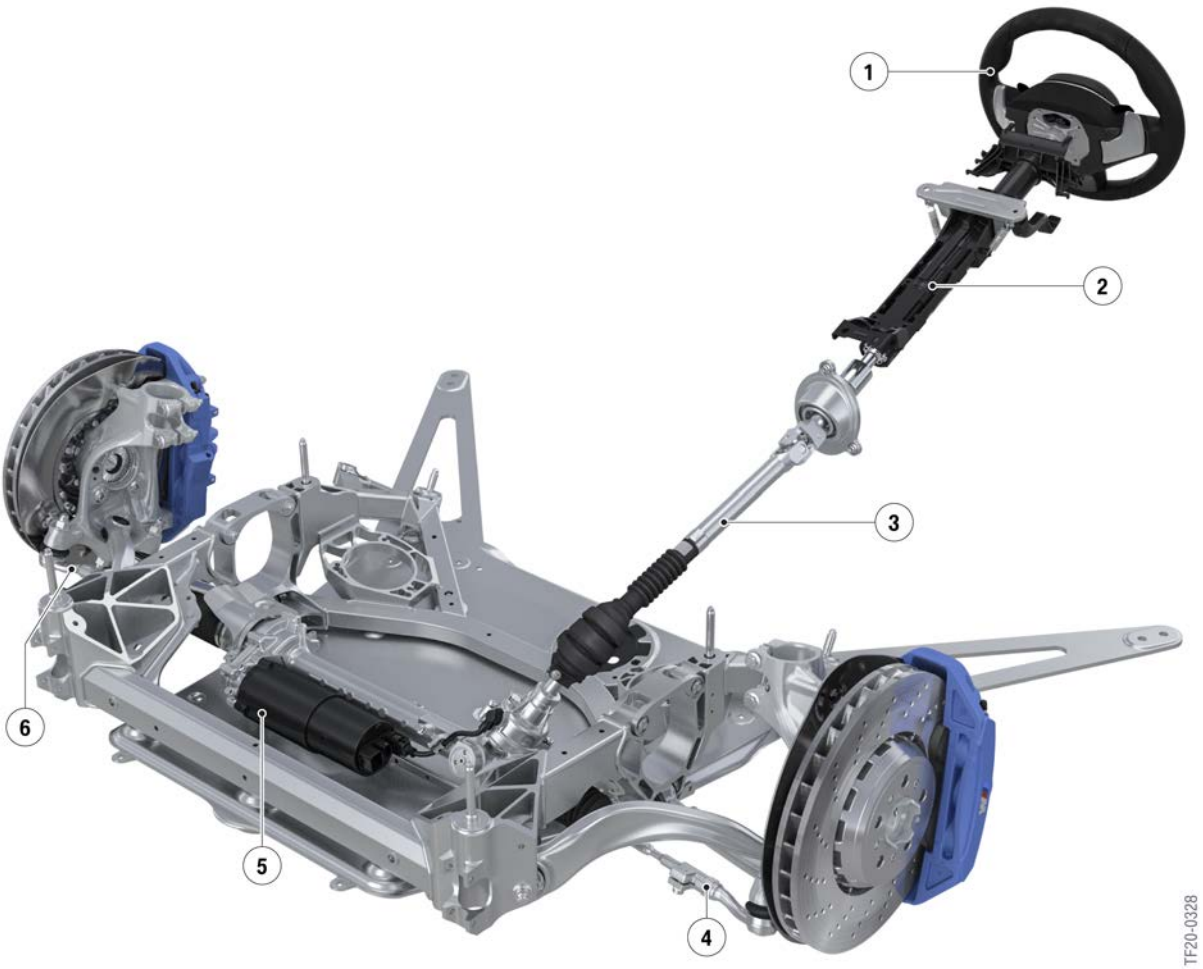
The steering used for the new G80/G82 is a rack and pinion steering with electrical steering wheel support "M Servotronic based on EPS" from Thyssen Krupp Power Steerings.

For power assistance during steering an electric motor is housed parallel to the rack at the steering gear housing, the power transmission is achieved via a ball screw.

In order to reduce the influence of heat on the steering, the M Electronic Power Steering (M EPS) in the G80/G82 has a heat shield, which is installed upstream from the M Electronic Power Steering (M EPS).

G80/G82 Complete Vehicle.

6. Chassis and suspension.



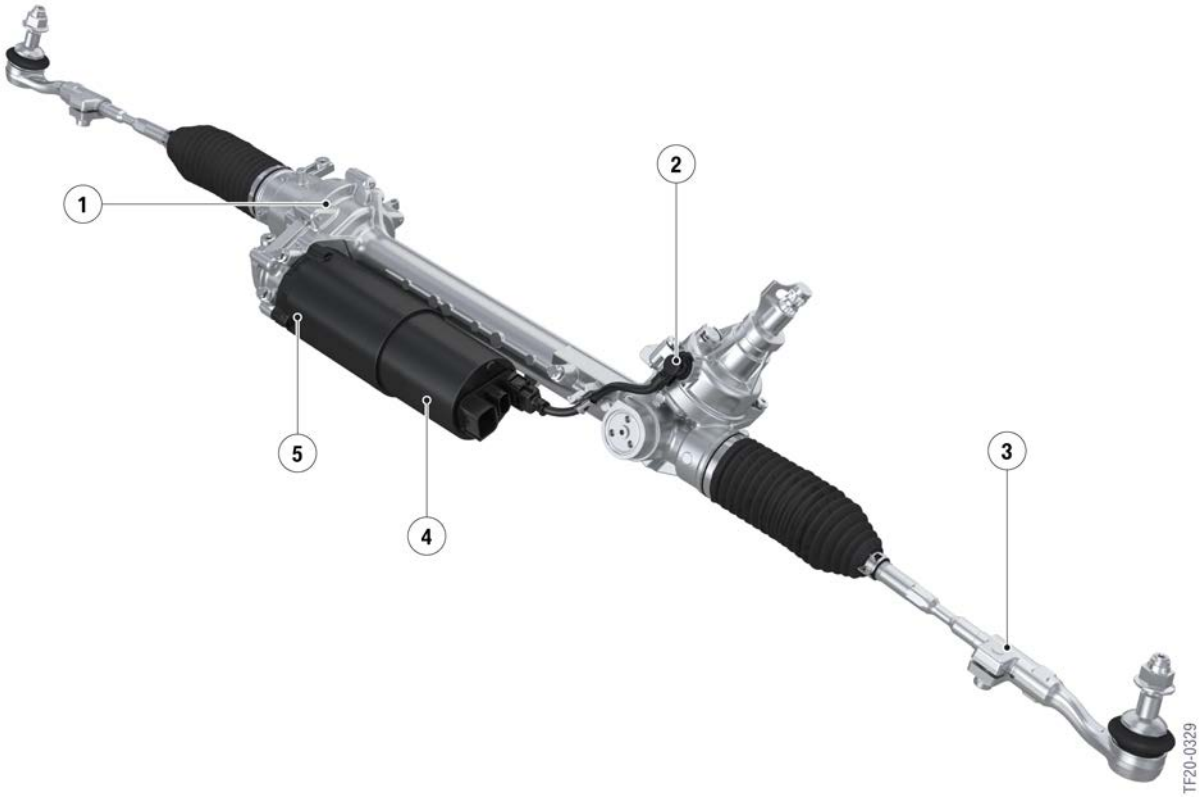
G80/G82 steering

Index	Explanation
1	M steering wheel
2	Adjustable steering column
3	Steering column
4	M track rod, left
5	M Servotronic (EPS)
6	M track rod, right

The M Servotronic (EPS) is an independent development for the BMW M3 and the BMW M4 Coupe. All components of the M Servotronic (EPS) have been developed specifically for the BMW M3 and the BMW M4 Coupe. With this measure the development of the steering was able to be coordinated to the typical M properties. Special attention was paid here to the typical M features:

G80/G82 Complete Vehicle.
6. Chassis and suspension.

- Direct steering sensation.
- Driving condition feedback.
- Dynamic driving in the limit range.



G80/G82 M Servotronic (EPS)

Index	Explanation
1	Reduction gear
2	Steering-torque sensor
3	Track rod
4	Control unit, M Servotronic (EPS)
5	Electric motor with rotor position sensor

The ratio of the M Servotronic (EPS) has also been adapted to the BMW M3 and the BMW M4 Coupe, whereby different ratios are used for the variable ratio of the rack for rear-wheel drive and all-wheel drive due to the different front axle geometry.

Steering gear ratio, rear-wheel drive (C-factor)	Steering gear ratio, all-wheel drive (C-factor)
63/70/63 (mm/revolution)	69.3/78/71 (mm/revolution)

6.1.2. M Servotronic

The Servotronic function familiar from conventional hydraulic steering systems is also used in the M Servotronic (EPS) and is available as standard in the G80/G82. It is a M Servotronic, which functions according to the same operating principle as in production vehicles. The difference in the M Servotronic of the G80/G82 is that this can be selected in 2 stages (in the F8x 3-stages); in contrast to the F8x in the G80/G82 the Servotronic Settings menu is accessed in the central information display (CID) via a SETUP button in the center console. The driver can switch between "COMFORT" and "SPORT" via the SETUP button. The program selection can also be preconfigured in the Head Unit High 3 (HU-H 3) and selected using the M1/M2 buttons on the steering wheel. Here the corresponding characteristic curve is activated and in Sport direction the power steering support is also noticeably withdrawn.

Program description, M Servotronic:

- “COMFORT”: Focus on light and comfortable steering torques with perfect feedback from the road surface at the same time.
- "SPORT": Greater rise in the steering force and perceptibly more feedback for sporty M dynamic driving, both for every day use and at the dynamic driving limit.

6.1.3. Steering angle sensor

The information on the steering angle in the G80/G82 is not recorded by the Electronic Power Steering (EPS) and not via a separate sensor on the steering wheel and instead is computed based on the motor position angle of the EPS motor in relation to the steering wheel.

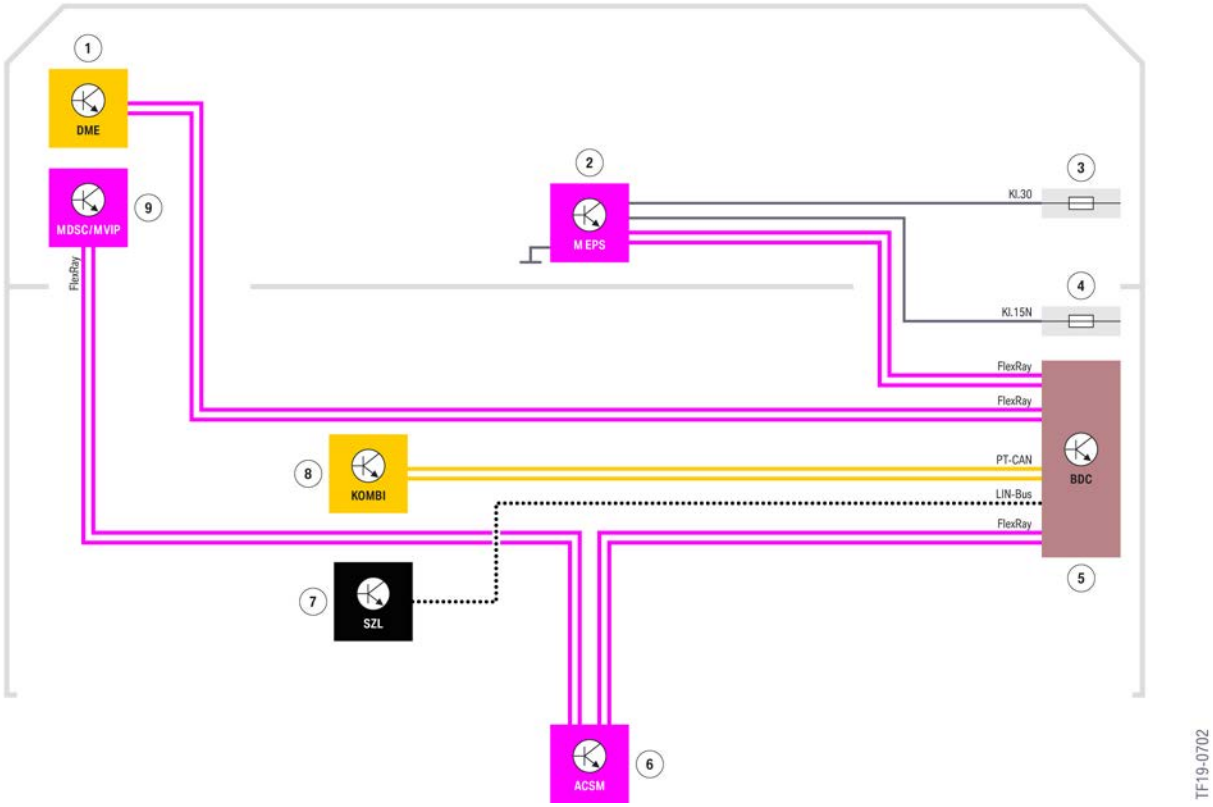
The EPS delivers the position of the rack via FlexRay to the M Dynamic Stability Control integrated (M DSCi). During this process, the EPS calculates the absolute position of the rack based on the current motor position of the EPS motor and the number of complete revolutions performed by the motor starting from the zero position (straight-ahead driving position).

Taking this position as the starting point, M Dynamic Stability Control integrated (M DSCi) determines the wheel-specific steering angle among other things using the stored ratio parameters (rack to wheel-specific steering angle) and transmits this via FlexRay. This wheel-specific steering angle is used by M Dynamic Stability Control integrated (M DSCi) among other things as a reference variable for internal control functions.

In cases where the absolute value is not available from the EPS (loss of terminal 30, flash process), the absolute value is determined through interaction between M Dynamic Stability Control integrated (M DSCi) and EPS using an adaptation function in which the steering wheel is turned from end stop to end stop (e.g. straight-ahead position -> left -> right -> straight-ahead position).

G80/G82 Complete Vehicle.
6. Chassis and suspension.

6.1.4. System wiring diagram, M Servotronic



G80/G82, EPS system wiring diagram

Index	Explanation
1	Digital Motor Electronics (DME)
2	M Servotronic (EPS)
3	Power distribution box, engine compartment
4	Power distribution box, front
5	Body Domain Controller (BDC)
6	Crash Safety Module (ACSM)
7	Steering column switch cluster (SZL)
8	Instrument cluster (KOMBI)
9	M Dynamic Stability Control integrated (M DSCi)

6.2. Rear axle

The M rear axle of the G80/G82 is based on the five-link rear axle from the F8x and has been adapted to the new installation space and load requirements in the G80/G82.

G80/G82 Complete Vehicle.

