

Steering complaints: Repair guide

Topic number	LI46.00-P-066886
Version	1
Function group	46.00 General
Date	08-10-2017
Validity	MODEL 463
Reason for change	Specified damage code list adjusted.
Reason for block	

Complaint:

With these comfort-related complaints, the vehicle remains fully steerable at all times.

a) "Vibrations":

Vibrations can (intermittently) be felt at the steering wheel.

b) "Noises":

Noises can (intermittently) be heard while steering.

c) "Play":

The steering exhibits slight play at small steering angles about the center position.

d) "Stiffness from full lock":

The steering force required to turn the steering wheel from full lock when parking or unparking is excessively high.

e) "Stiff":

The steering forces at the steering wheel are perceived to be excessively high across the entire steering range, although general steerability is not impaired.

f) "Not smooth":

The steering forces vary across the entire steering range; the necessary steering forces are different.

g) "Veering":

With the steering wheel in the straight-ahead position, the vehicle veers slightly to the left or right, or the steering wheel position for straight-ahead running differs slightly from the center position.

Cause:

There may be various possible causes depending on the complaint. The actual cause must be determined using the tests and measures described under "Remedy".

XENTRY TIPS

Attachments	
File	Description
Kraftmessung.jpg	Force measurement at pitman arm: Example for measuring equipment
Hydraulikoel.jpg	Wear debris in hydraulic fluid. Red: Shavings Green: Normal wear debris

Remedy:

Perform the tests and measures described for the complaint in question. Observe the sequence of the measures and perform each one only if the problem was not rectified by the preceding measure.

If none of the measures described for the complaint is effective, a PTSS case must be opened and sent to Market Support.

Re. a) "Vibrations"

Measure 1:

Only affects diesel vehicles – Check the VIN end number:

On diesel vehicles with VIN end number lower than 238 302, the larger power steering fluid reservoir A 000 460 28 83 must be installed, if this has not already been done.

Damage code 46521-36

Measure 2:

Only affects diesel vehicles – Check the cap of the power steering fluid reservoir for leaks:

If leaks are identified, the new cap A 001 466 27 05 must be installed.

Damage code 46522-04

Measure 3:

Use a magnet to check the hydraulic fluid in the expansion reservoir for metal shavings.

To do this, open the expansion reservoir of the power steering and hold a magnet in the hydraulic fluid for approx. 30 seconds with the engine running. If there are shavings in the hydraulic fluid, all oil-carrying components of the steering system must be replaced; flushing is not effective.

Note: Slight metallic wear debris/dust is normal and no grounds for complaint; parts should only be replaced if metal shavings are clearly identified (also see attachment).

Test method: Rub the wear debris between your fingers. If it feels like grains of sugar or salt, then it is metal shavings. If it feels like flour, then it is normal wear debris.

Damage code 46401-36

Measure 4:

XENTRY TIPS

This repair method may only be performed on steering gears manufactured by HEMA (see attachment "HEMA identification plate").

Install modified cap A 463 462 13 00 on control plunger of steering gear (see below: Repair instructions "Replace cap of control plunger").

Damage code 46429-07

Measure 5:

Replace steering gear (see below: Work instructions "Replace steering gear").

Damage code 46401-36

Re. b) "Noises"

Measure 1:

Only affects diesel vehicles – Check the VIN end number:

On diesel vehicles with VIN end number lower than 238 302, the larger power steering fluid reservoir A 000 460 28 83 must be installed, if this has not already been done.

Damage code 46521-36

Measure 2:

Only affects diesel vehicles – Check the cap of the power steering fluid reservoir for leaks:

If leaks are identified, the new cap A 001 466 27 05 must be installed.

Damage code 46522-04

Measure 3:

Use a magnet to check the hydraulic fluid in the expansion reservoir for metal shavings.

To do this, open the expansion reservoir of the power steering and hold a magnet in the hydraulic fluid for approx. 30 seconds with the engine running. If there are shavings in the hydraulic fluid, all oil-carrying components of the steering system must be replaced; flushing is not effective.

Note: Slight metallic wear debris/dust is normal and no grounds for complaint; parts should only be replaced if metal shavings are clearly identified (also see attachment).

Test method: Rub the wear debris between your fingers. If it feels like grains of sugar or salt, then it is metal shavings. If it feels like flour, then it is normal wear debris.

