

MODEL 164.1 with ENGINE 156, 272, 273, 629, 642 with TRANSMISSION 722.9

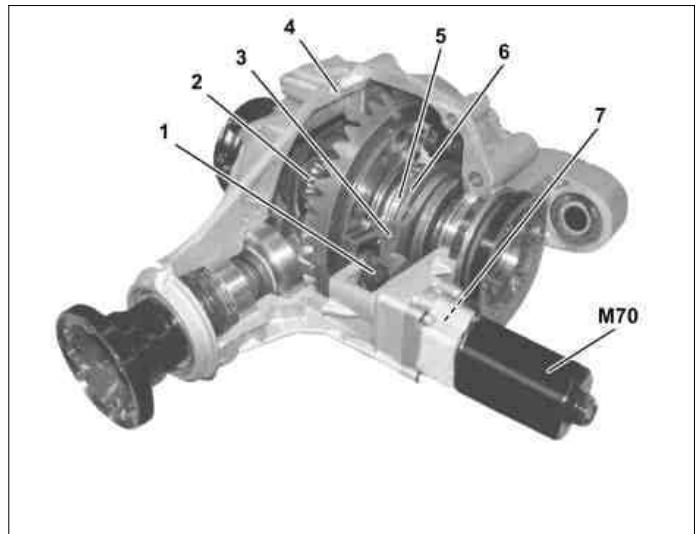
as of Model Year 09 /Modification Year 08 model refinement package
with CODE (430) Off-road package

MODEL 164.8 with ENGINE 273, 629, 642 with TRANSMISSION 722.9
as of Model Year 09 /Modification Year 08
with CODE (430) Off-road package

Sectional view of rear axle differential

- 1 Spur gear
- 2 Differential side gear
- 3 Cam with ball ramp mechanism
- 4 Differential housing
- 5 Interwheel differential lock disk pack
- 6 Thrust ring
- 7 Magnetic brake

M70 Rear axle differential actuator motor



P28.60-2079-11

Function requirements for interwheel differential lock, general

- Ignition ON
- Transmission in position "N"

Interwheel differential lock, general

The interwheel differential lock distributes the engine torque between the left and right rear wheel.

Interwheel differential lock, function sequence

The function sequence is subdivided into the following steps:

- Function sequence for differential stages
- Function sequence for specified locking power
- Function sequence for locking control
- Function sequence for safety concept
- Function sequence for locking actuation on antilock brake system (ABS)/Electronic Stability Program (ESP) control
- Function sequence for locking overload protection

The following differential stages are available in the "Low" off-road ratio:

- 1st stage: Transfer case differential (interaxle differential lock) is locked automatically
- 2nd stage: Transfer case differential (interaxle differential lock) is locked manually (100 %)
- 3rd stage: Transfer case differential (interaxle differential lock) and the rear axle differential (interwheel differential lock) are locked manually (100 %)

Each differential stage has a red LED to indicate the active state.

Function sequence for specified locking power

When the lock is actuated, the transfer case control unit (N15/7) calculates a specified locking torque according to the current operating state.

Function sequence for locking control

Function sequence for differential stages

The driver can use a differential lock selector wheel (N72s34) located in the lower control panel (N72) to select between three different differential stages. The following differential stages are available in the "High" on-road ratio:

- 1st stage: Transfer case differential (interaxle differential lock) is locked automatically
- 2nd stage: Transfer case differential (interaxle differential lock) is locked manually (100 %)
- 3rd stage: Transfer case differential (interaxle differential lock) and the rear axle differential (interwheel differential lock) are locked manually (100 %)

The information about the specified locking torque is sent by the transfer case control unit via the engine-compartment CAN (CAN C) to the rear axle differential lock control unit (N15/9). This pre-control of the locking torque has the following advantages:

- Ensure start-off traction
- Avoiding overbraking of the rear axle during manual downshifts
- Avoiding oversteer or understeer under load

To allow calculation of the specified locking torque, the transfer case control unit requires the following information:

- Cornering recognition
- Tire tolerances
- Wheel speeds
- Vehicle speed
- Engine torque
- Accelerator pedal position

Function sequence for safety concept

The rear axle differential lock control unit regulates the distribution of the engine torque between the left and right rear wheels. The multidisk clutch (interwheel differential lock) is actuated via the rear axle differential actuator motor.

When the rear axle differential actuator motor is actuated by the rear axle differential lock control unit, the rear axle differential actuator motor rotates the eccentric with ball ramp mechanism (3) via the spur gear (1). Due to the ball ramp mechanism installed on the eccentric (3), the balls run up their "ramps" when the eccentric (3) is rotated. This produces an axial movement of the eccentric (3). The eccentric (3) pushes the thrust ring (6) against the interwheel differential lock disk pack (5). This produces a defined friction torque in the disk pack (5). The differential housing (4) and the differential side gear (2) are mutually locked.

In order to optimize fuel consumption, the position of the spur gear is maintained by the magnetic brake (7) in the rear axle differential actuator motor if the differential is permanently locked.

Function sequence for locking overload protection

The aim of the lock overload protection is to protect the interwheel differential lock against damage and guarantee the maximum possible availability of the lock function.



After ignition "OFF/ON" for >10 s the 1st stage of the differential lock is automatically activated. The current differential stage selection remains active if the period is less than 10 s.

In the deenergized state (power failure) the interwheel differential lock is open.

Function sequence for locking actuation on antilock brake system (ABS)/Electronic Stability Program (ESP) control

The transfer case control unit must respond to the particular requirements of the ABS and ESP systems in order to avoid negative influences on directional stability and road adhesion. These requirements are made available to the rear axle differential lock control unit via the CAN data bus. For this purpose the transfer case control unit is capable of opening the interwheel differential lock. To guarantee this function, the following information is required:

- Deceleration at the rear axle
- Vehicle speed
- ABS request
- ESP requirement
- Stop light signal

	Component description of transfer case control unit	N15/7	GF28.19-P-3200VG
	Component description of rear axle differential lock control unit	N15/9	GF28.19-P-3500VG