6. Chassis and suspension.

G80/G82 five-link rear axle

Index	Explanation
1	M wheel bearing unit with drive flange
2	M control arm
3	M trailing arm
4	M camber control arm
5	M rear axle support
6	M wishbone
7	M track control arm
8	M wheel carrier

The M wishbone, M wheel carrier and the M wheel bearing units have been developed new for the G80/G82. All trailing arms and also the wheel carrier are manufactured in aluminum forging technology. This design reduces the unsprung masses of the components responsible for wheel guidance.

G80/G82 Complete Vehicle.

6. Chassis and suspension.

G80/G82 five-link arrangement with wheel carrier

Index	Explanation
1	M wheel bearing unit with drive flange (new G80/G82)
2	M wheel carrier (new G80/G82)
3	M control arm (adopted from F8x)
4	M track control arm (adopted from F8x)
5	M wishbone (new G80/G82)
6	M rear axle support
7	M camber control arm (adopted from F8x)
8	M trailing arm (adopted from F8x)

The rear axle support itself is made from steel pipe which is similar to a steel pipe grid frame. This design is characterized by maximum rigidity and minimal weight. The M rear axle support is fixed to the body without a bearing. This fixed screw connection directly to the body ensures an optimized wheel guide and thus enhanced directional stability. In addition, through the use of diagonal struts a direct transmission of the longitudinal forces applied during braking to the body structure was achieved.

Weight savings are achieved with the aluminum spring strut and the anti-roll bar in a tubular design.

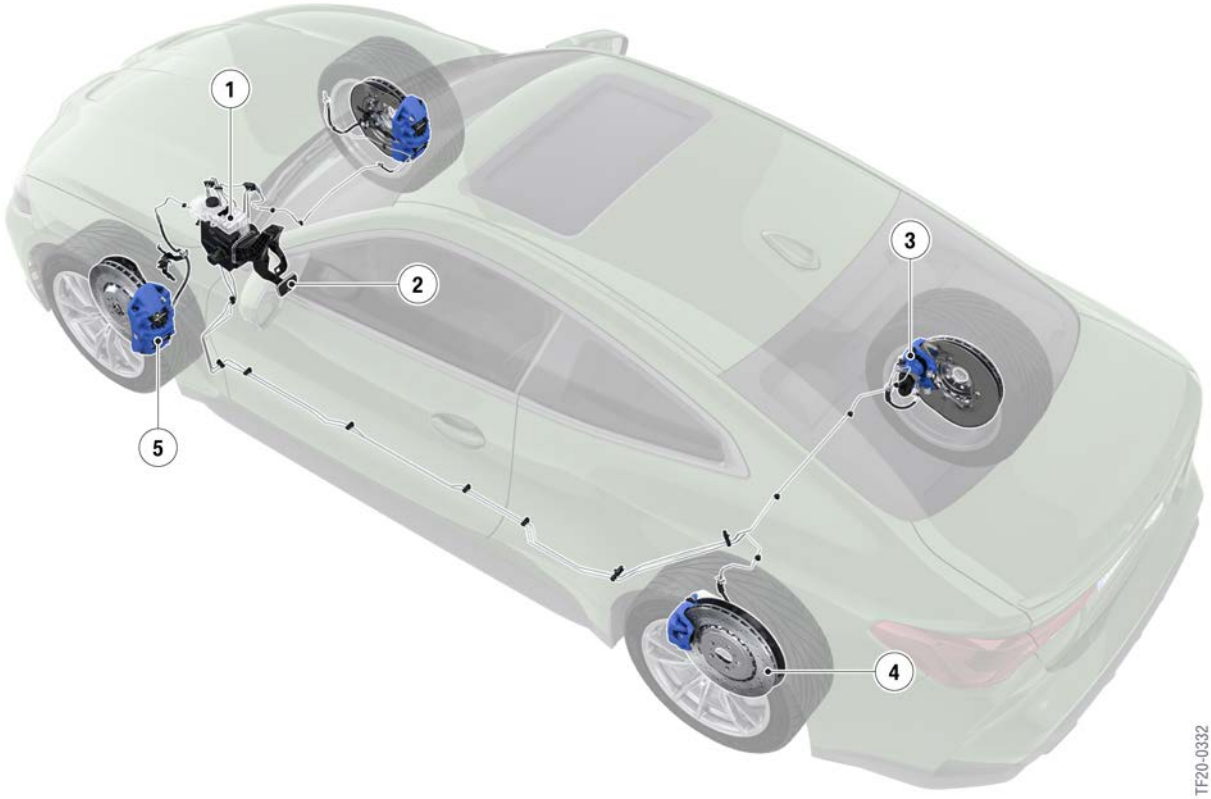
The design of the rear axle was created in close cooperation with the tires which were also specially developed for the G80/G82.

G80/G82 Complete Vehicle.

6. Chassis and suspension.

6.3. Brakes and wheels/tires

6.3.1. Brakes



G80/G82, brake system

Index	Explanation
1	M Dynamic Stability Control integrated (M DSCi)
2	Brake pedal
3	Rear single-piston floating caliper with actuator for the electromechanical parking brake
4	Rear brake disc
5	Front six-piston fixed caliper

M Compound brake

The M compound brake offers even greater braking power than the Sport brake offered in the G2x. In a direct comparison it also offers:

G80/G82 Complete Vehicle.

6. Chassis and suspension.

- Reduction in the vehicle weight, resulting in improved agility and dynamics, accelerating capability and reduced consumption.
- Reduction in the rotating mass, resulting in improved accelerating ability, response and handling.
- Increased fading stability and greater thermal resistance.
- Copper-free brake pads.
- Perforated disc ring, sports-style look, optimized response characteristics in the wet.
- Consistent realization of intelligent lightweight construction.
- Technology transfer from M sport.
- Unique, authentic M design.

Designation	Unit	F80/F82	G80/G82
Front brake		4 pistons, fixed caliper	6 pistons, fixed caliper
Brake disc, front	[mm]	380 x 30	380 x 36
Rear brakes		2 pistons, fixed caliper	1 piston, floating caliper
Brake disc	[mm]	370 x 24	370 x 24
Parking brake		mechanical	electro-mechanical

A large-sized, perforated M compound brake disc combined with a six-piston fixed caliper from Brembo is used at the front axle. Irrespective of the selected vehicle color, all brake calipers are blue metallic in color with the M logo. The colors red and black are also available as brake caliper colors at the front and rear in order to customize the BMW M3 and the BMW M4 Coupe.

Front brake, M Compound brake

A large-sized, perforated M Compound brake disc combined with a 1-piston floating caliper with electromechanical parking brake from TRW is used at the rear axle, which corresponds in design and function to the AG vehicles. Irrespective of the selected vehicle color, all brake calipers are blue metallic in color with the M logo. The colors red and black are also available as brake caliper colors at the front and rear in order to customize the BMW M3 and the BMW M4 Coupe.

With the use of the M Compound brake system, the use of sport brake pads (available separately) is recommended on race tracks.

For necessary information on spare parts, the information and specifications of the documents in the Electronic Parts Catalog (EPC) which are updated daily must be observed in each case.

For necessary service work the current information and specifications in the documents in the Integrated Service Technical Application (ISTA) must be observed in each case.

In vehicles with M Compound brake, the covers of the brake ventilation duct in the wheel arches at the front left and right must be removed before operation on the race track.

- Improved cooling of the M Compound brake on the race track is guaranteed with the removal of the covers.
- The wear and brake fading are reduced by better cooling of the M Compound brake.

In vehicles with M Compound brake, reinstall the covers of the brake ventilation duct in the wheel arches at the front left and right after operation on the race track.

- The covers reduce the ingress of water to the M Compound brake, thus improving the response characteristics of the M Compound brake in wet conditions.
- The covers have an impact on the drag coefficient, and thus on the carbon dioxide emissions.

These covers must always be installed when the vehicle is used on a public road (approval-related).

For necessary servicing and further guidance about driving on the race track, the current information and specifications in the documents in the Integrated Service Technical Application (ISTA) must be observed in each case.

M carbon ceramic brakes

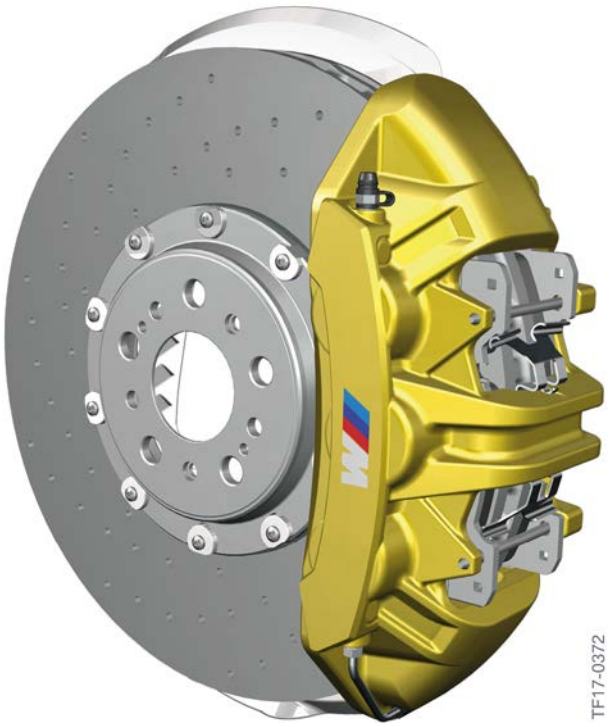
The M carbon ceramic brake is available from the series launch of the new G80/G82. The M carbon ceramic brake can be ordered as optional equipment SA 2NK.

The M Carbon ceramic brake system is also called the C/SiC brake system.

Depending on the situation, this offers a further increase in braking power as compared to the M compound brake. In a direct comparison it also offers:

G80/G82 Complete Vehicle.
6. Chassis and suspension.

- Even more direct/spontaneous use of brake force.
- Maximum heat resistance even with continuous sporty operation.
- Higher fading stability.
- Copper-free brake pads.
- Significantly reduced wear.
- 15 lb weight reduction of rotating wheel masses.
- Increased suitability for winter driving conditions thanks to corrosion resistance.



Front brake, M carbon ceramic brake

As a visible distinguishing feature to the M Compound brake system the brake calipers are painted in gold with a colored M logo.

The brake discs are manufactured by Brembo SGL Carbon Ceramic Brakes GmbH.

Designation	Unit	F80/F82	G80/G82
Front brake		6 pistons, fixed caliper	6 pistons, fixed caliper
Brake disc, front	[mm]	400 x 38	400 x 38
Rear brakes		4 pistons, fixed caliper	1 piston, floating caliper
Brake disc	[mm]	380 x 28	380 x 28
Holding brake		mechanical	electro-mechanical

In vehicles with M carbon ceramic brake, the covers of the brake ventilation duct in the wheel arches at the front left and right must be removed before operation on the race track.

- Improved cooling of the M carbon ceramic brake on the race track is guaranteed with the removal of the covers.
- The wear and brake fading are reduced by better cooling of the M carbon ceramic brake.

In vehicles with M carbon ceramic brake, reinstall the covers of the brake ventilation duct in the wheel arches at the front left and right after operation on the race track.

- The covers reduce the ingress of water to the M carbon ceramic brake, thus improving the response characteristics of the M carbon ceramic brake in wet conditions.
- The covers have an impact on the drag coefficient, and thus on the carbon dioxide emissions.

These covers must always be installed when the vehicle is used on a public road (approval-related).

For necessary servicing and further guidance about driving on the race track, the current information and specifications in the documents in the Integrated Service Technical Application (ISTA) must be observed in each case.

Brake noise

- Humming of the BMW M compound brake disc at high speeds.
- Squeaking brakes shortly before coming to a stop.
- Hooting in the event of wet, cold BMW M carbon ceramic brakes.
- Ticking noises from the area of the BMW M compound brake discs when hot.

Explain to the customer at this point that such noises occurring temporarily or in specific situations are inherent in the design and do not represent a quality problem. They are a consequence of the special performance of the brakes and do not pose any danger or risk of damage.

Point out that the customer can use his/her braking technique to help prevent the noises occurring or ensure they quickly disappear again. For example, after washing the vehicle it is important to dry the brakes out by braking (braking a few times from 31 mph to 0 is sufficient). Or that the brakes can have a tendency to squeak if they go through long periods when they are only exposed to light braking, which is why braking hard a few times can help out (= higher brake temperature). After driving the vehicle very hard and subjecting the braking system to high loads (high brake disc temperatures) the driver should try to make sure that the brakes are able to cool down while the vehicle is moving and not to keep the brakes on the first time the vehicle comes to a stop. As a result of the increased material transfer from the brake pads to the disc after very hard driving, a humming noise can occur which disappears again after a short time.

Brake dust

G80/G82 Complete Vehicle.

6. Chassis and suspension.

Brake dust is the consequence of a high-performance brake system. The BMW M models are high-performance vehicles which are designed for fast and dynamic driving and embody a racing pedigree. The specially designed brakes make possible the high braking performance required by the vehicle and in so doing generate larger amounts of dust due to the greater levels of friction. The brake dust tells the customer that his/her BMW M vehicle has been driven in an appropriate manner. What is important is to ensure that it is regularly removed by washing the vehicle, as otherwise it will eat into the surface of the wheel.

For necessary service work the current information and specifications in the documents in the Integrated Service Technical Application (ISTA) must be observed in each case.

6.3.2. Wheels/Tires

G80/G82, range of wheels

Index	Explanation
1	M wheel 824M double-spoke Orbit Grey
2	M wheel 825M double-spoke Bi-color
3	M wheel 825M double-spoke Orbit Grey-Matte
4	M wheel 826M double-spoke Bi-color
5	M wheel 826M double-spoke Jet Black

The following wheel/tire combinations are offered:

1. Styling 824M	Manufacture	Wheels/Tires		Tire manufacturer
Double spoke Orbit grey in high-gloss	Forged	Front	9.5J x 18 H2 IS20 275/40 ZR18 (103Y) XL	Yokohama Advan Sport V107, Continental SportContact 6
		Rear	10.5J x 19 H2 IS20 285/35 ZR19 (103Y) XL	

G80/G82 Complete Vehicle.