Damage code 46401-36

Measure 4:

With the vehicle raised, check all mechanical parts of the steering system, such as the drag link, corrugated tube, tie rod joints and universal joint etc., for ease of movement, unrestricted travel, concentricity, proper fastening etc., and repair any defects.

Measure 5:

XENTRY TIPS

This repair method may only be performed on steering gears manufactured by HEMA (see attachment "HEMA identification plate").

Install modified cap A 463 462 13 00 on control plunger of steering gear (see below: Repair instructions "Replace cap of control plunger").

Damage code 46429-07

Measure 6:

Replace steering gear (see below: Work instructions "Replace steering gear").

Damage code 46401-36

Re. c) "Play"

Measure 1:

With the vehicle raised, check all mechanical parts of the steering system, such as the drag link, corrugated tube, tie rod joints and universal joint etc., for ease of movement, unrestricted travel, concentricity, proper fastening etc., and repair any defects.

Measure 2:

Check the steering play and adjust if necessary.

Important: The maximum steering torque permitted by Mercedes-Benz is 6.0 Nm (600 Ncm)!

Damage code 46401-17

Measure 3:

This repair method may only be performed on steering gears manufactured by HEMA (see attachment "HEMA identification plate").

Install modified cap A 463 462 13 00 on control plunger of steering gear (see below: Repair instructions "Replace cap of control plunger").

Damage code 46429-07

Measure 4:

Replace steering gear (see below: Work instructions "Replace steering gear").

Damage code 46401-17

Re. d) "Stiffness from full lock"

Measure 1:

Only affects diesel vehicles – Check the VIN end number:

On diesel vehicles with VIN end number lower than 238 302, the larger power steering fluid reservoir A 000 460 28 83 must be installed, if this has not already been done.

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Damage code 46521-36

Measure 2:

Only affects diesel vehicles – Check the cap of the power steering fluid reservoir for leaks.

If leaks are identified, the new cap A 001 466 27 05 must be installed.

Damage code 46522-04

Measure 3:

Adjust the steering stops so that the hydraulic steering stop starts to act immediately before the mechanical end stop.

Then check the servo assistance:

- With the engine running, turn the steering wheel to full left lock and reverse the vehicle a short distance (sometimes the steering wheel can then be turned slightly more).
- Stop the vehicle and engage the forward gear, keeping the steering wheel at full lock.
- Drive off and steer in the opposite direction. - If the servo assistance starts too late, the steering stops must be adjusted again.
- Perform the same procedure with the steering wheel turned to the right.

Damage code 46407-51

Re. e) "Stiff"

Measure 1:

Only affects diesel vehicles – Check the VIN end number:

On diesel vehicles with VIN end number lower than 238 302, the larger power steering fluid reservoir A 000 460 28 83 must be installed, if this has not already been done.

Damage code 46521-36

Measure 2:

Only affects diesel vehicles – Check the cap of the power steering fluid reservoir for leaks:

If leaks are identified, the new cap A 001 466 27 05 must be installed.

Damage code 46522-04

Measure 3:

Measure the steering torque at the steering wheel with the engine running.

The maximum steering torque permitted by Mercedes-Benz is 6.0 Nm (600 Ncm). A justifiable complaint exists only when the measured steering torque is over 6.0 Nm (600 Ncm).

Measure 4:

Check the suspension for modifications that are not approved by Mercedes-Benz:

XENTRY TIPS

If the suspension has been modified (larger wheels, wide base tires, wheel spacers, lowered suspension etc.), the suspension must be restored to the series production configuration and the complaint reassessed before any further measures are performed.

Note: Modifications to the suspension can have negative effects on the steering torque and the handling characteristics. Larger/wider wheels and/or wheel spacers in particular are very frequently the cause; repair work on the steering system is not practical in these cases.

Measure 5:

With the vehicle raised, check all mechanical parts of the steering system, such as the drag link, corrugated tube, tie rod joints and universal joint etc., for ease of movement, unrestricted travel, concentricity, proper fastening etc., and repair any defects.

Measure 6:

Check the hydraulic pressure in the steering system. If the hydraulic pressure is too low, the power steering pump must be replaced.

Damage code 46501-53

Measure 7:

Replace steering gear (see below: Work instructions "Replace steering gear").