6. Chassis and suspension.

2. Styling 825M	Manufacture	Wheels/Tires		Tire manufacturer
Double spoke Bi-color diamond polished/milled in high-gloss	Forged	Front	9.5J x 19 H2 IS20 275/35 ZR19 (100Y) XL	Yokohama Advan Sport V107, Pirelli P Zero, Michelin Pilot Sport 4S
		Rear	10.5J x 20 H2 IS20 285/30 ZR20 (99Y) XL	

3. Styling 825M	Manufacture	Wheels/Tires		Tire manufacturer
Double spoke Orbit grey Rim flange diamond polished in matte	Forged	Front	9.5J x 19 H2 IS20 275/35 ZR19 (100Y) XL	Yokohama Advan Sport V107, Pirelli P Zero, Michelin Pilot Sport 4S
		Rear	10.5J x 20 H2 IS20 285/30 ZR20 (99Y) XL	

4. Styling 826M	Manufacture	Wheels/Tires		Tire manufacturer
Double spoke Bi-color diamond polished spokes in high-gloss	Forged	Front	9.5J x 19 H2 IS20 275/35 ZR19 (100Y) XL	Yokohama Advan Sport V107, Pirelli P Zero, Michelin Pilot Sport 4S, Track: Pirelli P Zero Corsa, MichelinPilot Sport Cup2
		Rear	10.5J x 20 H2 IS20 285/30 ZR20 (99Y) XL	

5. Styling 826M	Manufacture	Wheels/Tires		Tire manufacturer
Double spoke Jet Black High-gloss	Forged	Front	9.5J x 19 H2 IS20 275/35 ZR19 (100Y) XL	Yokohama Advan Sport V107, Pirelli P Zero, Michelin Pilot Sport 4S Track: Pirelli P Zero Corsa, MichelinPilot Sport Cup2
		Rear	10.5J x 20 H2 IS20 285/30 ZR20 (99Y) XL	

G80/G82 Complete Vehicle.
6. Chassis and suspension.

Wheel/tire combinations:

Styling	1. 824M	2. 825M	3. 825M	4. 826M	5. 826M
Optional equipment	SA 1T5	SA 1T6	SA 1T7	SA 1T8	SA 1U0
Basic model Manual gearbox Rear-wheel drive	Standard	OE	OE	OE	OE
Competition model Automatic transmission Rear-wheel drive	Standard	OE	OE	OE	OE
Competition model Automatic transmission Four-wheel drive	-	OE	OE	OE	OE
Snow chains	No	No	No	No	No
Tire type	Normal	Normal	Normal	Normal	Normal
SA 2NK M carbon ceramic brakes	No	No	No	Yes	Yes

For necessary service work the current information and specifications in the documents in the Integrated Service Technical Application (ISTA) must be observed in each case.

The components of the above-listed wheel/tire combinations have been developed specially for the G80/G82. This can be recognized by the star on the outer side of the tire, among other things.

Other combinations may have a negative effect on the performance and the driveability of the G80/G82.

Race track/Track tires Michelin/Pirelli

The following tire manufacturers are offered for use on the race track for the G80/G82:

- Pirelli P Zero Corsa
- Michelin Pilot Sport Cup 2.

The track tires are tires designed for the race track which also meet the legal regulations for use on public roads. These tires were optimized specifically for use on the race track in dry conditions. On wet roads or race tracks with a risk of aquaplaning, it is necessary to drive at an appropriate speed and with activated driving dynamics systems.

The tires are similar to a pure sport tire in terms of design, structure and rubber compound, but have a dominant influence on the excellent drivability of the G80/G82 thanks to their very heat-resistant rubber compound.

G80/G82 Complete Vehicle.
6. Chassis and suspension.

G80/G82, Cup tire tread

The tires are designed for maximum dry performance and offer significantly more potential for longitudinal and lateral acceleration and for steering precision than comparable standard tires. They have an asymmetrical tread pattern with a high positive pattern share (large contact surface = few recesses). Their wet performance is correspondingly reduced. The customer should be informed about this by an additional sheet as an appendix to the purchase contract when purchasing the G80/G82. The tires have the following properties and thus customer benefits:

- **High tread depth:** Improved wet grip and thus later aquaplaning tendency. This means greater safety on wet roads.
- **Two-component technology:** Two different rubber compounds on the outer side and inside of the tire tread surface. The tire outer side consists of highly linked elastomers which offer optimum grip and abrasion protection in particularly tight corners. The tire inner side comprises hard elastomers which improve steering precision and offer optimum grip on wet road surfaces.

ATTENTION

- If the tires are not used for an extended period, it is recommended to remove the wheels from the vehicle and to reduce the tire pressure to half the usual value.
- The tires should be stored in a clean, dry and dark location in accordance with the recommendations from the tire manufacturer and at temperatures above 0 °C (32 °F).
- The use, storage or handling of the tires at ambient temperatures below –10 °C (14 °F) should be avoided. Elements of the rubber compound may be damaged under these conditions. This will impair the performance characteristics of the tire and may even cause cracks or breaks in the tire tread which make further use of the tire impossible.
- Never use a tire that has cracks, breaks or other damage on the tire tread or sidewalls. In case of doubt, the customer should consult BMW Service.
- In the case of intensive race track use, the tires or tire casing may become damaged after extended driving and frequent driving over the curbs.
- The tires must be checked carefully if they have been frequently driven over curbs or the vehicle has left the track. In such a case, it is necessary to remove the tire from the wheel in order to inspect both the outer and inner sides of the tire.
- A visual check of the tires must be performed after every “run” and before returning to the track.

The following must be observed before intensive race track use:

- Use track tires recommended for use on the race track, "Pirelli P Zero Corsa" or "Michelin Cup 2".
- Always check the condition of the tires for wear and possible damage.
- Warm up the tires by driving moderately for a few laps.
- The optimal tire pressure is between 2.3 bar (33 psi) and 2.7 bar (39 psi) when warm. If the tire pressure for use on the race track falls below the level of the cold tire inflation pressure approved for use on public roads, a filling pressure warning can be avoided in the electronic tire pressure specification by selecting "other tires" and then "Reset".
- Never drive with a tire pressure of less than 1.9 bar (27.5 psi).

Cooling laps

- Directly following the intensive race track use the vehicle may not be stopped straight away for an extended period (e.g. refueling stops).
- It must be driven initially at reduced speed and without using the brakes where possible in order to cool down the entire vehicle and in particular the brake system and the tires.

Observe the following after race track use and before driving on public roads:

- Allow the tires/brakes to cool down before making corresponding tire pressure adjustments.
- Adjust the tire pressure recommended by the vehicle manufacturer on the cold tire.
- Always check the condition of your tires to make sure that they comply with the legal regulations for use on public roads.
- If the driving dynamics systems were deactivated, activate these again.

TIRE PRESSURE RECOMMENDATIONS

The correct tire pressures for approved tire sizes can be found on the B pillar of the driver's door or in the electronic tire pressure specification. Further information on tire pressures is provided in the Supplementary Owner's Manual. The pressure specifications apply for tires at ambient temperature.

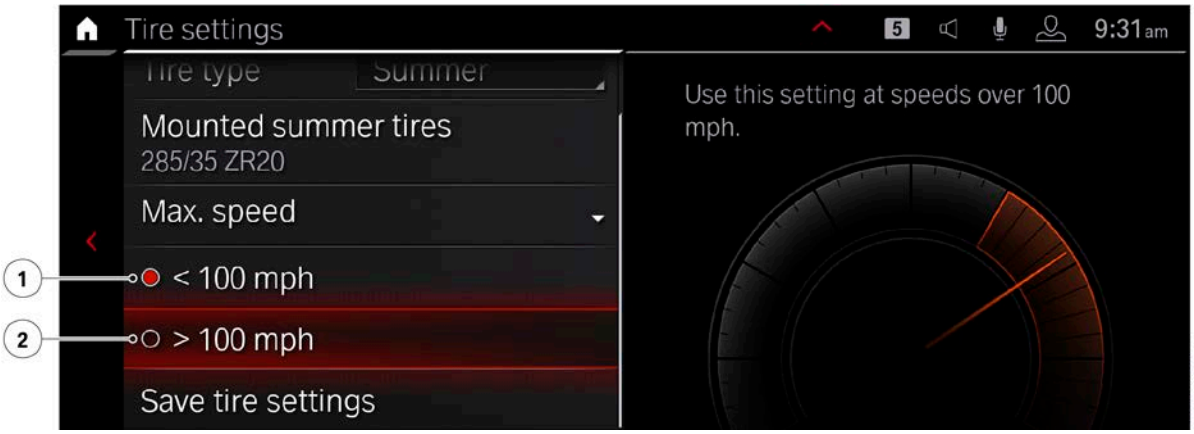
For necessary servicing and further guidance about driving on the race track, the current information and specifications in the documents in the Integrated Service Technical Application (ISTA) must be observed in each case.

Electronic tire pressures plate

Function adaptations to the electronic tire pressure specification increase comfort and traction potential in the G80/G82 with M Drivers package SA 7ME.

The changes make it possible to offer the customer an additional, speed-monitored tire inflation pressure level as follows:

- Tire inflation pressure level " < 100 mph" - up to 100 mph.
- Tire inflation pressure level " > 100 mph" - up to the maximum speed



G80/G82, electronic tire pressure specification

Index	Explanation
1	< 100 mph
2	> 100 mph

When the respective load status is selected, the tire pressure setpoint values to be set are displayed for the customer.

The tire inflation pressure level "< 100 mph" can be driven up to a maximum speed of 100 mph. If the tire inflation pressure level is not adjusted for the "> 100 mph" range by the customer, the customer - if a speed of 100 mph is exceeded - receives a Check Control message with the prompt to adjust the tire inflation pressure.

The Check Control message is output in 2 priorities:

Priority	Check Control message	Information
1	High speed. Increase tire pressure.	None
2	High speed. Increase tire pressure.	Increase tire pressure. Increase tire pressures for journeys in the high-speed range. Correctly set load status for speed range under "Tire pressure control (TPM)". For further information, see operating instructions.

6.4. Driving dynamics systems

The M-specific coordination of the driving dynamics (longitudinal, transverse and vertical) was realized on the Nürburgring Nordschleife. The main criteria were handling and the lap times.

6.4.1. Vertical Dynamics Management

The EDC function integrated in the M vertical dynamic platform (M VDP) controls the adjustable dampers.

The handling can be further shifted in the direction of individual driving dynamics via the SETUP button in the center console. The program selection can also be preconfigured in the Head Unit High 3 (HU-H 3) and selected using the corresponding M1/M2 buttons on the steering wheel.

Adaptive M suspension (EDC)

None of the EDC control valves known from the G2x are installed on the shock absorbers on the outside, but inner control valves typical of the M design are used. The shock absorbers have been developed with the supplier ZF Sachs and the system adapted to the G80/G82.

The EDC works with infinitely variable valves in the absorbers. The hydraulic oil flow is controlled via electromagnetic control valves. It is thus possible to make available the damping force actually required at all times. The infinitely variable control principle was introduced for the first time in the E65 and has consistently been further developed.

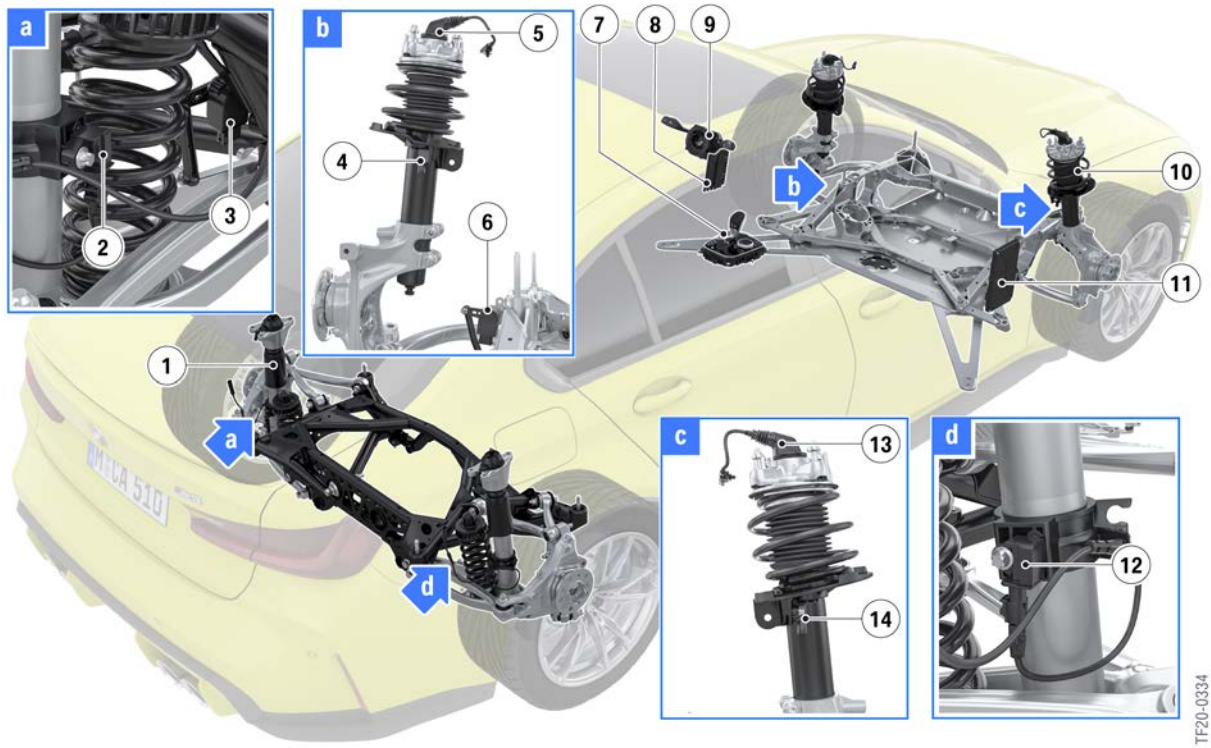
The following variables, among others, were processed into the corresponding control variables in the M vertical dynamic platform (M VDP): vertical acceleration, wheel speeds (M DSCi), steering angle change (M EPS), angle change rate (ACSM) and damper piston speed.

In addition, the ride height between the wheel suspension and body is used as a control, reference and load variable and is read off of the ride height sensors of the headlights. There is 1 sensor each at the front and rear. They operate on the basis of the potentiometer principle and their signal is made available to the M vertical dynamic platform (M VDP).

G80/G82 Complete Vehicle.

6. Chassis and suspension.

System overview



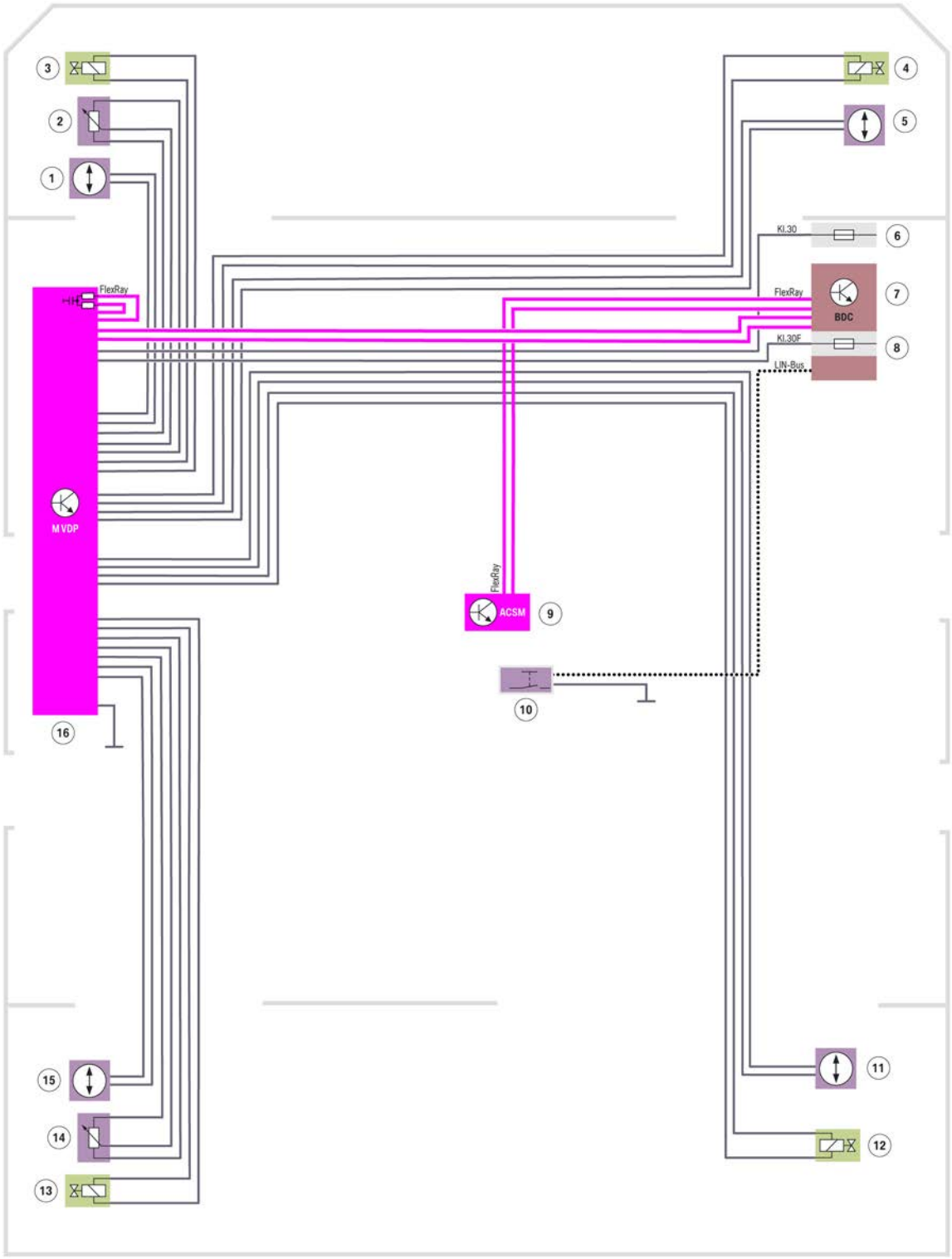
G80, EDC system overview

Index	Explanation
1	Electronic adjustable damper, rear
2	Rear left vertical acceleration sensor
3	Ride height sensor, rear left
4	Vertical acceleration sensor, front left
5	Electrical connection, EDC valve
6	Ride height sensor, front left
7	SETUP button
8	M vertical dynamic platform (M VDP)
9	Steering column switch cluster (SZL)
10	Electronic adjustable damper, front
11	Body Domain Controller (BDC)
12	Rear right vertical acceleration sensor
13	Electrical connection, EDC valve
14	Front right vertical acceleration sensor

G80/G82 Complete Vehicle.

6. Chassis and suspension.

System wiring diagram



G80/G82, EDC system wiring diagram

Index	Explanation
1	Vertical acceleration sensor, front left
2	Ride height sensor, front left
3	EDC control valve, front left
4	EDC control valve, front right
5	Front right vertical acceleration sensor
6	Power distribution box, front
7	Body Domain Controller (BDC)
8	Fuse 30F Body Domain Controller (BDC)
9	Crash Safety Module (ACSM)
10	SETUP button
11	Rear right vertical acceleration sensor
12	EDC control valve, rear right
13	EDC control valve, rear left
14	Ride height sensor, rear left
15	Rear left vertical acceleration sensor
16	M vertical dynamic platform (M VDP)

System function

The Electronic Damper Control (EDC) is a variable, electronically controlled shock absorber adjustment system that controls the vertical dynamics. The front axle damper and rear axle damper can be controlled independent of each other. The EDC adapts the damping forces of the shock absorber more or less instantly to the changing road or driving conditions.

The EDC consists of the following components:

- 4 continuously variable shock absorbers with coupled rebound/compression stage adjustment.
- M VDP control unit.
- 2 vertical acceleration sensors on the front axle (spring plate of shock absorber) for determining the wheel movement.
- 2 vertical acceleration sensors on the rear axle (shock absorber) for determining the wheel movement.
- 2 ride height sensors.
- Body Domain Controller (BDC) as gateway.

The sensors in the vehicle permanently measure the following:

- Body and vertical acceleration
- Current lateral/longitudinal acceleration
- Vehicle speed
- Steering wheel position

Based on this measured data, the M VDP control unit calculates the control commands to be sent to the electromagnetic valves in the shock absorbers for each individual wheel according to the road profile and driving situation. This means that the damping forces will always be applied according to requirements.

This improves ride comfort and also increases driving dynamics.

This is expressed as follows:

- Suitability for long-distance journeys.
- Enhanced body stability and agility.
- Improves driving safety by minimizing wheel load fluctuations and reducing the stopping distance.

Adaptive M suspension (EDC) button option

The SETUP button is connected via the LIN bus to the Body Domain Controller (BDC). The Body Domain Controller BDC forwards this information via the FlexRay bus to M VDP.

The Dynamic Damper Control on the G80/G82 offers the options "Comfort", "Sport" and "Sport+". All 3 programs feature M dynamic control on the G80/G82.

Note:

In the first E92/E90 M3 models, the EDC had the 3 options, "Comfort", "Normal" and "Sport", whereby with the "Sport" option there is no M dynamic control, but the dampers are set very hard. This is primarily suited for a cone slalom on an even surface. However, the fastest possible times on normal roads cannot be achieved with the "Sport" option. The E93 M3 was dynamically controlled in "Sport" mode on standard production models upwards, and all succeeding models including the G80/G82 are dynamically controlled in "Sport+" mode.

SETUP button, program description, EDC:

- "COMFORT" emphasizes the comfortable design in the G80/G82 in order to satisfy the comfort requirements of a BMW M3 and BMW M4 Coupe customer. The basic damper hardness is comfortable without forfeiting safe handling in an emergency (such as during rapid evasive maneuvers).
- "SPORT" supports a demanding M dynamic and sporty driving style with increased basic damper stiffness and sufficient remaining comfort (for example on country roads or bumpy race tracks such as the Nürburgring Nordschleife).
- "SPORT+" on the G80/G82 now also means that M dynamic control comes into effect with the basic damper stiffness being further increased relative to "Normal". It may therefore also be the best selection for the fastest times on different route profiles on very even surfaces, unlike a route profile similar to a “cone-lined slalom”. For very uneven routes this program may not be optimal.

6.4.2. M Dynamic Stability Control integrated (M DSCi)

In contrast to the G2x derivatives, the G80/G82 exclusively receives the Dynamic Stability Control integrated (DSCi) appropriate for the F91/F92/F93 and F95/F96. The basic functions of the Dynamic Stability Control integrated (DSCi) for the other M derivatives with Dynamic Stability Control integrated (DSCi) do not differ.

The M Dynamic Stability Control integrated (DSCi) was able to be optimized in the G80/G82 in the following:

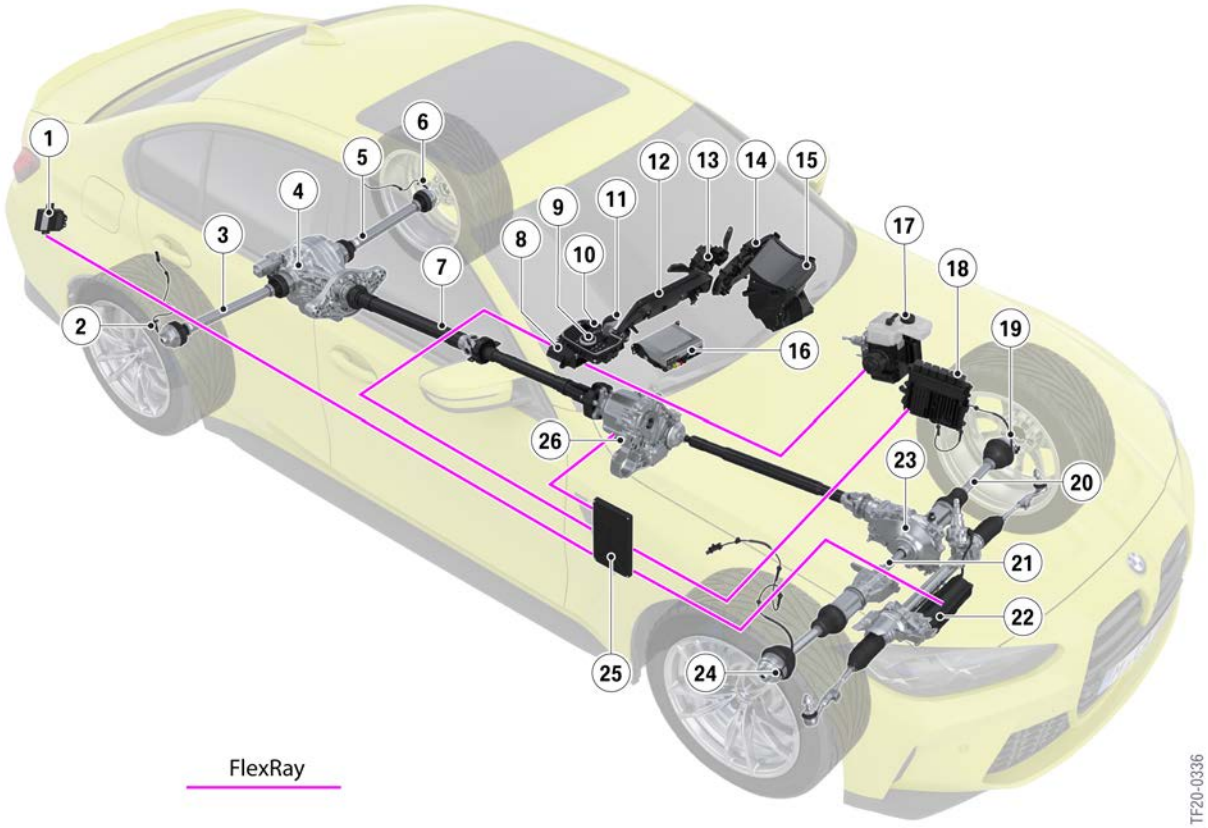
- Through further adjustment of the DSCi with the actuator wheel slip limitation (ARB) in the DME and also for the all-wheel drive in the M VTG, the control conditions and control speeds of the DSCi could be further improved for the G80/G82.
- In relation to the control characteristics in M Dynamic Mode (MDM) of the G80/G82, further improvements in the control characteristics of the highly dynamic M Dynamic Mode (MDM) program could be implemented with help of the actuator wheel slip limitation (ARB).

Further information on Dynamic Stability Control integrated and its function can be found in the reference manual "ST1852 DSCi".

M Dynamic Stability Control integrated (M DSCi) represents the longitudinally dynamic system network in the G80/G82. This control unit coordinates the interaction between the M EPS, DME, M VTG (for the M all-wheel drive) and the regulated M rear axle differential lock (M GHAS).

G80/G82 Complete Vehicle.

6. Chassis and suspension.



G80, longitudinal dynamics system overview

Index	Explanation
1	Regulated M rear axle differential lock (M GHAS)
2	Wheel speed sensor, rear right
3	Output shaft, rear left
4	M rear axle differential lock
5	Output shaft, rear left
6	Wheel speed sensor, rear left
7	Prop shaft
8	Crash Safety Module (ACSM)
9	Controller (CON)
10	SETUP button
11	M gear selector switch (M GWS)
12	Central information display (CID)
13	Steering column switch cluster (SZL)
14	Instrument cluster (KOMBI)
15	Head-Up Display (HUD)

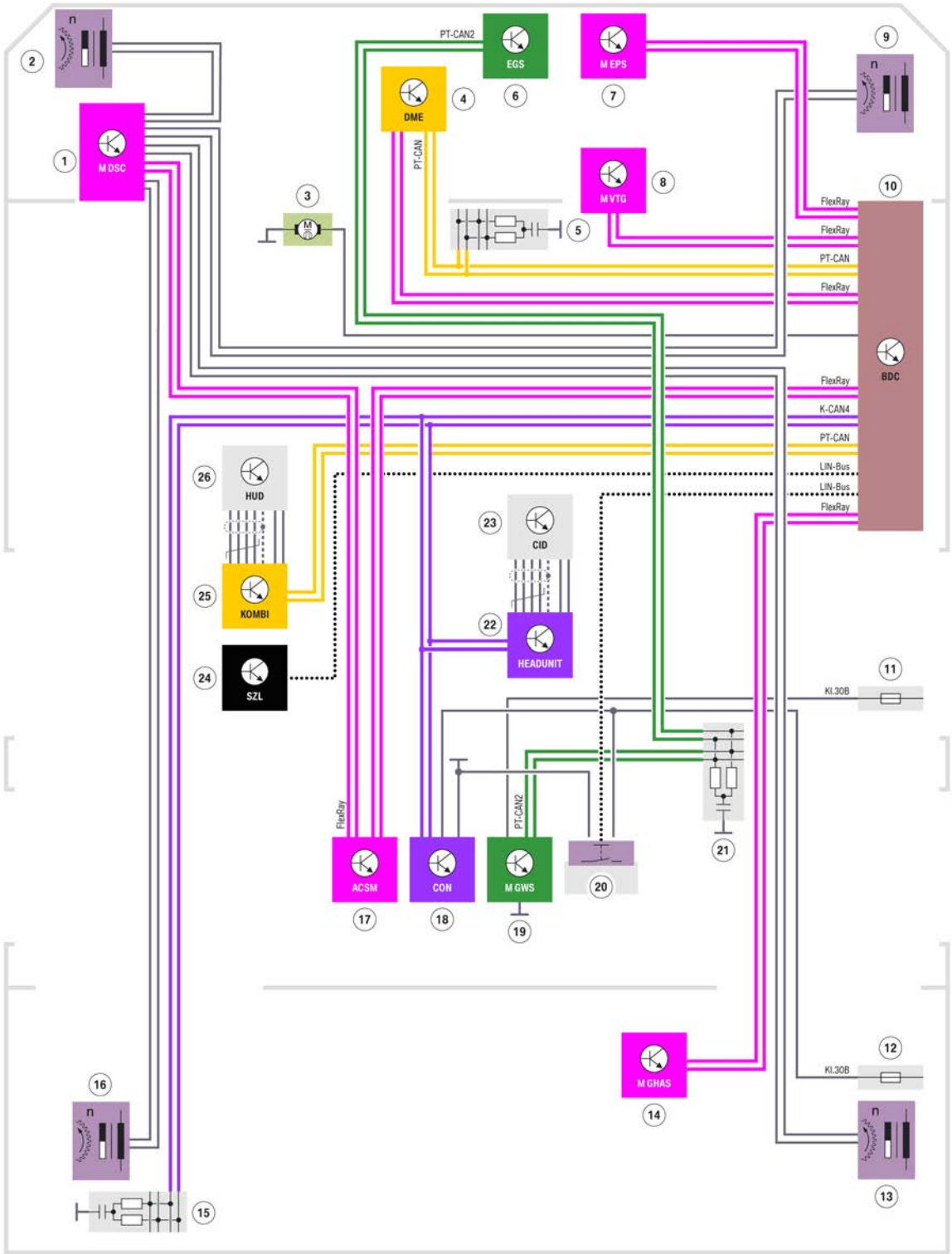
G80/G82 Complete Vehicle.
6. Chassis and suspension.