Damage code 46401-17

Re. f) "Not smooth"

Measure 1:

Only affects diesel vehicles – Check the VIN end number:

On diesel vehicles with VIN end number lower than 238 302, the larger power steering fluid reservoir A 000 460 28 83 must be installed, if this has not already been done.

Damage code 46521-36

Measure 2:

Only affects diesel vehicles – Check the cap of the power steering fluid reservoir for leaks.

If leaks are identified, the new cap A 001 466 27 05 must be installed.

Damage code 46522-04

Measure 3:

With the vehicle raised, check all mechanical parts of the steering system, such as the drag link, corrugated tube, tie rod joints and universal joint etc., for ease of movement, unrestricted travel, concentricity, proper fastening etc., and repair any defects.

Measure 4:

Use a magnet to check the hydraulic fluid in the expansion reservoir for metal shavings.

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To do this, open the expansion reservoir of the power steering and hold a magnet in the hydraulic fluid for approx. 30 seconds with the engine running. If there are shavings in the hydraulic fluid, all oil-carrying components of the steering system must be replaced; flushing is not effective.

Note: Slight metallic wear debris/dust is normal and no grounds for complaint; parts should only be replaced if metal shavings are clearly identified (also see attachment).

Test method: Rub the wear debris between your fingers. If it feels like grains of sugar or salt, then it is metal shavings. If it feels like flour, then it is normal wear debris.

Damage code 46401-36

Measure 5:

This repair method may only be performed on steering gears manufactured by HEMA (see attachment "HEMA identification plate").

Install modified cap A 463 462 13 00 on control plunger of steering gear (see below: Repair instructions "Replace cap of control plunger").

Damage code 46429-07

Measure 6:

Replace steering gear (see below: Work instructions "Replace steering gear").

Damage code 46401-D6

Re. g) "Veering"

Measure 1:

Check the suspension for modifications that are not approved by Mercedes-Benz: If the suspension has been modified (larger wheels, wide base tires, wheel spacers, lowered suspension etc.), the suspension must be restored to the series production configuration and the complaint reassessed before any further measures are performed.

Note: Modifications to the suspension can have negative effects on the steering torque and the handling characteristics. Larger/wider wheels and/or wheel spacers in particular are very frequently the cause; repair work on the steering system is not practical in these cases.

Measure 2:

Perform a wheel alignment check and, if necessary, readjust the steering wheel position for straight-ahead running and the track.

Note: The wheel alignment check must be performed with universal adapters; using the Mercedes-Benz rapid clamping system is not permissible (also refer to the relevant TIPS document in Group 40.20).

Apart from the track at the front axle, other values can be adjusted. The measurements of camber, caster, wheel offset etc. can be ignored if they are slightly outside the tolerance and there is no identifiable damage to the suspension.

Damage code 40214-B3 (veers left) or 40214-B5 (veers right)

Measure 3:

This test/measure may only be performed on steering gears manufactured by HEMA (see attachment "HEMA identification plate"):

XENTRY TIPS

Measure the steering forces at the pitman arm. If the forces to the left and to the right differ by more than 50%, the steering gear must be replaced (see below: Work instructions "Replace steering gear").

Damage code 46401-D6.

1. Detach the drag link from the pitman arm at one end.
2. Then measure the force required to move the pitman arm to the left and right (with the engine running!). A commercially available spring balance, spring force meter, luggage scale or similar must be used for this; the scale should extend from 0 to 400 N (0 to 40 kg). The force measurement must be performed at a right angle to the pitman arm, uniformly and at the same height and also performed at the same speed to the left and right.
3. Difference between left and right: The greater force must be no more than 50% higher than the lower force. To work out the difference, multiply the lower force by the factor 1.5 and compare the result with the higher force.

Examples:

- Force for moving the pitman arm to the left: 300 N (30 kg)
- Force for moving the pitman arm to the right: 200 N (20 kg)
- Calculation: $200 \text{ N (20 kg)} \times 1.5 = 300 \text{ N (30 kg)}$
- Result: Replace steering gear (see below: Work instructions "Replace steering gear"). Damage code 46401-D6.

- Force for moving the pitman arm to the left: 240 N (24 kg)
- Force for moving the pitman arm to the right: 150 N (15 kg)
- Calculation: $150 \text{ N (15 kg)} \times 1.5 = 225 \text{ N (22.5 kg)} < 240 \text{ N (24 kg)}$
- Result: Replace steering gear (see below: Work instructions "Replace steering gear"). Damage code 46401-D6.