Index	Explanation
16	Head Unit High 3 (HU-H 3)
17	M Dynamic Stability Control integrated (M DSCi)
18	Digital Motor Electronics (DME)
19	Wheel speed sensor, front left
20	Output shaft, front left
21	Output shaft, front right
22	M Servotronic (M EPS)
23	Front axle differential
24	Wheel speed sensor, front right
25	Body Domain Controller (BDC)
26	M transfer box (M VTG)

G80/G82 Complete Vehicle.

6. Chassis and suspension.

System wiring diagram



G80/G82, longitudinal dynamics system wiring diagram

Index	Explanation
1	M Dynamic Stability Control integrated (M DSCi)
2	Wheel speed sensor, front left
3	Auxiliary coolant pump, heating
4	Digital Motor Electronics (DME)
5	PT-CAN terminating resistor
6	Electronic transmission control (EGS)
7	M Servotronic (M EPS)
8	M transfer box, (M VTG)
9	Wheel speed sensor, front right
10	Body Domain Controller (BDC)
11	Power distribution box, front
12	Power distribution box, rear
13	Wheel speed sensor, rear right
14	Regulated M rear axle differential lock (M GHAS)
15	K-CAN4 terminating resistor
16	Wheel speed sensor, rear left
17	Crash Safety Module (ACSM)
18	Controller (CON)
19	M gear selector switch (M GWS)
20	SETUP button
21	PT-CAN2 terminating resistor
22	Head Unit High 3 (HU-H 3)
23	Central information display (CID)
24	Steering column switch cluster (SZL)
25	Instrument cluster (KOMBI)
26	Head-Up Display (HUD)

6.4.3. Integrated actuation (longitudinal transverse dynamics)

What is known as integrated actuation is used on the G80/G82. The integrated actuation in M DSCi comprises DSC, which is responsible for the longitudinal dynamics, and a virtual integration platform control unit (VIP) integrated in the DSC control unit. This means that the current customer request is distributed to the appropriate actuator via this M DSCi control unit. That results in the following customer benefits when driving the G80/G82:

- Excellent traction, especially on low coefficients of friction.
- M-specific agility and playfully intuitive control of the vehicle.
- Superiority in every day use.
- Depending on the customer request, variable functions of the M xDrive possible.

Depending on the customer request, the following actuator and following control units are used:

- M Servotronic (M EPS)
- M VDP Electronic Damper Control (EDC)
- M regulated M rear axle differential lock (M GHAS)
- M Dynamic Stability Control integrated (M DSCi)
- M transfer box (M VTG)
- Digital Motor Electronics (DME)

Further information about the integrated actuation can be found in the reference manual for the "ST1915 F91/F92 Complete Vehicle".

The virtual integration platform control unit (VIP) is not a separate control unit, but is integrated in M DSCi. It therefore cannot be replaced separately.

6.4.4. Actuator contiguous wheel slip limitation (ARB)

The new feature of the actuator wheel slip limitation is the shift of the slip controller from the Dynamic Stability Control integrated (DSCi) control unit to the engine control (DME). This reduces the control times significantly and therefore increases the performance of the traction control system. The function is particularly apparent in high-torque drive systems. The actuator wheel slip limitation is familiar from the I01 LCI vehicles. I01s LCI and F44. Whether the wheel slip occurs at the rear wheels like in the G80/G82 with rear-wheel drive or at the front wheels in the aforementioned vehicles as front-wheel drive does not change the operating principle of the actuator wheel slip limitation (ARB).

Actuator wheel slip limitation ARBx in the M all-wheel drive

The key new feature of the actuator wheel slip limitation in the G80/G82 is the further shift of the slip controller for the longitudinal dynamics of the M xDrive from the virtual integration platform control unit (VIP) to the M transfer box (M VTG). This reduces the control times again significantly and therefore increases the performance of the traction control system.

The M transfer box can now adjust speed differences between rear and front axles within certain limits, without having to wait on the "slow" control loop via the virtual integration platform control unit.

This means that high differential speed peaks between front axle and rear axle in the multidisc clutch of the M transfer box can be avoided. The result is a significant improvement of the all-wheel drive performance of the M xDrive, both with regard to the driving performance such as dynamics and agility, as well as a thermal relief of the multidisc clutch and thus the transfer box oil of the M transfer box.

6.4.5. M traction control with actuator wheel slip limitation (ARB)

The G80/G82 receives the so-called M traction control in the optional equipment M Drive Professional (SA 1MB).

The following conditions must be satisfied in order to be able to use the M traction control:

- DSC OFF
- 2WD activated for the M all-wheel drive

The M traction control is a traction controller, which allows the customer in the rear-wheel drive to learn the oversteering in steps. The customer can permit an automated defined slip at the rear wheels in 10 adjustable steps.

In order to adjust the M traction control to the different ambient conditions, the M traction control with the coefficient of friction assessor detects the following conditions during the journey by means of various slip factors:

- Tire type (summer tires, winter tires, track tires, etc.)
- Tire condition (tire thread, etc.)
- Road surface (tar, gravel, concrete, etc.)
- Weather conditions (wet, dry, snow, ice, etc.)

In the lower levels of the M traction control the slip controller is wide open, this means that a large slip is permitted at the drive wheels.

In the upper levels the slip controller is largely closed and permits almost no slip at the drive wheels. The M traction control acts as a traction aid here.

The following examples should serve as a guide for the levels:

- Level 10, the highest level. Acts as a traction aid in this range, protects the rear tires and if necessary brings them to the appropriate temperature.
- Level 9, offers the best traction on race tracks, e.g. the Nürburgring.
- Level 7, the M traction control acts as a traction aid from level 7 upwards.
- Level 6, the slip controller is always wide open from level 6 downwards.
- Level 0, here the slip controller is completely open, the maximum slip at the drive wheels is permitted, without any intervention from the slip controller.

This means that with an optimally set slip controller the customer can concentrate on the necessary steering movements during the oversteer at the steering wheel without also having to control the drive torque at the same time. The customer can therefore cautiously approach the complete oversteer of the vehicle slowly in steps and learn this with help of the M traction control. In conjunction with the M Drift Analyzer, the customer can have his progress or learning success evaluated and shared with like-minded individuals. Further information about the M Drift Analyzer can be found in the chapter "M Drift Analyzer".

6.4.6. M Dynamic Mode and DSC OFF

In M Dynamic Mode (MDM) the control threshold of the brake interventions is expanded/raised and the engine power reduction by the actuator wheel slip limitation (ARB) is applied significantly later. This enables customer-oriented dynamic and sporty handling. "DSC OFF" is described separately in a later chapter.

6.4.7. Brake

The use of M Dynamic Stability Control integrated (M DSCi) enables the customer to select 2 different ranges of adjustment for the brake in the G80/G82.

In “COMFORT" and in "SPORT" different ratios are created between the vehicle deceleration and the pedal force noticeable to the driver and the brake pedal travel. In this way, the driver can decide between a comfort-oriented perception of the braking process and a particularly direct and spontaneous feedback to deceleration requests.

Program description of brake:

M Compound brake

- **"Low speed"**
  At low speeds an approximately equal deceleration is set for up to 1/5 of the brake pedal travel in COMFORT and SPORT. The upside of this is that the customer can meter the brake more sensitively at low speeds.
  In the middle range of the brake pedal travel (2/5-4/5) the deceleration in SPORT is increased compared with COMFORT. The upside of this increase is that the braking effect in SPORT increases with the same brake pedal travel. For the customer a fast-response brake is set in this range.
  At the end of the brake pedal travel (5/5) the deceleration in SPORT decreases compared with COMFORT.

- **"High speed"**
  The responsiveness at higher speed is similar to the responsiveness at low speed. However, a greater deceleration corresponding to the speed is set with the same brake pedal travel.
  At high speeds an approximately equal deceleration is set for up to 1/5 of the brake pedal travel in COMFORT and SPORT. The upside of this is that the customer can meter the brake more sensitively even at higher speeds.
  In the middle range of the brake pedal travel (2/5-4/5) the deceleration in SPORT is increased compared with COMFORT. The upside of this increase is that the braking effect in SPORT increases at high speeds with the same brake pedal travel. For the customer a fast-response, sporty brake at high speeds is set in this range.
  At the end of the brake pedal travel the deceleration in SPORT decreases compared with COMFORT. The upside of this is that the customer must actively increase the pedal force. This underlines the sporty driving feel.

M carbon ceramic brakes

Since the M carbon ceramic brake exhibits a different braking response than the M Compound brake, the settings of the brake do not have such a pronounced different effect.

- **"Low speed to high speed"**

The deceleration with regard to the speed does not have an effect as a result of the physical braking response in the M carbon ceramic brake.
An approximately equal deceleration is set for up to 1/6 of the brake pedal travel in COMFORT and SPORT. This upside of this is that the customer can meter the brake sensitively in this range.
In the remaining range of the brake pedal travel (2/6-6/6) the deceleration in SPORT is increased compared with COMFORT. The upside of this increase is that the braking effect in SPORT increases with the same brake pedal travel. For the customer a fast-response, sporty brake is set in this range.

The settings cannot be changed while the brake pedal is pressed. In other words, the last setting remains active when the brake pedal is pressed. The switch to the new setting takes place only when the brake pedal is released. However, the customer receives immediate feedback via the CID.

G80/G82 Complete Vehicle.
7. Electrical system/Electronics.

7.1. Voltage supply

A lithium-ion starter battery is installed in the G80/G82 for the voltage supply of the electrical system, like for predecessor vehicles of M GmbH. In the G80/G82 a 70 Ah lithium-ion starter battery, as known from the F91, is used.

In the G80/G82 a crash protection for the lithium-ion starter battery is used as additional protection. This is a U-shaped expanded polypropylene (EPP) shaped part, which is pulled over the battery from above and thus protects the lithium-ion starter battery to the front and rear against mechanical effects.

7.1.1. Service information

Charging

Use only BMW-recommended chargers to charge the lithium-ion starter battery during servicing.

Please observe the operating instructions of the charger manufacturer.

The maximum charging voltage of the lithium-ion starter battery of 14.4 V must not be exceeded. For this reason, use only BMW-recommended chargers for lithium-ion starter batteries.

For necessary adjustment work on the charger, the current information and specifications in the documents in the Integrated Service Technical Application (ISTA) must be observed in each case.

Identification

The lithium-ion starter battery is labeled with a corresponding sticker on the top of the battery: **"Li-ion 30"**.

Replacement

Lithium-ion starter batteries do not differ in appearance but in terms of the different vehicle electrical systems of the F80/82/83, F90/F91/F92/F93 and G80/G82 and the resulting software differences of the battery supervision circuits (BUE). The G80/G82 lithium-ion starter batteries are therefore not compatible with the F8x M3/M4 and F90 and vice versa. The batteries can be differentiated using the part numbers of the lithium-ion starter batteries.

General handling of lithium-ion starter battery

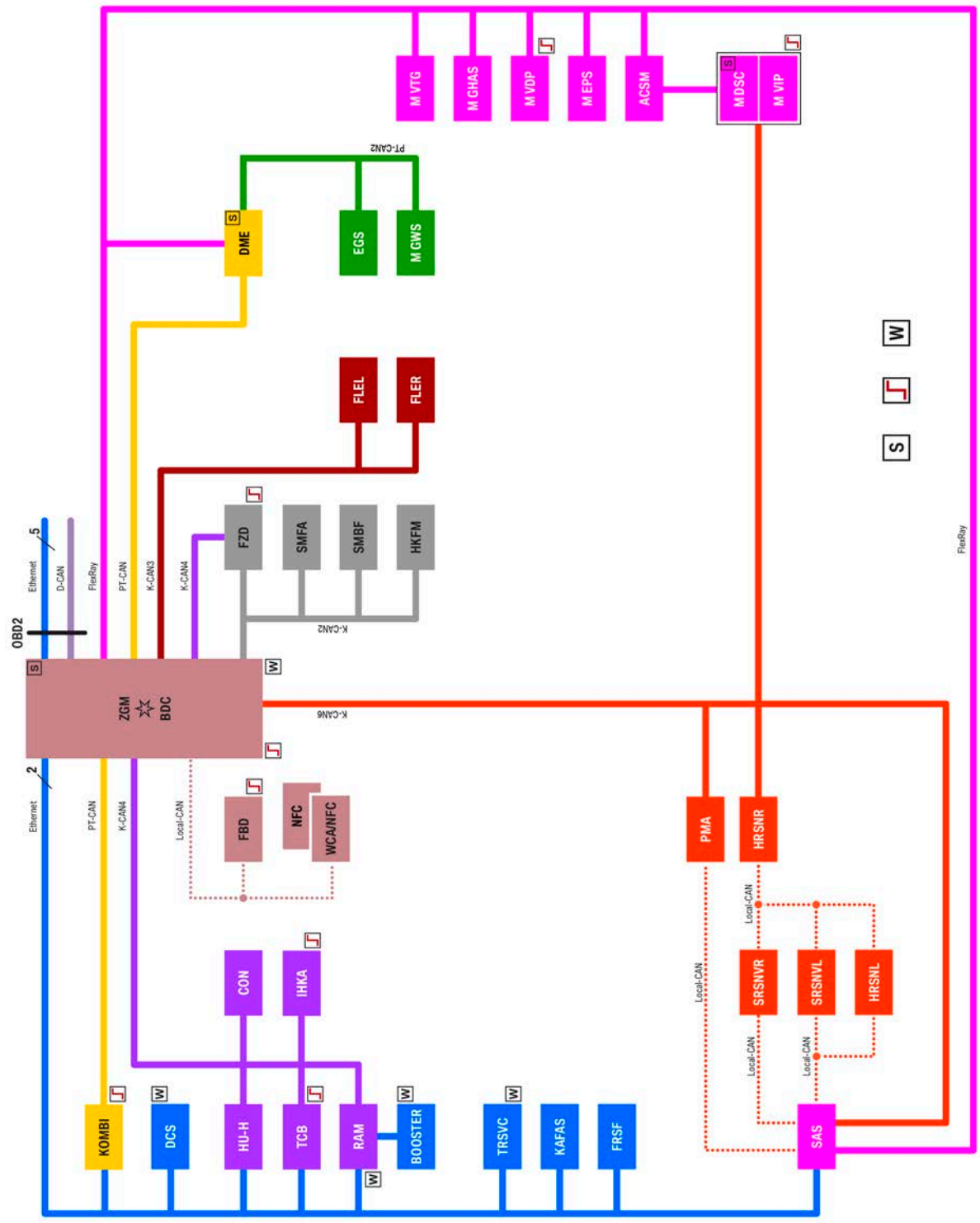
Instructions on the handling of lithium-ion starter battery are available in the safety data sheet.

When performing the necessary service work, it is always important to follow the current information and specifications in the documents in the workshop information system ISTA.

G80/G82 Complete Vehicle.

7. Electrical system/Electronics.

7.2. Bus overview



G80, data bus overview

Index	Explanation
1	Start-up node control units for starting and synchronizing the FlexRay bus system
2	Control units authorized to perform wake-up function
3	Control units additionally connected to the wake-up line
ACSM	Advanced Crash Safety Module
BDC	Body Domain Controller
BOOSTER	Hi-fi amplifier
CON	Controller
DME	Digital Motor Electronics
DCS	Driver Camera System
EGS	Electronic transmission control
FBD	Remote control receiver
FLEL	Frontal Light Electronics Left
FLER	Frontal Light Electronics Right
FRSF	Front radar sensor long range
FZD	Roof function center
HKFM	Tailgate function module
HRSNL	Rear radar sensor short range left
HRSNR	Rear radar sensor short range right
HU-H	Head Unit High 3 (HU-H 3)
IHKA	Integrated automatic heating / air conditioning
KAFAS	Camera-based driver assistance systems
KOMBI	Instrument cluster
NFC	Near Field Communication
NVE	Night Vision Electronics
M DSC	M Dynamic Stability Control integrated
M EPS	M Servotronic
M GHAS	Regulated M rear axle differential lock
M GWS	M gear selector lever
M VDP	M vertical dynamic platform
M VIP	M Virtual Integration Platform
M VTG	M transfer box
PMA	Parking Assistant
RAM	Receiver Audio Module
SAS	Optional equipment system

Index	Explanation
SMBF	Front passenger seat module
SMFA	Driver's seat module
SRSNVL	Side radar sensor short range front left
SRSNVR	Side radar sensor short range front right
TCB	Telematic Communication Box
TRSVC	Top rear side view camera
WCA	Wireless charging station
ZGM	Central gateway module

There are the following deviations in comparison with the G2x:

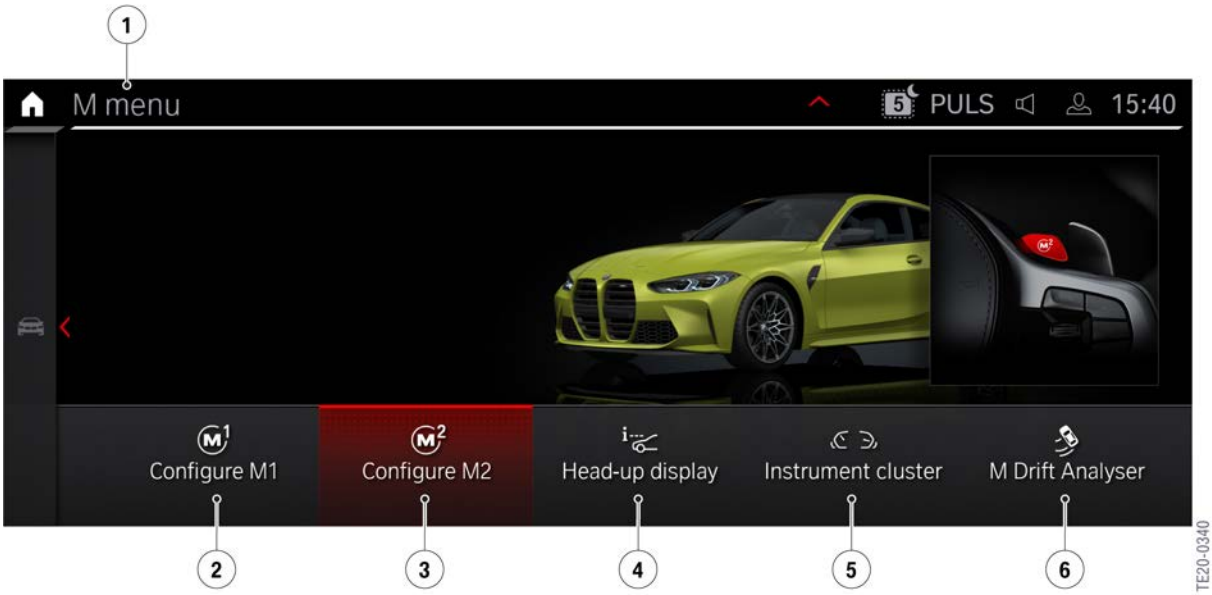
By means of the special M GmbH software application the control units for Electronic Power Steering (EPS), transfer box (VTG), Dynamic Stability Control (DSC), integrated virtual integration platform control unit (VIP), regulated rear axle differential lock (GHAS) and vertical dynamic platform (VDP) become M Servotronic (M EPS), M transfer box (M VTG), M DSC, M VIP, M GHAS and M vertical dynamic platform.

PT-CAN2
By means of the special M GmbH software and hardware application, the GWS gear selector switch becomes the M GWS gear selector switch with Drivelogic button.

7.3. On-board information

7.3.1. M menu

The M menu serves as a main menu with an overview of the M-specific content. You can navigate to the M menu via the HMI interface.



G80/G82, M menu

Index	Explanation
1	M menu
2	Configure M1
3	Configure M2
4	Head-Up Display
5	Instrument cluster
6	M Drift Analyzer

7.3.2. M SETUP

Configuration via the center console switch cluster:

The M SETUP menu is used for the direct adjustment of the M Drive functions with which personal driving profiles can be set and saved. The respective configurations can also be displayed in a widget of the instrument cluster.

G80/G82, center console switch cluster

Index	Explanation
1	M MODE
2	SETUP button (direct entry into the M menu in the Head Unit High 3 (HU-H 3))
3	Sound pattern

It is possible to switch directly to the M SETUP display in the Head Unit High 3 (HU-H 3) via the "SETUP" button in the center console.

Configuration via the Head Unit High 3 (HU-H 3):

The following personal driving profiles of the M Drive* functions can be set via the M SETUP menu:

- Engine
- Gear Shift Assistant (only for manual transmission)
- Chassis and suspension
- Steering
- Brake
- M xDrive (only with M all-wheel drive)
- M traction control (only in conjunction with the optional equipment M Drive Professional SA 1MB)*

G80/G82, M SETUP menu (example)

Index	Explanation
1	Engine
2	Chassis and suspension
3	Steering
4	Brake
5	M xDrive

7.3.3. M configuration

The M Drive function "Configure" includes two independent HMI menus: "Configure M1" and "Configure M2". In these menus all subsystems of the M Drive* functions can be individually configured.

M configuration HMI menu

The following subsystems are included in the M configuration:

- Engine
- Gear Shift Assistant (only for manual transmission)
- Transmission program (only with automatic transmission)
- Transmission Drive Logic level (only with automatic transmission)
- Chassis and suspension
- Steering
- Brake
- DSC
- M xDrive (only with M all-wheel drive)

- M traction control (only in conjunction with the optional equipment M Drive Professional SA 1MB)
- Start/Stop
- Sound Control

M xDrive can only be freely configured in the status "DSC OFF".

M traction control can only be freely configured in the status "DSC OFF" and "M xDrive 2WD".

G80/G82, M configuration (section)

Index	Explanation
1	Steering
2	Brake
3	DSC
4	M xDrive
5	Auto start/stop function
6	Sound Control

*The scope of the available M Drive functions is dependent on the optional equipment of the vehicle.

M buttons on M steering wheel

The settings performed there are called up by pressing the corresponding button of the 2 available M buttons on the multifunction steering wheel.

G80/G82, M buttons

Index	Explanation
1	M1 button
2	M2 button

The changed setting can also be permanently assigned to one of the two M buttons on the steering wheel. For this, the corresponding button is pressed and held down until the acoustic confirmation. The current configuration is assumed and overwrites the previously saved setting. This enables a quick adaptation or saving without calling up the M menu.

The activation of an M configuration is indicated by an M1 or M2 symbol in the instrument cluster.

Special features in the operation of the M configuration

- The configuration of the subsystem statuses via the menus "Configure M1" or "Configure M2" does not have a direct impact on the statuses of the respective subsystems. The subsystems only assume their individual statuses upon activation of a M configuration via the respective M buttons.
- However, if the selected M configuration is already active, a configuration via the corresponding menu has a direct impact on the statuses of the subsystems. This means that, for example, with an active M1 configuration a direct status change of the subsystems can be realized through customizing via the "Configure M1" menu. In this case the M configuration still remains active.
- An active M configuration is deactivated by pressing the corresponding M button again. A deactivation sets all subsystems of the M configuration to the defined start-up statuses.
- An active M configuration is automatically "exited" as soon as a subsystem changes its status (e.g. with operation via the M SETUP menu, change of the driving program using the gear selector switch or operation of the sound or automatic engine start-stop function button in the center console).

- In the menus "Configure M1" and "Configure M2" the last menu item is a "Reset" button. After operation and confirmation this results in the adjustment of the factory settings of the desired M configuration. If the M configuration is active at the time of the reset, it is deactivated and the start-up status is set.
- An efficient/comfortable configuration is set by default at the factory for the M1 button and a sporty configuration for the M2 button.
- The M1 and M2 configurations are assigned to the currently active driver profile. Separate M configurations can be assigned to each driver profile.

Default settings

M1/M2 is automatically deactivated when the vehicle is exited and locked. As a result, on restart the default setting is obtained again without M1 or M2 being active. This ensures that subsequent customers are not confronted with a configuration of the vehicle which could potentially overextend them in driving dynamics terms.

The default settings are therefore configured for comfortable, safe and efficient. The customer can however at any time as desired activate his/her individual settings at M1/M2.

The following table shows the default settings when starting and the factory settings of M1/M2.

System	Control unit	Setting	Start	M1	M2
DSC	M DSCi	ON	X	X	
		MDM			X
		OFF			
M xDrive	M DSCi	4WD	X	X	
		4WD SPORT			X
		2WD			
Engine dynamics control	DME	EFFICIENT	X		
		SPORT		X	
		SPORT PLUS			X
Electronic Damper Control	M VDP	COMFORT	X		
		SPORT		X	
		SPORT PLUS			X
M Servotronic M EPS	M EPS	COMFORT	X	X	
		SPORT			X
Brake	M DSCi	COMFORT	X	X	X
		SPORT			
Gearbox: D/S	EGS	D	X	X	
		Sequential			X
Gearbox: Drivelogic	EGS	1	X		

System	Control unit	Setting	Start	M1	M2
		2		X	
		3			X
Sound pattern	DME	SPORT	X	X	X
		COMFORT			
MSA	DME	ON	X*		
		OFF		X	X
Gear Shift Assistant	DME	ON	X	X	
		OFF			X
M traction control	DME	Level 0	X	X	X

* US version: Last activated setting by the customer remains active.

7.3.4. Subsystems of the M Drive function

M Dynamic Stability Control, M DSC

- **ON**: Maximum possible driving stability with 4WD
- **MDM**: Reduced stabilizing interventions with 4WD Sport. Permits driving with a higher lateral and longitudinal acceleration on dry and wet roads
- **OFF**: Stability control switched off. ABS control remains active.

DSC OFF

Upon deactivation of the DSC, the customer can freely configure the M xDrive via the M SETUP menu. In DSC OFF the customer can select 1 of 3 M xDrive settings:

4WD DSC OFF with traction-optimized all-wheel drive and neutral handling

4WD SPORT DSC OFF with sporty agile all-wheel drive

- Oversteering possible

2WD DSC OFF with pure standard drive

- Unlimited oversteering possible

The selected M xDrive setting is displayed in the instrument cluster.

Engine dynamics control

- **EFFICIENT**: Comfortable response (urban traffic, on snow), minimized consumption.
- **SPORT**: Dynamic, sports-style responsiveness.
- **SPORT PLUS**: Spontaneous and direct response characteristics with maximum dynamics.

Electronic Damper Control

- **COMFORT**: Comfort-optimized tuning.
- **SPORT**: Balanced.
- **SPORT PLUS**: Consistently sporty.

M Servotronic

- **COMFORT**: Medium steering force, noticeable feedback.
- **SPORT**: High steering force, significant feedback.

Brake

- **COMFORT**
- **SPORT.**

Transmission

- D1: Automatic shifting, efficient shift points. Maximum shifting speed.
- D2: Automatic shifting, sporty shift points. Maximum shifting speed.
- D3: Automatic shifting, performance-oriented shift points. Maximum shifting speed.
- S1: Sequential shifting. Comfortable shifting speed.
- S2: Sequential shifting. High shifting speed.
- S3: Sequential shifting. Maximum shifting speed.

Sound Control sound pattern Active Sound Design ASD and exhaust flaps

- **COMFORT** (OFF) sound of the exhaust system, comfort.
- **SPORT** (ON) sound of the exhaust system, sporty.

Automatic Start/Stop function (MSA)

- **ON** Automatic engine Start/Stop function activated.
- **OFF** Automatic engine Start/Stop function deactivated.

M traction control (only with DSC OFF and 2WD)

- Adjustable in levels from 0 to 10
- Level: 0 to 5 for high coefficients of friction (e.g. dry road)
- Level: 5 to 10 is defined for low coefficients of friction (e.g. wet road)

Only in conjunction with the optional equipment M Drive Professional.

Gear Shift Assistant (only for manual transmission)

- **ON** Gear Shift Assistant assists gear change with rev matching (intermediate throttle application).
- **OFF** Gear Shift Assistant deactivated. Customer can support this himself with intermediate throttle application.