- Force for moving the pitman arm to the left: 250 N (25 kg)
- Force for moving the pitman arm to the right: 170 N (17 kg)
- Calculation: $170 \text{ N (17 kg)} \times 1.5 = 255 \text{ N (25.5 kg)} > 250 \text{ N (25 kg)}$
- Result: Do not replace steering gear.

Repair instructions "Replace cap of control plunger"

Install the modified cap A 463 462 13 00 for the control plunger with reduced diameter of oil hole.

Important: This repair method may only be performed on steering gears manufactured by HEMA (see attachment "HEMA identification plate"). Before the repair, the steering system must be checked for shavings in the oil. The repair method below is only to be performed on steering systems which have no shavings in the oil (cf. 1. "Vibrations", Measure 3).

The repair and the subsequent test must always be performed with the engine cold.

1. Remove underride guard (4 bolts, see attachment, item 1).
2. Remove mounting bolt of electric fan on underside of cooler (item 2 and item 3).
3. Remove engine cover and mounting clips of coolant hose from cooler to expansion reservoir. Fasten coolant hose to engine (3 clips, item 4 and item 5).

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4. Remove the two retaining clips of fan housing (item 6 and item 7).
5. Separate electrical power supply connection of fan (item 8).
6. Remove electric fan (item 9).
7. Remove retaining ring of cap on steering gear (item 10). On vehicles with engine 642 and retrofitted oil cooler, the cap is located behind an oil line, but is still accessible (item 10a)
8. Carefully remove the cap of the control plunger using pliers (item 11). Collect escaping power steering fluid and do not reuse it.
9. Insert new cap A 463 462 13 00 with new seal A 009 997 44 45 (item 12), tapping it gently if necessary (with a hammer and suitable bit) to bring it into its final position. The position of the oil hole is irrelevant.
10. Attach the new retaining ring A 001 994 84 41; the retaining ring bulges outwards one side. The retaining ring must be installed with the bulged side facing towards the steering gear (item 12a). If necessary, tap the retaining ring gently (with a hammer and suitable bit) to bring it into its final position. Important: Make absolutely sure that the retaining ring is securely seated!
11. Install electric fan and underride guard.
12. Correct oil level of power steering.
13. Bleed steering gear:
 - Start engine and switch off again
 - Raise vehicle at the front (load off front wheels) and turn steering wheel to left and right lock at least 5 times with engine off
 - Check oil level and correct if necessary
 - Lower vehicle at the front (load on front wheels) and turn steering wheel to left and right lock at least 10 times with engine running
 - Check oil level and correct if necessary
 - Check cap for leaks
14. Perform final test.

Important: The test may only be performed on dry asphalt, and the engine and the steering system must be cold (temperature display in instrument cluster below 40°C).

During the test, check whether the complaint still exists and whether other noticeable problems occur.

Note: After the cap has been replaced, the steering will be slightly stiffer across the entire steering angle! Before starting the test, it is essential to check the tire inflation pressure and correct it if necessary.

- With the vehicle stationary and the engine running, turn the steering to the left and right 10 times at a constant steering rate. (Steering rate: approx. 2 seconds from center position to steering stop).
- Perform the same test with the engine warm (approx. 50°C).
- Perform the same test with the engine hot (over 90°C).
- Perform a test drive: Pay particular attention to the steering behavior about the center position and the straight-ahead running behavior.

If all the tests have been performed without any problems, the repair has been completed successfully. If any noticeable problems occur with the steering behavior (stiffness at certain points, noises, vibrations), the power steering must be replaced (see below: Work instructions "Replace steering gear").

[Work instructions "Replace steering gear"](#)

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Note: The work instructions described in WIS differ from those described below and will be updated.

1. Remove steering gear including pitman arm (included in package).

Note: The marking on the steering shaft of the new steering gear is not valid. The new steering gear and the steering wheel must be in the straight-ahead position when installing.

2. Install new steering gear (including pitman arm) on frame and connect hydraulic connections
3. Attach drag link to pitman arm
4. Set the front wheels straight (same track on left and right)
5. Straighten steering wheel
6. Connect steering shaft to steering gear (the steering wheel and front wheels must be straight!)
7. Bleed steering gear (after filling with power steering fluid):

- Start engine and switch off again.

- Raise vehicle at the front (load off front wheels) and turn steering wheel to full left and right lock at least 5 times with engine off.