7.3.5. M MODE

To offer the customer a motorsport experience which is contrary to the intervening driver assistance systems in the G2x, the G80/G82 offers the customer the option of using the M MODE to set his/her vehicle quickly to the following demands:

- ROAD starting, same as normal vehicle operation (G2x)
- SPORT deliberate sporty driving
- TRACK* driving on the race track.

The M modes have an impact on the views in the M instrument cluster and M Head-Up Display, on the central information display and entertainment, as well as on the driver assistance systems.

M MODE Matrix

M MODE	ROAD	SPORT	TRACK*
Driver assistance systems	Driver assistance systems similar to G20/G22	Reduced driver assistance systems (information but no direct active interventions)	All driver assistance systems OFF
Intelligent Safety	All ON similar to G20/G22	Individual. Preassigned with: • Front collision warning ON • Rest OFF	All OFF
Driver information systems	All ON similar to G20/G22	But: • no-overtaking indicator • Road sign recognition	All OFF
Displays	• M KOMBI = Basic • M HUD = Basic	• M KOMBI = M View • M HUD = M View	• M KOMBI = M View+ • M HUD = M View+
Others			• CID OFF • Entertainment mute • Deactivate hazard warning flashers after emergency braking OFF • Rear-end collision warning OFF • HUD distance information OFF • Evasion Assistant OFF

The M MODE can be operated as follows:

- M MODE short press switches between ROAD and SPORT
- M MODE long press for entry into TRACK* mode, additionally with confirmation via the central information display (CID).

M MODE dependencies

System	Control unit	Characteristics	ROAD	SPORT	TRACK*
KOMBI	KOMBI	standard	X		
		M View		X	
		M View+			X
HUD	KOMBI	standard	X		
		M View		X	
		M View+			X
Intelligent Safety	BDC	All ON	X		
		Individual		X	
		All OFF			X
Driver assistance systems	SAS/M DSCi	approved	X		
		Switching-off		X	
		Switch-off & block			X
Hazard warning flashers after emergency braking	BDC	not prevented	X	X	
		prevented			X
Rear-end collision warning	HRSNL/ HRSNR	not prevented	X	X	
		prevented			X
Entertainment	HU-H	No MUTE	X	X	
		MUTE			X
Central information display	HU-H	ON	X	X	
		OFF			X

*Only in conjunction with the optional equipment M Drive Professional.

7.3.6. M instrument cluster

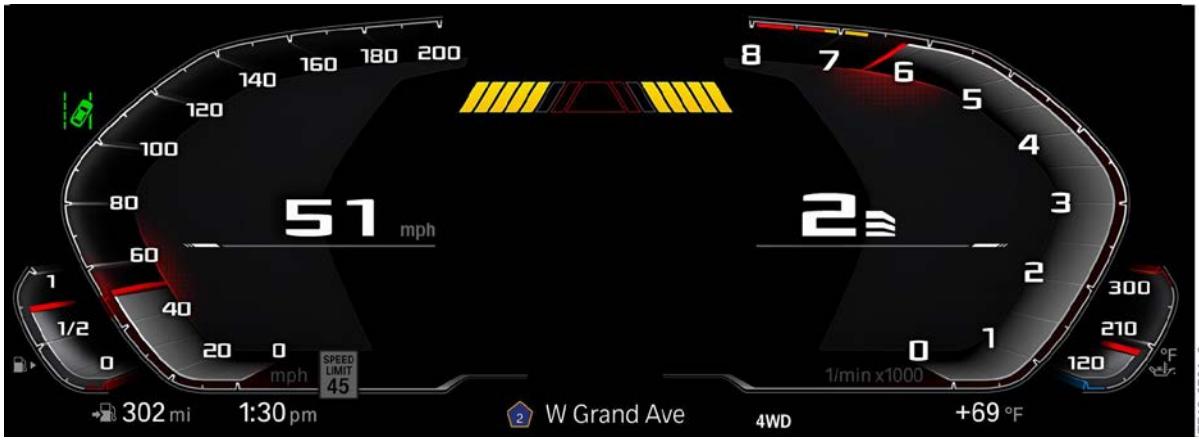
The M instrument cluster of the G80/G82 is based on the multifunctional instrument display (12.3" TFT display) of the G05/G2x and is therefore already familiar from the models.

The following M-specific changes exist in comparison with the G2x:

- Speed display and revolution counter correspond to the drive concept (200 mph in 20 mph increments, 8000 rpm)
- Typical M red needles, lighting of the dial in white (also during the day without driving lights), BMW M3/BMW M4 model inscription when starting.

3 different views are made available to the customer:

Basic view

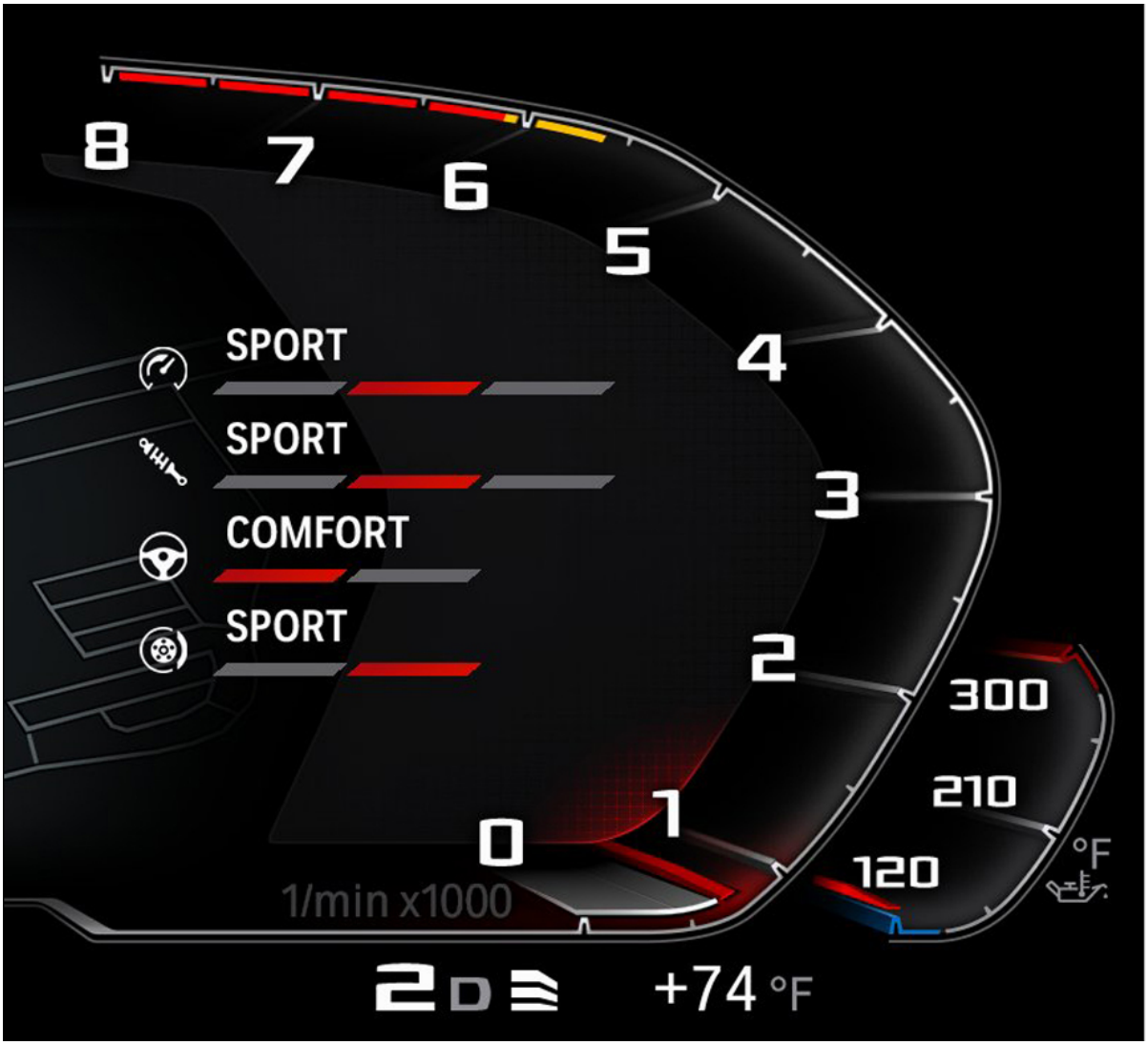


G80/G82, basic instrument cluster

M-specific displays:

- MDM M Dynamic Mode symbol instead of TRACTION
- Additional digital speedometer in km/h and mph
- Display of all-wheel-drive mode
- M1
- M2
- M Drift Analyzer/M traction level
- Display of gear
- Display of Drivelogic (bar symbol such as a button)
- Shiftlight function in the middle display range
- Temperature-dependent, variable engine-revolutions advance-warning field
- Oil temperature gauge in 90 °F increments.

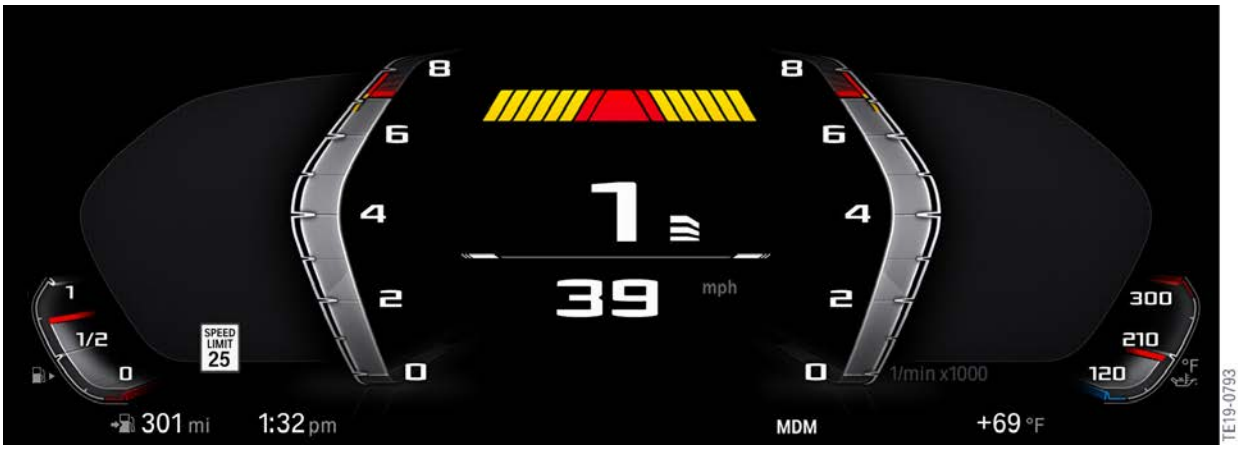
The current configuration of the engine dynamics, damper control, brake and M Servotronic systems can be shown in a widget next to the revolution counter in the instrument cluster. The widgets cannot be activated in the display configuration menu via the Head Unit High 3 (HU-H 3). The customer can quickly switch between all the widgets only via the on-board computer button.



G80/G82, M Setup widget combination display

The gear display and the Drivelogic display are then moved to an alternative position in the bottom right area of the instrument cluster.

M-specific display



G80/G82, instrument cluster M-specific

Only the essential information is displayed for the customer in the M-specific display:

- Sporty view with focus on driving, engine revs, Shiftlight function and gear display.
- No driver assistance systems superimposed in the display.
- No speed scale, speed only as a digital value.
- Transition animation between basic view and M-specific display.
- Display of “TRACK" lettering in Track mode.

The following M-specific additional displays can be superimposed in the right and left of the instrument cluster:

Display	Information about	Content
	Engine	• Coolant temperature • Charging pressure
	Tires	• Tire pressures • Tire pressure warnings • Tire air temperatures
	Centrifugal forces	• Longitudinal acceleration • Lateral acceleration • Secondary indicator

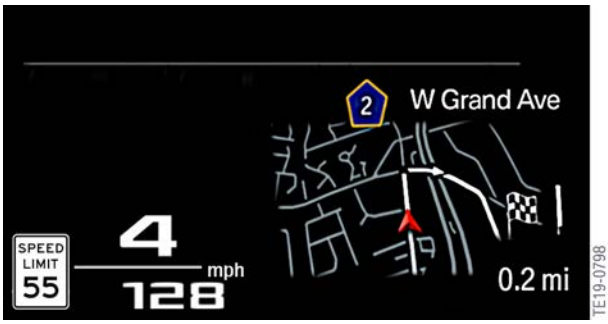
7.3.7. M Head-Up Display

The multi-color standard head-up display, which depends on the national-market version, can switch to the M-specific display.

The following information/parameters can be shown:

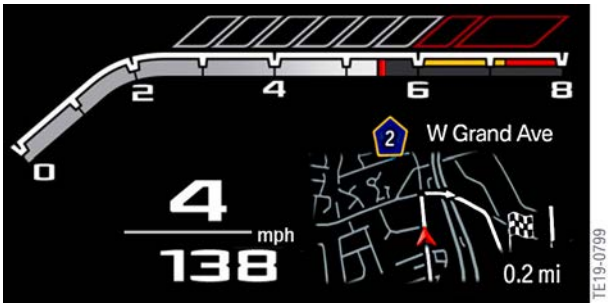
- Shift point indicator by Shiftlight function
- Engine speed via speed bar and temperature-dependent engine-revolutions advance-warning field
- M font
- Gear indicator
- Vehicle speed
- Road sign recognition
- No-overtaking display
- Navigation displays

View ROAD



G80/G82, head-up display with navigation system

SPORT/TRACK* view



G80/G82, head-up display with Shiftlight function

The Shiftlight function in the M Head-Up Display M HUD is only activated if "SPORT" or "TRACK*" is activated in the M MODE.

The M-specific display is activated via the M MODE button (SPORT or TRACK*).

*Only in conjunction with the optional equipment M Drive Professional.

7.3.8. Active Sound Design

Active Sound Design (ASD) is a subfunction of the Receiver Audio Module (RAM) and is described in the separate reference manual "ST1857 Infotainment 2018".

The ASD characteristic and status are coupled to the engine dynamics control/Sound Control settings:

- Sound Control **COMFORT** = ASD deactivated
- Sound Control **SPORT** = ASD activated

- Engine dynamics **Efficient** = ASD Comfort
- Engine dynamics **SPORT** = ASD Sport
- Engine dynamics **SPORT PLUS** = ASD Sport Plus

7.3.9. BMW M Laptimer App 4.0

This app is an add-on for ambitious driving on the race track and enables precise analysis of the personal driving style.

The smartphone with the installed BMW M Laptimer App 4.0 is connected to the vehicle via Bluetooth.

The following prerequisites for the BMW M Laptimer App 4.0 function must be fulfillled:

- Only BMW vehicle (no full support for PHEV/BEV vehicles).
- ConnectedDrive markets.
- BMW Operating System 5 and 6 via BMW Apps.
- BMW Operating System 7 via Online Apps operating system.
- Compatible with iPhone, iPad and iPod Touch.
- BMW M Laptimer App 4.0 is compatible with iOS 11.2 or later.
- Standard equipment Life Cockpit Professional SA 6U3 and Connected Package Pro SA 6C4.

The BMW M Laptimer App 4.0 continuously records the following data:

- Braking points via the brake pedal hall sensor status via M Dynamic Stability Control integrated (M DSCi).
- Driving speed via M Dynamic Stability Control integrated (M DSCi).
- Lateral acceleration and longitudinal acceleration via Crash Safety Module (ACSM).
- Steering angle via M Electronic Power Steering (M EPS).
- Fuel injection quantity via Digital Motor Electronics (DME).
- Engine speed via Digital Motor Electronics (DME).
- Gear position via the electronic transmission control (EGS) with automatic transmission.
- Vehicle position using GPS data via Head Unit High 3 (HU-H 3).

This data is prepared for the BMW M Laptimer App 4.0 in the form of graphics, the journey is played back with the real values as a virtual test drive.

The records of the BMW M Laptimer 4.0 can be processed accurately and the journeys of different drivers can also be analyzed, compared and shared via social media channels.

The vehicles are accepted by means of a synchronization via the BMW Connected Drive portal.

G80/G82, BMW M Laptimer App

The 4 main functions of the BMW M Laptimer App 4.0 are:

- Map view with detailed bird's-eye view.
- Table view for comparing the lap times.
- Measurement results of the vehicle sensors are shown in a graph.
- Lateral acceleration and longitudinal acceleration in the G-meter.

The following content can be displayed in the vehicle:

- Live display of route length and journey duration with route records.
- Live lap detection including lap time.
- Live lap time as display in the instrument cluster (KOMBI).
- Live lap time as pop-up (displayed for 7.5 sec) in the M Head-Up Display (M HUD) after start-finish line is passed.
- Lap time display in the instrument cluster and in the M Head-Up Display (M HUD) only for BMW M vehicles and with the optional equipment M Drive Professional.

For the display of the BMW M Laptimer App 4.0 values in the Head-Up Display HUD, under the display settings in the Head-Up Display menu in the central information display "Display entertainment lists in the Head-Up Display" must be activated.

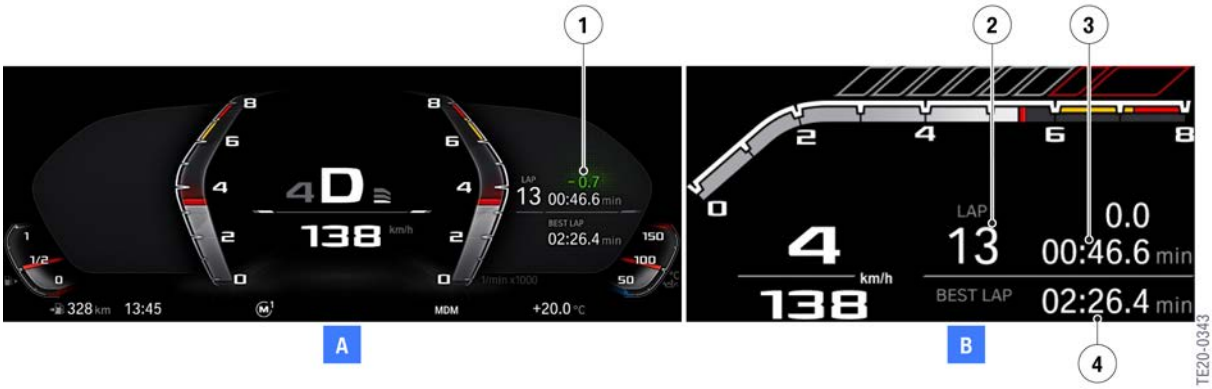
The following content can be displayed on the smartphone:

- Graphic journey analysis via the smartphone app.
- Apple iPhone video recording and playback.
- Comparison of laps & drivers.
- Share on social media channels.
- App design in the Next Generation style of BMW M.
- Evaluation of drift data only in conjunction with the optional equipment M Drive Professional.

M Drive Professional (SA 1MB)

In conjunction with the optional equipment M Drive Professional, the following add-ons are used for the customer in the G80/G82 with the BMW M Laptimer App 4.0:

- Evaluation of the drift data from the M Drift Analyzer.
- Display of the lap times via an additional display (widget) in the instrument cluster.
- Best lap time as pop-up in the Head-Up Display after start-finish line is passed.
- Lap time difference to the best lap via an additional display (widget) in the instrument cluster.



G80/G82, BMW M Laptimer App with SA 1MB

Index	Explanation
A	Display of lap times in the instrument cluster
B	Display of lap times in the HUD
1	Time difference to the best lap
2	Current lap
3	"Last lap" time
4	"Best lap" time

7.3.10. M Drift Analyzer

In conjunction with the optional equipment M Drive Professional, the M Drift Analyzer is used in the G80/G82.

The function serves for the evaluation and analysis of single drifts and the recording and assessment of any track layouts with drifts.

The M Drift Analyzer can be reached from the M menu and the DSC OFF display.

The M Drift Analyzer is not active as standard at the time of the vehicle starting.

If the M Drift Analyzer is called up from the M menu, the function is deactivated as standard, when it is called up using the DSC OFF display the relevant legal disclaimer must be confirmed immediately. Following the confirmation the M Drift Analyzer is opened in activated state. The single drift evaluation is always preselected upon opening of the M Drift Analyzer. Via the split screen display the customer has the option:

- To activate/deactivate the M Drift Analyzer
- To change the M traction control level
- To switch between the "Single drift" and "Drift session" displays.

To activate the function, a deactivated DSC and if necessary a M xDrive characteristic of 2WD are required. This condition is automatically met with activation of the M Drift Analyzer and the associated confirmation of the relevant legal disclaimer. As soon as the function is active, single drifts are detected and evaluated immediately and their analysis is displayed in the central information display (CID) or in the M instrument cluster (M KOMBI)/M Head-Up Display (HUD).

If the M Drift Analyzer is deactivated again, DSC ON and 4WD are automatically set. If a precondition is breached during an active M Drift Analyzer (e.g. changeover from DSC or M xDrive), then it is automatically deactivated.

If the customer reset the system or changed the M traction control level, then instead of "Last drift" "Next drift" the level is displayed as a function of the maximum number of attainable stars.

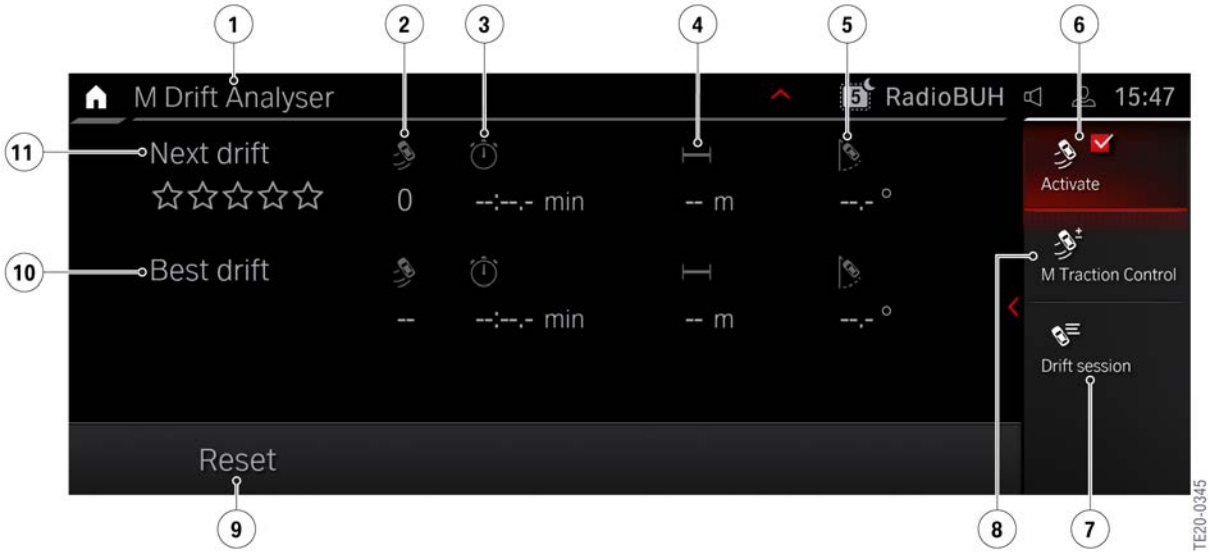
The following drift values are shown to the customer:

- Star rating of drift
- M traction level of drift
- Drift duration
- Drift distance
- Drift angles (average)

The customer can therefore always compare the last drift to his best drift.

G80/G82 Complete Vehicle.

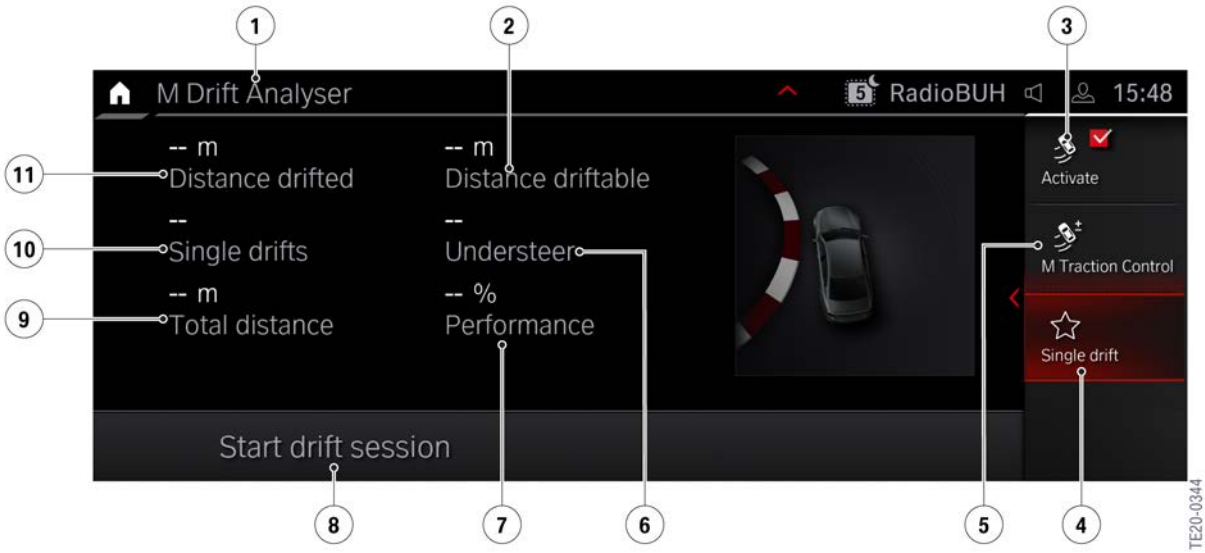
7. Electrical system/Electronics.



G80/G82, drift session

Index	Explanation
1	M Drift Analyzer
2	M traction control level with which next drift is driven/last drift was driven
3	Drift duration
4	Drift distance
5	Drift angles (average)
6	Activate M Drift Analyzer
7	Start drift session
8	Set M traction control level
9	Reset single drift data
10	Star rating "Best drift"
11	Star rating "Last drift" or "Next drift"

As described, it is possible to change to the drift session via the split screen display.



G80/G82, drift session

Index	Explanation
1	M Drift Analyzer
2	Distance that can be oversteered
3	Activate M Drift Analyzer
4	Evaluate single drift
5	M traction settings
6	Understeer
7	Performance
8	Start drift session
9	Total distance
10	Single drifts
11	Distance oversteered

The drift session serves for the display of the key data of a driven drift distance. The following values are recorded and evaluated for the customer as soon as he actively starts a session using the corresponding soft key. The session is divided into the following parameters:

- Detection of the distance that can be oversteered
- Detection of the distance actually oversteered
- Number of single drifts
- Detection of understeers
- Record of total distance
- Display of the personal drift performance during the drift session.

The drift performance is also displayed to the customer using a graphic. The vehicle which can be seen increases its drift angle depending on the output achieved.

7.4. Driver assistance systems

For the G80/G82 the scopes of driver assistance systems as for the G20/G22 are used.

The following minor changes arise for the G80/G82 in the area of the driver assistance systems:

- Active Cruise Control with Stop&Go function SA 5DF is not offered for the G80/G82.
- Parking Assistant Plus does not allow any automatic driving out of parking spaces for the G80/G82. Automatic parking is possible with the G80/G82. The reason for the no automatic driving out of parking spaces for the G80/G82 is that the parking space is generally left after a long stationary period of the vehicle.

7.5. Other

The following additional differences arise in the area of the electrical system/electronics in the G80/G82 compared to the G20/G22

- With Comfort Access SA 322 in conjunction with automatic tailgate operation SA 316, the "Contactless opening and closing of the tailgate" function is not available for the G80/G82 with the optional equipment SA 71C M Carbon exterior package (carbon diffuser).
- With the 2nd generation of Comfort Access SA 322, a third aerial is installed in the rear area in the G80/G82. This makes automatic locking and unlocking with Comfort Access 2.0 possible when approaching/walking away from the vehicle across the entire area of the vehicle.
- Auxiliary heating SA 536 is not used in the G80/G82 due to the lack of installation space; therefore, operation via BMW Operating System 7 or "BMW display key" or My BMW App is also not possible. The installation space used for the auxiliary heating is required for the G80/G82 in order to ensure the thermal robustness of the drive system and the brakes (cooling air supply).
- The LED fog lights are not used for the G80/G82. The installation space used for the LED fog lights is required for the G80/G82 in order to ensure the thermal robustness of the drive system and the brakes (necessary cooling air openings for the cooling air supply in the front bumper).

G80/G82 Complete Vehicle.
7. Electrical system/Electronics.

- The outside temperature sensor is located in the air curtain on the right in the G80/G82. The previous installation location for the outside temperature sensor in the air ducts for brake system cooling was not possible in the G80/G82 since the measured values were not plausible on account of the greater heat dissipated by the S58 engine and brake system while the vehicle is at a standstill.
- The electrical glass moonroof SA 403 is not offered for the G80/G82 with M Drivers Package 7ME. A pressure resistance of the glass moonroof cannot be guaranteed from 155 mph, therefore it is not used for the G80/G82 M Drivers Package 7ME.
- With the optional equipment "Ambient Lighting" SA 4UR, in the G80/G82 a staged light carpet by light projection is not used in the entry and exit area on the left and right. The required installation space for the light projectors is not available in the sill area due to the "skateboards" of the G80/G82.

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