- Then lower vehicle (load on front wheels) and turn steering wheel to full left and right lock at least 10 times with engine running until the system is free of air.

- Check oil level and correct if necessary.

8. Adjust hydraulic steering limiter.

Adjust the hydraulic steering stops such that they take effect immediately before the mechanical end stops.

9. Testing the power steering:

- With the engine running, turn the steering wheel to full left lock and reverse the vehicle a short distance (sometimes the steering wheel can then be turned slightly more).

- Stop the vehicle and engage the forward gear, keeping the steering wheel at full lock.

- Drive off and steer in the opposite direction.

- If the servo assistance starts too late, the steering stops must be adjusted again.

- Perform the same procedure with the steering wheel turned to the right.

Attachments	
File	Description
Typschild.JPG	HEMA identification plate
Kappe Lenkung.pdf	Repair instructions "Replace cap of control plunger"

Symptoms
Chassis/suspension / Steering system / Noises / Dragging/squealing
Chassis/suspension / Steering system / Noises / Chattering/knocking
Chassis/suspension / Steering system / Noises / Humming/vibrations
Chassis/suspension / Steering system / Function / Support
Chassis/suspension / Steering system / Steering wheel / Lopsided/crooked
Chassis/suspension / Steering system / Function / Stiff/sluggish
Chassis/suspension / Steering system / Steering wheel / Vibrates
Chassis/suspension / Steering system / Function / Too much play/clearance
Chassis/suspension / Steering system / Steering wheel / Pulses

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Chassis/suspension / Steering system / Steering wheel / Torsional vibrations at steering wheel
Chassis/suspension / Steering system / Function / Support starts too late
Chassis/suspension / Steering system / Leakage / Oil reservoir leaks
Chassis/suspension / Steering system / Leakage / Pump leaks

Parts						
Part number	ES1	ES2	Designation	Quantity	Note	EPC
A 000 460 28 83			Expansion reservoir	1	Only for diesel vehicles: Install new, larger power steering fluid reservoir.	X
A 001 466 27 05			Expansion reservoir cap	1	Only for diesel vehicles: New cap for power steering expansion reservoir	X
A 463 462 13 00			Cap	1	New repair method: Replace cap of control plunger	X
A 009 997 44 45			O-ring	1	New repair method: Replace cap of control plunger	X
A 001 994 84 41			Retaining ring	1	New repair method: Replace cap of control plunger	X

Operation numbers/damage codes				
Op. no.	Operation text	Time	Damage code	Note
46-5400	REMOVE/INSTALL OIL RESERVOIR OF POWER STEERING, REPLACE IF NECESSARY			Only for diesel vehicles: Install new, larger power steering fluid reservoir.
02-9536	REPLACE CAP ON STEERING GEAR CONTROL PLUNGER			New repair method: Replace cap of control plunger
46-3400	REMOVE/INSTALL POWER STEERING RING			Observe work instructions "Replace steering gear" at the end of the TIPS document.
46-3230	ADJUST STEERING SHAFT OF POWER STEERING			Adjustment of steering play
46-3070	CHECK OIL PRESSURE OF PUMP FOR POWER STEERING			
40-6505	PERFORM VEHICLE ALIGNMENT CHECK (OPTICAL/ WITHOUT ADJUSTMENT OPERATIONS)			Only use universal sensor holders; the MB rapid clamping system is not permissible.

WIS-References			
Document number	Title	Note	Allocation
AP46.00-P-4650-01G	Check steering play		Remedy
AR46.20-P-0810F	Adjust steering shaft		Remedy
SM46.00-P-0002A	Check steering torque	Procedure is also valid for MODEL 461/463.	Remedy

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		Maximum steering torque for MODEL 461/463: 6.0 Nm or 600 Ncm	
AR46.30-P-0100GW	Check oil pressure of power steering pump	M157	Cause
AR46.30-P-0100GL	Check oil pressure of power steering pump	M112, M113, M273	Cause
AR46.30-P-0100GM	Check oil pressure of power steering pump	OM642, OM612	Cause
AR40.20-P-0200AC	Perform wheel alignment check	Only use universal sensor holders; the MB rapid clamping system is not permissible.	Cause

Attachments

Typschild.JPG:



XENTRY TIPS

Kraftmessung.jpg:



XENTRY TIPS

Hydraulikoel.jpg:

